Energy Statistics Yearbook 2017

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LATIN AMERICAN ENERGY ORGANIZATION

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Energy Information System of Latin America and the Caribbean

IDB

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Original title in Spanish:
Anuario de Estadísticas Energéticas 2017

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Design and Layout
Círculo Publicitario - (593 9) 995260754
Quito, Ecuador

With the financial support of the Inter-American Development Bank - IDB, within the framework of the Regional Non-reimbursable Technical Cooperation ATN/OC-15923-RG "Programme for Strengthening the Management and Dissemination of Energy Information for Sustainable Development in Latin America and the Caribbean." The Inter-American Development Bank - IDB has no responsibility for the content of the document.

ISBN: 978-9978-70-128-7
First edition March 2018

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The availability of accurate, transparent, reliable and up-to-date information, in a modern interface, is a fundamental element that underpins planning processes, enables informed decision-making, signals transparency and consolidates trust in institutions. This is even more relevant in the energy sector. The information allows to enlighten the decision-makers' path at the political level, supports the decisions of companies to make them more efficient and competitive, and constitutes the key tool to optimize the important investments required by the sector. Likewise, quality information supports and defines the research lines of technical staff in the private, public and academic fields, providing the necessary basis to catalyze innovation. At the same time, the information provided in detail is the basis for defining the access and financing conditions of the public sector and of the private stakeholders interested in favoring the sector.

For all of the above, it is relevant to bear in mind that information is not simply about the statistics available in a table to complete a historical series that is included in the annually published book. When we have valid and recognized information, we are faced with a virtuous path, because on the basis of quality information the expectations that condition our future are built. It is the expectations that gradually articulate the future scenario at the level of the investments made; these expectations are giving the signals to the market for the formation of prices; and it is the same expectations that identify and generate accessions at a political and institutional level that allow the structural changes that are now called to be made viable.

Quality information gives a greater level of certainty to the decisions made by market agents, it reduces the perceived risks and contributes with elements for the analysis and the deeper understanding of the processes involved in the formation of the observed trends. On the other hand, consistency and transparency in the reporting of relevant information builds trust in a particular country, government or regional administration. For this reason, the existence or lack of quality and reliable information is definitely a sign that reflects the strength or weakness of our institutions.

Considering the relevance of statistical information for Latin America and the Caribbean (LAC), the improvement and strengthening of the information systems constitute a fundamental element of my administration at OLADE, where the information systems, have been acknowledged as the heart of the technical contribution of OLADE to our region.

In order to highlight this new path in the field of information systems, we are working deeply and intensively on the improvement and modernization of energy information in LAC. Starting this year, the Energy Statistics Report of OLADE's member countries will be called the Yearbook of Energy Statistics.

Starting this year, the databases that make up the Energy Information System of Latin America and the Caribbean (sieLAC) are dynamic and completely use and access free. Just log on to http://sielac.olade.org and register to have full information on energy balances, emissions, economic and energy indicators of all types, at no cost. That is why we do not see it beneficial to present mere tables with raw data for reading, printed on paper. It is precisely for this reason that we have structured the Energy Statistics Yearbook, which is aimed at presenting the reader, graphically and simply processed information that can facilitate knowledge about the evolution of the different subsectors and the main indicators, in order to create a detailed profile of the recent energy performance of the member countries of our Organization. On the other hand, we have decided to present separately, the information of each country for detailed analysis, wrapping up with a general summary of the whole region, in order to facilitate a self-contained and consistent reading. We have also decided to dispense with comments on the trends or displayed graphs, as it results in generally redundant information and is part of the individual interpretation work to be performed by the reader - an informed analysis - of this document

I am convinced that this new communication model aimed to inform about our information systems will be a much more powerful and useful tool for policymakers, researchers, evaluators, project developers and professionals in general in the sector. I hope that the important effort made by our team of technicians and specialists dedicated to achieving this valuable regional product, contributes positively to the development of our nations.

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This year's 2017 Energy Statistics Yearbook presents about 1,000 graphs containing detailed information about the recent evolution of the energy matrixes of the 27 Member Countries of the Latin American Energy Organization (OLADE). Likewise, it presents a set of graphs showing the trends of the regional aggregates that the organization usually considers, namely Central America, Brazil, the Caribbean, the Southern Cone, Mexico and the Andean Region, as well as Latin America and the Caribbean, in its entirety. In the case of hydrocarbons, regional and global trends are compared between the regions of Africa, Latin America and the Caribbean, Asia and Australasia, Europe, the Commonwealth of Independent States (i.e. some countries of the former Soviet republics), Middle East and North America. The information presented comes from the Latin American and Caribbean Energy Information System (sieLAC) managed by the OLADE's information team.

The main objective of making available this extensive amount of graphs is to provide the Latin American and Caribbean community with the possibility of having a source of knowledge about the energy profiles of the countries of the region on a common basis, trying to provide as much detailed information as possible in a systematized, intelligible and concise way.

The first page of each country presents the values of the main energy indicators to the year 2016 or the last year available according to each case, together with a summarized version of the Sankey diagram of each one. The graphs presented contain information on reserves and production of various sources, energy supply and flows, primary and final energy consumption, considering also their values at the sector level. An extensive set of indicators is also presented, including energy intensities of various kinds, renewability indices, energy autarky, avoided demands, indicators per capita and per unit of value-added, the evolution of the relative shares of different energy sources, etc. Some indicators that analyze the registered trends of CO_2 are also presented. Finally, a summary graph that shows the recent and comparative evolution of several energy and economic indicators is introduced.

Those indicators that do not appear to be in common use are defined and described in the respective chapter of this Yearbook. To facilitate and make the visualization of indicators much more user-friendly, it was decided to present the trend information in the form of smoothed curves. As it can be seen, in some cases, in addition to presenting the respective variables, there were also included the cumulative rates of variation for the years 2000-2004 / 2005 - 2009/2010 - 2014 and the annual rates for the years 2015 and 2016.

We hope that the Yearbook will become a tool of regular use and consultation that will account for the evolution of the tendencies of the region in the field of energy. Given that, the Latin American and Caribbean Energy Information System, sieLAC, is freely accessible as of this year 2017. You only need to log-in in order to access to the entire database. We recommend and invite those who are interested in furthering the analysis and work with the available information, to do so by visiting our web page:

sieLAC
Energy Information System of Latin America and the Caribbean

http://sielac.olade.org.

Relevant Events

The following are the main relevant events that took place in Latin America and the Caribbean in the energy field during 2016 and which, due to their importance, could have an impact on the evolution of the performance of the energy matrix of each country under consideration, both in terms of the volume of flows and their structural composition.

Hydrocarbons

Oil and derivatives

Barbados announced the drilling of five new wells on land in 2016. The Government continues to focus on fulfilling its commitments to the exploration of offshore potential. The implemented actions concluded with the award of the Black Belly offshore block to Repsol.

Brazil, for the first time in history, closed a year with a surplus in the oil account, with a positive result of US$410 million in 2016. In order to encourage investments in the hydrocarbon sector, guidelines were approved for the 14th round of bids for blocks for oil and natural gas exploitation, for the second round of pre-salt block auctions and the fourth round of bids for marginal fields.

In **Chile**, after a rigorous geological analysis of the Glauconitic Zone (ZG) of the Magallanes Basin, the United States Geological Survey (USGS) confirmed the existence of significant unconventional gas potential in the region. The study estimated an average of 8.3 TCF of technically recoverable tight gas resources. This figure represents double the gas production accumulated in the basin for 70 years, which reaches 4.2 TCF. These data confirm the immense unconventional gas potential in Magallanes.

In **Ecuador**, the construction of the Pascuales Cuenca Poliducto of 215 km, was completed, which includes the Pascuales - La Troncal stretch of 102 km, pipe of 10 "and capacity of 46,500 bbl/day and the La Troncal - Cuenca section of 113 km, the pipeline of 8" and capacity of 30,800 bbl/day. This work guarantees the supply of LPG, diesel, and gasoline to 2,600,000 inhabitants in seven provinces in the south of the country. Likewise, it will facilitate the stabilization of pumping, storage, reception and dispatch of fuels, which will avoid transportation using self-tanks, reducing road wear, risks, and CO_2 emissions. The new Liquefied Petroleum Gas (LPG) packaging system was also inaugurated in Esmeraldas. With the implementation of the new carousel system, the plant's bottling process doubles from 280 to 560 cylinders per hour and improves the supply of fuel for citizens. Unlike the previous manual control LPG filling system, it has automatic weight and leakage control, which optimizes the process time and improves the working conditions of the operators. Petroamazonas EP's oil production in April 2016 reached a new historical average daily production record of 366,754 barrels per day, a figure that exceeds the average of more than 800 bbl/day for the same period in 2014 when it registered 365,942 bbl/day. This result, which has been certified by the Secretariat of Hydrocarbons (SH), is part of an optimization plan for the company that works under the guidelines of responsible production increases carried out by the National Government.

In **Mexico**, the timetable for flexibilization of gasoline and diesel markets was approved, which considers five stages of regional opening aimed at allowing the free fluctuation of prices all over the country throughout 2017, during which period, the gasoline and diesel markets will be in transition from a single supplier model to an open and competitive scheme, in which various players will carry fuels. The new scheme allows different brands to compete for the preference of consumers based on the price, service, and quality of the product. The process will begin in the border states of the north of the country, as it is the area with the greatest connectivity to various sources of gasoline and diesel supplies. With market flexibility, the price of gasoline and diesel will be determined by the price of oil; the costs of refining, transport, and storage; the commercial margin of sale; taxes and the current exchange rate. With this measure, Mexico joins the group of countries that have flexible and unmanaged prices. Likewise, the Ethylene XXI Petrochemical Complex was inaugurated in Veracruz, which will contribute to the modernization of the petrochemical industry at a national level and will allow the increase in more than one million tons per year of the national production of polyethylene, representing a value of 2 billion dollars per year.

The project consists of three plants for the production of polyethylene, which will complement the ethane value chain and replace imported products to generate them in the national territory. PEMEX will supply 66 kbbl/day of ethane for the next 20 years, which will be the raw material and production base of this petrochemical complex.

At its 171 Ministerial Conference the Organization of the Petroleum Exporting Countries **(OPEC)**, Mexico agrees to cut by 1.2 Mbbl the production of oil with effect from January 1, 2017, to contribute to the stabilization of oil prices.

Panama started the operations of the Fuel Free Zone of the company Payardi Terminal Company, S. de RL (formerly Refinería Panamá, S. de RL), located in Las Minas Bay, province of Colón. The terminal has a total storage capacity of 3,351,984 barrels of fuel to supply the country with diesel, gasoline, bunker C, jet fuel, liquefied petroleum gas, among others. This work has a great impact on the marine fuel market.

Paraguay executed the redefinition of prices and quality of common diesel, as an implementation mechanism of Decree No. 4.562/2015 that establishes new technical specifications of petroleum-derived fuels for importation and commercialization in the country. With these new specifications, the quality of diesel marketed in the country rises, a fuel that represents 63% of the total oil derivatives consumed nationwide. On the other hand, it was announced the discovery of traces of hydrocarbons in geological witnesses (rocks) of the Jaguareté I Well (San Pedro), samples were taken from a depth of 2600 meters. Government authorities suggest that with these new signs of hydrocarbons it can be deduced that there is a generating basin, which will give a closer approximation to perhaps the commercial discovery in the future. With this evidence, it will be possible to determine the height of the hydrocarbon generation, so that the following drilling can be carried out in different places, but with greater certainty of how the subsoil behaves.

Six zones with hydrocarbon potential were identified in the **Dominican Republic.** The areas with the greatest potential belong to the basins of Enriquillo, Azua, San Juan, Ocoa, San Pedro and Cibao Oriental, where there are faults and structures that could function as traps to retain hydrocarbons, but that still require further studies to reach definitive conclusions. With such a background, the Caribbean nation was accepted at London's Chatham House, a group that brings together new oil producers and countries like this one, who are taking their first steps to lay the technical and legal foundations for establishing themselves in the hydrocarbon industry. This group contributes to the creation of capacities in the hydrocarbon producing countries with free training sessions offered by experts. On the other hand, the first National Hydrocarbon Database (NHD) was presented, it was a high-value digitized information package that includes 20,000 kilometers of seismic lines. To date, there is information on the drilling of 80 oil wells in the country - structures at sea or on land that allow us to confirm whether or not there are hydrocarbon deposits in the subsoil and extract them. In the database available to all public, there are 180 documents and 150 records of the aforementioned wells.

Staatsolie, the state oil company of **Suriname**, completed an expansion of the Tout Lui Faut refining complex. The process began more than 10 years ago when the expansion of the refinery was designed and conceptualized for the first time. The project analyzed the increase in crude oil production capacity and the expansion of the quantity of refined products. The expansion doubled the crude refining capacity from 7,000 bbl/day to 15,000 barrels/day. The facility now also produces premium diesel and premium gasoline. The daily production of gasoline in the Staatsolie facility before the expansion covered approximately 30% of local demand: 1,300 barrels of gasoline. For 2017, gasoline production will be up to 2,000 bbl/day and will cover approximately 50% of local demand. The refinery reduced the import of foreign fuels by around 100 million dollars per year.

In **Uruguay** the agreement was signed, from which, with the consent of Ancap, the BG Company made a partial transfer of its rights (50%) in block 13 offshore, in favor of Total, Exxon and Statoil. In this way, the hydrocarbon exploration continues in block 13, with BG as operator and the other three companies as non-operators. Government authorities define this act as "another step in the path of offshore exploration" In addition, a contract was signed whereby Total ExxonMobil, operator of block 14 of hydrocarbon exploration in the Uruguayan maritime platform, cedes to the Norwegian company Statoil 15% of the contract it has with the Uruguayan State.

Venezuela, in order to contribute to the balance of the world oil industry, announced the implementation of a 95 kbbl/day cut, without diminishing its international contractual commitments. These actions are part of the agreement to reduce production reached between member and non-members nations of the Organization of Petroleum Exporting Countries (OPEC), at a meeting No. 171 held on November 30, 2016 in Vienna, Austria, in which it was decided to adjust the production to 32.5 Mbbl / day, from January 1, 2017. Crude oil production registered in September 2016 reached a positive variation when closing at 2,534 Mbbl / day, a contribution that brought the total production of hydrocarbons to 3,487 Mbbl at the close of the referred period. The positive variation recorded is based on the 17 Mbbl / day growth of the Orinoco Oil Belt. An increase in the installed hydrocarbon processing capacity of Petróleos de Venezuela, S. A. was also announced. (PDVSA) in the Orinoco Oil Belt, through the start-up of crude oil treatment plants in the joint ventures Sinovensa and Petrocarabobo, located in the southern states of Monagas and Anzoátegui, respectively, which translates into an increase in the installed hydrocarbon treatment capacity by more than 100 kbbl/day. On the other hand, the increase in gas prices was officially announced since February 2016. The one with 91 octanes will cost one Bolívar a liter, while the one with 95 octanes will cost 6 bolivars per liter. It was reported that with this measure the country will be able to save approximately 800 million dollars. Government authorities explained that the behavior of the fuel consumer, after the adjustment, is inclined to use the appropriate octane, taking into account that gasoline of 95 octanes demanded 73% consumption when the vehicle fleet is reversed. The reduction of the subsidy of gasoline in Venezuela, in addition to sincere fuel prices, seeks that users actually consume the octane required by their vehicles.

Natural Gas

Bolivia started the operations of the Incahuasi Plant, in the Municipality of Lagunillas, Department of Santa Cruz, which will inject approximately 7 Mmcd of natural gas, which implies an increase of 12% in the national production of this energy; thus ensuring with ease the supply of gas in the domestic market as well as the export commitments. Incahuasi groups the Aquio and Ipati blocks, operated by Total (50%), the Russian Gazprom (20%), the Italo-Argentine Tecpetrol (20%) and the Bolivian YPFB Chaco (10%); companies that subscribed, on the occasion, an agreement for the development of the second phase; with which it is expected to reach production in 2018, 10 Mmcd and one year later, 7 Mmcd more, to reach the 17 Mmcd in 2019. Government authorities informed that with the Incahuasi Plant, a total of 104 Mmcd of processing capacity is reached throughout the country. The construction of this mega field demanded an investment of more than 1000 million Dollars. Also, the LNG plant in Rio Grande was opened to supply natural gas to 27 towns, between capital cities and intermediate cities in the departments of Beni, La Paz, Oruro, Pando, Potosí and Santa Cruz. The Plant will send liquefied natural gas in cryogenic cisterns to the Satellite Stations of Regasification, where it takes back its gaseous state and is delivered to the distribution networks of homes, shops, industries and refueling stations to NGV (natural gas vehicles). The LNG project has the construction of the Natural Gas Liquefaction Plant, a Virtual Transport System (cisterns) and Satellites Regasification Stations in each of the 27 populations where the energy will arrive. This system will contribute to the development of populations where conventional pipelines do not arrive and will promote the use of natural gas, allowing the gradual replacement of the consumption of LPG and gasoline. The plant is expected to process 12 Mpcd of natural gas and produce 210 metric tons per day of liquefied natural gas.

Brazil broke a record for natural gas production and reached 111.1 Mm^3 /day, representing an increase of 2.4% over the previous month and an increase of 18% compared to November 2015. The total production of oil and natural gas in November was approximately 3,307 Mboe / day. Oil production totaled 2,609 Mbbl / day, an increase of 9.6% about the same month in 2015. The Lula field, in the Santos Basin, was the largest producer of oil and natural gas, producing, on average, 663.2 kbbl / day of oil and 29.2 Mm^3 / day of natural gas. The volume of oil was the largest already produced in a single field, surpassing the previous record reached in September 2016, when Lula produced 639,700 bbl/day Pre-salt .

Chile began the process of sending natural gas to Argentina through the central zone, a supply that was delivered during the winter months through the GasAndes gas pipeline. In total, 4.5 Mm^3 /day of natural gas would be sent to Argentina, which could eventually reach 5.5 Mm^3 /day. The exchange is based on an agreement for export that also includes the development of hydrocarbon exploration projects in Patagonia and the integration of the electrical system.

The first terminal for the import, regasification and potential export of liquefied natural gas in **Colombia**, was inaugurated to strengthen the national electricity system. The work involved an investment of 142 million dollars added to an additional 300 million dollars for the value of the boat that will remain on a dock of 700 meters. This infrastructure, located in the Bay of Cartagena, will provide 400 Mpcd, which can generate up to 2,000 MW of energy. Through a gas pipeline of 10 kilometers, the imported gas will reach the National Transportation System in Mamonal, to then receive, store and re-gasify the liquefied natural gas in the floating vessel, and thus take it to the thermoelectric agents.

As part of the progress made in the implementation of the energy reform, in the area of natural gas, **Mexico** highlighted a range of 78% of the kilometers of pipelines planned for 2019, with a total investment in the process of 12 billion dollars. The proposal proposes going from 11,000 to 21,000 kilometers of gas pipelines in 2019.

In **Panama,** on Isla Telfers in Colon, the construction of the First Natural Gas Generation Plant in Central America began, with an expected investment of more than 1.15 billion dollars. With this project the Isthmus nation will become the first country to generate energy based on natural gas in Central America and will strengthen the country's energy matrix with 381 MW, joining the National Energy Plan 2015 - 2050. This gas-based power plant, in addition to being a catalyst for the future of energy diversification in the country, will offer the possibility of converting Panama into a liquefied natural gas distribution hub for the entire region. This liquefied natural gas plant will use combined cycle technology for its efficiency and contribution to the environment and will require only one-third of the water used by the other plants.

In **Peru**, product of the drilling of 4 exploratory wells with depths between 4000 and 5000 meters in Lot 58, 4 structures were discovered with accumulations of gas and condensates reaching an in situ volume of 3.9 trillion cubic feet (TCF) as contingent resources in category 2C. The finding represents an increase in proven reserves of natural gas of 27.7%. The reserves disclosed by CNPC represent almost 40% of the current proven reserve of Block 88 (known as Camisea). Additionally, within the framework of the natural gas massification program, it was inaugurated in the district of Echarate-Cusco, the new Natural Gas Compressor Plant "Kámani", with a power of 72,000 HP, which will increase the natural gas transportation capacity for the national market by fifty percent. Likewise, the second section of the coast loop, a 24-inch, 31-kilometer-long pipeline between the districts of Chilca and Lurín, was completed.

BP **Trinidad & Tobago** LLC ("bpTT") recorded the historic passage of BP British Merchant through the recently expanded Panama Canal. The ship, with cargo destined for Mexico, was the first LNG cargo vessel from Trinidad & Tobago to make its way through the expanded Panama Canal, which currently allows 90 percent of the world's LNG craft to pass through, which will have a major impact on global LNG flows and will offer numerous benefits to carriers. The LNG of Trinidad & Tobago will now benefit from greater market access, especially in Asian markets.

Venezuela, through PDVSA Gas, executed a natural gas conversion project for two turbo generator units (TGU) of the Josefa Joaquina Sánchez Bastidas Complex, in the Arrecifes sector of the Vargas state. This project is focused on advancing in the change of the energy matrix from consumption of liquid fuels (diesel) to natural gas in the electricity sector and with it, stabilizing the National Electrical System (SEN) battered by the ravages of the climatic phenomenon El Niño, with clean and safe energy. The gas will be supplied by the subsidiary of PDVSA from the Measurement and Regulation Station (EMR) of the Josefa Joaquina Sánchez Bastidas generator complex belonging to CORPOELEC, specifically to the UTG Josefa Rufina I and Margarita I (Barge type) with the purpose of generating 342 (MW).

Additionally, these actions allow the release of 14,620 barrels of liquid fuel per day, which due to its high profitability in the international market, represents a significant foreign exchange income for the nation. Additionally, with the activation of a new compression train at the “Copa Macoya” plant in Guárico State, PDVSA added an additional 80 Mpc of gas to the national market, destined for thermo generation and petrochemicals; thus allowing the replacement of diesel by gas in thermoelectric plants in the center of the country. Operations were also initiated for the SRA-1 non-associated gas well located in the San Ramón field, which will provide 8.6 Mcfsd of gas not associated with oil extraction, strengthening the electric, industrial and petrochemical sectors.

Electricity

In **Argentina**, the Life Extension process of the Embalse Nuclear Power Plant is successfully developed. The reconditioning will allow it to operate for a new cycle of 30 years. In addition, the plant will increase its power to 683 MWe, that is, a 6% more than its current generation capacity. One of the fundamental parts of this process are the steam generators that were contracted to the IMPSA Company in the city of Mendoza.

It was inaugurated in **Brazil**, in the municipality of Altamira, southwest of Pará, the Belo Monte hydroelectric plant. Built on the Xingu River, it is the largest hydroelectric plant in the country and the third largest in the world. With an installed capacity of 11,233.1 MW, it has enough capacity to serve 60 million people in 17 states, which represents nearly 40% of the residential consumption throughout the country. The turbine has an installed power of more than 611.11 MW, and the energy is already available for the National Interconnected System. The commercial operation of the second generating unit with an installed capacity of more than 611.11 MW was started. The released unit is part of the 18 generating units that will be completed and operated gradually until 2019. Also, the assembly of the first Ultra High Voltage line that will drain energy from the Belo Monte hydroelectric plant (11,233 MW) to the country's major energy consumption centers was initiated. The structures of transmission of direct current between Xingu (PA) - Estrecho (MG), will form the first 800 kV voltage line of the country , totalizing 2,087 kilometers of extension. The project, with characteristics rarely seen in the world, is being built in eight sections. The forecast for entry into operation is February 2018. The Jirau Hydroelectric Power Plant was also inaugurated on the Madeira River, composed of 50 turbines, with an installed capacity of 3,750 MW and an assured power of 2,279.40 MW. Currently, it is the third largest hydroelectric generation power plant in Brazil and the 17th largest in the world, with the capacity to serve approximately 40 million people. The HEPP Jirau generates under the concept of the hydroelectric power plant on water cable, so it does not need a large water tank to operate, which reduces the environmental impacts of the project. On the other hand, the San Antonio hydroelectric power plant, also installed on the Madeira River, was authorized to start the commercial operation of the generating unit (GU) 44, which will add 73.29 MW of installed capacity. With the generation units added in the subsequent project, the hydroelectric plant will have a total of 50 turbines and a power of 3,568 MW, enough energy to meet the consumption of more than 44 million people.

Likewise, the Mirueira II Substation was inaugurated in **Brazil**, an enterprise aimed at strengthening attention to the Metropolitan Region of Recife, with this work benefits are estimated for approximately 450 thousand inhabitants. In November 2016, 1,385.10 MW of installed generation capacity entered into commercial operation, in addition to 196 km of transmission lines and 300 MVA of transformation in the Basic Network. The total installed capacity of electric power generation reached 149,928 MW in November 2016, an increase of 10,430 MW compared to the same period of the previous year, with 5,791 MW of hydro generation, 1,681 MW from thermal sources, 2,956 MW from wind sources and 2 MW from solar source. Wind power generation presented the most expressive expansion, with 43.2% growth between November 2015 and 2016. In the same period, there was also the expansion of solar (8.4%), hydraulic (6.4%) and thermal (4.0%) sources. The advance of renewable sources goes in the same direction as the commitment made by Brazil during COP 21, to raise at least 23% to the share of renewable energies (other than water) in the electricity matrix by 2030.

According to data of the Bulletin of Nuclear Energy **Brazil** and the World 2016, of the Ministry of Mines and Energy, in 2016, Brazil ranked fifth in the world ranking of uranium reserves with 309 thousand tons, representing 5.3% of the total. Among the countries with nuclear reactors, Brazil occupies the 21st position, with two plants that have a total of 1,990 MW of installed capacity. Brazil currently has two nuclear power plants in operation (Angra 1 and Angra 2) with an electricity production of the order of 15 TWh, which represents approximately 2.5% of the electricity supply matrix.

The El Paso Hydroelectric Power Plant in the O' Higgins region was inaugurated in **Chile**. The project, which has an installed capacity of 60 MW, uses the water resources of the De Las Damas River, Colchagua Province. The construction involved an investment of 250 million dollars and uses the technology known as run-of-river since it returns water to the river after generating energy with the force of its fall. The Mini Central Itata was also inaugurated in Yungay commune. The new run-of-river power plant has an installed capacity of 20 MW and an average annual generation of 72 GWh, enough to supply about 40,000 homes. It is located on one side of Itata Falls, it is the first plant of its kind to be built in this commune. On the other hand, it was inaugurated a new transmission line between Copiapó and Diego de Almagro in the Atacama Region. This project is 156 kilometers long and involved an investment of USD 70 million. Within the framework of the Central Interconnected System Expansion Plan (SIC), the attribute of this line is very important because it transports clean energy.

Colombia launched the PaZa la Corriente program with which it intends to take power to more than 150,000 families in the next 3 years, and thus meet the mega goal of energizing 173,000 homes in the four-year period. With this initiative, areas directly impacted by the armed conflict have a high probability of being prioritized. For the implementation of the program, various measures have been planned to stimulate private investment, such as the regulation of tax incentives; the allocation of two public funds: the Financial Support Fund for the Energization of Rural Areas (FAER) and the Financial Support Fund for the Energization of Non-Interconnected Areas (FAZNI); as well as the appropriate regulation of electricity distribution and commercialization activities.

In **Costa Rica**, the Reventazon Hydroelectric Plant began operations. Located in the canton of Siquirres, province of Limón, it is considered the largest hydroelectric power plant in Central America. This is a strategic work for Costa Rica to maintain its electrical independence at least until 2025 and reach the national goals of reducing greenhouse gases, according to the ICE Electric Expansion Plan, the Plant will supply firm energy to 525 thousand homes with 305.5 MW. Additionally, the Bijagua Hydroelectric Plant began operations. It is located in the canton of Upala, province of Alajuela; it takes advantage of the capture of the Zapote and Bijagua rivers to provide electricity to some 21,000 homes. It will have an annual production of 65 GWh that represents 16% of the energy demand of Coopeguanacaste rural electrification cooperation.

The Coca Codo Sinclair hydroelectric plant was inaugurated in **Ecuador**, in the provinces of Napo and Sucumbíos. 1,500 MW will supply 30% of the energy demand, representing annual savings by substitution of imported sources of energy for USD 600 million per year, generating surpluses for the export. It is considered the largest hydroelectric project in the history of the country; it uses the waters of the Quijos and Salado rivers that form the Coca River. The project consists of a catchment work made of a rockfill dam with a 31.8 m high concrete screen, a 160 m wide net; a sand trap with 8 chambers and cleaning gates that allow the captured water to be transported to the Compensador Reservoir through a Conduction Tunnel of 24.83 km in length and an internal diameter of 8.20 m, thanks to a fall of 620 m from the compensating reservoir to the powerhouse that allows transforming the potential energy into electrical energy through 8 Pelton-type units of 187.5 MW each. 3.45 $MtCO_2$ /year avoided, equivalent to emissions of 1.2 million light vehicles in circulation during one year. As of December 2016, the plant has contributed 3,026.04 GWh to the National Interconnected System. The Paute-Sopladora hydroelectric power plant, considered the third largest in the country regarding generating capacity, also entered into operation. The work above will consolidate the change in the national energy matrix and will supply 13% of the current national demand for electricity, equivalent to the annual consumption of 1.8 million Ecuadorian families. It is located on the provincial border of Azuay and Morona Santiago. The hydroelectric power plant that forms part of the Paute Integral Hydroelectric Complex, captures the turbine waters of the Paute - Molino Power Plant by means of a direct connection between the unloading tunnels of this Plant and the loading system of the Paute - Blower Plant of underground type, equipped with three generating units with Francis type turbines. An investment of USD 755 million was required. The plant began its operation phase with all its capacity reaching 487 MW of power that will allow it to generate clean and renewable energy. It saves the country more than USD 280 million a year by ceasing to import fuel and will avoid the emission of approximately one million tons of CO_2 per year, by displacing inefficient and polluting thermal generation. As of December 2016, the plant has provided the National Interconnected System with an energy of 981.97 GWh.

El Inga substation, which is part of the Emblematic 500 kV Transmission System Project, was also inaugurated in Ecuador. This project allows us to receive energy from the Coca Codo Sinclair Hydroelectric Power Plant, strengthening the country's capacity to export electrical energy. The substation, built on a 17-hectare site in the southeast of the Ecuadorian capital, is made up of 500, 230 and 138 kV with a transformation capacity of 2,100 MVA, which represents more than 20% of the total capacity of the National Transmission System, making it the largest substation in the country. Thanks to the 230 and 138 kV, the electric ring will be closed between Santa Rosa, El Inga and Pomasqui, supplying electricity to the Metropolitan District of Quito and the northern zone of the country (Pichincha, Imbabura, and Carchi). While the 500 kV, considered an essential part of the 500 kV Transmission System, will transport energy from the Coca Codo Sinclair Hydroelectric Power Plant to consumption centers throughout the country. Likewise, the repowering works of the Centenario Substation were completed with an increase in capacity to 20/24 MVA. To this end, state-of-the-art motorized protection and switching equipment was installed, with ports for communication to the SCADA system, thus allowing remote operation and improving response times. The repowering, which entailed an investment of 1,469,239 dollars, benefits more than 15 thousand clients of the popular sectors and of great influence of the province of Santo Domingo de los Tsáchilas. During 2016, 2,261 MW of installed power were incorporated into the National Interconnected System, with a total installed capacity in generation of 8,226 MW, of which 4,640 MW (56.4%) comes from renewable sources, and 3,586 MW corresponds to non-renewable sources.

El Salvador made an expansion of the Hydroelectric Power Plant on November 5, increasing the generating capacity by 80 MW, with the construction and commissioning of a hydroelectric plant adjacent to the existing one that uses the surplus flow of the Cerrón Grande Hydroelectric Power Plant.

Mexico launched the Short Term Electric Market in the National Interconnected System, which received bids from 540 generators of the Federal Electricity Commission (CFE) and its independent producers, plus 183 generators of permits represented by CFE, and the offer of the Phoenix generating company, all for a total of 32,360 MW, to cover a supply of demand in peak hours of operation. With the Short Term Electric Market, generators and suppliers will be able to determine in advance their generation offers and load offers and make investments in new power plants that the electrical system requires.

In 2016, through the Development Fund of the National Electric Industry (FODIEN), 2,379 rural homes were electrified in **Nicaragua**, through the construction of 172.93 kilometers of the electrical distribution network. These projects were carried out in partnership with the municipal mayors, community leaders, organized population and other actors involved in the economic and social development of the beneficiary communities.

Panama announced the start of operations of the hydroelectric plants: Bajos de Totuma with 6,300 MW, Barro Blanco with 28,840 and La Cuchilla with 7,620, for a total of 42,760 MW. Likewise, it started operations at the Estrella Norte I and 2 thermal plants, Santa Inés, Jinro Power, Cerro Azul 1 and 2, and Urbalia (Bio-Gas) for a total of 202,335 MW.

The Cerro del Águila Hydroelectric Power Plant, located in the province of Tayacaja (Huancavelica), was inaugurated in **Peru**. It will contribute up to 6% in power to the National Interconnected Electrical System (SEIN). The aforementioned plant, which demanded an investment of more than 900 million dollars, takes advantage of the waters of the Mantaro River and has an installed capacity of 525 MW. On the other hand, the Malvinas Electric Transmission Substation, located in the Cercado de Lima, was inaugurated, which will benefit approximately 123 thousand users of the capital, in addition to supplying the energy requirements of the future Line 2 of the Lima Metro. This work also stands out for being among the first to use the latest generation GIS technology, which has considerably reduced the magnitude of the land required for its construction; so much so that this new substation only occupies 3,600 square meters and has a power 30% higher than conventional.

For the first time in the history of the 32 years of operation of **Itaipu Binationa**l, the production of the plant exceeded the 43 MWh mark in the five-month period in which the binational contributed 43,053 GWh to the power sector of Paraguay and Brazil.

That energy generated would be enough to supply Brazil as a whole for 30 days and a city the size of São Paulo for a year and a half. Additionally, the value of the adjustment factor to be incorporated in the Review Rate of the energy generated by the Itaipu hydroelectric plant for 2017 was defined. The value as of 2017 will be 1.8836 USD / kW, which represents a reduction of 24% in relation to the one included in the 2016 rate. In 2016, Itaipu Binational produced a total of 103,098.37 GWh, a new world record in annual generation.

Uruguay launched a benefit that will allow industrial electro-intensive companies, which maintain or increase their production, to obtain a discount of up to 30% on the monthly billing of the electric energy charge (excluding VAT). On the other hand, the electric hot water tank pilot was launched, designed to define hot water tank control strategies adjusted to each client's hot water needs. The plan involves the installation of a remotely configurable timer that will maximize energy consumption between 5:00 pm and 11:00 pm in order to optimize its use, without affecting the comfort of users. Additionally, in the First MUEVE Electric Mobility Exhibition, the opportunities to acquire taxis and electric utility vehicles were presented. In May, an electric bus was put into operation and in June, an economic model was presented to enlarge the use of the electric taxi and promote the transformation of the transport fleet towards this system. The plan also includes financial and infrastructure support for the first vehicles of this type. Additionally, the Electric Vehicle Power Systems Network (SAVE) was launched, which will be extended, in its first phase, from Colonia to Chuy, passing through Montevideo, while in its second phase it will cover all routes.

Energy Efficiency

Barbados announced the conclusion of negotiations for the signing of a contract between the Government and the Barbados Light & Power Limited Company, in order to finalize the acquisition and installation of public lighting with LED.

In June 2016, incandescent lamps went out of the market in **Brazil.** The rule applies to the import and commercialization of incandescent lamps for general use in Brazilian territory. The change started in 2012 with lamps of 150 W or more, it was carried out gradually and according to the power of the units. Banning the sale of incandescent bulbs in the country helps to encourage the adoption of efficient, more economical and durable options such as LED.

Colombia premiered the energy label as a tool for consumers of domestic appliances, ballasts and industrial motors to compare equipment of similar characteristics and choose the one that, according to their needs, presents lower energy consumption and better efficiency performance. From August 31, 2016, refrigerators, washing machines, air conditioners, ballasts and industrial engines -imported or domestically manufactured- should visibly display the label in all the points of sale in the country.

As a result of the implementation of the Renova program, until December 31, 2016, **Ecuador** succeeded in replacing approximately 96 thousand refrigerators nationwide, which has allowed electricity savings of approximately 63,123.72 MWh per year. It is estimated that more than 363,400 people have benefited directly.

Mexico launched the Program of Sustainable Integral Improvement in Existing Housing to promote the transition to energy efficient and sustainable homes. The initiative contemplates the granting of credits at preferential rates, for the acquisition of more efficient and cleaner equipment, such as gas-based solar heaters, air conditioning equipment, efficient lighting equipment, thermal windows, thermal enclosures, solar control films; and for the first time in Mexico, the installation of photovoltaic panels in low-income homes. The beneficiaries will have a discount of up to 40% of the cost of the technology they replace. The Program aims to reduce high energy consumption and provide economic savings for the benefit of families. Additionally, the Energy Transition Strategy was presented to promote the Use of Cleaner Technologies and Fuels, with which it is estimated that 50% of clean energy generation will be achieved by 2050.

The aforementioned document contemplates the modernization of the Mexican electricity sector and identifies areas of opportunity in research, technological development and training of human resources that will allow the country to reach the goals that are set. It also opens up the possibility for the development of products and services with high added value in clean energy technologies. In the case of energy efficiency, a goal of reducing the energy intensity by final consumption for the period of 2016 to 2030 of 1.9% is established; and 3.7% for the period from 2031 to 2050.

Renewable Sources

Argentina launched the "RenovAr" Program for the period 2016-2025, aimed at contracting in the Wholesale Electricity Market (MEM) for electricity from renewable sources of generation with a total requirement of 1000 MW, under Round 1, which would be added to the country's energy supply, divided as follows: 600 wind turbines, 300 solar MW, 65 MW of biomass, 20 MW of small hydroelectric projects and 15 MW of biogas. To successfully close Round 1 of the RenovAr Program, which together with Round 1.5, totals 59 projects awarded by 2,423.5 MW, obtaining a weighted price of 57.44 USD / MWh. The maximum term of execution of the contracts is up to 24 months, with an estimated investment of between 1,500 and 2,000 million US dollars (USD). With these new additions, the country would save about 300 million dollars a year in fuel imports for electricity generation and avoid the emission of almost 2 million tons of CO_2 (carbon dioxide) to the atmosphere on an annual basis, which would be equivalent to the pollution of about 900,000 cars.

Brazil launched the RenovaBio initiative, aimed at expanding the share of renewable fuels in a manner compatible with the growth of the market and in harmony with the international commitments assumed within the framework of COP 21. Among its premises are the search for convergence; the definition of clear, transparent and stable rules; recognition of externalities; security of supply; predictability of the sector and the strengthening of a competitive and harmonious market with other energy sources. Likewise, the Chapada do Piauí Wind Power Complex was inaugurated in Brazil, located in the municipalities of Marcolândia, Simões, Padre Marcos and Caldeirão Grande; with 247 GE 1.85 MW and GE 1.7 MW turbines, it is made up of three wind farms, with installed capacities of 205 MW, 172.4 MW, and 59.2 MW. As a result of the measures to stimulate the generation of energy by the consumers themselves (micro and mini distributed generation), the National Electric Energy Agency (ANEEL) registered 7,610 distributed generation connections, totaling an installed power of 73,569 kW. Among the most used renewable energies, the solar photovoltaic source stands out, with 7,528 connections. In terms of installed power, this source also stood out with 57,606 KW. According to data from the Energy Planning and Development Secretariat of the Ministry of Mines and Energy (MME), 2016 closed with a 43.2% share of renewable energies in the national energy matrix, indicating two percentage points higher than in 2015; 41.2%. On the other hand, the monthly production of biodiesel reached in October 2016, the highest volume of the year with 351 thousand m^3. In the accumulated of the year, the production reached 3,194 thousand m^3, a decrease of 3.4% in relation to the same period of 2015 (3,306 thousand m^3). The Ministry of Energy and Mines installed solar panels at the top of its headquarters building. It became the first in the esplanade of the ministries to generate energy through distributed generation connected to the distribution network, with the installation of 154 solar panels (1.0 x 1.64 m). The generation power of the mini power plant is 69 kW, or 60 kWp (kilowatts-peak), which represents around 5% to 7% of the building's consumption, which is equivalent to the consumption of 23 residences of an average Brazilian family consuming 300 kWh / month. The electrical energy generated by the solar photovoltaic system of the MME will prevent the emission of 6.4 tons of CO_2 a year in the atmosphere. In addition, the expansion of installed capacity and the high incidence of wind in the northeast of the country led to the registration of successive records for wind power generation in the region, including that generated in October 2016, when there were 4,809 MW. This was enough to supply more than 20 million residential consumer units in a day.

Chile launches the Trasforma Solar program that seeks to take advantage of the existence of an exceptional solar resource given the need to provide efficient energy solutions that contribute to improving the competitiveness of other national industries. The initiative involves an initial set of 50 projects with an approximate public-private budget of 800 million US dollars. Transforma Solar seeks to take advantage of the uniqueness of the Atacama Desert to develop a local solar industry with technological capabilities and exporting vocation. On the other hand, in the Valparaíso Region, a modern Solar Thermal Energy Laboratory was inaugurated, to provide specialized courses in related systems in solar energy.

On the other hand, in El Molle sanitary landfill in the Valparaíso commune, the El Molle non-conventional renewable energy plant was inaugurated with an installed power of 4.5 MW and an equivalent capacity to supply electricity to 20,000 houses. The project allows the use of biogas generated during the decomposition of waste into electrical energy through the use of internal combustion engines. With an estimated investment of 8 MUSD, in operation 24/7, it will be generating initially 30,000 MW year. The photovoltaic plant La Silla was also inaugurated, in dependencies of the La Silla Astronomical Observatory, north of La Serena. The project, of 1.7 MW of installed power, will supply 50% of the energy currently used by the site. The solar park demanded an investment of more than 3 million dollars and will produce about 4.75 GWh per year, equivalent to the consumption of 2 thousand homes. It is composed of three types of panels: the standard, a type of bifacial panel that produces on both sides, increasing the capacity between 10 and 15%, and an intelligent panel, which has an electronic component to avoid the losses of conventional panels. The second stage of the Lebutoro wind farm was also inaugurated in the Lebu commune in the Province of Arauco, which contributes about 15 MW to the Central Interconnected System. Additionally, eight projects belonging to the Public Solar Roofs Program were inaugurated in Parral, with an installed capacity of 245 kWh. In addition, within the framework of the Ministry of Energy's Solar Public Roofs programme, the largest installation belonging to this initiative was inaugurated at the Gabriela Mistral Cultural Centre (GAM). The complete installation will deliver 10% of the energy consumed by the building avoiding the emission of 40 tons of CO_2 year. This project, with 100 kW of installed capacity, generates sufficient electric power to supply 70 houses, 1,500 public lighting, 82 performances of scenic or musical arts or 75 activities of audience formation per year. Likewise, the Photovoltaic Plant "Altos del Paico" was inaugurated. The project located in the municipality of El Monte includes, in its entirety, the installation of a 2.1 MW solar plant, with an investment of four million dollars. In a first stage, it will have a capacity of 0.5 MW. The energy produced will be conducted by a private line of 13.2 kV and delivered to the SIC, to be subsequently injected into the El Paico Substation.

In **Cuba**, in order to increase the use of renewable energy in the agricultural sector, more than 3,000 biodigesters were built for use in swine and cattle breeding. In addition, in the municipality of La Sierpe in the province of Sancti Spíritus, a photovoltaic park was inaugurated, consisting of 520 tables with 10 photovoltaic panels each one installed on 2.5 hectares, generating an average of 5.5 MWh daily, which would provide around 2,000 MWh per year, equivalent to the monthly energy consumed by some 836 homes. With state-of-the-art technology and synchronized to the National Electroenergetic System (SEN). The site ensures a considerable reduction in losses due to distribution and transformation of energy and its entry into operation represents a saving in generating plants of more than 500 tons of oil per year with the consequent reduction in emissions of polluting gases into the atmosphere. The location of the park in an area close to the load brings benefits by reducing energy losses both for distribution and transformation; these values are equivalent to the electricity consumed per month by 105 houses.

In **Ecuador**, the Photovoltaic and Energy Storage Plant located in Baltra Island of the Galápagos archipelago came into operation. The conclusion of this clean energy work contributes to the governmental initiative "Zero Fossil Fuels for Galápagos". The project has two components: the 67 kWp photovoltaic plant which will deliver approximately 111 MWh of electricity per year to be distributed in the Santa Cruz - Baltra electricity system; and two sets of battery banks, one consisting of deep discharge lead-acid banks with the capacity to store up to 4 MWh of energy from the wind farm and thus optimise its generation, and the other of lithium-ion banks with a capacity of 268 kWh, which will compensate for the constant fluctuations of wind power generation. The plant has a 65 kWp photovoltaic plant, with an energy storage system with a power of 1 MW. The energy storage system is important to stabilize the frequency fluctuations that influence the operation of the Santa Cruz electricity network, and it will also allow the surplus energy generated by the Baltra Wind Farm to be stored so that it can be dispatched to the system when the demand of the Baltra and Santa Cruz Islands requires it. Since its inauguration, the photovoltaic plant has contributed 91.5 MWh of energy to Isla, with a reduction in diesel consumption of approximately 6,229 gallons, equivalent to the non-emission of 59.61 tCO_2 / year.

In **El Salvador**, the operations of the project to produce electricity from sugarcane bagasse "Ingenio El Ángel" was initiated. The work consisted of expanding its water steam and electric power generation capacity, increasing the latter from 48 MW to 70.1 MW, of which 17.8 MW are destined for its own consumption and the remaining 52.3 MW for sale in the wholesale electricity market. Additionally, the feasibility study of the geothermal field of Chinameca was completed. The results prove the existence of a geothermal system of great importance with suitable characteristics for the generation of electrical energy.

Grenada completed a major renewable energy project at Grenlec's facilities in Grand Anse, Queen's Park and Plains consisting of 11 photovoltaic solar installations. The project, with an investment of more than 6 million dollars, has a total capacity of 937 kW, with a combination of roof-mounted and floor-level photovoltaic solar installations. This new project will generate enough energy to annually feed more than 500 typical homes with clean energy, offsetting more than 1,200 metric tons of carbon dioxide (CO_2).

Guyana completed the installation and rehabilitation of four (4) solar systems in schools located in the periphery and riparian communities that did not have access to electricity.

Jamaica, inaugurated a renewable energy training facility at its Resource Center in Rose Hill, Manchester. The Wigton Renewable Energy Training Laboratory will offer practical and theoretical courses in areas such as solar thermal energy, photovoltaic energy, concentrated wind solar energy, small hydroelectric plants, bioenergy, fuel cells, and energy conservation. The objective of Wigton is to position the laboratory as one of the main renewable energy training facilities in the Caribbean. The training offered will focus on capacity building and exposure to best practices with an emphasis on innovation and efficiency.

In **Mexico** in the first half of 2016 generated 30,586.81 GWh of clean energy, which represented 19.68% of the total generation. The outstanding growth is shown by the efficient cogeneration of 34.94%, and by the wind, of 11.87%. It should be noted that the Energy Transition Law set a minimum clean energy share for electric power generation of 25% by 2018, 30% by 2021 and 35% by 2024. Likewise, the Requirement for the Acquisition of Clean Energy Certificates (CEC) was established for 2019, which aims to establish the percentage of electricity consumption that companies and users must cover with clean sources. According to the aforementioned instrument, the large consumers of the sector must demonstrate, through the acquisition of CEC, where 5.8% of their consumption will come from clean energy sources by 2019. It should be noted that the installed capacity of photovoltaic generation showed a greater growth among the different technologies. As of June 2016, the growth was approximately 100 MW, and it is expected that by the end of 2019 5,400 MW of capacity - 20 times the current capacity - will be added, due to the addition of new plant capacity and the winning projects of the first and second auctions that will contribute with 1,691 MW and 1,853 MW respectively. The country tripled its capacity in renewable energies. In the Second Electricity Market Auction, it acquired 98% of all solar and wind capacity installed in the last 18 years. With these results, the electric auctions allow the country to approach the goal that by 2024, 35 percent of the electricity comes from environment – friendly energy sources. Also, the Phase II of the Solar Photovoltaic Garden Eosol TAI was inaugurated in Durango, Mexico, with 207 thousand panels. The orchard is the largest in the country and the only one that is interconnected to the country's electricity grid.

As of December 2016, **Nicaragua** recorded a percentage of electricity generation based on renewable resources equivalent to 52.6% of the total energy generated in the year in the National Interconnected System (SIN). Of the total energy generated with renewable sources, wind plants accounted for 31%, followed by geothermal plants with 28.6%, hydroelectric plants with 26.8% and sugar mills with 13.6%.

It was inaugurated in **Panama**, Penonomé, Coclé, the Laudato Si wind farm, with capacity to generate 8% of the national energy demand, which currently amounts to 1,600 MW. The park has 86 wind turbines, an investment of 430 million dollars, and a capacity to supply clean energy to more than 125,000 Panamanian families, with an annual savings of 88 million dollars in operating costs of the local electrical system.

With this work it is expected to avoid the emission of more than 450 thousand tons of carbon to the environment, and mitigate the emission of 1,000 tons of nitrogen oxide and 500 tons of sulfur dioxide, saving approximately 900 kbbl of oil per year. It is also worth noting the commisioning of the photovoltaic plants: Solar Bugaba (2,560 MW), Solar Los Angeles (9,522 MW), Solar Paris (8,990 MW), Solar Coclé (8,990 MW), Solar Caldera (5,500 MW), Solar de David (9,990 MW) and Solar el Fraile (4,800 MW) for a total of 50,352 MW.

In **Peru,** the "Tres Hermanas" wind power plant, located in the district of Marcona (Ica), was integrated into SEIN. The plant with an installed capacity of 97.15 MW required an investment of almost 197 million dollars. This new wind farm is composed of 33 wind turbines and will inject its energy into the SEIN through the existing sub-station in Marcona. To date, there are four wind farms operating in the country contributing 239 MW to the National Interconnected Electric System (SEIN).

Uruguay launched a stimulus tool to strengthen the public policy guidelines focused on the promotion of renewable energies through the participation of private investors. The joint stock company Areaflin, currently wholly owned by UTE, opened its capital to the market by issuing shares to small savers who, with a minimum investment of $100 and a maximum of $2,000, can be co-owners in the Valentines wind farm, located on the border between the departments of Florida and Treinta y Tres. In parallel, those who wish to invest larger amounts up to $ 20,000 can do so directly through brokers, the Electronic Securities Exchange and local banks. In this way, UTE has participated in the development of 34% of the wind farms in Uruguay. The subscription of shares of Areaflin SA for the Valentines wind farm had its closing and presentation of results. The total demand was 146,775,090 dollars, 85,303,090 of them retailers. The demand in the issue had been of 20 million dollars for the retail segment (for which it turned out to be, finally, more than four times greater), and of 22 million in the wholesale segment..

Energy and Environment

In **Colombia,** the green tax went into effect to discourage the use of fossil fuels. The aforementioned tax on gasoline and the ACPM (motor fuel oil), seeks to reduce greenhouse gas emissions, generating positive impacts on air quality and environmental health.

In April 2016, a devastating earthquake of 7.8 magnitude occurred in **Ecuador**, affecting mainly the provinces of Manabí and Esmeraldas, considered one of the worst catastrophes in the country's history. As a result of the effort undertaken by the agencies and companies in the electricity sector, the electric service of the entire affected area was recovered in just three days.

On the other hand, in **Ecuador**, in the course of 2016, Ecopaís gasoline reached a percentage of 29% in the market, replacing the extra gasoline sold in the country. During this period, the project was extended to the provinces of: Guayas, Santa Elena, Los Ríos, Loja, Zamora Chinchipe, and Manabí. As a result of the optimization project of electric generation and energy efficiency - OGE & EE during 2016, the country avoided the emission of 156,562 tons of CO_2, which allowed a saving of USD 607 million.

The heavy downpours registered, during the La Niña Phenomenon of 2016, in almost all the territory of **Honduras**, caused various failures in the national electricity grid and with it, an intense work of the technical area of the National Electric Energy Company (ENEE). Three departments were heavily affected as a result of the storm; the crews multiplied to attend to emergencies and solve the interruptions of the energy service in the shortest time. This failure caused the interruption of energy affecting hundreds of customers in this area of the west of the country. Burnt transformers, fallen poles, broken lines, chains of open insulators and damaged lightning rods were, among others, the faults attended by the technical staff of the West.

Integration, cooperation and energy complementation

Argentina signed a memorandum of understanding with China, reaffirming the will to build two nuclear power plants in Argentina with financing from Chinese banks. One with Canadian Uranium Deuterium (CANDU) heavy water reactor technology, which is the same one used by the Embalse plant; and the other PWR with which a leap will be made towards enriched uranium and light water technology.

Colombia signed a memorandum of understanding with Australia that will allow the two nations to achieve greater cooperation between their respective hydrocarbon sectors. The aforementioned instrument promotes the sustainable development of the sector, through the design of policies, regulatory frameworks and good practices for the exploration/production of offshore hydrocarbons and methane gas associated with coal. Additionally, Colombia signed with South Korea, a memorandum of understanding aimed at the implementation, in the South American nation, of a quality management system for liquid fuels, as well as a tracking system for fuel performance and gas distribution liquefied petroleum (LPG).

Cuba and Panama sign a scientific and technical cooperation agreement on climate issues aimed at promoting climate variability and prediction studies to develop new applications for health, energy and food and nutritional security, for adaptation to the effects of climate change. Cuba also signed cooperation agreements with China on renewable energy and environmental protection; among these agreements are the granting of credits for the production of solar panels, the installation of a wind farm on the island and the creation of a bio-electric plant, which is attached to a sugar plant in the province of Villa Clara. Cuba also signed a strategic alliance with Spain to promote renewable energy sources and respect for the environment, with emphasis on the development of photovoltaic energy. The alliance is focused on the exchange of policies, experiences and information and cooperation in possible commercial missions that promote the development of the sector in both countries. Currently, Cuba, which has a solar radiation level of 5 kWh/m^2 per day throughout the national territory, has 22 MW of installed photovoltaic power, distributed among 14 photovoltaic parks and in accordance with the Renewable Sources Policy approved in 2014, 700 MW of photovoltaic power will be installed by 2030.

Ecuador began exporting electricity to Colombia; the amount of energy exported will initially reach 1 GWh per day, and will gradually increase to 7 GWh per day. This fact marks a milestone in Ecuador's energy history. The electricity interconnection line between Ecuador and Colombia of 230 kV and 500 MW of capacity, which in the past allowed Ecuador to supply imports for lack of energy, will be the route to transmitt the energy produced in Ecuador to Colombia. This will allow neighboring country to increase its reserves. Thus, the electrical trade balance totally unfavorable for Ecuador throughout its history, with imports exceeding 9% of the energy required to cover the country's demand, became a historical fact and for the first time, it is an exporting country of electrical energy with a net surplus of around 29.23 million dollars. On the other hand, in compliance with the commitments assumed at the Presidential Meeting and the IX Binational Cabinet of Ministers **Ecuador - Peru** 2015, the Public Hydrocarbons Company EP Petroecuador and Petroperú S.A signed a Framework Agreement for the Exchange of Knowledge and Good Practices in Activities of the Hydrocarbons Sector. The agreement seeks to avail of reciprocal strengths and experiences within the hydrocarbon sector of both nations.

Mexico, Canada and the United States signed a Memorandum of Understanding on Cooperation on Climate Change and Energy. It was designed to harmonize national policies and promote green strategies. Among the common objectives of the three countries is to offer clean electricity at competitive prices, supported by a durable and reliable infrastructure, as well as increase investments in technological innovation in clean energy, according to the subscription of "Mission Innovation". Additionally, **Mexico and Belize** initiated negotiations, pursuant to the Memorandum of Understanding for the establishment of a Negotiating Group on Transboundary Hydrocarbon Reservoirs, signed in 2015. The objective of the meeting was to share available technical information on the 5-kilometer zone on each side of the border, on which both governments agreed a moratorium to temporarily suspend drilling and hydrocarbon production activities. In addition, the progress of Mexico's electrical integration and, with the creation of the Mexico Interconnection Commission to the Electrical Interconnection System for the Countries of Central America (CIEMS) announced at the U.S. Energy Security Summit, Central America and the Caribbean are also noteworthy.

This body accompanies this process in order to follow up on the commitments made in the area of electrical integration arising from the Summits of Heads of State and Government of the Tuxtla Dialogue and Coordination Mechanism. This body met for the first time at the headquarters of the Foreign Affairs Secretariat (SER) of Mexico to lay the foundations for its operation and advance in the analysis of infrastructure proposals, regulatory harmonization and policy integration of the electricity markets of Mexico and Central America.

Peru and China, signed promotion agreements and memoranda of understanding related to energy projects, in the framework of the XXIV Leaders' Summit Asia-Pacific Economic Cooperation Forum (APEC). Among the commitments made, China is expected to invest in hydroelectric generation projects and in the hydrocarbon sector.

Uruguay signed two memoranda of understanding with China in the areas of renewable energy and industrial cooperation. The objectives are focused on development on issues of common interest to both countries, which support the diversification of energy sources to promote economic, social and environmentally sustainable development.

The Agreement, which establishes the fundamental terms and conditions for the implementation and execution of the Natural Gas Supply Project from **Venezuela to Trinidad & Tobago**, through a gas interconnection from the Dragon Field in northeastern Venezuela, was signed. Also, with the objective of continuing bilateral energy relations with **Colombia**, and at the same time boosting the development of Venezuela's natural gas reserves, it was agreed to export gas to neighboring countries through the signing of a contract between PDVSA Gas and Petromil Gas, S.A. E.S.P. The exported gas will reach up to 50 Mcfd from gas fields in the Gulf of Venezuela, in which there are proven reserves of 9.5 TCF. Additionally, Venezuela signed energy agreements with China for 2.2 billion dollars, aimed at increasing oil production by 227 kbbl / day, and oil trade with the Asian giant, with the goal of bringing it to 800 kbbl / day. One of the main agreements to be developed in the form of a joint venture is the Jie Yang refinery in China, which will have a 40% national shareholding, while the corporation of the Asian country will subscribe 60%. The refining center will process 400 kbbl/day. This will use primarily Venezuelan crude oil and will be of deep conversion of high complexity. Another agreement is aimed at increasing the production of the joint venture Petrozumano to 15 kbbl/day. The project includes the reactivation and rehabilitation of wells and infrastructure with an investment of 225 MUSD. On the other hand, an agreement was signed to increase the production of the Petrourica joint venture by 30 kbbl / day. In addition, a project was signed that includes the rehabilitation of 500 light crude oil wells (31° API), with an associated production potential of 42,800 bbl/day. Likewise, Venezuela signed a Complementary Energy Cooperation Agreement with Turkey, which provides for the study and development of commercial projects. On the other hand, Venezuela signed a new financing agreement with the Japanese bank for 500,000 MUSD for the Deep Conversion Project of the Puerto La Cruz Refinery, which will allow processing of heavy and extra-heavy crude oil from the Orinoco Oil Belt. With this project, the HDH Plus technology created by PDVSA Intevep will be launched for the first time on a commercial scale.

Origin of the indicators and sources of information used

For the calculation of the indicators and the presentation of the graphs of this Yearbook, there are three types of sources of information corresponding to the producers or compiler's work scale who report the statistics and indicators. Generally, each type of information source responds to different user needs, of different scale, and presents specific advantages and disadvantages for analytical purposes.

Global Sources

They consist on databases that come from international organizations on a global scale, whose characteristic is to offer a high coverage of countries, sometimes resorting to estimates and imputations of data for countries that lack national official data. Another characteristic is the usual transverse homogenization of calculation and estimation methods, without considering the differences in the statistical generation capacity of countries and regions. The main sources of global information used to prepare this Yearbook were the World Bank's database, the World Development Indicators[1] ; the last update of the database was used, consulted on October 15, 2017, and the BP Statistical Review of World Energy 2017[2] .

Regional Sources

These are databases and statistical information from regional organizations that, just like OLADE, have a partial coverage of the countries of the Latin American and Caribbean region. In this case, the statistical processing used allows regional comparability based on the national data that these agencies compile from their Member Countries. The economic and demographic indicators were obtained for this Yearbook, form the database of the Commission for Latin America and the Caribbean (ECLAC, UN) called CEPALSTAT[3]

Needless to say, the energy information from the Latin America and the Caribbean countries contained in the Yearbook comes from sieLAC (http://sielac.olade.org/), the Energy Information System which OLADE manages and updates on the basis of information officially supplied by Member Countries. The energy statistics presented and plotted in this yearbook come from the most recent update of the information requested to the OLADE's Member Countries through the OLADE SIE Advisers in the countries, who act as a link between the energy authorities in each country and OLADE and provide official information. In this sense, it is important to note that for the realization of this yearbook OLADE acts as a user and it does not constitute the producer or primary source of the energy information sector. The energy authorities in each country are the ones who provide this information and have the necessary resources and knowledge to collect and process the data with which this yearbook was made, based on previously agreed methodologies. Likewise, being aware that this is the Yearbook's first edition; and that the information used could have some discrepancies with the national data sources, particularly in the first years recorded in the time series, we invite the energy community of the Member Countries to send us their comments and suggestions about the information provided and the contents of the Yearbook to the email address: sielac@olade.org.

National sources

In most cases, it was used official information provided by the SIE Advisors of each country. When no information is available for the Energy Balances of a given country, estimates are made with partial information that is usually obtained from official institutions (Ministries, Secretariats and National Energy Directorates, Sector Regulatory Agencies, National Commissions of Energy, etc.) Data from these sources usually have a lower scope and are not always comparable with other data in the region and are therefore used to estimate trends, particularly in the last reference year (in this case, 2016).

Given the dynamic nature of the statistical information presented in this Yearbook, the series included may not coincide with subsequent queries to the used databases.

1. http://databank.worldbank.org/wdi
2. https://www.bp.com/content/dam/bp/en/corporate/pdf/energy-economics/statistical review2017-/bp-statistical-review-of-world-energy--2017full-report.pdf
3. http://estadisticas.cepal.org/cepalstat

Timeline of the analysis and base year

The Energy Statistics Yearbook presents information about the evolution and trends of numerous statistics and indicators that combine energy, economic and social information. Attempts have been made to make the most of the visual space in each graph so that in some cases, additional information is presented on the right axis. The information is displayed in the form of graphs covering a period between 2000 and 2016. The economic information refers to the base year 2011 in the case of GDP of Purchasing Power Parity and base 2010 for GDP at constant prices.

Country coverage

The information presented covers the 27 Member Countries of OLADE, where available data so allow it. These are: The Republic of Argentina, Barbados, Belize, the Pluri-national State of Bolivia, the Federative Republic of Brazil, the Republic of Chile, the Republic of Colombia, the Republic of Costa Rica, the Republic of Cuba, the Republic of Ecuador, the Republic of el Salvador, Grenada, the Republic of Guatemala, the Co-operative Republic of Guyana, the Republic of Haiti, the Republic of Honduras, Jamaica, the United Mexican States, the Republic of Nicaragua, the Republic of Panama, the Republic of Paraguay, the Republic of Peru, the Dominican Republic, the Republic of Suriname, the Republic of Trinidad & Tobago, the Eastern Republic of Uruguay and the Bolivarian Republic of Venezuela. In order to make the presentation of the indicators as user-friendly as possible, the short name of each country was used and it is presented in alphabetical order.

Discrepancies and statistical reconciliation

It is possible that when comparing indicators presented in this Yearbook with those published in other documents, there may be statistical discrepancies due to differences in the applied units systems and their conversion factors, conceptual definitions and methodological options used. These differences may be subtle, such as differences in the years or countries included, or more complex ones, such as the use of approximate indicators (proxies) or estimates of different nature, different geographic coverage (regional, national, local), differences in the databases updating periods consulted or the use of different population denominators and / or GDP. This Yearbook has sought to reconcile statistical data, presenting as explicitly and comprehensively as possible the conceptual and methodological definitions used.

About the population denominators and GDP

For all per capita indicators used in the Yearbook, the same database was used from the Latin American and Caribbean Demographic Center (CELADE, Population Division, ECLAC, and UN).

In order for comparability between countries to capture as effectively as possible the real effects of economic activity and to isolate, as much as possible, the exchange rate effects, the GDP values used in the Yearbook correspond to the annual statistical series of accounts expressed in purchasing power parity (PPP) and published by the World Bank in the base year 2011. The current series published by ECLAC were considered to carry out the sectorial weights, in the case of energy intensities and CO_2.

Methodology and definition of indicators

Reserves

These are the total amounts available in the deposits of fossil and mineral sources at a given date, within the national territory, which are feasible to be exploited to the short medium or long term. They are classified into proven, probable or possible reserves. The proven reserves are those that are economically extractable from existing wells or reservoirs with the country's available infrastructure and technology at the time of evaluation. Included are schemes of improved production, with a high degree of certainty in reservoirs that have demonstrated favorable performance in the exploitation. They are measured by exploratory studies.

Natural gas reserves represent the amount of natural gas that is found in the subsoil of all the deposits, whether associated or not associated with oil, at a certain date. Associated gas reserves are estimated as percentages of oil reserves.

Energy Sources

Crude oil

It corresponds to the individual audited oil productions of all the country's oil fields, after the separation process that is carried out at the wellhead of the extraction fluid which may contain natural gas liquids, natural gas, and water in addition to crude oil.

Oil derivatives

These are the products processed in a refinery that use oil as raw material. Depending on the composition of crude oil and demand, refineries can produce different oil products. Most of the crude oil is used as raw material for energy, for example, gasoline. They also produce chemical substances, which can be used in chemical processes to produce plastic and/or other useful materials. Since oil contains 2% sulfur, large amounts of sulfur are also obtained. Hydrogen and coal in the form of petroleum coke can also be produced as oil derivatives.

The production of oil products is broken down into fuel oil, diesel oil, LPG, kerosene, jet fuel, gasoline, alcohol, and others (non-energy plus other secondary and all energy that are not recorded individually).

Other energy Other Sectors

It corresponds to the grouping of the following energy: coke, fuel oil, gas, non-energy and other secondary.

Other energy Transport Sector

It mainly corresponds to the grouping of the following energy: natural gas and fuel oil.

Natural gas

Mixtures of gaseous hydrocarbons formed in sedimentary rocks and in dry deposits or together with crude oil. It consists mainly of methane (86%), liquefied petroleum gases, nitrogen and carbon dioxide. Due to its high caloric power and the almost total absence of contaminants, it is used in the generation of electric power and in domestic consumption for caloric uses.

Natural gas production refers to the sum of the production of the natural gas fields both associated and not associated with oil, including offshore production within national waters. Shale gas and gas obtained from coal mines is also added to the production. For gas associated with oil, this measurement is performed after the separation of the extraction fluid that contains crude oil, natural gas liquids, natural gas, and water. For free or non-associated gas, the measurement is taken directly from the wellhead.

Coal

It is the sum of the productions of the coal mines of the country. Coal has very different calorific power before and after washing. To avoid inconsistencies, coal is considered as washed coal, that is, without impurities. This coal is known as: anthracite, bituminous coal, lignite, and peat, which are the main varieties and possess precise calorific powers of between 4,000 and 8,000 kcal/kg. The production of coal can come from three sources: underground mines, surface mines, and recovery. The quantities used for the production process and those delivered to other energy producers are included.

Biofuels

Fuel from organic matter or biomass. It includes primary energy sources such as wood, as well as derived fuels such as methanol, ethanol, and biogas, from primary elements after undergoing biological conversion processes, i.e., fermentation or anaerobic digestion.

Energy aggregates

Production

It is considered the internal production of all primary energy source, extracted, exploited or harvested, in the national territory, that is important for the country.

Imports

It is the amount of primary and secondary energy sources, originated outside the borders and entering the country to form part of the total energy supply.

Exports

It is the quantity of primary and secondary energy sources that leave the territorial limits of a country and, therefore, are not destined to the supply of the domestic demand. This concept excludes the quantity of fuels sold to foreign air and sea ships.

Total Domestic Energy Supply

It is the sum of the total amount of energy, of both primary and secondary sources and, to avoid double accounting, in the case of Production, only the production of primary sources that is available for internal use is considered, either for input to transformation, for self-consumption of the energy sector or for final consumption. Part of this item is also covered by the losses that occur in the different stages of the energy chain. The total domestic supply is calculated using the following formula:

$$TDES_t = PP_t + IM_t - EX_t + SC_t - NU_t$$

Where:

$$\begin{aligned} TDES_t &= \text{Total domestic energy supply in } t \\ PP_t &= \text{Production of primary sources in } t \\ IM_t &= \text{Imports of primary and secondary energy in } t \\ EX_t &= \text{Exports of primary and secondary energy in } t \\ SC_t &= \text{Stock changes in } t \\ NU_t &= \text{Not used energy in } t \end{aligned}$$

Total energy supply by source

It is the quantity of energy of each source, which is available for internal use, either for input to transformation, for self-consumption of the energy sector or for final consumption. Part of this item is also covered by the losses that occur in the different stages of the energy chain. The total domestic supply by source is calculated using the following formula:

$$TDES_t^i = PP_t^i + IM_t^i - EX_t^i + SC_t^i - NU_t^i$$

Where:

$$\begin{aligned} TDS_t^i &= \text{Total domestic energy supply in } t \text{ of source } i \\ PP_t^i &= \text{Primary and secondary production in } t \text{ of source } i \\ IM_t^i &= \text{Primary and secondary imports in } t \text{ of source } i \\ EX_t^i &= \text{Primary and secondary exports in } t \text{ of the source } i \\ SC_t^i &= \text{Stock changes of primary and secondary energy} \\ &\quad \text{in } t \text{ of source } i \\ NU_t^i &= \text{Not used energy in } t \text{ of source } i \end{aligned}$$

Installed Capacity

It is the nominal capacity of supply of a generation plant by each type of technology. In the Yearbook, it is presented in aggregate form. It is expressed in Megawatts (MW) or Gigawatts (GW).

Electricity Generation

It is defined as the production of electricity from local generators, including self-producers. It is expressed in Megawatts hour (MWh) or Gigawatts hour (GWh).

Electrification rate

It is the percentage of inhabitants that have electric service versus the total number of inhabitants. It is obtained by dividing the total population served by the total population of the country, expressing the value in percentage.

Population without access to electric service

It is an estimate of the number of people who do not have access to electricity services. It is defined by the expression:

$$PWAE = \text{Total Population} \cdot (1 - \text{Electrification rate})$$

Final energy consumption

It refers to all the energy delivered to the consumption sectors (total final consumption, of all productive sectors, final consumption by sector) for its use as useful energy. Excluded from this concept are the sources used as inputs or raw materials to produce other energy products, as this corresponds to the "transformation" activity.

Primary energy consumption

It refers to the consumption of natural resources available directly or indirectly that do not undergo any chemical or physical modification for their energy use. The main sources considered by the energy balances of the countries of Latin America and the Caribbean are oil, natural gas, mineral coal, hydroelectricity, firewood and other by-products of firewood, biogas, geothermal, wind, nuclear, solar and other primary such as bagasse and agricultural or urban waste.

Macroeconomic aggregates and social indicators

Added Value

It is the macroeconomic magnitude that measures the added value generated by the set of producers of the economy of a country. Gross Value Added (GVA) is the Gross Value of Production (GVP) (i.e. the value of all goods and services produced in a country) minus the Intermediate Consumption (IC) (i.e. the value of the inputs used in the production of non-durable goods and services). The GVA in a given period at constant prices of a given base year is estimated by valuing the quantities produced in that period at the prices of the base year considered. For more technical details it is recommended to consult the National Accounts System (UN, 2008).

Gross domestic product at constant prices

The Gross Domestic Product (GDP) is the macroeconomic magnitude that expresses the monetary value of a country's final set of goods and services over a specific period of time. It is published quarterly or annually. Annual values are used in this Yearbook. The sum of the Gross Aggregate Values (GVA) of all the economic sectors plus the net taxes of subsidies on the products, make up the Gross Domestic Product (GDP) of a country. Since national accounts are calculated in local currency, for international comparisons, GDP values are converted into dollars or expressed in Purchasing Power Parity (PPP). GDP can be expressed at current or constant prices. In the first case, the value is expressed at current market prices in the year of its calculation. For the GDP indicator to express the evolution of levels of economic activity in real terms, the distortion of price changes is eliminated and prices of a base year are taken as a reference. In this case, GDP is expressed at constant prices. To this end, GDP is accounted for by reference to a basket of prices (deflator) that refers to the base year considered.

GDP expressed in PPP constant dollars is an indicator that transforms the nominal value of local GDP to a valorization that is performed in relation to a weighted standardized price basket and that takes the United States of America as a reference for comparisons. The valorization of GDP and other macroeconomic aggregates to PPP, allows decoupling the results of the variations that may exist in the exchange rate between the local currency and the dollar from year to year. By eliminating the monetary illusion linked to the value of the dollar in each country and reflecting the purchasing power that this currency has in each of them, this valorization methodology, when used to compare the performance of the countries, reflects more accurately the real activity in the consumption and production of goods and services and therefore, of the final demand of the economy.

Private consumption

Household consumption expenditure, commonly referred to as private consumption, is the effective and imputed expenditure of households plus social in kind transfers from non-profit institutions that serve the households.

Human Development Index (HDI)

It is a compound indicator, defined by the UNDP (United Nations Development Programme) that represents a measure of the progress achieved by a country in three basic dimensions of human development: (i) long and healthy life, (ii) access to education and (iii) decent standard of living, and it is estimated as a geometric mean, at equal weights, of the normalized indices of each of the three dimensions mentioned above. The variables used for each dimension are as follows:

(i) Life Expectancy Index: life expectancy at birth is used.

(ii) Education Index: It is a compound indicator that includes the adult literacy rate and the combined gross ratio of enrollment in primary, secondary and higher education, as well as the years of mandatory education.

(iii) Standard of living: Composed of GDP adjusted to purchasing power parity dollars per capita.

For the construction of the aggregate index, for each dimension, the results are normalized by taking the minimum and maximum values, so that values between 0 and 1 are obtained, in order to finally calculate the geometric average of the indices of the 3 dimensions to the same weight.

Energy Indicators

Energy intensity

It is an economic-energy indicator that allows aggregate quantification of the link between energy consumption and the production capacity of the economy. In general, it is calculated as the ratio between Energy Consumption and Gross Domestic Product (GDP). It allows a rough estimate for the level of efficiency in the use of the energy resources of the unit under analysis. Variations in the values of this relationship over time and across countries reflect changes in the economy and changes in the way energy is consumed in each country.

In order to establish cross-country comparisons, it can be calculated by using GDP values at constant prices in dollars of a base year or GDP at purchasing power parity (PPP) values. In the latter case, the valorization is performed in relation to a weighted standardized price basket, which takes the United States of America as a benchmark for comparisons. The valorization of GDP and other macroeconomic aggregates to PPP allows decoupling the results of the variations that may exist in the exchange rate between the local currency and the dollar from year to year. By eliminating the monetary illusion linked to the value of the dollar in each country and reflecting the purchasing power that this currency has in each of them, this valuation methodology, when used to compare the performance of the countries, reflects more accurately the real activity in the consumption and production of goods and services.

Primary Energy Intensity

It is defined as the ratio between the Primary Energy Consumption and the Gross Domestic Product in Purchasing Power Parity at a constant value of 2011 (GDP USD2011 PPP). It measures the total amount of energy needed to produce a unit of GDP. It is expressed in kilograms of oil equivalent per PPP constant dollar (koe / USD2011 PPP).

Final Energy Intensity

It is defined as the ratio between Final Energy Consumption and GDP USD2011 PPP. It is linked to final uses, that is, it is evaluated at the level of final consumption (excluding the production centers) and can be calculated at the sectorial level by taking values from the energy balances and the variables that make up the GDP. Among the factors that affect the intensity of the final energy we can name the following:

(i) Structure Effect: changes in the sectorial composition of GDP. For example, if the economy is outsourced, under equal conditions, the final energy intensity decreases, thus a decrease in the contribution of energy-intensive branches would lead to a decrease of the final energy intensity.
(ii) Efficiency Effect: the replacement of more efficient sources and generation technologies , the penetration of more efficient equipment, the implementation of energy saving techniques or the change of habits of the population, towards more rational consumption practices.
(iii) Activity Effect: Changes in the economic activity levels and the consequent changes in consumption patterns can obviously affect the evolution of final energy intensity.
(iv) Changes in patterns of consumption, for example, modal changes in the use of urban transport or social changes, like the increase of single-parent housing due to the increase in separations or divorces, or improvements in the living standards, which lead to a higher demand for devices in households.

It is expressed in kilograms of oil equivalent per PPP constant dollar (koe / USD2011 PPP).

Sectoral energy intensities

It is the relation between the Final Energy Consumption of each sector and the Sectoral Added Value expressed in PPP at constant value of the year 2011, corresponding to the same sector. For the specific case of the Residential sector, energy intensity is defined as the ratio between the final consumption of the sector and the PPP private consumption at a constant value.

$$EI_{it} = \frac{FC_{it}}{GVA_{it}}$$

Where:

$$\begin{aligned} EI_{it} &= \text{Energy intensity of sector } i \text{ in time } t \\ FC_{it} &= \text{Final consumption of sector } i \text{ in time } t \\ GVA_{it} &= \text{Gross value added of sector } i \text{ in time } t \\ i &= \text{Sectors: Industrial, Service, Transport,} \\ & \quad\ \text{Residential \& others} \end{aligned}$$

This Yearbook expresses the sectorial intensities in kilograms of oil equivalent per PPP constant dollar (koe / USD2011 PPA).

It is important to note that, since more detailed information on the transport sector is not available, the added value of the transport sector has been used as a proxy for the level of activity. In this case, the level of economic activity in this sector only computes activities related to passenger and cargo transportation (land, air and maritime), storage activities and communications. It should be borne in mind that self-transport by companies to distribute their products and households, is not part of this definition.

For this reason, the energy intensity of the transport sector tends to be underestimated, since the energy consumption of the sector also includes fuel consumption of the residential sector and companies.

Ratio between Final Intensity / Primary Intensity

It represents the relation between the Final Consumption and the Primary Consumption of Energy. In most countries, there is a slight decrease in this ratio indicating that, on average, more and more primary energy per unit of final energy consumption is needed. The losses in the transformations and the distribution of energy, and mainly in energy generation, where the majority of these losses are registered, are responsible for most of the differences between the primary and final energy consumption.

The variability of this relationship can be due to several factors (ECLAC, 2013):

(i) Changes in energy supply, particularly in the generation mix or in the technical and non-technical loss levels, will affect the relationship. For example, an increase in the share of thermal energy generation increases the gap between the two intensities; in contrast, an increasing share of hydropower or wind energy reduces this gap.

(ii) Changes in the efficiency of the transformations: for example, a higher efficiency of thermal power plants (for example, by the development of combined cycle gas plants) reduces the relationship between final and primary intensity.

(iii) Changes in the share of secondary energies (mainly electricity) in the final consumption.

(iv) The change in the percentage of energy for non-energy uses decreases the value of the relation since these consumptions are included in the primary intensity but are excluded from the final intensity.

(v) Changes in the proportion of imported secondary energies, for example, the increase in electricity imports will reduce the transformation losses and, therefore, will reduce the gap between the two intensities.

Intensity of final energy at constant structure

It serves to analyze the effect of the structural changes in the GDP on the energy intensity by facilitating the comparison of the Final Energy Intensity with an estimate of the Final Energy Intensity calculated on the assumption that the economic structure remained unchanged with respect to a base period. The Energy Intensity at Constant Structure is then a theoretical intensity that results from assuming that all sectors grow at the same rate as GDP (i.e. the structure of GDP remains constant with respect to the base year). It is estimated using the actual values of the sectorial intensities. The calculation is made considering the main sectors (industry, tertiary, transport and residential).

$$EICS_t = \frac{\left[\frac{VA_{t_o}^{Ind}}{VA_t^{Ind}}\right] \cdot FC_t^{Ind} + \left[\frac{VA_{t_o}^{Serv}}{VA_t^{Serv}}\right] \cdot FC_t^{Serv} + \left[\frac{GDP_{t_o}}{GDP_t}\right] \cdot FC_t^{Trans} + \left[\frac{C_{t_o}^{Resid}}{C_t^{Resid}}\right] \cdot FC_t^{Resid}}{GDP_{t_o}}$$

Where:

$$\begin{aligned} EICS_t &= \text{Energy intensity at constant structure in time } t \\ VA &= \text{Value added: industrial (Ind) y Service (Serv)} \\ t_o &= \text{Reference or base period: 2000} \\ FC &= \text{Final consumption of energy: Industrial (Ind),} \\ &\quad \text{Service (Serv), Transport (Trans), Residential (Resid)} \\ C^{Resid} &= \text{Household final consumption expenditure} \\ GDP &= \text{Gross Domestic Product} \end{aligned}$$

Avoided energy demand due to changes in energy intensity

The elasticity of a "Y" magnitude respect of another "x", that is the Elasticity (y, x) , tells in what percentage does "Y" vary, when "x " increases by 1%. Since it is a ratio between 2 rates of variation, it can be represented as:

$$Elasticity(y,x) = \frac{x}{y}\frac{dy}{dx} = \frac{d\ln(y)}{d\ln(x)} \approx \frac{\Delta\ln(y)}{\Delta\ln(x)}$$

Similarly, if we take the Energy Intensity and the Final Energy Consumption of the sector i, the value of:

$$\frac{\ln(EI_t) - \ln(EI_{t-1})}{\ln(FC_t) - \ln(FC_{t-1})}$$

It represents the percentage that varies the Energy Intensity between t and t-1 of sector i, when the final energy consumption varies by 1%. We can then use this value to weight the variation in the final consumption and calculate the avoided energy demand in the period t of the sector i, that is:

$$AED_t^i = (FC_t^i - FC_{t-1}^i) \cdot \left(\frac{\ln(EI_t^i) - \ln(EI_{t-1}^i)}{\ln(FC_t^i) - \ln(FC_{t-1}^i)}\right)$$

This indicator estimates the variation of the final energy weighted by the changes in the Energy Intensity due to the changes in the final energy. For this reason, it is a good approximation of the avoided demand by improvements in energy efficiency. In this case the value is negative. Conversely, when its value is positive, it accounts for the final energy demand induced by increases in inefficiency (increase in intensity) in the use of energy.

This same indicator could be calculated at the level of the economic sectors, thus computing the energy avoided demands in each sector. In the graphs published in this yearbook, and to better capture the evolution of the ongoing avoided (or induced) demands, given due to the changes that occur over time in energy intensity and in final energy consumption, the evolution of avoided energy demand is calculated by setting 1999 as the base year (World Bank, 2015).

Analysis of the structural decomposition based on the Logarithmic Mean Divisia Index (LMDI)

It is an index developed by François-Jean-Marie Divisia in the 1920s, designed to analyze changes of a magnitude over time from subcomponents that are measured in different units. The resulting series is dimensionless. It started to be used in the 1970s, in the energy scope to break down the causal factors of the changes in energy consumption, allowing to disaggregate the activity effect (due to the aggregate change in economic activity), the structure effect (due to changes in the structural composition of the economy, i.e. changes in the relative shares of the activity's branches) and efficiency effect (due to the energy savings generated) (Ang and Liu, 2006).

Since we are processing time series, we used the multiplicative version of the Logarithmic mean divisia Index . Then, the changes in the Final Consumption between the instant t and a reference instant to, are decomposed into the 3 effects mentioned:

$$\frac{FC_t^{Tot}}{FC_{to}^{Tot}} = D_t^{Tot} = D_t^{act} \cdot D_t^{str} \cdot D_t^{eff}$$

With:

$$D_t^{act} = \exp\left[\sum_{i=1}^{n_{sectors}} \widetilde{w_t^i} \cdot \ln\left(\frac{Q_t}{Q_{t_o}}\right)\right]$$

$$D_t^{str} = \exp\left[\sum_{i=1}^{n_{sectors}} \widetilde{w_t^i} \cdot \ln\left(\frac{P_t^i}{P_{t_o}^i}\right)\right]$$

$$D_t^{eff} = \exp\left[\sum_{i=1}^{n_{sectors}} \widetilde{w_t^i} \cdot \ln\left(\frac{EI_t^i}{EI_{t_o}^i}\right)\right]$$

being:

$$\widetilde{w_t^i} = \frac{\left[\frac{FC_t^i - FC_{t_o}^i}{\ln(FC_t^i) - \ln(FC_{t_o}^i)}\right]}{\left[\frac{FC_t^{Tot} - FC_{t_o}^{Tot}}{\ln(FC_t^{Tot}) - \ln(FC_{t_o}^{Tot})}\right)\right]}$$

where:

$$\begin{aligned}
FC_t^{Tot} &= \text{Final consumption of all sectors in time } t \\
FC_t^i &= \text{Final consumption of sector } i \text{ in } t \\
t_o &= \text{Reference or base time period: 1999} \\
D_t^{act} &= \text{Decomposition factor that explain activity effect in } t \\
D_t^{str} &= \text{Decomposition factor that explain structure effect in } t \\
D_t^{eff} &= \text{Decomposition factor that explain efficiency effect in } t \\
Q_t &= \text{Total activity level (i.e the sum of sectoral value added) in } t \\
P_t &= \text{Share of sector } i \text{ in } t \\
EI_t^i &= \text{Energy intensity of sector } i \text{ in } t \\
i &= \text{Represents sectors: industrial, service, transport and others}
\end{aligned}$$

The year 1999 was considered as a reference year in this Yearbook, and only the productive sectors were used to analyze the evolution of the explanatory factors of the changes that occurred in the final energy consumption.

Efficiency in the transformation processes

It is defined as the relation between the Final Energy Consumption and the Total Energy Supply. This indicator, when presented as a time series, accounts for the aggregate performance of the transformation centers that convert primary energy into secondary energy regardless of the source.

Efficiency of the electricity sector

It is the relationship between the production of electricity and the inputs required in its generation. In this case, and taking into account that the indicator refers to the processes of transformation of the electricity sector, the inputs must be taken from the transformation centers (including self-producers) and not from the consumer sectors as in the latter case that considers the transformation process as a whole (including, for example the refining processes). As for the hydroelectricity, wind and solar generation, the value of the inputs is equal to the amount of electricity produced, thus it is assumed that the efficiency is 100%.

Ratio between Losses / Electricity supply

Losses in the electricity transmission and distribution systems are the sum of the technical or non-technical inefficiencies that occur in a given time frame.

The technical losses are related to the energy lost during transportation and distribution within the network as a result of the natural heating of transformers and conductors that transport electricity from the generation plants to the customers. According to the second principle of thermodynamics, the technical losses cannot be eliminated completely, although it is possible to reduce them through improvements in the network.

Non-technical losses represent the remaining balance of energy losses and constitute the energy consumed that has not been billed due to technical or administrative errors, measurement anomalies, self-connecting customers or energy thefts.

Since increasing levels of losses in the system result in lower availability of installed capacity, decrease, in turn, revenues from unbilled consumptions; this can lead to increases in electricity rates due to the waste of energy generated and increases the costs of maintenance of the distribution networks. It becomes important to establish quantitative measures that allow to evaluate the evolution of the levels of the losses and, therefore, of the efficiency of the electrical system. The relationship between losses and the electricity supply is the appropriate indicator to measure and evaluate the state of electricity losses over time.

Renewability index of primary energy supply

It is defined as the percentage that represents the renewable primary energy supply with respect to the total energy supply. The total supply of renewable primary energy can be considered as the total renewable energy entering the transformation centers plus the final consumption of that energy. The total energy supply has been defined in a previous section. This indicator measures the degree of penetration of renewable resources in the country's energy matrix. In combination with emission factors, it can also assess the mitigation of the environmental impact that takes place in the energy sector.

Energy External Dependency Index

It is defined as the ratio of total energy imports minus total exports divided by total primary energy supply.

Hydrocarbon autarky index

It is defined as the primary production of hydrocarbons (oil and natural gas) divided for the total supply of these same sources plus the supply of oil products minus the production of derivatives (to avoid double accounting). When the index is greater than the unit, the country is self-sufficient, while if it is less than 1, the country is dependent on imports of crude oil, natural gas or oil products.

Index of biomass residential consumption

It is defined as the ratio between the sum of fuelwood and charcoal consumption in the residential sector divided by the final consumption of the residential sector.

Participation of hydro-energy in the renewable primary supply

It defines the proportion of hydroelectricity in the renewable supply. It is calculated by dividing the total supply of hydro-energy by the primary supply of renewable energies.

Participation of Dendroenergy in the total renewable supply

It is defined as the amount of dependence on energy produced after the combustion of wood fuels such as firewood, charcoal, pellets, etc. It is calculated dividing the total supply of firewood and charcoal by the primary supply of renewable energy.

Energy path

It is a graphical representation that attempts to briefly summarize the link between the evolution of the levels of development of a country or sub-region, expressed in a very simplified way by GDP per capita, and the quality of its energy performance, represented by changes in the Energy final intensity. By combining both variables in a single graph it is possible to identify periods of time that have a virtuous or desirable performance, since the per capita GDP levels increase and, therefore, the path shifts to the right, while the energy intensity decreases, moving the energy path downwards. On the contrary, if at some period of time the energy path shifts to the left, this would mean that a contraction of economic activity has taken place; whereas if it moves upward, energy intensity would be increasing over previous periods, for which the energy performance would be, in aggregate terms, more inefficient. Given this combination of variables expressed in the figure, it is also possible to represent a set of level curves that represent the possible combinations of GDP per capita and Energy Intensity that maintain a constant value of the final energy consumption per capita. In this sense, if a sub-region or country has an energetic path whose trajectory moves through different level curves, that is crossing them, it means that the final consumption per capita is changing and, therefore, the patterns in which the energy demand is generated have been modified.

This may be due for example, to a greater provision of electronic devices in households or a substantial growth in the vehicle fleet. Likewise, it could happen that the energy path moves to the right and up, which could mean not a growth of energy inefficiency but a change in the productive structure that, in particular, happens in the industrial sector. Clearly, the analysis of the energy paths should be complemented by a more detailed analysis of how the economic activity and the productive matrix evolved, as well as to know the how and why of the changes that took place in the energy matrix.

Indicators of CO_2 emissions

CO_2 emissions derived from the combustion of fossil fuels, unlike other greenhouse gases, can be calculated with an acceptable degree of accuracy from the calculation of the amounts of carbon contained in fuels, while the volume of the other emissions depends on the technologies and the combustion conditions.

The most important source of CO_2 emissions in the Energy Sector is the carbon oxidation that takes place during the combustion process of fossil energy sources and represents between 70% and 90% of total anthropogenic emissions. The rest is emitted in the form of carbon monoxide (CO), methane (CH4) and another form of compound hydrocarbons, that, in the time frame from a few days to 10 or 11 years, oxidizes in the atmosphere to become CO_2.

In this Statistical Yearbook, the method of estimation of emissions by technologies was applied. According to the IPCC (Intergovernmental Panel on Climate Change), this method consists of estimating the CO_2 emissions depending on the activity and technology under which the energy is used. It is about quantifying the emissions that occur along the energy chains, from the use of primary energies, through the processes of transformation, losses due to transportation and distribution, until the final use of energy. CO_2 emissions of the sector i during the time t, are calculated using the expression:

$$Emissions_t^i = \sum_{j=1}^{\text{Source}} EF_j^i \cdot FC_{jt}^i$$

METHODOLOGY

where:

$$\begin{aligned} EF_j^i &= \text{Emission factor of source } j \text{ of sector } i \\ FC_{jt}^i &= \text{Final consumption of energy of source } j \\ &\quad \text{of sector } i \text{ in } t \end{aligned}$$

Thus the total emissions during time t are:

$$Total\ Emissions_t = \sum_{i=1}^{Sectors} Emissions_t^i$$

This Yearbook not only presents total CO_2 emissions by sectors of final consumption, but it shows total emissions per capita and per unit of GDP in dollars as of 2011, expressed in purchasing power parity.

It is worth mentioning that the emission values presented do not strictly correspond to the national official greenhouse gas inventory reports, according to the 2006 IPCC guidelines.

The Carbon Dioxide Emission factors used as reference for the calculations can be consulted in the sieLAC option Energy Statistics - Environmental Impact.

CO_2 emissions index per energy consumed

It is defined as the ratio of total CO_2 emissions divided by the final consumption of energy.

CO_2 emissions index in the electric generation

It is defined as CO_2 emissions produced by electricity generation divided by total electricity production.

Generic formulas

Variation rates

It is defined as a variation of an amount relative to its previous value in relative terms, that is, as the rate of change of it. It is expressed as a percentage. The rate of change can be "punctual" when comparing data from two periods or maybe a "cumulative average variation rate" when calculated based on the initial and final data of a series of values.

Formula of the percentage change rate:

$$VR_t = \frac{M_t - M_{t-1}}{M_{t-1}} \cdot 100$$

where:

$$\begin{aligned} VR_t &= \text{Percentage change rate in } t \\ t &= \text{Period of time} \\ M_t &= \text{Amount or value in time } t \\ M_{t-1} &= \text{Amount or value in previous time } t-1 \end{aligned}$$

Formula of the cumulative average variation rate:

$$\overline{VR_{t+n}^t} = \left[\left(\frac{M_{t+n}}{M_t} \right)^{\frac{1}{n}} - 1 \right] \cdot 100$$

where:

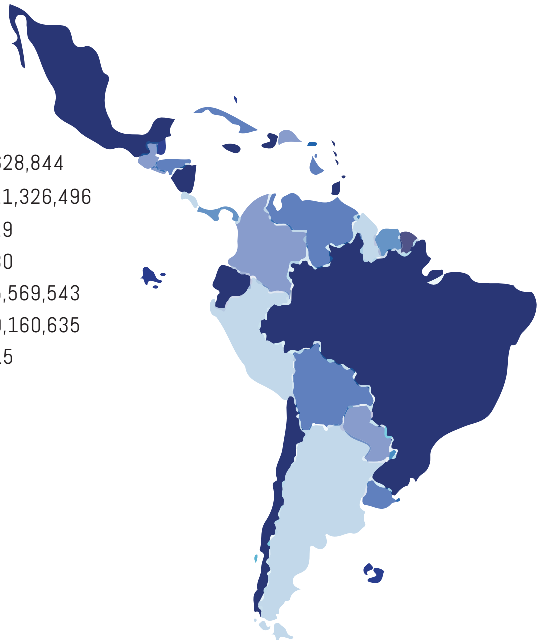
$$\begin{aligned} \overline{VR_{t+n}^t} &= \text{Cumulative average variation rate} \\ &\quad \text{between } t+n \text{ and } t \\ M_t &= \text{Amount or value in time } t \\ M_{t+n} &= \text{Amount or value in time } t+n \end{aligned}$$

Statistics and aggregate energy indicators of Latin America and the Caribbean and the World

LATIN AMERICA AND THE CARIBBEAN

GENERAL INFORMATION 2016

Population (thousand inhab.)	628,844
Area (km²)	21,326,496
Population Density (inhab./km²)	29
Urban Population (%)	80
GDP USD 2010 (MUSD)	5,569,543
GDP USD 2011 PPP (MUSD)	9,160,635
GDP per capita (thou. USD 2011 PPP/inhab.)	15



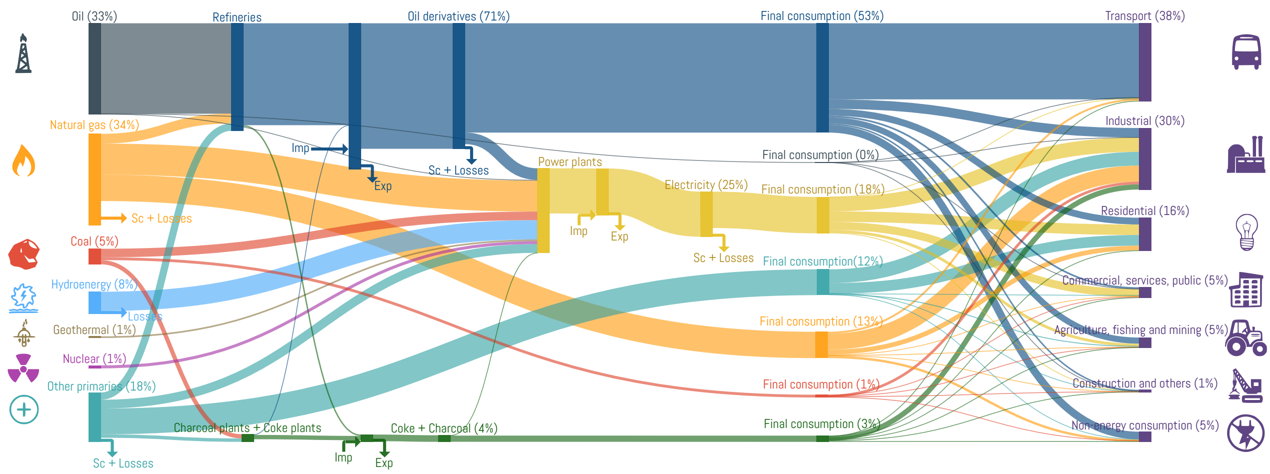
ENERGY SECTOR

Final consumption in the Transport Sector	Mtoe	236
Final consumption in the Industrial Sector	Mtoe	186
Final consumption in the Residential Sector	Mtoe	100
Final consumption in the Commercial and Service Sector	Mtoe	33
Final consumption in the Agriculture, Livestock, Fishing, Mining, Other and Non - Energy Consumption	Mtoe	69

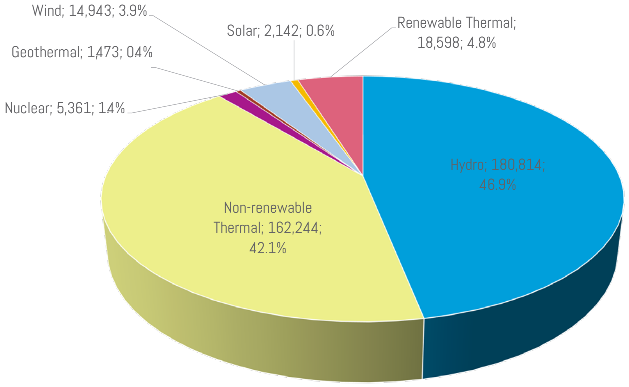
Oil Reserves	Natural gas reserves	Coal reserves
Mbbl 330,955	Gm³ 7,653	Mt 14,831

Electricity consumption per capita	Final energy consumption per capita	Electrification rate	Total energy supply	Total energy production	Total energy imports	Total energy exports	Total final energy consumption	Refining capacity	Installed power generation capacity	Primary energy intensity and final energy intensity
kWh / inhab.	toe / inhab.	%	Mtoe	Mtoe	Mtoe	Mtoe	Mtoe	kbbl/day	GW	koe / USD 2011 PPP
2,034	0.99	97	885	1,086	275	422	624	7,459	294	0.09 / 0.07

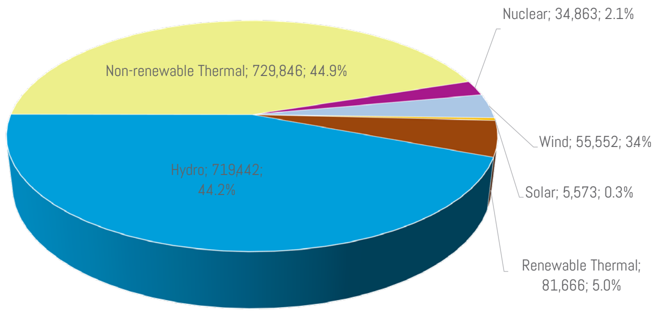
Summarized energy matrix 2016



Installed power generation capacity LAC [MW; %]
2016

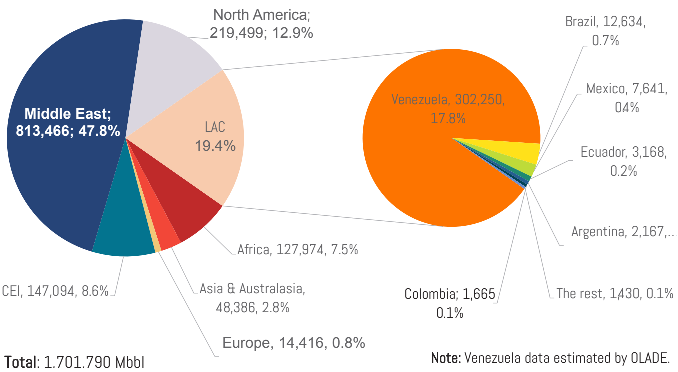


Electricity Generation LAC by Source [GWh; %]
2016



Renewable thermal generation includes geothermal generation.

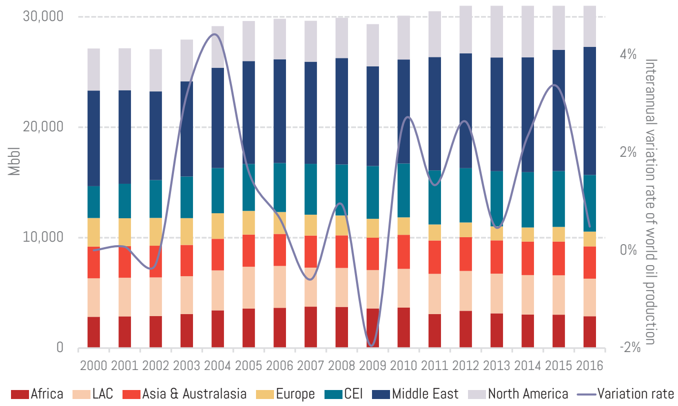
World proven reserves of oil [Mbbl, %]
2016



Total: 1.701.790 Mbbl

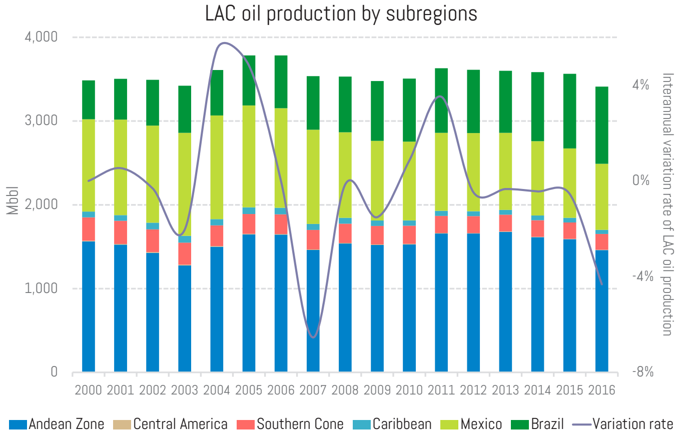
Note: Venezuela data estimated by OLADE.

World oil production by subregions

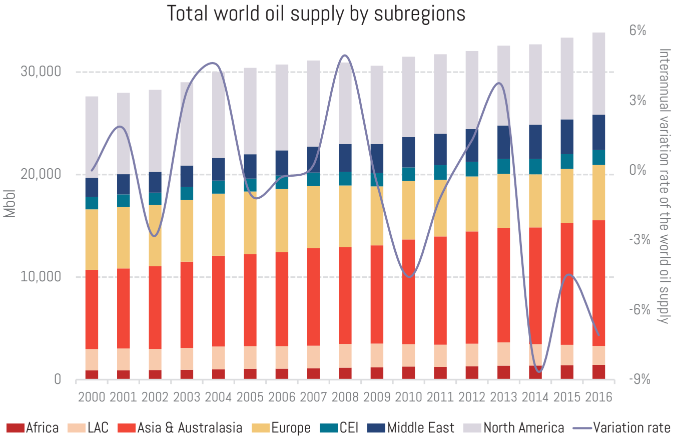


LAC

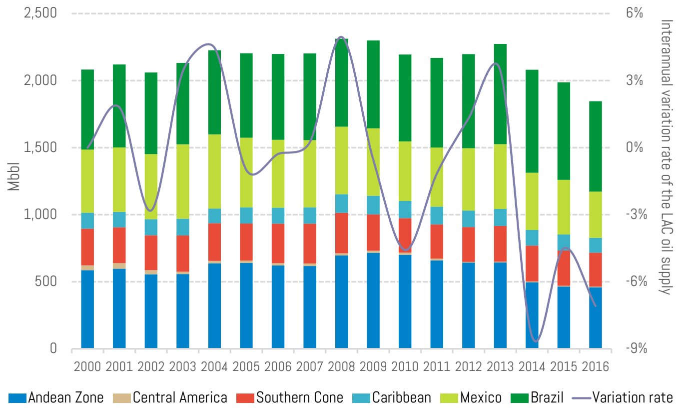
LAC oil production by subregions



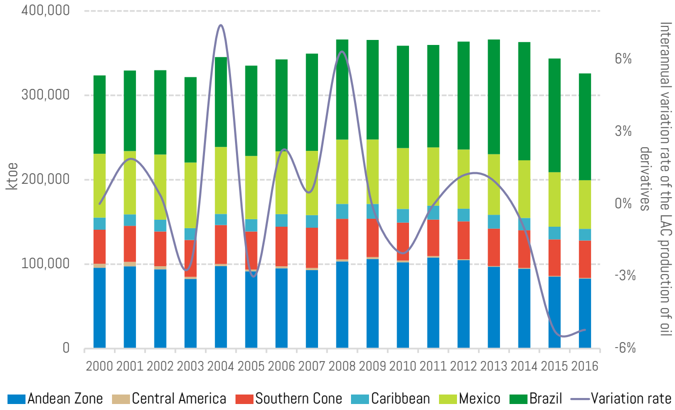
Total world oil supply by subregions



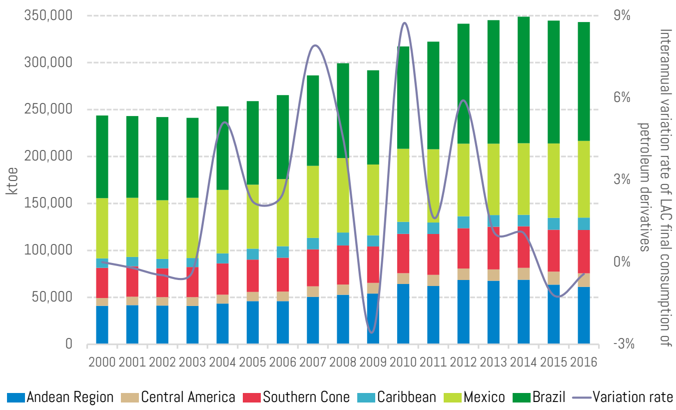
Total LAC oil supply by subregions



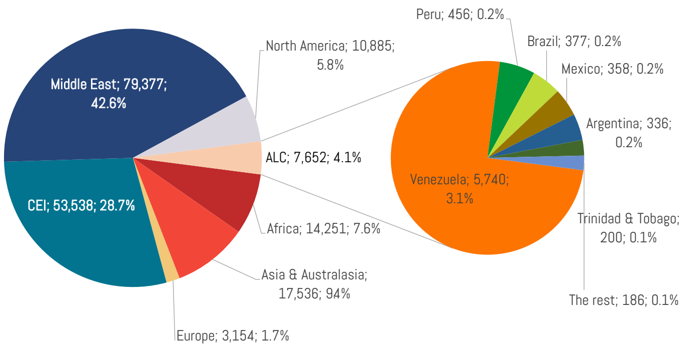
LAC Production of oil derivatives by subregions



LAC Final consumption of oil derivatives by subregions



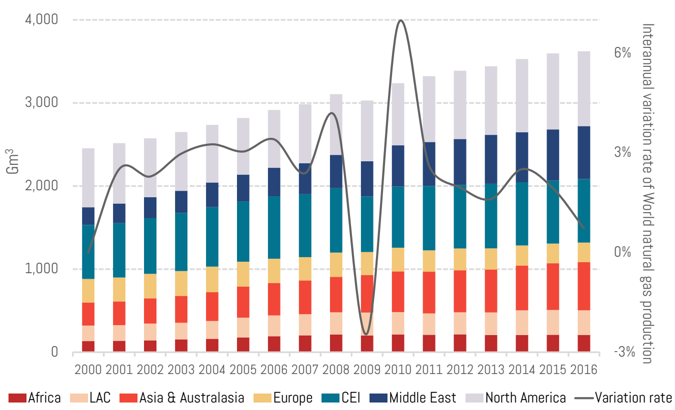
World proven natural gas reserves [Gm^3, %]
2016



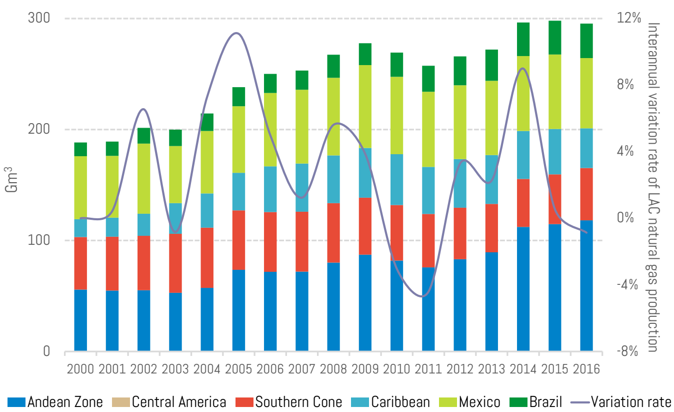
Total: 186,394 Gm^3

Note: Venezuela data estimated by OLADE.

World natural gas production



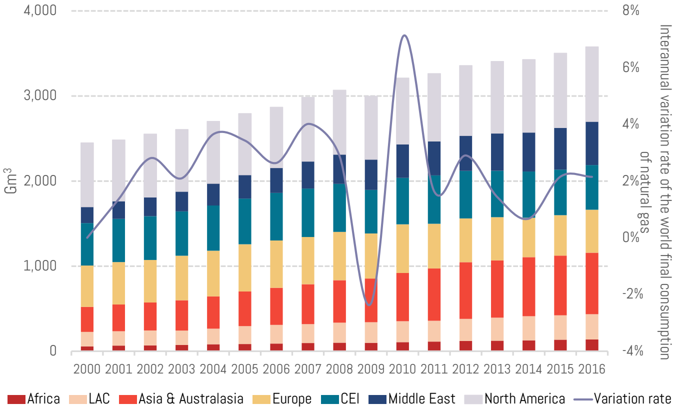
LAC Production of natural gas by subregions



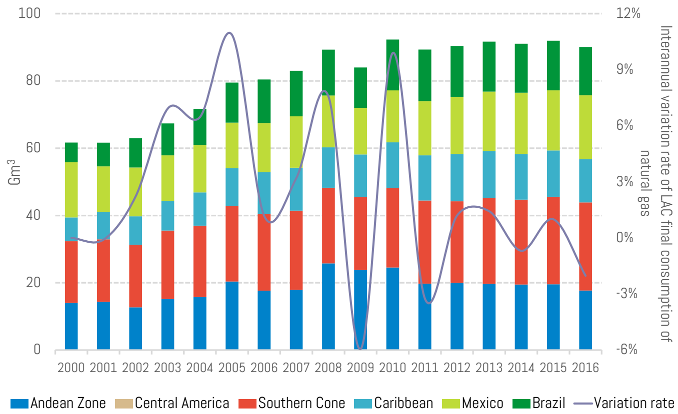
LAC

LAC

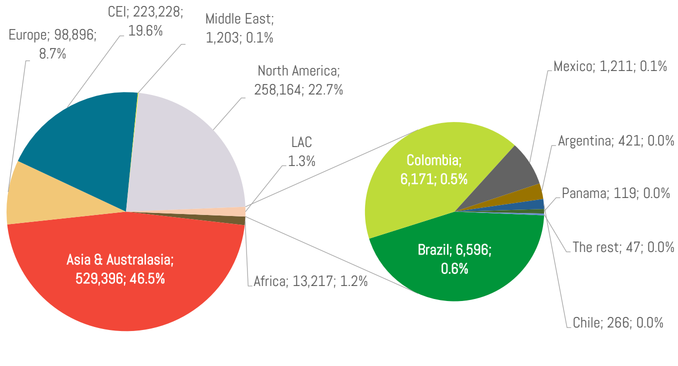
World final consumption of natural gas



LAC Final consumption of natural gas by subregions

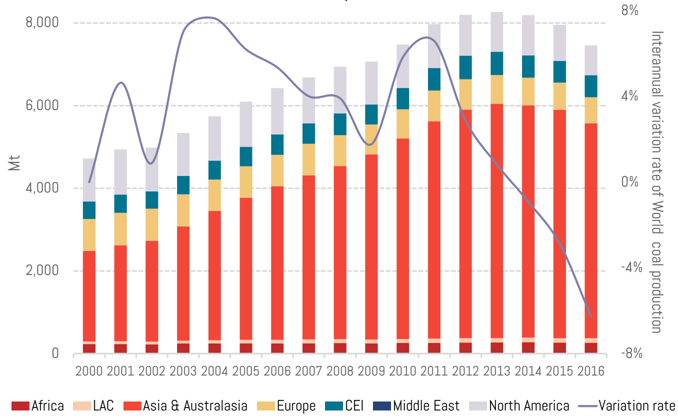


World proven reserves of coal [Mt, %]
2016

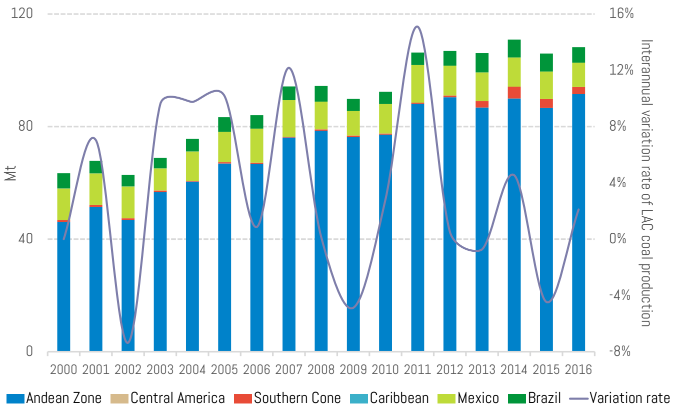


Total: 1,138,935 Mt

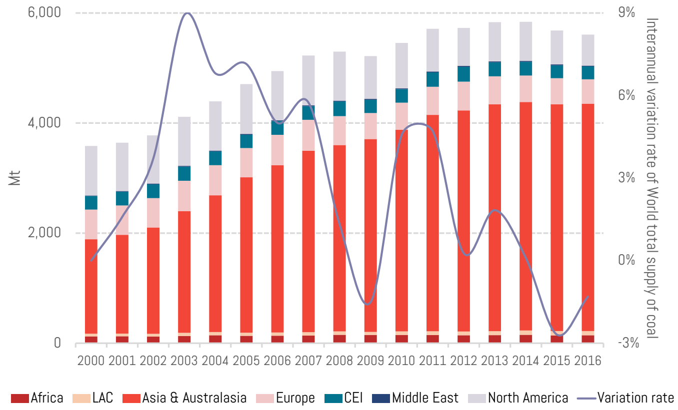
World coal production

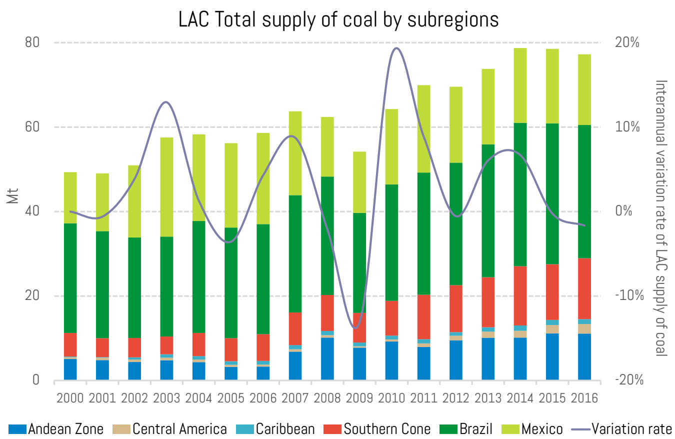


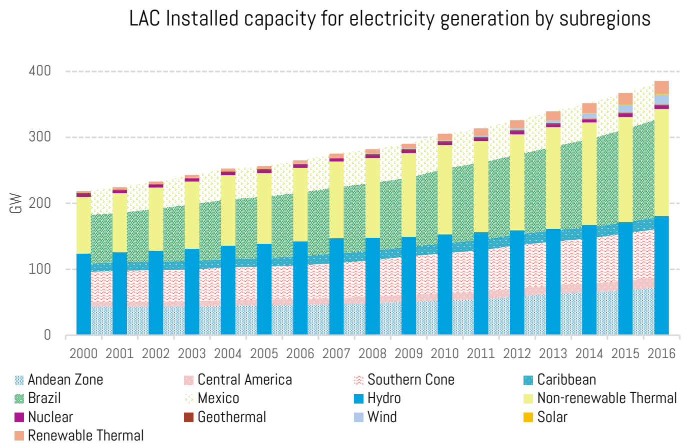
LAC coal production by subregions

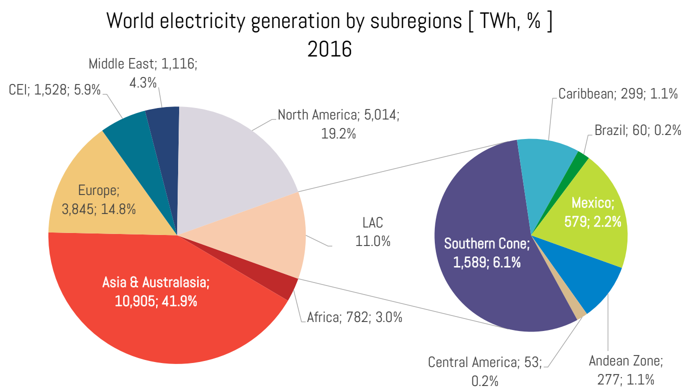


World total supply of coal by subregions

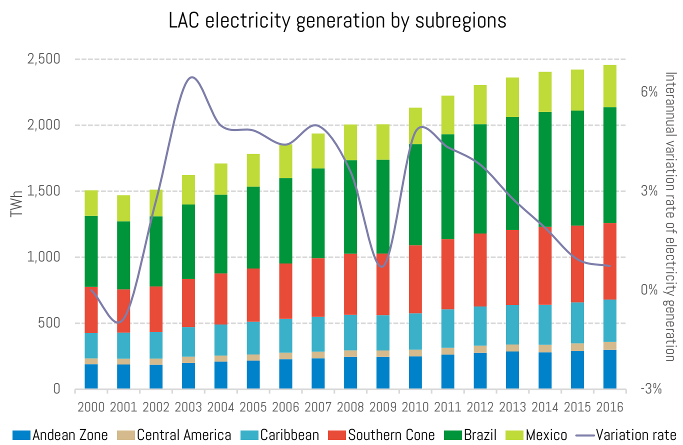


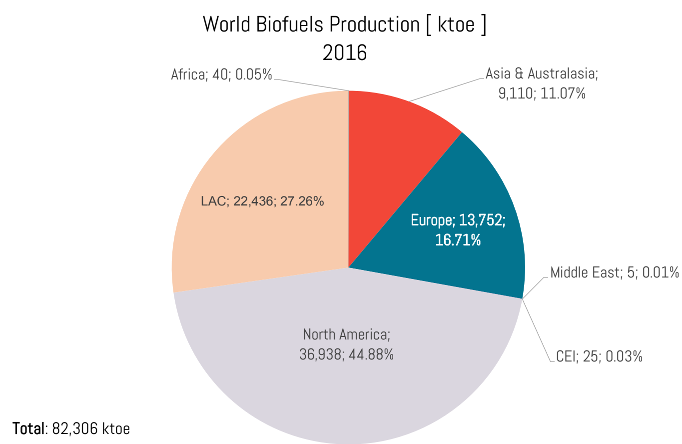




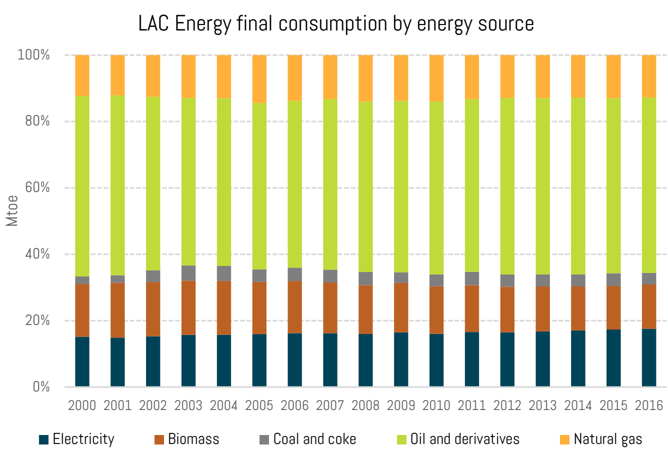


Total: 24,816 TWh

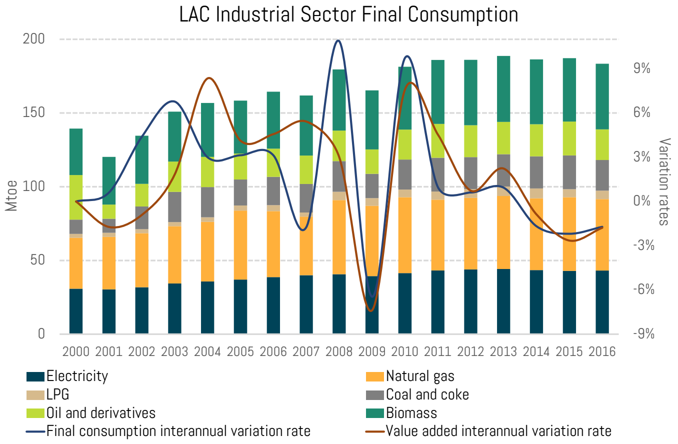


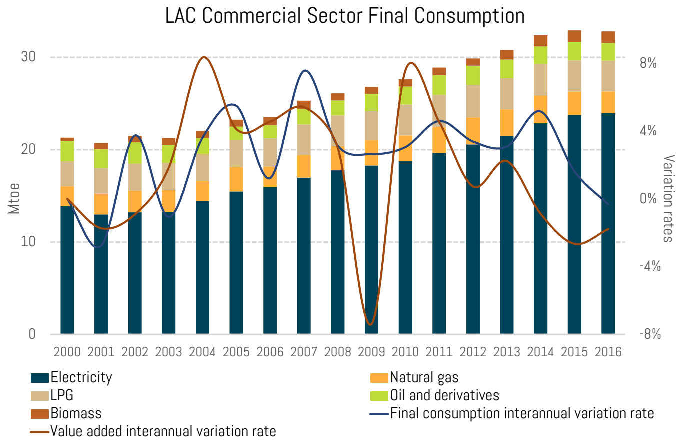


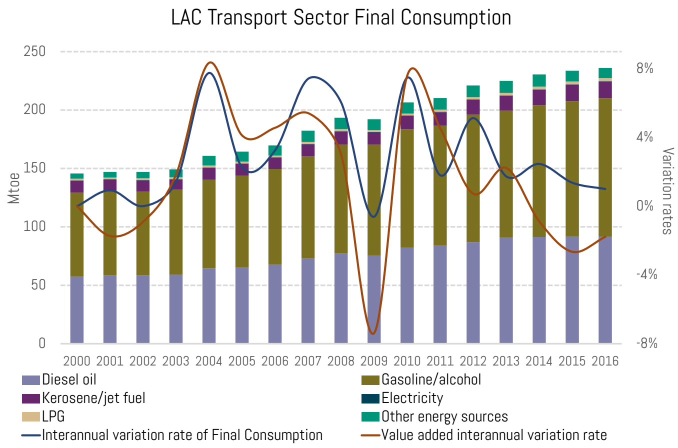
Total: 82,306 ktoe

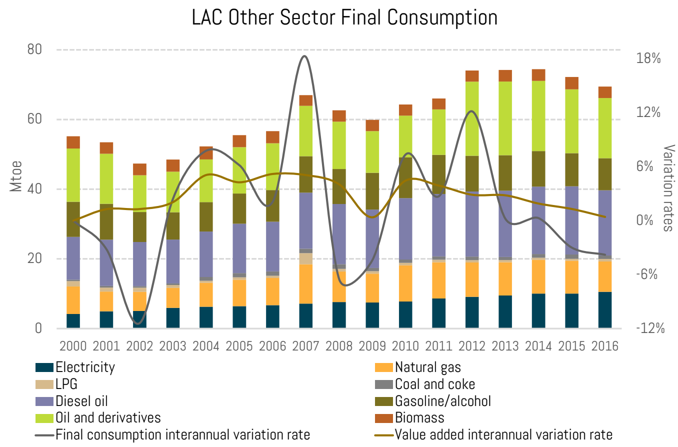


LAC

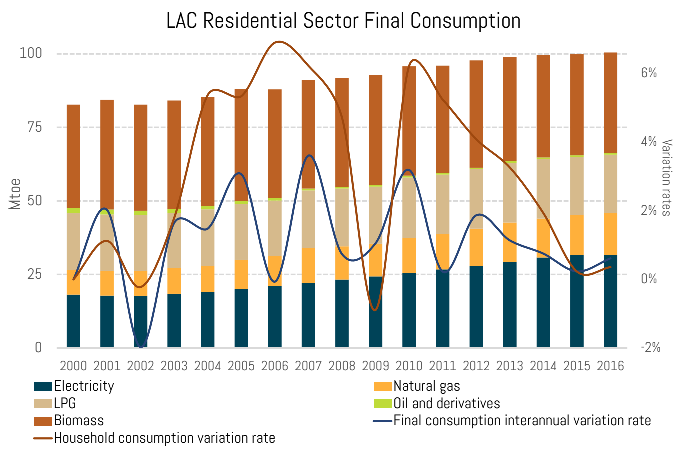

LAC Industrial Sector Final Consumption
Mtoe
Variation rates
Electricity
LPG
Oil and derivatives
Final consumption interannual variation rate
Natural gas
Coal and coke
Biomass
Value added interannual variation rate

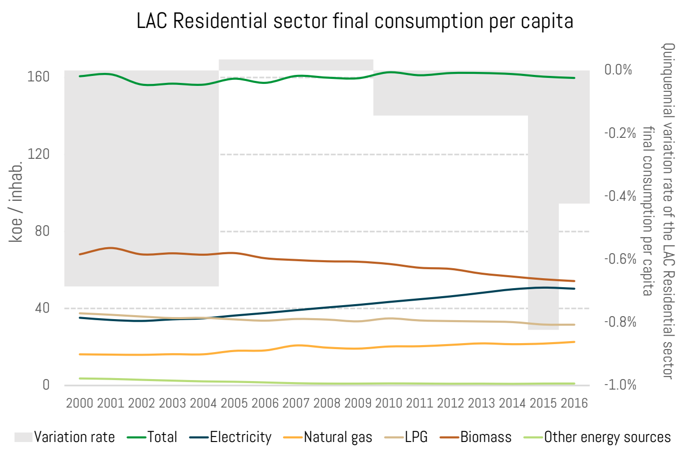

LAC Commercial Sector Final Consumption
Mtoe
Variation rates
Electricity
LPG
Biomass
Value added interannual variation rate
Natural gas
Oil and derivatives
Final consumption interannual variation rate

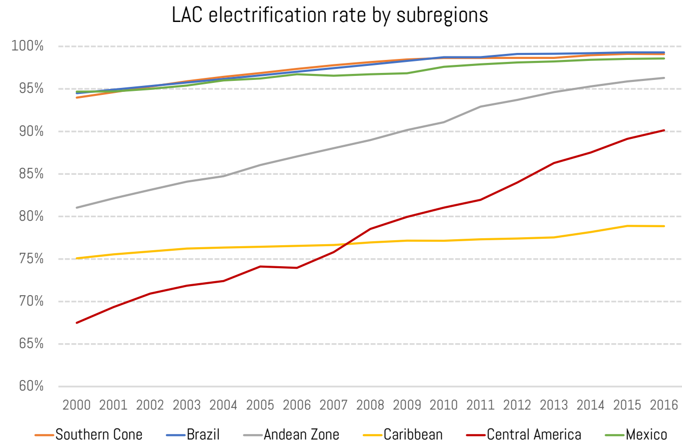

LAC Transport Sector Final Consumption
Mtoe
Variation rates
Diesel oil
Kerosene/jet fuel
LPG
Interannual variation rate of Final Consumption
Gasoline/alcohol
Electricity
Other energy sources
Value added interannual variation rate

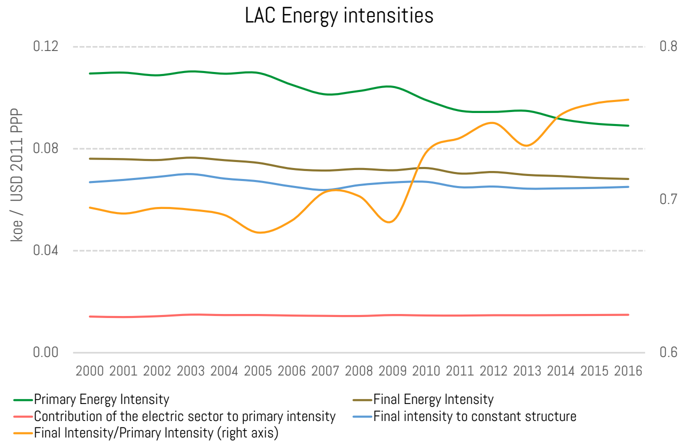

LAC Other Sector Final Consumption
Mtoe
Variation rates
Electricity
LPG
Diesel oil
Oil and derivatives
Final consumption interannual variation rate
Natural gas
Coal and coke
Gasoline/alcohol
Biomass
Value added interannual variation rate

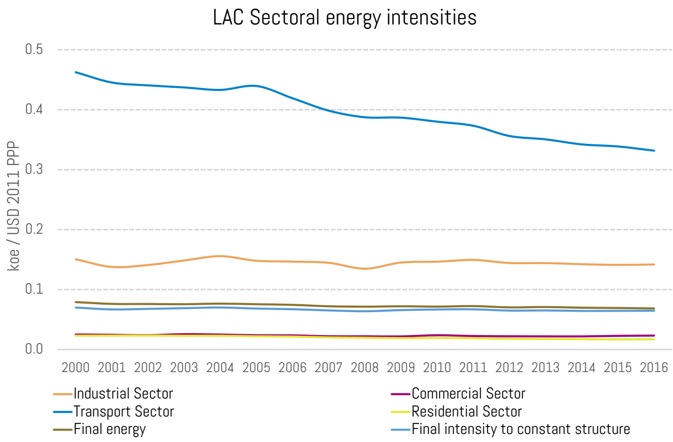
LAC

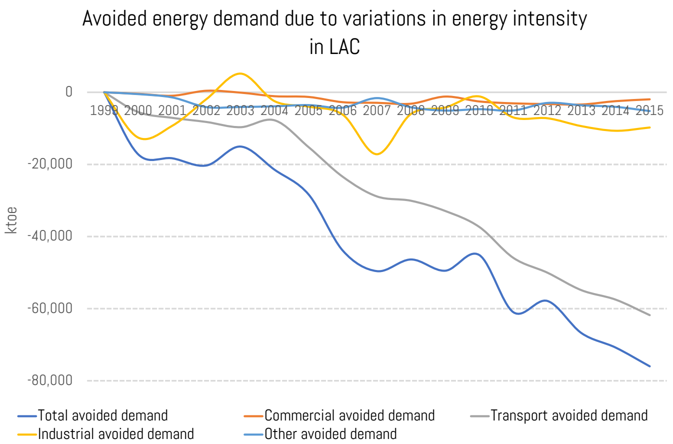

LAC Residential Sector Final Consumption
Mtoe
Variation rates
Electricity
LPG
Biomass
Household consumption variation rate
Natural gas
Oil and derivatives
Final consumption interannual variation rate

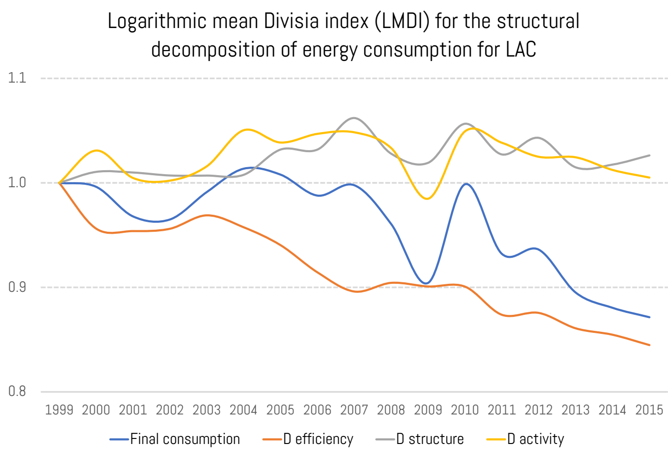

LAC Residential sector final consumption per capita
koe / inhab.
Quinquennial variation rate of the LAC Residential sector final consumption per capita
Variation rate
Total
Electricity
Natural gas
LPG
Biomass
Other energy sources

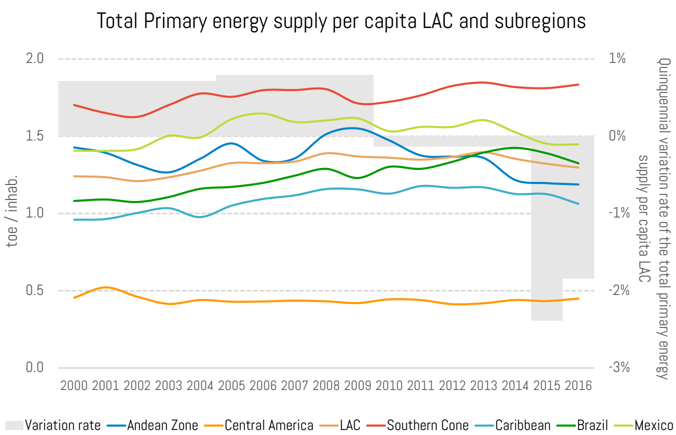

LAC electrification rate by subregions
100%
95%
90%
85%
80%
75%
70%
65%
60%
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Southern Cone
Brazil
Andean Zone
Caribbean
Central America
Mexico

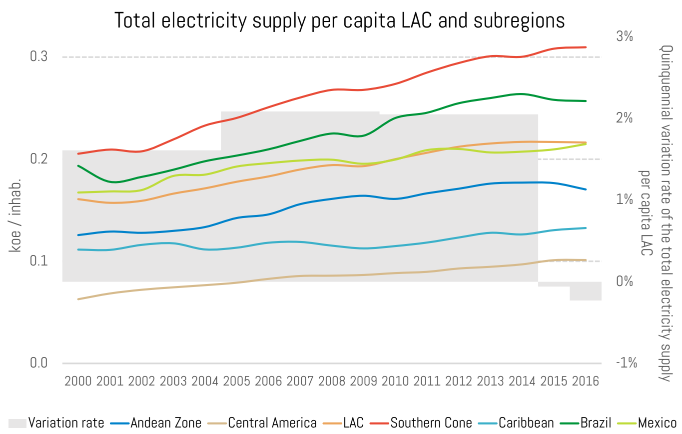

LAC Energy intensities
koe / USD 2011 PPP
0.12
0.08
0.04
0.00
0.8
0.7
0.6
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Primary Energy Intensity
Final Energy Intensity
Contribution of the electric sector to primary intensity
Final intensity to constant structure
Final Intensity/Primary Intensity (right axis)

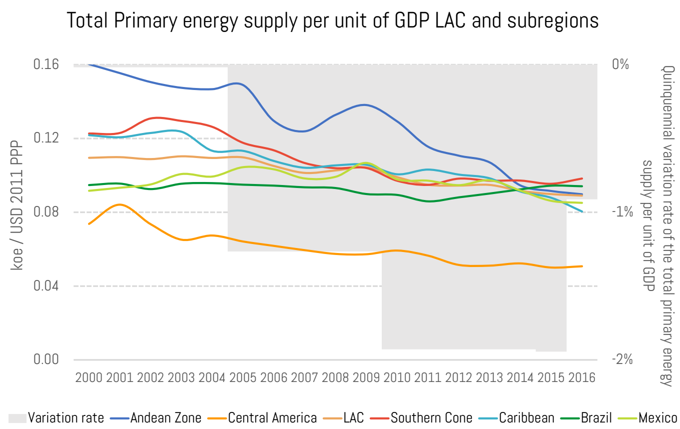

LAC Sectoral energy intensities
koe / USD 2011 PPP
0.5
0.4
0.3
0.2
0.1
0.0
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Industrial Sector
Commercial Sector
Transport Sector
Residential Sector
Final energy
Final intensity to constant structure

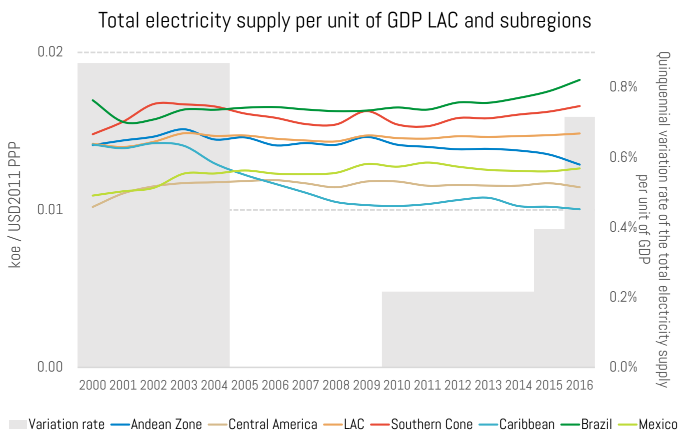

Avoided energy demand due to variations in energy intensity in LAC
ktoe
0
-20,000
-40,000
-60,000
-80,000
1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015
Total avoided demand
Commercial avoided demand
Transport avoided demand
Industrial avoided demand
Other avoided demand

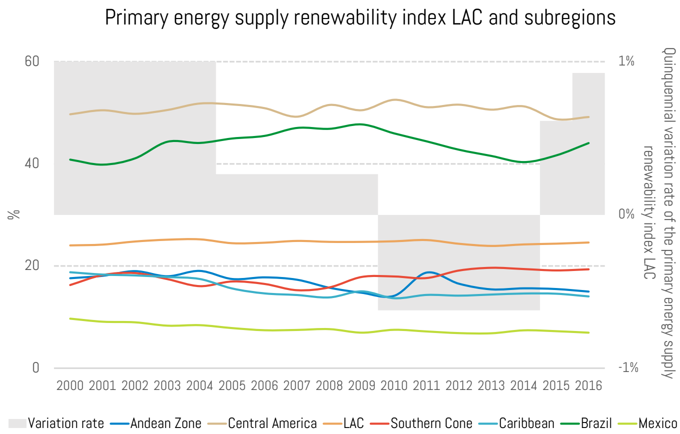

Logarithmic mean Divisia index (LMDI) for the structural decomposition of energy consumption for LAC
1.1
1.0
0.9
0.8
1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015
Final consumption
D efficiency
D structure
D activity


Total Primary energy supply per capita LAC and subregions
toe / inhab.
2.0
1.5
1.0
0.5
0.0
1%
0%
-1%
-2%
-3%
Quinquennial variation rate of the total primary energy supply per capita LAC
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Variation rate
Andean Zone
Central America
LAC
Southern Cone
Caribbean
Brazil
Mexico

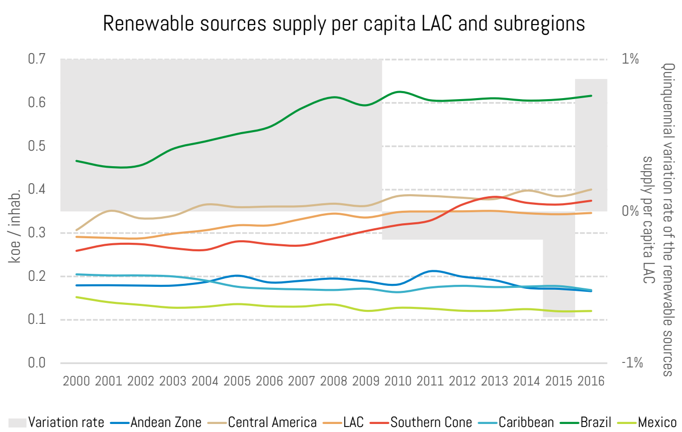

Total electricity supply per capita LAC and subregions
koe / inhab.
Quinquennial variation rate of the total electricity supply per capita LAC
Variation rate
Andean Zone
Central America
LAC
Southern Cone
Caribbean
Brazil
Mexico

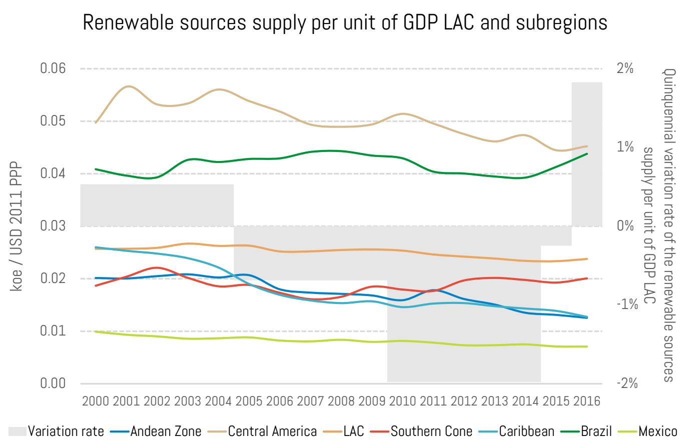

Total Primary energy supply per unit of GDP LAC and subregions
koe / USD 2011 PPP
Quinquennial variation rate of the total primary energy supply per unit of GDP
Variation rate
Andean Zone
Central America
LAC
Southern Cone
Caribbean
Brazil
Mexico


Total electricity supply per unit of GDP LAC and subregions
koe / USD2011 PPP
Quinquennial variation rate of the total electricity supply per unit of GDP
Variation rate
Andean Zone
Central America
LAC
Southern Cone
Caribbean
Brazil
Mexico

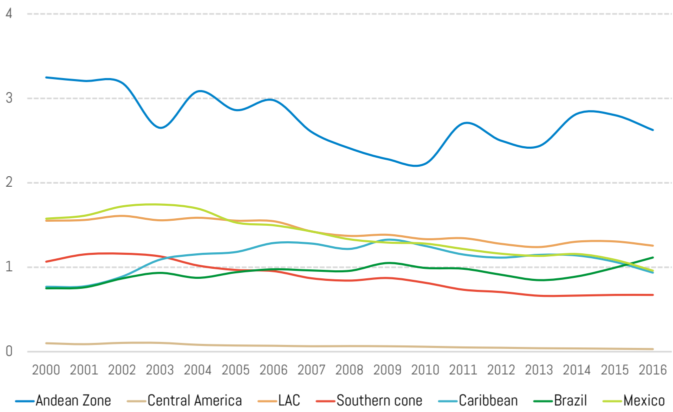

Primary energy supply renewability index LAC and subregions
%
Quinquennial variation rate of the primary energy supply renewability index LAC
Variation rate
Andean Zone
Central America
LAC
Southern Cone
Caribbean
Brazil
Mexico

LAC

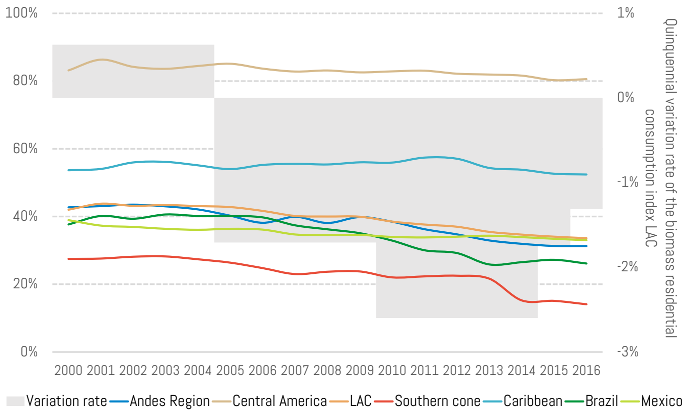

Renewable sources supply per capita LAC and subregions
koe / inhab.
Quinquennial variation rate of the renewable sources supply per capita LAC
Variation rate
Andean Zone
Central America
LAC
Southern Cone
Caribbean
Brazil
Mexico


Renewable sources supply per unit of GDP LAC and subregions
koe / USD 2011 PPP
Quinquennial variation rate of the renewable sources supply per unit of GDP LAC
Variation rate
Andean Zone
Central America
LAC
Southern Cone
Caribbean
Brazil
Mexico

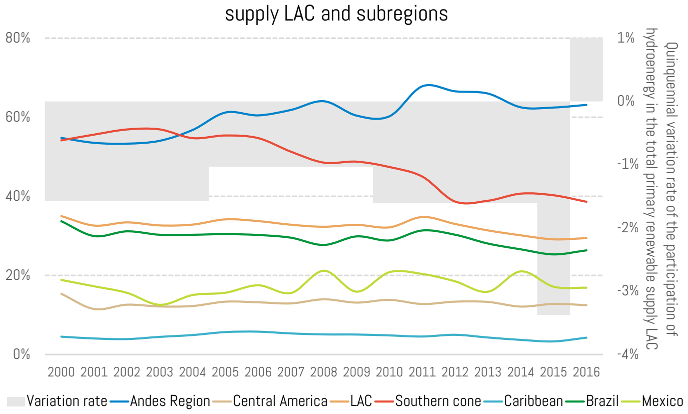
Hydrocarbon autarky index LAC and subregions



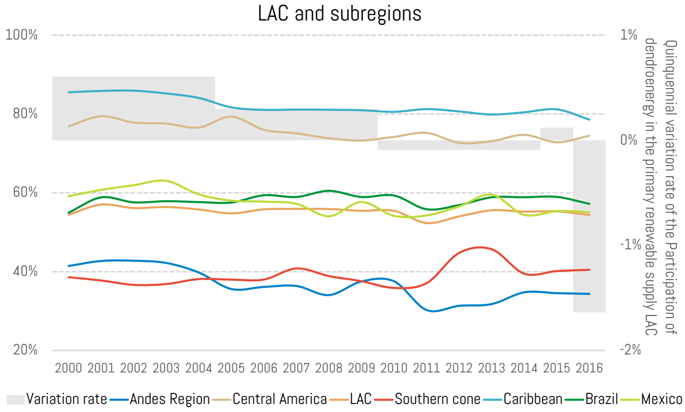
Biomass residential consumption index LAC and subregions



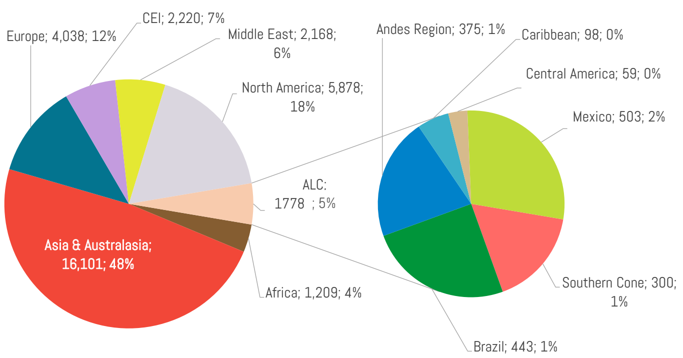
Participation of hydroenergy in the total primary renewable supply LAC and subregions



Participation of dendroenergy in the primary renewable supply LAC and subregions

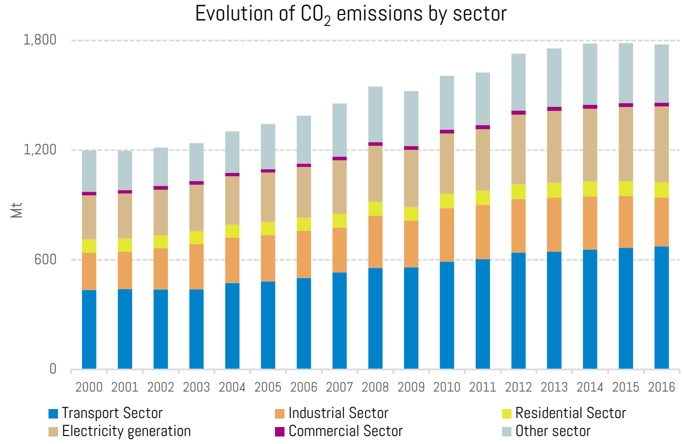


Global CO_2 emissions by subregions[Mt; %] 2016



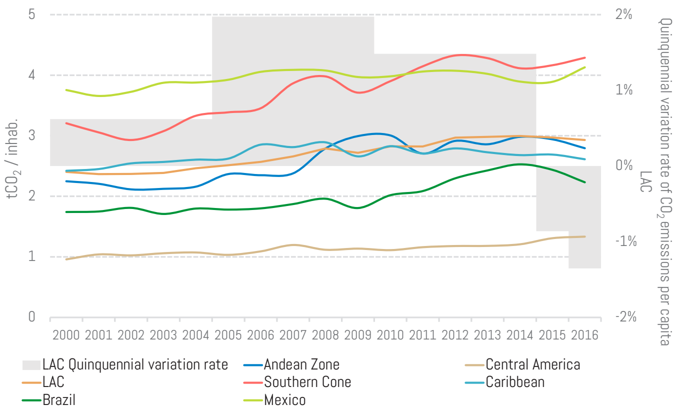
Total: 33,392 Mt

Evolution of CO_2 emissions by sector

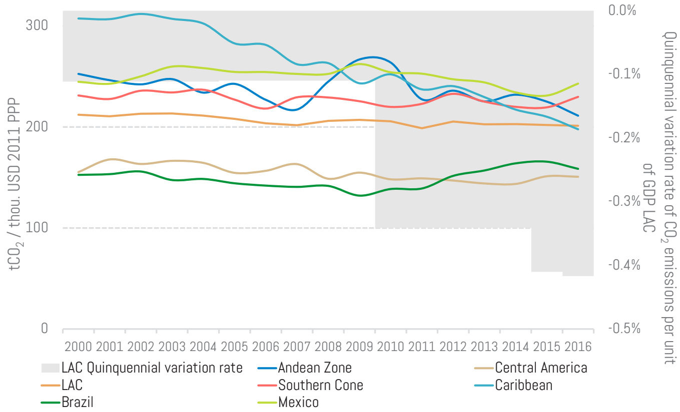


LAC

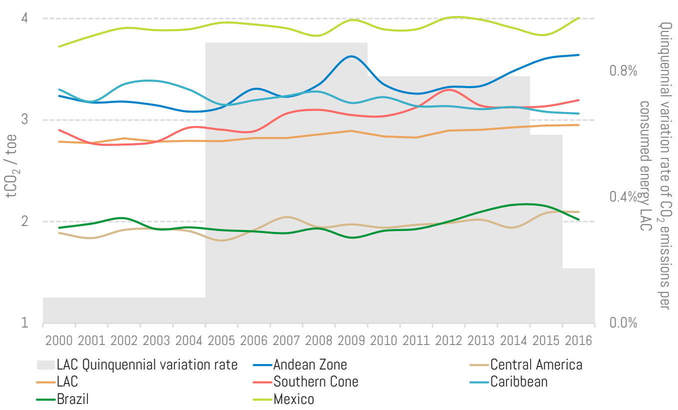
Evolution of CO_2 emissions per capita



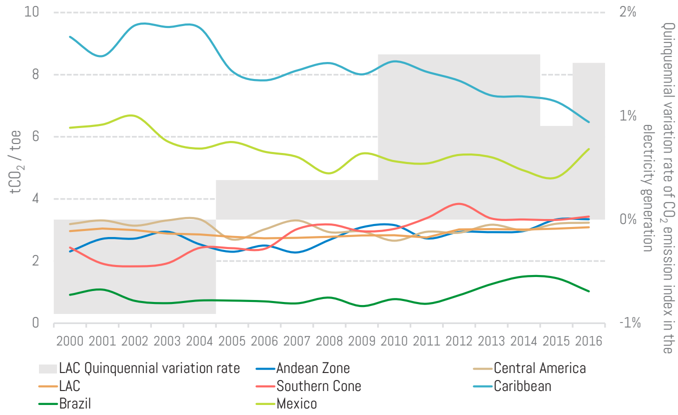
Evolution of CO_2 emissions per unit of GDP



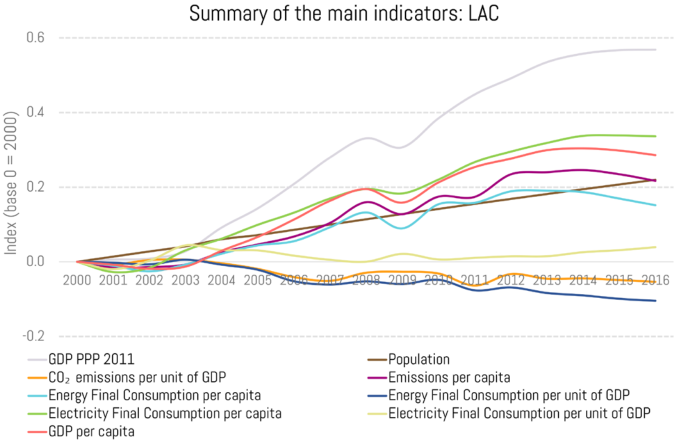
CO_2 Emissions per consumed energy



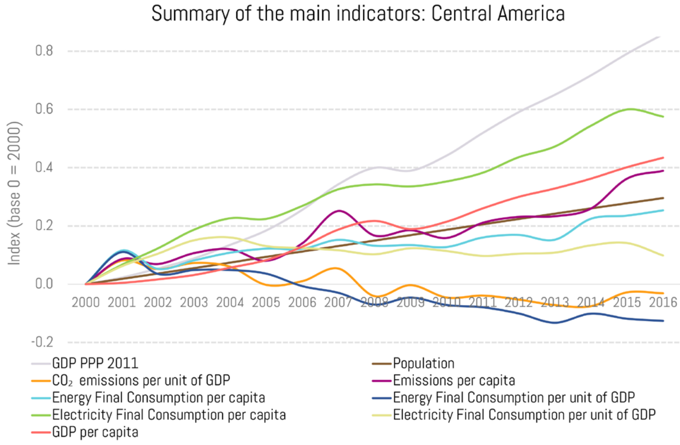
CO_2 Emissions in the electricity generation



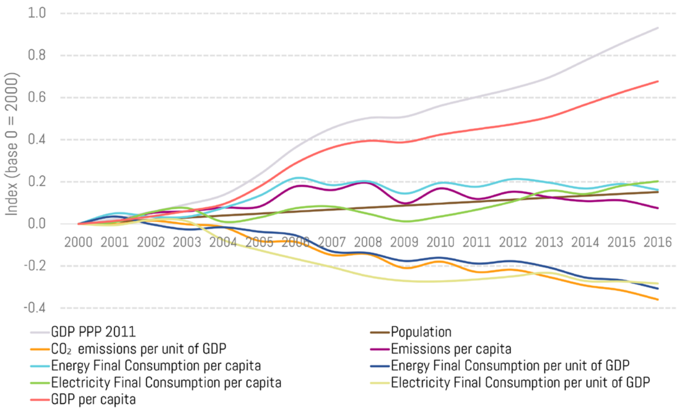
Summary of the main indicators: LAC



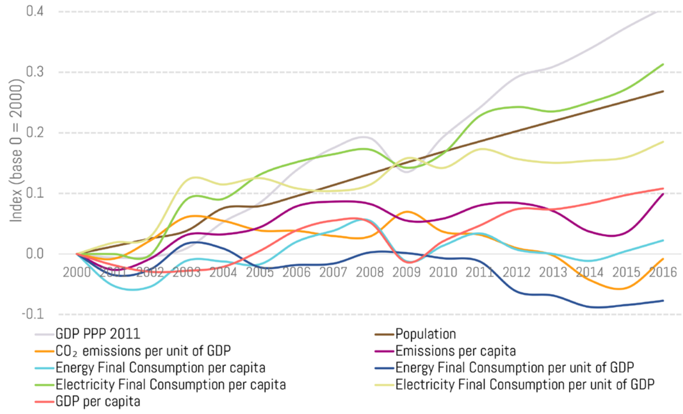
Summary of the main indicators: Central America



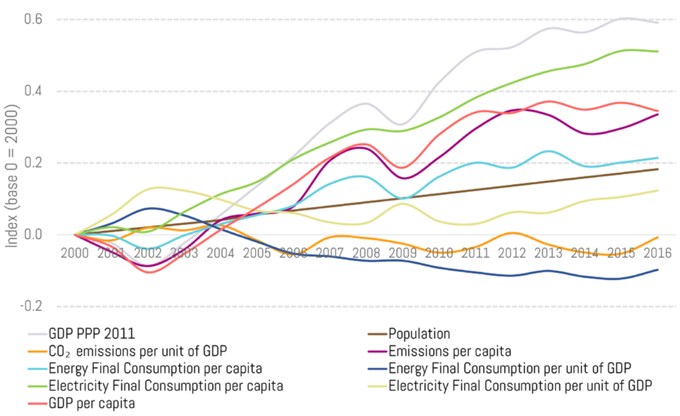
Summary of the main indicators: Caribbean



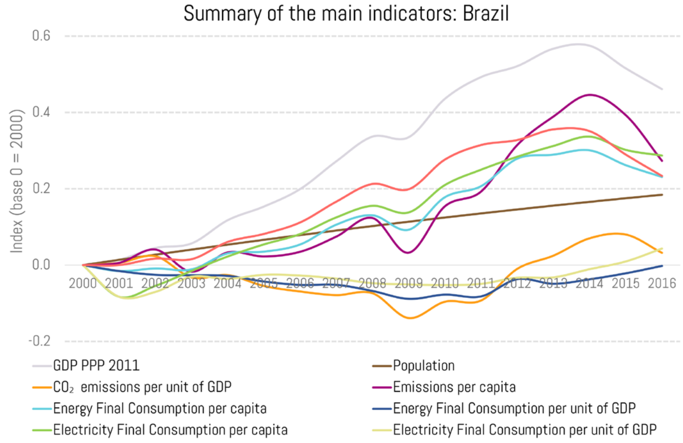
Summary of the main indicators: Mexico



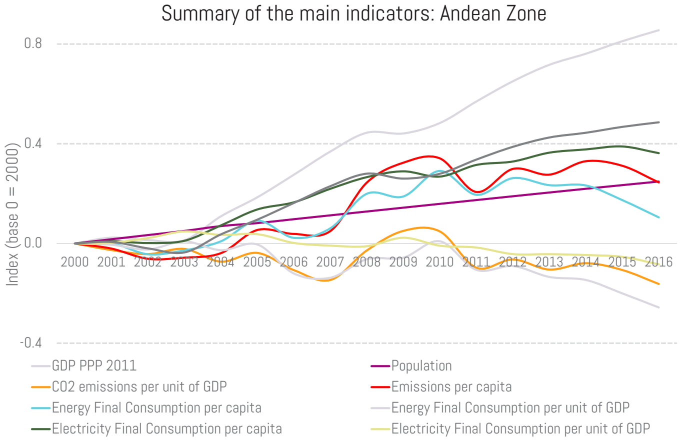
Summary of the main indicators: Southern Cone



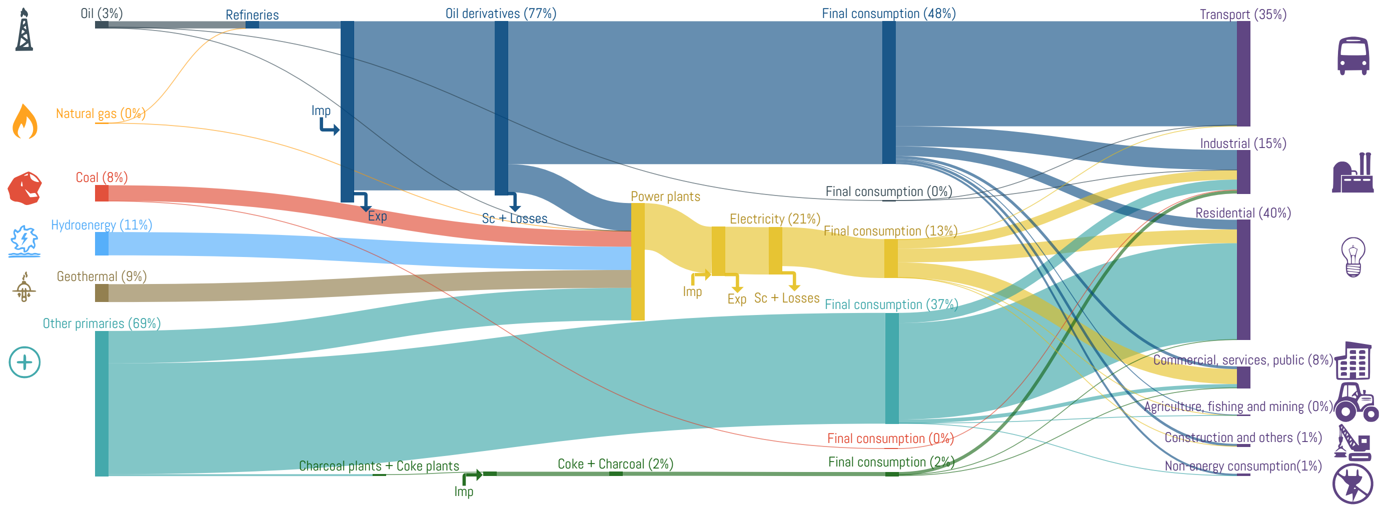
Summary of the main indicators: Brazil



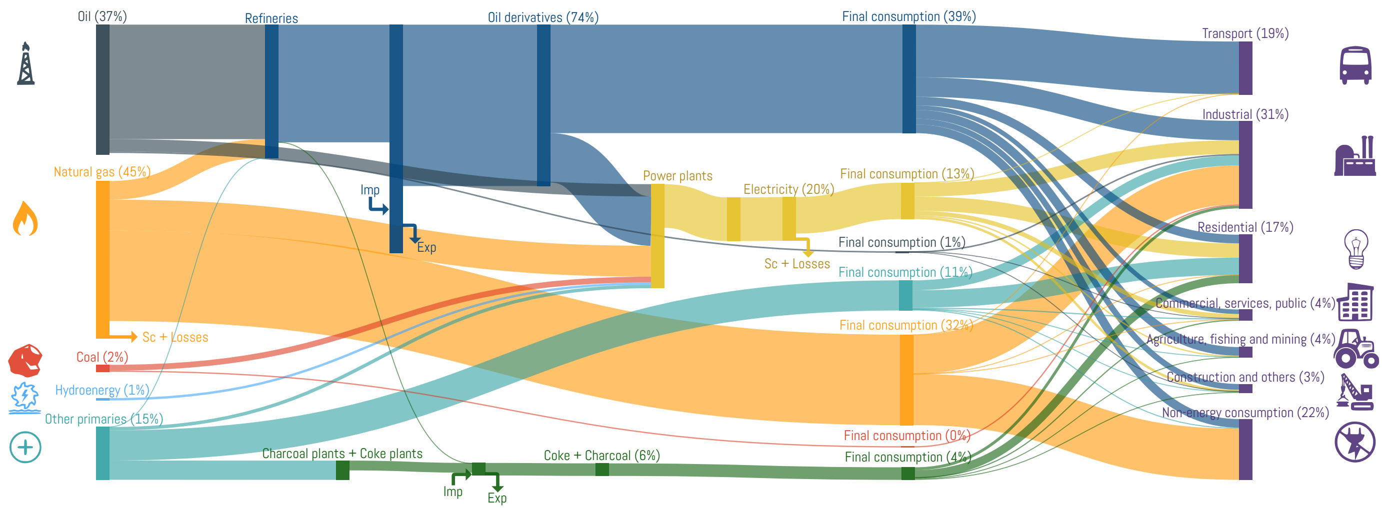
Summary of the main indicators: Andean Zone



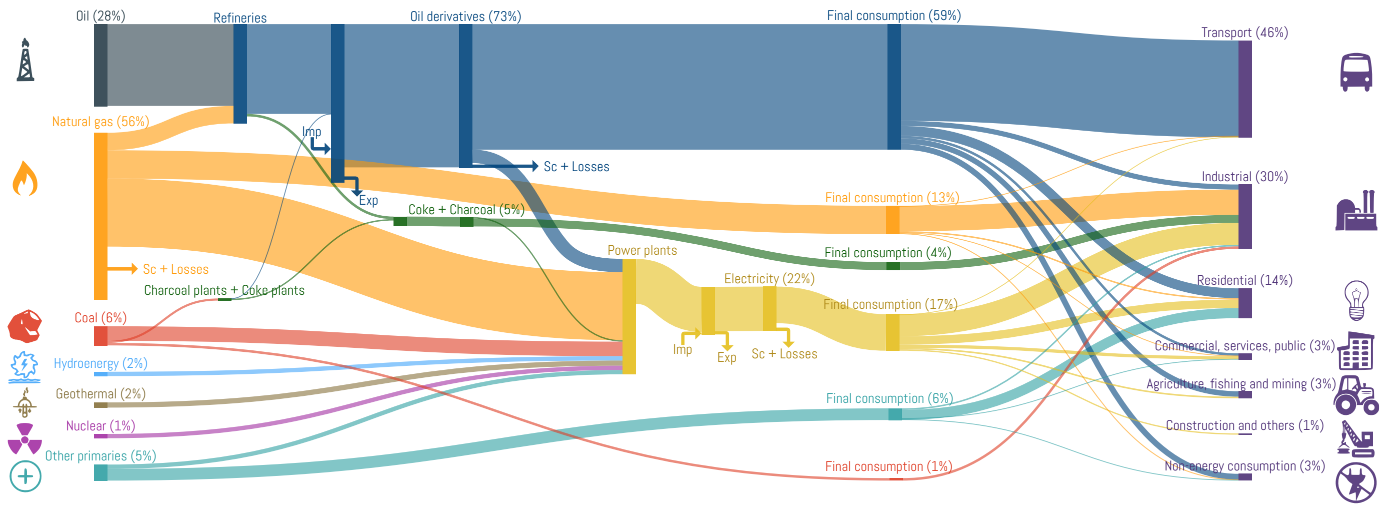
Summarized energy matrix: Central America - 2016 | Total energy supply: 37,549 ktoe



Summarized energy matrix: Caribbean - 2016 | Total energy supply: 46,565 ktoe

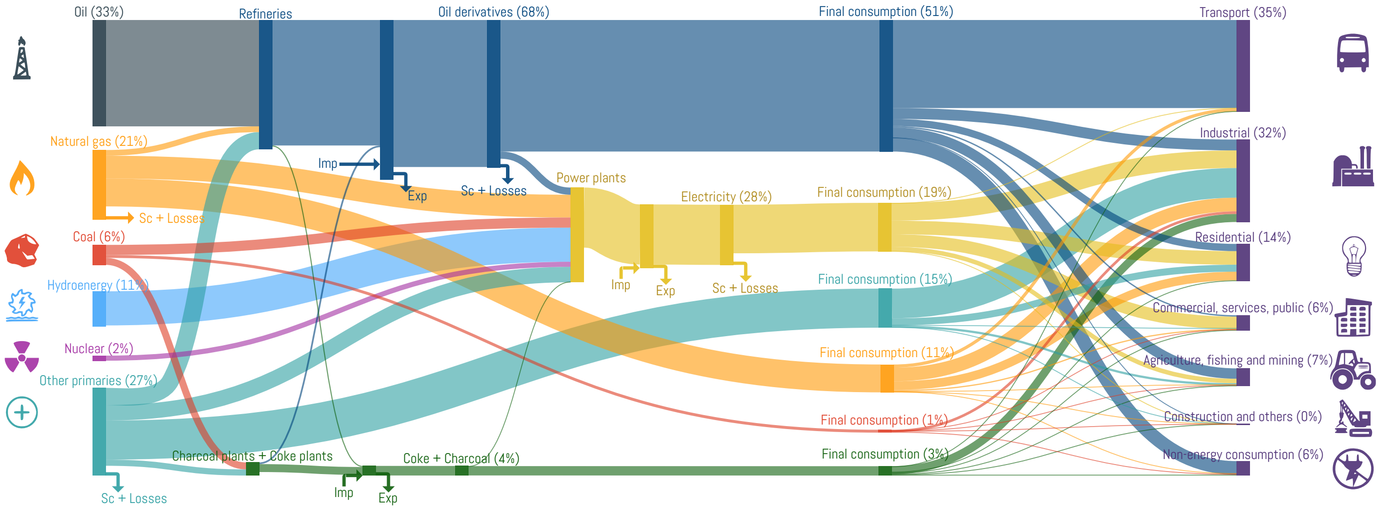


Summarized energy matrix: Mexico - 2016 | Total energy supply: 218,456 ktoe

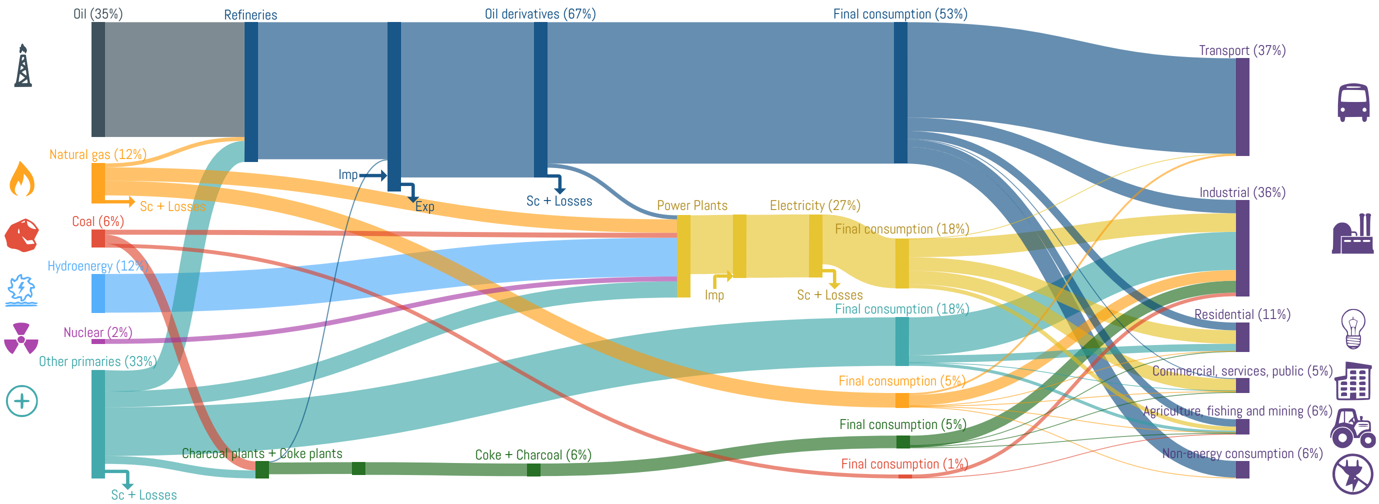


ALC

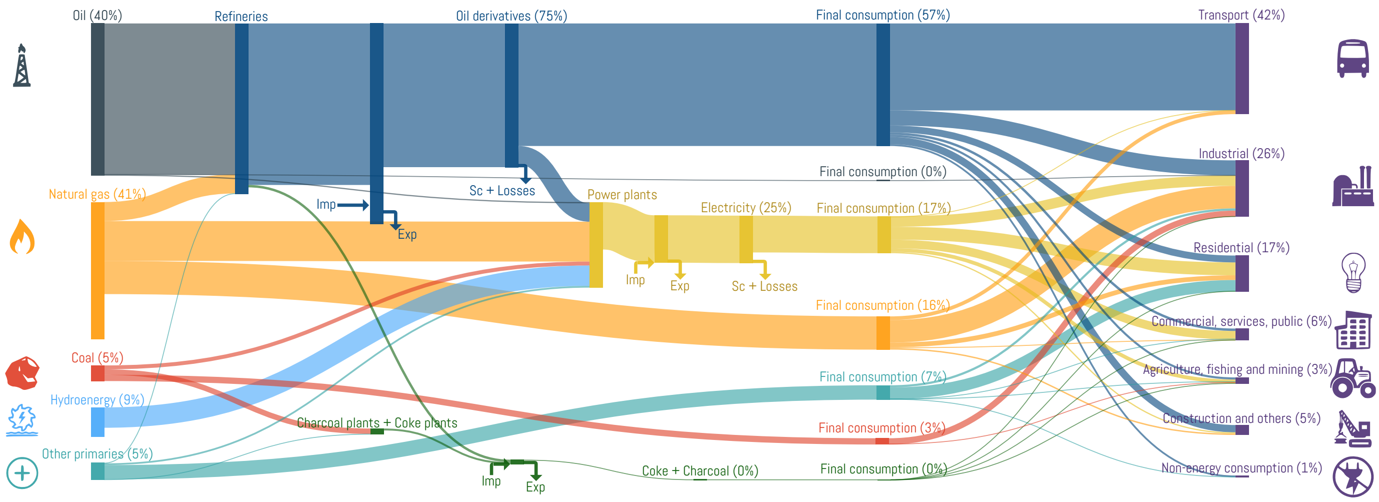
Summarized energy matrix: Southern Cone - 2016 | Total energy supply: 428,972 ktoe

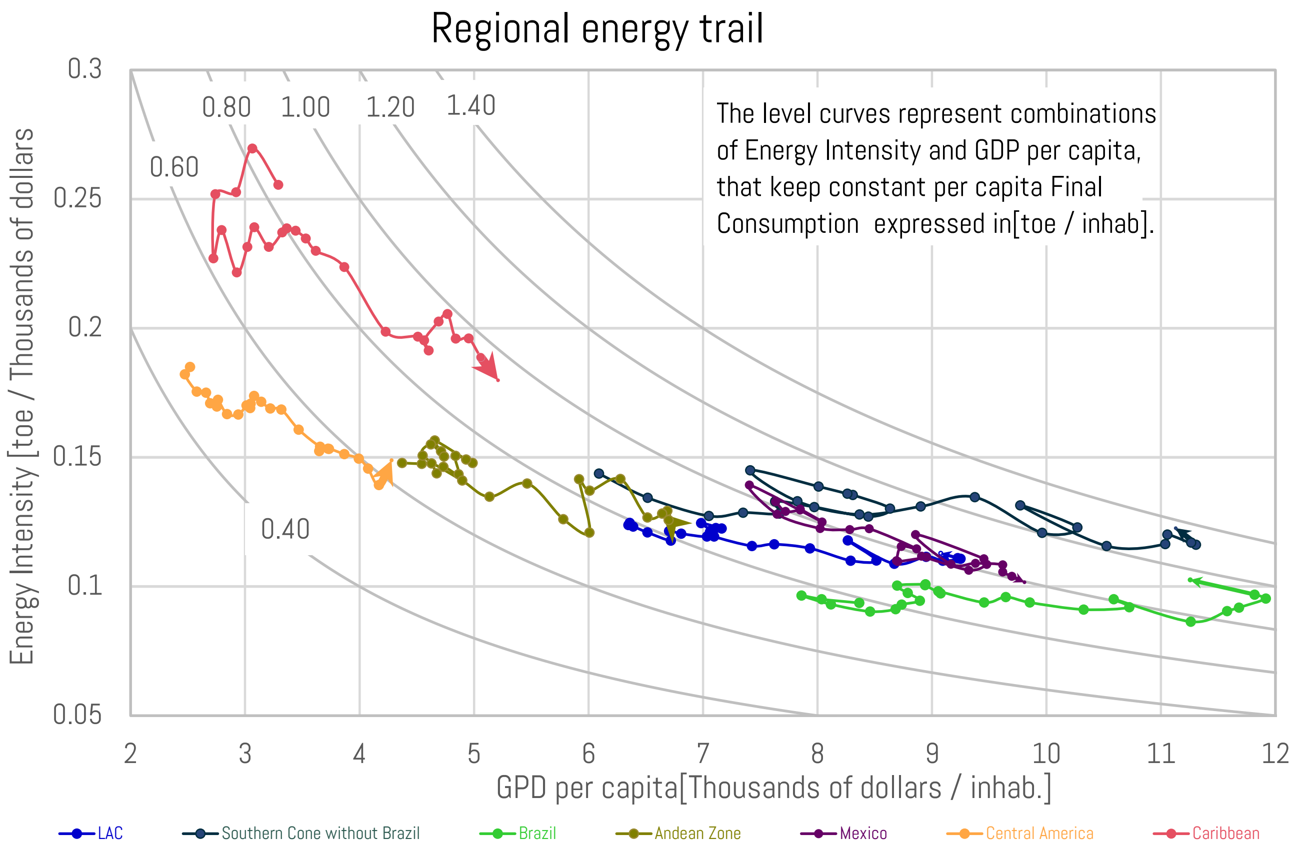


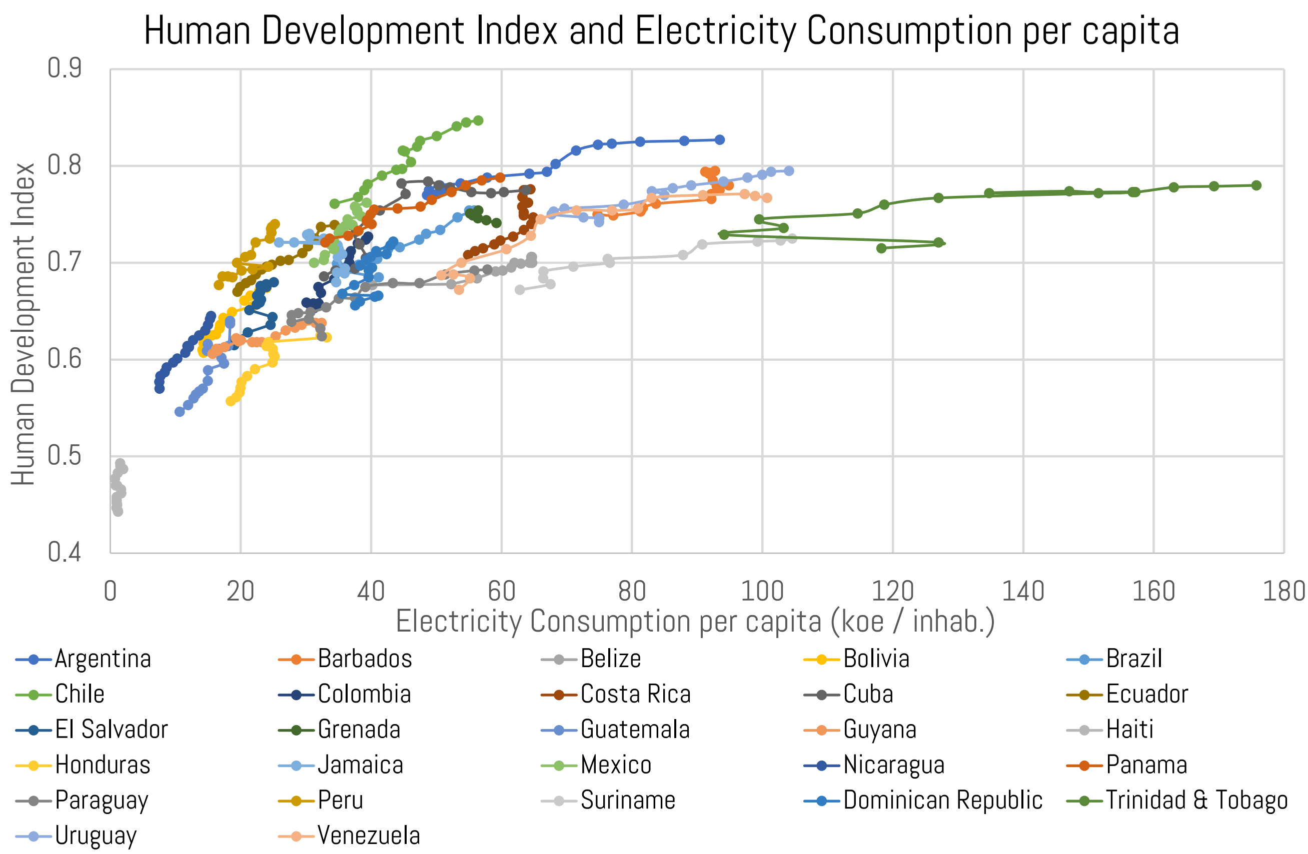
Summarized energy matrix: Brazil - 2016 | Total energy supply: 289,411 ktoe



Summarized energy matrix: Andean Zone - 2016 | Total energy supply: 153,550 ktoe

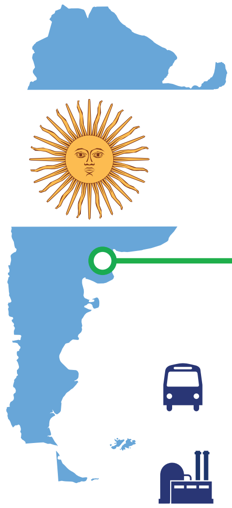


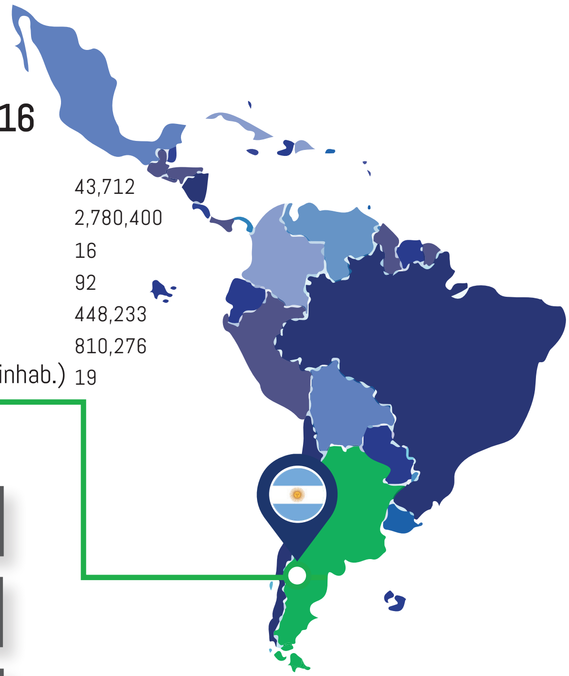

Regional energy trail
The level curves represent combinations of Energy Intensity and GDP per capita, that keep constant per capita Final Consumption expressed in[toe / inhab].
0.40
0.60
0.80
1.00
1.20
1.40
Energy Intensity [toe / Thousands of dollars
GPD per capita[Thousands of dollars / inhab.]
LAC
Southern Cone without Brazil
Brazil
Andean Zone
Mexico
Central America
Caribbean


Human Development Index and Electricity Consumption per capita
Human Development Index
Electricity Consumption per capita (koe / inhab.)
Argentina
Barbados
Belize
Bolivia
Brazil
Chile
Colombia
Costa Rica
Cuba
Ecuador
El Salvador
Grenada
Guatemala
Guyana
Haiti
Honduras
Jamaica
Mexico
Nicaragua
Panama
Paraguay
Peru
Suriname
Dominican Republic
Trinidad & Tobago
Uruguay
Venezuela

Energy Profile of Member Countries

ARGENTINA





GENERAL INFORMATION 2016

Population (thousand inhab.)	43,712
Area (km^2)	2,780,400
Population Density (inhab./km^2)	16
Urban Population (%)	92
GDP USD 2010 (MUSD)	448,233
GDP USD 2011 PPP (MUSD)	810,276
GDP per capita (thou. USD 2011 PPP/inhab.)	19

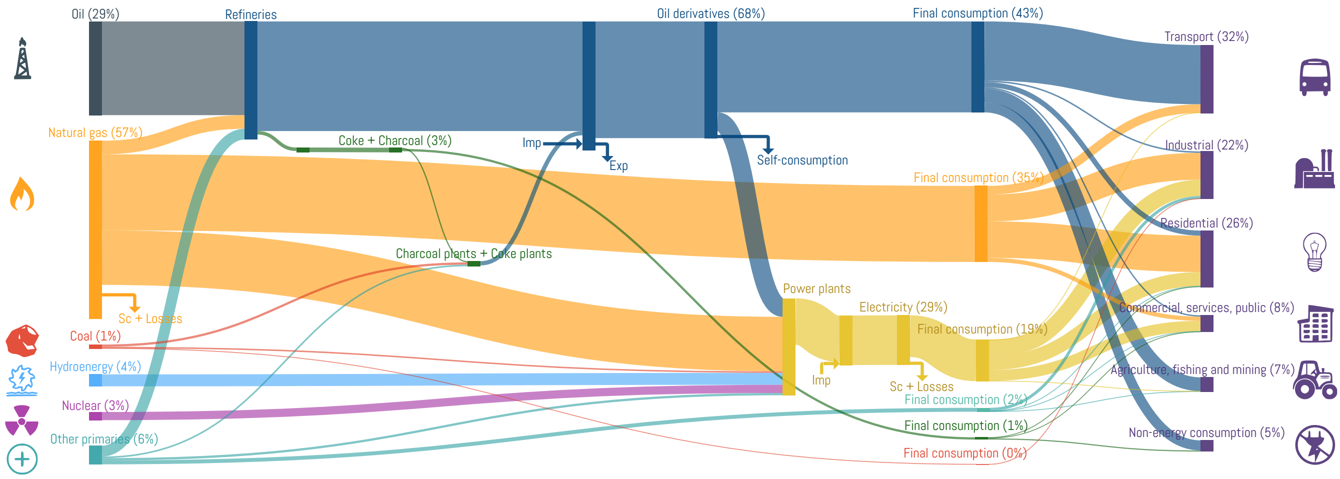
ENERGY SECTOR

Final consumption in the Transport Sector	Mtoe 19
Final consumption in the Industrial Sector	Mtoe 13
Final consumption in the Residential Sector	Mtoe 15
Final consumption in the Commercial and Service Sector	Mtoe 5
Final consumption in the Agriculture, Livestock, Fishing, Mining, Other and Non - Energy Consumption	Mtoe 7

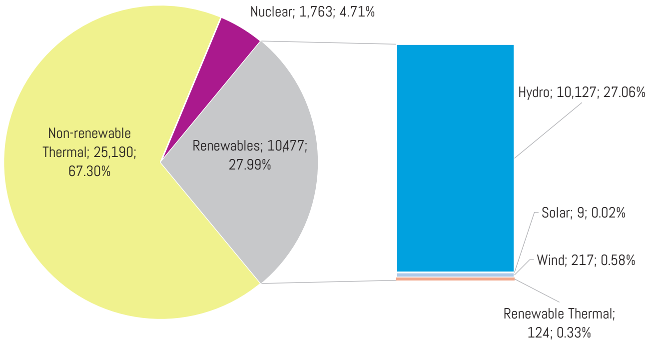
Oil Reserves	Natural gas reserves	Coal reserves
Mbbl 2,167	Gm^3 336	Mt 421

Indicator	Unit	Value
Electricity consumption per capita	kWh / inhab.	3,018
Final energy consumption per capita	toe / inhab.	1.34
Electrification rate	%	98.79
Total energy supply	Mtoe	87
Total energy production	Mtoe	74
Total energy imports	Mtoe	18
Total energy exports	Mtoe	6
Total final energy consumption	Mtoe	58
Refining capacity	kbbl/day	632
Installed power generation capacity	GW	37
Primary energy intensity and final energy intensity	koe / USD 2011 PPP	0.11 / 0.07

Summarized energy matrix 2016

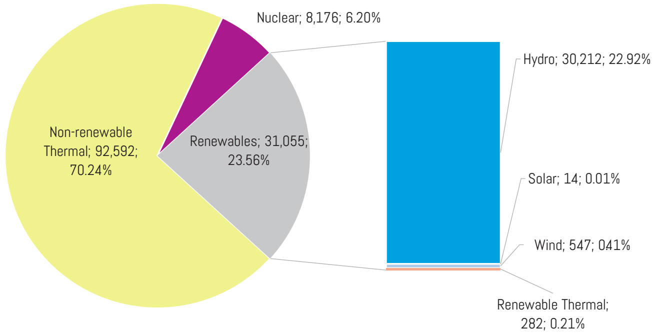


Installed power generation capacity* [MW; %]
2016



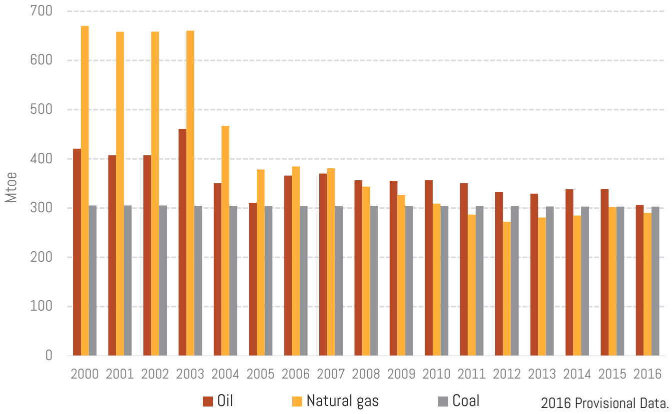
*Provisional data and subject to revision.

Electricity Generation by Source* [GWh; %]
2016

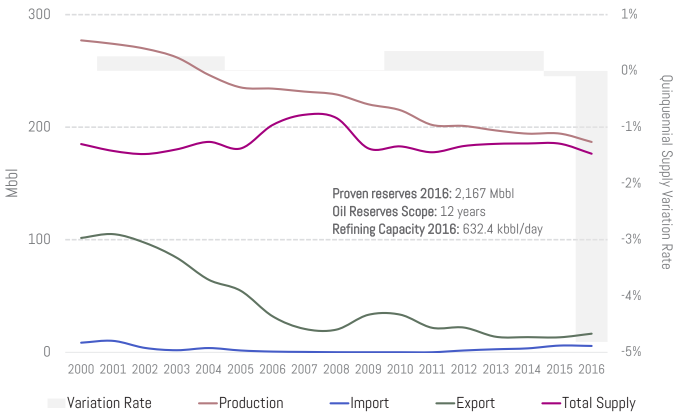


*Provisional data and subject to revision.

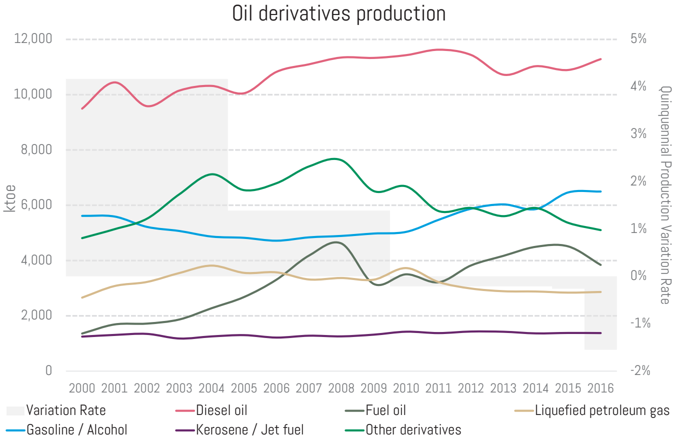
Proven reserves of oil, natural gas and coal



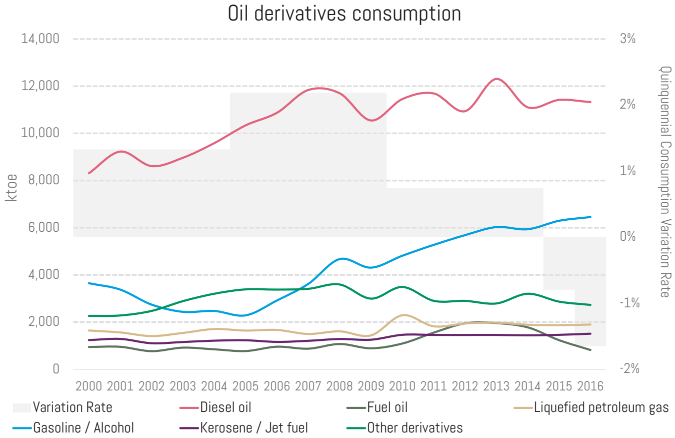
Oil Supply



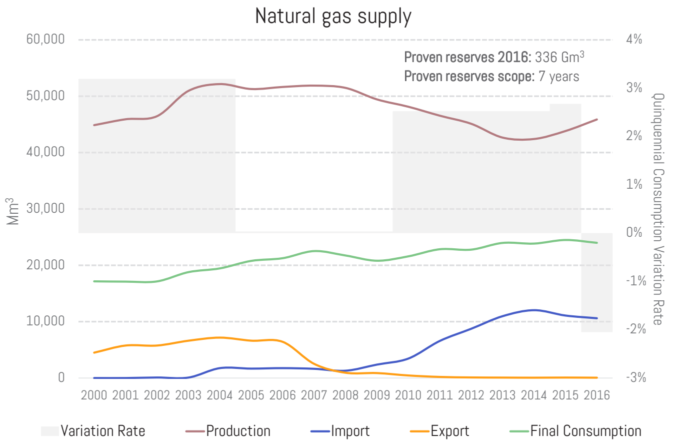
Oil derivatives production

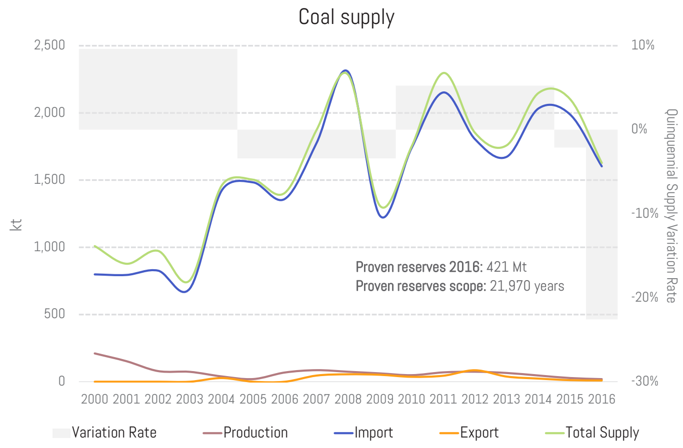


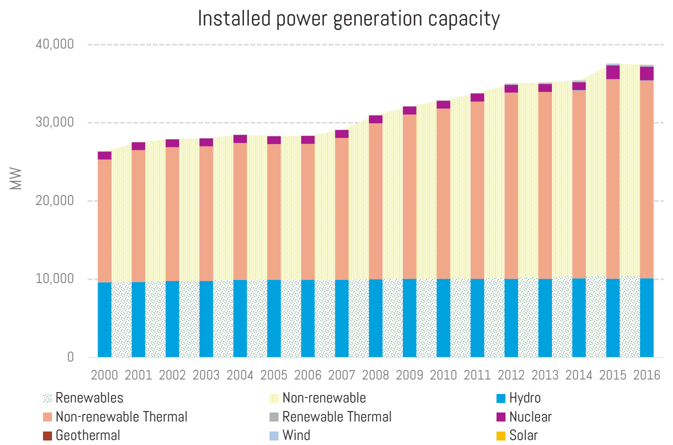
Oil derivatives consumption

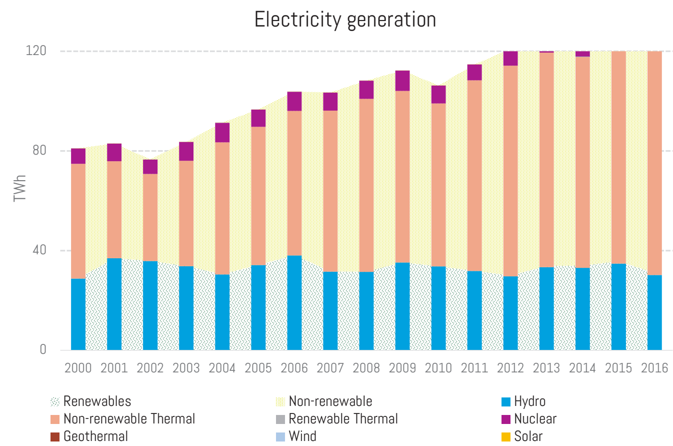


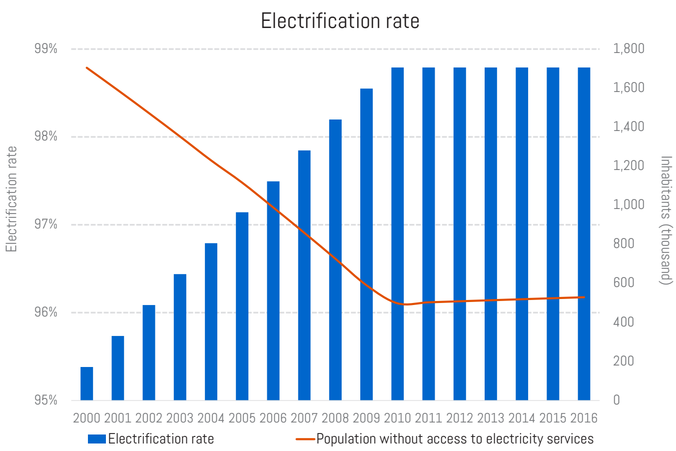
ARGENTINA

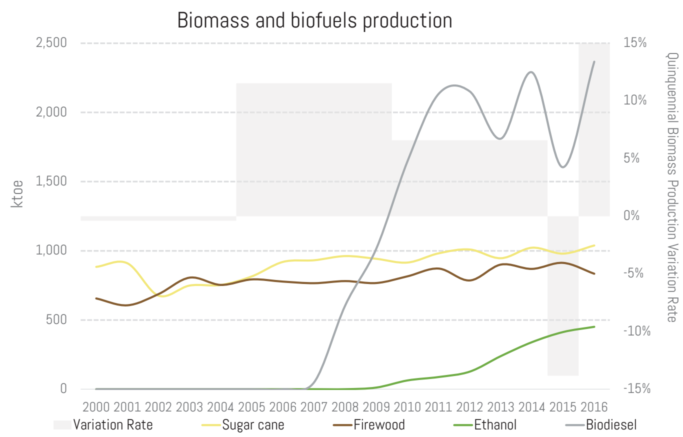

Natural gas supply
Proven reserves 2016: 336 Gm³
Proven reserves scope: 7 years
Mm³
Quinquennial Consumption Variation Rate
60,000
50,000
40,000
30,000
20,000
10,000
0
4%
3%
2%
1%
0%
-1%
-2%
-3%
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Variation Rate
Production
Import
Export
Final Consumption


Coal supply
Proven reserves 2016: 421 Mt
Proven reserves scope: 21,970 years
kt
Quinquennial Supply Variation Rate
2,500
2,000
1,500
1,000
500
0
10%
0%
-10%
-20%
-30%
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Variation Rate
Production
Import
Export
Total Supply


Installed power generation capacity
MW
40,000
30,000
20,000
10,000
0
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Renewables
Non-renewable
Hydro
Non-renewable Thermal
Renewable Thermal
Nuclear
Geothermal
Wind
Solar


Electricity generation
TWh
120
80
40
0
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Renewables
Non-renewable
Hydro
Non-renewable Thermal
Renewable Thermal
Nuclear
Geothermal
Wind
Solar

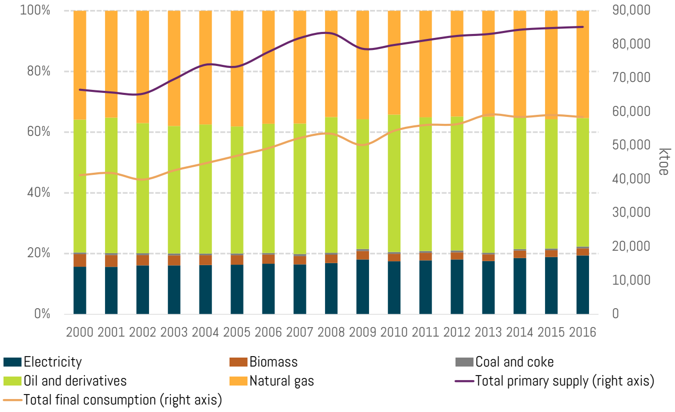

Electrification rate
Electrification rate
Inhabitants (thousand)
99%
98%
97%
96%
95%
1,800
1,600
1,400
1,200
1,000
800
600
400
200
0
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Electrification rate
Population without access to electricity services


Biomass and biofuels production
ktoe
Quinquennial Biomass Production Variation Rate
2,500
2,000
1,500
1,000
500
0
15%
10%
5%
0%
-5%
-10%
-15%
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Variation Rate
Sugar cane
Firewood
Ethanol
Biodiesel

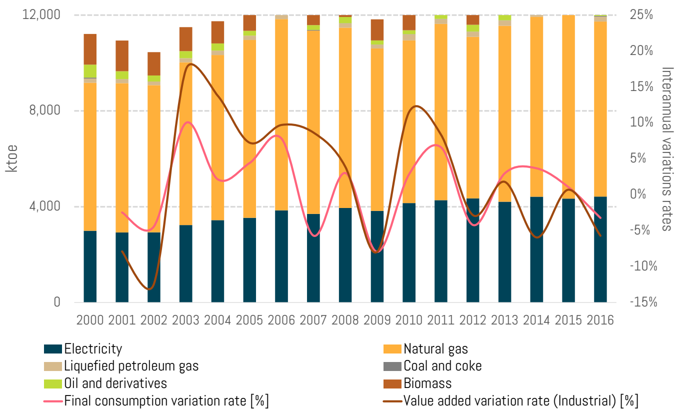
ARGENTINA

ARGENTINA

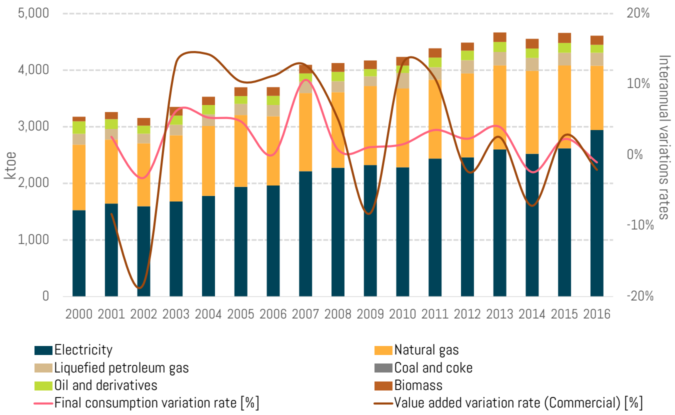
Final energy consumption by source



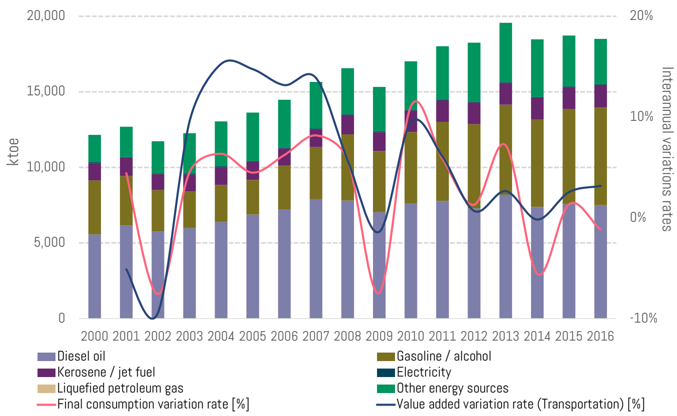
Industrial Sector Final Consumption



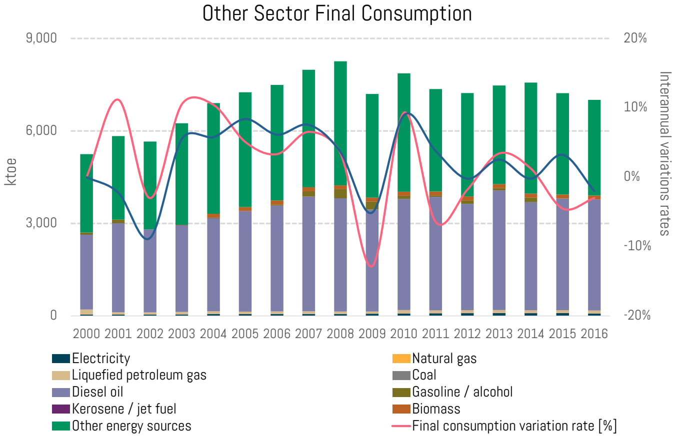
Commercial Sector Final Consumption



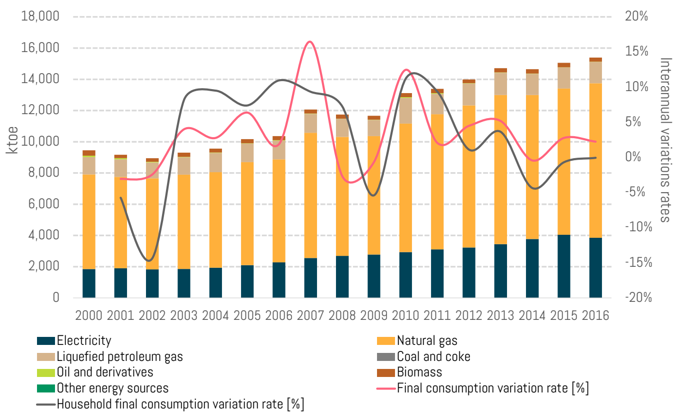
Transport Sector Final Consumption

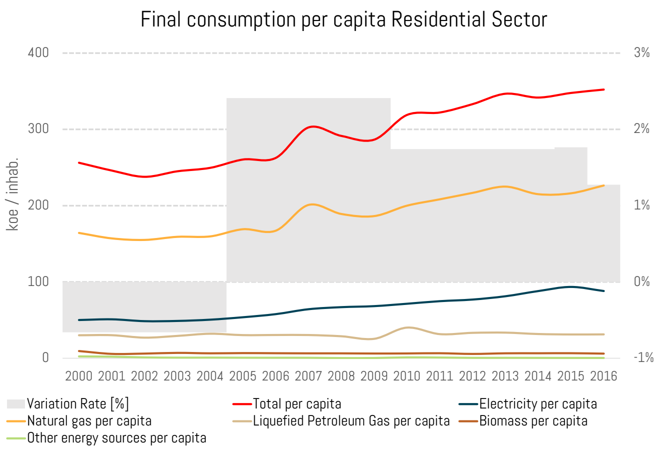


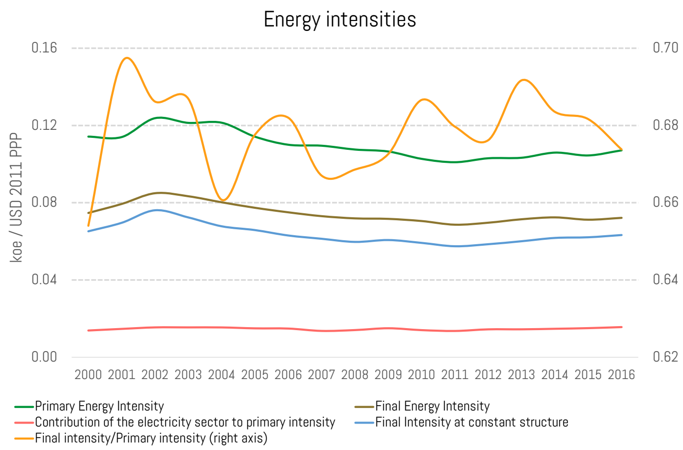
Other Sector Final Consumption

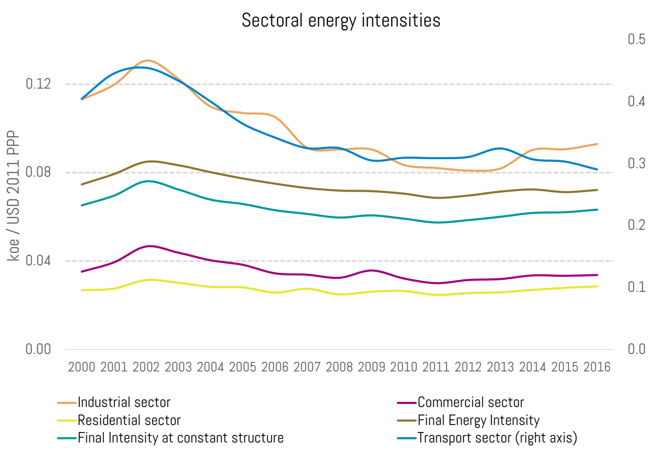


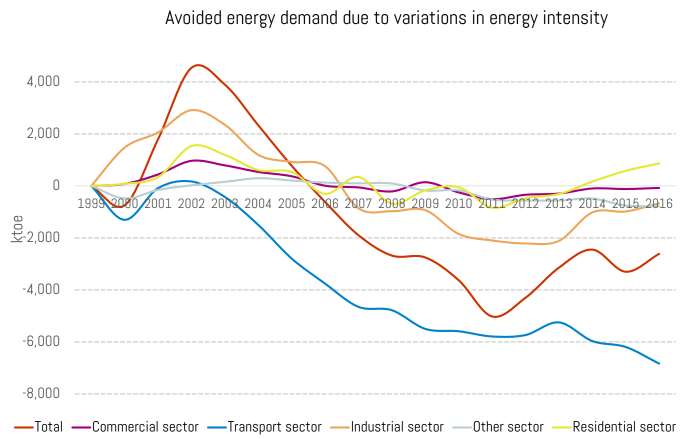
Residential Sector Final Consumption

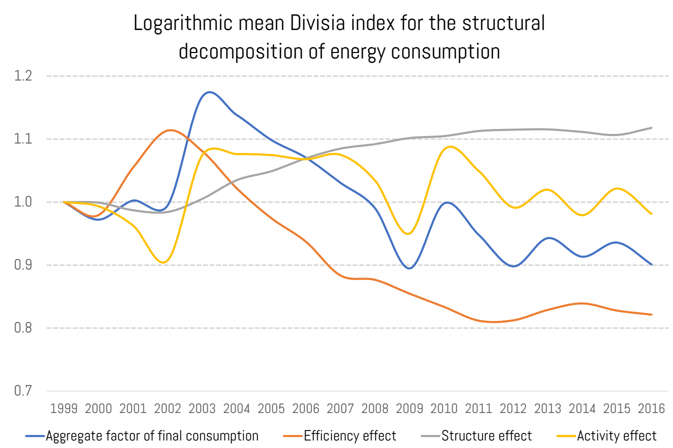


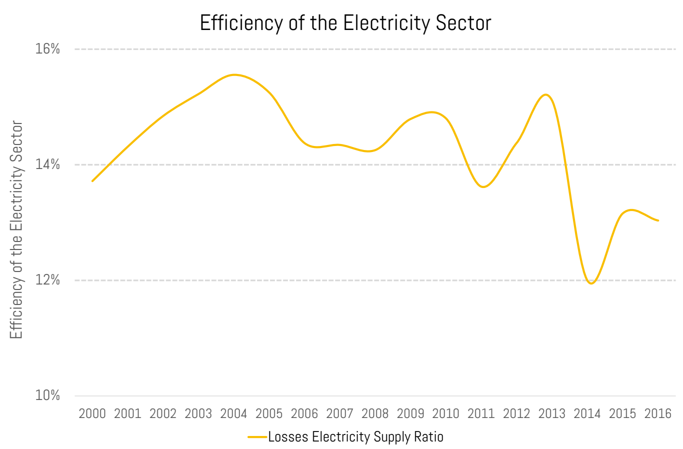

Final consumption per capita Residential Sector
koe / inhab.
Final consumption quinquennial variation rate
Variation Rate [%]
Total per capita
Electricity per capita
Natural gas per capita
Liquefied Petroleum Gas per capita
Biomass per capita
Other energy sources per capita


Energy intensities
koe / USD 2011 PPP
Primary Energy Intensity
Final Energy Intensity
Contribution of the electricity sector to primary intensity
Final Intensity at constant structure
Final intensity/Primary intensity (right axis)


Sectoral energy intensities
koe / USD 2011 PPP
koe / USD 2011 PPP
Industrial sector
Commercial sector
Residential sector
Final Energy Intensity
Final Intensity at constant structure
Transport sector (right axis)


Avoided energy demand due to variations in energy intensity
ktoe
Total
Commercial sector
Transport sector
Industrial sector
Other sector
Residential sector


Logarithmic mean Divisia index for the structural decomposition of energy consumption
Aggregate factor of final consumption
Efficiency effect
Structure effect
Activity effect


Efficiency of the Electricity Sector
Efficiency of the Electricity Sector
Losses Electricity Supply Ratio

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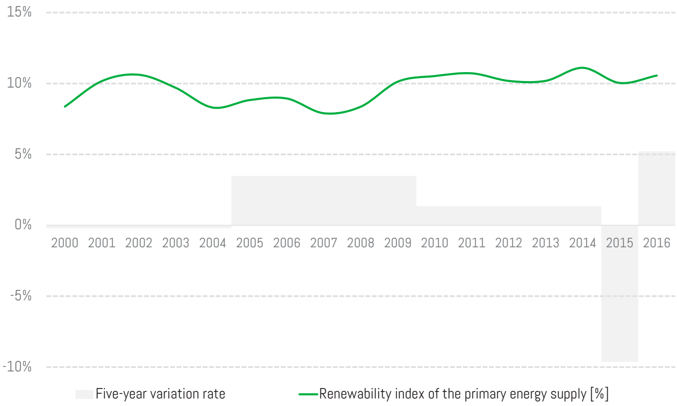
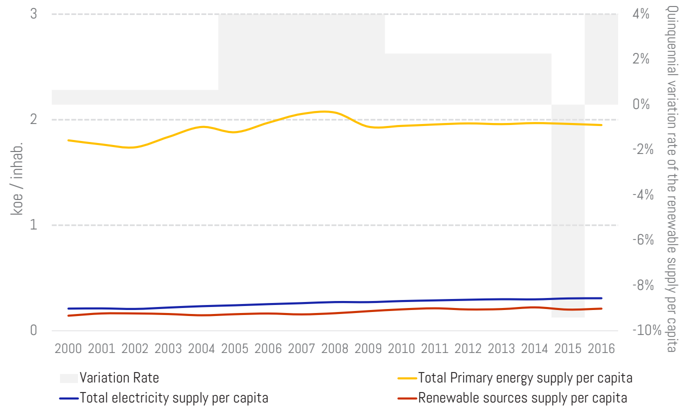
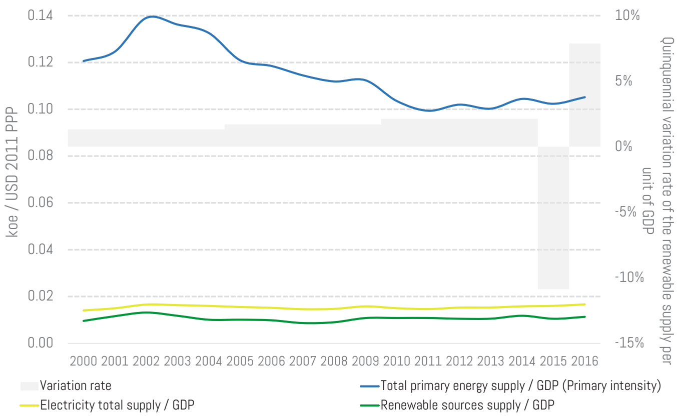
Primary energy supply renewability index



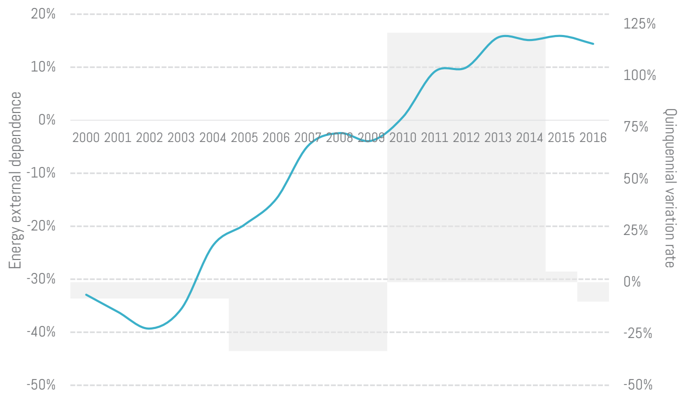
Energy supply per capita



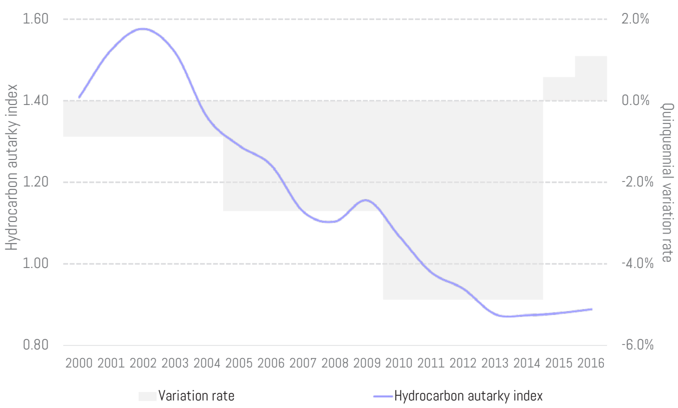
Energy supply per unit of GDP



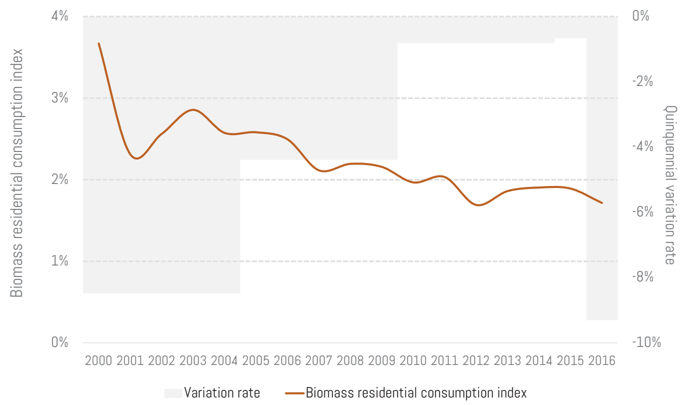
Energy external dependence



Hydrocarbon autarky index



Biomass residential consumption index



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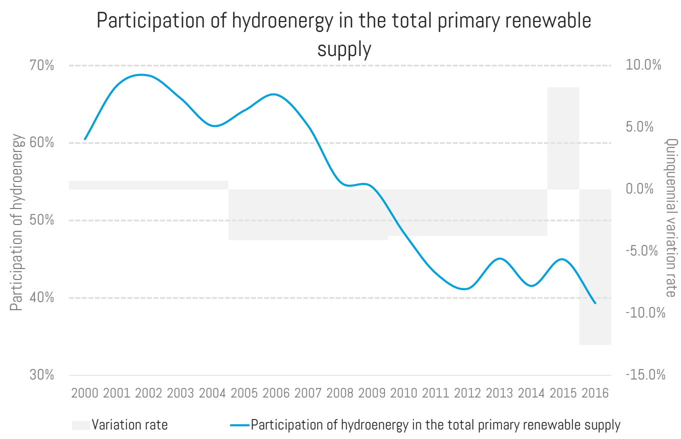
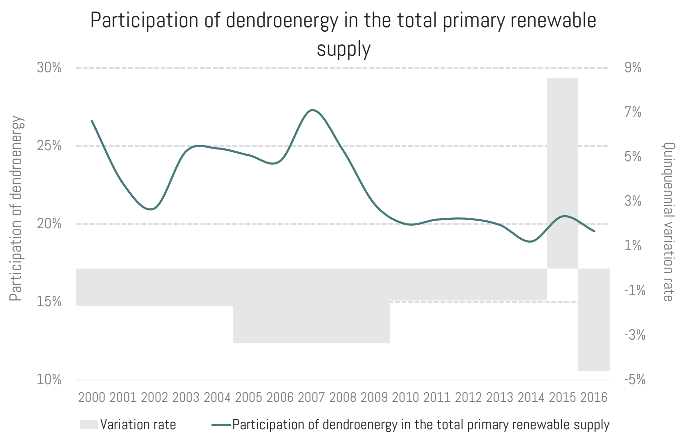
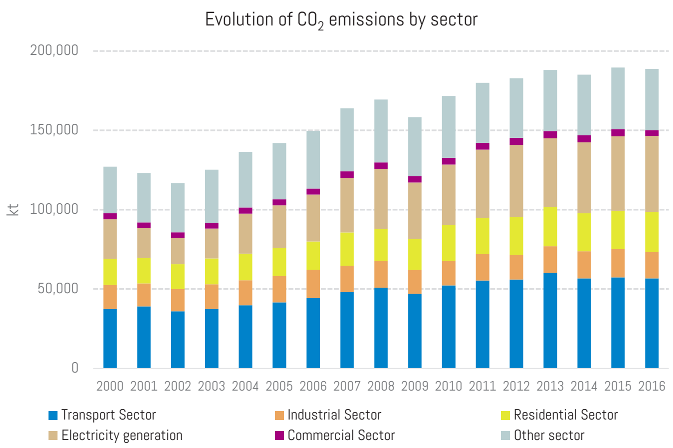
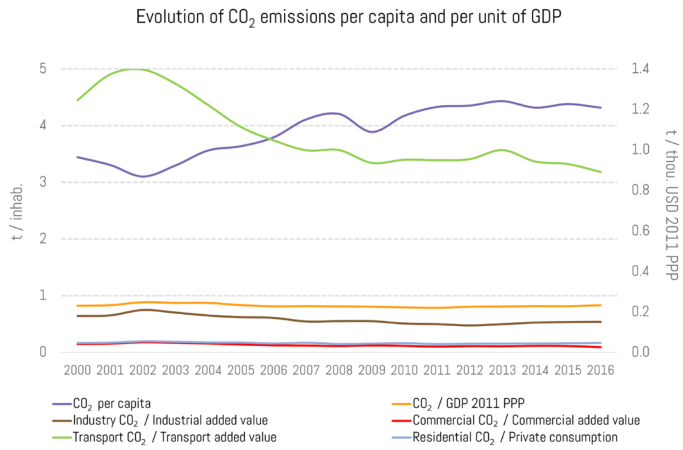
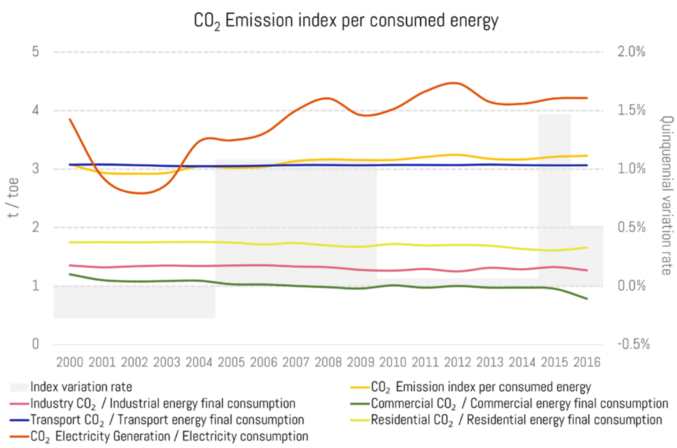
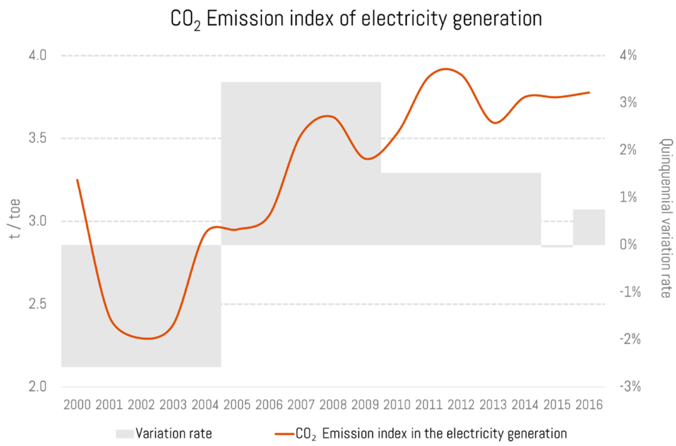

Participation of hydroenergy in the total primary renewable supply
Participation of hydroenergy
Quinquennial variation rate
70%
60%
50%
40%
30%
10.0%
5.0%
0.0%
-5.0%
-10.0%
-15.0%
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Variation rate
Participation of hydroenergy in the total primary renewable supply


Participation of dendroenergy in the total primary renewable supply
Participation of dendroenergy
Quinquennial variation rate
30%
25%
20%
15%
10%
9%
7%
5%
3%
1%
-1%
-3%
-5%
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Variation rate
Participation of dendroenergy in the total primary renewable supply


Evolution of CO2 emissions by sector
kt
200,000
150,000
100,000
50,000
0
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Transport Sector
Industrial Sector
Residential Sector
Electricity generation
Commercial Sector
Other sector


Evolution of CO2 emissions per capita and per unit of GDP
t / inhab.
t / thou. USD 2011 PPP
5
4
3
2
1
0
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
CO2 per capita
Industry CO2 / Industrial added value
Transport CO2 / Transport added value
CO2 / GDP 2011 PPP
Commercial CO2 / Commercial added value
Residential CO2 / Private consumption


CO2 Emission index per consumed energy
t / toe
Quinquennial variation rate
5
4
3
2
1
0
2.0%
1.5%
1.0%
0.5%
0.0%
-0.5%
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Index variation rate
Industry CO2 / Industrial energy final consumption
Transport CO2 / Transport energy final consumption
CO2 Electricity Generation / Electricity consumption
CO2 Emission index per consumed energy
Commercial CO2 / Commercial energy final consumption
Residential CO2 / Residential energy final consumption


CO2 Emission index of electricity generation
t / toe
Quinquennial variation rate
4.0
3.5
3.0
2.5
2.0
4%
3%
2%
1%
0%
-1%
-2%
-3%
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Variation rate
CO2 Emission index in the electricity generation

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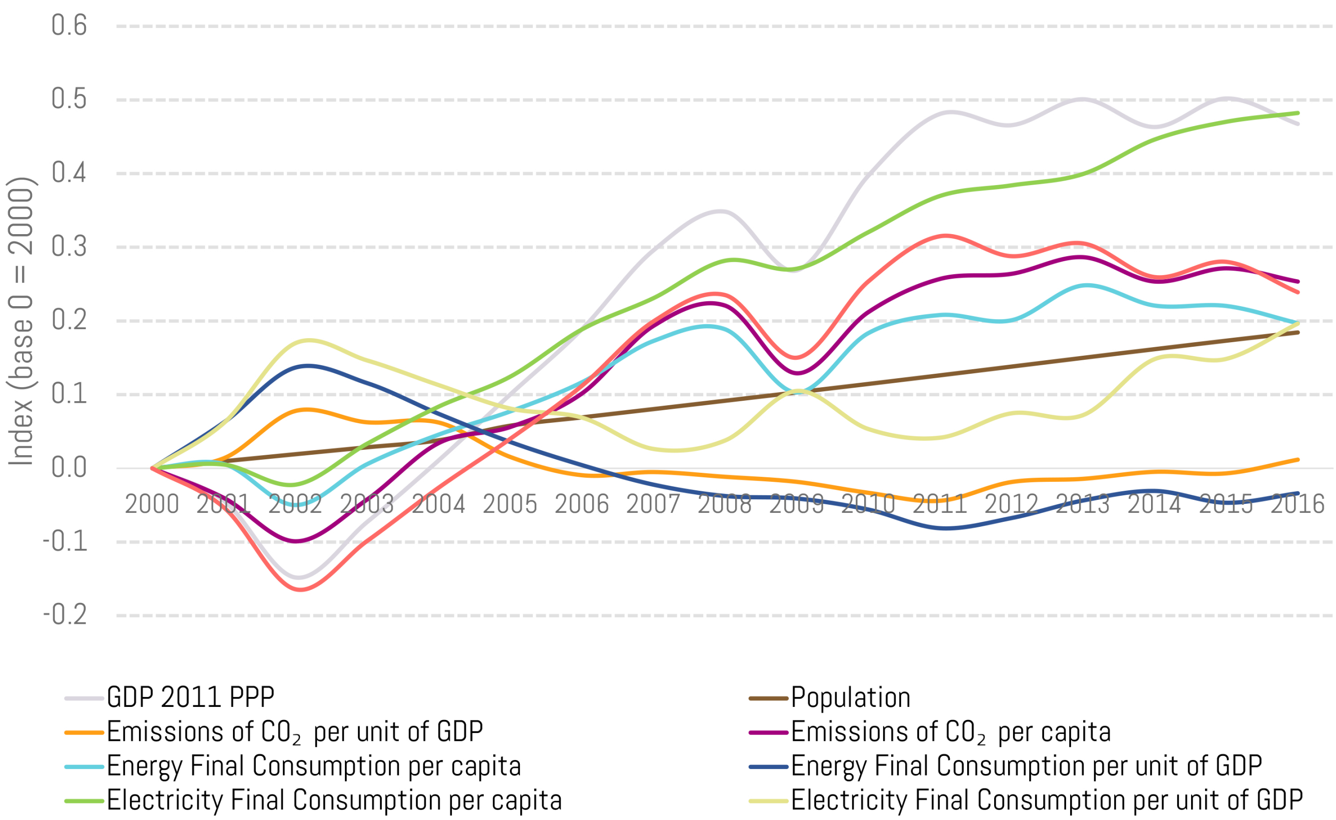
Summary of the main energy indicators



ARGENTINA

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GENERAL INFORMATION 2016

Population (thousand inhab.)	285
Area (km^2)	430
Population Density (inhab./km^2)	663
Urban Population (%)	31
GDP USD 2010 (MUSD)	4,615
GDP USD 2011 PPP (MUSD)	4,443
GDP per capita (thou. USD 2011 PPP/inhab.)	16

ENERGY SECTOR [1]

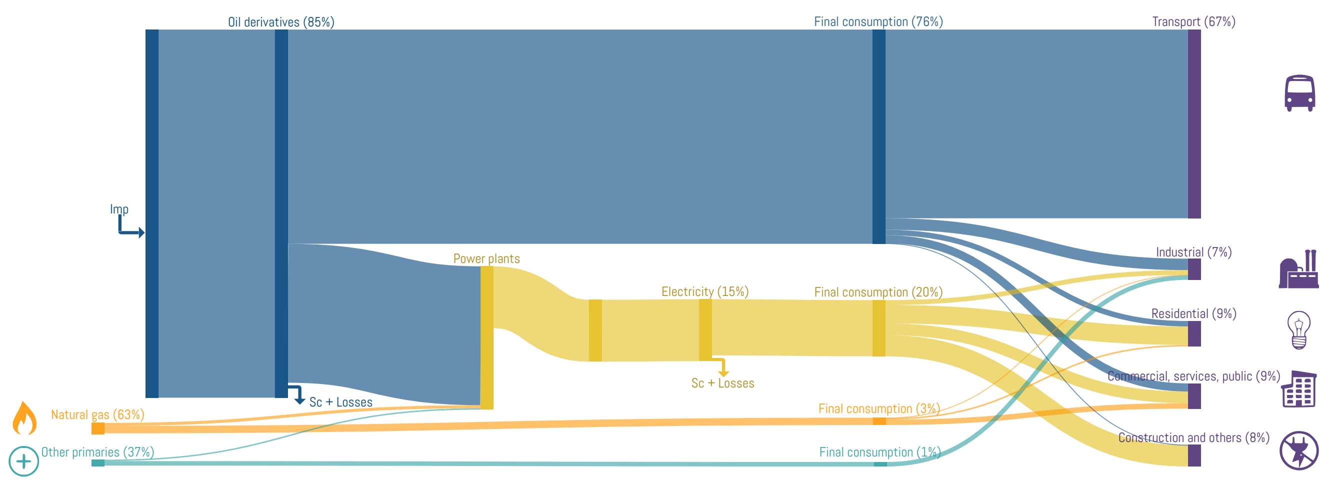
Final consumption in the Transport Sector	Mtoe 0.27
Final consumption in the Industrial Sector	Mtoe 0.03
Final consumption in the Residential Sector	Mtoe 0.04
Final consumption in the Commercial and Service Sector	Mtoe 0.04
Final consumption in the Agriculture, Livestock, Fishing, Mining, Other and Non - Energy Consumption	Mtoe 0.03

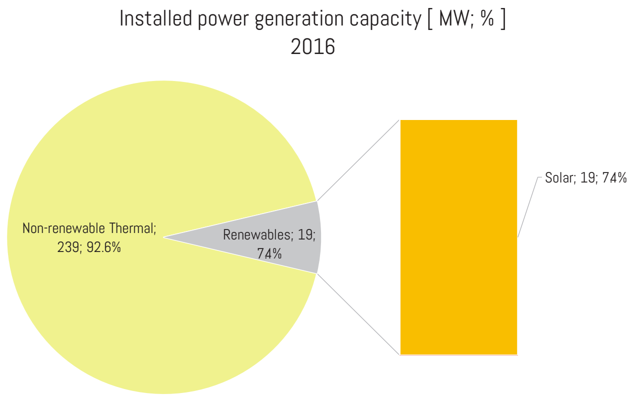
Mbbl 0.59	Gm^3 0.06	Mt n.a.
Oil Reserves	Natural gas reserves	Coal reserves

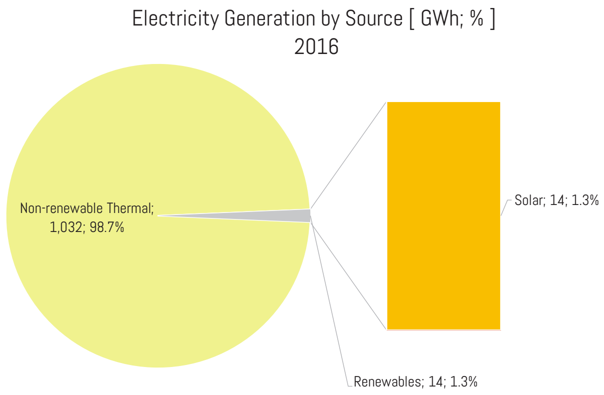
[1] Data estimated by OLADE
[2] 2015 Data.

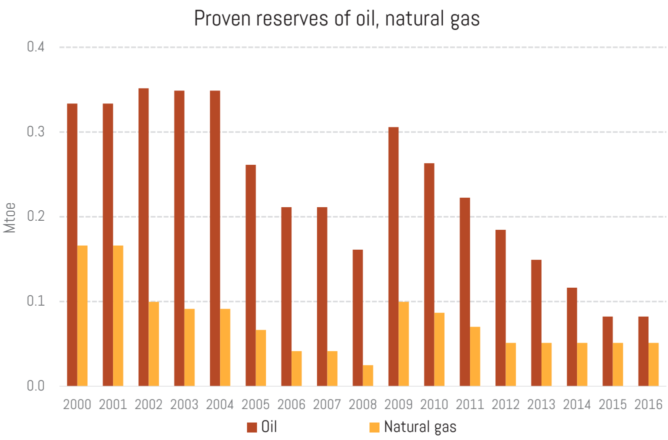
Electricity consumption per capita	Final energy consumption per capita	Electrification rate	Total energy supply	Total energy production	Total energy imports	Total energy exports	Total final energy consumption	Refining capacity	Installed power generation capacity	Primary energy intensity and final energy intensity
kWh / inhab.	toe / inhab.	%	Mtoe	Mtoe	Mtoe	Mtoe	Mtoe	kbbl/day	GW	koe / USD 2011 PPP
3,328	1.44	99.80 [2]	0.54	0.06	0.53	0.03	0.41	n.a.	0.26	0.01 / 0.09

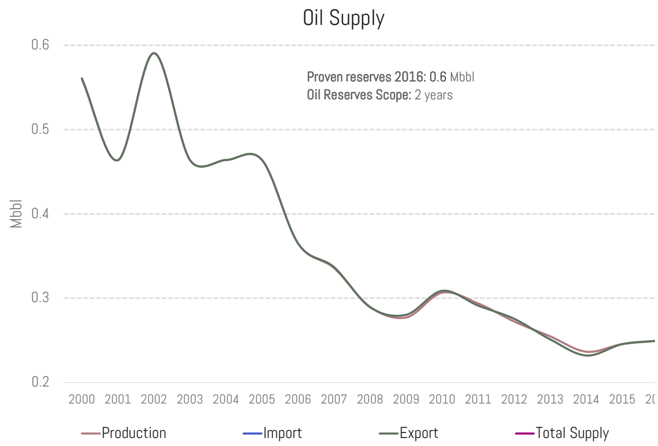
Summarized energy matrix 2016

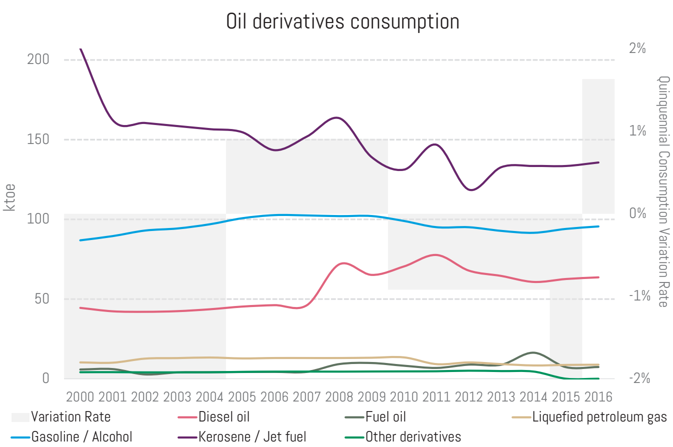


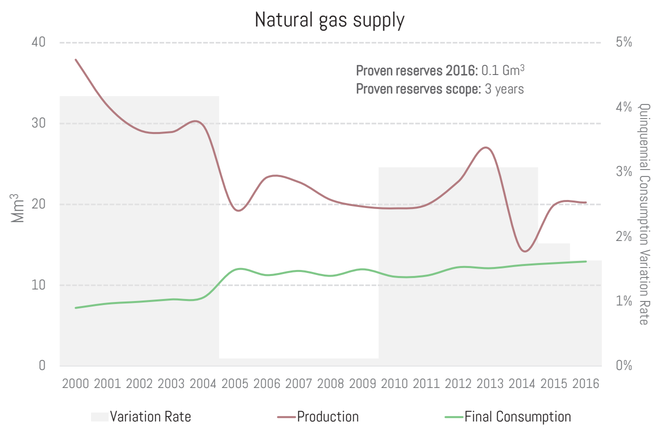

Installed power generation capacity [MW; %]
2016
Non-renewable Thermal; 239; 92.6%
Renewables; 19; 74%
Solar; 19; 74%


Electricity Generation by Source [GWh; %]
2016
Non-renewable Thermal; 1,032; 98.7%
Solar; 14; 1.3%
Renewables; 14; 1.3%

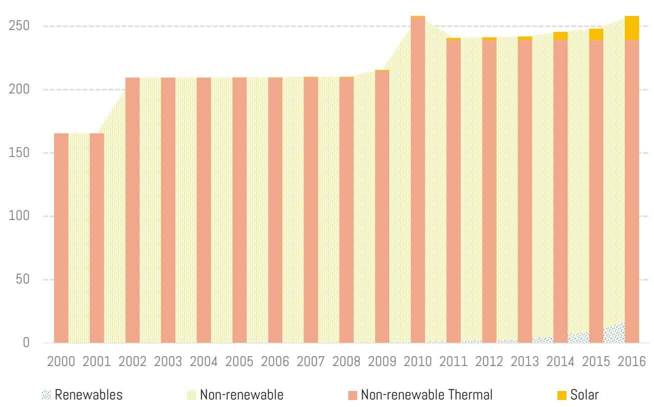

Proven reserves of oil, natural gas
Mtoe
0.4
0.3
0.2
0.1
0.0
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Oil
Natural gas


Oil Supply
Proven reserves 2016: 0.6 Mbbl
Oil Reserves Scope: 2 years
Mbbl
0.6
0.5
0.4
0.3
0.2
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015
Production
Import
Export
Total Supply

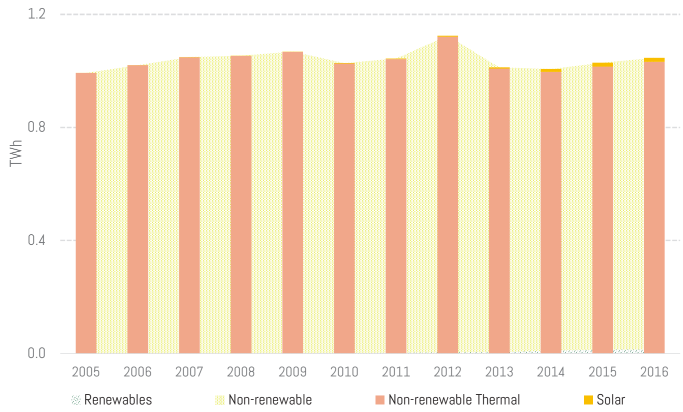

Oil derivatives consumption
ktoe
200
150
100
50
0
2%
1%
0%
-1%
-2%
Quinquennial Consumption Variation Rate
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Variation Rate
Diesel oil
Fuel oil
Liquefied petroleum gas
Gasoline / Alcohol
Kerosene / Jet fuel
Other derivatives


Natural gas supply
Proven reserves 2016: 0.1 Gm³
Proven reserves scope: 3 years
Mm³
40
30
20
10
0
5%
4%
3%
2%
1%
0%
Quinquennial Variation Rate
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Variation Rate
Production
Final Consumption

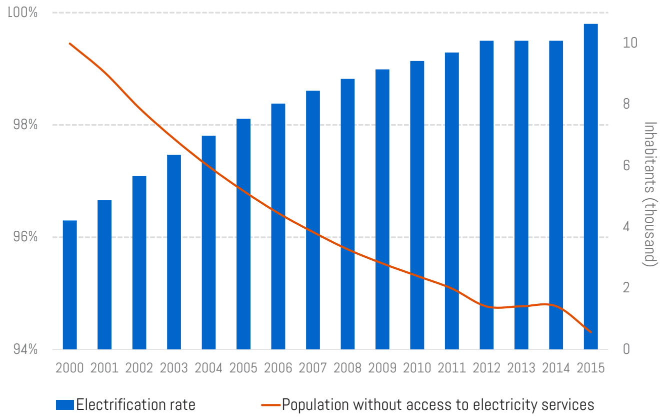
Installed power generation capacity



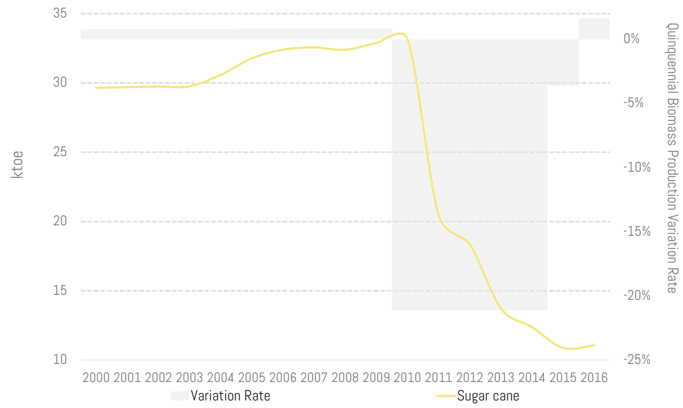
Electricity generation



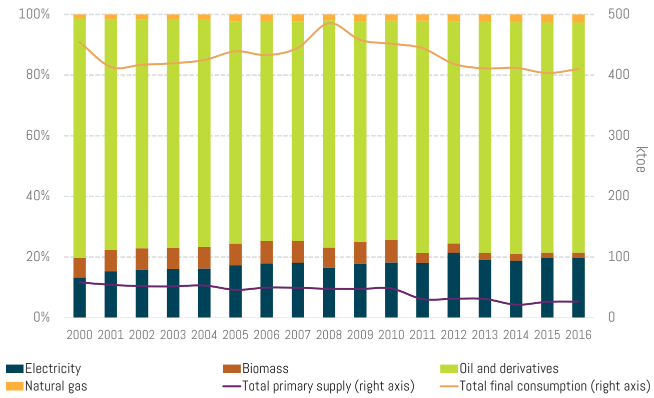
Electrification rate



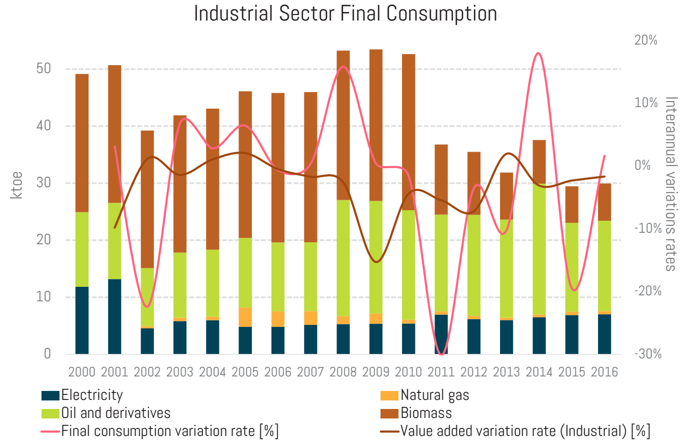
Biomass production



Final energy consumption by source



Industrial Sector Final Consumption



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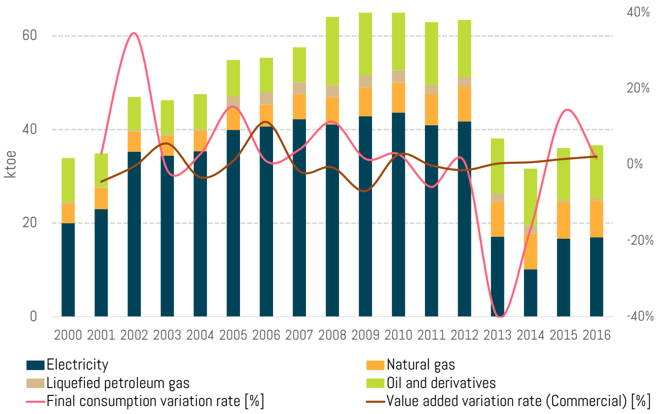
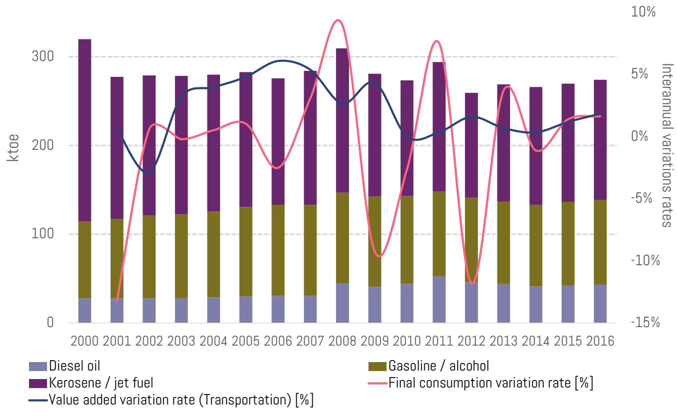
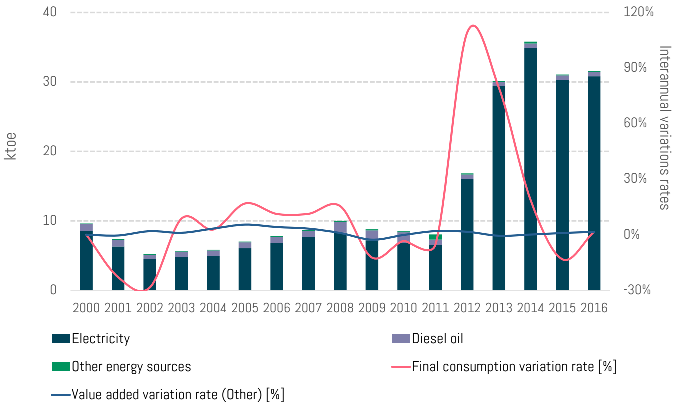
Commercial Sector Final Consumption



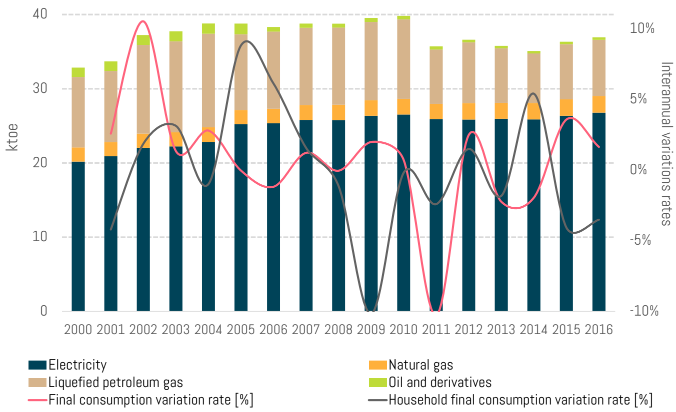
Transport Sector Final Consumption



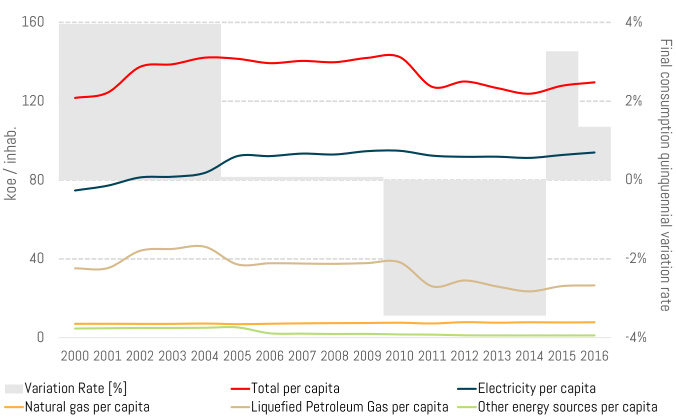
Other Sector Final Consumption



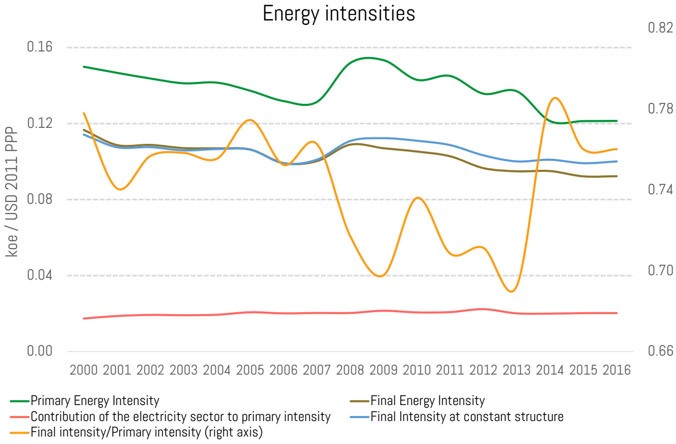
Residential Sector Final Consumption

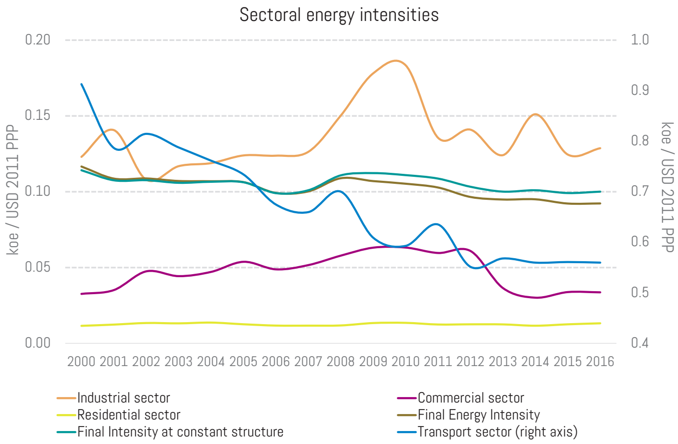


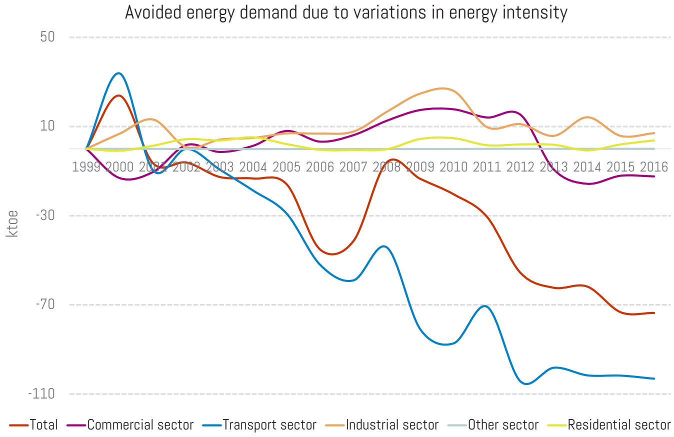
Final consumption per capita Residential Sector

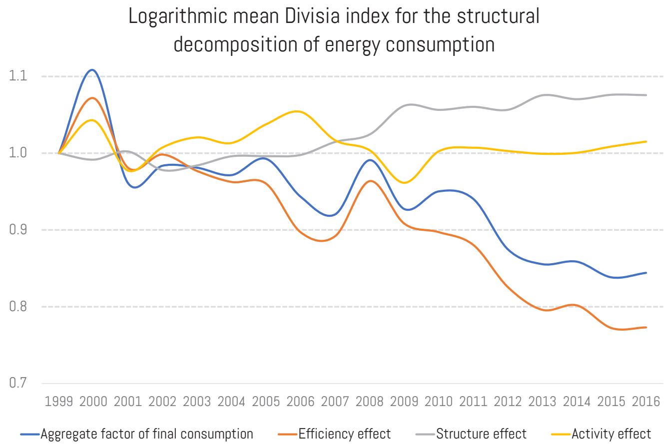


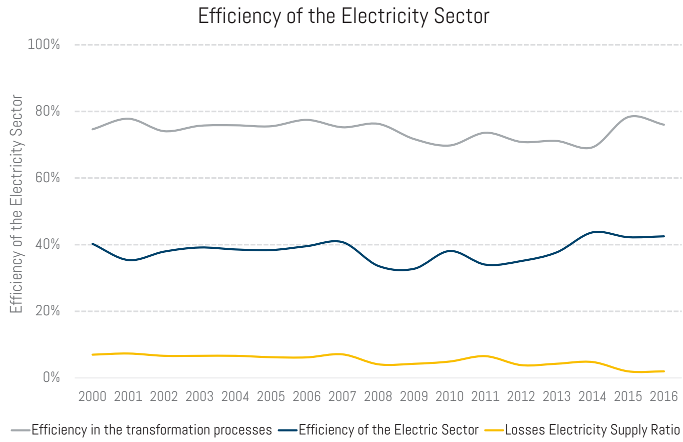
Energy intensities

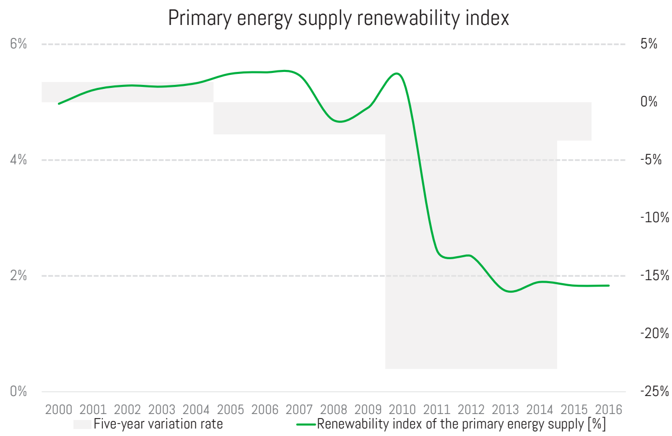


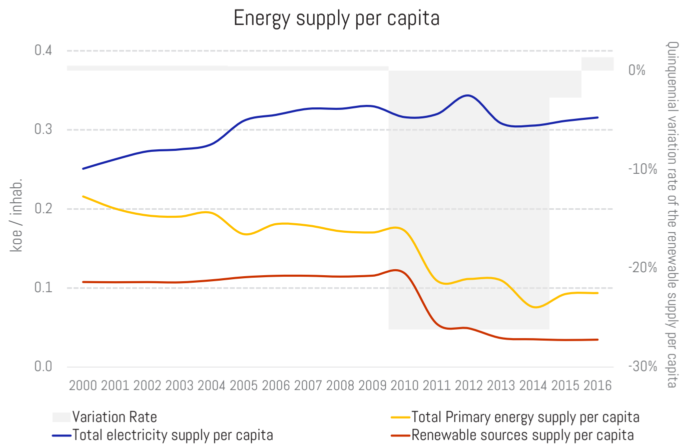

Sectoral energy intensities
koe / USD 2011 PPP
koe / USD 2011 PPP
Industrial sector
Residential sector
Final Intensity at constant structure
Commercial sector
Final Energy Intensity
Transport sector (right axis)


Avoided energy demand due to variations in energy intensity
ktoe
Total
Commercial sector
Transport sector
Industrial sector
Other sector
Residential sector


Logarithmic mean Divisia index for the structural decomposition of energy consumption
Aggregate factor of final consumption
Efficiency effect
Structure effect
Activity effect


Efficiency of the Electricity Sector
Efficiency of the Electricity Sector
Efficiency in the transformation processes
Efficiency of the Electric Sector
Losses Electricity Supply Ratio


Primary energy supply renewability index
Five-year variation rate
Renewability index of the primary energy supply [%]


Energy supply per capita
koe / inhab.
Quinquennial variation rate of the renewable supply per capita
Variation Rate
Total electricity supply per capita
Total Primary energy supply per capita
Renewable sources supply per capita

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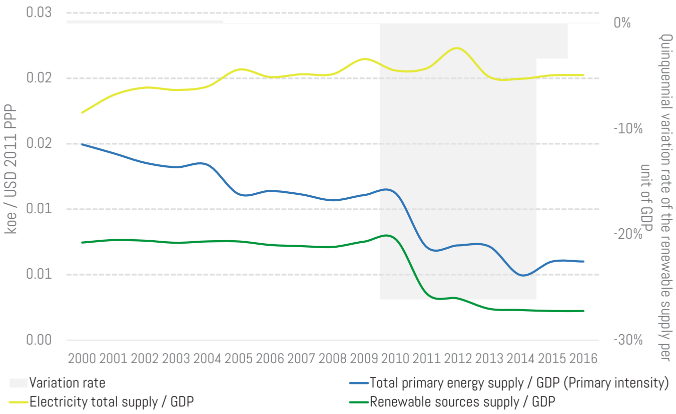
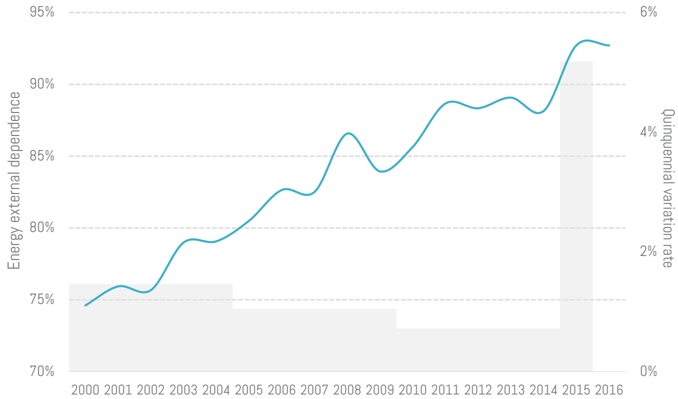
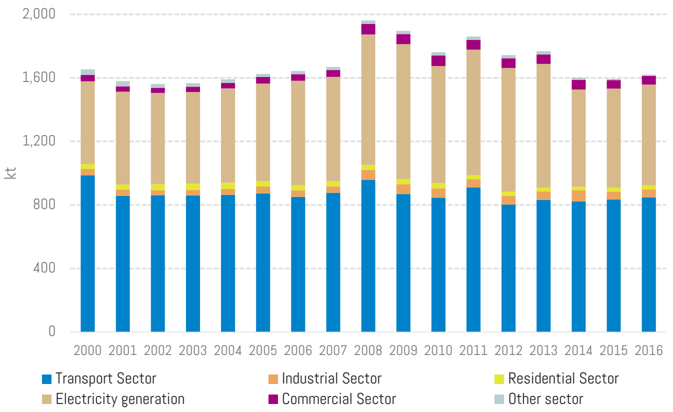
Energy supply per unit of GDP



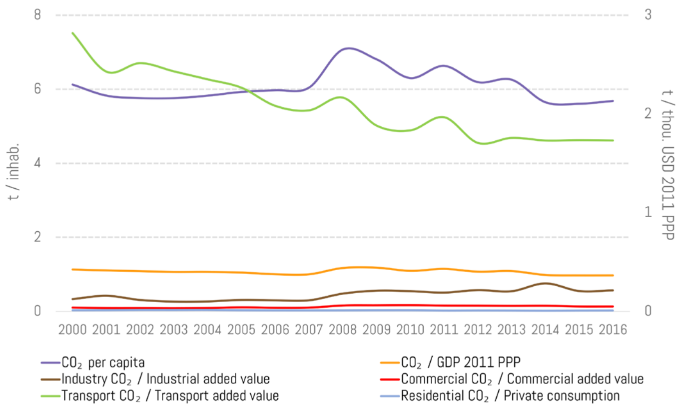
Energy external dependence



Evolution of CO_2 emissions by sector



Evolution of CO_2 emissions per capita and per unit of GDP



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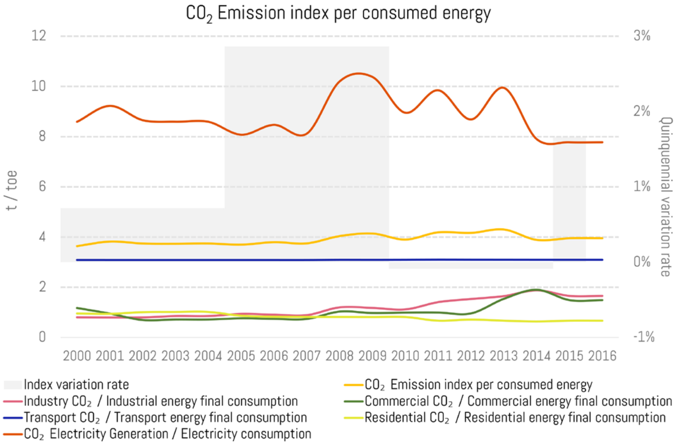
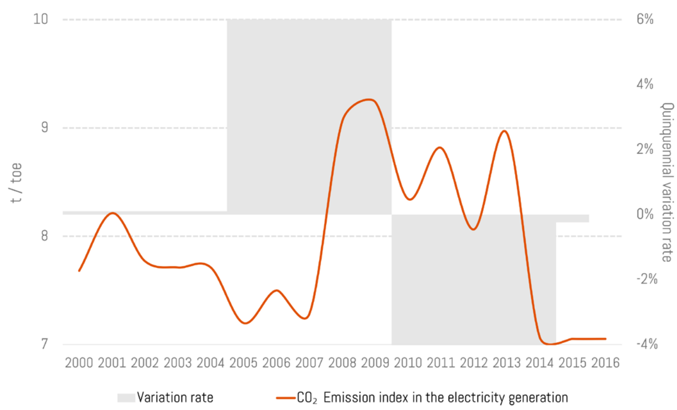
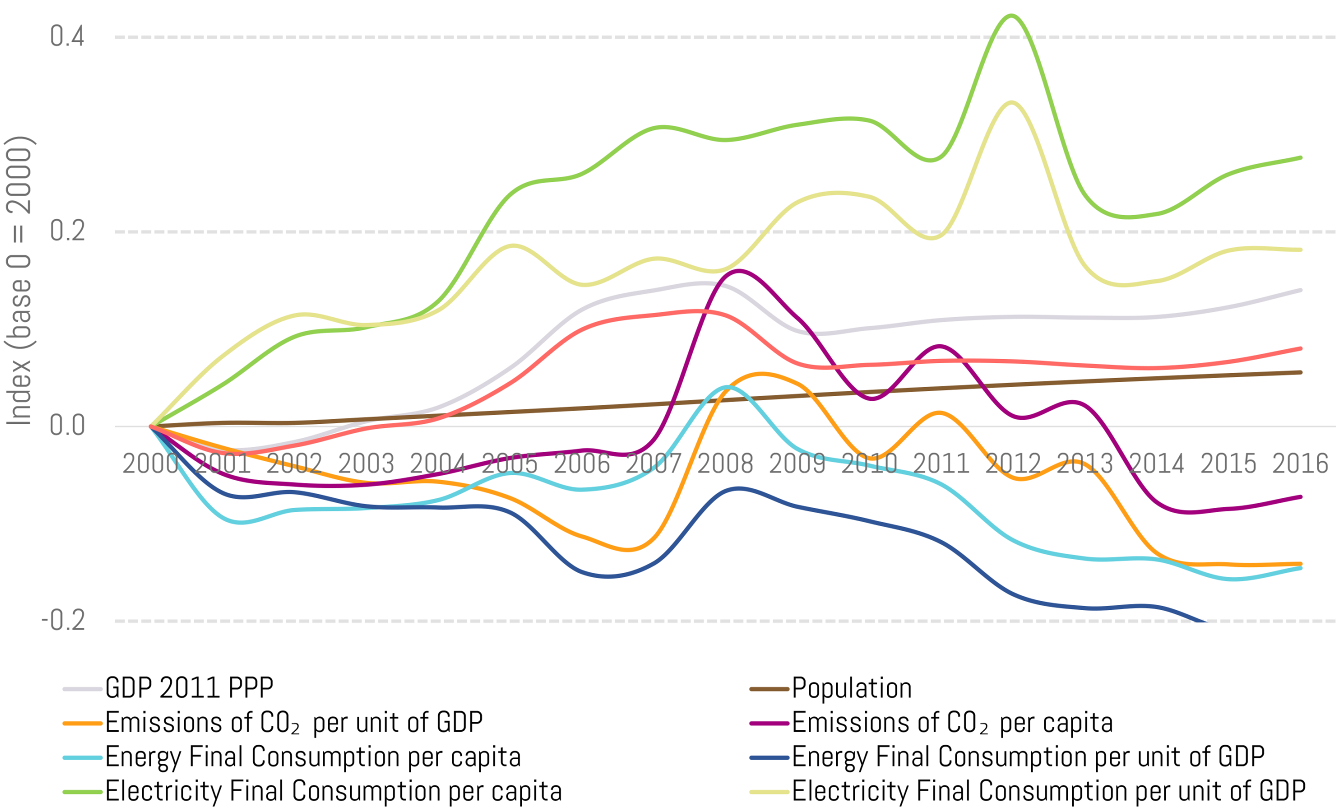
CO_2 Emission index per consumed energy



CO_2 Emission index of electricity generation



Summary of the main energy indicators



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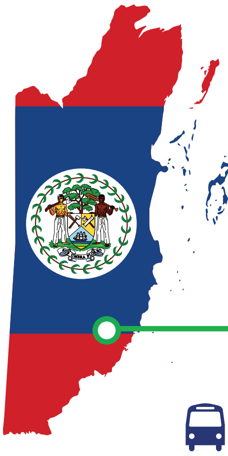
BELIZE



GENERAL INFORMATION 2016

Population (thousand inhab.)	367
Area (km²)	22,970
Population Density (inhab./km²)	16
Urban Population (%)	44
GDP USD 2010 (MUSD)	1,584
GDP USD 2011 PPP (MUSD)	2,874
GDP per capita (thou. USD 2011 PPP/inhab.)	8

ENERGY SECTOR [1]

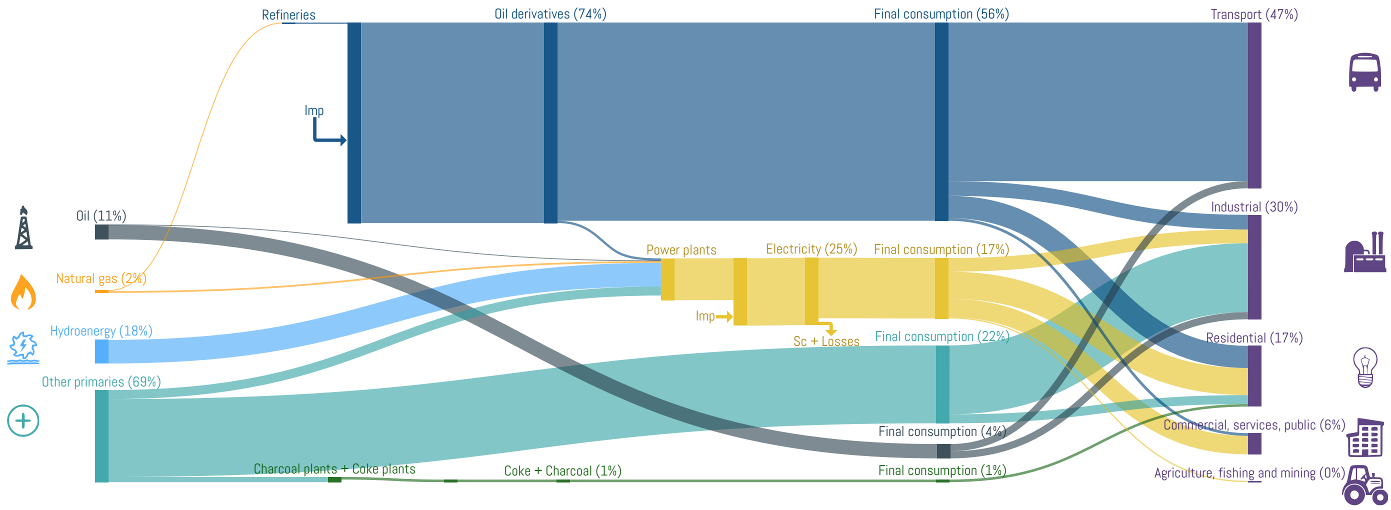
	Mtoe
Final consumption in the Transport Sector	0.14
Final consumption in the Industrial Sector	0.09
Final consumption in the Residential Sector	0.05
Final consumption in the Commercial and Service Sector	0.02
Final consumption in the Agriculture, Livestock, Fishing, Mining, Other and Non - Energy Consumption	0.00

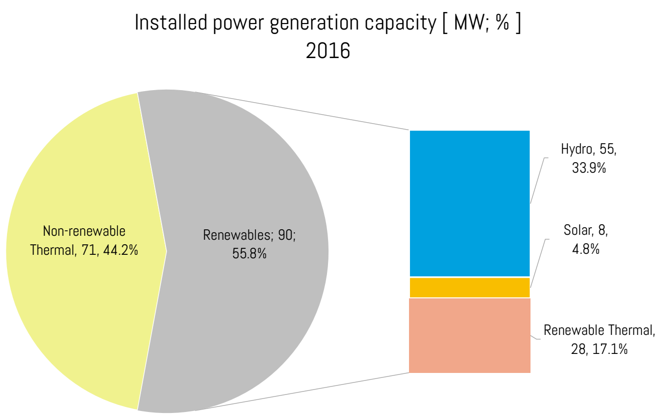
	Oil Reserves	Natural gas reserves	Coal reserves
Unit	Mbbl	Gm³	Mt
Value	9.10	n.a.	n.a.

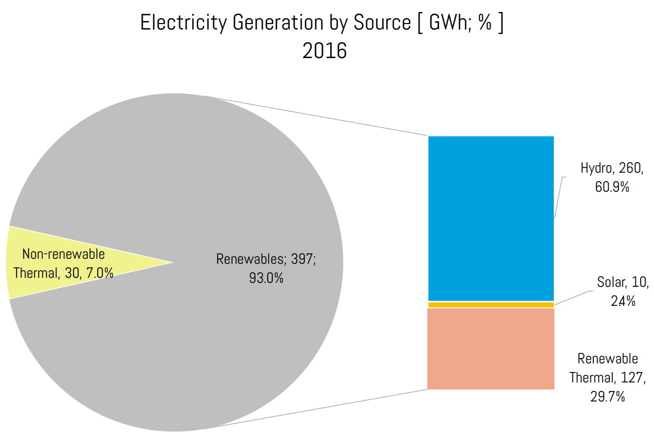
[1] Data estimated by OLADE
[2] 2015 Data.

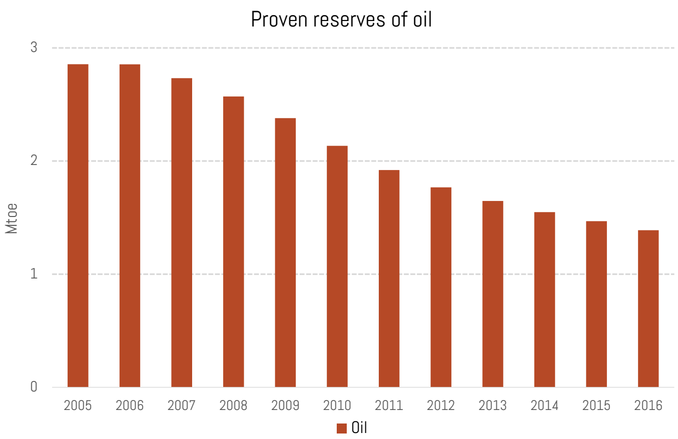
Indicator	Unit	Value
Electricity consumption per capita	kWh / inhab.	1,632
Final energy consumption per capita	toe / inhab.	0.82
Electrification rate	%	93 [2]
Total energy supply	Mtoe	0.30
Total energy production	Mtoe	0.18
Total energy imports	Mtoe	0.19
Total energy exports	Mtoe	0.06
Total final energy consumption	Mtoe	0.30
Refining capacity	kbbl/day	n.a.
Installed power generation capacity	GW	0.16
Primary energy intensity and final energy intensity	koe / USD 2011 PPP	0.04 / 0.10

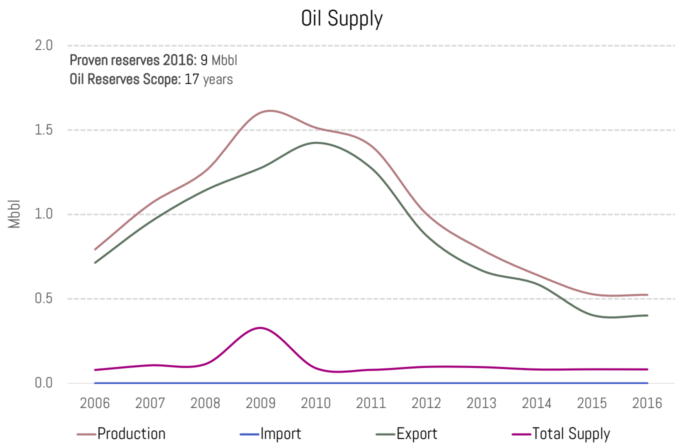
Summarized energy matrix 2016

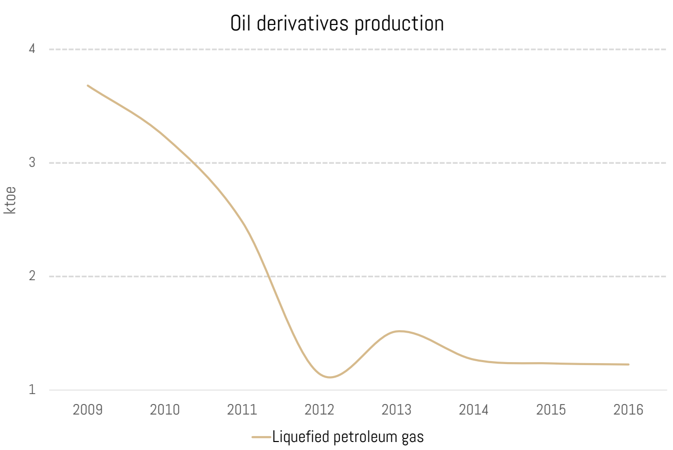


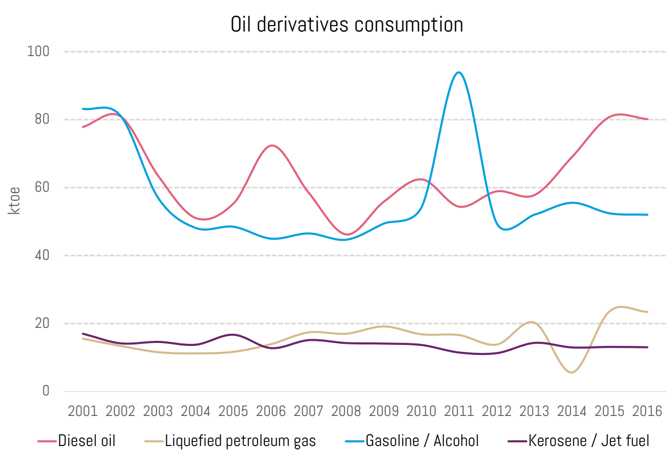

Installed power generation capacity [MW; %]
2016
Non-renewable Thermal, 71, 44.2%
Renewables; 90; 55.8%
Hydro, 55, 33.9%
Solar, 8, 4.8%
Renewable Thermal, 28, 17.1%

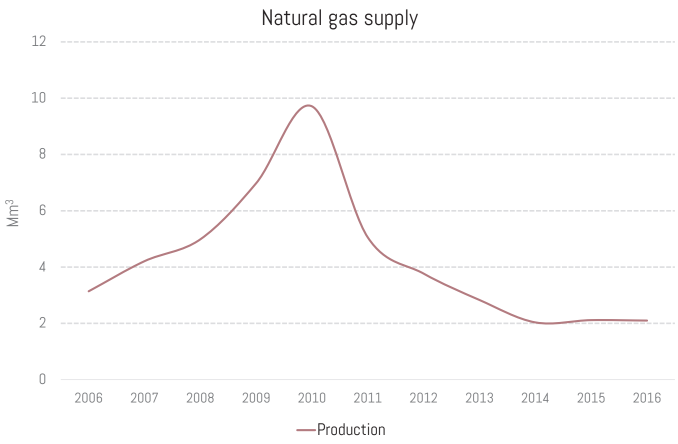

Electricity Generation by Source [GWh; %]
2016
Non-renewable Thermal, 30, 7.0%
Renewables; 397; 93.0%
Hydro, 260, 60.9%
Solar, 10, 24%
Renewable Thermal, 127, 29.7%

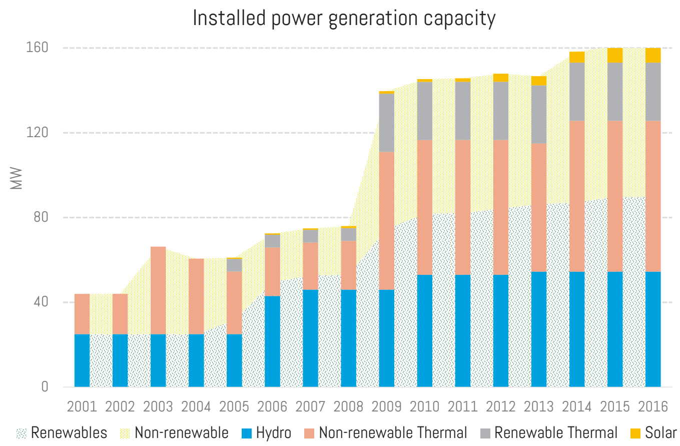

Proven reserves of oil
Mtoe
0
1
2
3
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
Oil

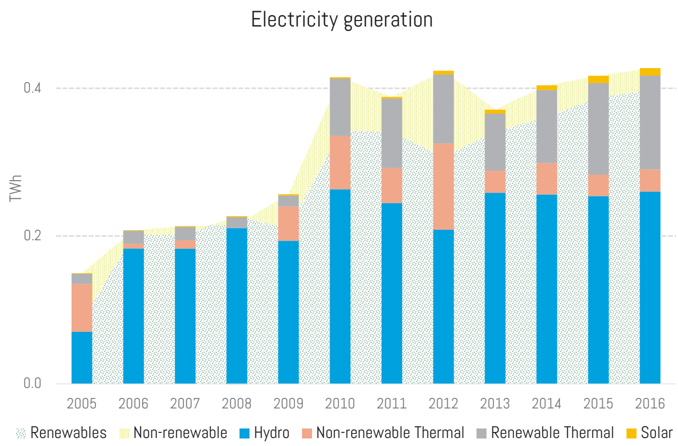

Oil Supply
Proven reserves 2016: 9 Mbbl
Oil Reserves Scope: 17 years
Mbbl
0.0
0.5
1.0
1.5
2.0
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
Production
Import
Export
Total Supply

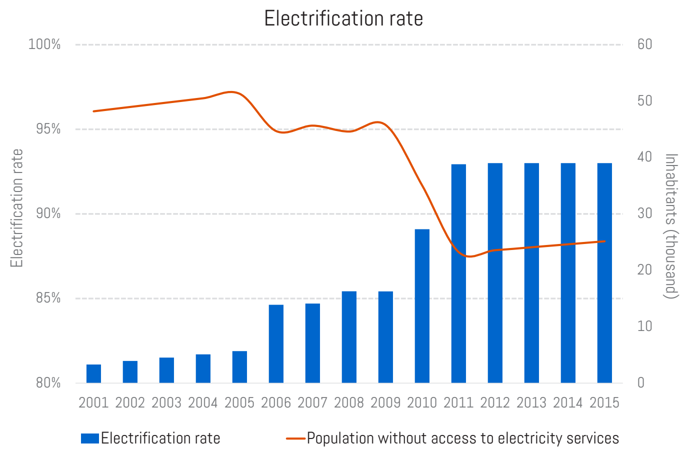

Oil derivatives production
ktoe
1
2
3
4
2009
2010
2011
2012
2013
2014
2015
2016
Liquefied petroleum gas

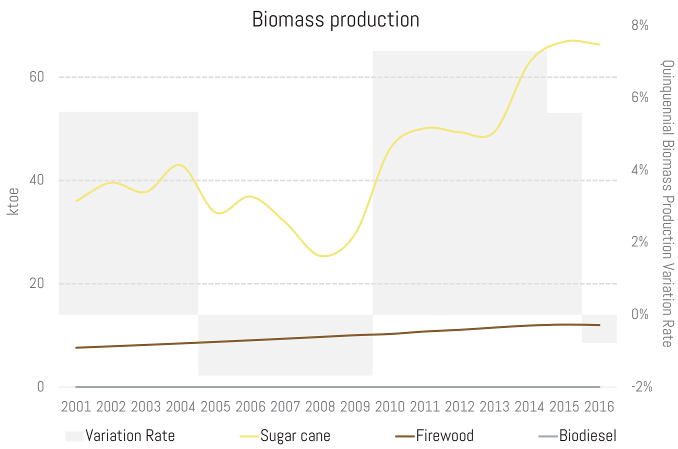

Oil derivatives consumption
ktoe
0
20
40
60
80
100
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
Diesel oil
Liquefied petroleum gas
Gasoline / Alcohol
Kerosene / Jet fuel

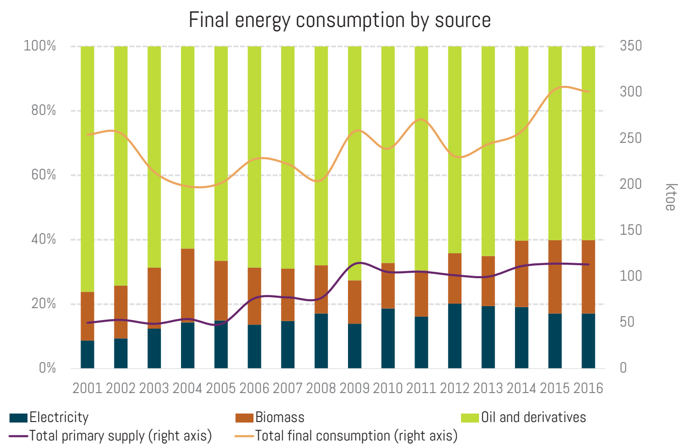

Natural gas supply
Mm³
0
2
4
6
8
10
12
2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Production


Installed power generation capacity
MW
0
40
80
120
160
2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Renewables
Non-renewable
Hydro
Non-renewable Thermal
Renewable Thermal
Solar


Electricity generation
TWh
0.0
0.2
0.4
2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Renewables
Non-renewable
Hydro
Non-renewable Thermal
Renewable Thermal
Solar

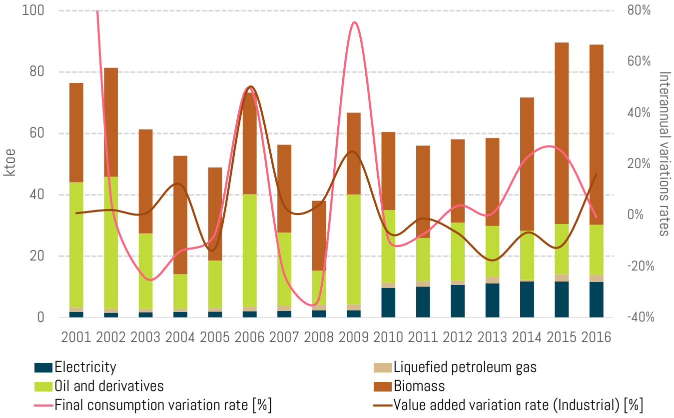

Electrification rate
Electrification rate
80%
85%
90%
95%
100%
Inhabitants (thousand)
0
10
20
30
40
50
60
2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015
Electrification rate
Population without access to electricity services


Biomass production
ktoe
0
20
40
60
Quinquennial Biomass Production Variation Rate
-2%
0%
2%
4%
6%
8%
2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Variation Rate
Sugar cane
Firewood
Biodiesel

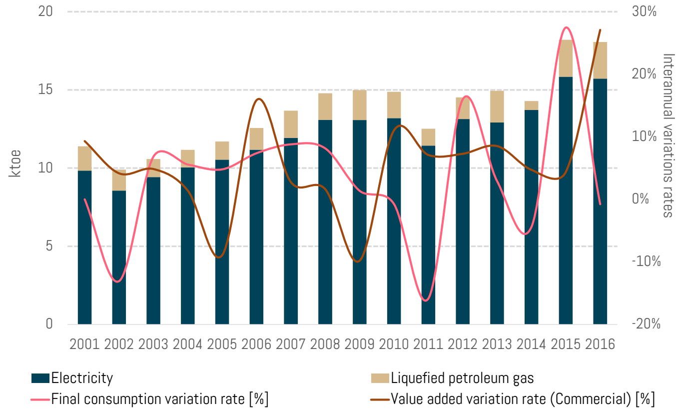

Final energy consumption by source
0%
20%
40%
60%
80%
100%
ktoe
0
50
100
150
200
250
300
350
2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Electricity
Biomass
Oil and derivatives
Total primary supply (right axis)
Total final consumption (right axis)

BELIZE

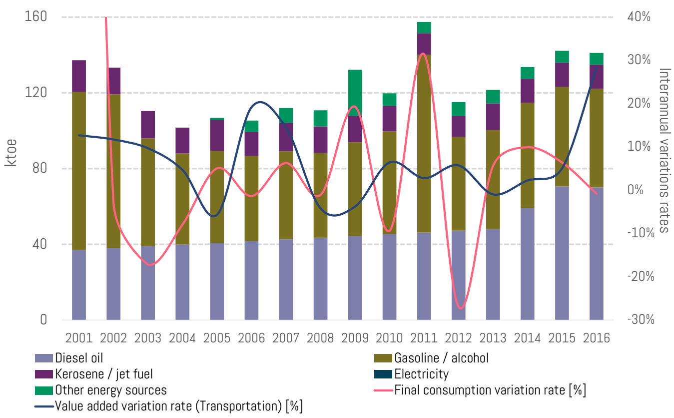
Industrial Sector Final Consumption



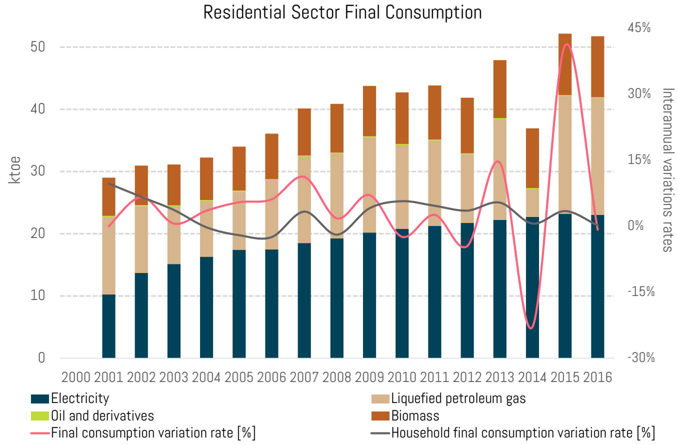
Commercial Sector Final Consumption



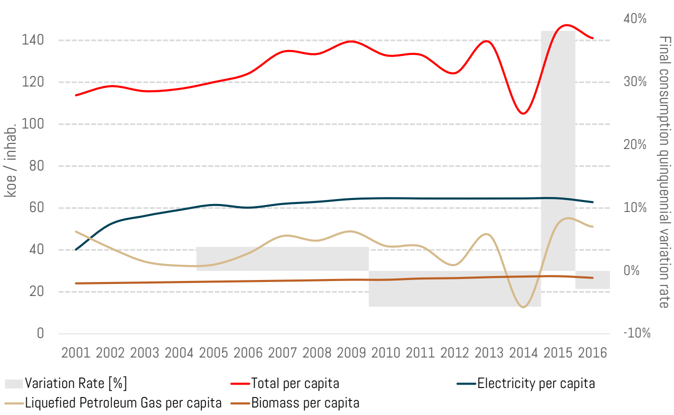
Transport Sector Final Consumption



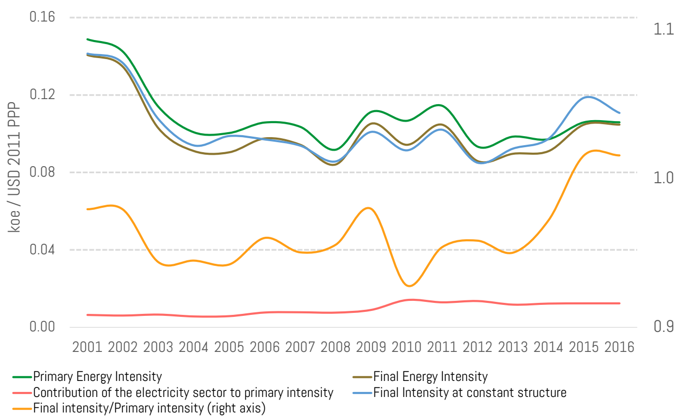
Residential Sector Final Consumption

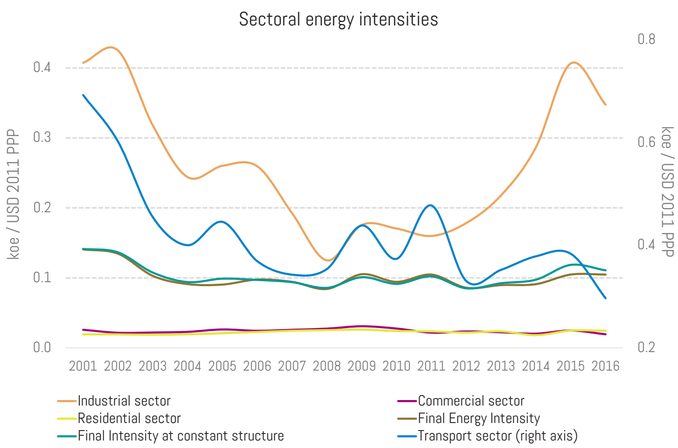


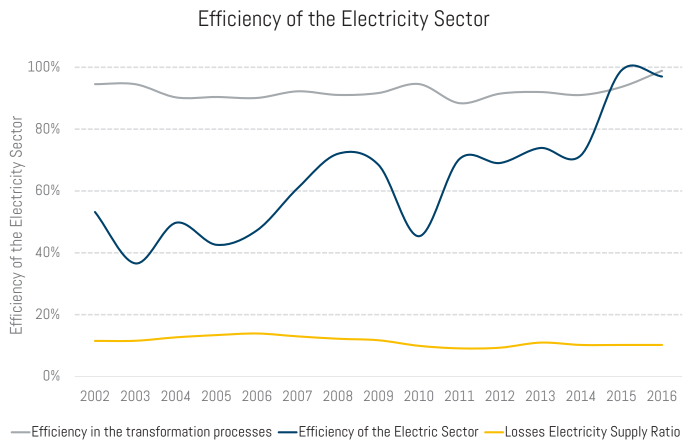
Final consumption per capita Residential Sector

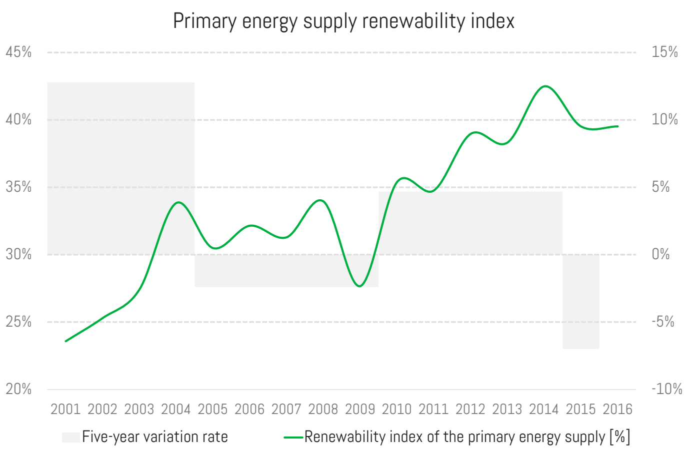


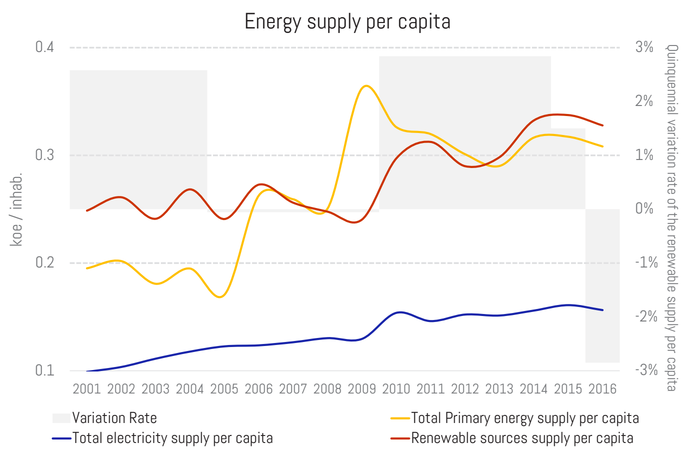
Energy intensities

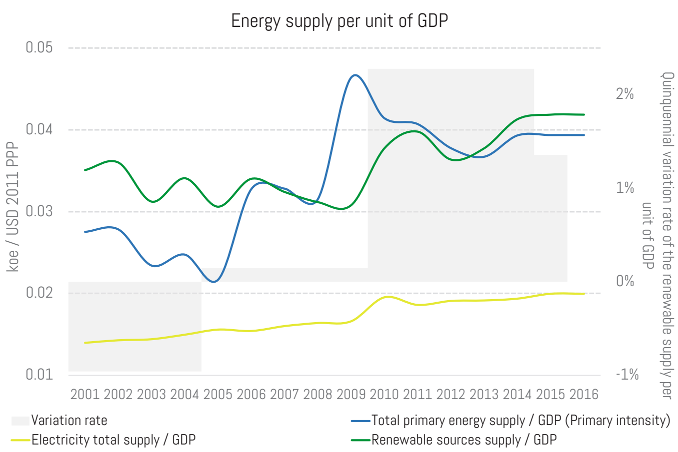


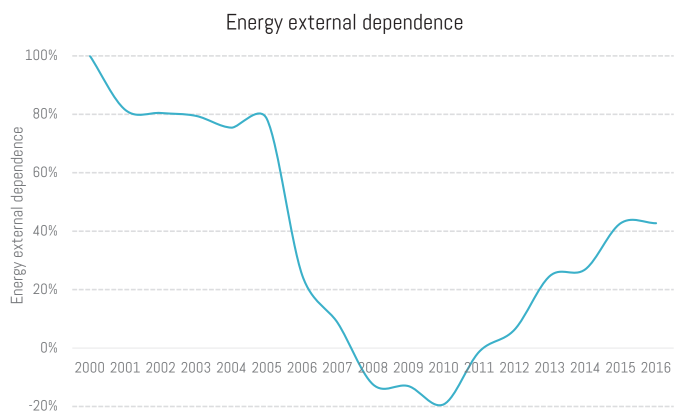

Sectoral energy intensities
koe / USD 2011 PPP
koe / USD 2011 PPP
Industrial sector
Residential sector
Final Intensity at constant structure
Commercial sector
Final Energy Intensity
Transport sector (right axis)


Efficiency of the Electricity Sector
Efficiency of the Electricity Sector
Efficiency in the transformation processes
Efficiency of the Electric Sector
Losses Electricity Supply Ratio

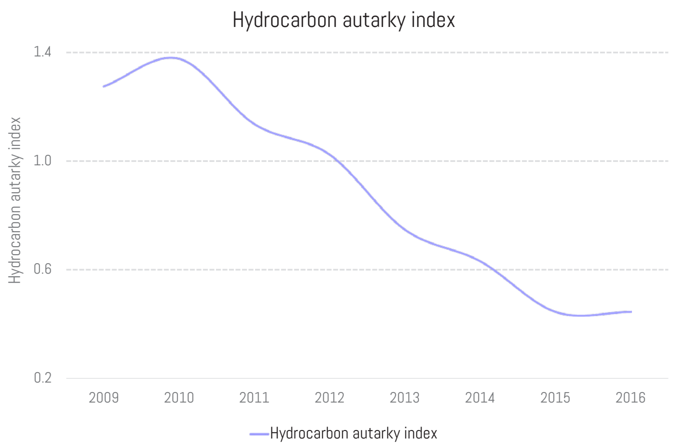

Primary energy supply renewability index
Five-year variation rate
Renewability index of the primary energy supply [%]

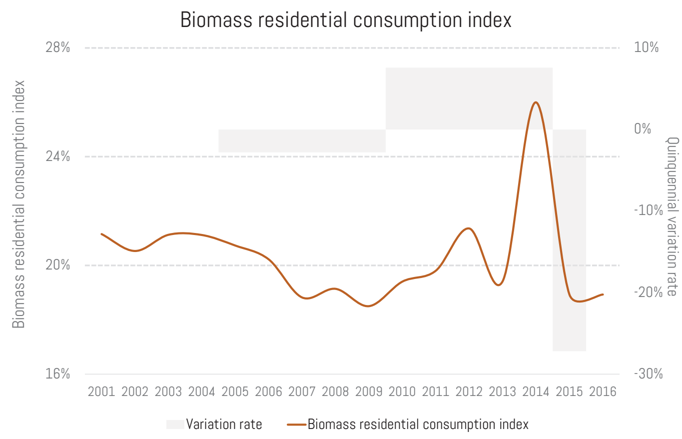

Energy supply per capita
koe / inhab.
Quinquennial variation rate of the renewable supply per capita
Variation Rate
Total electricity supply per capita
Total Primary energy supply per capita
Renewable sources supply per capita

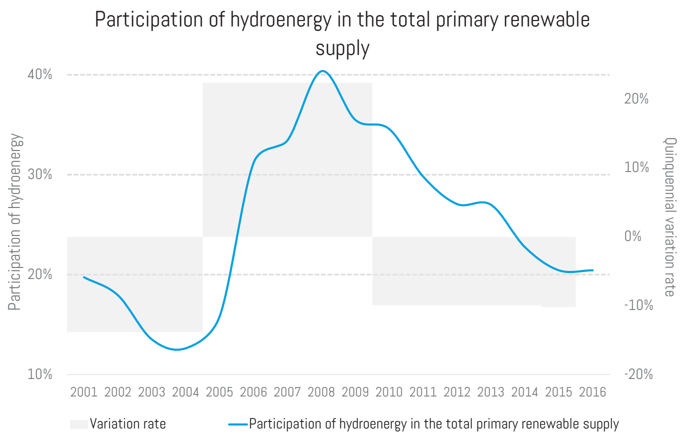

Energy supply per unit of GDP
koe / USD 2011 PPP
Quinquennial variation rate of the renewable supply per unit of GDP
Variation rate
Electricity total supply / GDP
Total primary energy supply / GDP (Primary intensity)
Renewable sources supply / GDP

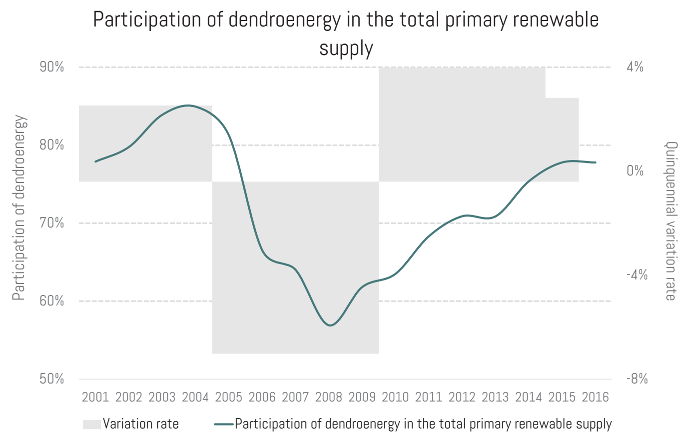

Energy external dependence
Energy external dependence

BELIZE

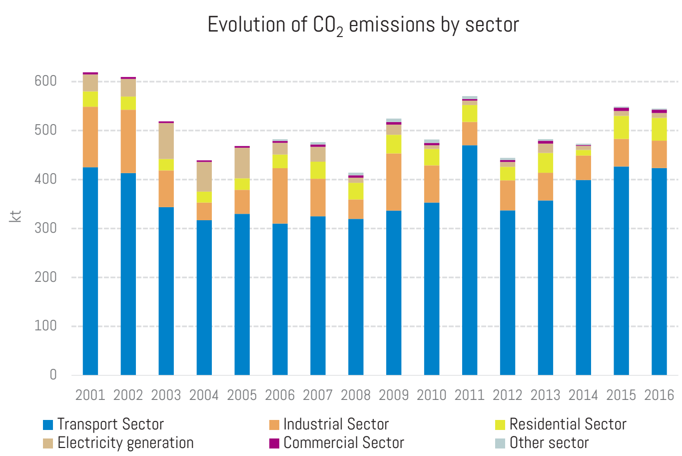

Hydrocarbon autarky index
Hydrocarbon autarky index
1.4
1.0
0.6
0.2
2009
2010
2011
2012
2013
2014
2015
2016
Hydrocarbon autarky index

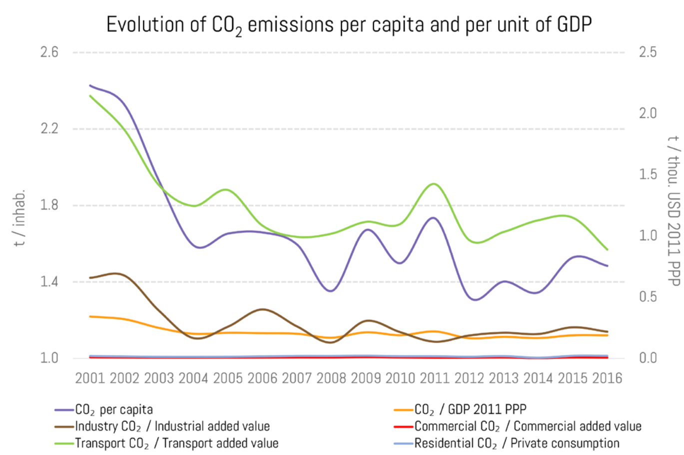

Biomass residential consumption index
Biomass residential consumption index
28%
24%
20%
16%
10%
0%
-10%
-20%
-30%
Quinquennial variation rate
2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Variation rate
Biomass residential consumption index

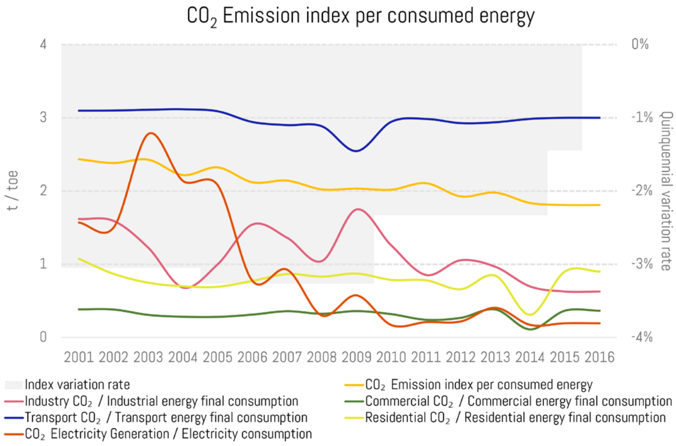

Participation of hydroenergy in the total primary renewable supply
Participation of hydroenergy
40%
30%
20%
10%
20%
10%
0%
-10%
-20%
Quinquennial variation rate
2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Variation rate
Participation of hydroenergy in the total primary renewable supply


Participation of dendroenergy in the total primary renewable supply
Participation of dendroenergy
90%
80%
70%
60%
50%
4%
0%
-4%
-8%
Quinquennial variation rate
2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Variation rate
Participation of dendroenergy in the total primary renewable supply

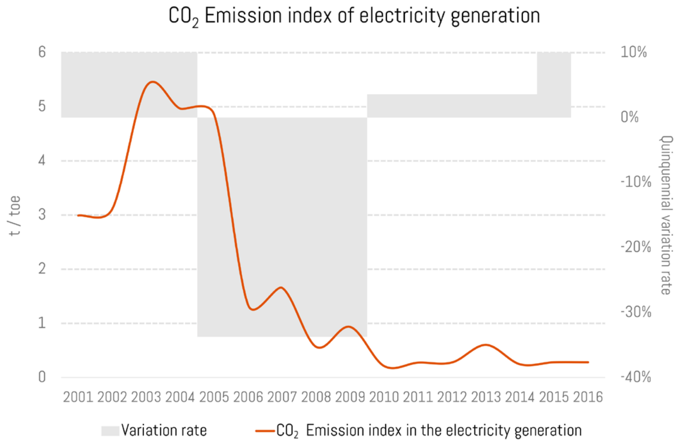
BELIZE


Evolution of CO_2 emissions by sector
kt
600
500
400
300
200
100
0
2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Transport Sector
Industrial Sector
Residential Sector
Electricity generation
Commercial Sector
Other sector

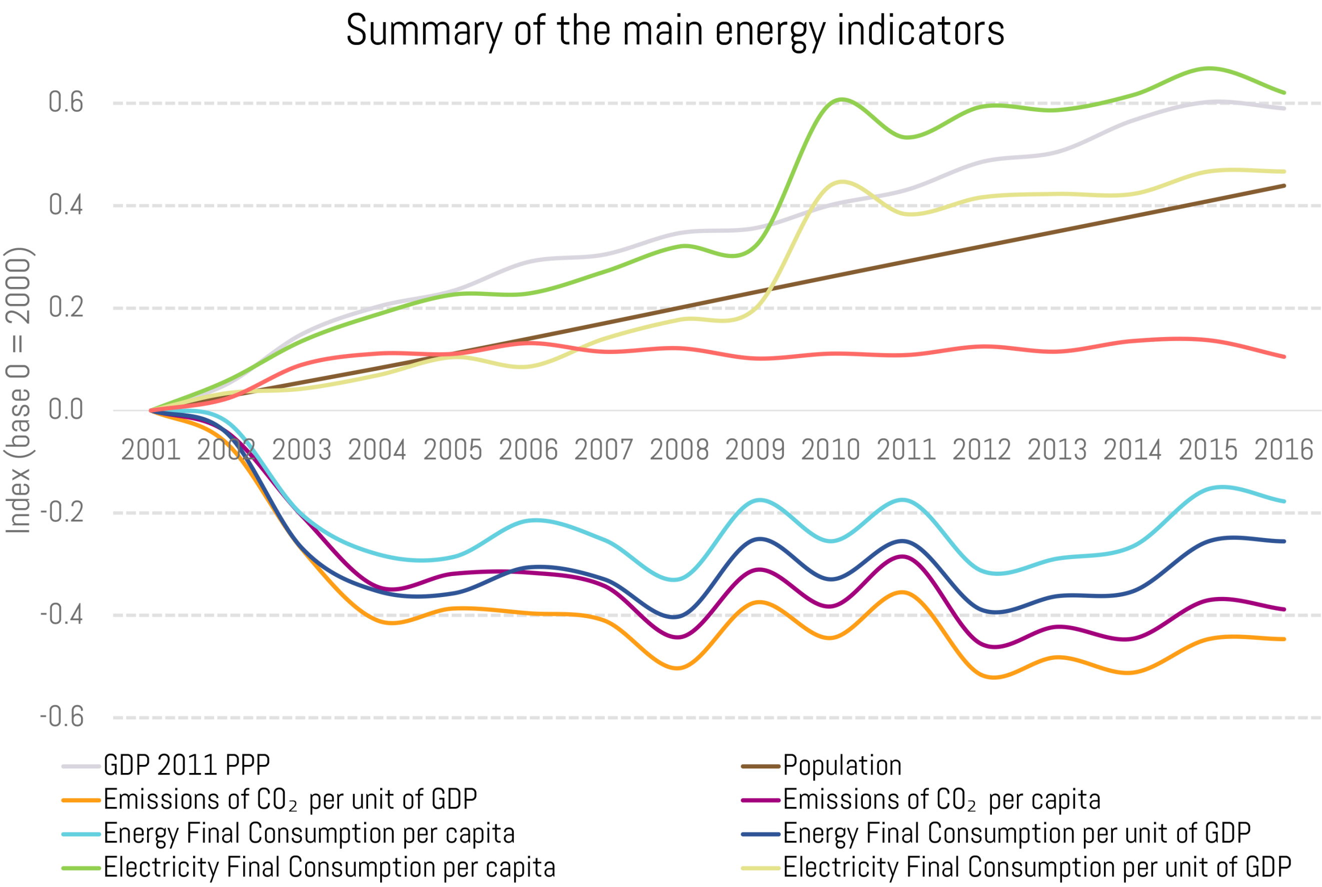

Evolution of CO_2 emissions per capita and per unit of GDP
t / inhab.
2.6
2.2
1.8
1.4
1.0
2.5
2.0
1.5
1.0
0.5
0.0
t / thou. USD 2011 PPP
2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
CO_2 per capita
CO_2 / GDP 2011 PPP
Industry CO_2 / Industrial added value
Commercial CO_2 / Commercial added value
Transport CO_2 / Transport added value
Residential CO_2 / Private consumption



CO_2 Emission index per consumed energy
t / toe
Quinquennial variation rate
Index variation rate
Industry CO_2 / Industrial energy final consumption
Transport CO_2 / Transport energy final consumption
CO_2 Electricity Generation / Electricity consumption
CO_2 Emission index per consumed energy
Commercial CO_2 / Commercial energy final consumption
Residential CO_2 / Residential energy final consumption



CO_2 Emission index of electricity generation
t / toe
Quinquennial variation rate
Variation rate
CO_2 Emission index in the electricity generation

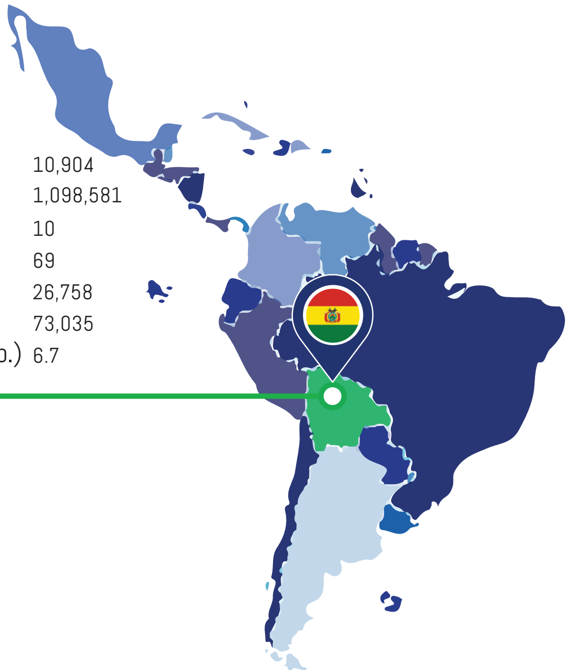


Summary of the main energy indicators
Index (base 0 = 2000)
GDP 2011 PPP
Population
Emissions of CO_2 per unit of GDP
Emissions of CO_2 per capita
Energy Final Consumption per capita
Energy Final Consumption per unit of GDP
Electricity Final Consumption per capita
Electricity Final Consumption per unit of GDP

BOLIVIA

GENERAL INFORMATION 2016

Population (thousand inhab.)	10,904
Area (km²)	1,098,581
Population Density (inhab./km²)	10
Urban Population (%)	69
GDP USD 2010 (MUSD)	26,758
GDP USD 2011 PPP (MUSD)	73,035
GDP per capita (thou. USD 2011 PPP/inhab.)	6.7



ENERGY SECTOR

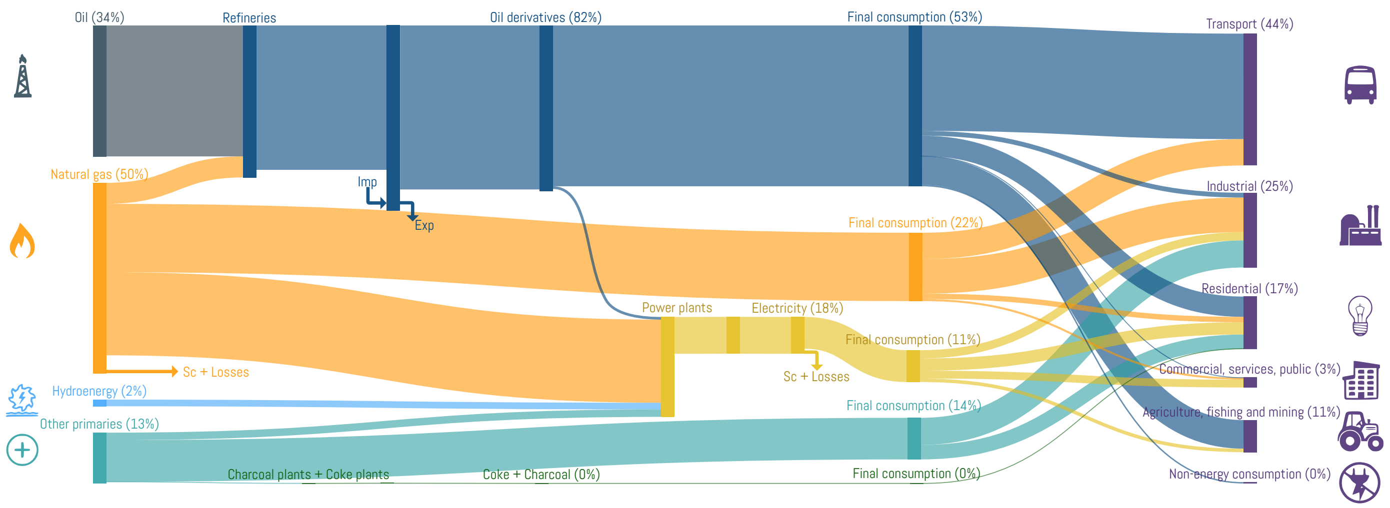
Final consumption in the Transport Sector	Mtoe 2.92
Final consumption in the Industrial Sector	Mtoe 1.66
Final consumption in the Residential Sector	Mtoe 1.17
Final consumption in the Commercial and Service Sector	Mtoe 0.22
Final consumption in the Agriculture, Livestock, Fishing, Mining, Other and Non - Energy Consumption	Mtoe 0.74

Oil Reserves	Natural gas reserves	Coal reserves
Mbbl 166 [1]	Gm³ 251 [1]	Mt n.a.

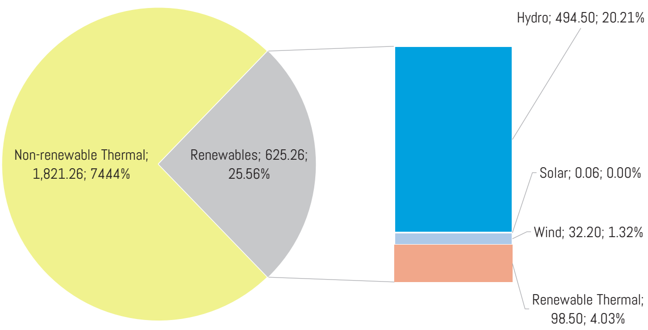
[1] 2015 Data.

Indicator	Unit	Value
Electricity consumption per capita	kWh / inhab.	752
Final energy consumption per capita	toe / inhab.	0.62
Electrification rate	%	88.00 [1]
Total energy supply	Mtoe	8.84
Total energy production	Mtoe	21.86
Total energy imports	Mtoe	0.91
Total energy exports	Mtoe	13.89
Total final energy consumption	Mtoe	6.71
Refining capacity	kbbl/day	68.1 [1]
Installed power generation capacity	GW	2.45
Primary energy intensity and final energy intensity	koe / USD 2011 PPP	0.11 / 0.09

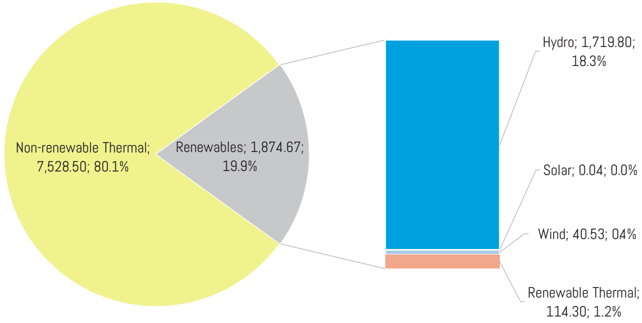
Summarized energy matrix 2016



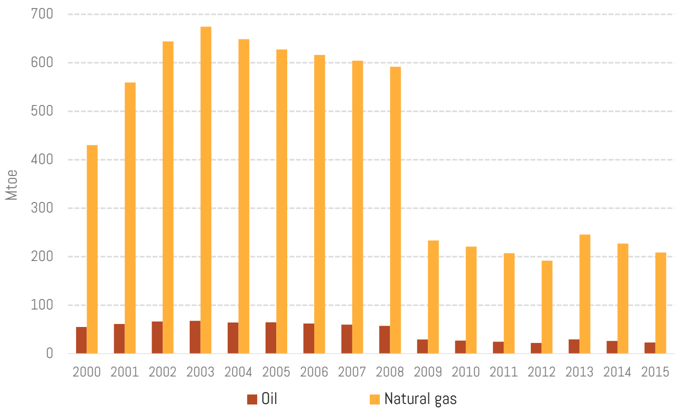
Installed power generation capacity [MW; %]
2016



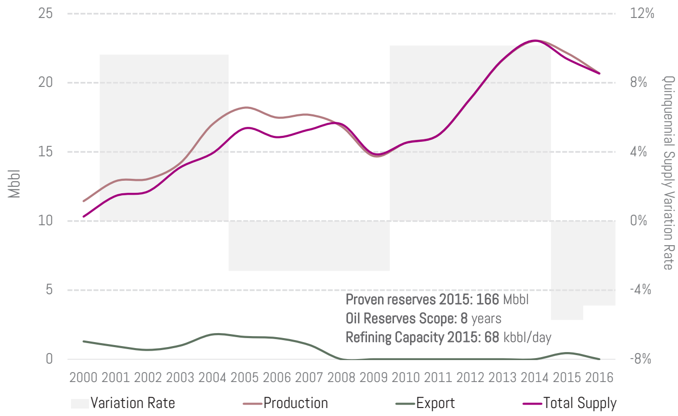
Electricity Generation by Source [GWh; %]
2016



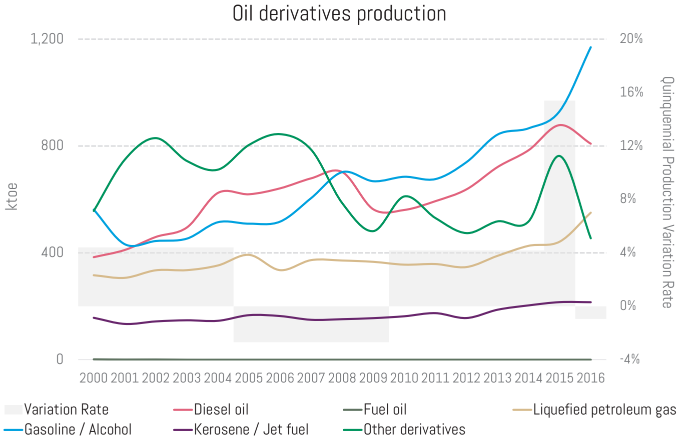
Proven reserves of oil and natural gas



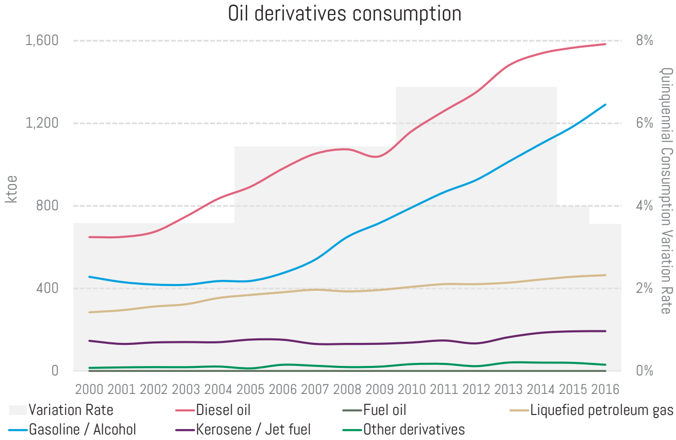
Oil Supply

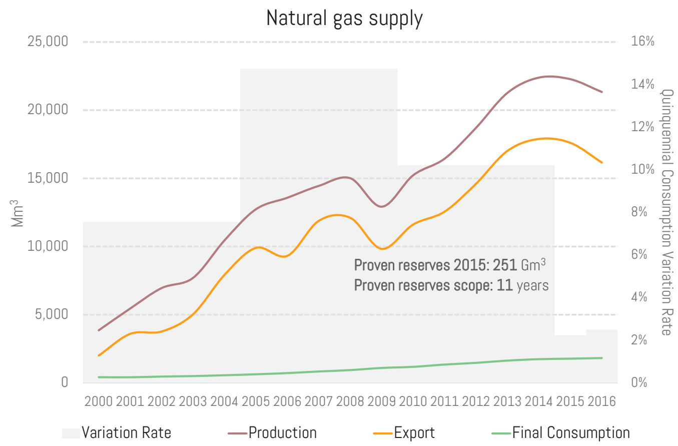


Oil derivatives production

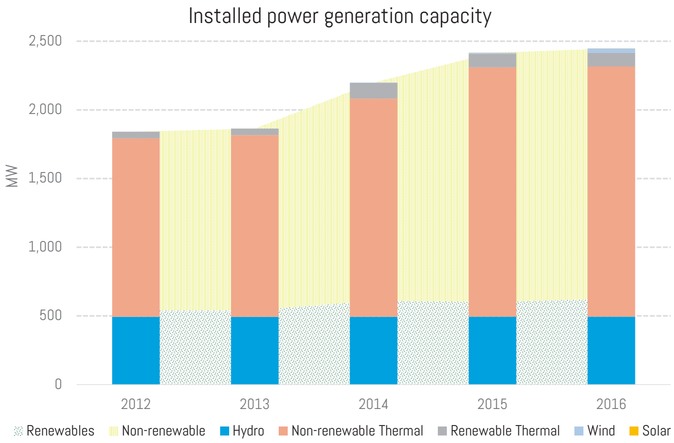


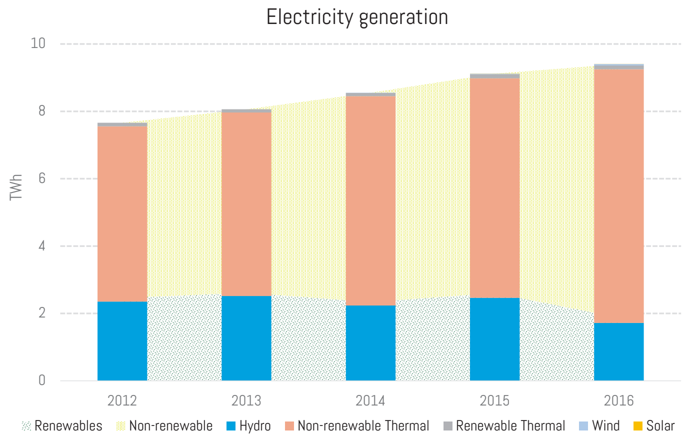
Oil derivatives consumption

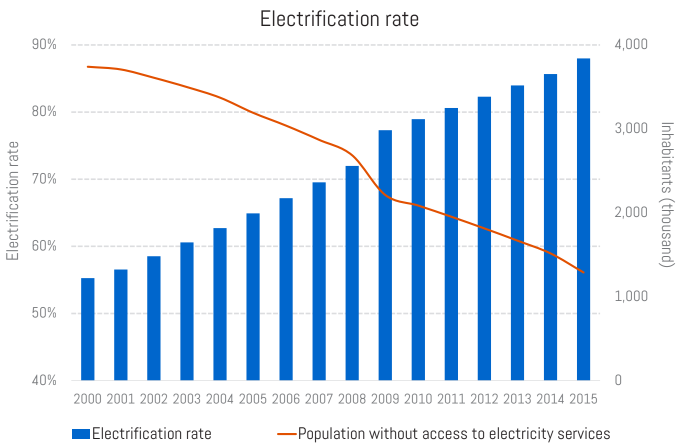


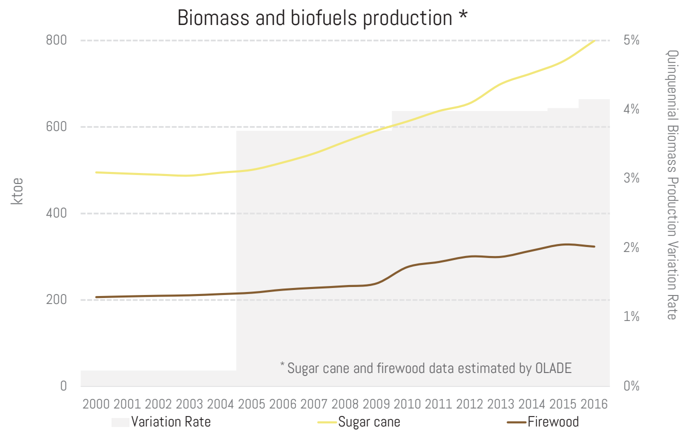


In 2016, the operations of the Incahuasi Plant were started, which will inject approximately 7 Mmcd of natural gas, which implies a 12% increase in the national production of this energy source, thus guaranteeing with ease the gas supply in the internal market and export commitments.

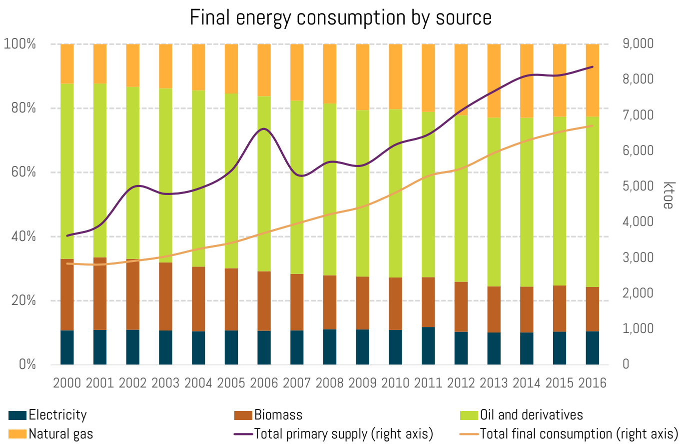


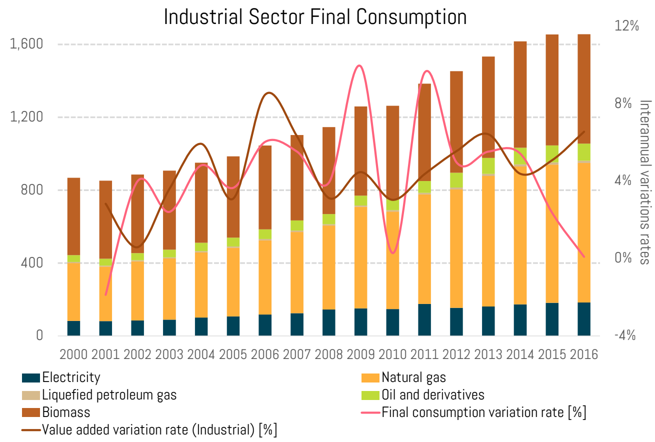


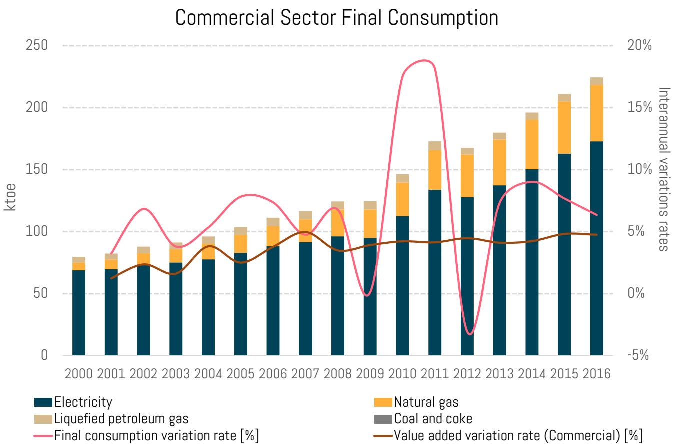


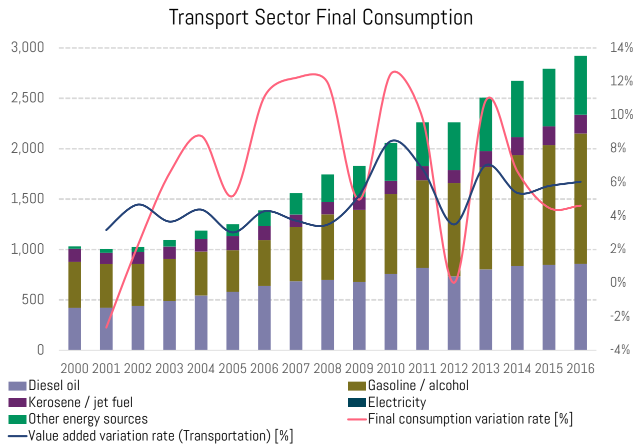


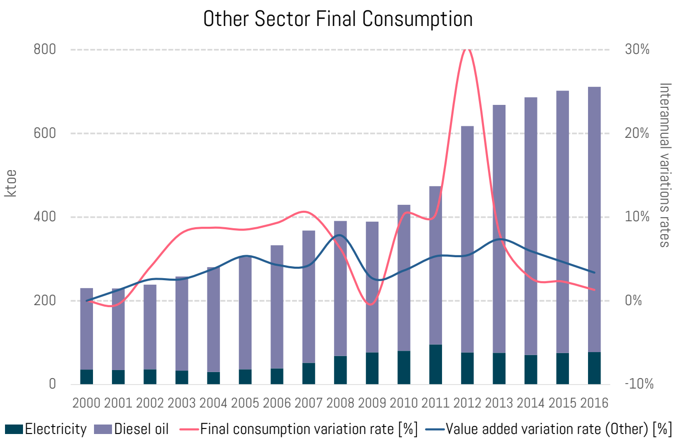
BOLIVIA

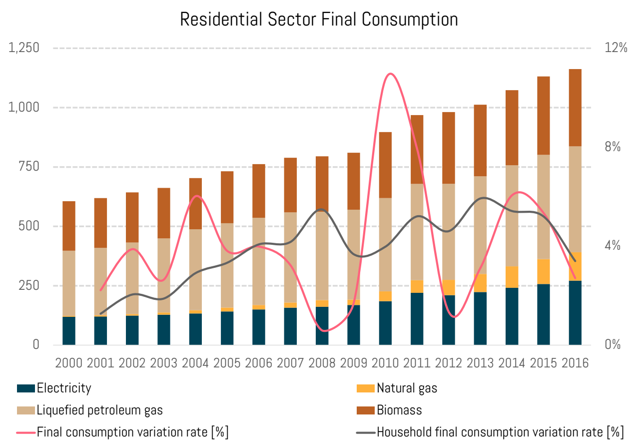

Final energy consumption by source
100%
80%
60%
40%
20%
0%
9,000
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
ktoe
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Electricity
Natural gas
Biomass
Total primary supply (right axis)
Oil and derivatives
Total final consumption (right axis)

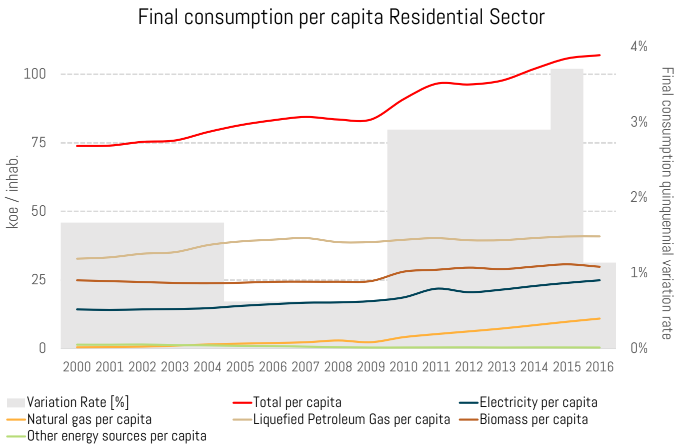

Industrial Sector Final Consumption
1,600
1,200
800
400
0
ktoe
12%
8%
4%
0%
-4%
Interannual variations rates
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Electricity
Natural gas
Liquefied petroleum gas
Oil and derivatives
Biomass
Final consumption variation rate [%]
Value added variation rate (Industrial) [%]

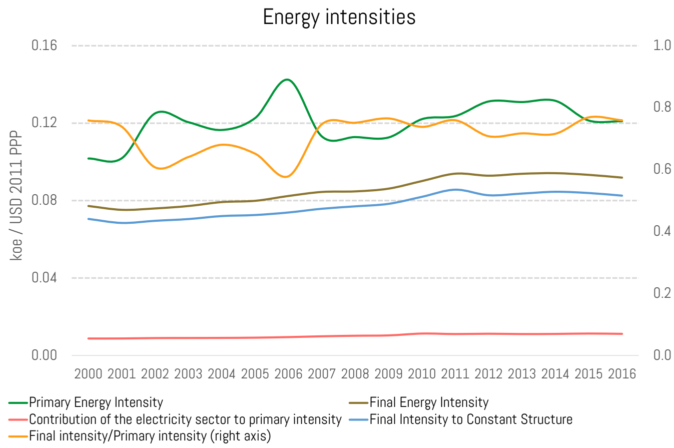

Commercial Sector Final Consumption
250
200
150
100
50
0
ktoe
20%
15%
10%
5%
0%
-5%
Interannual variations rates
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Electricity
Natural gas
Liquefied petroleum gas
Coal and coke
Final consumption variation rate [%]
Value added variation rate (Commercial) [%]

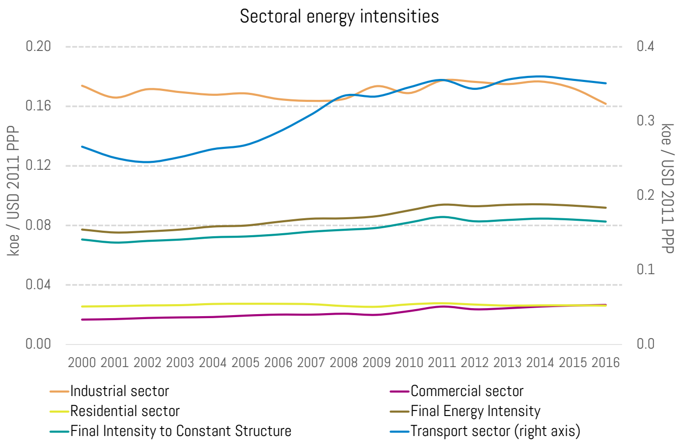

Transport Sector Final Consumption
3,000
2,500
2,000
1,500
1,000
500
0
ktoe
14%
12%
10%
8%
6%
4%
2%
0%
-2%
-4%
Interannual variations rates
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Diesel oil
Gasoline / alcohol
Kerosene / jet fuel
Electricity
Other energy sources
Final consumption variation rate [%]
Value added variation rate (Transportation) [%]

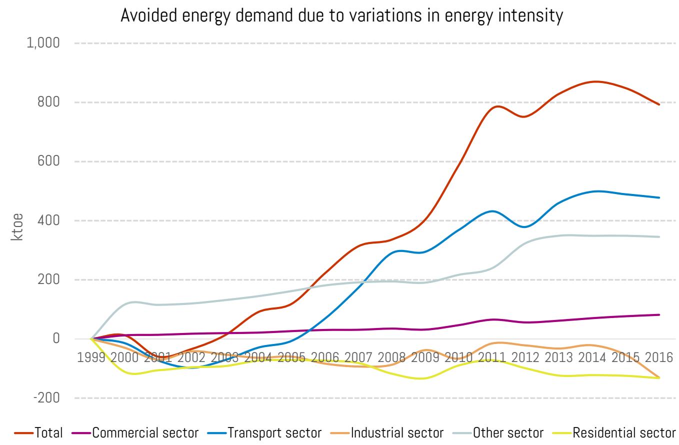

Other Sector Final Consumption
800
600
400
200
0
ktoe
30%
20%
10%
0%
-10%
Interannual variations rates
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Electricity
Diesel oil
Final consumption variation rate [%]
Value added variation rate (Other) [%]

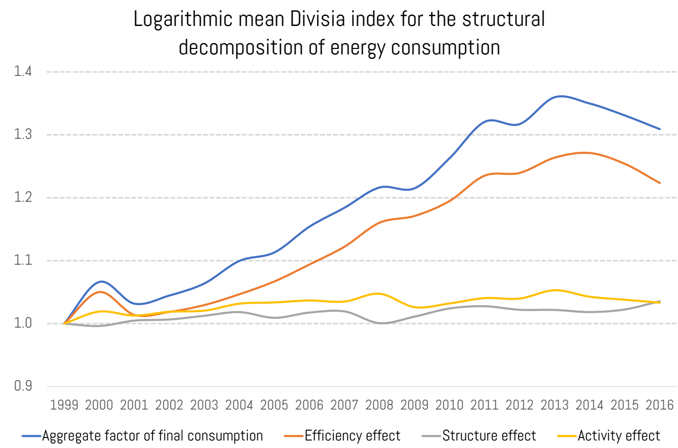

Residential Sector Final Consumption
1,250
1,000
750
500
250
0
ktoe
12%
8%
4%
0%
Interannual variations rates
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Electricity
Natural gas
Liquefied petroleum gas
Biomass
Final consumption variation rate [%]
Household final consumption variation rate [%]

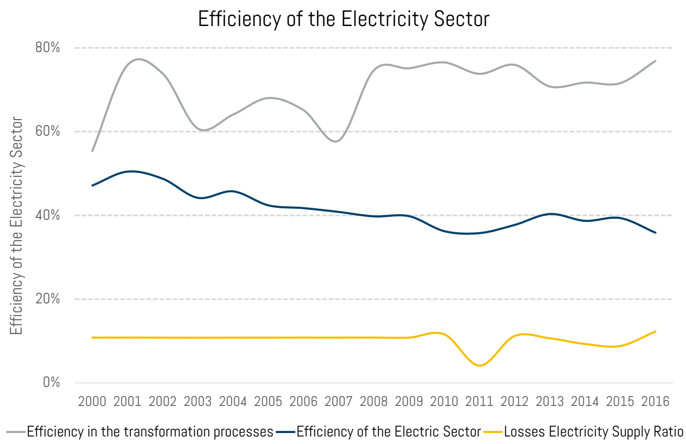

Final consumption per capita Residential Sector
koe / inhab.
Final consumption quinquennial variation rate
Variation Rate [%]
Total per capita
Electricity per capita
Natural gas per capita
Liquefied Petroleum Gas per capita
Biomass per capita
Other energy sources per capita


Energy intensities
koe / USD 2011 PPP
Primary Energy Intensity
Final Energy Intensity
Contribution of the electricity sector to primary intensity
Final Intensity to Constant Structure
Final intensity/Primary intensity (right axis)


Sectoral energy intensities
koe / USD 2011 PPP
Industrial sector
Commercial sector
Residential sector
Final Energy Intensity
Final Intensity to Constant Structure
Transport sector (right axis)


Avoided energy demand due to variations in energy intensity
ktoe
Total
Commercial sector
Transport sector
Industrial sector
Other sector
Residential sector

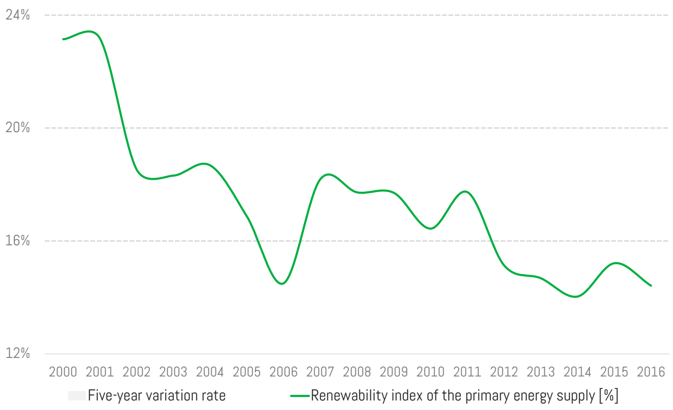

Logarithmic mean Divisia index for the structural decomposition of energy consumption
Aggregate factor of final consumption
Efficiency effect
Structure effect
Activity effect


Efficiency of the Electricity Sector
Efficiency of the Electricity Sector
Efficiency in the transformation processes
Efficiency of the Electric Sector
Losses Electricity Supply Ratio

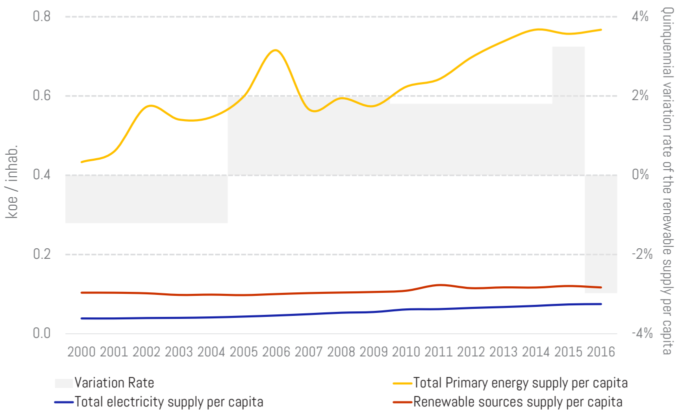
BOLIVIA

BOLIVIA

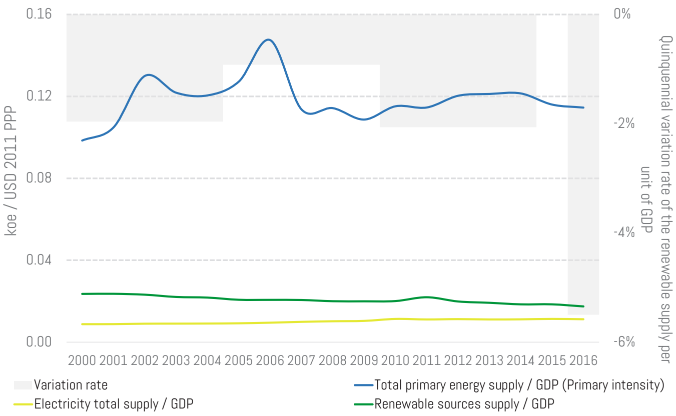
Primary energy supply renewability index



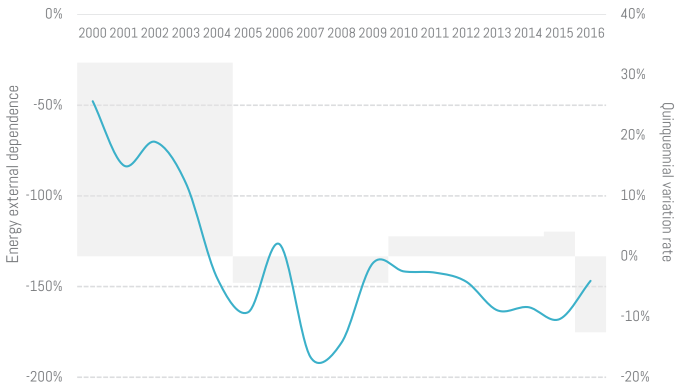
Energy supply per capita



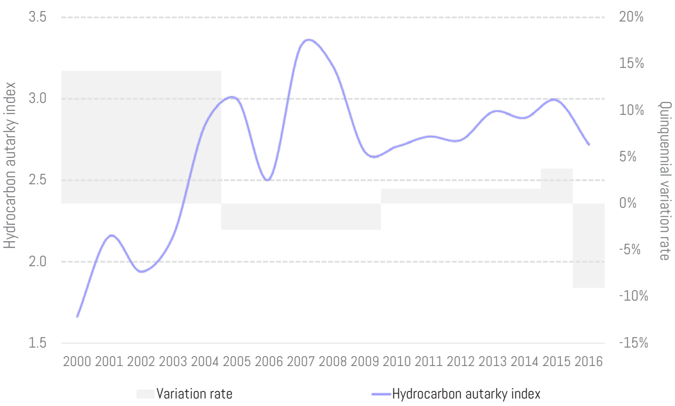
Energy supply per unit of GDP



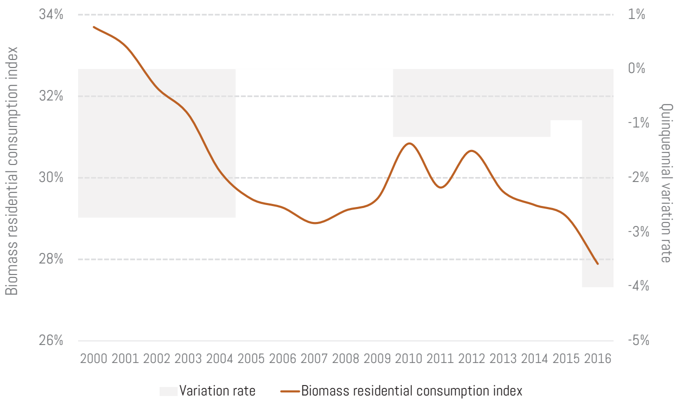
Energy external dependence



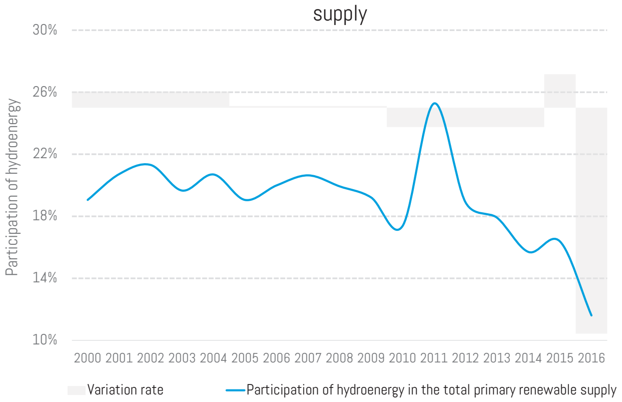
Hydrocarbon autarky index



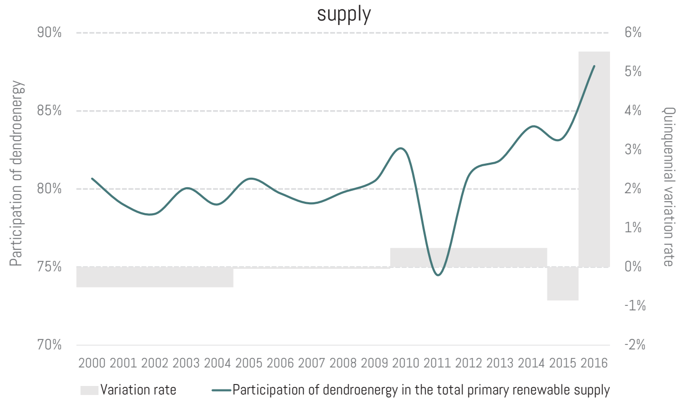
Biomass residential consumption index



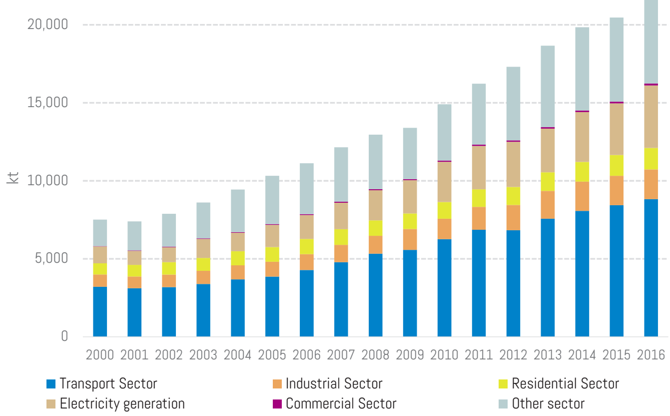
Participation of hydroenergy in the total primary renewable supply



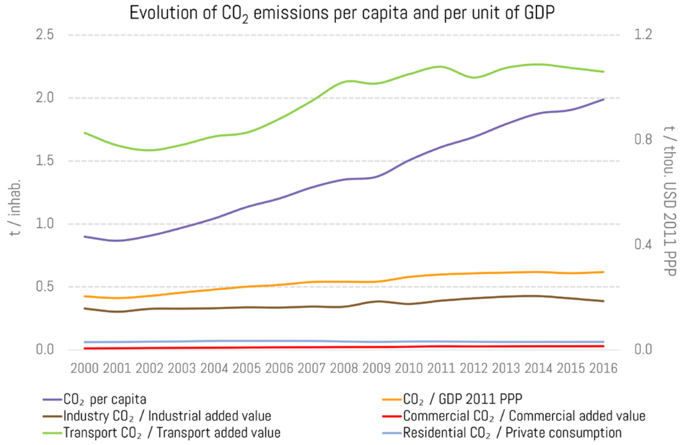
Participation of dendroenergy in the total primary renewable supply



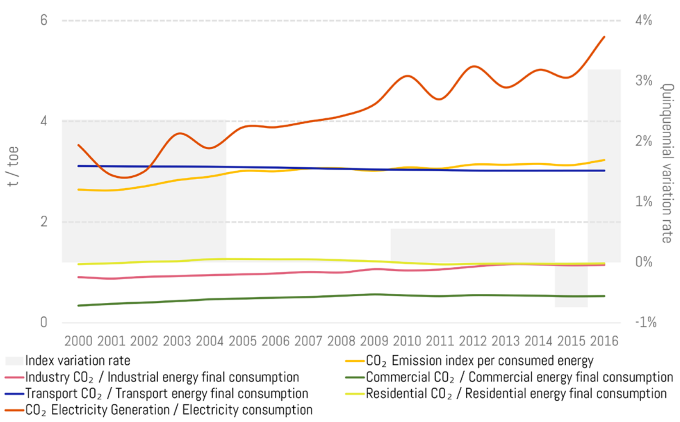
Evolution of CO_2 emissions by sector



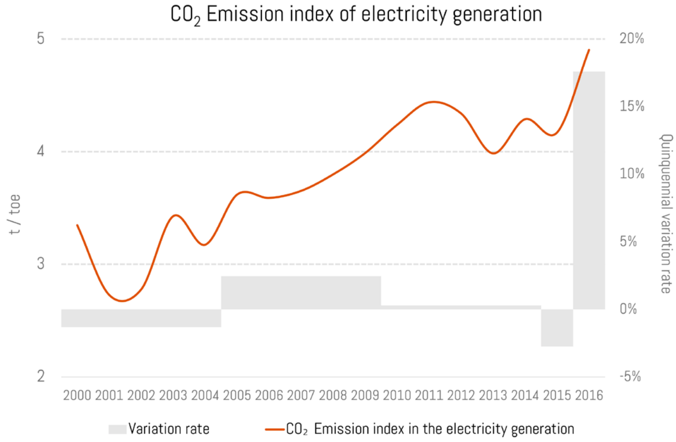
Evolution of CO_2 emissions per capita and per unit of GDP

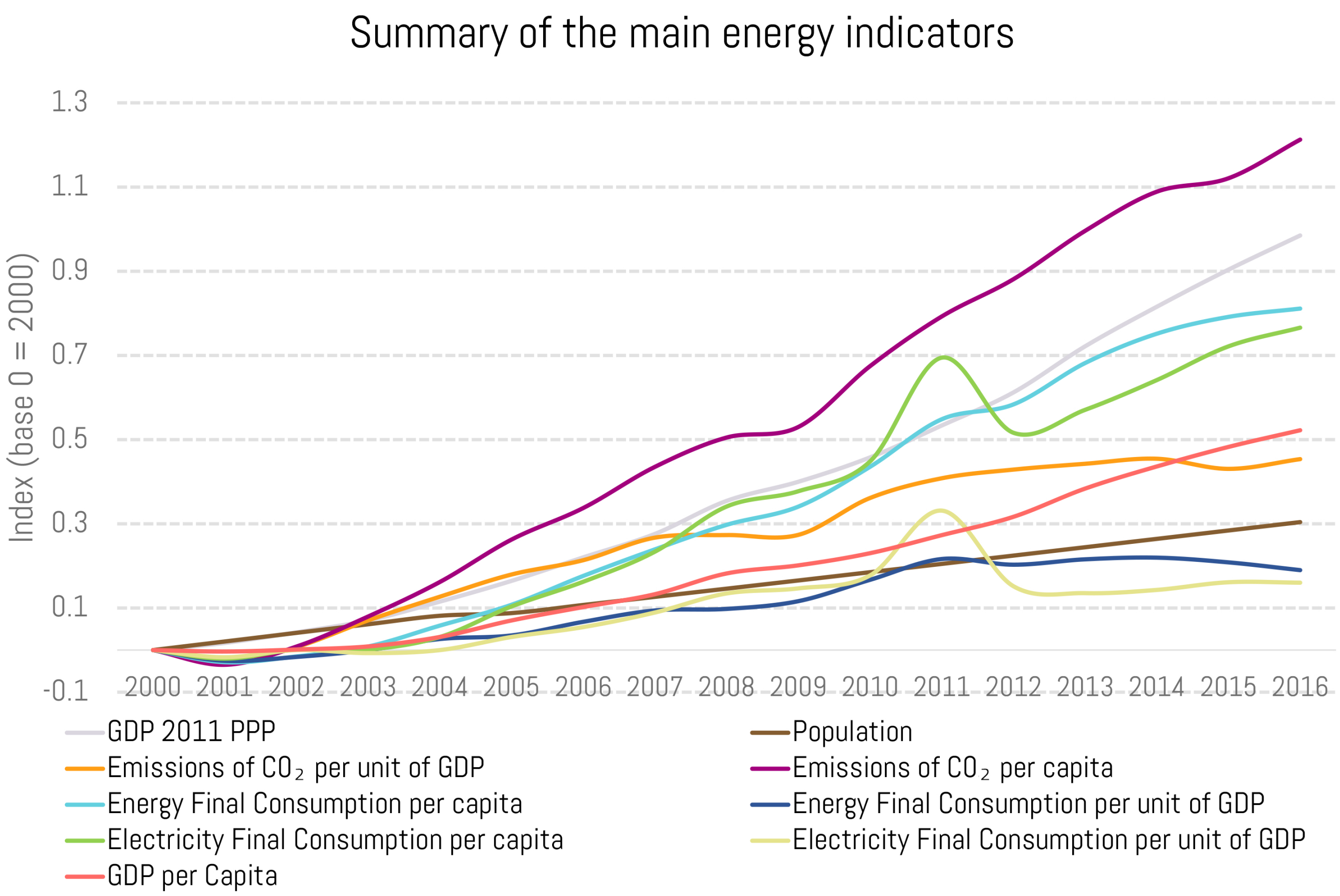


CO_2 Emission index per consumed energy



CO_2 Emission index of electricity generation





Summary of the main energy indicators
Index (base 0 = 2000)
1.3
1.1
0.9
0.7
0.5
0.3
0.1
-0.1
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
GDP 2011 PPP
Population
Emissions of CO_2 per unit of GDP
Emissions of CO_2 per capita
Energy Final Consumption per capita
Energy Final Consumption per unit of GDP
Electricity Final Consumption per capita
Electricity Final Consumption per unit of GDP
GDP per Capita

BOLIVIA

BRAZIL

GENERAL INFORMATION 2016

Population (thousand inhab.)	206,871
Area (km²)	8,515,759
Population Density (inhab./km²)	24
Urban Population (%)	86
GDP USD 2010 (MUSD)	2,248,071
GDP USD 2011 PPP (MUSD)	2,912,060
GDP per capita (thou. USD 2011 PPP/inhab.)	14

ENERGY SECTOR

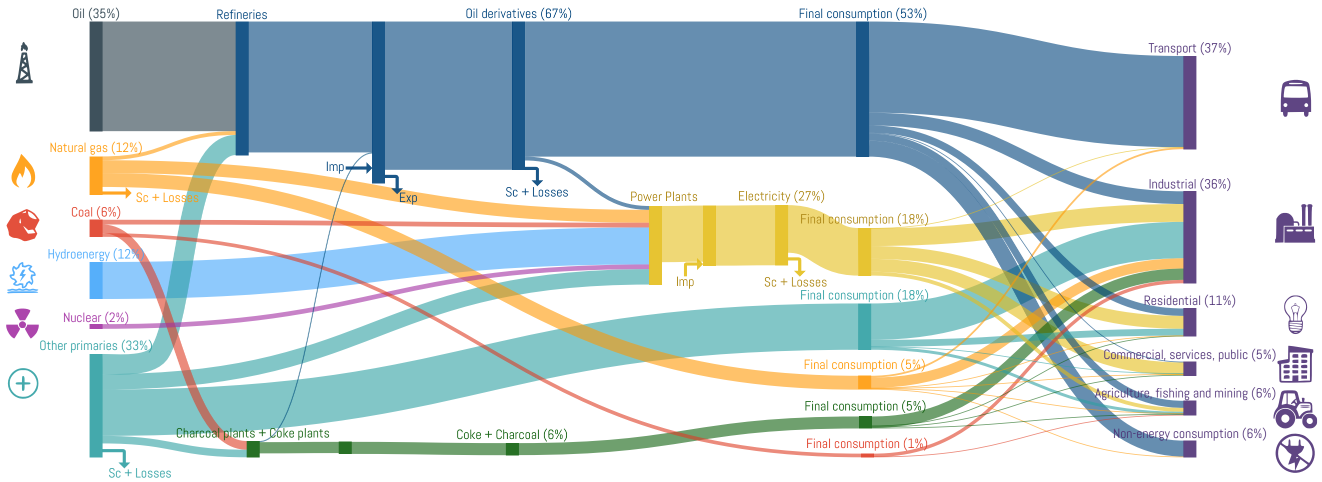
Final consumption in the Transport Sector	Mtoe 82.37
Final consumption in the Industrial Sector	Mtoe 81.34[2]
Final consumption in the Residential Sector	Mtoe 24.79
Final consumption in the Commercial and Service Sector	Mtoe 12.40
Final consumption in the Agriculture, Livestock, Fishing, Mining, Other and Non - Energy Consumption	Mtoe 27.71

Oil Reserves	Natural gas reserves	Coal reserves
Mbbl 12,634	Gm³ 377	Mt 6,596 [2]

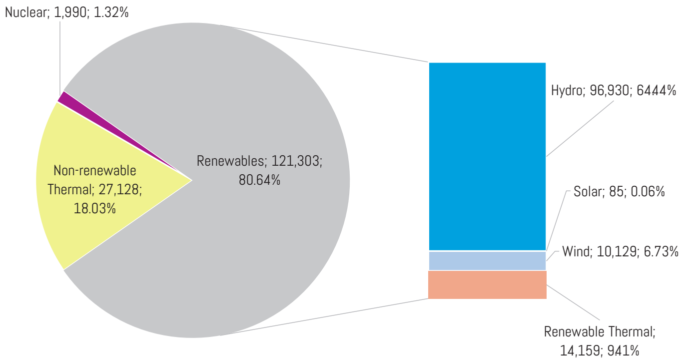
[1] It does not include self - consumption of the energy sector.
[2] Data estimated by OLADE.
[3] It does not include Mining and Pelletizing.

Electricity consumption per capita	Final energy consumption per capita	Electrification rate	Total energy supply	Total energy production	Total energy imports	Total energy exports	Total final energy consumption	Refining capacity	Installed power generation capacity	Primary energy intensity and final energy intensity
kWh / inhab.	toe / inhab.	%	Mtoe	Mtoe	Mtoe	Mtoe	Mtoe	kbbl/day	GW	koe / USD 2011 PPP
2,371 [1]	1.11[1]	99.29	289.41	289.83	58.52	56.52	228.62 [1]	2,409	150.42	0.09 / 0.08

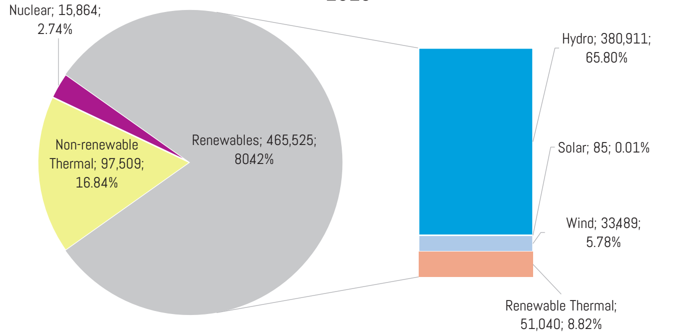
Summarized energy matrix 2016



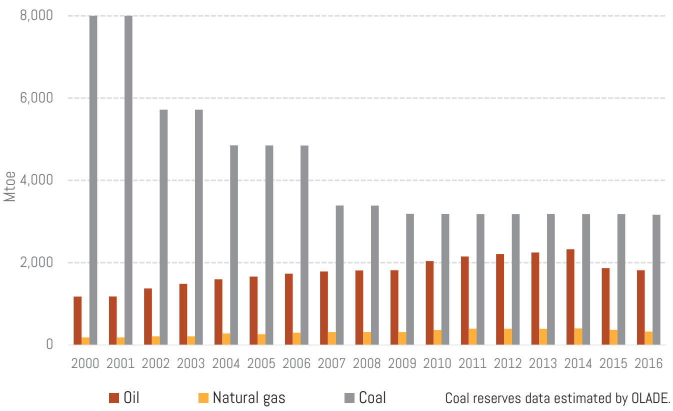
Installed power generation capacity [MW; %]
2016



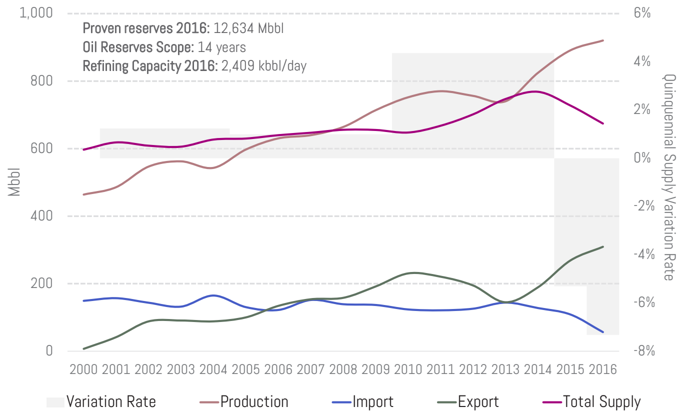
Electricity Generation by Source [GWh; %]
2016



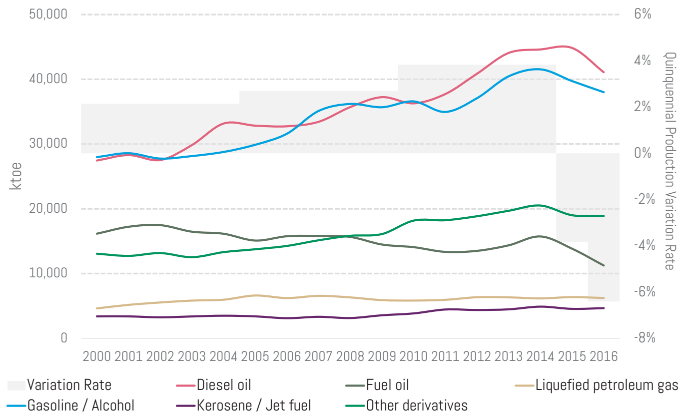
Proven reserves of oil, natural gas and coal



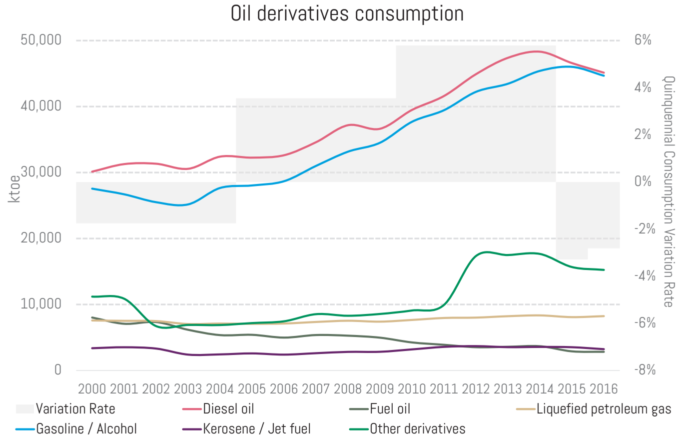
Oil Supply

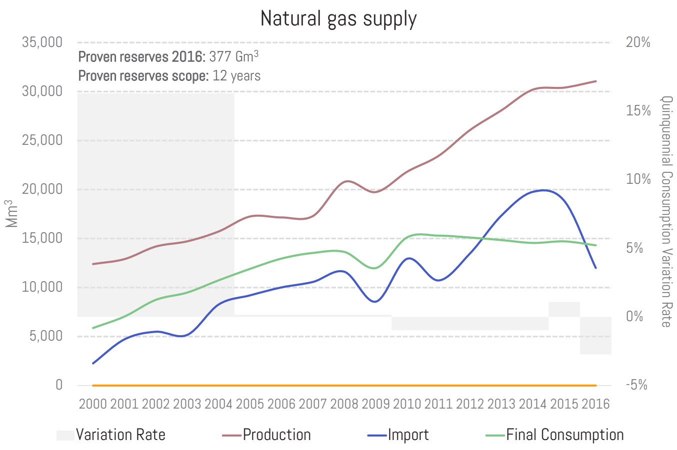


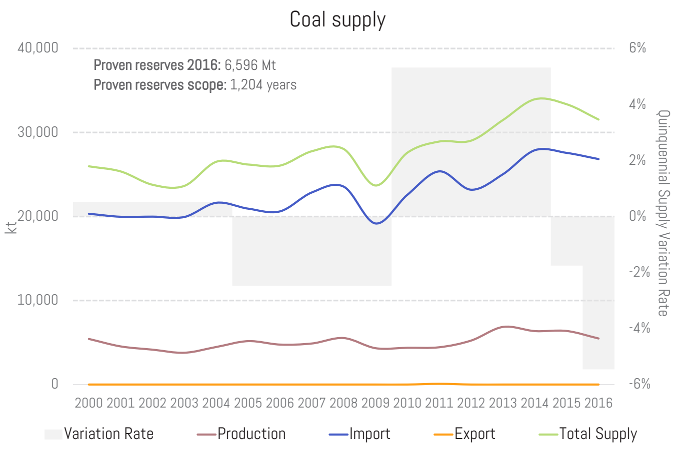
Oil derivatives production

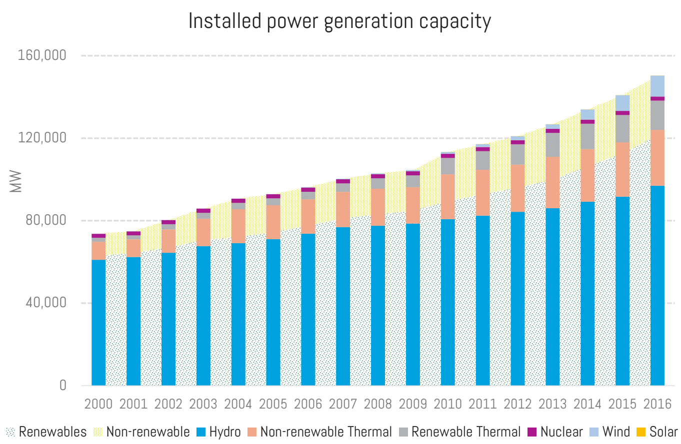


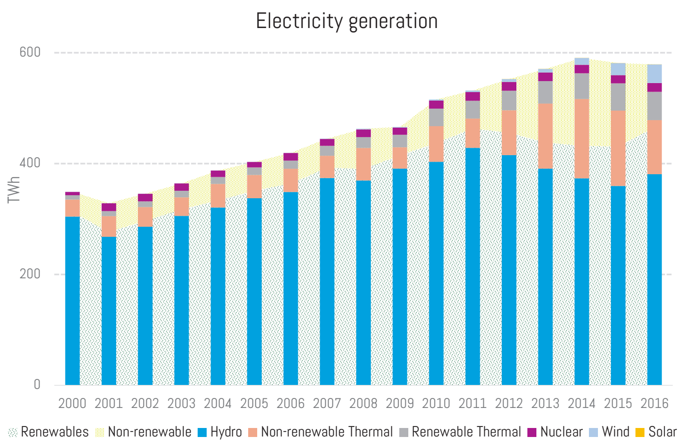
Oil derivatives consumption

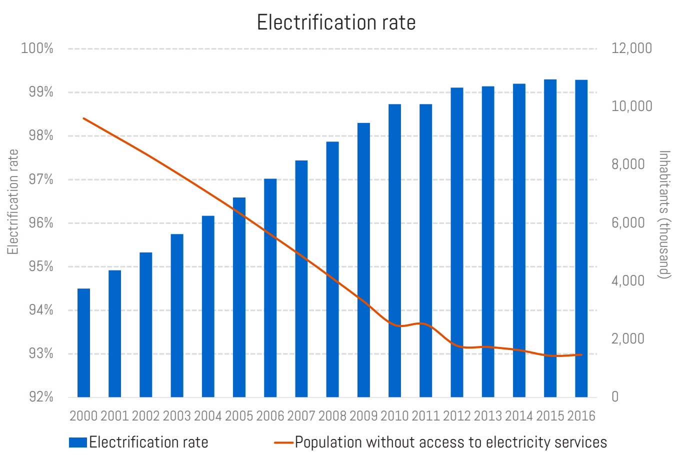


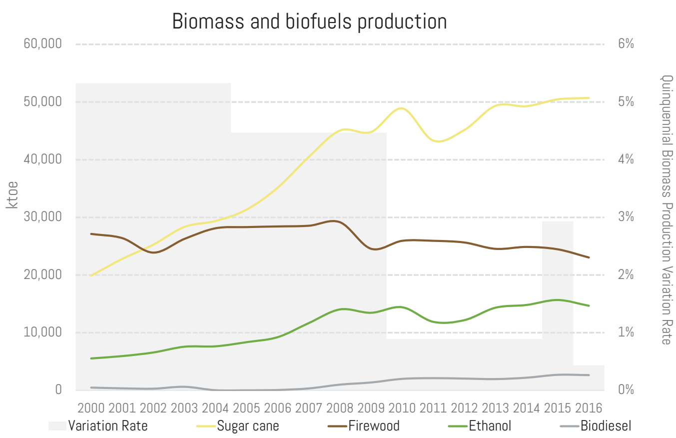

Natural gas supply
Proven reserves 2016: 377 Gm³
Proven reserves scope: 12 years
Mm³
Quinquennial Consumption Variation Rate
35,000 30,000 25,000 20,000 15,000 10,000 5,000 0
20% 15% 10% 5% 0% -5%
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Variation Rate
Production
Import
Final Consumption


Coal supply
Proven reserves 2016: 6,596 Mt
Proven reserves scope: 1,204 years
kt
Quinquennial Supply Variation Rate
40,000 30,000 20,000 10,000 0
6% 4% 2% 0% -2% -4% -6%
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Variation Rate
Production
Import
Export
Total Supply


Installed power generation capacity
MW
160,000 120,000 80,000 40,000 0
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Renewables
Non-renewable
Hydro
Non-renewable Thermal
Renewable Thermal
Nuclear
Wind
Solar

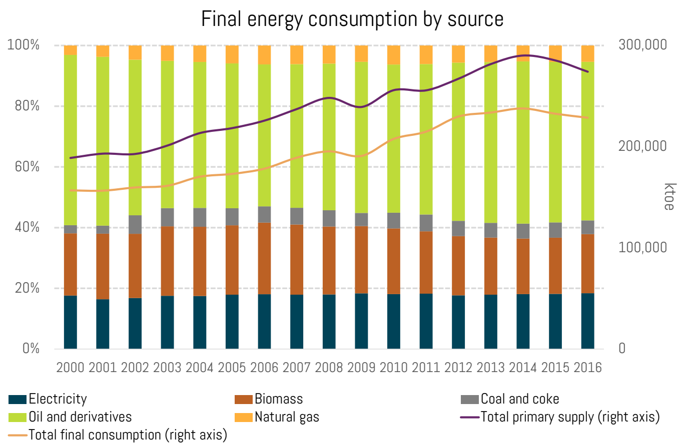

Electricity generation
TWh
600 400 200 0
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Renewables
Non-renewable
Hydro
Non-renewable Thermal
Renewable Thermal
Nuclear
Wind
Solar

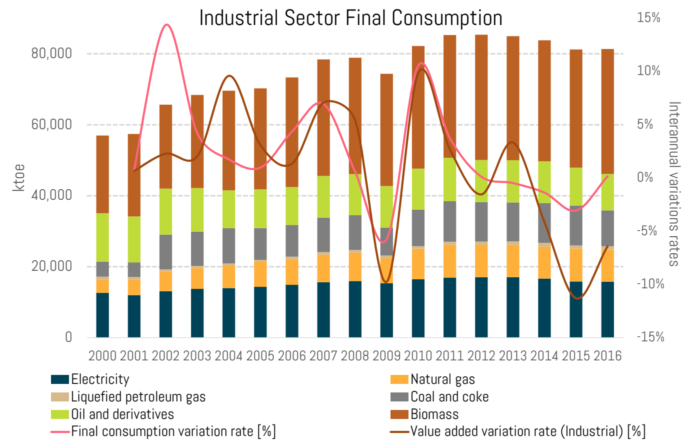

Electrification rate
Electrification rate
Inhabitants (thousand)
100% 99% 98% 97% 96% 95% 94% 93% 92%
12,000 10,000 8,000 6,000 4,000 2,000 0
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Electrification rate
Population without access to electricity services

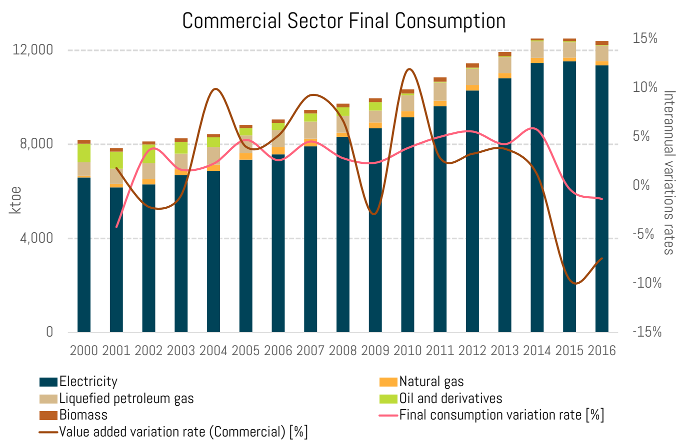

Biomass and biofuels production
ktoe
Quinquennial Biomass Production Variation Rate
60,000 50,000 40,000 30,000 20,000 10,000 0
6% 5% 4% 3% 2% 1% 0%
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Variation Rate
Sugar cane
Firewood
Ethanol
Biodiesel

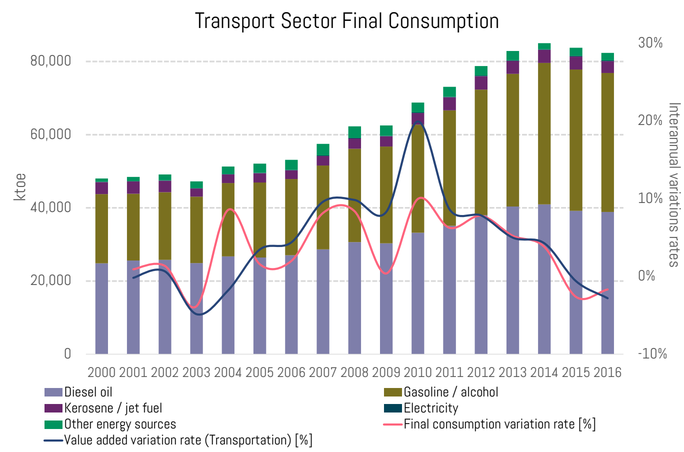
BRAZIL

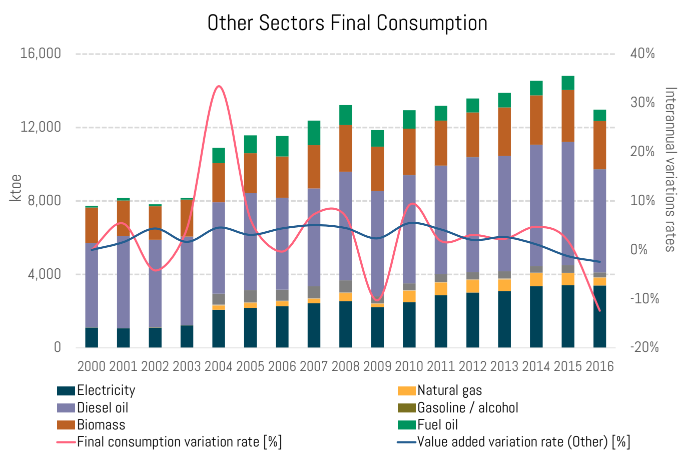
BRAZIL

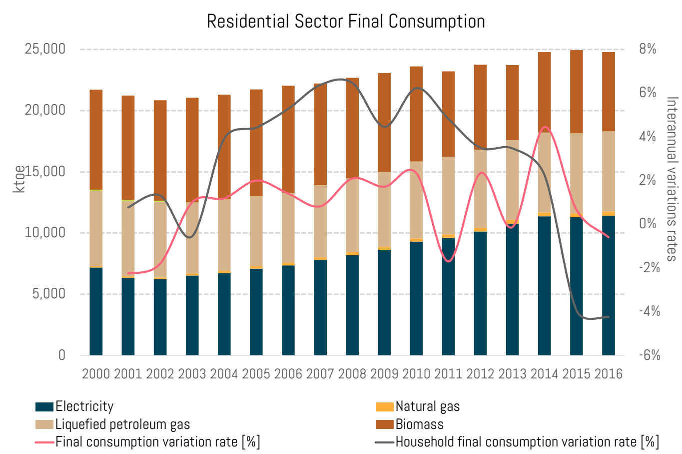

Final energy consumption by source
100%
80%
60%
40%
20%
0%
300,000
200,000
100,000
0
ktoe
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Electricity
Biomass
Coal and coke
Oil and derivatives
Natural gas
Total primary supply (right axis)
Total final consumption (right axis)

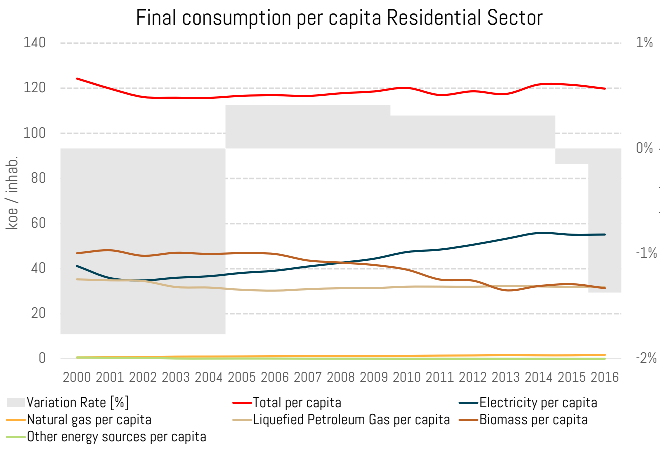

Industrial Sector Final Consumption
80,000
60,000
40,000
20,000
0
ktoe
15%
10%
5%
0%
-5%
-10%
-15%
Interannual variations rates
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Electricity
Natural gas
Liquefied petroleum gas
Coal and coke
Oil and derivatives
Biomass
Final consumption variation rate [%]
Value added variation rate (Industrial) [%]

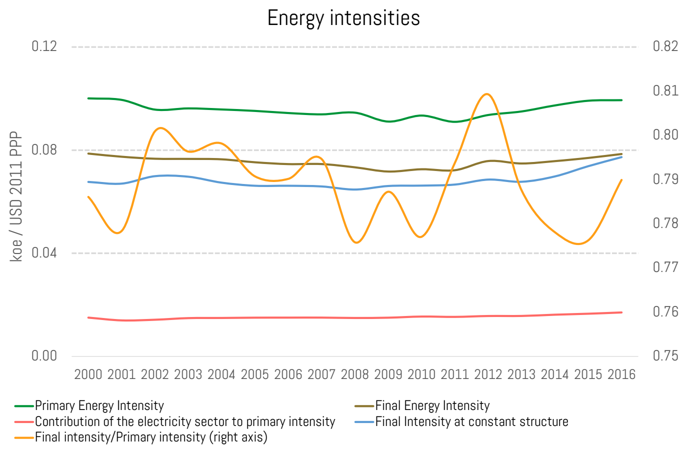

Commercial Sector Final Consumption
12,000
8,000
4,000
0
ktoe
15%
10%
5%
0%
-5%
-10%
-15%
Interannual variations rates
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Electricity
Natural gas
Liquefied petroleum gas
Oil and derivatives
Biomass
Final consumption variation rate [%]
Value added variation rate (Commercial) [%]

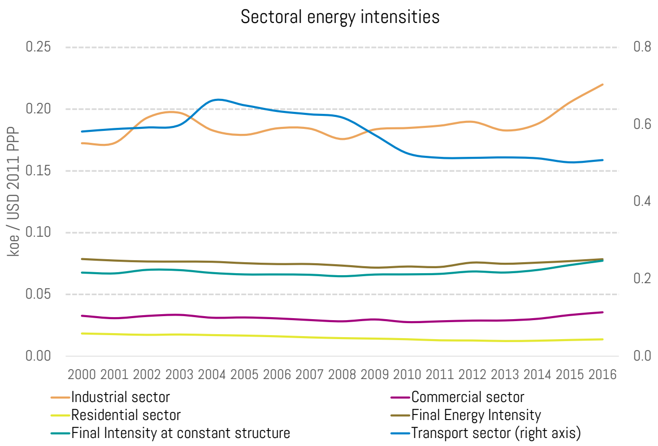

Transport Sector Final Consumption
80,000
60,000
40,000
20,000
0
ktoe
30%
20%
10%
0%
-10%
Interannual variations rates
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Diesel oil
Gasoline / alcohol
Kerosene / jet fuel
Electricity
Other energy sources
Final consumption variation rate [%]
Value added variation rate (Transportation) [%]

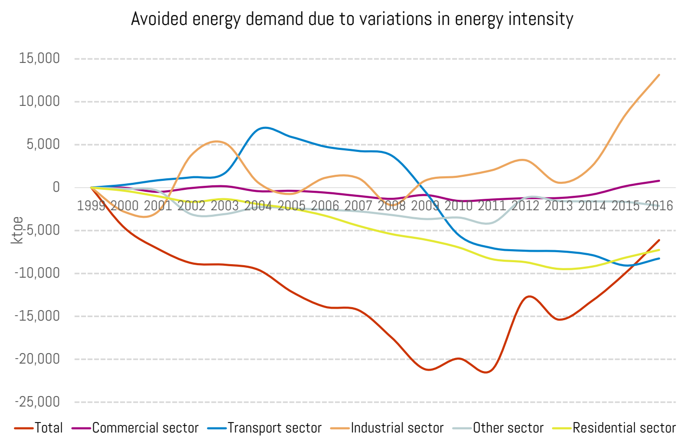

Other Sectors Final Consumption
16,000
12,000
8,000
4,000
0
ktoe
40%
30%
20%
10%
0%
-10%
-20%
Interannual variations rates
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Electricity
Natural gas
Diesel oil
Gasoline / alcohol
Biomass
Fuel oil
Final consumption variation rate [%]
Value added variation rate (Other) [%]

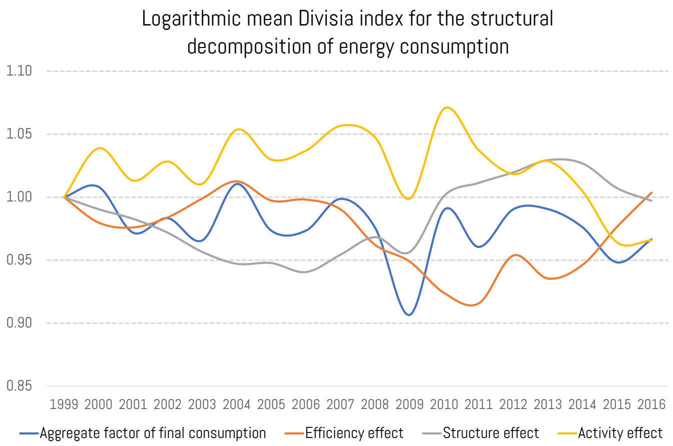

Residential Sector Final Consumption
25,000
20,000
15,000
10,000
5,000
0
ktoe
8%
6%
4%
2%
0%
-2%
-4%
-6%
Interannual variations rates
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Electricity
Natural gas
Liquefied petroleum gas
Biomass
Final consumption variation rate [%]
Household final consumption variation rate [%]

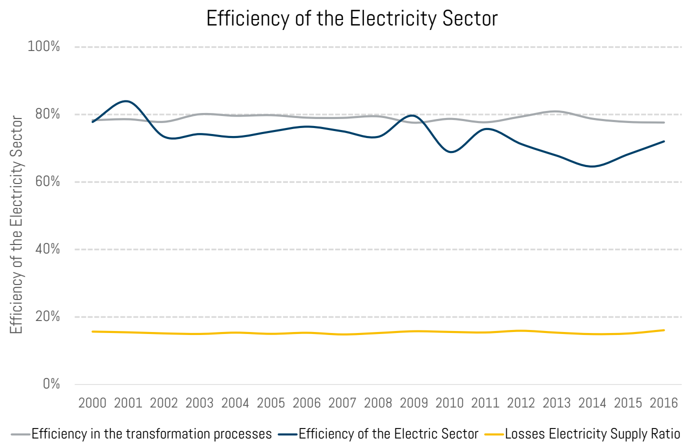

Final consumption per capita Residential Sector
koe / inhab.
Final consumption quinquennial variation rate
140
120
100
80
60
40
20
0
1%
0%
-1%
-2%
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Variation Rate [%]
Total per capita
Electricity per capita
Natural gas per capita
Liquefied Petroleum Gas per capita
Biomass per capita
Other energy sources per capita

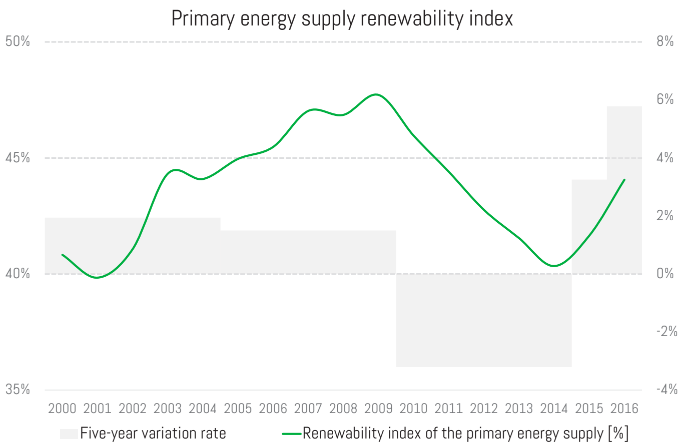

Energy intensities
koe / USD 2011 PPP
0.12
0.08
0.04
0.00
0.82
0.81
0.80
0.79
0.78
0.77
0.76
0.75
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Primary Energy Intensity
Final Energy Intensity
Contribution of the electricity sector to primary intensity
Final Intensity at constant structure
Final intensity/Primary intensity (right axis)

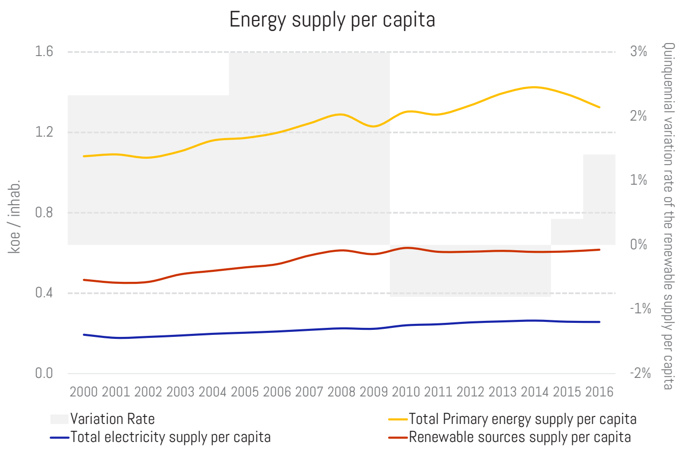

Sectoral energy intensities
koe / USD 2011 PPP
koe / USD 2011 PPP
0.25
0.20
0.15
0.10
0.05
0.00
0.8
0.6
0.4
0.2
0.0
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Industrial sector
Commercial sector
Residential sector
Final Energy Intensity
Final Intensity at constant structure
Transport sector (right axis)

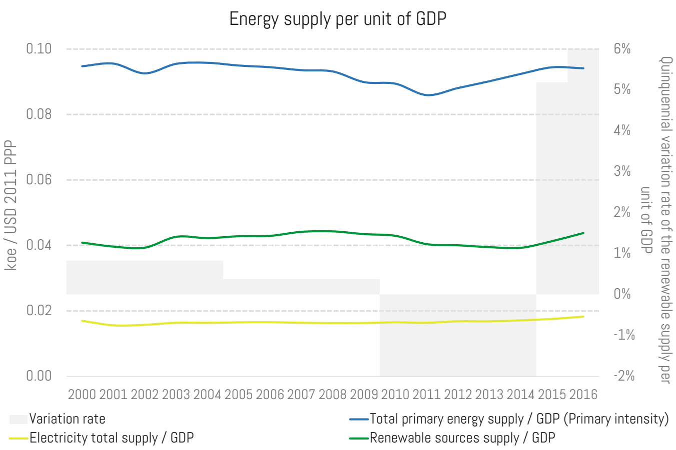

Avoided energy demand due to variations in energy intensity
ktoe
15,000
10,000
5,000
0
-5,000
-10,000
-15,000
-20,000
-25,000
1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Total
Commercial sector
Transport sector
Industrial sector
Other sector
Residential sector

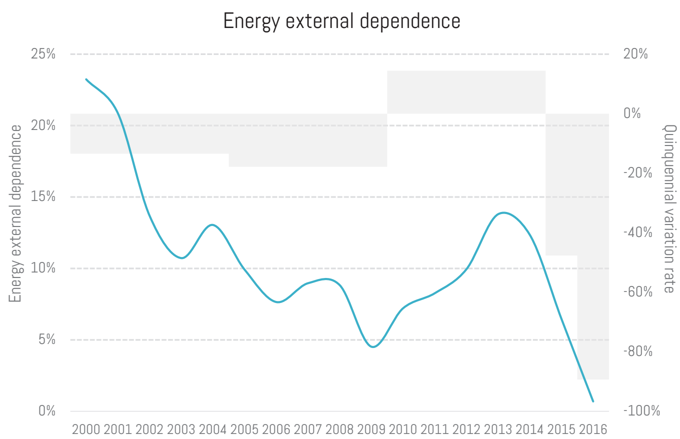

Logarithmic mean Divisia index for the structural decomposition of energy consumption
1.10
1.05
1.00
0.95
0.90
0.85
1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Aggregate factor of final consumption
Efficiency effect
Structure effect
Activity effect


Efficiency of the Electricity Sector
Efficiency of the Electricity Sector
100%
80%
60%
40%
20%
0%
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Efficiency in the transformation processes
Efficiency of the Electric Sector
Losses Electricity Supply Ratio

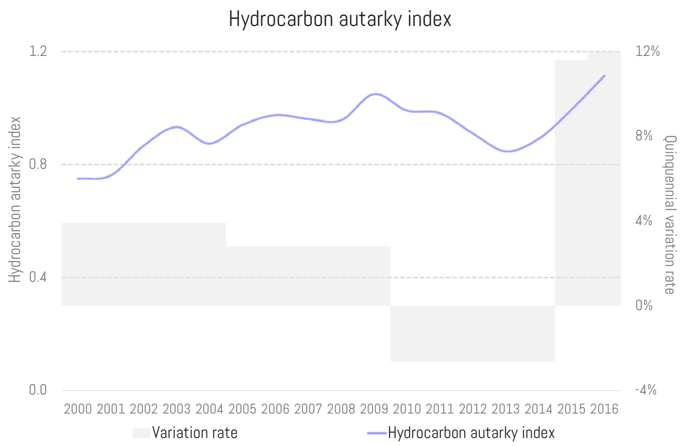

Primary energy supply renewability index
50%
45%
40%
35%
8%
6%
4%
2%
0%
-2%
-4%
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Five-year variation rate
Renewability index of the primary energy supply [%]

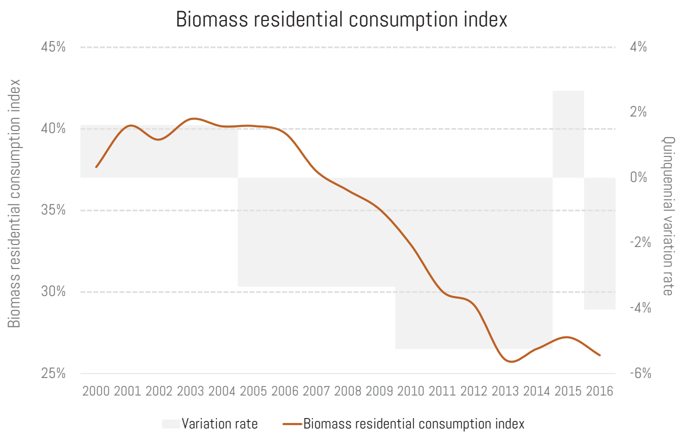

Energy supply per capita
1.6
1.2
0.8
0.4
0.0
koe / inhab.
3%
2%
1%
0%
-1%
-2%
Quinquennial variation rate of the renewable supply per capita
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Variation Rate
Total Primary energy supply per capita
Total electricity supply per capita
Renewable sources supply per capita

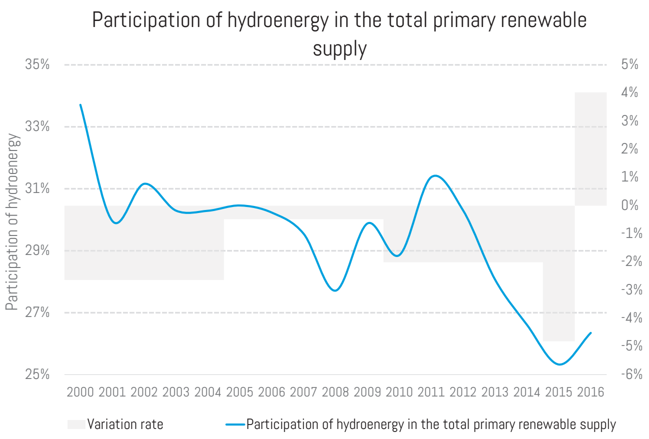

Energy supply per unit of GDP
0.10
0.08
0.06
0.04
0.02
0.00
koe / USD 2011 PPP
6%
5%
4%
3%
2%
1%
0%
-1%
-2%
Quinquennial variation rate of the renewable supply per unit of GDP
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Variation rate
Total primary energy supply / GDP (Primary intensity)
Electricity total supply / GDP
Renewable sources supply / GDP


Energy external dependence
25%
20%
15%
10%
5%
0%
Energy external dependence
20%
0%
-20%
-40%
-60%
-80%
-100%
Quinquennial variation rate
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016

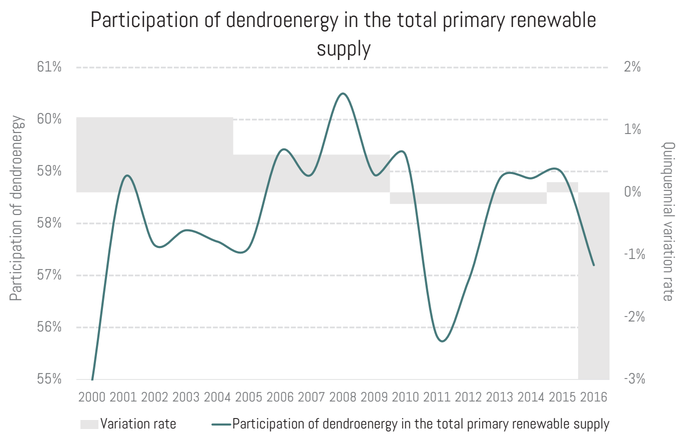
BRAZIL


Hydrocarbon autarky index
1.2
0.8
0.4
0.0
Hydrocarbon autarky index
12%
8%
4%
0%
-4%
Quinquennial variation rate
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Variation rate
Hydrocarbon autarky index

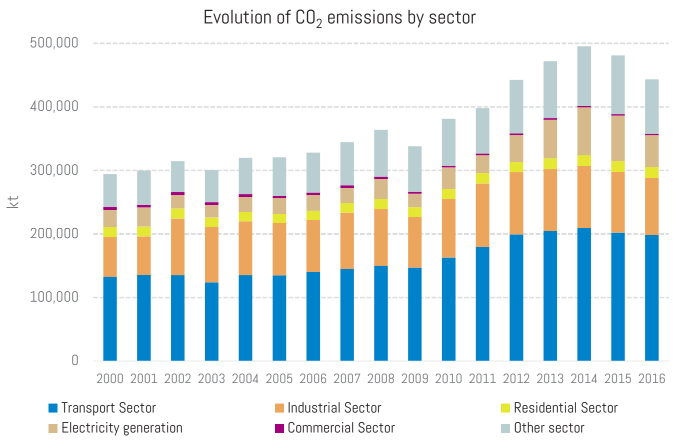

Biomass residential consumption index
45%
40%
35%
30%
25%
Biomass residential consumption index
4%
2%
0%
-2%
-4%
-6%
Quinquennial variation rate
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Variation rate
Biomass residential consumption index



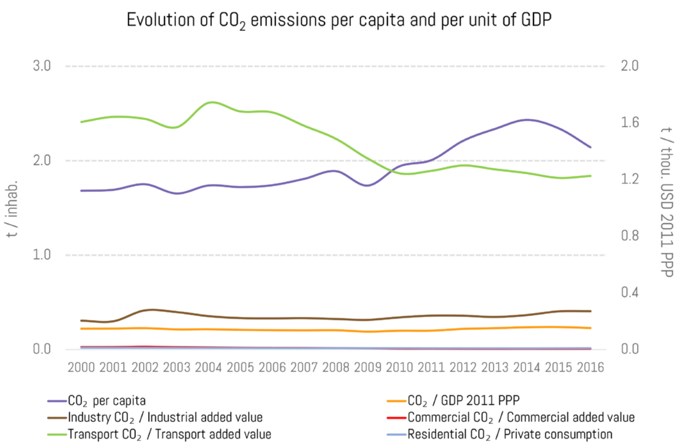
Participation of hydroenergy in the total primary renewable supply
Participation of hydroenergy
Quinquennial variation rate
Variation rate
Participation of hydroenergy in the total primary renewable supply



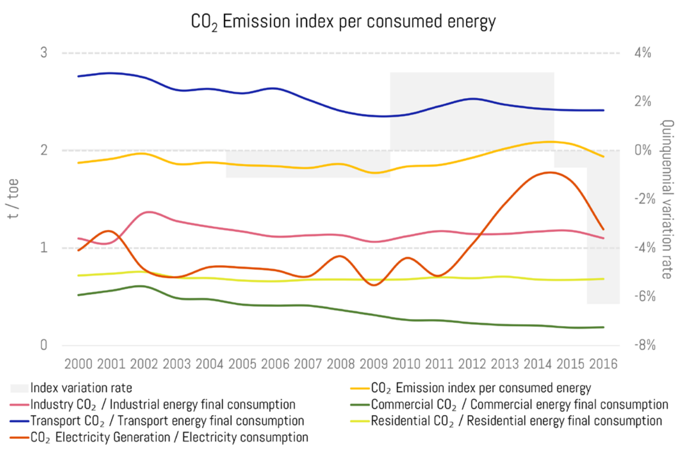
Participation of dendroenergy in the total primary renewable supply
Participation of dendroenergy
Quinquennial variation rate
Variation rate
Participation of dendroenergy in the total primary renewable supply



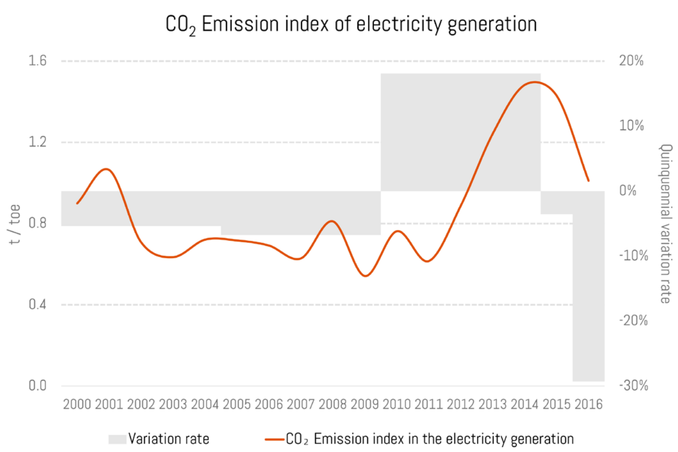
Evolution of CO_2 emissions by sector
kt
Transport Sector
Industrial Sector
Residential Sector
Electricity generation
Commercial Sector
Other sector



Evolution of CO_2 emissions per capita and per unit of GDP
t / inhab.
t / thou. USD 2011 PPP
CO_2 per capita
Industry CO_2 / Industrial added value
Transport CO_2 / Transport added value
CO_2 / GDP 2011 PPP
Commercial CO_2 / Commercial added value
Residential CO_2 / Private consumption

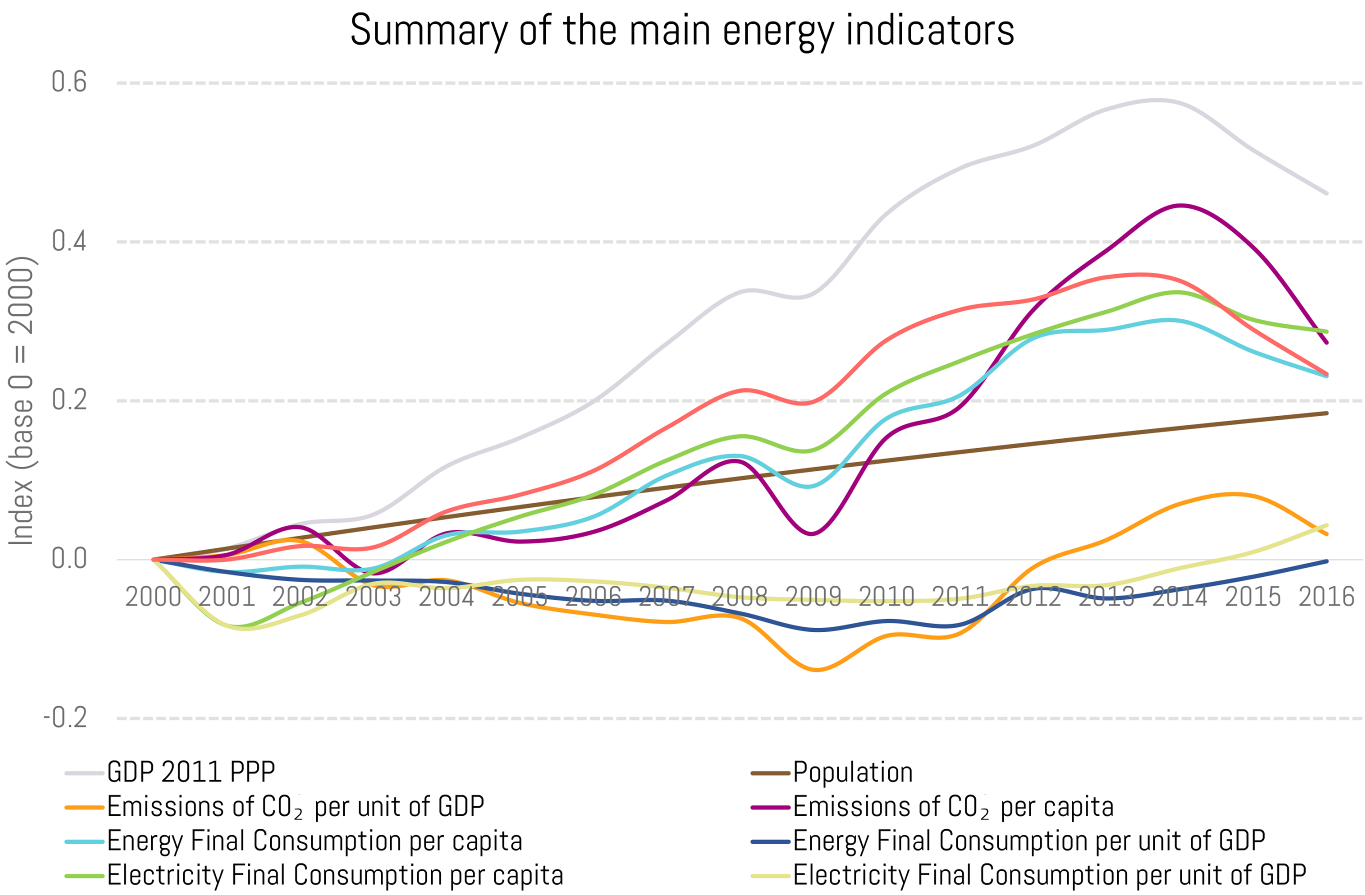


CO_2 Emission index per consumed energy
t / toe
Quinquennial variation rate
Index variation rate
Industry CO_2 / Industrial energy final consumption
Transport CO_2 / Transport energy final consumption
CO_2 Electricity Generation / Electricity consumption
CO_2 Emission index per consumed energy
Commercial CO_2 / Commercial energy final consumption
Residential CO_2 / Residential energy final consumption



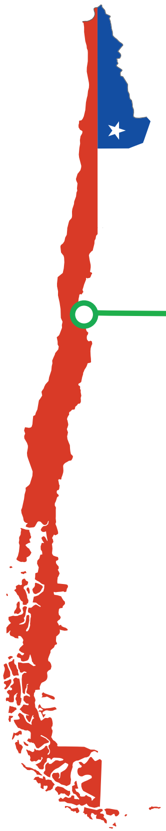
CO_2 Emission index of electricity generation
t / toe
Quinquennial variation rate
Variation rate
CO_2 Emission index in the electricity generation

BRAZIL


Summary of the main energy indicators
0.6
0.4
0.2
0.0
-0.2
Index (base 0 = 2000)
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
GDP 2011 PPP
Population
Emissions of CO_2 per unit of GDP
Emissions of CO_2 per capita
Energy Final Consumption per capita
Energy Final Consumption per unit of GDP
Electricity Final Consumption per capita
Electricity Final Consumption per unit of GDP

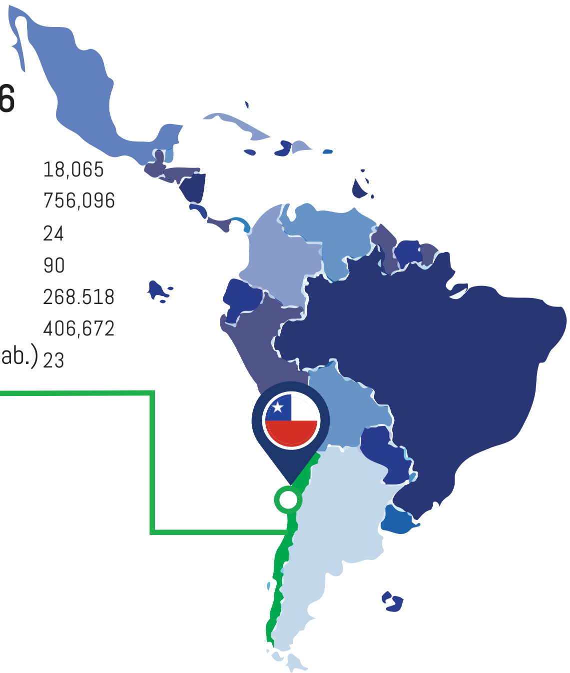
BRAZIL

CHILE



GENERAL INFORMATION 2016

Population (thousand inhab.)	18,065
Area (km^2)	756,096
Population Density (inhab./km^2)	24
Urban Population (%)	90
GDP USD 2010 (MUSD)	268.518
GDP USD 2011 PPP (MUSD)	406,672
GDP per capita (thou. USD 2011 PPP/inhab.)	23



ENERGY SECTOR

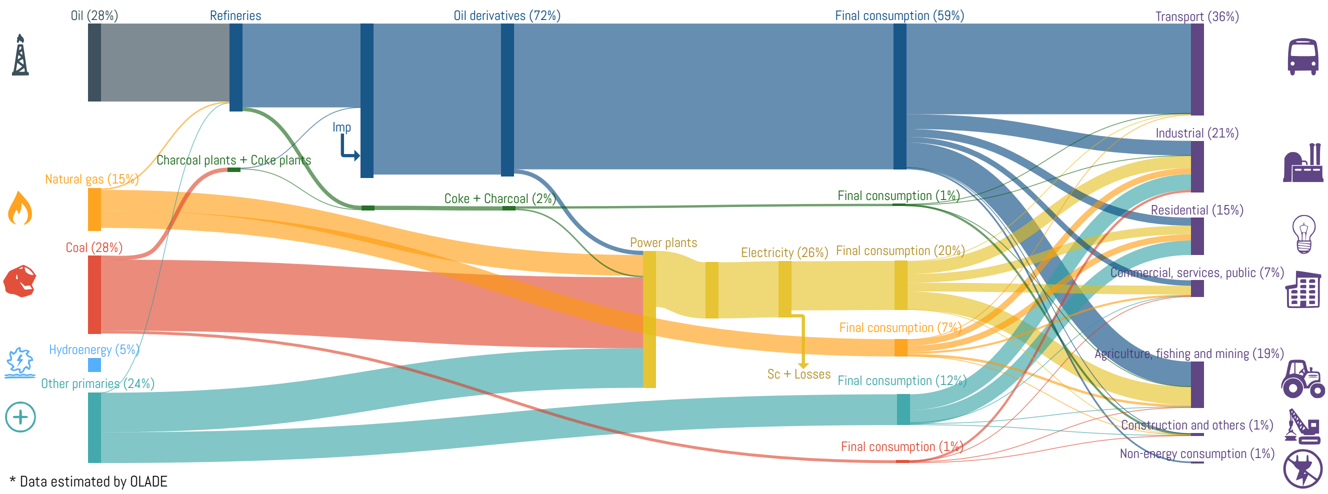
	Mtoe
Final consumption in the Transport Sector	10.49[1]
Final consumption in the Industrial Sector	5,87
Final consumption in the Residential Sector	4.26[1]
Final consumption in the Commercial and Service Sector	1.90[1]
Final consumption in the Agriculture, Livestock, Fishing, Mining, Other and Non - Energy Consumption	5,80[1]

Reservas de petróleo	Natural gas reserves	Coal reserves
Mbbl 12	Gm^3 8	Mt 266

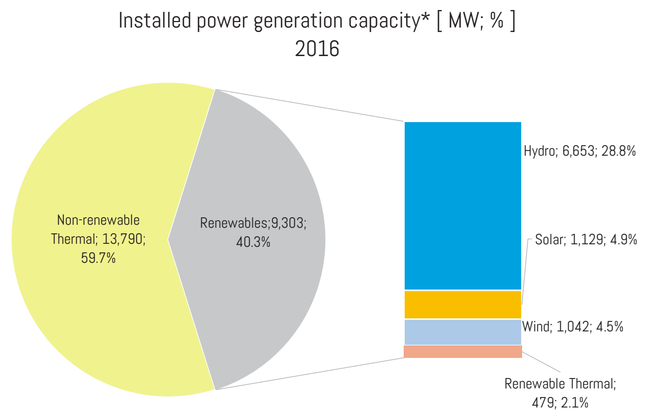
[1] Supply and demand data for 2016 estimated by OLADE.
[2] Corresponding to the year 2015.

Indicator	Unit	Value
Electricity consumption per capita	kWh / inhab.	3,605 [1]
Final energy consumption per capita	toe / inhab.	1.57[1]
Electrification rate	%	99.72[2]
Total energy supply	Mtoe	40.13 [1]
Total energy production	Mtoe	12.77[1]
Total energy imports	Mtoe	28.41[1]
Total energy exports	Mtoe	1.36[1]
Total final energy consumption	Mtoe	28.32[1]
Refining capacity	kbbl/day	220
Installed power generation capacity	GW	23.09
Primary energy intensity and final energy intensity	koe / USD 2011 PPP	0.08 / 0.07

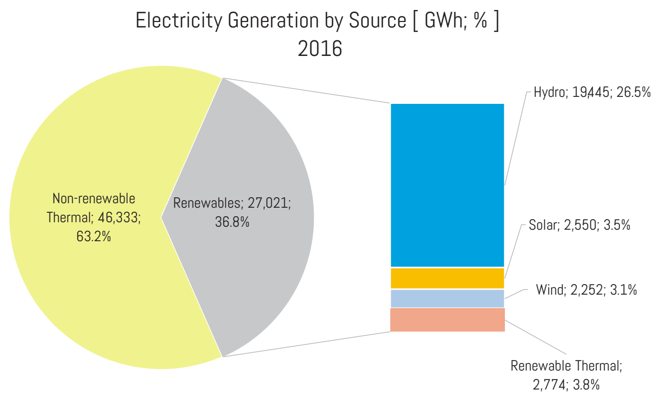
Summarized energy matrix 2016*

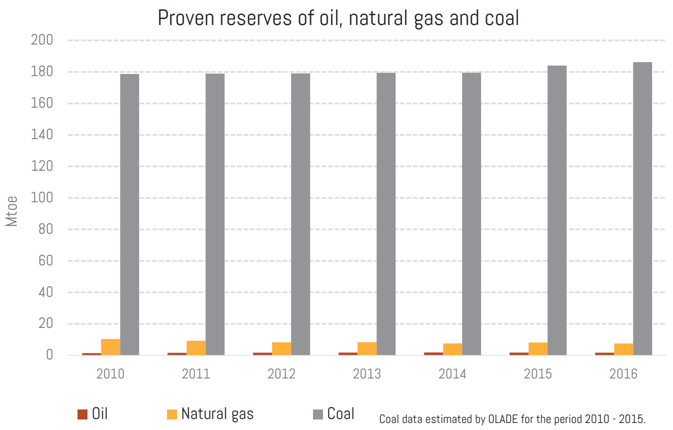


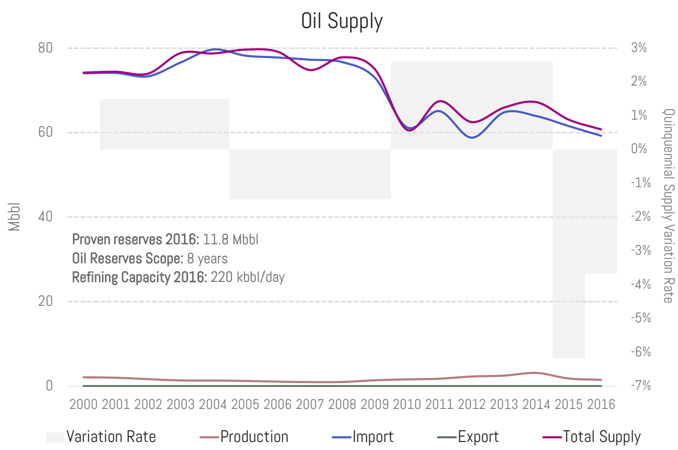
* Data estimated by OLADE

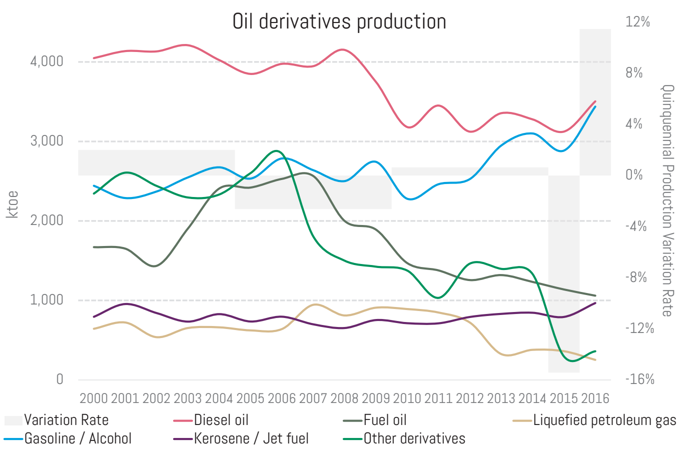


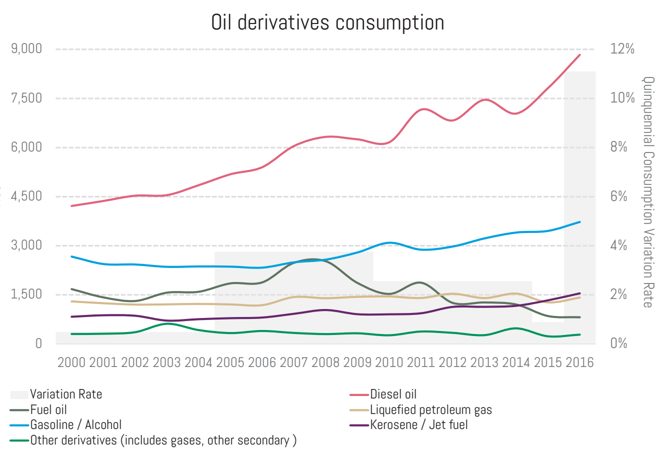
(*): It corresponds to gross installed capacity.





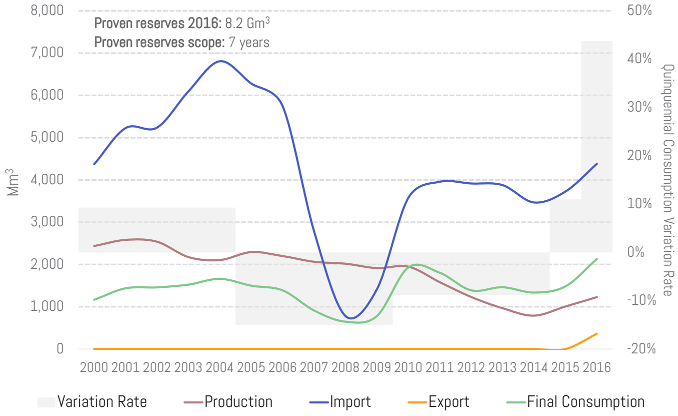




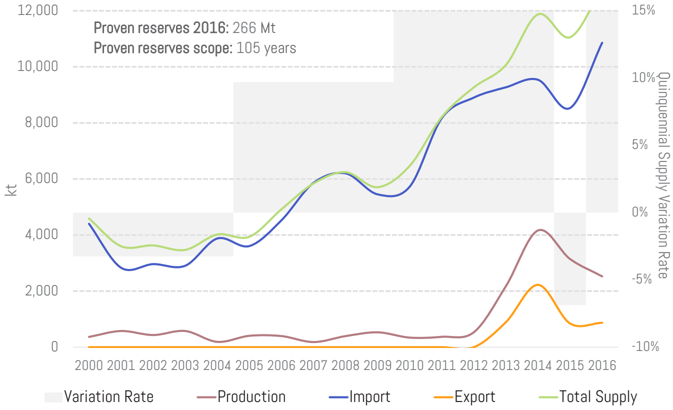


CHILE

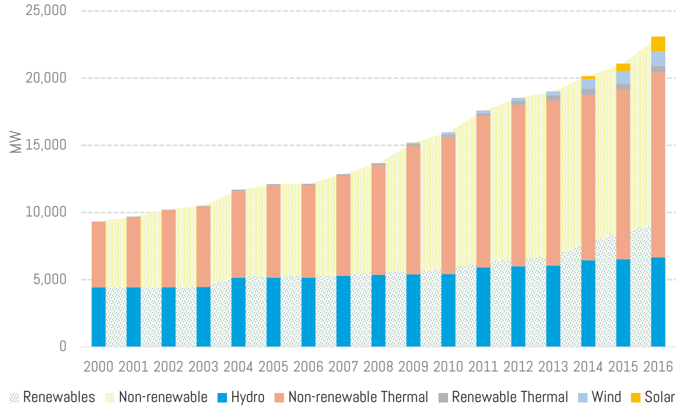
Natural gas supply



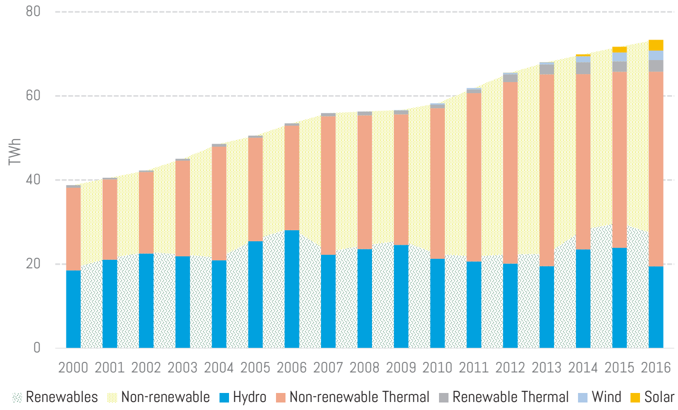
Coal supply



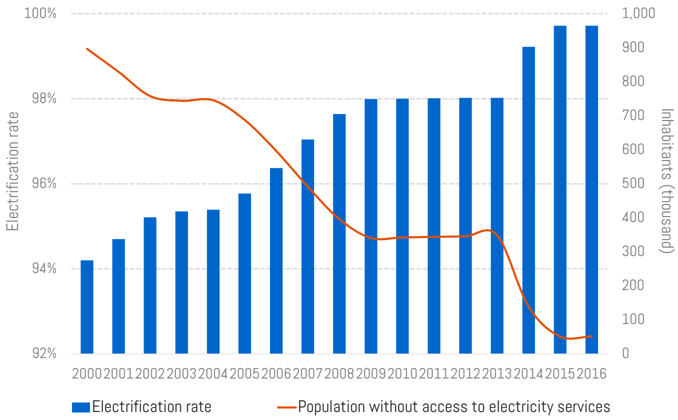
Installed power generation capacity



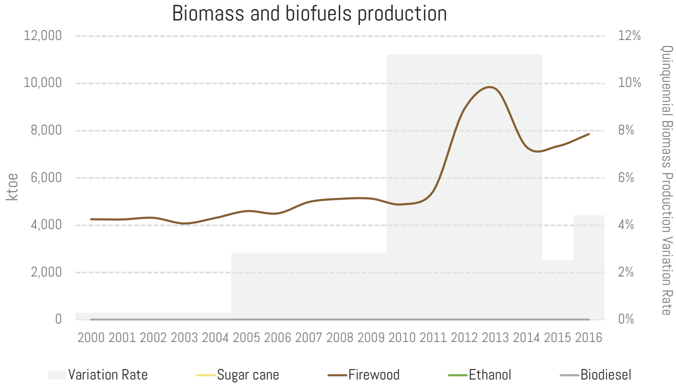
Electricity generation



Electrification rate

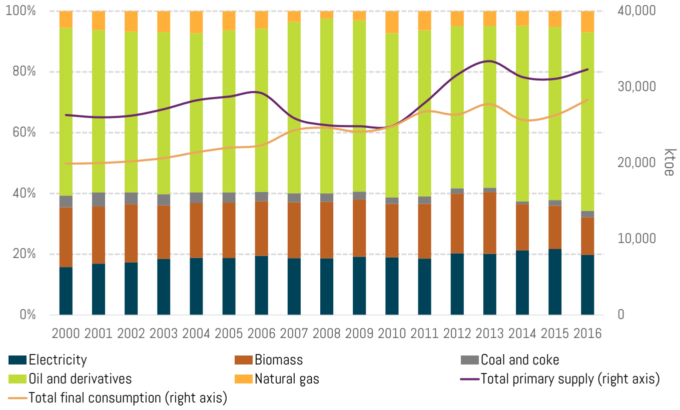


Biomass and biofuels production

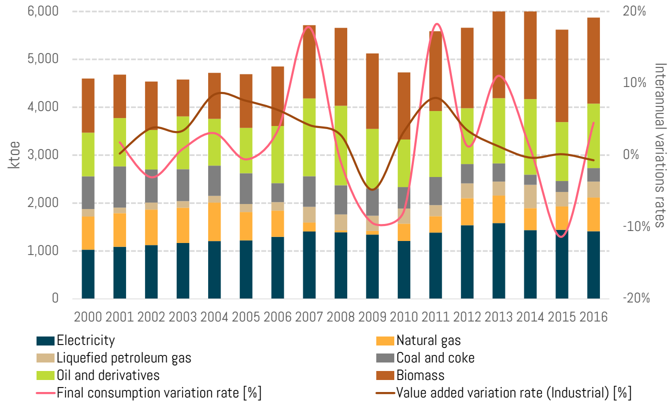


Note: The downturn between 2013 and 2014 corresponds to a methodological change made by the country in the National Energy Balance.

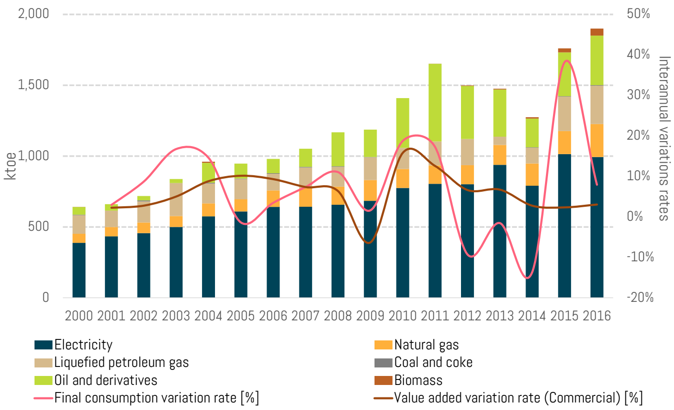
Final energy consumption by source



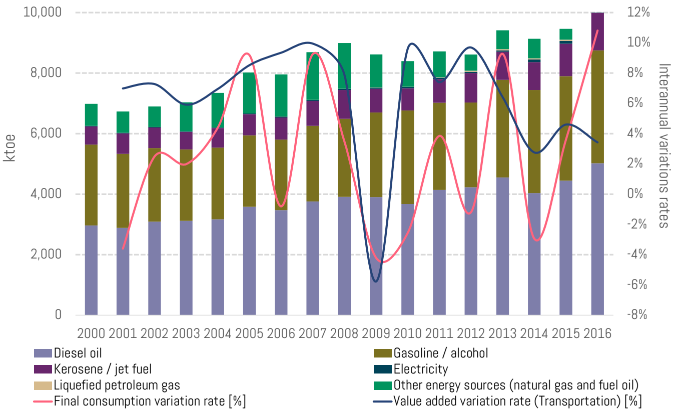
Industrial Sector Final Consumption



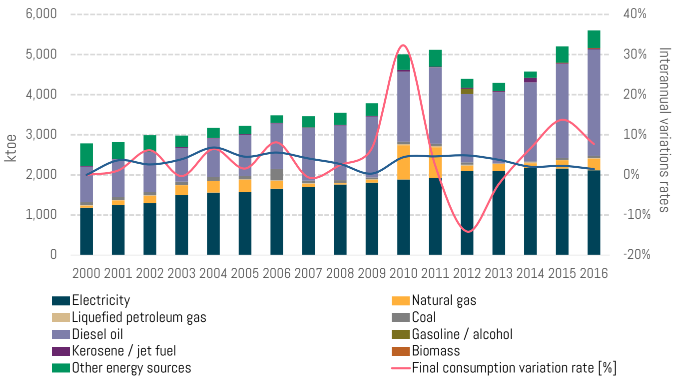
Commercial Sector Final Consumption



Transport Sector Final Consumption

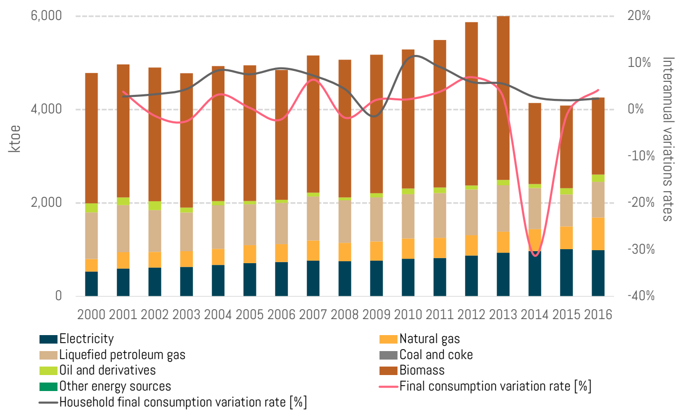


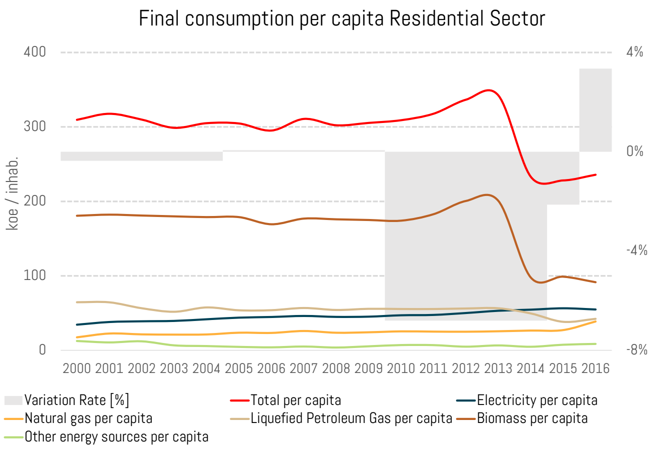
Other Sectors Final Consumption*

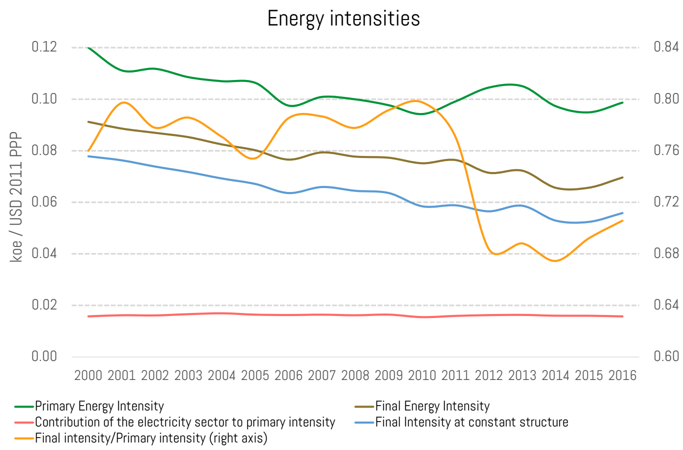


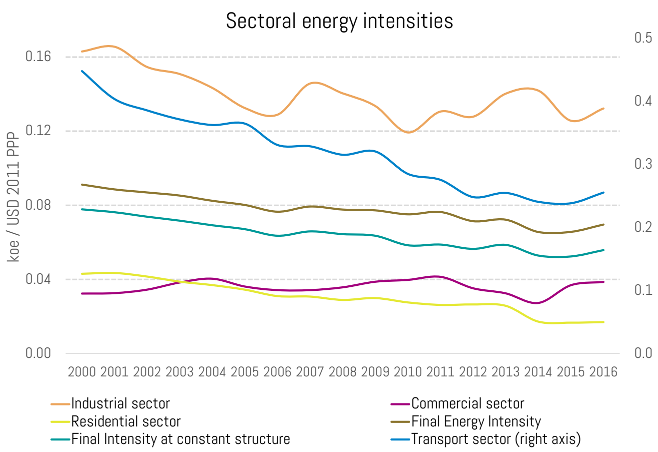
(*) It includes Agro, Fishing, Mining, Construction and Non - Energy Consumption.

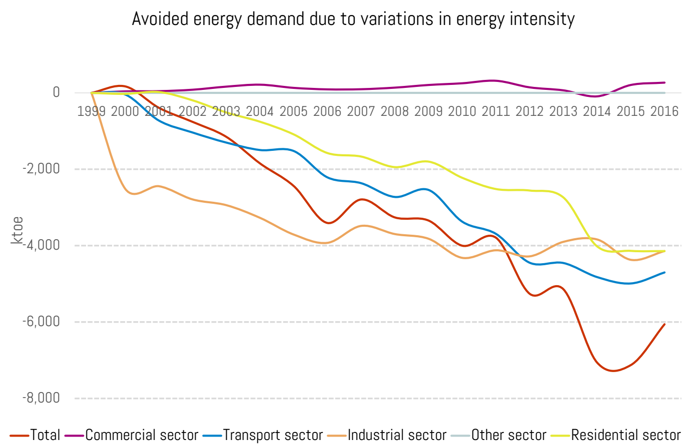
Residential Sector Final Consumption

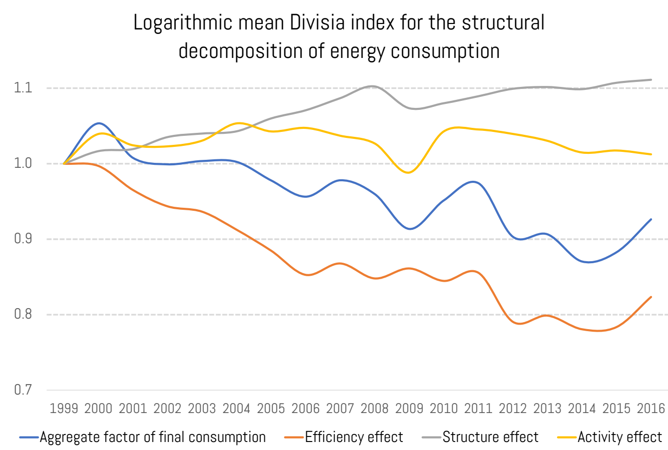


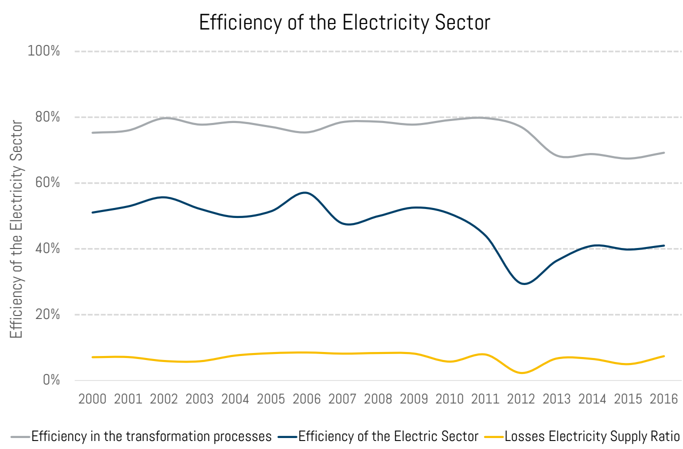

Final consumption per capita Residential Sector
koe / inhab.
Final consumption quinquennial variation rate
Variation Rate [%]
Total per capita
Electricity per capita
Natural gas per capita
Liquefied Petroleum Gas per capita
Biomass per capita
Other energy sources per capita


Energy intensities
koe / USD 2011 PPP
Primary Energy Intensity
Final Energy Intensity
Contribution of the electricity sector to primary intensity
Final Intensity at constant structure
Final intensity/Primary intensity (right axis)


Sectoral energy intensities
koe / USD 2011 PPP
koe / USD 2011 PPP
Industrial sector
Commercial sector
Residential sector
Final Energy Intensity
Final Intensity at constant structure
Transport sector (right axis)


Avoided energy demand due to variations in energy intensity
ktoe
Total
Commercial sector
Transport sector
Industrial sector
Other sector
Residential sector

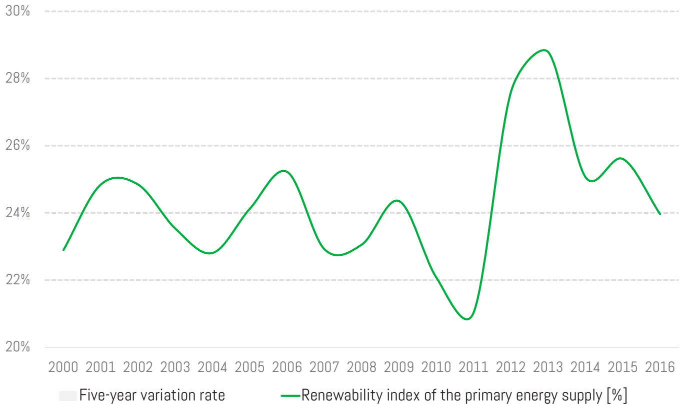

Logarithmic mean Divisia index for the structural decomposition of energy consumption
Aggregate factor of final consumption
Efficiency effect
Structure effect
Activity effect


Efficiency of the Electricity Sector
Efficiency of the Electricity Sector
Efficiency in the transformation processes
Efficiency of the Electric Sector
Losses Electricity Supply Ratio

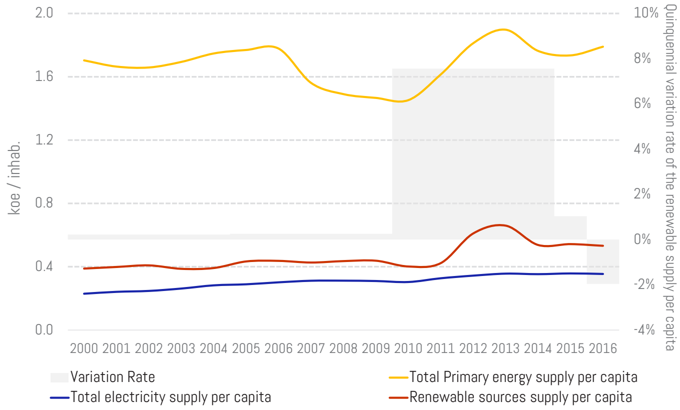
CHILE

CHILE

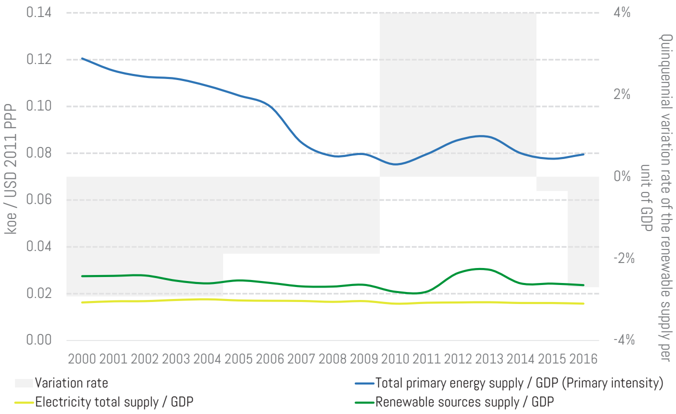
Primary energy supply renewability index



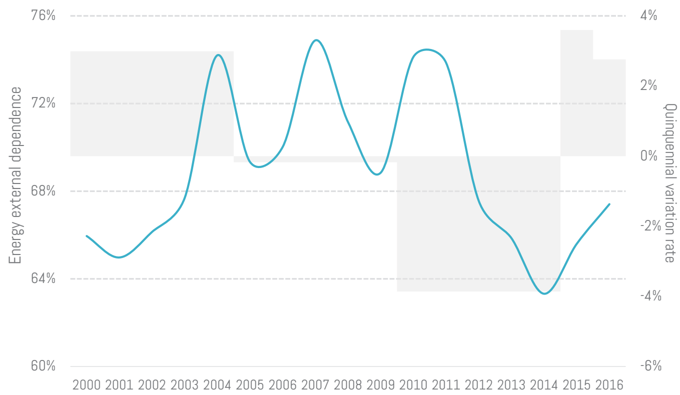
Energy supply per capita



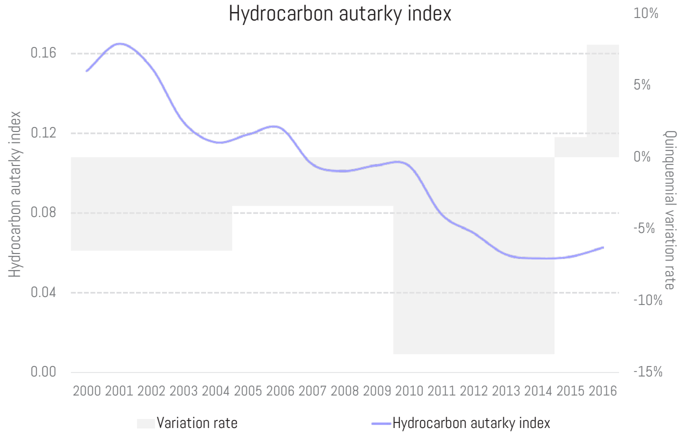
Energy supply per unit of GDP



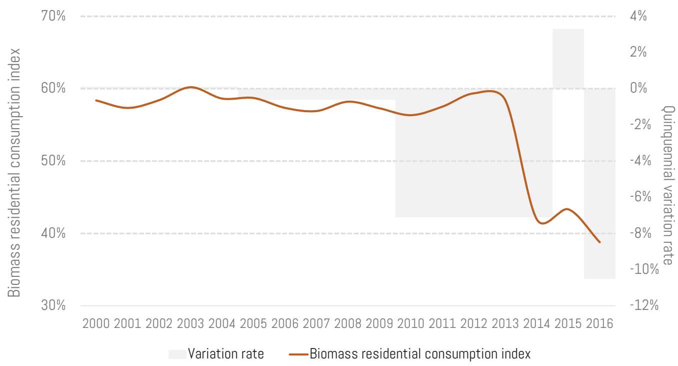
Energy external dependence



Hydrocarbon autarky index

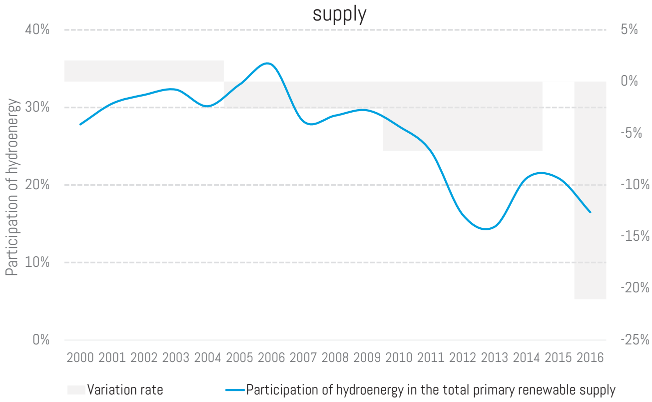


Biomass residential consumption index

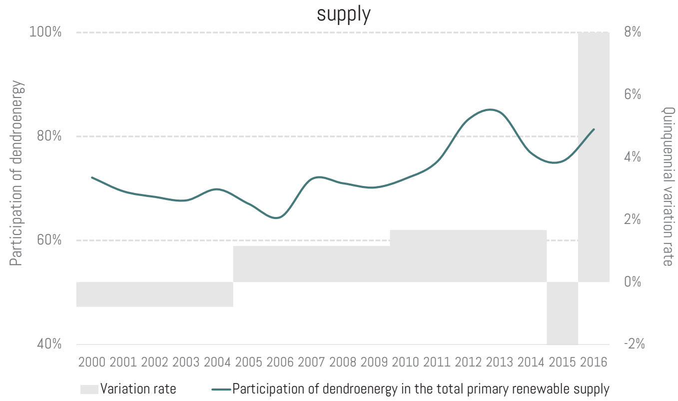


Note: The downturn between 2013 and 2014 corresponds to a methodological change made by the country in the National Energy Balance.

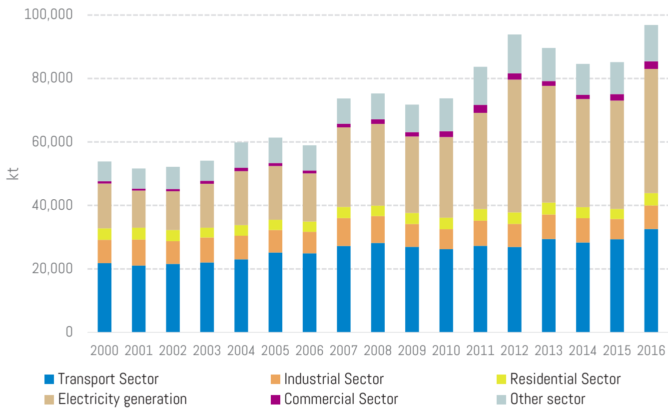
Participation of hydroenergy in the total primary renewable supply



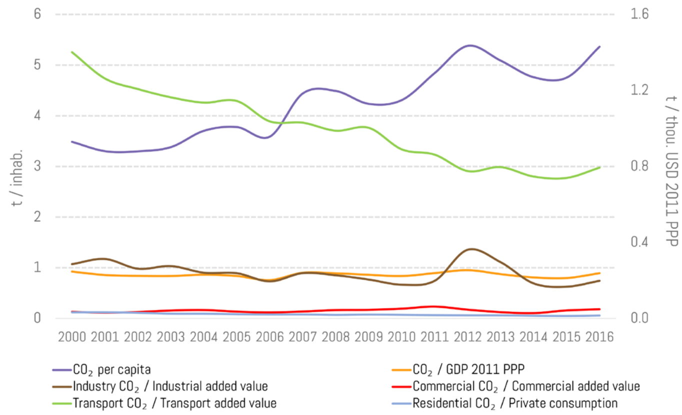
Participation of dendroenergy in the total primary renewable supply



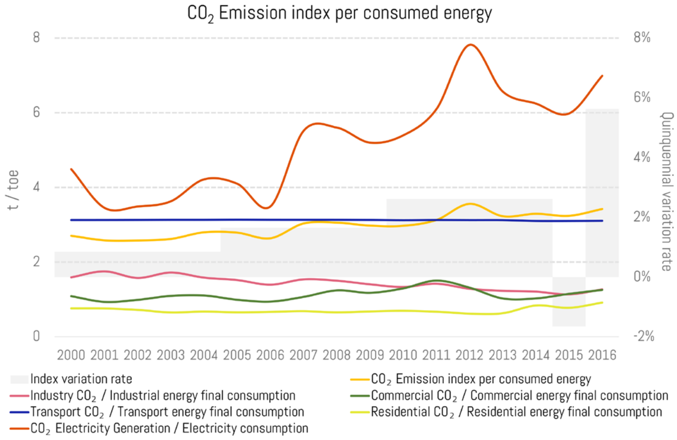
Evolution of CO_2 emissions by sector



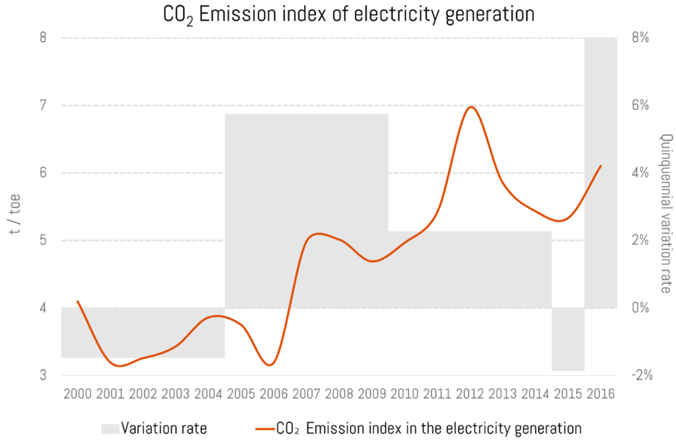
Evolution of CO_2 emissions per capita and per unit of GDP

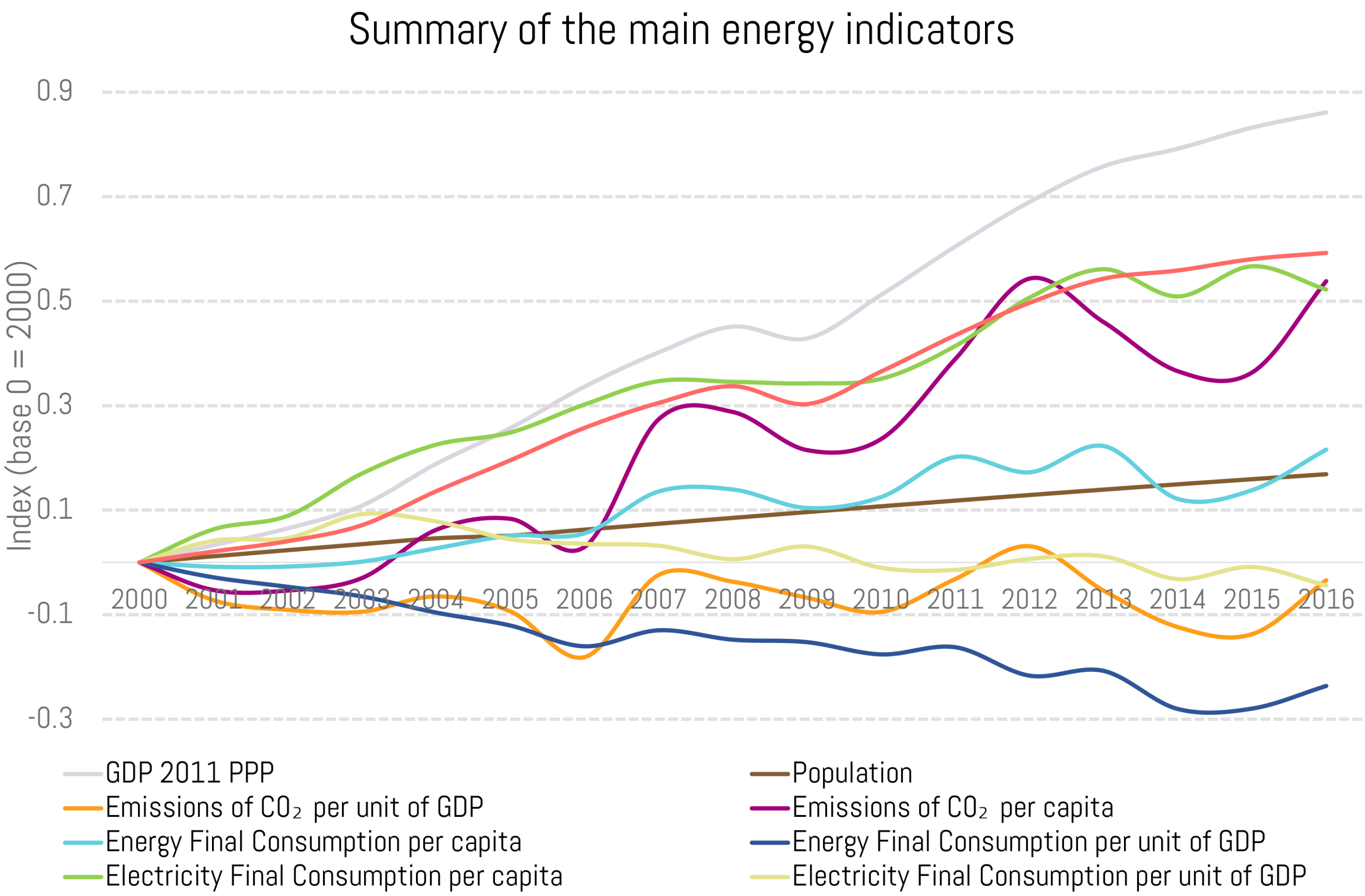


CO_2 Emission index per consumed energy



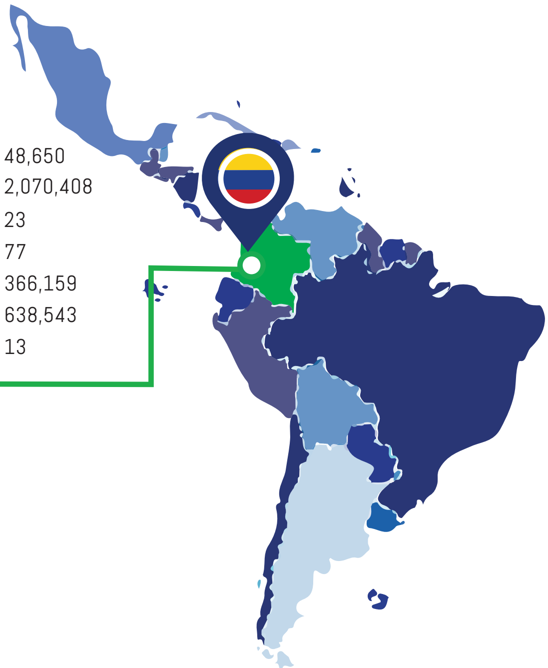
CO_2 Emission index of electricity generation




Summary of the main energy indicators
Index (base 0 = 2000)
0.9
0.7
0.5
0.3
0.1
-0.1
-0.3
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
GDP 2011 PPP
Population
Emissions of CO_2 per unit of GDP
Emissions of CO_2 per capita
Energy Final Consumption per capita
Energy Final Consumption per unit of GDP
Electricity Final Consumption per capita
Electricity Final Consumption per unit of GDP

CHILE

COLOMBIA



GENERAL INFORMATION 2016

Population (thousand inhab.)	48,650
Area (km^2)	2,070,408
Population Density (inhab./km^2)	23
Urban Population (%)	77
GDP USD 2010 (MUSD)	366,159
GDP USD 2011 PPP (MUSD)	638,543
GDP per capita (thou. USD 2011 PPP/inhab.)	13

ENERGY SECTOR

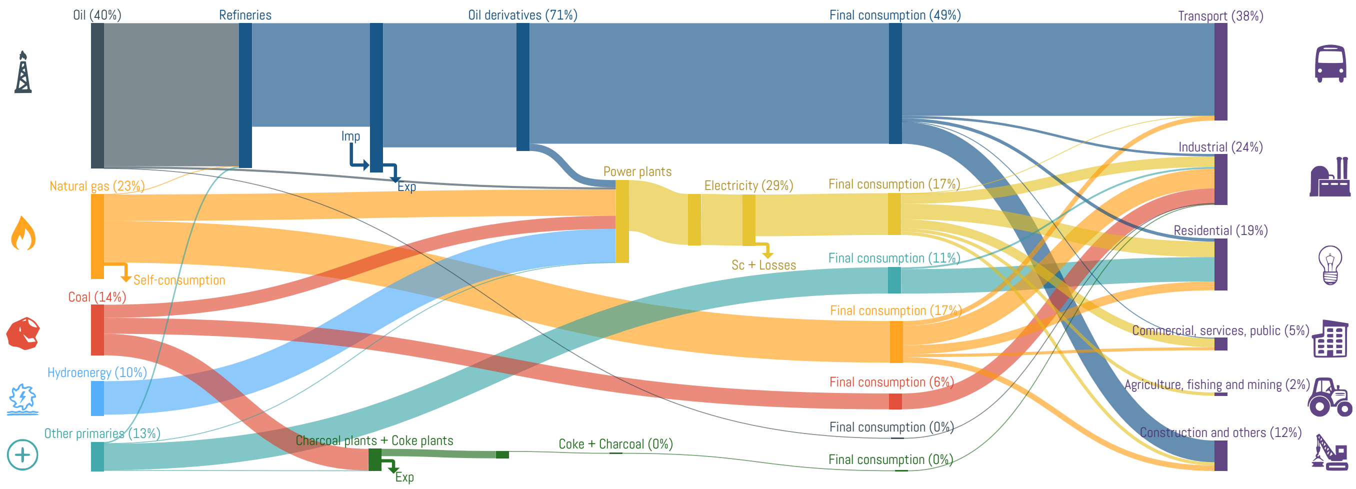
Final consumption in the Transport Sector	Mtoe 12.25
Final consumption in the Industrial Sector	Mtoe 7.73
Final consumption in the Residential Sector	Mtoe 6.21
Final consumption in the Commercial and Service Sector	Mtoe 1.59
Final consumption in the Agriculture, Livestock, Fishing, Mining, Other and Non - Energy Consumption	Mtoe 4.57

Oil Reserves	Natural gas reserves	Coal reserves
Mbbl 1,665	Gm^3 114	Mt 6,162

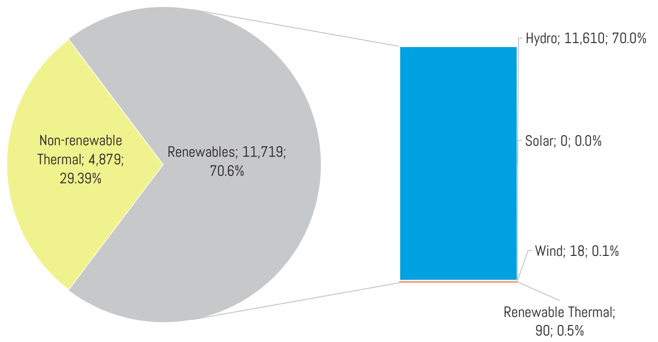
[1] 2015 Data.

Unit	Value	Indicator
kWh / inhab.	1,253	Electricity consumption per capita
toe / inhab.	0.66	Final energy consumption per capita
%	96.96[1]	Electrification rate
Mtoe	47.01	Total energy supply
Mtoe	135.11	Total energy production
Mtoe	5.79	Total energy imports
Mtoe	94.62	Total energy exports
Mtoe	32.34	Total final energy consumption
kbbl/day	330	Refining capacity
GW	16.60	Installed power generation capacity
koe / USD 2011 PPP	0.07 / 0.05	Primary energy intensity and final energy intensity

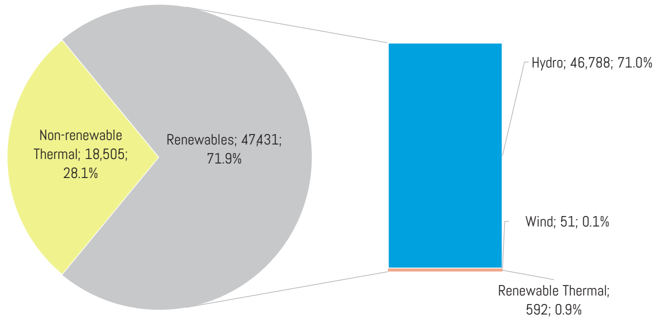
Summarized energy matrix 2016



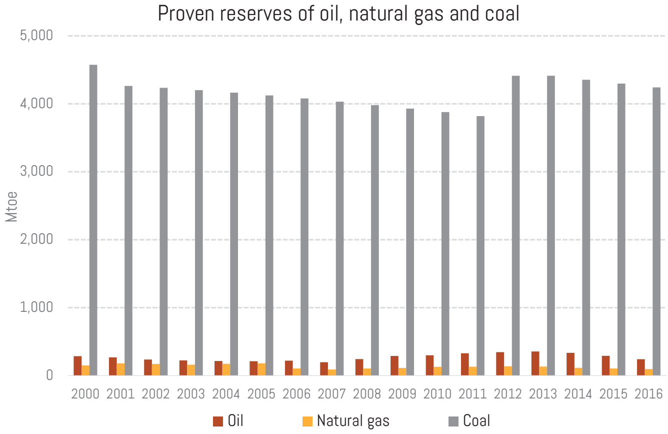
Installed power generation capacity [MW; %]
2016



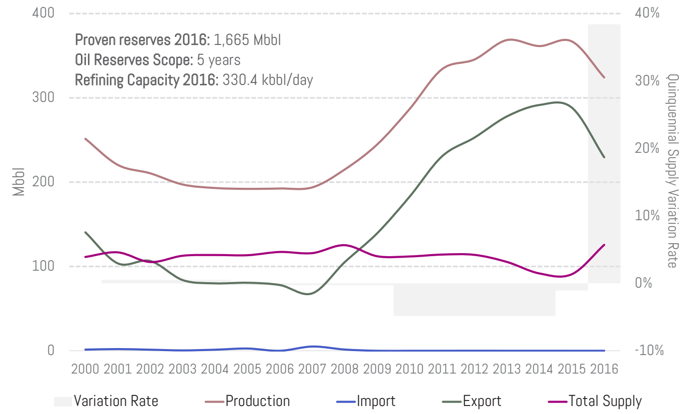
Electricity Generation by Source [GWh; %]
2016



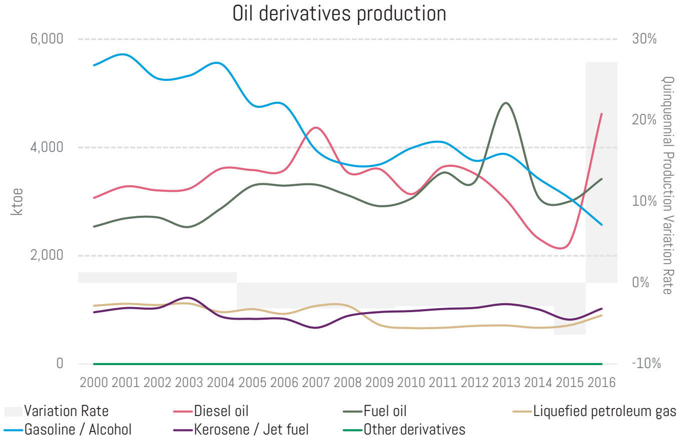
Proven reserves of oil, natural gas and coal



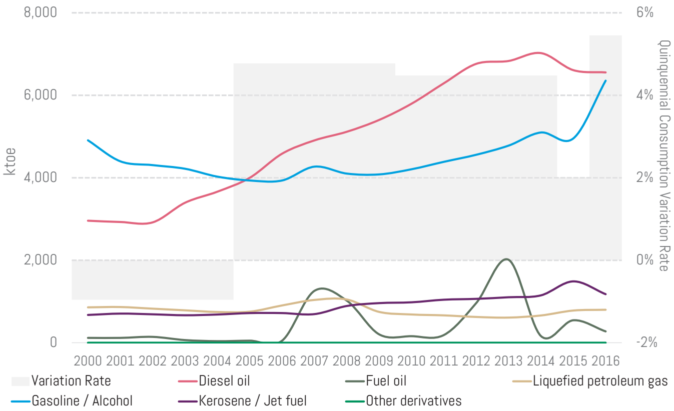
Oil Supply

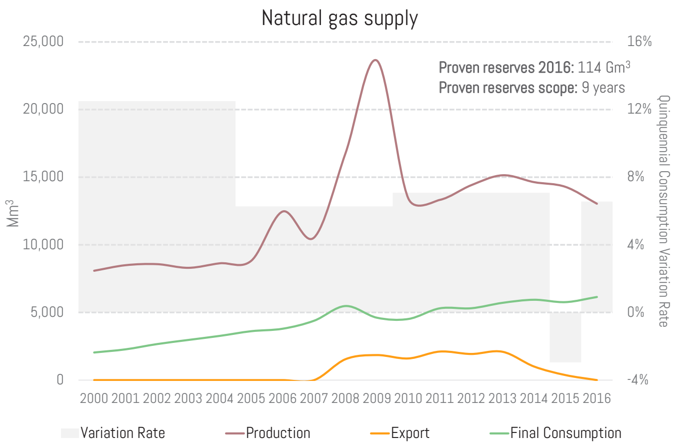


Oil derivatives production

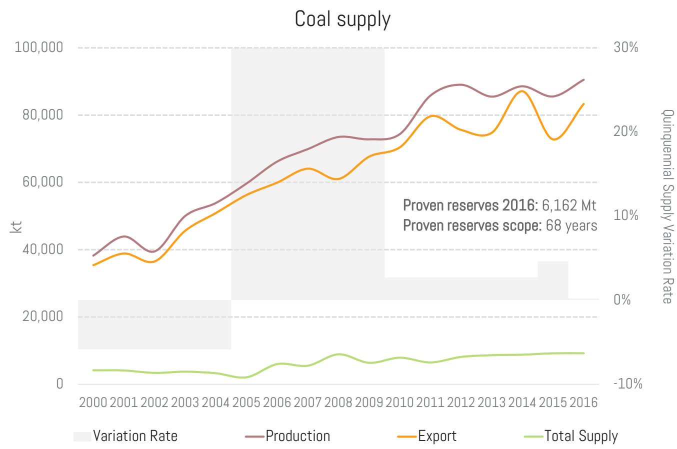


Oil derivatives consumption

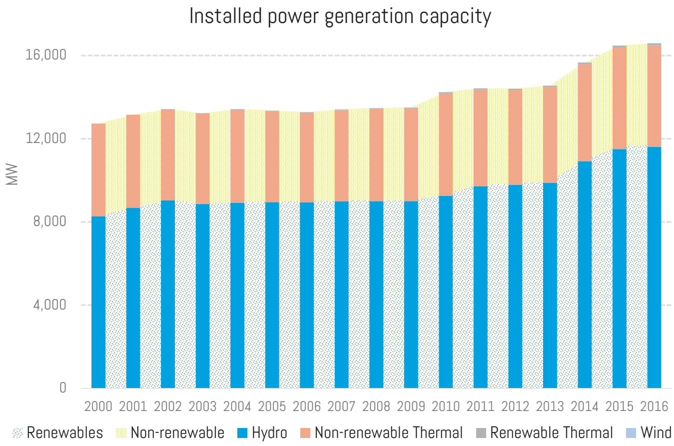




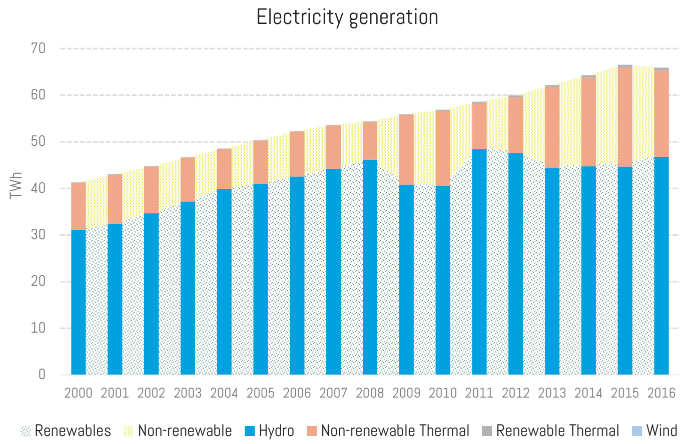
Natural gas supply
Proven reserves 2016: 114 Gm³
Proven reserves scope: 9 years
Mm³
25,000
20,000
15,000
10,000
5,000
0
16%
12%
8%
4%
0%
-4%
Quinquennial Consumption Variation Rate
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Variation Rate
Production
Export
Final Consumption



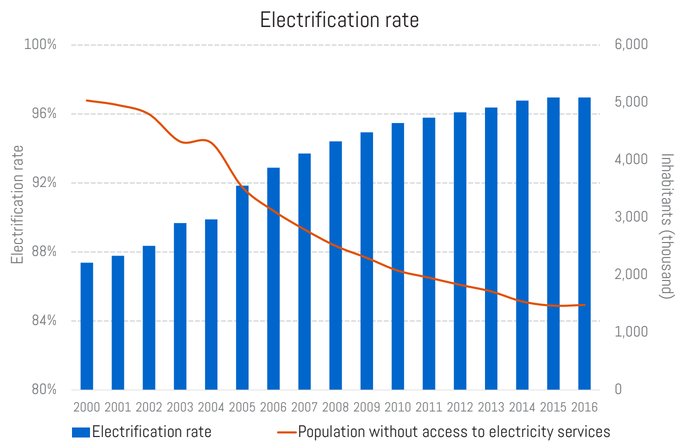
Coal supply
Proven reserves 2016: 6,162 Mt
Proven reserves scope: 68 years
kt
100,000
80,000
60,000
40,000
20,000
0
30%
20%
10%
0%
-10%
Quinquennial Supply Variation Rate
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Variation Rate
Production
Export
Total Supply



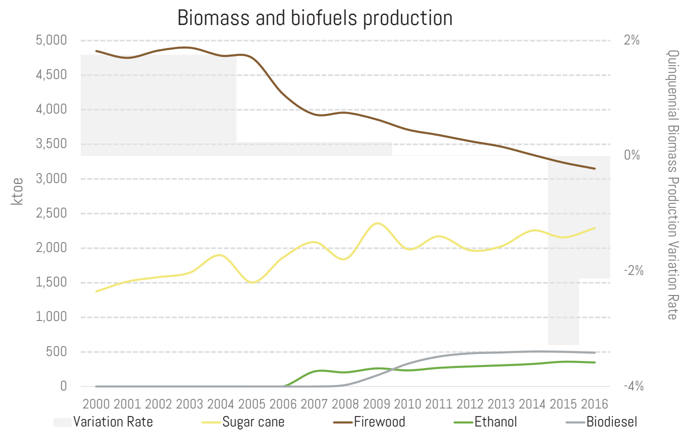
Installed power generation capacity
MW
16,000
12,000
8,000
4,000
0
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Renewables
Non-renewable
Hydro
Non-renewable Thermal
Renewable Thermal
Wind



Electricity generation
TWh
70
60
50
40
30
20
10
0
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Renewables
Non-renewable
Hydro
Non-renewable Thermal
Renewable Thermal
Wind

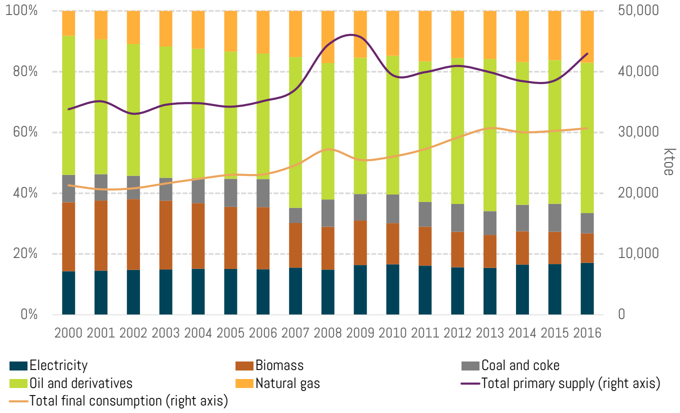


Electrification rate
Electrification rate
100%
96%
92%
88%
84%
80%
6,000
5,000
4,000
3,000
2,000
1,000
0
Inhabitants (thousand)
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Electrification rate
Population without access to electricity services

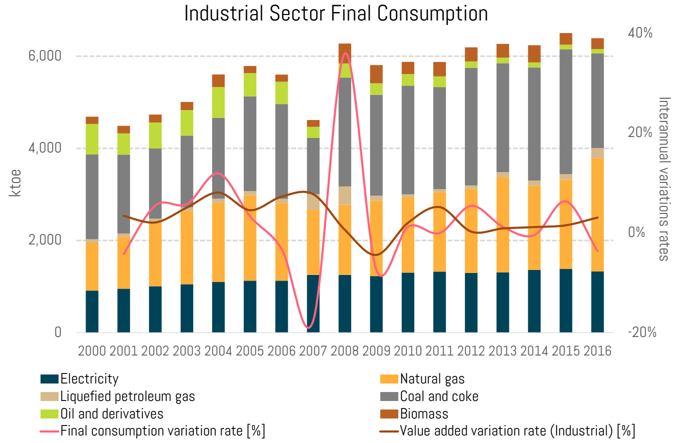


Biomass and biofuels production
ktoe
5,000
4,500
4,000
3,500
3,000
2,500
2,000
1,500
1,000
500
0
2%
0%
-2%
-4%
Quinquennial Biomass Production Variation Rate
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Variation Rate
Sugar cane
Firewood
Ethanol
Biodiesel

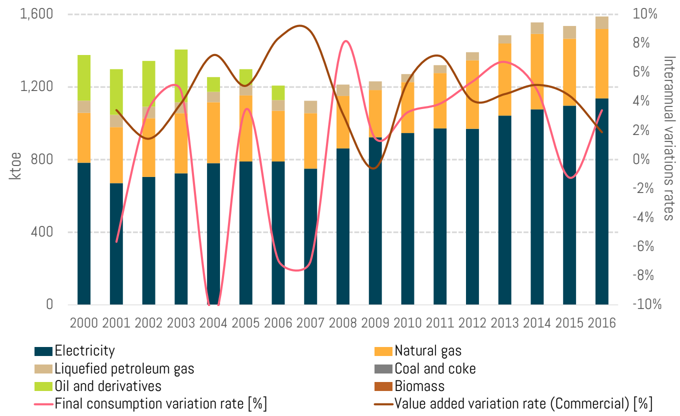
Final energy consumption by source



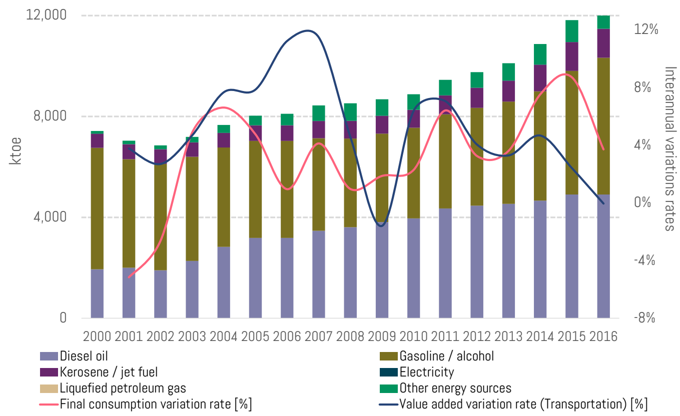
Industrial Sector Final Consumption



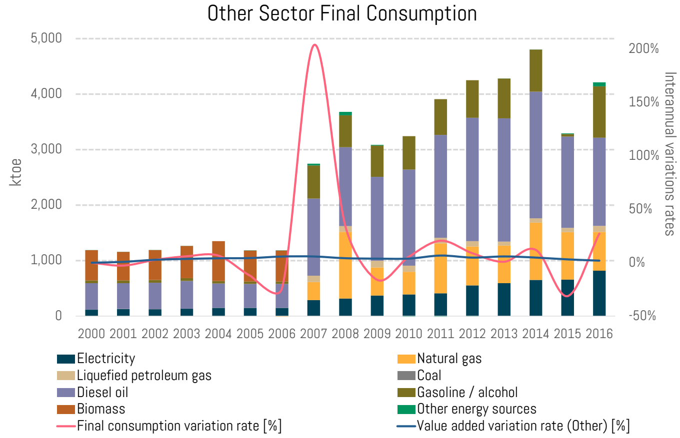
Commercial Sector Final Consumption



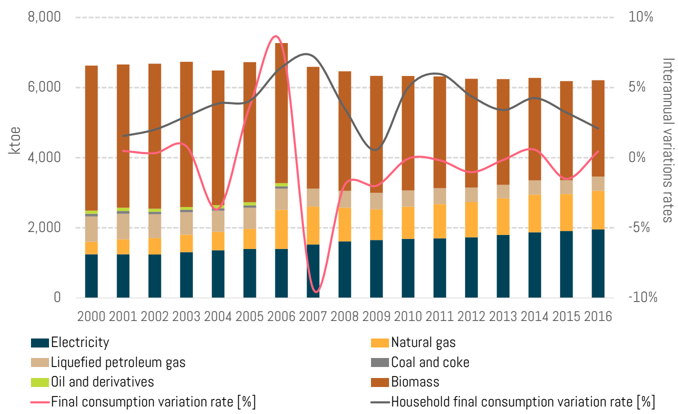
Transport Sector Final Consumption



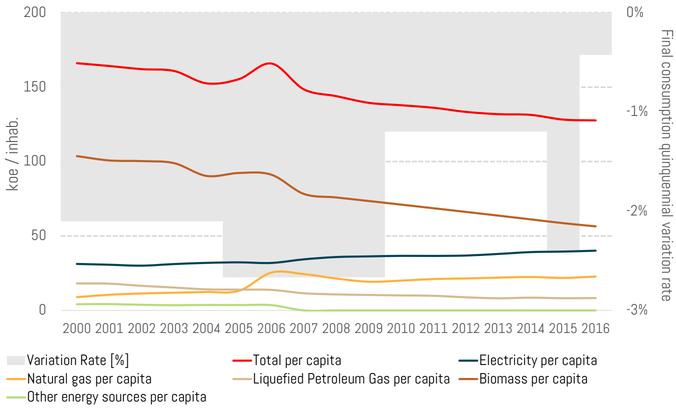
Other Sector Final Consumption



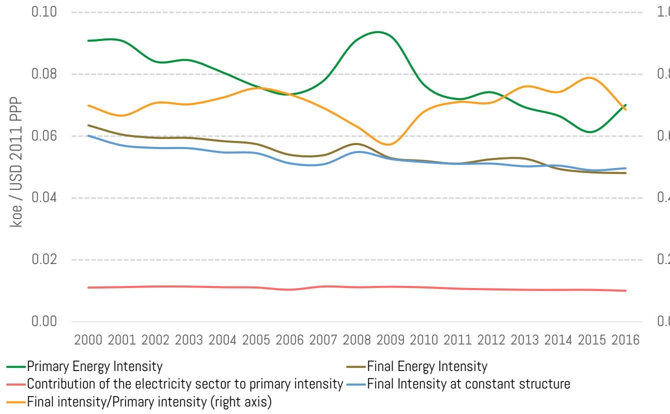
Residential Sector Final Consumption



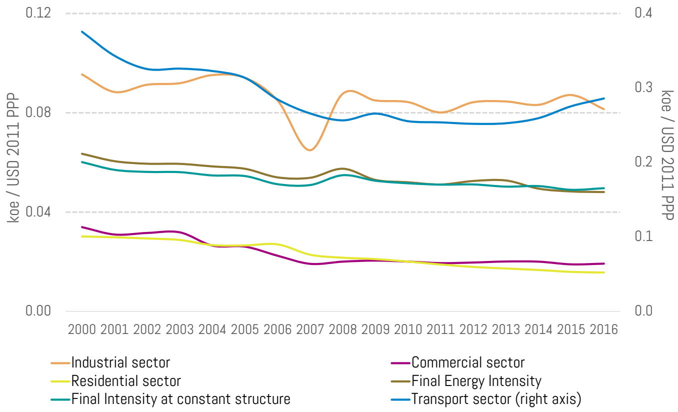
Final consumption per capita Residential Sector



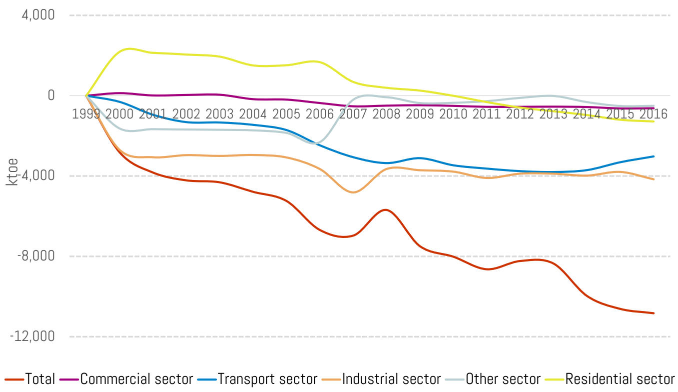
Energy intensities



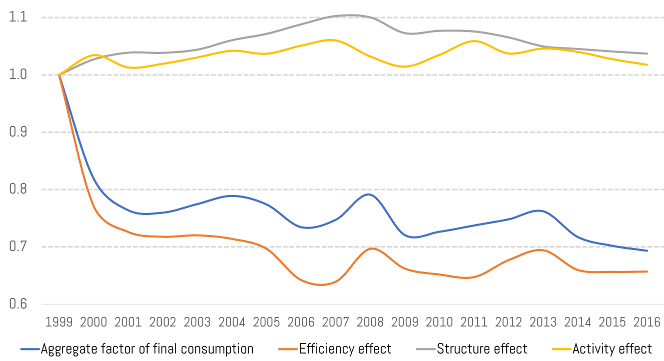
Sectoral energy intensities



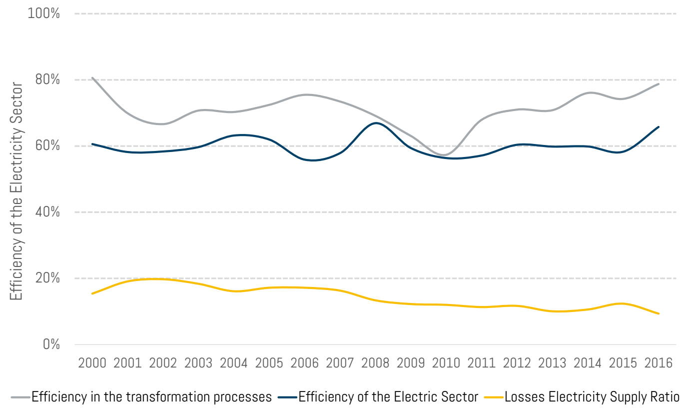
Avoided energy demand due to variations in energy intensity



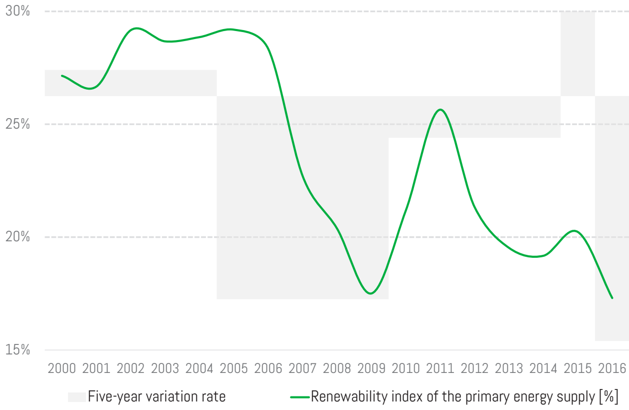
Logarithmic mean Divisia index for the structural decomposition of energy consumption



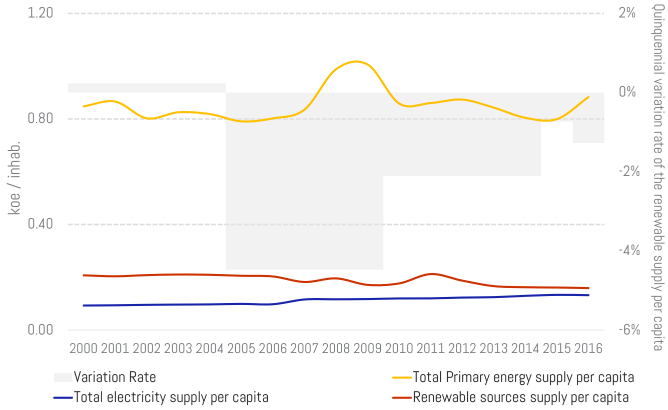
Efficiency of the Electricity Sector



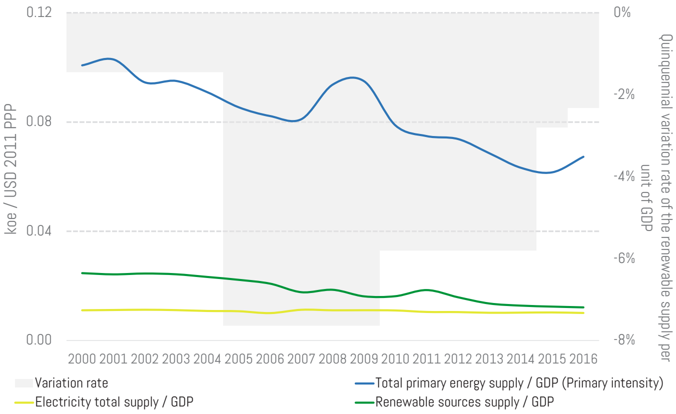
Primary energy supply renewability index



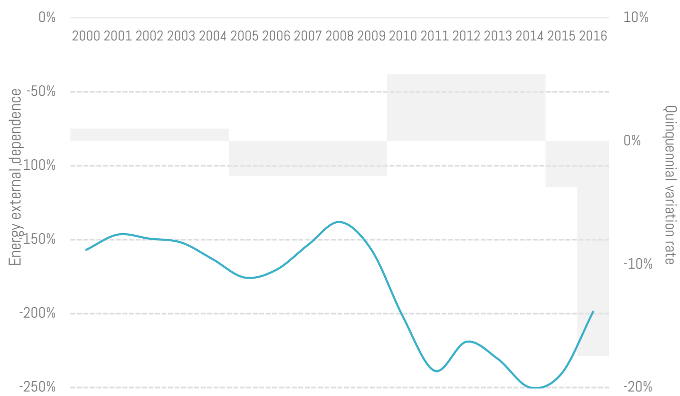
Energy supply per capita



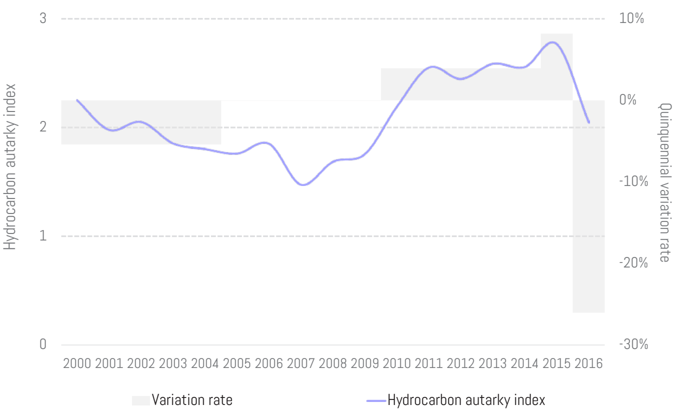
Energy supply per unit of GDP



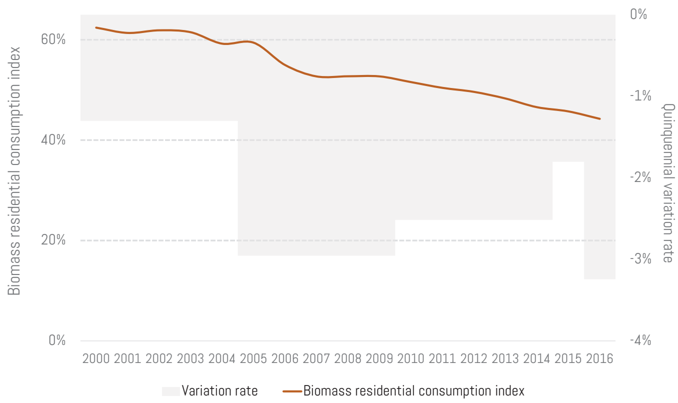
Energy external dependence



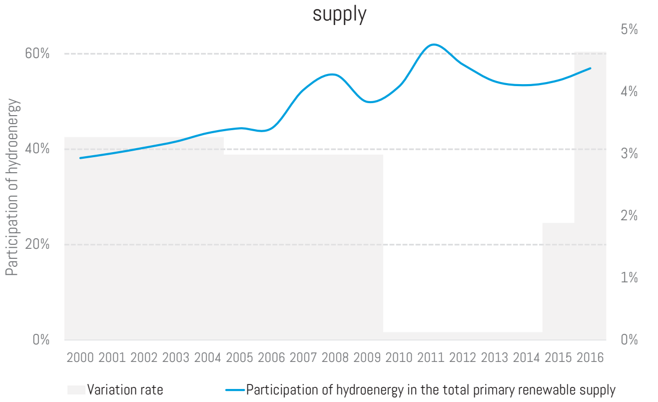
Hydrocarbon autarky index



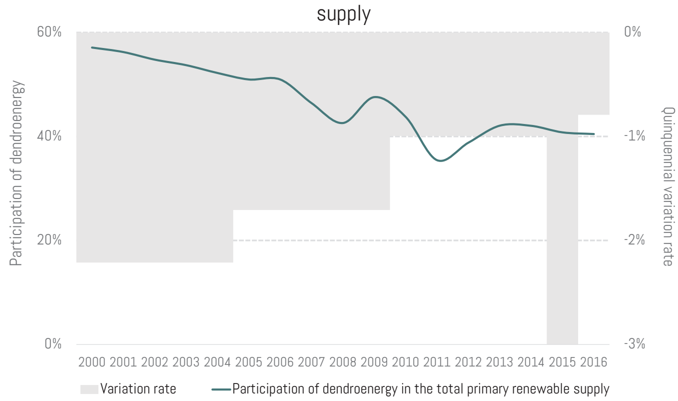
Biomass residential consumption index



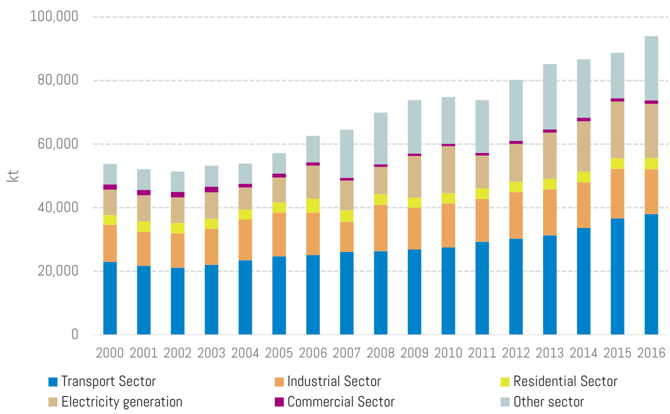
Participation of hydroenergy in the total primary renewable supply



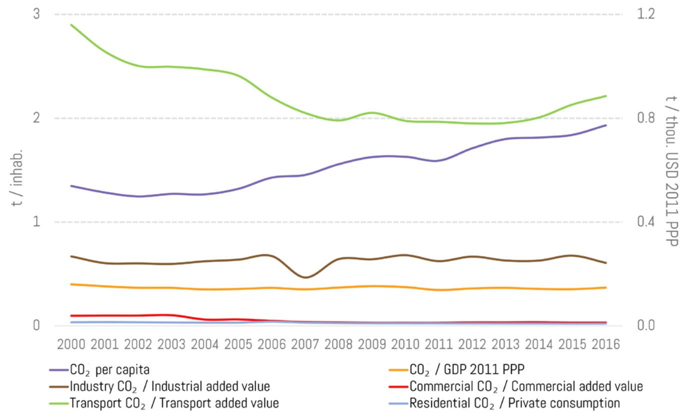
Participation of dendroenergy in the total primary renewable supply



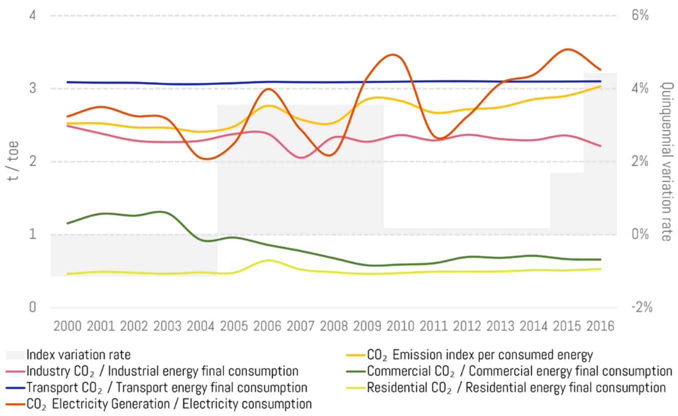
Evolution of CO_2 emissions by sector



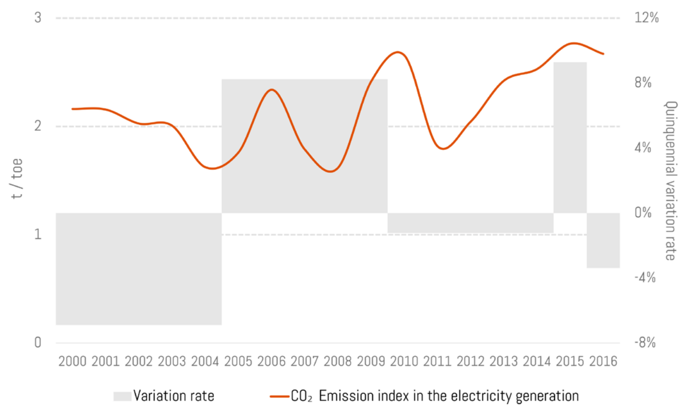
Evolution of CO_2 emissions per capita and per unit of GDP



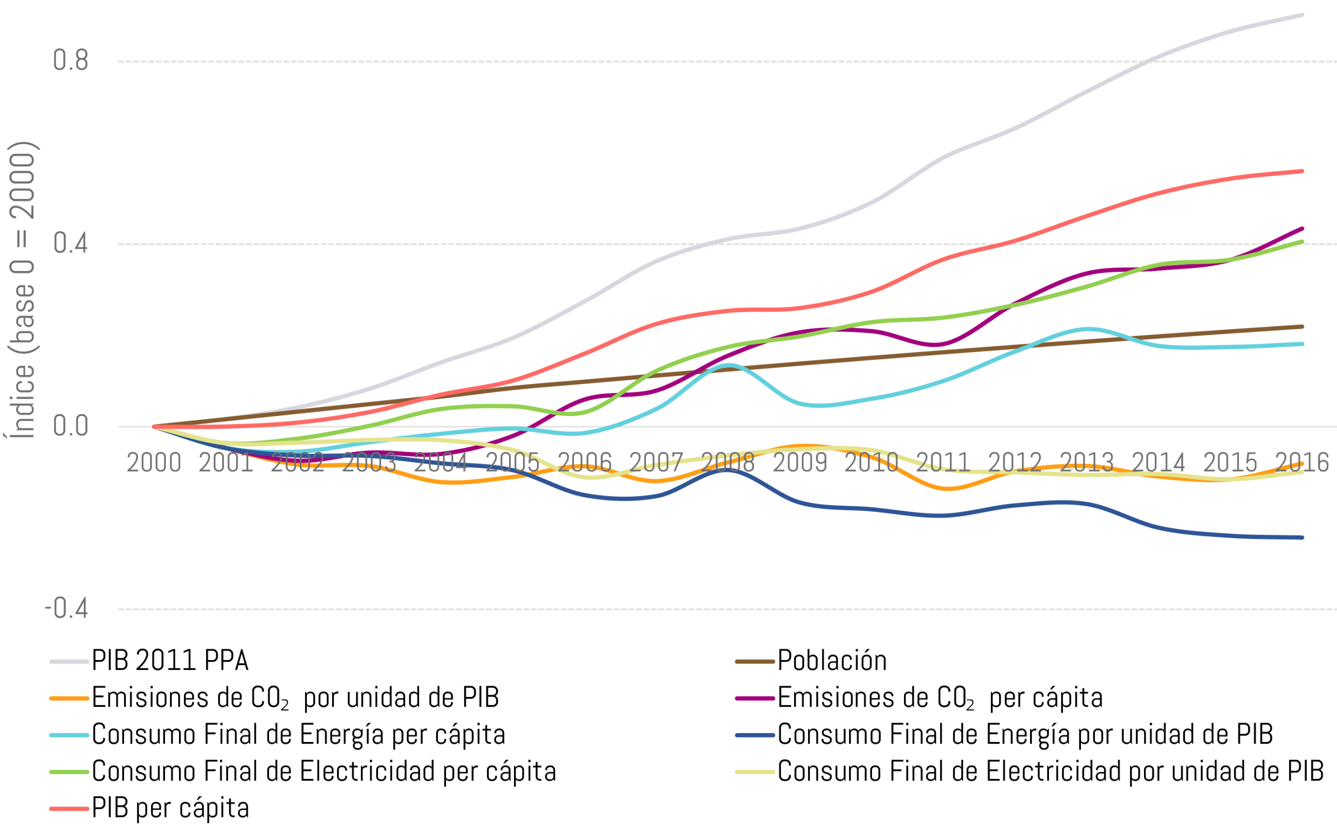
CO_2 Emission index per consumed energy



CO_2 Emission index of electricity generation



Resumen de los principales indicadores

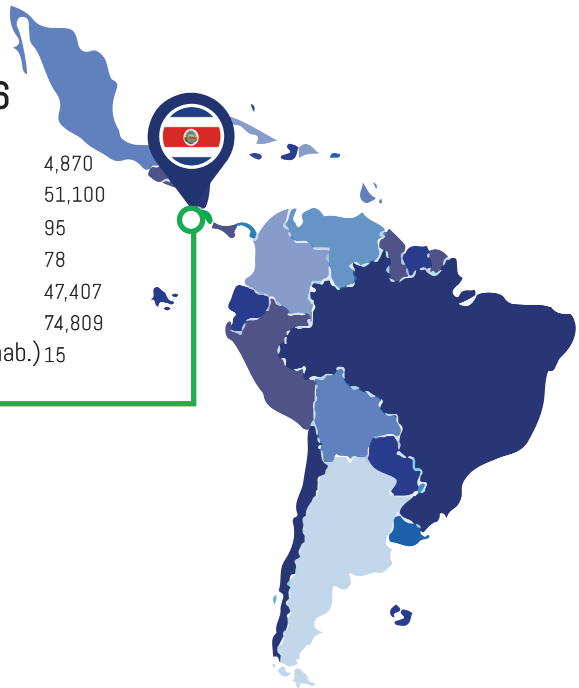


COLOMBIA

COSTA RICA

GENERAL INFORMATION 2016

Population (thousand inhab.)	4,870
Area (km²)	51,100
Population Density (inhab./km²)	95
Urban Population (%)	78
GDP USD 2010 (MUSD)	47,407
GDP USD 2011 PPP (MUSD)	74,809
GDP per capita (thou. USD 2011 PPP/inhab.)	15



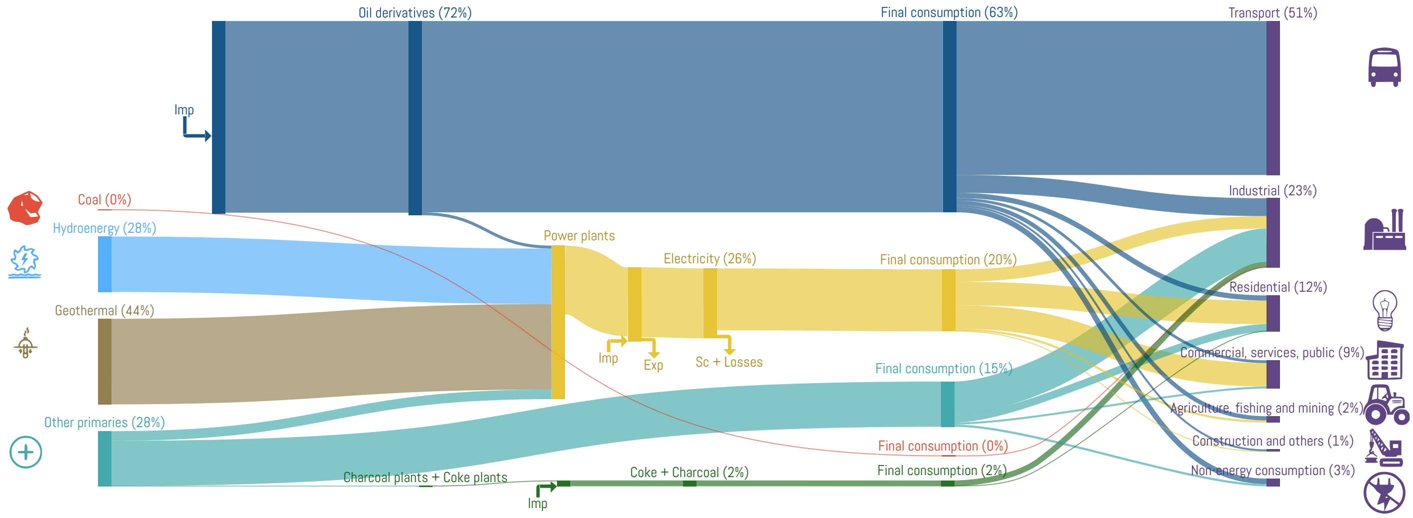
ENERGY SECTOR

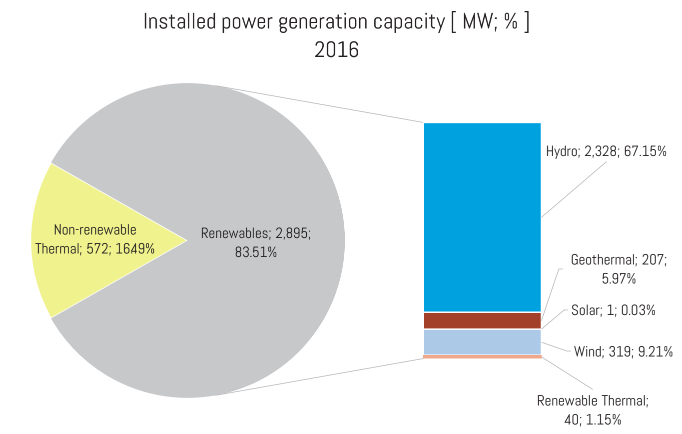
	Mtoe
Final consumption in the Transport Sector	2.09
Final consumption in the Industrial Sector	0.94
Final consumption in the Residential Sector	0.49
Final consumption in the Commercial and Service Sector	0.38
Final consumption in the Agriculture, Livestock, Fishing, Mining, Other and Non - Energy Consumption	0.22

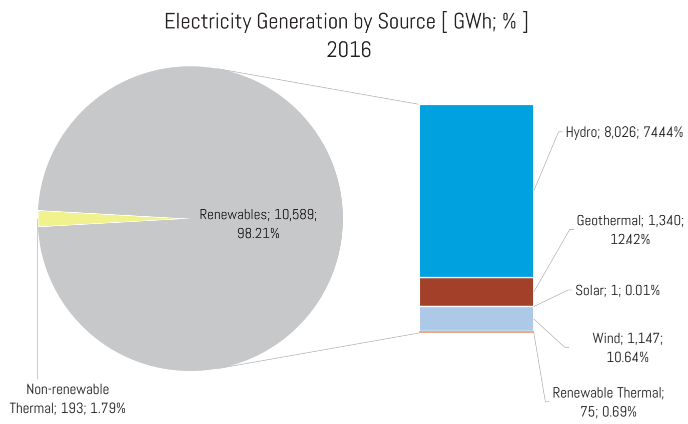
Oil Reserves	Natural gas reserves	Coal reserves
Mbbl	Gm³	Mt
n.a.	n.a.	32.8

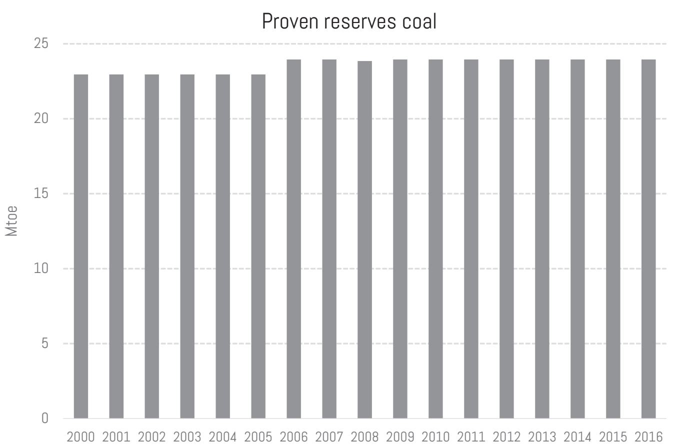
Indicator	Unit	Value
Electricity consumption per capita	kWh / inhab.	2,009
Final energy consumption per capita	toe / inhab.	0.85
Electrification rate	%	99.30
Total energy supply	Mtoe	5.37
Total energy production	Mtoe	3.09
Total energy imports	Mtoe	2.75
Total energy exports	Mtoe	0.07
Total final energy consumption	Mtoe	4.14
Refining capacity	kbbl/day	n.a.
Installed power generation capacity	GW	3.47
Primary energy intensity and final energy intensity	koe / USD 2011 PPP	0.04 / 0.06

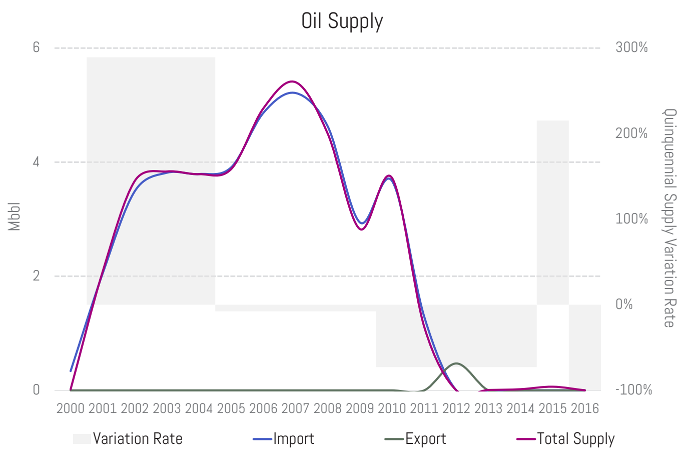
Summarized energy matrix 2016

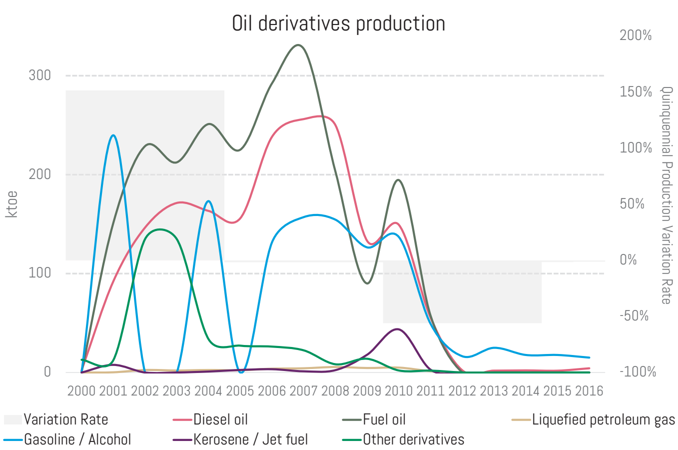


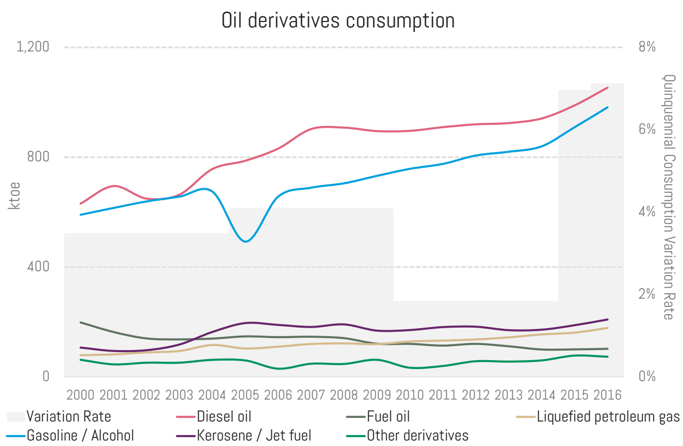

Installed power generation capacity [MW; %]
2016
Non-renewable Thermal; 572; 1649%
Renewables; 2,895; 83.51%
Hydro; 2,328; 67.15%
Geothermal; 207; 5.97%
Solar; 1; 0.03%
Wind; 319; 9.21%
Renewable Thermal; 40; 1.15%


Electricity Generation by Source [GWh; %]
2016
Renewables; 10,589; 98.21%
Non-renewable Thermal; 193; 1.79%
Hydro; 8,026; 7444%
Geothermal; 1,340; 1242%
Solar; 1; 0.01%
Wind; 1,147; 10.64%
Renewable Thermal; 75; 0.69%

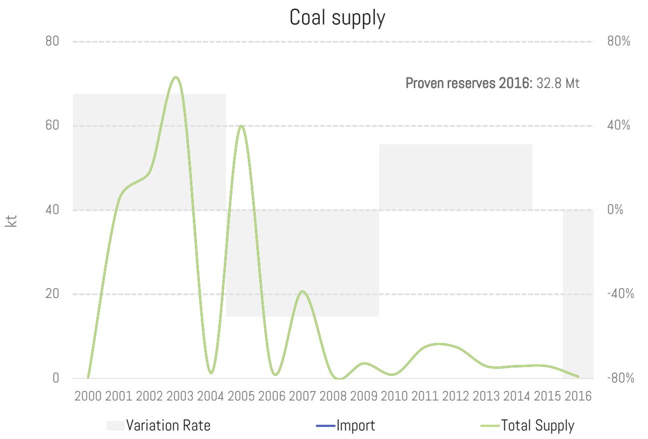

Proven reserves coal
Mtoe
25
20
15
10
5
0
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016

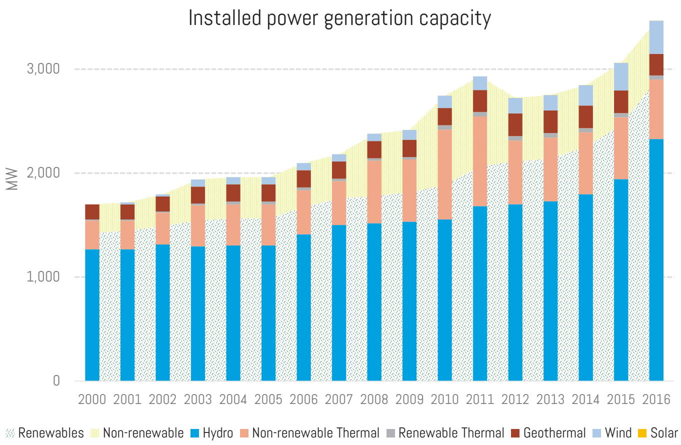

Oil Supply
Mbbl
6
4
2
0
300%
200%
100%
0%
-100%
Quinquennial Supply Variation Rate
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Variation Rate
Import
Export
Total Supply

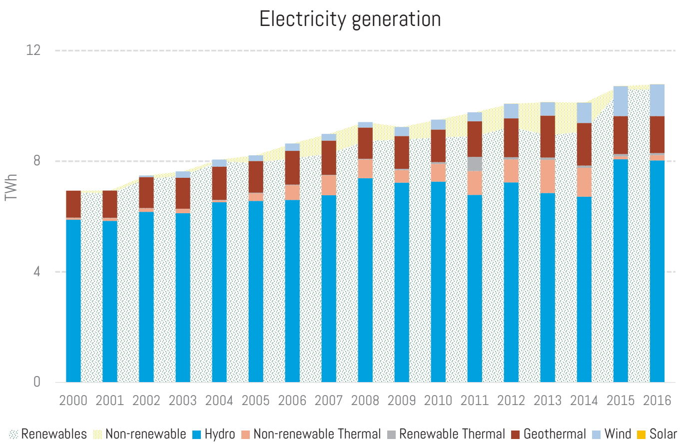

Oil derivatives production
ktoe
300
200
100
0
200%
150%
100%
50%
0%
-50%
-100%
Quinquennial Production Variation Rate
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Variation Rate
Diesel oil
Fuel oil
Liquefied petroleum gas
Gasoline / Alcohol
Kerosene / Jet fuel
Other derivatives

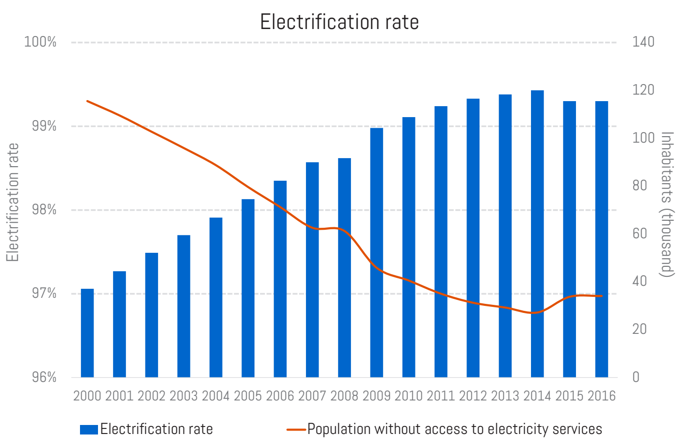

Oil derivatives consumption
ktoe
1,200
800
400
0
8%
6%
4%
2%
0%
Quinquennial Consumption Variation Rate
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Variation Rate
Diesel oil
Fuel oil
Liquefied petroleum gas
Gasoline / Alcohol
Kerosene / Jet fuel
Other derivatives

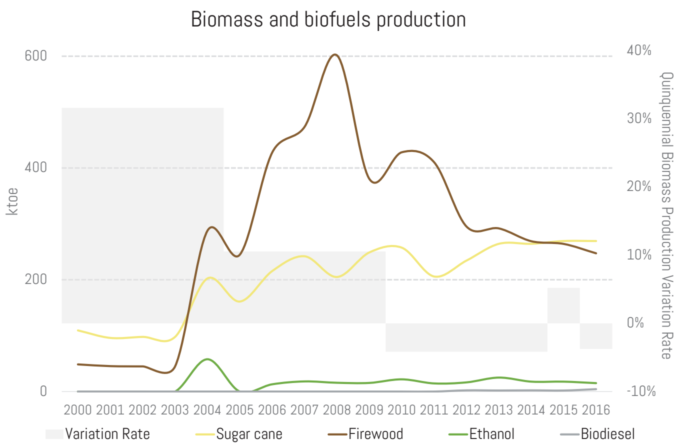
In August 2011, the Moin Refinery of the Costa Rican Petroleum Refinery (Recope) was dismantled and closed.



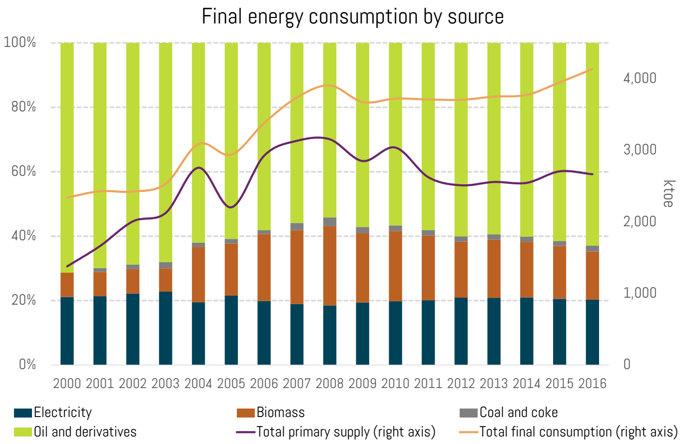


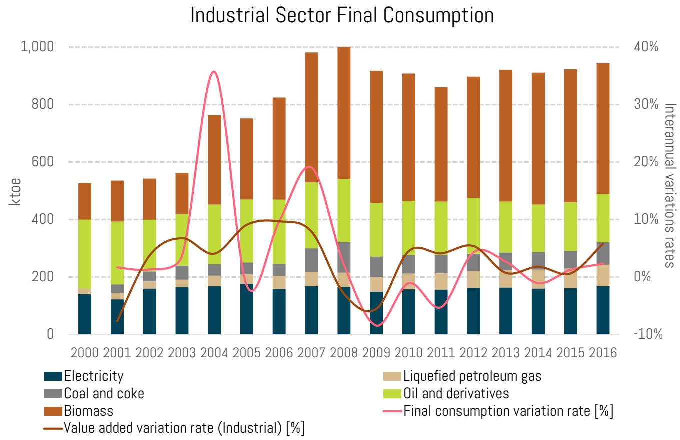


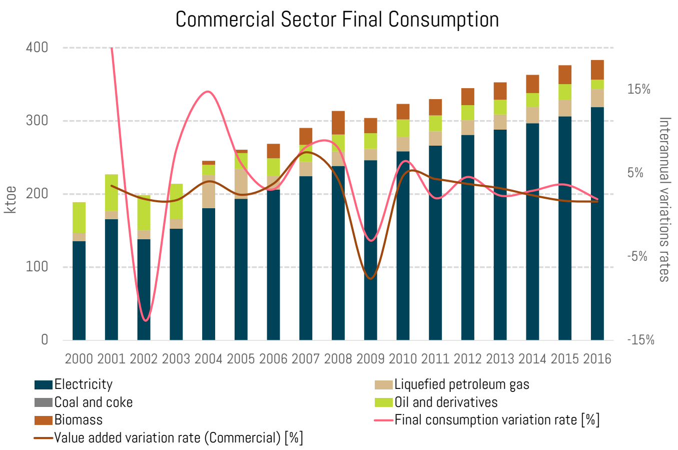


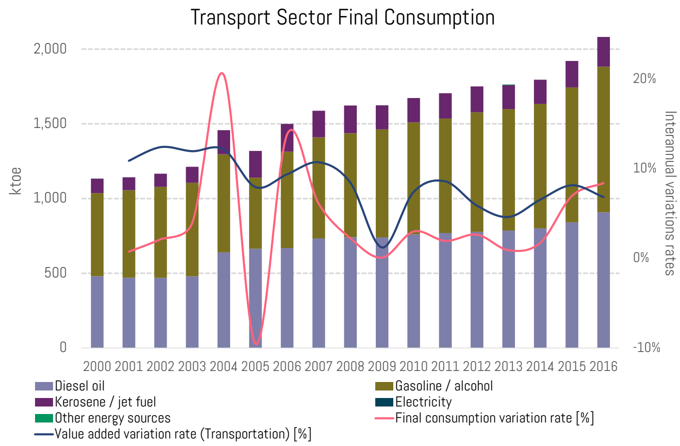


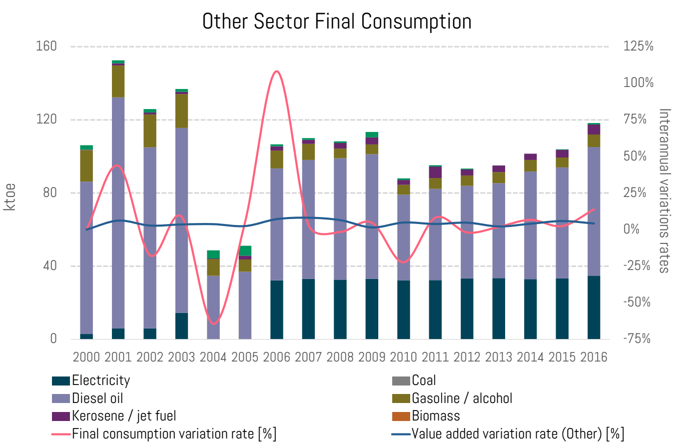
COSTA RICA

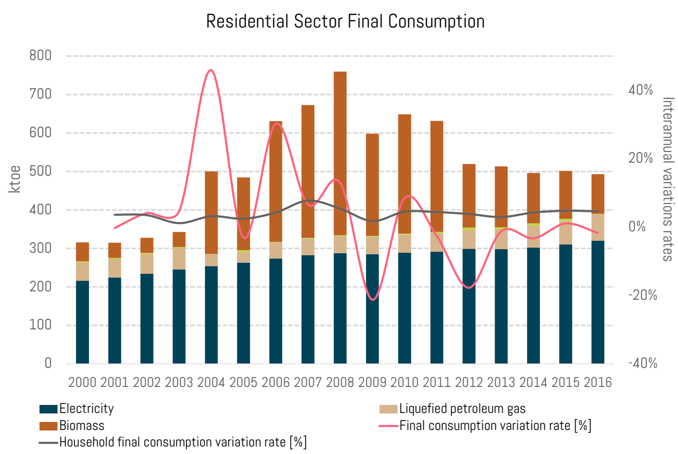

Final energy consumption by source
100%
80%
60%
40%
20%
0%
4,000
3,000
2,000
1,000
0
ktoe
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Electricity
Biomass
Coal and coke
Oil and derivatives
Total primary supply (right axis)
Total final consumption (right axis)


Industrial Sector Final Consumption
1,000
800
600
400
200
0
ktoe
40%
30%
20%
10%
0%
-10%
Interannual variations rates
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Electricity
Liquefied petroleum gas
Coal and coke
Oil and derivatives
Biomass
Final consumption variation rate [%]
Value added variation rate (Industrial) [%]

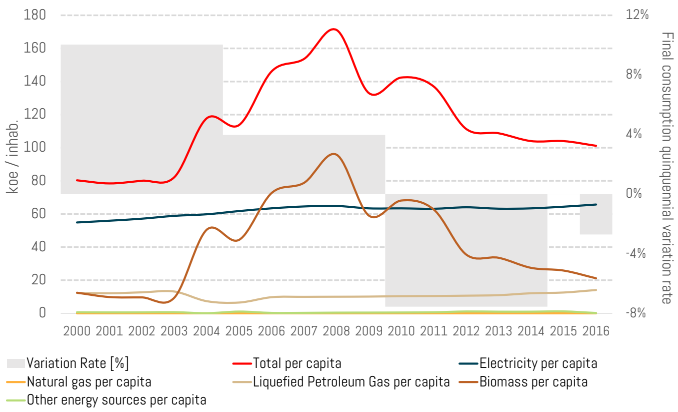

Commercial Sector Final Consumption
400
300
200
100
0
ktoe
15%
5%
-5%
-15%
Interannual variations rates
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Electricity
Liquefied petroleum gas
Coal and coke
Oil and derivatives
Biomass
Final consumption variation rate [%]
Value added variation rate (Commercial) [%]


Transport Sector Final Consumption
2,000
1,500
1,000
500
0
ktoe
20%
10%
0%
-10%
Interannual variations rates
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Diesel oil
Gasoline / alcohol
Kerosene / jet fuel
Electricity
Other energy sources
Final consumption variation rate [%]
Value added variation rate (Transportation) [%]

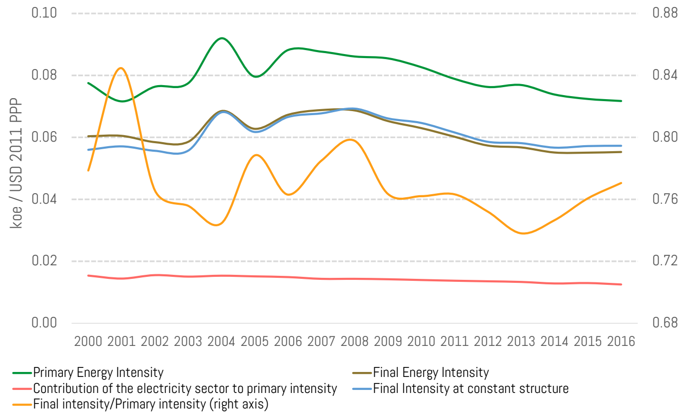

Other Sector Final Consumption
160
120
80
40
0
ktoe
125%
100%
75%
50%
25%
0%
-25%
-50%
-75%
Interannual variations rates
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Electricity
Coal
Diesel oil
Gasoline / alcohol
Kerosene / jet fuel
Biomass
Final consumption variation rate [%]
Value added variation rate (Other) [%]


Residential Sector Final Consumption
800
700
600
500
400
300
200
100
0
ktoe
40%
20%
0%
-20%
-40%
Interannual variations rates
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Electricity
Liquefied petroleum gas
Biomass
Final consumption variation rate [%]
Household final consumption variation rate [%]

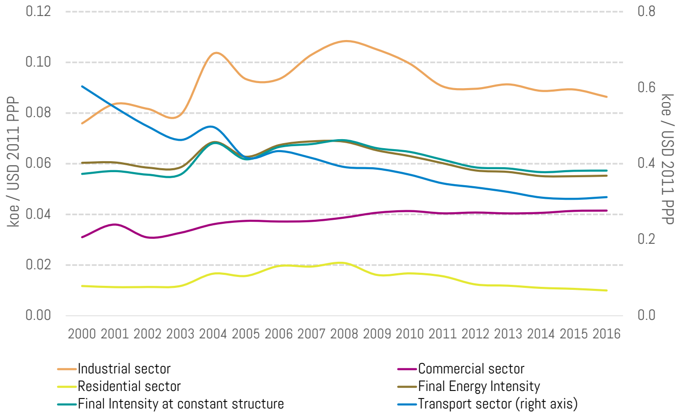
Final consumption per capita Residential Sector



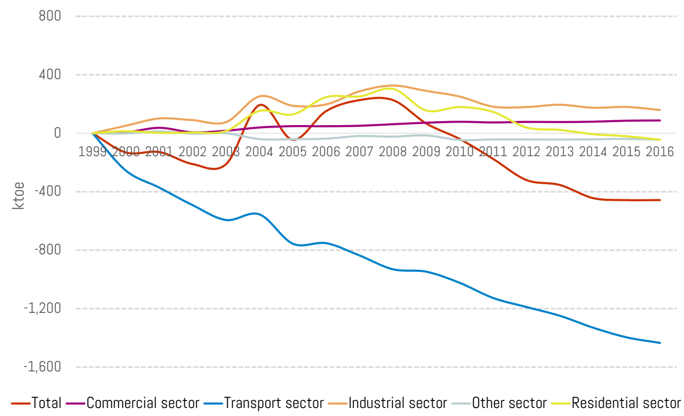
Energy intensities



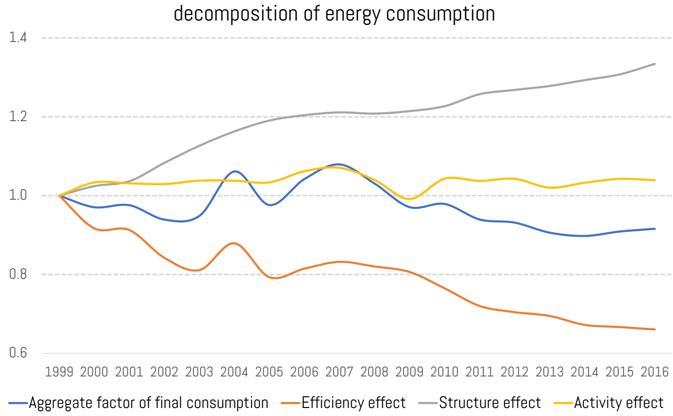
Sectoral energy intensities



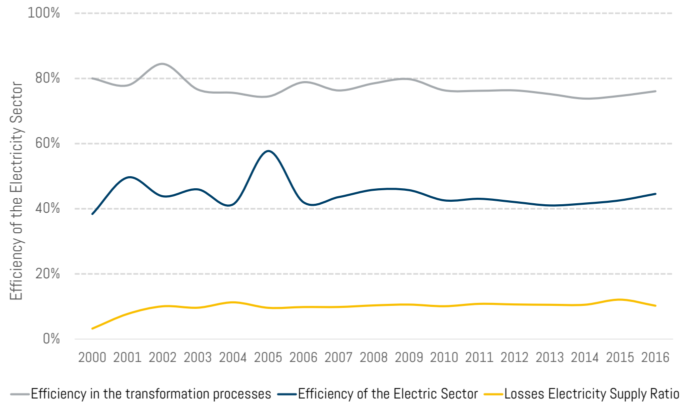
Avoided energy demand due to variations in energy intensity



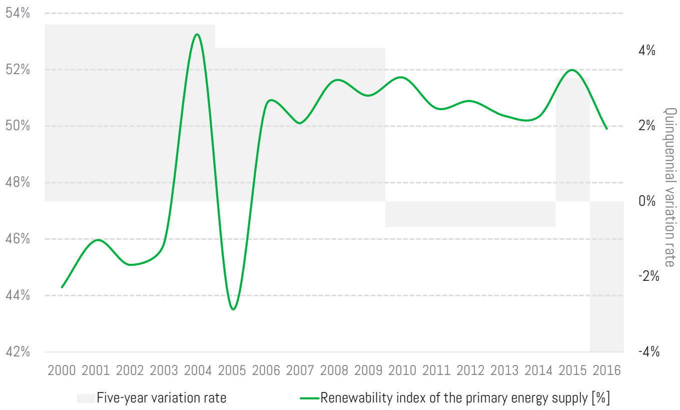
Logarithmic mean Divisia index for the structural decomposition of energy consumption



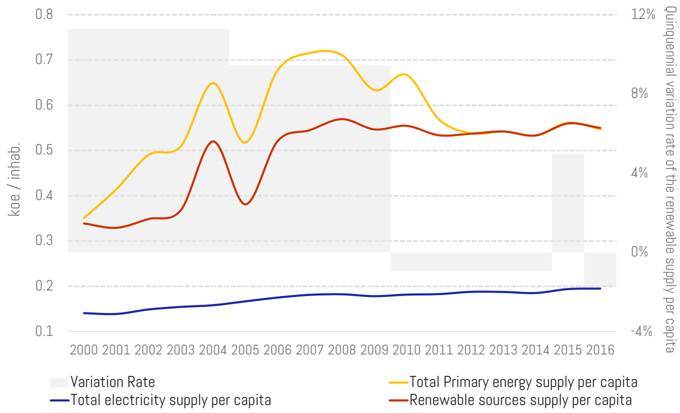
Efficiency of the Electricity Sector



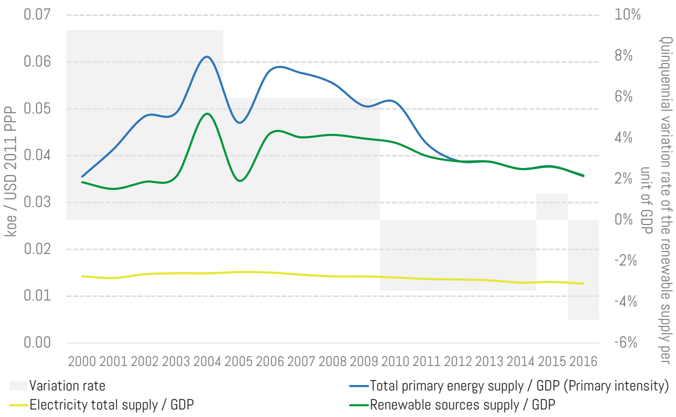
Primary energy supply renewability index



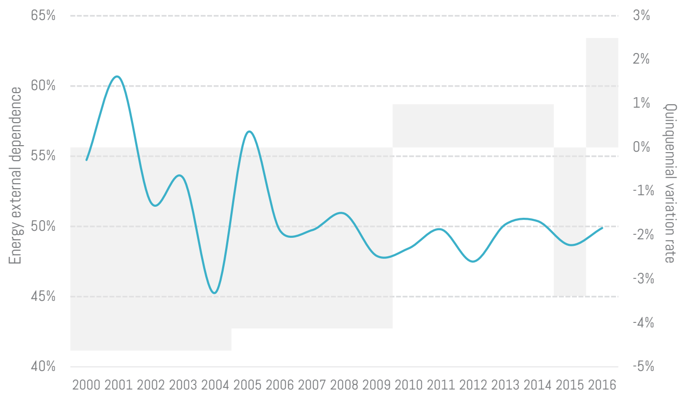
Energy supply per capita



Energy supply per unit of GDP



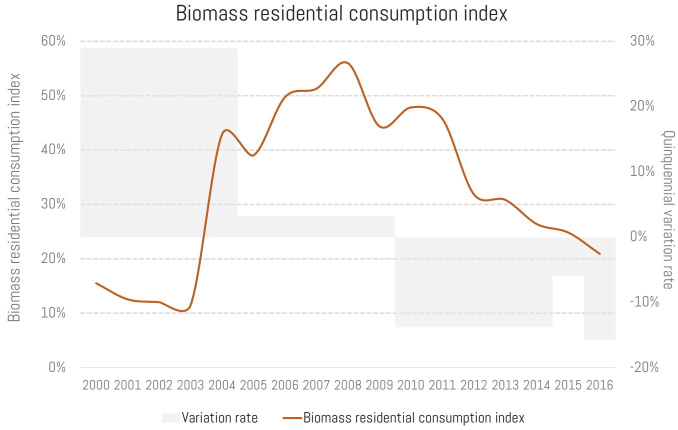
Energy external dependence



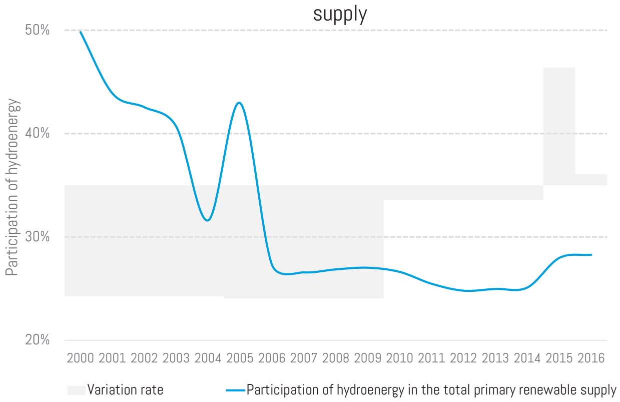
COSTA RICA

In March 2016, the Reventazón hydroelectric plant began operations, considered the largest hydroelectric plant in Central America that will supply 525,000 homes with 305.5 MW of firm energy.

Biomass residential consumption index

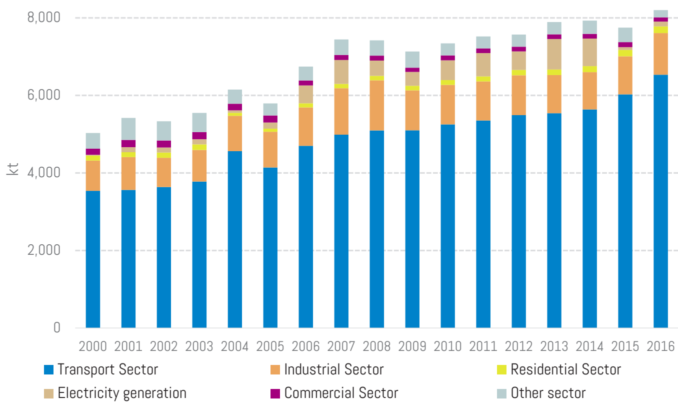


Participation of hydroenergy in the total primary renewable supply

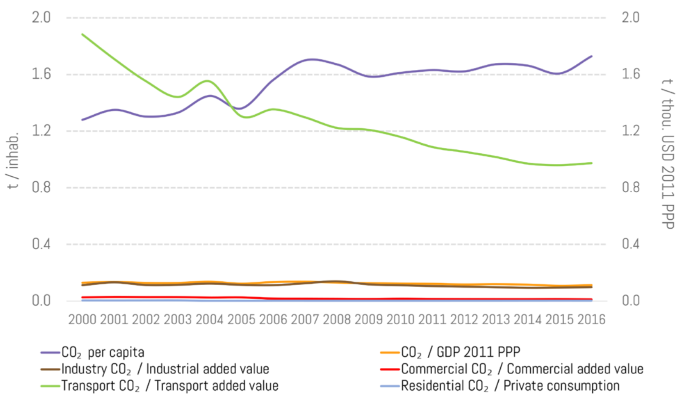


Participation of dendroenergy in the total primary renewable supply

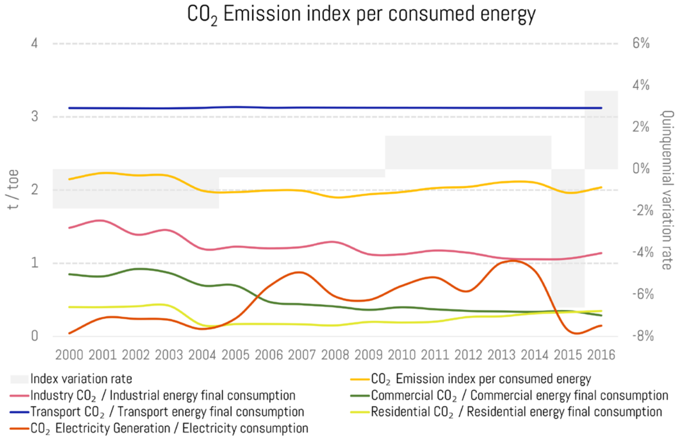
Evolution of CO_2 emissions by sector



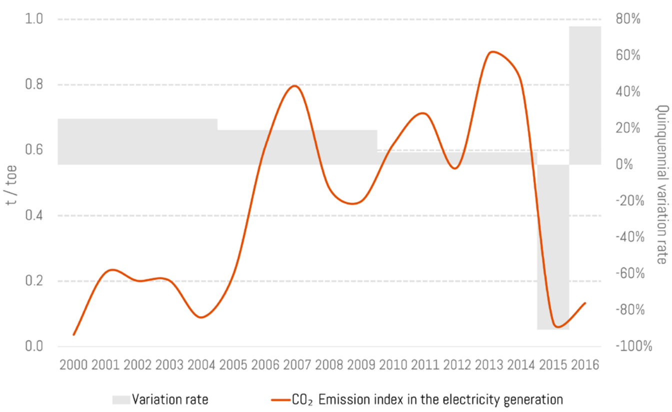
Evolution of CO_2 emissions per capita and per unit of GDP



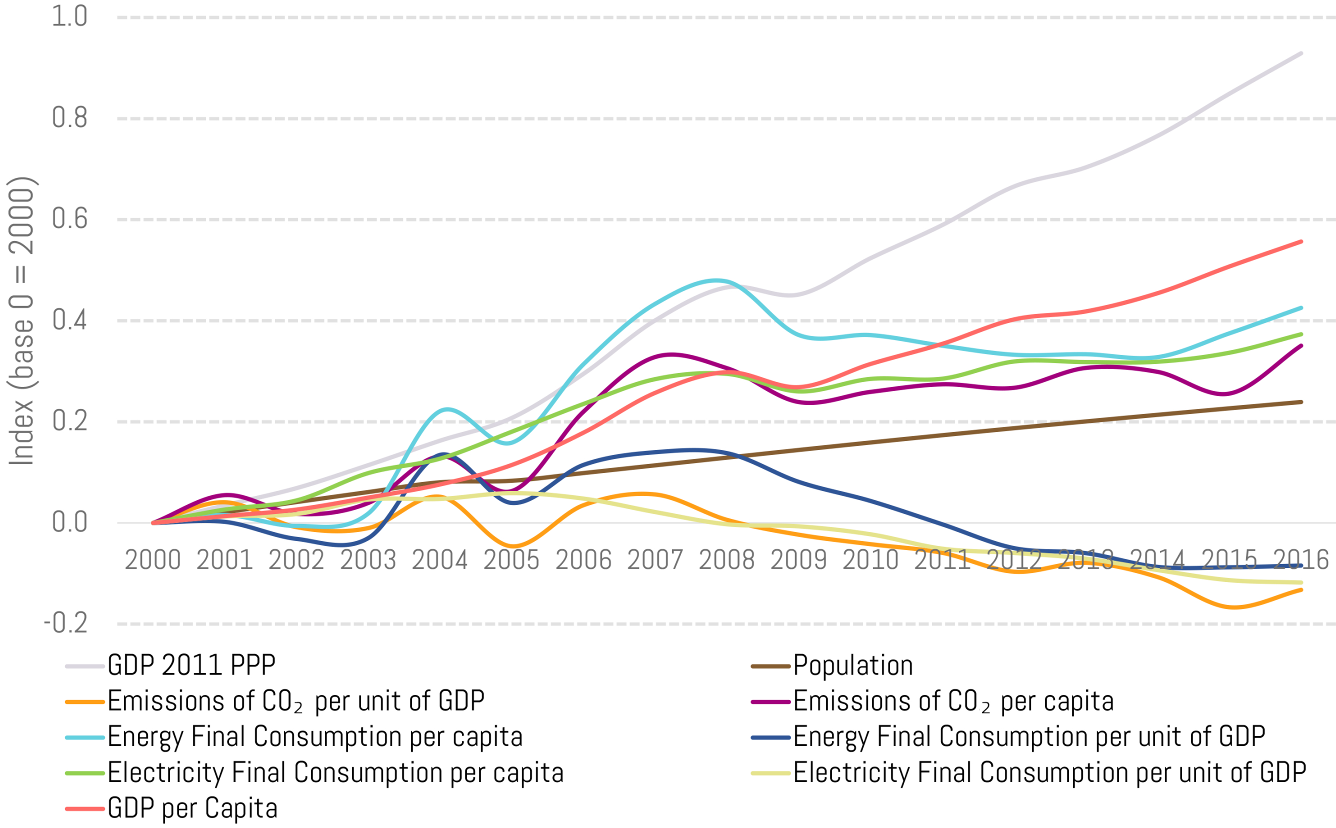
CO_2 Emission index per consumed energy



CO_2 Emission index of electricity generation



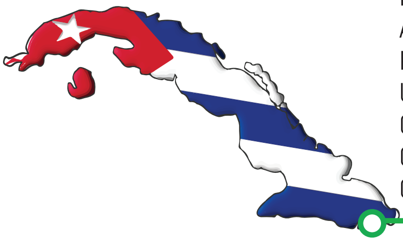
Summary of the main energy indicators



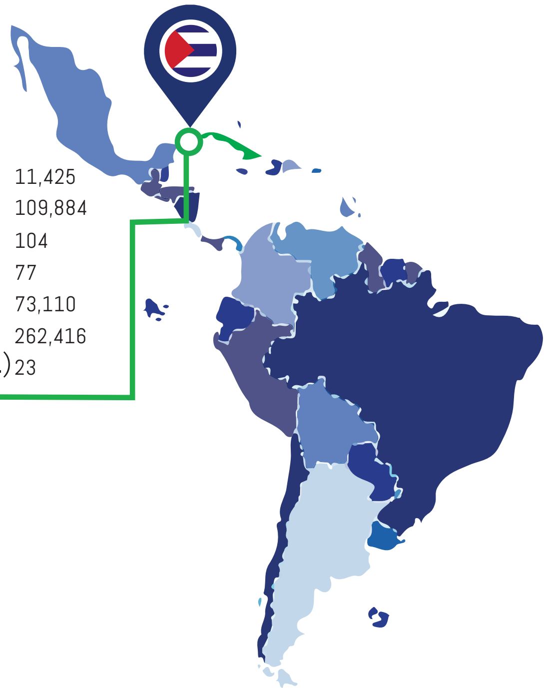
COSTA RICA

CUBA

GENERAL INFORMATION 2016



Population (thousand inhab.)	11,425
Area (km²)	109,884
Population Density (inhab./km²)	104
Urban Population (%)	77
GDP USD 2010 (MUSD)	73,110
GDP USD 2011 PPP (MUSD)	262,416
GDP per capita (thou. USD 2011 PPP/inhab.)	23



ENERGY SECTOR 2015

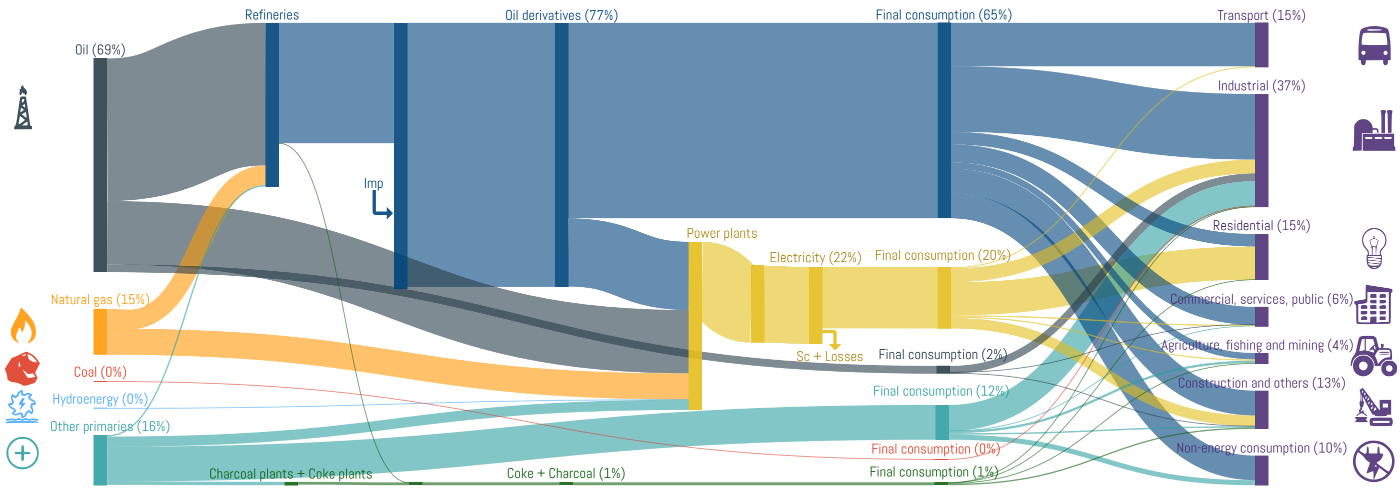
	Mtoe
Final consumption in the Transport Sector	1.05
Final consumption in the Industrial Sector	2.96
Final consumption in the Residential Sector	1.03
Final consumption in the Commercial and Service Sector	0.45
Final consumption in the Agriculture, Livestock, Fishing, Mining, Other and Non - Energy Consumption	1.84

Oil Reserves	Natural gas reserves	Coal reserves
Mbbl	Gm³	Mt
79[2]	53[2]	n.a.

[1] 2016 Data.
[2] Data estimated by OLADE.

Indicator	Unit	Value
Electricity consumption per capita	kWh / inhab.	1,425[1]
Final energy consumption per capita	toe / inhab.	0.64
Electrification rate	%	99.60 [1]
Total energy supply	Mtoe	11.62
Total energy production	Mtoe	5.51
Total energy imports	Mtoe	7.21
Total energy exports	Mtoe	1.10
Total final energy consumption	Mtoe	7.32
Refining capacity	kbbl/day	123
Installed power generation capacity	GW	6.45[1]
Primary energy intensity and final energy intensity	koe / USD 2011 PPP	0.03 / 0.03

Summarized energy matrix 2016*



* Data estimated by OLADE

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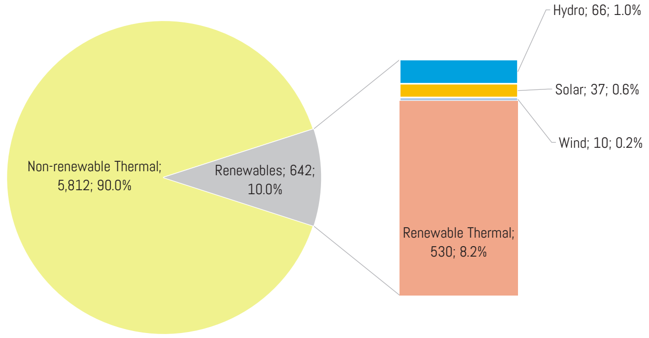
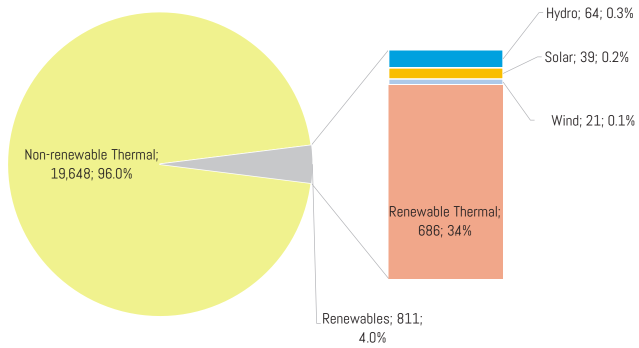
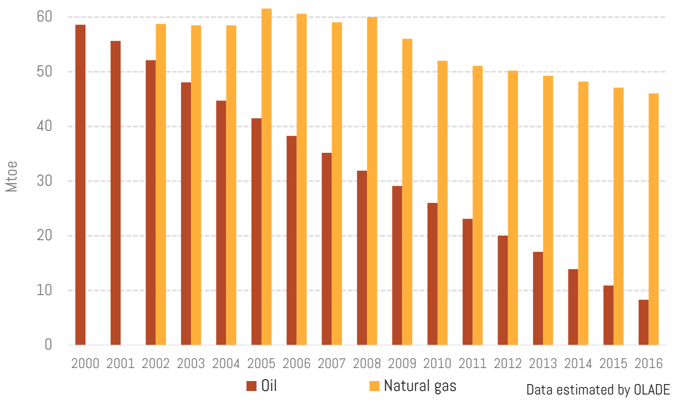
Installed power generation capacity [MW; %]
2016



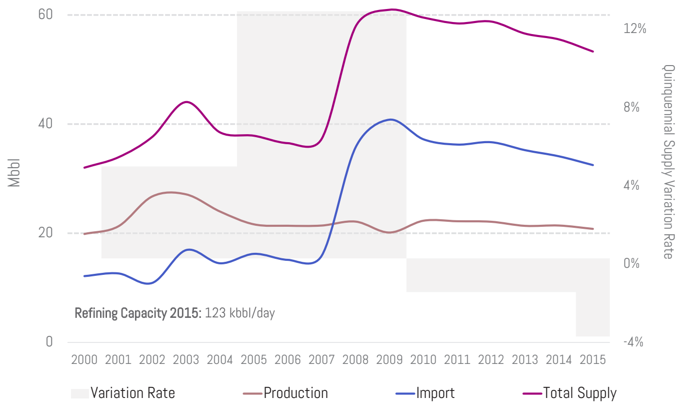
Electricity Generation by Source [GWh; %]
2016



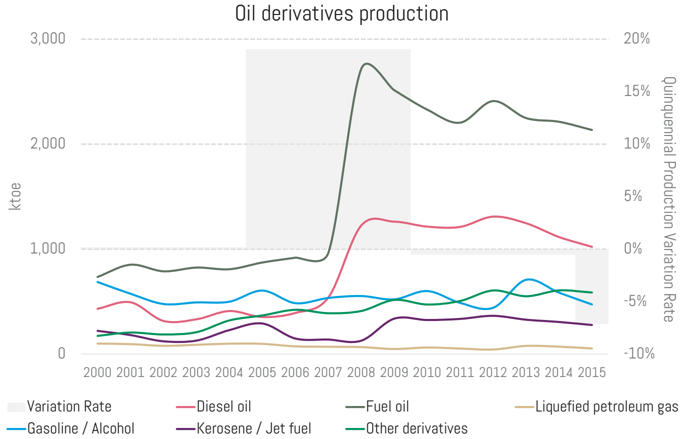
Proven reserves of oil and natural gas



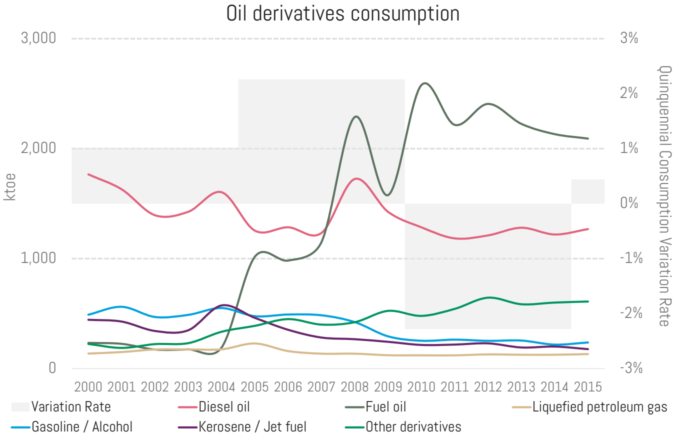
Oil Supply

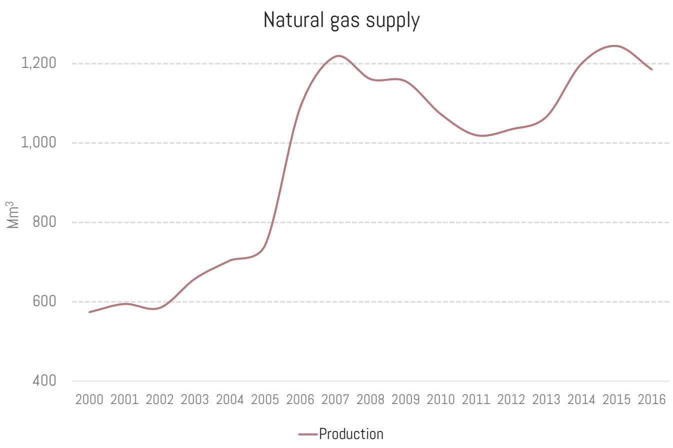


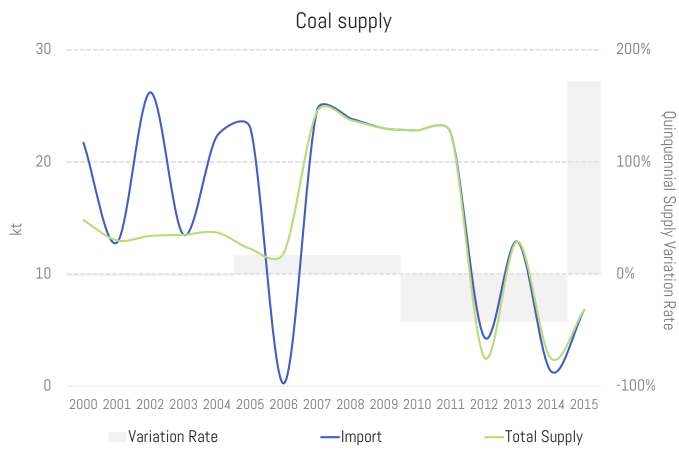
Oil derivatives production

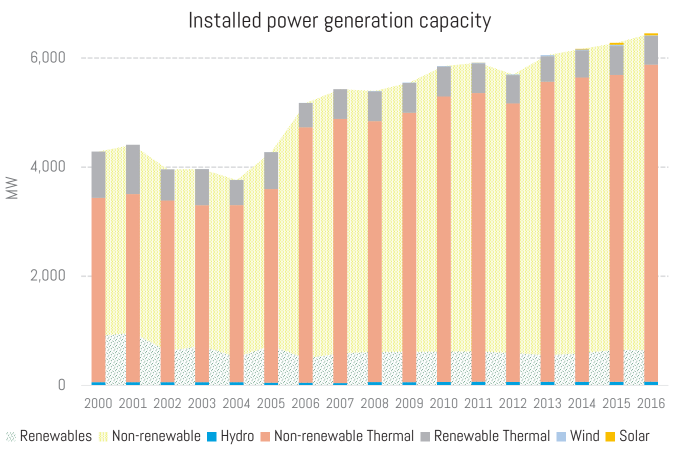


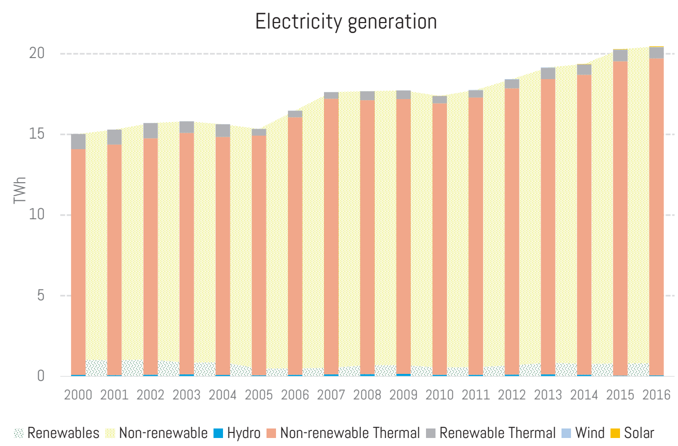
Oil derivatives consumption

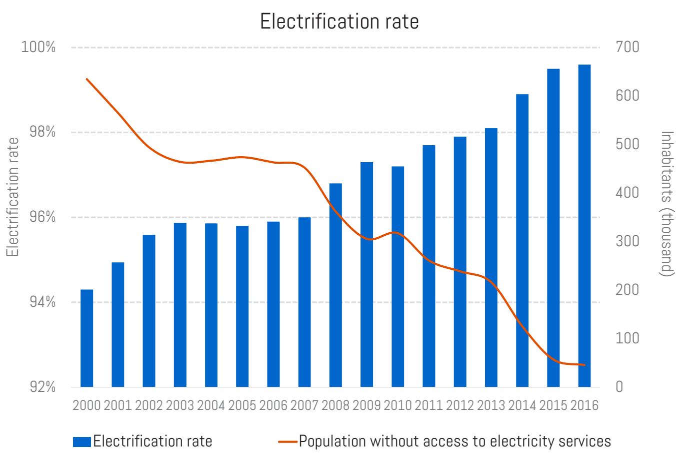


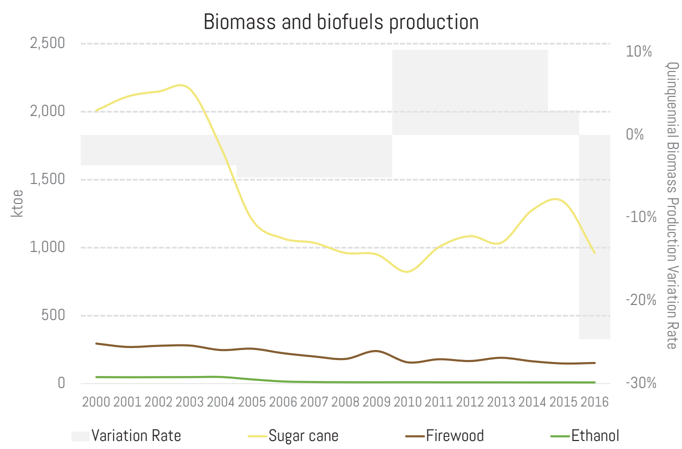

Natural gas supply
Mm³
1,200
1,000
800
600
400
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Production


Coal supply
kt
30
20
10
0
200%
100%
0%
-100%
Quinquennial Supply Variation Rate
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015
Variation Rate
Import
Total Supply

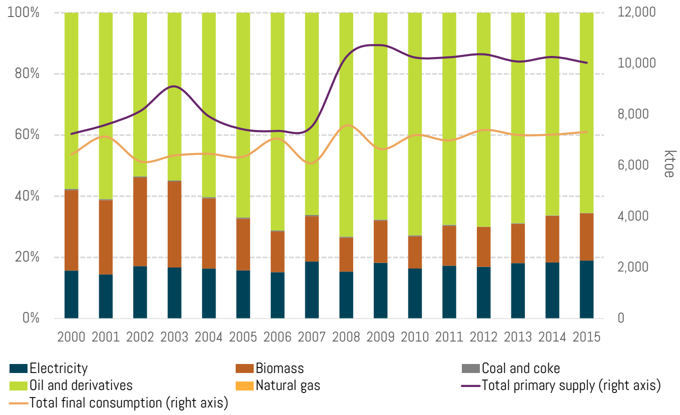

Installed power generation capacity
MW
6,000
4,000
2,000
0
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Renewables Non-renewable Hydro Non-renewable Thermal Renewable Thermal Wind Solar


Electricity generation
TWh
20
15
10
5
0
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Renewables Non-renewable Hydro Non-renewable Thermal Renewable Thermal Wind Solar

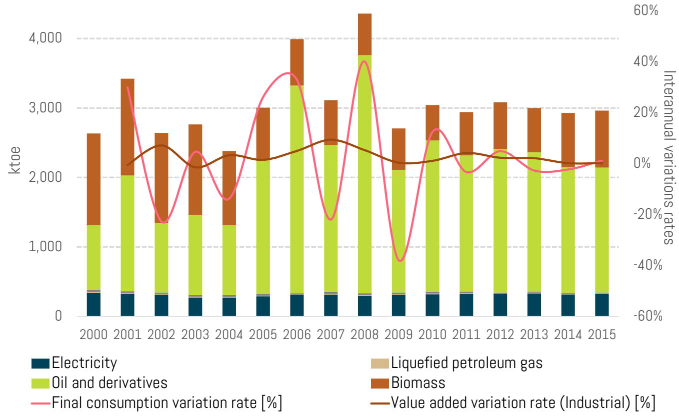

Electrification rate
Electrification rate
100%
98%
96%
94%
92%
700
600
500
400
300
200
100
0
Inhabitants (thousand)
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Electrification rate
Population without access to electricity services


Biomass and biofuels production
ktoe
2,500
2,000
1,500
1,000
500
0
10%
0%
-10%
-20%
-30%
Quinquennial Biomass Production Variation Rate
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Variation Rate
Sugar cane
Firewood
Ethanol

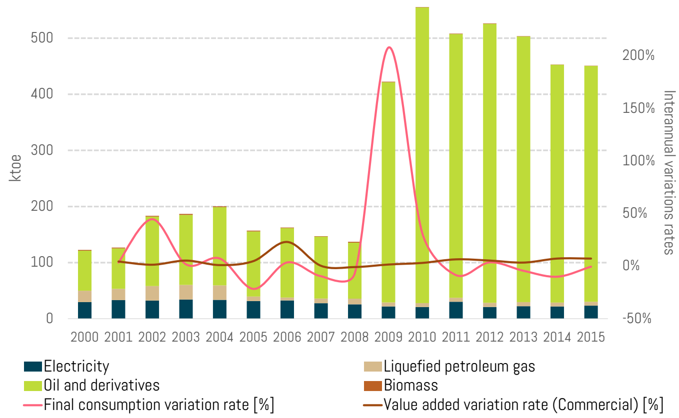
Final energy consumption by source



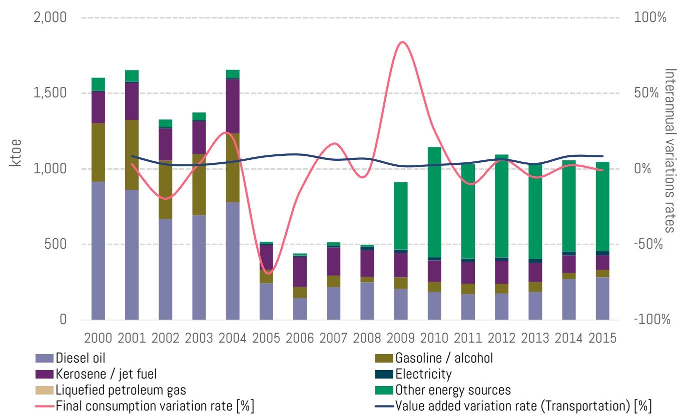
Industrial Sector Final Consumption



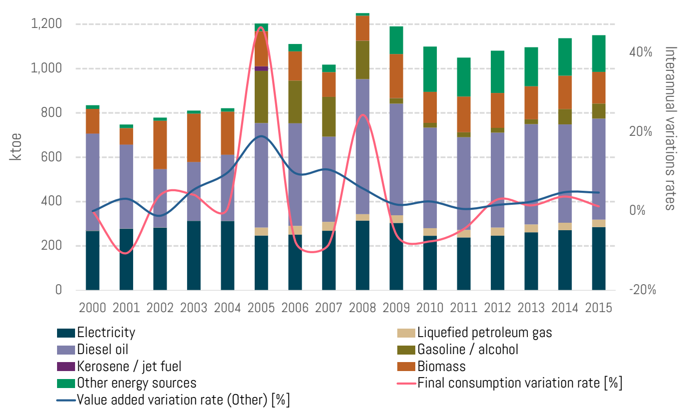
Commercial Sector Final Consumption



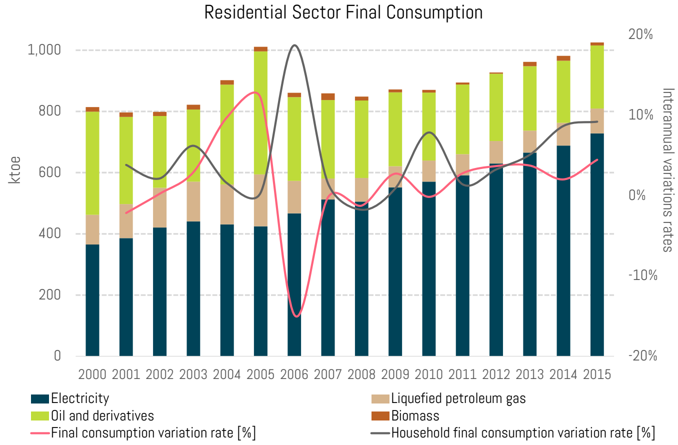
Transport Sector Final Consumption



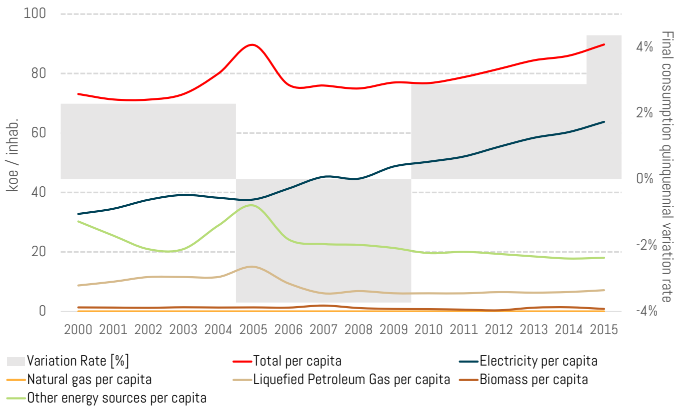
Other Sector Final Consumption



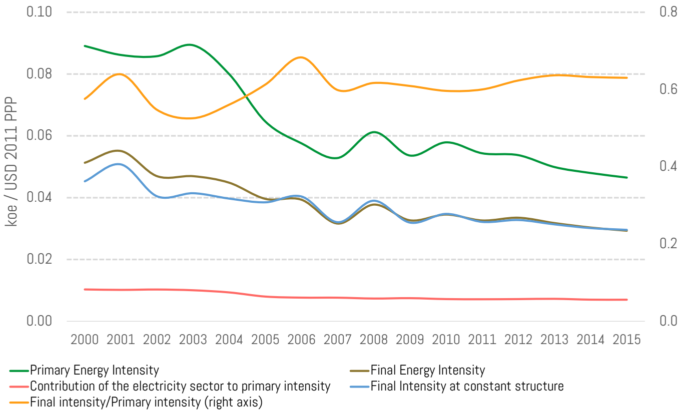
Residential Sector Final Consumption



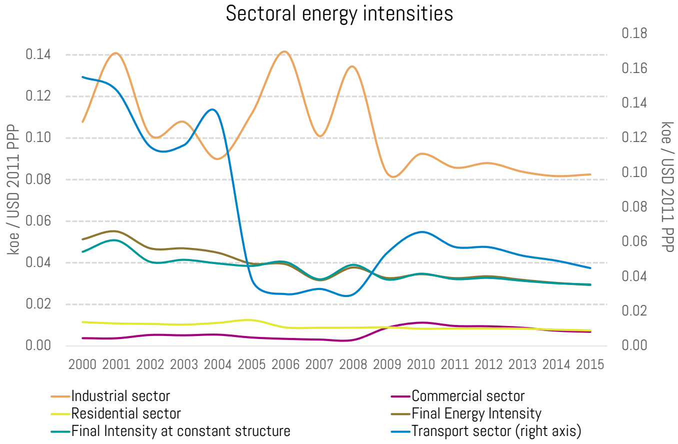
Final consumption per capita Residential Sector



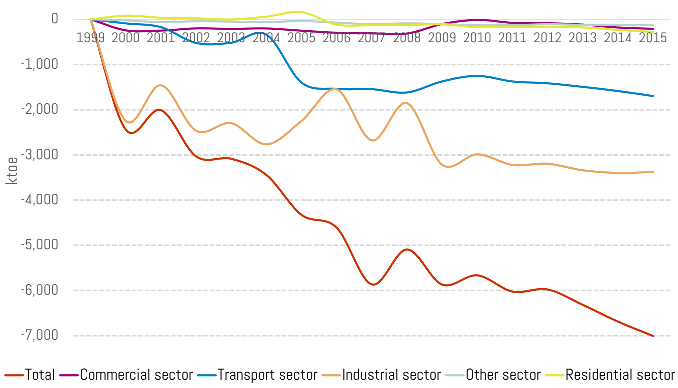
Energy intensities



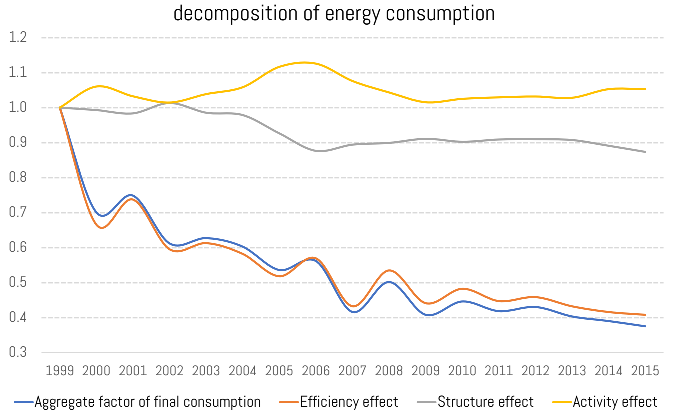
Sectoral energy intensities



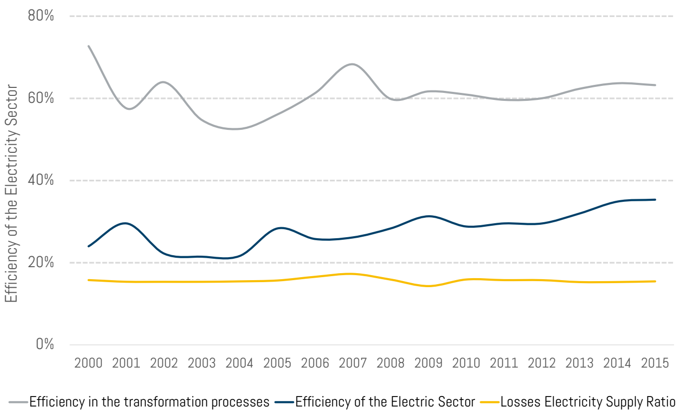
Avoided energy demand due to variations in energy intensity



Logarithmic mean Divisia index for the structural decomposition of energy consumption



Efficiency of the Electricity Sector



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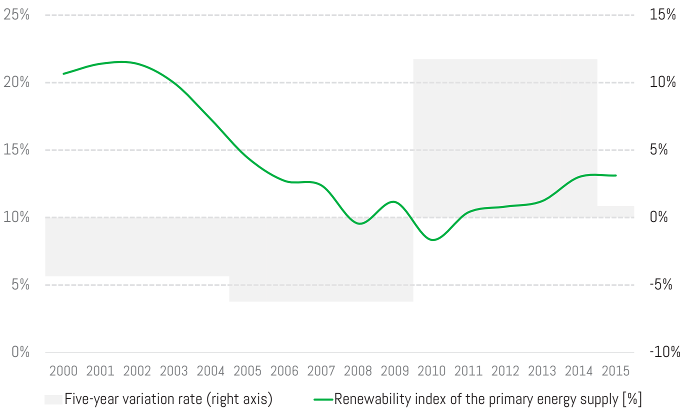
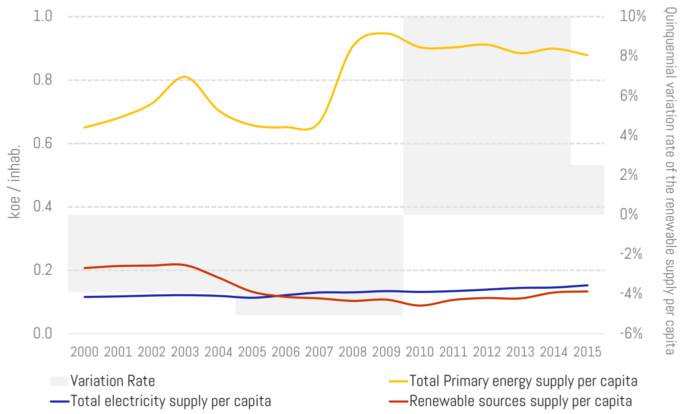
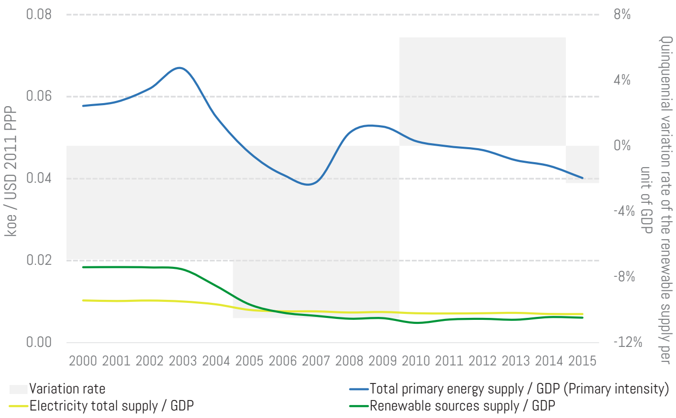
Primary energy supply renewability index



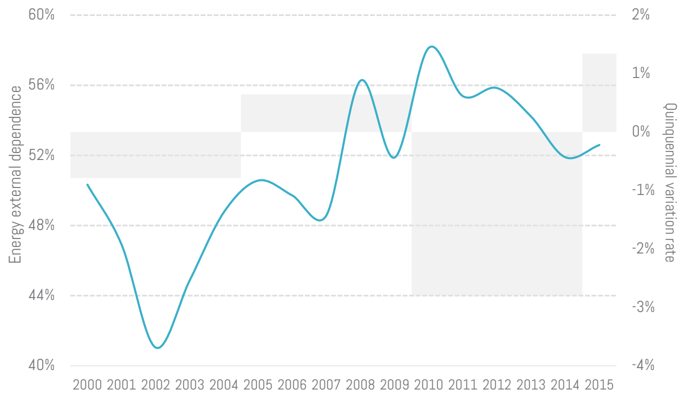
Energy supply per capita



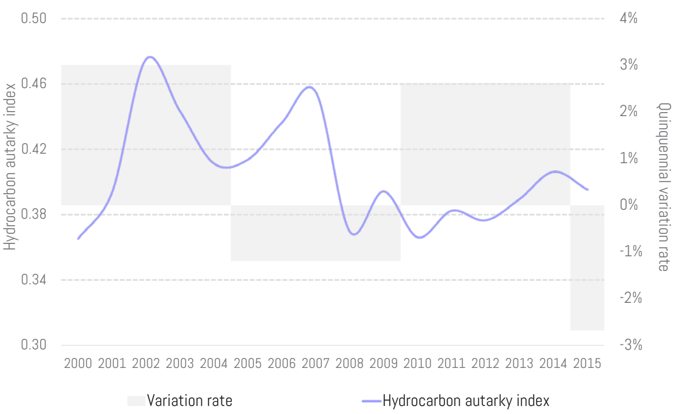
Energy supply per unit of GDP



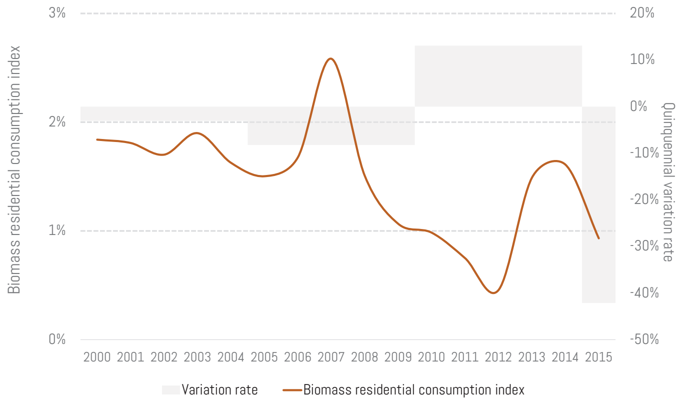
Energy external dependence

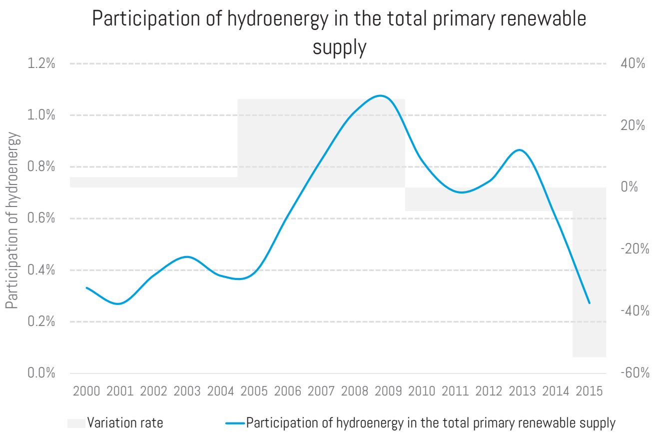


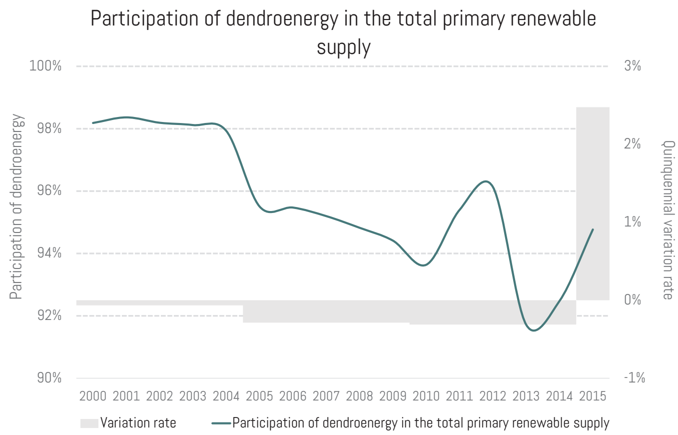
Hydrocarbon autarky index

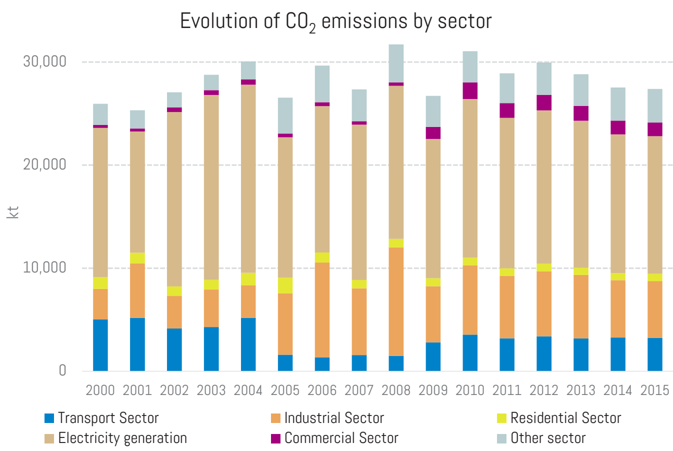


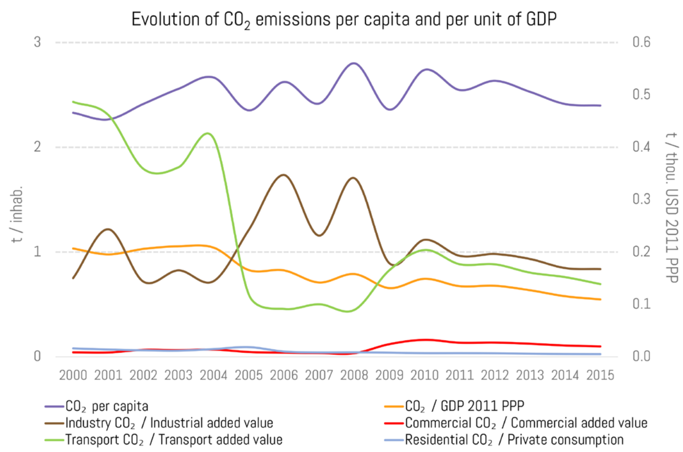
Biomass residential consumption index

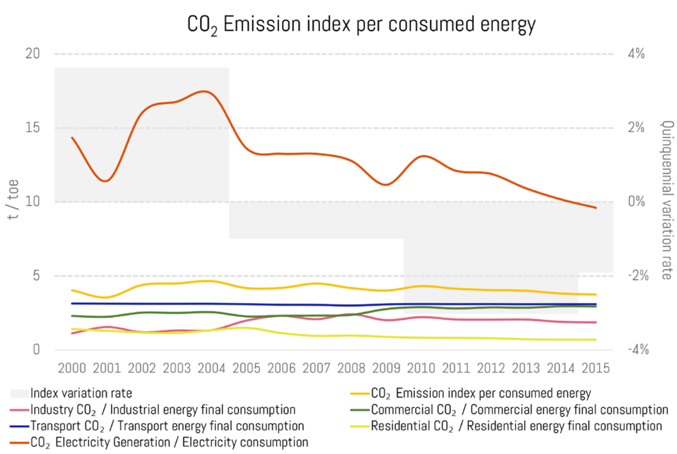


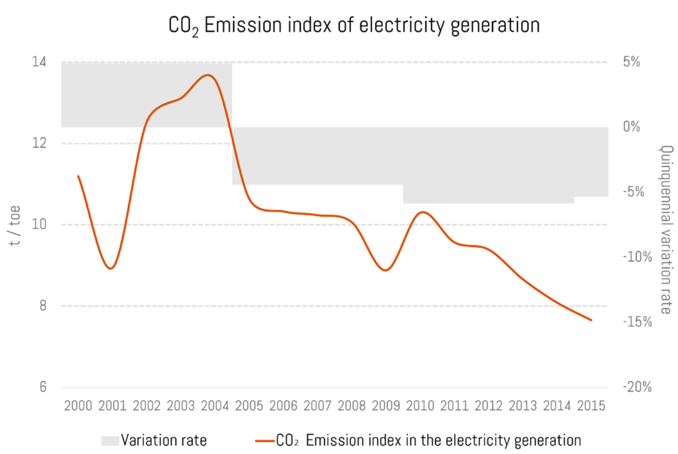

Participation of hydroenergy in the total primary renewable supply
Participation of hydroenergy
Quinquennial variation rate
Variation rate
Participation of hydroenergy in the total primary renewable supply


Participation of dendroenergy in the total primary renewable supply
Participation of dendroenergy
Quinquennial variation rate
Variation rate
Participation of dendroenergy in the total primary renewable supply

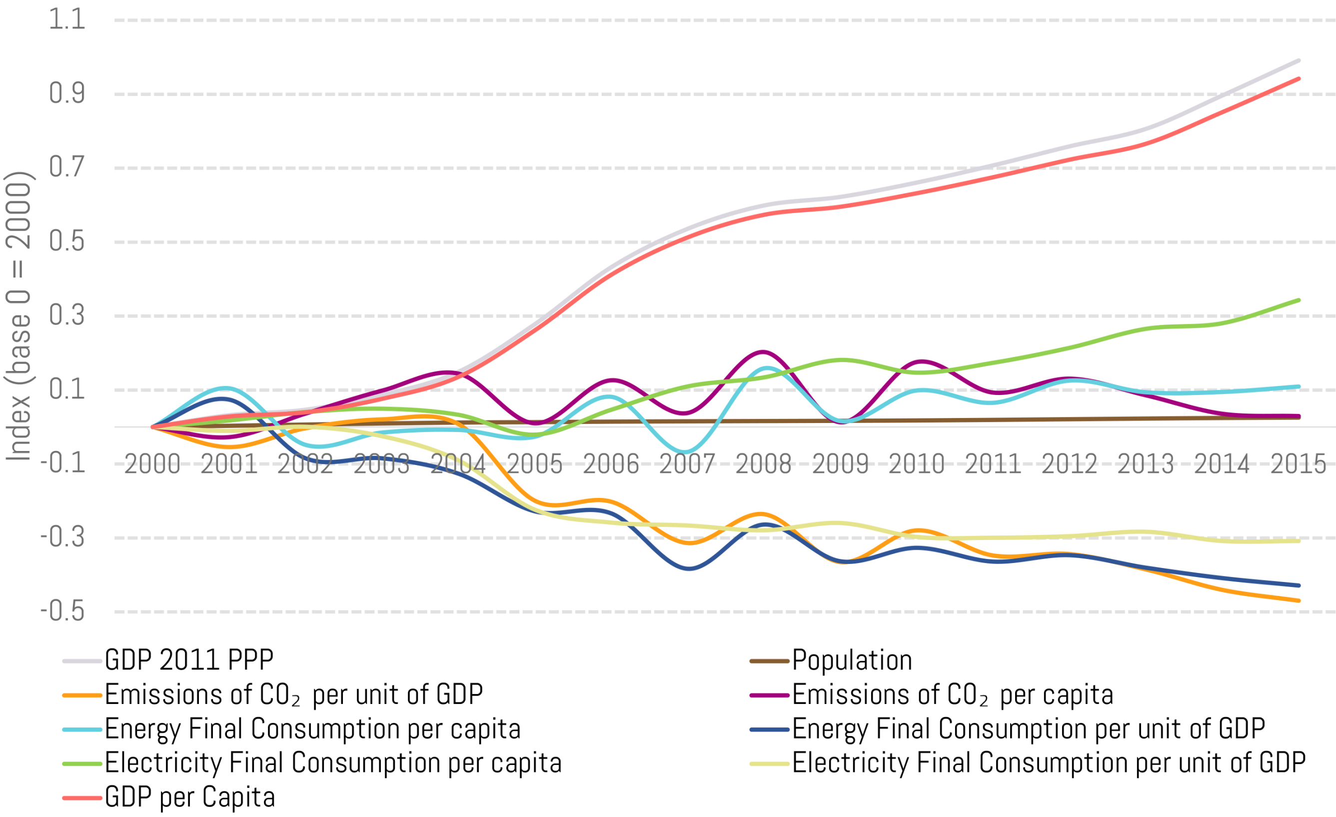

Evolution of CO_2 emissions by sector
kt
Transport Sector
Industrial Sector
Residential Sector
Electricity generation
Commercial Sector
Other sector


Evolution of CO_2 emissions per capita and per unit of GDP
t / inhab.
t / thou. USD 2011 PPP
CO_2 per capita
CO_2 / GDP 2011 PPP
Industry CO_2 / Industrial added value
Commercial CO_2 / Commercial added value
Transport CO_2 / Transport added value
Residential CO_2 / Private consumption


CO_2 Emission index per consumed energy
t / toe
Quinquennial variation rate
Index variation rate
CO_2 Emission index per consumed energy
Industry CO_2 / Industrial energy final consumption
Commercial CO_2 / Commercial energy final consumption
Transport CO_2 / Transport energy final consumption
Residential CO_2 / Residential energy final consumption
CO_2 Electricity Generation / Electricity consumption

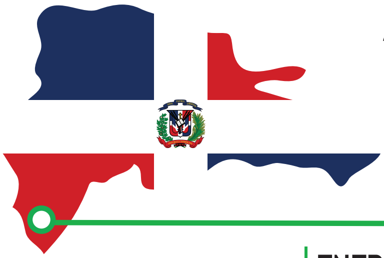

CO_2 Emission index of electricity generation
t / toe
Quinquennial variation rate
Variation rate
CO_2 Emission index in the electricity generation

Summary of the main energy indicators



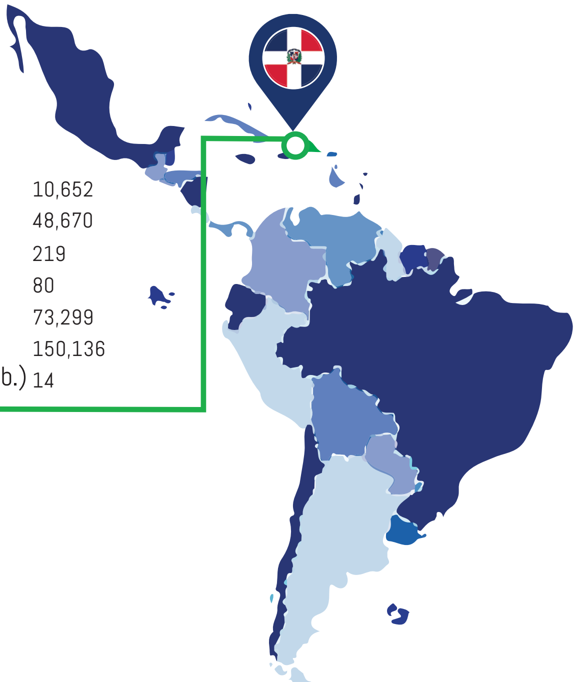
CUBA

DOMINICAN REPUBLIC



GENERAL INFORMATION 2016

Population (thousand inhab.)	10,652
Area (km^2)	48,670
Population Density (inhab./km^2)	219
Urban Population (%)	80
GDP USD 2010 (MUSD)	73,299
GDP USD 2011 PPP (MUSD)	150,136
GDP per capita (thou. USD 2011 PPP/inhab.)	14



ENERGY SECTOR

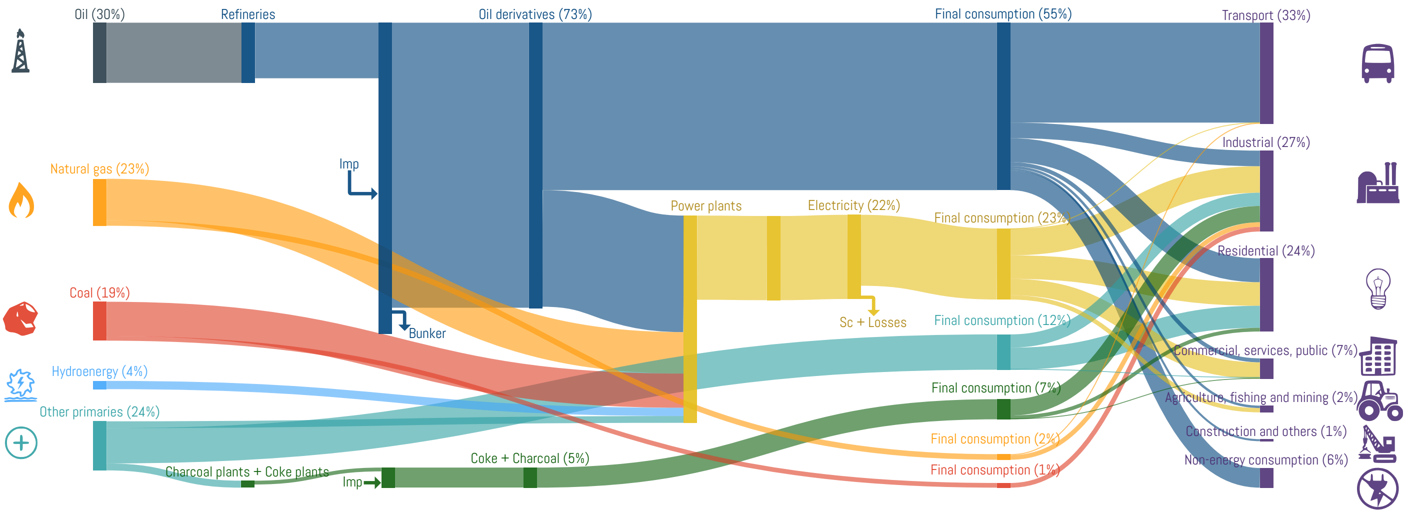
Final consumption in the Transport Sector	Mtoe 2.01
Final consumption in the Industrial Sector	Mtoe 1.60
Final consumption in the Residential Sector	Mtoe 1.45
Final consumption in the Commercial and Service Sector	Mtoe 0.41
Final consumption in the Agriculture, Livestock, Fishing, Mining, Other and Non - Energy Consumption	Mtoe 0.56

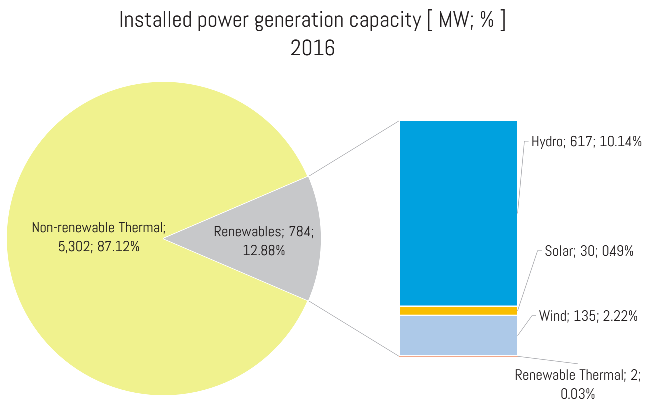
Oil Reserves	Natural gas reserves	Coal reserves
Mbbl n.a.	Gm^3 n.a.	Mt n.a.

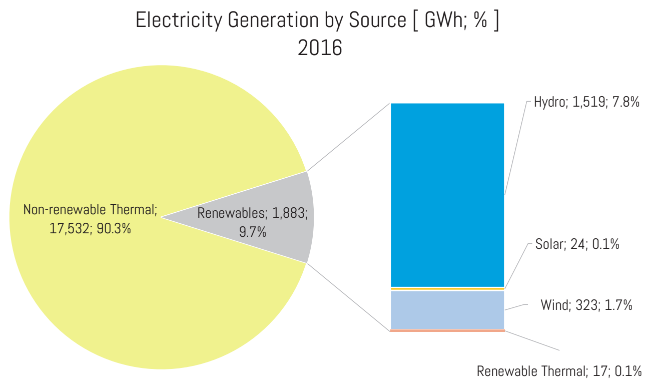
[1] Exports include AVTUR bunker.

Indicator	Unit	Value
Electricity consumption per capita	kWh / inhab.	1,536
Final energy consumption per capita	toe / inhab.	0.57
Electrification rate	%	97.07
Total energy supply	Mtoe	8.90
Total energy production	Mtoe	1.14
Total energy imports	Mtoe	8.29
Total energy exports	Mtoe	0.53[1]
Total final energy consumption	Mtoe	6.03
Refining capacity	kbbl/day	35
Installed power generation capacity	GW	6.09
Primary energy intensity and final energy intensity	koe / USD 2011 PPP	0.02 / 0.04

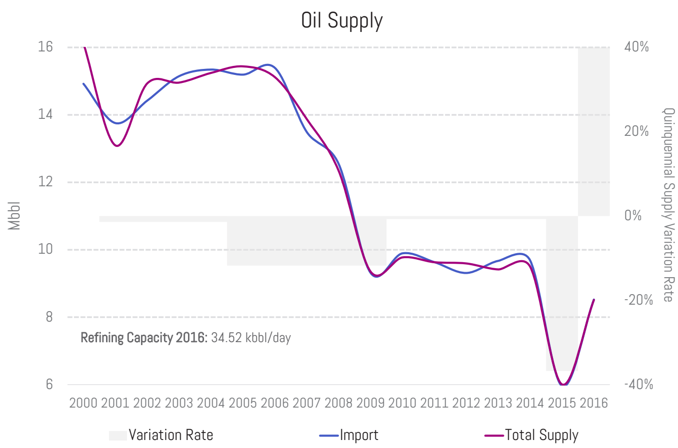
Summarized energy matrix 2016

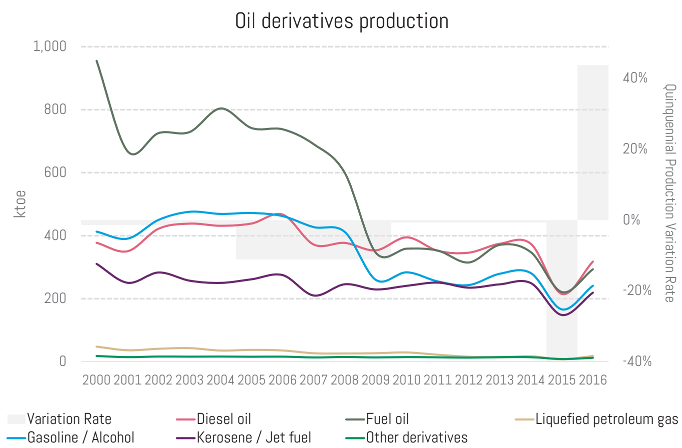


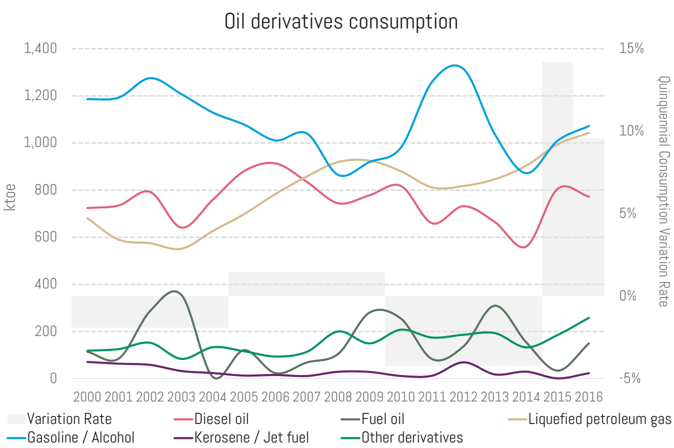


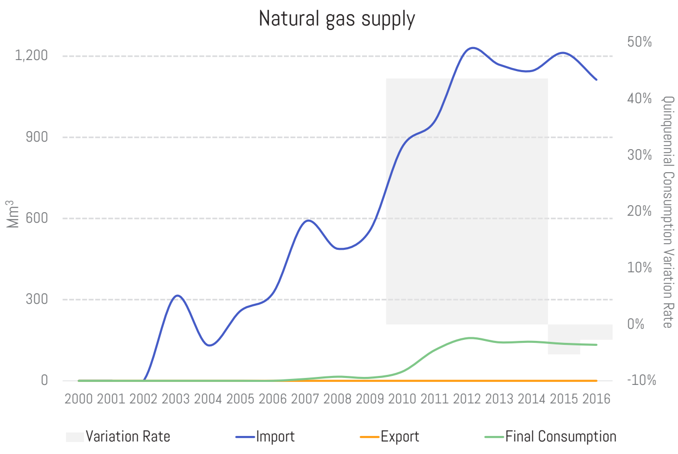


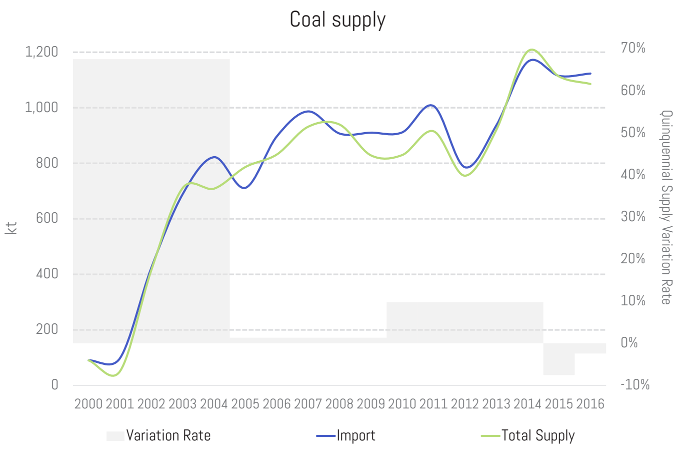
In 2016, the first biomass power plant (San Pedro Bio Energy) of the Interconnected Energy System was inaugurated. It will generate 30 MW of energy with sugar cane bagasse from the Cristóbal Colón sugar mill.

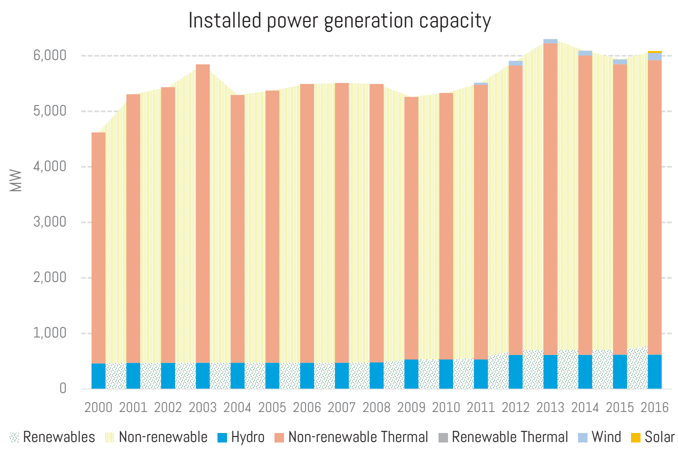


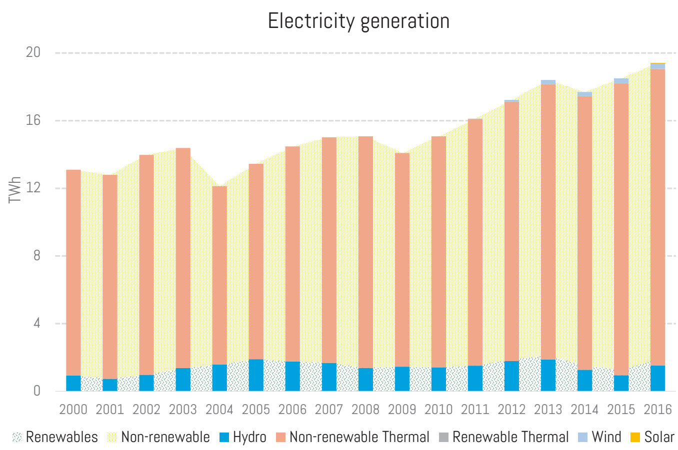


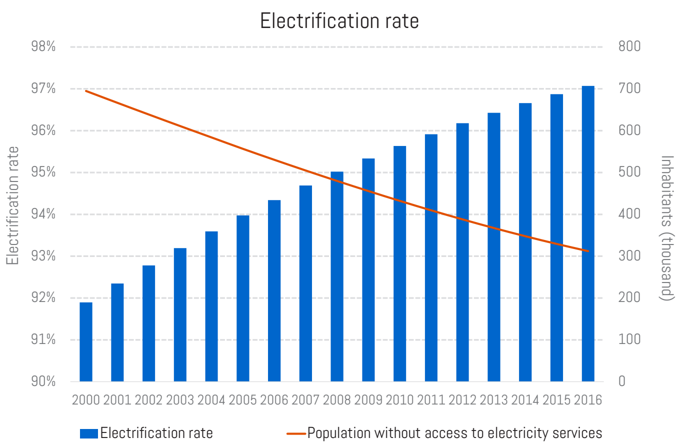


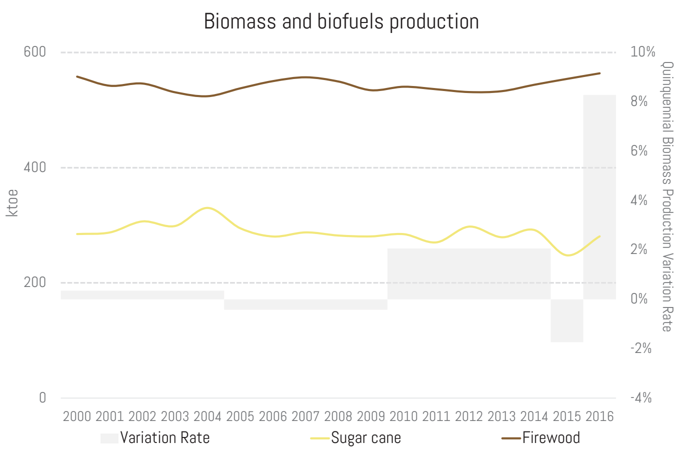

Natural gas supply
Mm3
Quinquennial Consumption Variation Rate
1,200
900
600
300
0
50%
40%
30%
20%
10%
0%
-10%
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Variation Rate
Import
Export
Final Consumption

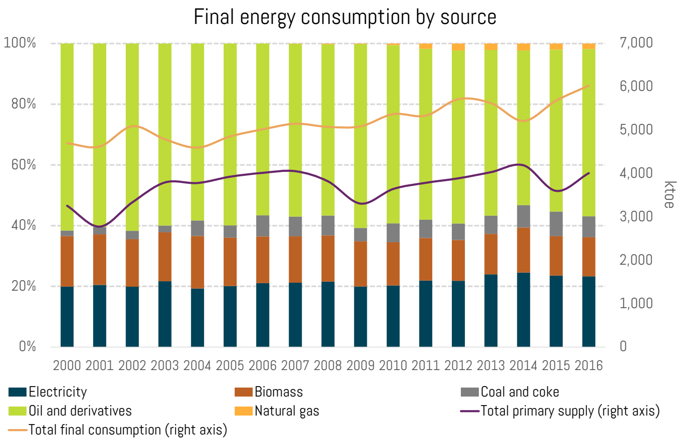

Coal supply
kt
Quinquennial Supply Variation Rate
1,200
1,000
800
600
400
200
0
70%
60%
50%
40%
30%
20%
10%
0%
-10%
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Variation Rate
Import
Total Supply

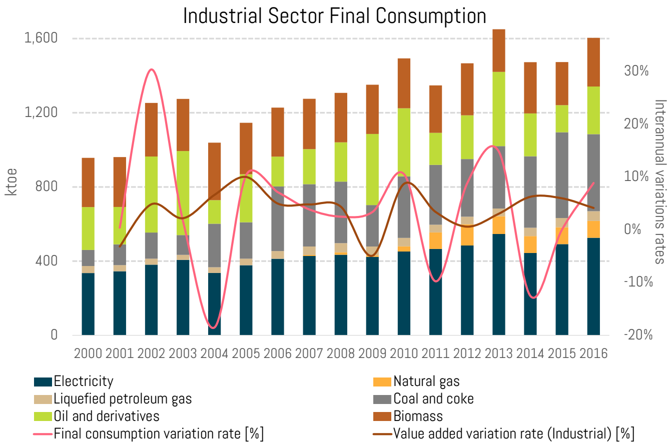

Installed power generation capacity
MW
6,000
5,000
4,000
3,000
2,000
1,000
0
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Renewables
Non-renewable
Hydro
Non-renewable Thermal
Renewable Thermal
Wind
Solar

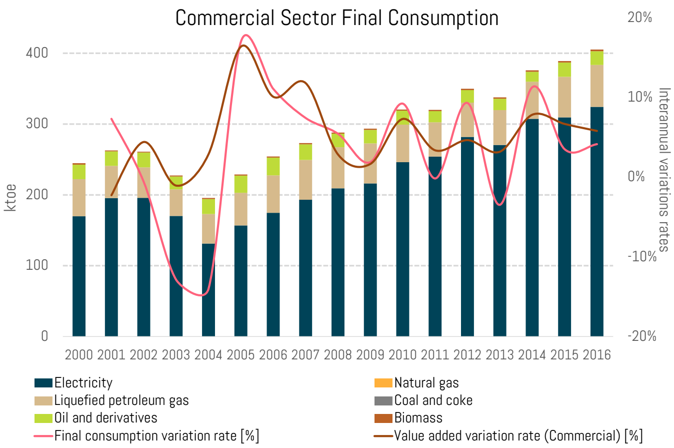

Electricity generation
TWh
20
16
12
8
4
0
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Renewables
Non-renewable
Hydro
Non-renewable Thermal
Renewable Thermal
Wind
Solar

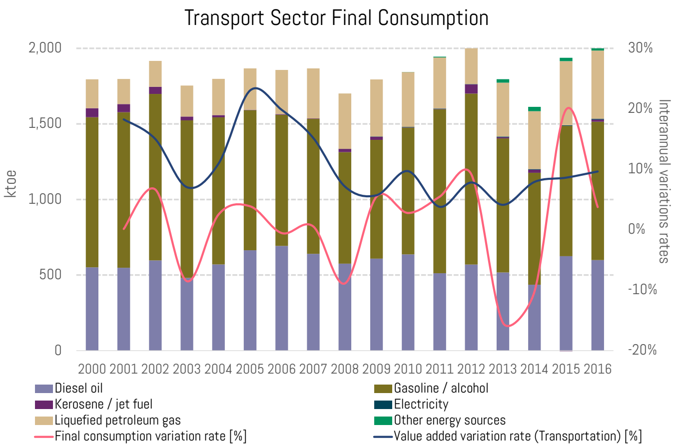

Electrification rate
Electrification rate
Inhabitants (thousand)
98%
97%
96%
95%
94%
93%
92%
91%
90%
800
700
600
500
400
300
200
100
0
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Electrification rate
Population without access to electricity services


Biomass and biofuels production
ktoe
Quinquennial Biomass Production Variation Rate
600
400
200
0
10%
8%
6%
4%
2%
0%
-2%
-4%
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Variation Rate
Sugar cane
Firewood









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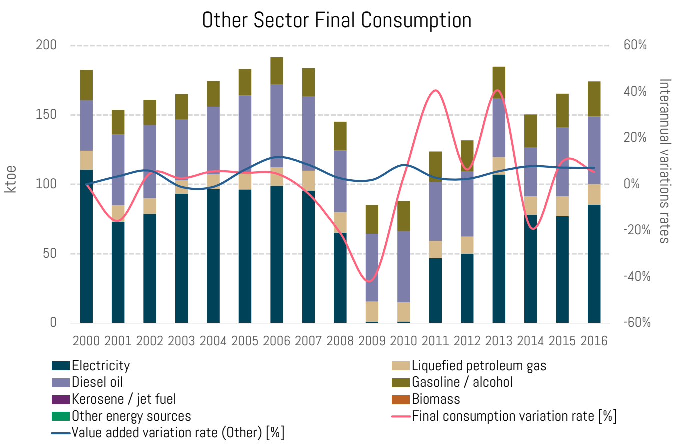
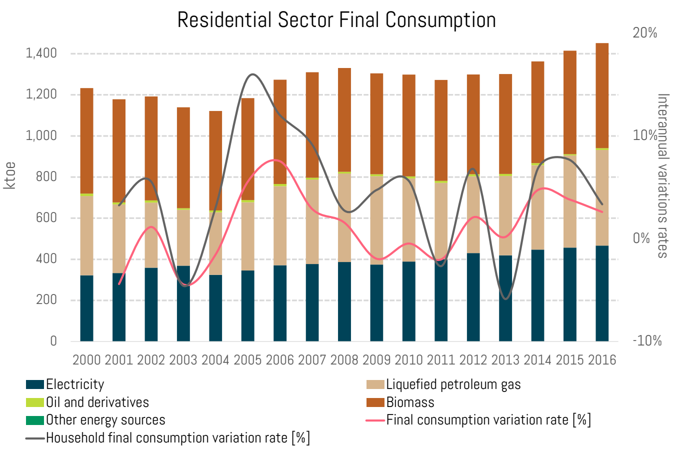
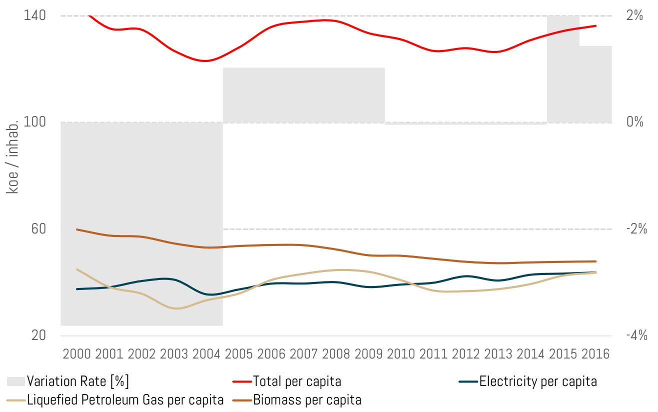
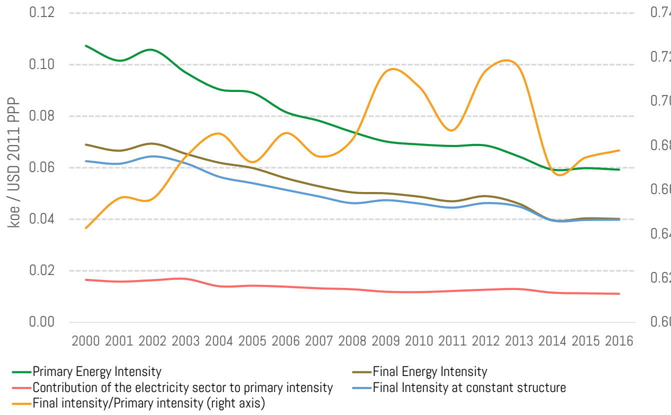




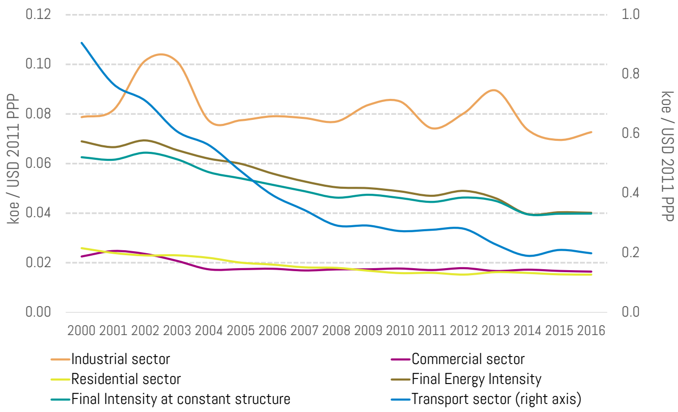
Final consumption per capita Residential Sector



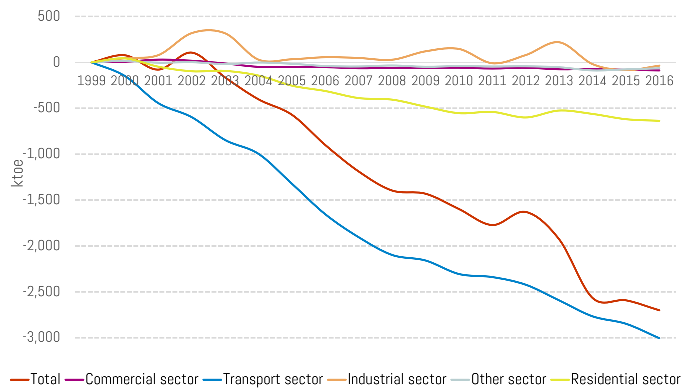
Energy intensities



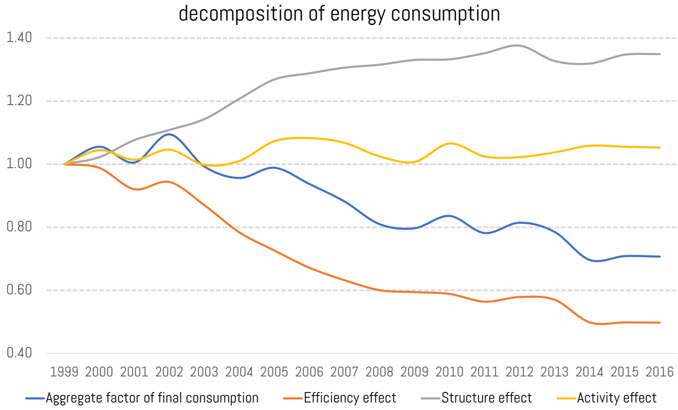
Sectoral energy intensities



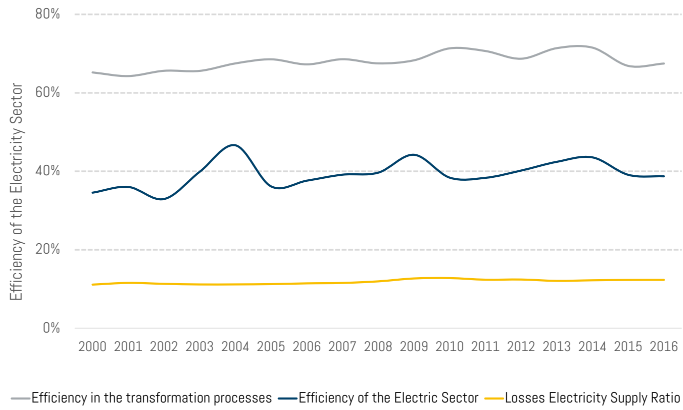
Avoided energy demand due to variations in energy intensity



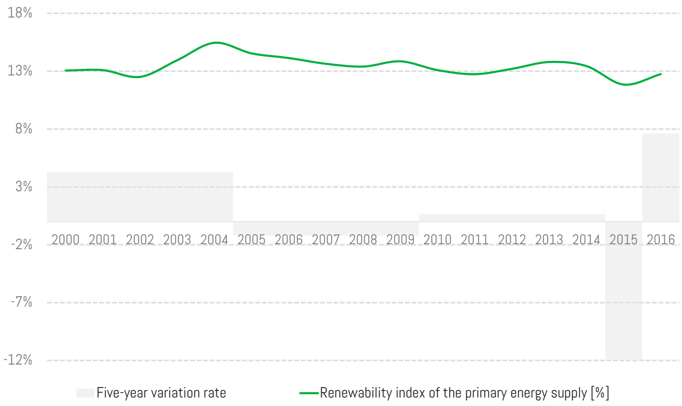
Logarithmic mean Divisia index for the structural decomposition of energy consumption



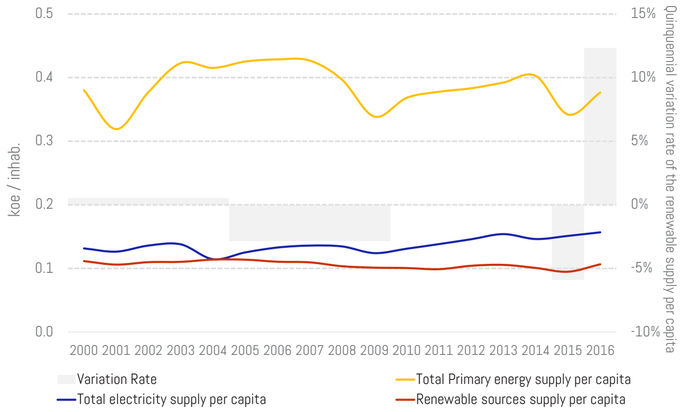
Efficiency of the Electricity Sector



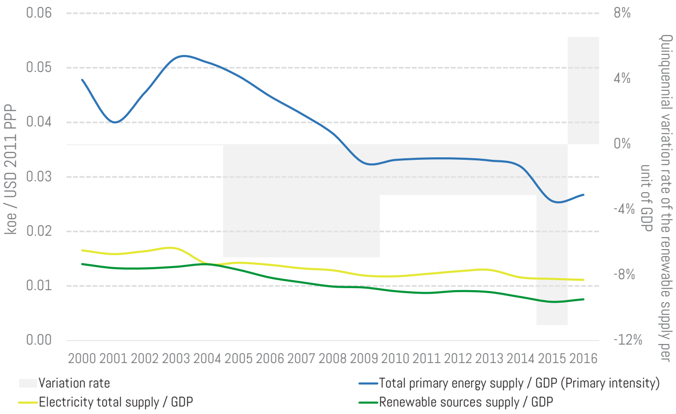
Primary energy supply renewability index



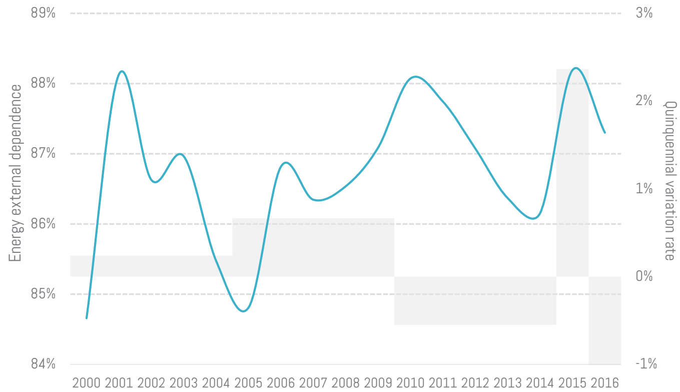
Energy supply per capita



Energy supply per unit of GDP

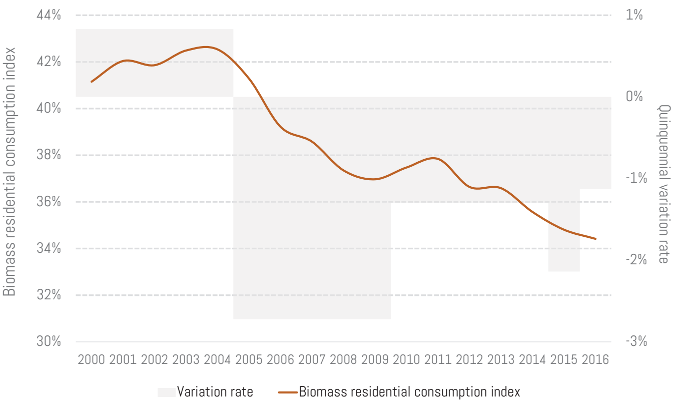


Energy external dependence

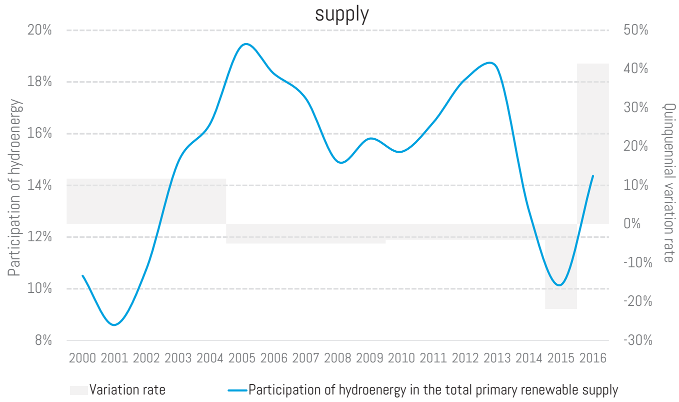


DOMINICAN REPUBLIC

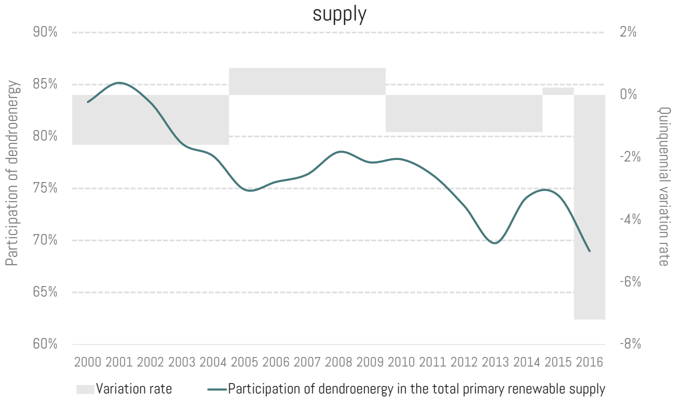
Biomass residential consumption index



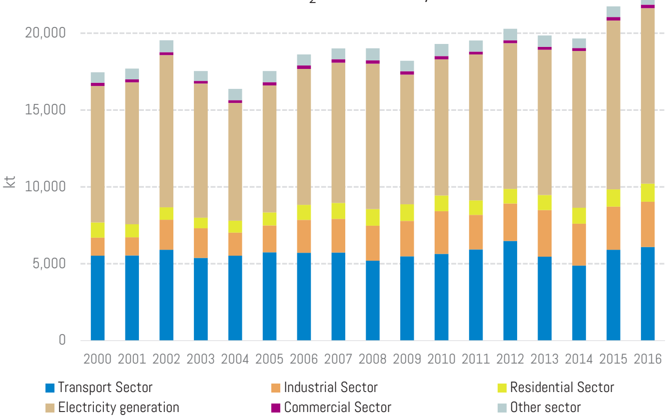
Participation of hydroenergy in the total primary renewable supply



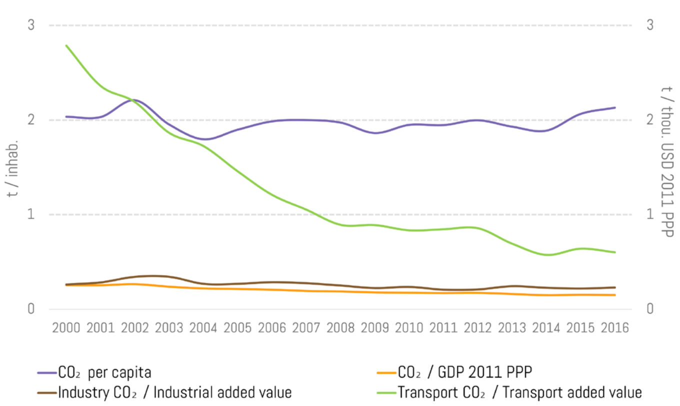
Participation of dendroenergy in the total primary renewable supply



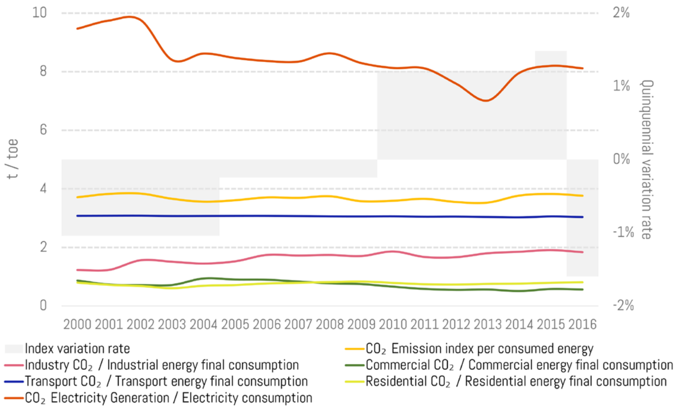
Evolution of CO_2 emissions by sector



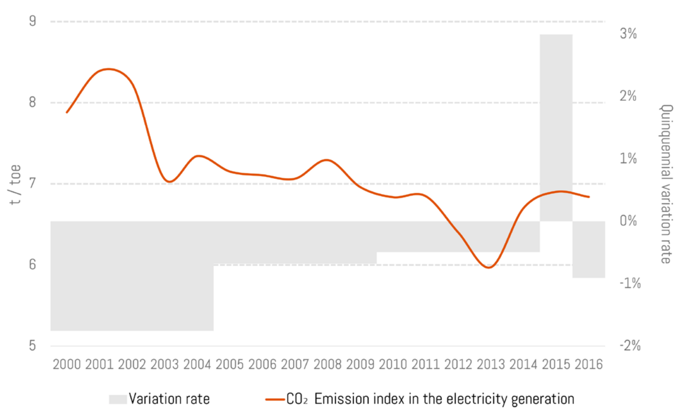
Evolution of CO_2 emissions per capita and per unit of GDP



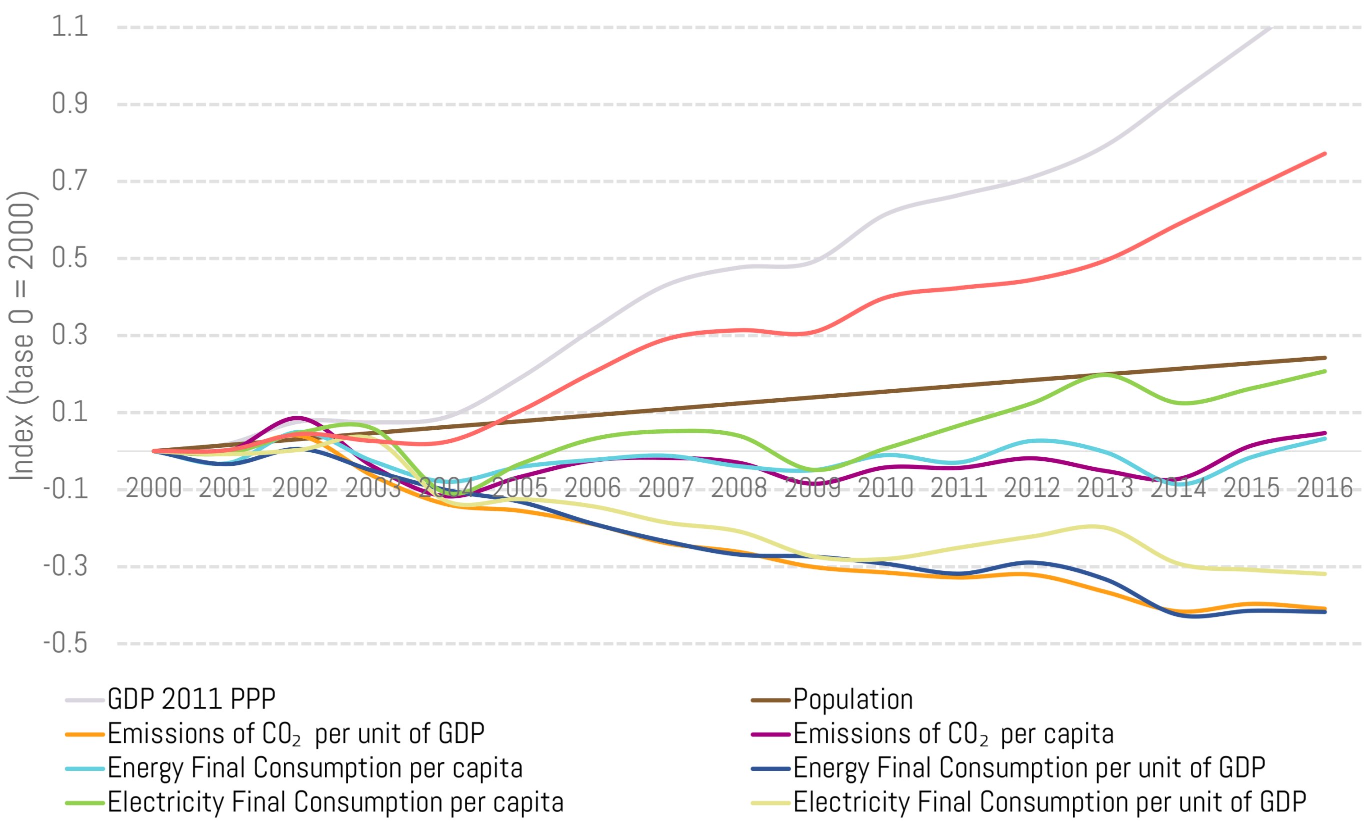
CO_2 Emission index per consumed energy



CO_2 Emission index of electricity generation



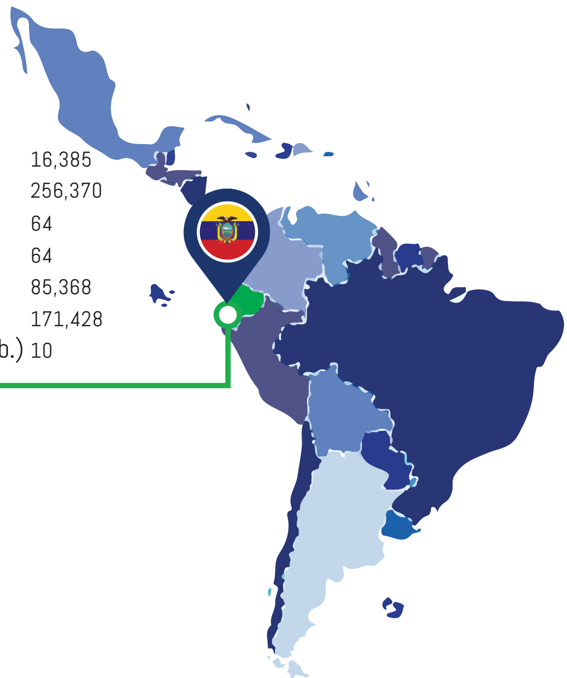
Summary of the main energy indicators



ECUADOR

GENERAL INFORMATION 2016

Population (thousand inhab.)	16,385
Area (km²)	256,370
Population Density (inhab./km²)	64
Urban Population (%)	64
GDP USD 2010 (MUSD)	85,368
GDP USD 2011 PPP (MUSD)	171,428
GDP per capita (thou. USD 2011 PPP/inhab.)	10



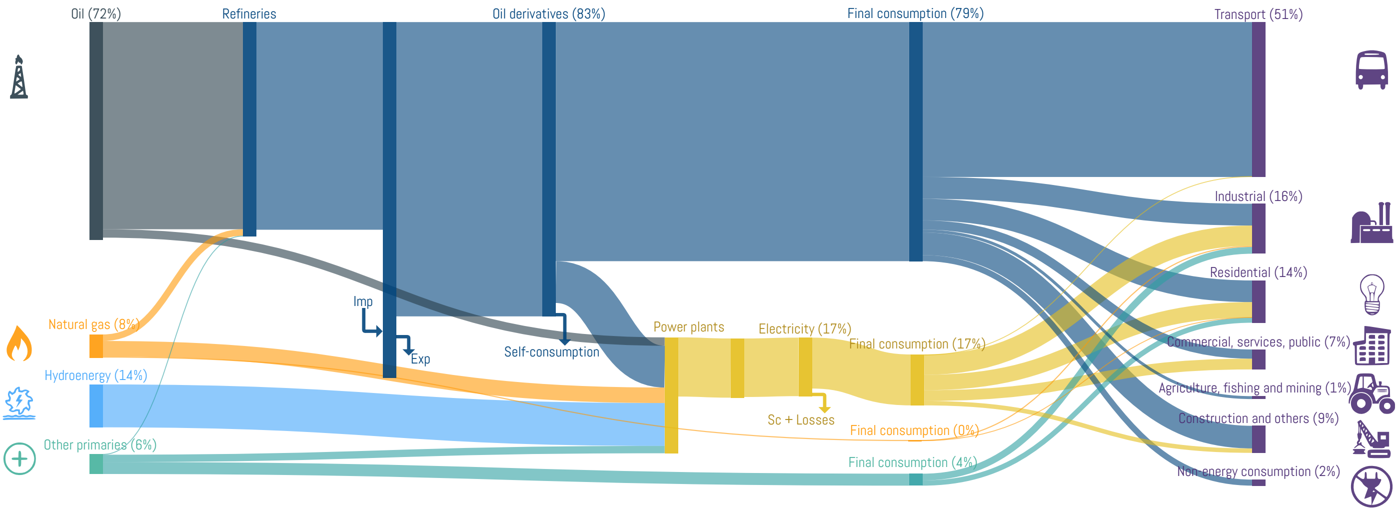
ENERGY SECTOR

Final consumption in the Transport Sector	Mtoe 6.15
Final consumption in the Industrial Sector	Mtoe 1.98
Final consumption in the Residential Sector	Mtoe 1.68
Final consumption in the Commercial and Service Sector	Mtoe 0.79
Final consumption in the Agriculture, Livestock, Fishing, Mining, Other and Non - Energy Consumption	Mtoe 1.43

Oil Reserves	Natural gas reserves	Coal reserves
Mbbl 3,168	Gm³ 11	Mt n.a.

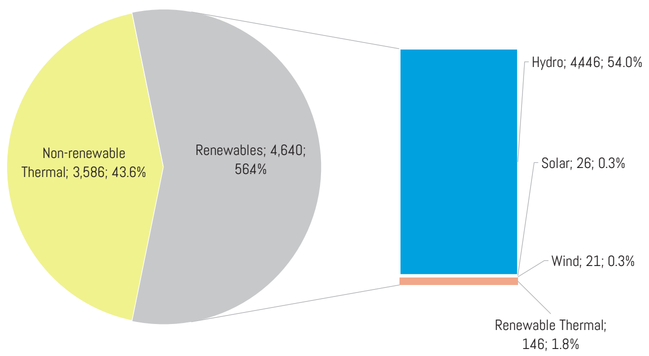
Electricity consumption per capita	Final energy consumption per capita	Electrification rate	Total energy supply	Total energy production	Total energy imports	Total energy exports	Total final energy consumption	Refining capacity	Installed power generation capacity	Primary energy intensity and final energy intensity
kWh / inhab.	toe / inhab.	%	Mtoe	Mtoe	Mtoe	Mtoe	Mtoe	kbbl/day	GW	koe / USD 2011 PPP
1,434	0.73	97.24	15.43	31.84	5.88	21.76	12.02	175	8.23	0.07 / 0.07

Summarized energy matrix 2016

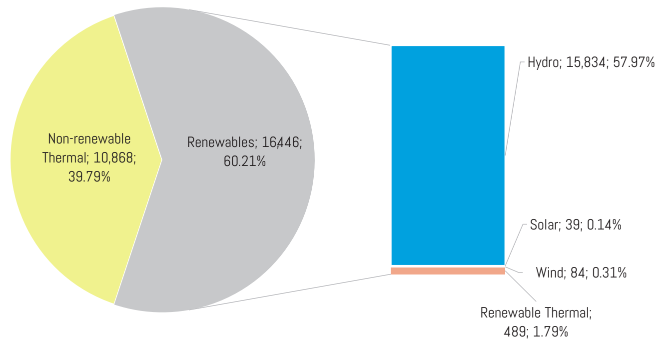


ECUADOR

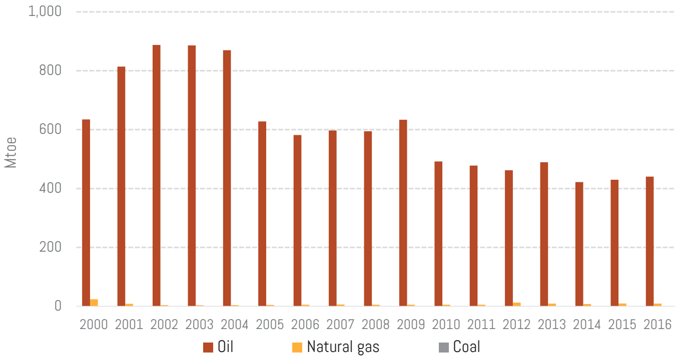
Installed power generation capacity [MW; %] 2016



Electricity Generation by Source [GWh; %] 2016

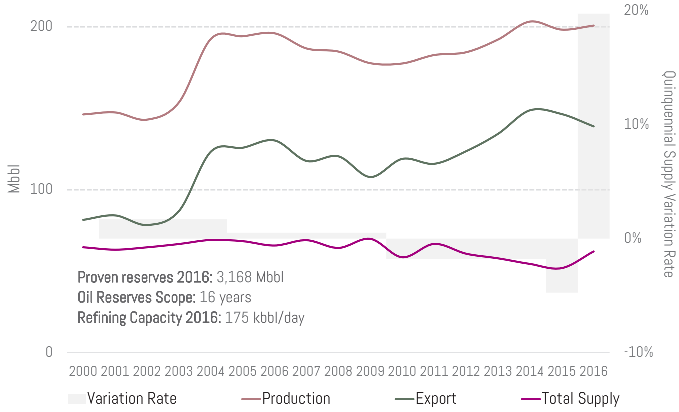


Proven reserves of oil, natural gas and coal

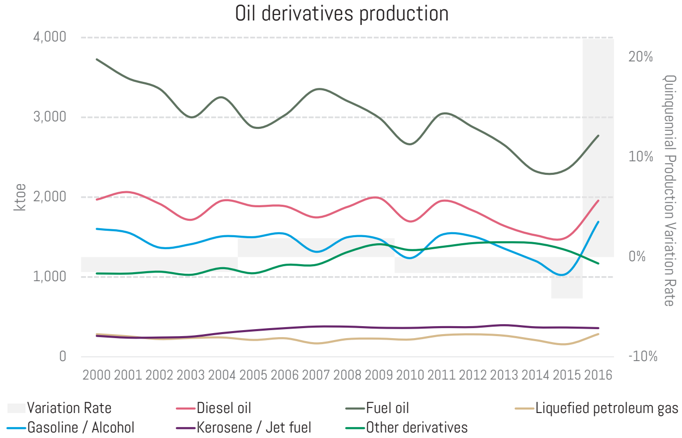


1) The figures corresponding to oil reserves are approved according to the SPE - PRMS.
2) From 2016 onwards, oil reserves will be considered as Contingent Resources.

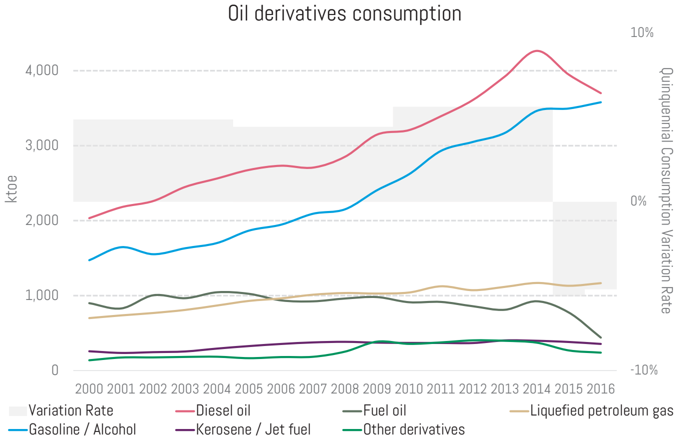
Oil Supply



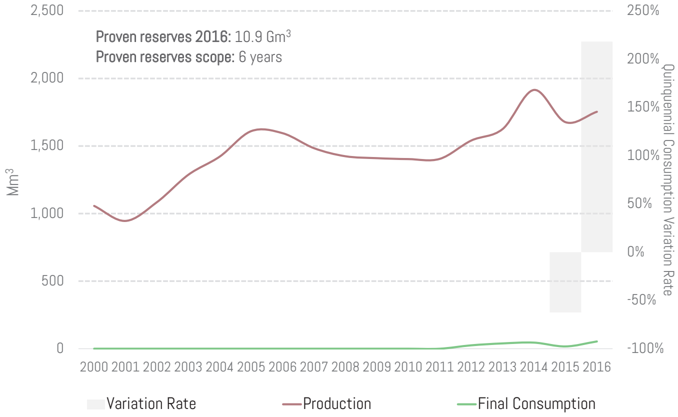
Oil derivatives production



Oil derivatives consumption

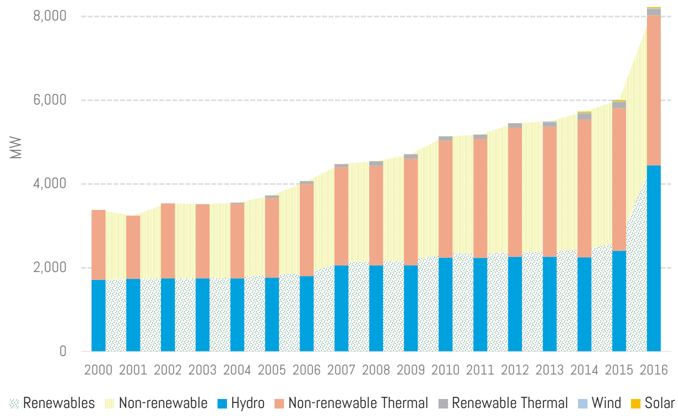


Natural gas supply

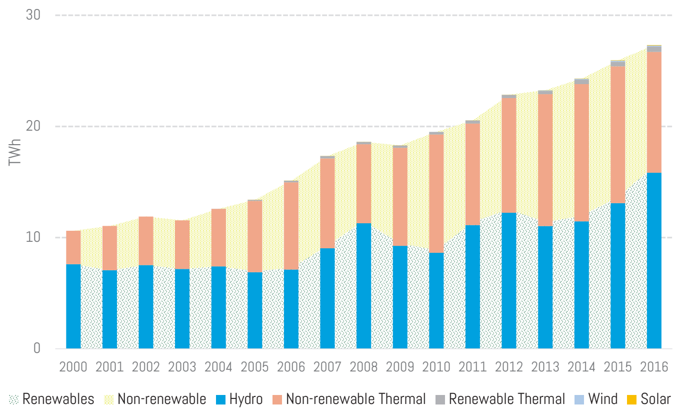


In August 2016, the Coca Codo Sinclair Hydroelectric Power Plant came into operation with 1.5 GW and will supply 30% of the national energy demand.

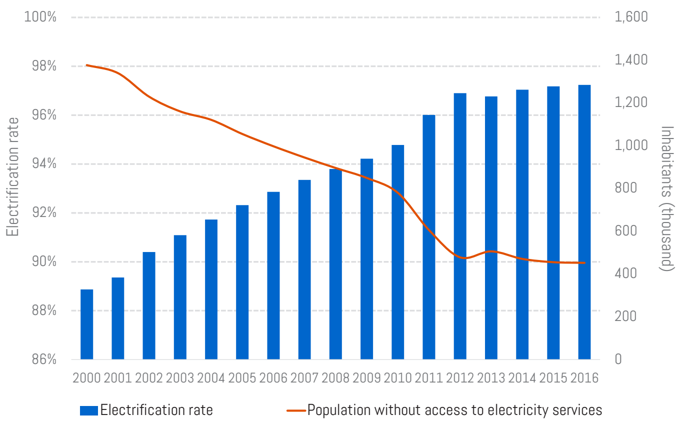
Installed power generation capacity



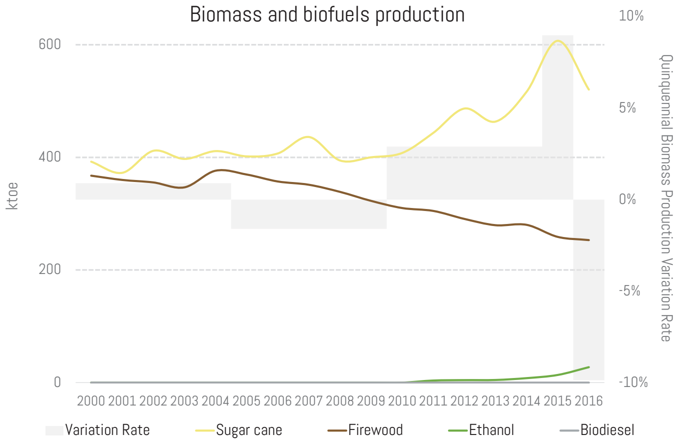
Electricity generation



Electrification rate



Biomass and biofuels production



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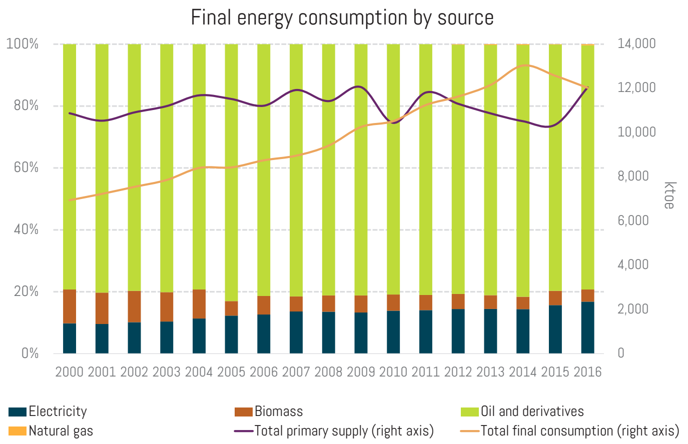
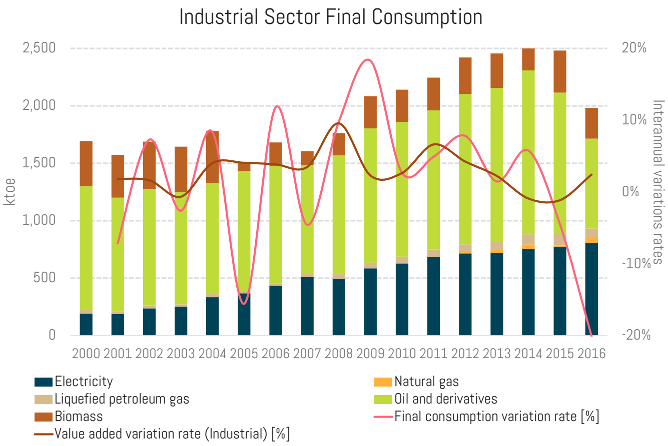
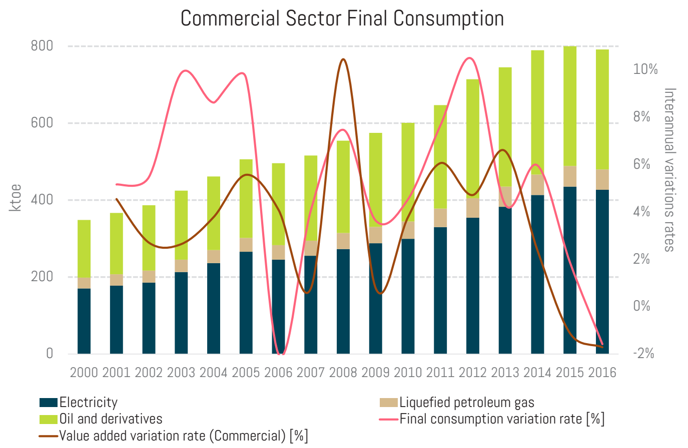
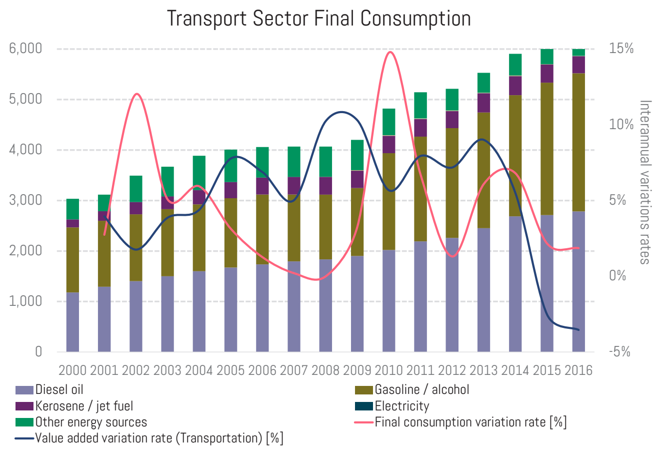
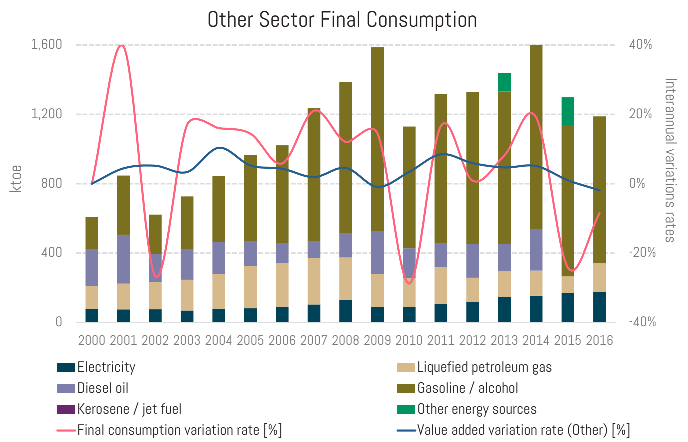
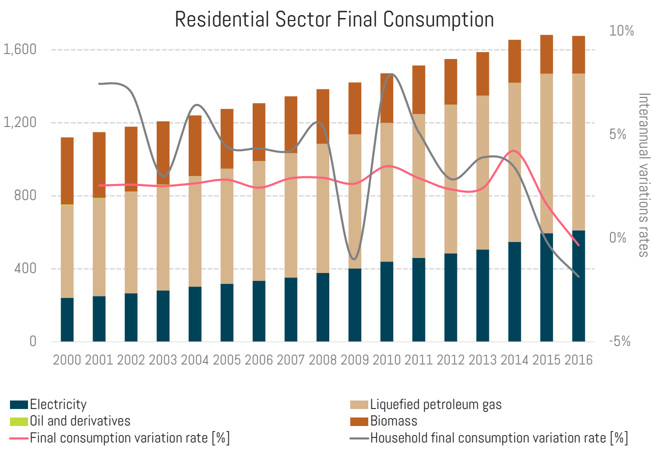

Final energy consumption by source
100%
80%
60%
40%
20%
0%
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
ktoe
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Electricity
Natural gas
Biomass
Total primary supply (right axis)
Oil and derivatives
Total final consumption (right axis)


Industrial Sector Final Consumption
2,500
2,000
1,500
1,000
500
0
ktoe
20%
10%
0%
-10%
-20%
Interannual variations rates
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Electricity
Liquefied petroleum gas
Biomass
Value added variation rate (Industrial) [%]
Natural gas
Oil and derivatives
Final consumption variation rate [%]

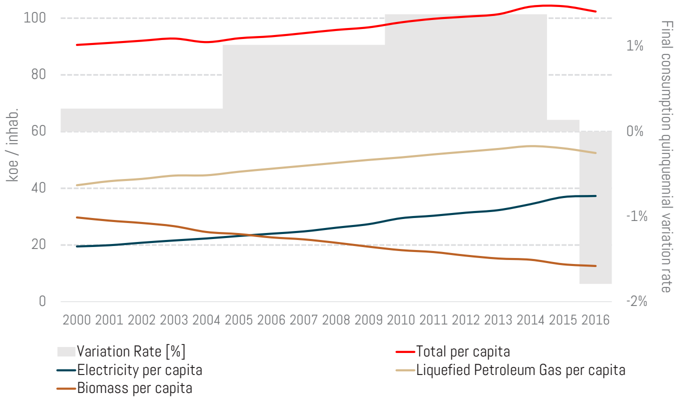

Commercial Sector Final Consumption
800
600
400
200
0
ktoe
10%
8%
6%
4%
2%
0%
-2%
Interannual variations rates
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Electricity
Oil and derivatives
Value added variation rate (Commercial) [%]
Liquefied petroleum gas
Final consumption variation rate [%]


Transport Sector Final Consumption
6,000
5,000
4,000
3,000
2,000
1,000
0
ktoe
15%
10%
5%
0%
-5%
Interannual variations rates
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Diesel oil
Kerosene / jet fuel
Other energy sources
Value added variation rate (Transportation) [%]
Gasoline / alcohol
Electricity
Final consumption variation rate [%]

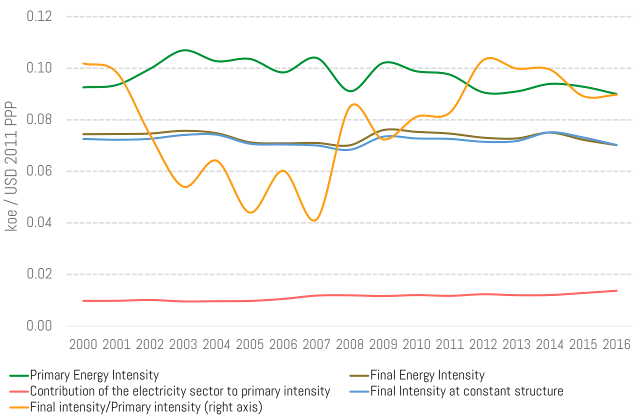

Other Sector Final Consumption
1,600
1,200
800
400
0
ktoe
40%
20%
0%
-20%
-40%
Interannual variations rates
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Electricity
Diesel oil
Kerosene / jet fuel
Final consumption variation rate [%]
Liquefied petroleum gas
Gasoline / alcohol
Other energy sources
Value added variation rate (Other) [%]


Residential Sector Final Consumption
1,600
1,200
800
400
0
ktoe
10%
5%
0%
-5%
Interannual variations rates
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Electricity
Oil and derivatives
Final consumption variation rate [%]
Liquefied petroleum gas
Biomass
Household final consumption variation rate [%]

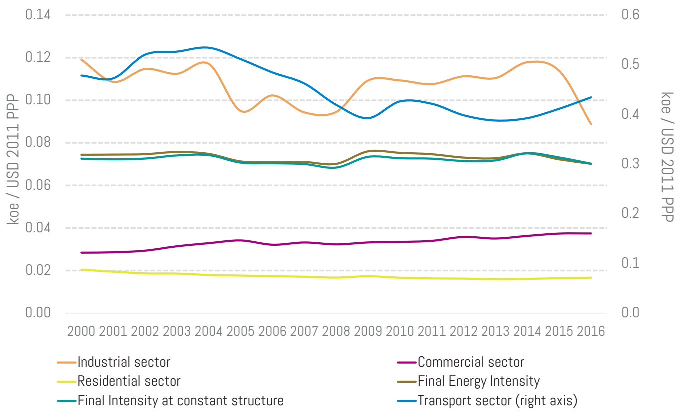
Final consumption per capita Residential Sector



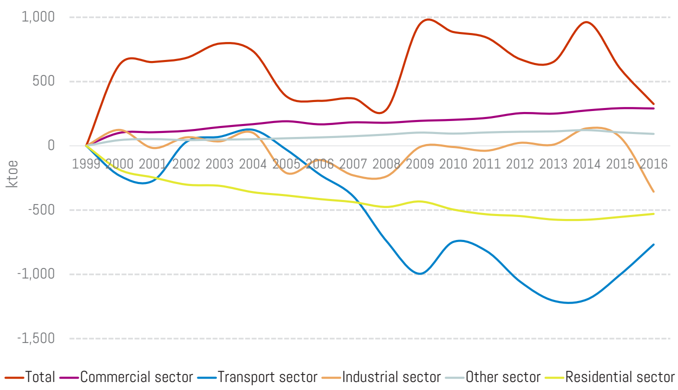
Energy intensities



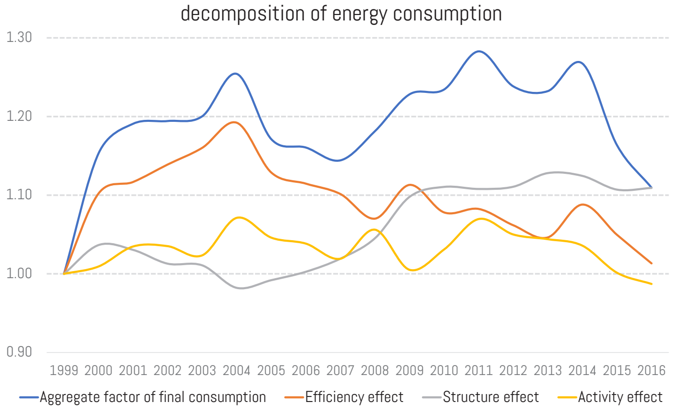
Sectoral energy intensities



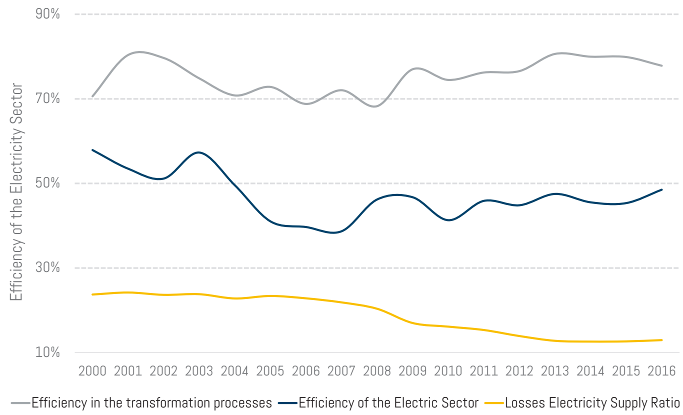
Avoided energy demand due to variations in energy intensity

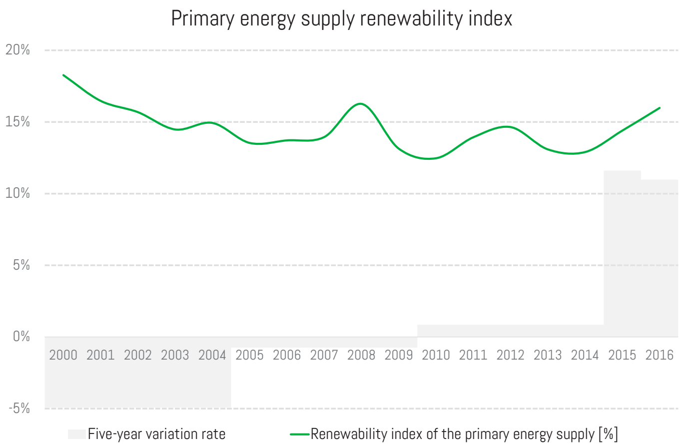


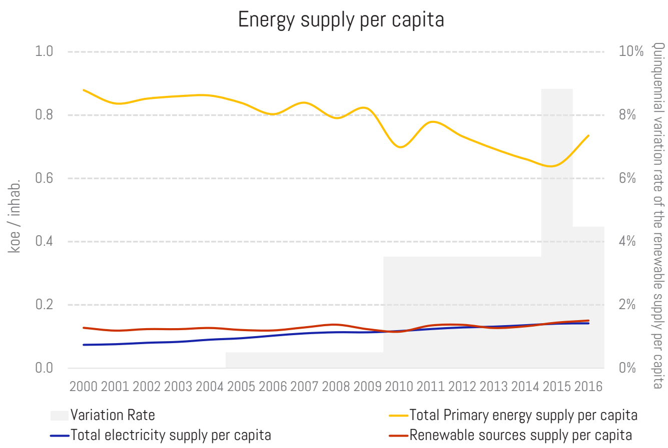
Logarithmic mean Divisia index for the structural decomposition of energy consumption

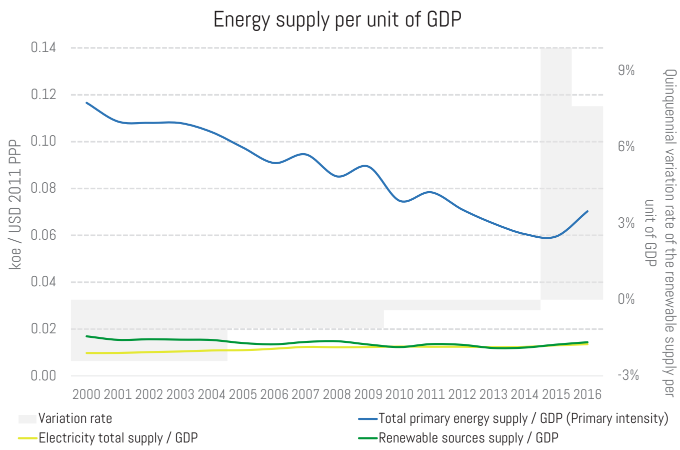


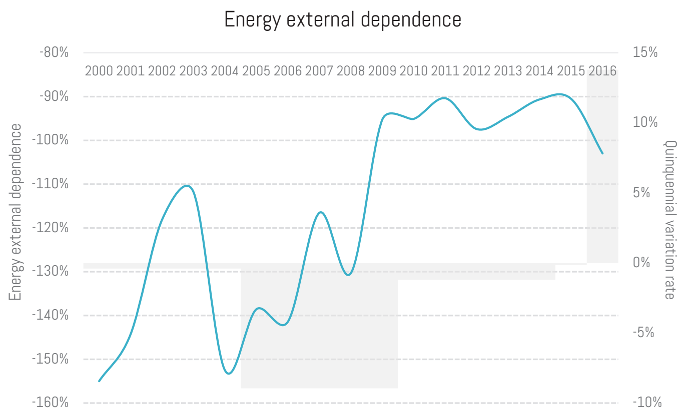
Efficiency of the Electricity Sector




Primary energy supply renewability index
Five-year variation rate
Renewability index of the primary energy supply [%]


Energy supply per capita
koe / inhab.
Quinquennial variation rate of the renewable supply per capita
Variation Rate
Total Primary energy supply per capita
Total electricity supply per capita
Renewable sources supply per capita


Energy supply per unit of GDP
koe / USD 2011 PPP
Quinquennial variation rate of the renewable supply per unit of GDP
Variation rate
Total primary energy supply / GDP (Primary intensity)
Electricity total supply / GDP
Renewable sources supply / GDP


Energy external dependence
Energy external dependence
Quinquennial variation rate

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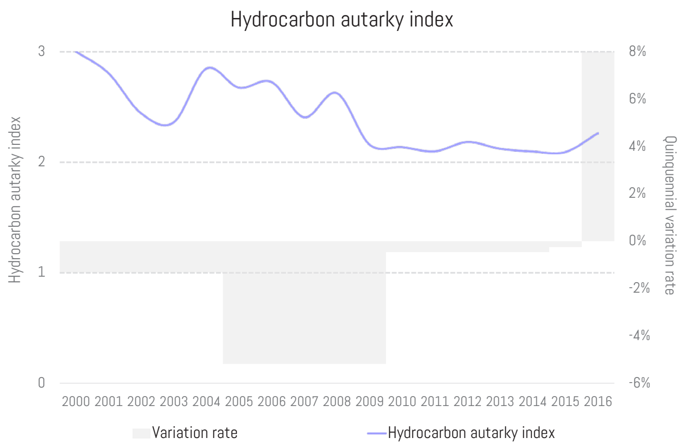
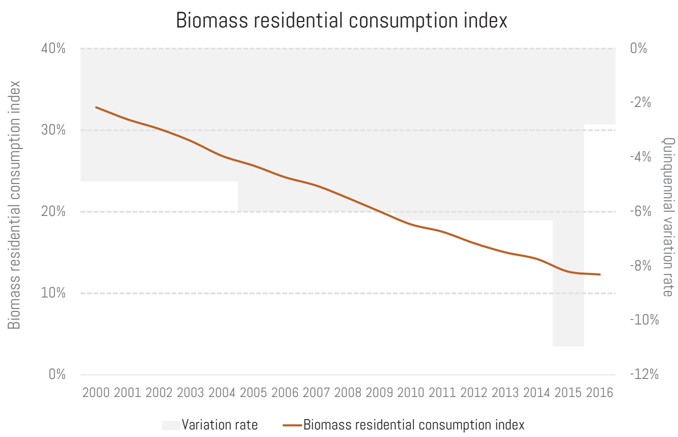
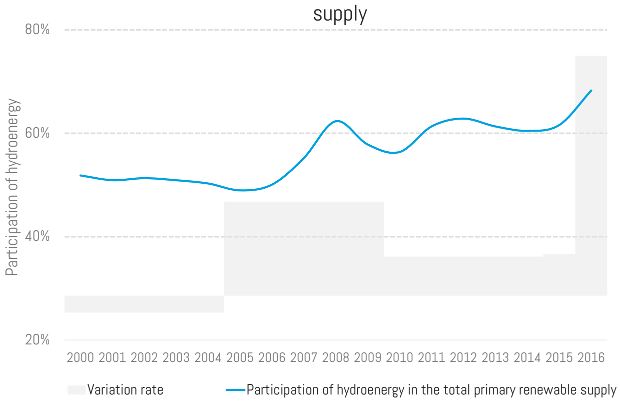
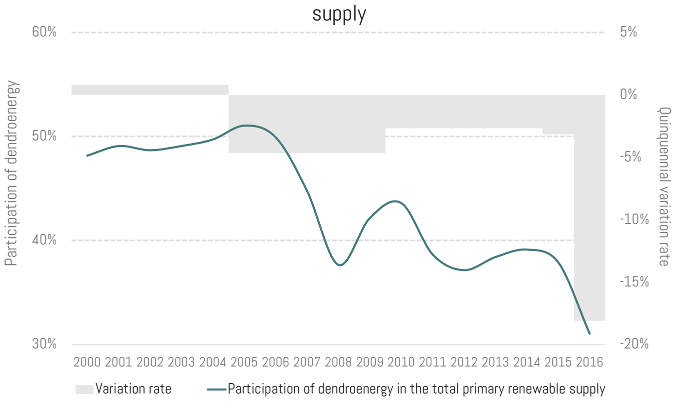

Hydrocarbon autarky index
Hydrocarbon autarky index
Quinquennial variation rate
Variation rate
Hydrocarbon autarky index


Biomass residential consumption index
Biomass residential consumption index
Quinquennial variation rate
Variation rate
Biomass residential consumption index

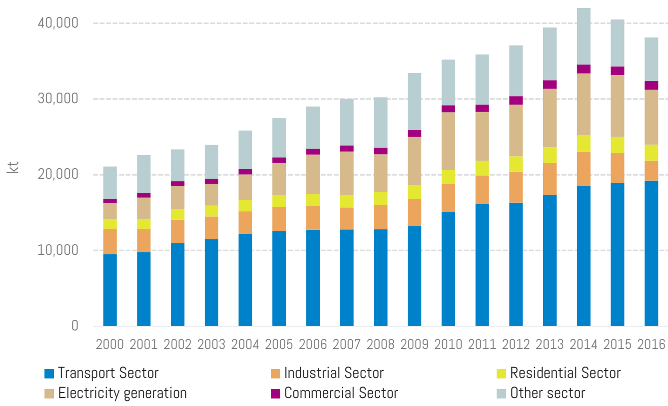
Participation of hydroenergy in the total primary renewable supply



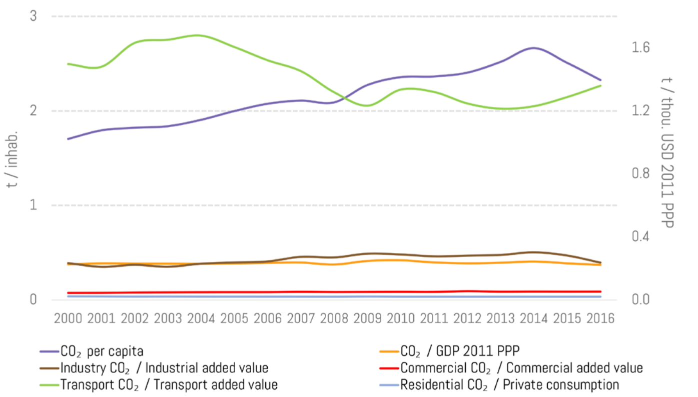
Participation of dendroenergy in the total primary renewable supply



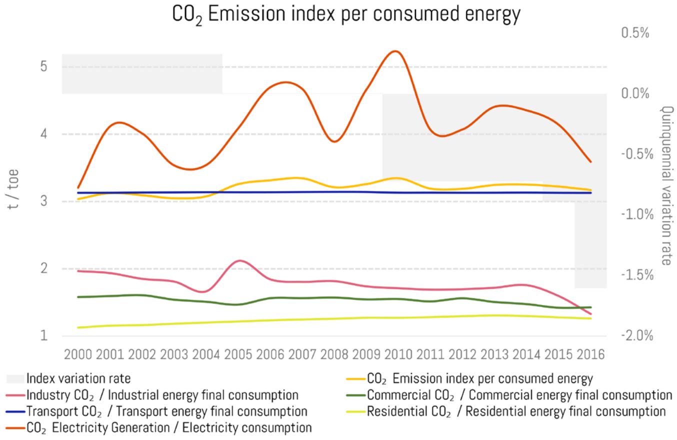
Evolution of CO_2 emissions by sector



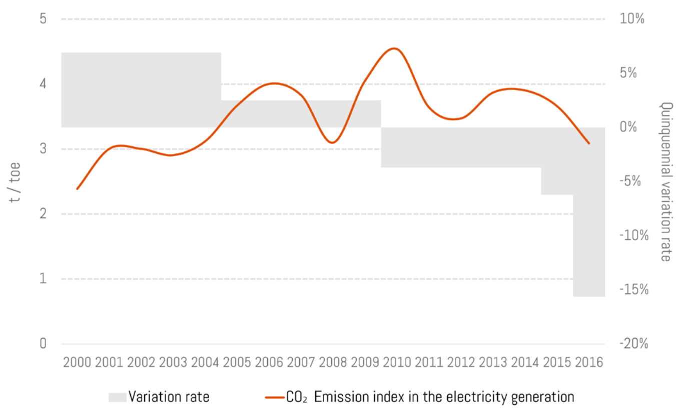
Evolution of CO_2 emissions per capita and per unit of GDP



CO_2 Emission index per consumed energy



CO_2 Emission index of electricity generation



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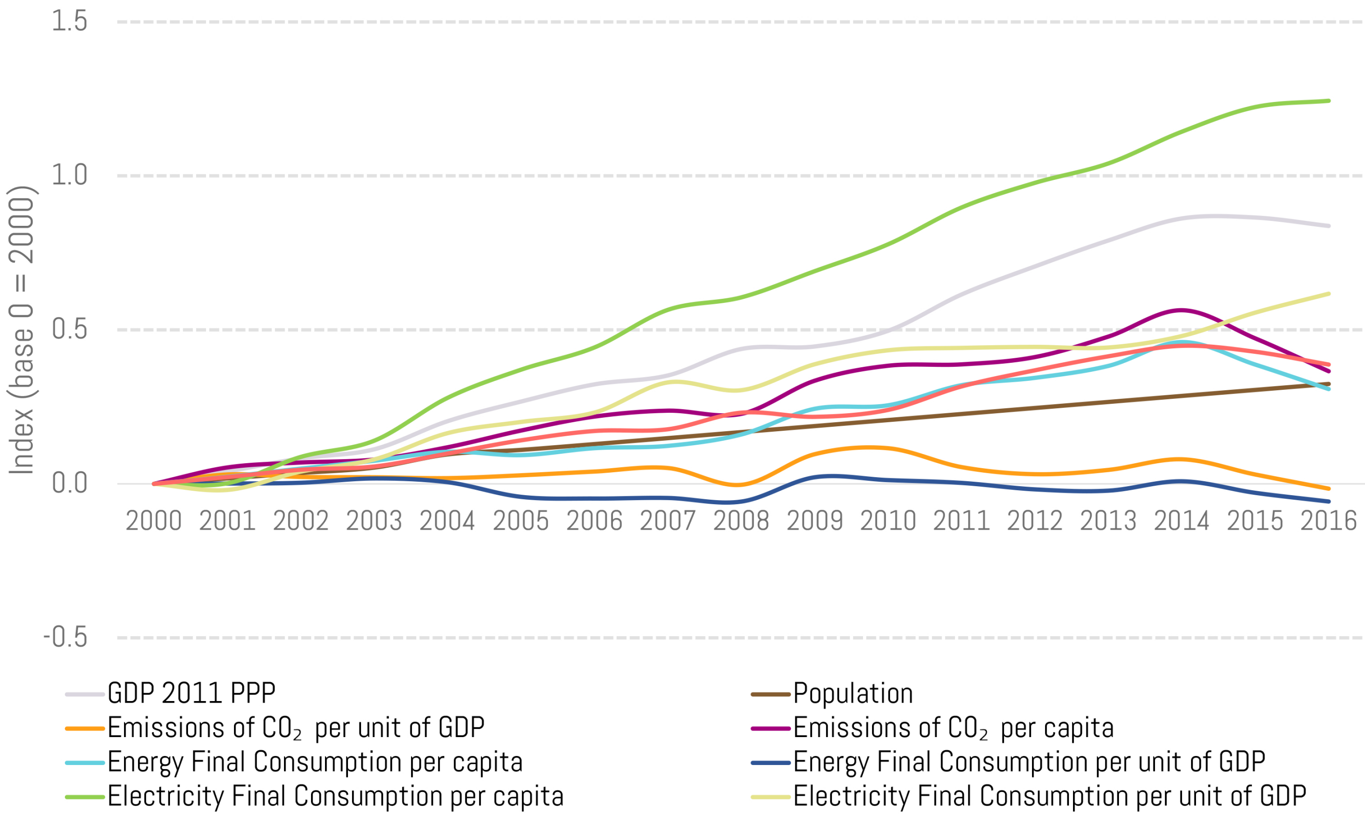
Summary of the main energy indicators



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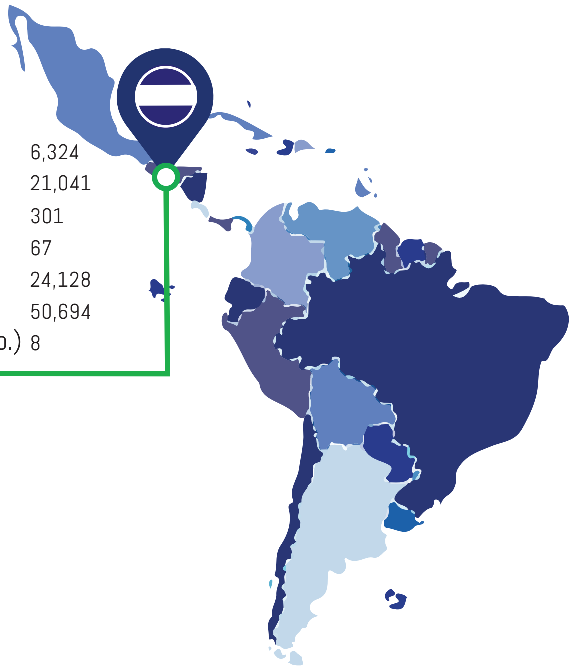


GENERAL INFORMATION 2016

Population (thousand inhab.)	6,324
Area (km^2)	21,041
Population Density (inhab./km^2)	301
Urban Population (%)	67
GDP USD 2010 (MUSD)	24,128
GDP USD 2011 PPP (MUSD)	50,694
GDP per capita (thou. USD 2011 PPP/inhab.)	8

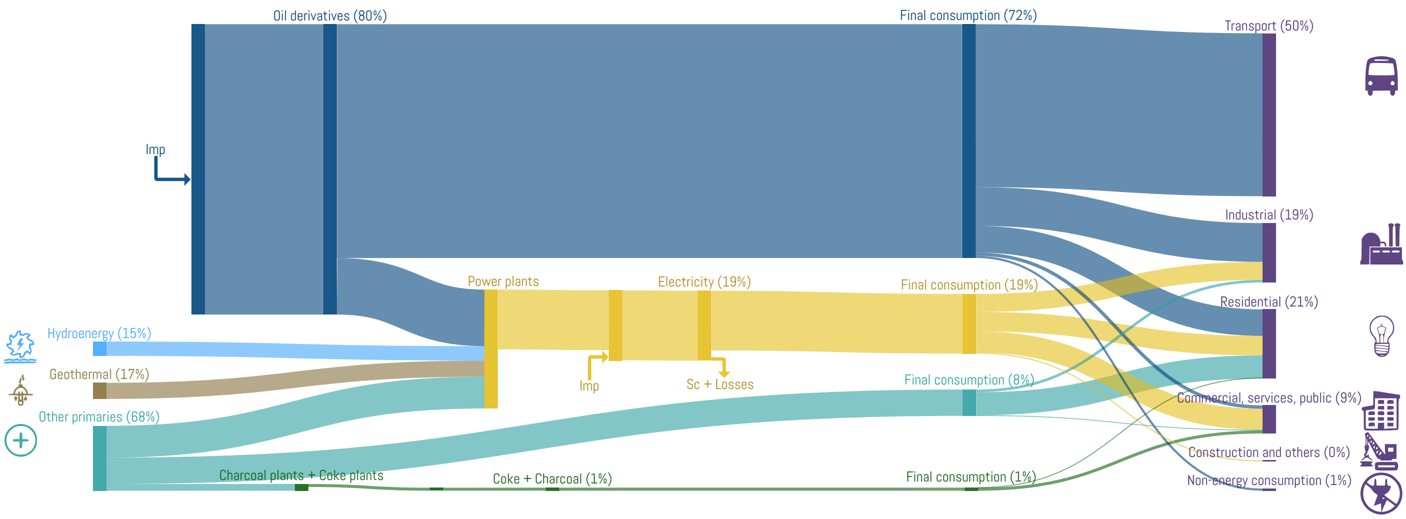
ENERGY SECTOR

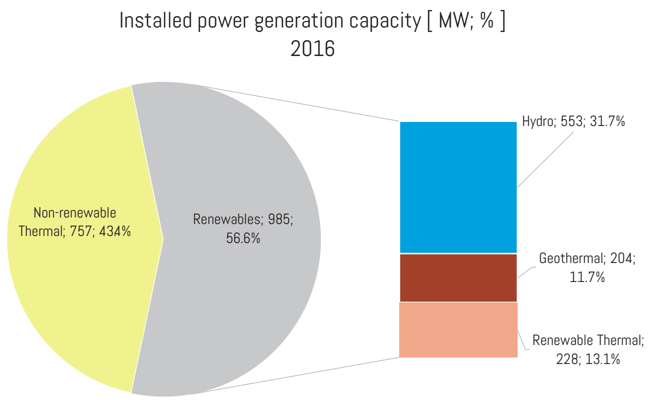
	Mtoe
Final consumption in the Transport Sector	1.36
Final consumption in the Industrial Sector	0.50
Final consumption in the Residential Sector	0.58
Final consumption in the Commercial and Service Sector	0.24
Final consumption in the Agriculture, Livestock, Fishing, Mining, Other and Non - Energy Consumption	0.03

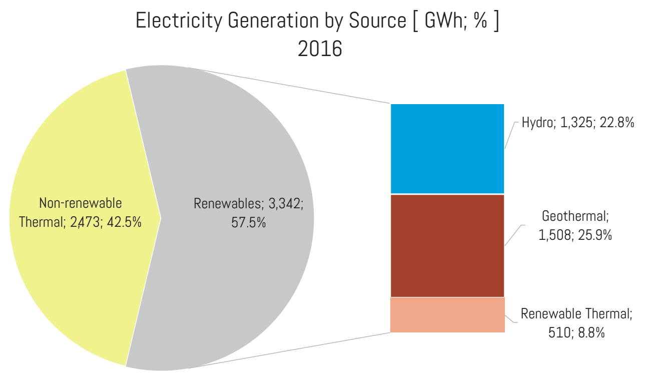
Oil Reserves (Mbbl)	Natural gas reserves (Gm^3)	Coal reserves (Mt)
n.a.	n.a.	n.a.

Indicator	Unit	Value
Electricity consumption per capita	kWh / inhab.	918
Final energy consumption per capita	toe / inhab.	0.43
Electrification rate	%	96.00
Total energy supply	Mtoe	3.31
Total energy production	Mtoe	0.80
Total energy imports	Mtoe	2.52
Total energy exports	Mtoe	0.01
Total final energy consumption	Mtoe	2.70
Refining capacity	kbbl/day	n.a.
Installed power generation capacity	GW	1.74
Primary energy intensity and final energy intensity	koe / USD 2011 PPP	0.02 / 0.05

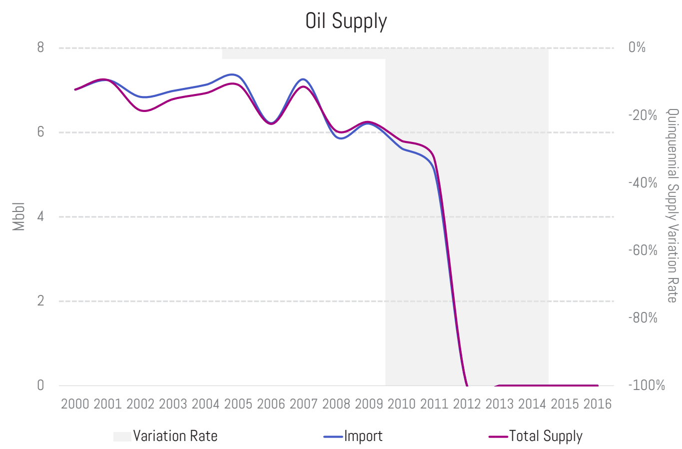
Summarized energy matrix 2016



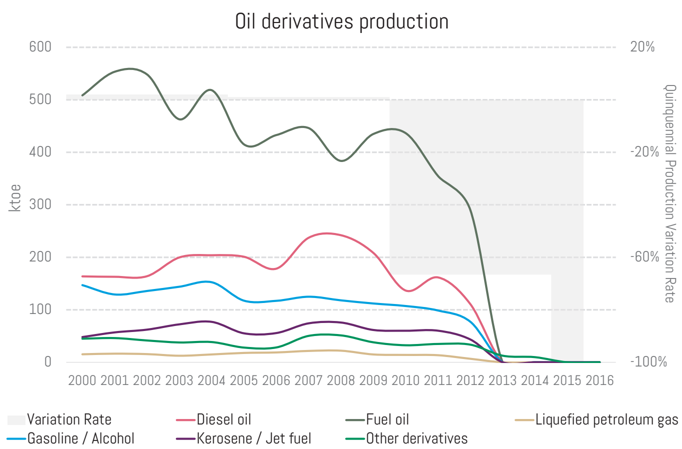


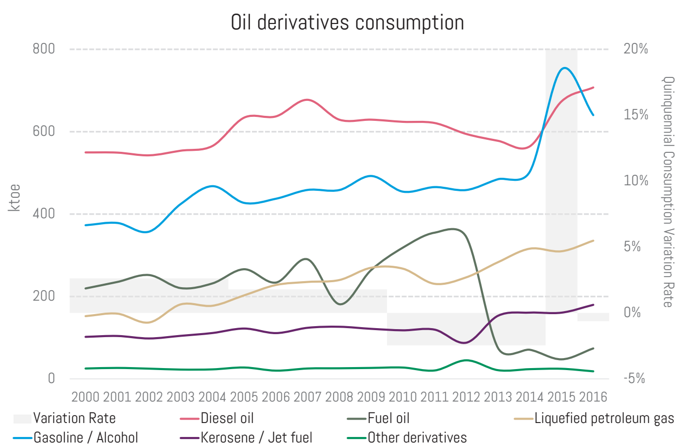


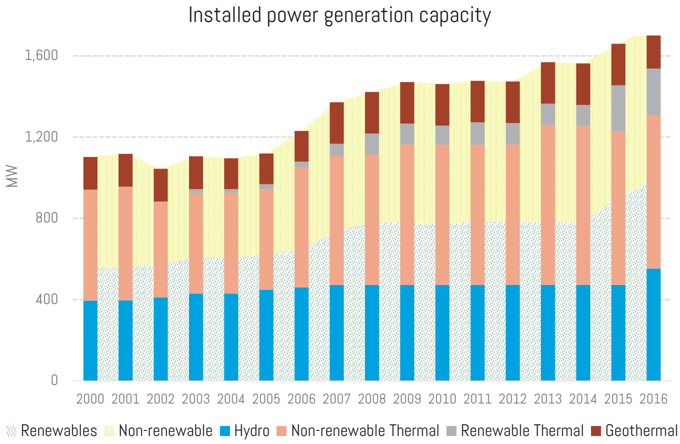
In September 2012, the Salvadoran Refinery (RASA) in Acajutla ceased operations.



EL SALVADOR

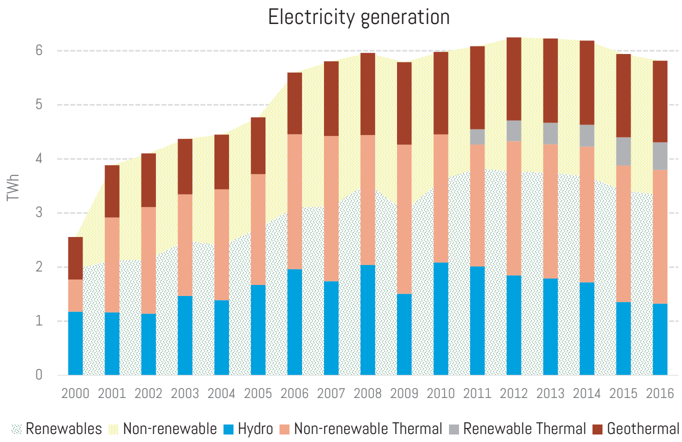


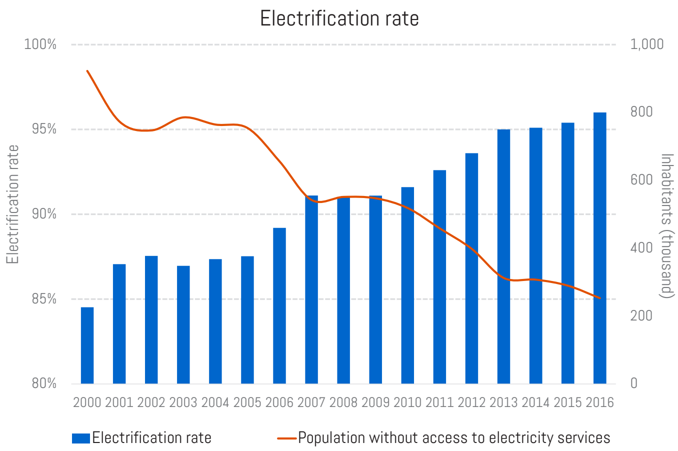


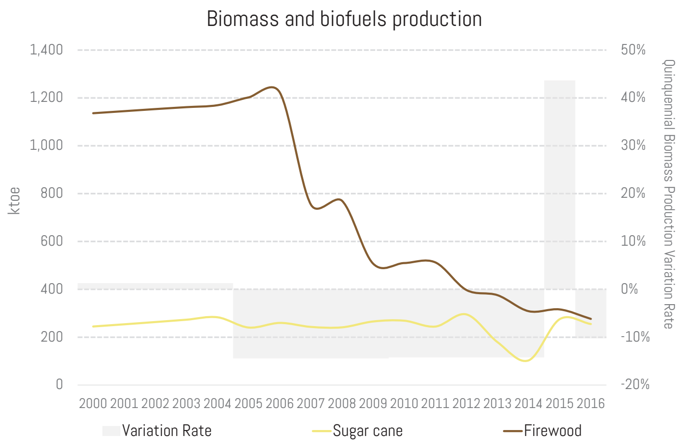


In 2016, the hydroelectric plant “5 de Noviembre” increased its installed capacity from 100 to 180 MW. The expansion covers a construction area of 11.5 hectares and is located between the departments of Chalatenango and Cabañas. This hydroelectric power plant began operating in 1954, with an initial installed capacity of 81.4 MW and that after a first process of repowering, 99.4 MW was generated.

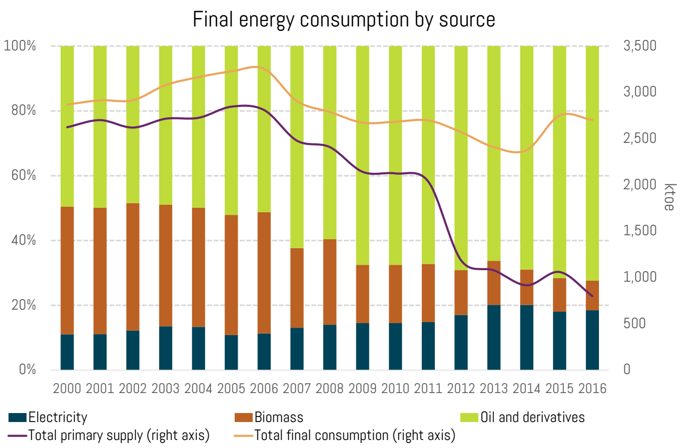
El Salvador produces 26% of the power generation from geothermal sources and not all the potential is exploited yet.

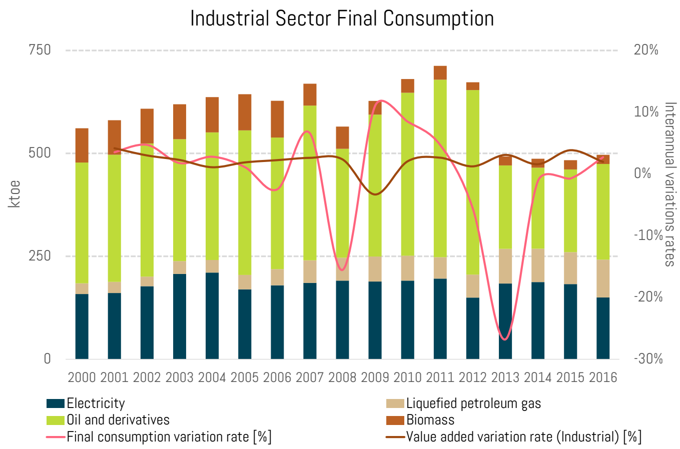


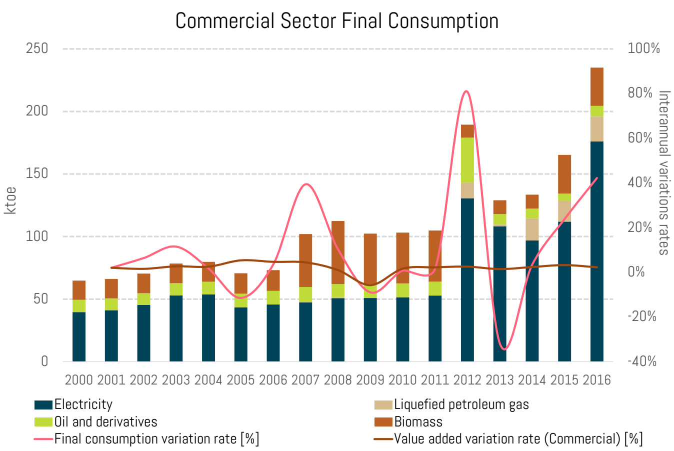


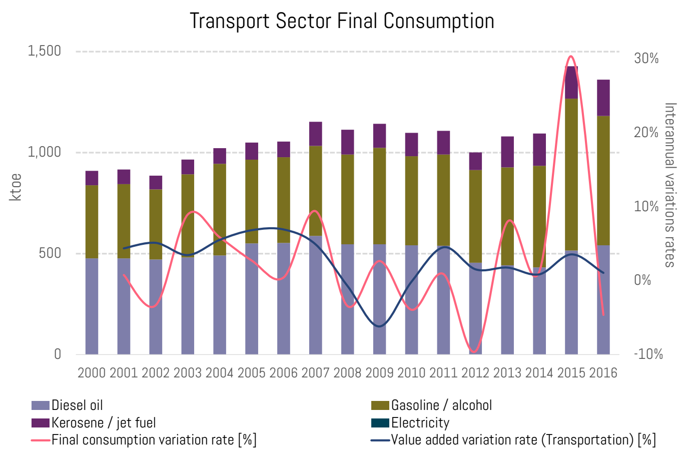


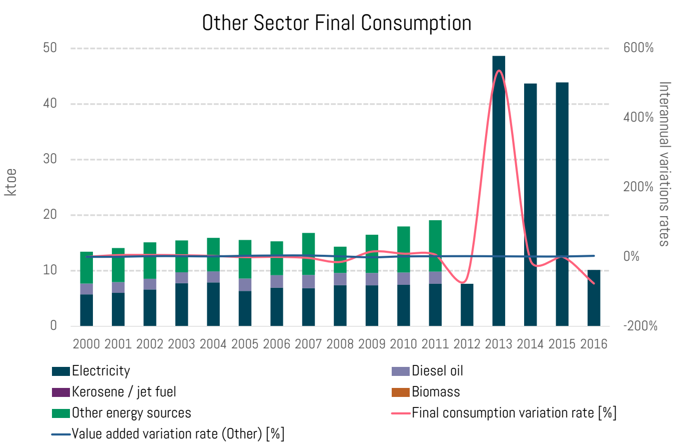
EL SALVADOR

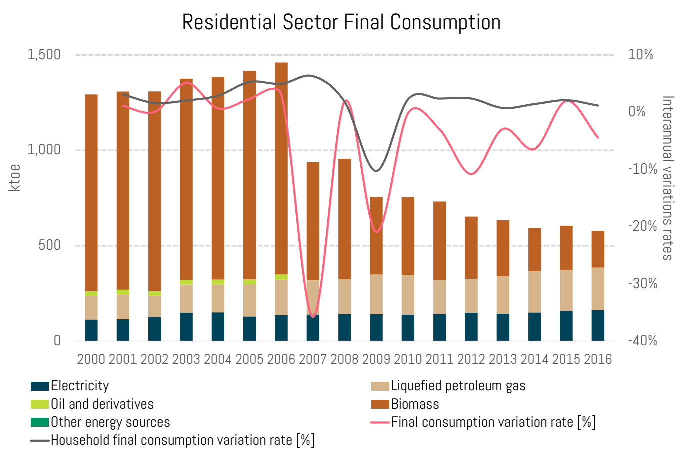

Final energy consumption by source
100%
80%
60%
40%
20%
0%
3,500
3,000
2,500
2,000
1,500
1,000
500
0
ktoe
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Electricity
Biomass
Oil and derivatives
Total primary supply (right axis)
Total final consumption (right axis)


Industrial Sector Final Consumption
750
500
250
0
ktoe
20%
10%
0%
-10%
-20%
-30%
Interannual variations rates
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Electricity
Liquefied petroleum gas
Oil and derivatives
Biomass
Final consumption variation rate [%]
Value added variation rate (Industrial) [%]

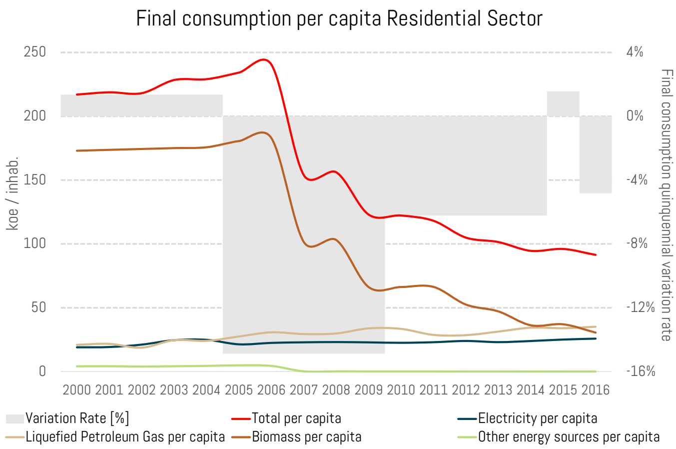

Commercial Sector Final Consumption
250
200
150
100
50
0
ktoe
100%
80%
60%
40%
20%
0%
-20%
-40%
Interannual variations rates
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Electricity
Liquefied petroleum gas
Oil and derivatives
Biomass
Final consumption variation rate [%]
Value added variation rate (Commercial) [%]


Transport Sector Final Consumption
1,500
1,000
500
0
ktoe
30%
20%
10%
0%
-10%
Interannual variations rates
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Diesel oil
Gasoline / alcohol
Kerosene / jet fuel
Electricity
Final consumption variation rate [%]
Value added variation rate (Transportation) [%]

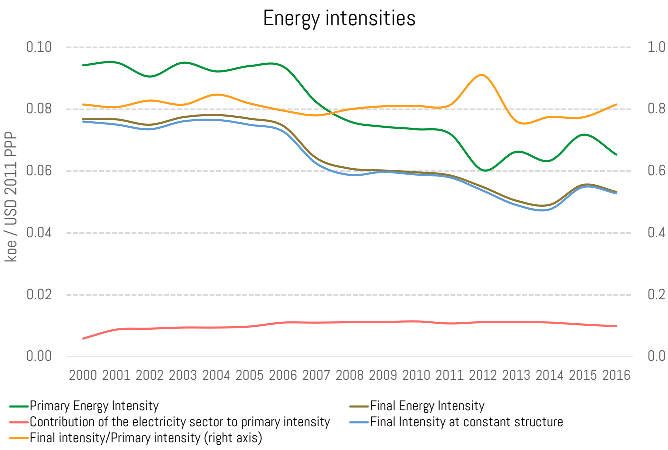

Other Sector Final Consumption
50
40
30
20
10
0
ktoe
600%
400%
200%
0%
-200%
Interannual variations rates
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Electricity
Diesel oil
Kerosene / jet fuel
Biomass
Other energy sources
Final consumption variation rate [%]
Value added variation rate (Other) [%]


Residential Sector Final Consumption
1,500
1,000
500
0
ktoe
10%
0%
-10%
-20%
-30%
-40%
Interannual variations rates
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Electricity
Liquefied petroleum gas
Oil and derivatives
Biomass
Other energy sources
Final consumption variation rate [%]
Household final consumption variation rate [%]

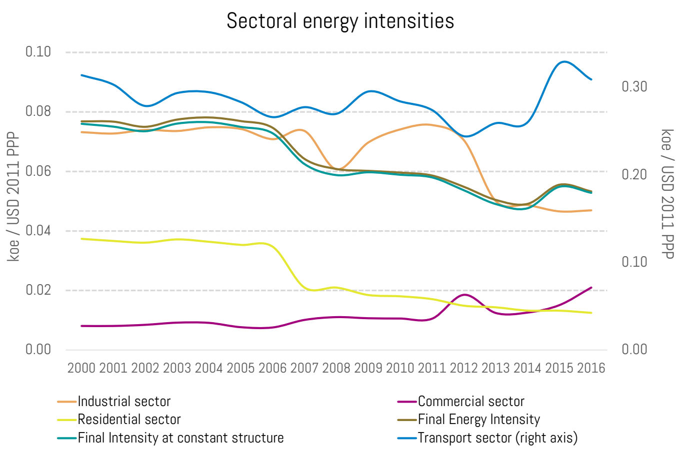
EL SALVADOR



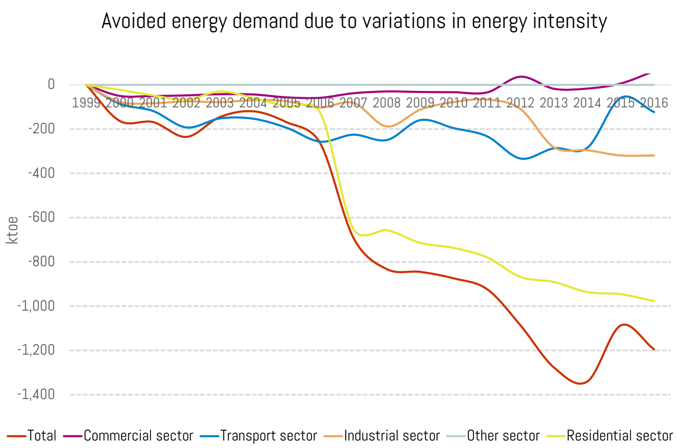
Final consumption per capita Residential Sector
koe / inhab.
Final consumption quinquennial variation rate
Variation Rate [%]
Total per capita
Electricity per capita
Liquefied Petroleum Gas per capita
Biomass per capita
Other energy sources per capita



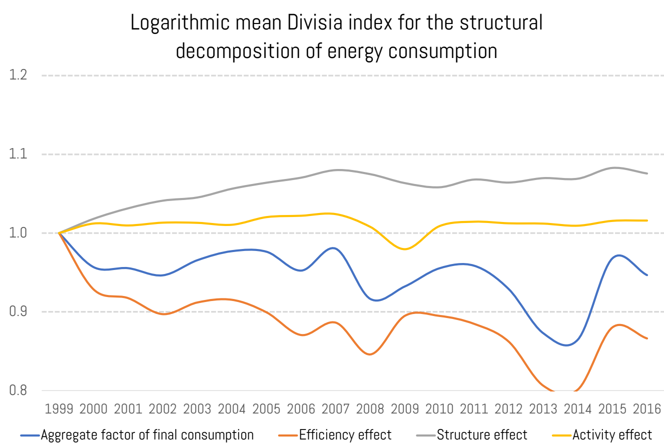
Energy intensities
koe / USD 2011 PPP
Primary Energy Intensity
Final Energy Intensity
Contribution of the electricity sector to primary intensity
Final Intensity at constant structure
Final intensity/Primary intensity (right axis)



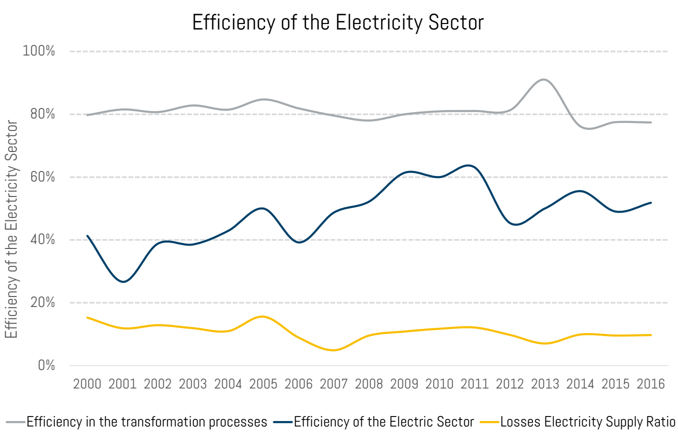
Sectoral energy intensities
koe / USD 2011 PPP
Industrial sector
Commercial sector
Residential sector
Final Energy Intensity
Final Intensity at constant structure
Transport sector (right axis)



Avoided energy demand due to variations in energy intensity
ktoe
Total
Commercial sector
Transport sector
Industrial sector
Other sector
Residential sector



Logarithmic mean Divisia index for the structural decomposition of energy consumption
Aggregate factor of final consumption
Efficiency effect
Structure effect
Activity effect



Efficiency of the Electricity Sector
Efficiency of the Electricity Sector
Efficiency in the transformation processes
Efficiency of the Electric Sector
Losses Electricity Supply Ratio

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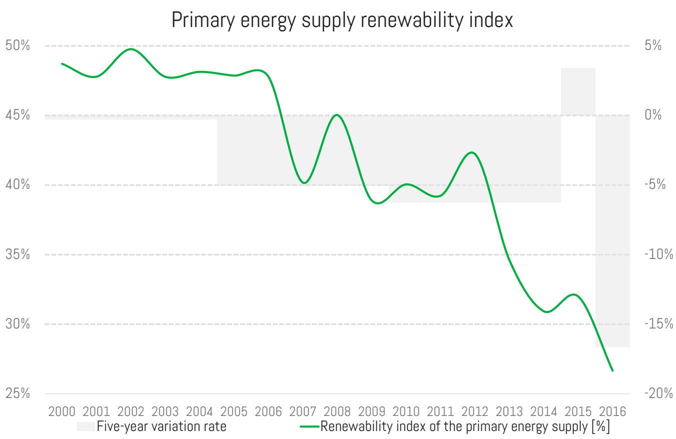
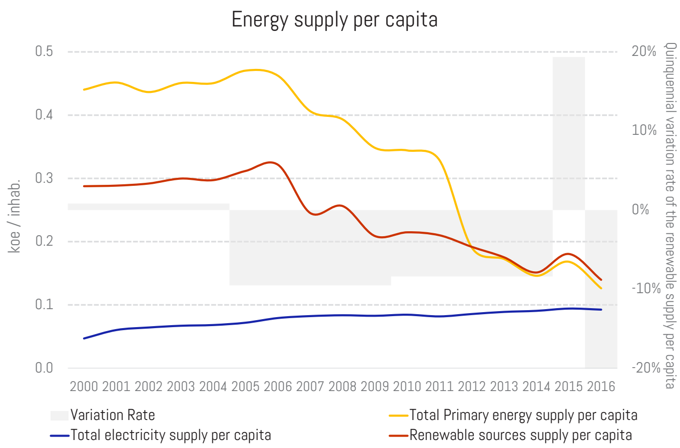
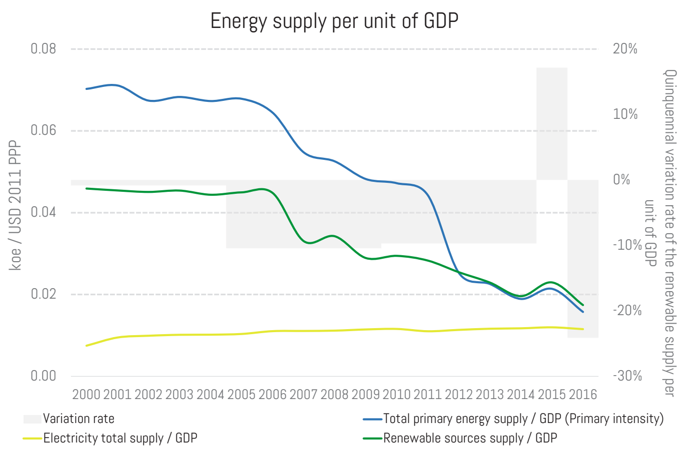
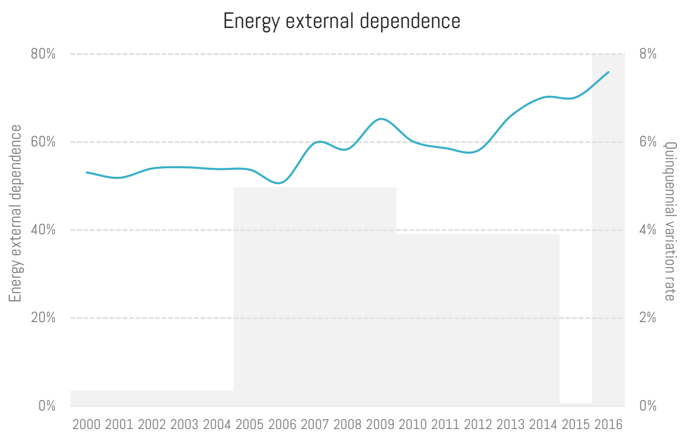
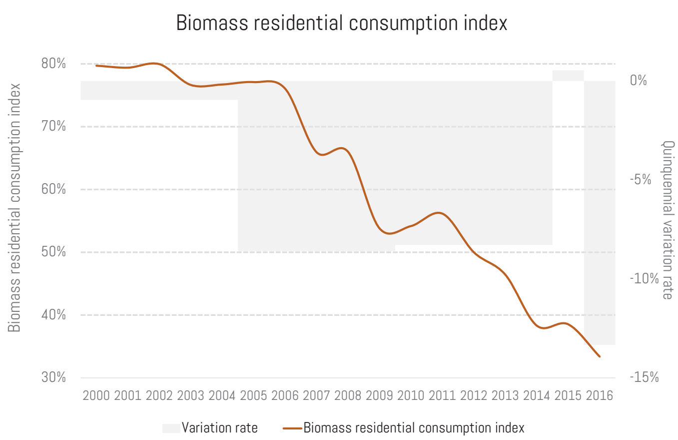
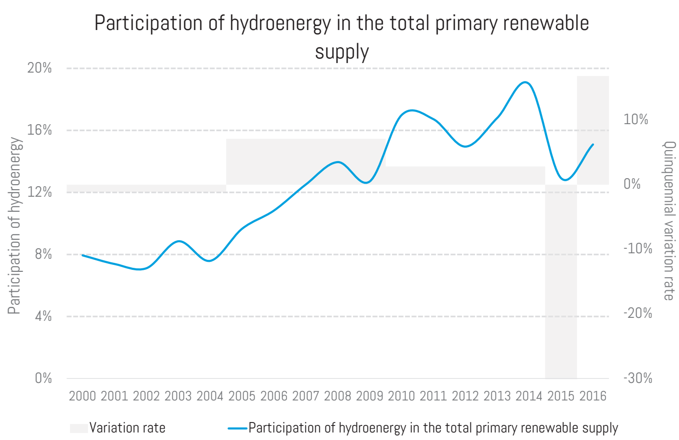

Primary energy supply renewability index
50%
45%
40%
35%
30%
25%
5%
0%
-5%
-10%
-15%
-20%
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Five-year variation rate
Renewability index of the primary energy supply [%]

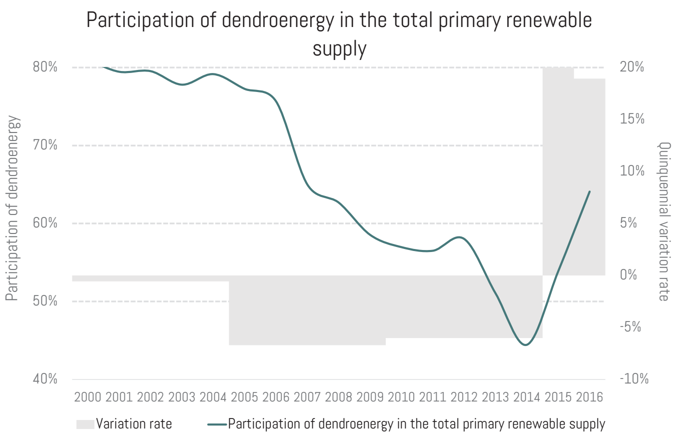

Energy supply per capita
0.5
0.4
0.3
0.2
0.1
0.0
koe / inhab.
20%
10%
0%
-10%
-20%
Quinquennial variation rate of the renewable supply per capita
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Variation Rate
Total Primary energy supply per capita
Total electricity supply per capita
Renewable sources supply per capita

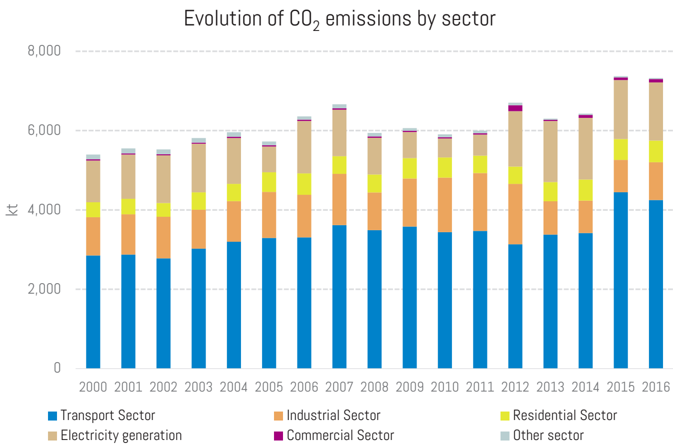

Energy supply per unit of GDP
0.08
0.06
0.04
0.02
0.00
koe / USD 2011 PPP
20%
10%
0%
-10%
-20%
-30%
Quinquennial variation rate of the renewable supply per unit of GDP
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Variation rate
Total primary energy supply / GDP (Primary intensity)
Electricity total supply / GDP
Renewable sources supply / GDP

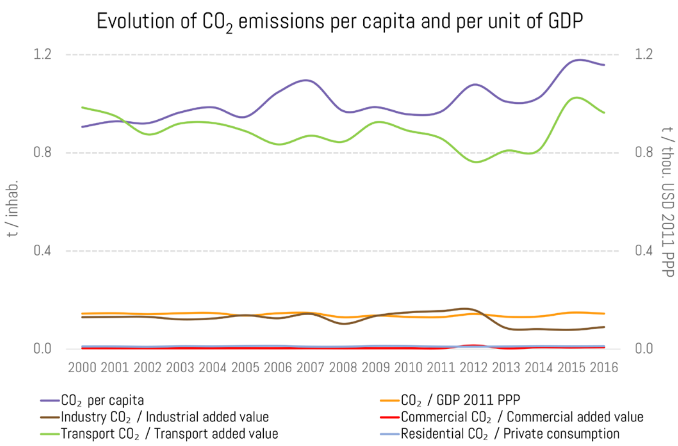

Energy external dependence
80%
60%
40%
20%
0%
Energy external dependence
8%
6%
4%
2%
0%
Quinquennial variation rate
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016

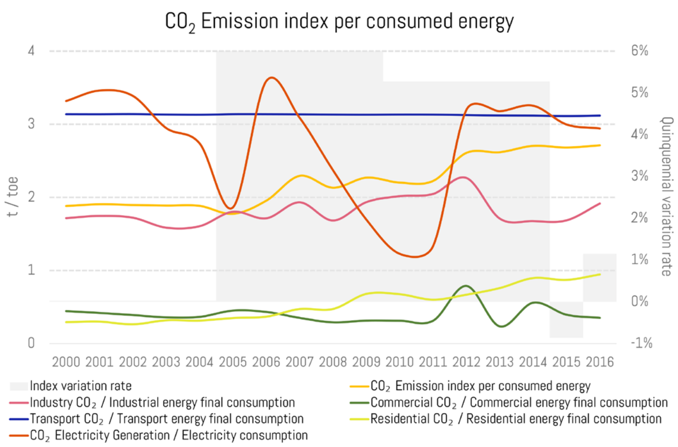

Biomass residential consumption index
80%
70%
60%
50%
40%
30%
Biomass residential consumption index
0%
-5%
-10%
-15%
Quinquennial variation rate
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Variation rate
Biomass residential consumption index

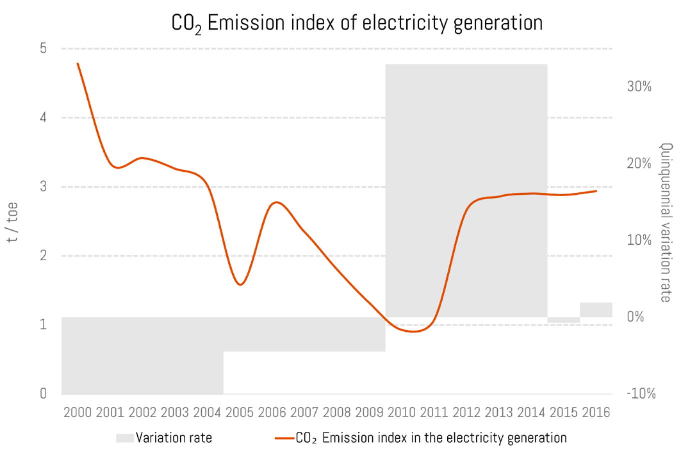

Participation of hydroenergy in the total primary renewable supply
20%
16%
12%
8%
4%
0%
Participation of hydroenergy
10%
0%
-10%
-20%
-30%
Quinquennial variation rate
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Variation rate
Participation of hydroenergy in the total primary renewable supply


Participation of dendroenergy in the total primary renewable supply
Participation of dendroenergy
Quinquennial variation rate
Variation rate
Participation of dendroenergy in the total primary renewable supply


Evolution of CO_2 emissions by sector
kt
Transport Sector
Industrial Sector
Residential Sector
Electricity generation
Commercial Sector
Other sector


Evolution of CO_2 emissions per capita and per unit of GDP
t / inhab.
t / thou. USD 2011 PPP
CO_2 per capita
CO_2 / GDP 2011 PPP
Industry CO_2 / Industrial added value
Commercial CO_2 / Commercial added value
Transport CO_2 / Transport added value
Residential CO_2 / Private consumption


CO_2 Emission index per consumed energy
t / toe
Quinquennial variation rate
Index variation rate
CO_2 Emission index per consumed energy
Industry CO_2 / Industrial energy final consumption
Commercial CO_2 / Commercial energy final consumption
Transport CO_2 / Transport energy final consumption
Residential CO_2 / Residential energy final consumption
CO_2 Electricity Generation / Electricity consumption


CO_2 Emission index of electricity generation
t / toe
Quinquennial variation rate
Variation rate
CO_2 Emission index in the electricity generation

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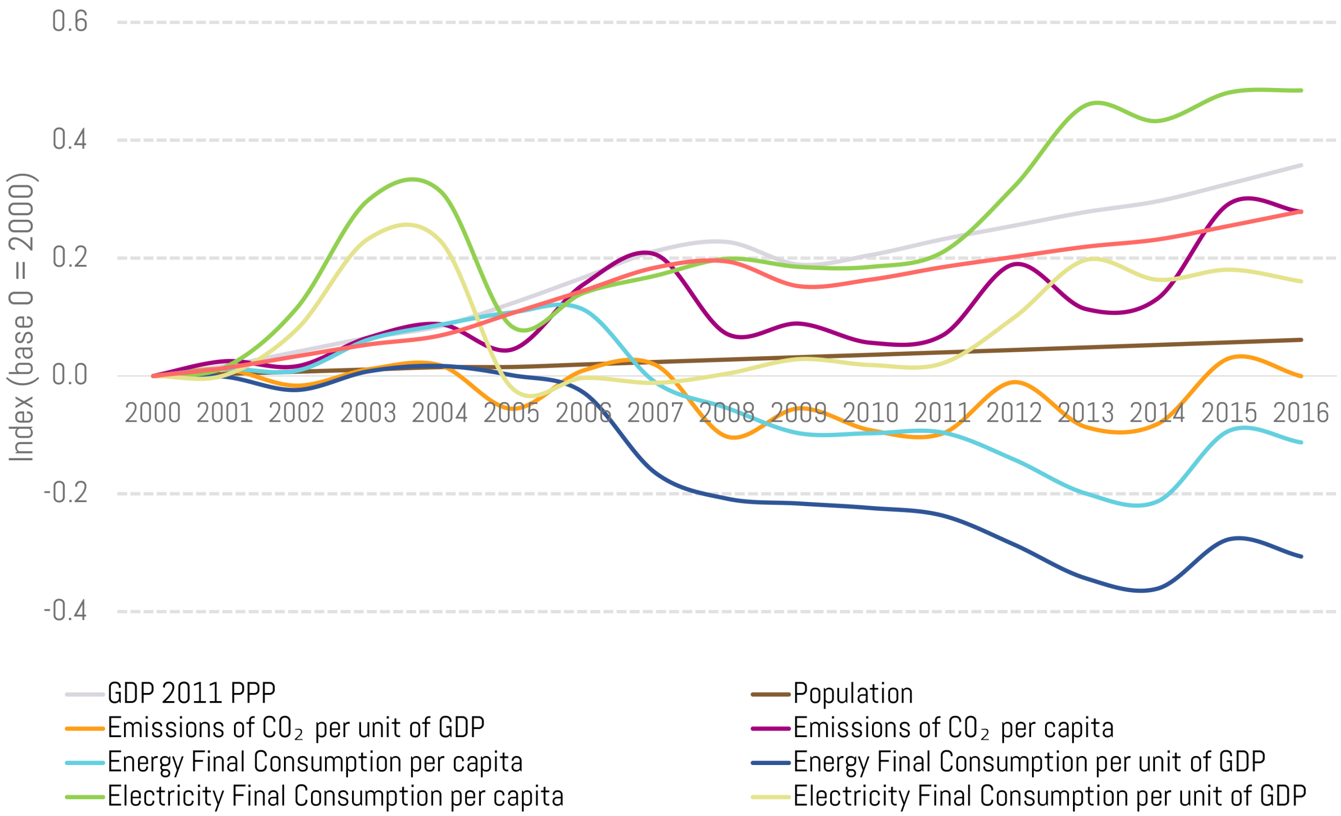
Summary of the main energy indicators



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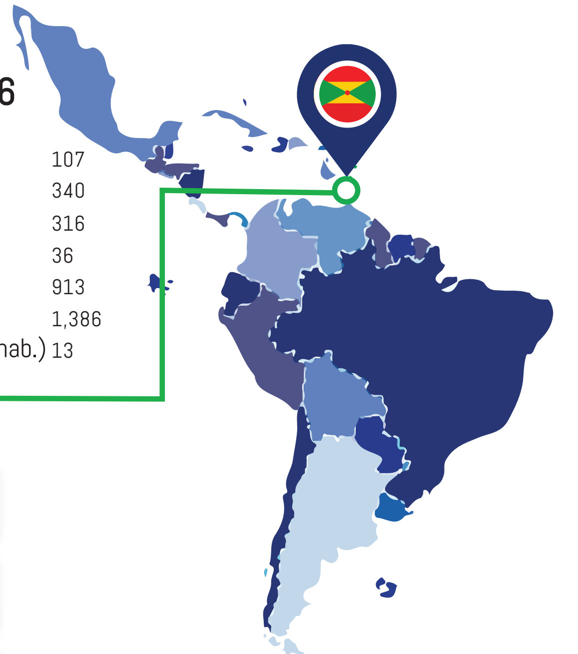
GRENADA

GENERAL INFORMATION 2016

Population (thousand inhab.)	107
Area (km²)	340
Population Density (inhab./km²)	316
Urban Population (%)	36
GDP USD 2010 (MUSD)	913
GDP USD 2011 PPP (MUSD)	1,386
GDP per capita (thou. USD 2011 PPP/inhab.)	13



ENERGY SECTOR[1]

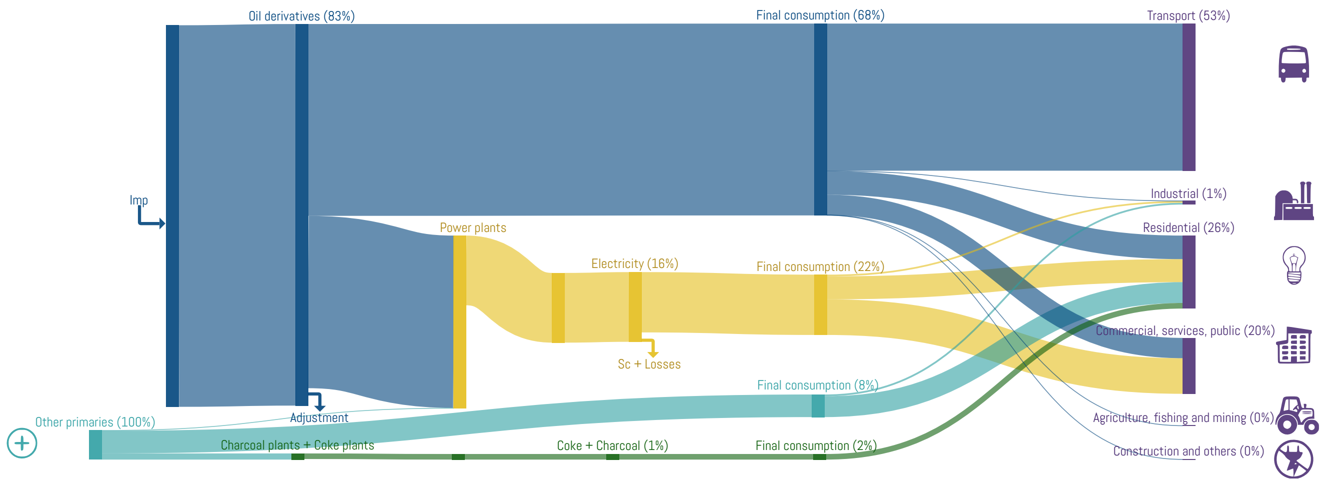
Final consumption in the Transport Sector	Mtoe	0.04
Final consumption in the Industrial Sector	Mtoe	0.00
Final consumption in the Residential Sector	Mtoe	0.02
Final consumption in the Commercial and Service Sector	Mtoe	0.02
Final consumption in the Agriculture, Livestock, Fishing, Mining, Other and Non - Energy Consumption	Mtoe	0.00

Oil Reserves	Mbbl	n.a.
Natural gas reserves	Gm³	n.a.
Coal reserves	Mt	n.a.

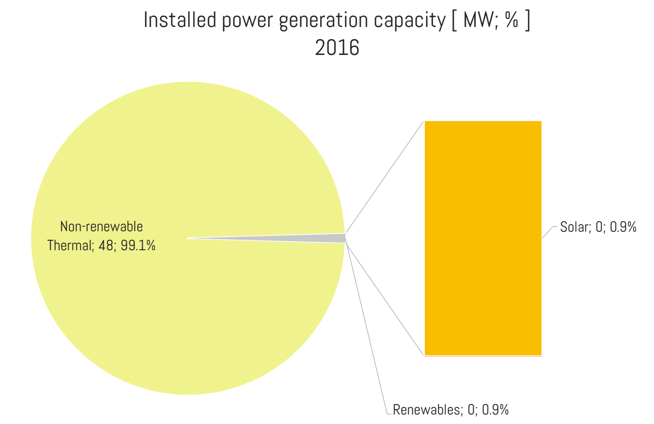
[1] Data estimated by OLADE .
[2] 2015 Data.

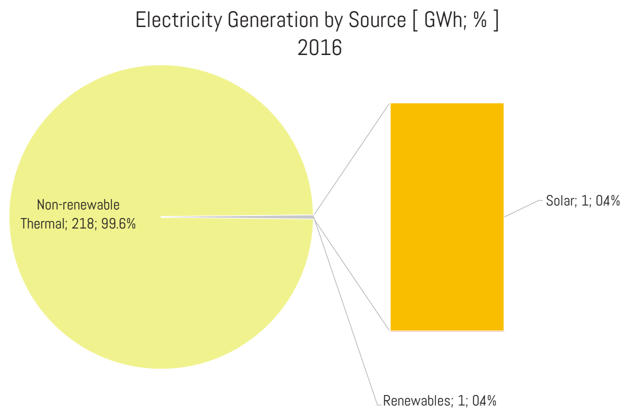
Indicator	Unit	Value
Electricity consumption per capita	kWh / inhab.	1,761
Final energy consumption per capita	toe / inhab.	0.70
Electrification rate	%	98.10[2]
Total energy supply	Mtoe	0.11
Total energy production	Mtoe	0.01
Total energy imports	Mtoe	0.10
Total energy exports	Mtoe	0.00
Total final energy consumption	Mtoe	0.08
Refining capacity	kbbl/day	n.a.
Installed power generation capacity	GW	0.05
Primary energy intensity and final energy intensity	koe / USD 2011 PPP	0.01 / 0.05

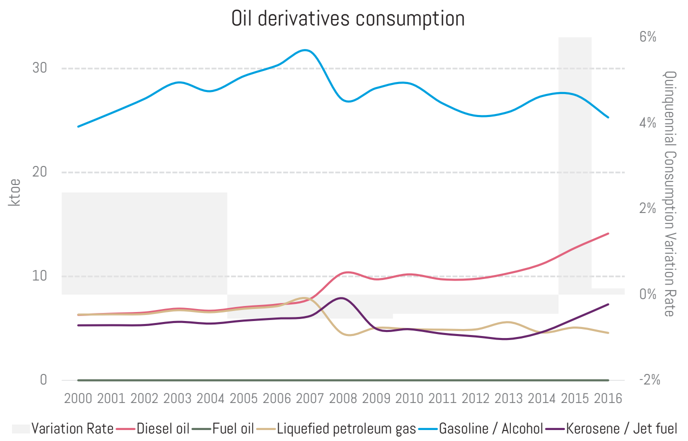
Summarized energy matrix 2016

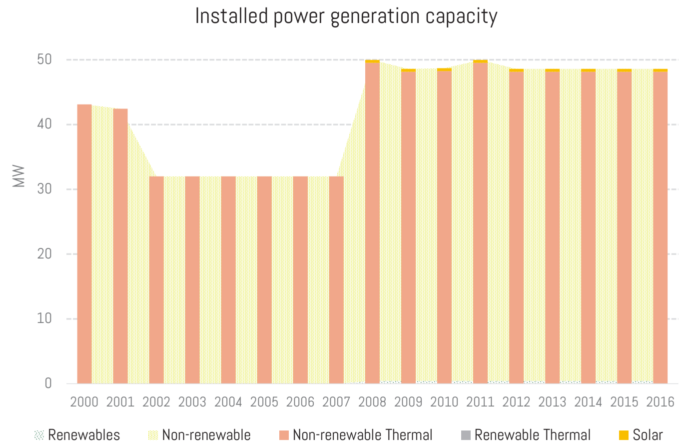


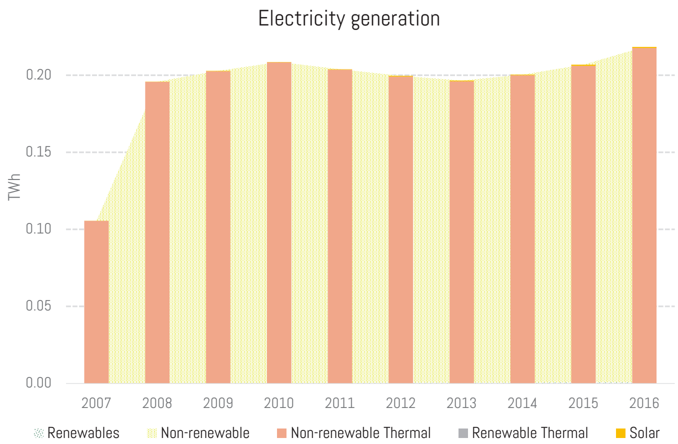
GRENADA

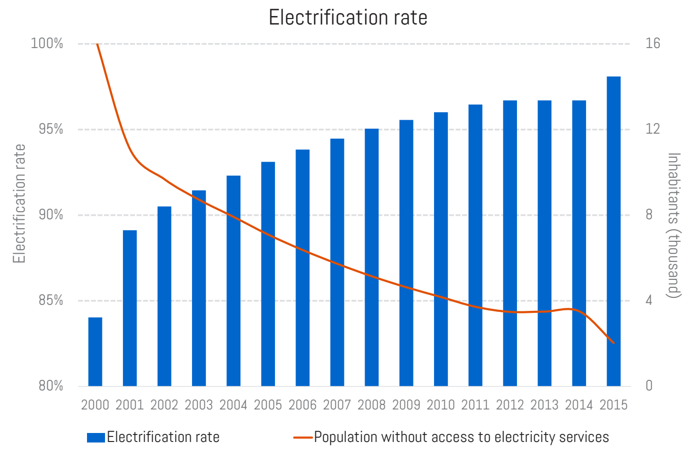

Installed power generation capacity [MW; %]
2016
Non-renewable Thermal; 48; 99.1%
Solar; 0; 0.9%
Renewables; 0; 0.9%


Electricity Generation by Source [GWh; %]
2016
Non-renewable Thermal; 218; 99.6%
Solar; 1; 04%
Renewables; 1; 04%

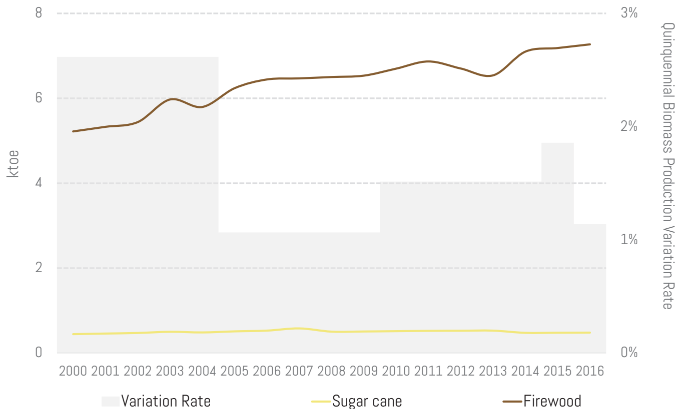

Oil derivatives consumption
ktoe
Quinquennial Consumption Variation Rate
30
20
10
0
6%
4%
2%
0%
-2%
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Variation Rate
Diesel oil
Fuel oil
Liquefied petroleum gas
Gasoline / Alcohol
Kerosene / Jet fuel


Installed power generation capacity
MW
50
40
30
20
10
0
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Renewables
Non-renewable
Non-renewable Thermal
Renewable Thermal
Solar

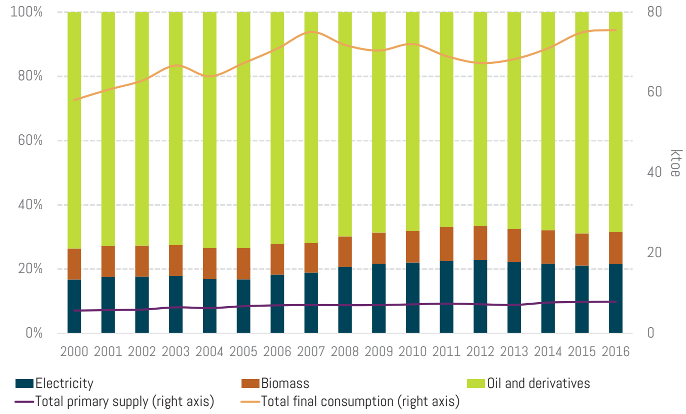

Electricity generation
TWh
0.20
0.15
0.10
0.05
0.00
2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Renewables
Non-renewable
Non-renewable Thermal
Renewable Thermal
Solar


Electrification rate
Electrification rate
Inhabitants (thousand)
100%
95%
90%
85%
80%
16
12
8
4
0
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015
Electrification rate
Population without access to electricity services

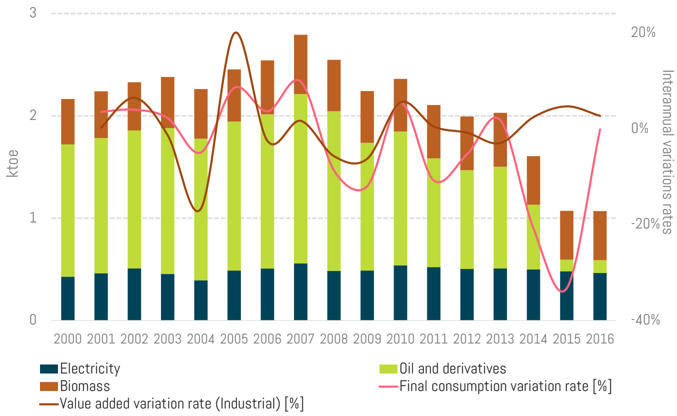
Biomass production



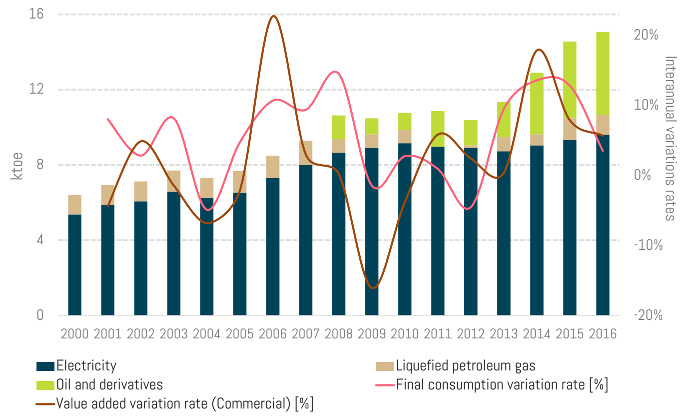
Final energy consumption by source



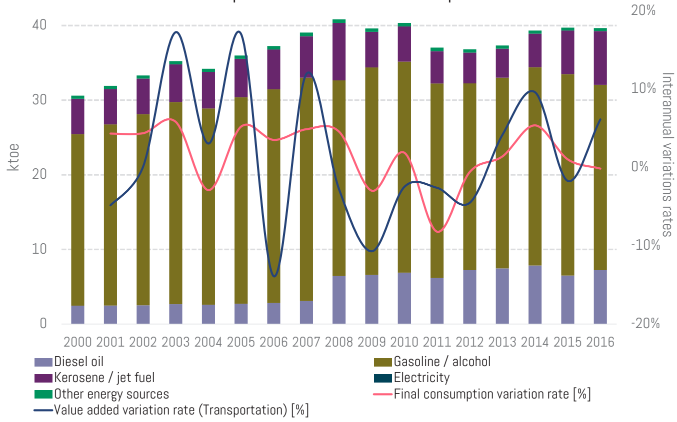
Industrial Sector Final Consumption



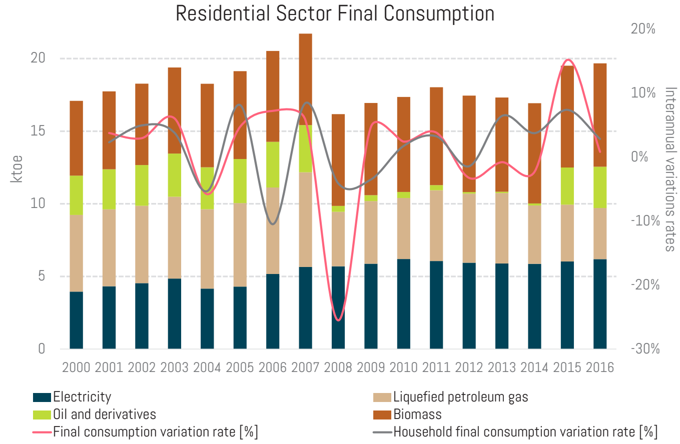
Commercial Sector Final Consumption



Transport Sector Final Consumption



Residential Sector Final Consumption



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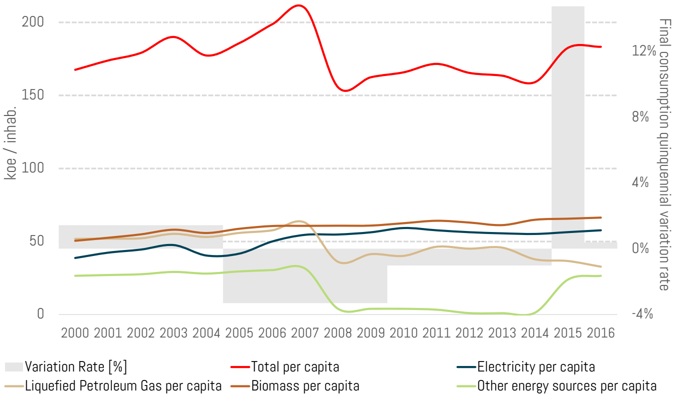
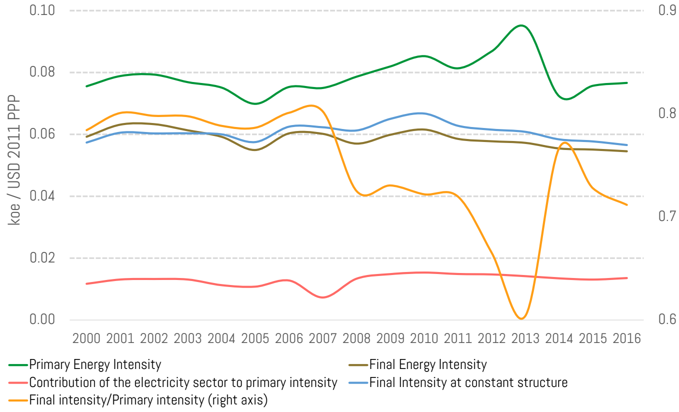
GRENADA

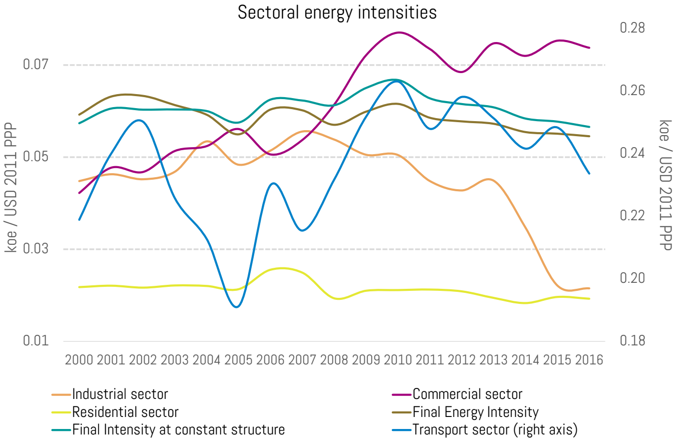
Final consumption per capita Residential Sector



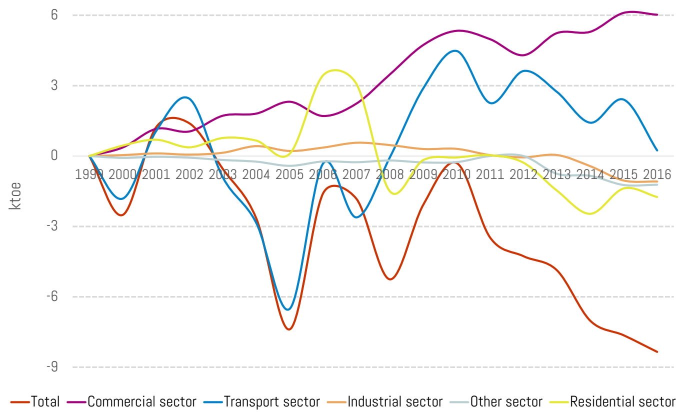
Energy intensities



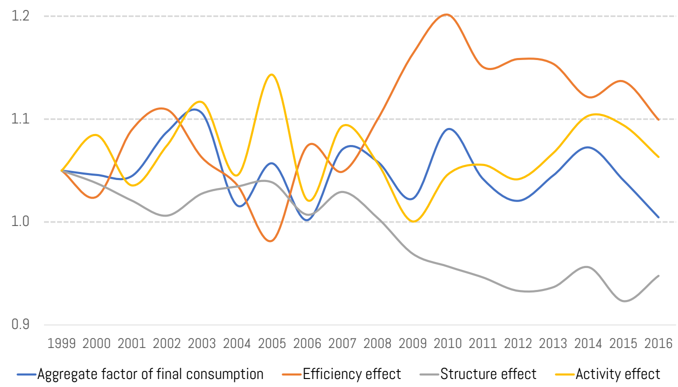
Sectoral energy intensities



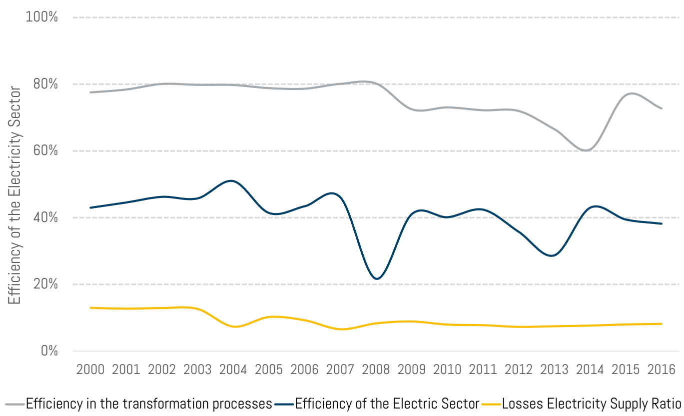
Avoided energy demand due to variations in energy intensity

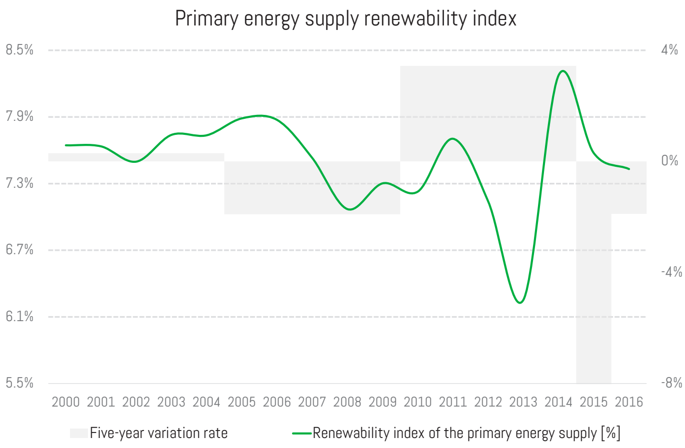


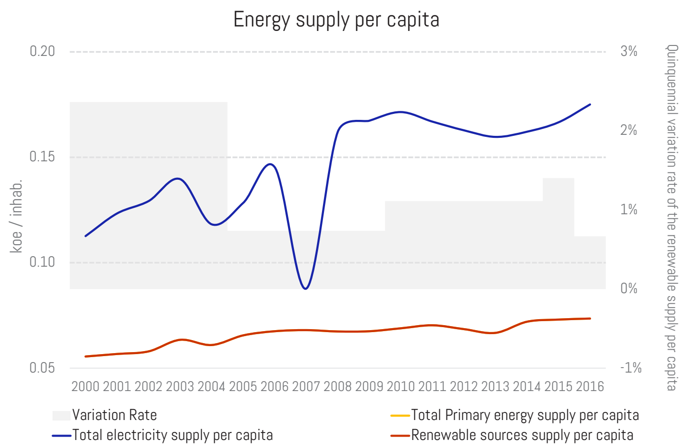
Logarithmic mean Divisia index for the structural decomposition of energy consumption

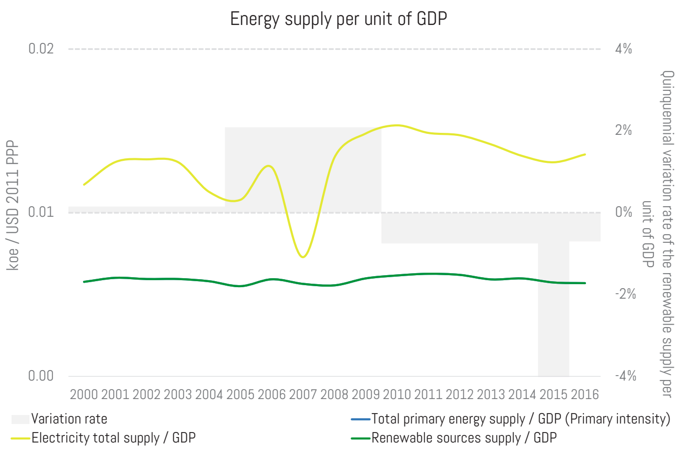


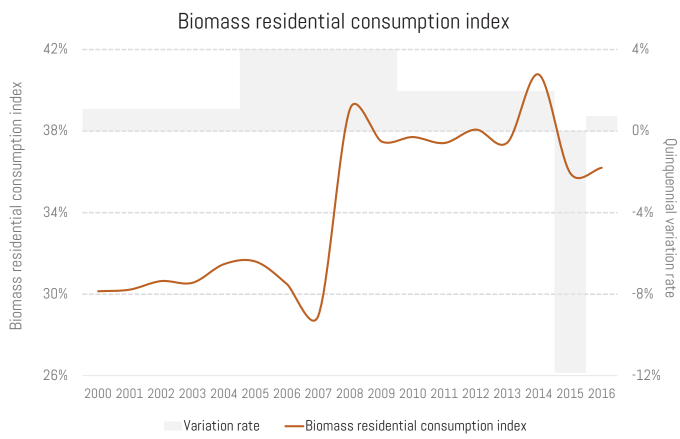
Efficiency of the Electricity Sector

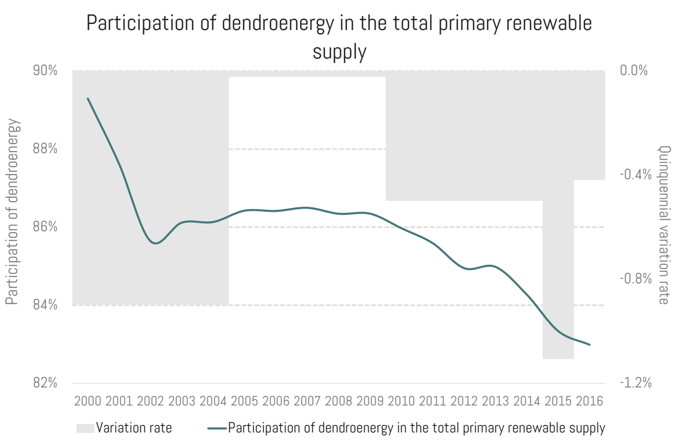


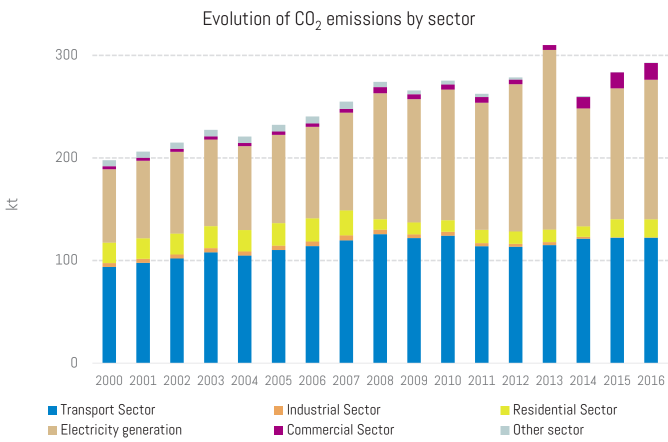

Primary energy supply renewability index
Five-year variation rate
Renewability index of the primary energy supply [%]


Energy supply per capita
koe / inhab.
Quinquennial variation rate of the renewable supply per capita
Variation Rate
Total Primary energy supply per capita
Total electricity supply per capita
Renewable sources supply per capita


Energy supply per unit of GDP
koe / USD 2011 PPP
Quinquennial variation rate of the renewable supply per unit of GDP
Variation rate
Total primary energy supply / GDP (Primary intensity)
Electricity total supply / GDP
Renewable sources supply / GDP

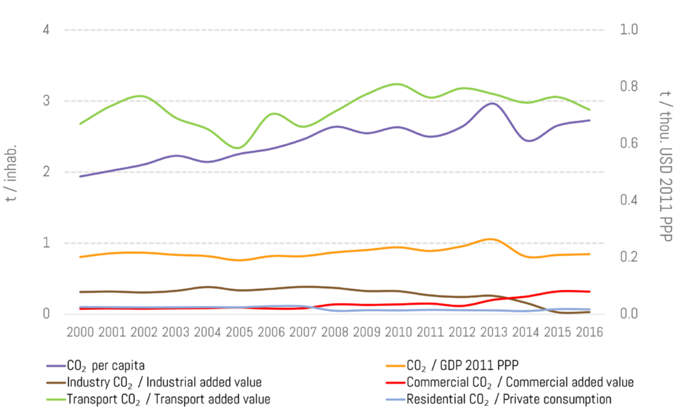

Biomass residential consumption index
Biomass residential consumption index
Quinquennial variation rate
Variation rate
Biomass residential consumption index


Participation of dendroenergy in the total primary renewable supply
Participation of dendroenergy
Quinquennial variation rate
Variation rate
Participation of dendroenergy in the total primary renewable supply

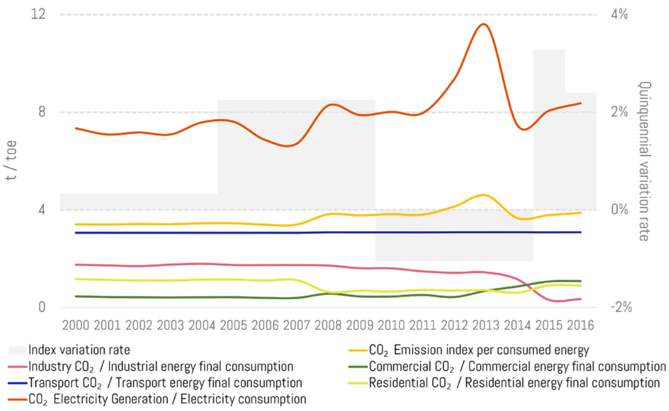

Evolution of CO_2 emissions by sector
kt
Transport Sector
Industrial Sector
Residential Sector
Electricity generation
Commercial Sector
Other sector

GRENADA

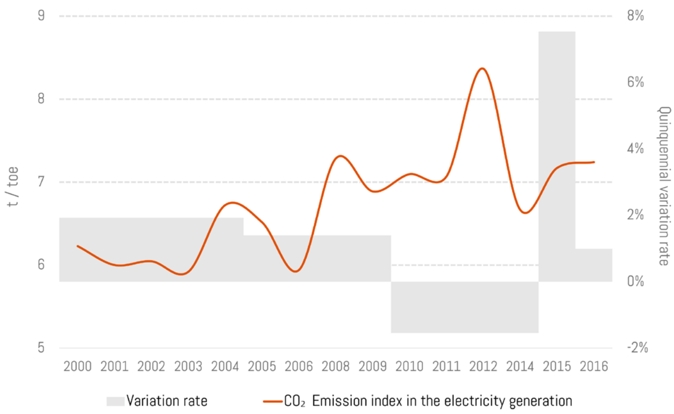
Evolution of CO_2 emissions per capita and per unit of GDP



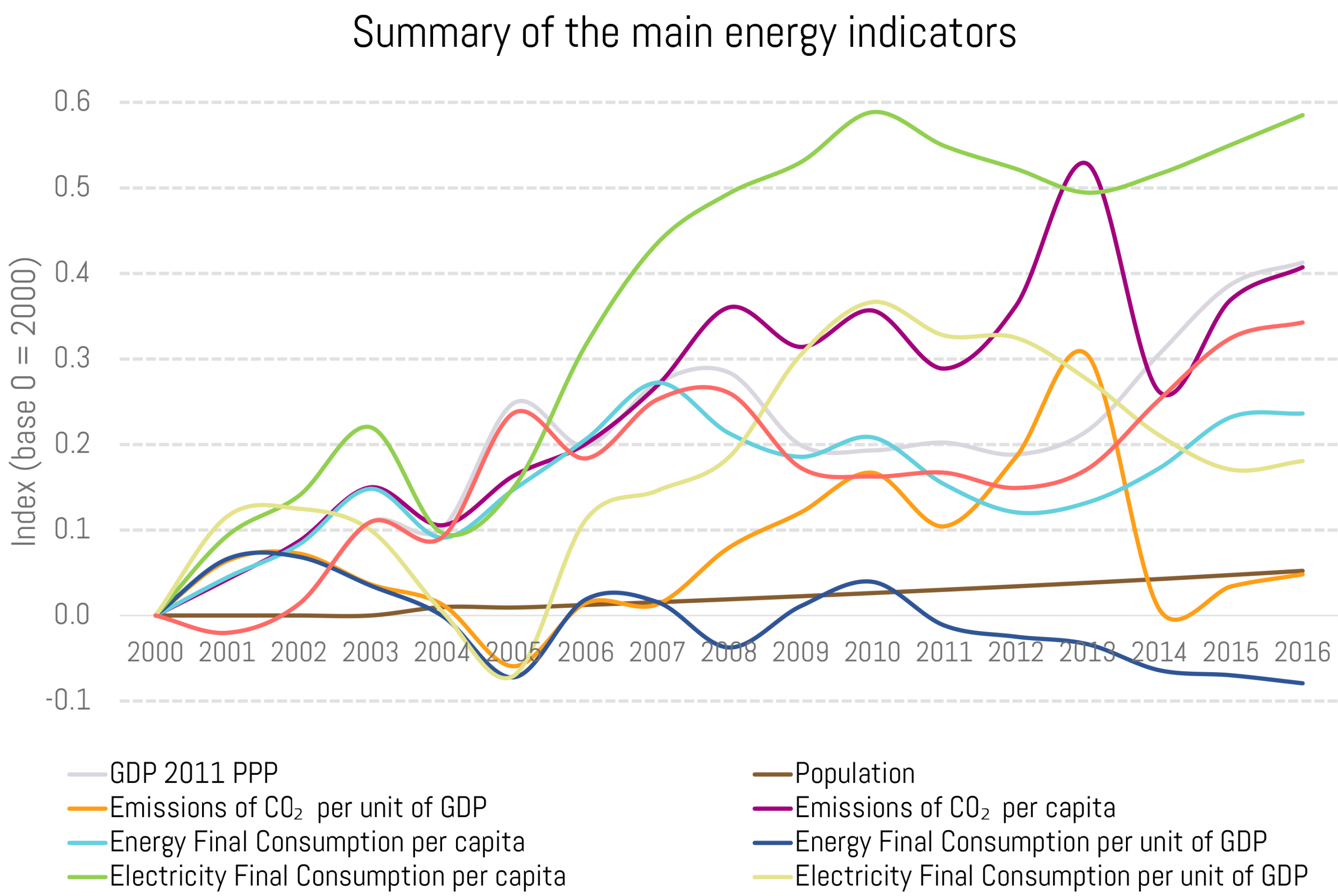
CO_2 Emission index per consumed energy



CO_2 Emission index of electricity generation

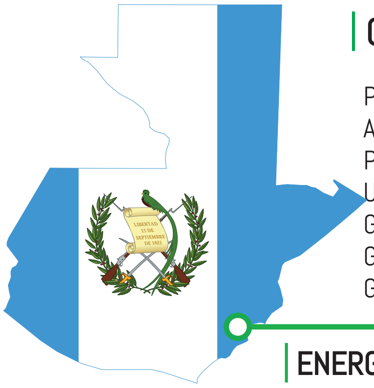


GRENADA


Summary of the main energy indicators
Index (base 0 = 2000)
0.6
0.5
0.4
0.3
0.2
0.1
0.0
-0.1
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
GDP 2011 PPP
Population
Emissions of CO2 per unit of GDP
Emissions of CO2 per capita
Energy Final Consumption per capita
Energy Final Consumption per unit of GDP
Electricity Final Consumption per capita
Electricity Final Consumption per unit of GDP

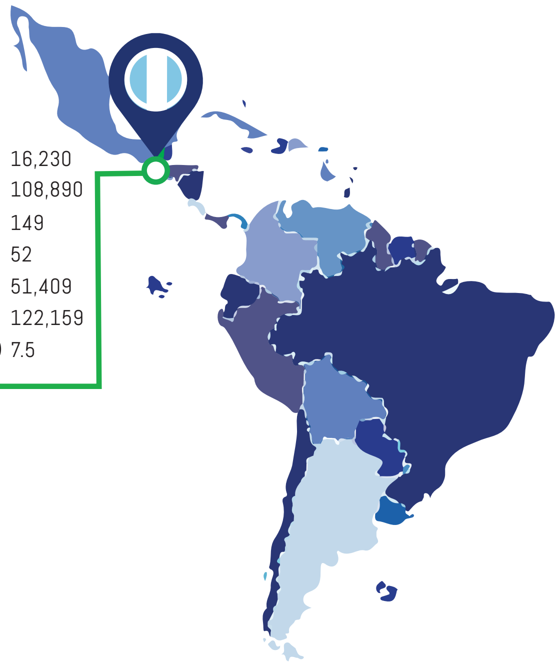
GRENADA

GUATEMALA



GENERAL INFORMATION 2016

Population (thousand inhab.)	16,230
Area (km^2)	108,890
Population Density (inhab./km^2)	149
Urban Population (%)	52
GDP USD 2010 (MUSD)	51,409
GDP USD 2011 PPP (MUSD)	122,159
GDP per capita (thou. USD 2011 PPP/inhab.)	7.5



ENERGY SECTOR

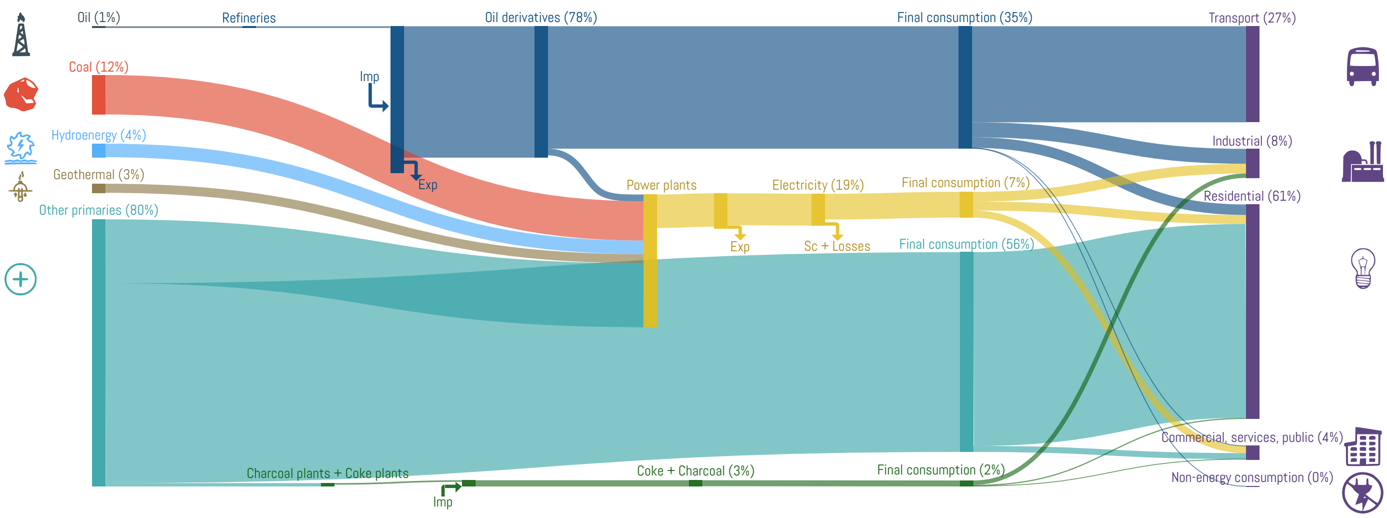
Final consumption in the Transport Sector	Mtoe 3.08
Final consumption in the Industrial Sector	Mtoe 0.93
Final consumption in the Residential Sector	Mtoe 6.87
Final consumption in the Commercial and Service Sector	Mtoe 0.45
Final consumption in the Agriculture, Livestock, Fishing, Mining, Other and Non - Energy Consumption	Mtoe 0.01

Oil Reserves	Natural gas reserves	Coal reserves
Mbbl 437.2[1]	Gm^3 0.6[1]	Mt n.a.

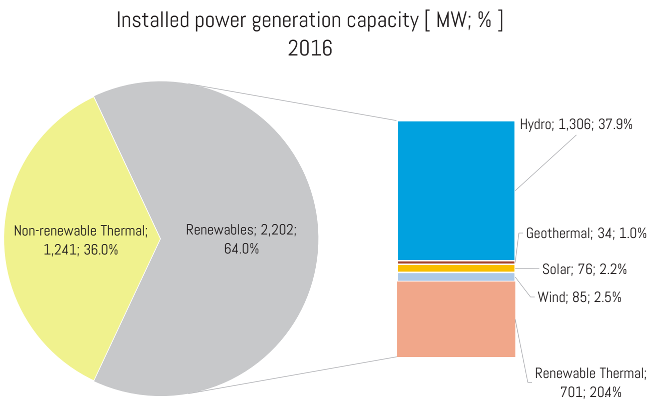
[1] Data estimated by OLADE.

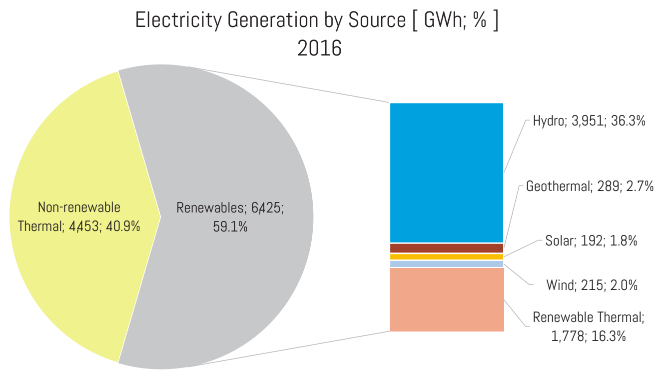
Electricity consumption per capita	Final energy consumption per capita	Electrification rate	Total energy supply	Total energy production	Total energy imports	Total energy exports	Total final energy consumption	Refining capacity	Installed power generation capacity	Primary energy intensity and final energy intensity
kWh / inhab.	toe / inhab.	%	Mtoe	Mtoe	Mtoe	Mtoe	Mtoe	kbbl/day	GW	koe / USD 2011 PPP
591	0.70	92.06	14.81	9.73	6.29	0.98	11.34	15[1]	3.44	0.09 / 0.09

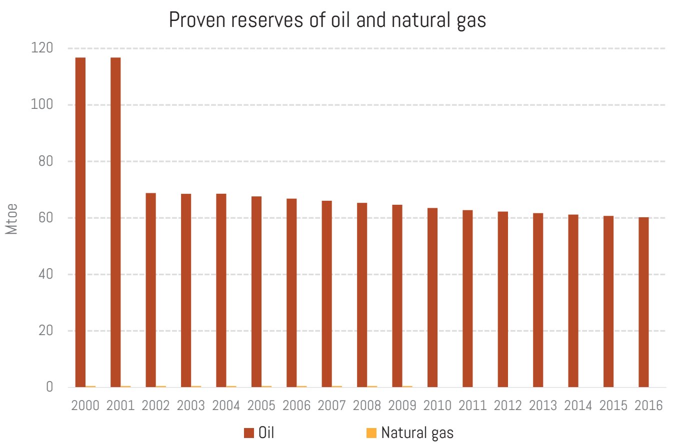
Summarized energy matrix 2016

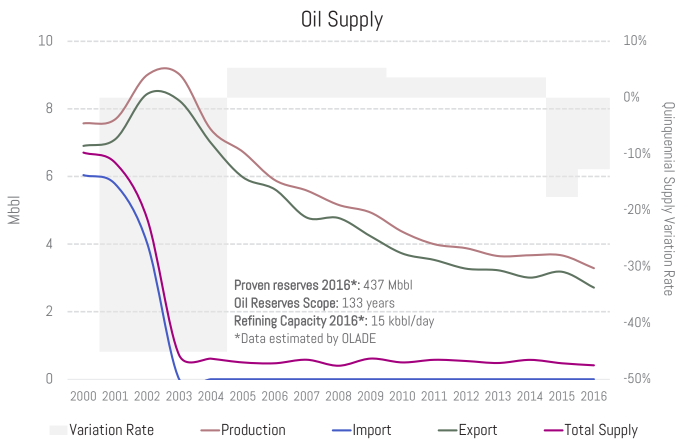


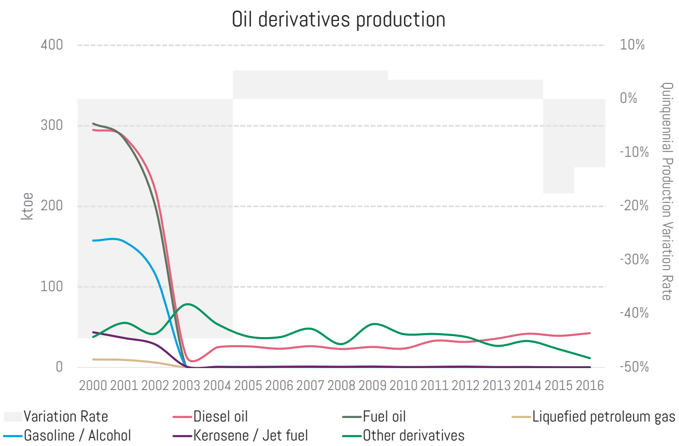
GUATEMALA

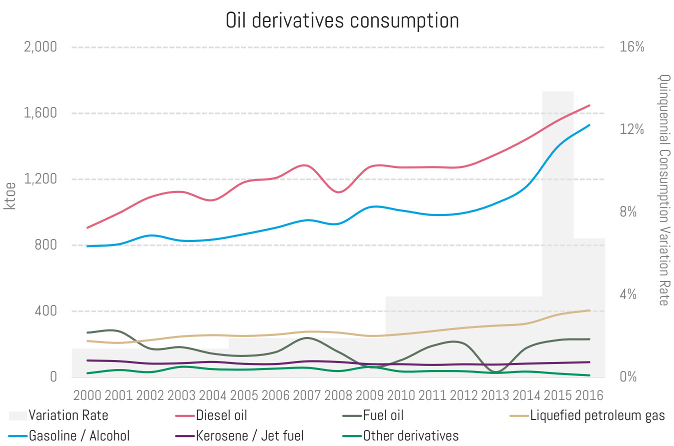

Installed power generation capacity [MW; %]
2016
Non-renewable Thermal; 1,241; 36.0%
Renewables; 2,202; 64.0%
Hydro; 1,306; 37.9%
Geothermal; 34; 1.0%
Solar; 76; 2.2%
Wind; 85; 2.5%
Renewable Thermal; 701; 204%


Electricity Generation by Source [GWh; %]
2016
Non-renewable Thermal; 4453; 40.9%
Renewables; 6425; 59.1%
Hydro; 3,951; 36.3%
Geothermal; 289; 2.7%
Solar; 192; 1.8%
Wind; 215; 2.0%
Renewable Thermal; 1,778; 16.3%

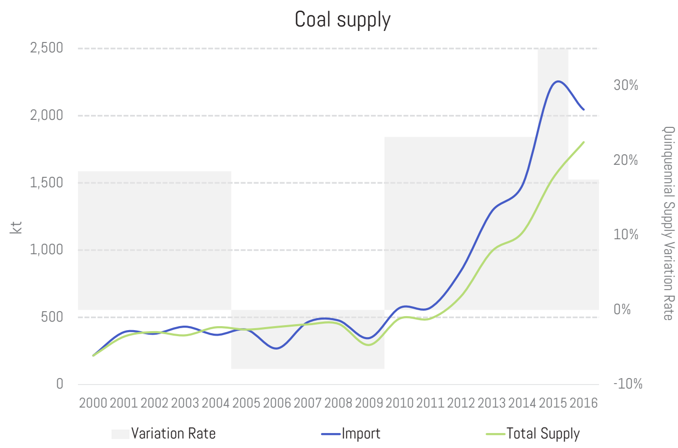

Proven reserves of oil and natural gas
Mtoe
0
20
40
60
80
100
120
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Oil
Natural gas

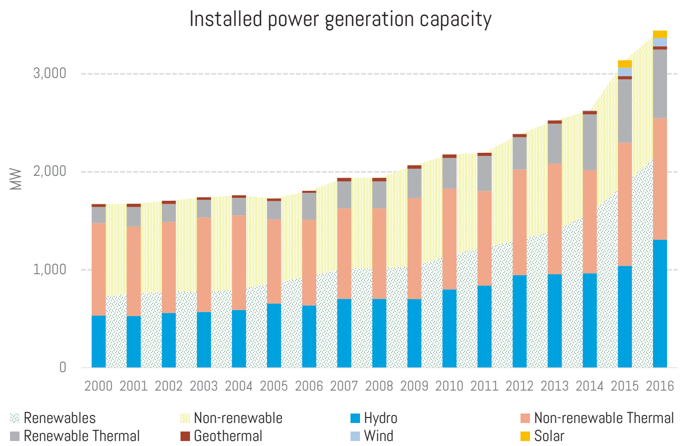

Oil Supply
Mbbl
0
2
4
6
8
10
10%
0%
-10%
-20%
-30%
-40%
-50%
Quinquennial Supply Variation Rate
Proven reserves 2016*: 437 Mbbl
Oil Reserves Scope: 133 years
Refining Capacity 2016*: 15 kbbl/day
*Data estimated by OLADE
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Variation Rate
Production
Import
Export
Total Supply

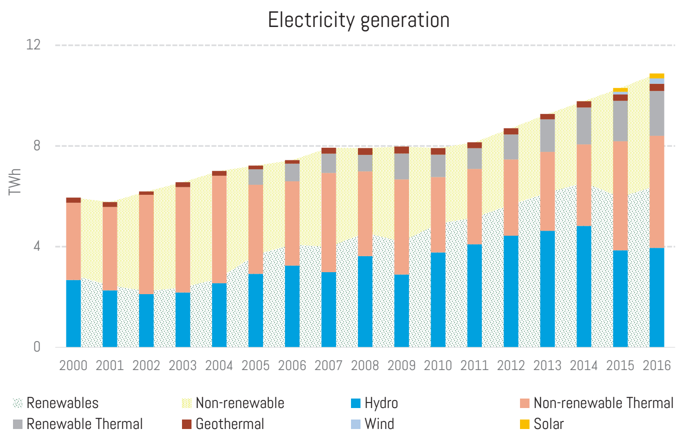

Oil derivatives production
ktoe
0
100
200
300
400
10%
0%
-10%
-20%
-30%
-40%
-50%
Quinquennial Production Variation Rate
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Variation Rate
Diesel oil
Fuel oil
Liquefied petroleum gas
Gasoline / Alcohol
Kerosene / Jet fuel
Other derivatives

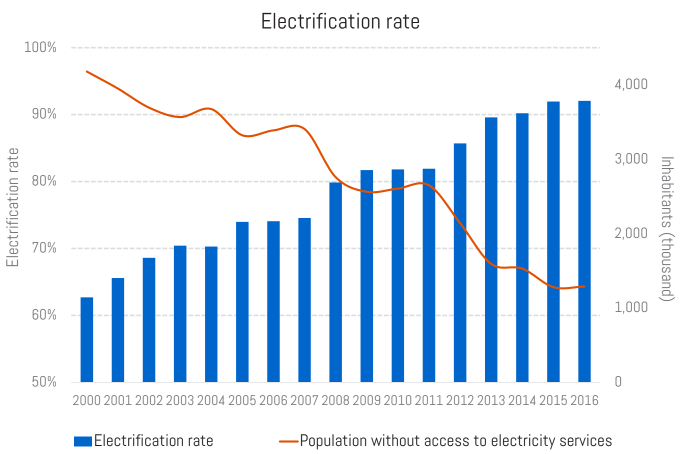

Oil derivatives consumption
ktoe
0
400
800
1,200
1,600
2,000
16%
12%
8%
4%
0%
Quinquennial Consumption Variation Rate
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Variation Rate
Diesel oil
Fuel oil
Liquefied petroleum gas
Gasoline / Alcohol
Kerosene / Jet fuel
Other derivatives

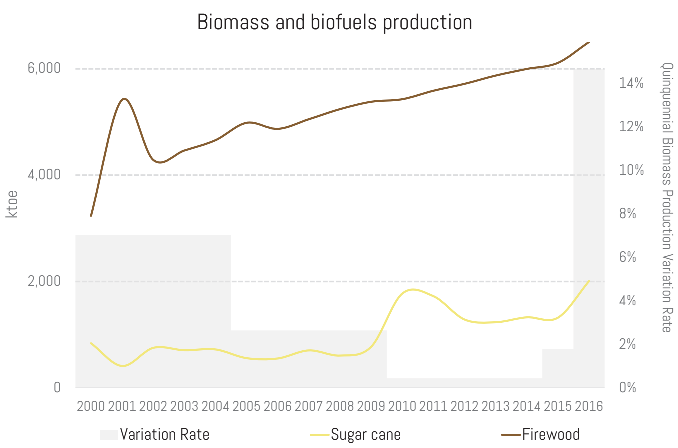
In April 2015, the entity San Antonio El Sitio, Sociedad Anónima; installed the first wind generation park, composed of 16 wind turbines, each with a power of 3.3 MW and a total of 52.8 MW. This park is located in the municipality of Villa Canales, department of Guatemala.



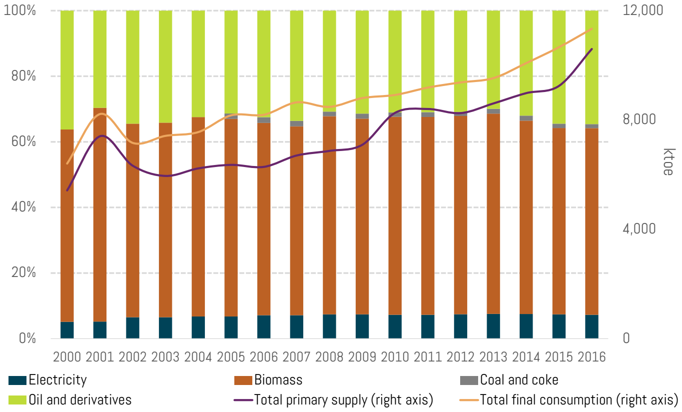




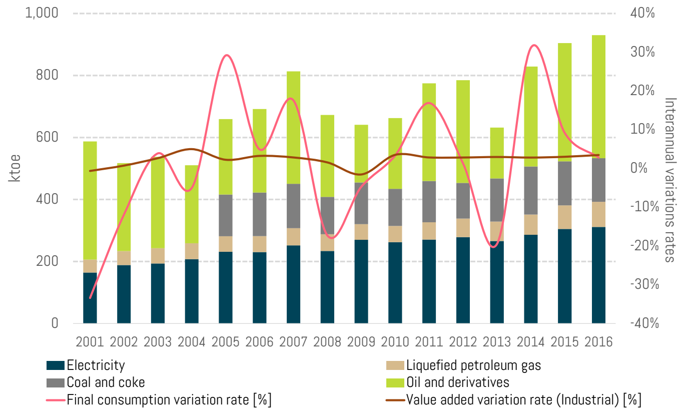




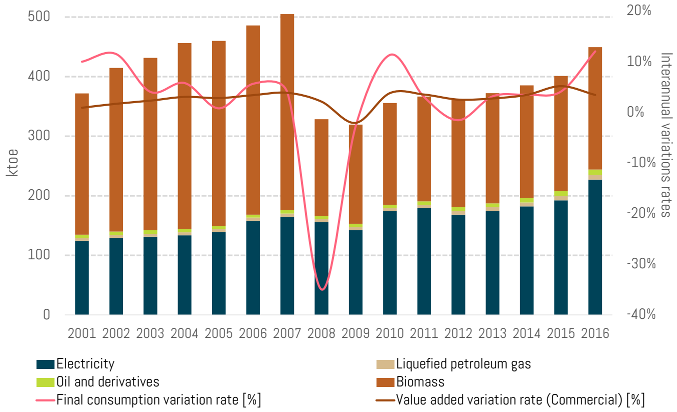
Final energy consumption by source



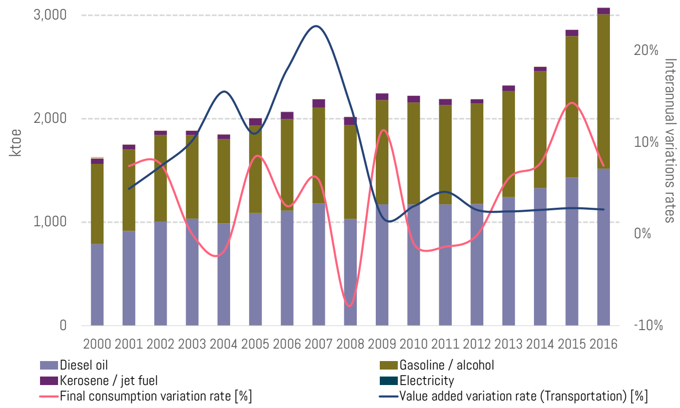
Industrial Sector Final Consumption



Commercial Sector Final Consumption



Transport Sector Final Consumption



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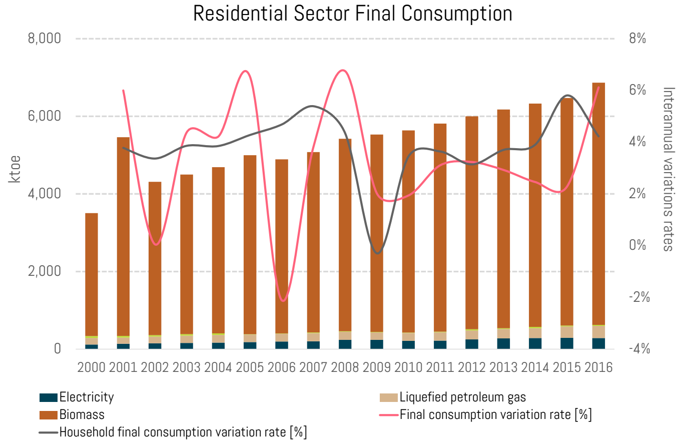
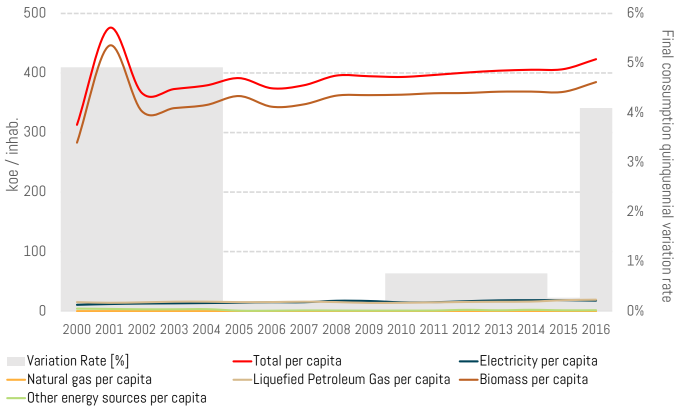
The first generation plant based on solar energy came into operation in May 2014. The Sibo entity, Sociedad Anónima; installed the power plant with an effective power of 5.0 MW, located in the municipality of Estanzuela, department of Zacapa, consisting of 20 thousand panels of photovoltaic cells that occupy a space of 12 hectares.

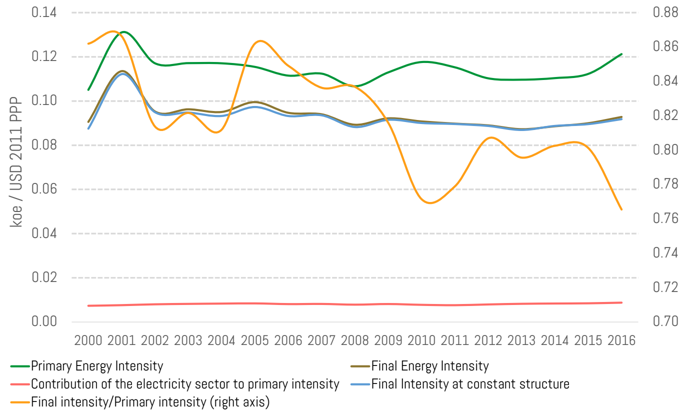
Residential Sector Final Consumption



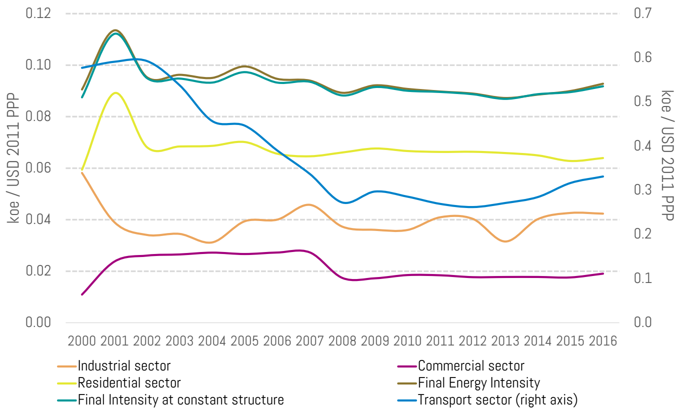
Final consumption per capita Residential Sector



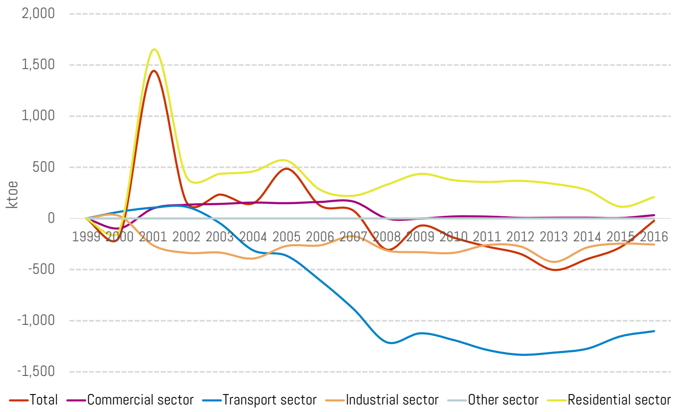
Energy intensities



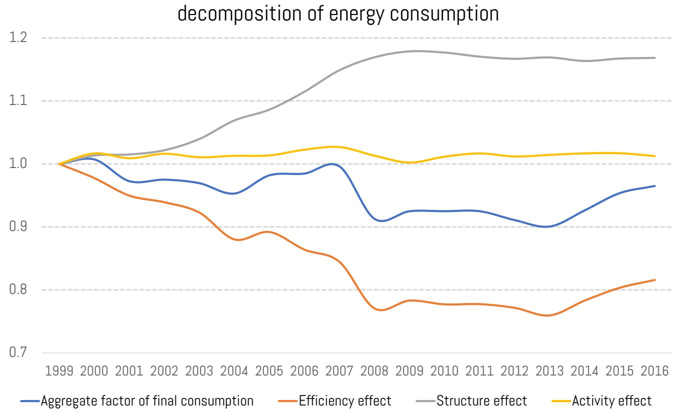
Sectoral energy intensities



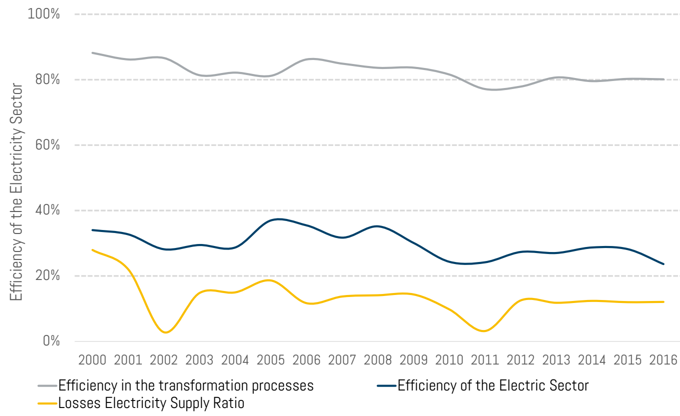
Avoided energy demand due to variations in energy intensity



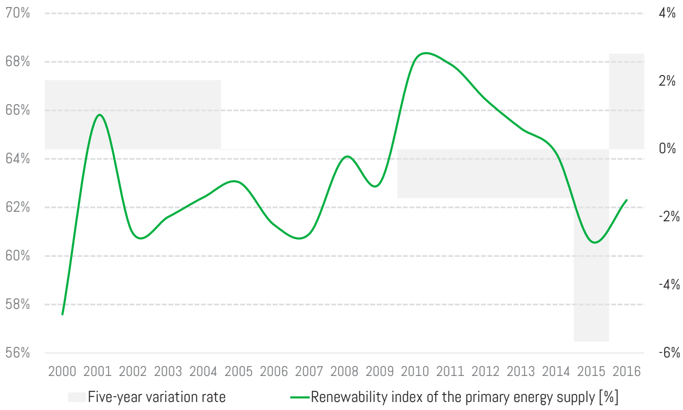
Logarithmic mean Divisia index for the structural decomposition of energy consumption



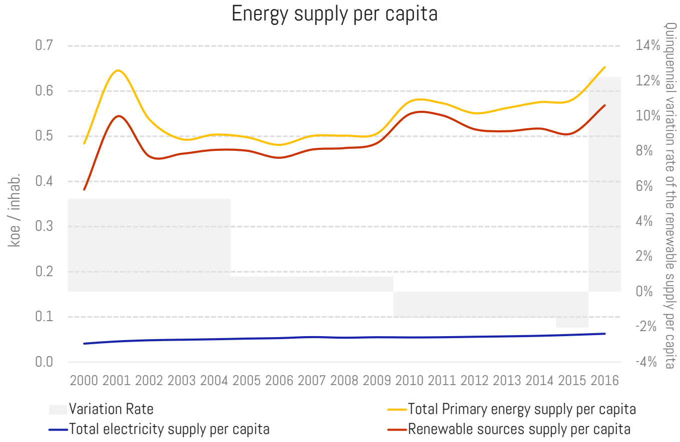
Efficiency of the Electricity Sector



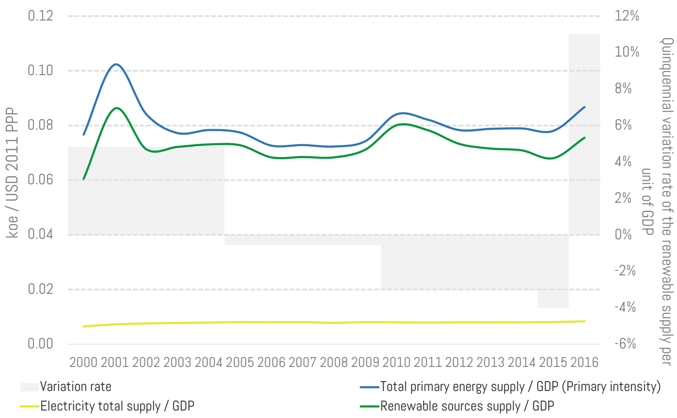
Primary energy supply renewability index



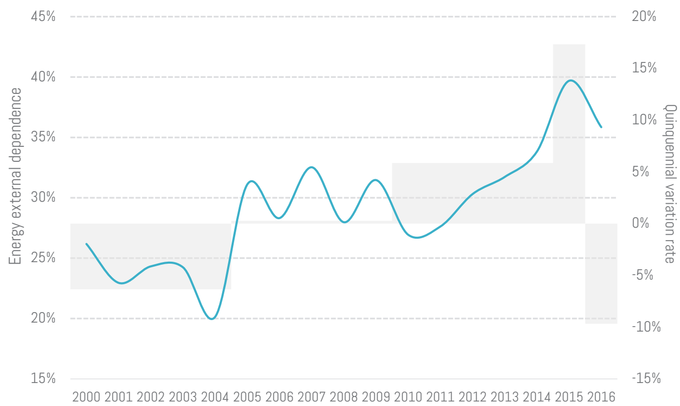
Energy supply per capita



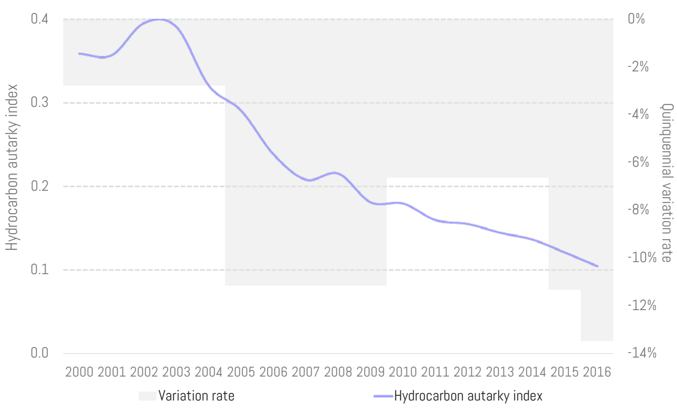
Energy supply per unit of GDP



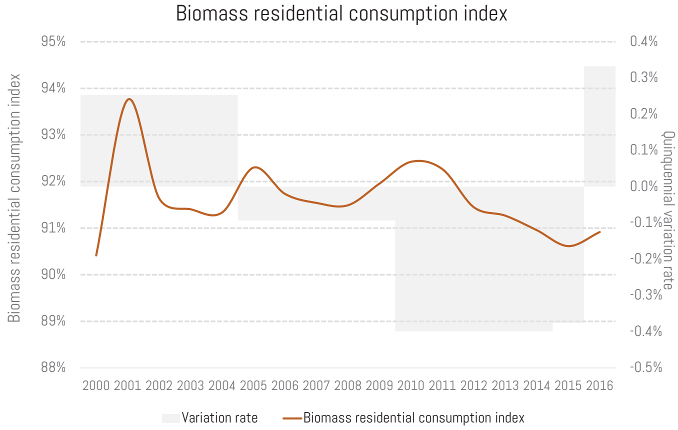
Energy external dependence



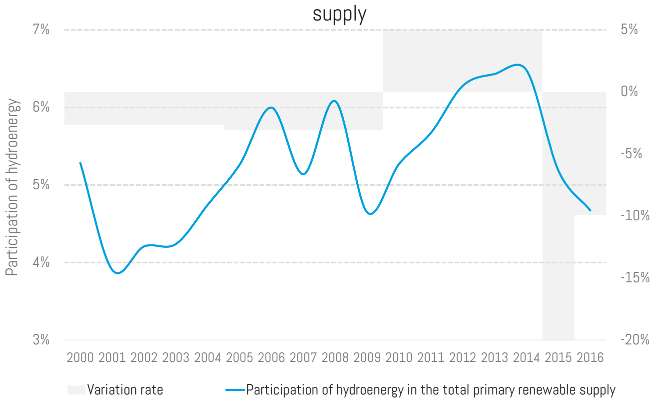
Hydrocarbon autarky index



Biomass residential consumption index

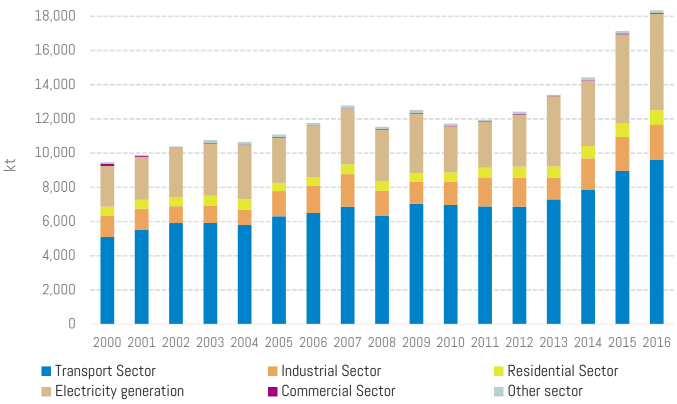


Participation of hydroenergy in the total primary renewable supply

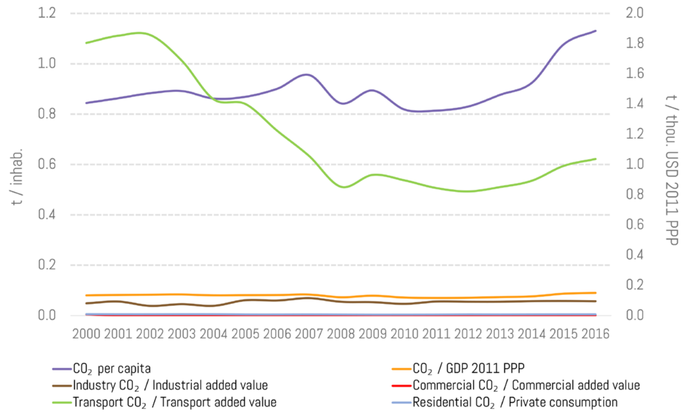


Participation of dendroenergy in the total primary renewable supply

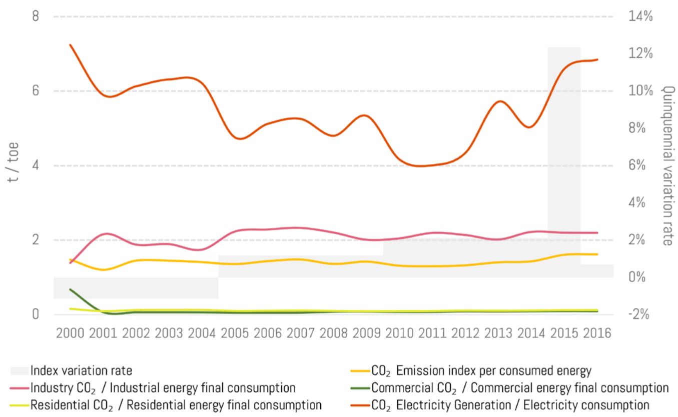
Evolution of CO_2 emissions by sector



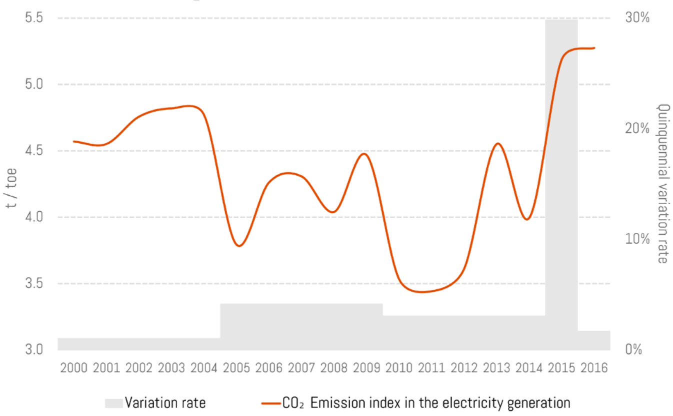
Evolution of CO_2 emissions per capita and per unit of GDP

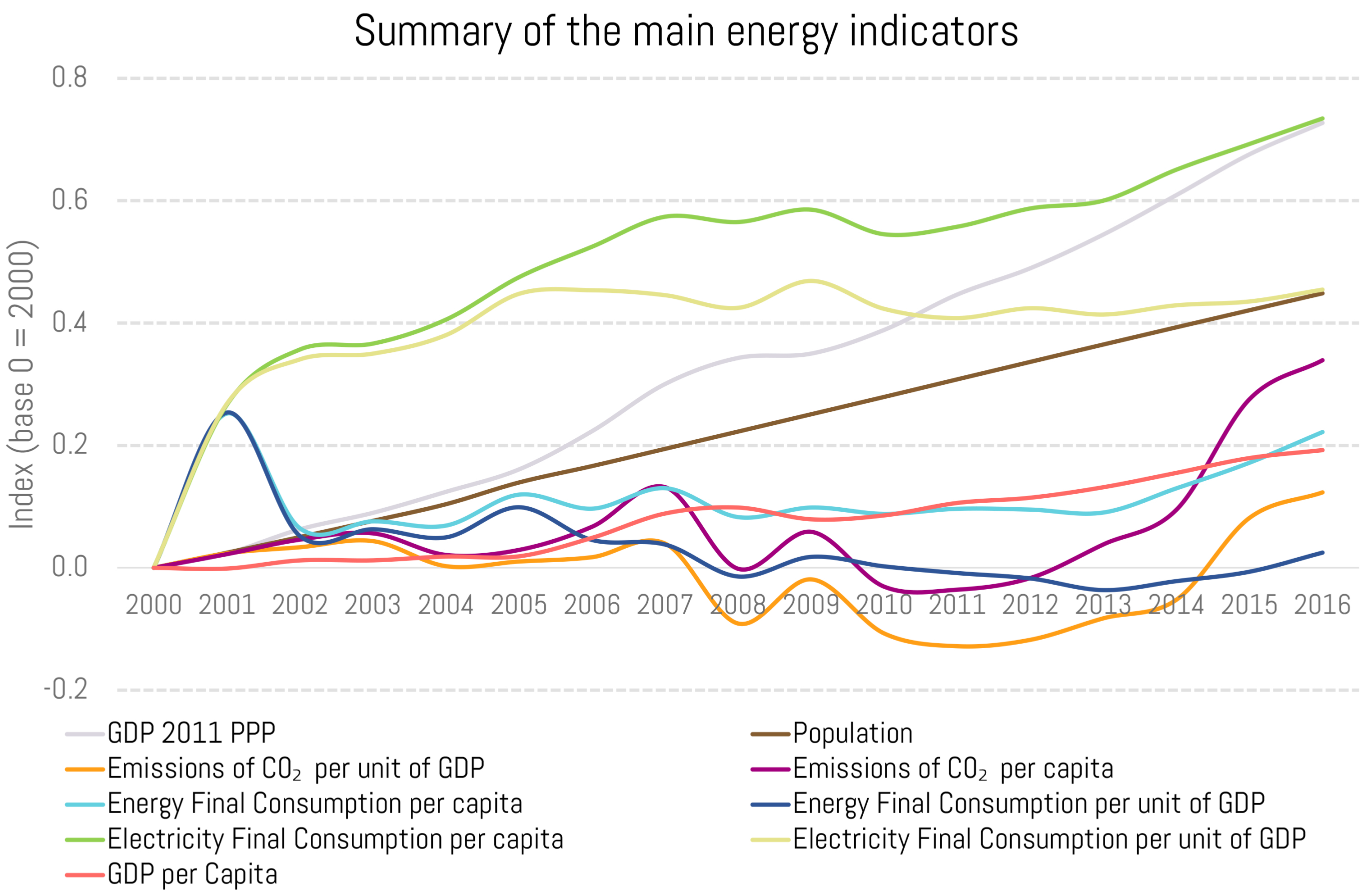


CO_2 Emission index per consumed energy



CO_2 Emission index of electricity generation



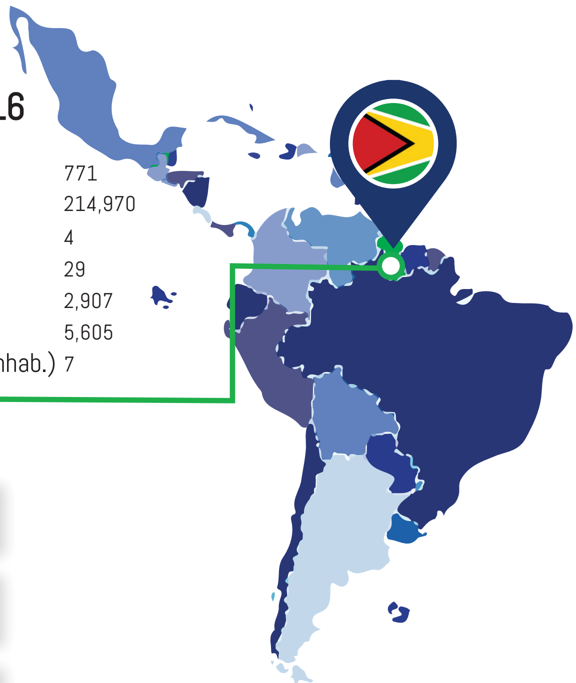


Summary of the main energy indicators
0.8
0.6
0.4
0.2
0.0
-0.2
Index (base 0 = 2000)
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
GDP 2011 PPP
Population
Emissions of CO_2 per unit of GDP
Emissions of CO_2 per capita
Energy Final Consumption per capita
Energy Final Consumption per unit of GDP
Electricity Final Consumption per capita
Electricity Final Consumption per unit of GDP
GDP per Capita

GUYANA

GENERAL INFORMATION 2016

Population (thousand inhab.)	771
Area (km^2)	214,970
Population Density (inhab./km^2)	4
Urban Population (%)	29
GDP USD 2010 (MUSD)	2,907
GDP USD 2011 PPP (MUSD)	5,605
GDP per capita (thou. USD 2011 PPP/inhab.)	7



ENERGY SECTOR [1]

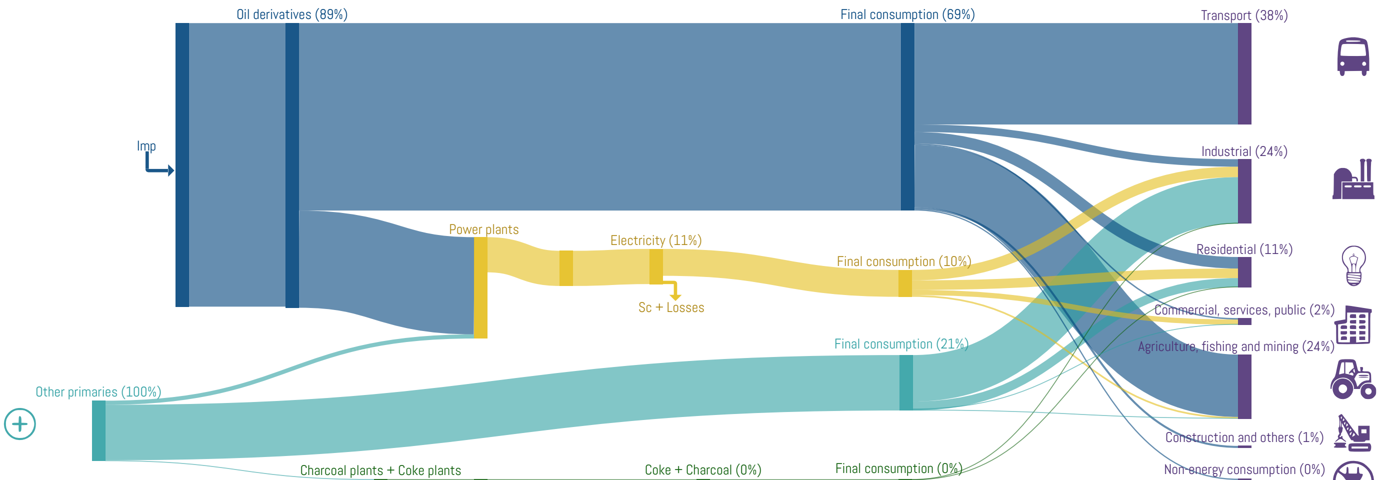
Final consumption in the Transport Sector	Mtoe 0.27
Final consumption in the Industrial Sector	Mtoe 0.17
Final consumption in the Residential Sector	Mtoe 0.08
Final consumption in the Commercial and Service Sector	Mtoe 0.02
Final consumption in the Agriculture, Livestock, Fishing, Mining, Other and Non - Energy Consumption	Mtoe 0.18

Oil Reserves	Natural gas reserves	Coal reserves
Mbbl n.a.	Gm^3 n.a.	Mt n.a.

[1] Data estimated by OLADE.
[2] 2015 Data.

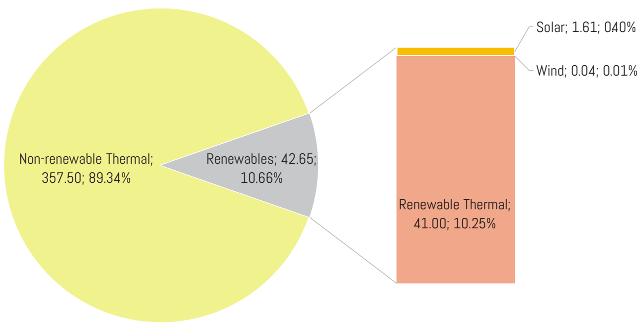
Indicator	Unit	Value
Electricity consumption per capita	kWh / inhab.	1,072
Final energy consumption per capita	toe / inhab.	0.93
Electrification rate	%	88.24 [2]
Total energy supply	Mtoe	0.92
Total energy production	Mtoe	0.17
Total energy imports	Mtoe	0.75
Total energy exports	Mtoe	0.00
Total final energy consumption	Mtoe	0.71
Refining capacity	kbbl/day	n.a.
Installed power generation capacity	GW	0.40
Primary energy intensity and final energy intensity	koe / USD 2011 PPP	0.03 / 0.13

Summarized energy matrix 2016*

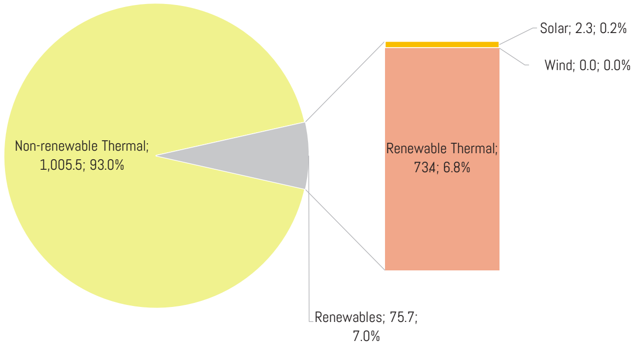


* Data estimated by OLADE

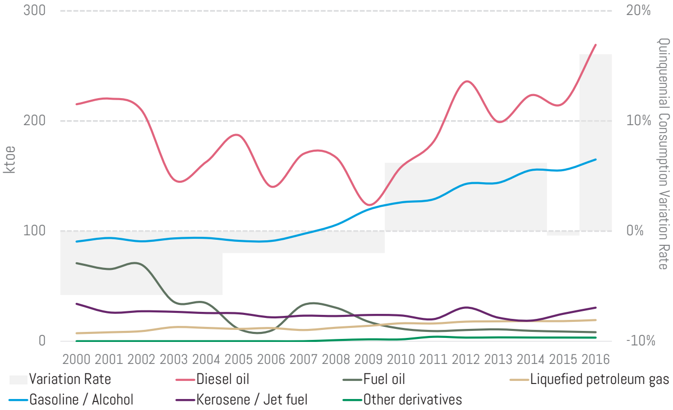
Installed power generation capacity [MW; %]
2016



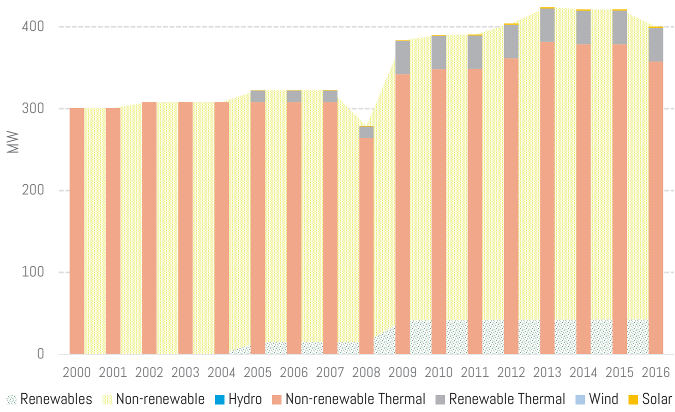
Electricity Generation by Source [GWh; %]
2016



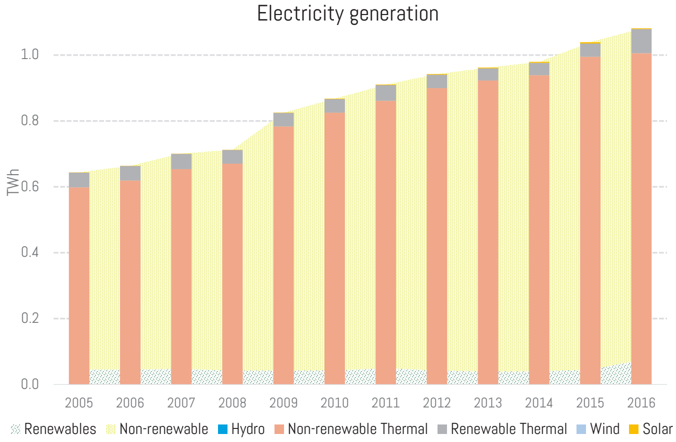
Oil derivatives consumption



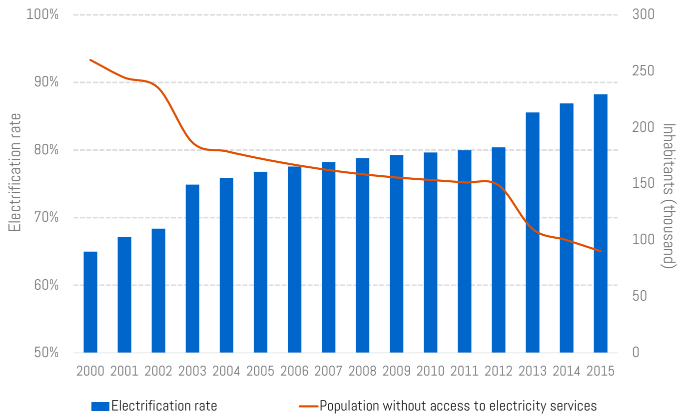
Installed power generation capacity

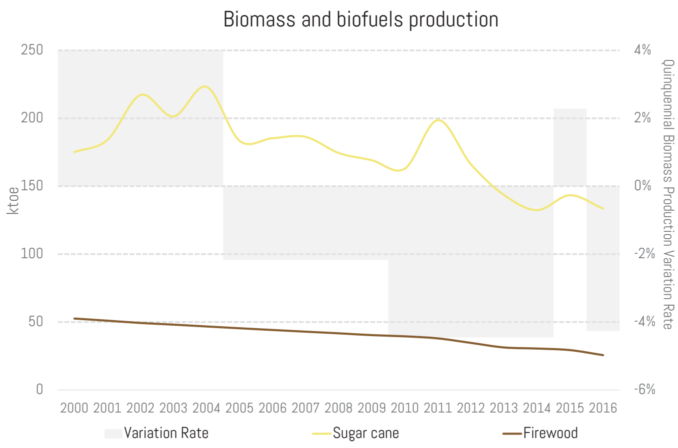


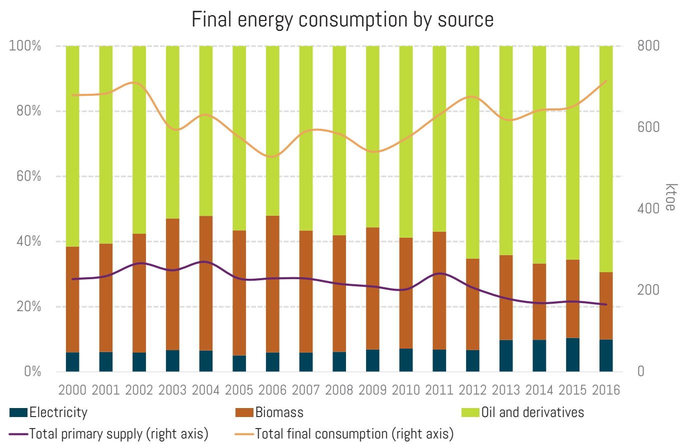
Electricity generation

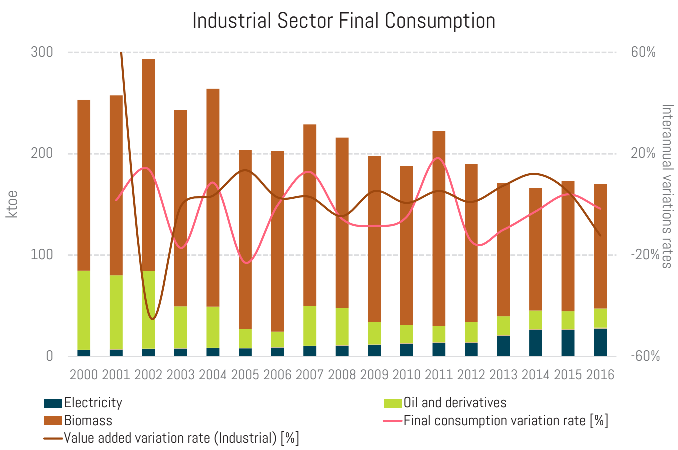


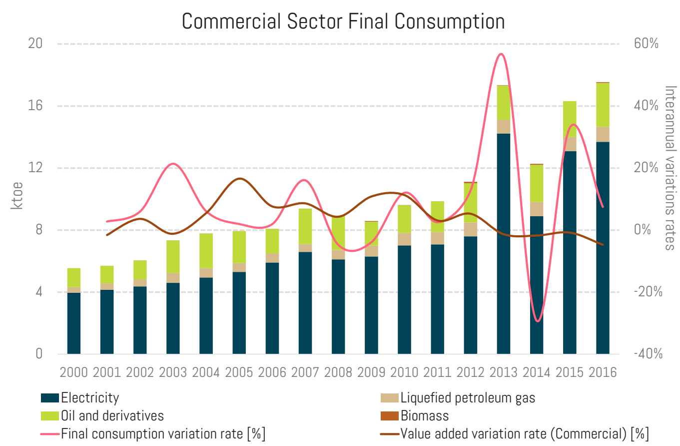
Electrification rate

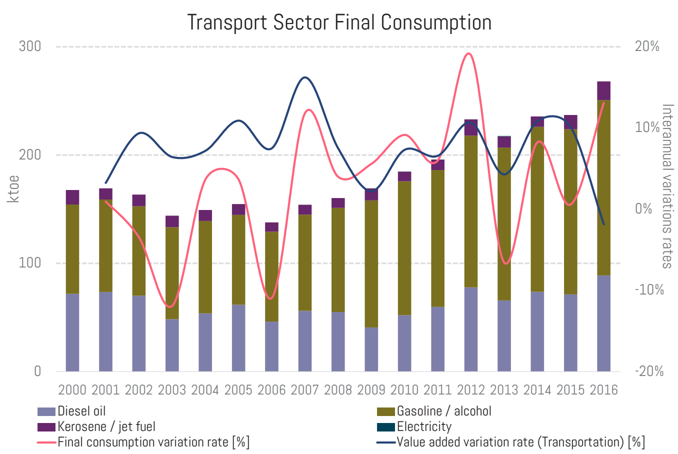


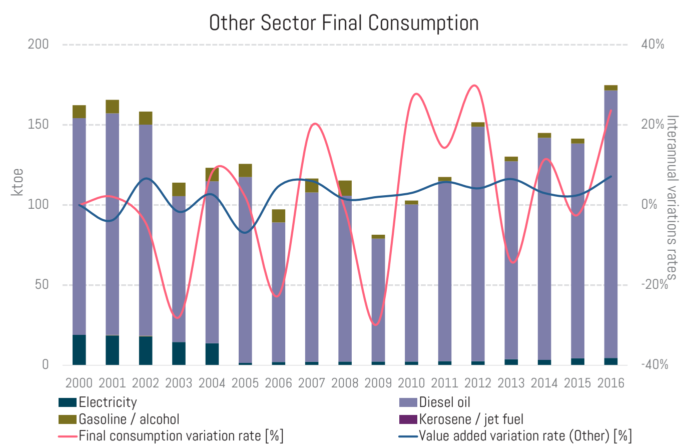

Biomass and biofuels production
ktoe
Quinquennial Biomass Production Variation Rate
250
200
150
100
50
0
4%
2%
0%
-2%
-4%
-6%
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Variation Rate
Sugar cane
Firewood


Final energy consumption by source
100%
80%
60%
40%
20%
0%
800
600
400
200
0
ktoe
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Electricity
Biomass
Oil and derivatives
Total primary supply (right axis)
Total final consumption (right axis)

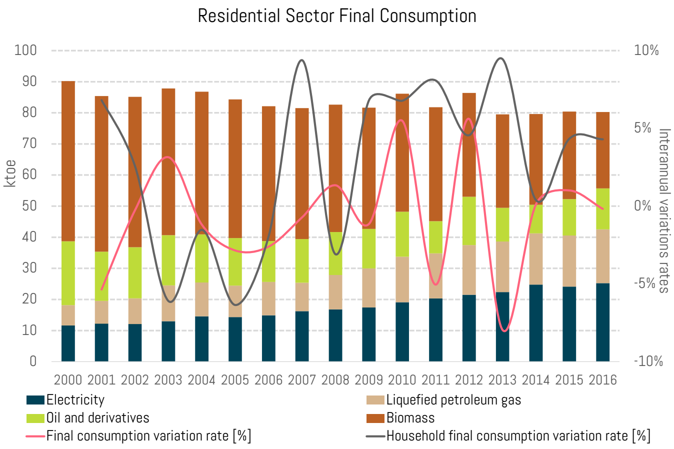

Industrial Sector Final Consumption
ktoe
Interannual variations rates
300
200
100
0
60%
20%
-20%
-60%
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Electricity
Oil and derivatives
Biomass
Final consumption variation rate [%]
Value added variation rate (Industrial) [%]

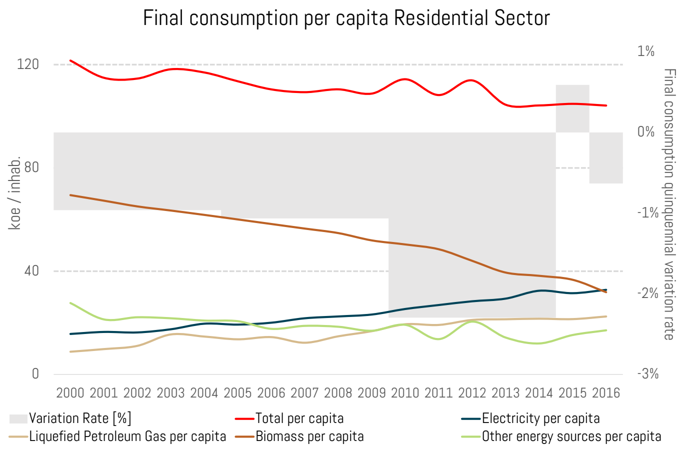

Commercial Sector Final Consumption
ktoe
Interannual variations rates
20
16
12
8
4
0
60%
40%
20%
0%
-20%
-40%
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Electricity
Liquefied petroleum gas
Oil and derivatives
Biomass
Final consumption variation rate [%]
Value added variation rate (Commercial) [%]

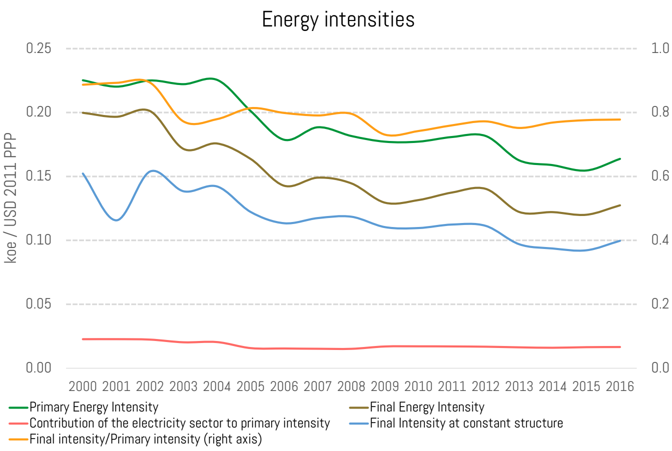

Transport Sector Final Consumption
ktoe
Interannual variations rates
300
200
100
0
20%
10%
0%
-10%
-20%
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Diesel oil
Gasoline / alcohol
Kerosene / jet fuel
Electricity
Final consumption variation rate [%]
Value added variation rate (Transportation) [%]

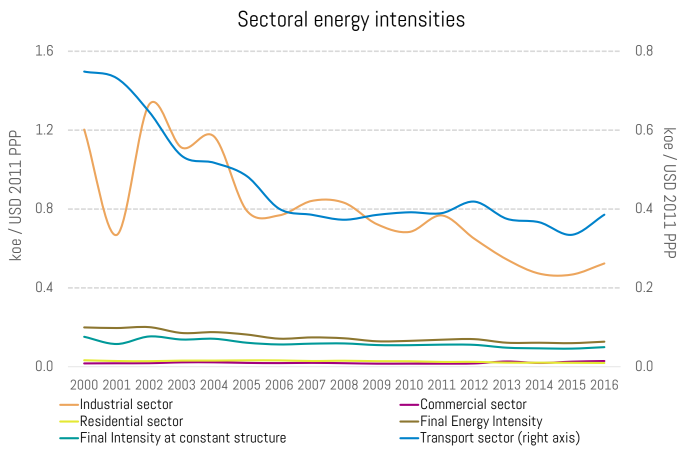

Other Sector Final Consumption
ktoe
Interannual variations rates
200
150
100
50
0
40%
20%
0%
-20%
-40%
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Electricity
Diesel oil
Gasoline / alcohol
Kerosene / jet fuel
Final consumption variation rate [%]
Value added variation rate (Other) [%]

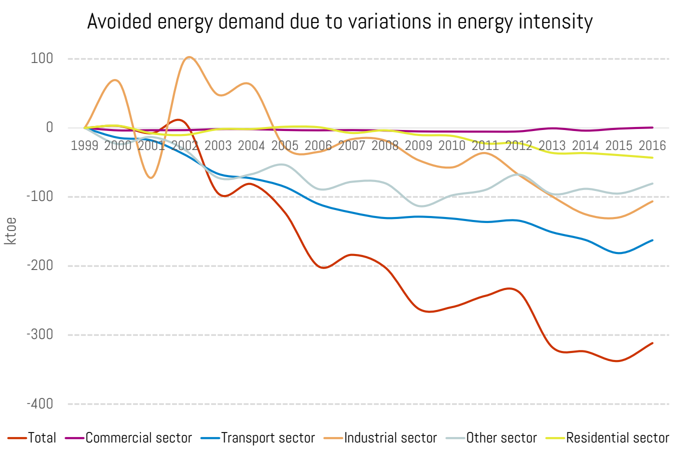
GUYANA

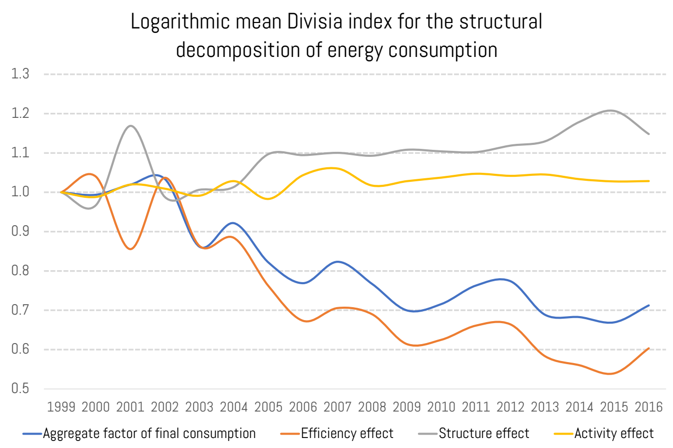

Residential Sector Final Consumption
ktoe
Interannual variations rates
Electricity
Liquefied petroleum gas
Oil and derivatives
Biomass
Final consumption variation rate [%]
Household final consumption variation rate [%]

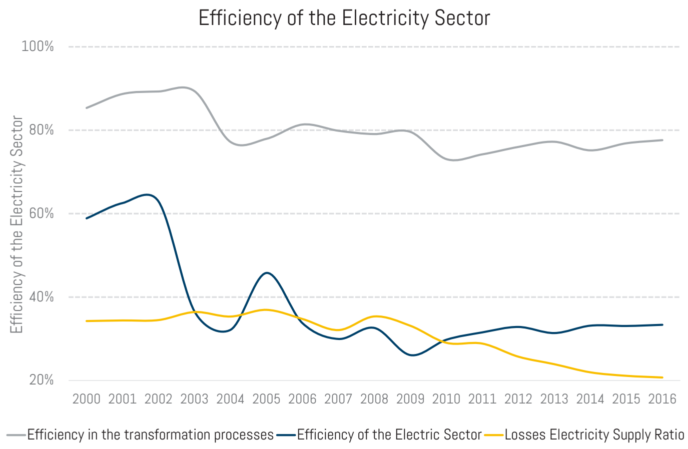

Final consumption per capita Residential Sector
koe / inhab.
Final consumption quinquennial variation rate
Variation Rate [%]
Total per capita
Electricity per capita
Liquefied Petroleum Gas per capita
Biomass per capita
Other energy sources per capita

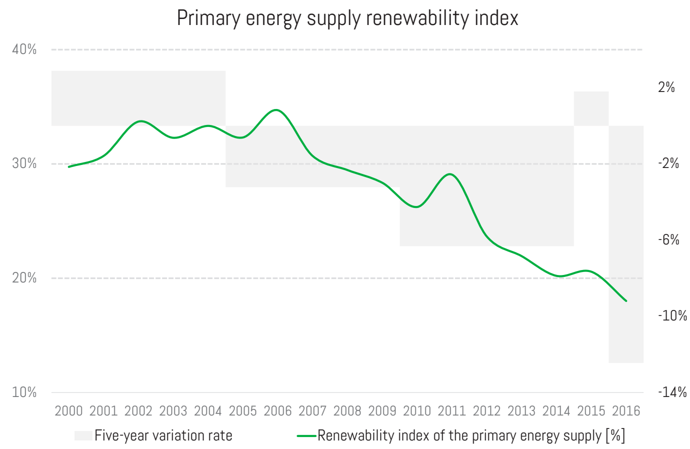

Energy intensities
koe / USD 2011 PPP
Primary Energy Intensity
Final Energy Intensity
Contribution of the electricity sector to primary intensity
Final Intensity at constant structure
Final intensity/Primary intensity (right axis)

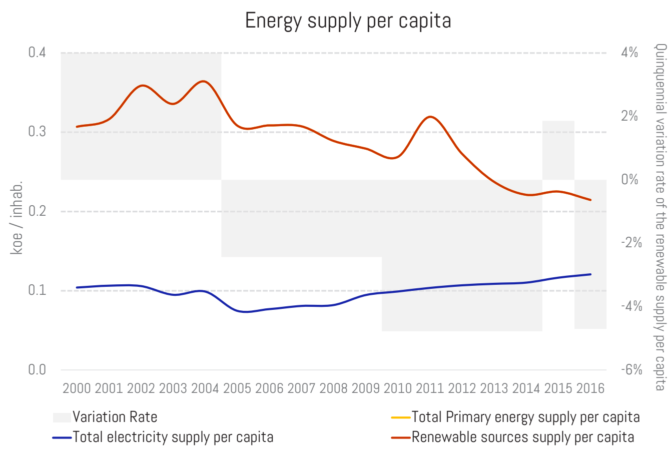

Sectoral energy intensities
koe / USD 2011 PPP
Industrial sector
Commercial sector
Residential sector
Final Energy Intensity
Final Intensity at constant structure
Transport sector (right axis)

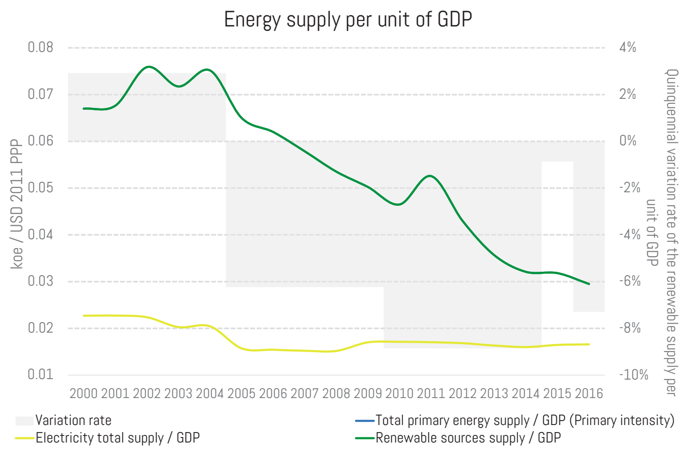

Avoided energy demand due to variations in energy intensity
ktoe
Total
Commercial sector
Transport sector
Industrial sector
Other sector
Residential sector

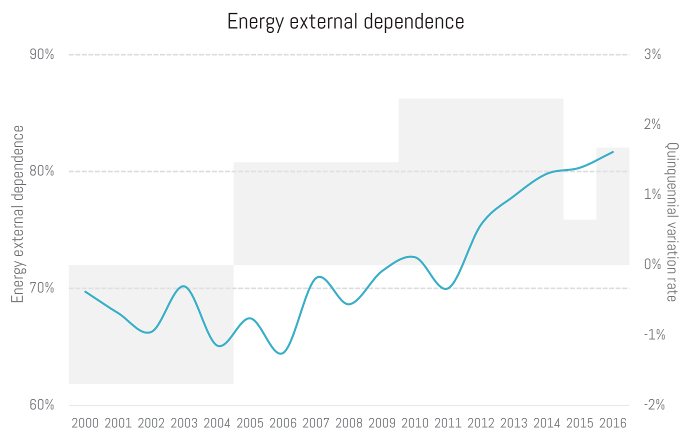

Logarithmic mean Divisia index for the structural decomposition of energy consumption
Aggregate factor of final consumption
Efficiency effect
Structure effect
Activity effect

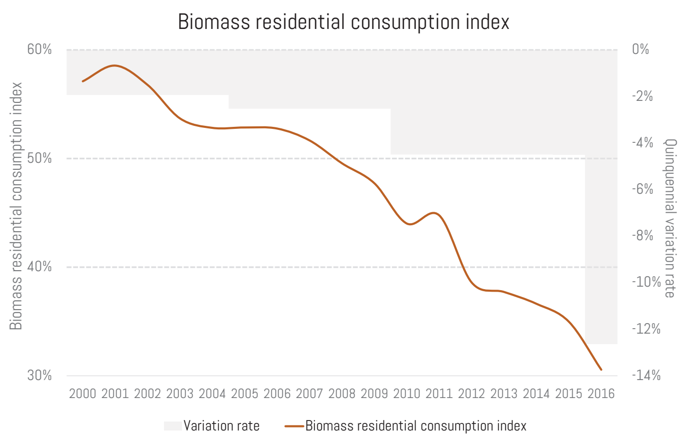

Efficiency of the Electricity Sector
100%
80%
60%
40%
20%
Efficiency of the Electricity Sector
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Efficiency in the transformation processes
Efficiency of the Electric Sector
Losses Electricity Supply Ratio


Primary energy supply renewability index
40%
30%
20%
10%
2%
-2%
-6%
-10%
-14%
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Five-year variation rate
Renewability index of the primary energy supply [%]

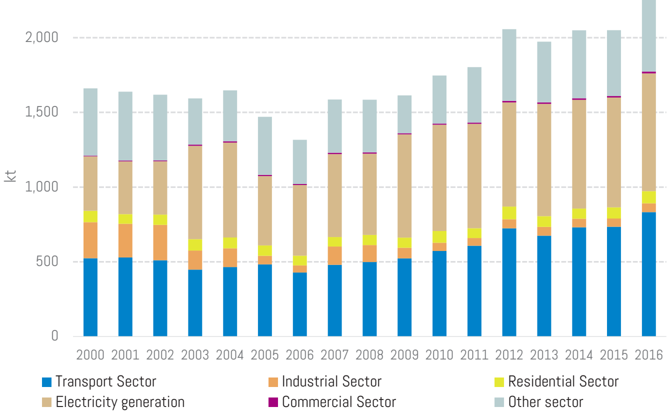

Energy supply per capita
0.4
0.3
0.2
0.1
0.0
koe / inhab.
4%
2%
0%
-2%
-4%
-6%
Quinquennial variation rate of the renewable supply per capita
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Variation Rate
Total Primary energy supply per capita
Total electricity supply per capita
Renewable sources supply per capita


Energy supply per unit of GDP
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
koe / USD 2011 PPP
4%
2%
0%
-2%
-4%
-6%
-8%
-10%
Quinquennial variation rate of the renewable supply per unit of GDP
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Variation rate
Total primary energy supply / GDP (Primary intensity)
Electricity total supply / GDP
Renewable sources supply / GDP

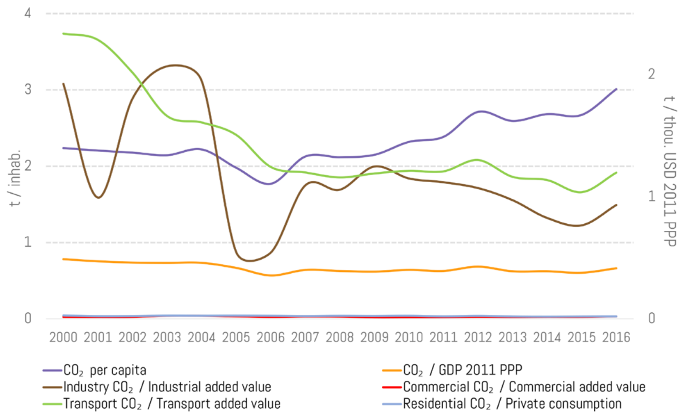

Energy external dependence
90%
80%
70%
60%
Energy external dependence
3%
2%
1%
0%
-1%
-2%
Quinquennial variation rate
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016


Biomass residential consumption index
60%
50%
40%
30%
Biomass residential consumption index
0%
-2%
-4%
-6%
-8%
-10%
-12%
-14%
Quinquennial variation rate
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Variation rate
Biomass residential consumption index

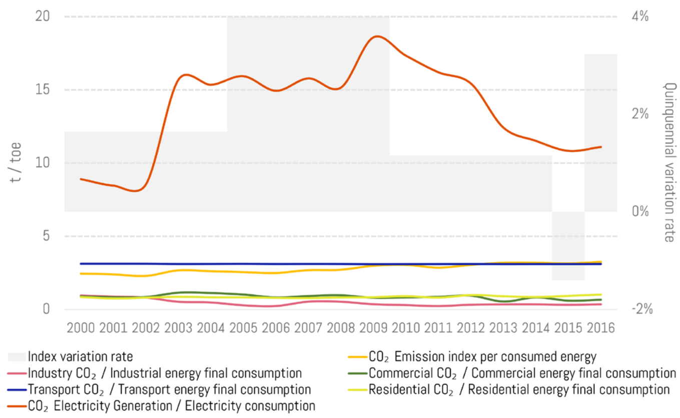
Evolution of CO_2 emissions by sector



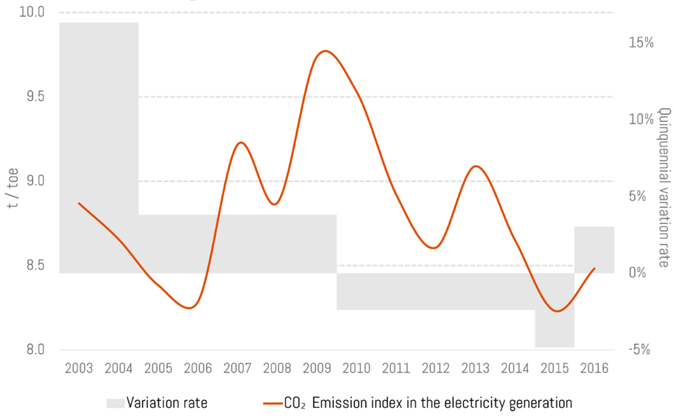
Evolution of CO_2 emissions per capita and per unit of GDP



CO_2 Emission index per consumed energy



CO_2 Emission index of electricity generation



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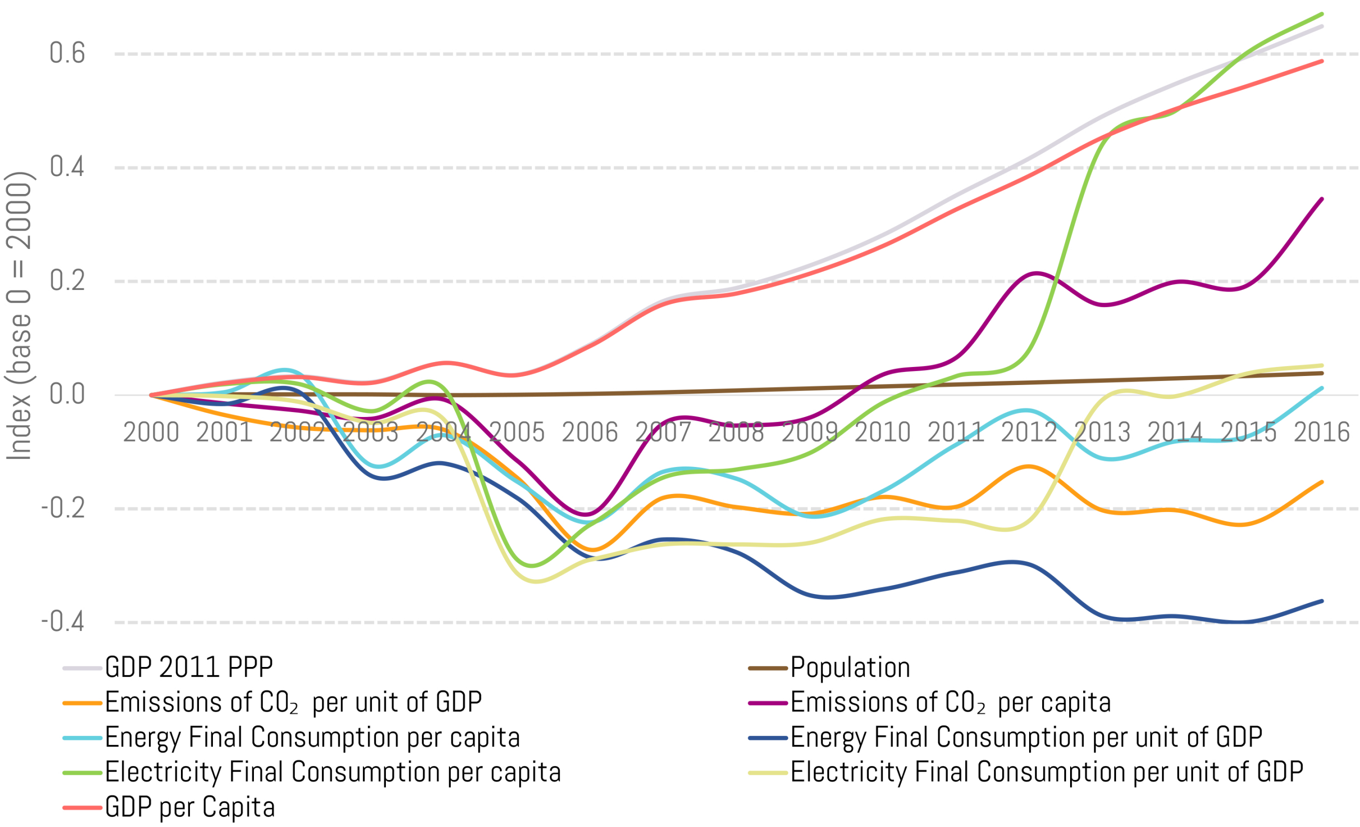
Summary of the main energy indicators



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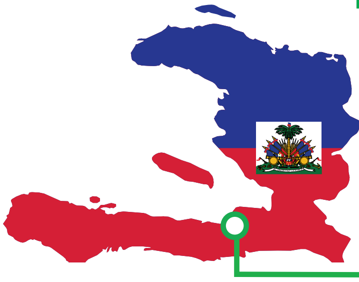
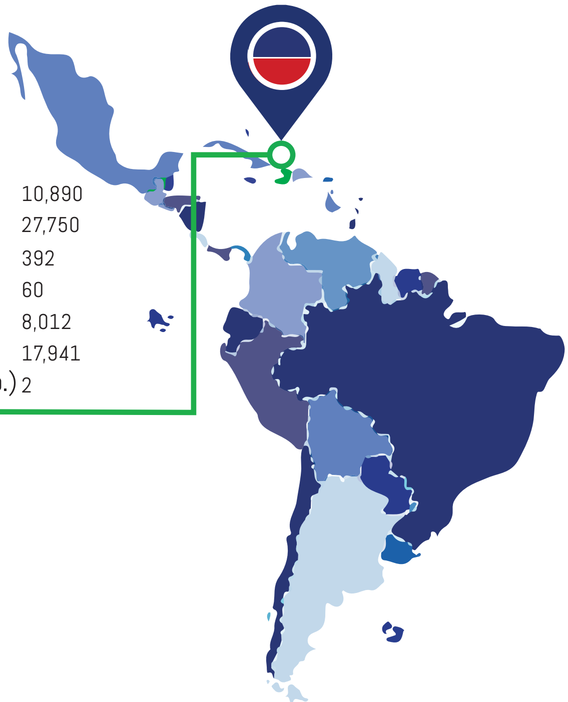
GENERAL INFORMATION 2016



Population (thousand inhab.)	10,890
Area (km²)	27,750
Population Density (inhab./km²)	392
Urban Population (%)	60
GDP USD 2010 (MUSD)	8,012
GDP USD 2011 PPP (MUSD)	17,941
GDP per capita (thou. USD 2011 PPP/inhab.)	2



ENERGY SECTOR [1]

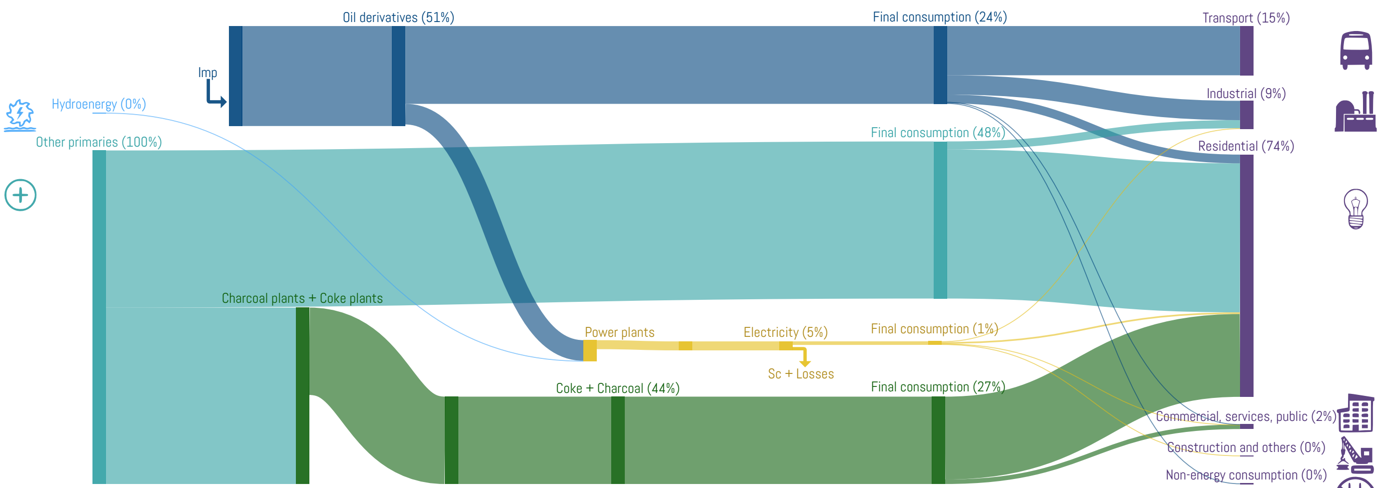
	Mtoe
Final consumption in the Transport Sector	0.50
Final consumption in the Industrial Sector	0.28
Final consumption in the Residential Sector	2.44
Final consumption in the Commercial and Service Sector	0.05
Final consumption in the Agriculture, Livestock, Fishing, Mining, Other and Non - Energy Consumption	0.01

Oil Reserves	Natural gas reserves	Coal reserves
Mbbl	Gm³	Mt
n.a.	n.a.	7

[1] Data estimated by OLADE .
[2] 2015 Data.

Indicator	Unit	Value
Electricity consumption per capita	kWh / inhab.	38
Final energy consumption per capita	toe / inhab.	0.30
Electrification rate	%	30 [2]
Total energy supply	Mtoe	4.36
Total energy production	Mtoe	3.42
Total energy imports	Mtoe	1.00
Total energy exports	Mtoe	0.00
Total final energy consumption	Mtoe	3.28
Refining capacity	kbbl/day	n.a.
Installed power generation capacity	GW	0.34
Primary energy intensity and final energy intensity	koe / USD 2011 PPP	0.19 / 0.18

Summarized energy matrix 2016*



* Data estimated by OLADE

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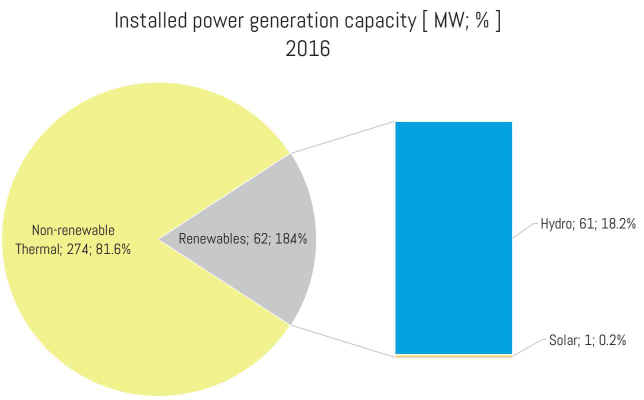
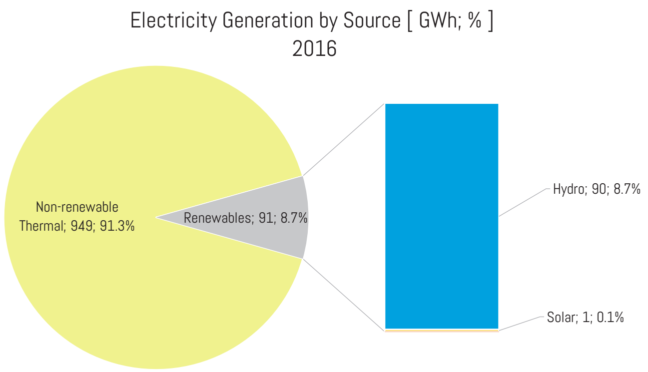
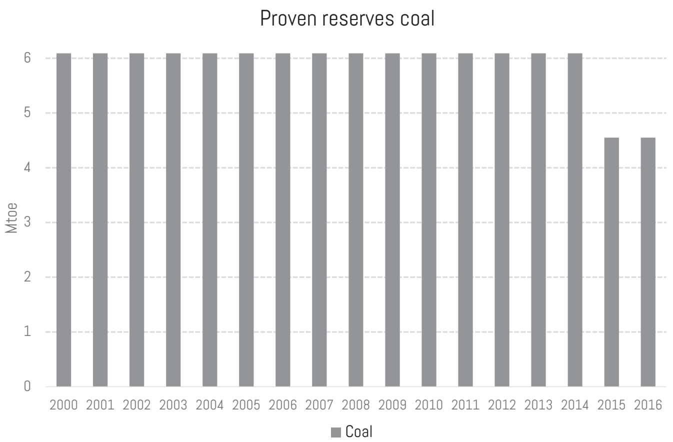
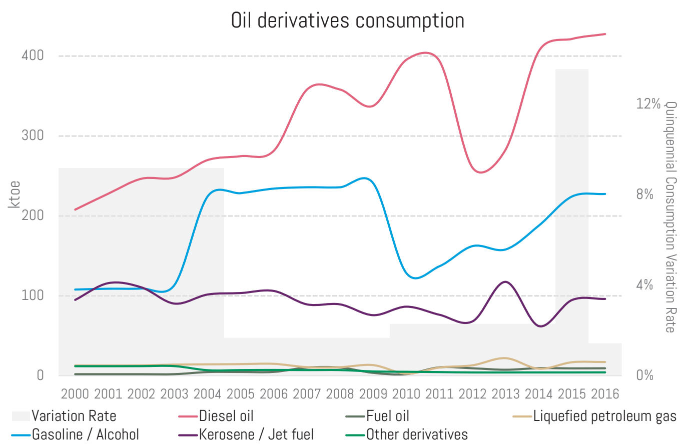
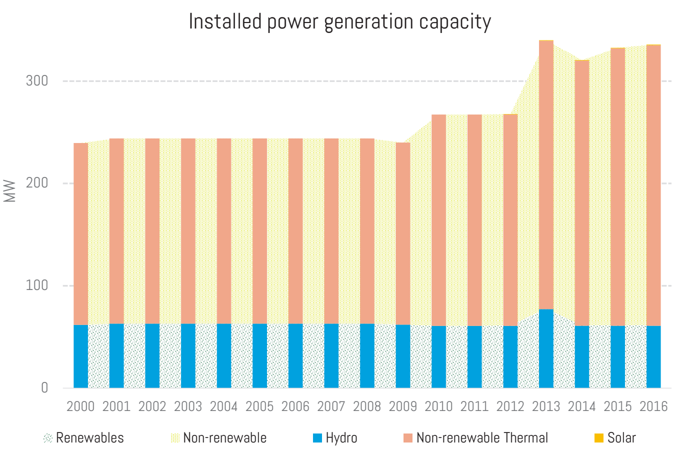
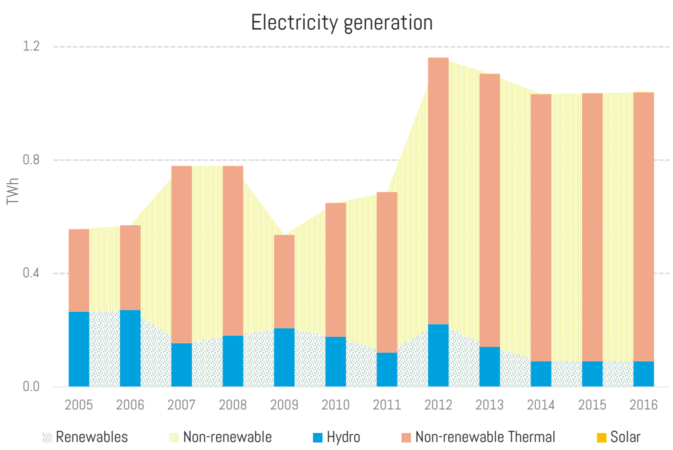

Installed power generation capacity [MW; %]
2016
Non-renewable Thermal; 274; 81.6%
Renewables; 62; 184%
Hydro; 61; 18.2%
Solar; 1; 0.2%

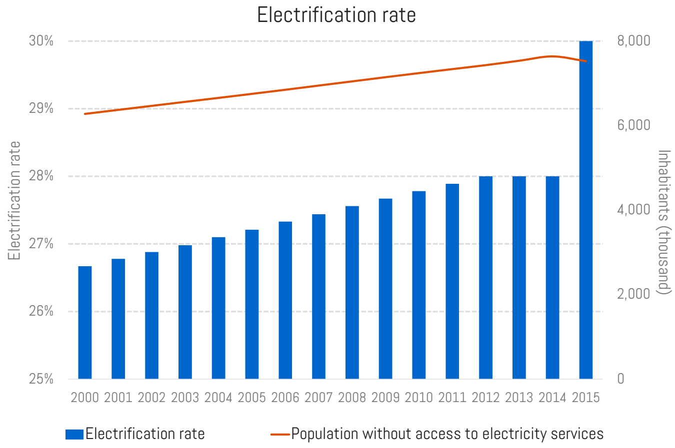

Electricity Generation by Source [GWh; %]
2016
Non-renewable Thermal; 949; 91.3%
Renewables; 91; 8.7%
Hydro; 90; 8.7%
Solar; 1; 0.1%

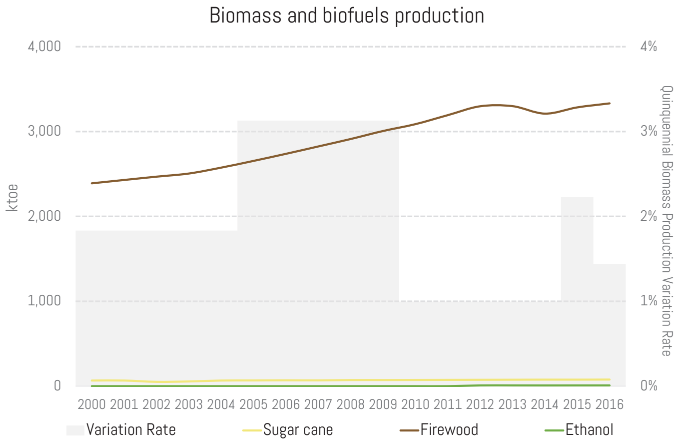

Proven reserves coal
Mtoe
0
1
2
3
4
5
6
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Coal

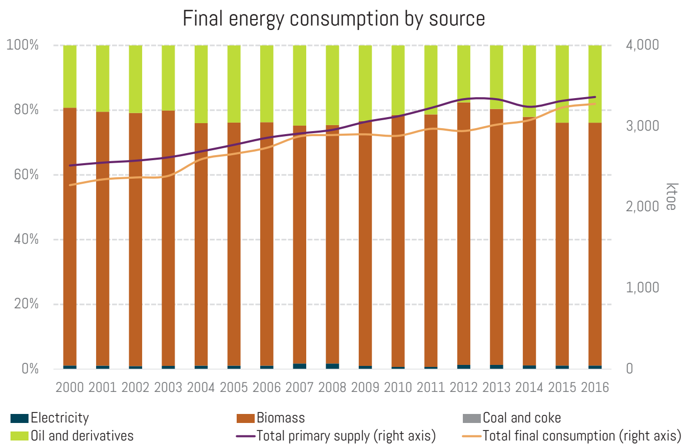

Oil derivatives consumption
ktoe
0
100
200
300
400
0%
4%
8%
12%
Quinquennial Consumption Variation Rate
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Variation Rate
Diesel oil
Fuel oil
Liquefied petroleum gas
Gasoline / Alcohol
Kerosene / Jet fuel
Other derivatives

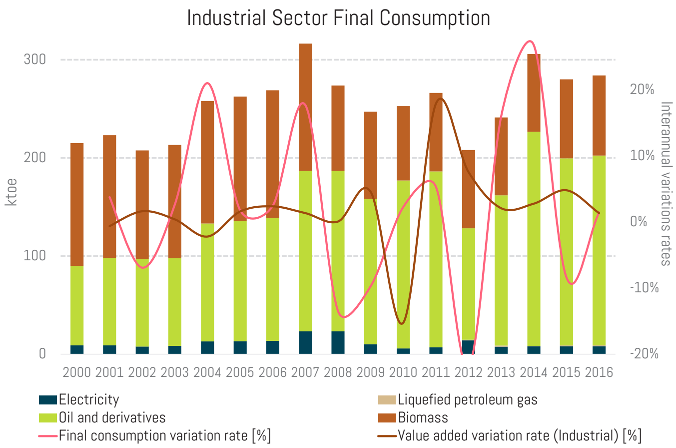

Installed power generation capacity
MW
0
100
200
300
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Renewables
Non-renewable
Hydro
Non-renewable Thermal
Solar

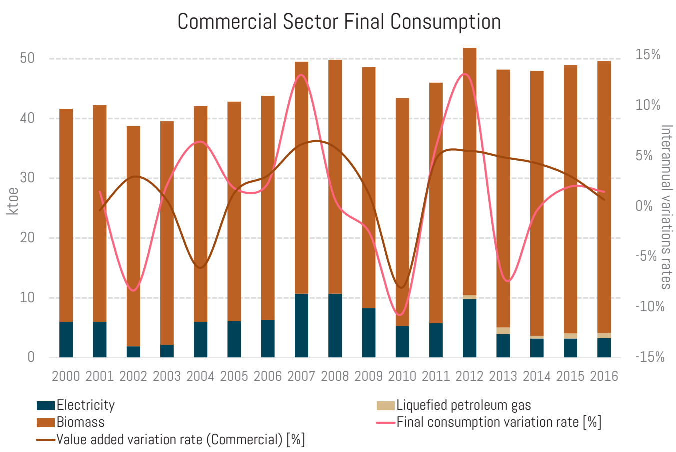

Electricity generation
TWh
0.0
0.4
0.8
1.2
2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Renewables
Non-renewable
Hydro
Non-renewable Thermal
Solar

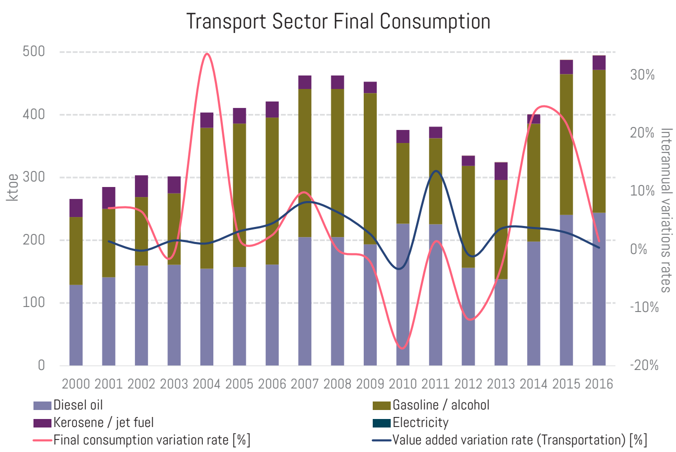

Electrification rate
Electrification rate
Inhabitants (thousand)
30%
29%
28%
27%
26%
25%
8,000
6,000
4,000
2,000
0
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015
Electrification rate
Population without access to electricity services


Biomass and biofuels production
ktoe
Quinquennial Biomass Production Variation Rate
4,000
3,000
2,000
1,000
0
4%
3%
2%
1%
0%
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Variation Rate
Sugar cane
Firewood
Ethanol


Final energy consumption by source
ktoe
100%
80%
60%
40%
20%
0%
4,000
3,000
2,000
1,000
0
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Electricity
Biomass
Coal and coke
Oil and derivatives
Total primary supply (right axis)
Total final consumption (right axis)


Industrial Sector Final Consumption
ktoe
Interannual variations rates
300
200
100
0
20%
10%
0%
-10%
-20%
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Electricity
Liquefied petroleum gas
Oil and derivatives
Biomass
Final consumption variation rate [%]
Value added variation rate (Industrial) [%]


Commercial Sector Final Consumption
ktoe
Interannual variations rates
50
40
30
20
10
0
15%
10%
5%
0%
-5%
-10%
-15%
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Electricity
Liquefied petroleum gas
Biomass
Final consumption variation rate [%]
Value added variation rate (Commercial) [%]


Transport Sector Final Consumption
ktoe
Interannual variations rates
500
400
300
200
100
0
30%
20%
10%
0%
-10%
-20%
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Diesel oil
Gasoline / alcohol
Kerosene / jet fuel
Electricity
Final consumption variation rate [%]
Value added variation rate (Transportation) [%]

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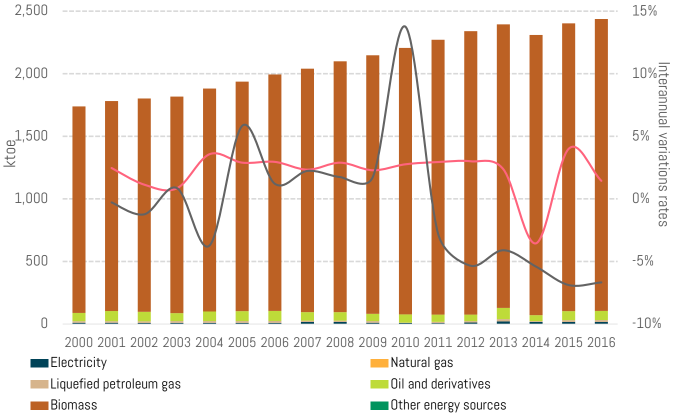
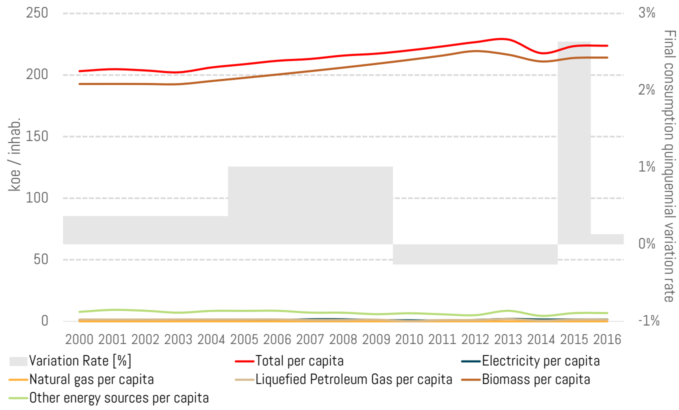
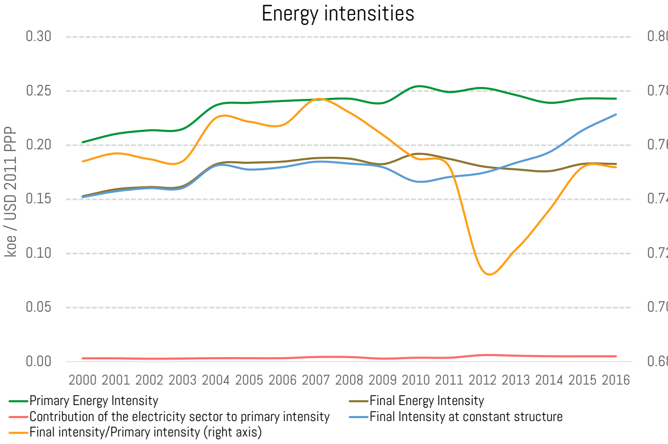
Residential Sector Final Consumption



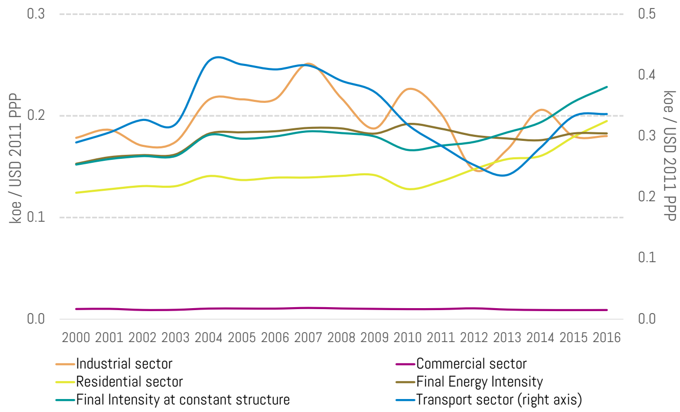
Final consumption per capita Residential Sector



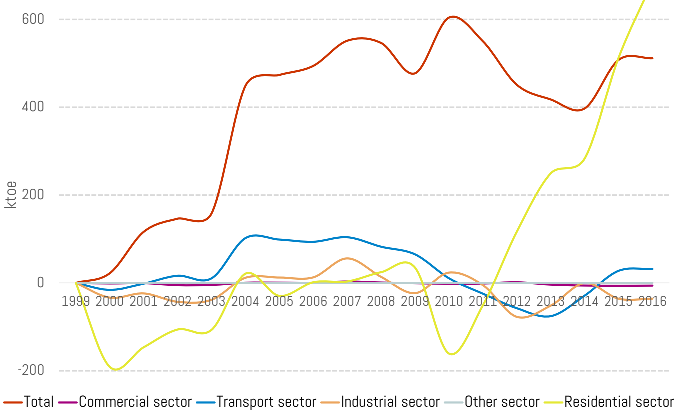
Energy intensities



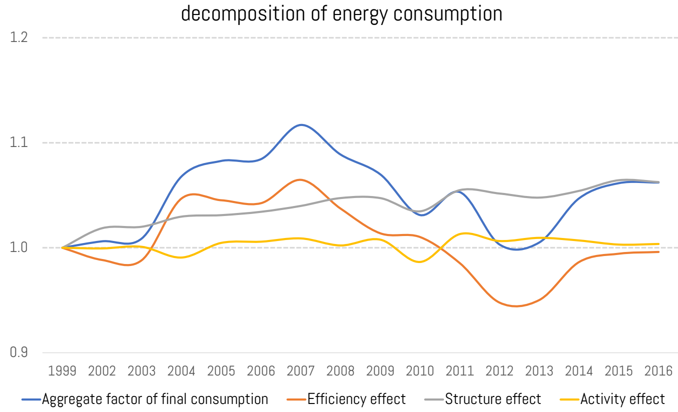
Sectoral energy intensities

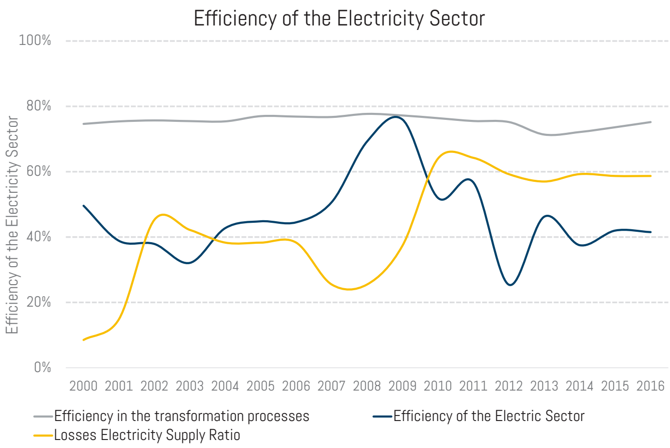


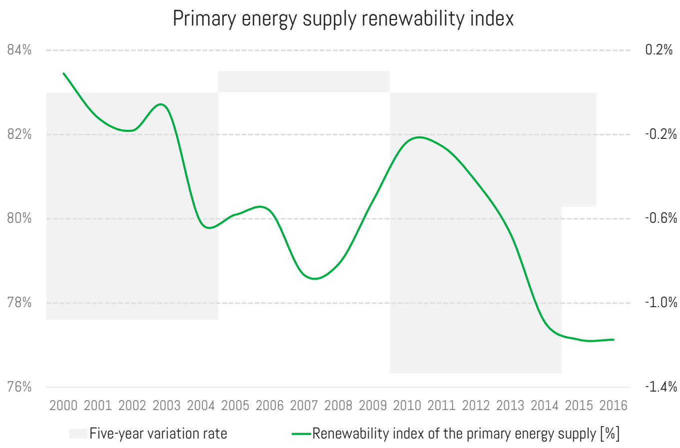
Avoided energy demand due to variations in energy intensity

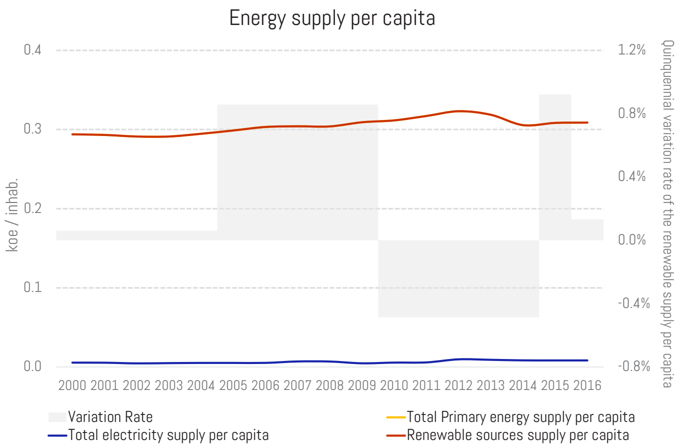


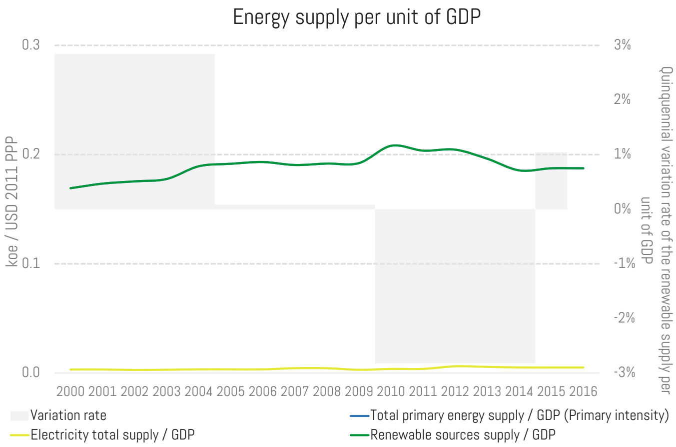
Logarithmic mean Divisia index for the structural decomposition of energy consumption

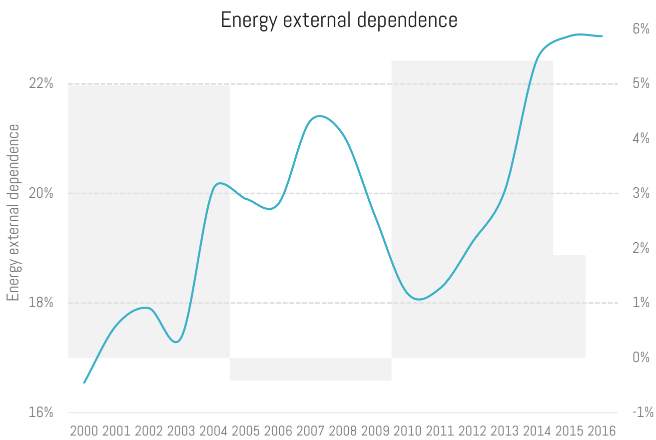


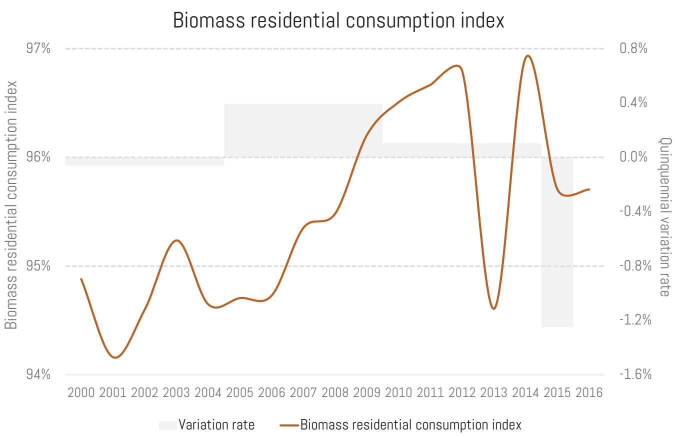

Efficiency of the Electricity Sector
100%
80%
60%
40%
20%
0%
Efficiency of the Electricity Sector
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Efficiency in the transformation processes
Efficiency of the Electric Sector
Losses Electricity Supply Ratio

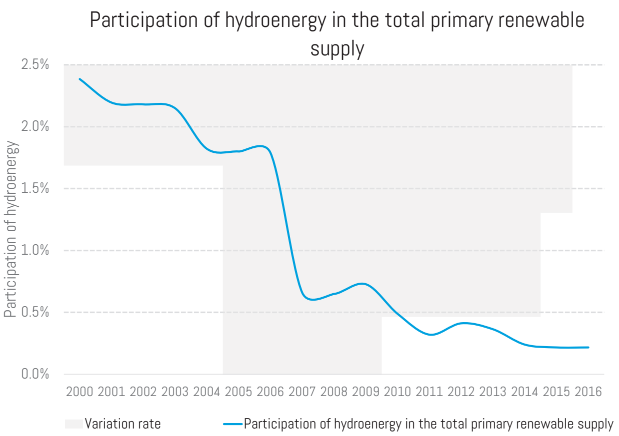

Primary energy supply renewability index
84%
82%
80%
78%
76%
0.2%
-0.2%
-0.6%
-1.0%
-1.4%
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Five-year variation rate
Renewability index of the primary energy supply [%]

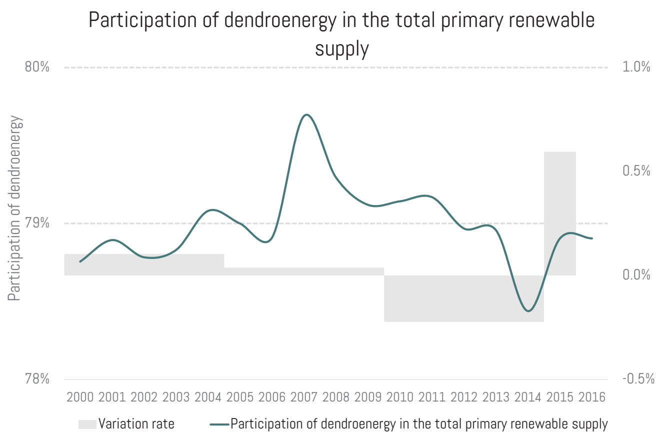

Energy supply per capita
0.4
0.3
0.2
0.1
0.0
koe / inhab.
1.2%
0.8%
0.4%
0.0%
-0.4%
-0.8%
Quinquennial variation rate of the renewable supply per capita
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Variation Rate
Total Primary energy supply per capita
Total electricity supply per capita
Renewable sources supply per capita

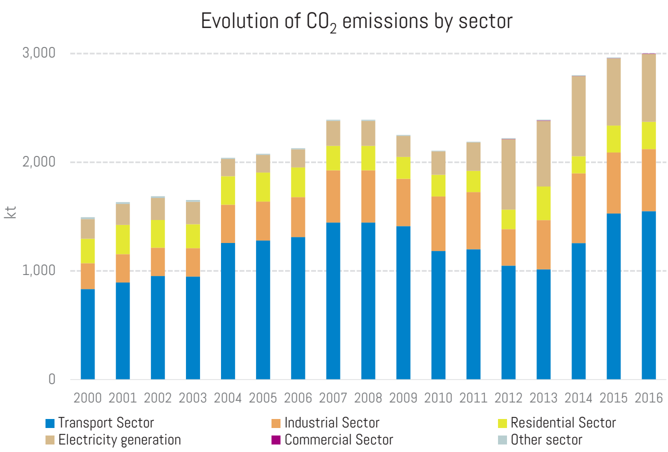

Energy supply per unit of GDP
0.3
0.2
0.1
0.0
koe / USD 2011 PPP
3%
2%
1%
0%
-1%
-2%
-3%
Quinquennial variation rate of the renewable supply per unit of GDP
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Variation rate
Total primary energy supply / GDP (Primary intensity)
Electricity total supply / GDP
Renewable sources supply / GDP

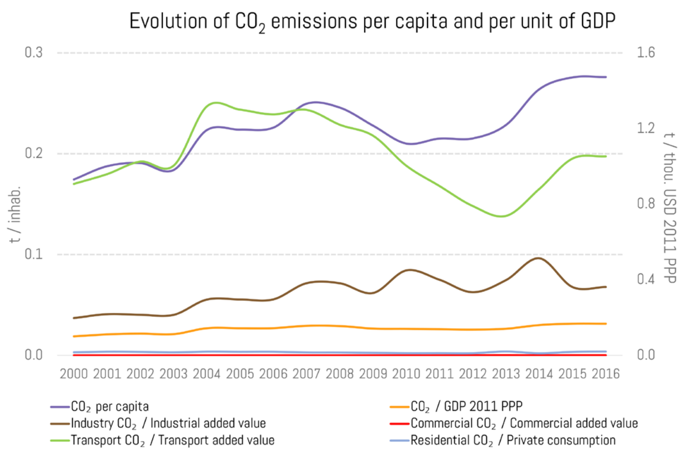

Energy external dependence
22%
20%
18%
16%
Energy external dependence
6%
5%
4%
3%
2%
1%
0%
-1%
Quinquennial variation rate
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016

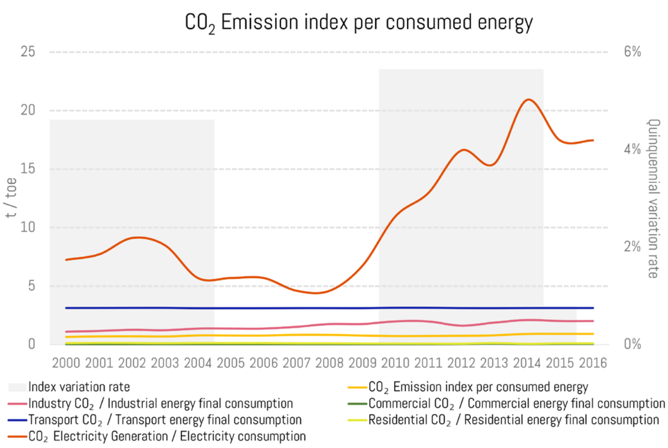

Biomass residential consumption index
97%
96%
95%
94%
Biomass residential consumption index
0.8%
0.4%
0.0%
-0.4%
-0.8%
-1.2%
-1.6%
Quinquennial variation rate
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Variation rate
Biomass residential consumption index

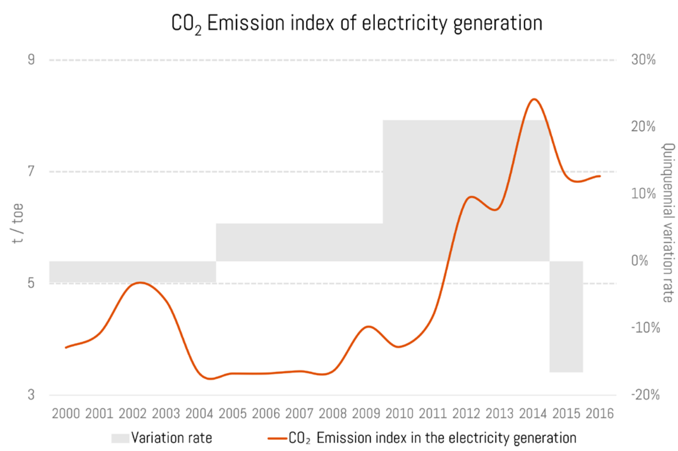

Participation of hydroenergy in the total primary renewable supply
Participation of hydroenergy
Quinquennial variation rate
2.5%
2.0%
1.5%
1.0%
0.5%
0.0%
0%
-5%
-10%
-15%
-20%
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Variation rate
Participation of hydroenergy in the total primary renewable supply


Participation of dendroenergy in the total primary renewable supply
Participation of dendroenergy
Quinquennial variation rate
80%
79%
78%
1.0%
0.5%
0.0%
-0.5%
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Variation rate
Participation of dendroenergy in the total primary renewable supply


Evolution of CO_2 emissions by sector
kt
3,000
2,000
1,000
0
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Transport Sector
Industrial Sector
Residential Sector
Electricity generation
Commercial Sector
Other sector

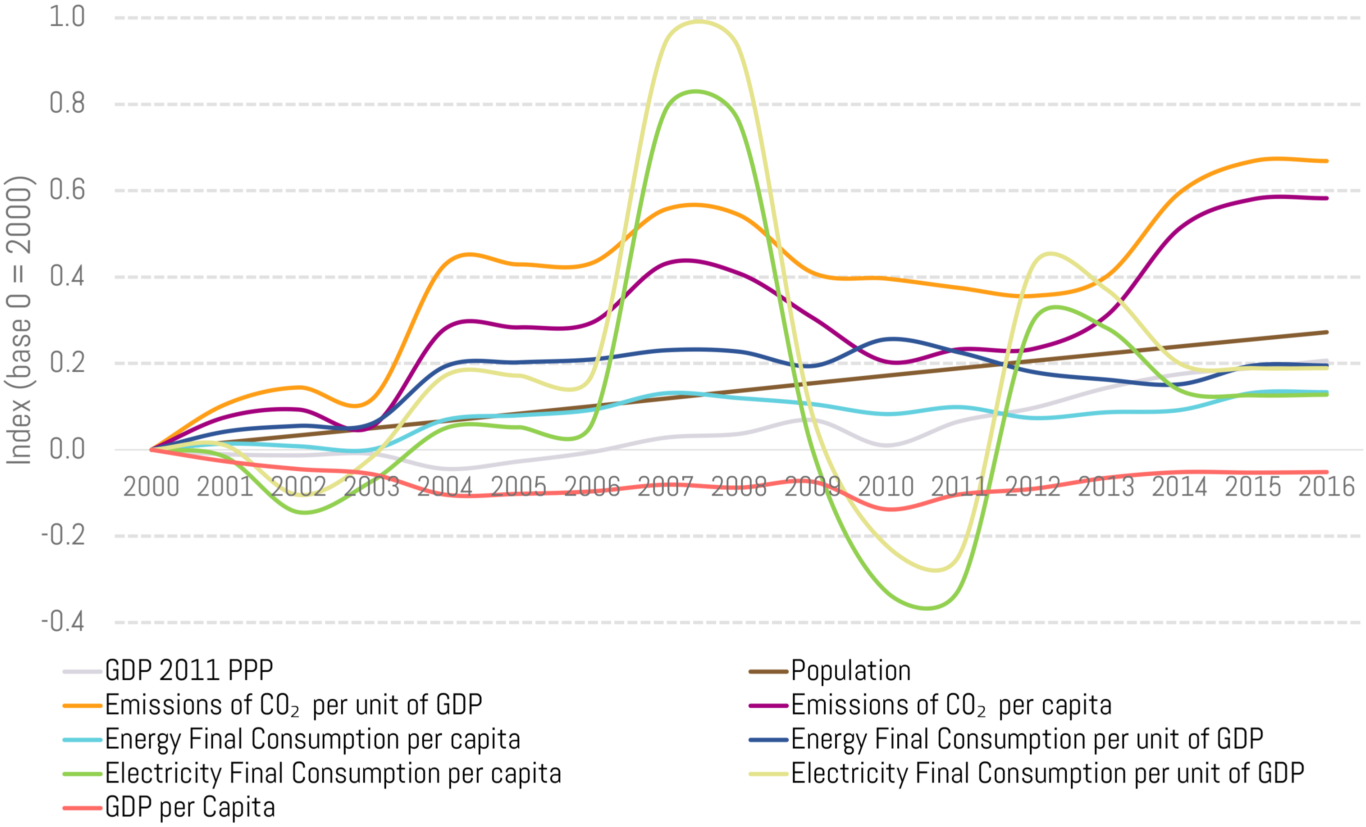

Evolution of CO_2 emissions per capita and per unit of GDP
t / inhab.
t / thou. USD 2011 PPP
0.3
0.2
0.1
0.0
1.6
1.2
0.8
0.4
0.0
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
CO_2 per capita
CO_2 / GDP 2011 PPP
Industry CO_2 / Industrial added value
Commercial CO_2 / Commercial added value
Transport CO_2 / Transport added value
Residential CO_2 / Private consumption


CO_2 Emission index per consumed energy
t / toe
Quinquennial variation rate
25
20
15
10
5
0
6%
4%
2%
0%
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Index variation rate
CO_2 Emission index per consumed energy
Industry CO_2 / Industrial energy final consumption
Commercial CO_2 / Commercial energy final consumption
Transport CO_2 / Transport energy final consumption
Residential CO_2 / Residential energy final consumption
CO_2 Electricity Generation / Electricity consumption


CO_2 Emission index of electricity generation
t / toe
Quinquennial variation rate
9
7
5
3
30%
20%
10%
0%
-10%
-20%
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Variation rate
CO_2 Emission index in the electricity generation

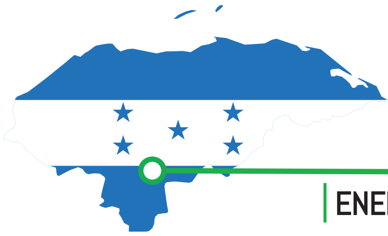
HAITI

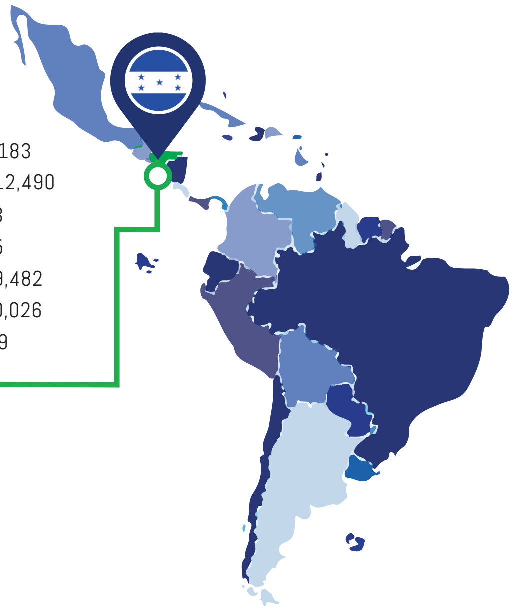
Summary of the main energy indicators



HAITI

HONDURAS





GENERAL INFORMATION 2016

Population (thousand inhab.)	8,183
Area (km²)	112,490
Population Density (inhab./km²)	73
Urban Population (%)	55
GDP USD 2010 (MUSD)	19,482
GDP USD 2011 PPP (MUSD)	40,026
GDP per capita (thou. USD 2011 PPP/inhab.)	4.9

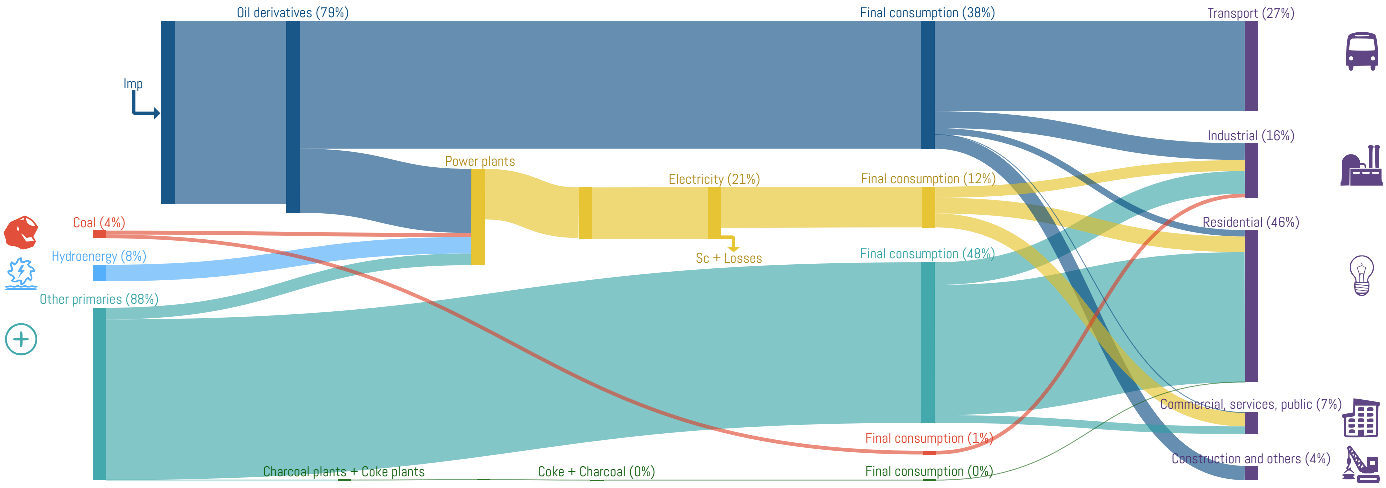
ENERGY SECTOR 2015

Final consumption in the Transport Sector	Mtoe 1.38
Final consumption in the Industrial Sector	Mtoe 0.81
Final consumption in the Residential Sector	Mtoe 2.28
Final consumption in the Commercial and Service Sector	Mtoe 0.34
Final consumption in the Agriculture, Livestock, Fishing, Mining, Other and Non - Energy Consumption	Mtoe 0.21

Oil Reserves	Natural gas reserves	Coal reserves
Mbbl	Gm³	Mt
n.a.	n.a	n.a.

Electricity consumption per capita	Final energy consumption per capita	Electrification rate	Total energy supply	Total energy production	Total energy imports	Total energy exports	Total final energy consumption	Refining capacity	Installed power generation capacity	Primary energy intensity and final energy intensity
kWh / inhab.	toe / inhab.	%	Mtoe	Mtoe	Mtoe	Mtoe	Mtoe	kbbl/day	GW	koe / USD 2011 PPP
968	0.62	73.96	5.78	2.73	2.83	0.49	5.03	n.a.	2.25	0.07 / 0.13

Summarized energy matrix 2016 *



* Data estimated by OLADE

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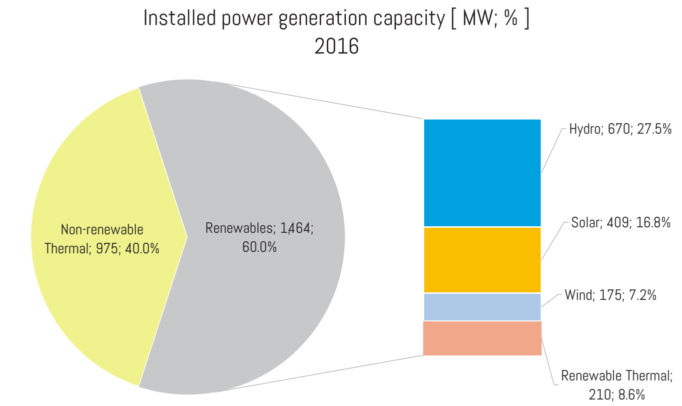
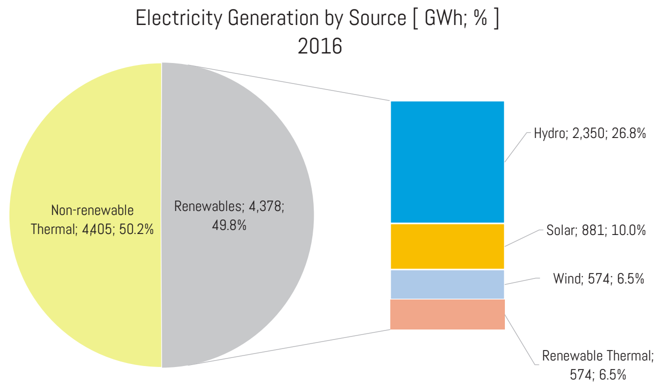
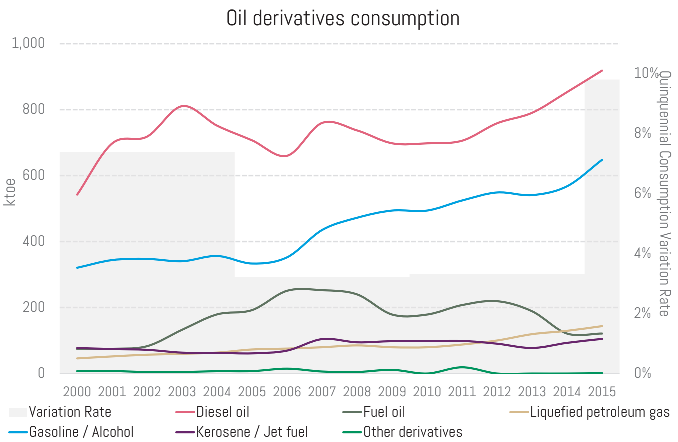
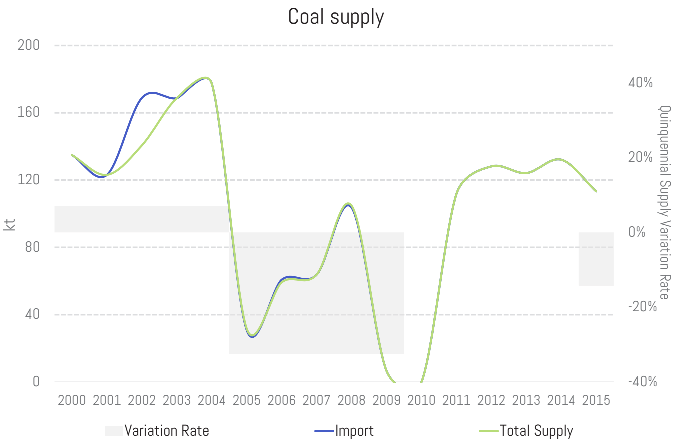
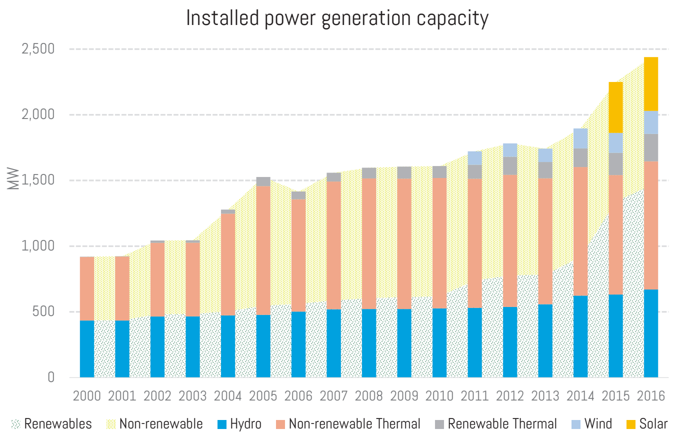
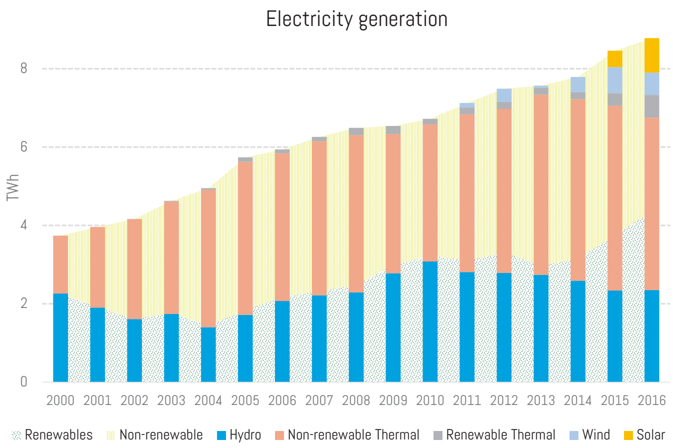

Installed power generation capacity [MW; %]
2016
Non-renewable Thermal; 975; 40.0%
Renewables; 1,464; 60.0%
Hydro; 670; 27.5%
Solar; 409; 16.8%
Wind; 175; 7.2%
Renewable Thermal; 210; 8.6%

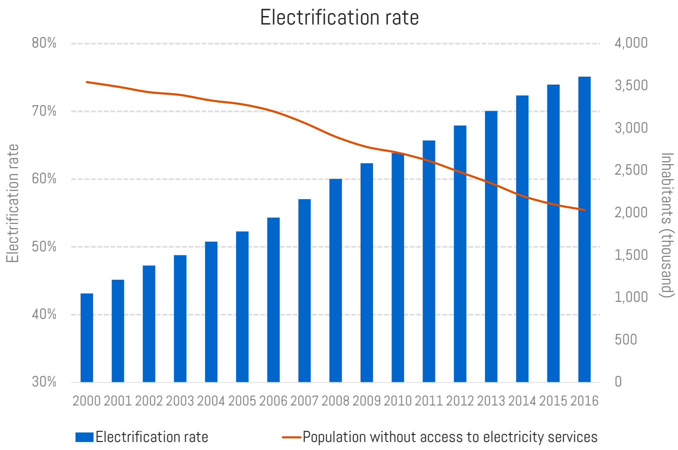

Electricity Generation by Source [GWh; %]
2016
Non-renewable Thermal; 4,405; 50.2%
Renewables; 4,378; 49.8%
Hydro; 2,350; 26.8%
Solar; 881; 10.0%
Wind; 574; 6.5%
Renewable Thermal; 574; 6.5%

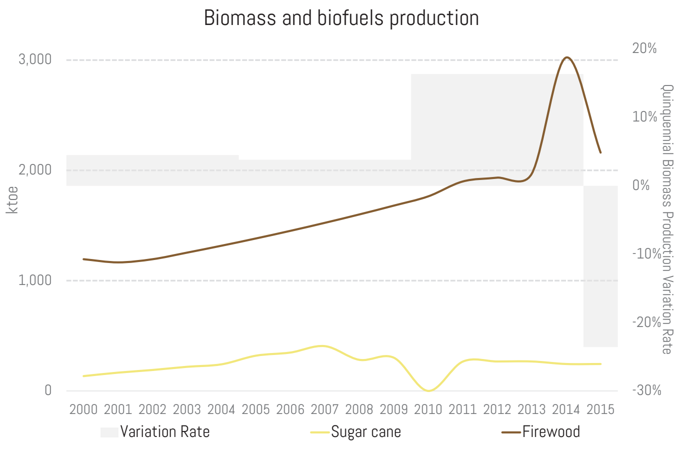

Oil derivatives consumption
ktoe
Quinquennial Consumption Variation Rate
Variation Rate
Diesel oil
Fuel oil
Liquefied petroleum gas
Gasoline / Alcohol
Kerosene / Jet fuel
Other derivatives

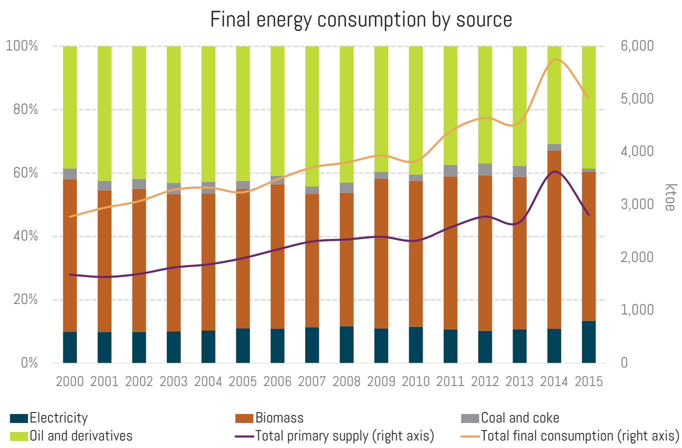

Coal supply
kt
Quinquennial Supply Variation Rate
Variation Rate
Import
Total Supply

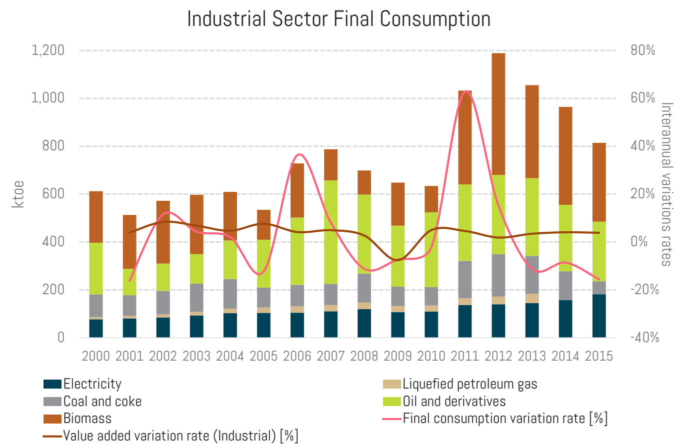

Installed power generation capacity
MW
Renewables
Non-renewable
Hydro
Non-renewable Thermal
Renewable Thermal
Wind
Solar

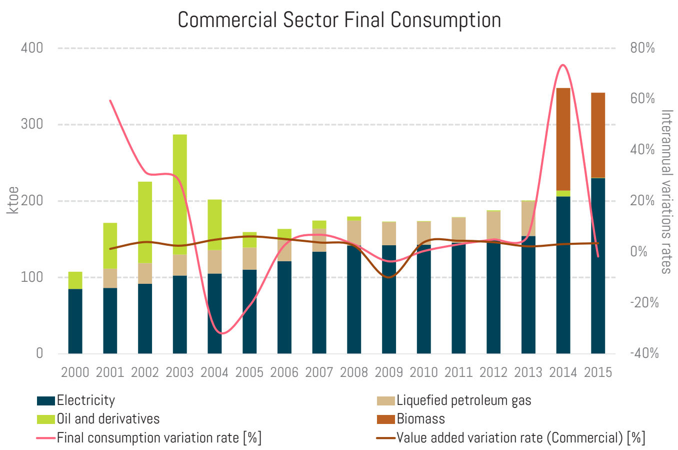

Electricity generation
TWh
Renewables
Non-renewable
Hydro
Non-renewable Thermal
Renewable Thermal
Wind
Solar

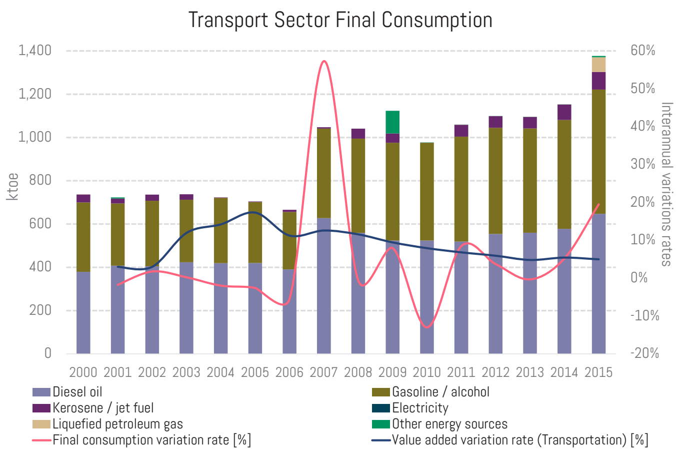

Electrification rate
Electrification rate
Inhabitants (thousand)
Electrification rate
Population without access to electricity services


Biomass and biofuels production
ktoe
Quinquennial Biomass Production Variation Rate
Variation Rate
Sugar cane
Firewood


Final energy consumption by source
ktoe
Electricity
Biomass
Coal and coke
Oil and derivatives
Total primary supply (right axis)
Total final consumption (right axis)


Industrial Sector Final Consumption
ktoe
Interannual variations rates
Electricity
Coal and coke
Biomass
Value added variation rate (Industrial) [%]
Liquefied petroleum gas
Oil and derivatives
Final consumption variation rate [%]


Commercial Sector Final Consumption
ktoe
Interannual variations rates
Electricity
Oil and derivatives
Final consumption variation rate [%]
Liquefied petroleum gas
Biomass
Value added variation rate (Commercial) [%]


Transport Sector Final Consumption
ktoe
Interannual variations rates
Diesel oil
Kerosene / jet fuel
Liquefied petroleum gas
Final consumption variation rate [%]
Gasoline / alcohol
Electricity
Other energy sources
Value added variation rate (Transportation) [%]

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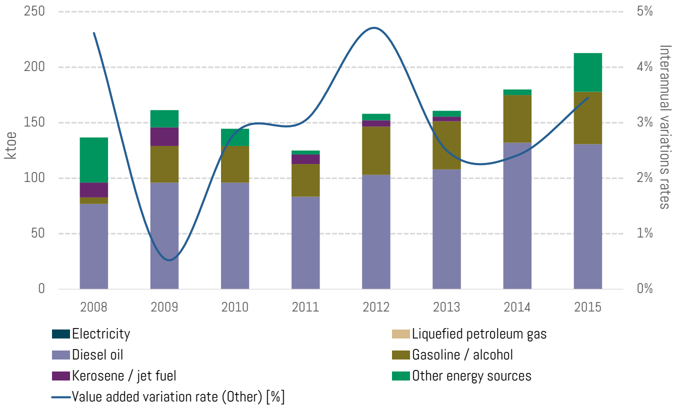
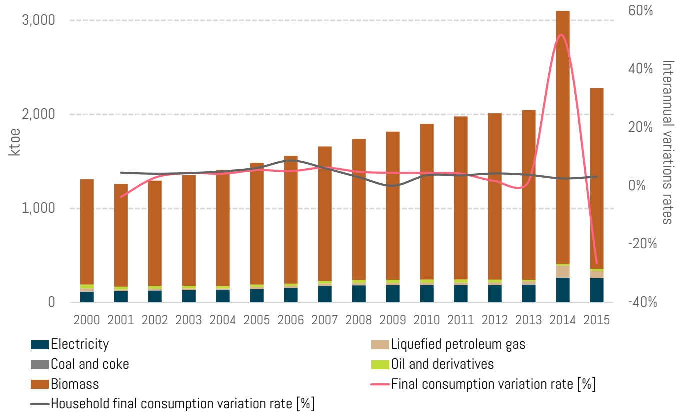
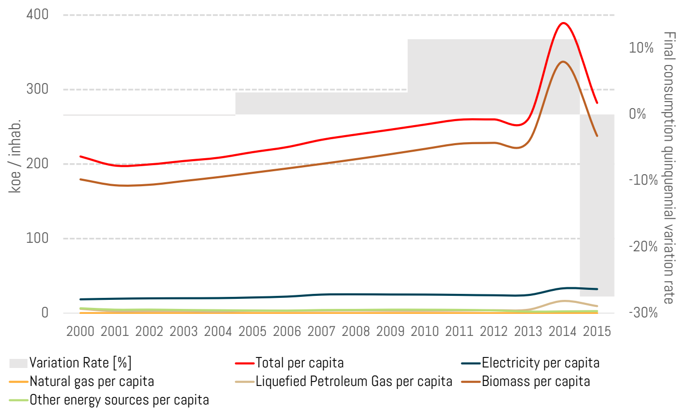
Other Sector Final Consumption



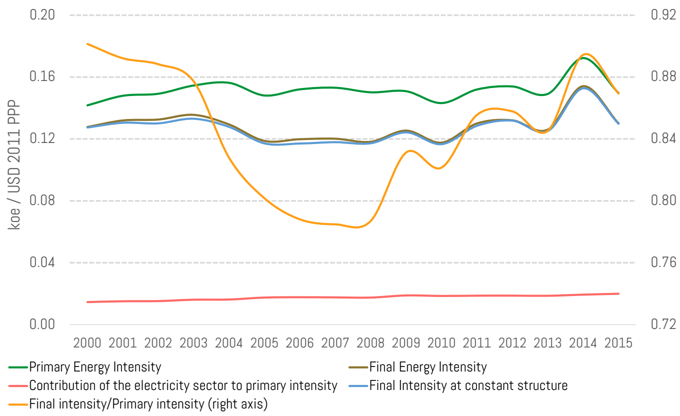
Residential Sector Final Consumption



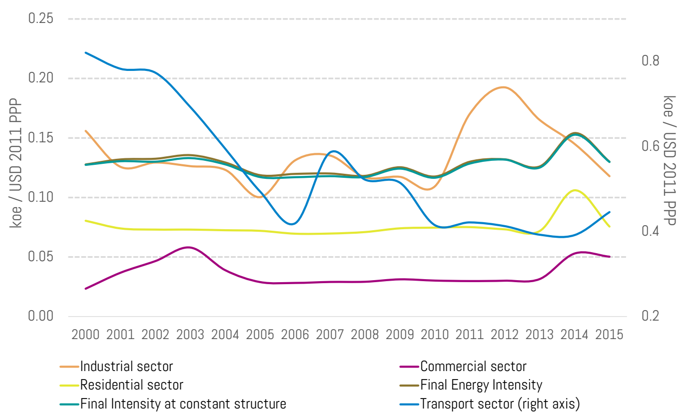
Final consumption per capita Residential Sector



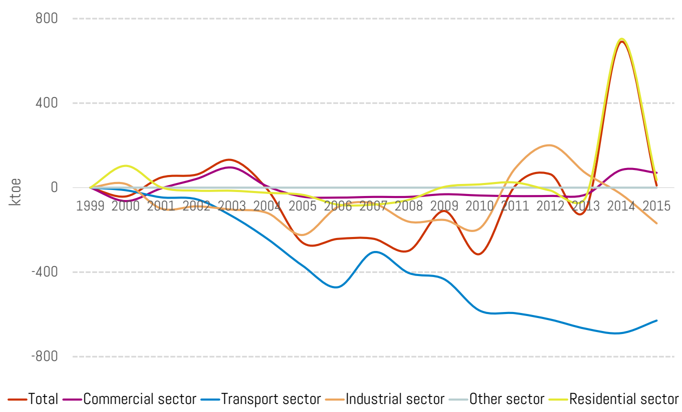
Energy intensities

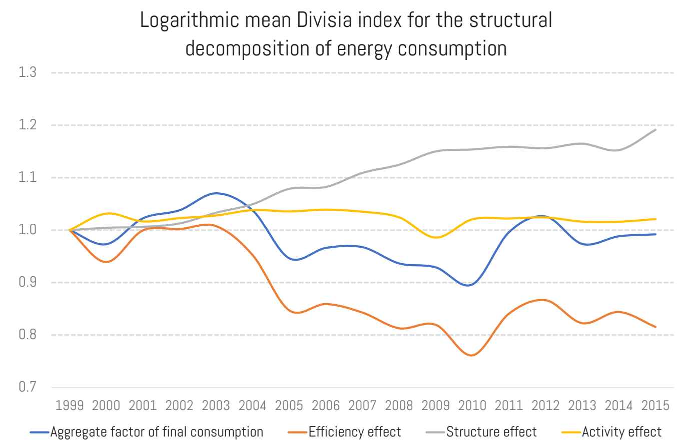


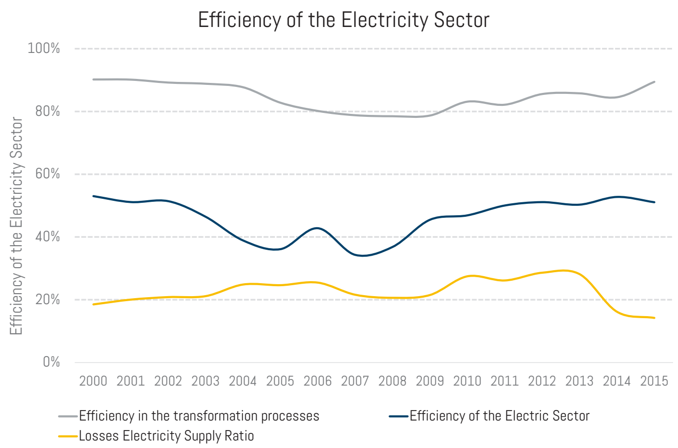
Sectoral energy intensities

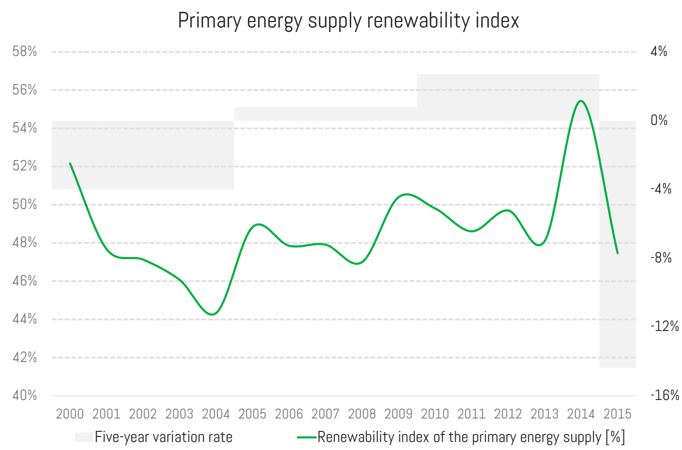


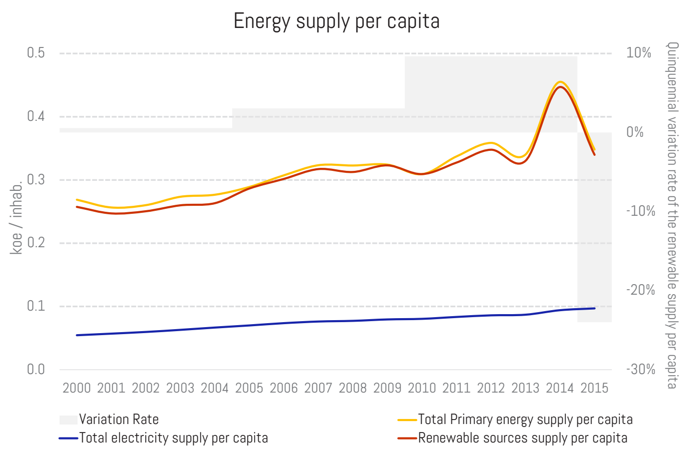
Avoided energy demand due to variations in energy intensity

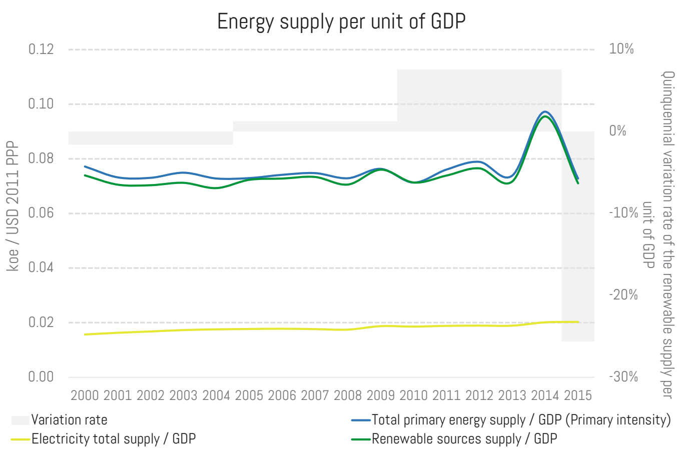


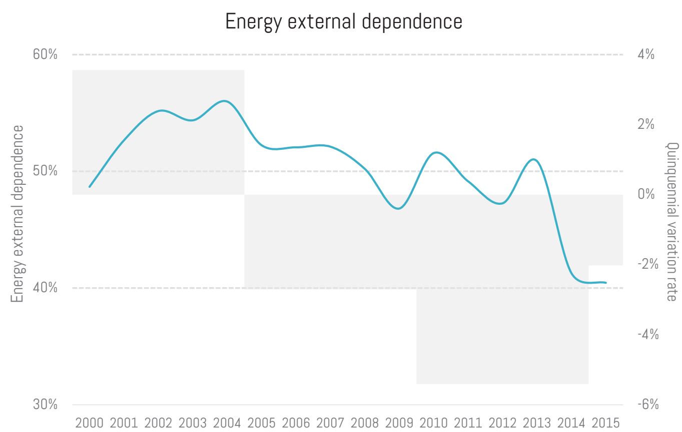

Logarithmic mean Divisia index for the structural decomposition of energy consumption
1.3
1.2
1.1
1.0
0.9
0.8
0.7
1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015
Aggregate factor of final consumption
Efficiency effect
Structure effect
Activity effect


Efficiency of the Electricity Sector
100%
80%
60%
40%
20%
0%
Efficiency of the Electricity Sector
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015
Efficiency in the transformation processes
Efficiency of the Electric Sector
Losses Electricity Supply Ratio


Primary energy supply renewability index
58%
56%
54%
52%
50%
48%
46%
44%
42%
40%
4%
0%
-4%
-8%
-12%
-16%
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015
Five-year variation rate
Renewability index of the primary energy supply [%]


Energy supply per capita
0.5
0.4
0.3
0.2
0.1
0.0
koe / inhab.
10%
0%
-10%
-20%
-30%
Quinquennial variation rate of the renewable supply per capita
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015
Variation Rate
Total Primary energy supply per capita
Total electricity supply per capita
Renewable sources supply per capita


Energy supply per unit of GDP
0.12
0.10
0.08
0.06
0.04
0.02
0.00
koe / USD 2011 PPP
10%
0%
-10%
-20%
-30%
Quinquennial variation rate of the renewable supply per unit of GDP
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015
Variation rate
Total primary energy supply / GDP (Primary intensity)
Electricity total supply / GDP
Renewable sources supply / GDP


Energy external dependence
60%
50%
40%
30%
Energy external dependence
4%
2%
0%
-2%
-4%
-6%
Quinquennial variation rate
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015

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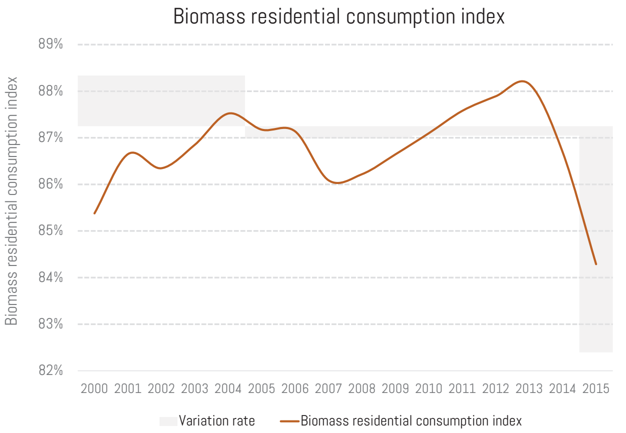
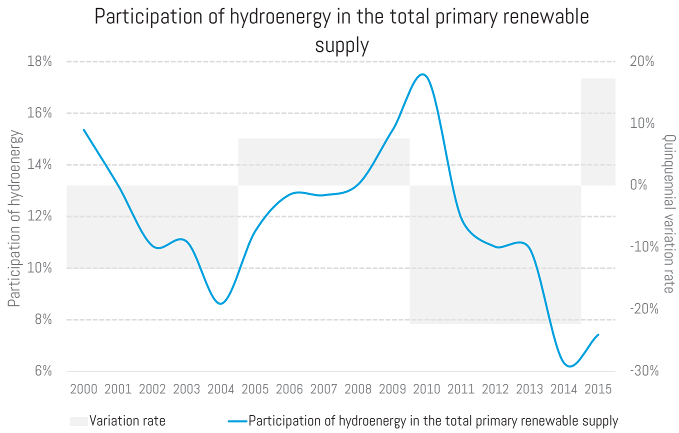
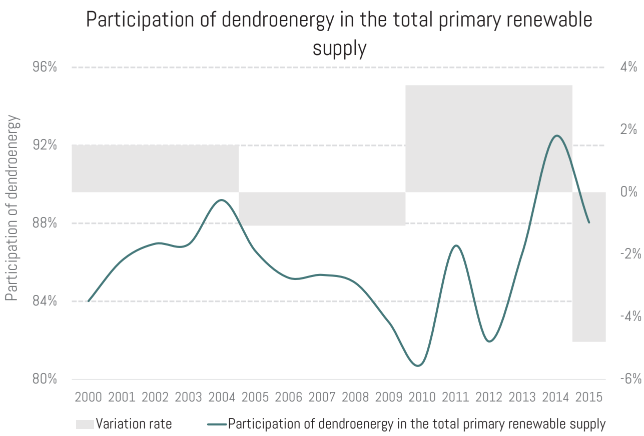
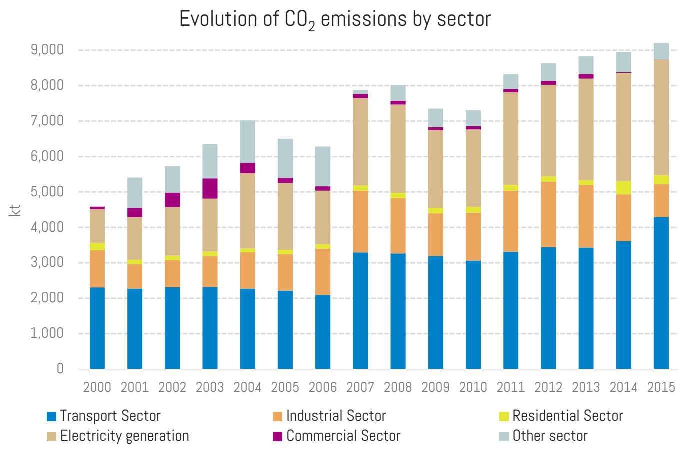
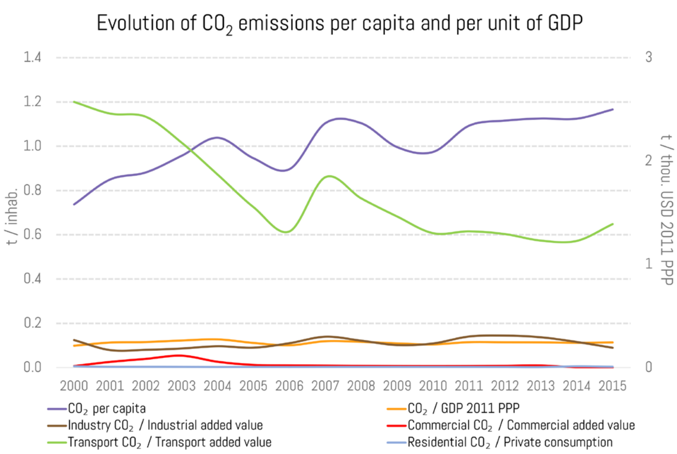
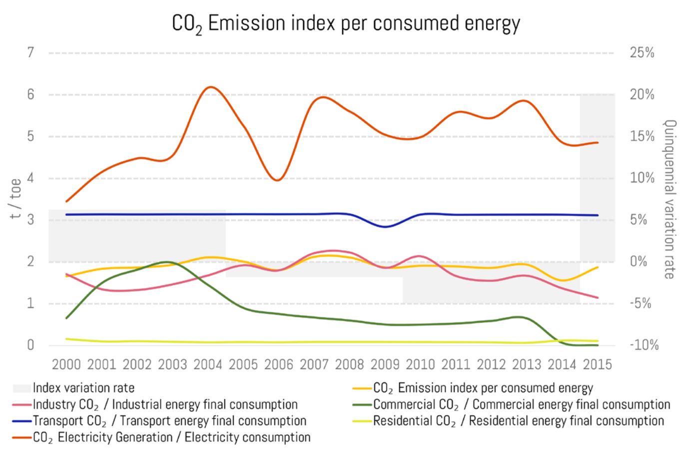

Biomass residential consumption index
Biomass residential consumption index
Quinquennial variation rate
89%
88%
87%
86%
85%
84%
83%
82%
1%
0%
-1%
-2%
-3%
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015
Variation rate
Biomass residential consumption index

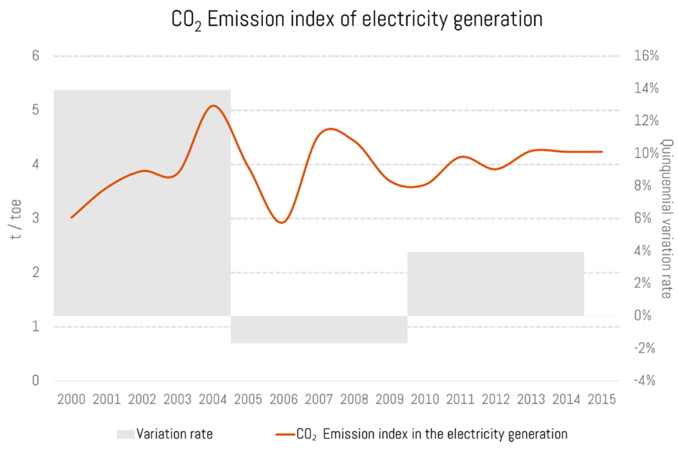

Participation of hydroenergy in the total primary renewable supply
Participation of hydroenergy
Quinquennial variation rate
18%
16%
14%
12%
10%
8%
6%
20%
10%
0%
-10%
-20%
-30%
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015
Variation rate
Participation of hydroenergy in the total primary renewable supply

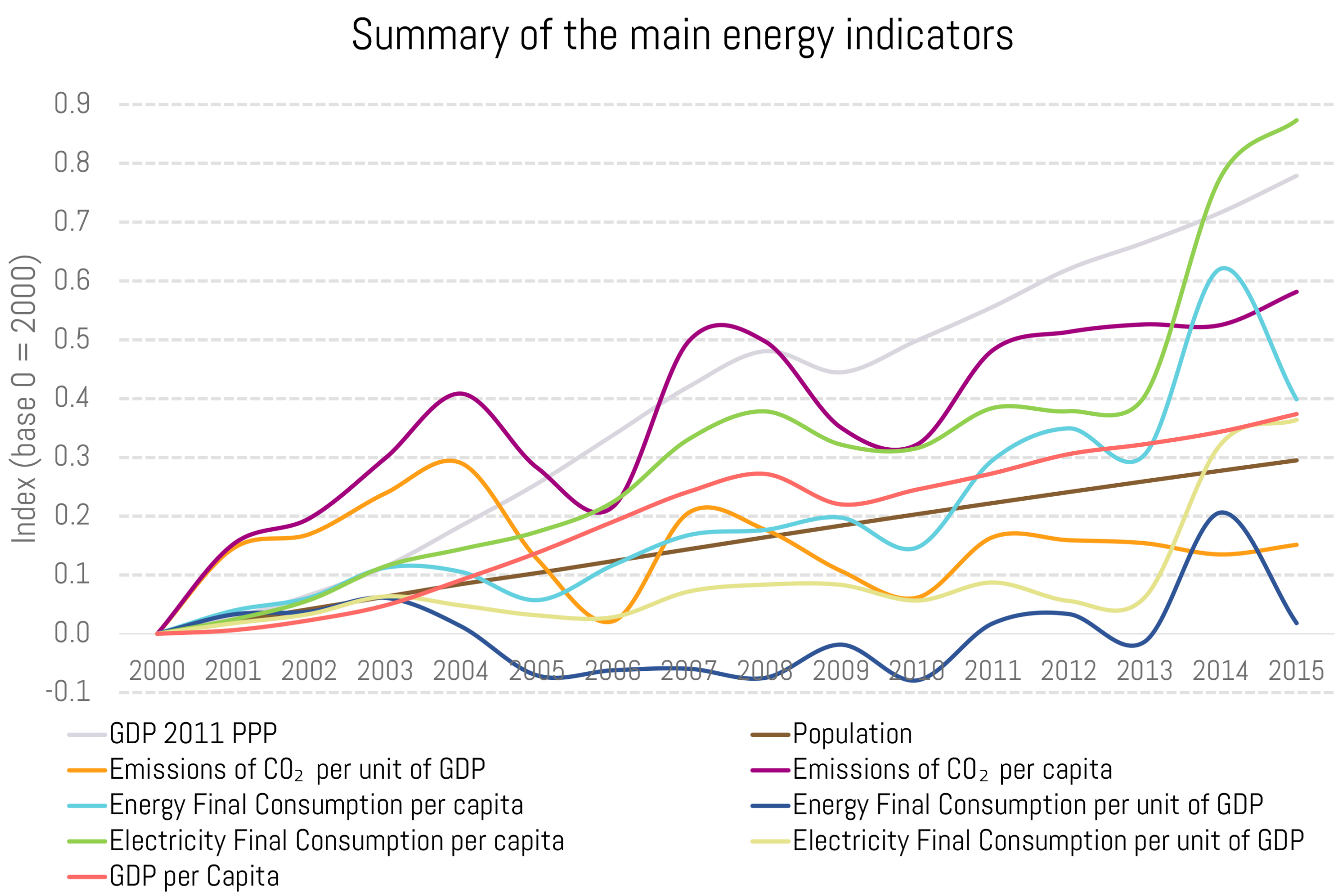

Participation of dendroenergy in the total primary renewable supply
Participation of dendroenergy
Quinquennial variation rate
96%
92%
88%
84%
80%
4%
2%
0%
-2%
-4%
-6%
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015
Variation rate
Participation of dendroenergy in the total primary renewable supply


Evolution of CO_2 emissions by sector
kt
9,000
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015
Transport Sector
Industrial Sector
Residential Sector
Electricity generation
Commercial Sector
Other sector


Evolution of CO_2 emissions per capita and per unit of GDP
t / inhab.
t / thou. USD 2011 PPP
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
3
2
1
0
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015
CO_2 per capita
CO_2 / GDP 2011 PPP
Industry CO_2 / Industrial added value
Commercial CO_2 / Commercial added value
Transport CO_2 / Transport added value
Residential CO_2 / Private consumption


CO_2 Emission index per consumed energy
t / toe
Quinquennial variation rate
7
6
5
4
3
2
1
0
25%
20%
15%
10%
5%
0%
-5%
-10%
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015
Index variation rate
CO_2 Emission index per consumed energy
Industry CO_2 / Industrial energy final consumption
Commercial CO_2 / Commercial energy final consumption
Transport CO_2 / Transport energy final consumption
Residential CO_2 / Residential energy final consumption
CO_2 Electricity Generation / Electricity consumption


CO2 Emission index of electricity generation
t / toe
Quinquennial variation rate
Variation rate
CO2 Emission index in the electricity generation


Summary of the main energy indicators
Index (base 0 = 2000)
GDP 2011 PPP
Population
Emissions of CO2 per unit of GDP
Emissions of CO2 per capita
Energy Final Consumption per capita
Energy Final Consumption per unit of GDP
Electricity Final Consumption per capita
Electricity Final Consumption per unit of GDP
GDP per Capita

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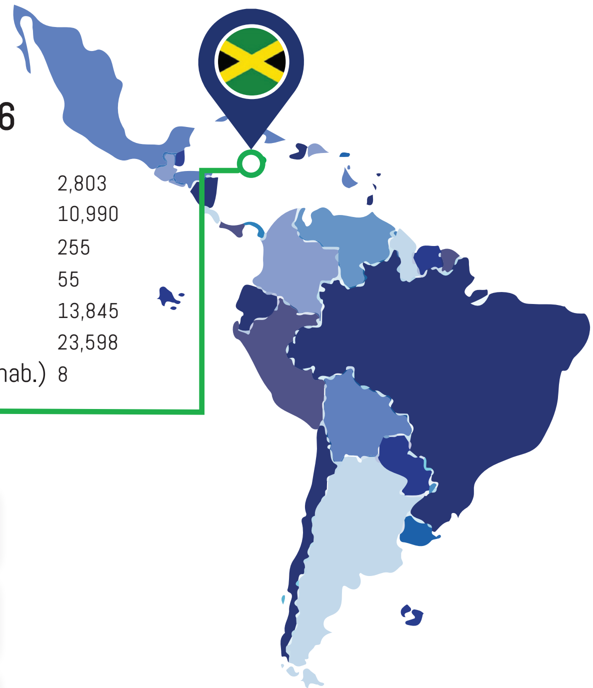
GENERAL INFORMATION 2016

Population (thousand inhab.)	2,803
Area (km^2)	10,990
Population Density (inhab./km^2)	255
Urban Population (%)	55
GDP USD 2010 (MUSD)	13,845
GDP USD 2011 PPP (MUSD)	23,598
GDP per capita (thou. USD 2011 PPP/inhab.)	8



ENERGY SECTOR

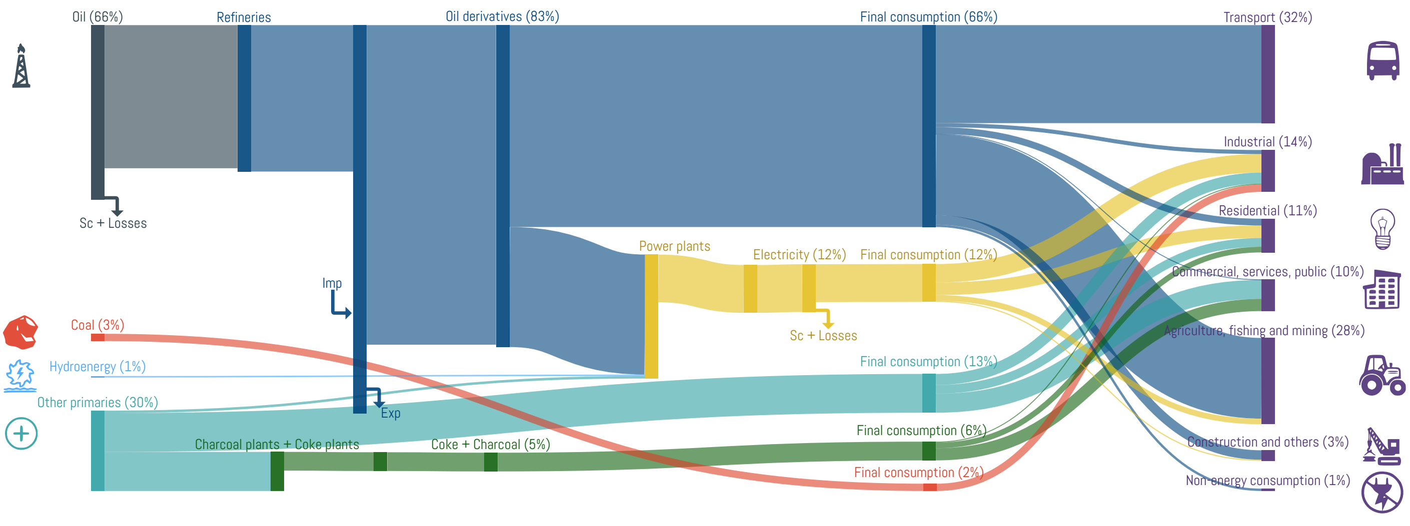
Final consumption in the Transport Sector	Mtoe 0.69
Final consumption in the Industrial Sector	Mtoe 0.29
Final consumption in the Residential Sector	Mtoe 0.24
Final consumption in the Commercial and Service Sector	Mtoe 0.22
Final consumption in the Agriculture, Livestock, Fishing, Mining, Other and Non - Energy Consumption	Mtoe 0.70

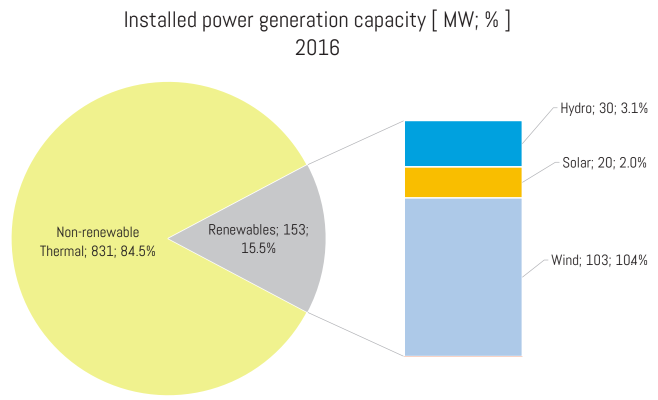
Oil Reserves	Natural gas reserves	Coal reserves
Mbbl	Gm^3	Mt
n.a.	n.a.	n.d.

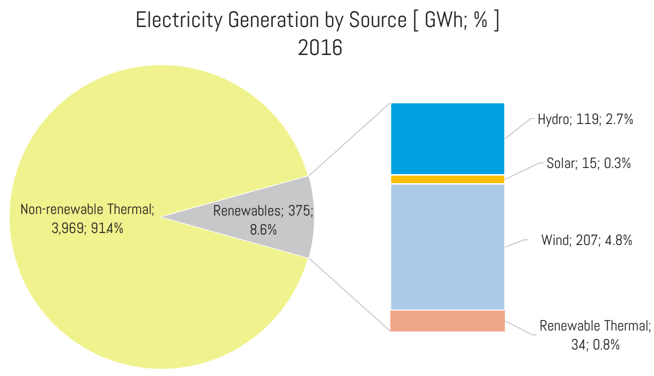
[1] 2015 Data.

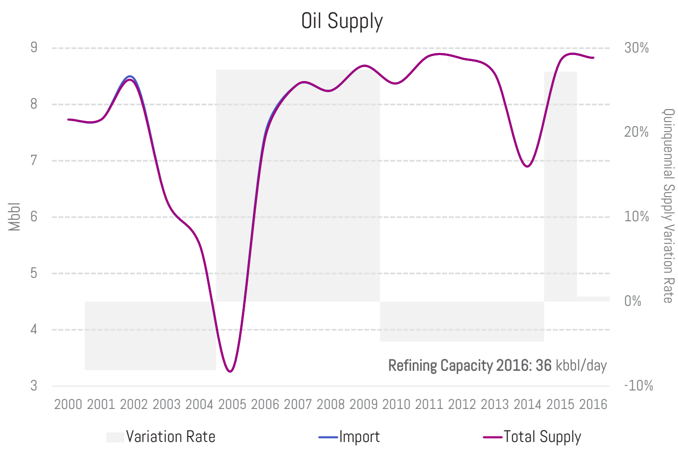
Electricity consumption per capita	Final energy consumption per capita	Electrification rate	Total energy supply	Total energy production	Total energy imports	Total energy exports	Total final energy consumption	Refining capacity	Installed power generation capacity	Primary energy intensity and final energy intensity
kWh / inhab.	toe / inhab.	%	Mtoe	Mtoe	Mtoe	Mtoe	Mtoe	kbbl/day	GW	koe / USD 2011 PPP
1,106	0.76	98[1]	3.09	0.58	3.00	0.48	2.14	36	0.98	0.08 / 0.09

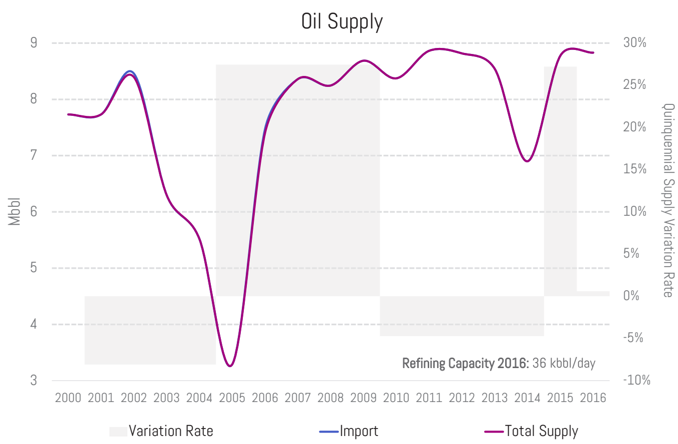
Summarized energy matrix 2016



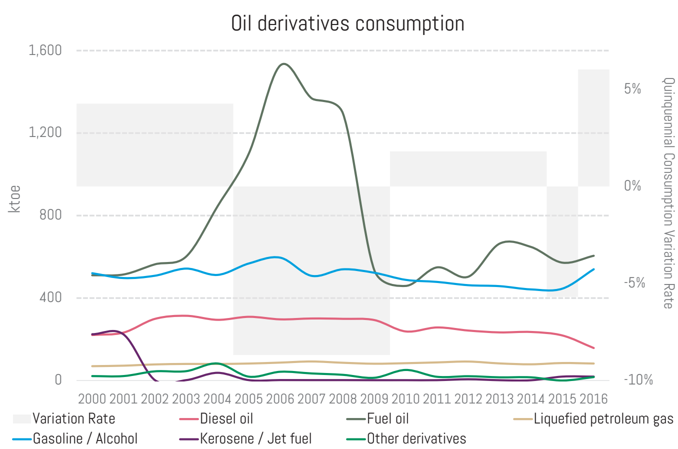

Installed power generation capacity [MW; %]
2016
Non-renewable Thermal; 831; 84.5%
Renewables; 153; 15.5%
Hydro; 30; 3.1%
Solar; 20; 2.0%
Wind; 103; 10.4%

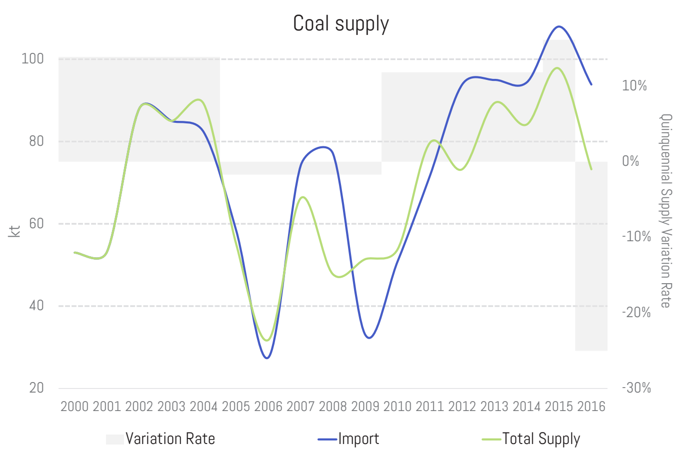

Electricity Generation by Source [GWh; %]
2016
Non-renewable Thermal; 3,969; 91.4%
Renewables; 375; 8.6%
Hydro; 119; 2.7%
Solar; 15; 0.3%
Wind; 207; 4.8%
Renewable Thermal; 34; 0.8%

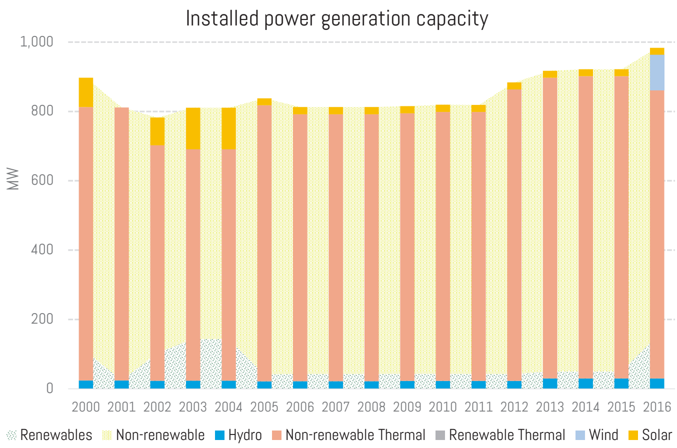

Oil Supply
Mbbl
Quinquennial Supply Variation Rate
Refining Capacity 2016: 36 kbbl/day
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Variation Rate
Import
Total Supply

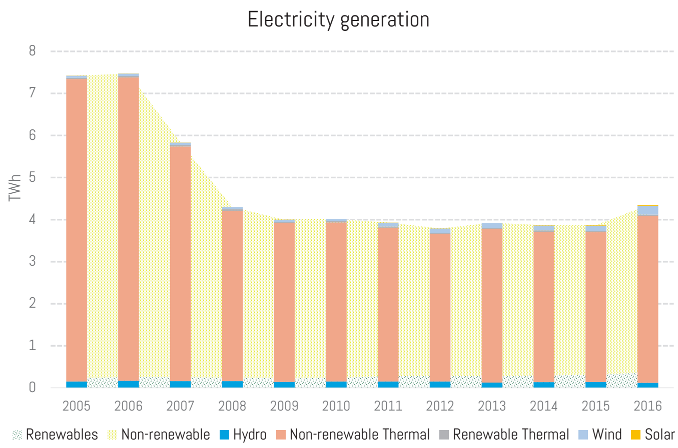

Oil Supply
Mbbl
Quinquennial Supply Variation Rate
Refining Capacity 2016: 36 kbbl/day
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Variation Rate
Import
Total Supply

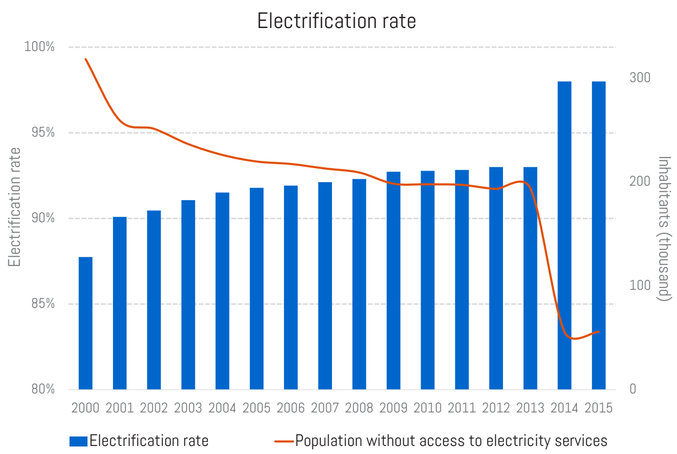
JAMAICA

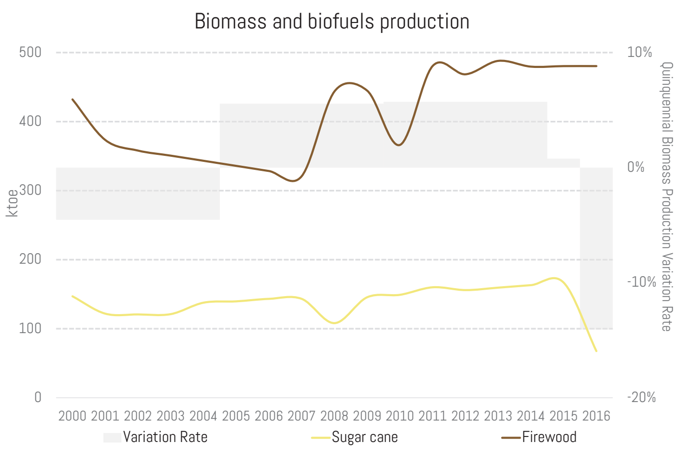

Oil derivatives consumption
ktoe
Quinquennial Consumption Variation Rate
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Variation Rate
Diesel oil
Fuel oil
Liquefied petroleum gas
Gasoline / Alcohol
Kerosene / Jet fuel
Other derivatives

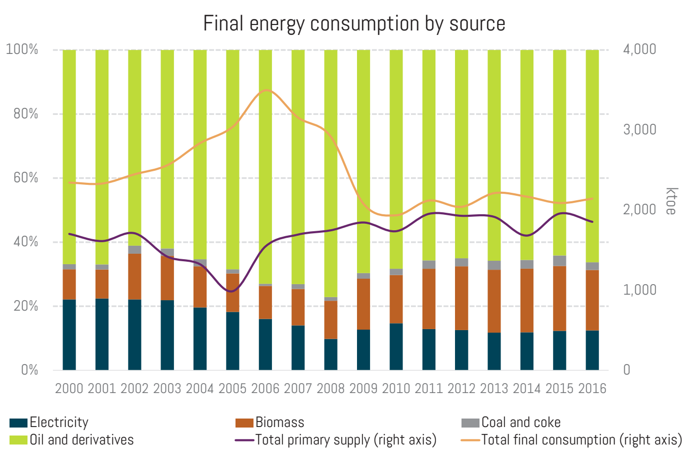

Coal supply
kt
Quinquennial Supply Variation Rate
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Variation Rate
Import
Total Supply

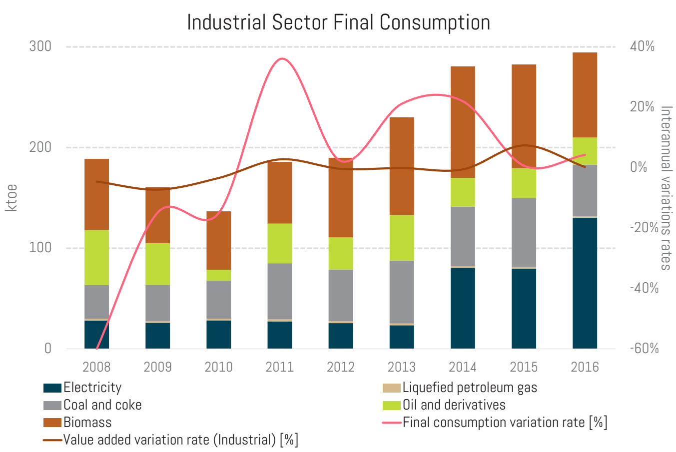

Installed power generation capacity
MW
1,000
800
600
400
200
0
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Renewables
Non-renewable
Hydro
Non-renewable Thermal
Renewable Thermal
Wind
Solar


Electricity generation
TWh
8
7
6
5
4
3
2
1
0
2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Renewables
Non-renewable
Hydro
Non-renewable Thermal
Renewable Thermal
Wind
Solar


Electrification rate
Electrification rate
100%
95%
90%
85%
80%
Inhabitants (thousand)
300
200
100
0
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015
Electrification rate
Population without access to electricity services

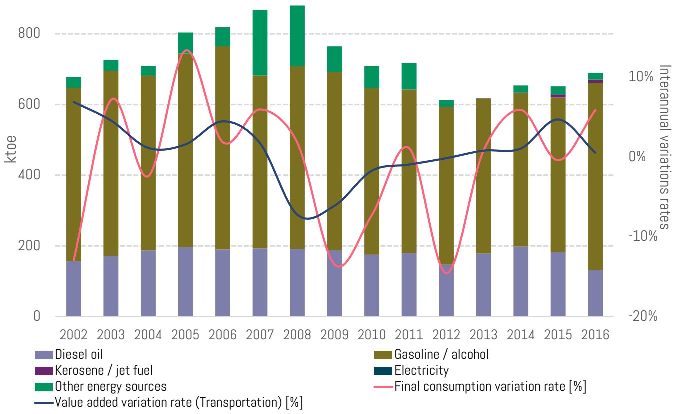

Biomass and biofuels production
ktoe
500
400
300
200
100
0
Quinquennial Biomass Production Variation Rate
10%
0%
-10%
-20%
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Variation Rate
Sugar cane
Firewood


Final energy consumption by source
100%
80%
60%
40%
20%
0%
ktoe
4,000
3,000
2,000
1,000
0
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Electricity
Oil and derivatives
Biomass
Total primary supply (right axis)
Coal and coke
Total final consumption (right axis)

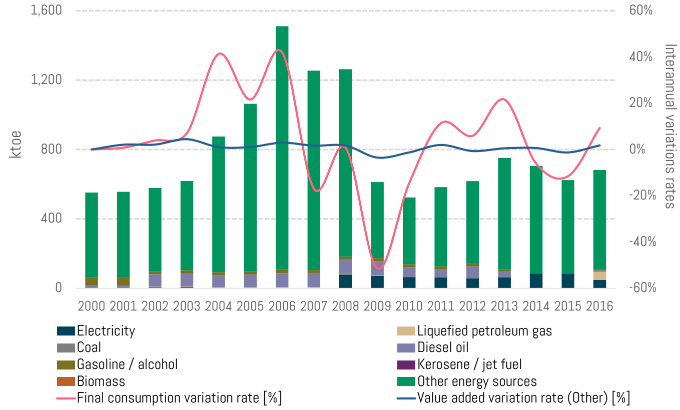

Industrial Sector Final Consumption
ktoe
300
200
100
0
Interannual variations rates
40%
20%
0%
-20%
-40%
-60%
2008 2009 2010 2011 2012 2013 2014 2015 2016
Electricity
Coal and coke
Biomass
Value added variation rate (Industrial) [%]
Liquefied petroleum gas
Oil and derivatives
Final consumption variation rate [%]

JAMAICA

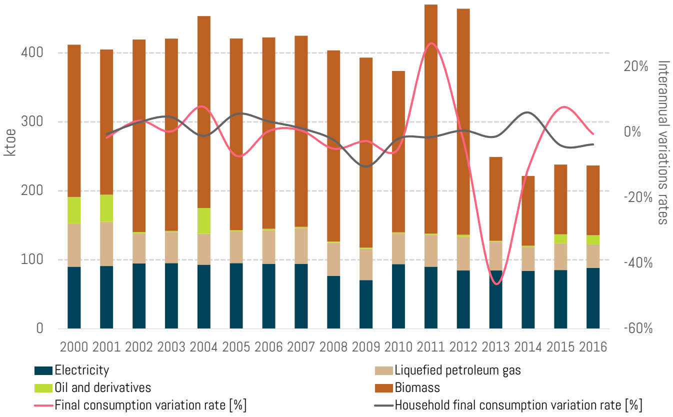
Transport Sector Final Consumption



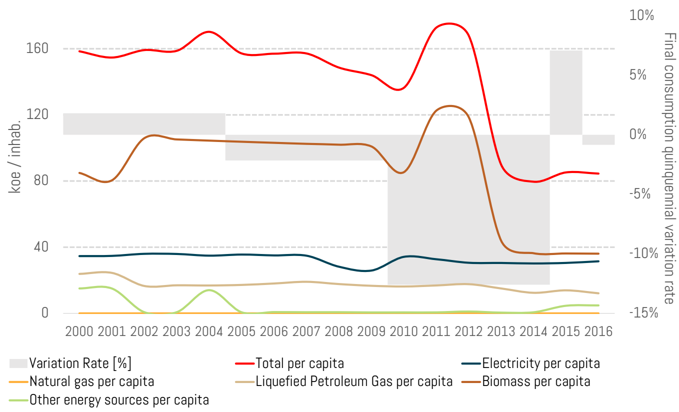
Other Sector Final Consumption



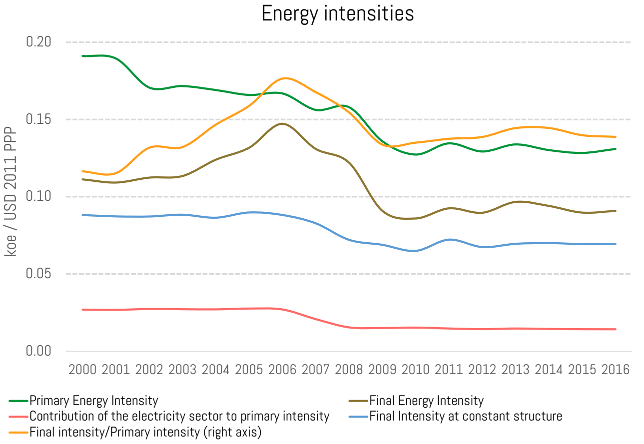
Residential Sector Final Consumption



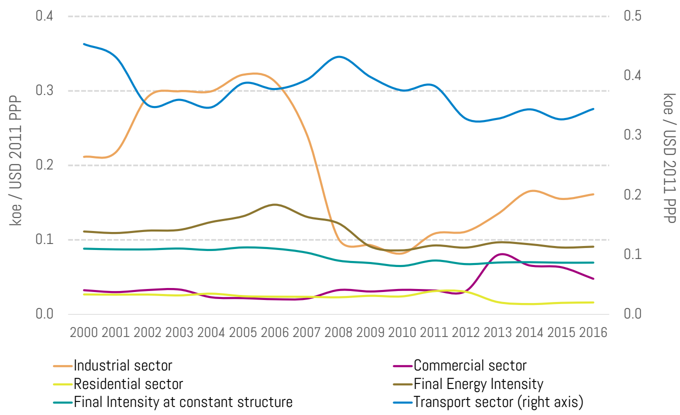
Final consumption per capita Residential Sector



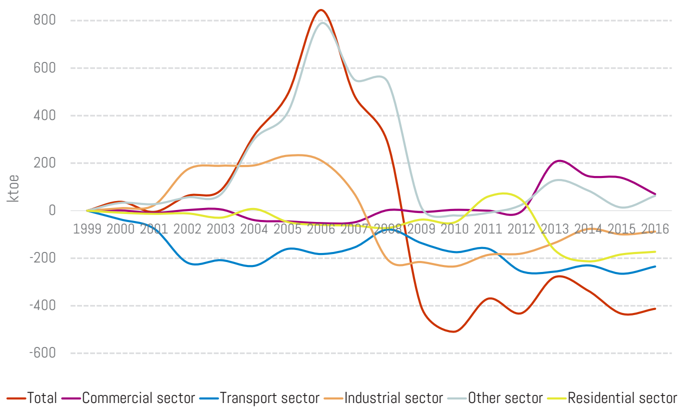
Energy intensities



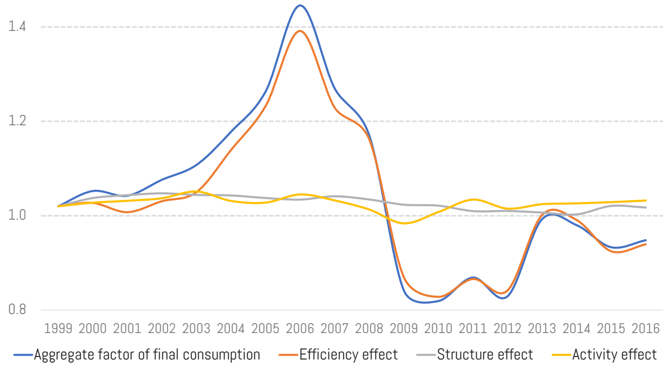
Sectoral energy intensities



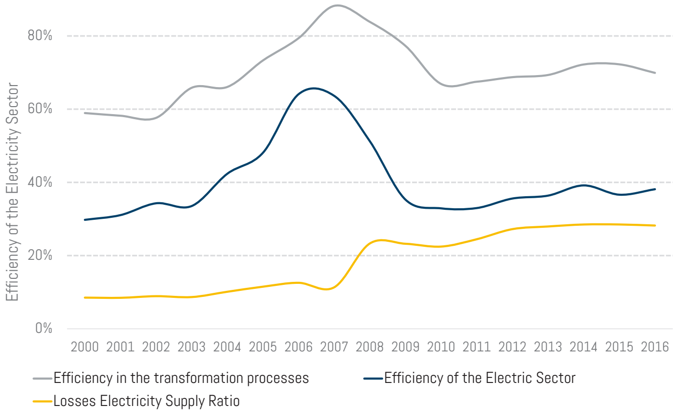
Avoided energy demand due to variations in energy intensity



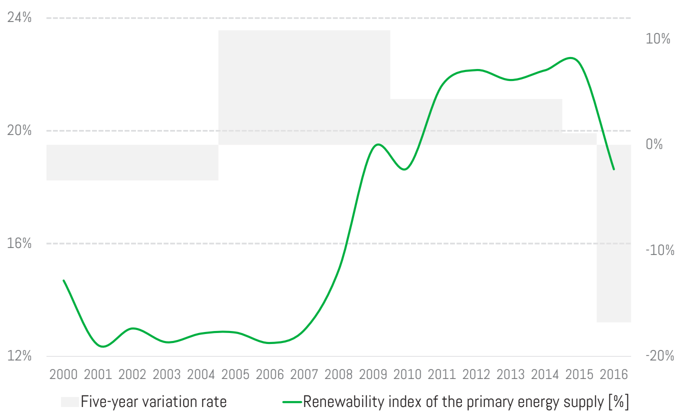
Logarithmic mean Divisia index for the structural decomposition of energy consumption



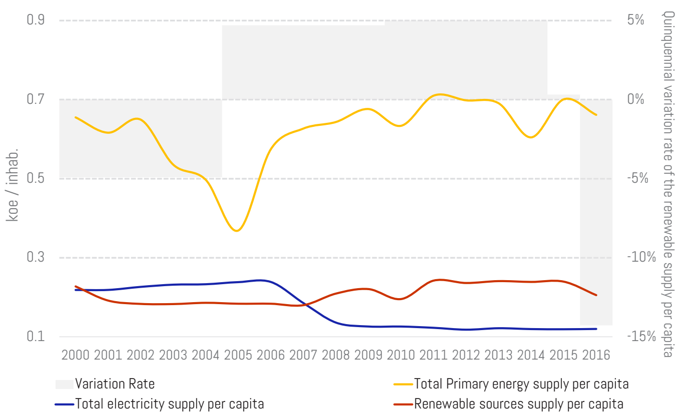
Efficiency of the Electricity Sector



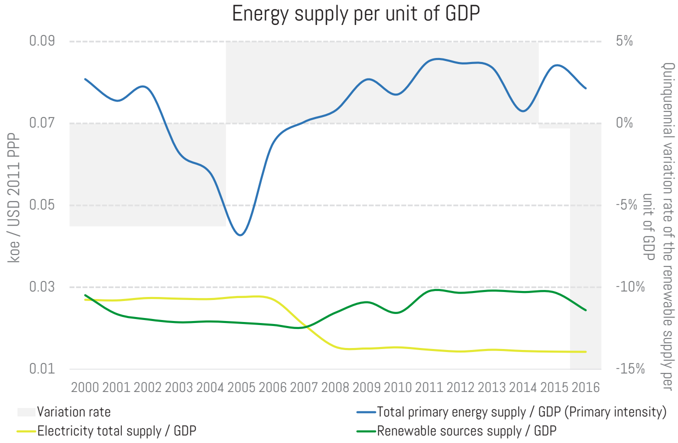
Primary energy supply renewability index



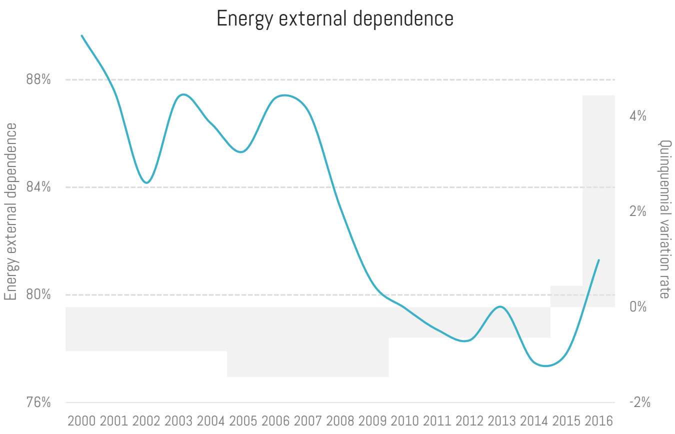
Energy supply per capita

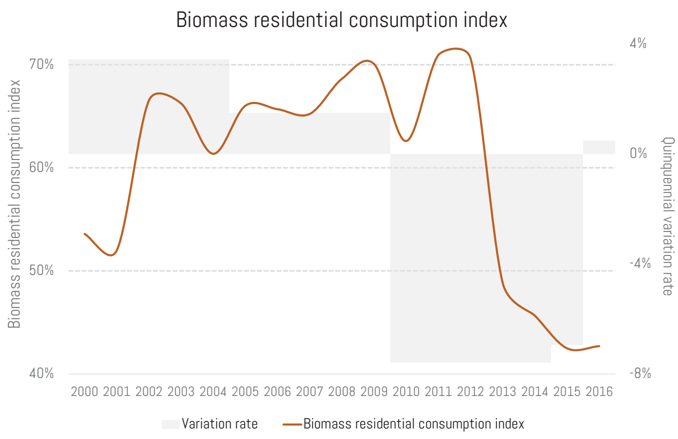


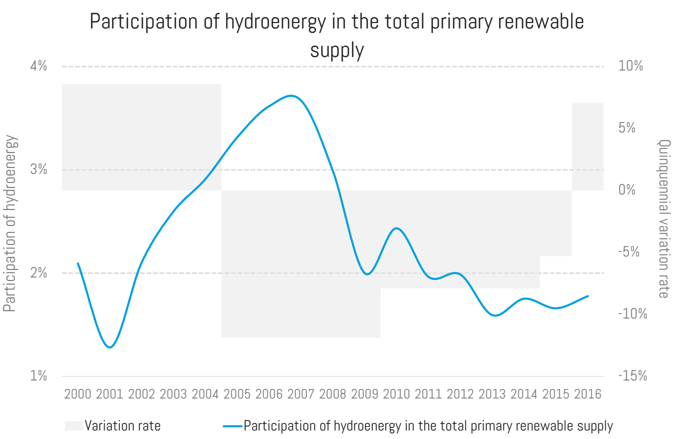
Energy supply per unit of GDP

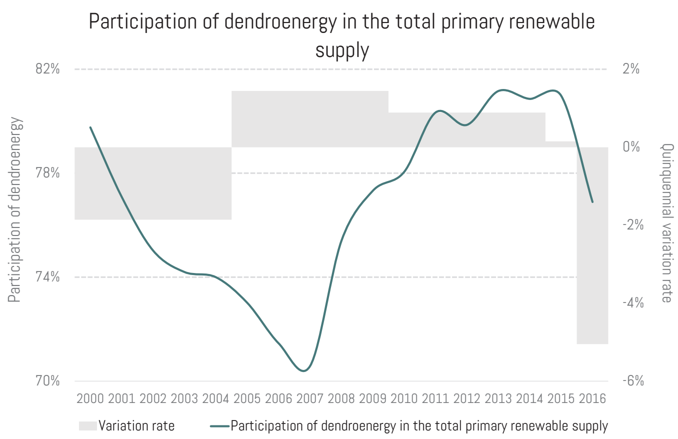


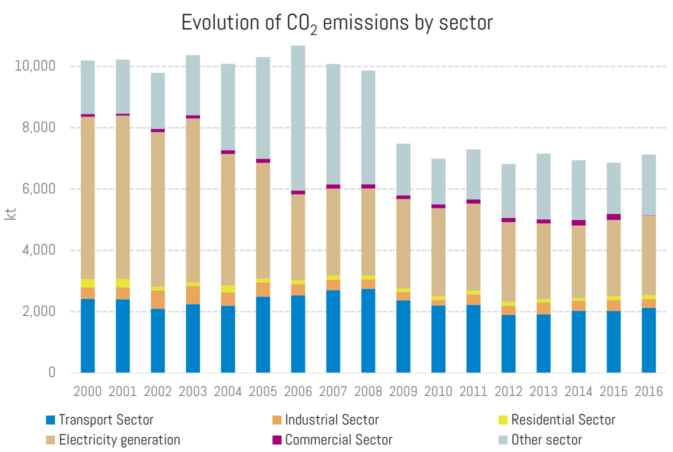
JAMAICA

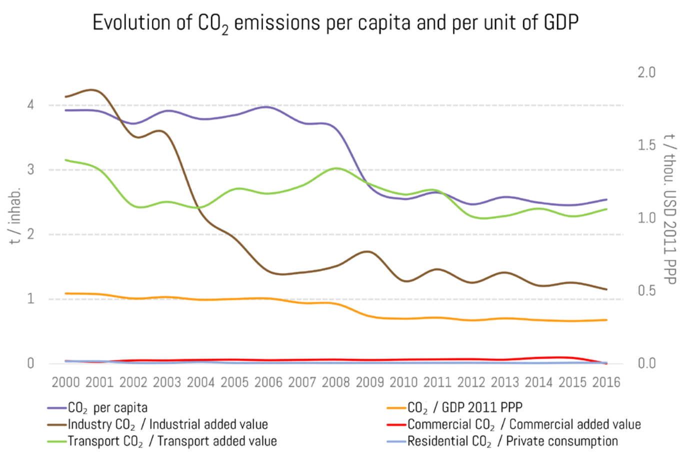

Energy external dependence
Energy external dependence
Quinquennial variation rate
88%
84%
80%
76%
4%
2%
0%
-2%
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016

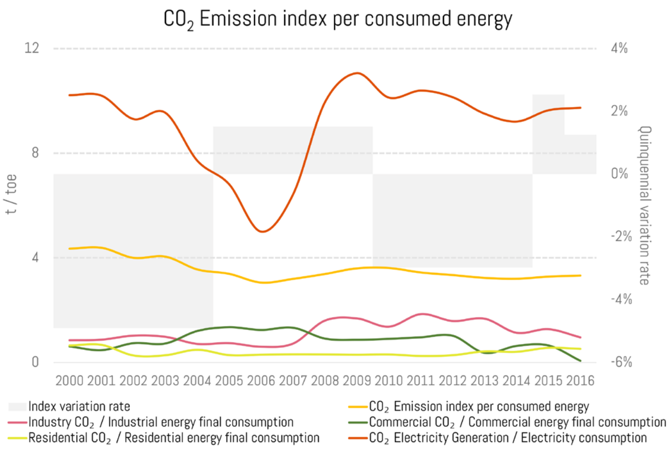

Biomass residential consumption index
Biomass residential consumption index
Quinquennial variation rate
70%
60%
50%
40%
4%
0%
-4%
-8%
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Variation rate
Biomass residential consumption index

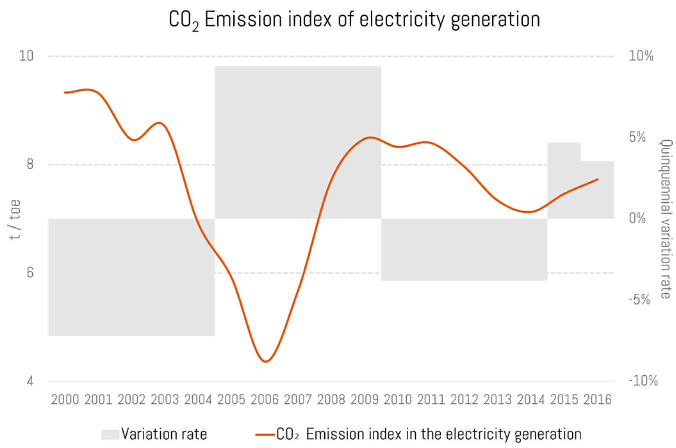

Participation of hydroenergy in the total primary renewable supply
Participation of hydroenergy
Quinquennial variation rate
4%
3%
2%
1%
10%
5%
0%
-5%
-10%
-15%
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Variation rate
Participation of hydroenergy in the total primary renewable supply

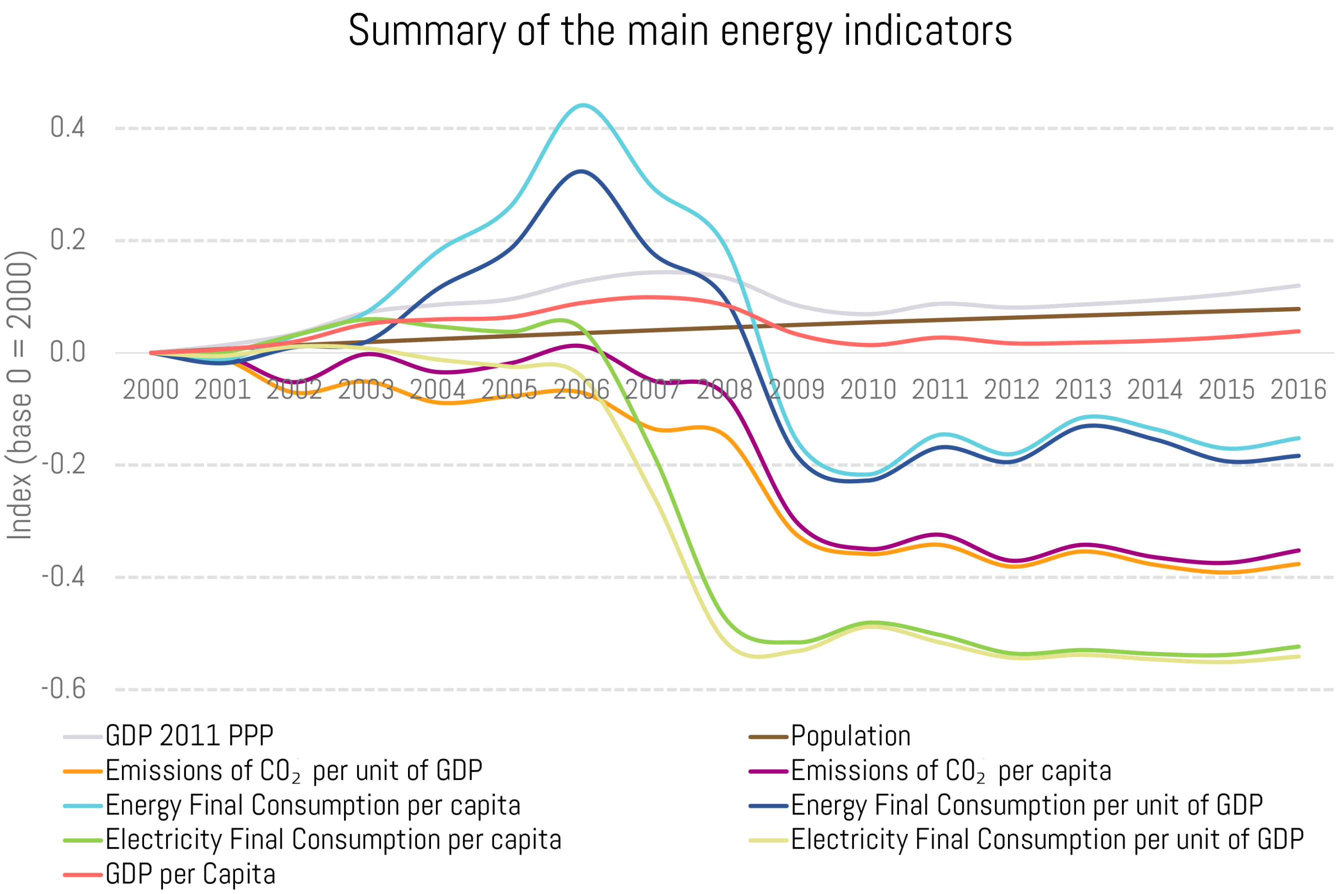

Participation of dendroenergy in the total primary renewable supply
Participation of dendroenergy
Quinquennial variation rate
82%
78%
74%
70%
2%
0%
-2%
-4%
-6%
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Variation rate
Participation of dendroenergy in the total primary renewable supply


Evolution of CO_2 emissions by sector
kt
10,000
8,000
6,000
4,000
2,000
0
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Transport Sector
Industrial Sector
Residential Sector
Electricity generation
Commercial Sector
Other sector

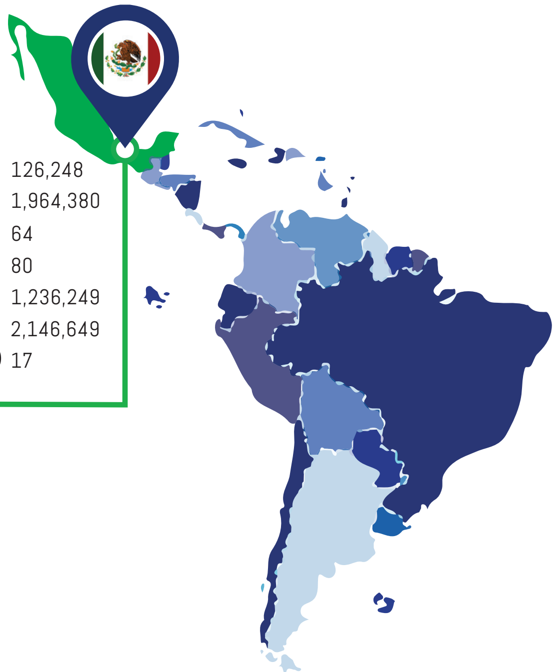

Evolution of CO_2 emissions per capita and per unit of GDP
t / inhab.
t / thou. USD 2011 PPP
4
3
2
1
0
2.0
1.5
1.0
0.5
0.0
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
CO_2 per capita
CO_2 / GDP 2011 PPP
Industry CO_2 / Industrial added value
Commercial CO_2 / Commercial added value
Transport CO_2 / Transport added value
Residential CO_2 / Private consumption


CO2 Emission index per consumed energy
t / toe
Quinquennial variation rate
Index variation rate
Industry CO2 / Industrial energy final consumption
Residential CO2 / Residential energy final consumption
CO2 Emission index per consumed energy
Commercial CO2 / Commercial energy final consumption
CO2 Electricity Generation / Electricity consumption


CO2 Emission index of electricity generation
t / toe
Quinquennial variation rate
Variation rate
CO2 Emission index in the electricity generation


Summary of the main energy indicators
Index (base 0 = 2000)
GDP 2011 PPP
Population
Emissions of CO2 per unit of GDP
Emissions of CO2 per capita
Energy Final Consumption per capita
Energy Final Consumption per unit of GDP
Electricity Final Consumption per capita
Electricity Final Consumption per unit of GDP
GDP per Capita

MEXICO



GENERAL INFORMATION 2016

Population (thousand inhab.)	126,248
Area (km^2)	1,964,380
Population Density (inhab./km^2)	64
Urban Population (%)	80
GDP USD 2010 (MUSD)	1,236,249
GDP USD 2011 PPP (MUSD)	2,146,649
GDP per capita (thou. USD 2011 PPP/inhab.)	17

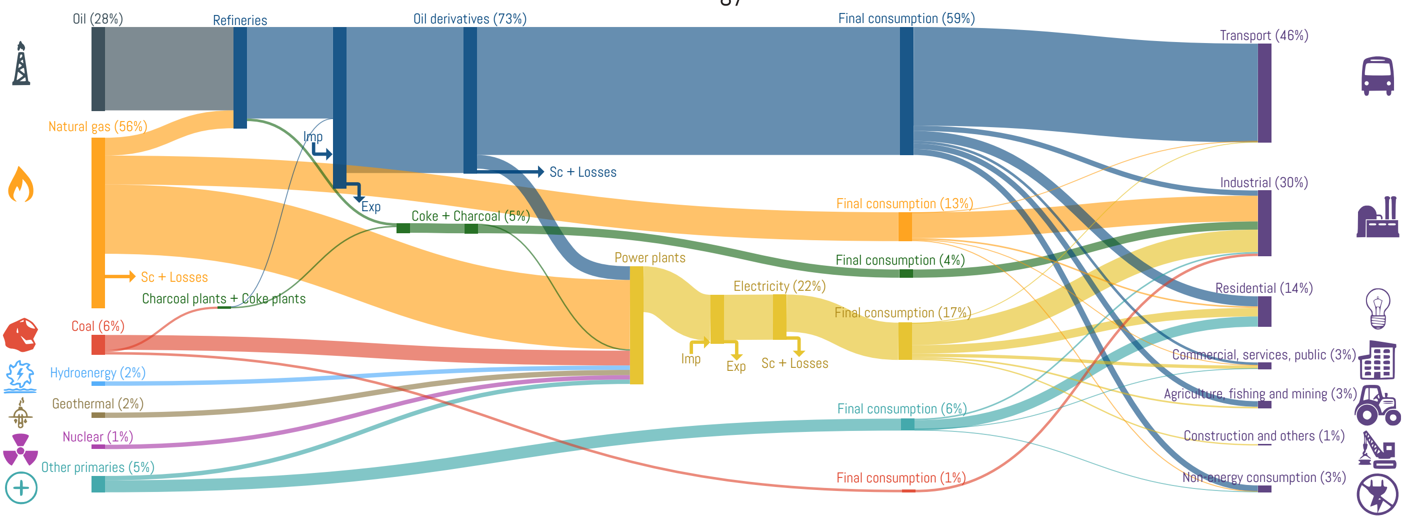
ENERGY SECTOR

Final consumption in the Transport Sector	Mtoe 59.39
Final consumption in the Industrial Sector	Mtoe 39.39
Final consumption in the Residential Sector	Mtoe 18.22
Final consumption in the Commercial and Service Sector	Mtoe 3.93
Final consumption in the Agriculture, Livestock, Fishing, Mining, Other and Non - Energy Consumption	Mtoe 9.25

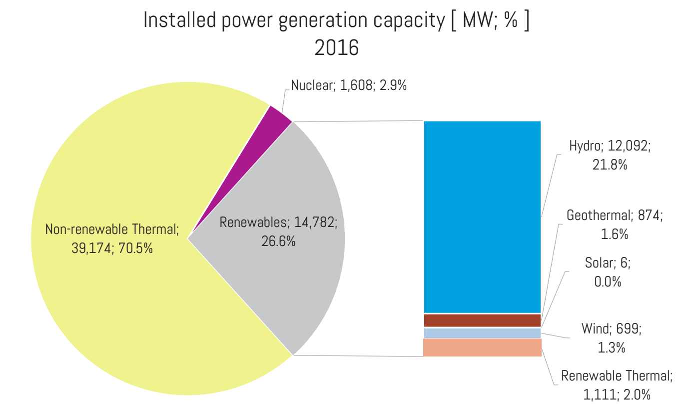
Oil Reserves	Natural gas reserves	Coal reserves
Mbbl 7,641	Gm^3 358	Mt 1,211

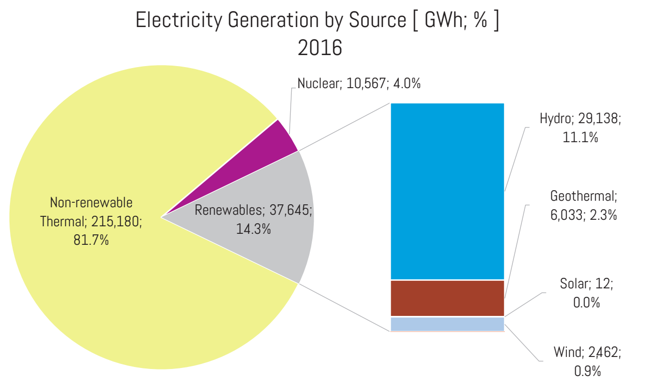
Electricity consumption per capita	Final energy consumption per capita	Electrification rate	Total energy supply	Total energy production	Total energy imports	Total energy exports	Total final energy consumption	Refining capacity	Installed power generation capacity	Primary energy intensity and final energy intensity
kWh / inhab.	toe / inhab.	%	Mtoe	Mtoe	Mtoe	Mtoe	Mtoe	kbbl/day	GW	koe / USD 2011 PPP
2,061	1.03	98.58	218.46	205.58	95.46	74.11	130.18	1,640	55.56	0.09 / 0.06

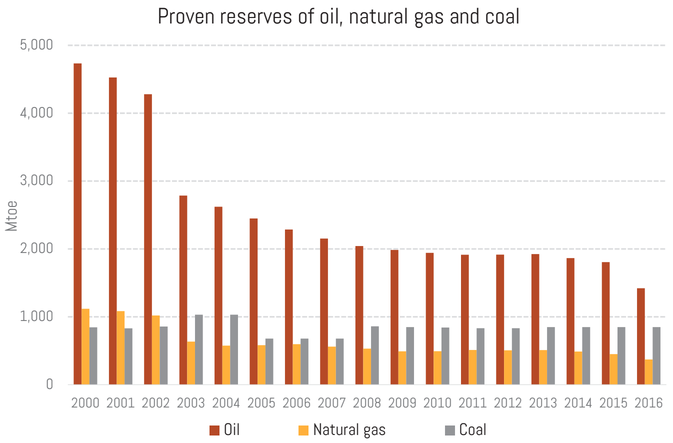
Summarized energy matrix 2016

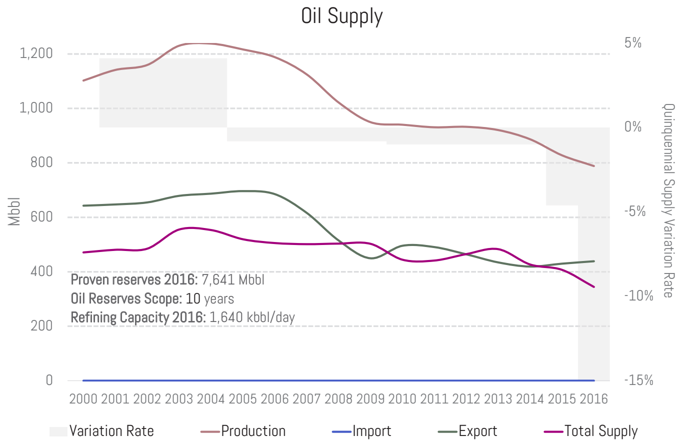


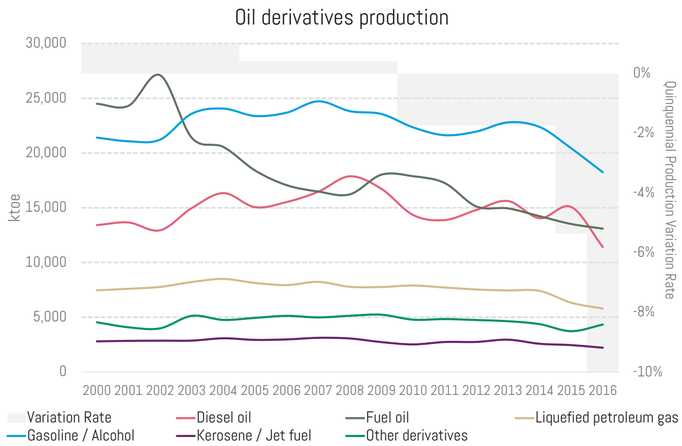
MEXICO

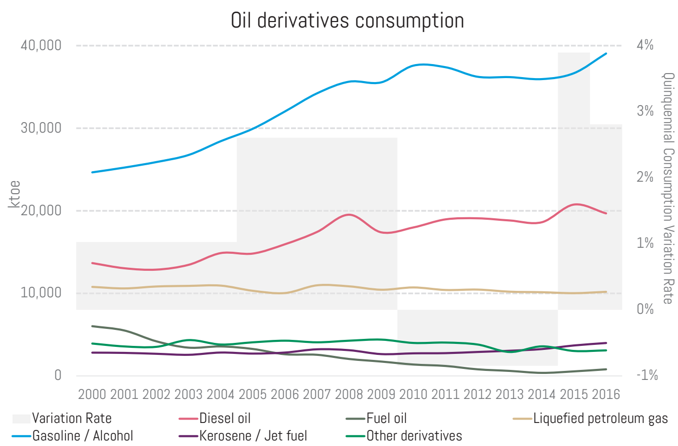

Installed power generation capacity [MW; %]
2016
Nuclear; 1,608; 2.9%
Non-renewable Thermal; 39,174; 70.5%
Renewables; 14,782; 26.6%
Hydro; 12,092; 21.8%
Geothermal; 874; 1.6%
Solar; 6; 0.0%
Wind; 699; 1.3%
Renewable Thermal; 1,111; 2.0%

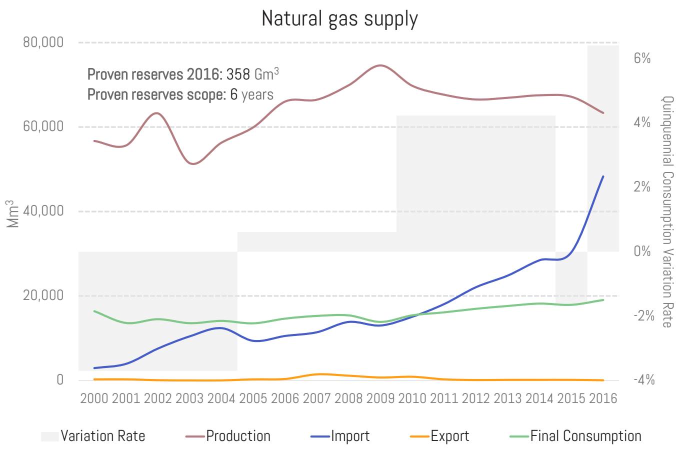

Electricity Generation by Source [GWh; %]
2016
Nuclear; 10,567; 4.0%
Non-renewable Thermal; 215,180; 81.7%
Renewables; 37,645; 14.3%
Hydro; 29,138; 11.1%
Geothermal; 6,033; 2.3%
Solar; 12; 0.0%
Wind; 2,462; 0.9%


Proven reserves of oil, natural gas and coal
Mtoe
5,000
4,000
3,000
2,000
1,000
0
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Oil
Natural gas
Coal

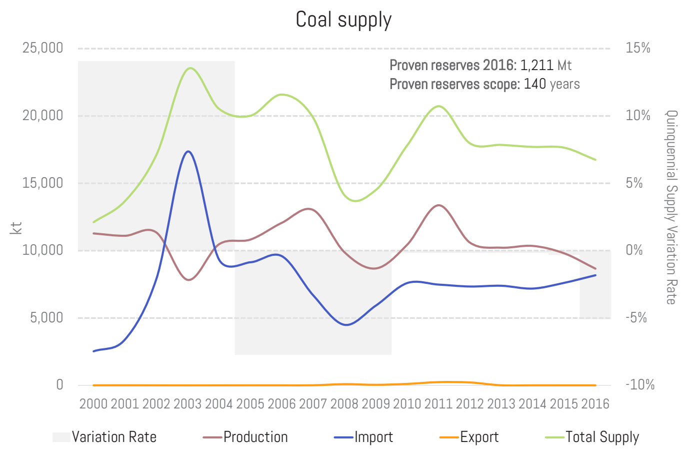

Oil Supply
Mbbl
1,200
1,000
800
600
400
200
0
5%
0%
-5%
-10%
-15%
Quinquennial Supply Variation Rate
Proven reserves 2016: 7,641 Mbbl
Oil Reserves Scope: 10 years
Refining Capacity 2016: 1,640 kbbl/day
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Variation Rate
Production
Import
Export
Total Supply


Oil derivatives production
ktoe
30,000
25,000
20,000
15,000
10,000
5,000
0
0%
-2%
-4%
-6%
-8%
-10%
Quinquennial Production Variation Rate
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Variation Rate
Diesel oil
Fuel oil
Liquefied petroleum gas
Gasoline / Alcohol
Kerosene / Jet fuel
Other derivatives

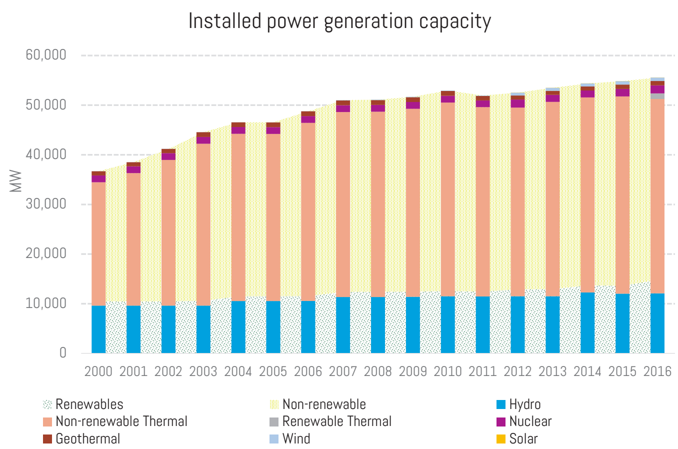

Oil derivatives consumption
ktoe
40,000
30,000
20,000
10,000
0
4%
3%
2%
1%
0%
-1%
Quinquennial Consumption Variation Rate
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Variation Rate
Diesel oil
Fuel oil
Liquefied petroleum gas
Gasoline / Alcohol
Kerosene / Jet fuel
Other derivatives



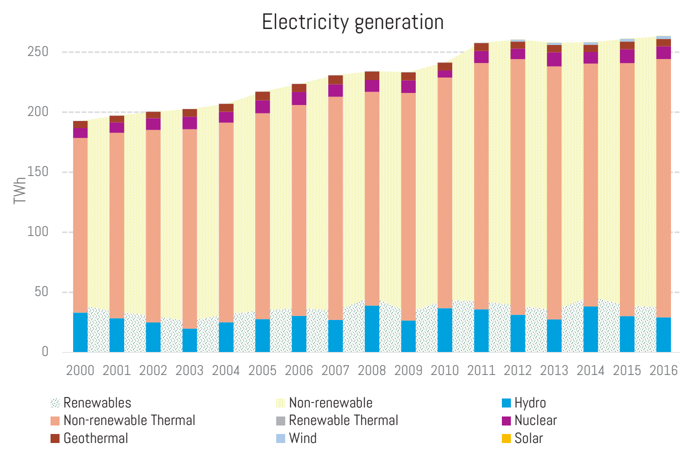
Natural gas supply
Proven reserves 2016: 358 Gm3
Proven reserves scope: 6 years
Mm3
Quinquennial Consumption Variation Rate
Variation Rate
Production
Import
Export
Final Consumption



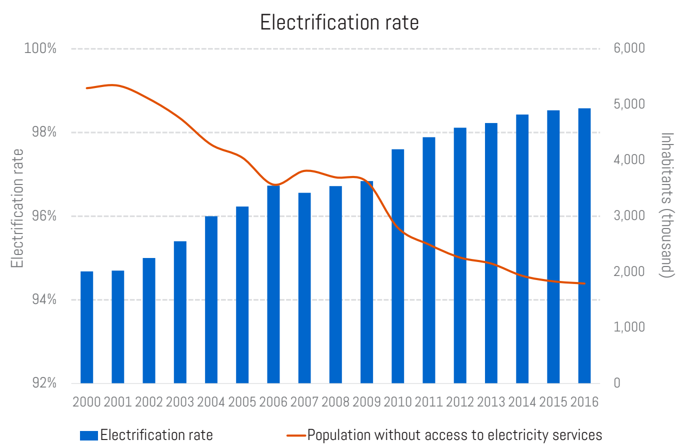
Coal supply
Proven reserves 2016: 1,211 Mt
Proven reserves scope: 140 years
kt
Quinquennial Supply Variation Rate
Variation Rate
Production
Import
Export
Total Supply



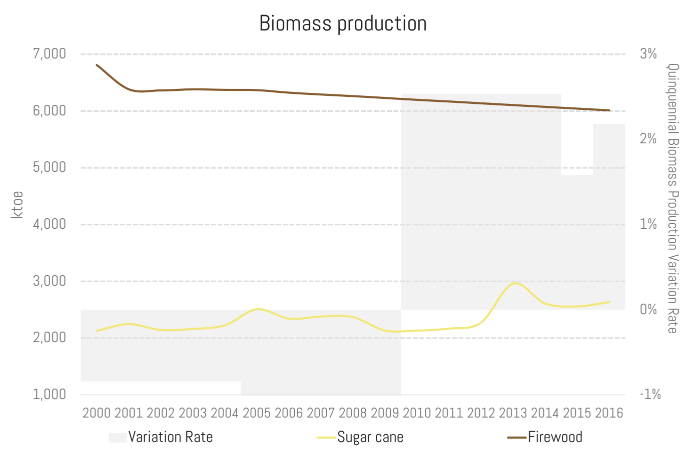
Installed power generation capacity
MW
Renewables
Non-renewable
Hydro
Non-renewable Thermal
Renewable Thermal
Nuclear
Geothermal
Wind
Solar



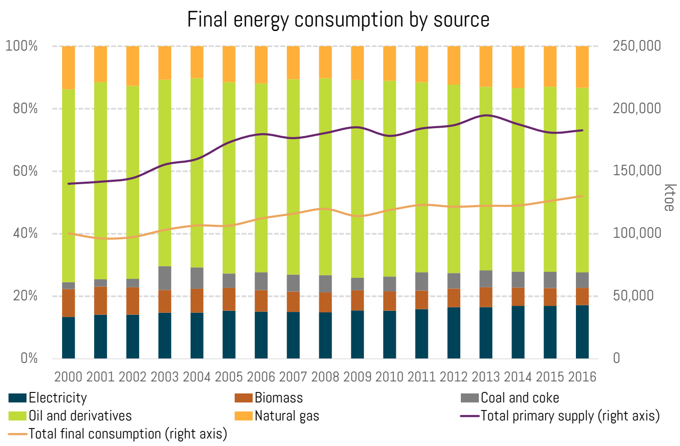
Electricity generation
TWh
Renewables
Non-renewable
Hydro
Non-renewable Thermal
Renewable Thermal
Nuclear
Geothermal
Wind
Solar

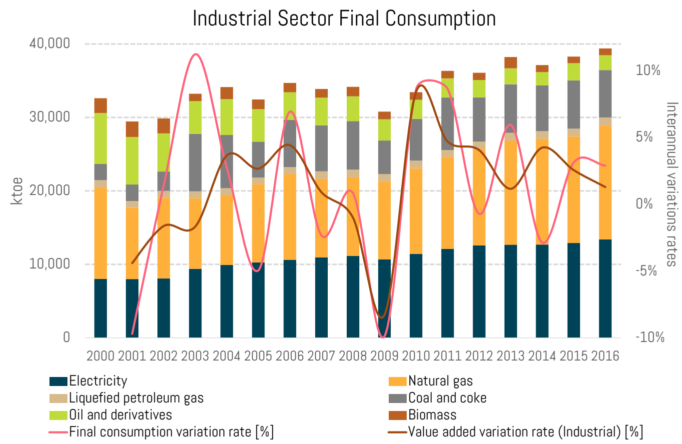


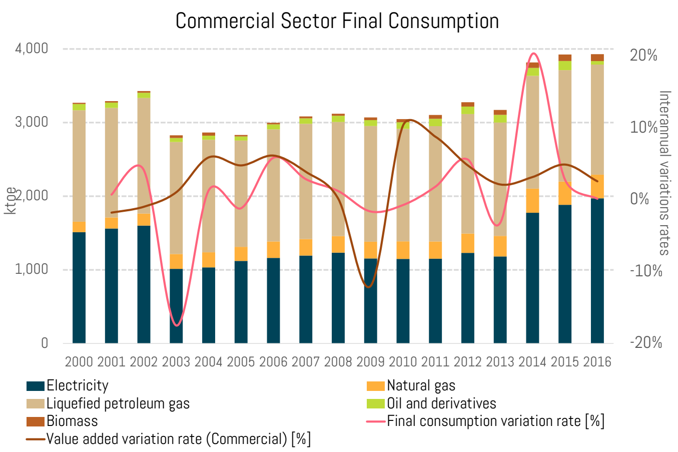
Electrification rate
Electrification rate
Inhabitants (thousand)
Electrification rate
Population without access to electricity services

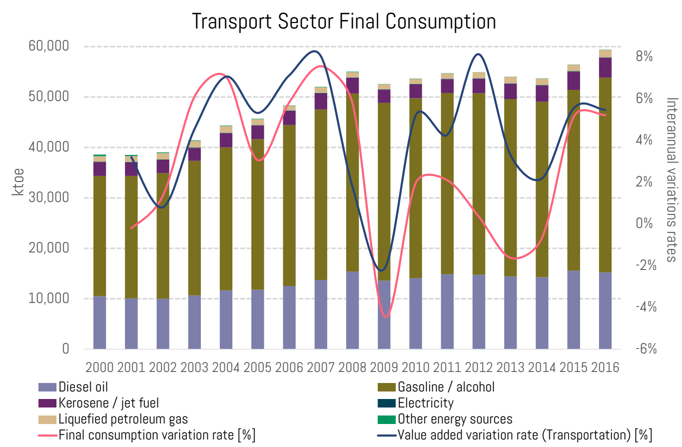


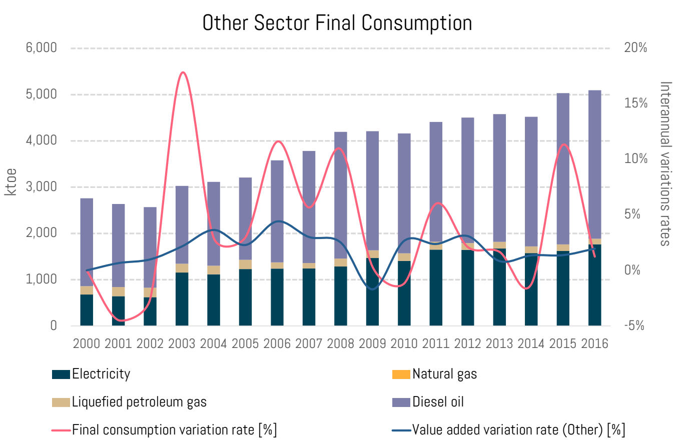
Biomass production
ktoe
Quinquennial Biomass Production Variation Rate
Variation Rate
Sugar cane
Firewood

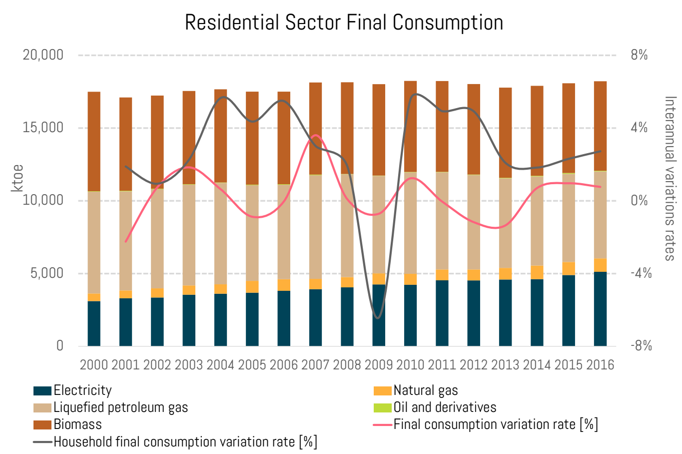

Final energy consumption by source
100%
80%
60%
40%
20%
0%
250,000
200,000
150,000
100,000
50,000
0
ktoe
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Electricity
Biomass
Coal and coke
Oil and derivatives
Natural gas
Total primary supply (right axis)
Total final consumption (right axis)


Industrial Sector Final Consumption
40,000
30,000
20,000
10,000
0
ktoe
10%
5%
0%
-5%
-10%
Interanual variations rates
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Electricity
Natural gas
Liquefied petroleum gas
Coal and coke
Oil and derivatives
Biomass
Final consumption variation rate [%]
Value added variation rate (Industrial) [%]

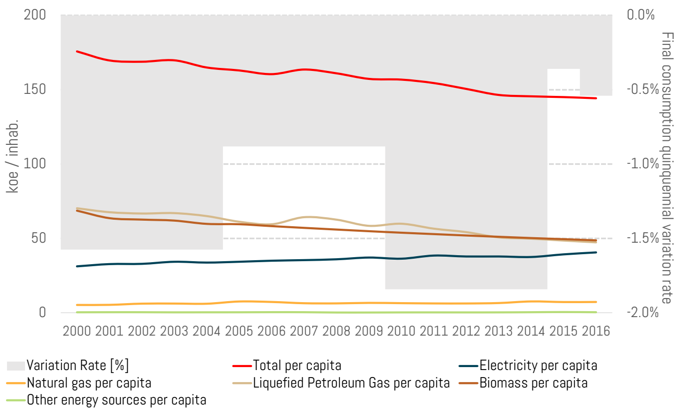

Commercial Sector Final Consumption
4,000
3,000
2,000
1,000
0
ktoe
20%
10%
0%
-10%
-20%
Interanual variations rates
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Electricity
Natural gas
Liquefied petroleum gas
Oil and derivatives
Biomass
Final consumption variation rate [%]
Value added variation rate (Commercial) [%]


Transport Sector Final Consumption
60,000
50,000
40,000
30,000
20,000
10,000
0
ktoe
8%
6%
4%
2%
0%
-2%
-4%
-6%
Interanual variations rates
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Diesel oil
Gasoline / alcohol
Kerosene / jet fuel
Electricity
Liquefied petroleum gas
Other energy sources
Final consumption variation rate [%]
Value added variation rate (Transportation) [%]

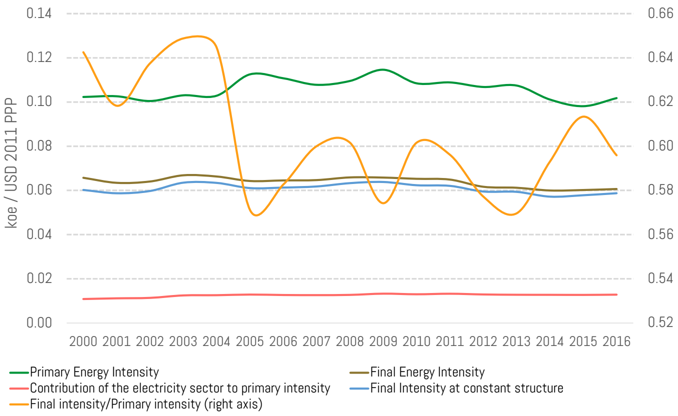

Other Sector Final Consumption
6,000
5,000
4,000
3,000
2,000
1,000
0
ktoe
20%
15%
10%
5%
0%
-5%
Interanual variations rates
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Electricity
Natural gas
Liquefied petroleum gas
Diesel oil
Final consumption variation rate [%]
Value added variation rate (Other) [%]


Residential Sector Final Consumption
20,000
15,000
10,000
5,000
0
ktoe
8%
4%
0%
-4%
-8%
Interanual variations rates
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Electricity
Natural gas
Liquefied petroleum gas
Oil and derivatives
Biomass
Final consumption variation rate [%]
Household final consumption variation rate [%]

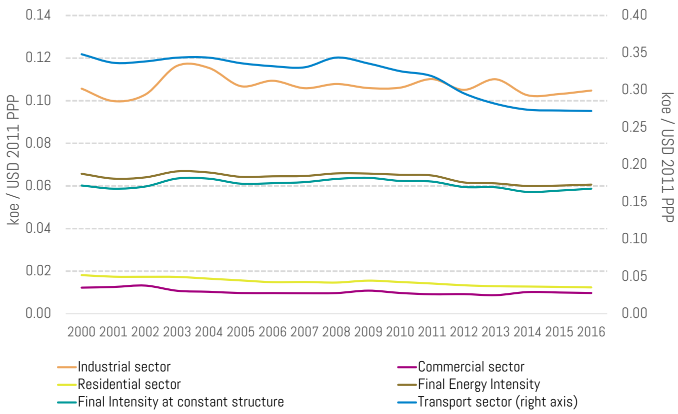
Final consumption per capita Residential Sector



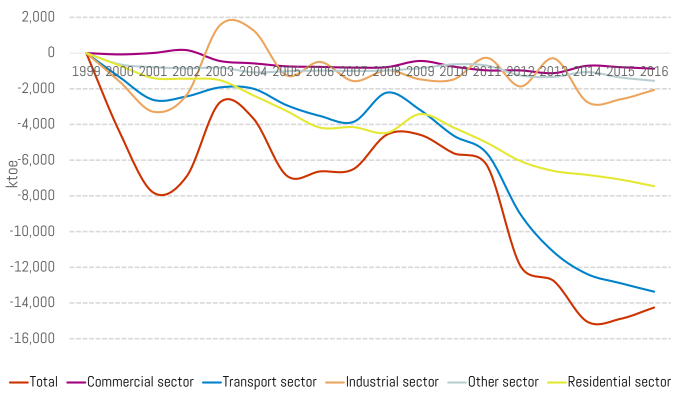
Energy intensities



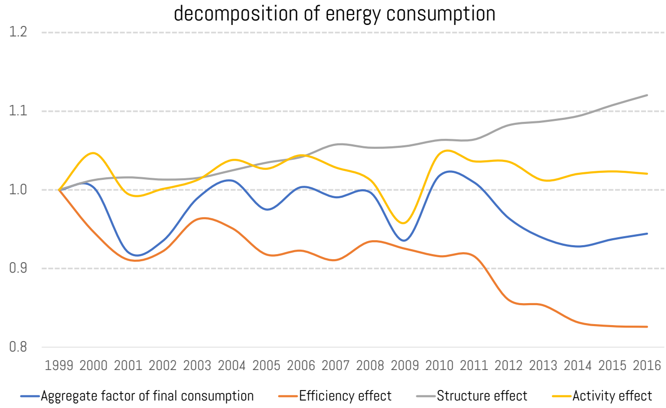
Sectoral energy intensities



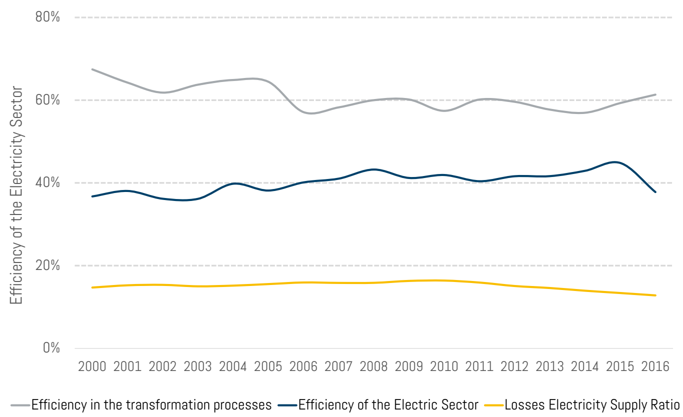
Avoided energy demand due to variations in energy intensity



Logarithmic mean Divisia index for the structural decomposition of energy consumption

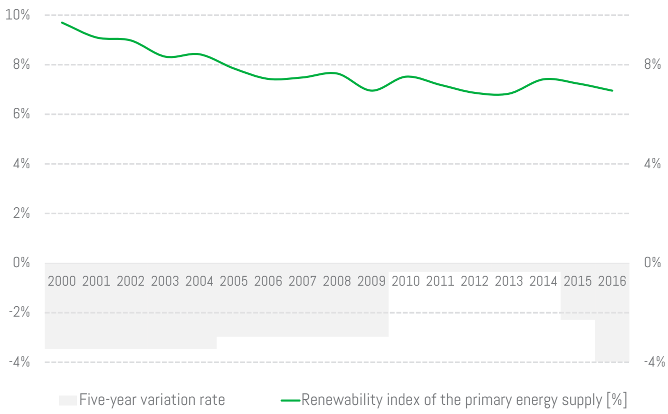


Efficiency of the Electricity Sector

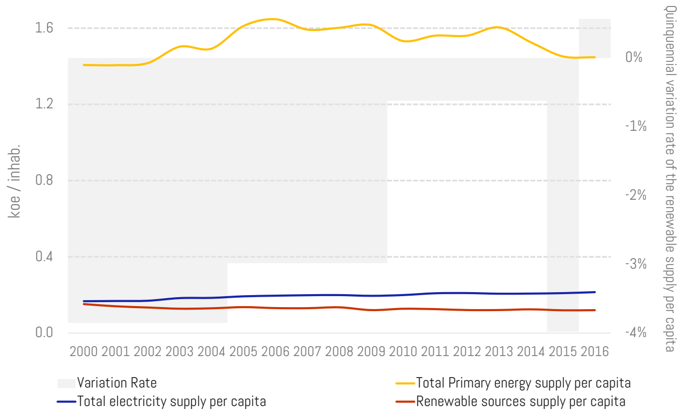


MEXICO

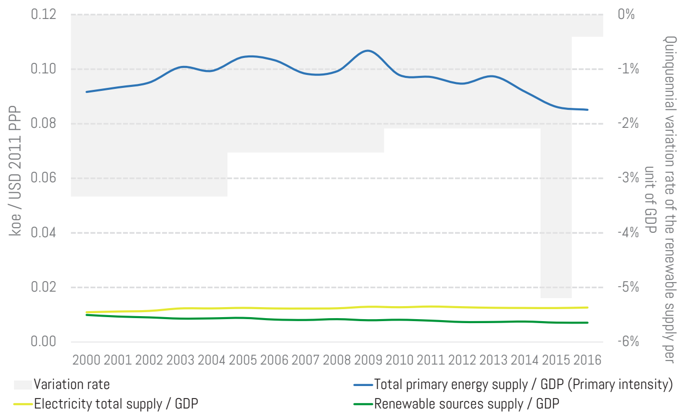
Primary energy supply renewability index



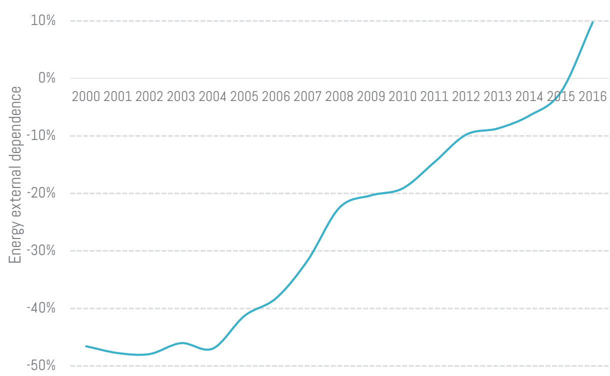
Energy supply per capita



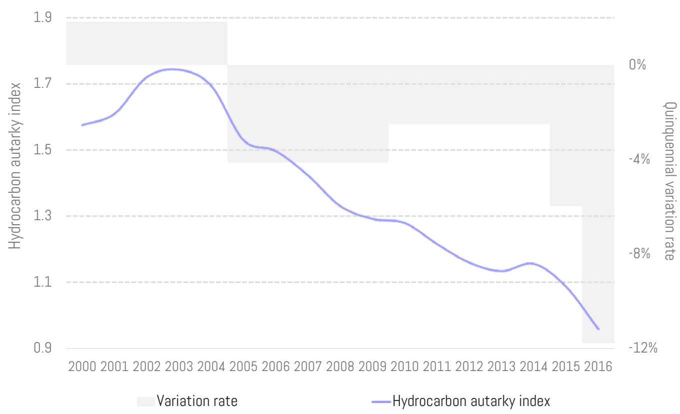
Energy supply per unit of GDP



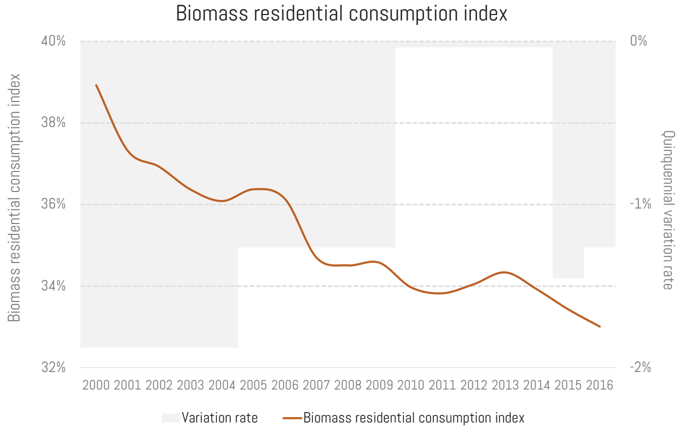
Energy external dependence



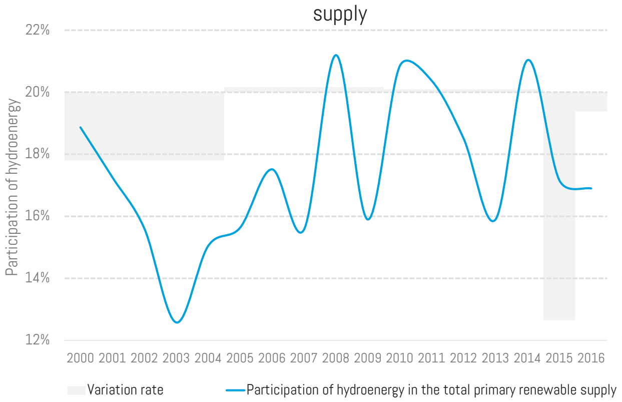
Hydrocarbon autarky index



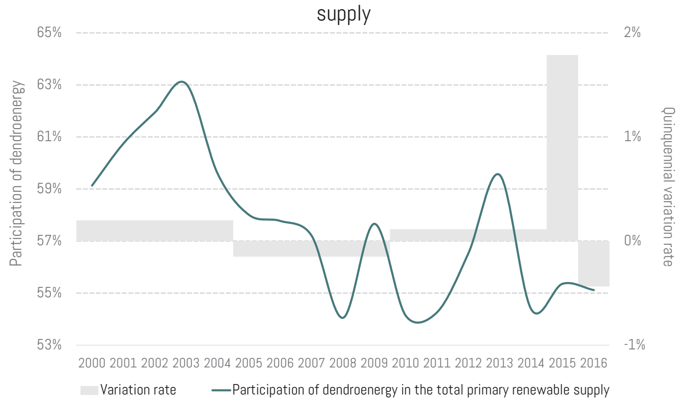
Biomass residential consumption index



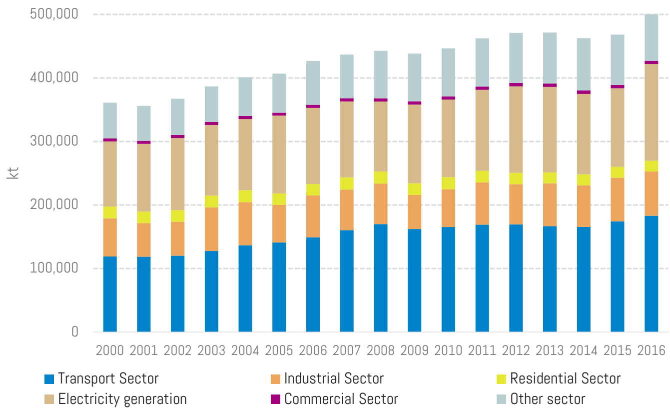
Participation of hydroenergy in the total primary renewable supply



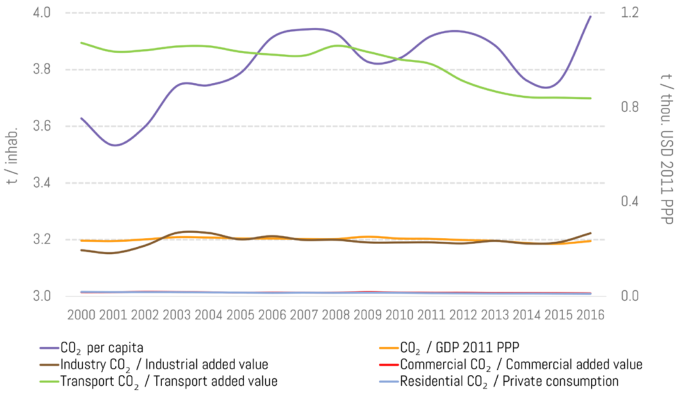
Participation of dendroenergy in the total primary renewable supply



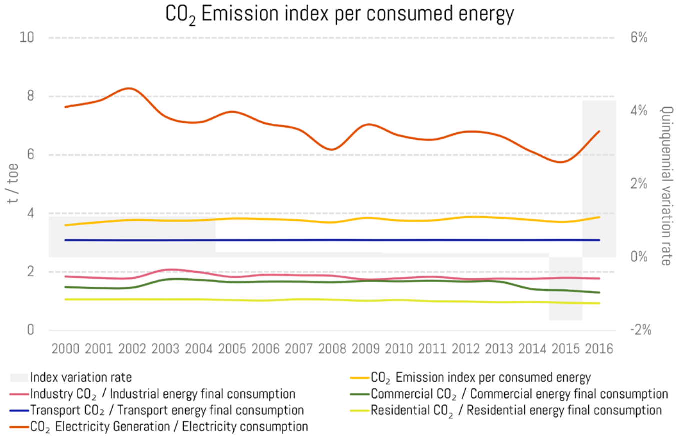
Evolution of CO_2 emissions by sector



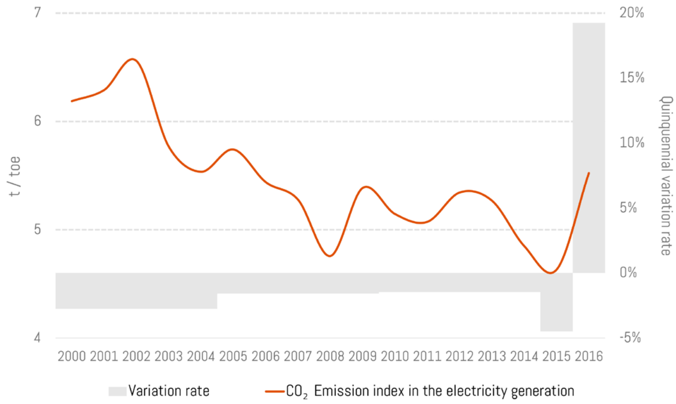
Evolution of CO_2 emissions per capita and per unit of GDP

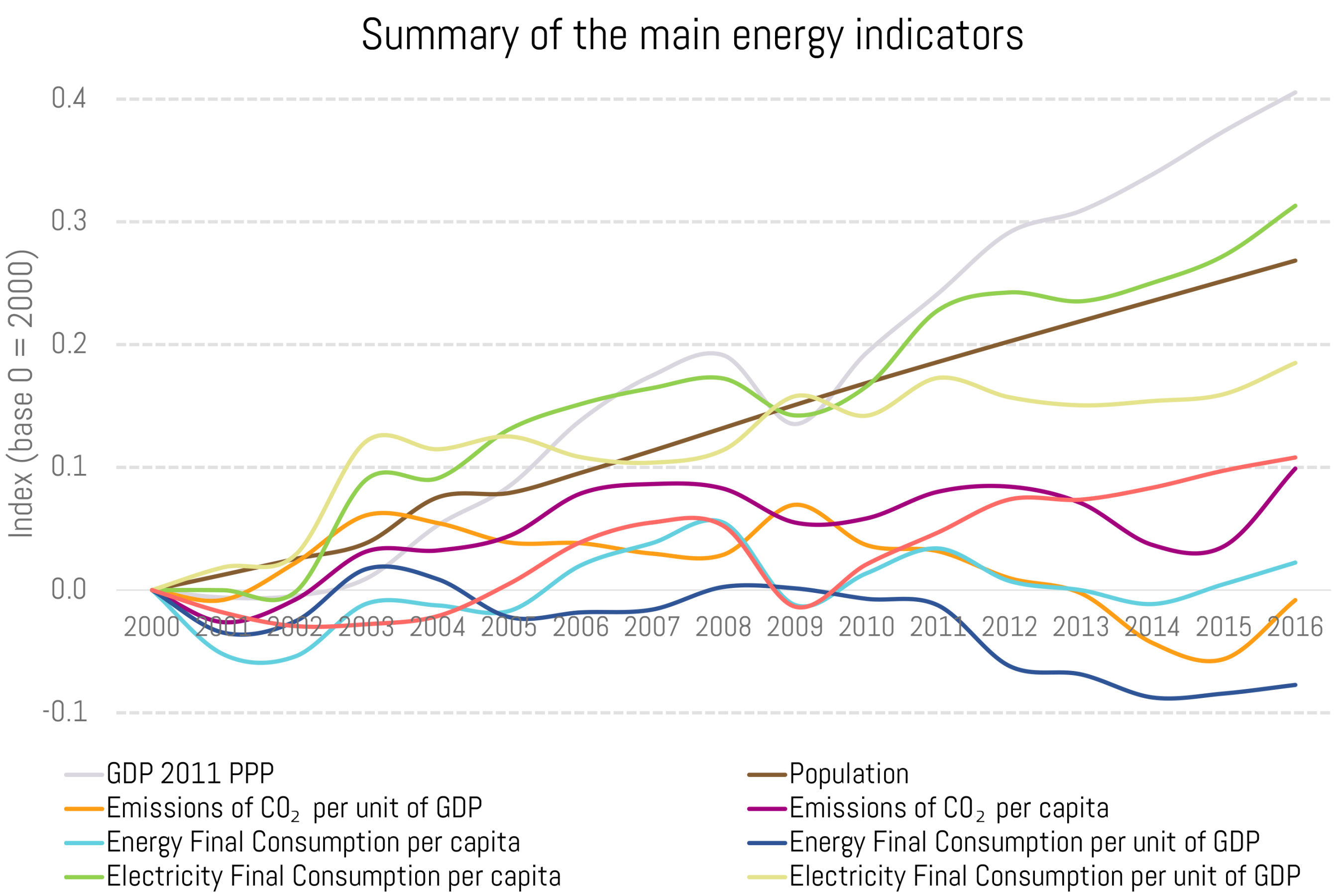


CO_2 Emission index per consumed energy



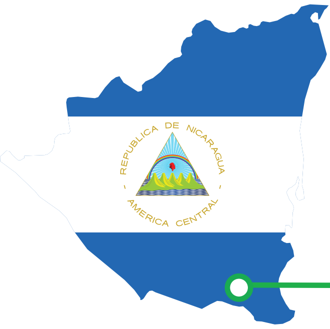
CO_2 Emission index of electricity generation




Summary of the main energy indicators
Index (base 0 = 2000)
0.4
0.3
0.2
0.1
0.0
-0.1
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
GDP 2011 PPP
Population
Emissions of CO_2 per unit of GDP
Emissions of CO_2 per capita
Energy Final Consumption per capita
Energy Final Consumption per unit of GDP
Electricity Final Consumption per capita
Electricity Final Consumption per unit of GDP

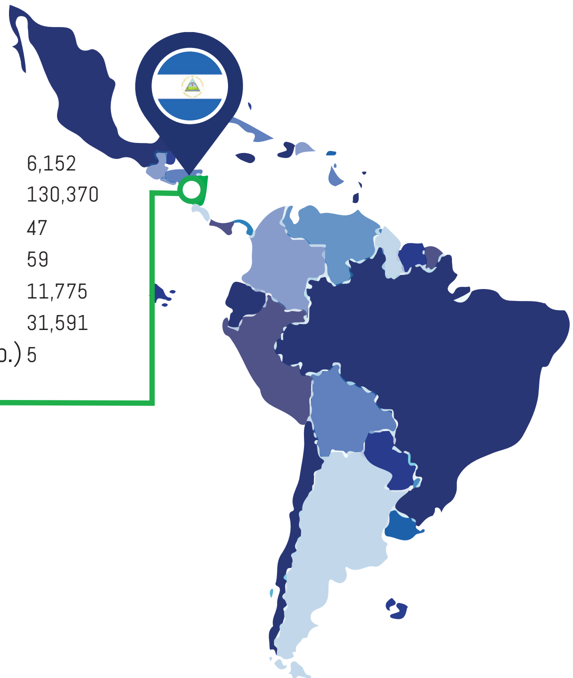
MEXICO

NICARAGUA



GENERAL INFORMATION 2016

Population (thousand inhab.)	6,152
Area (km^2)	130,370
Population Density (inhab./km^2)	47
Urban Population (%)	59
GDP USD 2010 (MUSD)	11,775
GDP USD 2011 PPP (MUSD)	31,591
GDP per capita (thou. USD 2011 PPP/inhab.)	5



ENERGY SECTOR

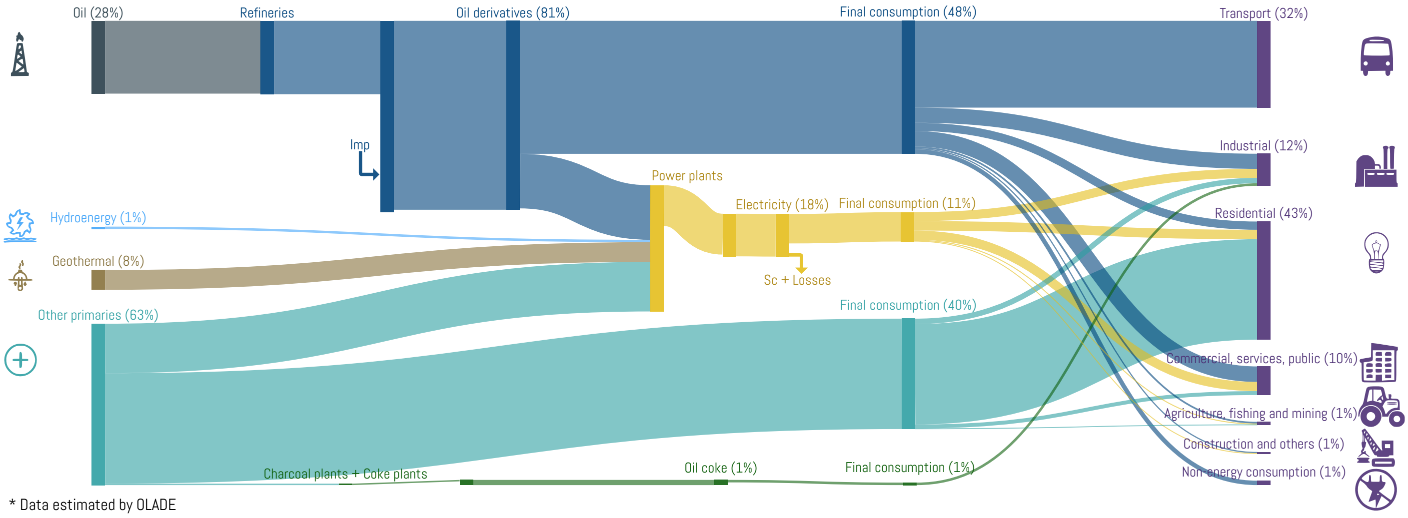
Final consumption in the Transport Sector	Mtoe	0.78
Final consumption in the Industrial Sector	Mtoe	0.29
Final consumption in the Residential Sector	Mtoe	1.06
Final consumption in the Commercial and Service Sector	Mtoe	0.26
Final consumption in the Agriculture, Livestock, Fishing, Mining, Other and Non - Energy Consumption	Mtoe	0.09

Oil Reserves	Mbbl	n.a.
Natural gas reserves	Gm^3	n.a.
Coal reserves	Mt	n.a.

Supply and demand data for 2016 estimated by OLADE.

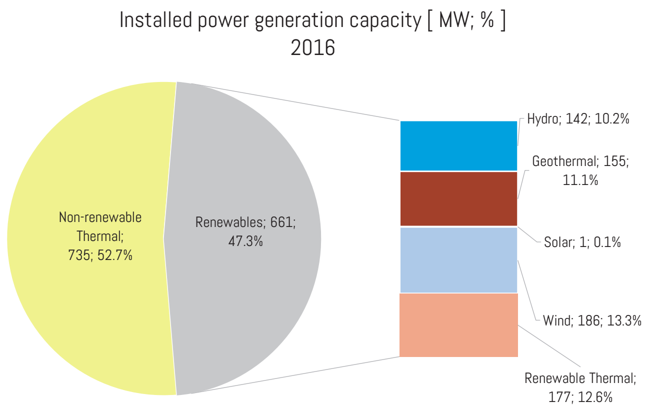
Indicator	Unit	Value
Electricity consumption per capita	kWh / inhab.	499
Final energy consumption per capita	toe / inhab.	0.40
Electrification rate	%	90.10
Total energy supply	Mtoe	3.37
Total energy production	Mtoe	1.67
Total energy imports	Mtoe	1.75
Total energy exports	Mtoe	0.02
Total final energy consumption	Mtoe	2.47
Refining capacity	kbbl/day	20
Installed power generation capacity	GW	1.40
Primary energy intensity and final energy intensity	koe / USD 2011 PPP	0.07 / 0.08

Summarized energy matrix 2016 *

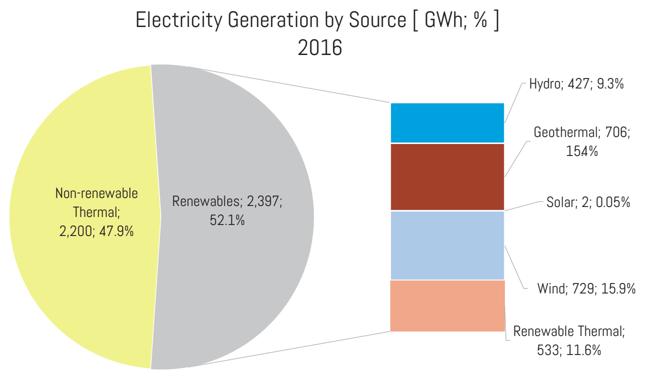


* Data estimated by OLADE

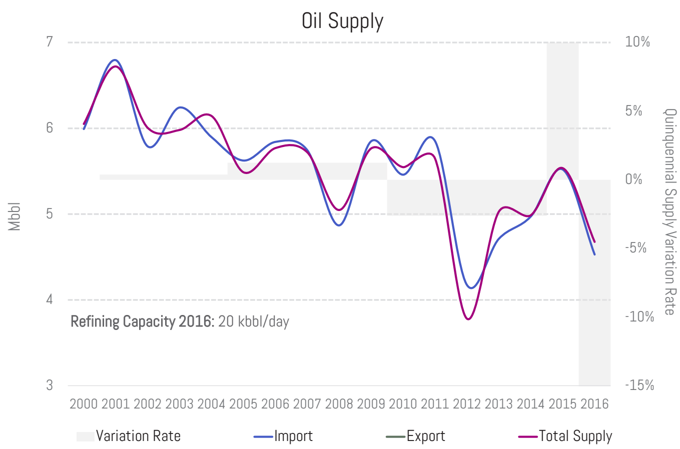
NICARAGUA



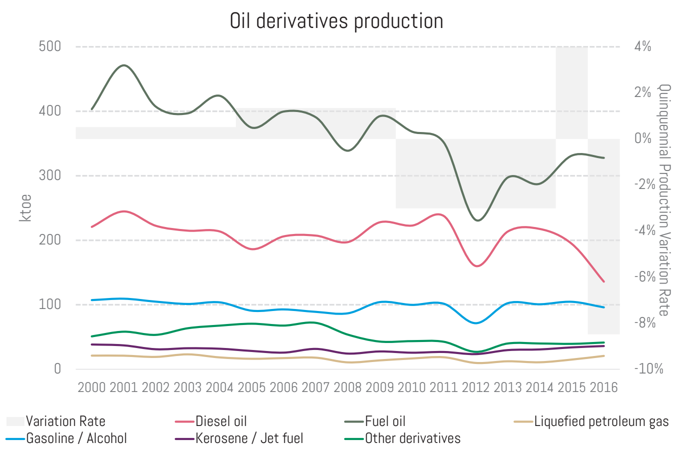
Installed power generation capacity [MW; %]
2016
Non-renewable Thermal; 735; 52.7%
Renewables; 661; 47.3%
Hydro; 142; 10.2%
Geothermal; 155; 11.1%
Solar; 1; 0.1%
Wind; 186; 13.3%
Renewable Thermal; 177; 12.6%



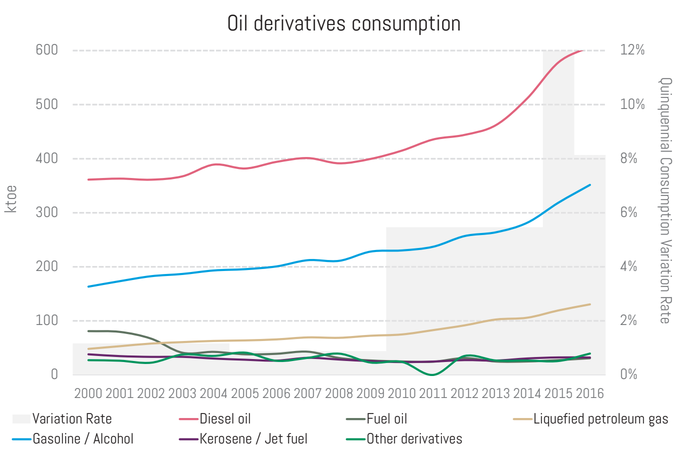
Electricity Generation by Source [GWh; %]
2016
Non-renewable Thermal; 2,200; 47.9%
Renewables; 2,397; 52.1%
Hydro; 427; 9.3%
Geothermal; 706; 15.4%
Solar; 2; 0.05%
Wind; 729; 15.9%
Renewable Thermal; 533; 11.6%



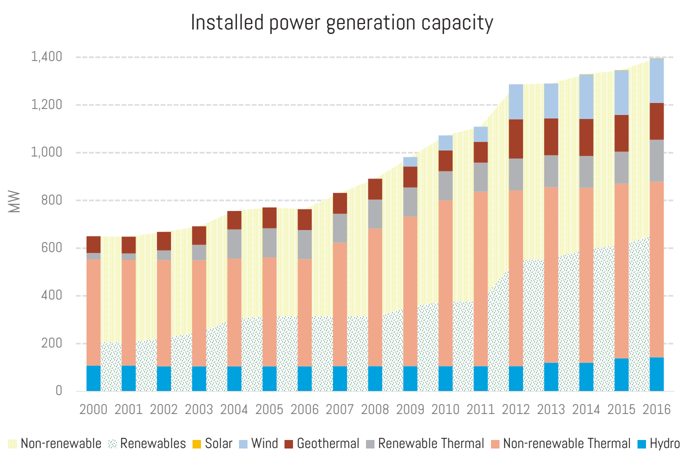
Oil Supply
Mbbl
Quinquennial Supply Variation Rate
Refining Capacity 2016: 20 kbbl/day
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Variation Rate
Import
Export
Total Supply



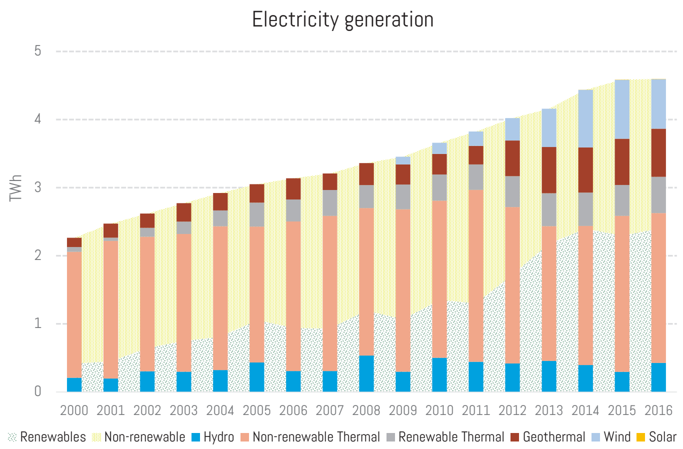
Oil derivatives production
ktoe
Quinquennial Production Variation Rate
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Variation Rate
Diesel oil
Fuel oil
Liquefied petroleum gas
Gasoline / Alcohol
Kerosene / Jet fuel
Other derivatives

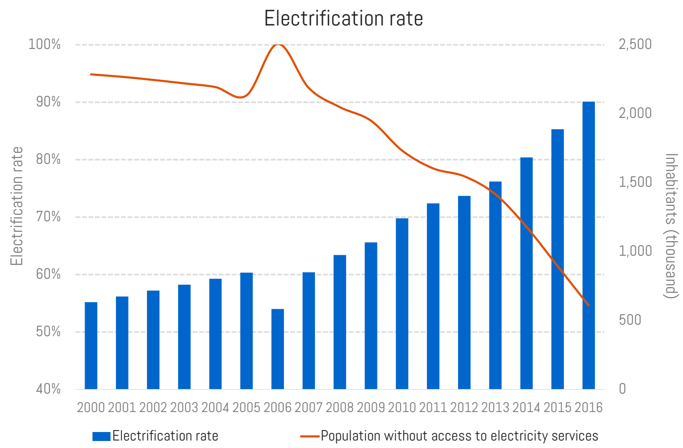


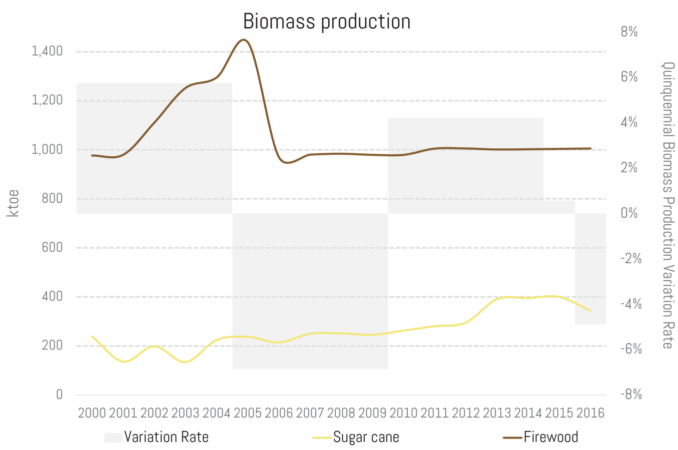
Oil derivatives consumption
ktoe
Quinquennial Consumption Variation Rate
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Variation Rate
Diesel oil
Fuel oil
Liquefied petroleum gas
Gasoline / Alcohol
Kerosene / Jet fuel
Other derivatives

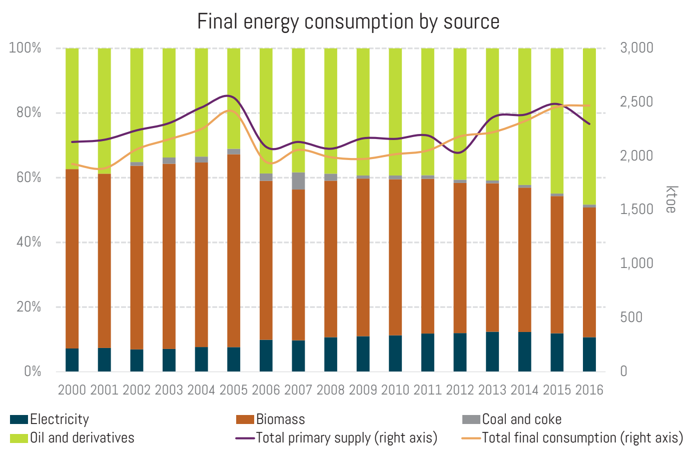


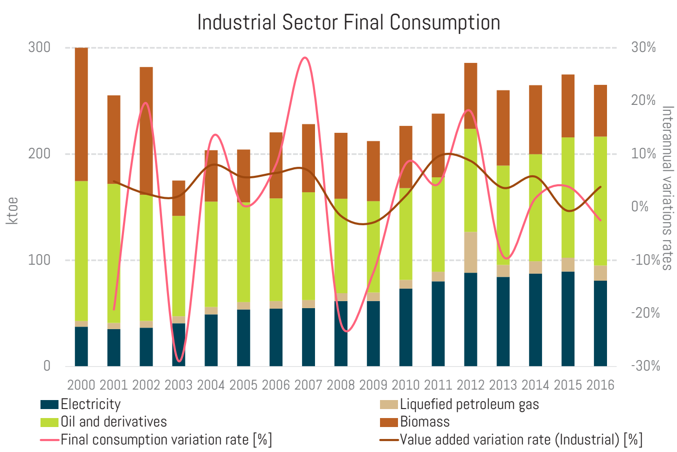
Installed power generation capacity
MW
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Non-renewable
Renewables
Solar
Wind
Geothermal
Renewable Thermal
Non-renewable Thermal
Hydro

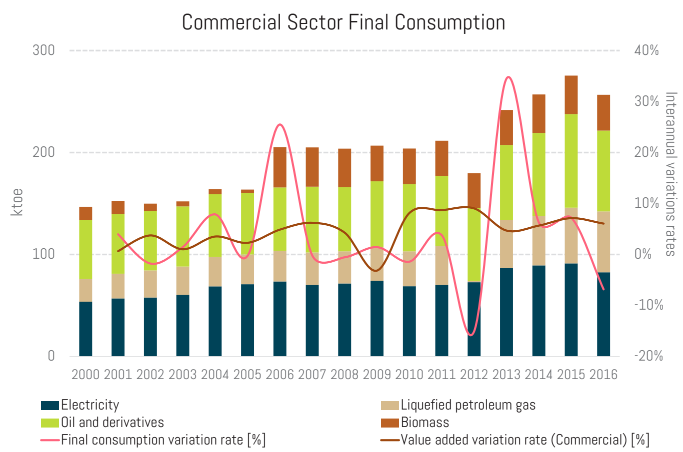

Electricity generation
TWh
0
1
2
3
4
5
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Renewables
Non-renewable
Hydro
Non-renewable Thermal
Renewable Thermal
Geothermal
Wind
Solar


Electrification rate
Electrification rate
40%
50%
60%
70%
80%
90%
100%
Inhabitants (thousand)
0
500
1,000
1,500
2,000
2,500
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Electrification rate
Population without access to electricity services

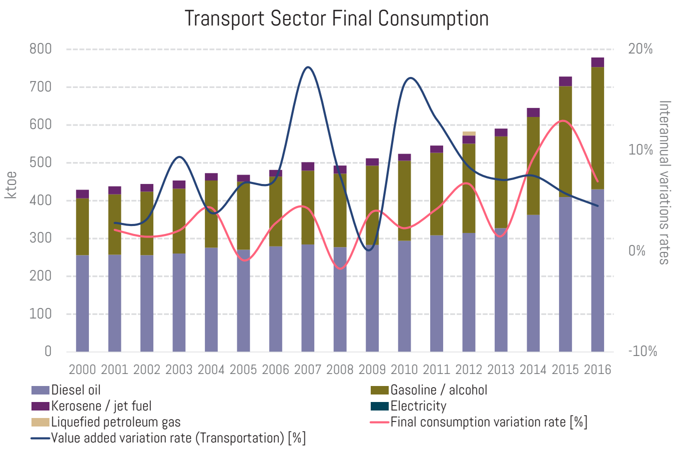

Biomass production
ktoe
0
200
400
600
800
1,000
1,200
1,400
Quinquennial Biomass Production Variation Rate
-8%
-6%
-4%
-2%
0%
2%
4%
6%
8%
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Variation Rate
Sugar cane
Firewood


Final energy consumption by source
0%
20%
40%
60%
80%
100%
ktoe
0
500
1,000
1,500
2,000
2,500
3,000
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Electricity
Oil and derivatives
Biomass
Total primary supply (right axis)
Coal and coke
Total final consumption (right axis)

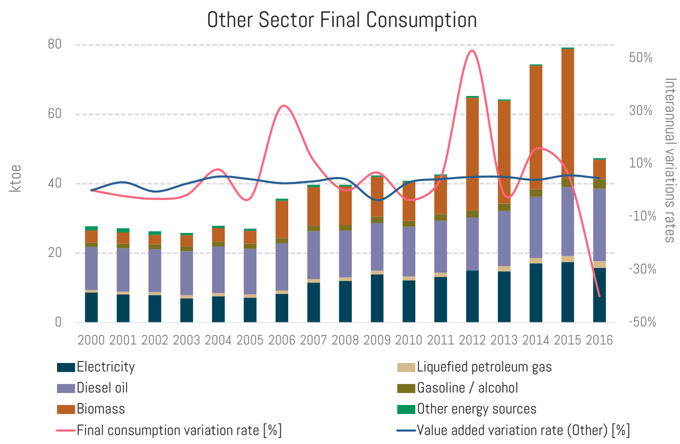

Industrial Sector Final Consumption
ktoe
0
100
200
300
Interannual variations rates
-30%
-20%
-10%
0%
10%
20%
30%
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Electricity
Oil and derivatives
Final consumption variation rate [%]
Liquefied petroleum gas
Biomass
Value added variation rate (Industrial) [%]


Commercial Sector Final Consumption
ktoe
0
100
200
300
Interannual variations rates
-20%
-10%
0%
10%
20%
30%
40%
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Electricity
Oil and derivatives
Final consumption variation rate [%]
Liquefied petroleum gas
Biomass
Value added variation rate (Commercial) [%]

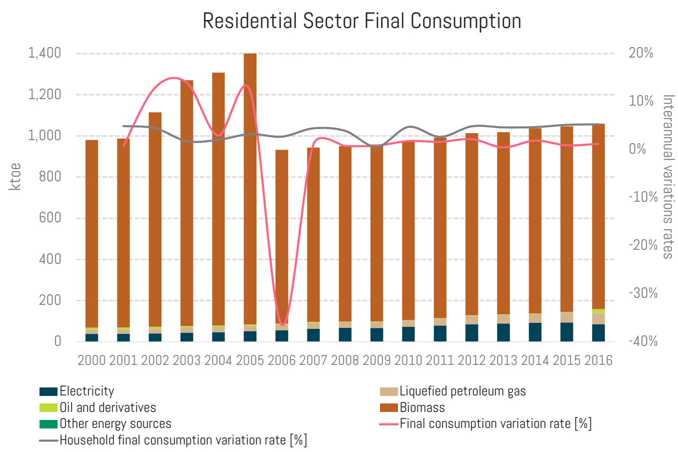
NICARAGUA



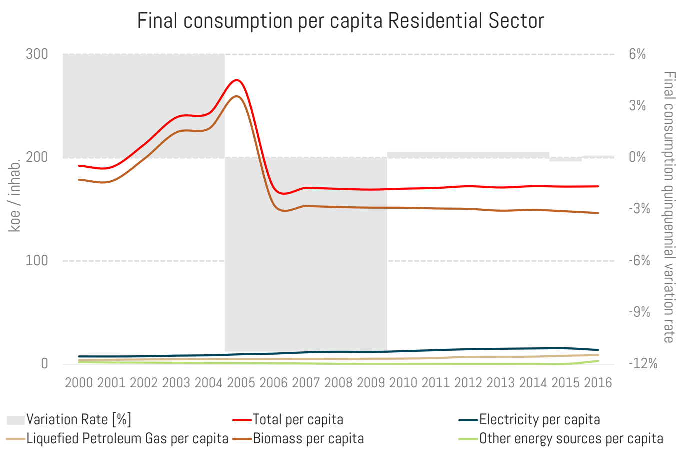
Transport Sector Final Consumption
ktoe
Interannual variations rates
Diesel oil
Kerosene / jet fuel
Liquefied petroleum gas
Value added variation rate (Transportation) [%]
Gasoline / alcohol
Electricity
Final consumption variation rate [%]



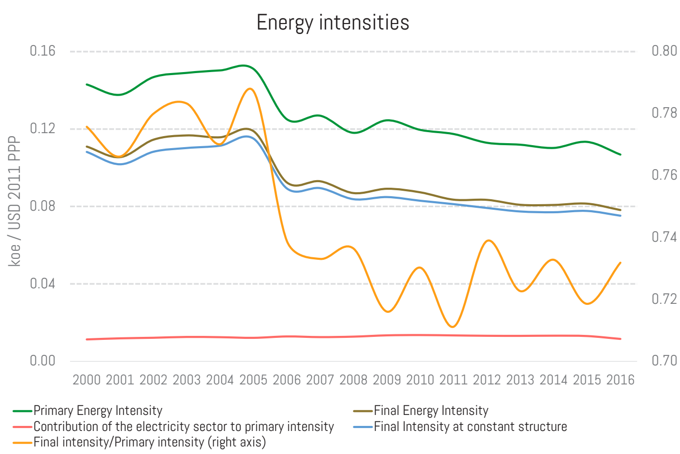
Other Sector Final Consumption
ktoe
Interannual variations rates
Electricity
Diesel oil
Biomass
Final consumption variation rate [%]
Liquefied petroleum gas
Gasoline / alcohol
Other energy sources
Value added variation rate (Other) [%]



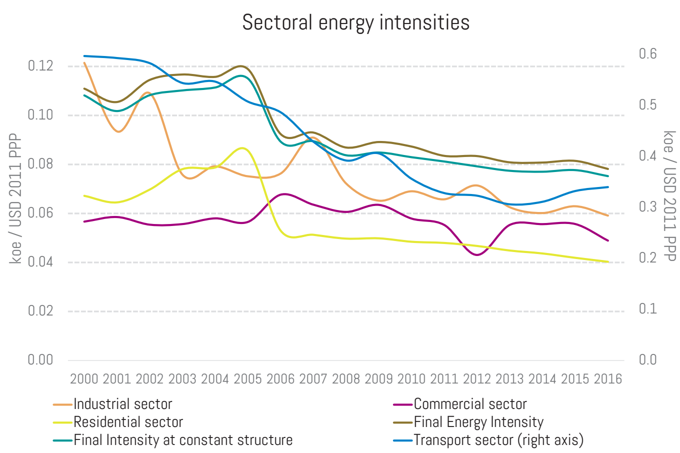
Residential Sector Final Consumption
ktoe
Interannual variations rates
Electricity
Oil and derivatives
Other energy sources
Household final consumption variation rate [%]
Liquefied petroleum gas
Biomass
Final consumption variation rate [%]



Final consumption per capita Residential Sector
koe / inhab.
Final consumption quinquennial variation rate
Variation Rate [%]
Total per capita
Electricity per capita
Liquefied Petroleum Gas per capita
Biomass per capita
Other energy sources per capita

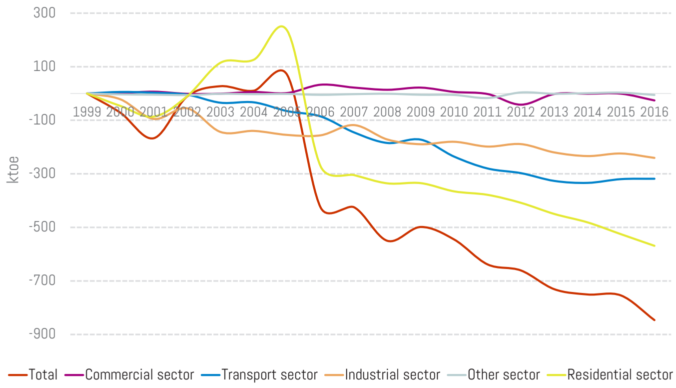


Energy intensities
koe / USD 2011 PPP
Primary Energy Intensity
Contribution of the electricity sector to primary intensity
Final intensity/Primary intensity (right axis)
Final Energy Intensity
Final Intensity at constant structure

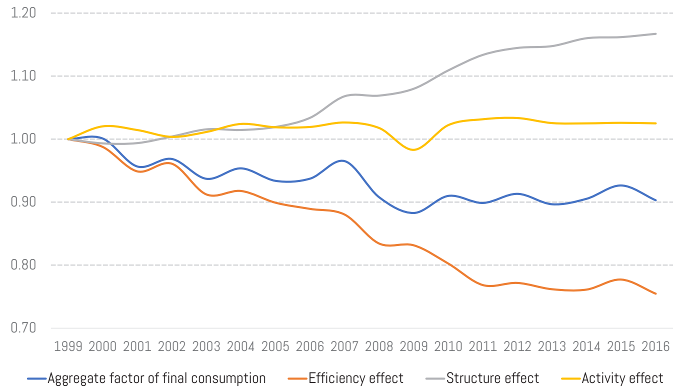


Sectoral energy intensities
koe / USD 2011 PPP
Industrial sector
Residential sector
Final Intensity at constant structure
Commercial sector
Final Energy Intensity
Transport sector (right axis)

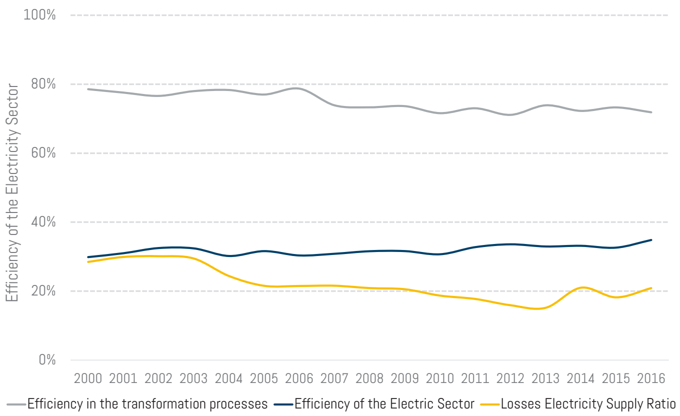
Avoided energy demand due to variations in energy intensity



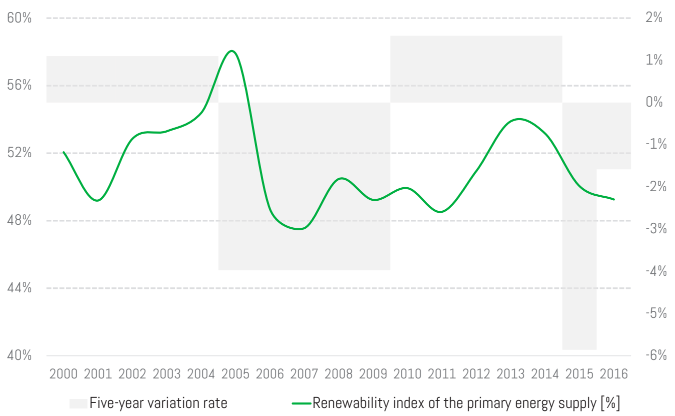
Logarithmic mean Divisia index for the structural decomposition of energy consumption



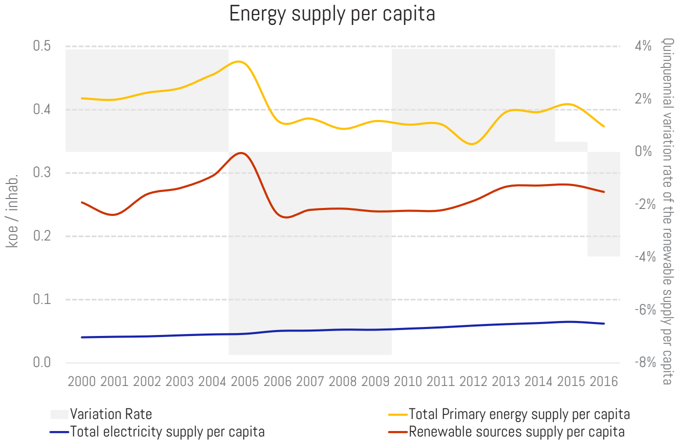
Efficiency of the Electricity Sector



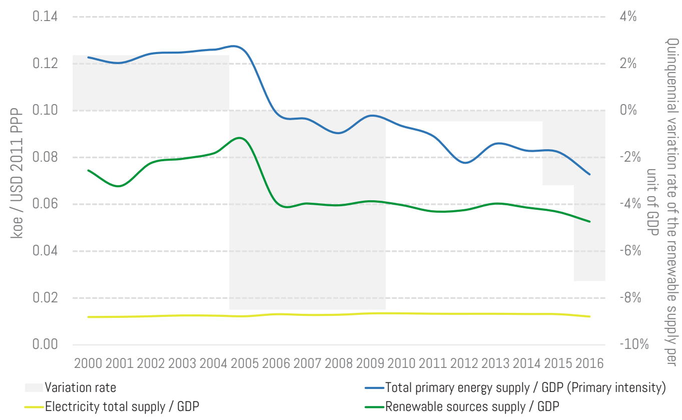
Primary energy supply renewability index

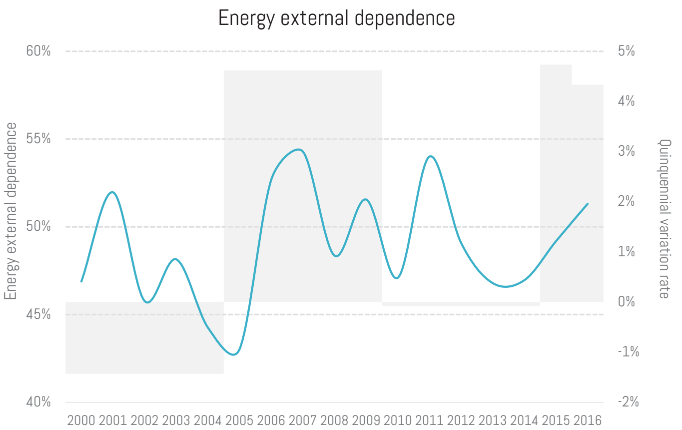


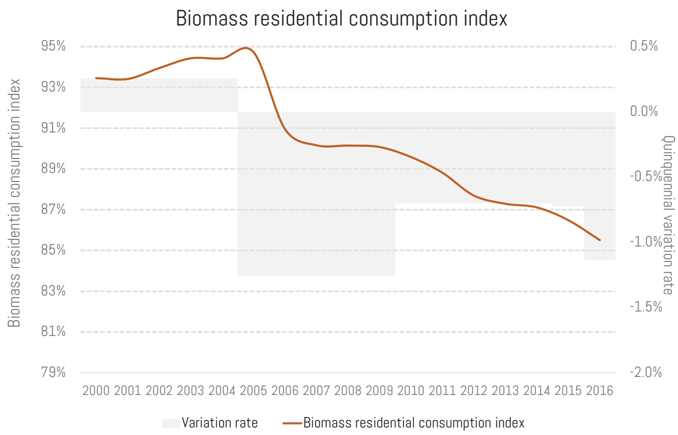
Energy supply per capita

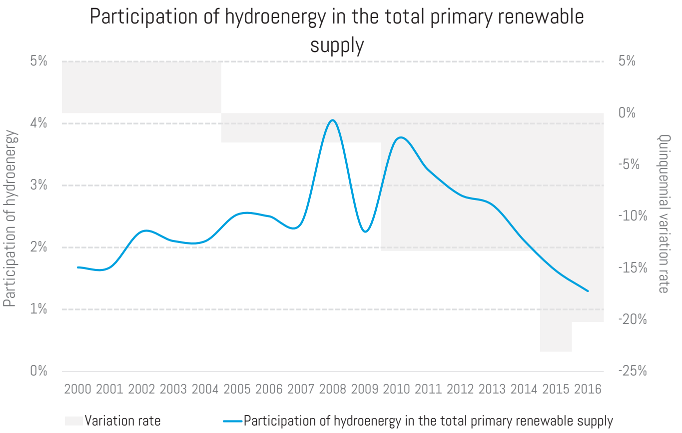


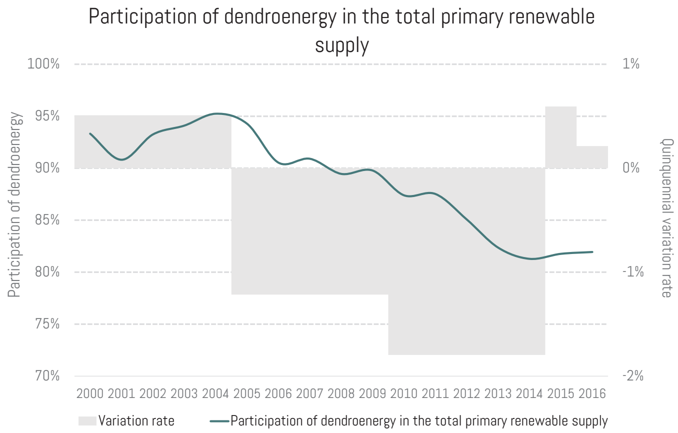
Energy supply per unit of GDP

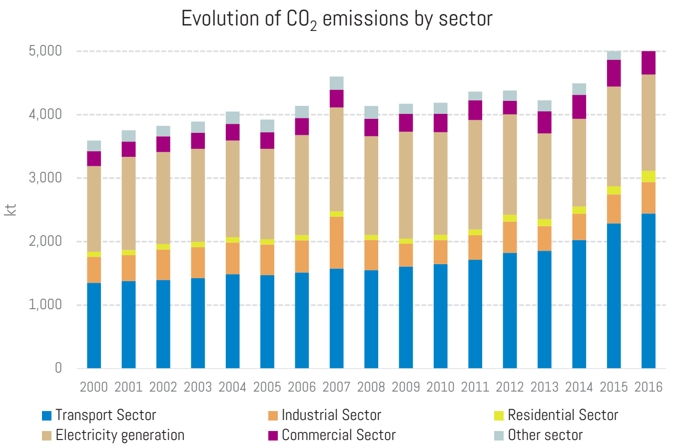


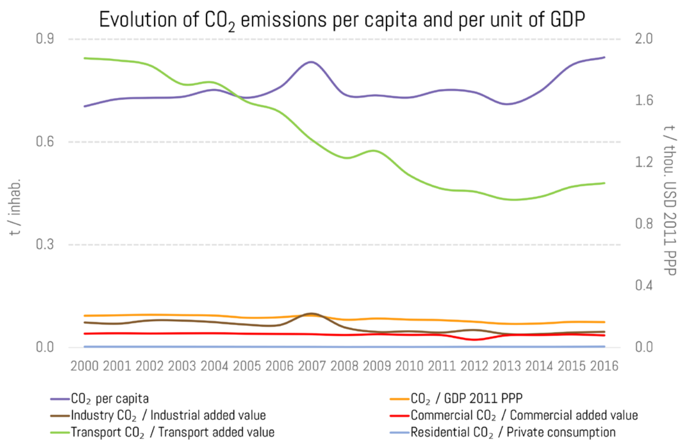

Energy external dependence
Energy external dependence
Quinquennial variation rate
60%
55%
50%
45%
40%
5%
4%
3%
2%
1%
0%
-1%
-2%
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016

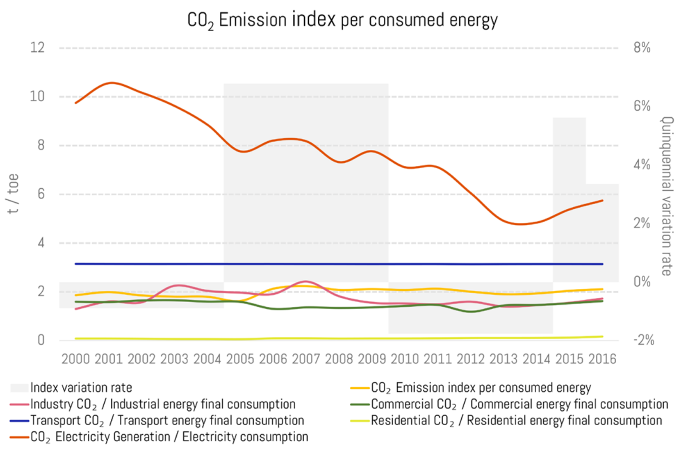

Biomass residential consumption index
Biomass residential consumption index
Quinquennial variation rate
95%
93%
91%
89%
87%
85%
83%
81%
79%
0.5%
0.0%
-0.5%
-1.0%
-1.5%
-2.0%
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Variation rate
Biomass residential consumption index


Participation of hydroenergy in the total primary renewable supply
Participation of hydroenergy
Quinquennial variation rate
5%
4%
3%
2%
1%
0%
5%
0%
-5%
-10%
-15%
-20%
-25%
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Variation rate
Participation of hydroenergy in the total primary renewable supply

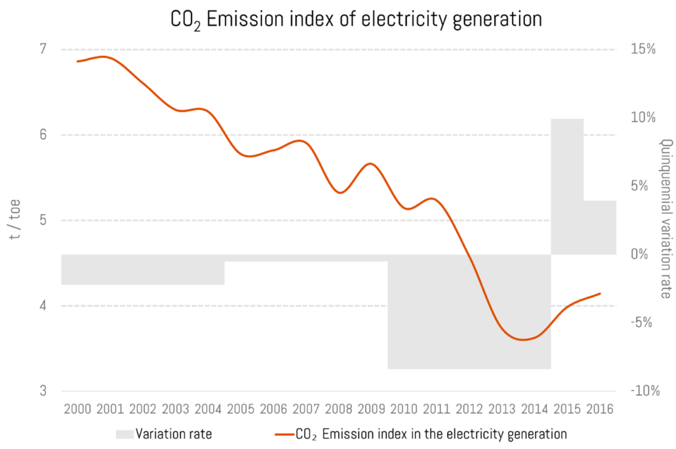

Participation of dendroenergy in the total primary renewable supply
Participation of dendroenergy
Quinquennial variation rate
100%
95%
90%
85%
80%
75%
70%
1%
0%
-1%
-2%
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Variation rate
Participation of dendroenergy in the total primary renewable supply


Evolution of CO_2 emissions by sector
kt
5,000
4,000
3,000
2,000
1,000
0
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Transport Sector
Industrial Sector
Residential Sector
Electricity generation
Commercial Sector
Other sector

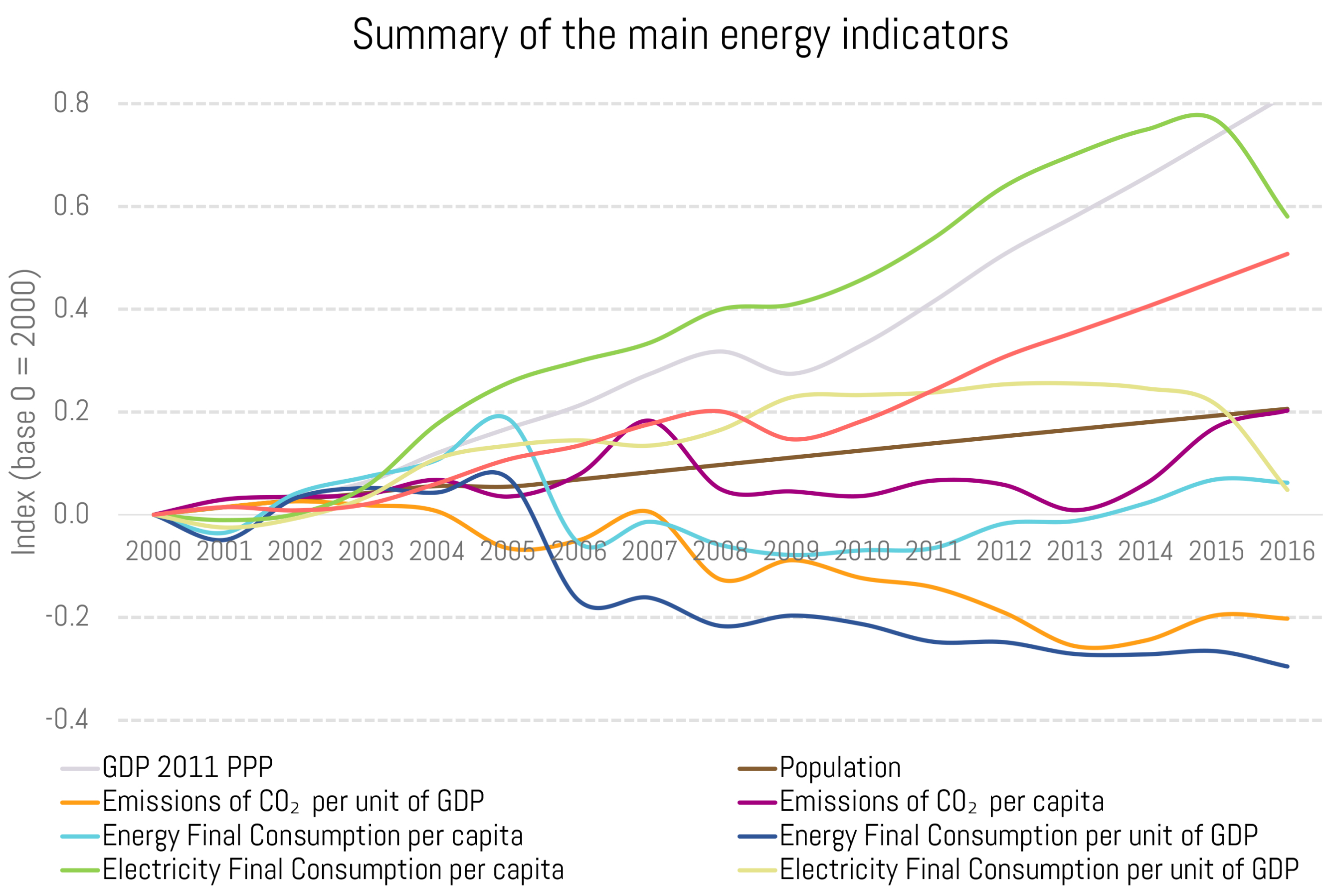

Evolution of CO_2 emissions per capita and per unit of GDP
t / inhab.
t / thou. USD 2011 PPP
0.9
0.6
0.3
0.0
2.0
1.6
1.2
0.8
0.4
0.0
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
CO_2 per capita
CO_2 / GDP 2011 PPP
Industry CO_2 / Industrial added value
Commercial CO_2 / Commercial added value
Transport CO_2 / Transport added value
Residential CO_2 / Private consumption



CO_2 Emission index per consumed energy
t / toe
Quinquennial variation rate
Index variation rate
Industry CO_2 / Industrial energy final consumption
Transport CO_2 / Transport energy final consumption
CO_2 Electricity Generation / Electricity consumption
CO_2 Emission index per consumed energy
Commercial CO_2 / Commercial energy final consumption
Residential CO_2 / Residential energy final consumption



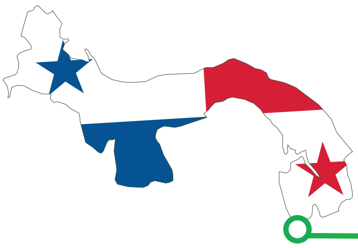
CO_2 Emission index of electricity generation
t / toe
Quinquennial variation rate
Variation rate
CO_2 Emission index in the electricity generation

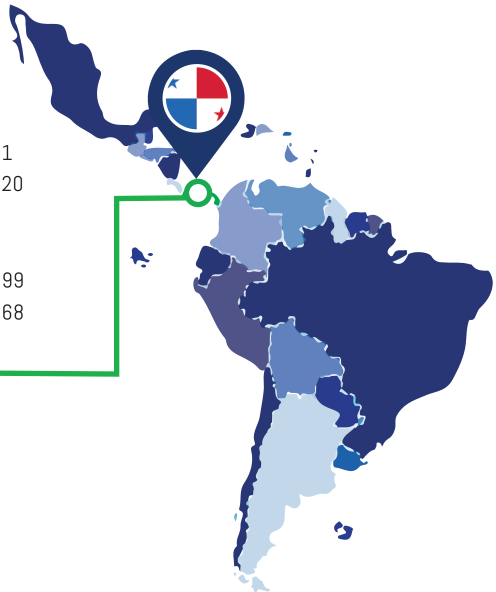


Summary of the main energy indicators
Index (base 0 = 2000)
GDP 2011 PPP
Emissions of CO_2 per unit of GDP
Energy Final Consumption per capita
Electricity Final Consumption per capita
Population
Emissions of CO_2 per capita
Energy Final Consumption per unit of GDP
Electricity Final Consumption per unit of GDP

NICARAGUA

PANAMA





GENERAL INFORMATION 2016

Population (thousand inhab.)	3,991
Area (km^2)	75,420
Population Density (inhab./km^2)	53
Urban Population (%)	67
GDP USD 2010 (MUSD)	44,299
GDP USD 2011 PPP (MUSD)	86,068
GDP per capita (thou. USD 2011 PPP/inhab.)	22

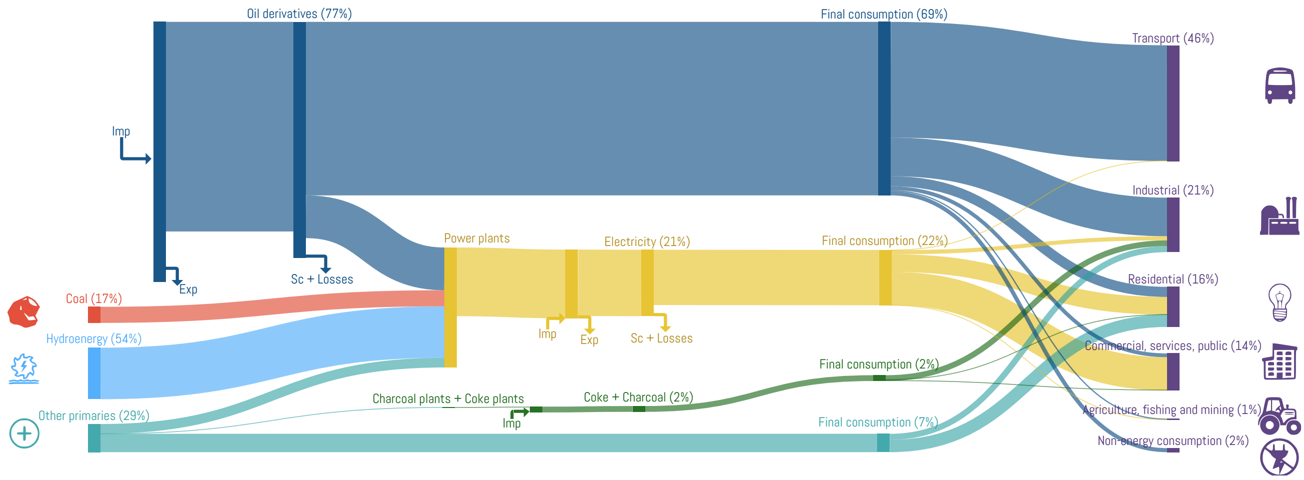
ENERGY SECTOR

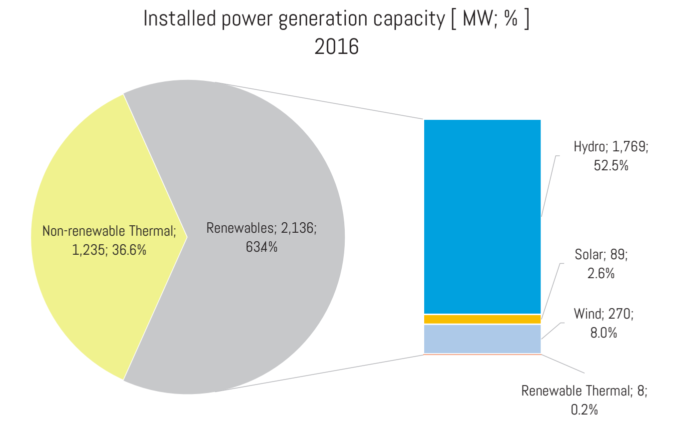
Final consumption in the Transport Sector	Mtoe 1.58
Final consumption in the Industrial Sector	Mtoe 0.74
Final consumption in the Residential Sector	Mtoe 0.55
Final consumption in the Commercial and Service Sector	Mtoe 0.50
Final consumption in the Agriculture, Livestock, Fishing, Mining, Other and Non - Energy Consumption	Mtoe 0.07

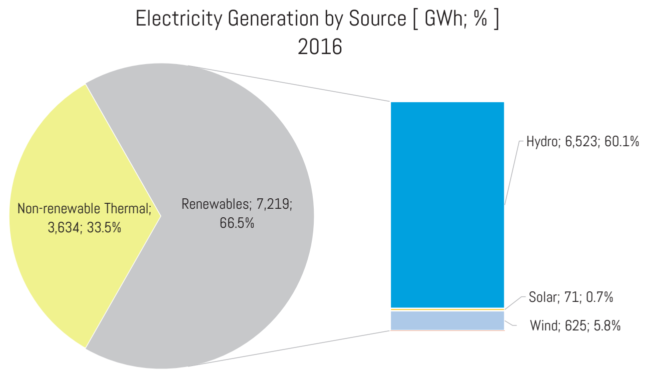
Oil Reserves	Natural gas reserves	Coal reserves
Mbbl n.a.	Gm^3 n.a.	Mt 119

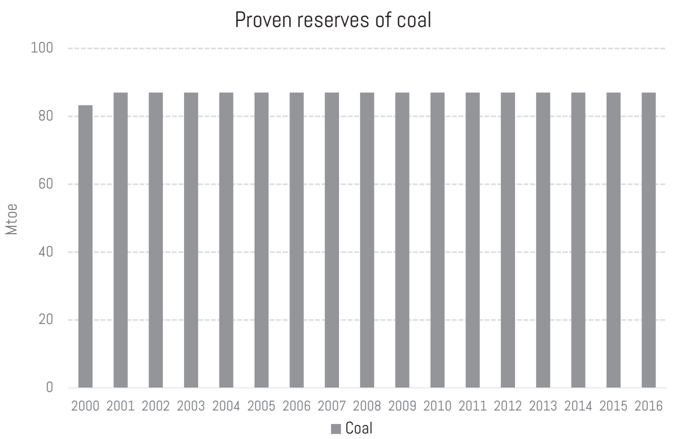
Indicator	Unit	Value
Electricity consumption per capita	kWh / inhab.	2,195
Final energy consumption per capita	toe / inhab.	0.86
Electrification rate	%	92.41
Total energy supply	Mtoe	4.56
Total energy production	Mtoe	1.08
Total energy imports	Mtoe	3.84
Total energy exports	Mtoe	0.72
Total final energy consumption	Mtoe	3.45
Refining capacity	kbbl/day	n.a.
Installed power generation capacity	GW	3.37
Primary energy intensity and final energy intensity	koe / USD 2011 PPP	0.02 / 0.04

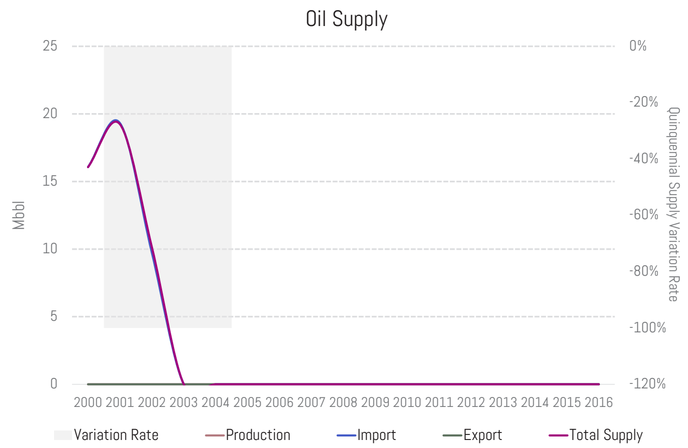
Summarized energy matrix 2016

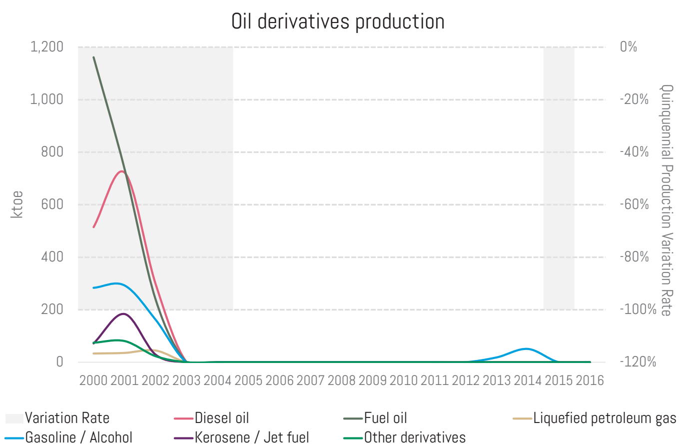


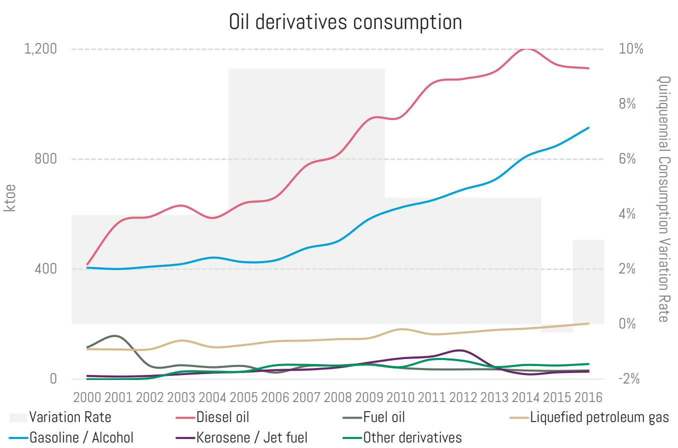

Installed power generation capacity [MW; %]
2016
Non-renewable Thermal; 1,235; 36.6%
Renewables; 2,136; 634%
Hydro; 1,769; 52.5%
Solar; 89; 2.6%
Wind; 270; 8.0%
Renewable Thermal; 8; 0.2%


Electricity Generation by Source [GWh; %]
2016
Non-renewable Thermal; 3,634; 33.5%
Renewables; 7,219; 66.5%
Hydro; 6,523; 60.1%
Solar; 71; 0.7%
Wind; 625; 5.8%

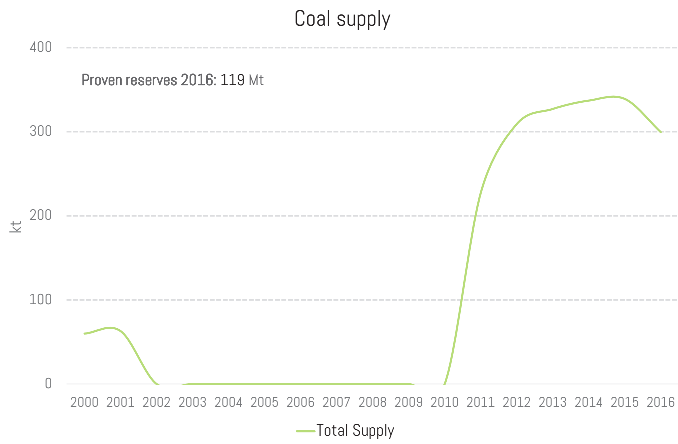

Proven reserves of coal
Mtoe
100
80
60
40
20
0
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Coal

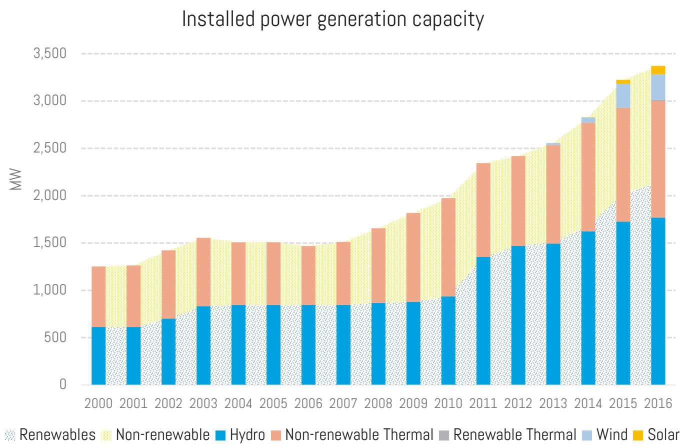

Oil Supply
Mbbl
25
20
15
10
5
0
0%
-20%
-40%
-60%
-80%
-100%
-120%
Quinquennial Supply Variation Rate
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Variation Rate
Production
Import
Export
Total Supply

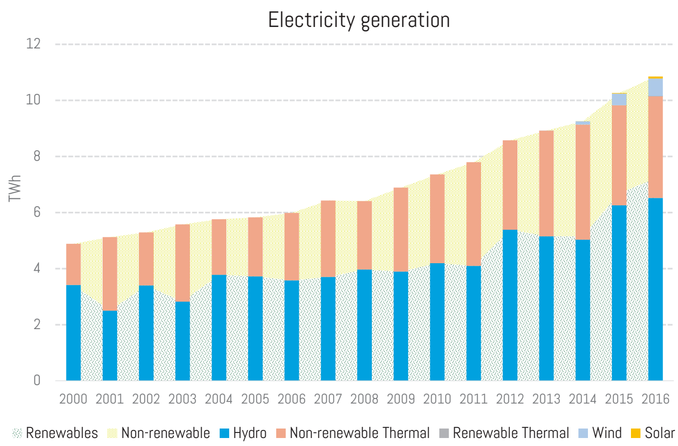

Oil derivatives production
ktoe
1,200
1,000
800
600
400
200
0
0%
-20%
-40%
-60%
-80%
-100%
-120%
Quinquennial Production Variation Rate
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Variation Rate
Diesel oil
Fuel oil
Liquefied petroleum gas
Gasoline / Alcohol
Kerosene / Jet fuel
Other derivatives

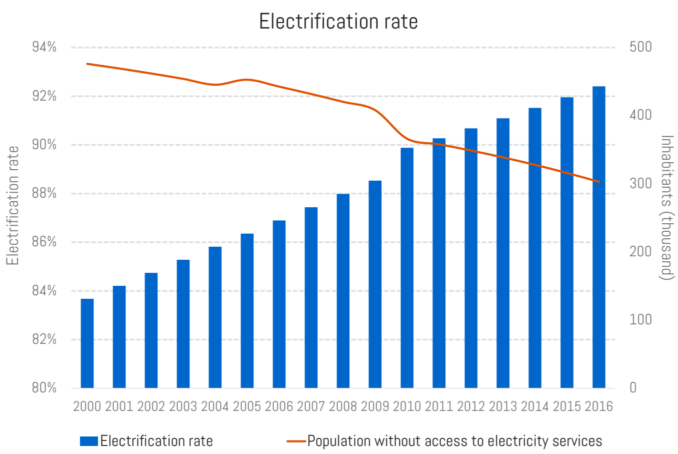

Oil derivatives consumption
ktoe
1,200
800
400
0
10%
8%
6%
4%
2%
0%
-2%
Quinquennial Consumption Variation Rate
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Variation Rate
Diesel oil
Fuel oil
Liquefied petroleum gas
Gasoline / Alcohol
Kerosene / Jet fuel
Other derivatives

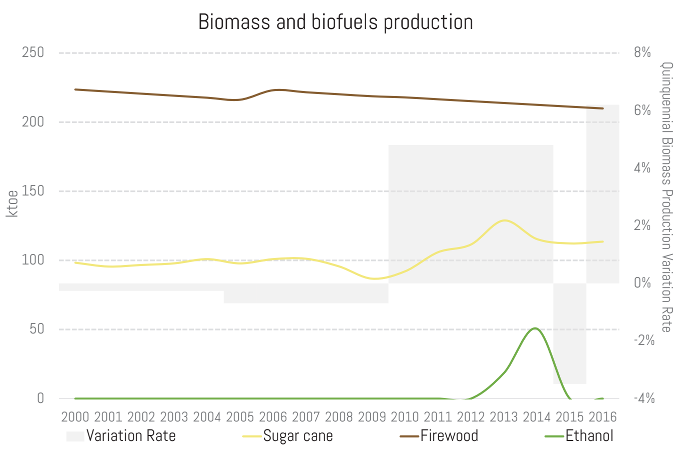
In 2003, the Panama S.A. Refinery was closed.



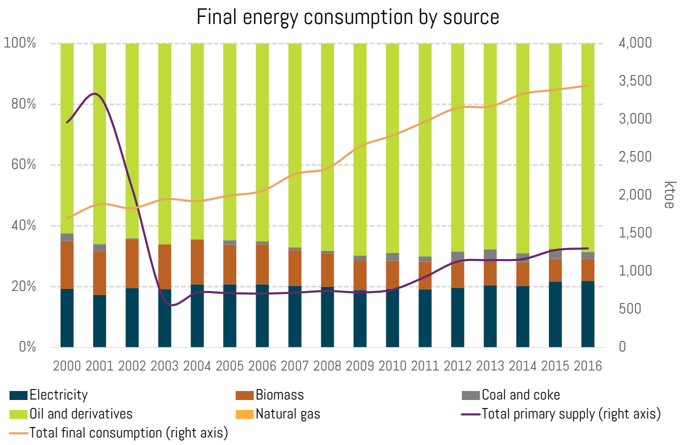


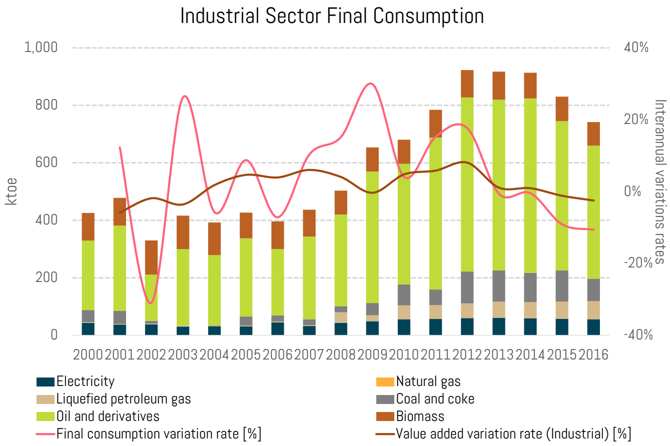


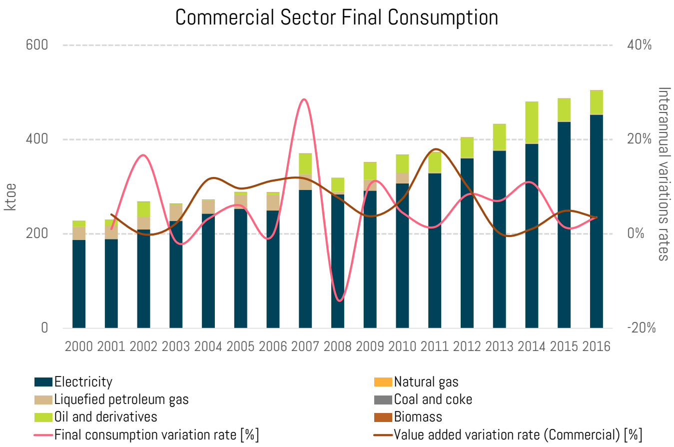


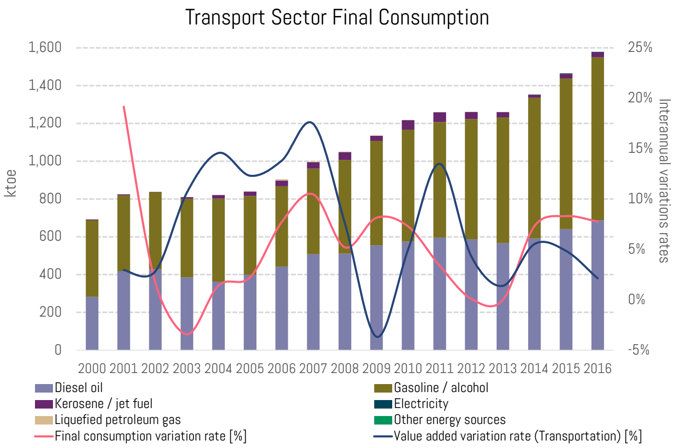


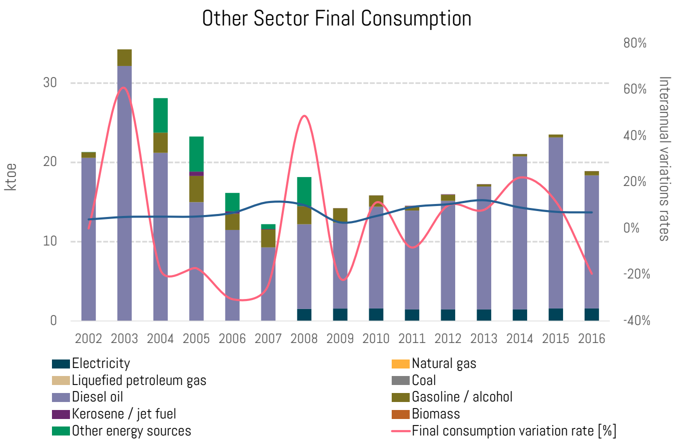
PANAMA

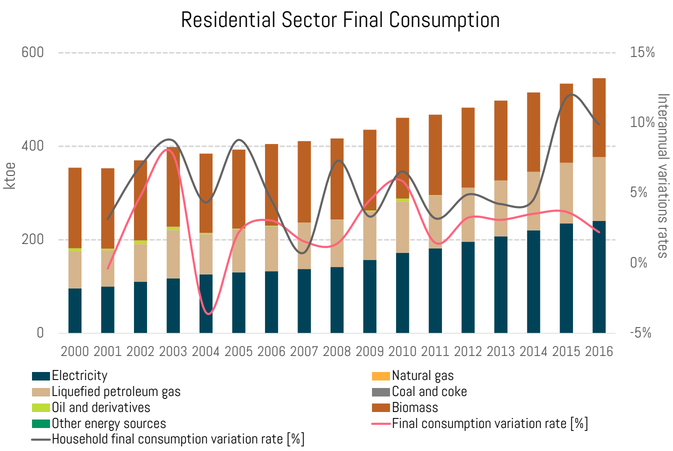

Final energy consumption by source
ktoe
Electricity
Biomass
Coal and coke
Oil and derivatives
Natural gas
Total primary supply (right axis)
Total final consumption (right axis)

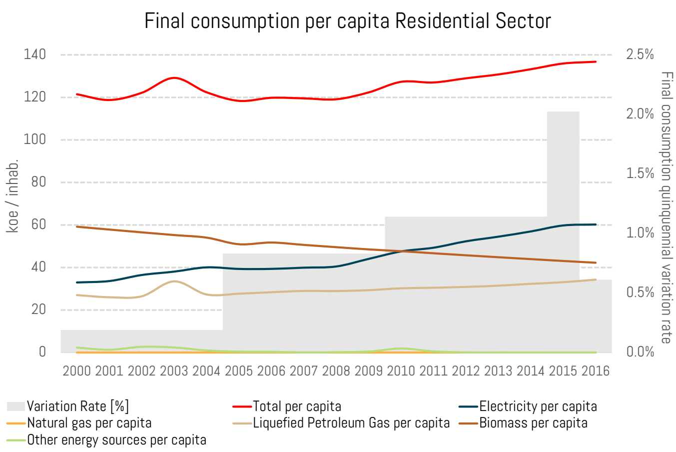

Industrial Sector Final Consumption
ktoe
Interannual variations rates
Electricity
Natural gas
Liquefied petroleum gas
Coal and coke
Oil and derivatives
Biomass
Final consumption variation rate [%]
Value added variation rate (Industrial) [%]

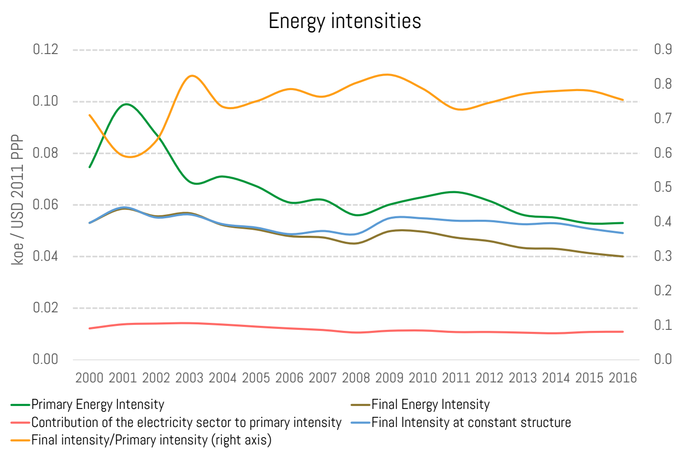

Commercial Sector Final Consumption
ktoe
Interannual variations rates
Electricity
Natural gas
Liquefied petroleum gas
Coal and coke
Oil and derivatives
Biomass
Final consumption variation rate [%]
Value added variation rate (Commercial) [%]

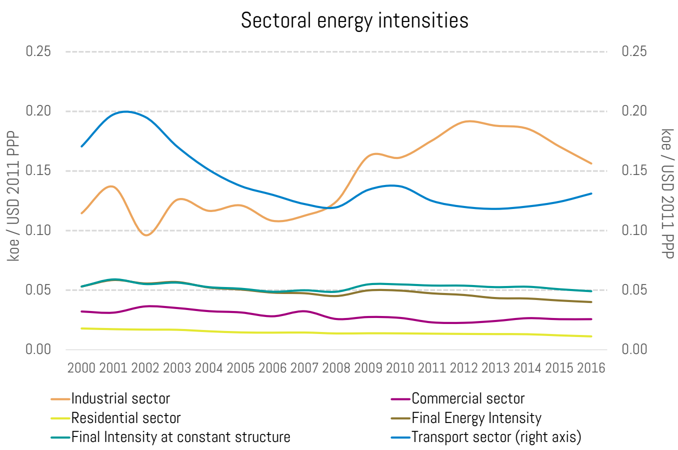

Transport Sector Final Consumption
ktoe
Interannual variations rates
Diesel oil
Gasoline / alcohol
Kerosene / jet fuel
Electricity
Liquefied petroleum gas
Other energy sources
Final consumption variation rate [%]
Value added variation rate (Transportation) [%]

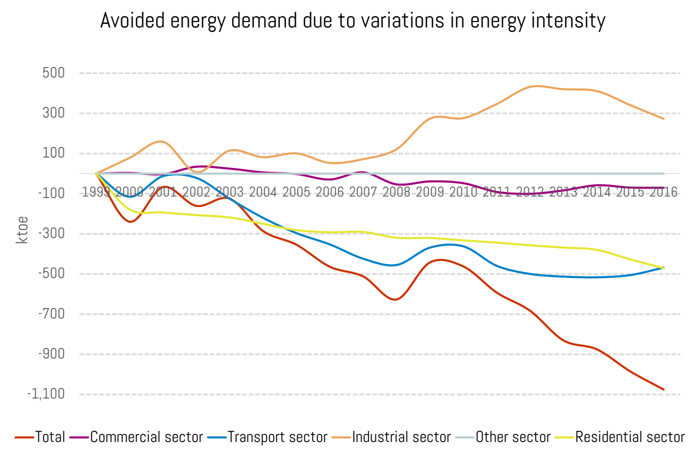

Other Sector Final Consumption
ktoe
Interannual variations rates
Electricity
Natural gas
Liquefied petroleum gas
Coal
Diesel oil
Gasoline / alcohol
Kerosene / jet fuel
Biomass
Other energy sources
Final consumption variation rate [%]

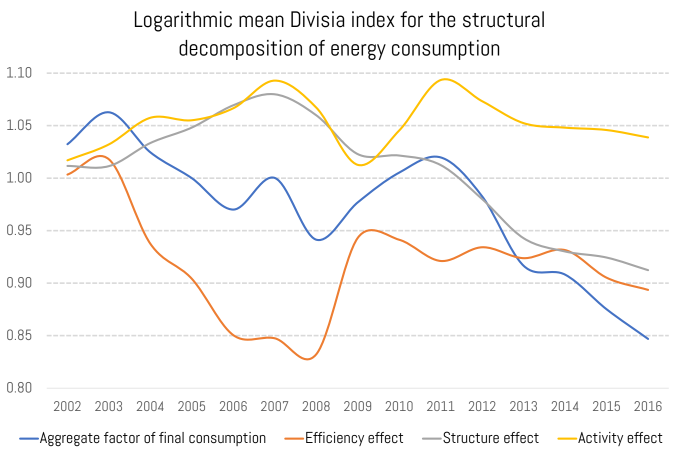

Residential Sector Final Consumption
ktoe
Interannual variations rates
Electricity
Natural gas
Liquefied petroleum gas
Coal and coke
Oil and derivatives
Biomass
Other energy sources
Final consumption variation rate [%]
Household final consumption variation rate [%]

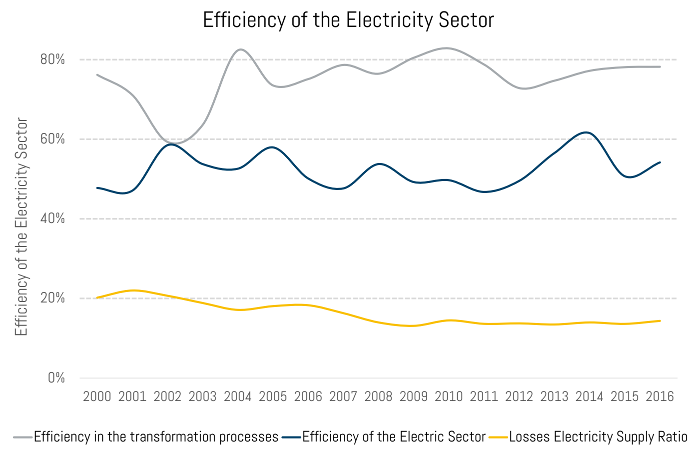

Final consumption per capita Residential Sector
koe / inhab.
Final consumption quinquennial variation rate
Variation Rate [%]
Total per capita
Electricity per capita
Natural gas per capita
Liquefied Petroleum Gas per capita
Biomass per capita
Other energy sources per capita

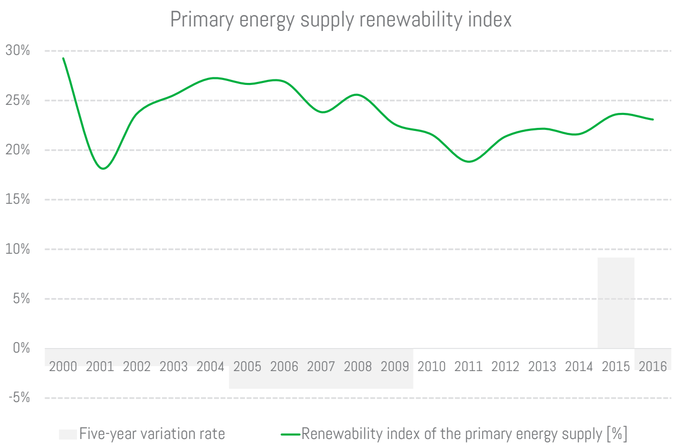

Energy intensities
koe / USD 2011 PPP
Primary Energy Intensity
Final Energy Intensity
Contribution of the electricity sector to primary intensity
Final Intensity at constant structure
Final intensity/Primary intensity (right axis)

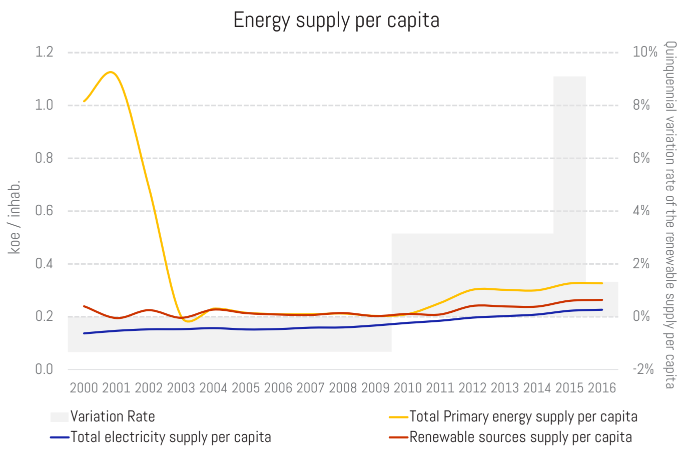

Sectoral energy intensities
koe / USD 2011 PPP
Industrial sector
Commercial sector
Residential sector
Final Energy Intensity
Final Intensity at constant structure
Transport sector (right axis)

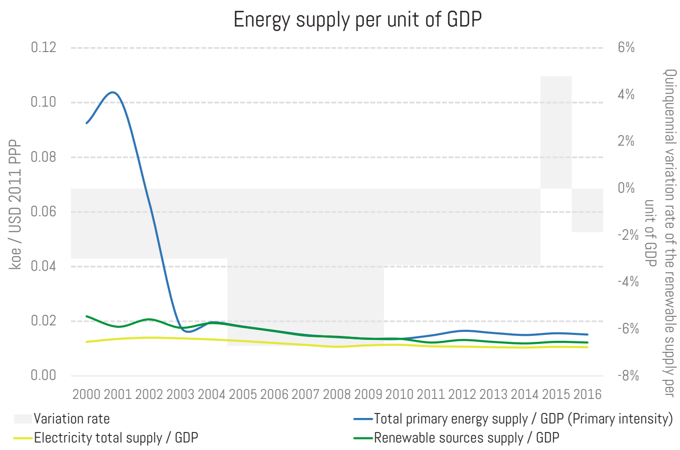

Avoided energy demand due to variations in energy intensity
ktoe
Total
Commercial sector
Transport sector
Industrial sector
Other sector
Residential sector

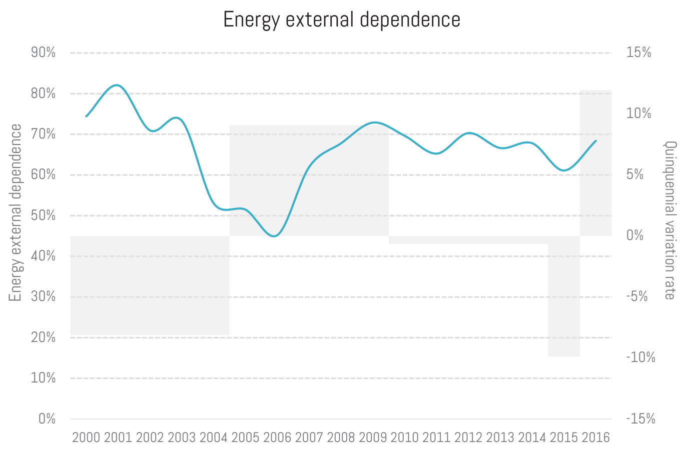

Logarithmic mean Divisia index for the structural decomposition of energy consumption
Aggregate factor of final consumption
Efficiency effect
Structure effect
Activity effect


Efficiency of the Electricity Sector
Efficiency of the Electricity Sector
Efficiency in the transformation processes
Efficiency of the Electric Sector
Losses Electricity Supply Ratio



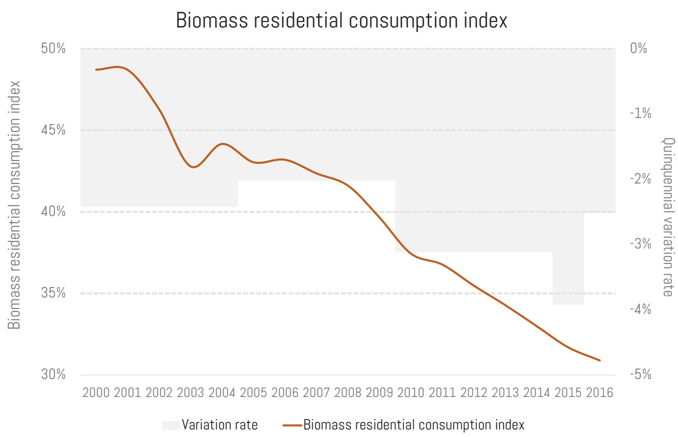




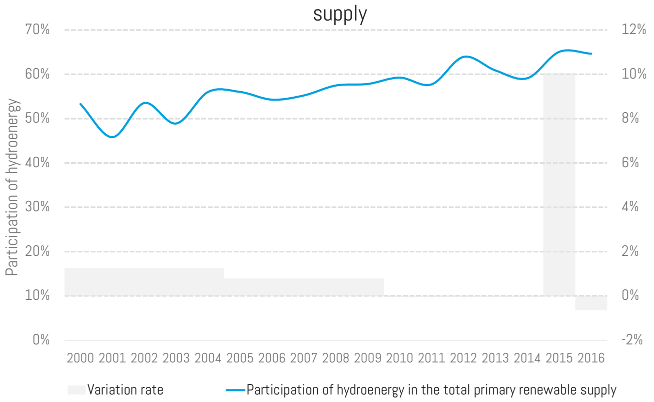


PANAMA

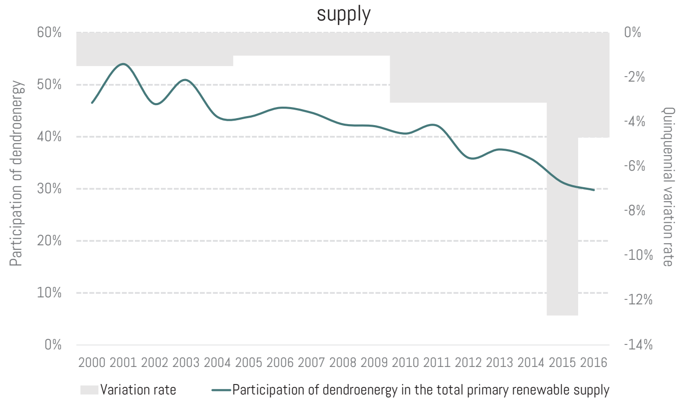
In 2016, construction began on the first Natural Gas Generation Plant in Central America with 381 MW, joining the 2015-2050 National Energy Plan.



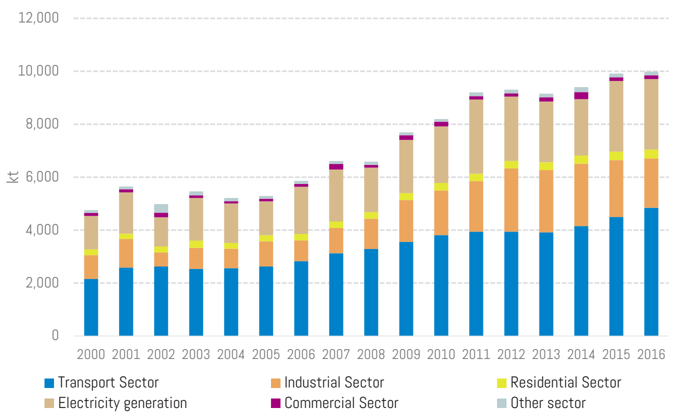
Participation of hydroenergy in the total primary renewable supply



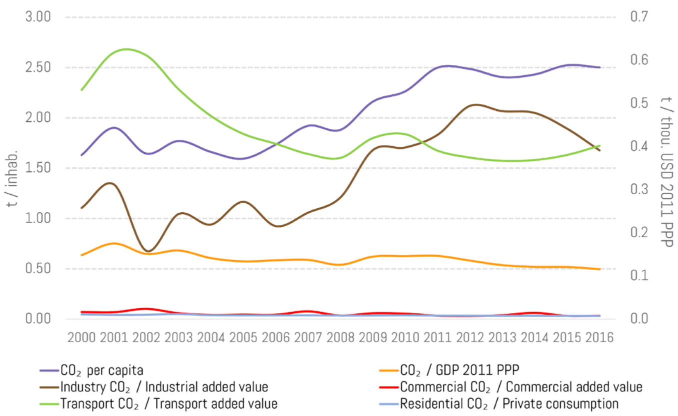
Participation of dendroenergy in the total primary renewable supply



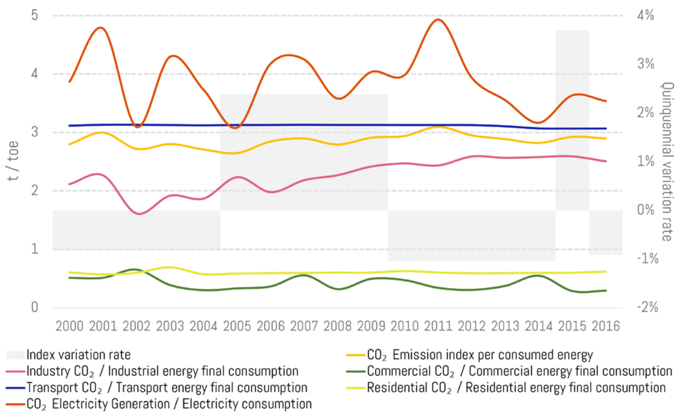
Evolution of CO_2 emissions by sector



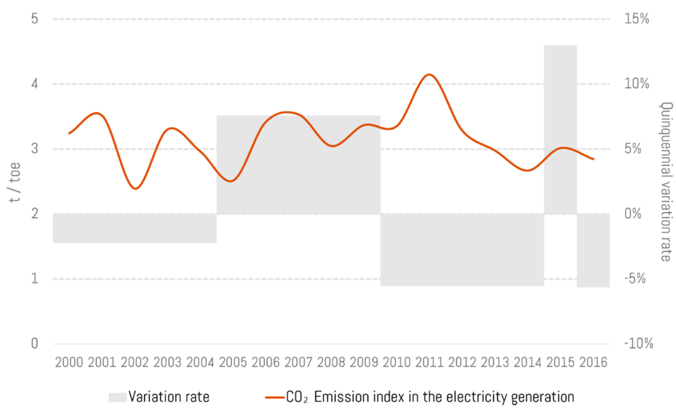
Evolution of CO_2 emissions per capita and per unit of GDP



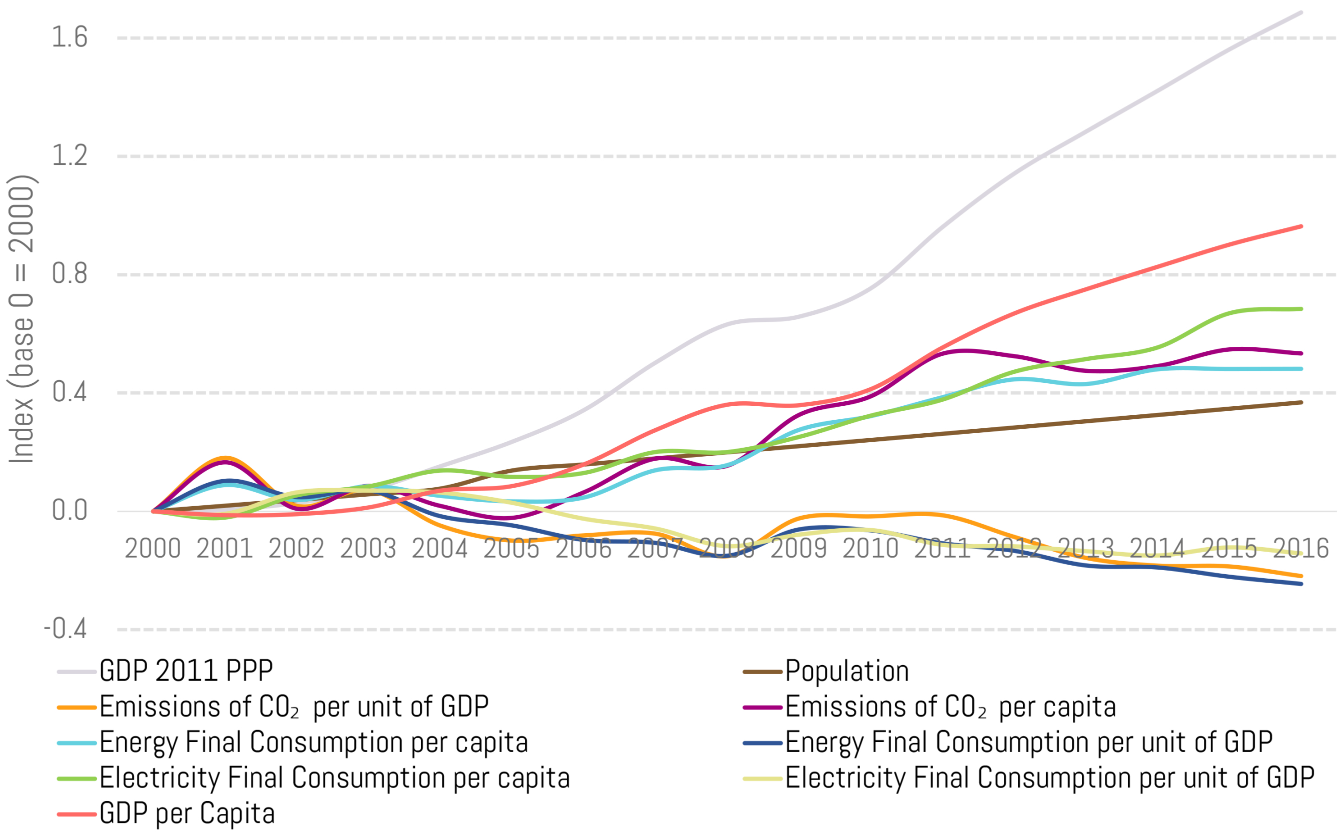
CO_2 Emission index per consumed energy



CO_2 Emission index of electricity generation



Summary of the main energy indicators

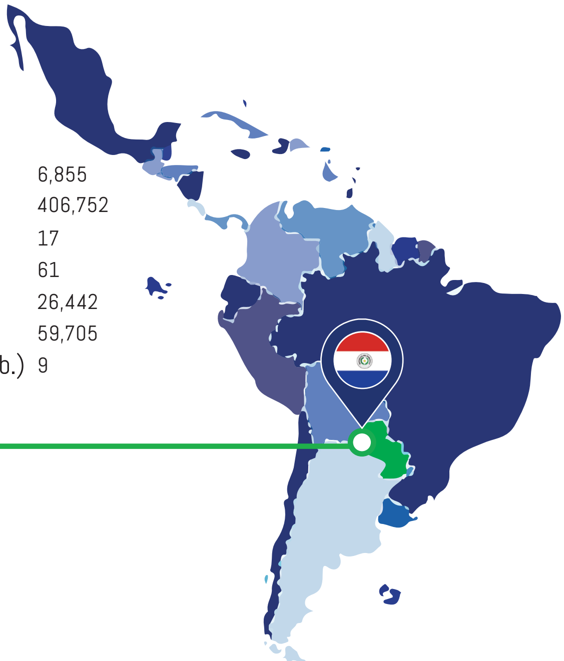


PANAMA

PARAGUAY

GENERAL INFORMATION 2016

Population (thousand inhab.)	6,855
Area (km²)	406,752
Population Density (inhab./km²)	17
Urban Population (%)	61
GDP USD 2010 (MUSD)	26,442
GDP USD 2011 PPP (MUSD)	59,705
GDP per capita (thou. USD 2011 PPP/inhab.)	9



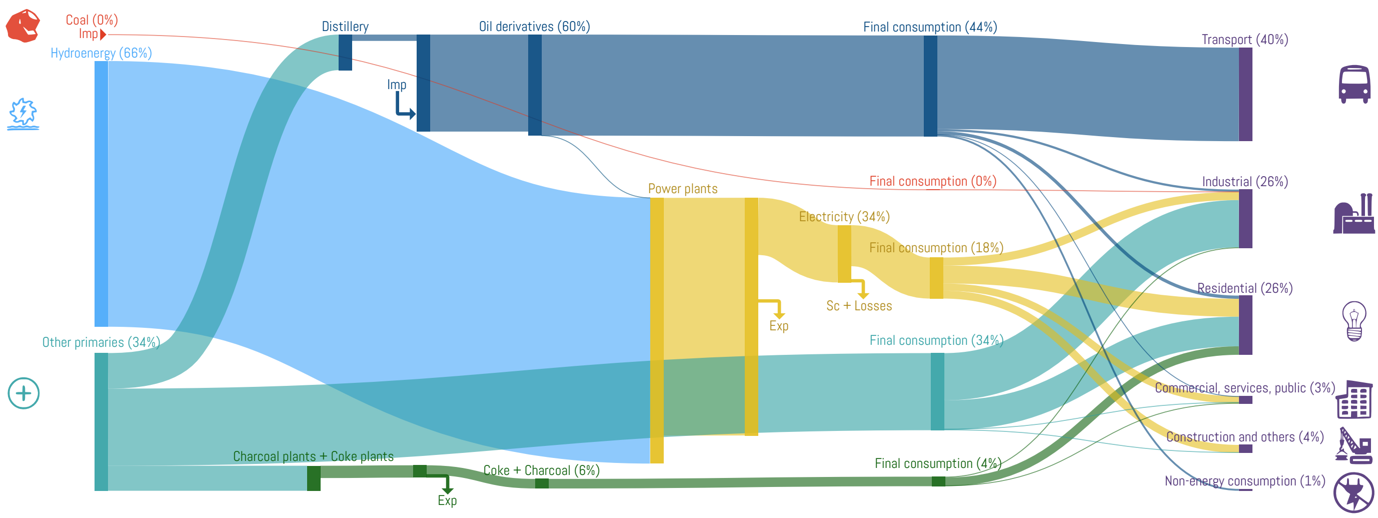
ENERGY SECTOR

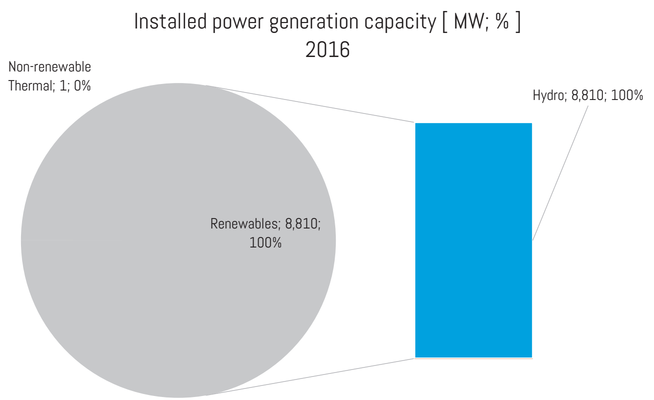
Final consumption in the Transport Sector	Mtoe 2.16
Final consumption in the Industrial Sector	Mtoe 1.35
Final consumption in the Residential Sector	Mtoe 1.37
Final consumption in the Commercial and Service Sector	Mtoe 0.18
Final consumption in the Agriculture, Livestock, Fishing, Mining, Other and Non - Energy Consumption	Mtoe 0.23

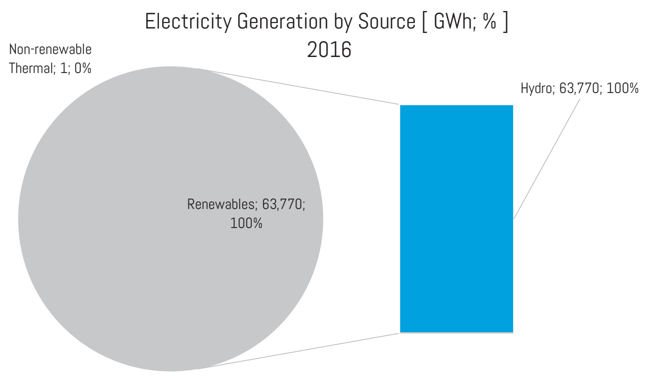
Oil Reserves	Natural gas reserves	Coal reserves
Mbbl	Gm³	Mt
n.a.	n.a.	n.a.

Indicator	Unit	Value
Electricity consumption per capita	kWh / inhab.	1,607
Final energy consumption per capita	toe / inhab.	0.77
Electrification rate	%	99.06
Total energy supply	Mtoe	7.27
Total energy production	Mtoe	10.62
Total energy imports	Mtoe	2.10
Total energy exports	Mtoe	4.23
Total final energy consumption	Mtoe	5.28
Refining capacity	kbbl/day	n.a.
Installed power generation capacity	GW	8.81
Primary energy intensity and final energy intensity	koe / USD 2011 PPP	0.16 / 0.09

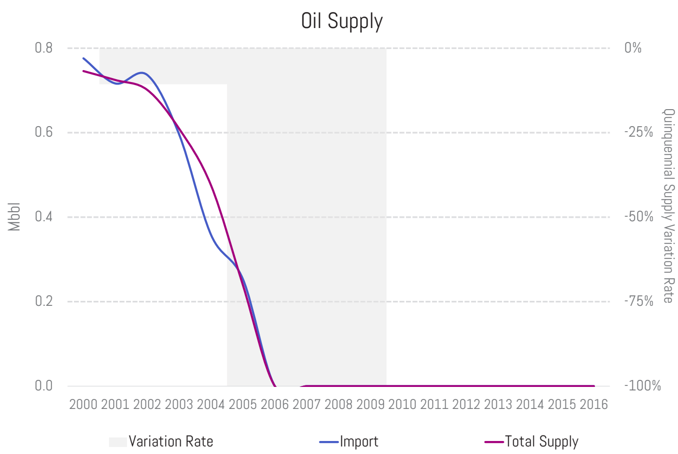
Summarized energy matrix 2016



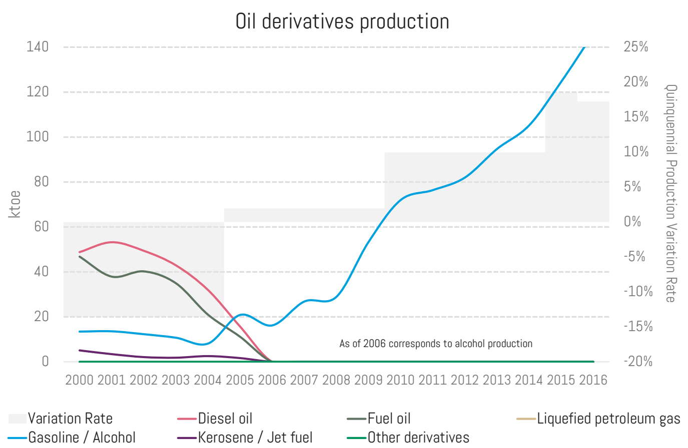


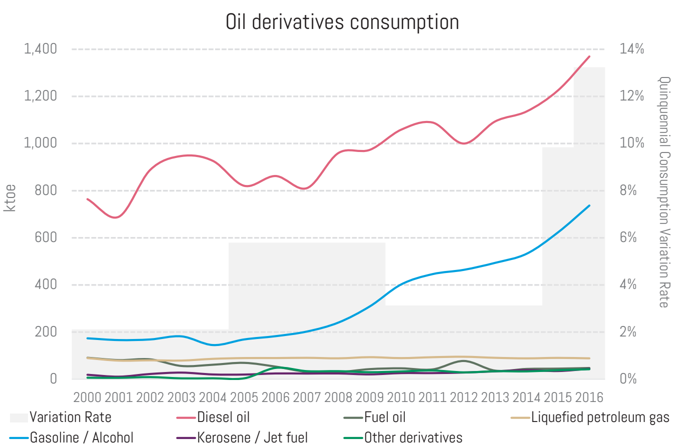


Itaipu Binacional produced a total of 103 TWh, a new world record in annual generation.

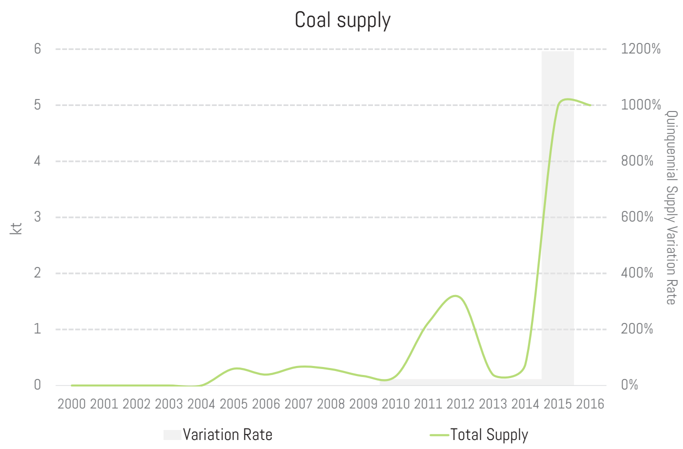


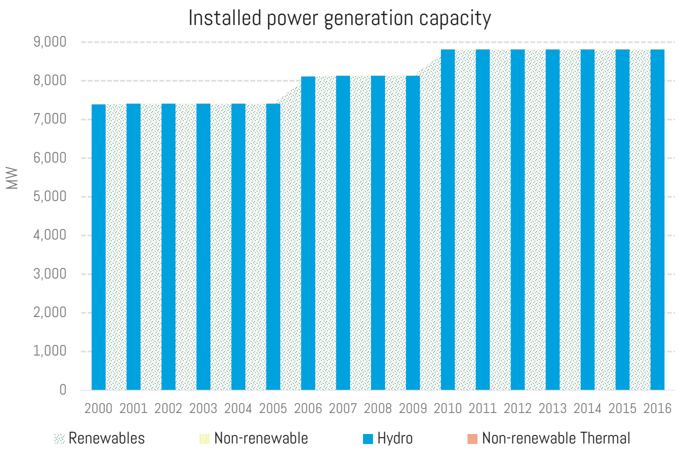
PARAGUAY

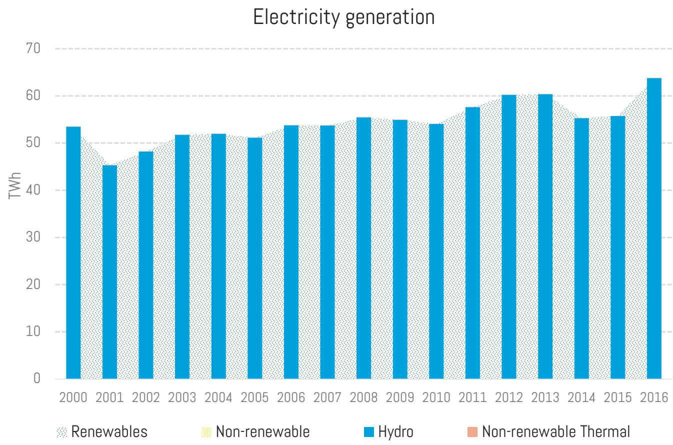


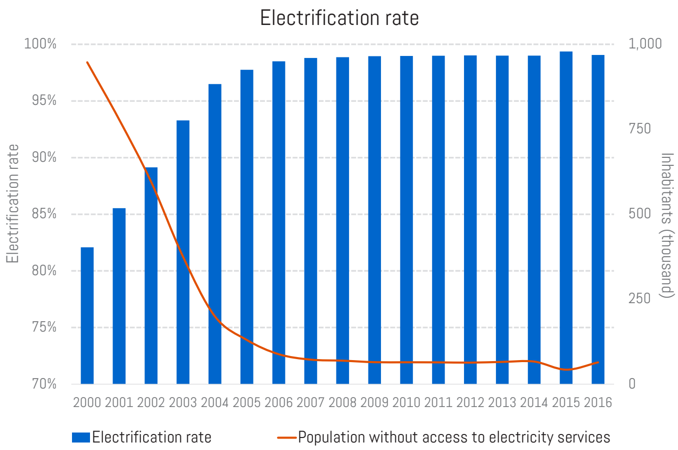


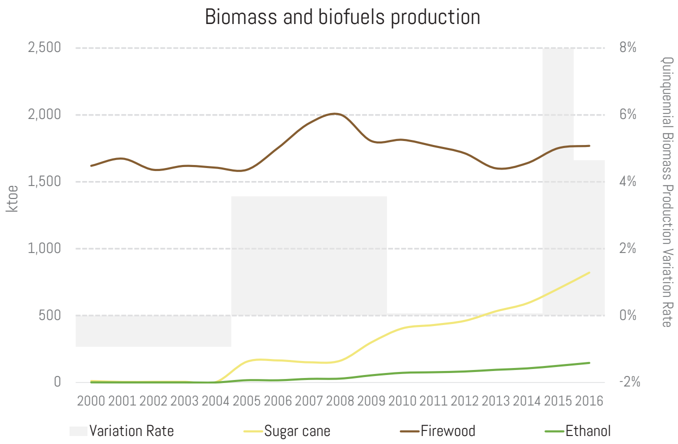
In 2005, the Villa Elisa refinery closes.



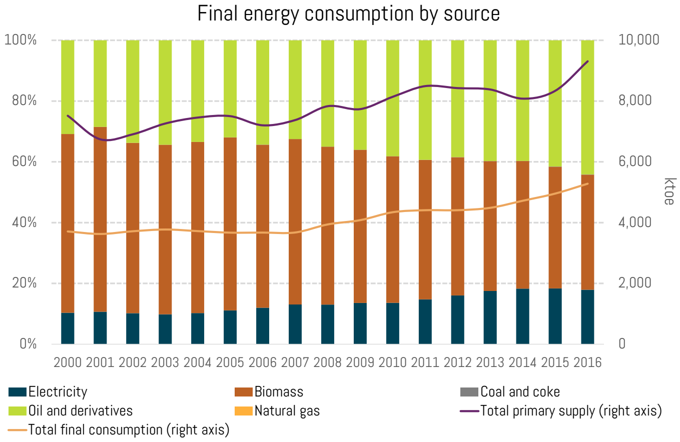


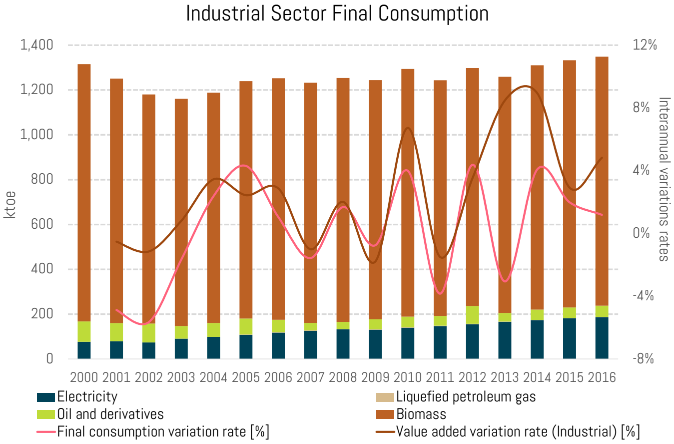


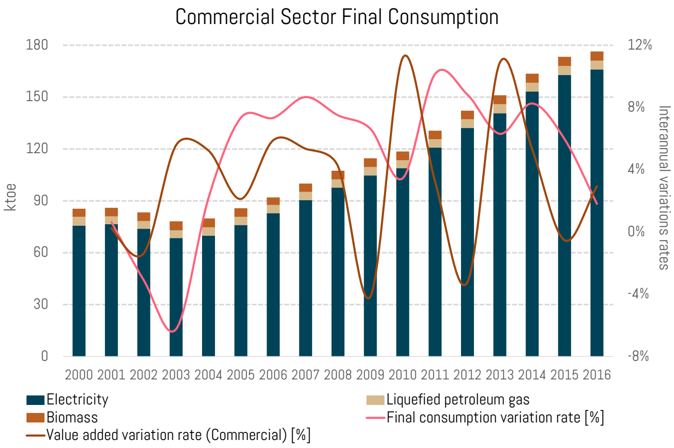


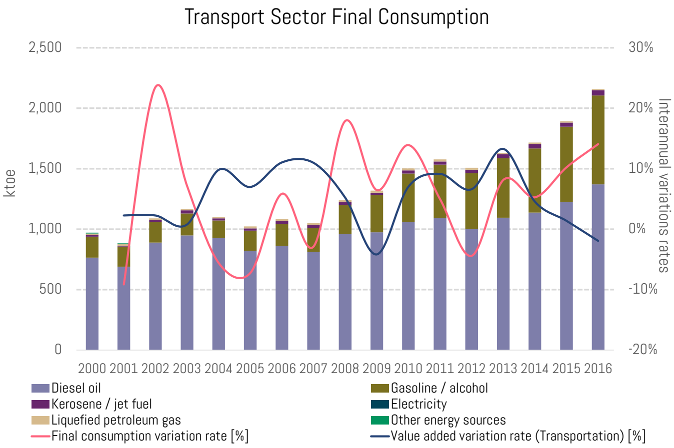


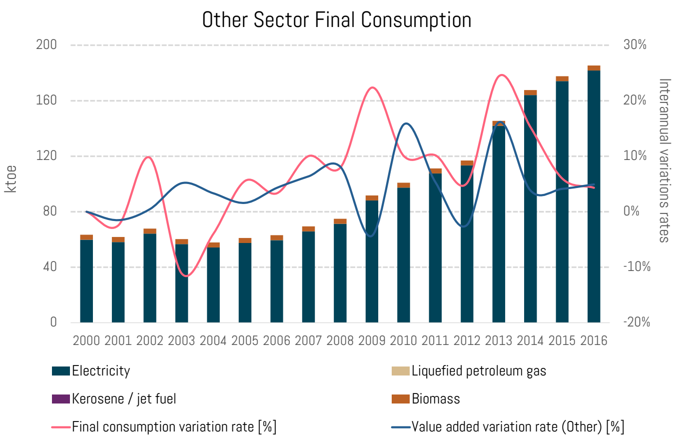
PARAGUAY

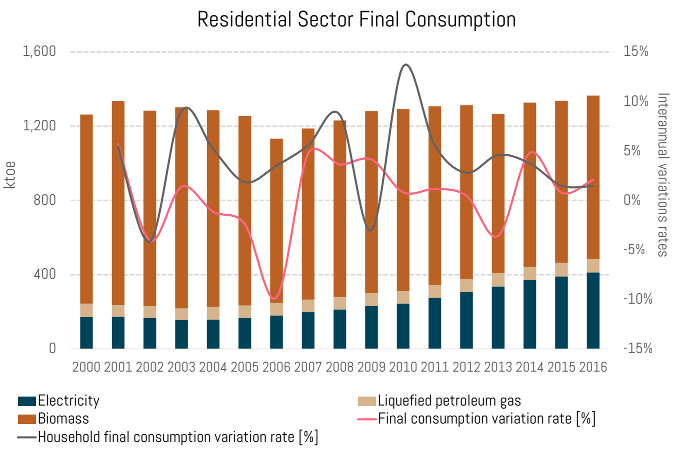

Final energy consumption by source
100%
80%
60%
40%
20%
0%
10,000
8,000
6,000
4,000
2,000
0
ktoe
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Electricity
Biomass
Coal and coke
Oil and derivatives
Natural gas
Total primary supply (right axis)
Total final consumption (right axis)

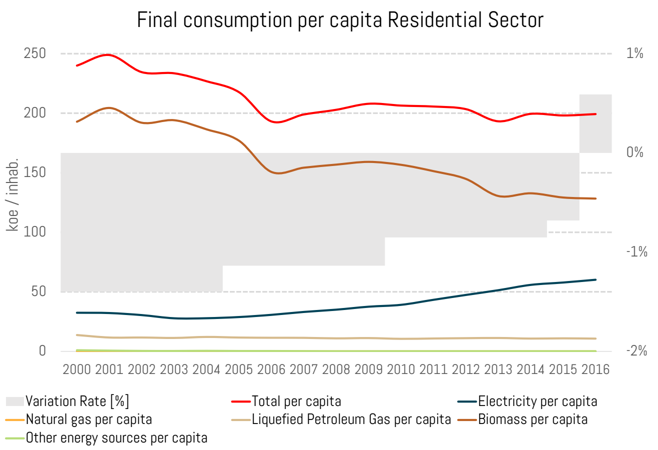

Industrial Sector Final Consumption
1,400
1,200
1,000
800
600
400
200
0
ktoe
12%
8%
4%
0%
-4%
-8%
Interannual variations rates
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Electricity
Liquefied petroleum gas
Oil and derivatives
Biomass
Final consumption variation rate [%]
Value added variation rate (Industrial) [%]

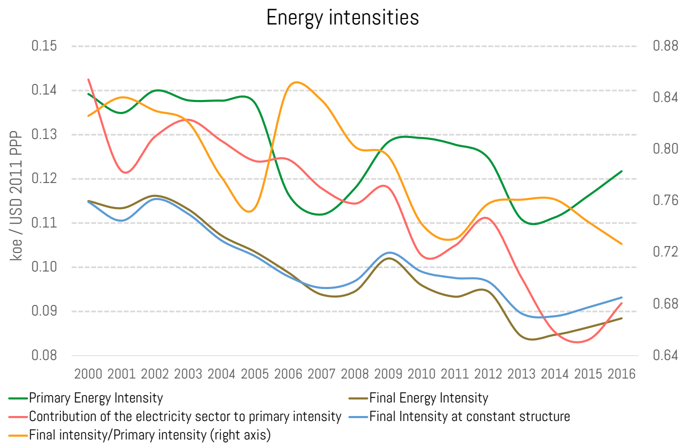

Commercial Sector Final Consumption
180
150
120
90
60
30
0
ktoe
12%
8%
4%
0%
-4%
-8%
Interannual variations rates
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Electricity
Liquefied petroleum gas
Biomass
Final consumption variation rate [%]
Value added variation rate (Commercial) [%]

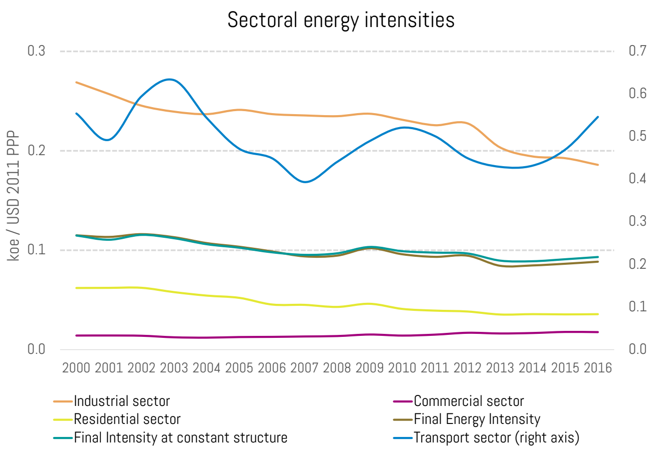

Transport Sector Final Consumption
2,500
2,000
1,500
1,000
500
0
ktoe
30%
20%
10%
0%
-10%
-20%
Interannual variations rates
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Diesel oil
Gasoline / alcohol
Kerosene / jet fuel
Electricity
Liquefied petroleum gas
Other energy sources
Final consumption variation rate [%]
Value added variation rate (Transportation) [%]

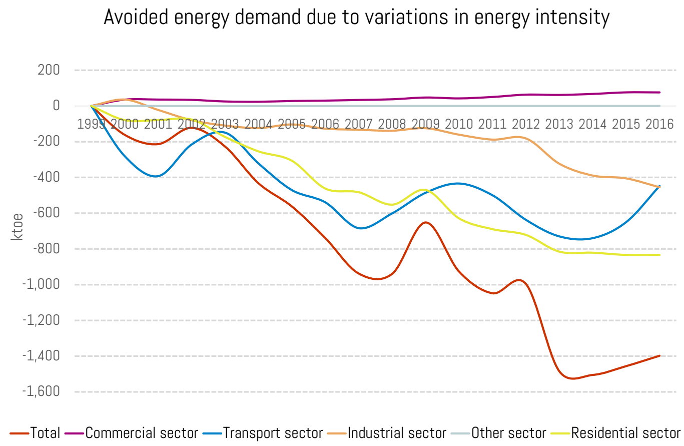

Other Sector Final Consumption
200
160
120
80
40
0
ktoe
30%
20%
10%
0%
-10%
-20%
Interannual variations rates
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Electricity
Liquefied petroleum gas
Kerosene / jet fuel
Biomass
Final consumption variation rate [%]
Value added variation rate (Other) [%]

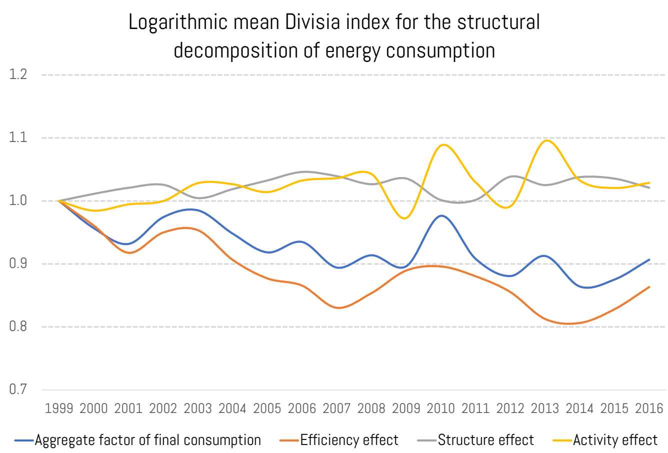

Residential Sector Final Consumption
1,600
1,200
800
400
0
ktoe
15%
10%
5%
0%
-5%
-10%
-15%
Interannual variations rates
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Electricity
Liquefied petroleum gas
Biomass
Final consumption variation rate [%]
Household final consumption variation rate [%]

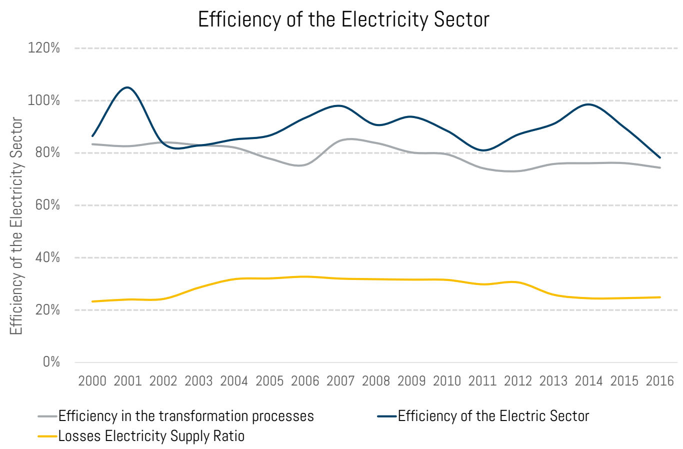

Final consumption per capita Residential Sector
koe / inhab.
Final consumption quinquennial variation rate
250
200
150
100
50
0
1%
0%
-1%
-2%
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Variation Rate [%]
Total per capita
Electricity per capita
Natural gas per capita
Liquefied Petroleum Gas per capita
Biomass per capita
Other energy sources per capita

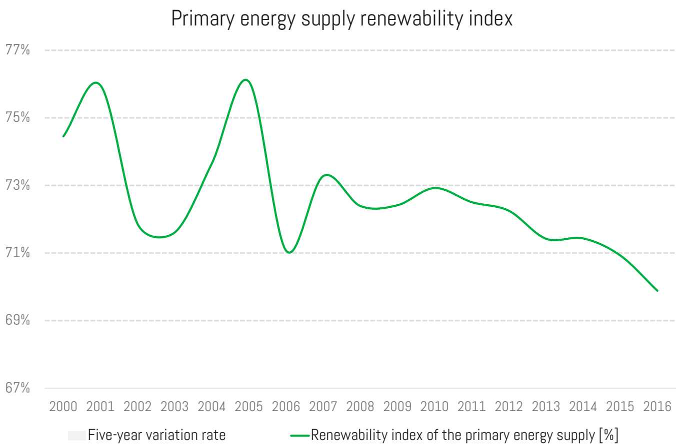

Energy intensities
koe / USD 2011 PPP
0.15
0.14
0.13
0.12
0.11
0.10
0.09
0.08
0.88
0.84
0.80
0.76
0.72
0.68
0.64
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Primary Energy Intensity
Final Energy Intensity
Contribution of the electricity sector to primary intensity
Final Intensity at constant structure
Final intensity/Primary intensity (right axis)

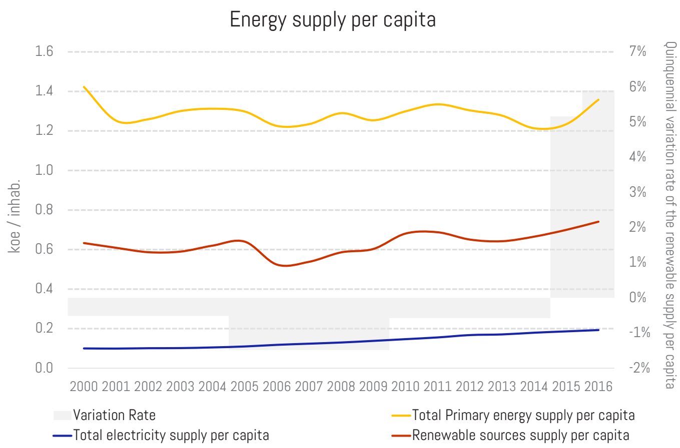

Sectoral energy intensities
koe / USD 2011 PPP
0.3
0.2
0.1
0.0
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Industrial sector
Commercial sector
Residential sector
Final Energy Intensity
Final Intensity at constant structure
Transport sector (right axis)

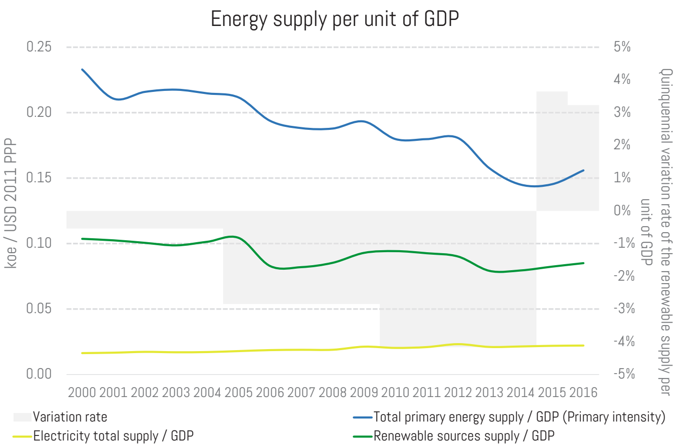

Avoided energy demand due to variations in energy intensity
ktoe
200
0
-200
-400
-600
-800
-1,000
-1,200
-1,400
-1,600
1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Total
Commercial sector
Transport sector
Industrial sector
Other sector
Residential sector

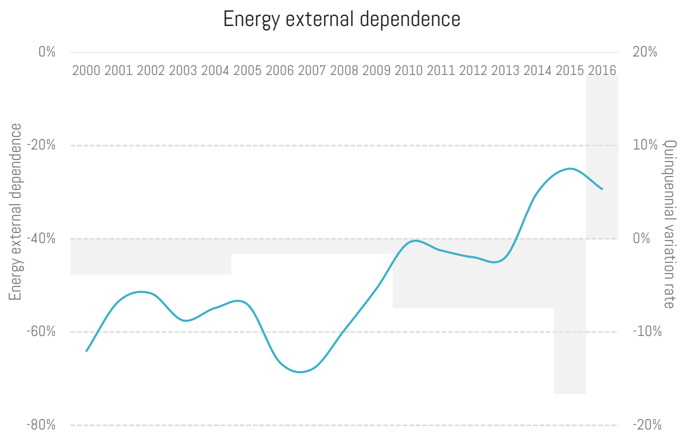

Logarithmic mean Divisia index for the structural decomposition of energy consumption
1.2
1.1
1.0
0.9
0.8
0.7
1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Aggregate factor of final consumption
Efficiency effect
Structure effect
Activity effect

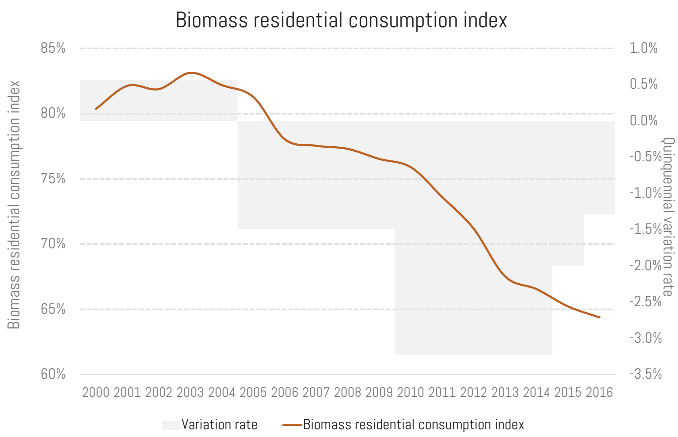

Efficiency of the Electricity Sector
Efficiency of the Electricity Sector
120%
100%
80%
60%
40%
20%
0%
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Efficiency in the transformation processes
Efficiency of the Electric Sector
Losses Electricity Supply Ratio







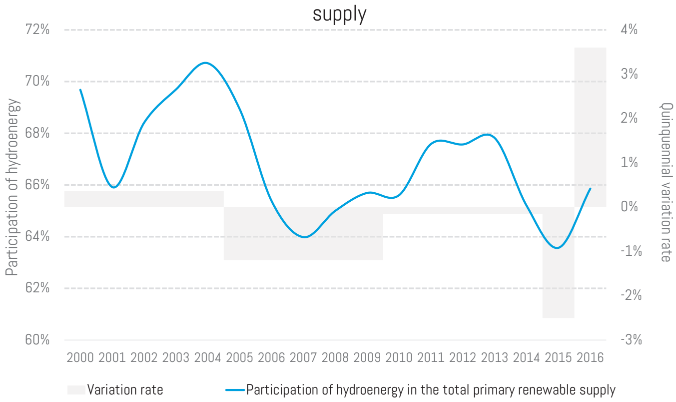




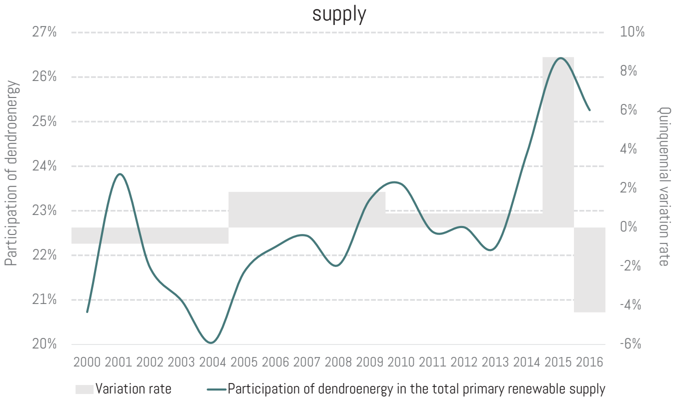
On October 2016, 10th, the President of the Republic Horacio Carts, approved by Decree No. 6092 the Energy Policy of the Republic of Paraguay.

PARAGUAY

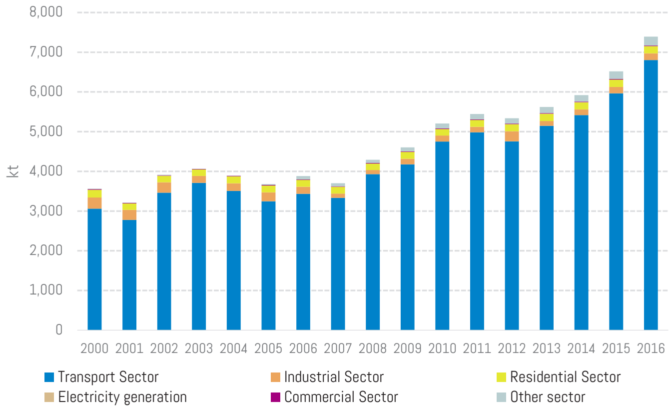
Participation of hydroenergy in the total primary renewable supply



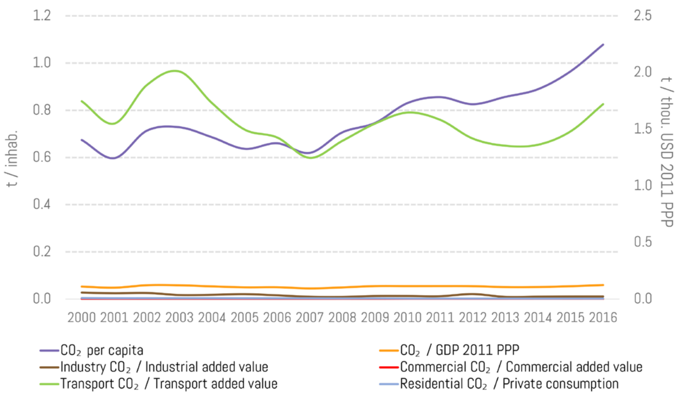
Participation of dendroenergy in the total primary renewable supply



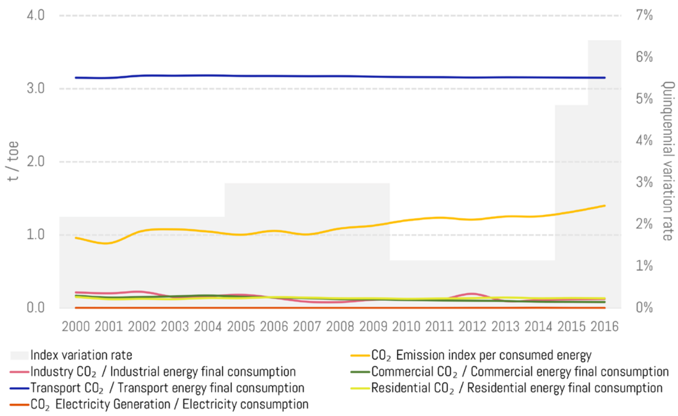
Evolution of CO_2 emissions by sector



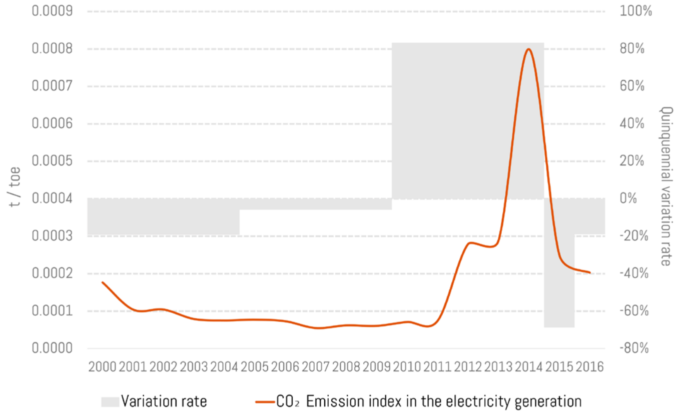
Evolution of CO_2 emissions per capita and per unit of GDP

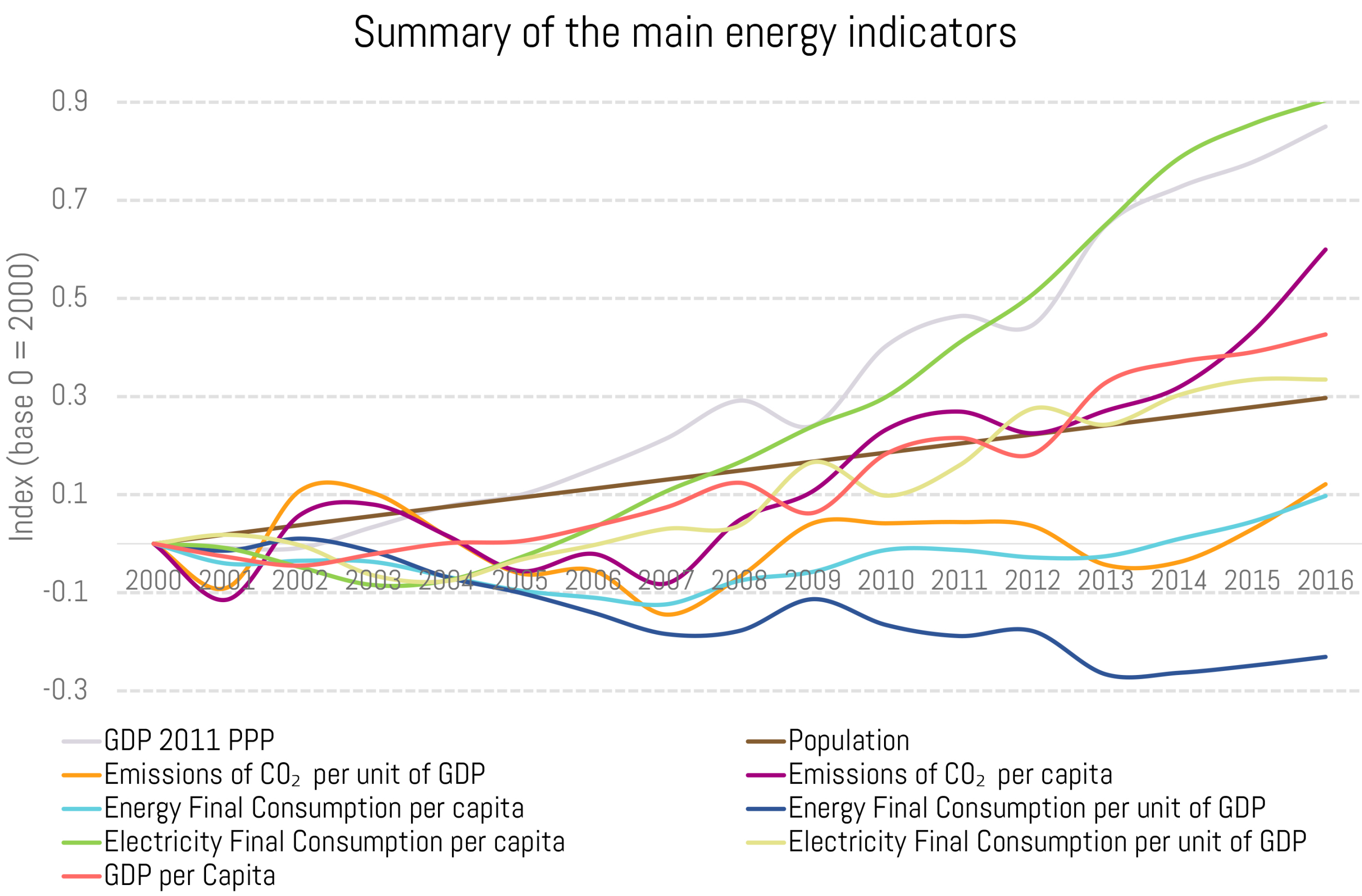


CO_2 Emission index per consumed energy



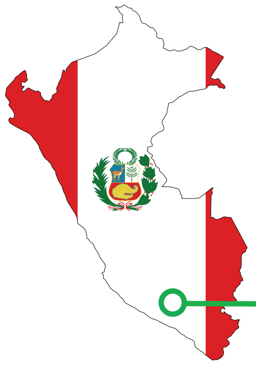
CO_2 Emission index of electricity generation




Summary of the main energy indicators
Index (base 0 = 2000)
0.9
0.7
0.5
0.3
0.1
-0.1
-0.3
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
GDP 2011 PPP
Population
Emissions of CO2 per unit of GDP
Emissions of CO2 per capita
Energy Final Consumption per capita
Energy Final Consumption per unit of GDP
Electricity Final Consumption per capita
Electricity Final Consumption per unit of GDP
GDP per Capita

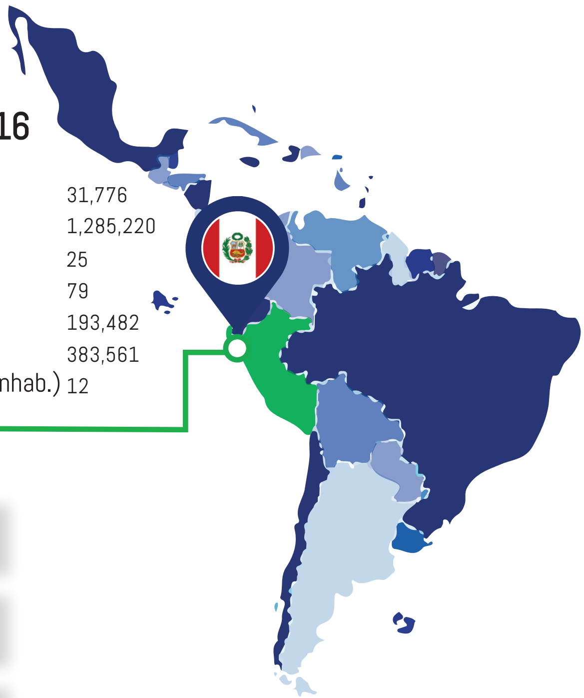
PARAGUAY

PERU



GENERAL INFORMATION 2016

Population (thousand inhab.)	31,776
Area (km^2)	1,285,220
Population Density (inhab./km^2)	25
Urban Population (%)	79
GDP USD 2010 (MUSD)	193,482
GDP USD 2011 PPP (MUSD)	383,561
GDP per capita (thou. USD 2011 PPP/inhab.)	12



ENERGY SECTOR

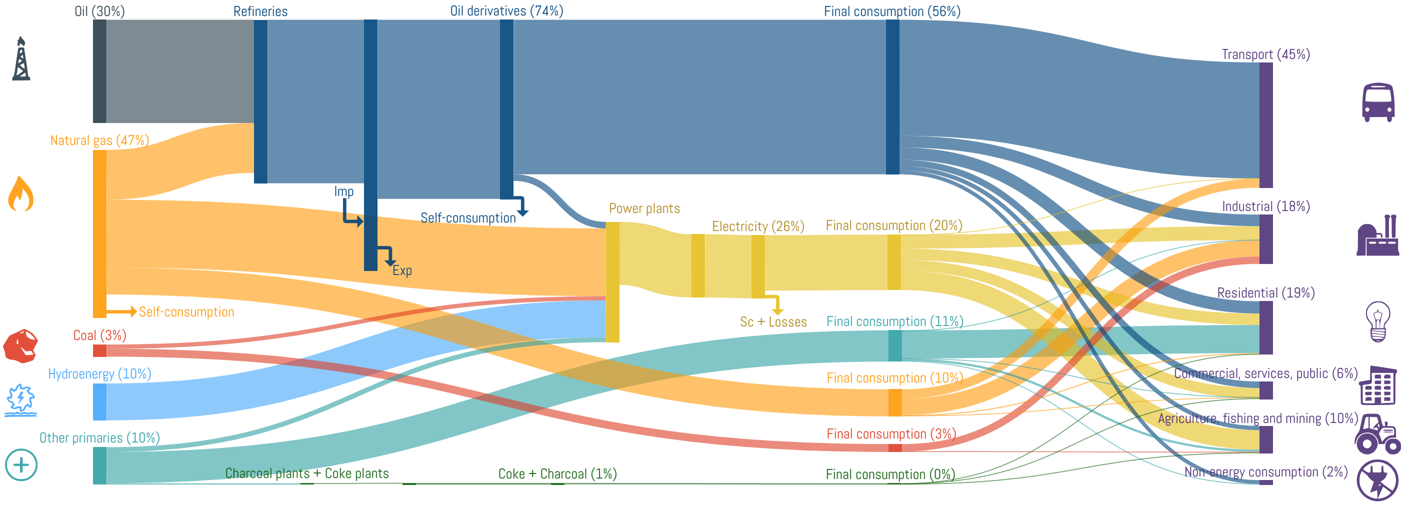
	Mtoe
Final consumption in the Transport Sector	8.82
Final consumption in the Industrial Sector	3.47
Final consumption in the Residential Sector	3.76
Final consumption in the Commercial and Service Sector	1.24
Final consumption in the Agriculture, Livestock, Fishing, Mining, Other and Non - Energy Consumption	2.25

Oil Reserves	Natural gas reserves	Coal reserves
Mbbl	Gm^3	Mt
435	456	7[1]

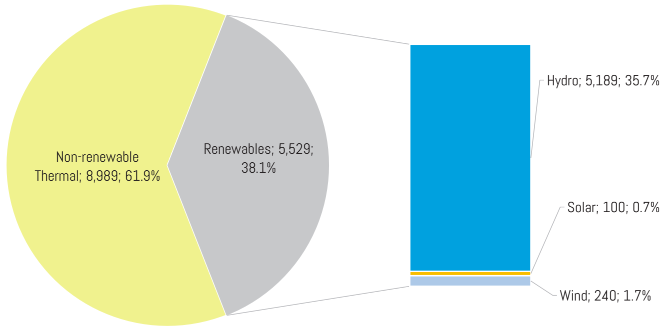
[1] Data estimated by OLADE.
[2] 2015 Data.

Electricity consumption per capita	Final energy consumption per capita	Electrification rate	Total energy supply	Total energy production	Total energy imports	Total energy exports	Total final energy consumption	Refining capacity	Installed power generation capacity	Primary energy intensity and final energy intensity
kWh / inhab.	toe / inhab.	%	Mtoe	Mtoe	Mtoe	Mtoe	Mtoe	kbbl/day	GW	koe / USD 2011 PPP
1,428	0.61	95.10	25.28	30	10.97	11.08	19.54	198[2]	14.52	0.07 / 0.05

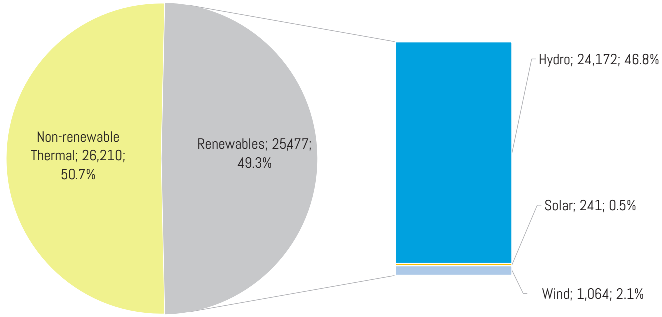
Summarized energy matrix 2016



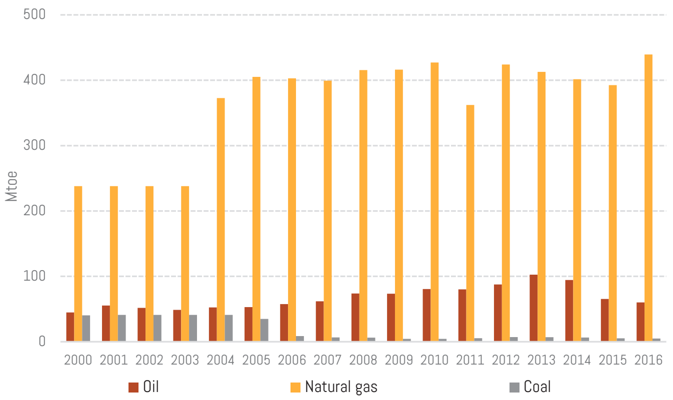
Installed power generation capacity [MW; %]
2016



Electricity Generation by Source[GWh; %]
2016

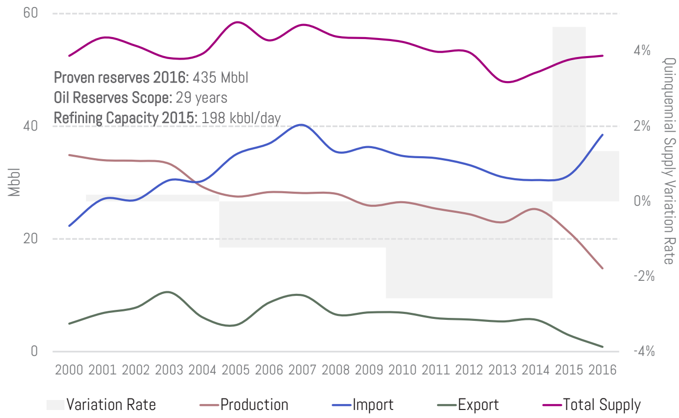


Proven reserves of oil, natural gas and coal

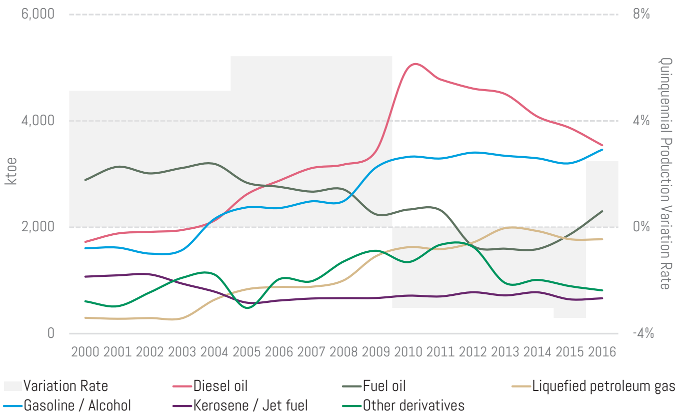


2016 coal reserves, estimated by OLADE.

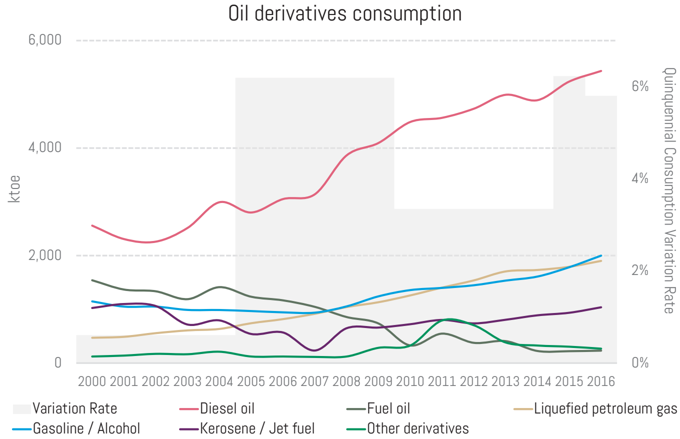
Oil supply

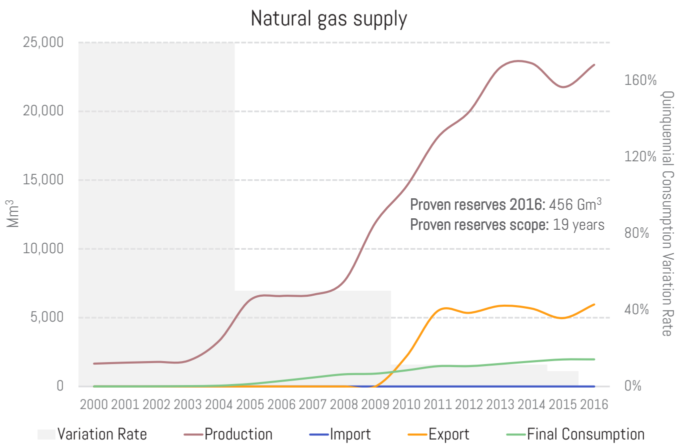


Oil derivatives production

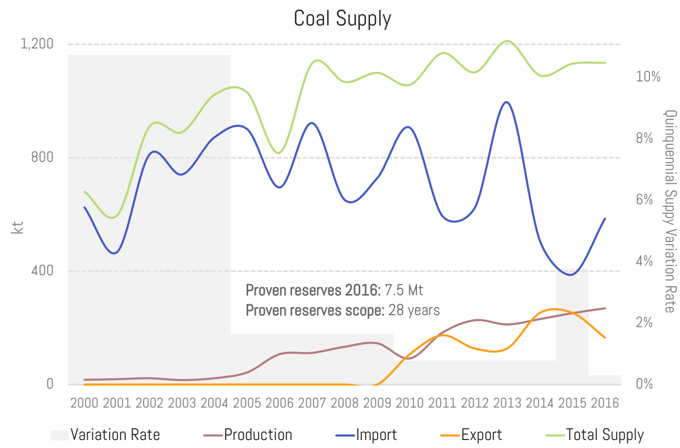


Oil derivatives consumption

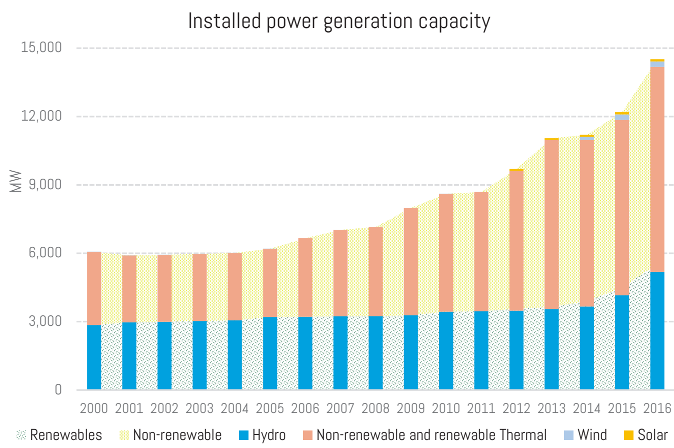




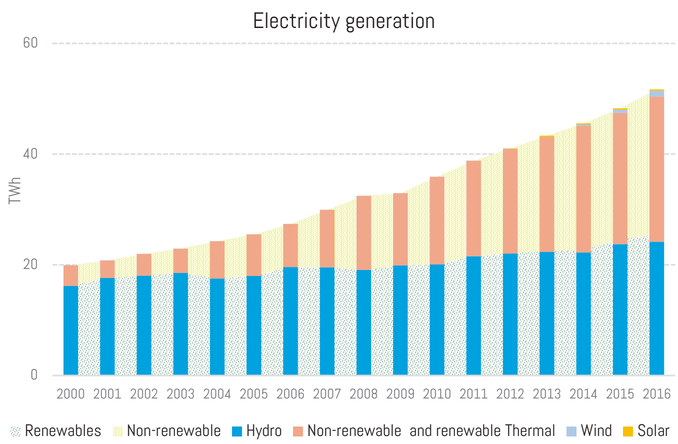
Natural gas supply
Mm3
Quinquennial Consumption Variation Rate
Proven reserves 2016: 456 Gm3
Proven reserves scope: 19 years
Variation Rate
Production
Import
Export
Final Consumption



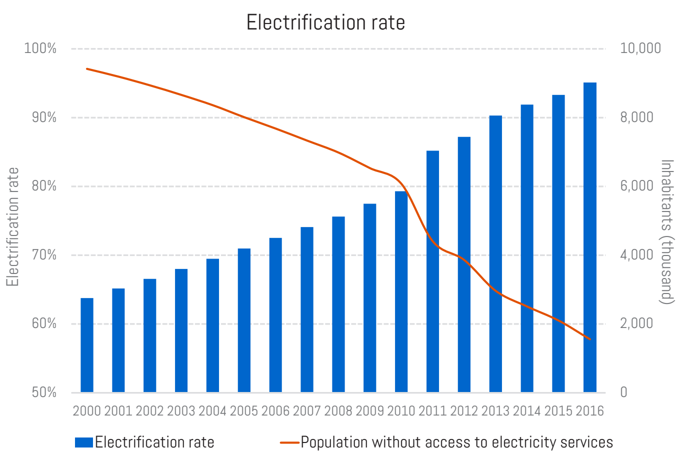
Coal Supply
kt
Quinquennial Suppy Variation Rate
Proven reserves 2016: 7.5 Mt
Proven reserves scope: 28 years
Variation Rate
Production
Import
Export
Total Supply



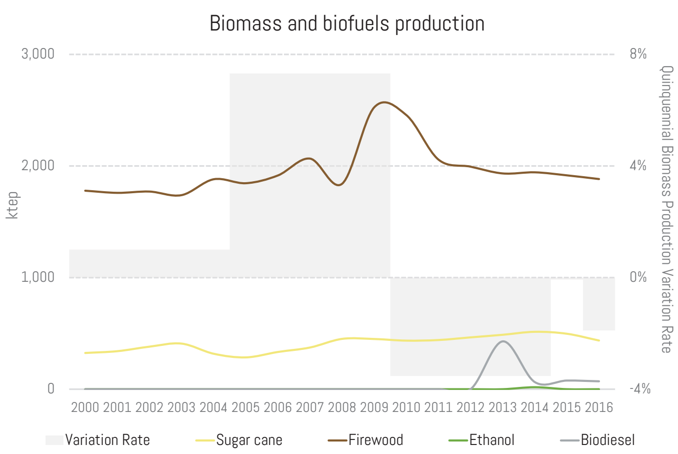
Installed power generation capacity
MW
Renewables
Non-renewable
Hydro
Non-renewable and renewable Thermal
Wind
Solar



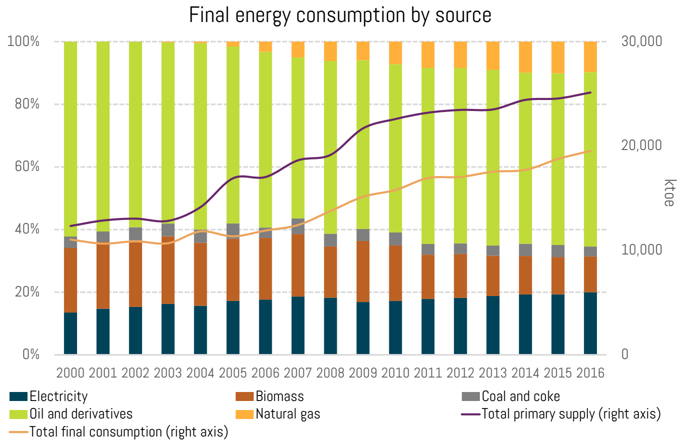
Electricity generation
TWh
Renewables
Non-renewable
Hydro
Non-renewable and renewable Thermal
Wind
Solar

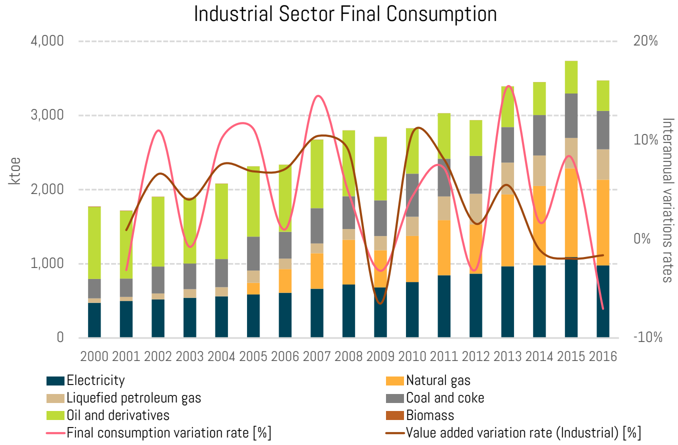


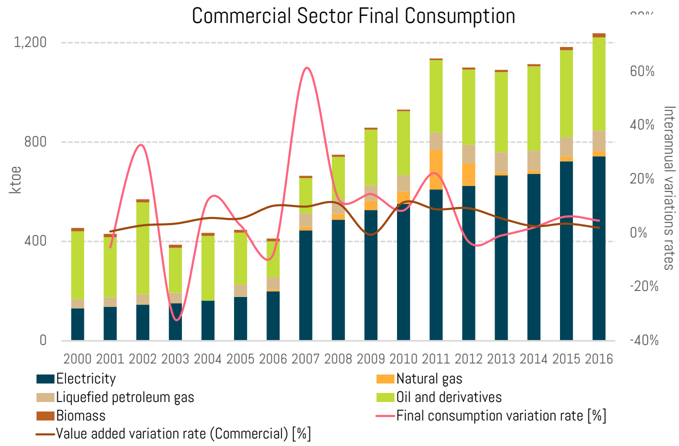
Electrification rate
Electrification rate
Inhabitants (thousand)
Electrification rate
Population without access to electricity services

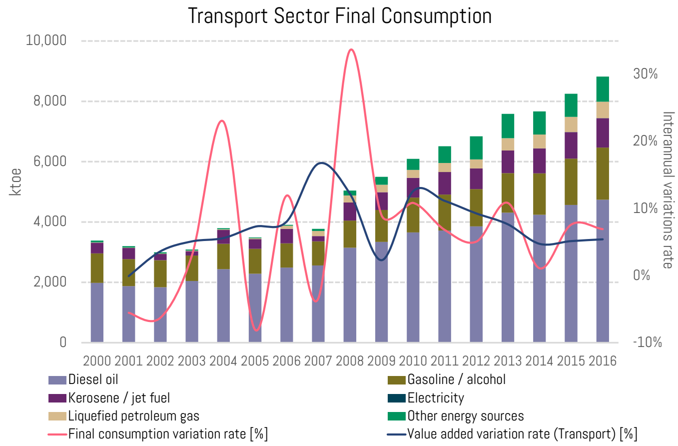


Biomass and biofuels production
ktep
Quinquennial Biomass Production Variation Rate
Variation Rate
Sugar cane
Firewood
Ethanol
Biodiesel

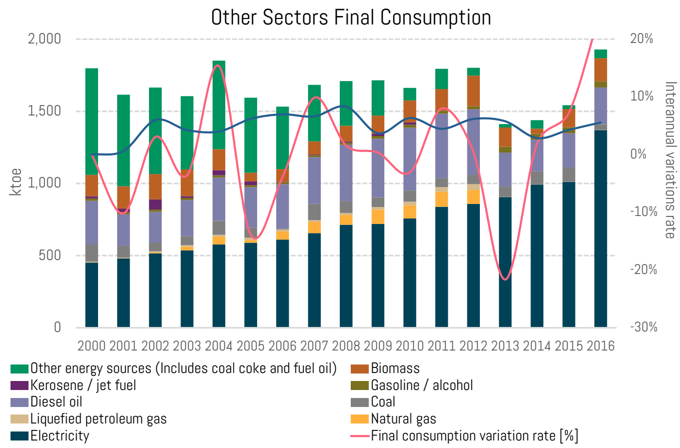

Final energy consumption by source
100%
80%
60%
40%
20%
0%
30,000
20,000
10,000
0
ktoe
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Electricity
Biomass
Coal and coke
Oil and derivatives
Natural gas
Total primary supply (right axis)
Total final consumption (right axis)

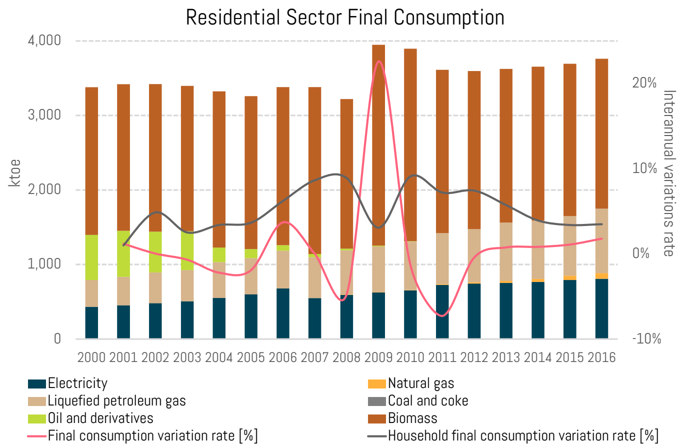

Industrial Sector Final Consumption
4,000
3,000
2,000
1,000
0
ktoe
20%
10%
0%
-10%
Interannual variations rates
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Electricity
Natural gas
Liquefied petroleum gas
Coal and coke
Oil and derivatives
Biomass
Final consumption variation rate [%]
Value added variation rate (Industrial) [%]


Commercial Sector Final Consumption
1,200
800
400
0
ktoe
60%
40%
20%
0%
-20%
-40%
Interannual variations rates
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Electricity
Natural gas
Liquefied petroleum gas
Oil and derivatives
Biomass
Final consumption variation rate [%]
Value added variation rate (Commercial) [%]

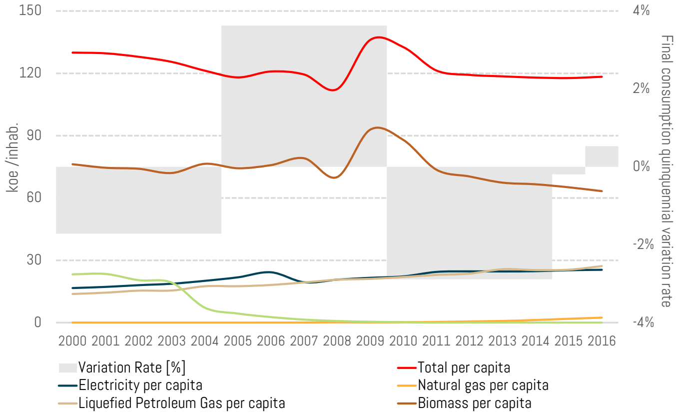

Transport Sector Final Consumption
10,000
8,000
6,000
4,000
2,000
0
ktoe
30%
20%
10%
0%
-10%
Interannual variations rate
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Diesel oil
Gasoline / alcohol
Kerosene / jet fuel
Electricity
Liquefied petroleum gas
Other energy sources
Final consumption variation rate [%]
Value added variation rate (Transport) [%]

PERU

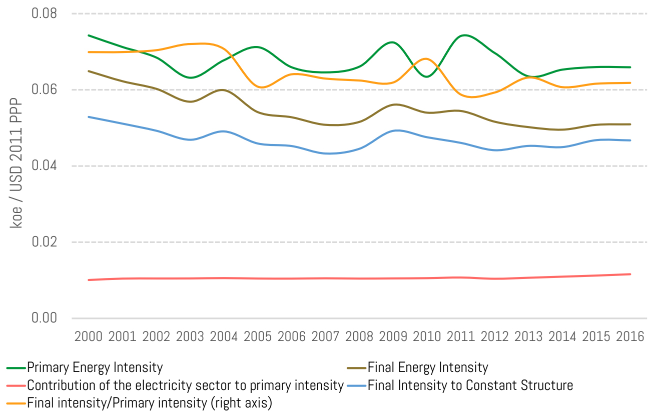

Other Sectors Final Consumption
2,000
1,500
1,000
500
0
ktoe
20%
10%
0%
-10%
-20%
-30%
Interannual variations rate
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Other energy sources (Includes coal coke and fuel oil)
Biomass
Kerosene / jet fuel
Gasoline / alcohol
Diesel oil
Coal
Liquefied petroleum gas
Natural gas
Electricity
Final consumption variation rate [%]


Residential Sector Final Consumption
4,000
3,000
2,000
1,000
0
ktoe
20%
10%
0%
-10%
Interannual variations rate
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Electricity
Natural gas
Liquefied petroleum gas
Coal and coke
Oil and derivatives
Biomass
Final consumption variation rate [%]
Household final consumption variation rate [%]

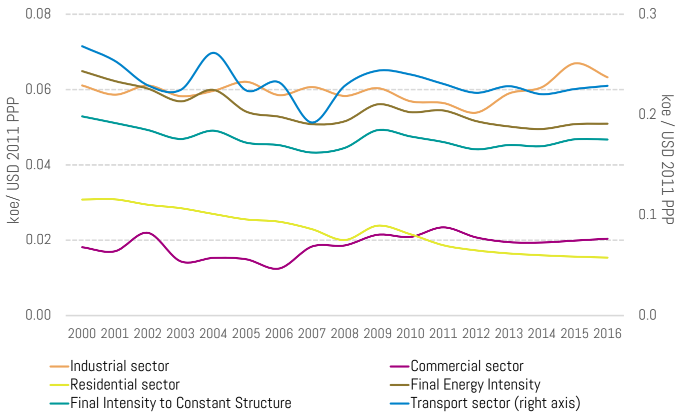
Final consumption per capita Residential Sector



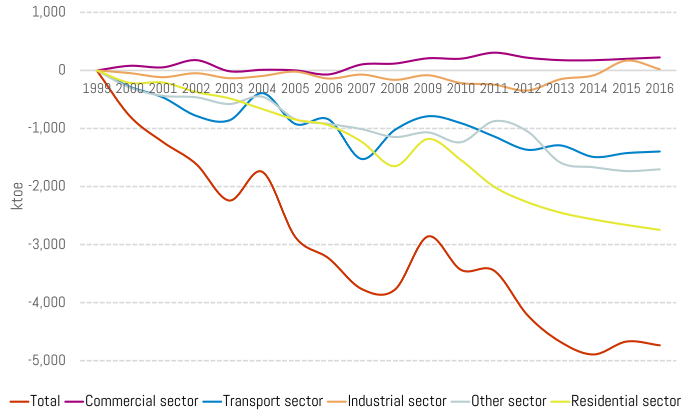
Energy intensities



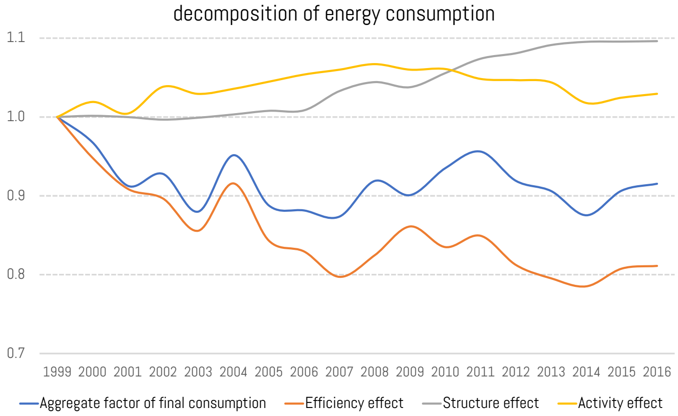
Sectorial energy intensities



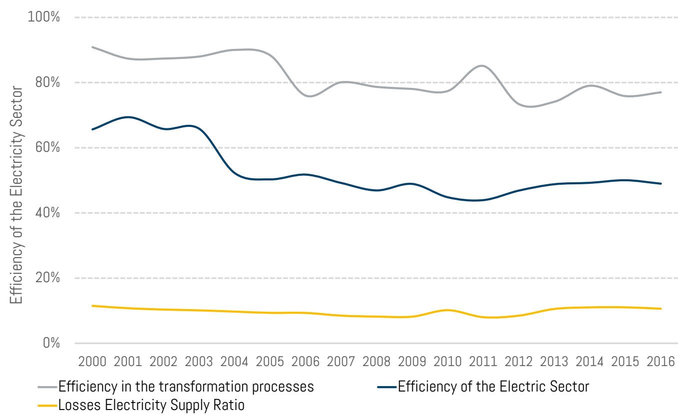
Avoided energy demand due to variations in energy intensity

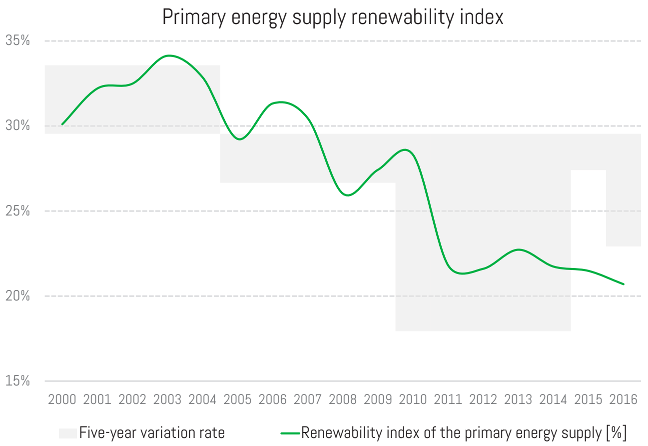


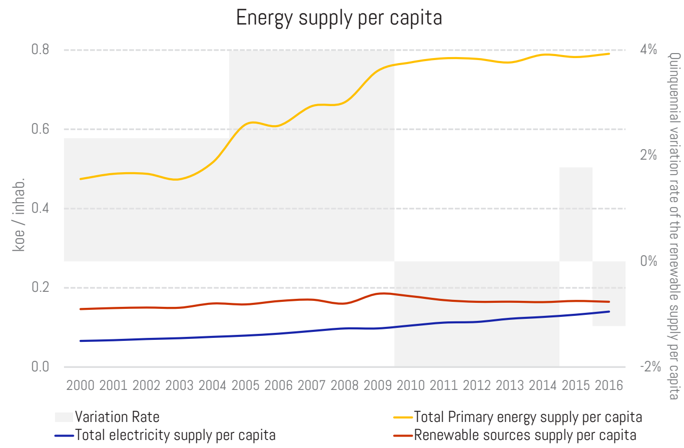
Logarithmic mean Divisia index for the structural decomposition of energy consumption

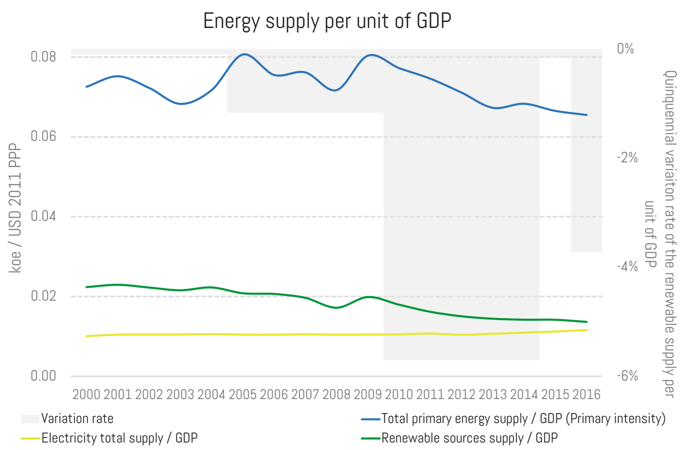


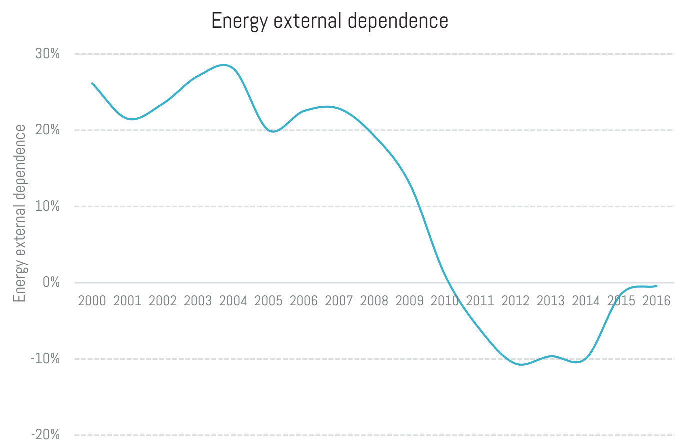
Efficiency of the Electricity Sector

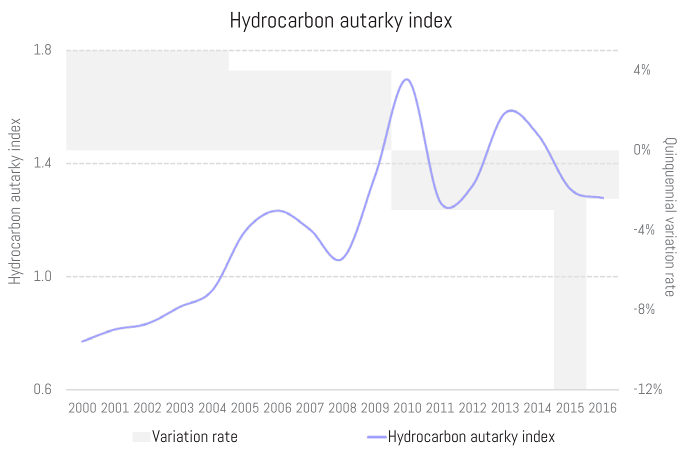


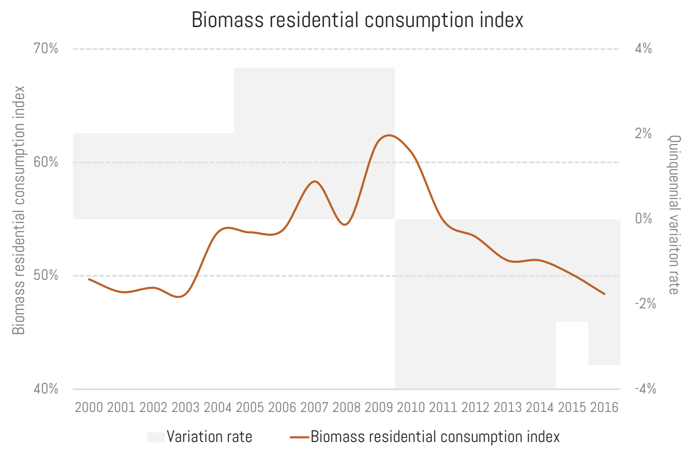

Primary energy supply renewability index
35%
30%
25%
20%
15%
2%
0%
-2%
-4%
-6%
-8%
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Five-year variation rate
Renewability index of the primary energy supply [%]


Energy supply per capita
koe / inhab.
0.8
0.6
0.4
0.2
0.0
4%
2%
0%
-2%
Quinquennial variation rate of the renewable supply per capita
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Variation Rate
Total Primary energy supply per capita
Total electricity supply per capita
Renewable sources supply per capita

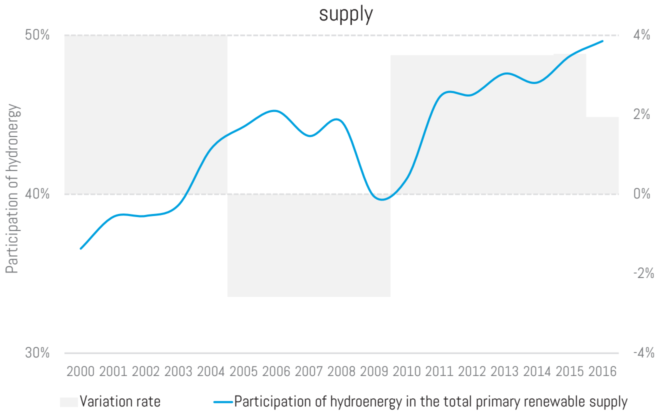

Energy supply per unit of GDP
koe / USD 2011 PPP
0.08
0.06
0.04
0.02
0.00
0%
-2%
-4%
-6%
Quinquennial variaton rate of the renewable supply per unit of GDP
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Variation rate
Total primary energy supply / GDP (Primary intensity)
Electricity total supply / GDP
Renewable sources supply / GDP


Energy external dependence
Energy external dependence
30%
20%
10%
0%
-10%
-20%
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016

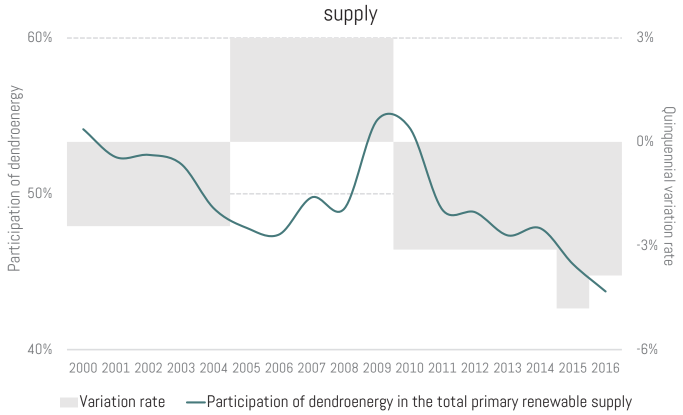

Hydrocarbon autarky index
Hydrocarbon autarky index
1.8
1.4
1.0
0.6
4%
0%
-4%
-8%
-12%
Quinquennial variaton rate
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Variation rate
Hydrocarbon autarky index


Biomass residential consumption index
Biomass residential consumption index
70%
60%
50%
40%
4%
2%
0%
-2%
-4%
Quinquennial variaton rate
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Variation rate
Biomass residential consumption index

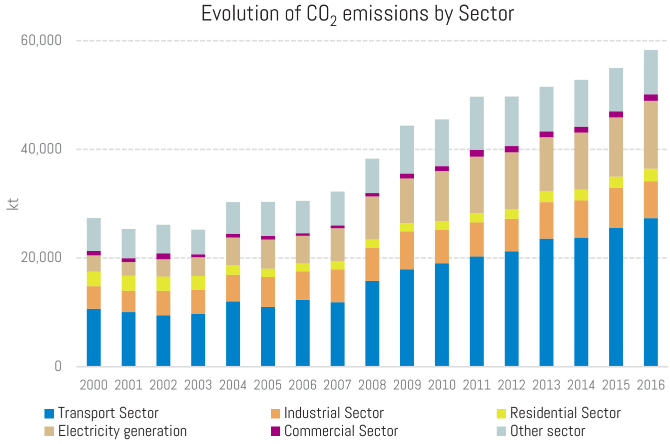
Participation of hydroenergy in the total primary renewable supply



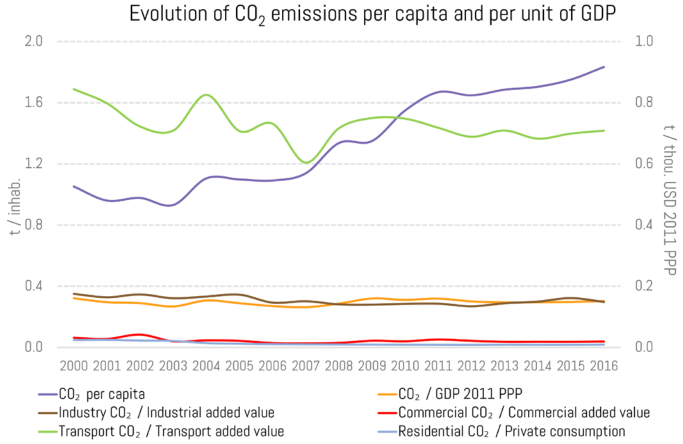
Participation of dendroenergy in the total primary renewable supply



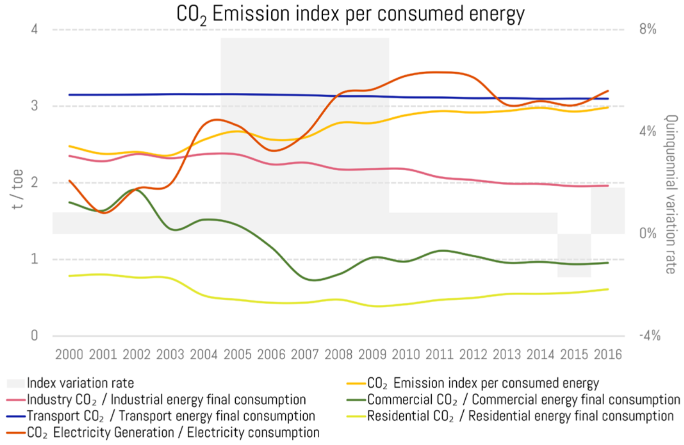
Evolution of CO_2 emissions by Sector



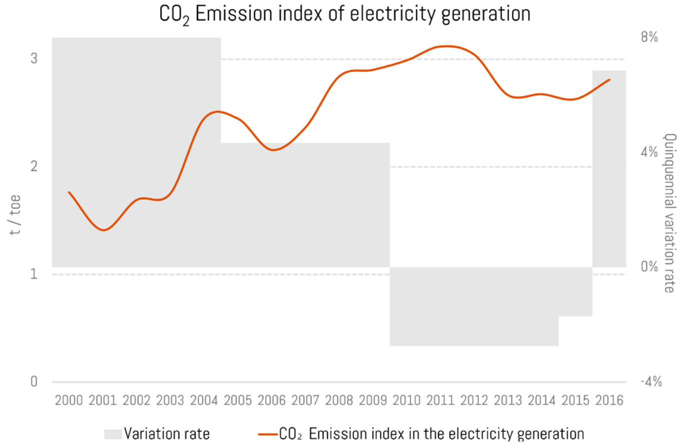
Evolution of CO_2 emissions per capita and per unit of GDP

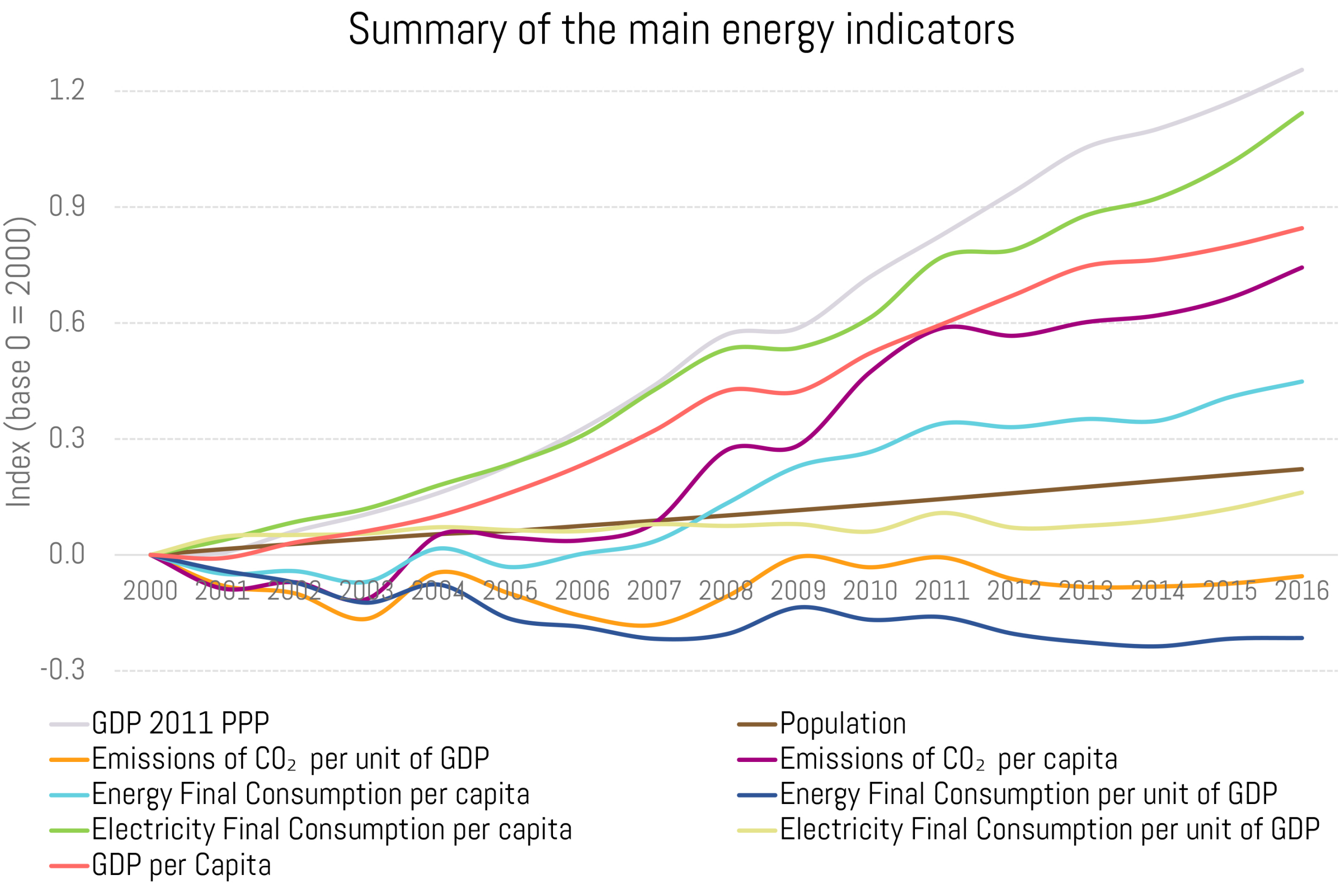


CO_2 Emission index per consumed energy



CO_2 Emission index of electricity generation

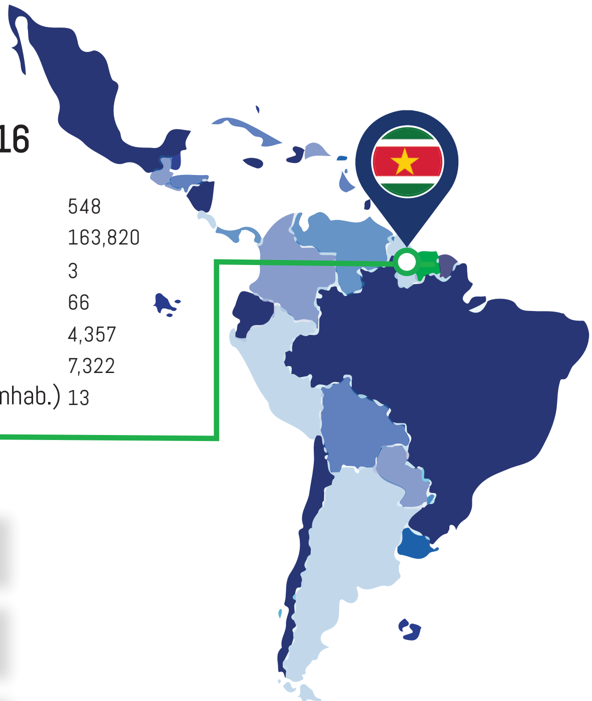




Summary of the main energy indicators
Index (base 0 = 2000)
1.2
0.9
0.6
0.3
0.0
-0.3
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
GDP 2011 PPP
Population
Emissions of CO_2 per unit of GDP
Emissions of CO_2 per capita
Energy Final Consumption per capita
Energy Final Consumption per unit of GDP
Electricity Final Consumption per capita
Electricity Final Consumption per unit of GDP
GDP per Capita

PERU

SURINAME



GENERAL INFORMATION 2016

Population (thousand inhab.)	548
Area (km^2)	163,820
Population Density (inhab./km^2)	3
Urban Population (%)	66
GDP USD 2010 (MUSD)	4,357
GDP USD 2011 PPP (MUSD)	7,322
GDP per capita (thou. USD 2011 PPP/inhab.)	13

ENERGY SECTOR

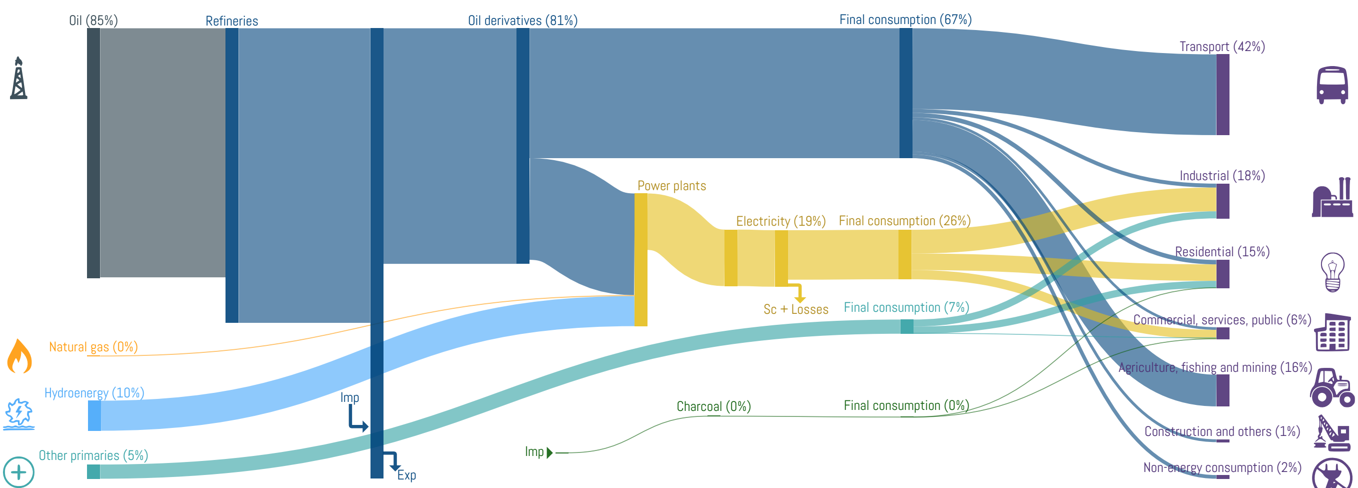
Final consumption in the Transport Sector	Mtoe 0.25
Final consumption in the Industrial Sector	Mtoe 0.11
Final consumption in the Residential Sector	Mtoe 0.09
Final consumption in the Commercial and Service Sector	Mtoe 0.04
Final consumption in the Agriculture, Livestock, Fishing, Mining, Other and Non - Energy Consumption	Mtoe 0.12

Oil Reserves	Natural gas reserves	Coal reserves
Mbbl 84	Gm^3 n.a.	Mt n.a.

[1] Data estimated by OLADE .
[2] 2015 Data.

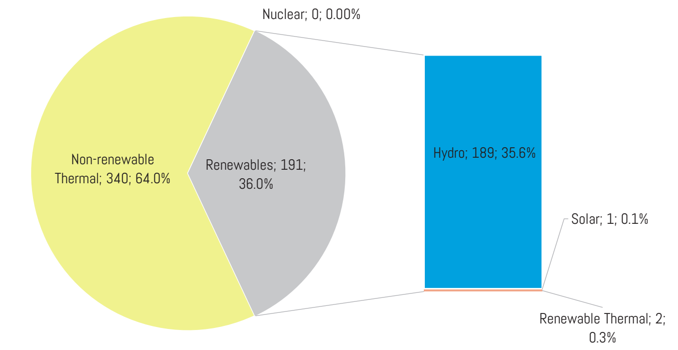
Indicator	Unit	Value
Electricity consumption per capita	kWh / inhab.	3,235
Final energy consumption per capita	toe / inhab.	1.09
Electrification rate	%	90.34 [2]
Total energy supply	Mtoe	0.71
Total energy production	Mtoe	0.92
Total energy imports	Mtoe	0.46
Total energy exports	Mtoe	0.66
Total final energy consumption	Mtoe	0.60
Refining capacity	kbbl/day	15
Installed power generation capacity	GW	0.53
Primary energy intensity and final energy intensity	koe / USD 2011 PPP	0.12 / 0.08

Summarized energy matrix 2016 *

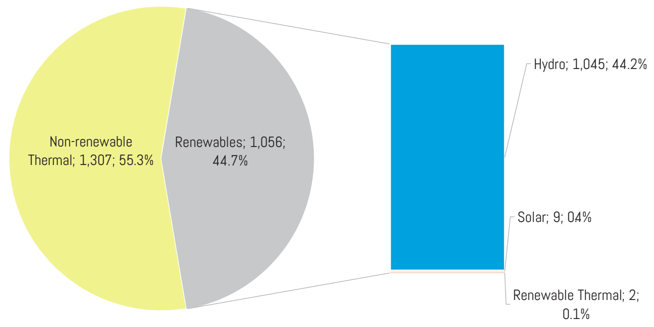


* Data estimated by OLADE

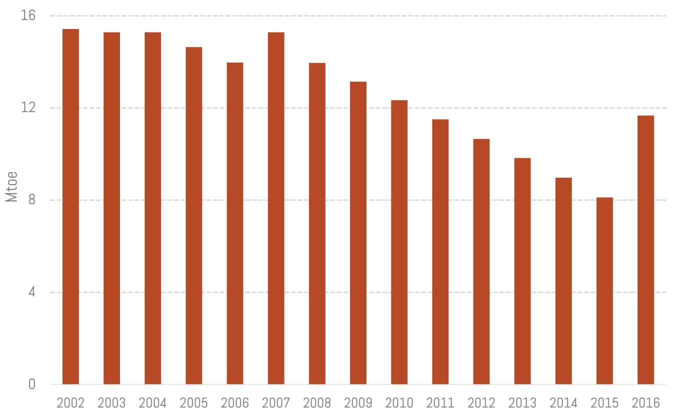
Installed power generation capacity [MW; %]
2016



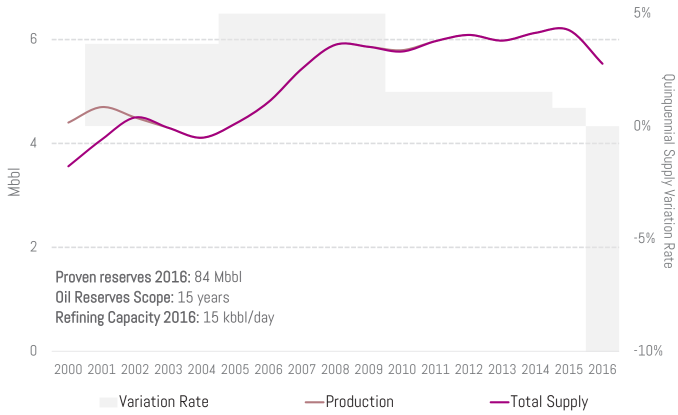
Electricity Generation by Source [GWh; %]
2016



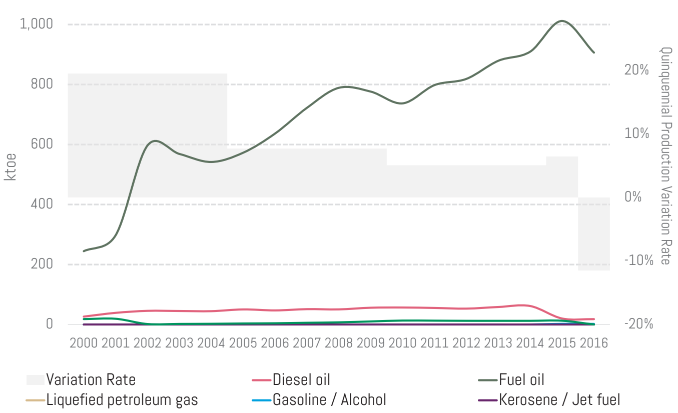
Proven reserves of oil



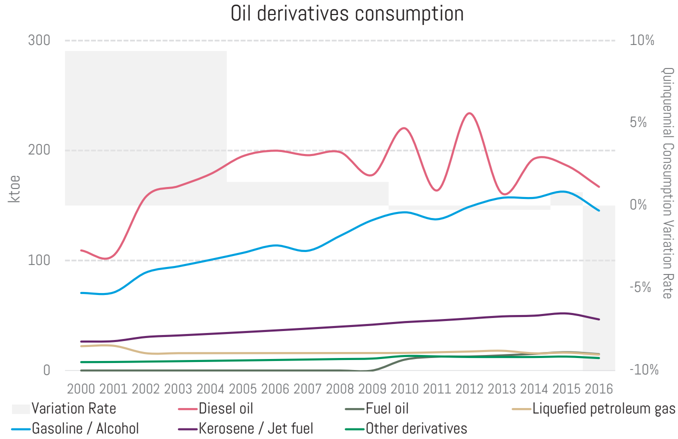
Oil Supply

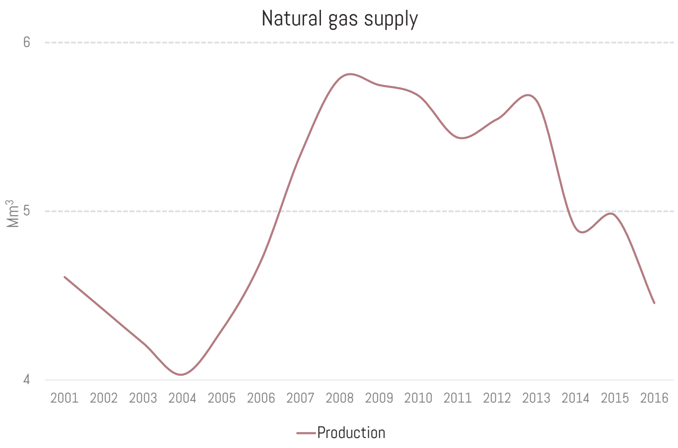


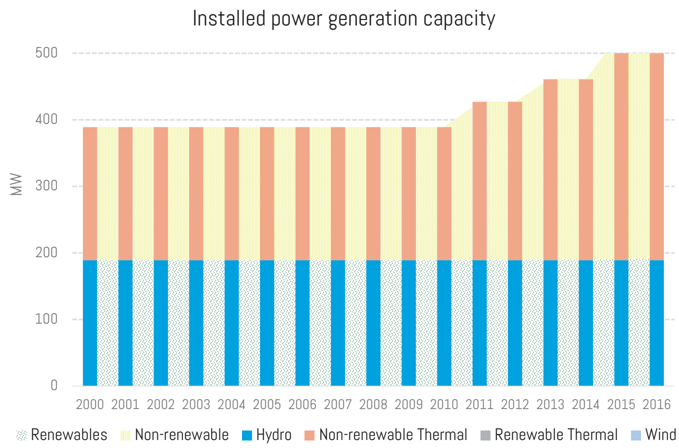
Oil derivatives production

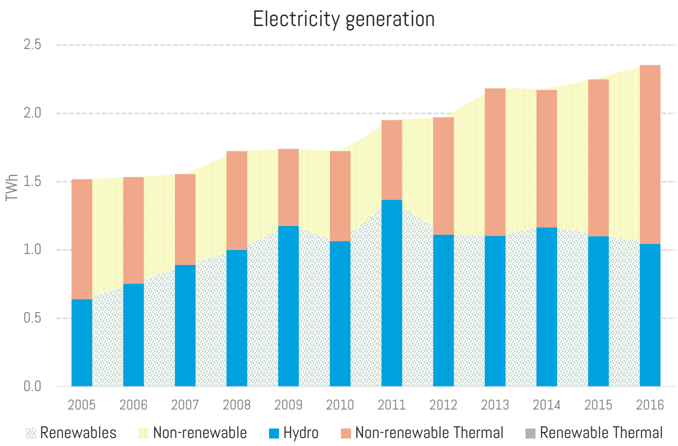


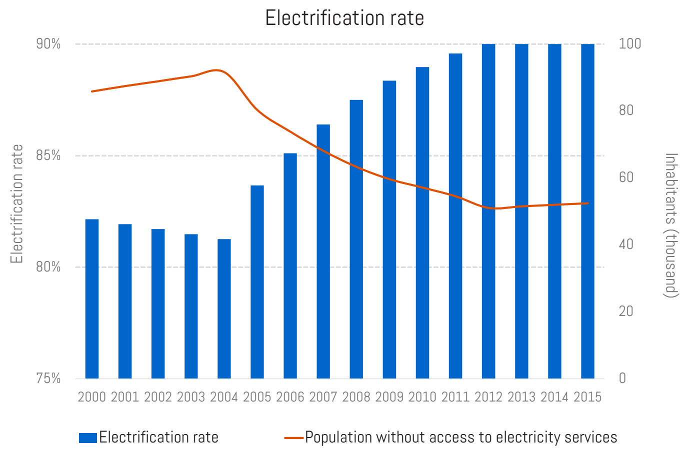
Oil derivatives consumption

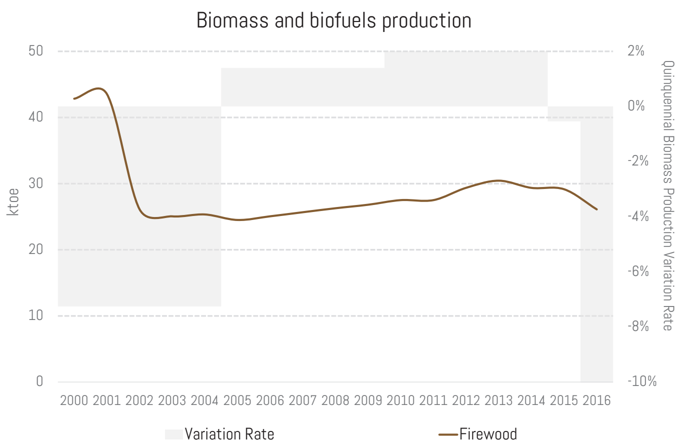


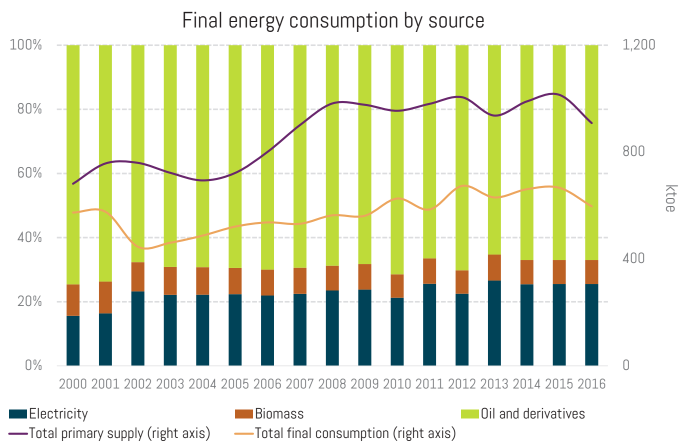

Natural gas supply
Mm3
6
5
4
2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Production


Installed power generation capacity
MW
500
400
300
200
100
0
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Renewables
Non-renewable
Hydro
Non-renewable Thermal
Renewable Thermal
Wind

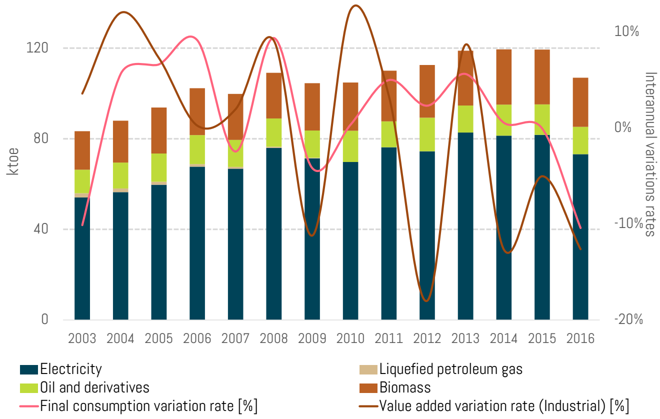

Electricity generation
TWh
2.5
2.0
1.5
1.0
0.5
0.0
2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Renewables
Non-renewable
Hydro
Non-renewable Thermal
Renewable Thermal


Electrification rate
Electrification rate
90%
85%
80%
75%
Inhabitants (thousand)
100
80
60
40
20
0
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015
Electrification rate
Population without access to electricity services

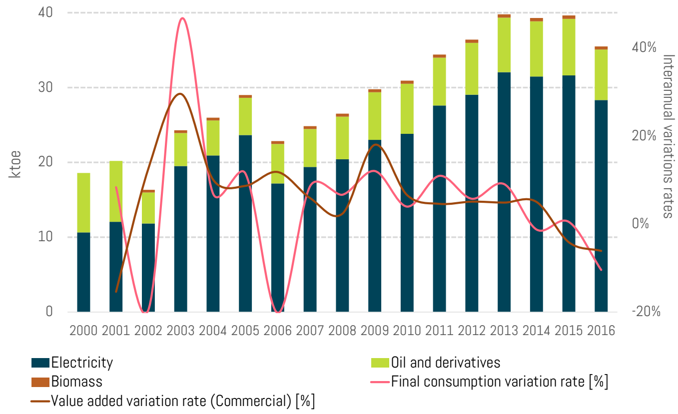

Biomass and biofuels production
ktoe
50
40
30
20
10
0
Quinquennial Biomass Production Variation Rate
2%
0%
-2%
-4%
-6%
-8%
-10%
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Variation Rate
Firewood


Final energy consumption by source
100%
80%
60%
40%
20%
0%
ktoe
1,200
800
400
0
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Electricity
Biomass
Oil and derivatives
Total primary supply (right axis)
Total final consumption (right axis)

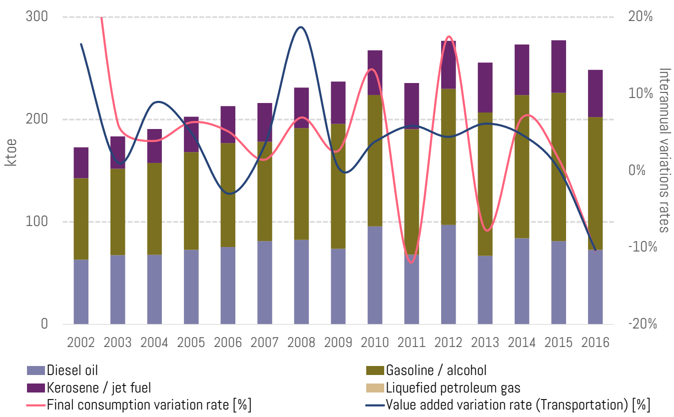
Industrial Sector Final Consumption



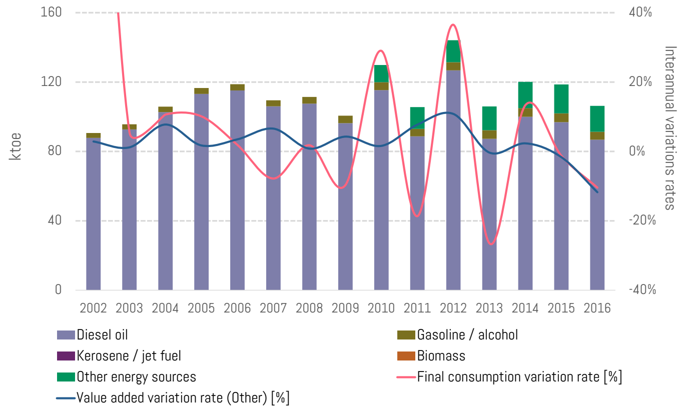
Commercial Sector Final Consumption



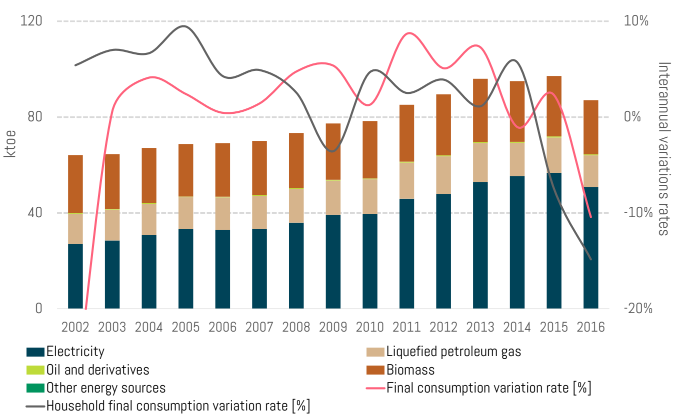
Transport Sector Final Consumption



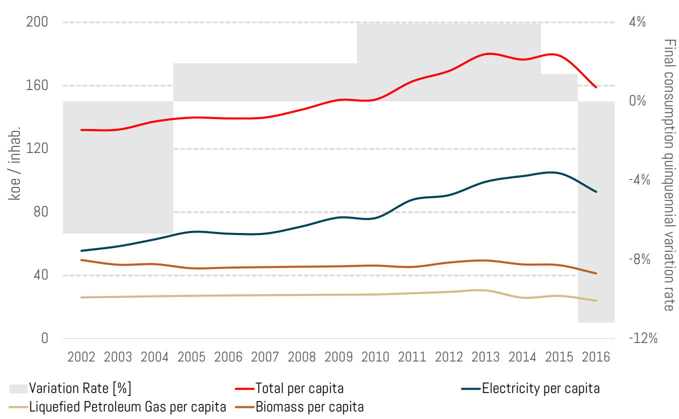
Other Sector Final Consumption

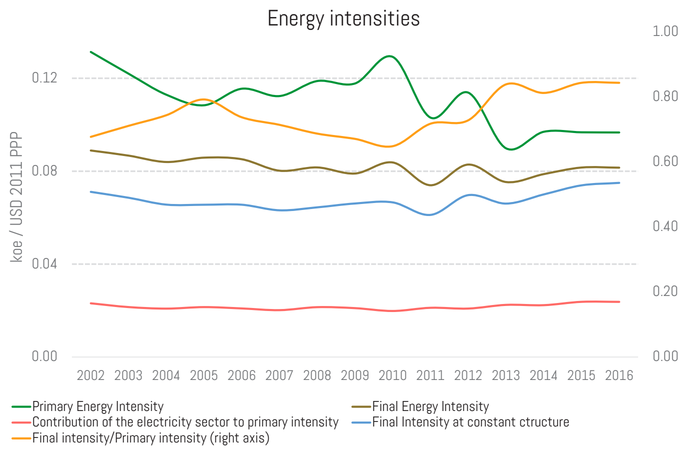


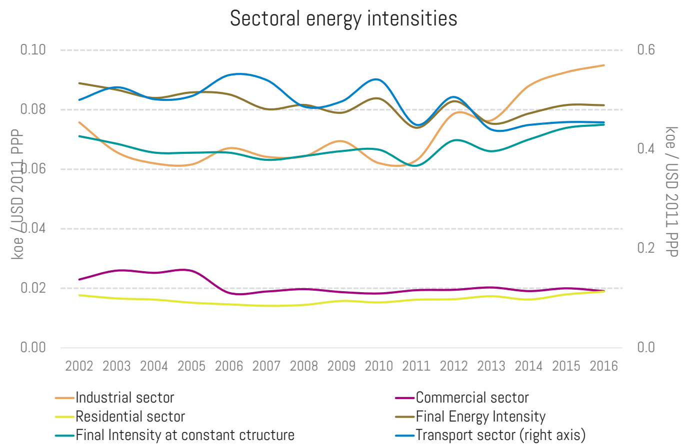
Residential Sector Final Consumption

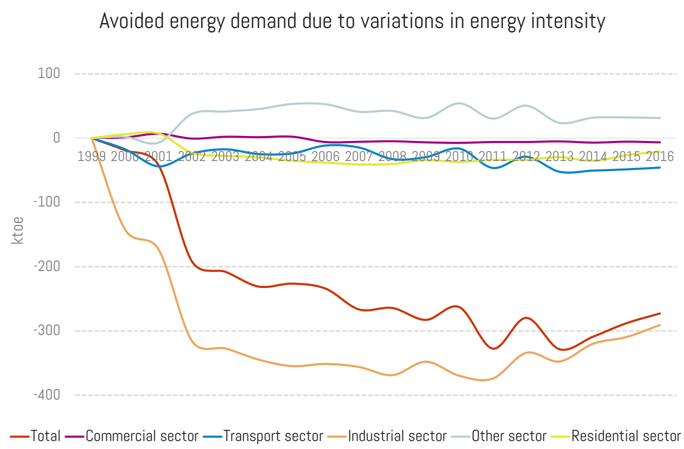


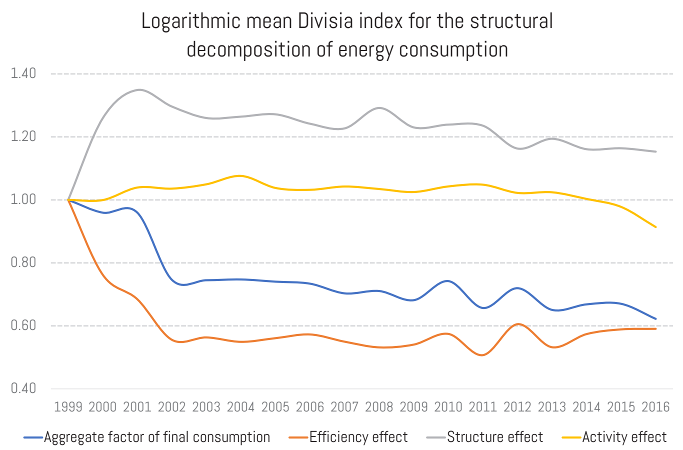
Final consumption per capita Residential Sector

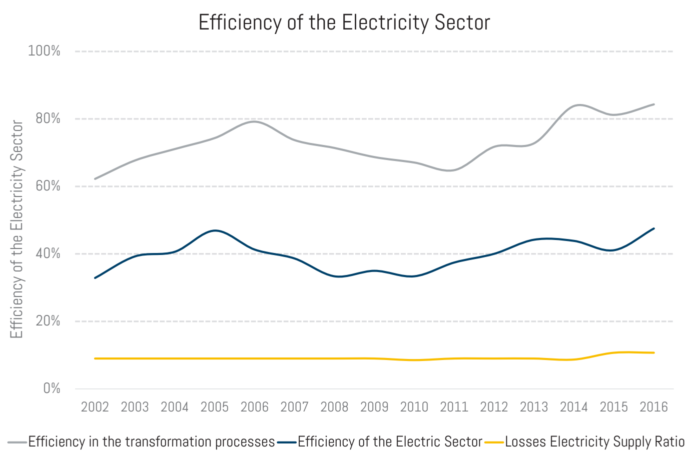


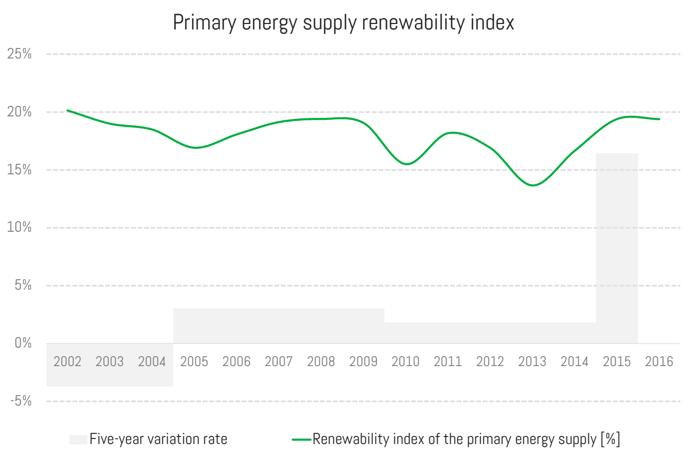

Energy intensities
koe / USD 2011 PPP
Primary Energy Intensity
Contribution of the electricity sector to primary intensity
Final intensity/Primary intensity (right axis)
Final Energy Intensity
Final Intensity at constant ctructure


Sectoral energy intensities
koe / USD 2011 PPP
Industrial sector
Residential sector
Final Intensity at constant ctructure
Commercial sector
Final Energy Intensity
Transport sector (right axis)

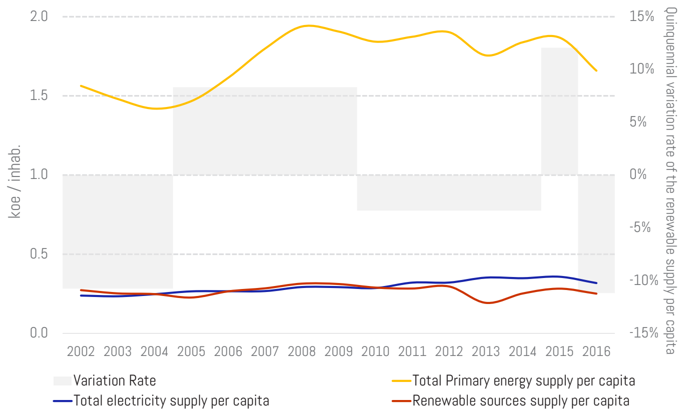

Avoided energy demand due to variations in energy intensity
ktoe
Total
Commercial sector
Transport sector
Industrial sector
Other sector
Residential sector


Logarithmic mean Divisia index for the structural decomposition of energy consumption
Aggregate factor of final consumption
Efficiency effect
Structure effect
Activity effect

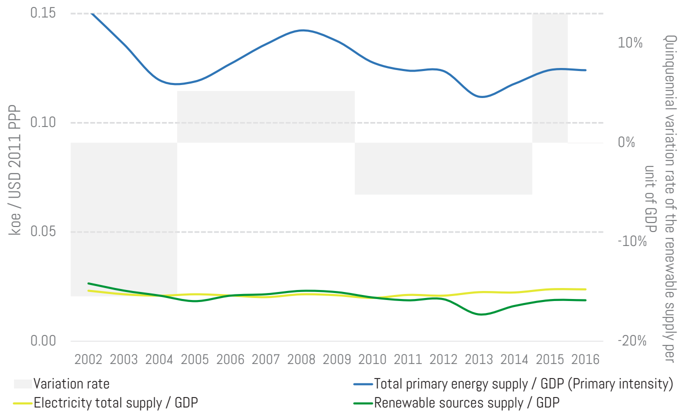

Efficiency of the Electricity Sector
Efficiency of the Electricity Sector
Efficiency in the transformation processes
Efficiency of the Electric Sector
Losses Electricity Supply Ratio


Primary energy supply renewability index
Five-year variation rate
Renewability index of the primary energy supply [%]

Energy supply per capita

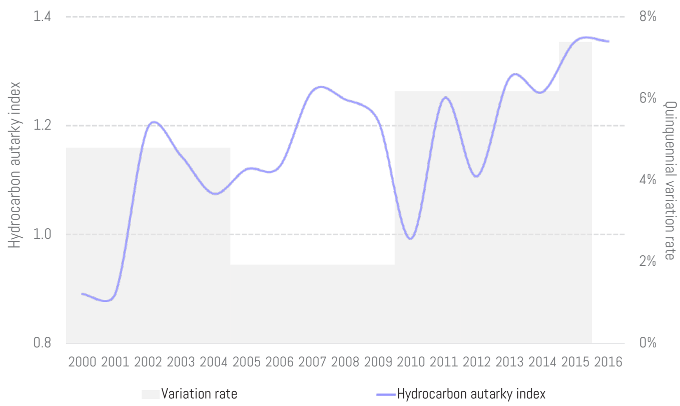


Energy supply per unit of GDP

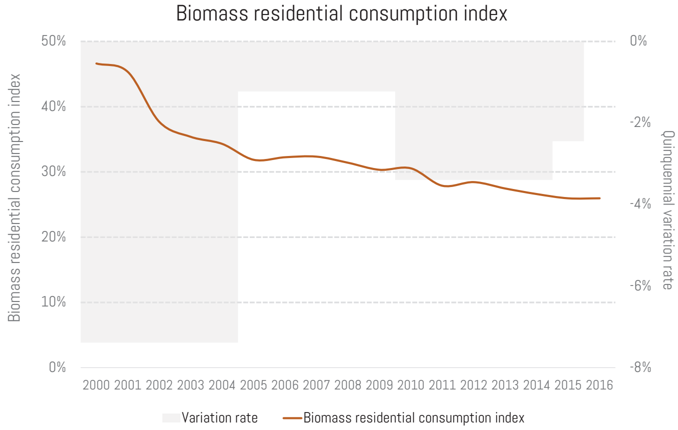


Energy external dependence

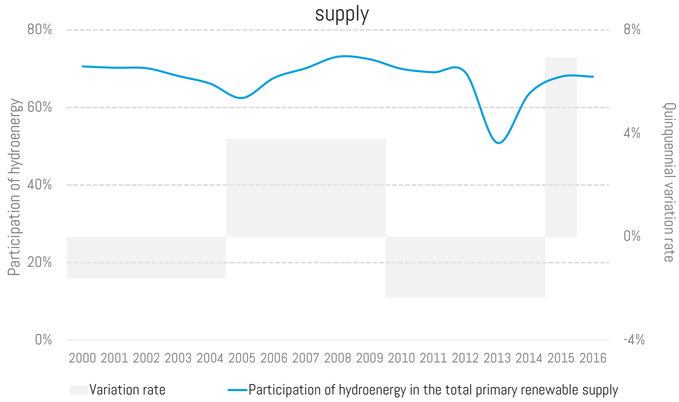
Hydrocarbon autarky index



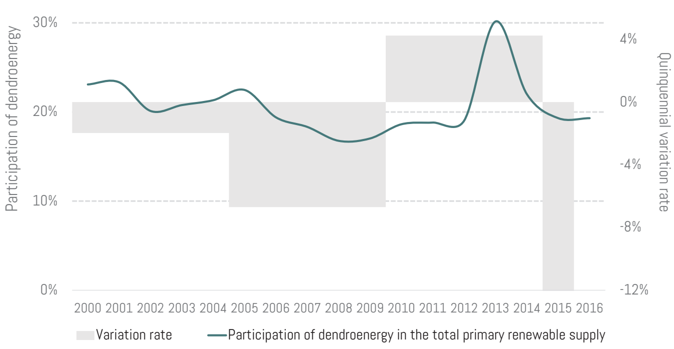
Biomass residential consumption index



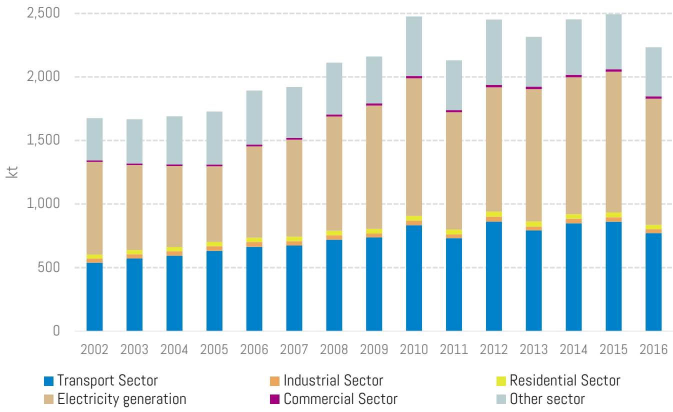
Participation of hydroenergy in the total primary renewable supply



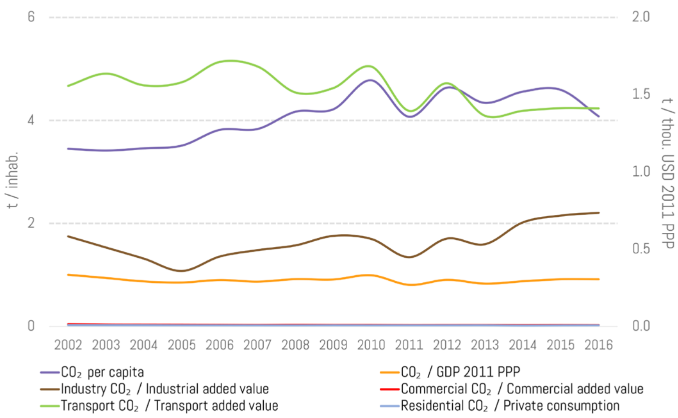
Participation of dendroenergy in the total primary renewable supply



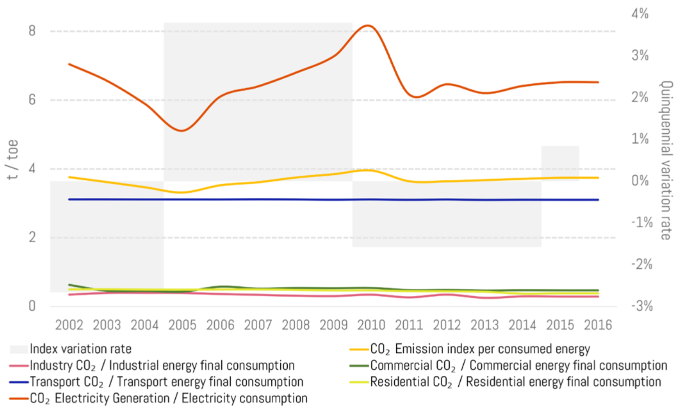
Evolution of CO_2 emissions by sector



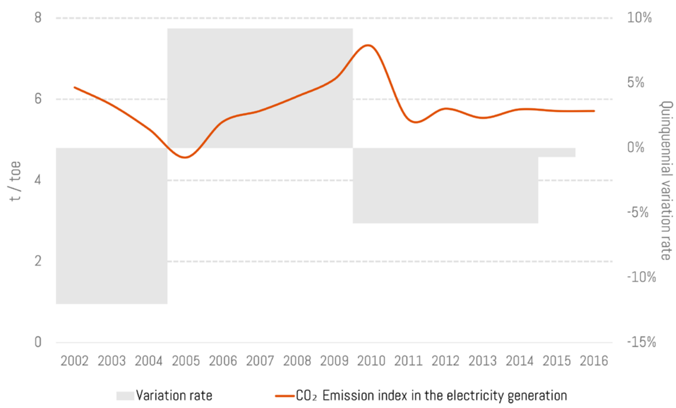
Evolution of CO_2 emissions per capita and per unit of GDP



CO_2 Emission index per consumed energy

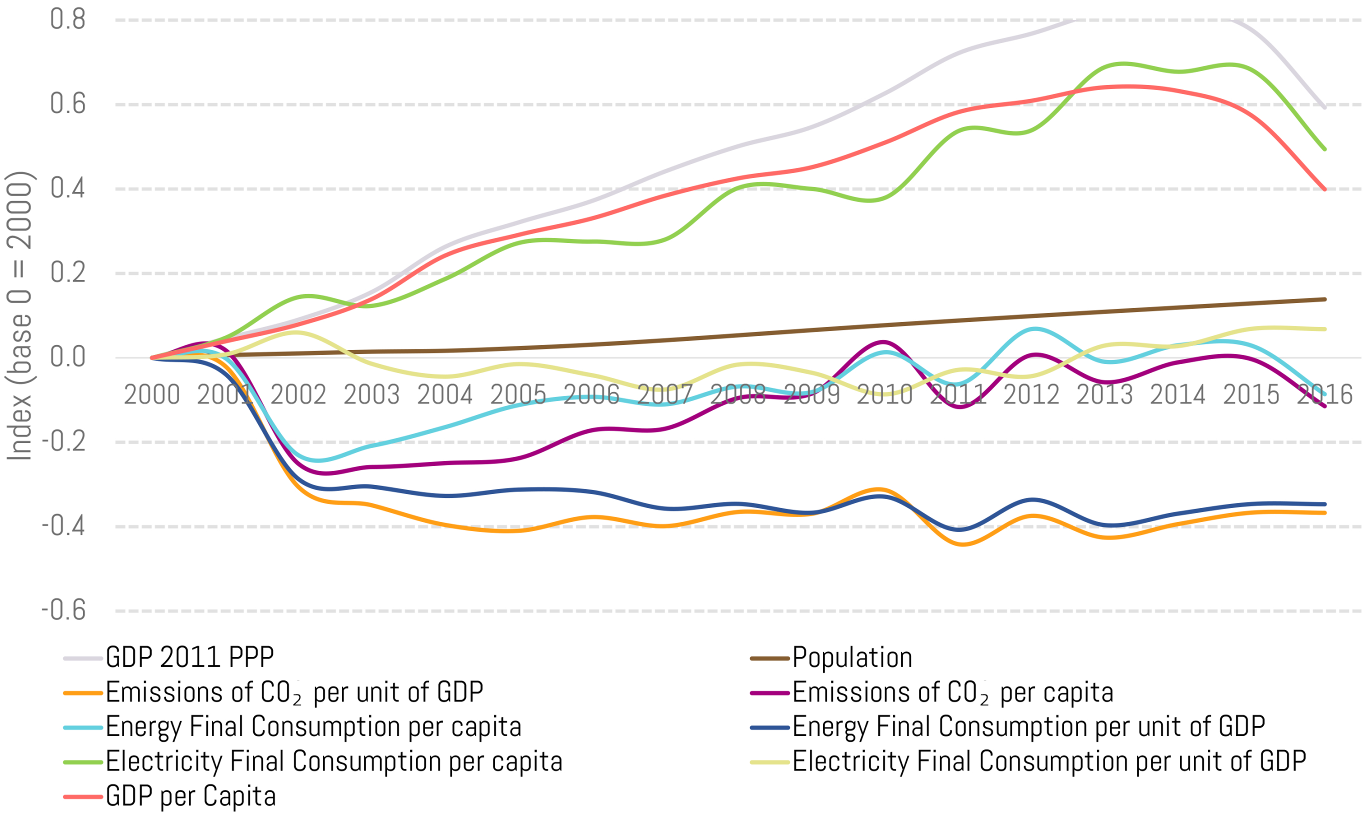


CO_2 Emission index of electricity generation



SURINAME

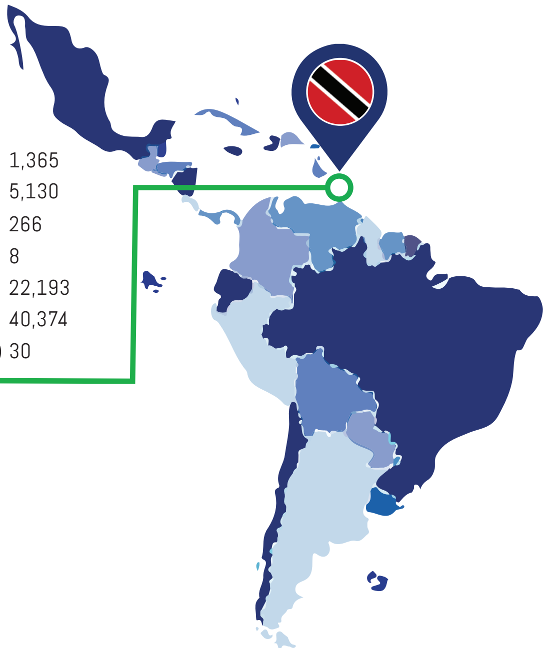
Summary of the main energy indicators



TRINIDAD & TOBAGO

GENERAL INFORMATION 2016

Population (thousand inhab.)	1,365
Area (km^2)	5,130
Population Density (inhab./km^2)	266
Urban Population (%)	8
GDP USD 2010 (MUSD)	22,193
GDP USD 2011 PPP (MUSD)	40,374
GDP per capita (thou. USD 2011 PPP/inhab.)	30



ENERGY SECTOR

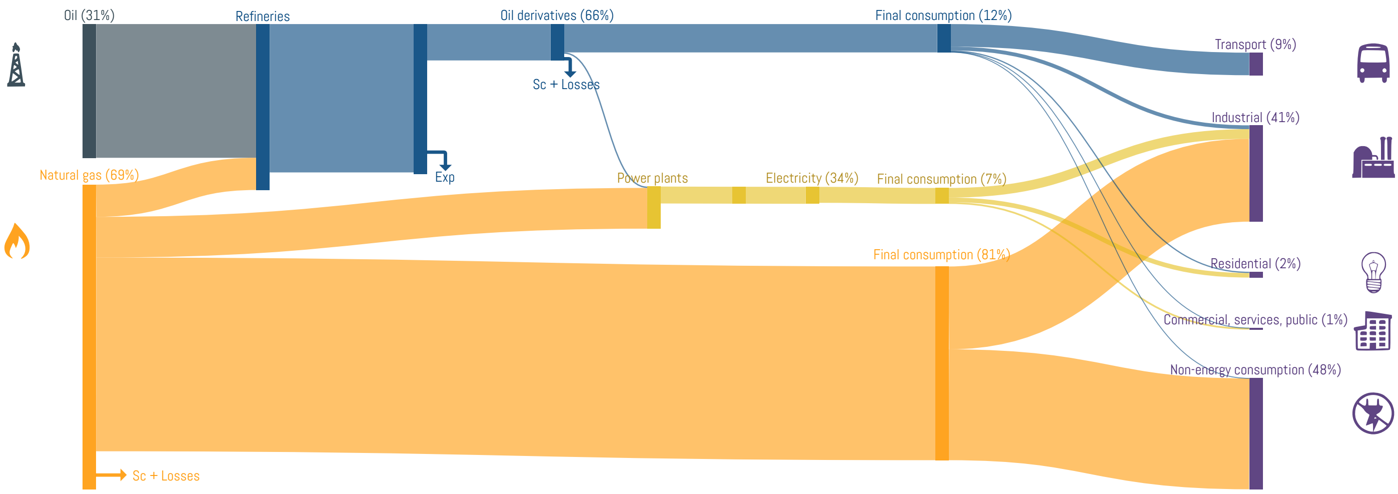
Final consumption in the Transport Sector	Mtoe 1.23
Final consumption in the Industrial Sector	Mtoe 5.24
Final consumption in the Residential Sector	Mtoe 0.32
Final consumption in the Commercial and Service Sector	Mtoe 0.11
Final consumption in the Agriculture, Livestock, Fishing, Mining, Other and Non - Energy Consumption	Mtoe 6.06

Oil Reserves	Natural gas reserves	Coal reserves
Mbbl 393	Gm^3 200	Mt n.a.

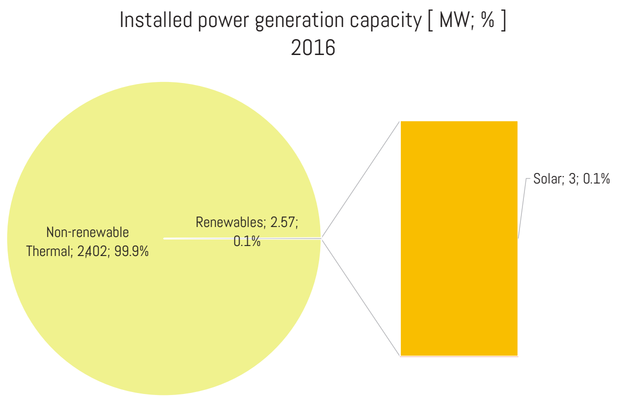
[1] Data estimated by OLADE.
[2] 2015 Data.

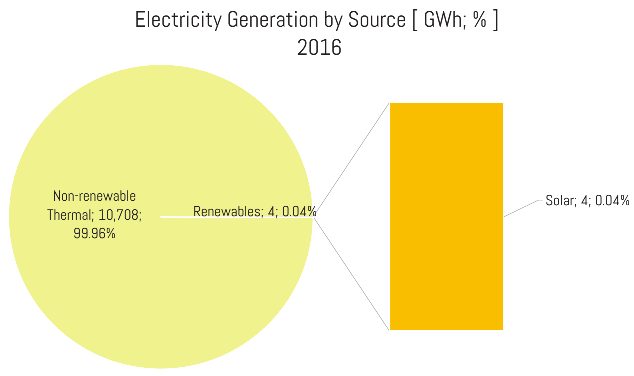
Indicator	Unit	Value
Electricity consumption per capita	kWh / inhab.	7,393
Final energy consumption per capita	toe / inhab.	9.49
Electrification rate	%	98 [2]
Total energy supply	Mtoe	17.58
Total energy production	Mtoe	32.22
Total energy imports	Mtoe	5.24
Total energy exports	Mtoe	19.69
Total final energy consumption	Mtoe	12.95
Refining capacity	kbbl/day	190
Installed power generation capacity	GW	2.40
Primary energy intensity and final energy intensity	koe / USD 2011 PPP	0.59 / 0.32

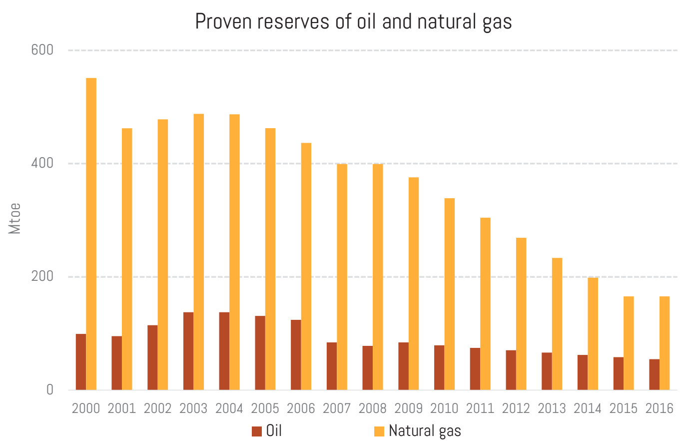
Summarized energy matrix 2016 *

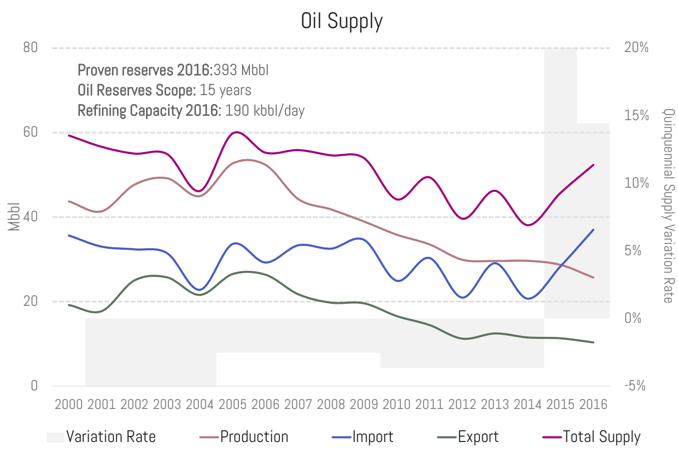


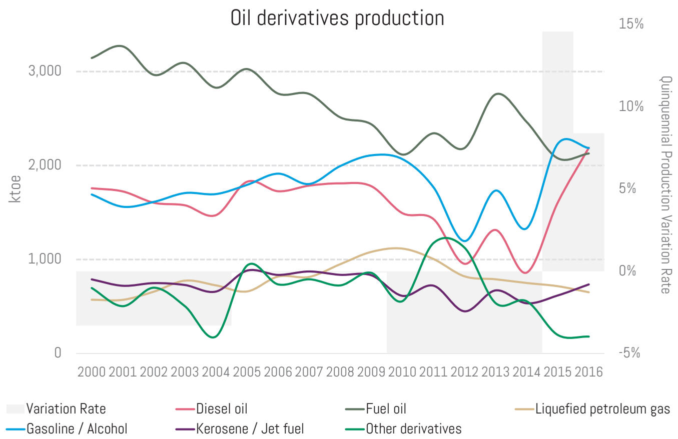
* Data estimated by OLADE

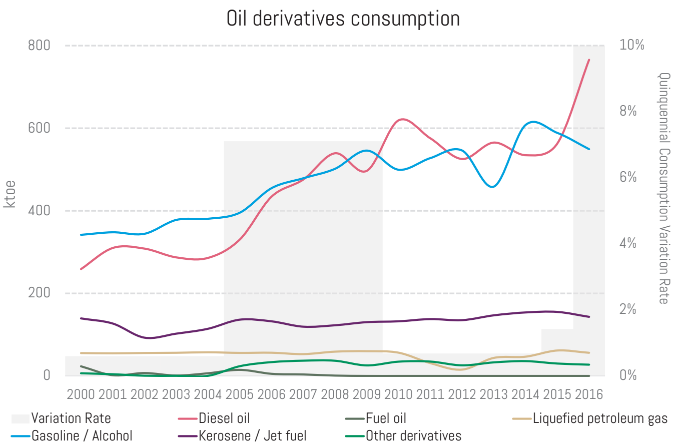

Installed power generation capacity [MW; %]
2016
Non-renewable Thermal; 2,402; 99.9%
Renewables; 2.57; 0.1%
Solar; 3; 0.1%

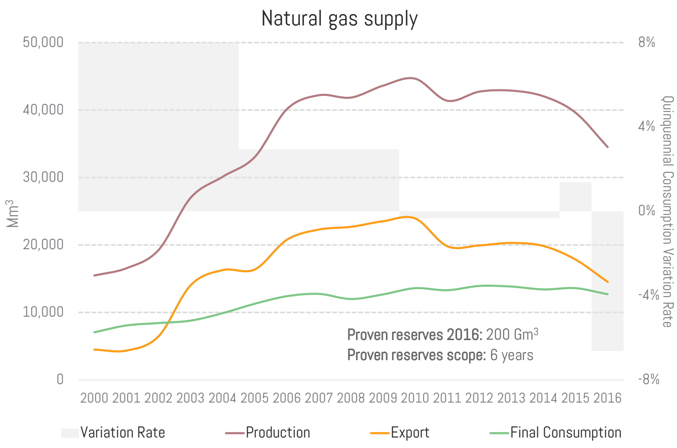

Electricity Generation by Source [GWh; %]
2016
Non-renewable Thermal; 10,708; 99.96%
Renewables; 4; 0.04%
Solar; 4; 0.04%

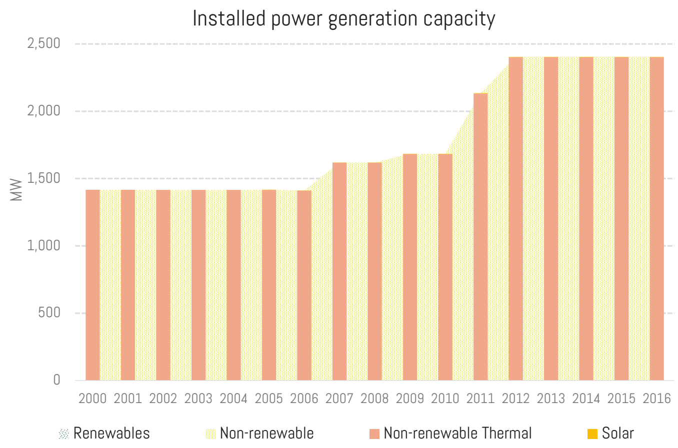

Proven reserves of oil and natural gas
Mtoe
0
200
400
600
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Oil
Natural gas

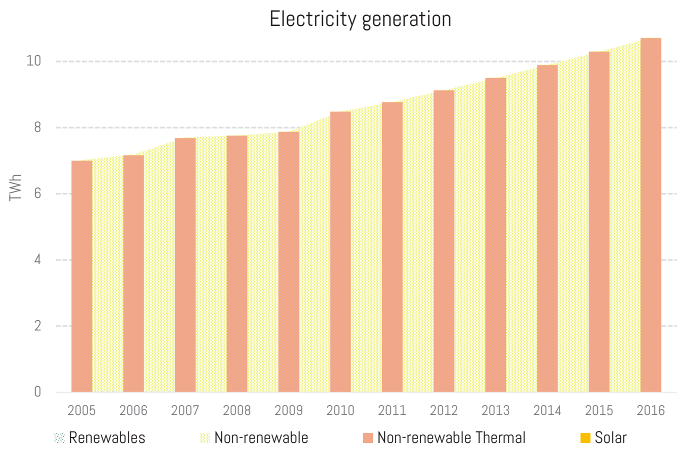

Oil Supply
Proven reserves 2016:393 Mbbl
Oil Reserves Scope: 15 years
Refining Capacity 2016: 190 kbbl/day
Mbbl
0
20
40
60
80
20%
15%
10%
5%
0%
-5%
Quinquennial Supply Variation Rate
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Variation Rate
Production
Import
Export
Total Supply

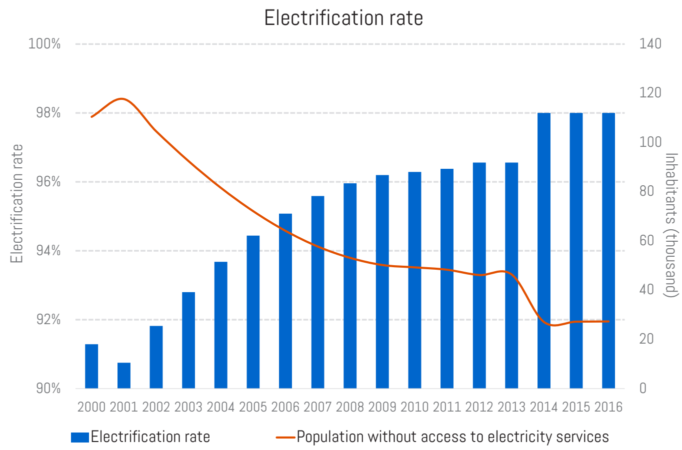

Oil derivatives production
ktoe
0
1,000
2,000
3,000
15%
10%
5%
0%
-5%
Quinquennial Production Variation Rate
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Variation Rate
Diesel oil
Fuel oil
Liquefied petroleum gas
Gasoline / Alcohol
Kerosene / Jet fuel
Other derivatives

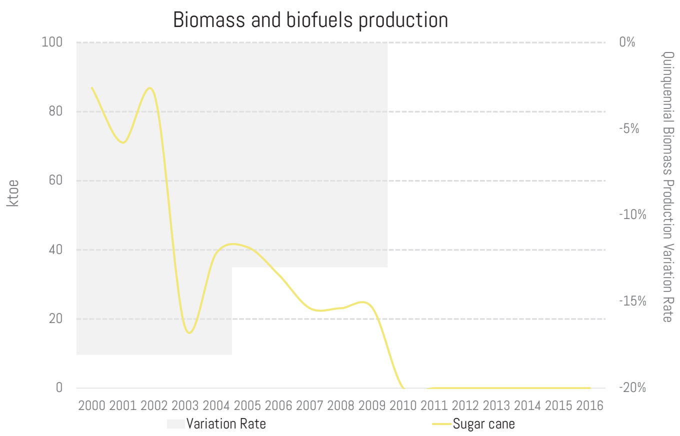

Oil derivatives consumption
ktoe
0
200
400
600
800
10%
8%
6%
4%
2%
0%
Quinquennial Consumption Variation Rate
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Variation Rate
Diesel oil
Fuel oil
Liquefied petroleum gas
Gasoline / Alcohol
Kerosene / Jet fuel
Other derivatives

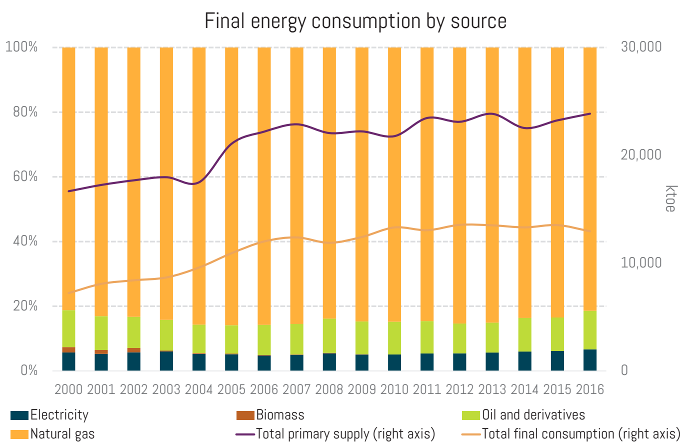

Natural gas supply
Mm3
Quinquennial Consumption Variation Rate
Proven reserves 2016: 200 Gm3
Proven reserves scope: 6 years
Variation Rate
Production
Export
Final Consumption


Installed power generation capacity
MW
Renewables
Non-renewable
Non-renewable Thermal
Solar

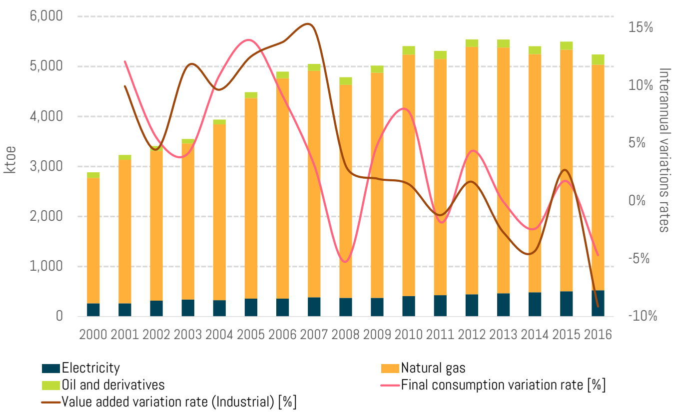

Electricity generation
TWh
Renewables
Non-renewable
Non-renewable Thermal
Solar


Electrification rate
Electrification rate
Inhabitants (thousand)
Electrification rate
Population without access to electricity services

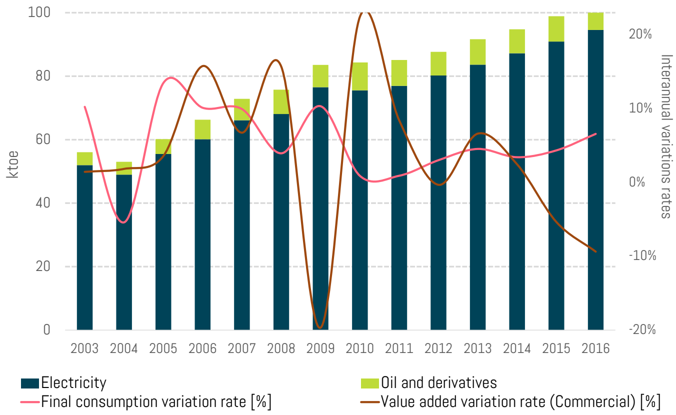

Biomass and biofuels production
ktoe
Quinquennial Biomass Producton Variation Rate
Variation Rate
Sugar cane


Final energy consumption by source
ktoe
Electricity
Biomass
Oil and derivatives
Natural gas
Total primary supply (right axis)
Total final consumption (right axis)

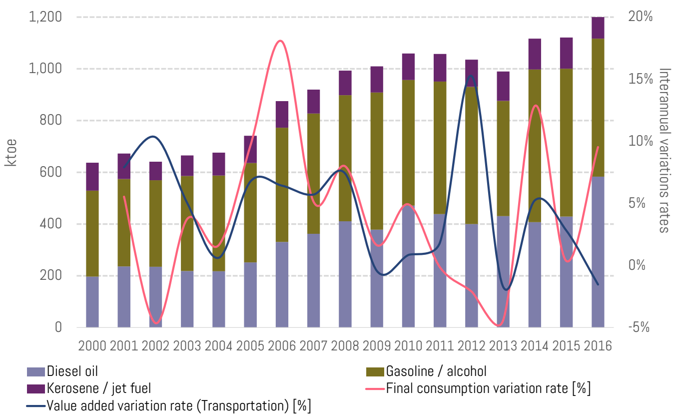
Industrial Sector Final Consumption



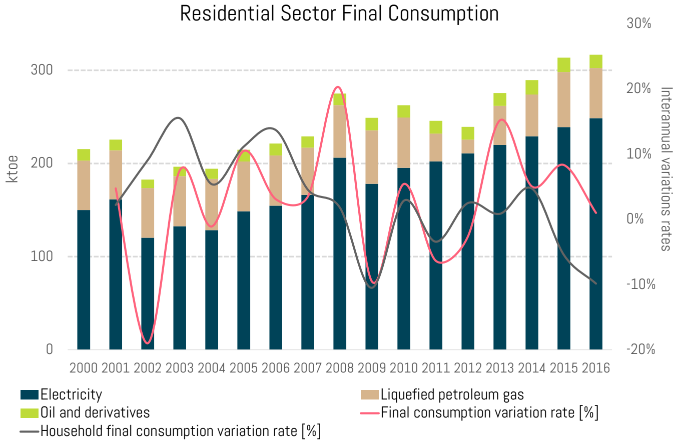
Commercial Sector Final Consumption



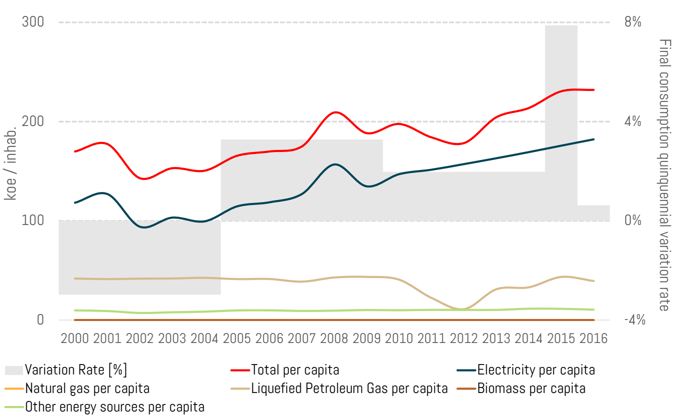
Transport Sector Final Consumption



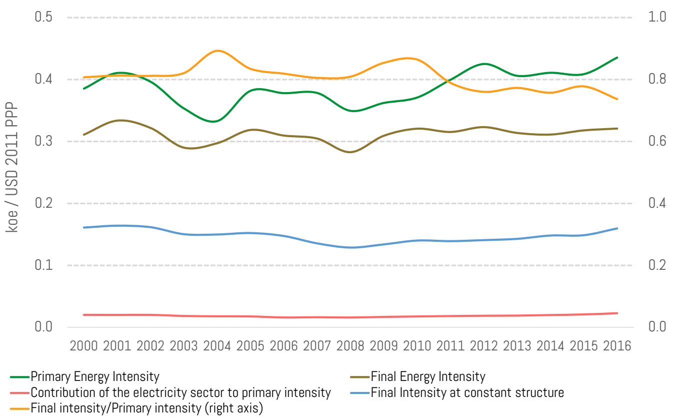
Residential Sector Final Consumption



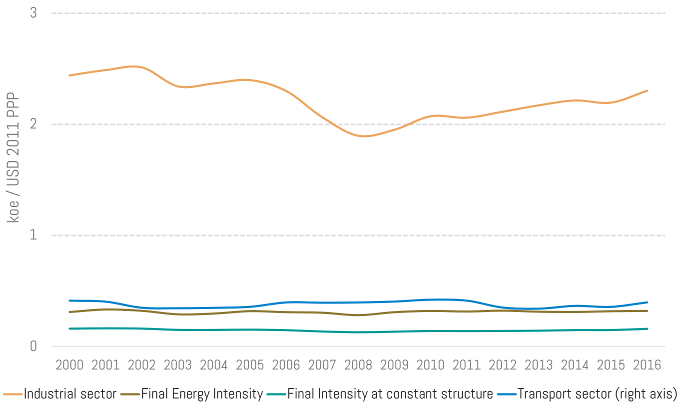
Final consumption per capita Residential Sector



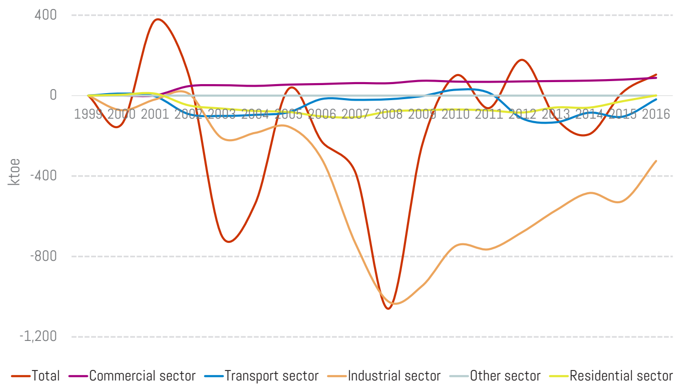
Energy intensities



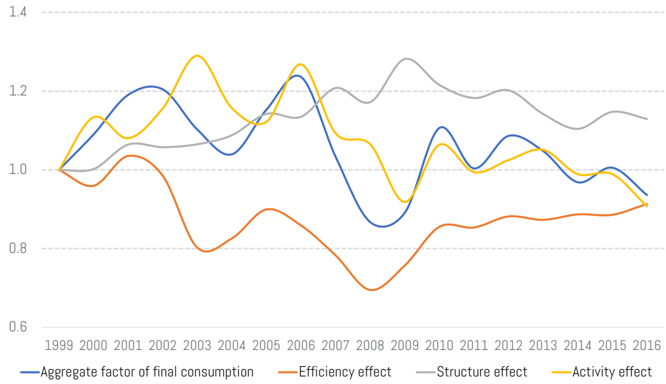
Sectoral energy intensities



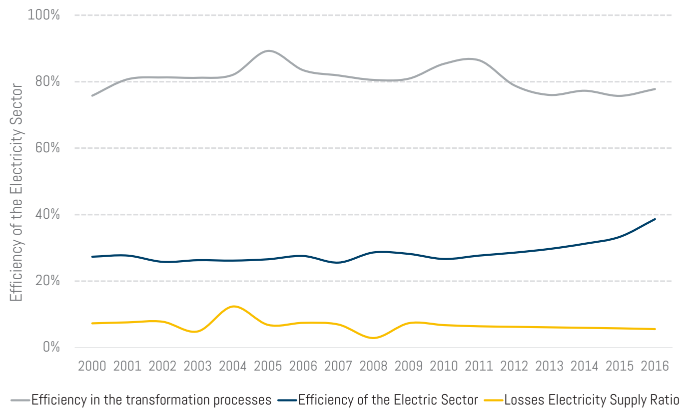
Avoided energy demand due to variations in energy intensity



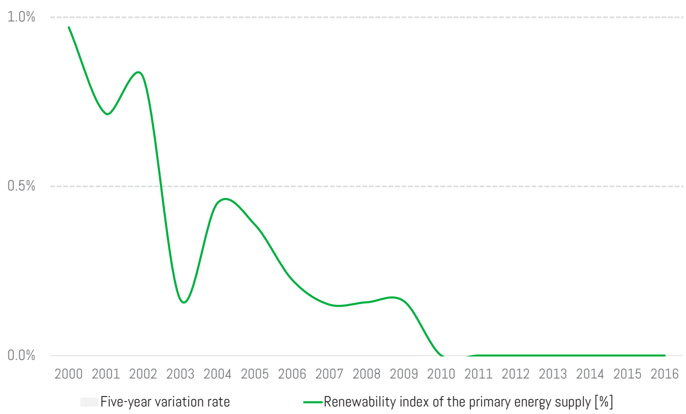
Logarithmic mean Divisia index for the structural decomposition of energy consumption



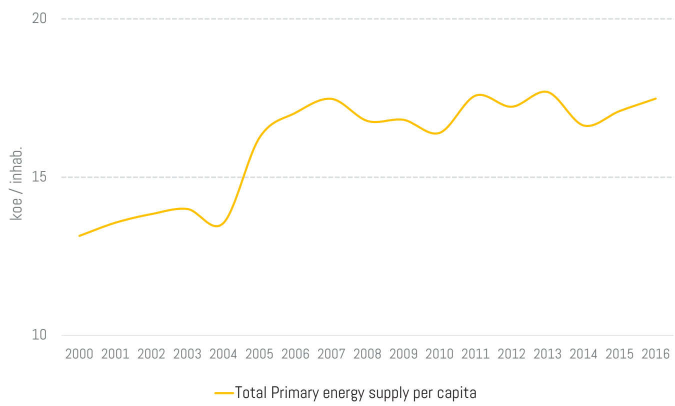
Efficiency of the Electricity Sector



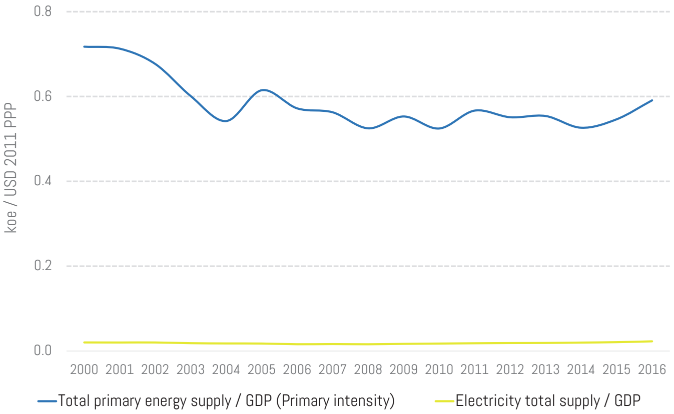
Primary energy supply renewability index



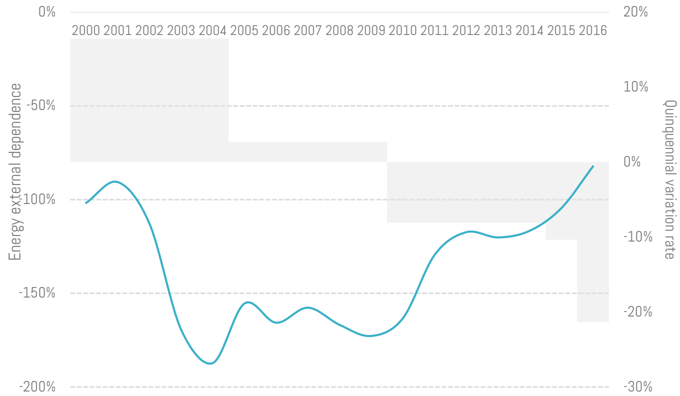
Energy supply per capita



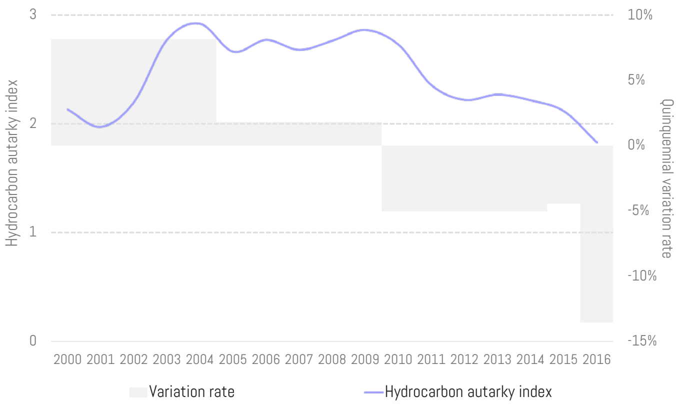
Energy supply per unit of GDP



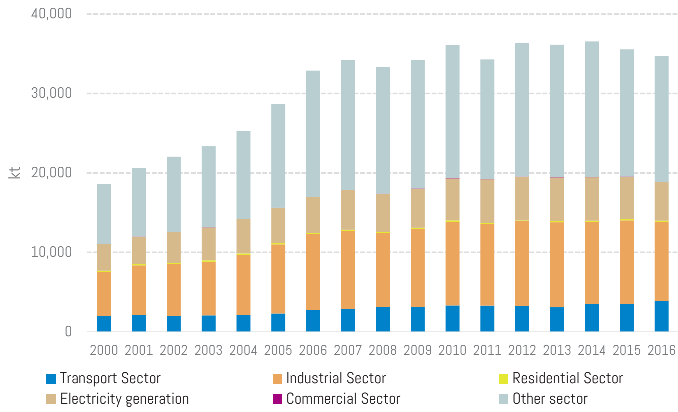
Energy external dependence



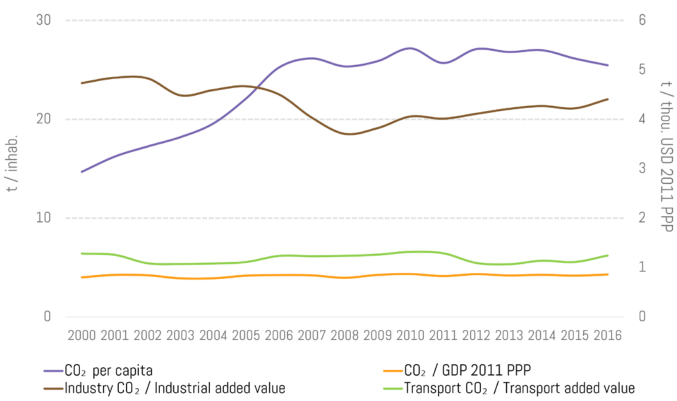
Hydrocarbon autarky index



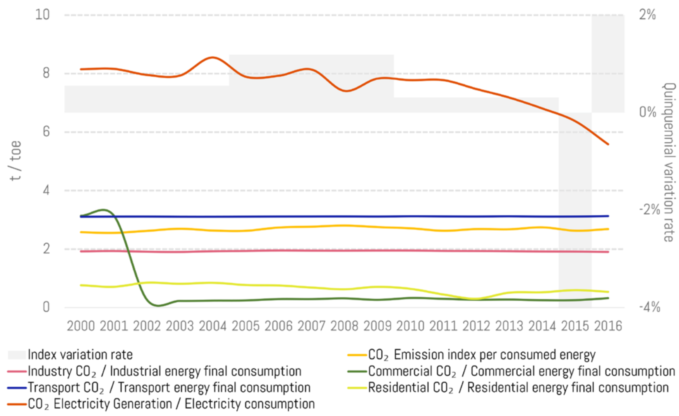
Evolution of CO_2 emissions by sector

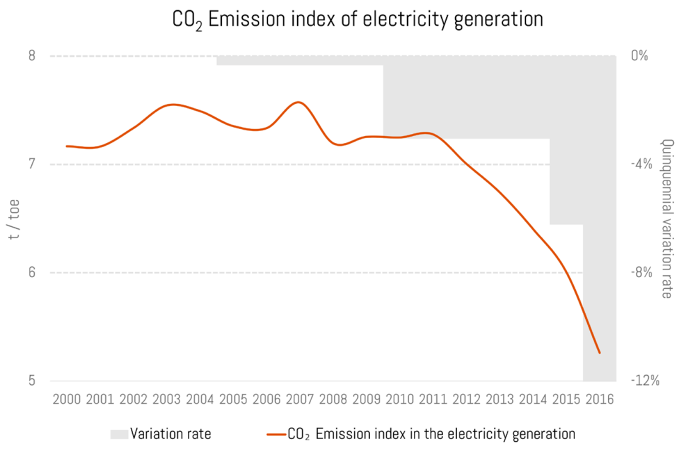


Evolution of CO_2 emissions per capita and per unit of GDP

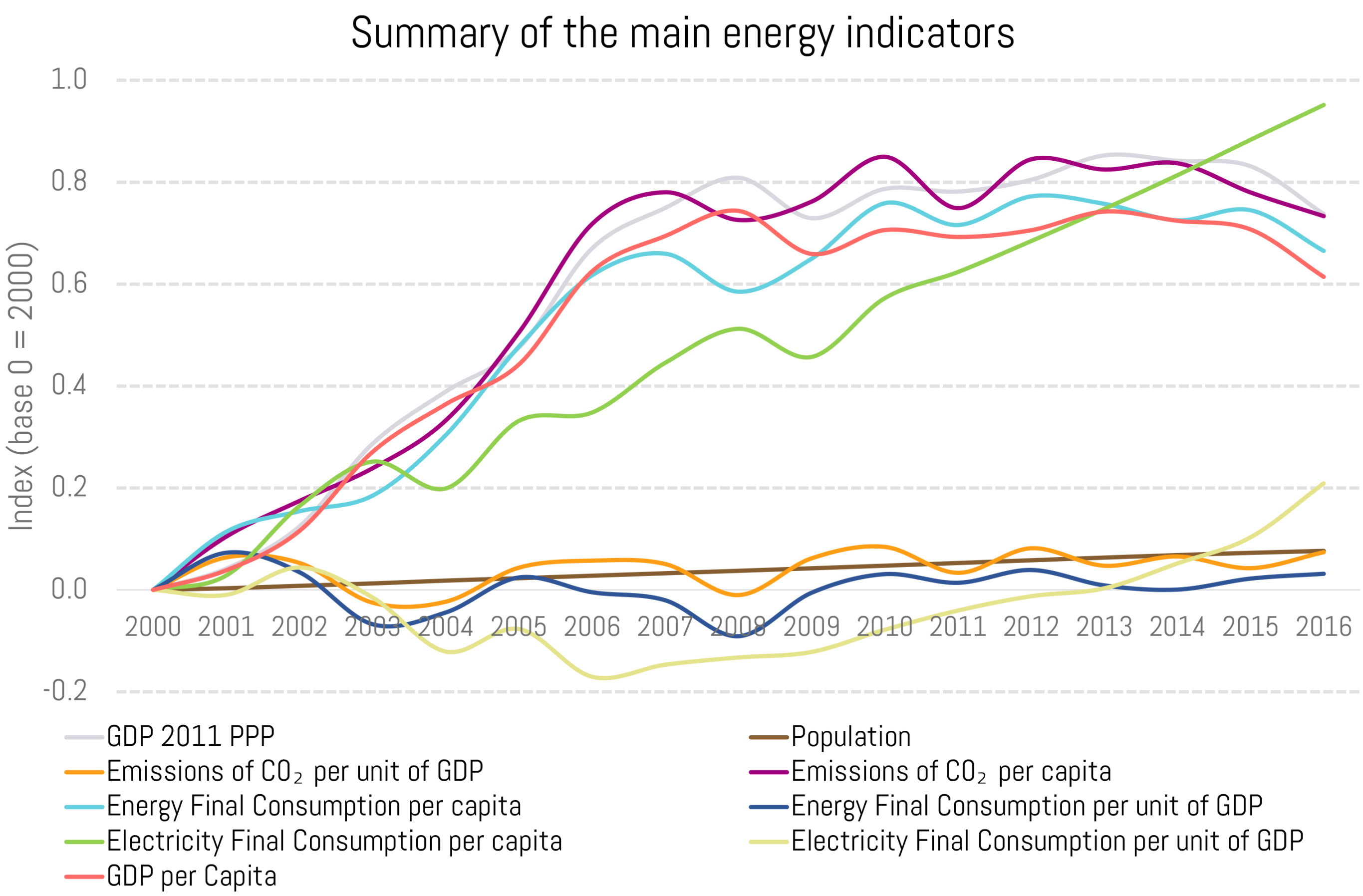


CO_2 Emission index per consumed energy





CO2 Emission index of electricity generation
t / toe
Quinquennial variation rate
8
7
6
5
0%
-4%
-8%
-12%
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Variation rate
CO2 Emission index in the electricity generation

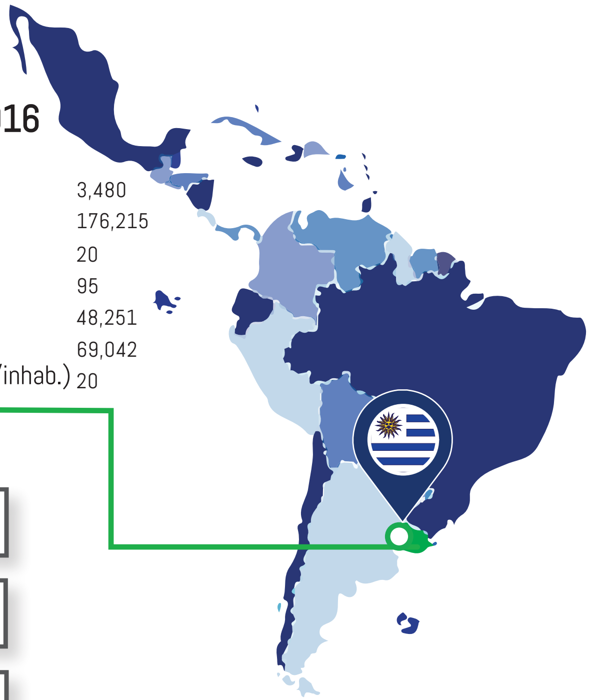


Summary of the main energy indicators
Index (base 0 = 2000)
1.0
0.8
0.6
0.4
0.2
0.0
-0.2
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
GDP 2011 PPP
Population
Emissions of CO2 per unit of GDP
Emissions of CO2 per capita
Energy Final Consumption per capita
Energy Final Consumption per unit of GDP
Electricity Final Consumption per capita
Electricity Final Consumption per unit of GDP
GDP per Capita

URUGUAY

GENERAL INFORMATION 2016

Population (thousand inhab.)	3,480
Area (km²)	176,215
Population Density (inhab./km²)	20
Urban Population (%)	95
GDP USD 2010 (MUSD)	48,251
GDP USD 2011 PPP (MUSD)	69,042
GDP per capita (thou. USD 2011 PPP/inhab.)	20



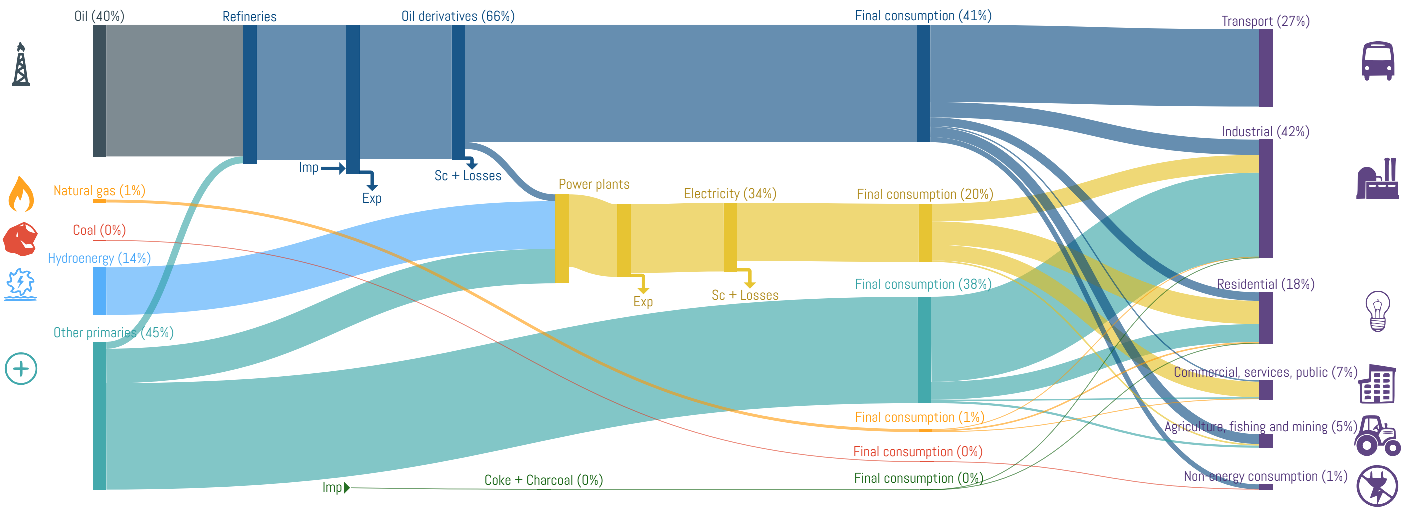
ENERGY SECTOR

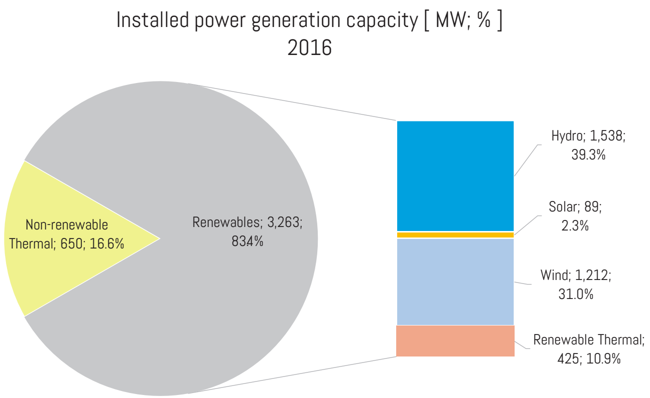
Sector	Mtoe
Final consumption in the Transport Sector	1.27
Final consumption in the Industrial Sector	1.95
Final consumption in the Residential Sector	0.84
Final consumption in the Commercial and Service Sector	0.31
Final consumption in the Agriculture, Livestock, Fishing, Mining, Other and Non - Energy Consumption	0.31

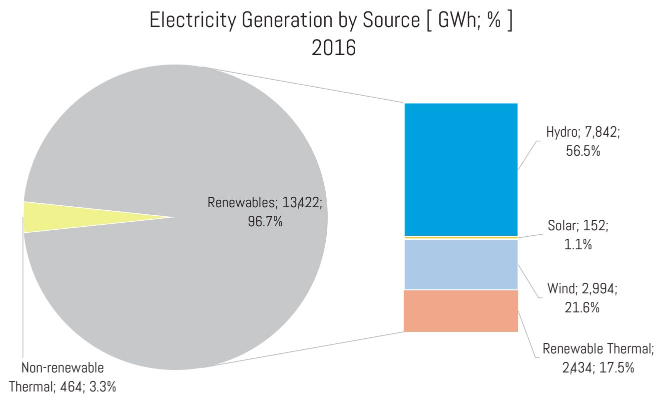
Oil Reserves (Mbbl)	Natural gas reserves (Gm³)	Coal reserves (Mt)
n.a.	n.a.	n.a.

Indicator	Unit	Value
Electricity consumption per capita	kWh / inhab.	3,194
Final energy consumption per capita	toe / inhab.	1.35
Electrification rate	%	99.70
Total energy supply	Mtoe	5.37
Total energy production	Mtoe	3.57
Total energy imports	Mtoe	2.39
Total energy exports	Mtoe	0.07
Total final energy consumption	Mtoe	4.69
Refining capacity	kbbl/day	50
Installed power generation capacity	GW	3.91
Primary energy intensity and final energy intensity	koe / USD 2011 PPP	0.08 / 0.07

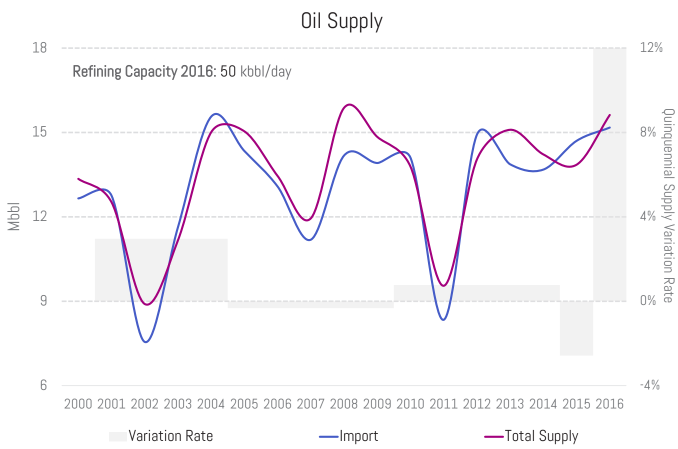
Summarized energy matrix 2016



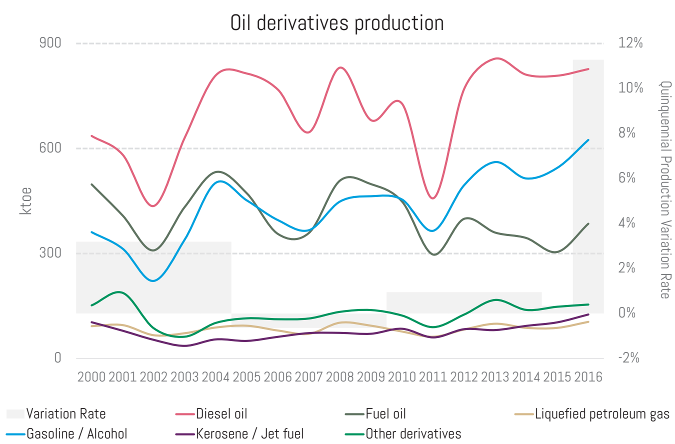


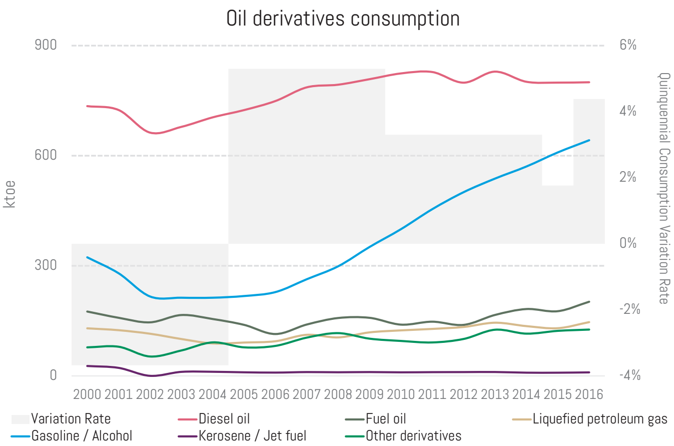


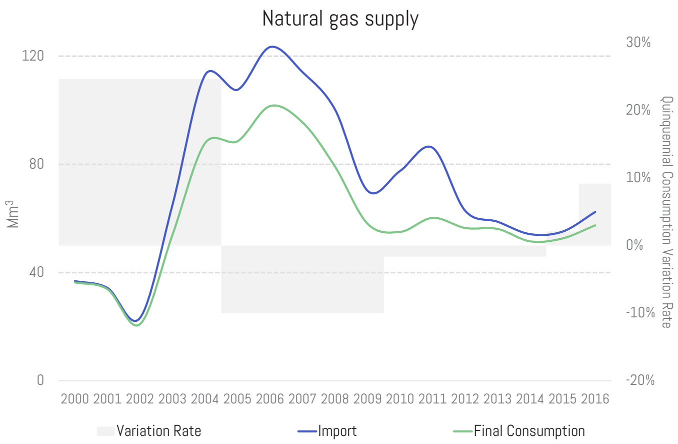
Uruguay has become the country with the highest proportion of electricity generated from wind energy in Latin America and the Caribbean. In 2016, 22% of electricity was generated with this resource.

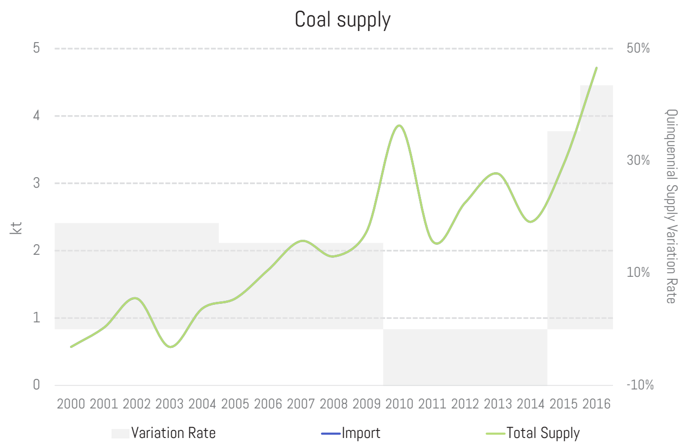


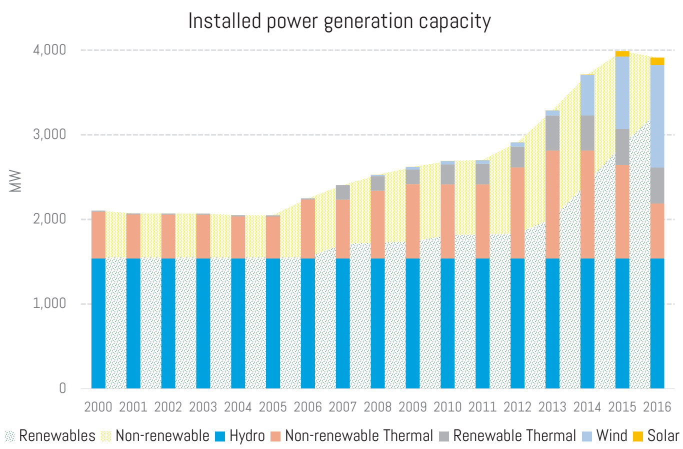
URUGUAY

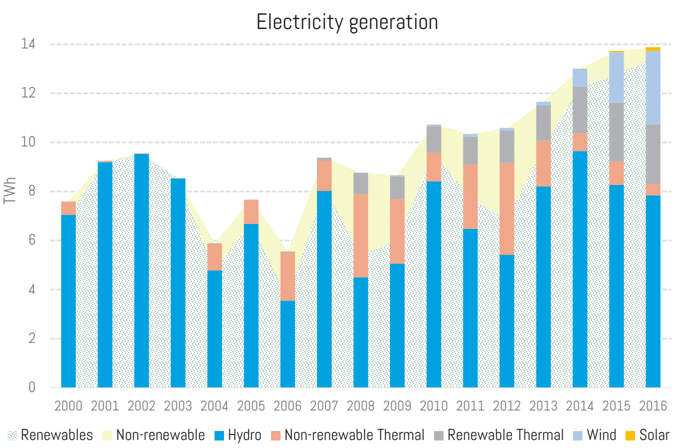


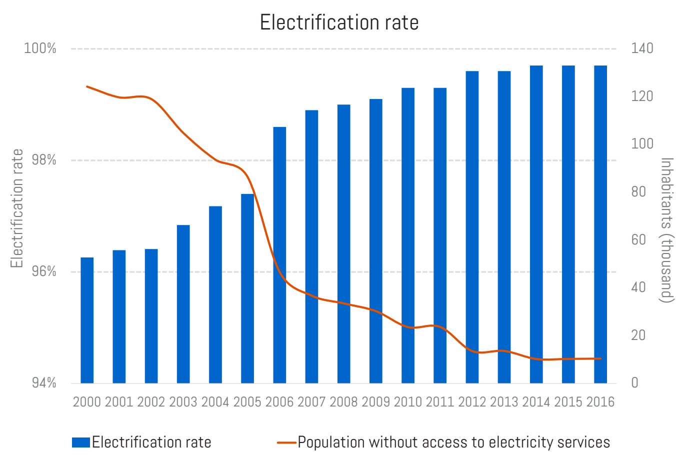


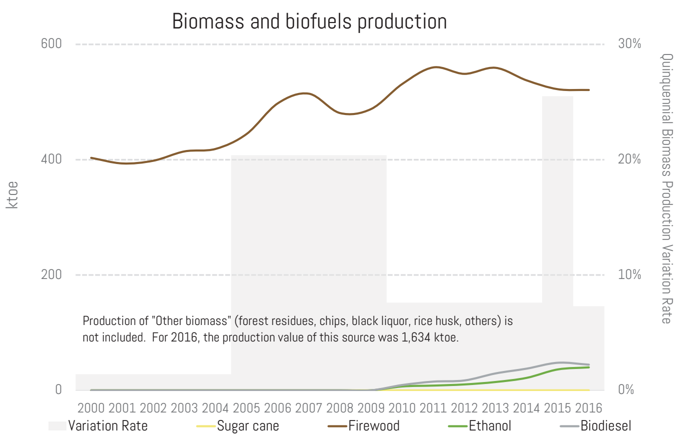

Natural gas supply
Mm³
120
80
40
0
30%
20%
10%
0%
-10%
-20%
Quinquennial Consumption Variation Rate
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Variation Rate
Import
Final Consumption

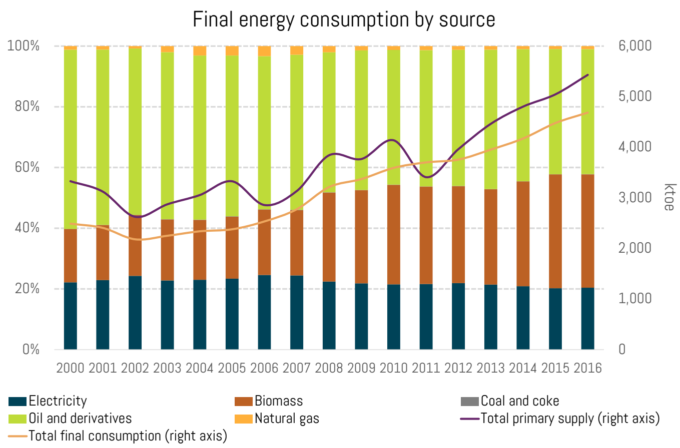

Coal supply
kt
5
4
3
2
1
0
50%
30%
10%
-10%
Quinquennial Supply Variation Rate
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Variation Rate
Import
Total Supply

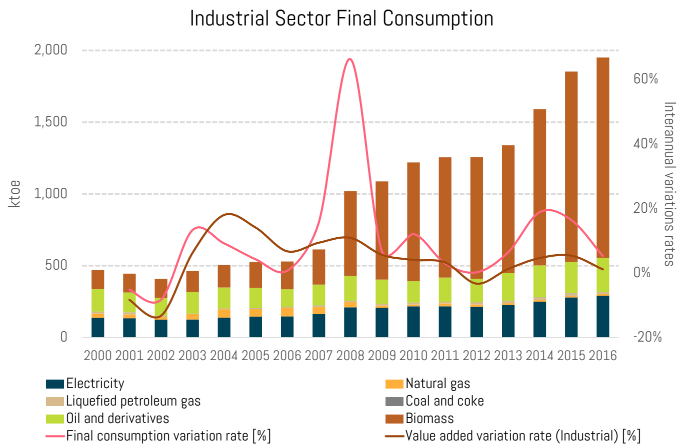

Installed power generation capacity
MW
4,000
3,000
2,000
1,000
0
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Renewables
Non-renewable
Hydro
Non-renewable Thermal
Renewable Thermal
Wind
Solar

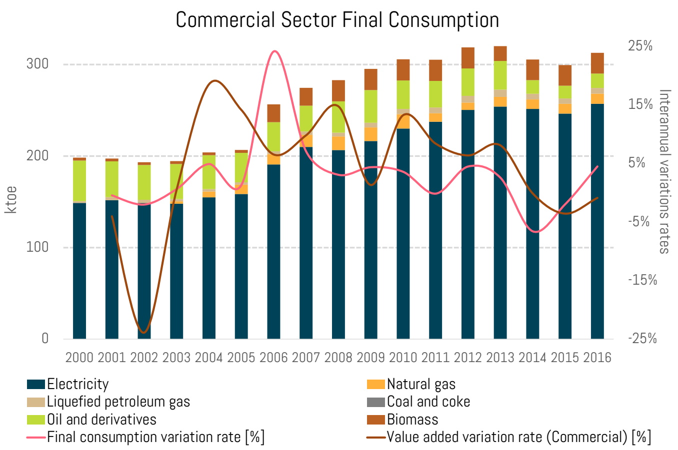

Electricity generation
TWh
14
12
10
8
6
4
2
0
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Renewables
Non-renewable
Hydro
Non-renewable Thermal
Renewable Thermal
Wind
Solar

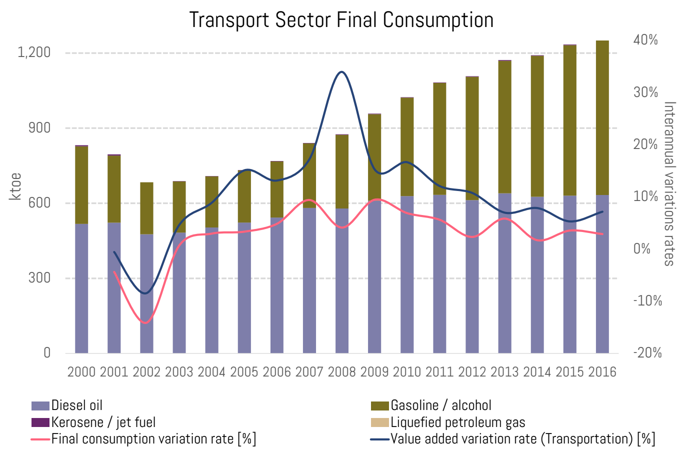

Electrification rate
Electrification rate
100%
98%
96%
94%
140
120
100
80
60
40
20
0
Inhabitants (thousand)
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Electrification rate
Population without access to electricity services


Biomass and biofuels production
ktoe
600
400
200
0
30%
20%
10%
0%
Quinquennial Biomass Production Variation Rate
Production of "Other biomass" (forest residues, chips, black liquor, rice husk, others) is not included. For 2016, the production value of this source was 1,634 ktoe.
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Variation Rate
Sugar cane
Firewood
Ethanol
Biodiesel

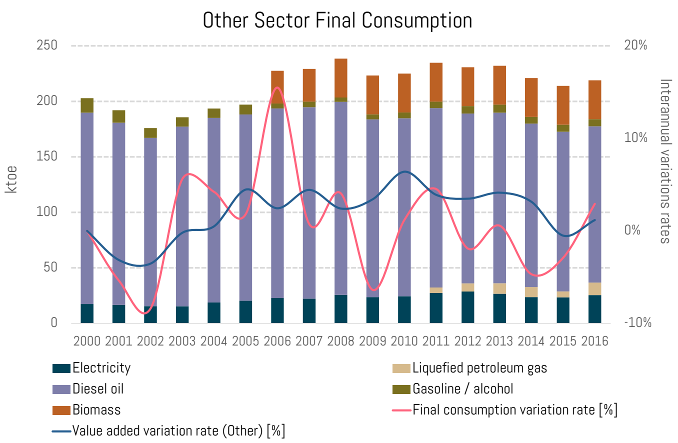

Final energy consumption by source
100%
80%
60%
40%
20%
0%
6,000
5,000
4,000
3,000
2,000
1,000
0
ktoe
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Electricity
Oil and derivatives
Total final consumption (right axis)
Biomass
Natural gas
Coal and coke
Total primary supply (right axis)

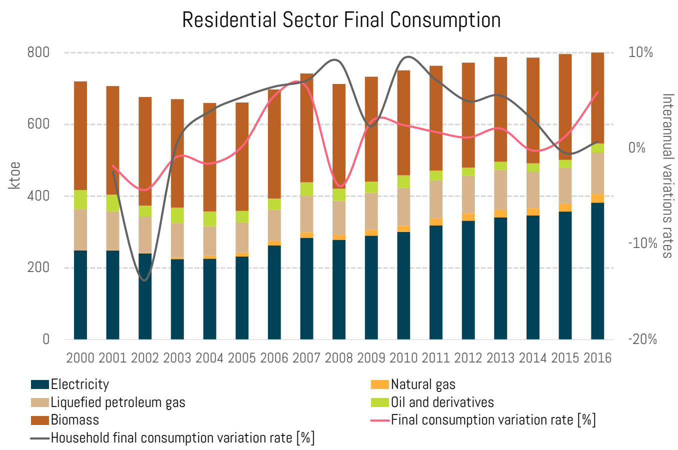

Industrial Sector Final Consumption
2,000
1,500
1,000
500
0
ktoe
60%
40%
20%
0%
-20%
Interannual variations rates
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Electricity
Liquefied petroleum gas
Oil and derivatives
Final consumption variation rate [%]
Natural gas
Coal and coke
Biomass
Value added variation rate (Industrial) [%]


Commercial Sector Final Consumption
300
200
100
0
ktoe
25%
15%
5%
-5%
-15%
-25%
Interannual variations rates
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Electricity
Liquefied petroleum gas
Oil and derivatives
Final consumption variation rate [%]
Natural gas
Coal and coke
Biomass
Value added variation rate (Commercial) [%]

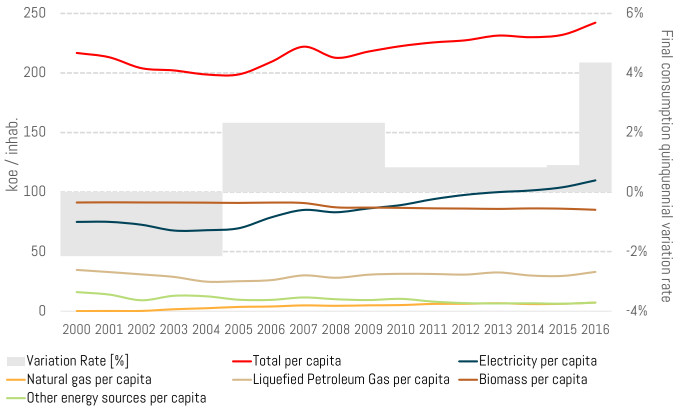

Transport Sector Final Consumption
1,200
900
600
300
0
ktoe
40%
30%
20%
10%
0%
-10%
-20%
Interannual variations rates
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Diesel oil
Kerosene / jet fuel
Final consumption variation rate [%]
Gasoline / alcohol
Liquefied petroleum gas
Value added variation rate (Transportation) [%]

URUGUAY

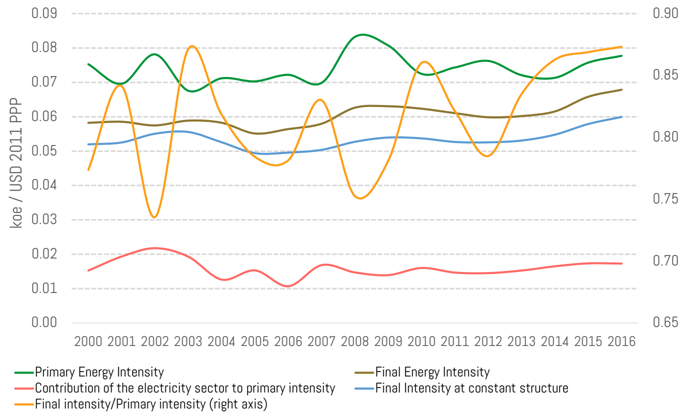

Other Sector Final Consumption
250
200
150
100
50
0
ktoe
20%
10%
0%
-10%
Interannual variations rates
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Electricity
Diesel oil
Biomass
Value added variation rate (Other) [%]
Liquefied petroleum gas
Gasoline / alcohol
Final consumption variation rate [%]


Residential Sector Final Consumption
800
600
400
200
0
ktoe
10%
0%
-10%
-20%
Interannual variations rates
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Electricity
Liquefied petroleum gas
Biomass
Household final consumption variation rate [%]
Natural gas
Oil and derivatives
Final consumption variation rate [%]

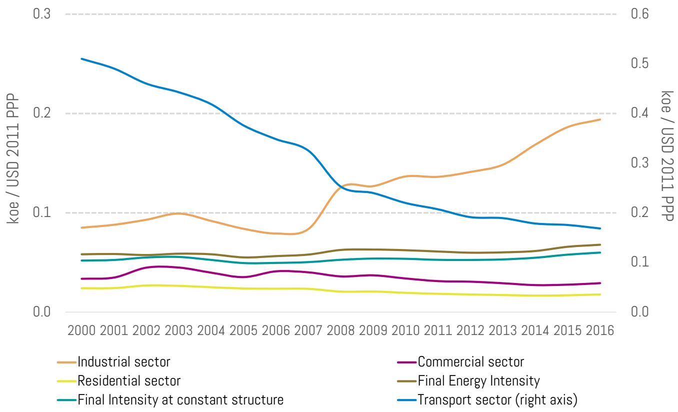
Final consumption per capita Residential Sector



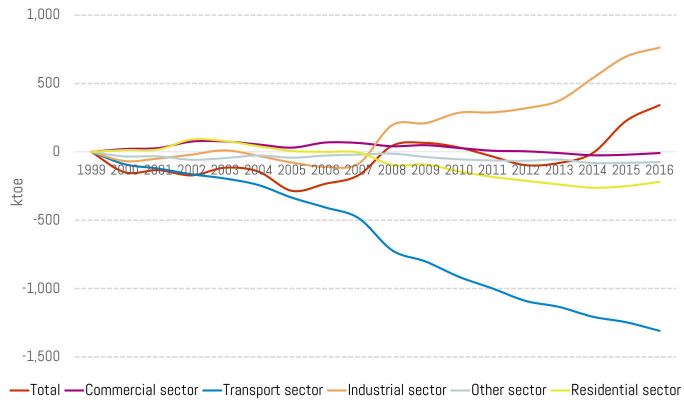
Energy intensities



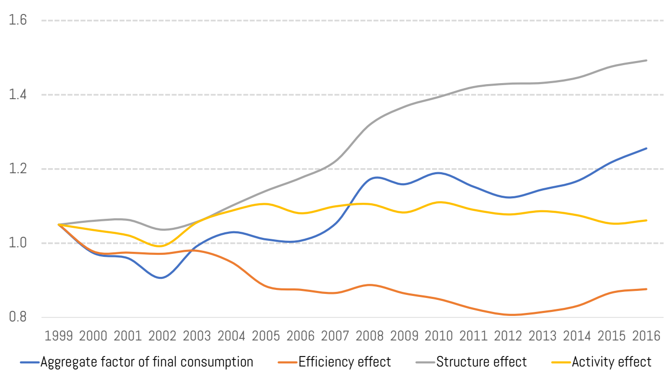
Sectoral energy intensities



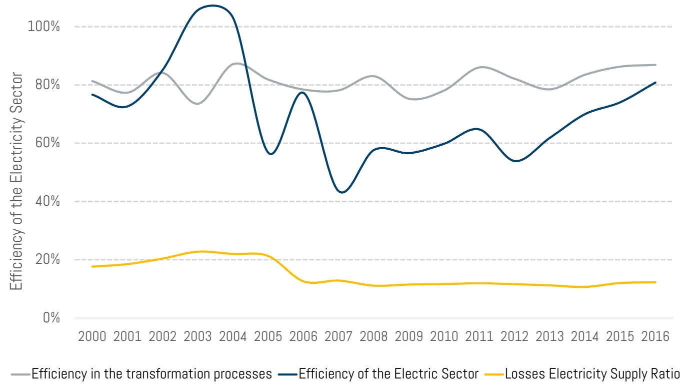
Avoided energy demand due to variations in energy intensity



Logarithmic mean Divisia index for the structural decomposition of energy consumption



Efficiency of the Electricity Sector



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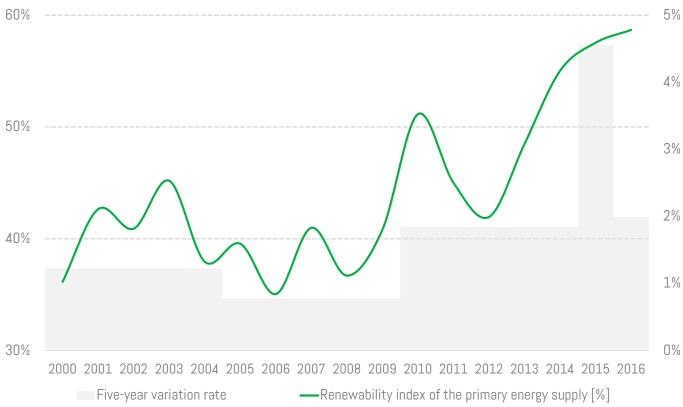
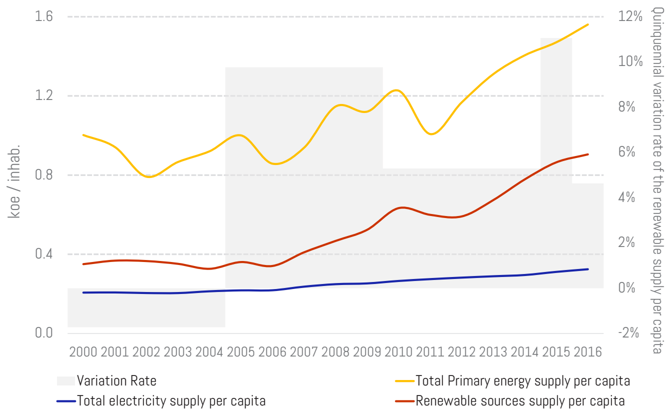
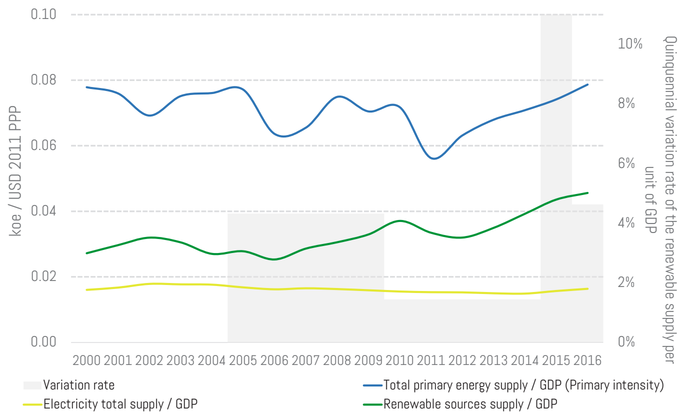
Primary energy supply renewability index



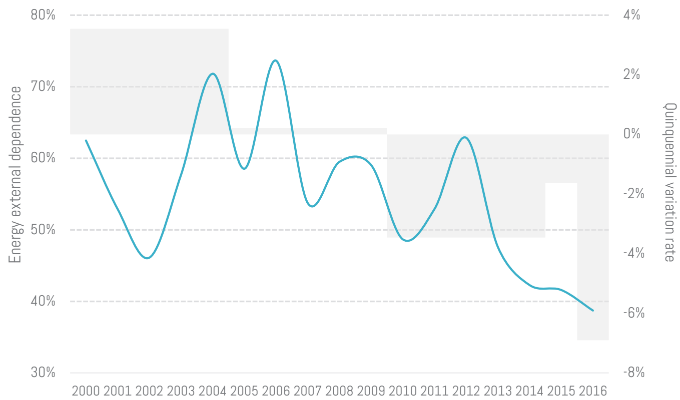
Energy supply per capita



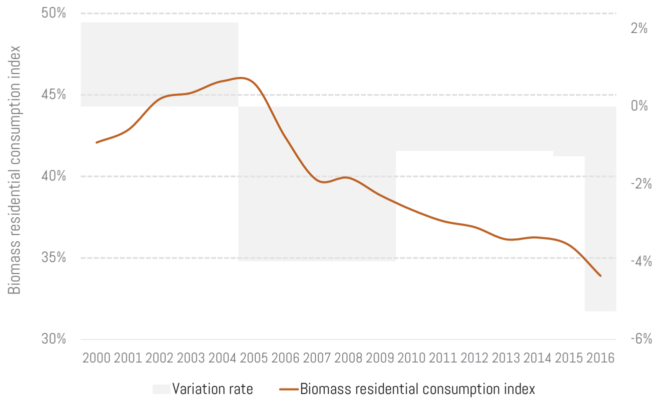
Energy supply per unit of GDP



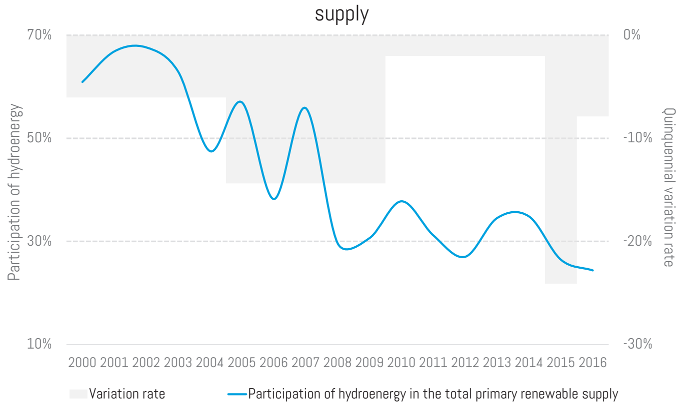
Energy external dependence

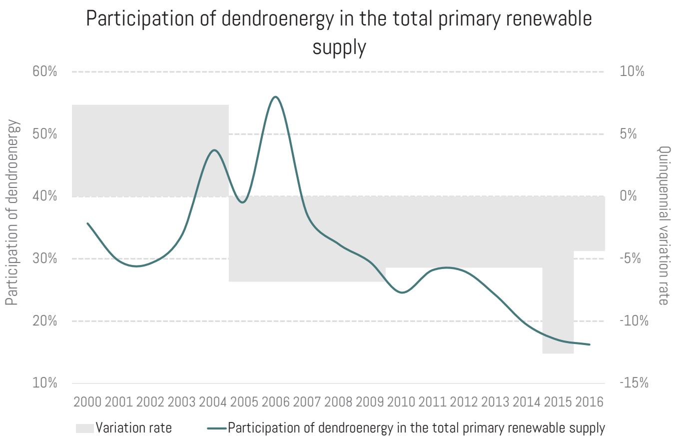


Biomass residential consumption index

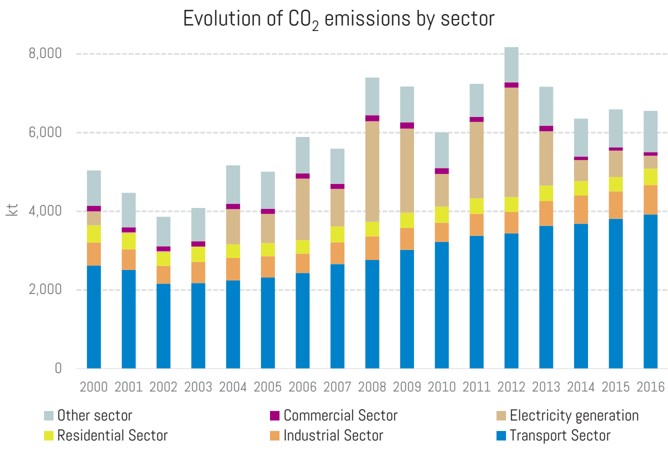


Participation of hydroenergy in the total primary renewable supply

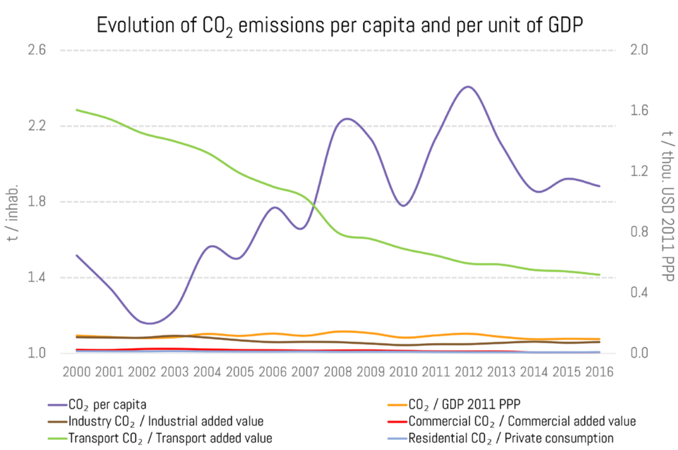




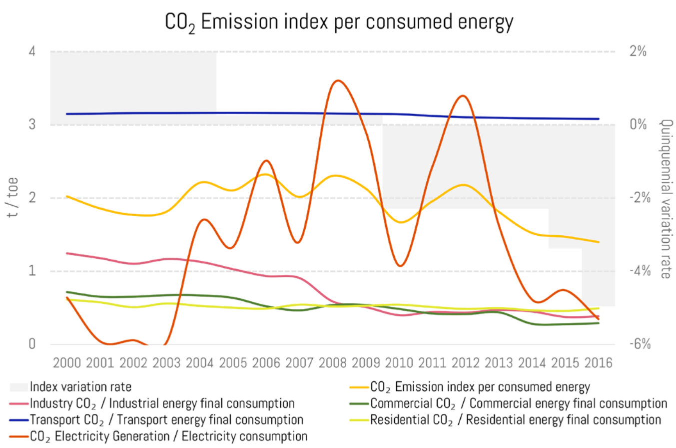
Participation of dendroenergy in the total primary renewable supply
Participation of dendroenergy
Quinquennial variation rate
Variation rate
Participation of dendroenergy in the total primary renewable supply



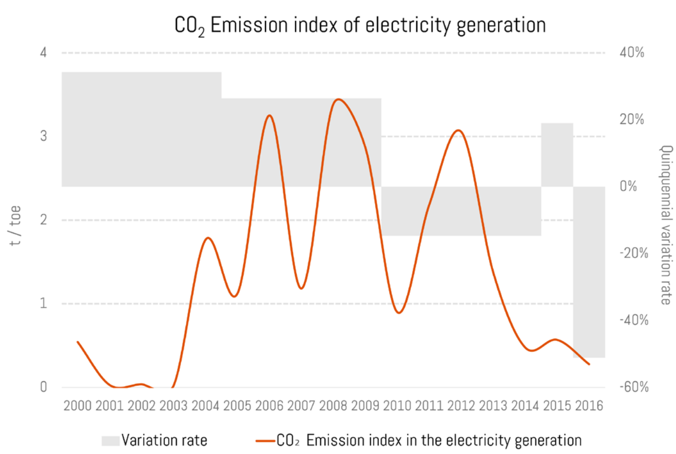
Evolution of CO_2 emissions by sector
kt
Other sector
Commercial Sector
Electricity generation
Residential Sector
Industrial Sector
Transport Sector



Evolution of CO_2 emissions per capita and per unit of GDP
t / inhab.
t / thou. USD 2011 PPP
CO_2 per capita
CO_2 / GDP 2011 PPP
Industry CO_2 / Industrial added value
Commercial CO_2 / Commercial added value
Transport CO_2 / Transport added value
Residential CO_2 / Private consumption



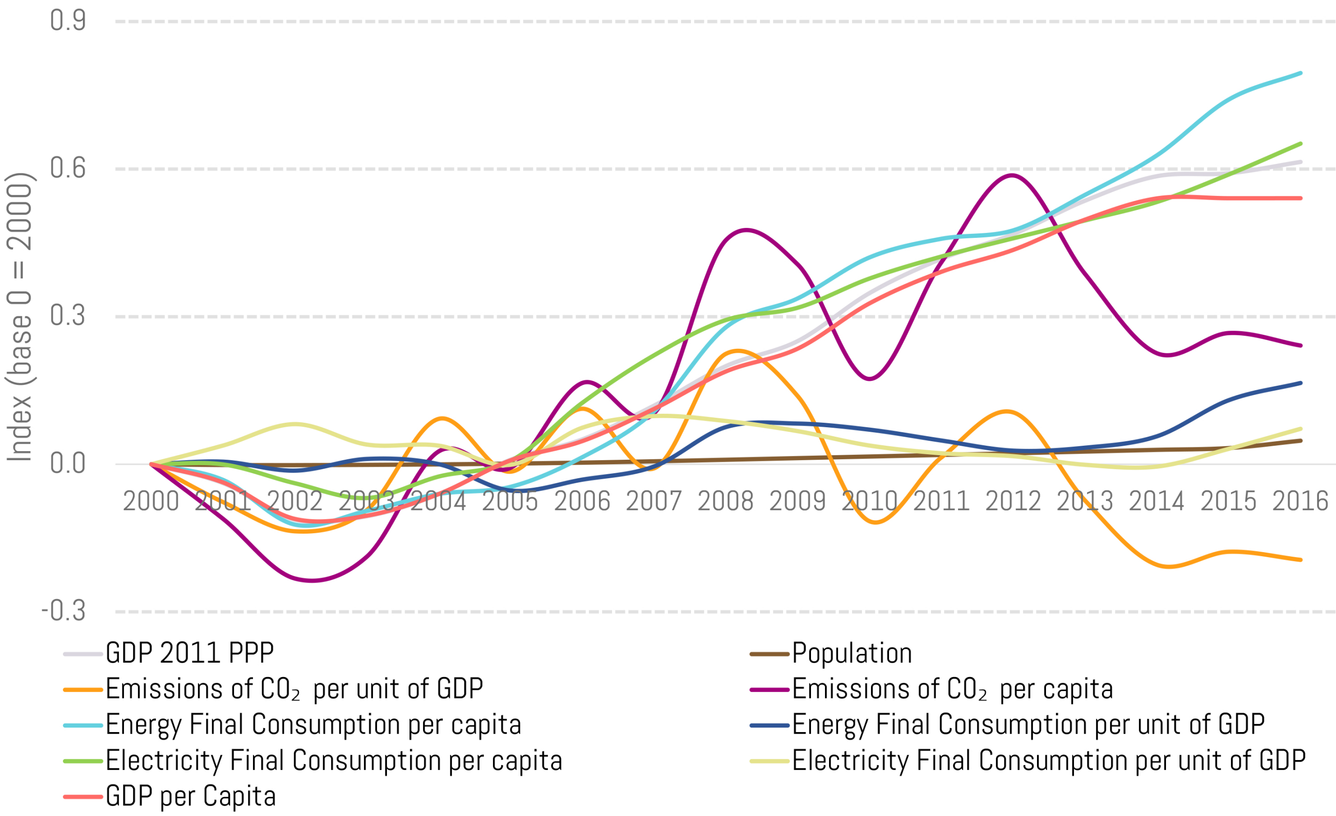
CO_2 Emission index per consumed energy
t / toe
Quinquennial variation rate
Index variation rate
CO_2 Emission index per consumed energy
Industry CO_2 / Industrial energy final consumption
Commercial CO_2 / Commercial energy final consumption
Transport CO_2 / Transport energy final consumption
Residential CO_2 / Residential energy final consumption
CO_2 Electricity Generation / Electricity consumption



CO_2 Emission index of electricity generation
t / toe
Quinquennial variation rate
Variation rate
CO_2 Emission index in the electricity generation

URUGUAY

Summary of the main energy indicators



VENEZUELA

GENERAL INFORMATION 2016

Population (thousand inhab.)	30,936
Area (km²)	912,050
Population Density (inhab./km²)	34
Urban Population (%)	89
GDP USD 2010 (MUSD)	218,679
GDP USD 2011 PPP (MUSD)	568,222
GDP per capita (thou. USD 2011 PPP/inhab.)	18

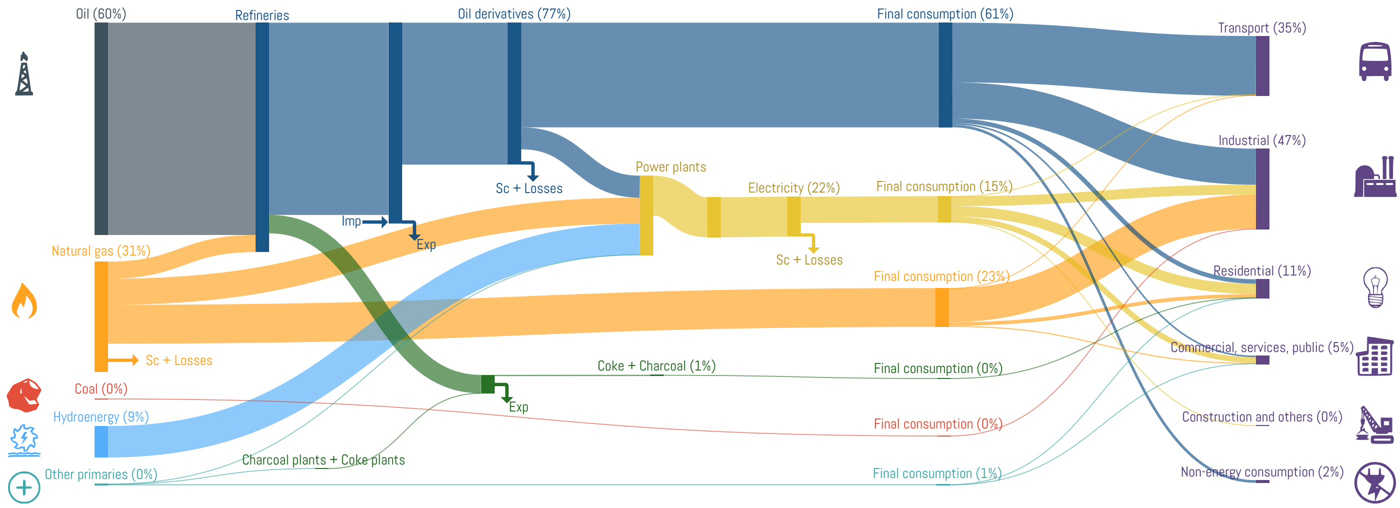
ENERGY SECTOR 2013

Final consumption in the Transport Sector	Mtoe 16.72
Final consumption in the Industrial Sector	Mtoe 22.57
Final consumption in the Residential Sector	Mtoe 5.42
Final consumption in the Commercial and Service Sector	Mtoe 2.39
Final consumption in the Agriculture, Livestock, Fishing, Mining, Other and Non - Energy Consumption	Mtoe 0.85

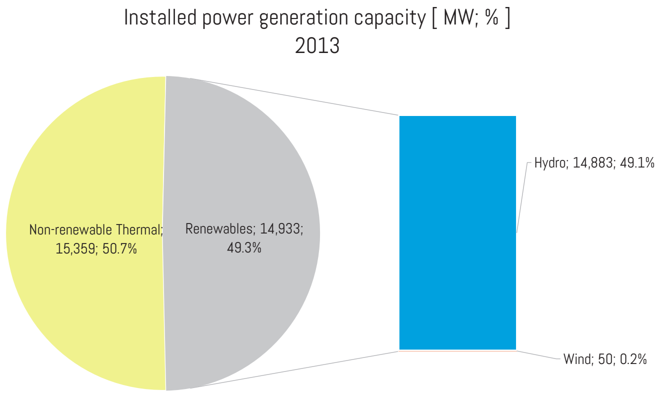
Oil Reserves	Mbbl	298,353
Natural gas reserves	Gm³	5,581
Coal reserves	Mt	1,767

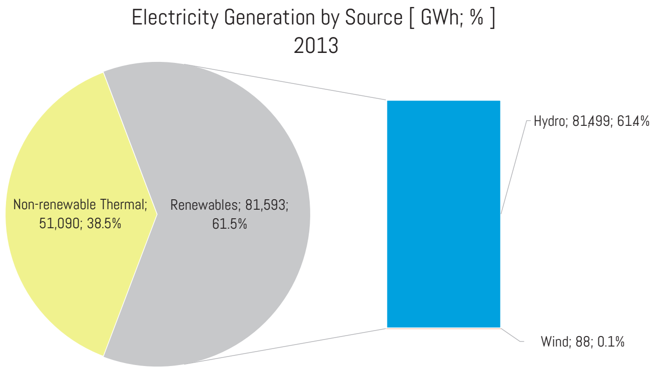
Indicator	Unit	Value
Electricity consumption per capita	kWh / inhab.	2,918
Final energy consumption per capita	toe / inhab.	1.61
Electrification rate	%	98.90
Total energy supply	Mtoe	79.43
Total energy production	Mtoe	191.17
Total energy imports	Mtoe	5.29
Total energy exports	Mtoe	123.82
Total final energy consumption	Mtoe	47.95
Refining capacity	kbbl/day	1,303
Installed power generation capacity	GW	30.29
Primary energy intensity and final energy intensity	koe / USD 2011 PPP	0.19 / 0.09

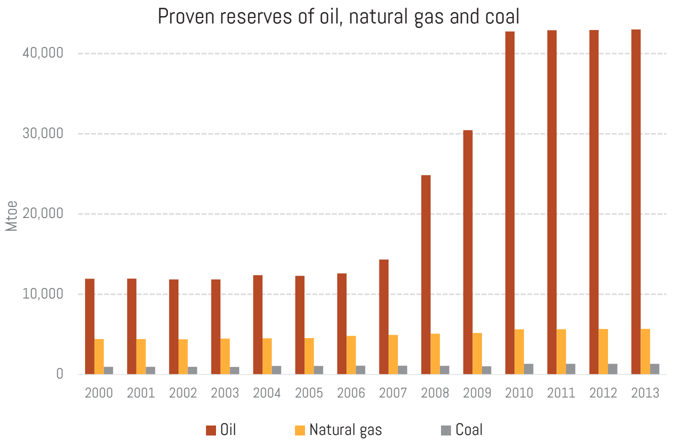
Summarized energy matrix 2013

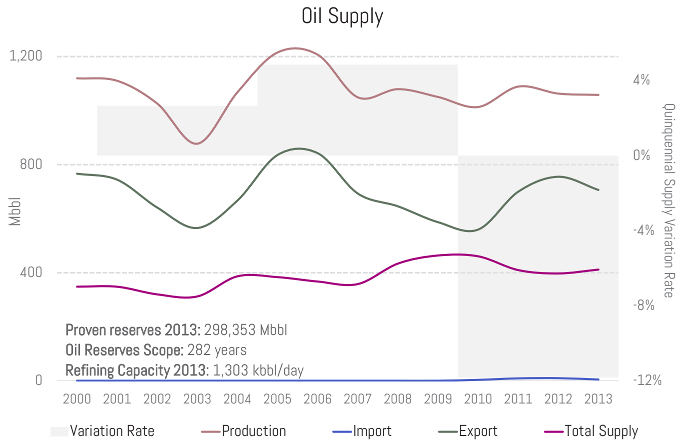


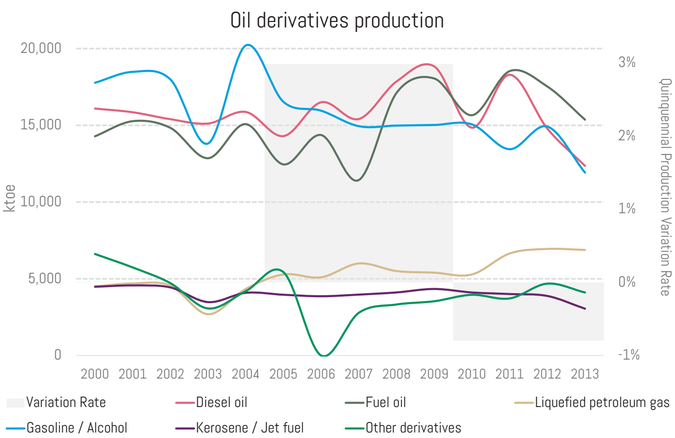
VENEZUELA

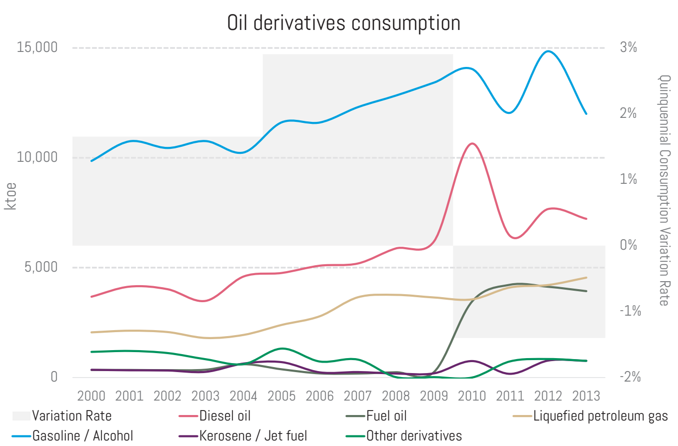

Installed power generation capacity [MW; %]
2013
Non-renewable Thermal; 15,359; 50.7%
Renewables; 14,933; 49.3%
Hydro; 14,883; 49.1%
Wind; 50; 0.2%

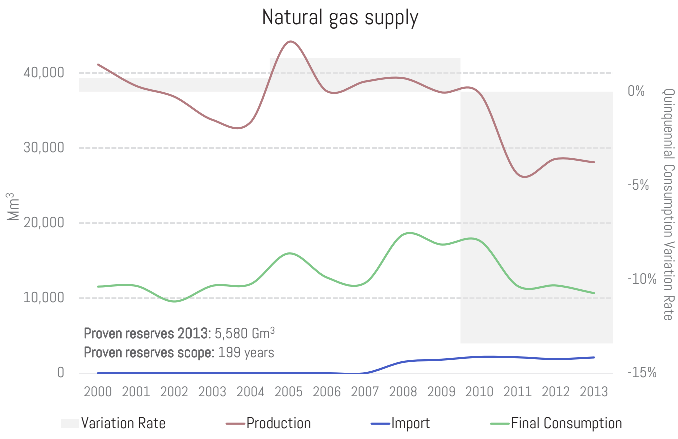

Electricity Generation by Source [GWh; %]
2013
Non-renewable Thermal; 51,090; 38.5%
Renewables; 81,593; 61.5%
Hydro; 81,499; 61.4%
Wind; 88; 0.1%

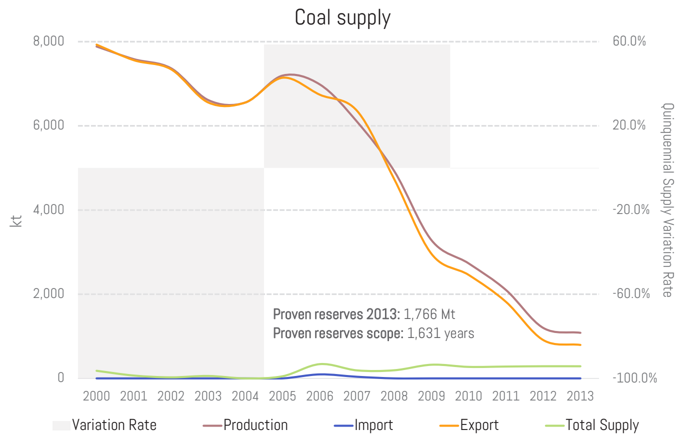

Proven reserves of oil, natural gas and coal
Mtoe
40,000
30,000
20,000
10,000
0
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013
Oil
Natural gas
Coal

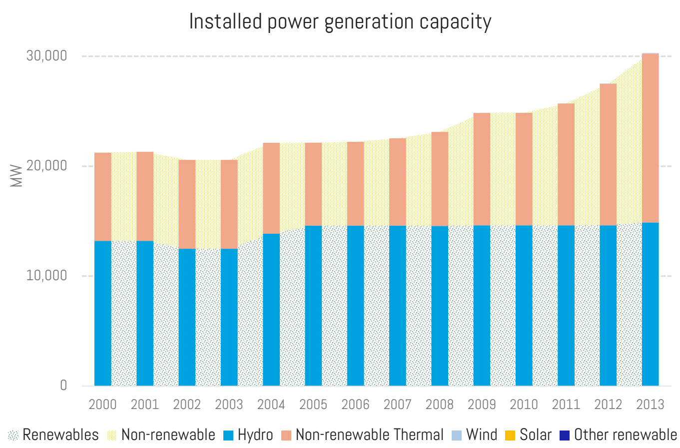

Oil Supply
Mbbl
1,200
800
400
0
4%
0%
-4%
-8%
-12%
Quinquennial Supply Variation Rate
Proven reserves 2013: 298,353 Mbbl
Oil Reserves Scope: 282 years
Refining Capacity 2013: 1,303 kbbl/day
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013
Variation Rate
Production
Import
Export
Total Supply

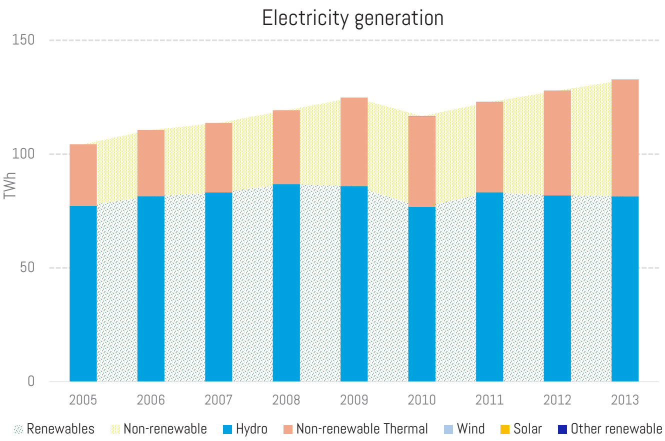

Oil derivatives production
ktoe
20,000
15,000
10,000
5,000
0
3%
2%
1%
0%
-1%
Quinquennial Production Variation Rate
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013
Variation Rate
Diesel oil
Fuel oil
Liquefied petroleum gas
Gasoline / Alcohol
Kerosene / Jet fuel
Other derivatives

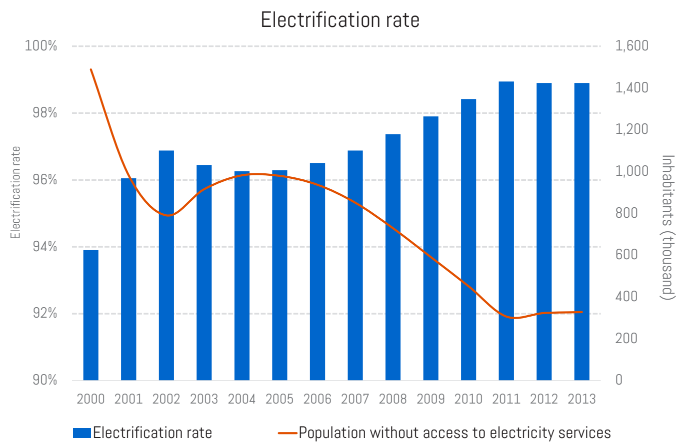

Oil derivatives consumption
ktoe
15,000
10,000
5,000
0
3%
2%
1%
0%
-1%
-2%
Quinquennial Consumption Variation Rate
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013
Variation Rate
Diesel oil
Fuel oil
Liquefied petroleum gas
Gasoline / Alcohol
Kerosene / Jet fuel
Other derivatives

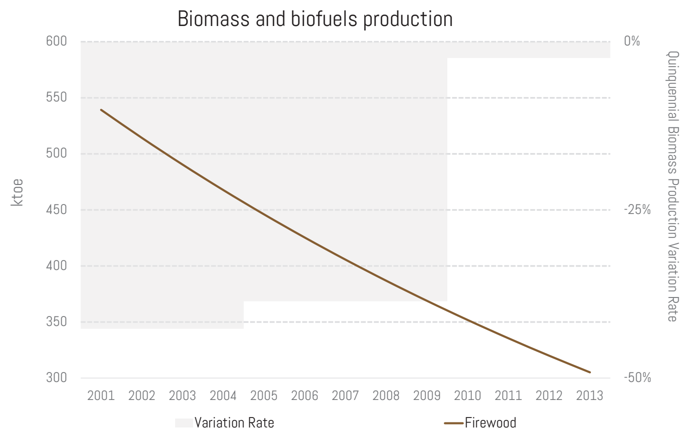

Natural gas supply
Mm³
40,000
30,000
20,000
10,000
0
0%
-5%
-10%
-15%
Quinquennial Consumption Variation Rate
Proven reserves 2013: 5,580 Gm³
Proven reserves scope: 199 years
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013
Variation Rate
Production
Import
Final Consumption


Coal supply
kt
8,000
6,000
4,000
2,000
0
60.0%
20.0%
-20.0%
-60.0%
-100.0%
Quinquennial Supply Variation Rate
Proven reserves 2013: 1,766 Mt
Proven reserves scope: 1,631 years
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013
Variation Rate
Production
Import
Export
Total Supply

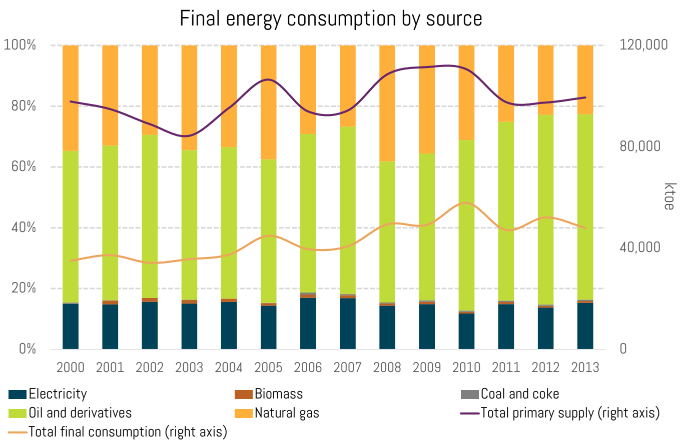

Installed power generation capacity
MW
30,000
20,000
10,000
0
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013
Renewables
Non-renewable
Hydro
Non-renewable Thermal
Wind
Solar
Other renewable

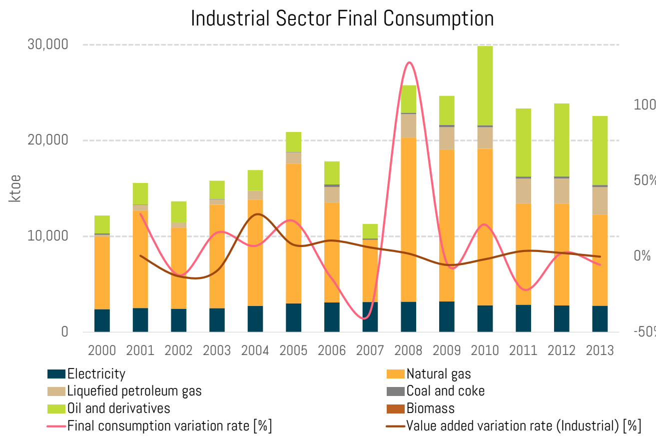

Electricity generation
TWh
150
100
50
0
2005 2006 2007 2008 2009 2010 2011 2012 2013
Renewables
Non-renewable
Hydro
Non-renewable Thermal
Wind
Solar
Other renewable

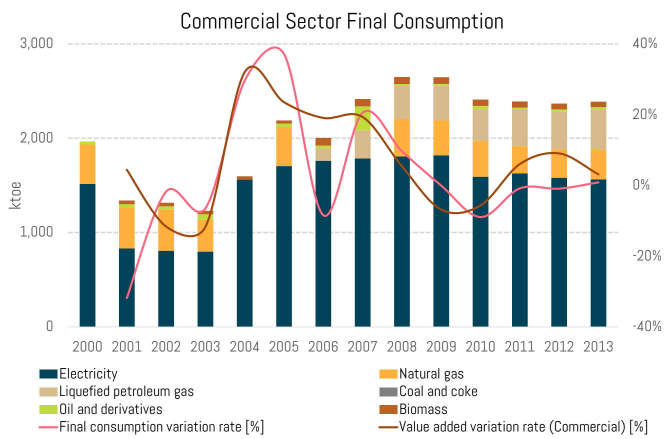

Electrification rate
Electrification rate
100%
98%
96%
94%
92%
90%
1,600
1,400
1,200
1,000
800
600
400
200
0
Inhabitants (thousand)
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013
Electrification rate
Population without access to electricity services

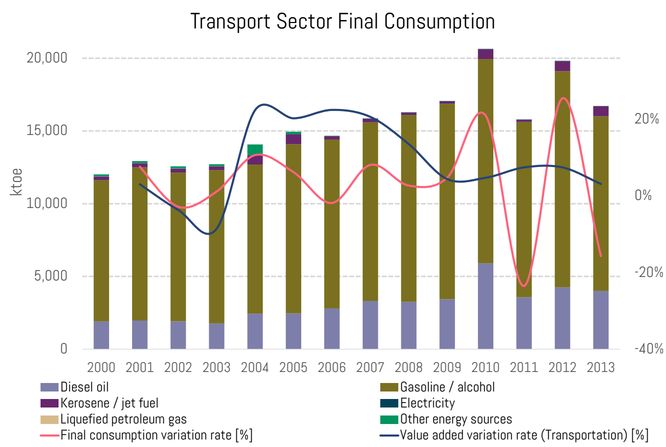

Biomass and biofuels production
ktoe
600
550
500
450
400
350
300
0%
-25%
-50%
Quinquennial Biomass Production Variation Rate
2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013
Variation Rate
Firewood

VENEZUELA


Final energy consumption by source
100%
80%
60%
40%
20%
0%
120,000
80,000
40,000
0
ktoe
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013
Electricity
Biomass
Coal and coke
Oil and derivatives
Natural gas
Total primary supply (right axis)
Total final consumption (right axis)


Industrial Sector Final Consumption
30,000
20,000
10,000
0
ktoe
100%
50%
0%
-50%
Interannual variations rates
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013
Electricity
Natural gas
Liquefied petroleum gas
Coal and coke
Oil and derivatives
Biomass
Final consumption variation rate [%]
Value added variation rate (Industrial) [%]


Commercial Sector Final Consumption
3,000
2,000
1,000
0
ktoe
40%
20%
0%
-20%
-40%
Interannual variations rates
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013
Electricity
Natural gas
Liquefied petroleum gas
Coal and coke
Oil and derivatives
Biomass
Final consumption variation rate [%]
Value added variation rate (Commercial) [%]


Transport Sector Final Consumption
20,000
15,000
10,000
5,000
0
ktoe
20%
0%
-20%
-40%
Interannual variations rates
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013
Diesel oil
Gasoline / alcohol
Kerosene / jet fuel
Electricity
Liquefied petroleum gas
Other energy sources
Final consumption variation rate [%]
Value added variation rate (Transportation) [%]

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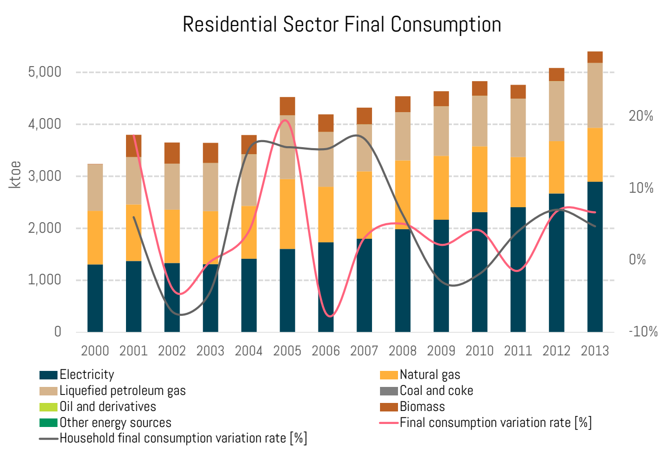
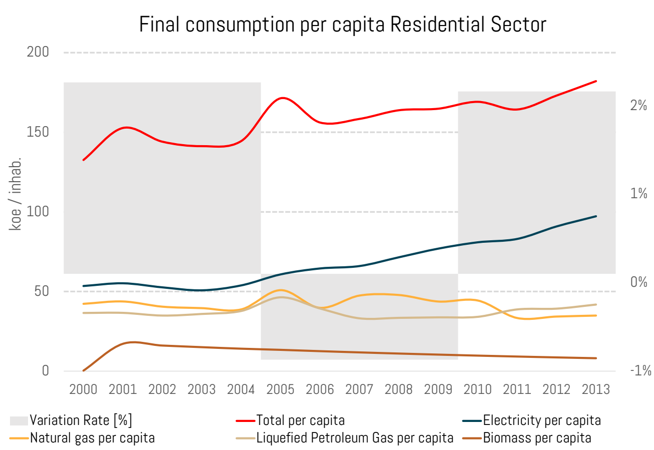
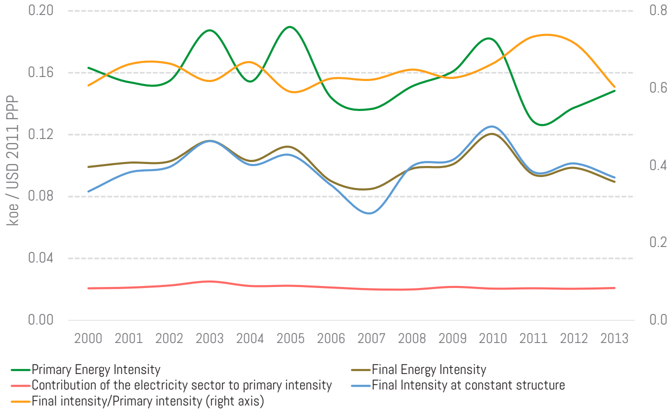
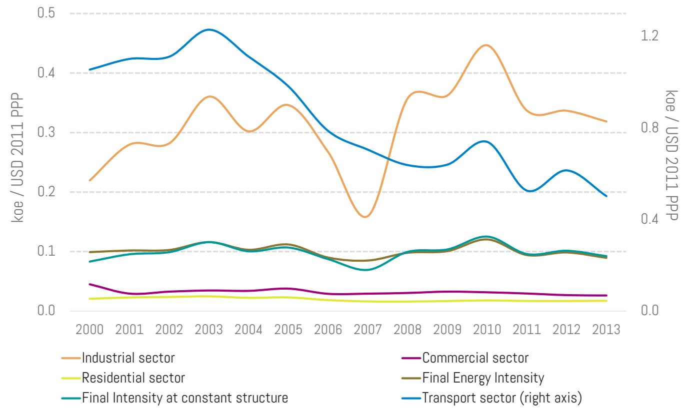

Residential Sector Final Consumption
5,000
4,000
3,000
2,000
1,000
0
ktoe
20%
10%
0%
-10%
Interannual variations rates
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013
Electricity
Natural gas
Liquefied petroleum gas
Coal and coke
Oil and derivatives
Biomass
Other energy sources
Final consumption variation rate [%]
Household final consumption variation rate [%]


Final consumption per capita Residential Sector
200
150
100
50
0
koe / inhab.
2%
1%
0%
-1%
Final consumption quinquennial variation rate
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013
Variation Rate [%]
Total per capita
Electricity per capita
Natural gas per capita
Liquefied Petroleum Gas per capita
Biomass per capita

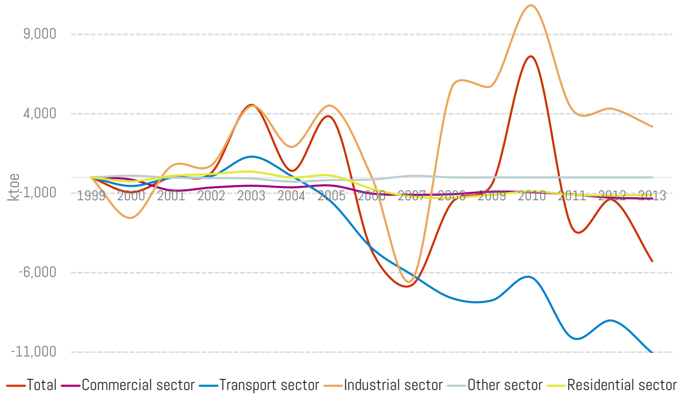
Energy intensities



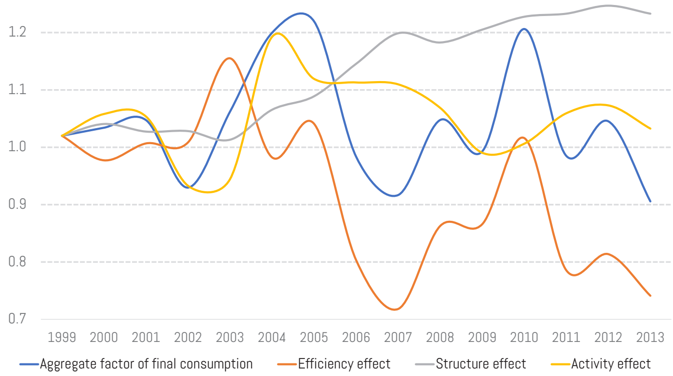
Sectoral energy intensities



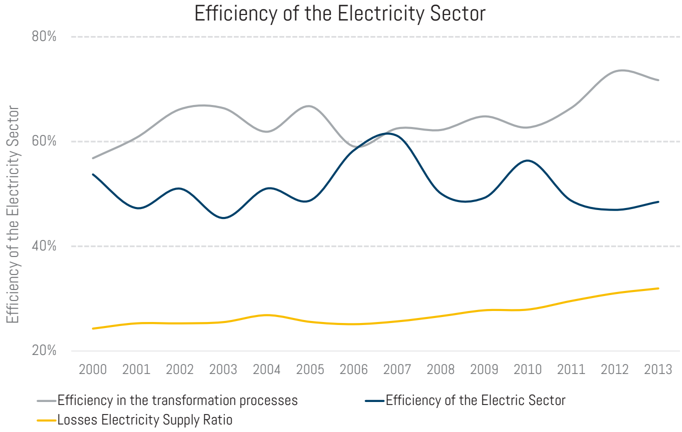
Avoided energy demand due to variations in energy intensity



Logarithmic mean Divisia index for the structural decomposition of energy consumption



Efficiency of the Electricity Sector



Primary energy supply renewability index

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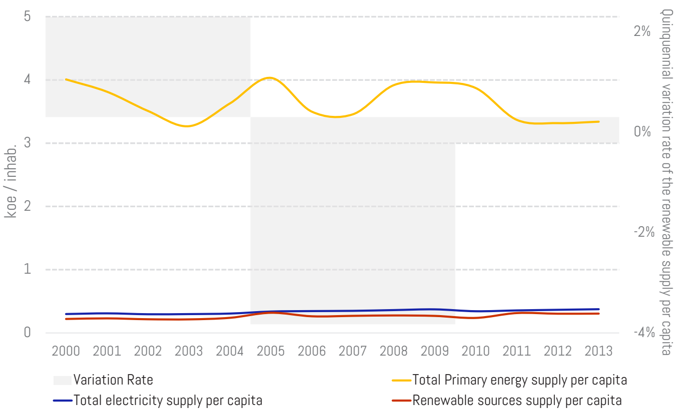
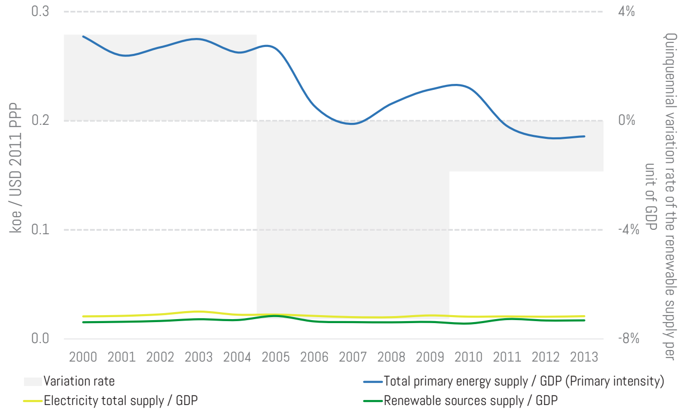
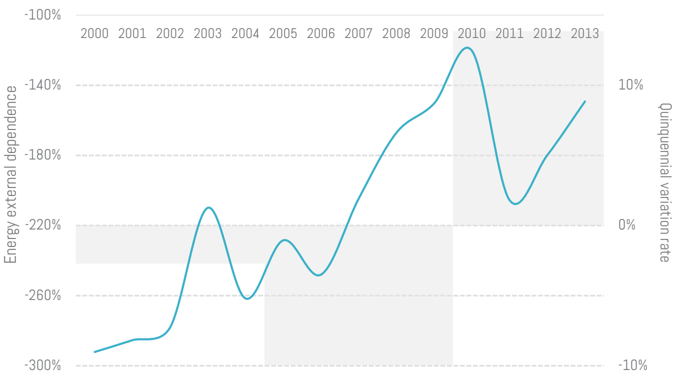
Energy supply per capita



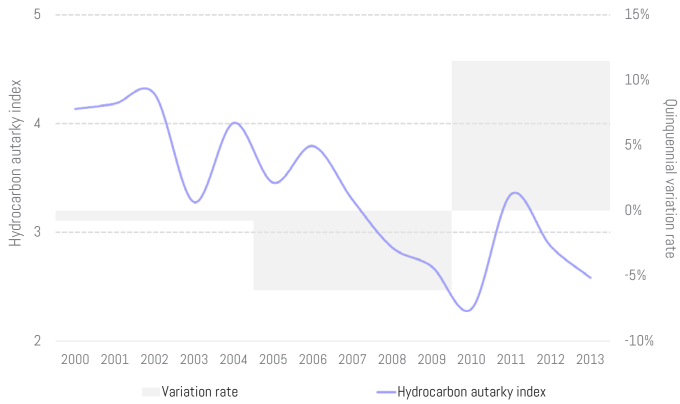
Energy supply per unit of GDP



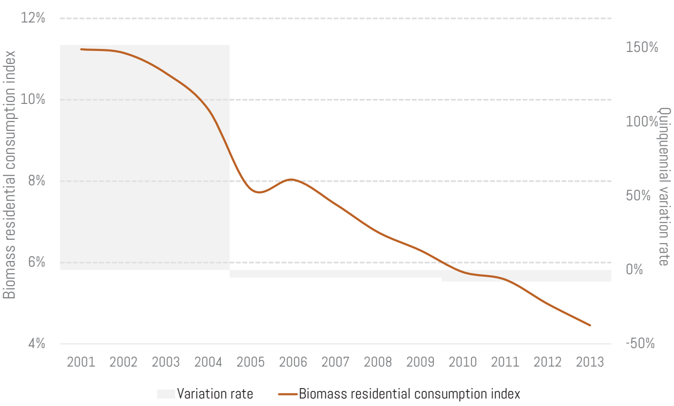
Energy external dependence



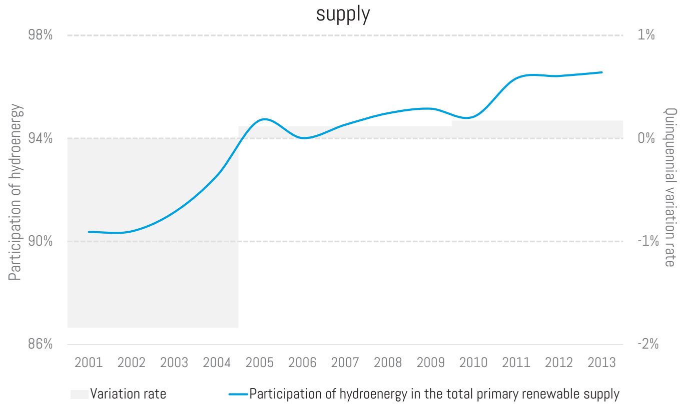
Hydrocarbon autarky index

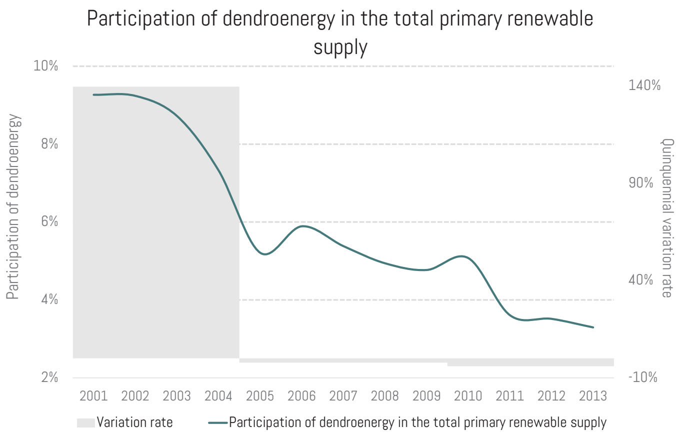


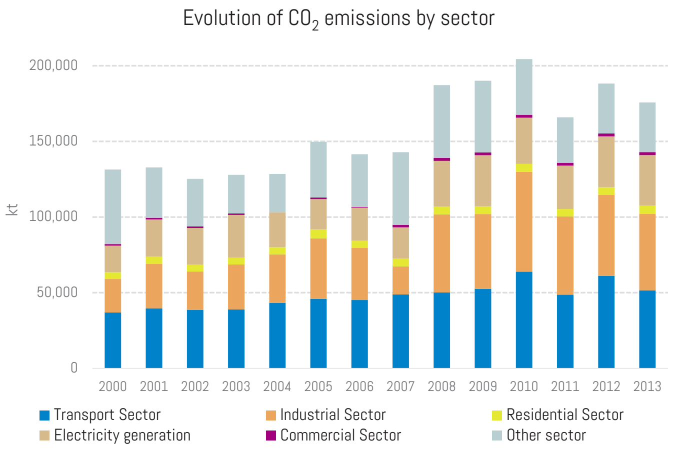
Biomass residential consumption index

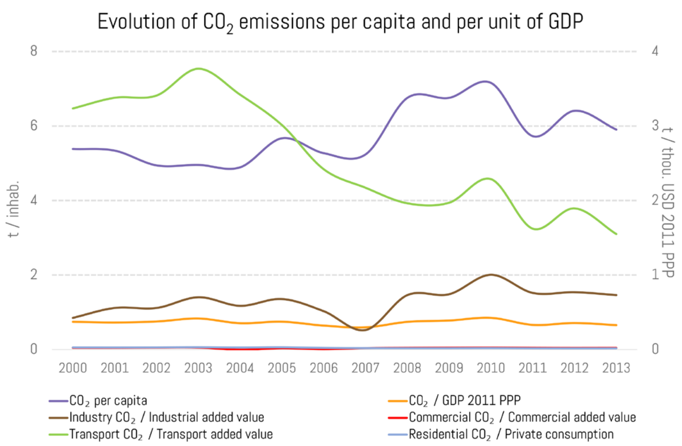


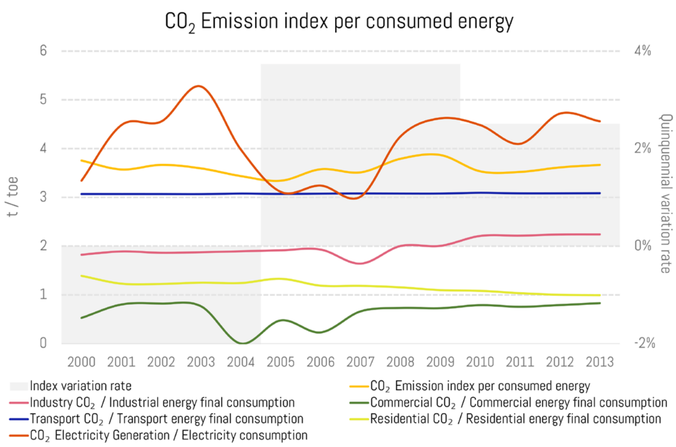
Participation of hydroenergy in the total primary renewable supply

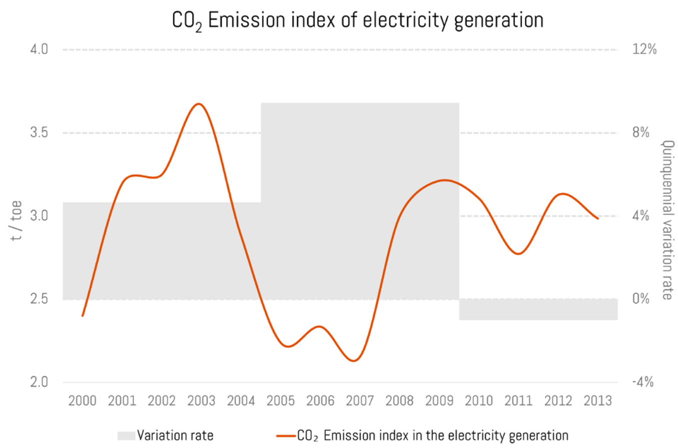



Participation of dendroenergy in the total primary renewable supply
Participation of dendroenergy
Quinquennial variation rate
Variation rate
Participation of dendroenergy in the total primary renewable supply

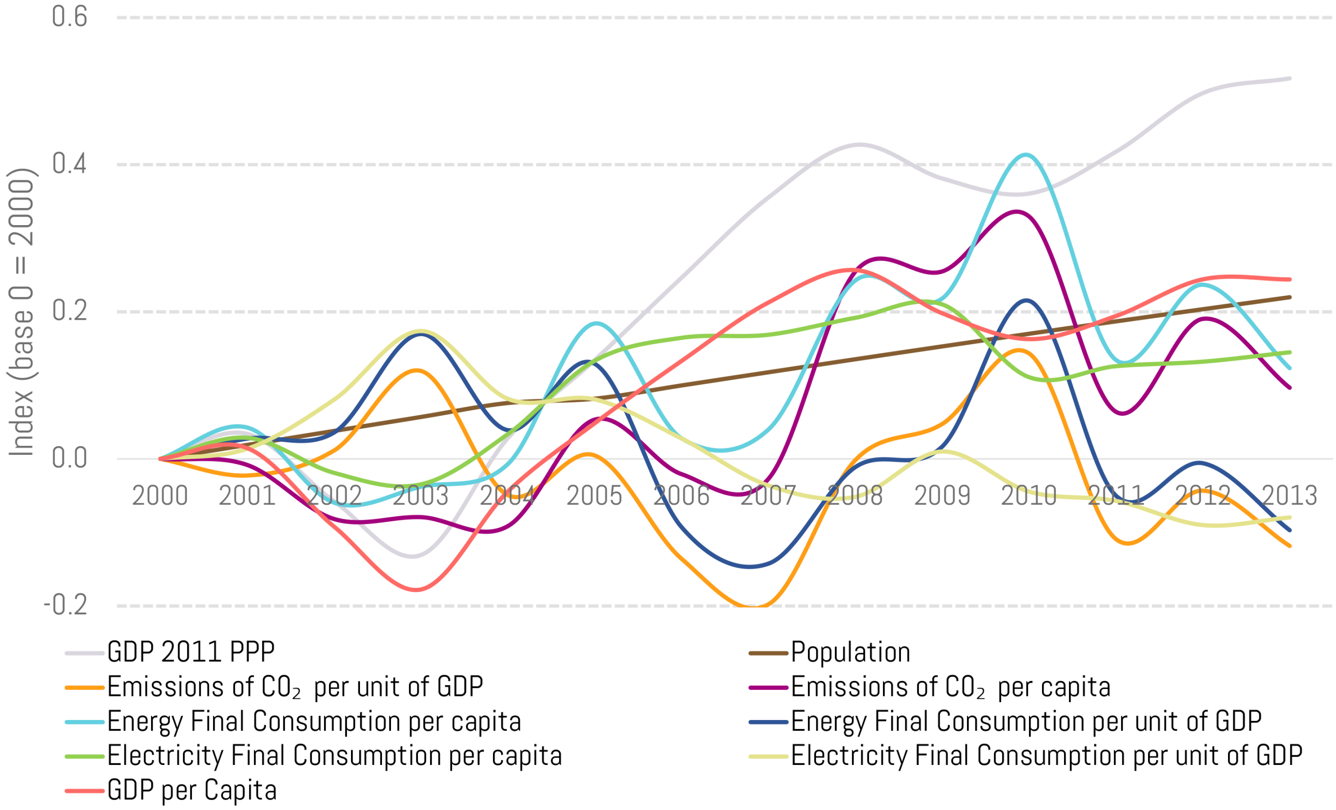

Evolution of CO_2 emissions by sector
kt
Transport Sector
Industrial Sector
Residential Sector
Electricity generation
Commercial Sector
Other sector


Evolution of CO_2 emissions per capita and per unit of GDP
t / inhab.
t / thou. USD 2011 PPP
CO_2 per capita
CO_2 / GDP 2011 PPP
Industry CO_2 / Industrial added value
Commercial CO_2 / Commercial added value
Transport CO_2 / Transport added value
Residential CO_2 / Private consumption


CO_2 Emission index per consumed energy
t / toe
Quinquennial variation rate
Index variation rate
CO_2 Emission index per consumed energy
Industry CO_2 / Industrial energy final consumption
Commercial CO_2 / Commercial energy final consumption
Transport CO_2 / Transport energy final consumption
Residential CO_2 / Residential energy final consumption
CO_2 Electricity Generation / Electricity consumption


CO_2 Emission index of electricity generation
t / toe
Quinquennial variation rate
Variation rate
CO_2 Emission index in the electricity generation

Summary of the main energy indicators



Legislation, regulation and energy policy

Approval of Policies, plans, programs, and institution-building

To consolidate the fulfillment of the commitments and relevant goals assumed in order to achieve the objectives of greenhouse gas mitigation, **Argentina** created, within the framework of the Chief of Cabinet of Ministers, the National Cabinet of Climate Change. This entity is in charge of the articulation of policies on climate change as well as the generation of awareness at national level about its relevance, through the articulation of participatory processes, among other actions aimed at including mitigation and adaptation to climate change in the planning of the different sectors and / or systems. Additionally, and in order to provide greater operability, simplify the process of implementing its technical functions, and strengthen the efficiency of public management, the Execution and Management Unit for the Rational and Efficient Use of Energy (UNIRAE) was transferred from the scope of the Ministry of Modernization to the sphere of the Undersecretary of Energy Saving and Efficiency, dependency of the Secretariat of Strategic Energy Planning of the Ministry of Energy and Mining of the Argentine Republic. On the other hand, it is worthy to highlight the creation, by decree, of the "Argentina 2030 Program: Thinking about Our Future", which aims to outline a long-term national vision that will help guide the strategy and articulate the programming of public policies, including energy policy.

In compliance with the state function related to development and scientific, technical and technological research for the benefit of the general interest and in order to consolidate the country's technological sovereignty, **Bolivia** created the Bolivian Nuclear Energy Agency (ABEN), a decentralized public institution with legal personality and its own assets, with autonomy of administrative, technical, legal, economic and financial management, of indefinite duration and under the Ministry of Hydrocarbons and Energy. The aforementioned entity is responsible for the implementation of the policy on nuclear technology for peaceful purposes, as well as the development of the plans, programs and activities required in this area.

Brazil made modifications to the law that establishes the ANEEL National Electric Power Agency, and establishes the concession regime for public electric power services. In accordance with the reforms, ANEEL is the responsible entity to establish tariffs for the supply of electric energy to the concessionaires and distribution licensees, including rural electrification cooperatives classified as permit holders, whose own markets are less than 700 GWh / year, and supply rates to authorized cooperatives, considering technical, economic, operational parameters and the structure of the markets served. In the exercise of the aforementioned competence, ANEEL shall define the value of the subsidy to be received by the rural electrification cooperatives, concessionaires or permit holders to compensate for the reduced load density of their market, when this is the case. Additionally, the powers of ANEEL are modified with regard to authorizations, being competent according to the reforms to approve: exploitation of hydraulic potential of power greater than 5,000 kW and equal to or less than 30,000 kW, intended for independent production or self-production, maintaining the characteristics of a small hydroelectric power station; and exploitation of hydraulic potential of power greater than 5,000 kW and equal to or less than 50,000 kW, intended for independent production or self-production, with or without the characteristics of a small hydroelectric power station. Additionally, important legislative modifications focused on the improvement of the administration of the resources of the Energy Development Account (CDE), which was entrusted to the Chamber of Commercialization of Electric Power (CCEE), ceasing to be the responsibility of Eletrobras. On the other hand, reforms were carried out in the auctioning process for de-nationalization, in order to provide greater efficiency to the sale processes of the Eletrobras distributors.

In accordance with the Electricity Transmission Law, in **Chile,** the state role is established in the planning of strategic activities in the electric subsector and an independent coordinating body is created to provide transparency and ensure the efficiency of the national electricity system.

The National Assembly of the People's Power of **Cuba** approved the updating of the guidelines of the economic and social policy for the period 2016 - 2021. The aforementioned instrument on energy policy is proposed: raise the national production of oil and gas companion, developing the known deposits and incorporating the improved recovery; accelerate geological studies aimed at being able to count on new deposits, including exploration works in the Exclusive Economic Zone of the Gulf of Mexico; increase the efficiency and performance of the refining system in Cuba; increase the efficiency in electric generation; execute the program of construction, assembly and start-up of new thermal generation capacities and give priority attention to the completion of the generation capacities in the combined cycles of Boca de Jaruco and Varadero; maintain an active policy in the accommodation of the electric charge, which decreases the maximum demand and reduces its impact on generation capacities; continue the program for the rehabilitation and modernization of electrical networks and substations, for the elimination of low-voltage areas, achieving the planned savings by reducing losses in the distribution and transmission of electrical energy; advance in the approved electrification program in isolated areas of the National Electroenergetic System; promote cogeneration and trigeneration in all activities with possibilities and project the education system and the mass media in order to deepen the quality and comprehensiveness of the policy focused on saving and the efficient and sustainable use of energy.

In order to reduce the import of petroleum products, contribute to climate change mitigation and create an energy efficiency culture backed by a strong legal and institutional base, the Ministry of Electricity and Renewable Energy **Ecuador** approved the 2016-2035 National Energy Efficiency Plan (PLANEE), an instrument aimed at increasing the efficient use of energy resources through the execution of energy efficiency programs and projects in sectors related to energy supply and demand. In the course of its validity, it is expected that the minimum energy threshold avoided in the sectors of analysis was around 543 Mbep. These savings will represent approximately USD 84 131 million with an estimated reduction of GHG emissions of 65 $MtCO_2e$. Additionally, the aforementioned body approved the 2016-2025 Electricity Master Plan, an instrument focused on guaranteeing the supply of the public electric power service to all social and productive sectors of the country, in the short, medium and long-term, with adequate levels of safety, quality, observation of technical, economic, financial, social and environmental criteria; and above all, the promotion of public, private participation, as well as a mixed and solidary economy, in all generation, transmission, distribution and energy efficiency projects. The Committee for the Management of Risks and Emergencies of the Electricity Sector was also constituted as a technical entity in charge of facilitating an adequate coordination and arrangement between the Ministry of Electricity and Renewable Energy (MEER) and other entities and companies that compose the country's electricity sector. This for the integral management of risks and emergencies, to ensure effective decision-making in the face of potential risk circumstances that affect or jeopardize the normal functioning and operation of the Ecuadorian electricity sector, the security of the population, goods and infrastructure, and the provision of the public electric power service at the national level.

El Salvador created the National Council on Environmental Sustainability and Vulnerability, as a plural and autonomous, consultative, dialogue and consensus-building body on environmental sustainability and vulnerability, focused on reaching agreements and commitments aimed at ensuring the transition to an environmentally sustainable society, reducing vulnerability to natural and man-made disasters, and building a society resilient to the effects of climate change.

Guatemala, approved the Expansion Plans for the 2016-2025 Transport System, and the Indicative Expansion Plan for the 2016-2030 Generation System, both based on the Regulations of the General Electricity Law, the Wholesale Market Administration Regulation and the 2013-2027 Energy Policy.

In fulfillment of the measures established to facilitate the state labor as for environmental protection by means of the incorporation of criteria and better practices in energy efficiency, decrease in the generation of gases and compounds of greenhouse effect, low generation of residues and emissions, **Mexico,** via decree, approved the transformation of the Institute of Electrical Research in the National Institute of Electricity and Clean Energies in compliance with the measures established to facilitate State work on environmental protection through the incorporation of criteria and best practices in energy efficiency, reduction in the generation of gases and greenhouse compounds, low generation of waste and emissions. It is a decentralized public agency of the Federal Public Administration, with legal personality, own property and autonomy of management. It is sectorized in the Energy Secretariat, and it is in charge of coordinating and carrying out studies and projects of scientific or technological research with public or private academic institutions in the field of energy. It is also in charge of promoting and disseminating criteria, methodologies and technologies for the prevention of pollution in the electric industry, as well as contributing to the training of specialists and researchers in the areas of the electrical industry and related industries. Likewise, the National Electricity System Development Program (PRODESEN) 2016-2030 was approved. It is an instrument that establishes planning in all matters concerning the generation, transmission, and distribution of electricity. The document includes among its fundamental goals: to guarantee the efficiency, quality, reliability, continuity, and security of the SEN; promote the diversification of the electric energy generation matrix, as well as national energy security; promote the installation of sufficient resources to meet the demand in the SEN and meet the clean energy objectives; provide the necessary infrastructure to ensure the reliability of the SEN; to encourage an efficient expansion of generation, considering the criteria of quality, reliability, continuity and security of the network, minimize the costs of providing the service, reducing congestion costs.

On the other hand, the Federal Law was issued to prevent and punish crimes committed in the area of hydrocarbons, petroleum or petrochemicals, and other assets; and approved the corresponding amendments, additions and derogations of various provisions of the Federal Code of Criminal Procedures, of the Federal Penal Code; of the Federal Law against Organized Delinquency; of the Federal Law of Extinction of Dominion, Regulatory of Article 22 of the Political Constitution of the United Mexican States; of the Fiscal Code of the Federation and of the National Code of Criminal Procedures.

Panama approved the National Energy Plan (PEN), 2015-2050," Panama the future we want," with a strong focus on the development of alternative energy sources. This roadmap proposes that, by 2050, at least 70% of the electricity matrix should come from renewable sources with an emphasis on solar and wind energy. In addition, this instrument forecasts energy savings by 2019, equivalent to what is generated by a small hydroelectric power plant. It also provides information about the definition of an equitable territorial regulation to locate the generation plants appropriately and promote transparency and competition in the sector, to achieve fair prices for the final consumer. The National Energy Plan 2015-2050 is a breakthrough that contemplates the entrance of natural gas to the energy matrix, the creation of a sustainable construction code and the implementation of labels that allow knowing about the efficiency of domestic appliances.

The implementation and dissemination of the Energy Policy of the Republic of **Paraguay** was approved by Decree, a document that contains guidelines aimed at meeting the energy needs of the population and all productive sectors, with criteria of quality, socio-environmental responsibility, and efficiency, were energy constitutes a factor of economic growth, industrial development and social progress, within the framework of regional integration. This long-range vision is expected to materialize through the fulfillment of strategic objectives (superior and specific) established for the National Energy Sector as a whole, as well as to defined objectives for each of the Subsectors: Electric subsector; Binational Hydroelectric Entities and Electrical Integration; Bioenergy and other Alternative Sources; and Hydrocarbons.

In the application of the guidelines established in the National Environmental Policy, **Peru** approved the National Environmental Education Plan 2017-2022 (PLANEA). This instrument is aimed at instilling in the population, through an integral educational process, the respect, care and conservation of the natural environment as a guarantee for the development of life, generating in the individual the knowledge, attitudes and practices necessary for the exercise of their activities in an environmentally appropriate way, with a view to contribute to the sustainable development of the country. Also, in order to comply with the international commitments assumed under the Paris Agreement, the Gender and Climate Change Action Plan was approved, an instrument focused on developing in the population the awareness and adaptive capacity for action against the effects, adverse impacts and opportunities of climate change by assessing women's contribution to the sustainable management of natural resources through the incorporation of a gender approach in risk management and natural disaster prevention. Along the same lines, and with the objective of preventing and monitoring environmental degradation, minimizing its causes and adopting the appropriate measures for mitigation, recovery, restoration or compensation, the Decree was approved that establishes provisions on air quality and creates the Multisectoral Working Group, a unit under the Ministry of the Environment that aims to coordinate and formulate proposals to improve the quality of fuels and reduce vehicle emissions levels and promote the necessary actions. In addition, the public need and national interest in the operation of the North Peruvian pipeline was declared by decree, and the reorganization and improvement of the corporate governance of Petroperú S. A. was ordered. This measure is aimed at guaranteeing the reliability of the supply of hydrocarbons to the internal market through the safe operation of the pipeline, promoting the development of hydrocarbon activities, and strengthening PETROPERÚ S. A. through a corporate governance structure.

On the basis of the constitutional postulate that the benefits received by the State for the exploitation of natural resources will be destined to the development of the nation and the provinces where they are in the proportion and conditions set by law, **Dominican Republic** created, by decree, the National Commission for the Implementation of the Extractive Industries Transparency Initiative, in its capacity as a tripartite body made up of representatives of the government sector. The aforementioned entity is in charge of promoting and presenting the country's candidature to the ITIES, including the definition of the scope of the initiative in the country, preparing, designing and approving the action plan, proposing measures, monitoring the actions and articulation of involved stakeholders.

Venezuela creates the Ministry of the Popular Power of Ecological Mining Development, ordering therefore the suppression of the Vice-ministry of Mines of the Ministry of Popular Power of Petroleum and Mining, instance that happens to be denominated Ministry of Popular Power of Petroleum. The measure is based on the national interest of concentrating the public policies and administrative structures developed by the Executive Power; and generate an instance of advice and coordination, regarding the development of the mining activity, ensuring that the exploitation of the potential of the mineral resources is carried out without damaging the environment or its biological diversity. Additionally, the creation of the State Company, Military Anonymous Company of Oil and Gas Mining Industries (CAMIMPEG) was authorized by decree, in charge of everything related to oil, gas and mining activities; including the area of rehabilitation and maintenance of oil wells; repair, maintenance and administration of drilling rigs, manufacture, repair and maintenance of flow stations, pumping stations and compressors; import, export, distribution, commercialization and sale of chemical products for the mining, oil and gas industry; construction of civil works, oil spill plan, waste management, decontamination, etc.

Hydrocarbons

Oil and derivatives

Given the persistence of the downward trend in the international prices of crude oil, **Argentina** approved the Decree that repeals the Special Regime for Small Refiners created in 2008 to encourage the production of fuels.

In order to encourage investment in the hydrocarbons sector, **Bolivia** made additions to the Hydrocarbons Law, pursuant to which are exempt of the maximum term of five years prior to the end of the contract stipulated to be able to subscribe addenda to the original contract, to the holders with current contracts in the exploitation phase and with regular commercial production as of December 11, 2015, who commit and execute new investments equal to or greater than three hundred and fifty million US dollars in exploration activities, or five hundred million US dollars in exploration activities and their development. This according to the Work Program and Budget to be approved by YPFB, aimed at increasing regular commercial production in the Contract Area; investments that must be executed within the framework of an investment plan within the next five (5) years, computed as of the enactment of said addition. For these purposes, the regulation of the Law for the Promotion of Investment in Hydrocarbon Exploration and Exploitation was approved, activities declared of national interest with emphasis on the need to achieve greater exploration in the so-called Non-Traditional Zone-ZNT within the framework of the guidelines established in the Patriotic Agenda for 2025.

On the other hand, and in compliance with what is established in the National Hydrocarbons Policy, with regard to the use of Hydrocarbons as a factor of national and integral development in a sustainable and sustainable manner in all economic activities and services; and in order to guarantee and promote the industrialization, commercialization and exportation of Hydrocarbons with added value, **Bolivia** approved the Supreme Decree that establishes the mechanisms of control, supervision and inspection of the commercialization and aeronautical use of Jet Fuel A-1 and Aviation gasoline. Also, it reforms the Fuel Quality Regulation and the Lubricants Regulation, in force since 2013. The complements and modifications are aimed at adapting fuel and lubricant quality specifications to the implementation of new technologies and products generated in order to increase supply for the domestic market.

Brazil passed legislative reforms that empower Petrobras in the exercise of the preferential right to act as operator and own a minimum participation of 30% in the consortiums formed for the exploitation of blocks tendered under the production sharing system.

Colombia published a new technical regulation applicable to LPG warehouses, outlets and points of sale, instrument aimed at improving and updating according to international standards the conditions of quality and safety that guarantee the protection of life and health of the community, as well as the integrity of the environment, minimizing the risks associated with the storage, distribution and commercialization of this fuel.

Additionally, the country issued the regulation that establishes the technical standards for the safe development of the LPG packaging activities in cylinders used in the provision of the domiciliary public service and/or in the loading of tanks destined to serve stationary tanks. On the other hand and in order to determine the levels of contamination of LPG when used in internal combustion engines and in automotive transport; evaluate the autonomy of the vehicle due to the difference in heat energy of this product with respect to motor gasoline and diesel; analyze the conditions of engine adaptability and the possible impacts that may arise from the use of this fuel, through resolution, there were set the technical and administrative conditions for conducting pilot tests aimed at evaluating the behavior of LPG as fuel in internal combustion engines, as well as in automotive transport, among other alternative uses.

In order to deter the committing of practices harmful to the general interest by certain market agents, **Ecuador** , via resolution approved the rules for the action and control of the commercialization of petroleum derivatives that establish the random control procedure of the Hydrocarbon Regulation and Control Agency, ARCH, in cases of infringements detected at the time of their commission, related to alteration of the quantity and adulteration of the quality of liquid fuels derived from petroleum and its mixtures with biofuels and LPG.

Mexico approved reforms and additions to the Hydrocarbon Revenue Law, aimed at providing greater flexibility to the sale of tax receipts. The modifications are concentrated in four fundamental points: Right for shared utility, Mechanism of adjustment, Determination of receipts of expenses in consortia for fiscal purposes, Conduct of Audits and visits of the Tax Administration Service. Likewise, Mexico updated its Official Regulation that contains the technical regulations of obligatory observance established by the quality specifications to be met by the petroleum products at each stage of the production and supply chain, in national territory, including their import, in order to promote the efficient development of the activities of production, transport and storage, distribution and sale of petroleum products, and to safeguard the provision of said services, to foster a sound competition in the sector, to protect the interests of users, to promote an adequate national coverage and to attend to the reliability, stability and security of the permitted activities.

In order to update the quality specifications of light diesel, fundamentally with regard to environmental and technological aspects, **Panama** approved new Technical Regulations, Oil Industries and Related Technology. Diesel 2D Grade, an instrument of mandatory compliance that replaces the one adopted in 2007. The main changes are aimed at adjusting the concentration of sulfur content to international standards focused on reducing environmental pollution and adapting the product to the source of supply. The established requirements apply to diesel fuels destined for internal combustion engines, industrial and agricultural machinery, engines for electric generation and others that require fuel and/or are sold nationwide.

Paraguay, via decree, established for Gasoil / Diesel Type 3 and Marine Diesel, a rate of 18% of the Selective Consumption Tax, on the retail price. The modification specifies the basis for the collection of the tax, allowing the Treasury to acquire a greater collection, taking into account that it increases the taxable base for the liquidation of the tax, both in relation to what was established at the time of importation into Customs and with the transitory fixed in the aforementioned decree.

In order to guarantee the efficient exploitation of hydrocarbon reserves, the integrity of the people and the preservation of the environment, **Dominican Republic** approved the Regulation on Exploration and Production of Hydrocarbons, an instrument that constitutes the fundamental legal basis for attracting investment in hydrocarbons, promoting the development of local industry through the implementation of clear and predictable rules, leaving a record of the absolute, inalienable and imprescriptible dominance of hydrocarbons. The regulation establishes the parameters and procedures concerning the granting of authorizations, concessions or permits for exploration and production of hydrocarbons at the national level. The exploration and exploitation of the mineral coal are excepted from the provisions of the Regulation. On the other hand, it was approved the Regulation for the System of Refund of Selective Taxes on Consumption of all Fossil Fuels and Petroleum Derivatives that establish the application procedure and the conditions for the beneficiaries of the aforementioned system established for electric power generators and other economic agents.

Venezuela established, through resolution, the methodology for the planning, monitoring and control of the production costs of companies that feed on non-petrochemical hydrocarbon streams, with the aim of orienting them towards satisfying the needs of the nation. The aforementioned instrument also regulates the evaluation of projects for new production units, as well as the registration and permits for companies that industrialize hydrocarbons for non-petrochemical use. Any person engaged in the industrialization of refined hydrocarbons that are not of non-petrochemical use is subject to the application of this resolution.
On the other hand, and in order to avoid, that the differential between the price of gasoline issued in the national territory and the price of said fuel in bordering countries be exploited fraudulently and by criminal groups, Venezuela, within the framework of the state of emergency and economic emergency, decrees "Special border establishments for the commercialization of fuels", subject to special conditions for the commercialization of Venezuelan fuel and related goods and services.

In order to update the regulation regarding LPG to the new realities of the market and contribute to the improvement in the regular, efficient and safe provision of activities related to LPG, **Uruguay** approved the guidelines for making adjustments to the Regulation for the Provision of Activities of Wholesale Marketing, Transportation, Packaging, Recharge and Distribution of LPG. This action was aimed at the determination and regulation of the conditions for the granting of authorizations for the realization of activities of packaging and distribution of GLP; the due formalization of the links in the LPG market chain to facilitate the permanent and direct exchange of information and coordinate state action in an efficient manner; encourage greater diversification in the modalities and possibilities of supply for supply; perform periodic monitoring of indices that allow evaluating over time, in an objective manner, the performance evolution of the different actors involved in the LPG market in terms of efficiency, safety and product and service quality.

Natural gas

Taking into account that, within the framework of the energy policies promoted so far, there have been agents of the hydrocarbon sector who, due to the conditions of the deposits they exploit, have not been able to access the benefits established in the respective programs; and for the purpose of continuing with the programs promoted with a view to increasing gas production in the short term, reducing imports and stimulating investment in exploration and exploitation in order to have new deposits to recover the reserve horizon in the national territory, **Argentina,** created the "Program to Stimulate New Natural Gas Projects" by the Secretariat of Hydrocarbon Resources.

In order to cover regulatory gaps **Bolivia** approved, by decree, the guidelines and criteria for the determination of the prices of Natural Gas for its commercialization in the internal market destined to the Distribution of Natural Gas by Networks, to the thermoelectric generation, to the direct consumers that use the Natural Gas for their own consumption and that are outside a geographical area of Gas Distribution by Networks, Natural Gas used in the Fields producing Liquid Hydrocarbons such as Gas Lift and the one used in liquefiable extraction plants that are within the Areas of Operation Contracts. The aforementioned instrument sets a maximum price for the Gas Lift; it also determines a minimum price for Natural Gas used in liquefied extraction plants that are within the areas of the operating contracts that take the Transportation System, establishing that this cannot be less than the price of Natural Gas used as fuel for Refining, to which the Internal Market Transportation Rate- TMI will be added. Likewise, in order to meet the goals proposed by the Executing Entity for Conversion to Natural Gas Vehicles - EEC-GNV, given the insufficient budget for the requalification of cylinders of Natural Gas Vehicles (NGV) and to strengthen the execution of the Program of Requalification and Replacement of Cylinders for NGV, without modifying the cost to the final user of NGV or the total value of the sum of the assigned amounts, were modified via decree, the amounts allocated to the NGV Cylinder Recall and Replenishment Fund (FRCGNV) and the CNG Vehicle Conversion Fund (FCVGNV).

In order to maximize the economic value of natural gas, both oil-associated gas in conventional and non-conventional oil fields, in the exploration and extraction of hydrocarbons, **Mexico** approved the provisions establishing the technical and operational elements that define the goal, on the basis of which the associated natural gas development programs should be structured, within the framework of the process of approval of exploration and development plans for hydrocarbon extraction. The aforementioned regulations of general compliance and mandatory character specify the procedures, requirements, and criteria to be met by oil tanker operators in the process of evaluating the alternatives aimed at planning and achieving the best use of these hydrocarbons.

Peru reformed the regulations that create the Energy Security System in Hydrocarbons (SISE) and the Energy Social Inclusion Fund (FISE). The amendments are aimed at reflecting in the procedural scope the changes approved in the legislation with respect to: modification of the destination of FISE resources for the Massification of the Use of Natural Gas from Vulnerable Sectors to Population of Minor Resources with the purpose of expand the use of Gas; modification of the transportation surcharge for surcharge on the supply of liquid products derived from hydrocarbons and natural gas liquids, as one of the resources financed by the FISE. In addition, the reforms focus on achieving the required complementation and concordance between the law that creates the FISE and that which determines the Hydrocarbon Energy Security System, in order to guarantee the strengthening of national energy security through diversification of sources, reduction of external dependence and reliability in the supply chain. On the other hand, the regulatory reform concentrates on enhancing compliance with the objectives of the auctions established in the Regulation for the promotion of electricity investment in areas not connected to the grid with regard to the use of FISE resources. This is to cover other costs directly associated with the Autonomous RER facilities and the annual remuneration derived from investment and service contracts within the framework of the process of promoting electricity investment in areas not connected to the grid. Finally, there are provisions to improve the application of the Law for the Promotion of the Efficient Use of Energy.

Electricity

Bolivia, by supreme decree, declared the strategic and national priority nature of the implementation and execution of the Bolivian Nuclear Program, PNB, in all its stages, components and applications, with the central level of the State, autonomous territorial entities and private institutions, the necessary support for its development.

Brazil made amendments to the law that regulates electric power services in isolated systems. Under the terms of the reforms, among other provisions, the inclusion in the total cost of the electric power generation of the isolated systems, of the fixed and variable costs related to: the contracting of associated power, the generation required to attend the public service of distribution of electric power, the expenses and taxes of the electric sector and the investments made. Additionally, it is determined that from January 2017 ,1 to December 2020 ,31, the valuation of the corresponding amount of electric energy by the average cost of power and energy marketed in the Regulated Contracting Environment (ACR) of the National Interconnected System (SIN) will exclude sectorial charges, which will be included, from January 1st, 2030, in the valuation of the corresponding amount of electric energy by the average cost of power and energy commercialized in ACR of the SIN. In this sense, it is determined that from January 1st, 2021 to December 31st, 2029, the valuation of the corresponding amount of electric energy by the average cost of power and energy marketed in the RCA of the SIN will gradually increase annually by one-tenth of the sectorial expenditures. On the other hand, and in order to ensure continuity and efficiency of service provision, as well as the reduction of tariffs, modifications were made to the law that regulates electricity generation, transmission, and distribution concessions.

The amendments determine that the concessionaires or licensees of electricity generation with a capacity equal to or less than 5 MW, at the expiration of the concession or authorization term, will be exempted from the concession, permit or authorization, and must only inform the granting power, among other provisions aimed at making the process of granting concessions, authorizations and extensions for hydroelectric generation more flexible and easier.

Likewise, in order to optimize the operation of the system of provision of the public electric power service **Brazil** made changes to the law that provides for the expansion of the supply of emergency electric power, restructuring of the extraordinary rate, and the creation of the Alternative Electric Power Source Incentive Program (PROINFA), the Energy Development Account (CDE), and the universalization of the public electric power service. Under the reforms, the objectives of the Energy Development Account include the provision of resources for: compensation for discounts applied to the use of electricity transmission system tariffs; expenses for electricity generation in isolated systems; payment of securities related to the administration and operation of the Energy Development Account, the Fuel Consumption Account and the Global Reversion Reserve (RGR) of the Electric Energy Trading Chamber (CCEE), including administrative and financial and tax charges; resources to compensate for the tariff impact of the reduced load density of the rural electrification cooperatives market, concessionaires, in relation to the main supplier of distribution, among others. In addition, among other provisions, mechanisms are established to achieve in the long term (2030) that the apportionment of the annual quotas of the Energy Development Account is proportional to the electricity consumer market served by the concessionaires and the distribution and transmission permits, expressed in MWh.

On the other hand, **Brazil** made amendments to the law that establishes the system of concessions of public electric power services, according to which the subsidy to be received by rural electrification cooperatives, concessionaires or permit holders to compensate for the reduced load density of their market will be equal to the additional value of required income that would need to be granted to the main distribution concessionaire providing the services if the assets, the market and the consumers of the rural electrification cooperative, concessionaire or permit holder were part of its concession. On these premises, the discounts granted to the rural electrification cooperatives, concessionaires or permit holders, in the rates of use of the distribution and transmission systems and in the energy, tariffs will be reduced until their extinction. Likewise, ANEEL shall, for purposes of the definition of the subsidy and discounts on the tariffs for the use of distribution and transmission systems and energy tariffs, consider the market limited to 500 GWh / year for the electrification rural cooperatives whose own markets are higher than 500 GWh / year.

Likewise, **Brazil** promulgated the Cooperation Agreement with the European Atomic Energy Community in the area of research, signed in November 2009, with the aim of intensifying cooperation between the parties in the fields covered by their respective fusion programmes on the basis of the principle of mutual benefit and reciprocity in general in order to develop the scientific knowledge and technological capacity underlying a fusion energy system.

Chile approved by law the establishment of a new electric transmission system focused on favoring the development of a competitive market, to lower energy prices to the end customer, free and regulated; greater transparency for consumers in the payment of transmission; improvements in safety standards and quality of service system, as well as promoting the development of non-conventional renewable energies. To this end, significant modifications were made to the electrical regulation established in accordance with the general law on electrical services and the law creating the Superintendence of Electricity and Fuels. Among the most relevant reforms are: the creation of a new and unique independent coordinating body for the national electricity system to replace the Cargo Economic Dispatch Centers; a new nomenclature for transmission systems, energy planning and transmission expansion; profound changes in the system's remuneration model; compensation for unavailability of supply; and complementary services to maintain the quality, safety and permanent technological updating of the system. In this context, amendments were made to the decree establishing the Regulations of the General Law of Electrical Services in order to include the legal precepts necessary to promote competition in the markets for services associated with electricity supply.

On the other hand, **Chile** approved the law that establishes mechanisms of equity in electricity service tariffs, by introducing two fundamental measures to be implemented in two stages: recognition of local generation, through a monthly reduction in electricity service bills for all communes that generate energy. Residential tariff equity, according to which no account for electricity service may exceed 10% of the national average, in order to correct the difference between the most expensive and the cheapest commune, which has reached more than 70%. In the same way, powers are granted to include part or all of the services associated with the supply in the tariff, and this provision ends with the individual charging of the electricity cut-off and replacement.

Evaluating the incidence of unexpected events related to technical exits of the system by some hydraulic and thermal generators that reduce the safety strip aimed at guaranteeing, in times of low hydrology, the continuity and quality of the provision of the domestic public service of electric energy and put at risk the provision of the service in hours of high energy demand; **Colombia** made additions to the Single Decree regulating the Mining and Energy Sector, to the effect that the Commission for Energy and Gas Regulation (CREG) is empowered, in extraordinary circumstances, to adjust the tariff formulas to establish a differential scheme that promotes savings in energy consumption by users.

Likewise, and with the purpose of the optimal and integral development of the project contemplated in the concession scheme for the provision of electric energy service in the Amazonas Exclusive Service Area, within the framework of the planning and promotion of energy solutions for non-interconnected areas and given the need to update the procedure for the granting of subsidies for the electric sector in the exclusive service areas of non-interconnected continental zones. **Colombia** amended the general formula for determining subsidies to be applied to residential and non-residential electricity service users.

In order to update the criteria for the commercial liquidation of the energy produced by the power plants or generation units during the technical testing and experimental operation stages on the basis of the Organic Law of the Public Electric Energy Service, **Ecuador** published the regulation that determines the requirements and the procedure to be followed by the holders of certificates authorizing generation, in order to start the technical testing and experimental operation stages. In addition to it, and in order to ensure that the National Electricity Operator CENACE count with the information necessary for the settlement of electricity transactions carried out within the ESS in a safe, timely and reliable manner, the regulation was issued establishing the minimum requirements and conditions that the participants of the Ecuadorian Electricity Sector SEE must meet, with regard to the installation and operation of the Commercial Measurement System SISMEC, general technical characteristics of the SISMEC.

El Salvador made amendments to the penal code, reformulating the denomination, hypothesis and penalization of the crime established in article 211, redefined as "fraud of energy and fluid services", sanctioned, in accordance with the reforms, with imprisonment from one to three to more than the corresponding fine, the amount of which was increased.

Assessing the need to adapt the regulations to the current circumstances, and given the construction of new hydroelectric plants in the country, **Guatemala** approved dam's safety regulations, mandatory application for the person in charge of the dam in all phases of a hydroelectric plant or distributed renewable hydroelectric generator. This regulation includes all aspects of design, auscultation, the operation of dams, as well as operational safety measures and emergency plans.

Panama approved amendments and additions to the Law that contains the regulatory and institutional framework for the provision of public electricity service, to promote equity in the supply of electricity in rural areas. These reforms are aimed at solving identified difficulties in accessing the benefits of the Rural Electrification Fund, as well as facilitating the contribution of market agents by extending the pre-established term, among other administrative and sanctioning measures.

In order to ensure the proper application of the provisions aimed at establishing mechanisms that allow a greater amount of investments in improving the coverage and quality of electric services **Peru** approved the regulation of the Legislative Decree that promotes the development of investment plans in the distribution companies under the scope of the National Fund for the Financing of State Business Activity (FONAFE). The Regulation of the Wholesale Electricity Market was also approved, under which some provisions of the Short-Term Market are perfected. It includes rules on the participation of new agents, as well as the obligations to be fulfilled by the Economic Operation Committee of the National Interconnected System (COES). Other aspects include ensuring the efficiency of generation, reducing the exposure of the national electricity system to price volatility and rationing risks, assuring the final consumer a more competitive electric tariff, reducing administrative intervention for the determination of generation prices through market solutions and the adoption of measures necessary to foster effective competition in the generation market.

On the other hand, reforms to the Regulation of the Electric Concessions Law, to the Transmission Regulation and to the Regulation of Free Users of Electricity were approved. The modifications are aimed at improving the implementation of the legislative framework regarding the use of terms, the operation of the Concessions Registry and Electric Authorizations. It is also aimed at requirements and procedures for requesting and granting concessions and temporary and definitive authorizations, temporary concession for studies of power plants of generation, substations and transmission lines, calculation of compensations, determination of distribution sectors, compensation for interruption of supply, calculation of the internal rate of return, billing data, establishment of easements, optimal use for hydroelectric projects, readjustment factor for quality of services, billing of tolls for connection and transmission, maximum demand range, implementation of intelligent metering systems, among other technical, administrative and operational aspects.

On the other hand, and with the purpose to ensure the competitiveness of residential electricity tariffs, **Peru** enacted the Law that creates the mechanism of compensation of the residential electricity tariff aimed at reducing the energy charge and the fixed charge of the BT5B tariff, and other tariff options applicable to residential users in all the country's electricity systems, before the application of the Clearing Fund Mechanism Social Electricity (FOSE). The referred mechanism will be financed with the balances available from the Social Energy Inclusion Fund (FISE), provided for in the Law that creates the Energy Security System in Hydrocarbons and the Social Energy Inclusion Fund, up to a maximum of 180 million soles per year, so it will not require additional resources from the public treasury. According to the Supervisory Agency for Investment in Energy and Mining (Osinergmin), the benefit of the reduction in electricity tariffs will reach more than 2.8 million residential users who would obtain a discount in their tariffs of up to 68%. Electricity supplies with photovoltaic systems and similar systems with other non-conventional renewable energy resources are exempted from the application of the compensation mechanism to the residential electricity tariff with the norm, the electricity tariff of residential users throughout the country will not be greater than S / 0.55 kilowatt-hour (kWh), regardless of their geographical location and the electrical system to which they belong. Likewise, via decree, amended the Regulations for the promotion of Electrical Investment in Non-Networked Areas. The reforms are aimed at establishing precisions that guarantee the adequate application of the Compensation Mechanism for the Generation in Isolated Electrical Systems (MCGSEA) with respect to the compensation of the autonomous RER (Renewable Energy Resources) rate corresponding to the Health Entities, Educational Institutions and others defined in the Bases, subsidized by the Social Energy Inclusion Fund (FISE).

With the objective of guaranteeing the safety and reliability of the electric service and achieving the reduction of fires and deaths due to electrocution, due to conditions attributable to the quality of the electrical connections, equipment and products used in them, **Paraguay** approved the law of verification and control of the quality and safety of products and services in electrical installations.

Considering the negative impact of the "El Niño" weather phenomenon in the decrease of water contributions to reservoirs destined for hydroelectric generation and the accelerated growth of the demand for electric power, **Venezuela**, via decree, activated the Presidential Commission of the Electrical General Staff and instructed all bodies and entities of the National Public Administration to implement plans to reduce electricity consumption by at least 30% as of the effective date of the decree, taking as a reference the consumption of the same month of the previous year. With this background, a special work schedule is established for the bodies and entities of the Public Administration, until further notice, from 7.30 am to 1.00 pm, excluding from this determination the public attention units, essential sectors, and services, as well as high level and trust personnel. Likewise, the Ministry of People's Power for Electric Energy is instructed to take measures to increase thermoelectric generation during the hydroelectric crisis.

Energy Efficiency

Brazil made modifications to the law that regulates the execution of investments in research, development and energy efficiency by the concessionary, permitting and authorized companies of the electric energy sector. According to the reforms, the concessionaires of electricity distribution will be able to apply up to 80% of the resources of their energy efficiency programs in consumer units that benefit from the Electric Energy Social Tariff, in low-income communities and rural communities, among other measures aimed at improving regulations and compliance with the application of the resources allocated to energy efficiency programs.

Colombia,through resolution, made additions and modifications in definitions applicable to lamps and luminaires using LED technology, availability, and access to minimum product information, an extension of the term for the use of incandescent halogen technology and flexibility of requirements applicable to decorative luminaires.

In order to have a guiding framework focused on ensuring security of supply, rational and efficient use of resources and energy in a sustainable manner, in compliance with the provisions of the national development plan, based on economic, competitive, quality and environmental parameters, **Panama** approved the Guide for Sustainable Construction for Energy Saving in Buildings and measures for the rational and efficient use of energy, for the construction of new buildings in the national territory. The Guide contains the baseline of energy consumption for each type of building, as well as proposals for active and passive measures aimed at achieving compliance with the established minimum savings percentages. The actions to be implemented include the use of mechanical and/or electrical systems to guarantee comfort conditions inside the buildings, through boilers and air conditioning, mechanical ventilation, electric lighting, etc. In addition, passive measures are also included in the architectural design of the buildings, aimed at ensuring that the environmental conditions of the surroundings are exploited, promoting sources of thermal control, ventilation and energy reduction, without compromising comfort, taking into account climate, location, landscape, orientation, shape, solar protection, material selection, thermal mass, insulation, interior design and the location of openings for the management of solar access, light and natural ventilation.

Uruguay, via decree, approved the Manual of Energy Efficiency Certificates, an instrument that establishes the guidelines of the process for its issuance and attainment by the beneficiaries. According to the aforementioned document, users or providers of Energy Services must comply with the general criteria defined in the National Energy Efficiency Plan and comply with the specific conditions established by the Ministry of Industry, Energy, and Mining (MIEM) for each call.

Renewable Sources

Argentina published the new regulation of the Law of Renewable Energies, recently reformed at the end of 2015. The reforms focused on guaranteeing that by 2017, 8% of the national electric power matrix will be integrated by renewable sources until reaching 20% by the year 2025. One of the main contributions is the establishment of mechanisms for the creation of a trust fund (FODER) to support the financing of investment projects required to meet new aspirations in renewable energy. Another fundamental aspect focuses on the setting of obligations with a penalty for non-compliance, for large users of electricity (consumption equal to or greater than 300 kW) who must meet certain targets for renewable energy consumption. With the approval of the new regulation, it is completed the National Promotion Regime for the Use of Renewable Sources of Energy Destined for the Production of Electric Power In terms of tax incentives, the new regulation establishes: accelerated amortization of income tax; Advance refund of the Value Added Tax (VAT); exemption from the minimum presumed income tax; tax certificate for 20% of the national component provided that a minimum of 30% is integrated; tax exemption on the distribution of dividends (10%) before the reinvestment of profits; exemption of import duties for capital goods and equipment until 2017; no application of specific taxes, national, provincial and municipal royalties during the promotion and transfer of possible tax increases to the prices of contracts.

On the other hand, with a view to fostering stability in the supply of bioethanol made from sugar cane and that produced from corn, in order to obtain greater energy security by virtue of the diversification of raw materials and to promote a balanced development harmonic of the regions incorporating value aggregate in origin, **Argentina** approved, via Decree, the increase of 10 to 12%, mandatory for the minimum in volume, of the participation of Bioethanol in the naphtha of automotive use to be marketed throughout the National Territory, with a mandatory nature for the companies in charge of making the mixtures.

Brazil made modifications to the law that establishes the National Electric Energy Agency ANEEL, and establishes the system of concessions of public services of electric power, according to which it established that for the hydroelectric ventures with a power equal to or less than 5,000 kW (five thousand kilowatts) and for those based on solar, wind, biomass and cogeneration, including solid urban and rural waste, whose power is injected into transmission systems or If the distribution is less than or equal to 30,000 kW, ANEEL will establish a reduction percentage of not less than 50% applicable to the tariffs for the use of electrical transmission and distribution systems, focusing on the production and consumption of energy. Likewise, in order to reduce diesel imports and promote the development of agriculture through incentives to production, Brazil, published the law that establishes changes in the percentages established in 2014 for the mandatory addition of biodiesel in diesel oil, according to the reforms the federal government increased from 7 to 8% the mandatory percentage of biodiesel in diesel fuel sold to consumers. The mandatory mix will be increased again up to 9% from 1 March 2018 until reaching 10 % in March 2019.

Through Resolution of the Energy Mining Planning Unit, UPME, **Colombia** established the procedures and requirements to issue the certification and endorse projects from non-conventional sources of energy (FNCE), with aims to obtain the benefit of the VAT exclusion and the exemption from tariff charges referred to in articles 12 and 13 of the Law 1715 of 2014 among other related provisions. These fiscal benefits are focused on promoting investment, research and development of clean technologies for energy production and energy efficiency, through the application of incentives. Additionally, the Ministry of Environment and Sustainable Development established the procedure and requirements for the issuance of environmental certification for new investments in projects from non-conventional sources of renewable energy and efficient energy management, to obtain tax benefits in terms of special deduction of rent and complementary, VAT exclusion. In addition, within the framework of the promotion of the use and exploitation of renewable natural resources, Colombia published the resolution that determines the terms of reference for the preparation of the Environmental Impact Study - EIA, required for the process of the environmental license of projects for the use of continental wind energy sources.

In order to reduce the country's dependence and energy vulnerability in the short term, through the acceleration of the process of diversification of the energy matrix, prioritizing unconventional renewable energy sources -ERNC, **Ecuador** issued the regulation that establishes the criteria and technical requirements related to the connection of non-conventional renewable generators to the transmission and distribution networks, in order not to degrade the quality and reliability of the electric power service, in the area of influence of the generator; maintain the current and voltage levels of the system within their allowable ranges at all times; and ensure the efficient and safe operation of the network.

Panama made amendments and additions to the law that establishes the incentive regime for the promotion of the construction, operation and maintenance of power plants and / or solar installations, according to which the benefits of tax exemption for the acquisition of equipment and other materials necessary for the construction operation and maintenance of infrastructure to all natural or legal persons who acquire the goods described in the law, incentives that were previously restricted to builders, operators or installers. Additionally, autonomous and semi-autonomous entities, beneficiaries of the law, are authorized to sign agreements with international organizations to obtain financing, training, goods or equipment related to photovoltaic technology.

Given the significant increase in the generation of electricity from renewable sources at the national level and the opportunity to promote activity in the industrial sector that uses electricity intensively, by taking advantage of generation surpluses in relation to domestic demand, **Uruguay** enacted the Decree that urges the National Administration of Power Plants and Transmissions (UTE) to implement a program of commercial benefits for industrial companies in which the annual cost in acquisition of electric power represents a value greater than or equal to 5% of the value Annual Production Gross (VBP). The aforementioned benefit will be materialized through a discount of up to 50% to the energy charge, applied monthly for the maintenance or increase in the consumption of electricity, for subscribers categorized as industrial according to Section C, Divisions 10 to 33 of the Uniform Industrial International Classification Code, Revision IV. The benefit may be extended for 12 months, renewable for the same period if the requirements for increasing or maintaining physical production and carrying out the committed external energy audit are maintained. For the application of the benefit, the UTE will make a comparison of the energy consumption of the current month with the consumption of the same month in the previous year and will determine the corresponding bonus percentage. In the event of three monthly losses in consumption, the benefit will be interrupted. In the event that the industrial consumer has obtained the benefit promoted by the implementation of energy efficiency measures promoted by MIEM and the joint venture, the energy savings resulting from the implementation of said measures will be considered to continue promoting efficient energy consumption. On the other hand, as an incentive to the development of renewable energy sources, Uruguay made modifications to the orderly text of the General Tax Directorate according to which it grants exonerations and other tax benefits to the production of solar panels for the generation of photovoltaic energy, including the establishment of a VAT refund regime applicable to purchases in term and imports of the goods and services destined to integrate the cost of the aforementioned solar panels.

Energy and Environment

With the ratification of the 80 countries that represent more than 55% of global emissions, on November 4th, 2016, entered into effect the **Paris Climate Accord** of the United Nations Framework Convention on Climate Change, adopted in December 2015 among the Parties, in order to strengthen the global response to the threat of climate change in the context of sustainable development and efforts to eradicate poverty. The aforementioned Agreement intends to maintain the increase in average global temperature well below 2 ° C with respect to pre-industrial levels and continue efforts to limit this temperature increase to 1.5 ° C, with respect to pre-industrial levels, recognizing that these measures will significantly reduce the risks and effects of climate change; increase the ability to adapt to the adverse effects of climate change and promote resilience to climate and development with low greenhouse gas emissions, in a way that does not compromise food production; raise financial flows to a level compatible with a trajectory that leads to climate-resilient development and low greenhouse gas emissions. It should be noted that the Agreement will be applied in a way that reflects equity and the principle of common but differentiated responsibilities and respective capabilities, in light of different national circumstances.

Bolivia approved the regulation of the Law of Integral Waste Management, for its implementation in observance of the right to health, to live in a healthy and balanced environment, as well as to the rights of Mother Earth.

In order to fill gaps in under-represented ecosystems, mitigate threats and promote territorial and biological connectivity of existing protected areas **Chile** has approved the law establishing the real right to environmental conservation, which encourages and allows the formalization of private conservation initiatives, thus complementing the State's role in the protection of natural heritage, through the implementation of a legal and voluntary mechanism that allows the owner of a natural area to dedicate it to conservation without losing his right to ownership over it, which in the international legal sphere is known as an ecological easement.

With the aim of monitoring the quality of fuels in order to avoid air and water pollution as well as to control the effects that they can have on human health and the environment, **Costa Rica** published the Regulation for the control of polluting emissions produced by vehicles with internal combustion engines, an instrument that establishes the following guidelines for the entry and circulation control of vehicles equipped with an internal combustion engine for self-propulsion, based on their polluting emissions. It includes the establishment of permitted emission levels for any motor vehicle circulating on public roads and using petrol, diesel, LPG, alcohol or blends thereof as fuel.

In order to create and strengthen ecological awareness in the population, **Mexico** made changes to the General Law of ecological balance and environmental protection, according to which it is determined that the competent authorities will promote the incorporation of ecological content, sustainable development, mitigation, adaptation and reduction of vulnerability to climate change, protection of the environment, knowledge, values, and competences, in the various educational cycles, especially at the basic level, as well as in the cultural formation of children and youth.

In order to counteract the substantial increase in the levels of environmental pollution generated by inadequate maintenance of motor vehicles, lack of control and the growth of the vehicle fleet, **Peru** established via decree new maximum permissible limits of polluting emissions for motor vehicles circulating on the road network applicable to both new and used vehicles. In this sense, the procedures for testing and analysis of results for the control of vehicle emissions are specified, as well as the equipment used for this purpose. This decree expressly establishes the penalties applicable to offenders who exceed the limits established, in accordance with the provisions of the National Traffic Regulations. On the other hand, the internal regulations were adapted to the standards of the World Technical Regulation of the Economic Commission for Europe of the United Nations in relation to the implementation for motorcycles of a procedure for measuring modern and globally-used gas emissions called WMTC for its acronym in English (Worldwide Harmonized Motorcycle Emissions Certification / Test Procedure).

International agreements, integration, and interconnections

Within the framework of what is established in the Patriotic Agenda of the Bicentennial 2025, an instrument that includes among its fundamental pillars, scientific and technological sovereignty with its own identity to consolidate the technological sovereignty of the country, The Bolivian State ratified the "Agreement between the Government of the Plurinational State of **Bolivia** and the Government of the Russian Federation on cooperation in the construction of the Center for Research and Development in Nuclear Technology in the territory of the Plurinational State of Bolivia ", signed in the city of El Alto, on March 6, 2016. Bolivia also ratified the "Framework Agreement between the Governments of the Plurinational State of Bolivia and the Republic of Paraguay for the Provision of Natural Gas, Liquefied Natural Gas, Liquefied Petroleum Gas and Other Petroleum Derivatives", signed in the city of Yacuiba, Department of Tarija, on August 24, 2015.

The representatives of the CANREL's electricity regulators completed the elaboration of the draft decision entitled "Regulatory Framework for the Sub-Regional Interconnection of Electrical Systems and Community Electricity Exchange", in order to be considered by said Committee and subsequently raised after its review and approval to the Commission. However, in response to the request of the Delegation of Peru, Decision 811 was issued, which extends the period for the suspension of Decision 536 until February 28, 2017. At the XIX Meeting of CANREL, held in December 2016, the delegations of the Member Countries of the **Andean Community** (CAN) agreed that the text of the new Decision will be sent by official note to the General Secretariat of the CAN, for the procedure corresponding, with a view to raising the project for consideration by the CAN.

El Salvador ratifies the Second Additional Protocol to the Agreement on Economic Complementation between the Government of the Republic of El Salvador, the Government of the United Mexican States and the Government of the Republic of **Guatemala** on Trade and Transport of Natural Gas. This update was aimed at facilitating the bidding process and access to international financing for the implementation of a regional gas pipeline. Additionally, it was ratified the Third Protocol of this instrument to formalize the accession of the Republic of **Honduras** to the referred process of economic complementation.

Annexes and bibliography

ABEN	Bolivian Nuclear Energy Agency
ACR	Regulated Contracting Environment
ANCAP	National Administration of Fuels, Alcohol and Portland
ANEEL	National Agency of Electric Energy
APEC	Asia-Pacific Economic Cooperation
ARCH	Hydrocarbons Regulation and Control Agency
BID	Inter-American Development Bank
BNDH	National Hydrocarbons Database
CAMIMPEG	Military Anonymous Company of Oil and Gas Mining Industries
CCEE	Electric Power Marketing Chamber
CDE	Energy Development Account
CEL	Clean Energy Certificates
CENACE	National Electricity Operator
CFE	Federal electricity commission
CI	Intermediate Consumption
CIEMS	Interconnection Commission to SIEPAC
CNPC	National Petroleum Corporation of China
COES	Committee of Economic Operation of the National Interconnected System
CREG	Energy and Gas Regulation Commission
DRNI - ECLAC	Division of Natural Resources and Infrastructure of ECLAC
ECLAC	United Nations Economic Commission for Latin America and the Caribbean
EMR	Measurement and Regulation Station
FAER	Financial Support Fund for the Energization of Rural Areas

FAZNI	Financial Support Fund for the Energization of Non-interconnected Areas
FISE	Social Energy Inclusion Fund
FODIEN	Development Fund of the National Electric Industry
FONAFE	National Fund for the Financing of the State's Business Activity
FOSE	Electric Social Compensation Fund
GAV	Gross Value Added
GDP	Gross domestic product
GPV	Gross Production Value
GZ	Glauconitic Zone
IRENA	International Renewable Energy Agency
MEER	Minister of Electricity and Renewable Energy
MEM	Wholesale Electricity Market
MME	Mnistry of Mines and Energy
OGE & EE	Optimization of Electricity Generation and Energy Efficiency
OLADE	Latin American Energy Organization
ONU	United Nations
OPEC	Organization of Petroleum Exporting Countries
PDVSA	Petroleum of Venezuela, S.A
PEN	National Energy Plan
PLANEA	National Plan for Environmental Education
PLANEE	National Energy Efficiency Plan
PPA	Purchasing Power Parity
PRODESEN	Development Program of the National Electric System

PROINFA	Incentive Program for Alternative Sources of Electric Power
RGR	Global Reversal Reserve
SAVE	Electric Vehicle Power Systems
SCADA	Supervision, Control and Data Acquisition
SEIN	National Interconnected Electric System
SEN	National Electric System (Venezuela)
SEN	National Electroenergetic System (Cuba)
SER	Secretary of Foreign Relations
SH	Secretariat of Hydrocarbons
sieLAC	Latin America and The Caribbean Energy Information System
SIEPAC	Electric Interconnection System for Central American Countries
SIN	National Interconnected System
SISMEC	Commercial Measurement System
UPME	Mining and Energy Planning Unit
USGS	United States Geological Survey
UTE	National Administration of Power Plants and Electrical Transmissions

bbl	American barrels
boe	Barrels of oil equivalent
CO_2	Carbon dioxide
FOE	Fuel oil for engines
Gm^3	Billions of cubic meters
GW	Gigawatt
GWh	Gigawatt hour
GWh / year	Gigawatt hour per year
HP	Horsepower
Inhab.	Inhabitants
Inhab. / km^2	Inhabitants per square kilometer
kbbl	Thousands of American barrels
kbbl / día	Thousands of barrels per day
kboe	Thousands of barrels of oil equivalent
km	kilometers
km^2	square kilometers
koe	Kilogram of oil equivalent
koe / inhab.	Kilogram of oil equivalent per inhabitant
koe/ USD	Equivalent kilogram of oil per US dollar
koe / USD 2011 PPA	Kilogram equivalent of oil per dollar of GDP Purchasing Power Parity at constant prices 2011
kt	One thousand metric tons
ktoe	Thousands of tons of oil equivalent
kV	Kilovolt

kW	Kilowatt
kWh	Kilowatt hour
kWh / inhab.	Kilowatt hour per inhabitant
kWh / month	Kilowatt hour per month
kWh/m^2	kilowatt hour per square meter
kWp	Kilowatt peak
LPG	Liquified pretoleum gas
LGN	Liquefied natural gas
Mbbl	Million of American barrels
Mbbl / day	Million of barrels per day
Mboe	Million of barrels of oil equivalent
Mboe / day	Million of barrels of oil equivalent per day
Mm^3	Million of cubic meters
Mm^3 / day	Million of cubic meters per day
Mmcd	Million of standard cubic meters per day
Mpcd	Millions of standard cubic feet per day
Mt	Millions of tons
Mtoe	Millions of tons of oil equivalent
MUSD	Millions of US dollars
MVA	Megavoltamperio
MW	Megawatt
MWh	Megawatt hour
NGV	Natural Vehicular Gas

Sc	self - consumption
Thousands USD 2011 PPA / inhab.	Thousands of dollars of GDP Purchasing Power Parity at constant prices 2011 per capita
t /toe	Metric ton per ton oil equivalent
t / inhab.	Ton per capita
TCF	Trillions of cubic feet
toe / inhab.	Tonnes of oil equivalent per inhabitant
tCO_2	Ton of carbon dioxide
TWh	Terawatt hour
USD / kW	Dollars per kilowatt
USD / L	US dollars per liter
V	Volt
Wh	Watt per hour
$MtCO_2e$	Millons of tons of carbon dioxide equivalent

Conversion Factors Used by OLADE´s Member Countries (Year 2016)

Original Units	kbbl	Mm³	kt	GWh	GWh	kg	kt	GWh	kbbl	kbbl	kbbl	kbbl	kbbl	kt	kt	kbbl
A: boe x 10³	Oil	Natural Gas	Coal	Hydroenergy	Geothermal	Nuclear	Firewood	Electricity	LPG	Gasoline	Kerosene/Jet Fuel	Diesel oil	Fuel oil	Coke	Charcoal	Alcohol
Argentina	1.0196	6.2127	5.1881	0.6197		110.1888	1.4916	0.6197	0.7010	0.8934	0.9583	1.0015	1.0304	4.8998	5.0440	0.9096
Barbados	1.0015	5.9806	5.0439	0.6196			2.5940	0.6196	0.6701	0.8934	0.9583	1.0015	1.0304	4.8998	4.9718	
Bolivia	1.0015	5.9806	5.0439	0.6196			2.5940	0.6196	0.6701	0.8934	0.9583	1.0015	1.0304	4.8998	4.9718	
Belize	1.0015	5.9806	5.0439	0.6196			2.5940	0.6196	0.6701	0.8934	0.9583	1.0015	1.0304	4.8998	4.9718	
Brazil	1.0366	6.1815	3.4573	0.6181		71.6957	2.2282	0.6181	0.6983	0.9000	0.9206	0.9691	1.0718	4.9596	4.6433	0.6424
Chile	1.0551	6.6721	5.0440	0.6197			2.4002	0.6197	0.7624	0.9366	1.0300	1.0300	1.0300	5.0000		
Colombia	1.0476	6.1400	4.9498	0.6196			2.9246	0.6200	0.6981	0.9175	0.8109	0.9760	0.9398	3.4593	4.6829	0.5826
Costa Rica	0.9937		5.2630	0.6200	0.6200		3.0999	0.6200	0.6992	0.8938	0.9438	0.9937	1.0660	4.6138	4.6861	
Cuba	1.0015	6.3604	5.7645	0.6196			2.5940	0.6196	0.6701	0.8934	0.9583	1.0015	1.0304	4.8998	4.9718	
Dominican Republic	1.0015	5.9805	5.0439	0.6196			2.5939	0.6196	0.6843	0.8930	0.9583	1.0015	1.0304	4.8998	4.9723	
Ecuador	1.0015	5.9806		0.6196			2.5940	0.6196	0.6701	0.8934	0.9583	1.0015	1.0304			
El Salvador				0.6196	0.6196		2.5940	0.6196	0.6701	0.8934	0.9583	1.0015	1.0304		4.9718	
Grenada		5.9806	5.0439	0.6196			2.5940	0.6196	0.6701	0.8934	0.9583	1.0015	1.0304	4.8998	4.9718	
Guatemala	0.9929		5.0439	0.6196	0.6196		2.5940	0.6196	0.6701	0.8913	0.9453	0.9929	1.0685	4.8998	4.9718	
Guyana	1.0015	5.9806	5.0439	0.6196			2.5940	0.6196	0.6701	0.8934	0.9583	1.0015	1.0304	4.8998	4.9718	
Haiti	1.0015	5.9806	5.0439	0.6196			2.5940	0.6196	0.6701	0.8934	0.9583	1.0015	1.0304	4.8998	4.9718	
Honduras			5.0439	0.7558			2.5940	0.6196	0.6701	0.8711	0.9583	1.0087	1.0462	4.8998	4.9718	
Jamaica	1.0015	5.9806	5.0439	0.6196			2.5940	0.6196	0.6701	0.8934	0.9583	1.0015	1.0304	4.8998	4.9718	
Mexico	1.0543	7.4907	5.0520	0.6196	0.6196	566.0843	2.4948	0.6196	0.7147	0.9240	1.0182	1.0397	1.1306	5.2132		
Nicaragua	1.0059			0.6197	0.6197		2.3086	0.6197	0.6975	0.8906	0.9540	0.9857	1.0679	0.5009	2.7864	
Panama			5.2690	0.6196			2.6940	0.6196	0.6701	0.8934	0.9583	1.0015	1.0304	4.9100	4.8926	
Paraguay			5.0201	0.6197			2.5940	0.6196	0.6899	0.8901	0.9451	0.9920	1.0689		4.9719	0.5957
Peru	0.9973	6.9749	5.0439	0.6197			2.5940	0.6197	0.6845	0.8791	0.9584	0.9944	1.0593	4.6115	4.7016	
Suriname	1.0015	5.9806	5.0439	0.6196			2.5940	0.6196	0.6701	0.8934	0.9583	1.0015	1.0304	4.8998	4.9718	
Trinidad & Tobago	1.0015	5.9806	5.0439	0.6196			2.5940	0.6196	0.6701	0.8934	0.9583	1.0015	1.0304	4.8998	4.9718	
Uruguay	0.9986	5.9816	5.0440	0.6197			1.9456	0.6728	0.6741	0.9142	0.9597	0.9963	1.0995	4.8998	5.4042	0.5804
Venezuela	1.0391	7.3453	5.4029	0.6072			2.5219	0.6072	0.7361	0.9990	1.0850	1.1408	1.2058	5.0621	5.6252	

Coal Imports

Argentina	10^3 t =	5.1881	10^3 boe		
Brazil	10^3 t =	3.4573	10^3 boe		
Peru	10^3 t =	5.2599	10^3 boe		
	10^6 m³	Refinery Gas =		7.9261	10^3 boe
	10^6 m³	Coke Oven Gas =		3.0263	10^3 boe
Others	10^6 m³	Blast Furnace Gas =		0.6485	10^3 boe
	10^6 m³	Gas Works Gas =		2.8820	10^3 boe
	10^6 m³	Biogas =		3.9630	10^3 boe
	10^6 m³	Bagasse =		1.3114	10^3 boe

Conversion table for energy units

	boe	toe		Tcal	TJ	10^3 BTU	MWh	kg LPG	m³ Nat. Gas	cf Nat. Gas
boe	1	0.13878	0.1982593	0.00139	0.00581	5524.86	1.61394	131.0616	167.2073	5917.1598
toe	7.205649	1	1.4285868	0.01	0.04184	39810.22	11.62952	944.3839	1204.8371	42636.9763
tce	5.04390	0.6999925	1	0.007	0.029288	27866.85	8.14057	661.0616	843.3769	29845.5621
Tcal	720.56490	100	142.85868	1	4.184	3981022	1162.9520	94438.388	120483.714	4263697.6
TJ	172.21914	23.900574	34.144044	0.2390057	1	951487	277.95214	22571.316	28796.2988	1019048.19
10^3 BTU	0.00018	2.51E-05	3.59E-05	2.51E-07	1.05E-06	1	0.00029	0.02372	0.030265	1.07101
MWh	0.61960	0.08599	0.1228	0.00086	0.0036	3423.2	1	81.20577	103.6016	3666.2722
kg LPG	0.00763	0.00106	0.001513	1.06E-05	4.43E-05	42.154696	0.0123144	1	1.2758	45.1479
m³ Nat. Gas	0.00598	0.00083	0.001186	8.30E-06	3.47E-05	33.041989	0.0096524	0.783827	1	35.3882
cf Nat. Gas	0.00017	2.35E-05	3.35E-05	2.35E-07	9.81E-07	0.9337017	0.0002728	0.0221494	0.02825803	1

* 1bbl LPG = 0.6701 boe; * 1bbl LPG = 0.15898 m³ = 5.6143 cf; * 1m³ LPG = 552.4 kg; * 1 cf = 0.028317 m³

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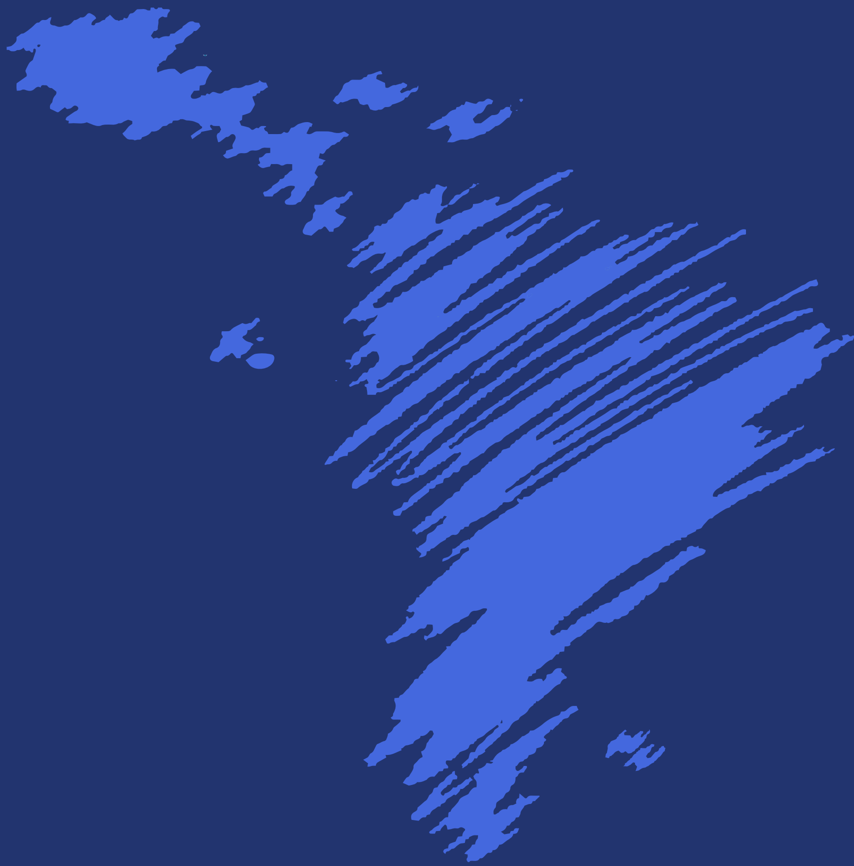

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ISBN 978-9978-70-128-7