

Energy Balance 2021

Contents

- Presentation
- Energy supply in Uruguay
- Production of oil products
- Electricity generation
- Flow chart
- Demand
- Carbon dioxide emissions



Presentation

The National Energy Directorate of the Ministry of Industry, Energy and Mining presents this publication which gathers the main results of the energy sector at the national level for the year 2021. This material is intended to be an input for consultation on the evolution of the country's energy situation, as well as on the different variables considered.

Uruguay has a historical series covering the period from 1965 to 2021, being one of the few countries in Latin America and the Caribbean to have such an extensive series. It is available on the website: www.ben.miem.gub.uy

Uruguay

Land area
176,215 km²
(+/- 64 km²)

Population
3,543,026 inhab.

Population growth rate
0.34%
(2020-2021)

Currency
Uruguayan Peso (\$)

Exchange rate
43.6 \$/US\$
(AVERAGE)

GDP per capita
16,725 US\$/inhab.

GDP variation
4.4%
(2020-2021)

CPI
7.96%
(CONSUMER PRICE INDEX)

Unemployment rate
9.3%

SOURCE: BCU and INE



MAIN FUELS	CONVERSION FACTOR
Crude oil	0.8509 toe/m ³
Natural gas (1atm/15°C)	0.8300 toe/10 ³ m ³
Firewood	0.2700 toe/t
LPG ⁽¹⁾ (1atm/15.6°C)	1.0912 toe/t
Gasoline ("Super 95 SP") ⁽²⁾	0.7863 toe/m ³
Bioethanol	0.5066 toe/m ³
Gas oil ("Gasoil 50S") ⁽²⁾	0.8583 toe/m ³
Biodiesel	0.8312 toe/m ³
Heavy fuel oil	0.9533 toe/m ³
Electricity	0.0860 toe/MWh

(1) LPG: LIQUEFIED PETROLEUM GAS. (2) OF FOR GASOLINE WITHOUT BIOETHANOL AND GAS OIL WITH BIODIESEL.
TOE: TONNE OF OIL EQUIVALENT.

Total final consumption/GDP
83.0 toe/US\$ millions

Total final consumption per capita
1,389 toe/1,000 inhab.

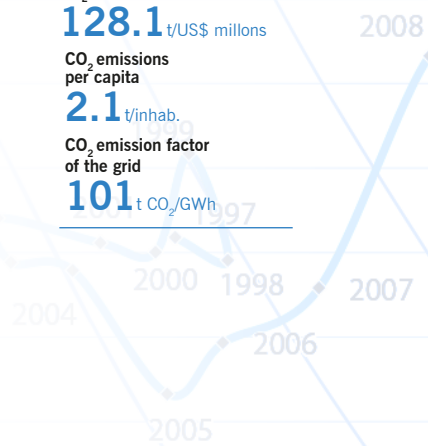
Electricity consumption per capita
3,255 kWh/inhab.

Urban and rural electrification rate
99.9%

CO₂ emissions/GDP
128.1 t/US\$ millions

CO₂ emissions per capita
2.1 t/inhab.

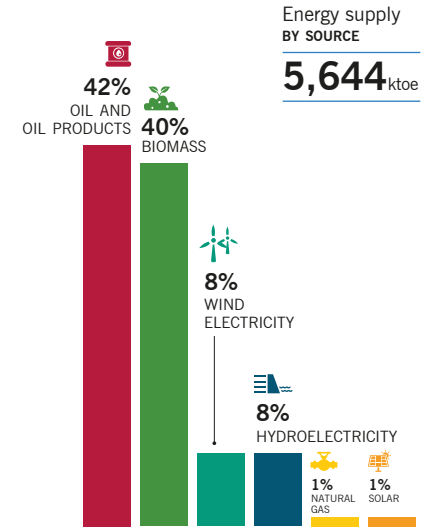
CO₂ emission factor of the grid
101 t CO₂/GWh



Energy supply in Uruguay

In 2021, the total energy supply increased 5% compared to 2020. **Oil and oil products returned to first place after five years.** As a result, biomass (firewood, charcoal, biomass waste, and biomass for biofuel production), which led the primary matrix from 2016 to 2020, was displaced to a second position.

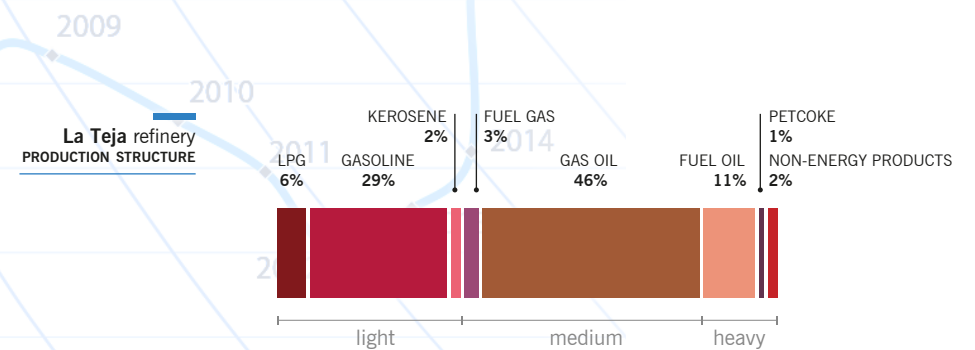
In 2021, the increase in the supply of oil and oil products (9%; 195 ktoe) was marked by higher imports of gas oil for power generation. On the other hand, although in 2021 hydroelectricity grew by almost a third compared to 2020, it was the lowest recorded in the last ten years before 2019. This condition of low rainfall affected the primary matrix, contributing to low participation of renewable energy sources and, consequently, to higher consumption of fossil fuels for generation ■



Production of oil products

The La Teja refinery (the only one in the country), has a daily refining capacity of 50,000 barrels of oil and produces mainly gas oil, gasoline, fuel oil, LPG (LP gas and propane), and jet fuels, among other products.

In 2021, around 2,500,000 m³ (2,145 ktoe) of crude oil were processed, resulting in levels 10% higher than the previous year. A total of 2,135 ktoe of oil products were produced with a production structure similar to that of 2020. The main products were gas oil and motor gasoline, with a production of 983 ktoe and 611 ktoe respectively, without considering their blends with biofuels. 2021 was the second pandemic year in the country, however, there were no strong restrictions on mobility and fossil fuel consumption returned to its pre-pandemic levels ■

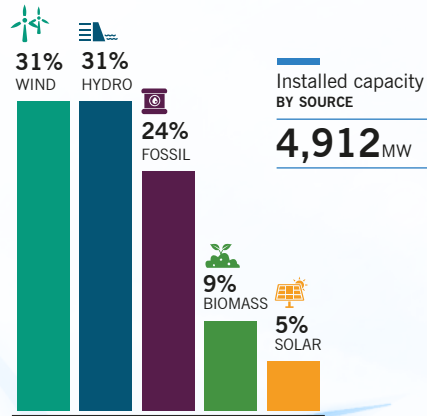


Electricity generation

Installed power

In 2021, total installed capacity registered a slight increase over the previous year (0.2%, 9.1 MW), due solely to the installation of solar generators.

Considering the installed capacity by type of source, **76% corresponded to renewable**, while the remaining 24% corresponded to nonrenewable ■

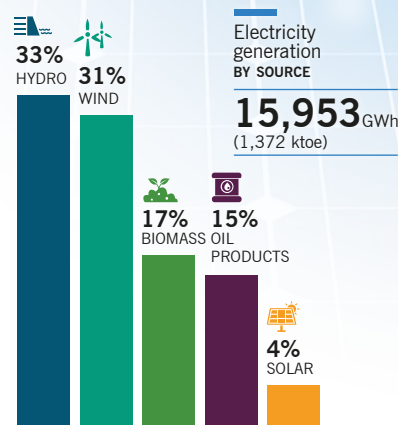
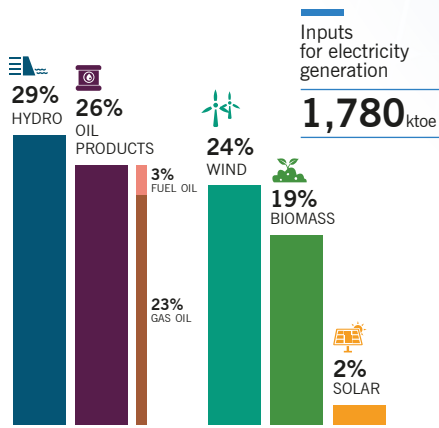


Inputs and electricity generated by source

In 2021, total energy consumption for electricity generation grew 26% compared to 2020. There were significant increases in the consumption of oil products (gas oil 175% and fuel oil 129%), hydropower (27%), and firewood (25%) as generation inputs.

The consumption of biomass and solar energy for electricity generation increased slightly 4% and 5%, respectively. However, wind energy consumption for electricity generation decreased (9%).

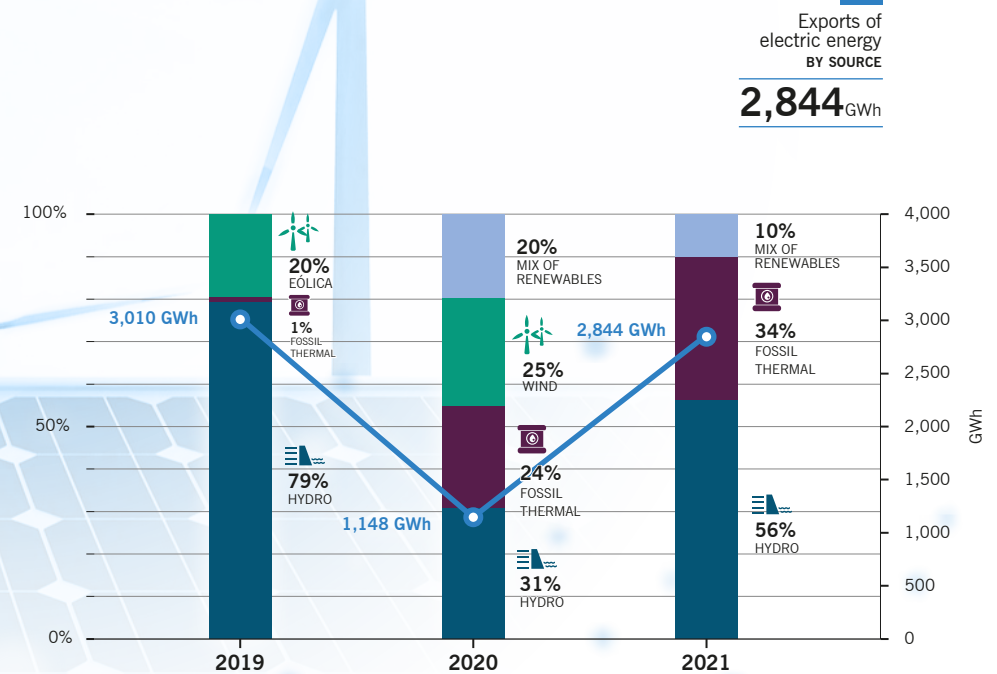
The electricity generation matrix presents a different structure to the generation input matrix, as it considers the transformation efficiencies for the different sources. **The electricity generated in 2021 increased 18% and came mainly from hydropower, which presented an increase of 29% compared to 2020.** It was followed in importance by electricity produced from wind energy, with a 9% reduction compared to the previous year, while the third place was occupied by electricity generated from biomass waste, with a slight increase of 1% compared to 2020. Finally, it should be noted that electricity generation from **solar photovoltaic energy increased 5%** over the previous year ■



Exports of electric energy

In 2021, electricity exports amounted to 2,844 GWh. **This was 148% more than the previous year and similar to 2019, the year in which the historical maximum since 1965 was recorded (3,010 GWh).** In 2021, the composition was mainly electricity from hydro (56%), followed by fossil thermal electricity (34%), and, to a lesser extent, by electricity from a mix of renewable sources that cannot be discriminated (10%).

On the other hand, in 2019 most exported electricity was generated by hydro and very little from fossil fuels, whereas in 2020 there were fewer exports (1,148 GWh), but it was more evenly distributed among the different sources ■





◀ SELECT TO DISPLAY FLOWS SEPARATELY

Flow chart 2021



NOTE: ONLY MAIN ENERGY FLOWS ARE REPRESENTED

Demand

Final energy consumption characteristics

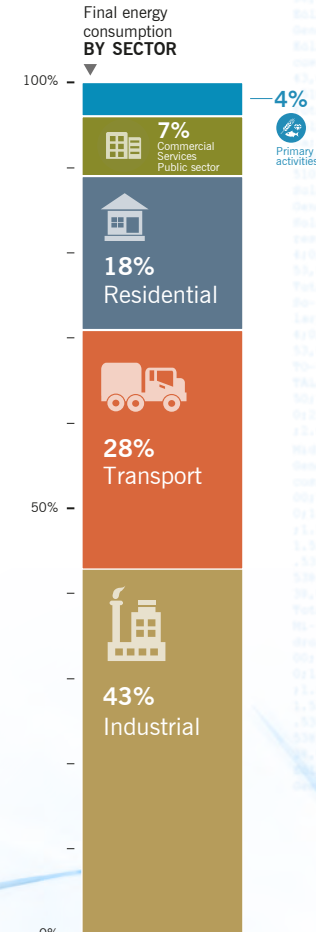
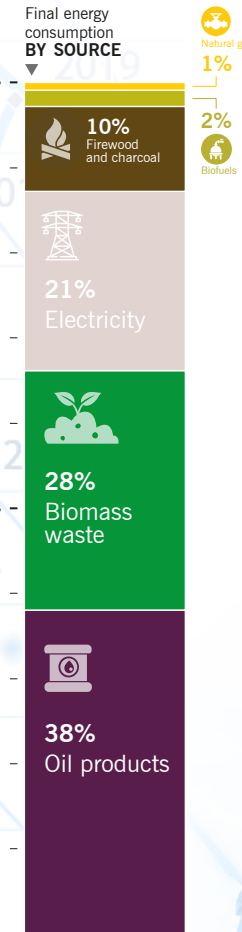
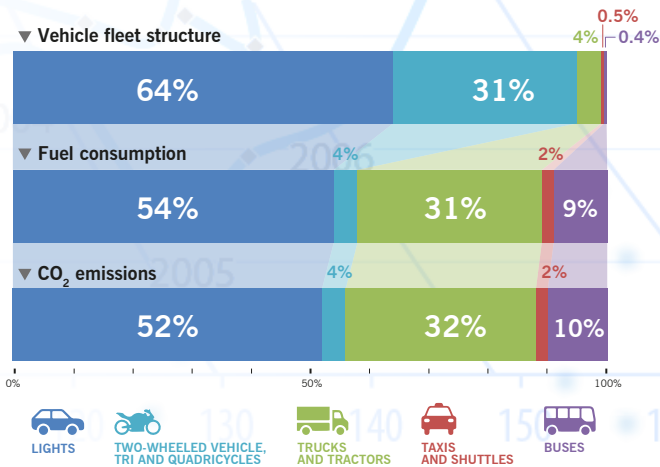
In 2021, Uruguay's final energy consumption was **4% higher than the previous year** and maintained the same consumption structure both in terms of sources and sectors. Considering energy sources, this increase was mainly due to higher consumption of oil products, biomass waste, and natural gas.

As for sectoral behavior, final energy consumption **was led by the industrial sector with a 3% increase, followed by transport with a 9% increase over the previous year.** The commercial/services/public sector increased 6%, while the primary activities sector decreased 1%. The residential sector remained constant.

For the **residential sector, the main source consumed in 2021 was electricity (46%)** followed in importance by firewood (34%). In the commercial/services/public sector, 82% of the energy consumed came from electricity, while firewood accounted for 7%. In the industrial sector, biomass waste (65%) and electricity (15%) were the main sources of energy consumed. In the primary activities sector, gas oil with biodiesel was the main fuel consumed (69%), followed by electricity (14%).

In the transport sector, the main sources consumed were gasoline (48%) and gas oil (52%), including biofuels. When the structure of the vehicle fleet is related to fuel consumption in the transport sector, it can be seen that in 2021 the light-duty category ranked first in terms of number of vehicles, energy consumption, and CO₂ emissions. On the other hand, the bus and truck categories represented a small percentage of the vehicle fleet, however, they corresponded to high energy consumption and CO₂ emissions. On the contrary, the two-wheeled category represented almost a third of the fleet, while it had a very low share in energy consumption and associated emissions.

Final energy consumption
4,810 ktoe

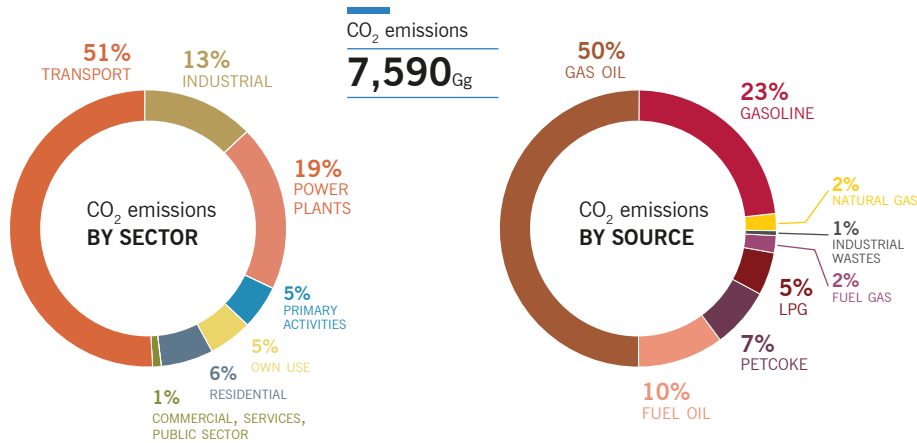


Carbon dioxide emissions

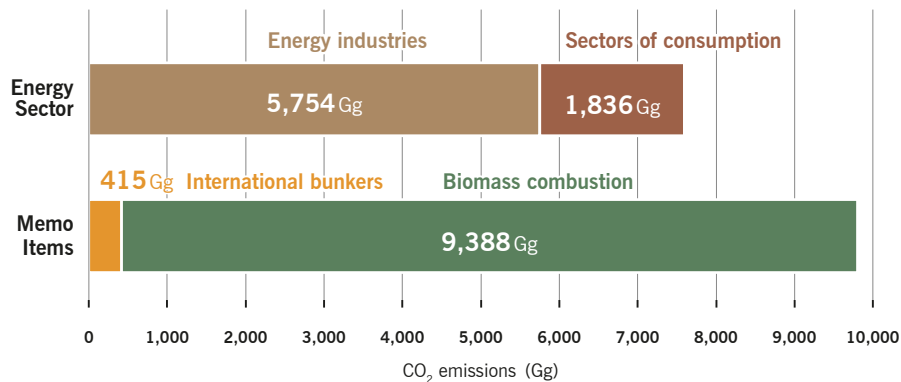
In 2021, total CO₂ emissions **increased 22% over the previous year.**

There was a significant increase in emissions from public service power plants (170%), while CO₂ emissions associated with the energy sector's own use registered a 2% increase compared to 2020.

In the same sense, CO₂ emissions from the consumer sectors grew 9% compared to 2020. The largest increase was recorded in the commercial/services/public sector (23%), followed by the industrial and transport sectors (11% and 10%, respectively). Meanwhile, the residential and primary activities sectors remained virtually constant



In 2021, emissions reported as memo items were 29% higher than total emissions from the energy sector. CO₂ emissions from biomass burning had a slight increase over last year, while emissions from international bunkers (shipping and aviation) decreased 6% in 2021 over 2020

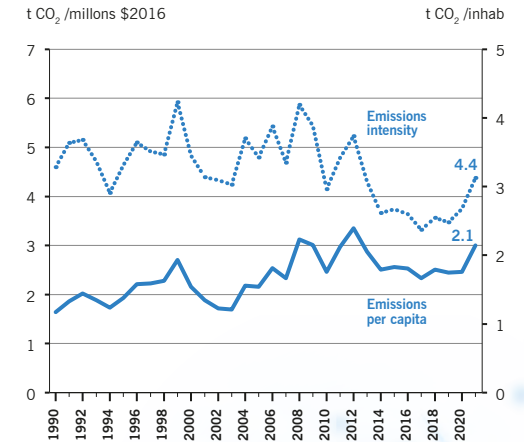


CO₂ emissions: intensity and per capita

The intensity of CO₂ emissions per unit of GDP has presented certain variability throughout the series, mainly associated with variations in power plant emissions, due to greater or lesser consumption of oil products for electricity generation. The years with the highest levels of emissions intensity corresponded to 1999 and 2008 (5.9 t/million \$2016), while in recent years (2014-2020) the lowest values have been reached since 1990 (3-4 t/million \$2016), in 2021 it went up again reaching a value of 4.4 t/million \$2016.

Regarding CO₂ emissions per capita, net growth is observed in the period with a strong variation. In the last years (2014-2020), per capita emissions remained at almost constant values (1.7-1.8 t/inhabitant), in 2021 there was a slight increase to 2.1 t/inhabitant

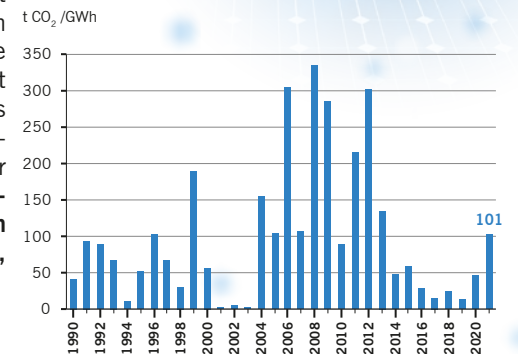
CO₂ emissions
BY GDP AND PER CAPITA



The CO₂ emission factor of the grid

The emission factor of the National Interconnected System (SIN) has also shown great variability throughout the series, as has the intensity of emissions. It should be noted that, in recent years, Uruguay has registered great growth in the generation of electricity from renewable sources (mainly wind and to a lesser extent solar), which, together with hydroelectricity, has allowed the use of smaller amounts of fossil fuels. This resulted in a lower CO₂ emission factor from the grid. **In the last year, the emission factor doubled, mainly due to higher consumption of fossil fuels for electricity generation, which, in turn, was partly for export**

CO₂ emission factor of the grid



Energy Balance 2021

National Energy Directorate
Planning, Statistics and Balance Area

info.estadistica@miem.gub.uy
www.ben.miem.gub.uy
www.gub.uy/miem/energia

TRANSLATION
Andrea Viglietti
DESIGN
Agustín Sabatella

Consumo final total per capita (tep/1000 hab)

