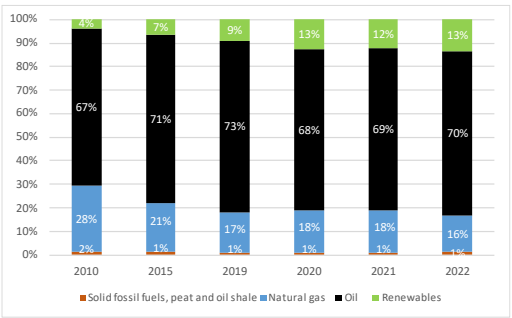
State of the Energy Union 2024: Luxembourg

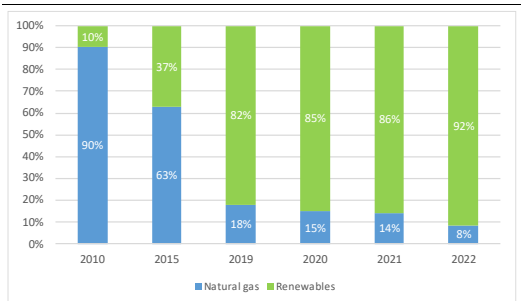
Key energy figures

Graph 1: **Energy mix**



(1) The 2022 gross inland energy consumption was 140,428 TJ. (0.2% of the total EU consumption).
Source: Eurostat

Graph 2: **Electricity mix**



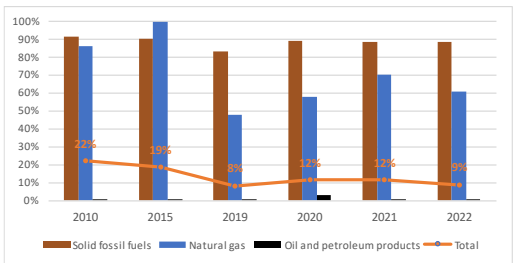
(1) The 2022 gross electricity production was 1.2 TWh. (0.04% of the total EU production).
Source: Eurostat

- Fossil fuels account for 86.7% of Luxembourg´s **energy mix** (compared to 69% at EU level). The share of renewables was 13.3%.
- The **electricity mix** of Luxembourg is dominated by renewable energy with 91.6% (compared to 38.6% at EU level). Natural gas accounted for the remaining 8.4%.

Security, solidarity and trust

1. DIVERSIFICATION OF ENERGY SOURCES AND REDUCTION OF IMPORT DEPENDENCY

Graph 3: **Import dependency on fossil fuels**



(1) The graph shows the Member States' import dependency on third countries by fuel type.
(2) Combustible renewables and electricity are excluded.
(3) The total amount takes into consideration the energy mix of the country.
Source: Eurostat

2. FLEXIBILITY OF THE ENERGY SYSTEM

- Luxembourg **has no underground gas storage facility.** The European Commission does not have additional information on arrangements between Luxembourg and other Member States with existing facilities, in accordance with the burden-sharing mechanism [1].

[1] Regulation (EU) 2022/1032 of the European Parliament and of the Council of 29 June 2022 amending Regulations (EU) 2017/1938 and (EC) No 715/2009 with regard to gas storage.

Integrated internal energy market

1. ELECTRICITY INTERCONNECTIVITY

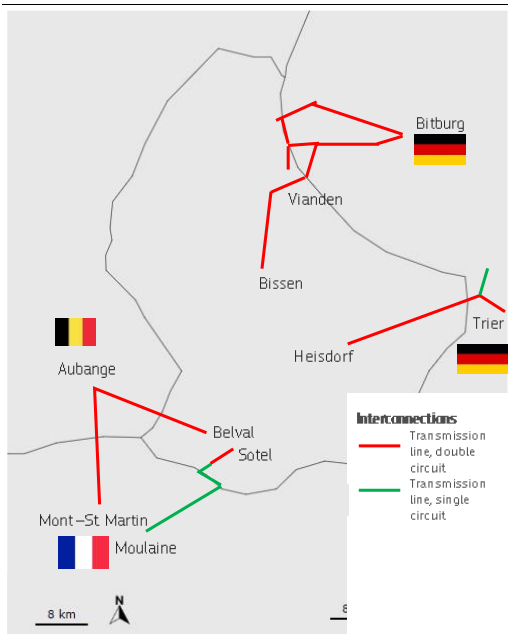
Table 1: **Electricity interconnectivity**

2024	2030 target
163.8 %	At least 15%

1) The electricity interconnectivity is a ratio of electricity import capacity of a given Member State (sum of net transfer capacities of interconnectors with neighbouring Member States) and its total power generation capacity. The 2030 level represents the general interconnectivity target of 15%.
Source: European Commission's own calculations based on the ENTSO-E Winter Outlook 2023-2024 data

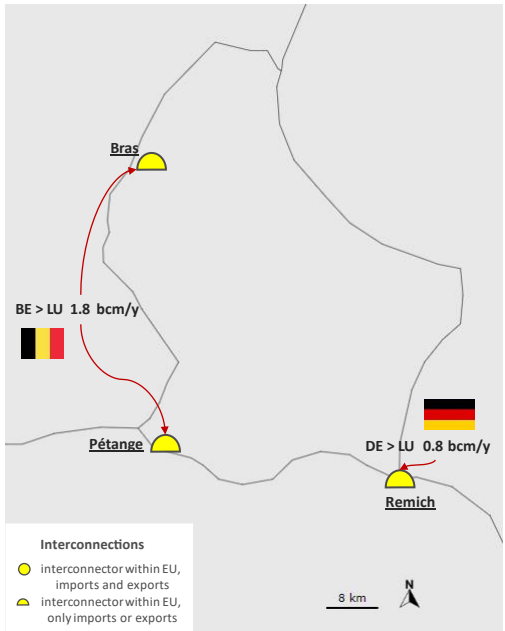
2. ENERGY TRANSMISSION INFRASTRUCTURE

Map 1: **Cross-border electricity infrastructure**



Source: DG ENER map recreation (based on ENTSO- E)

Map 2: **Cross-border gas infrastructure**



(1) The capacities are based on ENTSO-G 2024 capacity dataset (as of 11 January 2024) and the ENTSO-G Transparency Platform.
Source: DG ENER map recreation (based on ENTSO- G)

3. MARKET INTEGRATION

Rollout of electricity smart meters

- Luxembourg has a high electricity smart meter rollout, with 99% of household consumers being equipped with smart meters in 2023. [2]

Diversification of gas supplies

- In 2023, Belgium and Luxembourg had 10 natural gas supply sources, the same as in 2021. Its three largest suppliers accounted for 75%, with Norway being the main supplier, holding a share of 33%. In 2021, Norway with 37%, the Netherlands with 31%, and Russia (14%) were Belgium and Luxembourg's biggest natural gas supply sources. [3]

[2] ACER, 2024 Retail Market Monitoring Report, Energy retail and decarbonisation (forthcoming).

[3] ACER-CEER Annual Report Monitoring: the Internal Gas Market in 2022 and 2023.

4. ENERGY POVERTY, SOCIAL CLIMATE PLAN AND JUST TRANSITION

Table 2: **Energy poverty**

Indicator	%	Evolution compared to		EU average
EED NECPs four main indicators	2023	2021	2017	
Inability to keep home adequately warm	2.1	- 0.4 pp	+0.2 pp	10.6
Arrears on utility bills	4.8	+1.2 pp	+3.1 pp	6.9
Share of pop. With leak, damp or rot in dwelling	18	+ 2.6 pp (2020)	+ 0.6 pp	15.5
AROP (At risk of poverty)	18.8	+0.7 pp	+2.2 pp	16.2

Source: Eurostat

Social Climate Plan

- Member States need to submit these plans to the European Commission by June 2025.
- Maximum financial allocation for Luxembourg: EUR 73 million or 0.1 % of total SCF.

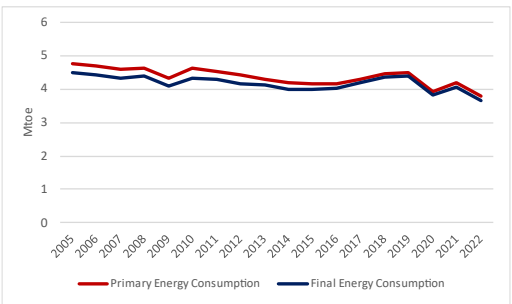
Just Transition Plan

- Luxembourg's Just Transition Plan (TJTP) outlines the just transition of the steel and cement industry in the south of the country. The plan sets out how the Just Transition Fund (JTF), with a national allocation of EUR 9.3 million, will support energy efficiency and renewable energy projects, as well as sustainable mobility with the replacement of the bus fleet in the south of the country.

Energy efficiency

1. ENERGY EFFICIENCY

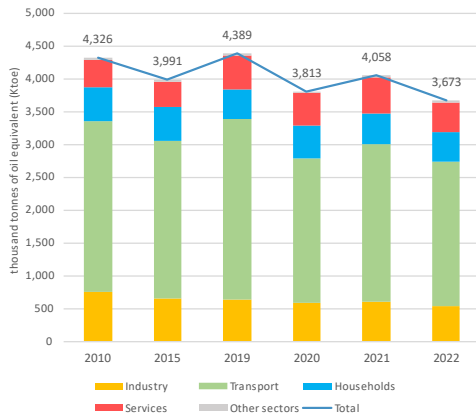
Graph 4: **Primary and final energy consumption**



Source: Eurostat

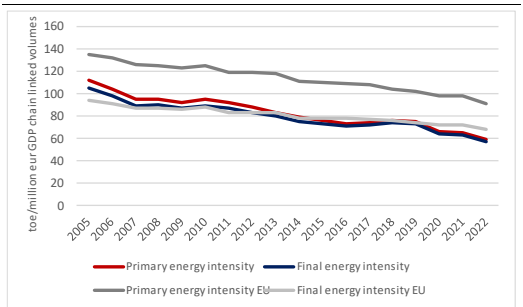
- In 2022, Luxembourg's **Primary Energy Consumption (PEC)** amounted to 3.8 Mtoe, 9.3% lower than in 2021, while its **Final Energy Consumption (FEC)** amounted to 3.7 Mtoe, 9.5% lower than in 2021.

Graph 5: **Final energy consumption by sector**



(1) Final energy consumption excludes consumption of the energy sector (including transformation and distribution losses) and non-energy use of energy carriers.
Source: Eurostat

Graph 6: **Primary and final energy intensity**



Source: Eurostat

2. ENERGY PERFORMANCE OF BUILDINGS

- In 2022, Final Energy Consumption (FEC) in the Luxembourgish **residential sector** was **0.5 Mtoe**, representing **a reduction of 5.0%** compared to 2021. In the **services sector**, FEC was **0.5 Mtoe**, with an **18.5% decrease** compared to 2021. However, climate corrected data[4] show a **residential FEC increase of 13.2%** from 2021 to 2022, indicating that the above reduction is mostly climate-related (e.g. milder winter) rather than linked with an improvement of the building stock.
- Heating and cooling account for around **88%** of the country's residential final energy

[4] Following JRC's methodology (see for reference "Energy Consumption and Energy Efficiency trends in the EU, 2000 – 2020).

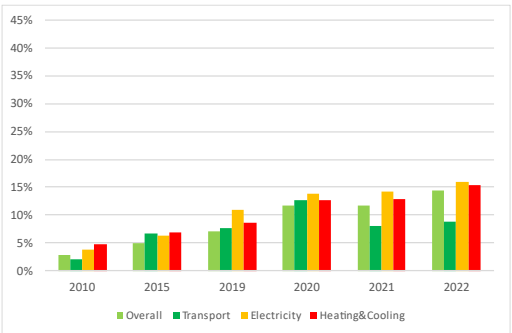
consumption, with renewables supplying approximately **15%** of the gross final energy consumption for heating and cooling. As per the European Heat Pump Association (EHPA), there are no data available for Luxembourg.

- In 2023, **4.8%** of the total population was experiencing difficulties on paying their utility bills while **2.1%** was not able to keep their home adequately warm over the cold periods of the year (with a mixed evolution compared to 2021, when such figures were, respectively, 3.6% and 2.5%). This underlines the importance to increase rate and depth of building renovation, specifically of worst-performing buildings.

Decarbonisation and climate action

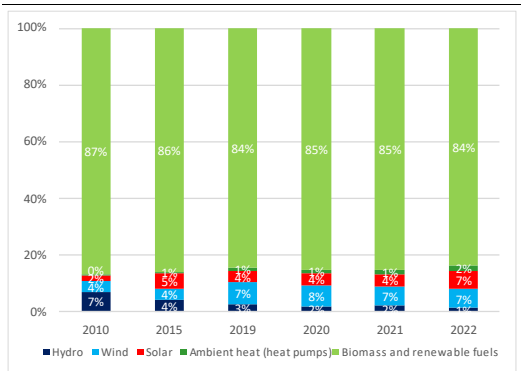
1. SECTORAL SHARE OF RENEWABLE ENERGY

Graph 7: **Share of renewable energy sources**



(1) In % of gross final consumption of energy.
Source: Eurostat

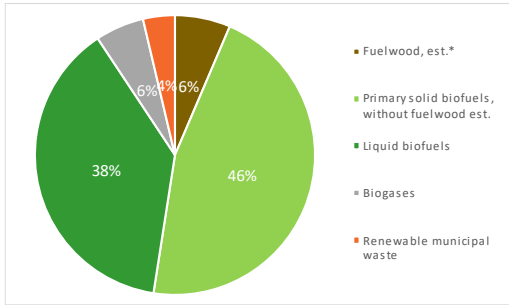
Graph 8: **Renewable energy mix**



(1) In % of gross final consumption of energy.
Source: Eurostat

2. BIOENERGY MIX

Graph 9: **Bioenergy mix**

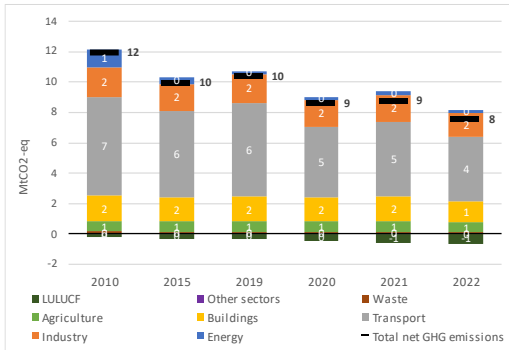


(1) In % of gross final consumption of energy (2022).
(2) * Fuelwood estimate, based on the Primary solid biofuels consumption in Other sectors, Eurostat and industry secondary data, DG ENER estimations.
Source: Eurostat and DG ENER

- For more information see the dedicated website on biomethane country fiches.

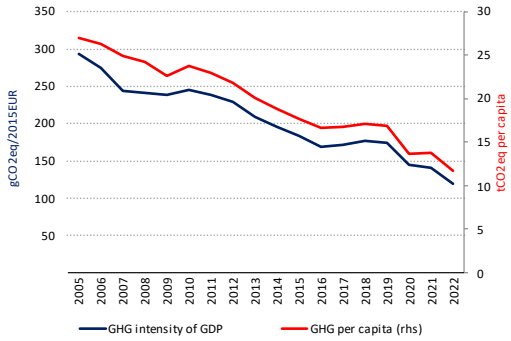
3. GREENHOUSE GAS EMISSIONS

Graph 10: **Greenhouse gas emissions by sector**



Based on UNFCC GHG Inventory reporting as per the IPCC categories: (1) Energy sector refers to electricity and heat production and petroleum refining. (2) Industry includes fuel combustion in manufacturing and construction and emissions in industrial processes and product use. (3) Buildings include emissions from energy use in residential and tertiary buildings, and energy use in agriculture and fishery sectors. (4) Total net GHG emission including LULUCF and excluding international aviation.
Source: Greenhouse gas inventory 1990-2022 (EEA)

Graph 11: **GHG per capita and GHG intensity of GDP**



(1) Total greenhouse gas emissions, including LULUCF and excluding international aviation.
Source: Greenhouse gas inventory 1990-2022 (EEA). Real GDP in 2015-prices (AMECO, European Commission). Population (Eurostat).

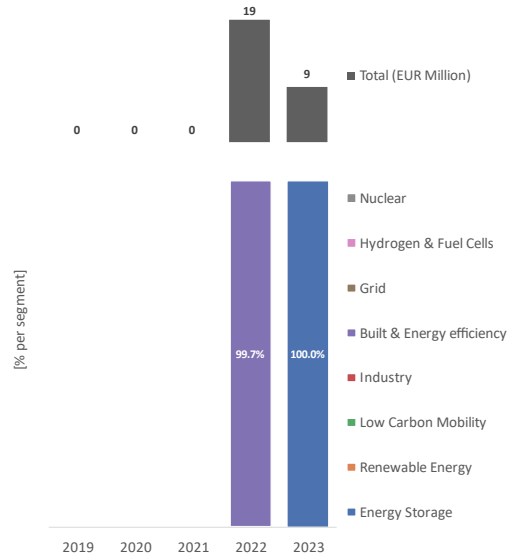
- With 119 gC02eq/2015EUR, Luxembourg lies below the EU average in terms of GHG intensity of GDP.
- With 12 tonnes of C02 equivalent per capita, Luxembourg is above the EU average in terms of GHG emissions per capita.
- For more detailed information on country profiles see Progress on climate action (europa.eu).

Research, innovation and competitiveness

1. INVESTMENT IN R&I

- Data related to public investment in Energy Union R&I priorities[5] are not available[6].

Graph 12: **Venture capital investment in net-zero energy technology (start-ups and scale-ups)**



(1) Firms typically use venture capital to expand, break into new markets, and grow faster. Venture capital is essential for the growth of innovative firms and it is key to foster the EU's competitiveness and to strengthen the EU's technology sovereignty in the net-zero energy sector.
Source: JRC elaboration based on PitchBook data (08/2024)

2. NET-ZERO ENERGY TECHNOLOGIES

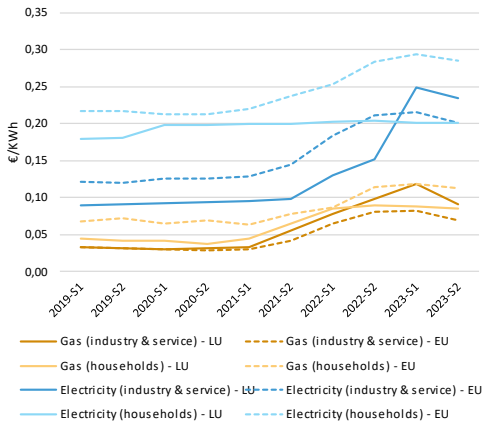
- Luxembourg lacks manufacturing capacity for clean technologies and has historically relied on imports for renewable energy deployment. However, promising initiatives have recently emerged, especially in the PV and battery sector. A solar panel manufacturing factory came online in late 2023. The facility has a maximum rated output of 100 MW a year (nearly 200 000 panels). Full capacity is expected to be achieved by 2026 with production levels projected to remain below 100 000 panels per year until that time. Some lithium-sulphur batteries related ventures are also implementing their activities in Luxembourg, to conduct R&D activities and eventually industrial pilots.

(5) Renewables, smart system, efficient systems, sustainable transport, CCUS and nuclear safety, COM(2015) 80 final ('Energy Union Package').

(6) Source: JRC SETIS 2024

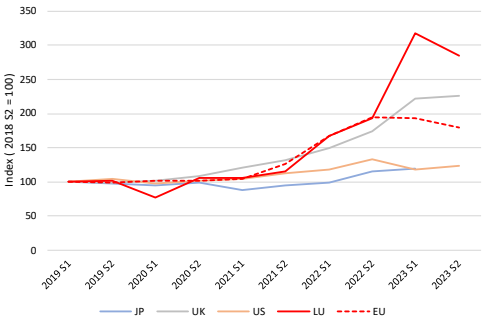
3. ENERGY PRICES DEVELOPMENT

Graph 13: **Luxembourg's energy retail prices for households and industry & service**



(1) For industry, consumption bands are I3 for gas and IC for electricity, which refer to medium-sized consumers and provide an insight into affordability.
(2) For households, the consumption bands are D2 for gas and DC for electricity.
(3) Industry prices are shown without VAT and other recoverable taxes/levies/fees as non-household consumers are usually able to recover VAT and some other taxes.
Source: Eurostat

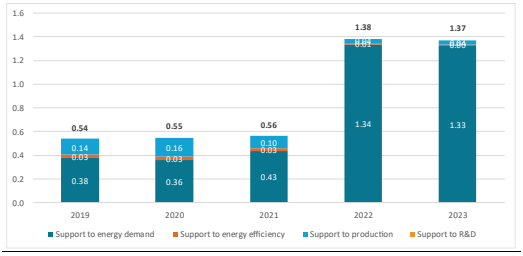
Graph 14: **Trends in electricity prices for non-household consumers (EU and foreign partners)**



(1) For Eurostat data (EU and LU), the band consumption is ID referring to large-sized consumers with an annual consumption of between 2 000 MWh and 20 000 MWh, such as in electricity intensive manufacturing sectors, and gives an insight into international competitiveness.
(2) JP = Japan
Source: Eurostat, IEA

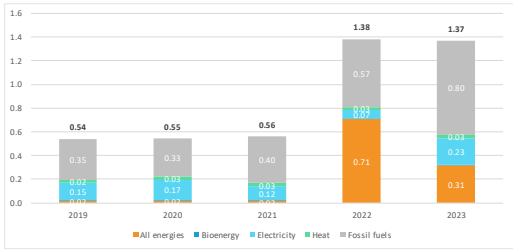
4. ENERGY SUBSIDIES

Graph 15: **Energy subsidies by purpose**



(1) Subsidies in EUR 2023 billion
(2) Some 2023 data were not fully available or validated at the time the study was completed (August 2024). For missing 2023 values, 2022 data were taken as a basis for an estimate.
Source: Enerdata. Inventory of energy subsidies in the EU27 – 2024 edition

Graph 16: **Energy subsidies by carrier**



(1) Subsidies in EUR 2023 billion
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Source: Enerdata. Inventory of energy subsidies in the EU27 – 2024 edition

European Semester 2024

- **Country Specific Recommendation (Energy):** Reduce reliance on fossil fuels by investing in energy efficiency and renewable energy.[7]
- For more information see the 2024 European Semester Country Report.

National Energy and Climate Plan (NECP)

- Member States were due to submit their **final updated NECP by 30 June 2024**, taking into account the Commission recommendations.
- **The final updated NECP** was submitted to the European Commission in July 2024.

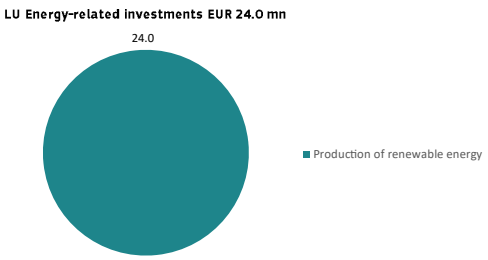
[7] Council of the European Union 11708/24.

- For documents and information see the dedicated webpage of the European Commission on the NECPs.

Recovery and Resilience Plan (RRP and REPowerEU chapter)

- The Luxembourgish RRP has a total allocation of EUR 239 million (only grants), with 68.8 % of available funds supporting climate objectives.
- **EUR 24 million are allocated to energy-related measures**[8], entirely going into the **production of renewable energy**:
  - Fostering the deployment of photovoltaic power generation via subsidies awarded to businesses.
- The Commission disbursed the 1st payment of EUR 20 million to Luxembourg in 2023. Overall (including also pre-financing), the Commission disbursed EUR 32.37 million to Luxembourg.

Graph 17: **Energy-related investments in the RRP (in EUR million)(*)**



(*) The graph refers to the RRP as approved in 2023 (without the REPowerEU chapter).
Source: European Commission

EU Funds supporting energy related investments

Graph 18: **Energy-related investments across EU funds (in EUR million) (*)**

(*) European Regional Development Fund (ERDF) + Cohesion Fund (CF): comprise EU grants & national cofinancing; RRF: comprise grants & loans. Investment categories can also differ across funds.
Source: European Commission

[8] The allocation refers to the RRP as approved in 2023 (without the REPowerEU chapter)