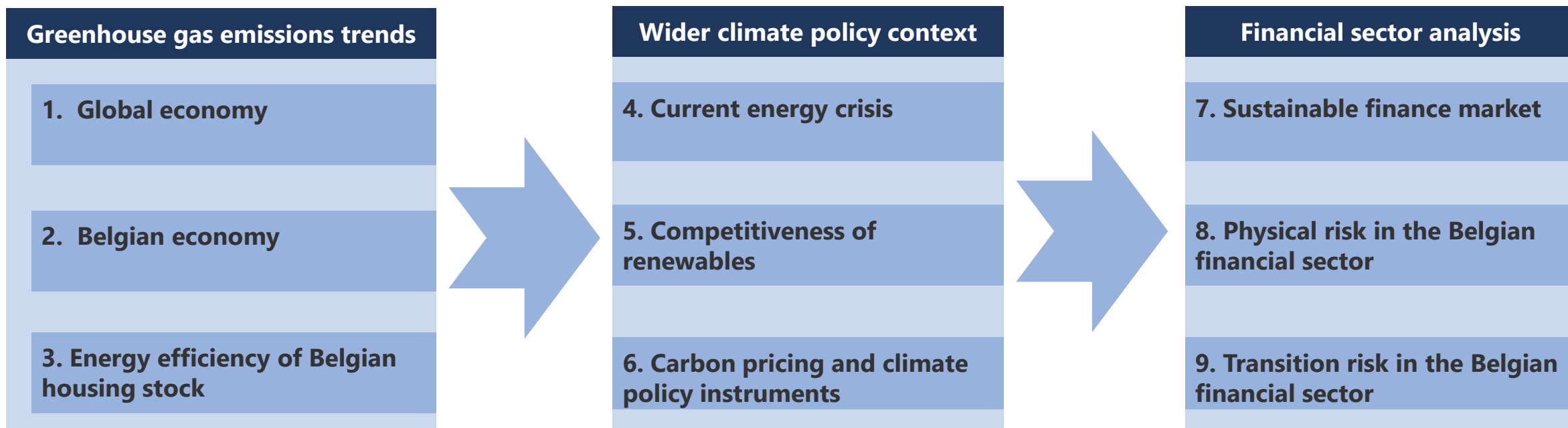


Climate Dashboard

Compiled by the National Bank of Belgium Climate Hub
November 2022

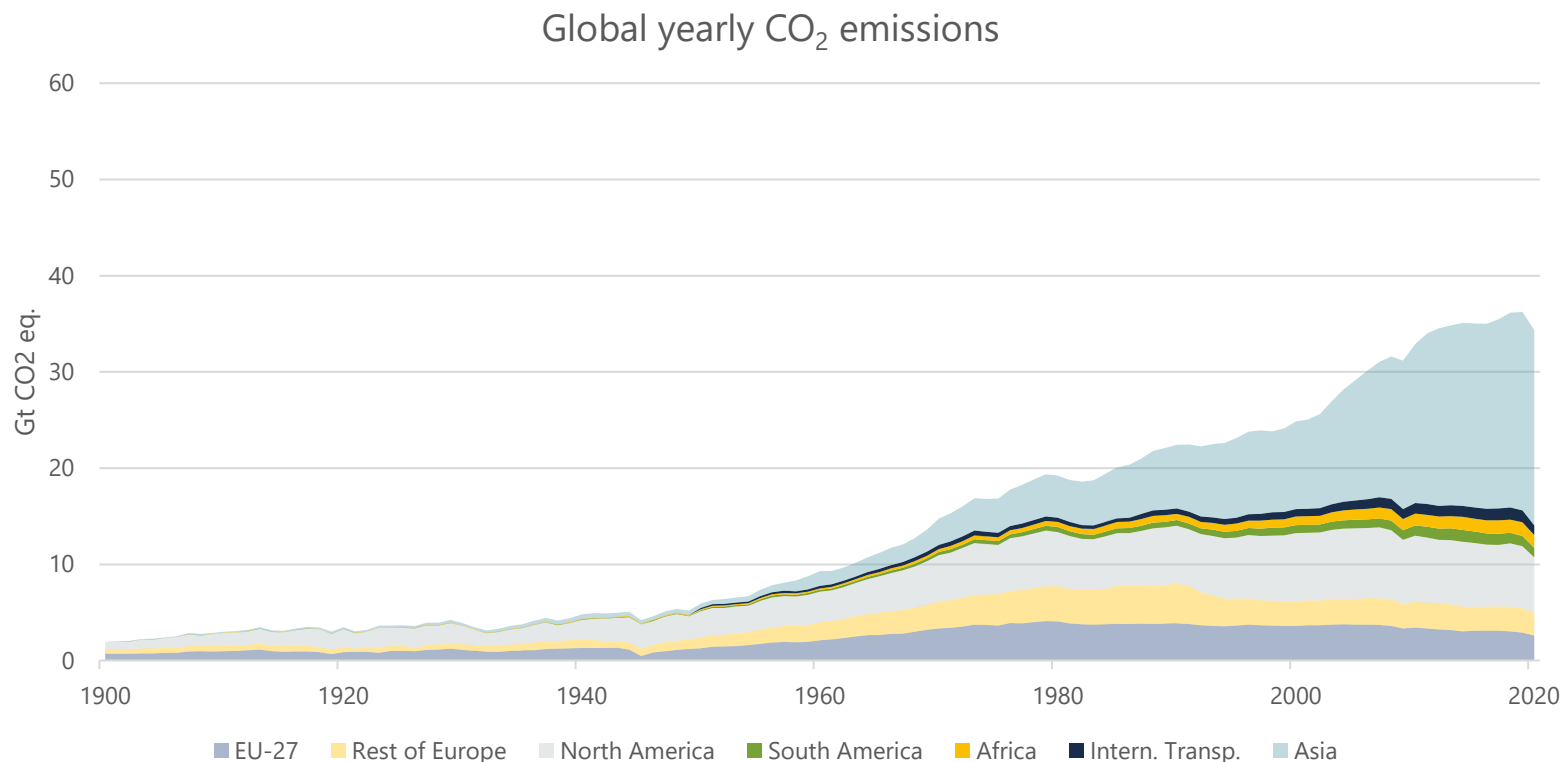






1. Greenhouse gas emissions trends: Global economy

Global greenhouse gas emissions are still rising, making it unlikely for the world to limit warming to 1.5°C: less than ten years at current emissions consume the remaining 1.5°C carbon budget



Source: Global Carbon Project; Carbon Dioxide Information Analysis Centre, National Oceanic and Atmospheric Administration

Remaining carbon budget

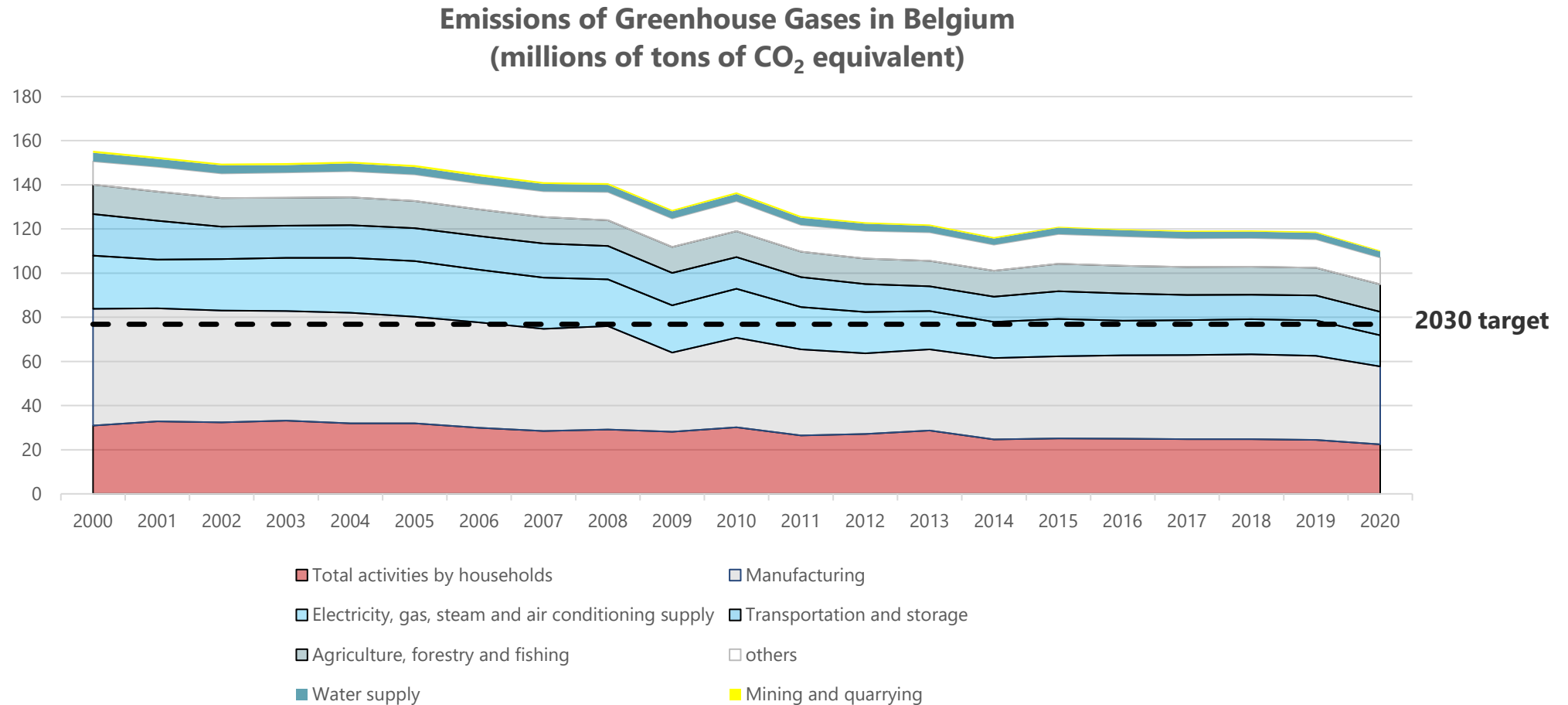
- = "the maximum amount of cumulative net global anthropogenic carbon dioxide (CO₂) emissions that would result in limiting global warming to a given level with a given probability[...]"
- For a 67% likelihood of limiting global warming to
 - 1.5°C: ~300 Gt CO₂
 - 2.0°C: ~1050 Gt CO₂
 - Changes to non-CO₂ greenhouse gas emissions can add or subtract ~220 GtCO₂eq.

Source: Based on IPCC AR6 SPM Table SPM2.



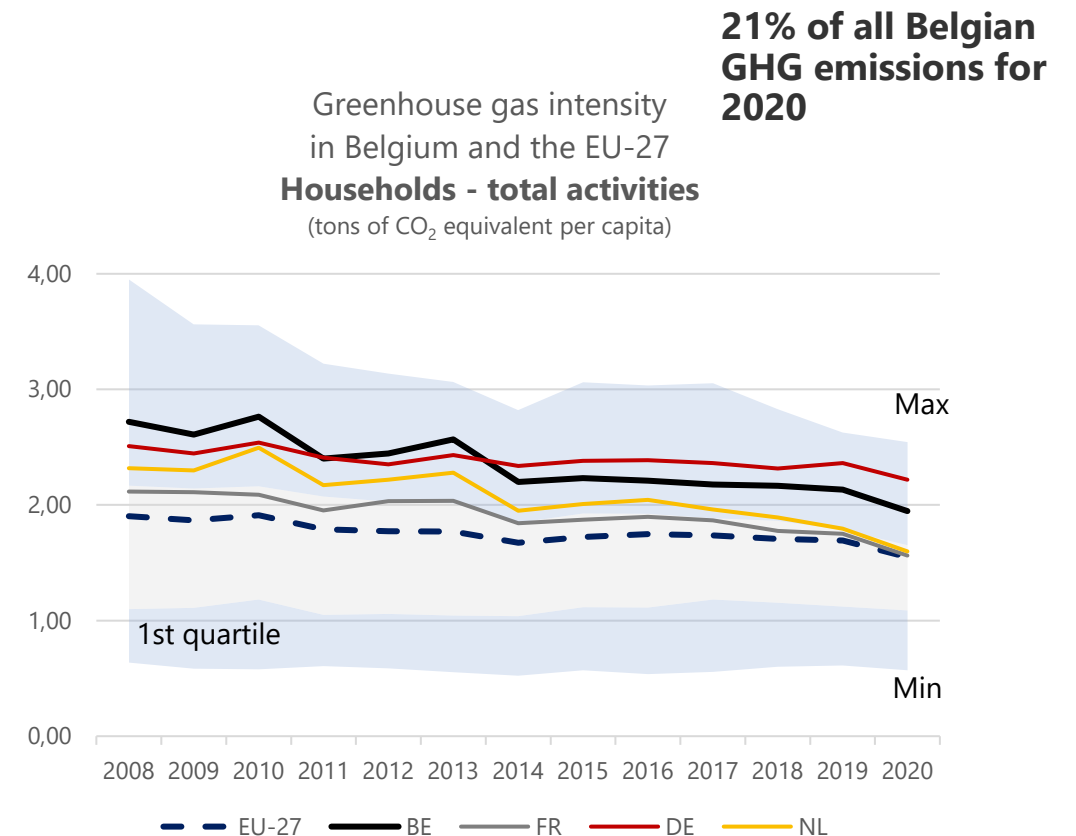
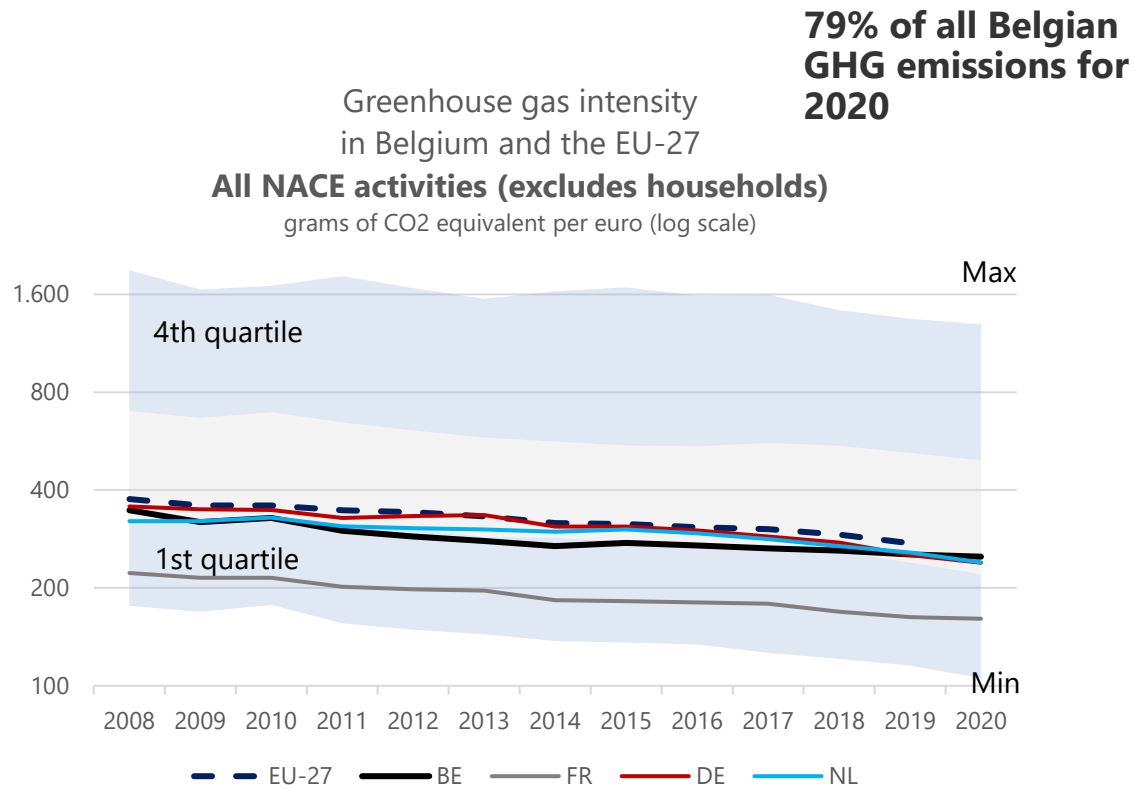
2. Greenhouse gas emissions trends: Belgian economy

< While Belgian greenhouse gas emissions have fallen in the last decades, additional decarbonisation is needed towards the 2030 target



Belgium's carbon intensity is declining at a similar pace as the carbon intensity of the European Union.

Evolution of BE emissions efficiency – Firms & Households

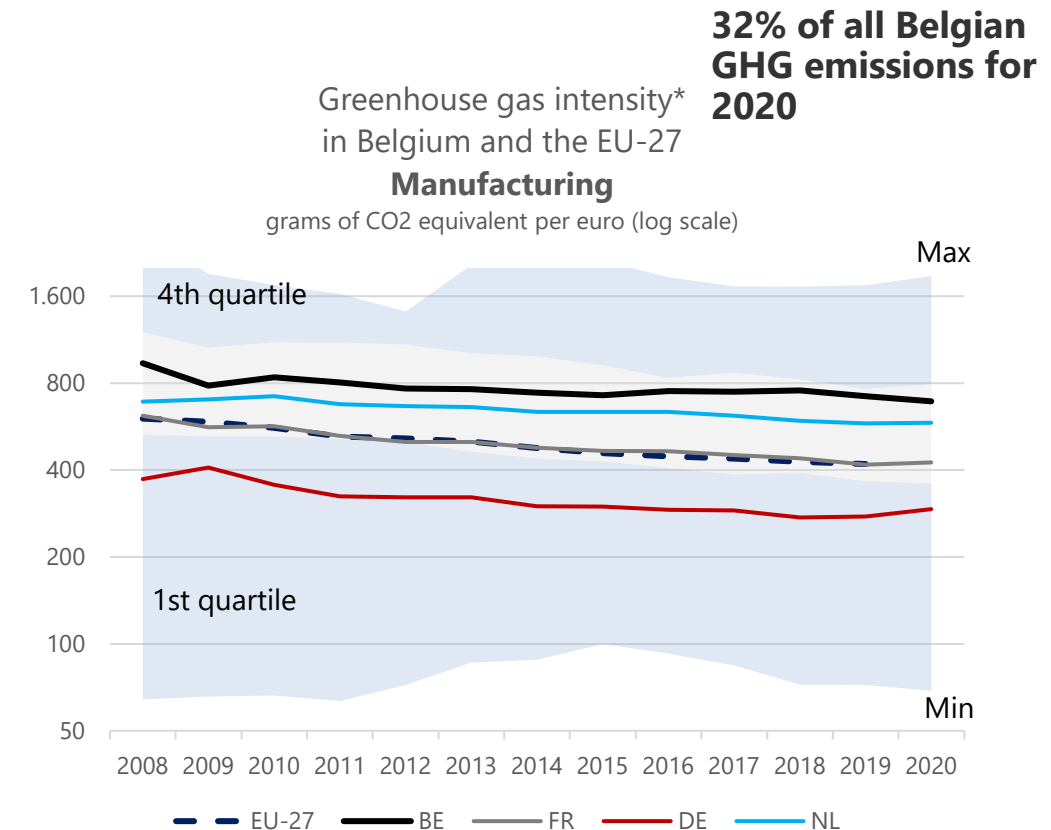
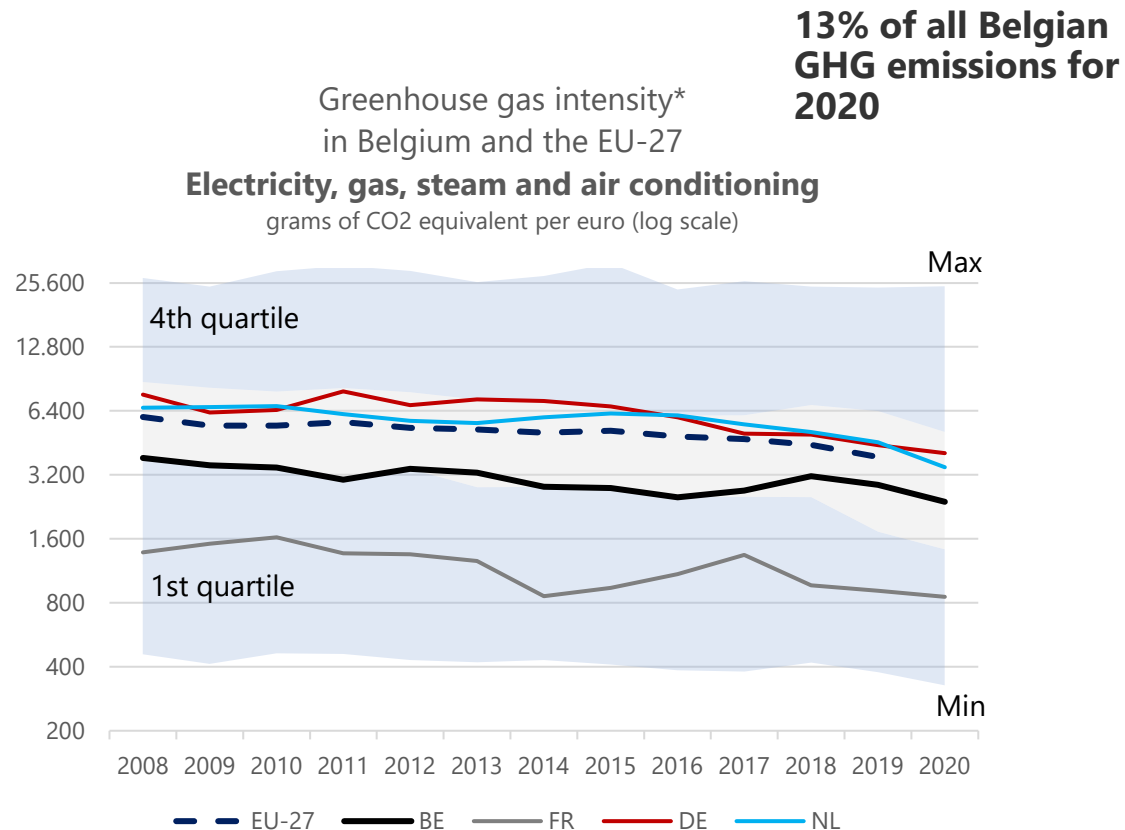


Source: Eurostat

* ratio of emission to gross value added (chain-linked volumes); CO₂, CH₄, N₂O, hydrofluorocarbons, perfluorocarbons, SF₆ and NF₃

This decline in carbon intensity is mostly driven by the power sector and manufacturing...

Evolution of BE emissions efficiency – All activity except households



Source: Eurostat

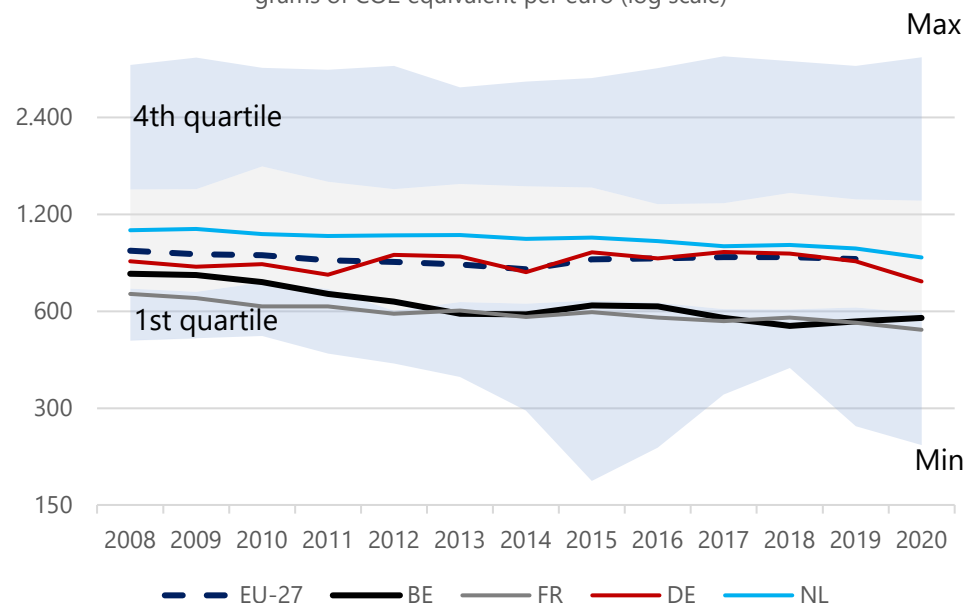
* ratio of emission to gross value added (chain-linked volumes); CO₂, CH₄, N₂O, hydrofluorocarbons, perfluorocarbons, SF₆ and NF₃

...less so in transport or agriculture

Evolution of BE emissions efficiency – All activity except households

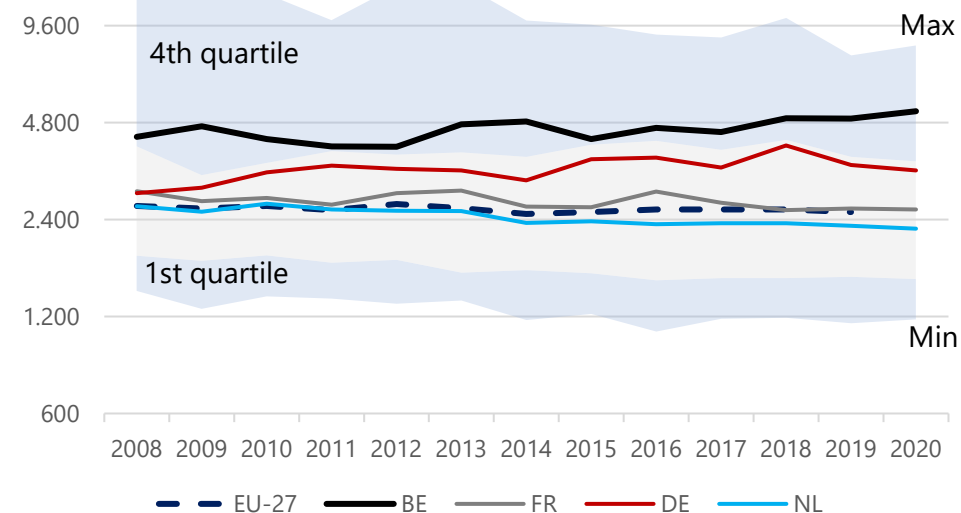
Greenhouse gas intensity*
in Belgium and the EU-27
Transport and storage
grams of CO2 equivalent per euro (log scale)

**10% of all Belgian
GHG emissions of
2020**



Greenhouse gas intensity*
in Belgium and the EU-27
Agriculture, forestry and fishing
grams of CO2 equivalent per euro (log scale)

**11% of all Belgian
GHG emissions of
2020**



Source: Eurostat

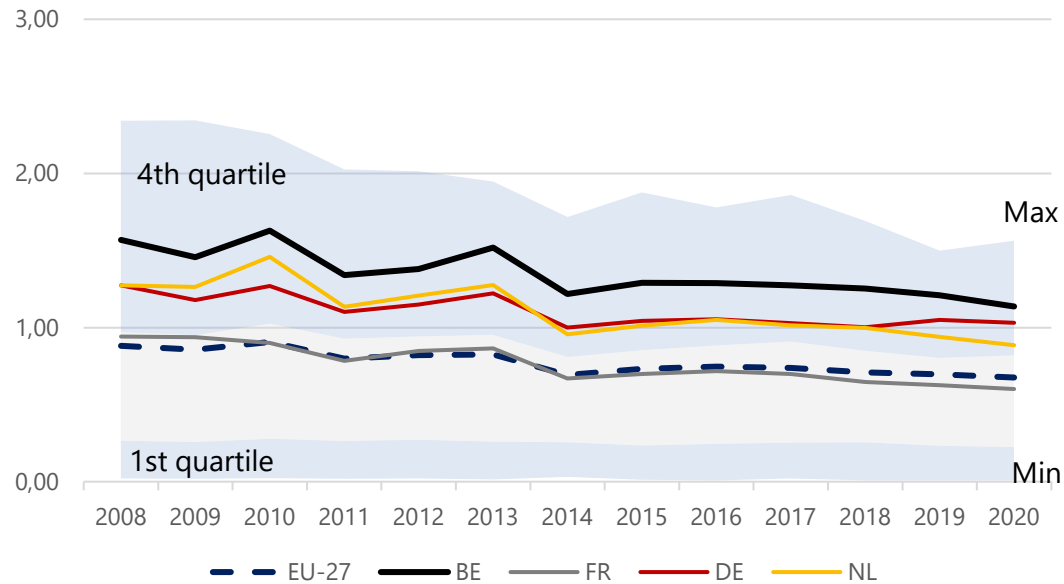
* ratio of emission to gross value added (chain-linked volumes); CO₂, CH₄, N₂O, hydrofluorocarbons, perfluorocarbons, SF₆ and NF₃

The emissions intensity of Belgian households has largely remained unchanged

Evolution of BE emissions efficiency – Households

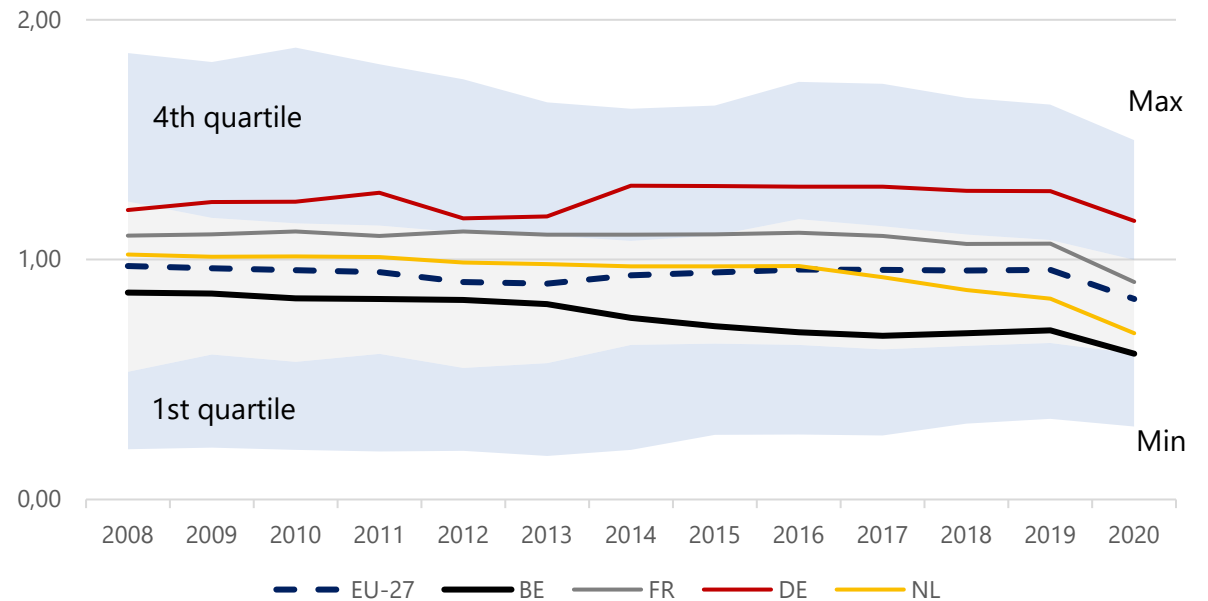
12% of all Belgian GHG emissions of 2020

Greenhouse gas intensity in Belgium and the EU-27
Households - heating and cooling
(tons of CO₂ equivalent per capita)



6% of all Belgian GHG emissions of 2020

Greenhouse gas intensities in Belgium and the EU-27
Households - transport
(tons of CO₂ equivalent per capita)



Source: Eurostat

* ratio of emission to gross value added (chain-linked volumes); CO₂, CH₄, N₂O, hydrofluorocarbons, perfluorocarbons, SF₆ and NF₃

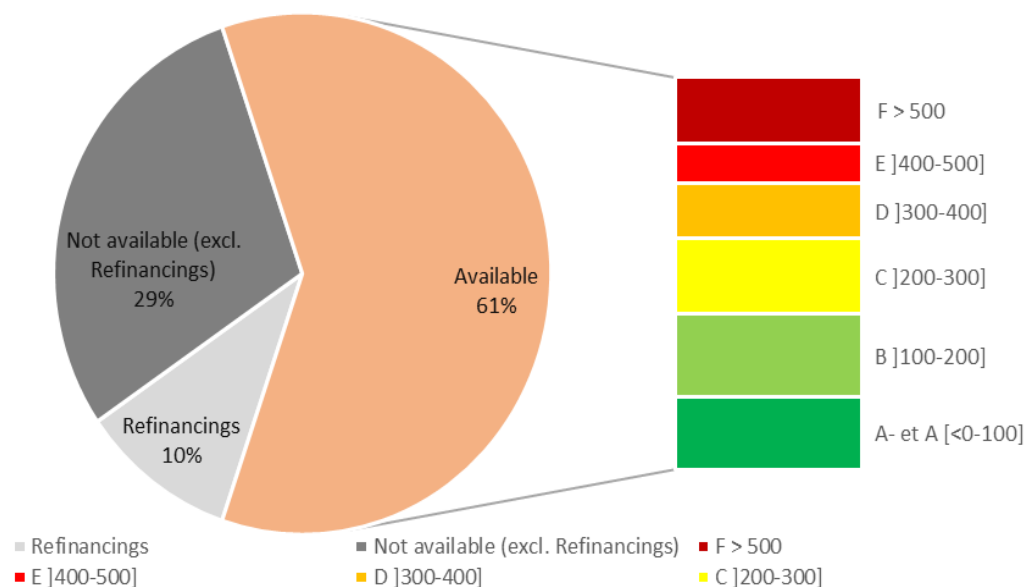


3. Energy efficiency of Belgian housing stock



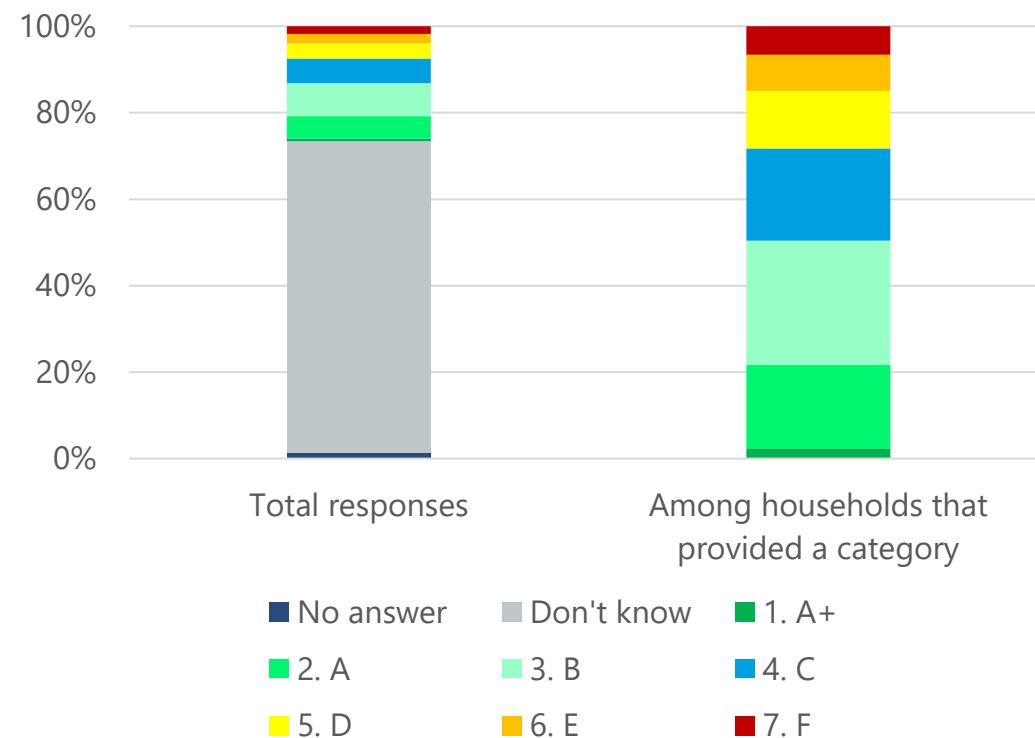
Financial institutions cannot yet fully gauge the energy performance of their real estate exposure. Most households are also unaware of the energy performance of their homes

**EPC new production residential mortgage loans
(Jan-July 2022-BE banks-EPC scores in kWh/m²)**



NB: Banks did not need to report EPC labels for refinancings (not real new loans).
Classification according to Flanders label.
Source: NBB.

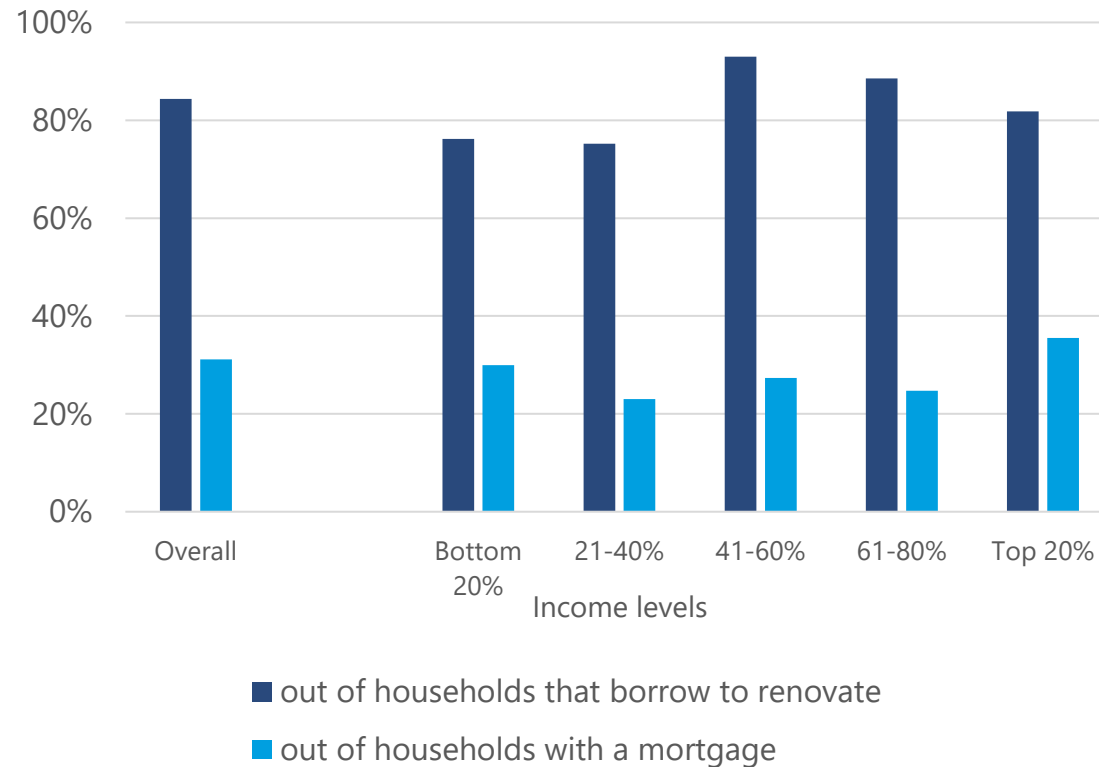
Energy performance certificate status of homes (%)



(HFCS, 4th wave , June 2020-June 2021). EPC labels refer to the Flemish standard.
Source: NBB

< Only around one third of households with a mortgage on their home intended to improve its energy efficiency. This is similar across income groups

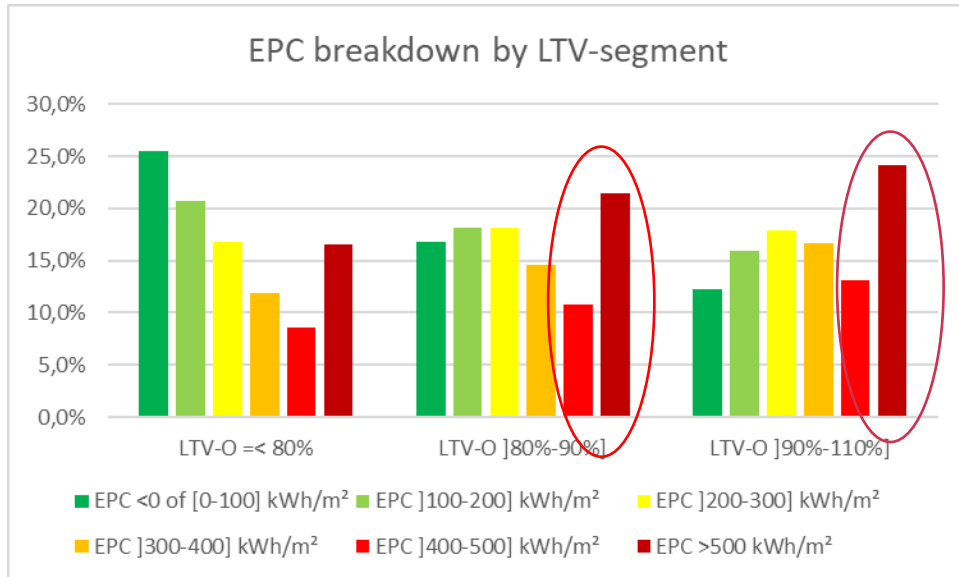
Households borrowing to improve energy efficiency (%; mortgages on the main residence)



Source: NBB (HFCS, 4th wave, June 2020-June 2021).

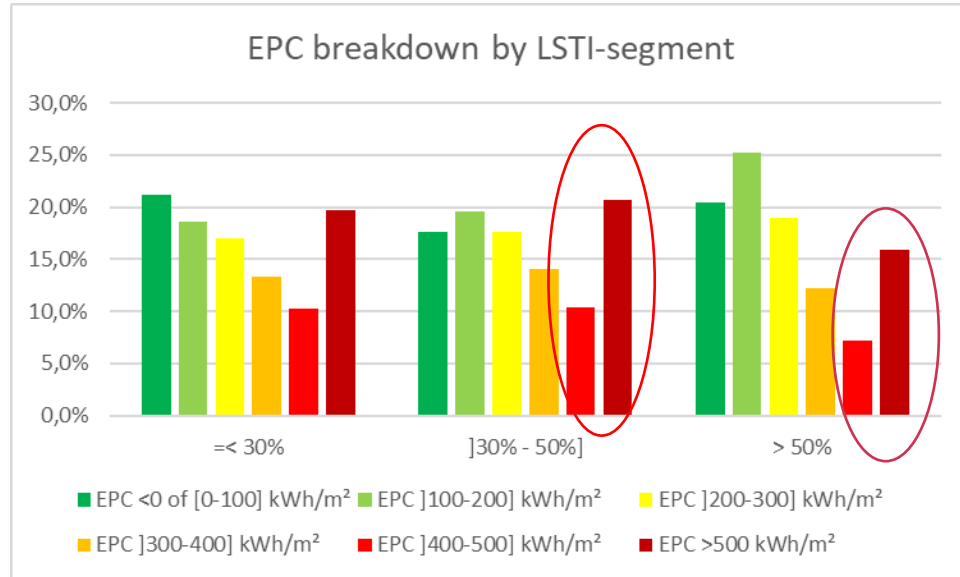
Mortgages associated with weaker lending standards and energy inefficient houses are more vulnerable for increased energy prices and shocks in the housing markets

EPC new production residential mortgage loans (First half of 2022-BE banks)



Houses with lower energy efficiency scores tend to be purchased more by households with a higher loan compared to the value of the house (Loan to value-LTV)

= double vulnerability



A large proportion of houses with lower energy efficiency scores are purchased by households with higher debt payments compared to the income (higher loan service to income-LSTI)

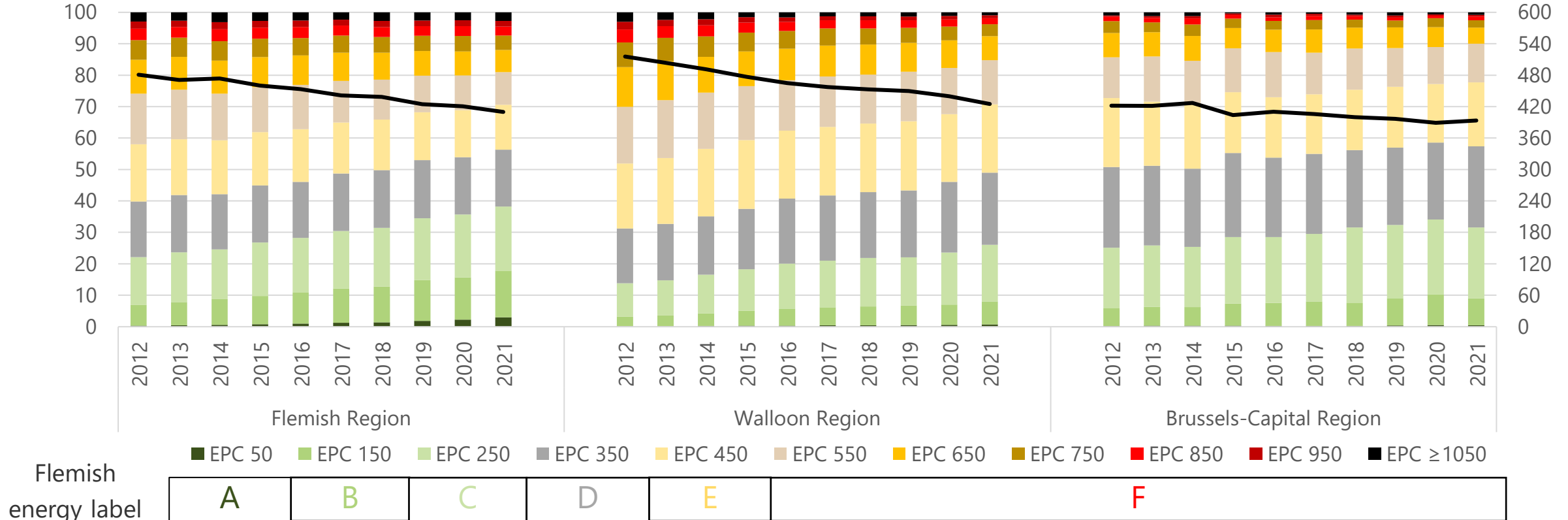
= double vulnerability

Caveat: EPC unavailable for more than 50% of all new residential loans.

Energy performance of the sold houses has improved over the past decade, but it will need to improve significantly more to reach the 2050-goal of label A

Energy efficiency EPC-score of the sold houses¹

(in % of houses sold (left-hand axis); average EPC in kWh/m²y (right-hand axis))



2050 target = EPC 100

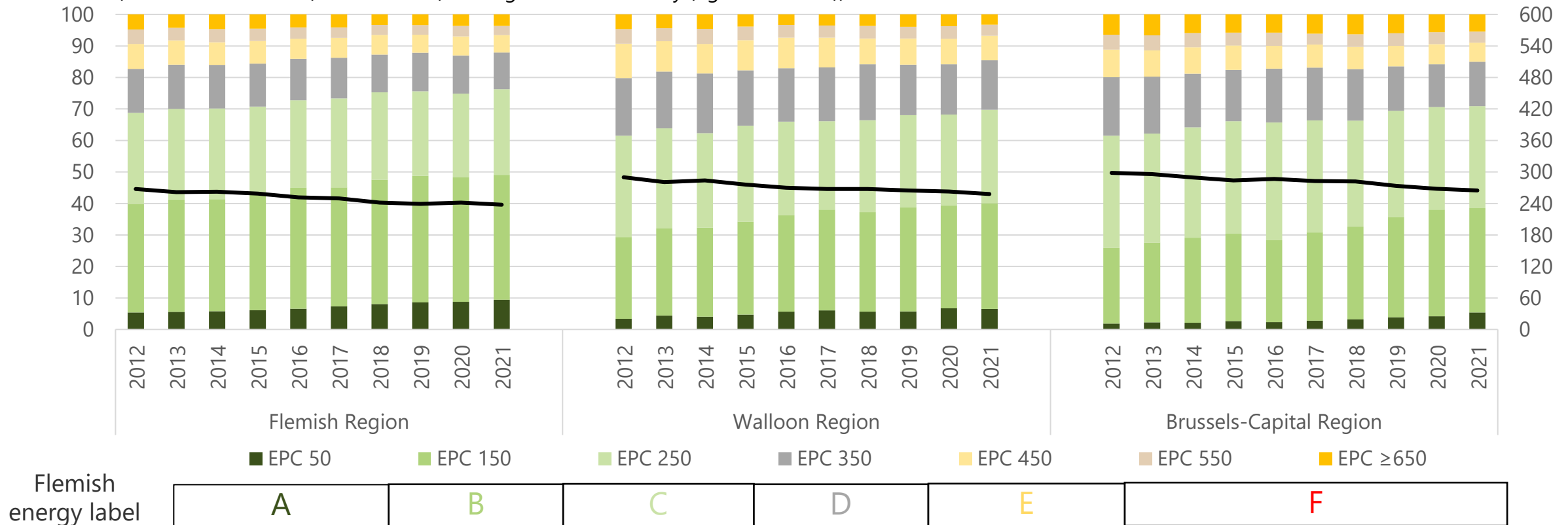
Source: FPS Finance, VEKA, SPW Wallonie, Leefmilieu Brussel, own calculations

¹ The energy performance scores of the sold dwellings are worse than that of the entire dwelling stock as energetical renovations often take place after the sale (and are therefore not yet included in the EPC score) and because older dwellings are overrepresented in the transaction dataset (Vastmans, 2020).

The average EPC of the sold apartments is better than that of houses. Energy efficiency will also need to improve markedly to reach the 2050-goal of label A

Energy efficiency EPC-score of the sold **apartments**¹

(in % of houses sold (left-hand axis); average EPC in kWh/m²y (right-hand axis))



Source: FPS Finance, VEKA, SPW Wallonie, Leefmilieu Brussel, own calculations

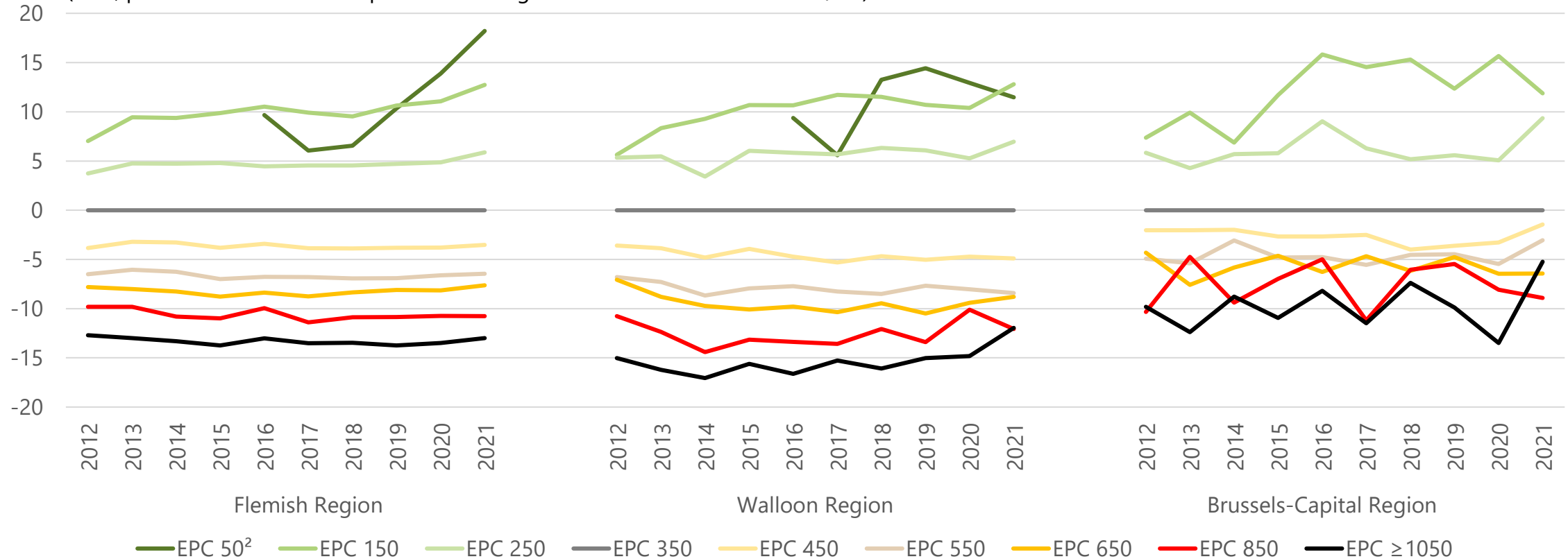
¹ The energy performance scores of the sold dwellings are worse than that of the entire dwelling stock as energetical renovations often take place after the sale (and are therefore not yet included in the EPC score) and because older dwellings are overrepresented in the transaction dataset (Vastmans, 2020).

2050 target = EPC 100

The price premium of energy efficient houses has increased over the past decade (and will likely have risen further in recent months due to the energy price surge)

Estimated energy efficiency price premium of **houses**¹

(in %, price difference to a comparable dwelling with an EPC score of 350 kWh/m²)



Source: FPS Finance, VEKA, SPW Wallonie, Leefmilieu Brussel, own calculations

¹ The estimated price premia have been roughly corrected for the impact of unobserved quality and comfort characteristics. Interpretation requires caution.

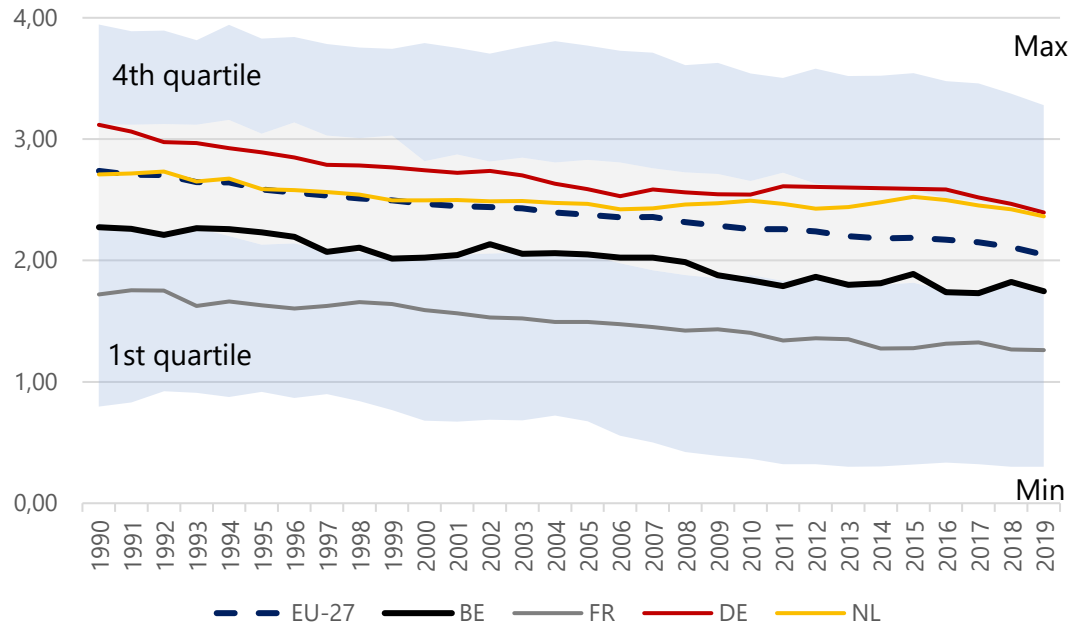


4. Current energy crisis

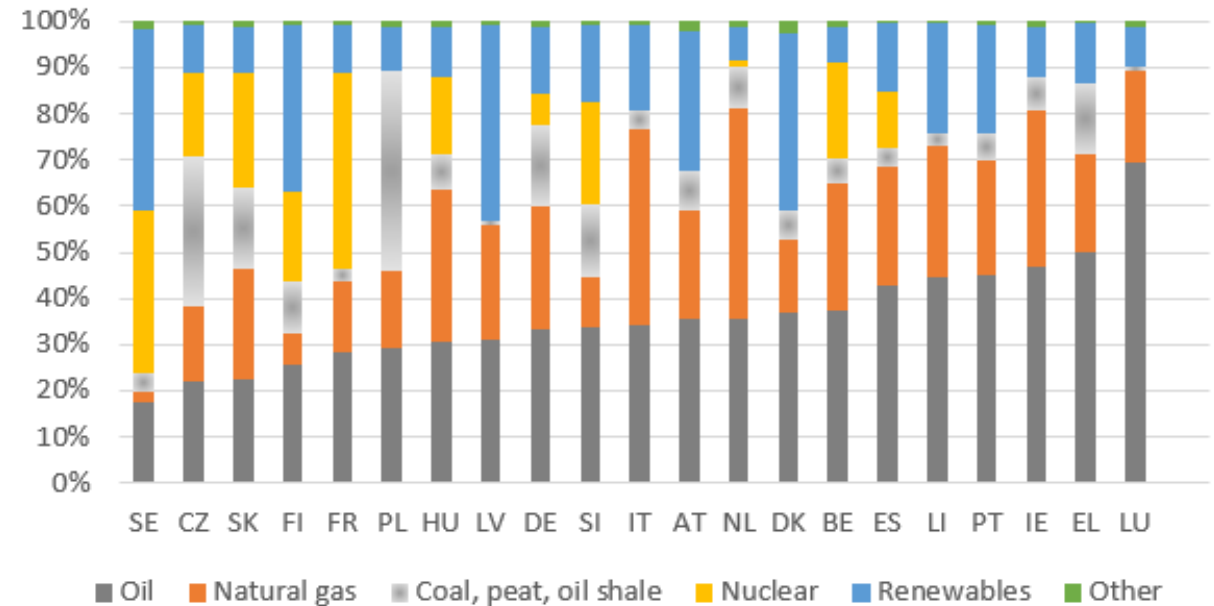
While the greenhouse gas intensity of Belgium's energy consumption is declining, substantial fossil-fuel based greenhouse gas emissions remain

**Greenhouse gas intensity of energy consumption
in Belgium and the EU-27**

(tons of CO₂ equivalent per ton of oil equivalent)

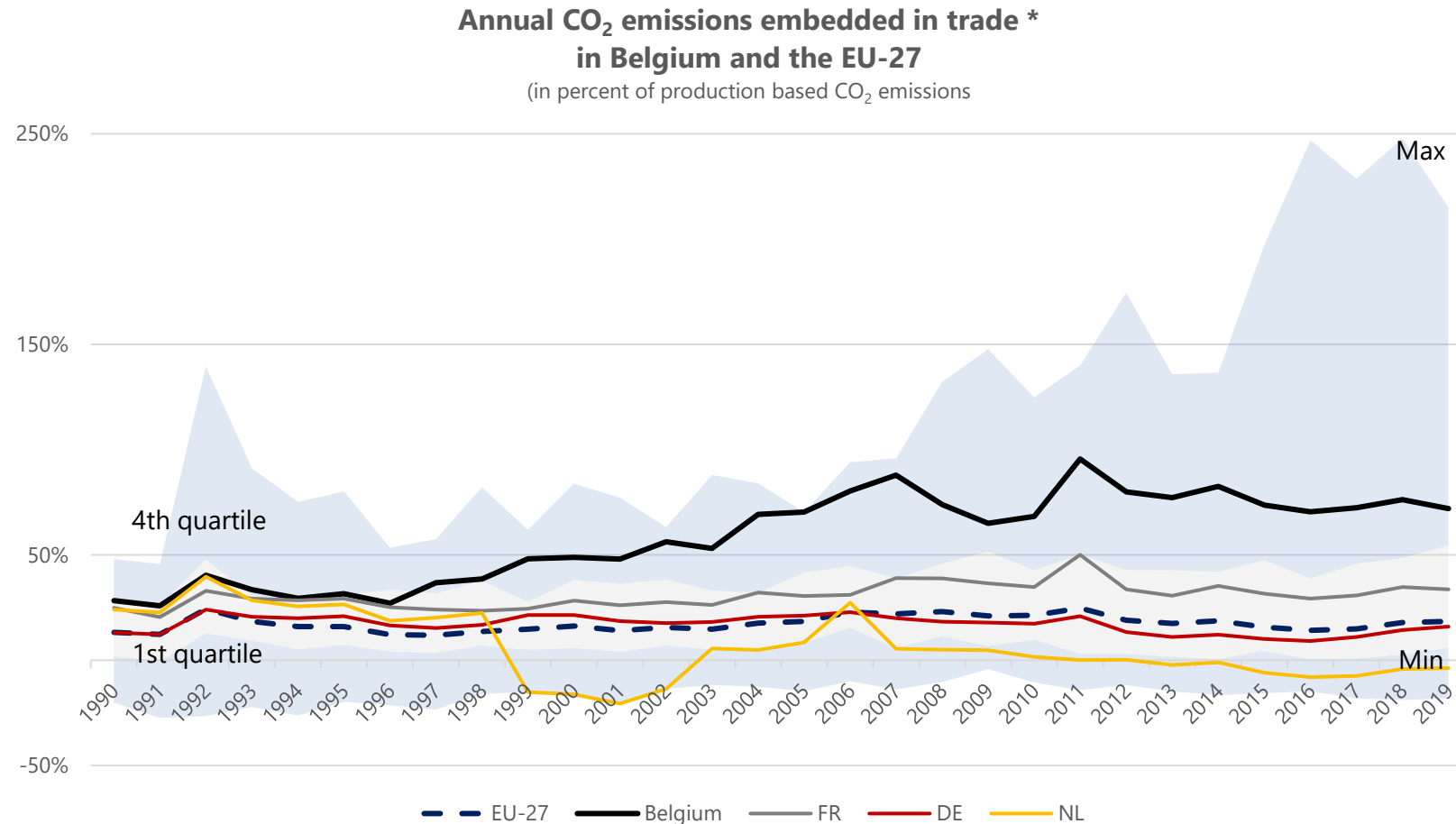


Energy mix in total energy supply (2019)



source: IEA World Energy Statistics and Balance

Indications that Belgium is increasing its consumption carbon footprint via trade



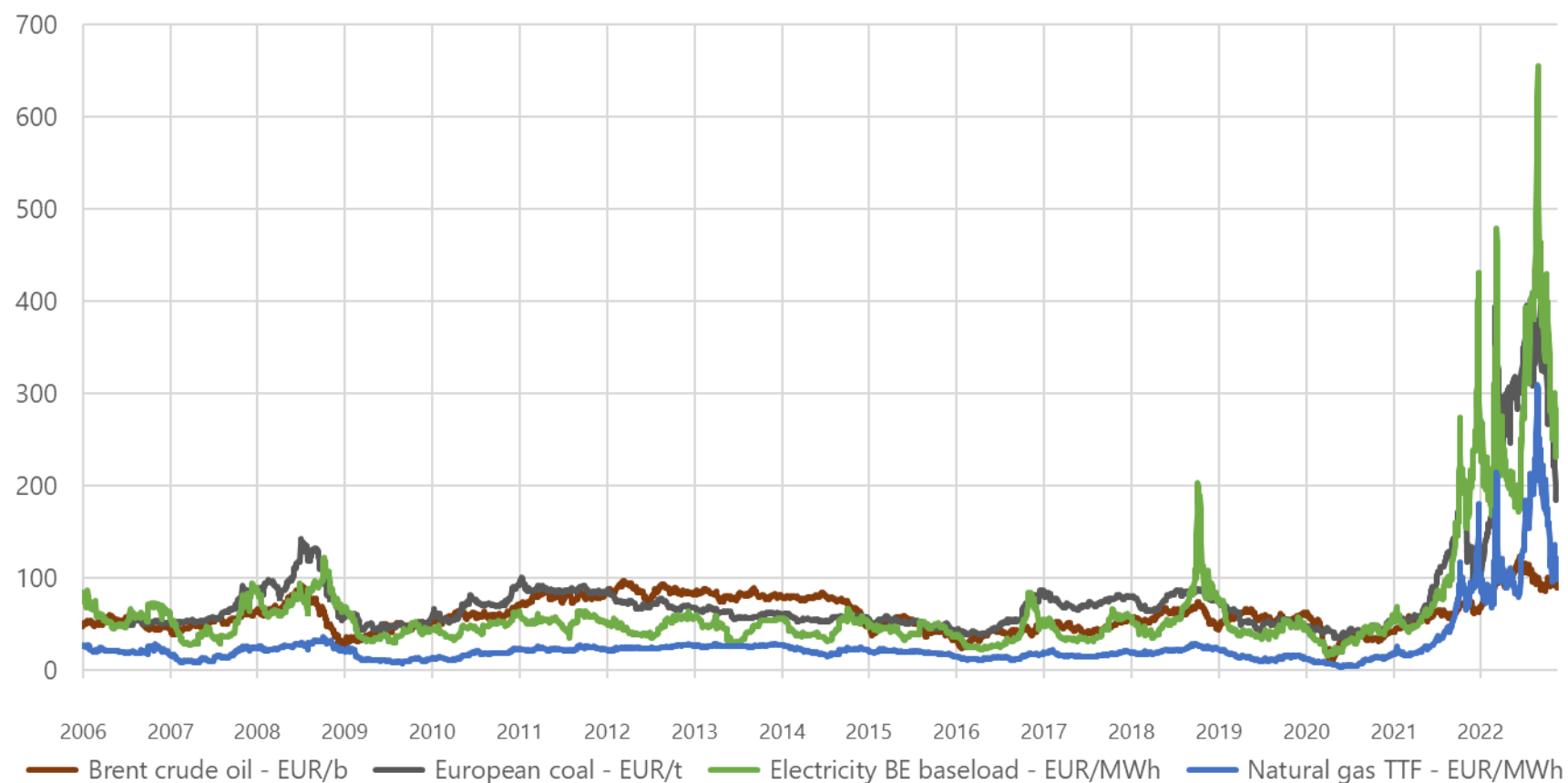
* Annual net carbon dioxide (CO₂) emissions embedded in trade, measured as a percentage of production-based emissions of CO₂. Net CO₂ emissions embedded in trade is the net of CO₂ which is imported or exported via traded goods with an economy. A positive value denotes a country or region is a net importer of CO₂ emissions; a negative value indicates a country is a net exporter.

source: Andrew, Robbie M., & Peters, Glen P. (2021). The Global Carbon Project's fossil CO₂ emissions dataset.

<https://doi.org/10.5281/zenodo.5569235>.

Global Carbon Project. (2021). Supplemental data of Global Carbon Project 2021 (1.0). <https://doi.org/10.18160/gcp-2021>

Energy prices for fossil fuels and electricity have spiked sharply following the Russian invasion of Ukraine and have now receded to levels that remain elevated



Source: Refinitiv, last data point: 17 November 2022.

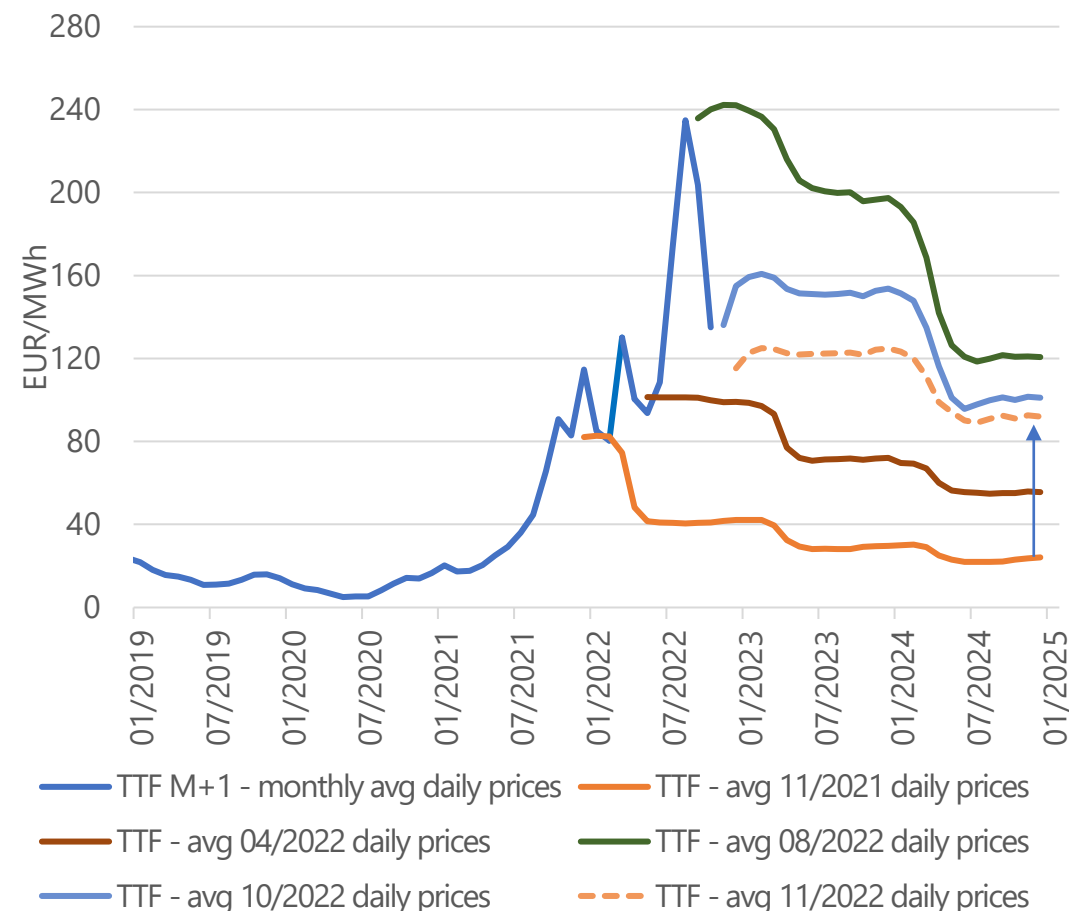


European natural gas prices have fallen to about the same level a year earlier

- Dutch TTF – M+1 delivery price



- Dutch TTF Futures¹ (monthly averages)



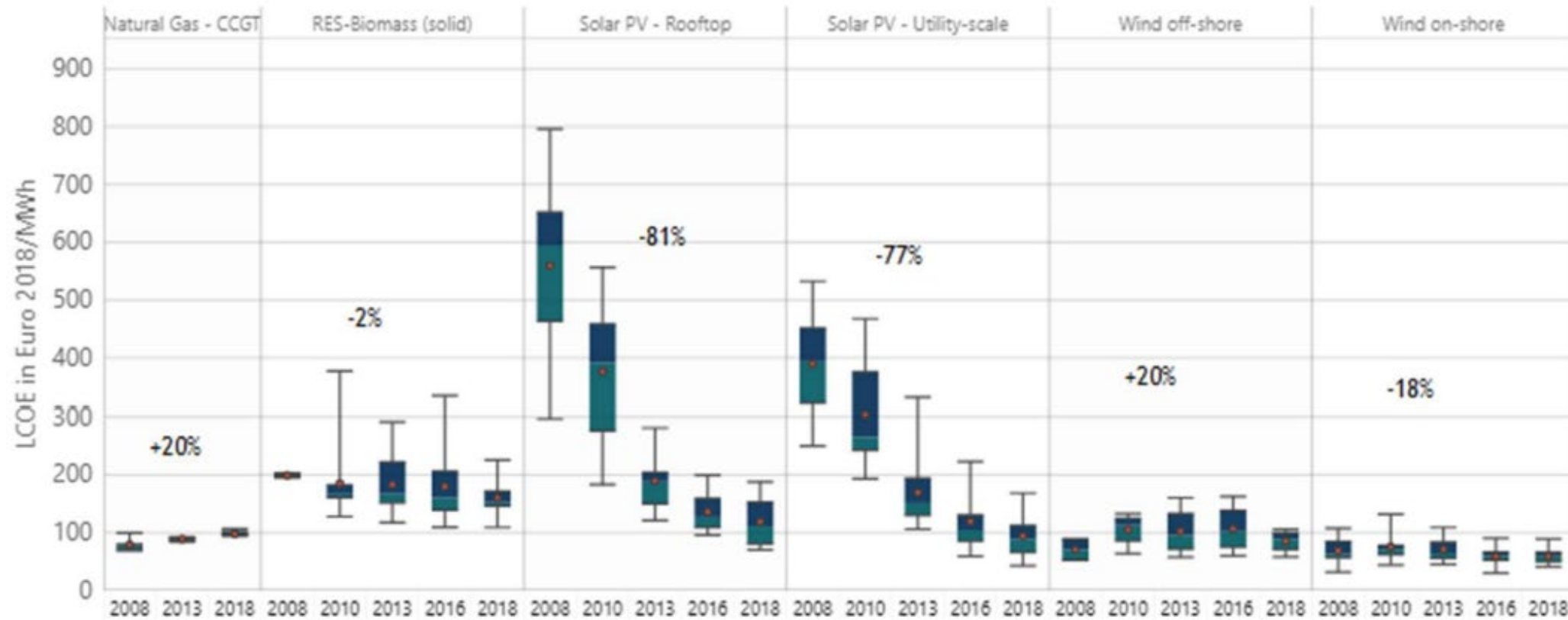
Sources: Refinitiv (a London Stock Exchange company), last data point: 17 November 2022.

TTF is the Dutch Title Transfer Facility, a virtual trading point for natural gas that acts as reference price.



5. Competitiveness of renewables

The cost of renewables has declined substantially, thus increasing their competitiveness. Energy security is an additional co-benefit



LCOE = gives the average cost incurred to produce one unit of electricity over the life of a project = ratio of lifetime costs (upfront capital investment, financing costs, fuel costs, O&M costs, and CO₂ prices when applicable) to lifetime electricity generation of a plant discounted back to a common year. LCOE does not include network costs due to intermittency.

Discount rate used: 7%, except for rooftop solar for which it is 3%.

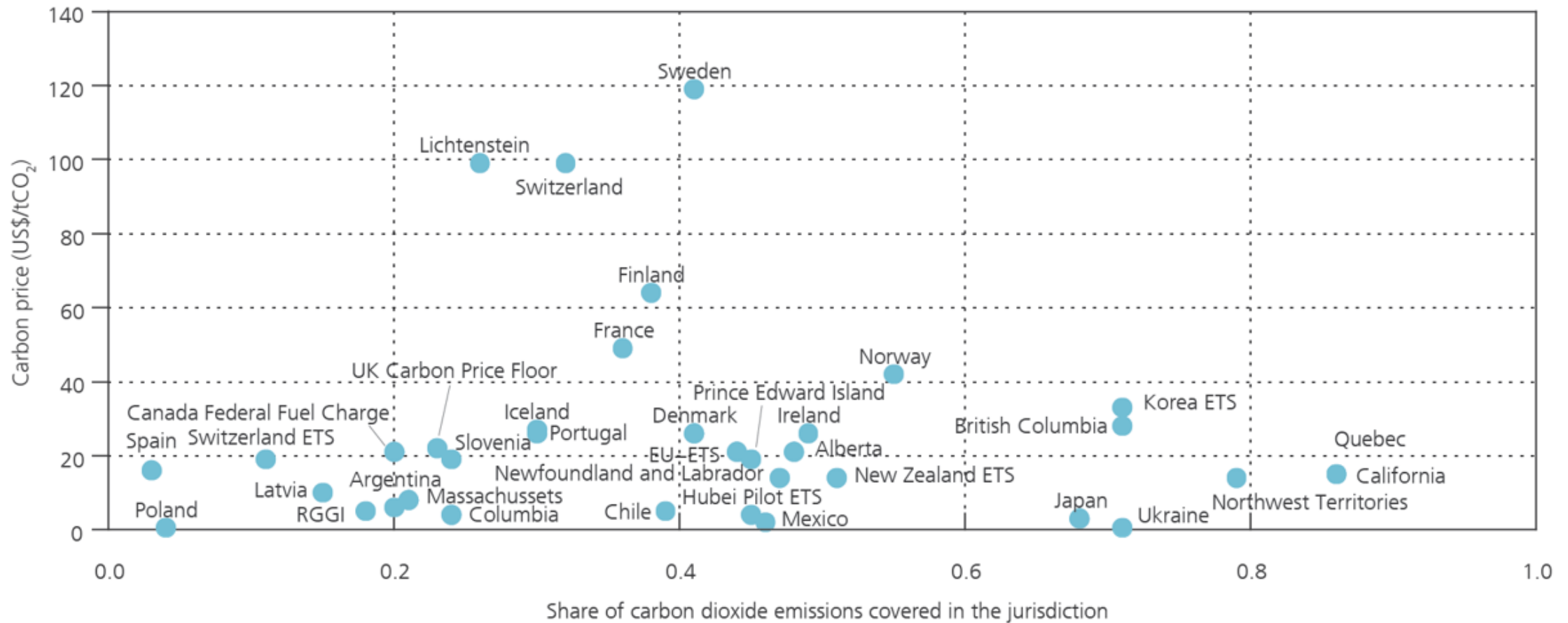
Source: EC (2020), "Cost of Energy (LCOE): Energy costs, taxes and the impact of government interventions on investments".



6. Carbon pricing and climate policy instruments

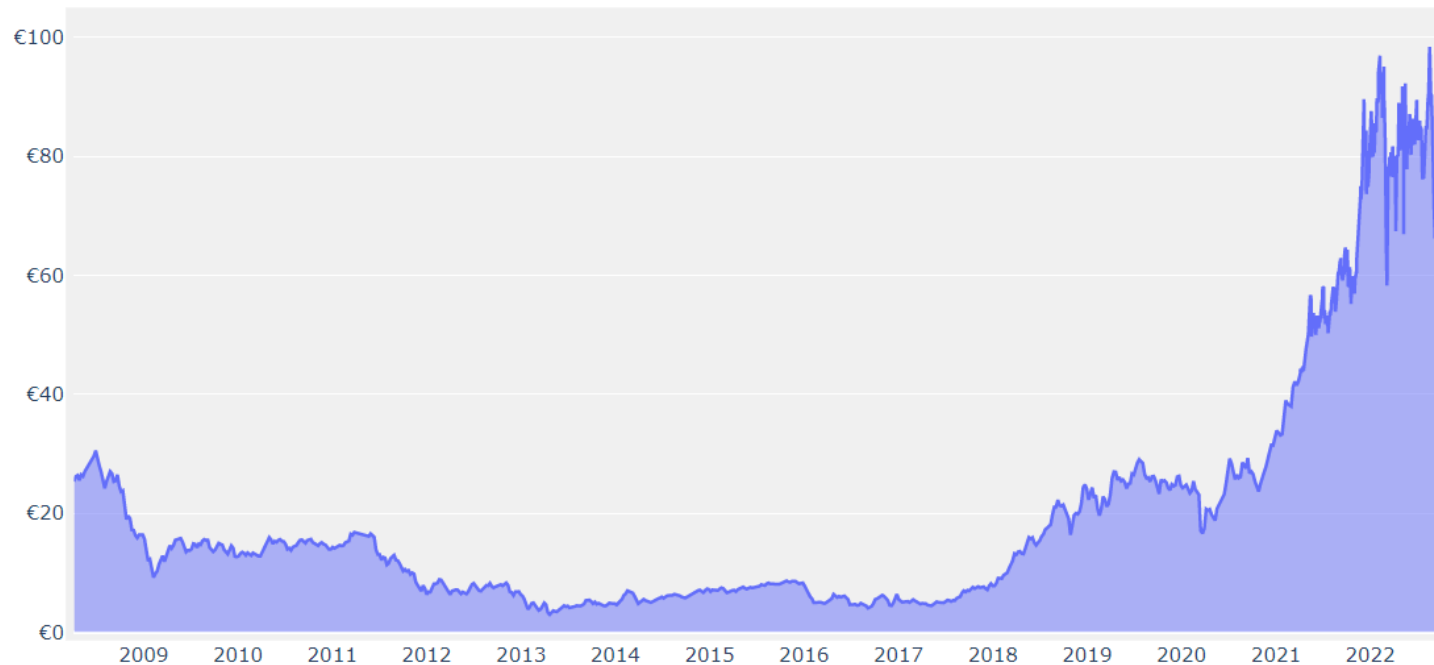
Carbon pricing is the key policy instrument to shift relative prices. Its use is, however, still only moderately wide-spread

Carbon pricing initiatives around the World
as of April 2020



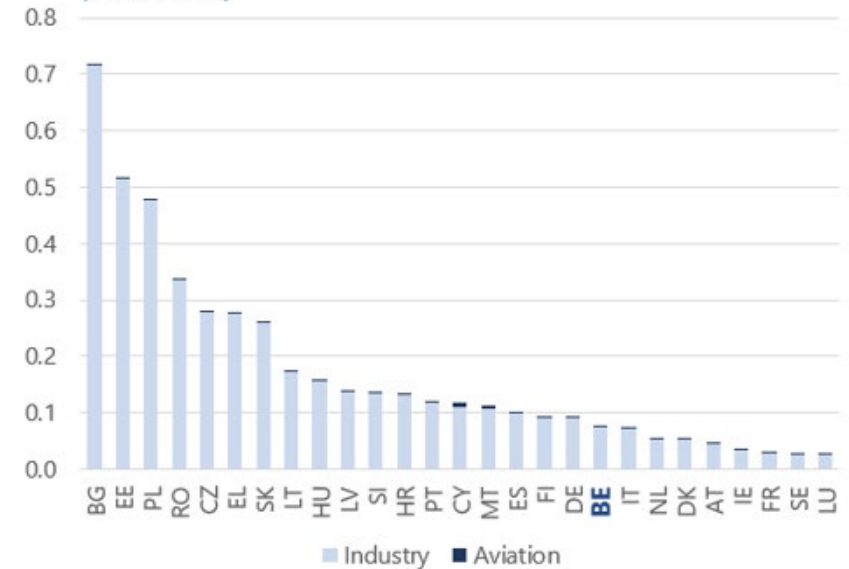
Source: World Bank Group, *States and Trends of Carbon Pricing 2020*

A carbon price is crucial to change relative prices. The EU Emissions Trading System sets a carbon price for the power sector, industry, and domestic aviation



Source: Sandbag carbon price viewer, consulted 7th October 2022.

Revenues from EU ETS¹
(2019, % GDP)

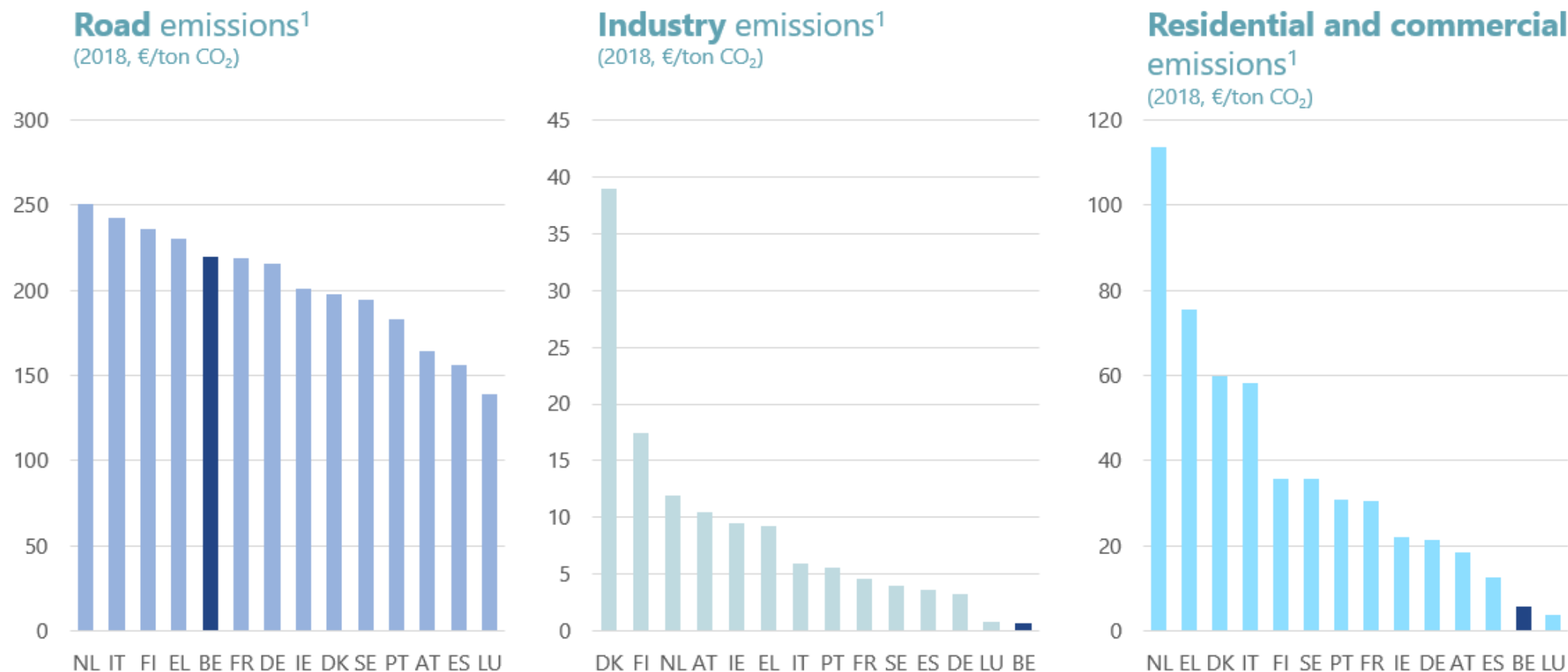


Source: European Commission Carbon Market Report (2020).

¹EU ETS revenue for year t refers to 1 April t until March 30 in t+1.

Effective carbon pricing in the economy differs widely across sectors

Average effective carbon tax rates



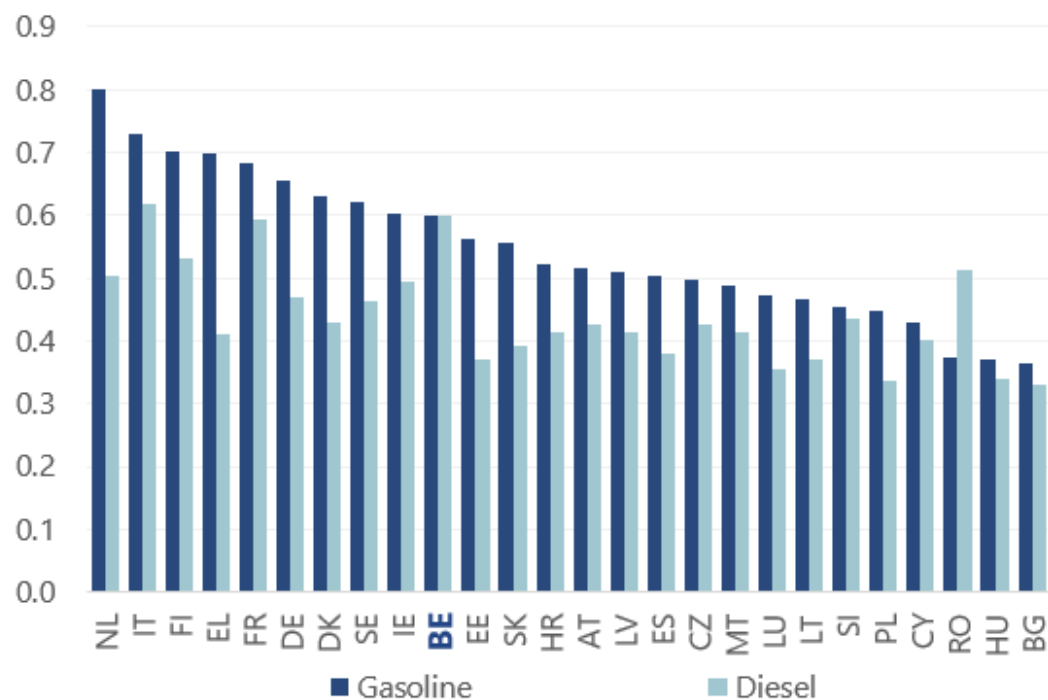
Source: OECD (2019).

¹including emissions from the combustion of biofuels. Industry emissions only includes national effective carbon price.

Effective carbon pricing in the economy differs widely across sectors (ctd.)

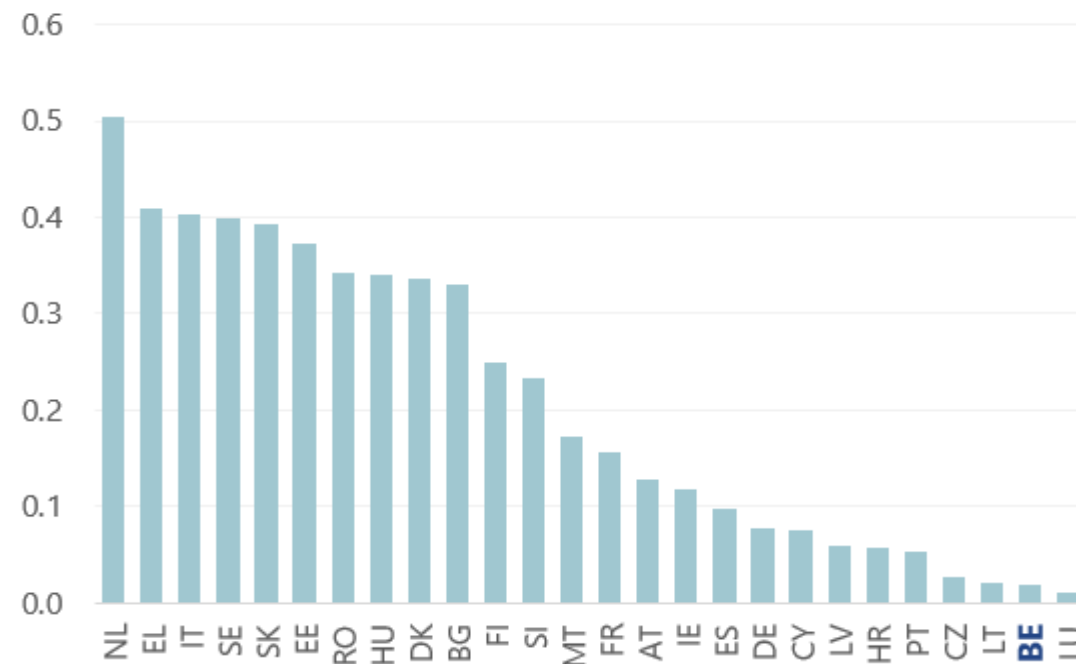
Average effective carbon tax rates

Taxing road emissions
Motor fuel excise duties in Europe
(2020, € per litre)



Source: ECB, De Jonghe et al. (2021).

Taxing residential and commercial emissions
Excise duties diesel in Europe
(2020, € per litre)



Source: EC Carbon market report (2020).

¹ An EU ETS revenue year t is from 1 April t until March 30 $t+1$.

Source: OECD (2019).

¹ including emissions from the combustion of biofuels.

The macroeconomic cost of the transition toward climate neutrality is manageable

National Bank of Belgium

- A back-of-the-envelope calculations suggests abatement cost of ca. 17 billion euro per year for Belgium, which translates to ca. 3.5% of GDP today, or about 2-3% of GDP by 2050 (depending on GDP growth between now and then).
- Put differently, we estimate that annual aggregate income growth between now and 2050 would be ca. 0.1 percentage points lower.

International Monetary Fund

- -0.15 to -0.25 percentage points of GDP growth between now and 2030.
- +0.1 to +0.4 percentage point increase in inflation.

European Commission

- GDP changes of between -0.4% to +0.5% of GDP in 2030, and between -1.3% to +2.2% in 2050.

Note: Co-benefits are not included in the above estimates. According to European Commission estimates, improved air quality would lead to co-benefits of +218-459 billion euro per year for the EU27 alone.

Sources: NBB: <https://www.bis.org/review/r220318d.pdf>;
European Commission: <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52020SC0176&from=EN> and
https://climate.ec.europa.eu/system/files/2018-11/com_2018_733_analysis_in_support_en.pdf;
IMF: <https://www.imf.org/en/Publications/WEO/Issues/2022/10/11/world-economic-outlook-october-2022>

A hand holding a small globe with a tree growing on it, symbolizing sustainable finance.

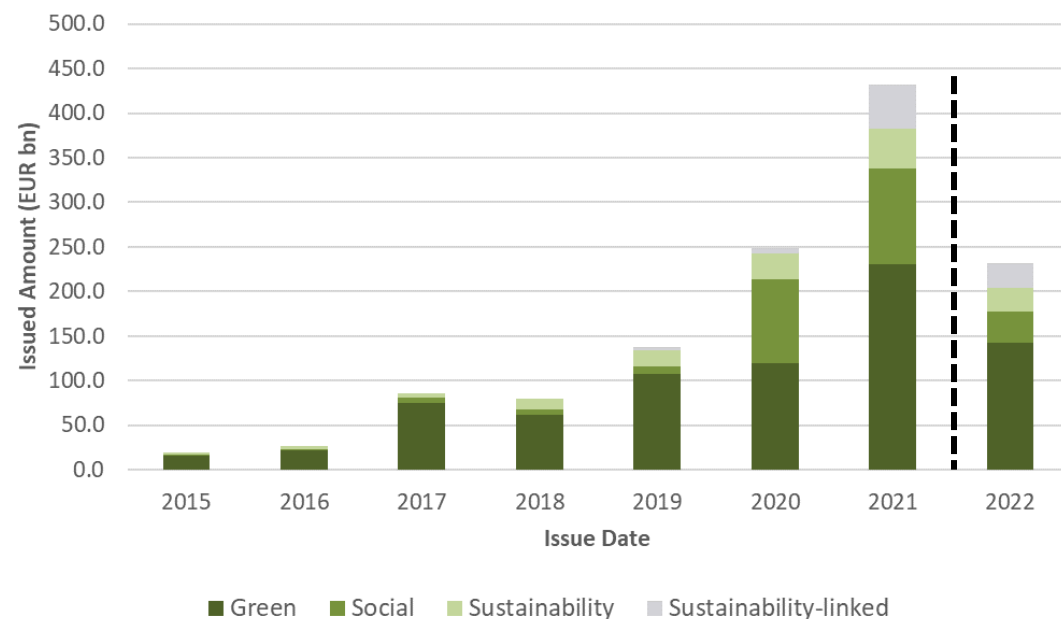
7. Sustainable finance market



Sustainable bond issuance remains flat in 2022 after period of growth

EUR-denominated ESG Bond Issuance by bond type

EUR bn



USD-denominated ESG Bond Issuance by bond type

USD bn



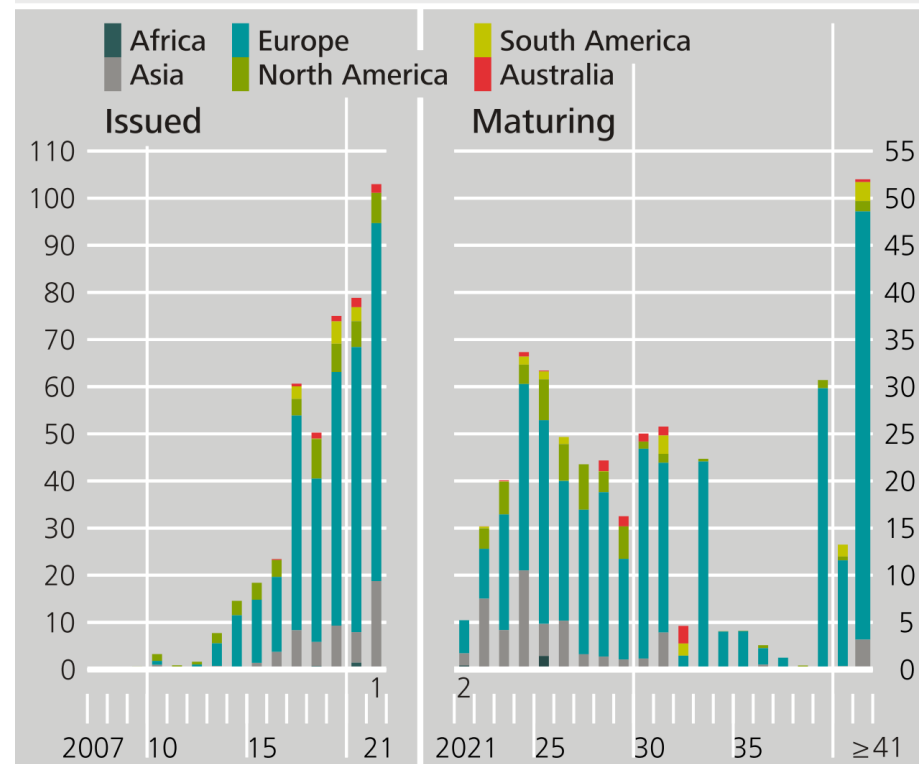
Note: 2022 represents 2022 year-to-date data (end august 2022).

Source: Bloomberg/NBB.

Increase in government-issued green bonds originates in Europe

Volumes of green bonds issued and maturing: Governments and supranationals*

€ billion



Source: Bloomberg. * Includes development banks. **1** 1 January to 1 October 2021. **2** 1 October to 31 December 2021.

Source: Network for Greening the Financial System based on Bloomberg.

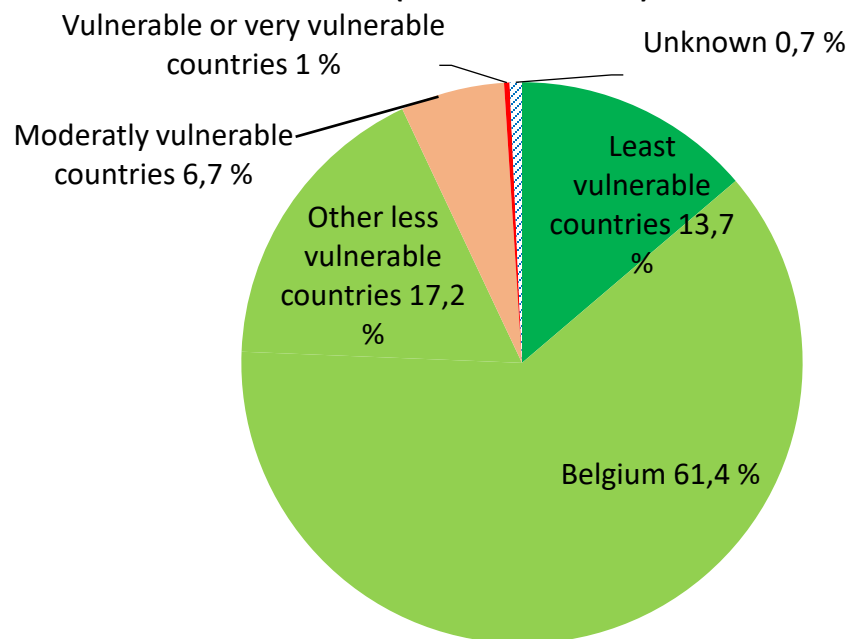


8. Physical risk in the Belgian financial sector

Based on preliminary data, Belgian Financial institutions' exposures to physical risk seems limited

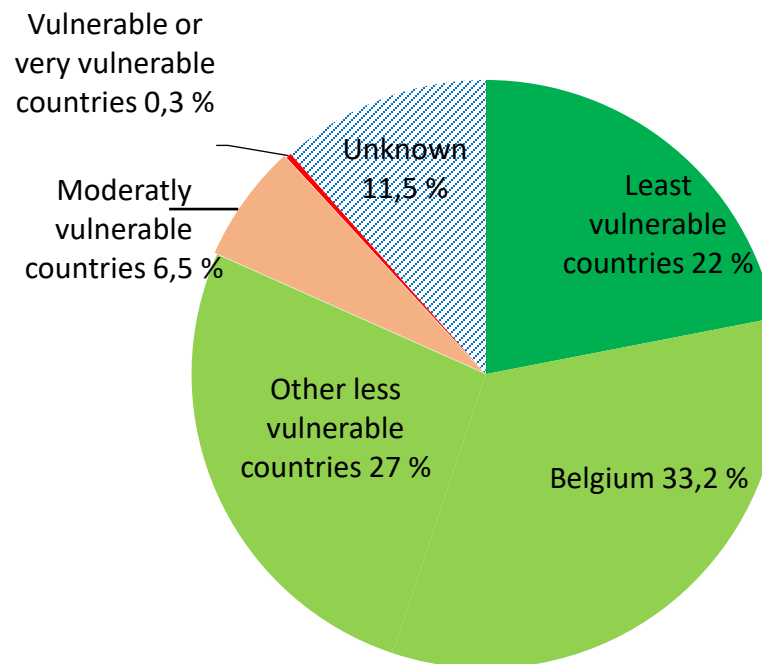
Belgian banks' loans, equity and debt securities portfolio

(consolidated data)



Belgian insurance companies' investment portfolio

(excl. unit-linked, solo data)



Note: Based on a methodology of S&P on country vulnerability to weather-related events: risk seems limited but there is a lack of granularity. There can be important discrepancies in physical risk between regions within a country. For insurance companies: "unknown" = loans to physical persons whose country of residence is not specified.

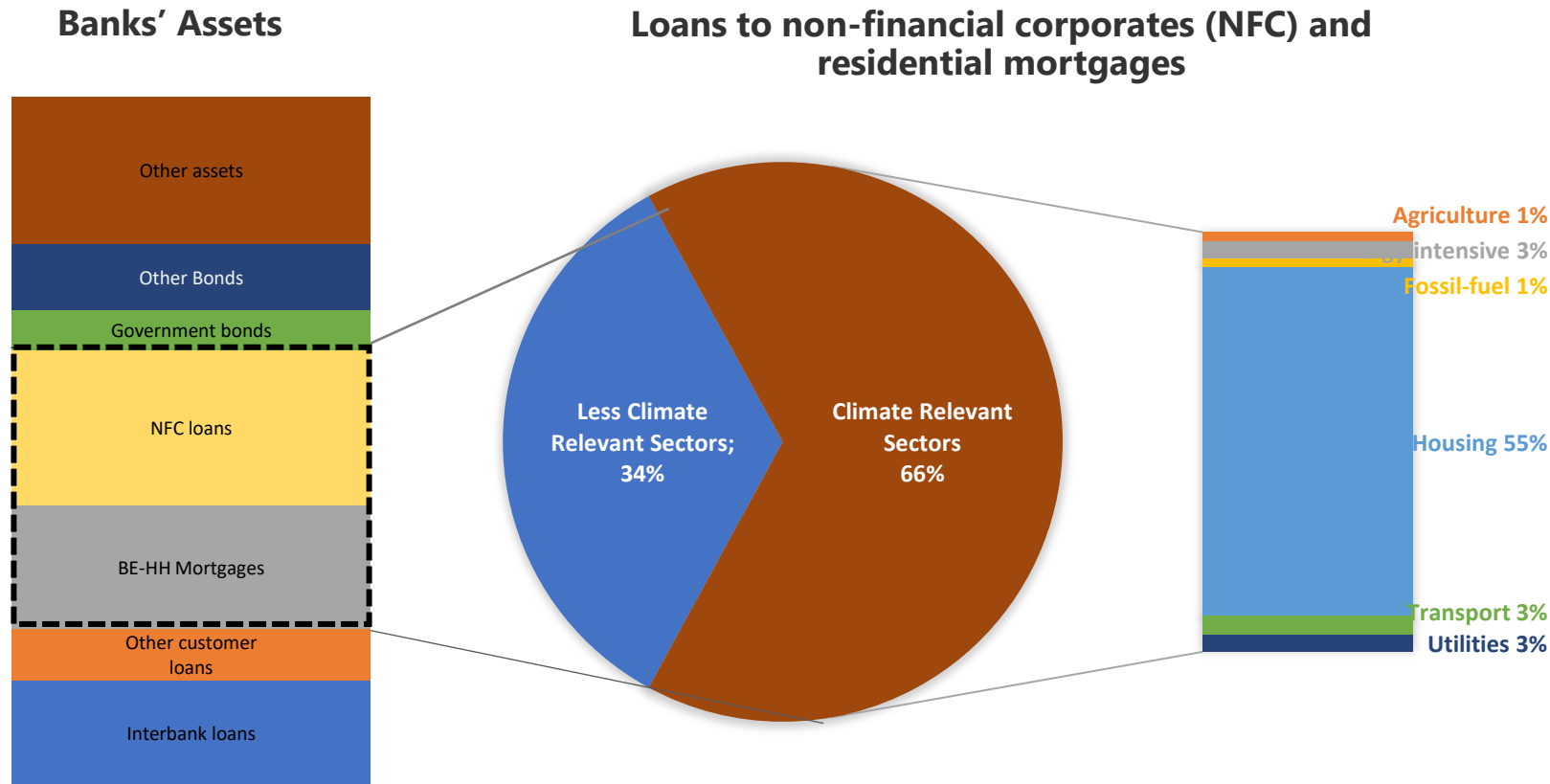
Source: NBB, end 2021 data.

A background image showing several hands of different skin tones cupped together, holding a small blue paper cutout of a house with four windows. A semi-transparent blue trapezoidal shape is overlaid on the right side of the image, containing the title text.

9. Transition risk in the Belgian financial sector

Real estate exposures are considered to be the main source of transition risk for Belgian banks

Belgian Banks' loan exposure to greenhouse gas intensive sectors (end 2021)



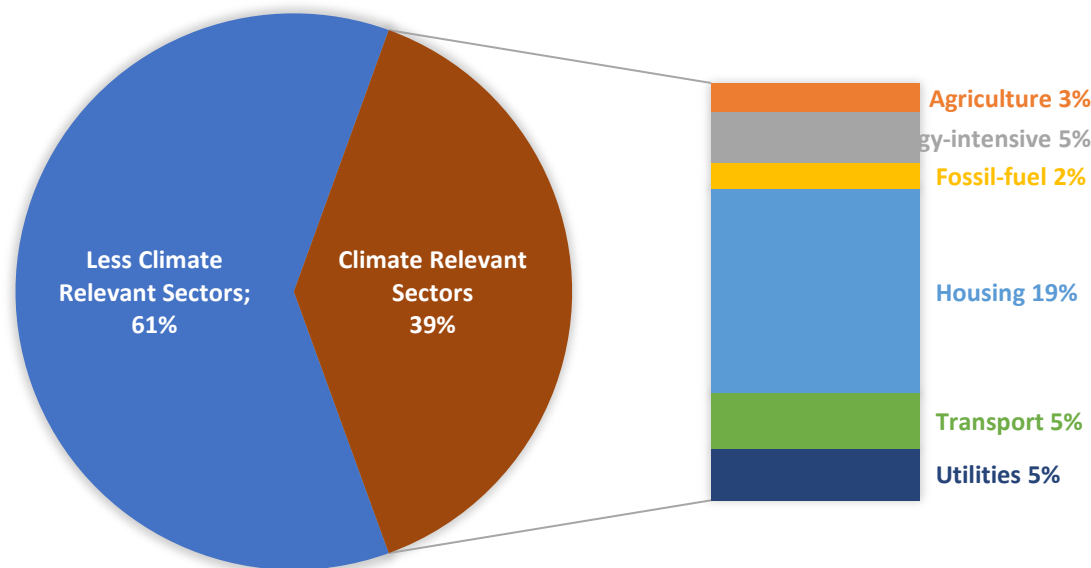
- 66% of banks' loans to non-financial corporates and mortgages have counterparties in "climate relevant sectors"
- GHG intensive sectors are considered climate relevant, as they are most vulnerable for additional climate policies and impacts from technological changes and consumer preferences directed at increased sustainability, resulting in higher transition risk.
- Of all climate relevant sectors, real estate exposures or housing represents the largest sector, making up 55% of all loans to NFCs and mortgages
- There are of course differences in GHG intensity within sectors, which are not taken into account

Source: NBB

Real estate exposures are considered to be the main source of transition risk for Belgian banks

Belgian Banks' loan exposure to greenhouse gas intensive sectors (end 2021)

Loans to non-financial corporates (NFC)



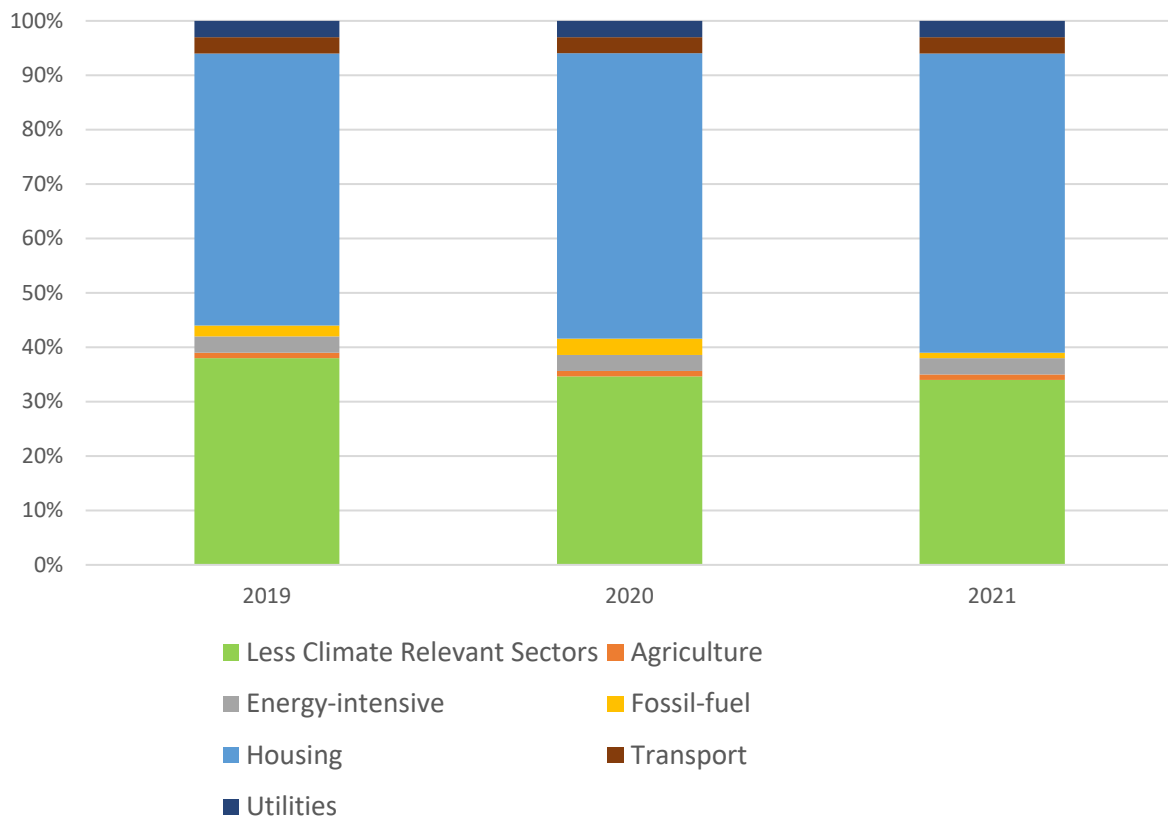
- 39% of banks' loans to non-financial corporates are considered "climate relevant or GHG intensive sectors"
- Of all climate relevant sectors, real estate exposures or housing represents the largest sector, making up 19% of all loans to NFCs
- There are of course differences in GHG intensity within sectors, which are not taken into account

Source: NBB

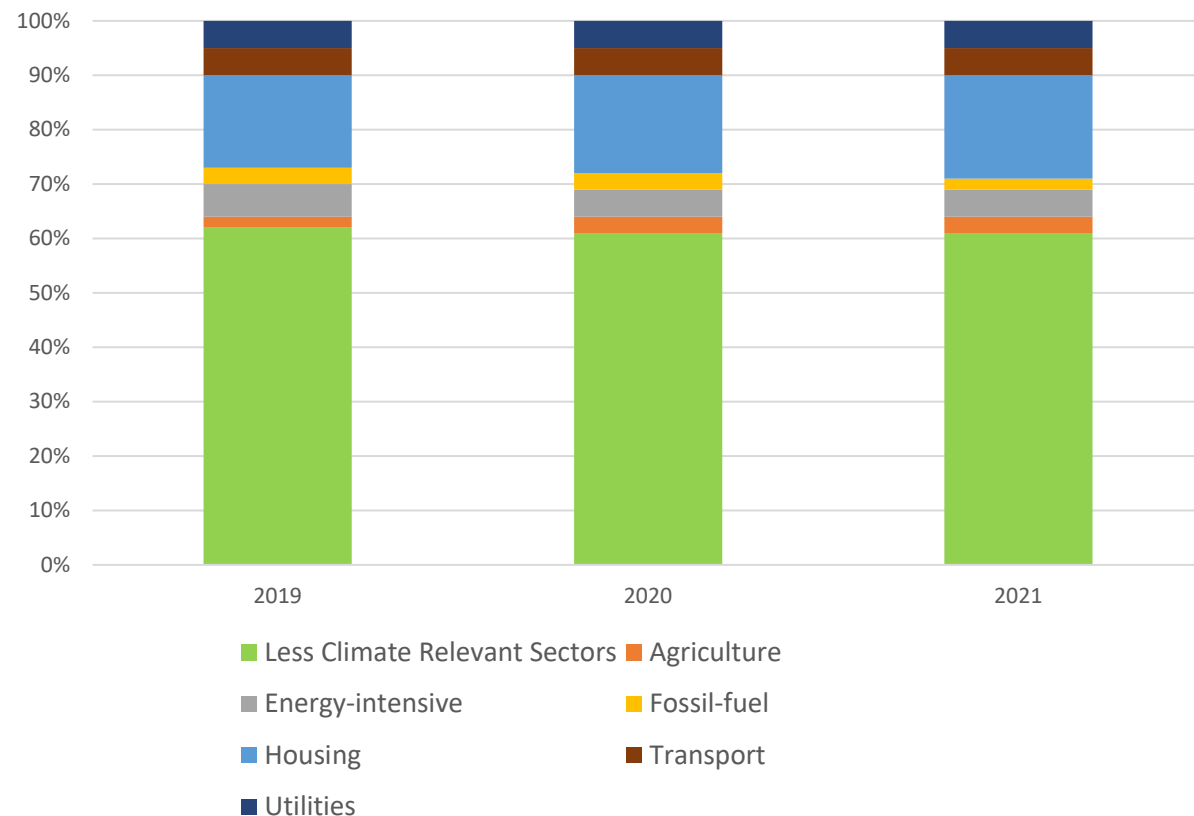
The increase in real estate exposures causes banks' exposure to transition risk to slightly increase over the past years

Belgian Banks' loan exposure to greenhouse gas intensive sectors (evolution 2019-2021)

Total NFC (Non-Financial Corporates) + mortgages



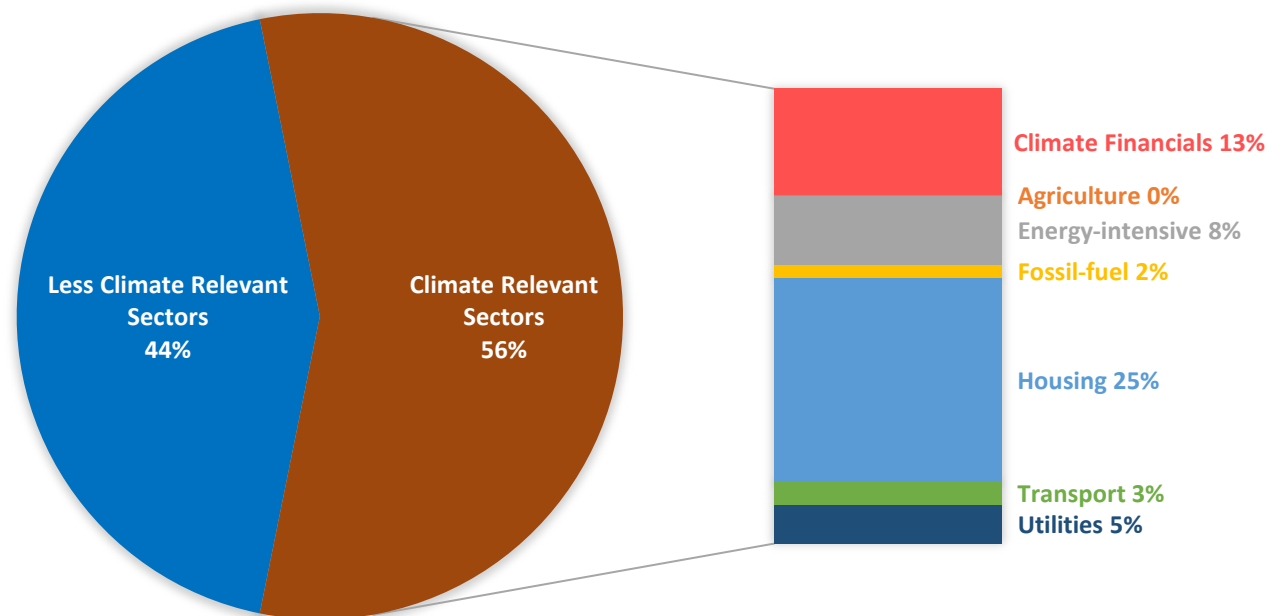
NFC (non-Financial Corporates)



Source: NBB

Real estate exposures is also a major source of transition risk for Belgian insurers

Belgian Insurance Companies' EQUITY/CORPORATE BONDS/LOANS/ MORTGAGES exposure to greenhouse gas intensive sectors (end 2021)



Climate Financials refers to an estimated portion of the assets that belong to the financial sector that would have been classified as climate relevant sectors if properly looked through.

Those assets, include participation in other insurance companies or banks and holdings of investment funds, which are not looked through.

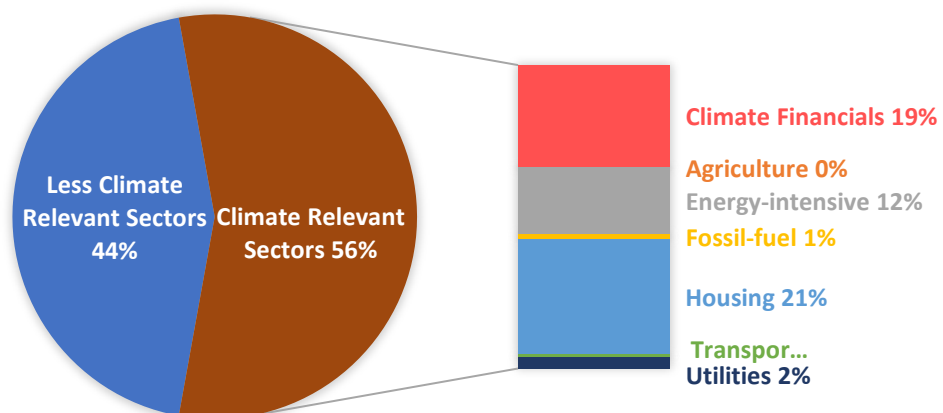
To approximate the exposures that would result from a look-through approach, it was assumed that entities or funds classified in the financial sector include climate-relevant assets in a similar proportion to that of assets directly held by insurers.

Source: NBB

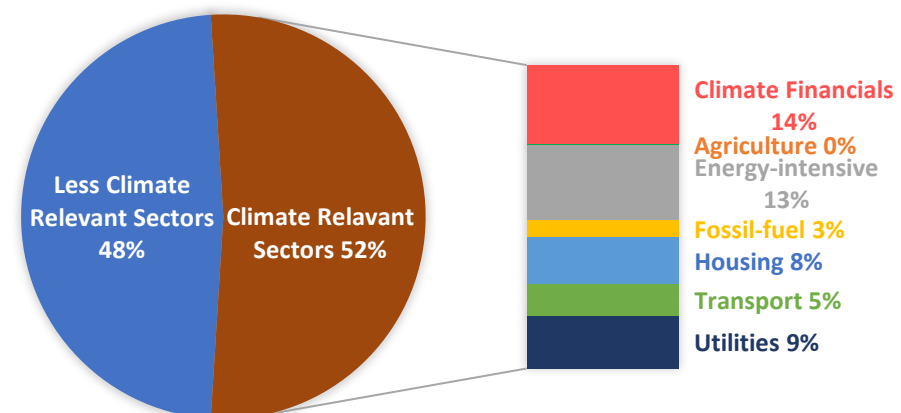
Real estate exposures is also a major source of transition risk for Belgian insurers

Belgian Insurance Companies' exposure to greenhouse gas intensive sectors (end 2021)

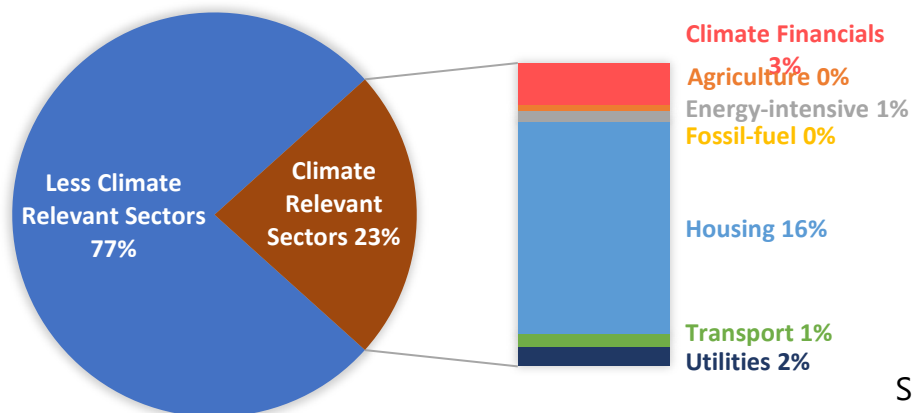
EQUITY



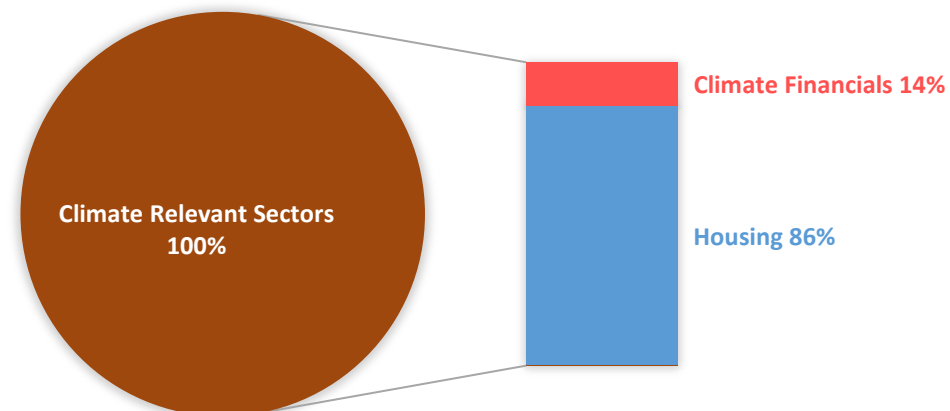
CORPORATE BONDS



LOANS



MORTGAGES



Source: NBB