2023 STATISTICAL REPORT

FuelsEurope

Editor: John Cooper

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FuelsEurope

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FOREWORD

High quality, verified and reliable facts and figures are essential to support economic and political analysis. For this purpose, FuelsEurope Statistical Report 2023 aims at providing a comprehensive set of statistics about the refining industry that can be used by all stakeholders.

This 2023 edition contains the most up-to-date information based on currently available data for the sector. One should, however, note that some of the data is updated every two or four years.

This includes data on taxation, global energy markets, oil products demand and international trade flows, fuel specifications, prices and margins, the integration with the petrochemical sector as well as the environmental performance of the EU fuel manufacturing industry.

In this year's edition, we have decided to keep graphs on the EU import dependency in light of the continued impact of the Russian war on Ukraine.

We have also added graphs showing the EU average fleet age for light duty, heavy duty vehicles and buses to shed the light on how long vehicles stay on the road.

John Cooper
Director General

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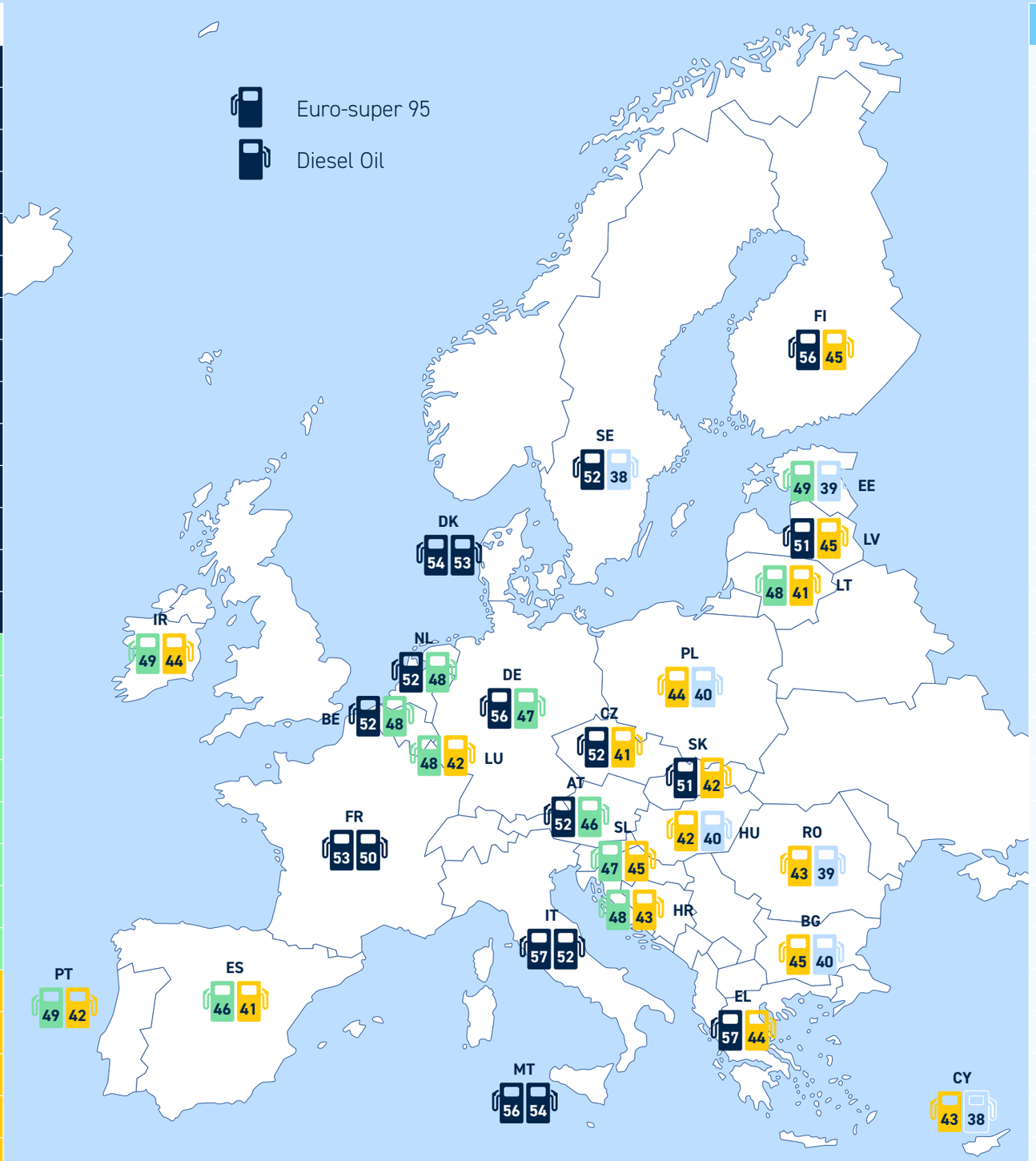
Prices & Margins

FIG.01 TOTAL TAXATION SHARE IN THE END CONSUMER PRICE

Source: European Commission

COUNTRY	Euro-super 95
GREECE	57
ITALY	57
FINLAND	56
GERMANY	56
MALTA	56
DENMARK	54
FRANCE	53
AUSTRIA	52
BELGIUM	52
CZECHIA	52
NETHERLANDS	52
SWEDEN	52
LATVIA	51
SLOVAKIA	51
ESTONIA	49
IRELAND	49
PORTUGAL	49
CROATIA	48
LITHUANIA	48
LUXEMBOURG	48
SLOVENIA	47
SPAIN	46
BULGARIA	45
POLAND	44
CYPRUS	43
ROMANIA	43
HUNGARY	42



COUNTRY	Diesel Oil
MALTA	54
DENMARK	53
ITALY	52
FRANCE	50
BELGIUM	48
NETHERLANDS	48
GERMANY	47
AUSTRIA	46
FINLAND	45
LATVIA	45
SLOVENIA	45
GREECE	44
IRELAND	44
CROATIA	43
SLOVAKIA	42
PORTUGAL	42
LUXEMBOURG	42
CZECHIA	41
LITHUANIA	41
SPAIN	41
BULGARIA	40
POLAND	40
HUNGARY	40
ESTONIA	39
ROMANIA	39
SWEDEN	38
CYPRUS	38

Unit: Percentage

<40% or = 40%
>40% - < or = 45%
>45% - < 50%
= or >50%

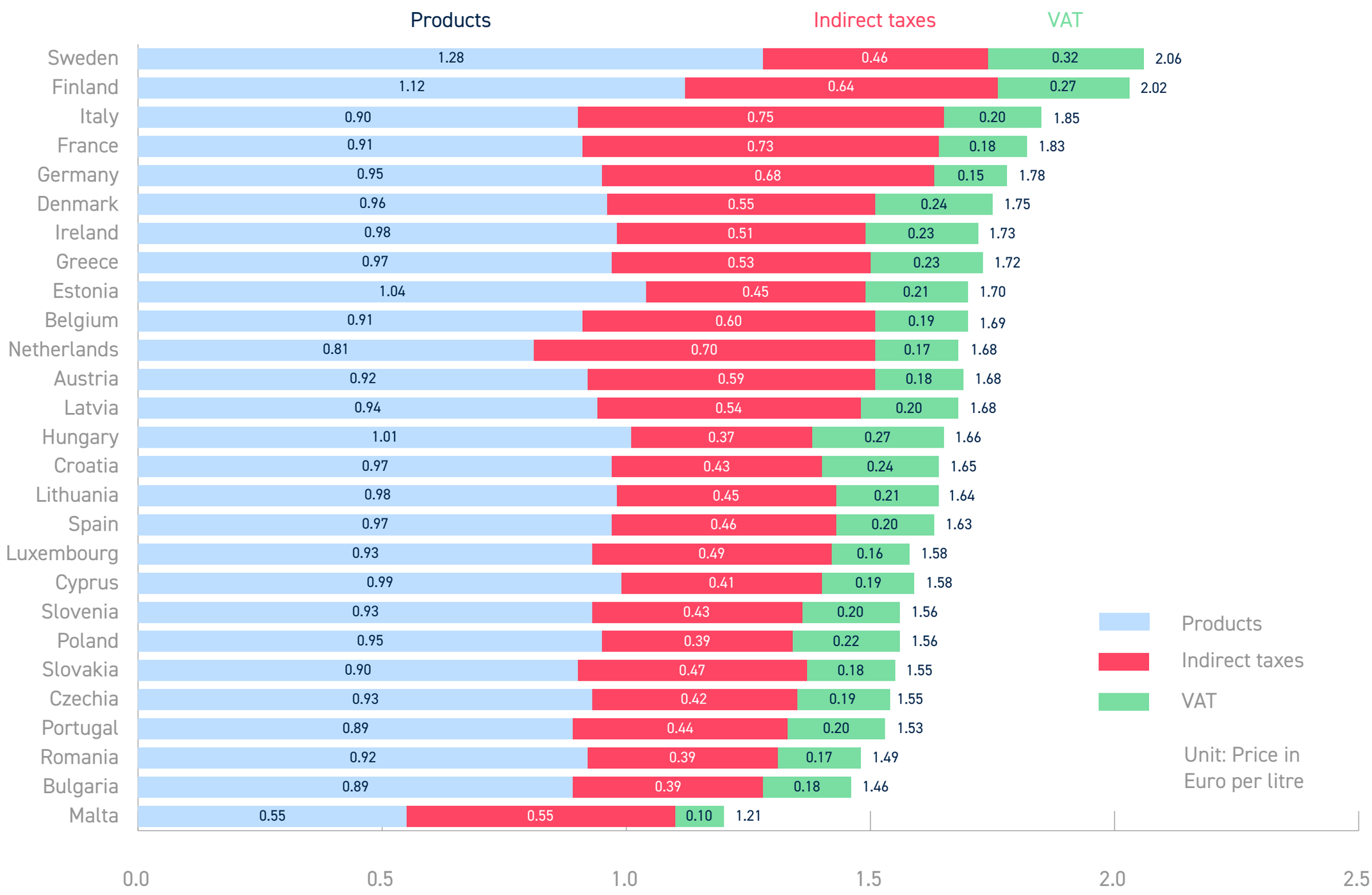
The price at the pump is driven to a large degree by tariffs and taxes and contribute substantially to Member States' revenues. On average, around half of the cost of fuel at the pump represents taxes.

This proportion is superior compared to 2022. Indeed, due to the Russian war on Ukraine in 2022, some countries cut fuel taxes to alleviate price increases. However, due to the stabilisation of oil prices over time some Member States have stopped cutting fuel taxes, which has led to an increase in taxes compared to the previous year.

FIG.02

BREAKDOWN OF AUTOMOTIVE DIESEL PRICES ACROSS EU-27 (FEBRUARY 2023)

Source: Oil Bulletin, European Commission



Gasoline prices were generally higher than diesel prices due to the higher tax element. While gasoline prices are still higher on average, we have witnessed that the gap has been significantly reduced. Only a fraction of the price paid at the pump contributes to the refiners income, the remainder is going to Member States and the purchasing of crude oil.

FIG.03

BREAKDOWN OF AUTOMOTIVE GASOLINE PRICES ACROSS EU-27 (FEBRUARY 2023)

Source: Oil Bulletin, European Commission

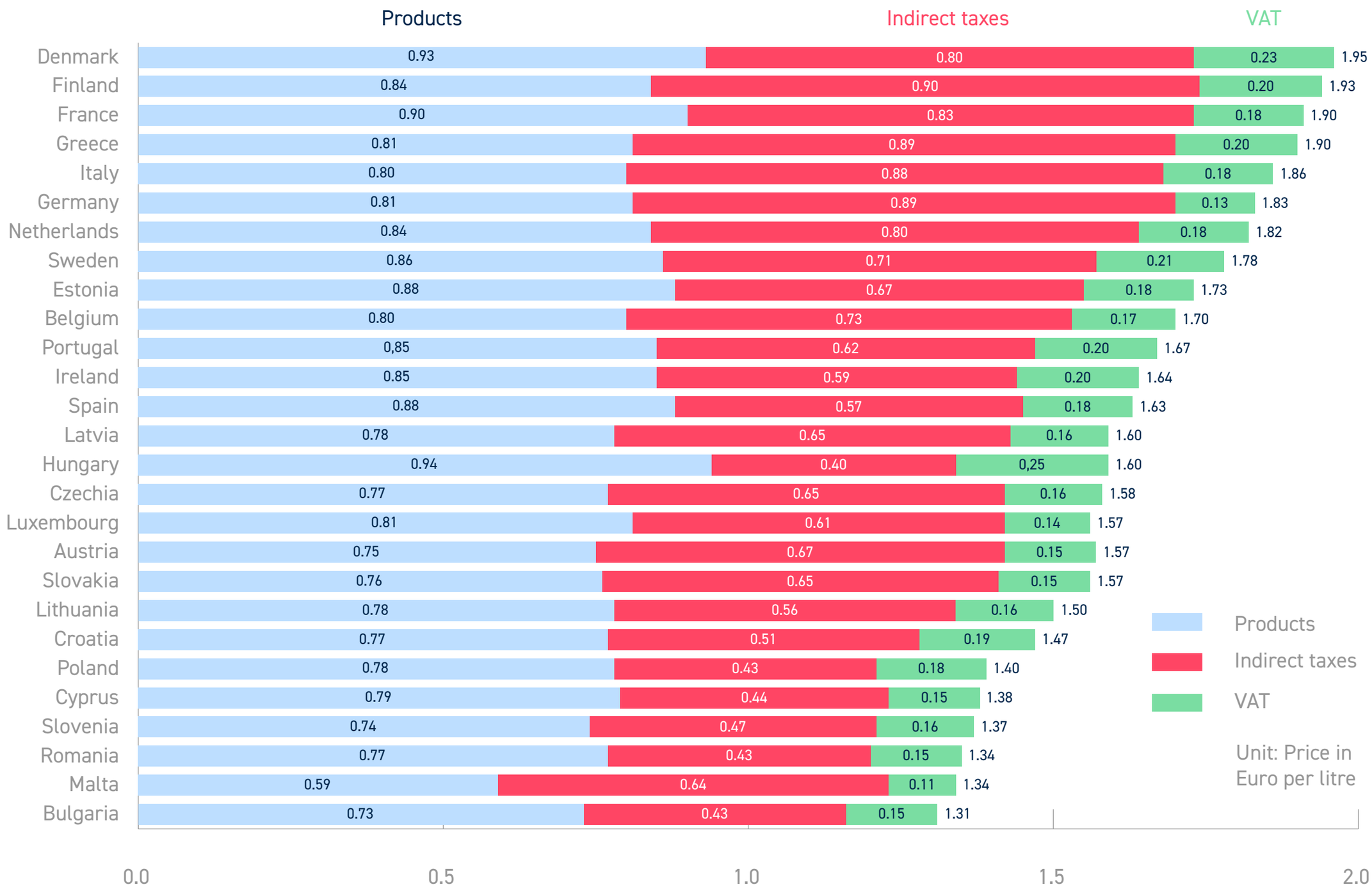


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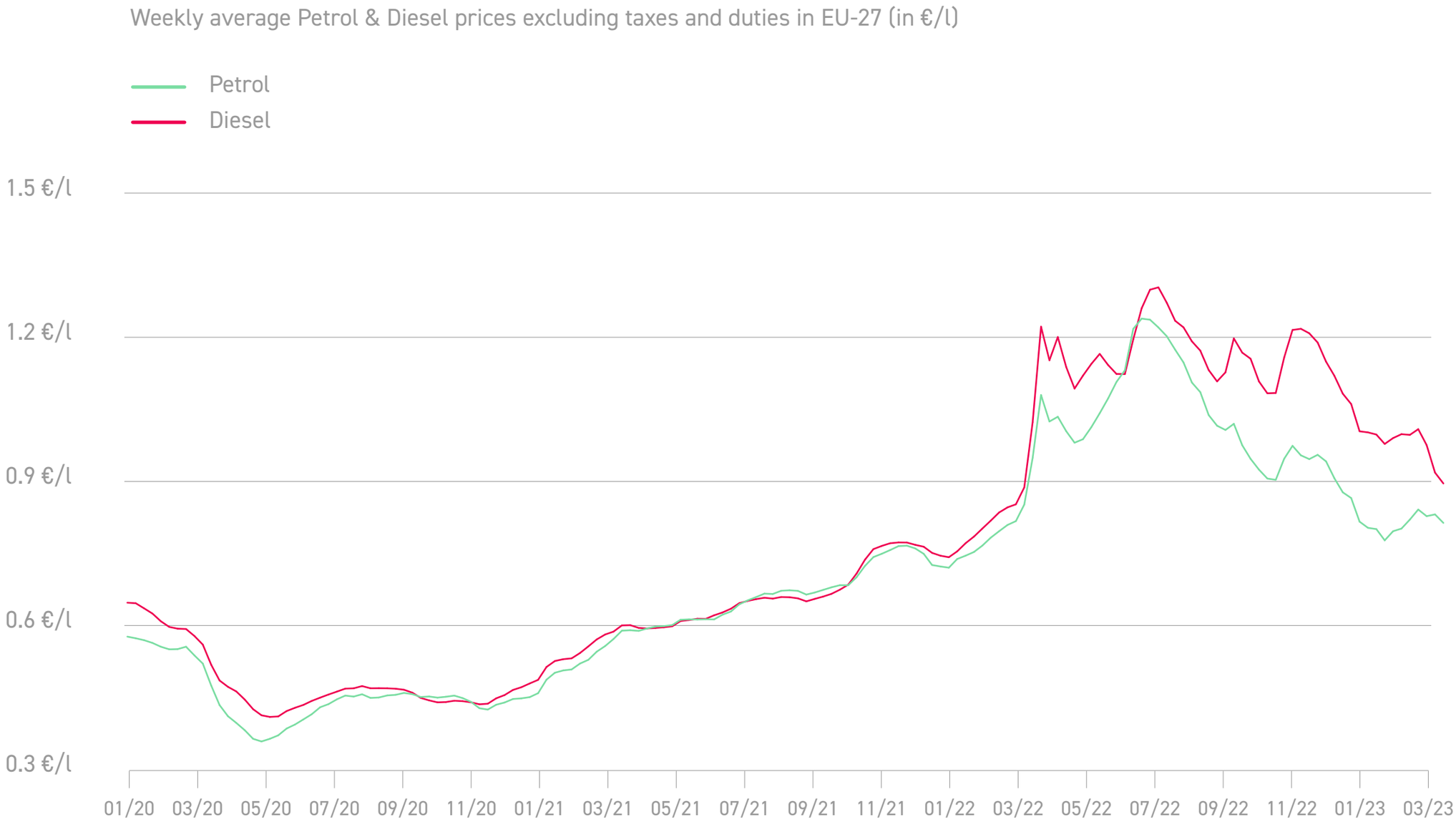
FIG.04a

GASOLINE AND DIESEL **UNTAXED PRICE DEVELOPMENT 2020-2023**

Source: Oil Bulletin, European Commission



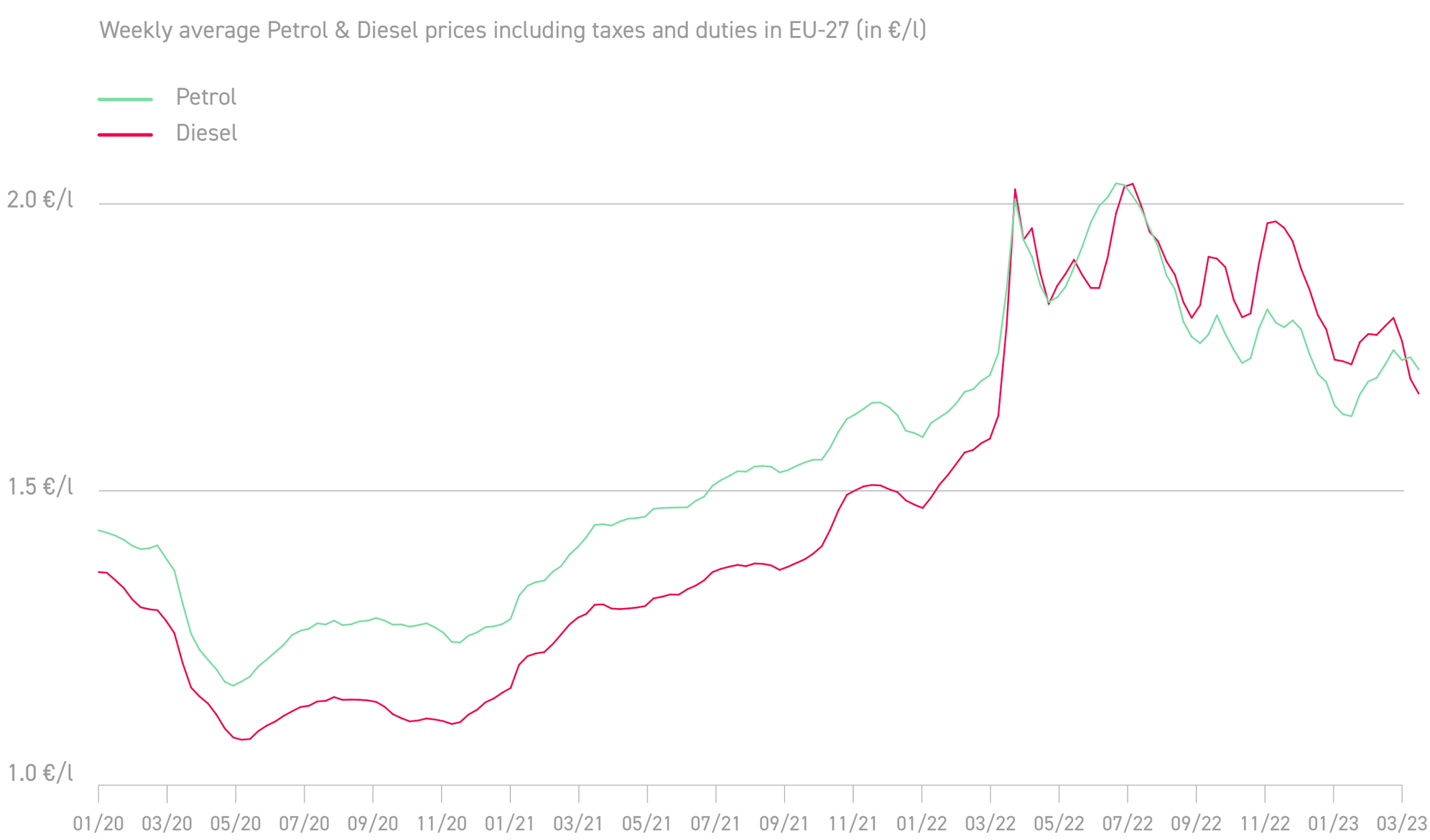
After a rapid decline in economic activity caused by the Covid-19 pandemic in 2020, petrol and diesel prices progressively went back up in 2021 due to increasing vaccination rates, loosening of pandemic-related restrictions, and a growing economy. Increasing demand and lower supply of oil resulted in consistent global petroleum and liquid fuels inventory withdrawals that contributed to increasing prices globally.

The prices of gasoline and diesel peaked in 2022 with the war in Ukraine and the sanctions imposed by the West on Russian oil. In February 2023, the EU banned Russian import of diesel fuel and other oil products, yet prices decreased slightly due to imports of refined oil products from the Middle East and Asia.

FIG.04b

GASOLINE AND DIESEL **PRICE WITH TAXES DEVELOPMENT 2020-2023**

Source: Oil Bulletin, European Commission



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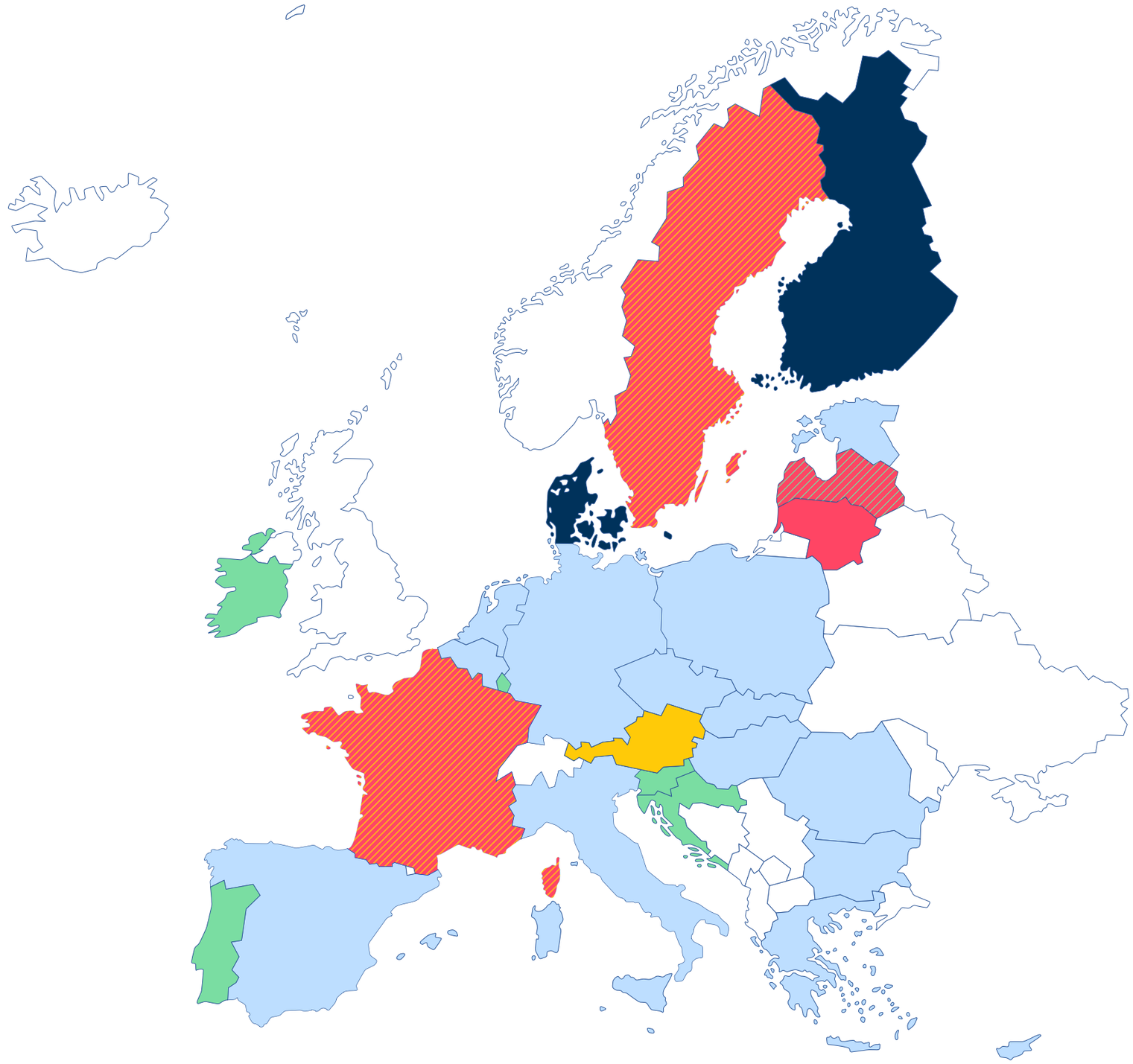
The prices of gasoline and diesel peaked in February 2022 with the war in Ukraine and the sanctions imposed by the West on Russian oil. From March 2022, some EU countries decided to cut fuel taxes to reduce the impact of surging prices on citizens but prices remained high due to EU sanctions on Russian oil products. Since the beginning of 2023, prices decreased slightly due to imports of refined oil products from the Middle East and Asia.

FIG.05

TAX INCENTIVES FOR BIOFUELS
IN TRANSPORT IN EU-27

Source: ePURE, National Fuel Industry Associations, Finnish Ministry of Finance & USDA



No tax incentive:

Biofuels do not benefit from any tax advantages compared to fossil fuels.

Lower tax for low biofuels blends:

Lower taxation rates are applied to biofuel blends with a percentage of fossil fuel content above 70%.

Lower tax for high biofuels blends:

Lower taxation rates are applied to biofuel blends with a percentage of fossil fuel content below 70%.

Taxation based on the energy/CO_2 content:

Biofuels are taxed according to their energy content (calorific value) and their average CO_2 emissions.

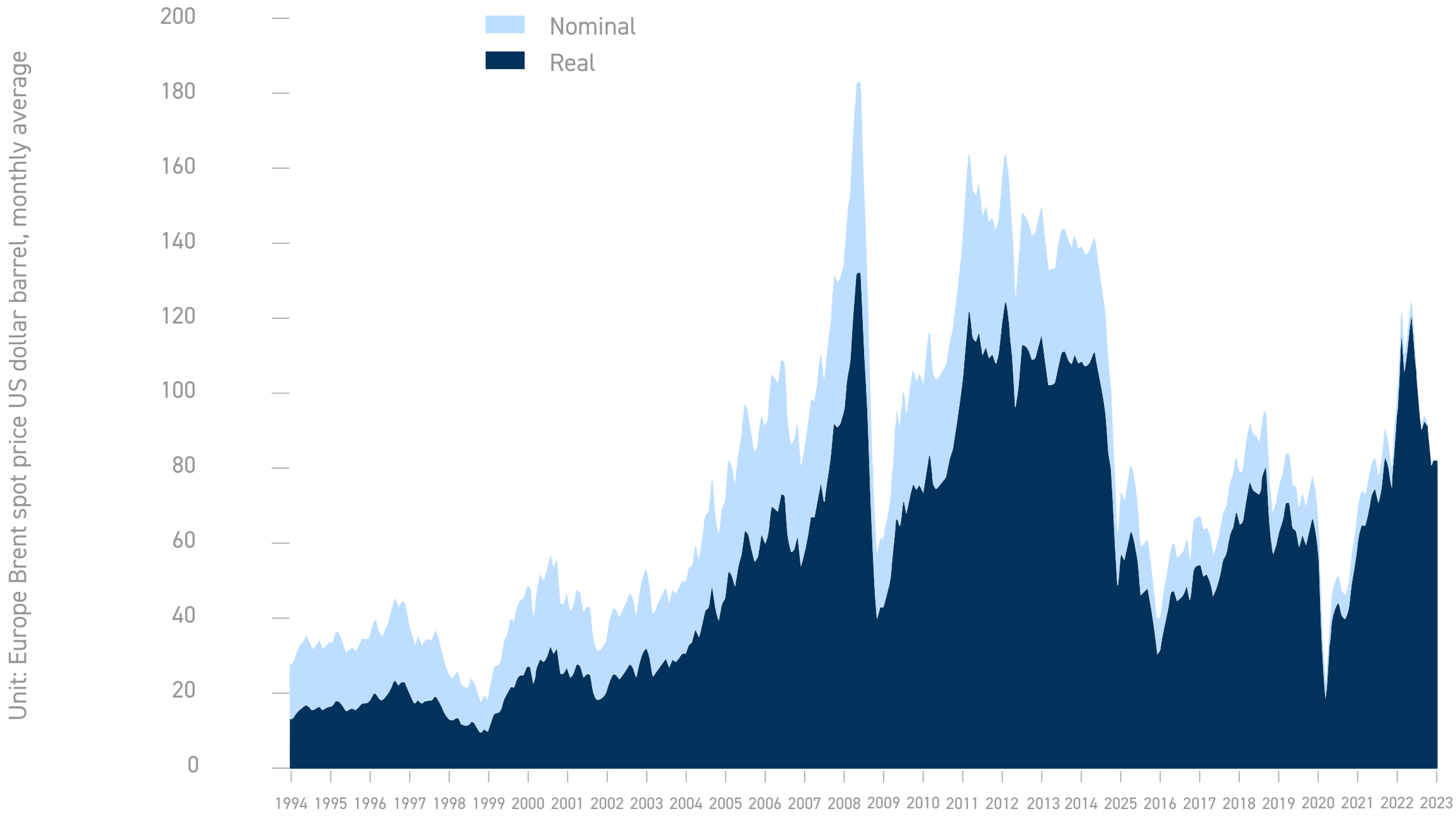
No excise duty/exempted from certain taxes (components):

Biofuels are not subject to excise dutie or are exempted from certain taxes. E.g. exemption from carbon tax.

In the EU, all liquid fuels for a certain purpose or a specific sector are currently taxed at a similar level, regardless of carbon intensity. However, some EU Member States implemented specific taxation incentives to encourage the use of biofuels in the transport sector. The current revision of the Energy Taxation Directive (ETD) included in the Fit for 55 package proposes a taxation based on the climate impact of fuels and energy.

FIG.06 CRUDE OIL PRICE EVOLUTION

Source: US Energy Information Administration & Federal Reserve Economic Data



The EU refining industry operates between two global, open and transparent markets: the market for crude oil and the market for refined products. The main benchmarks are priced in dollars.

The price of crude oil is set on international spot markets and reported by designated agencies. The price of oil is an important marker for the global economy and is closely watched by businesses and policy-makers.

Amid the Covid-19 pandemic and a price war between Riyadh and Moscow, demand in April 2020 reached down to a level last seen in 1995. While the oil price level bouced back, following the reopening of the global economy, it dramatically jumped to around $120/bbl level after the breakout of the Russian war on Ukraine in March 2022 to go back to $80/bbl early 2023.

FIG.07

REFINERS OPERATE BETWEEN TWO GLOBAL COMMODITY MARKETS: CRUDE MARKET AND REFINED PRODUCTS MARKET

Source: Wood Mackenzie

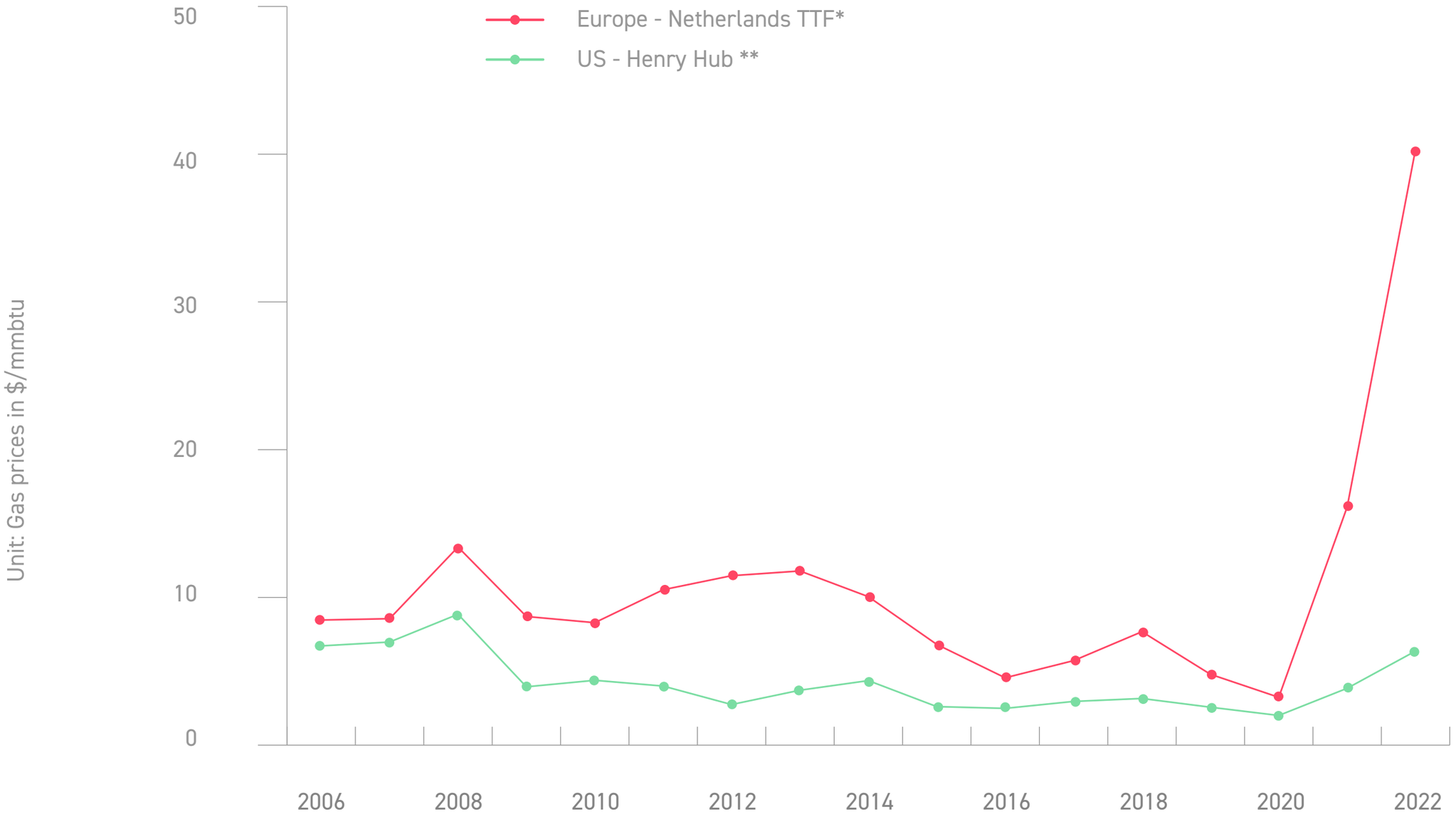
Unit: Average yearly prices US Dollar per barrel

EU refining operates between two global commodity markets, the crude market and the refined products market. The 'crack spread' represents the difference between the cost of crude oil and the market sales price for refined products. Generally, product prices rise with crude prices but the drivers of the difference are many. In historic terms, the profitability has started to decline in a context of falling demand (2008).

After a first, yet small, improvement, in 2012-2013 a better period started for refineries in 2015-2018. Profitability started falling again in 2019, with a record low in 2020 due to the global pandemic. The spread is generally tight, margins are low and the industry is highly vulnerable to the operating costs that must be deducted from the spread before profitability can be considered.

FIG.08 **EVOLUTION OF** NATURAL GAS PRICES

Source: World Bank



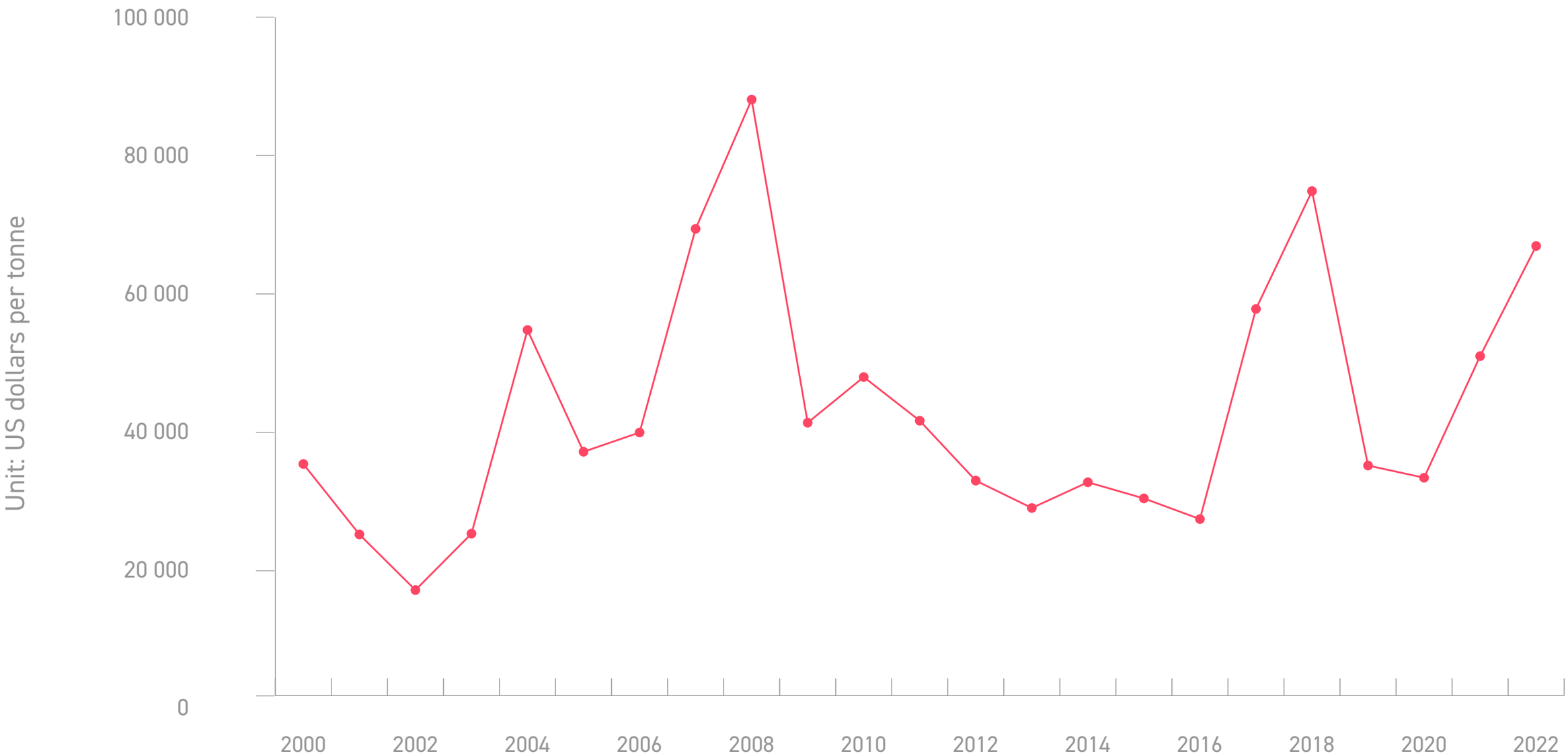
Since 2009, the US industry gained a significant competitive advantage over the EU industry as a result of the shale oil revolution. Gas prices around the world rose in 2021 as Covid-19 measures were lifted and economies returned to normal. This trend was enhanced in February 2022 in Europe as a result of Russian war on Ukraine.

*Natural Gas (Europe), from April 2015, Netherlands Title Transfer Facility (TTF); April 2010 to March 2015, average import border price and a spot price component, including UK; during June 2000 - March 2010 prices excludes UK.
**Natural Gas (U.S.), spot price at Henry Hub, Louisiana

Note: Prices may differ from the FuelsEurope Statistical Report 2022 as prices were calculated in CIF: cost + insurance + freight (average prices). This new version of the graph presents prices in nominal dollars.

FIG.09 **EVOLUTION OF** COBALT PRICES

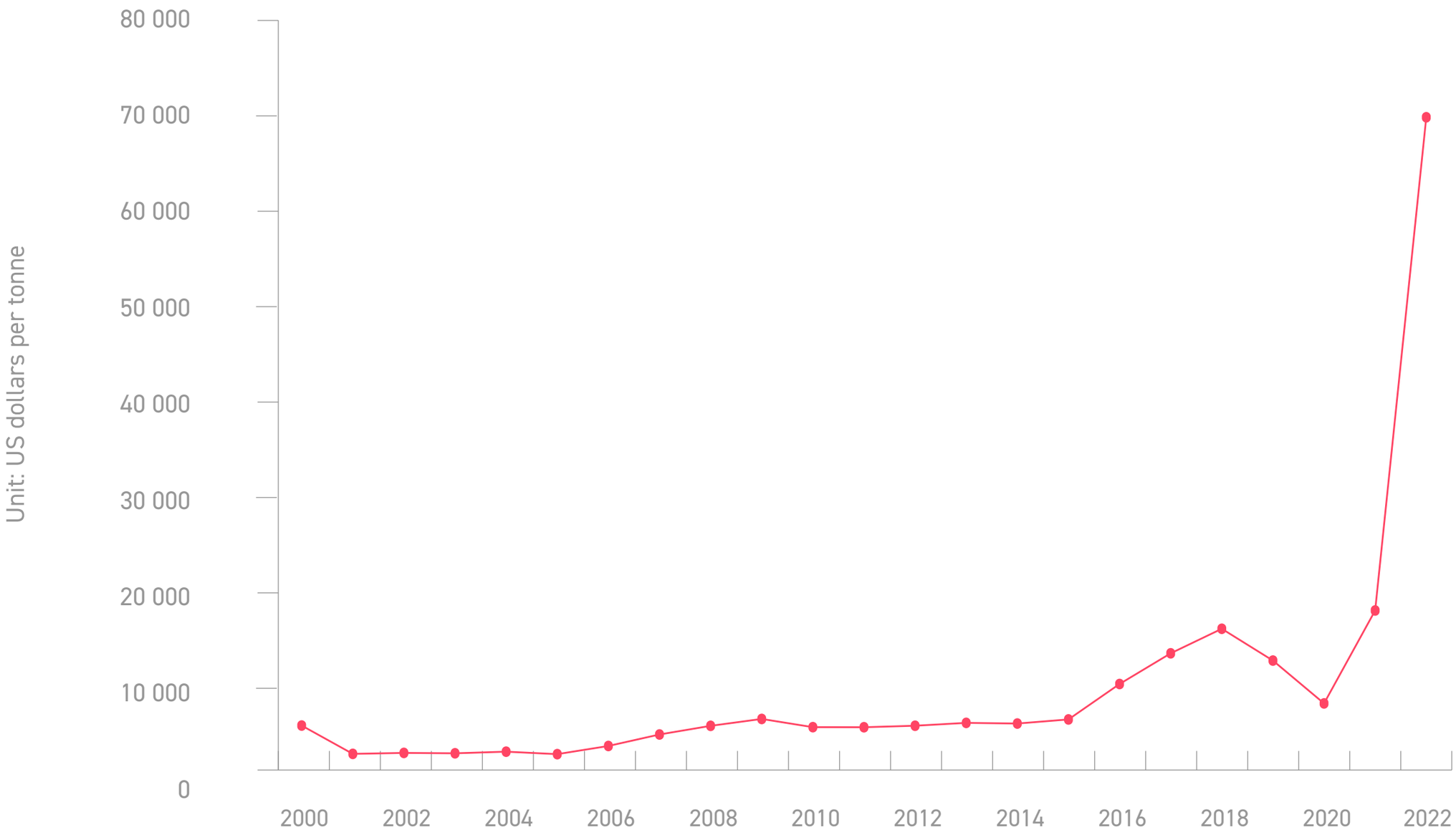
Source: BP Statistical Review of World Energy 2021 & Trading Economics



Cobalt, a key element in lithium-ion batteries, benefits from robust growth in rechargeable batteries and energy storage due to the impressive demand for electric vehicles. Adding to the bullish outlook were mounting sanctions on Russia for invading Ukraine, which account for roughly 4% of the world's cobalt production.

FIG.10 **EVOLUTION OF** LITHIUM CARBONATE PRICES

Source: BP Statistical Review of World Energy 2021 & Trading Economics

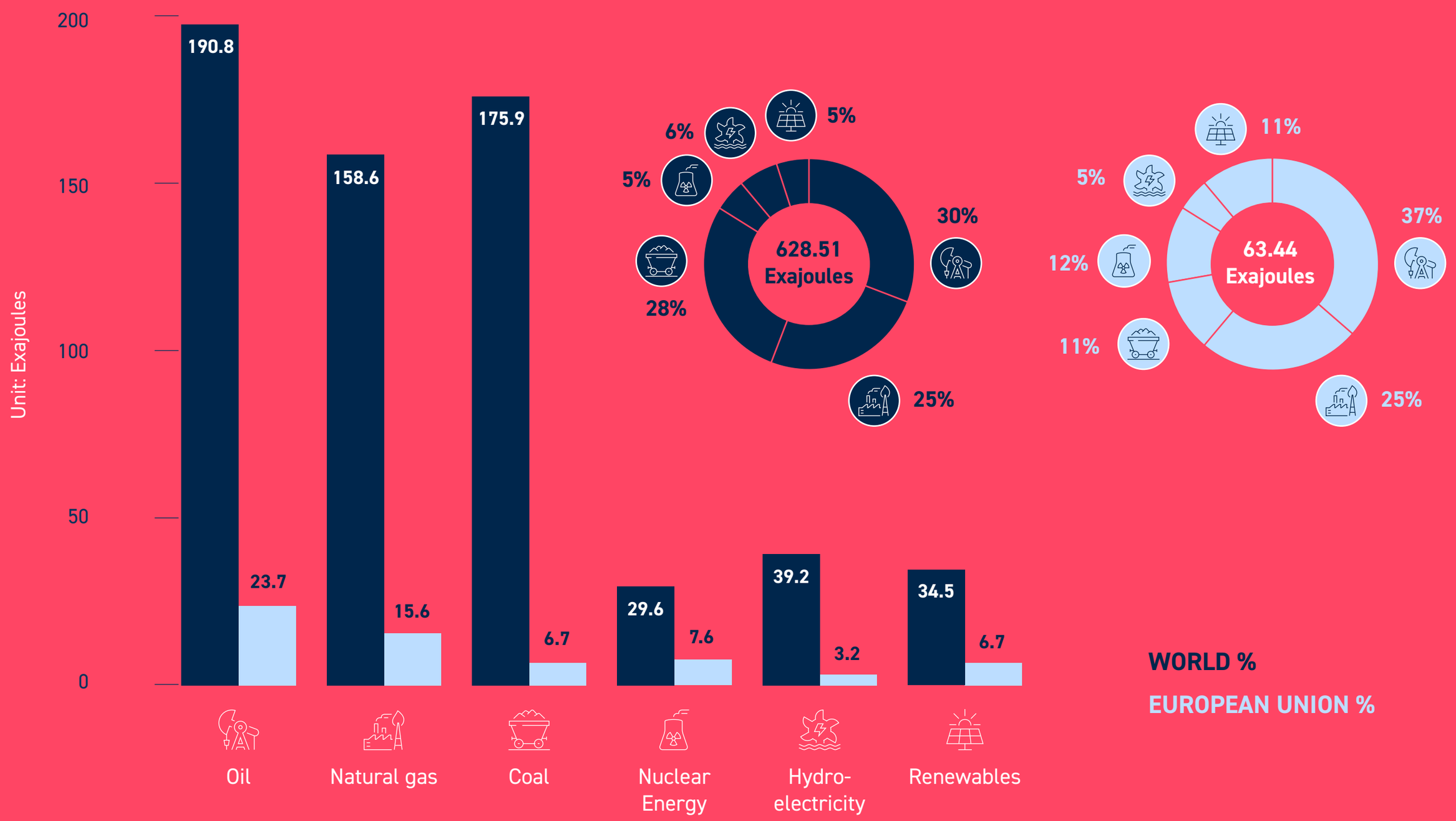


After steep rises in prices for lithium in 2017 and 2018, prices fell back sharply in 2019. In 2020, prices for lithium carbonate prices slipped by 40%. Production remained low as a response to the drop in prices, lithium production fell 4.6%, driven mainly by lower Australian output. in 2022, Lithium prices have jumped to their highest thanks to an upsurge in electric vehicle sales and depleting stocks of the battery material in top consumer, China.

Energy

FIG.11 WORLDWIDE ENERGY CONSUMPTION
BY FUEL TYPE IN 2021

Source: US Energy Information Administration



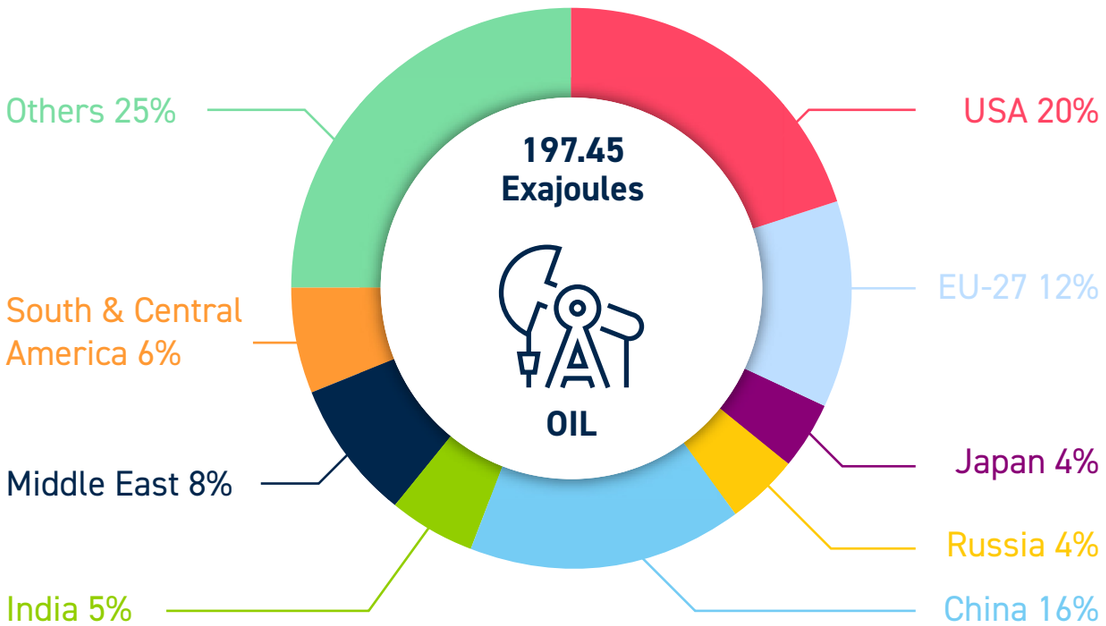
Oil remains the world's dominant fuel, accounting for more than a third of all energy consumed. In 2020, during the first year of the Covid-19 pandemic, there was a drop in oil consumption due to the large number of restrictions. After the restrictions were gradually lifted in 2021, oil total consumption (in real terms) increased by 13% and the market share remained the same as the previous year. Natural gas remained stable, coal and nuclear gained 1% of the market share while hydroelectricity and renewables lost 1%.

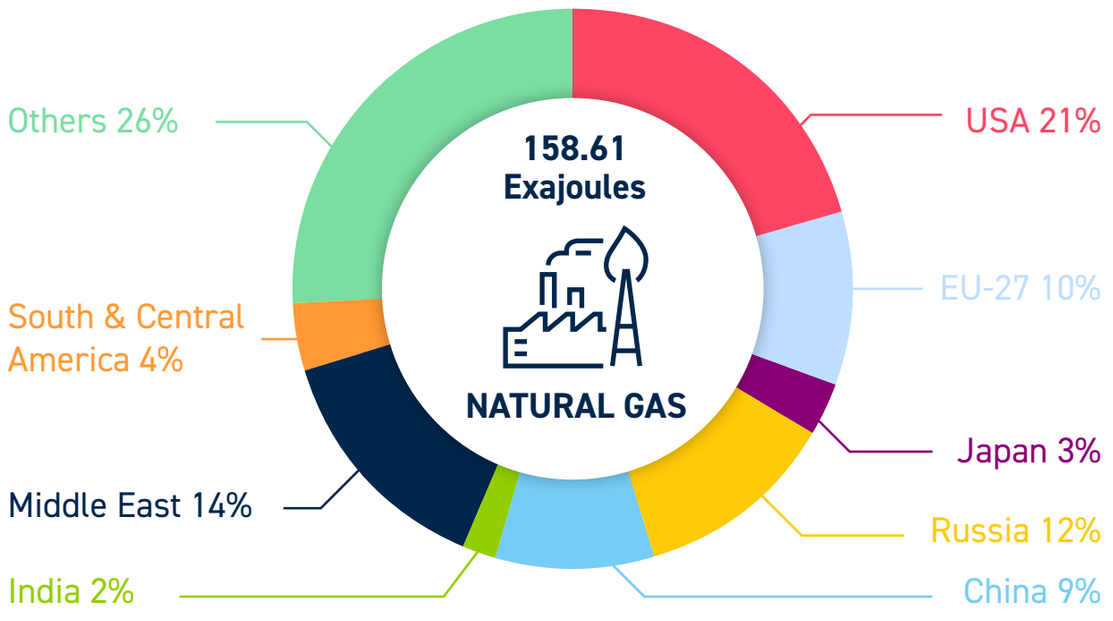
Note: Please note that due to rounding, figures may not add up exactly to 100%.
1 Exajoule = 10^{18} J (1 billion of billions of Joules) = 23,884 Mtoe.

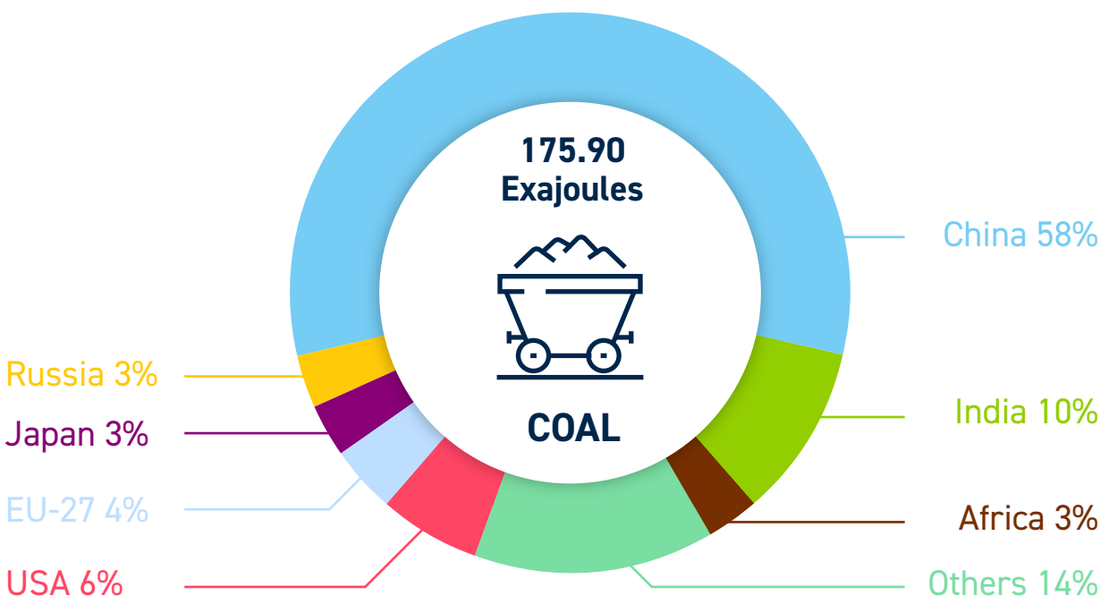
FIG.12

WORLDWIDE FOSSIL ENERGY CONSUMPTION BY REGION IN 2021

Source: US Energy Information Administration







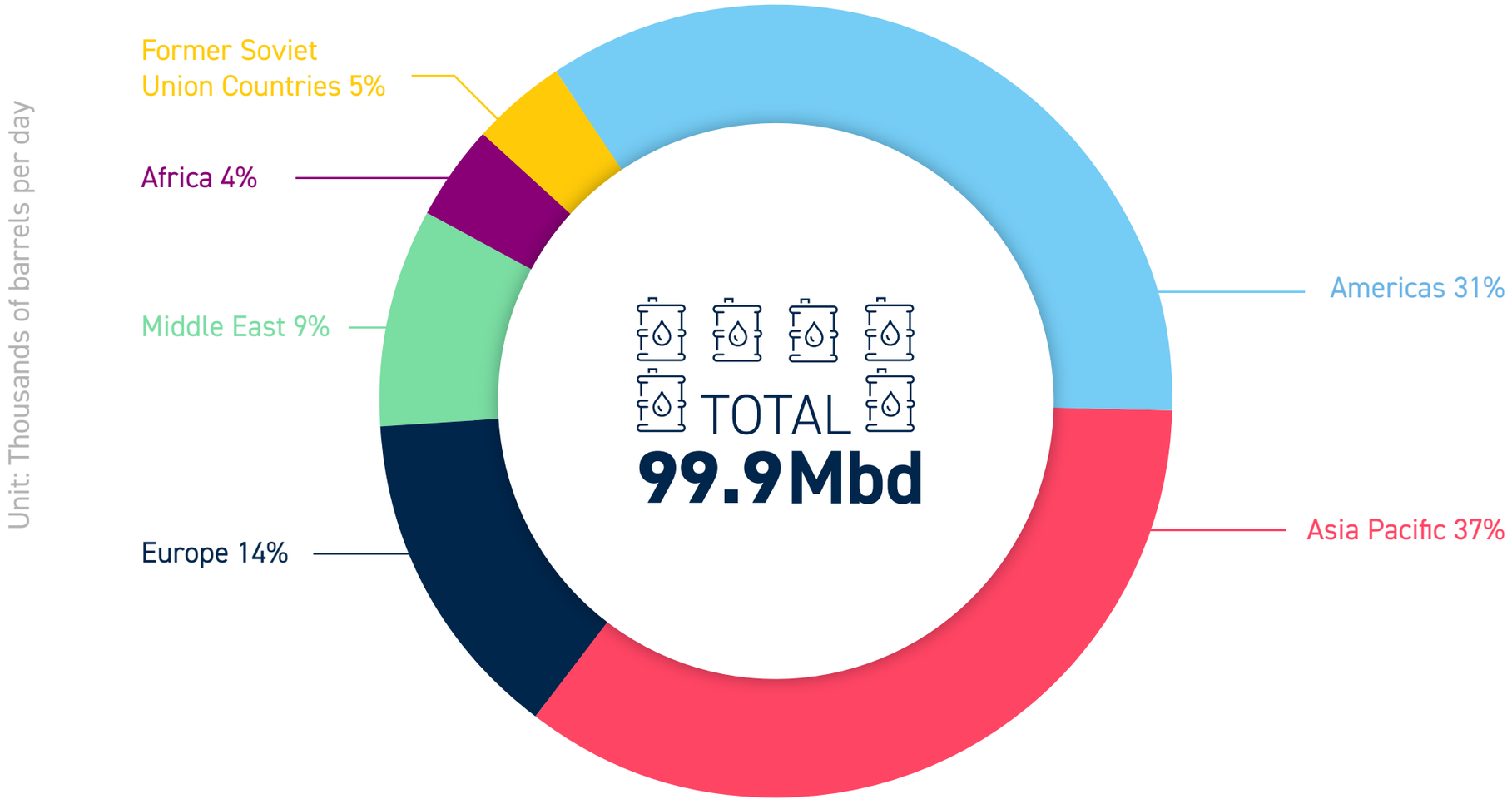
Global energy consumption increased due to the increase in economic activities linked to the gradual lifting of Covid-19 pandemic restrictions. EU share of oil consumption rised 1% (12%) and natural gas remained stable (10%). Globally, coal consumption increased 1% to 28%. Coal remains the main energy consumed in China and India - together the two countries are responsible for 68% of the global consumption. The consumption of natural gas in China and India is the same compared to 2020.

Note: Please note due to rounding, figures may not add up to exactly 100%.

FIG.13

WORLDWIDE REFINED PRODUCT DEMAND AVERAGED 99.9 MILLION BARRELS PER DAY IN 2022, WITH EUROPE ACCOUNTING FOR 14% OF THE TOTAL

Source: International Energy Agency Oil Market Report January 2023



Global demand for oil products increased from 97.7 million barrels per day in 2021 to 99.9 in 2022. Europe accounts for 14% while Asia Pacific accounts for 37% of the global demand, followed by Americas with 31%.

Note: Please note due to rounding, figures may not add up to exactly 100%.

*Inland demand plus international aviation and marine bunkers and refinery fuel and loss. Consumption of biogasoline (such as ethanol), biodiesel and derivatives of coal and natural gas are also included.

FIG.14

EU TOTAL OIL DEMAND AMOUNTED TO 541.8 MILLION TONNES IN 2021 IN THE EU-27

Source: Wood Mackenzie

Unit: Million tonnes per year

COUNTRY	MILLION TONNES
AUSTRIA	11.6
BELGIUM	31.4
BULGARIA	4.7
CROATIA	3.2
CYPRUS	2.7
CZECHIA	9.6
DENMARK	7.2
ESTONIA	1.5
FINLAND	8.9
FRANCE	73.3
GERMANY	105.5
GREECE	14.3
HUNGARY	8.7
IRELAND	7.4
ITALY	57.4
LATVIA	1.9
LITHUANIA	5.1
LUXEMBOURG	2.8
MALTA	2.8
NETHERLANDS	44.8
POLAND	34.2
PORTUGAL	12.1
ROMANIA	10.7
SLOVAKIA	4.1
SLOVENIA	2.5
SPAIN	62.5
SWEDEN	13.6
TOTAL EU-27 = 541.8	
UNITED KINGDOM	64.2
NORWAY	8.8
SWITZERLAND	8.9
TÜRKIYE	49.1
TOTAL = 672.8	

EU-27 total oil demand amounted to 541.8 Mt in 2022 increasing by 2.7% compared to 2021. Oil demand dropped significantly during the Covid-19 pandemic. In 2022, most of Covid-19 restrictions were lifted leading to a recovery in oil demand. Portugal (+14.5%), Ireland (+8.6%) and Spain (+7.9%) were the countries with the strongest increase in demand.

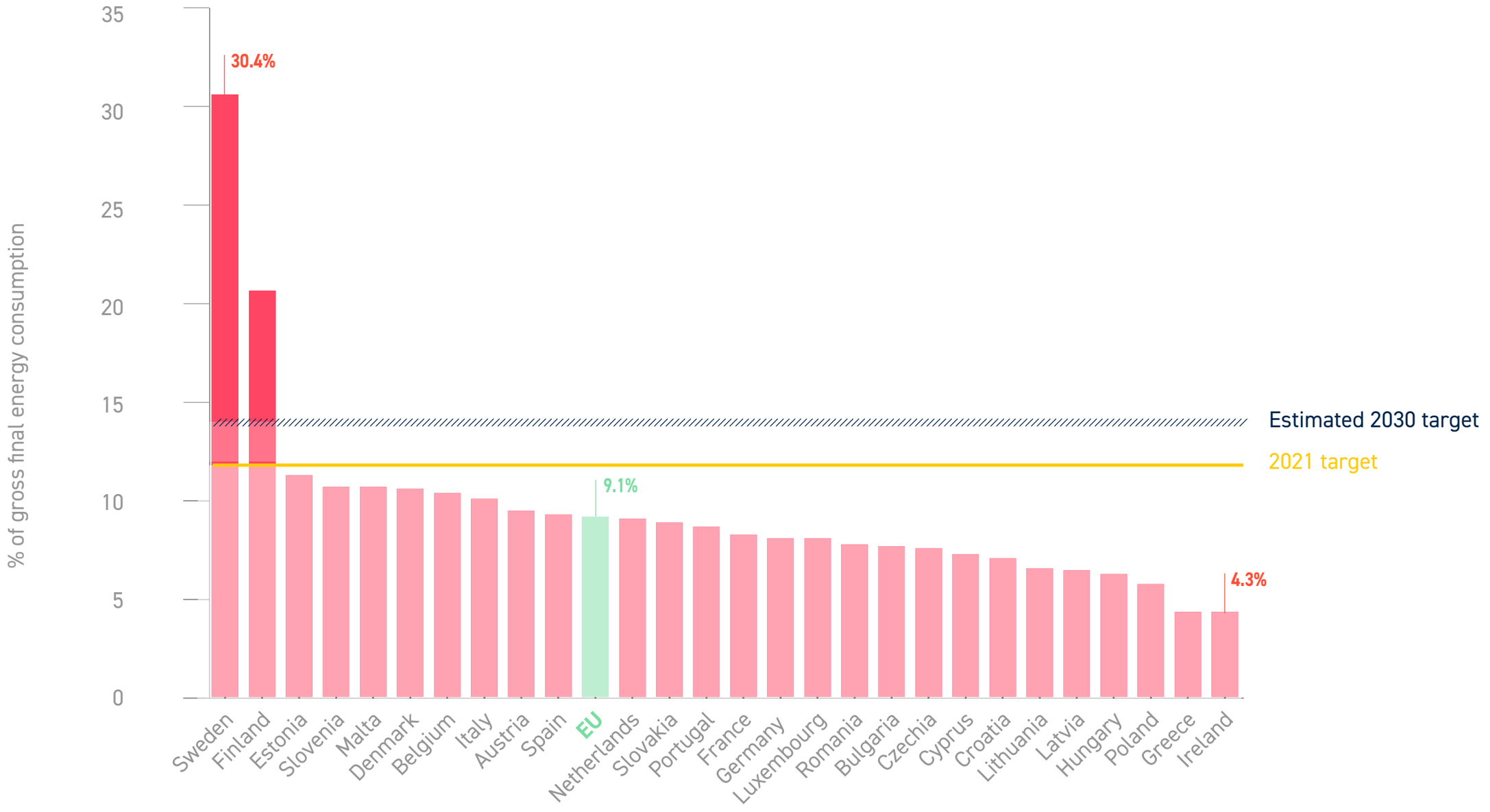
Among EU Member States that recorded the biggest fall in the oil demand were Estonia (-3.2%), Romania (-3.0%) and Belgium (-2.3%).

Note: Due to rounding, figures may not add up.

FIG.15

ENERGY FROM RENEWABLE SOURCES USED IN TRANSPORT ACTIVITIES IN THE EU-27 IN 2021

Source: Eurostat



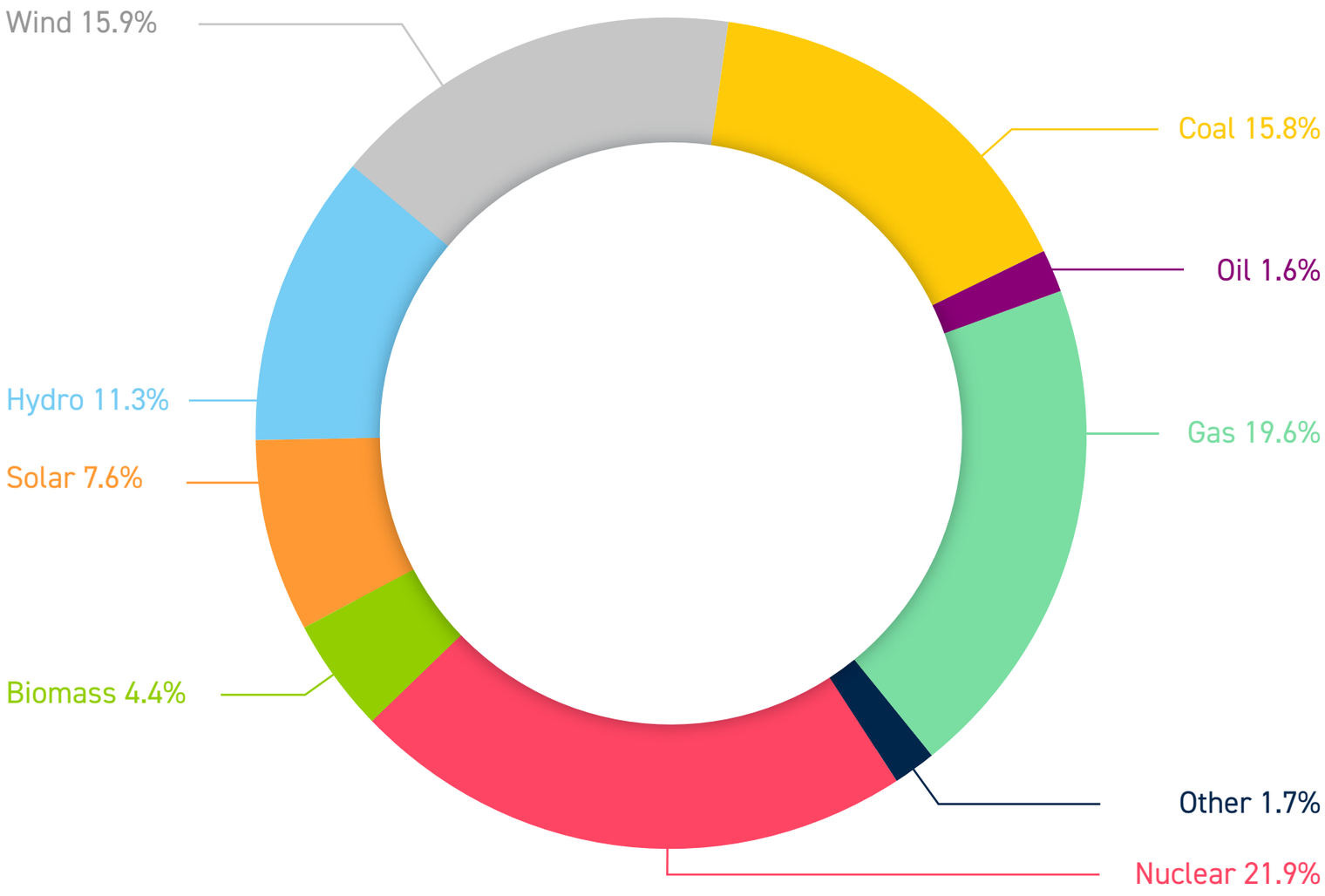
The EU agreed to set a common target of 14% for the share of renewable energy (including liquid biofuels, hydrogen, biomethane, 'green' electricity, etc.) used in transport by 2030.

The average share of energy from renewable sources in transport increased from 1.6% in 2004 to 9.1% in 2021. Among the EU Member States, the share of renewable energy in transport fuel consumption ranged from highs of 30.4% in Sweden, 20.5% in Finland and 10.6% in Slovenia and Malta down to less than 7% in Greece and Ireland (4.3%), Poland (5.7%), Hungary (6.2%), Latvia (6.4%) and Lithuania (6.5%).

FIG.16

NET ELECTRICITY GENERATION IN THE EU
BY FUEL TYPE (2022)

Source: Eurostat

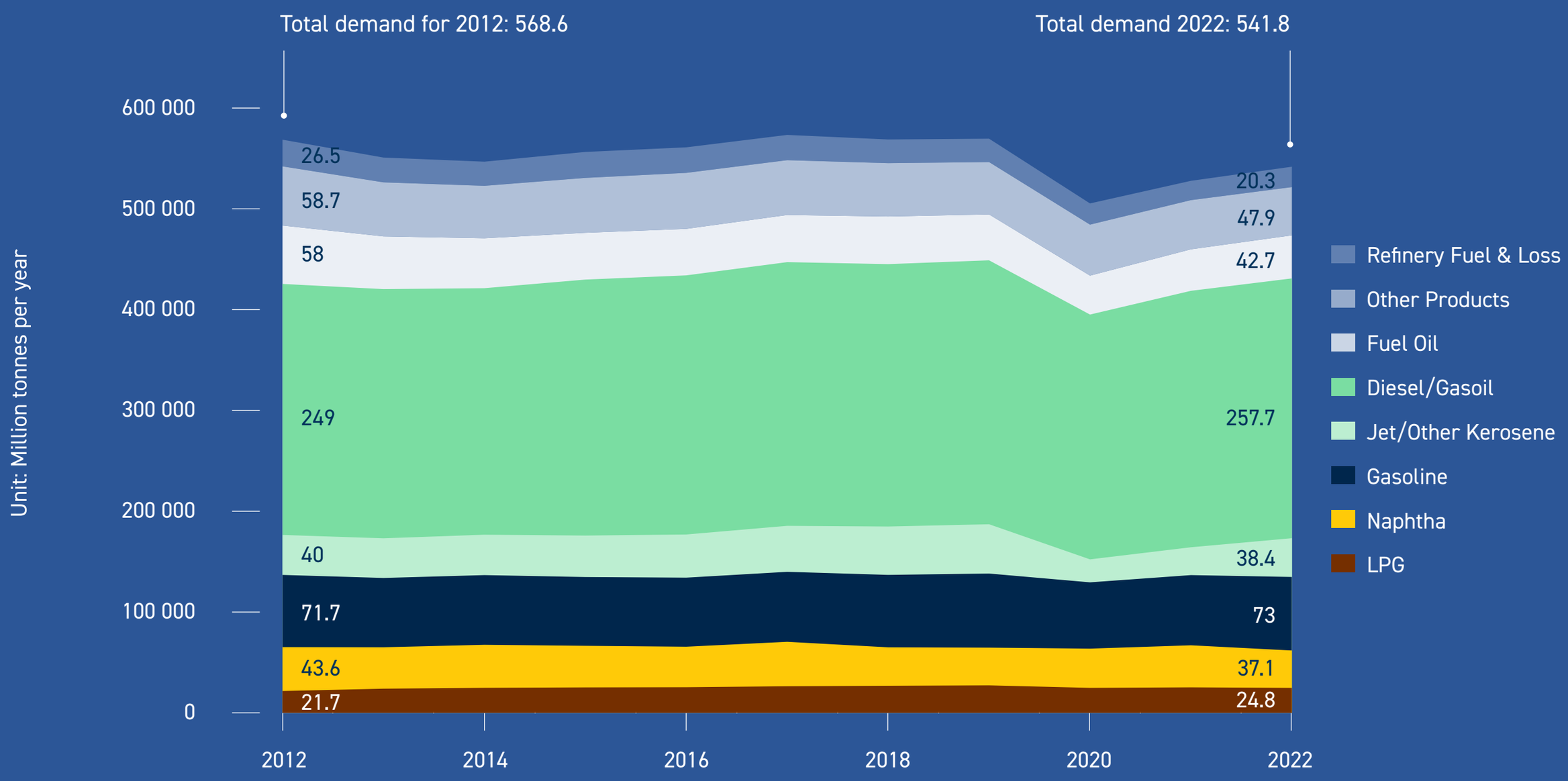


In 2022, the EU produced 2 641 TWh (terawatt-hours) of electricity. Almost 40% of this came from renewable sources. Fossil fuels made up 38.6% and nuclear electricity over 20%. Gas was the main fossil fuel used to generate electricity (19.6%), followed by coal (15.8%).

Refined Products

FIG.17 HISTORICAL DEMAND FOR OIL PRODUCTS IN THE EU-27

Source: Wood Mackenzie

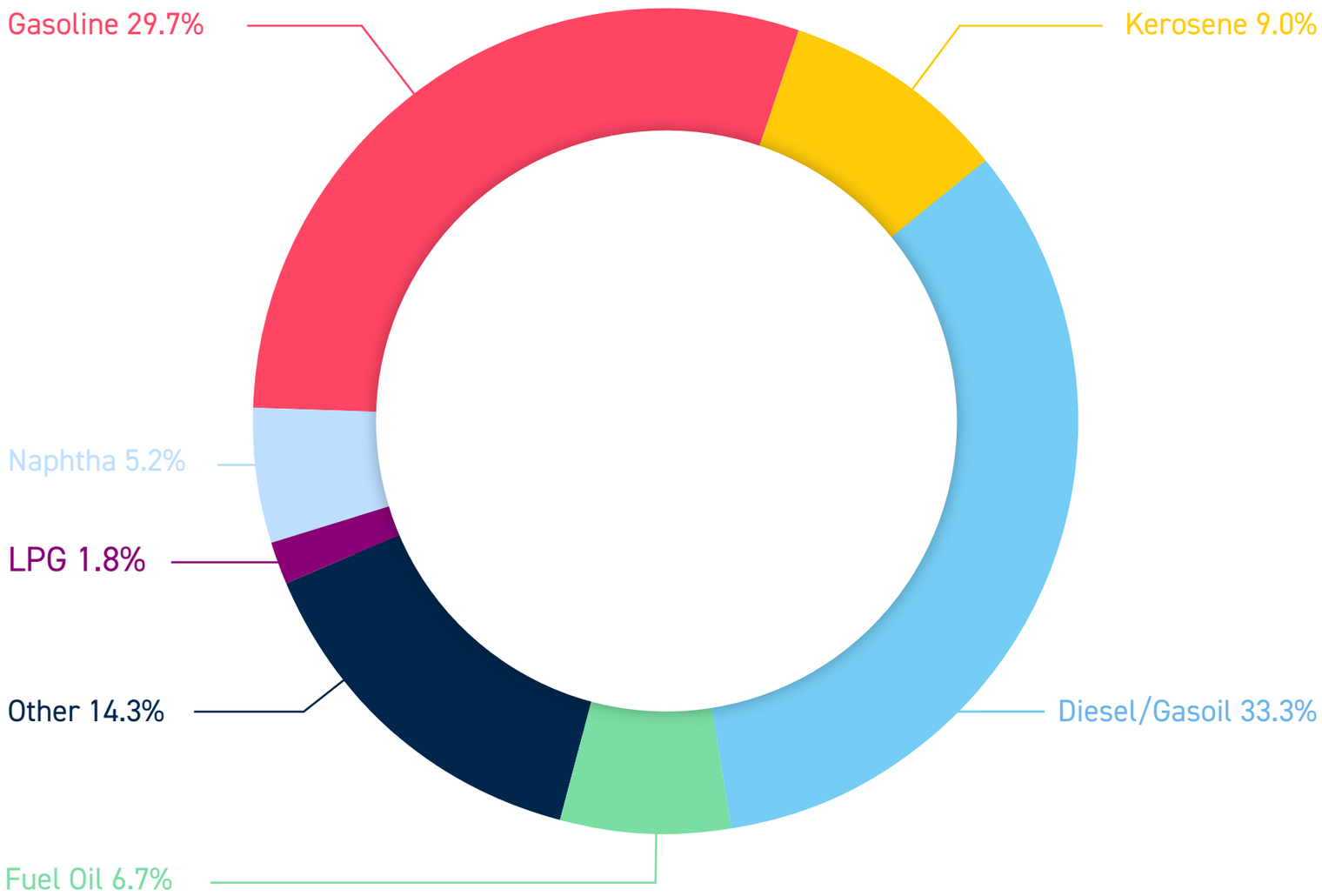


From 2012 to 2014, a downward trend has been observed for oil products demand in the EU. From 2015, a slight increase has been witnessed mainly due to the rise in demand of diesel/gasoil and kerosene products. In 2020, the total demand of oil products decreased by 12% compared with 2019 due to the Covid-19 pandemic. Demand in 2021 and 2022 is stronger but does not reach 2019's level.

FIG.18

AVERAGE REFINERY OUTPUT BY PRODUCT TYPE
IN OECD EUROPE IN 2022

Source: International Energy Agency

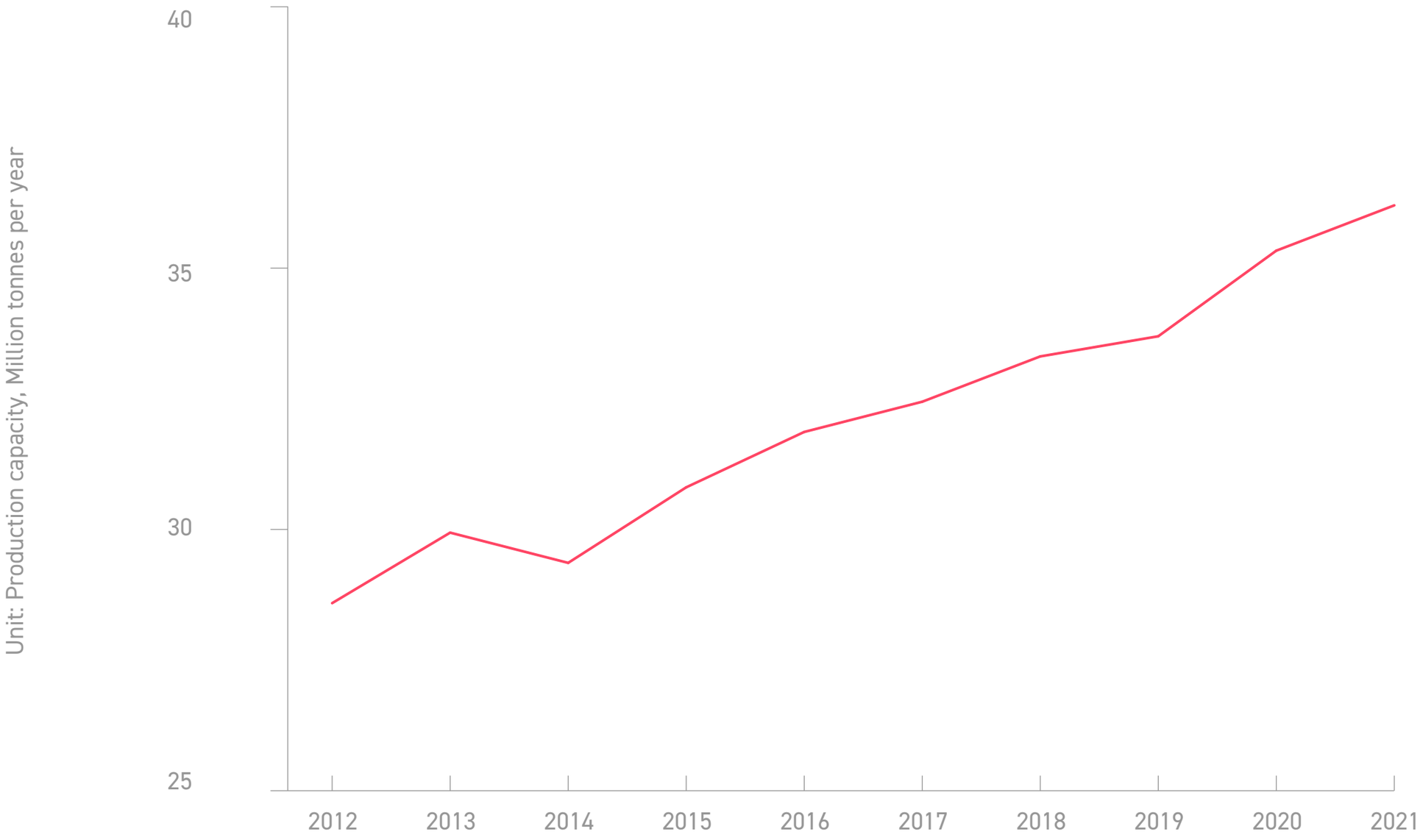


A wide range of products, from transportation and industrial fuels to chemical feedstock, are produced from crude oil. EU refineries also produce many specialty products, such as bitumen for road construction and roofing, lubricants for transport and industry, petroleum coke for the metal industry as well as waxes, solvents and other specialised products. Fuels for transport represent the biggest share of the production.

Note: Please note that due to rounding, figures may not add up.

FIG.19 **BIOFUELS PRODUCTION** IN THE EU-27

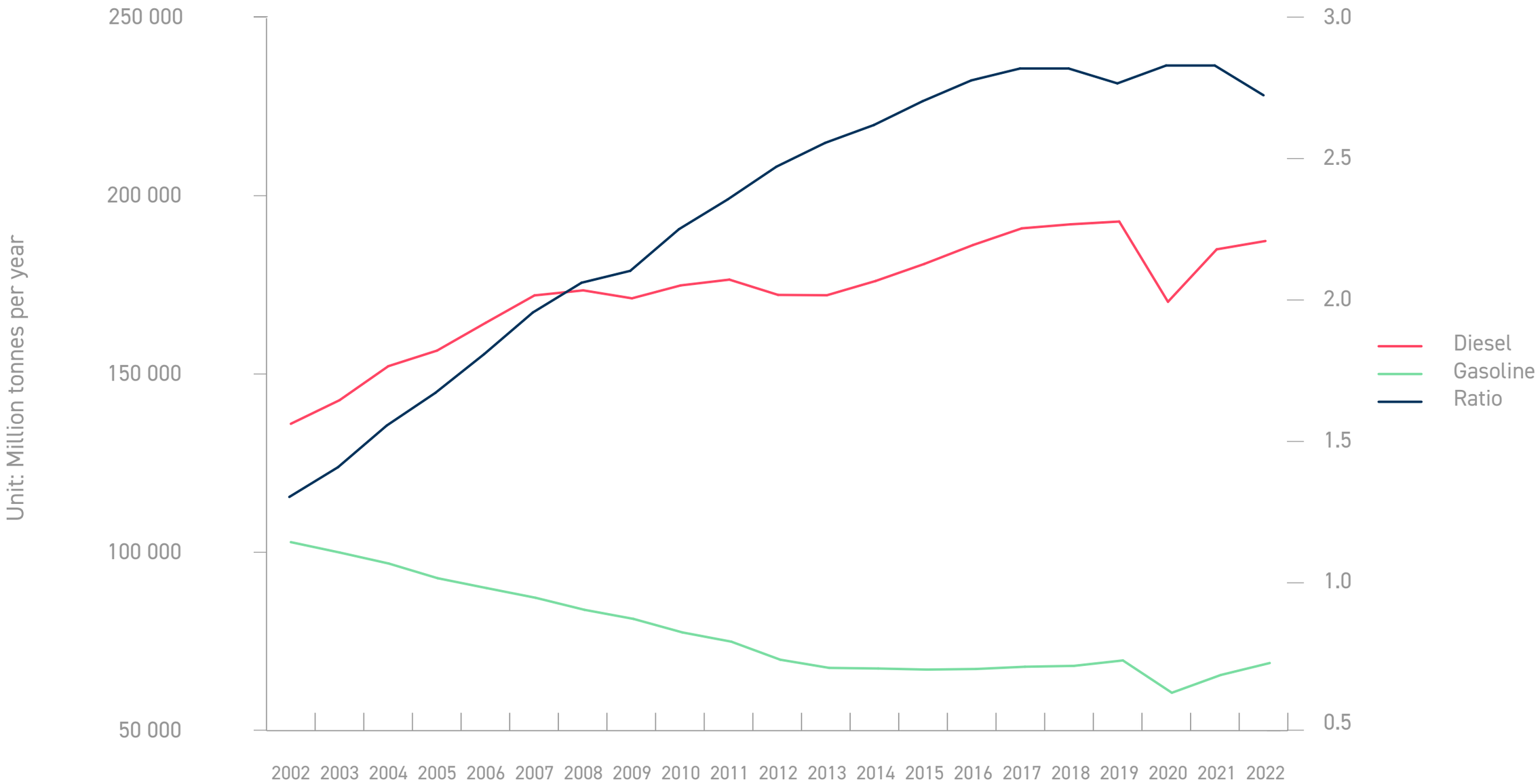
Source: Eurostat



The overall production of biofuels in the EU has increased 28% since 2012.

FIG.20 **ROAD FUEL DEMAND** IN THE EU-27 IN 2022

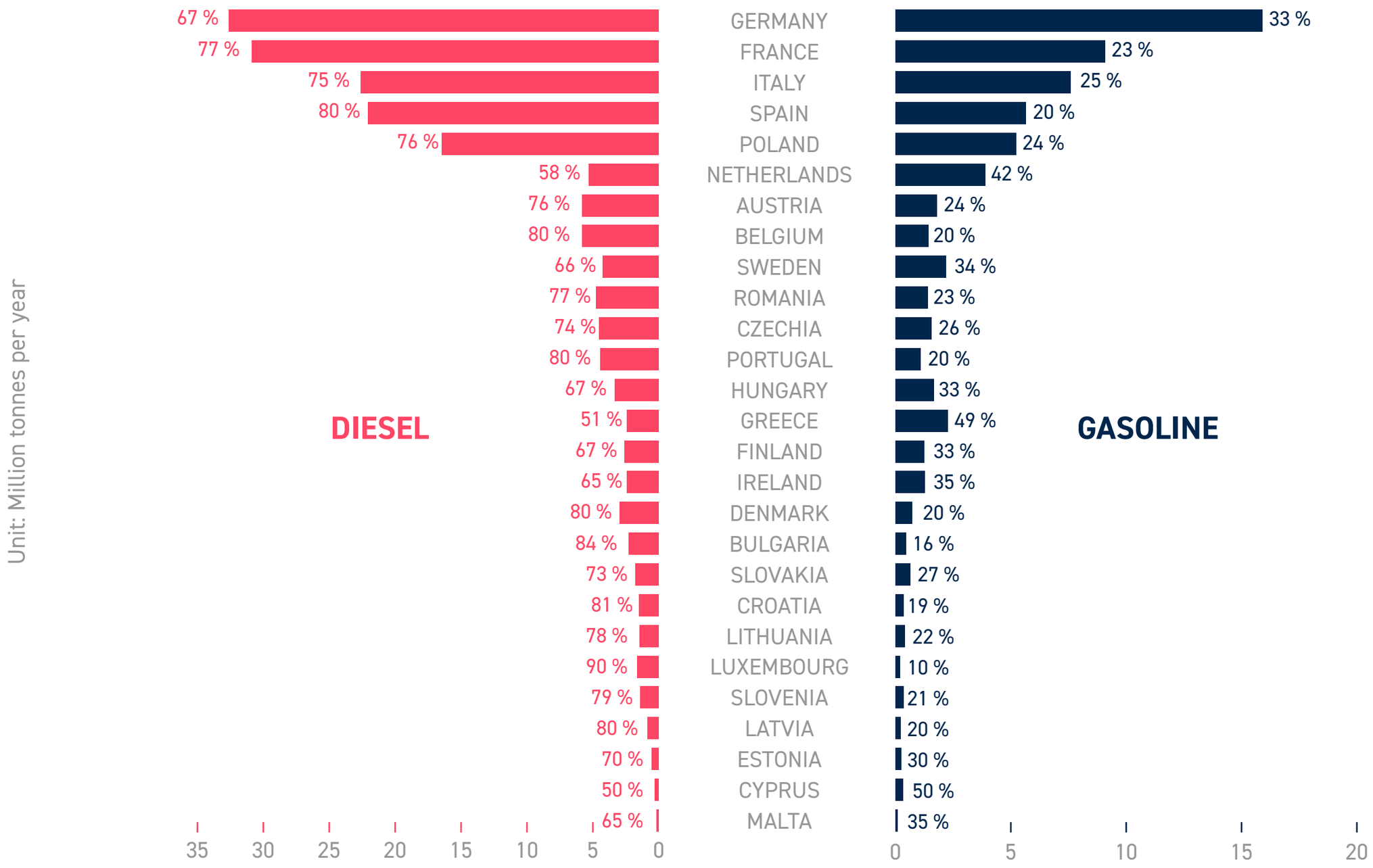
Source: Wood Mackenzie



The tax-incentivised dieselisation trend has significantly contributed to a fundamental change in the EU's road fuel demand structure. The shift from gasoline to diesel began some 25 years ago and led to a major demand decline for gasoline as well as a shortage of diesel production in the EU.

FIG.21 **ROAD FUEL DEMAND** IN THE EU-27 BY COUNTRY IN 2022

Source: Wood Mackenzie

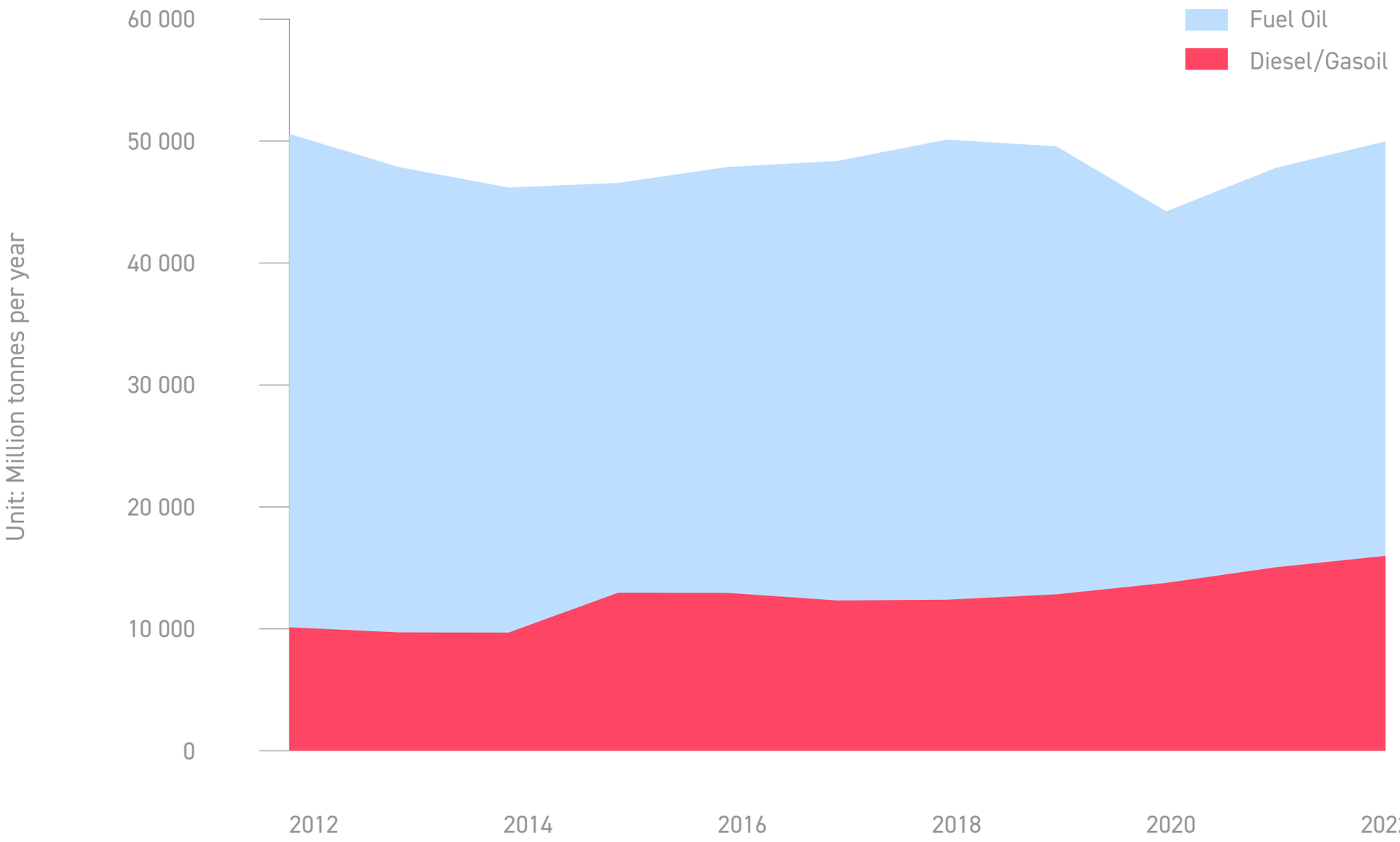


Sustained by favourable excise taxes on diesel, the shift from gasoline to diesel over the past two decades led to a higher demand for diesel as a road fuel in the vast majority of EU Member States. In some countries, such as France and Spain, the imbalance is far more pronounced as a result of even more favourable tax policies for diesel.

The continued growth in heavy duty transport in the EU, driven by the internal market and external trade, has further contributed to spurring diesel demand. However, recent measures to rebalance taxation level of diesel with gasoline could trigger a progressive shift in diesel demand.

FIG.22 EU-27 MARINE FUEL CONSUMPTION

Source: Wood Mackenzie



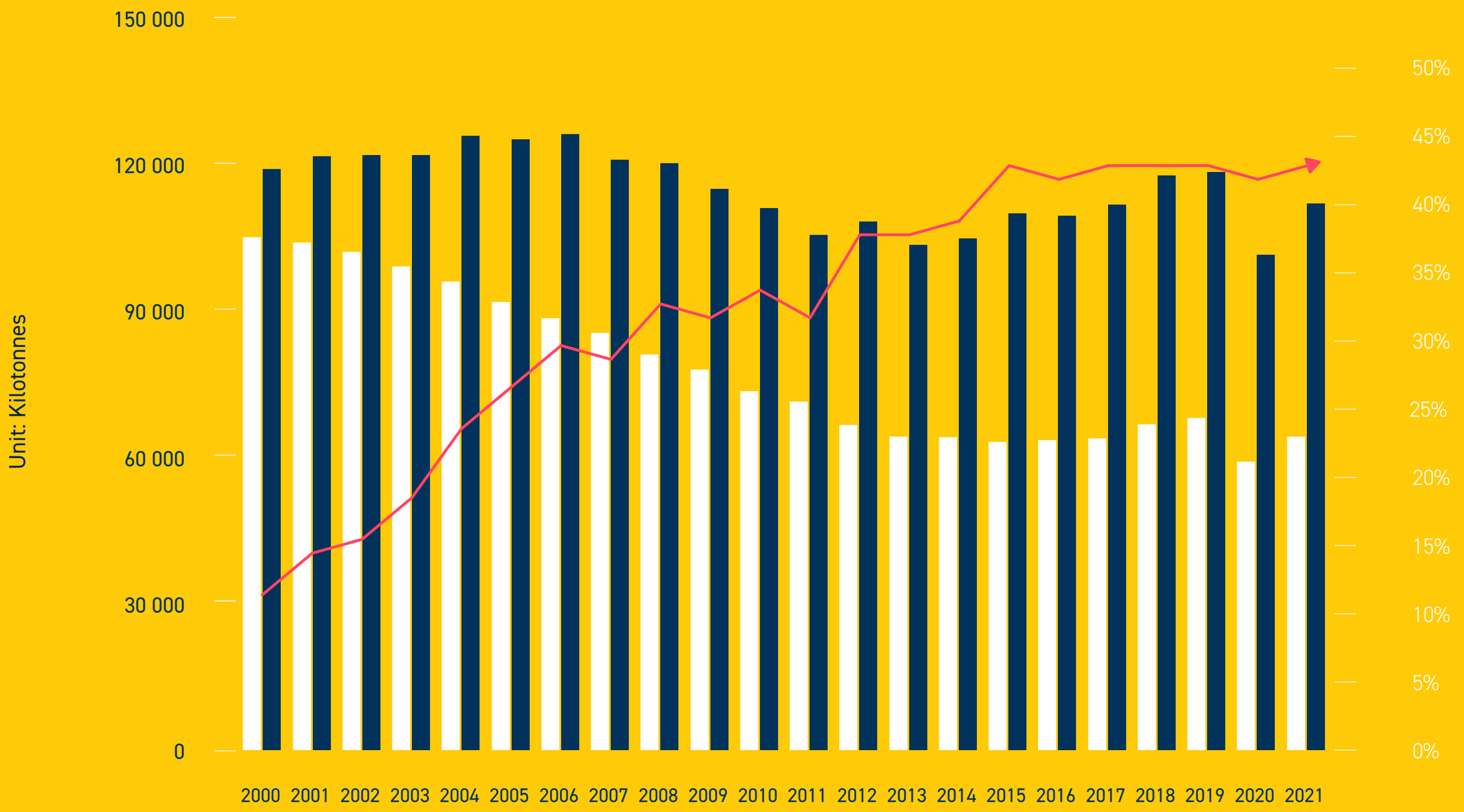
During the past years there was a rise in marine gasoil consumption at the expense of fuel oil. Switching to LNG or using scrubbers are alternatives to meeting the new International Maritime Organisation (IMO) emissions limits.

Import Dependency

FIG.**23a**

NET TRADE FLOWS FOR REFINED PRODUCTS
IN-DEPTH LOOK AT GASOLINE (EXCLUDING BIO-COMPONENTS)

Source: Eurostat



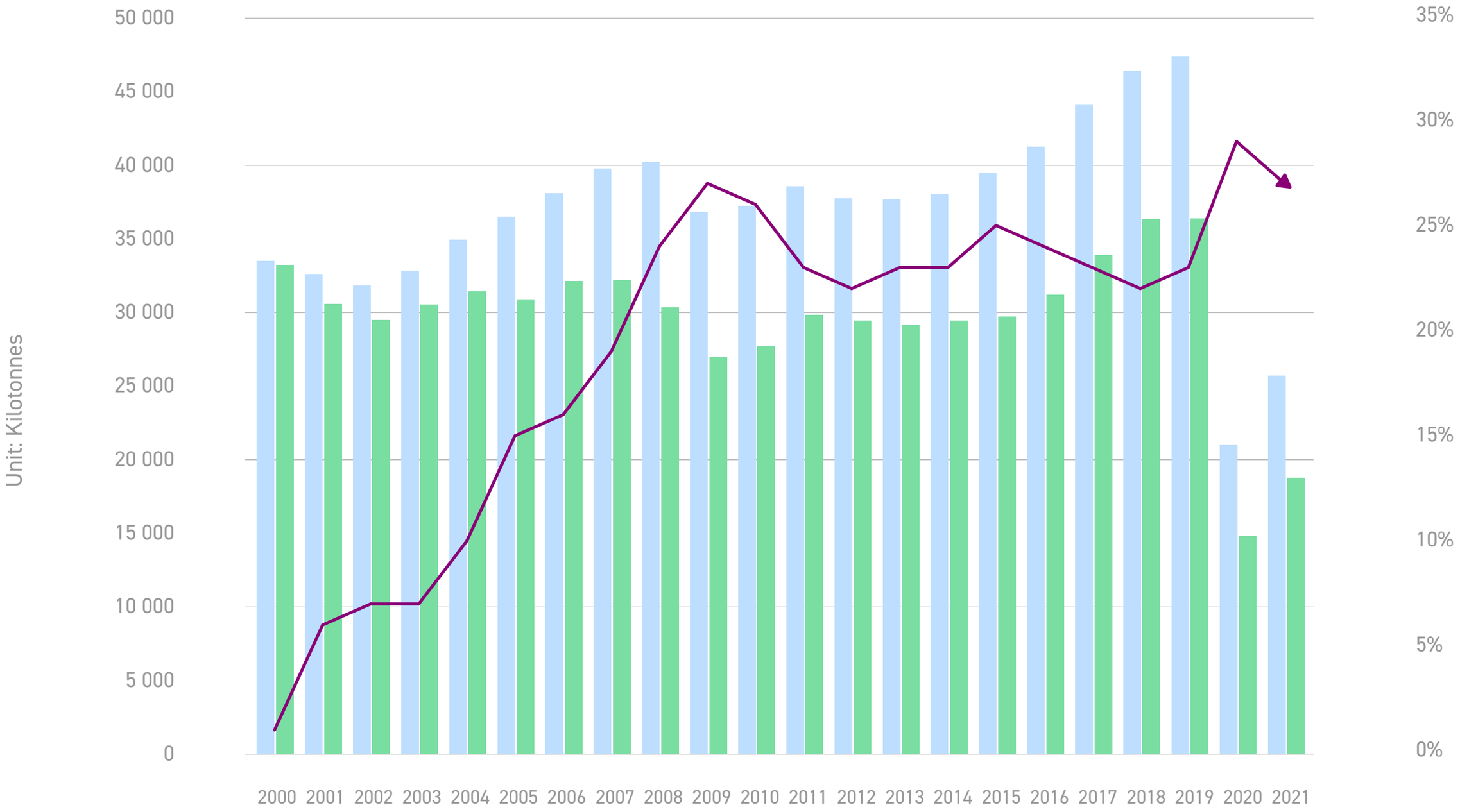
Overproduction of gasoline in the EU has been increasing over the years, despite a mild decrease in overall production volumes, due to a decrease in domestic consumption. This decreasing trend for domestic consumption, however, has stabilised from 2013 onwards. This may in part be driven by a change in consumer preferences toward gasoline.

FIG.23b

EU-27 NET TRADE FLOWS FOR REFINED PRODUCTS

IN-DEPTH LOOK AT KEROSENE (EXCLUDING BIO-COMPONENTS)

Source: Eurostat

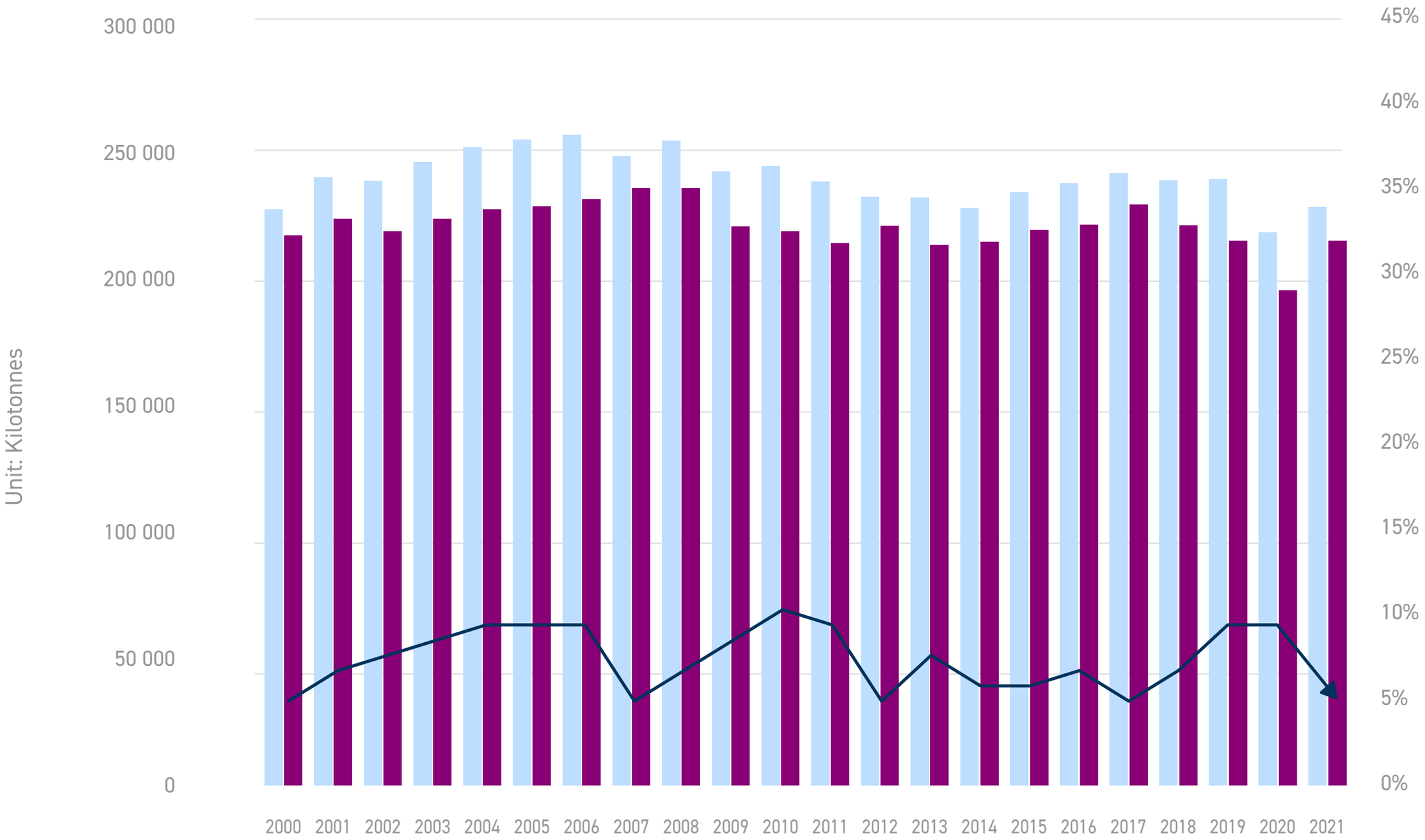


For kerosene, the EU is import dependent, relying substantially on supplies from Russia and Asia.

FIG.23c

NET TRADE FLOWS FOR REFINED PRODUCTS IN-DEPTH LOOK AT DIESEL/GASOIL (EXCLUDING BIO-COMPONENTS)

Source: Eurostat

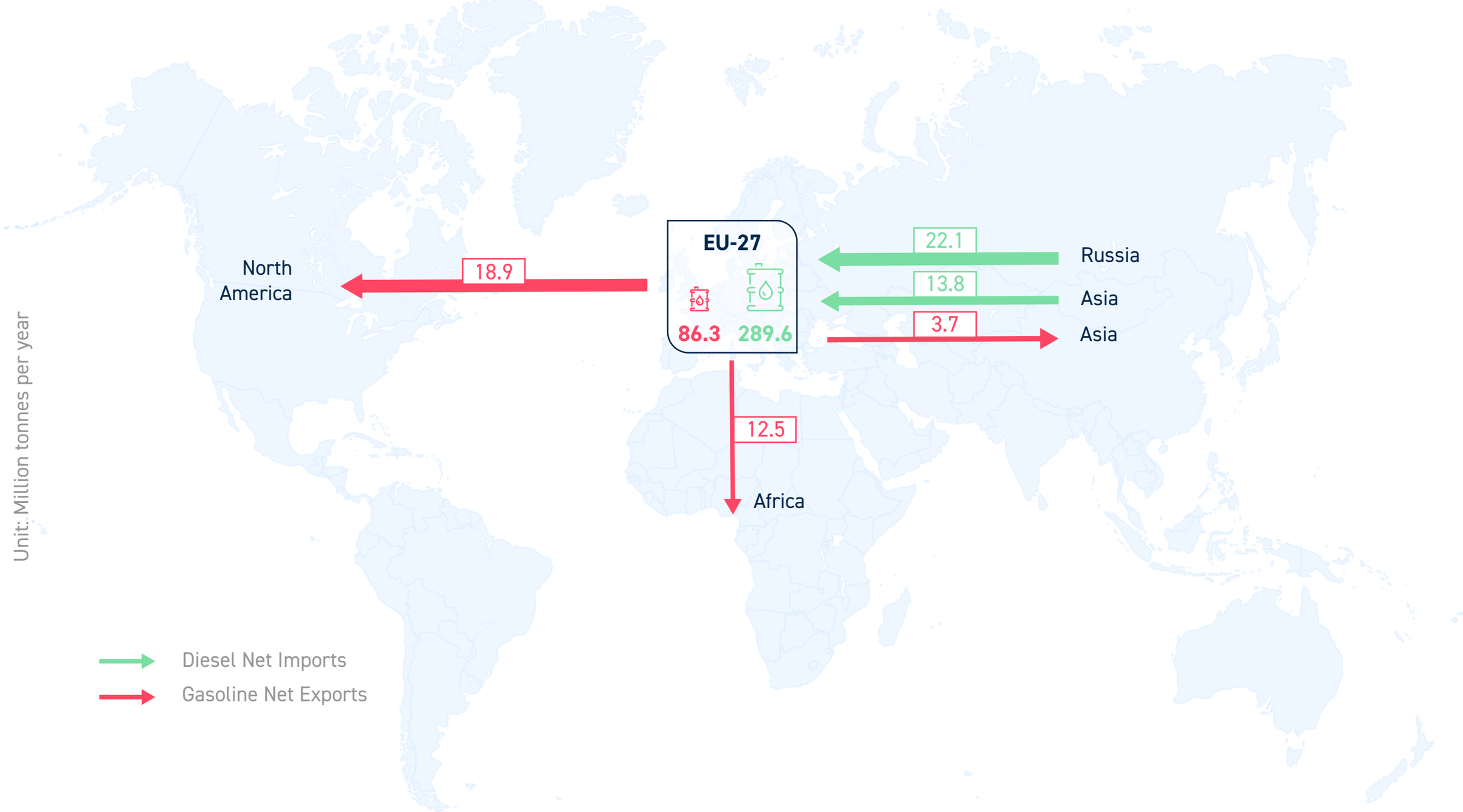


For diesel/gasoil, on the other hand, the EU covers most of its consumption through domestic production.

FIG.24

MAJOR GASOLINE AND DIESEL/GASOIL TRADE FLOWS
TO AND FROM THE EU-27 IN 2021

Source: Eurostat/Wood Mackenzie



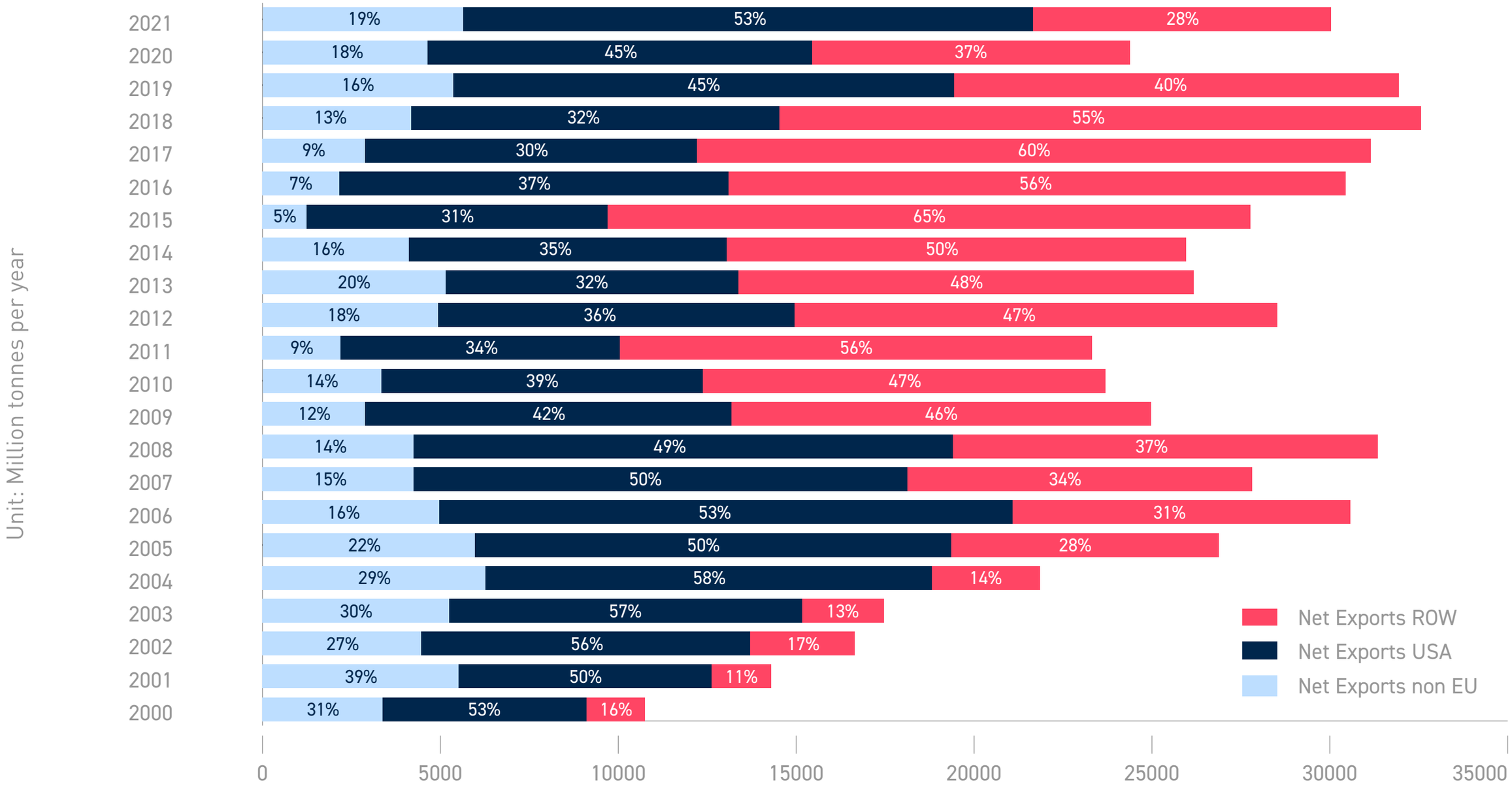
The major trade flows to and from the EU reflect the imbalance in gasoline/diesel demand in Europe. As a consequence, significant excess gasoline production capacity needs to be exported, whilst Europe became heavily reliant on imports from third countries/ regions - especially Russia and the Middle East to meet regional demand for diesel.

North America was the traditional export market for gasoline surpluses in Europe, but the recent shale oil revolution and cheap energy enabled USA refiners to increase their supplies for their internal market and compete on other export markets with EU refiners.

FIG.25

EU-27 GASOLINE TRADING BALANCE:
USA IS A KEY EXPORT MARKET FOR THE EU

Source: Eurostat



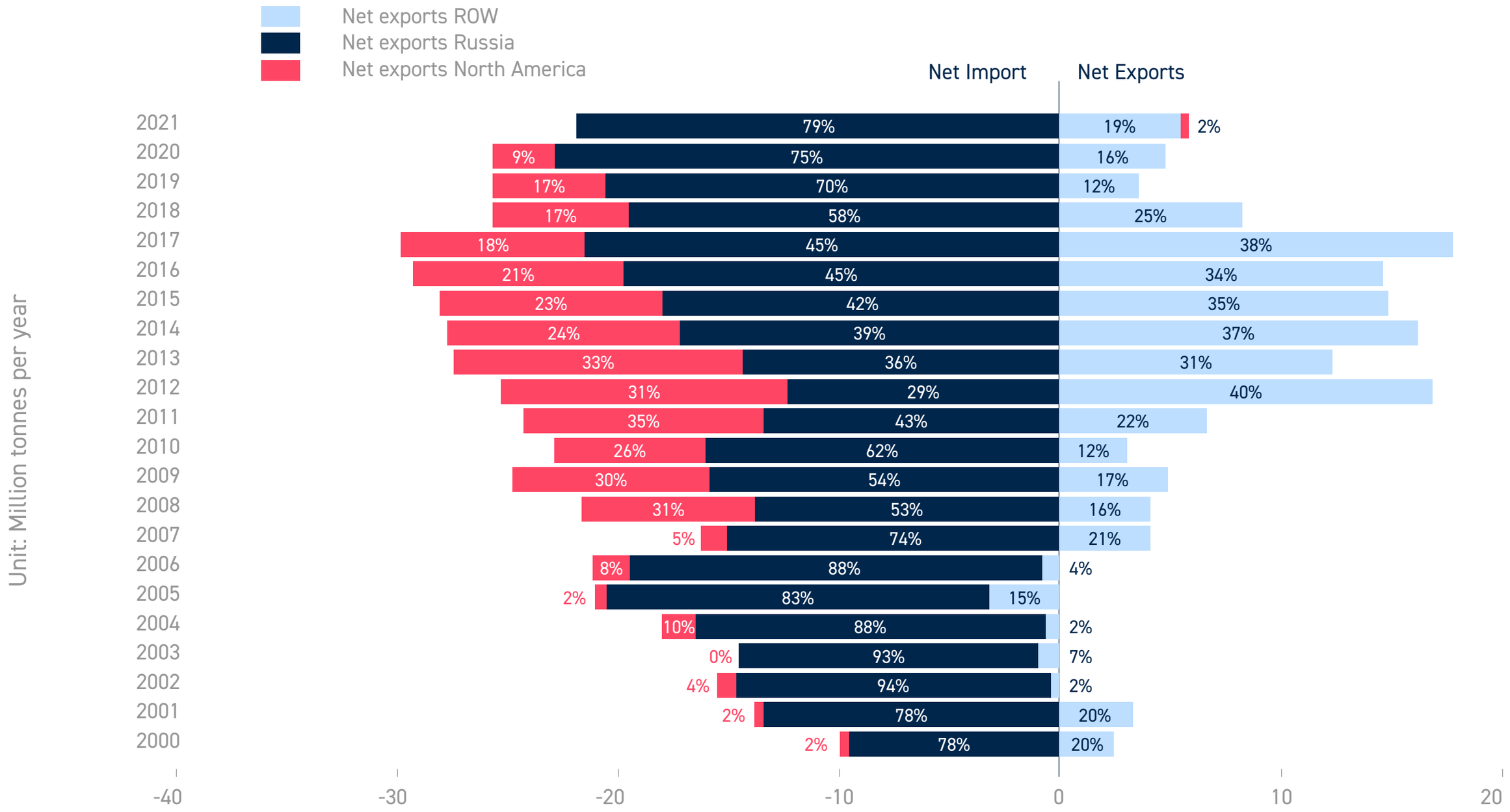
The USA was the traditionally the main export market for the structural EU gasoline surplus. The shale oil boom in the late 2000s has decreased export opportunities to the USA and forced EU refiners to find other markets, primarily in Africa and Asia. North America and Asia were the two key export markets for the EU.

Note: Please note due to rounding, figures may not add up to exactly 100%.

FIG.26

EU-27 NET GASOIL TRADING BALANCE:
RUSSIA IS THE LEADING EXPORTER OF GASOIL TO THE EU

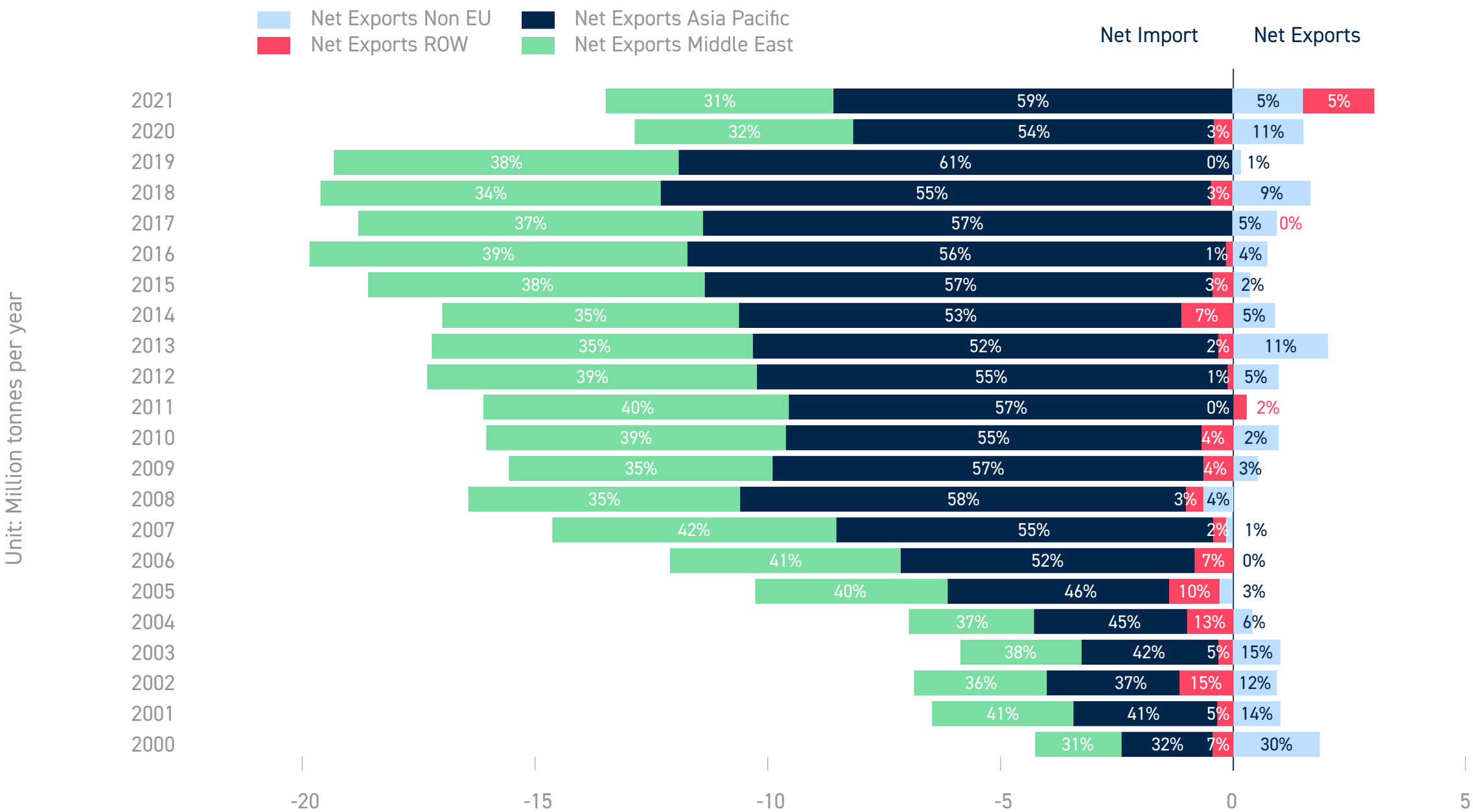
Source: Eurostat



After a significant increase of gasoil imports from the USA between 2008 and 2013, Russia recovered some of the lost shares in 2014-2018 to remain the leading gasoil exporter to the EU. This continued dependence of the EU on imports of gasoil is the result of the diesel/gasoline imbalance that the EU is facing for many years.

FIG.27 NET EU-27 JET FUEL TRADE BALANCE

Source: Eurostat

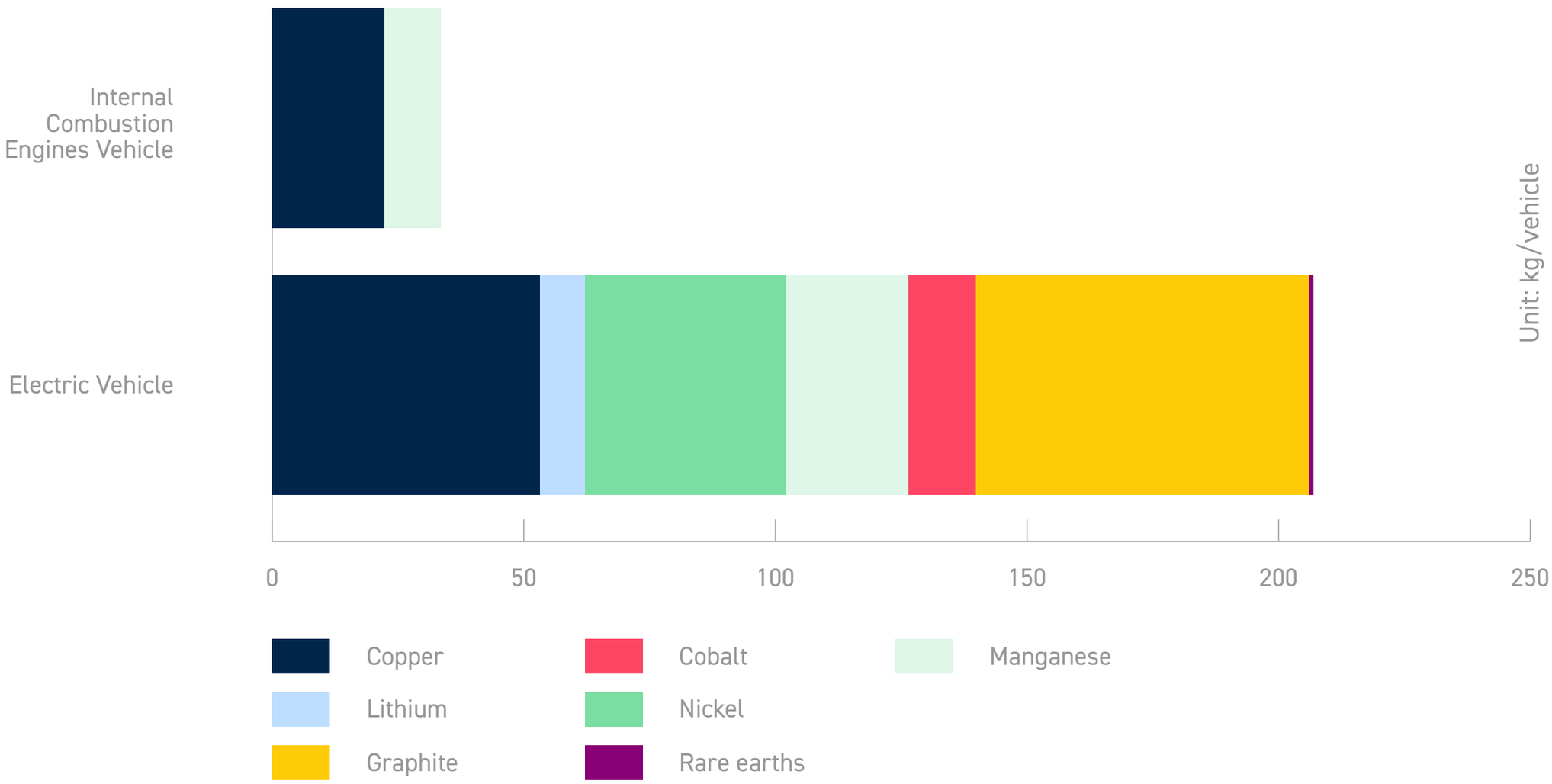


There is a substantial EU dependence on jet fuel imports originating mainly from the Middle East and to a lesser extent from the Asia Pacific region.

FIG.28

MINERALS USED IN ELECTRIC VEHICLES
COMPARED TO CONVENTIONAL VEHICLES

Source: International Energy Agency

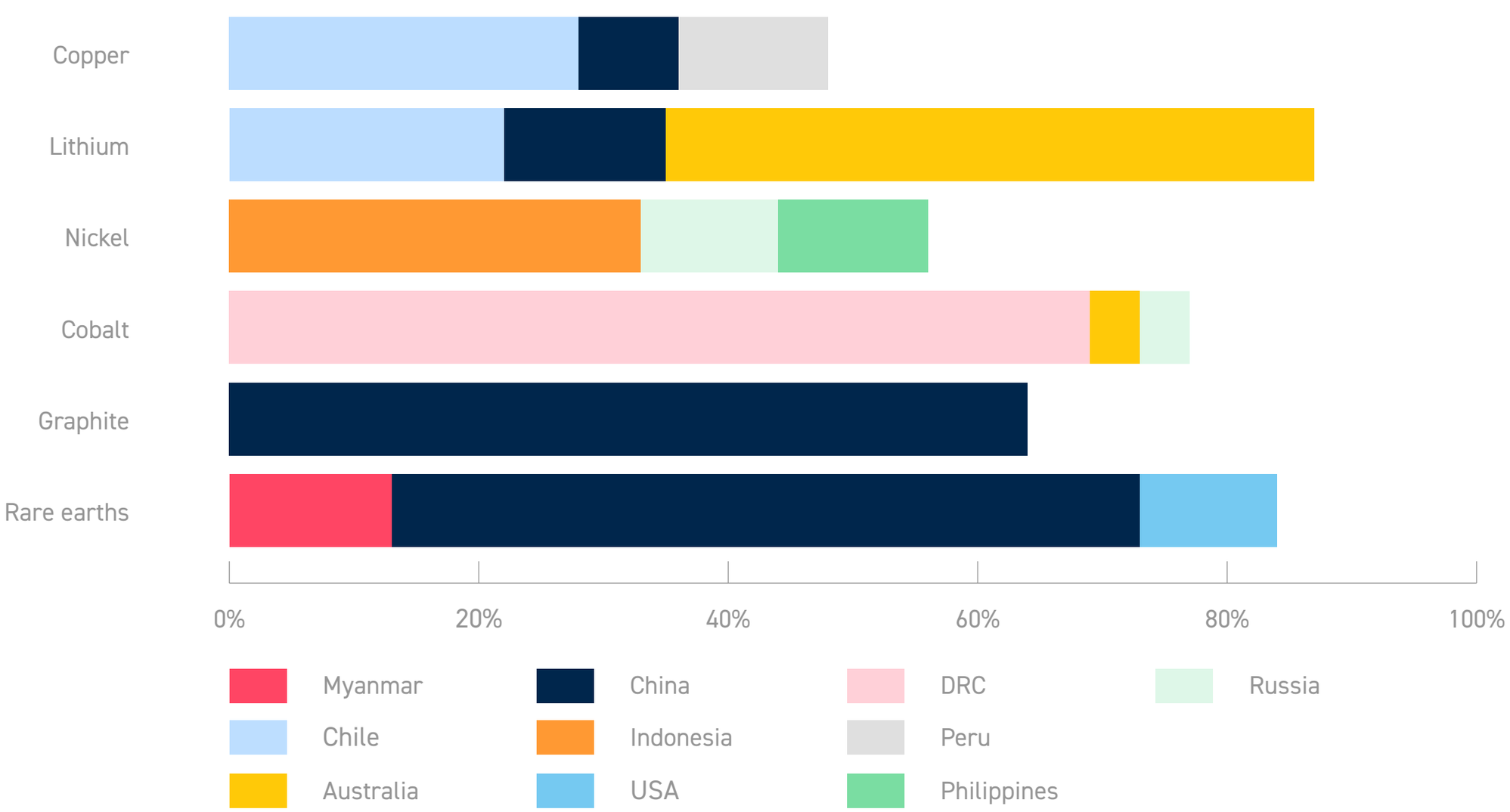


A typical electric vehicle (EV) requires six times the mineral inputs of a conventional car. Lithium, nickel, cobalt, manganese and graphite are crucial to battery performance, longevity and energy density, whereas rare earth elements are essential for permanent magnets that are vital for EV motors. The shift to EVs is set to drive a huge increase in the requirements for these minerals, meaning that the energy sector is emerging as a major force in mineral markets.

FIG.29a

SHARE OF TOP THREE PRODUCING COUNTRIES IN EXTRACTION OF SELECTED MINERALS

Source: International Energy Agency

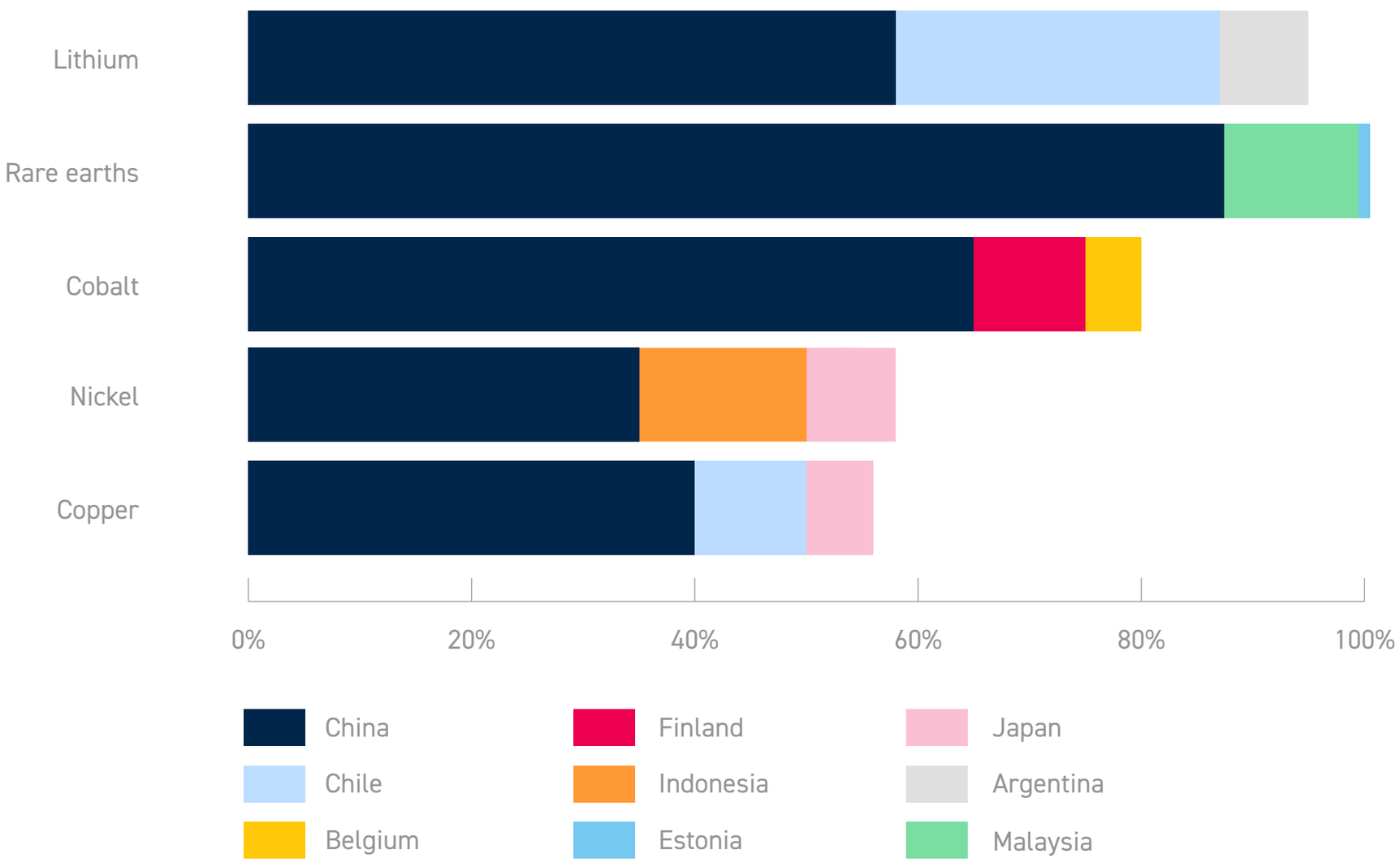


The prospect of a rapid rise in demand for critical minerals necessary for the technologies required in energy transitions poses huge questions about the availability and reliability of supply. The production of these minerals is more concentrated than that of oil. For lithium, cobalt and rare earth elements, the world's top three producing nations control well over three-quarters of global output. In some cases, a single country is responsible for around half of worldwide production. The Democratic Republic of the Congo (DRC) and China were responsible for some 70% and 60% of global production of cobalt and rare earth elements respectively in 2019.

FIG.29b

SHARE OF TOP THREE PRODUCING COUNTRIES IN TOTAL PROCESSING OF SELECTED MINERALS

Source: International Energy Agency

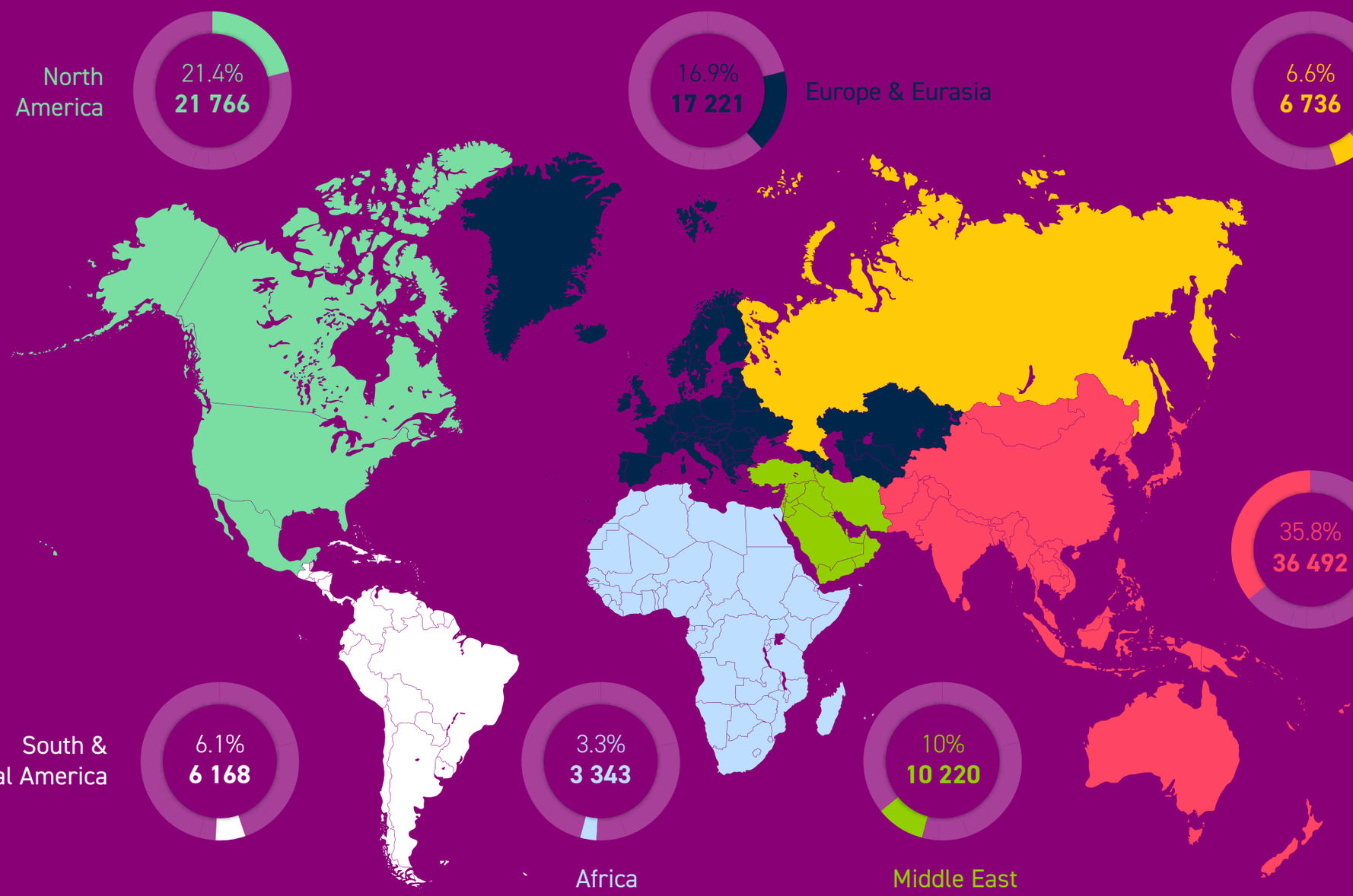


The prospect of a rapid rise in demand for critical minerals necessary for the technologies required in energy transitions poses huge questions about the availability and reliability of supply. The level of concentration for processing operations is particularly high, with China's strong presence across the board: China's share of refining is around 35% for nickel, 50-70% for lithium and cobalt, and nearly 90% for rare earth elements. High levels of concentration, compounded by complex supply chains, increase the risks that could arise from physical disruption, trade restrictions or other developments in major producing countries.

Refining

FIG.30 **GLOBAL REFINING CAPACITY** AS OF 2020

Source: BP Statistical Review of World Energy 2021



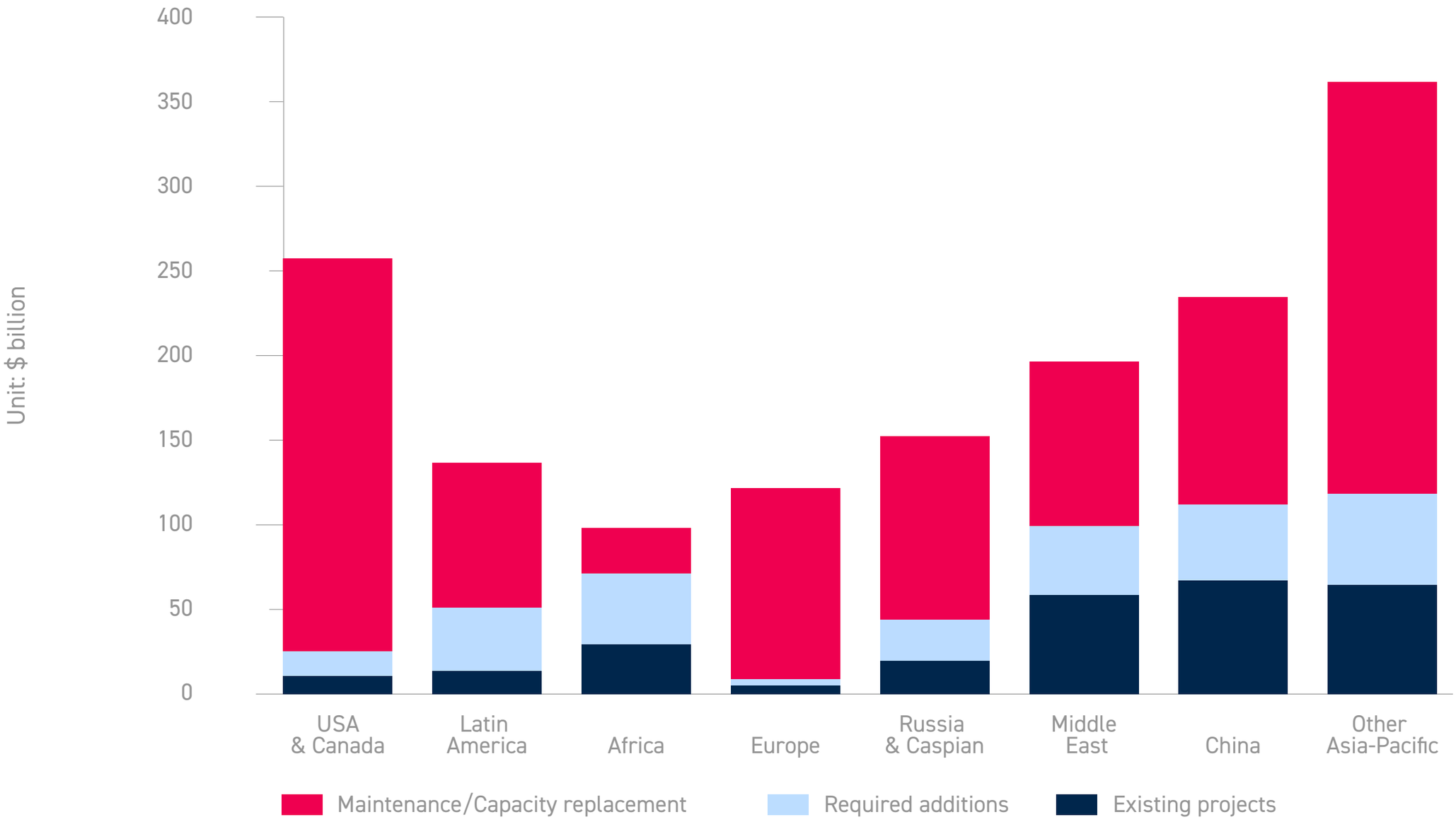
Unit: Thousand Barrels Daily

Refining is spread around the world and truly a global business. The share of Europe and Eurasia (excluding Russia) has remained the same compared to 2019. At 17% it remains the third largest region for refining, behind Asia Pacific at 36% and North America at 21%.

FIG.31

PROJECTED INVESTMENTS IN REFINING SECTOR PER REGION 2022-2045

Source: Organization of the Petroleum Exporting Countries

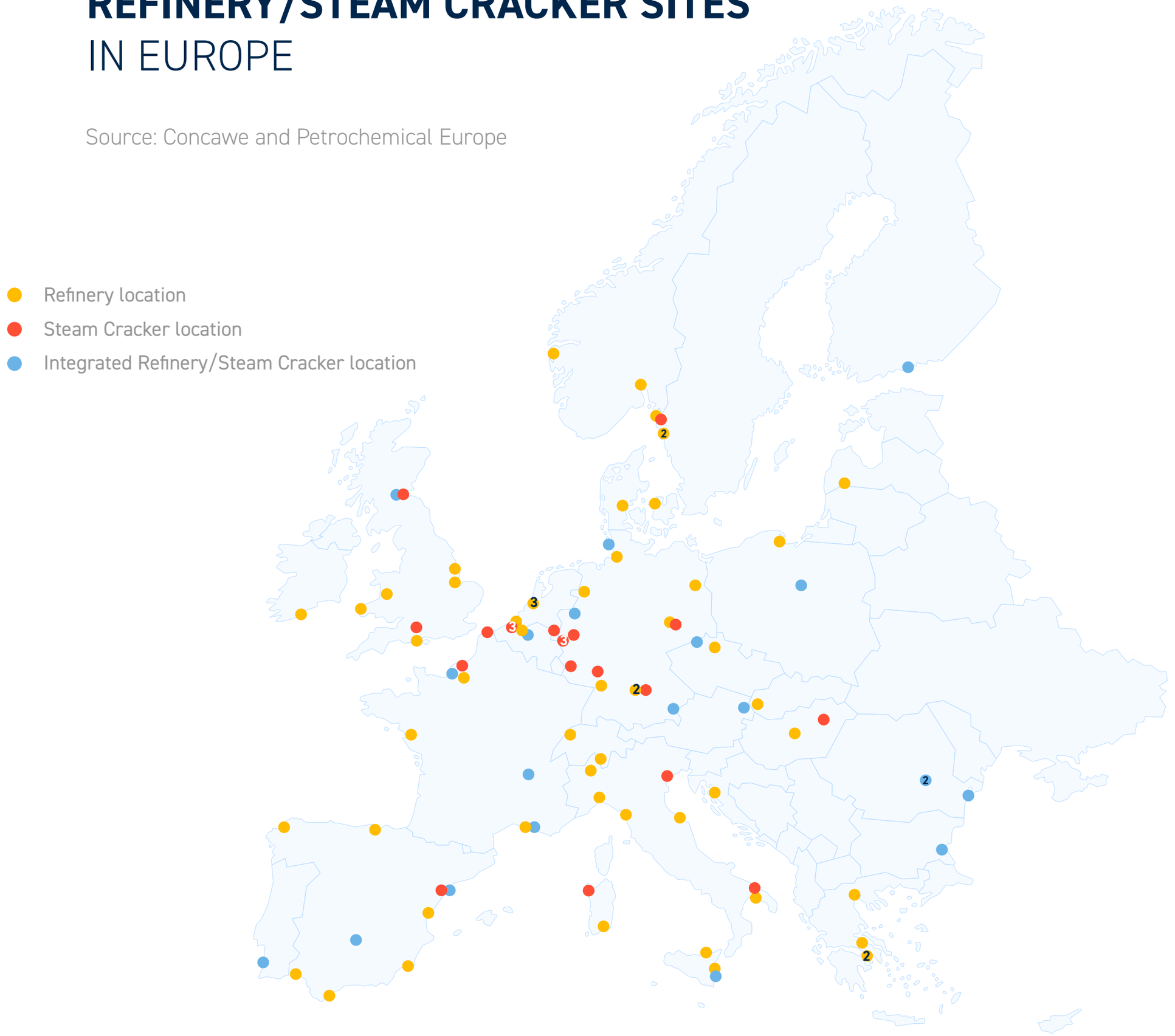


All three categories of refinery investments are estimated at around $1.56 trillion for the 2022-2045 period. More than $1 trillion will be dedicated to maintenance, $268 billion will be invested in known projects and the remaining $261 billion to additions beyond firm projects.

FIG.32

REFINERY/STEAM CRACKER SITES IN EUROPE

Source: Concawe and Petrochemical Europe

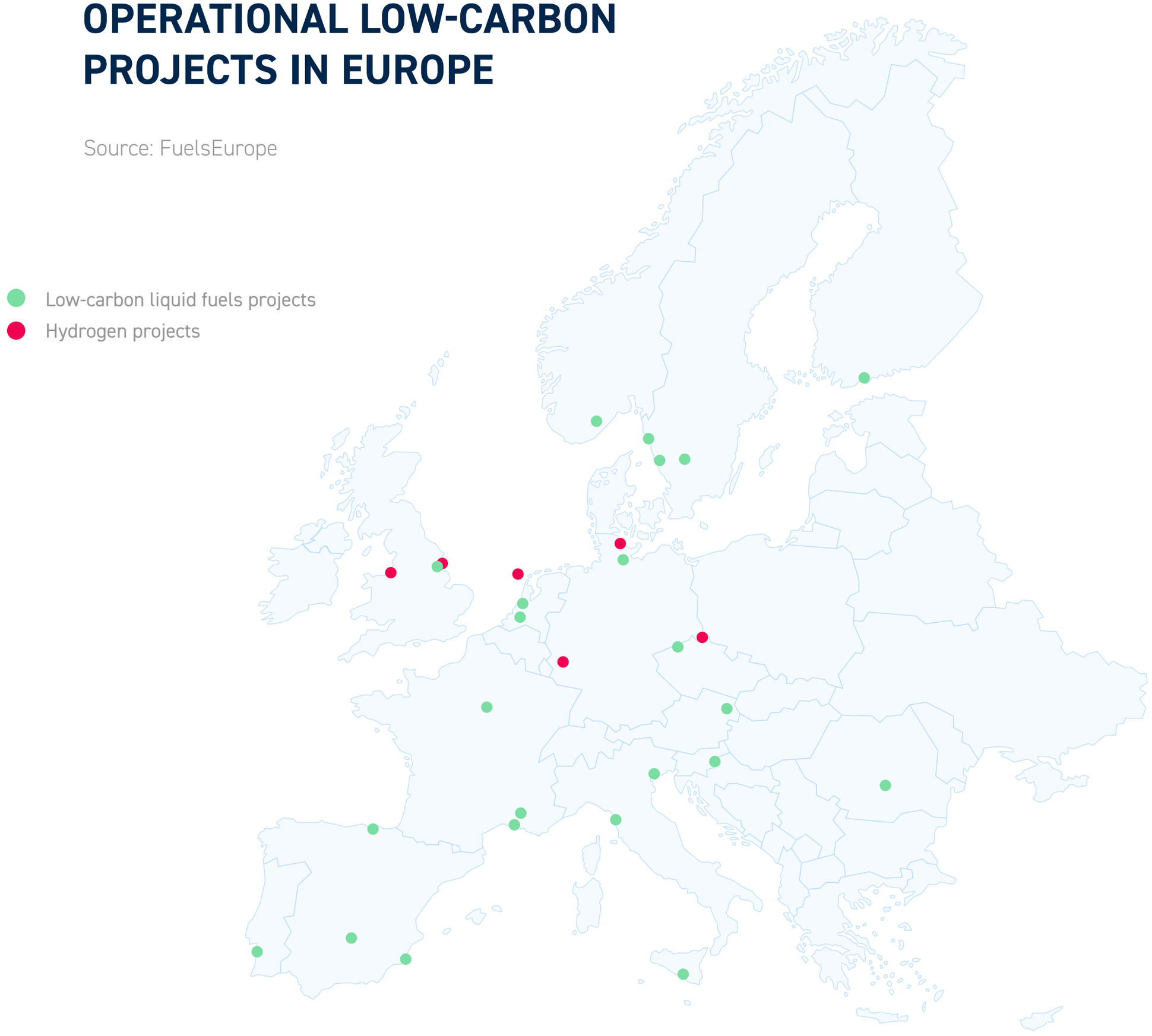


A large number of refineries are integrated with, or very close to steam crackers which produce the feedstock for the petrochemical industry. Such interconnections show how refining is an intrinsic part of the industrial value chain and provides the basis for advanced high value products.

FIG.33

OPERATIONAL LOW-CARBON PROJECTS IN EUROPE

Source: FuelsEurope



Up to May 2023, there were 23 low-carbon liquid fuels across Europe. Additionally, there were six hydrogen ongoing projects also contributing to achieving EU's climate goals.

You can visit our **cleanfuelsforall.eu** website for regular updates on the map and more information about each project.

FIG.34

75 MAINSTREAM REFINERIES WERE OPERATING IN THE EU-27, UK, NORWAY AND SWITZERLAND AT THE END OF 2022

Source: Concawe

COUNTRY	NUMBER OF REFINERIES
Austria	1
Belgium	2
Bulgaria	1
Croatia	1
Czechia	2
Denmark	2
Finland	1
France	6
Germany	11
Greece	4
Hungary	1
Ireland	1
Italy	10
Lithuania	1
Netherlands	5
Poland	2
Portugal	1
Romania	3
Slovakia	1
Spain	8
Sweden	3
EU-27 TOTAL = 67	
CH + NO + UK	8
TOTAL = 75	

The 75 'mainstream' refineries (capacity above 30 kbbdl/d or 1.5Mt/a) operating in 2022 in the EU-27, United Kingdom, Norway and Switzerland had a primary refining capacity of 650.3 million tonnes - similar to the 2021 total. This represents a decrease by 156 million tonnes of primary refining capacity since 2009.

FIG.35

EU-27, UK, NORWEGIAN AND SWISS MAINSTREAM REFINERIES HAD 650.3 MILLION TONNES OF PRIMARY REFINING CAPACITY IN 2022

Source: Concawe

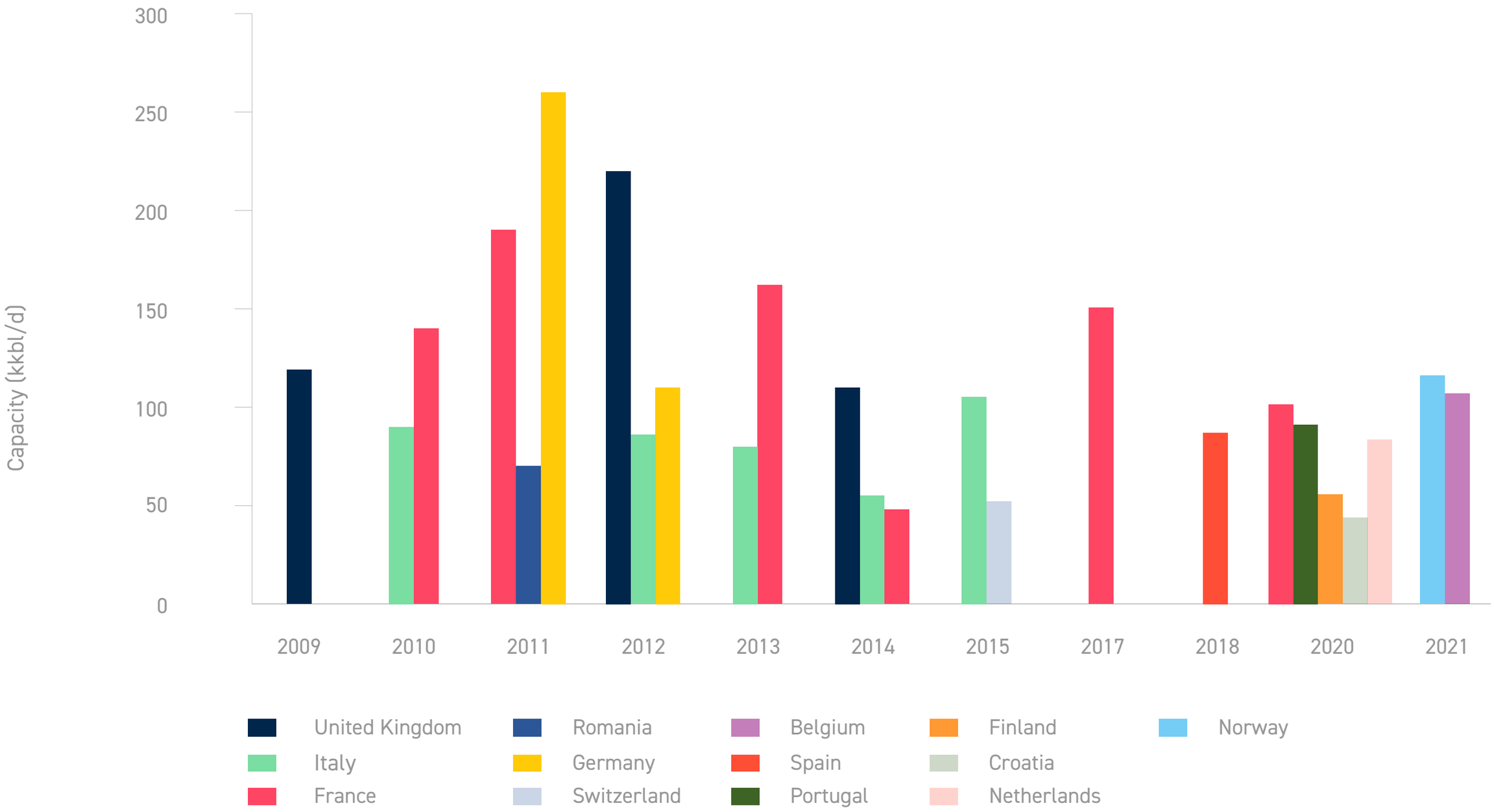
COUNTRY	Mainstream > 1.5 Mt/a
	Mt/a
Austria	9.8
Belgium	32.4
Bulgaria	5.8
Croatia	4.6
Czechia	8.0
Denmark	8.8
Finland	10.4
France	58.2
Germany	100.9
Greece	25.2
Hungary	7.8
Ireland	3.6
Italy	83.9
Lithuania	9.6
Netherlands	61.6
Poland	27.2
Portugal	11.5
Romania	12.1
Slovakia	5.4
Spain	71.6
Sweden	20.1
EU-27 TOTAL	**578.5**
Norway	10.5
Switzerland	3.3
United Kingdom	58.0
NO + CH + UK	**71.8**
TOTAL	**650.3**

The 75 mainstream refineries (capacity above 30 kbbdl/d or 1.5Mt/a) operating in 2022 in the EU-27, United Kingdom, Norway and Switzerland had a primary refining capacity of 650.3 million tonnes. This represents a decrease by 156 million tonnes of primary refining capacity since 2009. There was no mainstream refinery closure in 2022.

Note: Refining capacity is expressed in million tonnes per year. Numbers may not add up due to rounding.

FIG.36 **REFINERY CLOSURES** IN EUROPE

Source: Platts and Concawe

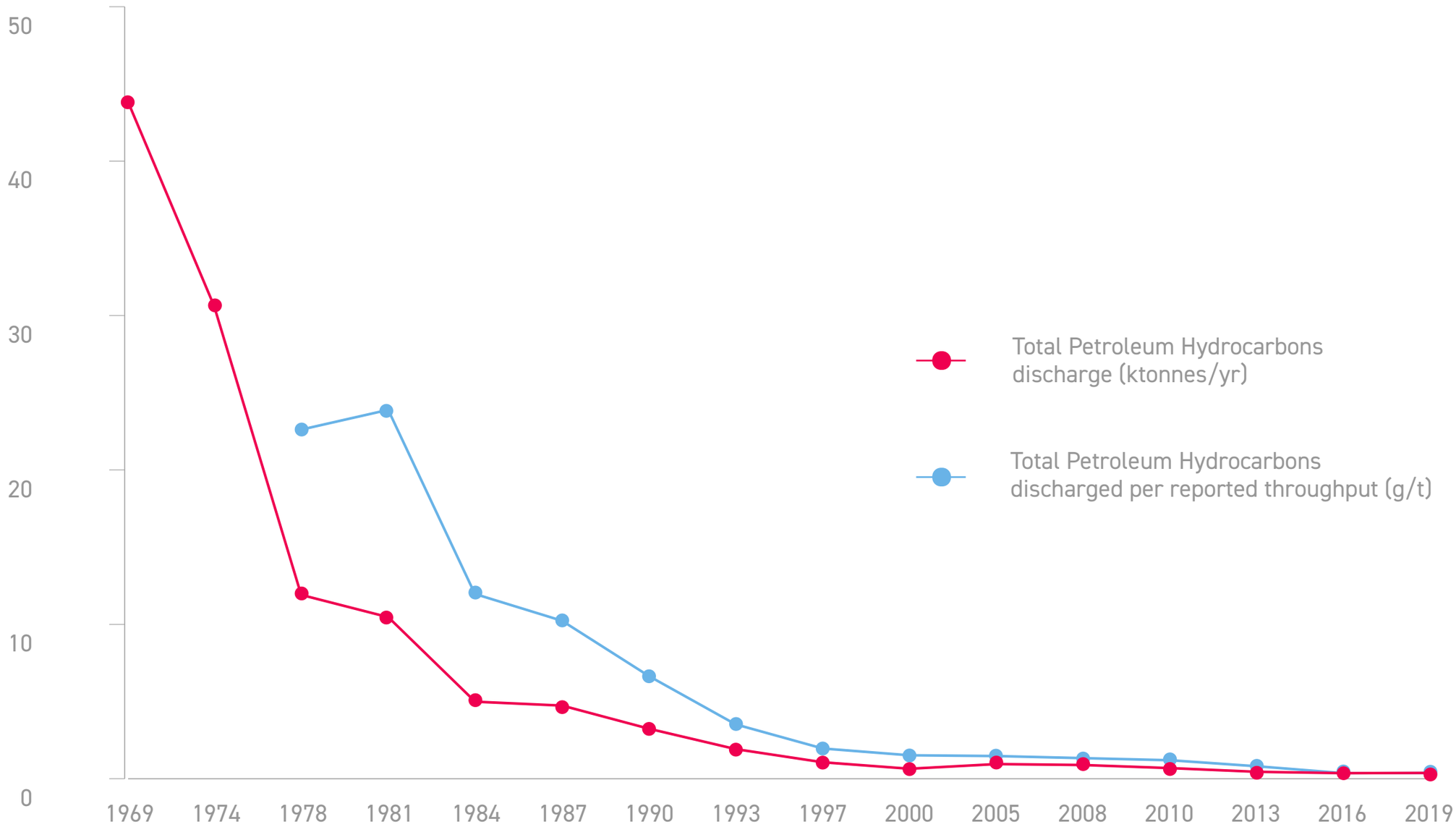


Since 2009, out of close to 100 refineries operating in Europe, 26 refineries (threshold > 30 kbbl/d or 1.5 Mt/a) were closed or transformed. Currently, at least five refineries in Europe underwent a transformation process, moving away from oil and converting into biorefineries. In 2022, there was no refinery closure.

FIG.37

QUALITY OF REFINERY WATER EFFLUENT OIL DISCHARGED IN WATER

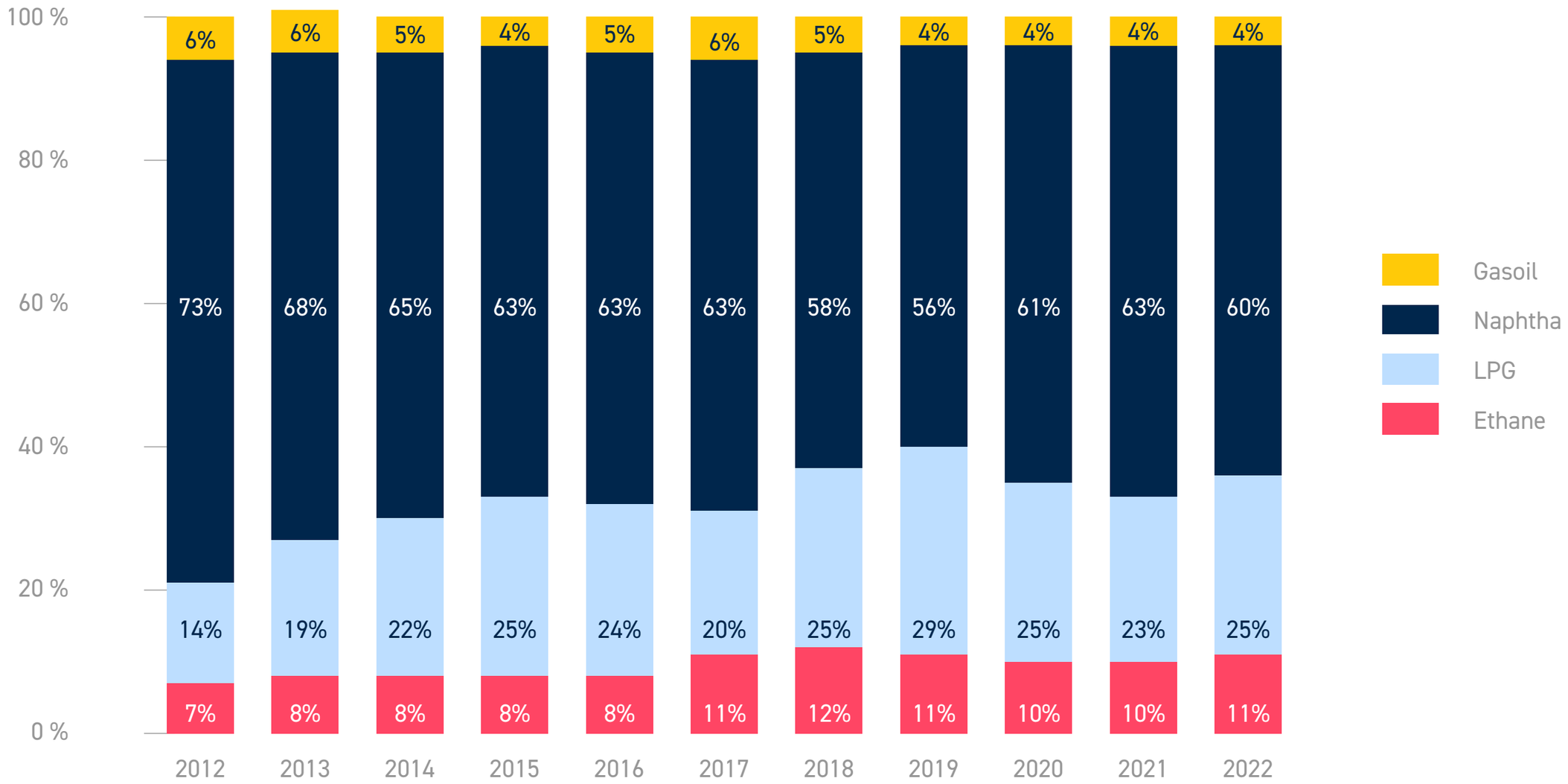
Source: Concawe



The EU refineries have significantly improved the quality of refinery water effluent in the last decades. The amount of Total Petroleum Hyrdrocarbons (TPH) discharged in effluents from reporting installations continued to decrease to extremelly low levels relative to pre-1990; both in terms of the absolute amount of TPH discharged and the amount expressed relative to the volume of feedstock processed (throughput) and the refining capacity of the installations.

FIG.38 CHEMICAL INDUSTRY RAW MATERIAL USE

Source: ICIS/CEFIC



The EU refining sector is closey integrated with the petrochemical sector. A large part of the petrochemical feedstock relies on refined products, such as naphtha and petroleum gases.

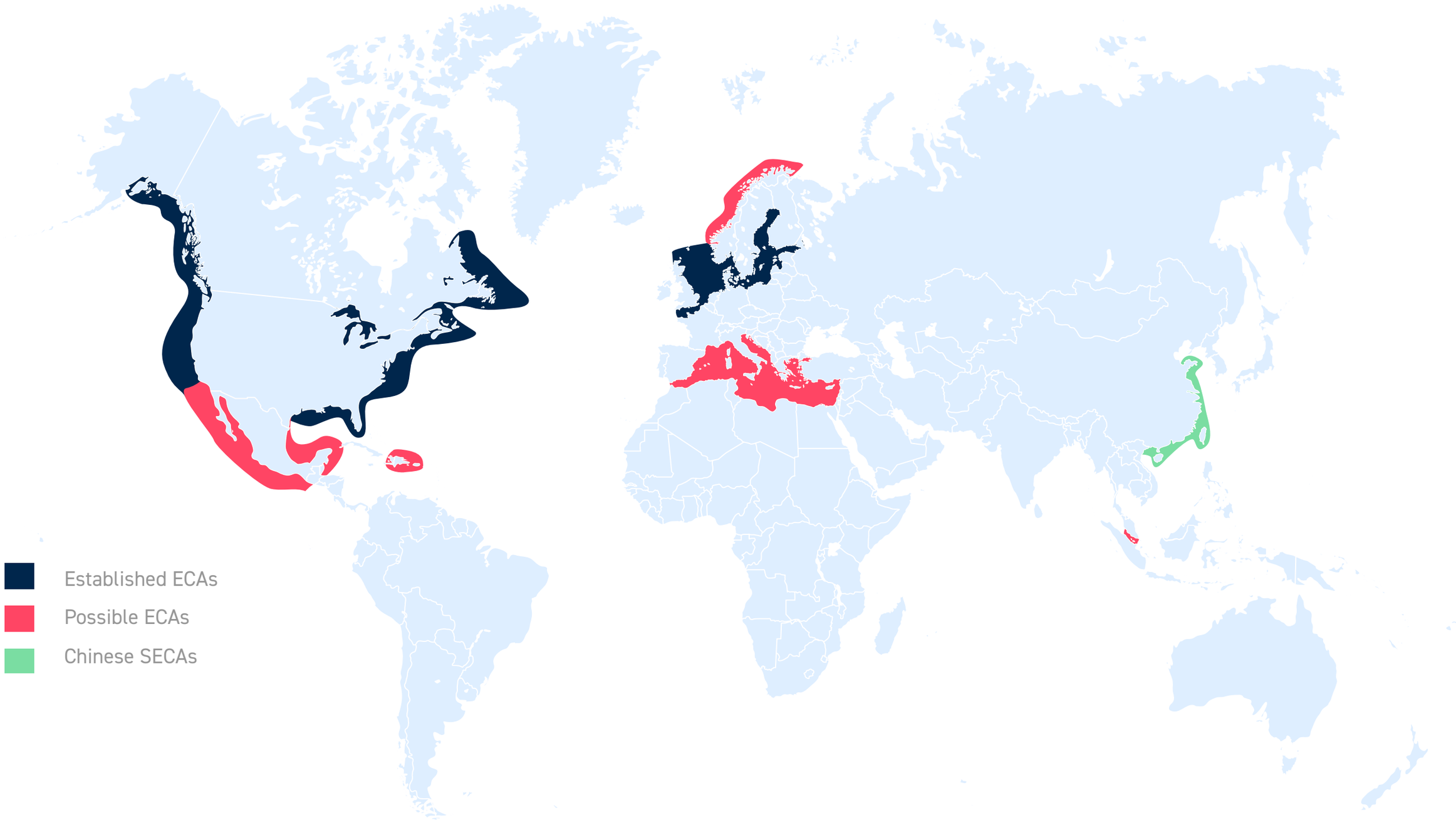
Note: Please note due to rounding, figures may not add up to exactly 100%.

FIG.39

MARINE FUEL SULPHUR SPECIFICATIONS

SO_2 EMISSIONS CONTROL AREAS (SECAs)

Source: International Maritime Organization and Concawe



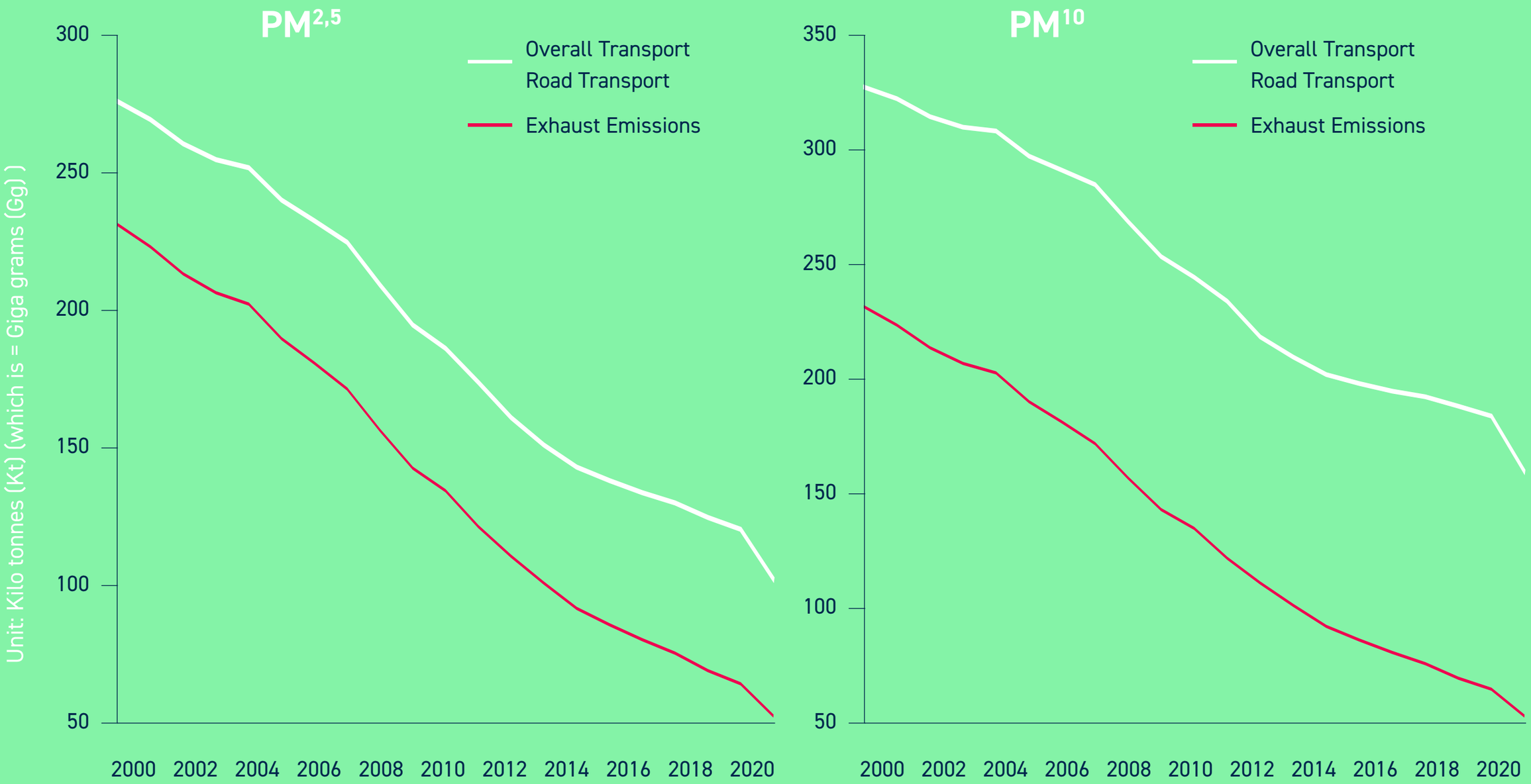
From January 2020, under the new sulphur limit, ships started to use fuel oil on board with a sulphur content of no more than 0.50% m/m, against the previous limit of 3.50%, which had been in effect since 1 January 2012. The interpretation of “fuel oil used on board” includes use in main and auxiliary engines and boilers.

Emissions

FIG.**40a**

SINCE 2000, PM EMISSIONS FROM EXHAUST REDUCED BY OVER 35% IN THE EU

Source: European Environmental Agency

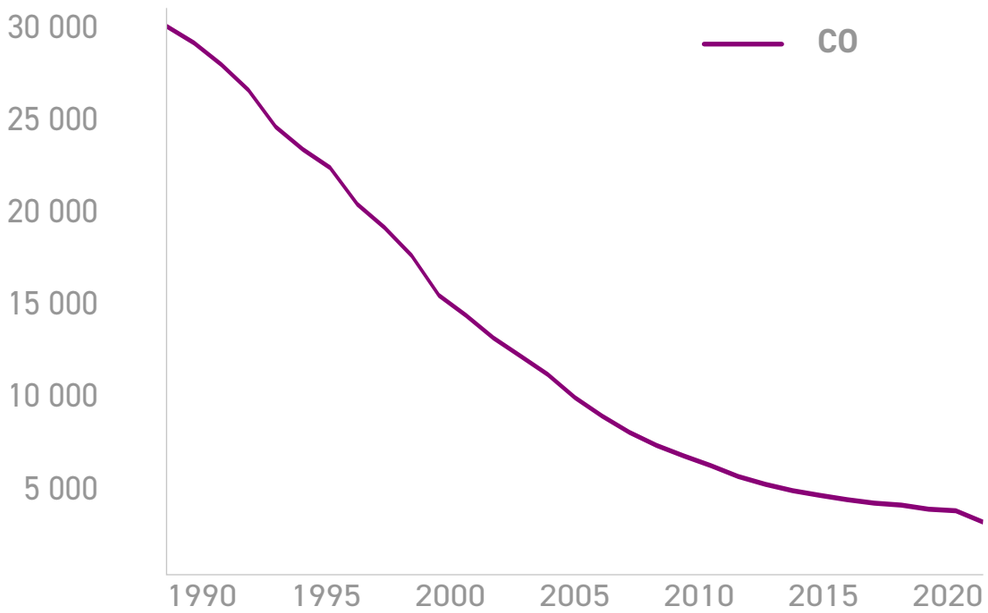


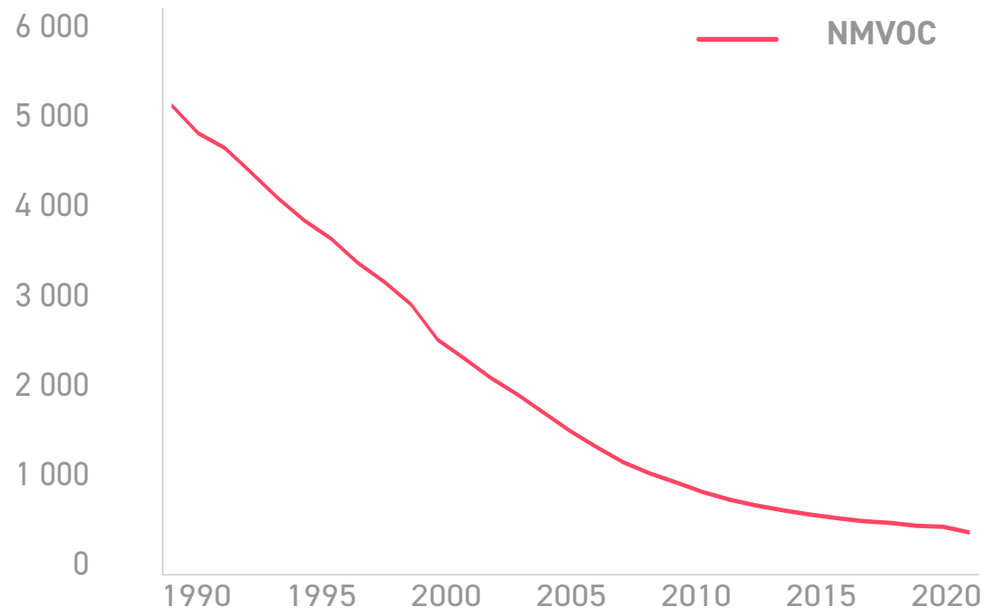
PM emissions are continuously decreasing as the result of cleaner diesel fuel, advanced engines and effective emissions control technology. Since the introduction of the Euro 6 standard, modern road vehicles with diesel engines are using highly efficient filters that remove 99.9% of PM.

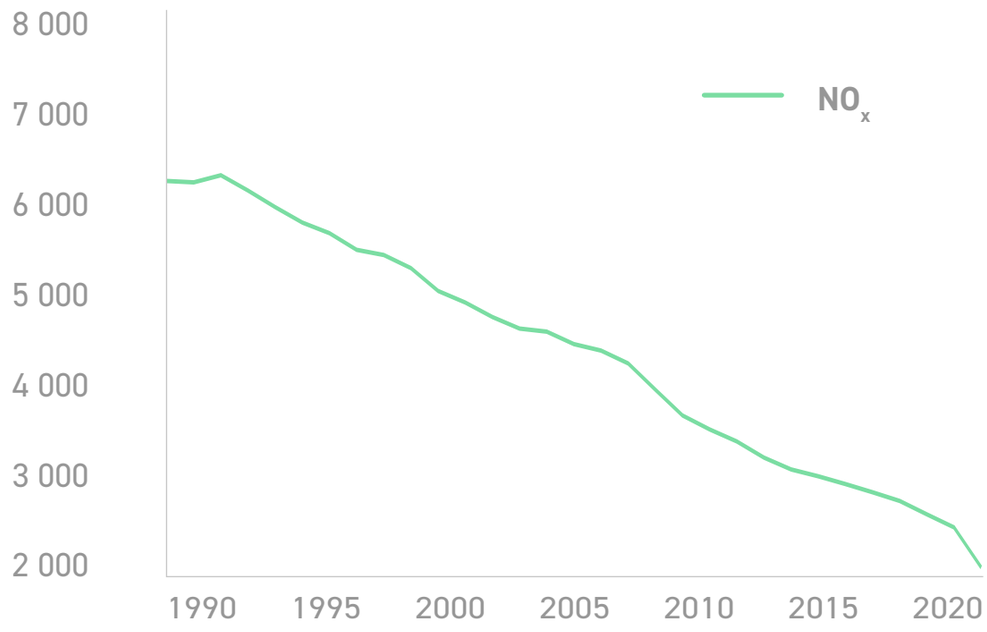
FIG.40b

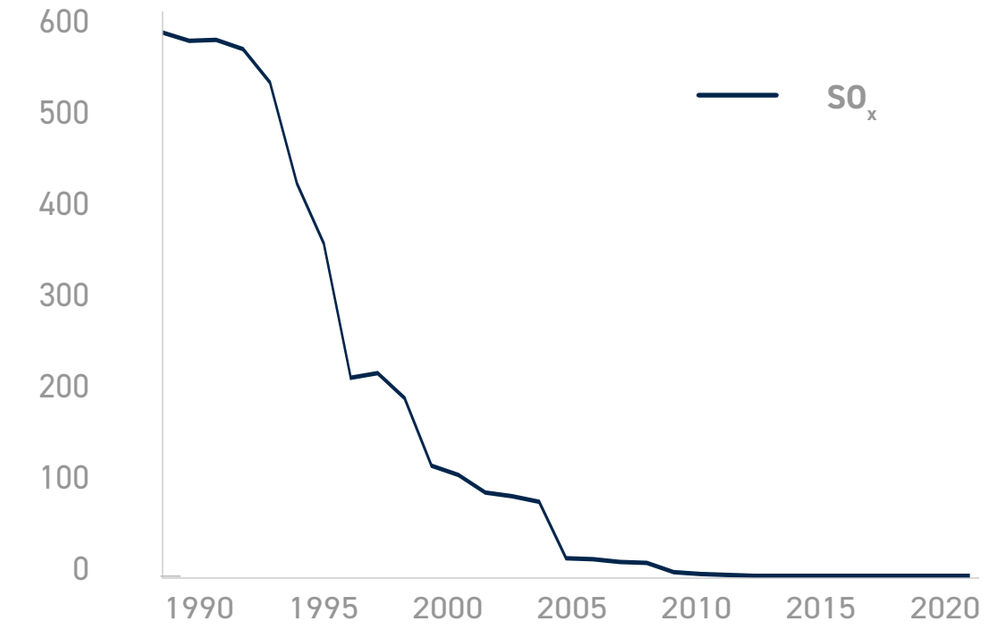
SINCE 1990, FUELS ARE PROGRESSIVELY BECOMING CLEANER RESULTING IN EXHAUST EMISSIONS REDUCTION BY OVER 80%

Source: European Environmental Agency





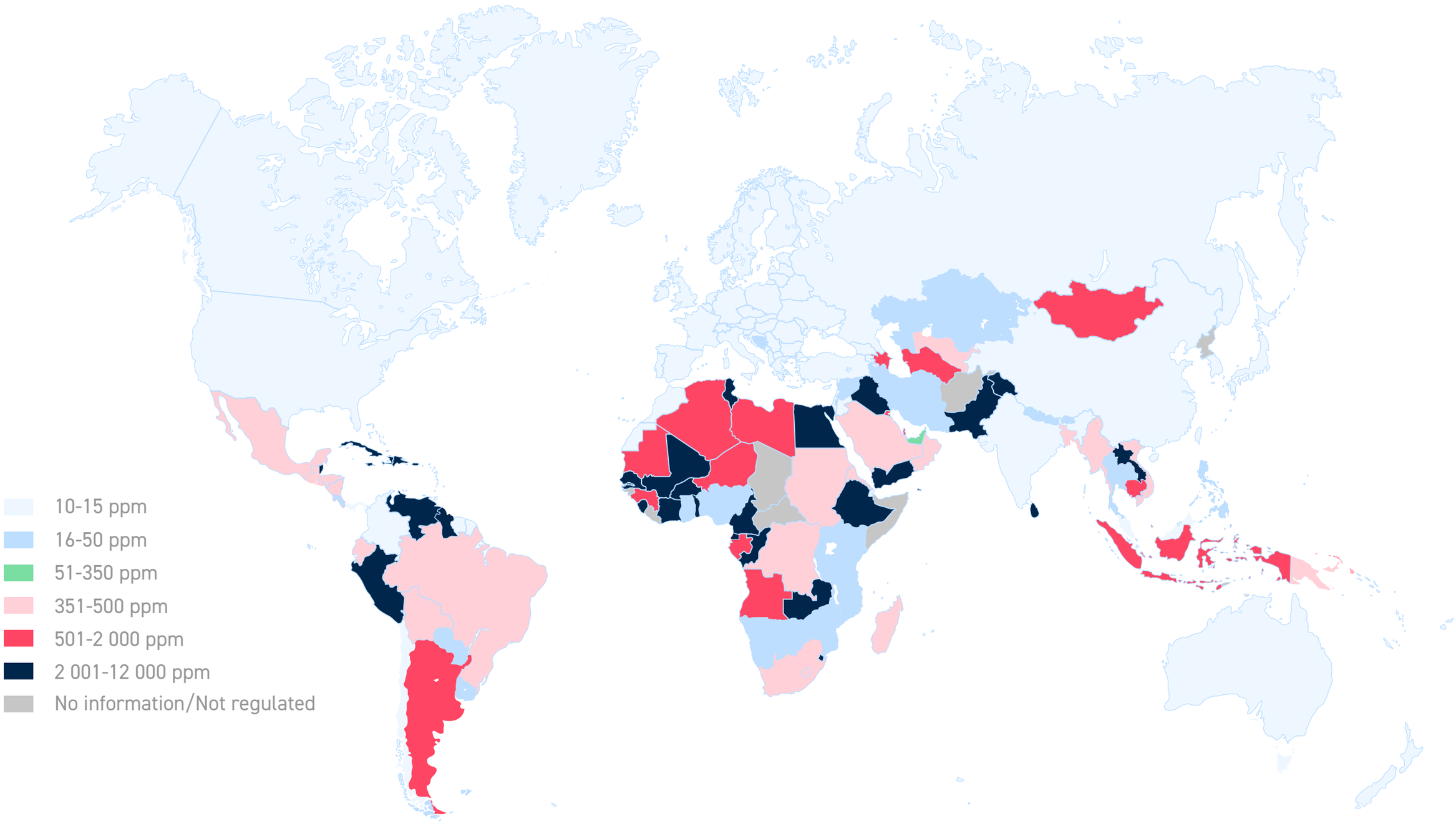




Since 1990, the refining industry has contributed to cleaner exhausts by today containing over 80% lower SO_x, NMVOC & CO, while NO_x emissions decreased by over 60%. These significant improvements are the result of the partnerships with the automotive industry aiming at improving the fuel-engine efficiency and leading to multiple environmental benefits.

FIG.41 ON-ROAD DIESEL SULPHUR LIMITS

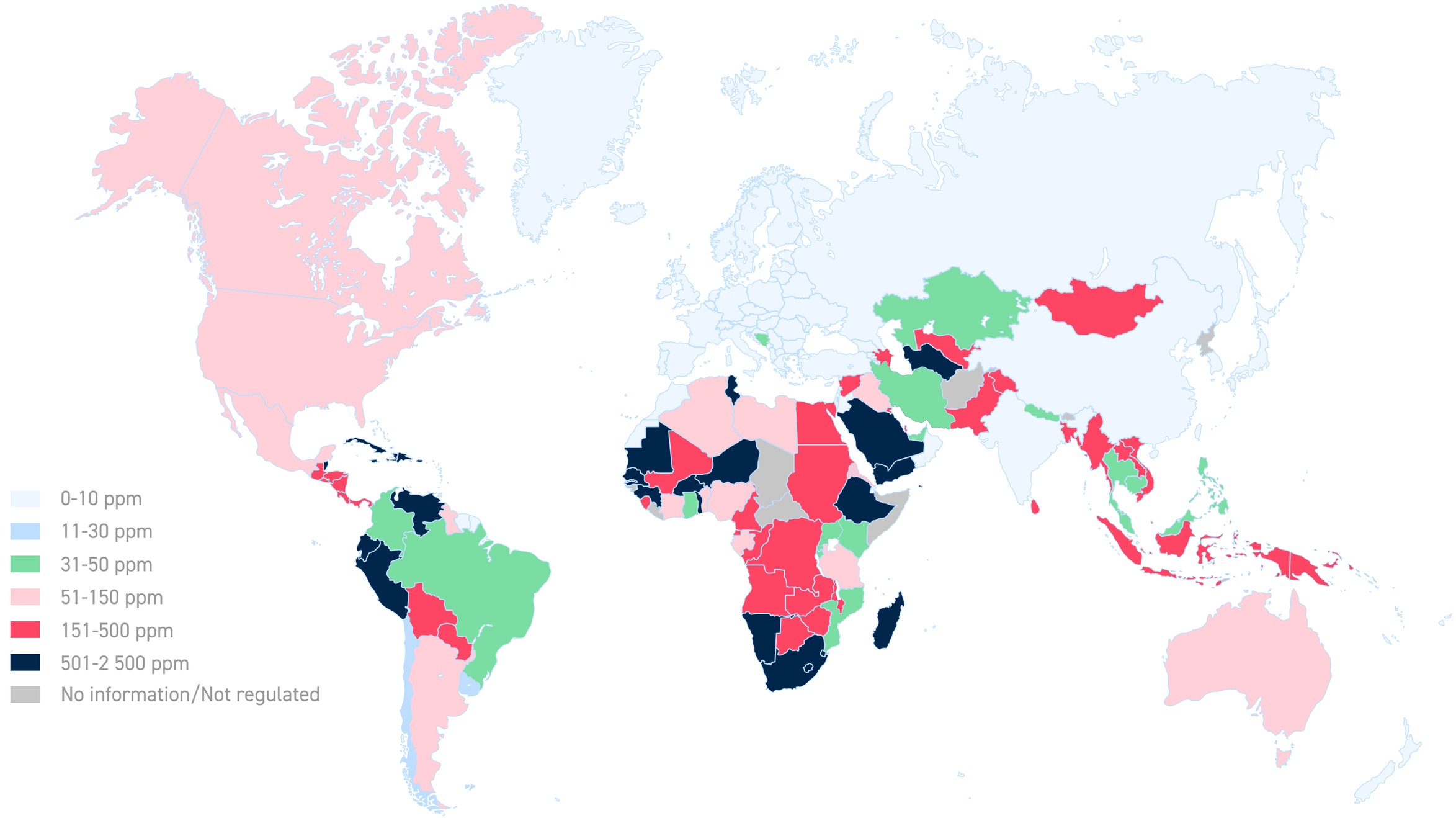
Source: Stratas Advisors 2023



Countries may apply lower limits for different grades, regions/cities, or based on average content. Detailed information on limits and regulations can be found at **www.stratasadvisors.com**.

FIG.42 GASOLINE SULPHUR LIMITS

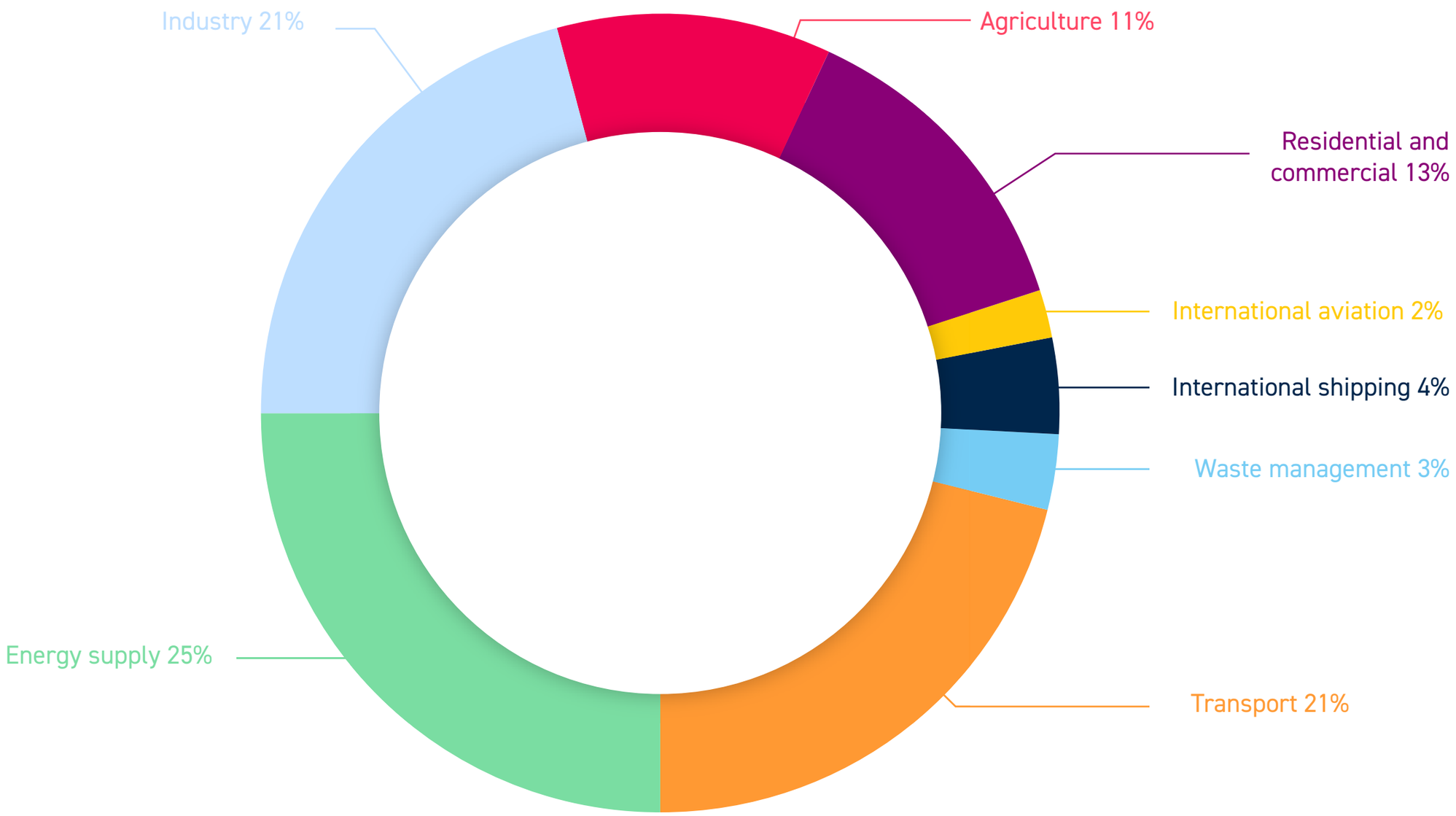
Source: Stratas Advisors 2023



Countries may apply lower limits for different grades, regions/cities, or based on average content. Detailed information on limits and regulations can be found at **www.stratasadvisors.com**.

FIG.43 **GHG EMISSIONS** BY SECTOR IN THE EU-27 IN 2020

Source: European Environmental Agency

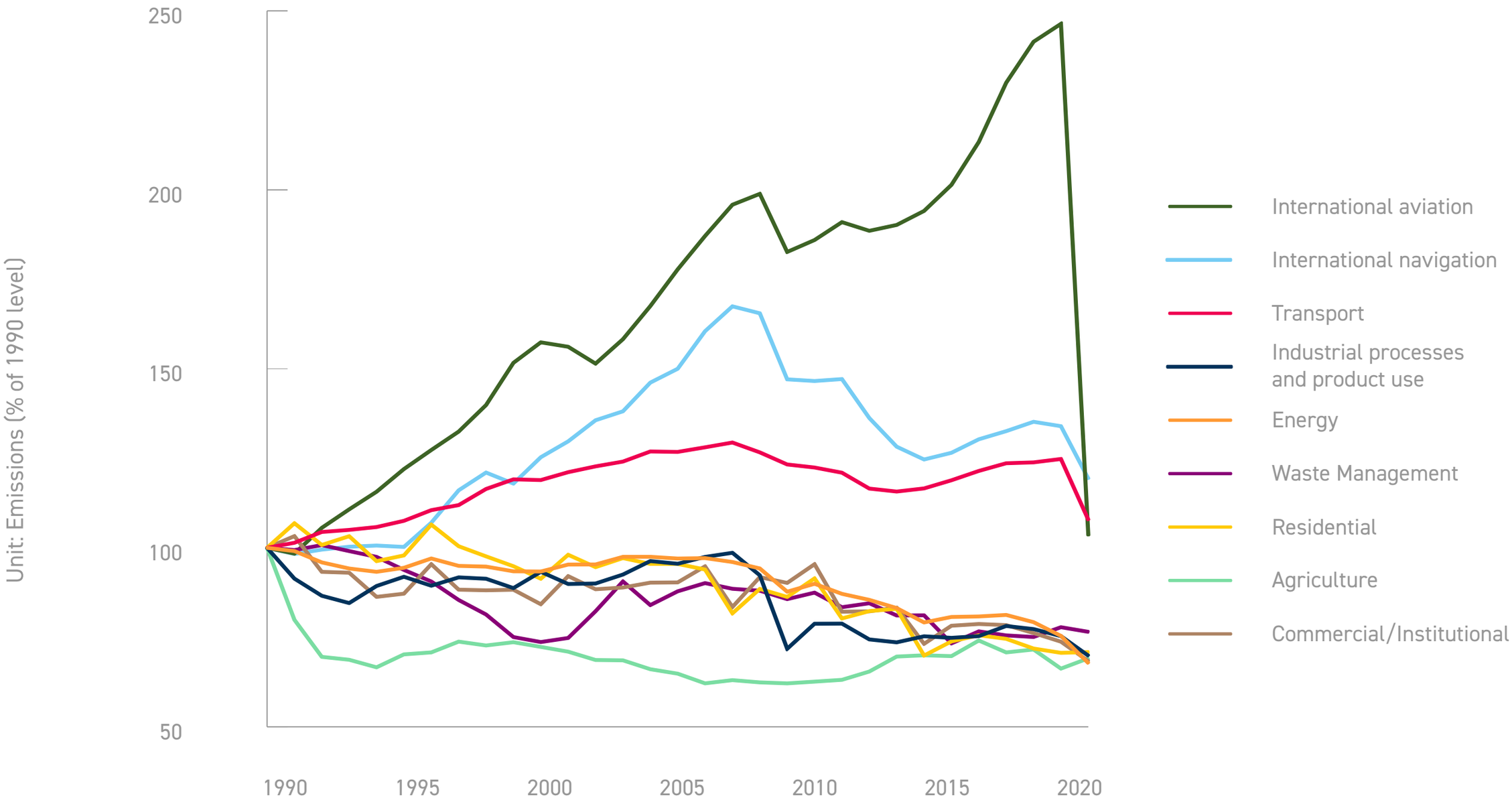


Energy supply and industry accounted for 46% of total GHG emissions in the 27 EU Member States in 2020. Transport, including international shipping and aviation generated 27% of EU GHG emissions.

FIG.**44**

CO_2 **EMISSION TREND** BY SECTOR IN THE EU-27

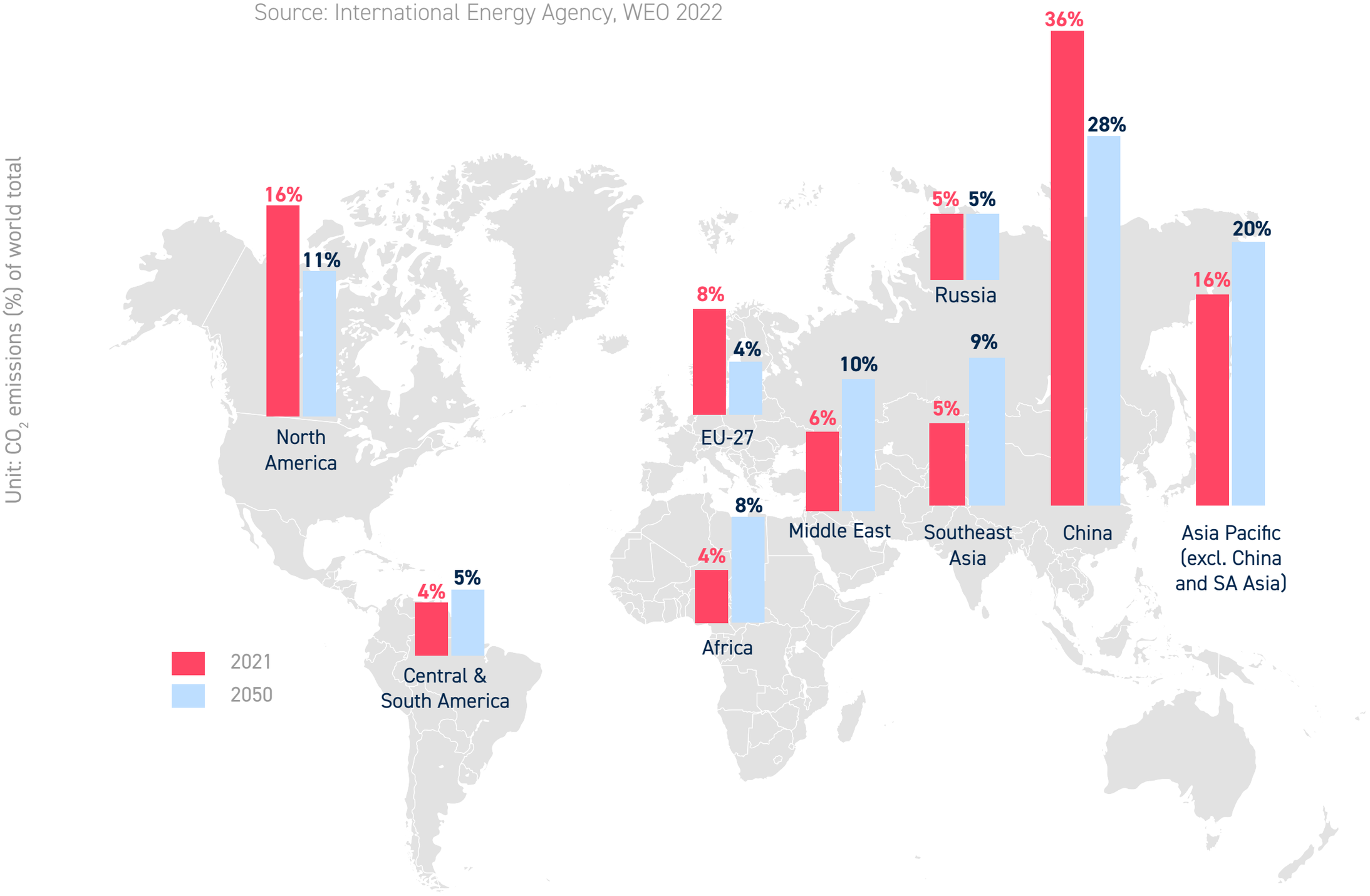
Source: European Environmental Agency



CO_2 emissions per sector have generally been declining since 2007. Industry (processes and manufacturing) CO_2 emissions decreased sharply over the period 2007-2012 and are now between 30% and 38% below the 1990 levels. CO_2 emissions from transport has been steadily decreasing between 2008 and 2015. However, since 2016 we had witnessing an increase in the CO_2 emissions in transport mainly due to international aviation. This increase was halted in 2020 due to global travel restrictions linked to the Covid-19 pandemic, with CO_2 emissions dropping drastically for international aviation.

FIG.45 DECLINING EU SHARE IN GLOBAL CO_2 EMISSIONS

Source: International Energy Agency, WEO 2022

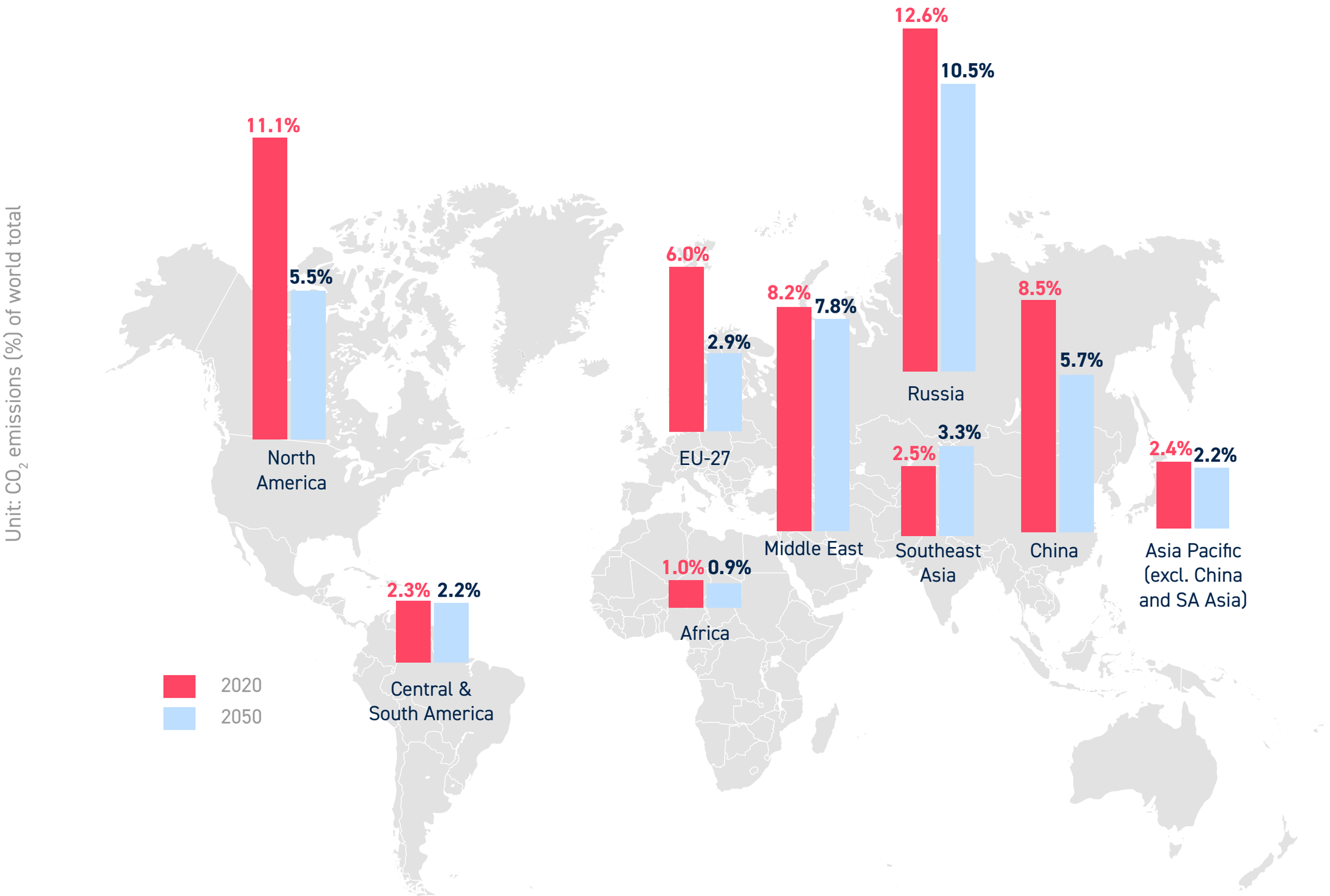


In 2021, the EU accounted for 8% of the total global CO_2 emissions and this share is expected to reduce to 4% in 2050. CO_2 emissions in North America and China are also forecasted to decrease by 2050 by respectively 5 and 8 percent points, whereas in the other parts of the world, emissions are likely to increase. The share of CO_2 emissions in Russia is expected remain stable at 5% in 2050.

FIG.46

CO_2 EMISSIONS PER CAPITA/REGIONS

Source: International Energy Agency, WEO 2022

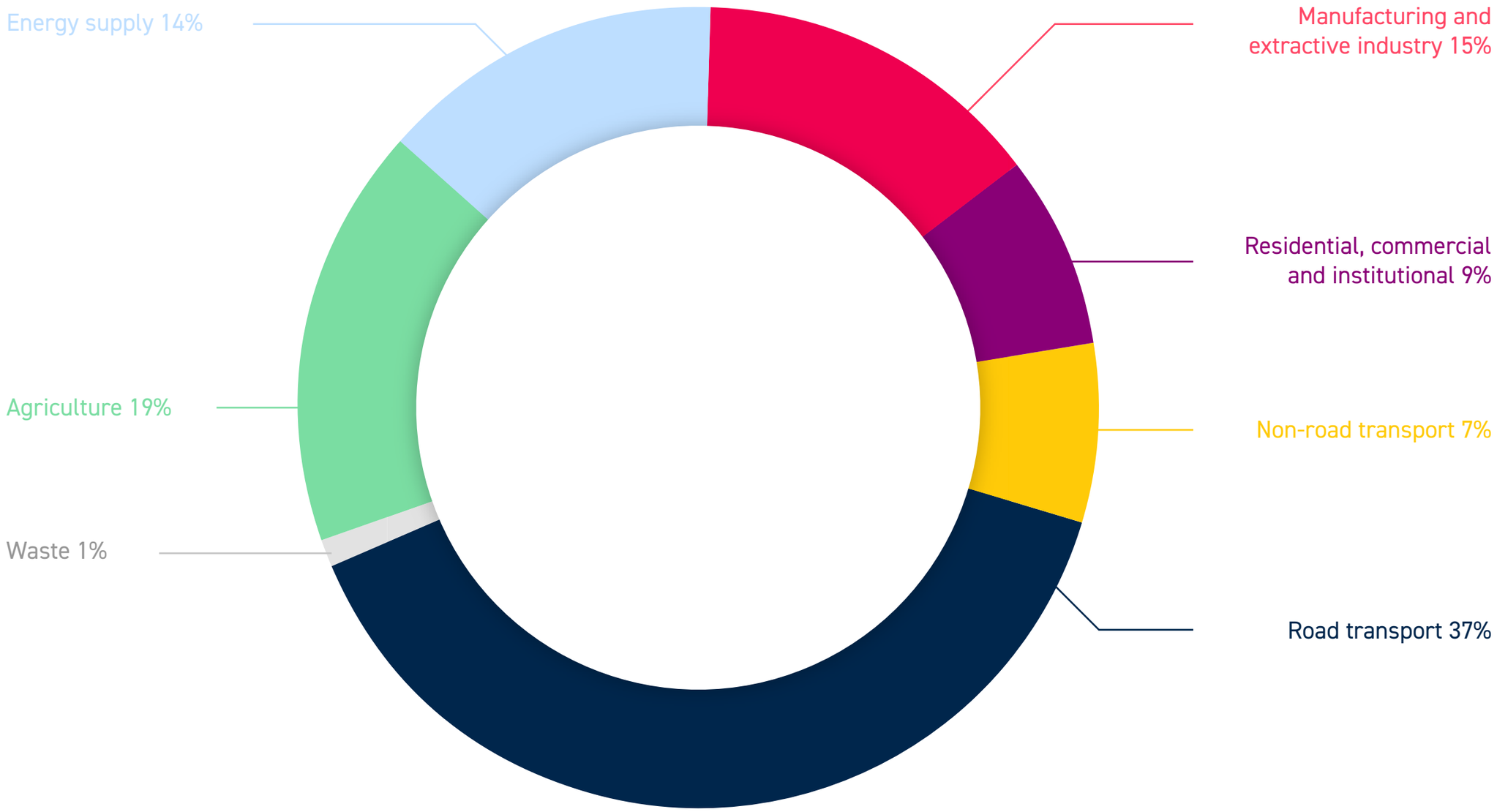


All regions but Southeast Asia are forecasted to see a decrease in CO_2 emissions by 2050. The drop is especially notable in the EU-27 and North America, where CO_2 emissions are estimated to decreased by 53% and 51% compared to 2021.

FIG.47

NO_x CONTRIBUTION TO EU-27 EMISSIONS FROM MAIN SOURCE SECTORS IN 2020

Source: European Environmental Agency

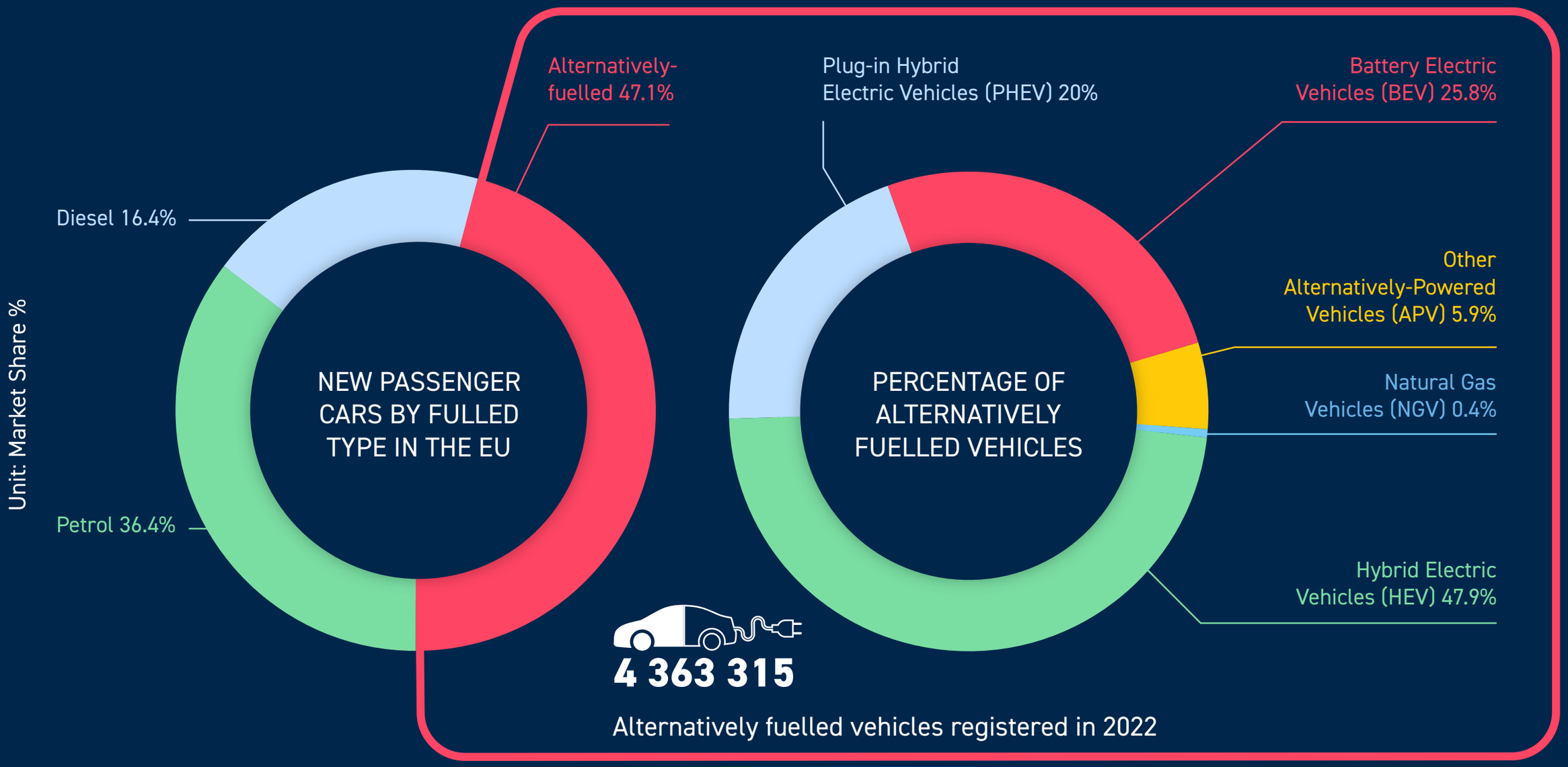


NO_x are main contributors to the air quality problems found in several urban areas in the EU. The road transport sector is the most significant contributor, being responsible for 37% of the total of NO_x emissions emitted in 2020 in the EU - came down from 39% in 2019. Between 2015 and 2020, the agricultural sector's NO_x emissions increased from 5% to 19%. In the opposite direction, the residential, commercial and institutional sector shrunk their NO_x emissions from 14% to 9%. Moreover, since 2005 to 2020, overall NO_x emissions have decreased 48%.

Retail & Marketing Infrastructure

FIG.48 **ALTERNATIVELY FUELLED VEHICLES ACCOUNTED** FOR 47.1% OF TOTAL PASSENGER CAR REGISTRATIONS IN 2022

Source: European Automobile Manufacturers' Association



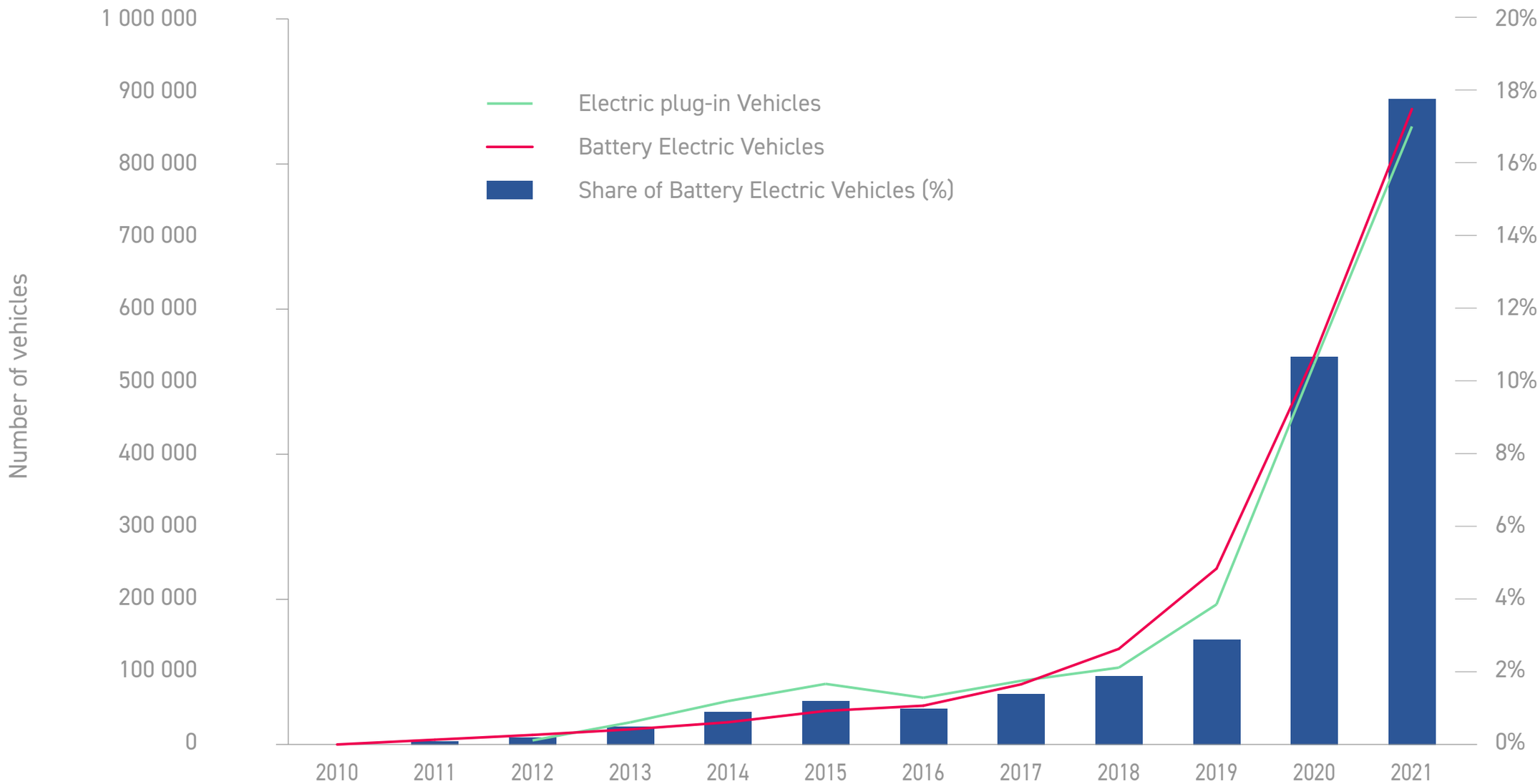
2022 was a strong year for alternatively fuelled vehicles but conventional fuel types still dominated EU car sales in terms of market share (52.8%) in 2022. Alternatively fuelled vehicles accounted for 47.1% of the total passenger car sales across the EU, a significant increase from 2019 to 2022 (11% to 47.1%, respectively). Stimulus packages introduced by governments to boost demand, following the unprecedented impact of Covid-19 on car sales, sought to stimulate alternatively-powered vehicles in particular, further driving demand for low and zero-emission cars.

Note: Please note that due to rounding, figures may not add up exactly to 100%.

FIG.**49**

ALTERNATIVE VEHICLES AS A PROPORTION OF THE TOTAL PASSENGER CARS REGISTRATIONS IN THE EU-27

Source: European Environment Agency



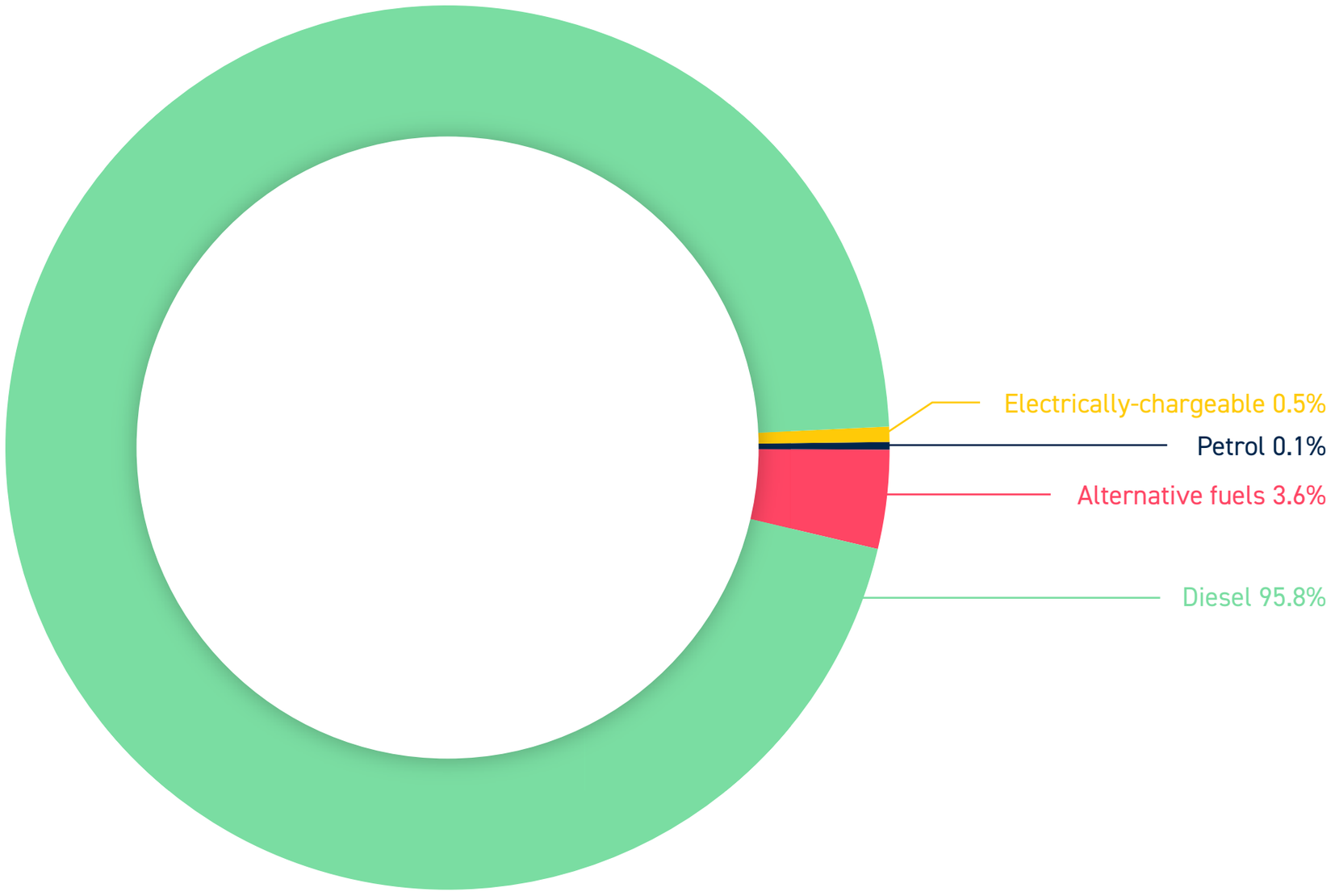
2021 saw a significant increase in the uptake of electric cars — battery electric vehicles (BEVs) and plug-in hybrid electric vehicles (PHEVs) — in the EU-27. The share of electric cars grew from 10.7% in 2020 to 17.8% in 2021. That's an increase of 17.7% since 2011.

Note: The chart reports the number of electric vehicles (battery electric vehicles - BEV and plug-in hybrid electric vehicles - PHEV) newly registered in EU27_2021.

- 'Share of electric vehicles' refers to electric vehicle registrations (BEV and PHEV) as a percentage of the new cars' registration.
- Non-plug-in hybrid electric vehicles, which are exclusively fuelled by conventional fuels, are not included in the data shown.

FIG.50 **NEW TRUCKS IN THE EU** BY FUEL TYPE IN 2021

Source: European Automobile Manufacturers' Association

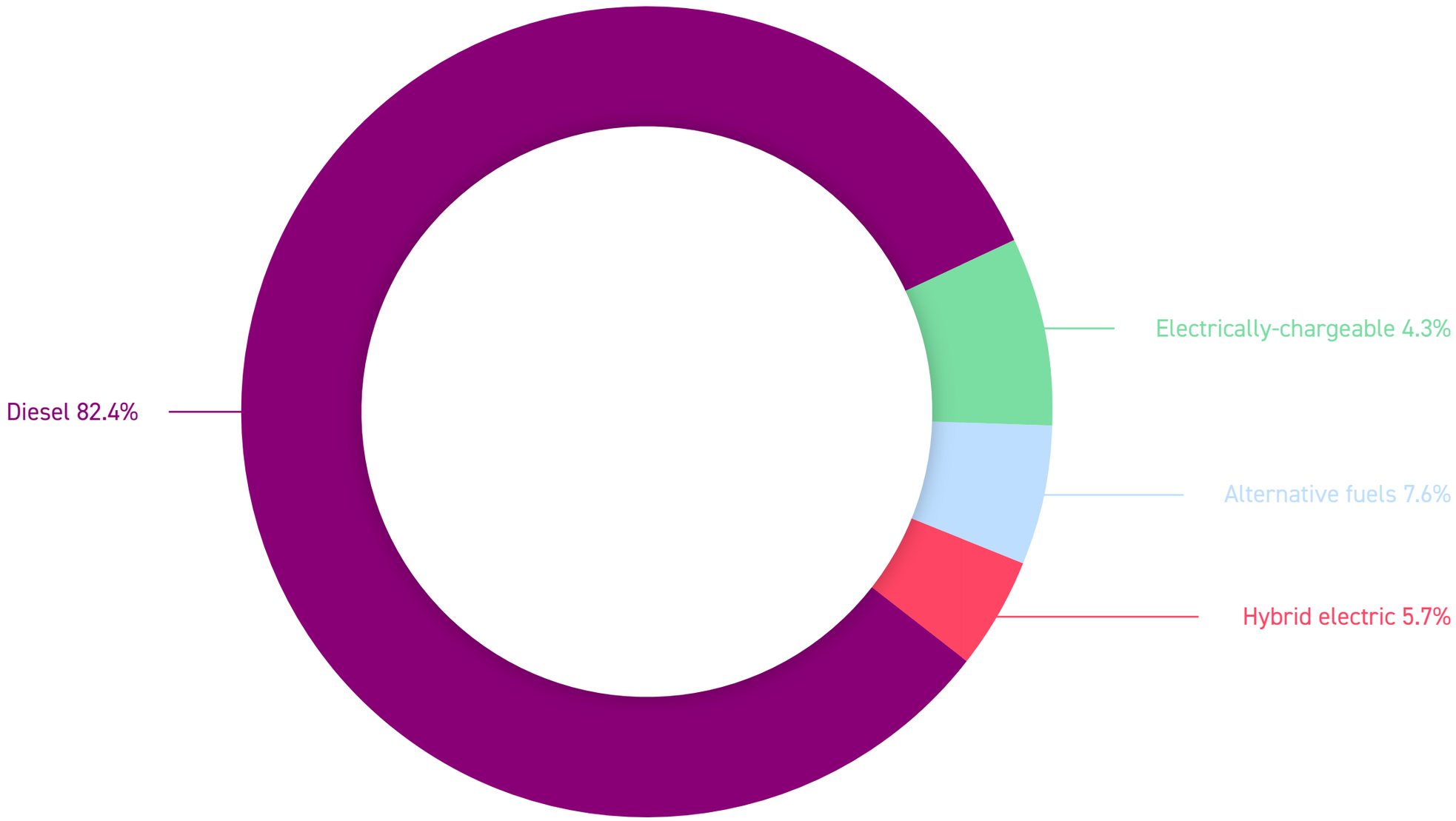


In 2021, the use of low-carbon technologies in trucks remains minor with 95.8% of all newly-registered trucks in the European Union running on diesel, 3.6% fuelled by alternative fuels, while only 0.5% of trucks sold are electrically-chargeable vehicles.

Note: Please note that due to rounding, figures may not add up exactly to 100%

FIG.51 **NEW BUSES IN THE EU** BY FUEL TYPE IN 2021

Source: European Automobile Manufacturers' Association

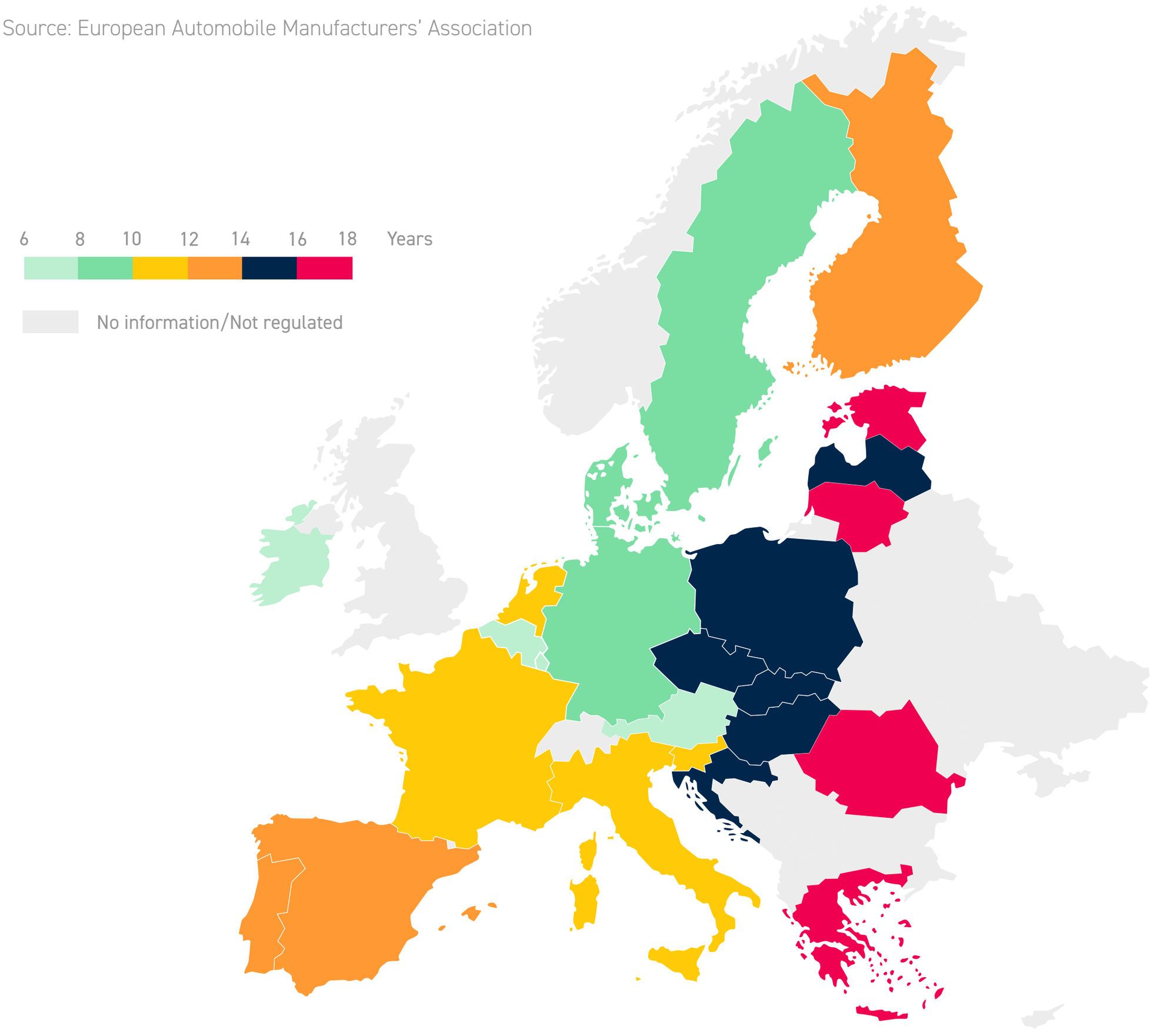


In 2021, 4.3% of new buses were electrically-chargeable vehicles, 5.7% are hybrid electric, 7.6% ran on alternative fuels, while diesel still fuelled 82.4% of all buses sold in the European Union. The proportion of alternatively-powered new buses decreased from 26.8% in 2020 to 17.6% in 2021.

Note: Please note that due to rounding, figures may not add up exactly to 100%.

FIG.52 AVERAGE AGE OF **THE EUROPEAN VEHICLE FLEET**

Source: European Automobile Manufacturers' Association

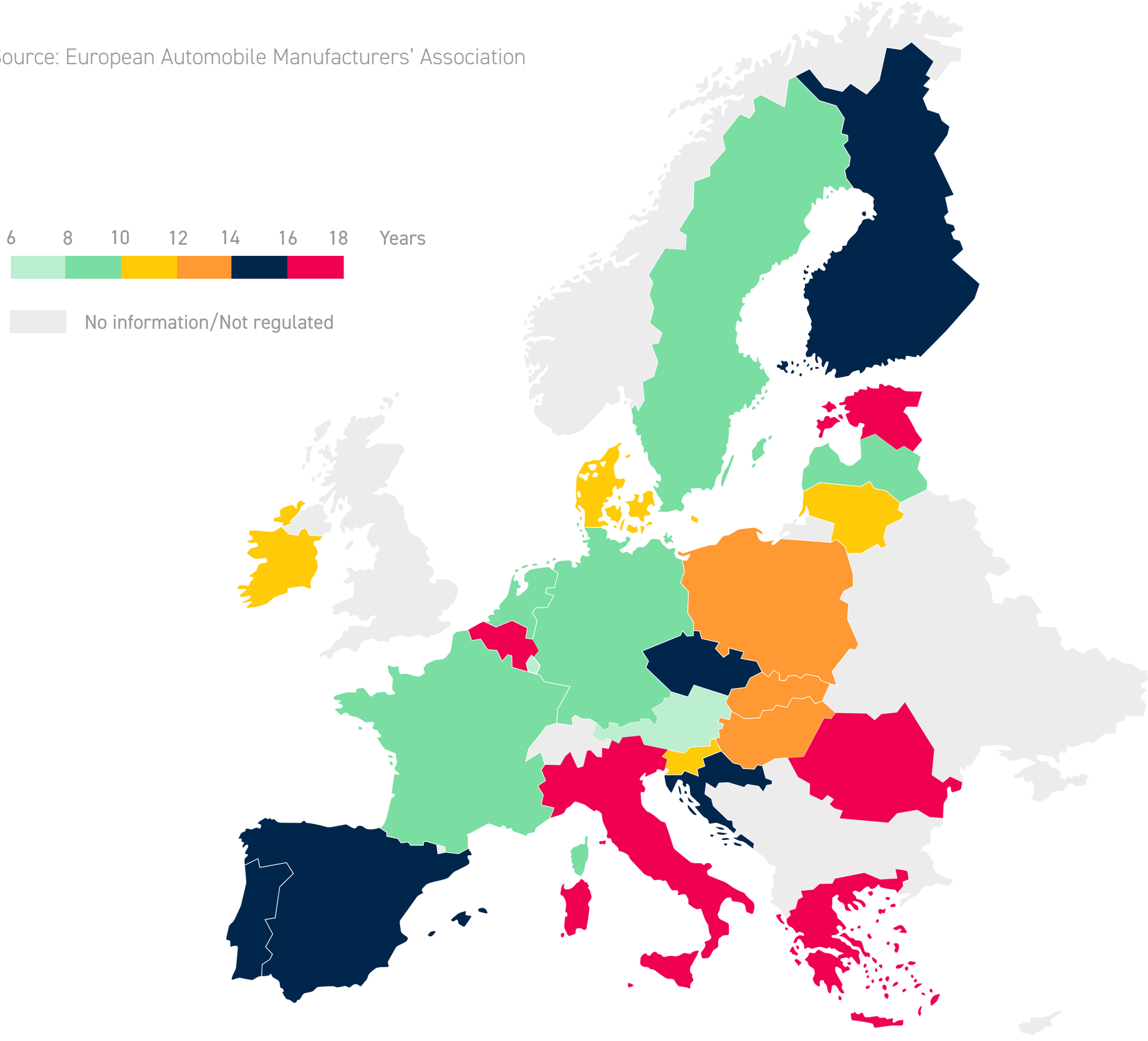


The age of the vehicle fleet can differ greatly across European countries with an average age of 6.7 years for Luxemburg and 17 years for Lithuania. In Eastern and Southern Europe, where citizens cannot necessarilty afford to buy new vehicles and depend on the second-hand car market, passenger cars will stay on the road longer and will need solutions for decarbonisation.

FIG.**53**

AVERAGE AGE OF THE EUROPEAN VEHICLE FLEET
FOR MEDIUM AND HEAVY DUTY COMMERCIAL

Source: European Automobile Manufacturers' Association

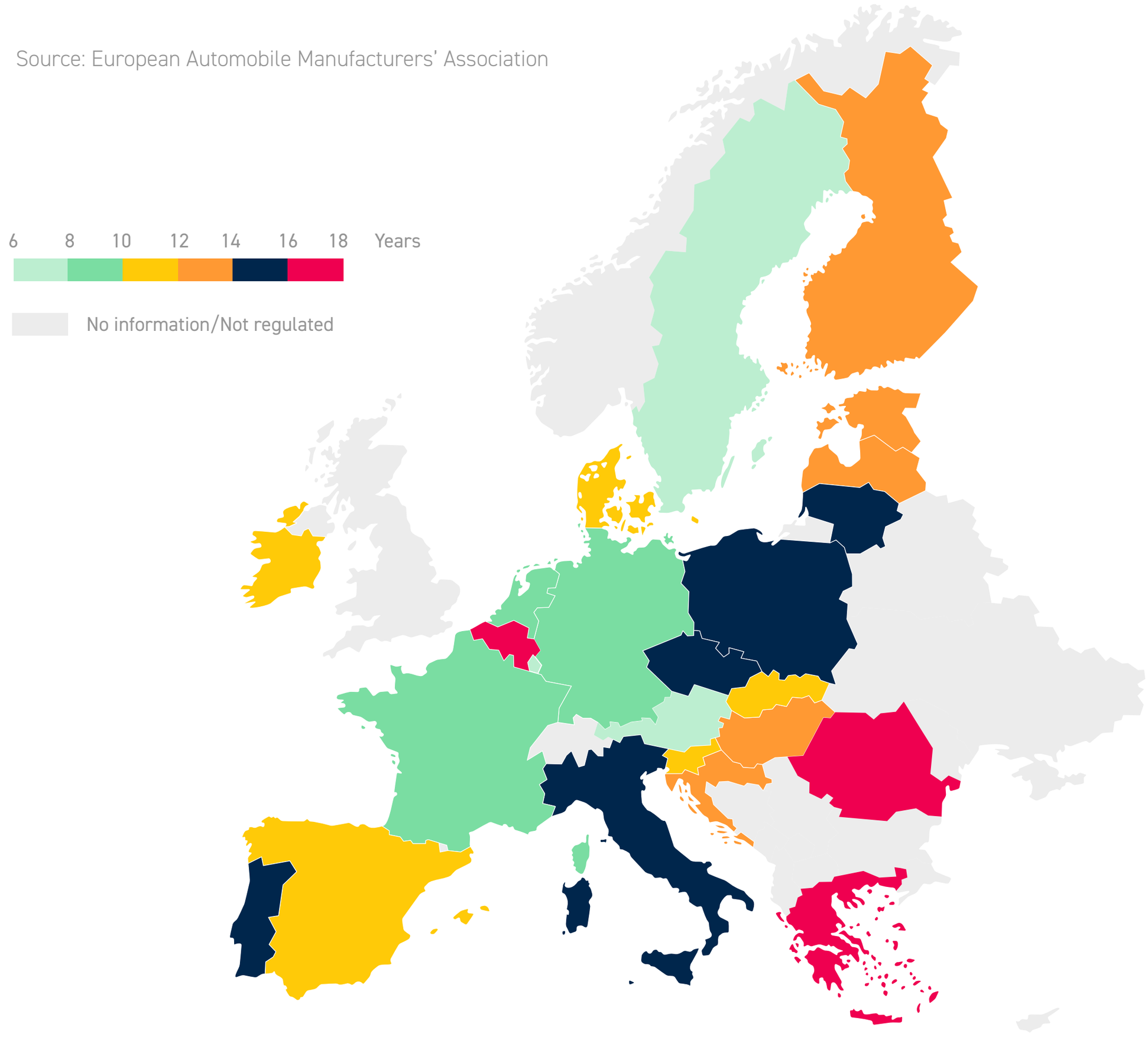


Trucks are on average 13.9 years old in the European Union. With an average age of 21.4 years, Greece has the oldest truck fleet, while the newest ones can be found in Luxembourg (6.7 years) and Austria (7 years). In Eastern and Southern Europe, where companies cannot necessarily afford to buy new vehicles and depend on the second-hand car market, trucks will stay on the road longer and will need solutions for decarbonisation.

FIG.**54**

AVERAGE AGE OF THE EUROPEAN VEHICLE FLEET FOR BUSES

Source: European Automobile Manufacturers' Association



Buses on EU roads are on average 12.8 years old. Aged more than 19 years, Greek buses are the oldest in the region. Only six countries in the European Union have a bus fleet that is less than 10 years old. In Eastern and Southern Europe, where companies and cities cannot necessarily afford to buy new vehicles, buses will stay on the road longer and will need solutions for decarbonisation.

FIG.55 SERVICE STATIONS IN EUROPE IN 2022

Source: National Fuel Industry Associations

COUNTRIES	Number of service stations
AUSTRIA	2 759
BELGIUM	3 119
BULGARIA	3 531***
CROATIA	N/A
CYPRUS	320***
CZECHIA	2 847
DENMARK	2 066
ESTONIA	515
FINLAND	1 869**
FRANCE	11 040
GERMANY	14 452
GREECE	5 889
HUNGARY	2 012
IRELAND	1 892
ITALY	21 700
LATVIA	600
LITHUANIA	765
LUXEMBOURG	238
MALTA	69*
NETHERLANDS	4 135
POLAND	7 898
PORTUGAL	3 216
ROMANIA	2 292***
SLOVAKIA	970
SLOVENIA	553*
SPAIN	12 084
SWEDEN	2 700
TOTAL EU-27 = 109 531	
UNITED KINDGOM	8 365
NORWAY	1 838***
SWITZERLAND	3 314
TURKEY	12 671
UK + NO + CH + TR	**26 188**
TOTAL = 135 719	

There were over 135 000 petrol stations in the EU, Norway, United Kingdom, Switzerland and Turkey operating in 2022.

* Numbers for 2019

** Numbers for 2020

*** Numbers for 2021

ABOUT
FUELSEUROPE

FuelsEurope is a division of the European Fuel Manufacturers, an AISBL operating in Belgium. This Association, whose members are all 39 companies that operate refineries in the European Economic Area in 2023, is comprised of FuelsEurope and Concawe divisions, each having separate and distinct roles and expertise but administratively consolidated for efficiency and cost effectiveness.

FuelsEurope represents the EU fuels & industrial value chains products manufacturing industry in the policy debate with EU Institutions and other stakeholders, providing an expert opinion on the production process, distribution and use of our industry's products, in order to contribute to a regulatory framework that:

- **Promotes EU excellence** in technologies contributing to the energy transition towards society's climate goal;

- **Boosts sustainable development** through supporting a competitive EU industry;

- **Establishes effective, technically feasible and sustainable requirements** to protect human health and the environment.

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