FuelsEurope

REFINING PRODUCTS FOR OUR EVERYDAY LIFE

STATISTICAL REPORT

2021

Editor: John Cooper

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STATISTICAL REPORT 2021

Foreword

High quality, verified and reliable facts and figures are essential to support economic and political analysis. For this purpose, FuelsEurope Statistical Report 2021 aims at providing a comprehensive set of statistics about the refining industry that can be used by all stakeholders.

This 2021 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 2 or 4 years.

This includes 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 refining industry.

In this year edition, we kept the section dedicated to the COVID-19 pandemic as it is still having an impact on the EU refining industry.

- **Prices & Margins**
- **Oil & Energy**
- **Refined Products**
- **Refining**
- **Emissions**
- **Retail & Marketing Infrastructures**
- **COVID-19's Impact**

John Cooper
Director General

FuelsEurope

REFINING PRODUCTS FOR OUR EVERYDAY LIFE

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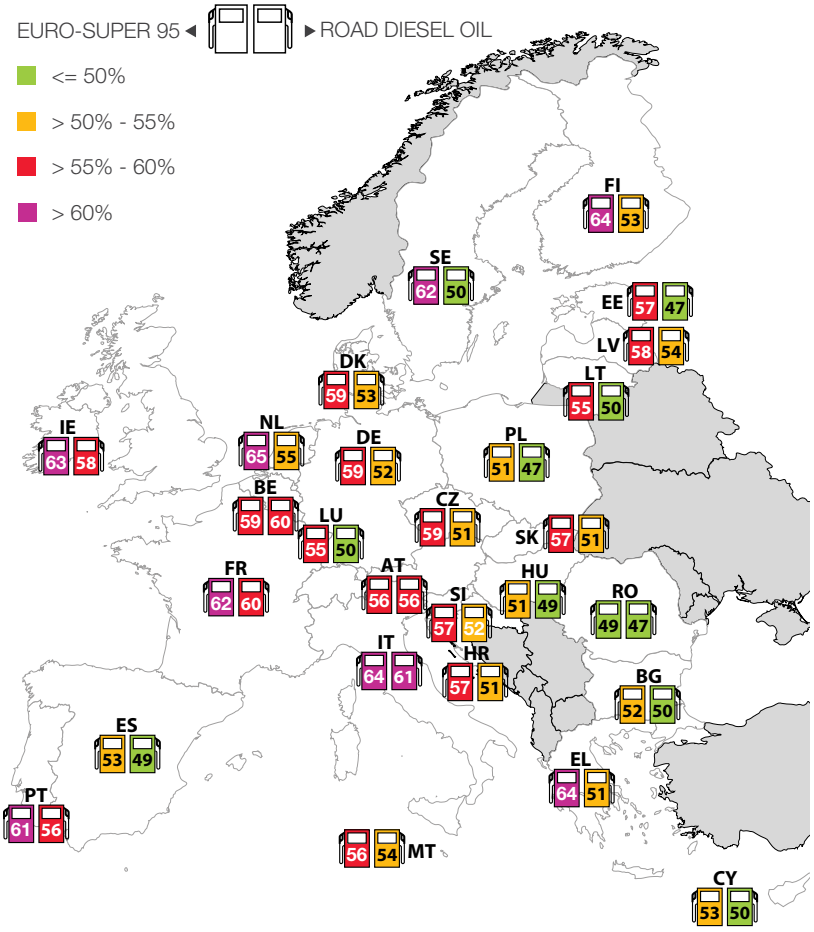
Prices & Margins

FIG.1 TOTAL TAXATION SHARE IN THE END CONSUMER PRICE

Source: European Commission

EURO-SUPER 95

COUNTRY	%
Netherlands	65
Finland	64
Greece	64
Italy	64
Ireland	63
France	62
Sweden	62
Portugal	61
Belgium	59
Czechia	59
Denmark	59
Germany	59
Latvia	58
Austria	57
Croatia	57
Estonia	57
Slovakia	57
Malta	56
Slovenia	56
Lithuania	55
Luxembourg	55
Cyprus	53
Spain	53
Bulgaria	52
Hungary	51
Poland	51
Romania	49



ROAD DIESEL OIL

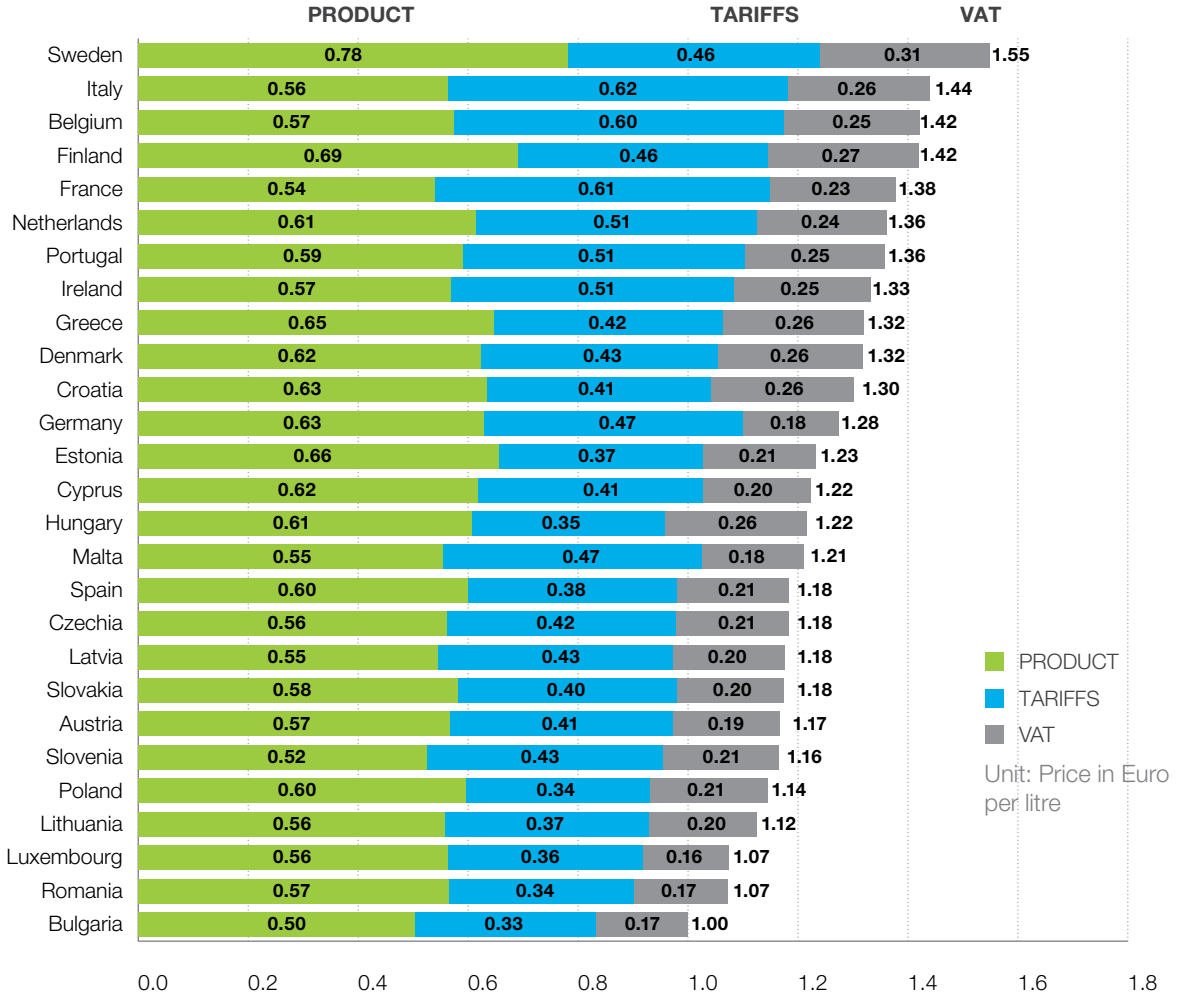
COUNTRY	%
Italy	61
Belgium	60
France	60
Ireland	58
Portugal	56
Slovenia	56
Netherlands	55
Latvia	54
Malta	54
Denmark	53
Finland	53
Austria	52
Germany	52
Croatia	51
Czechia	51
Greece	51
Slovakia	51
Bulgaria	50
Cyprus	50
Lithuania	50
Luxembourg	50
Sweden	50
Hungary	49
Spain	49
Estonia	47
Poland	47
Romania	47

The price at the pump is driven to a large degree by tariffs and taxes. On average, over half the cost of fuel at the pump represents taxes. The taxes on gasoline are generally higher than for diesel. This differential tax treatment has driven the demand shift over the past 20 years. Since the dieselgate and a progressive alignment of taxes on gasoline and diesel in a number of member states, this shift in demand has progressively ceased. Road fuel taxes contribute substantially to Member States' revenues.

Reference date: 22 March 2021

FIG.2 BREAKDOWN OF AUTOMOTIVE DIESEL PRICES ACROSS EU-27 (MARCH 2021)

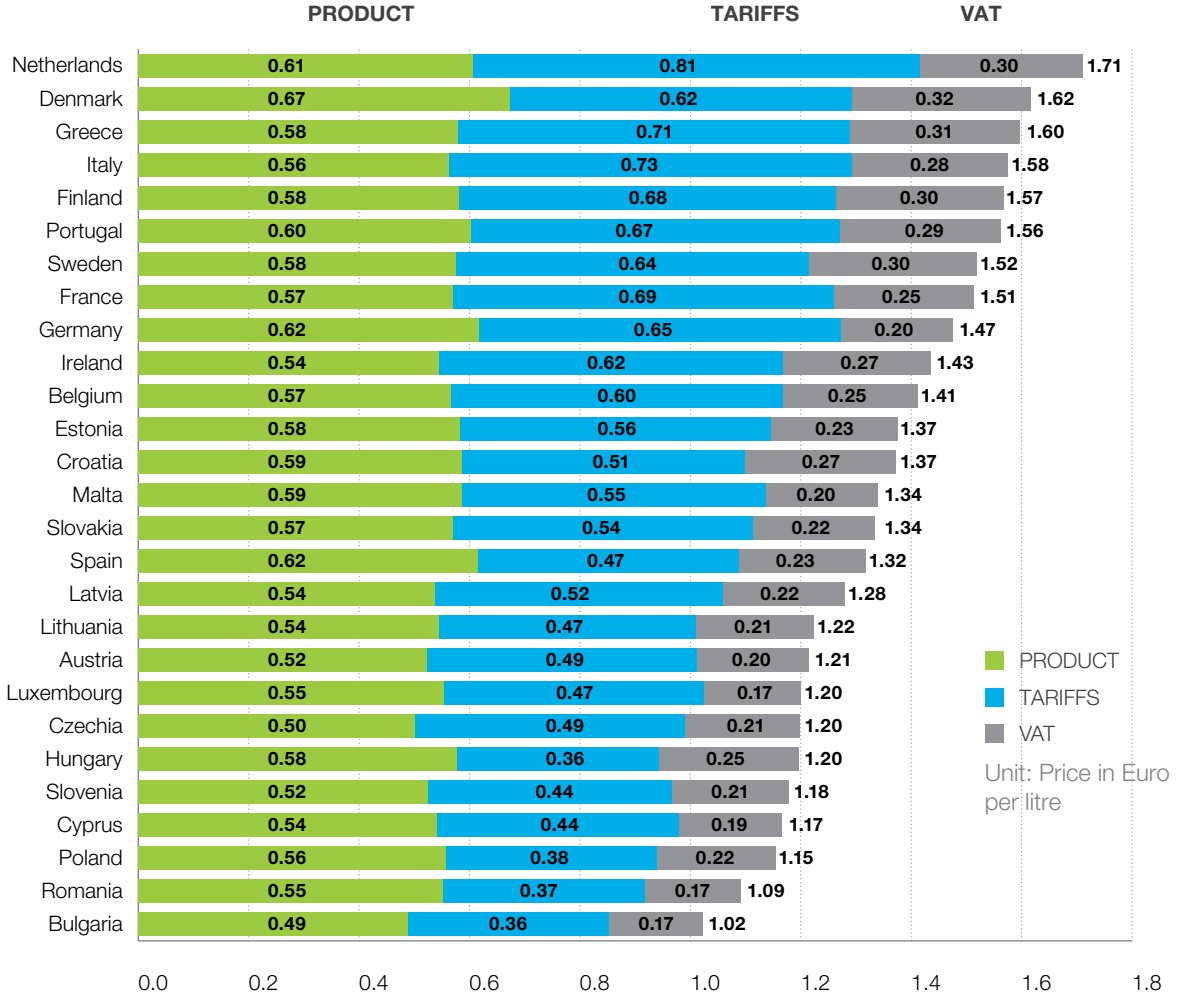
Source: Oil Bulletin, European Commission



Whereas this is progressively evolving towards equal taxation rates, gasoline prices were generally higher than diesel prices in most member states due to a higher tax element. Only a fraction of the price paid at the pump contributes to the refiner's income, the remainder represents taxes, the biggest share, the purchase of the crude and the distribution and marketing costs.

FIG.3 BREAKDOWN OF AUTOMOTIVE GASOLINE PRICES ACROSS EU-27 (MARCH 2021)

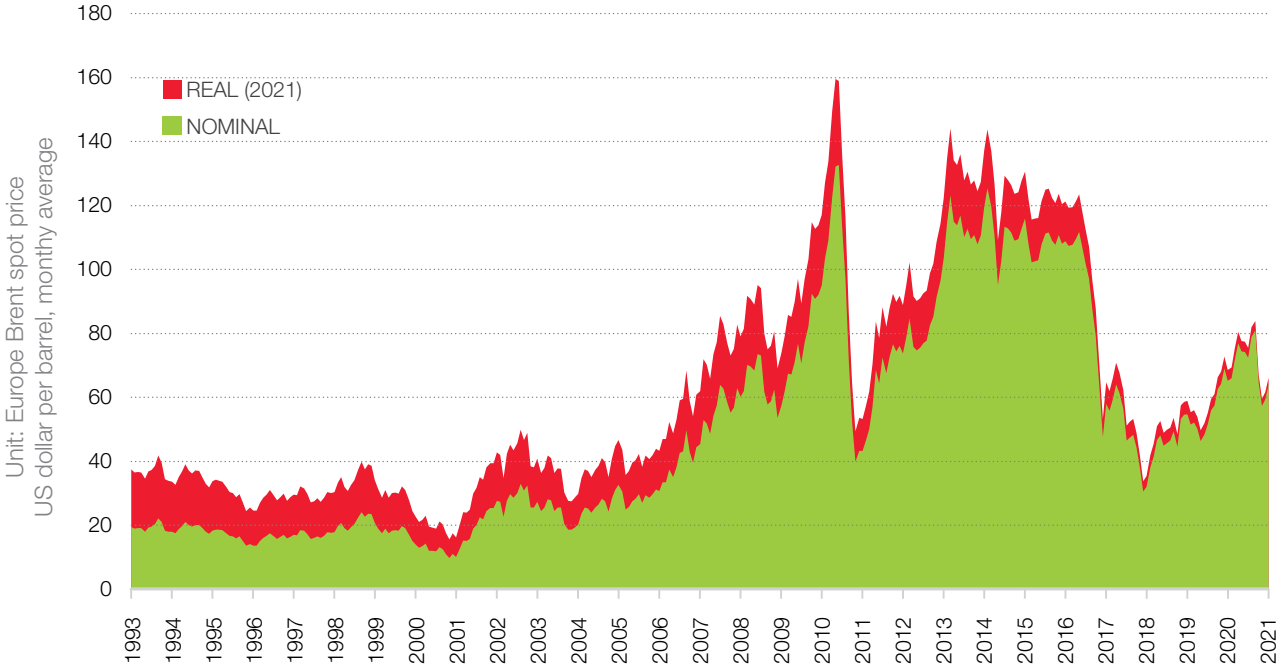
Source: Oil Bulletin, European Commission



Whereas this is progressively evolving towards equal taxation rates, gasoline prices were generally higher than diesel prices in most member states due to a higher tax element. Only a fraction of the price paid at the pump contributes to the refiner's income, the remainder going to Member States and the purchasing of the crude oil.

FIG.4 CRUDE OIL PRICE EVOLUTION

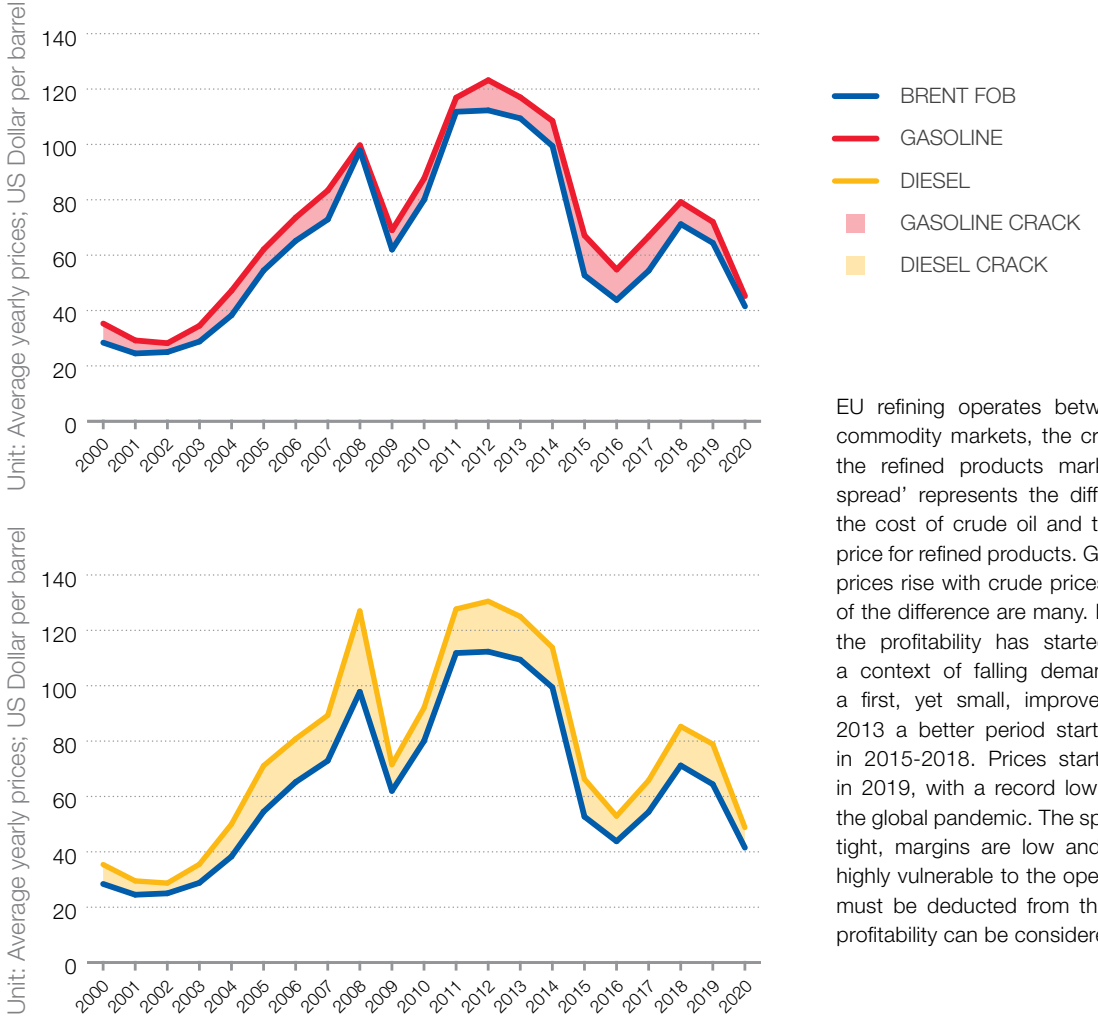
Source: Energy Information Administration and Federal Reserve Economic Data



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. After a decade of relatively low prices, oil started rising leading to peaks just before the financial crisis in 2008. Amid the coronavirus crisis and a price war led by Riyadh and Moscow, demand in April 2020 reached down to a level last seen in 1995. By the end of 2020, crude oil price went above $50/bbl for the first time since early March.

FIG.5 REFINERS OPERATE BETWEEN TWO GLOBAL COMMODITY MARKETS: CRUDE MARKET AND REFINED PRODUCTS MARKET

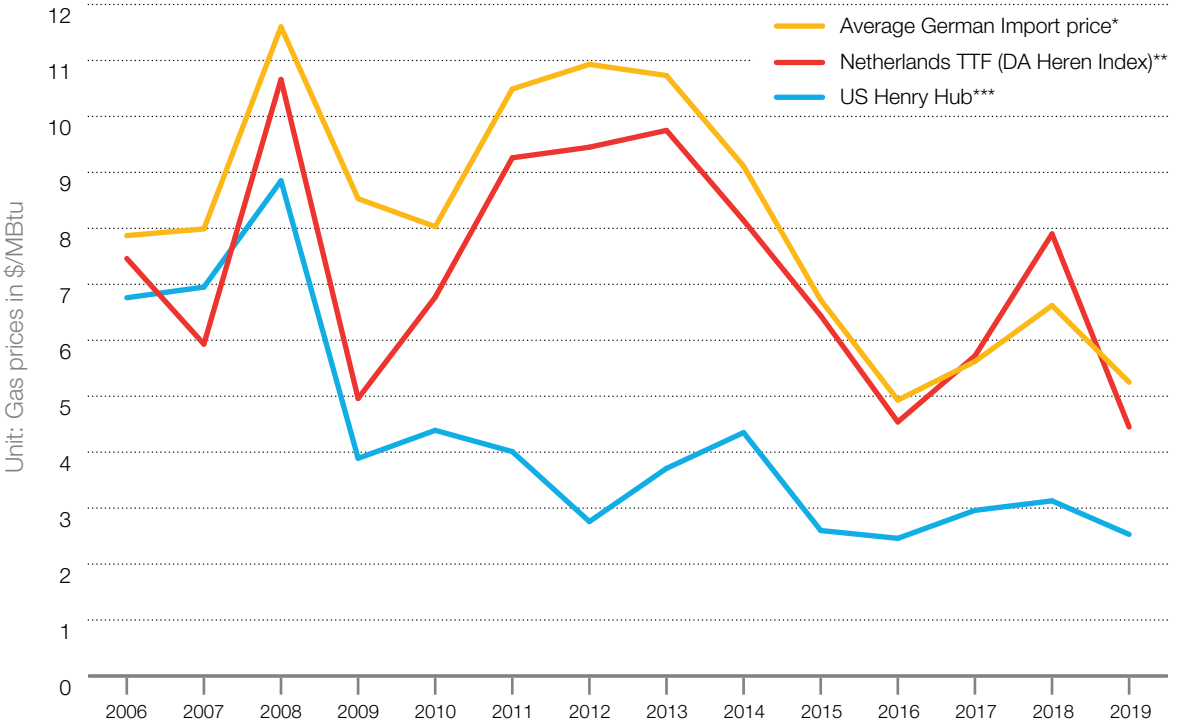
Source: Wood Mackenzie and Argus Media



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. Prices 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.6 EVOLUTION OF GAS PRICES

Source: BP Statistical Review of World Energy 2020

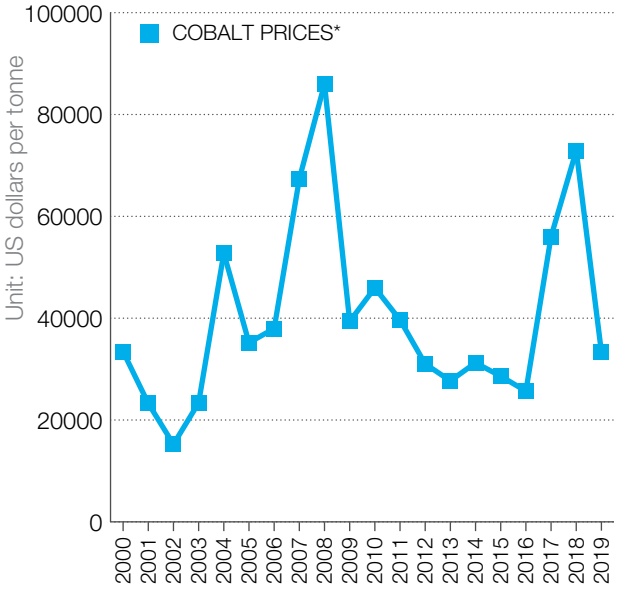


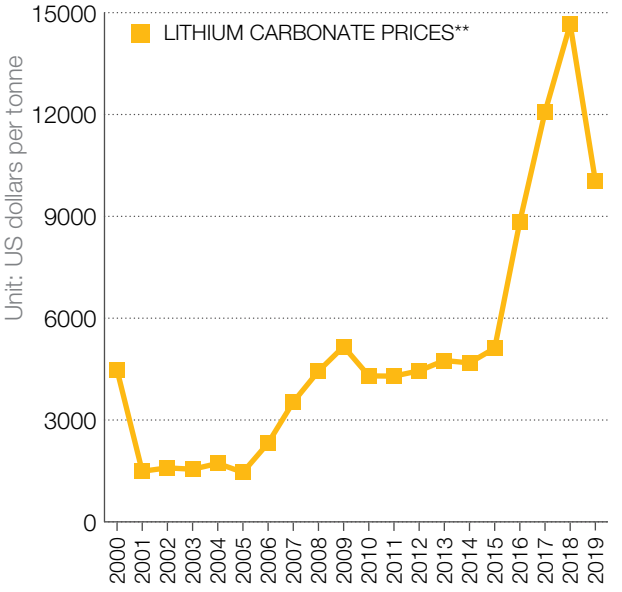
Since 2009, the US industry gained a significant competitive advantage over the EU industry as a result of the shale oil revolution.

Source: *1986 -1990 German Federal Statistical Office, 1991-2020 German Federal Office of Economics and Export Control (BAFA)
**ICIS Heren Energy Ltd.
***Energy Intelligence Group, Natural Gas Week.

FIG.7 COBALT AND LITHIUM CARBONATE PRICES

Source: BP Statistical Review of World Energy 2020





After steep rises in prices for cobalt and lithium in 2017 and 2018, prices fell back sharply in 2019. Cobalt prices declined by over 50% while lithium carbonate prices slipped 31%. Production responded quickly to the drop in prices, with cobalt production down 21.2%, largely due to a decline in the Democratic Republic of Congo. Lithium production fell 19.2%, driven mainly by lower Australian output.

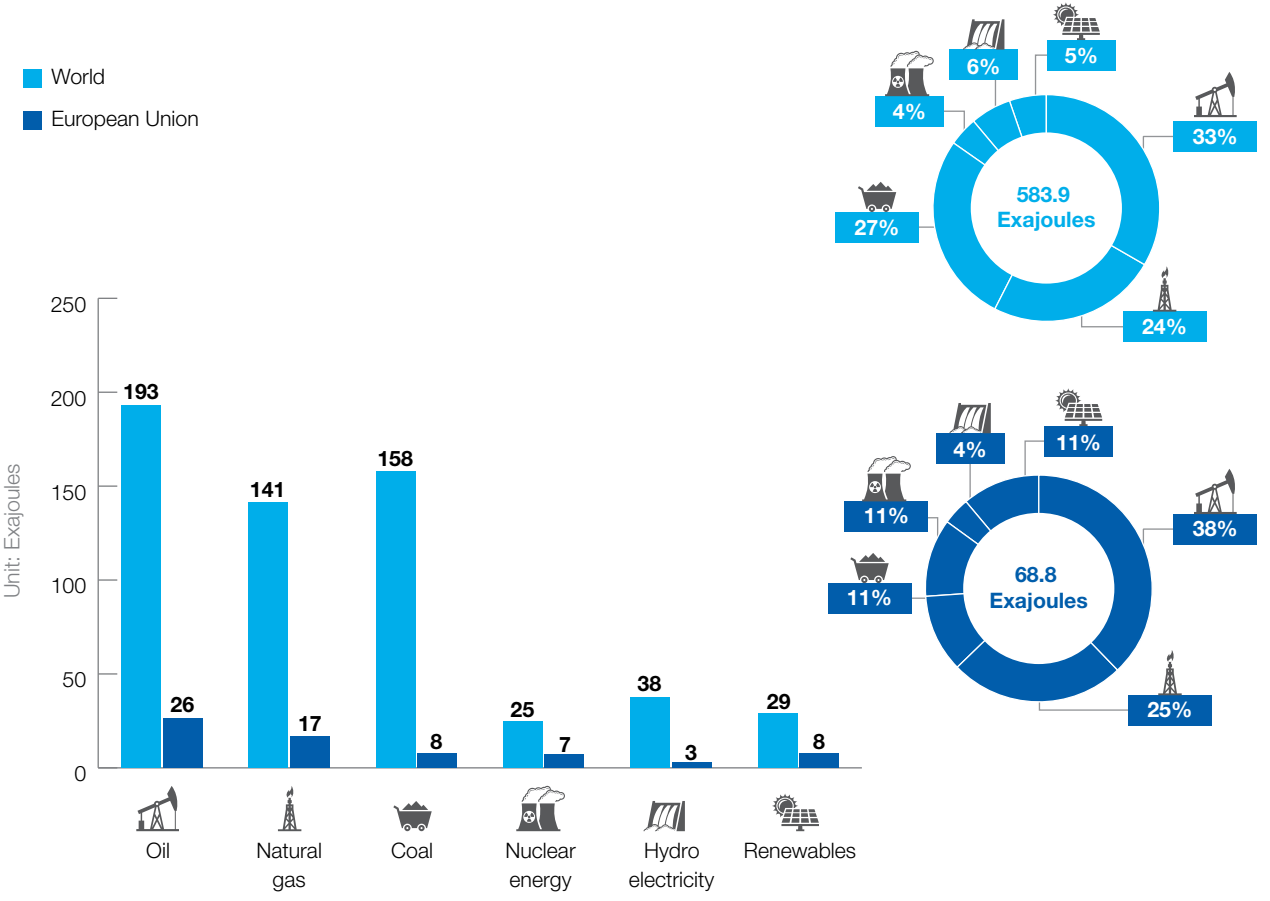
***Note:** 2000-2012 spot grade for cathodes, source US Geological Survey. 2013-2018 min purity 99.8%, source London Metal Exchange.

****Note:** 2000-2008 unit value, data series 140, source US Geological Survey. 2009-2018 FOB South America, source Benchmark Mineral Intelligence.

OIL & ENERGY

FIG.8 WORLDWIDE ENERGY CONSUMPTION BY FUEL TYPE IN 2019

Source: BP Statistical Review of World Energy 2020

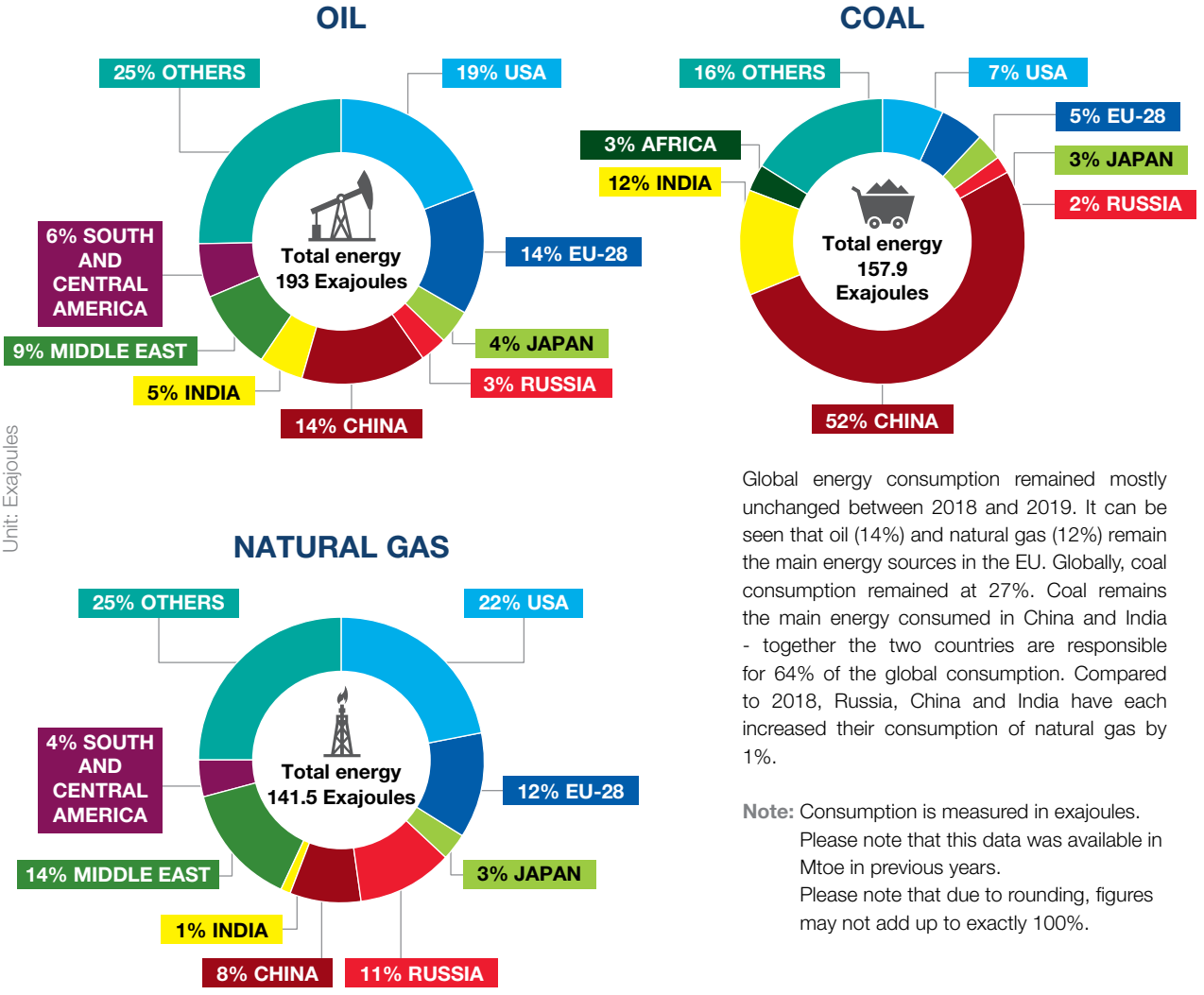


Oil remains the world's dominant fuel, making up just over a third of all energy consumed. Compared to 2018, oil and coal's market share decreased by roughly 1% whilst natural gas and hydroelectricity gained 1%. In addition, renewables increased their share by 2% globally, now accounting for 5% of the world's energy consumption.

Note: Please note that due to rounding, figures may not add up exactly to 100%
Exajoules - Please note that this data was available in Mtoe in previous years.

FIG.9 WORLDWIDE ENERGY CONSUMPTION BY REGION IN 2019

Source: BP Statistical Review of World Energy 2020

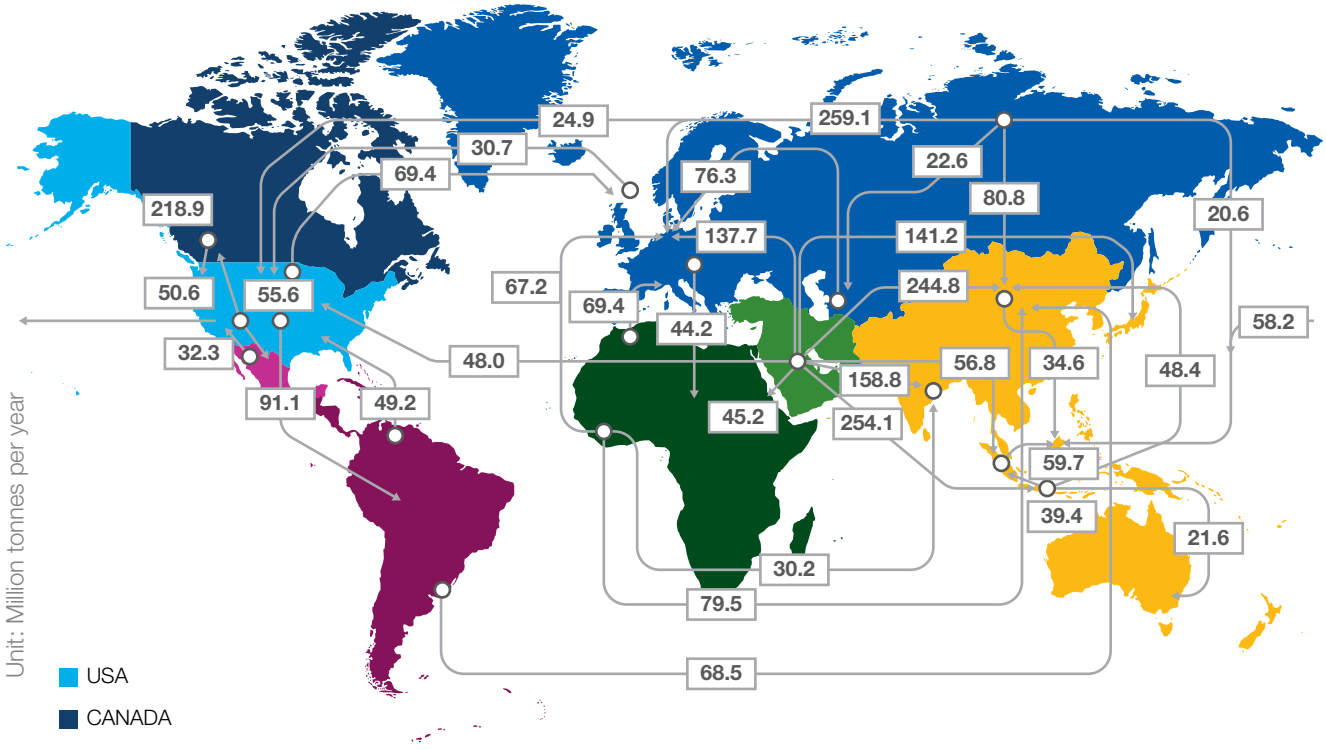


Global energy consumption remained mostly unchanged between 2018 and 2019. It can be seen that oil (14%) and natural gas (12%) remain the main energy sources in the EU. Globally, coal consumption remained at 27%. Coal remains the main energy consumed in China and India - together the two countries are responsible for 64% of the global consumption. Compared to 2018, Russia, China and India have each increased their consumption of natural gas by 1%.

Note: Consumption is measured in exajoules.
Please note that this data was available in Mtoe in previous years.
Please note that due to rounding, figures may not add up to exactly 100%.

FIG.10 WORLDWIDE CRUDE OIL MOVEMENT IN 2019

Source: BP Statistical Review of World Energy 2020

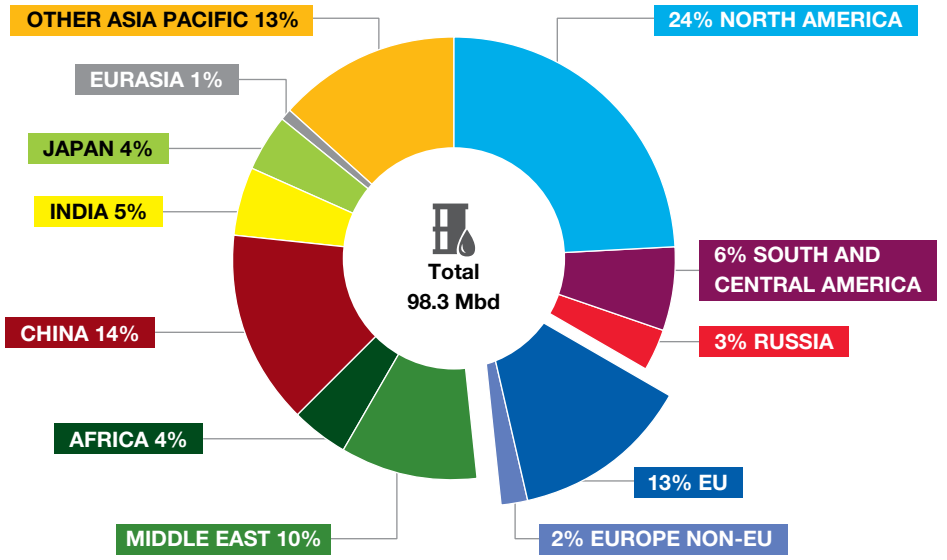


Crude oil is an internationally traded commodity with trade flows taking place all over the world.

There are two open and transparent markets - crude oil and refined products - within which the European refining industry operates.

FIG.11 WORLDWIDE REFINED PRODUCT DEMAND* AVERAGED 98.3 MILLION BARRELS PER DAY IN 2019, WITH EU ACCOUNTING FOR 13%

Source: BP Statistical Review of World Energy 2020



Global demand for oil products decreased from 99.8 million barrels per day in 2018 to 98.3 in 2019. The EU's share remained at 13% compared to the previous year. North America accounts for 24% of the global demand, followed by China with 14% of the demand.

*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.12 EU-28 TOTAL OIL DEMAND AMOUNTED TO 566.9 MILLION TONNES IN 2020

Source: Wood Mackenzie

COUNTRY	Mt/y	COUNTRY	Mt/y
Austria	12.8	Italy	50.8
Belgium	29.3	Latvia	1.8
Bulgaria	3.9	Lithuania	2.8
Croatia	3.1	Luxembourg	2.9
Cyprus	2.3	Malta	2.6
Czechia	9.2	Netherlands	42.9
Denmark	6.6	Poland	30.8
Estonia	1.4	Portugal	10.1
Finland	8.4	Romania	8.9
France	71.0	Slovakia	4.0
Germany	106.4	Slovenia	2.3
Greece	12.8	Spain	52.3
Hungary	7.4	Sweden	14.4
Ireland	6.9	United Kingdom	58.8
EU TOTAL = 566.9			
Norway	7.6		
Switzerland	9.4		
Turkey	45.3		
TOTAL NO + CH + TR = 62.3			
TOTAL = 629.2			

EU NON EU

Unit: Million tonnes per year

EU-28 total oil demand amounted to 566.9 Mt in 2020 decreasing by 11.4% compared to 2019.

Oil demand dropped significantly due to the Covid-19 pandemic in all the EU Member States except in Sweden where the demand remained stable.

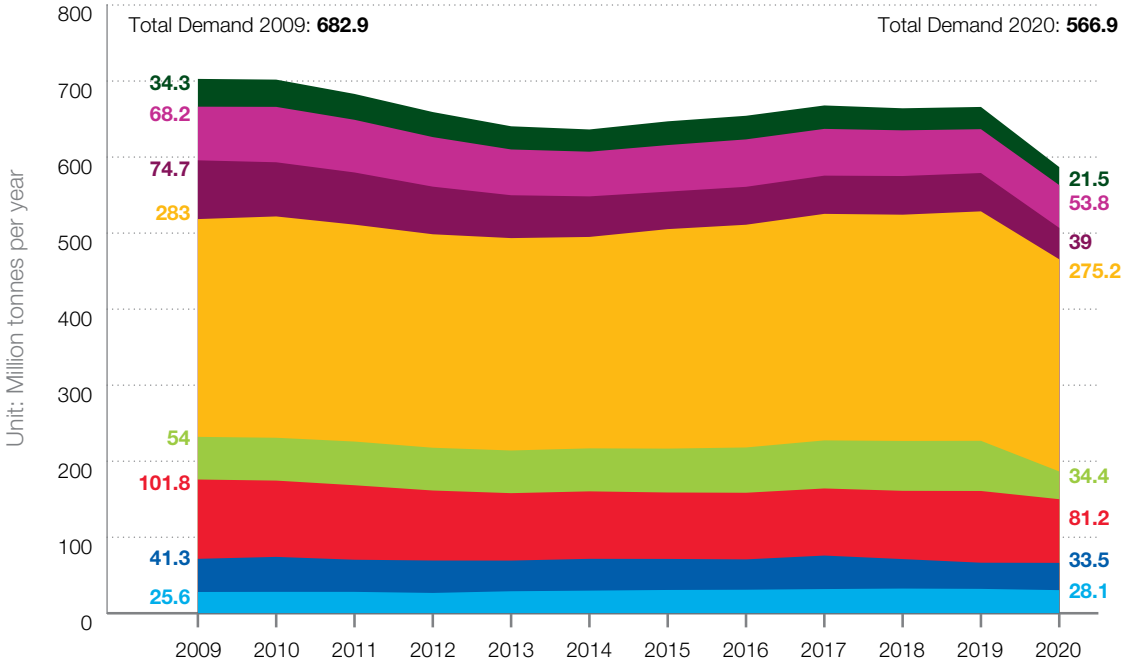
Among EU Member States that recorded the biggest fall in the oil demand were Spain (-20.1%), United Kingdom (-19.8%) and Finland (-16.9%).

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

REFINED PRODUCTS

FIG.13 HISTORICAL DEMAND FOR OIL PRODUCTS IN THE EU-28 IN 2020

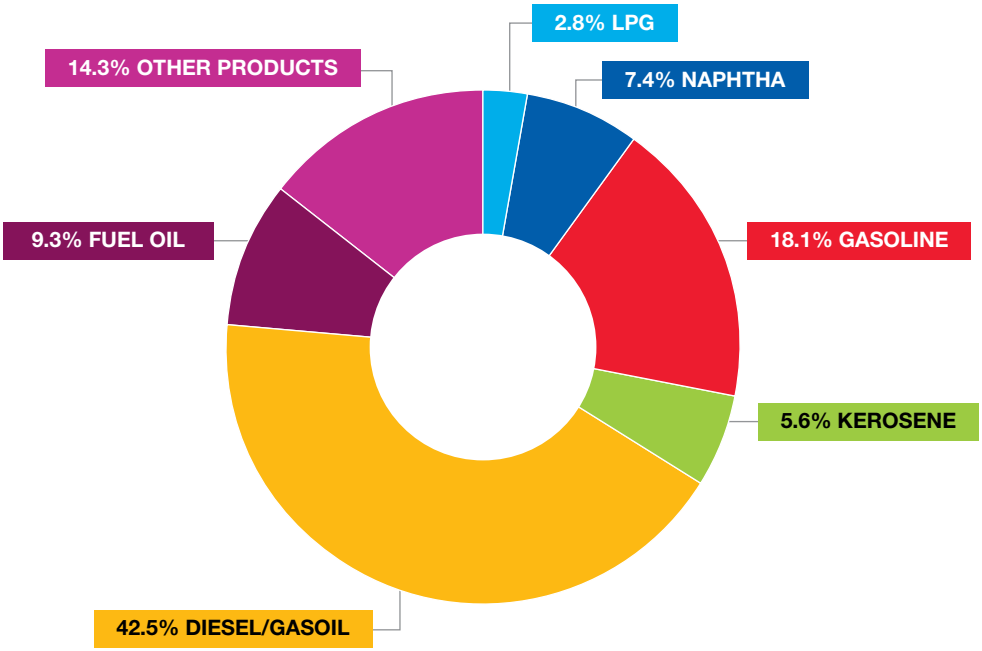
Source: Wood Mackenzie



From 2009 to 2014, a downward trend has been observed for oil products demand in the EU. This 10% decline over these 5 years was mainly due to the fall in fuel oil and gasoline demand. From 2015, a slight increase has been witnessed mainly due to the rise in demand of diesel/gasoil and kerosene products over the past years. In 2020, the total demand of oil products decreased by 12% compared with 2019 due to the Covid-19 pandemic.

FIG.14 **AVERAGE REFINERY OUTPUT BY PRODUCT TYPE** IN OECD EUROPE IN 2020

Source: International Energy Agency

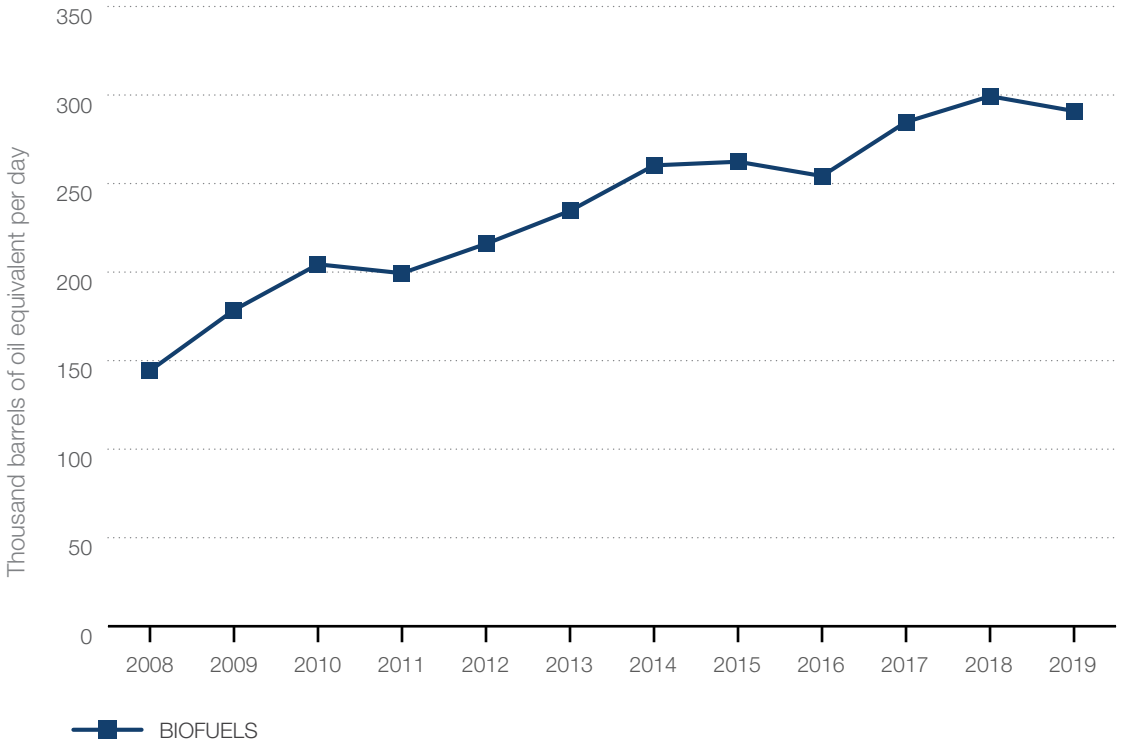


A wide range of products, from transportation and industrial fuels to chemical feedstock, are produced from crude oil. EU refineries also produce many specialty products, such as bitumen for road construction and roofing, lubricants for transport and industry, petroleum coke for the metal industry as 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.15 BIOFUELS PRODUCTION IN THE EU-28 IN 2019

Source: BP Statistical Review of World Energy 2020

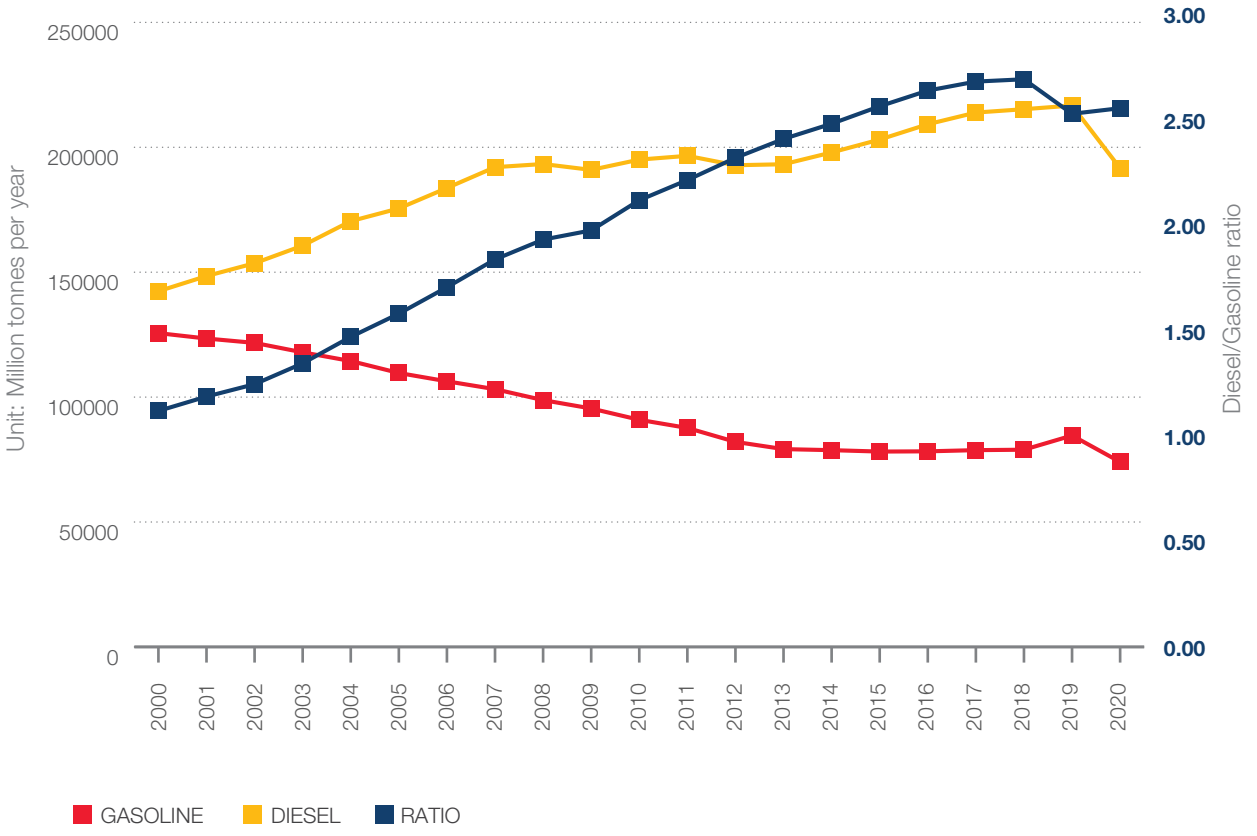


The overall production of biofuels in the EU has doubled since 2008; growing from 144 thousand barrels of oil equivalent per day to 290 in 2019.

Note: Includes biogasoline (such as ethanol) and biodiesel. Volumes have been adjusted for energy content.

FIG.16 ROAD FUEL DEMAND IN THE EU-28 IN 2020

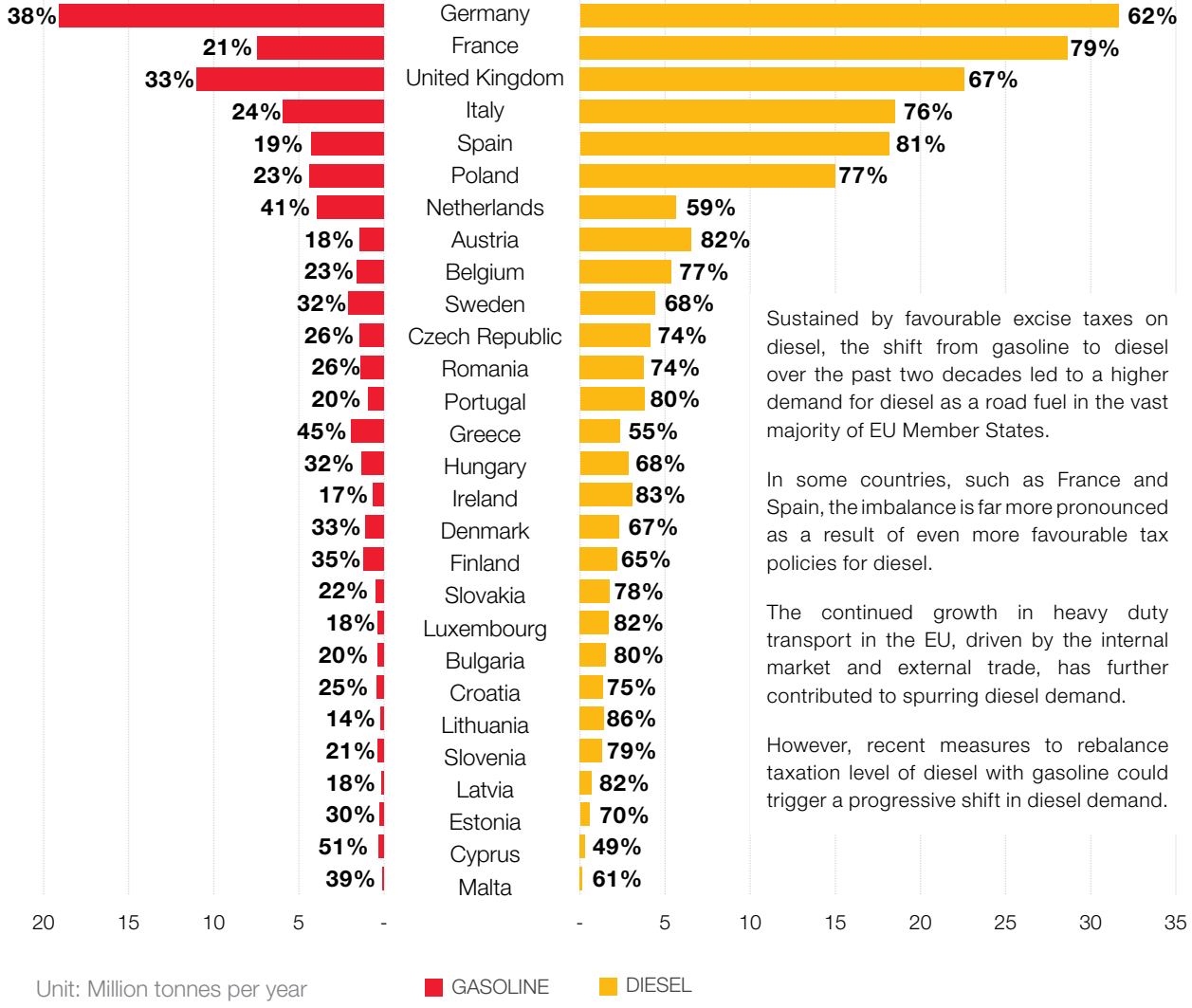
Source: Wood Mackenzie



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. However, since the diesel gate and the progressive alignment of gasoline and diesel taxes the trend is slowly reversing.

FIG.17 ROAD FUEL DEMAND IN THE EU BY COUNTRY IN 2020

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.

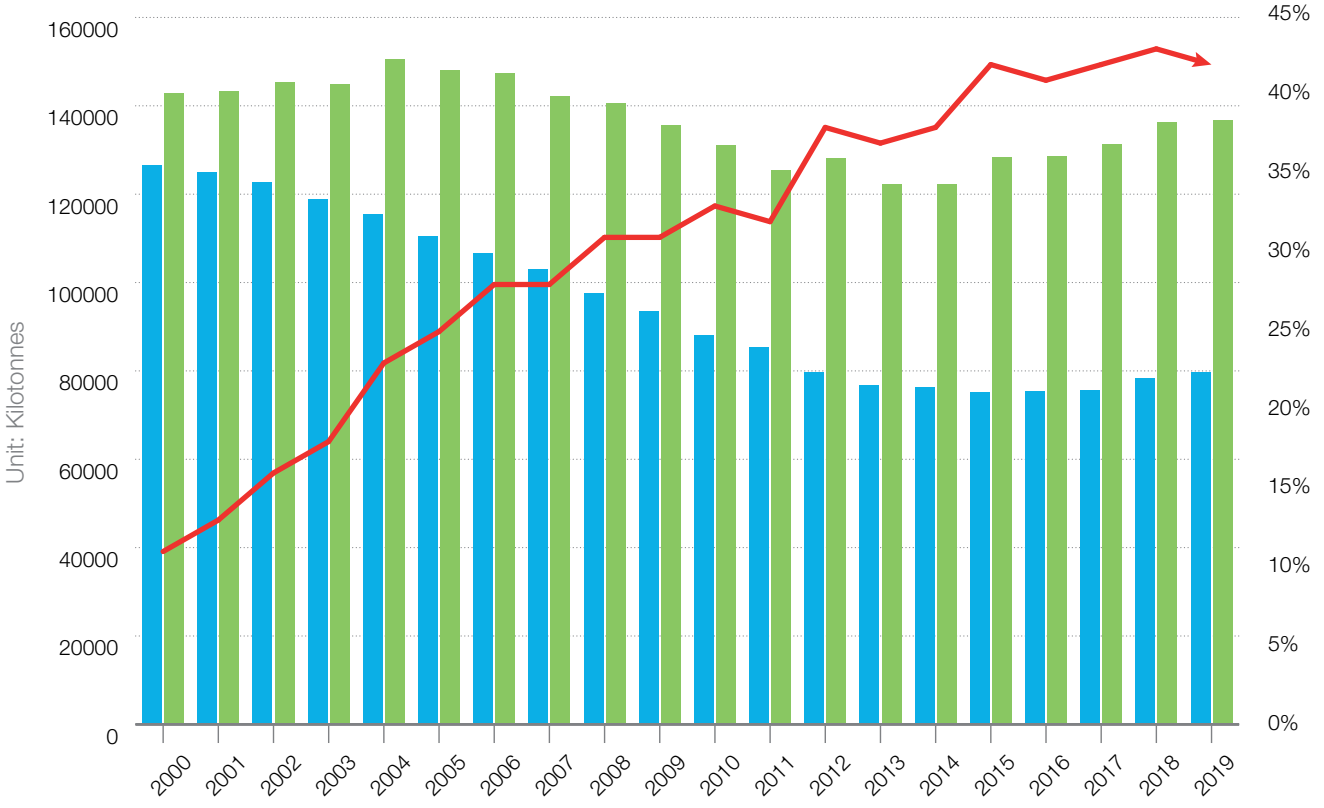
The continued growth in heavy duty transport in the EU, driven by the internal market and external trade, has further contributed to spurring diesel demand.

However, recent measures to rebalance taxation level of diesel with gasoline could trigger a progressive shift in diesel demand.

FIG.18.a NET TRADE FLOWS FOR REFINED PRODUCTS

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

Source: Eurostat

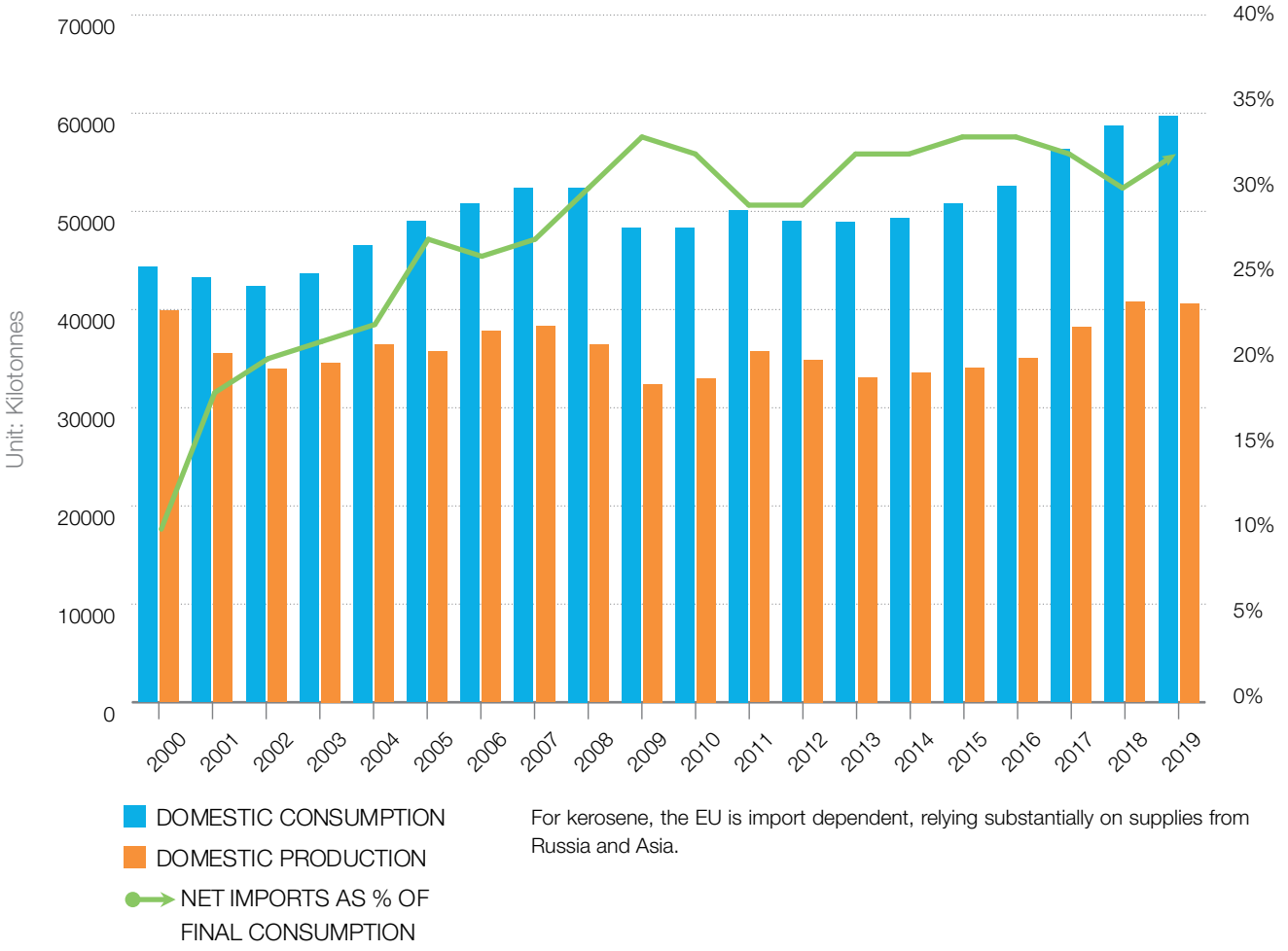


Overproduction of gasoline in the EU has been increasing over the years, despite a mild decrease in overall production volumes, due to a decrease in domestic consumption. This decreasing trend for domestic consumption, however, has stabilised from 2013 onwards. In 2019, we can see a first increase in domestic gasoline production driven by a change in consumer preferences toward gasoline fuelled vehicles.

FIG.18.b NET TRADE FLOWS FOR REFINED PRODUCTS

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

Source: Eurostat

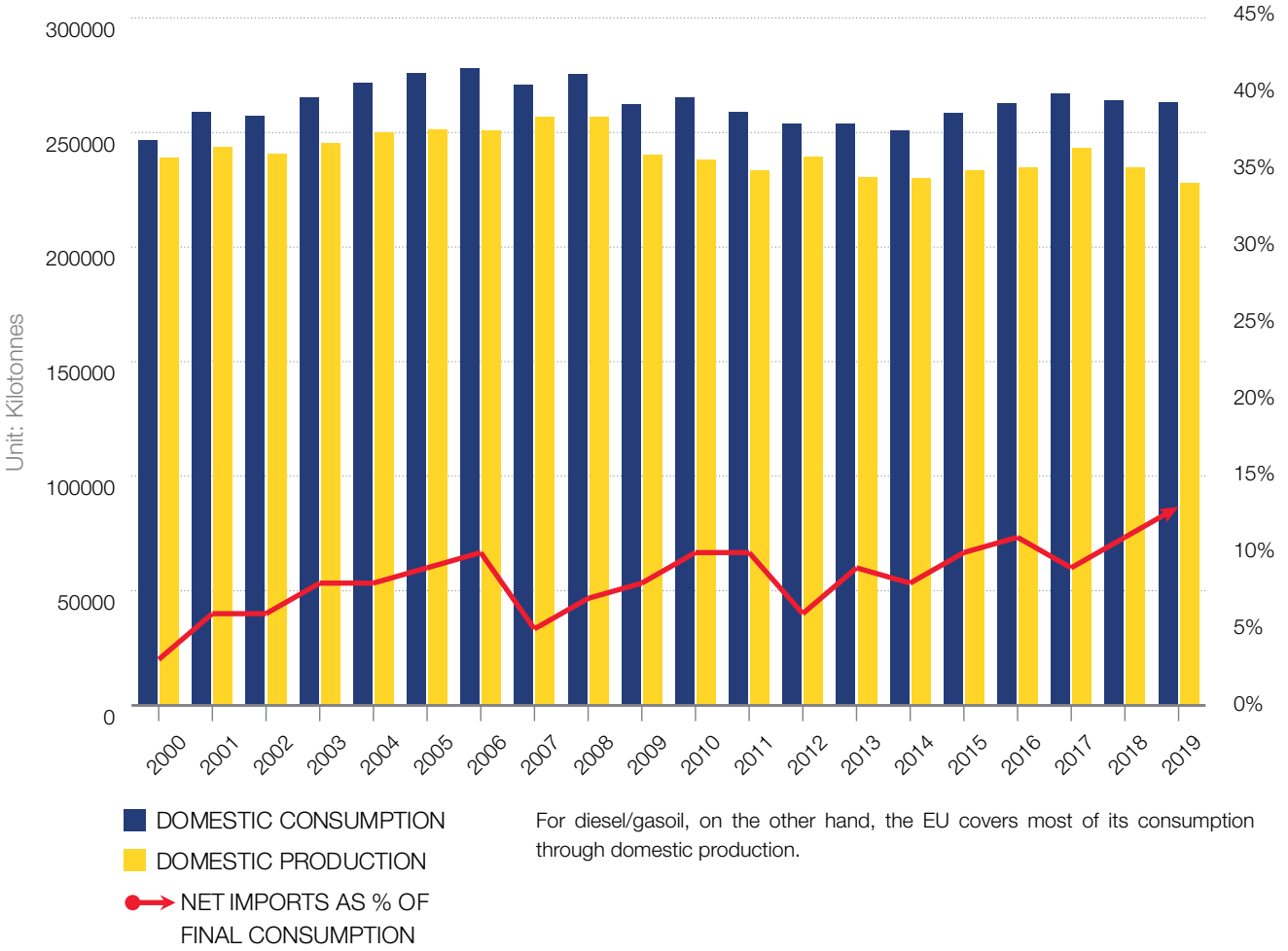


For kerosene, the EU is import dependent, relying substantially on supplies from Russia and Asia.

FIG.18.c NET TRADE FLOWS FOR REFINED PRODUCTS

IN-DEPTH LOOK AT DIESEL/GASOIL (EXCLUDING BIO-COMPONENTS)

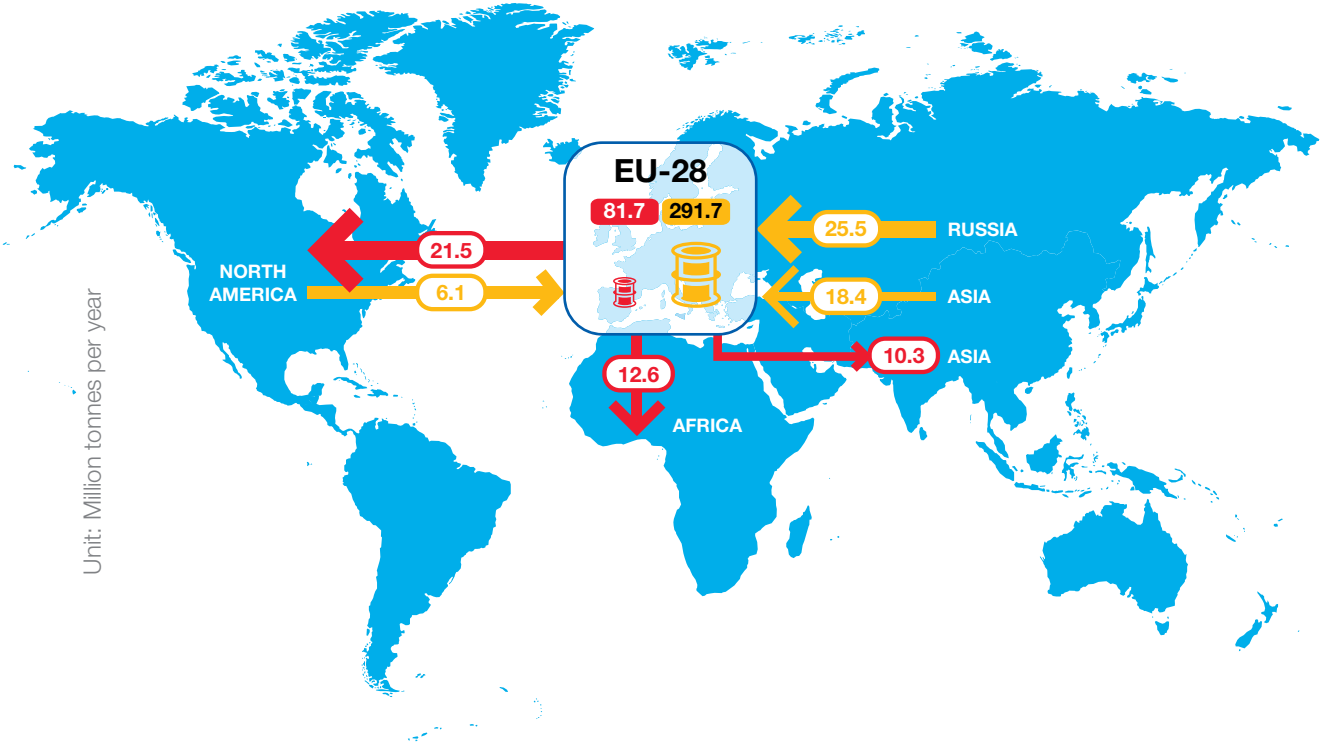
Source: Eurostat



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

FIG.19 MAJOR GASOLINE AND DIESEL/GASOIL TRADE FLOWS TO AND FROM THE EU-28 IN 2019

Source: Eurostat



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, the Middle East and the USA to meet regional demand for diesel and jet fuel.

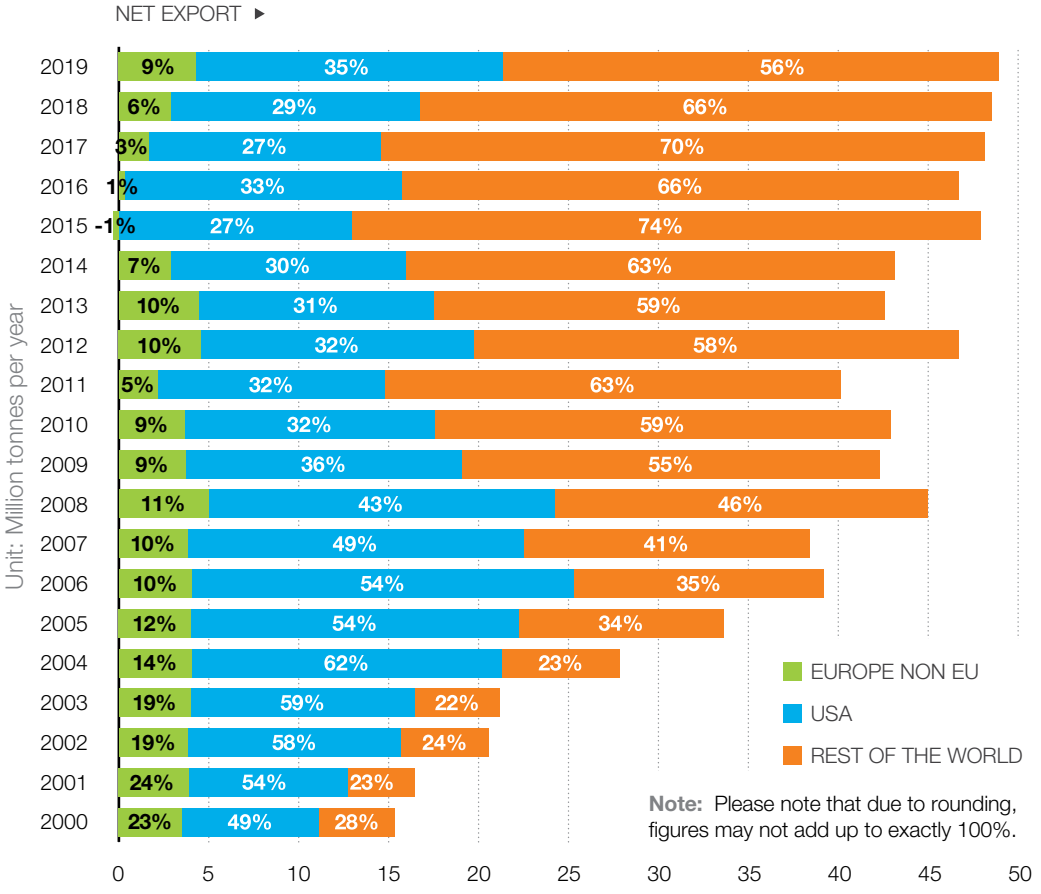
North America was the traditional export market for gasoline surpluses in Europe, but the shale oil revolution and cheap energy enabled US refiners to increase their supplies for their internal market and compete on other export markets with EU refiners.

- GASOLINE DEMAND IN 2019
- DIESEL/GASOIL DEMAND IN 2019
- MAIN GASOLINE TRADE FLOWS IN 2019
- MAIN DIESEL/GASOIL TRADE FLOWS IN 2019

FIG.20 EU-28 GASOLINE TRADING BALANCE

USA REMAINS AN IMPORTANT EXPORT MARKET FOR THE EU

Source: Eurostat

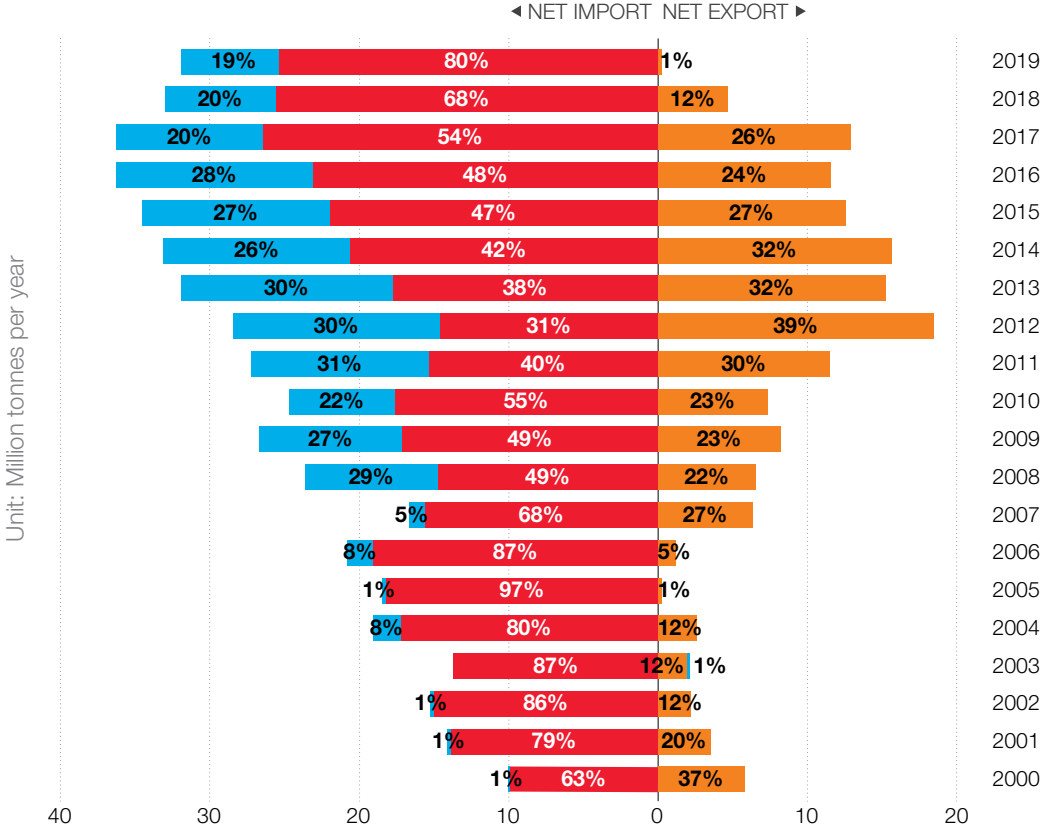


The US was the traditionally the main export market for the structural EU gasoline surplus. The shale oil boom in the late 2000s has decreased export opportunities to the US and forced EU refiners to find other markets, primarily in Africa and Asia. The EU gasoline surplus in 2019 remained high. North America and Asia were the two key export markets for the EU.

FIG.21 EU-28 DIESEL/GASOIL TRADING BALANCE

RUSSIA IS A LEADING EXPORTER OF GASOIL TO THE EU

Source: Eurostat



NORTH AMERICA
RUSSIA
REST OF THE WORLD

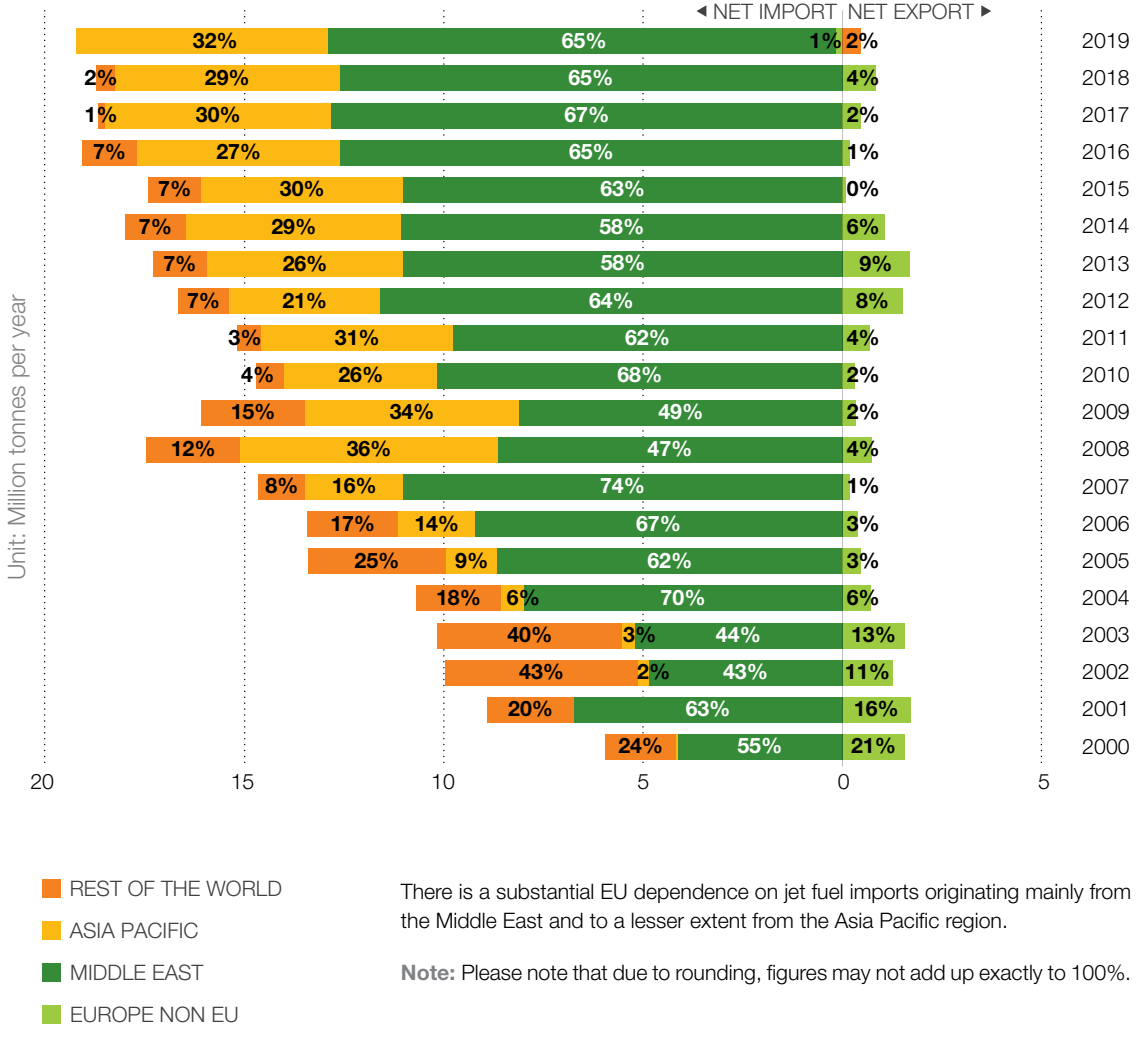
After a significant increase of gasoil imports from the US between 2008 and 2013, Russia recovered some of the lost shares between 2014-2018 to remain the leading gasoil exporter to the EU. This continued dependence of the EU on imports of gasoil is the result of the diesel/gasoline imbalance that the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

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

FIG.22 EU-28 JET FUEL TRADING BALANCE

MIDDLE EAST REMAINS MAIN JET FUEL SUPPLIER FOR THE EU

Source: Eurostat

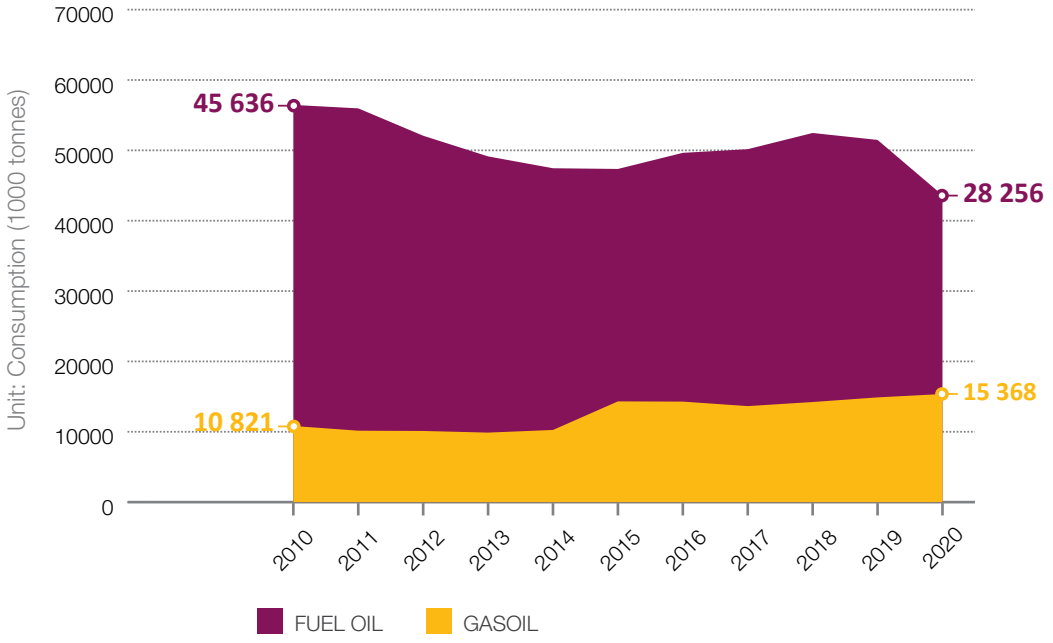


There is a substantial EU dependence on jet fuel imports originating mainly from the Middle East and to a lesser extent from the Asia Pacific region.

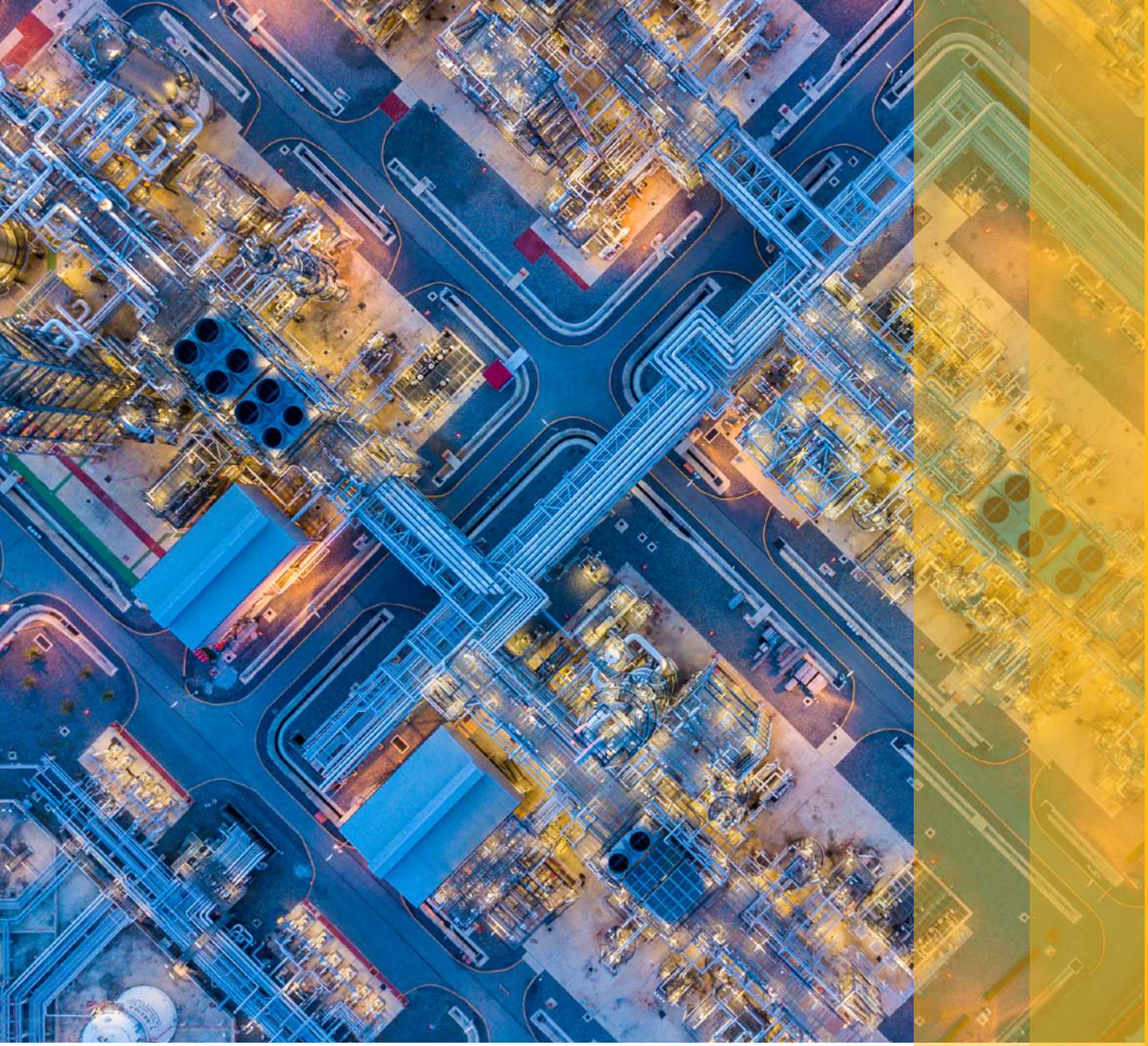
Note: Please note that due to rounding, figures may not add up exactly to 100%.

FIG.23 MARINE FUEL CONSUMPTION IN THE EU-27

Source: Wood Mackenzie



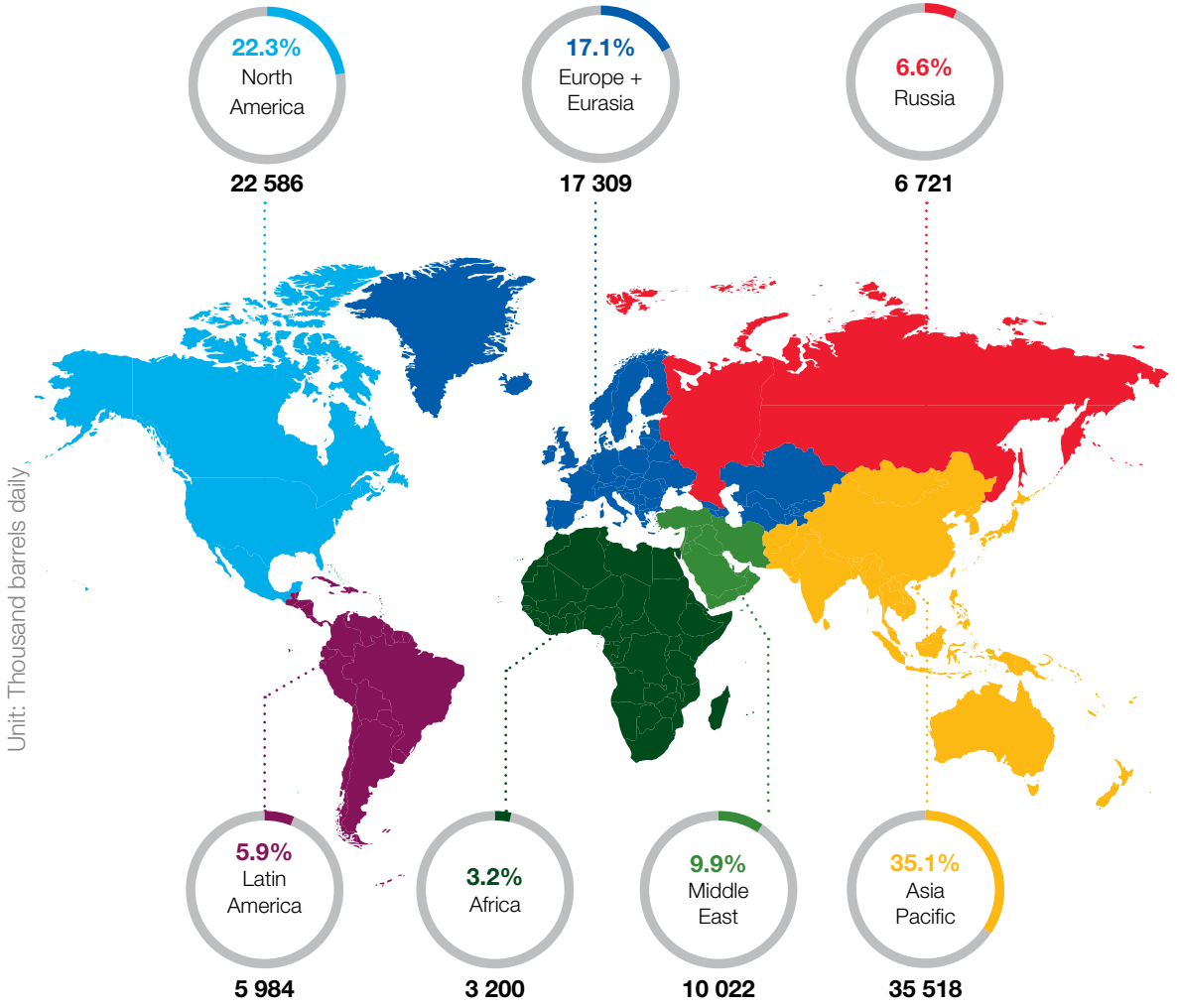
During the past years there was a rise in marine gasoil consumption at the expense of fuel oil. Switching to LNG or using scrubbers are alternatives to meeting the new International Maritime Organisation (IMO) emissions limits.



REFINING

FIG.24 GLOBAL REFINING CAPACITY AS OF 2019

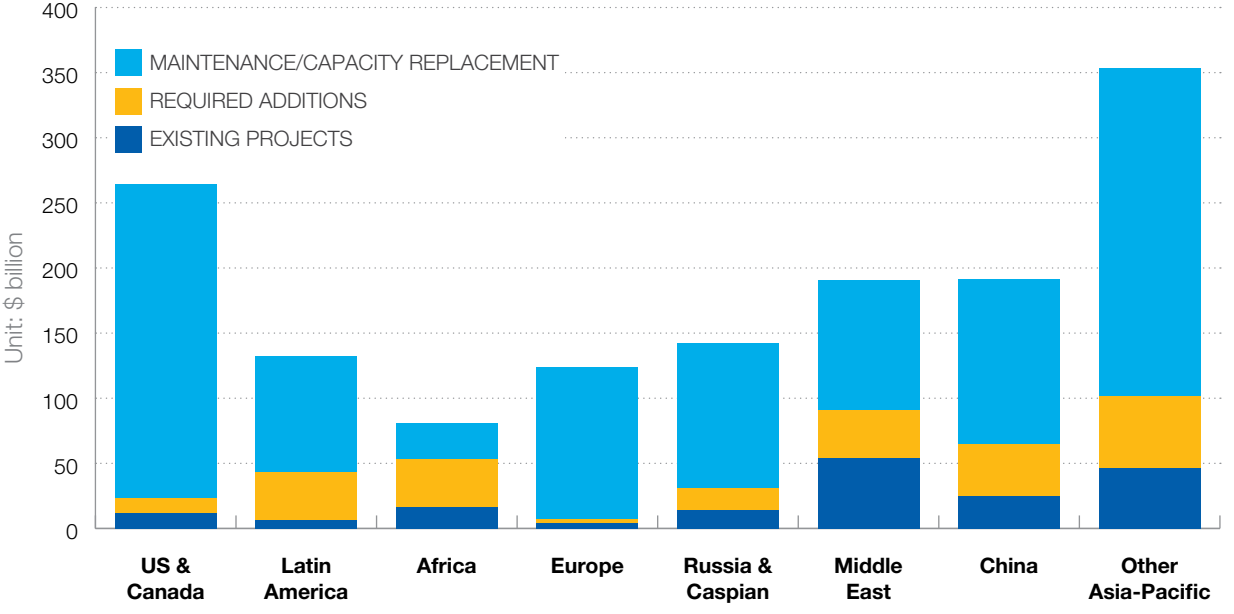
Source: BP Statistical Review of World Energy 2020



Refining is spread around the world and a truly global business. The share of Europe and Eurasia (excluding Russia) has declined by -0.2% compared to 2018. At 17% the region remains third largest for refining, behind Asia Pacific at 35% and North America at 22%.

FIG.25 PROJECTED INVESTMENT IN REFINING SECTOR PER REGION 2020-2045

Source: OPEC World Oil Outlook 2020

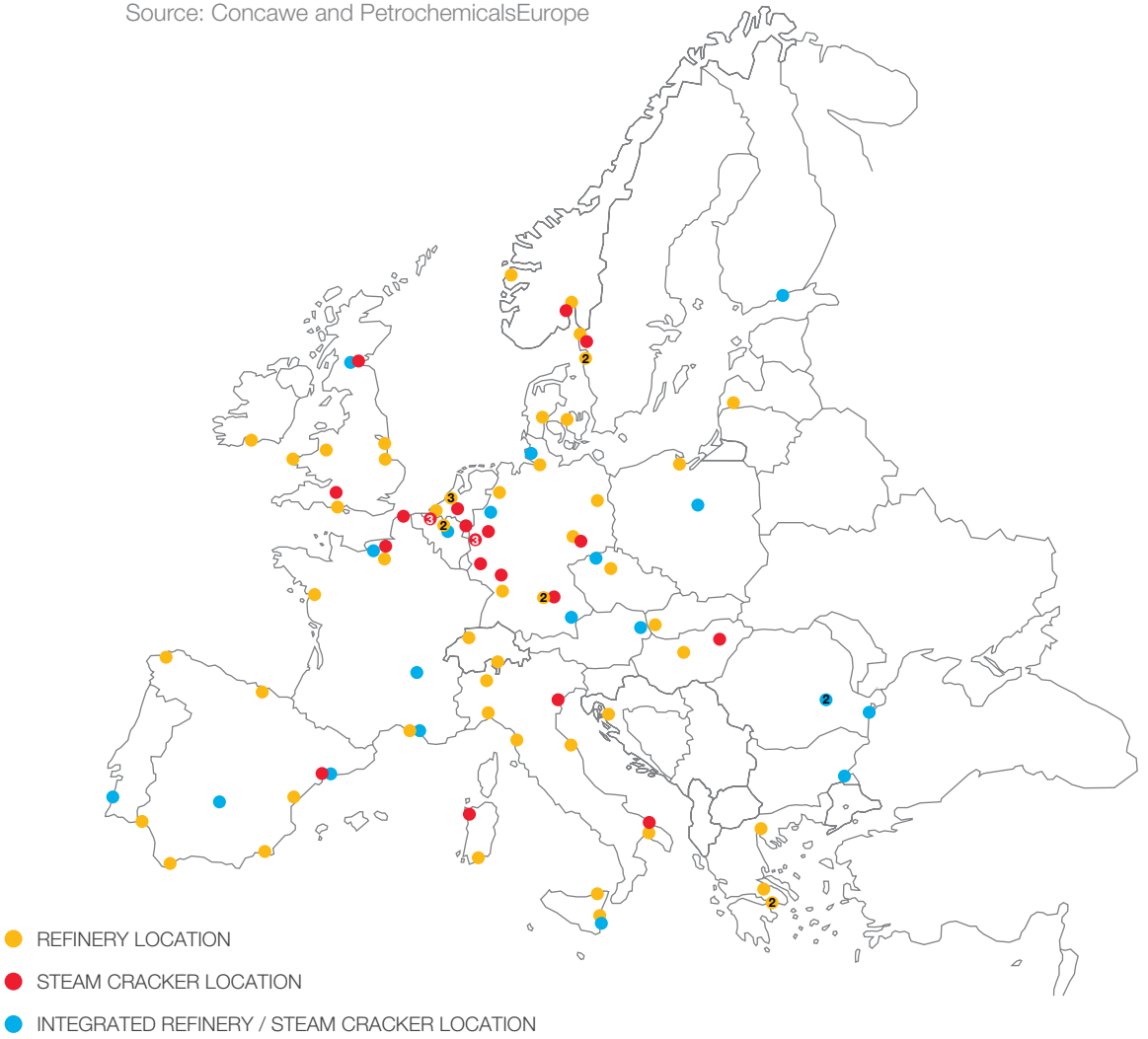


All three categories of refinery investments are estimated at around $1.47 trillion for the 2020-2045 period.

More than $1 trillion is projected to be dedicated to maintenance, $235 billion invested in known projects and the remaining $178 billion to additions beyond firm projects.

FIG.26 REFINERY/STEAM CRACKER SITES IN EUROPE

Source: Concawe and PetrochemicalsEurope



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.27 OPERATIONAL LOW-CARBON PROJECTS IN EUROPE

Source: FuelsEurope

Up to May 2021, there were 23 low-carbon projects operational across Europe. These projects - ten low-carbon technologies projects and thirteen low-carbon liquid fuels projects - are helping the EU achieve its climate goals. You can visit our cleanfuelsforall.eu website for regular updates on the map and more information about each project.

FIG.28 77 MAINSTREAM REFINERIES WERE OPERATING IN THE EU-28, NORWAY AND SWITZERLAND AT THE END OF 2020

Source: Concawe

COUNTRY	Number of refineries
Austria	1
Belgium	3
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
United Kingdom	6
EU-28 TOTAL = 74	
Norway	2
Switzerland	1
TOTAL NO + CH = 3	
TOTAL = 77	

EU NON EU

Threshold > 30 kbbl/d or 1.5 Mt/a

In December 2020, there were 77 'mainstream' (capacity above 30 kbbdl/d or 1.5Mt/a) refineries in the EU-28, Norway and Switzerland.

Note: The threshold data used as basis for the FuelsEurope Statistical Report was lowered from 50 kbbdl/d or 2.5Mt/a to 30 kbbdl/d or 1.5Mt/a. As a result, 3 refineries were added to the total (1 in Croatia, 1 in Italy and 1 in Romania).

FIG.29 EU-28, NORWEGIAN AND SWISS MAINSTREAM REFINERIES HAD 662.2 MILLION TONNES OF PRIMARY REFINING CAPACITY IN 2020

Source: Concawe and Oil & Gas Journal

COUNTRY	*Refining capacity	COUNTRY	*Refining capacity
Austria	9.7	Ireland	3.6
Belgium	38.8	Italy	88.3
Bulgaria	9.8	Lithuania	9.5
Croatia	6.7	Netherlands	60.2
Czechia	8.8	Poland	25.2
Denmark	8.7	Portugal	10.6
Finland	10.3	Romania	10.8
France	58.5	Slovakia	5.8
Germany	97.0	Spain	68
Greece	21.2	Sweden	22
Hungary	8.1	United Kingdom	63.7
EU-28 TOTAL = 579.2 million tonnes per year			
Norway	16.0		
Switzerland	3.40		
TOTAL NO + CH = 19.4 million tonnes per year			
TOTAL = 662.2 million tonnes per year			

EU NON EU

Threshold > 30 kbbl/d or 1.5 Mt/a

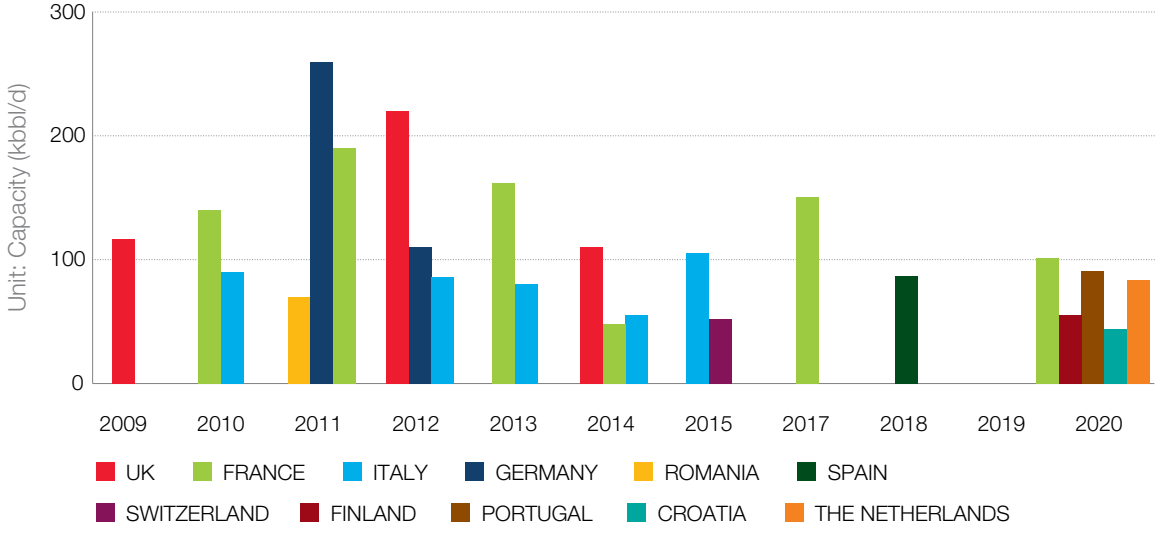
The 77 mainstream refineries operating in 2020 in the EU-28, Norway and Switzerland had a primary refining capacity of 662 million tonnes. This represents a decrease by 144 million tonnes of primary refining capacity since 2009. Over the last year the refining capacity in the EU has decreased due to five refinery closures.

Note: The threshold data used as basis for the FuelsEurope Statistical report was lowered from 50 kbbdl/d or 2.5Mt/a to 30 kbbdl/d or 1.5Mt/a. As a result, three refineries were added to the total and the total refining capacity increased.

Note: Refining capacity is expressed in million tonnes per year. Numbers may not add up due to rounding. *Status in December 2020

FIG.30 REFINERY CLOSURES IN EUROPE

Source: Platts and Concawe



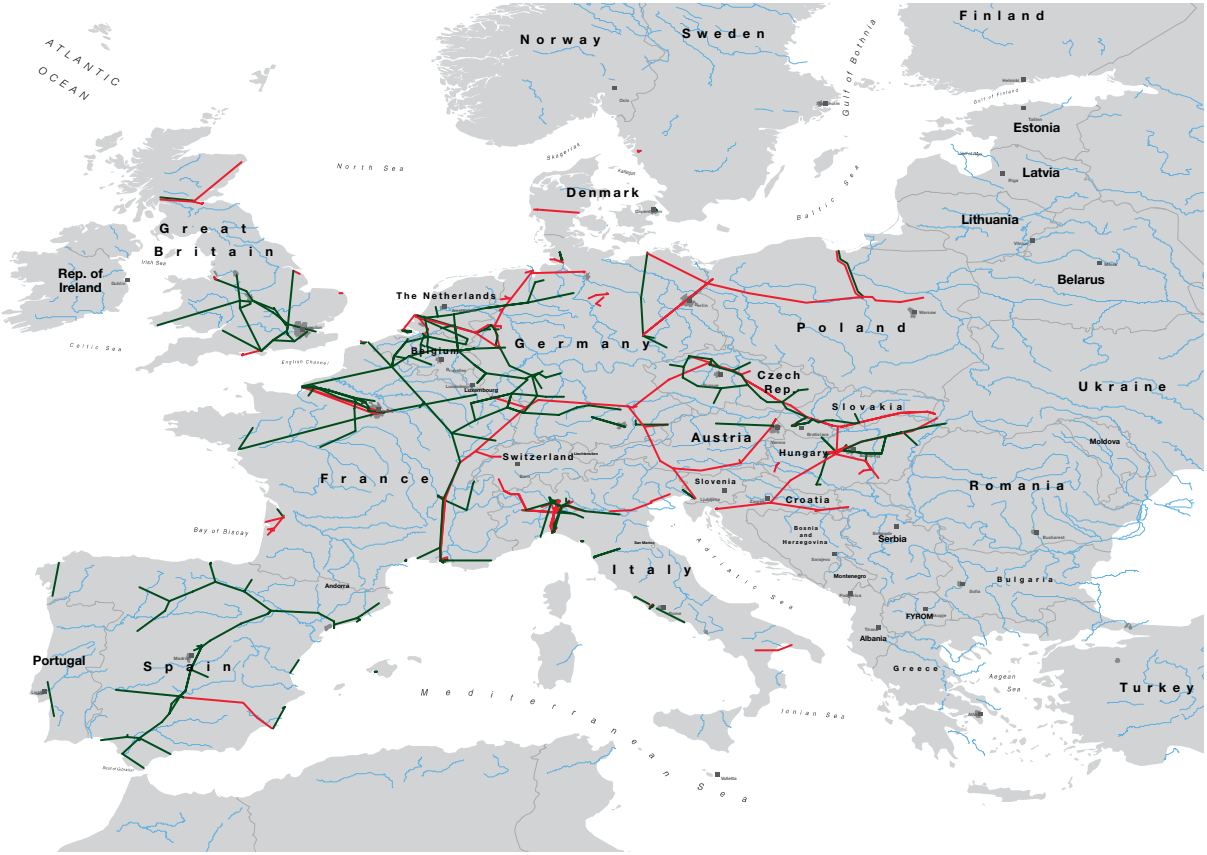
Threshold > 30 kbbl/d or 1.5 Mt/a

Since 2009, out of close to 100 refineries operating in Europe, 24 mainstream refineries were closed or transformed. Currently, five refineries in Europe underwent a transformation process, moving away from oil and converting into biorefineries.

Note: The threshold data used as basis for our report was lowered to 30 kbbdl/d or 1.5Mt/a, which added one refinery closure to the total (Dunkirk in 2014).

FIG.31 OIL PIPELINES - MAP OF EUROPE

Source: Concawe



PIPELINES: IN OPERATION OR STAND BY

- CRUDE OIL
- OIL PRODUCTS

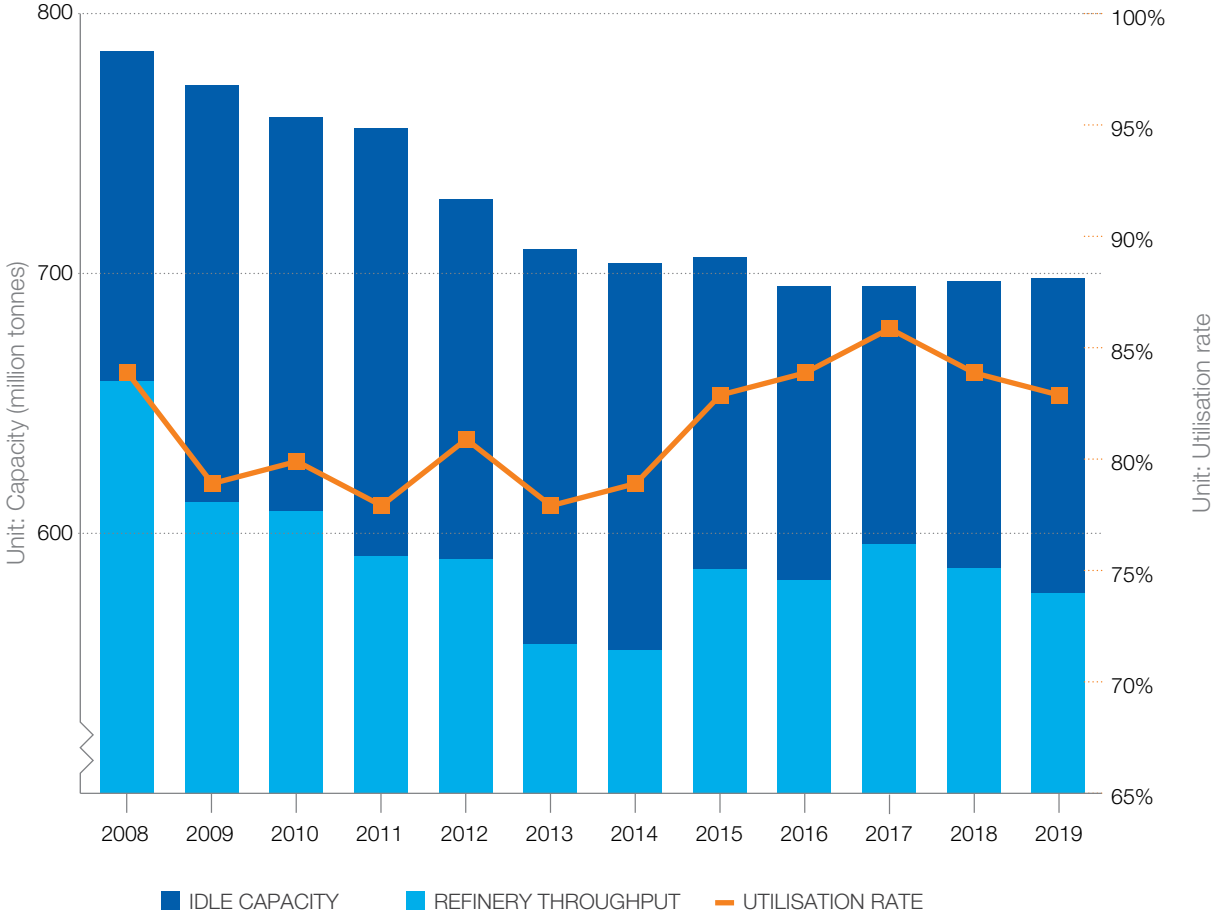
Note: The map is based on publicly available information as well as the information gathered by Concawe and as such should not be considered exhaustive.

Pipelines are a long-established, safe and efficient mode of transport for crude oil and petroleum products. They are used both for short-distance transport (e.g. within a refinery or depot, or between neighbouring installations) and long distances.

An extensive network of cross-country oil pipelines in Europe meets a large proportion of the need for transportation of petroleum products.

FIG.32 CAPACITY AND UTILISATION OF EUROPEAN REFINERIES

Source: BP Statistical Review of World Energy 2020

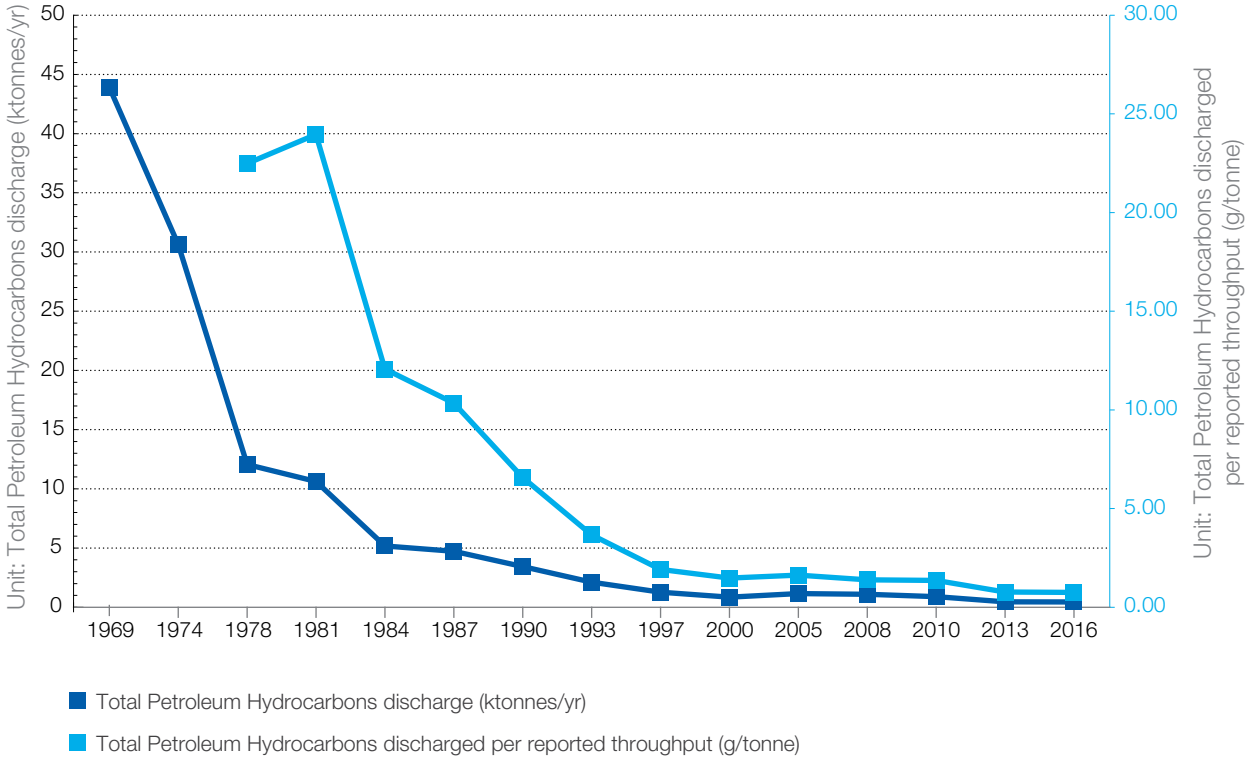


Since 2008, the utilisation rate of EU refineries has been oscillating between 86% to a lowest of 78%. In 2017, an increased rate has been observed with the utilisation of European refineries reaching 86%. This rate is commonly accepted as a requirement for efficient economic operations of a refinery.

FIG.33 QUALITY OF REFINERY WATER EFFLUENT

OIL DISCHARGED IN WATER

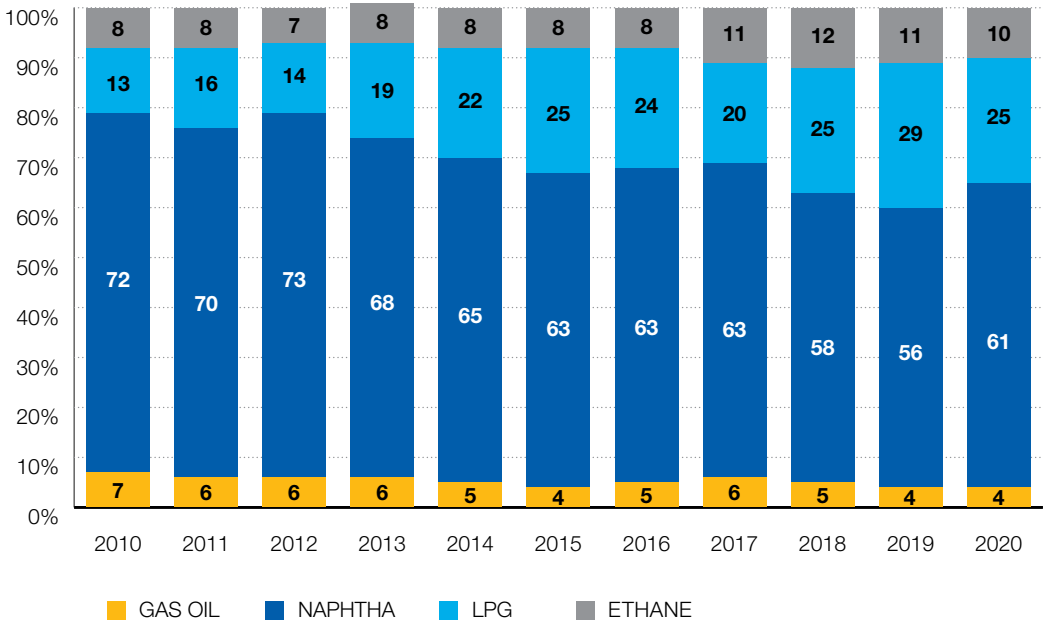
Source: Concawe



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.34 CHEMICAL INDUSTRY RAW MATERIAL USE

Source: CEFIC and ICIS



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.

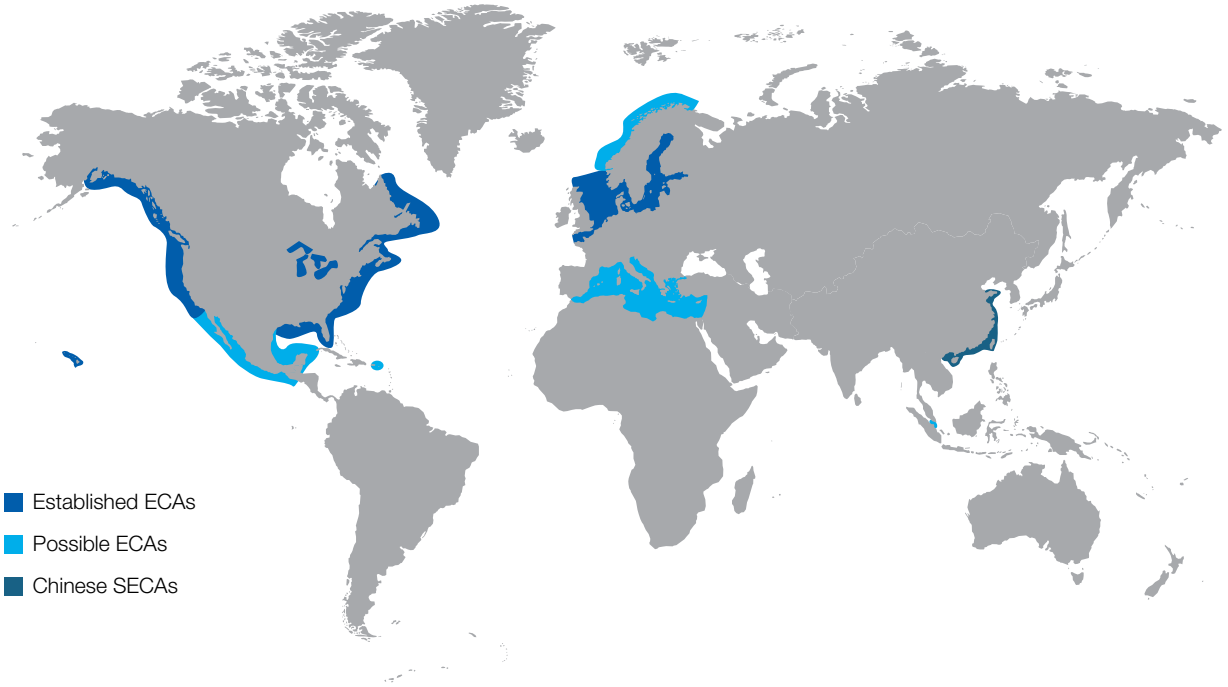
Note: Please note that due to rounding, figures may not add up exactly to 100%.

EMISSIONS

FIG.35 MARINE FUEL SULPHUR SPECIFICATIONS

SULPHUR EMISSION CONTROL AREAS (SECAs)

Source: IMO and Concawe



The limit for the sulphur content of marine fuels in SECAs is 0.1% since 1 January 2015.

The limit for the sulphur content of marine fuels outside SECAs in the EU waters is set at 0.5% for EU waters from 2020.

Since January 2015, all vessels in the Emission Controlled Area (ECA) of the Baltic Sea, North Sea, English Channel and waters 200 nautical miles from the coast of US and Canada, have had to reduce their sulphur emissions to 0.1%.

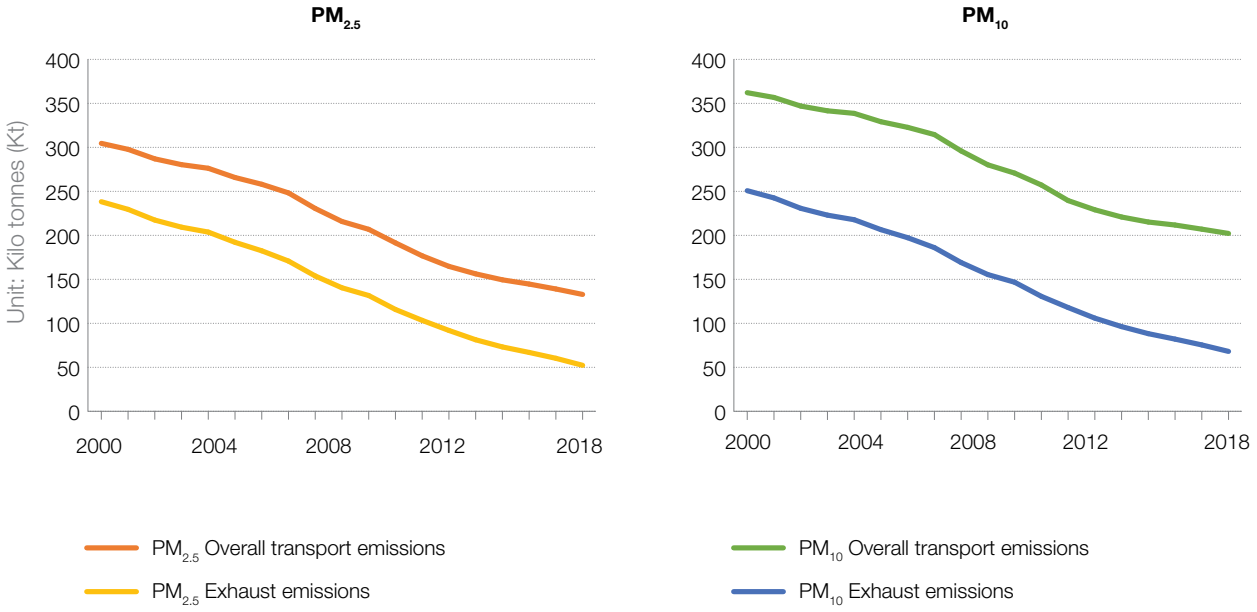
From 1 January 2019, vessels have been required to use fuel with a sulphur content not exceeding 0.5% while operating within the Coastal ECA, i.e. within China's territorial sea (including the Hainan Coastal ECA) as well as Hong Kong, Taiwan and Mainland China.

From 1 January 2020, the new 0.5% global sulphur cap entered into force replacing the previous limit of 3.50% which had been in effect since 1 January 2012.

From 1 January 2022, vessels must use fuel with a sulphur content not exceeding 0.1% while operating within the Hainan Coastal ECA. Vessels are required to use either a distillate, an alternate fuel or install a scrubber that removes sulphur from the exhaust after combustion.

FIG.36a PM EMISSIONS FROM EXHAUST IN THE EU-28 REDUCED BY OVER 60%

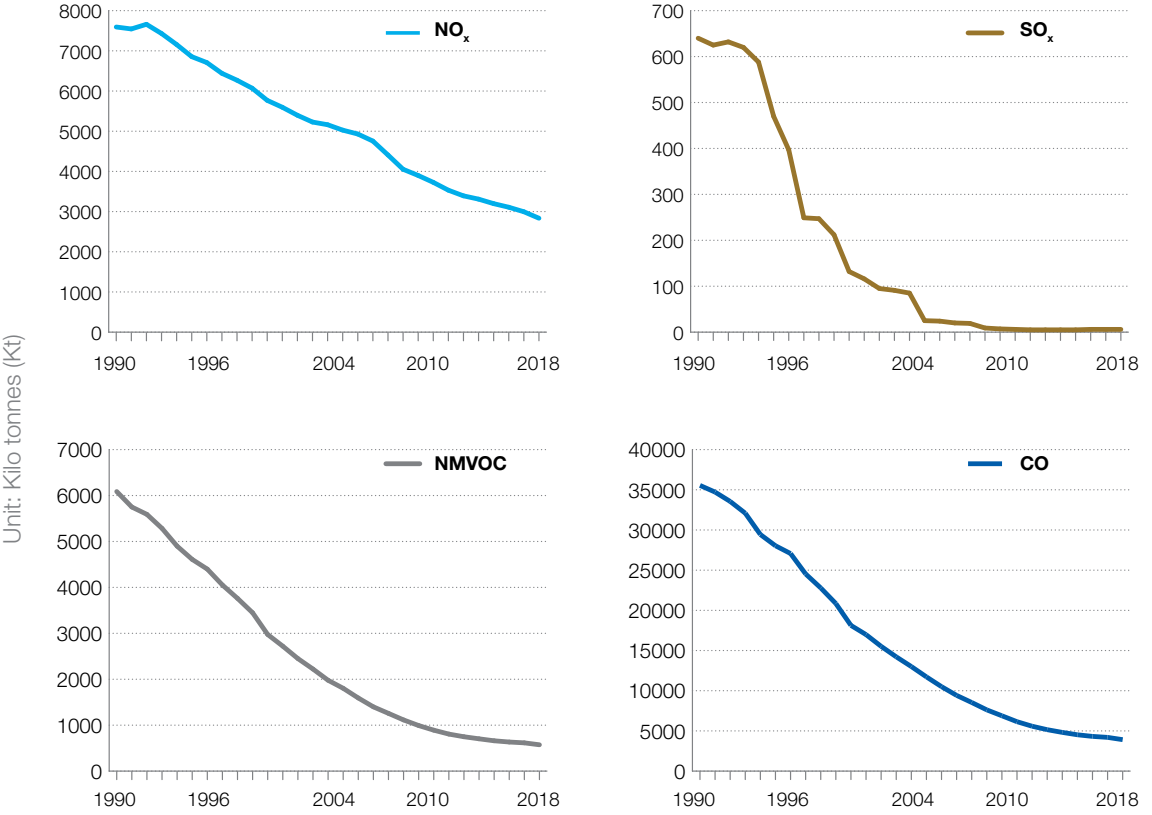
Source: European Environment Agency



PM emissions are continuously decreasing as the result of cleaner diesel fuel, advanced engines and effective emissions control technology. With 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.36b SINCE 1990, FUELS ARE GETTING PROGRESSIVELY CLEANER RESULTING WITH EXHAUST EMISSIONS REDUCTION BY OVER 80%

Source: European Environment Agency

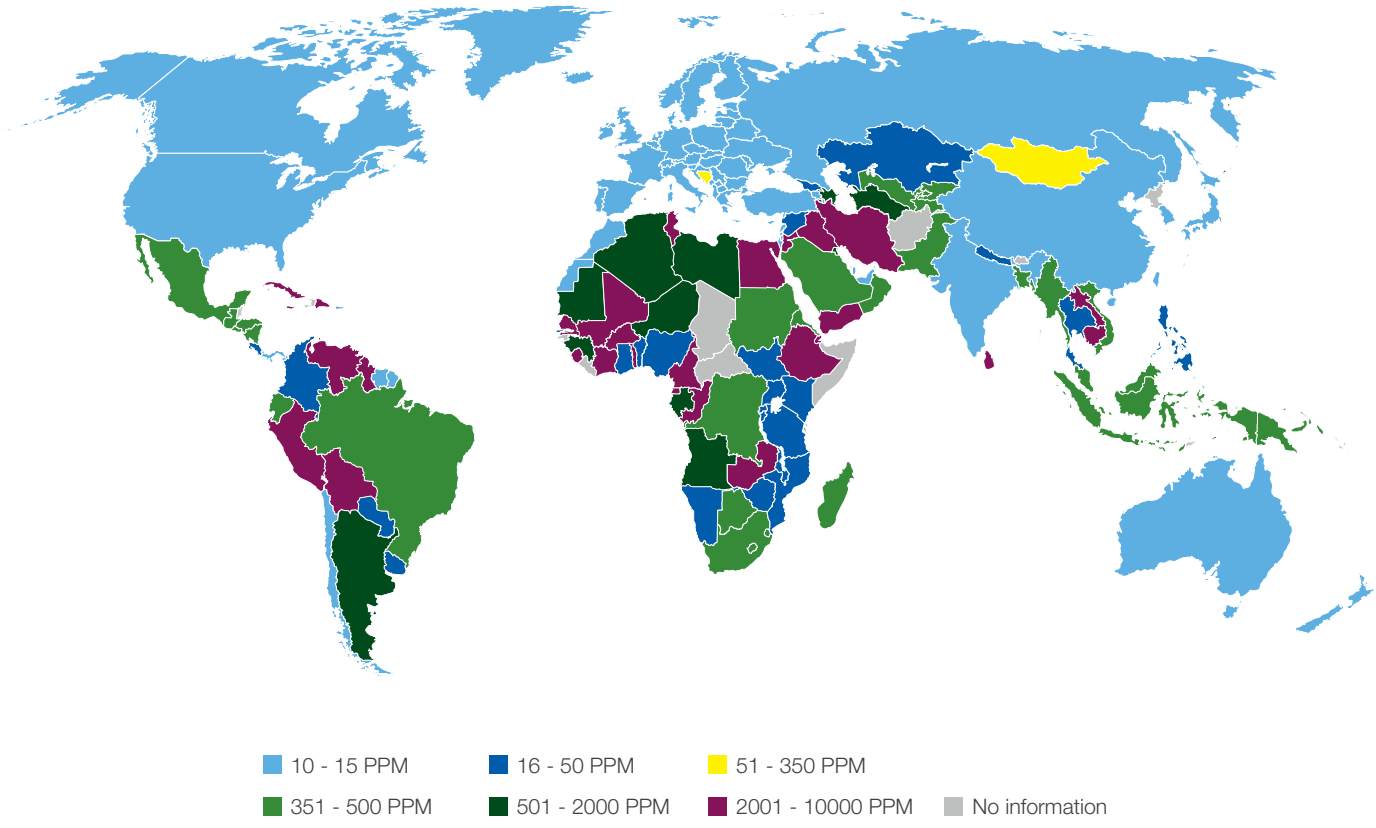


Since 1990, the refining industry contributed to cleaner exhausts currently containing over 80% lower SO_x, NMVOC, and CO emissions. NO_x emissions have decreased by over 60%. These significant improvements are the result of the partnerships with the automotive industry which aims at improving the fuel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

NO_x (as NO_2) - Nitrogen Oxides
SO_x (as SO_2) - Sulphur Oxides
NMVOC - Non Methane Volatile Organic Compounds
CO - Carbon Monoxide

FIG.37 MAXIMUM ON-ROAD DIESEL SULPHUR LIMITS

Source: Stratas Advisors, March 2021

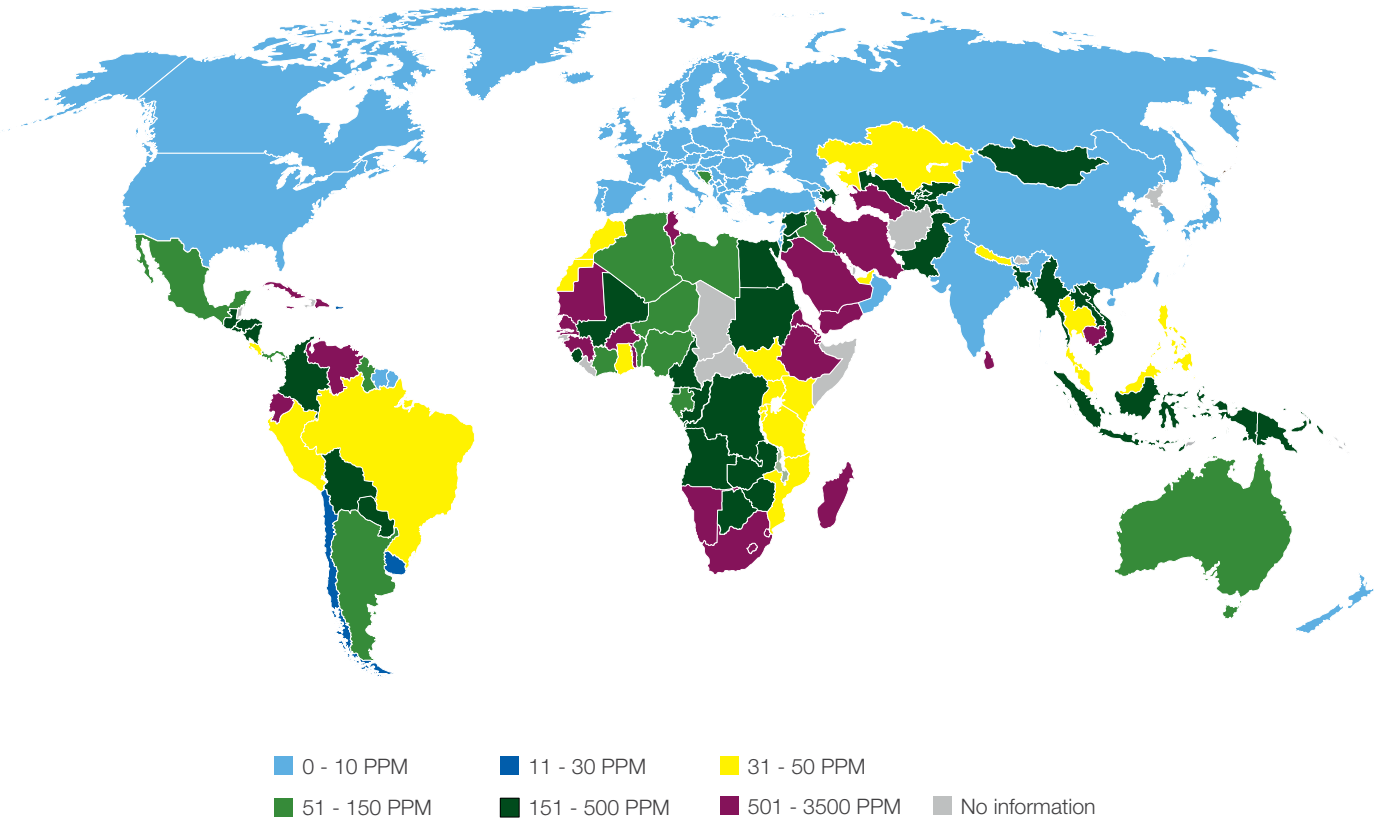


Countries may apply lower limits for different grades, regions/ cities, or based on average content.

Detailed information on limits and regulations can be found at www.stratasadvisors.com.

FIG.38 MAXIMUM GASOLINE SULPHUR LIMITS

Source: Stratas Advisors, March 2021

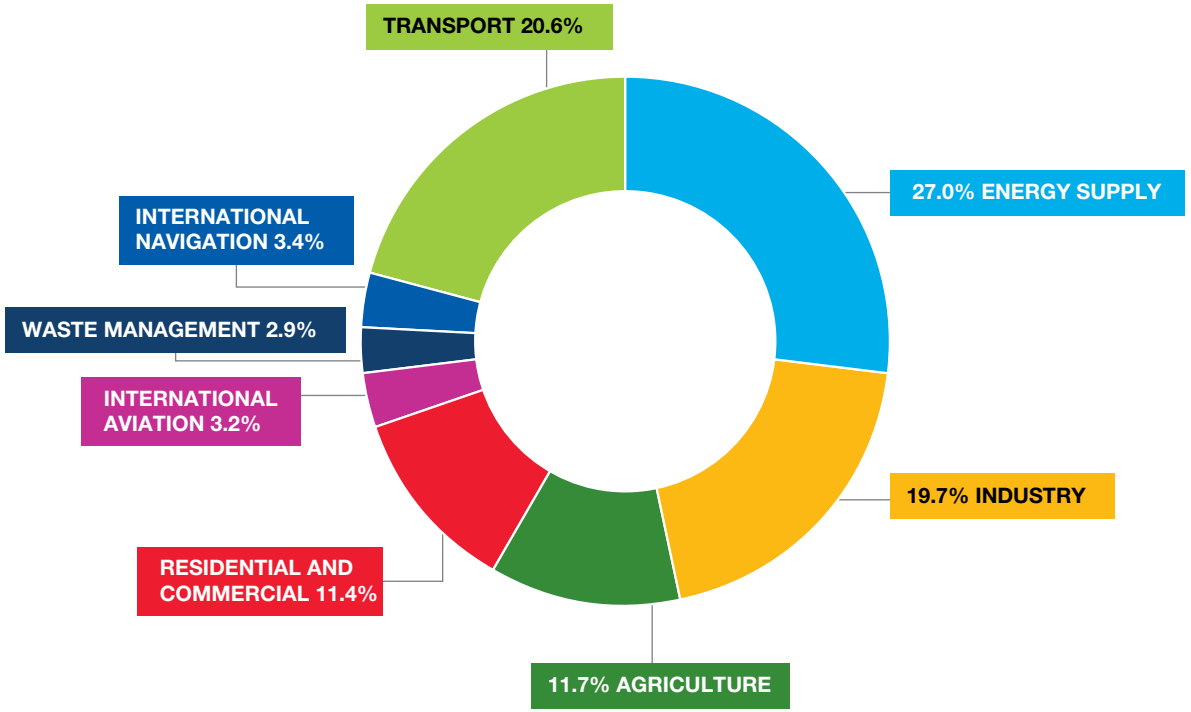


Countries may apply lower limits for different grades, regions/ cities, or based on average content.

Detailed information on limits and regulations can be found at www.stratasadvisors.com.

FIG.39 GHG EMISSIONS BY SECTOR IN THE EU-27 IN 2018

Source: European Environmental Agency

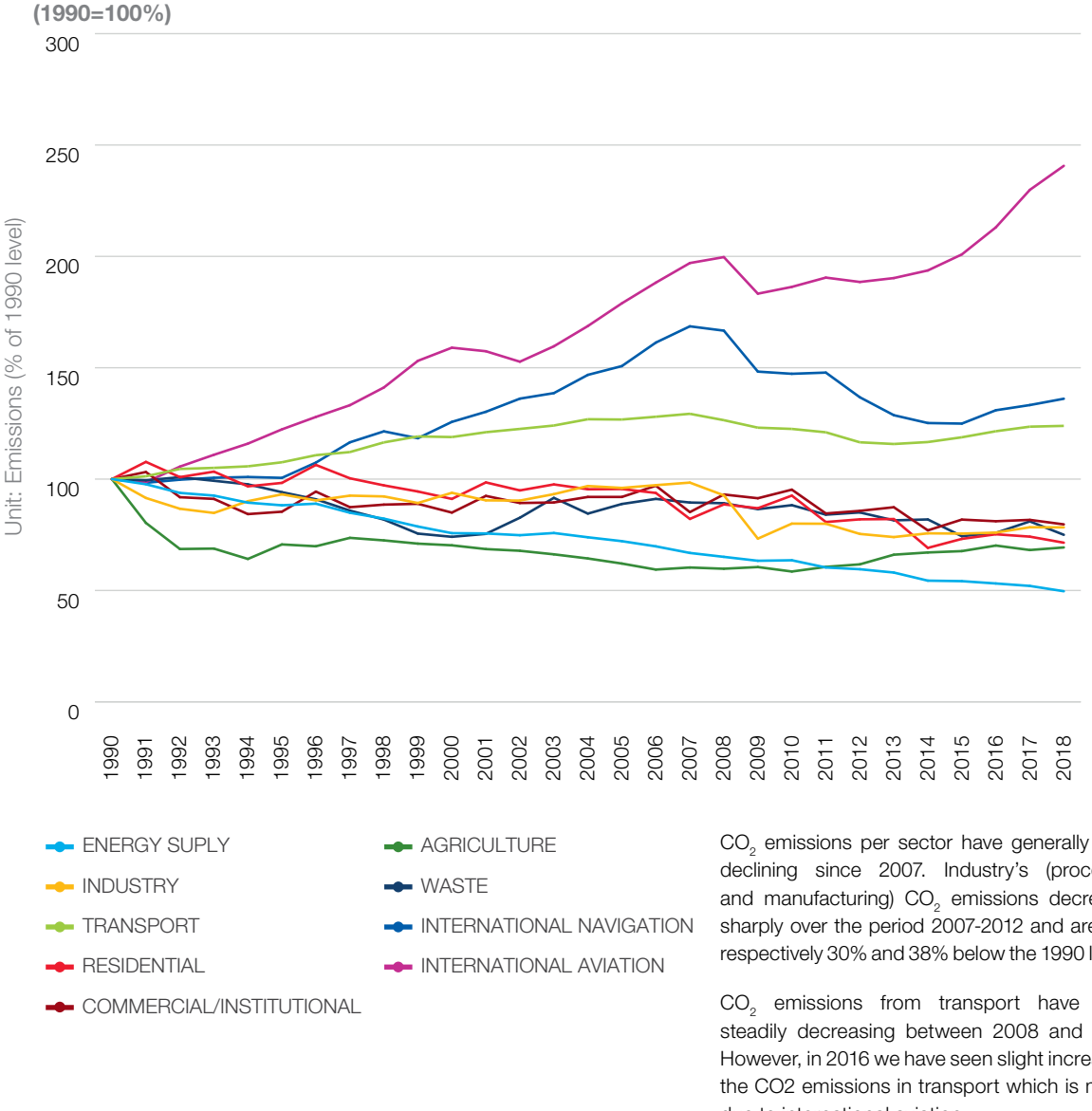


Energy supply and industry accounted for 46,7% of total GHG emissions in the EU in 2018. Transport, including international shipping and aviation generated 27,2% of EU GHG emissions.

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

FIG.40 CO_2 EMISSIONS TREND BY SECTOR IN THE EU-27

Source: European Environment Agency

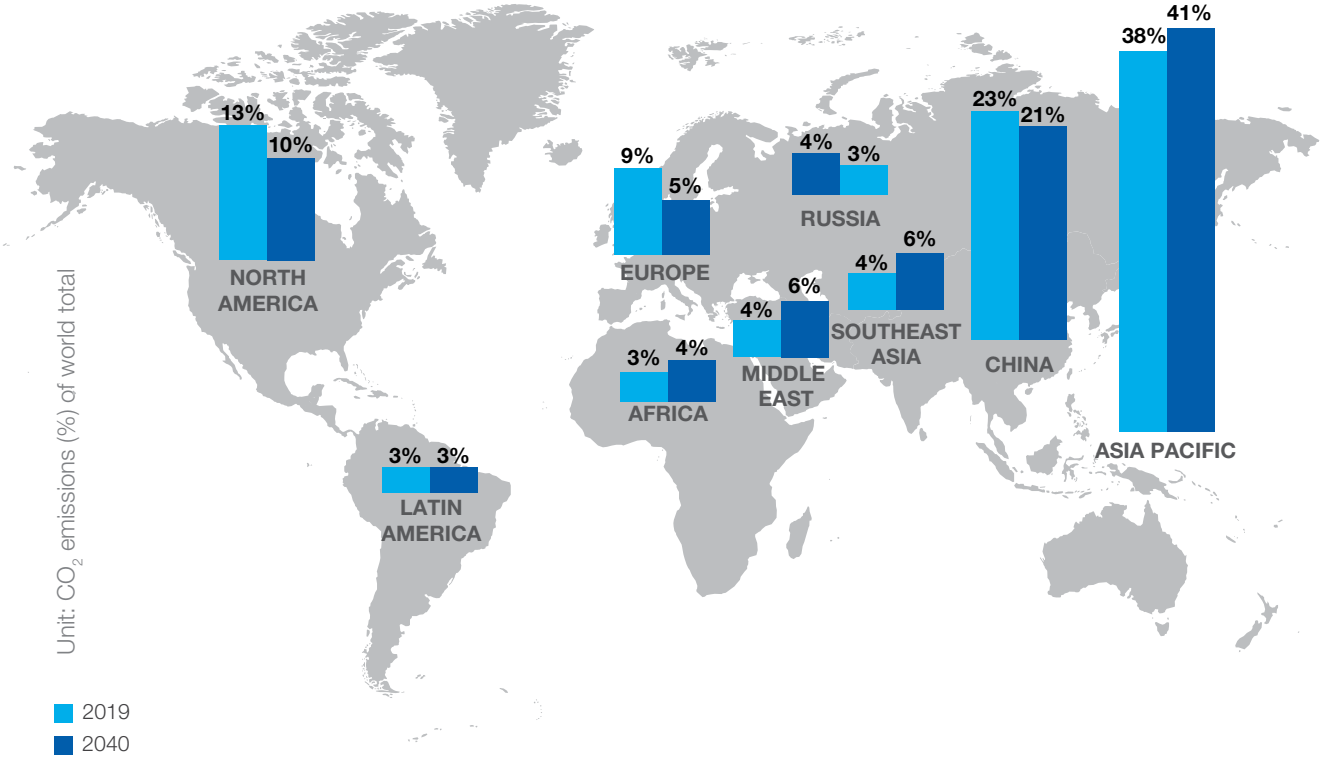


CO_2 emissions per sector have generally been declining since 2007. Industry's (processes and manufacturing) CO_2 emissions decreased sharply over the period 2007-2012 and are now respectively 30% and 38% below the 1990 levels.

CO_2 emissions from transport have been steadily decreasing between 2008 and 2015. However, in 2016 we have seen slight increase in the CO2 emissions in transport which is mainly due to international aviation.

FIG.41 PROJECTED DECLINING EU SHARE IN GLOBAL CO_2 EMISSIONS

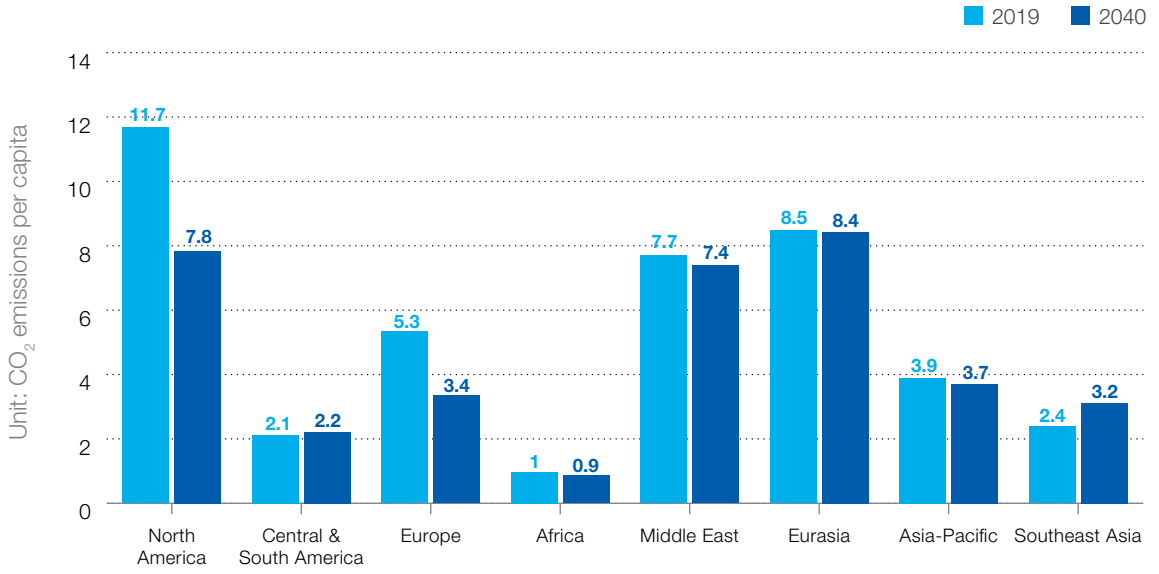
Source: International Energy Agency, WEO 2020



In 2019, the EU accounted for 9% of the total global CO_2 emissions and this share is expected to reduce to 5% in 2040. CO_2 emissions in North America, Russia and China are also forecasted to decrease by 2040, whereas in the other parts of the world, emissions are likely to increase.

FIG.42 PROJECTED CO_2 EMISSIONS PER CAPITA/REGIONS

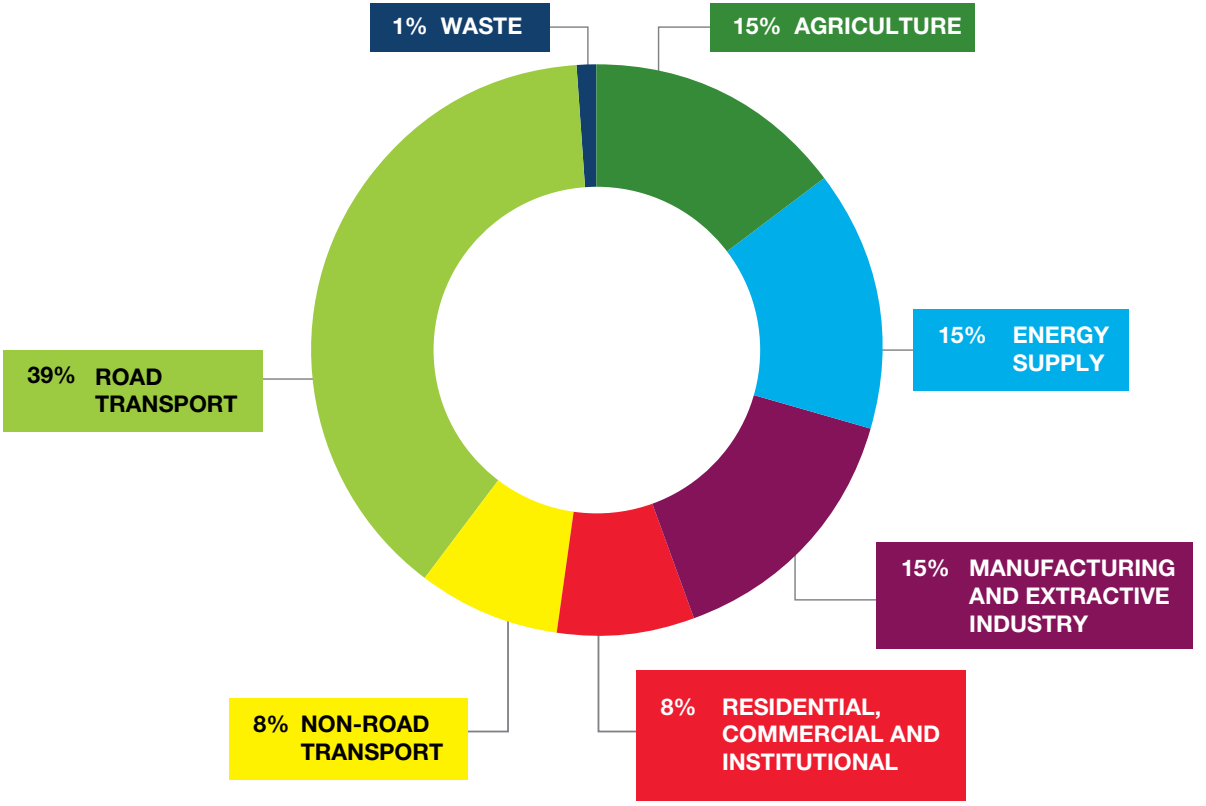
Source: International Energy Agency, WEO 2020



All regions but Eurasia and Southeast Asia are expected to see a decrease in CO_2 emissions by 2040. The drop is especially notable in North America, where CO_2 emissions are estimated to be reduced by nearly 4 million tonnes by 2040 while in Europe, a decrease of 2 million tonnes is foreseen.

FIG.43 NO_x CONTRIBUTION TO EU-28 EMISSIONS FROM MAIN SOURCE SECTORS IN 2018

Source: European Environmental Agency



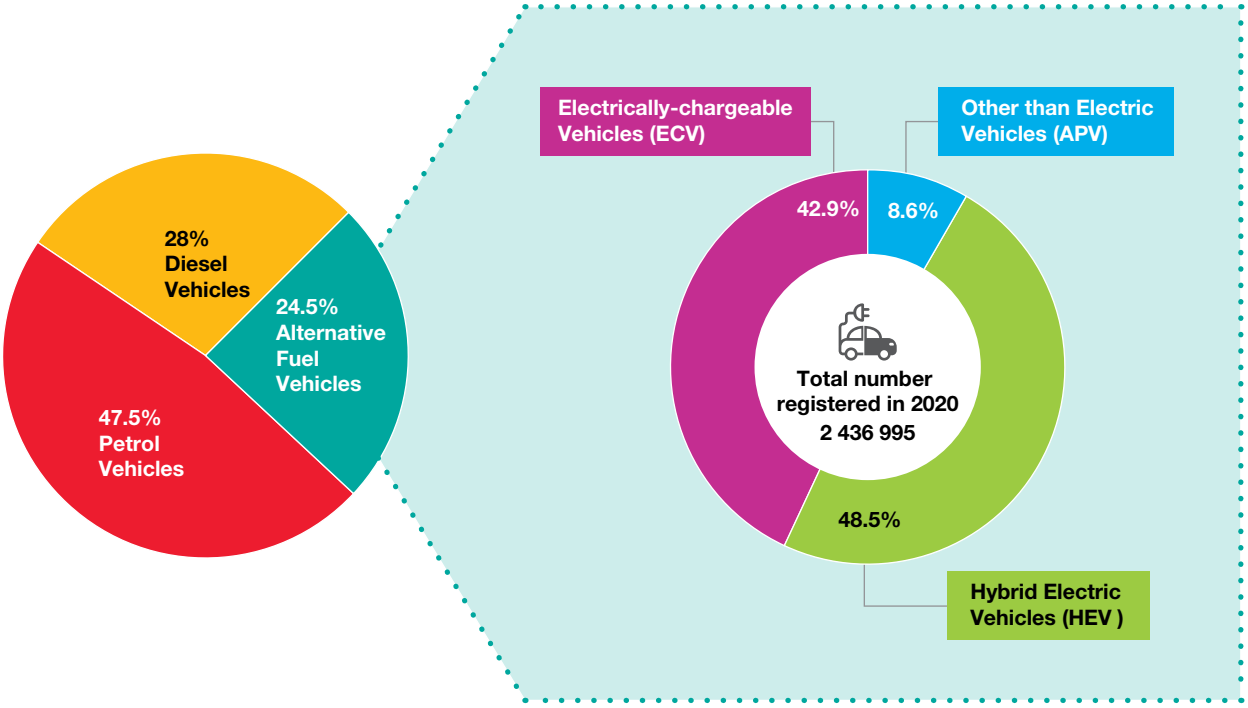
NO_x are main contributors to the air quality problems found in several urban areas in the EU. The road transport sector is the most significant contributor, being responsible for 39% of the total of NO_x emissions emitted in 2018 in the EU.

We have witnessed two major changes between 2017 and 2018. The agricultural sector's NO_x emissions increased from 8% to 15%. In the opposite direction, the residential, commercial and institutional sector shrunk their NOx emissions from 14% to 8%.

RETAIL & MARKETING INFRASTRUCTURES

FIG.44 ALTERNATIVELY FUELLED VEHICLES ACCOUNTED FOR 25% OF TOTAL PASSENGER CAR REGISTRATIONS IN THE EU-27 IN 2020

Source: ACEA

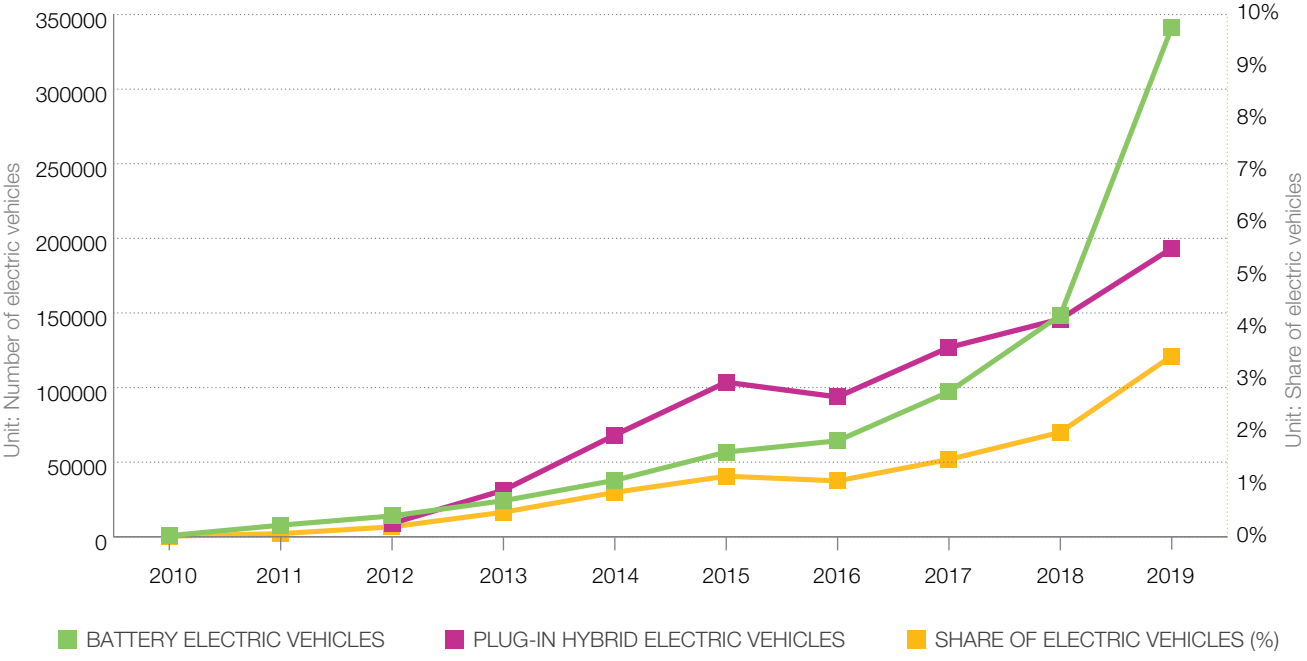


Although the decline of 3 million units in car registrations resulting from COVID-19 hit diesel and petrol-powered vehicles the hardest, conventional fuel types still dominated EU car sales in terms of market share (75.5%) in 2020. Alternatively fuelled vehicles accounted for 25% of the total passenger car sales across the EU, a significant increase from 2019 to 2020 (11% to 25%, 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%.
Data for Bulgaria is not available.

FIG.45 ELECTRIC VEHICLES AS A PROPORTION OF THE TOTAL FLEET IN THE EU-27, ICELAND, NORWAY & UK

Source: European Environment Agency



Electric cars — battery electric vehicles (BEVs) and plug-in hybrid electric vehicles (PHEVs) — are gradually penetrating the EU market. However, despite a steady increase in the number of new electric car registrations annually, from 700 units in 2010 to about 550 000 units in 2019, they still account for a market share of only 3.5 % of newly registered passenger vehicles.

Note: The chart reports the number of electric vehicles (battery electric vehicles - BEV and plug-in hybrid electric vehicles - PHEV) newely registered in EU27_2020, Iceland, Norway and United Kingdom.

'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.

Islandic data included from 2018 and Norwegian data included only in 2019.

FIG.46 NUMBER OF PETROL STATIONS IN EUROPE END OF 2020

Source: National Oil Industry Associations

Unit: Number of petrol stations

COUNTRY	Number of petrol stations	COUNTRY	Number of petrol stations
Austria	2 733	Italy	21 750
Belgium	3 085	Latvia	612
Bulgaria	4 600*	Lithuania	718*
Croatia	N/A	Luxembourg	238
Cyprus	315	Malta	69*
Czechia	4 008	Netherlands	4 142
Denmark	2 051	Poland	7 739
Estonia	495	Portugal	3 418
Finland	1 869*	Romania	1 615**
France	11 160	Slovakia	973
Germany	14 459	Slovenia	N/A
Greece	6 100	Spain	11 650
Hungary	2 014	Sweden	2 701
Ireland	1 850		
EU-27 TOTAL = 110 364			
United Kingdom	8 385		
Norway	1 709		
Switzerland	3 357		
Turkey	13 063		
TOTAL UK + NO + CH + TR = 26 514			
TOTAL = 136 878			

EU NON EU

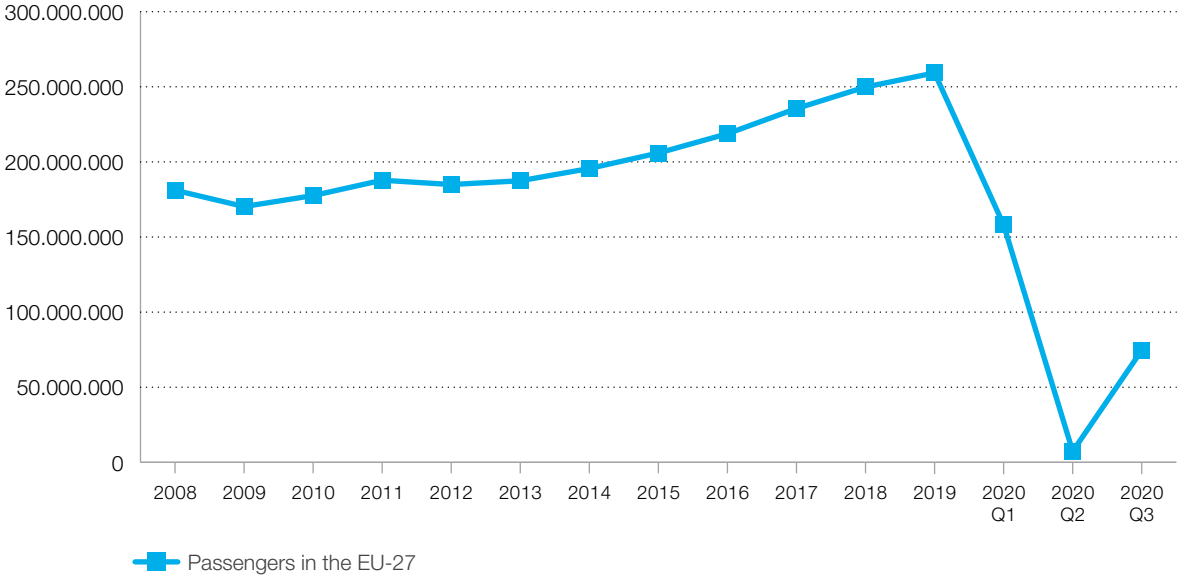
There were over 136 000 petrol stations in the EU-27, Norway, UK, Switzerland and Turkey operating in 2020 fuelling some 250 million cars and over 35 million trucks.

* Numbers for 2019

** The decrease in the number of the stations in Romania compared to the previous year is the result of a new procedure of counting, which does not include the unbranded pump stations.

FIG.47 AVERAGE QUATERLY PASSENGER AIR TRANSPORT IN THE EU-27

Source: Eurostat

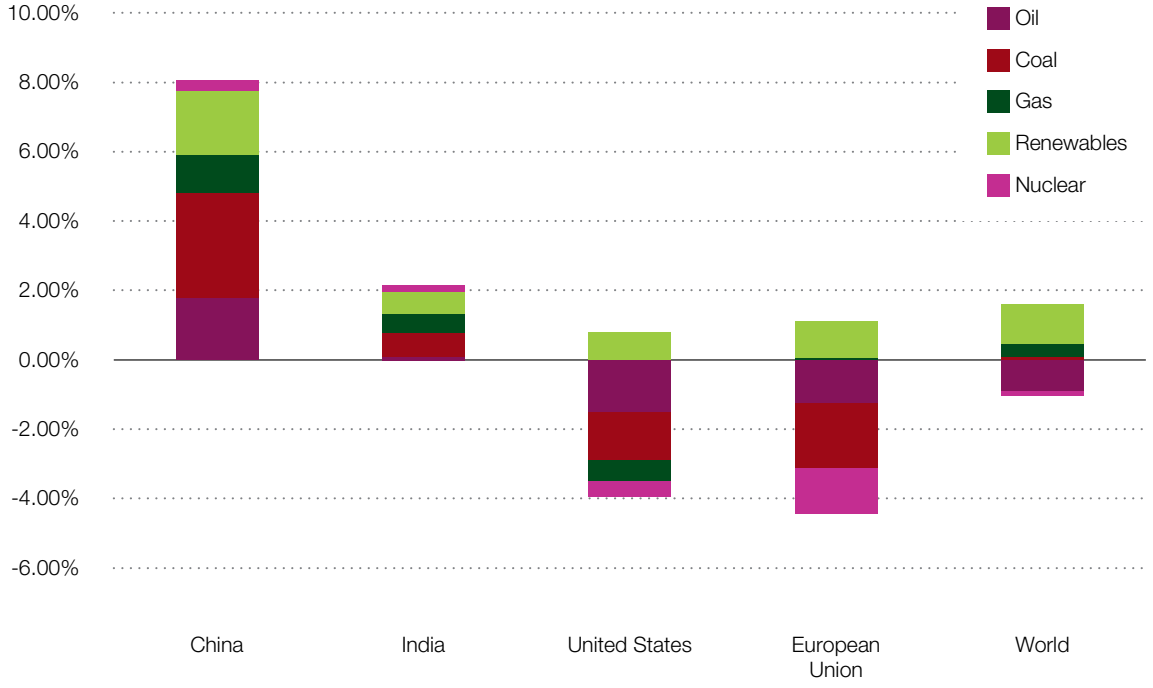


The number of air transport passengers has been progressively growing since 2008 until 2019. A small decrease, which can be attributed to the aftermath of the 2008 financial crisis, has been witnessed in 2009-2010. The change in the amount of passengers transport by air following the COVID-19 crisis, travel restrictions and the economical conditions have resulted in a dramatic drop reaching -70% in 2020 versus 2019 based on average quarterly air passenger transport figure.

COVID-19’S IMPACT

FIG.48 CHANGE OF PRIMARY ENERGY DEMAND BY REGION AND BY FUEL TYPE IN 2021 RELATIVE TO 2019

Source: International Energy Agency



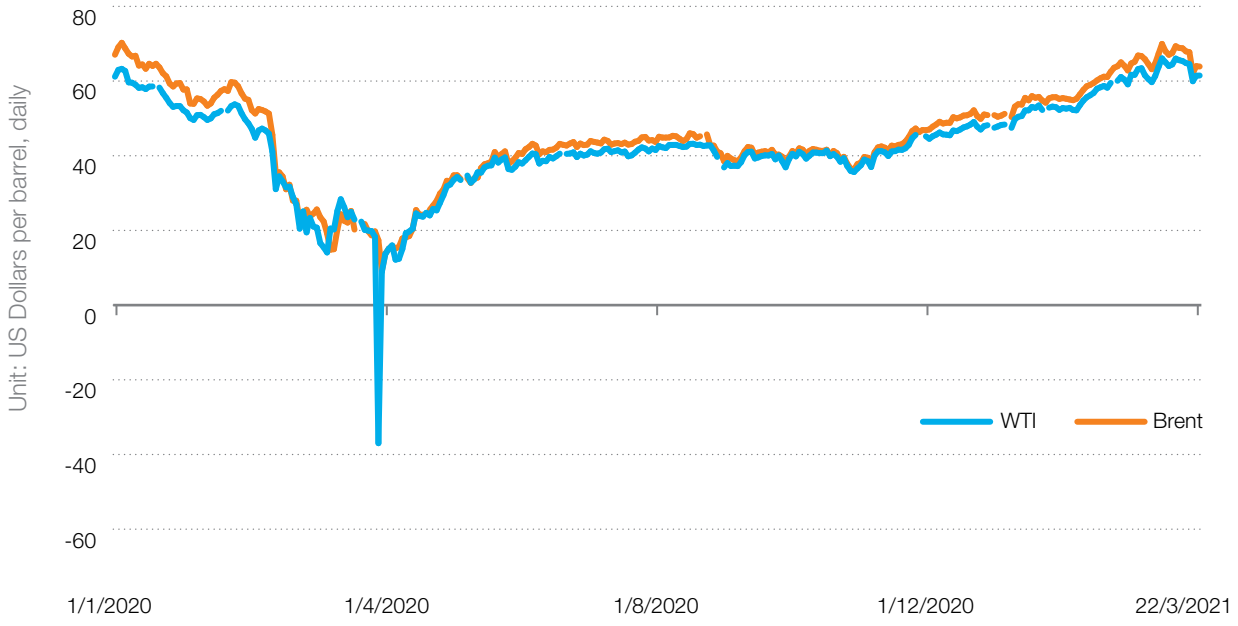
The drop in demand in 2020 did not affect all fuels evenly. Oil was by far the hardest hit, with restrictions on mobility causing demand for transport fuels to fall by 14% from 2019 levels. At the peak of restrictions in April, global oil demand was more than 20% below pre-crisis levels. Overall, oil demand was down by almost 9% across the year.

In 2021, oil demand is expected to rebound by 6%, faster than all other fuels. The last time oil demand increased this rapidly was in 1976. Despite the strong rebound, oil demand remains 3% (3.1 mb/d) below 2019 levels.

Road transport activity has remained subdued through much of the year, expected to recover to pre-Covid-19 levels only in the last months of 2021, while air transport demand is on track to remain markedly below 2019 levels for all of 2021. Only in Asia and, notably, in China does oil demand climb well above pre-Covid-19 levels.

FIG.49 WTI VS BRENT

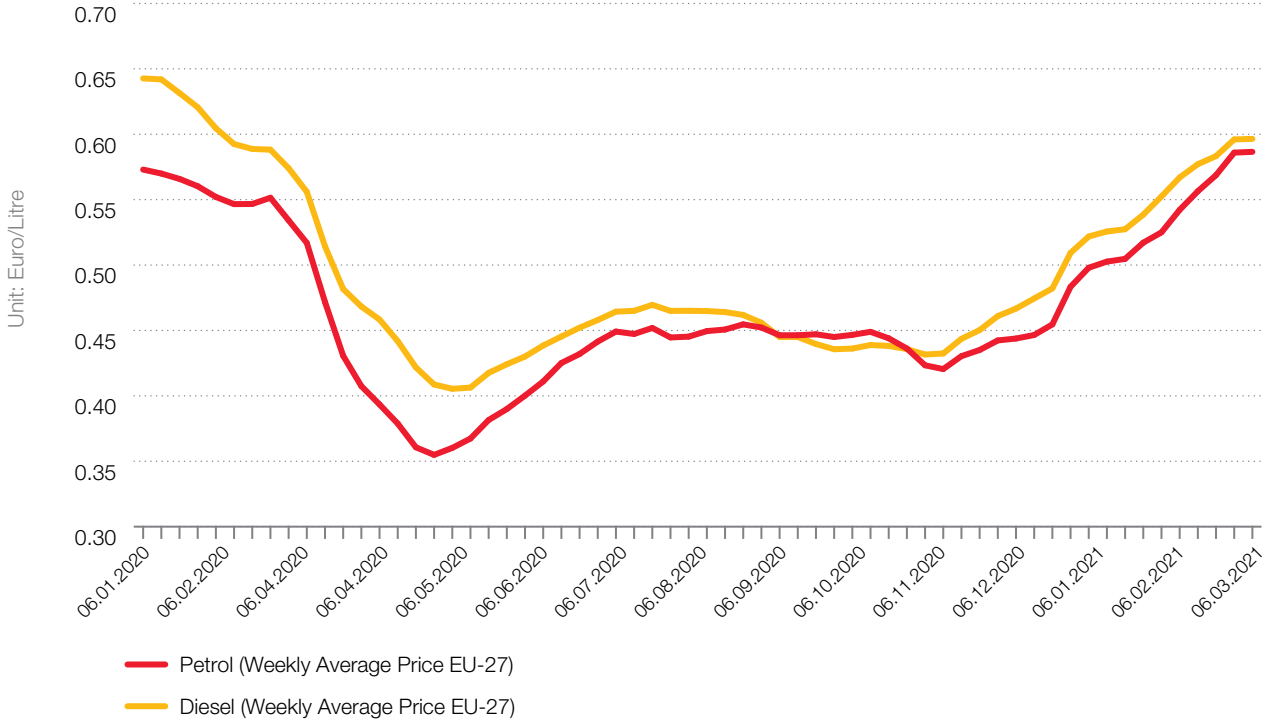
Source: Federal Reserve Economic Data



With the onset of the COVID-19 pandemic, the WTI price fell precipitously; the Brent price also fell, but not as much. This difference in the behavior of the two oil prices may be caused by differences in the storage technologies at settlement. In Cushing, where WTI is settled, storage is fixed and the cost of transporting the crude to another storage facility is high. Brent, on the other hand, is produced in the North Sea and can be more easily transported to waterborne tankers for temporary storage.

FIG.50a GASOLINE AND DIESEL UNTAXED PRICE DEVELOPMENT DURING COVID-19 CRISIS

Source: Oil Bulletin, European Commission



The rapid decline in economic acitivity during the COVID-19 crisis put a downward pressure on fuel prices, as demand plummeted and refineries struggled with over-production and limited storage capacity. The price decline was exaerbated by a price war between Russia and OPEC in Q1 2020 that faciliated a -65% quaterly drop in crude prices. With plummeting product prices, the relative share of the tax burden on refining products grew considerably. Prices went progressively back up reaching pre-Corona level in February 2021.

FIG.50b GASOLINE AND DIESEL PRICE WITH TAXES DEVELOPMENT DURING COVID-19 CRISIS

Source: Oil Bulletin, European Commission

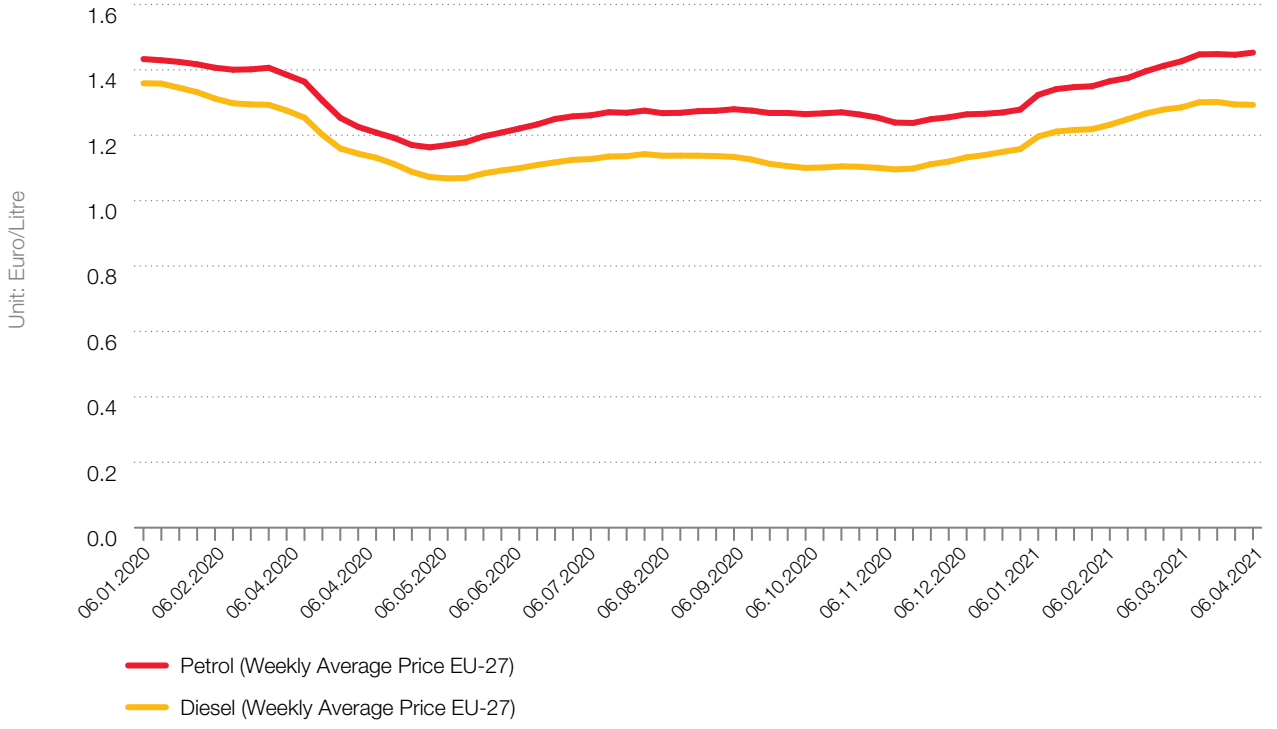


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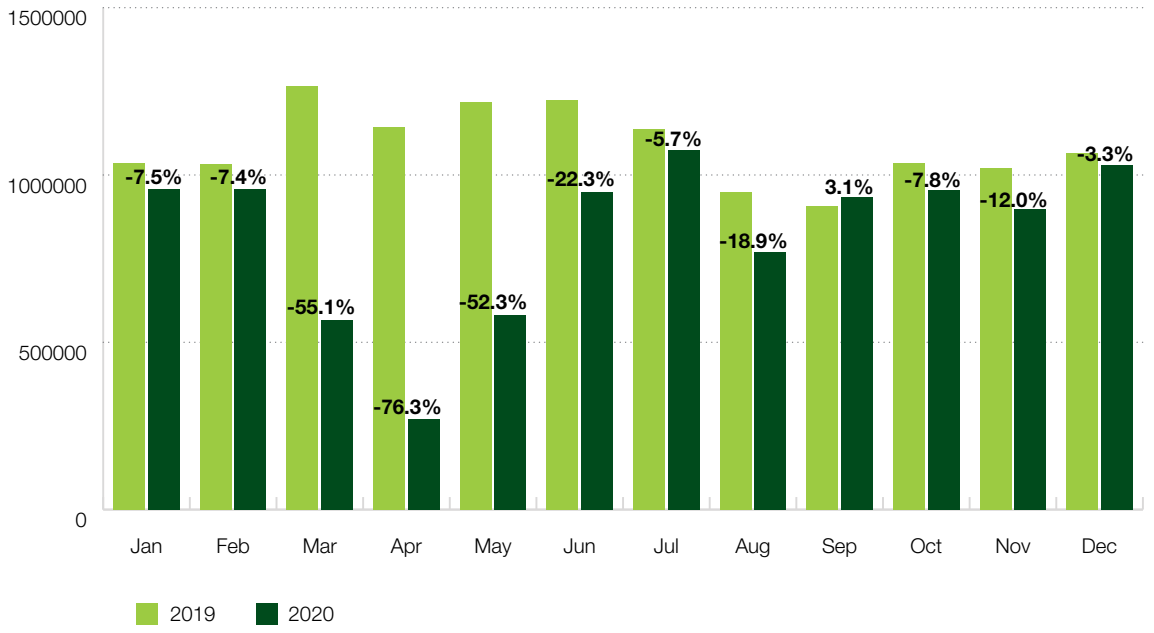
FIG.51 NEW PASSENGER CAR REGISTRATIONS IN THE EU-27 IN 2020 COMPARED TO 2019

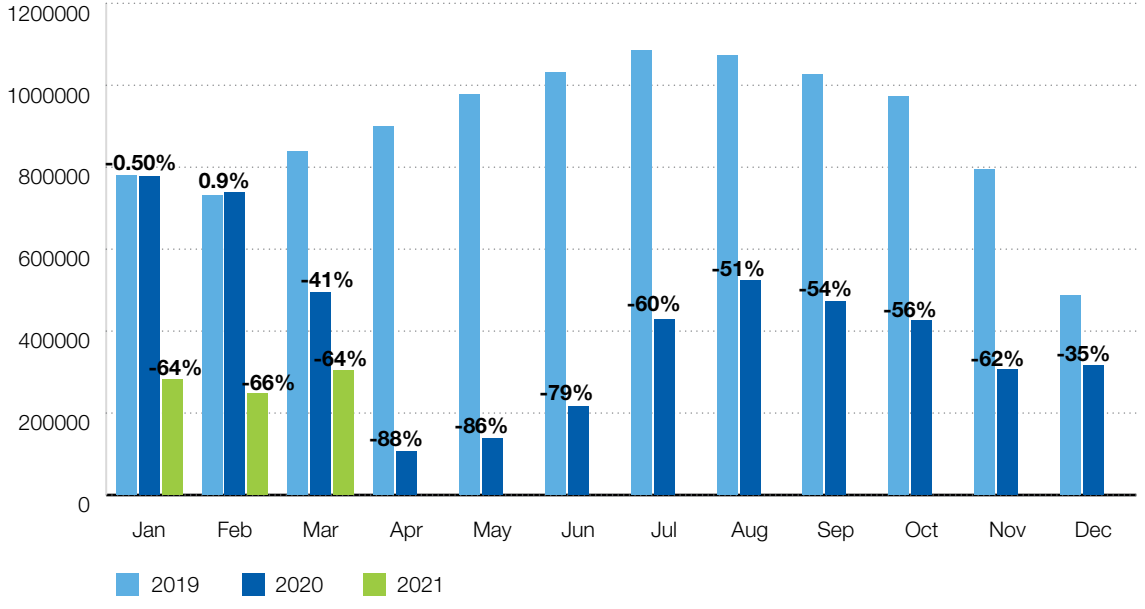
Source: ACEA



2020 saw the biggest yearly drop in car demand since records began. As COVID-related restrictions continued to weigh heavily on sales across the European Union. From 2019 to 2020, the EU passenger car market contracted by 23.7% to 9.9 million units.

FIG.52 NUMBER OF FLIGHTS PER MONTH IN THE EUROCONTROL AREA IN 2020 AND 2021 COMPARED TO 2019

Source: EUROCONTROL



In 2020, a large number of countries across the globe shut down borders and limited travel as a response to the COVID-19 outbreak. While January 2020 and February 2020 recorded a minor decrease in the number of flights in the EUROCONTROL area* compared to 2019, a drastic fall in the number of flights in April 2020 (-88.2%) and May (-85,93%) was witnessed. The number of flights rose slightly by June (-78,97%) with the relaxation of flight restrictions, then dropped again with the second wave of COVID-19 in October (56,31%). In 2021, the number of flights stayed relatively stable but low.

* EUROCONTROL area: EU-27, Albenia, Armenia, Bosnia and Herzegovina, Georgia, Israel, Monaco, North Moldova, Republic of Moldova, Montenegro, Morocco, Norway, Serbia, Switzerland, Turkey, UK, Ukraine.

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