



UKPIA

United Kingdom
Petroleum Industry Association



Statistical Review

2019: 17th Edition



The UK Petroleum Industry Association (UKPIA) is the trade association for the UK downstream oil sector. We represent the interests of our members and associate members across the industry, who are involved in the refining, distribution and marketing of oil and gas products in the UK.

Members



Associate members



Disclaimer:

This report has been prepared by UKPIA by its own assessment and does not represent the combined views of its members. All data shown in tables and charts are UKPIA's own data, except where otherwise stated and cited in footnotes and are copyright © of the UK Petroleum Industry Association. This report is the intellectual property of UKPIA and may not be published or distributed without prior written permission. The modelling and results presented here are based on information provided by third parties, upon which UKPIA has relied in producing its report and forecasts in good faith. Any subsequent revision or update of those data will affect the assessments and projections shown.

Contents

Introduction	5
UKPIA Analysis	6
Economics	8
Refining	12
Products	16
Health and Safety	22
Retail	28
Mobility	32
Environment	36
Acronyms	50

Introduction

Welcome to the 2019 UKPIA Statistical Review.

This year's publication has undergone a change in style, which we hope readers will enjoy, but the focus on providing – in one place – in-depth and rigorous data remains the same.

In this review you will find an array of information about the downstream oil sector's impact across the UK: be it the contribution to the UK economy, the improvements being made in the fields of process safety and environmental protection, statistics on our refineries, terminals and filling stations, to the fuels and products we produce.

Overall, these statistics once again demonstrate the robustness and significance of the downstream oil industry in the UK. As our sector looks ahead to the future, it is these strengths that will help to propel us onwards. With a vision for our sector as a key part of the UK's drive to decarbonise the economy, these statistics already demonstrate the major reductions in greenhouse gas emissions the industry has made over many years. Building on these achievements, the downstream oil sector can leverage our position to society's mutual advantage and help to secure our industry's vital role for generations to come.

Martin White | President, UK Petroleum Industry Association



UKPIA Analysis

This year's UKPIA Statistical Review – with data reviewed from across the downstream oil sector – aims to be a comprehensive compendium of relevant information for downstream oil. Across a range of measurements, we can discern the impact that the sector has retained, be it in terms of its contribution to GDP, employment and tax revenue, supporting decarbonisation targets in industry and transport, or prioritising improvements in safety standards and reliability.

As highlighted in Oxford Economics' recent UKPIA-commissioned publication¹, in 2016 the downstream oil sector made an overall contribution – through direct, indirect and induced impacts – of £21.6 billion to GDP and supported around 300,000 jobs across the nations and regions of the UK.

While there is rightly a focus on the long-term changes that are expected to take place in the downstream sector, not least with UKPIA's own publication of the UKPIA Future Vision in July², the statistics here in many ways have shown relative stability year-on-year. There are, however, some notable changes:

in 2016 the downstream oil sector made an overall contribution – through direct, indirect and induced impacts – of £21.6 billion to GDP

- The sector is still a major contributor to the Exchequer, with £39.4 billion raised from road fuels duty and VAT in 2018. This was the highest amount raised in the last decade, and above the 5-year average of £38 billion and 10-year average of £37.7 billion. It came principally from the increase in average pump price (and therefore tax receipts) rather than any significant growth in demand.
- The deficit of imports versus exports of refined petroleum products continues, following the trend set since the UK became a net importer in 2013, driven by the ongoing strong demand for diesel and jet fuel. In spite of this negative effect on the country's balance of payments, the UK nonetheless continues to be a net exporter of petrol, fuel oil, gasoil and other gases.
- While overall miles driven in the UK have continued to rise incrementally in line with most of the last decade, 2018 saw a continuation of the rapid fall seen in 2017 diesel vehicle registrations. Despite year-on-year growth in alternative fuels vehicles (EVs and others), petrol vehicles registrations growth still outstripped them, although 2018 saw fewer sales overall than 2017.
- The sector continues to demonstrate resilience in a challenging economic climate, with net profits for UKPIA member companies of £1 billion in 2017, with £60 billions of operating expenses, taxes and interest, and £61 billions of gross sales. Rates of return on capital employed show the sector fares favourably in comparison to other capital-intensive sectors such as manufacturing, services and upstream oil, with 5-yearly and 10-yearly ROCE averages of 10.9% and 8.4% respectively for UKPIA members.



For more information please contact
info@ukpia.com

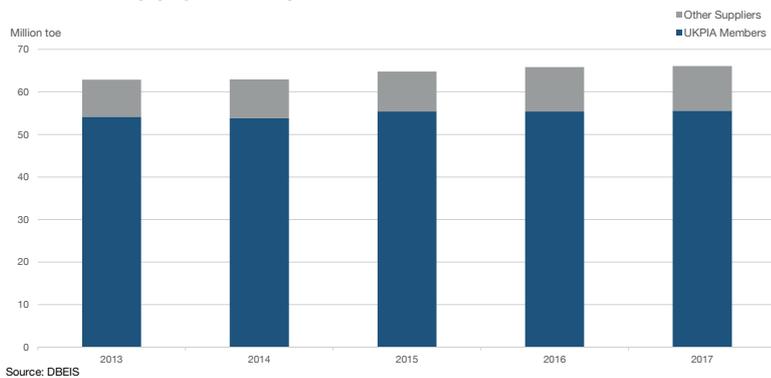
¹ Oxford Economics, 'The Economic Contribution of the UK Downstream Oil Sector', February 2019, [<https://www.ukpia.com/media/1005/the-economic-contribution-of-the-downstream-oil-sector-evidence-paper.pdf>]

² UKPIA Future Vision: The Downstream Oil Sector in a Low-Carbon World, July 2019, [<https://www.ukpia.com/media/2230/ukpia-vision-july-2019.pdf>]

Economics

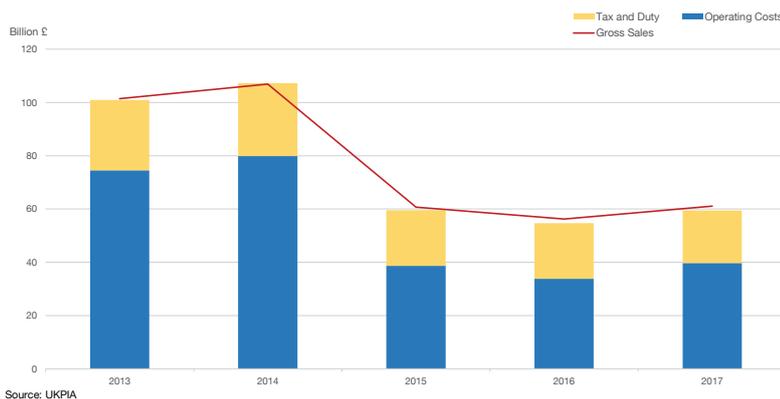


Source of supply of oil products in the UK



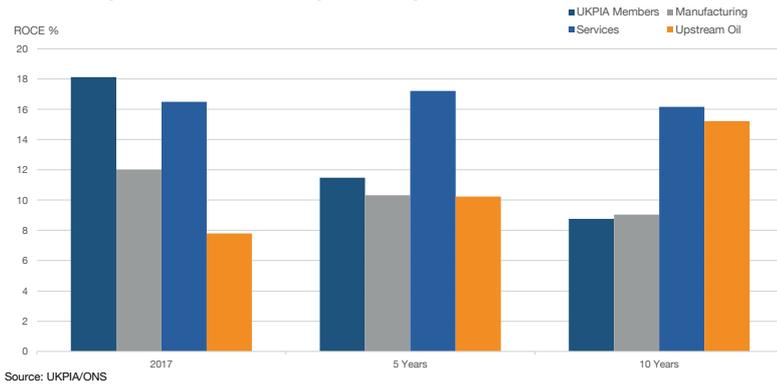
As in 2016, over 84% of inland oil consumption in the UK was sourced by UKPIA member companies in 2017, providing the secure supply of fuels at competitive prices.

Profit measurement of UKPIA members



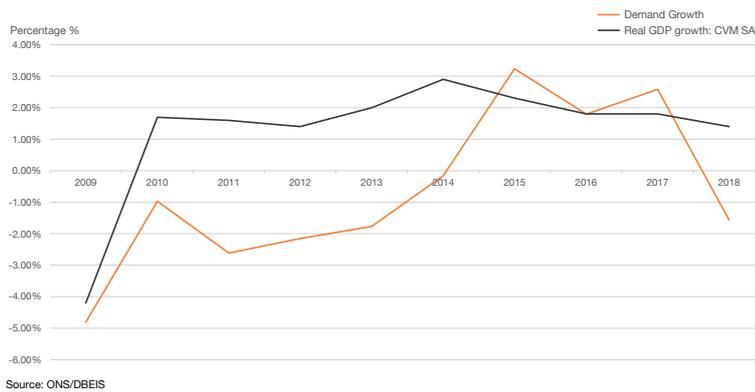
UKPIA members net profits (gross sales minus operating expenses, tax and interest) remained at £1 billion compared to the previous year, with £60 billion of operating expenses, taxes and interest, and £61 billion of gross sales.

Profitability and efficiency of capital invested



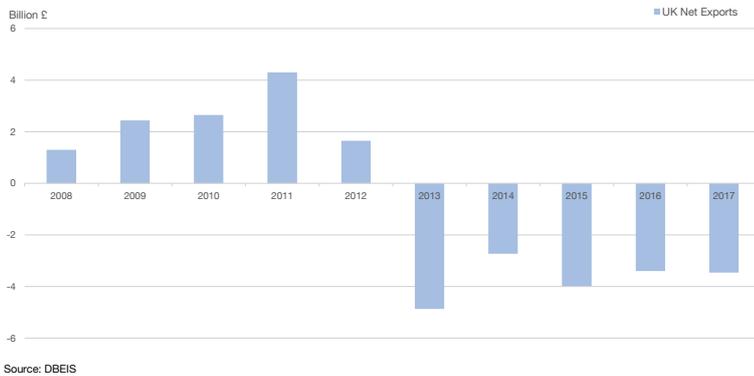
With 18.1% return on capital employed (ROCE), UKPIA members fared better in comparison to other capital-intensive sectors such as manufacturing, services and upstream oil. ROCE for UKPIA members has been stable and rising favourably at a 5-yearly and 10-yearly average of 10.9% and 8.4% respectively.

GDP growth and demand for oil and oil products



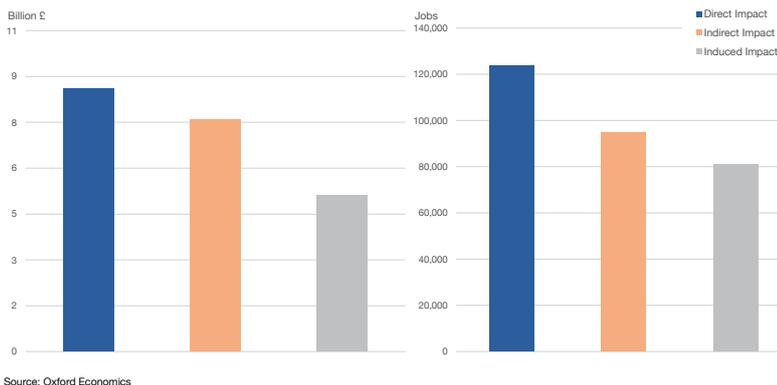
2018 saw a contraction in demand for oil products from 71,205kt to 70,094kt, driven largely by a fall in transport fuel demand, in particular for diesel.

Contribution to balance of payments (excluding crude oil)



The downstream oil sector's contribution to UK balance of payments continues to be negative, since the UK became a net importer of refined petroleum products in 2013, as a result of growing demand for diesel and jet fuel and the closure of two refineries since 2012.

Total sector economic contribution

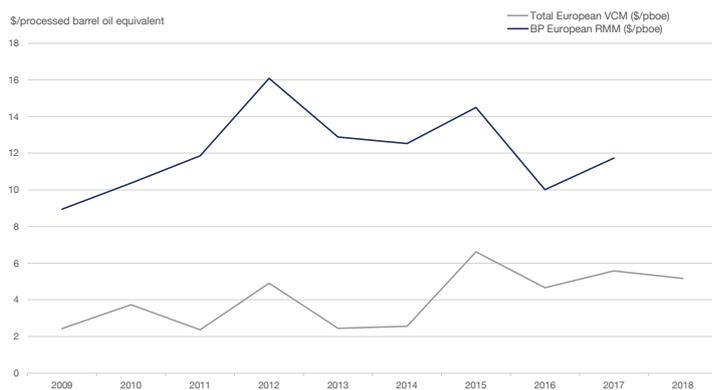


The sector supported £8.6 billion in GDP and 123,800 jobs directly through its own activities. Including indirect and induced impacts, the sector supports £21.2 billion annually in GDP and nearly 300,000 jobs across the UK.

Refining



European refining marker margins



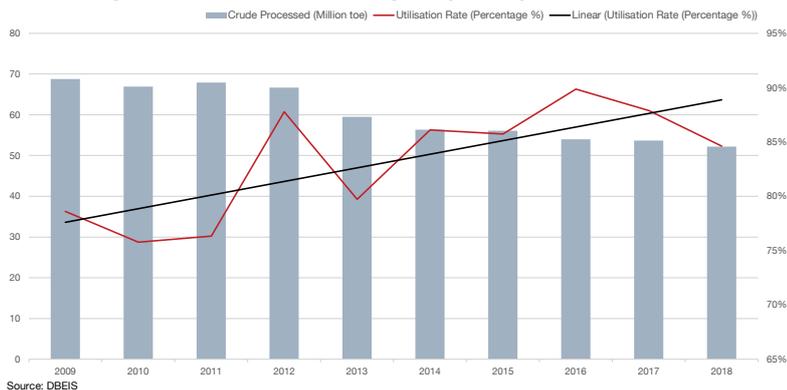
Source: Total / BP / CME Group

Refining margins vary from refinery to refinery and depend on refiner characteristics and the crude feedstocks used. Margins shown are based on each company's methodology; BP using Refining Marker Margin* and Total using Variable cost margins**.

*The BP Refining Marker Margin (RMM) uses regional crack spreads to calculate the margin indicator and does not include estimates of fuel costs and other variable costs. The RMM shown here is for North Western Europe (Brent Crack Spreads).

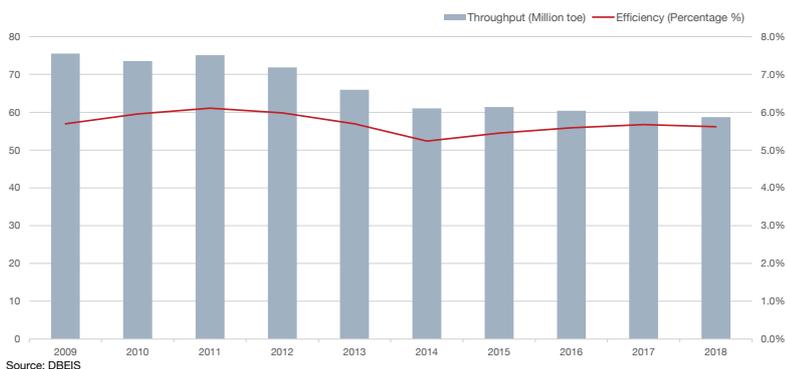
**This indicator represents the average margin on variable costs realized by Total's European refining business (equal to the difference between the sales of refined products realized by Total's European refining and the crude purchases as well as associated variable costs, divided by refinery throughput in tonnes).

UK refining and manufacturing capacity utilisation



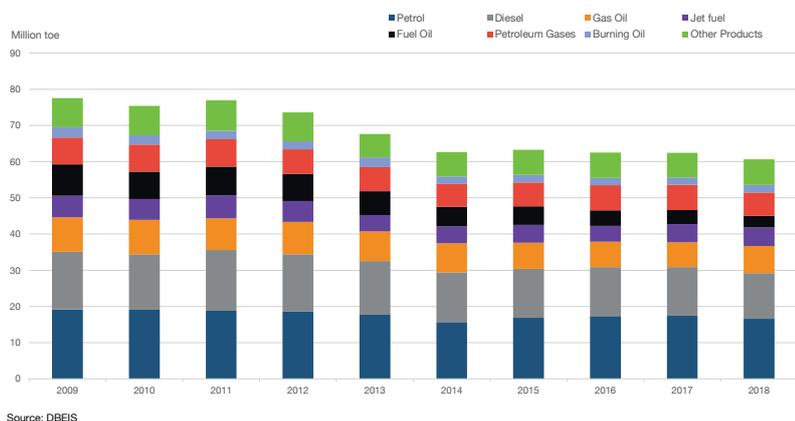
In 2018 refinery utilisation was down by 3.7%. However, using a linear approach rates have steadily risen since 2009. Utilisation rates are never 100% as they are impacted by several operating factors, including planned and unplanned maintenance shutdowns.

UK refinery throughput and energy efficiency



In 2018 refinery throughputs were down by a further 2.6% from 2017, due to changes in refinery set-ups. This also led to stable energy efficiency rates (i.e. the amount of crude that is used in processing within a refinery) under 6%, with less throughput needed as fuel for operational processes.

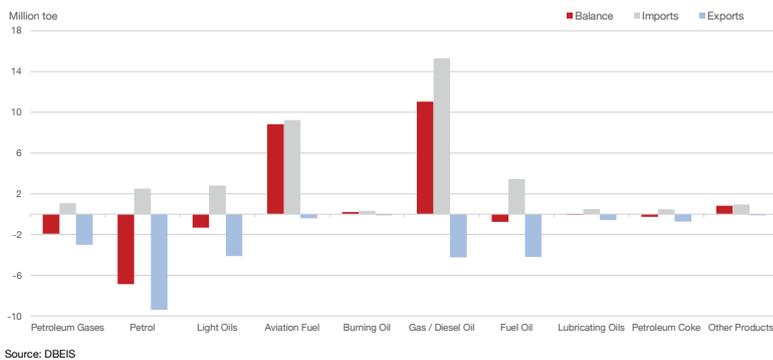
UK refined products of crude oil



The declining proportion of fuel oil produced by UK refineries continued in 2018, with 3.2 million tonnes produced compared to 8.6 million tonnes in 2009. Middle distillates – such as diesel, gas oil and jet fuel – continue to make up the largest part of the fuels produced in the UK, with a 41% share of barrel in 2018.

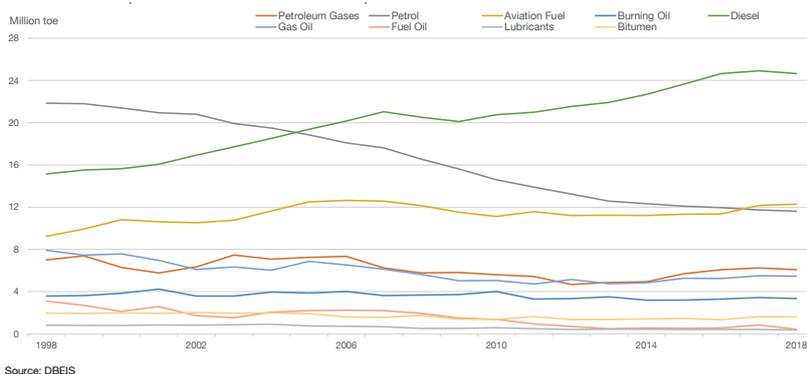
Products

Imports and exports of oil products in the UK in 2017

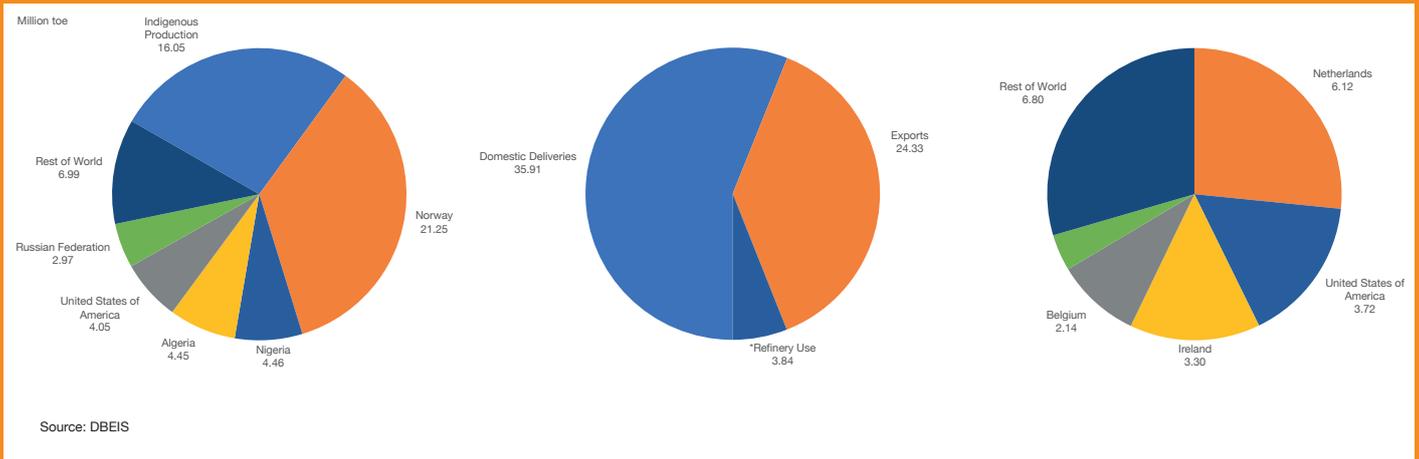


UK refineries were historically configured to predominantly produce petrol, but as a result of shifts in domestic product demand, imports and exports have changed. In 2017 the UK was a net exporter of petrol (6.9mtoe) and petroleum gases (1.9mtoe) and net importer of diesel (11mtoe) and aviation fuel (8.8mtoe).

Deliveries of oil products for UK inland consumption



In the last decade, the UK diesel market has increased by 65% from 15 million tonnes, with consumption in 2018 standing at 24.9 million tonnes – albeit there was a slight drop off from 2017. This has been mirrored by a gradual decline of 47% in petrol consumption from 21.9 million tonnes to 11.6 million tonnes.



Source location of crude oil in 2017

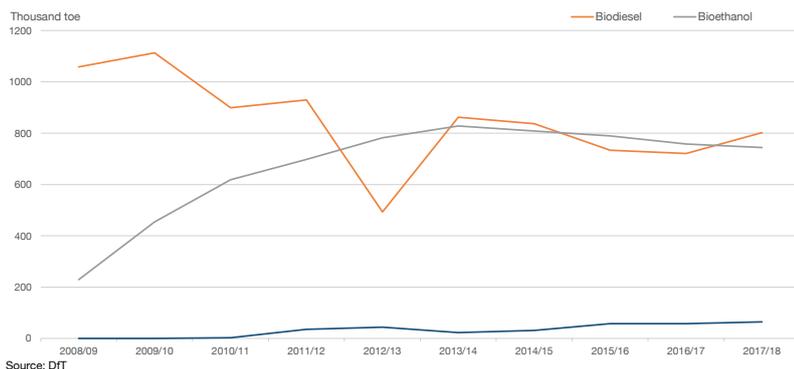
Disposal of produced oil products in 2017

Export destination of oil products in 2017

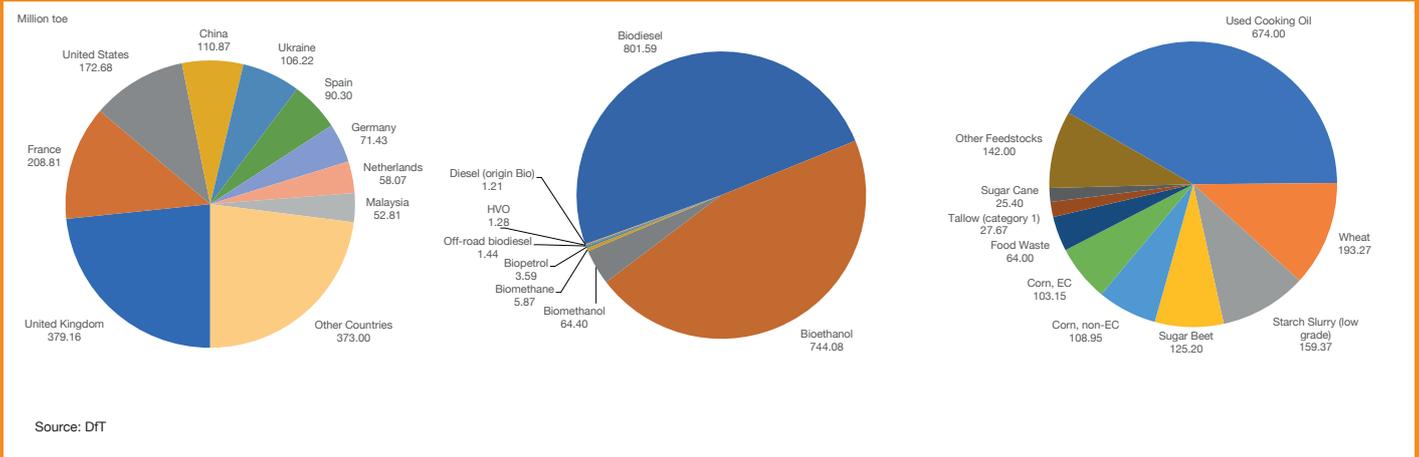
The UK became a net importer of crude oil in 2005, with latest figures showing 16 million tonnes of feedstock sourced from the UK Continental Shelf, (making up 26.5% of the total) in 2017. In total, however, nearly 62% of UK refinery crude output was from the North Sea when imports from Norway (35.2%) are included. The majority of oil products processed at UK refineries continue to be consumed in the inland market, at approximately 56% of production alongside nearly 6% used in refinery processes. The difference of 37.9% of finished products produced in the UK is exported to key markets, including the Netherlands (26.6% of total exports), the USA (16.1%) and the Republic of Ireland (14.4%).



Deliveries of biofuels for UK inland consumption



Bioethanol consumption continued to decline in 2017/18 at 744 million litres, since a peak of 828 million litres in 2013/14. Current supplies to the UK market are limited at a maximum of 5% volume ethanol in petrol (E5). Biodiesel consumption has remained essentially flat at 800 million litres in 2017/18.



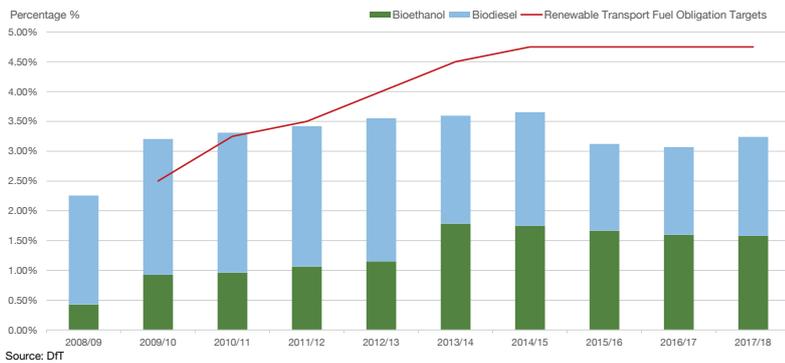
Source location of biofuel products in 2017

Types of biofuel products in 2017

Biofuel feedstocks in 2017

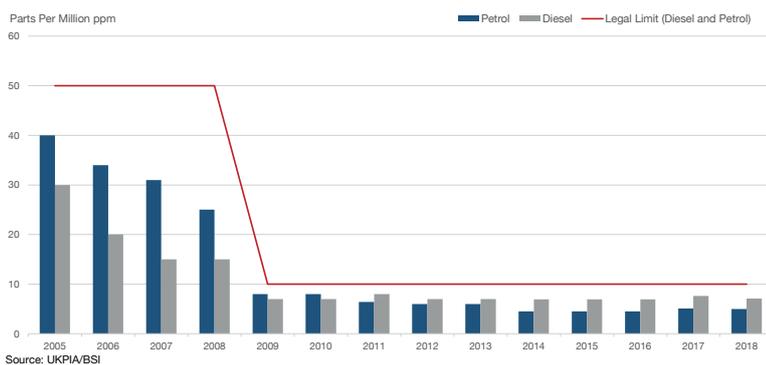
Just under one-quarter of biofuels used in the UK are produced domestically (23.3%), with France (12.8%), the US (10.6%) and China (6.8%) the next largest sources. Used Cooking Oil (UCO) makes up the largest proportion of biofuel, with 41% of feedstocks from this source, followed by wheat (11.8%), starch slurry (9.8%) and sugar beet (7.7%). Of all the biofuels used in the UK in 2018, 45.8% was bioethanol (used in petrol), nearly 4% was biomethanol (also used in petrol) and the highest proportion (49.4%) being biodiesel (predominantly Fatty Acid Methyl Esters or FAME).

Volume of biofuels in road fuels in the UK



Progress against the Renewable Transport Fuel Obligation (RTFO) target can be assessed by comparing the number of 'Road Transport Fuel Certificates' (RTFC) issued to the total volume of fuel sold. One RTFC is issued per litre or kilo of liquid biofuel derived from crop-based feedstocks, whilst non-crop based sourced biofuels receive two RTFCs. In the last accounting period (2017/18), biofuels volumes reached 3.3% when averaged over all obligated fuels. However, when factoring in the 'double counting' allowance for non-crop based biofuels, volumes met the RTFO target.

Levels of sulphur in petrol and diesel

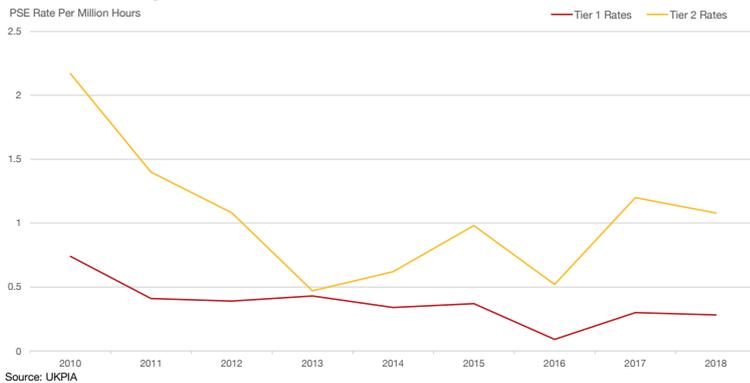


The level of sulphur in petrol and diesel is limited by the European Union's Fuel Quality Directive (FQD), transposed into UK legislation. Since 2009, all UK petrol and diesel has been sulphur-free at 10ppm or less.

Health & Safety



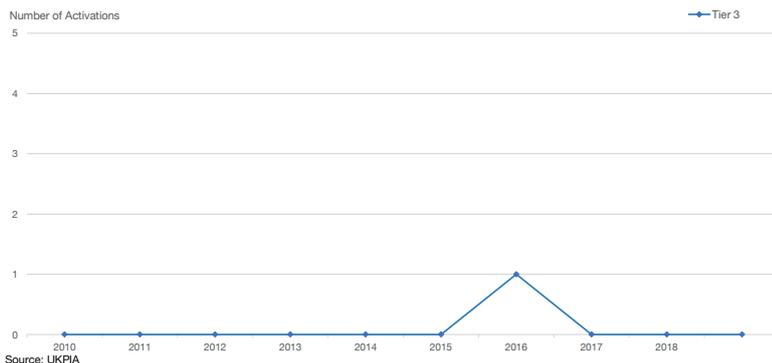
Process safety event rates



Tracking the number of Tier 1 and Tier 2* process safety events (PSE) across UKPIA members provide an indication of the rate at which these events occur, against the total number of hours worked normalised per million hours. The Tier 1 PSE rate remained static in 2018 compared to 2017, with approximately 0.3 events per million hours worked. Tier 2 PSEs per million hours worked declined from around 1.2 to 1.1 between 2017 and 2018.

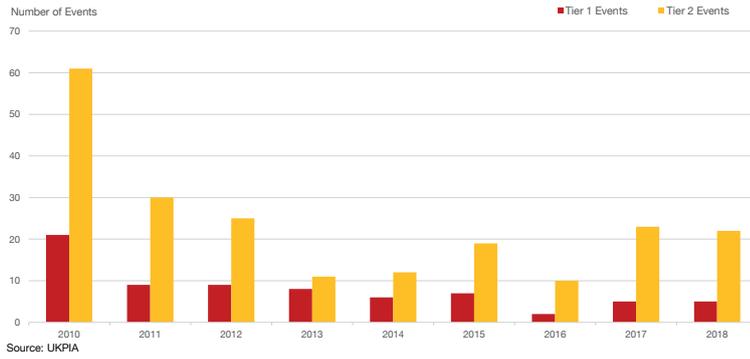
** To ensure consistency in reporting process safety indicators as an industry, UKPIA members have adopted the American Petroleum Institute's (API) Recommended Practice (RP) 754 'Process Safety Performance Indicators for the Refining and Petrochemical Industries'. It is on the indicators classified as Tier 1, Tier 2 and Tier 3 that this section is based.*

Finished gasoline tanks High-High alarm activations



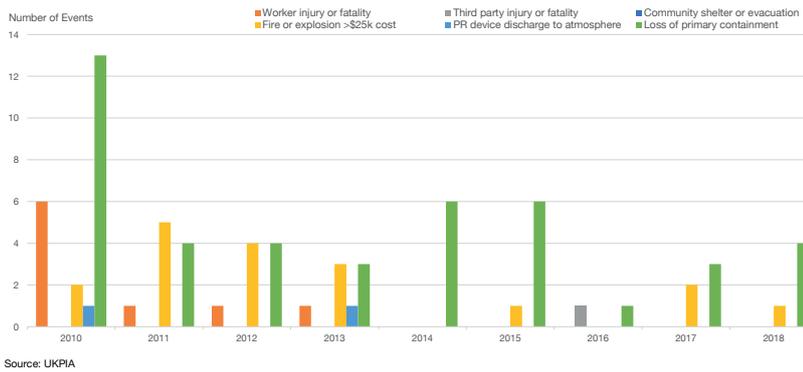
High-High alarm activations provide an indication of the number of times a safety-related or instrumented system has been activated on finished petrol tanks. UKPIA members have maintained consistent levels of low or zero events in alarm activations.

Refining process safety events



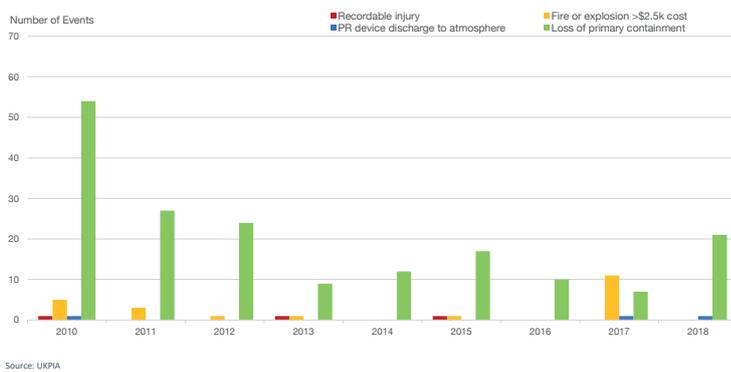
The number of Tier 1 events at UK refineries in 2018 remained unchanged from 2017 at 5. This represents a 76.1% decline in Tier 1 events at refineries since 2010. Tier 2 events at UK refineries in 2018 have been relatively low and stable since a high in 2010.

Refining Tier 1 events by consequence



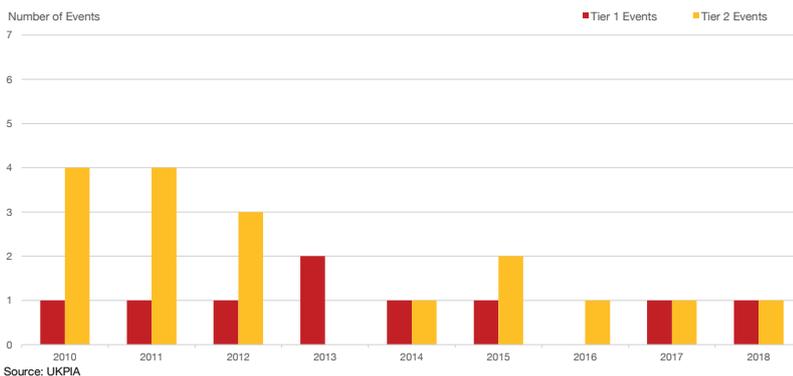
The consequences of Tier 1 events at refineries from 2010 to 2018. Note that there may be more than one consequence per Tier 1 event.

Refining Tier 2 events by consequence



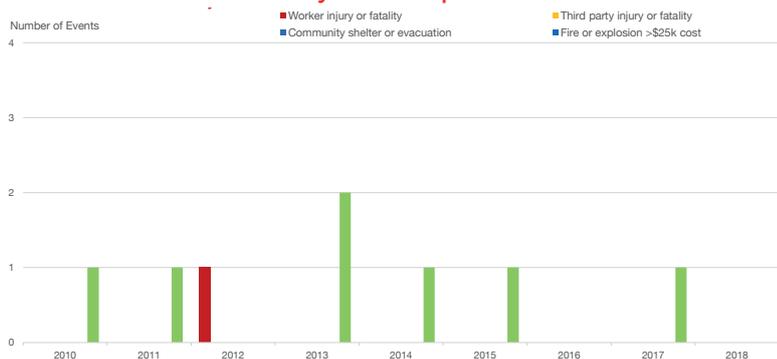
The consequences of Tier 2 events at refineries from 2010 to 2018. Note that there may be more than one consequence per Tier 1 event.

Terminals process safety events



The number of Tier 1 and Tier 2 events at UK terminals in 2018 remained unchanged from 2017 at 1 each.

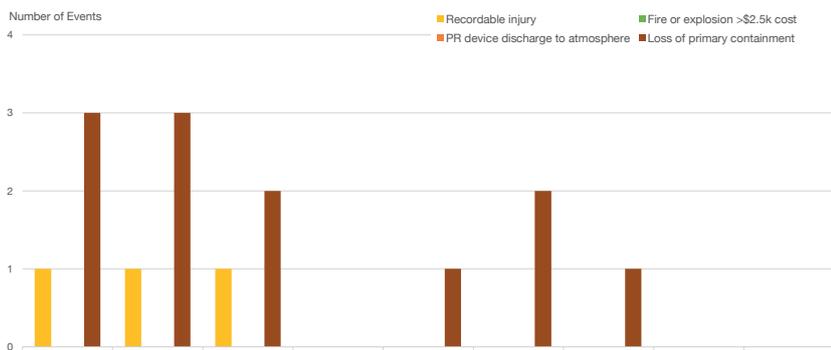
Terminals Tier 1 events by consequence



Source: UKPIA

The consequences of Tier 1 events at terminals from 2010 to 2018. Note that there may be more than one consequence per Tier 1 event.

Terminals Tier 2 events by consequence



Source: UKPIA

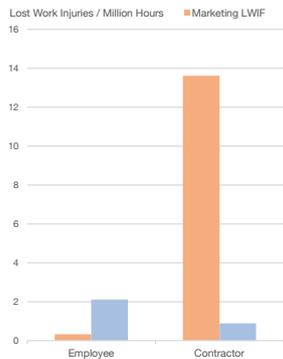
The consequences of Tier 2 events at terminals from 2010 to 2018. Note that there may be more than one consequence per Tier 2 event.



Source: UKPIA

2018 Reported injuries, diseases and dangerous occurrences

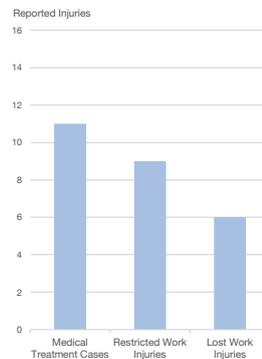
RIDDOR >7 Day figures show the frequency of injuries in three downstream oil sector categories: marketing employees, refinery employees and refinery contractors. There were zero reported refinery employee injuries that resulted in 7 or more days away from work in 2018, compared with 55 refinery contractor injuries of the same nature. Marketing employees saw 17 RIDDOR reportable injuries in the same year.



Source: UKPIA

2018 Frequency of lost work injuries

Refining Lost Work Injury Frequency compares lost work incidents relative to millions of hours of work between refinery employees and contractors. The Lost Work Injury Frequency for the marketing division of the downstream oil sector also compares injuries of contractors and employees.



Source: UKPIA

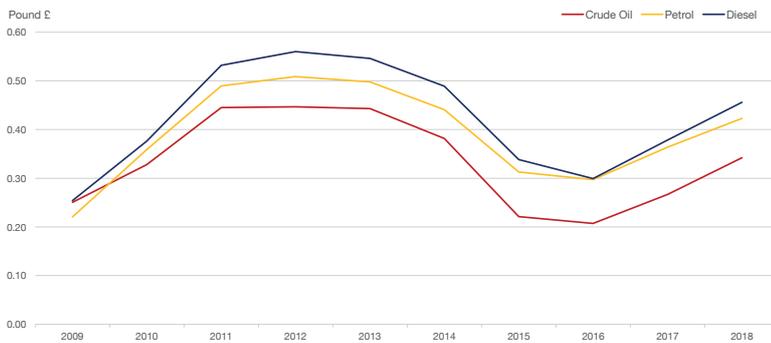
2018 Refining injuries

Refining injuries are reported according to the impact severity of injury.

Retail



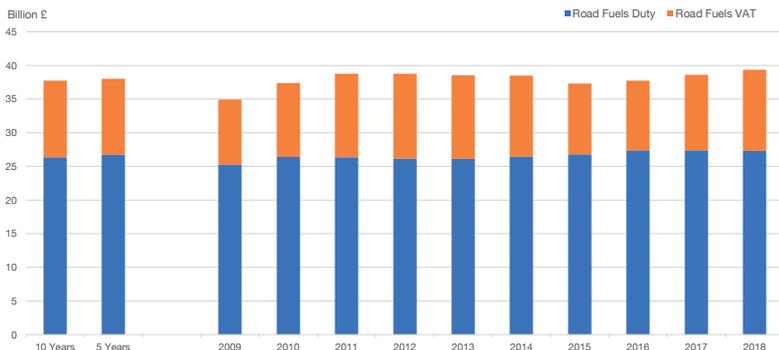
UK pre-tax fuel price differential per litre



Source: HMRC/WoodMac

The pre-tax price of petrol and diesel trends with the price of crude oil, however the effect of crude prices on the final pump price is lessened by the high levels of fuel duty and VAT, as well as by the requirement to include biofuels in petrol at the pump. The £/\$ exchange also has a significant influence on fuel prices at retail stations.

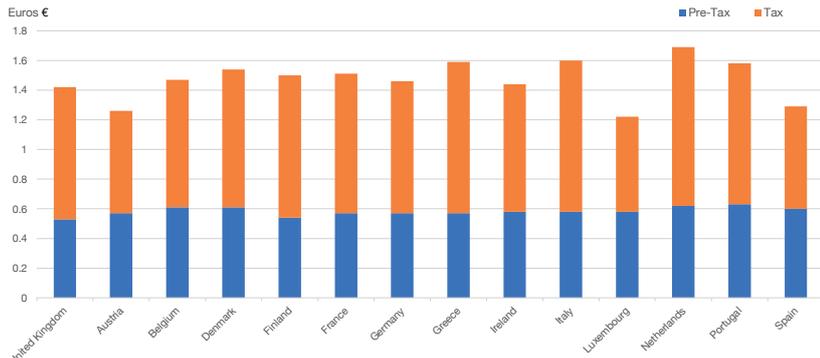
UK road fuels duty and VAT



Source: HMRC/WoodMac

£39.4 billion was raised from road fuels duty and VAT in 2018. This was the highest amount raised in the last decade, and above the 5-year average of £38 billion and 10-year average of £37.7 billion.

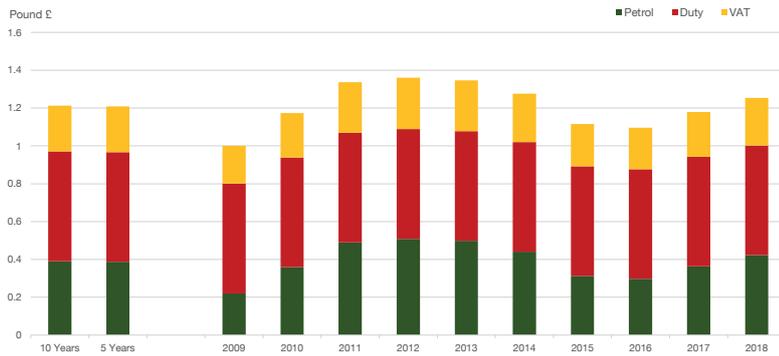
2018 EU petrol price breakdown per litre



Source: HMRC/WoodMac

The UK again enjoyed the lowest pre-tax price of major brands of unleaded petrol in 2018 at an average of €0.53. However, the price paid at the pump by UK consumers was considerably higher due to the levels of fuel tax (duty and VAT).

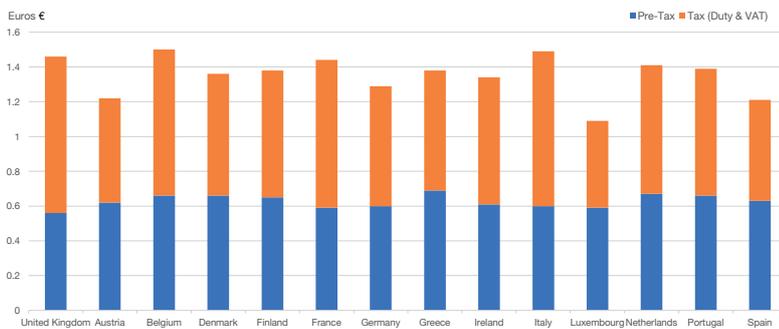
UK petrol price breakdown per litre



Source: HMRC/WoodMac

The price of petrol at the pump increased in 2018, from 30.5% of the pre-tax cost in 2017 to 33.5% a year later. Fuel duty and VAT made up 66.5% of the price of petrol at the pump in 2018.

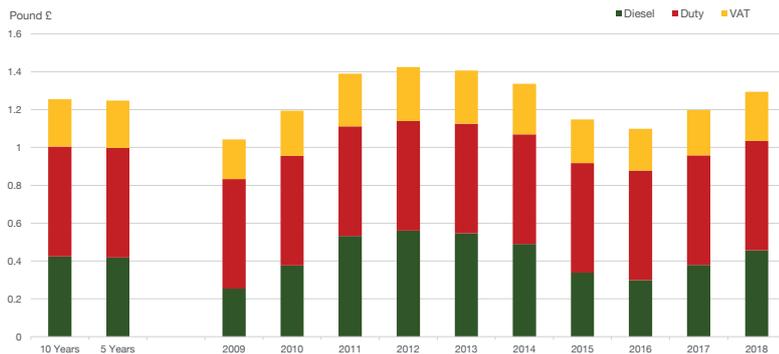
2018 EU diesel price breakdown per litre



Source: HMRC/WoodMac

The UK again enjoyed the lowest pre-tax price of major brands of diesel in 2018 at an average of €0.56. However, the price paid at the pump by UK consumers was considerably higher due to the levels of fuel tax (duty and VAT).

UK diesel price breakdown per litre



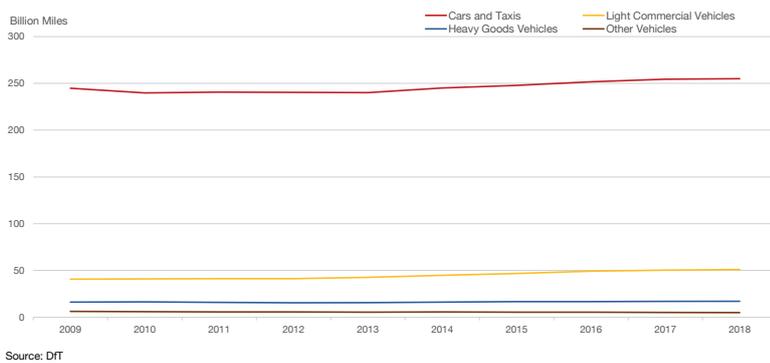
Source: HMRC/WoodMac

The price of diesel at the pump increased in 2018, from 31.5% of the pre-tax cost in 2017 to 35.1% a year later. Fuel duty and VAT made up 64.5% of the price of diesel at the pump in 2018.

Mobility

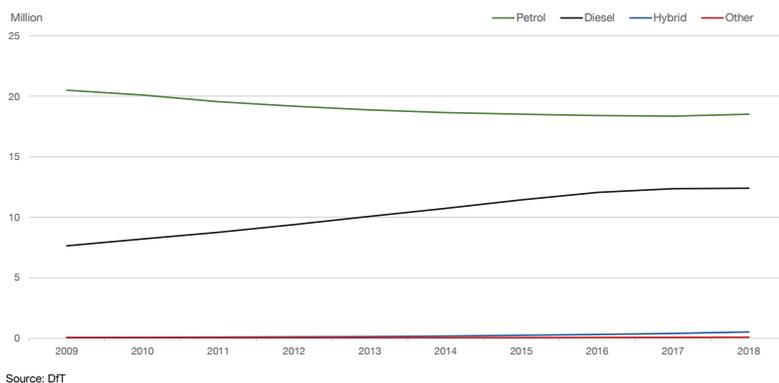


Road traffic by vehicle classification in Great Britain



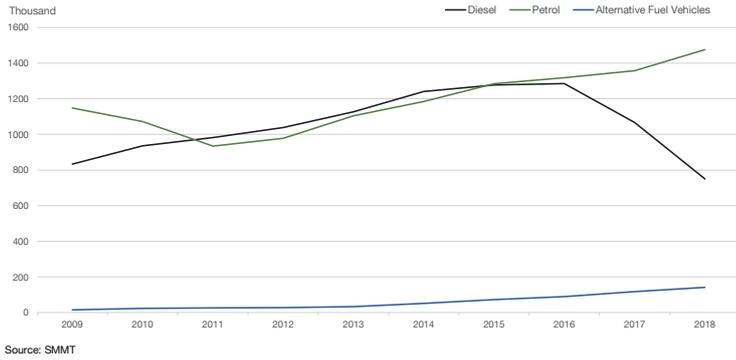
Road travel demand has increased in the last decade, from a total of 308.1 billion miles across all vehicle types in 2009 to 328.1 billion miles in 2018. The vast majority of these journeys in 2018 were made by cars and taxis (77.7%), followed by light commercial vehicles (15%) and Heavy Goods Vehicles (5.2%).

Car parc by fuel type in Great Britain



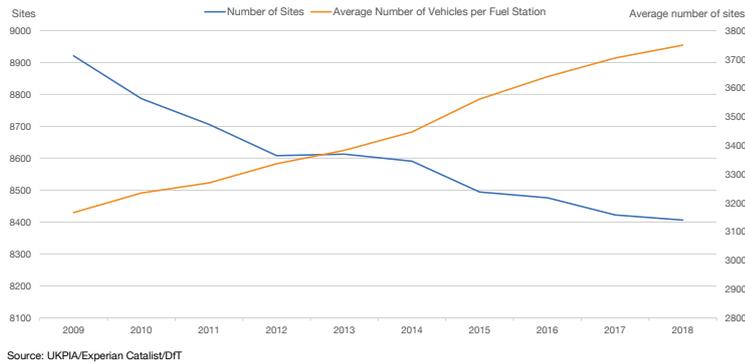
There were 31.5 million cars on the road in Great Britain in 2018. Of these, 58.7% were petrol-fuelled cars and 39.3% diesel-fuelled, 1.7% were hybrid vehicles and the balance being LPG, other gas and EVs.

New UK car registrations by fuel type



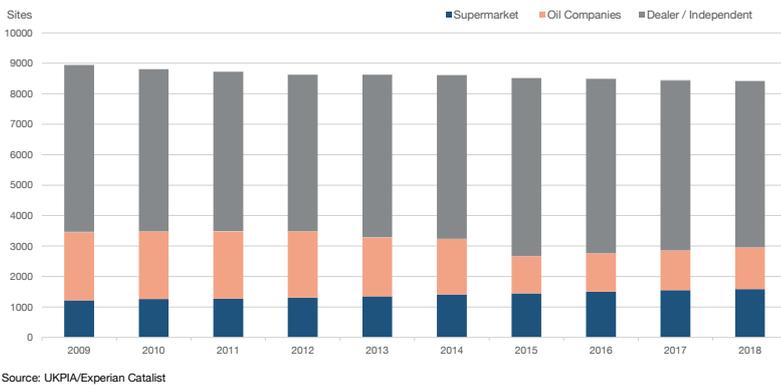
2.3 million new cars were registered in the UK in 2018, a second consecutive year of declining registrations. This can largely be explained by the sharp drop in new diesel car registrations, falling from over 1 million registrations in 2017 to only 750,000 in 2018. Alternative Fuel Vehicles (AFVs), including hybrids and EVs, saw a further increase in new registrations in 2018. In 2017, AFVs made up 4.6% of new car sales compared to 5.9% in the last year.

Average number of vehicles per site



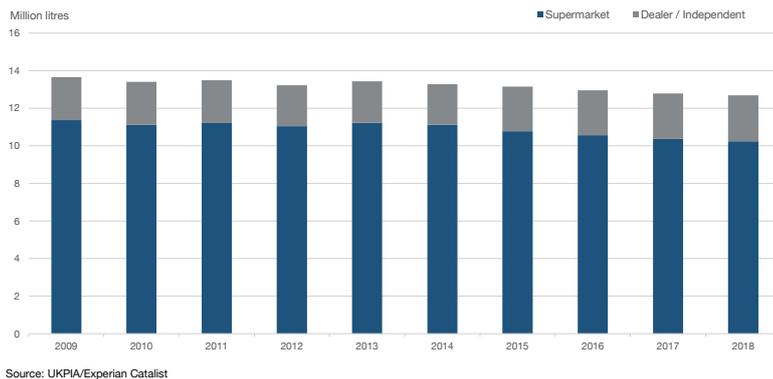
The number of vehicles registered in the UK has been growing steadily. With the number of forecourts decreasing, there are more vehicles per filling station today than ever before. The number of forecourts decreased by 16 across the UK between 2017 and 2018 to a total of 8,406, but vehicle numbers rose from 31.2 million to 31.5 million.

UK site ownership share



UK retail forecourts slightly decreased between 2017 and 2018 to a total of 8,406. Dealer and independent-owned forecourts still account for the majority of filling station sites in the UK, with 64.8% of the total number, compared to 18.9% of supermarket-owned sites and 16.1% owned by oil companies.

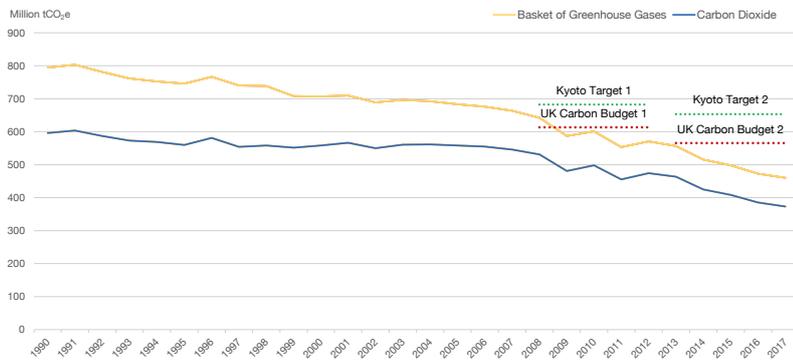
UK site throughputs



Dealer and independent-owned sites make up a preponderance of UK retail stations, however, they account for considerably less of the total throughput; on average, 2.45 million litres of fuel were sold at these sites in 2018, compared to 10.24 million litres of sales at UK supermarket forecourts.

Environment

Greenhouse Gases and commitments



Source: DBEIS

Latest emissions data from 2018 measure the UK's carbon footprint at 373.2 million tonnes a year, and an overall basket of emissions at 460.2 million tonnes a year. This means there has been a 39% reduction in CO₂ emissions since 1990, and an overall reduction of 44% against the basket of emissions.

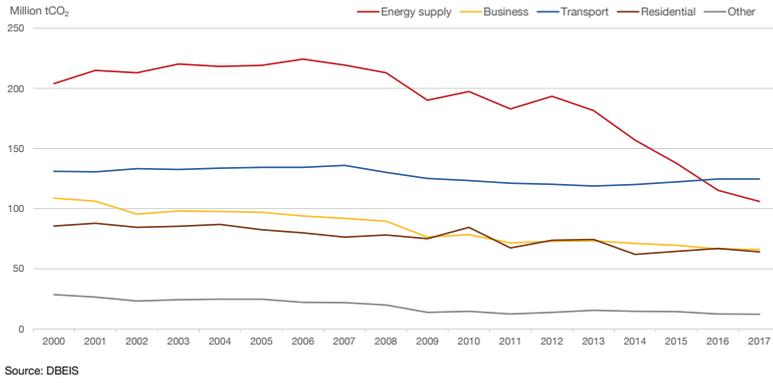
Average number of days per year air pollution by area classification



Source: DEFRA

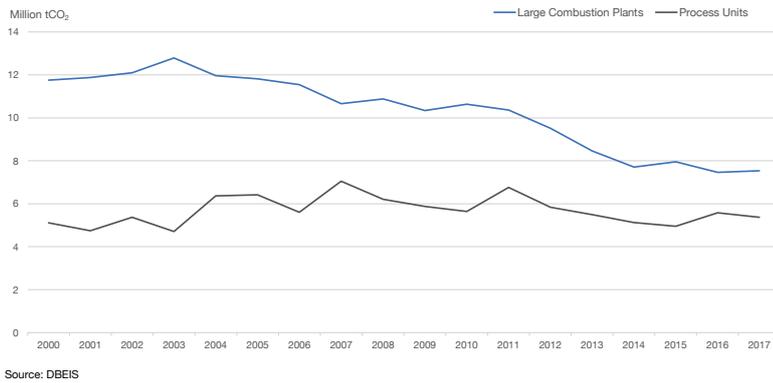
The number of days when air pollution was measured as moderate or high has fallen from an urban average of 20 days and rural average of 27.3 in 2000, to an urban average of 7 days and a rural average of 8.8 in 2017, a respective decline of 65% and 67.7%. There has been a general long-term decline in both urban and rural air pollution, with weather impacts largely accounting for variability.

UK Carbon Dioxide (CO₂) emissions



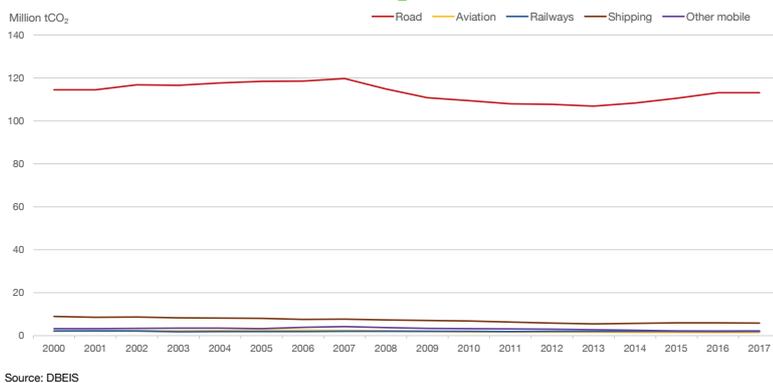
The energy supply sector accounts for 28.4% of overall CO₂ produced in 2017. However, the decline over time has been much more substantial, with an improvement of 48% between 2000 and 2017. The transport sector has been the UK's largest carbon emitter since 2016 following steep declines from energy supply which has reduced from high emitting fossil fuels to lower fossil-based sources (coal to gas) and a significant proportion of renewables. Transport, despite the growth of EVs and engine efficiency, has continued to see growth of usage and relatively little move away from the traditional transport fuels of petroleum products.

Refinery Carbon Dioxide (CO₂) emissions



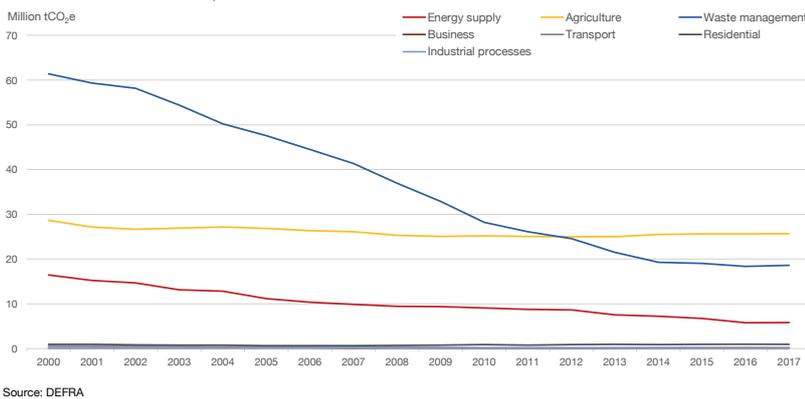
CO₂ emissions have also fallen over time at all UK refineries. Large combustion plant emissions at refineries have declined from 11.75 million tonnes in 2000 to 7.53 million tonnes in 2017, a drop of 35.9%. These declines over this period can be accounted for due to refinery closures and investment in improved energy efficiency, such as Combined Heat and Power (CHP) Cogeneration facilities.

Transport Carbon Dioxide (CO₂) emissions



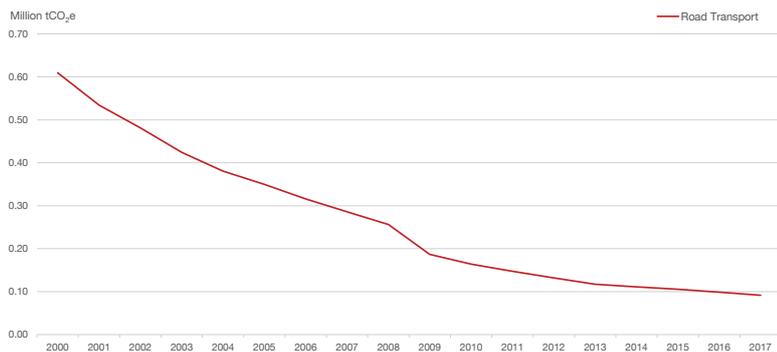
Transport make up a preponderance of carbon emissions, being responsible for 33.4% of CO₂ in 2017 (with road transport emissions accounting for 90.7% of all transport emissions). Transport emissions as a proportion of overall carbon emissions has remained relatively static, with a decline of 4.8% between 2000 and 2017, although as per the earlier mobility chapter, the number of miles travelled rose during the same period.

UK Methane (CH₄) emissions



Road transport is a minor contributor to UK methane emissions, producing around 0.18% of the total in 2017. The main contributing sector is agriculture, which accounted for 48.6% of UK methane emissions in 2017.

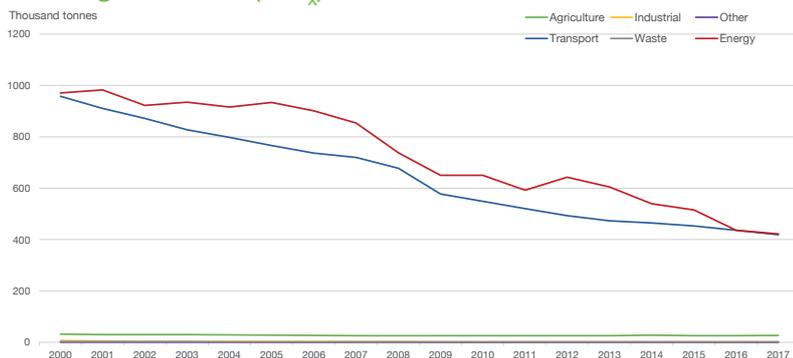
Transport Methane (CH₄) emissions



Source: DEFRA

Road transport methane emissions have reduced by 80% since 2000.

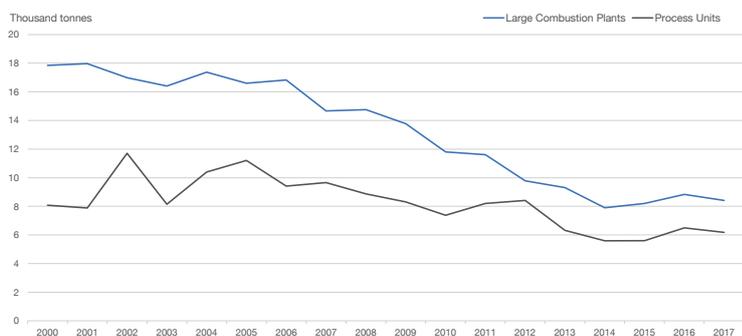
UK Nitrogen Oxide (NO_x) emissions



Source: NAEI

The largest sources of NO_x emissions in the UK economy include the transport and energy industry sectors. Of the UK's total NO_x emissions in 2017, transport accounted for 48% and energy industries for 48.4% of the total, with the difference shared between the agricultural, industrial and waste sectors.

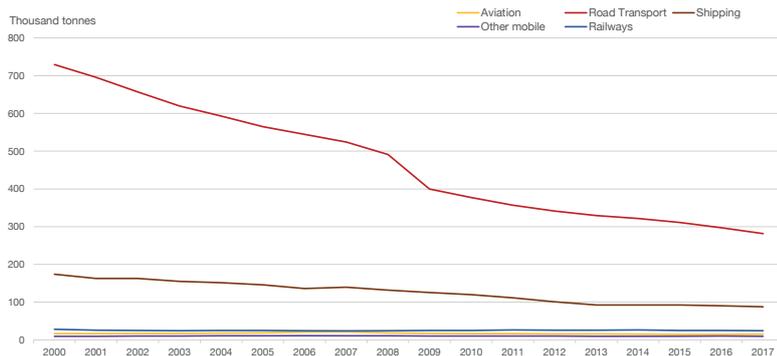
Refinery Nitrogen Oxide (NO_x) emissions



Source: NAEI

At UK refineries, NO_x emissions have also fallen over time. Large combustion plant emissions at refineries have declined by 52.8% from 17.86 thousand tonnes in 2000 to 8.42 thousand tonnes in 2017. This is due to refinery closures, fuel switching in refinery combustion plants and investment in low and ultra-low NO_x burners.

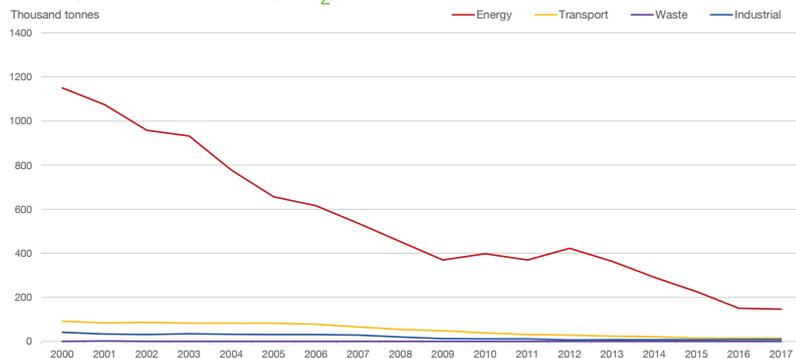
Transport Nitrogen Oxide (NO_x) emissions



Source: NAEI

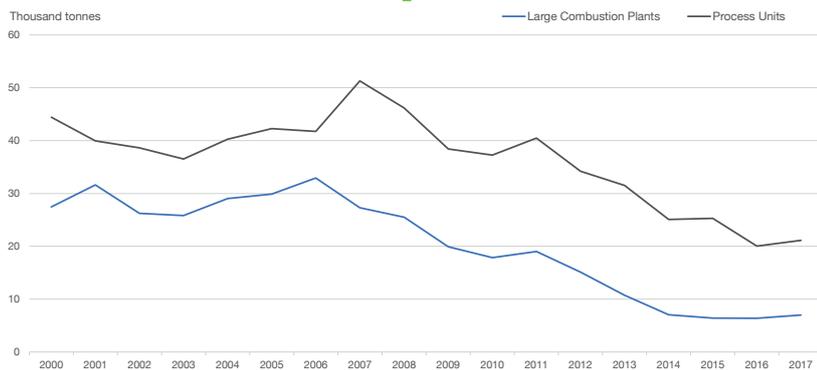
Within the transport sector, road vehicles accounts for 67.2% of transport NO_x emissions, with shipping at 20.9%, rail 5.8% and aviation 3.5% in 2017.

UK Sulphur Dioxide (SO₂) emissions



Source: NAEI

Refinery Sulphur Dioxide (SO₂) emissions

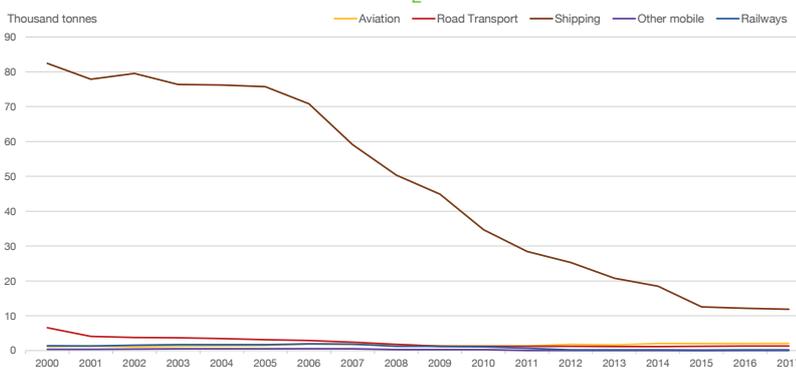


Source: NAEI

SO₂ emissions in the UK are predominantly produced within the energy sector, with the sector accounting for 85.1% of total SO₂ emissions in 2017. Nonetheless, this amounts to an 87.2% reduction in energy sector SO₂ levels since 2000.

At UK refineries, SO₂ emissions have fallen over the same period. Large combustion plant emissions at refineries have declined by 74.5% from 27.43 thousand tonnes in 2000 to 6.98 thousand tonnes in 2017. SO₂ emissions in process units have declined by 52.4% from 44.41 thousand tonnes to 21.1 thousand tonnes. This decrease has been achieved through capacity reduction, fuel switching and investment in gas-fired Combined Heat and Power (CHP) generation and additional sulphur recovery.

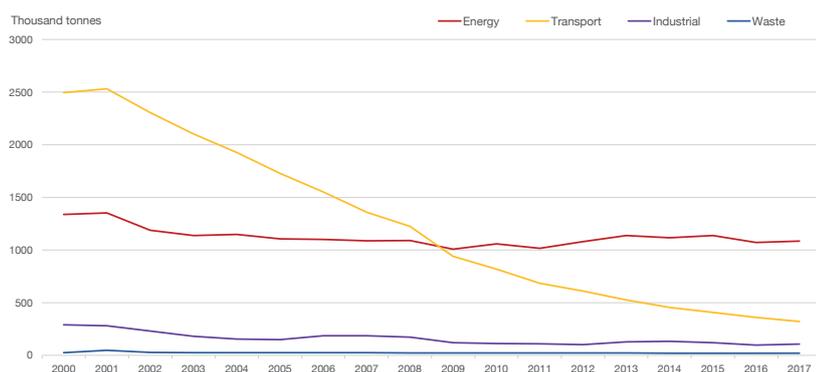
Transport Sulphur Dioxide (SO₂) emissions



Source: NAEI

Within the transport sector, shipping accounts for the largest proportion of transport SO₂ emissions, with 76.9% in 2017, most other transport fuels have very strict sulphur emissions limits. This follows many years of substantial reductions, having fallen by 85.6% since 2000 with cleaner fuels being the main contributor to this change. Those reductions have been led by regulatory change, and global sulphur limits on marine fuels are due to change from January 2020 continuing this long-term trend.

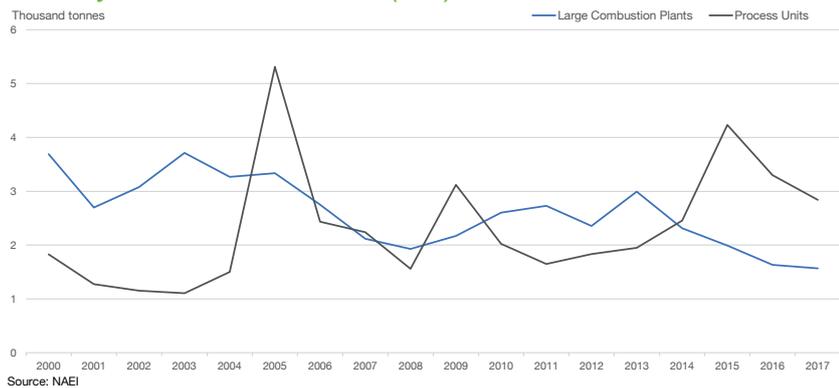
UK Carbon Monoxide (CO) emissions



Source: NAEI

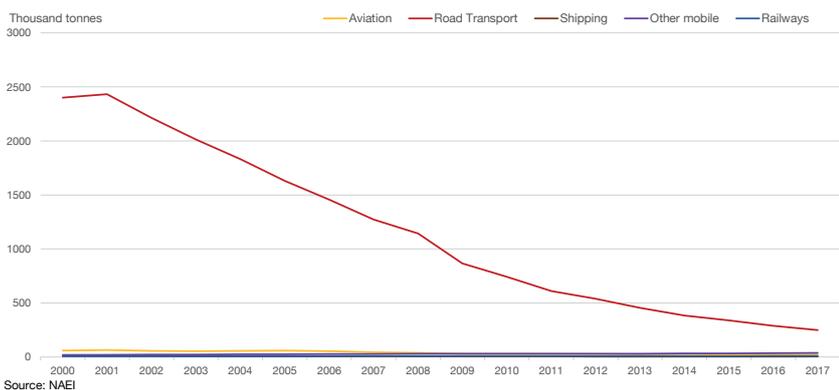
In 2000, transport CO emissions stood at nearly 2.5 million tonnes. By 2017 this had fallen to 321 thousand tonnes, a drop of 87.1%. The energy sector, by contrast, has seen a much slower rate of decline. Since 2000, the sector's CO emissions have fallen by only 18.9% to just over 1 million tonnes in 2017.

Refinery Carbon Monoxide (CO) emissions



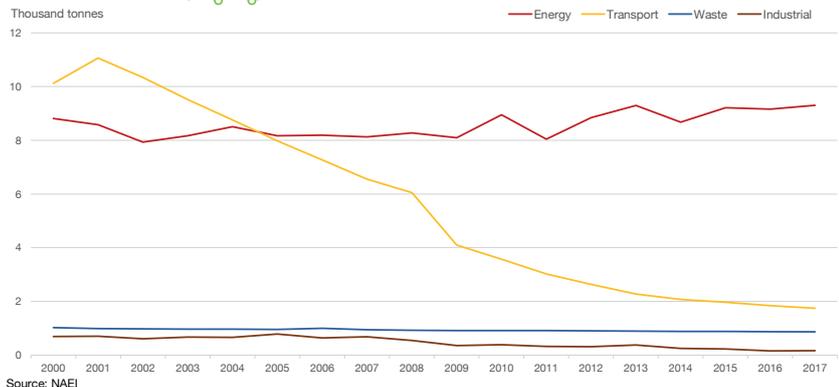
In the refining sector, large combustion plant emissions of CO have fallen by 57.4% across the same period, thanks largely to fuel switching. Process unit emissions of CO vary greatly over the time period due to refinery turnarounds or unplanned procedures, however, did they fall against their 2016 levels in the latest reporting period.

Transport Carbon Monoxide (CO) emissions



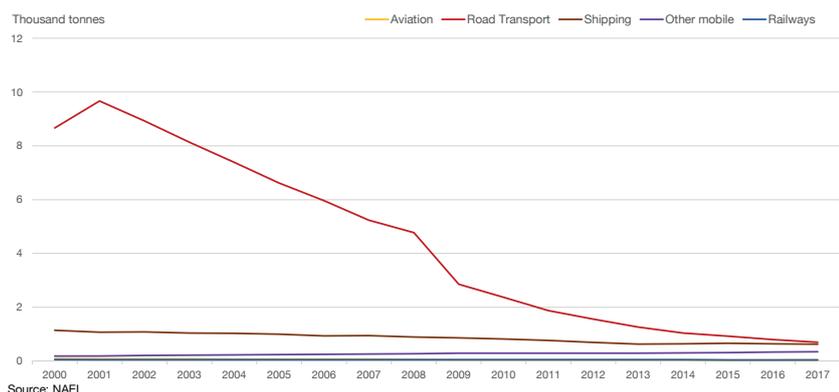
Road transport CO emissions have fallen considerably in recent years, having decreased by 89.6% between 2000 and 2017.

UK Benzene (C₆H₆) emissions



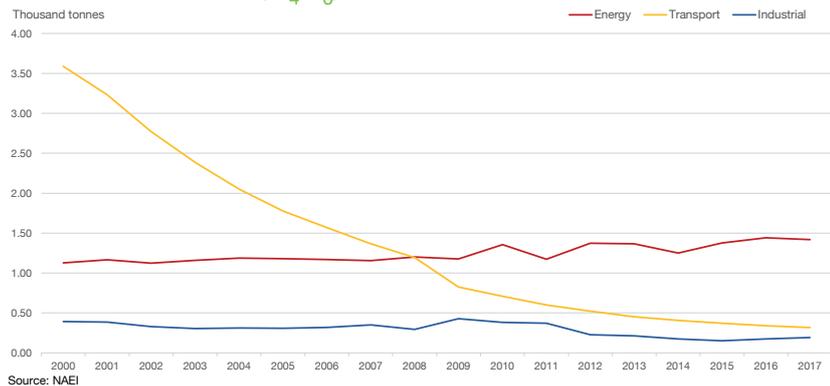
Transport benzene emissions declined from 10.12 thousand tonnes in 2000 to 1.74 thousand tonnes in 2017. This compares to an increase over the same period in energy sector benzene emission from 8.8 thousand tonnes to 9.3 thousand tonnes.

Transport Benzene (C₆H₆) emissions



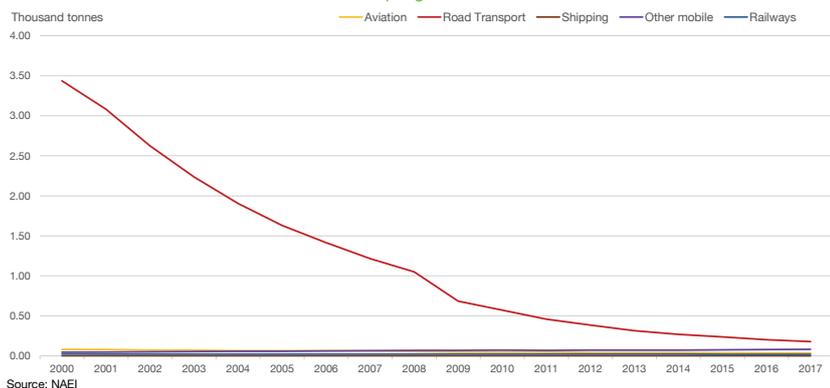
Following the introduction of exhaust after-treatment technology enabled by unleaded petrol, as well as lowering benzene and aromatics limits in petrol, the level of emissions of benzene in the UK transport sector has fallen substantially in the last two decades. In 2000, benzene levels in transport were 10.12 thousand tonnes. By 2017 this had fallen by 82.8% to 1.74 thousand tonnes.

UK 1,3-Butadiene (C₄H₆) emissions



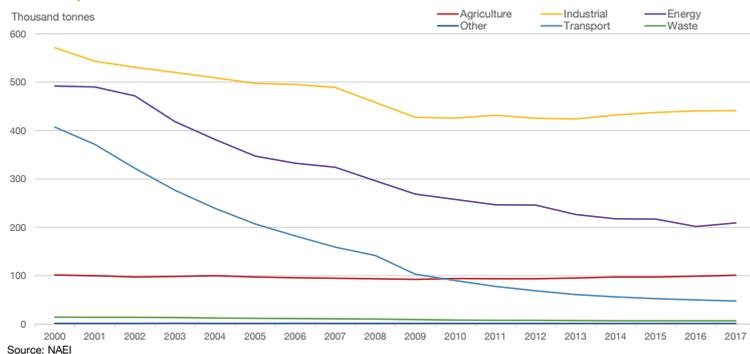
In 2000, 1,3-butadiene levels in transport were 3.59 thousand tonnes. By 2017 this had fallen to 0.32 thousand tonnes, a drop of 91%. Over the same period, energy sector 1,3-butadiene levels in the energy sector increased from 1.1 thousand tonnes to 1.4 thousand tonnes, but declined in the industrial sector from 0.39 thousand tonnes to 0.19 thousand tonnes.

Transport 1,3-Butadiene (C₄H₆) emissions



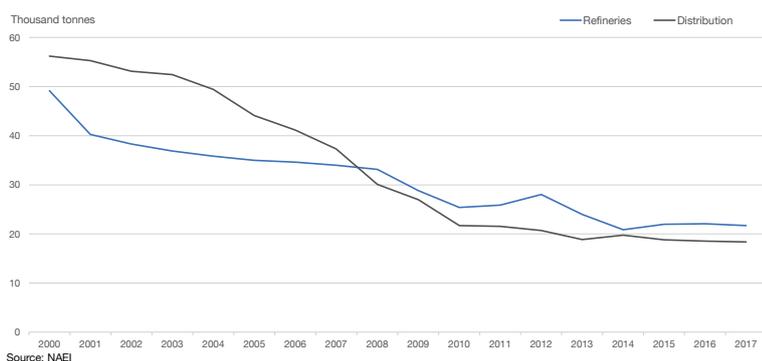
In 2000, 1,3-butadiene levels in transport were 3.59 thousand tonnes. By 2017 this had fallen to 0.32 thousand tonnes, a drop of 91%.

UK Non-Methane Volatile Organic Compound (NMVOC) emissions



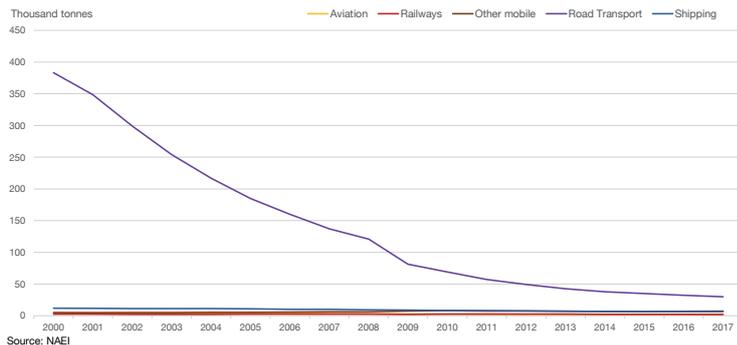
The industrial sector is the largest contributor to UK NMVOC emissions, with over 440 thousand tonnes emitted in 2017, constituting a share of 54.6% of total NMVOCs that year. In comparison, the energy sector contributed 25.9% in 2017, agriculture contributed 12.5% and transport contributed 5.9%.

Petroleum Non-Methane Volatile Organic Compound (NMVOC) emissions



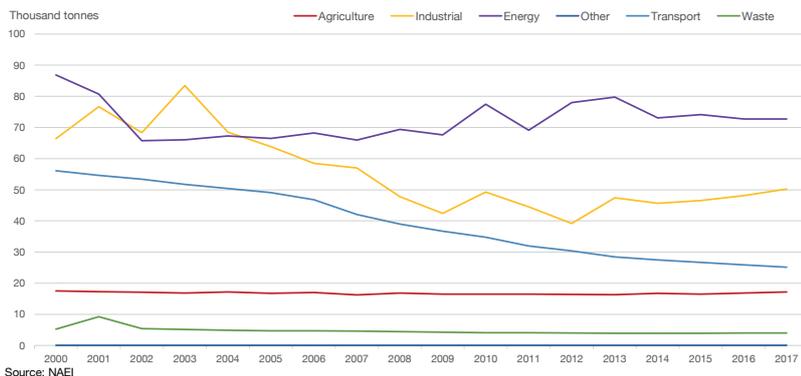
There has been a marked and continuing downward trend in NMVOC emissions across the refining and distribution sectors of the downstream oil industry. Refinery NMVOCs stood at nearly 50 thousand tonnes in 2000 but had reduced by 55.8% in 2017 to under 22 thousand tonnes. Distribution facilities saw an even more dramatic fall of 67.3% in the same period. These reductions have been achieved following investment in improved sealing and vapour recovery equipment at storage and loading/unloading facilities.

Transport Non-Methane Volatile Organic Compound (NMVOC) emissions



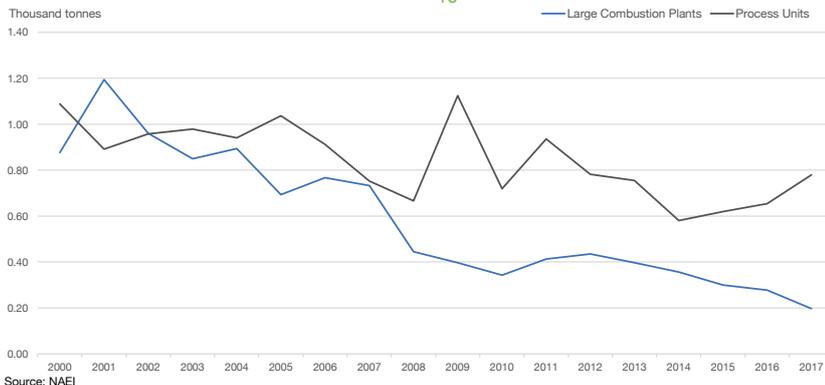
In the transport sector, road transport emissions of NMVOCs have seen a marked improvement in recent years. In 2000, road transport NMVOCs stood at over 383 thousand tonnes. In 2017 this had fallen to 29.9 thousand tonnes, a reduction of 92.1%.

UK Particulate Matter (PM₁₀) emissions



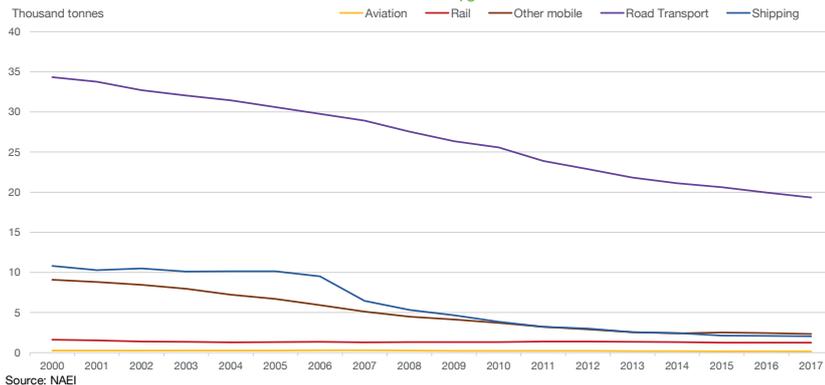
The energy sector in the UK is the largest contributor of particulate matter emissions, having fluctuated over time. In 2000 emissions stood at 86.8 thousand tonnes, whilst in 2017 they stood at 72.7 thousand tonnes – a decline of 16.2%. The industrial sector has similarly seen declines over this period, falling from 66.3 thousand tonnes in 2000 to 50.2 thousand tonnes in 2017.

Refining Particulate Matter (PM₁₀) emissions



Particulate emissions from large combustion plants located within UK refineries have reduced by 85.1% between 2000 and 2017. Although three refineries have closed during this period, investment in CHP plants and substitution of oil-firing with gas-firing (natural gas and refinery fuel gas) has also led to this significant reduction.

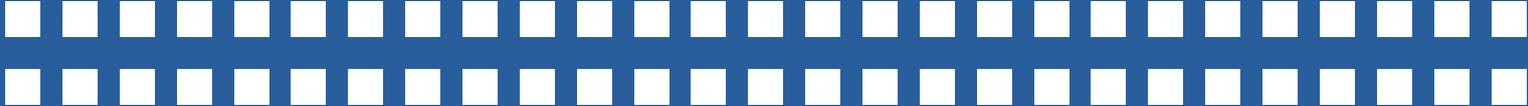
Transport Particulate Matter (PM₁₀) emissions



In 2017, road transport accounted for 11.4% of the UK's primary emissions of particulate matter. Since 2000, road transport particulate emissions have fallen by 43%, down to around 19 thousand tonnes in 2017.

Acronyms

API	American Petroleum Institute
BSI	British Standards Institution
C ₄ H ₆	1,3-Butadiene
C ₆ H ₆	Benzene
CH ₄	Methane
CHP	Combined Heat and Power
CO	Carbon Monoxide
CO ₂	Carbon Dioxide
CVM SA	Chained Volume Measure Seasonally Adjusted
DBEIS	Department for Business, Energy and Industrial Strategy
DEFRA	Department for Environment, Food and Rural Affairs
DfT	Department for Transport
E5	A petrol blend where a maximum oxygen content of 2.7% and a maximum ethanol content of 5% apply
FAME	Fatty Acid Methyl Ester
FQD	Fuel Quality Directive
GDP	Gross Domestic Product



HMRC	Her Majesty's Revenue and Customs
LWIF	Frequency of Lost Work Injuries
Million tCO ₂ e	Million Tonnes of Carbon Dioxide Equivalent
NAEI	National Atmospheric Emissions Inventory
NMVO	Non-Methane Volatile Organic Compound
NO _x	Nitrogen Oxide
ONS	Office of National Statistics
PR	Pressure Release
PSE	Process Safety Event
PM ₁₀	Particulate Matter (of less than 10µm diameter)
RIDDOR	Reporting of Injuries, Diseases and Dangerous Occurrences
ROCE	Return on Capital Employed
RTFO	Renewable Transport Fuel Obligation
RTFC	Renewable Transport Fuel Certificate
SMMT	Society of Motor Manufacturers & Traders
SO ₂	Sulphur Dioxide
Toe	Tonnes of Oil Equivalent
UCO	Used Cooking Oil
VAT	Value Added Tax

Visit www.ukpia.com/publications to read more publications from UKPIA, including:



UKPIA Future Vision: The Downstream Oil Sector in a Low-Carbon World
July 2019

UKPIA's contribution to the debate about how the UK's downstream oil sector plays its part in supporting a low-carbon future and helps to achieve net-zero emissions reductions whilst maintaining economic growth.



The Economic Contribution of the UK Downstream Oil Sector
February 2019

An independent assessment by Oxford Economics for UKPIA, assessing the impact of the downstream oil sector in the UK today, based on an analysis of public data.