Environment Agency

Regulating for people, the environment and growth, 2018

October 2019

This report is for England. Most of the data presented are for the calendar year 2018. Where information is only available by financial year, it is based on the financial year April 2018 to March 2019.

Chief executive's foreword

The biggest single threat to everything we all care about, and the biggest threat to everything the Environment Agency exists to do – protect people from flood and drought, enhance the environment and support sustainable growth – is the climate emergency.

One of our key tools as a nation to help tackle the climate crisis is regulation. And regulation isn't red tape – the right kind of regulation that is simple, risk-based, proportionate and aims for partnership – helps enhance our environment, protects communities and unlocks growth.

Regulation is not a nice to do. I have seen first-hand the devastation that is caused when regulation isn't in place. I visited Bhopal, the site of the worst industrial disaster the world has seen. People there are still suffering the consequences. Not regulating, and not regulating well, endangers people's lives, our environment and livelihoods, for future generations as well.

The greatest threat now is the climate emergency and the Environment Agency is working hard with those it regulates to tackle this. In the last decade, emissions from industry have fallen, less waste is landfilled, over 70% of the waste produced by the sites we regulate is recycled, and high levels of bathing water quality are being maintained.

But we know there is still more to do. We have to make greater strides in tackling environmental crime, improving the quality of our rivers and reducing serious pollution incidents further. The Environment Agency will continue to be tough on those who offend. We've recently seen longer custodial sentences and bigger fines, reminding offenders that environmental crime doesn't pay. Good regulation is about more than just prosecution. Many improvements have been achieved in business performance by working with those we regulate. So we all have a part to play in helping us reach these goals.

As the country continues to prepare to leave the EU, we have an opportunity to do regulation even better. So EU exit doesn't mean taking down regulations, or relaxing regulation. The Environment Agency stands ready to clamp down on offenders as robustly as before.

The climate emergency provides us with opportunity as well. The future of regulation needs to focus on two things. One: continue to focus and be tough on what drives the climate emergency. Being tough on emissions and reducing carbon is at the heart of this. The Environment Agency is committed to this; we have just announced our goal to achieve net zero by 2030. Two: continue to support industry and businesses that are committed to green technology.

If we seize this opportunity now and make the changes we need, we can make a better world – literally. We shouldn't be aiming for a planet which is in a marginally less bad state than it would be if we didn't act. We should be aiming for a planet which is better than it was and better than it is now. A planet where the climate stabilises, biodiversity increases and sustainable growth goes forward, lifting billions of people out of poverty. A planet that is blue and green, not grey and brown.

Sir James Bevan, Environment Agency Chief Executive

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Main facts

The majority of the sites we regulate are well run. Over **92%** of operators were in our **highest compliance bands** A and B in 2018. Permit compliance is gradually improving. In 2008, 4.4% of permits were in the lowest bands D, E, or F. In 2018 it was 3.2%, slightly more than the 2.8% in 2017. Permit compliance in the waste sector still needs significant improvement. In 2018, **3.6%** of waste sector permits were rated D, E or F, compared with 1.7% averaged across non-waste sectors.

There were **533 serious pollution incidents** in 2018, 14% fewer than 10 years ago in 2008, but 27% more than in 2017. Less than half the incidents in 2018 were caused by industries we regulate. To reduce serious incidents there has to be vigilance and action from all businesses.

During the summer of 2018, we responded to an increased number of dry weather associated environmental incidents. There were **over 50 serious pollution incidents** due to natural causes **associated with the hot and dry conditions** during May to September.

We administer 6 major energy efficiency and emissions trading schemes aiming to reduce greenhouse gas emissions contributing to **climate change**. They cover over **50% of the UK's carbon emissions** from industry, businesses and the public sector. We've successfully delivered over **98% compliance** for each.

Since 2008, emissions from sites we regulate under the Environmental Permitting Regulations of:

- SOx decreased by **81%**
- Greenhouse gases decreased by **47%**
- NOx decreased by **65%**
- PM10 decreased by **37%**

However, emissions since 2016 continue to plateau with only minor improvements.

Bathing water standards remained high, with **98%** passing quality standards for the third year in a row, compared with 91% in 2008.

Phosphorus loads in sewage discharges **dropped 33%** between 2005 and 2015, with further improvements planned. In 2016, **86%** of river water bodies had **not reached good ecological status**.

We are still finding about as many new illegal waste sites as we are stopping – a situation that has prevailed for the last 10 years. In the financial year 2018 to 2019, we **stopped 912 illegal waste sites**, 12% more than last year. We found **896 new sites**, 5% more than last year.

We prevented the illegal export of **12,690 tonnes of unsuitable waste**. Not having to repatriate that waste saved the UK economy an estimated £1.1 million.

Of the **waste produced** by permitted sites, in 2018, a record **72%** was recovered, up from 59% a decade ago.

As a result of prosecutions taken by us, the courts fined businesses and individuals almost **£2.8 million** for environmental offences in 2018.

In 2018, **52 enforcement undertakings** were completed by businesses. Environmental groups or projects received almost **£2.1 million**, as a result of our regulatory interventions.

A challenging summer

The summer of 2018 was the hottest on record for England.[1] The exceptionally dry conditions put pressure on water supplies and the environment. From May to July, rainfall was just 54% of the long term average. This caused a rapid reduction in reservoir levels, river flows and the amount of water available to wildlife. By September many reservoirs were only 40% full. The changing climate means that summers like this are likely to happen more often.

We responded to an increased number of environmental incidents associated with the dry weather, including moorland fires, algal blooms, dry boreholes, low river flows and fish rescues. Between May and September there were more than double the typical number of serious pollution incidents that could be attributed to dry and hot weather-related conditions.

We worked with water companies, businesses and farmers to provide dry weather practical help and advice. We balanced the needs of water users while minimising the effects of the dry weather on the environment. To achieve this we:

- applied for a drought order and issued 6 drought permits to help water companies maintain public water supplies, reviewing each application to ensure the environment was not put at risk
- worked with water companies to ensure they followed their drought plans and implemented actions in a timely way
- monitored water availability and shared the results with others, enabling better water management
- placed restrictions on over 800 water abstraction licence holders, requiring them to reduce their abstraction, or to stop entirely
- worked with businesses, farmers and others who abstract water under licence from us to manage demand and protect the environment, using our regulatory powers where necessary
- stepped up engagement to encourage the public and others to cut down on non-essential water use

[1] Met Office. Was summer 2018 the hottest on record? (www.metoffice.gov.uk/about-us/press-office/news/weather-and-climate/2018/end-of-summer-stats).

Supporting farmers during the dry weather

Farmers faced considerable pressures during the 2018 dry weather, in particular, the availability of sufficient water supplies for irrigation and livestock.

To support farmers we allowed a more flexible approach to water abstraction, and introduced a new digital system to make this more responsive. We also permitted temporary variations to their abstraction conditions. This allowed them rapid access to water in order to safeguard food production and animal welfare.

We only allowed these variations if we were satisfied there would be no adverse effects on the environment. During 2018, we received 150 requests for flexible abstraction, of which, we agreed two-thirds. Following a dry winter, we've continued to offer this support into 2019.

1. Supporting healthier and safer communities

As a regulator, our work directly supports healthier and safer communities. We work to ensure:

- emissions from industries to the environment are reduced so that improved air quality means people can live longer healthier lives
- waste is seen as a resource and it is managed in the right place, in the right way by the right people to minimise risk
- people continue to enjoy the water environment
- communities are safe from industrial accidents, protected and resilient to environmental hazards, pollution and natural threats
- people are protected from exposure to radiation, including radioactive sources used in medicine and clinical research, nuclear site decommissioning and in new build designs, and from radioactive waste disposal

We also contribute to healthier and safer communities in our role regulating major hazard sites as part of a joint competent authority with the Health and Safety Executive.

Improvements in environmental quality are associated with the implementation of environmental standards and laws made by government. Our role includes giving practical advice and ensuring industry meets the required standards. To do this, we review and change permits, check compliance and take enforcement action where necessary; all with

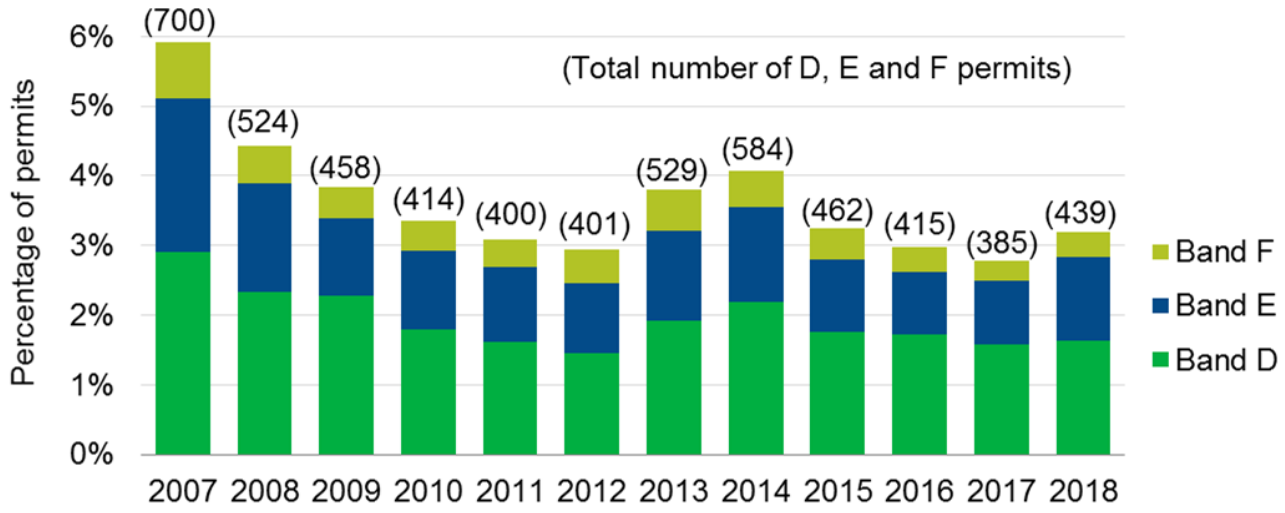
the aim of reducing operators' negative effects on the environment.[2] In turn this can reduce negative effects on human health.

1.1. Operator permit compliance

Poorly managed sites can harm the environment, affect local communities and undermine legitimate businesses. We focus our regulatory action and compliance checks on the highest risk sites and activities. But we also have to balance this with work to ensure we prevent risks from new or existing industry emerging, or poor compliance developing. Businesses are responsible for their own compliance.

The majority of the sites we regulate are well run. Over 92% of 13,771 operator permits[3] were rated in our highest compliance bands A and B in 2018. Permit compliance is gradually improving. In 2008, 4.4% of permits were in the lowest bands D, E, or F. In 2018, it was 3.2%, slightly more than the 2.8% in 2017.[4]

Figure 1. Poor performance in operator permit compliance



Although the waste sector is one of the largest sectors, with proportionally more permits, compliance in this sector still needs significant improvement. In 2018, 3.6% of all the waste sector permits were rated D, E or F for compliance. In comparison, the proportion of D, E or F rated permits averaged across the non-waste sectors was 1.7%. Overall, there were 54 more D, E or F rated permits in 2018 than in 2017, most of which were in the waste sector.

There were 140 persistently poorly managed sites (those having permits in D, E or F bands for 2 or more consecutive years) in 2018, 4 less than in 2017; 91% in the waste sector. The number of persistently poorly managed landfill sites improved, dropping from 37 in 2017 to 30 in 2018.

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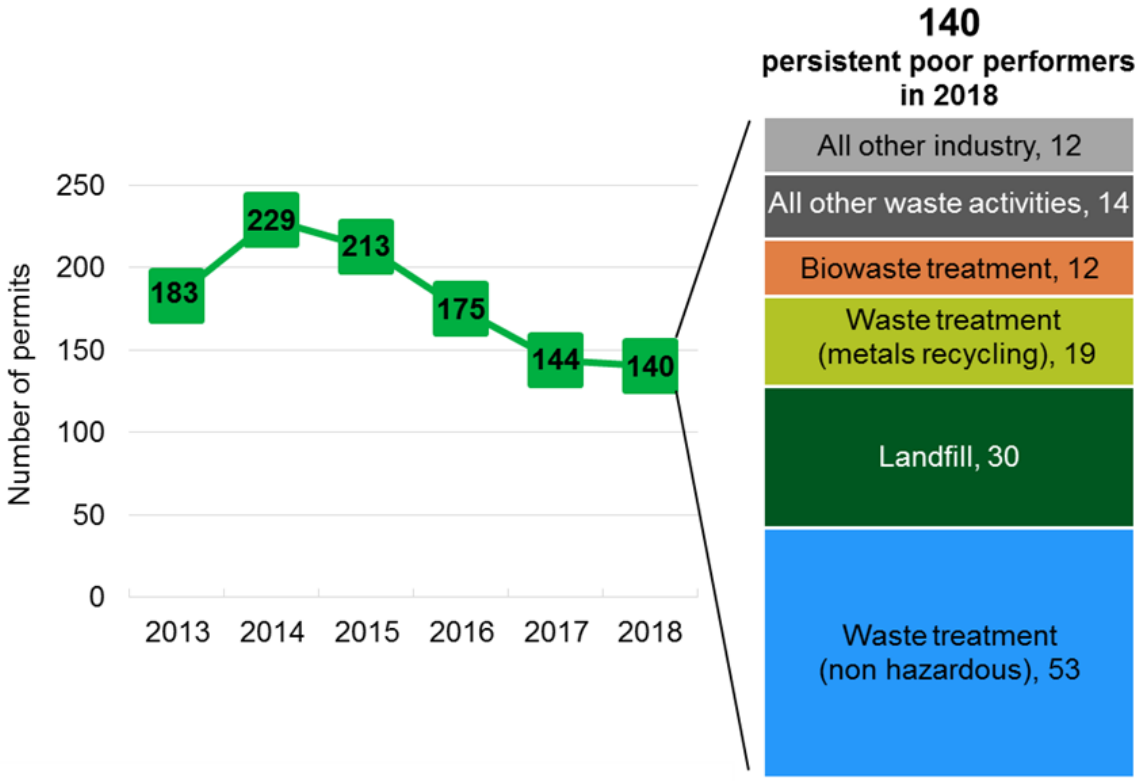
[2] Environment Agency, regulated industry sector strategies. (www.gov.uk/government/publications/environmental-performance-sector-strategies).

[3] This covers permits for waste activities, and other 'installation' sectors including chemicals, food and drink, paper, textiles, metals, cement and minerals, refineries, oil and gas, combustion (power), nuclear, and intensive farming. It does not include Environmental Permitting Regulation water quality permits, or for example major hazard sites.

[4] This includes sites where there was no compliance check in 2018. Our approach to categorising permit compliance where there was no compliance check changed in 2013. This is in part responsible for the rise in D, E and F permits between 2012 and 2013 in the chart of poor compliance.

Figure 2. Persistent poor performers: operators with permits in compliance bands D, E or F for 2 consecutive years



1.2. Serious pollution incidents

Serious pollution incidents harm the environment and can have significant financial and reputational effects on a business.

We categorise incidents from 1 to 4, according to their effects on air, land and water. Category 1 is the most serious and 4 the least, regarded as having no impact.

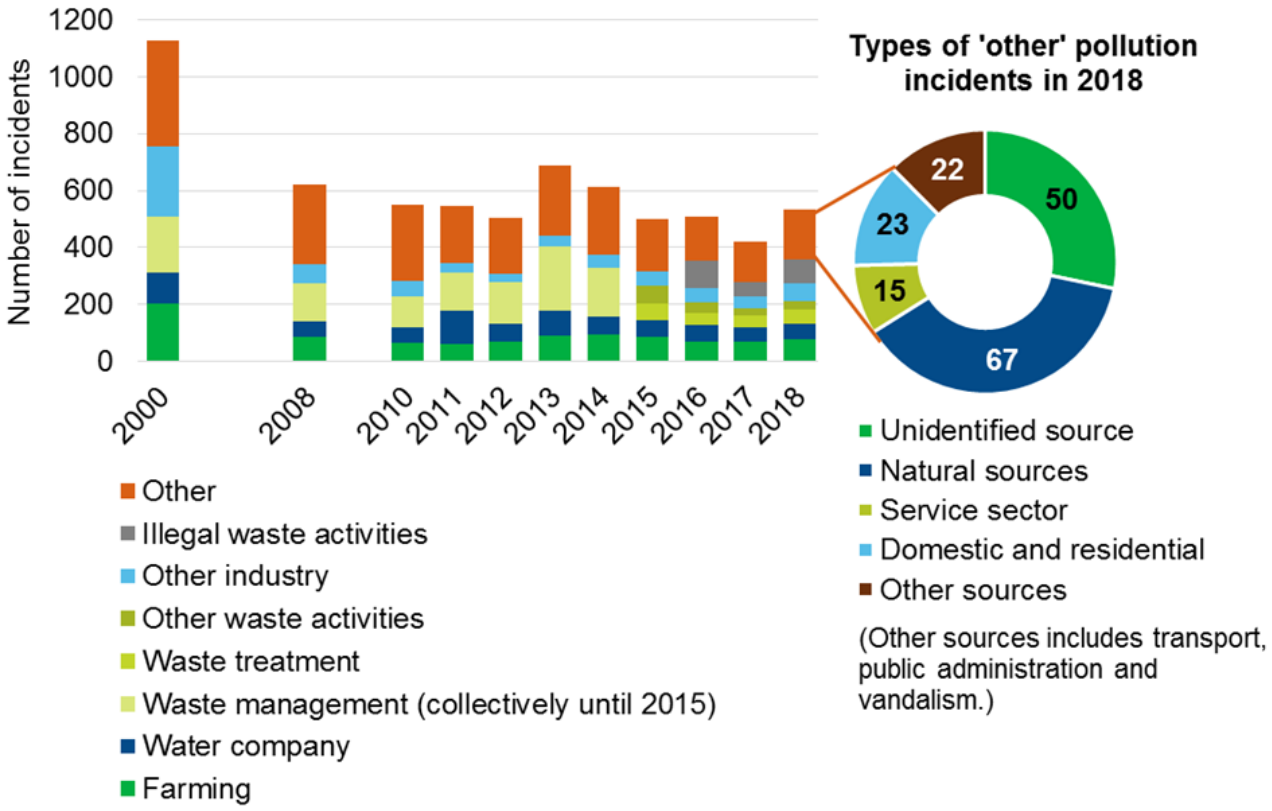
In 2018 we dealt with 16,454 incidents:

In this report we look at the category 1 and 2 incidents. There were 533 serious pollution incidents (categories 1 and 2) in 2018, 27% more than in 2017. Where we were able to identify the source, less than half the incidents (41%) were caused by industrial activities with permits. To reduce serious pollution incidents, there has to be vigilance and action from all businesses, not just those we permit.

Of the 533 serious incidents:

- 81 were attributed to illegal waste activities
- 79 were caused by waste management activities
- 77 were caused by farming activities
- 56 were caused by water companies

Figure 3. All serious pollution incidents (caused by activities we permit and those we do not) by sector



From 2015 waste management activities (collectively) are split into the waste treatment sector and other waste activities (the latter including the biowaste, landfill, incineration with energy recovery sectors and exempt activities). Illegal waste activities are split from the 'other' category from 2016.

In the 10 years between 2008 and 2018, the number of serious pollution incidents reduced by 14%.

Serious pollution incidents increased in most of the sectors in 2018 compared with 2017.[5] Incidents from non-permitted and permitted activities increased by 44% and 29% respectively.

There were 67 incidents in 2018 identified as resulting from natural causes,[6] compared with 26 in 2017. This increase alone accounts for over one-third of the overall rise in incidents during 2018. Increased incidents from illegal waste activities account for another quarter of the increase.

We do not hesitate to take enforcement action, including prosecution where appropriate, against operators who are causing pollution incidents. The cost to an operator of a pollution incident can be substantial. For example the £20 million fine received by a water company in 2017 for a series of significant pollution incidents. In 2018, a water company

[5] In this analysis 56 incidents were attributed to water companies. This is restricted to the 9 main water and sewerage companies in England, and to incidents affecting the water environment (not land or air) under their Water Industry Act responsibilities.

[6] Incidents attributed to natural causes includes: algal activity, dry weather, other extreme weather events such as very high rainfall in a short period of time, flooding, disease outbreak, other natural processes such as low oxygen due to weed growth, and landslip.

paid £250,000 as a single enforcement undertaking[7] to a Rivers Trust for a water pollution incident. Enforcement Undertakings can play an important part in changing and improving how operators respond to a pollution incident.

1.2.1. Dry weather related incidents

In the summer of 2018, we responded to an increased number of dry weather associated serious pollution incidents.

Dry weather can cause low water levels in rivers, lakes and ponds causing fish overcrowding and vulnerability to disease and predators. Hot weather increases the risk of algal blooms, which can lead to lower oxygen in the water and subsequent fish deaths. Heavy rainfall after prolonged periods of drought may also increase the risk of surface run-off pollution incidents.

There were over 50 serious pollution incidents between May and September that could be attributed to dry and hot weather-related conditions. In comparison, in the May to September period in each of the years 2016 and 2017, there were around 20 incidents of a similar nature.

1.2.2. Illegal waste activities

Illegal waste activities were the single biggest source of incidents in 2018. The number of incidents of this type has fluctuated over recent years; 95 in 2016, 51 in 2017, and 81 in 2018.

Around 50% of these incidents were attributed to illegal waste sites. Illegal waste sites and fly-tipping cause pollution, attract vermin and can be costly for landowners to clear up. The government's Resources and waste strategy for England[8] outlines a new strategic approach to prevent, detect and deter criminals and poor performers and in turn better protect the environment.

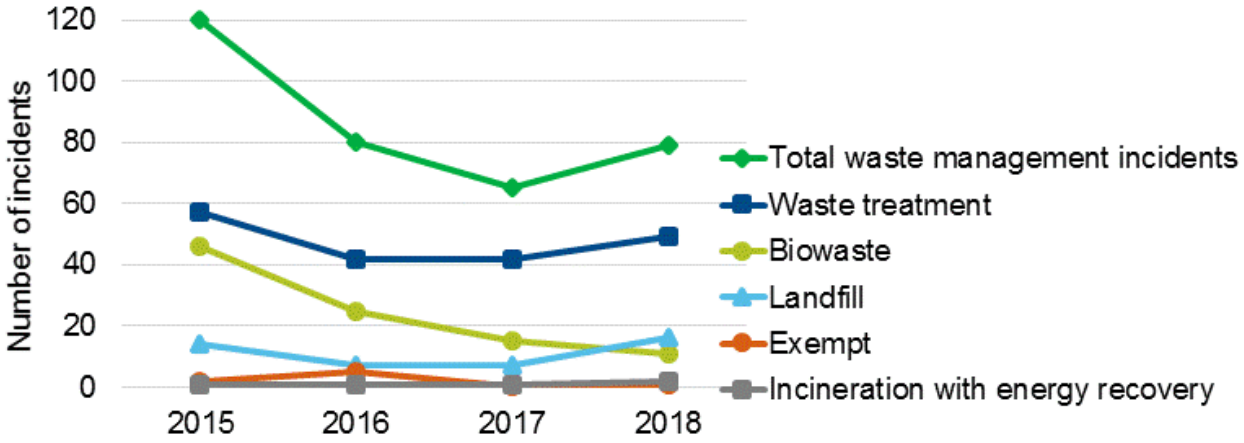
1.2.3. Waste management

There were 79 serious pollution incidents caused by waste management activities in 2018, 22% more than in 2017. Waste management activities include: the permitted sectors waste treatment, landfill, biowaste and incineration with energy recovery (energy from waste) and waste activities exempt from permitting (1 incident in 2018).

There were 16 incidents at landfill sites, more than double the number in 2017. Two individual sites were responsible for half of the landfill incidents, with 1 site causing 5 odour incidents.

[7] Enforcement undertakings usually involve some payment to charities or other groups or organisations to rectify damage or for environmental improvements. See section 1.4 in this report.
[8] Our waste, our resources: a strategy for England. HM Government, 2018. (www.gov.uk/government/publications/resources-and-waste-strategy-for-england).

Figure 4. Serious pollution incidents caused by waste management activities



The biowaste sector has continued to reduce incidents; from 46 in 2015 to 15 in 2017 and 11 in 2018. Our work with this sector has helped identify and remedy root causes of on-site failures. We are undertaking a permit review using information gained from the root cause analysis to improve the sector further. This will help prevent costs to communities, the wider environment and operators. We also aim to increase the quality of material used on land.

1.2.4. Farming activities

In 2018, farming activities caused 77 serious pollution incidents, 13% more than in 2017. Almost two-thirds were caused by containment and control failures.

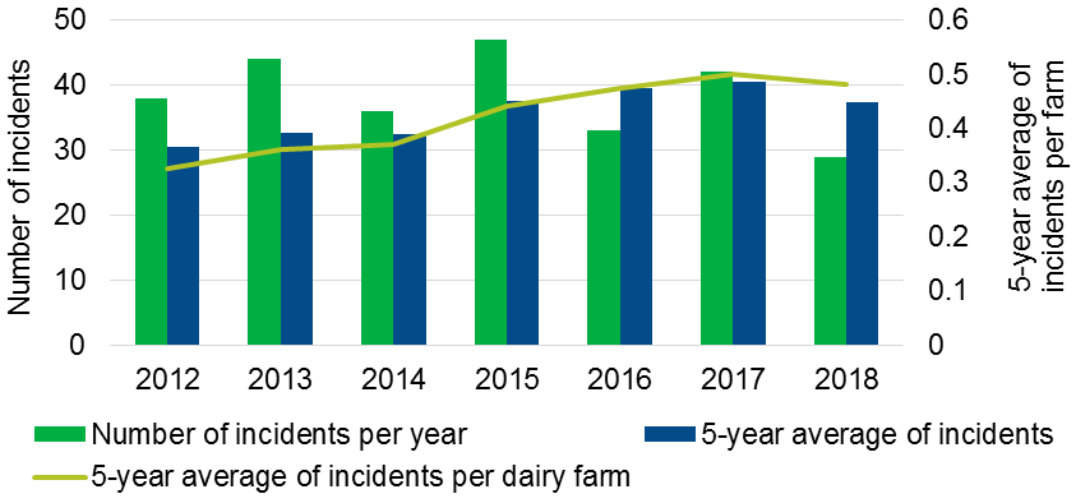
Intensive pig and poultry farming, which is the only farming subsector we currently regulate under the Environmental Permitting Regulations, caused 26 incidents, more than double the number in 2017. Of these, 25 were due to odour pollution.

Agricultural incidents fluctuate year on year largely due to the weather. Looking at 5-year averages helps to smooth out variations in the weather over the years and the effect that has on the number of incidents in wet or dry years. In 2018, there was a 28% decrease in the number of incidents caused by dairy farming activities compared with 2017. Dry weather may have contributed to this, especially for incidents involving slurry. But the reduction in the number of registered dairy producers in England, down by over 500 from 2017, may also be a factor.

Over time the industry is changing, with fewer registered dairy farms that each have bigger herds. Inevitably this means increasing slurry storage capacity to prevent incidents. Of the 29 dairy farming incidents in 2018, 26 involved slurry or silage, with containment and control failures accounting for 23 of them.

Figure 5 shows that for the dairy sector, both the 5-year average of incidents and the 5-year average of incidents per dairy farm, increased over the period 2012 to 2017. Although the trend dips in 2018, by itself, it is not a sufficient signal of change to provide confidence of sustained improvement in the sector.

Figure 5. Serious pollution incidents caused by dairy farming



Working in partnership with industry assurance bodies, we used our evidence of pollution incidents and non-compliant practices to influence Red Tractor assurance standards. Now slurry storage is a key standard assessed by the scheme auditors.

To help farmers take account of all potential liquids entering their slurry stores, including rainfall, we worked with the dairy division of the Agriculture and Horticulture Development Board to improve their Slurry Wizard.[9] The Wizard calculates how much slurry a farm produces, the areas that contribute to the store throughout the year, and the total slurry containment the farm needs.

This will help to ensure that at least the legal minimum is provided and help to improve storage resilience during wet weather. The Red Tractor auditors have agreed to use the Wizard as part of their compliance checks and share their data with us so we can monitor improvements.

We expect this to result in fewer incidents involving slurry storage and containment failures. In addition we continue to encourage farmers to plan ahead for future livestock expansion and build extra capacity. This work has a double benefit; farmers should be able to reduce the risk of pollution, and will also be able to use the nutrient value of slurries on land more effectively.

1.2.5. Water companies

In 2018, serious pollution incidents caused by water companies[10] increased slightly to 56, compared with 52 in 2017. Overall in 2018, water company performance has deteriorated compared with 2017.

Without a rapid response, relatively minor events can escalate. We seek high levels of self-reporting from water companies; where they tell us about their pollution incidents before a member of the public or third party does. This means we and the companies can act early, deploy mitigation measures and reduce the severity of incidents.

[9] Agriculture and Horticulture Development Board (AHDB) dairy division. Slurry wizard (www.ahdb.org.uk/knowledge-library/slurry-wizard). AHDB is a levy-funded, not-for-profit organisation working on behalf of Britain's dairy farmers.

[10] In this report 'water companies' means the 9 main water and sewerage companies in England; the same as for our Water company performance report. (www.gov.uk/government/publications/water-and-sewerage-companies-in-england-environmental-performance-report).

Self-reporting of pollution incidents by water companies, averaged across the 9 companies, remained at 76%, the same as 2017. However, in 2017, 8 out of 9 companies improved their self-reporting compared to the previous year; just 1 was worse. In comparison, in 2018, 4 companies improved their self-reporting, and 5 companies were worse than in 2017. The variation between companies was also higher, with the best at 84% and the worst at 62%. More information can be found in the Water and sewerage companies' performance, 2018 summary.[11]

1.2.6. Odour

Odour is one of the most common types of incident reported to us. Odour can cause nuisance and distress to affected communities, can lead to expense and disruption to businesses and reputational damage to us and the industries we regulate. Tackling odour is an important part of achieving our strategic objectives to protect and improve the environment for local people and wildlife.

We review and monitor odour reports and regulate permitted sites to reduce the impact on people and the environment. We require operators to submit Odour Management Plans to us when there is a significant risk that odour from their activities will cause amenity issues beyond their site boundary.

1.2.7. Causes of pollution incidents

Containment and control failures, such as spills and leaks from pipes and tanks, continue to be a leading cause of pollution incidents. Of the 533 pollution incidents in 2018, 40% were caused by containment and control failures.

Of the incidents at permitted sites, this figure rises to 61%. This type of incident is preventable and indicative of poor environmental management controls operated by businesses. We expect all businesses to actively manage these risks, have appropriate environmental management systems in place and operate them effectively.

1.2.8. Incidents involving fires

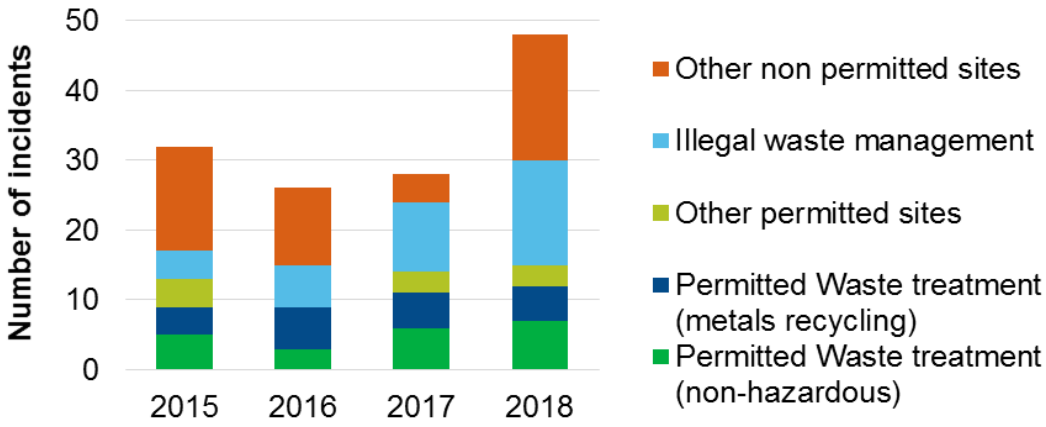
Fires have significant impacts on local air quality, the water environment and nearby residents and businesses.

In 2018, there were 33 serious pollution incidents caused by fires at sites where we do not regulate activities under the Environmental Permitting Regulations. This included 15 fires at illegal waste sites, 3 fires at non-permitted chemical sites, and 2 fires in each of the agriculture, retail and transport sectors.

There were 15 serious pollution incidents caused by fires at sites where we issued a permit; 1 more than in 2017. Of the 15, 14 were at permitted waste sites.

[11] Environmental performance of the water and sewerage companies in 2018. (www.gov.uk/government/publications/water-and-sewerage-companies-in-england-environmental-performance-report).

Figure 6. Serious pollution incidents caused by fires



In 2016, we revised our Fire Prevention Plan (FPP) guidance to help reduce the risk and impact of fires at regulated waste sites. New permit applications for sites that store combustible waste must be accompanied by a FPP. We can also require existing permit holders to submit FPPs following a fire, or if we consider the site to be at high risk.

1.3. Waste crime

Rogue operators illegally dumping or exporting waste may undermine legitimate businesses by disposing of waste cheaply and recklessly. This harms the environment and local communities and deprives the government of tax income. Tackling this type of illegal activity is complex but very important, and understanding the full scale of waste crime is an ongoing challenge to which we are very committed.

The independent Serious and Organised Waste Crime Review,[12] published in November 2018, stated that the government's intention must be to give those criminals responsible for waste crime real cause to fear the repercussions of their actions.

We continue to use intelligence-led approaches to target the most serious crimes and evaluate which interventions are most effective. We aim to find the best ways to prevent, deter and disrupt waste crime.

1.3.1. Illegal waste sites

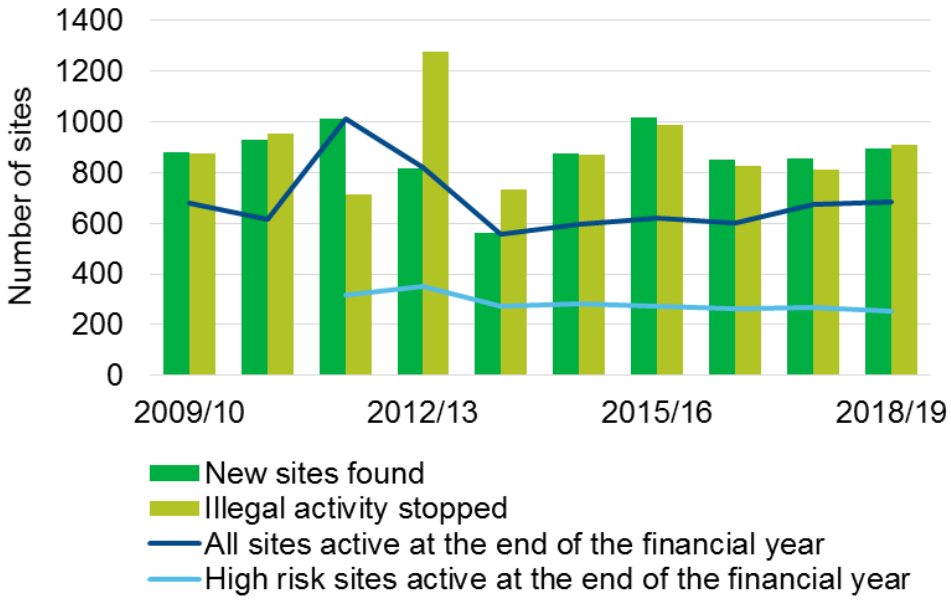
Our prevention and disruption team is dedicated to establishing strong, effective relationships with partner agencies, sharing information on waste criminals to provide a clearer intelligence picture.

There is a lot of illegal activity around waste. We are still finding almost the same number of new illegal waste sites as the number we close. In the financial year 2018 to 2019, we stopped illegal waste activity at 912 sites, 12% more than the previous year. We found 896 new illegal waste sites, 5% more than the previous year.

In comparison, almost 10 years ago in the financial year 2009 to 2010, we stopped activity at 876 illegal waste sites, and found 882 new ones.

[12] Serious and organised waste crime: 2018 review. (www.gov.uk/government/publications/serious-and-organised-waste-crime-2018-review).

Figure 7. Illegal waste sites



At the end of March 2019, 685 known illegal waste sites were still active, 255 of which were classified as high-risk sites. Of the 912 illegal waste sites where we stopped activity, 89 sites brought their activities into regulation.

The top 3 types of waste found at illegal sites in this period were:

- household and commercial waste
- construction and demolition waste
- end-of-life vehicles

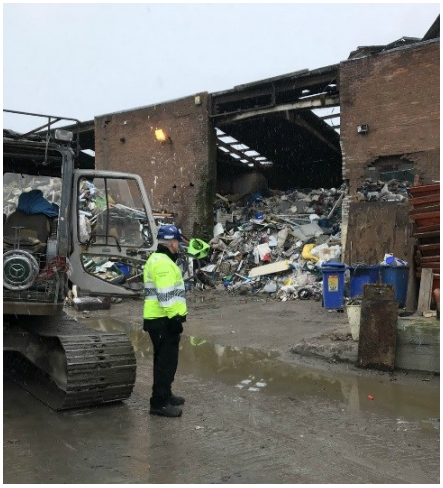
New landfill tax rules came into force on 1 April 2018, increasing the penalties for illegal waste sites. This can be up to 100% of the tax due as well as criminal prosecution. We have been working with HMRC to raise awareness of the change and have already targeted 500 suspected illegal waste sites.

We've been seizing vehicles involved in waste crime since 2017, and have seized over 30 vehicles so far. In March 2018, we were given new powers, giving us the authority to lock up illegal waste sites and block access to prevent waste piling up and posing a risk to the environment. We can require rogue operators to clear all the waste at a problem waste site, not just the illegal waste.

Using our regulatory powers to stop waste crime

Environment Agency officers, supported by Merseyside Police and The Mansfield Group (a vehicle rescue and recovery operator), carried out a dawn raid at a Merseyside illegal waste site in February 2018. We investigated and inspected the site to gain evidence of illegal activities. During the raid we seized 6 vehicles, including 2 skip-transporting lorries, a digger and a grabber.

Simon, the Environment Manager who led the raid, said: “The work that was done is vital to send out a clear message to illegal sites that we have the power to disrupt and investigate their activities. The team’s hard work ensured we gained results, seizing 6 vehicles and making 2 arrests, which has sent out shock waves to other sites.”



1.3.2. Large-scale dumping

We dealt with 204 incidents of illegal large-scale dumping in the financial year 2018 to 2019. The trend in the number of dumping incidents has fluctuated over recent years; 218 in 2016, 226 in 2017, and 204 in 2018.

We classified the majority of these incidents as category 3, having a minor impact on the environment, people and property. However, these incidents can still have a pronounced detrimental effect on legitimate businesses and the welfare of the community, and deter re-development and economic growth.

We have produced advice and guidance for landowners and businesses to help avoid this type of crime.[13]

1.3.3. Illegal waste exports

We continue to work closely with our partners to gather intelligence on waste shipments. This helps us to prevent illegal exports of unsuitable wastes. These are often deliberately mis-described as recyclable materials.

We inspected 926 containers in the financial year 2018 to 2019, with 236 being returned to their site of loading. In doing so we prevented the illegal export of 12,690 tonnes of unsuitable waste. If the waste had been shipped and we had been required to repatriate it, the cost to the UK would have been an estimated £1.1 million.

Businesses involved in the shipment of wastes must ensure that the waste they handle is managed in an environmentally sound manner throughout its shipment and recycling.

1.4. Enforcement action

We continue to provide advice and guidance to help industry to improve its environmental performance. This includes supporting businesses trying to do the right thing, issuing enforcement notices, and penalising businesses as a last resort.

[13] This can be viewed here: (www.youtube.com/user/EnvironmentAgencyTV).

We take proportionate enforcement action to bring operators back into compliance and to prevent and disrupt criminal activity. But we do not hesitate to take action, including prosecution, where appropriate. In 2018, we[14]:

- issued 236 enforcement notices (156 for registered companies)
- issued 38 formal cautions (16 for registered companies)
- brought 113 prosecution cases (30 for registered companies)

As a result of prosecutions taken by us in 2018, the courts fined businesses and individuals almost £2.8 million for environmental offences.

Prosecutions are becoming more complex. There is a greater focus on disclosure and the use of search warrants, together with other ancillary issues such as disqualification of directors, confiscation, and the removal of proceeds of crime. For these reasons we are increasingly choosing to reserve prosecution for our most serious cases.

Cracking down on crime

For the first time we've used body worn camera footage captured by one of our officers on patrol to support a prosecution. The defendant was convicted of willfully obstructing the officers in the execution of their duty and using abusive behaviour towards 2 of them.

Paul, an Environment Agency waste officer, said:

“As a former police officer, I’ve seen routine visits rapidly escalate into threatening or sometimes even violent situations. Sadly the same risks apply to the Environment Agency’s enforcement officers. We want to get on with our jobs without the threat of violence and the cameras will help to protect staff and bring abusive individuals to justice."

We have a range of enforcement sanctions for environmental offences available to us. If an operator commits a serious offence, we will hold the offender to account through prosecution, and will seek the highest possible penalties.

For some offences, where there is less harm done, and the damage can be remedied by local partners, operators who recognise they have breached the rules can offer enforcement undertakings. This type of sanction aims to change behaviour by requiring operators to comply with the law and pay to clean up and put right the damage they have caused, rather than paying fines through prosecution. Enforcement undertakings can play an important part in changing how operators respond to a pollution incident. Whether we accept an enforcement undertaking rather than prosecute is our decision; it is not determined by the operator or type of business involved.

Enforcement undertakings usually involve some payment to charities, other groups, or organisations to rectify damage or for environmental improvements. They can also include

[14] This covers enforcement actions used for waste, water quality and emissions offences by businesses and individuals. Previous Regulating for people, the environment and growth reports have quoted statistics for registered companies only. 'Businesses' includes registered companies, but is not limited to them. The data come from a live database and are subject to adjustment over time.

other actions such as payment of our costs, new or improved infrastructure, staff training and new or improved systems and procedures, which may take longer to complete.[15]

In 2018, 52 enforcement undertakings were completed by operators. Environmental groups received almost £2.1 million as a result of our regulatory interventions. The amount received by these groups as a result of this type of sanction has generally been increasing, especially since 2016.

In 2018, county wildlife trusts received over £600,000 from 18 enforcement undertakings. Rivers trusts received almost £550,000 from 13 undertakings.

We also administer energy efficiency and emissions trading schemes for the UK and regulate those in England. When necessary, we have taken enforcement action and issued civil penalties for a range of offences covered by these schemes. In the past 5 years we have issued over 250 civil penalties with financial penalties ranging from a few hundred to a few hundred thousand pounds.

[15] An enforcement undertaking accepted by us in one year might not necessarily be completed in the same year.

2. Protecting and improving the environment

Our aim is to protect and improve the environment for people and wildlife. We work with Defra and others to achieve the government's ambitions as set out in the 25 Year Environment Plan; leaving the environment in a better state than we find it.

2.1. Cleaner air

Air pollution is caused by natural sources and by people's activities. This includes the combustion of fuels for heat and power, industrial processes and manufacturing, agriculture and transport. Air pollution plays a role in major health challenges and has been linked to cancer, asthma, stroke, heart disease, diabetes, obesity, and changes linked to dementia.[16]

It has negative effects on habitats, ecosystems, plants and animals. Of England's nitrogen-sensitive habitats, 95% are adversely affected by nitrogen deposition. Of England's acid-sensitive habitats, 59% are affected.[17]

Reducing emissions improves people's health and protects sensitive species and sites such as upland moorlands. It helps the economy by reducing healthcare costs by lowering the risk of respiratory illnesses.

Air quality in England has improved. Changes made at the sites we regulate have achieved significant reductions of greenhouse gases, sulphur oxides (SOx), nitrogen oxides (NOx) and small particulates (PM10[18]). We will continue to work with government and these industries to maintain and improve current standards. Achieving future improvements in air quality will require everyone to play their part.

There are legally-binding international targets to reduce emissions of 5 damaging air pollutants by 2020 and 2030. They apply to nitrogen oxides, sulphur dioxide, fine particles, ammonia, and non-methane volatile organic compounds. The Clean Air Strategy[19] sets further goals and targets to reduce emissions from transport, the home, farming and industry, making air healthier to breathe, protecting nature and boosting the economy.

The 25 Year Environment Plan progress report for January 2018 to March 2019 estimates the value of measures introduced in the Clean Air Strategy. It is anticipated they will cut the annual cost of air pollution to society by £1.7 billion by 2020 and by £5.3 billion by 2030.

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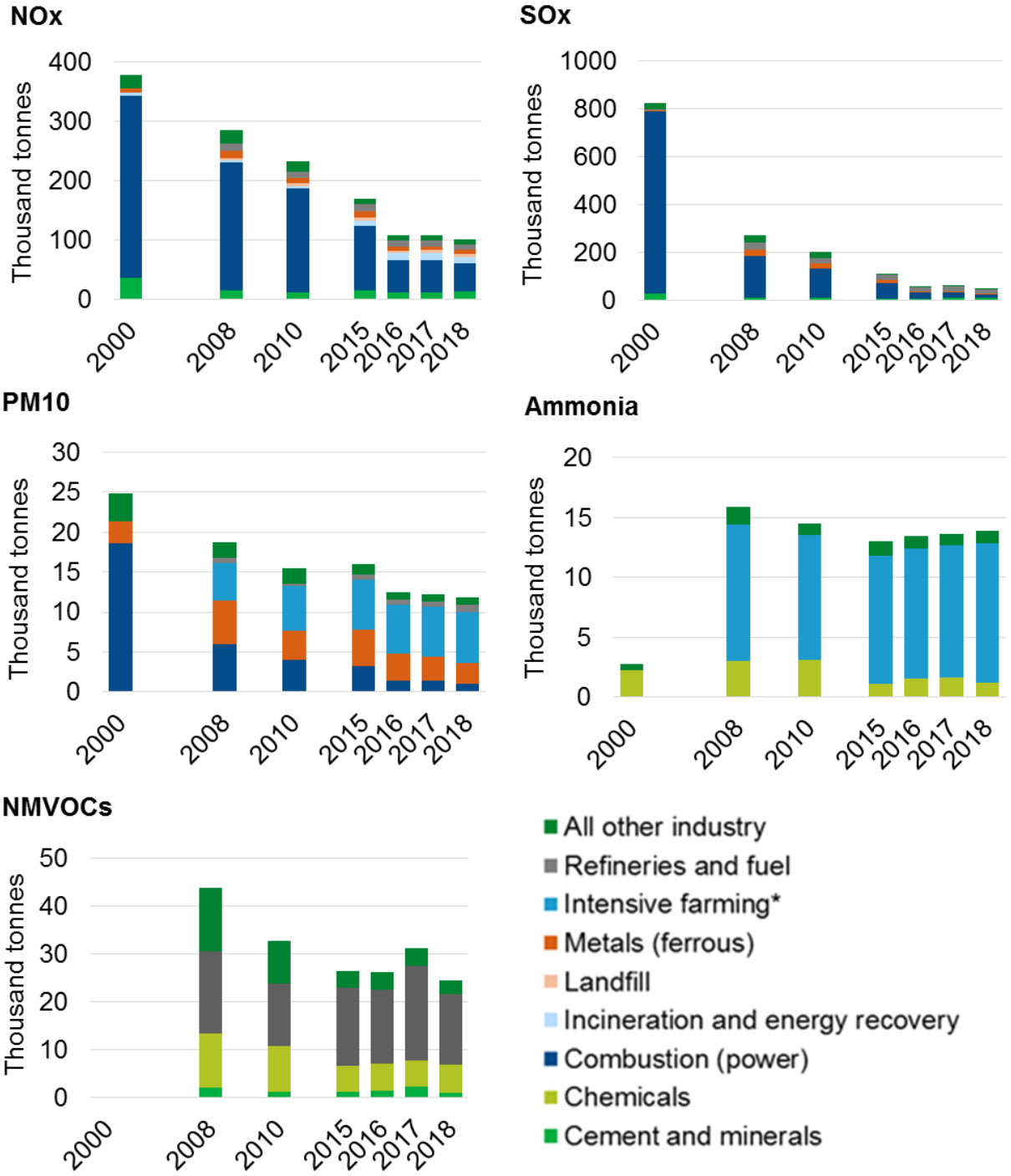
[16] Royal College of Physicians. Every breath we take: the lifelong impact of air pollution. Report of a working party. London: RCP, 2016 (www.rcplondon.ac.uk/projects/outputs/every-breath-we-take-lifelong-impact-air-pollution).
[17] Environment Agency, State of the environment air quality report. (www.gov.uk/government/publications/state-of-the-environment).
[18] PM10 is small particulate matter less than 10 micrometres in size, such as dusts, smoke particles and pollens, which can be breathed deeply into the lungs.
[19] The Clean Air Strategy 2019, Defra. (www.gov.uk/government/publications/clean-air-strategy-2019).

2.1.1. Industrial emissions

We are working with government and the industries we regulate to implement the Clean Air Strategy and further reduce emissions to air. In particular, we are looking for ways to address diffuse emissions of ammonia and small particles from our regulated sectors.

Figure 8. Emissions to air from sites with permits



'All other industry' includes emissions from sectors that contribute less than 5% towards the total release of each pollutant in 2018. *Emissions from the intensive farming sector were reported from 2007.

2.1.2. Nitrogen and sulphur oxides (NOx and SOx), and small particles (PM10)

Significant reductions in emissions of NOx, SOx and PM10 have been achieved since 2000, and over the last 10 years, 2008 to 2018. However, emissions since 2016 have plateaued, with relatively minor improvements.

Table 1: Emissions from sites regulated under the Environmental Permitting Regulations

	NOx	SOx	PM10
Since 2000, emissions have decreased by:	73%	94%	52%
In the 10 years 2000 to 2010, emissions decreased by:	38%	76%	38%
In the last 10 years, 2008 to 2018, emissions decreased by:	65%	81%	37%

Small particulate matter is not a single pollutant. It is made up of a wide variety of chemical compounds and materials and classified according to size. The Clean Air Strategy proposes a new, ambitious, long-term target to reduce people's exposure to PM2.5[20] as well as PM10.

2.1.3. Ammonia

Emissions of ammonia have been increasing slowly but steadily since 2015.

The farming sector as a whole is the biggest contributor to this country's total ammonia emissions. In 2016, 88% of all ammonia emissions in the UK were from farming.[21] Most of these emissions come from farming activities not currently regulated under the Environmental Permitting Regulations, such as beef and dairy farming. Ammonia is also emitted during the storage and landspreading of manures and slurries, and from the application of inorganic fertilisers. Most farmers will need to change their practices and invest in farm infrastructure and equipment to reduce emissions.[22] Our work on slurry storage and application with the Red Tractor assurance body and the Agriculture and Horticulture Development Board dairy division's Slurry Wizard should help to reduce ammonia emissions from dairy farms.

Of the sites we regulate under the Environmental Permitting Regulations, most of the ammonia emissions come from intensive pig and poultry farming. They contribute just 5.5%[23] of all ammonia emissions in England. Emissions from this sector have continued to rise over recent years, due in part to a 25% increase in farm numbers over the past 7 years. Intensive pig and poultry is only a small proportion of total farming activity.

Other sources of emissions of ammonia include the waste and road transport sectors. They accounted for 4% and 2% respectively of ammonia emissions in England in 2016.

2.1.4. Non-methane volatile organic compounds (NMVOCs)

Sources of NMVOCs include the burning of fossil fuels, transport, solvents, paints and aerosols. Smaller amounts are also released from dry cleaning, production of alcoholic drinks and from arable farming.

Emissions of NMVOCs from the sites we regulate under the Environmental Permitting Regulations have decreased by 44% in the last 10 years (2008 to 2018). NMVOC

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[20] PM2.5 is small particulate matter less than 2.5 micrometres in size; smaller than PM10. It is highly respirable - able to get very deeply into the lungs when breathed in.
[21] Environment Agency, State of the environment air quality report. (www.gov.uk/government/publications/state-of-the-environment).
[22] The Clean Air Strategy 2019. Defra. (www.gov.uk/government/publications/clean-air-strategy-2019).
[23] Based on National Atmospheric Emissions Inventory data 2016 (the latest available, published Oct 2018).

emissions in 2018 were 7% lower than in 2016[24], continuing the downward trend. The refineries we regulate contributed 3% of the total NMVOC emissions in England[25] with other sites we regulate contributing a further 2%.

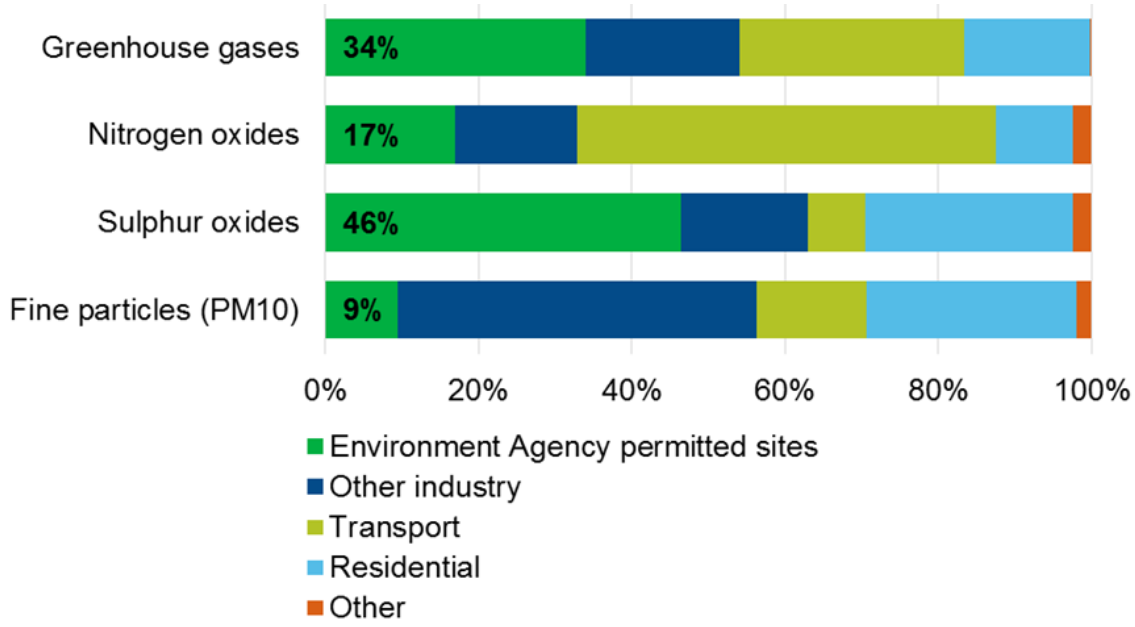
2.1.5. Improving air quality

The businesses we regulate under the Environmental Permitting Regulations contribute 34% of greenhouse gases, 17% of all NOx emissions, 46% of SOx and 9% of PM10 in England.

Significant contributions to the reductions achieved so far include:

- coal and oil fired combustion plants closing as they are unable to meet the tighter emissions standards set in the Industrial Emissions Directive, enacted through the Environmental Permitting Regulations
- more energy being generated from renewable sources, reducing the amount needed from fossil fuels
- application of best available techniques to improve process efficiency and remove pollutants from flue gases

Figure 9. Emissions to air from sites we permit as a percentage of all England emissions, 2016



[24] Not all sources of NMVOC emissions can be measured, so they are assessed using a calculation methodology. The increase in 2017 may be due to a change in the way one oil refinery has applied this calculation. Hence 2016 may be a more realistic comparison point.

[25] Based on National Atmospheric Emissions Inventory data 2016 (the latest available, published Oct 2018).

Bringing diesel generators into regulation

We have recently been successful in bringing arrays (large serial arrangements) of diesel powered generators into regulation as Specified Generators alongside the Medium Combustion Plant Directive.

John, Environment Agency Senior Advisor for Fuel and Power, explains; “as the electricity supply industry decarbonises, there’s a shift from coal to renewables. Renewable supply is intermittent so there’s still reliance on technologies such as diesel generator arrays to cover demand peaks. Arrays can be as big as football pitches and pop up in spaces like disused car parks. NOx emissions from these generators, if unabated, could have a significant effect on local air quality and health.”

We worked together across the business, and with Defra, to put in place legislation closing the loophole that allowed these arrays to operate without being regulated.

2.2. Climate change

Climate change is one of the greatest threats to people and the environment. It will have far-reaching effects on economies and societies, and major impacts on habitats and species.

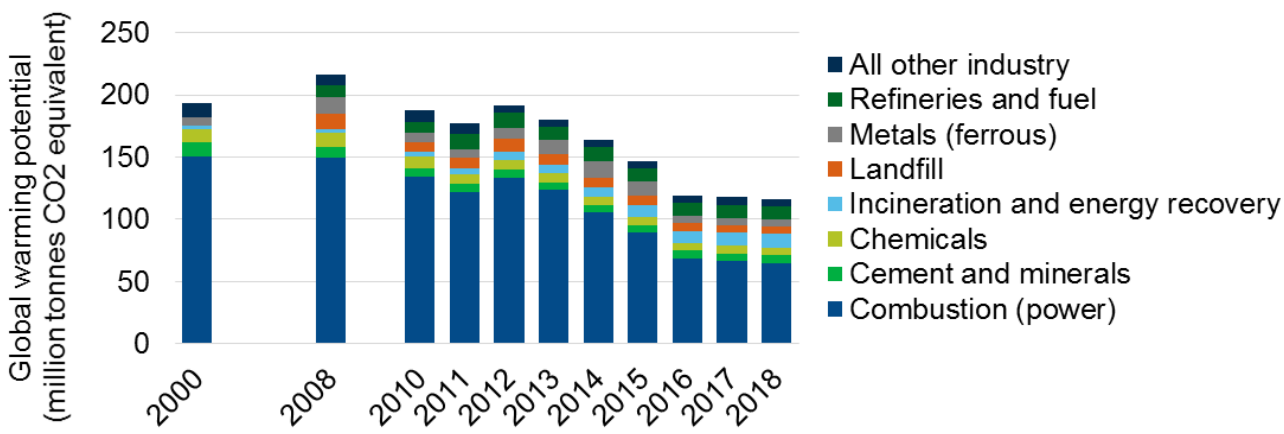
Sir James Bevan, the Environment Agency Chief Executive, recently described the climate emergency as "the biggest single threat to everything we all care about, and the biggest threat to everything the Environment Agency exists to do - protect people from flood and drought, enhance the environment and support sustainable growth".[26]

2.2.1. Greenhouse gas emissions

In the last 10 years, emissions of greenhouse gases from the businesses we regulate under the Environmental Permitting Regulations and Industrial Emissions Directive have decreased by 47%. The rate of decrease has slowed since 2016, with only a 2.2% decline in emissions since then.

[26] It's the climate emergency, stupid. Sir James Bevan. June 2019. (www.gov.uk/government/speeches/its-the-climate-emergency-stupid).

Figure 10. Greenhouse gas emissions (as global warming potential) to air from sites with permits



'All other industry' includes emissions from sectors that contribute less than 5% towards the total release of greenhouse gases in 2018.

The combustion (power generation) sector contributes 55% of greenhouse gas emissions from the sites we regulate under the Environmental Permitting Regulations. The second largest contributor is the incineration and energy recovery sector, accounting for 10% of emissions from sites we regulate. As this sector has expanded, its total greenhouse gas emissions have also been steadily rising.

2.2.2. Methane emissions

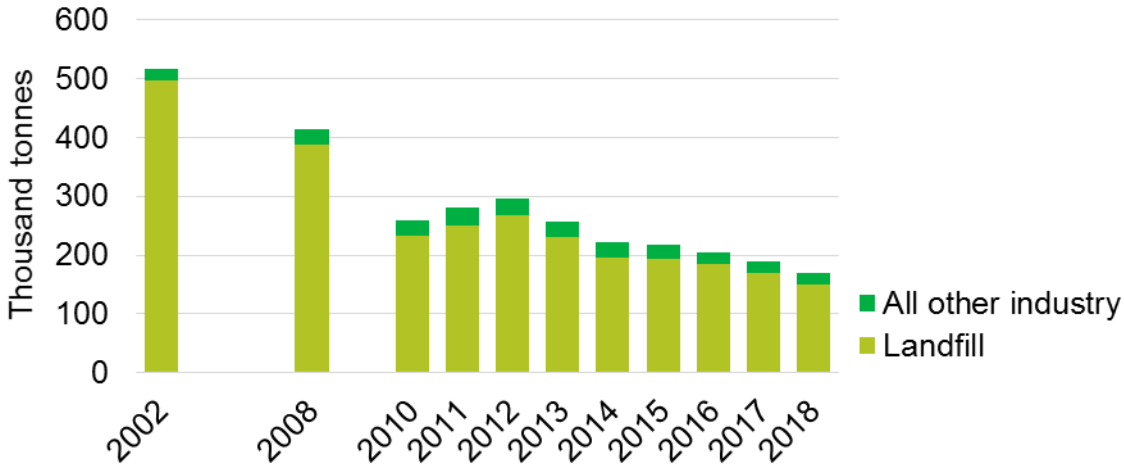
The global warming potential of methane is estimated to be around 25 times greater than carbon dioxide. Even small decreases in methane can have significant benefits in terms of its contribution to climate change.

In 2018, the landfill sites we permit released 149,000 tonnes of methane to air. This accounts for 89% of all methane emissions reported from the sites we permit, and about 14%[27] of total methane emissions in England.[28] Methane emissions from the landfill sector have decreased by 61% since 2008 and by 12% between 2017 and 2018. This reduction in emissions is due to a combination of a drop in landfill gas production and improvements in landfill gas collection.

The drop in landfill gas production is largely due to the implementation of the Landfill Directive.[29] This diverted biodegradable waste away from landfill and led to a reduction in the number of operational sites. As these sites are closed and capped, collection of landfill gas improves. Since 2008 we have also focussed our regulatory effort on improving landfill gas collection and minimising emissions at operational landfill sites.

[27] Based on National Atmospheric Emissions Inventory data 2016 (the latest available, published Oct 2018).
[28] Defra, Greenhouse gas inventories for England, Scotland, Wales and Northern Ireland: 1990 to 2016 (www.naei.beis.gov.uk/reports/reports?report_id=958).
[29] Understanding the Landfill Directive Environment Agency 2011. (www.gov.uk/government/publications/understanding-the-landfill-directive-lfd-1).

Figure 11. Methane emissions to air from sites with permits in England



'All other industry' includes emissions from sectors that contribute less than 5% towards the total release of methane in 2018.

The farming sector as a whole[30] contributes 43%[31] of methane emissions in England. The majority of this comes from livestock. Emissions from the intensive farming sites we regulate contribute less than 1% of all methane emissions in England. Anaerobic digestion plants in the biowaste sector also release methane. We are building requirements into our permits for this sector to ensure that methane releases are minimised.

2.2.3. Energy efficiency and emissions trading schemes

There are a number of energy efficiency and emissions trading schemes that we administer for the UK and regulate in England. At the heart of all of these schemes is the goal of reducing greenhouse gas emissions with a particular focus on carbon emissions. These schemes cover the emission of over 200 million tonnes of carbon dioxide equivalent from industry, businesses and the public sector. This is over 50% of the UK's carbon emissions.

We regulate more than 10,000 organisations in the UK and have successfully delivered compliance rates above 98% for each of the 6 schemes:

- EU Emissions Trading Scheme for installations
- EU Emissions Trading Scheme for aviation
- CRC Energy Efficiency Scheme
- Energy Saving Opportunity Scheme
- Climate Change Agreements
- Fluorinated Greenhouse Gases (F gas) and Ozone Depleting Substances.

These regimes are important market instruments. Our robust regulation and shaping of future direction with government provides a platform for industry confidence and investment. We believe that our regulation is making a difference.

[30] Including intensive pig and poultry farms regulated under the Environmental Permitting Regulations (EPR) and non-EPR regulated farms.

[31] Based on National Atmospheric Emissions Inventory data 2016 (the latest available, published Oct 2018).

2.2.4. Low carbon electricity

Renewable energy is an important part of the solution to reducing greenhouse gas emissions and meeting future energy needs. We are helping the development and implementation of low carbon technologies while also ensuring that appropriate measures are in place to protect the local environment. We do this through permitting and regulating specific sites and by assessing our evidence of how new low carbon schemes and technologies might be affecting the local environment.

2.2.5. Nuclear new build

Our permitting work on new nuclear build is progressing well. We're continuing to regulate the Hinkley Point C construction site in Somerset where NNBGenCo is building a new £20 billion twin reactor nuclear power station. When complete it will be capable of providing around 6% of the UK's future electricity needs while reducing emissions of greenhouse gases.

In 2018, we completed our generic design assessment (GDA) Initial Assessment of the UK HPR1000 reactor and progressed to Detailed Assessment. This design is the basis for a proposal to build a new nuclear power station at Bradwell B in Essex. Our GDA process enables us to assess the acceptability of new reactor designs up front. This helps avoid time and cost risks arising from modifications during construction, and improves potential investors' confidence. In our GDA activities, we work closely with the safety and security regulator, the Office for Nuclear Regulation and, where there are potential developments in Wales, with Natural Resources Wales. We have also been preparing for the environmental permitting of Sizewell C power station in Suffolk.

We are working closely with government and industry on a number of enabling programmes for advanced nuclear technologies. We are building our capability and capacity internally to ensure we are ready to undertake design assessment work and environmental permitting for a wide range of advanced reactor designs including small modular reactors and nuclear fusion reactors. As part of these programmes we've modified our GDA process to cater for smaller, less mature designs and met with reactor designers.

2.2.6. Hydropower

We are responsible for the regulation of hydropower in England. We ensure that only those schemes that minimise local environmental impacts to an acceptable level are licensed. Hydropower provides renewable and reliable electricity generation and is the world's largest renewable energy source. In England it plays a more modest role in our energy mix, but it does provide a contribution to our decarbonisation goals.

2.3. Cleaner, plentiful water

Water provides people and wildlife with a wide range of services. Having good water quality, managed in a way that makes sure the country is more resilient to flood and drought, is essential. We ensure good water quality standards for all, working in conjunction with the other water regulators, namely Ofwat and the Drinking Water Inspectorate.

2.3.1. Freshwaters

Freshwaters, which include surface waters and groundwaters, are worth at least £40 billion to the economy.[32] Water quality in rivers, assessed as biological and chemical quality, improved over the period 1990 to 2008, but these improvements have not continued as quickly in more recent years.[33] In 2009, the assessment changed to the Water Framework Directive's ecological status, a broader definition of health and quality. In 2016, 86% of river water bodies had not reached good ecological status, and only 53% of groundwater bodies achieved good chemical status. The main reasons are environmental impacts caused by agriculture and rural land management, the water industry, and urban and transport pressures.

Chemicals get into the water environment from products used in our homes, hotels, restaurants, offices and industry via sewers and sewage treatment works. Others are released directly to the water environment, such as from industry and run-off from roads and farmland.

As the environmental regulator, we manage the complex systems that allow people to water crops, wash cars, take showers and drink healthy tap water wherever they live in England. We are working with water companies, farmers and businesses to plan for further improvements as part of the next cycle of river basin management planning for the Water Framework Directive.

Population growth, climate change, increasing concern about certain chemicals, plastic pollution, and nano-particles all present potential future threats to water quality.

Drinking water protected areas are water bodies where water is, or can be, abstracted for people to drink. This could be from reservoirs, rivers, lakes or groundwater. The Water Framework Directive requires drinking water sources to be protected and pollution controlled, to prevent deterioration in water quality, and over time to improve it. This is particularly important for groundwater because it can take many decades to reverse pollution in these waters.

Abstracted, or raw, water is treated before we drink it, and the treated water must meet the Drinking Water Directive standards.[34] Reducing pollution in drinking water protected areas is important because it ensures water remains fit to drink, and good water quality reduces the amount of treatment needed before it can go into the public supply system.

In England:

- 231 of the 485 surface water Drinking Water Protected Areas (48%) are 'at risk' of deterioration
- 127 of the 271 groundwater Drinking Water Protected Areas (47%) are ‘at risk’ of deterioration and 71 are not meeting good chemical status

The top pollutants are pesticides and nitrates from fertilisers. Through runoff into water, they are a risk to sources for abstraction, have wider environmental impacts, and their removal increases costs at water treatment works. Nitrate and pesticides not taken up by crops also have economic costs for farmers.

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[32] ONS, Natural capital accounting 2020 roadmap: Interim review and forward look (www.gov.uk/government/statistics/natural-capital-accounting-2020-roadmap-interim-review-and-forward-look).
[33] The state of the environment: water quality. Environment Agency, 2018. (www.gov.uk/government/publications/state-of-the-environment).
[34] Drinking water standards are regulated by the Drinking Water Inspectorate.

Working with water companies we identify Safeguard Zones around these protected areas. These are areas where land use practices are causing, or have caused, water quality to deteriorate.

In the next water company investment period 2020 to 2025, water companies will complete:

- 29 measures to improve the water they abstract from the environment
- 236 measures to prevent deterioration
- 77 investigations into why water quality is deteriorating

Many of these actions are targeted at nitrates and pesticides and will help provide recommendations for further actions.

New work on Environmental Land Management payments by Defra will enable us to influence farming practices to reduce pesticide entry to surface waters through land use changes. We are working with the company BASF on the development of a Bentazone Stewardship Scheme. Bentazone is an active herbicide and is the most commonly found pesticide in UK groundwater. The Voluntary Initiative[35] also looks at other product groups and associated crops to enable more stewardship opportunities.

2.3.2. Working with industry to reduce water pollution

Agriculture covers 70% of England and consequently has a large impact on the environment. It currently contributes over 35% of the phosphorus load to rivers.[36] This proportion is expected to increase to about 50% by 2027, as contributions from other sources, mainly sewage treatment works, decrease. It also contributes 50 to 60% of nitrate and 75% of the sediment loads.[37]

Poor agricultural practice can result in compacted soils, reducing infiltration and creating more run-off. This transfers top soil with nutrients and pesticides to rivers, and may increase flood risk downstream.

Over the last few years we've worked with Defra to produce new rules for farmers to help protect water quality. Since 2 April 2018, we have been working with farmers to implement the Farming Rules for Water,[38] which require farmers to:

- match nutrients to soil and crop needs
- keep fertilisers and organic manures out of the water
- keep soil on the land, prevent bankside erosion caused by livestock and make sure livestock feeders are carefully located away from inland freshwaters and coastal waters

We raised awareness of the rules through engagement with 28 farming industry stakeholder organisations. By December 2018, our relevant web pages had been viewed more than 25,000 times.

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[35] An industry-led programme promoting the responsible use of pesticides.
[36] Environment Agency modelling.
[37] The Impact of Agriculture on the Water Environment: summary of evidence. Defra, 2014.
[38] Defra and Environment Agency, Rules for farmers and land managers to prevent water pollution (www.gov.uk/guidance/rules-for-farmers-and-land-managers-to-prevent-water-pollution). The Farming Rules for Water are part of the Reduction and Prevention of Agricultural Diffuse Pollution (England) Regulations, 2018.

We took a planned advice-led approach to enforcement for the first year the regulations came into effect in order to allow farmers to adapt. We continue to work with farmers to meet the requirements before taking civil or criminal enforcement action.

Our Future Farming team look at how to make the most of the opportunities presented for farming.
They said: "Brexit is expected to provide opportunities to better assist farmers in managing land or water in ways that deliver public goods, and better environmental outcomes. There will be new opportunities to improve farming-related regulation so that it supports better environmental protection and a thriving farm industry, and makes it harder to do the wrong things such as cause pollution."

Water companies' performance is presented in detail in our latest report published in July this year (2019).[39] The report rates how well the 9 main water and sewerage companies, operating wholly or mainly in England, managed their impact on the environment. This includes reducing pollution incidents, managing sewage and complying with their permits.

In 2018, there was a drop in performance. Three companies were rated as 2 star (requiring improvement) and only one company achieved the highest 4 star rating (industry leading company) under our environmental performance assessment.

Compliance with numeric permit conditions at sewage treatment works and water treatment works remained good with 98.6% of permits compliant, the same as in 2017 and 2016. Some companies still need to make significant improvements to cut pollution, reduce pollution incidents and improve permit compliance to meet the 100% expectation.

We have introduced an ‘Improving Water Company Performance’ programme. This will help toughen our regulation to ensure that water companies drive necessary improvements and will deliver effective enforcement against poorer performing companies.

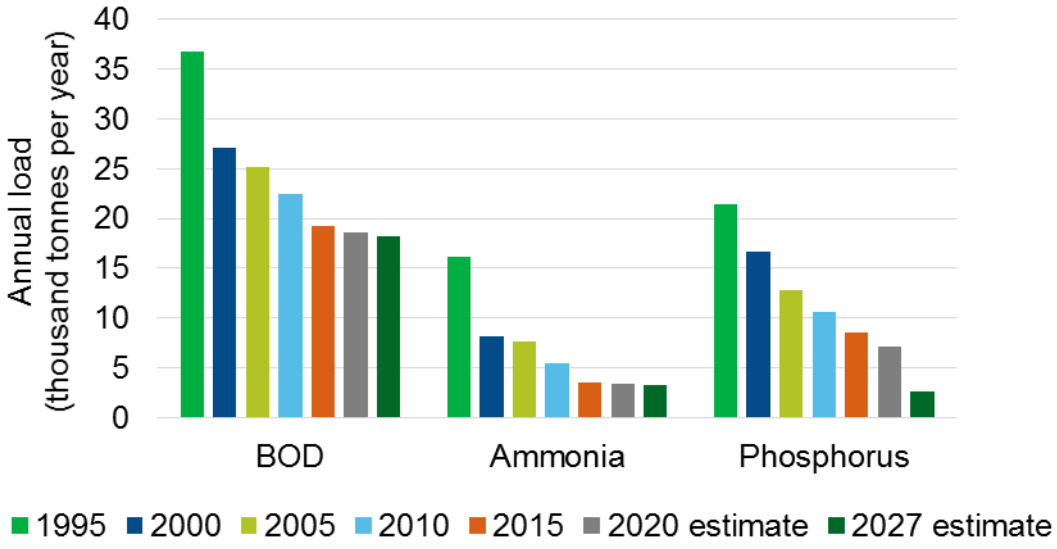
It will include:

- enhancing the Agency’s regulatory tools and approaches, including more and better quality inspections, audits and greater use of technology to remotely monitor operations
- maximising the use of enforcement and sanctions powers so they act as a powerful deterrent
- working with Ofwat to develop greater links between environmental performance and financial penalties and incentives
- improving our regulation of sewage sludge treatment and disposal to ensure it is sufficiently robust to protect against emerging risks such as chemicals, anti-microbial resistance and micro-plastics

Water company discharges of sewage effluent are the largest source of phosphorus entering rivers, accounting for 60 to 70% of the total load. Environmental improvements have reduced phosphorus, ammonia and biological oxygen demand (BOD) in sewage treatment works discharges. The reduction in phosphorus load from 1995 to 2020 will be about 66% and is planned to rise to over 85% by 2027.

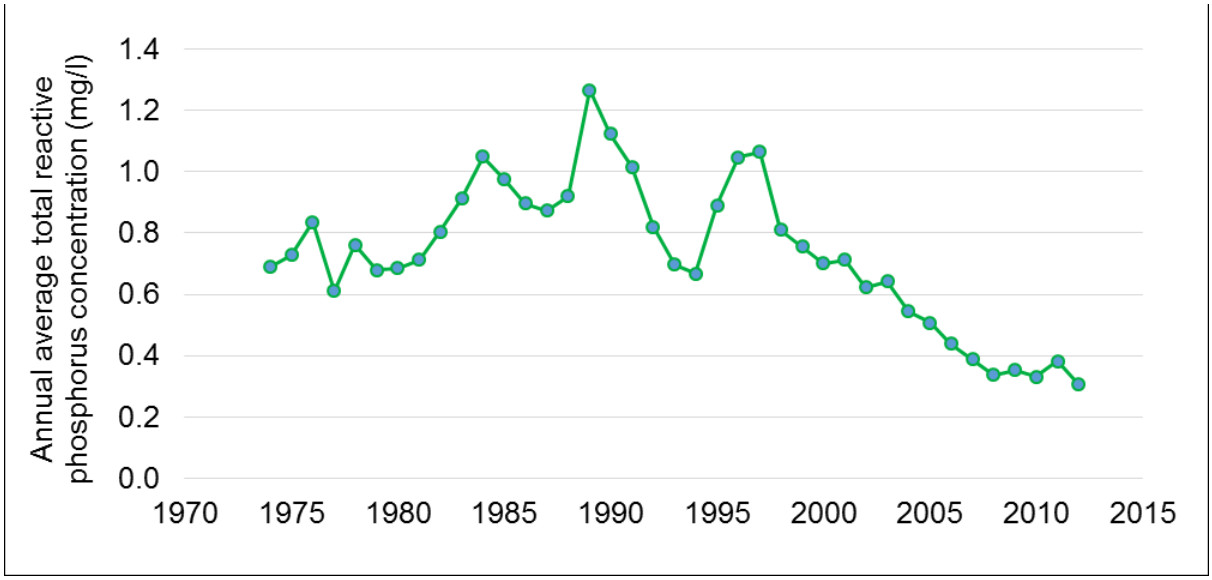
[39] Water and sewerage companies in England: environmental performance report 2018. (www.gov.uk/government/publications/water-and-sewerage-companies-in-england-environmental-performance-report).

Figure 12. Loads discharged to rivers from water company sewage treatment works in England and Wales



The reduction in phosphorus load has resulted in a significant decrease in river concentrations. Figure 13 shows the annual average river total reactive phosphorus concentrations from 1974 to 2012.

Figure 13. Annual average concentration of total reactive phosphorus in rivers in England[40]



Despite these reductions, in 2015, 55% of river water bodies in England failed to achieve Water Framework Directive good status for phosphorus. Further improvement measures are planned.

Between 1990 and 2020, the water industry will have invested about £25 billion in environmental improvement work through the Water Industry National Environment

[40] Figure 13 shows Harmonised Monitoring Scheme data. Analysis from: Worrall, F., Jarvie, H.P., Howden, N. J. K., Burt, T.P. (2016) The fluvial flux of total reactive and total phosphorus from the UK in the context of a national phosphorus budget: comparing UK river fluxes with phosphorus trade imports and exports. Biogeochemistry 130: 31-51.

Programme. We work with the water companies to target these investments to maximise water quality improvements where it matters most.

Current legislation establishes **environmental quality standards** (EQSs) for a wide range of chemicals in rivers, where they have the potential to damage flora and fauna or pose risks to human health.

In order to address the challenge of meeting EQSs, the water industry, under the coordination of UKWIR,[41] and in collaboration with us and other UK regulatory agencies, initiated the Chemical Investigations Programme (CIP). The programme includes actions on water companies to monitor effluent quality at over 600 wastewater treatment sites and evaluate the likely effectiveness of novel wastewater treatment processes.

Our role in the CIP includes ensuring actions are completed and measures are identified to prevent the deterioration of, and improve, chemical water quality. These are included in the 2019 Price Review (PR19) in which water companies set out their longer term plans for managing water supply and sewerage.

Water company storm overflows are a safety valve within the sewerage network. Pressures such as population growth and climate change can result in discharge frequency and volume from these overflows increasing over time. This has potential implications for the environment and flood risk.

In England there are about 15,000 storm overflows that are permitted by us to limit the impact on the environment. There is currently a programme to install monitoring on over 13,000 overflows by 2020. This monitoring will measure how frequently and for how long an overflow operates in wet weather and will be used to inform the water companies' future improvement programmes. The programme is currently on target, with event duration monitoring installed at 10,100 storm overflows by March 2019.

Spill data for 2018 was reported for 6,182 storm overflows with a total of 146,930 spill events. This averages to about 24 spills per year from each overflow.

In 2018, we:

- issued new guidance to water companies on environmental permits for storm overflows and emergency overflows – on issues ranging from drainage strategy, screens, telemetry systems, pumping systems and connections for new developments[42]
- worked with the water industry to develop a consistent planning framework for water company drainage assets[43]

Ensuring plentiful water, the Security of Supply Index (SoSI) compares forecasted water available for supply with actual customer demand. Companies are expected to have a balance or a small surplus of water available when compared with demand, scoring an SoSI of 100. For the financial year to the end of March 2019, 7 of the 9 companies reported a score of 100, and 2 companies reported a score of 98.

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[41] UKWIR is a UK Water Industry Research group. It is a collaborative research platform for the UK and Ireland water sector.

[42] Water companies: environmental permits for storm overflows and emergency overflows. 2018. (www.gov.uk/government/publications/water-companies-environmental-permits-for-storm-overflows-and-emergency-overflows/water-companies-environmental-permits-for-storm-overflows-and-emergency-overflows).

[43] A framework for the production of Drainage and Wastewater Management Plans. 2018. Atkins. Report commissioned by Water UK in collaboration with Defra, Welsh Government, Ofwat, Environment Agency, Natural Resources Wales, Consumer Council for Water, ADEPT and Blueprint for Water.

Average household per capita consumption increased slightly, to just under 139 litres per head per day for the period April 2017 to March 2018. This may have been influenced by the hot and dry weather spells during the year.

For the period April 2017 to March 2018 total leakage increased from 2.4 million cubic metres to around 2.45 million cubic metres per day. Almost all companies reported higher than forecast leakage. We expect water companies to take action to bring leakage under control.

2.3.3. Sustainable abstraction

Abstraction provides essential water for public water supply, agriculture and industry. Unsustainable levels of abstraction impact the ecology, drought resilience and value of our rivers, wetlands and aquifers. Sustainable water abstraction is essential to create a balance between these different needs.

Of the water taken from freshwater sources, 55% is abstracted by water companies for public water supply and 36% is used by other industries. Current levels of abstraction are unsustainable in more than a quarter of groundwater bodies and up to one-fifth of surface waters, reducing water levels and damaging wildlife.[44]

Through the restoring sustainable abstraction programme we are working with abstractors to find solutions that will increase water levels in certain rivers, streams, lakes and other natural wetland habitats. Our goal is to allow water abstraction to continue in a way that the environment can sustain. Since the programme began in 2008, we've made 92 water company licence changes. We have 62 left to change by March 2020 when the programme closes. In 2018, we completed actions changing 4 water and sewerage company licences, saving approximately 5 million cubic metres of water from being abstracted each year.

At the end of 2018, this programme had:

- returned over 13 million cubic metres of water per year to the environment
- removed 45 million cubic metres of unused quantity from abstraction licences, giving us a more realistic picture of the quantities of water that are likely to be abstracted, and preventing increased abstraction creating new environmental pressures

In December 2017, Defra published a new water abstraction plan.[45] It will help us make full use of our regulatory powers, local knowledge and partnerships to address unsustainable abstraction. The plan outlines reforms for water abstraction that are vital to ensure there are resilient water supplies for the future while still protecting the environment.

We are also adopting a stronger catchment focus that will support abstractors to access the water they need to operate efficiently, address unsustainable abstraction and encourage innovation. We are working with abstractor groups and stakeholders in 4 initial priority catchments to develop and trial new solutions, such as rapid water trading and enabling high flow abstraction. Water trading is the trading of water on an under-used abstraction licence to another party. It is usually confined within a local area and usually for the same purpose such as between farmers for irrigation water, although it does not have to be. We successfully trialled this more flexible approach during the prolonged dry weather in 2018.

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[44] Environment Agency, 2018. The state of the environment: water resources. (www.gov.uk/government/publications/state-of-the-environment).

[45] Defra, Water abstraction plan 2017 (www.gov.uk/government/publications/water-abstraction-plan-2017).

Abstracting water without a licence, in excess of the licenced amount, or abstracting in excess of restrictions such as low flows, is considered to be water theft. As water theft increases, it increases the risk of adversely affecting lawful users and the environment.

The Water Resources Act protects the quantity of water available for legitimate abstractors, and the environment. We undertake regular checks of abstractors and follow up reports of water theft. If we find there is illegal activity, then operators will face enforcement action that could result in a significant fine and a criminal record.

During 2018, we checked over 4,200 licences and found over 90% were compliant. The reasons for non-compliance were varied. Some abstractors exceeded their licence volume limits, or abstracted water despite river levels falling below critical trigger thresholds. The unusually hot and dry weather during the summer of 2018 is likely to have been a significant contributory factor in some cases.

We have developed an online abstraction information service to help abstractors manage their operations more effectively. The first stage was launched in March 2018.

Modernising our water abstraction service

We launched our online water abstraction licence service in March 2018. The service allows users to view and manage their water abstraction licence details online. By April 2019, 3,000 licence holders and their representatives had registered.

We have also made our flow data, from over 500 river gauges across England, accessible online. This will enable abstractors to quickly source the data they need to help manage their flow controls and abstractions more effectively and efficiently.

Bruce, one of our area environment managers, said “making the water quantity data we collect available to everyone will help all of us make the best choices for the health of our rivers and groundwater.”

2.3.4. Estuaries and coasts

'Clearing the Waters for All’ is our Water Framework Directive guidance[46] for activities in estuaries and coastal waters in England up to 1 nautical mile out to sea. It replaced the original guidance that was only for marine dredging and disposal activities.

It was developed in response to customer demand to clarify the Water Framework Directive assessment process and extends the guidance to cover the full range of activities in our estuaries and coasts - from small scale maintenance of structures to major construction projects.

[46] Water Framework Directive assessment: estuarine and coastal waters. December 2017. (www.gov.uk/guidance/water-framework-directive-assessment-estuarine-and-coastal-waters).

The guidance:

- helps regulators and operators to assess and mitigate the impact of activities along our estuaries and coasts using a consistent, risk-based approach
- sets out our expectations of what should be included in a Water Framework Directive assessment
- helps to ensure local decisions taken on assessments are more standardised across England

Our Estuarine and Coastal Monitoring and Assessment Manager said: “When our 'Clearing the Waters for All' guidance was first published in 2016, it was widely welcomed by industry and praised for its ease of use. The guidance continues to be well used and has been subject to updates in 2017 and further review in 2018. We will be looking to see how the guidance can be developed further to support the ambitions of the 25 Year Environment Plan.”

2.3.5. Bathing waters

Maintaining a high quality of bathing water benefits the seaside economy. There were 133 million overnight holidays and day visits taken to the seaside in England in 2017, worth £7.4 billion to the economy.[47]

Improvements in bathing water quality are largely due to improvements in the sewerage infrastructure at, or near, a number of bathing waters. Local action plans are in place for the waters that need improvement, involving a range of partner organisations.

Bathing water quality has remained high following the record results in 2016, which showed bathing waters were the cleanest since records began.

Over the last 10 years, bathing waters have continued to improve. Bathing water standards changed in 2015, with more stringent standards being applied. If today's standards had been applied in the 2000s, between 2008 and 2018, bathing waters passing the minimum standard would have increased from 91% to 98%. The number of waters meeting the excellent standard would have increased from 53% to 67%.

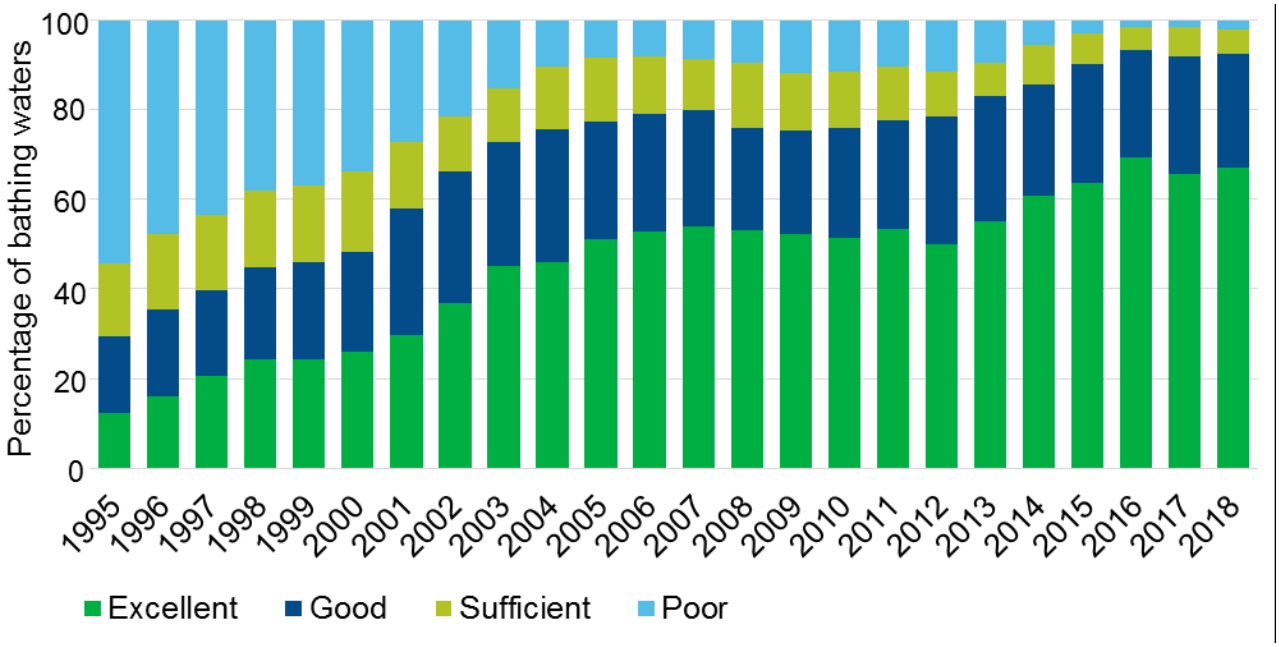
In 2018, bathing water quality was tested at over 400 beaches and lakes. Compliance with bathing water standards was 97.9%, with only 9[48] waters receiving the lowest classification of 'poor'.

Bathing waters meeting at least the minimum standard has been largely stable over the last 3 years at 98.5% in 2016, 98.3% in 2017, and 97.9% in 2018. The number of bathing waters meeting the excellent or good standard over the last 2 years remains at 92%. The number of poor bathing waters is also stable at around 2%.

[47] This is for holiday visits and day visits. Visit Britain (www.visitbritain.org); GB Day Visitor Survey 2017 (www.visitbritain.org/gb-day-visits-survey-archive), GB Tourism Survey 2017 Overview, England - Holidays 2017. (www.visitbritain.org/archive-great-britain-tourism-survey-overnight-data).

[48] Since the data were reported in the autumn of 2018, one of the nine waters classified as 'poor' has been de-designated because of its low use for bathing.

Figure 14. Bathing water quality[49]



The Bathing Water Directive classification requires measurement of faecal indicator organisms in the water. Bathing water quality is affected by a range of sources of such organisms. The most important are diffuse pollution from agriculture, sewage related pollution and urban diffuse pollution (including contamination from dogs and birds). The relative contribution from these sources will vary between sites depending on the nature of the catchment and its land use. Most sites are affected by more than one source. Heavy rainfall has a significant short-term impact on water quality.

Between 1990 and 2020, the water industry will have invested over £2.5 billion in bathing waters improvement work.

2.3.6. Reservoir regulation

Reservoirs in England are regulated by the Reservoirs Act 1975. This sets stringent conditions for their operation to ensure high levels of safety. They are designed and operated to ensure the likelihood of failure is incredibly low.

Responsibility for ensuring the safety of reservoirs lies with their operators. Our job, as the regulator, is to ensure they comply with the legal safety requirements. We monitor compliance at all 2,072 large raised reservoirs in England and use a range of enforcement options to address non-compliance. These can include:

- enforcement notices requiring reservoir owners and operators to complete outstanding safety works
- requiring operators to employ government-appointed supervising and inspecting engineers
- powers to force entry to conduct surveys, inspections and physical works
- direct intervention to carry out safety measures where an operator has not done so

[49] The bathing water standards changed in 2015 to become more stringent. The chart shows the classifications of bathing waters as they would have been if the 2015 standard had been applied to all the years prior to 2015 on the chart.

- powers to force entry to land without giving notice and taking any appropriate measures to reduce the risk or mitigate the effects of a failure

Between January 2017 and December 2018 we:

- issued 385 certificates[50] after satisfactory completion of an inspection
- issued 124 certificates[50] which contained measures to be taken in the interests of safety
- issued 148 certificates[51] showing that measures to be taken in the interests of safety had been satisfactorily completed
- served 24 enforcement notices at 22 reservoirs
- issued 12 formal warnings to reservoir undertakers[52]

2.4. Reduced waste

Waste reuse and recovery helps protect natural resources and reduce the need to dispose of material.

The government's Resources and waste strategy for England[53] gives more information on the government's plans to reduce waste through:

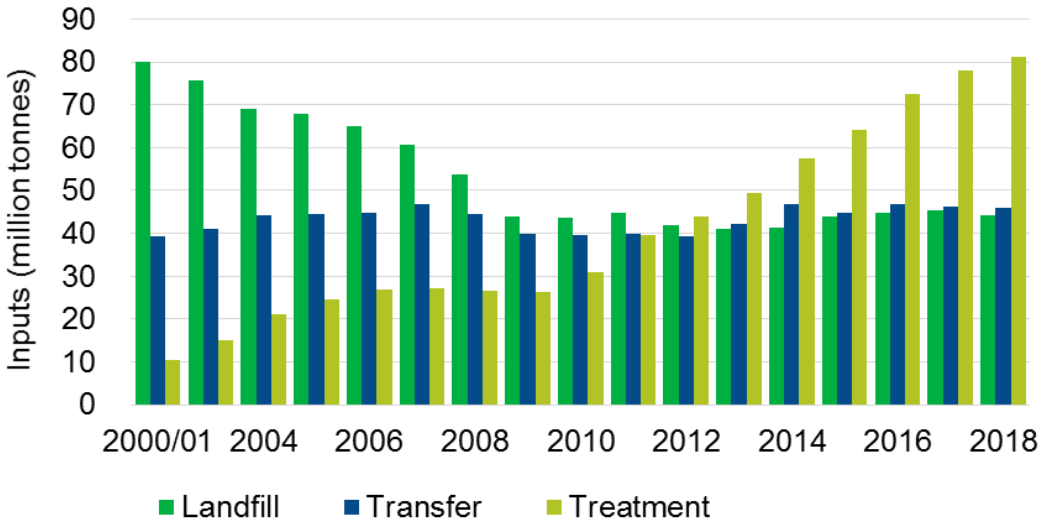
- more sustainable production
- helping consumers choose and use more sustainable products
- resource recovery and management
- tackling waste crime
- cutting down food waste

In recent years, more waste has been reused and recycled, and less landfilled. Twenty years ago nearly all waste went to landfill. Most waste is now reused or used for energy generation. But this has led to a large increase in the number of sites storing and treating wastes, often in close proximity to communities. In turn this has also increased the risks of fires and odours.

The amount of waste going to landfill in England decreased by 45% between the financial year 2000 to 2001 and the calendar year 2018,[54] and by 18% since 2008.

[50] This is a 10(5) certificate under Section 10 of the Reservoirs Act.
[51] This is a 10(6) certificate under Section 10 of the Reservoirs Act.
[52] The reservoir undertaker is the person responsible for the day to day monitoring of the reservoir in line with recommendations made by the supervising or inspecting engineer.
[53] Resources and waste strategy for England. December 2018. (www.gov.uk/government/publications/resources-and-waste-strategy-for-england).
[54] Environment Agency, Waste management for England 2018. (www.assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/741304/Waste_management_2017_England_summary.pdf).

Figure 15. Waste management in England



2.4.1. Waste from regulated industry

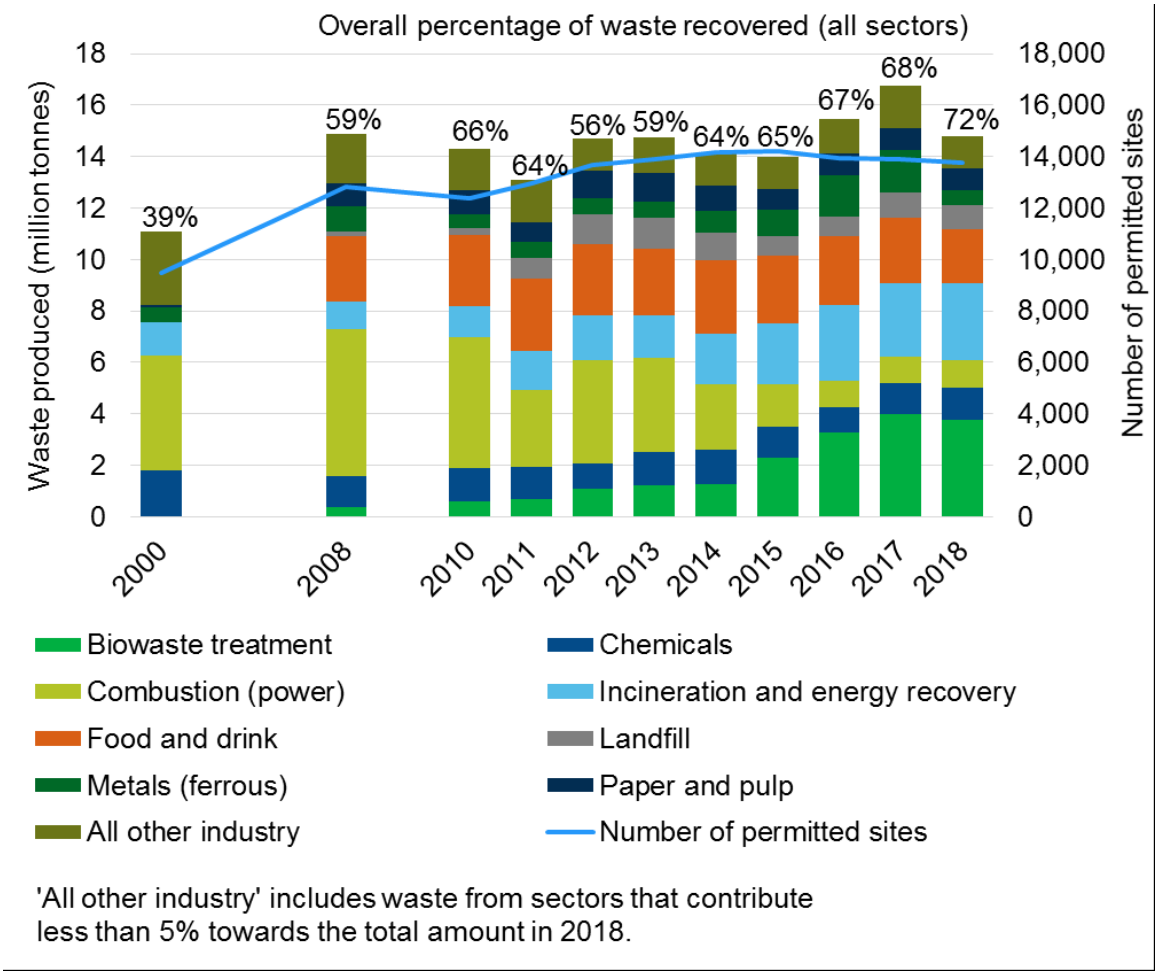
In 2018, the sites we permit produced 14.8 million tonnes of waste, 2.0 million tonnes less than in 2017. A record 72% of this waste was recovered or reused. In the 10 years between 2008 and 2018, the amount of waste recovered increased from 59% to 72%.

Figure 16 shows the amount of waste produced by each sector. It also shows the overall percentage of material recovered each year (all sectors). For sectors that take in recyclable materials from other sites or sectors, it does not represent the amount taken in, but the amount of waste that is produced after the recycling activities have concluded. The sectors that produced the most waste in 2018 were:

- biowaste treatment, 26% of the total produced (80% recovered)
- incineration with energy recovery, 20% of the total (80% recovered)
- food and drink,14% of the total (93% recovered)

The biowaste treatment and incineration with energy recovery are sectors that take in waste materials from other sectors.

Figure 16. Waste produced and recovered by sites with permits



2.4.2. Waste spread to land

Over 5.5 million tonnes of waste was spread to land in 2018, about the same as in 2017, and almost twice as much as the 3 million tonnes spread in 2011. The application to land of sludges from wastewater treatment, food preparation and digestate from the anaerobic digestion of waste has increased. This reflects changes to waste management practices and the increase in anaerobic digestion as a treatment option.

Done well, landspreading can help improve soil fertility. Done badly, it contributes to diffuse water and air pollution problems, harms soil quality and can put at risk food grown for human consumption. It can also undermine confidence of land managers in selecting waste derived materials for use on their land.

In early 2017, we implemented revisions to landspreading mobile plant permits. This will help stop application of inappropriate wastes, and help prevent legitimate operators being undercut. One revision was a requirement for all operators to tell us when they plan to spread their waste. This allows our staff to target field inspections to high-risk spreading activities so we can act early to protect the environment.

The work we do supports beneficial recovery and stops inappropriate waste disposal to land. It supports the government's 25 Year Environment Plan in maximising resource efficiency and minimising environmental impacts by improving management of waste.

2.4.3. Waste exports

In 2018, an estimated 14.2 million tonnes of waste was legitimately exported from England. This included:

- 4.2 million tonnes of notified waste
- 3.9 million tonnes of packaging waste
- 6.1 million tonnes of green list waste other than packaging waste

Any wastes other than clean, separated material sent for recycling, must be notified to us. Exports of notified waste are predominantly refuse derived fuels sent to European countries for energy recovery. Green list wastes are considered low risk to the environment and subject to lower regulatory controls. Unless specific restrictions are set by the receiving country, sorted, uncontaminated waste sent for recycling overseas can be exported as green list waste.

In 2018, we received 455 export notifications and 181 import notifications. We processed all of them within the required timeframes.

We have strengthened our assessment of exporters of producer responsibility packaging waste. This applies where the waste is being exported for the purpose of contributing to the UK packaging recycling rates. Exporters are required to demonstrate that exported waste is high quality with minimal contamination, destination sites are appropriately licensed to receive and treat the waste and waste is correctly processed once received.

In 2018, 3,838 overseas sites were assessed to receive packaging waste for recycling; 104 of them were refused approval.

In 2018, we prioritised our joint work with HMRC on reviewing inconsistencies between customs information and our packaging data. We are contacting exporters to investigate why and how these inconsistencies arise and take enforcement action if required.

A dedicated producer responsibility Waste Regimes Operational Services Investigations team was established in January 2018. The team works collaboratively across the Environment Agency, and with other UK and international regulators and enforcement agencies to target serious offenders using a risk-based, intelligence-led approach.

We started 2 projects to support our understanding of the proposed regulatory reform of green list wastes. The projects look at waste tracking forms and risk profiling overseas recycling sites. Wastes must be shipped with the correct tracking form, which contains important information about the shipment.

So far, as a result, we:

- have already prevented the export of unsuitable wastes
- are investigating concerns about an overseas recycling facility with the overseas competent authority
- are contacting overseas competent authorities to facilitate inspections of high-risk recyclers

2.4.4. Plastics

The plastics we see in the environment and the issues highlighted by Blue Planet II galvanised businesses, government and society to take action to prevent plastics escaping into the environment. An important component of this action is to increasingly build a circular economy for plastics.

In the UK we use around 4 times more plastic than the lowest consumers in Europe. Research shows that the average British person produces 76kg of plastic a year, far more

than in Sweden and Norway, at 18kg, although well below the US, at 120kg.[55] In Europe only 9%, on average, of plastic waste is recycled.

The government's Resources and waste strategy for England sets out the ambition and recommendations for dealing with plastic waste. This includes looking at deposit and return schemes and improving the recovery and recycling of plastic in household waste. In 2018, the sale and production of personal care products containing micro-beads was banned to reduce sources of micro-plastics into the environment. Plastic straws, drink stirrers and cotton buds will be banned by April 2020. This is part of government's aim to "be a global leader in tackling plastic pollution".

Our regulation helps to prevent:

- plastic becoming waste in the first place
- waste plastics escaping from the waste management system
- illegal waste activities, which make it more likely that plastics will end up in the wrong place

Our activities include:

- ensuring our permits for waste facilities have conditions to prevent litter escaping, and to prevent plastic going into compost, anaerobic digestion plants or landspreading activities
- implementing duty of care legislation, which prevents waste escaping from sites and vehicles
- implementing hazardous waste regulations, which help prevent harmful plastics escaping waste management controls
- overseeing requirements to destroy some types of plastic containing persistent organic pollutants, usually by incineration
- checking that companies have looked at how to meet the waste hierarchy in their permitted activities
- implementing producer responsibility regulations, which require producers of plastic packaging to ensure it is recovered
- monitoring waste shipments, which regulates the import and export of waste, including plastic as segregated or in mixed municipal waste or refuse derived fuel
- waste crime prevention, disruption and enforcement to reduce the amount of plastic waste escaping the waste management system
- working with businesses and industry to reduce plastic contamination in materials spread to land
- working with larger materials recycling facilities, monitoring contamination in recovered plastic and recycling rates

[55] Norwegian Government Agency Grid Arendal.

We’re also working in partnership with many organisations, businesses and trade associations to:

- support their voluntary action
- understand the issues and opportunities to increase the circular economy for plastics
- reduce plastics escaping into the environment

These include, WRAP and their UK Plastics Pact initiative, Business in the Community, The Prince's Responsible Business Network and their Circular Economy Taskforce, water companies and WaterUK, Highways England, farm assurance schemes, National Farmers Union, and the biowaste industry.

3. Supporting growth and innovation

As a regulator we have a role in supporting sustainable economic growth and innovation. This is important in responding to the climate emergency, the government's commitment to an economy with net zero carbon emissions by 2050, the challenge of plastics, and the development of a circular economy.

3.1. Innovation

Our regulation needs to support businesses, giving them confidence to invest, innovate and grow.

Working with Tata Chemicals Europe

Tata Chemicals Europe operate a number of facilities in Cheshire including the manufacture of sodium bicarbonate and soda ash, the raw materials for major industries including pharmaceuticals, glass, food, and water treatment. This is energy intensive and they operate their own heat and power plant (CHP) to provide energy to their businesses and surplus electricity to the network. The cost of retrofitting part of the plant to meet new emission targets was disproportionate for the emergency back-up boilers, which might operate for a few hours per year, but their loss would have had a significant impact for the chemical manufacturing business.

Our Industry Regulation team worked with and across Environment Agency departments to identify a pragmatic solution which resulted in a bespoke environmental permit for the power plant. This helped the company to unlock over £7 million of investment in a new boiler plant at their salt manufacturing facility, also in Cheshire. This will improve NOx emissions and meet tighter limits under the Industrial Emissions Directive. We are also supporting the company with permitting advice to develop carbon capture utilisation that will extract carbon dioxide from the CHP flue gas for use in the chemical manufacturing process.

Environment Agency Chair Emma Howard-Boyd said:

"This work is a true example of cross government working in order to help better protect the environment. Following on from the great successes of this joint working, Tata are now developing their plans for carbon capture utilisation technology at the plant, which the Environment Agency are supporting through permitting advice. This will be the first scheme of its type to progress to a commercial manufacturing scale in the UK.

It was fantastic to see Environment Agency colleagues working closely with key stakeholders and other government bodies towards that important step in decarbonising industrial activity and supporting the carbon net zero target."

We work with businesses to understand their needs as well as advising government where changes to legislation could support the promotion of innovation and sustainable growth.

United Utilities: The Petteril catchment nutrient balancing study

United Utilities have led on the development of integrated catchment delivery. They have developed innovative low carbon solutions to water treatment challenges and played a major role in the £10 million Natural Course Life bid and the Defra 25 Year Environment Plan pioneer catchment trials. This supports the development and delivery of catchment solutions and shares the learning with others. The company has received draft approval from Ofwat to continue the roll out of this approach.

We worked with United Utilities to agree a catchment nutrient balancing approach in the Petteril catchment. The company is funding catchment measures such as river bank fencing, a balancing pond and improvements to farm infrastructure to reduce phosphorus inputs to the River Petteril from agriculture.

The aim was to reduce the annual phosphorus emissions from the Calthwaite wastewater treatment works to meet Water Framework Directive objectives.

The catchment solutions should also provide additional ecological benefits such as reducing the amount of sediment in run-off discharged to the river.

3.2. Better customer services

We interact with businesses at a variety of levels including via local officers, national services or trade meetings and groups. We apply continuous improvement processes, taking a structured approach to review the way we work and make improvements. We work to streamline and improve our services and processes, to save businesses time and money and provide good customer service.

Streamlining hydropower

In January 2018, we introduced measures to improve our handling of hydropower applications, providing a more consistent service to water users and reducing our costs. We also worked with the hydropower industry to make further efficiencies and improve the quality of applications we received.

This included:

- improving guidance
- simplifying internal structures and processes
- training for our permitting and technical staff

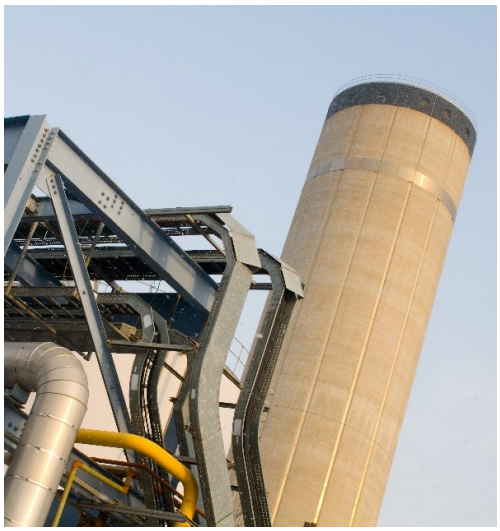
This has resulted in our pre-application timescales reducing by a third, our application timescales reducing by 43%, and realising 64% savings in resources.

Our streamlining work delivered real benefits to the hydropower industry in early 2019, when we handled a surge in hydropower applications prior to the closure of the government's Feed-In Tariff Scheme.

Helping businesses with permit applications

In April 2018, we introduced our new pre-application service.

Led by our National Permitting Service, it forms part of our commitment to providing enhanced customer service.



Mark, a pre-application co-ordinator from our National Permitting Service said: “Our new pre-application service is driven by our customers' needs. They specify the advice and support required to help make sure they get their application right first time.

We provide permit application advice, and co-ordinate input from local teams and specialist colleagues, covering everything from a domestic water discharge to a new power station.

Good quality pre-application advice means we can process permit applications more quickly and smoothly, improving compliance at regulated sites and supporting healthier and safer communities while still enabling growth.”

3.3. Making the most of digital technology

3.3.1. Enabling digital permissions

We issue a wide range of permissions to businesses and people for activities that pose varying risks to people and the environment. We are working hard to make it easier for the right people to obtain the right permission for the right activity in the right place. One way we are doing this is by enabling people to apply online. We are designing and developing digital products with those that apply for them, to ensure that we meet their needs as best we can. This in turn helps to make more of these applications right first time and helps us to approve them faster.

In August 2018, our first digital permission for people to apply for waste standard rules permits went live. We are using this experience to create digital application options for other permission types. Over the next 5 years, we hope to create digital application processes for a wide range of the permissions we authorise.

3.3.2. River flows

In 2018, we continued to invest in improving our customer services through the use of digital technology via our Regulatory Service Programme. In March 2018, we launched the water resources licensing service, which allows licence holders to view and manage their licences online.[56] Licence holders with 'hands-off flow conditions' in their licences will be better able to manage their abstractions as a result of improved access to river flow and level information online, and by receiving notifications when low flows may affect their rights to abstract. We published river flow data for gauging stations across Devon and Cornwall in 2018 and have recently added over 500 flow gauges covering the rest of the country.

We produced a film 'A river of change' to promote the benefits associated with the increased availability of our data to both internal and external customers.[57]

3.3.3. Hydrological data

We publish real-time and validated hydrological data from our National Hydrometric Archive on the Defra Data Services Platform.[58] This means customers are able to access the most up to date data.

South West Water said: "The new website has allowed us to access instantaneous and daily mean river flows data much more quickly and easily. Being able to instantly view flow values and trend graphs for any key river in the region allows us to share a common understanding with the Environment Agency of the current situation. This supports management of our abstractions and associated operations in a way that protects the environment."

3.3.4. Groundwater

We are now investigating adding groundwater sites, and later in 2019, we will look at options to increase the number of flow sites that are available.

"Getting this project off the ground has been a wonderful example of cross-organisational working and would not have been possible without a huge amount of work and dedication

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[56] Environment Agency, Manage your water abstraction or impoundment licences online (www.gov.uk/guidance/manage-your-water-abstraction-or-impoundment-licences-online).
[57] Watch the film 'A river of change' here: (www.youtube.com/user/EnvironmentAgencyTV).
[58] (environment.data.gov.uk/).

from numerous teams including Data Sharing and Access and Monitoring Data and Systems and the National Telemetry Service," said Andrew the Project Manager.

We are now using the knowledge and experience from building and operating these services on the development of future digital permitting.

4. People trust and respect our regulation

We are a fair and balanced regulator, working to protect public health, natural resources and the environment, while supporting businesses and sustainable economic growth.

Our role and approach

We are responsible for implementing environmental regulations and standards set by government including:

- issuing permits to businesses and individuals, setting standards so that businesses operate without harming people or the environment
- reviewing permits and guidance to make sure they are up to date
- checking that businesses and individuals comply with their permits and the law
- investigating incidents and complaints
- using the full force of the law to crack down on illegal activities that blight communities and the local environment
- providing advice and guidance on how to comply with regulations and permits
- using appropriate sanctions and enforcement to bring businesses back into compliance
- monitoring and providing evidence on the state of the environment, to advise and inform policy development

We apply a sector based approach, allowing us to tailor our work to the needs of the different industrial sectors we regulate. We continue to encounter new and varied challenges in the work we do, and we have limited resources to achieve our ambitions. We work to spot problems before they occur and resolve issues before they escalate, rather than reacting afterwards. We focus our efforts where we can have the most impact, and prioritise our resources based on risk.

Working with industry: Overton paper mill

We regularly review permits and are re-permitting the UK`s heavy and energy intensive industries under the Industrial Emissions Directive. The Directive sets mandatory emission limits for similar processes. This sets the standards for progressive improvements in industrial performance and the reduction of their environmental impact.

Our sector based approach to regulation recently enabled staff to challenge long standing operating practices at a paper mill. Around £20 million of investment was secured for the re-design of both paper production and effluent treatment processes.

Site wide improvements to water, raw material and energy use ensures the business continues to operate legally and more sustainably, while substantially reducing the impacts of a large abstraction and discharge to an important chalk stream fishery.

Roger, in one of the Environment Agency's compliance teams said “Regulating ‘process industries’ means working with businesses to understand how industrial pollution can be prevented well before end-of-pipe solutions. This work was the result of many years of regulation with an operator in a difficult position. Our approach to compliance and permitting involves working with business, and in this case has resulted in both improvements to the environment as well as supporting a more sustainable future for the paper mill”.

Once complete, the predicted outcomes include an expected 50% reduction in pollutants to water, including a 70% reduction in phosphorus discharged to the River Test, an important salmon fishery, a 25% reduction in energy use and over 90% reduction in waste.

4.1. Our regulatory work

As a trusted regulator we work closely or in partnership with government and other regulatory bodies to deliver a broad range of regulatory schemes. This work strengthens the management of environmental impacts outside our immediate remit, supporting improvements in local air quality, waste management, local development, agriculture and major industrial accidents. We:

- have a Local Authority Unit that provides technical advice to local authorities on the industrial processes they regulate
- work with HMRC, the police and local authorities to tackle waste crime
- administer UK-wide regimes on behalf of the government, such as the Carbon Reduction Commitment energy efficiency scheme and the EU emissions trading system
- work with the Health and Safety Executive, jointly regulating over 600 major hazard sites
- are part of the generic design assessment team for new nuclear reactor designs, working with the Office for Nuclear Regulation
- work closely with other nuclear sector regulators, including the Office of Nuclear Regulation and Natural Resources Wales
- work with regulators such as Ofwat and the Drinking Water Inspectorate
- work with Natural Resources Wales, the Scottish Environment Protection Agency and Northern Ireland Environment Agency to share best practice and support environmental protection across the UK

- are part of the Shale Environmental Regulator Group, working with the Health and Safety Executive and the Oil and Gas Authority regulating onshore oil and gas activities

We work with the Health and Safety Executive:

- as joint regulators for onshore oil and gas exploration and production, working closely with the Oil and Gas Authority
- to ensure operators of major hazard sites prevent and limit the effects of accidents

We work closely with other nuclear sector regulators, including the Office of Nuclear Regulation and Natural Resources Wales to:

- secure around £60 billion of investment in low carbon electricity generation
- further develop our enabling regulatory regime for the development of advanced nuclear technology

4.2. Working with businesses and partners

Ways we support businesses include:

- taking decisive action to improve compliance of poorer performing businesses and closing down illegal sites to help create a level playing field for good performers
- introducing more standard rules permits,[59] saving businesses time and money, and developing online permit application tools for standard permits
- reducing the time we take to determine permit applications, and at the same time improving the quality of applications
- introducing modern digital systems to allow businesses to register their activities online and carry out their business faster
- simplifying our advice and guidance
- working with others to streamline regulation in the farming and chemicals sectors
- supporting operators of major hazard sites to be more resilient to extreme weather events with a particular focus on flood preparedness

We also work in partnership with businesses, civil society groups and communities. Staff in our local offices work closely with organisations and communities to improve the local environment and encourage sustainable development.

These partnerships make us more effective, creating bonds that strengthen our ability to engage with people and businesses on matters such as waste crime, environmental protection and climate resilience.

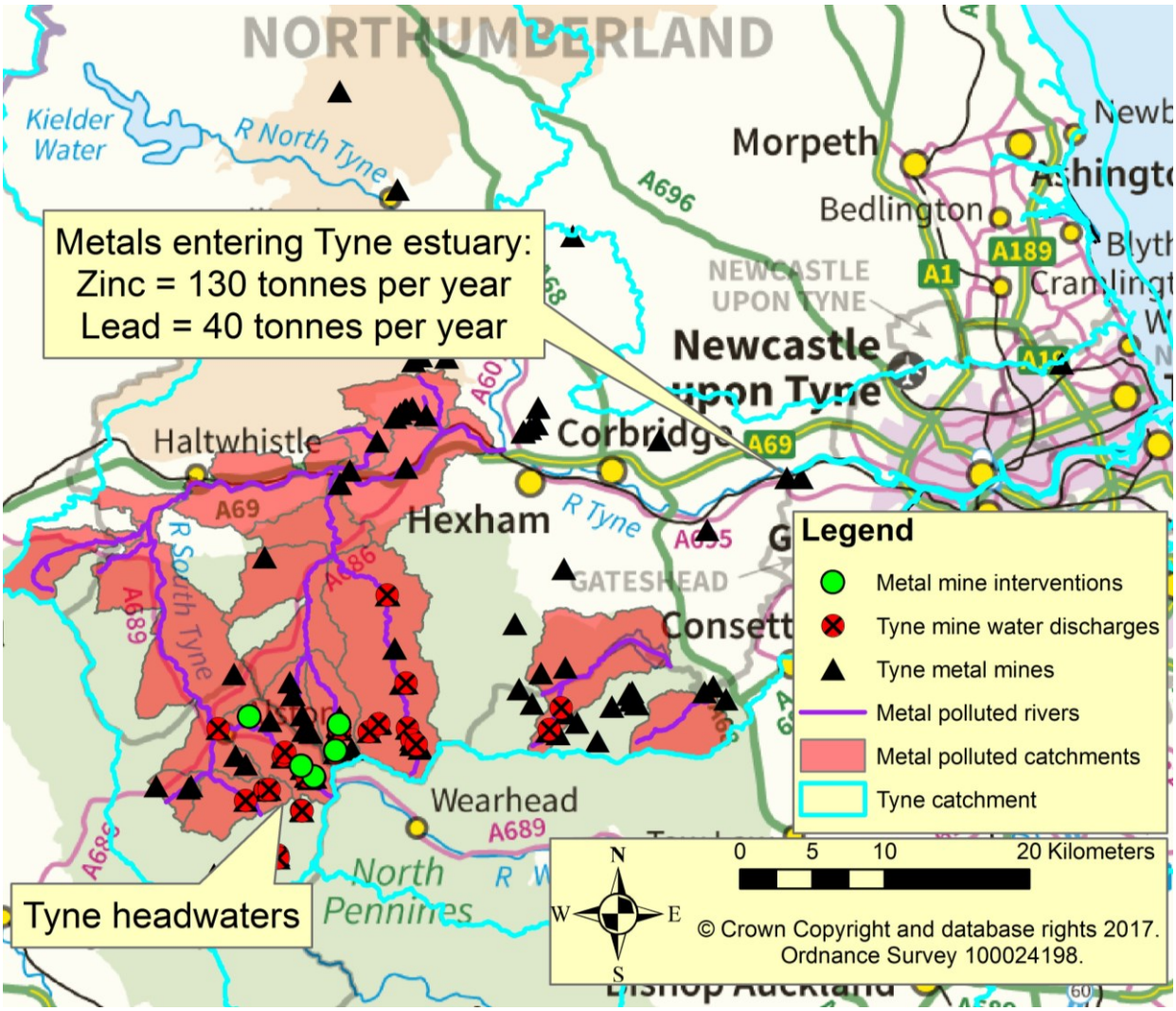
[59] Standard rules permits are subject to a process of regular continuous improvement and review and are revised to ensure environmental standards are met.

Partnership working to clean up pollution from abandoned metal mines in the Tyne catchment

Discharges from abandoned metal mines in the headwaters of the Tyne catchment significantly pollute over 100km of rivers, harming wildlife. Before 2000, mines could be abandoned with no responsibility on the owner to deal with ongoing water pollution after mining ended. This is the case here. Through the Water and Abandoned Metal Mines Programme, the Environment Agency works with the Coal Authority, Defra and others to clean up the 1,500km of metal polluted rivers across England.

Each year about 130 tonnes of zinc and 40 tonnes of lead accumulate in the Tyne estuary sediments. This increases the costs of maintaining the economically vital deep water shipping berths. The annual input of zinc needs to be reduced to less than 65 tonnes. The River Tyne Steering Group brings together environmental regulators, Newcastle City Council and other local authorities, the Port of Tyne and the North East Local Enterprise Partnership to manage the issue and "support a sustainable environmental and economic future for the River Tyne".

Interventions to prevent metal-rich mine wastes eroding in the headwaters have stopped over 10 tonnes of zinc, lead and cadmium from entering the Tyne each year since 2018, and have begun to improve water quality. We're also developing several large mine water treatment schemes that will cause a step change in water quality and further protect economic activity, if funding can be secured.



Onshore oil and gas: Preston New Road, Lancashire

In October 2018, hydraulic fracturing for shale gas took place for the first time in the UK since 2011. We have the environmental controls to protect groundwater, surface water and air quality and to ensure the safe storage, management and disposal of wastes.

The shale exploration site at Preston New Road in Lancashire, has a comprehensive monitoring programme in place to help us understand the quality of the air and water around the site and identify any changes. During operations we monitored the site closely through regular site visits, audits and spot checks.

We are working with our partners as the Shale Environmental Regulator Group. This brings us together with the Health and Safety Executive and the Oil and Gas Authority to act as a single face for local communities, local authorities and industry. Together we aim to provide transparency and clarity to the public, resolve regulatory issues and share best practice with local authorities considering shale gas applications.

We are active in keeping local people informed through face to face meetings, newsletters and publishing information on GOV.UK.

We are committed to ensuring that all onshore oil and gas sites meet the highest environmental standards, and through a process of permit review, these robust controls are applied across the sector.

4.2.1. Engagement

Being informed and having good evidence supports fair and proportionate decision making. We listen to our stakeholders and gather evidence in a number of ways such as:

- running public consultations; we carried out 22 national external consultations with stakeholders in 2018
- consulting industry when we propose to make regulatory changes, for example speaking to trade associations when new environmental standards are being set to ensure they are appropriate and achievable
- allowing time for businesses to plan future investment or make changes to meet new regulations or standards
- by listening – there may be good and justified reasons why businesses cannot meet new requirements
- agreeing derogations where, if certain criteria are met, a lesser standard can be applied

We have a process that enables operators to ask for a review of a regulatory decision we've taken, independently to any statutory appeal right. We received 16 such appeals from business against our regulatory decisions in 2018. After investigation 3 were upheld.

4.2.2. Permitting activities

Our permitting and licensing activities enable businesses to carry out their operations, while robust regulation provides the level playing field legitimate businesses need to prevent being undercut by irresponsible or illegal operators. In return, we expect businesses to take responsibility for their operations.

Our National Permitting Service issues and deals with permits for waste, water quality, water resources, flood risk activities and industrial activities. In 2018, we:

- processed 3,135 new permit applications
- issued 5,936 permit variations
- dealt with 1,587 permit surrenders
- dealt with 1,039 permit transfers
- registered 2,260 mobile plant deployments

In the financial year 2018 to 2019 we registered 72,517 waste exemptions. Our area teams:

- made 1,931 flood risk activity permit decisions
- registered 1,197 flood risk activity exemptions

Updating our charging schemes

Our programme of work to update many of our charging schemes came into effect on 1 April 2018. The changes provide a long-term, sustainable charging framework that ensures we are compliant with Treasury guidelines and that our charges are simple, fair and effective. The charges are based on customers paying for the full costs of the regulatory service that we provide.

4.2.3. Leaving the European Union

Preparing to leave the EU has been one of our top priorities since the 2016 referendum. Since the referendum, we have emphasised to our customers that current standards, guidance and our expectations as a regulator will remain the same immediately after exit.

Leaving presents both risks and opportunities for the environment and economic growth. We have been working with government to mitigate the risks and identify possible future opportunities. We have concentrated on ensuring we can continue to regulate effectively to protect people and the environment once the UK has left the EU. Our national teams have been looking at how we can make the most of the opportunities presented by Brexit for people and businesses, and use any greater flexibility we have to improve environmental outcomes.

In particular we have:

- worked closely with government on new regulations to replace EU derived legislation, which will largely replicate existing requirements
- engaged with businesses through our Regulated Business Forum and with the sectors we regulate to identify and resolve post-exit issues such as ensuring continuity of waste shipments
- reviewed our documents and processes to identify essential changes needed for day one and made arrangements to implement these as soon as we leave

It remains the responsibility of businesses and other operators to make sure they have the necessary preparations in place for when the UK leaves the European Union.

Our Brexit co-ordinator said: "We are confident the vast majority of our day to day regulatory activity will continue as it is now, although some areas of regulation such as chemicals regulation, fluorinated greenhouse gases and emissions trading will be subject to more significant change. In these cases, we have worked closely with trade bodies, government departments and other regulators to ensure businesses understand what will change and are prepared to deal with new processes."

Preparing for Brexit: Fluorinated Greenhouse Gases (F gas) and Ozone Depleting Substances (ODS)

These substances are used mainly as refrigerants, but also in other products including fire extinguishers, insulation foams and solvents. If the UK leaves the EU without a deal, current EU F gas and ODS regulations would no longer apply in this country.

We've been working with Defra to develop effective, practical and enforceable UK legislation and systems for regulating the production, import, export and use of F gas and ODS. The legislation and system developed maintains the UK's commitment to phase out ODS, and ensure a 79% reduction in F gas use by 2030, without reliance on EU systems. This is important for the UK's international reputation and for UK businesses' ability to trade.

Our project team worked with industry and all relevant UK regulators to ensure the new legislation, guidance and IT were fit for purpose, well understood and that industry was prepared for a 'no deal' scenario.

We are working to help shape the future with government and providing regulatory certainty to our customers, as well as protection of the environment and public health.

All our Brexit preparations have been carried out against a backdrop of uncertainty over the timing and circumstances in which the UK will leave the EU. Consequently we've planned and prepared for a range of scenarios, including the prospect of leaving with 'no-deal'.