REPORT

LEARNING FROM OUR NEIGHBOURS
AIR QUALITY POLICY IN EUROPE

Six Case Studies

August 2026

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August 2026

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The **Institute for European Environmental Policy UK (IEEP UK)** is a sustainability think tank with over 45 years of experience. As part of the broader IEEP family, we are committed to advancing evidence-based research, analysis and policy insights in the UK and its interaction with policy in the EU and globally.

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EXECUTIVE SUMMARY

After Brexit, continued awareness and learning in both directions between the UK and EU can help to maintain a shared awareness of best practice, shaping informed policy decisions in the interests of the environment and human health.

This report examines six European case studies to draw lessons from policy interventions aimed at improving air quality. The examples collectively cover a broad scope of sectors and major pollutants of concern. While the UK has undertaken measures to address some pollutants, air pollution remains the largest environmental threat to human health in the country, so UK ambition on air quality is still lacking.

This report looks in some detail at the nuances in the policy context and design across the selected case studies, some broad takeaways from which are summarised below:

Electric Vehicle Rollout (NOx, CO, + Other Pollutants)
Case Study: Norway

- A responsive air quality framework with target pollutant values that governments can update over time without new legislation means Norway has more consistent ambition on pollutants and is less prone to outdated air quality targets than the UK.
- As well as strong electric vehicle rollout supported by extensive charging infrastructure and fiscal incentives, Norway has combined policy action on greening of domestic heating, and technological improvements to reduce industrial emissions to tackle a range of key pollutants.
- Most EU environmental law also applies in Norway, but it as it is not an EU Member State, it also exercises some autonomy. Norway enjoys both co-operation and competition with the EU, including through being part of the EU ETS and a member of the European Environment Agency.
- Norway rapidly expanded its EV rollout through policy interventions. In the four years between 2008-2011, only 10,000 EVs were sold in the country. In comparison, the same number sold in about four weeks in 2022.
- Total emissions of fine particulate matter (PM2.5) reduced by 30% from 2005 to 2022, leading to more than a 60% reduction of premature deaths due to PM2.5 in Norway. In 2025, Norway's annual PM2.5 concentration was 6.2µg/m^3, lower than the UK's average concentration of 8.7µg/m^3.

Greening Domestic Heating and Insulation (NOx, PM, CO, + Other Pollutants)
Case Study: Poland

- Regarding subsidies for energy efficiency retrofits, support is needed for implementation at scale, meeting highest socioeconomic need. A subsidy system that is not overly complex and which is accessible and easy to understand is key here.
- Long-term consistency of government support, including financial backing and public messaging around low-emission boilers and heat pumps is essential for sustained uptake by the public.
- Between 2019 and 2024, the Clean Air Priority Programme (CAPP) led to improvements in 453,000 low-energy-efficiency buildings and the replacement of 393,000 heat sources, which reduced energy consumption by 7.6 GJ annually. In terms of air quality and climate impacts, this reduced Poland's annual emissions by 11,300 tons of PM_{10}, 13.7 tons of benzo(α)pyrene, and more than 3.2 million tons of CO_2 .

Reducing Agricultural Nitrogen Pollution (NH_3, NOx, Nitrates)
Case Study: Denmark

- Denmark takes a more ambitious approach to agricultural emissions than does the UK. Through pioneering policy such as its 'Green Tripartite Agreement', it has been able to reduce nitrogen pollution while also promoting biodiversity through the restoration of forests and peatland, although implementation remains in early stages.
- Stronger regulation on key sources of nitrogen pollution, including storage and application of slurry and application of fertiliser, helps to tackle air pollution at source.
- Despite a 60% increase in pig production between 1985-2005, Danish ammonia emissions from agriculture reduced by a quarter.

Monitoring Indoor Air Pollution (Formaldehyde, Benzene, + Other Pollutants)
Case Study: France

- France has set an example for the UK and others to follow through its Grenelle II law, mandating the monitoring of air quality in buildings receiving the public. However, this monitoring would ideally be conducted for a broader range of indoor air pollutants.
- Through support from its National Indoor Air Quality Observatory (OQAI), France is moving beyond measurement to providing guidance on best practice action to improve indoor air quality.

Urban Design Interventions Benefitting Air Quality (NO_2, PM)
Case Study: Spain

- Barcelona's 'superblocks' set a bold international precedent in cleaner and greener urban design. Benefits do vary by context, but superblocks have seen broad local improvements in air quality as well as health and wellbeing.
- The UK's history of greener approaches to urban planning, including the Garden City and New Towns movements make it well placed to build on lessons both from the past and from present practice in Spain as it looks to expand its house building.
- In the superblock around Barcelona's central Sant Antoni market, it reported a 25% decrease in NO2 levels and a 17% decrease in PM10. Other findings included resident survey results showing locals felt more comfortable walking and felt accessibility had improved, while reduced noise pollution had positive wellbeing impacts.

Tackling Landfill Waste Emissions (CH_4)
Case Study: Sweden

- Like the UK, Sweden has used fiscal policy to reduce the amount of waste sent to landfill, reducing methane emissions, but this has created an unintended problem of an over-reliance on waste incineration, which has climate and air quality implications.
- Moving further up the "waste hierarchy" to promote more recycling and reuse, particularly of plastic, is essential for a cleaner approach to circular economy.
- Methane missions from the Swedish waste sector have nonetheless fallen by 77% since 1990 due to combined policy efforts effecting improved methane recovery from landfills, reduced organic waste disposal, and investments in recycling and waste-to-energy.

INTRODUCTION

Since Brexit, responsibility and decision making for the protection of the UK's environment has been fully returned to its national and devolved governments. While some retained EU law has a continued legacy, the EU has continued to introduce further directives and amend existing legislation affecting environmental policy, while the UK has acted independently. This has led to various areas of divergence in policies and regulations between the UK and EU, which the Institute for European Environmental Policy UK (IEEP UK) has been tracking and reporting on.[1]

Air pollution is the greatest environmental threat to public health in the UK, and is responsible for an estimated 28,000-36,000 deaths each year.[2] In December 2025, IEEP UK released our *State of Play* report on the UK's air quality, including comparing UK policy with progress in the EU.[3]

This report is intended to follow on from and build upon the *State of Play* report by highlighting a series of case studies from the UK's European neighbours. The six country examples cut across key areas of air pollution both in terms of sectors and sources and the pollutants involved.

Specifically, the case studies we examine are as follows:

Norway: *Electric Vehicle Rollout*
Here we look at the role of charging infrastructure and fiscal incentives in Norway's exceptional progress in expanding uptake of electric road vehicles.

Poland: *Home Heating and Energy Efficiency – The Clean Air Priority Programme*
This programme to improve energy efficiency and reduce pollution from Poland's homes has parallels with UK efforts but brings cautionary lessons for policy makers.

Denmark: *Reducing Agricultural Ammonia Emissions*
As a major livestock-producing nation, Denmark has had to work hard to reduce the powerful pollution effects of agricultural ammonia, including through novel policy instruments.

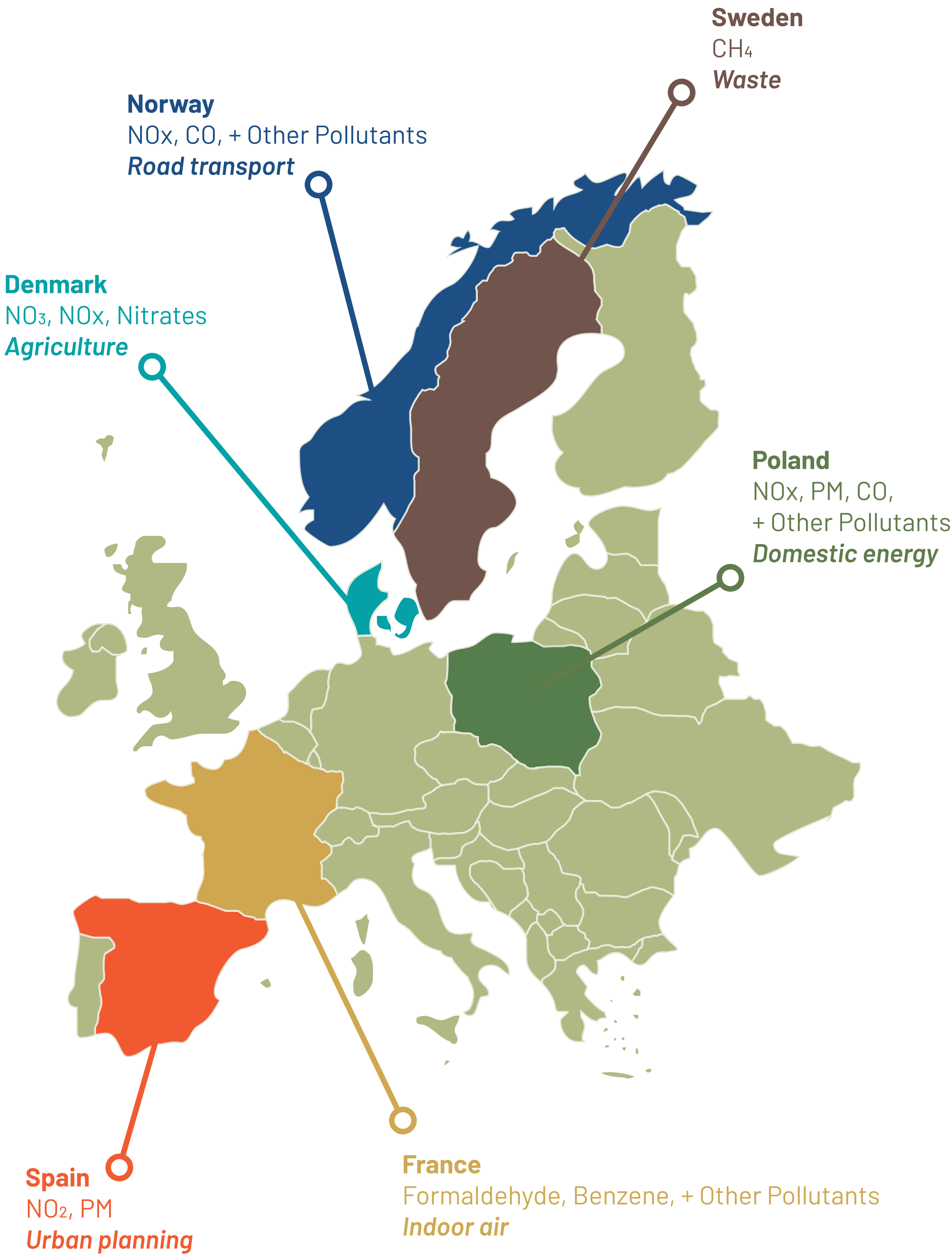
France: *Indoor Air Quality Monitoring – Grenelle II Law*
France has taken a stride forward in establishing nation legislation to make monitoring of air quality mandatory in buildings receiving the public. This monitoring marks an important first step in taking seriously the threat of indoor air pollution to public health and moving toward taking action to address it.

Spain: *Urban Planning Interventions Through Barcelona's 'Superblocks'*
While the UK's Garden City movement was a pioneering influence in approaching urban design with consideration of the role of the environment in public health and wellbeing, the Superblocks model first deployed in Barcelona is now drawing international interest. It sets an example of how urban areas can reclaim spaces from the dominance of cars and create greener, more pleasant, less polluted zones even within high-density developments.

Sweden: *Action on Methane from Waste*
Like the UK and many other nations, Sweden has sought to take action to reduce the enormous methane emissions that can result from landfilling of waste. However, the alternatives to landfill have presented their own issues and limitations.

In each case, we examine in turn the key policy progress in the case study country, the UK context in terms of the pollution problem and actions that have or have not been taken, and the lessons that can be drawn.

It is certainly not always the case that the case studies we have selected are to be considered best-practice examples; often the lessons learned are constructive takeaways from the mistakes, shortcomings, and shared limitations of the experience in other nations. However, there are also pioneering success stories that the UK may wish to imitate as appropriate within its own policy context.


Sweden
CH_4
Waste
Norway
NOx, CO, + Other Pollutants
Road transport
Denmark
NO_3, NOx, Nitrates
Agriculture
Poland
NOx, PM, CO,
+ Other Pollutants
Domestic energy
Spain
NO_2, PM
Urban planning
France
Formaldehyde, Benzene, + Other Pollutants
Indoor air

NORWAY
ELECTRIC VEHICLE ROLLOUT

Almost all new cars registered in Norway in 2025 were fully electric vehicles (EVs), with almost 96% market share.[4] The country intends to complete the transition this year, a decade ahead of the EU, and well ahead of the UK, where fewer than a quarter of new registrations are fully electric. In some ways, Norway is an unlikely champion of the green transport revolution, but concerted government policy has delivered results. At the same time, the country has established large low-cost hydro-electric capacity and enjoys high disposable income per capita – factors it has used to its advantage.

Norway famously built much of its present wealth as an oil-producing nation. It is also one of the coldest countries in the world, and cold weather can notably hamper the performance of EV batteries.[5] The nation is therefore perhaps an unlikely poster child for the rollout of electric vehicles, yet today it leads the world on EV uptake.

Transitioning to electric vehicles reduces and ultimately eliminates vehicle tailpipe emissions, bringing improvements in key air pollutants including NOx, particulate matter, VOCs and carbon monoxide. However non-exhaust emissions from brake and tyre wear remain a challenge, especially if a newer EV fleet is comprised of heavier vehicles, with particular implications for particulate matter pollution. Nonetheless, the net benefit to air quality from a transition to EVs is very clear.[6]

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Norway has long been interested in going electric, and its high wealth and small population no-doubt aided the transition. On the flip side, it has had to install infrastructure across many rural and often mountainous areas of its dispersed settlements. The lack of a domestic auto industry meant there was no car lobby to resist EV policies, and as early as the 1990s, Norway even made efforts to create its own state company to manufacture EVs. Yet, even with these contextual caveats, the concerted success of vehicle electrification can be largely attributed to two key policy factors – support for a strong charging infrastructure and generous fiscal incentives.

Charging infrastructure

The Norwegian Government was the first in the world to announce, in 2017, a complete ban on new sales of internal combustion engine (ICE) vehicles by 2025. It therefore had to ensure that the charging infrastructure was in place to support the mass transition to electric passenger vehicles.

Norway now boasts almost 27,000 charging stations across the country, with at least one fast charging station on every main road and a travel distance of no more than 30 miles between rapid charge points.[7] A high simultaneous charging capacity also alleviates concerns over queuing.

The Government invested early in charging infrastructure, with a €7 million programme to support 1,900 charging points by 2011, and it has continued that investment ever since. The country has also been sure not to leave lower-income households behind in the transition, with financial support for housing associations and legislation ensuring a 'charging right' for residents of apartment buildings.[8]

A 2022 study in Norway found that the establishment of a first public charging station led to, on average, a 200% increase in the local electric vehicle ownership rate over five years.[9] The country's relatively low electricity prices and high share of renewable energy production further boost the economic, social and environmental benefits of the EV transition.

The growth of Norway's EV market has nonetheless been nonlinear and highlights the economics of critical mass in the rollout process. In the four years between 2008-2011, only 10,000 EVs were sold in the country. In comparison, the same number sold in about four weeks in 2022.[10] Once the total cost of EV ownership reached parity with ICE ownership, there was a spike in EV sales that in turn triggered a rapid growth in demand for charging stations, further boosting the rollout.[11]

Fiscal incentives

In addition to its robust charging infrastructure, Norway has employed a broad suite of fiscal incentives to support EV uptake.

As early as 1990, Norway abolished purchase and import taxes for zero emission vehicles, and in 2001, introduced a VAT exemption too.[12] The Government is only looking to remove that exemption in 2027.

As well as VAT, Norway's zero-emission vehicles (ZEVs) have been exempt from registration tax and motor fuel taxes, in addition to receiving at least a 50% reduction in road taxes and ferry and parking fees. According to OECD projections, the stock of ZEVs may have reached 1.25 million by 2030, compared to 225,000 without incentives.[13]

According to a 2025 study, the Norwegian EV exemption from purchase taxes increased the EV market share to 66% in 2021, compared to the 25% it would have been without the exemption. It also decreased CO2 emissions of new cars sold by 167%, although increasing their total weight by 22%, and increased the number of new cars sold by 10%.[14] However, the lost tax revenues from these taxes imply a high carbon price of US$1,700 per metric tonne, borne by the Norwegian treasury. Heavier vehicles also have negative air quality implications, as they generally show more brake and tyre wear, which produces PM2.5.

Similarly, the implied tax expenditure from the VAT exemption reached US$1.3 billion in 2021, while the overall advantage of electric vehicles (fully battery electric and plug-in hybrid) was estimated at US$3.5 billion that year, reports the OECD.[15] The Norwegian Government appears to be now looking to move toward a more sustainable revenue model after these early investments, having achieved its objective with the incentives.

Further to the taxes directly affecting EVs, Norway was also one of the first countries in the world to introduce a carbon tax. From 1991, the CO2 Tax Act on Petroleum Activities mandated a tax on all combustion of gas, diesel and oil in petroleum operations and on releases of CO2 and natural gas.[16] That means in practice that the carbon tax applies to most domestic fuel combustion in Norway, across industry, buildings, and road transport sectors. Taxation of fossil fuels used in road transport can further incentivise the transition to EVs, assuming the nation does not rely on sourcing electricity from fossil fuels. In Norway, this is certainly the case: Norway's electricity grid has one of the highest shares of renewables in the world. 98.9% of the country's electricity comes from low-carbon sources, with 90% sourced from hydropower alone.[17]

UK context

The UK Government is looking to support the move in manufacturing towards ZEVs.[18] It is also moving to incentivise EV uptake, with a boost in the 2025 autumn budget to the Electric Car Grant up till 2030, as well as investment in expansion of public charging points.[19] Further, the ZEV mandate, now passed in law, requires manufacturers to meet increasing percentages of EV sales each year (28% for new cars in 2026). This helps provide market certainty, but still clearly lags behind the example that Norway has set. There is also the possibility that a future government could amend or repeal the legislation, removing the long-term certainty of Government support.

In short, the UK is well behind Norway on EV rollout. Our own domestic car lobby and high electricity prices may arguably have contributed to a different political and economic context. But targeted fiscal incentives and concerted effort to stay ahead of the curve on infrastructure provision clearly pay dividends.

Lessons from Norway

Responsive air quality framework not based on legislated limit values

Unlike the UK and EU, Norway has not legislated specific limit values for air quality. Rather, the Pollution Control Act 1981 grants the government authority to establish such limits and other pollution control conditions through regulations and permits.

In the absence of legally-binding pollutant limit values, Norway uses air quality criteria from the Norwegian Environment Agency and its National Institute of Public Health to indicate levels considered safe for all. This allows for a more responsive policy framework that does not rely on updating national legislation to set safe levels and targets for pollutants.

Multi-pronged action on key pollutants

Norway has seen tremendous improvements in air quality through its combined policy action on vehicle electrification, greening of domestic heating, and technological improvements to reduce industrial emissions. Total emissions of fine particulate matter (PM2.5) reduced by 30% from 2005 to 2022, leading to more than a 60% reduction of premature deaths due to that pollutant.[20] In 2025, Norway's annual PM2.5 concentration was 6.2μg/m^3, lower than the UK's average concentration of 8.7μg/m^3.[21]

On EV rollout in particular, Norway has been ahead of the UK in facilitating that transition. The UK is now well underway with playing catch-up in the move toward road vehicle electrification. However, lessons remain based on the Norwegian experience around the policy environment and support both for EVs and for air quality in general.

A further part of the lesson from Norway concerns the air quality issues that persist even after almost full rollout of EVs. For example, Oslo notably still has particulate matter (PM) issues due to the persistence of non-exhaust emissions from EVs, and a cultural penchant for wood-fired saunas. Wood-burning affects not only those who choose to burn it, but also spreads PM2.5 into neighbourhoods. The city's authorities intend to further tackle such issues with initiatives including tunnel-scrubbing and electrostatic particle traps. While the UK might not share the issue with saunas, non-exhaust emissions are likely to become a growing concern. Initial acknowledgement of this issue has been made by the UK Government in the Environmental Improvement Plan for England, although it remains to be seen what policy action will be taken.[22] Government claims it will: 'Draw on findings from published research on brake and tyre wear emissions to take a leading role in developing internationally harmonised regulations for limiting these emissions through the United Nations Economic Commission for Europe'.[23]

Cooperation and competition with the EU

While Norway is not an EU Member State, it cooperates closely with the EU and is part of the European Economic Area (EEA). This necessitates cooperation and alignment in other areas, including notably that Norway is a full member of the European Environment Agency.

It also joined the EU Emissions Trading System (ETS) in 2008. The UK has its own ETS, but the UK Government and the EU agreed in 2025 to work on linking their respective systems.

On air quality, its ambitions exceed the standards set by the EU for limit values of key pollutants. Norway's Air Quality Criteria are set out in its *Air Quality Handbook*. Many of the air pollution criteria comply with WHO recommendations, but some have been set stricter after an overall assessment. It also sets criteria for other pollutants that are beyond the scope of WHO guidelines.

Policy and infrastructure support for EV rollout

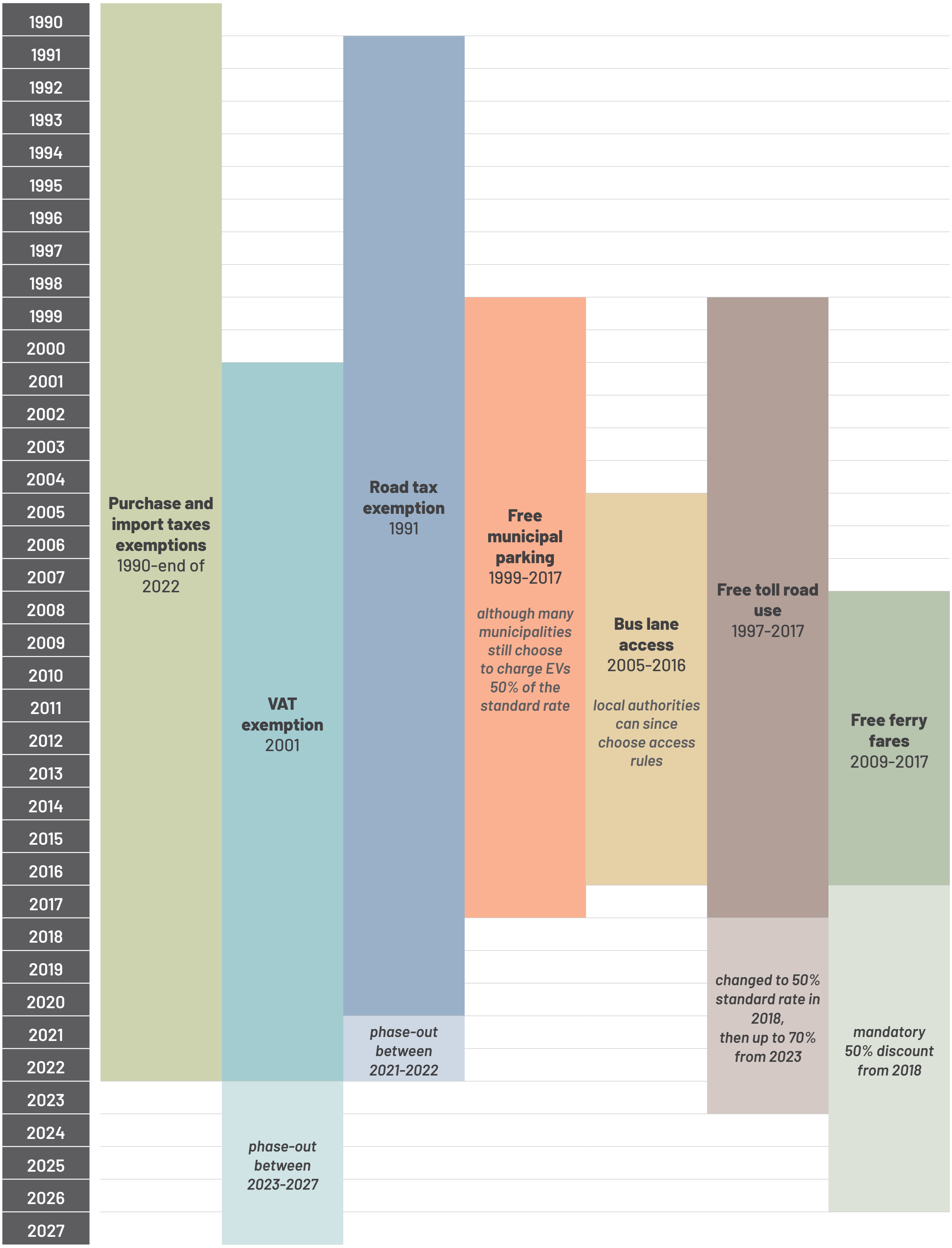
Norway's bold ambition on EV rollout offers lessons for the UK. While the UK is currently meeting its targets for charging infrastructure, Norway has shown the benefit of always remaining ahead of the curve with these developments. Norway's 'right to charge' legislation also supported EV uptake in high-density urban areas, ensuring apartment residents could still access charge points, and increasing consumer confidence in the technology infrastructure.

Fiscal incentives have affected price adjustments to ensure EVs in Norway are at parity with or cheaper than ICEs. Key fiscal interventions have included the following:

- EVs have been exempt from VAT and import taxes.
- The motor vehicle registration tax includes a CO_2 component.
- Ownership taxes for petrol and diesels vehicles are high.

In earlier stages of the EV rollout, there were additional incentives for EVs, such as use of bus lanes and free municipal parking; these were later phased out as EV uptake increased. Further, Norway's phase-out of some fiscal benefits over time illustrates a roadmap for adjusting incentives as the market matures.

Introduction and Phase-Out of Key EV Incentives



Perhaps the greatest takeaway for the UK from the Norwegian model is consistency. Successive Norwegian governments have adhered to more than three decades of tax incentives, enduring several political cycles. Cross-party consensus on environmental issues is far from guaranteed in the UK, as recent shifts around net zero climate policy have shown.

Complementary policies

In addition to EV incentives seen across Norway, Oslo and neighbouring Akershus County are aiming to make all public transport zero-emission by 2028. The city centre has been increasingly pedestrianised since 2017, with former car roads and street parking spaces repurposed for other uses including outside dining, culture activities, art, bicycle stands or playgrounds. Oslo has an extensive bike-sharing scheme with bikes at 200 stations across the city. This attention to urban planning and use of urban space has parallels with the superblocks scheme initiated in Barcelona, which is covered **elsewhere in this report**.

Interestingly, Oslo has also implemented some policies that appear not to have delivered the intended effects. A 2020 study found no evidence that reducing speed limits in Oslo from 80 to 60 km/h lead to fewer emissions of PM or nitrogen oxides, despite leading to an annual time loss valued to US$3.8m USD or US$66 per vehicle.[24]

POLAND
HOME HEATING AND ENERGY EFFICIENCY THE CLEAN AIR PRIORITY PROGRAMME

Poland has had to address major air quality concerns in recent years. Finding parts of the country routinely in breach of standards set by the EU Air Quality Directive, there was a legal imperative as well as a responsibility to its citizens for the Polish Government to act. It launched the Clean Air Priority Programme (CAPP) in 2018, which was last updated in 2025.

As coal-based home heating is the largest source of air pollution in Poland, the aim of CAPP is to replace coal heating systems with others based on gas, wood pellets or electricity, as well as supporting other renovations that help reduce domestic energy consumption.[25] The primary objectives of the program are to reduce energy consumption, particularly from coal, and to reduce domestic emissions both of air pollutants, particularly particulate matter, and greenhouse gases. Other key air pollutants the replacements should help to tackle include SO2 and benzo(α)pyrene.[26]

The CAPP is operated by the National Fund for Environmental Protection and Water Management (NFEPWM) and its regional bodies, involving about 2,000 local communities. Standard grants can be up to PLN 30 000, increasing to PLN 37,000 for low-income households, with a further PLN 5,000 grant available for photovoltaic solar panels.[27] This is the highest-budget planned programme for improving air quality in Poland's history, with an expected cost of PLN 103 billion by 2029, split between PLN 63.3 billion in grants and 39.7 billion in loans.[28]

Those who had already begun building their house qualify for the scheme, as well as existing homeowners.[29] Funding for the scheme comes from the NFEPWM, which in turn manages money provided for environmental projects by the EU.[30] Poland is set to receive €8 billion from the EU for the period 2012-2027 specifically to combat air pollution.[31]

In tandem with the CAPP, Poland also adopted the Stop Smog (SS) programme from 2019, targeted at municipalities and with a focus on thermal modernisation of single-family households experiencing energy poverty.[32] The two programmes combined were intended to lead to replacement of around 3 million outdated stoves, boilers and furnaces with less polluting and more energy-efficient technologies by 2029.[33] Whether or not this target will be met remains to be seen.

Between 2019 and 2024, the CAPP led to improvements in 453,000 low-energy-efficiency buildings and the replacement of 393,000 heat sources, which reduced energy consumption by 7.6 GJ annually.[34] In terms of air quality and climate impacts, this reduced Poland's annual emissions by 11,300 tons of PM10, 13.7 tons of benzo(α)pyrene, and more than 3.2 million tons of CO_2. [35]

While laudably ambitious in their aims and successful in delivering strong reductions in pollution, Poland's CAPP and SS have provided important lessons in the practicalities of designing, implementing, and funding such programmes.

UK context

For greening domestic heating, much attention has been paid across Europe to air- and ground-source heat pumps to replace traditional boilers that rely on fossil fuels. Heat pumps are powered by electricity and have zero emissions at source, bringing co-benefits for local air quality. Further, they are typically around three times more energy efficient than traditional boilers, so can potentially reduce both carbon footprints and energy bills.[36] The UK is well behind much of Europe in uptake of heat pumps, but this has been starting to change in the last few years.[37]

The UK Government's Boiler Upgrade Scheme (BUS) runs between 2022-2027 and provides capital grants of up to £7,500 toward the cost of upgrading to a heat pump.[38] Most homeowners in England and Wales are eligible to upgrade through the scheme. This has already been seen to strongly encourage uptake: the roughly 80,000 units sold in the UK in 2024 marked more than a 50% increase on the previous year.[39] This figure increased by more than 50% again the following year to over 125,000 UK sales.[40]

UK adoption of heat pumps has likely been suppressed by the high cost of electricity relative to gas compared to elsewhere in Europe.[41] However, the Government is keen to emphasise that households can save money by making use of smart tariffs with off-peak rates when using heat pumps.[42]

The UK has been proactive in supporting households to improve energy efficiency through retrofit schemes in recent years, after home insulation installations fell by more than 90% between 2010 and 2024.[43]

For example, the Great British Insulation Scheme (GBIS) ran between March 2023 and March 2026, providing subsidies to allow households to install free or reduced-cost insulation. The scheme aimed to reduce domestic energy bills,[44] targeting need by setting eligibility according to a combination of council tax band and energy performance certificate rating, with enhanced assistance for those receiving certain state benefits.

The GBIS was billed as a £1 billion scheme but ran to a total cost of £424.8 million by its completion, suggesting that uptake was not as strong as intended.[45] Nonetheless, by March 2026, over 100,000 households had energy efficiency measures installed, at an average delivery cost (including planning, management, and installation) of £25.30 per £ of annual bill savings.[46] Calculations based on these official figures indicate an average annual energy bill saving of £154 for the households involved.

In 2026, the UK Government launched the £15 billion Warm Homes Plan, again intended to cut energy bills through green retrofits including not only insulation but also solar panels, batteries, and heat pumps.[47] The Plan covers all types of households, but again includes targeted interventions for low-income households, plus upgrades for social housing. It aims to upgrade up to five million homes and 'help lift up to a million families out of fuel poverty by 2030'. Further, new rules alongside the plan are intended to ensure landlords invest in upgrades to cut bills for tenants.

Lessons from Poland

Support for subsidy implementation at scale, meeting highest need

Poland faced difficulties with the scalability of CAPP almost from the outset. In the first two years after its launch, CAPP received more than 170,000 applications for PLN 2.904 billion (€629 million) in subsidies, with an average subsidy funding request of PLN 16,814 (€3,642).[48] However, the scheme was established with a target of three million single-family buildings receiving upgrades over the twelve years of its implementation. The pace of implementation in those first two years would have to more than double for Poland to be on track to meet that target.[49] Complexity both in terms of levels of subsidy available and the application process, combined with slow processing of applications due to insufficient administrative staff, were key stumbling blocks in this initial phase.[50]

Reforms in 2020 attempted to strengthen scalability, with notable adjustments including:

- Simplification of subsidy levels and the subsidy application system.
- Updating the list of eligible equipment and materials.
- Speeding up processing time for applications.
- Participation of commercial banks to provide loan financing to support CAPP investments.[51]

Despite these improvements, the World Bank reported in 2020 that: 'transitioning towards modern efficient boilers and thermal improvement will need key regulatory and policy support to ensure CAPP targets are achieved'.[52] Among its recommendations, it flagged concerns that better support for middle- and low-income households would be critical both to ensure an inclusive programme and to reach the scale of ambition. Noting that encouraging rollout to low-income families is more challenging due to lack of awareness about high-emission boilers, as well as higher needs for technical support and finance, it urged for increased outreach, further technical assistance, and higher subsidies.[53] The World Bank has then worked with Poland on an ongoing basis to advise on the structure and implementation of necessary reforms.[54]

A reform in 2022 subsequently saw the introduction of a more sophisticated and streamlined subsidy design to better address the needs of beneficiaries from different income groups and further boost participation of low-income homeowners in the programme.[55]

Those collective efforts to boost and support applications bore fruit. 2024 marked the peak of new applications to the CAPP scheme to date, with a quarter of a million applications in that year alone.[56] That contributed to a milestone of one million applications by November 2024, at which time further reforms were implemented aimed at improving the efficiency of public spending after concerns that some of the funds had been misused.[57] However, the programme was temporarily suspended to implement those changes, and environmentalists in the country have argued that this interruption caused a loss of trust among citizens, with applications rapidly decreasing since.[58] That leaves 2.5 million coal-based heaters still to be modernised across Poland.[59]

The programme again saw reform in March 2025, with changes including new funding conditions linked to income and the building's energy standard, new requirements for energy audits before and after investment, and the introduction of free beneficiary support. These changes may reduce applications, although are intended to further tailor the scheme to deliver effective outcomes for the buildings and homeowners that are most in need. Current plans are for the scheme to remain open for applications until the end of 2030, with funding payments made until 2032.[60]

A 2020 academic study commended the achievements of the CAPP, but outlined changes that the authors deemed essential for achieving the full aims of the programme, such as:[61]

- Allowing municipal local governments to assess applications.
- Broadening the effective channels for the distribution of funds to beneficiaries by means of cooperation with banks and local governments in the transfer of monies, not just by means of Regional Environmental Protection and Water Management Funds.
- Providing financial support to local governments to support the programme.
- Making income thresholds more realistic, so as to encourage broader participation in the programme, appealing not only to the most impoverished of building owners.
- Providing financial support for the purchase and installation of solar collectors and photovoltaic modules, not only in the form of loans but also grants.

Poland has met its emission reduction commitments for 2020–2029 for nitrogen oxides (NOx), non-methane volatile organic compounds (NMVOC), sulphur dioxide (SO_2), ammonia (NH_3) and PM2.5, and is projected to continue to do so from 2030 onwards.[62] The country has seen downward trends in all major pollutants since 2019, but exceedances above limit values and target values remain for NO_2, PM10, ozone, arsenic and benzo(α)pyrene.[63]

Consistent support and public messaging around low-emission boilers and heat pumps

While Poland saw encouraging uptake of low-emission heating technology during parts of the CAPP programme, it has struggled more recently, with a market decline for heat pumps of 11% in 2025.[64] The European Heat Pump Association (EHPA) reports that this downturn is primarily due to a combination of poorly designed support under the CAPP and delays in fund disbursements, resulting in a five-fold fall in applications for heat source replacements from 2024 to 2025.[65] Furthermore, widespread online misinformation about heat pumps that was not met with corrective measures, together with an absence of clear policies promoting heat pumps and electrification in general have been seen to exacerbate the slowdown.[66]

Meanwhile, the recent UK sales growth in heat pumps has been well supported by the BUS and the Warm Homes Plan, which also provide regulatory clarity and long-term funding for subsidies.[67] Nonetheless, the EHPA notes that 'reaching the government target of 450,000 annual installations by 2030 will require sustained momentum and measures to improve the electricity to gas price ratio'.[68] Poland's example has demonstrated the importance of administrative efficiency and well-designed support to households in order to sustain such ambitions, as well as consistent policy over the long term. It has also highlighted the dangers of failing to respond robustly to online misinformation spread through social media.

DENMARK
REDUCING AGRICULTURAL AMMONIA EMISSIONS

Ammonia (NH3) pollution is problematic on multiple fronts. It directly affects vegetation, harming vulnerable ecosystems and reducing agricultural yields. It is also implicated inthe eutrophication of aquatic environments. Then, through the formation of secondary pollution from ammonia in the air, there are serious implications for human health. Ammonia contributes to half of PM2.5 air pollution in the EU, which causes chronic respiratory illnesses and can lead to premature mortality.[69] Further, the production of ammonia itself is heavily reliant on fossil fuels and is responsible for significant CO2 emissions.[70]

Agricultural production is responsible for 95% of EU ammonia emissions.[71] This is both from livestock management and the application of ammonia as arable fertiliser. All inorganic nitrogen-based fertilisers have ammonia as a central ingredient, making it a notable input to conventional arable farming.

Denmark is one of the most intensively farmed countries in the world.[72] As such, it has faced a greater imperative than most to curb the negative effects of agricultural pollutants. Its policy action on ammonia has been comprehensive and effective, and brings lessons for other nations, including the UK. It shows how regulation backed by incentives can allow a more ambitious approach than has been attempted in the UK.

Policy in Denmark

A suite of policies since 1985 have seen Denmark reduce its nitrogen surplus by 40% by 2010 compared to its peak in the 1980s.[73] These policies have targeted four broad areas of farming and land management practice: crop fertilisation, livestock stocking, manure storage and spreading technologies, and the creation or restoration of wetlands, forestry and peatlands.

As well as addressing concerns about nitrogen pollution to water and air, some policy efforts affecting ammonia enjoy crossover with climate-focused ambitions to reduce greenhouse gases (GHGs). Denmark has set ambitious goals to reduce economy-wide GHG emissions by 70% by 2030, including reducing agricultural emissions by 55-65% within that timeframe.[74] Air quality policy also intersects with ecological drives to restore peatland and forests.

A milestone was reached in 2024, when Denmark announced a Green Tripartite Agreement (GTA) between government, the environmental community and the agriculture industry, supporting regulation with large-scale government funding to tackle emissions.[75] This comprehensive package includes moves toward nature restoration and reduction of nitrogen pollution at source. The World Resources Institute branded the move 'the world's most comprehensive national effort to address the environmental challenges of agriculture'.[76]

Reducing livestock emissions and fertiliser pollution

Denmark engages in substantial livestock production, mostly though large, intensive, industrial farms. Ammonia emissions have therefore been on the radar for some decades. Despite a 60% increase in pig production between 1985-2005, Danish ammonia emissions from agriculture reduced by a quarter.[77]

To begin to tackle fertiliser pollution, the 1985 NPo Action Plan required fertiliser accounts to be tabulated for each farm. These accounts only had to be provided if requested, until 1994, when they became mandatory.[78] 1994 also saw the introduction of a requirement for farmers to gradually increase their manure storage capacity up to nine months, and spreading of animal slurry in late autumn and winter was banned.[79]

Early interventions on livestock management included restrictions on livestock densities introduced as part of the 1998 Action Plan II (AP-II). From 1990, Danish farmers had already begun making efficiency improvements to the dairy and pig sectors, as well as by reducing excess nitrogen use, with positive implications for ammonia emissions.[80]

From 2001, the Ammonia Action Plan specifically targeted ammonia, aiming to reduce ammonia pollution by 33%.[81] The plan was comprised of three key elements:[82]

- A complete ban on the broadcast spreading of slurry.
- Subsidies for animal housing and manure storage that would reduce ammonia pollution.
- Increased requirements for minimum planting of catch crops.

The 2006 Livestock Act (enacted 2007) aimed to further reduce ammonia and has prompted a strong increase in technological development in the Danish agricultural sector.[83] The Act established a comprehensive legal framework to ensure livestock production and fertiliser use are sustainable, with a scope covering livestock facilities, manure and silage storage, and land receiving fertiliser. Its aim was not only to reduce pollution to air, but also to soil and water, as well as limiting nuisances cause by odour, noise and dust, and to protect vulnerable wildlife habitats and cultural landscapes.[84]

Key provisions of the Act include:

- Limits on nitrogen and phosphorus application per hectare.
- Strict location, design, and operational requirements for livestock and manure-handling facilities, including minimum distances from residential areas, water sources, and sensitive natural habitats.
- Requirement of prior municipal approval or permits, with thresholds based on animal numbers and ammonia emissions, for certain farm projects.

The 2024 GTA built on previous efforts and introduced a landmark tax on livestock GHG emissions. Around half of Denmark's agricultural greenhouse gas emissions result directly from production of meat and milk in the form of enteric methane (emitted directly by animals) and manure management, so these were seen as key sources to target.[85]

Under Denmark's novel tax regime:

- Pork and dairy producers pay no tax on 60% of average emissions per animal but are subject to a marginal tax on emissions exceeding that level. In other words, farmers can avoid taxes if they can cut their emissions by 40% of the 2024 average.
- The rate of tax above the emissions threshold will be about $40 per ton of emissions (carbon dioxide equivalent) in 2030 and rise to around $100 in 2035.
- Revenue will go into a fund designed to help all producers reduce emissions.[86]

The tax has therefore been designed in a systemic way to incentivise farmers to increase the efficiency of their production, rather than to reduce production.[87]

Another key feature of Denmark's 2024 GTA was the introduction of financial incentives to farmers to reduce emissions from nitrogen fertilisation. The subsidy rate is US$100 per tonne of CO_2e mitigated. The key aim here is to reduce synthetic nitrogen fertiliser use per hectare, thus reducing emissions of N_2O, a powerful greenhouse gas. Air quality co-benefits arise not only from reduced N_2O but also reduced ammonia. This intervention is funded by redirecting EU Common Agricultural Policy subsides. Globally, only a very small proportion of farm subsidies are intended directly to support environmental outcomes, so this is a notable move.[88]

Over time, all on-farm nitrogen sources have been comprehensively targeted, including synthetic nitrogen, manure nitrogen and nitrogen in livestock feed.[89]

Supporting these successive regulatory changes, Denmark has also pushed ahead of other European countries in technological development in livestock housing and manure management.[90] Adopting this technology has allowed Danish farmers to comply with regulations at lower cost or even to generate savings.[91]

Restoration of wetlands, forestry and peatland

Denmark's Action Plan II, introduced in 1998, included provision for wetland restoration. Over subsequent years, this restoration continued to expand, as suitable low-lying areas were identified for conversion into wetlands, new land and funding were provided in subsequent action plans, and farmers were offered incentives to cease farming in relevant areas.[92]

Another initiative established under the 2024 GTA was the US$6 billion Green Area Fund. This is to be invested in restoring 250,000 ha of select agricultural lands to forestry – with a focus on planting native trees on fields that leach the most nitrogen to coastal waters – as well as restoring 140,000 ha of drained peatlands. The aim is for 10% of Denmark's land to be converted into valuable habitat supporting biodiversity at the same time as reducing or storing carbon emissions and reducing nitrogen pollution.[93]

Measurement, monitoring and enforcement

Regulatory policies are only as effective as the monitoring and enforcement that supports them. In Denmark's case, it has made use of ammonia monitoring stations, a comprehensive soil sampling system, annual yield trials, farm and field scale statistics on nitrogen, and groundwater, and marine sampling systems.[94]

Mandatory reporting such as annual fertiliser accounts from farms have helped the Danish Government keep tabs on compliance and where the priority areas for further action lie.

UK context

Denmark has a substantially higher nitrogen input rate, gross nitrogen balance and nitrogen emission rate than the UK and the EU-15 average, but reductions in these rates (2000-2013) have been higher in Denmark than in the UK and the EU-15.[95] Through policy action since 1985, Denmark has brought about a 40% reduction in its nitrogen surplus by 2010 from its peak in the 1980s.[96]

Dairy cattle and pigs are the dominant livestock in Denmark, both of which are associated with potentially high levels of ammonia pollution without good management.[97] In the UK, poultry and sheep dominate, although there are significant numbers of both dairy and beef cattle as well as pigs in the livestock mix.[98] In terms of contribution to agricultural ammonia pollution, dairy and beef cattle are nonetheless by far the biggest culprits in the UK.[99]

The UK Department for Food and Rural Affairs (DEFRA) has a target to make a cumulative reduction in ammonia emissions in England of 4.1 kilotonnes by 2028 from a 2023 baseline, although estimating this contribution is difficult, particularly as it relies on farmer participation in relevant measures.[100]

There has nonetheless been some improvement. IEEP UK reported in 2024 that the greatest ammonia abatement potential (approximately 14 kilotonnes per year) for the UK is to mandate use of a urease inhibitor with both solid urea and liquid urea.[101] As of 2022, urea products with urease inhibitors were only used on 6% of the land area that urea was applied to, but increasing this to 100% could lead to a reduction of 54 kilotonnes per year in GHG emissions and may also help to reduce nitrate leaching to water and reduce reliance on ammonium nitrate as a substitute fertiliser. As of 1 April 2024, Government introduced a voluntary scheme for urea used throughout England to be treated with a urea inhibitor.[102] It was hoped that this could avoid the need for mandatory regulation.

Peatland restoration

Peatlands are incredible stores of carbon as well as globally important habitats and natural filters for drinking water.

Ammonia and other nitrogenous compounds can be deposited on peatlands through air, rain, or cloud droplets.[103] While peatlands can absorb ammonia from the atmosphere, it causes damage in the process by increasing acidity and affecting delicate nutrient balances, with the increased nitrogen affecting species composition by allowing plants like heather and grass to dominate.

Nitrogen and acidic depositions from the atmosphere are exceeding critical loads for blanket peatlands across around half of the UK, and 80% of UK peatlands are in a degraded condition.[104] Centuries of draining of peatlands for agriculture has also degraded peatlands over the long term, causing their organic matter to decompose and release carbon to the atmosphere.[105]

Scotland has in recent years paid particular interest to peatland restoration, as around a quarter of its land area is covered by peatlands.[106] As part of its array of policies to achieve the GHG emissions reduction targets of the Climate Act (Scotland) 2009, it has undertaken large-scale restoration programmes. For example, over 20,000 hectares were restored in Scotland in 2017 alone.[107]

In 2026, the UK government announced £47 million of funding to protect and improve peat in England, through a trio of schemes to tackle the country's varied peat landscapes. These funding pots are as follows:

1. **The Lowland Peat Water Implementation Grant (£36 million)**
   Improving peat in lowland areas where farming continues through improved water management and more sustainable land use.
2. **The Paludiculture and Wetter Farming Fund (£10 million)**
   Instead of draining peatlands for agriculture, this supports paludiculture, which involves growing specially adapted crops on waterlogged peatlands.

3. **The Peatland Restoration Sector Capacity Grant (£1.15 million)**
   Helping to provide the skilled workforce needed to deliver restoration projects.

These schemes form part of the £85 million 2026-2030 Peat Programme announced in the Environment Improvement Plan in 2025. The government has set a target to restore 280,000 hectares of peatland by 2050.[108]

Lessons from Denmark

Taking a comprehensive approach to agricultural emissions

The boldest and most pioneering of Denmark's successive policy initiatives is surely its 2024 Green Tripartite Agreement.

As well as reducing nitrogen pollution, the GTA promotes biodiversity through the restoration of forests and peatland. As Denmark has devoted so much of its land to cropping for animal feed, only a small proportion of land is devoted to valuable habitats, meaning these interventions have high impact. However, the UK could still benefit from double wins for pollution and biodiversity through further supporting such ecological restoration.

Strong regulatory ambition on key sources of nitrogen pollution

Concerning the UK context on nitrogen pollution in general, IEEP UK together with Aether Ltd reported in 2024 on the state of play.[109] Our key conclusions were as follows:

- The UK has relatively undemanding standards for the storage and application of organic slurry/manure compared with best practice as applied in leading countries such as Denmark. The Northern Ireland Nitrates Action Programme has led the UK in this, but the UK as a whole is behind best practice. Improved management of organic manures and slurries throughout the cycle from production to storage, handling and application remains a critical priority.
- Reducing N losses from both inorganic and organic nitrogenous fertilisers is essential if more ambitious targets are to be met. There is an absence of regulation on inorganic fertiliser inputs in particular.
- The UK regulatory system lacks ambition compared to best practice in countries such as Denmark. Notably, there is limited environmentally driven enforcement of regulations regarding agricultural pollution, which is weak relative to industrial sectors. Monitoring (inspection) levels are likely too low across all four nations of the UK to ensure adequate compliance with environmental legislation. There is a strikingly low rate of prosecutions for substantive breaches of environmental legislation on farms.

It is clear then that there could be lessons here for the UK from the Danish example.

FRANCE
INDOOR AIR QUALITY MONITORING – GRENELLE II LAW

Much attention is rightly given to the pollution of ambient (outdoor) air and its effects on human health. However, increasing interest is being paid to indoor air quality (IAQ). People in developed nations are spending more time indoors than they did in previous generations – with particular implications for children's health – and relatively confined indoor spaces often lead to much higher concentrations of pollutants than seen in ambient air, making IAQ a pertinent issue for public health.

Toxins, fine particles, moulds and allergens suspended in air can trigger asthma, allergies, and other respiratory disorders, while long-term exposure to indoor air pollutants can contribute to the development of cardiovascular diseases, cancers, neurological disorders, and fertility issues.[110] Children, the elderly, and those with pre-existing medical conditions are the most vulnerable. At the same time, good indoor air quality has been shown to have positive effects on reducing absenteeism rates, improving well-being, and enhancing children's learning.[111]

The EU lacks a specific overarching directive for IAQ, but for more than a decade, France has been making strides through a programme of mandatory measurement of pollution levels in public buildings.

Grenelle II

France has shown high commitment to environmental health, developing a National Health-Environment Plan every five years.[112] These plans aim to protect citizen health by improving environmental quality. The fourth instalment, PNSE4, covered the period 2021-2025, and one of its key aims was to reduce environmental exposures impacting human health, such as air and soil pollution, electromagnetic waves, artificial light, and nanomaterials.[113] This is the broader policy context within which the Grenelle II law was introduced.

France's Grenelle II law (enacted 2010, revised 2022) establishes the country's national commitment to the environment, including creating healthy spaces in establishments receiving the public (ERP). Its practical rollout saw an initial focus on crèches, nurseries and schools, but as of 2023, Grenelle II has mandated compliance for all ERP buildings on monitoring of IAQ. Then, starting from the end of 2024, this monitoring has been extended to other types of buildings, with the ultimate aim of ensuring optimal IAQ for the entire population.

The 2022 update to the Grenelle Law tightened the regulations, such that it now includes the following requirements:[114]

- Mandatory annual assessment of ventilation systems, including measurement of CO_2.
- Self-diagnosis of indoor air quality every four years to detect and problems and take necessary measures to improve air quality in your premises.
- Campaign to measure regulatory pollutants at each key stage of the building's life that could impact indoor air quality.
- Establishment of a detailed action plan in the event of air quality issues.

These procedures are intended to limit the risks associated with air confinement and to ensure an acceptable concentration of pollutants in indoor public spaces used by sensitive groups, particularly children and the elderly.[115] Ventilation then becomes key where unacceptable pollutant concentrations are identified.

While the law was enacted to prioritise vulnerable sections of the population, from the end of 2024 it was expanded to other types of public buildings, with the aim of ensuring optimal air quality conditions for the entire population.[116]

There are many potential types and sources of indoor air pollution, from chemical (semi-volatile and volatile organic compounds (VOCs), inorganic gases), to biological (viruses, bacteria, moulds, allergens), to physical (particulates, toxic fibres, electromagnetic fields). Measurement and monitoring are therefore important to understand which pollutants are prevalent in a particular building.

Between 2013-2017, a national measurement campaign in France found that the vast majority of schools conformed to the regulatory guideline values on IAQ for formaldehyde and benzene, but indoor concentrations of particulate matter were higher than the World Health Organization's (WHO) guideline values in 96% of schools.[117] Some pollutants were present in the air in

100% of classrooms, including phthalates, which are used as plasticizers; polycyclic aromatic hydrocarbons, produced by combustion, including from road traffic outside; and lindane, a neurotoxic insecticide.

UK context

Monitoring in public spaces

Existing UK legislation on indoor air is confined to workplace conditions and some product standards, with no formal policy on IAQ monitoring in public buildings or homes.

However, the Schools Air Quality Monitoring for Health and Education (SAMHE) project, started in 2022, has been leading the way on highlighting indoor air quality priorities for our nation's schools.[118] It sets the precedent for broader action to follow under a national legislative framework, learning from Grenelle II in France. Mirroring the picture in France, SAMHE has emphasised the wide prevalence of fine particulate matter (PM2.5) and the importance of improved ventilation in schools. However, as yet, the UK lacks the regulatory impetus to ensure that action is taken.

Measuring harmful effects and 'safe' levels of indoor pollutants continues to present challenges. In the absence of binding national legislation in the UK, both the Royal College of Paediatrics and Child Health and the Committee on the Medical Effects of Air Pollution (COMEAP) have leant on WHO studies to establish guidance. However, advisory bodies in other European nations have employed contrasting methodologies to estimate and quantify harmful health effects.

Lessons from France

National mandatory monitoring of indoor air in buildings receiving the public

Indoor air quality remains a complex issue that in some ways can obfuscate clear pathways to policy action. Pollution sources are multiple, they can interact in unpredictable ways, and specific health effects remain unclear for many pollutants. The WHO advises on limits for eight key indoor air pollutants, while some jurisdictions (such as Flanders in Belgium) set recommendations for twelve or more pollutants.

What is clear, nonetheless, is that the potential health effects of poor indoor air quality, especially on the most vulnerable groups of the population, cannot be ignored, and that a national regulatory framework that encompasses indoor air, as well as ambient air, is overdue. A first step can be regular and reliable measurement and monitoring of IAQ.

Scalability of IAQ monitoring should become more achievable over time due to technological advances. The development of miniaturised, connected sensors to measure pollutants should make it possible to monitor IAQ at larger scales, allowing action to be taken where pollution is identified.[119]

Moving from measurement to action on indoor air pollution

Once suitable monitoring of IAQ is underway, the identification of unacceptable pollutant concentrations of course necessitates remedial action.

Where key pollutant sources can be directly controlled by users of the building, such as cooking practices or cleaning products, there is value in education and behavioural change. Likewise, adequate and appropriate ventilation plays a key role in maintenance of good IAQ. Where pollutants arise from building materials, paints or cleaning chemicals, there can be a key role for building and product regulations alongside shifts in practices.

France's Indoor Air Quality Observatory (OQAI) runs national campaigns to measure indoor air pollution and has been instrumental in supporting efforts to expand IAQ monitoring.[120] Through its extensive study and reporting on IAQ, it also recommends the following solutions and good practice for maintaining high indoor air quality:[121]

- **Cleaning and maintenance** – Regular cleaning of the building's equipment and combustion appliances for heating and hot water production to limit the emission of pollutants such as carbon monoxide. Management of water damage, water ingress and rising damp to limit the presence of moisture and growth of moulds.
- **Air circulation and ventilation** – Ventilation systems should be properly sized, installed and maintained, air inlets should not be blocked, and intake valves for mechanical ventilation systems should be away from any external sources of pollution. Filters should be cleaned and replaced regularly. A gap of 2cm should be left under doors to allow air to circulate.
- **Use of air purifiers** – These can be used selectively, but with caveats. Current scientific knowledge cannot demonstrate the effectiveness and safety of indoor air purifiers that work on the principles of catalysis or photocatalysis, plasma, ozonation or ionization. Traditional mechanical filtration of particulates at the ventilation system's air intake or using a standalone appliance is effective if the device is correctly and regularly maintained.

SPAIN
URBAN PLANNING INTERVENTIONS THROUGH BARCELONA'S 'SUPERBLOCKS'

The other case studies assembled in this report concern policies implemented at the national level in countries across Europe. However, sometimes there is reason to zoom in to smaller scales to identify models for learning. In the case of Spain, Barcelona offers particular insights from the city level into the role of urban planning in strategic improvements to local air quality, climate, and quality of life for residents.

Barcelona's 'superblocks' ('superilles' in Spanish) presents a model of urban transformation that prioritises reclaiming space for citizens that was previously occupied by private vehicles. The aim is to create healthy, greener, fairer and safer public spaces that also promote social relations and the local economy.[122] Superblocks are a new scale of urban unit, larger than a block, but smaller than a neighbourhood. They allow for a new specialisation of streets that facilitates redistribution of public areas between vehicles and pedestrians, limiting traffic and freeing up spaces for other functions, such as recreation and relaxation.[123] Each superblock initially restricts traffic around a neighbourhood of at least nine blocks, such that vehicles are limited to major roads around the outside of the superblock, and the interior is open to pedestrians and cyclists. As it has expanded over time, the model has adapted to surrounding urban structures while keeping the same objectives.[124]

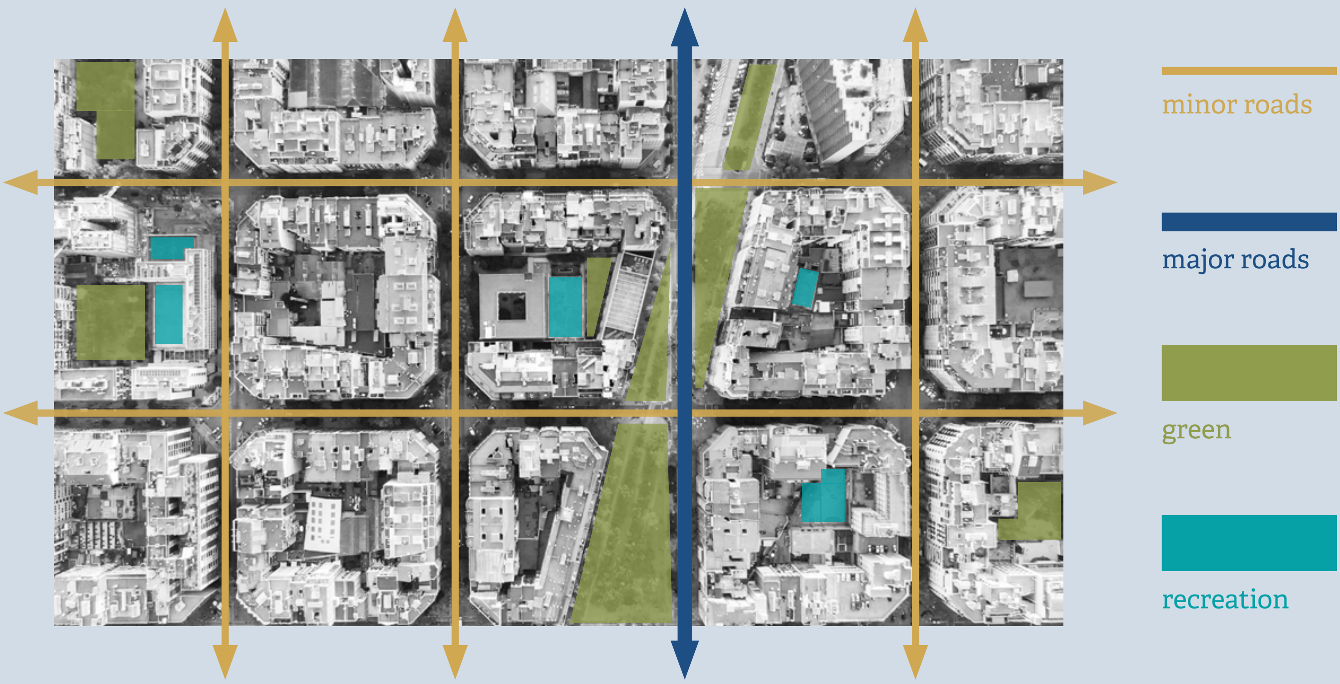
The concept of superblocks

The concept of superblocks has existed since the 1980s, first being proposed by Salvador Rueda, but it took time for support to gather in favour of implementation in the city, with the first superblock being introduced in 2016.[125] Initially, small-scale interventions in areas such as Peblenou, Horta and Sant Antoni demonstrated a proof of concept, before the scheme was expanded to other districts.[126] Barcelona's Urban Mobility Plan establishes that the entire city is eventually to be organised into superblocks, such that any new project must be developed under this new structure.[127]

Key design principles of superblocks are as follows: [128, 129]

- Urban spaces are prioritised principally for pedestrians, followed by bicycles and public transport. Private car traffic is greatly restricted to major roads outside of the superblock.
- Public spaces are re-naturalised with planted elements and permeable surfaces. (For Barcelona, this meshes with the Barcelona Climate Commitment plan to increase green areas by one square metre per city resident). The principle of 'tactical urbanism' promotes soft measures that are often low-cost and easy to adapt.
- Open spaces are created for recreation, relaxation, and socialising.
- Citizen participation and civic co-responsibility are central through all phases of the project, from diagnosis and proposals through to implementation. Barcelona City Council focuses on fostering public dialogue and consensus building.

Barcelona's Superblocks



The approach allows for gradual change over time, comprising three kinds of action:[130]

1. Basic – small, functional changes such as parking restrictions, bans on certain kinds of vehicle, or changing street traffic directions.
2. Tactical – low-cost actions that may be temporary or suitable for piloting ideas, such as painting new roads or adding urban furniture such as benches or planters.
3. Structural – permanent transformations, including redevelopment and infrastructure.

UK context

Garden cities, New Towns, and urban planning

The UK has a long history of planning interventions aimed at improving the environment in which people live. The 'garden city' model, set out by Ebenezer Howard in 1898, has had notable influence on subsequent planning movements.[131] Howard's model aimed simultaneously to address the social, economic, and environmental issues arising from the nineteenth-century Industrial Revolution by combining the advantages of urban and rural areas in new settlements in the countryside.[132]

Howard hoped the pollution, overcrowding, and poor housing conditions of industrial cities could be tempered by planning settlements that incorporated elements of rural life.[133] Key features of garden were intended to be as follows:[134]

- A compact town surrounded by a wide rural belt.
- Residents, industry, and agriculture all located within the town area.
- Limits on the extent of the town and prevention of encroachment upon the rural belt.
- The natural rise in land values to be used for the town's own improvement and welfare.

The garden city concept in its original form therefore went beyond pure planning principles and included social and financial models too. Howard foresaw that elements of daily life would be subject to the democratic control of the community through municipal organisation.[135]

The garden city concept was based on an ideal of a 6,000-acre tract of land that had only been used for agriculture. Only a fraction of this land would be built upon by the town's 30,000 inhabitants, with the rest used for agricultural and recreational purposes.[136]

Despite the relatively formal overall structure, it was also a core design principle of garden cities to retain existing mature trees and natural features from the rural landscape being developed.[137] Therefore, at the street level, the layout could be informal. Residential areas also included green spaces to imitate the traditional British village green, intended as a community hub.[138]

In the UK, practical garden city examples materialised in Letchworth in 1903, followed by Rosyth in Scotland in 1909, then Welwyn in 1920. The towns encountered many issues due to lack of capital to build enough houses and industrial facilities and ultimately had to involve state support.[139] While only three garden cities were built in the UK, various towns have since been given 'garden town' status for following similar principles, and the influence of the garden city concept has been broad. For example, Howard's emphasis on protected greenbelt areas to limit urban sprawl, together with controlled population densities, has become an integral part of suburban and city planning.[140]

Since the early days of the garden city model, an updated model of 'connected cities' has also been proposed. Howard acknowledged that urban transformation may sometimes mean adapting existing cities rather than building from scratch on rural land. Connected cities follow this idea and base settlement structure around existing railways, blending existing settlements with new, sustainable development.[141]

The UK government introduced the New Towns Act in 1946 to alleviate postwar housing shortages and urban overcrowding. The New Towns programme built on the legacy of the garden city concept, with the aim of constructing affordable and well-built homes in beautiful surroundings across 32 settlements.[142] These towns are now home to millions of the UK population and have seen a resurgence of interest from the Government.

The UK Government is now proposing to create seven New Towns in a new programme of building.[143] The stated intent is 'to create well-connected, well-designed, sustainable and attractive places where people want to live with all the infrastructure, amenities and services necessary to sustain thriving communities'. Key principles of the original New Towns are retained, including the importance of social infrastructure, environmental sustainability, and community engagement, so that new settlements are healthy and safe places to live.[144]

However, enacting strong environmental principles in practice will require careful planning and management. The Strategic Environmental Assessment conducted for the proposed New Towns programme found there will be negative air quality and health and wellbeing effects in both the short and medium term, only becoming positive in the long term as more sustainable transport measures are introduced and new recreational and healthcare facilities are provided.[145] Likewise, there are minor negative climate effects, which the Government notes 'could be mitigated through the implementation of sustainability measures', though these have not been specified.[146]

Low Emission Neighbourhoods

Low Emission Neighbourhoods (LENs) are a London scheme that form one of the initiatives within the Mayor of London's Mayor's Air Quality Fund (MAQF). They are intended to improve air quality and promote sustainable living in targeted areas and initially had a £13 million budget comprised of £7 million from the MAQF and Ultra Low Emission Zone (ULEZ) revenues together with £6 million in match funding from boroughs and the private sector.[147] The initial scope was to support four boroughs.

Delivered jointly by the MAQF and Transport for London (TfL), boroughs have now received £27 million of state funding matched by £20 million from boroughs and partners, marking a notable expansion in the scheme's ambition.[148] A further £6 million in investment was committed by the MAQN and TfL in June 2026. As of 2026, the scheme has now supported eleven boroughs as well as six business LENs.[149]

Physical upgrades made to LENs can include infrastructure to promote walking and cycling, the creation of new green spaces (over 4,000 square metres to date, including small 'pocket parks' and green roofs), sustainable drainage, trees, electric vehicle charge points, plus air quality monitors. LENs can also feature schemes aimed at shifting behaviour to improve local air quality, including car-free days, no-idling zones, coordinated deliveries, and other behavioural change initiatives.[150]

The continuing success of London's LEN scheme offers practical lessons for other areas of the UK, including the planned New Towns, in terms of improving local air quality and health and wellbeing for residents.

Lessons from Spain

Improving urban access for health and wellbeing benefits

Barcelona's superblocks have now created a precedent for urban planning and access regulations globally, with more than 250 cities expressing interest in the superblocks model.[151] Some of those cities have already implemented changes inspired by Barcelona, including Berlin, Los Angeles, and Vienna, after technical consultation with Barcelona's superblocks teams.[152]

This international interest has been fuelled by the demonstrable outcomes for air quality and human health and wellbeing in Barcelona. The city's Public Health Agency (ASPB) conducted the 'Health in the Streets' ('Salut als Carrers') project to assess health and environmental impacts of three of the city's superblocks over a three-year period.[153] In the superblock around Barcelona's central Sant Antoni market, it reported a 25% decrease in NO2 levels and a 17% decrease in PM10. Other findings across the report included resident survey results showing locals felt more comfortable walking and felt accessibility had improved, while reduced noise pollution had positive wellbeing impacts.

A 2025 academic study found that residents and workers reported gains in perceived well-being, greater peacefulness and enhanced sleep quality, some reduction of noise and pollution, and an increase in social interaction.[154] It also found that air quality improvements varied by area, with stronger benefits in areas that had previously experienced higher traffic levels. The authors therefore concluded that 'the variability in the results shows that a more personalised approach, taking into account existing traffic patterns and road network configurations, could be crucial to maximise the benefits of these interventions'.[155] They suggested, for example, that traffic-calming interventions could prioritise areas with higher levels of pollution and/or where the most vulnerable populations (such as children and the elderly) are located. There is also the key consideration that simply redirecting traffic to other parts of the city merely displaces the air pollution and other detrimental effects, so more comprehensive traffic calming across the city and the broader replacement of car use with green public transport, cycling, or walking, are important.

Looking ahead to the expansion of the superblocks model to the rest of Barcelona, a 2021 study estimated that implementing the full 503 planned superblocks would lead to a reduction of 667 premature deaths each year.[156] These reductions in mortality would mostly be attributable to reduced NO_2, with smaller effects from noise, heat, and green space development.

In the UK, while London fell under legal limits for NO_2 for the first time in September 2025, other major cities including Birmingham, Manchester, and Liverpool still exceed them.[157] While the London ULEZ and MAQF offer lessons for UK cities in improving ambient air quality, so too do the varied design interventions of superblocks.

SWEDEN
ACTION ON METHANE FROM WASTE

Methane (CH4) is a powerful greenhouse gas, responsible for 12% of all greenhouse gas (GHG) emissions in Europe.[158] It is also a precursor to the development of ground-level ozone (O3), an air pollutant linked to respiratory disease. The Global Methane Assessment estimated that ozone attributable to anthropogenic methane emissions causes globally around half a million premature deaths per year.[159] Around 94% of the urban population of the EU are subject to levels of O3 that exceed World Health Organization (WHO) guidelines. At the same time, ground-level O3 harms ecosystems and agricultural production, being responsible for at least €2 billion in damage to food crops every year in Europe.[160]

Sweden reduced its methane emissions by 68% between 1990 and 2015 and they are projected to continue falling sharply until 2027.[161] Part of the explanation for this is that the nation is reducing agricultural emissions, mostly because its cattle population is declining. This is due to increased productivity, product pricing mechanisms, and adoption of EU policy regulations.[162]

However, aside from agriculture, another of the key sources of methane emissions is the waste sector, most notably landfill sites. As of 2020, Sweden's methane emissions from waste amounted to 0.68 Mt CO2 equivalent, marking an 80% decrease since 1990.[163] This is on par with Sweden's overall 80% reduction in GHGs between 1990-2022, which it achieved while growing its economy.[164]

Here we will look at Sweden's national policy to drive these huge reductions, targeting landfill waste but also action around circular economy and extended producer responsibility.

Landfill waste

The decline in Sweden's methane emissions from landfill has been driven by policy instruments both at national and EU levels. These interventions centre around three key factors: expansion of methane recovery from landfills, reduced landfill disposal of organic material, and increased recovery of materials and waste incineration with energy recovery.[165] Without intervention, landfills produce and emit large amounts of methane for several decades after deposits are made.[166]

Early action on waste was taken through the requirement since 1991 for all municipalities in Sweden to have their own municipal waste plan. These requirements were formalised in Swedish Environmental Protection Regulation NFS 2006:6, which sets out the minimum inclusion in municipal waste plans, such as a description of the current situation, recycling plants and landfills, environmental assessment, measures, and monitoring. The Swedish Government established both a National Waste Plan and a National Prevention Programme to guide municipalities in developing their local plans and deciding on priorities.[167]

The 1999 EU Landfill Directive (Directive 1999/31/EC) requires that landfilling of biodegradable waste is reduced and that methane is collected from landfills, preferably through waste incineration with energy recovery.[168] Sweden's national legislation goes further than the requirements of the EU Directive, regulating landfilling of biodegradable waste as well as collection of methane from landfills, and since 2005 has included a ban on landfilling of organic waste.[169]

From 2000, Sweden introduced a landfill tax on waste disposal to landfill (SFS 1999:676). The tax has increased gradually since; in 2025, it was levied at 725 Swedish kronor (around €60) per tonne of landfilled waste, and it is subject to annual review.

In 2001, the introduction of the Swedish Ordinance on the Landfill of Waste (SFS 2001:512) banned the landfilling of combustible waste from 2002. The Ordinance also regulates the collection and disposal of methane gas from landfills. A further ban was introduced for organic material in 2005.

Emissions from the Swedish waste sector have fallen by 77% since 1990 due to combined policy efforts effecting improved methane recovery from landfills, reduced organic waste disposal, and investments in recycling and waste-to-energy.[170]

Circular economy as a counter to landfilling

Sweden's broader policy on circular economy aims to reduce both the use of materials and the amount of waste that goes to landfill. This action has been spurred by a series of EU regulations and directives. Notably, as an EU Member State, Sweden has been subject for example to:

- **Directive on Waste 2008/98/EC** – Established a 'waste hierarchy' from prevention through to disposal, confirmed the 'polluter-pays principle' whereby original waste producers bear the costs of waste management, and set recycling and recovery targets to be achieved by 2020 for household waste (50%) and construction and demolition waste (70%).[171] The Directive was updated in 2025, introducing mandatory Extended Producer Responsibility (EPR) for textiles and setting a binding target for reducing food waste.
- **Regulation on Shipment of Waste (EC) No 1013/2006** – Defined control procedures for waste shipments to reduce the risk of shipments of uncontrolled waste.[172]
- **Regulation (EC) No 1907/2006 concerning the Registration, Evaluation, Authorization and Restriction of Chemicals (REACH)** – Set registration, authorisation, and restriction rules for producers, importers, and suppliers of chemicals.[173]

The 'waste hierarchy' has long been a key principle in Sweden's approach to waste management and circular economy. As of 2008, Sweden aligned its waste hierarchy with the approach specified by the new EU Waste Framework Directive. The hierarchy specifies a priority order whereby waste should be approached in the following order:[174]

1. Prevention.
2. Reuse.
3. Recycling (when environmentally motivated).
4. Other recovery, e.g. energy recovery.
5. Disposal, e.g. landfilling.

Some of Sweden's key actions to reduce waste to landfill have involved promoting and incentivising shifts to actions further up the waste hierarchy. For example, the 2000 landfill tax was intended to make landfilling relatively less economically attractive than alternative treatment methods, while the bans on landfilling combustible waste and organic waste in 2002 and 2005 respectively forced other treatments for those materials.[175]

Importantly, the move toward energy recovery required the relevant infrastructure to be in place. By 2016, it had established its 32 waste-to-energy plants, both municipal and private, and had advanced its waste sorting capabilities to better organise the waste used in energy and heat production.[176] These plants recover heat and energy from both household and industrial waste and include technology to collect flue gases. The flue gases and wastewater are then cleaned, almost eliminating emissions of heavy metals.[177] Meanwhile, high incineration temperatures should remove the vast majority of methane.[178]

However, expansion of energy recovery capabilities carries the risk of over-reliance on incineration as opposed to the more complicated and generally more costly process of recycling. This is certainly a relevant concern for the country, as it is for the UK, as we will revisit in the Lessons from Sweden. Research has indicated that overall, incineration is worse for local air quality than landfill.[179]

Extended producer responsibility (EPR) concerns the duty of producers of goods to promote sorting, collection, and recycling of certain waste flows. At the policy level, the aim is to incentivise producers to develop more resource-efficient products that are easier to recycle and that do not contain environmentally hazardous substances, and to reduce waste production in the first place.[180]

The 2008 EU Directive on Waste encouraged Member States to take up EPR as a way of reducing waste and helping to fund its processing. Sweden's EPR legislation contains national targets for recycling and has resulted in increased separated collection of waste fractions and increased recycling (excepting pharmaceuticals and radioactive products, which have no specific targets).[181]

In Sweden, EPR applies to packaging waste from both households and non-households for all packaging materials. Sweden applies some limited fee modulation based on recyclability criteria for paper and cardboard and plastic packaging.[182] Following the 2025 update to the EU Waste Directive, EPR also applies to textiles.

UK context

Sweden is a signatory of the Global Methane Pledge, aiming for a 30% reduction of methane by 2030, and it presented its Methane Plan at COP27. The UK is also a signatory to the GMP, having signed up at COP26 in 2021.[183]

The UK also signed onto the COP29 Declaration on Reducing Methane from Organic Waste, which was intended to support global methane reductions from the waste sector and provide funding to the International Energy Agency's methane programme.[184]

The UK has enacted a landfill tax since 1996, the country's first explicit environmental tax. Increased rates over time have helped disincentivise landfilling of waste. The UK also implemented the EU Landfill Directive while still an EU Member State, which was retained in England and the devolved nations. The amount of residual waste (waste that is not reused or recycled, excluding major mineral wastes) sent to landfill decreased by around half between 2010-2025 as a result of these policies.[185] A report for HM Treasury found that the UK landfill tax has been effective in achieving its primary objective of reducing waste to landfill, an incentive effect that has strengthened over time as the rates have increased.[186] For example, for municipal solid waste, a £1 increase in the landfill tax is associated with an average reduction of 2,079 tonnes in waste disposed in landfill for each local authority.[187]

Latest statistics show that UK methane emissions have reduced by 62% between 1990 and 2023, one of the highest percentage reductions among OECD countries, which has been achieved notably through policy progress in the fuel supply, waste and agriculture sectors.[188] However, despite the UK waste sector's 74% reduction in methane emissions since 1990, this sector still generates 31% of the UK's methane emissions, and 81% of which are from landfill gas.[189]

Burning waste also releases a range of other air pollutants to the atmosphere, including sulphur dioxide (SO_2), particulate matter, and carbon monoxide, meaning that reduction of methane levels relative to landfill far from solves the air quality problems from waste disposal.[190]

On the other hand, research has shown that recycling and other circular economy practices can be a key tool for mitigating urban air pollution. For example, a US studyconcluded that a 10-percentage-point rise in recycling rates correlates with an estimated 0.08 μg/m3 decrease in $PM_{2.5}$ concentrations.[191]

Lessons from Sweden

The danger of over-reliance on waste incineration to replace landfill

The introduction of landfill taxes in both Sweden and the UK helped to provide a cost incentive to reduce landfill waste and move further up the waste hierarchy. The danger with this is that if it is easier and cheaper to move up just one level – to energy recovery through incineration – than it is to recycle, this eventually becomes the dominant treatment and there is insufficient incentive for recycling, reuse, or prevention of waste.

In 2025, the European Environment Agency (EEA) reported that: 'There is no clear indication that waste generation is decoupled from economic growth and Sweden's waste is generally increasing'.[192] While Sweden has reduced landfilling to account to less than 1% of waste disposal, the majority of its residual waste is instead incinerated, accounting for 59% of waste treated, while it has a recycling rate of 40%.[193] The EU average recycling rate is 49% and average incineration rate is 27%.[194, 195]

Meanwhile, in the UK, the tonnage of waste incinerated nearly trebled between 2010 and 2020, with a further 12% increase up to 2023 in England.[196] In 2023/4, just over half of municipal waste in England was incinerated, with rates of around 30% in the rest of the UK.[197] The recycling rate from UK households in 2023 was 44% in England, 50.2% in Northern Ireland, 42.1% in Scotland, and 57% in Wales.[198]

While the UK's landfill tax has been shown to have a positive impact on preventing waste in the first place, which may explain the reductions in the volume of waste sent for recycling as the tax rate increases, study findings suggest a lack of conclusive evidence of the tax promoting options higher up in the waste hierarchy.[199]

While the shift away from landfill toward incineration is ostensibly effective in terms of reducing methane emissions, the broader environmental picture is not so straightforward. First, while high-temperature incineration removes most methane, some can remain. For example, on study that monitored an incinerator chimney in Sweden found there were still methane emissions of 7–11 tonnes per year.[200] Secondly, the same study found emissions of nitrous oxide (N_2O) corresponding to 30–40 tonnes per year.[201] This is a consequence of adding urea to decrease nitrogen oxides (NO_x) emissions, in order to comply with NO_x regulation, but the N_2O subsequently released is approximately three times more potent as a greenhouse gas than CO_2 on a 100-year time scale.[202]

However, the most important environmental implication of incinerator plants in the UK concerns the shift in the mix of waste being burned. Food waste produces less harmful GHGs when burned compared to when it is landfilled, but when plastic is burned, it produces 175 times more CO2e compared to landfill.

According to The Big Plastic Count, a scheme set up by campaign groups Greenpeace and Everyday Plastic, only 16% of UK plastic waste is being recycled in 2026, with 59% burned and the remainder shipped abroad or buried in landfill.[203] This helps to explain why a 2024 investigation by the BBC that examined five years of data from across the UK found that incinerating waste is producing almost the same amount of GHGs for each unit of energy produced as coal power.[204]

Wales and Scotland have introduced bans on building new incinerator plants, but England and Northern Ireland are yet to follow suit. The UK Climate Change Committee has cautioned that no further plants should be built without efforts to capture all of their GHG emissions.[205] However, this is not currently happening in the UK's 58 incinerators; one pilot project is underway at the Ferrybridge energy-from-waste facility but only collects one tonne of CO2e per day, despite producing more than half a million tonnes per year. The UK government has stated that it will only support new projects that 'offer the best efficiency and are future proofed towards supporting our net zero objectives', but that does mean it is open to new facilities and does not deal with emissions from existing sites. Much more clearly remains to be done to address these negative climate effects, either through avoiding incineration of plastic or substantial expansion of capture efforts at incineration sites.

Sweden also faces criticism for an over-reliance on waste incineration. In 2023, the European Commission (EC) flagged this issue for Sweden and made a series of specific policy recommendations:[206]

- Support preparing for reuse of municipal waste and reuse systems for packaging.
- Develop waste treatment infrastructure associated with the higher steps of the waste hierarchy to reduce reliance on incineration, including infrastructure for the recycling of plastic packaging.
- Improve separate collection services for waste fractions separated at source – in particular for packaging and bio-waste – to ensure high capture rates across the country.
- Introduce support mechanisms to ensure the separate collection of recyclable municipal waste from businesses.

What Sweden has done differently to the UK to date is to include emissions from energy-from-waste sites in its Emissions Trading Scheme (ETS) since 2013. It is the only nation in the EU apart from Denmark to do this voluntarily, moving beyond EU requirements. The Swedish example here has shown that some waste companies have subsequently invested in after-sorting facilities to separate out plastic waste from the residual waste mix, so less plastic is incinerated and lower costs are borne under the ETS.[207]

The Department for the Environment, Food and Rural Affairs (DEFRA) acknowledged in 2011 that: 'emissions from waste combustion of non-biogenic material (via any technology including mass-burn incineration) are also not comprehensively reflected in the price of disposal. Unless the installation in question is in the ETS (municipal solid waste incinerators are excluded) a negative externality persists – such installations are creating GHG emissions without paying the relevant price'.[208] However, the UK does not currently include incinerator emissions in its ETS.

The UK Government did publish a consultation to consider expanding its ETS scope to include energy from waste, which is now closed and is being assessed. If it goes ahead, the proposal for expansion would start from 2028 and this would mark a helpful move in allowing costs better to reflect the climate damages implicated in waste incineration.[209]

CONCLUSIONS

The six case studies of this report bring wide-ranging lessons from across Europe from which the UK and other nations could stand to learn.

In summary, the key takeaways from these case studies are as follows:

Norway

- A responsive air quality framework with target pollutant values that governments can update over time without new legislation means Norway has more consistent ambition on pollutants and is less prone to outdated air quality targets than the UK.
- As well as strong electric vehicle rollout supported by extensive charging infrastructure and fiscal incentives, Norway has combined policy action on greening of domestic heating, and technological improvements to reduce industrial emissions to tackle a range of key pollutants.
- Norway enjoys both co-operation and competition with the EU, despite not being an EU Member State, including through being part of the EU ETS and a member of the European Environment Agency.

Poland

- Regarding subsidies for energy efficiency retrofits, support is needed for implementation at scale, meeting highest socioeconomic need. A subsidy system that is not overly complex and which is accessible and easy to understand is key here.
- Long-term consistency of government support, including financial backing and public messaging around low-emission boilers and heat pumps is essential for sustained uptake by the public.

Denmark

- Denmark takes a comprehensive approach to agricultural emissions. Through pioneering policy such as its Green Tripartite Agreement, it is able to reduce nitrogen pollution while also promoting biodiversity through the restoration of forests and peatland.
- Stronger regulation on key sources of nitrogen pollution, including storage and application of slurry and application of fertiliser, helps to tackle air pollution at source.

France

- France has set an example for the UK and others to follow through its Grenelle II law, which mandates monitoring of air quality in buildings receiving the public. However, this monitoring would ideally be conducted for a broader range of indoor air pollutants.
- Through support from its National Indoor Air Quality Observatory (OQAI), France is moving beyond measurement to providing guidance on best practice action to improve indoor air quality.

Spain

- Barcelona's 'superblocks' set a bold international precedent in cleaner and greener urban design. Benefits do vary by context, but superblocks have broadly seen local improvements in air quality as well as health and wellbeing.
- The UK's history of greener approaches to urban planning, including the Garden City and New Towns movement make it well placed to build on lessons both from the past and from present practice in Spain as it looks to expand its house building.

Sweden

- Like the UK, Sweden has used fiscal policy to reduce the amount of waste sent to landfill, reducing methane emissions, but this has created a new problem of an over-reliance on waste incineration, which has negative climate implications.
- Moving further up the "waste hierarchy" to promote more recycling and reuse, particularly of plastic, is essential for a cleaner approach to circular economy.

LIST OF ABBREVIATIONS

ASPB	Agència de Salut Pública de Barcelona/Barcelona Public Health Agency (Barcelona, Spain)
BUS	Boiler Upgrade Scheme (UK)
CAPP	Clean Air Priority Programme (Poland)
CH4	Methane
COMEAP	Committee on the Medical Effects of Air Pollution (UK)
CO2e	Carbon dioxide equivalent, a unit used to express the global warming impact of greenhouses gases as a single, comparable number.
CO2	Carbon dioxide
DEFRA	Department for Food and Rural Affairs (UK)
EC	European Commission
EEA	European Economic Area OR European Environment Agency
EHPA	European Heat Pump Association
EPR	Extended Producer Responsibility
ERP	Establishments Receiving the Public (France)
ETS	Emissions Trading System
EV	Electric Vehicle(s)
GBIS	Great British Insulation Scheme (UK)
GTA	Green Tripartite Agreement (GTA)
IAQ	Indoor air quality
LEN	Low Emission Neighbourhood (London, UK)
MAQF	Mayor's Air Quality Fund (London, UK)
N2O	Nitrous oxide
NH3	Ammonia
NO2	Nitrogen dioxide
NOx	Nitrogen oxides
NMVOC	Non-methane volatile organic compounds
OQAI	Observatoire de la Qualité de l'Air Intérieur/Indoor Air Quality Observatory (France)
TfL	Transport for London (London, UK)
ULEZ	Ultra-Low Emissions Zone (London, UK)
WHO	World Health Organization
ZEV	Zero Emission Vehicle

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