green alliance...

# The Global Methane Pledge

## How the UK can meet its commitment

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**Erratum:** Following publication, text on page 11 was amended to include avoided costs from potential changes to the UK emissions trading scheme and how these would enhance financial savings. We also corrected a miscalculation of the costs of some methane saving interventions in the energy sector in the table on page 12.

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# Contents

# Summary

**“Rapid methane reductions will be critical to keeping global warming within the target of 1.5°C.”**

Methane is a potent greenhouse gas with more than 80 times the global warming power of $CO_2$ in the first 20 years after it is emitted. Even though $CO_2$ lasts longer in the atmosphere, at least a quarter of global warming is driven by methane from human actions. Rapid methane reductions will help to cool the planet and will be critical to keeping global warming within the target of 1.5°C, set under the 2015 Paris climate agreement. Despite this, methane is often overlooked in efforts to address climate change.

The COP26 UN climate summit’s roadmap requires methane emissions to fall, from 2020 levels, by at least 30 per cent in this decade, a commitment formalised through the Global Methane Pledge. Keeping the 1.5°C target alive now rests on meeting this pledge.

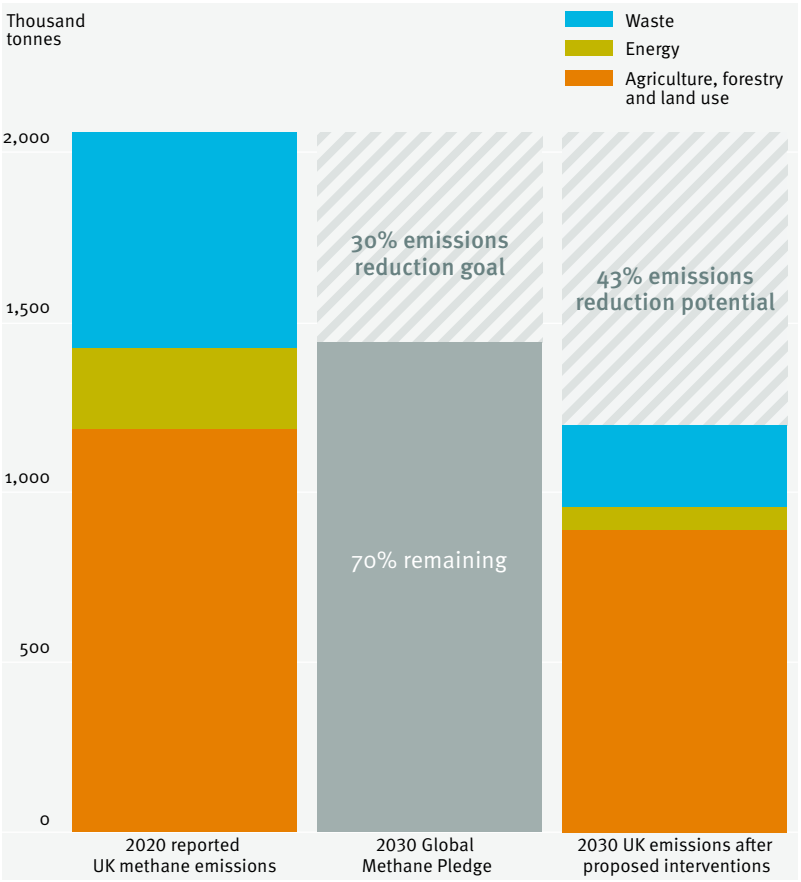
Whilst the UK has been a leader in cutting methane emissions, reducing them by 60 per cent since 1990, progress has slowed in recent years. But achieving the 2030 Global Methane Pledge would bring the UK’s total methane emissions down by at least 72 per cent from a 1990 baseline.

As the COP president until November 2022, the UK has a special responsibility to demonstrate how it will play its part in meeting the pledge target. Almost a year since it was made, however, no UK plan to meet the commitment has been published.

Today, methane emissions come mainly from three sectors: agriculture, forestry and land use, energy and waste.[1] Our analysis shows that it is possible for the UK to exceed the pledge target and reduce methane emissions by up to 43 per cent. This can be achieved through low cost measures and by acting soon across the three sectors.

> **“Not only is meeting the pledge target feasible, it can be exceeded.”**

The potential to meet and exceed the Global Methane Pledge from three sectors




**Agriculture:** changes to food and farming could cut total UK methane emissions by 15 per cent, mainly in ways that increase the productivity of the food system. This includes the use of methane suppressing feed additives, better slurry management and dietary shift towards more alternative proteins, fruit and vegetables.

**Energy:** the oil and gas sector could act on methane leaks, venting and flaring. This would cut total UK methane emissions by nine per cent and support UK energy security, through measures that would save money.

**Waste:** the UK waste sector, despite being a global leader in methane reduction, could cut a further 19 per cent from total UK emissions by 2030, with an early ban on organic waste going to landfill and better landfill biogas capture rates.

> **“The interventions have numerous additional benefits to energy security, health and the environment.”**

These actions together could cut total UK methane emissions by 43 per cent by 2030.

The interventions are also either profitable or low cost, have numerous additional benefits to energy security, health and the environment, and are in line with wider government goals.

We also outline how the UK could capitalise on its reputation for global climate leadership by supporting other countries to cut their methane emissions. We explore three possibilities: sharing policy on reducing methane from landfills, leading global growth in the manufacturing of alternative proteins and feed additives, and encouraging the sustainable intensification of rice cultivation through trade deals and aid grants.

Acting in advance of COP27 to produce a plan, based on the analysis presented here, would show strong UK climate leadership and set a global benchmark for effective action on methane.

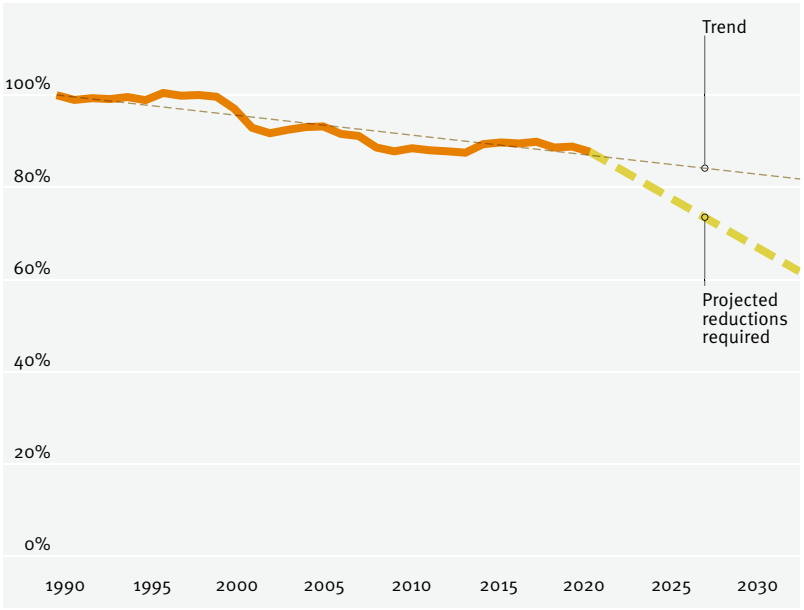
# Agriculture
## Methane from livestock

Methane emissions from agriculture, forestry and land use (AFOLU) have only fallen by 12 per cent since 1990.

The sector has significant unexplored potential to cut methane, primarily from agriculture.

We have modelled four potential interventions which, taken together, would cut AFOLU methane emissions by 25 per cent, leading to a UK wide reduction of 15 per cent.[2]

Relative methane emissions from AFOLU in the UK since 1990



## What could the UK do?

### Feed methane reducing supplements to dairy cows

> “The feed additive Bovaer/3-NOP could cut methane emissions from dairy cows by at least 40 per cent.”

The feed additive Bovaer/3-NOP, manufactured by DSM, could cut methane emissions from dairy cows by at least 40 per cent, if it was approved by the Food Standards Agency.[3] It must be fed to cows regularly, making it immediately suitable for dairy cows but less so for outdoor reared beef cattle and sheep.

Supporting beef and sheep farmers to trial feed additives, and researching more effective additives (90 per cent reductions have been achieved in laboratory tests) would improve the performance of this technology.[4] However, the Climate Change Committee (CCC) has assessed that Bovaer is already a cost effective climate measure. Even if its use were not subsidised by government, using it across the national dairy herd would add around a quarter of a penny to the cost of a pint of milk. This would cost the average consumer an extra 33 pence a year.[5]

A 30 per cent uptake rate for dairy cows, costing consumers an extra ten pence per year, would cut agricultural methane emissions by five per cent by 2030.

### Manage slurry better

Adding acid to slurry generates better fertiliser and can cut methane emissions from this source by over 80 per cent.[6] This is common practice in Denmark and is already being explored through the Department for Environment, Food and Rural Affairs’ (Defra’s) Farming Transformation Fund.[7] Its cost is low, at around £40 per animal per year.[8]

Methane can also be captured from slurry stores and converted to biogas, which can be used for energy on the farm or sold for additional revenue. Cornish company Bennamann has begun to scale up this technology in the UK.[9]

Assuming a 65 per cent uptake rate and a conservative 70 per cent reduction in methane across both interventions, these practices could cut UK agricultural methane emissions by at least four per cent. Managing slurry better can also reduce nitrogen pollution in rivers.

“Managing slurry better can also reduce nitrogen pollution in rivers.”

## Replace processed meat with alternative proteins

The UK buys a third of all the plant-based proteins in Europe. With investment, it could be an industry leader in alternative protein production, an industry which is increasingly cost competitive: in the Netherlands alternative proteins became cheaper to buy than processed meat in 2022.[10]

Replacing processed meat and dairy with alternative proteins, as recommended in the National Food Strategy, would cut agricultural methane emissions by eight per cent.

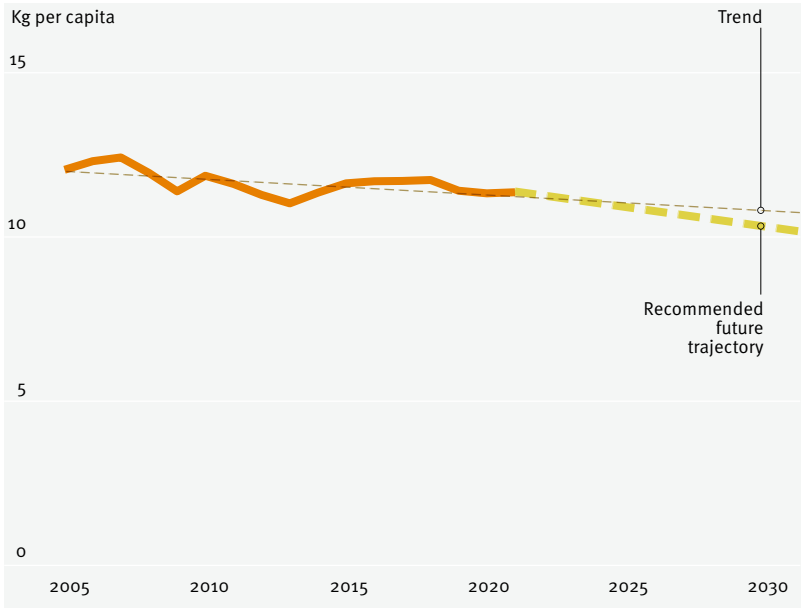
## Eat more vegetables, and less meat and dairy

Cattle and sheep are responsible for nearly 70 per cent of agricultural methane emissions. Beef consumption in the UK has declined five per cent since 2010, but UK diets still contain 40 to 50 per cent more protein, and less than half the fruit and vegetables, than is needed for good health.

Bringing UK diets closer to healthy eating guidelines, in line with the independent National Food Strategy's recommendations, will cut agricultural methane emissions by a further eight per cent.[11]

> **“Bringing UK diets closer to healthy eating guidelines will cut agricultural methane emissions by a further eight per cent.”**

### UK beef consumption since 2005



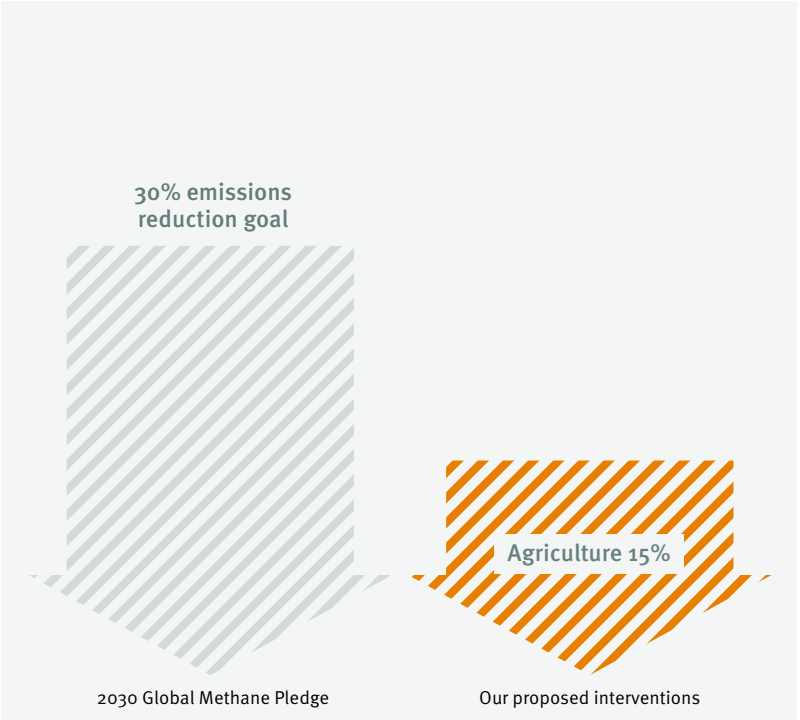
# Predicted impacts

Methane suppressing feed additives, better slurry management and dietary shift away from meat and dairy (to alternative proteins, fruit and vegetables), would result in a 25 per cent cut in agricultural methane emissions by 2030, on a 2020 baseline. This is equivalent to a 15 per cent reduction in total UK methane emissions.

Most of these changes are already outlined in the independent 2021 National Food Strategy, produced for the government.

Associated benefits include better health, better air quality and the reduced use of synthetic fertiliser through improved slurry management.

Acting on agricultural methane could meet half the emissions reduction goal



# Energy
## Leaks, flaring and venting

> “Methane leakages to the atmosphere from the energy sector are a waste of fuel that could otherwise be used.”

Methane emissions from the energy sector have fallen by 84 per cent since 1990, mostly due to a reduction in coal mining and improvements to the gas distribution network. However, the rate of reduction has plateaued in recent years.

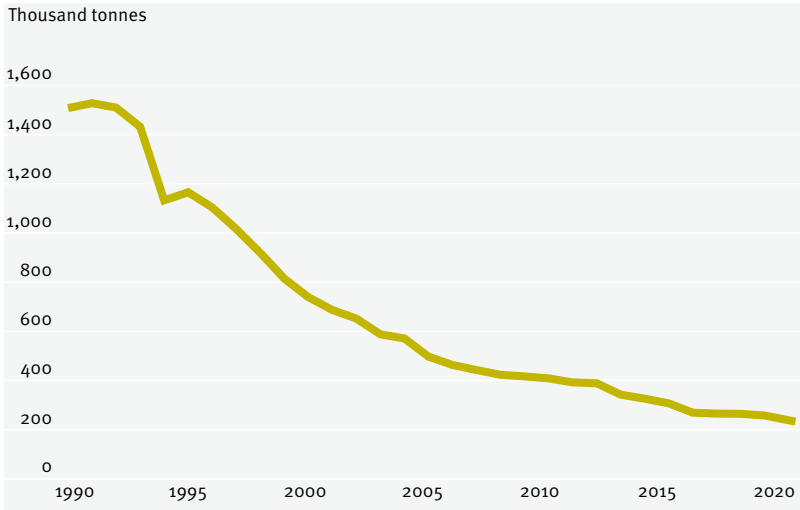
Natural gas is mostly composed of methane, and methane leakages to the atmosphere from the energy sector are a waste of fuel that could otherwise be used to heat UK homes.

### Emissions are underestimated

Most studies suggest that methane emissions from the offshore oil and gas industry and leakage from gas pipes are systematically under reported. Reported emissions are based on modelling, estimates and outdated conversion factors.[12]

Onshore and offshore emissions measurements suggest the true volume of methane leakage, referred to as ‘fugitive’ methane emissions, might be 50 per cent higher than reported.[13,14]

Reported methane emissions from the energy sector in the UK since 1990



## What could the UK do?

### Regulate to cut methane leakage

> “The cost of almost all of these interventions would be less than the value of the recovered gas.”

The gas industry’s *Methane action plan* targets a 50 per cent reduction in emissions by 2030, but the International Energy Agency (IEA) estimates that 72 per cent of existing methane leaks from the UK’s oil and gas sector could be abated with existing technologies and practices.[15] The cost of the majority of these interventions would be less than the value of the recovered gas, even if gas prices dropped to 180 pence per therm, the lowest they have been since September 2021. This would cut UK methane emissions by nine per cent.

Controlling leaks and ending flaring would see as much gas captured from existing wells than is expected to be produced by the newly proposed Rosebank and Jackdaw North Sea oil and gas fields over the next five years. This is the projected timescale of the current gas crisis.[16] Most interventions could be implemented immediately.

A range of technical measures to reduce methane leakage from the oil and gas industry are listed by the IEA and the highest impact interventions are outlined in the table on page 12. As this shows, one of the most effective interventions would be to mandate monthly leak detection and repair (LDAR) activities. This is a proposal the EU is discussing and is normal practice in Norway. Better leak detection would also help to quantify the true volumes of fugitive methane.

The final three interventions listed in the table on page 12 incur a small cost, all others result in savings. However, if the UK includes methane in its emissions trading scheme from January 2026, as proposed, then all measures would avoid a charge of £38 to £43 per mmbtu. In this case, all interventions will result in significant savings to operators.

## Interventions to cut methane leakage in the energy industry

| Intervention | Methane abatement (thousand tonnes) | Savings (£/mmbtu[17]) |
|---|---|---|
| Replace gas pumps and controllers with pressurised air pump systems (offshore) | 5.78 | 18.54 |
| Vapour recovery units (recovery of gas built up in equipment, eg oil tanks) | 6.41 | 17.39 |
| Annual upstream leak detection and repair (LDAR) | 9.07 | 16.47 |
| Vapour recovery units (offshore gas) | 3.87 | 16.39 |
| Vapour recovery units (offshore oil) | 8.56 | 16.28 |
| Replace with pressurised air pump systems (onshore oil) | 0.34 | 16.24 |
| Replace gas pumps with electric motors (downstream gas) | 4.56 | 14.35 |
| Biannual upstream LDAR | 4.53 | 14.28 |
| Annual downstream LDAR | 17.36 | 13.48 |
| Quarterly upstream LDAR | 3.40 | 12.81 |
| Monthly upstream LDAR | 2.26 | 9.89 |
| Replace gas pumps with electric motors (onshore oil) | 0.81 | 9.31 |
| Biannual downstream LDAR | 8.68 | 8.83 |
| Quarterly downstream LDAR | 6.51 | 5.72 |
| Other | 7.27 | 2.21 |
| Install flares (downstream gas) | 1.10 | -0.19 |
| Monthly downstream LDAR | 4.34 | -0.48 |
| Install flares (offshore) | 58.60 | -1.50 |

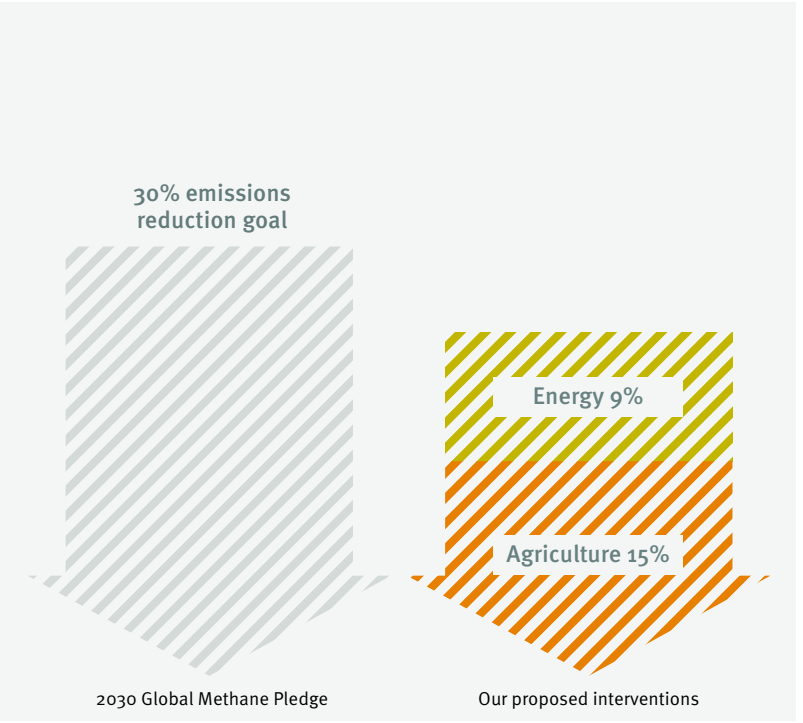
## Predicted impacts

By reining in wasteful practices in the energy sector, total UK methane emissions could be reduced by almost nine per cent.

Additional benefits include improved air quality and better energy security. The North Sea Transition Authority encouraged gas companies to reduce venting and flaring, leading to cuts of a fifth between 2020 and 2021, showing that it can be done quickly.[18] The captured gas would be available faster than new gas sources could be developed, in time to ease supply restrictions caused by Russia's invasion of Ukraine.

> **"Captured gas would be available faster than new gas sources could be developed."**

Potential methane reductions in energy and agriculture could, together, reduce emissions by 24 per cent



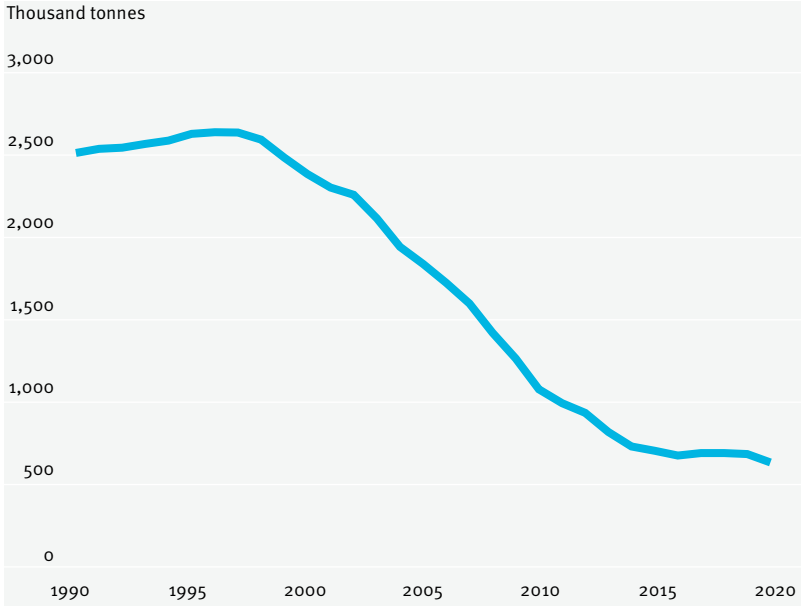
# Waste
## Organic material in landfill

> “There is still significant scope to further reduce methane emissions from the waste sector.”

The landfill tax, introduced in 1996, and support for landfill gas capture from the mid-2000s, have led into rapidly declining methane emissions from waste. As a result, the waste sector also boasts a large reduction in UK methane emissions of 68 per cent since 1990.

Despite this positive progress, there is still significant scope to further reduce methane emissions from the waste sector.

Methane emissions from the waste sector in the UK, from 1990



# What could the UK do?

> “Landfill gas capture rates decreased to around 70 per cent in 2020 as biogas incentives waned.”

## Ban biodegradable waste from landfills

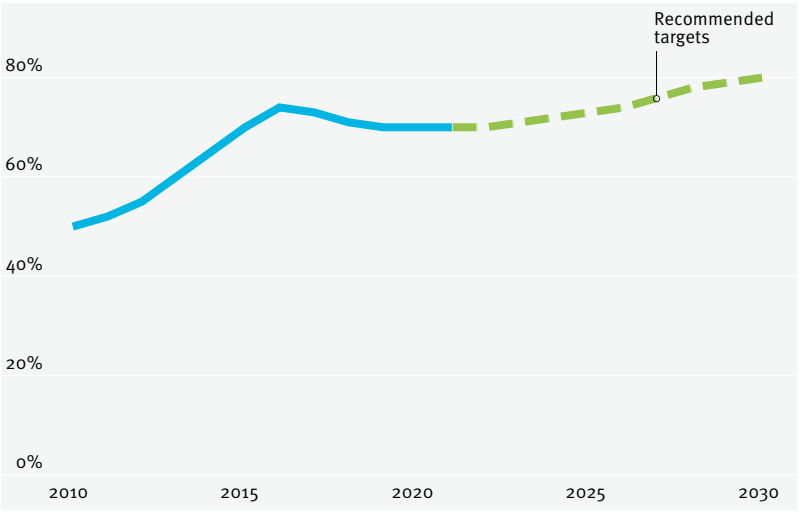
The Landfill Tax has reduced the total volume of waste sent to landfill since 1996, cutting methane emissions significantly. However, some organic waste, especially from non-household sources, is still landfilled or otherwise incinerated, which releases $CO_2$ emissions.

Scotland will ban the landfilling of organic waste by 2025. Defra has proposed a similar ban in England for 2028. Because of the time lag between waste arriving in landfill and the production of methane, a ban in 2028 would only cut an extra one per cent of landfill methane emissions by 2030. A 2025 ban, with complementary policy designed to avoid incineration, would cut emissions an extra 13 per cent by 2030.

## Capture more landfill gas

Landfill gas capture rates peaked at 74 per cent in 2016, but they decreased to around 70 per cent in 2020 as biogas incentives waned.[19] Landfill operators should be required to capture 80 per cent by 2030 (90 per cent has been observed).[20] This would cut landfill methane emissions by an additional 24 per cent and high gas prices make this profitable.

Estimated landfill gas capture rates in the UK



## Predicted impacts

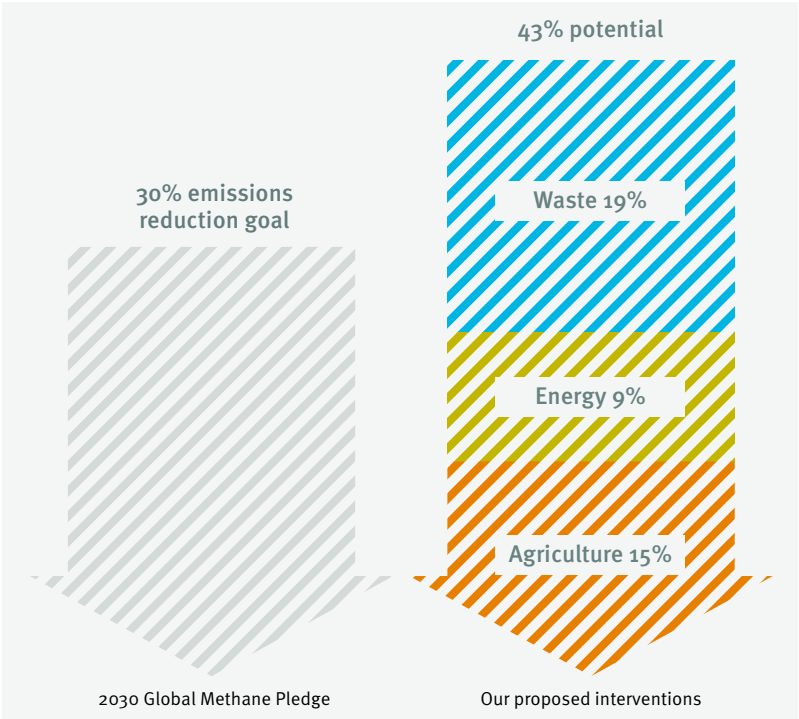
Our analysis indicates that combining a ban on organic waste entering landfill in 2025, and tighter requirements on capturing landfill gas, will lead to a 62 per cent drop in methane emissions from the waste sector, compared to 2020.[21]

This would result in a 19 per cent reduction in overall UK methane emissions. Combined with the other actions we have outlined, this would exceed the minimum contribution to the 30 per cent Global Methane Pledge, cementing the UK's leadership and resulting in a 43 per cent cut in methane emissions by 2030.

Additional benefits of capturing methane from waste include improved air quality and a ready supply of biogas which can be used as fuel.

**“Additional benefits of capturing methane from waste include improved air quality and a ready supply of biogas.”**

Potential methane emissions cuts in all three sectors could exceed the Global Methane Pledge target



# Supporting others to meet the pledge

The UK is already a global leader in methane emissions reduction. This analysis shows how it could easily meet and surpass its commitment to reduce them by at least a further 30 per cent by 2030.

There are also three areas where the UK could go beyond addressing its own emissions and support other signatories to the Global Methane Pledge in meeting their targets:

## Landfill methane

Sharing the policy, technical expertise and business models the UK has pioneered with Latin American countries, where policy for landfill gas capture is under consideration, could have significant benefits. If all Central and South American countries captured 70 per cent of their landfill gas, it would cut 4.3Mt of methane emissions, which is more than twice the UK's total methane emissions in 2020.[22]

## Methane suppressants and alternative proteins

The UK is poised to compete with New Zealand, USA and Israel in the production of alternative proteins and feed additives. According to the National Food Strategy, building an alternative proteins industry could create 10,000 new food manufacturing jobs and 6,500 farming jobs in the UK.[23]

## Methane from rice cultivation

The system of rice intensification (known as SRI) could cut methane emissions by 40 to 70 per cent and has been supported by UK grants. Expanding SRI from the current ten per cent of rice paddies to the 77 per cent it could be applied to, through a combination of UK aid and preferential access via UK trade deals, would cut 100Mt of methane emissions. This is equivalent to 50 times the UK's total methane emissions in 2020.[24]

# Economic advantage and global leadership

**“Our proposals provide an achievable, comprehensive plan to reduce UK methane emissions by up to 43 per cent by 2030.”**

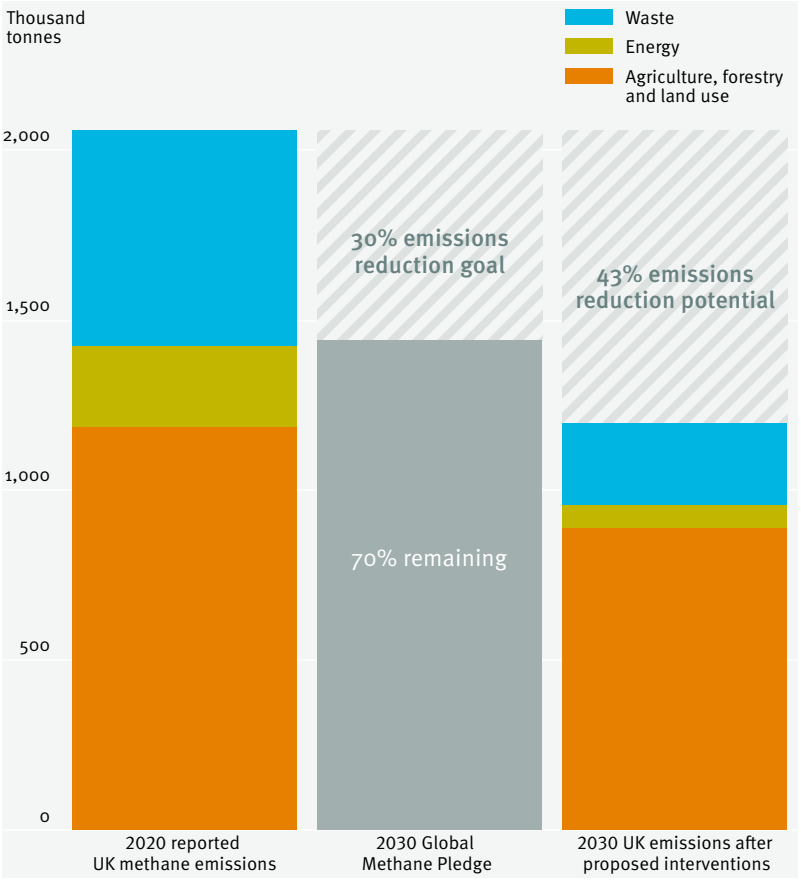
Methane is a powerful greenhouse gas. Although it degrades faster than $CO_2$ in the atmosphere, taking simple actions to cut methane emissions now will complement other efforts to tackle climate change and help to keep the world safe from its impacts.

As the graph on the next page shows, our proposals together provide an achievable, comprehensive plan to reduce UK methane emissions by up to 43 per cent by 2030, which would demonstrate the UK’s global leadership under the Global Methane Pledge.

These interventions are either profitable or low cost and have numerous additional benefits to energy security, public health and the environment.

We have also demonstrated that the UK could support other countries to reduce their methane emissions, significantly amplifying global climate action.

## The UK's potential to meet and exceed the Global Methane Pledge from three sectors



# Endnotes

1 Total methane emissions were 2.06 Mt (million tonnes) in 2020. Source: Department for Business, Energy and Industrial Strategy (BEIS), 'National Atmospheric emissions inventory'

2 If all agricultural interventions were implemented side by side, there would be some overlap in emissions reductions, lessening the overall impact by around one per cent of UK methane emissions.

3 J L Black, T M Davison and I Box, 2021, 'Methane emissions from ruminants in Australia: mitigation potential and applicability of mitigation strategies', Animals, vol 11, pp 951-971

4 R S Hegarty, et al, November 2021, 'An evaluation of evidence for efficacy and applicability of methane inhibiting feed additives for livestock', Global Research Alliance

5 The feed additive Bovaer/3-NOP has a carbon cost of £85/t$CO_2$e assuming it cuts methane by 20-30 per cent and costs £38 per head per year. Source: V Eory, et al, December 2020, *Non-$CO_2$ abatement in the UK agricultural sector by 2050*, Scottish Rural College report for the Climate Change Committee (CCC).

However, more recent evidence suggests 3-NOP can cut methane emissions by 60-90 per cent. Source: N Walker, June 2021, 'Methane inhibitors: update on the methane inhibitor Bovaer' (3-NOP), NZAGRC Conference.

Assuming £38 per year per head and 8,100 litres per year per head of milk, the cost per litre is 0.47p, or around one quarter of one pence per pint. The average UK consumer drinks 70 litres of milk per year, so would pay an additional 33 pence per year.

6 J Habtewold, et al, 2018, 'Reduction in methane emissions from acidified dairy slurry is related to inhibition of methanosarcina species', *Frontiers in microbiology*, vol 9, article 2806

7 Farming Transformation Fund Improving Farm Productivity grant, January 2022, www.gov.uk/guidance/farming-transformation-fund-improving-farm-productivity-grant

8 V Eory, et al, December 2020, *Non-$CO_2$ abatement in the UK agricultural sector by 2050*, section 2.2.25, Scottish Rural College report for the CCC

9 *Farmers Weekly*, 15 July 2021, 'Cornish firm creates kit to turn slurry emissions into fuel'

10 *Food Navigator*, 26 July 2022, 'Plant-based now cheaper than meat in the Netherlands'

11 The National Food Strategy, 2021, *The plan*

12 International Energy Agency (IEA), 'Estimating methane emissions', in *Global methane tracker 2022*

13 Phys.org, 17 February 2022, 'Study shows London produces up to a third more methane than estimates suggest'

14 S N Riddick, et al, 2019, 'Methane emissions from oil and gas platforms in the North Sea', *Atmospheric chemistry and physics*, vol 19, pp 9,787-9,796

15 IEA, September 2022, 'Methane tracker data explorer', www.iea.org/data-and-statistics/data-tools/methane-tracker-data-explorer#iea-total-sources

16 From the environmental impact statements of the Rosebank (Equinor) and Jackdaw (Shell) projects.

17 mmbtu = metric million British thermal units.

We adjusted the IEA's results, presented in the table, to reflect more recent gas prices, using the minimum price since September 2021 of 180 pence per therm.

18 *Offshore*, 4 March 2022 'UK offshore flaring on downward path'

19 Climate Change Committee, 2021, *Progress in reducing emissions. 2021 report to parliament*

20 M Bourn, et al, 2019, 'Regulating landfills using measured methane emissions: an English perspective', *Waste management*, vol 87, pp 860-869

21 To avoid a rise in $CO_2$ emissions, diverted organic waste should not be burned in incineration facilities but instead should be captured by anaerobic digestion.

22 Data from the 'Climate watch data explorer', www.climatewatchdata.org/data-explorer/historical-emissions

23 The National Food Strategy, 2021, op cit

24 Green Alliance calculations based on information from Project Drawdown, see: drawdown.org/solutions/system-of-rice-intensification

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