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# THRIVING WITHIN OUR PLANETARY MEANS

REDUCING THE UK'S FOOTPRINT OF  
PRODUCTION AND CONSUMPTION BY 2030

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WWF and 3Keel are  
working in partnership  
to reduce the UK's  
footprint of production  
and consumption.

**3keel**





# HOW TO SIGNIFICANTLY REDUCE THE UK'S FOOTPRINT OF PRODUCTION AND CONSUMPTION

The UK must reduce the footprint of its production and consumption by **three quarters** this decade to bring it within environmental limits and to contribute its fair share towards halving the global footprint of production and consumption. Urgent and transformative action is needed to prevent further irreversible global biodiversity loss and failure of earth systems.



## AIR POLLUTION

Limit emissions of harmful air pollutants, by 1) meeting the European Environmental Bureau's 'Maximum Technically Feasible Reductions' for pollutants of concern set out in A Critical Guide to the New NEC Directive, and 2) assessing and mitigating the UK's contribution to overseas air pollution by 2030



## GREENHOUSE GAS EMISSIONS

Reduce domestic GHG emissions including international shipping and aviation by 39% and reduce the overseas carbon footprint of UK's consumption of imports by 33% by 2030



## CHEMICAL POLLUTION

Action must be taken to reduce the emissions of all chemical pollutants to levels at or below safe thresholds and restore social and ecological systems damaged by chemical pollution by 2030



## MARINE RESOURCE USE

100% of marine resources from sustainable sources by 2030



## WATER POLLUTION

Protect, enhance and restore all bodies of water in the UK to achieve good ecological status and good chemical status by 2027, and reinforce the positive trend in coastal and marine waters to half the harmful effects of water pollution on those ecosystems



## BIOMASS CONSUMPTION

Reduce biomass consumption footprint by 50% by 2030



## DEGRADATION AND LAND USE CHANGE

UK supply chains of agricultural and forest commodities are responsible for no deforestation and conversion of ecosystems as soon as possible and no later than 2023, degradation of domestic environments is halted, and environmental degradation that occurs overseas as a result of the UK's demand for materials and goods is minimised by 2030



## NUTRIENT USE

Reduce nitrogen and phosphorus use by at least 80% by 2030



## WATER AVAILABILITY AND FLOWS

All surface water bodies and at least 90% of groundwater bodies in the UK must meet sustainable abstraction and ecological flow requirements by 2030, and the UK must support sustainable water management in key overseas sourcing regions based on quantification of the impact of its imports on overseas water availability and flows



## MATERIAL CONSUMPTION

Reduce material consumption footprint by 40% by 2030

# EXECUTIVE SUMMARY

## FRAMING THE OPPORTUNITY

Human activities are propelling the climate crisis, disrupting global biochemical cycles, degrading or converting species-rich natural ecosystems, causing chemical and plastic pollution, and inducing a decline in global biodiversity. Almost 75% of all ice-free land is significantly altered by human activities and animal populations have declined 68% since the 1970s<sup>1</sup>. These impacts on the natural world – on which human society and wellbeing ultimately depend – are driven by overconsumption, unsustainable extraction rates, and by the methods we use to produce material goods.

The science is unambiguous: we need to reduce the impact that our production and consumption has on the natural environment if we are to conserve biodiversity for its own intrinsic value and ensure that future human generations have access to sufficient resources to thrive. Doing so will require urgent, sustained, and transformative action to address how we produce and consume materials.<sup>2</sup> Within this, we also need to recognize and address global inequalities: people living in high income countries consume more than thirteen times the quantity of materials per year than those in developing countries.

As a major economy, the UK's production and consumption has a disproportionate footprint on earth systems and biodiversity. In this report, we assess what it will take to reduce the UK's production and consumption footprint to within sustainable boundaries.

## THE APPROACH

A framework for meeting the goal of halving the global footprint<sup>3</sup> is adapted for the UK's economic, social, political and environmental contexts. A crucial piece of analysis in this localisation involved assessing the quantified footprints of consumption and production across multiple domains of environmental impact, as well as assembling representative indicators and identifying primary drivers of impact for domains where quantified footprints do not currently exist. This was conducted for both domestic production and consumption of imports, across ten Topic Areas. For each Topic Area, we present an Outcome Target and specific actions (Action Targets) that together would allow the Outcome Target to be achieved.

## THE OVERARCHING TARGET

In order to understand the magnitude of the overall reduction in production and consumption footprint that is appropriate to the UK, we assessed six footprints. For each, we calculated the UK *per capita* footprint, and compared that to the *per capita* footprint required to stay within planetary environmental limits<sup>4</sup> for the same footprint (Table A). This allowed a calculation of the size of the reduction required by the UK for each of these footprints to meet sustainable planetary ecological limits. The reduction ranged from 38% (material consumption footprint) to 89% (nitrogen footprint).

Based on this, and the fact that the UK's contribution to a global target of halving must reflect its responsibility for the impacts and its capacity to address them, we conclude that a reasonable reduction to bring the UK's impact on earth systems and biodiversity within sustainable limits whilst allowing some convergence in footprint by less developed nations would be **a reduction in the UK's footprint of production and consumption by at least three quarters.**

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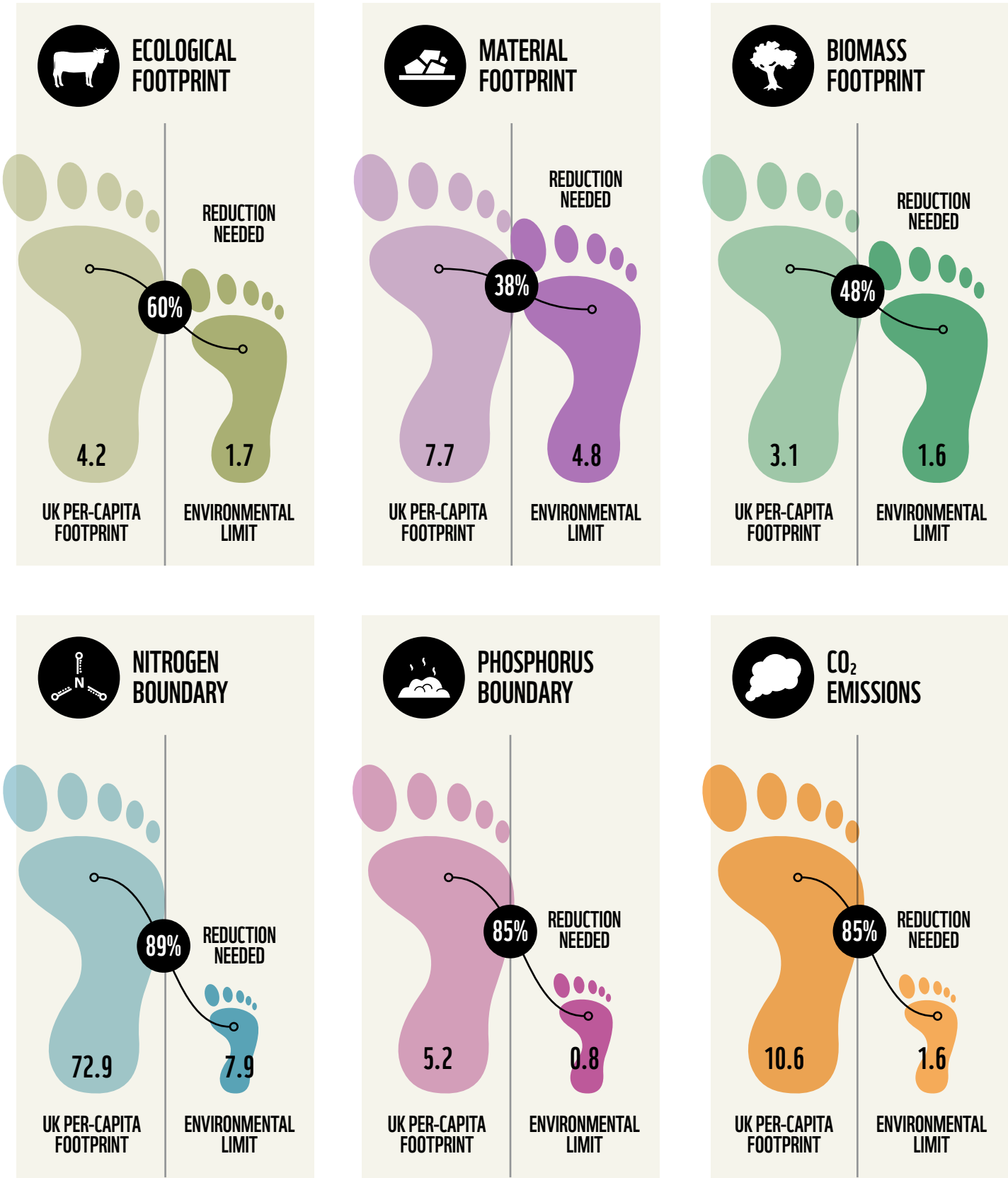
<sup>1</sup> WWF (2021). Living Planet Report 2020. <https://livingplanet.panda.org/en-gb/>

<sup>2</sup> Dasgupta, P. (2021), The Economics of Biodiversity: The Dasgupta Review. London: HM Treasury

<sup>3</sup> Metabolic & WWF (2020). Halving the footprint of production and consumption. [https://wwfint.awsassets.panda.org/downloads/halvingfootprint\\_report\\_wwf\\_metabolic.pdf](https://wwfint.awsassets.panda.org/downloads/halvingfootprint_report_wwf_metabolic.pdf)

<sup>4</sup> The per capita footprints required to stay within environmental limits were calculated based on the planetary boundary framework from; O'Neill, D. W., Fanning, A. L., Lamb, W. F., & Steinberger, J. K. (2018). A good life for all within planetary boundaries. *Nature sustainability*, 1(2), 88–95. UK data from Global Footprint Network (2021). Total Ecological Footprint. <https://data.footprintnetwork.org/#/> and W. Steffen et al., 'Planetary Boundaries: Guiding Human Development on a Changing Planet', *Science* 347, no. 6223 (13 February 2015): 1259855–1259855, <https://doi.org/10.1126/science.1259855>

TABLE A: THE UK'S FOOTPRINT AND PLANETARY ECOLOGICAL LIMITS<sup>5</sup>



<sup>5</sup> O'Neill et al 2018, the Global Footprint Network and data published by the Office for National Statistics. See the section 'Reducing the UK's footprint', below, for further details and sources of data. For explanation of the units used in each footprint please refer to Table 2, page 19



## OUTCOME AND ACTION TARGETS

To accomplish this overarching reduction, we set Outcome Targets across ten Topic Areas.<sup>6</sup> The Topic Areas and Outcome targets are summarised in Table B. Combined, these Action Targets present a holistic approach to bringing the UK's production and consumption footprint within sustainable planetary limits: all must be addressed.

The Action Targets represent the most substantial opportunities to achieve each Outcome Target. The Action Targets presented have been narrowed down from a broader range of measures, based on considerations for potential magnitude of impact, feasibility, urgency and expediency as identified by scientific evidence and political consensus. Together, the aggregated impact of the Action Targets is designed (where technically possible) to achieve the Outcome Target, and whilst there are in some instances alternative pathways to reaching the same outcome, all must be implemented. Action Targets are directed at multiple stakeholders – generally public institutions in charge of regulation and policymaking, as well as economic sectors closely tied to and responsible for the environmental consequences of production and consumption.

## CONCLUSIONS

Significant reductions in the UK's footprint across multiple environmental domains should not be interpreted as meaning that the UK's economy must shrink, or that the wellbeing of UK citizens be reduced. With a very few exceptions, the Action Targets proposed are about doing things differently: reducing waste, increasing recycling, eliminating the most egregious environmental impacts of UK production and consumption at home and overseas, increasing efficiency, and shifting towards production systems that work with nature. This is best understood for greenhouse gas emissions, where reducing the UK's emissions is brought about through actions such as decarbonising electricity production, then using electricity more broadly in areas such as transport than is currently the case<sup>7</sup>. As is the case with greenhouse gas emissions, there are significant economic opportunities embedded within the changes described. And, as has been repeatedly shown with climate change, taking meaningful action now across all Topic Areas is likely to be far more economically desirable than having to take even more radical action later.

For human society to return to living within environmental limits will ultimately take collaborative action and international agreements by every country on earth<sup>8</sup>. Here, we outline what is needed for the UK to take leadership and put our own house in order.

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<sup>6</sup> Metabolic & WWF (2020). Halving the footprint of production and consumption. [https://wwfint.awsassets.panda.org/downloads/halvingfootprint\\_report\\_wwf\\_metabolic.pdf](https://wwfint.awsassets.panda.org/downloads/halvingfootprint_report_wwf_metabolic.pdf)

<sup>7</sup> Climate Change Committee, The Sixth Carbon Budget. The UK's path to Net Zero, December 2020. <https://www.theccc.org.uk/wp-content/uploads/2020/12/The-Sixth-Carbon-Budget-The-UKs-path-to-Net-Zero.pdf>

<sup>8</sup> Dasgupta, P. (2021), The Economics of Biodiversity: The Dasgupta Review. London: HM Treasury

**TABLE B: SUMMARY OF THE TARGETS REQUIRED TO RESTORE THE IMPACTS OF THE UK'S PRODUCTION AND CONSUMPTION WITHIN ENVIRONMENTAL LIMITS BY 2030**







TOPIC AREA	CURRENT UK FOOTPRINT	BOUNDARY FOOTPRINT	UNITS	OUTCOME TARGET
 GREENHOUSE GAS FOOTPRINT	522	316	MtCO <sub>2</sub> e	Reduce UK domestic GHG emissions including international shipping and aviation by 39% on 2018 levels by 2030 and reduce the overseas carbon footprint of UK's consumption of imports by 33%
 MATERIAL CONSUMPTION	7.7	4.8	Tonnes per person per year	Reduce the UK's material consumption footprint by 40% by 2030
 BIOMASS CONSUMPTION	3.1	1.6	Tonnes per person per year	Reduce the UK's biomass consumption footprint by 50% by 2030
 MARINE RESOURCE USE	The UK footprint of marine resource use is not well defined. It is estimated that in 2019 over 60% of commercial UK fish stocks were unsustainably exploited or at high risk of unsustainable exploitation. Illegal and unregulated fishing, damaging capture practices and unsustainable feed are prevalent issues globally which is key as 60% of the UK's marine resource use is met by imports from other countries. As pressure on global marine resources intensifies, the UK's sourcing must be rapidly made unambiguously sustainable.			100% of marine resources from sustainable sources by 2030
 DEGRADATION AND LAND-USE CHANGE	The UK footprint of degradation and non-deforestation land use change is not well defined. In 2017 UK supply chains were estimated to be responsible for over 20,200 hectares of deforestation embodied in imports. Expert consensus is that the ecological threshold for deforestation is zero and that all forms of degradation and land conversion should be minimised.			UK supply chains of agricultural and forest commodities are responsible for no deforestation and conversion of ecosystems as soon as possible and no later than 2023, degradation of domestic environments is halted, and environmental degradation that occurs overseas as a result of the UK's demand for materials and goods is minimised by 2030

TABLE B: CONT

TOPIC AREA	CURRENT UK FOOTPRINT	BOUNDARY FOOTPRINT	UNITS	OUTCOME TARGET
 <b>NUTRIENT USE</b>	Phosphorus: 5.2 Nitrogen: 72.9	P: 0.79 N: 7.9	kg per person per year	Reduce nitrogen and phosphorus use by at least 80%
 <b>CHEMICAL POLLUTION</b>	The footprint of overall chemical pollution, occurring both domestically and overseas, is not well defined. However, safe emissions thresholds are relatively well defined for many pollutants and can be used to set reduction targets for individual pollutants.			Reduce the emissions of all chemical pollutants to levels at or below safe thresholds (preventing emissions where risks are unknown) and restore social and ecological systems damaged by chemical pollution
 <b>WATER POLLUTION</b>	36% <sup>9</sup>	100%	% of water bodies achieving good ecological status	Protect, enhance and restore all bodies of water in the UK to achieve good ecological status and good chemical status by 2027, and reinforce the positive trend in coastal and marine waters to halt the harmful effects of water pollution on those ecosystems
 <b>WATER AVAILABILITY AND FLOWS</b>	84% surface waters  72% groundwaters <sup>10</sup>	100% surface waters  90% groundwaters	% water bodies meeting required flow standards	All surface water bodies and at least 90% of groundwater bodies in the UK meet sustainable abstraction and ecological flow requirements, and the UK supports sustainable water management in key overseas sourcing regions based on quantification of the impact of its imports on overseas water availability and flows
 <b>AIR POLLUTION</b>	National and international legislation calls for reduced emissions of all air pollutants of concern. However, the UK's air pollution targets are insufficient to prevent significant harms. While there is not a well-defined ecological threshold for air pollution, more ambitious reductions will prevent avoidable deaths and ecological degradation.			Limit the emissions of harmful air pollutants, by 1) meeting the European Environmental Bureau's 'Maximum Technically Feasible Reductions' for pollutants of concern set out in A Critical Guide to the New NEC Directive (2017) and 2) assessing and mitigating the UK's contribution to overseas air pollution

<sup>9</sup> Note that this footprint only covers domestic water pollution. Local water pollution that occurs overseas as a result of UK imports is not quantified. Established criteria reflect 'good' or 'high' status from the Water Framework Directive, as measured by JNCC indicator 'B7. Surface water status'.

<sup>10</sup> Note that this footprint only covers domestic water availability and flows. Local alterations to availability and flows that occur overseas as a result of UK imports is not quantified. Required flow standards are defined in the 25 Year Environment Plan and measured by indicators defined therein



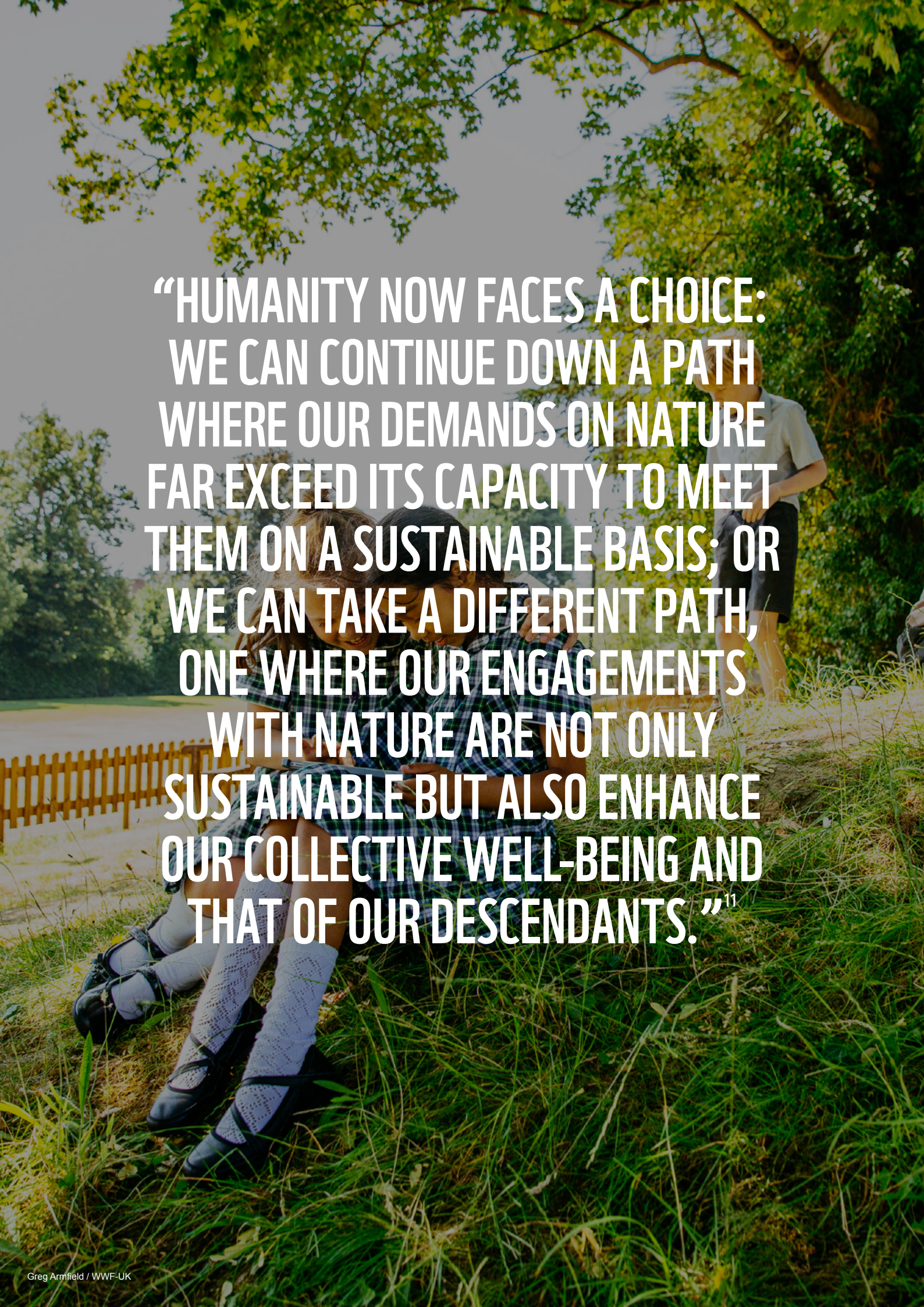
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A photograph of children in a park. In the foreground, two girls in school uniforms are sitting on the grass, looking at a book together. In the background, another child is standing near a large tree. The scene is outdoors with lush greenery and a wooden fence visible in the distance.

**“HUMANITY NOW FACES A CHOICE:  
WE CAN CONTINUE DOWN A PATH  
WHERE OUR DEMANDS ON NATURE  
FAR EXCEED ITS CAPACITY TO MEET  
THEM ON A SUSTAINABLE BASIS; OR  
WE CAN TAKE A DIFFERENT PATH,  
ONE WHERE OUR ENGAGEMENTS  
WITH NATURE ARE NOT ONLY  
SUSTAINABLE BUT ALSO ENHANCE  
OUR COLLECTIVE WELL-BEING AND  
THAT OF OUR DESCENDANTS.”<sup>11</sup>**



# INTRODUCTION

## FRAMING THE OPPORTUNITY

We are in an era of unprecedented global environmental change, driven almost entirely by human activities. The climate crisis, disruption of global biochemical cycles, conversion of natural ecosystems to agricultural land, intensive aquaculture and overfishing, and chemical and plastic pollution are driven by overconsumption, unsustainable extraction rates, and by the methods we use to produce and consume material goods.<sup>12</sup> As a result, almost 75% of Earth's ice-free land surface has undergone significant alteration and there is an acute biodiversity crisis characterised by a 68% fall in populations of mammals, birds, amphibians, reptiles and fish since 1970. We are depleting the species and habitats that make up our natural world and on which human society is based.<sup>13</sup> The human suffering caused by the Covid-19 pandemic is a salutary warning of the risk that degradation of the global environment also poses to the health, wellbeing and livelihoods of people.<sup>14</sup>

Urgent and transformative action needs to be taken to address how we produce and consume materials if further irreversible global biodiversity loss and failure of earth systems is to be avoided. Within this, we also need to recognize and address global inequalities: people living in high income countries consume more than thirteen times the quantity of materials per year than those in developing countries.<sup>15</sup>

Reducing the impacts of production and consumption is necessary but not sufficient to return global biodiversity to levels that will thrive.<sup>16</sup> WWF recognises three major changes that have to be brought about: zero loss of natural habitats, zero extinction and halving the footprint of production and consumption.<sup>17</sup> Whilst this report is focused on the third of these actions, 'bending the curve' of biodiversity decline upwards (Figure 1) will require significant additional interventions focused specifically on the protection and restoration of biodiversity.<sup>18</sup>

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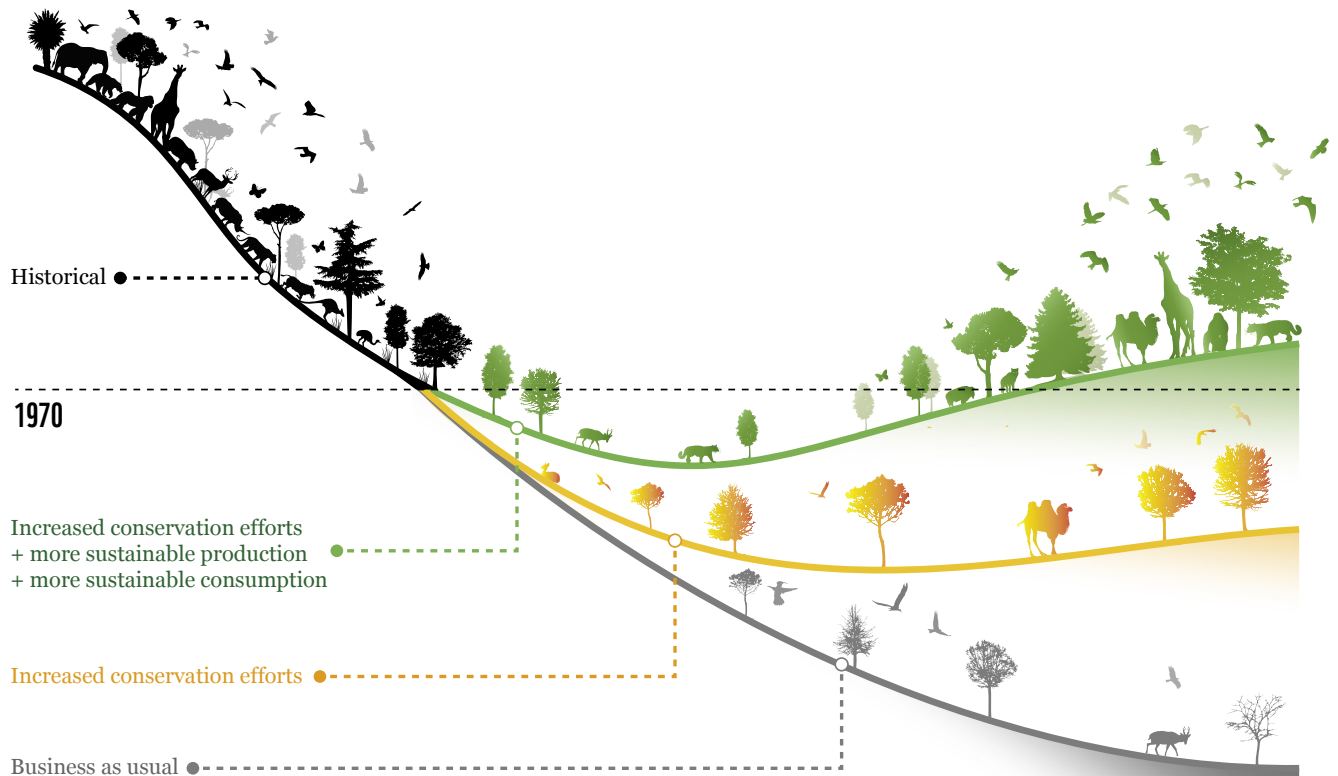
17 WWF (2020). *A New Deal for Nature and People*. [https://wwfint.awsassets.panda.org/downloads/newdeal\\_brochure\\_final.pdf](https://wwfint.awsassets.panda.org/downloads/newdeal_brochure_final.pdf)

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# REVERSING NATURE LOSS REQUIRES SIGNIFICANT EFFORTS TO ADDRESS UNSUSTAINABLE PRODUCTION AND CONSUMPTION

Credit: Adam Islaam | International Institute for Applied Systems Analysis (IIASA)



**Figure 1:** Artwork illustrating historical biodiversity loss curve before 2010 (black) and different loss curves with different action to address the loss. The green curve shows that efforts to improve the sustainability of production and consumption achieves a faster and steeper increase in biodiversity than conservation efforts alone (orange curve) and significantly more than business as usual. The artwork illustrates the main findings of a Nature article by Leclere et al 2020<sup>19</sup>, but does not intend to accurately represent its results.

## THE FOOTPRINT OF PRODUCTION AND CONSUMPTION

In this report we evaluate the ‘footprint’ of the UK’s production and consumption. The footprint refers to the impacts of extraction, production, consumption and related socioeconomic activities on nature and the functioning of natural systems, as well as the drivers and pressures that cause this impact.<sup>20, 21</sup>

Various models attempt to define and quantify the footprint and sustainable limits of human activities, such as the Planetary Boundaries, the Ecological Footprint, the Material Footprint, the Carbon Footprint and the Water Footprint. However, none of these footprints alone provide a comprehensive measure of the total impacts of production and consumption. In this report, we encompass impacts across these footprints and beyond, based on the framework developed by WWF and Metabolic.<sup>22</sup>

The scope of the footprint encompasses both production and consumption and both domestic and overseas impacts. The footprint of UK production occurs within the country borders, related to domestic production

<sup>19</sup> <https://www.nature.com/articles/s41586-020-2705-y>

<sup>20</sup> WWF (2020). Halving the footprint of production and consumption is critical to protecting nature and ourselves. <https://wwf.medium.com/halving-the-footprint-of-production-and-consumption-is-critical-to-protecting-nature-and-ourselves-c6d7754ff02>

<sup>21</sup> Metabolic & WWF (2020). Halving the footprint of production and consumption. [https://wwfint.awsassets.panda.org/downloads/halvingfootprint\\_report\\_wwf\\_metabolic.pdf](https://wwfint.awsassets.panda.org/downloads/halvingfootprint_report_wwf_metabolic.pdf)

<sup>22</sup> Metabolic & WWF (2020). Halving the footprint of production and consumption. [https://wwfint.awsassets.panda.org/downloads/halvingfootprint\\_report\\_wwf\\_metabolic.pdf](https://wwfint.awsassets.panda.org/downloads/halvingfootprint_report_wwf_metabolic.pdf)

<sup>23</sup> Cornelius et al (2020). Carbon Footprint: Exploring the UK’s contribution to Climate Change. WWF UK. [https://www.wwf.org.uk/sites/default/files/2020-04/FINAL-WWF-UK\\_Carbon\\_Footprint\\_Analysis\\_Report\\_March\\_2020%20%28003%29.pdf](https://www.wwf.org.uk/sites/default/files/2020-04/FINAL-WWF-UK_Carbon_Footprint_Analysis_Report_March_2020%20%28003%29.pdf)

and processing of goods. The footprint of the UK's consumption is spread globally and encompasses the impacts of goods produced and processed overseas for import to the UK. The UK's consumption footprint is considerable, with nearly half of the UK's carbon footprint occurring overseas<sup>23</sup> and the overseas land footprint required to meet the UK's demand for just seven key commodities amounting to the equivalent of 88% of UK's total land area.<sup>24</sup> It is critical to consider both the domestic and overseas impacts of UK production and consumption in tandem to avoid taking actions to reduce domestic impacts which result in an 'offshoring' of the impacts of UK production and consumption to other countries.

## HALVING (OR MORE) THE UK'S FOOTPRINT: A FAIR AND EQUITABLE TARGET

The science is unambiguous: we need to reduce the impact that our production and consumption has on the natural environment to conserve biodiversity for its own intrinsic value and to ensure that future human generations have access to sufficient resources to thrive.

In its Global Goals, WWF states the need to halve the global footprint of production and consumption.<sup>25</sup> A key report commissioned by WWF and produced by Metabolic explored this further to present an overarching target for halving the global footprint of production and consumption with targets for action across key topic areas and aimed at key sectors and activities behind the largest impacts.

Meeting this global goal will require efforts by all countries. However, the footprints of production and consumption are not spread evenly amongst countries; simply put, richer nations have greater footprints than less economically developed countries<sup>27</sup>. For this reason, the impact of consumption and production needs not only to be brought within sustainable levels, there also needs to be a convergence of impact footprint across and within regions and income groups. In other words, the relative role of a country in efforts to halve the global footprint must be determined on the basis of equity, based on its relative contribution to the global footprint and taking into account the need for sustainable development and eradication of poverty, particularly in developing countries<sup>28</sup>.

The UK's per capita footprint in many domains exceeds the global average<sup>29</sup>, and the UK has had a disproportionately high historical impact on biodiversity and earth systems. The reduction in the UK's production and consumption footprint must not only be ambitious, it must also be fair and equitable based on the UK's responsibility for the impacts to date and its capacity to address these impacts<sup>30</sup>. This is so far best understood and enshrined in the arena of greenhouse gas emissions reductions<sup>31</sup> where, despite accounting for only 1% of the global population, the UK is the sixth wealthiest nation and the fifth biggest historical contributor to global greenhouse gas emissions<sup>32</sup>, which is reflected in its Nationally Determined Contribution as a share of global greenhouse gas reduction commitments.

To contribute to an overall global halving of the footprint of production and consumption, the UK's own footprint reduction target must be more ambitious than a halving. This is reflected in the overarching target set in this report.

The UK must also contribute to ensuring that the shift towards more sustainable global production and consumption comprise a 'just transition' for poorer nations. Wealthy countries like the UK must assist poorer nations in the transition away from unsustainable resource-dependent economic activities and ensure that poorer people and communities, both within the UK and overseas, gain from the change.

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## UK POLICY CONTEXT

In ‘A Green Future: our 25 Year Plan to Improve the Environment’<sup>33</sup> the UK Government articulates an ambitious set of goals and actions for the UK, including committing that ‘*our consumption and impact on natural capital are sustainable, at home and overseas*’. This represents a significant statement of intent which supports the UK’s international commitments including the Sustainable Development Goals<sup>34</sup>, the Paris Agreement<sup>35</sup>, the Aichi Biodiversity Targets<sup>36</sup>, the New York Declaration on Forests<sup>37</sup> and the Amsterdam Declaration<sup>38</sup>. In 2019, the Global Resource Initiative TaskForce was launched jointly by Ministers from DEFRA, BEIS, DFID and FCDO, and proposed a suite of actions to achieve sustainable supply chains for food and forestry products, free from deforestation and land conversion. It is envisaged that efforts should then extend to address wider environmental and human rights impacts associated with other food and non-food commodities<sup>39</sup>. Moreover, the JNCC and Stockholm Environment Institute is developing a suite of indicators to enable more granular and data-driven attribution of the overseas impacts of UK consumption<sup>40</sup>.

The withdrawal of the UK from the European Union has necessitated the development of environmental regulations to replace the EU legal frameworks that previously applied within the UK. This has resulted in the drafting of the Environment Bill, which, at the time of writing, is in its second reading and is expected to pass into law by the end of 2021. Relevant secondary legislation will be developed over the coming years. Whilst most of the provisions extend to England only there are some parts that extend to the whole of the UK or apply to specific UK nations. The Environment Bill thus represents a unique opportunity to legislate for the UK to set a specific footprint reduction target, whilst not constraining the devolved nations of Scotland, Wales and Northern Ireland from setting more ambitious provisions of their own on many issues. The devolved nations have their own legislation and policies relating to their environmental footprint at home and abroad. For example, the ‘One Wales: One Planet Strategy’ 2009 set an ambition for halving Wales’ footprint in a generation. This approach was enshrined in law with the Well-being of Future Generations (Wales) Act 2015 which has goals which include proportionate use of resources, resilient ecosystems and global responsibility<sup>41</sup>.

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33 HM Government (2018). A Green Future: our 25 Year Plan to Improve the Environment. <https://www.gov.uk/government/publications/25-year-environment-plan>

34 <https://sdgs.un.org/goals>

35 United Nations Framework Convention on Climate Change (2015). Paris Agreement. [https://unfccc.int/sites/default/files/english\\_paris\\_agreement.pdf](https://unfccc.int/sites/default/files/english_paris_agreement.pdf)

36 <https://www.cbd.int/sp/targets/>

37 <https://forestdeclaration.org/>

38 <https://ad-partnership.org/>

39 Global Resource Initiative (2020). Final Recommendations Report [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/881395/global-resource-initiative.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/881395/global-resource-initiative.pdf)

40 Croft, S., West, C., Harris, M., Otley, A. & Way, L. (2021). Towards indicators of the global environmental impacts of UK consumption: Embedded Deforestation. JNCC Report No. 681, JNCC, Peterborough, ISSN 0963-8091.

41 Welsh Government (2015). Well-being of Future Generations (Wales) Act 2015. <https://www.legislation.gov.uk/anaw/2015/2/contents/enacted>



# METHODS

This work builds on the WWF-Metabolic report ‘Halving the Footprint of Production and Consumption’<sup>42</sup>. That framework includes twelve topic areas, each having its own Outcome Target (the level of reduction required to bring current impacts under ecological thresholds for that topic area) with a variety of ‘Action Targets’ that, if enacted, would comprise the bulk of progress required to meet the Outcome Target reduction.

The findings are based primarily on a comprehensive literature review drawing from both academic and non-academic sources. This was supported by analysis of publicly available datasets, where relevant.

## AN OVERARCHING TARGET FOR THE UK FOOTPRINT OF PRODUCTION AND CONSUMPTION

The first step in the analysis was to establish an appropriate overarching target for the reduction in the UK’s footprint of production and consumption. As described above, WWF has previously called for a global *halving* of the global footprint of production and consumption. We used this as a starting point and assessed the appropriate magnitude for a national target for the UK. We took published data for the UK’s per capita footprint for six footprint metrics<sup>43</sup>; Ecological Footprint, Material Footprint, Biomass Footprint, Nitrogen Boundary, Phosphorus Boundary and CO<sub>2</sub> emissions. There are several published estimates of several of these footprints, which have different scopes and are evaluated using different analytical processes. We selected the ones that were most robust and which gave coherent results across linked Topic Areas (e.g., Biomass Footprint is a subset of Material Footprint, and so the selected footprints for these domains have to be consistent with each other). We calculated the percentage reduction in each footprint needed to bring the UK’s footprint in line with published estimates of the per capita footprint required to stay within environmental limits based on the planetary boundary framework<sup>44</sup> (Table 2). We also considered what the magnitude of a reduction target for the UK should be based on a fair and equitable contribution to the global target of halving.

## ORGANISING FRAMEWORK

This report uses a framework of Topic Areas similar to that in the WWF-Metabolic report to structure the analysis. The Topic Areas provide a framing that comprehensively covers the range of impacts, pressures and drivers that make up the UK’s production and consumption footprint. Compared to an analysis by sector, the Topic Areas allow a more holistic evaluation of the major components of the UK’s overall footprint of production and consumption and the actions required to reduce this, many of which are relevant across sectors. Each Topic Area has a single ‘Outcome Target’ – the overall footprint reduction that needs to be achieved – and a number of ‘Action Targets’ that specify how the Outcome Target **could** be achieved.

The Topic Areas from the Metabolic report judged to comprehensively capture the key areas of the UK’s footprint of production and consumption. The magnitude of the UK’s impact in each of the topic areas was assessed via literature review and data analysis and is summarised in the introduction to each topic area section in this report. This confirmed that the UK is exceeding its footprint of production and consumption across all Topic Areas. It also confirms that the Topic Areas are not a ‘menu’ from which some can be chosen: all footprints must be addressed.

However, in adapting the framework to the context of the UK, we make three changes. Firstly, the WWF-Metabolic report apportions the twelve topic areas between ‘drivers’ of negative environmental states,

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42 Erin Kennedy, Thomas Thorin and Maja Johannessen (2020). Halving the Footprint of Production and Consumption: A Proposed Framework for Measurable Outcomes & Actions. WWF and Metabolic

43 Note that it was not possible to formulate a footprint for all Topic Areas – some do not have sufficient indicators (especially relating to overseas impact); some, such as degradation, lack a coherent approach to unify all of the disparate elements of impact within a national footprint.

44 The per capita footprints required to stay within environmental limits were calculated based on per capita planetary boundary footprints from; O’Neill, D. W., Fanning, A. L., Lamb, W. F., & Steinberger, J. K. (2018). A good life for all within planetary boundaries. *Nature sustainability*, 1(2), 88-95. UK data from Global Footprint Network (2021). Total Ecological Footprint. <https://data.footprintnetwork.org/#/> and W. Steffen et al., ‘Planetary Boundaries: Guiding Human Development on a Changing Planet’, *Science* 347, no. 6223 (13 February 2015): 1259855–1259855, <https://doi.org/10.1126/science.1259855>, but updated to reflect the current global population. UK per capita footprints were calculated from sources including O’Neill et al 2018, the Global Footprint Network and data published by the Office for National Statistics.

‘pressures’ on the environment, and ‘states’ where environmental parameters are at risk of going beyond sustainable limits. Whilst this is a useful way of articulating the global framework, our focus here is to articulate the best scientific knowledge of how much the UK needs to reduce its footprint in each Topic Area (the Outcome Target), and critically, provide guidance on what needs to be done to achieve that (the Action Targets). As there is no functional difference in Outcome and Action targets between ‘drivers’, ‘pressures’ and ‘states’, we simply list the topic areas (Table 2).

Secondly, the global framework includes a topic area ‘genetic diversity’. A narrow focus on genetic diversity – rather than biodiversity in its entirety – is limiting in the context of the UK, and as described in the introduction, the sum of proposed reductions across Topic Areas will together contribute to reducing the pressure on biodiversity. The WWF sees that in addition to reducing the footprint of production and consumption, ‘bending the curve’ of biodiversity decline will require efforts to achieve zero loss of habitats and zero extinction. Biodiversity is explored in an Issue Highlight later in this report.

Finally, we re-organised the issues concerning freshwater into ‘water pollution’ and a ‘water availability and flows’ topic areas as it was judged that water flows are often affected by the same actions that impact water availability: the WWF-Metabolic framework included flows under pollution.

## OUTCOME TARGETS, KEY SECTORS AND ACTION TARGETS

For each Topic Area, we used publicly available data and literature to define an Outcome Target. Where the topic area aligned with one of the global footprints (Table 1), we used the reduction required in the UK per capita footprint to meet the per capita footprint required to stay within environmental limits as an initial indication of the scale of reduction needed for the outcome target. However, for all topic areas – and particularly where there was not an aligned global footprint – we triangulated between published policy targets and reductions suggested in scientific and grey literature to arrive at a best estimate (Figure 2). Outcome targets are intended to capture the UK’s footprint of production and consumption, domestically and overseas, and to be achieved by 2030.

Having set the outcome targets, we used the scientific and grey literature to identify the key sectors and activities which make the most significant contributions to impacts in the Topic Area.

We then formulated a longlist of Action Targets aimed at addressing the key actions that should be taken to achieve the outcome target. These were aimed at the identified key sectors wherever possible, although in some cases cross-sector targets were necessary. Targets were formulated based on published technical and policy proposals for actions to reduce impacts in the given topic area, as well as analysis and interpretation of published academic and grey literature and, in some cases, published datasets. The longlist of potential action targets was assessed according to their likely contribution to reducing the overall impact based on findings from literature, which allowed us to prioritise 6-12 Action Targets for each topic area. As Action Targets are intended to collectively deliver the required Outcome target, each Action Target needs to be achieved.

Action Targets are generally written as proportional decrease (e.g., ‘decrease the use of x by 70% by 2030’), however, in some instances it was clear that the most impactful actions would be broader levers for change. Examples of the latter include developing, implementing and publishing indicators for certain footprints, or passing laws to bring about a specific change.

Except where otherwise specified, we use a target date of 2030 for all Outcome and Action Targets and a baseline of 2019. We identify indicators that could be used to measure progress against each target. Where available, these are based on existing indicators. However, in some cases, indicators tailored to a particular target do not yet exist. In these cases we identify where indicators are in development, or need to be developed. Many relevant published targets are for 2050, and where applicable we have adapted these for a 2030 timeline, assuming annual average percentage reduction (i.e., the total reduction divided by the number of years to 2050 x the number of years to 2030). More complex modelling of the relative reduction needed by 2030 has been attempted elsewhere, but is beyond the scope of this project.

All Topic Areas include a mixture of Action Targets concerning domestic actions and actions that reduce the UK’s overseas footprint.

**TABLE 1: TOPIC AREAS COVERED IN THIS REPORT**

TOPIC AREA	DESCRIPTION
 <b>GREENHOUSE GAS FOOTPRINT</b>	Climate change due to the increasing concentration of greenhouse gases (GHGs) in the atmosphere is a major driver of habitat and species loss. Under the UNFCCC and the Paris Agreement, a country's contribution to global GHG emissions is based on its territorial emissions of the six main greenhouse gases. There is also increasing focus on the emissions associated with the overseas production of goods that a country imports and consumes. This analysis covers both territorial emissions and those produced overseas attributable to UK consumption.
 <b>MATERIAL CONSUMPTION</b>	Material consumption relates to the consumption of materials including fossil fuels, metal ores and non-metal ores. The material footprint relates to the proportion of global material extraction that is attributable to the domestic demand of a country. For this analysis, biomass is considered separately in the Biomass Consumption topic area.
 <b>BIOMASS CONSUMPTION</b>	Biomass consumption relates to the consumption of agricultural products, animal products, and forestry products. The biomass consumption footprint is the proportion of global production or extraction of biomass materials which is attributable to the domestic demand of a country. It is a subset of the broader material consumption footprint.
 <b>MARINE RESOURCE USE</b>	Marine resources include fisheries products and mariculture products, including aquatic plants and algae: it is the marine fraction of the UK's biomass consumption footprint. It includes imported and domestically produced marine resources for direct consumption (e.g., eating of fin fish/shell fish and seaweed), as well as marine resources embodied within other products, such as fish feed and fish oils used in livestock production.
 <b>DEGRADATION AND LAND-USE CHANGE</b>	Land-use change is the conversion of natural and semi-natural ecosystems to another land use, or profound change in a natural ecosystem's species composition, structure, or function. Environmental degradation describes the loss of productive capacity and deterioration of key ecosystem features caused by human activities. Degradation is a complex topic area and a host of environmental impacts fall under it.
 <b>NUTRIENT USE</b>	Nutrient use relates to the addition of nitrogen and phosphorus to agricultural land in inorganic and organic fertiliser. Rates of nitrate and phosphate use in the UK are well above the global average.
 <b>CHEMICAL POLLUTION</b>	Chemical pollution refers to the release of toxic substances to the environment. Chemical pollution can come in many forms as many of the products and by-products of economic activities are acutely toxic or have the potential to become toxic under certain conditions.
 <b>WATER POLLUTION</b>	Phosphorus is the most significant pollutant in the UK in terms of water bodies failing to achieve good ecological status, and Nitrate s are a significant issue for coastal areas and estuaries. Both phosphorus and nitrates cause eutrophication, which has adverse impacts on aquatic life, water quality and water uses.
 <b>WATER AVAILABILITY AND FLOWS</b>	The environmental impacts of altered water flows are related to 'ecological flows', which refers to the level of flow in waterways that is required for the maintenance of essential ecological functions. A reduction in water levels leading to lower than ecological flows means less space for wildlife to live, feed and reproduce. As water availability and levels are reduced, pollutants entering the water environment also become more concentrated and harmful.
 <b>AIR POLLUTION</b>	Air pollution refers to emissions and atmospheric loading of primary and secondary pollutants of concern. Key regulated air pollutants include nitrogen oxides (NOx), ammonia (NH <sub>3</sub> ), non-methane volatile organic compounds (NMVOCs), sulphur dioxide (SO <sub>2</sub> ) and particulate matter (PM). These pollutants are among the most harmful substances emitted to the air.

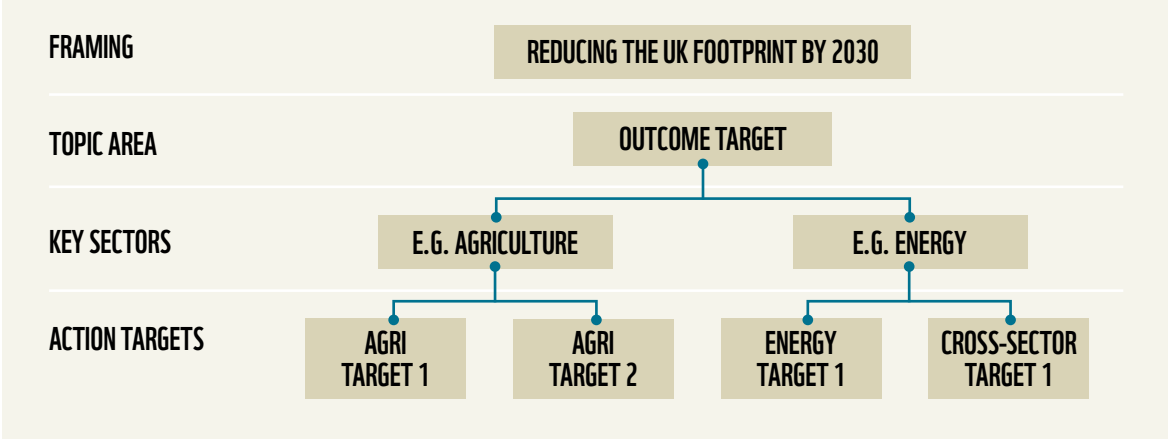


The level of detail of targets varies somewhat between Topic Areas due to the differing scope of the topic area. For example, the action targets for greenhouse gas footprint are generally at a higher ‘whole economy’ level because of the range of relevant sectors and vast number of potential actions that could be taken. In contrast, the topic area of nutrient use, is relatively narrow with targets focusing on actions by agricultural and water and sewerage companies, and so Action Targets can be more specific.

For each Action Target, we specify actors that will be responsible for taking action and provide suggested metrics for measuring the progress against each.

Finally, we include two issue highlights that dig deeper into subjects that are receiving increasing interest for their footprint implications, with impacts that span several of the Topic Areas outlined in this report: finance and biodiversity conservation.

**Figure 2:** Hierarchy for developing targets



## INTERACTIONS AND LIMITATIONS OF THE APPROACH

Ideally, each environmental Topic Area would have an associated, quantified global and domestic footprint entrenched and substantiated in the scientific literature. This is not always the case. As described in the preceding section, for some Topic Areas this means that estimation of a sustainable and fair reduction had to be addressed through triangulating different types of scientific and policy information. The indicators used to quantify Topic Area footprints differ in terms of maturity and comprehensiveness. For example, the UK’s domestic and overseas greenhouse gas footprint is relatively well quantified and frequently updated. A total consumption-based land use change footprint, on the other hand, is not fully realised – individual studies have estimated the land use change attributable to UK consumption, but the scope and methods of those studies can vary, producing somewhat incomparable results<sup>45</sup>. In some cases, there is no unified approach to monitoring or measuring the disparate elements of environmental impact that would comprise the footprint for a Topic Area. This is the case, for example, with degradation, where the distinct modes of degradation (e.g., soil degradation, forest degradation) have not been integrated to achieve a full view of impacts.

Another notable trend is the relative knowledge gap between the quantification of a domestic footprint and an overseas footprint for many Topic Areas. Many Topic Areas have only cursory data available for the local impacts occurring in producer countries that are attributable to UK trade flows. For instance, all the pollution-focused Topic Areas have domestic monitoring programmes tied to policy targets or emissions ceilings, but there is no clear measure of pollution embodied in imports. For Topic Areas where this is the case, we include Action Targets around quickly closing this knowledge gap.

Attainment of the Action Targets under each Topic Area would preferably sum to the Outcome Target. Where possible, we have endeavoured to achieve this. However, most Topic Areas include a range of issues that cannot be measured by the same metrics or have limited data available to quantify the magnitude of a

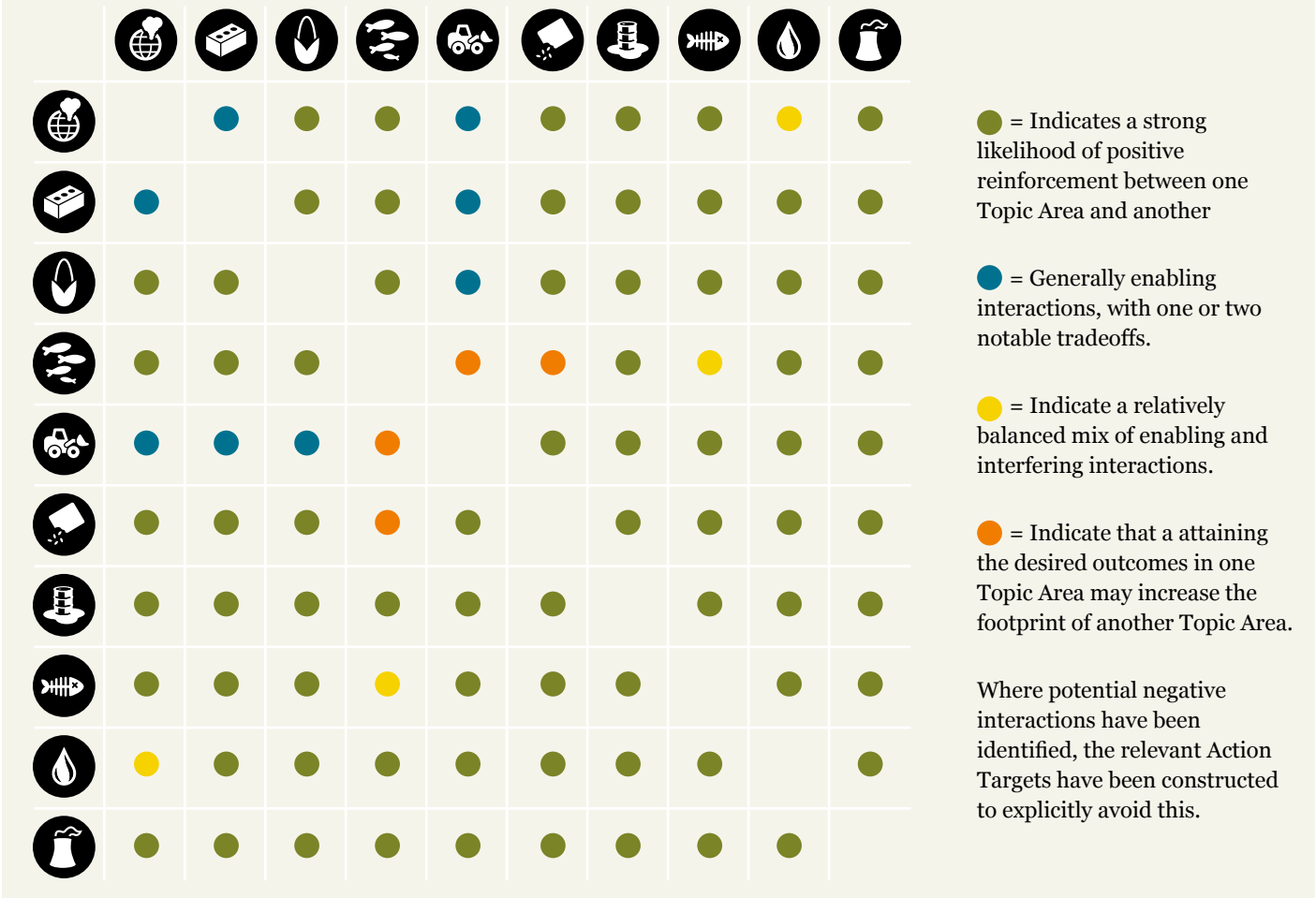
45 E.g. Pendrill, F. et al. (2020). ‘Deforestation risk embodied in production and consumption of agricultural and forestry commodities 2005–2017; de Ruiter et al. (2017). ‘Total global agricultural land footprint associated with UK food supply 1986–2011’, *Global Environmental Change*.

particular impact or remedial measure. This results in there being no straightforward way of aggregating the impacts of Action Targets under the majority of Topic Areas. We have attempted to reduce the consequences of this by selecting Outcome Targets that aggregate to a higher measurement level: for example, the Outcome Target for Water Pollution is framed around the proportion of water bodies in good ecological and chemical status, rather than being a target for the maximum concentration of pollutants.

A second difficulty in ensuring that attainment of Action Targets sums to the Outcome Targets is the interaction between them. For example, a reduction in destructive ocean floor fishing practices (Marine Resource Use Topic Area) would result in reduced GHG emissions from the seabed, and thus interact with the Greenhouse Gas concentration Outcome Target. In this case, the interaction is positive – it would support the attainment of the GHG Concentration Outcome Target – but this may not always be the case. For example, a decrease in the use of fish-based feed in aquaculture could potentially drive an increase in Degradation and Land-Use Change if it were replaced by soy (noting that in this specific instance, the Action Targets are formulated to avoid this possibility). A high-level illustration of the key interactions is given in Figure 3. Again, the level and complexity of interactions means that it is impossible within the constraints of this research to ensure that the Action Targets for each Topic Area sum precisely to the Outcome Target. As the recommended Action Targets underpin complex and transformative change, it will be vital to identify or develop consistent indicators to ensure that adequate progress is being made.

Care has been taken to delineate environmental impacts (and the Action Targets addressing those impacts) between Topic Areas. This has been done to avoid possible issues around double counting wherever possible. However, as demonstrated by the interactions between the Topic Areas above, the feedbacks from actions in one Topic Area to another should not be discounted as either potential enablers or inhibitors of progress (sometimes both). A quantitative analysis of these interactions is beyond the scope of this study.

**Figure 3:** Interactions between environmental topic areas.



# REDUCING THE UK'S FOOTPRINT

## OVERARCHING TARGET

In order to understand the magnitude of the overall reduction in production and consumption footprint that is appropriate to the UK, we assessed six footprints, all but one of which relates directly to one of the Topic Areas defined here. For each, we calculated the UK per-capita footprint, and compared that to the per capita ecological limit for the same footprint (Table 2). This allowed a calculation of the size of the reduction required by the UK for each of these footprints to meet planetary ecological limits. The extent of reduction required by the UK ranged from 38% (material consumption footprint) to 89% (nitrogen footprint). Based on this, and the fact that the UK's contribution to a global target of halving must reflect its responsibility for the impacts and capacity to address them, we conclude that a reasonable reduction to bring the UK's impact on earth systems and biodiversity within sustainable limits whilst allowing some convergence in footprint by less developed nations would be a reduction in the UK's footprint of production and consumption by at least three quarters.

As is clear from the Action Targets, reducing the UK's footprint by three quarters does not imply that the UK economy has to shrink by three quarters, or that UK citizens consume three quarters of their current levels of material use. Whilst some reductions in consumption are required (e.g., reduced meat consumption), for the most part the reductions in footprint are met by doing things differently: increasing recycling; reducing waste; using low impact production practices; switching to technologies that use less of the earth's resources; tightening controls on the use of polluting chemicals, and increasing production efficiency. Within these approaches, there is clearly scope for many economic sectors to grow substantially.

**TABLE 2: THE UK'S FOOTPRINT AND ECOLOGICAL LIMITS**

FOOTPRINT	UNITS	UK PER CAPITA FOOTPRINT	REFERENCE YEAR	PLANETARY LIMIT PER CAPITA FOOTPRINT	REDUCTION IN UK FOOTPRINT NEEDED TO MEET PLANETARY LIMIT
<b>ECOLOGICAL FOOTPRINT<sup>46</sup></b>	<b>GLOBAL HECTARES (HA)</b>	<b>4.2</b>	<b>2017</b>	<b>1.7</b>	<b>59%</b>
<b>MATERIAL FOOTPRINT<sup>47</sup></b>	<b>TONNES PER YEAR</b>	<b>7.7</b>	<b>2017</b>	<b>4.8</b>	<b>37%</b>
<b>BIOMASS FOOTPRINT<sup>48</sup></b>	<b>TONNES PER YEAR</b>	<b>3.1</b>	<b>2017</b>	<b>1.6</b>	<b>48%</b>
<b>NITROGEN BOUNDARY<sup>49</sup></b>	<b>Kg N PER YEAR</b>	<b>72.9</b>	<b>2015</b>	<b>7.9</b>	<b>89%</b>
<b>PHOSPHORUS BOUNDARY<sup>50</sup></b>	<b>Kg N PER YEAR</b>	<b>5.2</b>	<b>2015</b>	<b>0.8</b>	<b>85%</b>
<b>CO<sub>2</sub> EMISSIONS<sup>51</sup></b>	<b>TONNES CO<sub>2</sub> EQUIVALENT PER YEAR</b>	<b>10.6</b>	<b>2018</b>	<b>1.6</b>	<b>85%</b>

46 Calculated from O'Neill, D. W., Fanning, A. L., Lamb, W. F., & Steinberger, J. K. (2018). A good life for all within planetary boundaries. *Nature sustainability*, 1(2), 88-95. UK data from Global Footprint Network (2021). Total Ecological Footprint. <https://data.footprintnetwork.org/#/>

47 Global Material Footprint from United Nations Department for Economic and Social Affairs <https://unstats.un.org/sdgs/report/2019/goal-12/>. UK data from Office for National Statistics (2020). Material Footprint in the UK <https://www.ons.gov.uk/economy/environmentalaccounts/datasets/materialfootprintintheuk>. The biomass portion of each was excluded.

48 Global Material Footprint from United Nations Department for Economic and Social Affairs <https://unstats.un.org/sdgs/report/2019/goal-12/>. UK data from Office for National Statistics (2020). Material Footprint in the UK <https://www.ons.gov.uk/economy/environmentalaccounts/datasets/materialfootprintintheuk>. The non-biomass portion of each was excluded.

49 Calculated from O'Neill, D. W., Fanning, A. L., Lamb, W. F., & Steinberger, J. K. (2018). A good life for all within planetary boundaries. *Nature sustainability*, 1(2), 88-95

50 Calculated from O'Neill, D. W., Fanning, A. L., Lamb, W. F., & Steinberger, J. K. (2018). A good life for all within planetary boundaries. *Nature sustainability*, 1(2), 88-95

51 Calculated from O'Neill, D. W., Fanning, A. L., Lamb, W. F., & Steinberger, J. K. (2018). A good life for all within planetary boundaries. *Nature sustainability*, 1(2), 88-95. UK data from Department for Environment Food and Rural Affairs (22 April 2021). UK's Carbon Footprint 1997-2018. <https://www.gov.uk/government/statistics/uks-carbon-footprint>

# GREENHOUSE GAS FOOTPRINT







## GREENHOUSE GAS FOOTPRINT

Climate change due to the increasing concentration of human-induced greenhouse gases (GHGs) in the atmosphere is a major driver of habitat and species loss<sup>52</sup>. Under the UNFCCC and its Paris Agreement, a country's contribution to global greenhouse gas (GHG) emissions is based on its territorial emissions of the seven main greenhouse gases i.e. the emissions associated with its production. There is also increasing focus on the emissions associated with the overseas production of goods that a country imports i.e. emissions related to consumption.

Despite accounting for only 1% of the global population, the UK is historically the fifth largest contributor to GHG emissions in the world<sup>53</sup>. Although territorial emissions declined 44% between 1990 and 2019, this is partly due to increasing imports and the displacement of emissions overseas<sup>54,55</sup>. The UK's emissions reductions efforts must therefore be more ambitious than the global average to contribute its 'fair share' to the global effort in reducing emissions.

Signatories to the Paris Climate Agreement have committed to aim to limit global warming to 1.5°C above pre-industrial levels. Warming is currently around 1°C. The Intergovernmental Panel on Climate Change (IPCC) says that this requires global CO<sub>2</sub> emissions to decline by 45% below 2010 levels by 2030 and to reach net zero by 2050. The UK's Climate Change Committee (CCC) set out a Balanced Pathway to net zero in 'The Sixth Carbon Budget - The UK's path to Net Zero' which has been adopted by the UK government in a commitment to a 78% reduction in emissions by 2035 from 1990 levels which, for the first time, explicitly includes the UK's share of international shipping and aviation<sup>56</sup>. Adjusting the timeline, this equates to a 64% reduction in UK territorial emissions compared to 1990 levels, including the UK's share of international shipping and aviation, by 2030. Scotland and Wales have individual targets. For Scotland, the target is more ambitious, aiming for net zero by 2045, with a 75% reduction in emissions by 2030 compared to a 1990 baseline, including its fair share of international aviation and shipping<sup>57</sup>. In Wales, the targets are lower; 63% reduction in emissions by 2030 and net zero by 2050<sup>58</sup>. Targets presented here are for the UK as a whole, but the nature and intensity of actions taken in the different countries of the UK must be tailored.

Given the historic and disproportionate contribution of the UK to global emissions, UK reduction efforts must also be globally ambitious in order to represent a fair and equitable contribution to global emissions reductions efforts<sup>59</sup>. Efforts must also address overseas emissions associated with UK consumption, including better tracing and quantification of these emissions and support to producer countries to reduce these emissions.

All percentages in the targets below are calculated based on emissions figures from the CCC Balanced Pathway in the Sixth Carbon Budget and include the UK's share of international shipping and aviation emissions.

Greenhouse gases are comprehensively measured and monitored by all countries for IPCC and UNFCCC reporting. Territorial emissions are reported annually by the UK and data is available with regional and sectoral resolution. In addition to domestic emissions, however, there are also considerable greenhouse gas

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52 WWF-UK (2018). Wildlife in a Warming World: The effects of climate change on biodiversity in WWF's Priority Places [https://www.wwf.org.uk/sites/default/files/2018-03/WWF\\_Wildlife\\_in\\_a\\_Warming\\_World.pdf](https://www.wwf.org.uk/sites/default/files/2018-03/WWF_Wildlife_in_a_Warming_World.pdf)

53 WWF UK. (2021) COP26: The UK's 2030 Climate Target to Cut Emissions. <https://www.wwf.org.uk/updates/cop26-climate-target-cut-emissions>

54 Department for Business, Energy & Industrial Strategy (2021). Final UK greenhouse gas emissions national statistics: 1990 to 2019. <https://www.gov.uk/government/statistics/final-uk-greenhouse-gas-emissions-national-statistics-1990-to-2019>

55 UK Parliament (2020). UK and global emissions and temperature trends. Published Wednesday, 24 June, 2020. <https://commonslibrary.parliament.uk/uk-and-global-emissions-and-temperature-trends/>

56 UK Government (2021). UK enshrines new target in law to slash emissions by 78% by 2035. <https://www.gov.uk/government/news/uk-enshrines-new-target-in-law-to-slash-emissions-by-78-by-2035>

57 Scottish Government (2020). Climate change: reducing greenhouse gas emissions. <https://www.gov.scot/policies/climate-change/reducing-emissions/>

58 Welsh Government (2021). Climate change targets and carbon budgets. <https://gov.wales/climate-change-targets-and-carbon-budgets>

59 WWF UK. (2021) COP26: The UK's 2030 Climate Target to Cut Emissions. <https://www.wwf.org.uk/updates/cop26-climate-target-cut-emissions>

emissions overseas embedded in imports for UK consumption. These emissions are far less well quantified, although, in contrast to many of the other issues covered here, methodologies are being developed and reporting attempts do exist; Defra has published data on the UK’s carbon footprint, which encompasses overseas greenhouse gas emissions, for 1997-2018. So far, however, this data is described as ‘experimental’ due to limited resolution and completeness<sup>60</sup>.

OUTCOME TARGET:

REDUCE UK DOMESTIC GHG EMISSIONS INCLUDING INTERNATIONAL SHIPPING AND AVIATION BY 39% COMPARED TO 2019 LEVELS, AND REDUCE THE OVERSEAS CARBON FOOTPRINT OF UK’S CONSUMPTION OF IMPORTS BY 33% BY 2030

The UK government has adopted the CCC’s Balanced Pathway in the Sixth Carbon Budget and committed to a 78% reduction in emissions by 2035 including, for the first time, the UK’s share of international shipping and aviation. Adjusting the timeline, this equates to a 64% reduction by 2030 compared to 1990 levels, which is equivalent to a 39% reduction compared to 2019 emission levels<sup>61</sup>.

Given the UK’s historical and disproportionate contribution to global greenhouse gas emissions, the UK’s reduction target must be ambitious to represent a fair and equitable contribution to global GHG reductions<sup>62,63</sup>. The recent commitments to a 78% reduction by 2035 are in line with this and ‘commit [the UK] in law to the fastest fall in greenhouse gas emissions of any major economy between 1990 and 2035, making it one of the most ambitious climate targets in the world’<sup>64</sup>. The challenge will be to ensure that these targets are met.

Overseas emissions linked to UK consumption of imports have become a greater proportion of the UK’s global carbon footprint. The overseas component of the UK’s emissions – i.e. emissions that occur in other countries to produce products that are imported and consumed by the UK – is less well quantified than domestic emissions. They are based on data described by Defra as experimental and only include the three main greenhouse gases (CO<sub>2</sub>, CH<sub>4</sub>, N<sub>2</sub>O). The most recent data are from 2018<sup>65</sup>. Action is urgently needed to better trace and quantify, and significantly reduce, overseas emissions linked to UK consumption. A reduction target of 33% is proposed based on internal analysis by WWF-UK.

ACTION TARGETS	SECTOR(S)	METRICS/ INDICATOR(S)
Reduce emissions from the use of fossil fuels to heat buildings (residential and non-residential) by 24%, for example through installing 1 million electric heat pumps in residential properties per year by 2030.	Construction	Total annual operational emissions from buildings of all types

Buildings accounted for 17% of UK GHG emissions in 2019, the majority of which was from residential buildings<sup>66</sup>, mainly from burning natural gas to heat rooms and water (electricity use in buildings is not included in this figure, and is included under energy production and supply, below). Currently less than 5% of the energy used to heat homes is from low carbon sources. There are significant gains to be made from installation of low carbon residential heating<sup>67</sup>. Actions could include phasing out the installation of fossil fuel boilers and increasing electric heat pumps alongside decarbonising the electricity grid. Achieving this target would result in a 4% reduction in UK territorial emissions.

60 UK Government (2021). UK enshrines new target in law to slash emissions by 78% by 2035. <https://www.gov.uk/government/news/uk-enshrines-new-target-in-law-to-slash-emissions-by-78-by-2035>

61 Climate Change Committee (2020). The Sixth Carbon Budget: The UK’s path to Net Zero. <https://www.theccc.org.uk/publication/sixth-carbon-budget/>

62 Neil Grant (n.d.). Setting and ambitious and feasible NDC for the UK. [https://www.wwf.org.uk/sites/default/files/2020-11/WWF\\_NDC\\_report.pdf](https://www.wwf.org.uk/sites/default/files/2020-11/WWF_NDC_report.pdf)

63 Climate Change Committee (2020). The Sixth Carbon Budget: The UK’s path to Net Zero. <https://www.theccc.org.uk/publication/sixth-carbon-budget/>

64 UK Government (2021). UK enshrines new target in law to slash emissions by 78% by 2035. <https://www.gov.uk/government/news/uk-enshrines-new-target-in-law-to-slash-emissions-by-78-by-2035>

65 Defra (2021). UK’s Carbon Footprint. <https://www.gov.uk/government/statistics/uks-carbon-footprint>

66 Climate Change Committee (2020). The Sixth Carbon Budget dataset. <https://www.theccc.org.uk/wp-content/uploads/2021/02/The-Sixth-Carbon-Budget-Dataset.xlsx>

67 Climate Change Committee (2020). The Sixth Carbon Budget: The UK’s path to Net Zero. <https://www.theccc.org.uk/publication/sixth-carbon-budget/>

ACTION TARGETS	SECTOR(S)	METRICS/ INDICATOR(S)
<b>Reduce emissions from energy production and supply by 62% including increasing generation from variable renewable energy in UK from 77 TWh (2019) to 240 TWh in 2030.</b>	Energy providers	Total annual emissions from electricity production and fuel supply
Electricity generation and supply accounted for 10% of UK GHG emissions in 2019. The ongoing decarbonisation of the UK's energy supply as fossil fuels are replaced with renewable generation means emissions from electricity production have fallen 74% since 1990 <sup>68</sup> . Efforts to phase out fossil fuels should continue. Bioenergy should be limited to using biomass from sustainable sources and to facilities with carbon capture and storage. Achieving this target would result in an 11% reduction in UK territorial emissions.		
<b>Reduce emissions from transport (land, sea and air) by 33%, including ending sales of new petrol and diesel cars by 2030</b>	Transportation, citizens, policymakers	Total annual emissions from surface transport, aviation and shipping; eV, zero-emission and alternative fuel cars as % of new car sales
Emissions from transport have hardly fallen since 1990 <sup>69</sup> . Surface transport now accounts for by far the biggest proportion of transport emissions and comprised almost one quarter (22%) of the UK GHG emissions in 2019 <sup>70</sup> . Aviation comprises 7% and shipping 3%. This will require both significant reduction in travel demand and take up of low emissions technologies. The government has committed to banning sales of new internal combustion engine vehicles by 2030 with concurrent targets to increase electric vehicle sales. Addressing aviation and shipping requires the UK to take a driving role in international processes through the International Civil Aviation Organization and International Maritime Organization. Achieving this target would result in an 11% reduction in UK territorial emissions.		
<b>Reduce emissions from domestic manufacturing and construction by 43% through decarbonisation of energy supply (including an increase in use of low-carbon heat in manufacturing, delivering 7Mt of CO<sub>2</sub>e abatement by 2030) and improved resource efficiency</b>	Manufacturing, construction	Total annual emissions from manufacturing and construction; annual use of heat energy from electricity, low-carbon hydrogen and biofuels in manufacturing
Industry comprised a fifth of UK GHG emissions in 2019. Achieving meaningful emissions reductions will require strategic sector-wide policy rather than the current piecemeal approach. Achieving this target would result in a 5% reduction in UK territorial emissions. Low-carbon heat production methods including electrification, low-carbon hydrogen and biofuel are anticipated by the CCC to have the potential to deliver the greatest emissions reductions in this sector by 2030.		

<sup>68</sup> Climate Change Committee (2020). The Sixth Carbon Budget: The UK's path to Net Zero. <https://www.theccc.org.uk/publication/sixth-carbon-budget/>

<sup>69</sup> UK Parliament (2020). UK and global emissions and temperature trends. Published Wednesday, 24 June, 2020. <https://commonslibrary.parliament.uk/uk-and-global-emissions-and-temperature-trends/>

<sup>70</sup> Climate Change Committee (2020). The Sixth Carbon Budget dataset. <https://www.theccc.org.uk/wp-content/uploads/2021/02/The-Sixth-Carbon-Budget-Dataset.xlsx>

ACTION TARGETS	SECTOR(S)	METRICS/ INDICATOR(S)
<b>Reduce emissions from agriculture by at least 22% by 2030 on 2019 levels using agroecological methods as far as possible and without offshoring these impacts</b>	Agriculture, policymakers	Total annual emissions from agriculture
<p>Agriculture accounted for 10% of UK GHG emissions in 2019. Agricultural emissions should be reduced by supporting farmers to maximise the adoption of low-carbon practices and technologies, restore soil carbon, reduce overuse of artificial fertilisers and improve animal health and grazing practices to minimise livestock emissions. Measures should also be taken to reduce fossil fuel use in farm vehicles, buildings and machinery. In the CCC's Balanced Pathway, agriculture related abatement is strongly supported by broader societal behaviour change, including a significant reduction in food waste and 'at least' 20% lower per capita consumption of beef, lamb and dairy by 2050. See the Biomass topic area for targets relating to consumption of meat and dairy.</p> <p>Actions should be tailored to the agricultural sectors in the devolved countries. Scotland also has its own national target for direct agricultural emissions; reduce by 24% by 2032 compared to a 2020 baseline<sup>71</sup>. Wales has a national target for agriculture emissions; reduce by 28% by 2030 (from 1990 baseline)<sup>72</sup>.</p>		
<b>Reduce net land-related emissions by 48% (from 13Mt in 2019 to 7Mt in 2030) so that UK land becomes a net carbon sink by 2040 at the latest and achieves a 19 MtCO<sub>2</sub>e (and growing) carbon sink by 2050</b>	Land managers, agriculture, policymakers	Annual emissions from land use; annual carbon sequestration by landscapes
<p>UK land was a net source of 2% of the UK's emissions in 2019. Scaling up afforestation would contribute to this target. However, any tree planting must be carefully planned to avoid detrimental impacts to existing habitats and biodiversity. Trees should be a mix of types but focused on broadleaves and it is imperative that 'the right tree is planted in the right place' and that planting does not occur on organic soils such as peatland. This could include supporting farmers to pursue tree planting and the creation of hedgerows on their land<sup>73</sup>. Efforts must also include restoration of peatlands, which are currently a major net source of greenhouse gases due to degradation. See the Biodiversity Issue Highlight for related targets on peatland. Scotland has its own targets for reducing land use emissions, including through peatland restoration and tree planting<sup>74</sup>. The Welsh Government has its own policies for emissions and land use with a commitment to significantly increase the Land use, Landuse Change and Forestry sink in Wales by the year 2030.</p>		
<b>Reduce emissions from waste by 40%, including reducing edible food waste by 50%, preventing biodegradable waste to landfill and ensuring all energy-from-waste plants are fitted with carbon capture and storage (CCS)</b>	Policymakers, citizens, agriculture	Total annual emissions from waste; % biodegradable waste sent to landfill; % of energy from waste plants with CCS
<p>Waste accounted for 6% of UK GHG emissions in 2019<sup>75</sup>. The biggest reductions can be achieved by reducing biodegradable waste to landfill and reducing the creation of food waste, both of which are addressed in the Biomass Consumption topic area. Any bioenergy plants should also be fitted with CCS to capture emissions.</p>		

<sup>71</sup> Scottish Government (2020). Securing a green recovery on a path to net zero: climate change plan 2018–2032. <https://www.gov.scot/publications/securing-green-recovery-path-net-zero-update-climate-change-plan-20182032/>

<sup>72</sup> Welsh Government (2019). Prosperity for All: A Low Carbon Wales. [https://gov.wales/sites/default/files/publications/2019-06/low-carbon-delivery-plan\\_1.pdf](https://gov.wales/sites/default/files/publications/2019-06/low-carbon-delivery-plan_1.pdf)

<sup>73</sup> Climate Change Committee (2020). The Sixth Carbon Budget: The UK's path to Net Zero. <https://www.theccc.org.uk/publication/sixth-carbon-budget/>

<sup>74</sup> LUC (3rd November, 2020). Scotland's progress on GHG emissions reductions. <https://landuse.co.uk/scotland-ghg-emissions/>

<sup>75</sup> Climate Change Committee (2020). The Sixth Carbon Budget dataset. <https://www.theccc.org.uk/wp-content/uploads/2021/02/The-Sixth-Carbon-Budget-Dataset.xlsx>



ACTION TARGETS	SECTOR(S)	METRICS/ INDICATOR(S)
<b>Reduce emissions from F-gases (fluorinated gases commonly used as refrigerants) by 67%, through enforcement of the F-Gas Regulations which require substitution of refrigerants with higher global warming potential</b>	Policymakers, manufacturers	Total emissions from F-gases; enforcement of F-Gas regulations;
F-gases accounted for 3% of UK GHGs in 2019. F-gases are already the target of regulations for some sources. This regulation should extend to all sources <sup>76</sup> . Almost 80% of F-gas emissions are from refrigerant fluids but alternative fluids with far lower global warming potential are now available.		
<b>Improve the quantification of overseas GHG emissions related to UK's consumption of imports and commit to their annual publication alongside territorial emissions</b>	Policymakers	Collection of quantified overseas emissions data; annual publication of data
As UK territorial emissions decline on the Balanced Net Zero Pathway, overseas emissions associated with UK consumption will become an ever more important part of the UK's contribution to climate change. It is estimated that almost half – 46% - of the UK's carbon footprint is related to overseas emissions linked to UK imports <sup>77</sup> . The Government estimates that emissions linked to the UK's consumption of goods, including imports, are around 70% higher than UK territorial emissions from production <sup>78</sup> . Current data on these overseas emissions is lacking due to a general lack of traceability of trade to precise source. A critical component of reducing overseas emissions is improving the quantification and tracing of emissions. This fundamentally relies on improvements in the availability of statistics on overseas production, trade and emissions which must be more robustly measured in order to improve traceability of imports and their impacts.		
<b>Set targets to reduce emissions related to UK's consumption of imports, backed up by support for producer countries to set and meet ambitious Nationally Determined Contributions</b>	Policymakers	Targets set; evidence of support to producer countries
Emissions associated with the UK's consumption of imports occur in trading partner countries. Given the UK's responsibility for these emissions through its consumption demand, and the disproportionate historical contribution of the UK to global emissions, the UK should adopt responsibility for reducing these overseas emissions <sup>79</sup> . Actions will need to occur within producer countries but should be facilitated by UK policies and agreements with trading partners, as well as through actions by private sector actors.		

<sup>76</sup> Climate Change Committee (2020). The Sixth Carbon Budget: The UK's path to Net Zero. <https://www.theccc.org.uk/publication/sixth-carbon-budget/>

<sup>77</sup> Cornelius et al (2020). Carbon Footprint: Exploring the UK's contribution to Climate Change. WWF UK. [https://www.wwf.org.uk/sites/default/files/2020-04/FINAL-WWF-UK\\_Carbon\\_Footprint\\_Analysis\\_Report\\_March\\_2020%20%28003%29.pdf](https://www.wwf.org.uk/sites/default/files/2020-04/FINAL-WWF-UK_Carbon_Footprint_Analysis_Report_March_2020%20%28003%29.pdf)

<sup>78</sup> UK Parliament (2020). UK and global emissions and temperature trends. Published Wednesday, 24 June, 2020. <https://commonslibrary.parliament.uk/uk-and-global-emissions-and-temperature-trends/>

<sup>79</sup> WWF UK. (2021) COP26: The UK's 2030 Climate Target to Cut Emissions. <https://www.wwf.org.uk/updates/cop26-climate-target-cut-emissions>

OVERLAPS	Many of the actions to reduce emissions will also reduce the UK's Material Consumption Footprint; fossil energy materials are a major component of the UK's material footprint.
DATA GAPS AND UPCOMING WORK	The contribution of different sectors and potential actions to reducing the UK's territorial emissions is well quantified (particularly compared to other Topic Areas). Data on overseas emissions associated with UK consumption is far less robust and described by Defra as 'experimental' <sup>80</sup> .
KEY MESSAGES	Territorial emissions and the contribution to these by different sectors are well quantified for the UK and there are a number of actions that can be used to address particular hotspots within these sectors. Overseas GHG emissions are increasing as a proportion of the UK's contribution to global emissions but, as yet, are poorly quantified. The UK should adopt a significant share of the responsibility for addressing these emissions.

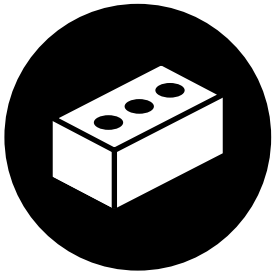
<sup>80</sup> Department for Food, Farming and Rural Affairs (n.d.). UK's Carbon Footprint 1997 – 2018 [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/979588/Defra\\_UK\\_carbon\\_footprint\\_accessible\\_rev2\\_final.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/979588/Defra_UK_carbon_footprint_accessible_rev2_final.pdf)



# MATERIAL CONSUMPTION







## MATERIAL CONSUMPTION

The national material consumption footprint comprises the raw materials needed to satisfy demand for all goods and commodities. There are four categories of materials included in the official inventory of material consumption: biomass, fossil fuels, metal ores and non-metal ores. Because Biomass Consumption is directly addressed in a separate topic area, all recommendations presented here relate solely to the non-biomass fraction of the UK's material footprint. These materials, which encompass both those extracted at home and imported from abroad, are essential inputs for driving the UK's economic engine and for delivering the vital functions of modern civilisation.

The scope of this topic area is the consumption of materials that are produced domestically and imported from overseas. The focus in this chapter is on reducing levels of material consumption; impacts of the production and extraction of these materials are captured in other topic areas including the Degradation and Land-Use Change and various pollution topic areas. This scope is based on the recognised approach of economy-wide material flow accounting analyses which do not capture the pressures exerted by extraction and production. The processes of extraction and production are generally where ecological harms such as deforestation, water and air pollution and biodiversity loss arise, but they are driven by the demand for – or consumption of – materials, so it is also critical to address this. It is possible to consume a relatively large amount of material that is produced or extracted with all considerations for sustainability and equity, just as it is possible to consume a small amount of material whose production or extraction causes disproportionately outsized environmental damages. While this topic area does not strictly capture the impacts from production and extraction, a reduction in consumption is the most direct way to mitigate whatever harms do arise from production and extraction.

Consuming also relates to disposal. Once we've extracted these materials, it is crucial to cycle them back into the stream of production wherever possible, and to safely, equitably dispose of them when those possibilities have been exhausted. An increase in reuse, remanufacturing, recycling and other forms of material recovery equates to a substitution in demand for virgin materials.

The vision of a sustainable material footprint includes all feasible actions that will cut consumption of virgin materials (e.g., increased resource productivity, efficient design, advanced manufacturing and recovery technologies and processes, etc.), as well as actions to replace demand that exceeds sustainable levels with circular, non-virgin materials.



## OUTCOME TARGET: REDUCE THE UK'S MATERIAL FOOTPRINT BY 40% BY 2030

Reducing the per capita material footprint from 7.7 tonnes per person in 2017 to the planetary ecological limit of 4.8 tonnes per person implies a 37% reduction<sup>81</sup>. 37% was adjusted upwards to 40% to provide a clearer, less fastidious figure. This level of reduction would bring the UK's domestic consumption in line with its proportional share of global sustainable material extraction and consumption. At current levels, the UK's material consumption (with biomass excluded) is 2.9 tonnes per person per year over the recommended safe threshold for material consumption. This outcome is also essentially aligned with meeting the UK's commitment to achieve both SDG 8.4 ('...endeavour to decouple economic growth from environmental degradation, in accordance with the 10-Year Framework of Programmes on Sustainable Consumption and Production, with developed countries taking the lead.') and SDG 12.2 ('By 2030, achieve the sustainable management and efficient use of natural resources')<sup>82</sup>.

ACTION TARGETS	SECTOR(S)	METRICS/ INDICATOR(S)
<b>Significantly reduce the use of fossil fuels as the UK decarbonises in line with the Climate Change Committee's Sixth Carbon Budget</b>	Energy providers	Official indicator: RMC ('Fossil energy materials and carriers' category) <sup>83</sup>
<p>Fossil energy materials, made up of coal, oil, natural gas and products made mainly from fossil fuels, comprised approximately 40% of the UK's non-biomass material footprint in 2017<sup>84</sup>. The footprint of these materials will be directly affected by the UK's legally binding commitment to achieve net zero greenhouse gas emissions by 2050. Under the Climate Change Committee's 6th Carbon Budget 'balanced pathway', 36% gross emissions reductions from 2020 levels (414.1 million tonnes CO<sub>2</sub>e)<sup>85</sup> are required by 2030 if the net zero target is to be achieved by 2050<sup>86</sup>. This reduction in emissions will consequently reduce the UK's demand for the fossil fuel materials currently used to generate electricity and supply heat. This action target is likely to be feasible to achieve, given the required decarbonisation of UK electricity and heat – see the Greenhouse Gas topic area for more detail on how decarbonisation will be achieved<sup>87</sup>.</p>		
<b>Significantly increase product lifespans and repairability, and eliminate planned obsolescence</b>	Manufacturing	Suggested indicators: Additional months of product availability; reduction in waste arisings
<p>A law requiring manufacturers to make spare parts available for appliances is entering into force in 2021<sup>88</sup>. This policy is a fair model for 'right to repair' legislation, but a robust legal framework ensuring consumers' rights to serviceable products with maximised lifespans would significantly reduce the UK's material footprint – particularly for products whose extraction, production and disposal are especially ecologically damaging, such as electronic components requiring rare earth metals. Measures for achieving these goals could include regulations to require manufacturers to make products accessible for service, facilitate the development of repair and remanufacturing business clusters, stimulate research into advanced design and materials to increase product durability and prohibit design features that are intended to fail over time<sup>89</sup>. At the moment, there is no readily available way of quantifying the target, however, future 'right to repair' legislation would benefit from the inclusion of monitoring and reporting requirements, perhaps beginning with an accounting of reductions in electronics waste.</p>		

81 Office for National Statistics (10 May 21). Material flow accounts. <https://www.ons.gov.uk/economy/environmentalaccounts/datasets/ukenvironmentalaccountsmaterialflowsaccountunitedkingdom>

82 Office for National Statistics. UK data for the sustainable development goals. <https://sdgdata.gov.uk/>

83 From the UK's Material Flow Accounts

84 Office for National Statistics (10 May 21). Material flow accounts. <https://www.ons.gov.uk/economy/environmentalaccounts/datasets/ukenvironmentalaccountsmaterialflowsaccountunitedkingdom>

85 Defra (2021). 2020 UK greenhouse gas emissions, provisional figures.

[https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/972583/2020\\_Provisional\\_emissions\\_statistics\\_report.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/972583/2020_Provisional_emissions_statistics_report.pdf)

86 Climate Change Committee, The Sixth Carbon Budget. The UK's path to Net Zero, December 2020. <https://www.theccc.org.uk/wp-content/uploads/2020/12/The-Sixth-Carbon-Budget-The-UKs-path-to-Net-Zero.pdf>

87 Please note a caveat for this action target: this target does not account for the likely displacement of fossil fuels with unknown volume of materials that will be required to manufacture renewable energy infrastructure.

88 Roger Harrabin (10 March 2021). 'Right to repair' law to come in this summer. BBC News. <https://www.bbc.com/news/business-56340077>

89 Ellen MacArthur Foundation (n.d.). The Circular Economy in Detail. <https://www.ellenmacarthurfoundation.org/explore/the-circular-economy-in-detail>

ACTION TARGETS	SECTOR(S)	METRICS/ INDICATOR(S)
<b>Eliminate 43% of avoidable plastic waste<sup>90</sup></b>	Waste management, policymakers	Official indicator: disposal of plastic waste, split by method of treatment <sup>91</sup>
<p>‘Eliminate all avoidable plastic waste’ is a target set for 2042 in the 2018 Resources and Waste Strategy for England<sup>92</sup>. This action serves as a milestone in measuring progress toward the 2042 goal of total elimination, which will not only reduce the UK’s material footprint but also result in significant co-benefits for biodiversity and climate. However, adequate progress has not been achieved since that target’s formulation – according to the 2020 progress report on the Resources and Waste strategy, there is currently no formal methodology for measuring and reporting on this target<sup>93</sup> and current programmes are generally limited to voluntary initiatives. Measures for achieving this goal could include progressively increasing minimum recycled content requirements for plastic packaging (with an associated tax on packaging not meeting the threshold), a deposit return scheme for drinks containers (see the action target later in this section) and an extended producer responsibility scheme (see the action target later in this section).</p>		
<b>Reduce the volume of material used during the construction process, and when buildings reach the end of their lifespans, increase the recovery and recycling rate of construction materials to maximum feasible levels</b>	Construction and demolition	Official indicators: recovery rate of construction and demolition waste; reduction in construction and demolition waste arisings
<p>In 2016 (the most recent year for which comprehensive analysis has been conducted by Defra), construction and demolition generated 66.2 million tonnes of waste across the UK, or approximately 30% of all waste arisings<sup>94</sup>. This target aligns with the emphasis placed on the construction sector in several resource-focused government strategic initiatives, including the 2018 Resources and Waste Strategy for England<sup>95</sup> and the 2021 Industrial Decarbonisation Strategy<sup>96</sup>. Measures to reduce the demand for materials during the construction process could include: incentivising ‘design for deconstruction’ (which allows material components to be segregated for reuse), regulations that stipulate maximised material efficiency and use of recycled rather than primary materials, incentives for prioritising renovation over demolition and new construction, guidance on reducing over-ordering, guidance on reducing damage of materials that occurs on-site and facilitation of industrial symbiosis (which encourages material exchanges and donation/sale of unused materials)<sup>97,98</sup>.</p> <p>When buildings eventually do need to be renovated or demolished, priority should be given to appropriate material reuse, remanufacture and recovery. Since 2010 the construction and demolition industry has consistently maintained recovery rates between 90% and 91%<sup>99</sup>, and while recovery is high, little progress has been made in increasing these rates over the course of the previous decade. Further, a focus should be placed on utilising recycled and recovered building materials for high quality end uses (e.g., segregation and reuse in new construction) – down-cycling uses, such as backfilling, should be minimised where possible.</p>		

<sup>90</sup> Avoidable plastic waste is defined in the strategy as plastic that could have been reused or recycled, plastic that could have been substituted for a reusable or recyclable alternative or plastic that could have been composted or biodegraded.

<sup>91</sup> From ‘UK statistics on waste’ (Office for National Statistics)

<sup>92</sup> Department for Environment, Food & Rural Affairs and Environment Agency (18 December 2018). Resources and waste strategy for England. <https://www.gov.uk/government/publications/resources-and-waste-strategy-for-england>

<sup>93</sup> Department for Environment, Food & Rural Affairs and Environment Agency (2020). Resources and Waste Strategy: Monitoring Progress. [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/907029/resources-and-waste-strategy-monitoring-progress.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/907029/resources-and-waste-strategy-monitoring-progress.pdf)

<sup>94</sup> Department for Environment, Food & Rural Affairs. UK statistics on waste Published: 25 September 2014, last updated:16 September 2020, <https://www.gov.uk/government/statistical-data-sets/env23-uk-waste-data-and-management>

<sup>95</sup> Department for Environment, Food & Rural Affairs and Environment Agency (18 December 2018). Resources and waste strategy for England. <https://www.gov.uk/government/publications/resources-and-waste-strategy-for-england>

<sup>96</sup> Department for Business, Energy & Industrial Strategy (2021). Industrial decarbonisation strategy. <https://www.gov.uk/government/publications/industrial-decarbonisation-strategy>

<sup>97</sup> Business in the Community (2020). Advancing Circular Construction: Case studies from the building and infrastructure sectors <https://www.bitc.org.uk/case-study/building-a-circular-economy-in-construction/>

<sup>98</sup> Department for Environment, Food & Rural Affairs and Environment Agency (2018). Our Waste, Our resources: A strategy for England. Evidence Annex.

[https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/765915/rws-evidence-annex.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/765915/rws-evidence-annex.pdf)

<sup>99</sup> Department for Environment, Food & Rural Affairs. UK statistics on waste Published: 25 September 2014, last updated:16 September 2020, <https://www.gov.uk/government/statistical-data-sets/env23-uk-waste-data-and-management>

ACTION TARGETS	SECTOR(S)	METRICS/ INDICATOR(S)
<b>Develop mechanisms to meet the target set out in the 25 Year Environment Plan to increase resource productivity 33% by 2030 (on a Gross Value Added basis) specifically targeting industries and practices with significant potential to improve efficiency</b>	Policymakers	Official indicator: £ GVA/tonne
<p>The 25 Year Environment Plan set a target of ‘Maximising the value and benefits we get from our resources, doubling resource productivity by 2050<sup>100</sup>.’ A 33% increase in productivity by 2030 should serve as a milestone for progress toward the final goal of doubling resource productivity. A significant issue with this target is a lack of specified mechanisms or measures that tackle resource productivity in especially inefficient sectors. The government has offered limited guidance on exactly which sectors are expected to deliver increased productivity, and on how individual actors are supposed to achieve the doubling target<sup>101</sup>. Increased support from the government in developing and implementing these mechanisms has the potential to significantly reduce the UK’s material consumption footprint.</p>		
<b>Increase the rate of circular material utilisation to a level that brings the UK’s virgin material consumption under sustainable thresholds</b>	Policymakers, waste management	Official indicator: circular material utilisation rate use rate (%)
<p>Circular material use rate, a EUROSTAT metric, covers the same material categories as the material footprint. In 2019, the UK’s circular material use rate was 16.6%, placing it well behind countries like the Netherlands and Belgium, who achieved circular use rates of 30% and 24%, respectively<sup>102</sup>. While it is not clear what rate of circular material utilisation would equate to sustainable levels of material consumption, with this target the UK has the opportunity to position itself as a thought leader on transitioning to a circular economy that represents a sustainable, equitably proportional level of virgin material consumption. Although achieving this target will require major investment and effort put toward the development of the circular economy, this action’s potential to reduce the extraction and consumption of virgin material is substantial. Note that further work is likely needed to establish what level of circular material utilisation will equate to a sustainable, equitably proportional reduction in virgin material consumption. Note also that all other actions relating to recovery of waste and substitution of virgin materials can be viewed as ‘sub-targets’ contributing to this headline target.</p>		
<b>Achieve a 75% recycling rate for packaging</b>	Policymakers, waste management	Official indicator: Recovery rate (%); suggested indicator: tonnes of newly circular materials in supply
<p>Achieving a 75% recycling rate for packaging is already enshrined as a target in the 2018 Resources and Waste Strategy for England<sup>103</sup>. In 2017, 64% of packaging was recycled and a further 6% of packaging waste was used to generate energy<sup>104</sup>. However, the target of 75% is presented as an average across all packaging material types, so high rates of recycling for individual materials can offset low rates for other materials. For example, although the total packaging recycling rate in 2017 was 64%, only 46% of plastic, 52% of aluminium and 30% of wood were recycled. Rates were higher for steel (77%), paper (79%) and glass (68%). While a 75% average target for packaging recycling is currently appropriate, further scrutiny should be given to per-material recycling rate targets.</p>		

100 HM Government (2018). A Green Future: our 25 Year Plan to Improve the Environment. <https://www.gov.uk/government/publications/25-year-environment-plan>

101 Department for Environment, Food & Rural Affairs and Environment Agency (2020). Resources and Waste Strategy: Monitoring Progress. [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/907029/resources-and-waste-strategy-monitoring-progress.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/907029/resources-and-waste-strategy-monitoring-progress.pdf)

102 EUROSTAT (10 May 2021). Circular material use rate.

103 Department for Environment, Food & Rural Affairs and Environment Agency (18 December 2018). Resources and waste strategy for England. <https://www.gov.uk/government/publications/resources-and-waste-strategy-for-england>

104 Department for Environment, Food & Rural Affairs. UK statistics on waste Published: 25 September 2014, last updated:16 September 2020, <https://www.gov.uk/government/statistical-data-sets/env23-uk-waste-data-and-management>

ACTION TARGETS	SECTOR(S)	METRICS/ INDICATOR(S)
<p><b>Pursue strong implementation of policy which enforces the ‘polluter pays principle’ (e.g., Extended Producer Responsibility legislation) to ensure manufacturers and importers are responsible for appropriate recovery of the materials at the end of a product’s life</b></p>	<p>Polymakers</p>	<p>Official indicator: Recovery rate (%);</p>
<p>Extended Producer Responsibility (EPR) policies are targeted for several material types in the 2018 Resources and Waste Strategy for England<sup>105</sup>, and a UK-wide EPR policy for packaging is currently open for consultation<sup>106</sup>. These policies should be adopted after appropriate scoping and impact assessment, and they should be viewed as the start of a legal framework to support capturing additional business externalities through the ‘polluter pays principle’. Note that this action will contribute to both the ‘eliminate avoidable plastic waste’ and ‘achieve a 75% recycling rate for packaging’ targets.</p>		
<p><b>Achieve no more than 10% of municipal waste sent to landfills</b></p>	<p>Polymakers, local government, waste management</p>	<p>Official indicator: In development</p>
<p>‘Municipal waste to landfill is 10% or less by 2035’ is a target 2018 Resources and Waste Strategy for England<sup>107</sup>. As of 2016, 54% of household waste (a fraction of the municipal waste footprint) was sent to landfill<sup>108</sup>. Note also that a formal metric for measuring progress toward this goal had not been developed as of 2020<sup>109</sup>, indicating that inadequate effort has gone toward achieving this target in a timely manner. To stimulate sufficient progress on achieving 10% of municipal waste to landfill, it is recommended that the target date of 2035 be pushed forward to 2030. The measures and controls behind this target will likely need to be tightened, especially given the appetite for waste legislation like the forthcoming Extended Producer Responsibility for Packaging policy and Deposit Return Scheme. Scotland and Wales both have their own waste targets and strategies with Wales aiming to be zero waste by 2050<sup>110</sup>.</p>		
<p><b>Reduce the export of unprocessed waste materials from the UK</b></p>	<p>Polymakers, waste management</p>	<p>Export of waste (tonnes per year), recovery rate (%)</p>
<p>The UK is a major exporter of unprocessed waste, which limits the rates of recycling domestically as well as placing a waste and pollution burden on other countries. In 2016, the UK exported approximately 16 million tonnes of its scrap materials, equivalent to 7% of all waste arisings<sup>111</sup>. This Action Target is taken from a WWF/ Eunomia report titled ‘UK’s global packaging material footprint’<sup>112</sup>. Achieving the target would require the UK to increase its capacity to maximise the processing of waste materials domestically, and, where exports of waste material are necessary, process material to a level that facilitates ease of reclamation prior to export. A complementary action to support this target would be to increase the tracking, monitoring and transparency of overseas waste flows originating from the UK.</p>		

105 Department for Environment, Food & Rural Affairs and Environment Agency (18 December 2018). Resources and waste strategy for England. <https://www.gov.uk/government/publications/resources-and-waste-strategy-for-england>

106 Department for Environment, Food & Rural Affairs and Environment Agency (24 March 2021). Extended Producer Responsibility for Packaging. <https://consult.defra.gov.uk/extended-producer-responsibility/extended-producer-responsibility-for-packaging/>

107 Department for Environment, Food & Rural Affairs and Environment Agency (18 December 2018). Resources and waste strategy for England. <https://www.gov.uk/government/publications/resources-and-waste-strategy-for-england>

108 Department for Environment, Food & Rural Affairs. UK statistics on waste Published: 25 September 2014, last updated:16 September 2020, <https://www.gov.uk/government/statistical-data-sets/env23-uk-waste-data-and-management>

109 Department for Environment, Food & Rural Affairs and Environment Agency (2020). Resources and Waste Strategy: Monitoring Progress. [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/907029/resources-and-waste-strategy-monitoring-progress.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/907029/resources-and-waste-strategy-monitoring-progress.pdf)

110 Welsh assembly government (2010). Towards Zero Waste. <https://gov.wales/sites/default/files/publications/2019-05/towards-zero-waste-our-waste-strategy.pdf>

111 Department for Environment, Food & Rural Affairs and Environment Agency (May 2018). Digest of Waste and Resource Statistics – 2018 Edition. [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/878124/Digest\\_of\\_Waste\\_and\\_Resource\\_Statistics\\_2018\\_v2\\_accessible.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/878124/Digest_of_Waste_and_Resource_Statistics_2018_v2_accessible.pdf)

112 Simon Hann, Hannah Gillie & Chris Sherrington (2021). UK’s Global Packaging Material Footprint. Eunomia



OVERLAPS	<p>Biomass and Marine Resource Consumption are traditionally part of the Material Footprint but are treated separately in this analysis.</p>
DATA GAPS AND UPCOMING WORK	<p>There is a general lack of clarity as to data collection methodology per action targets, frequency of data gathering and transparency/availability of the data for analysis.</p> <p>Defra is in the process of developing sector-specific targets and measures for meeting the Resources and Waste Strategy goal of doubling resource productivity by 2050. These measures are likely to facilitate better progress toward that goal, whereas currently there is limited guidance for sectors attempting to increase resource productivity.</p>
KEY MESSAGES	<p>A determined shift by policy and industry towards circular use of materials – by the construction industry, the waste management sector, and manufacturing can, if supported by appropriate policies and incentives play a significant role in reducing the UK’s material footprint.</p> <p>Material consumption is driven largely by the private sector, where the economic feasibility of any new measures to enable more circular material flows is paramount. The government will need to exert concerted effort to incentivise, create enabling financial infrastructure for, draw investment to, and send market signals around a mature circular economy.</p>





**BIOMASS  
CONSUMPTION**





## BIOMASS CONSUMPTION

Biomass consumption relates to the consumption of agricultural products, animal products, forestry products and fishery products. The biomass consumption footprint is the proportion of global production or extraction of biomass materials which is attributable to the domestic demand of a country. It is a sub-set of the broader Material Footprint which comprises biomass, fossil fuels, metal ores and non-metal ores. For the purposes of this report, the fishery products are excluded and addressed in the Marine Resource Use Topic Area.

Biomass consumption considers the volume of biomass-based materials that are consumed. This includes both materials produced within the UK and imported from overseas. The impacts of the production or extraction of biomass-based materials, such as land use change or greenhouse gas emissions, are not directly encompassed in this, rather covered under the topic areas including Degradation and Land Use Change, Marine Resource Use and Greenhouse Gas Footprint. Biomass consumption is unsustainable because of these impacts but it is worth addressing separately: even if every measure to reduce the negative impacts of production or extraction was implemented, the impact could still be reduced by reducing the overall demand for biomass materials.

The vision of a reduced biomass footprint comprises actions that will cut consumption of primary biomass materials, including through increased efficiency of processes (the same or greater output with less primary biomass use), reduced waste and the substitution of primary materials with recovered or recycled 'secondary' materials.

Food and feed (including crops, crop residues and fodder crops, fish and animal products) comprise over 80% of the UK's Biomass Consumption footprint so are the main focus of the Action Targets. Feed is additionally covered by targets in Land Use Change and in any targets that address the production and consumption of animal products. Wood and wood products comprise a further 12% whilst other products from biomass – mainly paper and beverages – comprise 6%<sup>113,114</sup>.

The drivers and scale of biomass consumption and related environmental impacts within the UK are relatively well known, although the availability of quantified data varies for different biomass fractions (e.g. data on pre-farmgate food losses is less robust than for post-farmgate food losses). Equivalent information related to the UK's consumption of biomass imported from overseas is scarce and is rarely coherently collated or reported.

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<sup>113</sup> <https://www.ons.gov.uk/economy/environmentalaccounts/datasets/materialfootprintintheuk>

<sup>114</sup> <https://www.cbs.nl/en-gb/figures/detail/83180ENG?q=biomass>

## OUTCOME TARGET: REDUCE THE UK'S BIOMASS CONSUMPTION FOOTPRINT BY 50% BY 2030

The per capita planetary ecological limit biomass consumption footprint is estimated to be 1.6 tonnes per person per year<sup>115</sup>. The 2018 UK per capita biomass footprint was 3.1 tonnes per person<sup>116</sup>. Bringing UK biomass consumption within sustainable planetary ecological limits therefore requires a 48% reduction. This 48% was adjusted upward to 50% to provide a more clear-cut figure.

ACTION TARGETS	SECTOR(S)	METRICS/ INDICATOR(S)
<b>Food chain actors introduce measures to reduce post-farmgate food waste by 50%</b>	Food service, food retailers, policymakers, citizens	kg of food waste per capita; Food Loss Index; Food Waste Index <sup>117</sup> ; Food and drink waste produced (tonnes and kg per capita) <sup>118</sup>
<p>Figures from 2018 show that an estimated 10 million tonnes of food and drink are wasted post-farm gate annually in the UK<sup>119</sup> around 70% of which is edible<sup>120</sup>. The UK is committed to Sustainable Development Goal 12.3 to halve food waste at the retail and consumer levels and reduce food losses along production and supply chains by 2030<sup>121</sup>. In addition, the Courtauld Commitment – a UK-wide commitment from the charity WRAP with over 160 signatories including food producers, manufacturers, retailers, NGOs, government and certification bodies – is to reduce post-farm gate food waste by 20% by 2025 (compared to 2015 baseline)<sup>122</sup>, so a greater reduction should be achieved by 2030. This will involve collaborative action by actors along the food value chain, including many based outside the UK.</p>		
<b>Facilitate farmers to minimise pre-farmgate food losses</b>	Policymakers, agriculture, food traders, food processors, manufacturers, food service, food retailers	kg of food waste recovery rate (%); kg of pre-farm gate food waste per capita
<p>Data on pre-farmgate food losses are less robust than for post-farm gate food waste, but food waste and surplus on farms might be as much as 2.2-5 million tonnes per year in the UK<sup>123,124</sup> and much more additionally associated with overseas production of imported goods. In the Resources and Waste Strategy 2018, the UK government acknowledges that much of the agency to implement solutions lies with food chain actors other than farmers i.e., those who set the conditions of contracts<sup>125</sup>. Potential measures such as prohibiting last-minute specification changes and improved market intelligence to better match supply with demand. There is a lack of existing quantified targets aimed at pre-farm gate food losses in the UK. For example, the Courtauld Agreement is specifically limited to post-farm gate food waste<sup>126</sup>. There is also a lack of focus on pre-harvest food waste (food left unharvested because it does not meet specifications or due to lack of labour etc) and SDG 12.3 only commits countries to reduce post-harvest losses.</p>		

115 Based on O'Neill et al, 2018. The per capita material consumption planetary boundary footprint suggested by O'Neill was first updated to account for current global population. To approximate the per capita boundary footprint attributable solely to biomass (all other materials in the material footprint being covered in the 'Material Consumption' Topic Area), contributions of biomass to national material footprints were analysed. For the UK, biomass has been approximately 25% of the total material footprint on average from 1990-2017. The final per capita biomass consumption planetary boundary footprint was set at 1.6 t y<sup>-1</sup> (25% of the per capita material consumption planetary boundary footprint 6.4 t y<sup>-1</sup>) on this basis.

116 From EUROSTAT total material footprint for the UK with non-biomass materials subtracted, divided by the UK population to give a per capita value. Source: <https://www.ons.gov.uk/economy/environmentalaccounts/datasets/materialfootprintintheuk> The Eurostat method is one of the two methodologies used to calculate the UK's official material footprint. This method allows for comparability between EU countries and for a detailed breakdown of by material category.

117 <http://www.fao.org/sustainable-development-goals/indicators/1231/en/>

118 Headline indicator WP4 from [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/907029/resources-and-waste-strategy-monitoring-progress.pdf#page=111&zoom=100,72,92](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/907029/resources-and-waste-strategy-monitoring-progress.pdf#page=111&zoom=100,72,92)

119 H.M. Government (2018). Our Waste, Our Resources: A Strategy for England. [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/765914/resources-waste-strategy-dec-2018.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/765914/resources-waste-strategy-dec-2018.pdf)

120 Parry, A., Harris, B., Fisher, K. & Forbes, H. (2020). UK progress against Courtauld 2025 targets and UN Sustainable Development Goal 12.3. WRAP, Banbury, UK <https://wrap.org.uk/sites/default/files/2020-09/UK-progress-against-Courtauld-2025-targets-and-UN-SDG-123.pdf>

121 Food and Agriculture Organisation of the United Nations. Sustainable Development Goals <http://www.fao.org/sustainable-development-goals/indicators/1231/en/>

122 Department for Environment, Food & Rural Affairs and Environment Agency (2020). Resources and Waste Strategy: Monitoring Progress. [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/907029/resources-and-waste-strategy-monitoring-progress.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/907029/resources-and-waste-strategy-monitoring-progress.pdf)

123 WRAP (2019). Food waste in primary production in the UK. <https://wrap.org.uk/resources/report/food-waste-primary-production-uk> and The Grocer (2017). From farm to food waste: the pre-farmgate fight. <https://www.thegrocer.co.uk/food-waste/from-farm-to-food-waste-the-pre-farmgate-fight/559044.article>

124 One informant cited unpublished work that suggests that pre-farmgate food losses may be much higher than this.

125 <https://www.thegrocer.co.uk/food-waste/from-farm-to-food-waste-the-pre-farmgate-fight/559044.article>

126 <https://wrap.org.uk/taking-action/food-drink/initiatives/courtauld-commitment-2025>



ACTION TARGETS	SECTOR(S)	METRICS/ INDICATOR(S)
<b>Eliminate food waste to landfill and significantly reduce the volume of other non-food biodegradable municipal waste sent to landfills by 2030</b>	Food service, food retailers, policymakers, citizens	Food waste to landfill (tonnes, kg per capita, % total food waste); biodegradable waste to landfills (tonnes, kg per capita, % total municipal waste) <sup>127</sup>
<p>Twelve million tonnes of municipal waste were landfilled in 2016, half of which was biodegradable. The Resources and Waste Strategy 2018, which is monitored annually, states an ambition to work towards no food waste entering landfill by 2030 and to explore policies to work towards eliminating all biodegradable waste to landfill by the same date<sup>128</sup>. This target strengthens this ambition. The government in England has committed to reducing biodegradable municipal waste to landfill to 35% of 1995 production levels by 2020. In 2018, the rate was 20% of the 1995 baseline value<sup>129</sup>.</p>		
<b>Set binding targets to address textile waste including banning the incineration or landfilling of unsold textile stock that can be re-used or recycled and significantly increasing textile circularity</b>	Textile retailers, textile manufacturers, policymakers, citizens	Recovery rate (%)
<p>The production and manufacture of textiles have significant environmental impacts including very high water use, greenhouse gas emissions and often intensive production involving high rates of agri-chemical use and other practices. The UK government currently has no targets addressing textile waste<sup>130</sup>. Clothing purchases in the UK increased almost 20% between 2012 and 2016 whilst over 900,000 tonnes of textiles are disposed of in household waste each year<sup>131</sup>. Current practices by clothing retailers of incinerating or disposing of unsold stock should cease and policies should be pursued to increase the circularity of the textile industry from design and sourcing to end use by consumers<sup>132</sup>. Policies could include setting minimum standards for durability and recycled content in clothing and improving consumer labelling and awareness campaigns around textile waste<sup>133</sup>.</p>		
<b>Achieve an 85% recycling rate for paper and cardboard packaging and a 30% recycling rate for wood packaging</b>	Packaging manufacturers, retailers, citizens, policymakers	Packaging waste recycled (tonnes, kg per capita and % of total packaging waste) <sup>134</sup>
<p>The amount of packaging materials on the market in the UK has been increasing whilst rates of recycling have remained relatively static. Recycling rates were around 64% in 2017<sup>135</sup>. The Resource and Waste strategy includes targets for 85% recycling rates for paper and cardboard and 30% for wood by 2030. Lower targets for recycling wood are due to its potential value for use as biomass fuel to generate energy<sup>136</sup>.</p>		

127 Headline indicator LF2 and LF3 from [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/907029/resources-and-waste-strategy-monitoring-progress.pdf#page=111&zoom=100,72,92](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/907029/resources-and-waste-strategy-monitoring-progress.pdf#page=111&zoom=100,72,92)

128 H.M. Government (2018). Our Waste, Our Resources: A Strategy for England. [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/765914/resources-waste-strategy-dec-2018.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/765914/resources-waste-strategy-dec-2018.pdf)

129 Department for environment, Food and Rural Affairs (19 March 2020). UK Statistics on Waste [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/918270/UK\\_Statistics\\_on\\_Waste\\_statistical\\_notice\\_March\\_2020\\_accessible\\_FINAL\\_updated\\_size\\_12.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/918270/UK_Statistics_on_Waste_statistical_notice_March_2020_accessible_FINAL_updated_size_12.pdf)

130 Headline indicator for RC5. Packaging waste recycled [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/907029/resources-and-waste-strategy-monitoring-progress.pdf#page=111&zoom=100,72,92](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/907029/resources-and-waste-strategy-monitoring-progress.pdf#page=111&zoom=100,72,92)

131 Department for Environment, Food & Rural Affairs and Rebecca Pow MP (18 March 2021). Government unveils plans for wide-ranging Waste Prevention Programme. Press release. <https://www.gov.uk/government/news/government-unveils-plans-for-wide-ranging-waste-prevention-programme>

132 WRAP (2021). Textiles 2030: Circularity pathway. <https://wrap.org.uk/sites/default/files/2021-04/Textiles%202030%20Circularity%20Pathway.pdf>

133 Department for Environment, Food & Rural Affairs and Rebecca Pow MP (18 March 2021). Government unveils plans for wide-ranging Waste Prevention Programme. Press release. <https://www.gov.uk/government/news/government-unveils-plans-for-wide-ranging-waste-prevention-programme>

134 Department for Environment, Food & Rural Affairs and Environment Agency (2020). Resources and Waste Strategy: Monitoring Progress. RC5. Packaging waste recycled [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/907029/resources-and-waste-strategy-monitoring-progress.pdf#page=111&zoom=100,72,92](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/907029/resources-and-waste-strategy-monitoring-progress.pdf#page=111&zoom=100,72,92)

135 Department for Environment, Food & Rural Affairs and Environment Agency (2020). Resources and Waste Strategy: Monitoring Progress. [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/907029/resources-and-waste-strategy-monitoring-progress.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/907029/resources-and-waste-strategy-monitoring-progress.pdf)

136 S. Eminton (2018). Recycling targets for wood packaging cut by half. Letsrecycle.com, 1 March 2018. <https://www.letsrecycle.com/news/latest-news/wood-packaging-cut/>

ACTION TARGETS	SECTOR(S)	METRICS/ INDICATOR(S)
<b>Reduce consumption of primary timber and increase the proportion of waste wood that is recycled or used for energy to 100% in the short-term, with a shift away from wood biomass as a fuel to other, more renewable energy sources by 2030</b>	Forestry, energy providers, policymakers, timber processors	primary timber as % of timber used (%); % waste wood recycled
<p>Wood and wood products account for 12% of the UK's biomass footprint. Over 5 million tonnes of wood waste is generated annually in the UK. In 2018, 1.3 million tonnes (36%) was recycled plus 2 million tonnes (40%) was used for energy (combined, 76%)<sup>137</sup>. Recycling and re-use of waste wood should be maximised, especially where it could displace demand for primary timber. In the short-term, it is also preferable that other wood waste is used to produce energy if the alternative is disposal, e.g., to landfill. However, in the UK, much of the wood biomass used for energy comes from imported timber with the risk that it is driving deforestation and unsustainable forestry management overseas<sup>138</sup>. The market for wood biomass for energy in the UK should therefore be phased out, and wood biomass should be replaced by other more efficient renewable energy sources by 2030.</p>		
<b>Reduce the consumption of meat and dairy by at least 20% and increase the proportion of plant-based foods in the average diet</b>	Policymakers, retail, food service sector, citizens	Meat and dairy consumption per capita (g/person/day)
<p>Various quantifications of a healthy sustainable diet have concluded that a significant reduction in consumption in animal protein and increase in consumption in plant-based protein is required<sup>139</sup>. A 20% reduction by 2030 in meat and dairy products with a concurrent increase in plant-based options is called for by the Climate Change Committee<sup>140</sup>. A 50% reduction by 2050 (17% by 2030) in meat and dairy consumption is recommended by a Government-funded Catapult Energy Systems report<sup>141</sup>. These estimates are contingent on parallel changes to more sustainable agricultural production systems. Confidential research seen by the authors suggests a reduction in consumption of animal protein of 46% compared with 2018 figures by 2030, and corresponding increase in plant-based protein of nearly 500% over the same period is required. Some NGO groups also provide higher estimates (e.g., Greenpeace, 71%; Eating Better Coalition, 50%) which reflect the scale of reductions needed if 'business as usual' agricultural production continues.</p>		
<b>Appropriately size domestic livestock production to maximise the beneficial roles of farm animals</b>	Policymakers, agriculture	Number of head of livestock required for waste processing and ecological services
<p>Livestock can play a key role in transforming low value and inedible residues from agriculture and food processing into high quality protein<sup>142</sup>. Livestock can also be managed to productively and sustainably utilise areas unsuited to other land uses. These features mean that livestock have a role to play in a sustainable food system, especially when overconsumption of animal products is addressed concurrently. Indeed, the Food, Farming and Countryside Commission envisions a 2050 system of agroecology in the UK that relies on livestock to, among other things, transfer fertility between grassland and cropland. This system would require approximately 10 million livestock animals, or roughly one third fewer animals than were reared in 2010<sup>143</sup>. Reducing the number of animals under management will not only support a directly reduced biomass consumption footprint, it will also lead to reductions in the significant volumes of feed that are grown domestically and imported to support UK livestock production.</p>		

137 UNECE Forestry and Timber Market Statement for the United Kingdom 2019 [https://www.forestresearch.gov.uk/documents/7433/UK\\_Timber\\_Market\\_Statement\\_2019\\_FINAL.pdf](https://www.forestresearch.gov.uk/documents/7433/UK_Timber_Market_Statement_2019_FINAL.pdf)

138 WWF-UK and RSPB (2017). Riskier Business: the UK's overseas land footprint. [https://www.wwf.org.uk/sites/default/files/2020-07/RiskierBusiness\\_July2020\\_V7\\_0.pdf](https://www.wwf.org.uk/sites/default/files/2020-07/RiskierBusiness_July2020_V7_0.pdf)

139 For example, The Livewell Plate <https://www.wwf.org.uk/what-we-do/livewell>; the Eatwell Guide <https://www.gov.uk/government/publications/the-eatwell-guide>; and EatLancet <https://eatforum.org/eat-lancet-commission/>

140 The Climate Change Committee (2020). The Sixth Carbon Budget The UK's path to Net Zero. <https://www.theccc.org.uk/wp-content/uploads/2020/12/The-Sixth-Carbon-Budget-The-UKs-path-to-Net-Zero.pdf>

141 Catapult Energy Systems (2020). Net Zero 2050 possible with targeted innovation and scale up. <https://es.catapult.org.uk/news/net-zero-by-2050-is-possible/>

142 van Hal et al. (2019). Upcycling food leftovers and grass resources through livestock: Impact of livestock system and productivity. Journal of Cleaner Production. <https://www.sciencedirect.com/science/article/abs/pii/S0959652619303622>

143 Food, Farming and Countryside Commission (2021). Modelling an Agroecological UK in 2050. <https://ffcc.co.uk/library/farmingforchangeworkingpaper>

ACTION TARGETS	SECTOR(S)	METRICS/ INDICATOR(S)
<b>Develop and support alternative systems for producing animal feed</b>	Polymakers, agriculture, food system actors	% of agricultural feed produced from alternative sources

Animal feed represents a significant fraction of the UK’s biomass consumption footprint, both in terms of what is fed to UK livestock and what is embedded in imported animal products. Wheat and barley, the UK’s largest crops by planted area, are both mainly used for animal feed: between 2014-19, 48% of the UK’s consumption of wheat and 63% of barley was for animal feed, the majority of which was home grown<sup>144</sup>. In addition, the UK imported approximately 6.2 million tonnes of animal feed and fodder in 2019<sup>145</sup>. The largest fraction, 2.1 million tonnes, was comprised of soy-based animal feed, 960,000 tonnes of which came from Argentina alone<sup>146</sup>. One promising alternative feed system relies on insects. Insects have the potential to replace some animal feed (e.g., in poultry and fish farming) while substantially reducing environmental impacts, as they can be reared on waste<sup>147</sup> (including biowaste streams not suitable for livestock consumption<sup>148</sup>), require considerably less water and land and emit fewer greenhouse gases than equivalent volumes of feed crops<sup>149</sup>. Insects also offer comparable, or in some cases superior, nutrition and conversion to body mass compared to conventional feed<sup>150</sup>.

OVERLAPS	The Biomass consumption footprint is a subsection of the Material Footprint, so many targets are complementary with that Topic Area.
DATA GAPS AND UPCOMING WORK	<ul style="list-style-type: none"> <li>- Part Two of the National Food Strategy for the UK is due to provide a whole-system ‘comprehensive plan’ for transforming the food system so that it provides healthy and affordable food and supports sustainable and resilient agriculture that is efficient and cost-effective</li> <li>- Uncertainty over pre-farm gate food waste<sup>151</sup></li> <li>- Lack of consistency between biomass fuel ambitions and resource productivity (and the general Resources and Waste Strategy agenda)</li> <li>- Divergent estimations of the decrease in animal protein required to meet a healthy and sustainable diet</li> <li>- General lack of clarity as to data collection methodology per action targets, frequency of data gathering and transparency/availability of the data for analysis</li> </ul>
KEY MESSAGES	Any actions to address unsustainable biomass consumption must take into account issues of equity. It is not suitable, for example, to set a target to reduce per capita consumption of food when there are some people who currently do not have access to sufficient healthy food based on nutritional guidelines. The whole-system approach in the upcoming National Food Strategy should encompass this. Actions should target hotspots of over-consumption in parallel with addressing waste.

144 Agriculture and Horticulture Development Board (24 September 2020). Supply and Demand. <https://projectblue.blob.core.windows.net/media/Default/MI%20Reports/BST/UK%20Supply%20and%20Demand/201920/201920%20-%20Sep%20update.pdf>

145 United Nations Department of Economic and Social Affairs (2021). UN Comtrade database. <https://comtrade.un.org/data/>

146 The Royal Institute of International Affairs (2020). ResourceTrade.Earth. <https://resourcetrade.earth/>

147 Sogari et al. (2019). The Potential Role of Insects as Feed: A Multi-Perspective Review. *Animals*. <https://www.mdpi.com/2076-2615/9/4/119>

148 UN Policy Analysis Branch, Division for Sustainable Development (n.d.). Policy Brief: Insects as Livestock Feed. [https://sustainabledevelopment.un.org/content/documents/12867Policybrief\\_Insects.pdf](https://sustainabledevelopment.un.org/content/documents/12867Policybrief_Insects.pdf)

149 UN Policy Analysis Branch, Division for Sustainable Development (n.d.). Policy Brief: Insects as Livestock Feed. [https://sustainabledevelopment.un.org/content/documents/12867Policybrief\\_Insects.pdf](https://sustainabledevelopment.un.org/content/documents/12867Policybrief_Insects.pdf)

150 Hawkey et al. (2021). Insects: A Potential Source of Protein and Other Nutrients for Feed and Food. *Annual Review of Animal Biosciences*. <https://www.annualreviews.org/doi/abs/10.1146/annurev-animal-021419-083930>

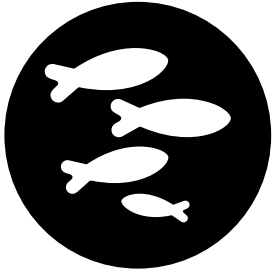
151 National Food Strategy (2019). National Food Strategy: our approach and principle. <https://www.nationalfoodstrategy.org/approach-2020/>



# MARINE RESOURCE USE







## MARINE RESOURCE USE

Marine resources encompass fisheries products and mariculture products, including aquatic plants. Marine resources are consumed directly by people (e.g., eating of fish and seaweed) and are also embodied within other products, such as fish feed and fish oils used in feed for livestock production.

From an ecological perspective, key impacts of marine resource use include the depletion of animal and plant stocks. Overfishing occurs when harvesting populations beyond a sustainable level can diminish numbers to the point that marine organisms can no longer replenish themselves naturally, which can have devastating effects on individual species and cascading impacts on marine ecosystems. The intensity of fishing and associated activity in UK waters and the impact of some of the methods used to harvest these resources, both domestically and overseas, mean marine resource use is also a major source of other environmental damages including habitat destruction and greenhouse gas emissions<sup>152</sup>. The targets here address unsustainable use of marine resources through unsustainable production and harvesting systems, policies and practices both in the UK and related to imports from overseas.

Around 60% of the UK's marine resource consumption is imported from outside the UK from almost 90 countries and the majority of UK marine resource production is for export purposes, mainly destined for the EU<sup>153</sup>. This means that the UK has a significant overseas impact on marine resource use. There is a lack of data to allow full traceability and transparency of marine resource supply chains for imports from overseas. Addressing this gap is one of the priority steps in reducing the overseas impacts of UK marine resource use.

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<sup>152</sup> Sala et al (2021). Protecting the global ocean for biodiversity, food and climate. *Nature*. 592:397-402. <https://www.nature.com/articles/s41586-021-03371-z>

<sup>153</sup> Seafish (2021). 2019 UK Seafood Import and Export Summary Factsheet Finalised Data. <https://www.seafish.org/insight-and-research/market-supply-data-and-insight/>

## OUTCOME TARGET: 100% OF MARINE RESOURCES FROM SUSTAINABLE SOURCES BY 2030

UK production and consumption of marine resources must be from sources and using methods that are unambiguously sustainable by 2030 in terms of factors including the population of the target species, the state of the wider marine ecosystem, impacts on ocean functions such as carbon sequestration, and broader environmental impacts. This target encompasses both domestic production and harvesting of marine resources and overseas production and harvesting for import and consumption by the UK. The latter is critical as around 60% of the UK's marine resource consumption is met by imports from countries outside the UK. Global demand for marine resources is growing, putting increasing pressure on stocks. For example, over one-third of global fish stocks are estimated to be exploited above biologically sustainable levels<sup>154</sup>. In the UK, government figures report around half of fish stocks were exploited sustainably in 2018 (up from 9% in 1990)<sup>155</sup>, but this ignores those stocks with little or no data which when taken account of results in over 60% of commercial stocks being unsustainably exploited or at high risk of unsustainable exploitation in 2019<sup>156</sup>. As well as rates of exploitation relative to ecological sustainable population levels, the sustainability of marine resource use encompasses; feedstocks for farmed fish, bycatch of non-target species, and impacts of different production and capture techniques and equipment on the environment.

ACTION TARGETS	SECTOR(S)	METRICS/ INDICATOR(S)
<b>Aquaculture halves the use of unsustainable fishmeal and fish oil from purpose-caught fish by 2030, avoiding substitution by environmentally damaging replacements</b>	Fishing industry, aquaculture	Suggested metric: Total requirement of wild fish for aquaculture (tonnes)

The fishmeal and fish oil used by the UK's aquaculture sector comes from a combination of trimmings from fish for human consumption – which would otherwise be waste – and purpose-caught fish. Aquaculture is expanding worldwide, and both Scotland<sup>157</sup> and Wales<sup>158</sup> have policies to expand the sector. The use of purpose caught fish to produce feed creates a danger of increasing demand pushing up the price of fishmeal to levels that incentivises exploitation of small pelagic species (the main source of fishmeal) beyond their maximum sustainable yield, potentially leading to rapid depletion of resources<sup>159</sup>. The Norwegian salmon aquaculture industry achieved a reduction in fish-based ingredient use from 90% in the 1990s to just 25% at present<sup>160</sup> – however much of the replacement was by soy from South America, and the sector is currently striving to decouple its soy supplies from deforestation. Approximately three quarters of the soy used to produce salmon in UK supermarkets has verified deforestation-free claims, virtually none of the soy used to produce other seafood has similar sustainability attributes<sup>161</sup>. Use of alternative feeds (e.g. insect feed from agricultural surplus and by-products, seaweed protein, fisheries by-products and algal oil) could be promoted to reduce the use of other land-based proteins like soy. The target is from a 2010 baseline (per Merino *et al.*, 2012).

154 FAO (2021). The state of the world's fisheries and aquaculture. <http://www.fao.org/state-of-fisheries-aquaculture>

155 JNCC. B2: Sustainable Fisheries. <https://jncc.gov.uk/our-work/ukbi-b2-sustainable-fisheries/>

156: [https://europe.oceana.org/sites/default/files/oceana\\_uk\\_fisheries\\_audit.pdf](https://europe.oceana.org/sites/default/files/oceana_uk_fisheries_audit.pdf)

157 Scottish Government (2015). Scotland's National Marine Plan. Marine Scotland Directorate. <https://www.gov.scot/publications/scotlands-national-marine-plan/>

158 Welsh Government (2019). Welsh National Marine Plan. November 2019. <https://gov.wales/welsh-national-marine-plan-document>

159 Merino, G., Barange, M., Blanchard, J. L., Harle, J., Holmes, R., Allen, I., Edward H. Allison, Marie Caroline Badjeck, Nicholas K. Dulvy, Jason Holt, Simon Jennings, Christian Mullon, Lynda D. Rodwell (2012). Can marine fisheries and aquaculture meet fish demand from a growing human population in a changing climate? *Global Environmental Change*, 22, 795–806.

160 Aas, T. S., Ytrestøyl, T. & Åsgård, T. Utilization of feed resources in the production of Atlantic salmon (*Salmo salar*) in Norway: An update for 2016. *Aquacult. Rep.* 15, 100216 (2019)

161 3Keel (2019). Moving to deforestation free animal feed. 2018 Retail Soy Initiative. <https://www.3keel.com/moving-to-deforestation-free-animal-feed/>

ACTION TARGETS	SECTOR(S)	METRICS/ INDICATOR(S)
<p><b>All UK and imported fish stocks are fished at or below levels capable of producing maximum sustainable yield (FMSY) by 2030</b></p>	<p>Fishing industry, policymakers, importers</p>	<p>Percentage of marine fish stocks harvested sustainably.</p> <p>Percentage of marine fish stocks with biomass at levels that maintain full reproductive capacity</p>
<p>The UK Government estimates that only half of fish stocks were fished at or below levels capable of producing maximum sustainable yield (FMSY) in 2018 (an improvement from 9% in 1990). Each stock's spawning biomass (SSB) should be at or above the level capable of producing maximum sustainable yield (MSY B): the percentage of stocks subject to quota management and achieving this goal was 61% in 2018 (up from 32% in 1990)<sup>162</sup>. Again this figure fails to take account of those stocks for which there is poor or little data<sup>163</sup>. Key interventions to achieve this target therefore include improving data collection, strictly enforcing catch limits and quotas in line with MSY, with violations resulting in fines and legal action; robust monitoring, control and enforcement of the Landing Obligation (and where compliance remains poor or uncertain, catch limits should factor this in and apply a buffer to ensure actual catches do not exceed sustainable levels); and introducing extra precautions into catch limits for deep sea stocks that are particularly vulnerable to overfishing, including zero catch limits are applied where recommended by ICES; and spatial measures such as seasonal closures. Nearly 60% of the UK's fish consumption is imported and the SSB of some key international fish stocks like some tuna species are lower than 40% of their unfished stock levels<sup>164</sup>. The UK must address its contribution to the unsustainable exploitation of fish stocks on a global scale.</p>		
<p><b>Eradicate IUU (Illegal, Unregulated, Unreported) fishing in UK waters and from imports of fish and related products</b></p>	<p>Policymakers; fish and fish product supply chain actors; enforcement agencies (local governments)</p>	<p>Proportion of UK and imported landings which are IUU fish.</p>
<p>Up to a third of all landed fish globally is IUU fish and <i>'Whilst fishing is well controlled in UK waters, with strict regulations such as the registration of buyers and sellers, on a world scale IUU fishing remains the biggest global threat to the sustainable management of fish stocks.'</i><sup>165</sup> This is important, because the UK is a net importer of fish and related products, with net imports of around 358,000 tonnes in 2019<sup>166</sup>. The UK government needs to strengthen its transposed EU IUU Regulation to ensure no illegal seafood can enter UK through digitisation of catch certificate and mass balance calculation, include IUU and sustainability criteria in international trade deals, and introduce a due diligence requirement on UK importers of marine products to ensure that no imports are derived from IUU. Use of innovative technologies such as blockchain and Remoted Electric Monitoring (REM) with cameras could be promoted to ensure full traceability and transparency of the traded marine resources.</p>		

162 JNCC. B2: Sustainable Fisheries. <https://jncc.gov.uk/our-work/ukbi-b2-sustainable-fisheries/>

163: [https://europe.oceana.org/sites/default/files/oceana\\_uk\\_fisheries\\_audit.pdf](https://europe.oceana.org/sites/default/files/oceana_uk_fisheries_audit.pdf)

164 WWF (2021) Back to Biology – Using spawning stock biomass as the indicator of tuna stock health. <https://www.wwf.org.uk/sites/default/files/2021-05/WWF%20-%20Back%20to%20Biology%20report%20%28new%29.pdf>

165 Seafish (2021). Illegal, Unreported and Unregulated fishing. <https://www.seafish.org/responsible-sourcing/fisheries-management/illegal-unreported-and-unregulated-fishing/>

166 Elena Ares, Elise Uberoi, Georgina Hutton & Matthew Ward (2020). UK Fisheries Statistics: Research Briefing. Published Monday, 23 November 2020. The House of Commons Library. <https://commonslibrary.parliament.uk/research-briefings/sno2788/>

ACTION TARGETS	SECTOR(S)	METRICS/ INDICATOR(S)
<b>Incidental bycatch is below levels which threaten long-term viability and recovery of fish (including shark), mammal, turtle and bird populations</b>	Policymakers, fishing industry, research institutions and enforcement agencies (local governments)	Bycatch numbers of vulnerable species and catch rates per fishing fleet.
<p>Although not directly included in the calculation of the marine consumption footprint, incidental bycatch is an ongoing threat to populations of some marine species such as endangered sharks, marine turtles, marine mammals and sea birds and has little known impacts for others. For example, bycatch of porpoises should ideally be less than 1% of the best available abundance estimate and ultimately, be reduced to zero<sup>167</sup>. Use of technologies such as remote electronic monitoring with onboard cameras (REM) should be promoted to monitor incidences of bycatch and implementation of mitigation.</p>		
<b>Reduce the cost of trade finance for sustainably produced commodities through an incentive like the Sustainable Import Guarantee</b>	Policymakers, financial sector	Suggested metric: Relative price difference between sustainable and unsustainable marine product imports
<p>Reducing the cost of sustainably produced marine commodities relative to commodities produced at the risk of unsustainable practices would send a clear market signal for importers. In addition, driving greater revenue to sustainable producers will likely motivate a shift away from practices that cause overharvesting, ecosystem damage, bycatch, and other forms of damage to marine ecosystems. This is directly analogous to an action target focused on deforestation-risk commodities in the Land Use Change section.</p>		
<b>Fully transition to low impact fisheries, including prohibiting the use of non-selective and destructive fishing gears and techniques in protected UK waters and by UK vessels, including distant water fleets by 2030</b>	Policymakers, fishing industry	Extent of trawl free zones
<p>Some of the techniques and equipment used to catch fish can lead to rapid depletion of fish stocks and degradation of the marine environment including the release of carbon stored in those habitats. There is a current proposal from the Marine Management Organisation to ban bottom trawling – in which weighted nets are dragged along the sea floor – in certain areas. This target prioritises a ban of techniques such as these within protected areas by 2030, but this should be extended to more areas as soon as possible beyond this date. Achieving this would also contribute to the Greenhouse Gas Footprint target.</p>		

<sup>167</sup> Department for environment and Rural Affairs (2019). Marine Strategy Part One: UK updated assessment and Good Environmental Status. October 2019. [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/921262/marine-strategy-part1-october19.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/921262/marine-strategy-part1-october19.pdf)



OVERLAPS	<p>This topic area is in effect a subset of Biomass Consumption Footprint.</p> <p>Actions concerning extraction of non-living marine resources (e.g., oil and gas, mining) and pollution caused by material consumption (e.g., marine plastics) are treated under the Material Consumption topic area.</p> <p>Actions concerning the quality of marine habitats are considered under the Degradation and Land-Use Change topic area and the Biodiversity Issue Highlight.</p> <p>Chemical and nutrient pollution entering the marine environment are considered under the Chemical Pollution and Nutrient Use topic areas respectively.</p>
DATA GAPS AND UPCOMING WORK	<p>The ecological status of vulnerable species as bycatch, marine habitats, and fish stocks of the UK's imports from nearly 90 countries<sup>168</sup> like China, Indonesia and in UK Overseas territories<sup>169</sup> are major information gaps.</p>
KEY MESSAGES	<p>The UK has made some progress in recovering fish stocks over the last 30 years, but much remains to be done to restore healthy marine ecosystems in UK waters. Critically, the UK, as a net importer of fish, does not have a holistic national policy to address its impacts on global marine resources. Specifically, the UK has a responsibility for ensuring that those imports exclude the worst forms of capture fisheries: Illegal, Unregulated, Unreported fishing, and stop the threats to vulnerable species as bycatch. There is a need to reduce the reliance on fish as feed for protein and fish oil and to promote the use of alternative feeds. Consumption of marine resources has the potential to contribute significantly to healthy and sustainable diets, particularly on the promotion of plant-based seafood like seaweed or low trophic seafood like mussels, whilst wise stewardship of marine resources can maintain and enhance marine ecosystems, and the multiple social, cultural and economic opportunities that a healthy marine environment can bring.</p>

<sup>168</sup> UK Trade Info: <https://www.uktradeinfo.com/trade-data/ots-custom-table/>

<sup>169</sup> Government Office for Science (2018). Foresight Future of the Sea: A Report from the Government Chief Scientific Adviser.



# DEGRADATION AND LAND USE CHANGE







## DEGRADATION AND LAND-USE CHANGE

Environmental degradation describes the loss of productive capacity and deterioration of key ecosystem features caused by human activities leading to species loss, change in species compositions and reduced ability of ecosystems to provide essential functions<sup>170</sup>. Land-use change is closely related and occurs when human activities – deliberately or unintentionally – cause sustained changes to an ecosystem, such that its structure and functioning is fundamentally altered.

Globally, the major activities that contribute to degradation are: forest management (for timber and forest products), agriculture and soil management, biomass harvesting (marine and terrestrial), mining and quarrying, leakages of hazardous materials and expansion of the built environment. In this chapter, we focus primarily on forest degradation caused by forest management and soil degradation caused primarily by agriculture. These are the most prevalent and geographically extensive issues related to degradation. Degradation caused by mining and quarrying and marine resource extraction are dealt with more extensively in the Material Consumption and Marine Resource Use topic areas.

For land-use change, deforestation and conversion are the mechanisms that have received the most scrutiny to date from policymakers, environmental advocates and members of the public. Deforestation is a type of land-use change and happens when natural forest is replaced by other land uses including agriculture or forestry plantations<sup>171</sup>.

The UK's land-use change footprint has been defined as the quantity of land, both domestically and overseas, that is undergoing conversion or is at risk of conversion due to UK demand for goods and commodities. Domestically, land-use change is most directly attributed to changes in forest cover. From the 11th century to the early 20th century, tree cover in England steadily dropped to an overall low of 5% of total area covered by forests<sup>141</sup>. Currently, tree cover across the UK stands at 13%, significantly lower than the EU average of 38%<sup>142</sup>. The overseas component of the UK's land-use change footprint arises from the financing of destructive activities overseas (see the Finance Footprint Issue Highlight) and the import of commodities produced overseas for UK consumption. Agricultural and forest commodities like soy, palm oil, cacao, rubber, beef, leather, timber and pulp and paper are the main drivers of deforestation and conversion globally<sup>172</sup>. The UK's imports of agricultural products (excluding livestock) were responsible for an estimated 20,196 hectares of deforestation in 2017<sup>173</sup>.

While the notion of setting a national sustainable land-use change target is not well discussed, the international dialogue around deforestation and conversion has reached a clear conclusion: any amount is too much. The government has been advised, notably by the Global Resource Initiative Taskforce, that tackling the UK's land-use change footprint will require eliminating both legal and illegal deforestation from supply chains by 2030 at the latest<sup>174</sup>. Indeed, global experts recommend exceeding the Global Resource Initiative Taskforce's suggestion by halting all forms of conversion (including deforestation) globally as soon as possible to remain within safe ecological limits. As a result, the UK's goal for reducing its land-use change footprint should be to halt deforestation and other forms of land conversion associated with UK consumption and production by 2023.

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168 Accountability Framework Initiative. Definitions. <https://accountability-framework.org/the-framework/contents/definitions/>

169 Accountability Framework Initiative. Definitions. <https://accountability-framework.org/the-framework/contents/definitions/>

170 Department for Environment, Food & Rural Affairs (2013). Government Forestry and Woodlands Policy Statement. [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/221023/pb13871-forestry-policy-statement.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/221023/pb13871-forestry-policy-statement.pdf)

171 Forest Research (2015). Forest cover: International comparisons. <https://www.forestresearch.gov.uk/tools-and-resources/statistics/forestry-statistics/forestry-statistics-2018/international-forestry/forest-cover-international-comparisons/>

172 WWF-UK, RSPB and 3Keel (2020). Riskier Business: The UK's Overseas Land Footprint. <https://www.wwf.org.uk/riskybusiness>

173 Croft, S., West, C., Harris, M., Otley, A. & Way, L. (2021). Towards indicators of the global environmental impacts of UK consumption: Embedded Deforestation. JNCC Report No. 681, JNCC, Peterborough, ISSN 0963-8091

174 Global Resource Initiative (2020). Final Recommendations Report [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/881395/global-resource-initiative.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/881395/global-resource-initiative.pdf)

Defining a degradation footprint target for the UK is challenging due to the vast number of environmental impacts covered by the term degradation, many of which are not quantified. There is no coherent quantification of the UK's consumption-based degradation footprint. Even domestically, there is not a single indicator used to measure the varying kinds of degradation occurring in different ecosystems. As a result, the UK target is to work towards halting degradation.

The scale and drivers of domestic degradation and land-use in the UK are relatively well-known. However, significant degradation and land-use change are embedded in UK imports and finance and there is a comparative lack of data to allow tracing and quantification of the overseas degradation and land-use change from UK consumption and financial services. Degradation is more difficult to quantify in both cases as it covers a broad scope of issues across different habitats and ecosystems and can be less easy to identify than a total change in land-use.

## **OUTCOME TARGET: UK SUPPLY CHAINS OF AGRICULTURAL AND FOREST COMMODITIES ARE RESPONSIBLE FOR NO DEFORESTATION AND CONVERSION OF ECOSYSTEMS AS SOON AS POSSIBLE AND NO LATER THAN 2023, DEGRADATION OF DOMESTIC ENVIRONMENTS IS HALTED, AND ENVIRONMENTAL DEGRADATION THAT OCCURS OVERSEAS AS A RESULT OF THE UK'S DEMAND FOR MATERIALS AND GOODS IS MINIMISED BY 2030**

The target of zero deforestation and conversion reflects a 100% reduction from the 2017 deforestation footprint of 20,196 hectares<sup>175</sup>. This level of reduction is based on the recommendations of independent task forces and environmental NGOs<sup>176</sup>. The target also includes the conversion of all natural ecosystems recognising the pressure that consumption places on other vital, non-forest ecosystems<sup>177</sup>. The supply chains of agricultural and forest commodities are the focus because of their prevalence in causing deforestation and conversion. Other industries, like mining, contribute less to land-use change when compared to the thousands of hectares that are put at risk annually by demand for food, fibre, timber and other forest commodities, although the expansion of mining and associated infrastructure could become a more significant driver in the future<sup>178</sup>.

The target for halting domestic degradation is informed by factors that are well covered under separate pieces of policy for the UK or devolved countries (e.g., the Tree health resilience strategy<sup>179</sup>, the Agriculture transition plan<sup>180</sup>, the Marine Strategy<sup>181</sup>, the Environment Strategy for Scotland<sup>182</sup>, the 25 Year Environment Plan<sup>183</sup>, the Woodland for Wales Strategy<sup>184</sup> and Natural Resources Policy (Wales)<sup>185</sup>). These distinct targets cover the key hotspots for action, but do not reach far enough given the urgency of action required. Further, in some cases targets that are supposed to be met in the near future have not seen sufficient progress<sup>186</sup>. Therefore, it is recommended that select objectives be shored up in order to meet the ambition of halting domestic degradation by 2030. Degradation occurring *overseas* that is embodied in UK trade is not as well understood or addressed. Select regulations acknowledge overseas environmental impacts from UK trade, but the notion of the UK being responsible for overseas environmental degradation spurred by import demand is evolving rapidly. The first crucial step in addressing overseas degradation will be measuring and attributing the impacts of UK consumption – from there, more detailed strategic interventions can be developed.

175 Croft, S., West, C., Harris, M., Otley, A. & Way, L. (2021). Towards indicators of the global environmental impacts of UK consumption: Embedded Deforestation. JNCC Report No. 681, JNCC, Peterborough, ISSN 0963-8091

176 For example: WWF-UK, RSPB and 3Keel (2020). Riskier Business: The UK's Overseas Land Footprint

177 Béatrice Wedeux and Anke Schulmeister-Oldenhove (2021). Stepping Up? The Continuing Impact

of EU Consumption on Nature Worldwide. WWF [https://wwfeu.awsassets.panda.org/downloads/stepping\\_up\\_the\\_continuing\\_impact\\_of\\_eu\\_consumption\\_on\\_nature\\_worldwide\\_fullreport\\_low\\_res.pdf](https://wwfeu.awsassets.panda.org/downloads/stepping_up_the_continuing_impact_of_eu_consumption_on_nature_worldwide_fullreport_low_res.pdf)

178 WWF (2021) Deforestation Fronts: Drivers and responses in a changing world. [https://wwfint.awsassets.panda.org/downloads/deforestation\\_fronts\\_drivers\\_and\\_responses\\_in\\_a\\_changing\\_world\\_full\\_report\\_1.pdf](https://wwfint.awsassets.panda.org/downloads/deforestation_fronts_drivers_and_responses_in_a_changing_world_full_report_1.pdf)

179 Department for Environment, Food & Rural Affairs (2018). Tree health resilience strategy <https://www.gov.uk/government/publications/tree-health-resilience-strategy-2018>

180 Department for Environment, Food & Rural Affairs (2020). Agricultural transition plan 2021 to 2024 <https://www.gov.uk/government/publications/agricultural-transition-plan-2021-to-2024>

181 Department for Environment, Food & Rural Affairs (2015). Marine strategy part three: UK programme of measures <https://www.gov.uk/government/publications/marine-strategy-part-three-uk-programme-of-measures>

182 Scottish Government (2020). The Environment Strategy for Scotland: visions and outcomes. <https://www.gov.scot/publications/environment-strategy-scotland-vision-outcomes/>

183 HM Government (2018). A Green Future: our 25 Year Plan to Improve the Environment. <https://www.gov.uk/government/publications/25-year-environment-plan>

184 Welsh Government (2018). Woodlands for Wales. [https://gov.wales/sites/default/files/publications/2018-06/woodlands-for-wales-strategy\\_o.pdf](https://gov.wales/sites/default/files/publications/2018-06/woodlands-for-wales-strategy_o.pdf)

185 Welsh Government (2017). Natural Resources Strategy. <https://gov.wales/sites/default/files/publications/2019-06/natural-resources-policy.pdf>

186 See the failure to attain 'Good Environmental Status' for numerous indicators in the Marine Strategy: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/971696/uk-marine-strategy-part-two-monitoring-programmes-2021.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/971696/uk-marine-strategy-part-two-monitoring-programmes-2021.pdf)



ACTION TARGETS	SECTOR(S)	METRICS/ INDICATOR(S)
<p><b>Develop, monitor and publicly report an indicator for deforestation and ecosystem conversion that quantifies the UK's land-use change footprint for both production and consumption as soon as possible, based on the Accountability Framework Initiative's definitions</b></p>	<p>Polymakers, research institutions</p>	<p>Suggested metric: Hectares at risk of having been converted due to UK production and consumption per year</p>
<p>The first step in mitigating the UK's contribution to conversion and deforestation should be to clearly measure its consumption-based footprint. A proposed indicator for the deforestation impacts of UK consumption has recently been released<sup>187</sup>. This metric could be extended to include conversion of non-forest land. This action also directly aligns with a goal from the 25 Year Environment Plan to develop better measurements on <i>'the overseas impact of domestic consumption'</i><sup>188</sup>.</p>		
<p><b>Establish a mandatory due diligence obligation on businesses and financial institutions that requires them to identify, mitigate and report on legal and illegal deforestation and ecosystem conversion in their supply chains or investment portfolios relating to forest-risk commodities by 2023</b></p>	<p>Polymakers, importers (of forest-risk commodities)</p>	<p>Suggested metric: % of companies in compliance with supply chain reporting and mitigation requirements</p>
<p>This action is directly aligned with a recommendation from the Global Resource Initiative Taskforce<sup>189</sup>, although it extends the ambitions of the GRI forward by explicitly including conversion of non-forest ecosystems. The government has indicated their intention to include such a due diligence system in the forthcoming Environment Bill<sup>190</sup>. However, the planned system will only assess and mitigate the risks of <i>illegal</i> deforestation – excluding any deforestation which occurs in line with a producer country's local laws as well as any conversion, if this is not explicit in the producer country's legislation. It is crucial that both illegal and illegal deforestation and conversion of non-forest ecosystems be included in the scope of the national system for land-use change risk management. This could involve mandating reporting and mitigation for legal conversion and deforestation in the currently proposed due diligence legislation, or the rapid development of additional policies to cover the current gap.</p>		
<p><b>Government procurement standards are developed (or strengthened) and implemented for all forest-risk commodities by 2023</b></p>	<p>Polymakers, public procurement (importing forest-risk commodities)</p>	<p>Suggested metric: % of public procurement imports covered by sustainable procurement policies</p>
<p>This action is directly aligned with a recommendation from the Global Resource Initiative<sup>191</sup> and the WWF Riskier Business report<sup>192</sup>. It is directly analogous to the Government Buying Standards and Timber Procurement Policy. The government's response to GRI's recommendations indicated willingness to create sustainable procurement standards for food and catering<sup>193</sup>. To increase the ambition of the government's considered measure, it is important to include policies for non-food forest-risk commodities, such as timber used for construction of public buildings.</p>		

<sup>187</sup> Croft, S., West, C., Harris, M., Otley, A. & Way, L. (2021). Towards indicators of the global environmental impacts of UK consumption: Embedded Deforestation. JNCC Report No. 681, JNCC, Peterborough, ISSN 0963-8091

<sup>188</sup> HM Government (2018). A Green Future: our 25 Year Plan to Improve the Environment. <https://www.gov.uk/government/publications/25-year-environment-plan>

<sup>189</sup> Global Resource Initiative (2020). Final Recommendations Report [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/881395/global-resource-initiative.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/881395/global-resource-initiative.pdf)

<sup>190</sup> UK Parliament (2020). The Environment Bill <https://bills.parliament.uk/bills/2593>

<sup>191</sup> Global Resource Initiative (2020). Final Recommendations Report [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/881395/global-resource-initiative.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/881395/global-resource-initiative.pdf)

<sup>192</sup> WWF-UK, RSPB and 3Keel (2020). Riskier Business: The UK's Overseas Land Footprint. <https://www.wwf.org.uk/riskybusiness>

<sup>193</sup> Policy paper: Government response to the recommendations of the Global Resource Initiative

Published 11 November 2020 <https://www.gov.uk/government/publications/global-resource-initiative-taskforce-government-response/government-response-to-the-recommendations-of-the-global-resource-initiative>

ACTION TARGETS	SECTOR(S)	METRICS/ INDICATOR(S)
<b>Reduce the cost of trade finance for sustainably produced commodities through an incentive like the Sustainable Import Guarantee</b>	Polymakers, financial sector	Suggested metric: Relative price difference between sustainable and unsustainable forest-risk commodity imports
<p>This action is directly aligned with a recommendation from the Global Resource Initiative<sup>194</sup>. The government's response to GRI's recommendations indicated willingness to investigate a Sustainable Import Guarantee further<sup>195</sup>. These efforts should be encouraged – reducing the cost of sustainably produced land-based commodities relative to commodities produced at the risk of deforestation and conversion would send a clear market signal for importers. In addition, driving greater revenue to sustainable producers will likely motivate a shift away from practices that cause deforestation and conversion. Including organic goods (statutorily required to be produced without synthetic pesticides) within this guarantee, or designing a comparable mechanism specific to commodities produced with minimal chemical pesticides, would likely drive demand for commodities that lessen the ecosystem impacts of pesticides overseas – contributing to the Chemical Pollution topic area.</p>		
<b>Introduce a legally binding target to end conversion within UK agricultural and forestry commodity supply chains by no later than 2023</b>	Polymakers	Suggested metric: Legal status of deforestation embedded in supply chains
<p>This action is a direct recommendation from the Global Resource Initiative<sup>196</sup>. Introducing a legal target for the UK will motivate lagging sectors and companies to invest in the sustainability of their supply chains. Without a mandatory cut off, some industries that are particularly entwined with deforestation risk will likely never make the changes required to mitigate the impact of their imports.</p>		
<b>The government measures and publicly report on the impact of their partnerships, dialogues and trade agreements between producer and consumer countries on the transition to sustainable commodity supply chains, equity for farmers, foresters, communities and indigenous peoples, and long-term economic growth through sustainable trade</b>	Polymakers	To be determined
<p>This action is an extension of the Global Resource Initiative's recommendation that the government 'take a bold new approach to partnerships, dialogues and trade between producer and consumer countries' that support sustainable and equitable land management<sup>197</sup>. The government has indicated that it is actively developing its approach to partnerships, dialogue and trade as it relates to a just transition to land management systems that mitigate environmental damages in producer countries (for example through its partnership on Forest Law Enforcement, Governance and Trade<sup>198</sup>, or through its intended leadership role in prioritising the environment in international trade post-Brexit<sup>199</sup>). However, these stated ambitions have not been coupled with adequate measures to ensure accountability. This action is intended to create a system through which the government can demonstrate the impact of its actions across sustainable international trade.</p>		

194 Global Resource Initiative (2020). Final Recommendations Report [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/881395/global-resource-initiative.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/881395/global-resource-initiative.pdf)

195 Policy paper: Government response to the recommendations of the Global Resource Initiative

Published 11 November 2020 <https://www.gov.uk/government/publications/global-resource-initiative-taskforce-government-response/government-response-to-the-recommendations-of-the-global-resource-initiative>

196 Global Resource Initiative (2020). Final Recommendations Report [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/881395/global-resource-initiative.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/881395/global-resource-initiative.pdf)

197 Global Resource Initiative (2020). Final Recommendations Report [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/881395/global-resource-initiative.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/881395/global-resource-initiative.pdf)

198 Office for Product Safety and Standards (2014). Regulations: timber and FLEGT licences: Guidance for businesses trading in timber and timber-related products. <https://www.gov.uk/guidance/regulations-timber-and-flegt-licences#extent-of-obligation>

199 Department for International Trade and The Rt Hon Elizabeth Truss MP (3 March 2020). Elizabeth Truss outlines bold new era for trade Speech given by Secretary of State for International Trade to the WTO General Council, the first since the UK took its independent seat. <https://www.gov.uk/government/speeches/elizabeth-truss-outlines-bold-new-era-for-trade>

ACTION TARGETS	SECTOR(S)	METRICS/ INDICATOR(S)
<p><b>The government actively participates in direct investment in sustainable land use systems in producer countries, beginning by launching a significant blended finance demonstrator (public-private collaboration) that mobilises significant additional capital in support of sustainable land use and livelihoods</b></p>	<p>Polymakers, financial sector</p>	<p>Suggested metric: Hectares transitioned to sustainable management as a result of investment; % and value of government investment in sustainable land use (versus conventional commodity production)</p>
<p>This action is aligned with a recommendation from the Global Resource Initiative<sup>200</sup>. The government's response to GRI highlights the vast benefit that would result from shifting a fraction of the investment that flows to conventional agricultural commodity production<sup>201</sup>. To normalise the role of finance in transitioning growers and foresters to sustainable land use systems, the government should commit additional resources – especially first-loss capital that reduces risk for private investment. A new demonstrator facility with the explicit objective of minimising ecosystem conversion attributed to international trade would be an ideal first step. First priority should be given to key high-risk landscapes.</p>		
<p><b>Develop, monitor and publicly report indicators of the UK's impact on ecosystem and soil degradation within the UK and overseas by 2025</b></p>	<p>Polymakers, research institutions</p>	<p>In development in work by JNCC and SEI on overseas consumption indicators</p>
<p>The first step in mitigating the UK's contribution to degradation should be to clearly measure its consumption-based footprint. This is currently a significant knowledge gap<sup>202</sup> that limits the ability of the government and other stakeholders to develop strategic interventions that provide the greatest reductions in impact for the least cost and effort. Some components of domestic degradation are fairly well measured by discrete monitoring programmes (e.g., the Integrated Forest Monitoring<sup>203</sup>), however, degradation embodied in imports is a significant knowledge gap. This action also directly aligns with a goal from the 25 Year Environment Plan to develop better measurements on 'the overseas impact of domestic consumption'<sup>204</sup>.</p>		
<p><b>Achieve 100% certification of all imported timber products (including pulp and paper) and publicly report the proportion of certified imports annually under credible certification schemes by 2030</b></p>	<p>Importers (of timber products)</p>	<p>Suggested metric: share of imported tropical timber that is PEFC or FSC certified</p>
<p>According to the IDH Sustainable Trade Initiative, 42.5% of the UK's primary and secondary tropical timber product imports are independently certified by PEFC and/or FSC<sup>205</sup>. IDH suggest that achieving 100% certification for imported tropical timber to Europe would positively impact 18 million hectares of forest and mitigate 100 million tCO<sub>2</sub>e. Assuming that the UK's positive impact were proportional to its share of European tropical timber imports<sup>206</sup>, this would equate to 1.7 million hectares ameliorated and 9.2 million tCO<sub>2</sub>e mitigated by the UK. This action is also fully aligned with the UK's commitment to achieve SDG 15.2 ('promote the implementation of sustainable management of all types of forests, halt deforestation, restore degraded forests and substantially increase afforestation and reforestation globally')<sup>207</sup>. It is suggested that certification reflect PEFC standard criteria at a minimum, with aspirations of achieving FSC certification as time goes on.</p>		

200 Global Resource Initiative (2020). Final Recommendations Report [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/881395/global-resource-initiative.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/881395/global-resource-initiative.pdf)

201 Policy paper: Government response to the recommendations of the Global Resource Initiative

Published 11 November 2020 <https://www.gov.uk/government/publications/global-resource-initiative-taskforce-government-response/government-response-to-the-recommendations-of-the-global-resource-initiative>

202 JNCC (2020). Land Use Change Related GHG Emissions Embodied in Commodity Production and Trade 2020. <https://hub.jncc.gov.uk/assets/e8829201-aeaa-4346-bd1d-f7331441fa94>

203 Forest Research. Integrated forest monitoring <https://www.forestresearch.gov.uk/research/integrated-forest-monitoring/>

204 HM Government (2018). A Green Future: our 25 Year Plan to Improve the Environment. <https://www.gov.uk/government/publications/25-year-environment-plan>

205 IDH (2020). Understanding sustainable secondary tropical wood products through data <https://www.idhsustainabletrade.com/uploaded/2020/11/Understanding-sustainable-tropical-wood-products-through-data.pdf>

206 International Tropical Timber Organisation (2021). Biennial review statistics [https://www.itto.int/biennial\\_review/](https://www.itto.int/biennial_review/)

207 <https://sdgdata.gov.uk/15/>

ACTION TARGETS	SECTOR(S)	METRICS/ INDICATOR(S)
<p><b>Develop a comprehensive programme for agricultural soil management, and maximise the adoption of sustainable agricultural practices</b></p>	<p>Agriculture, food sector, research institutions</p>	<p>Suggested metric: adoption rate of soil conservation practiced; Official indicator: ‘Species supporting ecosystem functions’ (D7 from the 25 Year Environment Plan indicator framework)</p>
<p>Soil degradation, primarily occurring in the agricultural sector, is a key contributor to domestic ecosystem degradation. According to the Environment Agency, 3.9 million hectares are at risk for compaction and more than 2 million hectares are at risk for erosion in England and Wales alone<sup>208</sup>. Additionally, there is no estimate for the area of agricultural land at risk of exhausting natural fertility or degrading soil biotic communities. Improving soil management is a stated goal of the 25 Year Environment Plan and the recent Agricultural Transition Plan sets out a number of programmes intended to reduce the impact of agriculture on the environment<sup>209</sup>. However, it is crucial through advice, guidance and enforcement, existing regulations to minimise erosion<sup>210</sup> and avoid excessive nutrient application<sup>211</sup> are complied with and that long-established good practice is adopted. In the development of new programmes (e.g., the Sustainable Farming Incentive), recognition and reward for farmers who go beyond good practices that mutually benefit agriculture and environment will be important<sup>212</sup>. Support should also extend to enhancing knowledge around the link between healthy soils and more profitable, effective farming. This action is fully aligned with the UK’s commitment to achieve SDG 15.3 (‘By 2030, combat desertification, restore degraded land and soil...’).</p>		
<p><b>Develop a mandatory due diligence and reporting system on the risks to ecosystems, soil and freshwater for companies importing mining and quarrying products</b></p>	<p>Policymakers, importers (of mining and quarrying products)</p>	<p>Suggested metric: % of companies in compliance with reporting and mitigation requirements</p>
<p>Mining and quarrying are significant drivers of ecosystem degradation, especially in developing countries where production is projected to increase at the highest rates to keep pace with global demand – and where environmental regulations are more limited<sup>213</sup>. The government has indicated that it is willing to establish a system of due diligence and reporting for forest products. This system will require importers of forest commodities to assess and mitigate the risk of ecosystem degradation and conversion occurring in producer countries<sup>214</sup>. This mechanism should be extended to – or a comparable mechanism should be created for – imported mining and quarrying products.</p>		

208 Environment Agency (2019). The state of the environment: soil [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/805926/State\\_of\\_the\\_environment\\_soil\\_report.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/805926/State_of_the_environment_soil_report.pdf)

209 Department for Environment, Food & Rural Affairs (2020). Agricultural transition plan 2021 to 2024 <https://www.gov.uk/government/publications/agricultural-transition-plan-2021-to-2024>

210 The Reduction and Prevention of Agricultural Diffuse Pollution (England) Regulations 2018

211 The Nitrate Pollution Prevention Regulations 2015

212 Note that the schemes under the SFI, such as the arable and horticultural soil standard and the improved grasslands soils standard, offer payments for soil conservation and improvement (see: <https://www.gov.uk/government/publications/sustainable-farming-incentive-scheme-pilot-launch-overview/sustainable-farming-incentive-defras-plans-for-piloting-and-launching-the-scheme>). It will be crucial to gauge appetite for these programmes when they begin to roll out officially in 2022; full roll out is from 2024. [2021 onwards will pilot the scheme with increasing numbers of farmers; expanding from late 2022 on; full rollout will be in 2024]. If uptake is low, multi-stakeholder approaches may be required to minimise barriers and further incentivise participation. [While we advocate a ‘top up’ above income foregone + cost incurred representing, but not necessarily equalling the value of, the public good, simply increasing payment rates will use up a limited budget on potentially less impactful activities]

213 Kissinger, G., M. Herold, V. De Sy. (2012). Drivers of Deforestation and Forest Degradation: A Synthesis Report for REDD+ Policymakers. Lexeme Consulting, Vancouver Canada. [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/65505/6316-drivers-deforestation-report.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/65505/6316-drivers-deforestation-report.pdf)

214 Global Resource Initiative (2020). Final Recommendations Report [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/881395/global-resource-initiative.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/881395/global-resource-initiative.pdf)



ACTION TARGETS	SECTOR(S)	METRICS/ INDICATOR(S)
<b>Establish nature-enhancing land and marine uses across at least 25% of the UK</b>	Polymakers, land managers, fishing industry	D1 Quantity, quality and connectivity of habitats (under development) <sup>215</sup>
<p>This Action Target refers to land and seas that are used for production and urban areas: wild species require benign habitats between protected areas if they are to thrive. This will connect core protected areas within broader mosaic of land and marine uses that should be stimulated, such as low-impact mixed forestry, harvesting of natural products, nature-based tourism and high-nature value grazing<sup>216</sup>. In urban areas it will mean ensuring there are substantial wild zones in urban parks; turning road verges into wildflower habitats; ensuring that built development contributes towards nature's recovery<sup>217</sup>. The target extends the ambition in the 25 Year Plan for the Environment (<i>"creating or restoring 500,000 hectares of wildlife-rich habitat outside protected sites"</i>)<sup>218</sup>. This target is additionally aligned with the commitment to conserve 30% of UK land and marine area<sup>219</sup>. However, nature-enhancing uses are not restricted to protected areas.</p>		
<b>Significantly reduce production and imports of sand (and concrete produced from sand) that is mined from ecologically fragile sites (e.g., riverbeds, deep seafloor)</b>	Mining and quarrying, construction and demolition	Suggested metric: tonnes of sand (and concrete) produced and imported from ecologically fragile areas
<p>Sand, used in construction and concrete manufacturing, is increasingly being mined from ecologically sensitive areas (e.g., riverbeds, coastal estuaries, deep sea ecosystems). Researchers warn that overextraction of sand from these ecosystems has put us on track for a 'tragedy of the sand commons' that may cause cascading environmental damages<sup>220</sup>. The UK sources up to 25% of its sand from the sea floor through marine dredging, which can degrade sea floor ecosystems and contribute to coastal erosion<sup>221</sup> (10.4 million tonnes of sand and gravel was produced by marine dredging in UK waters in 2020<sup>222</sup>). Domestic production of sand should ensure that robust environmental impact assessments are conducted before mining begins, and risk for environmental degradation from imported sand (and concrete produced from sand) should be assessed and mitigated.</p>		

## OVERLAPS

Actions to reduce impact in Material Consumption, Biomass Consumption, Water Availability and Flows and Chemical Pollution will contribute to reducing degradation. The Material Consumption and Biomass Consumption topic areas are also minorly linked to Land-use change. Some of the action targets suggested in both of those topic areas will have implications for land-use change, especially those Action Targets that aim to reduce consumption, reduce waste and increase recycling rates. For example, the recommendation to reduce Biomass Consumption by shifting toward a greater share of plant-based protein will also likely reduce the conversion and deforestation risk associated with imported meat.

215 Department for Environment, Food & Rural Affairs (2019). Measuring environmental change: outcome indicator framework for the 25 Year Environment Plan. [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/925779/25-yep-indicators-2019.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/925779/25-yep-indicators-2019.pdf)

216 Rewilding Britain (n.d.). Our Manifesto for Rewilding. <https://www.rewildingbritain.org.uk/about-us/manifesto>

217 Goulson, D. (2019). Insect Declines and Why They Matter <https://www.bbcwildlife.org.uk/sites/default/files/2019-11/Insect%20declines%20BBCWT.pdf>

218 HM Government (2018). A Green Future: our 25 Year Plan to Improve the Environment. <https://www.gov.uk/government/publications/25-year-environment-plan>

219 Department for Environment, Food and Rural Affairs (28 September 2020). Press release: PM commits to protect 30% of UK land in boost for biodiversity. <https://www.gov.uk/government/news/pm-commits-to-protect-30-of-uk-land-in-boost-for-biodiversity>

220 Aurora Torres, Jodi Brandt, Kristen Lear & Jianguo Liu (2017). A looming tragedy of the sand commons. Science 08 Sep 2017: Vol. 357, Issue 6355, pp. 970-971 <https://science.sciencemag.org/content/357/6355/970>

221 Fred Pearce (2019). The Hidden Environmental Toll of Mining the World's Sand. Yale Environment 360. February 5, 2019 <https://e360.yale.edu/features/the-hidden-environmental-toll-of-mining-the-worlds-sand>

222 Monthly Statistics of Building Materials and Components

Published by: Department for Business, Energy and Industrial Strategy (12 April 2021). Monthly Statistics of Building Materials and Components. <https://data.gov.uk/dataset/75ee36ed-21f7-4d7b-9e7c-f5bf4546145d/monthly-statistics-of-building-materials-and-components>

## DATA GAPS AND UPCOMING WORK

Notable data gaps:

- i) There is not a coherent understanding of the UK's footprint of overseas degradation that is embodied in imports. In part, this is because there are numerous mechanisms that drive ecological degradation. These contributors have not been arranged under the heading of degradation, preventing easy comparison.
- ii) No quantifiable/measurable planetary boundary or environmental limit for degradation was found. Well-studied environmental issues that contribute to degradation tend to have expert guidance on best practices and safe limits, some of which are targeted to the UK or EU + UK level. However, there is not a consensus on what would constitute a safe environmental limit for so multifaceted a topic as degradation.
- iii) There is not a clear picture of the UK's consumption-based land-use change footprint – individual studies have estimated the UK's contribution to deforestation and conversion, but not inclusive of all commodities and biomes.
- iv) There is no hectare-based planetary boundary to compare the UK's footprint to – the planetary boundary framework does include a 'land system change' boundary, but it is quantified in terms of the percent of original forest cover that remains intact globally.

Upcoming work:

- v) JNCC is currently developing a suite of indicators to measure the biodiversity impacts of UK consumption<sup>223</sup>.
- vi) Part Two of the National Food Strategy is due for publication in 2021 – this strategy will likely contain recommendations for food system reforms that may shape demand for land-based commodities.
- vii) The Sustainable Farming Incentive is beginning a pilot phase in 2021 – results of the pilot will inform the UK's approach to agricultural soil management.
- viii) WWF soil health guides based on UK Soil Health Initiative data are forthcoming for six different farming systems.
- ix) WWF and the Sustainable Soils Alliance are assessing the potential role for retailers in farm-level soil health. Proposed work areas include stakeholder engagement on a prospective retailer soils standard and investigation into the role of soil monitoring in increased soil health outcomes.

## KEY MESSAGES

Beyond direct investment in sustainable and equitable land use systems, the government's most efficacious role in this arena is to create regulations, guardrails and incentives that make it easier for producer countries to protect the environment while they interact with the global system for trade in land-based commodities. This starts with managing how environmentally damaging imports to the UK are permitted to be, but also extends to the UK's role as a global power in international trade. Any target to halt conversion and deforestation should include both illegal and legal conversion and deforestation.

Significant work is needed to define a total consumption-based degradation footprint for the UK.

The UK's ability to mitigate degradation occurring as a result of international trade depends on the ability to monitor the degree to which commodities are sourced from risk-prone areas and sectors.

While there is no planetary boundary to define the safe ecological thresholds for degradation, the UK should embrace a precautionary approach to minimise the well-understood ecological harms caused by degradation at home and abroad.

<sup>223</sup> Joint Nature Conservation Committee (n.d.). Assessing the environmental impacts of UK supply chains. <https://jncc.gov.uk/our-work/environmental-impacts-of-uk-supply-chains/#assessing-impacts>





**NUTRIENT  
USE**





## NUTRIENT USE

Nutrient use relates to the addition of nitrogen and phosphorus to agricultural land in inorganic and organic fertiliser. Nutrient efficiency is recognised by the UK agriculture industry as crucial for business and environmental reasons<sup>224</sup> and regulations in England<sup>225</sup>, Wales<sup>226</sup> and Scotland<sup>227</sup> limit fertiliser use to match crop requirements, at least for nitrogen. However, rates of nitrate and phosphate use in the UK are over twice as high as the average amongst other European countries<sup>228</sup>. There is also significant global inequality: as some parts of the world import (and waste) significant quantities of nitrogen and phosphate to the point where they have become serious pollutants, other regions - such as large parts of Africa – have insufficient fertiliser.

Most phosphate fertiliser is derived from phosphate rock extracted via highly destructive surface mining in places like North Africa, the Middle East and Russia<sup>229,230</sup>. Whilst these finite 'primary' phosphate resources are being depleted, an estimated 80-95% of primary phosphate is lost to the environment throughout the stages of production, processing, use and consumption<sup>231</sup>. In particular, significant amounts are lost to waterways in wastewater discharge. Techniques exist for the recovery of this 'secondary' phosphorus for use as fertiliser, but adoption in the UK is minimal.

Nitrogen is readily available in the atmosphere but the industrial process to 'fix' it for use in fertiliser is highly energy intensive and can be up to 50% of the energy use associated with industrial agriculture<sup>232</sup>. Rates of nitrate fertiliser application in the UK are amongst the highest in the world<sup>233</sup> whilst the average efficiency of nitrogen use on farms is only around 60%<sup>234</sup>. Rates of nitrogen fertiliser use have remained relatively steady over the past 10 years<sup>235</sup>. A significant proportion of the nitrogen fertiliser used in the UK is imported from overseas<sup>236</sup>.

Animal manures are also used as a source of nutrients on farmland and can reduce the use of synthetic fertilisers, thereby reducing associated impacts of extraction and production. The geographic division of crop and animal farming in the UK means manure is mostly currently used on grassland within the livestock farms in which it is produced, rather than on cropland<sup>237</sup>.

In this topic area, the focus is on the amount and efficiency of nutrient use and particularly that of manufactured fertilisers, the impacts of which are damaging extraction, energy intensive manufacturing, and depletion of finite resources. Use in the UK for production is well measured and quantified. However, there is also significant nutrient use embedded within imports to the UK. The use of nutrients overseas for the

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224 Tried & Tested (NFU) (2019) Nutrient Management Plan <https://www.nutrientmanagement.org/assets/118297>; National Farmers Union (2019) NFU unveils its plan for British farming to deliver net zero. <https://www.nfuonline.com/news/latest-news/nfu-unveils-its-plan-for-british-farming-to-deliver/>

225 Defra & Environment Agency (2018). Using nitrogen fertilisers in nitrate vulnerable zones. <https://www.gov.uk/guidance/using-nitrogen-fertilisers-in-nitrate-vulnerable-zones#how-much-nitrogen-you-can-apply-to-your-crops>

226 Welsh Government (2021) The Water Resources (Control of Agricultural Pollution) (Wales) Regulations 2021 Guidance for Farmers and Land Managers. <https://gov.wales/sites/default/files/publications/2021-03/water-resources-control-of-agricultural-pollution-wales-regulations-2021-guidance-for-farmers-and-landmanagers.pdf>

227 SEPA (2019). The Water Environment (Controlled Activities) (Scotland) Regulations 2011 (as amended) A Practical Guide. Version 8.4. [https://www.sepa.org.uk/media/34761/car\\_a\\_practical\\_guide.pdf](https://www.sepa.org.uk/media/34761/car_a_practical_guide.pdf)

228 FAOSTAT <http://www.fao.org/faostat/en/#data/> via <https://ourworldindata.org/fertilizers>

229 United Nations Environment Programme and International Fertilizer Industry Association (2001). Environmental Aspects of Phosphate and Potash Mining <https://wedocs.unep.org/bitstream/handle/20.500.11822/8071/-Environmental%20Aspects%20of%20Phosphate%20and%20Potash%20Mining-20011385.pdf>

230 House of Parliament (2014). Phosphate resources. PostNote Number 477, August 2014. <https://post.parliament.uk/research-briefings/post-pn-477/>

231 House of Parliament (2014). Phosphate resources. PostNote Number 477, August 2014. <https://post.parliament.uk/research-briefings/post-pn-477/>

232 Woods, J., Williams, A., Hughes, J.K., Black, M., & Murphy, R. (2010). Energy and the food system. *Philos Trans R Soc Lond B Biol Sci.* 2010 Sep 27; 365(1554): 2991–3006. doi: 10.1098/rstb.2010.0172

233 Oita, A., Malik, A., Kanemoto, K. et al. Substantial nitrogen pollution embedded in international trade. *Nature Geosci* 9, 111–115 (2016). <https://doi.org/10.1038/ngeo2635>

234 Richard Allison (05 February 2019). 6 steps to improve your fertiliser use efficiency. *Farmers Weekly* [https://www.fwi.co.uk/arable/crop-management/nutrition-and-fertiliser/6-steps-to-improve-your-fertiliser-use-efficiency-and-CF-Fertilisers-\(n.d.\).-Nitrogen-Fertiliser-Use-Efficiency](https://www.fwi.co.uk/arable/crop-management/nutrition-and-fertiliser/6-steps-to-improve-your-fertiliser-use-efficiency-and-CF-Fertilisers-(n.d.).-Nitrogen-Fertiliser-Use-Efficiency)

235 Statista (2021). Usage of nitrogen fertilizer in Great Britain (GB) from 2011 to 2019. <https://www.statista.com/statistics/659270/overall-nitrogen-fertilizer-usage-uk/>

236 Dampney et al. 2003. Production and use of nitrogen fertilisers. [http://randd.defra.gov.uk/Document.aspx?Document=NT2605\\_4062\\_FRP.doc](http://randd.defra.gov.uk/Document.aspx?Document=NT2605_4062_FRP.doc)

237 Defra (2020). British Survey of Fertiliser Practice. [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/894211/fertiliseruse-statsnotice2019-23jun20.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/894211/fertiliseruse-statsnotice2019-23jun20.pdf)

production of these goods for UK consumption is thus far poorly quantified, although upcoming work from JNCC and SEI on indicators for the overseas impact of UK consumption is due to include some consideration of nitrogen/phosphorus emissions.

Losses of excess nitrogen and phosphorus are also a major driver of water pollution, air pollution and climate change<sup>238</sup>. This is true of both manufactured fertilisers and animal manure and both should be applied according to strict guidelines to limit negative impacts. See these Topic Areas for additional targets related to the impact of nutrient loss.

OUTCOME TARGET:

REDUCE NITROGEN (N) AND PHOSPHORUS (P) USE BY AT LEAST 80%

Rates of nitrogen and phosphorus use in the UK are – and have historically been – amongst the highest in the world. To meet per capita planetary boundaries, the UK’s per capita nitrogen and phosphorus footprints need to be reduced by more than 80%<sup>239</sup>. In the UK, cereal farming is the biggest user of nitrates and general crop farming is the biggest users of phosphate<sup>240</sup>. The efficiency of P and N use is low and losses are high. Losses from farmland are a significant issue for both N and P whilst wastewater discharge by sewage treatment plants is also a hotspot for P loss to waterways. The over-use of nutrients has received limited attention to date and there are currently no UK policies to address security of supply or recycling<sup>241</sup>. Addressing the issue will require a reduction in the quantity of nutrients used as well as a reduction in losses. There is also significant N and P use (and pollution) embedded within imports to the UK<sup>242</sup> but limited analysis or policy to date to address this<sup>243</sup>. Efforts to address the UK’s N and P footprint must therefore include tracing and quantifying the N and P associated with the overseas production of UK imports and measures to facilitate a reduction in nutrient use in key regions the UK imports from.

ACTION TARGETS	SECTOR(S)	METRICS/ INDICATOR(S)
Significantly reduce use of primary phosphorus on farmland through measures to increase the specificity of fertiliser application and reduce losses	Agriculture	Metric tbd

Agriculture is the main user of primary phosphate<sup>244</sup>. Up to 10% of the phosphorus applied to farmland is lost to water bodies<sup>245</sup>. Greater efficiency of application, for example through precision agriculture techniques, can contribute to reducing the amount of phosphorus fertilisers applied. Currently there are no government targets addressing rates of phosphorus use or the issues of extraction of primary phosphate<sup>246</sup>. Reducing losses complements intended Environment Bill targets to reduce phosphorus pollution from agriculture<sup>247</sup> (see the Water Pollution chapter).

238 Erisman, J.W., Galloway, J.N., Dise, N.B., Sutton, M.A., Bleeker, A., Grizzetti, B., Leach, A.M. & de Vries, W. (2015). Nitrogen: too much of a vital resource. WWF Netherlands. [http://www.n-priint.org/sites/default/files/docs/WWF%20Science%20Brief\\_Nitrogen.pdf](http://www.n-priint.org/sites/default/files/docs/WWF%20Science%20Brief_Nitrogen.pdf)

239 Planetary boundaries adapted from: <https://www.nature.com/articles/s41893-018-0021-4>, UK per capita footprint adapted from: <https://goodlife.leeds.ac.uk/>. Calculation = (UK footprint – planetary boundary footprint)/UK footprint\*100

240 Department for Environment, Food & Rural Affairs (2020). Fertiliser usage on farms: Results from the Farm Business Survey, England 2018/19 [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/894688/fbs-fertiliseruse-statsnotice-25jun20.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/894688/fbs-fertiliseruse-statsnotice-25jun20.pdf)

241 House of Parliament (2014). Phosphate resources. PostNote Number 477, August 2014. <https://post.parliament.uk/research-briefings/post-pn-477/>

242 Oita, A., Malik, A., Kanemoto, K. et al. Substantial nitrogen pollution embedded in international trade. Nature Geosci 9, 111–115 (2016). <https://doi.org/10.1038/ngeo2635>

243 European Environment Agency (2020). Is Europe living within the limits of our planet? An assessment of Europe’s environmental footprints in relation to planetary boundaries. Joint EEA/ FOEN Report, EEA Report No 01/2020 <https://www.eea.europa.eu/publications/is-europe-living-within-the-planets-limits#:~:text=The%20study%20explores%20different%20ways,yet%20living%20within%20those%20limits.&text=This%20means%20that%20production%20and,the%20rest%20of%20the%20world>

244 Brunner, P.H. (2010). Substance Flow Analysis as a Decision Support Tool for Phosphorus Management. Journal of Industrial Ecology. <https://doi.org/10.1111/j.1530-9290.2010.00300.x>

245 House of Parliament (2014). Phosphate resources. PostNote Number 477, August 2014. <https://post.parliament.uk/research-briefings/post-pn-477/>

246 House of Parliament (2014). Phosphate resources. PostNote Number 477, August 2014. <https://post.parliament.uk/research-briefings/post-pn-477/>; In England and Wales, there are no direct regulatory controls on rates of phosphorus use on farmland. In Scotland, however, the Water Environment (Controlled Activities) (Scotland) Regulations 2011, state that fertilisers must not be applied in excess of the nutrient needs of the crop

247 Department for Environment, Food & Rural Affairs (2020). Environment Bill - environmental targets. Policy paper <https://www.gov.uk/government/publications/environment-bill-2020/august-2020-environment-bill-environmental-targets>

ACTION TARGETS	SECTOR(S)	METRICS/ INDICATOR(S)
<p><b>Increase phosphorus recycling from wastewater by 60% using techniques (such as biological phosphate removal followed by struvite recovery) which precipitate phosphorus in a form that can be used as fertiliser</b></p>	<p>Water and sewerage managers, policymakers</p>	<p>Average % P recovery across water treatment plants</p>
<p>A major hotspot for P losses in the UK is in wastewater discharge from water and sewage treatment plants (STPs). Analyses suggest a 60-70% phosphorus recycling target is achievable for STPs<sup>248,249</sup>. In the UK, there are currently no financial or regulatory incentives for water companies to recover phosphate in a form that can be used by agriculture. Measures are in development and already exist in other countries. For example, Sweden has a law targeting minimum P recycling from wastewater<sup>250</sup>. Achieving this target will also contribute to addressing P pollution in water (see Water Pollution topic area).</p>		
<p><b>Use 50% recycled phosphate in manufactured fertiliser</b></p>	<p>Fertiliser manufacturers, policymakers, agriculture</p>	<p>% recycled phosphate in manufactured fertiliser</p>
<p>Using ‘secondary’ phosphate in fertiliser reduces the extraction of primary phosphate rock. Examples exist in other countries, for example a fertiliser plant in the Netherlands has agreed with the government to use 100% recycled phosphate by 2025<sup>251</sup>.</p>		
<p><b>Increase the use of biosolids from Sewage Treatment Plants on farmland (in line with standards of the Biosolids Assurance Scheme)</b></p>	<p>Water and sewerage managers, policymakers, agriculture</p>	<p>% of recovered biosolids used as fertiliser</p>
<p>Between 50-75% of biosolids produced from sewage treatment plants (STPs) are regularly returned to agricultural land as fertiliser in the UK<sup>252,253</sup>, however, this is largely limited to urban areas, close to the location of STPs treating urban wastewater. The remaining proportion is generally disposed of via incineration or landfill<sup>254</sup>. Maximising the use of recovered P in biosolids could reduce the UK’s imports of primary P by around one third<sup>255</sup>. Achieving this could involve; reviewing legislation on the application of biosolids to farmland in light of the Biosolids Assurance Scheme, economic incentives to use biosolid-based fertiliser rather than phosphate fertiliser, and supporting research and innovation to make biosolids easier to handle and use as agricultural fertiliser.</p>		

248 Cooper, J. (2014). Managing phosphorus in the UK water industry to increase national resource security. A thesis submitted to The University of Birmingham for the degree of Doctor of Philosophy, The University of Birmingham. <https://etheses.bham.ac.uk/id/eprint/5764/1/Cooper15PhD.pdf>

249 Kleeman, R., Chenoweth, J., Clift, R., Morse, S., Pearce, P. & Saroj, D. (2015). Evaluation of local and national effects of recovering phosphorus at wastewater treatment plants: Lessons learned from the UK. Resources, Conservation and Recycling. Volume 105, Part B, December 2015, Pages 347-359 <https://www.sciencedirect.com/science/article/abs/pii/S0921344915300847>

250 House of Parliament (2014). Phosphate resources. PostNote Number 477, August 2014. <https://post.parliament.uk/research-briefings/post-pn-477/>

251 House of Parliament (2014). Phosphate resources. PostNote Number 477, August 2014. <https://post.parliament.uk/research-briefings/post-pn-477/>

252 House of Parliament (2014). Phosphate resources. PostNote Number 477, August 2014. <https://post.parliament.uk/research-briefings/post-pn-477/>

253 Kleeman, R., Chenoweth, J., Clift, R., Morse, S., Pearce, P. & Saroj, D. (2015). Evaluation of local and national effects of recovering phosphorus at wastewater treatment plants: Lessons learned from the UK. Resources, Conservation and Recycling. Volume 105, Part B, December 2015, Pages 347-359 <https://www.sciencedirect.com/science/article/abs/pii/S0921344915300847>

254 Biosolids Assurance Scheme (2021). <https://assuredbiosolids.co.uk/>

255 Kleeman, R., Chenoweth, J., Clift, R., Morse, S., Pearce, P. & Saroj, D. (2015). Evaluation of local and national effects of recovering phosphorus at wastewater treatment plants: Lessons learned from the UK. Resources, Conservation and Recycling. Volume 105, Part B, December 2015, Pages 347-359 <https://www.sciencedirect.com/science/article/abs/pii/S0921344915300847>



ACTION TARGETS	SECTOR(S)	METRICS/ INDICATOR(S)
<b>Trace and quantify the total footprint of nitrogen and phosphorus embedded in UK imports and formulate policies that facilitate a significant reduction in nutrient over-use amongst agricultural producers in countries from which the UK is a major importer of agricultural products (food, feed and fibre)</b>	polymakers, research institutions, commodity traders	To be determined
<p>There is significant N and P use (and pollution) embedded within imports to the UK<sup>256</sup>. As imports of food and feed to the UK increase, so does its global N and P footprint<sup>257</sup>. There is relatively limited analysis to quantify this overseas impact and existing policy in the UK and in Europe does not explicitly address the external N and P footprint of domestic consumption<sup>258</sup>. The UK must adopt the responsibility for addressing nutrient use associated with its imports rather than making it the responsibility of the producer countries. P depletion from soils is a critical issue globally, with water erosion of soils being a particularly urgent challenge<sup>259</sup>.</p>		
<b>Increase nitrogen use efficiency to at least 80% for all farmers through the use of farming techniques that tailor the rate, timing and accuracy of nitrogen applications to current conditions</b>	Agriculture	Nitrogen Use Efficiency (NUE), %
<p>The average efficiency of nitrogen use on UK farms – that is, the proportion of added nitrogen that is used by crops – is currently around 60%. Better efficiency is achievable through more precise application techniques<sup>260</sup>. This applies to both manufactured fertilisers and animal manures.</p>		
<b>Increase the use of nitrogen-conserving farming practices</b>	Agriculture	% of farmers adopting practices
<p>Reducing the leaching of nitrates from soil reduces the quantity that then needs to be applied whilst also reducing emissions to air and water (see the Water Pollution and Air Pollution topic areas). Existing techniques include legumes in crop rotations, winter cover crops and applying nutrients according to strict practice guidelines which reduce leaching. The rules for farmers within Nitrate Vulnerable Zones – areas designated due to levels of nitrate pollution and which currently cover 55% of land in England– include closed periods for fertiliser and manure application, restrictions on spreading slurry and storage requirements<sup>261</sup>. Similar rules could be extended to the whole of the UK.</p>		
<b>Increase the use of phytase enzyme in animal feed to increase uptake of phosphorus from food in monogastric animals such as pigs</b>	Agriculture (animal husbandry)	Metric tbd
<p>Around 5% of global phosphate is used as an additive in animal feed because the uptake by animals of P from plant-based feed is limited. Phytase increases this uptake of P from plant-based feed, reducing the need for additional P<sup>262</sup>.</p>		

<sup>256</sup> Oita, A., Malik, A., Kanemoto, K. et al. Substantial nitrogen pollution embedded in international trade. *Nature Geosci* 9, 111–115 (2016). <https://doi.org/10.1038/ngeo2635>

<sup>257</sup> Worrall et al (2016). The UK's total nitrogen budget from 1990 to 2020: a transition from source to sink? <https://link.springer.com/article/10.1007/s10533-016-0234-4>

<sup>258</sup> European Environment Agency (2020). Is Europe living within the limits of our planet? An assessment of Europe's environmental footprints in relation to planetary boundaries. Joint EEA/FOEN Report, EEA Report No 01/2020 <https://www.eea.europa.eu/publications/is-europe-living-within-the-planets-limits#:~:text=The%20study%20explores%20different%20ways,yet%20living%20within%20those%20limits.&text=This%20means%20that%20production%20and,the%20rest%20of%20the%20world>

<sup>259</sup> Alewell, C., Ringeval, B., Ballabio, C. et al. (2020). Global phosphorus shortage will be aggravated by soil erosion. *Nat Commun* 11, 4546. <https://doi.org/10.1038/s41467-020-18326-7>

<sup>260</sup> Richard Allison (05 February 2019). 6 steps to improve your fertiliser use efficiency. *Farmers Weekly* <https://www.fwi.co.uk/arable/crop-management/nutrition-and-fertiliser/6-steps-to-improve-your-fertiliser-use-efficiency>

<sup>261</sup> Natalie Noble (12 April 2021). The rules for arable farming in an NVZ in England. *Farmers Weekly*. <https://www.fwi.co.uk/business/compliance/nvzs/the-rules-for-arable-farming-in-an-nvz-in-england>

<sup>262</sup> House of Parliament (2014). Phosphate resources. PostNote Number 477, August 2014. <https://post.parliament.uk/research-briefings/post-pn-477/>

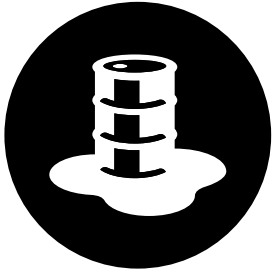
<b>OVERLAPS</b>	<p>Losses of excess P and N from farmland (and, for P, in wastewater discharge) is a major contributor to climate change, air and water pollution. Other relevant targets can therefore be found in the Water Pollution, Air Pollution and Greenhouse Gas topic areas.</p> <p>Nutrient use in farming is closely linked to food consumption habits and is therefore incorporated within some targets in the Biomass Consumption topic area.</p>
<b>DATA GAPS AND UPCOMING WORK</b>	<p>There is limited analysis on nutrient use overseas associated with the production of goods for UK consumption. This will require improved traceability of imports to a producer level.</p>
<b>KEY MESSAGES</b>	<p>There is a need for action to increase the efficiency of nutrient use and increase nutrient recovery and recycling. Overseas nutrient use associated with UK consumption needs to be traced and quantified.</p>



# CHEMICAL POLLUTION







## CHEMICAL POLLUTION

Chemical pollution refers to the release and accumulation of toxic substances in the environment. Chemical pollution can come in many forms, as many of the products and by-products of economic activities are acutely toxic or have the potential to become toxic under certain conditions. For example, fossil fuels combustion and industrial processes can release dangerous heavy metals into the atmosphere<sup>263</sup> and agricultural pesticides can be devastating to beneficial organisms like pollinators<sup>264</sup>. The consequences of these substances entering the environment are as varied as the sources of their release. Pollutants can cause illness and death to humans and wildlife, reduce the ability of ecosystems to perform their essential functions, contaminate soil and water and more.

Most chemical pollutants are monitored in terms of maximum thresholds, releases above which pose risks to living creatures and ecosystems<sup>265</sup>. Given the variation across individual pollutants, there is not a specific estimated planetary ecological limit associated with chemical pollution. For some especially harmful pollutants, the safe threshold is zero. For others, safe levels depend on conditions like the ecosystem into which pollutants are released – one set of organisms may be able to cycle pollutants that would be uniquely harmful to another. For this reason, the ecological threshold for each pollutant can vary. Adhering to a principle of precaution, the overall target therefore should be taken as 'limit chemical pollution to levels at or below allowable levels for individual pollutants of concern'.

Chemical pollution occurs domestically in the UK as a result of production and is relatively well measured and monitored. A significant amount of chemical pollution is also embedded in the UK's imports from overseas. There is very little quantification or tracing of the overseas chemical pollution associated with UK consumption.

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<sup>263</sup> Department for Business, Energy & Industrial Strategy (n.d.). National Atmospheric Emissions Inventory. Mercury. [https://naei.beis.gov.uk/overview/pollutants?pollutant\\_id=15](https://naei.beis.gov.uk/overview/pollutants?pollutant_id=15)

<sup>264</sup> Schulz, R., Bub, S., Petschick, L.L., Stehle, S., & Wolfram, J. (2021). Applied pesticide toxicity shifts toward plants and invertebrates, even in GM crops. *Science* Vol. 372, Issue 6537, pp. 81-84. DOI: 10.1126/science.abe1148

<sup>265</sup> Department for Environment, Food & Rural Affairs (n.d.). Pollutant & thresholds list. <https://prtr.defra.gov.uk/pollutant-list>

## OUTCOME TARGET: REDUCE THE EMISSIONS OF ALL CHEMICAL POLLUTANTS TO LEVELS AT OR BELOW SAFE THRESHOLDS (PREVENTING EMISSIONS WHERE RISKS ARE UNKNOWN) AND RESTORE SOCIAL AND ECOLOGICAL SYSTEMS DAMAGED BY CHEMICAL POLLUTION

As the ecological threshold for each pollutant can vary, the boundary of chemical pollution has been set as ‘under allowable levels’ as defined by the relevant body. This approach defers to the expertise of science. In addition, it acknowledges that the understanding of a pollutant’s harm can evolve over time. Because there is no unified indicator for chemical pollution, a quantitative outcome target based on an overall reduction by 2030 has not been set. Instead, the outcome target for this topic area reflects the need to understand and act to prevent all forms of harmful chemical pollution.

ACTION TARGETS	SECTOR(S)	METRICS/ INDICATOR(S)
<b>Identify and address major causes of chemical pollution associated with the production of goods for UK consumption overseas</b>	Polymakers, research institutions, importers	To be developed
<p>To date there has been very limited evaluation and quantification of the impact of UK consumption on chemical pollution overseas. A huge range of activities involved in production of goods for UK consumption will contribute to chemical pollution occurring at a local level. Forthcoming work by JNCC on indicators to measure the overseas impact of UK consumption may include the local impacts of chemical pollution<sup>266</sup>. If chemical pollution is not included in that body of work, efforts could begin by mapping the most chemically polluting industries, then identifying overlap with top UK trading partners.</p>		
<b>Minimise the generation of hazardous waste and treat 100% of hazardous waste before disposal</b>	Waste management, policymakers	Official indicator: Hazardous waste generated, % of hazardous waste treated (SDG indicator 12.4.2) <sup>267</sup>
<p>As of 2016, only 43% of hazardous waste generated in the UK was treated. Further, the proportion of treated hazardous waste has decreased while the generation of hazardous waste has increased since 2010<sup>268</sup>. It is apparent from these trends that this issue is not currently well addressed. This action is aligned with the 25 Year Environment Goal of ‘managing exposure to chemicals’<sup>269</sup>, and with the UK’s commitments under SDG 12.4 (‘... By 2020, achieve the environmentally sound management of chemicals and all wastes throughout their life cycle...’).</p>		

<sup>266</sup> See JNCC (2020). A4. Global biodiversity impacts of UK economic activity / sustainable consumption <https://jncc.gov.uk/our-work/ukbi-a4-global-biodiversity-impact/>. Note that if chemical pollution is not included in the first iteration of these metrics, then it is possible that it will be in future versions.

<sup>267</sup> <https://sdgdata.gov.uk/12-4-2/>

<sup>268</sup> <https://sdgdata.gov.uk/12-4-2/>

<sup>269</sup> HM Government (2018). A Green Future: our 25 Year Plan to Improve the Environment. <https://www.gov.uk/government/publications/25-year-environment-plan>

ACTION TARGETS	SECTOR(S)	METRICS/ INDICATOR(S)
<b>Reduce land-based emissions of mercury to air and water by 50% by 2030</b>	Transportation, industry (e.g. nonferrous metal production), energy providers	Official indicator: in development
<p>This action is taken directly from a 25 Year Environment Plan target<sup>270</sup>. Land-based emissions of mercury occur largely from combustion of coal, industrial processes (e.g. metal production) and disposal of mercury to landfills. 2019 Pollution Inventory data shows that 1.3 tonnes of mercury was released to the air, but land-based emissions to water are currently unknown<sup>271</sup>. While a 50% reduction target is appropriate, progress monitoring for the 25 Year Environment Plan indicates that, beyond there being no official indicator for measuring this ambition, further action will be needed to achieve this goal<sup>272</sup>. Significant tightening of controls will likely be needed to reach the 50% reduction target.</p>		
<b>Substantially increasing the amount of persistent organic pollutants (POPs) material being destroyed or irreversibly transformed by 2030, to make sure there are negligible emissions to the environment</b>	Waste management	Official indicator: in development
<p>This action is taken directly from a 25 Year Environment Plan target<sup>273</sup>. Persistent organic pollutants (POPs) are a range of toxic chemical pollutants that do not easily break down under natural conditions. While many (eg DDT) have been phased out of use, it is necessary to irreversibly transform waste containing POPs to ensure that they do not re-enter the environment. As of 2019, there was no official indicator or monitoring programme for tracking persistent organic pollutants. The government indicates that ‘Further work is required to develop the indicator...’<sup>274</sup>. This suggests that inadequate progress has been made to date. Significant tightening of controls will likely be needed to reach the goal of ‘substantially’ increasing the amount of POP-containing material being destroyed.</p>		
<b>Reduce the rates of application and toxicity of chemical pesticides by 50% by 2030</b>	Agriculture, policymakers	Suggested indicators: pesticide application rates; pesticide toxicity risks
<p>This action is in line with the EU’s proposed target to reduce by 50% the overall use of – and risk from – chemical pesticides by 2030 in the European Green Deal<sup>275</sup>. There is currently no quantified pesticide risk reduction target in the UK, and experts worry that protections for ecosystems and pollinators may weaken after leaving the EU. This action is advocated by the Pesticide Action Network (PAN) with apparent increasing support amongst policymakers<sup>276</sup>. This action is also supported by other advocacy groups, such as Food Research and Collaboration<sup>277</sup>.</p>		

<sup>270</sup> HM Government (2018). A Green Future: our 25 Year Plan to Improve the Environment. <https://www.gov.uk/government/publications/25-year-environment-plan>

<sup>271</sup> Environment Agency (Last updated: 25 February 2021). Pollution Inventory. <https://data.gov.uk/dataset/cfd94301-a2f2-48a2-9915-e477ca6d8b7e/pollution-inventory>

<sup>272</sup> H.M. Government (2020). 25 Year Environment Plan Progress Report: April 2019 to March 2020. [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/891783/25yep-progress-report-2020.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/891783/25yep-progress-report-2020.pdf)

<sup>273</sup> HM Government (2018). A Green Future: our 25 Year Plan to Improve the Environment. <https://www.gov.uk/government/publications/25-year-environment-plan>

<sup>274</sup> H.M. Government (2020). 25 Year Environment Plan Progress Report: April 2019 to March 2020. [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/891783/25yep-progress-report-2020.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/891783/25yep-progress-report-2020.pdf)

<sup>275</sup> Pesticide Action Network (2020). PAN Europe reveals: Member States act against EU pesticide reduction. <https://www.pan-europe.info/press-releases/2020/12/pan-europe-reveals-member-states-act-against-eu-pesticide-reduction>

<sup>276</sup> See: Pesticide Action Network UK (2018). Introducing a UK Pesticide Reduction Target

<https://www.pan-uk.org/site/wp-content/uploads/Introducing-a-pesticide-reduction-target.pdf>

<sup>277</sup> Josie Cohen, Nick Mole & Keith Tyrell (n.d.). Brexit and pesticides: UK food and agriculture at a crossroads. Food Research Collaboration <https://foodresearch.org.uk/publications/brexit-pesticides-crossroads/>



ACTION TARGETS	SECTOR(S)	METRICS/ INDICATOR(S)
<p><b>Prevent weakening of UK pesticide standards through future trade deals following UK leaving the EU</b></p>	<p>Policymakers</p>	<p>Suggested indicators: residues of prohibited pesticides present on imported commodities</p>
<p>This action is suggested by the Wildlife Trusts<sup>278</sup> and supported by other advocacy groups, such as Food Research and Collaboration<sup>279</sup>. Post-Brexit, the UK will have the option to alter the relatively stringent pesticide restrictions upheld by the EU. Trade deals with partners who have considerably weaker pesticide controls (i.e., Australia, the USA and China) have the potential to put pressure on the UK to slacken regulations that prevent imports of commodities produced with previously-banned pesticides. According to the Pesticide Action Network, UK pesticide standards are a key point of contention for prospective trade partners, and there are clear efforts by these partners to weaken standards in an effort to open markets for products that would otherwise be prohibited<sup>280</sup>. Strong legal guidance on allowable pesticides, with specific provisions preventing exceptions for traded goods and commodities, will be required.</p>		
<p><b>Facilitate the widespread domestic adoption of practices that reduce the use of chemical pesticides</b></p>	<p>Agriculture, policymakers</p>	<p>Suggested indicators: hectares under production with Integrated Pest Management plans; hectares under organic production</p>
<p>Domestic produce cultivated with pesticides commonly carries residues of chemicals which are designed for their acute toxicity<sup>281</sup>. Supported practices should go beyond existing basic standards such as Integrated Pest Management and move towards more ambitious agroecological and organic practices. Agroecological and sustainable farming practices, like cover cropping, can reduce the overall demand for pesticides (by replicating the pest repelling functions of pesticides) and additionally reduce pesticide runoff<sup>282</sup>. Government support for farming practices that reduce the use of pesticides will likely fall under the Environmental Land Management Scheme<sup>283</sup>. Such programmes should be resourced to fully meet demand and actively seek to recruit new farmers.</p>		
<p><b>Rehabilitate areas of contaminated soil, including ‘special sites’ under the purview of the Environment Agency</b></p>	<p>Policymakers, land managers</p>	<p>Official indicator: contaminated land special sites</p>
<p>330 hectares across 47 locations are designated as un-remediated ‘special sites’ by the Environment Agency. The oldest of these un-remediated sites dates back to 2000<sup>284</sup>. Further, the Environmental Audit Committee estimated that approximately 300,000 hectares of soil were chemically contaminated in 2005 – the most recent year for which data is available<sup>285</sup>. Additional resources should be allocated to understanding the total footprint of chemically contaminated land in the UK, and additional effort should be put toward remediating this area so that environmental risks are minimised.</p>		

278 Goulson, D. (2020). Reversing the Decline of Insects. The Wildlife Trusts. <https://www.staffs-wildlife.org.uk/news/new-report-calls-ambitious-pesticide-reduction-target>

279 Josie Cohen, Nick Mole & Keith Tyrell (n.d.). Brexit and pesticides: UK food and agriculture at a crossroads. Food Research Collaboration <https://foodresearch.org.uk/publications/brexit-pesticides-crossroads/>

280 Pesticide Action Network UK (2020). Toxic Trade: How trade deals threaten to weaken UK pesticide standards. <https://www.pan-uk.org/toxic-trade/> It should also be noted that maintaining pesticide regulations on par with the EU will allow UK farmers to continue to export to those countries.

281 47.6% of 2019 products tested for residues had pesticide traces at or below the acceptable threshold. 2.88% of products had residues above the maximum limit. See: Department for Environment, Food and Rural Affairs (2019). The Expert Committee on Pesticide Residues in Food (PRiF) Annual Report 2019. [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/932348/expert-committee-pesticide-residues-food-annual-report-2019.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/932348/expert-committee-pesticide-residues-food-annual-report-2019.pdf)

282 Sustainable Agriculture Research and Education (2012). Managing Cover Crops Profitably. Third Edition. <https://www.sare.org/wp-content/uploads/Managing-Cover-Crops-Profitably.pdf>

283 Department for Environment, Food & Rural Affairs (2020). Agricultural transition plan 2021 to 2024. <https://www.gov.uk/government/publications/agricultural-transition-plan-2021-to-2024>

284 Environment Agency (Last updated: 09 September 2019). Contaminated Land Special Sites. <https://data.gov.uk/dataset/e3770885-fc05-4813-9e60-42b03ec411cf/contaminated-land-special-sites>

285 Environment Agency (2019). The state of the environment: soil. [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/805926/State\\_of\\_the\\_environment\\_soil\\_report.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/805926/State_of_the_environment_soil_report.pdf)

## OVERLAPS

This topic area overlaps to a degree with the Water Pollution, Air Pollution, Nutrient Use and Greenhouse Gas topic areas. Chemical Pollution has been designated as the topic area used to capture other sources and pathways of pollution that are not well addressed under one of the above topic areas.

Other topic areas contributing to achieving the outcome target for Chemical Pollution:

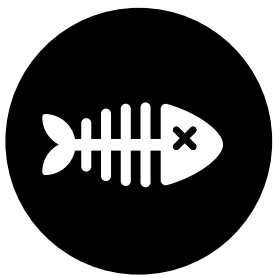
- i. Greenhouse Gas – emissions reduction actions often overlap with actions that will reduce the emissions of pollutants caused by fossil fuel combustion.
- ii. Material and Biomass Consumption – reduced consumption of many categories of material will likely reduce the local impacts of chemical pollution (e.g. reduced imports of mining and quarrying products is likely to reduce the UK's contribution to chemical leakages from mines).





# **WATER POLLUTION**





## WATER POLLUTION

Water pollution is a significant challenge in the UK. The 2019 water quality assessment under the Water Framework Directive shows that only 36% of water bodies in the UK were high or good status, and there has been little change in water quality since 2009<sup>286</sup>. Surface waters with good status support a high diversity of aquatic invertebrates, fish, mammals and birds.

Phosphorus (P) is the most significant pollutant in the UK in terms of water bodies failing to achieve good ecological status, with over half of rivers failing to meet standards for phosphorus. Nitrates are a significant issue for coastal areas and estuaries. Both phosphorus and nitrates cause eutrophication, which has adverse impacts on aquatic life, water quality and water uses. Trials of new technologies at sewage treatment works have resulted in a tightening of the ‘Technically Achievable Limit’ for phosphorus in wastewater discharges to 0.25mg/l. Standards for phosphorus levels in water bodies in the UK are tailored to specific sites depending on factors such as alkalinity and height above sea level, and vary between 0.05 and 0.1mg/l for good ecological status<sup>287</sup>. In 2009 (the most recent data found), 50% of river lengths exceeded P levels of 0.1mg/l. This had fallen from 62% of river lengths in 2000 (from General Quality Assessment reporting for rivers, which ended in 2009).

Additional water pollutants of concern include mercury, polybrominated diphenyl ethers (PBDEs), perfluorooctane sulfonate (PFOS) and microplastics. Pollutants classified as some of the most hazardous to marine environments include cadmium, mercury, copper, lead and zinc and the organic compound lindane<sup>288</sup>.

Requirements – and performance – in relation to water pollution differ between the devolved nations in the UK. In general, freshwater pollution is most severe in England although it is a critical issue in all of the UK countries. Actions should be informed by national-level legislation and priorities<sup>289</sup>.

Domestic water pollution occurring as a result of production in the UK is very well measured and monitored. A significant amount of water pollution is also embedded in imports from overseas<sup>290</sup>. There is comparatively limited quantification or tracing of the overseas water pollution associated with UK consumption, although upcoming work from JNCC and SEI on indicators for the overseas impact of UK consumption is due to specifically include water use and nitrogen/phosphorus emissions.

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<sup>286</sup> NCC (2020). UK Biodiversity Indicators 2020. B7. Surface water status. <https://jncc.gov.uk/our-work/ukbi-b7-surface-water-status/#indicator-description>

<sup>287</sup> Defra (2014). Water Framework Directive implementation in England and Wales: new and updated standards to protect the water environment. [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/307788/river-basin-planning-standards.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/307788/river-basin-planning-standards.pdf)

<sup>288</sup> JNCC (2020). UK Biodiversity Indicators 2020. B5b. Marine pollution. <https://jncc.gov.uk/our-work/ukbi-b5b-marine-pollution/>

<sup>289</sup> For example, the Water environment legislation for Scotland.

<sup>290</sup> Oita, A., Malik, A., Kanemoto, K. et al. Substantial nitrogen pollution embedded in international trade. *Nature Geosci* 9, 111–115 (2016). <https://doi.org/10.1038/ngeo2635>

## OUTCOME TARGET: PROTECT, ENHANCE AND RESTORE ALL BODIES OF WATER IN THE UK TO ACHIEVE ‘GOOD ECOLOGICAL STATUS’ AND ‘GOOD CHEMICAL STATUS’ BY 2027<sup>291</sup>, AND REINFORCE THE POSITIVE TREND IN COASTAL AND MARINE WATERS TO HALT THE HARMFUL EFFECTS OF WATER POLLUTION ON THOSE ECOSYSTEMS

This aligns with the target in the Water Framework Directive<sup>292</sup>. It also extends the commitment in the 25 Year Plan for The Environment for at least three quarters of water bodies in England to be ‘*close to their natural state as soon as is practicable*’, making it time-bound and applied to all water bodies.

In England, only 16% of water bodies meet the criteria for ‘good’ ecological status and none meet the criteria for ‘good chemical status’<sup>293,294</sup>. The majority - around 60% - are only of ‘moderate’ status in terms of pollution levels. The situation is better in Scotland where 50% of water bodies achieved good status as well as 13% achieving high status, and Wales where 40% of water bodies achieved good status.

The concept of a ‘footprint’ is challenging to apply to water pollution, as it is typically a local phenomenon (with some exceptions, such as the near ubiquitous microplastic pollutants). The concept of a ‘grey water’ footprint is disputed and no attempts were found to calculate a grey water footprint for the UK. Footprints specific to phosphorus and nitrates exist, but do not cover other water pollutants.

For these reasons, we suggest the criteria of ‘good’ status provides a practical baseline. However, is only relevant across the UK and EU. Otherwise, for a more global comparison the Phosphorus and Nitrogen losses from agriculture footprints<sup>295</sup> may be more useful.

ACTION TARGETS	SECTOR(S)	METRICS/ INDICATOR(S)
<b>Prevent the discharge of untreated sewage into waterways</b>	Water and sewerage managers; policymakers	Number of ‘permits to discharge’ issued; occurrence of raw sewage in waterways; concentration of pollutants in water ways

The Environment Agency currently issues permits to allow release of raw sewage after extreme weather events to prevent flooding. Their use has been increasing as climate change leads to more intense rainfall events and water infrastructure has not kept up with population growth. In 2019, water companies reportedly released raw sewage into rivers more than 200,000 times. Pollution from this practice impacts 36% of waterways in England. A dedicated Defra taskforce aims to “reduce the frequency and volumes of sewage discharges from storm overflows” and has committed to “to eliminate harm from storm overflows”. Provisions for this will be included in the Environment Bill<sup>296</sup>. Some stakeholders including the chair of the UK government Environmental Audit Select Committee are pushing to forbid the practice<sup>297</sup>. In devolved nations, regulation and permits are controlled by other authorities e.g. in Wales these permits sit with Natural Resources Wales.

291 In contrast to the target in the Degradation topic area - ‘Restore 75% of the total area of UK terrestrial and freshwater protected sites to favourable condition’ – the target here relates to i) all water bodies (not just protected sites), ii) achieving good ecological and chemical status defined by the Water Framework Directive, rather than ‘favourable condition’ which is defined for SSSIs in the UK and based on different (but complementary) criteria

292 The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017. <https://www.legislation.gov.uk/uksi/2017/407/regulation/13/made>

293 JNCC (2020). UK Biodiversity Indicators 2020. B7. Surface water status. <https://jncc.gov.uk/our-work/ukbi-b7-surface-water-status/#indicator-description>

294 Environment Agency (2020) WFD Surface Water Bodies in England: Classification Status and Objectives - Cycle 2. <https://environment.data.gov.uk/portalstg/home/item.html?id=bcec2775501841d7a4dacef57e291b61>

295 European Environment Agency (2020). Is Europe living within the limits of our planet? An assessment of Europe’s environmental footprints in relation to planetary boundaries. Joint EEA/ FOEN Report, EEA Report No 01/2020 <https://www.eea.europa.eu/publications/is-europe-living-within-the-planets-limits#:~:text=The%20study%20explores%20different%20ways,yet%20living%20within%20those%20limits.&text=This%20means%20that%20production%20and,the%20rest%20of%20the%20world.>

296 Defra & Pow (2021). New Environment Bill provisions to tackle storm overflows.

<https://www.gov.uk/government/news/new-environment-bill-provisions-to-tackle-storm-overflows>

297 Sandra Laville (2020). Defra forms taskforce to reduce sewage discharge into rivers and seas. The Guardian, 09 September 2020. <https://www.theguardian.com/environment/2020/sep/09/defra-forms-taskforce-to-reduce-sewage-discharge-into-rivers-and-seas>

ACTION TARGETS	SECTOR(S)	METRICS/ INDICATOR(S)
<b>Significantly reduce phosphorus entering waterways from sewage treatment plant discharge by requiring all plants to meet the concentration limit of 0.25 mg/l</b>	Water and sewerage managers	Metrics tbc
<p>Wastewater discharge from sewage treatment plants (STPs) contributes 60-80% of the phosphorus in rivers. The draft Environment Bill targets intended to include one related to “<i>reduce pollution from wastewater, in particular phosphorus and nitrates</i>”, and phosphorus concentration is still one of the most common causes of sewage works final effluent failures. The UK industry has agreed a technically achievable limit of 0.25mgP/l for the period April 2020 to March 2025, although not all works will have to meet them. This target requires <i>all</i> plants to meet this standard by 2030. Such limits are challenging, but the process technology already exists.</p>		
<b>Improve the regulatory and advice framework to enforce rules on pollution of water bodies from farming practices, so that farmers are aware of how to comply and do so, violations and pollution incidents are reduced to zero and diffuse pollution is minimised</b>	Policymakers, agriculture	Number of violations
<p>Despite 243 document violations since 2018, the Environment Agency had apparently not issued any penalties in England by the beginning of 2021<sup>298</sup>. In 2019/20, some aspects of the Farming Rules for Water were inspected at 129 farms, of which 66 were non-compliant with at least one rule<sup>299</sup> and three were sent warning letters. The funding the Environment Agency gets from the government to protect the environment was cut 57% between 2010 and 2019<sup>300</sup> leaving limited resourcing for farm visits and checks. In 2018, the rate of environmental inspections carried out by the Environment Agency was equivalent to each farm receiving just one visit every 200 years<sup>301</sup>. Dairy farming is a particular hotspot of nutrient run off and leakage from storage facilities. Similar improvements should be made in Scotland and Wales to enforce equivalent regulations (e.g., in Wales, the Water Resources (Control of Agricultural Pollution) (Wales) Regulations 2021) and, in Scotland, the PEPFFA Code and the Controlled Activities Regulations).</p>		
<b>Reduce losses of phosphorus and nitrates to water bodies from farmland by 10% and 65%, respectively</b>	Policymakers, agriculture	Metrics tbc
<p>Loss of phosphorus to water bodies, as a percentage of the total applied on agricultural land, is 1-10% but the Environment Agency estimates that it still accounts for 20-30% of the phosphorus in rivers in the UK. Nitrates are also lost to waterways in run-off from farmland. Actions should address the application and storage of both manufactured fertilisers and manure. The percentages in this target are based on calculation of nitrogen and phosphorus losses based on EU averages, with the per capita planetary boundary estimated by the European Environment Agency<sup>302</sup>. This target aligns with the Environment Bill’s focus on reducing water pollution from agriculture.</p>		

298 Wil Crisp (Fri 12 Feb 2021). Revealed: no penalties issued under ‘useless’ English farm pollution laws. The Guardian. [https://www.theguardian.com/environment/2021/feb/12/revealed-no-penalties-issued-under-useless-uk-farm-pollution-laws?CMP=Share\\_iOSApp\\_Other](https://www.theguardian.com/environment/2021/feb/12/revealed-no-penalties-issued-under-useless-uk-farm-pollution-laws?CMP=Share_iOSApp_Other)

299 Public sector information licensed under the Open Government Licence v3.0. Please refer to Open Government Licence which explains the permitted use of this information. Environmental Information Requests to the Environment Agency in June 2019 and November 2020. Responses NR 131677 and NR 194617

300 Letter to The Times from Emma Howard Boyd, Chair of Environment Agency (3 August 2019) <https://www.gov.uk/government/news/letter-to-the-times-from-emma-howard-boyd-chair-of-environment-agency>

301 Defra (2018), Farm Regulation and Inspection Review – Interim Report (July 2018). [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/724785/farm-inspection-review-interim-report.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/724785/farm-inspection-review-interim-report.pdf)

302 European Environment Agency (2020). Is Europe living within the limits of our planet? An assessment of Europe’s environmental footprints in relation to planetary boundaries. Joint EEA/FOEN Report, EEA Report No 01/2020 <https://www.eea.europa.eu/publications/is-europe-living-within-the-planets-limits#:~:text=The%20study%20explores%20different%20ways,yet%20living%20within%20those%20limits.&text=This%20means%20that%20production%20and,the%20rest%20of%20the%20world>



ACTION TARGETS	SECTOR(S)	METRICS/ INDICATOR(S)
<b>Restrict the use of phosphorus in industrial detergents</b>	Polymakers, manufacturers	Metrics tbc
<p>This target is based on legislation for non-industrial laundry and dishwasher detergents (under an amendment to the EU Regulation 648/2004 on Detergents)<sup>303</sup>. This regulation limits the quantity of phosphorous in a ‘recommended dose’ to 0.5 grams for consumer laundry detergents and 0.3 grams for consumer dishwasher detergents. The regulation (or similar) should be extended to industrial use of detergents.</p>		
<b>Develop and implement a robust sampling and detection methodology for micro-plastics in treated water, then introduce measures to prevent microplastic pollution by 2030</b>	Research institutions, policymakers, water and sewerage managers, manufacturers of consumer goods	Metrics tbc
<p>Micro-plastics in drinking and wastewater in the UK is under-researched. Better evidence, consistent and robust monitoring will allow development of a more precise target, but this is a priority issue to be addressed.</p> <p>Good levels of removal of microplastics in treated water are apparently achieved (for <i>water</i>, &gt;99.99% of microplastic particles are removed through the treatment processes, with raw water having an average of 4.9 microplastic particles/litre and potable water having on average 0.00011 microplastic particles/litre). For wastewater, the treatment processes were able to remove 99.9% of the microplastic particles with levels of 5.1 microplastic particles/litre being found in final effluent<sup>304</sup>. Microplastics are thought to be widespread in sediments around UK coasts<sup>305</sup>.</p>		
<b>Significantly reduce the discharge of pollutants from aquaculture – particularly mariculture – including both biological and chemical pollutants</b>	Aquaculture	Metrics tbc
<p>Aquaculture is expanding globally and both Scotland<sup>306</sup> and Wales<sup>307</sup> have policies to expand the sector. There is less aquaculture in England. Information on water pollution from aquaculture in UK is relatively scant. Water pollution targets tend to focus on terrestrial sources - agriculture, wastewater and run-off/storm overflows - however, aquaculture has significant pollution impacts both domestically and associated with overseas production, particularly from mariculture which refers to aquaculture in marine water bodies.</p>		
<b>Reduce the levels of six substances defined as being the most hazardous to the UK marine environment - heavy metals cadmium, mercury, copper, lead and zinc and the organic compound lindane - to zero</b>	Polymakers, shipping sector	UK Biodiversity Indicator B5b: Combined input of hazardous substances to the UK marine environment, as an index of estimated weight of substances per year
<p>Based on the UK government Marine Pollution indicator for the Biodiversity indicators<sup>308</sup>. Several substances are from paint and other chemicals used on seagoing vessels. The strategy states: “Pollution in the marine environment from these 6 substances should decrease to levels that are nondetrimental by 2020.” Non-detrimental is not defined. Reductions of 89%, 92%, 67%, 60%, 53% and 84% respectively were achieved between 1990 and 2018<sup>309</sup>.</p>		

303 European Commission (2004). Regulation (EC) No 648/2004 of The European Parliament and of The Council of 31 March 2004 on detergents.

304 Water Industry Research (2019). Sink to river, river to tap. A review of potential risks of nanoparticles and microplastics. [https://www.ukwir.org/view/\\$NvDnwfm/](https://www.ukwir.org/view/$NvDnwfm/)

305 UK Marine Monitoring and Assessment Strategy (2010). Charting Progress 2: An assessment of the state of UK seas. [https://tethys.pnnl.gov/sites/default/files/publications/UKMMAS\\_2010\\_Charting\\_Progress\\_2.pdf](https://tethys.pnnl.gov/sites/default/files/publications/UKMMAS_2010_Charting_Progress_2.pdf)

306 Scottish Government (2015). Scotland’s National Marine Plan. Marine Scotland Directorate. <https://www.gov.scot/publications/scotlands-national-marine-plan/>

307 Welsh Government (2019). Welsh National Marine Plan. November 2019. <https://gov.wales/welsh-national-marine-plan-document>

308 JNCC (2020). UK Biodiversity Indicators 2020. B5b. Marine pollution. <https://jncc.gov.uk/our-work/ukbi-b5b-marine-pollution/>

309 Department for Food, Farming and Rural Affairs (2020). Biodiversity 2020: A strategy for England’s wildlife and ecosystem services [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/925440/19\\_Pollution\\_air\\_and\\_marine\\_2020\\_accessible.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/925440/19_Pollution_air_and_marine_2020_accessible.pdf)

ACTION TARGETS	SECTOR(S)	METRICS/ INDICATOR(S)
<b>Identify and address major causes of water pollution associated with the production and manufacture of goods for UK consumption overseas</b>	Polymakers, research institutions	To be developed
<p>A significant amount of water pollution is embedded in overseas trade<sup>310</sup>, and although evaluation and quantification of the water pollution overseas resulting from the UK's imports of goods are limited, the UK is a net importer of embedded nitrogen emissions, including potential emissions to water bodies. Agriculture, aquaculture and other activities involved in production of goods for UK consumption, as well as manufacturing processes for textiles, leather, pharmaceuticals, chemicals and electronics contribute to pollution of local waters. Work by JNCC/SEI on indicators for the overseas impact of UK consumption is due to specifically include water use and nitrogen/phosphorus emissions. Efforts could begin by identifying major source countries for agriculture and aquaculture goods, water pollution issues in these countries, and the applicability of the targets above to the country context<sup>311</sup>.</p>		

<b>OVERLAPS</b>	There are overlaps between this topic area and the Nutrient Use, Degradation and Land-use Change, Water Availability and Flows topic areas in particular.
<b>DATA GAPS AND UPCOMING WORK</b>	Limited data available on microplastic pollution, and on the embedded water pollution in the UK's imports of goods. The latter will be substantially addressed by ongoing work by the JNCC and Stockholm Environment Institute.
<b>KEY MESSAGES</b>	Little progress has been made in improving the pollution status of the UK's water bodies for several years, with nitrates and phosphorous being the main pollutants. The situation is particularly poor in England. Greater efforts to return water bodies to good ecological status are required, along with specific actions on marine pollutants, microplastics, and on quantifying and reducing the water pollution embedded in the UK's imported goods.

<sup>310</sup> Oita, A., Malik, A., Kanemoto, K. et al. Substantial nitrogen pollution embedded in international trade. *Nature Geosci* 9, 111–115 (2016). <https://doi.org/10.1038/ngeo2635>

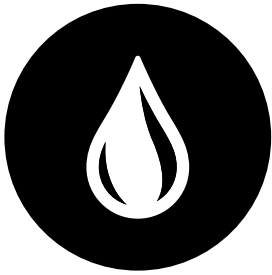
<sup>311</sup> JNCC (2020). UK Biodiversity Indicators 2020. A4. Global biodiversity impacts of UK economic activity / sustainable consumption. <https://jncc.gov.uk/our-work/ukbi-a4-global-biodiversity-impact/>



# WATER AVAILABILITY AND FLOWS







## WATER AVAILABILITY AND FLOWS

Water availability and flows relates to the abundance of freshwater and the levels and movement of water in channels and water bodies. Activities including abstraction, removal and redirection of water fundamentally alter water availability and flows.

In the UK, the biggest drivers of water abstraction are the public water supply (51.2% of abstractions in England in 2017) and energy supply (32% of abstractions in England in 2017). Other drivers of domestic abstraction include agriculture, manufacturing, fish farming, and industrial processes<sup>312</sup>. Water availability becomes an issue when demand for water outpaces natural rates of replenishment. The issue is intensifying as climate change causes changes in precipitation and more frequent and intense droughts. It is estimated that around 60% of the UK's water use occurs overseas, related to agricultural production and industrial processing of goods imported to the UK<sup>313</sup>. Over-abstraction is a particularly acute issue in arid and water-stressed regions. The overseas water impacts of UK consumption are far less well quantified than domestic impacts.

Alterations to water courses including damming, channel straightening, water diversion and flood defences also drastically reshape freshwater flows, and affect habitats and their connectivity. Around 40% of water bodies in the UK are not meeting ecological requirements due to physical alterations<sup>314</sup>. Accelerating pressures on freshwaters have resulted in a deepening crisis for biodiversity<sup>315</sup>. The “*quantity, timing, and quality of water flows required to sustain freshwater and estuarine ecosystems...*” is known as environmental flows<sup>316</sup>. The term ‘ecological flows’ is also used in relation to the EU Water Framework Directive (on which current UK water policy is based) and refers to the amount and flow of water required for the maintenance of essential ecological functions in a water channel or body. A reduction in water levels means less space for wildlife to live, feed and reproduce, and affects migration and life-stage cues. As water levels are reduced, pollutants entering the water environment also become more concentrated (see Water Pollution and Nutrient Use Topic Areas). The end result is that water bodies and channels cannot provide a healthy environment for fish, insects and plants<sup>317</sup>.

Water availability and flows are well measured and quantified in the UK. However, UK consumption also drives significant water use overseas, with concurrent impacts on availability and flows (and pollution)<sup>318</sup>. Some attempts have been made to map and quantify the UK's overseas water footprint<sup>319</sup>, but robust analysis is challenging as water impacts are highly regional whereas country-level import data lacks the resolution to trace imports back to specific production locations.

312 Department for Environment, Food & Rural Affairs (Published: 19 December 2012, Last updated: 14 March 2019). Statistical data set. ENV15 - Water abstraction tables for England Annual water abstraction estimates for England. <https://www.gov.uk/government/statistical-data-sets/env15-water-abstraction-tables#history>

313 Ashok Chapagain & Stuart Orr (2008). UK Water Footprint: the impact of the UK's food and fibre consumption on global water resources. Volume one [https://waterfootprint.org/media/downloads/Orr\\_and\\_Chapagain\\_2008\\_UK\\_waterfootprint-vol1.pdf](https://waterfootprint.org/media/downloads/Orr_and_Chapagain_2008_UK_waterfootprint-vol1.pdf)

314 Environment Agency (2019). 2021 River Basin Management Plan. Physical modifications challenge [https://consult.environment-agency.gov.uk/++preview++/environment-and-business/challenges-and-choices/user\\_uploads/physical-modification-challenge-rbmp-2021.pdf](https://consult.environment-agency.gov.uk/++preview++/environment-and-business/challenges-and-choices/user_uploads/physical-modification-challenge-rbmp-2021.pdf)

315 Reid, A.J., Carlson, A.K., Creed, I.F., Eliason, E.J., Gell, P.A., Johnson, P.T.J., Kidd, K.A., MacCormack, T.J., Olden, J.D., Ormerod, S.J., Smol, J.P., Taylor, W.W., Tockner, K., Vermaire, J.C., Dudgeon, D., & Cooke, S.J. (2019). Emerging threats and persistent conservation challenges for freshwater biodiversity. *Biological Reviews*, 94, pp. 849–873. 849 doi: 10.1111/brev.12480

316 Arthington et al (2018) The Brisbane Declaration and Global Action Agenda on Environmental Flows (2018). *Frontiers in environmental science*. <https://doi.org/10.3389/fenvs.2018.00045>

317 Department for Environment, Food & Rural Affairs (2020). Environment Bill - environmental targets. Policy paper <https://www.gov.uk/government/publications/environment-bill-2020/august-2020-environment-bill-environmental-targets>

318 Orr and Chapagain (2008). UK water footprint: the impact of the UK's food and fibre consumption on global water resources. [https://waterfootprint.org/media/downloads/Orr\\_and\\_Chapagain\\_2008\\_UK\\_waterfootprint-vol1.pdf](https://waterfootprint.org/media/downloads/Orr_and_Chapagain_2008_UK_waterfootprint-vol1.pdf)

319 Feng et al, (2011). Spatially Explicit Analysis of Water Footprints in the UK. *Water*. 3:47-63. <https://www.mdpi.com/2073-4441/3/1/47/pdf>; Orr and Chapagain (ibid)

## OUTCOME TARGET: ALL SURFACE WATER BODIES AND AT LEAST 90% OF GROUNDWATER BODIES IN THE UK MEET SUSTAINABLE ABSTRACTION AND ECOLOGICAL FLOW REQUIREMENTS AND THE UK SUPPORTS SUSTAINABLE WATER MANAGEMENT IN KEY OVERSEAS SOURCING REGIONS BASED ON QUANTIFICATION OF THE IMPACT OF ITS IMPORTS ON OVERSEAS WATER AVAILABILITY AND FLOWS

The 2020 progress report on the UK's 25 Year Environment Plan states an ongoing commitment to achieving sustainable flow levels for 90% of surface water bodies and 77% of groundwater bodies by 2021<sup>320</sup>. In 2018, 84% of surface water bodies and 72% of groundwater bodies were considered to meet these standards. A more ambitious target should therefore be possible by 2030.

There is currently a lack of data on the impacts of UK imports on water availability and flows overseas. There is an urgent need to quantify these impacts and to support sustainable water governance and management in the key areas the UK sources from. UK policy and private actors must recognise the urgent implications for future food security of relying on sourcing regions with unsustainable water management and use their influence through supply chains to facilitate the implementation of sustainable water governance.

ACTION TARGETS	SECTOR(S)	METRICS/ INDICATOR(S)
<b>Reduce water use by non-household water users, particularly the energy supply industry</b>	Energy providers, industry (classified as 'other non-household water users')	Water use by non-household water users (l or m3, % of abstraction)
<p>A significant proportion of the UK's domestic water demand is from non-household users. In particular, the energy supply industry accounts for the largest share of abstraction (32% of abstraction in England in 2017)<sup>321,322</sup>. This is predominantly for hydropower generation and cooling of power stations<sup>323</sup>. Although this use is largely non-consumptive (i.e., water is removed from a source but returned to, or near to, the source) rather than consumptive (i.e., water is removed and not returned to the source), it entails large-scale disruption to water flows and the characteristics of the returned water are often altered (e.g. temperature, oxygen content, turbidity). Improving power station efficiency, installing advanced cooling systems and increasing the use of non-freshwater and recycled water can reduce the use for cooling<sup>324</sup>, whilst any hydropower projects must be planned to keep disruption to ecological flows to an absolute minimum.</p>		
<b>Reduce water leakage during delivery by 32%</b>	Water and sewage managers	Volume of water lost to leakage (litres, % of total water supply)
<p>Around one-fifth of public water supply is currently lost in leakage<sup>325</sup>. The UK government has set a target to reduce leakage by 50% by 2050<sup>326</sup> which implies a 32% reduction by 2030. The target of 32% is based on the government having challenged water companies to deliver a 16% reduction in annual average leakage over the 2020-25 period<sup>327</sup>, which suggests a further 16% should be achievable by 2030.</p>		

320 H.M. Government (2020). 25 Year Environment Plan Progress Report: April 2019 to March 2020. [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/891783/25yep-progress-report-2020.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/891783/25yep-progress-report-2020.pdf)

321 Department for Environment, Food & Rural Affairs (2020). Environment Bill - environmental targets. Policy paper

<https://www.gov.uk/government/publications/environment-bill-2020/august-2020-environment-bill-environmental-targets>

322 Department for Environment, Food & Rural Affairs (Published: 19 December 2012, Last updated: 14 March 2019). Statistical data set. ENV15 - Water abstraction tables for England Annual water abstraction estimates for England. <https://www.gov.uk/government/statistical-data-sets/env15-water-abstraction-tables#history>

323 Environment Agency (2013). Water use and electricity generation. [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/489409/LIT\\_8990.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/489409/LIT_8990.pdf)

324 International Energy Agency (2021). If the energy sector is to tackle climate change, it must also think about water.

<https://www.iea.org/commentaries/if-the-energy-sector-is-to-tackle-climate-change-it-must-also-think-about-water>

325 Department for Environment, Food & Rural Affairs (2020). Environment Bill - environmental targets. Policy paper

<https://www.gov.uk/government/publications/environment-bill-2020/august-2020-environment-bill-environmental-targets>

326 Department for Environment, Food & Rural Affairs (2020). Environment Bill - environmental targets. Policy paper

<https://www.gov.uk/government/publications/environment-bill-2020/august-2020-environment-bill-environmental-targets>

327 H.M. Government (2020). 25 Year Environment Plan Progress Report: April 2019 to March 2020. [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/891783/25yep-progress-report-2020.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/891783/25yep-progress-report-2020.pdf)

ACTION TARGETS	SECTOR(S)	METRICS/ INDICATOR(S)
<p><b>Reduce household water use by: 1) increasing the proportion of households with metered water supplies to 80%; and 2) introducing mandatory labelling and minimum standards for water-using items and water-supply fittings in all new buildings or renovations</b></p>	<p>Polymakers, citizens, water and sewage managers, construction industry</p>	<p>Abstraction for household use (%); households with meter (%); existence of standards and labelling in construction</p>
<p>The Government has a target to reduce per capita domestic water use from 145 litres per head per day to 130 litres per day and water companies in England have committed to an average per capita consumption target of 120 litres by 2045<sup>328</sup>, down from 141 litres in 2018<sup>329</sup>. Achieving this reduction will require both technology and behaviour change. Metering has been shown to reduce daily household water consumption by around 30 litres per person and can also help detect leaks. In 2018, 52% of UK households had water metering<sup>330</sup>. Mandatory standards to make installing water efficient devices the norm in new builds is an effective way to reduce water use in households and is cost-effective<sup>331</sup>.</p>		
<p><b>Reduce water abstraction so that all currently over-abstracted areas are brought within ‘water available’ levels, beginning by reviewing and revoking unsustainable abstraction licenses</b></p>	<p>Polymakers, water and sewage managers, abstraction license holders</p>	<p>% of catchments over-licensed; % of catchments over-abstracted; water bodies achieving sustainable abstraction criteria (%)<sup>332</sup></p>
<p>Over-abstracted water areas are identified in the UK in Catchment Abstraction Management Strategies. Some catchments are over-licensed, which means that licenses issued for abstraction amount to more water than can sustainably be abstracted in practice. In England, around 20% of rivers and 26% of groundwater bodies are over-abstracted. Many are located in East and Southern England<sup>333</sup>. Sustainable alternatives to freshwater abstraction should be considered, such as increasing the use of recycled water and pursuing the potential for desalination<sup>334</sup>. This target builds on the Restoring Sustainable Abstraction programme which ended in March 2020<sup>335</sup>.</p>		

<sup>328</sup> Department for Environment, Food & Rural Affairs (2018). Water conservation report. Action taken and planned by government to encourage the conservation of water. [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/766894/water-conservation-report-2018.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/766894/water-conservation-report-2018.pdf)

<sup>329</sup> Department for Environment, Food & Rural Affairs (2018). Water conservation report. Action taken and planned by government to encourage the conservation of water. [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/766894/water-conservation-report-2018.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/766894/water-conservation-report-2018.pdf)

<sup>330</sup> Department for Environment, Food & Rural Affairs (2018). Water conservation report. Action taken and planned by government to encourage the conservation of water. [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/766894/water-conservation-report-2018.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/766894/water-conservation-report-2018.pdf)

<sup>331</sup> Lawson, R., Di Fiore, D., Provins, A., Cherci, F., Horton, B., Hunt, D. & Ryan, S. (2019). Pathways to long-term PCC reduction. UK Water. <https://www.water.org.uk/wp-content/uploads/2019/12/Water-UK-Research-on-reducing-water-use.pdf>

<sup>332</sup> Department for Environment, Food & Rural Affairs (2019). Measuring environmental change: outcome indicator framework for the 25 Year Environment Plan. [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/925779/25-yep-indicators-2019.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/925779/25-yep-indicators-2019.pdf)

<sup>333</sup> E.K. Weatherhead & N.J.K. Howden (2009). The relationship between land use and surface water resources in the UK. Land Use Policy 26S, S243–S250. doi:10.1016/j.landusepol.2009.08.007

<sup>334</sup> Robin Hackett (29 July 2019). Abstract concept: How can water companies reduce abstraction? Water & Wastewater Treatment Online. <https://wwtonline.co.uk/features/abstract-concept-how-can-water-companies-reduce-abstraction>

<sup>335</sup> Defra (2020). Policy paper: Water abstraction plan: Environment. <https://www.gov.uk/government/publications/water-abstraction-plan-2017/water-abstraction-plan-environment#:~:text=The%20Restoring%20Sustainable%20Abstraction%20Programme,necessary%20changes%20by%20March%202020>



ACTION TARGETS	SECTOR(S)	METRICS/ INDICATOR(S)
<p><b>Ensure the restoration of ‘natural functions of water and wetland ecosystems’ by reviewing the impacts of physical alterations to water bodies (with a focus on alterations not for flood protection or navigation) and restoring water bodies to a more natural physical state wherever practicable</b></p>	<p>Polymakers, conservation agencies, water and sewage managers</p>	<p>Further work needed to develop indicator B6 in 25YEP<sup>336</sup>; Environmental Flow Indicator<sup>337</sup>; water bodies and channels failing to meet Water Framework Directive requirements (% , km)</p>
<p>The 25 Year Environment Plan includes an indicator (B6) which necessitates action to ensure the ‘natural functions of water and wetland ecosystems’ including restoring hydrological and morphological processes which may have been altered<sup>338</sup>. Substantial further work is still needed to develop suitable indicators to measure progress<sup>339</sup>. Physical alteration is the most common pressure causing water bodies to fail good status under the EU Water Framework Directive standards. It affects 41% of water bodies in England and almost 50,000km of water bodies in the UK as a whole. According to Defra data, 90% of the ‘hydrological alterations’ causing this failure were alterations other than for flood protection or navigation<sup>340</sup>. The Environment Agency uses the Environmental Flow Indicator to indicate where abstraction or flow regulation, may start to have an undesirable impact on river habitats and species<sup>341</sup>.</p>		
<p><b>Develop, monitor and publicly report an indicator for the volume of water intensive products (i.e. irrigated food and fibre) in UK supply chains coming from areas without sustainable water management</b></p>	<p>Polymakers</p>	<p>A first effort will be included in forthcoming work by JNCC/SEI</p>
<p>Around 60% of the UK’s water footprint is estimated to be overseas and embedded in imported goods consumed within the UK<sup>342</sup>. However, this water use is relatively poorly quantified and reported and there is a need to develop and report an indicator. Water stress is particularly acute in regions including North Africa, Southern Europe, India and China. Animal products – meat, butter, eggs – have a particularly large embedded water footprint, as do some nuts, fruits and pulses<sup>343</sup>. Irrigation and chemical use in farming has significant impacts on water resources in producer countries, leading to reduced river flows, depleted groundwater sources and deteriorating water quality. The UK should support sustainable water management in key sourcing regions.</p>		
<p><b>Increase the amount of developmental assistance delivered to projects for water governance in key UK sourcing countries with severe water scarcity</b></p>	<p>Polymakers, financial sector</p>	<p>Value of development assistance focused on water conservation (£)</p>
<p>Such action is already a focus of public-private collaborations under the Courtauld 2025 Water Ambition<sup>344</sup>. This target is similar to the Sustainable Development Goal indicator 15.b.1 ‘Official development assistance on conservation and sustainable use of biodiversity’<sup>345</sup>, but targeted specifically at freshwater ecosystems.</p>		

336 Department for Environment, Food & Rural Affairs (2019). Measuring environmental change: outcome indicator framework for the 25 Year Environment Plan. [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/925779/25-yep-indicators-2019.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/925779/25-yep-indicators-2019.pdf)

337 Environment Agency (2021). Managing water abstraction. Policy paper <https://www.gov.uk/government/publications/managing-water-abstraction/managing-water-abstraction#catchment-abstraction-management-system-cams>

338 Department for Environment, Food & Rural Affairs (2019). Measuring environmental change: outcome indicator framework for the 25 Year Environment Plan. [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/925779/25-yep-indicators-2019.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/925779/25-yep-indicators-2019.pdf)

339 Department for Environment, Food & Rural Affairs (2019). Measuring environmental change: outcome indicator framework for the 25 Year Environment Plan. [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/925779/25-yep-indicators-2019.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/925779/25-yep-indicators-2019.pdf)

340 Environment Agency. Water Framework Directive Quantitative indicators for the scale of pressures <https://environment.data.gov.uk/portalstg/home/item.html?id=9f5a3032abd9435983c18207ab52beee>

341 Environment Agency (2021). Managing water abstraction. Policy paper <https://www.gov.uk/government/publications/managing-water-abstraction/managing-water-abstraction#catchment-abstraction-management-system-cams>

342 Ashok Chapagain & Stuart Orr (2008). UK Water Footprint: the impact of the UK’s food and fibre consumption on global water resources. Volume one [https://waterfootprint.org/media/downloads/Orr\\_and\\_Chapagain\\_2008\\_UK\\_waterfootprint-vol1.pdf](https://waterfootprint.org/media/downloads/Orr_and_Chapagain_2008_UK_waterfootprint-vol1.pdf)

343 Our World in Data (n.d.). Water withdrawals per capita. <https://ourworldindata.org/water-use-stress#water-withdrawals-per-capita>

344 WRAP (n.d.). Working together to protect critical water resources. <https://wrap.org.uk/resources/report/working-together-protect-critical-water-resources>

345 <https://sdgdata.gov.uk/15-b-1/>

## OVERLAPS

There is a lot of overlap between water availability and Water Pollution; the presence and concentration of pollutants in water impact whether it is 'available' for use as freshwater. Additionally, abstraction or alterations that reduce flows can intensify the concentration of pollutants.

There are also overlaps with greenhouse gas footprint; a significant water user is the energy supply sector, whilst water abstraction is also a significant user of energy.

## DATA GAPS AND UPCOMING WORK

The overseas impacts of the UK's consumption on water availability and flows is thus far poorly traced and quantified in supply chains. There is the need to develop and monitor indicators to account for this overseas impact. Upcoming work on consumption indicators for the UK by JNCC is due to include indicators related to water use.

## KEY MESSAGES

Addressing water availability involves addressing leaks and the possibility of water recycling as well as reducing demand from both non-household and household users. Overseas impacts on water availability and flows embedded in UK supply chains must be better quantified, monitored and addressed.

# AIR POLLUTION







## AIR POLLUTION

Air pollution refers to emissions and atmospheric loading of primary and secondary pollutants. Key regulated air pollutants include nitrogen oxides (NO<sub>x</sub>), ammonia (NH<sub>3</sub>), non-methane volatile organic compounds (NMVOCs), sulphur dioxide (SO<sub>2</sub>) and particulate matter (PM). These pollutants are among the most harmful substances emitted to the air which damage human and animal health, degrade landscapes and alter ecosystem functions. Primary pollutants are those emitted directly to the atmosphere – e.g., SO<sub>2</sub> and NO<sub>x</sub> – and secondary pollutants are those produced in the atmosphere from precursor gases – e.g., ground-level ozone (O<sub>3</sub>) and particulate matter (PM<sub>2.5</sub> and PM<sub>10</sub>)<sup>346</sup>.

Volumes of the individual regulated pollutants are measured and quantified domestically under the National Atmospheric Emissions Inventory (NAEI). According to NAEI data, the largest sources of NO<sub>x</sub>, NH<sub>3</sub>, NMVOCs and SO<sub>2</sub> (comparable data not available for PM<sub>2.5</sub>) from UK territorial activities are maritime shipping, domestic combustion (including power stations), industrial combustion, spirit manufacturing, and wastes<sup>347</sup>.

The UK has existing legislative targets for reducing all the pollutants of concern – NO<sub>x</sub>, NH<sub>3</sub>, NMVOCs, SO<sub>2</sub> and PM. Under the National Emissions Ceiling Regulations (NECR), the UK is committed to achieving the following reductions from 2005 levels by 2030 (Table 3).

Air pollution occurring domestically in the UK as a result of production is well measured. A significant amount of air pollution is also embedded in imports from overseas. There are some attempts to trace and quantify this through initiatives such as the Eora MRIO database<sup>348</sup>, but there is overall limited analysis or tracing of the overseas air pollution associated with UK consumption.

**TABLE 3: NECR EMISSIONS REDUCTIONS COMMITMENTS<sup>349</sup> AND EUROPEAN ENVIRONMENTAL BUREAU TECHNICALLY FEASIBLE REDUCTIONS (FROM 2005 BASELINE)<sup>350</sup>**

POLLUTANT	COMMITTED REDUCTION (NECR)	IMPLIED 2030 CEILING (KT)	FEASIBLE REDUCTION (EEB)	IMPLIED 2030 CEILING (KT)
NO <sub>x</sub>	73%	434	80%	321
SO <sub>2</sub>	88%	85	91%	64
PM <sub>2.5</sub>	46%	61	57%	49
NMVOC	39%	654	52%	515
NH <sub>3</sub>	16%	258	27%	224

<sup>346</sup> <https://scied.ucar.edu/learning-zone/air-quality/air-pollution>

<sup>347</sup> <https://naei.beis.gov.uk/data/data-selector?view=air-pollutants>

<sup>348</sup> Eora (2021). The Eora Global Supply Chain Database. <https://www.worldmrio.com/>

<sup>349</sup> Adapted from Department for Environment, Food and

Rural Affairs (2018). Impact Assessment for the Transposition of the National Emissions Ceiling Directive. [https://www.legislation.gov.uk/ukia/2018/37/pdfs/ukia\\_20180037\\_en.pdf](https://www.legislation.gov.uk/ukia/2018/37/pdfs/ukia_20180037_en.pdf)

<sup>350</sup> European Environmental Bureau (2017). Clearing the air: a critical guide to the new national emission ceilings directive. <https://eeb.org/publications/62/air-quality/1078/clearing-the-air-a-critical-guide-to-the-new-nec-directive.pdf>

However, there are two issues for which the UK's current legislative targets for air pollution have been criticised: failure to set a high enough bar and projected underperformance in pollutant reductions by 2030. The European Environmental Bureau (EEB) concluded in 2017 that EU-wide national emissions ceiling suffered from 'total lack of ambition' that is likely to cause hundreds of thousands of additional premature deaths from air pollution<sup>351</sup>. To quantify what increased ambition would look like, EEB modelled 'Maximum Technically Feasible Reductions' (MTFR) for each EU country. MTFRs reflect the reductions of pollutants that are feasible to achieve by 2030 (from 2005 levels) using mitigation techniques that are already recognised. The MTFRs do not even consider potential advances in methods or technologies that might enable greater reductions in the coming decade. MTFRs for the UK, which are proposed as the new per-pollutant outcome targets, are shown in Table 3.

The other issue with NECR targets is that whilst the UK has met its air pollution reductions targets since 2010<sup>352</sup>, expert assessment has concluded that the UK's plan to reach its 2030 targets will fall short: the UK is expected to fully meet the required 2030 emissions reduction targets for only one pollutant (SO<sub>2</sub>)<sup>353</sup>. Further, in spite of meeting the NECR reductions to date, UK emissions of air pollutants still exceed levels that are safe for humans and wildlife. For example, 58% of nitrogen-sensitive habitats in the UK exceeded critical levels for nitrogen-based pollutants like NH<sub>3</sub> in 2016<sup>354</sup>. The 2019 Clean Air Strategy set a target to reduce emissions of ammonia against the 2005 baseline by 8% by 2020 and 16% by 2030<sup>355</sup>. Total UK emission in 2019 were 2% below the 2005 baseline<sup>356</sup>.

As a result, it is recommended that the UK adopt the maximum technically feasible pollutant reductions suggested by the EEB and develop additional air pollution control measures to keep pace with these increased ambitions.

## OUTCOME TARGET: LIMIT THE EMISSIONS OF HARMFUL AIR POLLUTANTS, BY: 1) MEETING THE EUROPEAN ENVIRONMENTAL BUREAU'S 'MAXIMUM TECHNICALLY FEASIBLE REDUCTIONS' FOR POLLUTANTS OF CONCERN SET OUT IN A CRITICAL GUIDE TO THE NEW NEC DIRECTIVE (2017) AND 2) ASSESSING AND MITIGATING THE UK'S CONTRIBUTION TO OVERSEAS AIR POLLUTION

The UK's current air pollution reduction targets suffer from a lack of ambition and insufficient controls to meet the existing commitments. The Maximum Technically Feasible Reductions from EEB modelling exceed the current legislative targets for all pollutants of concern. Pushing these legislative targets will prevent avoidable ecosystem degradation and premature deaths.

Further this outcome target is aligned with other UK environmental commitments and ambitions, including:

- i. The 25 Year Environment Plan goal of 'tackling air pollution'<sup>357</sup>.
- ii. The 25 Year Environment Plan goal of creating indicators to measure 'the overseas impact of domestic consumption'<sup>358</sup>.
- iii. SDG 11.6, specifically in addressing urban air quality.

Because the National Air Pollution Control Programme is likely to miss current 2030 targets, an increase in the ambition of UK air pollution targets will require further tightening of controls needed to achieve the more ambitious reductions suggested<sup>359</sup>.

351 European Environmental Bureau (2017). Clearing the air: a critical guide to the new national emission ceilings directive. <https://eeb.org/publications/62/air-quality/1078/clearing-the-air-a-critical-guide-to-the-new-nec-directive.pdf>

352 National Atmospheric Emissions Inventory (n.d.). National Emissions Ceilings Directive (NECD)

<https://naei.beis.gov.uk/about/why-we-estimate?view=need>

353 Ricardo Energy and Environment (2020). Review of the National Air Pollution Control Programme – United Kingdom. Final Report for European Commission – DG Environment. [https://ec.europa.eu/environment/air/pdf/reduction\\_napcp/NAPCP%20review%20report%20UK%20-%20Final%20updated%2018May20.pdf](https://ec.europa.eu/environment/air/pdf/reduction_napcp/NAPCP%20review%20report%20UK%20-%20Final%20updated%2018May20.pdf)

354 Rowe, E., Sawicka, K., Mitchell, Z., Smith, R., Dore, T., Banin, L.F. & Levy, P. (2019) Trends Report 2019:

Trends in critical load and critical level exceedances in the UK. [https://uk-air.defra.gov.uk/assets/documents/reports/cato9/1908280952\\_Trends\\_Report\\_2019.pdf](https://uk-air.defra.gov.uk/assets/documents/reports/cato9/1908280952_Trends_Report_2019.pdf)

355 Defra (2019) Clean Air Strategy. [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/770715/clean-air-strategy-2019.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/770715/clean-air-strategy-2019.pdf)

356 Churchill, S et al (2021) UK Informative Inventory Report (1990 to 2019). [https://uk-air.defra.gov.uk/assets/documents/reports/cato9/2103151107\\_GB\\_IIR\\_2021\\_FINAL.pdf](https://uk-air.defra.gov.uk/assets/documents/reports/cato9/2103151107_GB_IIR_2021_FINAL.pdf)

357 HM Government (2018). A Green Future: our 25 Year Plan to Improve the Environment. <https://www.gov.uk/government/publications/25-year-environment-plan>

358 Ibid.

359 Please also note that a key action target for air pollution relates the UK achieving the 'With additional measures' (WAM) scenario for the National Air Pollution Control Programme (NAPCP). The WAM scenario originates from Ricardo Energy and Environment's Review of the National Air Pollution Control Programme ([https://ec.europa.eu/environment/air/pdf/reduction\\_napcp/NAPCP%20review%20report%20UK%20-%20Final%20updated%2018May20.pdf](https://ec.europa.eu/environment/air/pdf/reduction_napcp/NAPCP%20review%20report%20UK%20-%20Final%20updated%2018May20.pdf))

While the emissions of these pollutants are well measured, there is not an estimated planetary ecological limit for air pollution, or separate boundaries that apply to the individual pollutants of concern. Researchers from the Stockholm Resilience Centre, where the planetary boundary framework was originally formulated, have proposed an ‘aerosol loading’ boundary, but this threshold is not yet quantified<sup>360</sup>. For this reason, it is not possible to present an outcome target in terms of a single percentage reduction to bring the UK within safe ecological levels of air pollution<sup>361</sup>. In addition, there is no comprehensive research on the UK’s consumption-based footprint of air pollution, that is, air pollution which occurs overseas and is embodied in imports. Significant work is still needed to assess how UK demand contributes to air pollution in producer countries.

ACTION TARGETS	SECTOR(S)	METRICS/ INDICATOR(S)
<b>Develop, monitor and publicly report indicators for air pollution embodied in UK supply chains</b>	Importers (general goods and commodities)	To be developed
There is currently no clear understanding of the UK’s contribution to air pollution that occurs overseas as a result of demand for goods and commodities. Policies on air pollution focus on domestic ceilings and national emissions. There is very limited research undertaken to map emissions of air pollutants (other than CO <sub>2</sub> ) to trade flows. As such, this action will be a crucial first step to characterising and addressing the UK’s demand-based footprint of air pollution.		
<b>Introduce legislative targets to reduce air pollution caused by imported goods</b>	Policy makers	Official indicator: National Atmospheric Emissions Inventory pollutant levels
This action is enabled by the development of indicators for air pollution embodied in UK supply chains. A quantification of consumption-based air pollution would allow policy makers to introduce progressive targets to reduce air pollution associated with UK demand. These targets would be the driver of measures that compel importers to minimise the local environmental impacts associated with producing goods and commodities for UK supply chains. Potential measures could include emissions pricing on imported goods, and/or mandatory emissions allowance purchases by importers.		
<b>Revise the National Air Pollution Control Programme to ensure that included measures meet the more ambitious reduction targets, then ensure satisfactory implementation of the revised NAPCP.</b>	Policy makers	Official indicator: National Atmospheric Emissions Inventory pollutant levels
The NAPCP comprises the specific measures that the UK will enforce to meet the legislatively mandated pollution reduction targets set out under the National Emissions Ceiling Regulations. Given that the current NAPCP is projected to be insufficient to meet the current ceiling regulations <sup>362</sup> , and that it is recommended that the current ceilings be lowered, it will be necessary to expand the NAPCP. Increasing the scope and control of these measures, as well as developing additional measures, will likely be required <sup>363</sup> .		

<sup>360</sup> Stockholm Resilience Centre (n.d.) The nine planetary boundaries. <https://www.stockholmresilience.org/research/planetary-boundaries/planetary-boundaries/about-the-research/the-nine-planetary-boundaries.html>

<sup>361</sup> On the other hand, there are well known links between air pollution and adverse impacts on biodiversity. These links are sometimes even quantified in terms of pollution thresholds, above which key species and ecosystem functions are degraded or destroyed. An example is the ‘critical loads’ for the pollutants of concern monitored by the UK Air Pollution Information System (see: <http://www.apis.ac.uk/src/>).

<sup>362</sup> Ricardo Energy and Environment (2020). Review of the National Air Pollution Control Programme – United Kingdom. Final Report for European Commission – DG Environment. [https://ec.europa.eu/environment/air/pdf/reduction\\_napcp/NAPCP%20review%20report%20UK%20-%20Final%20updated%2018May20.pdf](https://ec.europa.eu/environment/air/pdf/reduction_napcp/NAPCP%20review%20report%20UK%20-%20Final%20updated%2018May20.pdf)

<sup>363</sup> Department for Environment, Food & Rural Affairs, Welsh Government, The Scottish Government, and Department of Agriculture, Environment and Rural Affairs (Northern Ireland) (2019). Air Quality: UK National Air Pollution Control Programme <https://www.gov.uk/government/publications/air-quality-uk-national-air-pollution-control-programme>



ACTION TARGETS	SECTOR(S)	METRICS/ INDICATOR(S)
<b>Effective on-farm fertiliser, manure and slurry management plans should be enforced to prevent NH<sub>3</sub> emissions.</b>	Agriculture	Official indicator: National Atmospheric Emissions Inventory pollutant levels
<p>Agriculture is the largest domestic source of NH<sub>3</sub> emissions<sup>364</sup>. Manure storage and application, fertiliser application, sewage sludge application and digestate application comprise 59% of the total NH<sub>3</sub> emissions from agricultural management. In addition, the sources of ammonia emissions that have increased most between 1990-2019 are sewage sludge and digestate<sup>365</sup>. More effective management of slurry and fertiliser should be mandated to mitigate ammonia emissions, including by requiring and incentivising more precise timing in the application of nutrients (so that nutrients are applied when crops can absorb them) and proper storage of slurry to minimise direct air emissions. Many of these practices are already laid out in the UK code of good agricultural practices, but a lack of inspection, outreach, enforcement, and penalty reduces the efficacy of existing slurry and fertiliser management strategies<sup>366</sup>. Defra committed to bring forward regulations and slurry storage incentive schemes to address NH<sub>3</sub> emissions in the Agricultural Transition Plan. These measures need to be implemented rapidly, appropriately balancing advice, incentives and enforcement, in order to exceed the current 2030 NH<sub>3</sub> Clean Air Strategy target and meet the proposed strengthened outcome target.</p>		
<b>Implement widespread combustion modification with selective catalytic reduction (SCR) of boilers and furnaces across a variety of sectors to reduce NO<sub>x</sub> emissions.</b>	Industry	Official indicator: National Atmospheric Emissions Inventory pollutant levels
<p>Optimisation of combustion processes and a post-combustion technology called selective catalytic reduction (which neutralises emissions into nitrogen and water) have the potential to reduce NO<sub>x</sub> emissions substantially. These methods come directly from the Multi Pollutant Measures Database, which projects the abatement potential of measures to 2030. Selective catalytic reduction applied across industrial applications has the potential to abate approximately 56 kilotonnes of NO<sub>x</sub>. Combustion modification has the potential to further reduce NO<sub>x</sub> emissions by 22.08 kilotonnes by 2030 when applied to miscellaneous industrial and commercial combustion (41.6 kilotonnes of NO<sub>x</sub> emissions when combined with selective catalytic reduction)<sup>367</sup>. These measures should be required and incentivised, as they are not stipulated in the current National Air Pollution Control Programme<sup>368</sup>.</p>		
<b>Commit to ‘Stage 2’ reformulations of chemicals used in manufacturing of VOC-emitting products</b>	Manufacturing	Official indicator: National Atmospheric Emissions Inventory pollutant levels
<p>Reformulation involves replacing Volatile Organic Compounds (VOC)-agents with non-VOC or low-VOC agents in the materials used for manufacturing of domestic products. Stage 2 refers to ‘possibly achievable reformulations’, acknowledging that some reformulations may require significant effort and incur cost disadvantages. This measure is directly from the Multi Pollutant Measures Database, which projects the abatement potential of measures to 2030. Widespread uptake of reformulation has the potential to reduce NMVOC emissions by 17.4 kilotonnes<sup>369</sup>.</p>		

364 Department for Environment, Food and Rural Affairs; Scottish Government; Welsh Government; and Department of the Environment in Northern Ireland (2018). Air Pollution from Agriculture. [https://uk-air.defra.gov.uk/assets/documents/reports/aeqg/2800829\\_Agricultural\\_emissions\\_vfinal2.pdf](https://uk-air.defra.gov.uk/assets/documents/reports/aeqg/2800829_Agricultural_emissions_vfinal2.pdf)

365 T.H. Misselbrook & S.L. Gilhespy (2021). Inventory of Ammonia Emissions from UK Agriculture 2019. Inventory Submission Report [https://uk-air.defra.gov.uk/assets/documents/reports/cat07/2103191000\\_UK\\_Agriculture\\_Ammonia\\_Emission\\_Report\\_1990-2019.pdf](https://uk-air.defra.gov.uk/assets/documents/reports/cat07/2103191000_UK_Agriculture_Ammonia_Emission_Report_1990-2019.pdf)

366 Department for Environment, Food & Rural Affairs (2009). Protecting our Water, Soil and Air: A Code of Good Agricultural Practice for farmers, growers and land managers. [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/268691/pb13558-cogap-131223.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/268691/pb13558-cogap-131223.pdf)

367 Janusz Cofala & Sanna Syri (n.d.). Nitrogen oxides emissions, abatement technologies and related costs for Europe in the RAINS model database. Interim Report. International Institute for Applied Systems Analysis. <http://pure.iiasa.ac.at/id/eprint/5563/1/IR-98-088.pdf>

368 Department for Environment, Food & Rural Affairs, Welsh Government, The Scottish Government, and Department of Agriculture, Environment and Rural Affairs (Northern Ireland) (2019). Air Quality: UK National Air Pollution Control Programme <https://www.gov.uk/government/publications/air-quality-uk-national-air-pollution-control-programme>

369 Department for Environment, Food & Rural Affairs (2012). Multi Pollutant Measures Database (MPMD). [https://uk-air.defra.gov.uk/assets/documents/reports/cat08/1212100954\\_31772\\_MPMD\\_Draft\\_Final\\_Report\\_for\\_comment.pdf](https://uk-air.defra.gov.uk/assets/documents/reports/cat08/1212100954_31772_MPMD_Draft_Final_Report_for_comment.pdf)

ACTION TARGETS	SECTOR(S)	METRICS/ INDICATOR(S)
<b>Ensure widespread uptake of solid wall insulation for residential buildings</b>	Polymakers, construction and demolition	Official indicator: National Atmospheric Emissions Inventory pollutant levels
<p>Solid wall insulation reduces the demand for heating, thereby reducing pollutants emitted from boiler combustion and other sources of heating. This measure is directly from the Multi Pollutant Measures Database, which projects the abatement potential of measures to 2030. Achieving only 23% additional uptake of solid wall insulation in homes by 2030 has the potential to reduce SO<sub>2</sub> emissions by 6.5 kilotonnes, NMVOC emissions by 5.8 kilotonnes and NO<sub>x</sub> emissions by 4.9 kilotonnes. It would also lead to significant reductions in PM<sub>10</sub> and PM<sub>2.5</sub><sup>370</sup>. This measure is of particular note because it has the potential for significant abatement for all regulated pollutants other than NH<sub>3</sub>.</p>		

<b>OVERLAPS</b>	<p>Air pollution overlaps with the Greenhouse Gas topic area. Greenhouse gases are typically legislated as air pollutants, though their environmental effects arise from increased atmospheric heating, not direct toxicity to ecosystems.</p> <p>The Water Pollution topic area additionally contributes to mitigating air pollution. Pollutants reaching waterways from airborne sources are addressed in that topic area, so actions to reduce select pollutants will involve reducing their emission to the air (and eventual transport to water).</p>
<b>DATA GAPS AND UPCOMING WORK</b>	<p>Notable data gaps:</p> <ol style="list-style-type: none"> <li>There is no clear picture of air pollution embodied in UK imports. Local emissions of air pollutants are well-tracked in many countries, but work to attribute the share of pollutants to trade flows has not been conducted.</li> <li>There is not a quantified planetary ecological limit that can be used to compare the UK's emissions footprint. The Stockholm Resilience Centre has proposed an 'aerosol loading' boundary, but this threshold is not fully developed.</li> </ol> <p>Upcoming work:</p> <ol style="list-style-type: none"> <li>JNCC is currently developing a suite of indicators to measure the biodiversity impacts of UK consumption. While air pollution may not be in the scope of the first iteration of this work, it may be included at a later date.</li> <li>Should the Stockholm Resilience Centre complete the formulation of an aerosol loading planetary boundary, determining the UK's proximity to a safe ecological threshold for air pollution would be more straightforward.</li> </ol>
<b>KEY MESSAGES</b>	<p>The current legislative emissions ceilings do not reflect adequate ambition to prevent ecosystem degradation and premature deaths. Further, expert assessment suggests that the required reductions will be only partly satisfied by 2030.</p> <p>Measures to address air pollution are generally well understood. Meeting increased ambitions for reducing emissions of pollutants will likely involve tighter regulations and greater incentives around these measures.</p>

<sup>370</sup> Department for Environment, Food & Rural Affairs (2012). Multi Pollutant Measures Database (MPMD). [https://uk-air.defra.gov.uk/assets/documents/reports/cat08/1212100954\\_31772\\_MPMD\\_Draft\\_Final\\_Report\\_for\\_comment.pdf](https://uk-air.defra.gov.uk/assets/documents/reports/cat08/1212100954_31772_MPMD_Draft_Final_Report_for_comment.pdf)

# ISSUE HIGHLIGHT:

## BIODIVERSITY CONSERVATION TO HALT AND REVERSE THE LOSS OF NATURE BY 2030

This report focuses on reducing the footprint of the UK’s production and consumption as an essential component of protecting and restoring local and global biodiversity as multiple studies show that halting and reversing the loss of nature by 2030 will not be achieved by conservation measures alone.

WWF recognises three transformative goals that have to be brought about at a global scale in order to ‘bend the curve’ of biodiversity decline upwards (Figure 1) zero loss of natural habitats, zero extinction, and halving the global footprint of production and consumption.<sup>371</sup>

Whilst not the focus of this report we highlight some key conservation mechanisms to sit alongside action on reducing the production and consumption footprint to address the protection and restoration of nature<sup>372</sup>. These would necessarily focus on species distribution, abundance, functional traits, genetic diversity, and demographic trends as well as the intactness, connectivity and integrity of ecosystems and biomes<sup>373</sup>. The targets below outline just a few of the actions that could contribute to achieving an overarching target for biodiversity: halting and reversing the loss of nature by 2030. Actions must be taken both domestically and overseas.

OVERARCHING TARGET: HALT AND REVERSE THE LOSS OF NATURE BY 2030		
ACTION TARGETS	SECTOR(S)	INDICATOR(S)
Protect 30% of UK land by 2030		
The UK Government has announced its commitment to protect 30% of UK land by 2030, sometimes referred to as the ‘30x30’ commitment. Evidence suggests that at lit is necessary to dedicate at least 30% of land to nature protection in order to safeguard biodiversity and the integrity and functioning of ecosystems <sup>374</sup> . Currently only 8% of land is statutorily designated specifically for nature’s protection, of which less than 40% is in favourable condition (see next action target). Making 30x30 meaningful means protecting land for nature in the long-term and ensuring good management of the land so it is in good or recovering condition.		
Restore 75% of the total area of UK terrestrial and freshwater protected sites to favourable condition	Protected areas land managers, policymakers	% of SSSIs in favourable condition
The UK’s protected areas provide a haven for rare, threatened and protected species, as well as conserving a representative selection of the ecosystems and habitats within the UK. This is a commitment in the 25 Year plan for the environment <sup>375</sup> . However, many protected areas are degraded, and, as of 2019, only 38.9.% of protected areas in England were in a favourable condition <sup>376</sup> . Protected areas include Sites of Special Scientific Interest (SSSIs).		

371 WWF (2020). A New Deal for Nature and People. [https://wwfint.awsassets.panda.org/downloads/newdeal\\_brochure\\_final.pdf](https://wwfint.awsassets.panda.org/downloads/newdeal_brochure_final.pdf)

372 The targets here are just a few of the conservation measures needed to restore and enhance biodiversity. For more in-depth consideration of the efforts needed please see other work by WWF as well as publications including the UK Post-2010 Biodiversity Framework by JNCC, UK State of Nature report by RSPB, assessments by IPBES, UK national targets and actions under the Convention on Biological Diversity.

373 WWF (2020) Living Planet Report 2020 - Bending the curve of biodiversity loss. Almond, R.E.A., Grooten M. and Petersen, T. (Eds). WWF, Gland, Switzerland.

374 Woodle, S., Locke, H., Laffoley, D., MacKinnon, K., Sandwith, T., & Smart, J. (2019). A review of evidence for area-based conservation targets for the post-2020 global biodiversity framework. PARKS, Vol. 252, November 2019, 31-46.

375 HM Government (2018). A Green Future: our 25 Year Plan to Improve the Environment. <https://www.gov.uk/government/publications/25-year-environment-plan>

376 H.M. Government (2020). 25 Year Environment Plan Progress Report: April 2019 to March 2020. [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/891783/25yep-progress-report-2020.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/891783/25yep-progress-report-2020.pdf)

Note that the situation differs across the devolved countries. While 38.9% of protected sites in England are in favourable condition, 78.3% of natural features in Scotland were in favourable condition as of 31 March 2021 (see Official statistics for protected sites, NatureScot)



ACTION TARGETS	SECTOR(S)	INDICATOR(S)
<p><b>Increase the extent of woodland in the UK by 30,000 hectares per year to 2030 with the right trees in the right place</b></p>	<p>Polymakers, land managers, forestry sector</p>	<p>Suggested indicators: Hectares established per year; % of newly established woodlands meeting UK Woodland Assurance Scheme criteria</p>
<p>Trees and woodland play a critical role in recovering nature, as well as being one of the most cost-effective nature-based solutions to climate change. This target is adapted from one of the Environment Bill's targets<sup>377</sup> and extends the Government's manifesto commitment from 2025 to 2030. However, inappropriate planting of trees can destroy existing valuable habitats, and stands of exotic softwoods have limited biodiversity value. New woodland creation should therefore be in line with the UK Woodland Assurance Scheme as a minimum<sup>378</sup>, and preferably with the additional requirements for generating positive ecosystem services and biodiversity impacts described by the FSC Ecosystem Services Procedure<sup>379</sup>. In addition, care should be taken to prevent inappropriate replacement of existing ecosystems or land management systems with woodland. Creation of new woodland should not displace or offshore the impacts of land-use change.</p>		
<p><b>Restore and sustainably manage 70% of the UK's two million hectares of peatland</b></p>	<p>Agriculture, Land Managers, Forestry</p>	<p>Suggested metric: area of peatland managed to prevent degradation</p>
<p>Currently, UK peat stocks are being depleted at a rate 100 times faster than they naturally regenerate<sup>380</sup>.</p> <p>In England alone, as much as 99% of peatland is damaged to some degree, and fenland peats may be less than 60 years away from a fundamental eradication of soil fertility<sup>381</sup>. The IUCN UK Peatland Strategy defines a target to restore or sustainably manage 50% of the two million hectares of peatland across the UK by 2030 and restore or sustainably manage 95% by 2045<sup>382</sup>. However, given the potential co-benefits of restoring and conserving peatland (such as converting degraded peatland from a carbon source into a potential carbon sink<sup>383</sup>) and the current dire state of existing peatlands, it is recommended that this target is pushed forward. The government should facilitate the restoration and sustainable management of 70% of peatlands by 2030 and aim to achieve the 95% target by 2035.</p>		
<p><b>Improve the quality of Marine Protected Areas</b></p>	<p>Polymakers, Protected Areas, fishing industry</p>	
<p>Well-maintained Marine Protected Areas (MPAs) allow marine life to flourish and contribute and the maintenance of fish stocks. 35% of England's seas are now within designated MPAs, and the 25 Year Plan for the Environment commits to 'Achieve good environmental status of our seas while allowing marine industries to thrive, and complete our ecologically coherent network of well-managed marine protected areas (MPAs)'<sup>384</sup>. However, the UK's MPAs are not well protected and are being actively degraded. For example, just 5% of the UK's Marine Protected Areas ban bottom trawling, a method of fishing that damages the seabed, kills animals and plants and releases carbon stored in the seabed.<sup>385</sup></p>		

377 Department for Food, Farming and Rural Affairs (19 August 2020). Environment Bill - environmental targets. Updated 21 October 2020. <https://www.gov.uk/government/publications/environment-bill-2020/august-2020-environment-bill-environmental-targets#part-a-process-for-developing-targets-under-the-environment-bill-framework>

378 UK Woodland Assurance Scheme. UKWAS Standard 4. <http://ukwas.org.uk/standard/background-and-purpose/>

379 FSC International (2021). Ecosystem Services Procedure: Impact Demonstration and Market Tools. FSC-PRO-30-006V1-2EN. <https://fsc.org/en/document-centre/documents/resource/316>

380 IUCN Peatland Programme (n.d.). Briefings <https://www.iucn-uk-peatlandprogramme.org/resources/briefings>

381 Environment Agency (2019). The state of the environment: soil [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/805926/State\\_of\\_the\\_environment\\_soil\\_report.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/805926/State_of_the_environment_soil_report.pdf)

382 IUCN Peatland Programme (n.d.). UK Peatland Strategy 2018-2040 <https://portals.iucn.org/library/sites/library/files/documents/2018-015-En.pdf> See also the England Peat Action Plan (May 2021) that was developed to align with the broad principles of the IUCN UK Peatland Strategy.

383 Lindsay, R. (2020). Peatbogs and Carbon: A Critical Synthesis. RSPB Scotland [https://www.iucn-uk-peatlandprogramme.org/sites/default/files/2019-07/Peatbogs\\_and\\_carbon.pdf](https://www.iucn-uk-peatlandprogramme.org/sites/default/files/2019-07/Peatbogs_and_carbon.pdf)

384 HM Government (2018). A Green Future: our 25 Year Plan to Improve the Environment. <https://www.gov.uk/government/publications/25-year-environment-plan>

385 Marine Conservation Society (2021). Marine UnProtected Areas. <https://www.mcsuk.org/media/marine-unprotected-areas-summary-report.pdf>

ACTION TARGETS	SECTOR(S)	INDICATOR(S)
<b>Government policy to support a global goal that by 2030 no species are threatened by illegal or legal overexploitation; species previously threatened by illegal or legal overexploitation are stable or recovering</b>	Policymakers	Suggested metric: number of species threatened by illegal or legal overexploitation
<p>The UK is a signatory to Convention on International Trade in Endangered Species (CITES), the purpose of which is to ensure that international trade in specimens of wild animals and plants does not threaten the survival of the species. Today, it accords varying degrees of protection to more than 37,000 species of animals and plants. However, it requires constant vigilance and action to ensure that CITES is effective, as well as specific investment and support to ensure that the populations of overexploited species are recovering. In addition, the illegal trade in wildlife is estimated to be worth between 7 and 23 billion US dollars a year globally, and is responsible for putting species such as pangolins, rhinos and tigers in danger of extinction<sup>386</sup>. The UK Government pledged £4.6 million to projects aimed at illegal wildlife trade in 2018, but there is a need to improve and enforce regulations domestically and further support governments overseas to do likewise.</p>		
<b>Roll out of Local Nature Recovery Strategies ensuring these are ladder up to a robust Nature Recovery Network</b>	Policymakers	Suggested metric: tbd
<p>Local Nature Recovery Strategies are spatial plans that enable stakeholders to direct investment in nature to where it can best benefit the natural environment. They have an important role to play in delivering the government's commitment to nature recovery and are a key element of the Environment Bill. Local</p> <p>Nature Recovery Strategies (LNRs) will put spatial planning for nature on a statutory footing and will support local action by consistently mapping important existing habitats and opportunities to create or restore habitat. Key actions for the Government are to:</p> <ul style="list-style-type: none"> <li>• learn the lessons from the pilots and ensure that it is built into the statutory guidance that will follow the Environment Bill</li> <li>• ensure there is adequate funding to support their development and implementation (e.g., to provide adequate capacity in Local Authorities to develop and implement Strategies, address data gaps, etc.)</li> <li>• ensure that they are underpinned by a common spatial planning process (SCP) that can ensure there is a focus on the most cost-effective solution and help to channel funding to these.</li> </ul>		

<sup>386</sup> S. Wong (2018). UK government directs £4.6 million to tackling illegal wildlife trade. New Scientist (21 April 2018). <https://www.newscientist.com/article/2200314-uk-government-directs-4-6-million-to-tackling-illegal-wildlife-trade/>

## ISSUE HIGHLIGHT:

# REDUCING THE ENVIRONMENTAL IMPACT OF THE UK'S FINANCE SECTOR

*Based on literature review and input from sustainable finance experts at WWF and World Benchmarking Alliance*

The private finance sector – which includes banks, asset owners, asset managers, and insurance companies – is a key enabler of global economic activity. The UK is one of the main global centres for financial services, and UK-based financial actors control an enormous amount of capital which they invest in different economic activities. Harnessing these resources could make the financial sector a major force in mobilising action towards sustainable production and consumption<sup>387</sup>.

Currently, a significant proportion of the UK capital flows – which amounted to £1.5 trillion in 2019<sup>388</sup> – are committed to activities including petroleum, pharmaceuticals and plastics, and mining and quarrying that can be environmentally damaging<sup>389,390</sup>. A recent WWF study estimated that the UK's global carbon emissions from the private asset managers and banks (covering approximately 39% of the total UK assets under management) were 805Mt/year, nearly double the UK's own annual emissions<sup>391</sup>. UK private financial institutions have also been shown to be lending significant sums to companies behind destruction of some of the world's most biodiverse tropical forests<sup>392</sup>.

As with all companies, the UK's financial sector will be expected to work towards aligning with the Paris agreement, which involves targets to at least halve GHG footprints by 2030. The UK's new Environment Bill will additionally place corporate due diligence obligations on actors financing commodities from regions of high deforestation risk, which could facilitate a target for the financial sector to eliminate deforestation and conversion from their portfolios. Data for setting such targets is increasingly available through footprinting tools<sup>393</sup> and providers like Trase Finance.

There is also increasingly a call for private financial actors to contribute to halting and reversing ecosystem and biodiversity loss. Currently, it is estimated that 133 billion USD flows into nature-based solutions globally each year, only 14% from private finance<sup>394</sup>. The scale of this investment will need increase drastically to close an estimated \$4.1 trillion gap to achieve global biodiversity targets<sup>395</sup>.

### **The emergence of 'double materiality'**

There has been, to date, relatively little consideration by financial institutions of how their investments might contribute to positive or negative environmental impacts. Focus has instead largely been on the risk posed to investments. There is a growing awareness amongst financial regulators, for example, of the risk that climate change poses to financial stability and investments. In the UK, the Task Force on Climate-Related Financial Disclosures (TCFD) was created in 2015 to facilitate businesses to disclose their exposure to climate change risk, mainly to allow financial actors to make informed investment decisions<sup>396</sup>.

The growing use of environmental, social and governance (ESG) criteria does represent some progress towards financial actors evaluating the impacts of their investments. More recently too, the concept of 'double materiality' has emerged as a way of harnessing the potential of the finance sector to drive sustainable economic activity that respects natural resource limitations. The concept captures both the risks posed by environmental degradation to financial institutions and the potential positive or negative impacts an institution's investments have on the environment. It is starting to be used by a small number of financial actors, facilitated by initiatives and tools that support institutions to measure and address the impacts of their portfolios. The World Benchmarking Alliance, for example, has created an accountability mechanism in the form of a benchmark to incentivise the private finance sector to measure their contribution to achieving the Sustainable Development Goals.

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387 World Economic Forum (2021). Investing Less than 1% of World GDP into Nature-Based Solutions Can Tackle Climate Change and Biodiversity Crisis <https://www.weforum.org/press/2021/05/investing-less-than-1-of-world-gdp-into-nature-based-solutions-can-tackle-climate-change-and-biodiversity-crisis>

388 UK Parliament (2020). Foreign Direct Investment Statistics. <https://commonslibrary.parliament.uk/research-briefings/cbp-8534/>

389 ONS (2020). Foreign direct investment involving UK companies: 2019.

<https://www.ons.gov.uk/economy/nationalaccounts/balanceofpayments/bulletins/foreigndirectinvestmentinvolvingukcompanies/2019>

390 UK Parliament (2020). (ibid)

391 WWF (2021). The Big Smoke: The Global Emissions of the UK Financial Sector. [https://www.wwf.org.uk/sites/default/files/2021-05/uk\\_financed\\_emissions\\_v11.pdf](https://www.wwf.org.uk/sites/default/files/2021-05/uk_financed_emissions_v11.pdf)

392 Global Witness (2019). Money to burn. <https://www.globalwitness.org/en/campaigns/forests/money-to-burn-how-iconic-banks-and-investors-fund-the-destruction-of-the-worlds-largest-rainforests/>

393 [https://ec.europa.eu/environment/biodiversity/business/tools-and-resources/index\\_en.htm](https://ec.europa.eu/environment/biodiversity/business/tools-and-resources/index_en.htm)

394 UNEP (2021) State of Finance for Nature. <https://www.unep.org/resources/state-finance-nature>

395 UNEP (2021) State of Finance for Nature. <https://www.unep.org/resources/state-finance-nature>

396 Task Force on Climate-related Financial Disclosures (2021). About. <https://www.fsb-tcfd.org/about/>



Other emerging initiatives specifically focus on biodiversity. The Finance for Biodiversity Pledge<sup>397</sup>, for example, includes a commitment by financial institutions to take ambitious action to reverse nature loss. As of May 2021, there were 55 signatories, including international banks, insurance companies and asset managers, have a combined €9 trillion worth of assets under management. The Biodiversity Footprint for Financial Institutions<sup>398</sup> is being developed to calculate the biodiversity impact of investments. The Task Force for Nature-related Financial Disclosures (modelled on the TCFD, above) is gaining support and is attempting to address the impact of production and deforestation in supply chains<sup>399</sup>. Elsewhere, the Sustainable Markets Initiative seeks to realign finance to activities such as waste reduction, reforestation and solar energy<sup>400</sup>.

### **Drivers and challenges for creation of a sustainable financial system**

The biggest driver for greater focus on sustainability amongst financial actors remains the potential risk that environmental degradation poses to assets and investments. However, there are increasing regulatory pressures. For example, the UK government plans to make TCFD disclosures mandatory for some actors by 2022<sup>401</sup> and will implement a UK 'green taxonomy' framework for determining and disclosing the environmental impact of firms' activities<sup>402</sup>. Growing public awareness of the activities of financial actors creates the potential to harness public pressure which may be particularly felt by publicly-listed financial entities.

Nevertheless, transforming the financial system is a considerable task. A specific challenge is a current lack of data and transparency about the environmental impacts of financial activities<sup>403</sup>. There remain gaps in coverage in the emerging frameworks for assessing investment; for example, PACTA, which assesses alignment of financial institutions' portfolios with climate scenarios, covers a broad range of asset classes but not investment banking, through which banks exert huge leverage<sup>404,405</sup>. Many other tools focus on assets but few allow evaluation of whole portfolios. There is also a lack of sustainability expertise amongst finance professionals and, as the field and associated tools are very new, actors are often reluctant to be the first to invest in these initiatives.

### **Conclusion**

The financial sector has the potential to be a major force driving more environmentally sustainable economic activities. However, to date, this has received limited consideration, and focus by private financial institutions has mostly been on the risk posed by environmental degradation to financial investments rather than the environmental impacts of the investments themselves. This is receiving increasing attention and tools and initiatives are emerging to harness the potential positive impacts of finance actors.

397 Finance for Biodiversity Pledge (2020). Finance for Biodiversity Pledge. <https://www.financeforbiodiversity.org/>

398 PRé Sustainability B.V. (2021). Biodiversity Assessment.

<https://pre-sustainability.com/solutions/consulting/sustainable-companies/biodiversity-assessment/>

399 TNFD (2021). Taskforce on Nature-related Financial Disclosures. <https://tnfd.info/>

400 Sustainable Markets Initiative (2021). <https://www.sustainable-markets.org/>

401 HM Treasury (2020). UK joint regulator and government TCFD Taskforce: Interim Report and Roadmap.

<https://www.gov.uk/government/publications/uk-joint-regulator-and-government-tcfd-taskforce-interim-report-and-roadmap>

402 <https://www.gov.uk/government/news/chancellor-sets-out-ambition-for-future-of-uk-financial-services>

403 OECD (2020) Global Outlook on Financing for Sustainable Development 2021

404 2degrees Investing Initiative (2020). PACTA Climate Scenario Analysis Programme. <https://2degrees-investing.org/resource/pacta/>

405 Bruno Besek, World Benchmarking Alliance. Pers Comm. Interview. 18th May 2021.





**“AN OUNCE OF PREVENTION IS  
WORTH A POUND OF CURE”<sup>406</sup>**



# CONCLUSIONS

As the recently published Dasgupta Review makes clear, it is cheaper and less disruptive to act now to conserve nature and address the dependence and impact our economies have on it than to try and restore nature later, once it is damaged or degraded<sup>407</sup>.

Multiple assessments, covering very different disciplines, have concluded that time is running out if we are to prevent irrevocably damage the planet's biodiversity and earth systems: the very things on which our own health, wellbeing and economy depends<sup>408</sup>. We are in effect at a moment where we have to restore *and* prevent further damage to planetary systems.

As the Dasgupta Review makes clear, the changes we need to make are not only urgent, they are also profound. Transformational changes to economies, governance and culture are required if we are to reverse the risk of biodiversity and ecosystem service collapse<sup>409</sup>. The UK has a unique moment of opportunity to lead this change through the upcoming Environment Bill, its chairing on the 26th Conference of Parties of the United Nations Framework Convention on Climate Change at the end of 2021, and the suite of technical work that is seeking to understand the impacts of UK production and consumption at home and overseas<sup>410</sup>.

It is also critical that goals and efforts by the UK comprehensively address the impacts of both its production and consumption, critically including those that occur overseas and are embedded in imports to the UK. Focusing only on domestic issues and actions runs the risk that damaging activities and their impacts will simply be 'offshored' or 'outsourced' to other countries. The UK therefore needs ambitious targets that are based on the complete footprint of its production and consumption, encompassing both domestic and overseas considerations.

To this end, we present an overarching target for the UK to reduce the footprint of its production and consumption by at least three quarters by 2030 in order to reduce its impacts on biodiversity and ecosystem services, both domestically and overseas. The size of this proposed reduction in footprint is designed to reflect a fair and equitable contribution of the UK to reduction of the global impact given its disproportionate responsibility for the impacts, capacity to address them and allowing less developed economies to realise the right to sustainable economic development.

Specific outcome targets are presented for ten topic areas that comprise key drivers behind the UK production and consumption footprint and are intended to bring the impacts within environmental limits by 2030 (Table 4). Each of these outcome targets is supported by 6-12 Action Targets: specific measures and sub-targets which, if attained, would broadly result in the Outcome being achieved.

Where possible, these are articulated as specific targets (or activities) for sectors that are established in the scientific literature as being the major contributors to the UK's footprint for that Topic Area. Mechanisms for achieving these Action Targets are detailed where appropriate. However, a lack of impact data means some Action Targets are more general levers of change (such as a law, or the need to measure, monitor and report an impact). Where possible, we suggest a metric for monitoring progress towards each Action Target. In some cases, there is a need to develop suitable metrics and indicators to measure impacts in a given topic area. In some areas there is a need for better data to cover the UK, but in almost all cases the impacts of producing UK imports are not well understood. This suggests an urgent need to support improvements in international environmental data collection and sharing.

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406 Attributed to Benjamin Franklin, 1733

407 Dasgupta, P. (2021), The Economics of Biodiversity: The Dasgupta Review. London: HM Treasury

408 For example, W. Steffen et al., 'Planetary Boundaries: Guiding Human Development on a Changing Planet', Science 347, no. 6223 (13 February 2015): 1259855–1259855, <https://doi.org/10.1126/science.1259855>; WWF (2020) Living Planet Report 2020 - Bending the curve of biodiversity loss. Almond, R.E.A., Grooten M. and Petersen, T. (Eds). WWF, Gland, Switzerland; IPCC, 2014: Climate Change 2014: Synthesis Report. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Core Writing Team, R.K. Pachauri and L.A. Meyer (eds.)]. IPCC, Geneva, Switzerland, 151 pp

409 Dasgupta, P. (2021), The Economics of Biodiversity: The Dasgupta Review. London: HM Treasury

410 For example, work by the JNCC and Stockholm Institute for the Environment: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/925437/17\\_Global\\_biodiversity\\_impacts\\_of\\_UK\\_consumption\\_2020\\_accessible.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/925437/17_Global_biodiversity_impacts_of_UK_consumption_2020_accessible.pdf)



**TABLE B: SUMMARY OF THE TARGETS REQUIRED TO RESTORE THE IMPACTS OF THE UK'S PRODUCTION AND CONSUMPTION WITHIN ENVIRONMENTAL LIMITS BY 2030**








TOPIC AREA	CURRENT UK FOOTPRINT	BOUNDARY FOOTPRINT	UNITS	OUTCOME TARGET
 GREENHOUSE GAS FOOTPRINT	522	316	MtCO <sub>2</sub> e	Reduce UK domestic GHG emissions including international shipping and aviation by 39% on 2018 levels by 2030 and reduce the overseas carbon footprint of UK's consumption of imports by 33%
 MATERIAL CONSUMPTION	7.7	4.8	Tonnes per person per year	Reduce the UK's material consumption footprint by 40% by 2030
 BIOMASS CONSUMPTION	3.1	1.6	Tonnes per person per year	Reduce the UK's biomass consumption footprint by 50% by 2030
 MARINE RESOURCE USE	The UK footprint of marine resource use is not well defined. It is estimated that in 2019 over 60% of commercial UK fish stocks were unsustainably exploited or at high risk of unsustainable exploitation. Illegal and unregulated fishing, damaging capture practices and unsustainable feed are prevalent issues globally which is key as 60% of the UK's marine resource use is met by imports from other countries. As pressure on global marine resources intensifies, the UK's sourcing must be rapidly made unambiguously sustainable.			100% of marine resources from sustainable sources by 2030
 DEGRADATION AND LAND-USE CHANGE	The UK footprint of degradation and non-deforestation land use change is not well defined. In 2017 UK supply chains were estimated to be responsible for over 20,200 hectares of deforestation embodied in imports. Expert consensus is that the ecological threshold for deforestation is zero and that all forms of degradation and land conversion should be minimised.			UK supply chains of agricultural and forest commodities are responsible for no deforestation and conversion of ecosystems as soon as possible and no later than 2023, degradation of domestic environments is halted, and environmental degradation that occurs overseas as a result of the UK's demand for materials and goods is minimised by 2030

TABLE B: CONT

TOPIC AREA	CURRENT UK FOOTPRINT	BOUNDARY FOOTPRINT	UNITS	OUTCOME TARGET
 <b>NUTRIENT USE</b>	Phosphorus: 5.2 Nitrogen: 72.9	P: 0.79 N: 7.9	kg per person per year	Reduce nitrogen and phosphorus use by at least 80%
 <b>CHEMICAL POLLUTION</b>	The footprint of overall chemical pollution, occurring both domestically and overseas, is not well defined. However, safe emissions thresholds are relatively well defined for many pollutants and can be used to set reduction targets for individual pollutants.			Reduce the emissions of all chemical pollutants to levels at or below safe thresholds (preventing emissions where risks are unknown) and restore social and ecological systems damaged by chemical pollution
 <b>WATER POLLUTION</b>	36% <sup>411</sup>	100%	% of water bodies achieving good ecological status	Protect, enhance and restore all bodies of water in the UK to achieve good ecological status and good chemical status by 2027, and reinforce the positive trend in coastal and marine waters to halt the harmful effects of water pollution on those ecosystems
 <b>WATER AVAILABILITY AND FLOWS</b>	84% surface waters  72% groundwaters <sup>412</sup>	100% surface waters  90% groundwaters	% water bodies meeting required flow standards	All surface water bodies and at least 90% of groundwater bodies in the UK meet sustainable abstraction and ecological flow requirements, and the UK supports sustainable water management in key overseas sourcing regions based on quantification of the impact of its imports on overseas water availability and flows
 <b>AIR POLLUTION</b>	National and international legislation calls for reduced emissions of all air pollutants of concern. However, the UK's air pollution targets are insufficient to prevent significant harms. While there is not a well-defined ecological threshold for air pollution, more ambitious reductions will prevent avoidable deaths and ecological degradation.			Limit the emissions of harmful air pollutants, by 1) meeting the European Environmental Bureau's 'Maximum Technically Feasible Reductions' for pollutants of concern set out in A Critical Guide to the New NEC Directive (2017) and 2) assessing and mitigating the UK's contribution to overseas air pollution

<sup>411</sup> Note that this footprint only covers domestic water pollution. Local water pollution that occurs overseas as a result of UK imports is not quantified. Established criteria reflect 'good' or 'high' status from the Water Framework Directive, as measured by JNCC indicator 'B7. Surface water status'.

<sup>412</sup> Note that this footprint only covers domestic water availability and flows. Local alterations to availability and flows that occur overseas as a result of UK imports is not quantified. Required flow standards are defined in the 25 Year Environment Plan and measured by indicators defined therein

Policymakers have a key role to play in attaining these targets as they set the boundary conditions driving land use, consumption, and production practices through regulation, taxes and subsidies, and influence over industry and citizens. However, equally important is the action of businesses spread across many sectors of the economy who will have to implement, and in some cases lead, efforts to reduce their impacts. Non-governmental organisations and civil society also have a role to play in raising awareness, changing behaviours of the general population and holding private and public actors to account.

For human society to return to living within environmental limits will ultimately take collaborative action and international agreements by every country on earth. In this report, we outline what is needed for the UK to take leadership and put our own house in order.



## SECTORAL CONTRIBUTIONS

The following tables list the Action Targets most applicable to each stakeholder group, particular economic sectors, but also research organisations and citizens. We have not included a separate table for policy makers, as almost all Action Targets have a policy element: policy makers should refer to the Topic Areas. Few targets are specified for the private finance sector at this stage; some are outlined in the 'Other' table here and discussion of emerging initiatives and target-setting for the sector are detailed in the Finance Footprint Issue Highlight.

### AGRICULTURE SECTOR

ACTION TARGET	RELATING TO TOPIC AREA
Develop a comprehensive programme for agricultural soil management, and maximise the adoption of sustainable agricultural practices	Degradation and land-use change
Restore and sustainably manage 70% of the UK's two million acres of peatland	Biodiversity (see Issue Highlight)
Reduce the rates of application and toxicity of chemical pesticides by 50% by 2030	Chemical Pollution
Facilitate the widespread domestic adoption of practices that reduce the use of chemical pesticides	Chemical Pollution
Effective on-farm fertiliser, manure and slurry management plans should be enforced to prevent NH <sub>3</sub> emissions.	Air Pollution
Facilitate farmers to minimise pre-farmgate food losses	Biomass consumption
Improve the regulatory and advice framework to enforce England's Farming Rules for Water, Water Resources (Control of Pollution) (Silage, Slurry and Agricultural Fuel Oil) (England) and Nitrates regulations so that farmers are aware of how to comply and do so, violations and pollution incidents are reduced to zero and diffuse pollution is minimised	Biomass consumption
Reduce losses of phosphorus and nitrates to water bodies from farmland by 10% and 65%, respectively	Water pollution
Significantly reduce use of primary phosphorus on farmland through measures to increase the specificity of fertiliser application and reduce losses	Nutrient Use
Use 50% recycled phosphate in manufactured fertiliser	Nutrient Use
Increase the use of biosolids from Sewage Treatment Plants on farmland (in line with standards of the Biosolids Assurance Scheme)	Nutrient Use
Increase nitrogen use efficiency to at least 80% for all farmers through the use of farming techniques that tailor the rate, timing and accuracy of nitrogen applications to current conditions	Nutrient Use

## AGRICULTURE SECTOR (CONTINUED)

ACTION TARGET	RELATING TO TOPIC AREA
Increase the use of nitrogen-conserving farming practices	Nutrient Use
Increase the use of phytase enzyme in animal feed to increase uptake of phosphorus from food in monogastric animals such as pigs	Nutrient Use
Reduce emissions from agriculture by at least 22% by 2030 on 2019 levels using agroecological methods and without offshoring these impacts	Greenhouse Gas footprint
Reduce emissions from waste by 40%, including reducing edible food waste by 50%, preventing biodegradable waste to landfill and ensuring all energy-from-waste plants are fitted with carbon capture and storage (CCS)	Greenhouse Gas footprint

## INDUSTRY (GENERAL)

ACTION TARGET	RELATING TO TOPIC AREA
Reduce land-based emissions of mercury to air and water by 50% by 2030	Chemical pollution
Identify and address major causes of chemical pollution associated with the production of goods for UK consumption overseas	Chemical pollution
Implement widespread combustion modification with selective catalytic reduction (SCR) of boilers and furnaces across a variety of sectors to reduce NOx emissions.	Air pollution
Reduce water use by non-household water users, particularly the energy supply industry	Water availability and flows

## WATER AND SEWAGE MANAGEMENT

ACTION TARGET	RELATING TO TOPIC AREA
Significantly reduce phosphorus entering waterways from sewage treatment plant discharge by requiring all plants to meet the concentration limit of 0.25 mg/l	Water pollution
Develop and implement a robust sampling and detection methodology for micro-plastics in treated water, then introduce measures to prevent microplastic pollution by 2030	Water pollution
Increase phosphorus recycling from wastewater by 60% using techniques (such as biological phosphate removal followed by struvite recovery) which precipitate phosphorus in a form that can be used as fertiliser	Nutrient Use

## WATER AND SEWAGE MANAGEMENT (CONTINUED)

ACTION TARGET	RELATING TO TOPIC AREA
Increase the use of biosolids from Sewage Treatment Plants on farmland (in line with standards of the Biosolids Assurance Scheme)	Nutrient Use
Reduce water leakage during delivery by 32%	Water availability and flows
Reduce water use by household water use by: 1) increasing the proportion of household with metered water supplies to 80% and 2) introducing mandatory labelling and minimum standards for water-using items and water-supply fittings in all new buildings or renovations	Water availability and flows
Reduce water abstraction so that all currently over-abstracted areas are brought within 'water available' levels, beginning by reviewing and revoking unsustainable abstraction licenses	Water availability and flows
Ensure the restoration of 'natural functions of water and wetland ecosystems' by reviewing the impacts of physical alterations to water bodies (with a focus on alterations not for flood protection or navigation) and restoring water bodies to a more natural physical state wherever practicable	Water availability and flows

## WASTE MANAGEMENT

ACTION TARGET	RELATING TO TOPIC AREA
Increase the rate of circular material utilisation to a level that brings the UK's virgin material consumption under sustainable thresholds	Material consumption
Achieve a 75% recycling rate for packaging	Material consumption
Achieve 10% of municipal waste sent to landfills	Material consumption
Reduce the export of unprocessed waste materials from the UK	Material consumption
Minimise the generation of hazardous waste and treat 100% of hazardous waste before disposal	Chemical pollution
Substantially increasing the amount persistent organic pollutants (POPs) material being destroyed or irreversibly transformed by 2030, to make sure there are negligible emissions to the environment	Chemical pollution
Achieve an 85% recycling rate for paper and cardboard packaging and a 30% recycling rate for wood packaging	Biomass consumption
Reduce emissions from waste by 40%, including reducing edible food waste by 50%, preventing biodegradable waste to landfill and ensuring all energy-from-waste plants are fitted with carbon capture and storage (CCS)	Greenhouse gas footprint



## FISHING AND AQUACULTURE

ACTION TARGET	RELATING TO TOPIC AREA
Improve the quality of Marine Protected Areas	Biodiversity (see Issue Highlight)
Fully transition to low impact fisheries, including prohibiting the use of non-selective and destructive fishing gears and techniques in protected UK waters and by UK vessels, including distant water fleets	Marine resource use
Establish nature-enhancing land and marine uses across at least 25% of the UK	Degradation and land-use change
Aquaculture halves the use of fishmeal and fish oil from purpose-caught fish by 2030, avoiding substitution by environmentally damaging replacements	Marine Resource Use
All UK and imported fish stocks are fished at or below levels capable of producing maximum sustainable yield (FMSY) by 2030	Marine Resource Use
Eradicate IUU (Illegal, Unregulated, Unreported) fishing in UK waters and from imports of fish and related products	Marine Resource Use
Incidental bycatch is below levels which threaten long-term viability and recovery of fish, animal and bird populations	Marine Resource Use
Significantly reduce the discharge of pollutants from aquaculture – particularly mariculture – including both biological and chemical pollutants	Water pollution

## FORESTRY, TIMBER PRODUCTS AND LAND MANAGERS

ACTION TARGET	RELATING TO TOPIC AREA
Reduce consumption of primary timber and increase the proportion of waste wood recycled and used for energy to 100%	Biomass consumption
Increase the extent of woodland in the UK by 30,000 hectares per year to 2030 with the right trees in the right place	Biodiversity (see Issue Highlight)
Achieve 100% certification of all imported timber products (including pulp and paper) and publicly report the proportion of certified imports annually under credible certification schemes by 2030	Degradation and land-use change
Restore and sustainably manage 70% of the UK's two million acres of peatland	Biodiversity (see Issue Highlight)
Restore 75% of the total area of UK terrestrial and freshwater protected sites to favourable condition	Biodiversity (see Issue Highlight)
Rehabilitate areas of contaminated soil, including 'special sites' under the purview of the Environment Agency	Chemical pollution

## FORESTRY, TIMBER PRODUCTS AND LAND MANAGERS (CONTINUED)

ACTION TARGET	RELATING TO TOPIC AREA
Reduce net land-related emissions by 48% so that UK land becomes a net carbon sink by 2040 at the latest and achieves a 19 MtCO <sub>2</sub> e (and growing) carbon sink by 2050	Greenhouse Gas footprint

## ENERGY PROVIDERS

ACTION TARGET	RELATING TO TOPIC AREA
Reduce land-based emissions of mercury to air and water by 50% by 2030	Chemical pollution
Reduce consumption of primary timber and increase the proportion of waste wood recycled and used for energy to 100%	Biomass consumption
Reduce water use by non-household water users, particularly the energy supply industry	Water availability and flows
Reduce emissions from energy production and supply (electricity and fossil fuels) by 62% including increasing generation from variable renewable energy in UK from 77 TWh (2019) to 240 TWh in 2030.	Greenhouse gas footprint
Significantly reduce the use of fossil fuels as the UK decarbonises in line with the Climate Change Committee's Sixth Carbon Budget	Material consumption

## CONSTRUCTION, MINING AND QUARRYING

ACTION TARGET	RELATING TO TOPIC AREA
Reduce the volume of material used during the construction process, and when buildings reach the end of their lifespans, increase the recovery and recycling rate of construction materials to maximum feasible levels	Chemical pollution
Significantly reduce production and imports of sand (and concrete produced from sand) that is mined from ecologically fragile sites (e.g., riverbeds, deep seafloor)	Degradation and land-use change
Develop a mandatory due diligence and reporting system on the risks to ecosystems, soil and freshwater for companies importing mining and quarrying products	Degradation and land-use change
Ensure widespread uptake of solid wall insulation for residential buildings	Air pollution
Reduce water use by household water use by: 1) increasing the proportion of household with metered water supplies to 80% and 2) introducing mandatory labelling and minimum standards for water-using items and water-supply fittings in all new buildings or renovations	Water availability and flows

## CONSTRUCTION, MINING AND QUARRYING (CONTINUED)

ACTION TARGET	RELATING TO TOPIC AREA
Reduce emissions from the use of fossil fuels in buildings (residential and non-residential) by 24%, for example through installing 1 million electric heat pumps in residential properties per year by 2030.	Greenhouse Gas footprint
Reduce emissions from domestic manufacturing and construction by 43% through decarbonisation of energy supply (including an increase in use of low-carbon heat in manufacturing, delivering 7Mt of CO <sub>2</sub> e abatement by 2030) and improved resource efficiency	Greenhouse Gas footprint

## FOOD RETAIL, FOOD SERVICE AND IMPORT

ACTION TARGET	RELATING TO TOPIC AREA
Develop a comprehensive programme for agricultural soil management, and maximise the adoption of sustainable agricultural practices	Degradation and land-use change
Eradicate IUU (Illegal, Unregulated, Unreported) fishing in UK waters and from imports of fish and related products	Marine Resource Use
Food chain actors introduce measures to reduce post-farmgate food waste by 50%	Biomass consumption
Facilitate farmers to minimise pre-farmgate food losses	Biomass consumption
Eliminate food waste to landfill and significantly reduce the volume of other non-food biodegradable municipal waste sent to landfills by 2030	Biomass consumption
Reduce the consumption of meat and dairy by at least 20% and increase the proportion of plant-based foods in the average diet	Biomass consumption
Trace and quantify the total footprint of nitrogen and phosphorus embedded in UK imports and formulate policies that facilitate a significant reduction in nutrient use amongst agricultural producers in countries from which the UK is a major importer of agricultural products (food, feed and fibre)	Nutrient use

## CITIZENS

ACTION TARGET	RELATING TO TOPIC AREA
Eliminate food waste to landfill and significantly reduce the volume of other non-food biodegradable municipal waste sent to landfills by 2030	Biomass consumption



## CITIZENS (CONTINUED)

ACTION TARGET	RELATING TO TOPIC AREA
Set binding targets to address textile waste including banning the incineration or landfilling of unsold textile stock that can be re-used or recycled and significantly increasing textile circularity	Biomass consumption
Achieve an 85% recycling rate for paper and cardboard packaging and a 30% recycling rate for wood packaging	Biomass consumption
Reduce the consumption of meat and dairy by at least 20% and increase the proportion of plant-based foods in the average diet	Biomass consumption
Reduce water use by household water use by: 1) increasing the proportion of household with metered water supplies to 80% and 2) introducing mandatory labelling and minimum standards for water-using items and water-supply fittings in all new buildings or renovations	Water availability and flows
Reduce emissions from transport (land, sea and air) by 33%, including ending sales of new petrol and diesel cars by 2030	Greenhouse gas footprint
Reduce emissions from waste by 40%, including reducing edible food waste by 50%, preventing biodegradable waste to landfill and ensuring all energy-from-waste plants are fitted with carbon capture and storage (CCS)	Greenhouse gas footprint

## RESEARCH ORGANISATIONS

ACTION TARGET	RELATING TO TOPIC AREA
Develop, monitor and publicly report an indicator for deforestation and ecosystem conversion that quantifies the UK's land-use change footprint for both production and consumption as soon as possible, based on the Accountability Framework Initiative's definitions	Land use change
Develop, monitor and publicly report indicators of the UK's impact on ecosystem and soil degradation within the UK and overseas by 2030	Degradation and land-use change
Develop a comprehensive programme for agricultural soil management, and maximise the adoption of sustainable agricultural practices	Degradation and land-use change
Identify and address major causes of chemical pollution associated with the production of goods for UK consumption overseas	Chemical pollution
Incidental bycatch is below levels which threaten long-term viability and recovery of fish, animal and bird populations	Marine resource use
Develop and implement a robust sampling and detection methodology for micro-plastics in treated water, then introduce measures to prevent microplastic pollution by 2030	Water pollution

## RESEARCH ORGANISATIONS (CONTINUED)

ACTION TARGET	RELATING TO TOPIC AREA
Identify and address major causes of water pollution associated with the production and manufacture of goods for UK consumption overseas	Water pollution
Trace and quantify the total footprint of nitrogen and phosphorus embedded in UK imports and formulate policies that facilitate a significant reduction in nutrient use amongst agricultural producers in countries from which the UK is a major importer of agricultural products (food, feed and fibre)	Nutrient use

## OTHERS

SECTOR	ACTION TARGET	RELATING TO TOPIC AREA
Finance sector (public, bilateral and multilateral)	Reduce the cost of trade finance for sustainably produced commodities through an incentive like the Sustainable Import Guarantee	Degradation and land use change; Marine resource use
	The government actively participates in direct investment in sustainable land use systems in producer countries, beginning by launching a significant blended finance demonstrator (public-private collaboration) that mobilises significant additional capital in support of sustainable land use and livelihoods	Land use change
	Increase the amount of developmental assistance delivered to projects for water governance in key UK sourcing countries with severe water scarcity	Water availability and flows
Transportation	Reduce land-based emissions of mercury to air and water by 50% by 2030	Chemical pollution
	Reduce the levels of six substances defined as being the most hazardous to the UK marine environment - heavy metals cadmium, mercury, copper, lead and zinc and the organic compound lindane - to zero	Water pollution
	Reduce emissions from transport (land, sea and air) by 33%, including ending sales of new petrol and diesel cars by 2030	Greenhouse gas footprint
General retail	Achieve an 85% recycling rate for paper and cardboard packaging and a 30% recycling rate for wood packaging	Biomass consumption
Textile sector (including retail)	Set binding targets to address textile waste including banning the incineration or landfilling of unsold textile stock that can be re-used or recycled and significantly increasing textile circularity	Biomass consumption
Local Government	Achieve 10% of municipal waste sent to landfills	Material consumption





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