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## **WWF Comprehensive Spending Review Response**

### **Summary:**

**WWF calls on the government to apply a net zero test to the spending package approved in the Comprehensive Spending Review, in order to build the resilience of the UK economy and public finances, and generate a green economic recovery by speeding up the transition to a low carbon economy, and stimulating job creation in the industries of the future.**

WWF welcomes the opportunity to submit written evidence to the Comprehensive Spending Review (CSR). We were encouraged by the Chancellor's announcement in July that the CSR is an opportunity to deliver on the third phase of the Government's recovery plan to rebuild, level up and invest in people and places spreading opportunities more evenly across the nation.

In light of the impact of COVID-19 across the UK, we know we are living in unprecedented times. It is likely the resulting economic shock will last for months, if not years to come. It is imperative, we believe, that in our response we invest in our future, because if we do not 'build back better', as articulated by the Prime Minister, we will do a disservice to young people and future generations who will look back critically at the decisions made at this moment.

As the Government is preparing to prioritise how public money is directed in the wake of the Covid-19 pandemic, as well as longer-term funding for Departments for the next few years, it is crucial that it is spent in a way that delivers these benefits. It must not exacerbate our vulnerability to climate change and other environmental risks, or store up even greater costs for the future by investing in environmentally damaging industries or infrastructure.

Recent research from WWF demonstrates investment in low-carbon infrastructure can boost long-term productivity and high returns, as every pound spent on low-carbon investment options returns 3-8 times the initial investment. Transitioning to net-zero could offer at least 210,000 jobs in 2030 and 351,000 in 2050 from sectors such as green buildings, electric vehicles and power, and yield over £90bn of annual benefits to the UK as a result of wider co-benefits such as improvements to human health (and so saving the NHS money), the natural environment, and the unlocking of substantial business opportunities.<sup>1</sup> We are asking the Treasury to adopt and apply a 'net zero test', supported by a rigorous future generations impact assessment, to all of its spending and fiscal decisions - including those announced in the upcoming Comprehensive Spending Review and Budget - to ensure that the whole package will add up to getting and keeping the UK on track for net-zero, sustainable economic growth and future economic resilience. Such a test would be a world first for a national economic ministry, not only supporting recovery spending for long term resilience in the UK but also showing global leadership ahead of the COP 26 climate summit which the UK will be hosting in 2021. Annexed to our submission we include a short discussion on the cost of decisions delayed on future generations, pressing the importance of future proofing UK decision making on infrastructure and safeguarding the burden on today's youth – and again the need for climate aligned investment in the UK's recovery.

Although the net-zero target is in legislation (Climate Change Act, 2008), and a methodology for assessing greenhouse gas emissions already exists in HM Treasury's Green Book<sup>2</sup>, there is currently no statutory requirement for government to follow this methodology when making spending and taxation decisions and the methodology itself is out of date and does not take account of the net zero target. It is vital that we have both a legally binding mechanism and a policy embedded into the work and consideration of all parts of government, which aligns government's overall programme to a trajectory to deliver net zero. Applying a test to spending and taxation decisions being taken at both the Budget and the Spending Review could achieve both. This test can be applied to the existing Green Book methodology to add a mandatory requirement for the whole package to deliver a net-zero trajectory; something which should very shortly be available when the Committee on Climate Change advises on the sixth carbon budget later this year, setting a net-zero pathway for future carbon budgets.

The forthcoming Comprehensive Spending Review is the perfect opportunity for the Government to show its spending commitment and credibility with regards to the net-zero target. Last year, WWF, along with other environmental organisations, published 'Government Investment for a Greener and Fairer Economy'<sup>3</sup>. The findings complement WWF and Vivid Economics latest report Keeping us Competitive<sup>4</sup> and highlight that, in order to put the UK on track for net-zero, the Government must commit to increased spending specifically on climate and nature. Around the time that the UK committed to the net-zero target, WWF and other NGOs calculated that we needed to double investment for climate action and restoring nature, with Government spending and measures to leverage private investment to the equivalent of 2% GDP per year – in line with the advice of the UK's own advisers, the Committee on Climate Change. This would bring total spending on climate and nature to around £40 billion a year, which is an additional £25 billion on top of the £17 billion a year already spent<sup>3</sup>. Our new evidence, referenced above, demonstrates in more detail not just the scale of commitment to get decarbonisation of each sector on track for net-zero, but also the co-benefits to the UK economy of doing so. And the costs of failing to do so.

As the interim report from HM Treasury's Review of the Economics of Biodiversity (The Dasgupta Review) has warned, humanity is degrading its own life support systems, putting our own future economic prosperity and well-being at risk. It stressed that, to develop sustainably, we need to increase our stock of natural assets to improve wellbeing (by reversing depletion/loss) and maintain biodiversity in our asset portfolio (to boost resilience). Crucially, we also need to reduce humanity's 'footprint' (i.e. the demand side of the equation) by tackling population, consumption, and efficiency of material use (through technology and institutions). This requires us to correct a range of institutional failures (e.g. missing price and property rights, excess demand, uncertain environmental risks, harmful subsidies etc), and adopt new measures of societal progress to complement GDP that focus on delivering Inclusive Wealth (i.e. the value of assets, including natural).

The spending review is an important opportunity to address some of these issues, and help accelerate the UK's transition, and support a sustainable and resilient recovery from COVID-19. Spending decisions have significant implications for the environment which, in turn, affect economic and social outcomes (through effects on nature's ability to continue to provide ecosystem services such as water and fertile soil, that we all depend on as key inputs to the economy). Secondly, fiscal policies can support the transition to development pathways that will enable a sustainable and resilient economic recovery.

#### **Principles for a sustainable spending review:**

Drawing on recommendations and evidence from the sources (e.g. The Dasgupta Review, OECD, IPBES, IPCC, National Audit Office, OBR, IFS and others), WWF has developed a set of 10 principles that should guide HM Treasury in preparing the spending review:

- 1. Recognise that investment in nature is not only necessary to meet new environment and climate targets; it is also sound fiscal policy as it builds resilience and buffers against future shocks.** This requires appropriate levels of investment (and borrowing) to tackle long-term risks (such as climate change and environmental degradation) and ensuring that spend across all areas of government policy is net positive for the environment and in line with national and international commitments (e.g. UK net zero target). Public spend on policies and subsidies that exacerbate environmental degradation and climate change (and hence store up costs for the future) should be identified, reported and phased out.
- 2. Adopt a long-term approach when determining spending priorities and limits.** As highlighted by the National Audit Office (NAO), adopting longer-term budgetary planning leads to better outcomes, reduced public spending and greater value for money.<sup>1</sup> It creates the conditions for promoting 'spend to save' investment in preventative action, the benefits of which pay off over the medium to long term. The spending review must consider future risks, and identify opportunities for up-front, preventative investment to help buffer against future risks/costs and improve the UK's resilience.
- 3. Undertake a comprehensive assessment of the spending requirements to meet its environmental and climate commitments, as part of a cross-government approach.** As highlighted by the OECD, identifying measures required to address environmental and climate goals and corresponding spending requirements is an important first step in defining spending priorities and needs.<sup>3</sup> In the UK, no such systematic analysis has been undertaken. Considering the escalating climate/environmental crisis, this must be urgently addressed, and the Treasury's analysis published alongside the spending review. In this response, we set out some preliminary analysis of costs of meeting the UK's climate and environment goals as an illustration (see below).
- 4. Include environmental performance criteria during the evaluation of departmental spending bids and finalisation of the spending review.** In accordance with 'Green Book', departments should identify and consider environmental impacts (direct and indirect, positive and adverse) in spending bids across *all* areas of policy (including capital spend, operational budgets, subsidies etc).<sup>5</sup> HM Treasury should then consider impacts across the whole of government as part of a coordinated and transparent approach, and publish this alongside the spending review.
- 5. Cut the costs of a sustainable recovery to COVID-19 by spending smartly.** Reallocation of spending away from environmentally damaging policies, sectors and subsidies – such as fossil fuel subsidies - will reduce the costs of meeting environmental and climate targets, as well as free up revenues to spend in sectors which will help to drive a sustainable, pro-jobs recovery. Smarter targeting of public spend can also reduce the burden on the public purse by stimulating private investment.
- 6. Introduce mechanisms to promote cross-departmental cooperation on public spending.** Promoting cross-departmental cooperation is critical for delivering societal outcomes for least cost. In its assessment of the sustainability of the 2015 spending review, the NAO reported that only one coordinated bid was prepared (related to air quality). It is unclear whether this has since been addressed. As recommended by the NAO, HM Treasury should initiate a cross-departmental review of the environmental impacts of the spending review (e.g. related to air quality, carbon, water, biodiversity etc), incentivising departments to break down silos and coordinate as they submit bids<sup>6</sup>. More use of fund-pooling mechanisms and modernised public service agreements (PSAs) should be made to help promote cross-departmental cooperation on environmental and climate outcomes.

7. **Ensure that public procurement criteria are firmly aligned with the UK's climate and environment commitments.** HM Treasury should strengthen and broaden its existing green procurement (GPP) policy and sustainability criteria, covering the full range of products and services. GPP helps to create stronger market for sustainable products and services, incentivising private sector investment in sustainable solutions, driving down prices and making compliance easier for business. Key areas of focus could include updating GPP requirements for reusable and recyclable products/packaging, and infrastructure, transport, energy, water and waste sectors, among others.
8. **Make more use of Forward Commitment Procurement (FPP) to drive environmental innovation in key sectors.** HM Treasury should undertake a full assessment of future procurement needs (e.g. over the next 5 years) to inform roll out of a range of new forward procurement contracts (e.g. in areas such as charging infrastructure, smart grids and heat pumps). FPP has proven to be effective in promoting private sector investment, innovation and market creation, and as a means of overcoming concerns in government departments about investing in green technology 'too early'.
9. **Provide adequate budget to enable statutory environmental advisory bodies to function.** The role that these bodies play in policy, monitoring and enforcement is critical to reversing nature's decline and the UK's long-term economic prosperity, yet are currently underfunded, hampering the government's ability to drive a sustainable recovery. The National Audit Office (NAO) also highlight that HM Treasury could also make more use of their expertise to scrutinise departmental spending bids and test the combined merits of proposals<sup>7</sup>.
10. **Ensure that the UK's overseas aid budget is targeted effectively, helping other countries to recover sustainably from COVID-19 as part of an integrated sustainable development agenda.** The government is committed to reducing its global environmental impact 'footprint' (including the impacts associated with UK supply chains), recognising that this is also good for the UK economy. HM Treasury should use the spending review to support an ambitious sustainable development aid agenda, one which recognises that protecting and restoring ecosystems is critical to tackling climate change and meeting global development goals.

## COSTS AND BENEFITS OF THE NET ZERO TRANSITION

**The net-zero transition could yield over £90 bn of annual benefits to the UK.** The net-zero transition can bring substantial net benefits to the UK, many of which are not directly captured in macro-economic modelling. Crucially, a policy approach which recognises the wider co-benefits is needed to ensure that these are indeed captured. This report<sup>1</sup> synthesises estimates of 4 types of costs and benefits.

- **The avoided yearly costs of global inaction provide over £3 bn of benefits to the UK.** UK climate leadership, and (assumed) global action, must be deployed in parallel to avoid significant climate damages in the UK. Monetary estimates of key climate impacts on the UK, such as increased flooding and heat stress, are limited, but where monetised, exceed £3 bn. This is a significant underestimate of the total cost of inaction since it ignores the likely larger indirect impacts of climate change on the UK (disruption to global supply chains, potential global political instability, etc.). Rapid UK action is instrumental to avoid facing these costs.
- **Business opportunities that may be unlocked by a net zero transition exceed £50 bn per year.** A net zero transition, supported with targeted supply side (industrial strategy) policies, can unlock substantial business opportunities for the UK in, for example, exporting offshore wind goods and services. We set out bottom-up estimates of the Gross Value Added (GVA) and jobs associated with selected opportunities, which total over £50 bn. Although these opportunities

are unlikely to all be additional (that is, the UK would capture some of the opportunity without a net-zero transition), they do represent some of the potential indirect benefits of investment in the net zero transition.

- **Over £80 bn of annual co-benefits can be captured.** The co-benefits of decarbonisation are large. These include health benefits from more active travel, and more and higher quality green spaces. The most valuable co-benefit, however, is expected to be improved air quality, which has large health benefits. Note, while some co-benefits will be captured regardless of how net zero is achieved (e.g. use of internal-combustion engine (ICE) vehicles will need to be virtually eliminated), careful policy design will be necessary to maximise the co-benefits of e.g. additional quality green spaces.
- **Yearly resource costs are expected to total around £40 bn.** There are costs to the economy of achieving a net zero economy compared to business-as-usual (BAU). For example, heating a home using a heat pump is often more expensive than a gas boiler (taken into account both higher upfront costs and lower running costs). Across the economy, the Committee on Climate Change estimates resource costs are relatively small compared to gross domestic product (GDP) (1-2%). Indeed, the benefits set out above significantly outweigh the costs.

## THE COSTS OF INACTION

### GLOBAL IMPACTS OF INACTION

**The direct monetary damages associated with continued UK emissions are around £0.5 trillion compared to a net-zero pathway.** The UK emitted 503 MtCO<sub>2</sub>e in 2017; 1.3% of global emissions. In a BAU<sup>8</sup> emissions trajectory the UK would emit over 7,000 Megatons (Mt) of additional CO<sub>2</sub>e by 2050 compared to a net-zero pathway. Assuming a long-run average social cost of carbon between £62 and £77/tCO<sub>2</sub> (Pindyck, 2016), this equates to an additional £441 billion to £551 billion in global economic damages.

**However, the key cost of UK inaction is likely to be global inaction.** UK domestic climate policy could impact global efforts through two channels. Firstly, UK progress to Net-zero sends a clear signal to all countries that the UK is committed to making meaningful contributions to curb global warming. As a large historical emitter and developed country, the UK achieving net-zero aligns with the principle of 'common but differentiated responsibilities'. Clear UK progress towards net-zero could facilitate greater cooperation and more ambitious commitments from the international community. Conversely, fragmented and divided efforts make limiting global warming more costly, and less feasible (Blanford et al., 2014). The second channel through which the UK's domestic efforts could impact mitigation outside of its borders is through the development and transfer of low-carbon technologies, leveraging for example its expertise in fuel cells or CCS.

**The costs to the global economy if all countries remain on their current emissions trajectories could reach 5 to 20% of global GDP, and even an increase from 1.5 to 2 °C warming is likely to have a 2.3-3.5% impact on global GDP** (IPCC, 2018b; Stern, 2007). Recent evidence shows that even incremental warming will have significant impact. Moving from 1.5 to 2 °C warming would cause an additional \$15-38.5 trillion annual damages in 2100, equivalent to 2.3-3.5 % of global GDP (IPCC, 2018a). Climate damages from BAU emissions would vastly exceed this, reaching up to 20% of GDP<sup>9</sup>. Without full global cooperation, beginning with ambitious reductions among developed nations such as the UK, damages are more likely to reach these high levels (Blanford et al., 2014). Furthermore, although useful, estimates of climate change damages do not include the non-negligible risk of catastrophe, nor do they

speak to the value of natural life and human experience of young people and future generations that will be affected in the future (see annex).

## DOMESTIC IMPACTS OF INACTION

Many of the domestic impacts of climate change are difficult to fully anticipate and quantify; however, key risks include flooding, heat extremes, and water shortages.

- Flooding - By 2050, the number of people and total value of physical assets vulnerable to flooding risk will increase substantially as warming occurs (CCC, 2016).
- Heat extremes - Increased temperature anomalies and heatwaves will increase the number of premature deaths and decrease productivity. For example, the 2003 heatwave is estimated to have reduced UK output by £400-500 million (CCC, 2016).
- Water shortages - A changing climate will likely result in water shortages affecting public water supply, agricultural production, and industrial cooling requirements. Shortages could mean 25% of water extraction is ecologically damaging in the UK (CCC, 2016).

**Beyond risks that lend themselves to quantification, climate change will have many highly uncertain but severe impacts on the UK.** The most recent climate change risk assessment (CCRA) highlights potentially severe climate impacts that increase exponentially with the degree of warming. For example, in a 4°C scenario there will not be an 'economic case' to invest in the level of coastal defences that would be required to prevent permanent abandonment of some coastal communities (Sayers et al., 2015). Furthermore, there are likely to be numerous knock-on impacts on the wider economy. For example, a 4°C scenario would place an additional 1.5 million households at significant risk of flooding<sup>10</sup>. Preliminary estimates suggest this could reduce the value of affected properties by £1.1 bn (Sayers et al., 2015). This figure could increase significantly if flood risk becomes a more salient consideration for buyers.

**Inaction on the mitigation of climate change will also increase the costs of required action for climate adaptation.** The investment needs for adaptation to climate change are significant. For example, the Environment Agency's analysis of flood and coastal risk management suggests that the optimal level of investment into flood risk management is £850 to £900 million a year by the 2040s (Environment Agency, 2014). Moreover, adaptation to changing weather patterns, such as through increased use of air conditioning, will require additional investment in the electricity system (Auffhammer, 2018). The required levels of adaptation investment will increase substantially if global warming exceeds 1.5°C. Current nationally determined contributions (NDCs) are expected to limit global warming to 2.9°C (Climate Action Tracker, 2019). It is therefore prudent to plan for scenarios significantly beyond 2°C warming, yet current levels of adaptation in the UK are insufficient for a 2°C scenario<sup>11</sup> and there are no thoroughly evidenced estimates of adaptation costs for higher levels of warming.

## FLOODING IN UK COASTAL COMMUNITIES

- Given the costs involved, the economic case for investing in community scale defences in low-lying flood plains in England is limited (Environment Agency, 2014). It would likely be cheaper to abandon thousands of properties in coastal communities such as Great Yarmouth, which are already experiencing the effects of coastal erosion, than to construct the required coastal defences. Even if this were not the case, building defences would likely have consequences for the cultural significance of these landscapes and the quality of life for those living behind them. This is particularly relevant for regions with coastal populations like Kent, Essex, Norfolk, and Suffolk.
- Coastal flooding in regions such as Kent and South London will see an 80% to 100% increase in annual economic damages by 2050 under a BAU emissions pathway. The baseline exposure to

flooding in the region is £33 million in annual damages and 86,000 properties at risk (Sayers et al., 2015). Under a BAU scenario, this is set to increase by £27 million - £33 million and put an additional 69,000 to 86,000 properties at risk of flooding in 2050—further increasing to £100 million and 270 thousand properties at risk by 2080 (Sayers et al., 2015).

**The direct climate impacts of key risks to the UK are likely to exceed multiple billions of pounds per year.** One approach to estimating the total climate damages from inaction is to use Integrated Assessment Models (IAMs) at the country level, which simulate how changes in the earth’s physical systems, i.e. climate, affect its social and economic systems. Using this localised, top-down method suggests higher temperatures in the UK will have an annualized cost of approximately £2.5 billion from 2019 to 2050. However, taking stock of bottom-up estimates of climate impacts on the UK suggests this is a significant underestimate. Bottom-up monetary estimates of the damages from flooding and higher temperatures alone suggest annual damages closer to £3 bn until 2050. However, even this figure is misleading since it excludes impacts such as water shortages and loss of natural capital, where less work has been conducted to express the impact in monetary terms.

**The direct economic impacts of climate change on the UK will be significant, and indirect impacts could be more severe.** As a net importing country which relies on global growth for its own economic prosperity (Bank of England, 2019), the UK will be affected by climate impacts occurring elsewhere. Increased frequency of extreme weather events such as droughts could impact prices of imported agricultural commodities and food security (CCC, 2016). Similarly, disruptions of global supply chains may send ripple effects throughout other sectors such as manufacturing, aviation, and shipping.

#### BENEFITS AND OPPORTUNITIES ASSOCIATED WITH A NET-ZERO TRANSITION

Large-scale emission reductions in the UK provide wider benefits beyond climate change mitigation. We consider two broad impacts:

1. Co-benefits of the net-zero transition, which the Intergovernmental Panel on Climate Change (IPCC) defines as “the positive effects that a policy or measure aimed at one objective might have on other objectives.” (IPCC, 2014). This includes, for example, the reduction in air pollution and its associated health benefits as a consequence of transitioning a locale to zero-emission vehicles. Co-benefits are often not directly valued in private markets, however their societal value can be large, as set out.
2. The UK business opportunities that can be unlocked by a net-zero transition. These benefits, discussed in Keeping us Competitive, focus on how rapid decarbonisation can help the UK develop a comparative advantage in low carbon sectors. This is necessarily a partial lens, but highlights the potential scale of some of the indirect economic benefits that could be unlocked.

#### The Net Zero Test

**We are proposing that the Treasury should adopt and apply a ‘net zero test’ to all of its spending and fiscal decisions** - including those announced in the upcoming Comprehensive Spending Review and Budget - to ensure that the whole package will add up and balance out to getting - and keeping - the UK on track for net-zero, sustainable economic growth and future economic resilience

The Equalities Act and The UN Convention on the Rights of the Child require us to put the interests of children and their futures at the heart of decision making. We know that the costs of acting on climate change increase over time as the problem and impacts intensify – this will impact disproportionately on young people. The ‘net zero test’ should therefore be supported by a rigorous future generations impact assessment to help avoid greater costs by driving action as early as possible.

The best way to stimulate the economy is for the government to invest in green industries and technologies that will underpin the UK's future clean growth. Such investments will build our resilience to climate change, create jobs and drive economic growth, and offer financial returns which are three to eight times greater than the original investment. They will also deliver wider benefits to the UK of £90bn a year, for example by cutting air pollution and saving healthcare costs. The IPCC's report on limiting global warming to 1.5°C showed there are many potential sustainability co-benefits to climate action. As the Government prepares for the Comprehensive Spending Review it is crucial that public funds invested in the UK's economic recovery deliver results that are aligned with its long-term policy goals. UK governments economic recovery package must therefore aim to reduce greenhouse gas emissions as rapidly as possible and to support adaptation to climate change impacts, so as to be aligned with the UK's legally binding target of achieving net zero emissions by 2050 and with the UK's ratification of the Paris Agreement.

## How

### Measurement

HMT's ***The Green Book*** provides "guidance to help officials develop transparent, objective, evidence-based appraisal and evaluation of proposals to inform decision-makers". For climate emissions and related environmental impacts, *The Green Book* refers officials to BEIS advice – ***Valuation of Energy Use and Greenhouse Gas*** – which offers guidance as to "how analysts should quantify and value energy use and emissions of greenhouse gases (GHGs) ... to aid the assessment of proposals that have a direct impact on energy use and supply and those with an indirect impact through planning, land use change, construction or the introduction of new products that use energy" for policy and project option appraisals, business cases and impact assessments. This would need to be supplemented by a robust means of assessing greenhouse gas removal by nature-based climate solutions; we are currently assessing the means available of doing this.

Assessment. The HMT/BEIS guidance on GHGs sets out in detail how to calculate greenhouse gas emissions – the critical assessment for a pathway to net-zero. It refers to ensuring that measurement is done in a way that supports assessment of delivery of carbon budgets. We propose that this is the principal gap which a test/rule fills – by requiring (a) that all fiscal decisions are tested against a net-zero pathway, and (b) that a decision about going ahead is based on how it contributes towards the UK's cumulative emissions against a pathway to net-zero emissions by 2050.

### Pathway

The ***Climate Change Act, 2008*** sets a target for emissions reductions by 2050 (against a 1990 baseline) and a requirement for five year carbon budgets to be set and met on the way to that target. From June 2019, ***that 2050 target was increased*** from 80% to 'at least 100%' – in other words, committing the UK to net-zero emissions by 2050. The fourth and fifth carbon budgets are already in place (taking us to 2032), and represent a trajectory to 80%, not net-zero – and the UK is not currently on track to meet these budgets. Advice from the Committee on Climate Change (CCC) on the sixth carbon budget is due to be provided to government later this year (September/October), and the Government will publish the budget before the end of the year. That budget will set out a pathway to net-zero by 2050, and will therefore enable calculation of where emissions reductions will need to be in the period before that budget, in order for the UK to be on track. Before then, there is not yet an agreed pathway for the UK to net-zero.

A net-zero test would mean that the *Green Book* guidance was amended or supplemented to require that impact assessments, using the BEIS methodology, must be shown to fit within either a sector or the whole-economy emissions reduction pathway as set out in the forthcoming sixth carbon budget.



## **Challenge & oversight**

The CCC is already the body responsible for assessing and reporting on government progress and delivery against carbon budgets – as well as the body which essentially sets the budgets which government and Parliament adopt. They should have a formal role in more frequently challenging and assessing delivery against those budgets, but via a remit to oversee delivery of this test/rule.

The Office for Budget Responsibility (OBR) was established in 2010 as an independent fiscal watchdog providing analysis of the UK's public finances. Alongside forecasting, evaluating fiscal risks and scrutiny of policy costing, it is responsible for evaluating government delivery against its own fiscal targets and assessing long-term sustainability of public finances.

The OBR should therefore be responsible, with the CCC's professional advice and assessment on carbon budgets, for assessing government delivery against the net-zero test/rule. Both the CCC and OBR should report on this to Parliament.

## **FISCAL RESILIENCE RULE**

A net-zero test would ensure alignment of public spending with the Government's legal commitment to net-zero, and would contribute to building the resilience of the UK economy. The test could stand alone or form a core part of a wider fiscal resilience rule. The requirement for a new fiscal rule is clear, as the previously agreed fiscal rules require a reduction in public sector borrowing and net debt, which will be impossible in light of the pandemic and fiscal stimulus required to underpin economic recovery.

It is clear that the time to bolster the economy is now. The new fiscal rules should guide the shape of spending and ensure we build back an economy which is more resilient because it has reduced our exposure to future crises and does not risk creating more economic problems in the future. This is particularly true because:

- The stimulus package will necessarily be very large and long lasting; therefore it must address a range of political imperatives alongside pure economic recovery – levelling up, net zero and more – because it will shape what the Government can achieve overall in the years to come. Thus the goals of stimulating the economic recovery must be aligned with and delivered simultaneously with these wider goals;
- The economy will need to recover and grow consistently and sustainably, in order to pay back the debt that will accumulate as a result of the response to this crisis, and economies that deliver a just low carbon transition will grow more strongly than those that return to business as usual;
- We know there are some major crises ahead of us, some of which are already increasingly manifesting themselves, and which we need to prepare better for, including those relating to climate change and associated issues around flooding, droughts and food security. These are likely to have major impacts on the UK's future prosperity that government policy must seek to minimise<sup>[1]</sup>; and
- Businesses and financiers want to rebuild their businesses to ensure long term success in the face of changing conditions, demands, regulation and risk. Thus they want to co-invest – and be given the confidence to invest – alongside government to move onto a more resilient and sustainable pathway.

Some of the short-term spending being considered has the potential to exacerbate our vulnerability to future crises. Spending on traditional infrastructure, for example shoring up the oil and gas sector or

the aviation industry, will not be resilient to the future effects of climate change. Such investments are highly likely to become stranded assets – while actively contributing to climate change – and thus represent very poor value for money for taxpayers. These kinds of investments should not be treated as equal in the public finances, as the long-term effects of this kind of spending on both the economy and the public finances, versus investments that build resilience and sustainability, will be very different.

## What

HM Treasury will review the government's fiscal framework ahead of the Autumn Budget 2020 to ensure it remains appropriate for the macroeconomic environment, supports the levelling-up agenda, and keeps the UK at the forefront of international best practice.

This review offers an opportunity to discuss how the UK's fiscal framework can be adapted in order to help efforts to tackle some of our most pressing challenges in the wake of a COVID-19 – including climate change, environmental degradation, and the need for increased resilience and a sustainable economic recovery.

A key priority is to ensure the fiscal framework puts adequate weight on considering long-term opportunities and risks for society, alongside shorter-term considerations such as the size and risks to the government's financial balance sheet. It must also take account of the full range of benefits that stem from investment and risk mitigation spending, including future cost savings for the Treasury and improved social, environmental and economic outcomes.

We propose that government adopts a new fiscal resilience rule which says that all spending will be aligned with building the UK's economic resilience, contributing to building the strong and resilient economy in the medium to long term that will be needed to pay back the debt that is inevitably going to be built up in the short term. The rule would encourage fiscal policy to be designed to address the major future risks to the UK economy and to reduce their potential impact on it and on the public finances. These risks are likely to include climate change, trade-related shocks and demographic changes.

## How

In order to assess compliance with this rule, criteria would need to be established relating to each of the major future risks identified, against which fiscal stimulus decisions would be tested. The OBR could review compliance with these, working with other relevant bodies such as the CCC to develop assessment criteria frameworks.

The criteria relating to resilience to climate change and other environmental shocks in particular could include the following:

- Will this have a positive impact on the UK's **economic performance and fiscal position**, in 2030, compared with no spending on that sector, including under different plausible future climate change / environmental scenarios?<sup>121</sup>
- Is this supporting the **economy's transition to net zero**? i.e. will it decrease the UK's GHG emissions and will it help unlock private finance for the transition?
- Will it help build the **skills needed** to fill jobs in the sectors of the future and improve the UK's competitiveness in a low-carbon and resource-constrained world?
- Is this building the **UK's stock of low carbon assets**, in terms of technology, skills and institutions?
- Is this investing in **restored and resilient nature** which provides:

- Eco-system services providing resilience against climate impacts – flood management, coastal protection, enhanced soil quality etc?
- Carbon sequestration to assist the transition to net-zero – particularly from re-forestation and improved soil quality from environmentally responsible agriculture?
- Improved and expanded habitats for wildlife to reduce human/wildlife interaction (a risk factor for zoonotic disease), and to support wildlife that can support ecosystem services – pollinators, for instance, or beavers to support flood management?
- Sustainable and expanded UK food production?
- Physical and mental health benefits including improved air quality?
- Is this building the UK's **Inclusive Wealth** – as outlined in the recent interim report from the Dasgupta Review Team? This demonstrates that in order to maximise social well-being, national economic policymakers should seek to maximise the value of an economy's portfolio of capital goods, (including physical, natural and human and social capital); that is its inclusive wealth<sup>[3]</sup>.

#### Fiscal objective:

The overall fiscal package will facilitate a swift economic recovery from the pandemic, while investing to ensure the long-term resilience of the public finances

#### Fiscal rule:

Net borrowing will be permitted over the next 5 years to support spending aligned with improved fiscal resilience by 2025 including by:

- a) reducing risk and promote intergenerational fairness in the public finances by supporting spending aligned with the low carbon transition to net zero emissions
- b) Other priority objectives determined by Treasury.

There are many short-term investment and spending opportunities that can deliver to all of these goals, as well as creating a major, short-term fiscal stimulus, as has been identified in other recent reports<sup>12</sup>. So it is important that the Government introduces this rule to ensure that short-term spending to bolster the economy does not come at the expense of our medium to long term economic resilience, in order to ensure some degree of intergenerational fairness in our national response to this crisis.

### **Powering Up Green Investment**

- **A Climate Infrastructure Bank**

**We are proposing that the Treasury should announce a decision at the Comprehensive Spending Review to set up and capitalise a Climate Infrastructure Bank with a net-zero mandate.** A team should be appointed to lead the detailed design and implementation work over the course of 2021.

Failure to invest in a timely and well-managed economic transition to meet the UK's target of net-zero emissions by 2050 will come at a huge cost to the UK; yet at present an investment gap exists between planned capital allocations to green infrastructure and those that are required to meet policy goals. According to the OECD, the UK has lagged behind its competitors on infrastructure spending for over three decades<sup>13</sup>. The UK is soon to lose access to the European investment bank, leading to a shortfall in

infrastructure investment in the range of £15-20bn<sup>14</sup>. An operationally independent infrastructure institution was also identified as core recommendation from the Nation infrastructure Committee last year<sup>15</sup>.

A new Climate Infrastructure Bank with a mandate to invest in the climate transition would begin to close this investment gap and play a leading role in harnessing the opportunities arising from investing in the industries and technologies of the future, acting as a market maker. Targeted public investments in green projects and sectors would increase resilience across the nations and regions of the UK and leverage the additional private investment at the necessary scale needed to achieve the UK's long-term policy goals.

Now is the time to race to the top with a world leading Climate Infrastructure Bank that drives innovation, breaks down the barriers to low carbon investments and supports long-term economic productivity. A new institution should include: a green banking function to de-risk and aggregate green infrastructure projects; support for the development of future markets in green technology by investing in innovation that supports the net-zero transition; provision of strategic advice to the government on the barriers to green investment and how to address them; an international investment arm to leverage in major funding to clean sectors around the world and support nature- **putting private finance sector on track to net-zero and 1.5°C**.

**We recommend that the Treasury move quickly to make climate risk disclosure mandatory, and to require all UK regulated financial institutions to have a strategy in place by the end of 2021 to meet the Paris Agreement, extending across global practices.** The UK financial sector is one of the centres of global fossil fuel finance and must transition to a net-zero future along with the rest of the economy if it is to remain globally competitive.

The UK Government has shown leadership in supporting disclosure of climate change risks and opportunities by private sector firms, but it is now time to move from disclosure to action. Moving a step forward by requiring financial firms to publish their transition plans for achieving net zero financed emissions will leverage change throughout the economy as investors, lenders and insurers engage with firms in the real economy and set expectations of decarbonisation. Voluntary standards for financial sector transition plans are rapidly emerging, risking market fragmentation, and there is a clear regulatory role for HMT to set clear market standards.

### **Zero Carbon Homes Fit for the Future**

Millions of families and households live in homes in the UK which are not fit for the future – the least energy efficient in western Europe, vulnerable to climate shocks, and contributing to winter deaths through cold and unhealthy living conditions. Our homes represent around 30% of the UK's greenhouse gas emissions, and the slow pace of decarbonisation is misaligned with the urgency required to get the UK on track to net-zero.

A related challenge is decarbonising heat. Only 8% of the UK's heat is provided from renewable energy, and the pace of new gas network connections far outstrips the deployment of zero carbon heating solutions like heat pumps and heat networks.

A step change is needed to put the UK on track for zero-carbon homes. A long-term infrastructure investment programme to future-proof UK homes can act as a recovery engine that brings multiple social and environmental benefits, as well as contributing toward macroeconomic stability, protecting jobs and bolstering UK industry and manufacturing. The announcement of £3 billion of stimulus funding for building energy efficiency and heat pumps is a good start. Investment must now be confirmed to

ensure an infrastructure programme to decarbonise UK homes continues at the scale and speed required to get on track to net-zero.

We recommend HMT work with BEIS to:

- Use the Heat and Buildings Strategy to bring forward to 2030 the energy efficiency target for all homes to reach at least Energy Performance Certificate (EPC) band C, with flexibility for traditional buildings with significant heritage value, and incentivise as many as possible to reach EPC A and B. In addition, set a target and provide investment to reduce emissions from home heating by 50% by 2030, through the expansion of district heating and the deployment of 10 million heat pumps in new and existing homes.
- Bring forward the Future Homes Standard to 2023 or sooner, ensuring all new homes and commercial buildings are built to a standard equivalent to Passivhaus by 2023, while ending the installation of fossil-fuel heating. Further regulation should require all new buildings to be net zero energy for all uses by 2030.

We recommend Treasury use the Comprehensive Spending Review to:

**Energy Efficiency: Deliver the full £9.2bn manifesto commitments on building energy efficiency this Parliament; in addition to funding already announced, £7.8 billion should be committed over the 4 years from 2021** – made up of £4.5 billion for low income households and social housing, and £3.3 billion to incentivise able to pay homeowners. This can leverage a further £15 billion from landlords and owner occupiers. This should include the continuation of the Green Home Grant scheme in England, and further measures and resource – across UK governments – to bolster demand for green home retrofits such as a zero interest loans scheme for home renovations and zero carbon heat; Stamp Duty rebates for highly efficient homes; and 5% VAT on energy saving products restored for all households;

**Zero carbon heat: Provide a further £5.8 billion for heat pumps and heat networks over the next 4 years from 2021**, which could unlock a further £5.3 billion in private investment. In addition, provide capital and support for a Heat Pumps Sector Deal – analogous to that for the offshore wind industry – aimed at scaling up skills and supply chains associated with zero carbon heat solutions.

Green buildings can support the highest number of jobs in the short-term and provide societal and resilience benefits in terms of better health and reduced demand for energy. Energy efficiency investments to date save households on average £500 a year; huge potential remains to do more on what is, in effect, a nation-wide ‘shovel-ready’ programme to improve homes in all regions of the UK. Investing in retrofitting homes (to meet existing government targets) can support at least 85,000 direct jobs – maybe up to 150,000 – with decarbonised heating and cooling supporting an additional 7,000 jobs. Doing so will also reduce household energy expenditure across the UK by £7.5bn a year at today’s prices.

Up to 20 million homes across the country require improved energy efficiency standards, meaning that jobs created by investment in retrofitting are required right across the country, benefitting areas hit hardest by austerity, and supporting government aims to level up in poorer regions. Germany’s programme of energy efficiency has succeeded in leveraging €6 for every €1 of public money spent.

### **Zero Carbon Power**

Evidence from investing in renewable power over the last decade has shown how public investment can leverage significant private investment, drive huge falls in costs of technology and bring supply chain

jobs to areas of the UK most in need of jobs and growth to support levelling up. The offshore wind sector – of which the UK is the single biggest part of the market globally – supports around 900 jobs per gigawatt (GW) of capacity installed. UK offshore capacity is currently 8.5GW and government has committed to support increasing this to 40GW by 2030 – which could support 28,000 jobs, including in manufacturing.

We must continue to capitalise on the success of the renewables sector to ensure that overall generation is tripled by 2030. Now that costs have fallen so far, this will be an essential way to lower energy bills.

**Auctions for onshore wind, solar and offshore wind should be held every year to ramp up deployment. Investment should also be increased in skills training, supply chain expansion and port infrastructure** in the North East, Scotland and Wales (only with the express consent of the devolved authorities) to support a just transition away from North Sea oil and gas and get the UK on track to delivering the government's 40GW by 2030 offshore wind target. Planning must also be improved to optimise opportunity for low cost power whilst avoiding harm to wildlife or special landscapes.

**Rooftop solar should be supported through increased procurement on public sector roofs and fiscal incentives, such as lower business rates to encourage private investment.** This policy certainty will give investors and energy firms a more regular business cycle.

### **Investing in a Clean Transport Future**

Transport is the largest single source of greenhouse gas emissions in the UK, accounting for 34% of our emissions, and a major source of poor air quality. During lockdown, less traffic meant that we experienced cleaner air and clearer roads, by-products that the public would like to keep and would help build health resilience to Covid-19 and other diseases. Without the right choices, and with continued social distancing, however, there is a risk of increased use of private transport once lockdown is eased, leading to increases in carbon emissions, air pollution and congestion. 71% of people are concerned about air pollution returning to pre-lockdown levels, once restrictions are lifted<sup>16</sup>. The Transport Secretary himself has acknowledged that we need to use private cars less and use public transport more, and has confirmed some spending to make this happen. However, if we want to make these changes permanent, we have to go much further.

To build a resilient future, we need the Treasury to put sustainability and net-zero at the heart of the UK Government's transport infrastructure plan, and the first step to achieving that is much greater investment.

**To support UK health and economic resilience, we are also recommend at least £10 billion a year more public investment in low carbon transport infrastructure, including:**

- **£3 billion a year to provide free public transport for people on the lowest incomes**
- **£6 billion a year to expand and electrify local and regional bus, train and tram services, restore routes that were cut and switch buses and coaches to zero emission power**
- **At least £4 billion extra over the next 5 years to deliver the government's existing target of doubling cycling and increasing walking in England by 2025**

Beyond cleaner air and lower emissions, the benefits of this investment would be:

- Creating over 179,000 jobs

- Preparing for the potential need for longer lasting social distancing, ensuring investment can begin in areas most in need of regeneration
- Levelling up communities across the whole of the UK through greater connectivity
- Ensuring fair access to travel for people on lower incomes and job seekers who rely more on public transport.

Additionally, this is the opportune time to consider Government revenue through the transport sector. Throughout the Covid-19 pandemic, the price of oil dropped to a historical low, while fuel duty was again frozen this year for the ninth year running, costing the Treasury an estimated £8 billion in lost tax and raising emissions equivalent to an additional 2.5 million cars on the road.

Transport funding should prioritise these spending objectives rather than new road-building. The UK Government must build a zero-carbon transport system fit for the 21st century which can boost productivity, create jobs and clean up the air we breathe.

### **Boosting the Recovery of Nature & Climate Resilience in the UK**

We propose a package of investment to help the UK to get on track to net-zero and boost natural assets that underpin our national life. This would allow the UK to ensure health, economic and climate resilience through new employment, new green spaces, cleaner air and waters and secured food supplies. Five investment priorities will deliver these benefits:

- **£1.2 billion annual investment to enable delivery of the Nature Recovery Network and nature-based solutions for climate change (£615 million terrestrial and £600 million marine and coastal):** Major investment is needed to pass on the environment in better condition, focused on delivering against existing environmental commitments and delivery of 500,000 hectares of new priority habitat promised in the 25 Year Environment Plan. Restoring nature will also reduce environmental risks to our economy like climate change, flooding and invasive species. Ahead of the roll out of Environmental Land Management, we propose a dedicated fund to catch-up and kick-start delivery against the 25 Year Environment Plan and Net Zero ambitions.
- **£3-4 billion annual investment in world-leading, high standards food and farming.** Protecting our soils, seas and pollinators, minimising pollutants and enhancing animal welfare will shore up these key sectors of our economy and the natural assets on which they depend.
- **£142 million annual investment in sustainable fisheries and marine protection** for the implementation and enforcement of robust management measures in our oceans, including all Marine Protected Areas and world leading fisheries management.
- **£500 million annual investment in a National Nature Service to employ and train unemployed people in environmental skills, addressing the economic crisis and building a workforce fit for a future green economy.** A National Nature Service will bring employment and opportunity to people who need it now, and provide the workforce needed to create the Nature Recovery Network and to green our cities. In the longer term, the training provided by the National Nature Service will fill the growing green skills gap, equipping people for the green jobs of the future. An additional £315 million investment in Link's shovel ready projects will provide an immediate pipeline of work for the NNS
- **In collaboration with the Department of Health, at-least £1 billion of annual investment in levelling up access to nature** in our towns and cities so that every community can access high quality green (and blue) spaces, and the health and wellbeing benefits they provide.
- **With the Ministry of Housing, Communities and Local Government, a one-off investment of £150 million in environmental information and data, plus an annual investment of at least**

**£331 million in advice, enforcement and expertise in arms-length bodies and Local Authorities.** On-the-ground expert ecological assessment advice should be twinned with modern data capture and sharing technologies to underpin strategic land use decision-making. Additional investment in Defra’s delivery bodies and Local Authorities—especially Natural England, the Environment Agency and the Office for Environmental Protection, as well as the establishment of the new UK REACH regulatory body— is needed to ensure that monitoring, enforcement and regulation can be carried out effectively. This figure has increased from previous representation due to new evidence from Natural England and Environment Agency<sup>17</sup>.

During the Covid crisis there was clear evidence of public reconnection to nature. As we emerge from the Covid crisis, there is a strong public desire for a healthier, secure future. This package of investment will underwrite that future by bringing nature back to health, and us with it.

### **International finance to build resilience, reduce emissions and protect nature**

It is in the UK’s interests to take a leading role in collaboration to solve shared challenges such as climate change and deterioration in the natural environment. Global leadership and support for multilateral action on the environment will support the emergence of a world order in which open societies and economies flourish. As a major economy and a leading financial centre globally, action on finance must be an important element of the government’s strategy.

We recommend that HMT takes the following steps:

- **Put an end to public finance for fossil fuels overseas**, as the logical next step from its previous pledge to end finance for coal overseas and its leadership in building an international coalition to ‘power past coal’. This would mean ending support - including ODA and UK Export Finance - for all fossil fuels (coal, oil, and gas) overseas, reviewing and phasing-out existing investments by the end of 2021, and scaling up support for renewable and efficient energy systems and for universal access to energy. The UK should focus all its support on assisting countries in the Global South to transition or leapfrog to renewable and efficient energy and delivering SDG 7 on universal energy access.
- **The UK Government needs to maintain its commitment to provide £11.6 billion over five years (2021/22 to 2025/26) for climate finance, and within that maintain the UK’s commitment to 50% of this finance being for adaptation.** International climate finance is a cornerstone of global cooperation on climate change, and will be central to a successful COP26 outcome.
- **Assign additional central budget allocation and/or new sources of finance (such as a Climate Damages Tax), are urgently needed to support vulnerable countries to pursue low-carbon development pathways, adapt to climate change, and respond to the loss and damage they’ve experienced.** No new and additional (to pre-existing aid commitments) sources of finance have yet been provided for developing countries to tackle climate change, despite historic promises of this from the UK. The economic impacts of the COVID-19 pandemic make this challenge all the more urgent and also open a window of opportunity for action that will create long-term impact by supporting clean growth pathways.
- **Government spending should also be increased, in line with the UK’s fair share, to support global efforts to protect and restore nature.** These funds must also be new and additional sources of public finance and must not come from the 0.7% commitment to aid. All ODA spend should undertake climate change and environmental risk assessments and monitoring. Programmes and investments must do no harm to the climate system and natural environment,



and where possible contribute to the rehabilitation of degraded natural resources and to the strengthening of the ecosystems on which lives and livelihoods depend.

## **Marine**

UK seas can be a true hero in the quest to reach net zero and adapt to the growing impacts of climate change, as well as providing other critical natural capital, from seafood to tourism and recreation. Seagrass and saltmarsh habitats, for example, captures carbon up to 30 times faster than tropical rainforests,<sup>18</sup> at the same time as providing a critical nursery habitat to a fifth of the world's major fisheries.<sup>19</sup> Up to 22 billion tonnes of carbon are thought to be locked away in the top 10cm of Northwest European shelf seas<sup>20</sup> and a square metre of UK offshore sediment stores more carbon than peatlands and forests.<sup>21</sup> What's more, offshore renewable energy is now cheaper than the fossil fuel based alternatives<sup>22i</sup> and if restored, fish stocks can capture carbon, contribute to food security and support sustainable livelihoods for generations to come.

WWF are calling on the UK Government to set a new vision for the recovery of UK seas by 2030, including investing in natural climate solutions. These are not replacements for the wider emissions reductions needed to meet net zero across society, but are complementary and can buy extra time for the UK to become a clean, green ocean leader.

## **THE NEED TO REDIRECT MAINSTREAM FINANCE TOWARDS SUSTAINABLE DEVELOPMENT PATHWAYS ACROSS THE BLUE ECONOMY**

In the coming decade, the marine energy, marine biotechnology, coastal tourism, transport and food production sectors could offer unprecedented development and investment opportunities. However, there is increasing evidence that unsustainable and poorly managed development in the blue economy is eroding the resource base on which a resilient economy and society depends.

To ensure that future development in UK Seas is fully sustainable and builds environmental, social and economic resilience in the long-term, it is critical that both public and private sector mainstream finance is redirected along the most sustainable development pathways possible and that new forms of finance are created to restore, regenerate and effectively manage natural capital to underpin the needs of society as well as business. This is particularly pertinent with significant added pressure on the UK's financial system due to Covid-19.

The **Sustainable Blue Economy Finance Principles** offer an urgently needed integrated framework to build resilience in the context of major global challenges; that of economic recovery from Covid-19, climate change and biodiversity loss. Developed by WWF, the European Commission, the European Investment Bank and the Prince of Wales' International Sustainability Unit (the marine programme of which is now integrated into the World Resources Institute), the Principles provide the first global finance framework to guide public and private sector financing of the ocean economy along the most sustainable development pathways possible.

These 14 Principles, now the guiding framework for UNEP's Sustainable Blue Economy Finance **Initiative**, and are intended to complement existing frameworks governing responsible investment, as well as social and environmental safeguards relating to the blue economy. They are expressly intended to further the implementation of the Sustainable Development Goals (SDGs), especially those which contribute to the management of the ocean (SDG 14). The Principles are targeted at both public and private sector organisations and agencies, with public sector signatories so far including the World Bank, European Investment Bank and the Asian Development Bank. If widely adopted, the Principles and emerging guidance would support the systemic change needed to drive ocean development towards

sustainability. **The UK Government could set a strong precedent globally by being the first nation to sign up to the Principles, ensuring future spending is driven towards a Sustainable Blue Economy.**

### **THE NEED FOR INVESTMENT IN OCEAN RECOVERY**

Unfortunately, UK seas are at their most vulnerable when we need them most, and investment in the protection, recovery and restoration of the marine and coastal environment is urgently needed. We have lost up to 92% of the UK's seagrass and 85% of saltmarsh in England, as well as 95% of England's native oyster beds, while less than 2% of UK's seabed is protected from damaging human activities. **Losing the remainder of these ecosystems would release up to the equivalent of 39.7 million tonnes of CO<sub>2</sub> (MtCO<sub>2e</sub>) by 2050 and cost the UK economy over £16 bn per year by 2050<sup>23</sup>;**

In line with the Government's ambitions in the 25 Year Environment Plan, we need to work towards scaling up the protection and restoration of these critical habitats. As such, the coming three year period covered by the next Comprehensive Spending Review (CSR) comes at a critical point, where investment is urgently needed to bring UK seas back to life by 2030.

### **INVESTING IN OCEAN RECOVERY**

Forthcoming WWF analysis to support a Green/Blue Recovery shows that **an investment of £5.8 billion in the coastal and marine area over the next three years would kickstart action that could deliver up to £26.5bn of additional economic benefits by 2050 (Table 1), as well as capturing up to 33% of the UK's 2018-level carbon emissions and protecting significant offshore carbon stores.** This is in addition to £26 billion potential additional benefits by 2050 from the sustainable deployment of offshore renewable energy.

As part of this, we support Wildlife and Countryside Link's call for a **£1.8billion integrated "Blue Restoration Programme"** to coordinate and scale up the restoration of coastal ecosystems and the protection of offshore carbon-rich habitats. Such a programme could be included in the UK's Nationally Determined Contribution (NDC) and a major part of the UK's leadership at COP26 and beyond. This programme would deliver additional carbon savings valued at £10.1bn alone by 2050, in addition to avoiding loss of £16bn/yr from coastal protection and fisheries services.

- Protect and restore key coastal ecosystems in partnership with local communities, including saltmarsh, seagrass meadows, kelp forests and oyster beds
- Protect and recover the carbon stored in offshore habitats, through fully or highly protected marine areas
- Streamline the licensing process for the restoration of blue carbon ecosystems and direct marine planning to safeguard areas for restoration
- Support for the fishing industry to reduce emissions and help to meet net zero

A specific **"Blue Carbon Fund"** to support this could match equivalent funding commitments under the Nature for Climate Fund, as well as directing money from the £5.2bn Flood and Coastal Erosion Settlement and potential Environmental Land Management Schemes towards protecting and restoring coastal ecosystems. This would also attract a blended mix of public and private finance, given the significant business invest in nature-based solutions. WWF is developing the governance structures for such a self-sustaining fund (the "Blue Impact Fund") to attract private investment and direct it towards both long term economic solutions and ocean recovery.

In the offshore marine environment, additional investment should be directed towards the management and enforcement of the Marine Protected Area network in English waters. This includes resourcing the enforcement of new powers in the Fisheries Bill for offshore protected sites, and the designation of new Highly Protected Marine Areas for blue carbon ecosystems.

*Table 1. Indicative cost-benefit analysis of investments in ocean recovery in CSR period 2021-24. This excludes additional investment assumed for the offshore renewable sector to help reach net zero with minimal impact on marine biodiversity.*

<b>Topic</b>	<b>Investment needed in next CSR period</b>	<b>2050 UK Benefits</b>	<b>Notes</b>
<b>Coastal protection and restoration projects, including saltmarsh, seagrass, kelp and oysters</b>	600 million/yr <sup>24</sup> (reducing from 2024)	£15bn/yr avoided cost  Sequestration of up to 147 MtCO <sub>2</sub> e carbon by 2050, at a value of £10.1bn compared to BAU. <sup>25</sup>	Allocations possible from from Nature for Climate Fund, Flood and Coastal Erosion Settlement and future ELMs schemes. Leveraged by private investment.
<b>Management and monitoring of the UK Marine Protected Area network, including for enforcing new powers in the Fisheries Bill to protect offshore carbon-rich habitats</b>	£90 million/yr <sup>26</sup>	£7.5bn additional benefits from a well-managed MPA network, rising to £10.5bn for 30% full protection	
<b>Secure a long-term sustainable and climate-smart fishing industry</b>	£45 million/yr	£1bn/yr avoided cost by 2050	Figure matches minimum annual replacement for the European Maritime and Fisheries Fund
<b>Floating wind accelerator fund and cumulative impact monitoring for offshore wind</b>	£100m	Significant to both UK economy and in UK exports	Floating wind minimises noise impacts on marine mammals and opens up much more of UK marine area for expansion. Huge potential for exporting UK expertise globally to areas with deeper waters.

## ANNEX: FUTURE GENERATIONS – THE COST OF DECISIONS DELAYED

### Summary

Politicians and policy makers know that the decisions they make often have impacts on the future and on future generations. Nowhere is that more important than in climate change policy. However, the tools that policy makers have at their disposal to assess these impacts have been inadequate to the task, meaning their political masters have not had the full information available to them when making critical decisions. WWF-UK with Vivid Economics have developed a tool to improve this information so that ministers will better understand the consequences of their decisions and how they impact the future.

Looking at the standards for new build homes as an example, by thoroughly assessing the impacts on different generations they looked at how, it was possible to estimate the cost of the climate change impacts and investments arising from policy decisions. The analysis shows that the failure to require that all new homes be built to zero carbon standards burdens children born between 2010 and 2019 with a cost of approximately £6 billion<sup>27</sup> over the course of their lifetime.

Vivid Economics' tool assesses the cost of emissions reductions being displaced to other parts of the economy, and not the costs and benefits associated with policy. Applying the same tools to other policy areas - such as electrification of vehicles or tackling industry emissions, will give a better indication of the enormous and unnecessary cost of delaying action and the burden being passed to our children and future generations.

### Introduction

Climate change is the biggest threat our planet has faced. The devastating impacts of climate change is already apparent – including the loss of wildlife, life threatening wildfires, and loss of Arctic sea-ice, intense hurricanes and floods. Even the UK experienced wildfires in February last year – blamed by the fire service on the 'unusual warm weather'<sup>28</sup> and seen by many as further evidence of the dramatic and rapid impacts of climate change. At current emission rates there is little over a decade's worth of the global carbon budget before it is too late to avert climate breakdown.

194 countries plus the European Union have signed the Paris Agreement, which commits them to keeping global warming to well below 2°C, aiming for 1.5°C. Following the Paris Agreement in 2015, the United Nations Framework Convention on Climate Change (UNFCCC) commissioned the Intergovernmental Panel on Climate Change (IPCC) to produce a Special Report on Global Warming of 1.5°C<sup>29</sup>. The results of this study, published in October 2018, made clear that that it is vital to keep warming to 1.5°C in order to limit the risks of severe climate impacts. Ice-free summers in the Arctic Ocean are ten times more likely, for instance, at 2°C warming; alongside the loss of all corals compared to the prospect of being able to save around a third of them at 1.5°C. Following these findings, there has been a general recognition that to avoid dangerous impacts from climate change, warming of 1.5°C should be the principal aim of the world's collective climate action, including nation states committed to the Paris Agreement.

To ensure we do not bequeath an unfair burden on future generations therefore, the world needs to pursue rapid and deep emissions cuts in all sectors. Developed and wealthy countries - particularly the UK, as the birthplace of the industrial revolution - have an obligation to get to net-zero as soon as possible, as these countries are better placed than less developed economies to take the rapid deep climate action necessary.

WWF-UK and Vivid Economics have demonstrated that it is feasible for the UK to get to net-zero by 2045 in their 2018 report *Keeping it Cool - How the UK Can End It's Contribution to Climate Change*<sup>30</sup> and set out ambitious policies and actions necessary for the UK to achieve net-zero greenhouse gas emissions across the whole economy 2045. WWF-UK and Vivid Economics have now, in this current report, identified how UK policymakers can better understand, how benefits and costs will be realised across the UK's generations and how this knowledge can improve policy decisions.

### **The burden on youth**

As politicians fail to act with the urgency required to avoid the worst climate impacts, it is apparent that they need to understand how their decisions will affect future generations. Lord Stern in his ground-breaking *Review of The Economics of Climate Change* in 2006<sup>31</sup> made it abundantly clear that delaying action is 'dangerous and more costly'.

The environmental debt, or cost to future generations of delaying decisions and action on climate, has been also brought to the fore in the last year by Greta Thunberg, the Swedish 16-year old student, now nominated for the Nobel Peace Prize<sup>32</sup>. She has inspired a global movement of young people who, under the #FridaysForFuture banner, regularly strike to remind the world that their generation will ultimately live with the consequences of governments' inaction on climate change.

Policy makers, therefore, must have the tools to ascribe the costs and benefits of proposals to different age groups when making policy decisions.

### **Greenhouse gas targets in the UK**

The UK has led the way on climate action, including with the world-leading Climate Change Act of 2008 - the first time a government set legally binding targets for emissions reductions. Action since then to deploy renewables in the UK and to phase out the use of coal have seen the biggest emissions reduction of any major economy - more than 40% on 1990 levels. However, despite success in decarbonising our power system, governments in the UK have flip flopped on policy and resource to cut emissions from our buildings, our transport, our agriculture and our industry, effectively shifting the burden on to future generations.

Focusing on future impacts can help to overcome the current short-term focus that is inadvertently prolonging the investments and actions that will make our climate change targets harder and more costly to meet - with significant implications for today's children. For example, the Welsh Assembly and Government have taken a more proactive approach and since 2015 The Well-being of Future Generations (Wales) Act<sup>33</sup> has required Welsh bodies to make long-term sustainability central to good policy making.

WWF-UK commissioned Vivid Economics to apply the lessons from the Welsh Assembly's Act to the impact assessment process used by the UK government to develop a framework or tool for policy makers to assess the true costs and benefits of policy options and how these are borne by different generations. The results of this work are summarised in this report.

### **Children and future generations impact assessment' - the tool to calculate the costs**

In assessing policy options, civil servants currently have various pieces of guidance to ensure that they take into account potential impacts. There are a number of factors they are obliged to consider. Chief amongst these are the costs and benefits of the different proposals and the burden of regulation. The purpose of 'economic impact assessments' and 'regulatory impact assessments' is to consider - and inform politicians of – the overall financial cost/benefit balance of a policy, as well as to show whether

the new regulation is piled on top of others, or is streamlining or replacing existing ones. These, and other forms of impact (environmental, or equality, for example ) are required by guidance in HM Treasury's Green Book<sup>34</sup> and the Government's Better Regulation Framework.<sup>35</sup>

These guidelines give direction on how, for instance, to take into account issues such as air quality and greenhouse gas emissions in terms of the environmental impact (or cost) of a decision.

They also recognise that some policies will have long term impacts that may involve 'irreversible' transfers of costs and benefits between generations, and that these should be taken into account in policies. However, the requirement for all regulation to be scrutinised in this way was removed in 2012 – the intergenerational impact assessment described by the then Prime Minister, David Cameron, as "extra tick box stuff". Given the costs and risks that are currently being passed on to children and future generations by delaying urgent climate action, future generation impact assessment should be required as part of all policy and legislation decision-making.

WWF and Vivid Economics have produced guidance for policy makers to split the costs and benefits across the generations that bear them, by timing them by decade. In the model, **costs and benefits are attributed to 'cohorts' of those born in the 1950s, 60s, 70s - and so on to the 2010s, 2030s, and beyond**. Attributing costs and benefits then takes into account the age of each cohort when they are either incurred or enjoyed. Some costs, such as the capital costs of installing technology, or the maintenance costs, can then be applied to those who are likely to be working and economically active at the point where these costs are borne. These costs are converted into today's equivalent cost (present values) using the Government's existing guidance on this (the reduced rate values).

Government guidance usually assumes that people prefer to get things today than tomorrow. In economic terms they make current costs and benefits worth more and 'de-values' or 'discounts' future costs and benefits. The 'reduced rate values' recognise that some actions have an unavoidable impact on the future - cutting down a forest or emitting carbon dioxide that will stay in the atmosphere, for example and so can provide a truer representation of the total costs and benefits. This model takes this analysis a step further and allows policy makers to allocate cost-benefits to age groups by decade providing detailed analysis on who will suffer or benefit from actions.

The approach recommends that policy proposals should be compared across a variety of start times for introduction and action as this may have a significant impact on the overall targets. This might mean the options are

- Not to introduce the policy
- To model the introduction of the policy at different time points to understand how the costs and benefits impact different ages future generations.

There may be other considerations, specific to the policies under-review. For example, some policies may have capital investments attached to them that load some of the expenditure up front, along with long term running costs. Some costs may need to be attributed across different interest groups - dependent on, for instance, rates of car ownership and public transport usage in different socio-demographic groups.

In order to look at how this approach - attaching costs and benefits to different age groups under a variety of policy scenarios - works in practice, Vivid Economics then applied it to a single policy proposal, that of requiring housebuilders to build zero carbon new homes.

### **A case in point: Zero Carbon Homes Policy**

Our homes account for around 15% of UK direct emissions and, this rose slightly when adjusted to take into account a warm winter in 2017<sup>36</sup>. The Committee on Climate Change, in their recent report on *UK Housing, Fit for the Future*<sup>37</sup>, stated that only a 'near-complete elimination' of building emissions would see the UK meet its legal obligations under the Climate Change Act to reduce emissions by 80% on 1990 levels by 2050. It follows that early action will be necessary to meet the more rapid reduction in emissions the IPCC indicates is necessary. However, of the 29 million homes in the UK only 30% currently reach an Energy Performance Certificate (EPC) rating of C or better.<sup>38</sup>

In 2006 the UK government had pledged that by 2016 all new homes would be able to generate electricity on-site through renewable technology (such as solar panels) equal to or more than the amount of electricity they consumed, alongside energy efficiency measures and implementation of renewable heat technologies. In other words they would be zero carbon. A code for building sustainable homes was drawn up and incentives in the form of tax breaks put in place.

In 2007 the government proposed tightening building regulations to achieve the target - first by 25% in 2010, and by 44% in 2013. In 2008 ambition was extended so that all new non-domestic buildings would be required to be zero carbon by 2019.

While new homes account for just 1% of the total housing stock, a zero carbon standard for new buildings increases familiarity with new technologies - the 2016 ambition would also have created better knowledge, skills, capacity and information across the whole of the housing sector. This would have, in turn, assisted efforts to retro-fit decarbonisation measures on the existing 20 million homes which are below that EPC standard C level.

In 2015, however, the plans were jettisoned. Following campaigning by WWF and others, the government made a commitment in the 2017 Clean Growth Strategy - its plan for delivering on the fourth and fifth carbon budgets - that all homes would achieve the EPC C level of energy efficiency by 2035 (fuel poor homes to reach this standard by 2030)<sup>39</sup>.

A recent report by the Energy and Climate Intelligence Unit (ECIU) found that "had the [zero carbon homes] policy not been cancelled, occupants of new homes built since 2016 would be saving up to £200 per year on their energy bills, close to triple the average saving intended to result from the Government's recently-introduced energy price cap."<sup>40</sup> Building more homes that do not meet zero carbon standards also adds to the number that need to be modified in the future - at additional expense to younger and future generations.

From the perspective of future generations, therefore, rowing back from the 2016 net zero homes commitment has had the impact of

- requiring deeper emissions reductions from other sectors;
- allowing investment in buildings that only meet outdated standards;
- increasing the fuel needs and costs of homeowners;
- putting a burden of retrofit into the future - falling on today's 'generation rent' when they finally get a foot on the housing ladder - as well as on to their children; and
- Increasing the likelihood that we miss national and global targets for emissions reductions - thereby increasing the risks of the same generations' suffering the impacts and costs of dangerous climate change

### **Applying the model to zero carbon homes policies**

Vivid Economics applied their policy assessment framework to the zero carbon homes problem, proposing three scenarios.<sup>41</sup>

- Do nothing
- Introduce a zero carbon new homes standard in 2021
- Introduce a zero carbon new homes standard in 2030

No action on zero carbon homes would require other sectors of the economy to do more to meet the legal targets under the Climate Change Act and would also incur an environmental cost, or debt, for future generations.

The research estimates that the total cost of emissions in a no action scenario is about £37 billion in today's values. About 70% of this cost falls to those born in 2010 or after – with children born in the decade 2010 bearing £6 billion of the emissions' costs. These costs include the cost of having to put the burden of reducing emissions on to other parts of the economy.

If zero carbon homes policy was introduced for new homes in 2030 the total costs to the rest of the economy are brought down to £18 billion (less than half the cost of doing nothing) and the total costs for children born in the decade from 2010 to 2019 would be brought down to £3 billion over the course of their lifetimes.

In his Spring Statement of March 2019, Chancellor Philip Hammond, indicated a willingness to reinstate a zero carbon homes standard for new homes, albeit not until 2025. On the basis of the assessment made by Vivid a similar standard introduced in 2025 would cost the whole economy approximately £11 billion.

The best savings for society though, are by bringing forward the policy as soon as possible. If a zero carbon new homes policy was introduced in 2021 the overall cost to the whole economy drops to just £5 billion and the cost to children born from 2010 to 2019 is brought down to a more reasonable £1 billion over their lifetime.

To summarise, the costs to the whole economy of

- Not introducing zero carbon homes standard is £37 billion
- Introducing a zero carbon homes standard in 2030 is £18 billion
- Introducing the standard in 2025 is £11 billion
- Introducing the standard in 2021 is £5 billion

And the costs to the children born in the decade between 2010 and 2019 rise from £1 billion where the standard is introduced in 2021, to £3 billion when it is introduced in 2030 and £6 billion if it is not introduced at all.

### **Where else could this be applied?**

WWF-UK and Vivid Economics have set out the policies and actions necessary for the UK to achieve net-zero greenhouse gas emissions across the whole economy by 2045 in *Keeping it Cool - How the UK Can End It's Contribution to Climate Change*<sup>42</sup>. The tool described here - to attribute the costs and benefits to different age cohorts and generations - could be used for policies in other sectors. The tool enables policymakers to assess the more specific outcomes of policy options - particularly decisions to delay action. This could include, for example:

- The speed at which we pursue electrification of road transport - an end to the sale of petrol and diesel vehicles in 2030, rather than the current commitment of 2040;
- Policies and behaviour change to alter our food consumption and food waste in the UK;



- Speeding up our energy transition to clean power and the relative costs and benefits of introducing incentives or penalties at different stages;
- The costs and benefits of introducing new regulations and incentives at different dates in agricultural practices, such as no till, to reduce emissions.

The first of these additional policies - to bring forward ban on the sale of new fossil fuel vehicles to 2030 - was looked at in more depth in Accelerating the EV transition,<sup>43</sup>. This study found that introducing this measure in 2030 rather than 2040 would reduce CO<sub>2</sub> emissions by roughly the equivalent to the emissions of 5 million homes over a 30 year period. This indicates that there are significant cumulative benefits from bringing these policies forward and the tool will provide a way to identify these more specifically than currently.

## Conclusions

School children in more than 100 countries around the world are striking regularly to demand action by governments on climate change<sup>44</sup>, and to protest the environmental debt they are bequeathed. Their actions should provide a stark and timely reminder that tackling climate change is the biggest and most pressing problem facing governments - and that theirs is the generation who will suffer climate change impacts the most, and bear the costs of delaying decisive action.

The tool introduced in this report would enable policy officials to put forward policy options with a better assessment and understanding of those impacts and the costs to different generations. Looking at the true costs of delaying decisions - and their impacts on younger people who will need to deal with the consequences of these delays - can help politicians and policy officials make better, more informed choices that will help tackle these problems more efficiently than putting them off to the future.

To illustrate its value, it was applied to assess the intergenerational benefits and costs borne as the result of a zero carbon homes policy across four scenarios. The cost difference between taking action soon and not taking action at all is nearly £30 billion. This means that, just in this one policy area, the failure to require that all new homes should be built to zero carbon standards will incur a cost to children born between 2010 and 2019 of nearly £6 billion over the course of their lifetimes.

That this is the case in just one policy area makes it abundantly clear that the overall costs to today's children of inaction on climate across the whole economy are very much higher. To get an idea of the scale of the cost to future generations it's worth remembering that while direct residential emissions account for 15% of UK emissions (direct and indirect, 20%), vehicles are responsible for 27%, the power sector 24% and our agriculture and waste sectors are emitting 10% and 4% of the UK's greenhouse gases respectively. Knowing that bringing forward the phase out of fossil fuel vehicles by a decade would reduce greenhouse gas emissions by approximately the same as emissions from 5 million homes should demonstrate the scale of savings available.

Failure to act now, to make rapid and deep cuts in emissions across all of these sectors, is not only jeopardising the future of this planet's wildlife and nature - perhaps the very survival of our own species; it is passing potentially crippling costs on to a generation who are currently powerless to make the decisions to tackle climate change.

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- <sup>1</sup> <https://www.wwf.org.uk/updates/uk-investment-strategy-building-back-resilient-and-sustainable-economy>
- <sup>2</sup> [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/191501/Accounting\\_for\\_the\\_effects\\_of\\_climate\\_change.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/191501/Accounting_for_the_effects_of_climate_change.pdf)
- <sup>3</sup> <https://www.greenpeace.org.uk/wp-content/uploads/2019/08/Government-Investment-for-a-greener-and-fairer-economy-FINAL-30.08.19.pdf>
- <sup>4</sup> [https://www.wwf.org.uk/sites/default/files/2020-06/Keepingus\\_competitive.pdf](https://www.wwf.org.uk/sites/default/files/2020-06/Keepingus_competitive.pdf)
- <sup>5</sup> <http://www.oecd.org/environment/green-budgeting/Green%20Budgeting-Agenda-29-Apr-19.pdf>
- <sup>6</sup> <https://www.nao.org.uk/wp-content/uploads/2016/07/Sustainability-in-the-Spending-Review.pdf>
- <sup>7</sup> <https://www.nao.org.uk/wp-content/uploads/2016/07/Sustainability-in-the-Spending-Review.pdf>
- <sup>8</sup> BAU in this report assumes that annual CO<sub>2</sub>e emissions remain at 2017 levels, 503 Mt, until 2050.
- <sup>9</sup> Based on the Stern Review, which assumes that annual emissions increase to 84 Gt CO<sub>2</sub>e by 2050, a 125% increase from current levels.
- <sup>10</sup> A 1 in 75 chance of being flooded in a given year (Sayers et al., 2015).
- <sup>11</sup> For example, if current levels of investment are maintained, at best 30-50% of expected annual damages from flooding would be prevented, implying roughly £400 m in additional flooding damages by 2050 (Sayers et al., 2015)
- <sup>12</sup> [https://ukc-word-edit.officeapps.live.com/we/wordeditorframe.aspx?ui=en%2DGB&rs=en%2DGB&wopisrc=https%3A%2F%2Fwwf.org.uk.sharepoint.com%2Fsites%2Funit-climchg%2F\\_vti\\_bin%2Fwopi.ashx%2Ffiles%2Fc50d84e127e54203848acea217d1da20&wdenableroaming=1&mssc=1&hid=5A39609F-30E8-B000-1843-C3CB7CC52725&worigin=Sharing&jsapi=1&newsession=1&corrid=1ad0965e-f980-4da8-af92-d4b239e463ee&usid=1ad0965e-f980-4da8-af92-d4b239e463ee&sftc=1&instantedit=1&wopicomplete=1&wredirectreason=Unified\\_SingleFlush&rct=Minor&ctp=LeastProtected#\\_ftn4](https://ukc-word-edit.officeapps.live.com/we/wordeditorframe.aspx?ui=en%2DGB&rs=en%2DGB&wopisrc=https%3A%2F%2Fwwf.org.uk.sharepoint.com%2Fsites%2Funit-climchg%2F_vti_bin%2Fwopi.ashx%2Ffiles%2Fc50d84e127e54203848acea217d1da20&wdenableroaming=1&mssc=1&hid=5A39609F-30E8-B000-1843-C3CB7CC52725&worigin=Sharing&jsapi=1&newsession=1&corrid=1ad0965e-f980-4da8-af92-d4b239e463ee&usid=1ad0965e-f980-4da8-af92-d4b239e463ee&sftc=1&instantedit=1&wopicomplete=1&wredirectreason=Unified_SingleFlush&rct=Minor&ctp=LeastProtected#_ftn4)
- <sup>13</sup> [http://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=ECO/WKP\(2015\)62&docLanguage=En](http://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=ECO/WKP(2015)62&docLanguage=En)
- <sup>14</sup> <https://www.nao.org.uk/wp-content/uploads/2017/12/The-Green-Investment-Bank.pdf>
- <sup>15</sup> <https://www.nic.org.uk/assessment/national-infrastructure-assessment/funding-and-financing/>
- <sup>16</sup> [https://docs.cdn.yougov.com/a414r61690/Greenpeace\\_Travel\\_200507\\_w.pdf](https://docs.cdn.yougov.com/a414r61690/Greenpeace_Travel_200507_w.pdf)
- <sup>17</sup> <https://www.gov.uk/government/news/letter-to-the-times-from-emma-howard-boyd-chair-of-environment-agency>  
<https://www.yorkshirepost.co.uk/news/environment/natural-england-needs-extra-ps40m-year-just-do-its-basic-job-1749093>
- <sup>18</sup> **2011, A blueprint for blue carbon**
- <sup>19</sup> **2014, Protecting the hand that feeds us**
- <sup>20</sup> Shelf Sea Biogeochemistry. Available at: <https://www.uk-ssb.org/>
- <sup>21</sup> **2019, Seagrass carbon storage**
- <sup>22</sup> **2018, Reality Check: which form of renewable energy is cheapest?**
- <sup>23</sup> **https://www.wwf.org.uk/press-release/launch-new-global-futures-report** (£15bn/yr for lost coastal protection services and £1bn/yr in lost marine fisheries catch potential)
- <sup>24</sup> As taken from Greenpeace 2020: **https://www.greenpeace.org.uk/wp-content/uploads/2020/06/A-green-recovery-how-we-get-there-Greenpeace-UK.pdf** The National Infrastructure Commission estimates that, based on the level of resilience needed under a 4°C temperature rise, approximately £1 billion extra funding a year is required to support the Environment Agency with domestic adaptation (<https://www.nic.org.uk/wp-content/uploads/Flood-modelling.pdf>). As per Greenpeace (2020), we judge this additional resilience spending to be necessary nonetheless to aid preparedness.
- <sup>25</sup> Based on increasing seagrass coverage by 300%, and saltmarsh and macroalgae by 15%
- <sup>26</sup> Extrapolation to UK MPA network, based on management cost estimates for MPAs in North Devon in: Eftec & ABPmer (2018) Assessment of management costs for Marine Protected Areas in North Devon, Report to WWF UK, 2018. Expanded to incorporate the costs of enforcement for offshore sites post Brexit and the process to introduce and manage new Highly Protected Marine Areas, including for blue carbon habitats
- <sup>27</sup> the costs to reduce greenhouse gas emissions by other parts of the economy
- <sup>28</sup> West Sussex Fire and Rescue Service quoted on CNN on 27 February 2019.
- <sup>29</sup> IPCC Special Report, Global Warming of 1.5 degrees Centigrade October 2018 <https://www.ipcc.ch/sr15/>
- <sup>30</sup> **https://www.wwf.org.uk/sites/default/files/2018-11/NetZeroReportART.pdf**
- <sup>31</sup> Stern, The Economics of Climate Change, 2006  
[http://mudancasclimaticas.cptec.inpe.br/~rmclima/pdfs/destaques/sternreview\\_report\\_complete.pdf](http://mudancasclimaticas.cptec.inpe.br/~rmclima/pdfs/destaques/sternreview_report_complete.pdf)
- <sup>32</sup> <https://www.theguardian.com/commentisfree/2019/mar/15/school-climate-strike-greta-thunberg>
- <sup>33</sup> <http://futuregenerations.wales/about-us/future-generations-act/>
- <sup>34</sup> The Green Book 2018  
[https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/685903/The\\_Green\\_Book.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/685903/The_Green_Book.pdf)
- <sup>35</sup> Better Regulation Framework 2018  
[https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/735587/better-regulation-framework-guidance-2018.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/735587/better-regulation-framework-guidance-2018.pdf)
- <sup>36</sup> <https://www.theccc.org.uk/wp-content/uploads/2018/06/CCC-2018-Progress-Report-to-Parliament.pdf>
- <sup>37</sup> <https://www.theccc.org.uk/publication/uk-housing-fit-for-the-future/>
- <sup>38</sup> At the time of writing this report the Chancellor, Philip Hammond, in the 2019 Spring Statement indicated willingness to reinstate a zero carbon homes ambition in 2025 and this is given an initial assessment below.
- <sup>39</sup> [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/700496/clean-growth-strategy-correction-april-2018.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/700496/clean-growth-strategy-correction-april-2018.pdf)
- <sup>40</sup> [https://eciu.net/assets/ECIU\\_Zero\\_Carbon\\_Homes\\_-compressed.pdf](https://eciu.net/assets/ECIU_Zero_Carbon_Homes_-compressed.pdf)
- <sup>41</sup> The analysis assumes that a zero carbon homes standard would be applied to new homes by introducing a Fabric Energy Standard with greenhouse gas emissions either eliminated or off set by exporting zero emissions power from wind and solar generation in the homes. They assumed different emissions targets for flats, terraced, semi-detached and detached houses.
- <sup>42</sup> November 2018, *Keeping it Cool: evidence review of net-zero feasibility in the UK*, Vivid Economics for WWF
- <sup>43</sup> Accelerating the EV transition, Vivid Economics for WWF-UK, March 2018
- <sup>44</sup> <https://www.theguardian.com/commentisfree/2019/mar/15/school-climate-strike-greta-thunberg>