

# Tackling climate change in 2017

Parliamentary briefing, January 2017

## Introduction

In November 2016 the UK Government ratified the global Paris Climate Agreement, which commits all nations to pursue efforts to keep global warming to 1.5 degrees.

We have already seen warming over 1 degree, and climate change is now leading to increasingly severe impacts – from rapidly melting sea-ice at the poles and 50 degree heatwaves in India, to floods in Bangladesh and drought in California. The UK is seeing worse impacts too – with increasingly severe flooding in almost every region and country in the UK in recent years.

The world is on track for far worse - over 3 degrees warming - and all nations will need to increase their ambition and effort to meet the Paris Agreement goals, and protect humanity from catastrophic levels of climate change.

The UK was a world leader in introducing the 2008 Climate Change Act. This set the country on a long term path to decarbonise our economy by 2050. This is vital to providing certainty to all sectors of the economy, politicians and the public about the UK's commitment to tackle climate change.

The UK has made much progress: greenhouse emissions were 38% below 1990 levels in 2015<sup>1</sup>, while the economy has grown by 64%<sup>2</sup>. But we are now off-track to meet our future legal targets, and even further off-track to meet the Paris goals. **In Spring 2017, there is a major opportunity to close these gaps, as the Government will publish a new “Emissions Reduction Plan” for how it will decarbonise the UK economy over the next 15 years.**

### The Paris Climate Agreement

The Paris Agreement commits the world to “Holding the increase in the global average temperature to well below 2 °C above pre-industrial levels and to pursue efforts to limit the temperature increase to 1.5 °C above pre-industrial levels”

There are huge economic and social benefits from a strong and comprehensive plan in line with the Paris goals, and we hope that parliamentarians will press and work with the Government to make this Emissions Reduction Plan the foundation and driver for a strong, clean, secure and decarbonised UK economy.

This briefing sets out:

- Climate science – the emergency situation we are now in
- The international response so far – what the Paris Agreement means, and what it requires
- The colossal economic opportunities from taking this action
- The big-picture UK response needed – including the Emissions Reduction Plan
- Five policy priorities for UK action to cut emissions in 2017
- International climate issues, and coping with the climate change we can no longer avoid

## CONTENTS:

1. Summary	p3
2. A climate emergency – the case for ramped-up action	p4
3. What the Paris Agreement means	p5
4. The economic opportunities of action	p7
5. The UK strategic response: UK action at home, UK action internationally, climate adaptation	p8
6. The Emissions Reduction Plan: high ambition, strong policies, good governance	p9
6.1. Energy efficiency and warm homes	p10
6.2. Clean air strategy	p11
6.3. Fossil fuel production, UK and abroad	p12
6.4. Infrastructure and industrial strategy	p14
6.5. Decarbonised electricity sector	p17
7. International issues – climate negotiations, Brexit, UK finance sector	p19
8. Adapting to the climate change we cannot avoid, UK and abroad	p20

# 1 Summary

The UK has made much progress on climate change in the last 25 years, cutting emissions by 38%. But we need to accelerate this progress if we are to make a fair contribution globally to keep to the Paris Climate Agreement goal – to pursue efforts to keep global warming to 1.5 degrees. There should be no complacency, on three counts:

- **First, we are already seeing shocking impacts at just 1 degree of warming.** Limiting further temperature rises to as low a level as possible must be an absolute priority
- **Second, meeting 1.5 degrees requires a foot-to-the-floor approach to cutting emissions, in all countries.** Even then, thanks to decades of delay globally, it might not now be achievable. But holding temperatures rises as close to 1.5 degrees as possible gives us the best chance of limiting impacts to levels that humanity and nature can cope with.
- **Third, it will require concerted, sustained, high-level, cross-party political effort** to get the action required and keep it on-speed and on-track. Fossil fuel use pervades every sector of the economy and every aspect of modern-life, and this needs to change within less than a generation. But cross-party consensus is possible – the 2008 Climate Change Act passed by 463 votes to 3.

These are huge challenges. But there are even bigger economic opportunities from this transition: for new businesses, technologies and jobs. There are huge societal gains to be won – cleaner air, warmer homes, more secure communities.

And we have new impetus. **The UK ratified the Paris Agreement in late 2016, and will shortly publish a new “Emissions Reduction Plan”, which should set out how we will meet the Paris goals.**

**Parliamentarians have a crucial role to ensure this Plan is as strong as possible.** The main critical areas for this plan are:

- **High ambition.** Based on a fair UK contribution to the Paris 1.5 degree goal, with an initial policy package based on the Committee on Climate Change’s “maximum” scenario, with policies strengthened to be fully Paris-compatible before the international climate negotiations’ review meeting in 2018.
- **Energy efficiency at its heart.** With a focus on eradicating “fuel poverty”, so that all people have an energy-efficient home they can afford to heat. Saves money, cuts carbon, improves health.
- **Clean air as a top priority.** Eradicating dirty diesel; clean air zones; shifting to electric vehicles, moving journeys to cleaner public transport and walking and cycling; tackling emission hot-spots such as airports and coal power stations.
- **Shifting away from new UK fossil fuel exploration.** The Government says that 70-75% of existing global coal, oil and gas reserves need to be left unused to stay within a two degree temperature limit, let alone explore for new reserves.
- **A strong low-carbon industrial strategy.** Helping heavy industry go green; supporting new clean-tech industries; and invest in low-carbon infrastructure such as zero-carbon buildings, smart-grids, Electric Vehicle charging points.
- **A decarbonised electricity sector by 2030.** Based around renewables, smart-grids, energy storage and interconnectors. Much progress has been made, but we are at a cliff-edge for renewable investment, and risk losing billions of inward-investment. Strong, clear policy for the 2020s is desperately needed to give businesses the confidence to invest in Britain’s clean energy sector.

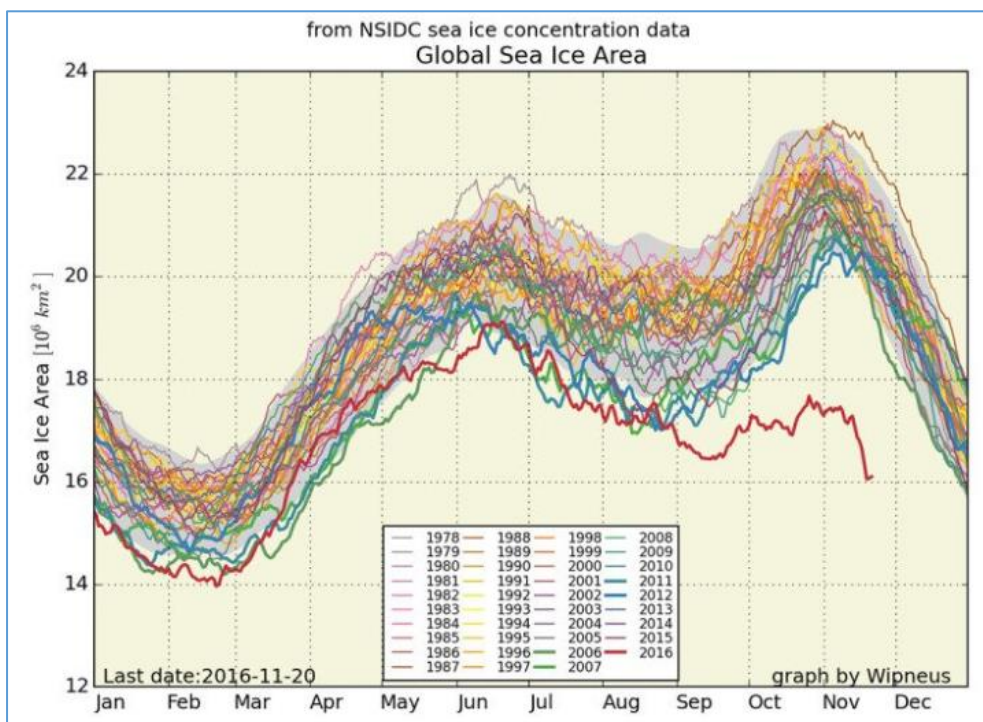
## 2 A climate emergency: the case for ramped-up action

The world has already warmed by 1 degree, largely due to human activity. The Paris agreement aims to keep warming to 1.5 degrees. But even if the current Paris pledges are met, we would still be on track for 3 degrees warming. This is why the Paris Agreement sets a path to strengthen ambition over time.

A warming world has on balance increasingly negative impacts the hotter it gets. There are two main issues:

- **Direct impacts - melting sea-ice and glaciers, sea-level rise, increased severity of heavy rainfall, storms and drought** – and their impacts: flooding, crop failure, species extinction, loss of life, damage to buildings and infrastructure.
- **Increasing risks of passing catastrophic irreversible tipping points, with runaway feedback loops** – eg melting sea ice and glaciers leaves darker sea and land behind, which means less of the sun's light is reflected back to space, increasing warming further; Siberian permafrost melting, leading to release of previously-trapped methane, increasing warming further.

**2016 has seen shocking impacts.** The Arctic is the canary in the mine – with summer temperatures 20°C above average leading to colossal sea-ice melt. Coupled with bizarre anomalies in the Antarctic, November saw an unprecedented fall in global sea ice, which will have far-reaching negative consequences across the planet:



Beyond ice, there have been 50 degree heatwaves in India and Pakistan, flooding that made 500,000 people homeless in Bangladesh, drought in Africa, the Middle East and the USA, and repeated, record-breaking flooding here in the UK in Cumbria last winter. These impacts will get worse: for example according to the World Bank a 3 degree warming world would see 113 “heat-wave days” a year in Baghdad, compared with 47 such days a year in a 1.5 degree world<sup>3</sup>.

Climate change will affect us all, but will hit the world's most marginalised people hardest: those whose lives are already precarious, living on marginal land, or in drought or flood prone cities and countryside.

The Paris 1.5 degree goal is not "safe". We are seeing terrible impacts at just 1 degree. But it is the lowest increase we can now achieve. People have thought previously that delaying action could be made up by increasing effort later. This thinking is out-of-date. It is clear that temperatures have to be kept as low as possible, because there is an increasing chances that we will pass irreversible runaway tipping points somewhere between 1 and 2 degrees<sup>4</sup>. If this happens, there is no going back. We are now in a situation where there are two priorities:

- Go all-out to cut emissions as fast as possible, to keep temperature rises as low as possible.
- Put far more effort into preparing for impacts which may escalate very quickly.

*"Climate change could lead to a humanitarian crisis of epic proportions. We're already seeing migration of large numbers of people around the world because of food scarcity, water insecurity and extreme weather, and this is set to become the new normal."*

Brigadier General Stephen Cheney, US Department of State's foreign affairs policy board, Dec 2016

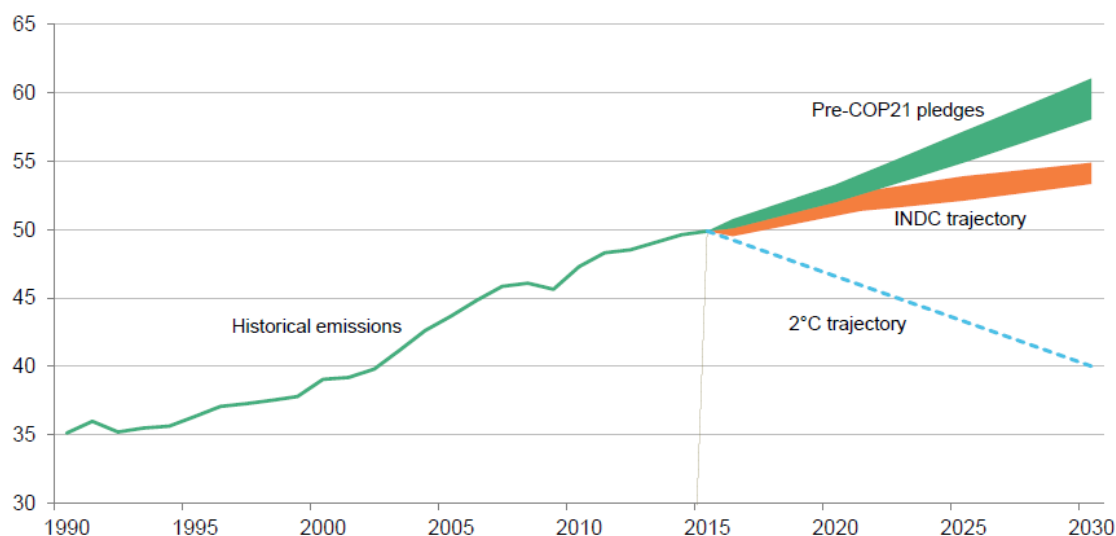
2015 saw the Paris Agreement signed. 2016 saw it ratified.

2017 needs to be the year when countries scale-up their action to meet its goals, to prevent a catastrophe we cannot recover from. That's the challenge, and it is desperately urgent. The good news is that it is entirely within our capability to meet that challenge. We just need to step-up.

### 3 What the Paris Agreement means

In many respect the Paris Agreement reached in December 2015 was a triumph – 195 countries agreeing for the first time to all take action to tackle climate change, and to base that action on a 1.5 warming goal: the most ambitious goal now possible. President Obama said *"This is a turning point. This gives us the best possible shot to save the one planet we've got"*. Chancellor Merkel called it *"a sign of hope. It can have a positive influence on the living conditions of billions of people"*. Since then 122 countries, including China, the USA, India, Brazil, the EU and the UK have ratified the treaty<sup>5</sup>.

However it is also only a first step. The pledges agreed in Paris – even if met in full – would still lead to a 3 degree warming world, set against its 1.5 degree goal. And there is little sign of the financial support agreed for developing countries, to help them take a clean-development path and cope with already growing climate impacts.



Source: UNFCCC, UNEP, Climate Action Tracker, Bloomberg New Energy Finance

Ambition and effort need to be scaled up in all countries. No country is on a 1.5 degree-compatible pathway. Both pre-2020 and post 2020 ambition must be ratcheted up. The latest discussions (Marrakesh in November 2016) have only set rules for post 2020, and have deferred taking pre-2020 action to 2018. The ratchet mechanism is meant to ensure that action on climate change becomes more ambitious over time, with review every 5 years.

## Scaling up global effort

Global warming is strongly correlated with cumulative emissions of greenhouse gas emissions: it's the total net global emissions over time that matter, the area under the curve in the above graph, which tends to be called the "Global Carbon Budget" (GCB). At current rates, the GCB for 1.5 degree warming will be entirely gone in less than ten years<sup>6</sup>. This is why **it is overwhelmingly what happens in the next ten years which matters on climate change** – and why the Paris Agreement calls for "global emissions peaking as soon as possible, and rapid reductions thereafter". Later decades are of course important, but they are a relative distraction: it is what happens between now and 2030 that overwhelmingly determines whether we can keep to 1.5 degrees, and keep the risks of tipping points as low as possible.

Doing this is a global effort, for all countries. It is no longer the case that climate change is entirely a problem caused by huge "Western" energy use – China uses vast amounts of coal, and other countries such as India are increasing their coal use too. Developing countries need to find a development path which by-passes new high-carbon infrastructure. But Western emissions per capita are still far higher than developing countries. Developed countries need to increase

### Negative Emissions – a distraction

We may need "negative emissions" (NETs) in future, particularly as a contingency. But it is an extremely dangerous distraction to focus on them right now, for two reasons. First, NETs will not be available at scale for decades at best – the overwhelming priority is to use the technologies we have right now to cut emissions fast in the next 10 years. Second, NETs have very many unknown consequences, and certain major impacts: for example a land-area 3 times the size of India would be needed to grown enough crops to do one of the NET techniques – BECCs – at a large enough scale to have a dent on global emissions.

their level of ambition by quite some way. Dividing the remaining Global Carbon Budget equally per person would see countries like the UK needing to cut emissions by at least 80% by 2030. And this would still be a contribution that ignores the entire historical responsibility for climate change so far, which lies very squarely with countries like the USA and the UK.

On what actions are needed – the forestry, cement and land-use sectors are important, but by far the biggest contributor to global emissions is the production and use of fossil fuels<sup>7</sup>. **The biggest priority globally is a set of strategies to phase-out global use of fossil fuels as fast as possible, with the job largely done by 2040 at the latest.**

## 4 Economic opportunities

The scale of this challenge can seem daunting, but there are three strong and linked signs of hope.

- **First, this transition is already happening, and is accelerating far faster than Governments and international agencies predicted.** Renewables investment in particular has seen astonishing changes. It is no longer “alternative” – it is absolutely mainstream:
  - Globally investment in renewable power was \$300 billion in 2015, twice that for fossil fuel power<sup>8</sup>.
  - Solar costs have fallen 90% globally since 2009<sup>9</sup>. It is now cheaper than fossil fuels in dozens of countries.
  - Onshore wind is cheaper than new coal or gas in the UK<sup>10</sup>.
  - The UK now gets 25% of its electricity from renewables, up from 6.5% in 2010<sup>11</sup>.
  - Solar generated more power than coal in the UK between April and September 2016<sup>12</sup>.
  - Wind power generated more power than coal in the UK over the whole of 2016<sup>13</sup>.

These trends will continue and accelerate – clean tech is being driven through innovation in digital, finance and IT as much as it is in falling component and installation costs.

- **Second, actions on climate bring “co-benefits” in other areas.** The moves to electric and cleaner vehicles will cut ill-health from air pollution, as well as cutting carbon. Moves on energy efficiency cut people’s high energy bills, as well as carbon emissions.
- **Third, they are bringing colossal economic opportunities** – this is a good news economic agenda. In 2014, the UK low-carbon economy had a turnover of £46 billion, and employed 238,500 people<sup>14</sup>. It was the only sector to grow through the crash in 2008-2010. The UK has cut its emissions by 38% since 1990, while the economy has grown by 64%: the UK economy can be strong and low carbon. There are increasing global economic export opportunities for the UK leading in low-carbon technology and services.

## 5 The UK strategic response

The UK's ratification of the Paris Agreement means we have joined 121 other countries in committing to efforts to keep global temperature rises to 1.5 degrees. But nations' pledges so far will see warming of 3 degrees. All nations need to increase their ambition, including the UK.

At a time of uncertainty about the United States' approach to climate change, it is vital that nation states build confidence in the international effort to deliver the Paris Agreement – as we have already seen in comments from China, the EU and Brazil among others.

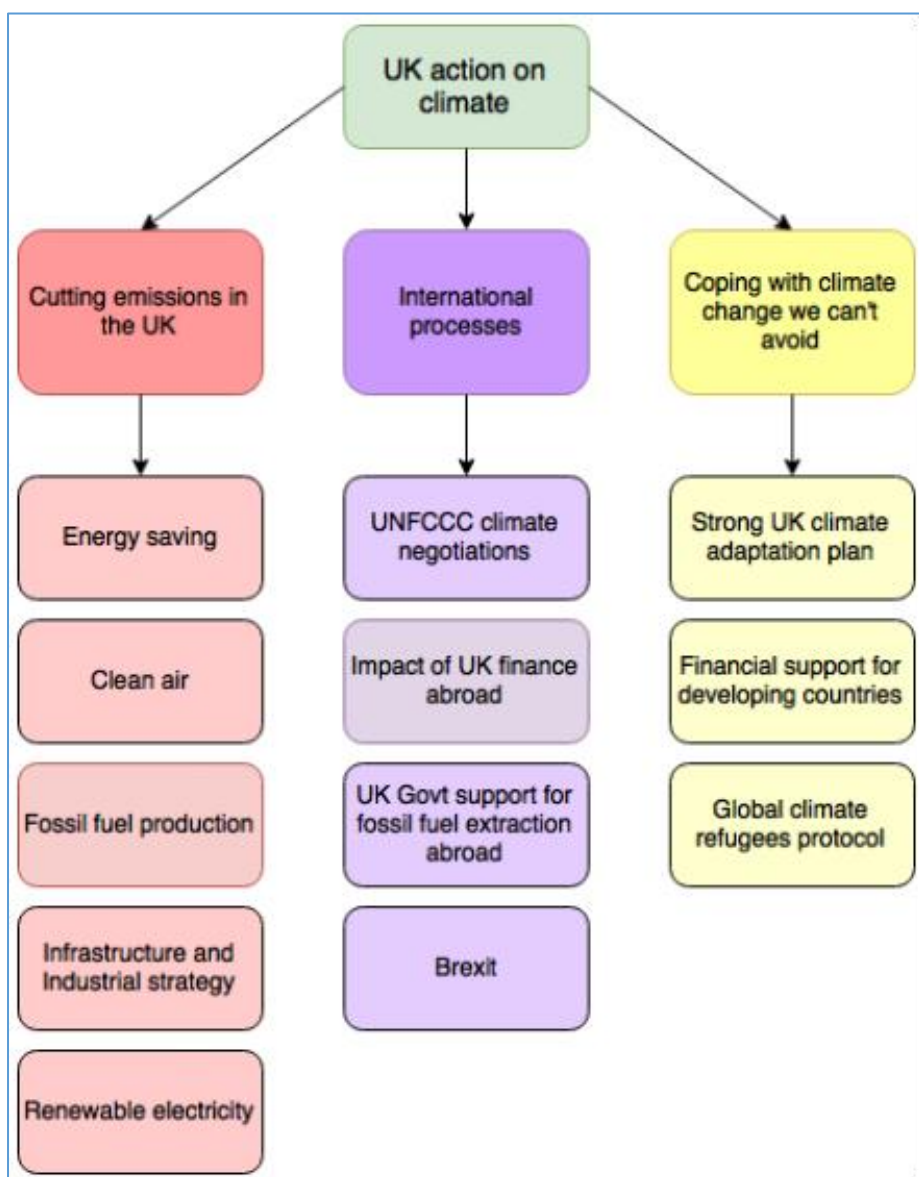
**There are three core elements of a comprehensive UK response:**

- Action to cut emissions in the UK, as part of meeting the Paris 1.5 degree goal
- Action internationally, to ensure global progress on cutting emissions
- Action to cope with the climate change impacts we can no longer avoid

*"We welcome the Government's commitment to ratifying the Paris Agreement by the end of the year. The clear intention of the Agreement is that effort should increase over time.*

*While relatively ambitious, the UK's current emissions targets are not aimed at limiting global temperature to as low a level as in the Agreement, nor do they stretch as far into the future."*

The Committee on Climate Change,  
October 2016





## 6 The Emissions Reduction Plan: ambition, policies, governance

The Government acknowledges<sup>15</sup> that its current climate plans are off-track to meet the targets it has set for the 2020s (the “4<sup>th</sup> carbon budget” (4CB) for 2023-2027). It has promised to set out a new “Emissions Reduction Plan” to meet these targets, plus the 57% 2030 target in the “5<sup>th</sup> Carbon Budget” (5CB), in Spring 2017.

It is worth remembering that the carbon budgets set the minimum level of effort, and are based on keeping warming within 2 degrees – not 1.5 degrees. They also do not reflect a fair contribution from the UK, taking too large a proportion of the available global carbon budget, at the expense of developing countries<sup>16</sup>. To maximise the advantages of the low-carbon economy and demonstrate responsible climate leadership, the UK should prepare to overachieve on existing targets and scale-up its ambition to deliver its commitments to the Paris Agreement.

This Emissions Reduction Plan needs to have three core elements:

- **High ambition** at its heart. The plan must be based on more ambitious targets which are based on our fair share of action domestically towards meeting the Paris 1.5 degree goal.
- **Clear policies** to deliver on this ambition
- **Stronger governance and scrutiny** arrangements for MPs to ensure the Government delivers – the previous Carbon Plan has had very weak mechanisms to measure and ensure progress.

The CCC have said that the UK’s current targets are not strong enough to meet the Paris goals, but the policies to meet such stronger targets are not yet clear. The UK should say it intends to meet the Paris goals, will put in place as strong policies as possible now, and develop a fully Paris-compatible suite of policies before an international meeting in 2018 where all countries will review and scale-up action to tackle climate change.

### The UK Government should:

- **State that the 2017 Emissions Reduction Plan will go further than delivery of the 4CB and 5CB, in recognition that these both need to be tightened to be a fair contribution to the Paris 1.5 degree goal**
- **Put in place as strong-as-possible policies now in the Spring 2017 Emissions Reduction Plan –for example the CCC’s “maximum” scenario<sup>17</sup>.** This would be a first step towards the Paris goals. Section 7 below sets out more detail for five of the most critical areas for the Emissions Reduction Plan.
- **State that it will tighten the 4CB** from 1950 to 1800 MtCO<sub>2</sub>e<sup>18</sup> – the CCC’s recommendation for when a global climate deal was agreed<sup>19</sup>. The Paris Agreement’s entry into force means this has now happened.
- **State that it will increase the UK’s ambition in time for the key international climate negotiation review meeting in 2018:**
  - The Government should instruct the Committee on Climate Change to advise on an appropriate fair UK carbon budget to the Paris 1.5 goal, and the carbon reduction policies beyond the CCC’s “maximum” scenario needed to meet these new goals
- **Improve Governance arrangements –**
  - Ensure that the Spring 2017 plan is debated in parliament, and has public consultation, with a final revised plan published in Summer 2017

- Annual progress updates and parliamentary scrutiny of the plan, with revisions to policy as necessary
- Oversight of climate strategy is a cross-departmental issue, and should be delivered at Cabinet level

## Five policy priorities for UK action to cut emissions in 2017:

The UK needs a comprehensive strategy on climate. Other issues such as farming, agriculture, cities, waste and shipping also require comprehensive strategies within the Emission Reduction Plan, but 5 areas stand out as priorities for action to cut emissions in 2017. They are either pivotal areas for action, areas where action has additional benefits in other non-climate priorities for the UK, or both. These are:

- Energy efficiency and warm homes
- A clean air strategy
- Fossil fuel production
- Infrastructure and industrial strategy
- A decarbonised electricity sector

### 6.1 Energy efficiency and warm homes

Energy saving is a top-priority for action on climate change. The more we can reduce our need to use energy, and the more we can use energy efficiently, the smaller the size of the job to switch from dirty to clean sources of energy.

Energy saving and efficiency is critical across all sectors, but particularly in homes – because the UK has some of the worst quality housing stock in Europe, with huge amounts of heat wasted through poorly insulated windows, doors, walls and roofs. At least 8,000 excess winter deaths each year are due to cold homes<sup>20</sup>.

Action on energy efficiency is a quintuple-win: it cuts carbon pollution, it cuts people’s fuel bills, it improves the UK’s energy security, it creates jobs in every constituency, and it reduces ill-health and early deaths.

However, the CCC reports that “Progress improving the energy efficiency of buildings has stalled since 2012”<sup>21</sup>. In recent years the government has watered down or cancelled a wide range of energy-saving policies, with huge drop-offs in rates of energy-efficiency installations<sup>22</sup>.

#### **Energy saving should be the centre-piece of the new Emissions Reduction Plan.**

##### **The UK Government should:**

- Put in place a publicly funded energy efficiency infrastructure programme to ensure 20 million homes are insulated to EPC band C or higher by 2030, starting with 4 million by 2020.
- Reinstate the Zero Carbon Homes Policy requirement for all new build.
- Put in place an accelerated programme for smart-meters in homes
- Put in place a boiler scrappage scheme

**It's happening:** Zero fuel bills in the world's most sustainable tower block in Hemel Hempstead<sup>23</sup>.

**It's happening:** Olive Tree primary school Bolton, Blackpool hospital and Bolton council have saved 60%, 76% and 59% off their electricity bills by installing LED lights<sup>24</sup>.

## 6.2 Clean air strategy

Outdoor air pollution results in 40,000 early deaths a year in the UK – more than alcohol or obesity. Air pollution is linked to cancer, asthma, heart disease, stroke and dementia. Children's developing lungs are particularly at risk. Air pollution costs the economy £20 billion a year.

There are many sources of air pollution, with *"the major threat to clean air is now posed by traffic emissions"* according to Defra<sup>25</sup>, and diesel vehicles are the most polluting of all<sup>26</sup>. The Volkswagen diesel-gate scandal last year has helped expose the true scale of the ongoing effect of diesel pollution on people's health. But to date there has been no compensation for the motorists who bought diesel in good faith, thinking they were clean. There has been no compensation for the people whose health has been damaged, or whose family members have died, due to illegal levels of pollution.

The Government has lost two court cases because its response to tackling air pollution is illegally weak. Three areas should be at the heart of a much stronger clean air strategy covering both cleaner vehicles and fewer vehicles:

- **Clean air zones**

EU legal standards should now be met by 2018 (we have already missed the 2015 deadline, and 2020 was deemed too late by the High Court) - and it is understood that Birmingham and Nottingham believe they can introduce Clean Air Zones (CAZs) by this date. CAZs are a critical mechanism to meet these standards, but they are needed in all the UK's cities and towns where EU legal limits would be exceeded, not just the 6 cities the Government has proposed (London, Birmingham, Leeds, Derby, Nottingham and Southampton). The strategy also needs to commit to ratchet down pollution further, to meet the more health-protecting World Health Organisation standards. The land-use planning system must be strengthened to be able to control development in air quality management areas to bring down emissions.

As a priority, the most polluting lorries, buses, taxis, vans, and cars need to be banned from cities as soon as possible, with compensation via scrappage schemes for people and businesses who bought vehicles in good faith.

- **Traffic reduction**

Traffic reduction should be a centre-piece of the Department for Transport's work – investing in making walking and cycling safe and easy, using planning policies to reduce the need for travel and avoid traffic-generating developments, and investing in affordable, clean, reliable public transport schemes for all cities and towns. The government must review the need for road traffic reduction targets under the Road Traffic Reduction Act, following the urgent need to bring air quality within EU legal limits in the shortest time possible, as required following legal action. Local Authorities should also set local road traffic reduction targets, under the local Road Traffic Reduction Act, to guide policy and development control decisions.

- **Electric vehicles**

The UK must plan for the phase out of diesel vehicles by 2025, and ultimately all fossil fuel burning engines – there is consideration of bans of all diesel and petrol cars being available for sale in some countries by 2025<sup>27</sup> and several cities around the world have pledged to get rid of all diesel vehicles by 2025<sup>28</sup>. The

government must back the acceleration of the transition to electric and low-emission vehicles by reforms to road tax, a diesel-scrappage scheme which would help motorists who bought vehicles in good faith, and strong support for electric vehicle charging infrastructure. On the latter, the 2016 Autumn Statement announcement of new funds for investment was very welcome; it needs to be placed within an overall package of measures to drive diesel out of the UK vehicle market.

A strong clean air strategy would cut ill-health and save NHS costs, drive new businesses, cut congestion and boost productivity and the economy as well as cut carbon pollution. It is a quadruple win which requires the Government to change tack, and act in the public interest and not act on behalf of elements within the motoring lobby.

### 6.3 UK fossil fuel production

Burning of the coal, oil and gas already in production worldwide would take the world over both 1.5 and 2 degrees warming<sup>29</sup>.

The UK Government has said that 70-75% of existing, proven coal, oil and gas reserves “*would have to remain unused*”<sup>30</sup> to give us even a 50:50 chance of meeting a 2 degree goal<sup>31</sup>. The Paris goals would mean even greater percentages of existing reserves needing to stay in the ground. In this context, the UK Government should not be supporting exploration for new fossil fuel reserves.

Countries should not be exploring for any new fossil resources, unless there is a clear plan for keeping fossil fuels already in production in the ground. This is particularly the case for the UK, which more than almost any other country has a huge historic legacy of exploiting vast quantities of all three of coal, oil and gas. If any country had a claim any of to the world’s remaining burnable fossil fuel reserves, it is not the UK.

However, the UK’s current strategy is to “maximise economic recovery” of North Sea oil and gas, and to pursue an entirely new additional exploration and production industry – fracking for shale gas and oil - as well as continue to permit new opencast coal developments. If we will not rein-in our own fossil fuel production, what chance do we have of persuading any other country to do the same?

The UK Government should commit to a **managed, just transition away from coal, oil and gas production in the UK.**

#### Coal

Coal is the filthiest energy source powering the UK – causing climate change and air pollution. It is a dinosaur technology that has no place in a modern energy mix. Its use for UK electricity is already collapsing – over six months in 2016, it was beaten by solar power<sup>32</sup> – but it requires political intervention to be removed entirely.

The Committee on Climate Change has advised that to meet carbon budgets, coal should come off the electricity system by the early 2020s.<sup>33</sup> The Government has committed to taking unabated coal power off the grid by 2025, and is currently consulting on the details – a welcome move.<sup>34</sup> The Government’s consultation paper makes it crystal clear that phasing out old coal presents no security of supply issues, and centre-right think tank Bright Blue has conducted modelling showing that all old coal could in fact be safely phased out two years earlier, by 2023.<sup>35</sup> This is what should happen.

But big opencast coal mines, like Ffos-y-fran in South Wales, continue extracting. There’s even an application under consideration for a new, 3-million-tonne opencast coal mine in the beautiful Druridge

Bay area of Northumberland.<sup>36</sup> This makes no sense – ending the burning of coal means we no longer need to consent new mines, as we can cover our remaining needs with already-consented developments.

Sajid Javid, the Communities Secretary, has rightly "called-in" this decision about whether to approve the Druridge Bay coal mine, which means he will make the decision himself following a Public Inquiry in Summer 2017. This is the first time a coal mine has been called-in on climate change grounds.

### The UK Government should:

- **Implement a plan to phase out all unabated coal by 2023**, following through on their coal phase-out commitment and tightening up the proposals currently being consulted on.
- **Turn down the application for a new opencast coal mine at Druridge Bay, and amend the planning rules so that coal is left in the ground**, implementing a similar planning policy as exists to stop peat extraction
- **Include in its forthcoming Industrial Strategy clear provision for a just transition for coal mining communities.** Coal mining now employs fewer than a thousand people,<sup>37</sup> but it is essential that they are offered training and re-employment in secure and fairly-paid jobs – something that the burgeoning clean energy sector can readily offer.

**It's happening:** Ontario stopped coal power in 2014; Canada announced in November 2016 that all coal power will shut by 2030.<sup>38</sup>

**It's happening:** UK coal mining company Hargreaves Services have seen that the writing's on the wall for coal, and are increasing their investments in wind and solar, whilst winding down their coal assets.<sup>39</sup>

## Fracking

Starting a new fossil fuel industry is incompatible with climate goals – we can't even afford to burn all the coal, oil and gas in existing production, let alone drill for new fossil fuels.

However the Government is still strongly pushing fracking. In October 2016, the Government overturned a locally made democratic decision to reject fracking in Lancashire, where the local community has been fighting it for over 5 years. In her first speech as Prime Minister, Theresa May said "*When we take the big calls, we'll think not of the powerful, but you*"<sup>40</sup>. The Lancashire fracking decision flies in the face of that commitment. The government is siding with the fracking industry.

Fracking:

- Is unpopular: only 17% of people support it, compared with 79% support for renewables<sup>41</sup>;
- will not cut energy bills: even chief-promoters Cuadrilla admit<sup>42</sup> this;
- is not needed. Insulating people's homes would save more gas<sup>43</sup>, and cut people's bills.
- has been banned or is on hold in France, the Netherlands, Scotland and Wales.

### The UK Government should:

- Call a halt to all fracking plans and introduce a ban immediately, before drilling starts;
- Invest in renewable and energy saving instead; in the North-West alone this could create 24,000 jobs<sup>44</sup>.

## North Sea Oil and Gas:

The UK Government should:

- **Comply with its international agreement to phase out fossil fuel subsidies.** The UK is the only G7 country to be increasing fossil fuel subsidies, despite a G7 agreement to cut them<sup>45</sup>.
- **Halt the current strategy in the North Sea to maximise economic recovery of oil and gas.**
- **Put in place a Just Transition plan to move jobs and industry out of North Sea Oil and Gas, and into North Sea Renewables.**

**Note on carbon accounting:** The UK Climate Change Act's accounting mechanisms and carbon budgets focus on end-use emissions, so strictly, the source, ie production, of fossil fuels is not considered for compliance with the Act's targets. But this issue can't be overlooked: even though fossil fuel production is not formally included within the UK Climate Change Act accounting mechanisms, production is a clear issue for a comprehensive UK climate response, given that the Government accepts that the vast majority of fossil fuel reserves globally need to stay unused. The Emissions Reduction Plan needs to be a comprehensive strategy, and cover all major aspects of the UK's impact on climate change – this includes fossil fuel production, and also other issues not technically covered by the Act, such as emissions embodied in imports.

## 6.4 Infrastructure and industrial strategy

### Low carbon infrastructure

To tackle climate change, the UK needs investment in low carbon infrastructure, and to stop building high-carbon infrastructure. A UK based around low-carbon and often high-tech, smart infrastructure will be more resilient, self-sufficient and more secure<sup>46</sup>.

### Industrial strategy

The Government's new commitment to industrial strategy is welcome. The forthcoming strategy should ensure that the UK does not build more high-carbon infrastructure, locking the UK into expensive stranded assets. There should be a four way focus on:

- **Building the infrastructure needed for the low-carbon transition:** energy storage, smart grids, low-carbon transport, energy efficient homes, EV charging networks;
- **Support for low-carbon sectors such as renewables;** we urgently need a clear vision for the renewables sector- recent policy changes have fuelled uncertainty and are driving business away: renewables investment is predicted to drop<sup>47</sup> by 95% between 2017 and 2020.
- **Helping energy-intensive industries manage the transition to becoming low-carbon**
- **Switching scarce Government funds and subsidy away from high-carbon infrastructure such as new road-building,** and use planning reforms to prevent high-carbon developments

## Planning rules

Planning guidance is not helping the UK to meet our climate change commitments. Successive planning decisions are adding to the problem.

The Government should:

- Reflect the Paris Agreement commitment in UK national planning policy: all national and local planning decisions should contribute to reducing emissions and should not contribute to increasing climate changing emissions.
- Address the bias in planning decision-making whereby communities can easily veto onshore wind applications on visual impact grounds, but cannot do the same for fracking applications on climate change grounds.

The Government's commitment to phasing out coal means we should no longer be permitting new opencast coal mines – the Ministerial called-in decision on Druridge Bay offers a chance for this to be corrected and fresh planning precedents to be set.

Also planning rules which are used to claim that developments which worsen air pollution can still be permitted are also a threat to more CO<sub>2</sub> emissions. The National Networks National Planning Statement (NN NPS) is used by those promoting schemes to claim that worsening air pollution is acceptable as long as the scheme does not delay the date that the relevant Air Quality Zone would comply with EU legal limits. Thus schemes apparently can worsen air pollution where it is already over EU legal limits as long as elsewhere in the AQ Zone has even worse air. Schemes which have used this argument include Heathrow and those from Highways England and Transport for London. At a local planning level, the national planning framework's lack of policy on air quality results in a failure to address the issue, both in plan-making and local decisions.

However following the Client Earth air pollution court ruling of 2016, which emphasised the need to meet EU limits in a way which minimises people's exposure to illegal levels of air across an Air Quality Zone as quickly as possible, this is even more untenable. The National Networks NPS test should be reviewed and revised. Allowing worsening of air pollution in one part of a Zone is not consistent with minimising exposure across the Zone.

## Road transport

Overall **progress towards decarbonising transport is very slow**. Car fuel-efficiency improves, but recent events such as the Volkswagen "dieseldgate" scandal show there is need for far more rigorous independent testing. The government continues to pour far more investment into high-carbon road building than into low-carbon public transport in cities, walking and cycling.

Following the High Court ruling in the recent Client Earth case<sup>48</sup>, the government must review its road-building plans, and abandon those which would worsen air pollution, at least where it would already be over EU legal limits. This is on the basis that the requirement for minimising exposure means the government cannot now rely on the National Networks NPS test of allowing worsening of air pollution as long as elsewhere in the relevant Air Quality Zone air quality would have even worse air.

On the plus side, electric vehicle (EV) production and sales are growing very rapidly. Over the next decade, EVs can become a strong complement to a renewable electricity grid, providing large amounts of additional storage.

It's essential that scarce public funds for transport are shifted away from new road building and into improvements to public transport networks and making walking and cycling safer and easier.

## Aviation

UK aviation sector passenger growth allowed under the CCC cap currently requires other sectors of the economy to cut their emissions by 85%, and given that we are already off-target in these other sectors, and that targets will need to be strengthened, the **Government should commit to a new aviation sector strategy where at a minimum its emissions decrease.**

Aviation policy is completely divorced from climate considerations, with Heathrow expansion set to produce an additional 300 million tonnes of carbon dioxide pollution.

Plans for a 3<sup>rd</sup> runway at Heathrow have not even shown how the CCC cap could be met – indeed the CCC have expressed concern that the central business case for the scheme would result in emissions 15% above those of 2005 in 2050, when the cap is for no increase. And the CCC cap was based on requirements prior to the Paris Agreement.

### The Government should:

- **Introduce a moratorium on airport and runway expansion**, and publish a strategy to reduce the sector's emissions, not increase them.
- **Introduce fair taxation for flights** which would reduce additional demand, which address aviation's exemption from fuel duties and VAT; use the tax increase to reduce taxes on jobs

## Heavy-industry

In recent years the Government has with industry written "road maps"<sup>49</sup> for how 8 key industrial sectors such as steel, ceramics and chemicals go low-carbon, but has not yet set out how the road-maps goals will be met. The focus now must be on implementation – putting in place policies to ensure these sectors are a thriving, competitive, energy-efficient, job-rich, secure, low-carbon, integral part of a strong UK manufacturing sector. The exact package of measures required will vary from industry to industry but would include:

- Use a publicly-owned Green Investment Bank or state loans to invest in plant upgrades and energy efficiency
- Support for implementation of industrial Carbon Capture and Storage;
- Clear, simple and increasing carbon prices with exemptions designed in where there are competitiveness threats;
- A clear, funded long-term R&D and innovation programme.

**It's happening:** The German Government is helping its steel industry go low-carbon<sup>50</sup>



## 6.5 Decarbonised electricity sector

Decarbonising electricity is pivotal, because decarbonising other sectors such as transport and homes depends to a large extent on electrification. The Committee on Climate Change has advised that the UK's electricity must be almost entirely fossil free by 2030 in order to meet current Climate Change Act commitments.

The UK has made strong progress on decarbonising power in the last few years, with electricity from renewables going from 7% in 2010 to 25% in 2015, and coal power falling from about 30% in 2012 to an estimated 10% in 2016.<sup>51</sup> Indeed, for a short period this summer coal was not used at all for the first time since the 1880s. With new nuclear looking expensive and highly questionable, and a “dash-for-gas” incompatible with tackling climate change (even a new gas power station has emissions 7 times the average level of emissions needed by 2030), **this leaves only one major source of new power to turn to for the next decade – renewables.**

**Renewables are growing at an astonishing rate globally.** Around the world, from China to Chile, the story is the same: **plummeting renewable energy costs, rocketing deployment.** This, allied to spectacular **technological developments in energy storage, means we can now envisage a fully renewable future,** one that could arrive far faster than most believe. In fact it is probably unstoppable.

But even as renewable technology rapidly develops, and costs fall, government support is still needed. Thanks to changes in renewables policy in the last two years, investment is now slowing:

- Since 2013 the UK has dropped from 4th to 13th in Ernst and Young's international attractiveness index for renewables investment<sup>52</sup>.
- Renewables investment is predicted to drop<sup>53</sup> by 95% between 2017 and 2020.
- Currently the two cheapest forms of renewable energy, and indeed globally the two cheapest<sup>54</sup> forms of energy full stop - onshore wind and large solar – have no route to market, blocked by a lack of Contract for Difference auctions and punitive planning rules.

Offshore wind requires certainty if it is to drive down costs and achieve the high levels of deployment we need to decarbonise the electricity sector (around 3GW installed a year from 2020-2030).

At the same time the government should pursue new smarter grid technologies - demand-response, interconnection and energy storage. These are critical to facilitate the integration of high levels of renewables, keep the lights on and to keep prices low. The National Infrastructure Commission has identified opportunities for £8billion in savings<sup>55</sup> by investing in the sector and has called for the UK to be a world leader in energy storage.

**The 2020s could see a colossal economic success story for the UK, as it moves to a digital, renewable, smart electricity grid which saves consumers money, goes low-carbon, and creates thousands of new businesses and export opportunities. Or it could see us losing those opportunities and limp along with old polluting technologies and an increasingly patched-up make-do old-tech 20<sup>th</sup> century grid.**

It's urgent that the Government sets out a clear vision and pathway for decarbonised UK electricity, with a target for a decarbonised electricity sector by 2030 and a set of simple, clear policies to enable businesses, communities and investors to get on with delivering it.

Two major issues around a switch away from high-carbon gas and coal power are:

- Keeping the lights on
- Avoiding alternatives with other major environmental downsides

## Renewables plus storage, smart-grids and interconnectors can keep the lights on

A 75% renewables electricity grid by 2030 would keep the lights on through a combination of energy storage, interconnectors and smart grids to manage demand and supply, and decreasing amounts of natural gas as back-up<sup>56</sup>.

Far from causing the lights to go out when the wind doesn't blow, energy systems with lots of variable renewables can be very reliable. Germany and Denmark have the two most reliable energy grids in Europe, with four times fewer outages than the UK, and some of the highest amounts of renewables on the grid<sup>57</sup>.

At the same time the cost of batteries and other energy storage systems has fallen by around 14% per year since 2007<sup>58</sup>. This will make it cheaper to integrate large amounts of variable renewables onto the grid, slowly reducing the need for fossil fuel back-up. Recent studies by Aurora Research show that building 40 GW solar, and using 8 GW of storage, will reduce the overall cost of balancing the grid compared to business as usual.<sup>59</sup>

Electric Vehicles are a good counterpart to renewables. For air pollution health reasons we need to make the switch to electric vehicles (EVs) as fast as possible. EVs are also far more energy efficient than diesel/petrol engines, and can provide back-up to the grid by storing electricity until it is needed. Similarly, we can increasingly move to electricity to heat our buildings, possibly alongside a move to other low carbon alternatives for gas central heating – perhaps hydrogen or synthetic gas made using renewable electricity or CCS.

## Biomass and nuclear are not the solution.

The Government should set out that it will achieve a decarbonised power sector without recourse to new nuclear power or large scale biomass and biofuels. Nuclear has an unresolved nuclear waste problem and unnecessary risks of catastrophic disasters. It is a distraction from decarbonisation, hugely costly and there are multiple cleaner, safer and cheaper ways<sup>60</sup> to power our country. The Government should review National Policy Statements on nuclear in order to phase out the UK's reliance on nuclear.

Biomass too is highly problematic, with many forms failing to show any benefits in terms of carbon reduction, and causing serious consequences for wildlife and habitats. No new biomass should be authorised unless it can demonstrate clear full life-cycle carbon savings compared with other renewable technologies, and can demonstrate a responsible and scalable supply source.

### Renewables policy the Government should adopt:

- Commit to **decarbonizing UK electricity** supply to 50gCO<sub>2</sub>/kWh by 2030.
- **Commit to construct 3 GW offshore wind per year** from 2020-2030. First phase 2020-25 would require approximately £1.3bn extra in CfD contracts, on top of £730mn committed.
- **Restore route to market for more mature low-cost renewables like onshore wind and solar** that are currently shut out by lack of auctions and negative planning rules (Through auctions in CfD Pot 1, with special measures for communities). End the de-facto ban on onshore wind in England.
- Implement the recommendations of the National Infrastructure Commission on Smart Energy to make the **UK a world leader in energy storage and smart technology**. Supportive policy, development funding and reform the capacity market to storage can thrive.

**It's happening:** over 23-26 December 2016, wind power provided all of Scotland's electricity needs<sup>61</sup>

**It's happening:** in 2015, global renewable electricity capacity overtook coal, with over 500,000 solar panels installed a day<sup>62</sup>

**It's happening:** In March-September 2016, solar generated more power in the UK than coal<sup>63</sup>

**It's happening:** Siemens has opened its £310 million offshore-wind turbine factory in Hull, creating 790 jobs<sup>64</sup>.

**It's happening:** Germany: Heliatek has expanded its Dresden solar PV factory and will make 1 million square metres a year of flexible photovoltaic film<sup>65</sup>

## 7 Action internationally to cut emissions

The UK as one of the world's politically, financially and economically strongest nations has a pivotal role internationally in cutting global emissions. There are 4 key areas to demonstrate global leadership:

- The UK's role in the international climate negotiations (UNFCCC)
- The role of the UK financial sector
- The impacts of Brexit
- UK Government support for foreign fossil fuel exploration

### 7.1 UNFCCC negotiations

Three priorities for UK action within the United Nations climate negotiations are:

- Pushing for strong pre-2020 ambition and post-2020 ratchet.
- Committing to a climate refugees protocol,
- Delivering on climate finance for developing countries

The latter two issues are covered in section 8.2, coping with climate change we can no longer avoid.

All countries need to increase their ambition, to deliver on the Paris goals. That's the purpose of the "ratchet" mechanism and 5-year review process in the Paris Agreement. The international process separates "pre-2020" and "post-2020" action. The Marrakesh talks in November 2016 were a huge disappointment – they delayed "pre-2020" action until COP24 in 2018, leaving almost no time for stronger pre-2020 action. This was despite the UNEP Emissions Gap report stating just before Marrakesh that current pledges would see temperature rises of 2.9-3.4°C.

**The UK must go into the 2018 talks with an increased Nationally Determined Contribution, based on a fair contribution to the 1.5 goal. This can based on recent 2016 analysis by the Committee on Climate Change<sup>66</sup>.**

### 7.2 UK finance

The UK is a small country, but it punches well above its weight in some areas. Finance is one of them. The world needs vast quantities of investment in energy infrastructure in the coming decades, and the ratio of this new investment which is renewables versus high-carbon is perhaps the greatest determinant of whether the world avoids catastrophic climate change. The UK's role as perhaps the biggest global financial centre is pivotal. The financial world is increasingly highlighting and addressing the multiple financial risks posed by climate change, including the risk of stranded fossil fuel assets. The UK Government should

prioritise working with the UK financial sector to accelerate the growing moves towards greener finance, and to channel investment away from new fossil fuel infrastructure and companies who do not have a Paris-compatible business model. For example this would include building on and helping implement the recommendations of the Financial Stability Taskforce on climate-related disclosures<sup>67</sup>.

## 7.3 Brexit

The UK's Brexit strategy is unclear. The way in which it unfolds could have positive or negative consequences for UK, EU and international progress on tackling climate change. Four climate-related goals for whatever approach the UK takes towards Brexit should be:

- UK commits to maintain or strengthen current EU standards – both to continue drive towards cleaner products, but also to prevent UK being a dumping ground for lower-standard products, including on air pollution;
- UK keeps free-trade in electricity, commits to continuing with joint infrastructure (eg interconnectors);
- Ensuring equivalent funding for UK projects – the European Investment Bank put 3.6 billion Euros into climate-related projects in the UK in 2015<sup>68</sup>;
- The UK pushes for strong EU climate ambition and targets.

These issues are covered in depth by the old ECC select committee<sup>69</sup>.

## 7.4 Ending UK Government support for foreign fossil fuel exploration

The UK Government has said that 70-75% of existing, proven coal, oil and gas reserves “would have to remain unused” to give us even a 50:50 chance of meeting a 2 degree goal<sup>70</sup>. The Paris goals would mean even greater percentages of existing reserves to stay in the ground. In this context, the UK Government should not be supporting exploration for new fossil fuel reserves abroad. However the UK has recently announced trade deals to explore and exploit new oil and gas resources in Colombia and East Africa<sup>71</sup>, and is supporting coal companies in Bosnia-Herzegovina. These actions are not compatible with our Paris Agreement commitments and should be reversed. The UK Government should change its trade policy and not do any further high-carbon trade deals. It should also instruct the publicly-owned banks to cease lending to new fossil fuel projects abroad. 21<sup>st</sup> Century trade policy should be low-carbon.

## 8 Coping with climate change we can no longer avoid:

### 8.1 Impacts in the UK

In winter 2015-16, the UK saw shocking flooding from Storm Desmond, with a record-breaking 16 inches of rain falling in two days at Thirlmere, and damage to homes and businesses in Leeds, Manchester, Cumbria and across the North. The Committee on Climate Change said “*The devastating flooding this weekend is a timely reminder that climate change is expected to increase the frequency and magnitude of severe flooding across the UK.*”<sup>72</sup> Met Office research shows that when such storms blow in from the tropical west Atlantic, extreme rainfall is now seven times more likely than in a world without human emissions of greenhouse gases.<sup>73</sup> The 2015 floods cost the UK economy £5 billion<sup>74</sup>.

1 in 6 homes in England & Wales are at risk from flooding, 370,000 of them at significant risk – and the Government's own projections show that this number could rise to 1 million by the 2020s and 1.5 million by 2050, thanks to climate change.<sup>75</sup> As we learn more about the risks of dangerous climate change, the scale of the increasing flood risk to the UK has become apparent. The Committee on Climate Change's latest research shows that 2,100 km<sup>2</sup> of the UK is at risk of inundation from sea level rise if temperatures rise by 2 degrees – but that this rises to 4,100 km<sup>2</sup> if we hit 4 degrees of global warming – that's an area larger than Kent.<sup>76</sup>

**We can still control by how much these impacts will worsen:** slashing emissions so that we keep global warming below 1.5-2 degrees is the best flood insurance policy we can buy. Nevertheless, extreme weather will become more likely, it is just a question of by how much. And so the UK needs to be better prepared – for we are not coping adequately even with 1 degree of warming. The UK needs an updated and strengthened climate adaptation plan. Four priority areas are:

- To publish a **strong Climate Change Risk Assessment** in January 2017, the statutory deadline, that clearly outlines the risks of 4 degrees to UK interests – and use this to produce a tough new National Adaptation Plan by 2018.
- **Address the short-term funding shortfall.** The Government’s announced floods expenditure for 2015-2021 is still around £1 billion below what the Environment Agency says is needed to prepare the UK for a high climate change scenario.<sup>77</sup>
- **Increase investment in natural flood measures**, including tree-planting and better upland management<sup>78</sup>. The £15 million announced at the Autumn Statement for natural flood measures was a welcome start, but still tiny in the overall scheme of flood protection required. What’s needed next as part of the changes post-Brexit is to reform our farm subsidy system so that public money pays for public goods, like farmers and landowners adopting land management practices that reduce flooding.
- It should be mandatory for **development to be retrofitted with (and new development to incorporate) sustainable urban drainage systems<sup>79</sup> in at risk areas, and the UK should stop building on floodplains.**
- **Key infrastructure needs to be future-proofed** where they are located in flooding and coastal erosion risk areas.

## 8.2 Impacts internationally

The UK should prioritise ensuring that developing countries receive the financial support they need, and victims of climate change impacts have adequate human rights protections.

### Climate refugees protocol

Climate change impacts such as droughts, floods and extreme weather are already responsible for hundreds of thousands of people losing their lives. Millions more are losing their homes and livelihoods.

Major General Munir Muniruzzaman, chairman of the Global Military Advisory Council on Climate Change says *“Climate change is the greatest security threat of the 21st century...We’re going to see refugee problems on an unimaginable scale, potentially above 30 million people.”*<sup>80</sup>

At present people who have fled their country due to extreme weather, food and water scarcity, or because their communities have been submerged, have no right to legal protection because they are not included in the formal legal definition of a “refugee”.

**The UK Government should lead the international community in adopting a new “climate refugee protocol”.**

## International climate finance

Financial support for developing countries is a central element of global climate agreements, reflecting the 1992 UN Framework Convention on Climate Change's first principle, of "common but differentiated responsibility". This aims to address the fact that richer countries have greater historical responsibility for the climate change we are seeing. There are three main areas of climate finance in international climate negotiations:

- Financial support for developing countries, to enhance their **adaptation** capacity: strengthening resilience to future climate change
- Financial support or compensation for developing countries, for the **"Loss and Damage"** from climate change which is already occurring
- Financial and technological support for developing countries in making the **transition to clean development, to help meet mitigation goals**

*"The Parties should protect the climate system for the benefit of present and future generations of humankind, on the basis of equity and in accordance with their common but differentiated responsibilities and respective capabilities. Accordingly, the developed country Parties should take the lead in combating climate change and the adverse effects thereof."*

UNFCCC, 1992. Article 3, principles

These issues are covered in Articles 7-10 of the Paris Agreement. In the Cancun Agreement of 2010, developed countries had already agreed to provide \$100 billion a year of mitigation finance by 2020. COP19 in Warsaw 2013 agreed a mechanism for Loss and Damage, but the Paris Agreement did not establish a clear source of finance.

Progress is very slow. At Marrakesh developed countries claimed to be on track to the \$100 billion, claiming \$62 billion contributions in 2014; developing countries say that the sum is \$27 billion. The possibility of substantive progress on Loss and Damage has been pushed back to 2019.

**Developed countries including the UK should increase their contributions to meet the \$100 billion public finance target, and not continue to seek to fill the shortfall with accounting wheezes such as counting loans or private finance<sup>81</sup>.**

## ENDS

### Contact:

Simon Bullock, climate change and energy team, Friends of the Earth

simon.bullock@foe.co.uk

January 2017

## References and notes:

- <sup>1</sup> <https://www.gov.uk/government/statistics/provisional-uk-greenhouse-gas-emissions-national-statistics-2015>
- <sup>2</sup> <https://www.ons.gov.uk/economy/grossdomesticproductgdp/timeseries/abmi/qna>
- <sup>3</sup> World Bank Group. 2014. *Turn Down the Heat : Confronting the New Climate Normal*. Washington, DC: World Bank
- <sup>4</sup> <http://www.ceh.ac.uk/news-and-media/news/scientists-identify-climate-tipping-points-2-degrees-warming>
- <sup>5</sup> [http://unfccc.int/paris\\_agreement/items/9444.php](http://unfccc.int/paris_agreement/items/9444.php), as of 6<sup>th</sup> Jan 2017
- <sup>6</sup> 8.9 years for a 50% chance of keeping below 1.5 degrees. See <https://www.carbonbrief.org/analysis-only-five-years-left-before-one-point-five-c-budget-is-blown>
- <sup>7</sup> Climate Analytics sets out its view of the priority areas globally to meet 1.5 here: <http://climateanalytics.org/blog/2016/we-can-limit-global-warming-to-1-5c-if-we-do-these-things-in-the-next-ten-years.html>
- <sup>8</sup> <https://about.bnef.com/presentations/liebreich-state-industry-keynote-emea-summit-2016/>, slide 31
- <sup>9</sup> <https://about.bnef.com/presentations/liebreich-state-industry-keynote-emea-summit-2016/>, slide 25
- <sup>10</sup> <https://about.bnef.com/blog/wind-solar-boost-cost-competitiveness-versus-fossil-fuels/>
- <sup>11</sup> [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/547977/Chapter\\_6\\_web.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/547977/Chapter_6_web.pdf)
- <sup>12</sup> <https://www.carbonbrief.org/analysis-uk-solar-beats-coal-over-half-year>
- <sup>13</sup> <https://www.carbonbrief.org/analysis-uk-wind-generated-more-electricity-coal-2016>
- <sup>14</sup> <http://www.businessgreen.com/bg/analysis/2458844/the-uks-low-carbon-economy-in-charts>
- <sup>15</sup> <https://www.gov.uk/government/publications/committee-on-climate-changes-2016-progress-report-government-response>
- <sup>16</sup> An equal per capita share of a 66% chance of staying below 2 degree global carbon budget would lead to a UK target of 80% cuts on 1990 levels by 2030. Budgets would be even lower for a 1.5 degree global budget. See page 32 of <https://www.theccc.org.uk/publication/uk-action-following-paris/>. Previous CCC analysis has found that the EU 2030 target, upon which UK targets are based, are “below estimates for a ‘fair’ EU share of a global 2°C pathway” see p9 <https://www.theccc.org.uk/publication/the-scientific-and-international-context-for-the-fifth-carbon-budget/>
- <sup>17</sup> <https://www.theccc.org.uk/wp-content/uploads/2016/10/UK-climate-action-following-the-Paris-Agreement-Committee-on-Climate-Change-October-2016.pdf>
- <sup>18</sup> <https://www.theccc.org.uk/publication/the-fourth-carbon-budget-reducing-emissions-through-the-2020s-2/>
- <sup>19</sup> <https://www.theccc.org.uk/publication/the-fourth-carbon-budget-reducing-emissions-through-the-2020s-2/>
- <sup>20</sup> On average 27,000 annual extra winter deaths in England and Wales. <https://www.gov.uk/government/publications/cfp-report-september-2016>, p12; of these, 30% due to low indoor temperatures, [http://www.euro.who.int/\\_data/assets/pdf\\_file/0003/142077/e95004.pdf](http://www.euro.who.int/_data/assets/pdf_file/0003/142077/e95004.pdf) p92
- <sup>21</sup> <https://www.theccc.org.uk/publication/meeting-carbon-budgets-2016-progress-report-to-parliament/>
- <sup>22</sup> <https://www.theguardian.com/environment/2016/mar/21/household-efficiency-installations-uk-plummet-cuts-heating-energy>
- <sup>23</sup> <http://www.homesandproperty.co.uk/property-news/buying/the-beacon-in-hemel-hempstead-no-energy-bills-for-inhabitants-of-worlds-most-sustainable-residential-a105846.html>
- <sup>24</sup> Bri-Tek presentation to Low-Carbon Britain Event, London 1<sup>st</sup> December 2016
- <sup>25</sup> <https://uk-air.defra.gov.uk/air-pollution/causes>
- <sup>26</sup> <http://policyexchange.org.uk/publication/up-in-the-air-how-to-solve-londons-air-quality-crisis-part-2/> ).
- <sup>27</sup> <http://www.autocar.co.uk/car-news/new-cars/netherlands-closes-2025-petrol-and-diesel-car-ban>),
- <sup>28</sup> [http://www.c40.org/press\\_releases/daring-cities-make-bold-air-quality-commitment-to-remove-all-diesel-vehicles-by-2025](http://www.c40.org/press_releases/daring-cities-make-bold-air-quality-commitment-to-remove-all-diesel-vehicles-by-2025)
- <sup>29</sup> <http://priceofoil.org/2016/09/22/the-skys-limit-report/>
- <sup>30</sup> <http://www.parliament.uk/business/publications/written-questions-answers-statements/written-question/Commons/2016-12-09/56871>
- <sup>31</sup> The Paris Agreement has aims to keep temperature rises “well below” 2 degrees, so a 50:50 chance is too high a risk for that goal; keeping to “well below” would require even greater than 70-75% of existing reserves unused.
- <sup>32</sup> Adam Vaughan, ‘Solar outstrips coal in past six months of UK electricity generation’, The Guardian, 4<sup>th</sup> October 2016, <https://www.theguardian.com/environment/2016/oct/04/solar-outstrips-coal-in-past-six-months-of-uk-electricity-generation>
- <sup>33</sup> <https://www.theccc.org.uk/2009/04/23/no-role-for-conventional-coal-beyond-2020s-23-april-2009/>
- <sup>34</sup> Coal phase-out consultation - <https://www.gov.uk/government/consultations/coal-generation-in-great-britain-the-pathway-to-a-low-carbon-future>
- <sup>35</sup> Bright Blue, ‘Keeping the Lights On: Security of supply after coal’, June 2016: <http://green.brightblue.org.uk/publications/2016/6/7/zgtnkg45pj97qs3y318jpajmpjsqlv>
- <sup>36</sup> See, for example, <http://www.savedruridge.co.uk/>
- <sup>37</sup> Coal Authority figures, 2016.
- <sup>38</sup> <https://www.theguardian.com/world/2016/nov/21/canada-coal-electricity-phase-out-2030>
- <sup>39</sup> Hargreaves Services Plc, ‘Strategic repositioning update’, April 2016, <http://www.hsgplc.co.uk/media/68267/Strategic-Repositioning-Update-27-April-2016.pdf>
- <sup>40</sup> <https://www.gov.uk/government/speeches/statement-from-the-new-prime-minister-theresa-may>

- <sup>41</sup> <https://www.gov.uk/government/statistics/public-attitudes-tracking-survey-wave-19>
- <sup>42</sup> <http://www.independent.co.uk/environment/green-living/cuadrilla-pr-man-admits-george-osbornes-shale-gasrevolution-won-t-cut-energy-bills-8656246.html>
- <sup>43</sup> <https://www.foe.co.uk/sites/default/files/downloads/no-need-step-gas-76983.pdf>
- <sup>44</sup> [https://www.foe.co.uk/resource/press\\_releases/doubts-over-fracking-jobs-claims-new-report-says-24000-jobs-clean-energy](https://www.foe.co.uk/resource/press_releases/doubts-over-fracking-jobs-claims-new-report-says-24000-jobs-clean-energy)
- <sup>45</sup> <https://www.theguardian.com/environment/2015/nov/12/uk-breaks-pledge-to-become-only-g7-country-increase-fossil-fuel-subsidies>
- <sup>46</sup> For more detail on low-carbon investment priorities, see Green Alliance's briefing: [www.green-alliance.org.uk/resources/Future\\_low\\_carbon\\_investment.pdf](http://www.green-alliance.org.uk/resources/Future_low_carbon_investment.pdf)
- <sup>47</sup> [http://www.green-alliance.org.uk/resources/The\\_UKs\\_Infrastructure\\_Pipeline.pdf](http://www.green-alliance.org.uk/resources/The_UKs_Infrastructure_Pipeline.pdf)
- <sup>48</sup> <http://www.documents.clientearth.org/wp-content/uploads/library/2016-11-02-high-court-judgment-on-clientearth-no-2-vs-ssefra-on-uk-air-pollution-plans-ext-en.pdf>
- <sup>49</sup> <https://www.gov.uk/government/publications/industrial-decarbonisation-and-energy-efficiency-roadmaps-to-2050>
- <sup>50</sup> <https://www.siemens.com/innovation/en/home/pictures-of-the-future/research-and-management/innovations-carbon2chem-environmentally-friendly-steel-production.html>
- <sup>51</sup> <https://www.theguardian.com/environment/2016/nov/09/britains-last-coal-power-plants-to-close-by-2025>
- <sup>52</sup> <http://www.ey.com/gl/en/industries/power---utilities/renewable-energy-country-attractiveness-index>
- <sup>53</sup> [http://www.green-alliance.org.uk/resources/The\\_UKs\\_Infrastructure\\_Pipeline.pdf](http://www.green-alliance.org.uk/resources/The_UKs_Infrastructure_Pipeline.pdf)
- <sup>54</sup> <http://carbontracker.us3.list-manage1.com/track/click?u=2eadafec2856c309ebf179e65&id=0d6fbde031&e=1159e47ac1>
- <sup>55</sup> <https://www.gov.uk/government/news/a-smart-power-revolution-could-save-consumers-8-billion-a-year-adonis>
- <sup>56</sup> [https://www.foe.co.uk/sites/default/files/downloads/plan\\_cbe\\_report.pdf](https://www.foe.co.uk/sites/default/files/downloads/plan_cbe_report.pdf)
- <sup>57</sup> <https://www.cleanenergywire.org/dossiers/energy-transition-and-germanys-power-grid>
- <sup>58</sup> <https://www.sei-international.org/mediamanager/documents/Publications/SEI-Nature-pre-pub-2015-falling-costs-battery-packs-BEVs.pdf>.
- <sup>59</sup> [Intermittancy and the cost of integrating solar in the GB power market, by Aurora Energy Research, September 2016](#)
- <sup>60</sup> <http://tomburke.co.uk/2016/09/30/hinkley-will-leave-britain-behind-the-curve-on-energy-policy/>
- <sup>61</sup> <http://renewables.seenews.com/news/scottish-wind-power-surpasses-demand-in-record-4-day-streak-553500>
- <sup>62</sup> <http://www.telegraph.co.uk/business/2016/10/25/global-renewable-power-capacity-overtakes-coal-as-500000-solar-p/>
- <sup>63</sup> <http://www.independent.co.uk/environment/solar-panels-electricity-coal-power-stations-uk-sun-a7344326.html>
- <sup>64</sup> <http://www.bbc.co.uk/news/uk-england-humber-37775300>
- <sup>65</sup> <https://www.greentechmedia.com/articles/read/Heliatek-Raises-90M-From-EU-Investors-for-Roll-to-Roll-Organic-Solar-Cells>
- <sup>66</sup> <https://www.theccc.org.uk/publication/uk-action-following-paris/> , page 30-33
- <sup>67</sup> <https://www.fsb-tcdf.org/publications/recommendations-report/>
- <sup>68</sup> <http://energydesk.greenpeace.org/2016/07/04/brexit-renewables-to-be-hit-by-cut-in-eu-bank-funds/>
- <sup>69</sup> <http://www.publications.parliament.uk/pa/cm201617/cmselect/cmenergy/705/70502.htm> ; the new BEIS select committee is continuing to investigate these issues <http://www.parliament.uk/business/committees/committees-a-z/commons-select/business-energy-industrial-strategy/news-parliament-2015/brexit-energy-climate-change-inquiry-launch-16-17/>
- <sup>70</sup> <http://www.parliament.uk/business/publications/written-questions-answers-statements/written-question/Commons/2016-12-09/56871>
- <sup>71</sup> East Africa oil deal (16/11): <https://www.gov.uk/government/speeches/uk-supports-growth-and-development-of-east-african-oil-gas-sector>; Colombia oil deal (2/11): <https://www.gov.uk/government/news/colombia-state-visit-strengthening-trade-and-investment-links>; New licensing rounds: (31/10) <https://www.ogauthority.co.uk/news-publications/announcements/2016/promising-applications-received-for-ukcs-frontier-licensing-round/>
- <sup>72</sup> CCC, 2015. UK floods: Climate change likely to increase frequency and magnitude of severe flooding events. Dec 7th.
- <sup>73</sup> Met Office, November 2015. [Studying the causes of extreme weather in 2014.](#)
- <sup>74</sup> <https://home.kpmg.com/uk/en/home/media/press-releases/2015/12/flooding-economic-impact-will-breach-5bn.html>
- <sup>75</sup> UK Climate Change Risk Assessment 2012 – technical appendices.
- <sup>76</sup> Committee on Climate Change – Paul Sayers for the ASC: Projections of future flood risk in the UK. Oct 2015. <https://www.theccc.org.uk/publication/sayers-for-the-asc-projections-of-future-flood-risk-in-the-uk/> ; Kent is 3,736 km<sup>2</sup>
- <sup>77</sup> Friends of the Earth analysis of flood defence spending commitments – details can be shared on request.
- <sup>78</sup> <https://www.foe.co.uk/sites/default/files/downloads/rewilding-flooding-foe-rewilding-britain-briefing-march-2016-100265.pdf>
- <sup>79</sup> <https://www.sepa.org.uk/regulations/water/diffuse-pollution/diffuse-pollution-in-the-urban-environment/>
- <sup>80</sup> <https://www.theguardian.com/environment/2016/dec/01/climate-change-trigger-unimaginable-refugee-crisis-senior-military>
- <sup>81</sup> <https://www.foe.co.uk/sites/default/files/downloads/paris-climate-agreement-2015-analysis-its-conclusions-101677.pdf>