THE NET ZERO DECARBONISATION REPORT
PUTTING NET ZERO AT THE HEART OF UK POLICY

Key Findings and Recommendations

November 2020
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1. CHAIR’S FOREWORD

The Net Zero All Party Parliamentary Group (NZ APPG) was created to embed net zero solutions and help accelerate Government action to meet the UK’s legally binding obligation to reach net zero by 2050. It brings together a great number of passionate and energetic MPs and Peers from all political parties and provides a powerful forum to build cross-party consensus on how to realise net zero ambitions and scale-up decarbonisation plans.

Given the UK is hosting COP26 in 2021, the most significant climate conference since Paris, there has never been a more important time for the UK to show leadership by clearly articulating how it will deliver net zero. With this in mind, the Net Zero All Party Parliamentary Group announced its ‘Decarbonisation Inquiry: Putting net zero at the heart of UK policy’ to gather evidence and examine what must be done in the key sectors of energy, transport and housing to achieve net zero in 30 years.

We held our first evidence sessions shortly before the COVID-19 outbreak was declared a global pandemic. As the scale of the pandemic came into focus, the need to align our resilience and recovery efforts with our net zero ambition also became clear. Fortunately, there is no longer a trade-off between what is good for our economy and what is good for our climate. It is clear that accelerating decarbonisation will also enhance our COVID-19 resilience and recovery efforts. Reaching net zero stands to create up to 260,000 new jobs in our energy sector alone, with many of them being in the North West. Over the next decade, we need to install 2.8 million low-carbon heating systems in homes, and install 60,000 electric vehicle chargers. Just two examples of shovel-ready projects that will create jobs and cut carbon.

The key findings and recommendations set out in our first Decarbonisation Report have been consolidated into an ambitious 10-Point Net Zero Action Plan. It reflects the scale of the challenge before us and focuses on a set of achievable actions the UK needs to take to accelerate progress to net zero. Given the level of all-Party support from MPs and Peers across Parliament, I urge the Government to adopt our 10-Point Net Zero Action Plan in full.

I would like to take this opportunity to thank all those who contributed to our Decarbonisation Report. From our industry sponsors, academic partners and peer reviewers, who delivered high-quality and insightful presentations and feedback, through to the MPs and Ministers, who provided constructive and robust engagement throughout. I would also like to thank the Chancellor and the Secretary of State for Business, Energy & Industrial Strategy, for providing written responses to letters I sent to them in July outlining our initial findings.

Achieving net zero will not be without its challenges. But with the right leadership and vision, setting us on a pathway to achieve net zero can serve as a springboard not just for decarbonisation, but also for enhancing our collective prosperity and resilience. Now is the time to act.

Alex Sobel MP
Chair of the Net Zero All Party Parliamentary Group
2. INTRODUCTION

The UK has committed to reducing all greenhouse gas emissions to net zero by 2050. Rapid decarbonisation across all sectors is required to achieve this ambitious target. The UK must demonstrate its climate leadership and commitment to net zero by dramatically scaling up its emissions reduction actions in the run up to COP26 in Glasgow, November 2021. In an effort to accelerate policy thinking on achieving net zero, the Net Zero All-Party Parliamentary Group (NZ APPG) held its ‘Decarbonisation Series: Putting net zero at the heart of UK policy’ from February to June 2020.

The Series comprised three virtual sessions focusing on key sectors for the UK: power and industry; transport; and housing and communities. Two in-person pre-sessions were also held in February and March 2020 on the role of the land sector in achieving net zero and the potential for capturing and permanently storing carbon dioxide respectively. The Series’ findings were peer reviewed in August 2020. All sessions were conducted using a select committee format, with contributions made from ministers, Parliamentarians, industry representatives, academics, NGOs, and the Climate Change Committee. All sessions were live-streamed, with recordings posted on the NZ APPG website and NetZeroClimate.org.

Section 3 of this report outlines the key themes that emerged from the Series. Section 4 is dedicated to the major recommendations, distilled into a 10-Point Net Zero Action Plan. Section 5 provides a summary of evidence collected in each session, and Section 6 contains a full list of participants and contributors to the Series.

In July 2020, NZ APPG Chair, Alex Sobel MP, wrote to the Chancellor of the Exchequer, the Rt Hon Rishi Sunak MP, and the Secretary of State for Business, Energy and Industry, the Rt Hon Alok Sharma MP, to encourage the Government to adopt an expansive and ambitious green recovery package based on the initial findings of the Series. Responses were provided in August and October 2020 respectively.

In delivering this report, the NZ APPG welcomes the green investment announcements made by the Government this year, including the £3.05 billion for energy efficiency upgrades and heat decarbonisation measures, £2 billion for cycling and walking, £800 million for Carbon Capture Use and Storage, £100 million for Direct Air Capture technologies, and the commitment to raise the 2030 offshore wind power target from 30 to 40 gigawatts. These investments are encouraging steps in the right direction. However, they fall short of what is required to put the UK on track for net zero, and are modest in comparison to the green recovery packages announced by France (£38 billion) and Germany (£40 billion).

The NZ APPG notes the Climate Change Committee’s forthcoming Sixth Carbon Budget, due in December 2020, covering the period 2033-2037, and the critical contribution it will make to lighting the path to net zero.
3. KEY THEMES

The following key themes emerged from the series:

- **The UK has made notable decarbonisation progress to date**, reducing emissions by 40% since 1990. But some sectors (e.g. electricity) have had more success than others (e.g. transport), and a proportion of emissions in certain sectors may have been pushed abroad;

- **The remaining challenge to achieve the 2050 mandate is formidable**, requiring strong leadership to fill the ‘policy gap’ identified in the [Climate Change Committee’s June 2020 report](https://www.smithschool.ox.ac.uk/publications/wpapers/workingpaper20-02.pdf), unprecedented investment in low and zero-carbon infrastructure and carbon removal and storage technologies, and far-reaching workforce reskilling;

- **The Government needs to provide a coherent, long-term and system-wide vision** to go further faster, promote system resilience and adaptation, and capitalise on synergies and interdependencies between different sectors;

- **Government and industry must work together to ensure enabling policy frameworks** are in place that deliver the technological solutions, long-term investment, and sustained skill base we need;

- **The COVID-19 recovery should serve as a springboard for delivering net zero through building back better** and imbedding beneficial behavioural changes, noting that green projects deliver high short-term returns, long-term cost savings, and ‘shovel-ready’ job opportunities;¹

- **Accelerating progress towards net zero presents a historic opportunity to grow the economy and create jobs**, notably in some of the more economically disadvantaged regions of the country. Research shows that reaching net zero will create up to 260,000 new jobs in our energy sector alone;²

- **Technological uncertainties remain, but we cannot afford to wait**. We must accelerate our effort now in a strategic way, making best use of the information and technologies we have to jump-start progress in priority areas; including on energy efficiency, retrofit programmes for the existing housing stock, improved standards for new buildings, low-emissions heating, renewable and firm zero-carbon energy, energy storage, clean industry, electrifying transport networks, cycle-lanes, and net zero hydrogen;

- **Significant civic engagement** through community groups, trade unions, and other relevant stakeholders is imperative to building long-term, society-wide decarbonisation; and

- **Despite our best efforts, we are likely to be left with residual emissions from hard to abate sectors** in 2050 (e.g. international aviation), therefore residual CO2 emissions will need to be offset with high-quality, permanent storage options (e.g. geological CCS) that we must start to scale today.

¹ [https://www.smithschool.ox.ac.uk/publications/wpapers/workingpaper20-02.pdf](https://www.smithschool.ox.ac.uk/publications/wpapers/workingpaper20-02.pdf)
4. 10 POINT NET ZERO ACTION PLAN

Based on the findings of its Decarbonisation Series, the NZ APPG recommends the Government urgently adopt and implement the following ‘10-Point Net Zero Action Plan’ to put the country on track to meet its net zero commitment:

1. **Develop a clear and systematic Net Zero Roadmap** for sustainable delivery of net zero at scale that clarifies urgent short-term priorities, sets interim (5-year) targets, and includes robust implementation, review, and governance arrangements;

2. **Develop an expansive and ambitious COVID-19 green recovery package that**: is guided by economics; focusses on **green job creation** and **workforce reskilling**, especially in disadvantaged areas; prioritises energy efficiency; incentivises scaled-up green technology and infrastructure development, including renewable and firm zero-carbon energy, energy storage, low emissions heating, clean industry; and maximises local impact through coordination with local government and industry;

3. **Overhaul building standards and incentives** to ensure that **existing and new buildings** are brought in line with net zero, including by encouraging, and, where necessary, mandating, the use of low carbon materials, low emissions heating, retrofits to existing homes, energy efficient design and construction, and circular economy thinking;

4. **Establish a strategic communications and civic engagement programme** that is championed by a cross-departmental group of Cabinet members and galvanises industry, community, and individual action for meaningful economy-wide emissions reductions;

5. **Accelerate the decarbonisation of the transport sector** by bringing forward the planned ban on the sale of new internal combustion engine vehicles to 2030 (from 2040), setting interim EV sales targets, accelerating the deployment of charging infrastructure, expanding rail networks, and including international shipping and aviation in the net zero target;

6. **Develop an ambitious net zero hydrogen strategy** to position the UK to capitalise on opportunities for green and blue hydrogen (with full CCS) production, and provide a pathway for decarbonising international transport, heavy goods vehicles, and heavy industry;

7. **Enhance electricity demand response tools and incentives** for consumers and industry to increase grid management flexibility, improve efficiency, and allow higher renewable energy penetration;

8. **Support the commercialisation of carbon capture and storage and carbon removal technologies**, including through the establishment of a ‘Carbon Takeback Obligation’ (CTBO) for fossil fuel extractors, importers, and airlines, requiring them to permanently store an increasing percentage of the CO2 generated by the products and services that they sell, rising to 100% by 2050;

9. **Align the Government’s corporate finance programmes with net zero**, including by making access to the Covid Corporate Financing Facility conditional upon clear corporate net zero business plans,3 and giving any new Government-backed infrastructure bank a net zero mandate; and

10. **Use post-2020 UK carbon pricing architecture and forthcoming Environment Bill to strengthen incentives for nature-based emissions reductions and enhanced CO2 uptake activities**, with particular potential to offset short-lived climate pollutants from agriculture (e.g. methane).

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3 See, for example, UNFCCC Race To Zero criteria ([https://unfccc.int/climate-action/race-to-zero-campaign](https://unfccc.int/climate-action/race-to-zero-campaign))
5. SUMMARY OF EVIDENCE COLLECTED

5.1 Pre-Sessions: Role of the Land & CO2 Capture and Storage

Two roundtable pre-sessions were held on 25 February 2020 and 24 March 2020 that brought together parliamentarians, stakeholders and academics to discuss policy and science issues on what it will mean, and what it will take, to achieve net zero.

The first session focused on the emission reductions opportunities in agriculture, land management, and other issues related to the Government’s 25-year Environment Plan, Agriculture Bill, and Environment Bill. The second session focused on why capturing and permanently storing CO2 are essential to delivering on net zero.

Key takeaways:

- The land sector is a major source of UK’s emissions (12% in 2017), with livestock making up the biggest share;
- Nature-based solutions can make a valuable contribution to achieving net zero, particularly for offsetting short-lived Green House Gases (e.g. methane);
- Unavoidable ongoing emissions of long-lived gases (CO2 and nitrous oxide) will need to be offset with active removal and permanent storage;
- New models for financing CO2 removal and storage, not dependent on the taxpayer, are needed for effective scale-up; and
- Shifting leadership to industry will bolster existing UK plans for permanent storage of residual CO2 emissions by increasing investment, accelerating innovation, lowering technology costs, and assigning responsibility more equitably.

Policy recommendations:

- Create market-based policies that mobilise capital towards nature-based solutions that promote the restoration of ecosystems;
- Encourage net zero carbon farming through public funding and support schemes;
- Regulate on-farm emissions, food waste, and supply-chain-management;
- Implement a Carbon Take Back Obligation (CTBO), whereby fossil fuel extractors and importers are required to permanently store an increasing portion of the CO2 generated by their products, to balance UK CO2 before 2050. The Netherlands’ CTBO offers important lessons learned for the UK; and
- Public acceptance challenges and high price of capture need to be further considered.
COVID-19 response - opportunity to build back better:

- The Government must align the COVID-19 response with its net zero ambition;
- Meeting net zero provides significant opportunities for domestic job creation and short and long-term economic benefit;
- Clean energy infrastructure construction is labour intensive, creating twice as many jobs per GBP as fossil fuel related investments.

Unprecedented electricity system transformation required:

- The UK has made great progress in recent years, with CO2 emission from the energy supply sector down 63% on 1990 levels in 2019;
- We must replace existing carbon intensive generation with net zero-carbon alternatives and increase overall capacity to allow for greater electrification of other sectors (e.g. transport);
- This will require an unprecedented build rate of 9-12GW per year, for which long-term planning will be essential;
- Success with offshore wind provides a platform to build upon;
- Nuclear also provides opportunities for ‘firm’ zero-carbon generation and for accelerating decarbonisation.

Align regulatory frameworks with net zero ambition:

- The Government must use the Energy White Paper (to be released later this year) to send a policy signal to the market and investors on investment priorities;
- Ensure that the second round of Ofgem’s Revenue using Incentives to deliver Innovation and Outputs (RIIO-2) framework facilitates decarbonisation investment.

Importance of enhanced flexibility:

- Greater reliance on variable renewables will increase the need for flexible system management;
- Consumer cooperation can make a major contribution, but market reforms are needed to send appropriate market signals to incentivise behavioural change and investment (e.g. through the provision of flexible energy tariffs);
- Leadership from Ofgem and Government will be critical for successful delivery.

Energy efficiency:

- Remains underutilised, particularly in the context of housing, and may provide opportunities for reducing pressure on capacity build rate;
- Is often lowest-hanging fruit, so is where the journey should start;
- Energy efficiency retrofits can be the most obvious option for a shovel-ready, job-creating local green investment.
Net zero hydrogen:

• Scope to manufacture green hydrogen from renewables, zero carbon hydrogen from nuclear, or blue hydrogen from gas with full carbon capture and storage;

• Uncertainty around the role it will play given technology and economics are still evolving, but it has significant potential;

• Could be key to decarbonising many industrial processes, heavy transport, and the gas network;

• Scope for it to provide an energy storage option and improve economics of overbuilding offshore wind capacity;

• The Government, together with Ofgem, should conduct a review as to what reforms will be necessary to ready the gas network to cope with high concentrations of hydrogen.

Carbon capture and storage (CCS) and carbon removal:

• CCS is a critical technology that will offer significant economic benefits and competitive advantage to the UK if the initial investment and engineering challenges can be overcome;

• Major investment is needed now from the Government and private sector to ensure we achieve the scale, cost reductions and domestic capacity required;

• Establishment of the £800 million CCS Infrastructure Fund in the 2020 Budget is a welcome development;

• Need to develop long-term sustainable funding models for CCS and direct air capture and storage of CO2, such as a Carbon Take Back Obligation (CTBO);

• Scope for North Sea infrastructure to play a major role – potentially provides opportunities for blue hydrogen.

Interconnectors with Europe:

• Will play an important role in creating flexibility, achieving net zero, and providing energy export opportunities;

• Connecting to other energy systems gives system operators the critical tools they need to manage rapid changes in supply and demand, particularly with the growth of intermittent renewables;

• Must avoid offshoring responsibility by simply importing electricity from carbon-intensive sources, but 90% of all energy imported into the UK via National Grid interconnectors will be from zero carbon sources by 2030.

Importance of community buy-in:

• Growing concern about climate change and support for net zero in the community;

• Can legislate and encourage behaviour, but need to maintain buy-in from the public and consent of the majority. Following the CCC’s recommendations will be key to achieving this;

• Key strategies to increase community buy-in could include promoting societal behaviour change through education, school and university engagement, and highlighting leadership and innovation through public competitions.
5.3 Session 2: Decarbonising Transport (2 June 2020)

Transport is now biggest source of emissions (34% of CO2 in 2019):

- Decarbonisation progress has been slow (emissions only down 3% on 1990 levels in 2018). The CCC found the UK only partly meeting two of the five transport sector policy actions needed (2019 Progress Report);
- Must accelerate pace if we’re to reach net zero by 2050;
- The Government’s forthcoming Transport Decarbonisation Plan will be central to this.

Decarbonisation pathway for passenger and light commercial vehicles and buses is clearly electrification:

- Expect electric vehicles (EVs) to reach purchase price parity with equivalent internal combustion engine vehicles (ICEs) by mid 2020s (some may already be at price parity on life cycle cost basis);
- Expect EVs on the road to grow from around 230,000 today to as many as 36 million by 2050;
- Decision to bring forward the ban on the sale of new ICEs from 2040 to 2035 is an important step, but the price decline trajectory of EVs could provide justification to bring the date further forward to 2030;
- Charging infrastructure will be critical to building consumer confidence, particularly on the road. Ease of access is as important as simple quantity;
- For EVs to assist with decarbonisation goal, the electricity source must be clean;
- To address the challenges that EVs present in terms of embodied carbon and resource intensity the Government should consider options around incentivising circular business models including, for example, enhanced producer responsibility regulation;
- Expanding rail networks stands to make a major contribution.

Pathway for aviation, shipping and heavy goods vehicles is less clear, but likely through hydrogen and offsets:

- Hydrogen needs to be green (produced through electrolysis using renewables), blue (from gas with CCS) or produced with nuclear energy;
- Need support and leadership from government to help industry further develop the technology and bring down the costs;
- Offsets will likely play a major role in aviation, but must transition to permanent (which at present means geological) storage offsets for CO2 emissions by 2050;
- High-speed rail may be an option for replacing a large portion of domestic aviation.

Electric vehicles opportunities and challenges:

- Charging requirements will increase grid demands, particularly high-voltage on road super-chargers;
- Need for leadership from Government and to carefully plan and manage infrastructure rollout, particularly in areas where oversight might be limited (e.g. in domestic EV installations);
- Vehicle-to-grid (V2G) technology will create opportunities for EVs to support higher renewable energy penetration and grid stability;
- Demand response tools for grid operator and consumer incentives will be key.
**COVID-19 opportunities and challenges:**

- Opportunity to cement some of the beneficial behavioural changes around walking and cycling that have resulted from adapting to COVID-19;

- Government’s £2 billion fund to support walking and cycling timely;

- E-scooters and e-bikes could also make a strong contribution;

- Significant health benefits from reducing roadside emissions;

- Developing body of research indicating link between high local air pollution and increased COVID-19 vulnerability;

- The Government should explore ways to ‘lock-in’ the pedestrianisation of high-streets, through combining no (or limited) car zones with a support package for high street retailers;

- Challenges posed by reduced public transport use and trust, and increased passenger and delivery vehicle use;

- Must consider how we make public transport COVID safe.
5.4 Session 3: Building Net Zero Homes and Communities (9 June 2020)

Workforce skill development:
- Chronic shortages in certain technician and installation roles, including some primary low carbon heating solutions, are predicted to become much worse;
- Workforce skills need to be cultivated to ensure we can support this rapid transition and future maintenance.

New homes:
- Every new house must be built for the future to meet net zero, as these are the houses of 2050;
- The 2030 Homes Competition, launched by the MHCLG in March, works to envision what the 2030 home should practically look like to be greener and more fit for modern purpose;
- Building capacity and capability of Modern Methods of Construction (MMC) and modular housing can play a significant role in achieving net zero new homes;
- High fabric standards minimise building emissions and reduce energy needs at the onset, as a result household energy needs will shift to mostly water heating instead of house heating;
- Energy flexibility is crucial: new homes must provide EV charging as the nation’s fleet will transition to EV.

Energy efficiency:
- There is a significant performance gap among new homes, resulting in heating costs being passed onto the customer;
- Substantial resources are needed for energy efficiency programmes to retrofit existing inefficient homes.

Future Homes Standard:
- Should be strengthened to include a timeline that applies to projects that have already received planning approval;
- Provide a national planning policy framework for new development that embeds net zero;
- Overall, regulatory and planning systems should ensure that high quality homes that meet local needs are being delivered to a high, consistent and national standard;
- Regulatory standards are key, as is stamp duty in driving down costs (e.g. Germany).

UK Sustainable Homes standards:
- Recommendation to make standards more technology agnostic to help address observed performance gap and better align mismatched policies;
- This would allow more technologies to develop and avoid deterring potential alternatives (e.g. heat networks);
- Overall, clear national standards and outcomes will drive behaviour and give business the confidence to plan and invest.

Hydrogen energy:
- Hydrogen is likely to have an important role to play in decarbonising home heating and cooking;
- Britain has an opportunity to be a leader in the hydrogen revolution;
- As new homes are built ‘off-gas’ from 2025, more clarity is needed on future network delivery, particularly on the feasibility of converting gas connections to hydrogen.
Local Vs central government:
• Clear and high national standards would support strong, local decision-making, and allow the market to deliver consistent standards across different areas and regions;
• Planning and decisions made at the local level are often more effective;
• Combined authorities are a useful tool and lever to help that discussion in local areas.

Just transition:
• The net zero transition needs to be just and inclusive, and address the housing crisis;
• Net zero homes, whether new or existing, should be available to all and not determined by ability to pay;
• Specialist help may be required for those in the most difficult situations;
• Lower income households, beyond social housing, should be able to access and benefit from low energy bills and the transition to net zero.

Circular economy:
• Policies need to allow flexibility for strategic co-achievement of related goals (e.g. circular economy) and adaptability to emerging technologies (e.g. AI and smart homes);
• Circular economy considerations in design development is key;
• Utilise reusable and recycled materials and designing for disassembling.

Public awareness:
• Policy approach must be customer oriented, promote behaviour change and public education on the tangible and financial benefits of decarbonisation;
• From the customer’s perspective, retrofits or hybrid solutions may be easier to transition towards compared to nascent technologies;
• As with the car industry, customer management of smart houses should become more intuitive and streamlined as functionalities become more complex.
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