ALL-PARTY PARLIAMENTARY GROUP FOR ENERGY STUDIES

40th Anniversary Inquiry

"What are the energy policies that will drive an independent UK to Net Zero while fuelling the economy?"

ENERGY POLICY

A report by

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PGES
All-Party Parliamentary Group for Energy Studies
Founded in 1980

The All-Party Parliamentary Group for Energy Studies
Established in 1980, the Parliamentary Group for Energy Studies remains the only All-Party Parliamentary Group representing the entire energy industry. PGES aims to advise the Government of the energy issues of the day. The Group's membership is comprised of over 100 parliamentarians, 100 associate bodies from the private, public and charity sectors and a range of individual members.

This report sets out the results of our Inquiry into energy policy, launched 4th December 2020.

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Executive Council

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Thanks

The All-Party Parliamentary Group for Energy Studies (PGES) would like to thank all respondents, including energy ministers, past and present, members of PGES and those outside PGES who responded as users of energy. We would also like to thank Andrew Griffith MP, UK Net Zero Business Champion at Business, Energy and Industrial Strategy for contributing his foreword.

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FOREWORD

by Ian Liddell-Grainger MP
Chairman,
All-Party Parliamentary Group for Energy Studies (PGES)

Without energy, there is no recovery, no economy, no future.

I am delighted that PGES has been able to conduct this Inquiry into energy policy at such a critical time. Not only is PGES celebrating its 40th anniversary, but the UK is finding its feet, independent from Europe, there is a pandemic running its course and we have the biggest global summit on Climate Change approaching at the end of the year.

Let us not forget that just two years ago, the only topic under discussion was Brexit. Since then, we have had a change of leadership in the UK, US and Europe including a new Prime Minister, new Leader of the Opposition and two new Presidents. Everyone is looking forward to CoP26 in Glasgow and discussing the future of energy and Climate Change.

This demonstrates so clearly how the lifespan of energy policy is far greater than that of politicians, how its effects are felt by future generations and how important it is we get it right now.

Outside the world of politics, industry and academia, all of whom are dependent on energy, were invited to let us know their thoughts on energy policy, how it affected them and where they believe the opportunities lie for the future. These ranged from small companies to multi-national organisations, from energy intensive users to those who never really notice their reliance on energy.

In a very short time, we have pulled together opinions and suggestions from across the spectrum. We have also aimed to set this out for legislators, with the key suggestions made clearly at the start.

Although our respondents come from across the spectrum, there was a common message for clear, set timelines, policies and desired outcomes to take us to Net Zero with immediate action.

By the time we reach CoP26 at the end of the year, the UK must demonstrate leadership in decarbonisation.

To achieve our Net Zero ambitions, a holistic approach must be taken, setting Regulations and using Demonstration at government level, with Implementation at local authority level and Education at consumer level.

Our focus must be on fossil free fuel, with the collection and use of all renewable energies, but we must keep two strong themes: “Net Zero must also mean Zero Waste” and “Use it, don’t lose it, don’t waste it.”

I hope you find this an interesting document, that draws you in to read more.

Ian Liddell-Grainger MP
Chairman PGES

INTRODUCTION

ALL-PARTY PARLIAMENTARY GROUP FOR ENERGY STUDIES 40th ANNIVERSARY INQUIRY

"What are the energy policies that will drive an independent UK to Net Zero while fuelling the economy?"

https://pges.org.uk/pges-40th-anniversary-inquiry

The objective of the Inquiry was to be able to make policy recommendations for energy that will affect future generations after the energy transition.

The All-Party Parliamentary Group for Energy Studies (PGES) aims to inform the Government of the energy issues of the day. To mark its 40th Anniversary, PGES held an Inquiry into the importance of energy in the context of the UK as an independent nation.

We sought views on the key policies required from those who supply, need and use energy. The Inquiry asked fundamental questions, across our activities, about energy as our vital resource. Without energy, there is no economy.

The timing of this Inquiry was perfect. Outside the EU, the UK is establishing policies that will affect future generations. The 'fourth industrial revolution' has moved industry from mechanical to digital, and a lifestyle revolution, accelerated by CoViD-19, is dramatically changing our energy footprint. Meanwhile, the challenge of Net Zero has prompted local, regional and sectoral organisations to use their initiative, skills and resources to encourage location-based decarbonisation.

EXECUTIVE SUMMARY

Responses from those outside the energy sector showed remarkable similarity to those within.

Key points

- The transition to Net Zero to prevent excessive Climate Change must involve everyone, from legislators to ordinary members of the public, through educators and communicators.
- There is a legal obligation to achieve Net Zero by 2050, so all Government measures should reflect the Energy Transition, subsidies should encourage reduction of waste, demand and carbon content, not reward wasteful or fossil fuel use.
- Collaboration is essential across Parliament, Government departments, and with regional and devolved administrations. National targets will be delivered best locally – the CoViD-19 vaccination programme is a great demonstration of this.
- The key risk to decarbonisation was seen as not moving quickly enough. Clear long-term policies are required with a roadmap for achievement and effect, policy should not specify the technology nor method of attainment. The markets will deliver.
- Key opportunities were seen in the use of fossil free fuel of all variants with consumer engagement led by regional schemes. In addition, a new fairer and more effective energy system is required that values demand, storage and supply equally.
- The biggest elements of energy policy holding us back are inflexibility of market rules and a lack of roadmap for policy.
- Key to decarbonisation is hydrogen, but it needs education at all levels to drive consumer behaviour change.
- Education was also seen as an urgent need to enable sectors to become active and flexible consumers of energy.
- The most effective Government investment should be focussed on R&D and retrofit in existing buildings (both public and private). Government should use their estate to lead by example and data should be made widely available.
- There was 'across the board' support for giving local and regional organisations a key role in delivering Net Zero. The 'place based' message was tempered by the fear of fragmentation as each region or area has very different natural resources, skills, expertise and businesses.
- Hard areas to decarbonise are transport, especially aviation and heat. Both are essential, hydrogen was seen as a means to make progress in heat, as it needs no major change in end-user behaviour.
- To assess the efficiency, effectiveness and cost of decarbonisation, a specific working group needs to be established. This would also ensure that information presented to the public is fair, balanced and transparent.
- Policy consensus is seen in the desire to end fossil fuel use - but a date needs to be set. Similarly, we need clarity on what the Net looks like in Net Zero.
- Policy negotiation is still needed on timescales and financing the transition.
- Actions that need to be taken to raise awareness on energy and the climate emergency focussed on clear and consistent communication and regular updates on progress, as demonstrated by the Climate Assembly UK and the CoViD-19 response. Again, public buildings modernisation will demonstrate to consumers what is available.
- When looking at what the UK should do differently post Brexit, post CoViD-19, there were recommendations for practical actions, promotion of the UK and political response. We need to establish a clear plan for a realistic Energy Transition in line with our climate targets and be fully coordinated across Whitehall.
- Agenda Items for CoP26 included:
    - → To set a clear agreed date to stop using fossil fuels.
    - → Securing agreement to adopt green recovery, due to its economic benefits.
    - → Focus on the UK demonstrating leadership in decarbonisation.

POLICY PROPOSALS

OVERRIDING PRINCIPLES

- Set clear, unambiguous policy based on science.
- Present policy decisions as a trade-off, with the counterfactual made clear.
- Define what the 'Net' looks like in Net Zero.
- Make clear the delivery timeline.
- Take a 'Learn, Adopt and Share' approach to solutions to speed up deployment.
- Consider societal benefits in analysis (e.g. reduced health care, more skills training).
- Collect consistent data, hold it centrally and make it freely available to any organisation to use (respect GDPR).
- Use consistent, transparent standards which are simple to understand.
- Use life cycle analysis not short-term measures.
- Expand levelised cost to the levelised cost of emissions.
- Enable all techniques and technologies to help achieve our aspirations for decarbonisation of heat (e.g. demand reduction or management, storage, biomass, hydrogen, CCUS, offshore and onshore renewable and nuclear).

POLICY RECOMMENDATIONS

USE ALL LEVELS OF GOVERNMENT AND DELIVERY

- **Set national targets** with the help of local and regional organisations and place the obligation to deliver on local authorities who have direct responsibility for some emissions as well as key influence over other decision makers and support them with Government funding.
- **Support energy research**, innovation and demonstration projects at a regional scale and deliver via umbrella organisations such as Local Enterprise Partnerships to share expertise.
- **Collate data** on local, regional and national scales and make it available.

PROMOTE JOBS

- **Direct education and training** to ensure that the necessary skills are available to carry out the necessary work over the coming years.
- **Provide incentives** and make positive use of public sector support, local as well as national, **to encourage job creation**, including trade and construction jobs in energy projects as well as science and management specialisms.

PROVIDE ADVICE

- **Engage with domestic consumers** so they can make informed decisions about energy in their homes and about more complex tariffs.
- **Educate consumers** about the carbon implications of their transport and heating choices. The consumer must have access to advice regarding their technology choices and Government is regarded as unbiased.

REDUCE INVESTMENT RISK

- **Help the supply chain invest** by designing subsidy regimes to even out the 'spend and return' fluctuations.

PROTECT HOME INDUSTRY

- **Protect UK manufacturing** with Carbon Border Tariffs or similar schemes, including for embedded emissions. This ensures that UK manufacturing remains competitive while decarbonising at a greater rate than other countries.

USE JOINT WORKING ACROSS THE ECONOMY – BUILD SUPERTEAMS

- **Build a network across Government** departments to promote a whole systems approach.
- **Include academia, catapults, industry**, policy makers and finance to provide a holistic approach.

IMPROVE THE BUILT ENVIRONMENT

- **Use Building Regulations immediately** to accelerate improvement in the built environment.
- **Review planning regimes** urgently and update to align with the UK's Net Zero commitment.
- **Improve public health** through building upgrades.

SUPPORT R&D

- **Support for investment in R&D** either by grants, subsidies, or increased R&D tax credits for projects leading to Net Zero.

HYDROGEN

- **Support the hydrogen economy** for use in transport and home heating.
- **Tackle process emissions** through support of CCS in conjunction with the hydrogen economy.

RAW MATERIALS

- **Support research** into alternative raw materials with a lower carbon footprint.

THE EVOLUTION OF ENERGY POLICY OVER 40 YEARS

An Assessment by Energy Ministers

All-Party Parliamentary Group for Energy Studies (PGES) is one of the longest standing APPGs. This year marks 40 years since we took on our role of informing the Government on the energy issues of the day. We collated personal views from past energy ministers to illustrate how energy issues have changed since 1980.

The UK is undergoing a revolutionary period. We are going through:

- a political revolution, as the UK moves outside of the European Union.
- a lifestyle revolution, with a mass population adoption of working from home driven by CoViD-19.
- an energy revolution, as we move from fossil domination to low carbon; and
- a digital revolution, moving from manual to digital, the fourth industrial revolution.

Acceptance of Climate Change is universal as is the need to reverse the trend. However, there remains a gulf between our ambitions, the level of debate and the recognition of energy as a vital resource.

We asked every past energy minister the same questions to see how energy issues and policies have evolved:

1: ***Which department had responsibility for energy during your tenure?***

Since the formation of PGES in 1980, energy has been the responsibility of no less than 7 different departments. There have been 54 energy ministers, of whom 44 are still alive, and many are still in Parliament or the upper House. There have only been 2 Government departments with a focus directly on energy (Department of Energy 1980 - 1992 and Department of Energy & Climate Change 2008-2017).

2: ***What was the most pressing energy policy issue when you were in office?***

→ 1980: Oil supply and price; militant coal mining unions threatening power supplies.

→ 1990: The privatisation of the Electricity Industry, which was effectively completed in 1990.

→ 2010: The pricing of nuclear power.

→ 2020: Net Zero target.

3: ***What is the most pressing issue for the future?***

Every response was based on Net Zero.

4: On what issue have you changed in your opinion* most, *since being in office – and why?

"Recognition that the UK coal industry declined to zero even faster than believed then (1979/80). Recognition that 'peak' in oil is in demand, not as was then in supply. Recognition that renewables can supply a larger part of power supplies, at competitive cost, than thought earlier."

"I haven't" (2010)

"The potential of hydrogen to transform our economy".
(2020)

"I think in 1990 at the time we saw energy security being best delivered by a mixture of coal, gas and nuclear-fired power stations. For reasons that are self-evident, the UK's reliance on coal-fired power stations will end in the not too distant future. With the growth of renewable energy and the ever-increasing potential of renewable energy, I consider further expenditure in nuclear power to be a waste of taxpayers' money. The infrastructure is incredibly expensive, and we have not yet really, satisfactorily, resolved the policy issues surrounding nuclear waste disposal and everyone grossly underestimates the contingent liability of the eventual disposal of nuclear power stations when they are no longer serviceable. The reality is that, given the nature of the nuclear industry, taxpayer investment in further nuclear power in the UK is simply going to create most of the jobs in France, rather than in the UK."

***5: When do you think we will achieve our goal of Net Zero emissions*?**

This was a slightly more varied set of opinion. Estimates of achieving Net Zero ranged from 2040 to impossible.

PGES would like to thank all the past energy ministers who took part in the survey. But, one unsolicited comment struck home – this is a two-way transaction:

"I should like to compliment the All-Party Parliamentary Group for Energy Studies on 40 years of thoughtful and well-considered policy work."
Sir Tony Baldry, Parliamentary Under Secretary of State 1990.

FULL REPORT

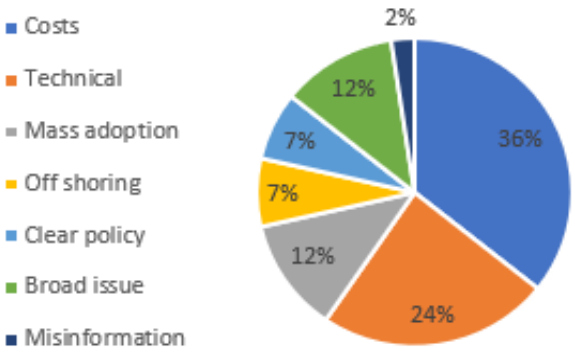
ABOUT YOUR SECTOR

Q.1: What is the key risk or burden of decarbonisation in your sector?

95% of respondents set out an opportunity for their sector and all respondents highlighted risks.

Risks could be categorised broadly into those that were general (76%) or technical (24%).

The general topics were further broken down into concerns over cost, funding or competitiveness (36%), the difficulty of encouraging mass adoption, especially of heat (12%) in the face of misinformation (a further 2%), off shoring carbon (7%) and policy (7%), (this included unintended restriction of markets due to regulation, some off shoring of carbon). The broader issues included not moving quickly enough and universities' concerns that they may lose international exchange and research schemes, but they remain keen to help develop and trial solutions.



"The key to defossilisation is the transition away from using fossil resources. We need carbon, but we need to avoid using virgin fossil carbon."

Professor Peter Styring Sheffield University

The most telling broader point, "Not moving quickly enough", applied not only to UK, but to all the CoP parties. It was seen that the UK could establish an advantage in developing wind and marine energy technologies, as well as Decarbonise, Decentralise, Digitalise and Democratise the energy system.

Short-term policy schemes and changes are very disruptive to energy responses in supply, demand and development. Clear long-term policies are required with a roadmap for achievement and effect, and policy should not specify the technology or method of attainment.

This is exhibited clearly in transport policy, where the policy encouragement for battery powered vehicles is disabling development of motors that use hydrogen, fugitive methane and biofuels. It has also developed a "self-charging" hybrid passenger vehicle that is quite simply an internal combustion car which saves surplus energy in batteries.

It is essential that the whole population is carried forward on the transition to fossil-free energy, but there is so much misinformation to deter adoption. Additionally, heating was mentioned several times with reference to consumer information and misinformation – Talk of a boiler ban is rife, but it is the fuel that needs to be changed, not the whole heating system.

"The key risk is lack of clarity as to who needs to do what… and a centralising mindset that blocks the roles of consumers, cities and other scales of activity."

Policy Recommendations

- Focus on introducing Fossil-Free fuel, not decarbonising.
- Consistency of policy measures, establishing goals and milestones for effect desired, not the means to achieve it.

Q.2: What is the sector's key opportunity in decarbonisation?

95% of respondents set out an opportunity for their sector.

Broadly grouped under "Fossil Free" (21%) were:

- Hydrotreated Vegetable Oil (HVO) and Fatty Acid Methyl Ester (FAME).
- Regional fossil-free transport solutions including hydrogen, cryogenic diesel and biofuels.
- Large-scale green hydrogen production using electrolysis and corresponding green hydrogen storage and transmission, also combined with large scale pumped hydro-energy storage.
- Providing a Circular Carbon Economy where emissions cease to be a waste and become a chemical feedstock, for example, mineral products.

"The key opportunity is an economic one. Creating a long-term economic driver for the UK that creates jobs and prosperity, whilst also benefiting the environment. A hydrogen economy can be absolutely central to this"
TUV SUD National Engineering Laboratory

Consumer-led opportunities (16%) included:

- Consumer engagement to transform to a consumer-led, digitised energy system, with concomitant benefits to the economy and the consumer experience.
- Improving existing properties with a long-term strategy of domestic energy efficiency upgrades.
- Heat – Displacement of methane with hydrogen: Changing the fuel, not the appliance or the consumer habit.
- Energy as a service, bundling supply with heating, micro generation, vehicle to grid (V2G) etc and optimisation without the need for consumers to have to manage it themselves.
- Smart meters enable consumers to take advantage of demand-side response (DSR). A high level of DSR participation is needed to flatten peak demand and overcome the intermittence of renewable energy sources.

Technology opportunities (21%) were found in:

- Technologies to use energy more efficiently and more effectively.
- Doubling capacity of the electricity grid.
- Offshore renewables for supply and export, including floating offshore wind.
- Hydrogen and CCUS: Hydrogen storage allows integration of variable renewable energy sources with variable local and export energy demands.
- Embedding carbon in industrial gases and therefore steel, cement and glass.

Education opportunities (16%) highlighted were:

- Attracting the best young minds.
- Research, development, demonstration and implementation of new low-carbon technologies.
- Develop world-leading teaching and learning with the experience gained from being immersed in the UK's Net Zero transition.
- Encouraging technology leaders and allowing others to replicate change.

Regulation opportunities (16%) highlighted were:

- A new fairer and more effective energy system that values demand, storage and supply equally.
- Displace hydro-carbon fuels, by using surplus electricity from constrained wind farms made available at competitive prices.
- Protect existing jobs in steel, refining & chemicals whilst attracting inward investment in sustainable air fuel, battery production, lower carbon hydrogen production and re-shoring manufacturing sectors to reduce overall UK footprint.

Policy recommendations:

- Focus on introducing fossil-free fuel, not decarbonising.
- Consistency of policy measures, establishing goals and milestones for effect desired, rather than the means to achieve it.
- A new fairer and more effective energy system that values demand, storage and supply equally.
- Displace hydro-carbon fuels, by using surplus electricity from constrained wind farms made available at competitive prices.
- The roll out of HVO to replace mineral diesel/ FAME for refuelling vehicles and the GHG savings that this brings. Also, the use of HVO to replace mineral heating oil/FAME in more remote rural locations (100% HVO is a direct replacement for both products with and provides up to 90% net reduction in greenhouse gas CO2 emission).

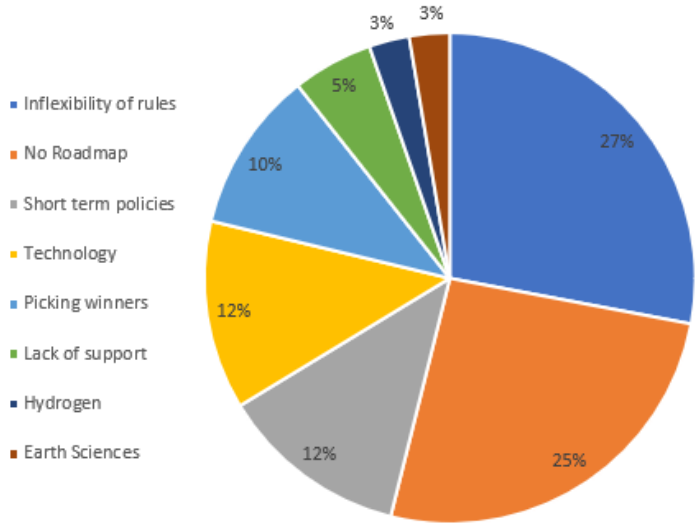
Q.3: What is the biggest element of energy policy that is holding you back?

Of all respondents 93% offered an energy policy that was a barrier.

There were three main themes that dominated responses: the **inflexibility of rules and markets** (27%), the **lack of a roadmap for policy** (25%) and the **short termism** they represented (12%).

Individual technology suggestions represented a further 12%. After that, the main barriers were picking winners (10%), where the support for one sector adversely affected others, and the lack of support for emerging technologies (5%).

It was clear that old energy market designs were considered a barrier to transition; that policy tended to be stop/start and pick winning technologies to the disservice of others, whilst failing to encourage emerging technologies. In addition, traditional subsidies prevented innovation.



"The long-term nature of the delivery plan will necessitate clear support across all political parties. With a need to embrace a wide range of technological solutions, as one size will not fit all"

Lack of support for training younger generations.

- Lack of detail and the lack of a credible roadmap to 2050 targets.
- Lack of understanding or lack of action regarding the need for pumped hydro energy storage.
- Lack of a clear pipeline of work and lack of capacity and skills in the construction sector workforce (to deliver retrofit).
- Lack of clear, long-term integrated construction, training, energy and decarbonisation policy/strategy for upgrading the existing building stock.
- Lack of clarity on what policy will be, and what mechanisms of market support will exist.
- Lack of tailored policy signals that would enable sectoral development and provide certainty to investors to drive private investment.
- Lack of consistent policy and a coherent understanding of the sector's capabilities in the decarbonisation of the UK which currently limit mass deployment.

"There has been an idiotic rush to deploy stationary lithium batteries for renewable energy storage at wind farms and solar farms but this is absurd because of the high cost and lack of scale which is a fart in the ocean of energy storage need."

Dr Theodore Holton Green Hydrogen Council

Inflexibility of rules

- The energy system of the future will need to be smart and highly integrated.
- DEFRA and BEIS do not currently recognise the offsetting impact of selling biosolids as fertiliser.
- Uncertainty and lack of direction on hydrogen strategy is currently holding the UK hydrogen economy back.
- Energy policy should have more long-term, integrated, planning, across infrastructure, markets and innovation.
- To make our energy system lower cost we must value flexibility as highly as we do new generation,] and stopping all subsidy to curtail renewable generation.

Picking winners

- Energy policies either promote heat or power, electricity or gas. Policies need to be all encompassing and acknowledge that these factors are inextricably linked.
- Support for battery electric vehicles (BEV) is a welcome part of the picture, but this focus has neglected green hydrogen fuel cell electric vehicles (FCEV).
- Stop fossil fuel subsidies. Currently a market for this surplus electricity does not exist, so wind farms are paid a large subsidy to shut down and not generate.

Policy recommendations:

- A detailed and credible roadmap to 2050 targets.
- A clear long-term integrated construction, training, energy and decarbonisation policy for upgrading the existing building stock.
- Immediate changes in Building Regulations to prevent new homes being built that do not achieve Net Zero.

ABOUT THE DECARBONISATION PROGRESS

Q.4: What behaviour or technology do you see as key to decarbonisation?

95% of respondents answered this question.

Technology provoked a wide and varied response among respondents to the Inquiry. There was a distinct focus on the primary energy source to achieve decarbonisation but sometimes this was allied with a secondary proposal in which case both have been counted in the survey.

Hydrogen was the dominant answer, but some respondents proposed CCUS and electrolysis without specific mention of hydrogen as the ultimate product of these technologies. Equally, storage was biased towards hydrogen but also covered hydro pumped, electricity, and heat.

Smart meters and the use of IT featured strongly, and if added together amount to the second highest total. However, whilst there is some overlap, use of IT is promoted more generally to manage and to control use and distribution of energy.

Tidal energy has the benefit of being predictable and dependable, and this certainty of supply is paramount.

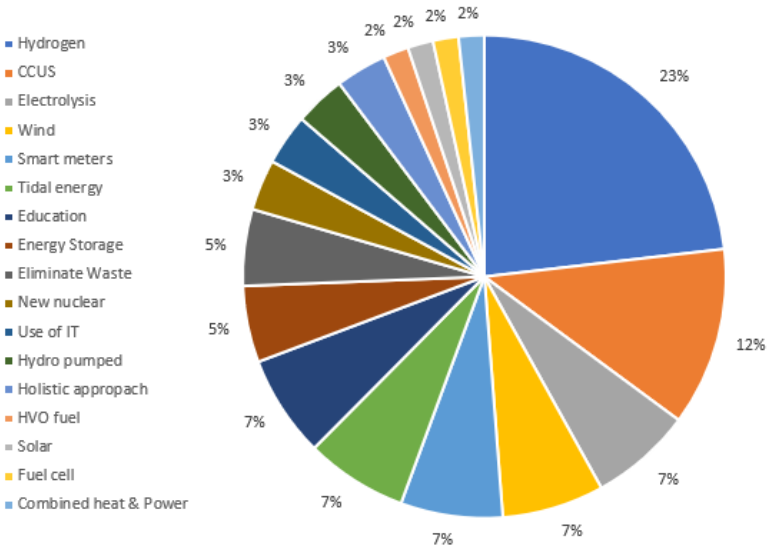
Perhaps surprisingly, Education was seen as the key to technology by 7% of respondents, and 3% said a holistic approach is needed, which in conclusion based on the above hydrogen is seen as the key tool for decarbonisation. Nevertheless, many other technologies were considered to play a part, especially in specific sectors, for example HVO as a replacement for diesel in transport.

Timescale for deployment

'Now' is the predominant answer, starting with science and education. 'Follow the science' is a current catchphrase and this is deemed to apply here. Respondents identified a need to learn how to compare the benefits and costs of not only the primary energy source technology but also the end use of the energy.

At utility level, blending hydrogen gas into the current network (up to 20%) is seen as a quick win and can start almost immediately without affecting end users, whilst an ongoing, well-managed and planned transition to 100% hydrogen and other natural energy sources needs to take place over the next 15-20 years.

At consumer level, education is seen as the key to public acceptance and buy-in, but the costs must be acceptable to the householder. Smart meters are the first step for many households but without understanding the information provided they may not be motivated to reduce their consumption to save carbon.



Effect of their deployment?

- Employment opportunities stands out as a massive positive effect of the move to decarbonisation.
- Utilities will have to make some big decisions, supported by Government and significant investment will be needed.
- At consumer level, the public will need to be educated to understand what they have the options to do, any capital investment needed, payback times and most importantly any behavioural changes needed to achieve decarbonisation or adapt to new products.
- Time of use tariffs will almost certainly be introduced, and these will force behavioural changes.

"The key barrier to deployment is the lack of a cohesive whole system strategy for hydrogen which encompasses power, heat, transport and system resilience".

Celia Greaves UK Hydrogen and Fuel Cell Association

Barriers to their deployment?

- At utility level, uncertainty over Government policy was listed by respondents as the prime barrier, followed by insufficient finance. Inevitably, the relationship between the two was frequently identified – investors will follow Government policy.
- At industry level, skills and training was a common theme, with the requirement for installers to be certified to PAS 2030 cited as a specific barrier, not in itself being a negative, but the time, cost and bureaucracy of the process is a deterrent for sole traders or small companies.
- At consumer level behaviour change and disruption is seen as a major barrier for technologies needing it. A lack of unbiased advice regarding the benefits of different spend options leads to a default position of a hesitation to change. Finally, there is a reluctance to purchase new technology products early (without financial support) because prices usually fall over time as economies of scale reduce manufacturing cost.
- Except in transport where there is positive agreement that the fuel sources must change rather than the vehicles, in other areas there is a perceived miscommunication regarding whether fuel sources or the types of appliance / behaviour have to change.

"It is therefore paramount that we engage across the House to ensure cross party support to establish a Department to oversee delivery of Net Zero as a United Kingdom project, with key National, Regional and Local inputs..... this is a project driven by the science."

"Individuals and businesses may be less willing to invest in the short term due to expectations that costs of deployment may decrease as technology improves.....so schemes that can smooth out costs and benefits over time would be beneficial."

Claire Ackroyd South East Midlands LEP

Costs of deployment

- To change or introduce new primary energy sources requires major planning, construction and financial investment involving billions of pounds over a period of many years and many fixed term parliaments. Strong, sustained and irreversible Government policies are needed to give confidence to companies and investors.
- At micro level, householders face uncertain costs, for example, a change to their fuel supply may be less expensive than a change to their appliances, but if both are needed then the costs can be considerable and with little chance of a financial payback.
- Energy efficiency measures also cost money, and the costs need to be known to enable payback calculations.
- The risk of high costs leads to a 'wait and see' approach. But the clock is ticking...

Policy Recommendations:

- Long term definitive irreversible Government policy for future energy based on science.
- Government incentives to encourage job creation, investment in R&D, and construction for energy projects.
- Government publications giving unbiased advice to the consumer regarding technologies available and how to select the best ones for them.
- Government subsidies or tax breaks to even out spend and return fluctuations.

Q.5: How can your sector organisations become active and flexible consumers of energy to help them decarbonise?

75% of respondents answered this question.

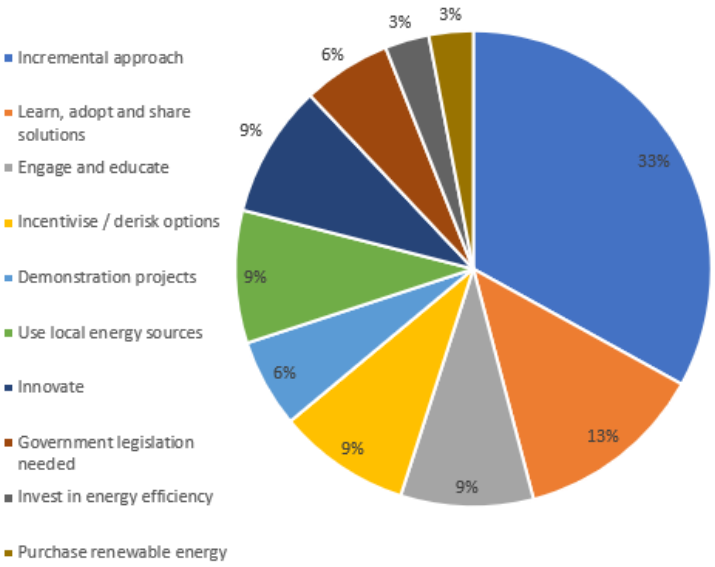
This question was targeted at individual respondents' circumstances so provoked a range of answers specific to the organisation, but for analysis they have been grouped into the following categories which emerged from the responses.

A third of the respondents who answered this question felt that a progressive incremental approach was appropriate and in most cases this has already started.

'Learn, adopt and share' solutions represented 12% of the response, which if added to 'engage and educate' (a slightly different angle on a similar theme) would account for 21% of respondents.

Throughout the replies, there was a clear underlying theme promoting learning, education, and implementation with a particular emphasis on the urgency to do so.

Innovation features heavily, as does de-risking and subsequent financial safeguards incentives, but two respondents felt that legislation was the best way to make this happen.



"The payback period for some energy efficient technologies is often beyond the 1-2 years which many companies seek, so incentives to invest are helpful."

Dai Richards Hitachi ABB Power Grids

"Delivering solutions to consumers is more likely to succeed than expecting all consumers to individually craft their own solutions to a very complex problem."

Kathryn Porter Watt-Logic

Policy Recommendations:

- Government assistance to de-risk and incentivise decarbonisation.
- Accelerate existing Government legislation to introduce additional decarbonisation measures via the Building Regulations.

Q.6: Where can UK Government investment be most effective?

86% of respondents answered this question.

Most respondents gave a single answer regarding where Government support should be focussed, but some responses proposed more than one field, in which case they have been included.

R&D support was the main benefactor, closely followed by big infrastructure projects and education and training to ensure that the necessary skills are available to carry out the necessary work over the next few years.

Where should the government invest regarding decarbonisation?	Response
R&D in emerging technologies	28%
Big infrastructure projects	21%
Education, training & job creation	15%
Funding around a clear policy	9%
Energy efficiency in buildings & retrofit	9%
Technologies which increase UK economy	7%
Demonstration trials of new technology	7%
Alternative fuels e.g. NVO, biofuel	2%
Providing low cost finance	2%
Total	100%

"Greater investment in and incentives for retrofitting renewable energy will help accelerate improvements in our existing housing stock and faster deployment of low-carbon solutions such as for heating."

Amy Fleming Local Government Association

Whilst R&D support was unanimous in 'emerging technologies' (a generic response to all relevant technologies), big infrastructure projects were more specifically identified, with most being hydrogen related but others referring to tidal energy or storage, particularly pumped hydro storage.

Energy efficiency measures and retrofit in existing buildings are well supported in the responses, (both public and private sector) as are investments which benefit the UK economy. However, an underlying theme throughout many of the responses to various questions in the Inquiry is the need for a clear unambiguous Government policy. Answers generally supported incentives and funding being based around this.

There were some contradictory answers, and these demonstrate the need for clarity in identifying different technologies. It is important that science is used to compare like for like products and equivalent fuels, but it is unreliable if comparisons are made between different types of products using different fuels. This is where Government should set out objectives, targets and timelines, leaving industry to develop the best technologies.

"Energy Efficiency must continue to be supported as a no-regrets action as it is a force multiplier for the successful decarbonisation of heating."

Michael McLaughlin National Grid ESO

Policy Recommendations:

- Clear unambiguous Government policy - defining policies based on the science.
- Support for investment in R&D either by grants, subsidies, or increased R&D tax credits for companies with decarbonisation projects.

ABOUT GOVERNANCE AND ORGANISATION

Q.7: How can place-based (local and regional) resources and organisations be harnessed to deliver Net Zero?

81% of respondents answered this question.

There was 'across the board' support for giving local and regional organisations a key role in delivering Net Zero.

The energy industry's move towards a decentralised system, with local resources owned by the region or district's businesses, local government, organisations and communities, have clearly been a major influence in the thinking of the respondents to PGES's survey. In addition, the need to decarbonise heat was seen as particularly a place-based whole system responsibility, because "heat does not travel".

Local Enterprise Partnerships, who have in-depth knowledge, were frequently mentioned and so were trusted organisations such as local authorities. The latter were seen as key players because they all have both a large estate and a range of services to manage. They also have both 'gatekeeper' roles, for example as planning authorities, and the ability to bring together organisations in a 'whole system' approach. What is more, they are in contact with and trusted by domestic customers.

Equally important for respondents was the fact that each region or area has very different natural resources, skills, expertise, businesses and geography. A local and regional responsibility for delivery should allow the most efficient and most appropriate response, which in turn would help win consumer support.

"A trusted one stop shop of energy and related data is something that would be utilised by many stakeholders."

Dr Grant Wilson, University of Birmingham,

Structure

Overall, in delivering low carbon systems, training and skills, and the technology necessary to deliver Net Zero the message was: **'set targets and provide funding nationally, deliver the outcomes locally'**.

The 'place-based' message was tempered by the fear of fragmentation - "It needs to be a large-scale consideration," said Andrew Robinson, Business Development Manager at Dunphy construction. National target setting and support were required to allay concerns in case local or regional bodies were left to deliver savings on their own, without the expertise or funding that would be necessary to ensure delivery. Co-ordination of tax policy and incentives, regulations and consenting, public investment in enabling large-scale infrastructure, innovation programmes, skills training, etc, would require consistent national frameworks.

"Different regions have varying strengths and needs. By using local and regional resources and organisations, place-specific optimum pathways for decarbonisation will emerge in the most efficient way."

Dr Martin Hanton, TUV SUD National Engineering Laboratory

Local authorities were named most often as delivery agents, with "a major role" because they have direct responsibility for some emissions, a level of expertise and the public's trust. They were seen as key to addressing the problem of decarbonising heat, as it would require complex changes in the local networks and individual properties, with no easy answer and extensive public engagement required.

Several examples of 'pathfinder' projects were mentioned. Their diversity – including a hydrogen gas project in Leeds, Southampton's geothermal district heating, heat from coal mines in the northwest and wind power in Shetland – illustrate the use of local resources. Guildford's requirement on housing emissions was an example of how local authorities could be pathfinders on setting standards, but there was concern that local authorities were discouraged from taking more ambitious action. The existing structure of local authorities, Local Enterprise Partnerships and regional Energy Hubs was regarded as able to deliver both regional co-ordination and local delivery once targets, and funding were provided locally.

Providing the tools

As with targets, investment would be required in developing the skills and retraining needed to deliver major programmes across the whole of the UK, but the design of suitable skills programmes "is best organised locally to meet the local situation".

A fundamental tool for delivery would be giving open access to timely, robust and granular local, regional and national energy system data. This should be collected at a national level, the data resource should be paid for centrally and made available at low or no cost to local authorities, LEPs, combined authorities and energy hubs. That would be in accord with Government and regulators' overriding ambition to open energy data.

Policy recommendations:

- Set national targets with the help of local and regional organisations – and provide central Government funding.
- Make use of umbrella organisations such as Local Enterprise Partnerships to share expertise.
- Place the obligation to deliver on local authorities who have direct responsibility for some emissions and key influence over other decision makers and support them with Government funding.
- Use standards, which are simple to understand, and support organisations that want to set more ambitious standards as long as they are in accordance with overall policy direction.
- Collect consistent data, hold it centrally and (respect GDPR) make it freely available to any organisation that can make use of it.
- Invest in skills and training.

Q.8: What areas are hard to decarbonise? Why? Are they essential or is there an alternative?

89% of respondents answered this question.

Respondents most consistently named and transport – especially aviation – and heat as the most difficult areas to decarbonise. Both are essential, but decarbonisation presents a different problem in each. In transport, technical and regulatory development are the main prerequisites to decarbonisation. But decarbonising heat requires intervention in every home in the country. It will disproportionally affect the vulnerable and it needs support from consumers.

Transport

Although aviation was most often named as the hardest transport sector to decarbonise, heavy goods vehicles (HGVs) – and other heavy equipment including that used in renewables construction and maintenance - came a close second. For these, the batteries used for EVs were thought to be impractical, and although some switch to electrified rail would be possible, there would always be a proportion for which new fuel options were needed.

The alternative would be to use hydrogen and other green gases. For responders these offered a solution, not only where electricity was unsuitable but also where the need was in areas far from existing power grids.

It was noted that these technologies also create economic opportunities, as they are targeted at meeting global needs.

"The scale of work that needs to be done to reduce the carbon impact of homes is vast."

Fflur Lawton, smart energy GB

Home heating

Overall, energy in the home emerged as the area hardest to decarbonise, because as well as the need to change to low-carbon heating it encompassed domestic energy efficiency, embodied carbon in buildings, and even the need for consumers to grapple with more complex energy tariffs. In a single example of the complexities of making homes more energy-efficient, one respondent noted that consumers' may not be able to take action as simple as installing energy-efficient windows if they were in a conservation area. Making the whole suite of changes required was a 'vast' undertaking and one with a high potential to disadvantage customers least able to absorb higher costs or a more complex landscape.

Hydrogen was most often suggested as one solution to the need to decarbonise home heating, having the benefit that in most cases it would require no major change in end-user behaviour. However, the need for local solutions such as heat networks would make co-ordination necessary (see Q9).

"A large proportion of society will lack the capability to plan for and implement the changes required in their homes."

Kathryn Porter, Watt-Logic

Other sectors

Alongside these hard to decarbonise areas, respondents also added:

- Process emissions
- Manufacturing
- Plastics production and use
- Enteric emissions from livestock
- Agriculture
- Embodied emissions

Among the solutions offered for process and manufacturing emissions, the need to find new low-carbon options to replace existing raw materials was suggested. Other respondents saw hydrogen as a practical solution to replace fossil gas, and they wanted investment in CCS that would provide a disposal route where carbon dioxide emissions could be captured directly.

Broad issues

The costs of the decarbonised options should be supported so they can compete with high-carbon options and, crucially, allow for technology rollout and cost reduction.

Among the most urgent new technologies, hydrogen came across as the most important energy carrier and one that could be used to address a variety of across hard to decarbonise sectors and uses. The investment in hydrogen also meant the Government should continue to invest in CCS, both to allow for the rollout of hydrogen and to decarbonise industrial processes directly.

Policy recommendations:

- Support the hydrogen economy for use in transport and home heating.
- Support CCS in conjunction with the hydrogen economy and to tackle process emissions.
- Support research into alternative raw materials with a lower carbon footprint.
- Conduct engagement with domestic consumers so they can make informed decisions about energy in their homes and about more complex tariffs.
- Educate consumers about the carbon implications of their transport and heating choices.
- Use standards and carbon assessments to bring down embodied carbon in buildings.

Q.9: How should the efficiency, effectiveness and cost of decarbonisation be assessed?

89% of respondents answered this question.

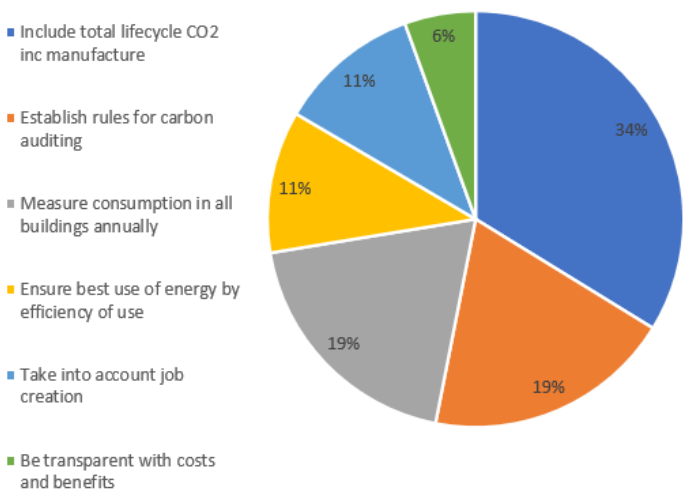
A majority of respondents (53%) suggested that total lifecycle CO2 should be used as parameters for measuring the effectiveness of carbon saving and that rules for measuring emissions should be agreed.

One proposed is that counterfactuals should be based not only on today's levels, but against future scenarios if various alternative paths are followed, including not decarbonising so that consumers can see the effect on future bills.

A further 19% stated that consumption and emissions should be measured regularly to compare with previous years, and a further 11% want measures to ensure efficiency measures are adopted.

Other respondents proposed that job creation should be a measured factor and that transparency on costings must be maintained. The latter comments were specifically targeted at information given to the public about features, costs, behavioural changes and disruption that they may need to endure when implementing changes to appliances.

A similar theme was implied by a respondent who advocated guarantees and effective communications regarding product certification, trustmarks etc. and finally one respondent stated that costs will be outweighed by the benefits of decarbonisation.



"I am aware that [carbon auditing] is a devilishly difficult area and perhaps the Government could take a lead in bringing together such companies to be part of the debate on setting standards"

"Political acceptance will be key to de-carbonisation, but obscuring the costs, as has so far been the case, will risk a political backlash at a point where value delivery is sub-optimal. It is also un-democratic to seek to hide the impact of policy decisions from voters."

Kathryn Porter Watt-Logic

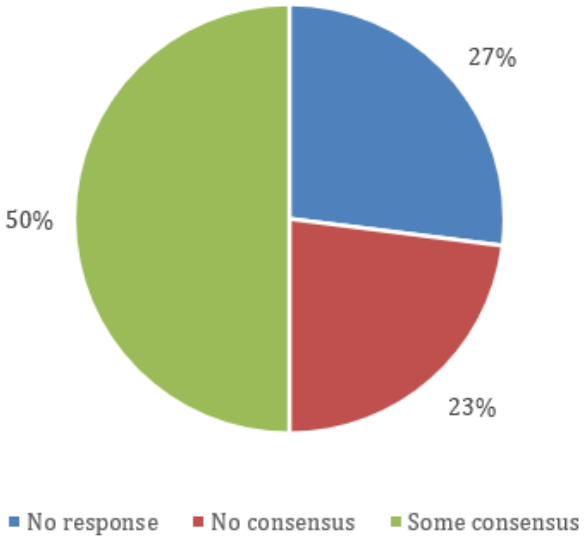
Policy recommendations:

- Establish a working group to agree the method of calculating carbon emissions throughout the lifecycle of the product / project.
- Create policies to incentivise CO2 reduction.
- Ensure that PR material is fair, balanced and transparent.

Q.10: In what UK Policy area do you believe there is cross party consensus?

73% of respondents answered this question.

The 2050 Target Amendment to the Climate Change Act 2008 achieved a cross party consensus that the UK's target will be to bring all greenhouse gas emissions to Net Zero by 2050 and restrict global warming to within 2°C above pre-industrial levels, as per the Paris Agreement. The recently published reports from the Committee for Climate Change, the Government's Ten Point Plan and its Energy White Paper provide a clear steer with regards to our Net Zero ambition. While each have attracted general support, publicly and politically, there is a general feeling from respondents that we must increase momentum and try harder in respect of following wise words and sentiment with action. Many offered advice with respect to next steps.



Responders believe there to be cross party support for:

- Driving the closure of coal-fired power stations, investment in nuclear, increased local generation at distribution network level and storage, and our ambition for new technologies such as CCUS and Marine Energy.
- Encouraging the use of geothermal energy, domestic heat pumps and insulation of dwellings highlighting the importance of improved energy efficiency standards to support the decarbonisation of heat and to reduce energy consumption.
- Hydrogen including the development of "green" hydrogen, produced from renewables to support the decarbonisation of heat and electrification.
- The adoption of SMART technologies, the move towards electric vehicles and investment in the required network infrastructure at a national and local level.
- Green jobs and infrastructure to help deliver Net Zero.

There was a wide range of views relating to additional action, including:

- A request for clarity as to what the Net looks like in Net Zero.
- A plea to get on with delivery.
- Sustainable and ethical sourcing of minerals to build the batteries required to power electric vehicles.
- Linking Government departments to demonstrate a whole system approach with common targets and deliverables.
- In response to CoViD-19, a grant offered to those with respiratory illnesses to upgrade their home's insulation. Upgrades would also contribute to the overall environment and the Government's zero carbon targets.
- Support for energy research, innovation, and demonstration projects at a regional scale, which will create jobs, new skills and attract investment.
- Help and support UK foundation industries to decarbonise, remain competitive and secure foundation industry jobs that are key to deliver Net Zero.
- Further protection for UK manufacturing by considering Carbon Border Tariffs or similar schemes to ensure that UK manufacturing remains competitive while decarbonising at a greater rate to other countries. With focus on those industries most at risk of carbon leakage.

For those less sure about the level of cross-party consensus there was also a degree of scepticism in that whilst the UK has a coherent policy this remains, at present, only words.

Policy recommendations:

- Take actions, not just words.
- Start with immediate measures, such as Planning and Building Regulations.
- Treat Net Zero with the same degree of urgency as CoViD-19.
- Define what Net Zero actually means.

Q.11: What UK Policy area do you see controversy that requires intensive policy renegotiation?

71% of respondents answered this question.

Respondents had suggestions across a wide range of issues that fall into the following categories:

Requests for clarification for the direction of travel

- Long-term future for and impact of the use of Biomass, Hydrogen, CCUS, increased Offshore renewable deployment and Nuclear technologies in the energy mix and future options for achieving our decarbonisation of heat aspirations.
- There was also concern about their impact on the environment and infrastructure without an urgent review and update to the current planning regime that has not been updated to be in line with the UK's Net Zero commitment, as legislated via the amendment to the Climate Change Act 2008.
- In addition, decisions to support the harmonisation of standards and compatibility of low carbon hydrogen with those used within [the EU, and any other] potential export markets for green/low carbon hydrogen. The Carbon footprint of blue hydrogen must include all-natural gas unabated production emissions. Carbon border adjustments policy needs to be developed for embedded emissions in imports/exports.

Guidance on how decarbonisation is funded

- To remain competitive Energy Intensive industries state that they cannot easily pass decarbonisation costs through to the customer.
- Others question future roles and responsibilities. Electricity suppliers at present are responsible for the collection of green taxes and installation of Smart meters. Is this sustainable or appropriate?

Timescales for the transition

- What does the delivery timeline look like? Which projects will take longer to deliver? Are there interdependencies that may slow delivery of some early quick wins?

Wider societal concerns were identified including:

Education and Training

What do workforce regimes look like and how quickly can we progress in this area? The UK Government must encourage more coherent working within the energy industry and academia to coordinate the national approach to the energy transition.

There is an unresolved debate as to the merits of allowing harder to decarbonise sectors to be bailed out by the use of negative emissions technologies in the energy sector.

Michael McLaughlin, National Grid ESO

Maximising the benefit of public sector support

How do we secure benefit from the positive use of public sector support to enable higher local content as well as local jobs? This could include support for the UK manufacturing sector energy costs and build, post-CoViD-19 ensuring local supply chain security. The importance and full societal value attached to all UK jobs should also be recognised, not just 'high value' jobs.

The training and qualifications landscape must be better aligned with the Government's target of achieving as many homes rated EPC C as possible by 2035, as well as their other climate change initiatives like the Future Homes Standard.

Lulu Shooter, Federation of Master Builders

Policy recommendations:

- Clearly identified line of travel.
- Policy that establishes outcomes with timescales.
- Review of planning regime and Building Regulations.
- Make "Green Taxes" universal, instead of imposed on electricity suppliers alone.
- Clear, consistent, coherent messages from Government to help inform all.

Q.12: What actions should be taken to raise awareness on energy and the climate emergency?

80% of respondents answered this question

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Whilst some were optimistic, believing that many are beginning to understand the problem and that as the issue receives further publicity, awareness should naturally follow. Almost half of respondents delivered similar messages providing widespread support for:

- Consistent education and communication on Climate Change information to the general public providing foresight of the long-term effects of carbon, NOx and particulates.
- Clear communication of how day-to-day life will change to highlight the benefits delivered by our transition to Net Zero and how these measures will contribute to fighting Climate Change.
- A clear and simple explanation of the cost incurred in delivering the extensive benefits of the transition to Net Zero, the range of incentives that will aid delivery of a variety of solutions, expectations around delivery timescales, balanced by clear information around the cost of not decarbonising.
- Building upon the valuable work undertaken by the Citizens Assembly. Top of the priority list of principles that should underpin the UK's path to Net Zero was 'informing and educating everyone'. In the space of energy efficiency retrofit, improving understanding of what retrofit is among consumers, together with why it is needed, will remove barriers to delivering retrofit at scale.
- Information that will provide an opportunity for consumers to understand the links between energy consumption, consumer empowerment and climate and energy justice.
- Identification of new approaches that provide a swift and just solution.
- Regular updates to include relevant data, wider regional and local energy issues. CoViD-19 has taught us that regular public information updates are important. This 'Climate Crisis' should be treated in the same manner with transparent, science and engineering-led policy coupled with increased media briefings.
- Educate including regular update delivery targets and call out the slow adopters.

Several respondents suggested merit in the creation of independent bodies to support and evaluate a whole systems approach, including:

- The impact of policy, economy and technological solutions.
- Opportunities provided by the adoption of best practise approaches for sustainable taxation, finance and investment in order to promote positive attitudes.
- The assessment of submissions from manufacturers of the carbon footprint of their products supported by the creation of a simple colour-coding standard to assist consumers to make informed merchandise choices.

There were several calls for Government together with Regional and Local Authorities to lead by example. Respondents suggested that:

- Hospitals and public buildings should be modernised to highlight a commitment of the transition to Net Zero. This would also provide an opportunity for public consultation, engagement and education via public information campaigns to demonstrate a range of technologies supporting regional and local heat decarbonisation strategies thus ensuring that local residents are aware of the heating solutions that are under consideration and deliverable in their homes.
- The funding of local practical solutions and/or businesses to implement energy efficiency measures.
- By working with energy providers this provides an opportunity, as we move towards time of use tariffs, to develop a broader education strategy to ensure that consumers understand this change. Consumers should not be expected to actively shift their energy use, instead they should be made aware of affordable, possibly subsidised, aggregator services and storage options to move their demand for them.

It's actually a climate crisis; emergency means immediate threat to life, limb and property!
Regular updates to the public of where we are in terms of reaching Net Zero and how that is being achieved
Cllr Philip Bell, Aberdeen City Council

Policy recommendations:

- Education. Build on the work of the Citizens' Assembly and set out why doing nothing is not an option
- Communication. CoViD has taught us the value of regular updates and information.
- Collaboration. Minimise unnecessary and expensive duplication through collaboration to ensure that carbon emissions are reduced wherever possible and as soon as possible.
- Demonstration – lead by example using the parliamentary estate, as well as other public buildings.

THE 2021 AGENDA

Q.13: What should the UK do differently, post Brexit and post CoViD-19

86% of respondents answered this question.

Practical Actions:

Timing is everything

- Take decisive action this decade to put the country on course for Net Zero by 2050.
- Sustain momentum to deliver the policy roadmaps and legislation to support implementation at pace.
- Listen to industry and support developments that can be implemented now.
- Streamline the planning process to speed up implementation timescales.
- Uphold Green House Gas reduction commitments.

Build on emissions reductions delivered whilst working from home

- Its success may help companies to reduce their carbon footprint through dynamic partial work-from-home policies and reduced travel requirements.
- Address the policy balance between transport and remote working, heating and technology.
- Continue to encourage essential only low carbon travel.
- Encourage Public transport companies to make commuting on a flexible basis more cost effective.

Do not waste opportunities to enhance existing

- Digital infrastructure, a key enabler and focus of investment.
- Education opportunities to provide skills for a green future.
- Renewable energy sources and infrastructure to service electrification of transport and heating.
- Work undertaken by local government with greater devolution of funding, powers and flexibilities.
- Utilisation of regional resources to identify the performance gap of new build housing and retrofit fabric improvements, perhaps using the energy hubs as a pilot? This will provide independent evidence to focus on driving standards up throughout the construction sector.
- Review and update the auctions processes to support construction of pumped hydro renewable energy storage and electrolyser capacity installed within wind and solar farms.

"The need to deliver new 'green jobs', particularly in areas that have been most impacted by CoViD-19, is more urgent than ever and demands an acceleration in pace of the transition."

Promote UK plc:

- Promote UK leadership in clean technology and the elimination of waste.
  (nuclear, energy efficiency, the building of on and offshore wind facilities (fixed and floating), hydrogen, fuel cell and micro-grid capability, hydrogen refuelling stations, high tech manufacturing of zero/low carbon technology, engineering and manufacturing and enhanced cross-industry collaboration.)
- Market UK technology and techniques, to ensure that developing country governments will rely on the highest possible industry standards.
- By investing heavily in Research and Development including fully sustainable recycling, low carbon transport design and engineering, manufacturing processes and agriculture.
- By demonstrating the retrofit of post combustion carbon-capture units to existing fossil fuel plants.

"Provide an example to the world, we started the industrial revolution and we need to take it to the next level. There is business and profit to be made and we need to be at the front and not following."

Political Response:

Operate in a SMART way

- The UK needs to review existing policies to bring them in line with our climate targets and be fully coordinated across Whitehall, the devolved administrations, cities and local government.
- Create a 30-year plan, backed by successive Governments and communicate clearly so that it becomes the norm to want to change, over an achievable time scale.
- Due to the long-term nature of the task, create a Department for Net Zero with cross party support, key national, regional and local input.
- Make a decision on the move to low carbon gas soon, then industry and academia can work together to produce the products and service to match the energy sources moving forward.
- Use CoP26 to support international development and deployment of low carbon energy systems using hydrogen and electrification.
- Minimise unnecessary and expensive duplication through collaboration to ensure that carbon emissions are reduced wherever possible and as soon as possible.
- Think local and deliver local solutions, including localised production, to solve overall national problem.

Communicate clearly

- Establish a clear plan for a realistic Energy Transition to ensure the whole country understand what needs to be done.
- Establish a concerted, short and long-term campaign. Identify and publicise the wins. Keep people's interest and commitment with fresh but consistent messaging.
- Make good climate behaviour the norm in the hearts and minds of upcoming generations. Have strong, involving and consistent messaging in schools and higher education, from early years onwards.

Finance

- In the wake of CoViD-19, there is a unique opportunity for major green spending that will immediately boost GDP.
- Link all new Government incentives and tax breaks to improving energy consumption and Climate Change.
- Set and maintain clear long-term policies to help investment in low carbon technologies.
- New energy technologies and the infrastructure required in homes, businesses, for transport, will create new jobs, innovation and encourage investment.
- Take measures to prevent a health crisis by supporting investment in healthier homes.
- Reduce the VAT on the purchase and installation of energy saving and energy waste reduction measures.
- Make access to low carbon grants and finance, for both investment and innovation, more widely available and plentiful, in order to address the scale of the issue and deliver against existing low carbon policies.
- Focus on investments and technologies that ensure a high level of self-sufficiency in our energy industry. This will also deliver greater export opportunities as we position ourselves as a world leader.
- Invest in high-quality lifeline and public services such as health and transport.
- Assess how energy costs are distributed across industrial and manufacturing sectors to maintain international competitiveness.

Levelling up to support delivery of a fair and just transition

- Remove social policy from energy policy. Fuel Poverty is Poverty.
- Seek to capture the health benefits of using green technologies and reduce inequality.
- Smart meters are already improving experiences for those on prepay, in fuel poverty or in other vulnerable circumstances. 70% of people with a disability, mental health condition or on low income say that having a smart meter has made managing their energy easier, and polling by Citizens Advice shows that people on prepay are less likely to self-disconnect if they have a smart meter installed. The CoViD-19 pandemic has highlighted the importance of ensuring no one is left behind on the journey to Net Zero.
- Commitments should span beyond the fossil fuel sector to include mainland regions and island communities that must also undergo a 'just transition' towards new production, industry and energy consumption models, a major driver for place-based strategies to ensure that no one is left behind. Create high value jobs within the green economy of the future to dispel inequalities across the UK.
- Commit to the level of resources for transitioning energy as other nations such as Germany and France.

Policy recommendations:

- Review existing policies to bring them in line with our climate targets and be fully coordinated across Whitehall, the devolved administrations, cities and local government.
- Establish a clear plan for a realistic Energy Transition to ensure the whole country understand what needs to be done.
- Link all new Government incentives and tax breaks to improving energy consumption and Climate Change.
- Remove social policy from energy policy. Seek to capture the health benefits of using green technologies and reduce inequality.

Q.14: Agenda items for CoP

81% of respondents made a response to this question.

Of which the majority (59%) were actions for UK to undertake before CoP to act as a role model for success. The remainder had a global perspective.

Responses ranged from general thoughts to specific technology solutions, but hoped for a clear tangible outcome, with all parties signing up to an agreement to act in specific ways.

Of the global suggestions, most were concerned with the urgency of establishing a clear agreement with milestones to deliver CoP25 (Paris), as well as progressing sustainable aviation and marine sectors, first considered at CoP22 (Marrakech).

Calls were made to set a clear date to stop using fossil fuel, quantified carbon targets and pricing, global hydrogen production, whilst demonstrating how a just green recovery can be an economic benefit.

The remainder focussed on how the UK can demonstrate leadership in decarbonisation (especially heating and the gas grid), by fast tracking CCUS and hydrogen production, using CoP26 to provide a showcase for UK R&D, technology and to show leadership across the five themes.

To make the most rapid transition, the UK was encouraged to legislate for Net Zero, to make clear actions and commitments on the Energy White Paper, refurbish homes in a National Retrofit Strategy and enable local renewable energy use.

"Ensure green hydrogen transport for visitors shuttling to Glasgow hotels, maybe the nearby Whitelee wind farm visitor centre." Green Hydrogen Council

"To establish the UK as a hub for energy innovation and high-quality manufacturing." EUA

"Investment in a long-term, ambitious National Retrofit Strategy represents a potential legacy... not only for the current administration but also the UK."
Federation of Master Builders

"It is important that the UK backs up its world leading Climate Change legislation (talk) with funding commitments and policies (action) that support making the goals set realistically achievable."
TUV SUD National Engineering Laboratory

"CoP26 is a golden opportunity for the UK to demonstrate to the world how it is taking the climate emergency into the heart of our transition to a green economy."
Hydrogen Accelerator

Policy recommendations:

- Define objectives and measurement criteria for successful outcome.
- Establish a directorate to focus on energy and Climate Change - applies to all countries.
- Clear actions and commitments on what's set out in the Energy White Paper, with evidence of real activity prior to the COP.
- Define what is expected for legacy.

Appendix I: The Summaries

Summaries of Key Points as provided by respondents.

Organisation	Summary
Air Products Ltd	The role of government is to chart a course that simultaneously achieves the following objectives: 1) Achieve the UK's climate objectives while providing energy-intensive industry with the time and support to adapt with new low-carbon production processes. 2) Make use of the opportunity offered by the required economic response to CoViD-19 to encourage investment in renewable and low-carbon energy. Specifically, encourage investment in domestic renewable and low-carbon energy while recognising the role to be played by imported renewable energy e.g. in the form of hydrogen. 3) Develop a policy framework to achieve these objectives with the minimum of market distortion, including by recognising the importance of entire industrial supply chains including by avoiding loss of the benefits of outsourced production of industrial gases. Achieving the above objectives will require consultation with existing energy-intensive manufacturers that can share extensive technical, commercial and operational experience.
Crapper and Sons Landfill Ltd	A focus on local production and sustainability, drive localism as the sustainable alternative to globalisation. Make the investment available to develop the techniques then perfect and share with the world.
Drax Group plc	In order to meet the Net Zero 2050 target the UK must undergo a fundamental transition to decarbonise all sectors of the economy. Drax is developing two large scale infrastructure projects which will play a vital role in decarbonising the UK economy. The first of these, Bioenergy with Carbon Capture and Storage (BECCS) will produce 'negative emissions' which will be vital to decarbonise 'difficult-to-decarbonise' sectors of the economy such as aviation and agriculture. The second, pumped storage hydro will provide both storage and a range of system support services such as inertia, voltage control, and frequency response to the grid helping to support the deployment of intermittent renewable technologies. The lack of market frameworks in both negative emissions and for storage/flexibility technologies means that investment in BECCS and Pumped Hydro Storage technologies cannot take place unless policy intervention supports the development of these markets. We believe BEIS and the wider UK government should look to support the rollout of these technologies, given their vital role in Net Zero, through policy intervention to improve market frameworks.

Dunphy Combustion Ltd	We must change our use of base energy for the generation of thermal energy over the next period of 10 - 20 years, though not be easy as the cost of the equipment used within our environment is not small and has large end user considerations for long term consistency and availability of a fuel / energy source as once in place this needs to be reliable and consistent in all aspects. The issue on any energy input is the large volumes required on a continuous basis for the large energy demands within the food, process and healthcare environments (for example) we operate within. We must assess the whole picture, generation to emissions and assess in terms of whole life considerations for the end user energy demand to the effect on the environment from start to finish. A large centralised or localised considerations, I believe not it needs to encompass all factors, there is a requirement around small and large towns / cities to very rural environments and one size does not and will not fit all, especially at the start. This, you could say, is akin to the electric car for town driving or country wide "Salesman" type driving.
Energy and Utilities Alliance	The transition to Net Zero heating will be a key aspect of the strategy to reach Net Zero across the economy by 2050. Bringing consumers along this journey will necessitate changes to the way they heat their homes and other premises. We believe that empowering consumers to make choices for their own home will deliver far better outcomes for all concerned than 'picking winners' and specifying certain types of appliances they must use. To this end, the Government should continue to push forward with assessing the feasibility of a hydrogen gas grid and the associated work that goes alongside this. The UK has a window of opportunity to become a world leader in the fields of hydrogen production, transmission, storage and usage and of carbon capture, usage and storage. These technologies could play a critical role in the decarbonisation of many sectors and could protect and add to the high skilled jobs in our energy sector. We await the forthcoming Hydrogen Strategy and hope that it will include further commitments to the creation of a hydrogen economy for the UK and much-needed detail on the timeline for switching our gas grid to this clean and sustainable fuel.
Durham Energy Institute	Work with the second law of thermodynamics, make best use of all energy, deliver local solutions on heat and power, think about and minimise impact including emissions, consider legacy for following generations.
Enertek International Ltd	There is no single solution to decarbonisation. There is a need and an opportunity for many different energy sources and technologies. Individuals across the world need to be conscious of local solutions and preferences, and guided by fair and reasonable policies, perhaps policed by fiscal incentives to make the economy stable. There is a need for decarbonised gas and electricity, for transport, heat and power. For example, there is an opportunity for boilers and heat pumps, each being suitable for specific applications, but not one to replace the other. Throughout the world solutions will have to be complimentary, not competitive but most of all, affordable to maintain social support and engagement.

ENVOI Limited	The following best encapsulates the key elements of the answers given above: • More Engagement and advice of the energy and industry sector experts • Appropriate metrics and formula to measure carbon footprints and compare to identify the highest Carbon footprint generators (including a simple Carbon measure) • A clear but cost-effective and sustainable Energy Transition plan for the whole energy supply chain over an achievable time frame (20+ Years which will need to incorporate the efficient use of hydrocarbons until affordable new technologies, carbon sequestration, alternative sources and associated new infrastructure can be evolved) • Simple understandable marketing of the plan for complete supply chain and population 'buy in' • Tax penalties and tax incentives to help encourage and achieve decarbonisation with 100% recycling of tax revenues to accelerate and incentive the whole process • Dedicated research and education programmes to facilitate and sustain an effective transition • An ambition vision of leading the World Energy Transition and Resource Recycling with future exportable expertise, engineering and services.
Federation of Master Builders	The FMB is calling on the Government to adopt the Construction Leadership Council's National Retrofit Strategy. Without steps to decarbonise our homes, the Government will not meet their Net Zero carbon targets. The Green Homes Grant scheme is a step in the right direction, but it is insufficient. This Strategy will provide the leadership that is needed to provide businesses and consumers with confidence and unlock retrofit at scale. The Government should also bring forward the full £9.2 billion committed in their manifesto to stimulate the market through a range of policy levers. Investing in retrofit offers a range of benefits including creating hundreds of thousands of jobs and supporting the levelling-up agenda, as well as addressing health issues associated with poor quality housing. An ambitious retrofit programme will position the UK as a global leader in the low carbon economy ahead of CoP26. (Reference: https://www.constructionleadershipcouncil.co.uk/wp-content/uploads/2020/12/CLC-National-Retrofit-Strategy-final-for-consultation.pdf
Fluor	Fluor is a global engineering, procurement, construction and maintenance company that designs and builds capital-efficient facilities and provides innovative solutions for its clients. Fluor has knowledge and experience in renewable fuels/energy, biofuels, environmental compliance, offshore wind farms, thermal power, nuclear and 30 years of experience in carbon capture. We have formed successful public-private partnerships. The UK committed to the Paris Agreement by amending the Climate Change Act 2008. We can start taking positive steps towards Net Zero by retrofitting carbon capture units to existing fossil fuel plants, shifting towards new "Net Zero" facilities, such as renewables or nuclear power. Incentives such as reduced rate loan schemes for capital expenditure, tax incentive schemes or assistance with planning for decarbonisation processes would help build a business case for capital investment. This could avoid the requirement for a controversial carbon tax or penalties scheme which could make the UK less competitive in the international energy market. For new technologies, such as blue and green hydrogen, seed investments, grants or loans may aid the path to decarbonisation by providing the start-up capital for projects and reducing some of the risks involved with understanding, developing and scaling up new technologies into fully operating plants.

Glass and Glazing Federation (GGF)	The existing housing stock is responsible for 40% of the UK's CO2 emissions. • As much as 24% of a property's heat energy can escape from a property's inefficient glazing (windows and doors). • The vast majority of the 100 million inefficient windows and 20 million doors were fitted pre-2002 and long before the technological revolution in the glass, glazing and fenestration industries. • The GGF as the largest and main representative organisation for the glass, glazing and fenestration industries, asks for Government to use these industries in its drive towards Zero-Carbon 2050. To do this a 10-year energy efficient home improvement scheme is required that will place glazing (replacement windows and doors) front and centre for homeowners when upgrading their properties and contributing to zero carbon targets. As outlined above, such a scheme would motivate homeowners, grow local economies, and create new businesses and thousands of jobs. In doing so it will also help the environment by significantly contributing to the Governments targets for zero carbon 2050.
Green Hydrogen Consulting Ltd	The problem is not lack of renewable energy but lack of energy storage! We need grid scale energy storage by two methods (a) pumped hydro, and (b) green hydrogen pipelines which store and deliver massive quantities of green hydrogen to consumers. Renewable Energy offers the UK an opportunity to harvest almost limitless wealth in a sustainable way – with adequate green hydrogen production using electrolysis and corresponding green hydrogen storage, best combined also with large scale pumped hydro energy storage to handle electrical energy storage, we can capture our bad weather and use it for societal needs and indeed we can export to the whole world our bad weather in the form of 100% sustainable zero emission green hydrogen transport fuel. Renewable energy is delivered to us for free and pure renewables can fully power all our needs including electricity, transport, heat, including agriculture and industry. The Renewable Energy sector will also create jobs in other sectors such as a major national construction programme of pumped hydro energy storage dams and reservoirs, balanced and reasonable planning which recognises that we can and must do this, and by provision of cheap reliable power and heat to industry and domestic consumers.
Hitachi ABB Power Grids	Decarbonisation requires a holistic approach, considering all parts of the energy, transport and industrial ecosystems. Failure to do this will decrease the pace, reduce the flexibility and increase the cost of decarbonisation. For example, increasing EV demand for electricity without increasing renewable generation will not maximise CO2 reductions. Increasing offshore wind capacity without both increasing the capacity of the, too often overlooked, electrical grid and making the grid smarter, to handle more intermittent supplies, will respectively result in curtailing renewables or risking grid reliability. Electricity is the backbone of our energy system and requires transformation across every part of the value chain, (generation, transmission, distribution and consumption). Significant short-term investment (to double capacity) is required, although in the longer term there will be a net cost reduction across the energy system. Investment is needed throughout the UK and will create many thousands of jobs, facilitated through investing in skills and key decarbonisation technologies, (to build long-term competitive platforms for UK industry). The pace, cost and effectiveness of transition are highly dependent on policy and creating an attractive energy market to private investors is essential. Specific and firm (i.e., long term) energy policies along with a credible actionable roadmap that has cross party, cross industry sector and investor support are urgently required.

Hydrogen Accelerator	Hydrogen technologies will play a pivotal role in the UK achieving its climate targets of becoming Net Zero emissions by 2050. A coherent policy of incentivising the use of green hydrogen and a fiscal framework to deter further investment in fossil fuel-based industries is essential in providing the private sector with confidence to invest in green technologies. Significant investment from the UK government is required to de-risk early-stage adoption and innovation of hydrogen-based technologies. This will encourage both public and private sectors to invest in high value hydrogen assets and ensure competitiveness through total cost of ownership. Through economies of scale, capital and operational costs will come down to those of incumbent technologies, showing this is a viable route to decarbonise various sectors including heavy duty transport, industry, domestic and commercial heating and agriculture. A clear message from the UK government regarding the climate emergency will bring the general public onboard on this journey to Net Zero and bring about a modal shift in behaviour. The combined benefits of reducing air pollution, limiting global warming and utilising skills and expertise through diversifying existing industries provides an ideal opportunity to level up the country and tackle growing levels of inequality.
Independent	If we accept that the Committee on Climate Change has provided the best view of the path, we must adopt to achieve Net Zero then I see no problem in supporting its holistic approach across societal, industrial and behavioural change. The Government has an opportunity to act as a facilitator for delivery, however the reality of a fixed term Parliament will not support this necessarily long-term project. It is therefore paramount that we engage across the House to ensure cross party support to establish a Department to oversee delivery of Net Zero as a United Kingdom project, with key National, Regional and Local inputs. Department should have the power to call in expertise from all affected interested parties, i.e., those who will ultimately benefit, and share the costs of the transition, whilst ensuring this is a project driven by the science, relevant technologies, business and academic leaders whilst understanding and supporting the needs of the nation.
Local Government Association	With at least 230 councils declaring a climate emergency, and nearly two thirds of councils in England aiming to be carbon neutral 20 years before the national target, councils are well placed to support Government to meet its Net Zero carbon ambitions by 2050. Since Net Zero can only be achieved with decarbonisation happening in every place across the country – that's every household, community and local economy – it will require local leadership where councils as democratic organisations can ensure that the benefits are felt by all. The Government should work with councils and businesses to establish a national fiscal and policy framework for addressing the climate emergency. This framework should outline responsibilities for the Government nationally – for example, aligning the regulatory system, including the planning system and national tax incentives – and the local responsibilities, together with a commitment to cooperate with local public sector bodies. There should be a process of engagement between central and local government and industry to enable councils to fulfil their role to translate a national framework into transformative local plans that deliver on this agenda and invest in solutions for a green recovery and future.

Mineral Products Association	Mineral products are essential to our everyday life. Although they can be carbon intensive to produce, they offer possibilities to save energy and reduce emissions in use. The decarbonisation of mineral sectors can be costly and, until the rest of the world catches up with the UK and international competitors face the same level of cost, decarbonisation puts the competitiveness of these sectors at risk. Mineral products, and energy intensive manufacturing in the sector, face the cost of their own decarbonisation and bear the cost burden of decarbonising energy sectors. The UK has some of the highest industrial electricity prices in the world. This is likely to be exacerbated by the expansion and reinforcement of networks that need to double in capacity to accommodate the decarbonisation of other sectors that switch to electricity and adapt to more intermittent and dispersed generation. Gas prices are also set to rise as the Green Gas Levy is introduced and Climate Change Levy is increased. Many gas consumers, like the UK lime sector, currently have no alternative, cost competitive, low carbon, clean-burning fuel. Government must provide support for the deployment of industrial CCUS, reassess the distribution of energy costs and accelerate the deployment of national low carbon heat and CO2 capture/transport infrastructure.

National Grid ESO	• Reaching Net Zero carbon emissions by 2050 is achievable.
	  - However, it requires immediate action across all key technologies and policy areas, and full engagement across society and end consumers.
	• When assessing the cost of reaching Net Zero we should consider the benefits it will produce for consumers as well as the cost of taking no action.
	  - The ESO's Future Energy Scenarios show a negligible difference in cost between reaching Net Zero before/by 2050 and missing this target.
	• Support is needed for the expanded use of data and negative emissions technologies, which are critical to the delivery of Net Zero.
	  - Data will allow consumers to access a more flexible energy system which will reward them for shifting behavioural patterns.
	  - Negative emissions technologies will allow the energy sector to go beyond Net Zero and will help contribute to the decarbonisation of the economy as a whole by balancing out the emissions from harder to decarbonise sectors.

Offshore Renewable Energy Catapult	Offshore renewables can play a greatly increased role in energy supply, energy exports, and related employment and wealth creation. To realise the opportunity, energy policy should be based upon more long-term, integrated, planning, and immediate action should be taken to enhance innovation programmes to build on our technology lead, attract inward investment in our supply chain, in offshore wind, and marine, technologies, and to provide revenue support for accelerating cost-reduction of key technologies, such as floating offshore wind, marine technologies, and large-scale green hydrogen generation. Substantial public investment in offshore renewables technology, projects and infrastructure can provide an immediate economic boost, and assist the post-CoViD, post-Brexit economy.

Power Circle Ltd	I. Meeting carbon targets and keeping energy affordable is a big challenge. A study for National Energy Action has projected that, on reasonable assumptions with today's solutions, getting to Net Zero will place up to 2½ million more people into fuel poverty and add between £200 and £800 per year to household energy bills. New approaches like ours are needed to meet the challenge. II. We need to shift to 'whole life economics' from capital cost as the primary energy option appraisal criterion and have the business models in place and accessible and trustworthy to support that shift. ESCO (energy services company) business models facilitate that shift. III. Trust in utilities is low. ESCO approaches need long term customer agreements. Scalable social enterprise-based models such as ours can deliver the trust needed for entering the long-term customer agreements needed to finance low carbon investments. IV. Building Smart Local Energy Systems will be a key means of avoiding an unjust transition and delivering all four 'D's of the Energy Transition, if done in the right way: Decarbonise, Decentralise, Digitalise, Democratise. The last of these can be facilitated by social ESCO/social VPP (virtual power plant) models such as ours.
Roberts Durur Ltd	The substitution of hydro-carbon fuels with electricity in industries operating process steam and hot water boilers. These energy intensive boilers are found all over the country in many different sectors, from hospitals to distilleries. Currently, the heat required is provided almost exclusively using hydro-carbon fuels. Electricity could be used instead but is prohibitively expensive e.g., min. 4.5 x cost of natural gas. Wind farms are frequently constrained, mainly in Scotland. This currently costs £100+M p.a. in subsidy. It also represents the potential to avert up to 0.75M tonnes CO2 p.a. If a market (entry via permit) were created to allow this otherwise constrained electricity to substitute for hydrocarbon fuels at a competitive price, a very significant part of this potential could be realised. Other industrial sectors may also be able to utilise such a market. The boiler technology is off the shelf and a full scale, first generation unit would simply require ordering and could be in operation in approximately six months. In operation the boilers would automatically switch between electricity and hydro-carbon fuels as required. National Grid would need to develop a real time switching capability. Please ask if further information is required.
Scottish Hydrogen & Fuel Cell Association	Green hydrogen produced from offshore wind in the North Sea can help deliver Net Zero and offers huge economic potential for the UK and Scotland in particular. Hydrogen can steadily replace dwindling oil and gas reserves and enable us to become a major exporter of clean energy. This offers a Just Transition with secure jobs and security of energy supply. The use of hydrogen fuelled vehicles offers the convenience and user experience very similar to petrol and diesel vehicles, but without emissions. Domestic heating is an essential need for all, and hydrogen can replace natural gas central heating, which is attractive to many consumers who are reluctant to make significant lifestyle changes. The UK's coordinated work in safety evidence building around hydrogen for heat is an exemplar to the rest of the world, and as a result our hydrogen know-how is becoming widely respected. Scotland is a leading location for deployment of hydrogen in low carbon energy systems. The hydrogen bus fleet in Aberdeen, local hydrogen energy solutions in Orkney, Acorn in St Fergus and the SGN H100 development at Methil are leading the way and 'learning by doing'. Please come to Glasgow for CoP26 and see for yourself.

South East Midlands Local Enterprise Partnership (SEMLEP)	This response has been made by the South East Midlands Local Enterprise Partnership (SEMLEP) which covers the fast-growing areas of Bedfordshire, Milton Keynes and Northamptonshire. The SEMLEP area has particular clean growth strengths with regards to the Future of Mobility, with cutting-edge work taking place locally on the decarbonisation of HGVs and aircraft. There is also strong local commitment, from the LEP, local authorities, businesses, universities and other stakeholders, to the decarbonisation agenda more broadly, with significant investment taking place into renewable energy, electric vehicles, and more energy-efficient buildings. However, many challenges remain. In particular, and as emphasised in SEMLEP's Energy Strategy, current energy regulation acts as an obstacle to investment in distribution network infrastructure ahead of need, which constrains low carbon development in certain instances. There are also barriers to business investment in energy efficient measures, including: businesses operating on leased premises; uncertainty around – or unavailability of – flexible capacity trading schemes; and a mismatch between the timing of costs and savings in many instances, with relevant measures often involving high upfront costs, while savings take a long time to be realised.
Sheffield University	The drive to Net Zero is an admirable ambition, however a clear policy is required on how this can be achieved within the ambitious timeframe. For this to be effective, and accountable, the policies must have cross-party support across the usual parliamentary lifetimes. Full cradle to grave (or cradle) lifecycle assessments are needed to ensure that the policies do not create unintended consequences in other areas. It is possible that a drive to electric vehicles may be hampered by available low-carbon energy sources and as a consequence of policy implementation may create transportation underclasses. Public acceptance of new energy policies will be required as they will undoubtedly lead to enquired behavioural changes. The removal of DECC is seen to be an unfortunate move as the focus is now in BEIS which makes the policies are seen as financial rather than environmental. At very least, efforts should be made to include DEFRA as a key partner in policy development and preferably form an independent Department for Climate Change Mitigation with an independent scientific, economic and behavioural group established similar to SAGE. This should be enacted before CoP26.
Shetland Islands Council	The ORION Clean energy Project can supply 10% of the UK national hydrogen requirement by 2040 if we have access to adequate levels of government funding for the essential research and feasibility studies required and we can build strong collaborative working arrangements with energy sector developers and investors. The subsequent development of industrial scale green hydrogen for national use and for export would generate over £5Bn of annual revenue with a strong return to the exchequer and provide work for around 2000 people in production and the supply chain.
Smart Energy GB	Over 15% of carbon emissions in the UK come from our homes, and the electrification of heat is set to increase future energy demands in this area. Decarbonising this sector through upgrading and digitising our energy system, coupled with widespread consumer participation in demand-side response, is vital to hitting Net Zero by 2050. The challenge of meeting these increased electricity demands through intermittent renewable sources can only be achieved by reducing peak demand, by incentivising consumers to shift their energy consumption to off-peak times and through developing automation within this process for the consumer. Enabled by smart meter data, energy suppliers are already offering dynamic time-of-use tariffs, saving consumers money and making the most of low-carbon energy sources. New technologies and services which harness smart meter data will help to engage consumers in their part of the decarbonisation journey. The way we buy and use our energy is already changing, and consumers will need to make increasingly complex choices relating to how they heat and power their homes, and how to make them more energy efficient. They need to have access to reliable information to make these choices, and people across society will require different levels of support and engagement for us to meet our Net Zero targets.

TerraUrsa	We need to start with Education, then just make some sensible changes supported by experts to create an energy mix that works for key decarbonisation milestones. We must understand the decarbonisation of heat challenge quickly. I think EV's will pretty much sort themselves out.
The European Marine Energy Centre Ltd	EMEC welcomes the opportunity to respond to this timely consultation. By way of summary. • Policy reform that supports the marine energy sector can deliver 12,000 jobs and generate a £5.4bn benefit for the economy by 2040, whilst securing a £25bn export opportunity by 2050 out of a £76bn global market. • This reform should include ringfenced minima capacity in future CfD rounds, starting at AR4; a specific strike price of £250MW/h and an IPPA mechanism for early-stage technologies. • Energy policy will benefit from understanding the need for a renewable energy mix that incorporates marine energy technologies, consumer empowerment and a whole-systems approach to policy that recognises social and technical energy system impacts alike. Thus, aligning clearly with ambitions for green recovery, regional levelling-up, energy resilience and economic development. • Electrolytic green hydrogen offers great potential for UK economy decarbonisation whilst aiding to level-up coastal and island communities. • Challenges to the UK marine energy industry are primarily of political support; whilst in hydrogen challenges are regulatory. Shipping fuel decarbonisation through hydrogen, is an opportunity with potential to decarbonise the fuel sector more widely through economies of scale. • Looking towards CoP26 and beyond, the UK has an opportunity to grasp key learnings from Covid-19 and industry advice to develop a strategic, transformative vision that integrates place-based strategies; renewable energy industries with high UK supply chain content such as the marine energy industry; increased investment in R&D's "Development" and a holistic 'just transition' approach across sectors and places at the core of its energy policy, Net Zero and economic recovery strategies. • Given the times we live in, CoP26 offers the UK an opportunity to leave transformative legacy benefits across the UK, at national and regional scales. My industry colleagues and I would welcome the opportunity to meet you and Committee colleagues to discuss our views further. In the meantime, should you have any questions, please do not hesitate to contact Neil Kermode, Managing Director (neil.kermode@emec.org.uk).
Thames Water	The work we have done so far to decarbonise our energy use, through buying and self-generating electricity from renewable sources, has reduced our operational emissions by 58% - equivalent to the typical annual emissions of 80,000 cars. • The UK water sector has an ambitious plan to reach Net Zero operational emissions by 2030. For the UK to achieve Net Zero by 2050, it is vital that emissions reduction in the water sector is supported. Water companies' annual gross operational emissions comprise a third of the UK's industrial and waste management emissions. • We currently sell biosolids from sewage treatment to the agricultural industry as a low-carbon alternative to fertiliser and we plan to initiate pilot schemes to recover our operational heat and supply it to local communities. However, the carbon-offset benefits of biosolid fertiliser and heat recovery still need to be recognised by DEFRA and BEIS so they can be counted towards the UK's Net Zero target. • We are looking to upgrade our plants so biogas from sewage treatment, currently used in Combined Heat and Power, can be converted into biomethane, generating emissions reductions 7.5 times greater. By broadening the eligibility criteria for the government's Green Gas Support Scheme (GGSS), we can make biomethane production cost-effective and viable.

TUV SUD National Engineering Laboratory	There needs to be a recognition that to achieve Net Zero we need 'all the tools in the box'; we cannot back any one technology to the exclusion of others. Given the diversity of end use applications and the many different situations in which organisations and individuals find themselves, along with regional strengths, different solutions will be more or less suited to different applications in different places. Policy should recognise this. It should not seek to force solutions, but encourage innovation and learning-by-doing, whilst encouraging a transition to a subsidy-free marketplace as soon as possible, thereby allowing market mechanisms to determine the best solutions for different scenarios. Furthermore, Net Zero should be viewed not as a burden, but as an opportunity. With Just Transition principles in mind, this is an opportunity for a sustainable economy, and one which ensures prosperity for all. Not just through domestic considerations such as jobs, but through the great potential of the UK to be a major supplier of green energy to other countries, most especially through export of low carbon hydrogen.
UK Hydrogen and Fuel Cell Association	• Hydrogen is now recognised as a key component of the transition to Net Zero with many countries having announced ambitious plans for hydrogen. Without rapid and ambitious progress, the UK is at substantial risk of falling behind. • Hydrogen and fuel cells offer a pathway to revitalise manufacturing capabilities in the UK and improve the skill base for workers. The UK was a leader in discovering hydrogen and creating fuel cells, and today has several world leading manufacturers and supply chain businesses that with the right support could become global leaders and engines of economic growth for the UK economy. • UK industry is committed to investment at scale for both blue and green hydrogen production where viable commercial cases for either can be established, and we recommend that Government's low carbon hydrogen production target for 2030 be raised to 25GW. Investment is needed now to both scale up supply and stimulate demand. It should encompass and reflect the full range of opportunities for hydrogen including transport, heat, industrial decarbonisation and adaptable distributed power, and include business models and a policy framework to incentivise supply and demand and kick-start the switch to low carbon hydrogen.
University of Birmingham	1) COP proposal for the UK to set up and run (and pump prime) an international network of education energy courses between universities across the world. The challenge of reaching Net Zero requires more and more people to have a grounding in energy education - an MSc typically for one year is a good balance between breadth and depth. Funds could be secured for scholarships, and the network would facilitate vetting of courses and the matching of students and courses (leveraging existing methods typically used to do this). Perhaps a Fulbright-Programme type of approach (with many countries), but with a specific focus on energy. 2) A range of market pull policies to accelerate the deployment of consecutive generations of hydrogen generation technologies through the 2020s. 3) A central trusted repository for local energy data. BEIS already provides excellent resources for this, so would be a good candidate to extend its capacity to provide greater granularity of data.

Vectec Ltd	HVO is an advanced renewable diesel fuel alternative. The product exhibits high purity and is free from contaminants such as Sulphur. Waste and residue derived, HVO is certified as being 100% renewable and sustainable and supplied into the UK market free from Palm or other virgin vegetable sources. Because of its manufacturing process, HVO does not contain aromatic compounds which can be hazardous to health and exhibits a high degree of efficiency when burned significantly reducing noxious emissions such as Particulate matter, NOx and Carbon Monoxide when compared to Mineral Diesel fuel. HVO is certified as being sustainable by the ISCC and complies with the Road Transport Fuel Obligation, which provides the user with a clear GHG carbon loading typically reducing GHG CO2 emission by 90% when compared to Mineral Diesel fuel. This means that HVO produces ca 30gCO2e/kWh of GHG CO2, which is a factor of 10 lower than Mineral Diesel and the publicised emission of CO2 from the National Grid. HVO can be deployed within existing UK infrastructure now with no CAPEX or infrastructure investment. HVO is approved and supported by a wide range of OEMs as a 100% fuel (biodiesel can be blended up to a maximum of 7% in Diesel fuel) and is the subject of a major evaluation project within OFTEC. Government support is however required to support the mass up take of HVO fuel as it is typically 20% more expensive to produce that Mineral Diesel fuel. With sufficient support it is likely that UK investment could be gained to build indigenous UK production, further supporting our COP21 goals and job creation.
Watt-Logic	Consumer engagement is key. New models of engaging with consumers are required which should be supported by a major shift in the role of suppliers and a re-set of suppliers' relationships with both Government and consumers.

Appendix II: The Inquiry

ALL-PARTY PARLIAMENTARY GROUP FOR ENERGY STUDIES 40TH ANNIVERSARY INQUIRY
"What are the energy policies that will drive an independent UK to Net Zero while fuelling the economy? "
Please answer these questions. It is not essential to answer every question.
Please keep each answer to a maximum of 100 words.

ABOUT YOUR SECTOR

Tell us on whose behalf you are answering the questions and the sector in which you operate.

1. What is the key risk or burden of decarbonisation in your sector?
2. What is the sector's key opportunity in decarbonisation?
3. What is the biggest element of energy policy that is holding you back?

ABOUT DECARBONISATION PROGRESS

4. What behaviour or technology do you see as key to decarbonisation? What is the
    - timescale for deployment?
    - effect of their deployment?
    - barriers to their deployment?
    - costs of deployment?
5. How can your sector organisations become active and flexible consumers of energy to help them decarbonise?
6. Where can UK Government investment be most effective?

ABOUT GOVERNANCE AND ORGANISATION

7. How can place-based (local and regional) resources and organisations be harnessed to deliver Net Zero?
8. What areas are hard to decarbonise? Why? Are they essential or is there an alternative?
9. How should the efficiency, effectiveness and cost of decarbonisation be assessed?
10. In what UK policy do you believe there is cross party consensus where action can be taken?
11. What UK policy area do you see controversy that requires intensive policy negotiation?
12. What actions should be taken to raise awareness on energy and the climate emergency? (public, workforce, investors, legislators)

THE 2021 AGENDA

13. What should the UK do differently, post Brexit and post CoViD-19?
14. What is the most important agenda item for COP that would enable the UK to maximise its effectiveness as the host?

SUMMARY

Please provide a 200-word summary of key points
Your answers above and the summary will be published. Please say whether you want it to be attributed to you, or kept anonymous.
Name:
Position:
Organisation:
Email:

Please complete the inquiry online here or send your completed submission by email to Matthew@PGES.org.uk before 29th January 2021.