HOUSE OF LORDS

Environment and Climate Change Committee

Corrected oral evidence: Mobilising action on climate change and environment: behaviour change

Tuesday 26 April 2022

10 am

Watch the meeting

Members present: Baroness Parminter (The Chair); Baroness Boycott; Lord Browne of Ladyton; Baroness Chalker; Lord Colgrain; Lord Grantchester; Lord Lilley; Lord Lucas; Baroness Northover; The Duke of Wellington; Lord Whitty; Baroness Young of Old Scone.

Evidence Session No. 12 Heard in Public Questions 108 - 125

Witnesses

I: Sir Patrick Vallance, Government Chief Scientific Adviser; Tim Lord, Head of Climate Change at Phoenix Group.

Examination of witnesses

Sir Patrick Vallance and Tim Lord.

Q108 **The Chair:** Good morning everyone, and welcome to our evidence session on our inquiry into mobilising behaviour change for climate and environmental goals. We are delighted that we have two witnesses today. Sadly, Professor Brooke Rogers could not be with us; she has had a family emergency, but we are delighted to have Sir Patrick Vallance, who is the Government Chief Scientific Adviser and Tim Lord, who is head of climate change at the Phoenix Group and also a senior fellow at the Tony Blair Institute for Climate Change. We are very pleased to have you both here today. A transcript will be taken and you will have the chance to review that before it is finalised. This is webcast live and will go out subsequently on the parliamentary website. I remind Members that if they have any declarations that they need to make public to do so before they speak the first time.

I will commence with the first question and ask you both, starting with Sir Patrick, how it was that scientific advice and other evidence was fed into government decisions on behaviour change for tackling the pandemic. What can we learn from that in thinking to the future and mobilising behaviour change for the Government's net-zero and environmental goals?

Sir Patrick Vallance: Thank you very much. I am pleased to be here and to have the opportunity to speak about this important topic. During the pandemic there were a number of ways in which science advice fed into government. On the behavioural side, a behavioural science sub-committee of SAGE included people from a range of backgrounds—behavioural scientists, social scientists, anthropologists, ethicists and public health people—who would act to try to bring together a consensus view of behavioural science. They were not undertaking research; they were looking at what research was out there. They might periodically be asked by a department for advice on undertaking research, feeding in through that route. That group would then feed into SAGE, which had a broader membership, covering a range of sciences—virology, epidemiology, public health, clinical science and the behavioural sciences—and the behavioural science would feed into that and be integrated with the other science.

The output of SAGE was in the form of the minutes and papers, which were fed, of course, directly into officials and to Ministers and made public. There was a public-facing side of it and there was internal advice. Behavioural science was obviously quite a big part of that. Very early in the pandemic, SPI-B, as it was called, the behavioural science sub-group, produced a set of principles by which one could think about applying behavioural science to government communication and engagement. I think that seven principles were laid out on how that could be approached. Those principles are generally applicable—and it is a pity

Brooke is not here because she could speak to that very clearly. Although they were specific in the context in which they were asked for, I think they are principles that apply more broadly.

As well as the minutes and output, we also did a number of teach-ins across government. There would be periodic teach-ins for officials where people would have a chance to ask questions and raise specific departmental areas. There was also input from the behavioural scientists in departments—most departments have some behavioural science capability—and there was input also from the behavioural insights team, which would be commissioned by either the Cabinet Office or departments to provide input. They worked quite closely with the Department of Health.

There was a range of ways in which information fed in, through the formal SAGE mechanism I have described and then a series of others including direct into department and via individuals. An important part of all this was the public-facing side, making sure that the information was available to everybody.

I have the principles that SPI-B set and I can briefly articulate them, if that is helpful.

The Chair: It would be, thank you very much.

Sir Patrick Vallance: I am not going to go through the details but, essentially, it was that the advice should be clear and specific—so in other words general advice is not so useful as specific advice; that messages should be positive—for example, protect each other, stand together; to avoid messages based on fear or disgust; focus on the support available that enables behaviour change—so do not focus on negatives and punishment but focus on what is available for people to make their own ability to make change; adopt tailored messaging, which takes into account cultural, linguistic and other differences; co-design messages where possible; and use trusted messengers. They were the principles, which I think are ones that stand true for other situations as well.

The Chair: Thank you for that. Tim, would you like to comment?

Tim Lord: I should preface my remarks to the committee by saying that before the current roles I occupy I spent about 20 years in Whitehall working on energy and climate policy, including the last three years as director responsible for the UK decarbonisation strategy. I will draw on that experience and context in my comments.

Clearly with regard to the pandemic, I shall defer to Sir Patrick around how behavioural science as used. On the climate side, science was principally used in two ways to inform policymaking, in particular around behavioural change. The first is around informing the level of targets that we set, so the level of the carbon budgets that we set, and the level of the UK's nationally determined contribution under the Paris agreement.

Obviously, we have recently set the sixth carbon budget and the 2035 target, which is to cut emissions by 78% on 1990 levels by 2035.

The second way in which it is used is around how you meet those targets and what combination of actions should we be looking to take to meet them. In that regard, while net zero is a complex endeavour, there are essentially three ways you can do that. One is around technology change that consumers do not notice; one is around a pure behavioural change, if you like, such as eating less meat or flying less or driving less; and the third, which is in some senses is the most significant, is around combination changes that do impact consumers, such as driving electric vehicles instead of petrol or diesel vehicles, or installing low-carbon heating in their homes.

Ministers took advice from a range of sources, including the Climate Change Committee, including their officials on what the strategy should look like and in what combination they should use those different options. In the past, over the past 10 years for example, almost all the emissions savings we have delivered have been through the first of those, through technological change, in particular through the decarbonisation of the power sector, which has not had a significant behavioural impact on consumers.

Looking ahead, when you look at the strategy that the Ministers have set, behavioural change obviously has a much more significant role; somewhere between 50% and 60% of the emissions savings that we will see over the next decade or so will result from behavioural change.

Q109 **The Chair:** I have a follow-up question to what Sir Patrick has said: you were saying you think the principles have a wider applicability in terms of the issue we are looking at today, which is mobilising behaviour change. Could you comment on whether you think the operating structure—and you mentioned the behavioural science sub-group, which Brooke was on, and others—has some wider applicability as we look at mobilising behaviour change for net zero, given that was a new structure set up to identify how one should act in a crisis.

Sir Patrick Vallance: SAGE and subcommittees are set up for specific emergency situations. The SAGE that took place during Covid met for 105 meetings, which is truly exceptional. Mostly they meet for three, four or five meetings. I do not think that is a structure that is necessarily right for longer term emergencies.

Is the principle of getting expert, external advice one that is useful? Absolutely it is, and there are mechanisms through chief scientific advisers in departments, there is a strong behavioural science network across government that can access external expertise, and there is commissioning of groups like the behavioural insights team that can also act. So there are mechanisms that can be used, and the principle of seeking external advice is a good one. I do not think that replicating the SAGE and SPI-B model is necessarily the right thing for this type of issue and probably would not work in terms of the sustainability of individuals

and their careers in academia and elsewhere. I think something else would need to be put in place. Indeed, there are other mechanisms in place.

Lord Lucas: Tim Lord, you say that 50% or 60% of the next stage of adaptation will come from behaviour change. When people are asked they seem very reluctant to make those changes. They will go electric but they buy an SUV. They will not turn the heating down. The same applies to institutions. When I asked the House of Lords authorities whether they would review the temperature at which they kept the Palace, the answer is essentially no, not interested. So how is this going to happen?

Tim Lord: Public opinion around climate and net zero shows very high levels of concern around climate change generally; 80%, 90% of people are concerned, and that has risen significantly over the last decade. It has not dipped in response to the pandemic, for example, in the way that it dipped in response to the global financial crisis. People have a concern about climate change.

When you look at willingness to act, there is a more of a mixed picture. People in general recognise the role that individuals have to play in doing that[1], but they are concerned about cost and about what is often called the "hassle factor" of taking action. Crucially, they often lack information about what the most effective things to do are to reduce their personal carbon footprint and contribute to wider emission savings across the economy.

In terms of how you design a behavioural approach, first of all you need to reduce the costs; we have seen that in electric vehicles, for example, where the costs a decade ago were very high, the range was very short, the inconvenience factor was high and sales were low. In recent years[2], the highest selling model in the UK is an electric vehicle. We now have around 500,000 on the roads and you have an exponential rise in the purchase of electric vehicles. The challenge now is to replicate that in other areas.

The second and final point I would make is that quite often there is a very confusing picture for consumers around what they can do on climate change. In fact, the behavioural changes that are required to meet the Government's net-zero targets are quite limited in number. In some cases they are significant—for example, changing the heating system in your house—but they are also not necessarily binary. Reducing meat consumption a bit gets you a long way towards what we need to achieve, for example, on diet and food. I know you have heard from Henry Dimbleby and others on that point. I think more clarity around the communications of what is required, more support in getting costs down and reducing the inconvenience and hassle factor for people in delivering

[1] Tim Lord later clarified that when he said, "doing that", he was referring to the role that individuals play in cutting emissions.
[2] Tim Lord later clarified that he meant recent months, rather than recent years.

those changes can go a long way to helping the Government meet their targets.

Baroness Boycott: Sir Patrick, given that you were operating in an emergency, that everyone agreed was an emergency, presumably that made behaviour change relatively easy in that we were all in it together. Even though we are in a climate emergency, it is not generally seen as an emergency because it is not here today. It is a perfectly nice day outside and, as far as the UK is concerned, life goes on as normal. How do you apply what you were able to do with Covid to persuade people to make those massive lifestyle changes to climate change?

Sir Patrick Vallance: I will answer as a non-specialist because clearly there are specialists in behavioural science who would have views on how to do this. I think you are absolutely right to point out a distinct difference. It is obvious that the Covid emergency was a short-term situation, with an immediate, obvious and visible change needed, and people knew it was for a time-limited period, even though the length of that was not completely clear. This is a longer-term issue—and one thing that is problematic but inevitable is that 2050 sounds like quite a long way off. When you talk about net zero by 2050, it sounds like there is a lot of time to do things, whereas the reality is if most things are not done in the next five or six years, it is very difficult to start making the 2050 target. These changes are urgent, but they are long term and require a mix of technological interventions and supply-side changes, together with demand-side changes.

The recent IPCC report picked up on this quite well and talked about the magnitude of change that could be effected by demand-side changes. As Tim has said, I think there are some things that could be read across, such as clear and specific guidance on what I as an individual can do. I have said before, and I will repeat it here, that one problem is that the individual actions appear trivial—"I will cycle a bit more. I will eat a bit less meat. I will fly less"—but aggregated across entire populations, they make a big difference. Making sure that people understand what they can do as individuals in this is an important part of this, and some similarities there are worth building up; but they need to be enabled, and that enabling includes things like infrastructure. Cycling is easier if you have an infrastructure to cycle on. It requires reducing what Bill Gates has called the "green premium". If it costs you 10 times more to do something, it is difficult for people to do. Therefore, it is about working on reducing that cost and making the affordability right and making sure that regulation and barriers are removed and regulation is in the right place to drive behaviours in that way. A series of levers needs to be looked at, rather than thinking this is a dramatic, sudden, all-society, big change. A series of things needs to take place.

Baroness Boycott: Your last principle was to use trusted messengers. Who should be the messenger, apart from David Attenborough? Should it come from the Prime Minister in a solid way?

Sir Patrick Vallance: There needs to be clear, consistent messaging across the board. If you look at the data from the public, they trust scientists. Therefore, scientists and others who can comment on this are trusted voices in this space and can give neutral, policy-independent science advice, which is helpful.

Q110 **Lord Browne of Ladyton:** Gentlemen, thank you very much. Inevitably, this question that I had in my mind has partly been answered, but I want to focus on communication, particularly on clarity about what we are asking people to do. At this point, what can we learn from the pandemic that we can apply to climate change and the environment about how the Government, scientists and other relevant parties can communicate behaviour change and related scientific concepts to the public? In a sense, you have partly answered that, but I would quite like for a few minutes to concentrate on that. Then I have a specific supplementary for you, Sir Patrick.

Tim Lord: There are lessons to learn from the pandemic. As Sir Patrick has said, there are also important differences in the scale of action required, the speed required and the universality of it across the population.

I highlight three areas. The first is around clarity and clear messages about what people need to do and when they might need to do it. With the pandemic, we all needed to stay at home immediately when lockdown was introduced. With climate change, there is more of a sequencing. Some homes are hard to treat, and some people are much more dependent on particular forms of transport. We have to recognise that—it does not mean that everyone has to do everything at the same time. Communicating what you can do and the potential sequencing of that activity can help to demystify and perhaps reduce some of the concerns that people quite legitimately have around elements of this transition.

The second element, which is linked to that, is around data. We saw with the public communications that Sir Patrick and others led that, increasingly, we used high-quality data to communicate to people what needed to happen and why it needed to happen. It was helpful to speak to people as grownups. We do not all need to be experts in virology to understand what is going on and what we need to do, but having improved data and communicating that effectively is important.

The third element is around the rationale for action. In the pandemic, the rationale was obvious in terms of pressures on the NHS, protecting the vulnerable and so on. With climate, quite often in Whitehall we can think of the benefits purely in terms of emissions and avoiding climate change impacts down the line. That clearly is a hugely important rationale. But when we think about, for example, energy efficiency, the co-benefits are lower bills, improved energy security, reduced import dependence, warmer homes, jobs in local areas and so on. Thinking about how we communicate, "A climate catastrophe is coming. We need to do something about it", is important, but we also need to communicate, "Here is a vision of the future that looks positive and does not require

hugely fundamental changes that will reduce your quality of life". That seems to be an important element of communications that collectively we have not quite got right yet.

Sir Patrick Vallance: I will pick out three things relevant to this. The first is that information and transparency of information is crucial. I am pleased that the Office for National Statistics is producing a dashboard of metrics for reaching net zero, which I hope will be completely public—and I think will be—so that everyone can see the aiming points and the process towards those. I think that helps. We saw over the pandemic that we had legions of armchair epidemiologists who got quite interested in seeing what was going on. The same is true: if the data is made available with completely independent, objective and robust information, it will help people to understand how we are doing and it can link to the clarity of messaging around what individuals can do. That is an important area.

Secondly, which was clear during the pandemic and will be true here, the ability to make this equitable across society is important. It is all very well to talk about buying an electric car, but it is totally impossible for the vast majority of the population. We need to make sure that there is messaging, accessing the right groups, doing this with trusted community leaders, and doing it at a local level; it is not all about people sitting in Westminster talking about it—it has to be done with local realities, taking into account contextual aspects. Approaching the whole thing through that mindset will be crucial and will require a total systems approach. This is not a series of point interventions. It is a systematic problem that needs to be addressed as a system with understanding and local leadership.

The third area that I will mention is that the Government Office for Science is undertaking a piece of work at the moment, which I hope will be published later this year, looking at future plausible scenarios for the way in which society might change and the impact of that on the ability to reach net zero, or the scale of the problem that might be either greater or lesser depending on various scenarios. We hope that this scenarios work will be published later in the year and will provide a useful way of people to conceptualise what all this means and understand how this interacts with all the other things that need to happen. Those are three areas worth considering in relation to your question.

Q111 **Lord Browne of Ladyton:** Sir Patrick, at COP 26 you candidly said that the people of the UK are not doing enough to change their behaviour to tackle climate change. I am sure you remember saying this. It was reported particularly in *New Scientist* in a way that contrasted your comments and the advice of the Climate Change Committee about the importance of behaviour change, such as eating less meat and doing more cycling—and you shared some of your own experiences of change—with the approach then being taken by government Ministers and officials, which focused mostly and almost exclusively on technological change rather than behaviour change. What does the pandemic experience teach us about the value of consistency of message coming

from people who are seen to be working together, along with clarity of reasoned messaging, to the understanding of and compliance with behaviour change measures of the public for getting these sorts of messages?

Sir Patrick Vallance: It is very often the job of the press to try to make differences as broad as they possibly can be, but the reality is that behaviour change is a part of reaching net zero. It is unarguable. If you look at what has already happened, meat consumption has reduced by about 17% in this country over the last decade. As Tim said, electric vehicle ownership is increasing as the cost comes down and as charging infrastructure gets better. These things are inevitably important and they are important as individual acts as well as things that need to be facilitated by government. I will repeat the point that they often seem a little trivial at the individual level but they are important as they aggregate across society. The three that I raised at COP 26 were just what I said I was doing. I am eating less meat, I cycle to work and I fly less than I used to. I have not said in any of those statements that I have stopped flying or I do not eat meat—I do. It is about appropriate reduction across society.

Clear, consistent messaging is important in this. Confused and inconsistent messaging contributes to the point that both of us have said. Individuals need to know what is expected of them and what they can do, as well as making that easier for them and making the green choice the easy choice.

Lord Browne of Ladyton: I agree with you, but if you are being told at the same time by a self-confessed technological optimist that technology will get us out of this, as it has done every previous challenge of this nature that we have faced before in our lives, then it must be confusing for people. Why change now if you just wait?

Sir Patrick Vallance: Here, again, is in some ways the danger of a 2050 statement, which sounds like the technological cavalry will come before 2050 and that will save us. The reality is to have technologies in place at scale and working well across society by 2050 requires those technologies to have already been invented. Some will come along and change things. There will definitely be iterative improvements and implementation challenges. A lot of R&D needs to be done. But dreaming that something brand new will appear and save us by 2050 is not sensible. That is not to say there might not be something, but it is unlikely. It is about the technologies that we can see, even if we cannot necessarily apply them yet. Therefore, there is an urgency to getting those things done. Even the most techno-optimistic person would not say, "It is okay. Do not do anything". As the IPCC has said, probably the most rapid change that can take place is the sort of change that Tim was alluding to—small individual changes, which society is already doing.

Maybe the other lesson or parallel with the pandemic is that society was pretty smart about knowing what to do, if you look at it across the world. When they saw something, people stopped going out. They stopped going

to pubs. They decided not to interact quite so much—irrespective, frankly, of how soon or late Governments decided to implement changes. The same is true here: we are beginning to see change. The clearer we can be about the types of things that make a difference, the more people feel empowered to be able to do that.

Tim Lord: If I can add one point on that, sometimes it can be unhelpful to draw an absolute distinction between technology and behaviour change. The critical thing here is that it is the technology in many cases that enables the behaviour change.

If we look back 10 years even, EVs had a range of 100 miles and they were far more expensive than petrol and diesel equivalents. Now they have a range of 300 to 500 miles and they are cheaper on a lifetime cost of ownership and soon they will reach cost parity on the forecourt as well. If we look at renewable power, I was working on offshore wind 10 years ago and it was £150 to £200 a megawatt hour. Now it is getting contracts for £40 a megawatt hour. That changes the game.

When we look at where we are now in terms of the key behavioural changes that we need to make, they are around transportation. I have already mentioned electric vehicles, but I know people with e-bikes. What has surprised them is that they have not replaced their bike; they have actually replaced their car to quite a significant degree, for short journeys.

If we look at diet, the alternatives to meat are now, frankly, more palatable to more people than perhaps they were a decade ago.

If we look at home heating, we still have some way to go but heat pumps are coming down in price. Alternatives are reducing in price and can significantly reduce in price if we upscale the rollout.

So while there is a distinction in some respects between technology and behaviour change, it is unhelpful to draw a pure distinction because in many cases technology, innovation and cost reduction will enable the behaviour change and make it more accessible to more people.

Sir Patrick Vallance: To add one point, I completely agree with what Tim said there. One of the reasons technology update does not occur is because people do not understand the behavioural things that need to go along with it. The idea that technologies come only from STEM graduates is not true. The arts, humanities and others have a big role to play in actually making sure that we understand where technologies fit in and how they can be used.

Q112 **Baroness Young of Old Scone:** I have a question first to Tim Lord and then I will open it up to both of you. I read with amazement a statement in your report that says that 2008-09 was the last major government communications campaign on climate. First, is that absolutely the case?

Secondly, we all became addicted to the press conferences, the data and the dodgy slides. They became an art form. There was a huge will to

engage with the messages day in and day out during Covid. Is it possible to generate a short-term crisis, as it were, in climate change that kickstarts through a communications programme across the Government the sort of enthusiasm, commitment and energy that we saw during Covid? Does it run the risk of not being repeatable, and the crying wolf syndrome if it goes on for too long? Is there enough join-up of the current messaging across government to have that sort of effect? If not, why not?

Tim Lord: On your first point, the last major government communications campaign around climate in the round was the Act on CO2 campaign, which ran from roughly 2007 to 2010. That included TV adverts, billboards and so on. Since then, there have been some small-scale campaigns, usually around specific elements of environmental behaviours, recycling and so on, but overall there has been a reluctance to communicate in a transparent and front-footed way around all those. In general, there is a reluctance to talk to people about the kinds of behaviour changes that ultimately achieving the targets that the Government have set and legislated for will require over time.

My own view is that there is scope to do that, which is a question not of telling people what they have to do but of giving people better information about where they can have most impact. If I look back to the Act on CO2 campaign, many of the adverts were about things like unplugging your phone charger or carrying less junk around in your boot. While those are good things to do, they are not the kinds of things that will deliver significant impacts. It is important to be clear with people about how they can have significant impact on their emissions and how they can reduce them.

In terms of the learnings from the pandemic, I am a little bit cautious about crisis communications around climate, because the key thing with climate change—and this is a distinction from the pandemic—is that we need sustainable and sustained changes in behaviour over a period of time. When lockdowns were introduced, there was never any sense that they would become permanent, whereas some of the changes that we need to make here are more longstanding.

The other important thing around the communications is the point I mentioned before, which is around sequencing. We do not want to say to everyone, "You have to go and buy a heat pump now", because, on Patrick's point about 2050, we have 28 million households and about 28 years to do it. We need to do the easiest bits first. We need to focus on the sections of the population that perhaps are better placed to do that whether financially or in their buildings. With electric vehicles, it is not a question of being wrong to drive a petrol or diesel vehicle because, if you do not buy brand-new cars, you will not have an electric vehicle, but hopefully they will come through to the second-hand market and will become more accessible and affordable.

There is scope for clearer communications, but I am cautious about anything that was trying to instruct people to make fundamental changes

they cannot afford in the short term; it is about being clear what they can do in the short term. For the kinds of measures that will be required over a period of time, there is much more scope to be more proactive from government and from other trusted communicators in doing that.

Sir Patrick Vallance: In terms of the communication, it is important that the messaging is not designed to cause fear or cause upset. It should be about making sure people understand the situation. Where are we now and what is the situation? What is known and what is unknown? When will those uncertainties be reduced and how might they be reduced? What actions could be taken to lead us into a better position? Those principles of laying out the communication clearly are right, and they apply across all sorts of areas.

The mechanism by which you do it of course will vary from area to area. There was a particular need during the pandemic for regular press conferences. I object to any reference to the idea that any of the slides were dodgy—they were not. Every single one was looked at carefully. The aim was to inform people and give people as much information as we knew at that time. The same applies here. We should give as much information as we can. We should not aim to frighten people, because that is not helpful, but we should aim to enable people to understand what that means in terms of actions they could take, what trajectory is being followed and what other things will come along that would make a difference.

Q113 **Lord Whitty:** I want to take you up on this issue of fear. The reason the majority of people complied in coronavirus, at least for some time, was exactly fear. What is lacking in the climate change thing is a sense of urgency but also, "If I do not do this, my whole way of life will disappear." That is not yet sufficiently pronounced. Some of the early stuff, the Al Gore stuff and so on, which people said was exaggerated and oversimplified, did momentarily create a feeling of fear about climate change. So I would not cross fear off the list.

There is one other resistance though. Whereas with coronavirus you have, "If you do not do this, you might be the next one to fall", in the climate change debate there are outright deniers and so forth but in general people say, "My contribution will not make much difference, and Britain's contribution will not make much difference if the Chinese go on building power stations." There is both a need to raise the fear factor, or at least the anxiety factor, and a need to prove to people that what they do themselves and what their immediate circle does is actually important in this fight. They got that completely with coronavirus but have not yet got, in my view, with climate change.

Tim Lord: To respond on that briefly, I agree absolutely up to a point. We should be worried. There is a reason we are pursuing net zero in the UK and similarly globally. My concern is that we then get worried to the point of paralysis or to the point that we cannot do anything about this.

To Sir Patrick's point earlier, this is an achievable target. The technologies exist. When you look at the CCC's scenarios or the Government's own scenarios, all those technologies exist. At some parts at the margins, they are at an earlier stage—things like direct air capture—but these are all technologies that exist. This target is an achievable target, which is not to say it is an easy target to achieve. Similarly, it does require, if the Government want to achieve those goals, lifestyle changes and behavioural changes, but it does not require a complete upending of our way of life.

Thirdly, there is not a counterfactual where we carry on as we are and everything is okay. A world of 2.5, 3 or 3.5 degrees of warming will also require significant behavioural changes in other respects. To your point, we should be concerned about that. We should be clear that that is the case, but we should be careful about not communicating fear in a way that makes people feel that this is an unsolvable problem.

Q114 **Lord Colgrain:** The question of communication I find so interesting in highlighting two particular issues. I have heard it said—and I do not know whether it is true or not—that an electric car has to travel 70,000 miles before it does the equivalent of the carbon footprint of its manufacturing costs like the mining of the metals, lead, cadmium and so forth. People who want to be critical of attempts to improve things in this area will point to that and say, "I drive only 20,000 miles. I have a car for only 20,000 miles of usage. Why should I spend the extra amount on a car that I will not use up to the limit required before we get the benefit?"

Likewise with wind, the carbon footprint for the masts for a wind tower in terms of the steel and concrete is absolutely enormous. The gainsayers again will say, "We are spending huge amounts and we are incurring substantial carbon footprints to put these things in. When does it become worthwhile?"

Is there a way in which we can get the other side of communication slightly better and be able to say to people who start from a negative standpoint, "Yes, these costs have been incurred, but it will be worth it for the following reasons in the following timescales?"

Tim Lord: There is a risk that some poor-quality information is out there and also that the information in the public domain sometimes does not reflect where we are now as opposed to where we were some years ago.

For electric vehicles, for example, the carbon footprint now on a lifecycle basis is about 70% lower, roughly, than for a petrol or diesel equivalent. It pays back in a lot less than 70,000 miles. I think it is around 20,000 to 30,000, although I need to check that. Most cars are driven far more over their lifetimes than 20,000 or 30,000 miles. The differential is increasing over time because, as we decarbonise the power system, the fuel that those vehicles are using is cleaner.

Similarly, wind turbines pay back their carbon debt, if you like, many times over in comparison to higher-carbon technologies. Again, the manufacturing processes are getting cleaner all the time, because they

use electricity and they use fossil fuels to some degree in their manufacture, but the alternatives to those as they deploy will, similarly, reduce that.

There is an important point about making sure the information out there—again, to Sir Patrick's point earlier—provides clear data for people. That is not to say that all these things are perfect and therefore we will solve the problem in one leap; it is about saying that significant savings are to be made and also that those savings evolve and, in general, improve over time. As we decarbonise as a system, not just in individual sectors, they will complement one another.

Sir Patrick Vallance: That is an important point, and it comes back to clarity and specificity of messaging. It is easy to pick individual items and say exactly what you have. You are right that the embedded carbon in making a new car is very large. Inevitably, if you look at it for that moment, you have just added to the problem—but of course the lifespan is such that you will reduce overall.

Trying to get these points clearly articulated is part of the challenge, and trying to make sure that people understand. The ONS dashboard is one way to help bring this life for people so they can track it a bit more easily than just trying to conceptualise all these moving parts as individual components.

Baroness Boycott: I have just a quick question. You have talked mostly about getting to net zero by 2050, but we also have to try to get to 50% by 2030, which, building on Larry's point, is jolly soon. Are you saying that we are doing enough to get there? Given that it is not many sessions of Parliament that need to put things in legislation, or whatever we need to do, what is your view of how we are doing in getting to that one and what we need to do to get there?

Sir Patrick Vallance: The whole thing is a huge challenge, and it has a massive operational component to it. It has behavioural change as part of it. There is no room for complacency at all. A big change is required, and it needs to be done urgently. We should stop viewing net zero as a cost and start seeing it as an investment.

Baroness Boycott: That needs a massive communication campaign by the Government to get people to both be a bit nervous but also take responsibility. It feels to me very near. How would you suggest communicating that both as a bit of a stick and as a bit of a carrot?

Sir Patrick Vallance: It is very near. I am not a communications expert—

Baroness Boycott: You are jolly good at it.

Sir Patrick Vallance: —but the principles that I have discussed and that the behavioural scientists have laid out are exactly the right ones. The urgency is clear, as you have said. The more that people can understand the specifics and not the generalities, the easier it will be to get there.

Complete honesty about the scale of what we face and the implications is important. If you want to call that fear, call it fear. I do not think that it is fear—it is what you need to understand to know what you need to do.

I said this around COP 26, and I will say it again here. We have been through just over two years of a terrible global crisis. We have now got 50 years of a chronic, long-term crisis, which we need to deal with as soon as we possibly can.

Q115 **Lord Grantchester:** Perhaps I could come in before we move off communications. I am trying in my mind to see the differences between the pandemic and net zero. Admittedly, we have been through those already. I categorise people in their religious beliefs. Coming up to Lent, they make resolutions, and they make New Year's resolutions around good intentions. How could we try to build on a good intention, to reinforce it and then to make that a lasting, effective change, so that it is not about it being a crisis but about good intentions that have to be made into realities.

Sir Patrick Vallance: There is a danger here that as a non-expert I will start giving homespun views of this. I will resist doing that. That is exactly why behavioural scientists, social scientists and others are important for trying to give advice on the right ways to approach these problems. I am sorry, but I do not know the answer to that question.

Tim Lord: Similarly to Sir Patrick, I am not a behavioural scientist, so I will be cautious about opining beyond my expertise. But the one point I would make is that making it easy matters a lot. For example, if I have recently moved house and I would like to improve my energy efficiency and install low-carbon heating and so on, trying to do that is hard. It is hard to get good information about it. It is hard to find suppliers who will do the work. No one in my area has done similarly recently, so there is not a social norm around it or expertise I can draw on. The critically important thing for me is about how we make this easier for people who want to do this. The next few years will be a big challenge, but we do not have to focus on the hardest properties, for example, to treat. We can focus on the people who want to do this and are potentially undergoing other work that means it makes sense for them to do it. How do we make that easy for them to do?

The EV example is a good one. By making it easier—and there is still a way to go on infrastructure, for example, but we have made enormous progress—we are seeing significant market uptake. For me, that is the lens through which I see all of this. How do we reduce the frictional cost for people wanting to undertake these kinds of behaviour changes?

Sir Patrick Vallance: Another example is happening now. Five years ago, if you approached a builder in London and said you wanted to put a heat pump in your house, you would have got quite blank stares and probably would have had quite a lot of difficulty working out how you might do that. Now it is much easier. The technology is much better and the cost has come down. Those things that make the green choice the

easy choice will be important. It comes back to this intersection between technologies and behaviour.

Q116 **The Chair:** Before we move on, could I ask a question on metrics, which Sir Patrick mentioned? You mentioned that the ONS is doing metrics, so we can see where we get from now to where we need to be. You mentioned that you make choices to eat less meat and to fly less, but in the net-zero strategy the issues of diet change and flying less are not mentioned. Therefore the Government's indicators they produce on the net-zero strategy will not include those two key areas, so there will not be metrics on reducing meat and dairy or on flying less. There may be issues around fuel but not flying less. Is the scientific community concerned that there will be a gap between the metrics on two key areas, if we are going to achieve behaviour change, and what the Government propose?

Sir Patrick Vallance: I do not know exactly what is in the ONS dashboard yet. We should not assume that those things are not there. The ONS is an independent organisation that will put in the metrics that it sees as appropriate to monitor.

The Chair: I am sorry if I was not clear. You mentioned the ONS, but the Government are producing their own indicators on the basis of the net-zero strategy. Given those two things are not featured in their own net-zero strategy, the Government's indicators will not include them.

Sir Patrick Vallance: All right. I do not know about that. I am focused on making sure the ONS dashboard is as complete as it can be. I have already quoted a figure that meat consumption has decreased 17% over the last period in the UK, so we can already see a trend there. Capturing those things is useful. Whether it is a set objective metric is different to whether it is useful to see and to monitor what progress we make.

Q117 **Lord Lilley:** You mentioned the need for complete honesty. Does that apply to being honest with the public about the real contribution these voluntary contributions can make? You mentioned cycling. We were told by our experts that the proportion of transport fuels used for short cyclable distances is trivial. Most petrol and diesel are used for long journeys that could not be done by cycling. We will make it compulsory to phase out petrol and diesel cars and replace them with electric. There will be no point for anyone who has an electric car cycling instead of going in an electric car, except for health reasons. There will not be any climate reasons.

That is not a reason for not asking people to do things voluntarily. During the war we asked people to give up pots and pans for the war effort. It served no purpose for the war effort, but it made people feel part of the team. It made them committed to the project. The Communist Party used to ask people to give sixpence a week for a Soviet tank, because that made people more sympathetic to the Soviet Union. The money never got to the tanks. By asking people to contribute in some way we are contributing to the cause, even though in practice, if we are honest, the

aggregate effect—although you talk about it adding up to a lot—is trivial compared with what will happen if we decarbonise all our electricity, move all transport fuels to electricity and all heating to electricity. There will be no point in voluntary contributions.

Will we be honest about that or will we say, "Let us make them do a bit of it because it will make them feel part of the team"?

Tim Lord: Again, I am not a behavioural scientist so not well placed to comment on the extent to which making people part of the team is an important part of the suite of measures. I absolutely agree with you that focusing on the big stuff is important. I mentioned the point about unplugging your phone charger earlier. That might make you feel worthy. I remember being in a focus group where someone said, "I turn my telly off standby and that makes up for the fact that I flew to Thailand for my summer holiday." I am not saying people should not be allowed to fly to Thailand, but those two things are not remotely equivalent in terms of emissions. There is an important point about transparency of where emissions come from.

It also plays to the point about equity. The wealthiest people in this country have far higher carbon footprints than less wealthy people, because they tend to heat larger spaces, travel more and so on. More clarity around that is important, both because it is the right thing to do and also because it can make sure that we do focus on the more important behaviours.

With things like cycling and so on, it is important to do the big stuff. Some of those smaller behaviours can, when aggregated, have an impact, but you are right that, if we just do those things, we will not get to net zero. It is worth saying that there are other reasons for doing it. There is no point listing all the different behaviour changes that people talk about. In many cases, they have other benefits that might be desirable from a social and political perspective, which again I am not necessarily the best person to comment on. But the fundamental point that we should focus on the things that have most impact is hugely important.

Sir Patrick Vallance: I will not try to stray into behavioural science as to the right way to do this, but I will repeat that the whole net-zero challenge is a systems one. You are right. Different parts of the system have different impacts and also can pull in different directions if we are not careful, which is why it is important that government does not see this as a series of discrete individual actions. Of course discrete individual actions need to be taken, but that needs to be integrated.

The Council for Science and Technology wrote a letter about this three years ago, which Tim was probably involved with at that time as well—

Tim Lord: I was.

Sir Patrick Vallance: —pointing out the need for the Government to be able to monitor this as a systems problem. Otherwise, we can get fixated on one bit of it and that bit may not be the bit that makes the biggest difference or may block some other change.

The short answer to the question in my view is that we should be completely honest about the impact of the different measures and not try to hide it. If other requirements mean that we need to get everybody to pull together, the way to do that is not through trying to manipulate the data and pretend something is more important than it is. We should be clear about it.

I have one final point on cycling. An air pollution aspect to that is quite important in cities as well.

Lord Lilley: Yes, it is a separate issue. In terms of complete honesty, is it scientists' job to tell the truth where it is alarming but to keep quiet when it is not? I put down a question asking the Government whether they knew of any peer-reviewed science that suggested that the human race would be rendered extinct in the next couple of centuries if we did nothing; they said they knew of no such peer-reviewed science. But no climate scientist will ever criticise Extinction Rebellion, whose very name implies we will be extinct if we do not do anything, or government documents that say the existence of mankind is threatened if we do nothing. Is it the job of scientists to tell part of the truth but not the whole truth?

Sir Patrick Vallance: Absolutely not. The job is to try to make the data and the evidence as clear as we can. But one important thing about science is often forgotten and often misrepresented. Science is not an immutable set of facts; it is an assessment of a current state of knowledge and how you might test that to get better understanding. A feature that we have seen right the way across the world—and I have discussed this with my colleagues in other countries over the past few years—is that if, as a scientist, an area that you currently think looks a certain way is tested and turns out to be completely different, it is a joyous moment of understanding. For a politician, it is a horrible U-turn. That difference is rather important to bridge when thinking about communication. The job of scientists is to lay things out as clearly as we can on the current state of knowledge.

Baroness Young of Old Scone: To go back to a point I made originally, we did not quite address it, but it has been raised again in my mind by Sir Patrick's comment about the Government not handling this with a series of unrelated actions but taking a systems approach to it. In communication terms, are we now ripe or should we start thinking about how we can start having a much more joined-up Government-led communications process for all of the key actions that Lord Lilley would be happy that we saw as having a real impact? If that is not likely to happen, what is your diagnosis? Why would the Government run away from that a bit?

Sir Patrick Vallance: I cannot answer for what Ministers and others would choose to do. I can say that, yes, it is a systems problem. Yes, we should make as much of the data available as we can, and it should be available to people so they can see where we are. It seems to me those are clear things that are useful scientifically.

Tim Lord: I agree with that. We need to articulate what a net-zero world looks like. That is not clearly articulated in terms of where we are trying to get to and what it might look like. To quite a large extent, many people would find that broadly reassuring, in the sense that sometimes the media narrative in some elements is not perhaps quite reflective of that.

There is also an important point about Government visibility around all this. If you look at the public polling, it is interesting. Most people think they do as much as they can at the moment to address climate change. They think the public do not do enough—they think they do enough but the rest of the public do not do enough—but they think the Government are not doing enough. There are elements of unfairness to that. The UK has genuinely outperformed pretty much everyone globally in terms of the rate of emissions reduction that we have achieved to date, but more visibility from the Government in terms of the strategy, how people can play their part in that and what other parts of the economy and society are doing—whether that is government, businesses and so on—can potentially help to provide more of the framework and motivation for action for consumers and for voters.

Sir Patrick Vallance: To go back to an earlier answer I gave about the Foresight report that the Government Office for Science is producing, it will lay out scenarios and the implications of those scenarios, which may be helpful because it gives an integrated view rather than picking off individual things. It will give a series of plausible societal scenarios. Then it is up to Ministers and the public to decide which of those scenarios they wish to drive towards.

Q118 **Lord Lucas:** On very much the same subject, what structures would you put in place to make that data available to people? At the moment, we cannot even find information on why recycling is worthwhile, let alone dealing with big system problems such as whether we should be flying our vegetables in from Kenya or why people say air travel is worse when it is a quarter of the cost of rail travel. You need good information to answer those questions, and it does not seem to be available.

Sir Patrick Vallance: That is why I am keen to see the ONS dashboard come out to give information that is updated on a regular basis and one can track and why, in an integrated approach, the scenarios approach can then put that into context. Will it answer all the questions we all want to know? No, I am sure it will not. It will give the ones that are seen as most important at the time. I hope that that will then be a living document and a living dashboard that can change and adapt as things are needed. Your basic premise I agree with, which is that the more information we can get out there, the better. That, again, has been seen

during the pandemic. The more information people had, the more able they felt to know what they should do. Of course, people had different reactions to that, but it is the way to go.

Tim Lord: That is absolutely right. Transparency through the ONS is important.

The other critical thing on data transparency is that national society-wide information is important but also important is information about individual choices. If you take the energy performance certificate as an example, if you get one, it does not tell you much about what you should do if you want to reduce your carbon footprint and the impact. It will give you some quite generic advice what band your property is in and the kinds of stuff you might do. We also need to be thinking much harder about how we get tailored information to people who want to take action so they understand where the biggest impacts are in their homes, what energy efficiency measures might be cost-effective, what low-carbon heating solution might work for them, and where they can access financial support to deliver that. That more individual and tailored information, alongside the kind of material that Sir Patrick is talking about, is critically important if we want to engage people in this process.

Q119 **Lord Colgrain:** You have both partly answered this question already. Are there lessons from the pandemic about how behaviour change can be asked for equitably and consistently, which could support meeting climate and environmental goals? "Equitable" is the key word there. Sir Patrick, you mentioned it two or three times already. Could you start on this, please?

Sir Patrick Vallance: Yes. It is a clear point that came up during the pandemic and it will be highly relevant to this. It is important that understanding information and messaging is tailored towards groups in the right way—otherwise, it is not equitable. Taking a one-size-fits-all approach to communication will not work here. I have already mentioned that local understanding and local context will be important in trying to make things meaningful and actionable by people. Co-creating messaging so that it resonates and using trusted leaders in communities will be an important part of this, as they were during the pandemic and other situations.

Lord Colgrain: Did you find feedback during the pandemic that there was reference to wealth differences and also rural and urban differences, or did that not come back to you in any strong feedback way?

Sir Patrick Vallance: It would have come back. Again, a whole hoard of people deal with government communications, and it would have come back through various things that they were doing. I am sure that focus groups and so on were picking up on this information. Scientifically, it would have come in through various reports and research that was going on, into the Behavioural Science Group and others. We certainly were concerned about the inequitable nature of what was happening, in some cases, and how that could be tackled.

I am afraid the same situation is true. I said earlier on in the pandemic that the problem was that the virus both fed off inequality and fed inequality. I am afraid the same is probably true with this situation. It is worse for those who are poorer, disadvantaged and marginalised. It will make that gap wider if it is not handled properly.

Tim Lord: That point on equity is a critically important point for two main reasons. One is that the wealthiest have a far bigger carbon footprint, as I mentioned earlier. In the UK, the wealthiest 10% have a carbon footprint more than double the national average and more than four times that of people at the lower end of the income distribution. That tells you something about where we can target to have most impact, in particular in the short term. It is not about telling people who do not have savings that they have to spend huge amounts of money decarbonising their homes. We can achieve a lot by getting costs down through delivery in other parts of the population.

The second critical point is that we have to make this an accessible transition for different parts of the population. If you google "zero-carbon house", you tend to find lots of pictures of four-bedroom houses with solar panels on the roof, heat pumps on the side and electric vehicles in the driveway. For many people, that is not their lived reality. Their ability to access those kinds of technologies, to physically install them or to afford them is very different. We need to make sure that we are providing different types of support for different parts of the population and that we do this in a way that targets particular parts of the population or makes it available for different parts of the population at different times, to ensure we do not ask those with the lowest carbon footprints and the least means to pay for this transition to do it first.

Q120 **Lord Whitty:** We talk a lot about what government should do and what government should tell people. Consumer behaviour is affected by lots of different things. It is to a limited extent affected by what the Government say or do to them by changing the price of things through tax, subsidies and so on. But most of the choices and most of the changes in habits come through what the commercial sector makes available and what the advertising sector tells them is now the latest fad or what their friends and reference groups are now adopting. The role of communications in the commercial sector is at least as important as what the Government tell consumers. That seems to be largely not consistent with the message the Government are trying to put across here, which is largely that you want a bigger car, you want a better holiday, you want clothes that have a high carbon content and so on. Can it be made more consistent and can we avoid the fact that most major changes in consumption patterns are firstly adopted by the richer element of the population? That may be a good thing, because of their carbon footprint, but it does mean that large sections are unaffected by that until the price comes down. In other words, are we missing what actually makes consumers change their behaviour: what is the latest fad, what is the thing to have and what is good for you, because that is what the advertising profession tells you?

Sir Patrick Vallance: It is absolutely the case in my view that the private sector is important in this. The private sector will be a major part of the technology innovation and the ability to make that technology innovation affordable and applicable.

If you look at the net-zero strategy, it talks about five areas in terms of relevance to behaviour change. The appropriate regulatory signals make a big difference to how industry behaves and does things. It is about removing barriers to make introduction and accessibility easier; making things affordable, which has implications both for industry and for the Government; empowering decision-making by making sure that people have the right information and ability to make those decisions; and motivating and building public support. Those five areas were flagged, and those definitely do not involve just government; they involve many other players in the system as well. Absent appropriate private-sector engagement and indeed direction, which can be shaped by some of those things from government, this will not be solved. Private sector involvement will be a critical part of this.

Tim Lord: I would add three brief points to that.

You are clearly absolutely correct that the private sector as a provider of services and goods is critically important and also as a communicator. Secondly, government does have a role in providing clear information and support to people to make the transition.

The third is that government has a critically important role in shaping markets and getting incentives right. If they are serious about delivering a 50% reduction[3] by 2030 and net zero by 2050, to some degree they have to shape markets to deliver that. You have seen with offshore wind, for example, costs come down from £150 a megawatt hour to £50[4] in a decade, partly because the Government shaped the market to help deliver that outcome. On EVs, the Government are giving clear signals that they will end the sale of petrol and diesel vehicles not just in the UK but elsewhere, and it has seen huge investment not just from Tesla but from the big existing automotive firms. You see the costs come down and consumers making the choice to drive electric vehicles. A lot of thinking is to be done about how we shape other markets to deliver the outcomes that the Government will need to deliver to meet these targets in an equitable way and—to your implicit point—one that is desirable for consumers.

Sir Patrick Vallance: Again, going back to a letter that the Council for Science and Technology wrote over the past few years—it may have been the one three years ago or it may have been a more recent one, I cannot remember exactly which—one thing we suggested was that every regulator should have a primary objective around net zero and green as part of the regulatory environment, so it is not an afterthought in regulation but is primary in some of the regulatory considerations.

[3] Tim Lord later clarified that he was referring to a 50% emissions reduction.
[4] Tim Lord later clarified that he meant costs come down to under £50.

Baroness Boycott: You say the thing makes something affordable, but there is a good argument for saying that we should not have fast fashion where you can buy a t-shirt for a quid. Also, cheap food is a disaster for many reasons for biodiversity, soil, and so on. It is such a big mindset change to say, "Do not go to Primark and buy." Now hundreds of other companies are coming in with these ridiculously cheap clothes. I read the other day that the whole fashion system is now responsible for 16% of CO_2 emissions, and we know what the food system does. How do you get the mindset around buying only one or two t-shirts a year rather than buying one a week? Effectively, the fast fashion industry tries to market and maintain that you would buy it and not even bother to wash it. It becomes inequitable. It is all very well if you buy one Burberry coat in a decade.

Tim Lord: Absolutely. The costs ultimately pop up somewhere. First of all, pressure from consumers can make a big difference and that can be based to a large extent on better information around the kinds of statistics that you talk about there, which people are not necessarily aware of. Secondly, we have to make sure that we internalise those costs where it is appropriate to do so but make sure we do that in a way that is equitable for the poorest.

Baroness Boycott: Do the Government have a role here?

Tim Lord: The Government has a role in looking at where emissions come from, how we can reduce them in a cost-effective way and how we shape markets to do that in a way that does not bear most heavily on the poorest in society. The Government—not just in the UK but globally—has a role in shaping some of those decisions.

Baroness Boycott: It is absolutely not going in the right direction at the moment. In fact, fast fashion is going up. They used to say, "Buy a lipstick when you are gloomy." Now you can buy a whole new outfit for less than the price of a lipstick. It seems that you do need a government intervention, although I do not know what it would be.

Q121 **The Duke of Wellington:** This is such an interesting discussion. I will deviate a little bit from the set question. During this discussion, I am thinking about previous sessions, when it was suggested to us that so much of behaviour change is brought about by regulation or taxation. We are trying to explore this morning how much behaviour change can come from other factors. I wonder whether you could both comment on the extent to which real behaviour change with an important impact can come without change in taxation or in regulation.

Sir Patrick Vallance: Again, I am not a behavioural science expert, but I shall give two observations. One I have said already that meat consumption has decreased, and that changed without regulation or taxation change. The uptake of electric vehicles is related to certain subsidies and so on, but predominantly it has been a technology change and the ability of infrastructure to be in place to enable it. So other things can push behaviour in one direction or another that are not necessarily

only regulation or taxation, but I cannot tell you the relative quantity of contribution of the different things.

The Duke of Wellington: To come back on the electric vehicle point, I understand what you say, but nevertheless that is partly through regulation, in the sense that it has become illegal from 2030 to sell fossil-fuel vehicles. Interestingly—and I declare an agricultural interest—it is still difficult to buy electric tractors. A lot of farmers would like to be able to buy electric tractors but they cannot—but that is a subpoint. But the switch to electric vehicles has come about through regulation, which has led the manufacturers to know that they have to produce electric vehicles.

Another point in all of this is affordability, which both of you and we have all mentioned on many occasions. I still worry about how you make some of the behavioural changes affordable.

Sir Patrick Vallance: On the regulatory point, the first in the list of five things in the net-zero strategy is regulatory signals. So I agree—that was a regulatory signal, even though the regulation has not come into play yet.

Tim Lord: On your original question, for all these behavioural changes and technological changes, it will be a combination of different things. Sometimes it will be regulation and sometimes tweaks to taxation. Often it will be fiscal support early in the process to get the costs down and markets moving, which hopefully we can move away from later, as we have seen successfully in renewable power and we see similar on electric vehicles.

The other point about regulation is long-term regulation, as we have seen on EVs and as we have seen in some other areas, can give a clear signal to markets, for example, to develop supply chains, which will then help to drive down costs and make it easier for consumers.

The other point is one that Sir Patrick made earlier, which is that we need to start getting on with some of this stuff so that we avoid punitive regulation later. We have 28 years to do 28 million households. That is pretty easy maths to do in terms of average we need to do over that period. If we wait 10 years and do not do anything, then you will be at a point where, if you got a new boiler in 2035, you would have to rip it out before 2050 before it has served its natural life. If you can give clear, long-term regulatory signals, you can give appropriate support to people. You can do these things more in natural replacement cycles, which is more efficient for the transition and, from my point of view, would probably be more palatable to consumers than trying to do it all in a rush at the end.

Sir Patrick Vallance: I cannot remember. You may know the replacement cycle for a domestic boiler.

Tim Lord: It is about 15 years.

Baroness Young of Old Scone: I am interested in the Foresight work. It would be useful to understand what scenarios will look like, not what they are but what they comprise, and what you think the Government will then do with them.

Sir Patrick Vallance: They are being worked up at the moment, so I cannot tell you exactly what they look like, but they are exploring plausible societal changes in four different scenarios, which will range from lots of behavioural change to much less behavioural change, and then trying to work out the impact on the overall ability to reach net zero and what the consequent other changes would need to be to make that happen. It will lay out a series of inevitably artificial scenarios but ones that are plausible, linked to the implication on net zero. When we have that report, we will publish it and we will make that widely available across Whitehall as well. It will be the starting point for, therefore, a series of discussions as to where the UK thinks it is in relation to those scenarios and what might move it in one direction or another. It will not give answers as to how you should reach any of those scenarios or make a judgment call on which of those is the right ones but lay the evidence out for people to look at.

Q122 **Baroness Northover:** I was listening yesterday to a session looking at the differences between UK and EU regulation in terms of climate change and the potential costs if we diverged. It came across strongly that British industry wanted to make sure that we did not diverge so that it minimised their costs.

I wondered whether you are able to work with what is happening within the EU so that we can dovetail. The argument was being made that Europe is likely to be the leading continent in this area and therefore, if we work together, it makes it much more effective. There are simple things like landing the energy from the North Sea; if you work together with the countries around, you need to have less infrastructure so it is less expensive to do it. Therefore, making sure that that is happening is, clearly, important for our economy and our businesses as well as citizens. I wondered if you might be able to comment on that.

Sir Patrick Vallance: I believe you have the Secretary of State for BEIS coming in front of this committee shortly and that is probably one for him rather than me.

Baroness Northover: Are scientists working together on the solutions?

Sir Patrick Vallance: Scientists across the world work together on this. An important feature of science is that it does not respect national boundaries and works across. British scientists are part of and have led in the past all sorts of programmes, including historic and newly proposed EU programmes, and we will continue to work with them. I am absolutely sure about that.

Baroness Northover: Do you know whether within the EU they are developing anything like you have laid out in terms of the dashboard

from the ONS and so on?

Sir Patrick Vallance: I do not know. Sorry.

Tim Lord: To add briefly on that, first, I agree with Sir Patrick that that sounds like an excellent question for the Secretary of State. I would add three other points.

One is that many of these markets are globalised and we need to think about the benefits of harmonisation in terms of standards and so on to make sure that we can access those markets. Often those will be shaped by the EU, in some cases potentially elsewhere.

The second point is that I completely agree with you about collaboration, in particular in energy markets. Generally, energy markets work more efficiently if they are interconnected but we also need to think about the security components of that. The North Sea in particular is a strategic asset not just for the UK but more widely. It will no doubt be more efficient to develop that in a way that is coherent across borders while respecting where we are on EU exit and so on.

The third point is that carbon border adjustments mechanisms and new taxes on borders are certainly being thought about actively in the EU and elsewhere globally. Decarbonising in the way that we have planned to quite rapidly is a key way of protecting against the risk that you end up facing tariffs down the line, whether that is the EU or with other parts of the world. Countries that go more slowly are at more risk of facing those kinds of tariffs and facing economic and trade consequences as a result.

Q123 **Lord Whitty:** I ask this question because Sir Patrick clearly starred in the communications effort through the early days of the Covid epidemic. That was more or less on a war footing and became compulsory viewing or at least compulsory showing on the main networks.

Do either of you think that the Government missed a trick, certainly when we are in for the long haul on this, in not using other methods of communication that are available, partly through the advertising industry and partly through social media, and the general development of the way people receive information these days? While it was effective, it was a bit resonant of 1943 rather than of 2023. If we are in for the long haul, we have to use the communications that people take notice of these days. Do you have any thoughts on that? Are you aware of any developments within government that will push us in that direction?

Sir Patrick Vallance: The Government did quite a lot of social media during this period, but these are questions for the Government's communications department. As I said, I am not a communications expert. That is one for them to address.

Lord Whitty: You are not aware of what they are looking into at the moment?

Sir Patrick Vallance: I am spending most of my time looking at the science and technology, not government communications.

Q124 **The Chair:** Can I ask a final question then? The point of our session today has been to ask about the lessons that can be learned from the pandemic as applied to mobilising change for the future of meeting the net-zero and environmental goals. Do you think the Government are seriously looking to learn those lessons, given that scientists want people to base policy on the evidence? Do you believe the Government do that job?

Sir Patrick Vallance: Again, these are questions for Ministers and others to answer what they want to do. I will tell you what my priorities are for the year. My priorities for this year are climate change and net zero, the Government's science system and innovation. I am focused on those three things. The fact that I have put climate change at the top of that list tells you what needs to be concentrated on over this period. The reason I said "for this year" is because this is not a problem that you pick up in 2048 and worry about whether you have it right. It is an absolute now problem that requires focused attention. On the behavioural side of this, the seven principles that the team laid out which were relevant for the communication during the pandemic are quite applicable to thinking about this as well.

Lord Browne of Ladyton: It does occur to me, taking a systems approach to this, that from our committee's point of view, in trying to figure out what advice we can give the Government and country about how we can engage the challenge that the Climate Change Committee has set us all with this 60%, we should not take evidence from scientists separately from government Ministers. We should take a systems approach to this. We should bring people in together and have them engage with each other in front of us. What do you think about that?

Sir Patrick Vallance: I frequently appear in front of select committees with Ministers.

Q125 **Lord Lilley:** Because you have ducked the behavioural questions and invoked science, could you give a view as to whether it will be possible technologically to replace gas as the back-up fuel when the wind does not blow and the sun does not shine or whether battery costs will come down? I do not know if you have read *Physics World* this month, but an interesting article shows that the £300 million battery plant in the Thames Estuary will store three minutes' worth of half our electricity supply. To have back-up for a 10-day wind-free zone would cost £1.5 trillion. If batteries are not there, what else is there apart from gas when the wind does not blow?

Tim Lord: It is a real challenge. I observe that last week or even a couple of days ago we had on the system 80% low-carbon power, which is not the same as a two-week wind-less week, I recognise, but that was inconceivable when I worked on the electricity market reform programme less than a decade ago. It was inconceivable at that point, and people

would have told us the system would fall over in those circumstances—and it did not. The rate of change can be pretty extraordinary.

In any net-zero power system, renewables and offshore wind will form the backbone of that in terms of volume of generation. There is a range of options for how you manage the intermittency of those sources, which is a fact and not disputed. We have a firm baseload like nuclear, and the Government have increased their commitment to nuclear not just at gigawatt scale but in terms of small modular reactors. We have hydrogen-fired power stations and gas-fired power stations with carbon capture and storage. I agree with you about short-term storage, which has a role to play in balancing in the short term but at the moment it is not economic to do that in the long term. Sir Patrick mentioned earlier one or two areas as we look over the next few decades where we could see real innovation, and long-term storage is absolutely one of those.

The current electricity market design is probably not adequate to that task and the Government were right to announce reform of the electricity market arrangements to make sure that we can continue to balance the system in a world where we are not dependent on unabated fossil fuels. But, yes, it is possible to do that. It is not easy or straightforward to do it, and it will require a mix of different technologies to get there.

Lord Lilley: No one would use nuclear as a backup.

Tim Lord: No, sorry, not as a backup, but in terms of providing baseload reliable generation alongside renewables. Some of the other technologies I talked about can help with the intermittency and the peaks in supply and demand.

The Chair: On that, I would like to thank both of you for the evidence you have given us this morning. It has been fascinating. I hope you will forgive us that on occasions we have tempted you to stray into areas around behavioural science in the absence of Professor Rogers and indeed other areas, but you have both been adept at swatting them away. Thank you for your time and the evidence. I now formally close this session.