



# HOUSE OF LORDS

## Science and Technology Committee

### Corrected oral evidence: Long-duration energy storage

Tuesday 7 May 2024

11.15 am

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Members present: Baroness Brown of Cambridge (The Chair); Lord Borwick; Lord Drayson; Lord Lucas; Baroness Neuberger; Baroness Neville-Jones; Baroness Northover; Lord Rees of Ludlow; Viscount Stansgate; Lord Strasburger; Baroness Willis of Summertown; Baroness Young of Old Scone.

Evidence Session No. 14

Heard in Public

Questions 143 - 154

#### Witnesses

**I:** Justin Tomlinson MP, Minister of State, Department for Energy Security and Net Zero; Dan Osgood, Director of Energy Markets and Analysis, Department for Energy Security and Net Zero.

#### USE OF THE TRANSCRIPT

1. This is a corrected transcript of evidence taken in public and webcast on [www.parliamentlive.tv](http://www.parliamentlive.tv).

## Examination of witnesses

Justin Tomlinson and Dan Osgood.

**Q143 The Chair:** I welcome the witnesses to the committee's second follow-up session to our inquiry into long-duration energy storage. This morning, we are very pleased to have with us Justin Tomlinson MP, the Minister for Energy Security and Net Zero in the Department for Energy Security and Net Zero, and Dan Osgood, the director of energy markets and analysis at the Department for Energy Security and Net Zero. As you will know, the session is being broadcast on parliamentlive.tv and a full transcript will be taken. That will be made available to you shortly after the meeting for you to make any minor corrections.

Thank you very much for coming to join us. We are having to switch gear now. Having just been thinking about engineering biology, we are getting back to thinking about net zero and net-zero grid. The Government have a target to decarbonise the grid fully by 2035. We know that there are plenty of challenges in that, which include the fact that both our power supply and our demand will become increasingly variable over time. There will be challenges in matching that supply and demand across very different timescales—across minutes and hours, but also across weeks, potentially months and even years.

There will be a lot of solutions needed to provide that sort of flexibility, including storage over all sorts of time ranges, interconnectors and, indeed, demand-side response. We are interested to know whether the department has a clear understanding of the roles of each technology and what they will be doing on the grid, and, indeed, whether the Government have a clear picture of what the grid is likely to or ideally would look like by 2035.

**Justin Tomlinson:** You summed it up very well in the sense that this is going to require a lot of solutions. The UK is world leading. This is only my third week in the role, but I have already represented the UK at the international climate finance forum in Berlin. I was certainly very pleased to see what high regard we are held in. There are mutual challenges that we all face, because there is a large reliance on new technologies that we hope will develop. We hope they will develop perhaps better than we have even put into our plans, but there are still a lot of questions. That is why there have to be a lot of solutions, to share out the risk.

So far, the track record has been good. We have exceeded our ambitious targets. We expect to take 68% fewer emissions within our power sector by 2030. We have ramped up renewables from

7% to 47% from 2010 to 2023, and our targets to go further exceed those of both America and the EU. A lot relies on new technology, though, and that is why we have to be pragmatic and cautious as we roll these out, to make sure the complex decisions that we have to take protect both consumers and businesses, but also continue to meet our ambitious net-zero targets.

**The Chair:** You are telling me that we do not have a clear plan for what our ideal grid looks like in 2035. One of the challenges, of course, is that 2035 is not that far away now. If we are waiting for new technologies, there is a danger that they will not be there in 10 years.

**Justin Tomlinson:** They are part of the process. For example, with the carbon capture technology, we have put £20 billion towards unlocking four clusters that will, I hope, be online by 2030. There is then £2.1 billion for hydrogen—again, coming forward again by 2030—which would give us 10 gigawatts. Both of those, as they come online by 2030, will give us an idea of how rapidly we can scale up ahead of 2035.

They are new technologies. We need to see how they work in the places that we can identify for them to be located and how we can link them up to the grid. There are myriad issues in terms of how quickly we can link things up to the grid. Number one in my inbox when I arrived at the department was the scale of the queue of things waiting to hook up to the grid. As we switch from a very flexible energy supply to a reliance on renewables—solar requires the sun to shine; wind requires the wind to blow—what will ultimately replace the more rigid, constant supplies of energy that come from things that contribute on the net-zero side?

We have an idea of which way we are going, but we must be pragmatic. As in all things—whether in the UK or internationally—not all new technologies will work as smoothly as we hoped and some will do better than we hoped. To make sure that the UK is first in the queue on this, we have put an additional £4.2 billion into research and innovation between 2022 and 2025, so we can be the first to try to unlock the next level of things that give us that edge in meeting our ambitious targets.

**The Chair:** Things that are in the stage of research and innovation in 2025 are not likely to be the things that are built and operational within 10 years, I would suggest. How confident can we be that the right technologies will come to market to give us the most cost-effective decarbonised grid, which also provides energy security, by 2035?

**Justin Tomlinson:** Those are fair challenges. First of all, we can go by our track record. We have exceeded all targets so far. Underpinning our approach is our work with consumers and businesses, which includes making sure that they help shape our future strategies and that we do not add unintended additional costs to consumer bills, whether personal or business. We must look at this as an opportunity to have a more efficient system—removing duplication, providing greater certainty, de-risking—to unlock private investment and ultimately deliver cheaper bills, as well as delivering on our ambitious net-zero targets.

**The Chair:** We hear continuously from industry that it needs certainty in order to be confident to invest. Even well-established infrastructure such as gas plants takes something in the order of five years. Hydrogen storage and power is more likely to take seven to 10 years, or even more. Do we not need a more specific vision for those investors to be taking the investment decisions that we need now, if we are going to have the grid and the security of supply that we need in the 2030s?

**Justin Tomlinson:** You are absolutely right about investment certainty. In all the stakeholder events that I have done, there is a huge appetite to invest in this area but, not unreasonably, investors want to see de-risking and certainty. That is why, as we go through each of our sectors looking at how to provide that certainty, we provide staging points to give the direction of travel that we are going in. The sector, including potential investors, is helping to shape those decisions.

We are looking at sectors where perhaps there does not need to be support. Short-term battery storage is rolling out very quickly. That is working fine, but in other areas with greater risk, greater uncertainty, we are starting to look at more price certainty and better regulatory frameworks to de-risk. When I was at the international climate finance talks in Berlin, this was something that we were all talking about. The UK is seen to be a leader in this role, because we will take a very cautious and pragmatic approach to how we set up those sectors in order to make sure we can unlock it.

The Government cannot do this alone; we will require private sector investment. Since 2010, we have seen £300 billion unlocked and we have an ambition to get a further £100 billion by 2030. Without that money, we cannot deliver the changes that we require.

**The Chair:** If I am thinking of investing in gas generation and I know it has to be net-zero ready—it has to be either hydrogen

ready or CCS ready—how can I take that investment decision if I do not know where hydrogen production is going to be happening or, indeed, apart from the CCS hubs, where there will be the availability of transport for the CO<sub>2</sub> that I am collecting?

**Justin Tomlinson:** That is why these decisions are taken in partnership. I cannot emphasise that enough. All the consultations are heavily focused on what investors and producers are feeding in, to ensure that we are making the decisions that will keep that private sector investment coming and that there is sufficient confidence to build those technologies.

I cannot emphasise enough that the Government cannot do this alone. We require the market to have the confidence to be able to invest in different technologies in order that we can build our capacity. We have the broader strategies, but we then do it sector by sector and technology by technology, to make sure that we continue to see the investment come in. That identifies where additional work needs to be done, or indeed where less work needs to be done because the rollout is going as it should be.

**The Chair:** Claire Coutinho has said we want to see the building of these new gas power generation facilities. Can you tell me, if I want to develop one of these, where I can put one that would need to be hydrogen ready?

**Dan Osgood:** We are having conversations with investors in potential new-build gas generation plants, as well as operators of existing gas generation plants, on an ongoing basis, including after the Secretary of State's speech in March. If you talked to investors, they would say that they have a reasonable idea where carbon capture, storage and transport infrastructure is likely to be. They also, based on their conversations, have a reasonable sense of areas that are likely frontrunners for where hydrogen might be, partly because, for instance, there is a concentration of potential users for hydrogen in a particular area or there is easy access to potential storage sites.

Potential gas investors are telling us there is less uncertainty around the geographic location of where the future infrastructure or production might be. The question for them is more about the business model and the financial confidence to invest. We are looking at the moment at the capacity market, which is the main policy instrument that we have to ensure security of supply and bring forward this type of longer-duration, flexible generation capacity.

As the Minister said, we are developing a business model for hydrogen to power. We have a business model in place for power with carbon capture as well. We are developing the missing elements of the policy framework to provide that commercial and investment confidence to businesses so that they can invest—whether in a new-build gas plant, with the intention of converting it to low carbon further down the track, or straight away in new hydrogen to power or new power CCUS. As the Minister has also said, these are still emerging technologies, so there is inevitably still some uncertainty about quite how they will evolve or the relative role that they might play in the power system of the future.

**Justin Tomlinson:** You are absolutely right to highlight this, which is why we felt the need to bring forward the *Powering Up Britain* strategy in March 2023, to set an overall direction of where we were going. We also had the sector-specific updates for CCUS in December 2023, the civil nuclear roadmap in January 2024, and the hydrogen production delivery roadmap in December 2023. We are working on the policy framework to enable investment in long-term durational electricity storage.

That then provides the roadmap and the certainty to de-risk for investors. That is crucial because, internationally, we are competing with other countries that are beginning to recognise the importance of this private sector investment, which is needed to reach the targets. It will become more competitive, so we have to stay one step ahead. That is why we will do the detail for each sector.

Q144 **Lord Lucas:** Is part of the problem that different teams in DESNZ work on different bits of energy policy and there is no guiding mind for the overall system, to ensure that these efforts will add up to energy security and a decarbonised grid? Will the National Energy System Operator fix this?

I have a couple of questions for Dan. Are we at last getting to the point where people like you stay in post a decent length of time, so you can establish really good relationships and expertise? I do not mean three years. Are there any lessons from your time on the vaccines task force that you would bring to your current job?

**Dan Osgood:** There are a lot of questions there. Starting with your question around how this all comes together within the department, you are right that there are a number of teams working on this. We have some teams focused on particular individual technologies. There is a hydrogen programme and you heard from one of the SROs for that programme at an earlier session. We have teams looking at big cross-cutting issues, such as

electricity networks, and then we have teams at the centre, whose role it is to pull it all together.

In terms of our internal structures and how we work together, we are very mindful of the need, ultimately, to view this as a system and to think about how the different elements interact with each other, making sure that we are thinking about this in an integrated and comprehensive way. I hope that provides some reassurance on that point.

I will not try to get into my personal career plans, but we have a lot of expertise within the department and we use that well. Clearly, there is also a huge amount of expertise and knowledge beyond the department as well. How we engage with external experts, businesses and potential investors is really critical, as well as the skills, expertise and capability that we have.

**Justin Tomlinson:** That is why there is a big emphasis on stakeholder involvement, not just in the formal consultations but in events and round tables, because we need their collective expertise to help shape our investment and policy frameworks. And, no, Dan is not going.

**Lord Lucas:** Will we see more details in the strategic spatial energy plan? When do we expect to see them? When the National Energy System Operator develops its strategic spatial energy plan, how will the Government ensure that it is delivered? Will the plan be put on a statutory basis and, if not, how will the Government make sure that the necessary decisions to enact the plan are made swiftly?

**Justin Tomlinson:** I have done a large stakeholder event on this and I was surprised just how warmly received the principles of this were across a very diverse audience. It is a key part of de-risking for future investment, providing a roadmap of where we would like to see investment, and helping across government to have a more co-ordinated approach to remove inefficiencies and duplication. It is also a key part of tackling our large queue to get on to the grid and removing clustering where there are current gaps, but not necessarily where we would ideally like to see investment going.

It is going to be shaped by the consultees, because we have to balance our efficiencies, which are good for consumers, with making sure it is as easy as possible for investors to have the confidence to unlock. We will do this. We expect to bring forward work quite shortly in this area. The initial thoughts are weeks away, and then we will continue to build that up as it covers all areas.

**The Chair:** Are we weeks away from our first strategic spatial energy plan?

**Justin Tomlinson:** The initial thoughts of it are weeks away.

**The Chair:** Is that a list of bullet points or a plan?

**Justin Tomlinson:** We will see. It had been pencilled in for the day that I did that consultation event, but it was not quite ready. We had to leave them wanting more. It will be soon.

**The Chair:** Is it clear that this new National Energy System Operator will have responsibility for the hydrogen system, as well as the electricity system?

**Justin Tomlinson:** Yes, it will cover everything. They will be the ones to publish the first iteration of this and then it will develop, because we have to look across maritime, land and all the other areas. The different layers will build up.

Q145 **Baroness Northover:** What role do you see long-duration energy storage—ie, storage over multiple days, weeks or months, as opposed to using the batteries in a shorter time—playing on a decarbonised grid?

**Justin Tomlinson:** We are anticipating an additional 30 to 50 gigawatts for long-term duration. It is going to be absolutely key. As we move away from unabated energy sources, this is the bit that will allow us to complement our ramp up on renewables, which can be inconsistent in how much they can produce—ie, solar when the sun does not shine and wind when the wind is not blowing. It is an absolutely key part.

It is reliant on new technologies. That is why the Chancellor has unlocked £20 billion for carbon capture and £2.1 billion for hydrogen. Going ahead, both of those projects are set at 2030, because that will then provide the lessons in terms of locations and the complex supply networks that need to support them. That will provide greater certainty for private sector investment to take the next wave on, so that we can meet our ambitious 2035 targets in these areas. It is an essential part of our strategy going forward.

**Baroness Northover:** That is the size of it, as you see it. It is not in line, for example, with the Royal Society's report.

**Dan Osgood:** I do not have the Royal Society's numbers at my fingertips, I am afraid. Just to go back to an earlier question from Baroness Brown about how we think our electricity system might evolve in future, we have a clear view as to the different types of functionality that we might need and the scale of that. As the



Minister said, we are targeting 30 to 50 gigawatts of longer-duration flexibility by 2035 and, alongside that, perhaps up to 55 gigawatts of shorter-duration flexibility to deal with that minute-by-minute, hour-by-hour flexibility challenge.

The question then, though, is what the different technologies are within the 30 to 50 gigawatts of longer-duration capacity. For instance, what role might unabated gas play, compared with longer-duration electricity storage, power with CCUS or hydrogen to power? That is the area where there is probably still greater uncertainty, because a number of those technologies are still emerging. We do not yet have a full picture of how easy or difficult it might be to bring those forward, how much it might cost or to what extent those costs will come down.

We do have a sense of the scale of different types of capacity that we are going to need in future. What we do not yet have, and you would expect, is a fully specified technology-by-technology plan saying, "We can definitely guarantee it will be X gigawatts of this technology and Y gigawatts of that technology". To a certain extent, the technologies are interchangeable. They can play the same role within the system. We are putting money into all of them, investing in all of them, seeing where that takes us and then adjusting.

**Baroness Northover:** It sounds like you are not looking at the potential of the United Kingdom to export to the rest of Europe, when looking at this in terms of those numbers.

**Dan Osgood:** That is part of our thinking. We certainly expect that, as the rollout of renewables proceeds at pace, the UK will in fact become a net exporter of electricity, because we have such fantastic potential for renewable generation here. Those are the numbers that we put out in March as part of the consultation on the review of the electricity market arrangements, in terms of what size system we think we might need for 2035. Looking to 2050 and beyond, there is greater uncertainty because we do not yet know the role that the electricity system might play in the wider economy and how far, for instance, heating buildings or heating industry might be electrified. There is more uncertainty the further out you look.

**Baroness Northover:** What is the current status of government policies that could support long-duration energy storage, such as the recent consultation? When can we expect to see the outcome of that and a little bit more certainty?

**Dan Osgood:** My understanding is that, as I say, we are looking to publish the government response to the recent consultation on business models for long-duration energy storage in the summer. We have said that we are aiming to complete the design of the business model by the end of this year, so that applications can start next year. That is a reasonably quick timescale because, as I said earlier, we recognise that, as these new and different technologies emerge, more tailored support is needed in some areas. That is why we are developing this business model.

**Justin Tomlinson:** It has to be done very carefully because, going back to my earlier point about consumers and businesses, we do not want to inadvertently add unnecessary cost by taking too quick a decision without working through the whole process. I spent two and a half years on the Public Accounts Committee, so I know the sorts of questions that are asked if you get it wrong.

**Baroness Northover:** There are always those risks, but there are also the projections going forward, which are pretty dramatic, in terms of the electricity demand that you can already anticipate will likely be there. If we recognise that some long-duration storage is required, can we not make some no-regrets investments in projects now, rather than being very cautious and not trying things until somebody else has proved that they work? By that time, we are well behind. Can we get on with building the infrastructure and speeding up development of new technologies?

**Justin Tomlinson:** To a certain extent, everything is always under review, because we have legally binding targets. Our Secretary of State, understandably, has to be focused on that. These are regular targets. You cannot hide from them. It is not just a simple case that the next generation of politicians will have to answer to today's promises. We have to answer to those. I have an Urgent Question potentially later on today.

This is where the consultations with investors and stakeholders identify barriers. In some cases, they are around regulatory framework, planning, or access to the grid. Those are all day-to-day operational things that we can fix with relatively little financial impact. Then there is the stuff around price certainty. We will have a look and, as I said earlier, there are some areas, such as short-duration storage, where there is no need for financial incentives. There is a big appetite for private investment and it is just a question of how quickly we can hook that up to the grid. In the long term, there is that need. This is actively reviewed, with those legally binding targets anchoring our thinking all the way through.

**Baroness Northover:** In terms of the scale of support, finance

and proposed support mechanisms such as the cap and floor, what difference do you think that would make in bringing storage forward? You have emphasised that you are linking up with business and so on, but is there not a contradiction? There was a rejection of the cap and floor in the review of energy markets for ensuring security of supply, but the consultation supports cap and floor. Are you indeed responding to what people are saying?

**Dan Osgood:** There is no contradiction. My team leads on the review of electricity market arrangements and, in our second consultation that we published in March, we were looking at what was the right market-wide mechanism to bring forward both investment in renewables, building on the current contracts for difference scheme, and the flexible capacity that we need to help keep the lights on.

We currently have the capacity market, which has been very successful up until now. A number of technologies are eligible. There is a huge variety in the scale of projects, from very small individual battery projects through to large projects with 1.5 gigawatts of gas turbines. We felt that a market-wide instrument—continuing the capacity market, but reforming it so that it better brings forward low-carbon generation in addition to the unabated gas generation that historically we have relied on—was the right approach. It is market-wide, open to all technologies, so that many hundreds, if not thousands, of projects can secure investment of all sorts of different scales.

On long-duration electricity storage specifically, what the industry was saying and, ultimately, what the department responded to with the consultation we have published—and we are considering the responses at the moment—was that you are talking about a very small number of potentially quite large projects, mainly, I suspect, pumped hydro projects. We are expecting it to result in a very different portfolio of projects coming forward.

The particular concern that we had in relation to methodologies that were based around revenue is how to calculate the revenue for an individual project. How can you be sure that you are measuring the right thing and that the system is not being gamed in some way? We felt that those questions are much easier to deal with when you have a very small number of very large projects than if you are trying to do something across hundreds, if not thousands, of very different, hard-to-compare projects across the market.

That is why we felt, as a market-wide approach, we should stick with the capacity market, but improve it. For the long-duration electricity storage as a technology in particular, because of the

nature of the projects that were coming forward, because of what the industry was saying to us and because of the work that we had been doing separately within the department, in terms of the actual market failure or the particular challenge that that technology faces, we felt that the revenue-based cap and floor model was the right approach.

As I say, there is a consultation that closed recently on the business model for long-duration storage. The consultation for REMA, as we were chatting about earlier, closes today. We will look at what comes back through both of those consultations and provide advice to Ministers, who will take decisions on the back of that.

**The Chair:** How will that interaction occur when the long-duration energy storage is something like hydrogen? Hydrogen is going to work with the hydrogen turbines that are being built as part of the capacity market support.

**Dan Osgood:** Hydrogen is still emerging as a technology. A business model is being developed for hydrogen storage and transportation. There has been a consultation recently on the business model to bring forward hydrogen-to-power projects. Part of the challenge is that you have to be sure that the hydrogen infrastructure is in place and that the power plant can generate. These things are all connected.

For hydrogen to power, because of the different characteristics of it as a technology, the different risks that it faces and the different role that it is likely to play—within both the electricity system and the hydrogen system as it emerges—we felt that a different business model was the right approach to achieve the best balance between what the industry is looking for, namely the confidence to invest, and what the consumer is concerned about, namely value for money and costs on bills.

That is another area where there has been a consultation recently and the responses are still being considered. The Government will publish a response.

**Justin Tomlinson:** This goes back to Baroness Northover's earlier point about making sure that we can keep up with the new technologies coming online. It is such a complex area in terms of the supply chains for investors to understand the true costs, challenges and opportunities. The £2.1 billion will unlock those 11 sites, 11 projects, which will provide sufficient information for future investors to then have the confidence to bring forward more.

**The Chair:** It is extremely complex.

Q146 **Baroness Young of Old Scone:** I do not know whether I am confused, you are confused or it is a lot more complicated than we think, but I am searching for what the government policy is on long-duration energy storage. In particular, how long is “long term” in your view? Are you genuinely looking for months and years, in terms of the flexibility that that would provide, or are we talking about a much shorter period?

Our report on this issue supported the need for a strategic reserve of low-carbon electricity generation and the National Infrastructure Commission report said the same. I am just not clear that we actually have a clear statement from government as to the policy on long-duration energy storage.

**Justin Tomlinson:** We have set out our ambition to get 30 to 50 gigawatts of long term.

**Baroness Young of Old Scone:** How are you defining “long term”?

**Justin Tomlinson:** It is about the technologies that will deliver that.

**The Chair:** You may be getting a little confused here between storage and flexibility, because 30 to 50 gigawatts is a power generation capacity. It is not an amount of stored energy. We are talking about stored energy and capacity of turbines, and they are two different things.

**Dan Osgood:** I appreciate the complexity and part of the challenge here is the interactions between the electricity system, the gas system and the emerging hydrogen economy and hydrogen system. From an electricity system point of view, we have a range of technologies that can provide us with flexibility—with apologies for using that term—across a range of timescales, from the very short durations that Baroness Brown was talking about at the start to hours, days or weeks.

In terms of keeping the lights on, we are relatively agnostic as to the precise mix of technologies, provided that the end result is achieved. At the moment, the main technology that we rely on for that long-duration flexibility, that ability to smooth out those variations in supply and demand, is unabated gas generation. It is a mature technology. It is coming forward through the capacity market and is competing with other mature technologies.

We know that we need to move away from unabated gas generation. There are other technologies that could perform a similar role, which are at varying stages of maturity. They have different characteristics. They all have a slightly different business model that is tailored towards that technology and bringing it forward. Longer term, as those technologies become more mature, we would look at—and we set this out in the REMA consultation document—folding those bespoke, first-of-a-kind targeted supports back into the capacity market so that, again, those different technologies are competing against each other and the market can help drive innovation and keep costs down for consumers.

That is the overall vision, if you like, for how we are going to secure that capacity and help to both keep the lights on and drive down emissions. We also need to recognise that these technologies are at very different stages of maturity. You heard from witnesses at your previous session that hydrogen is still at a very early stage globally. That is not a UK-specific challenge, but a global challenge.

That is the overall strategy. Our aim is to drive progress, drive the development of these new technologies, bear down on emissions and make sure that we keep the lights on throughout this transition, as we move away from relying on unabated gas generation, which is what we have done for the last few decades. That is the overall strategy.

**Baroness Young of Old Scone:** Minister, if I were to be a bit cynical when looking at the size of the unabated gas plants that have been approved, which come in just below the 300-megawatt level that requires them to be net-zero ready, I could say that the Government's strategy for this in the short to medium term is simply to build more unabated gas-fired stations.

**Justin Tomlinson:** We have to keep the lights on. If we are going to need unabated gas, it is better that it comes from Britain than being transported across the world, which would have a higher impact on global emissions. The speed that we are ramping up renewables and weaning ourselves off unabated gas is greater than the international commitments to keep temperatures within 1.5 degrees. We are ahead of schedule on that but, in the short term, it is a requirement as part of our energy mix.

**Dan Osgood:** There is a 300-megawatt threshold in the current carbon-capture readiness regulations, which have been in place for a number of years. We have consulted on possibly removing that threshold and I believe the response to that consultation will be published very soon. That is one of the questions we are looking at, exactly because of the risk of distortions that you have identified.

**The Chair:** One of the challenges is that, once we have this excellent renewables system with some nuclear on it as well, there will still be these rare events where renewable generation is very low over northern Europe. Even if we are prepared to burn some unabated gas, gas prices will be shooting up. Both the National Infrastructure Commission and our committee have suggested there should be a strategic reserve, whether that is hydrogen—some of us would prefer that—or unabated gas.

This is one thing that we are trying to find out from you. Are the Government ruling out a strategic reserve? It might have been rather helpful for keeping prices down when the Ukraine war broke out, for example.

**Dan Osgood:** You are right that we do not have a strategic reserve at the moment, within either the gas system or the electricity system. As I say, we have the capacity market on the electricity side, which has been very successful in ensuring our security of supply.

**The Chair:** There is security of supply, but not of cost, which is hugely important to consumers. The Government spent an enormous amount of money subsidising consumers when the Ukraine war broke out.

**Dan Osgood:** Just to finish, on the gas side, we benefit from very high levels of domestic gas production and imports from Norway. Again, our gas system has very different characteristics. You are absolutely right that we need to look ahead to the threats and risks that we might face in future.

In relation to the electricity side of things specifically, we looked at the concept of a strategic reserve within the electricity system, again as part of the recent REMA consultation. We decided that the capacity market was the right approach, at least for the time being, because it has worked very successfully in keeping the lights on. You are right that we saw peaks in prices. There was the structural increase in prices due to the increasing gas prices, but also, when electricity systems are under stress, and supply and demand are quite tight, prices inevitably rise. That is actually the market sending a signal to those consumers who can reduce their demand to do so.

We looked at whether a strategic reserve within the electricity system would be a better approach than the capacity market and came to the view that it would not be at this stage. We thought that moving to a strategic reserve might actually increase bills for consumers rather than reduce them. The reason is that you are

effectively taking some capacity out of the market and paying it to sit there for the 0.1% of times when you might need it. You have reduced the capacity in the market for the other 99.9% of times, so prices are higher over that period, and you might not ever use the strategic reserve capacity for the 0.1% of times. In a sense, you almost do not want to. We looked at the track record of the capacity market and the potential cost of a strategic reserve, and decided that it is not the right approach for now.

In a sense, we almost had a strategic reserve on the electricity side because the electricity system operator put contracts in place with the three remaining coal plants at that stage. Those contracts were agreed and put in place. Those coal plants were paid by the system operator, which ultimately came through to consumers' bills. That was the right decision at the time, because of the particular risks that we faced as a result of Russia-Ukraine. Those coal plants were not in fact needed.

That is the trade-off that we are trying to make: it is between what we need to do to maintain security of supply and how we keep bills as low as possible for consumers. We came to the view that the capacity market is the right approach at this stage.

**Chair:** Lord Drayson, apologies, I have intruded a bit on your question.

Q147 **Lord Drayson:** No, not at all, it was very helpful. Mr Osgood, we have heard you say that the Government have, therefore, decided not to invest in a strategic reserve, which is concerning given the recent experience, as Baroness Brown has highlighted, of having to pay over £80 billion as a result of the UK not having a strategic energy reserve back in 2021-22.

I want to probe the culture of the department and its attitude to risk. You have emphasised, Minister, the cautious and pragmatic approach. I am sure that you have been briefed that previous witnesses to this committee have highlighted the incoherence in the way that the Government think about this. There is no sense of urgency in delivery, a reluctance to make decisions and pick winners, and an overreliance on the market.

I understand how you can make the point that you can create investment incentives but, in certain circumstances, the market will not make the investment because the costs of the failure to have an energy reserve do not come back on the market; they come back on the country as a whole. Please can you tell us how you intend to meet that challenge, given that we have already learned that the market will not address a geopolitical shock, as we had back in 2021-22? The global situation is that geopolitical risks are



going up.

**Justin Tomlinson:** That is why there is a big emphasis on UK production. We have over 700 gigawatts of new capacity waiting to be hooked up to the system. Some of those projects are having to wait many years, too many years, to get hooked up. Earlier on I referred to that as the number one problem in my inbox. Hypothetically, if they were all to get delivered tomorrow, we would be looking for around 400 gigawatts. It is well ahead of what we need. Some of those are speculative applications. Not all will come to fruition. We are making those changes.

As a broad point around energy security, I absolutely recognise your point that geopolitically it is probably going to be trickier rather than easier in the future. That is why there is a big emphasis on UK production to provide energy security.

**Lord Drayson:** We have heard from Mr Osgood that you have effectively made the decision not to have a strategic reserve of energy.

**Justin Tomlinson:** He has set out why.

**Lord Drayson:** Minister, particularly as you are new to the department, can I press you on this fundamental point? It has a devastating economic effect on the country when a geopolitical event causes a spike in energy prices. You are relying on the capacity of the market, in rising prices, to address that. Can you not have another look at the need for an energy reserve?

**Justin Tomlinson:** Nothing is ever ruled out. Everything is always under constant review. Because of the nature of the changes required and the new technologies coming online, everything has to be regularly reviewed. We have legally binding targets and need to make sure that we do not create unintended consequences for consumers.

I absolutely understand the point you are making but, as it stands at the moment, the feeling is that it would be a greater cost to consumers to have that. That is based on the risk analysis so far, but it has to be kept under review. Ultimately, UK-produced energy will help to de-risk us in an increasingly risky geopolitical world.

**Lord Drayson:** Minister, we heard from expert witnesses to the committee that the department has a difficulty in retaining the expertise to be able to make good decisions in this area. As the new Minister with responsibility, can you please look at the expertise that the department has in this area, particularly around this need for a strategic energy reserve?

**Justin Tomlinson:** I understand. That is why we have a big emphasis on stakeholder events.

I am a long-standing Minister from DWP. My style has always been to spend as much time as possible with stakeholders who are dealing with these things day to day and to encourage them to speak freely when they meet me. None of my visits so far has been rushed. I spend time talking to the supply chain, which lets us know where the opportunities and the challenges are. I am happy to be challenged all the time because that is the way we make good policy.

**Lord Drayson:** I have one final point, Minister. Can I ask you to be open-minded in relying not just on the market in addressing the strategic challenge that the United Kingdom still has? We have had very clear feedback from witnesses who feel the Government are overreliant on the market to address this issue. The market works very well in the other areas that you have already mentioned, but on this issue the market does not work.

**Justin Tomlinson:** It is not binary; it is not all or nothing. We recognise that the Government cannot do everything, but we also recognise that the private sector cannot do everything. That is why we put £20 billion into the carbon capture area and why we spent £2.1 billion to unlock those 11 hydrogen projects, so we can provide greater certainty and greater information to be able to set the future policy frameworks and price arrangements to keep doing it.

It is not binary. It has to be a combination of the two. We have to lead.

**Lord Drayson:** When is the latest that you can make a decision on the strategic energy reserve for it to be effective?

**Justin Tomlinson:** Everything is reviewed constantly. To be clear, we welcome challenge from everybody. This is such a complex and rapidly changing area. New technologies will be unlocked that will significantly change the direction between now and 2050. Future versions of me will be having very different conversations. We can deal only with what we have today.

With the £4.2 billion investment into research and innovation, the Government have shown that we want to keep providing additional options for us to consider. We will invest directly to help unlock different sectors. We are writing policy statements and policy frameworks sector by sector and we are making sure that those

with real-life expertise, whether it is the supply chain or the investors, have a strong voice to set what we are doing.

These are not targets that are a long way in the distance and that somebody else can worry about in the future. They are things that we have to worry about today. We will be held accountable for that.

**Q148 Baroness Northover:** Just to build on what Lord Drayson has said, you talked about leading. If you future-scan, as opposed to looking back at what has happened in the past, which seems to be informing a lot of your current position, we already know—because of other policy areas, such as electric cars or heat pumps—that there will be increasing demand for electricity.

We are also, and this is very welcome, trying to make sure that we increasingly rely on renewables. We know there is a mismatch when it comes to energy storage. That is what we are asking about. How are you going to address that? What seems to be coming through is that you seem barely to be doing so.

**Justin Tomlinson:** I will push back against that. We all recognise that, but there is so much uncertainty in these areas. That is why, in this case, the Government have stepped forward with the money to be able to pump prime the initial wave of projects, so that both government and potential investors can learn the lessons, we know how quickly we can scale up, everybody has greater certainty and we can de-risk.

These are long-term strategies. If we get them horribly wrong at the beginning, we will pay a heavy cost both in capacity generation and in the financial costs for consumers and businesses. That is why, in these new emerging technologies, the Government are providing the evidence base so we can make informed decisions. That comes back to my earlier point: you cannot escape the Public Accounts Committee.

**Baroness Northover:** What did you think of our report?

**Justin Tomlinson:** It was very helpful. It is those sorts of insights that help to shape the direction that we are going in. We are not precious about challenge, because this is an area with so many emerging technologies where there is not something you can take off the shelf and say, "This is how you do it".

Internationally, countries face the same challenges. We are all looking to each other to share best practice and see how we can work in collaboration. The UK is seen as a leader. We are backing that not just with the policy frameworks or by trying to de-risk and

provide greater certainty but by putting additional upfront money into innovation and research—the £4.2 billion over three years—to make sure we are at the very front of getting new options across this very complex area.

**Q149 Baroness Neville-Jones:** Minister, in a sense it is a conflict of risks. I can see that the department is extremely anxious about not taking the wrong decision or encouraging the market to invest in places that turn out to be misplaced.

One of the preoccupations of the committee is that we are living in or approaching an increasingly dangerous and unpredictable world. It is not just risk in the technologies you choose; it is the context in which we are operating. We have had one nasty experience, which made quite an impression on the public. We are concerned that the Government themselves are reluctant to make decisions and take a lead, which gives the market the incentive to take action. That is the first point.

Secondly, we really do disagree on the need for some kind of reserve, whether it is a strategic reserve or market reserve. We would need to have a lot of incentives if we were going to operate in the market. We do not believe that those exist.

I would put this to you. Your defence colleague is saying that we are living in a pre-war world. The Americans, who are market operators par excellence, have always had a strategic reserve in the matter of energy policy. We benefited from it in this great crisis that we have just been through. It seems to me that a lot of the lessons of history, the practice of other parties and the nature of the world that we live in indicate that we need to move on the subject of a reserve. I just put it to you that there is a real disagreement here.

**Justin Tomlinson:** All of you are making very powerful arguments. I am three weeks into this role. I absolutely understand what you are saying. My commitment to you is that everything is under constant review. You are making a very powerful argument on the reserves. I get it.

On the earlier point, the Government, by putting £20 billion into carbon capture to pump prime it and £2.1 billion into hydrogen, are showing that we are willing to take a risk. There is a scenario where I could be sat in front of the Public Accounts Committee and have to answer why those have not worked. We understand that there is risk in doing that sort of thing, but we feel that is a pragmatic risk to take because of the potential to learn lessons from this and unlock significant investment to deliver on our ambitious targets.

We are not being slow to make decisions. We have taken renewables from 7% to 47%. Our aim is to have cut emissions from the power sector by 68% by 2030—we have already cut them by half, which is well ahead of any other major economy. The economy grew by 80% during the same period. We have exceeded each and every one of the targets so far. We have not sought to roll over those gains. We continue to have those targets. We are held to account for those both politically and legally.

We do make decisions, which is why I keep emphasising that everything is always under constant review. We have the traffic light system. If there are lots of red flickering lights, different decisions have to be taken. In some cases that will require taxpayers' money to try to speed up sectors or to de-risk them and provide greater certainty to unlock investment. In some areas, that is working very well and the Government can watch as the market delivers.

The Government cannot do this on their own. Private investment cannot do it on its own. It has to be a collaboration domestically and internationally.

**Q150 Viscount Stansgate:** Minister, I have listened very carefully to everything that you have had to say. By the end of this year, will you or the Government be in a position to make any major decision on long-duration energy storage?

**Dan Osgood:** In relation to long-duration energy storage, on the electricity side the consultation closed some months ago. We are looking to publish the government response to that this summer, as to whether to go ahead with the business model and what that business model should look like, and, as I said earlier, to get the detailed rules in place by the end of the year so that applications can start coming forward next year. I hope that provides some reassurance on that point.

To very quickly go back to a couple of earlier points, in relation to the idea of a strategic reserve on the electricity side, I am definitely hearing the committee's view. It is set out very clearly in your report as well. The position on the electricity strategic reserve was set out in the REMA consultation document. That is an open and live consultation until midnight tonight. We will then be looking at the responses that we get. We will also add into it the committee's view on that particular question, which has been very clearly expressed. We will provide further advice to Ministers after that.

On Baroness Northover's point and the earlier discussion, the risks that we face are changing. We absolutely recognise that, whether that is geopolitical risk or the risks related to the changing nature and role of the energy system. The fantastic rollout of renewables introduces new resilience risks into the system. Similarly, in the electricity system at the moment we do not really have to worry about the seasonality of demand because it stays reasonably constant through the year. If we electrify heating in a big way over the coming decades, we will have a new set of risks that need to be managed within the electricity system, which we have never had to manage before within electricity.

Just to reinforce what the Minister was saying earlier, all these risks are kept under review. We are thinking about how to evolve our policy framework so that we stay ahead of that and our system has the level of resilience that people would expect.

**Q151 Lord Borwick:** I want to ask about the definition of "net-zero ready" that you use in the second review of electricity market arrangements consultation. What does it mean? Are there any examples of gas plants that have successfully demonstrated that they are net-zero ready already?

**Dan Osgood:** Since 2009, there has been a requirement on new gas plants to demonstrate their readiness for carbon capture. All new gas plants above the 300-megawatt threshold that have been built since 2009 will have demonstrated that.

The consultation at the moment—this is another area where the consultation is closed and the government response will be set out very shortly—is looking at broadening that out so plants can also be built hydrogen ready as well as being built with carbon capture readiness. We think that is important because it gives investors more than one pathway into the future.

This goes back to the Minister's earlier point about people having the confidence to invest. Subject to the final decisions, once the regulations are laid and approved following the consultation, investors in new gas plants would have more than one option for how they were going to decarbonise in future.

**Lord Borwick:** Could you expand on that just a little bit? Does "ready" mean that, as an operator, I can press a switch and it changes? Does it mean that I can make a decision and, when the infrastructure is put in and the pipes are laid, I can swap over to a different system?

**Dan Osgood:** I am afraid that I am not fully on top of all the detail for this one but, from my understanding, what was in the previous

consultation was that new or substantially refurbished gas plants could easily convert. That is particularly around the work that would be done on the site. There is not an expectation on individual plant operators to build all the supporting infrastructure to enable it in terms of the pipes, stores or hydrogen production facilities.

That is not what is intended. It is about their ability to convert the plant in terms of how it operates and runs by fitting carbon capture technology or ensuring that the turbine can run on hydrogen as a fuel. It is those kinds of things.

**Lord Borwick:** Are these things that would take three, four or five years to happen?

**Dan Osgood:** No, not necessarily. Again, this goes back to the conversations that we have been having with gas investors. It partly depends on the individual site, how recently it was built or the particular characteristics of that site.

Gas operators and investors tell us that, in some cases, they would not need a huge amount of time to make that conversion. We are talking to them about making sure that our policy frameworks enable that. If you are a gas plant with a capacity market agreement, you have an obligation to be available when the system needs you. If you want to power down temporarily so you can convert to low carbon, we want to make it possible for you to do that in such a way that you do not get penalised under your capacity market agreement. It will not be a question of years, although it will vary according to individual sites.

**Lord Borwick:** Nobody is doing this at the present stage. You said that anybody above 300 megawatts in the past must have achieved it. Is there anybody above 300 megawatts in the past who has achieved it?

**Dan Osgood:** Any new-build gas plants that were built after 2009 have been required under the regulations to be carbon capture ready. Have any plants that were built as gas plants gone through that process to convert to hydrogen or to carbon capture? No. As the Minister has talked about, we have very large investment programmes in place to roll out the infrastructure that will make that possible for them.

At the moment, the carbon capture infrastructure and the hydrogen production and transport infrastructure does not exist. Individual plants have not yet made that conversion.

**Lord Borwick:** No plants above 300 megawatts have been built in the last few years, is that correct?

**Dan Osgood:** Quite a few new gas plants above that threshold have been built since the regulations came in in 2009.

**Lord Borwick:** How many is quite a few?

**Dan Osgood:** I am afraid I do not have the exact number to hand.

**Lord Borwick:** Would you be able to come back to us with that figure?

**Dan Osgood:** Yes, certainly.

**The Chair:** Could I just quickly slip in? Do we have any evidence that they are net-zero ready? Have they done anything different other than build a standard gas plant?

**Dan Osgood:** It has been a requirement of the regulations since 2009.

**The Chair:** Yes, but is there a process of checking that they have met that requirement in some way?

**Dan Osgood:** Yes, those regulations are enforced—I am testing my knowledge slightly here—by the Environment Agency. I would need to confirm that.

**The Chair:** If you could confirm that, that would be extremely helpful. I am sorry, Lord Borwick.

**Lord Borwick:** That was as much as I was going to achieve.

Q152 **Baroness Willis of Summertown:** I would like to follow up on that previous question. I am sitting here in my room in Oxford. I keep hearing that things have gone out to consultation and that you are consulting on X, Y and Z, but, if you are going to use carbon capture or hydrogen, we will need these networks to take away and dispose of the CO<sub>2</sub>. I have not really heard anything about how that fits in. That is another part of the jigsaw. How close are we to planning for those networks? We can say that those networks are going to be net zero already, but they are nowhere near.

**Dan Osgood:** In relation to those particular networks for carbon capture and hydrogen, as the Minister has said, we have allocated £20 billion for carbon capture. We are in negotiations with the two clusters that are in track 1. We have announced a process for expanding that. We are hoping to get to the point of being able to take final investment decisions for those first two clusters later this year. There needs to be a period of construction after that to put the infrastructure in place, but it is moving forward very quickly.



Similarly, on the hydrogen side, we are aiming to launch the first allocation round for hydrogen storage projects later this year and to award the contracts next year so that hydrogen storage infrastructure can be in either operation or construction by 2030. Both of those programmes are moving forward in terms of providing that enabling infrastructure.

**Baroness Willis of Summertown:** How will they align alongside the planning process? A lot of people are worried about salt mines, for example.

**Dan Osgood:** We would have to get back to you on that. I know that the planning system is one of the issues that the committee has raised previously. We will take that one away.

Q153 **Baroness Neville-Jones:** I want to ask you the opposite side of the question about introducing gas turbines at this stage when we should be coming off gas. What market incentive is there if we are producing gas, as far as I can see, as a stop gap? Minister, earlier on you said that we need to be able to ensure that the lights stay on.

How do we ensure that hydrogen really scales up as a replacement in the situation where we have an established operator who may or may not be in the process of converting?

**Justin Tomlinson:** UK-produced gas is from mature declining basins. The Climate Change Committee has also highlighted that it will still be a part even come 2050. Year on year, the decline will be greater than the international standards that have been set to keep 1.5 degrees. We will be well ahead of that.

There will be fewer and fewer opportunities to bring forward. That is what allows, where it is possible, for investment to have certainty.

**Baroness Neville-Jones:** You are arguing that the decline in gas supply will be a sufficient incentive in and of itself to have hydrogen scale-up.

**Justin Tomlinson:** Yes, because it will need to. Gas will be a declining part of our energy mix.

**Dan Osgood:** There are a number of elements to this that we have touched on at different stages through the session. The first is about the scale-up of the low-carbon infrastructure, the hydrogen or carbon capture infrastructure, so that the possibility to convert to low carbon or to build new low carbon is there.

The second is the business models and the commercial support, which we have talked about, and the progress that is being made to make sure business models are in place for each of the different stages of that process. You also have the role of carbon pricing, which will provide a further incentive to convert to low carbon.

The last element of it is the changes that we are planning to make to the capacity market so that the capacity market is increasingly bringing forward new low-carbon generation rather than unabated generation.

Investors are looking at that, informed by the wider context of net-zero targets and carbon budgets, and can very clearly see what the future direction of travel is. They are planning on that basis, so, when we talk to gas investors, it is in that context. "Okay, it is unabated gas at the moment, but what's my future? What's the long-term future for my asset? What's my decarbonisation plan? Is this a gas plan where my strategy is to max out the running hours in the short term and then close it down in future because it's not going to be viable to run in a low-carbon world?"

Those are some of the choices that commercial operators are faced with. That is what we are doing for each of those elements of the jigsaw that need to be in place.

**Baroness Neville-Jones:** From your argument, I do not understand how the decline in gas provides either a market opportunity or an incentive to grow hydrogen either as power or, indeed, for storage. These are different investors and different markets. I do not understand how you reckon one would be able somehow to make these two movements in the energy market coincide in and of themselves. Do there not need to be government signals for investment in hydrogen?

**Dan Osgood:** There are very clear signals for investment in hydrogen at the moment. The Minister has mentioned the £2.1 billion funding that has been announced. There is lots of work going on to develop business models for each stage of the hydrogen economy that will be needed in future; that is, the production of hydrogen, the storage and transportation of hydrogen and the use of hydrogen within the power system.

There is a very clear direction of travel for investors. There is still some work to do in finalising the details of some of those business models, but the overall direction of travel is very clear. When we talk to investors, they are not in doubt about the longer-term progress towards net zero. They want to talk to us about the

specifics of individual business models and the commercials as they relate to their particular projects.

**Baroness Neville-Jones:** We have heard from other witnesses that they want to see a plan on the part of the Government so they know what the timescales are for this sort of thing. The direction of travel is one thing, but when do you start investing if the background is simply a direction of travel? The Government have now reintroduced gas into the mix, which was not expected and is quite surprising. These investment timescales are long. The market is after much more of a plan from government about when and how.

**Justin Tomlinson:** That is why we have put in the £2.1 billion. They are asking for wider certainty over their overall costs. The whole point of these 11 schemes is to be able to show the total costs, which we can then de-risk for investors going forward. Again, that is an example of where it cannot just be private sector-led. There has to be government intervention to de-risk it.

**Baroness Neville-Jones:** It is very good news to hear that you think the Government need to be an active partner in this.

**Justin Tomlinson:** Yes, absolutely.

**Baroness Neville-Jones:** Timescales are part of this, not just direction of travel, if I might put it like that.

**The Chair:** The worry is that, if somebody is building a gas plant now, it will come online in about 2030, presuming it gets built in five years. That is quite a tight timescale. From 2030 onwards, we can expect it to have declining usage. We are concerned that the developers will expect very large subsidies to build new plants into this environment of declining usage.

**Baroness Neville-Jones:** There are short timescales.

**The Chair:** Therefore, we are concerned that the Government may be paying over the odds for the current approach that they are taking.

Q154 **Lord Drayson:** We are aware that the department, as part of its responsibilities, has to undertake scenario planning. We recognise, as you say, that predicting the future is extremely difficult. We accept that. It would be useful both for us as a committee and more widely to have visibility on what the department's central scenario is. Could you please write to us and tell us?

**Justin Tomlinson:** That was our *Powering Up Britain* strategy, which we published.

**Lord Drayson:** In terms of dealing with the geopolitical risk that we have talked about and the argument that the committee has made from its inquiry about the need for energy storage, there must be scenario planning by the department that takes into account various geopolitical scenarios. It will be interesting to see how the department accounts for the economic shock of, for example, Russia completing its war with Ukraine and a scenario for what the energy prices are going to be then. Will you write to us with that?

**Justin Tomlinson:** Yes.

**The Chair:** Thank you, indeed. I do not know whether you have been let off your Urgent Question.

**Justin Tomlinson:** I have.

**The Chair:** That is a relief for you this afternoon.

**Justin Tomlinson:** I am grateful for that 24 hours. I am sure it will come back tomorrow.

**The Chair:** You have already had a tough grilling today, so it is good to hear you will be spared one this afternoon as well. Thank you for coming. We very much appreciate you saying that you valued our report. We will hope to hear more.

**Justin Tomlinson:** Today's comments will go into the consultation. The second phase of the REMA consultation finishes today. I made sure that the team knew to listen in and record what has been said today. As a given, everything that you have said will be included in that.

**The Chair:** Thank you for that. You will receive a transcript of this in the near future. We would also very much appreciate the various pieces of information you have offered to send to us. That would be very helpful to us. Thank you.