HOUSE OF COMMONS

Energy Security and Net Zero Committee

Oral evidence: Securing the domestic supply chain, HC 298

Wednesday 28 February 2024

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Watch the meeting

Members present: Angus Brendan MacNeil (Chair); Vicky Ford; Barry Gardiner; Mark Garnier; Mark Pawsey; Mick Whitley.

Questions 1 - 122

Witnesses

I: Richard Arnold, Policy Director, UK Marine Energy Council; Jez Haskins, Business Development Director, Taylor Woodrow; Nicolas Pitrat, CEO, BRUSH Group.

II: Dr George Dibb, Associate Director for Economic Policy and Head of the Centre for Economic Justice, IPPR; Helena Bennett, Head of Climate Policy, Green Alliance; Rachel Soloman Williams, Executive Director, Aldersgate Group.

Written evidence from witnesses:

- UK Marine Energy Council
- Taylor Woodrow
- BRUSH Group
- Institute for Public Policy Research (IPPR)
- Green Alliance
- Aldersgate Group

Examination of witnesses

Witnesses: Richard Arnold, Jez Haskins, and Nicolas Pitrat.

Q1 **Chair:** Good afternoon and welcome to the Energy, Security and Net Zero Committee, which is probably the hardest working Committee in Parliament, given that this is our second session today—not that we like to blow our own trumpets.

This session is the first on domestic supply chains for low carbon technologies, and we have two panels, each lasting about an hour. Those who are watching can probably tweet using the Energy Committee hashtag. The first panel is in front of me now, and as ever, could we have your name, rank, and serial number please?

Richard Arnold: I am policy director of the UK Marine Energy Council. We represent the UK's tidal stream and wave energy industries.

Jez Haskins: I am the business development director for Taylor Woodrow, and we are a business delivering UK infrastructure.

Chair: Taylor Woodrow were very famous for the tug-of-war logo.

Jez Haskins: That is it, yes.

Nicolas Pitrat: I am the CEO for BRUSH Group. We offer a variety of products, services and engineering solutions to the electricity distribution network.

Chair: Thank you all very much for coming along this afternoon. I have been reminded by my Clerk that there has been a change to the scheduled programme so that we can allow the even busier Mr Barry Gardiner to go elsewhere to his other Committee. Not only does he do two with one Committee, but he is also going for a third with a second Committee.

Q2 **Barry Gardiner:** Thank you, Chair. I appreciate it and apologise to our witnesses in advance that I will be leaving straight after to get to the other Select Committee.

I want to explore supply chain bottlenecks, the constraints in the supply chain that prevent us getting to the low-carbon future that we want, and to look at what elements of the domestic supply chain you think need most development.

Richard Arnold: The biggest issue for us is maintaining a route to market. The UK Government set a ringfence for tidal stream, which was very welcome. That has seen a significant step change in the deployment pipeline for tidal stream, and it will give the UK supply chain confidence to invest, to shift manufacturing, and to actually address and accommodate these significant changes.

More broadly, there are foreseeable issues to do with cabling. Some members talked to me about there being 18-month delays and wait times to get cables for their projects, but for us as a sector at the moment, that is not the most pressing issue.

Jez Haskins: For us, it is all about the capability and capacity within our supply chains and how we can expand that capability and capacity. For example, the CITB says that we need a growth of 225,000 extra people within the construction industry by 2027, which is considerable growth, so for us it is all about the question of how we achieve those numbers.

Q3 **Barry Gardiner:** What are you doing as Taylor Woodrow? How are you actually developing that yourselves as a company and as an industry? What apprenticeship schemes have you put in place?

Jez Haskins: I will give you an energy-related example. At the moment, we are on a framework for National Grid to upgrade the transmission network, which is something new for us. We are partnering with Omexom, a sister company of Taylor Woodrow's, and we have set up a training school at Castleford, in the north-east. We have 13 training schools around the world, but this is the first one we have opened in the UK, and that was primarily because we had confidence in what was going to happen, so we could make that investment. We will be able to put 100 apprentices a year through that training school, and about 400-plus will go through reskilling.

So, my key message is that where we have confidence that the work is going to happen, the projects are going to happen, the investment is there, there is a clear pipeline and clear commitments, we can start to invest to grow our people and to grow that capability.

Q4 **Barry Gardiner:** That is very interesting. One of the themes of the written evidence we have received is precisely that confidence that you are able to see the full extent of the supply chain. Siemens highlighted to us that the main issue was the Government's project by project approach and the absence of a clear pipeline. They said: "Most supply chain investments take more than one project to pay back. A series of one-off projects is not a pipeline unless you can see the series in advance." Would you echo those sentiments?

Jez Haskins: Completely. Also, a pipeline cannot be just a list of projects. It has to include a robust plan and the sequence of which those projects are going to come to market. People need to have confidence in the dates of when these things are going to be procured and when they are going to be going on site. When it is robust, we can see a pipeline out for several years. That is exactly, as you say, when we are prepared to make an investment. Our training school cost us £400,000, and we invested that before any work was secured. Now the work is coming on board and it is a good investment for us.

Q5 **Barry Gardiner:** Mr Pitrat, the last time I had an interaction with

BRUSH, I was outside complaining about your fire and rehire policy, but we are in different territory today, so we are friends on this occasion. Tell me your take on this.

Nicolas Pitrat: I fully agree with what has just been said, and I can share our personal experience from the business.

Fifteen to 18 months ago, we started work on how we could increase capacity in our transformer facility and start recruiting more people. We reopened our winding shop, which had been closed for 15 years. We are retraining people, reinvesting, and the assumption we were working on at the time was a market growth of 20% to 30%, which is quite big for us. What we have seen in 2023 is probably 400% market growth, and no one, certainly not ourselves, is ready to deliver that growth. It is a very nice problem to have because it means we can recruit and invest more in the business, but at the end of the day, I have to regularly stand in front of customers and tell them that we are not yet at a stage where we can support their projects. So, having the heads-up of what is going to come our way, having that visibility of what is going to happen, is going to be absolutely fundamental.

I also want to come back to the point that was made earlier about training and the availability of people. Everything we do is engineered and designed for a specific project. We do not manufacture anything off the shelf, and therefore the amount of engineering hours and the amount of engineering resources that we require is quite significant. We really struggle today to get the right number of engineers going through the business. We are struggling with the recruitment of engineers.

Q6 **Barry Gardiner:** Why are the national sector specific targets and CfD allocations not enough to promote natural supply chain growth?

Nicolas Pitrat: From our standpoint, CfD is not really impacting us because we only touch the power distribution; we are really not on the generation side anymore. What BRUSH does, essentially, is to build connection points to the grid, so it helps. I obviously have more and more customers on the renewable and battery storage sides, for example, but the challenge is, very simply, that they cannot get a connection quick enough. There is a lot of investment in power generation, but the challenge is how you put that generation online, on the grid. Our industry is probably not sexy enough. We really struggle to attract young people.

Q7 **Barry Gardiner:** What should Government be doing to help you?

Nicolas Pitrat: The key is getting as much publicity as possible around all the perspectives in the industry. It is a really exciting industry. We are actually helping deliver net zero; that is a really big thing for us, and all our employees are very keen on that, but somehow that does not seem to transpire into publicity. In the long term, we need to incentivise more people to get into engineering degrees.

Barry Gardiner: Jez Haskins, you are nodding.

***Jez Haskins**:* Something we could do is to put some ownership, accountability and leadership in there and have a construction infrastructure Minister. There is a construction Minister, and we have social infrastructure in hospitals, schools, housing, potholes, which are all vitally important to maintain productivity and growth in Britain, but what we really need is an infrastructure Minister who can focus on the nationally significant infrastructure projects.

"Net Zero Strategy: Build Back Greener" is a very good strategy and there are some really good policies below it, but what it needs is someone to be constantly putting that message out there and saying, "We are committed, I am accountable for this, I am going to drive this through."

There are a lot of very good initiatives out there, but what is lacking is someone who is responsible for taking ownership of them. An infrastructure construction Minister could take that ownership on.

Barry Gardiner: Thank you very much. Once again, my apologies.

Q8 **Chair:** And thank you, Mr Gardiner, whose efficiency demands he has to leave instantly.

Mr Gardiner mentioned the Siemens evidence to the Committee, which I will come back to, but first, a general question: what is your top concern about the current state of the domestic supply chains in the UK for emerging low-carbon technologies? Siemens has mentioned pipeline, CfDs not always being appropriate for new work, and talked about the support for growing existing industries. One of the most interesting parts of the evidence was when Siemens discussed the size of investment it was prepared to make in Hull in 2014, which was reduced from the first announcement in 2010 due to Government announcements and a seeming flakiness in Government support. I often contend that Government talk about market forces but do not always fully recognise that they are themselves the biggest force in the market. What are your own concerns?

Nicolas Pitrat: I am going to come back to the point of visibility. We have just released a big investment in our transformer facility in Loughborough. I do not expect Government support for this. The market forces should be sufficient; there is a lot going there.

Q9 **Chair:** Would that be the same in all countries? Are some countries providing a better environment for you than you can get in the UK? Or would you like all countries to be like the UK?

Nicolas Pitrat: I can talk mostly about the UK, because BRUSH is 95% focused on the UK now. We see the UK market as being absolutely brilliant for us. There is a huge amount of work that can be done, so we are not actively pursuing outside opportunities. The customers that we still serve outside are few and far between. We want to deliver for the

UK—we are in the UK, and we want to serve the UK—but the key thing for us is, again, that visibility.

If I have a clear pipeline of two, three, four years' worth of project, it becomes quite easy to release the funds and get financing and look at the return for a major investment. When we are looking at it project by project, it is very, very difficult. Again, looking at a practical example from the BRUSH Group, our transformer facility, four years ago, we had barely £10 million-worth of product to deliver. Last year, it was £35 million. The market has jumped and there was no time whatsoever for us to gear up. That is a challenge, but having that visibility makes it very straightforward.

Q10 **Chair:** Should the Government support existing businesses or new businesses to grow the domestic supply chain? Should they nurture what they have, or should they hope for something else to grow?

Jez Haskins: They should nurture what they have because most of those businesses have the skills to be able to provide that growth relatively easily and get it started, whereas a new business is going to go through a longer learning curve. We already have established ways of training people and bringing them on, and we can increase those numbers.

The Government should be encouraging both, but within the existing supply chain there is definite capacity for us to be able to expand, so they should be focussing on that.

Q11 **Chair:** Thank you. Richard Arnold, are there sectors where the UK is particularly successful in developing supply chains, and are there any that have potential or could be nurtured better than they have been? I am always asking you to pick winners, which is difficult.

Richard Arnold: The LSE's Grantham Institute did a really good study last summer, looking at where, and in which renewables, the UK had advantages in comparison to other countries. You will not be surprised to hear, because I raised it from the UK Marine Energy Council, that tidal stream comes out far in front of other technologies.

What the UK can do is to learn lessons from renewable development elsewhere. Denmark, for example, has developed a really strong wind industry. It is worth around £7 billion a year in exports alone to its economy.

Q12 **Chair:** We often hear that it is worth more than the UK defence sector, and that is in absolute numbers, I understand.

Richard Arnold: Exactly, and that is despite the UK having a much better resource. The reason why Denmark managed to steal the initiative from the UK was that it had a feed-in tariff. It had a competitive tax regime to invest in the supply chain, and now it is reaping the benefits.

To go back to the point around the contracts for difference mechanism, it has been incredibly successful at increasing renewable deployment, but it is designed to lower the levelised cost of energy not necessarily to build UK supply chains and create green jobs, so there is a conflict within the Government's approach to that. They are talking about introducing the sustainable industry reward and that would benefit different projects, so they could prove they are investing and having a certain amount of local content.

Q13 **Chair:** That is an interesting distinction. What do you call the levelised cost of energy?

Richard Arnold: That is what those projects bidding for CfD are based or judged upon.

Chair: Thank you. My six minutes are up and for the next six minutes we have Vicky Ford.

Q14 **Vicky Ford:** Jez, how interdependent are the supply chains for different emerging technologies?

Jez Haskins: There is certainly a degree of interdependency between them. In the type of work we do, building infrastructure projects, there is a very close link between all our suppliers, and there is always a follow-on. There is always a design interface between different suppliers. The success of one of our suppliers is very dependent on the performance of another supplier. Some of our big contracts could have over 100 different subcontract suppliers, and yes, there are interfaces and interdependencies between them.

Q15 **Vicky Ford:** When you are looking at a particular part of the renewables, let us say your supply chain for solar versus your supply chain for a wind project, are similar types of contractors needed?

Jez Haskins: Yes. We are doing installation, so we do all the civil infrastructure, all the installation and all the commissioning. There are obviously going to be subtle differences between putting in a solar park and putting in battery storage or some other facility, but in terms of the supply chains, we are often calling upon our mechanical and electrical partners, those who have experience in the transmission or distribution networks, so we often use similar partners.

Q16 **Vicky Ford:** Nicolas, when you look up standards for the same product, like steel or cables, are they the same standards that we use in the UK, or are they different in other countries?

Nicolas Pitrat: From a strict standards standpoint there are some differences, but they are not very significant. As an industry, we have a tendency of creating differences where they are not necessary.

Vicky Ford: We are great at doing that.

Nicolas Pitrat: Sadly, we are very, very good. As an equipment manufacturer, this is usually the misery of our lives, that two projects are always going to be totally different when we could actually simplify a lot.

But I do want to echo what Mr Haskins was saying in terms of the interdependence of the supply chain. To be simplistic, there is the generation site, which can be solar, or it can be wind, and there will be specificities in each of these. Then there is the bottleneck of the connection in the middle, whether it is a transmission project or a distribution project, and this is where usually we end up with a big challenge because there are not enough players in the market, or it has no capacity left.

Q17 **Vicky Ford:** There are not enough players able to connect?

Nicolas Pitrat: That is correct. There is not enough capacity.

Q18 **Vicky Ford:** Are you talking about skilled people or access to cables?

Nicolas Pitrat: Skilled people; it is all about people. Again, with the vast majority of what we do, if I look at an 18 month lead time for a transformer, we probably have less than a month of actual manufacturing. It is all about what happens up front.

Q19 **Vicky Ford:** Do manufacturers really have a clear grasp on the volumes that they need? No?

Jez Haskins: I would agree that they do not. It is very difficult, an 18-month lead time.

We mentioned the CfDs, which are great for giving confidence that there is commitment to the project, but that point is not when you are actually placing an order with Nicolas's businesses. That can come very late, and often you will not be purchasing the equipment until the main contract is placed because of the way the contracts are done now. That is when the clock starts ticking, but the equipment is going to turn up 18 months ahead. If you could place the contracts earlier, you could be bringing that equipment in much sooner.

Q20 **Vicky Ford:** On supply chain issues, following the pandemic we had a major issue across the world about chips, and lots of discussions about rare earth, which is the most difficult part that you need to go into a product. Is that what the problem is, the fight for the most difficult part, that very rare commodity? Or is it something much more generic, like not having enough steel?

Nicolas Pitrat: It is much more generic, and it is not about the commodities.

Q21 **Vicky Ford:** Was it both?

Nicolas Pitrat: There are some areas where it is very specific, but I am going to make it a lot more generic. It is not about steel or copper or the availability of most of the raw material, it is the ability to transform these

raw materials into what is required to manufacture the products. We can buy copper from anywhere, not that we would, but there is a lot of copper available. However, the number of players who can transform this copper into a transformer winding is very low.

Q22 **Vicky Ford:** There is a lot of copper available, and we are getting lithium from Cornwall, hopefully, but are there other much rarer things that we have not narrowed down enough? I get that it is the transforming and the manufacturing capacity, but is there another thing we need to be worried about?

Nicolas Pitrat: My experience, again on the connection and distribution side, is that it is not about the raw materials, it is about the transformation.

Q23 **Vicky Ford:** Any comments from you, Jez?

Jez Haskins: I was just going to agree with that. If you want to look at one particular example, it is going to be cabling. We need so much cabling. You look at the HVDC programme in this country, which is thousands of kilometres, and that is where the pinch point is really going to come. There are going to be others in there, but if you want a critical path item which is really going to delay us, it is going to be big items like cabling.

Q24 **Mark Pawsey:** To pick up Mr Pitrat's point, about the challenge of two projects being totally different, I will ask you what we need to do to get to standardisation.

For example, we understand that Hinkley Point is being developed as a new nuclear power station, and lots of learning is taking place in that. When we come on to do Sizewell, it will be less expensive because there will be knowledge gained from the first one and, presumably, some form of standardisation. What can the industry, what can Government do to improve standardisation so that you do not get the costs incurred by the next project being completely different from the one you have just done?

Nicolas Pitrat: That is a really interesting question. The key is probably being a little more specific on some of the regulations and policies being issued. We work quite extensively with all the DNOs, the distribution network operators. They all have their regions. We all work to the same—

Q25 **Mark Pawsey:** They all have different standards?

Nicolas Pitrat: They all have their own specificities, and a design that we will do for one DNO is not going to be the same that we have to deliver for another DNO.

Q26 **Mark Pawsey:** I am going to ask you for a figure now. How much could we reduce the cost of this investment if there were to be a standard for the equipment that you provide?

Nicolas Pitrat: It is more than the cost; we could also significantly reduce the lead time. I will give you a practical example. It takes a year

to do a standard transformer, but I recently agreed a six-month delivery with a customer because they agreed to take an existing design.

Mark Pawsey: Thank you. That is very helpful.

Q27 **Mark Garnier:** Nicolas, I am going to carry on with your comment a little earlier, which was that it is not about the raw materials, it is all about the actual kit. In your evidence you commented that your competitors commonly import 33 kV units from Colombia, Tokyo or India, and you are unable to compete with their prices. Do you want to expand on that? Ideally, at the end of the day, we could produce this stuff locally at a competitive price, but that does need raw materials.

Nicolas Pitrat: There is a need for raw material, but if I look at a transformer, which this example is based on, it is around 75% material and 25% labour. So, the labour is an important part. There is obviously a lot of transportation. Going back to my point earlier about the transformation, what creates our bottleneck today is the ability to wind the core of the transformer to the bobbin at the heart of the transformer. We had to acquire one of our suppliers last year to secure our own supply chain because otherwise we were being priced out of the market.

Q28 **Mark Garnier:** That is for all pieces of kit that have been assembled?

Nicolas Pitrat: Yes. Clearly, we also have a cost issue. I want to keep investing in training and recruitment. We have just released a relatively big investment for us in a brand new test cell in the UK. All that involves some cost. Yes, we are more expensive, and typically the feedback I get from my customers is, "We keep buying BRUSH because we like the quality, but you are more expensive than everyone else."

Q29 **Mark Garnier:** On the labour point, I get why labour can be expensive if you are manufacturing something like chain, but you are talking about transformers. Ultimately, these modern factories are now staffed with robots with only one or two people there, or is that not the case?

Nicolas Pitrat: We actually have a very highly skilled workforce. Not everything we do is automated. We have no robotics in our factory, so it is all about the skillsets of our employees, and it typically takes nine to 12 months as a minimum to train our workforce on the shop floor. These are highly skilled roles.

Q30 **Mark Garnier:** Can we talk about the wider raw materials for the supply chain? The Democratic Republic of Congo provides 70% of cobalt, China 60% of rare earth elements, Indonesia 40% of nickel, and Australia 55% of lithium, mining in Chile for 25% of that. Vicky made a very good point before she had to go, which is that we are now getting lithium out of Cornwall. From what I understand, it proudly announced that it could provide enough lithium for the batteries for 35,000 domestically produced cars every year. The UK at peak production is 1.7 million cars, which are all going to have to be electric cars by 2035, some would argue by 2030. There is no way we are going to be able to produce enough raw materials

in order to have gigafactories producing this type of stuff. What do you think?

Jez Haskins: I tend to agree with you. When you look at the numbers, yes, we can make quite a significant step change in our production, but to get to the levels you have just spoken about is going to be difficult.

In the sphere where we operate, a lot of the basic materials we use, the steel and the concrete, can be increased to meet the levels of construction, but as we said, the pinch points are really going to come in the areas of supply which Nicolas was talking about, which take longer to produce because of the skilled people involved.

Coming back to the pinch point, for us, for the quantity of what we are installing in, say, the transmission networks, it is about having those trained line installation engineers, people who have skills which take a long time, maybe years, to develop. It is not something you can train them in straight away. That is why we are trying to invest now, because it is the only way we are going to be able to ramp up to it.

You are right, if we follow the trajectory, we will need so many people and so much material. It is going to be a tough task to get there, but I know we can definitely ramp up a great deal from where we are now.

Q31 **Mark Garnier:** This idea of high-skilled British jobs is absolutely fantastic, and it is exactly what any Government want to hear. We want to do everything we can to support you. But I still worry that, in the last five years or so, we have seen supply chain problems created by a war in Ukraine, and by covid, and we have also seen a supply chain problem provided by a bloke who could not sail his ship down the Suez Canal. The trouble is that the world is a very difficult place to operate in.

Chair: It was too narrow.

Mark Garnier: I will take you there; it is wider than you think. He was a worse pilot than you imagine, but it is an important point. If you have expensive, well-trained workers in the UK who need parts and components or raw materials, then we are actually in a vulnerable position. What I am really getting at is, do you think the Government have the right policies to make sure that we can secure our supply chains, that we encourage them and that we are competitive on a global basis? Who would like to go first?

Jez Haskins: It goes back to the transmission market I was talking about. The policies are there, and if you look at what came out of the recommendations of the Winser review and, following on from that, the transmission acceleration action plan that has been put in place, both are very good and would move things along. To the point I was making earlier, it is important that the action plan and what is set out in the annexe to it is delivered. There are some hard actions due at the start of this year and whether it be supply chain, more people, more capability or capacity, delivering on those commitments is what will really help.

Nicolas Pitrat: I want to come back to what is close to my heart, which is engineering, but if I can add a very practical example and go back to the chips that were discussed before. It was a very difficult time in my tenure when we had to buy two years' worth of chips off Amazon because that was the only vendor we could find.

Q32 **Mark Garnier:** Amazon?

Nicolas Pitrat: Yes, Amazon; a few years back when we had these challenges. We managed to secure two years' worth of stock at a very high price. Fast forward two years and our engineers found a way around this, so we no longer needed these chips.

Mark Garnier: They were obsolete.

Nicolas Pitrat: Correct.

Q33 **Mark Garnier:** Presumably, they have a commodity value.

Nicolas Pitrat: We use them, but we moved to a design which did not require the chips that we can no longer find. My concern with the focus on the product and supply chain is that, when we focus on what is becoming the problem for today, we are always going to be a step behind, but by reinvesting in that long-term design and engineering capability, we can actually solve the problems that we have not identified yet.

From my experience, again in terms of BRUSH, when we have a bottleneck on a specific product, we manage to design around it, avoid it, and replace the material with something else, in the majority of cases. This is clearly not going to work in every industry, but in a number of cases it does work, and that is the agility that we need, from my standpoint.

Mark Garnier: That is very helpful. Thank you.

Q34 **Mick Whitley:** What you just said about bypassing the chip was great, but the automotive industry, which was relying on chips during covid, was devastated while waiting to get the supply. It worries me if you have a situation where a lot of countries are now ramping up efforts to get down to net zero with a lot of materials they are ordering, particularly with what you were saying before about cables, and so on. Are we ready for this? If every country is after the same raw materials, that means there is going to be an increased demand for those commodities. We cannot rest on our laurels. We have to do something about it.

You said it may not necessarily be the case that we get these materials in, but I think we should be making provision, because it is going to be like a Dutch auction. This happened in the pharmaceutical industry during covid where people were buying when the aircraft was on the runway.

Chair: A demand/supply situation.

Q35 **Mick Whitley:** Yes. What is your view on that? We have to learn our lessons from the past, do we not, in terms of supply chains? Are they too far away? Should they be nearer home?

Nicolas Pitrat: My apologies if I was not clear. I am certainly not arguing that we should do nothing. There is long-term action, which is how do we de-risk the products that we have not yet identified as a risk? In the short term, we know what we know today, and you are absolutely right: there will be a huge push. It is not just about commodities though, and we have to be very clear on this. I was with one of my customers two weeks ago, and the message was, "I need more capacity from you because my European supplier has just told us that their capacity has been allocated to someone else, not the UK." So it is not just the components; it is the assembly capacity, and we need to be ready to ramp up very quickly internally if we want to secure our own supply chains.

Q36 **Chair:** Before I go back to Mick Whitley, I am also on the National Security Strategy (Joint Committee). On Monday, we had quite an interesting session about economic security, and energy featured hugely in that, as did the materials that were required.

Giving evidence was Ed Conway of Sky. He mentioned the six commodities of sand, salt, iron, copper, oil and lithium. Two fascinating things came forward. For instance, there is a quarry in the United States that provides a bit of quartz that goes in all the chips in the world, so this is required everywhere. Also, in the next 22 years, we have to mine the same amount of copper as we have since the beginning of the bronze age, which is about 5,000 years ago, so we are almost on a pivot point. I thought it was 30 years, but he said it was 22 years.

In the general energy industry, how aware do you think people are of those two little facts, especially the one about copper? It is all right to be looking at Mick saying that demand is chasing supply, but how aware are people of the pinch point? Richard, I can see you drawing breath as if you are ready to give an answer.

Richard Arnold: To link into Mick's point, countries are in competition against each other, but technologies within a country are also competing for things such as port infrastructure to ensure there is significant capacity to deal with a range of different technologies and deploying projects in our seas. For us as an emerging sector, one of the benefits is that we can learn lessons from wind in embedding circularity and thinking about the lifecycle of different projects. There are already plans to reuse materials. The risk for us is that we do not have the same buying power as the offshore wind industry. It is unlikely rare earth materials are going to get pushed towards us if offshore wind is demanding more of them, and that is why having a strategy for marine energy deployment in the UK is really critical.

Chair: One thing I have certainly learned this week is, again, how much I do not know. I will be downloading off Amazon "Material World: A

Substantial Story of Our Past and Future" by Ed Conway, which looks at those materials I mentioned, and maybe next time I will know a bit more about copper, lithium and the rest. In the meantime, I pass the baton back to Mr Whitley, who is poised and ready to go.

Q37 **Mick Whitley:** My question is to Richard. What differing roles do public and private investment play in growing domestic supply chains?

Richard Arnold: The key thing is for public financing to provide the confidence to leverage in private investment. For example, the ringfence for tidal stream in consecutive auctions has led us to have just 10 MW of tidal stream deployed. We now have a pipeline to get 100 MW by 2028. That is a massive increase in the amount of turbines going in our waters. It means that manufacturing facilities are moving from the Netherlands to the UK. But one of the issues with the CfD is that its budget is announced on an annual basis, so next month, on 13 March, we will find out whether we have a ringfence for this year's renewable auction, but we do not know whether we have one for next year or the year after that and so on. As we scale up, having that sight and commitment by the Government is absolutely crucial. That is why we advocate for a 1 GW tidal stream target by 2035 and a 300 MW target for wave energy.

Q38 **Mick Whitley:** Do the Government's views on "winners" align with private finance?

Richard Arnold: It is a choice. I mentioned earlier the levelised cost of energy. The Government clearly want the CfD to do more than just get the lowest cost renewables on to our energy system, which is absolutely right because the pathway to the lowest cost energy system by 2050 is not just through the lowest LCOE today, tomorrow and next week. They have to think about the energy mix they want. By deploying just 6 GW of tidal and 6 GW of wave, you will save £1 billion per annum in energy system costs. It is having that foresight and a strategy and plan for realising marine potential.

Q39 **Mick Whitley:** We do not put all our eggs in one basket. We are talking about solar power, wind power, wave power and tidal power. Looking back at the Swansea lagoon, we saw the Government withdrew. We have been involved in the Liverpool barrage system. If the Government are reluctant to put money in, that scares private finances off, does it not?

Richard Arnold: Yes, absolutely. I do not represent tidal lagoons or tidal range, just tidal streams, which is the speed of the tides rather than range, but the same logic applies, of course.

Mick Whitley: I put the same question to you.

Jez Haskins: Both private and public funding are absolutely critical. Everybody knows that private funding likes infrastructure. Once the CfDs and guarantees are in place, they give good returns over a long period. But public sector financing through Infrastructure Bank, for example, or

upfront seed funding to get the designs, DCOs and planning application processes done is again absolutely fundamental.

A colleague mentioned the investments being made in ports. That is a critical pinch point. Upgrading the ports is another interdependency, if you like, for a lot of our projects. The Infrastructure Bank investing in ports is absolutely key. Once those investments are made, even if they are not huge, again, it comes back to confidence. Private sector banks will start to look at those schemes when they see that the Infrastructure Bank has invested in them, so the combination of both private and public, particularly on that front end to get those projects started, is absolutely key.

Mick Whitley: I was going to ask you a supplementary question, but you have answered the point, so back to you, Chair.

Chair: Excellent, thank you. Mark Pawsey, over to you.

Q40 **Mark Pawsey:** I want to ask about introducing local content into these projects. It is right for lots of reasons, is it not? It is better for our economy, but it is also pretty important for getting public goodwill and support for the energy transition. In most cases, people know they are going to have to pay for this through their energy bills, and we will buy British and using British materials as and where we can.

I might start with you Richard. How do we do that? Under WTO rules, it is not currently permitted for us to mandate a specific UK requirement, and I do not even know whether we are capable of achieving a certain level of UK involvement, so how can we drive this?

Richard Arnold: The Government have a deal with the offshore wind sector to aim for 60% local content by 2030. For tidal stream, we are already deploying projects with over 80% UK supply chain content spend. For example, the Orbital O2 device in Orkney was conceived and designed in Orkney and Edinburgh, uses steel from Motherwell, anchors from Anglesey, hydraulics from the midlands and blades from Solent. It is a real success story across the UK.

Q41 **Mark Pawsey:** Is that because those are the best suppliers to go to with the right price and the right delivery, or is there an inherent desire rather than an imperative to buy British?

Richard Arnold: It is a mixture of both. All our members want marine energy to succeed in the UK, and they invest accordingly. However, the UK is in a leadership position, and so we have companies doing things here that they are not doing in other countries. It is really important to note that supply chains are incredibly sticky once they become embedded, so we want to see really high levels of UK content, not only in projects deployed here but around the world. We have a real opportunity to do that. Only this morning we had an industry call with the Indonesian Government asking about British companies, what the UK Government

were doing right and wrong, and what they can learn from. There is a massive global opportunity here.

Q42 **Mark Pawsey:** Jez, how can you embed British materials in the projects you undertake? In many cases, you are bringing in heavy materials, so it makes more sense to have them locally anyway.

Jez Haskins: Absolutely, yes.

Q43 **Mark Pawsey:** Presumably, they have a lower carbon footprint.

Jez Haskins: There are so many drivers, such as a lower carbon footprint. We have a social value action plan, which in our business commits us to have 40% of the workforce coming from within a 30-mile radius of any project, and that is what we strive to achieve. It is the same with materials. We will always try to source those earlier and closer by from our delivery and subcontractor partners.

Q44 **Mark Pawsey:** Could an over-commitment to that render some projects inefficient and uncompetitive?

Jez Haskins: Yes. We set it as an absolute target, but of course some projects might be in very remote areas, so we have to be flexible about it. We set it as a KPI within our business to report against and strive to get at least 40% within, as I say, a 30-mile radius of any of our projects.

Q45 **Mark Pawsey:** Nicolas, what about your equipment?

Nicolas Pitrat: We are in the same position, but there is also an important element here about the definition of the cost of a project. There is the upfront cost where the emissions are key, and potentially there will be a higher financial cost from a UK provider as compared with a foreign one. Where we see a difference—and across the distribution industry there is a huge difference—is in the long-term presence and cost of the project. If I look at some foreign suppliers, it is about the equipment where you are looking at pieces of kit that work for 10, 20, 30 years, and maintenance. Having a foreign manufacturer—

Q46 **Mark Pawsey:** Is that a quality issue then? Are we not able to get the same level of quality with a domestic approach?

Nicolas Pitrat: It is not a quality issue. The domestic approach allows you to guarantee knowledge and understanding of the product and the right action at the right time in terms of maintenance and upgrades going forward. This is the fundamental difference to me. If you have a localised supply chain, there is a much better positioning for the lifecycle of the asset and the projects, versus a foreign supply chain where you always run the risk of losing visibility or access to the supplier if anything goes wrong or if maintenance is required.

Q47 **Mark Pawsey:** Can the local supply chain be competitive? You spoke earlier about the need for a constant line of orders, knowing that there is a series of projects which the supply chain can invest in. If that does not

happen, you are going to incentivise bringing stuff in from a manufacturer overseas who has that line of sight.

Nicolas Pitrat: We would have to do that. At the end of the day, we are a business, so we need to make sure that we remain competitive. This is why, from a BRUSH standpoint, we try to invest a lot more into the long term, into the service cycle of the units, and this is where we see our difference. It is not just about manufacturing the unit on day one; it is about supporting it for the next 20 to 30 years.

Q48 **Mark Pawsey:** I want to turn to the issue of recycling materials because I know, Richard, you have made comments on that. How appropriate is recycling? Everybody wants to see something at the end of its life put to a good use, but technology in this sector, more than anywhere else, is moving very fast. When one project comes to end of life, it may not be appropriate for use because the technology has moved on.

Richard Arnold: Perhaps not. Orbital Marine Power, a company I have already mentioned, is working with MAXBlade and the University of Edinburgh to design its tidal turbine to be completely recyclable. In the wave energy space, there is also a Swedish company called CorPower, which is looking at using zero-emission steel in its project, so in the end, that steel would be recycled and used for different purposes, which would have a carbon-negative effect. We are benefitting from lessons learned from other renewable technologies and thinking ahead as to what we can do with these devices afterwards.

Q49 **Mark Pawsey:** Is there any way that Government can assist with that? Should the requirement for reuse be mandated in some way, or would that be unhelpful to your sector?

Richard Arnold: It could. At the risk of repeating myself, the Government need to provide a clear and consistent route to market. Companies are investing in circularity and recycling because it makes business sense to do so.

Q50 **Mark Pawsey:** The materials you embed in a project are there for many, many years. Is there any way that recyclability can be designed in to ensure that we get this circularity so that scarce materials are not wasted?

Jez Haskins: We are now reusing materials an awful lot more than before, so demolition materials are certainly being used, and to a degree, recyclability can be designed into the things we are producing now. We are also looking at products such as ultra-low carbon concrete. We have developed a product which is completely cement-free now, so it is ultra-low and 70% less than just low-carbon concrete, but because it is a new product, the issue is the time it will take to test it and how long it will be before it is widely used.

Q51 **Mark Pawsey:** And asking whether it is going to be performing in 50 years' time.

Jez Haskins: Exactly.

Q52 **Mark Pawsey:** We find that innovative products installed in that sector 50 years ago are not up to scratch today.

Jez Haskins: We are trying to encourage clients to let us use these products where we do not have to meet that high standard. If it is just some auxiliary parking areas, it is a matter of, "Can we just relax the standard so we can use these products and have that long-term testing?"

Q53 **Mark Pawsey:** Nicolas, in the products you supply, is there an element of reuse? Presumably, you need to break down the product and then recreate it rather than take a component from a legacy product and try to use it in a new project.

Nicolas Pitrat: We would potentially have to go back to the source material itself, but it would be difficult. More and more we see efforts to extend the life of the existing assets as, through targeted maintenance and small upgrades, you can effectively maintain the vast majority of the assets.

Mark Pawsey: We know that from our nuclear fleet. We extended the life there and in many areas.

Q54 **Chair:** I might come back to you. There are a couple of things I want to pick up on myself. The low-carbon cement that you mentioned is quite interesting. It is obviously not in major circulation at the moment, but is it displaying the same sort of strength as normal Portland cement cubes at 28 days showing 40 N, all that sort of stuff?

Jez Haskins: Yes, it is.

Q55 **Chair:** What is the cost equivalence at the moment?

Jez Haskins: It is quite a lot more expensive. A lot of it is in the batching, which has to be done bespoke. The way it is put together means you have to take out a batching plant to produce the cement, so it is the additional cost of that. This is a product where, with the economies of scale, once you can get up to using it more, the price will come right down.

Q56 **Chair:** Is there a possibility of making small mixes in a batch mixer on site by a bricklayer, for example?

Jez Haskins: Not at the moment, no.

Chair: It has to be made in a special—

Jez Haskins: Yes. In terms of its performance and its strength, it is very good, and all the signs are that it is a product which will match—

Q57 **Chair:** Would you write to the Committee a bit more about this?

Jez Haskins: I can, absolutely.

Q58 **Chair:** I want to ask a general question. People are often concerned about what the UK can and cannot do at the moment. Thinking back, many people would say there has perhaps been a cost of de-industrialisation in the '80s and '90s. Do you feel there is any cost to the de-industrialisation that happened in terms of a lack of skills and a lack of capability to do certain things in the UK now that were possible in the '50s and '60s, when the thought of the workshop of the world, if not immediate, was certainly a strong memory of the time? Is there any legacy from that era that is having an effect?

Richard Arnold: Looking ahead, one of the benefits of renewables is they provide an opportunity to attract investment into places that were previously industrialised and perhaps lost industries. One of the benefits for marine energy is that it attracts a lot of investment to coastal communities. I am not entirely sure what should or should not have been done in the '50s or '80s to avoid the UK not being as competitive as other countries, but we can learn and apply those lessons now.

Q59 **Chair:** That would require a bit of Government intervention. Is it possible to leave the market to do that? The United States, for instance, have the Inflation Reduction Act, which is far from reducing anything; it is pumping cash into the economy.

Richard Arnold: Everyone in the renewables sector would welcome UK Government having a similar package to the Inflation Reduction Act, but it does not need to be so significant. For example, the North Sea Transition Authority is targeting 50% carbon emission reductions in its operations and maintenance by 2030. Through that target, we have seen companies such as Shell and Total invest in a wave energy project called Renewables for Subsea Power. That is because the Government are sticking to a clear target and letting market forces respond. What we really require is a consistent route to market and clarity of direction so that private investment will come in.

Q60 **Chair:** Do you find that in other countries? Is this what Norway do? Despite inflationary pressures, with its vast natural resources, it is still managing not to de-industrialise and to build ships and to do loads of other things.

Richard Arnold: To give the UK Government credit, in setting their ringfence they were demonstrating international leadership in an area that other countries were not.

Q61 **Chair:** Such as?

Richard Arnold: The UK Government set the first ringfence for technology, I think, internationally. We should have 100 MW deployed by 2028, which is a rapid step change. Globally, there are 20 MW deployed.

Q62 **Chair:** When the UK Government do that, does that translate into supply chain in the UK or into telephone calls to head offices in Denmark or wherever, in terms of, "I hear there is a bonanza going on over there.

Tool up and start making."

Richard Arnold: In this example, it led directly to the benefit of the UK supply chain. Hydro Wind, which won a 10 MW contract in the last renewable auction, recently opened an office in north Wales specifically to deliver that project. They are also looking to move their turbine manufacturer to the UK.

Q63 **Chair:** Where from?

Richard Arnold: From the Netherlands, so that is having a direct and significant supply chain impact.

Q64 **Chair:** Just before we end, you mentioned earlier the levelised cost of energy against CfDs. I would like to give you a little opportunity to expand upon that almost as a tutorial for us on how those two things interact and interplay.

Richard Arnold: The CfD is the mechanism the Government use to increase low-carbon deployment. Projects bid, and you win or lose based on your levelised cost of energy. Historically, bids were judged on the broader benefit that different projects would deliver. That is why there was a scenario where we had the decreasing cost of wind which led to deploying or importing technologies from other countries. We are now seeing a slight step change to the industries in the Sustainable Industry Rewards, and that will benefit projects which have and hit certain local supply chain content targets and demonstrate investment in deprived areas.

Q65 **Chair:** Do they have an R&D component as well?

Richard Arnold: Yes, potentially. They are still consulting on it, so they have not yet decided on all the different metrics.

Q66 **Chair:** An R&D component would be important to help supply chain growth.

Richard Arnold: Yes, absolutely. The UK needs significant innovation and funding support, but the last point on the new Sustainable Industry Reward is that it is only going to benefit offshore wind, so other technologies do not have access to it at the moment. That is one thing we would like to see the Government change.

Q67 **Chair:** Gentlemen, any final observations you might like to make in the couple of minutes we have remaining? You do not have to take up the time, but if you do have any observations.

Jez Haskins: I was going to come back on your remark about de-industrialisation. We are now seeing a lot of business and growth in areas such as the Humber and Teesside, which have been de-industrialised over the past 50 years. We are going to see significant growth and the return of jobs and opportunities in these places, which are going to be extremely busy in the next 10, 20, 30 years.

Q68 **Chair:** It is good news for the economy, if you like, and industry generally.

Jez Haskins: Yes.

Nicolas Pitrat: I was going to comment in a very similar vein. As I said earlier, we have significant skillsets across the UK population. There is a lot of talent that we can build on. As long as there is clarity on where we want to be, there will be a significant level of investment. There is a lot to leverage, so to me, it is not all doom and gloom, in fact, the opposite. We are actually at a very exciting time when we can regrow industry and support net zero. We have all the cards in hand now.

Chair: Excellent. Thank you all very much. That was a very interesting session. It will be remembered by my Clerk, Dr Stephen McGinness, for the mention of Motherwell. He is of course from the conurbation of Motherwell and Wishaw, so this will have made his day. It was Richard who made mention of that. Can I thank you all very much for your time this afternoon? We will now move to our second panel, but thank you, Richard Arnold, Jez Haskins and Nicolas Pitrat.

Examination of witnesses

Witnesses: Dr George Dibb, Helena Bennett and Rachel Solomon Williams.

Q69 **Chair:** Welcome to our second panel of the afternoon and thank you for your patience. I hope you enjoyed listening to the first panel. I will ask you to introduce yourselves in the usual way I do—name, rank and serial number—to give you an introduction on your own terms. I always start on my left, so I will carry on doing that.

Helena Bennett: I am head of climate policy at Green Alliance. I am standing in fairly last minute for a colleague, Libby Peake, who you might have been expecting.

Chair: Yes, we are aware of that, so thank you very much for volunteering to come in front of a parliamentary Committee. Luckily, it is Wednesday afternoon and these colleagues of mine are quite tame, so you will be okay.

Dr Dibb: I am associate director for economic policy at IPPR, the Institute for Public Policy Research.

Rachel Solomon Williams: I am the executive director at the Aldersgate Group. We are a multistakeholder alliance representing a large number of major businesses and other organisations in the UK.

Chair: I should just maybe caveat: they are only tame just now because this is their second Committee session of today, and you are the fourth panel. Otherwise, otherwise! I will start with the Rottweiler Whitley, Mick Whitley.

Q70 **Mick Whitley:** I am not a Rottweiler, honest. How does the UK compare internationally in developing domestic supply chains for emerging energy technologies? I will start with George, if I might call you George.

Dr Dibb: I am sure my other colleagues will come in, but at a very top level the UK is comparatively weak compared with other similar developed economies. First, across the economy as a whole, we have very low levels of private sector investment—perhaps we will get into that a little—at least the lowest in the G7 and among the lowest in the OECD. That is matched by quite low levels of net zero investment as well. In fact, recent reports from the OBR show that is falling from its peak, which is the opposite direction we want it to be going in.

The UK is extremely weak across a range of different technologies, but I will just pick up on four. Solar and photovoltaics, although that is a common situation across other developed economies. Obviously, China is the dominant player in solar, but other countries like Germany and France are trying to make efforts in that space; the UK has very little.

Wind manufacturing is one of the starkest examples we can see. The UK is a genuine superpower in installing wind power but, again, we are comparatively weak in our specialisation compared with other countries within Europe that are manufacturing components. Even though we install more than almost anyone else in the world, we do not make as much as anyone else in the world.

On batteries and EVs, again, we have closed the gap somewhat with the recent announcement from Tata on a new factory in Somerset but, even looking ahead to future capacity, by 2030 we are likely to fall behind countries like Germany, France, and even Hungary. Equally, green hydrogen is a gap we need to continue to expand into.

So, comparatively, the UK is falling behind and could be doing significantly more on securing the manufacturing benefits of the transition to net zero.

Q71 **Mick Whitley:** Why is that? Is it the Government's fault? Is it a lack of investment by the private sector?

Dr Dibb: There are different parts to it. Looking at that low private sector investment piece, there are various reasons for the UK's low investment. You often hear things like corporation tax raise, which we can disregard; I do not think those are the biggest problems in the UK system. I would say where the UK has been missing out is from a significant lack of clear steer, a very clear industrial strategy from the centre, from Government, giving very clear indications to the private sector where future profits and growth opportunities will lie. IPPR research has shown we have had 11 different industrial strategies over the last 14 years. That level of chop and change is extremely damaging to private sector investors looking for certainty.

That is particularly the case in manufacturing. We know that building new manufacturing facilities and procuring the equipment that goes into them takes time and has a time lag. You need to know you are going to have that growth opportunity. It is not just about money; it is about the clear steer of where those opportunities will lie that can give firms the security to invest.

Q72 **Chair:** Rachel, do you want to make a comment?

Rachel Solomon Williams: Yes, I would add to what George said. The way policy has been designed in this country, for very good reasons at the time, has been very focused on decarbonisation and technology deployment. If you think back to the renewable energy directive—where we had a target for 2020—and our carbon budgets, these were all really great things to do, but the focus has always been on how fast we can deploy this technology and how fast we can decarbonise the economy, with a very laser focus on those outcomes. In designing that policy, we did not build in industrial outcomes at the same time and that is a lesson we need to learn from other countries that have thought about it in a more holistic way to make sure future policy thinks about the whole system at once. So, how we can decarbonise at the same time as taking the supply chain, and thinking about how all that fits together.

Q73 **Mick Whitley:** I would ask the question then: is there a lack of drive from the Government, or lack of somebody driving it to make sure we stay on top?

Rachel Solomon Williams: Policy has been designed by the Government working with industry to very explicitly achieve certain outcomes, but those levers are all completely focused on certain change they want to see and they have only built incentives around the edges for supply chain benefits. I do not blame the Government for it, but it is a factor of how policy has been designed, and it is something that, if those other benefits were seen as a good thing, would need to be built in as well.

Helena Bennett: I agree with everything the other panellists have said. Just going back to your first question to build on what George said, the UK compared with other economies of similar size just does not have access to the raw materials that the US, China, and Europe do. When we manage to get them to the UK for manufacturing or whatever it is, we are also really bad at keeping them here at the end of life. We mostly just export EV batteries to Belgium to be recycled; we do not have any capability to try to keep stuff here.

I also agree with the point around investor decisions in UK manufacturing being poor because of lack of clarity of direction on where policy is and where the future industries of the UK are. That is something we have noticed a lot in speaking to various different parts of different manufacturing supply chains for net zero industries.

Q74 **Mick Whitley:** Dr Dibb, you touched on it before when you were saying about the wind farms: are there any particular areas where the UK is a global leader?

Dr Dibb: The UK is a global leader but it tends to be further upstream, so in the more innovative areas where the UK has world-leading universities and research centres. It does have strengths in some areas of advanced manufacturing such as the High Value Manufacturing Catapult and those kinds of interventions but, historically, we have failed to retain those strengths and feed them through into industry.

There are some parts of those supply chains where the UK is strong and, in fact, I would argue part of the problem of these strategies over time from Government is that, historically, the UK Government have had quite a muddled view of where it is actually good at manufacturing, and whether it is good at all. The UK does have areas of comparative advantage and, actually, they tend to get talked down. For example, in a wind turbine, the UK has comparative advantage in things like the foundations and the cables, but not, unfortunately, in the bit that has the most high-value manufactured component, which is in the cell, the turbines. So, yes, we do have areas of advantage, but we have failed to capitalise on them.

Q75 **Mick Whitley:** Dr Dibb has half answered, but I am going to ask anyway: how effective is the Government's engagement with international partners and supply chains?

Rachel Solomon Williams: It is fair to say it has been quite uneven. There are lots of bilateral conversations that happen with certain other parts of the world about potential deals or corridors but it is not a consistent multinational approach to supply chain development. Generally speaking, the Government tend to rely on the private sector to think about the supply chain for itself which is, in a way, fair. It is not necessarily the Government's job to decide how to access supply chains for private sector investment, but I would suggest a separate job which is to be thinking about what those supply chains are in aggregate.

So, what are our needs in terms of green industries? Who is competing with us for those? We know there will be competition in the US and the EU, but elsewhere as well. How can the Government build up a picture that they can then share with industry to say, "This is how it all fits together, and these are the key relationships we need to have as a nation"? I do not think that has happened so far; it has not been seen as a top priority. There certainly have been good conversations, and we have seen it around the EU exit where Ministers have started conversations with certain countries bilaterally about where there might be complementary skills and engagement, but it is quite diffuse.

Q76 **Mick Whitley:** You mean like Denmark and Belgium?

Rachel Solomon Williams: Exactly, yes.

Helena Bennett: I totally agree with what Rachel said and, just building on that, one thing we are not doing very well is creating agreements in terms of CRMs with countries that have good ethical and environmental standards in place for the products we are importing. There is a lot of news and press around things happening in the DRC, for example, and different parts of South America, but there are other places where a lot of those materials can be found and we are not yet exploiting relationships with those countries in a constructive way.

In terms of the UK's approach more broadly, we have typically been a leader in a lot of this stuff and have not needed to consider a scenario where, as Rachel says, every other country in the world is going to start wanting access to different materials and supply chains. So, we do need a strategy going forward about what the UK's role in that wider ecosystem looks like because it is just not being considered at the moment.

Q77 **Mark Pawsey:** Can I ask a supplementary? You have told us we should have done better with development: we have installed lots of wind turbines, but we have not built them. Do you think—and perhaps this is one for Helena really—that has had a contribution to public attitude? If consumers knew there was an industrial dimension to onshore wind turbines, do you think there might be more support for the principle?

My own view is that public views have changed. Certainly, 10 years ago there was much resistance and, effectively, we have a moratorium right now. However, my view is that having had an energy crisis, people understand the need to create more of our domestic energy through renewables. There would of course be a benefit to the economy and jobs because these would be manufactured here, so there would be more support. Is there any evidence that people know and understand we do not have that industry in place? It is coming, and I think there is a plan in the process of being created in Teesside, but if we are able to demonstrate domestic supply, do you think there would be more public support?

Helena Bennett: I do not have any evidence and I do not know if any research on that kind of thing has been done; other panellists might have some. I would not doubt there is a correlation with being able to see direct jobs and local success in manufacturing and creating skills and so on, and exporting as well. The same could probably be said for heat pumps; we do not really have any heat pump manufacturing capabilities in the UK and public opinion of heat pumps is quite low.

Q78 **Mark Pawsey:** But, again, that is the line of sight. We heard in the previous session about the need for a line of sight in a project. People know heat pumps are coming and people like Vaillant and Bosch are starting to switch over from gas boiler manufacture to heat pumps, but it is a matter of knowing what the future holds.

Helena Bennett: Yes, and there is an element of the phrase "a just transition" in there as well, of understanding which jobs those could be

replacing. We know a lot of frustration with the old polluting industries in the UK is, obviously, because there is no clear pathway to what happens next. There is lots of evidence to show that has caused friction with transitioning to net zero. I do not know if there is evidence, but I imagine there is a pathway, exactly as you say, that seeing these industries in the UK might lead to more acceptance of them.

Rachel Solomon Williams: It is helpful if we look at historical precedent as well. Take west Cumbria and Sellafield as an example: if you talk to residents of west Cumbria about how they feel about working on radioactive waste and being part of that industry—I could find data for this—broadly speaking, it is a very positive response. They have seen the impact it has for them.

Q79 **Mark Pawsey:** This Committee visited a few years ago and we certainly got that impression.

Rachel Solomon Williams: They can see all the economic benefits that flow to the area through the jobs that provides. If you ask somebody from nearly everywhere else in the country, "Would you like to work on radioactive waste?" Probably not. That is just a lack of understanding and a lack of engagement with what those jobs mean, how it works and what the benefits are and so on.

Q80 **Chair:** The same people are not watching "The Simpsons" then?

Rachel Solomon Williams: I am not familiar with the evidence base behind "The Simpsons", but I know what you mean.

Chair: I took a liberty there.

Rachel Solomon Williams: Yes. Can we learn from those existing examples? There are probably others as well, where something that does not sound attractive or might not be something you choose to have located in your area, would be much more attractive with familiarity and with understanding of the challenges it brings.

Helena Bennett: Steel plants, for example.

Rachel Solomon Williams: Exactly.

Q81 **Chair:** Thank you. I just want to pick up on a couple of things before I move on a little. Rachel Solomon Williams, you painted a picture of the UK Government providing a big picture, but not actually paying attention to the detail. I am trying to put a bit more colour on this. The figure I am seeing that you sort of described is like a farmer who thinks they know the crop they want to plant and grow. So, they plant the seeds and walk away and just hope the weeding will happen, hope the pests will be under control, hope the place will be fenced, and then come back and see whatever crop they have at the end. Is that fair?

Rachel Solomon Williams: I think it has been built in by design. It has not been a priority to build in industrial benefits to a range of policies for quite a long time.

Q82 **Chair:** Do you think other countries do that?

Rachel Solomon Williams: Other countries do that, and obviously the Inflation Reduction Act in the US has built that in very clearly. It has come at its whole policy framework from a completely different point of view.

Q83 **Chair:** I am sorry to interrupt; is that because there is almost an article of faith or a belief in the UK in this mythic thing called the market? Going back to the invisible hand of the market—and the clue is probably in the name—it is invisible, it is searching around in the dark blindly.

Rachel Solomon Williams: There is obviously the prevalent view, and it makes a lot of sense in theory, that if you create a market and then let it service itself, you will get the most economically sensible result. That does not take into account extreme differences of cost in different countries for producing that.

Chair: Next door with a system brain, if you like.

Rachel Solomon Williams: Exactly, and that is why we welcomed the CBAM announcement made before Christmas, because that begins to level the playing field a bit between UK industry and other parts of the world. It is quite a big political decision in a way as to whether the UK—

Q84 **Chair:** It is almost a philosophical change, is it not?

Rachel Solomon Williams: Yes, exactly. It can be done if a choice is made, but it is very much a political decision which then needs to be followed with specific interventions to make it happen. It has been a choice, and that is not a criticism particularly.

Q85 **Chair:** Taking that philosophy and going back to something Helena said earlier about the recycling of EV batteries in Belgium: I have a number of questions about that because I did not know much about it. Is it done in Belgium because it is a European centre for it, or is it done there because Belgium is the closest market, the closest location to the UK—just a ferry ride from Dover or wherever—that you could take these batteries to? Why has the market, invisible or system brain, not thought about doing something somewhere else without the ferry ride to the continent?

Helena Bennett: Yes, it is both really. There is a big centre of excellence there, and we do not have anywhere in the UK that can do it at scale at the moment.

Q86 **Chair:** Is Belgium the centre of excellence for France, Germany and the Netherlands?

Helena Bennett: Yes, I believe other countries are sending some of their recycling or recyclable materials there. But that is where the UK is almost

exclusively sending anything we can recycle; well, not even anything we can recycle because there is a lot of stuff we are not recycling that we should be.

Q87 **Chair:** That would almost require an intervention to plant that seed—to go back to farming—to at least provide something that would start to grow.

Helena Bennett: There are some centres of excellence in the UK that are doing really cool stuff. Another thing with Umicore in Belgium is it is not a perfect system: it is not able to extract everything that we could extract. EV batteries are getting more complicated: they are getting bigger, there are more materials in them, they are all manufactured in different ways; there is not one kind of universal battery that goes into every EV. There are some really good, innovative things happening at various academic institutions in the UK around recycling and how to extract the most material possible.

The problem with what happens—and this is outside of batteries as well—with a lot of this really good innovation in the UK is there is just not the translation into a viable business in the UK. A lot of innovation happening at our academic institutions is going elsewhere where there is not that valley of death between the small start-up and where we want to get to commercially. For example, the University of Warwick, WMG, has some really good stuff going on with the black matter of batteries and how to extract it. I cannot remember the exact number, but a really high percentage of the materials in not just EV batteries, but even the batteries you get in tiny teddies that light up or whatever. However, it is struggling a little with funding, and it is not able to scale up at the rate it wants to in a way that is happening elsewhere outside the UK.

Q88 **Chair:** Thank you. George, if we look at this maturely, not to be overly critical, there will be some countries doing things better than the UK. Perhaps there are other areas where the UK is doing things better, but we are looking at this from a supply chain perspective and we are looking at the domestic supply chain in and around energy here. Can you look at specific examples or approaches from other countries the UK could potentially learn from? I think you hinted at it quite early on, I am just giving you more chance to flesh that out.

Dr Dibb: Yes, there are a few examples we can focus on. Rachel already mentioned the US, and I will come back in a second to talk about the kind of approach from the Inflation Reduction Act. We can look quite close at hand to France, for example, and the approach it has taken on industrial policy. If we go back to my example earlier of offshore wind, we had some really world-leading policy development off contract for difference invented here in the UK using auction methodology to really drive cost reduction at installation. However, we were not having the same level of innovation on manufacturing policy and developing the conversations with those actual firms: the people who were going to be building factories and making things. That is partly because of, as you

said, a bit of a lack of desire to intervene in the free market. To extend your analogy further, we have left it up to the market to decide which seeds are planted rather than actually going out and planting the seeds ourselves and deciding which areas we want to be in.

Q89 **Chair:** We are a multi-crop grower, not a single crop grower?

Dr Dibb: Yes, or maybe too many weeds knocking around, although it is stretching the tenacity of the metaphor a bit. In France, it has always had a much closer relationship and conversation between individual firms and the state, and we have not had that same approach. That leads to us being strong in—

Q90 **Chair:** We have the media here saying, for example, "Oh, that's corruption. Look at the Government designing this so these people can produce or recycle EV batteries." Is there a risk of that?

Dr Dibb: There is always a risk of that but, equally, there is a risk of missing out on opportunities if we do not have clear conversations between Government and business, especially in a transition to net zero which is fundamentally going to require the production, purchase, adoption and deployment of lots of new manufactured technologies. The states likely to be winning in that are the ones that understand it is intervening or understanding at least the individual firm level decisions of how a manufacturer decides what to make that is actually going to win that race. For example, France has a much lower level of offshore wind installation than the UK—a 2030 target one tenth of the UK Government's—yet it is involved in quite active conversations with firms and has, since 2016, really expanded their manufacturing capacity to overtake and leapfrog the UK.

Looking ahead, we know we are going to market; we know the direction we are going in; we have a very clear target on offshore wind installation. We need to be identifying now that there is probably going to be a global bottleneck in that supply chain and, therefore, we should be strategically seeking to expand our capacity in the UK.

The other example we probably have to discuss is around the USA and the Inflation Reduction Act as well as other industrial policies. We would say we need a similar level of ambition of the Inflation Reduction Act in the UK, if not exactly replicating the tools. The US Government, the Biden Administration, was particularly constrained politically. It had a majority of one in the Senate, which meant it was constrained on what it could get through legislatively and that meant its only real option was tax credits. It designed the Inflation Reduction Act with that in mind. We do not have the same restrictions, actually. The UK can use a much broader range of industrial policy tools that already exist in Government Departments to try to align and implement an industrial strategy, but we probably also need to be more focused on which areas we do so.

That kind of ambition, the very clear certainty the US has been able to put under those sectors, has been transformational. You can see some incredible numbers about factory construction in the US increasing almost exponentially. Again, partly going back to that point around certainty for firms, certainty for manufacturers, because they are thinking about those tax credits on a 10-year timescale, it gives those firms a decade-long certainty. We have had so much chop and churn in the last 10 years so that would be really desirable if we are going to try to transform those supply chains in the UK.

Q91 **Chair:** I suppose I just saw it in a different way when you were speaking: rather than Government spending and just forgoing tax basically, in a way it amounts to much the same. Rachel, any particular thoughts on what you have heard from George?

Rachel Solomon Williams: I would build on George's point about security of supply. So far, a lot of this conversation has assumed you would have an industrial supply chain in this country for economic reasons in the sense that it brings investment flows and, therefore, jobs and all those other good things. It would be good if we could reframe it to be much more about energy security. For example, we have a national emergency plan for fuel where we recognise we always need to keep fuel flowing in order to maintain our emergency services and all those things. We will also need a continuity of supply of all these critical raw materials, copper, all these supply chain items, which need to be considered as a critical part of our energy security.

Q92 **Chair:** How can the UK secure that supply?

Rachel Solomon Williams: We need to make sure we have access to them; that is the main thing. Everybody else will be thinking about that too so you could argue that carrying out manufacturing in this country would significantly contribute to that security of our energy supply in the future.

Q93 **Chair:** Looking more globally in the world at copper and going back to the evidence from the National Security Strategy (Joint Committee): Chile and Peru are now having worries about more mining of copper there, and there are concerns within those societies. That is clearly creating a pinch point and it is quite real in Chile and Peru. If you go to the Parliament in Santiago or Lima or somewhere, the mine constituents do not want this to help the people in London, Paris, Copenhagen, wherever; how do you get around that sort of stuff?

Rachel Solomon Williams: We need to start by understanding the vulnerabilities we have. As a nation, I am not sure we understand what our needs are going to be and where those vulnerabilities are. I know there was some work done during covid, for example, about our supply chain vulnerabilities because it became particularly tricky at that time, but there is no publicly available document that I am aware of. That would be a great place to start. We could understand what is going on in

Chile and Peru and where else the sources might be. What could we do more on circularity? We have not discussed circularity, but making sure we can keep as much as possible within this country—I know the previous panel picked up on that—and design with that in mind.

Q94 **Chair:** Okay, thank you. Looking at those vulnerabilities going forward, you are aware of your own security, you are talking about being aware of what you have, but you also need to be aware of where other countries are as well, and no country is going to be fully secure in any of this. You can probably get to a point of optimal security, but you are not going to get any further. We are always going to have to live with an inbuilt insecurity in all this. Would you agree there is a certain paradox in the middle of all this?

Rachel Solomon Williams: Yes, that is absolutely true, and being aware of it is a very good start.

Q95 **Mark Pawsey:** You spoke about what happened in covid when there was a shortage of chips, and we covered that with the effect on automotive. Do you think we neglect these things because they are going all right at the moment? It will only take a bottleneck in a commodity for us not to be able to get hold of it. It would be broader manufacturing, but particularly for this sector, that will then say, "Why didn't we do something ages ago?" How serious do you think a shortage of a critical mineral is likely to be?

Dr Dibb: First, there are a lot of crises happening in this country at the moment which we do not need to discuss but, naturally, the Government focus on problems happening today, and that is completely understandable. It is much harder to do big strategies based on a problem that has not happened yet. I do not know whether Helena wants to pick up on the critical materials.

Q96 **Chair:** In fairness to the Government, in a democracy you are going to see a horizon that is probably not stretching much further in the Treasury than beyond November this year. The average west highland crofter, of which I count myself one, is maybe looking at a three or four-year horizon breeding just a few sheep. So, you are actually looking further than the UK Treasury is. That is not a criticism, that is just by its very nature, whoever would be there. There is probably a flaw within democracy causing that.

Rachel Solomon Williams: To be fair on critical minerals, there is already a strategy that has been produced and just needs to be implemented. So, we have a starting point but getting out the blocks and delivering some of that would be really good.

Helena Bennett: One of the issues we have mentioned already is lack of industrial strategy and direction of policy and so on, but there is also the fact that industrial strategy around manufacturing for the net zero transition is not being tied very closely to the net zero strategy the Government have. One of the things that will make a really big difference

to security of supply and what we are able to keep in the country is reducing demand in the first place. There are massive savings that can be made across transport, buildings and energy production. Some analysis we have done shows we could reduce demand for lithium and cobalt 55% by 2030 from current projections.

Q97 **Chair:** How would you do that?

Helena Bennett: Insulating homes so you need less energy for heat pumps, more public transport so you have fewer CRMs needed because you are selling fewer electric vehicles—I know that is not a very popular thing to say in an environment where we are saying we want more EV manufacturing—and thinking about different ways we can reduce our overall energy usage. There are lots of different elements to the whole picture. If we looked at them properly all together, we would—

Chair: If you have more of those in detail, I would be quite pleased to get that written evidence. Just before I hand over to Mark Pawsey, when the Committee was in Denmark or Belgium last week, they heard there was no way for European net zero in energy without—as they put it—UK wind, which I thought was quite interesting and an opportunity. Of course, being a Scottish nationalist, I pointed out it was Scottish wind, but we will leave that where it is. Mark Pawsey?

Mark Pawsey: It was UK wind, not energy produced from UK-manufactured wind turbines.

Chair: That is right.

Q98 **Mark Pawsey:** That is what we are focused on. We have covered this a little, but will CBAM help by building in the carbon element to the products that do come in from elsewhere?

Dr Dibb: Certainly, CBAM would be welcome in that it would reduce so-called carbon leakage. There are three main reasons. First, it would prevent domestic increase in carbon pricing on low-carbon products. Secondly, help stop domestic industries from being at a competitive disadvantage from firms overseas that do not have the same rigorous and high standards that we do. Thirdly, there is a big potential from linking a UK CBAM—which the Government have committed to—to an EU one. It would, potentially, reduce trade barriers between the UK and the EU.

Q99 **Mark Pawsey:** You say it helps with the selling of the principle of the move to low-carbon technologies because we can demonstrate that by manufacturing here we are allowing less to be created in other markets. A great concern is that we might be importing EVs to the UK, but they may be EVs manufactured in another country where the source of power may still be coal. Do the public understand those principles? Again, that is probably one for Helena in terms of any public surveying your organisation has done.

Helena Bennett: I do not have any evidence, but I cannot imagine the understanding about that is very high at all.

Dr Dibb: I would not imagine so, although I do think there is probably some salience to the idea that, if we want to transition to net zero, it is counter-intuitive to do so by relying on countries that are high coal emitters, or perhaps not with the highest standards of worker rights and so on that we might expect. Trying to embed those broader progressive principles within the core policy programme seems to make sense to me.

Q100 **Mark Pawsey:** The reason for us not to aim to manufacture everything, for example, is that there will be certain components that are very specialist and there will be economies of scale. It may make more sense to source a high-volume component manufactured at low cost simply by virtue of that, rather than by trying to manufacture a relatively small quantity for our own market. Are there examples you can give us where that may apply?

Dr Dibb: Yes, it is absolutely right that the UK should not be approaching this as a question of trying to be an autarky and manufacture every single component we need.

Q101 **Chair:** A North Korea-style approach?

Dr Dibb: Yes.

Q102 **Mark Pawsey:** We have taken that view in chips, have we not? We are not attempting to make volume chips; we are making high-quality chips in the UK, but leaving the mass market to somebody else who is better at it.

Dr Dibb: Yes, and one of the areas where that is particularly stark is probably on PV, photovoltaics, given that so much of the manufacturing is concentrated on China and, given the trajectory around wider geopolitics, what that might mean for countries in the west. Going back to the example of the US Inflation Reduction Act: that is generally seen to be pretty technology neutral. That is not right; it is technology specific but it is technology specific in every different technology. The Inflation Reduction Act has something like 100 different programmes within it to incentivise different areas of different supply chains.

Q103 **Mick Whitley:** It also has local content in it.

Dr Dibb: Yes, absolutely, but it really is spreading the bets across the range of technology and we would not advocate for the UK to do the same. However, sometimes—and even in this conversation—we have muddled some of the concepts. There are areas where we will want to seek to be strong and expand and produce more because we have a comparative advantage and there is an economic benefit to be had there. There are a series of technologies which we will want to have because they are critical for the transition and if we do not have them here in the UK we are going to be exposed to national security risk. Also, there will

be a third category of things which may never be economically beneficial, but we still want to retain, and there I am thinking of flat steel and things which are critical to wider supply chains. So, there are different reasons to be intervening in these things that might call for different tools.

Q104 **Mick Whitley:** When the Ukraine war started, no one foresaw the gas price because, at that time, people were saying, "Oh, we only import 2% from Ukraine." We have seen what happens: the prices went viral. Do you know what I mean? We have not learned, I do not think, our lesson for that. If we are going to get wind power, wave power, tidal power, solar power, we need to make sure we have enough of those commodities.

Chair: The pricing is insulated from those shocks.

Mick Whitley: Yes, we need to do that so that we do not get a shock again.

Dr Dibb: Some of this should not necessarily be a shock. We know the transition to net zero; we know the technologies we need and we can already see we are likely to have bottlenecks in the future because we do not have the announced capacity for 2030. So, doing a bit of that look ahead with a strategic eye and then matching it with what we can do in the UK is probably the right plan going forward.

Q105 **Mick Whitley:** One of the advantages of developing strong domestic supply chains has been cited as the increasing potential for exports. What is the current status of exports from UK manufacturing in the low-carbon sector?

Helena Bennett: I can talk on EVs for a little because that is something we have done quite a lot of research on. The potential is good, if that is what the question is. There is an interesting relationship between the UK's zero-emission vehicle mandate and EV manufacturing. We export the majority of the cars we manufacture here. There was a question on the previous panel about how we are going to meet all our targets with the ban on petrol and diesel vehicle sales by 2035 because we are not projected to have that many CRMs. The answer is we will not only be producing electric vehicles; it is likely a lot of manufacturers will still produce some petrol and diesel vehicles.

Our biggest market is the EU. The EU is also introducing regulation to phase out petrol and diesel vehicles. From a Green Alliance perspective, as much as we did not agree with the Prime Minister's removal of the ban on petrol and diesel vehicle sales in 2030, it now aligns with what the EU is doing. So, from a manufacturing perspective, actually, some of what they were saying was, "Well, now it just makes our job a little easier because we don't have to worry about the fact that we might not be able to sell some of the vehicles that we wanted to." That means—for what we are continuing to sell here—we will need to make sure we have the CRMs we need to produce the vehicles we need. As the majority export market

is the EU and our regulation now aligns with the EU, we also have to make sure we have enough CRMs to sell the 80% that is going to the EU. At the moment we do not. Going back to that recycling point: we are going to have to make sure we are keeping CRMs in the UK if we want to ensure we can keep manufacturing with the continuing uncertainty of global supply chains as well.

Rachel Solomon Williams: On the export side, I would suggest we think about it in a wider frame. If you are specifically thinking about export of materials for clean energy, that is a very niche kind of conversation. There is obviously a wider conversation about where our comparative advantage is in the industrial sector. Compared with other countries, we do really well in terms of our export percentage in chemicals, non-ferrous metals, and beverages. It is a helpful conversation to have in that wider frame. It feels slightly like a red herring in the specific niche we are talking about for this inquiry in the sense that we are nowhere near the capacity to be exporting really at this time.

Dr Dibb: I do not have a huge amount to add apart from joining those two ideas up. I would agree we really need to concentrate on expanding capacity to fulfil our own domestic needs; however, there are areas—as Helena highlighted—where there is a significant net zero challenge in our current industrial strength. That leads you to cars and EVs which already make up a significant proportion of our export strength. We really want to make sure we are embedding that in the direction the sector is moving. We have seen the content of EVs as a proportion going up over time, so making sure we specialise in that would be an export strength I would identify.

Q106 **Mick Whitley:** Are there any areas where there might be a particularly strong incentive for growth?

Rachel Solomon Williams: Again, this is slightly tangential, but in carbon capture we have an enormous natural advantage compared with everywhere else in Europe, for example, in terms of the resources available for storing captured carbon. The Government are actually doing a really good job of trying to take advantage of that opportunity. I have not got line of sight into what they are doing around the supply chain for that, but that is another decarbonisation industry and will support green industries in the future so it is important to consider in this wider energy conversation.

Q107 **Chair:** Is that not another of those risks where the next thing is, "We want to do this, but basically sort it out yourselves," and in come companies from all over the world and take advantage of that opportunity?

Rachel Solomon Williams: I am not close to the detail of how the supply chain aspect is working, but it is an exciting opportunity because it

is happening now, and they have not quite started digging the holes in the ground yet, as it were.

Q108 **Mark Pawsey:** But is it not a long way away? We were in Denmark last week, and we saw a plant being manufactured immediately adjacent to a power station where they are building the equipment for carbon capture. Again, are we just a bit behind the curve?

Rachel Solomon Williams: I do not know the detail, but I am happy to send some more information about it.

Mark Pawsey: That would be helpful.

Helena Bennett: There are a couple of other areas, actually. In transport, there are no big hubs for manufacturing zero-emission buses, light vehicles, e-scooters and HGVs yet. We have an excellent automotive industry here; it could be something we start exploiting if we can get access to the CRMs we need.

Based on our historical excellence in manufacturing, the other area—it is not anything that will really be tangible in the next half decade—is zero-emission aircraft. Part of the reason I say that is we have a little government guidance on what the future of zero-emission flights could look like in the UK through the jet zero strategy. There is not yet a policy framework to surround how that commercialises and scales up; neither is there an industrial strategy for how we could actually start building and innovating more widely here. We are right at the nascent start of that technology coming onto the centre stage, and it is a really good example of where the Government could actually marry the net zero targets and an industrial strategy in a way that is then exported all over the world; it is just not being considered in that way at the moment.

Dr Dibb: If I were to highlight any areas of strength—similar to Helena—there are some in the transport sector. So, manufacturing of trains and electric vehicles is a strength the UK has. I think it was mentioned by one of my colleagues earlier, that we do not currently have very strong heat pump manufacturing. We do, however, have strengths in air conditioning manufacturing, which shares lots of the technological components so there is some potential there. The UK does have strengths in wider grid technologies as well.

IPPR is currently undertaking some research, doing a survey across all green supply chains, to identify current and potential areas of comparative advantage which we will finalise in the next month and I would be happy to share that with the Committee. I guess, though, thinking about whether we are a bit behind: yes, undoubtedly, we are a bit behind, but I do not think some of those things actually take as long to catch up as, potentially, some people fear. Looking at how long it takes to bring, for example, a wind turbine or nacelles manufacturing facility online is a matter of two to three years. Yes, the expense is significant, but it is not on the scale of a semiconductor fab or some of these other

big capital outlays. So some of them may be quicker and cheaper to bring online than some might fear.

Rachel Solomon Williams: I just have one thing to add to that in terms of UK advantage: we have not mentioned the services sector. We obviously have fantastic professional services in this country, especially in green finance but also legal and strategy consulting where they are not supply chain in the sense of physical materials, but they are an incredibly important part of delivering a lot of these energy systems. That is something to support, celebrate and remember that we have.

Q109 **Chair:** You made an interesting point there of comparative advantages. You mentioned muddled thinking and just making sure we are not overlapping things and choosing pet projects or whatever, or things that spring to mind. Is there a list of the comparative advantages—you have mentioned them a few times—and why they are comparative advantages?

Dr Dibb: Yes, that is the work we are currently looking at, so I think there is some work already out there from LSE and the Centre for Economic Performance.

Q110 **Chair:** Will there be a central point we can all go to and look at these other comparative advantages?

Dr Dibb: Yes, we will certainly be publishing that work and it is across all the green supply chains, looking at where our present comparative advantages are. We will also be looking at where those are located geographically in the UK.

Chair: Thank you. I do not want to interrupt Mr Whitley for too long.

Q111 **Mick Whitley:** No, that is fine. My last question: is there enough alignment between domestic and international standards and materials or products for export to be feasible and practical?

Rachel Solomon Williams: We would love to see much more aligned product standards internationally; it would help producers enormously. In many cases there are none, and it is a point we have been making repeatedly around the industrial transition that aligned product standards are incredibly helpful and bring down cost as well as empowering the domestic supply chain.

Helena Bennett: There are some things my colleague Libby, who should have been here today, will have to say about that, so I am happy to share details. It is not my area of expertise.

Chair: You can send that to the Committee.

Q112 **Mark Pawsey:** I just want to pick up the point that George made about the Inflation Reduction Act and the measures the EU has brought in. Do you think the Government's response is adequate? It tends to be a piecemeal thing. There was very substantial investment in Somerset to

build EVs for domestic automotive and substantial investment in Port Talbot in converting steel production to arc furnace using previously used steel; is it enough? Does the UK need to be as generous in its incentives like the US and perhaps those of Europe, or are we making a step in the right direction? Would a more strategic announced and stated policy be helpful in your view?

Dr Dibb: Yes, taking a step back and comparing the UK's approach to both Europe and the US: the UK's approach is currently inadequate. They have not stepped up to the challenge in the way some other countries have. There is obviously concern around a subsidy race, but that is not necessarily what we are seeing. What we are seeing is a correct step in the right direction of an increase in the ambition that other countries are taking, and the UK is behind.

Q113 **Mark Pawsey:** Do you think stepping back and just looking at it on a project-by-project basis is a better way than publishing that, "For anybody who wants to do this, we are going to lob all this amount of taxpayers' money at it"?

Dr Dibb: Absolutely, and in some areas the UK is making steps in the right direction. There are specific strategies we have highlighted already today, but the Inflation Reduction Act is not just throwing money at the wall and seeing what sticks. There are 104 different programmes within that which are focused at very specific levels of the supply chain. It is a targeted programme. I would not advocate taking the same approach in the UK, given the means of getting the money out through tax credits, but we could adopt a much more targeted supply side approach. Also, because we have more political latitude, it means we can match regulations—the things Helena was talking about—to reduce demand and get better bang for our buck. We can get more effective public spend because we can use both a carrot and a stick whereas the Americans are only using that tax credit carrot.

Q114 **Chair:** Is the Inflation Reduction Act, or IRA, not similar to world war two in a way, or to the NASA programme which threw up Teflon? It is basically a big fiscal stimulus that is coming under some guise that basically gets the economy moving and gunked up because the magic money tree is being shaken. The money is coming out; the grease is in the engine of the economy; the economy is moving faster, producing more stuff. Yes, of course, essentially, what it is all about is the targeting, but it is the enabling of that money into the economy to get capital and ability shifting twofold.

Rachel Solomon Williams: Can I come in on this? I do not think we should assume the UK throwing a lot of money at the problem is necessarily what is needed, actually.

Q115 **Chair:** But throwing it in a targeted way, as the war did, as NASA did?

Rachel Solomon Williams: Yes, it does not hurt, and it will certainly create stimulus of a kind, but there are other factors to take into account.

For example, we have double the industrial energy price compared with the EU, and doing business through the use of energy in production is incredibly expensive. So, what are the levers we could pull to think about redesigning electricity prices, electricity costs for high energy consumers? That does not necessarily need to be a grant of any kind, but it is a policy design that could, for example, significantly unlock a lot of investment.

Q116 **Chair:** We think we will look at the economics of energy, and zonal and nodal energy at some stage, which will have a change on that very thing.

Rachel Solomon Williams: Absolutely, and it plays straight into the supply chain conversation because if you can start manufacturing at a sensible cost, you do not need an extra grant to help you do that. That is a very simplistic summary, but our industrial energy prices are very high.

There are other things we can do in terms of regulating requirements of all sorts. We talked about product standards. I always use this example, but I think it is very good: we have a mandate for the supply of low-carbon fuels into this country. We could think about other sorts of mandatory and regulatory support that do not cost anything directly to the taxpayer, but they spread cost across the industrial sectors in a fair way. So, it creates an additional cost, but it does not lay it directly through taxes. We are very good at doing that; we are very good at making policy in this country when we choose to do that. There are also things around how we use UK infrastructure.

Q117 **Chair:** We are also quite good at sticking with the wrong policy.

Rachel Solomon Williams: Perhaps. I suppose it depends on what you are trying to do with it. The UK Infrastructure Bank exists to do exactly this kind of thing. I would say it has been quite conservative to date about how it has used its funding, but it does have loan guarantees as a lever it can pull that do not go on the balance sheet, and deployment of those loan guarantees into supply chain initiatives that really need them could be another way of helping out as well.

Q118 **Chair:** Helena and George, any final observations?

Helena Bennett: Just to completely back up what Rachel just said. There are so many other levers we can pull apart from just funnelling capital into these industries, but more capital still needs to go into these industries. The closest we had to a Government response to IRA was, I think, about £4.5 billion announced in the autumn statement for various things including gigafactories and steel which, when compared to the sums that IRA technically equivalates to within 10 years, is pennies really. We did a piece—

Q119 **Chair:** So, it is not a per capita match?

Helena Bennett: Not even close. Not even close. No, no, no. We are talking about hundreds of billions of pounds for IRA. I do not know if you can tell, but I have done a lot of work on EVs.

Chair: I had figured a little.

Helena Bennett: Just one example is we looked at what the equivalent of all the tax credits add up they are giving out in the US would be for the size of the UK market: by 2030, it will cost £65 billion which is almost two thirds of HS2, just for EVs.

Q120 **Chair:** So, that is the equivalent for the UK of what the Americans spend on EVs?

Helena Bennett: Yes.

Chair: Per capita, let us say.

Helena Bennett: We can share that analysis with you.

Chair: That would be really fascinating.

Dr Dibb: Yes, very much agreeing with Helena and Rachel. I would guide against talking about this as shaking a magic money tree kind of policy. There are many things the UK can do in terms of carrot and stick that are not a cost on the Exchequer. In fact, thinking about the industrial strategy as shaping markets is really useful.

Q121 **Chair:** IRA is a magic money tree. Where did the money come from?

Dr Dibb: They are borrowing it. It is entirely legitimate.

Q122 **Chair:** From themselves?

Dr Dibb: No, not from themselves; they are borrowing it on international markets. They are raising bonds, and it is absolutely legitimate for Governments to borrow to invest in future economic growth.

Chair: Yes, absolutely. The left hand borrows from the right hand most of the time when the Government have a big—anyway, let us not get into detail. We do not have the time.

Dr Dibb: Regardless of where the borrowing comes from, it is not just about spending money, and there is a huge amount of potential for the UK to do a lot more. You compared it to NASA and the moonshot. There are things Government can do which are not necessarily about funnelling money in. Look at what the UK Government did with the development of the covid vaccine with AstraZeneca, for example: we used a purchase guarantee. We said, "Look, we're going to need to buy millions of these doses from whoever successfully manufactures a vaccine that works." That gives firms the security to invest. That is exactly what we are talking about; you are going to spend that money anyway. All those things are right but, like Helena said, the UK is way behind the curve on levels of public investment across the board. We are below the G7 and the OECD average, and specifically on net zero investment, so we need both.

Chair: Thank you very much. We came up badly against time, but can I

thank you all? You have made some excellent points today, and we have the muddled thinking point. We had a lot of points from Rachel; and well done, Helena, for standing in for your colleague at such short notice: we wish Libby well, but thank you. Thank you all.