HOUSE OF COMMONS

Business and Trade Committee

Oral evidence: Batteries for electric vehicle manufacturing, HC 1070.

Tuesday 9 May 2023

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Watch the meeting

Members present: Darren Jones (Chair); Jane Hunt; Ian Lavery; Andy McDonald; Mark Pawsey.

Questions 35 – 76

II: Stephen Gifford, Chief Economist, The Faraday Institution; Alan Hollis, Chief Executive, AMTE Power plc; Ian Constance, Chief Executive, Advanced Propulsion Centre UK.

Examination of Witnesses

Witnesses: Stephen Gifford, Alan Hollis and Ian Constance.

Q35 **Chair:** We are now moving on to panel two, where we are going to welcome Stephen Gifford, who is the chief economist at the Faraday Institution; Alan Hollis, who is the chief executive of AMTE Power, which is a British company making batteries; and Ian Constance, who is the chief executive of the Advanced Propulsion Centre here in the UK.

Stephen Gifford, I am going to come to you first, because the Faraday Institution has been doing a lot of work over the last few years on UK demand, how many gigafactories and gigawatts we need, and how we support the automotive sector in the UK. I just want to pick up with where I left off on panel one to see if you can help me.

I can understand if the market stood still and we said that we are producing this number of cars today, so, assuming they are all going to be electric vehicles, we need this number of batteries and, therefore, this number of gigafactories and this amount of supply chain. That all stacks up and makes sense, but the clock is ticking and things are moving quite quickly, it seems, in both of our largest export markets.

How do you track over time, if there is a decline in the future projections for manufacturing numbers in the UK, what the underlying battery capacity requirements have to be in order to meet that declining sector, if, indeed, you agree that it is declining?

Stephen Gifford: I would not target a declining sector as an ambition, really. As a minimum, you target a stable automotive industry. I am thinking about the period 2015 to 2019, not counting the period of the Covid pandemic and the global recovery after that. If you target that as a long-term ambition for automotive, some people argue that we cannot just have stable automotive and that we need to have grown.

In terms of the requirements by 2040, given the overall EV sales projections—and not just passenger EVs but HGVs, micro-mobility and grid storage—the projection for battery demand is around 200 gigawatts, which is about 10 gigafactories, each with about 20 gigawatt hours. Gigafactories can differ in size, but, if you think about a gigafactory of about that order, that is probably what you need.

This means we need to have five gigafactories in place by 2030, which is about 100 gigawatt hours of demand. Tracking back then, you typically need two or three years to develop a gigafactory and to get it up to speed, and maybe one or two years' planning before that. We already have one in the pipeline in Sunderland with Envision AESC, but we need at least two or three to be decided on in the next two or three years in order to hit those 2030 targets and to be on track. We have not missed it, but we certainly do not have a lot of time to catch up, and this race is clearly not over yet.

Q36 **Chair:** I was slightly troubled by some of the evidence from the first panel. I can see how, if you want to build a gigafactory, you need to find a site, you build a building and you get a grid connection and, hopefully, some workers. Ideally, you do a deal with a car manufacturer, and you are near the car manufacturer in order to do that. That feels like a neat package to me. There are lots of problems in that, but you can visualise it.

The concerns from the first panel, though, were the supply chain that underpins it and the regulatory environment that requires us to import stuff from China if we are going to be able to meet EU regulatory standards. You talk about delivering five or 10 gigafactories. What confidence do you have that we can get the supply chain robust enough to underpin those gigafactories being viable commercial entities?

Stephen Gifford: The immediate supply chain slightly upstream is the important thing to focus on. Many of the panel members talked about cathode active material, so the components that go into the cell manufacturing. You have an anode, a cathode and an electrolyte. Those three parts of the manufacturing then go into the cell manufacturing, and the cell goes into pack manufacturing. Targeting the next level up in the stream is very important, and that will really help with all the regulations around rules of origin, etc.

Moving further down the supply, the answer is not that we need all raw materials from the UK or we do not. What is important, because of the Chinese monopoly on this, is a diversification of supply. Anything that the UK can do to help in the diversification of the supply is helpful. Anything that you could do to shift the demand slightly away from China, such as direct relationships with Australia with the new trade deal, would also help with diversification. That gives us security of supply across that raw materials edge. What is important is diversification of supply rather than either/or—UK or not UK.

Q37 **Chair:** Alan Hollis, you are doing this for real. Should I be less depressed after listening to the previous witnesses? It seemed pretty difficult. Is there hope?

Alan Hollis: I wrote down that we should not be so downbeat about the UK battery industry. From my perspective, the UK has a rich history in developing battery technology. Where we have a significant opportunity to improve is in the commercialisation of the cell technology, and that is the stage that we are at as a business. There are many problems and challenges that we need to overcome.

There are also many sizes and types of gigafactory. There is the 30-gigawatt-hour gigafactory to support very high volume automotive applications. There are smaller-scale gigafactories like the one that we are planning to put up, which is specifically focused on serving the lower-volume, higher-value-add manufacturers that we have in the UK for automotive and for energy storage.

We must not forget the thing that the UK is really good at, which is high technology, low volume, high value add, and we have to always bear in mind that we need to support that, because it is a very important part of our economy.

Q38 **Chair:** We hear similar evidence to what you have just given in lots of sectors in the UK economy. We are really good at R&D university partnerships. We are really good at innovation and IP. Companies, presumably like yours, then need to raise £400 million or £500 million in order to scale up to provide the British business that will supply the OEMs and others, but so many businesses just do not make it through what the tech industry calls the valley of death. How are we going to change this narrative for battery manufacturing?

Alan Hollis: The attitude of the Government needs to change and to be far more supportive in helping businesses go through the valley of death. You have hit the nail on the head. The UK industry is brilliant at supporting innovation. Without the support from the UK Government, we would not have been able to develop the three very unique cell technologies that we have managed to develop. What we need is that extra support just to help bridge through this period of having the technology, commercialising the technology and then building the gigafactory.

It is so important that we find the mechanisms to do that, and really quite urgently, because time is against us, as we heard in the previous panel. We need to get the gigafactories in full production by 2030 at the latest. Time is not on our side and we need to be taking action now. I know that it is a very difficult thing to do with the multiple challenges that we are all facing all of the time, but it is so critical to UK industry, and in particular the automotive industry and the very specialised, niche manufacturers that we are all proud of here in the UK. It is about Government support in whatever form is available.

Q39 **Chair:** Ian, I can see how, for very expensive cars, maybe F1 cars, and for the aerospace industry, the UK could carve out a global niche or USP for battery manufacturing in those sectors. Are we going to get there for mass manufacturing?

Ian Constance: We have to get there for mass manufacturing. The number of batteries that are going to be served for the applications that you talked about—F1 and aerospace—while significant for the type of high tech innovation activity that the UK is great at, will be relatively small. It is the ability to serve those volume sectors of the car market that really brings an industry with you. It brings that quantity of gigafactories that Stephen and your prior panel talked about in the supply chain.

The way we see it in APC is that the big gigafactories are really the keystone elements, because this whole story is riven with chicken and eggs. If you do not attract the big gigafactories, the 10 to 30-gigawatt-

hour kind of facilities, you cannot have a sensible discussion with people doing the rest of those supply chain elements. It all unfolds from there.

Q40 **Chair:** We essentially need car manufacturers in the UK to sign up to some deals with companies that are viable to supply in the UK. We need to get to that point pretty quickly.

Ian Constance: We do and therein lies a bit of the weakness that you see in the UK industry. We have a couple of very big car producers. One of them has already made its decision. The other one is in the process of making its decision. They are key, because they are those cornerstone investments that you can build an industry and a supply chain around.

The rest of the industry is quite fragmented. It is those smaller players. They will need access to batteries. They will need to form alliances in order to create the scale that brings gigafactories along. That requires a bit of time, which answers one of the questions, which is why we appear to be a bit behind some of the others.

Q41 **Chair:** Alan, if I am one of those big car manufacturing companies and I say, "I want to do the right thing by the British economy. I want to sign a contract with a UK-based company to supply me batteries for my future needs", who is the supplier that I sign up to for the batteries? Who is going to sign the contract to supply the batteries I need if I am a big car manufacturer?

Alan Hollis: It would be a company like ours, depending on the volumes that we are talking about. We have to create the environment where we can attract the inward investment to build the gigafactories. They are expensive things to build. Even on a relatively small scale we are talking £250 million. For a 30-gigawatt-hour facility, you could be talking £3 billion. They are expensive and therefore the funding necessary to invest is enormous.

We have to attract that investment in and it is very difficult at this particular moment in time, when you see what is happening in the US with IRA. You see what is happening in Europe with all the incentives that are available. The people with money are tending to place it in other locations, rather than focusing it on the innovative businesses such as ours. We have the technology and we just need to take it to market.

Q42 **Mark Pawsey:** I wanted to understand a little more about the competitive environment we are working in. Stephen, in 2012, Envision's plant in Sunderland was the first in Europe to produce batteries at scale. We have not really done a massive amount since then, and we have seen growth in places like Germany and Hungary. How have they done well, while we have lagged behind?

Stephen Gifford: We are definitely behind, so that is correct. It is a mixed bag in Europe. Some countries have done very well; some have not done so well. Eastern Europe has been concentrating on gigafactories quite successfully, partly initially because of the competitive nature of

labour costs, and land. Recently, Germany has been very successful in gigafactories as well. Overall, there are probably about 30 gigafactories in the pipeline in Europe, whereas we have maybe one, or two if you class the small one there at the moment.

It is quite competitive, but overall, in the global economy, it is China, as we heard in the previous panel, where almost all the gigafactories are. There is certainly time to develop those gigafactories in the UK because we have a strong automotive industry. We have a very flexible labour force. We have highly skilled people, both in jobs and in the research community. We have all the ingredients here for us to be successful.

There are three ways to think about how you could develop the industry. Typically, Governments in eastern Europe have had direct relationships with Asian manufacturers and brought them in, very much like the 1980s with Nissan. That is a success. Maybe it is not a British battery, but it is certainly a foreign country investing in the UK. You could do that. That is one model.

The second model is about OEMs signing their own agreements with either UK battery manufacturers or other, non-UK, battery manufacturers and building a gigafactory here. Then you have the third model, which is potentially the most risky and higher cost of capital. That is the greenfield sites, such as Britishvolt, which went to develop its own plant without any IP and developed its own IP. It is a much riskier way of approaching it and very few gigafactories have been successful in that model. Northvolt in Sweden has been successful in a greenfield site, but there have been very few others. It has been more about traditional bringing Asian battery manufacturers in or OEM relationships.

Q43 **Mark Pawsey:** Ian, is the principle that vehicle assembly will take place adjacent to where the batteries are made because the battery makes up such a high proportion of the value and the weight of the vehicle? That was one reason why Envision built its battery plant in Sunderland. Does that principle still apply? Is it always going to apply or might we not be at such a disadvantage, if we want to retain vehicle assembly, if the batteries happen to be made elsewhere? Arguably, it might give an OEM the opportunity to play one battery manufacturer off against another and perhaps get a better deal than locking themselves into a solus agreement with somebody who is next door.

Ian Constance: The prevailing view of the industry is that we have to have battery manufacturing where we have vehicle assembly. That is because, as you said, these things are very heavy and bulky. They are expensive to ship. They are in their safest and best condition when they are packed in a pack that goes into the car and you would not ship them in that form. They can get damaged. There is a huge amount of working capital tied up in very long supply chains, so there are lots of reasons to make batteries where you make cars. We think that that will be the predominant future, so it is really critical that we get these battery factories.

Q44 **Mark Pawsey:** I understand why battery manufacturers have flocked to Germany and Germany has provided the incentives for them to be there, but I do not get Hungary. Is Hungary assembling vehicles?

Alan Hollis: Hungary assembles vehicles. There is a lot of vehicle assembly in eastern Europe.

Q45 **Mark Pawsey:** Is there a danger that our assembly might migrate to where those gigafactories are?

Alan Hollis: There absolutely is. This is all about creating—you have heard this a number of times already today—a level playing field of investment. That level playing field of investment cuts through the batteries but also the vehicle assemblers and the supply chain element.

We hear two things all the time. One is about this level playing field on investment, with lots of money being poured in in the US and Europe. The other piece is energy costs. Everybody wants green energy to make vehicles and to make their batteries. They do not want batteries, which are very highly energy-intense products, full of carbon intensity from day one. They need green energy, but they need that at low cost.

Q46 **Mark Pawsey:** How can we get the consumer to understand that in that case? If there is a whole load of energy expended in the manufacture of the battery and I buy an electric vehicle, how do I know whether the battery has been made through a green manufacturing process or a particularly dirty one where they have used electricity from burning coal?

Ian Constance: I see that the vehicle manufacturers are getting religion on this. They recognise that this will be a key competitive battleground to demonstrate that their vehicles are zero carbon. Of course, they need to do that at a cost, so they need to work that out.

Q47 **Mark Pawsey:** When I buy an electric car, I have no idea who made the battery. Should I be asking that question of the salesperson attempting to sell me the vehicle?

Ian Constance: I think that that will be the future. That is certainly the expectation.

Q48 **Mark Pawsey:** How do we raise awareness of that?

Ian Constance: I think that there will be carbon border legislation and that will be a key element in creating that environment that you talk about.

Q49 **Andy McDonald:** We have touched on the European Union-UK trade and co-operation agreement. Can I take our attention back to that for a minute? The rules of origin will start to be phased in next year. Can we focus in on that? What sorts of challenges do you think that that presents to us next year?

Ian Constance: It will be a massive challenge because, over the next few years, there will be a lack of supply. We have seen the battery

industry grow significantly in Asia, so a lot of supply is still coming from Asia, which means that people are going to need to quickly work out where they get local batteries from. That battery element is going to be fundamental.

The next piece of it is going to be the cathode active materials. There is a massive shortfall of them in Europe and it is going to be billions of pounds of investment over the next few years to bring that together.

Alan Hollis: I would totally agree with what Ian has just said. The demand for electric vehicles is rising exponentially almost. The whole supply chain across the EU is playing catch-up, whether it is gigafactories or the raw materials that go into the gigafactories, cathode active material and anode active material. My biggest concern is that, with the lack of capacity, cathode active material capacity in particular, it is going to be very difficult for us to comply fully with the rules of origin.

Q50 **Andy McDonald:** So it is up for renegotiation.

Alan Hollis: It really needs to be.

Q51 **Andy McDonald:** What are the changes that we need to see? Do you have any thoughts on the specific changes we would like to see in the renegotiation of the TCA?

Alan Hollis: I do not have any to share today, but we can respond later on that, if that is okay. We have to take into account the measurable gap between the production capacity and the demand. Those figures are out there in the market. We will come back with some input on that, if that is okay.

Stephen Gifford: As a concrete suggestion on that, the rules of origin were created in 2020, before the pandemic, the energy problems and the global hit of the recovery and inflation. That was not envisaged when the TCA was developed, so that has hit most markets quite hard. As a minimum, I would suggest an increased length of time for the transition period. Full implementation is in 2027, so pushing that back one or two years would give everyone breathing space.

Q52 **Andy McDonald:** Are we just delaying the problem? Is there time enough for the market and the industry to adapt to 2027? Is that feasible? If you are going to avoid tariffs, everything has to be of a UK or EU origin. It is going to cause immense problems.

Ian Constance: I think 2027 is still going to be a stretch. As Alan said, we need to get cathode active material in to meet these rules. We need to have a discussion with the battery companies and supply companies. As a minimum, a delay is what the industry would expect.

Alan Hollis: This is where it comes down to us having a very clear, end-to-end industrial strategy that covers the whole supply chain. We are very good at looking at the number of gigafactories and the output of

those gigafactories. We have a view on the cathode active material. We have a view on the refining and mining capacity.

We need to be looking at the joined-up picture so that, when we are asking for delays in the implementation of the legislation, we can be quite confident that we have the right numbers in front of us. That end-to-end industrial strategy is absolutely key and, dare I say it, the UK really needs to look at that and put in place that strategy.

Q53 **Andy McDonald:** You are saying that we do not actually have the raw data to present and say, "These will be the consequences if we are bound by the phase-in for next year and the completion of that in 2027". Are we able to present the case and set out clearly what the consequences are?

Ian Constance: The data that we have today in the Advanced Propulsion Centre quarterly demand report says that, on anode materials, we have about a 50% lack of supply across the UK and Europe. On cathode materials, we have about a 25% deficit. That means that 25% of the cars that are traded around Europe are likely to be attracting some kind of potential tariff. In a world where we are trying to encourage people to go to electric cars, that is probably an unintended consequence.

Q54 **Andy McDonald:** We heard earlier about the supply chain challenges that we have. It is not feasible, apparently, or desirable to onshore all elements of the supply chain. Do you all agree that that is the position? Is that something that you would all sign up to?

Alan Hollis: Yes, I would.

Q55 **Andy McDonald:** If that is the case, which are the bits that we should be hosting domestically? Which are the key elements and for which bits are we content to rely upon importation from overseas?

Ian Constance: From our perspective, it is clearly cell manufacturing. That is the gigafactories and those materials that make up cathode active materials and anode active materials, which are largely carbon-based products. Those two, so the cathode and anode, make up about 55% of the value of a cell. Electrolyte is next and separator is after that. The separator and electrolyte are another 15%. If we focus on those four elements, we get the lion's share of the value and keep it focused. This comes back to Alan's view about having an industrial strategy that focuses in on what is important.

Alan Hollis: I agree with Ian. The previous panel mentioned this too. You start off with a gigafactory, because that is, ironically, perhaps the shortest time to market, to build the gigafactory and get it up and running. That is four to five years. Then you can start to build the rest of the supply chain around that.

Throwing something else into the mix, there are other technologies around, like sodium ion technology. That is something that the UK should

be and is investing in to develop alternative technologies to lithium ion cells to try to mitigate the need for lithium and cobalt.

Stephen Gifford: I very much agree with what elements of the supply chain we can onshore here. It is pretty much all of it apart from some of the raw materials, I think. As well as those mentioned, there are also the added value services around battery manufacturing: the BMS itself, the battery management system software, recycling, certification and safety testing. All those sorts of elements are building up now, as we speak.

To reinforce the point about the next generation from the earlier session, where someone mentioned that China started to build this out in 1978, the Faraday Institution is looking at the next generation and spends a lot of its research in that area, so sodium ion, lithium sulphur and solid state batteries. These are the next generation, the 2040s technologies. We need long-term research to continue and be stable among those.

Sodium is a low-cost, abundant material. That would be a solution, because sodium is everywhere. It is particularly used for grid storage. You could also use it in developing countries for micro-mobility, very cheap EVs. Lithium sulphur can be used for lightweight applications, particularly defence, aerospace and aviation. Solid state is very safe and has high performance. You could use it for many different applications.

These are all in play and we are leading researchers in this sphere, in many of the universities we have in the UK. As you said earlier, it is about commercialisation of that and getting through that valley of death. As long as we keep the research and commercialisation stable and long term over the time, there is every chance that we can do that.

Q56 **Andy McDonald:** Is that linked, ultimately, to the supply of these critical materials and mitigating the risks of any interruption in the supply? You are talking about future technologies. Is enough being done now and with an eye on the future? Are Government doing enough to mitigate the risks to the supply of critical minerals?

Ian Constance: On the R&D side, as Stephen said, we are in a leading position. We are one of the leaders in developing these alternative technologies. I do not think that they are going to come a lot more quickly than they are likely to come. They will be driven by the shortage of critical materials, by the technology readiness and by their ability to deliver performance into the market. They all have their pros and cons.

Q57 **Ian Lavery:** It is really interesting. Britishvolt was in my constituency. A lot of the things that have been discussed today are news to me, the tales and these stories, and everything that has gone with this wonderful proposal that was going to transform my area with a gigafactory. Lots of what has been said has not been said in the past. I thought that I would share that with you.

The pot of money from Government, as the UK's automotive transformation fund, is what people are looking to apply for. It has been

suggested that that has been overshadowed by investment in other countries, such as the US Inflation Reduction Act. I am wondering how the financial support here in the UK compares to that in, say, the EU and the US.

Alan Hollis: Right now, there is no comparison with what is on offer with IRA and what is on offer in Europe. That is unfortunate, but that is the reality of where we are. You have UK battery technology developers and manufacturers, because we have been manufacturing batteries on a small scale for the last 20 years. We are now at that stage where we have developed three different technologies and we want to commercialise it.

We absolutely want to commercialise that product here in the UK, but it makes the investment decisions, and attracting the large investors that we need to support that level of investment, difficult. It makes it difficult for us to argue the case with our potential investors when they ask, "What is on offer in the US?" It is 20% to 30% OpEx costs covered for the life of the facility and there is some tax support as well. In Europe, there are capital grants and other incentives available.

Then you get asked the question, "Why do you want to stay in the UK?" We want to stay in the UK because we passionately believe that it is the right thing to do. We are proud of UK plc and the UK industry. We want to be part of that and we can see an exceptionally strong future.

As an industry, we need to create the UK battery industry, and that includes the supply chain, so that we have something to be proud about and it supports and creates even more jobs than the 800,000 that are currently supported through the UK automotive industry. That is what this discussion is about. It is about how we protect and create high-paid, high-skilled jobs in the future, and this is an industry that can do that.

Ian Constance: The battery-making industry, like the car industry, is highly competitive, internationally competitive. If you cannot make it at the prevailing cost and with the quality, performance and everything else, you are not going to be in that game and people are not going to buy off you. To make it at that cost you have to be able to supply everything. You have to have the capital investment at a level that is consistent with the best in the world.

The problem is, when other nations are putting massive amounts into that, that creates a situation where not putting that level of cash in makes you uncompetitive. Then it is very difficult for shareholders to make a positive decision if we are not putting the same amounts on the table. It is like all these things. There are areas where we have strengths. You might not have to go in directly at the same level as America because we have the rules of origin and things like that on our side, if we do it right. We have to be at a level that gets us through the door of these investors.

There are two things. There are the globally mobile international investors, which are already big companies making batteries. They will not talk to you unless there is a route through to some de-risking. Then there are the people in Alan's situation, building up these technology businesses where getting through that valley of death we heard about earlier requires an attitude towards risk that is different to the prevailing mood.

Alan Hollis: There is just a final point from me on that. I do not think that anybody is expecting the UK Government to go toe to toe with IRA in the US, or even the schemes that are available in mainland Europe. There have to be targeted packages of support to grow and develop the industry.

Q58 **Ian Lavery:** That is a really important point. When you look at some of the investments in different parts of the world, the EU in fact and in the US, it is not at all uncommon to see investment from Governments of £750 million into these projects, yet that is not and has never been the case with the automotive transformation fund. It is quite the opposite. I believe that a lot of the strings attached to the finances that have been made available are very difficult.

Depending on who you speak to, we might want nine gigafactories by 2040. Whatever the facts might be, we need gigafactories. Will the UK Government have to step up to the plate? Will they have to be offering £750 million and the likes of it so that we can compete and bring gigafactories to the UK?

Alan Hollis: I would not like to agree or otherwise on the number, the £750 million, but it needs to be a very sizeable sum of money available to support the creation of the industry. That is what we are talking about. We are not talking about creating one gigafactory. We are talking about creating the UK battery industry, which is an integral part. That is the whole supply chain, however much we decide to create. That is what we need to do. It is an investment and that investment will pay back multiple times over with jobs, tax and the general returns that you get from investing in the industry.

Q59 **Ian Lavery:** How successful has the automotive transformation fund been?

Alan Hollis: From our perspective, we think that it is a very positive step in the right direction. It has been very successful in supporting businesses to grow and develop, but we are at a different stage of development now. We are at the birth of the UK battery industry. We have to recognise that and really up the investment and support.

Q60 **Ian Lavery:** Do you think that it has delivered what it was supposed to?

Ian Constance: It is difficult for me to answer that, because I am so closely engaged in the administration of that. With the automotive transformation fund we have secured one gigafactory. As you know, on

the case that did not make it, we were quite involved in helping that to get where it got to. It was a great disappointment that it did not make it any further.

We have done a lot of work on feasibility studies, scale-up readiness and helping bring people along to demonstrate that they have investable products. We are in a really difficult spot right now because investment in the markets is really tight and difficult to get hold of. Of course, the Government are not going to do it all by themselves so we need the investors and the Government bit coming together.

Stephen Gifford: It is not just about financial support into this industry. There is lots more that Government can do, so making sure that it is still a top three priority for inward investment, and that the inward investment stays focused on this as one of the three things that we should do in terms of inward investment. As I said, you only need 10 sites. They could help to identify those sites, give some of those sites special enterprise zones and provide some subsidies to level the playing field on energy costs, for example.

Then there are all the things that Governments always should do, so skills development and R&D. There are a huge amount of things, rather than just concentrating on the money and the financial side. That is very important, but there are other things as well that Government should do.

Q61 **Ian Lavery:** My questions were on the automotive transformation fund, but I accept what you say. With regards to the Inflation Reduction Act, has that had much of an impact on battery manufacturing in the UK? How do you think that the UK Government perhaps could respond to that?

Ian Constance: We are seeing companies across this whole industrial picture, regardless of whether they are in batteries, other EV manufacturing or other bits of the supply chain, telling us every day that they are encouraged to go to the US because of the level of incentive that is on the table. Their investors are much less interested in supporting them in the UK, so it is having a significant impact, yes.

Q62 **Jane Hunt:** My questions are on workforce. Alan, you talked about time not being on our side in an earlier answer. Stephen, you said that we have a flexible labour force in the UK. You have also just mentioned to Ian about skills development and maybe that is where the Government should be involved. What can the Government do to ensure that there are sufficient numbers of suitably qualified staff to support battery manufacturing in the UK? Should it be possible to train, recruit and upskill the UK workforce in time to meet that short timescale that Alan referred to, or indeed should the Government get out of the way?

Alan Hollis: If you look at the timescale required to build a gigafactory, it is four years, on average, from start to finish. That is an adequate time to train and develop, or retrain and develop, the necessary skills and the workforce. The battery industry needs high-skilled jobs, and they are

high-skilled jobs that require certain skillsets. We all know what those are and I can run through them at a later stage if you want.

We have to make sure that we are working with local authorities, the Faraday Institution and local colleges to set up apprentice schemes in the areas where we are going to put our gigafactory. We have a jobs manifesto and we are going to start to train and develop. That needs to start a couple of years at least, and probably earlier than that, before you are going to start up production in the gigafactory. We are looking at 30 months before start of production because you need to train and develop the skills and the people.

We have some really good facilities in the UK as well, such as the UK BIC that this Government have invested in. We are a prime user of that facility. We intend to use our own plant up in Thurso and the UK BIC as part of the training that we need to impart into our people, but it is a big task. If we have six to eight gigafactories by 2030 or 2040, there will be a workforce of 30,000 people in the battery industry. That is a sizeable number of people to train and develop and we absolutely need to be thinking about that now. I know that we are.

Q63 **Jane Hunt:** Stephen, that is almost a supply chain of people in itself. What do you think?

Stephen Gifford: I very much agree with what Alan said there. It is a problem that is eminently tackle-able by institutions and stuff. We have been involved in quite a lot of initiatives ourselves, developing the strategy for the electrification skills framework for example, along with other partners in that. As always with skills, the key thing that is needed is someone at a higher level, whether that is at a Government level, a sector skills council or something like that, to own it and help push it forward.

There are so many organisations involved. Many of the companies will do the skills training themselves. They need to have in place delivery partners that know what the curriculums and qualifications are—the BTEC level 2s and 3s. You need all those sorts of detail in advance. You cannot just say, "Tomorrow I am going to start training". You need all that kind of infrastructure in place beforehand and that is where some sort of strategic oversight is going to be helpful to make sure that everyone is heading in the right direction.

Q64 **Jane Hunt:** Ian, following on from that, yes, we need a workforce in place and hopefully ready to go, but then there is next generation coming forward as well. How can we get our front foot forward, if you like, and get ahead on that already?

Ian Constance: The skills subject is so broad, is it not? You have to have a national approach that covers the degree level and upwards. We are pretty good at that. The issues come when we are talking about those

lower-level manufacturing skills and things like that. That has to happen on a more local basis.

We talked earlier about the great work that is happening in research and development, and looking out for those future technologies, where the UK is pretty good. I am afraid that this comes back to developing those supply chains, because actually some of the processes will change on some of those technologies. A lot of those skills in the roll-to-roll, fast-paced production of these high-volume batteries are going to stay the same. Then there are a lot of things, like high-voltage capability, that we just need to a do a lot more of across the country for this electric vehicle revolution and rollout that is going to happen.

Q65 **Jane Hunt:** It is very exciting. I have one more question, on energy costs this time, particularly of production. You might just want to give me your general thoughts and a general rant. I am wondering what you are doing in terms of planning for the future now that we know that prices go up and down. Yes, they do. What can we do to make sure that it is more even for this particular set of production?

Ian Constance: The energy-intensive industries tariff is a massive help for battery makers and is now going to be applicable in that space. That is really helpful. As we get through the current energy crisis, longer term, we are likely to see a much better situation here.

With respect to getting investment in this space, the energy question, after that investment level playing field, is the second biggest thing. It is a big concern where our energy prices are not competitive. At a wholesale level, we are very competitive because we are creating a lot of green energy at a good cost. The issue is that, when we put on our levies and so on to pay for that green transformation, we become uncompetitive with our peer nations. We have to benchmark ourselves rigorously with our competitor nations and make sure we can deliver green energy at a competitive cost.

Alan Hollis: I totally agree with what Ian has just said. Energy is a major cost in the running of a gigafactory and it has to be competitive. We are in a global industry and we have to keep a very close eye on the costs of production, whether that is raw materials, energy, or people costs even. We can do lots and lots of things to focus on productivity, but, if energy costs are double what our European counterparts are paying, that is a major challenge for us and we can never recoup that because of the importance of the cost of energy and the cost of the product.

Q66 **Jane Hunt:** That is understood. Stephen, do you agree with all of the above?

Stephen Gifford: I definitely agree with that. I would make a slightly different point. We are moving to a renewables grid, wind and solar, but sometimes the wind does not blow and the sun does not shine.

Sometimes there is more demand in winter. What you need to drive down the costs of the grid is batteries for those. That is just to circulate what we need batteries for, not just EVs but also the grid.

Q67 **Andy McDonald:** This is just a quick one on energy costs and the assistance to the energy intensive industries. Is that comprehensive enough? We talked about the supply chain throughout this afternoon's session. Are all the relevant industries included in the assistance given for this purpose? Are there other people left out?

Ian Constance: If we cannot deliver energy at a competitive cost to those peer nations, we are going to struggle on investment across the board as this EV revolution takes place.

Q68 **Chair:** Ian, I wanted to follow up. You mentioned earlier your relationship at the Advanced Propulsion Centre with Britishvolt. Could you explain that a little bit further? Did you have to manage the relationship on behalf of Government?

Ian Constance: The Advanced Propulsion Centre is like the front door to the automotive transformation fund. We talk to those people interested in investing. We run the feasibility studies, the scale-up readiness and things such as that. We support people in that initial application phase for the fund.

With Britishvolt, we saw an ambitious start-up that wanted to be a founding bedrock of the British battery industry, so we gave it a lot of support, as we would anybody in that space. We support Alan's company as well. We do that from the point of view of helping them to get into the automotive transformation fund, but also working with other elements of Government to help them find the right piece of land, connect with the right energy suppliers or whatever it might be.

Q69 **Chair:** The Committee recently had a visit to Sweden. I cannot disclose who said it, but, when we were there, someone said to us, "The cofounder of Britishvolt, Mr Carlstrom, does not know what he is doing. You should have called us and we would have told you". Of course, he was convicted for tax fraud and had to stand down. The assessment from the people we spoke to in Sweden was that he was not one of the few people in Europe who actually know how to make batteries. He was somebody who just thought that he could bring the supply chain together and make it work in a warehouse up north. Surely it is your job to do due diligence on the individuals running these businesses before you set all of the support in place. Did you do that on Mr Carlstrom?

Ian Constance: Before there is any serious investment in these things, there is a level of due diligence. Equally, we start a discussion with people. As you know, he stepped out quite early in the story. We do a level of due diligence but, at that early stage, we are interested in people's ideas and their credibility around their ideas.

You are quite right: Britishvolt had an idea. They were not experts in battery making, but they managed to pull a very credible expert team of UK scientists and businesspeople in. That is why, over 12 to 18 months, that business made some significant headway. It was disappointing that it did not make it all the way there.

Q70 **Chair:** Do you think that that process of whether people are fit and proper or qualified people to run these businesses needs to be changed? In this Committee, we have seen examples before where there have been individuals who are good communicators and sell a strong story to a Government body, or supported body, and get quite far down the track with support, whether it is financial or otherwise. Then they blow up and it turns out that they do not know what they are doing.

We were told when we were in Stockholm that Mr Carlstrom came to the UK because he was not allowed to set up a business in Sweden because he was not deemed to be credible. I am trying to understand whether you think that the process needs to change so we can avoid raising everyone's expectations in a way that we did with Britishvolt again.

Ian Constance: He did not stay with the company for very long. He was in at the very early stages and he went.

Q71 **Chair:** The leadership of a company is important in terms of how you are signing off investment or support.

Ian Constance: Of course it is.

Q72 **Chair:** My question, which I do not think you quite answered, was whether the process in place for assessing the credibility of the leadership of a company that wants access to Government support, be it money or otherwise, is robust enough. Does it need to change?

Ian Constance: The process is reasonably robust. It is robust. It might be a question of when we apply those tests.

Q73 **Andy McDonald:** Following on from that, that Swedish trip was quite informative. I came away from it thinking that the reason Britishvolt did not work was that it did not have a product, it did not have a customer and there was no vertical integration present. It is the very thing we have been talking about this afternoon. Is that a fair analysis, that there was no product and no customer?

Ian Constance: I do not think that it is fair, from my point of view. As I said, it had a very credible group of scientific people and businesspeople, UK-based, who were developing what was a very strong product. We saw some of the initial outcome of that product development through the UK Battery Industrialisation Centre and it was very good. My understanding at least was that it had some very strong interest from some very credible OEMs.

We are talking about this valley of death issue when scaling businesses up once you get past that initial investment, those seed rounds and that

early phase, into that scale-up phase. That is a particular issue with hard tech, but particularly automotive. You fall into, again, another chicken and egg situation. In order to get an offtake agreement from an OEM, you have to demonstrate that you have the wherewithal to build a factory at volume. You have to then ask your investors, "Can I have the money to build my factory at volume?" They will say to you, "You do not have your offtake agreement from your OEM".

You are caught in this constant cycle. That is the bit where we really need to focus on how we solve it. That is a question of investors, Government and industry working together and putting their heads together. That is the biggest problem that I see in developing businesses such as Britishvolt and getting this UK technology out into a place where we industrialise it and the country does well out of it.

Q74 **Andy McDonald:** I do not want to continue this further, but is that not exactly what happened with Northvolt, to be able to have those things in place? That is what it actually pulled off.

Ian Constance: Northvolt did really well because it had European Investment Bank money and it bought the OEM in, in terms of Volkswagen and Volvo. It managed to create that environment and that magic did not happen with Britishvolt.

Alan Hollis: This point is a little bit at a tangent. We run the risk of being very pessimistic, again, about the UK battery industry. We should be very positive about it. We have a huge amount of opportunity ahead of us. We should learn from what has worked well in the past and what has not. We should use it as a learning exercise and not let it shape too much the future. We need a UK battery industry. We have the technology as a UK business. We have the passion. We have the plans and the capability. We just need Government support to make it happen.

Chair: That is heard loud and clear.

Q75 **Ian Lavery:** I have a very brief question to get back to the automotive transformation fund. How critical is it for a company like Britishvolt to have a commitment, whether it is £100 million, £200 million or £300 million, from the Government to attract private investment?

Alan Hollis: As the industrialist on the panel, it is vital to have the Government support and backing to attract the investors in. Nobody really wants to go first when you are talking about this level of investment.

Q76 **Ian Lavery:** My understanding with Britishvolt was that the Government were quizzing and probing it about whether it could achieve private investment and prove that that was the case. That would have been, basically, a tick-box exercise for getting money from the automotive transformation fund. Britishvolt was saying something completely different, the opposite, and it cannot be both. You have answered the question. From what you have said, it is critical to encourage private

investment, global investment really.

Ian Constance: The automotive transformation fund committed money. That commitment was there, provided they could get the investment from the market.

Chair: I suspect that we will come back to all this in future sessions, but we have timed out for today. Thank you to all three of you for your contributions. We will bring the session to an end.