

Energy Security and Net Zero Committee

Oral evidence: [National Planning Policy Statement on Nuclear Fusion](#), HC 571

Wednesday 9 September 2026

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[Watch the meeting](#)

Members present: Bill Esterson (Chair); Sir Christopher Chope; Wera Hobhouse; Melanie Onn; Mike Reader; Claire Young.

Questions 1 - 96

Witnesses

[I](#): Paul Methven CB, CEO, UK Fusion Energy Ltd, UKAEA Group; Tris Denton, UK Director, Fusion Industry Association; and Jo Nettleton, Chief Regulator, Environment Agency.

[II](#): Michael Shanks MP, Minister for Energy, Department for Energy Security and Net Zero; and David Sandford, Deputy Director, Department for Energy Security and Net Zero.

Examination of witnesses

Witnesses: Paul Methven, Tris Denton and Jo Nettleton.

Q1 Chair: Welcome to the Energy Security and Net Zero Committee and our inquiry into the nuclear fusion national policy statement. Welcome to our first panel. If you could introduce yourselves, starting on my left, please.

Tris Denton: Good morning. Tris Denton, UK director of the Fusion Industry Association. FIA is the global trade association for the fusion sector.

Paul Methven: Good morning. Paul Methven. I am chief executive of UK Fusion Energy Ltd, which is the Government-owned company running the STEP programme, trying to make fusion energy a global strategic success for the UK.

Jo Nettleton: Good morning, everybody. Jo Nettleton. I am chief regulator at the Environment Agency and I lead our regulation of nuclear and radioactive substances.

Q2 Chair: Thank you, and thank you very much for hosting my visit a couple of weeks ago, along with the senior Clerk, which gave us a very good sense of what happens at Culham and the exciting opportunities there, which I am sure you will tell us all about in the next 45 minutes or so.

I will start with a question about the impact of nuclear on the community. We know that nuclear fission development is better received in areas that have historically already hosted it. Do you think that we will have a similar approach for fusion, in that it is likely to go to the areas that have already hosted fission?

Paul Methven: I think it is going to go better than that. I have one really good data point for that, which is what has happened so far in West Burton. We selected that site for the Government's STEP programme in October 2022. That was a volunteer process, where sites put themselves forward to host a fusion plant. Of course there had been no fission plant there before, but what there had been was an incredible legacy of energy generation up and down the Trent valley. There was a community used to big infrastructure and doing something that matters for the nation, and when we came along with the fusion programme, they really embraced it. That has continued and we have had a great relationship with the local public, and increasingly with the important regional stakeholders coalesced by the East Midlands Combined Authority and the Greater Lincolnshire Combined Authority. So our experience so far is that it is even better, and I think that is because people understand that although the processes are nuclear, the hazards are very different.

Q3 Chair: In our report "Gridlock or growth? Avoiding energy planning chaos" we identified the problems of a lack of effective consultation in placing energy infrastructure. You have talked about the success you have had already at West Burton. What are the lessons from West Burton



for community engagement?

Paul Methven: We are learning them as we go, but I absolutely echo your point that early engagement and sustained engagement is critical. I think we have done that. Our first non-statutory phase of consultation for our development consent order, which is going into the formal process next year, shows that people really welcome the opportunity to get engaged. We do too. This is not just about a smokescreen of consultation; it is critical to hear what people have to say. They all have brilliant ideas locally. Our experience is that it is essential and, having done it, that it works. People should not be afraid of that early consultation and engagement. It is a really good thing to make your programme better.

Q4 **Chair:** How would you encourage the rest of the nuclear industry, and infrastructure developers more widely, to adopt your approach? Do you think it is relevant and do you think there are lessons that they can apply?

Paul Methven: I hope most developers are doing this, but it is actually really simple to say, "Be open, be honest, be completely transparent." If you do not take your community with you, then you are going to have a very difficult time, and that is going to drive up schedule, drive up costs and reduce benefits. If you take the communities with you on the journey and listen to what they have to say, you will be much more likely to have a success. I would hope that is a natural approach from developers. It certainly should be, in my view.

Q5 **Chair:** Do you think developing fusion power will be easier than it has been to develop fission power? If so, what are you doing differently that demonstrates confidence in that happening?

Paul Methven: Technically, no. The evidence is just there: we have been working on this—albeit that things are really accelerating now—for some 70 or so years. I should say, by the way, that AI has been in gestation for 70 or so years and has only recently had its inflection point, so it is not new that technologies take a while. Look, this is fiendishly difficult technically, but the prize at the end of it is so huge in terms of what you can do for an energy source—

Q6 **Chair:** What about in planning terms, which is the essence of our conversation today?

Paul Methven: In planning terms, as I say, what we are doing early is getting in place the relationships with regulators. We have a very strong relationship with both regulators in fusion. That reduces surprises on both sides and allows us to design. We also have an early relationship with the public and early consideration of all the consents and permissions that are going to be required. The lessons are not unique for fusion; they are how you make any major infrastructure and technology development work properly.



Q7 **Chair:** Jo, do you agree with what Paul has been saying?

Jo Nettleton: Yes. I think the policy statement is absolutely spot on in that it puts fusion on the same basis as other energy infrastructure, including fission. It gives that element of clarity and certainty to developers and their ability to make decisions. Obviously planning is just that first step. Our regulation—we can talk about it during this session—and the regulation of the Health and Safety Executive is absolutely designed to ensure that we are proportionate and robust in relation to the hazards presented by fusion, both the actual technology and the radioactive side of things, but also the wider environmental impacts. You talked earlier about the views of the community. Obviously, things that matter to the community include water resources and impact on habitat, so we have that wider perspective as well as the atoms.

Q8 **Sir Christopher Chope:** You say that you have to take communities with you. Does that mean that it is purely voluntary, or is there a coercive element of that? There is a big distinction between people saying, “I will voluntarily sign up to that” and the Government, through their regulators, saying basically, “You have to sign up to it.”

Paul Methven: For sure. We would aim for people absolutely wanting the development there. Our experience in West Burton is that what we can provide in terms of jobs growth and renewal in the region could be so transformative that that is the bit they welcome.

There are clearly concerns. The majority of those, as with a lot of developments, focus on transport movements. The consultation process we have been going through gives us some really good ideas from the public about how to manage those pressure points that are inevitably going to come.

Where possible, we say this is actually taking input from the public, which gives us a better approach to the project. In the final analysis, yes, if the Government have a policy and decide that something has to go somewhere, you could get to that sort of definitive stage at the end, but you are on track for a much better development if you can take people with you.

Q9 **Sir Christopher Chope:** In the latter example you gave—the Government forcing it—that could be counterproductive, because it means you do not have the consent of the local people.

Paul Methven: I think it would be counterproductive if it happened too early and if it was clearly in the face of a large amount of public opposition. We don’t think we are going to face that particular situation here, but yes, you could. Largely you want to avoid those sorts of situations, and I do not think we need to get into that territory.

Q10 **Sir Christopher Chope:** How environmentally friendly do you think fusion energy is?



Paul Methven: We think, once developed, that it will be. There are a couple of dimensions to that. Inherently, this is zero carbon at the point of generation. Our fuel source is lithium-producing tritium and deuterium, an isotope of hydrogen from seawater. Clearly it is a major piece of infrastructure, so there are carbon impacts and environmental impacts more broadly in the development and construction itself. Using modern methods of construction, working effectively with the local regions and local public, we can reduce those impacts, as with any major development. Inherently, I think this is a low-carbon solution and can be done in a very environmentally positive way.

I will give one quick example. At West Burton we are utilising the site of an old coal-fired power station—we are reusing a brownfield site that was focused on energy generation to do exactly the same—and, as part of that, we are looking to reutilise a large proportion of the old waste pulverised fuel ash, probably to produce concrete for the plant construction. We think we can do these things in a way that is as environmentally positive as possible, and of course in the big game around climate change is definitely the right thing to do.

Q11 **Sir Christopher Chope:** How does it compare with traditional nuclear, for example? Do you think it is more environmentally friendly?

Paul Methven: I would say yes, broadly, and probably slightly better, in the sense that large-scale infrastructure is roughly on a par in terms of the scope and scale of these projects, but once we get operating, we are in a better position in terms of the net environmental impact because of the fuel source and the waste products.

Jo Nettleton: I support that. This is fusion; it does not rely on criticality, so the environmental risks from something going wrong are really different than for fission reactors. It is a developing technology. The conditions in the fusion system are really challenging and will result, potentially, in some novel wastes—both radioactive material and hazardous materials that need to be used for that environment—that we still need to develop the appropriate routes for. However, that waste will not be of the same type as the very long-lived waste that comes from nuclear fission. Again, we are looking at a different type of impact and, I agree, a lesser impact generally.

Of course, as Paul says, the wider environmental impacts—impacts on water and transport systems, and impacts of building and combustion—are exactly the same way as for any large infrastructure. However, we do believe that fission absolutely is a key part of the energy mix as we move towards net zero.

Q12 **Sir Christopher Chope:** You refer to large infrastructure, but isn't one of the arguments that this is small construction—

Jo Nettleton: This is a prototype.

Sir Christopher Chope: Which can be put in lots of different places—



perhaps not quite as much as solar panels, but compared with nuclear power stations?

Jo Nettleton: Paul can talk in more detail on this. The particular STEP programme is around 100 MW. That is a prototype to demonstrate that we can get energy out of a fusion system. Fusion will be scalable. We might have smaller sites; we might have larger, more complex sites. Similarly with nuclear fission, there is a range of technologies looking at different sizes of reactor and different types of reactor, some of which can be placed to power industry and some of which are the large, multiscale reactors that we have at Hinkley Point C, for example. Fusion, in the same way as a technology or a set of technologies, will be scalable.

Paul Methven: It is too early to say whether there is an equivalent of the small modular reactor as there is in the fission space. In the public sector, with the Atomic Energy Authority and UK Fusion Energy, our view is it is probably biased towards large-scale energy generation, big baseload provision and juxtaposition with major industry, and that it is difficult to get to a small version. But, look, there could be some private providers internationally who have some ideas we have not thought of that do unlock the smaller end of the spectrum.

Q13 **Sir Christopher Chope:** You mentioned water. There is a big concern about the water requirements. What can you say about that?

Jo Nettleton: We will obviously take into account the impacts of the water for fusion in combination with other impacts. At the Trent Supercluster there are a number of developments there, including some small modular reactors, the large reservoir, datacentres. In terms of this particular site—again, Paul can give you better information—our expectation is that the water need will be much less than for Hinkley Point C. We are looking at around the order of magnitude of the coal-fired power station. Again, it is developing, isn't it?

Paul Methven: Yes.

Q14 **Sir Christopher Chope:** You seem rather vague about the water requirements, but obviously, at a time when people are saying, "We need to build a lot more reservoirs," this will put a lot more demand upon the water supply.

Jo Nettleton: At this particular site itself, the water demand is not insignificant, but it is in no way of the order of magnitude of a large new fission reactor. We will look at the impacts across the whole of that cluster and consider this in combination with the datacentres and the reservoirs in our approach to water regulation.

Paul Methven: One of the important things about the national policy statement is that it makes it clear that developers have to take into account the requirement to compute what their water usage is likely to be. Of course that is for cooling, so the water is returned; it is the temperature difference it is returned at that is the issue we have to



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manage. It is not a net consumption, if you like. The onus to address these things—and this is why we need the clarity of the national policy statement—is explicitly on the developers. We did that at an early stage, before selection of the site, but every developer in fusion will have to look at that issue.

Q15 Sir Christopher Chope: So the Environment Agency is going to be in charge of all this.

Jo Nettleton: We are joint regulator with the Health and Safety Executive. We are the environmental regulator; the Health and Safety Executive is the safety regulator. As we are not talking about nuclear fission, it is appropriate for us to regulate, rather than the Office for Nuclear Regulation. As I say, we have a lot of experience. We have been regulating Culham for many years and we understand how to develop the skills around fusion regulation.

Sir Christopher Chope: I thought the idea was to have a primary regulator, and I thought you were going to be the primary regulator.

Jo Nettleton: We are the primary environment regulator. We work really closely with the Health and Safety Executive, which is the safety regulator.

Q16 Sir Christopher Chope: I see. So the simplification of regulation promised by the Fingleton review is not yet going to result in a single regulator.

Jo Nettleton: We work really closely. The Fingleton review is in relation mostly to nuclear fission. We are developing a lead nuclear regulator model that will bring together co-ordination of regulators much more closely. In the case of defence, I think the defence nuclear regulator will move into ONR. But generally across the nuclear fission regulation landscape, we are developing that lead nuclear regulator model and a regulatory commission. This is much simpler—regulation in terms of the landscape for fusion is much simpler than for fission—hence ourselves and the Health and Safety Executive are working very closely.

Q17 Sir Christopher Chope: What percentage of your workload do you expect this to represent in the future?

Jo Nettleton: Again, it is difficult to predict exactly. We spend about 20 days a year with our technical team regulating Culham. We think it will be larger for the STEP site, but again, as Paul said, the size and complexity will vary for different developments. We think at the moment our regulation for STEP will be around 60,000 a year to the developer.

Q18 Sir Christopher Chope: In our consideration of EN-7, our Committee recommended that greater use of conditional commencement mechanisms should be used. Do you see that as something that might be useful in delivering fusion generation?



Jo Nettleton: Within the conditions, within policy statements and development consent orders, that does offer a potential to ensure that any uncertainties are addressed as things develop. For us, though, the key is early engagement.

Q19 **Sir Christopher Chope:** So you do think it is useful.

Jo Nettleton: I don't know the answer to that. We will need to come back to you generally around the policy statement.

Q20 **Sir Christopher Chope:** Mr Methven, do you want to say anything about that?

Paul Methven: At one end of the spectrum, developers do not want conditions because they just get in the way of delivery. However, I think there are circumstances bespoke to projects where conditions are really helpful because they drive certainty. It is better to have a condition that is clear for a developer than the absence of a condition, which means there is a huge uncertainty to carry forward.

One example is conditionality around apprenticeships or skills development in a region, which could be something that the local populus really wants and the developer really wants and is mutually reinforcing. Overly restrictive conditions are clearly unhelpful in terms of realising benefit, so I think it is horses for courses.

Jo Nettleton: An example where we have asked for strengthening within EN-8 is flood risk. We support the open siting criteria, because of the lack of certainty in this space, but we do think there are risks around the length of the life cycle of developments and the potential for flood risks to change.

Back to the comment about early engagement, I absolutely think that how we address that is to be talking early to developers about what the length of the full life cycle of the site might look like and what the changes to flood risk might be through that period, and to make sure that is built into the plans early.

Q21 **Mike Reader:** Why is regulation simpler for fusion than fission? You said it was much simpler.

Jo Nettleton: The regulatory landscape is simpler. It is ourselves and the Health and Safety Executive. As Paul said, the technology itself is very complex and developing. There are some of the same challenges as for nuclear fission regulation: in the advanced nuclear technology world, things are changing, and developers' plans change, so that is the same—

Q22 **Mike Reader:** Why is it simpler? Is it because, as yet, all those additional bits of regulation—we had a private session with a spaghetti bowl full of organisations that have involvement in delivery of nuclear—are just not involved yet? Will it get more complicated over time as this becomes a commercial reality?



Jo Nettleton: I don't think so, because the basic physics is different. We are not talking about a system where you have the potential for a nuclear explosion, which is where a lot of the addition comes in around nuclear fission regulation. This is a different set of physics. There are risks associated with it. We do have large amounts of tritium, radioactive materials, and there are risks associated with the waste. However, again, we do not have that really long-term waste profile that we do for nuclear fission, so all that makes it easier.

Q23 **Mike Reader:** Tris, Paul said it was net zero. Is it really?

Tris Denton: Yes. This is zero carbon at the point of generation. All energy technologies, all activities, have an embedded carbon element, but we represent around 50 companies looking at different ways of doing this, and all of them are zero carbon at the point of generation. They are large scale; they are variable. There is a range of models—you can have small, you can have large—all at different stages of maturity. But the overwhelming consensus is that companies expect to be delivering commercial plants in the mid-2030s with zero carbon at the point of output.

Q24 **Mike Reader:** Those raw materials that have to be mined, transported and produced, are they all net zero too? Are they net zero mined, net zero—

Tris Denton: No, to be clear, it is zero carbon at the point of generation. It is low-carbon life cycle, just like fission, just like offshore wind. It is absolutely in that bucket. All energy technologies have baked-in carbon.

Q25 **Mike Reader:** So only at the point those materials come through the door does it become a net zero operation. All the things that power the operation are not included in that statement that it is net zero.

Tris Denton: Let me be clear; apologies if I was unclear. This is a low-carbon technology, just like fission, just like offshore wind. There is no carbon released at the point of generation. But as I thought I said—apologies if not—with all energy technologies there is baked-in carbon, and we should be clear about that.

Q26 **Mike Reader:** Why are fusion reactors going to be planned separately and in a different way from fission?

Tris Denton: Because they are just fundamentally different technologies being developed by very different industries. The Planning Act 2008 was a fundamental enabler of a range of things, including fission development, but for fusion we are looking at this and you have an international community that is coming forward to deliver plants at pace. When we look at the UK as a deployment market—it is absolutely in the lead as one of the best deployment markets, and as a British taxpayer I am delighted about that—there is a range of things the Government are putting in place to make it an attractive place to come and do business. One of those is clarity on the regulatory landscape. One of those is the



forthcoming work on market structures. But EN-8 gives absolute clarity, and there is a bespoke and very applicable set of arrangements for deployment through consenting.

A lot of infrastructure sectors see consenting as a challenging area. I think this is a very good national policy statement. I think it gives great confidence to technology companies and their investors and their developers. That means we can hopefully see the UK in the first wave of fusion build.

Q27 Mike Reader: Paul, is there not a bit of smoke and mirrors here in terms of the scale of opportunity? We heard in inquiries on nuclear and SMR that SMR could be anywhere; it was going to be this technology that was going to transform things. Then we looked into EN-7 and it started to narrow down around needing a workforce, space, existing grid capacity and everything else, and you get down to, "Oh, we'll just put it on the existing nuclear sites." Why don't we just have EN-7 applying to this and have it all in the same place, where there is the skills, the capacity, the land and the water you will need and the existing local consensus on large-scale power?

Paul Methven: I think we are having a really UK-centric discussion here that is completely missing the opportunity for the UK. The big opportunity for the country here is that fusion is a global technology in which the UK is currently the world leader in the science. The opportunity is to convert that into a world leader in commercialisation.

Yes, we are going to need some fusion plant in the UK, but not just for UK domestic energy production. We can, frankly—as a small, windy island with a shallow seabed—produce a lot of wind. The solar is a bit less, but we can do that and we are doing that successfully, and we have a fission programme. But this is about global energy. This is the export opportunity. The reason we need this in the UK, more than anything else, is to lead the world in the export of a technology that really has a transformative opportunity.

As far as the UK hosting is concerned, as Tris said, the physics is literally 180 degrees from the physics of fission, if I am not mixing my scientific metaphors there. The hazard profile is different, so we do not need to restrict ourselves and we can open up those opportunities. Yes, we could put fusion plant on old fission sites, but why not keep those for fission programmes and open up the massive development opportunity, as we are doing in the east midlands?

Q28 Mike Reader: Is this NPS as much a signal to investors as it is an actual planning document, given we are a long way away from commercial delivery?

Paul Methven: It is both, but we are not a long way away from investment. We see development consent as pretty much in our critical path for delivery of the STEP plant. If the critical path for delivery of



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fusion plant is consenting, we have got this stratospherically wrong; it should be development of the technology, so we need to get these things off the critical path. But in doing so, yes, it does enable growth, development and international competition, and I don't think we should shy away from that. In fact, we should embrace it.

Tris Denton: I think we are really close to commercial delivery. There has been a level of progress in the last six or seven years that was just unseeable in 2018/2019. There are companies globally selecting sites for their first commercial power stations now. We saw just a month ago the UK Infinity consortium, a commercial entity, selecting the UK as a deployment market for a power station. We are seeing companies right now choosing their sites, and it is incredibly helpful to them to have a very clear planning regime as they choose those sites.

I also think it is useful for communities. When West Burton was being selected, 15 communities came forward and 15 communities were engaged. There were open conversations, town hall events and all that good stuff. There was a whole range of conversation about, "Is this fission? Is this fusion? What's the difference?" Being able to demonstrate that it is under a separate planning regime is another demonstration to those communities of what they are dealing with and it avoids conflation. It avoids communities feeling that you might be consenting a different technology by the back door. I think it is great for investors, developers and communities.

Q29 **Mike Reader:** I understand that the tritium currently needed would need to be imported. Is that correct?

Paul Methven: The initial charge, yes—

Q30 **Mike Reader:** I just wanted to confirm that. Is it an omission that the NPS says nothing about use, storage and transportation of that radioactive material?

Paul Methven: There is a set of existing regulations that cover all that. Just to be clear on this, our intent as far as the technology is concerned is that once we have the plants operating, they self-generate tritium, so our base fuel is lithium, and the amount you use in a fusion plant is very small proportionally. So we self-generate. We do need an initial charge to get going on that, which is imported. We already do import much smaller quantities from Canada, so we know how to do this.

Jo Nettleton: Yes, and tritium is absolutely something that we are familiar with. We understand tritium. We know how to regulate tritium.

Q31 **Mike Reader:** Why should it not be in this statement to guide developers, that they have to consider this when they are considering developing these schemes? We have talked about wanting to strengthen other elements of the NPS in terms of water. There are existing regulations on water and flood risk, so could we take that out of the NPS? Are we doubling up on regulation in some areas and then in other areas,



such as radioactive material, we don't seem to have any coverage at all?

Jo Nettleton: My understanding—and we can confirm this—is that the policy statement does include tritium when it talks about radioactive substances generally, because tritium is just another radioactive substance.

Paul Methven: To go a bit further on that, under the Energy Act 2023 the EA and the HSE regulate the production of fusion energy. The transportation of radioactive substances is regulated by the Office for Nuclear Regulation, so there are an existing set of regulations around that transport. It is not that it is not covered; it is just already dealt with in the regulatory firmament.

Mike Reader: That is our third regulator now. We are starting to make a small spaghetti bowl of regulation.

Jo Nettleton: It is the same for any transport of radioactive materials.

Q32 **Mike Reader:** You have talked about novel waste and there are some quite unique processes here. Does the NPS fail to address the unique radioactive concerns about this technology?

Paul Methven: Not in my view.

Jo Nettleton: No. Again, the development consent order is just the first stage. Our permitting regulation and HSE's regulation of the safety are the absolutely vital elements there. As I say, we are developing, along with the technology, the skills around what those novel wastes might look like. DESNZ funds us to develop our capability and capacity as the technology changes and becomes more complex.

Paul Methven: It is important to understand that, as Jo says, this deals with development consent. We still have to produce a safe design and get that design approved through the regulators. In doing that, the onus is on us as a developer or any other developer to demonstrate that all the hazards have been managed to the position of being as low as reasonably practicable. That is entrenched in UK legislation, in the regulatory model for the UK, so that is covered. It is not that it is absent.

Q33 **Mike Reader:** When things go wrong—if things go wrong—who will bear the radiological third-party liability, and how will parties affected be compensated?

Paul Methven: There is still work to do on that. In the fission regime there is a mature market for insurance and in certain instances there are indemnities. There is work to do, which the Department for Energy Security and Net Zero is leading on, to look at what is an appropriate set of regimes to enable the development of a vibrant fusion market, what the Government's role in that should be and how we stimulate an insurance market, which is helpful. Of course we lead in the UK, having international nuclear plants that are insured from the UK. The risk profile



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is very different, we should remember, so it should be possible to get there. I think we all start from the position that the developer pays, but when you are starting up an industry you will need to look at whether there are some changes just to get it off the ground.

Tris Denton: I agree with everything Paul says. It is worth noting we have already seen bespoke fusion-focused insurance funds launched. There was one launched earlier this year in the UK. It is an area that the DESNZ fusion strategy draws out as a potential economic opportunity for the country. We do lead in fission; we should lead in fusion. All the companies we deal with believe this is a private sector insurable product.

Q34 **Mike Reader:** If something went wrong at West Burton today, you are insured and you are all covered, just for the record.

Paul Methven: This is a Government project, so the answer is yes.

Chair: I think Sir Christopher is horrified by that.

Mike Reader: I am, too.

Chair: He is not denying it.

Q35 **Melanie Onn:** Tris, you mentioned that you think the technology is near to commercialisation. What does that mean in terms of cost per megawatt-hour compared with other technologies?

Tris Denton: This is something I was talking to our member companies about, because clearly we are relying on their data. The publicly cited numbers in US companies are between 5 and 10 cents per kilowatt-hour. Extrapolate that out and it is £35 to £75-ish per megawatt-hour electric. That will not be for first of a kind, but that is their nth-of-a-kind target. What you are talking about is a technology very comparable to the better end of low-carbon generation at the moment.

Q36 **Melanie Onn:** We are going to put in £2.5 billion over the next five years, which is only a fraction of what other countries are putting in. China and the US are doing probably double that over the same period. The rapidity of it, and the delivery, to come in at such a low point seems quite remarkable.

Tris Denton: Yes, to do that just on the UK contribution would be remarkable. Look, first, I would credit the UK. The UK Government spends more as a percentage of GDP on fusion than anyone else and I think the sector is grateful for that.

Melanie Onn: That is because we are small. We do not have the same population as China.

Tris Denton: The Industry globally has had about \$15 billion of private investment across the last five years or so. There is a very significant amount of capital flowing into private fusion companies, and those are the companies that are targeting those kinds of numbers. There have



also been PPAs signed with companies like Google and Microsoft, so globally we are seeing a very credible ecosystem emerging around the fusion off-take environment.

What all fusion companies are clear on is that if they are not economically competitive, no matter how strategically secure or environmentally beneficial they may be, they will struggle. Making sure they are designing very competitive products is absolutely front and centre of what these companies are doing.

Q37 Chair: Tris, can you repeat the figures you were quoting there for price?

Tris Denton: Yes, sure. The numbers quoted by FIA members vary, but between 5 and 10 US cents per-kilowatt hour—so, pulled through, £35 to £75 per megawatt-hour—are the kind of numbers that our member companies are talking about. They are the kind of numbers they are targeting for nth-of-a-kind plants.

I completely accept the point: if we could do that for £2.5 billion of public investment, that would be wonderful and we would all be delighted, but it would be incredible. But this is a global effort. We talk about the other countries developing this: the Germans have a fantastic programme, the Japanese have, the US have, and Canadians are doing loads. It is that international effort that will drive this forward.

Q38 Chair: And that is at West Burton that you are expecting that?

Tris Denton: No, that is private fusion companies—private companies with private plants.

Q39 Chair: Thank you for clarifying that. Paul?

Paul Methven: We don't know. That is the short answer.

Q40 Chair: So Tris is saying £35 to £75 and you are saying you don't know.

Paul Methven: I am saying we don't know. We absolutely need the ambition that is demonstrated in the private sector. From a public sector point of view—we are utilising the £2.5 billion over five years, £1.3 billion of it currently for the STEP programme, which will obviously expand—our starting point is very different. It is to say: we have to get this to a position of competitiveness, not just technologically working but commercially working. Frankly speaking, the benchmark is large-scale civil nuclear. If we can be broadly on a par with that as we enter commercial generation we think we are in the right space, because the hazard profile is lower, it is more globally deployable and therefore from an export potential that is the thing to go after.

You are right to mention China, by the way. It is going the proverbial gangbusters on this. There is genuine opportunity for the UK internationally and economically here. We have to grasp it and sustain it. I am glad to say that is what is happening at the moment, but we need to keep at it.



Q41 Chair: What are the key drivers to make sure we retain the international lead that you say we have in this technology? When we spoke a couple of weeks ago, we talked about the fact that we have a long list of technologies where we led and we threw those away. How do we avoid that happening again? What are the key ways of retaining that lead?

Paul Methven: Thank you for that question. The first thing is sustained Government support. The planning environment is critical. This NPS is really important, but it is not just that; we have to really push forward on a much more pragmatic implementation of planning policy in a wider sense. It was great to hear the Chancellor's commitment to that on Monday. We need a really good regulatory system that gives confidence to developers and the public, and they both feed off each other.

We have to have a sustained technical effort. You really need a sustained, credible fusion laboratory, which we have in UKAEA. We saw what happened in the fission programme when we let that go some decades ago, and we are trying to rebuild it, so we need to keep that going. We need a really ambitious public sector-led programme to bridge that investment valley of death. That is the STEP programme and we need to keep at it. We need a market mechanism—which the Government are committed to producing—to allow private developers to start working out what that economic delivery will be.

There are a few things. One thing that does not cost much is sustained vocal commitment: getting this into the region and talking about it internationally and making the UK the best place to do this. I am delighted to say that we have the UK-US global fusion summit coming up on Monday.

Chair: Yes, and you are being broadcast on BBC Parliament, so you have the opportunity to do exactly what you have just said is important. I hope lots of people are watching, hear your words and take them to heart.

Q42 Wera Hobhouse: Following on from what has just been said about being a leader in something, it is rare, isn't it, for all parts of a technology to be sourced from one country? Is there something that we as a country should particularly focus on that we are best at, where we can easily be a leader?

Paul Methven: That is a superb question. The answer is yes, we do not want to try to do it all. There are elements of this technology, when you have a full plant, that we just need to have best in class from international suppliers, but there are some things that the UK can genuinely lead in. The first of those is the integrated design and development. The experience we have in the UK from the operation of the JET plant for the last 40 years means that we can do that in a way that I think very few other people can. That is exactly what STEP is about.



Underneath that you have the tritium fuel cycle, which is a huge opportunity for the UK, again building on that JET experience. We have robotics; we are absolutely world-leading in complex robotics at Culham. That is an opportunity that the UK should pursue. There is what we call breeding blanket, so how you get that tritium out of the lithium—nobody has done that internationally yet. We have some amazing engineering capability in the UK and we should be all over getting that front and centre. There are a number of other supporting technologies and materials development as well. So not everything, but there are some really important things for the UK to go after and lead in, and lead globally.

Tris Denton: I agree. This is a global sector and the UK has a tremendous offering. We have a nice balance of capability in the national lab in the public sector. We also have some wonderful private companies doing things like HTS magnets, inertial confinement targets, and looking at things like robotics. There is a real press for the UK to make sure we are getting the maximum collaboration between the public sector and the private companies so that we commercialise those capabilities and ensure that we do not lose out on this national opportunity.

We have seen sustained political support across multiple Governments and multiple Ministers over many years now, which has enabled global industry to have confidence in the UK and enabled UK companies to have confidence in our own operating environment. I think that will see us forward. Within that, the DESNZ strategy published this March was widely welcomed by industry because it laid out specific tier 2 sectors where we could really lead and it laid out a pathway to develop them.

Looking across all sectors, when we are in a position where Government policy is stable, there is a strong pipeline of investment and industry is very well aligned to that, it is a great opportunity to sustain it and deliver together what the Government laid out in that strategy.

Q43 **Wera Hobhouse:** But should the Government focus on delivering test reactors or just on clearing the way for the private sector to deliver?

Tris Denton: The Government are absolutely clearing the way. Everyone will see this long term being a private sector enterprise. There are lots of companies coming forward and I don't think many people would want to see the entire sector owned and run by Government, but that does not mean the Government have—

Q44 **Wera Hobhouse:** What about test?

Tris Denton: The Government have done fantastic projects on test. If you look at Culham and everything that is down there, the legacy of JET, what is going on in the materials research facility, the robotics facility, there are really great Government capabilities, but it is now about that really difficult transition of those into private industry, and as much of that private industry as possible being in the UK. Whether that is UK



exports or foreign direct investment—likely a combination of the two—that is the sort of hard yards of the next five years or so to put the UK in the best possible position.

We have talked about China, which is clearly spending a lot on this and trying to drive a programme forward. There has to be absolutely lockstep collaboration with partners in Europe, North America and beyond to make sure that we, as a whole, can develop the technology.

Q45 Wera Hobhouse: Turning to skills, which you have already touched on, we understand that over-regulating the whole sector is not what you are advocating for. Is there a different way to give private developers confidence in the ambition for the UK Government with respect to fusion energy?

Paul Methven: In terms of skills?

Wera Hobhouse: Yes.

Paul Methven: I would say—and it builds off the last answer—the Government are taking and do have a stimulus role here. We have to start from the position that axiomatically there is no fusion market today; it is starting, and so the Government's role here is market making. There is a market failure, if you want to put it in economics terms. We have to stimulate that through some demand, and what that does in skills terms is have that pull through the supply chain. So, here we are going to build that initial demonstration plant that pulls through critical suppliers—temperature superconducting tape, for example. That allows them to invest with confidence to build their skills base. It allows us to work with the universities to produce the right educational programmes. It also allows us to work with the regions to say the whole panoply of skills that are going to be needed.

Without that pull through the system from the full-scale plant down through all elements of the supply chain, you will not have that critical mass, which we definitely don't have in fusion technology, but we need it. If you put it this way in terms of skills, we need that pull through to generate it. That is where the stimulus role—

Q46 Wera Hobhouse: Is there a significant overlap with fission or other energy technology?

Paul Methven: There is a partial overlap. There are some areas—materials science, for example—where there is quite close parity. There are other elements, such as robotics, where I would say that fusion is leading and fission could probably take some lessons from what goes on in fusion. There are other areas, like plasma physics, that are completely different and unique. Then there are other generic technologies, such as application of AI, which offer huge potential for both sectors but in slightly different ways. There are some overlaps, including some supply base overlaps, but there are also some entirely different elements.



Q47 **Wera Hobhouse:** How nimble and quick off your feet are you to go into colleges, universities and schools to—

Paul Methven: We are already doing it. In the West Burton area, we have probably been engaged with about 16,000 people directly, including thousands of schoolkids, in pitching with our outreach team to the region. There is a long-standing relationship between UK Atomic Energy Authority and universities across the country, and graduate programmes and so forth. This is already building.

Q48 **Melanie Onn:** What lessons have you learned from other technologies that have failed to put people and skills at the forefront of the planning of their new technology? What are you implementing to ensure that the same failures do not happen, and that you are not retrospectively scrabbling to try to find a workforce?

Paul Methven: Trying to look ahead is the big issue, and it is difficult. It is quite easy—and I have almost just done it—to focus on the very deep technical skills, but what tends to be your chokepoint is broader-based skills. At the moment, we are probably screaming hardest in commercial expertise and project management expertise. At some point that will become, “What is the construction pinch point?” On the flip side, there is a huge opportunity for apprentice development and keeping jobs in the regions where these plants are developed.

It is really about trying to plot your skills demand signal to a degree of fidelity way ahead and then working with regional providers. The No. 1 thing is that the more certain and confident you can be that you are going to do it, the easier it is for industry to plan ahead and put the mechanisms in place.

Jo Nettleton: It goes back to the discussion we had at the start about what it means for local communities. By starting at that grassroots level and having good engagement from the early days, bringing communities in to listen to their concerns and what it means for their local community, you begin to bring people into the vision—whether it is this technology or other technologies—and grow the desire for young people to go into STEM, with a view that they might have a career in fusion or fission or in regulation of those things. Engagement really is the key.

Tris Denton: This is a people industry. The vast majority of work being done in the private fusion sector at the moment is people working to develop their products. It is not a steel-cutting industry. That is not where most of the money goes; it is in people. The overriding thing I have experienced when I talk to people joining fusion companies and those in fusion companies is certainty in the pipeline. We talked about universities. The UK has the most incredible university base to support this. There is a phenomenal breadth and depth of capability.

Time and again I chat to folks and if they see one programme, two programmes, three programmes, if they can see a genuine career they



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can base their family's financial security on, then they want to work in the sector because it is phenomenally exciting. It is a transformational thing. If it is both transformational and stable, we can absolutely draw people into this sector.

Q49 Melanie Onn: What are the job number projections over the next 10 years?

Paul Methven: I can only speak for our unique programme, but we are looking at a steady-state set of job numbers in the West Burton region probably around the 1,500 mark to operate the plant. Through construction it will probably peak at about 8,000, as is roughly comparable to major infrastructure projects. But that is only the plant. The ambition is to create a business park and an ecosystem around it and attract businesses—both domestic and international, foreign direct investment—which could grow those numbers significantly. As I say, that is just the one, and the numbers are larger because it is an experimental plant.

Tris Denton: If you look at fusion companies globally, they range from start-ups to companies with 1,000 people in them. We are seeing that change. For each deployment project, you would expect to see numbers in the development phase similar to those Paul cites. Construction will vary depending on product type, but this is a tens-of-thousands-of-high-quality-jobs-for-the-UK opportunity if we get it right and capture it in the next five to 10 years.

Paul Methven: I should say that is just in the plant. The supply chain that goes beyond that is the big opportunity, and that is in the tens of thousands nationally if we get this right.

Q50 Chair: What is the private sector's involvement in the national laboratory?

Paul Methven: Really significant. The way that we are delivering this programme is public-private partnership. The model we have put together is to be relatively thin in terms of the pure public sector element of this, and to partner with industry to stimulate them. A great example—I failed to mention high-temperature superconductors earlier on—is our magnets partner, Tokamak Energy, which is absolutely stitched into the programme. That allows it to develop world-leading capability, not just in fusion, but in a whole range of applications beyond. Something we have not mentioned here is that spin-off capability.

Q51 Chair: What is the balance of public and private investment in the national laboratory, then?

Paul Methven: At the moment, as far as the STEP programme is concerned, that is fully Government funded, and then we channel as much of that as possible through industry to stimulate and create that capability, which then attracts investment. The national laboratory is almost exclusively grant in aid funded—not quite; there is some



commercial income from that—but the objective is to get to a technology ecosystem where it is entirely privately sustainable. We are trying to bootstrap that. That is the intervention that we are trying to make.

Q52 Chair: So the plan is to move to private investment in a national public asset, essentially.

Paul Methven: As far as the STEP programme is concerned, we are working through the opportunity at the moment for what private investment into that could be, while ensuring that the extent to which we do that, and the way we do that, makes sure that the benefits continue to land in the UK and are not offshored. You talked about things escaping earlier on. It is very much our plan to make sure that does not happen. But the biggest opportunity here is bolstering and generating a UK supply chain that can export.

Tris Denton: If we are looking beyond STEP and at the wider UKAEA footprint, there are a number of partnerships and collaborations that UKAEA has announced over the last two years with private companies, and I think that is an interesting way. If you look at RH3OVA, a partnership with the Italian company Eni, it is a great example of a UK public asset working with a major private company to build private capability in the market. We would expect to see more of that, as well as STEP, from the national lab itself across the next few years.

Chair: Thank you all for your evidence this morning. That is the end of the session. We will suspend while we change over the panellists.

Examination of witnesses

Witnesses: Michael Shanks and David Sandford.

Q53 Chair: Welcome back to this morning's session of the Energy Security and Net Zero Committee. I am delighted to welcome Minister Michael Shanks and David Sandford from the Department in our inquiry into the national policy statement for fusion energy generation.

Minister, when will we see energy generated from fusion and what will be the likely price?

Michael Shanks: Good morning. It is good to be with you again. On both questions, I would say that the exact answers are for the near future, but we are closer than we have ever been. It is important to say that, because part of the reason we are publishing this statement, and why we published the fusion strategy and we are hosting the global fusion summit next week, is that the UK is a world leader in this and we want to stay in that place. However, we are not yet at the stage where we have commercial deployment off it, although we are closer than we have ever been, so questions of what the megawatt price will be are uncertain at the moment. What is certain is that fusion energy has the potential to deliver abundant, clean, safe, firm power on to the system,



and that is critically important in the net zero pathway that we want to follow as a country.

Q54 **Chair:** We just heard from the Fusion Industry Association UK director a price of between £35 and £75 per megawatt-hour from the private sector. Does that sound about right?

Michael Shanks: I am not going to be drawn on a particular price for something that we have not yet built. That is wrong for me to do with any technology, frankly, and the world is changing rapidly. What we are clear on is that if we can deploy this, when we deploy this, it will give us the clean power we are looking for, deployable around the country, and at a cost point that we think will be comparable with other technologies.

But there is also a technology deployment curve that we have to take into account. This would be a first-of-a-kind deployment—we hope it would be followed by many more—and, inevitably, in the lifetime of any technology that you deploy you learn a lot from the first deployment. Costs shift over time, deployment pathways will shift over time and, as we are seeing right across the whole range of technologies, prices move up and down. We are determined as a Government to tackle affordability, so that will be a No. 1 challenge for us, but equally, the aim is to build this first plant by 2040. Clearly we will get to a point where we will have a conversation about the megawatt price closer to that time.

Q55 **Chair:** Yes. Maybe you and I will still be here having this debate in 2040; maybe we will not. We also heard that we are close to commercial delivery. What do you think is needed to ensure that that becomes a reality?

Michael Shanks: Obviously the STEP programme is led by the Government and we want that to be the first project deployed. We are at a stage where the science moves into deployment. There are a number of things, and we outlined them in the route map for delivering on the fusion strategy that we published in March. The first is continuing to invest. We have invested £2.5 billion, which is important to keep the R&D moving forward, to keep that investment to make sure we remain at the forefront of this.

The next thing, as we are seeing across the energy sector, is ensuring that we have a skills pathway and that we are bringing on apprentices. I met some of them last week when I was in Culham and they are fantastic individuals, but we need to make sure we are continuing to bring on that pipeline of a skilled workforce. We are also trying to move as many of the roadblocks we have seen in other deployments of technologies out of the way early. Part of the reason why EN-8 is before you today is that it is one of those things we want to get done and give certainty to industry about what is coming down the road so that they can move on and move that out of the way as a potential barrier in the future.

Q56 **Chair:** We talked in the first session about the importance of retaining



the UK's leading role in this technology. What are you doing to ensure that happens?

Michael Shanks: I have outlined already a few things that are in the strategy. Actually having a strategy is quite important. We are one of the only countries in the world that is driving this forward at a national level. Having the scale of ambition that we have is also important. We have become accustomed as a country to thinking that our age of discovery, invention and ingenuity was all in the past. This is a really clear example of where we are genuinely a world leader, and we should be shouting about that and the Government are determined to do that. That is the first thing: to make the UK genuinely a place that is seen as the centre of investment for this technology.

The second thing is we do want to work in collaboration wherever possible, so although I say we want the UK to be a world leader, we will do that by working with others around the world wherever possible. Hosting the global summit next week is an important moment to bring people together—those working in the development of this, Governments, but also, crucially, investors. We should not underestimate, either, that the £2.5 billion of investment is keeping us moving forward at the pace we need to do.

With all of this, you need to keep a watching brief—we need to keep a watching brief—to make sure that that is still happening and that we remain at the forefront of it, but I am confident that the team of people who are leading on this at the UKAEA, the team in DESNZ and the industry itself, which is growing rapidly, are able to do that.

I took on the fusion and nuclear parts of the brief in July, so I have been getting to know the industry. This is not just a future success story for Britain. It is important to say that this is not something the Government are spending money on now for some future prize in the mid-2030s to 2040; it is already delivering huge examples of British exports. I saw in Culham last week the small and medium businesses, the spin-outs, the work on robotics, the work on materials—all of this work is delivering for Britain right now and has huge opportunities in the future.

Q57 **Chair:** I think you and I have had the same tour of Culham recently. That is a good summary. Do you think Reform will oppose this technology like they have other zero carbon-generating approaches?

Michael Shanks: I think technically I should say that is not a matter for me as the Minister; it is a matter for Reform. I could make a political point about their slightly questionable approach to science generally, not least the science on climate. I hope—and I genuinely think this in terms of mainstream political parties—that there is real consensus on this, as there is on nuclear, and we have to hold on to that. We clearly have a more fractured environment across the rest of energy policy at the moment, but on nuclear and fusion, the previous Government, credit to them, did a lot to move this programme forward, they remain committed



to this, and I hope that we can keep that consensus together. It is important to give the long-term signals to investment that this is not one Government's priority, but Britain will be open for business for decades to come.

Q58 Chair: Thank you for the opening exchanges. We are here to talk about the NPS. We have seven for energy infrastructure; do we need another one?

Michael Shanks: We think we do, and this is why we have consulted on it. I think it is important to separate fusion energy from other energy types, but particularly to separate it from fission. The two are often conflated and they are fundamentally different technologies. EN-1 covers a number of the considerations that any energy project would have to undergo in the system, but there are particular unique things around fusion that we thought it was important to have this particular planning statement for.

In particular, separating out the hazard profile of fission and fusion is fundamental, and that is key to why we have this statement today. It is also intended to give certainty about what the regulatory process for fusion will look like now. We are very close to projects coming forward that will need to go through the planning system. They are not immediately before us, but having the certainty of a national planning statement in place will help with that process.

Q59 Chair: You have explained some of the difference. Given that fusion is different from fission, does that mean we will need a separate NPS for other novel technologies, such as fuel cells, hydrogen and tidal?

Michael Shanks: We take a consideration of every technology that comes forward, but this is about weighing up the particular factors that have to be taken into account by various regulators—HSE and the Environment Agency, in the case of this statement—that are different from fission. In other technologies, they are covered by different parts of national planning statements. If we have emerging technologies in the future that do have unique circumstances, we will look to incorporate them within planning statements, where possible. Where there is a significant body of evidence that says, "This does sit separately from anything else that we have currently on the system," we will consider it. The aim is to try to keep planning statements to a minimum and as coherent as possible. It is not to create a planning statement for every single technology, but where there are unique circumstances—as is the case with fusion—it has its own particular statement.

Q60 Chair: David, do you think from the work the Department has been doing that there is a potential need for further national policy statements on different technologies?

David Sandford: I concur with the principles that the Minister has set out. Clearly, one does not want a proliferation of such statements, but where there is a particular case for them then we will consider them. We



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would look on a case-by-case basis and decide what the most appropriate action is.

- Q61 **Chair:** Is there a danger that having more national policy statements adds to the complexity in the planning system, which, given the Government's commitment to make the planning system less complex, is a tension that might concern us?

Michael Shanks: It is a fair challenge, and we do need to keep all of this under review. We have reformed the broader planning system to make it as straightforward as possible for projects to go through it. We will continue to look at the wider NSIP regime; it is obviously the responsibility of MHCLG to do that in its entirety. The energy policy statements exist for a particular reason, and it is really important for those looking at building things in Britain that there is a clear pathway particular to their technology that they understand. A lot of general considerations for the energy landscape are covered in EN-1, but for fusion we considered that it was important to have a particular statement, and indeed the consultation responses overwhelmingly agreed.

- Q62 **Mike Reader:** We have talked a lot, as we did with the first panel, about the UK benefit, but the NPS will only cover England and Wales. I do not know what the position of the Scottish Government is. You may know, Minister, whether there is support from the Scottish Government for this technology, and that makes UK benefit easier, or it is resisted in Scotland.

Michael Shanks: Again, I am being tested on the opinions of people I am not responsible for. I would hope that there would be support. I have not asked the Scottish Minister specifically on the question of fusion. Obviously, I have a strong case around nuclear with the Scottish Government, which they do oppose. The regime for nationally significant infrastructure planning is different in Scotland from England and Wales, so it is not part of the national planning statements at all. They obviously consider these things differently in Scotland.

As with the nuclear supply chain, despite there not being immediate projects in Scotland, there are benefits in the supply chain in Scotland already, and companies and universities very closely involved in this work. My hope, both as the Minister for Energy for the whole of the UK and as a Scottish MP, is that the Scottish Government will wholeheartedly support fusion, but on evidence to date they are quite slow at catching up with science.

- Q63 **Mike Reader:** I was trying to follow your previous answers to the Chair. What was the specific trigger that led to this statement being created? What has happened in the market that means we now need it? What has changed?

Michael Shanks: I might pass to David in a moment, because this work was started under the previous Government. We support the journey that



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it has been on. I have been really impressed by the pace that this is now moving at. I have to admit that from the reading I did before I got this in my portfolio, there was a sense that this was much further in the future than it actually is. The reality is that we are closer than we have ever been, and within touching distance of deployment. Crucially, all the parts to deliver it are now moving into place. As I was saying to the Chair, we are already seeing spin-outs working on what is coming out of fusion technology, out of the laboratory and materials. All of that work is already moving forward now; it is not that the whole thing is pushed into the future.

Q64 **Mike Reader:** You suggested that David would be able to answer. David, do you have an answer?

David Sandford: I will say two things. First, we have a UK prototype power plant programme, STEP, and that will clearly be one important application of this. Secondly, we do get a lot of interest from the growing private fusion sector, including US companies and others, and they are thinking about where to site facilities. They are already building some facilities in the US and they are looking at where to build second facilities, and the UK is a potential source of investment for them. It is partly about attracting inward investment to the UK and providing a clear and attractive environment for both UK and overseas companies who might want to come and invest in the UK.

Q65 **Mike Reader:** So this NPS is about investor confidence and sending a message to industry as much as about planning rules.

David Sandford: Absolutely, yes. That is one of the things they tell us they really care about. They really like our regulatory environment on fusion generally. Clarity on the planning regime is another key part of their investment decision.

Q66 **Mike Reader:** We have had evidence that EN-8 is light on management of waste and in particular on management of radioactive material storage. Do you think there are gaps in the policy?

Michael Shanks: No, I don't. The national policy statement does have a section covering it and there are wider regulations covering transportation and storage generally that cover those issues.

Q67 **Mike Reader:** The buzzword of the Committee, the semi-urban population density criterion, will not apply because this is considered lower risk. Do you think that is correct?

Michael Shanks: Yes.

Mike Reader: My colleague will be very pleased. Thank you, Minister.

Chair: We like short answers; thank you.

Q68 **Sir Christopher Chope:** There is nothing in the national policy statement specifically about tritium, though. Why is that? My



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understanding is that tritium is the key component of the fuel and it costs about £30,000 a gram, so surely we should have something in the national policy statement about the use, storage and transport of tritium.

Michael Shanks: We do not use planning statements to cover all sorts of the detail of how projects are delivered or where things that are relevant in the supply chain are. Tritium is, as you say, critical, but it is already subject to appropriate regulatory regimes, so it does not have to be part of the planning system. It is worth remembering that the NPS is about how we build particular pieces of infrastructure across the country; the considerations are about the infrastructure that is being built. There are separate regimes that cover materials storage.

Q69 **Sir Christopher Chope:** So you are not worried that the national policy statement does not differentiate between the different radioactive issues.

Michael Shanks: To be fair—I looked this up because I saw there were questions earlier—it does have a very clear section in it, section 3.3.10, that covers the storage and processing of radioactive material and waste. Some of it is covered in more detail in EN-1, because that is more general across all technologies that use radioactive waste. Further to that, there is already a very well-established regulatory process for radioactive waste in the UK. It is worth also making the general point that fusion has a considerably lower risk than technology.

Q70 **Sir Christopher Chope:** Have you seen the evidence to our Committee from Lloyd's syndicate 1176?

Michael Shanks: I haven't specifically, sorry.

Q71 **Sir Christopher Chope:** That syndicate, which is key in the insurance industry, has given us evidence expressing concern about the risks not being covered off. The syndicate told us that draft EN-8 needs to be "strengthened by requiring applicants to integrate the complete site-wide radioactive inventory, stored-energy hazards and credible release mechanisms in one consequence assessment." They make other recommendations as well, centred on public confidence in the safety of this and the cost of insuring against the risks. Ultimately, it is a question of what happens if something goes wrong. Who will bear the third-party liability and who would pay the compensation if that was required? Those are big issues and I am disappointed, in a sense, that the Lloyd's syndicate's evidence has not yet been absorbed by your Department.

Michael Shanks: I say I have not read the specific submission. I should say that every single submission is clearly looked at very carefully by officials. I am sure David will say more about that in a second.

Let me say two things. On the public confidence point, you are absolutely right. Across everything that we build in this country we want to maintain public confidence around safety. This is first-of-a-kind technology, so there is a role for us to make sure the public are absolutely clear about the safety of these facilities as they are built, but our assessment and all



of the evidence points to the fact that there is a considerably lower risk from this compared with other technologies. Therefore, the insurance process that we think will follow—it is worth saying this is developing at the moment—will be the conventional insurance process that there is for other similar technologies, separately from the nuclear insurance processes that are followed in the fission sector. David might want to add something.

Q72 Sir Christopher Chope: Does your colleague want to say something about this?

David Sandford: Yes, thank you. It is a good question. This is partly a question of what falls into the NPS, what falls into the regulatory regime and what falls into an insurance conversation. For sure, developers need to produce a safety assessment, and that goes through the HSE, but that is part of the regulatory part of it rather than part of the planning part.

We have a good, regular dialogue with the insurance sector on this. In fact, there is a panel on it at the summit that the Minister referred to, which is coming up soon. We are very keen that the insurance sector gets up to speed on this so that it can understand the technology and understand the differences between this technology and fission technology, because the risks are not the same. My observation is that the insurance industry is just starting to engage with this, but I hope it is something that they come to realise has a significantly different risk profile from fission, and one that they can think about perhaps more consistently with other areas.

Q73 Sir Christopher Chope: The insurance industry may find that response slightly patronising. Surely they should be in the lead on this, assessing the risks and recognising the realities of the costs of covering those risks. Let us leave that to one side and hope it is all resolved at the gathering next week.

Delays in the regulatory system increase the costs of development. If you put conditions on a development consent order, is that any better than simply waiting for regulatory justification to be agreed?

Michael Shanks: There are mixed views on this, and I think you heard some of that from the earlier panel. There are clearly some circumstances where attaching conditions to consent does have value for local communities and developers, but the Government want to avoid additional regulatory burdens that are unpredictable for developers. One of the challenges in the UK for a long time has been unpredictability in the planning and regulatory process, so investors make investment decisions to build things and then it takes years—in some cases decades—for them to ever see the light of day. Some of that is the complexity we are trying to take out of the planning system.

Where there are very clear cases for conditions, they are applied, but they should be rare, in my view, and not something that becomes a



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regular occurrence. The moment we start attaching conditions, the predictability of the process becomes much more complicated.

- Q74 **Sir Christopher Chope:** It may be 20 or 30 years before the West Burton facility is built and functional, so do we really need to try now to anticipate all the issues around that by having conditional consents?

Michael Shanks: I think it will be built in much less time than that. I am looking to an expert over my shoulder who will tell you just how much faster, but certainly we will start to see construction very soon. The technology is not yet quite there, but the building work—the civils work—that will be required will start much sooner than that. The aim when we announced funding into fusion was that we would have our first operational plant by 2040, and we are obviously hoping it is much earlier than that, so I think it will happen much sooner than you say.

The point of publishing a statement now is trying to get ahead of where we have been with other infrastructure in the country, where there has not been a clear planning route for development. We want to give that certainty right now so that projects can see what is coming in the future when they are submitting their applications and they have clarity about what that looks like.

- Q75 **Claire Young:** Even if a fusion facility does not meet the criteria for being nationally significant, the NPS says that developers can ask for it to be considered as such. Is that right, given the perception people often have that that involves a loss of local control and imposition from the centre? We are talking about facilities that will have significant local impacts.

Michael Shanks: It is a really fair question. I cannot remember the exact timeline on this, but we consulted, I think as part of the Planning and Infrastructure Bill, to change the NSIP process so that across all energy projects it was possible for developers to move from the Town and Country Planning Act into the NSIP regime if they fell below the threshold. That is partly to recognise there are some projects that have nationally significant elements, even if their megawatt output is lower than what is defined. However, we are also conscious that in some areas—this is part of why we are introducing EN-8 now—the upskilling of planning officers to deal with these complex cases is not there, and sometimes planning departments just do not have the experience to deal with particular applications.

We have set the thresholds at 50 MW in England and 350 MW in Wales. That was in consultation with the Welsh Government. Obviously this regime only applies in England and Wales. We think those are fair thresholds to begin with, but we keep them under review. It is right that developers should have the opportunity to consider what is a nationally significant project through a nationally significant process.

- Q76 **Claire Young:** You said it is 350 MW in Wales but only 50 MW in



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England. Why the difference? Obviously, with devolution, Wales can make its own decision, but it presumably has some rationale and you have some rationale for your decision. What is that? Why the difference?

Michael Shanks: It is devolution. We said when we came into government that we would respect the devolved Governments more than they have been in the past and that they should be able to have influence over processes within their jurisdiction. Planning is one that is shared between Wales and the rest of the UK—it is separate in Scotland—and so we did consult with them and they came to that view. There are also different factors that they would consider why they would want to have a higher threshold, not least because they are responsible for transport and skills, and many of the other factors that the UK Government is responsible for in England.

Q77 **Claire Young:** Going back to the question of the skills of the people making the decisions, you talked about local planning officers maybe not having the skills; what about the planning inspectors? Obviously if this goes through the national framework, planning inspectors will be making the decisions. Will they have the knowledge necessary to judge the merits of permitting fusion reactors?

Michael Shanks: This is exactly the point of bringing this forward: to make sure that that upskilling is taking place. That has already been happening, but there is no doubt that first-of-a-kind projects are the test point for whether there is the resource within the Planning Inspectorate to do it. They will have to get to that stage before the first project enters the pipeline. Part of the reason we are publishing this now is to give a signal of intent, but also to make clear the pathway so that the Planning Inspectorate can start to upskill a workforce and recruit people into those roles.

It is doing that across a range of technologies at the moment. If we take, for example, the knowledge that exists around nuclear, that is already adapting into new SMRs and into the AMR regime as well. It is constantly adapting.

Q78 **Claire Young:** What are you doing to support local authorities so that their planning officers are upskilled?

Michael Shanks: I can write to the Committee with the exact figure, but the Government have invested significantly in planning departments, recognising that part of the issue with the length of time it takes to make decisions is capacity, and local government has been struggling for a long time. The complexity of these projects is also increasing significantly. There are technologies coming forward that planning departments and local councillors will never have dealt with before, so we have invested funding in that, but also in training programmes. I can write to the Committee with more detail.

Q79 **Claire Young:** Thank you. You have talked about why you have a separate NPS for fusion. Should the planning of fusion reactors be a



completely separate process from that of fission reactors or—the separate NPS documents aside—is there a great deal in common between the processes?

Michael Shanks: We do need to see them as separate. They are fundamentally different from a science point of view. I can understand why people conflate them, but they are fundamentally different right across the piece, but particularly when we look at safety and risks, and hazardous materials; all these things are fundamentally different in the two technologies. Clearly, across all of infrastructure, there are shared aspects, not least the civil engineering, site management, transport and community engagement parts. All those things are broadly similar, which is why EN-1 covers all-encompassing areas, but we should consider them as separate technologies. That is why we think it is so important that there is a separate statement.

Q80 **Melanie Onn:** Do you think that fusion is going to deliver more for security of energy or the cost benefits for consumers and business?

Michael Shanks: You are asking me to choose. I think it is both, but we are certain now that the energy security argument is why we are interested in this technology.

Q81 **Melanie Onn:** And we can't have energy security without fusion?

Michael Shanks: We can, but we want a mix of technologies and we have a real opportunity here. It would be wrong for us as a country to not invest in where we are already a world leader. There is huge potential. It is worth thinking—

Q82 **Melanie Onn:** Is it not worth us as a country investing more in the technology that is already operational? If you talk to each of those technologies, they will say they still need more Government support, they still need more pipeline sighting and they still need more risk lowering.

Michael Shanks: Yes, but I think if we took that approach, we would still be burning coal right across the country. We have to move on as a country and deploy new technologies. When we first deployed—

Q83 **Melanie Onn:** There are still new technologies. Floating offshore wind, for example, is classed as a new technology.

Michael Shanks: Yes, and we are supporting floating offshore wind as well. I do not think this is an either/or. The pathways that will come through in the strategic spatial energy plan will show a range of options. The energy mix we outlined in the clean power action plan involved a mix of renewables but also nuclear. We think fusion will be part of that mix in the future as well.

If we want to have a genuinely clean power system that we have security of supply in, we will need a mix of fusion and fission that provides that firm power on the system, and renewables, which are hugely important and of which we have opportunity to deploy much more, but which are



intermittent. We get inherent benefits for the system from fusion and fission that we do not get from renewables, so we need both.

Q84 Melanie Onn: From my perspective, it would seem that with the release of this statement, the Government are absolutely gung-ho 100% behind fusion, but in other areas, like CCUS and hydrogen, they are not feeling as confident. Is that fair?

Michael Shanks: No, I don't think that is fair. For CCUS and hydrogen we are going through a process. We have published strategies for both, we are keen on delivery for both and we are funding projects. We have funded more in CCUS than any Government have before. We are committed to those projects. I will be absolutely honest, though: we are committed to the R&D on fusion. There will come a point when there will be decisions about how much deployment there is, when we are at that stage, based on cost. Certainly this Government—I do not know where we will be by 2040, if we are deploying it then—will be driven by decisions on affordability. There is a point in every single bit of technology where the cost is significantly higher than it then becomes in the future, and fusion offers us an abundance of clean energy that we cannot get from any other source. It is a huge opportunity.

Q85 Melanie Onn: As and when it actually comes to fruition.

Michael Shanks: Yes, but I think we said that 25 years ago when we built the first offshore wind turbine: "A huge opportunity in the North sea." We had not built any until 25 years ago.

Q86 Melanie Onn: No, and the arguments now, of course, are that we talked about that and the capitalisation of it and we did not actually manage to get it right. We heard from the first panel the importance of getting it right. That leads me to my next question. Is the £2.5 billion we are spending too much or too little?

Michael Shanks: I think it is just the right amount.

Melanie Onn: How very Goldilocks of you.

Michael Shanks: I say that flippantly, but I think it is an important figure. Obviously every penny the Government are looking at spending at the moment is scrutinised incredibly closely. I am sure the industry would call for more funding, but equally it is a real statement of intent. It is a significant amount of investment that says that this Government are squarely behind it, which is the thing that catalyses more private investment into this space as well.

Q87 Melanie Onn: Does fusion meet the Government's agenda of growth in every postcode?

Michael Shanks: It does. This is where there are some similarities with nuclear, in that the supply chain is much more localised in the UK than it is for other technologies. We are obviously at the forefront of fusion and so the real opportunity—the same as I am pushing on SMR deployment—



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is to say we need to go even further, to have local content, to build things here in the UK. If we look at the nuclear supply chain there are jobs in almost every single part of the United Kingdom—including in Scotland—building nuclear projects at the moment. We need to see much more of that and there is a huge opportunity to do that in fusion as well.

Q88 Melanie Onn: Will there be the same grid connection issues facing this technology as there are with all other energy projects?

Michael Shanks: As I have said to this Committee before, we are determined to tackle the grid connection issue, but there is no special case for this. The benefit of the STEP programme—the Government-led first programme—is that it is at the West Burton power station, which was an existing power station and has a grid connection in place, but we are determined to fix the grid bottlenecks right across the country.

Q89 Melanie Onn: That does not sound ever so hopeful, Minister, I have to say. You are very confident in telling this Committee that this technology is not just the latest shiny thing that is being sold to the Government and the country as a solution for all of our energy woes.

Michael Shanks: No, and I am not sitting here saying this is the answer to everything. We need to be realistic. It is an incredibly important project for Britain right now, delivering economic growth and jobs and exports. It could play a critical role in the future in terms of the deployment of abundant clean, secure energy, but it will not immediately—or even in the medium term—replace all the other technologies that we need in the system. This is about a mix. I am not here saying this will avoid us building offshore wind, onshore wind, solar and nuclear. It will not, but it will play a really important role, and if we are ambitious about this it can be a critical part of our future energy security.

Q90 Mike Reader: UKAEA told our predecessor Committee that fusion might deliver 10% of the UK's energy need by the year 2100. Do you think that is a bit underwhelming?

Michael Shanks: I have not seen the particular calculation, so I don't know. We are looking here at deploying the first fusion reactor, which will generate a relatively small amount of electricity, but it is the first step. There will always be a first step in this process. Who knows? We have moved much faster in the R&D on this than many people would have expected in the past few years. I think that will continue in the years ahead and we might be much more ambitious than that.

Q91 Mike Reader: Is there a distinct benefit for energy security of having a low-carbon baseload that is deployable? It is not necessarily about scale, but the fact that there is that baseload within the energy mix.

Michael Shanks: Yes, that is really important. Having a range of technologies really matters—we don't want to put all our eggs in one basket—but the second thing is having a technology that is deployable in



a range of different spaces. This is the real interest in SMRs and AMRs at the moment: it opens up much more opportunity. It is the same for fusion reactors, which is why not just the STEP programme but the private interest in projects is so important. As I said to Melanie, having a mix of renewables will be the backbone of our system, but it has to be backed up with that firm power we can get from nuclear and fusion.

Q92 Mike Reader: I think we have heard today that there is a bit of a fusion race with other nations. Are we more ready to progress this than the US and China?

Michael Shanks: I am not going to make a comparison with other countries, other than to make what will sound like a comparison by saying that we are genuinely a world leader in this. We are having a global summit next week, which is an important moment to bring together everyone who has an interest in this. There are different approaches being taken to fusion in the US and the UK, but there is a lot of shared research that is obviously important.

I was at the UK-Canada summit yesterday talking about nuclear, but actually about fusion as well; there is a real interest in Canada in this. This will be an international partnership in which I think we can be proud we are world leading, but we will do it with the support of others as well. Then crucially—I think you heard this from your panel earlier—when we do manage to crack this, it will be a huge export opportunity for Britain. It is not just about our future energy needs, but the chance that Britain could be exporting our technology around the world.

Q93 Mike Reader: Given China's previous behaviours in the energy space, how concerned should we be about espionage and industrial actions from China to try to make itself the world leader?

Michael Shanks: I will make a general point about China. We have said as a Government throughout that we will co-operate with China where we can—it is important; it is a huge economic player—but we also recognise that we need to challenge it where we must. We have made decisions recently that reflect the fact that we will take a robust approach to our national security. Our energy security and resilience is my No. 1 priority as Energy Minister, and we will not be blown off course by any technology race. Our energy security is absolutely critical. That is not just to China; that is to any players across the world, and we are seeing an increasing threat to our energy infrastructure every single day. We have to respond to that. That is part of the reason that deploying new technologies to build resilience in our own system is so important.

Q94 Mike Reader: Are there any parts of this technology that you think are best placed to be delivered by the UK? It will eventually be a global supply chain and a global product. Where do you think the UK will end up in terms of its position in this global supply chain?

Michael Shanks: I will ask David if he wants to add anything to this, but what I have already seen is really interesting. Culham, which the Chair



and I have visited, is a really good example, particularly in robotics, in magnets and in materials development; I saw some examples of how we are already deploying that in steel. There are things from fusion that the UK is already becoming a world leader in, and I think there will be more as we develop it. David might want to add more.

David Sandford: Thank you, Minister. One thing I think we have a particular strength in in the UK is whole-plant integration—how you bring all the systems together and deliver a whole power plant. The way that UK Fusion Energy is working on bringing that together is a unique selling point that we have as an export opportunity. Then, as the Minister referred to, there are a number of subsystems where we have particular capability, including superconducting magnets, robotics, advanced materials and a number of others. Both at whole-plant delivery level and in particular subsystems, the UK has certain strengths.

Q95 **Mike Reader:** Do you think the onus on regulators like Ofgem and arm's length bodies and regulators to support UK manufacturing and sovereign capability is strong enough?

Michael Shanks: I think it could be stronger and I have reflected that to Ofgem. It has a growth mandate, as all the regulators now do, which was passed to them when we came into government. Ofgem is leaning into that more than some of the other regulators, but there is more to do. The tension here is an absolute determination to build much more in the UK, equally matched by a determination to bring down bills. There is a challenge in doing both of those things. We will not be able to achieve everything we might want to if it involves putting up bills, because affordability is our No. 1 priority.

What is really good about this space is that we are at the forefront of this. It is the same argument I am making on SMRs. We have a chance to do differently what we should have been doing with offshore wind 20 years ago, which is building the supply chains here in the UK. We did not do that and we missed an enormous opportunity. We are fixing that with the grid build-out, so that much more of that is built in the UK, and we are fixing it with other renewable technologies, but we have a chance to get it right from the ground up with fusion and SMRs.

Q96 **Chair:** Thank you very much indeed. I will take the opportunity to ask you about something you have just written to me about: the Eskdalemuir seismic monitoring station and the concerns raised by developers about the distance between seismic monitoring and wind farms. In your letter to me, which the Committee is publishing, you said that you had extended the consultation but that the approach you have taken is in accordance with the Government's consultation guidance and principles. I think, from what is in the public domain, that the concern developers have is that those are outdated, and that other countries are demonstrating perfectly sensible arrangements where wind farms can be closer to seismic monitoring stations than we have in this country and the MOD has not updated its guidance.



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I know from your letter that there are limits on what you can say, but I take the opportunity to ask you to take away that point that there are countries where this is working perfectly well up to as close as 5 km, and the guidance in this country is out of date and does not reflect the latest science. If there is anything you want to say in response, please do.

Michael Shanks: As I said in my letter—on the particular piece of correspondence I will be careful what I say for legal reasons, but on the general point—we acknowledge that we should be thinking about what the solution is at Eskdalemuir so we can build more onshore wind. That is an ambition that we have set. What we want to do very carefully is go through a consultation process that is not about building onshore wind at the cost of a seismic array that is a critical part of our national defence infrastructure. That will always take precedence over the deployment of renewables. I recognise the point that there are new technologies—new ways of monitoring and new ways of being able to build things next to the array—but we will do it in a methodical way with our partners in the Ministry of Defence to make sure we are doing it in a safe way for our national defence.

Chair: Thank you for that slight variation on today's session. Thank you for your time, and for yours, David. We will see you in a few weeks' time for your next appearance before the Committee. That is the end of the session.