

# Joint Committee on the National Security Strategy

## Oral evidence: Critical national infrastructure and climate adaptation

Monday 17 January 2022

4.30 pm

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Members present: Margaret Beckett (The Chair); Sarah Champion; Baroness Healy of Primrose Hill; Baroness Henig; Baroness Hodgson of Abinger; Darren Jones; Lord King of Bridgwater; Lord Laming; Baroness Neville-Jones; Bob Stewart; Lord Strasburger.

Evidence Session No. 2

Virtual Proceeding

Questions 20 - 38

### Witnesses

I: Professor Jim Hall, Professor of Climate and Environmental Risks, University of Oxford; John Hetherington, Head of London Resilience; Stuart Marshall, Chief Emergency Planning Officer and LRF Manager, Cleveland Local Resilience Forum.

### Examination of witnesses

Professor Jim Hall, John Hetherington and Stuart Marshall.

Q20 **The Chair:** I welcome our witnesses and thank them for giving evidence to us today in the second formal evidence session of our inquiry into the critical national infrastructure and climate adaptation, or the lack thereof. I ask the witnesses to bear in mind what I am sure you are familiar with, which is the complications of doing these things virtually. If you want to come in on the back of another witness's answer, could you raise your hand briefly so that we can try to keep track of who wants to join in?

I will begin by asking Mr Marshall. You recently experienced the effects of Storm Arwen in Cleveland. As I understand it, that included extended power outages and telecoms failures. How are the decisions made at the top of government informed by your experience as local responders? How are the decisions made by central government communicated to you in these circumstances?

**Stuart Marshall:** We were quite fortunate in Cleveland that we were at the base of Storm Arwen, so we were significantly less impacted than my

colleagues and counterparts in Northumbria and County Durham. That said, we were impacted. We got a warning through from the Met Office. The occasions when we see that level of warning are few and far between, and what we could see from the Met Office, in trying to establish what might be coming, was significant.

We were fortunate with the impacts. There was significant damage across our area, but the vast majority of resupply was dealt with within about 48 hours. I understand that there were complications with the impact on some of the local mobile sites and significant disruption to highways, which of course impacted on the electric system, particularly where trees fell on to lines. It was chicken and egg as to whether we could remove the tree or whether it was safe to send people in there. Were the risks safe to respond to, and was it safe to cut in among what could be live lines? We had a number of communities impacted, but Powergrid was quite effective in getting to the scene and getting information back.

We did not seek central government support. We know that it would have been there if we had sought it. There are schemes in place such as military aid to civil authorities, but we were fortunate. We were very aware that colleagues further north were significantly more impacted and were more likely to require the resource and focus of government than we were.

**The Chair:** You did not require aid from central government. Does that mean that there was no direct communication where you—or your colleagues, who you say were more impacted—were telling them what the impact was as it was going on, more or less? Was there any feedback from local level to central government?

**Stuart Marshall:** We work into the Department for Levelling Up, Housing and Communities and provide situation reports into them on what we know the impacts are on the ground. One of the big issues, one of the complications, with Storm Arwen was that it was such a fragmented risk. There are a number of risks that we plan for and manage where there is a specific location and we can map it. We have quite a good understanding of flood risk areas and what infrastructure is there for those. We do not have the same level of intelligence with something like the impacts of Storm Arwen. With the network itself, my understanding is that there were complications with the utility provider being able to identify how much damage there was to its network, because it was so fragmented. Trying to get an understanding of the depth and scale of the impact was quite problematic.

**The Chair:** When you say that it was fragmented, do you mean that there was a lot of it, but it was all over the place?

**Stuart Marshall:** Yes, there was a lot of damage caused to the network all over the place. In some instances, the supply was back on, and further down the network another piece of damage was identified that had to be resolved. It was not a situation where we could step back and

get a very clear understanding of what was required where. It was a lot more complex because of the integrated networks.

**The Chair:** You referred to getting input from the MoD at the outset. Was there any other communication from central government? You said that you reported back to DLHC. Was there anything coming back the other way?

**Stuart Marshall:** It was very limited. Once we had established that there were significant, but manageable impacts within the local area—so 48 hours later—there was no great need. Subsequently we have been asked for information, which we have fed back in with a view to any identifying areas where there might be some improvement. I know colleagues further north are undertaking significant inquiries into what happened and what the potential learning to be taken forward might be.

**The Chair:** Are you yet in a position to single out anything that went particularly well or particularly badly with what happened?

**Stuart Marshall:** We got the warning in. Speaking only from my own perspective, it is the co-ordination. It is rare that we get such significant warnings for wind. If it was flooding, I think it is fair to say that we might have had greater co-ordination. We are not as aligned to or as practised at wind and we do not have the same structures in place. If there are flood warnings, there will be a flood advisory teleconference with partners. In the event of it being severe weather, there is a larger grey area as to who calls it, who is the lead for it, and who has the responsibility for that. That is one area that we are looking at in our LRF to hardwire this in and make it very clear who has the authorisation to call on particular gradings of weather warnings.

**The Chair:** That is very helpful. Thank you.

Q21 **Lord King of Bridgwater:** Professor Hall, Storm Arwen has resulted in a government review of the resilience of energy networks. What do you think this event can tell us about the Government's current grip on this issue?

**Professor Jim Hall:** Thank you, Lord King. To introduce myself, I am professor of climate and environmental risks at the University of Oxford. I run a group that models and analyses risks to infrastructure networks and I advise government in a number of different capacities.

Storm Arwen has vividly illustrated to us something that we very much recognised already, which is the very high and increasing level of dependence of all our critical national infrastructure on electricity. As we transition towards net zero, dependence upon electricity will increase ever more. It also illustrated how broad, how widespread that dependence is. The footprint of Storm Arwen was a pretty widespread event, but the effects of the disruption cascaded even further across the country. We saw quite wide-ranging rates of recovery across parts of northern England and Scotland in how long it took to get the system up

and running again. I think there are lessons there about resilience in so far as the capacity to cope and recover is concerned.

I should emphasise that I was not involved at all in the operational aspects of Storm Arwen, and other witnesses will be able to comment more on that than I can.

**Lord King of Bridgwater:** I ask this question, because a very interesting paper has been sent to the committee by Colin Bayfield. I think his real experience is in Scotland, but he obviously knows a lot about the grid and all the parts of the electricity system, and the challenges it poses. He has a pretty chilling sentence. He says that, "The probability of complete or partial failure of the British grid system is currently small, but is increasing".

It very much picks up your point that we have gone into this drive for net zero with huge growth in renewables, but the challenge is when, at a critical moment when there is some serious climate emergency, there is no wind and there is no sun. I have just looked at my own electricity bill at home and I see that SSE, one of the providers, is 50% renewables and 50% gas. It seems to me that we are pretty exposed now, and the point you have made is that electricity is hugely important for a whole range of different facilities. Do you think we are at risk?

**Professor Jim Hall:** I will respond in particular to the assertion that the probability of large-scale failure is increasing. One of the things we should be concerned about is that we do not know how much it is increasing by, and in part this is to do with the nature of climate change. We are seeing more severe extreme events, but we do not know enough scientifically about the nature of climatic changes yet to know exactly how much the odds of severe events are changing. That is a known unknown and we ought to be cautious about that.

You referred to the changing nature of the power network, an increasing number of renewables on the network, more distributed supply, more interconnection. A network like that, which is very different to the one we have had in the past, should not necessarily be any less resilient. It can be engineered to maintain its resilience, particularly if we manage to put a lot of storage on to the network. The question is how the Government and their regulators ensure that the future network is resilient, because it can be if we want it to be.

**Lord King of Bridgwater:** That is my point really. You say that it can be sorted and it can be provided for, but have we provided for it? Do we have storage now? An interesting point to note was that with the weather we have just been having—high pressure, cold, no wind, and in many areas no sun—there is a suggestion that very cold weather would lead to a fall in supply from the interconnector from France and other countries. Is it right that we are at risk at the moment?

**Professor Jim Hall:** Those are circumstances that would be particularly challenging for the grid. I think the right question is: what stress tests, what reporting should be expected of National Grid to demonstrate the

level of resilience that exists at the moment? I cannot give you that number as a matter of fact right now.

**Lord King of Bridgwater:** The fact is that we are at risk at the moment, but things can be done to sort it. The question is whether they have yet been done.

**Professor Jim Hall:** Yes. The level of reliability of the power network in this country has been good by European standards in the past. The network is changing and the people who are changing it understand the resilience issues. My point is that we should perhaps be looking at how those standards of resilience are set and reported upon.

Q22 **Bob Stewart:** My question is to Mr Marshall. He mentioned that no MACA—military aid to the civil authorities—or aid to communities was asked for. Is it up to local authorities to ask for military assistance for Storm Arwen, in this case, or for any other disaster, or does central government say, “We can put these people at your disposal”? Where does the initiative come from, locally or nationally?

**Stuart Marshall:** We have seen it operate in both directions of late. Covid is very much from the top down, but there have been plenty of occasions previously when we have identified a role or task that we cannot meet locally, for whatever reason—specialisms, access to the private sector—where the military has been able to support.

It is very much a two-way conversation. It is probably about recognition of the size and scale. A lot of the impacts of Storm Arwen were relatively small and on their own would not make a major incident by any means. It is about trying to get the intelligence picture in real time as to how much impact where, and who is most vulnerable, and trying to get all the information to telecoms and the electricity supply can be a real challenge. It is two-way. We tend to work on asking the questions and we can manage it from there.

**Bob Stewart:** That seems very sensible indeed.

Q23 **Baroness Hodgson of Abinger:** Good afternoon. I want to ask about the reaction at the local level. In the event of infrastructure failure due to extreme weather, can you talk us through the key roles and responsibilities at the local level, including the interaction between the infrastructure operators and the local resilience forums? How does it happen?

**John Hetherington:** Thank you for the question. To put it in its most basic terms, organisations are still responsible for their statutory duties to respond. We are trying as far as possible to deliver normal services in abnormal circumstances. On the interaction that you mentioned, where we assess there to be a problem that needs a co-ordinated response we convene a strategic co-ordinating group at the local level. We look for the lead agency, which is primarily the police, from their experience with the command and control asset, or a more independent chair such as local authorities leading the response in the provision of service to the

residents. Our partners, the utility service providers, as category 2 responders under the Civil Contingencies Act, are engaged with resilience forums in the preparatory phase, and they would be brought into the strategic co-ordinating group as per the need.

We would have a difficulty where it is over a widespread area. A provider that spans multiple LRF areas may not have the staffing or support to engage in the detail that we would all like in individual response structures, but that is where we can utilise the economies of scale and work with the Department for Levelling Up, Housing and Communities and organise regional contingency groups to chair and bring together the necessary partners so that we have that access. That has not been an issue to date.

Experience in London has shown that providers such as Thames Water, where we have had severe weather that has required a response or a service failure such as a burst water main, can service our needs in London at a regional level, and we bring in the necessary partners to engage with them directly through those co-ordinating groups.

**Baroness Hodgson of Abinger:** What is the timescale on the setting up of the committee that you talked about?

**John Hetherington:** Depending on the response—we can be pretty quick in this day and age with the technology, like the technology that we are using today—the timescale is an hour or two hours, once we have ascertained the scope and scale of the problem. The difficulty comes in the assessment and understanding across a wide area, because we do not have an all-seeing eye. In some cases, it can be like trying to put a jigsaw together without understanding the overall picture or how many pieces you have. Once you are aware that there is a growing issue, our prudent actions in London are to convene regardless, and we typically take 30 minutes to an hour. We can convene people through electronic means in or out of hours to bring it together and conduct that assessment.

**Baroness Hodgson of Abinger:** Thank you. Does anybody else want to come in on this?

**Stuart Marshall:** I agree entirely with John's points about the structure. Regional response is not as practised within individual LRF areas, which are based on police force boundaries. It is not tested and staffed routinely. We saw that a number of times, such as in 2013 with the tidal surge, where various SCGs were not set up and operating. We have seen it a number of other times where there is potential for a regional group to form and it is either left to local responders or it is not instigated until some time into the event. That is just protocol and practice, to be quite honest.

Q24 **Baroness Hodgson of Abinger:** How do you share information across local boundaries and regions?

**Stuart Marshall:** There are a few different mechanisms in place, but in all honesty it is a phone call, points of contact and a network between officers with similar roles identifying that this information is important and needs to get through. Often we will pick up the phone and speak to counterparts if they are having similar issues or can advise on what might be coming to impact on us and vice versa. That is being done not just through my organisation but through the counterpart organisations and then brought back into the SCG that John mentioned. That is the primary route. Where we have those regional telecoms, a short amount of time per area to share what is important or pertinent from their side can very quickly share practice and identify issues that might impact on others shortly.

**Lord Strasburger:** Something that John Hetherington said rather struck me. He talked about getting on the phone or using Zoom to communicate with colleagues in different organisations, but since it is not at all improbable that communications like that would be down, what would you fall back on?

**John Hetherington:** We will always take advantage of what communications are available, and in our communications plan and the degradation thereof we have mechanisms for the agencies to communicate by. We also have the absolute fallback that if there is a complete power outage or telecommunications failure, we have a predetermined place where we expect leaders in London to convene and ascertain and set up the strategic co-ordinating group from there.

Q25 **Lord Laming:** There are many players in this field, and I am not sure where responsibility lies. Could our witnesses reflect on the fact that the Civil Contingencies Act requires category 1 responders to assess the risks of emergencies that occur and to use this to inform contingency planning? I am not sure how this works. Does the local resilience forum take on this duty in the local area, and does it include planning for the effects of climate change, extreme weather or anything more critical in the local infrastructure?

**John Hetherington:** The LRF has the duty to assess risk. We work closely with central government and follow the national risk and security assessment guidance and local risk assessment guidance on that. We do not assess the risk of climate change per se. Our methodology has changed relatively recently, in 2019. We used to assess the risk of an emergency occurring over a five-year period and it is now a two-year period. That would not enable us to see the difference in climate change or climate change as a specific risk, but the risks we assess are outcomes such as severe weather, a heat wave, surface water flooding and so on.

We expect our risk assessment of likelihood and impact to change over time as the results of climate change differentiate the risks and increase the likelihood or impact, or both. That is a collective responsibility across all agencies. We nominate lead agencies to lead on individual risks, but it is very much a group assessment and about utilising the national methodology and national guidance on those risks.

**Lord Laming:** Can you give us an example of who would take the lead at a local level on a particular issue? Let us take electricity failure, which would be serious and would severely disrupt everything that we all do.

**John Hetherington:** In London, we take the lead on that as the secretariat. The electricity providers are category 2. We took a local policy decision that it was not necessarily appropriate—not for any foul means, but we wanted to have an independent lead assessor on those risks, with the electricity companies providing their expert advice and support into the risk assessment and all the agencies. We provide the administrative lead to research the history and develop the individual risk assessment, looking at the likelihood, the cause, the government guidance on that, and then as a group we will jointly agree the risk scorings. That comes out as a very high risk across all the risk registers and the national risk register.

**Lord Laming:** Are all the essential services signed up to this process?

**John Hetherington:** Yes, all the category 1 responders within an area are signed up to that process. Certainly for us in London, and I have never heard of it not being the case in any LRF, all category 1 responders are part of our risk assessment group. Then, annually, we present the risk assessment to the forum for senior sign-off.

Q26 **Lord Laming:** Could you give us some idea of what kind of information is used in establishing the local contingency plans and how widespread that information is? We mentioned electricity, and it might be water or anything else, but are people like the Met Office or Defra included in all this, or is it just literally the local services?

**John Hetherington:** For us in London we consider the Met Office to be part of our local services, so it will be involved. Then it would be the agencies in the government departments. We would have the Environment Agency represented more locally on, say, a flooding development, and all agencies are consulted. We may have a smaller working group of some of the lead agencies. If we were looking at water disruption, the water companies would have a very strong lead on their roles in relation to the security and emergency measures directive and their own contingency plans, and thereafter it would be what the local agencies can do to support them. The local authorities are looking at the humanitarian needs and how other agencies could support the logistics.

I say “could”. There is limited resource locally in what we can do to support that. We are not a replication service for private industries at a local level, but we will always do whatever we can to support the needs and welfare of the residents who are affected by an emergency. Thereafter, all agencies within the forum are consulted as part of the process of the plans being signed off and agreed upon at a local level.

**Lord Laming:** How well do you think it is working in practice?

**John Hetherington:** The production of a plan is one part of the puzzle. The development of an actual capability is the greater difficulty. Take

water failure, for example: the water companies themselves are the provider and they will have plans in place utilising their own mutual aid across the industry for a certain figure that is directed by the regulator. But we know that there is a large gap between that and what our risk assessments say, and there have been further gaps between what the risk assessments say and what could actually happen on the ground. They have never come to fruition, but we have been relatively close on a couple of occasions where there have been fairly serious water service shortages due to major trunk nodes failing.

Fortunately the water companies are good at what they do and they have repaired them well within a short period, and they know how to re-zone and continue to provide that water, but at the local level we have very little additional capacity for generating the delivery of water to local residents. That would be a much harder ask were there to be a telecoms outage or power outage, and what we could deliver as local responders is fairly limited.

**Lord Laming:** You mentioned the gaps that exist and you are aware of them. Whose responsibility is it to close them?

**John Hetherington:** It is a collective responsibility. The difficulty is that that is not stipulated anywhere. This is where the role of the LRF is very interesting. We can foresee these issues, but we have very limited resources in what we can do to close those off. I will play devil's advocate here. Take the example of investing local funds as an LRF in procuring huge amounts of surplus water that was not required over a period of time. We have to use public money diligently and wisely.

As I said earlier, we are not necessarily a fallback service for the private sector delivery of utilities. However, we have the duty to provide to and support our residents and make sure of their welfare needs. We rely heavily on the voluntary sector in a lot of cases, and when in incidents such as the burst water mains—that is where we are most familiar with utilities failure in London, so I will speak for those—the utility companies have been excellent at coming forward and providing as much resource as they can and fulfilling the need.

**Lord Laming:** Thank you very much.

Q27 **Baroness Neville-Jones:** That was a very interesting set of answers. A question was left in my mind. I can imagine that the first responders have a very strong interest in making and planning something that has results. In other words, when you have done a wash-up you see where the gaps are and try to fill them.

What is your experience in practice of the second responders? You said that the water companies are very good at coming in and acting, which sounded to me rather like an after-the-event performance, but do you get a response out of them that reduces the level of hazards and risk for future events? Do they respond by strengthening their performance and palliating the problems that have given rise to the emergency before

things happen again? How do you find that it works in practice, or is there a problem there? What interest, if any, does central government display in that kind of issue, where you might need the engagement of the second responder at quite a high level, which I wonder whether you can always command at the local level?

**John Hetherington:** To answer directly on the experience that we have had, yes, the utility providers absolutely take preventive actions and are constantly working to improve their networks and make sure that they do not have any service delivery interruptions. We have seen a marked improvement over the past decade in their engagement with the local resilience forums, their pre-emptive warning of basic maintenance that could impact on their service delivery so that we can put necessary plans in place and have a far better understanding of the risk at the time.

The after-the-event response, as you put it, is a good response from them and they are proactive. They are not late in coming to the party. They are very open and honest now with us as responders. They are quick off the mark on the basic needs and the provision of alternative water supplies; I speak only for water companies, because that is the experience that we have had in recent years. If there were to be a significant failure, I think there would be a marked gap between what they can provide as part of their contingency planning and where we have a further capability through spare resources at the local level.

**Baroness Neville-Jones:** We have just heard about a London experience, and I would like to know whether it is the same in the north of England as well, in Cleveland.

Q28 **Lord Strasburger:** I want to burrow down a bit further on what Lord Laming was driving at. Back in 2016, we went through an exercise to test our readiness for a virus, a pandemic. A lot of recommendations came out of that that were not followed up and we are suffering from the consequences right now. You are identifying what you call shortfalls or gaps. Are you able to reassure the committee that we will not have a repeat of what happened with the virus exercise, in that the shortfalls have been identified but no one has responsibility for actually fixing them? I would be interested to hear from all three witnesses on that, if we have time.

**John Hetherington:** I think this comes back to the role of the LRFs versus the role of the regulators, particularly among utility providers. The role of the regulators is far stronger and is far more effective. That question is better channelled through them as opposed to the LRFs—not wanting to dodge the question. I think we are working hard, but there is a lack of resources and it is the responsibility of the utility company and therefore the responsibility of the regulator, first and foremost, to check up on the implementation of any recommendations.

**Lord Strasburger:** The professor's opinion might be interesting.

**The Chair:** If I may, I will go to Mr Marshall next and then to the professor. Mr Marshall, is what was said about London reflected

elsewhere?

**Stuart Marshall:** I think generally it is. We have good levels of engagement and buy-in. Category 2 responders have a very limited set of duties in comparison to category 1, and there are some questions about why that is the case when they already have emergency management teams. They are undertaking risk assessment and a number of the duties that category 1s are already doing and are statutorily required to do.

On the working relationships, as always it comes back to the balance of risk and how much we are prepared to invest. John covered off the civil contingencies or LRF side of risk assessment. Ten years ago we saw quite comprehensive work being undertaken regionally on climate adaptation. My understanding is that that has shifted significantly as the focus towards net zero has happened. The focus is very much now on energy conservation as opposed to some of the work that we saw previously on adaptation, which was starting to bring organisations together and looked at some of the complications.

That is not necessarily the same across the country, but I am led to believe that there is no clear responsibility for that medium and longer-term planning, especially not multisectoral. We are seeing our utilities undertake significant work to start to look at climate change and what it means for their networks and investing in their networks. We are not seeing a joint conversation similar to the one John outlined, which covers the two-year period of what this means for partners in service delivery. We are not seeing that across the medium to longer term for climate adaptation.

The other critical infrastructure element is that a lot of it comes from the security background through necessity and access to that information. There is a balance to be struck between what information can be readily shared and considered versus that needing to be locked away or not made available to partners. We have seen a couple of occasions where that has been identified through the SCG infrastructure part way through an incident, and suddenly the balance or the actions undertaken and needed to support that infrastructure have ramped up.

Suddenly there are secondary implications for something that was a minor incident at a level that we do not generally understand or have access to until it goes wrong. It is that understanding or that stress testing of structures: are they resilient to the external elements, do access roads flood? I understand that work is done on that, but not all partners in the LRF are fully engaged in that. I think there is some local knowledge and local awareness that could benefit from a more open conversation.

**Q29 The Chair:** A very quick practical point occurred to me earlier in these conversations. There was a reference earlier—it might have been from you—to the best thing to do in a crisis being to pick up the phone. Are there protocols that tell you when you should do that, or does it just rely on the common sense of individual officers?

**Stuart Marshall:** In all honesty, it is a combination. We have protocols set down, but before that there are text messages and contact is being made: "Are you seeing this?. We are looking at setting this up. What are your thoughts on this?" The protocols are almost there as a fallback to make sure that action happens, but hopefully in advance of that those networks are being utilised. We have seen it work quite effectively where senior officers within the three north-east LRFs have quickly got on the phone and set up regional co-ordination groups rather than tackling something individually.

John mentioned some of the partners. One of our partners covers seven separate police force boundaries, so there are potentially seven SCGs on call that you need to feed into. Having a single regional or two regional meetings can seriously benefit that. There are protocols, but there is sometimes the need to adapt and flex, based on the situation at hand.

**The Chair:** Thank you.

**Professor Jim Hall:** If I may, I will come in on a few of the points that have been discussed over the last few minutes. The first is on national and local co-ordination during emergencies. One instance is flooding, which is the largest climate risk that the UK has experienced. In that case, we see the Environment Agency as a national body and its equivalents in the devolved Administrations having the national co-ordinating role. I advised the EA in particular during the 2013-14 floods when a Science Advisory Group for emergencies was convened. There was the capacity there to provide expert insight from flooding and meteorological science as the events were unfolding on the ground. That might be an instance worth thinking about in the context of other types of very widespread disaster.

The second point was the extent to which, particularly with water, the asset management follow up on events when they happen. In particular, following the introduction of the duty of resilience on water supplied in the Water Act 2014, there has been much more of a focus on resilience, and the National Infrastructure Commission, which you heard from at the last hearing, has advised on a standard of resilience for the water utilities. I think that is providing a long-term focus on enhancing resilience across that utility.

There is the very good point about follow-up on stress tests and exercises. First, at a national scale there is not yet a systematic and agreed set of protocols about how and when it is next decided that stress tests should take place. That is absolutely fundamental, and perhaps there should be a bit more like the unexpected Ofsted inspections to really stress test the system. Then, as I think you are suggesting, there needs to be a very systematic approach to following up and checking whether the lessons learned have been implemented.

Finally, I would like to add something to what Mr Marshall said about local adaptation, because I recognise what he is saying there. I do not think that is because net zero is substituted for adaptation. I think it is because

there has been less resource going into organisations like the UK Climate Impacts Programme, which has been discontinued. Local adaptation partnerships had that convening role. Those things do not exist, and I think the advice from the Climate Change Committee's Adaptation Committee, which you also heard from at the last meeting, has underlined that reduction in adaptation capacity at a local level.

**Baroness Neville-Jones:** I think what has just been said answers the question I was going to raise, so I will not raise it.

Q30 **Darren Jones:** I am interested in what holistic assessments are done at national and local level. I am conscious that today, for example, the Government have published their third climate change risk assessment, which they are obliged to do under the Climate Change Act, in which they have looked at the modelling from the Climate Change Committee and then identified resilience risks to the country.

I would assume that that type of risk assessment would then flow down into more detailed risk assessments, and ultimately down to local level. Professor Hall, does that type of risk assessment to the third climate change risk assessment trigger somebody looking at assets across the country and correlating what that risk assessment says about preparedness for potential events in the future?

**Professor Jim Hall:** The process in the 2008 Climate Change Act is that, following the publication of the Climate Change Risk Assessment, the Government, with Defra in the lead, prepares a new National Adaptation Plan. That does not necessarily imply in the way you are suggesting that people are picking up the national scale risk assessment and working out what this means for them at a local level. I think the extent to which that is taking place is rather patchy.

The risk assessment is getting better and you can see more in it, which gives more local detail, more local differentiation, so there is a lot in there for people in communities, local authorities, to begin to pick up on and work out what it means for them, but there is no formal process in place for that direction to take place.

**Darren Jones:** Is it a risk assessment that is just done and put on the shelf?

**Professor Jim Hall:** No, because it does lead to central government publishing a NAP. Then the Climate Change Committee reports to Parliament on how well it thinks the Government are doing in implementing the NAP. You can read those progress reports for yourself, but latterly they have been quite critical of how much progress is being made on a number of key climate-related risks.

**Darren Jones:** John Hetherington, when you are working with your local authorities in London, do you look to these types of risk assessments, like the climate change risk assessment, to identify the types of issues that you might need to prepare for, as opposed to coming together in response to an actual incident or emergency?

**John Hetherington:** We are very much driven by the local risk assessment guidance, which looks at the outcomes as opposed to the causes. Climate change is given due regard in our risk assessment as one of the causes of it, but we assess the risk, moreover, of the severe weather: the extreme rainfall, the storms, gales, heatwave or cold weather.

**Darren Jones:** Would it be helpful to you if somebody translated the climate change risk assessment into outcomes that your body could then work to?

**John Hetherington:** Absolutely. I do not think they would be a million miles away from what we have, but anything to support that interconnectivity would be very useful.

**Darren Jones:** What makes you think that it would not be far from what you have already?

**John Hetherington:** We have risks for utility failures. We have the risks of severe weather, increased flooding, heatwaves, cold weather, storms, and so on. The space that it might come into is the more social risks for people, but that is a wider range of work that the LRFs might look to in the future.

**Darren Jones:** I ask, because in connection with Storm Arwen, the Business Select Committee, which I chair, was told that the resilience planning had been based on prevailing winds coming from a certain direction, but Storm Arwen led to wind coming from an unexpected direction. The climate change assessment would say that stronger winds were a risk, so what I am trying to identify is whether these national assessments are translated into something meaningful at local level or not and who checks that? Do you check that, Mr Hetherington, or does someone else check it?

**John Hetherington:** Our risks are not generally as specific as which way the wind would come from that caused the damage. We would have the risk of storm damage as a result of wind, but it would not necessarily be as detailed as which way the prevailing wind would come from and therefore what the exact impacts would likely be, which, as Mr Marshall said earlier, is why the real difficulty in those early stages of an incident is understanding the extent and the impact of what has actually happened.

**Darren Jones:** Mr Marshall, it would be useful to know how the infrastructure companies in your particular area share information with you, because, as I just put to Mr Hetherington, infrastructure companies make assessments of climate change risk and make certain assumptions. In the example I gave that included a particular direction of strong wind, somebody was translating it at that level of detail. When the companies do these assessments, do they share them with you as a local resilience forum?

**Stuart Marshall:** To a point. They have always been very proactive where we have asked for more information, and this probably goes back to the earlier point about our two-year outlook. We have had discussions. I suppose the example for me that tied in was about the sea-level rise and the suitability of flood defences going forward. The Teesside area is a very heavy petrochemical industrial base, and some of those sites are protected by and reliant on flood defences.

We know that as the sea level rises the potential for an inundation like 2013 will also increase, so there has been that discussion. It is not comprehensive across every climate-related risk and sector. That was the example that stood out. I know colleagues in the power industry are looking at temperature rises. They have undertaken work on ensuring that substations' equipment has been increased, again with modelling on sea-level rise and the potential for flooding, so we are seeing elements of that.

One of the issues we have is the amount of resource as well as mandate. I understand that our local risk register currently has about 120 separate risks on it. We have a team of four principal emergency planning officers to work through, train and plan, and there is a large requirement to try to get that golden thread from national doctrine down to local and sub-LRF level. That is a challenge for which we are not resourced and do not have a mandate for. Our current set-up is towards that two-year outlook.

There are discussions where something is highlighted by partners as a risk. We can ask for further information, and generally the industry is supportive about it is doing about that particular concern, but there is no comprehensive methodology or ownership of that at local level.

I think it goes back to the multisectoral question about climate adaptation at a local level. We are seeing the utilities—water and electricity—work more closely together on what climate adaptation might mean for them. We are not necessarily seeing that being joined up to local authorities, health providers and others as to what the collective picture for Cleveland is as a whole. It might be different in other areas.

**Darren Jones:** It might be helpful to you if a central government department or a regulator had the mandate to require the owners of critical national infrastructure to do their own assessments, in line with these national risk assessments, and then to provide you with all the pieces of the puzzle so that you can piece together the fact that you have power, water, telecoms, maybe some heavy industry, and then you can plan based on the information that is provided to you.

**Stuart Marshall:** A huge amount of resource is going into comprehensive understanding of how the different elements and risk assessments fit in across sectors and whether people are using the same baseline. That is not currently the LRF's remit. It is not our mandate. We are not resourced for it, and I do not know whether it might be detrimental to what LRFs do to increase the remit to that level. The

question from my side is: who is doing it at a local level? I am not sure that we have the answer.

**The Chair:** If it is not your remit, whose remit is it?

**Stuart Marshall:** Absolutely.

**The Chair:** A good point.

Q31 **Baroness Healy of Primrose Hill:** My question is for both Mr Marshall and Mr Hetherington. Thinking about your local infrastructure and extreme weather, have there been any near misses that concern you and that you could reveal to the committee? Mr Marshall, you have spoken about tidal surges. Is that one of the things that you are most worried about?

**Stuart Marshall:** Yes. we have 120 risks on the risk register. To me, there is a danger with the model risk assessment that we undertake if we put things into boxes, into silos. A lot of the incidents that we deal with have been far more complex than that. During the tidal surge that I mentioned, yes, there was flooding, but there was also a power outage because a substation was impacted, and I understand that three petrochemical sites were also impacted. Those sites are not necessarily designed to be flooded and operational. Their design spec did not consider lateral loading, the pressure of water on tanks and the potential for lift.

I think we are seeing a greater recognition of it not just being flooding—not just this, not just that. There are a number of outcomes, and scenarios tend to be more complex. As we see more reliance on remote infrastructure, there has to be consideration of where networks run, and trying to unpiece that can be quite problematic. It is way beyond our current resource to start to unpiece what it means for somewhere down the line if something impacts further up and if the network is operating in a certain way on a certain day.

My general feeling is that there is benefit in doing a risk assessment, but, thinking about John's point about capability, are we match fit to deal with this, this and this? The requirement to deliver water while there is a comms outage suddenly becomes a lot harder than just delivering water. It is getting more and more complex.

Q32 **Baroness Healy of Primrose Hill:** Thank you, Mr Marshall. Mr Hetherington, as a Londoner I was aware of the latest flooding, the impact it had on housing and how the local authorities deal with that. Could you also talk about any near misses, when the situation could have been worse?

**Stuart Marshall:** I think there were more actual events than near misses. One near miss that springs to mind and which demonstrates the interdependencies is the August 2019 lightning strike. Two simultaneous power supplies responded as they should have done and went into a failsafe mode so that they did not trip a larger, wider power outage, and

we saw that very short power outage into London that had quite impactful events on the rail industries. A number of the new types of locomotive tripped their own systems with that instantaneous power failure and required engineer restarts.

Through some events like that, we are starting to see the dependencies and some of the unknowns coming into play from quite small events. I understand from all the reports that came out that the power response was absolutely the right one, and that it was understood and intended that the network would respond to save the wider network—almost like a fuse tripping; that is how I would put it in my own layman’s head—but we saw those wider cascading impacts on the travel network and the wider understanding of the incident.

**Q33** **Baroness Neville-Jones:** I would like to tackle another area. Who is responsible for what and what are the potential consequences?

At our last evidence session, which I think some of you may have listened to, witnesses told us that they thought that there was a poor understanding of the interdependencies between different parts of the infrastructure and a lack of clarity about who owned them: for example, that there is the risk that one infrastructure failure will lead to another.

My question is perhaps directed initially to Professor Hall. What do you think the Government should be doing to address this? How far do you think they are addressing it, and what more do they need to do? Perhaps Mr Marshall and Mr Hetherington might talk about the extent to which they feel able to be active in and successful at stress testing the independencies at the local level. It is clear that this is increasingly an area of preoccupation and a difficult one. I would be interested in your reflections on it.

**Professor Jim Hall:** I think what you have said is right. Independencies are one of the trickiest aspects here, in the sense that individual utility operators understand their own networks pretty well, but they have a less clear picture of the networks upon which they depend.

What can and should be done about that? One aspect is information sharing and establishing whether the right information-sharing arrangements are in place. The other witnesses may wish to comment upon that. If they are not, is this because of a lack of time or resources? There may be security concerns—or indeed commercial concerns, because a number of these are private regulated companies—that are getting in the way of information sharing.

The other thing that can be done is to develop a system-of-systems perspectives. This is something that we do in my research group at the University of Oxford. We develop system models that couple together the power network, the water networks, telecommunication, transport, road and rail. Those types of models are never perfect. We are not directly responsible for any of those systems, so we do not have the best information that there can be.

A system-of-systems perspectives provides you with a shared platform, which all the different system operators can get around, develop a shared understanding of, and use as a basis for understanding where the critical interdependencies are where they ought to be sharing more information. In particular, it is where they can develop a sense of priority, because when you start talking about interdependencies, you can very quickly end up with a very long list of them and begin to worry about where to start.

It is only when you begin to analyse them and do the numbers that you get a sense of which these are absolute priorities that we must get right.

**Baroness Neville-Jones:** You have made a number of penetrating comments on the sort of approach that one could adopt to start getting at this issue. Are the Government doing any of this, and are they doing it effectively?

**Professor Jim Hall:** As you will have heard from Sir John Armitage at the last hearing, the National Infrastructure Commission did a study of the resilience of national infrastructure that made use of some of the analysis done within my group. Also, within the Climate Change Risk Assessment, there is some analysis both of infrastructure sectors and of their interdependencies. Those are the parts of government that, in my experience, are paying the most attention to interdependencies.

This surfaced in the 2016 National Flood Resilience Review, which was led out of the Cabinet Office. At that point, questions were being asked by the Cabinet Office about infrastructure interdependencies.

**Baroness Neville-Jones:** Do you agree—I think it was Sir John Armitage who said it—that there was a poor understanding of interdependencies between the different parts of it. Do you agree with that judgment? It does sound as if there are ways in which you can do this, but there is a long way to go in reality.

**Professor Jim Hall:** Yes. This will never be perfect, so it depends what one's judgment of poor is or is not, but certainly one could do better.

**Baroness Neville-Jones:** How does it feel at the coalface?

**John Hetherington:** I completely agree with that statement. We have been wrestling for a long time with how to properly understand those interdependencies. From 2013 onwards, we introduced a system of systems perspectives that was similar to, but probably a lot more crude than, Professor Hall's. We have an "any town" approach where we look to thematically map the primary, secondary and tertiary interdependencies or consequences by sector as a result of a utility failure, but this is quite a crude, first-pass understanding.

As the world becomes ever more complex and ever more reliant on new technologies—switching valves, the reliance on PSTN networks and how they will be switched off, greater reliance on the internet to drive remote gauges, modelling, understanding of different networks—it becomes very complex. We in the LRF are jacks of all trades and masters of none, to be

crude about my fellow professionals. We have to be across every incident that may occur, so we do not have the time, resource, understanding, expertise or knowledge to look into any of these in real detail to truly understand them.

The phrase goes, "It's not in the plan. It's in the planning". The step before that is trying to understand exactly what may happen, and that is the territory that we are still largely in: trying to understand what some of these impacts will be and then to have the networks and the understanding of who has what resources that we can bring to bear and respond to at the actual times of an emergency. I certainly agree that it is fairly rudimentary, and that a lot more work needs to be done on it.

**Baroness Neville-Jones:** I can see that there is a capacity issue for you in local government, but is it also simply a question of the complexity of the issues involved—common sense tells you that this is a complex area—or is it also or mainly an issue of attitude, of people being willing to come to the table and lay out where they see the problems and where they may be aware of their own internal weaknesses? You probably have to level up with quite a lot of honesty when you start getting into interdependencies. A lot of this lies in the private sector, so do you get co-operation?

**John Hetherington:** We do. It would probably be fair to say that there is a mixture of all three there. Sometimes it is not deliberate disinformation, misinformation or lack of information. It is simply—I would not even say a lack of imagination—a lack of understanding of the sheer dependencies, of just exactly how dependent other agencies are on a function that somebody else delivers.

**Baroness Neville-Jones:** Yes, I understand that. Mr Marshall, what has your experience been?

**Stuart Marshall:** It is similar to John's. We know it is an issue. We have tried to map out across our area what it means for us and seek assurance where we can about things like what the loss of power means for the petrochemical industry. In the event of a shutdown, what impact or concerns might we see among the public as a result?

The trouble is that the more questions you ask, the more questions you need to ask, and it becomes ever more complex; Professor Hall made the point about where we are going with this, the huge stack of problems, and what we can do as an LRF when we do get those problems. There would be benefits in looking at some kind of standard toolkit, similar to John's "any town", where as LRFs we can build in our experiences from perhaps more localised incidents and start to build a comprehensive bank of considerations.

In our experience, the loss of power resulted in the loss of water, sewerage, traffic lights and the ability to secure premises, which then led to staff concerns and demands on 999 and so on. That comprehensive mapping out of what the likely impacts could be is far too big a task for

an LRF, and there is a lot of potential learning from elsewhere. Talking about the larger incidents, a huge amount of learning came out of the States and the blackout on the east coast. We can take some of that learning and start to drill down to an LRF level to see whether something is relevant to us and what we can adapt from it. Things tend to be on an LRF case by case basis, in my experience, rather than a comprehensive national effort to improve resilience.

**Baroness Neville-Jones:** You think there is quite a big function for government there at a national level.

**Stuart Marshall:** At a national level, yes, whether it is government-led or government-facilitated. I think it can be looked at, but there is a void there that could be filled once for the 36 or 37 LRFs, rather than us all trying to do it ourselves.

**Baroness Neville-Jones:** Professor Hall, do you feel that this is an area that the committee could usefully pursue in order to try to get the game raised?

**Professor Jim Hall:** Yes. I think there are opportunities. I think Mr Jones referred to the possibilities of downscaling the Climate Change Risk Assessment. The CCRA is becoming more spatially resolved, and there are opportunities in science and in modelling eventually providing quite detailed information everywhere, but it also needs local input to verify it and add local credibility.

There are opportunities to combine some of what is going on in the analysis of national networks and what the national-scale utilities are doing and to customise that at a local scale. That could be done without an impossibly large amount of effort.

Q34 **Lord King of Bridgwater:** Just in passing, I notice that we have a rather east-coast preponderance here. As an ex-West Country MP, whose constituency included the Somerset Levels and the Hinkley Point nuclear power station, and reading in our briefing the talk about the increased risk of compound flooding for Cornwall, Devon and the Bristol Channel, I do not think we need too much warning about that. Certainly during my time as MP we had complex flooding a number of times, even before global warming had really got under way.

What has come out of your evidence is that although there are different critical national interest infrastructures, electricity is absolutely at the core of everything: communications, pumping facilities, the internet system. The whole of your operations in your local resilience is dependent upon electricity and good communication. There is a statement in our evidence that says that there needs to be increased political awareness of the high impact of major blackout and the inadequate measures currently available to restore the network to all parts of Great Britain in acceptable timescales. Individually, and from your own professional experience in each area, do you think that is an accurate criticism?

**Baroness Neville-Jones:** It took a long time with our one, did it not?

**Professor Jim Hall:** Yes. The so-called black-start scenario where all the grid goes down and then power is required to restart it deserves a great deal of attention.

**Lord King of Bridgwater:** Yes. You cannot do it. Is that right?

**Professor Jim Hall:** You have singled out electricity. Alongside electricity, I would add telecommunications. On the one hand, as telecommunications operators will point out, there is a lot of redundancy in the telecoms network; it is multiply connected. None-the-less, there are also dependent single points of failure within that network. How vulnerable that network is, the circumstances in which the telecommunications on which all these other critical national infrastructures depend in the same way as they depend upon electricity, is not fully understood.

**The Chair:** I do not want to rock the boat in any way, but I have heard it said that if water and sewage go down, civilisation is over in about three days, but I will let that lie. Mr Marshall and Mr Hetherington, do you want to add anything?

**Stuart Marshall:** In terms of planning, it is fair to say that there is a national effort under way to look at a national power outage. There have been instances globally, and instances of power outage nationally, which have identified some gaps. We know that with Arwen there was a significant amount of time and a number of problems that fell out of that are still being debriefed on. For me, one of the significant issues is the national and local planning and communication around that. There is only so much that we can do at a local level. We are not going to have access to the National Grid. We are not going to have that information fed through to us as individual SCGs without going through to national.

**Lord King of Bridgwater:** You would agree that there should be increased political awareness of the problem.

**Stuart Marshall:** We need the assurance that we are as match fit as we can be for the risk, which is a recognised risk.

**John Hetherington:** I agree. The increased political awareness of the risk is one of the risks that keeps me awake at night. The consequences would be quite catastrophic.

**Lord King of Bridgwater:** Do you think the others with whom you work at top level think they have done enough?

**John Hetherington:** To follow on from Mr Marshall's point, I think we need to step away from risk assessment through joint methodology and really embrace a joint risk management approach to where the mitigations are taking place and to the pre-warning of the population—warning and raising this risk not only to political levels but to the general public—so that people understand what they are potentially facing and how they can support themselves in the first instance so that public

sector organisations and the national effort can look after the vulnerable persons who will need the support most.

**Lord King of Bridgwater:** Thank you very much.

Q35 **Lord Laming:** A quick question. Our witnesses will know that the House of Lords Risk Assessment Committee concluded that the LRFs do not have sufficient contact with the Civil Contingencies Secretariat and are not viewed by government as trusted partners in the risk management process. Do you agree with that?

**John Hetherington:** We recognise that we do not have a direct link into the Cabinet Office, but we do have a link through the Department for Levelling up, Housing and Communities, which is our one-stop route into central government and serves us very well as local responders. We need to move towards joint risk management, both at the local and the national level, and possibly even get rid of those terms and just work out at what point within the entirety of the government structure the resources and capabilities are best galvanised and delivered, and work more cohesively together.

We are certainly a trusted delivery partner, and that has shone through the engagement as a result of the Civil Contingencies Act review which the department undertook recently. I think LRFs are viewed as trusted partners within central government in terms of delivery, but prior engagement on a number of actions perhaps still requires further work.

**Stuart Marshall:** I support that. Risk-assessment issues have been identified and raised with the committee. One that stood out was that a lot of the information comes from the centre and is assessed locally, but that assessment sometimes does not go back in and repopulate, get recognised. That, combined with the capability elements, means that at the local level we only have resource to meet this level of scenario. It is not necessarily fed back in and understood.

Therefore, rather than taking it step by step, we need more of a risk management approach to risk and capability—that sort of two-way flow of information. Ideally, learning from incidents is also needed. Anything that can improve what is already quite a robust information flow would be of benefit.

**Professor Jim Hall:** I would add to Mr Marshall's point about the two-way flow and whether the National Security Risk Assessment contributes to the national risk register at the moment. I sat on a Royal Academy of Engineering group that has recently made some recommendations about the NSRA. The first recommendation, by the way, is how unhelpful our categorising of risks in terms of likelihood and consequence often is. Secondly and more significantly, there is the need to focus much more on preparedness as part of the NSRA—so not just how big the risk is, but how ready we are for it. Questions about preparedness would be a very good basis for more of a dialogue with local resilience fora.

Q36 **Sarah Champion:** John, the Government set out a bold vision for their

forthcoming resilience strategy. Building on what you said in your previous answer, do you expect the strategy to devolve more responsibility and accountability for resilience to a local level, and, if so, what would you need to see in place to make that happen?

**John Hetherington:** Sorry, Chair, if we have time could I just give a quick example in answer to Lord Laming's question that might be useful?

**The Chair:** It is okay with me, if it is okay with everybody else.

**John Hetherington:** Sorry, and then we will come back to the question.

A real example of the two-way dialogue that Mr Marshall spoke about is the fuel shortages that we had earlier in the year and the expectation that local responders will have 10 days' bunkered fuel stocks ubiquitously across all agencies. That is simply not the case. We as local responders have made that case many times over a number of years, yet the answer comes back, "We've told you that we expect you to have 10 days, so you should have 10 days". That is an example of where we need to have a more constructive dialogue, because there are very good reasons—land-use purposes, for example, or just economic reasons, or the way in which services are constructed—for why that just is not possible for all cases. That serves as an example of how the two-way dialogue about the actual risk and what we are expected to have in place at a local level could be improved.

Sorry, could you remind me of your question?

**Sarah Champion:** Do you hope, do you believe, that the forthcoming strategy will devolve a lot of responsibility at a local level, and what would the Government need to do to enable that to happen?

**John Hetherington:** I do not necessarily hope that the responsibility will get devolved to the local level. Rather, I hope that, through the assessment of risk, we translate that into joint risk-management and hold the risk at the appropriate level. There are some places where risk is better held, or better resourced, at a national level, and there are some places where it is best done at a local level.

A simple greater devolvement to the local level would be too blunt an instrument. We need to be far more nuanced in how we look at that, and we need to look across the range of the risks that Mr Marshall spoke about, because we have a wide variety. The repatriation of UK nationals is not a suitable risk to hold at the local level, because we just do not have the levers, the policy adaptation or the resources to influence that. That is better held at a national level, where we can supplement and support appropriately if we are engaged in the proper planning.

**Sarah Champion:** Jim, what would the ideal division of responsibility be between national and local government in relation to CNI?

**Professor Jim Hall:** It has to be multiscale, because a lot of what we are talking about here are national networks that are understood and run

at national scale. None-the-less, as we heard, when disasters occur a lot of the action is expected to be made to happen by local responders, so it is not an either/or. It is to do with how one puts in the right multiscale approach.

**Q37** **Baroness Neville-Jones:** On information, particularly the national risk register, there have been comments that national government does not actually filter down enough information and could be much more open with the national risk assessment. Do you feel that you lack information when you are trying to perform your roles, or do you feel that you get enough? Perhaps this is a question for those at the local level, because this really applies to whether you are starved of relevant information or whether you feel that you are adequately supplied with the detail of a risk assessment.

**Stuart Marshall:** It can vary very much, depending on the risk and the lead department. In some areas, we have an abundance of information. In others, it is very thin and leaves a lot to local interpretation. One example is space weather undertaken nationally. What does it actually mean at a local level? Some localised planning assumptions or reasonable worst case scenarios developed nationally that we could apply and adapt would be useful, rather than us taking a broad statement, sitting around a table—none of us being experts in the field by any means—and trying to work out what it means for local service delivery and local consequence management.

I know that when we have asked for further information, DLUHC and others have gone out of their way to try to provide additional information. Sometimes we come up against barriers, which can be for a host of reasons, including security and confidentiality between operators, or because information is just not there or is not within their gift to provide. It varies.

**The Chair:** Mr Hetherington, you are nodding. I take it that means it is basically true for you.

**John Hetherington:** Yes. I have never come across a wilful holding back of information. It tends to be more that it just does not exist or it is difficult to translate it into a local parameter for us to use in a meaningful way.

**Q38** **Lord Strasburger:** This is a question where I give each of you a one-use-only magic wand. Setting funding aside, if you had one key ask of central government in order to improve local support for climate adaption and critical national infrastructure, what would it be?

**Stuart Marshall:** From my side it would go back to the clarification of expectation and methodology for local and regional levels. Previously, we had adaption plans in place. The resourcing behind those may have tailed off. The kind of clarity provided by, "Right, this is the product. This is the methodology. This is the lead for it", would provide benefit across a number of agencies and a number of fora.

**John Hetherington:** It is almost as if we planned this together, but that is exactly what I was going to say: a realistic review of the expectations, both of LRF and other structures locally, and the appropriate resources to meet those expectations would be really useful.

**Lord Strasburger:** Professor Hall, you may have a different perspective.

**Professor Jim Hall:** I would start with a very clear set of responsibilities and organisational capacity centrally within government, but part of that would be an information platform, a set of mechanisms for information sharing and support that would cascade down to the local level.

**Lord Strasburger:** Thank you very much.

**The Chair:** Thank you very much, everybody. Thank you all for your patience. There may be the odd more detailed thing that we would like to follow up with you in writing. I hope that will be okay. In the meantime, thank you all very much for your evidence. It has been a very interesting session.