

DÁIL ÉIREANN

AN COMHCHOISTE UM CHOMHSHAOL AGUS GHNÍOMHÚ AR SON NA HAERÁIDE

JOINT COMMITTEE ON ENVIRONMENT AND CLIMATE ACTION

Dé Máirt, 22 Márta 2022

Tuesday, 22 March 2022

Tháinig an Comhchoiste le chéile ag 11 a.m.

The Joint Committee met at 11 a.m.

Comhaltaí a bhí i láthair / Members present:

| Teachtaí Dála / Deputies | Seanadóirí / Senators |
|--------------------------|-----------------------|
| Richard Bruton, | Lynn Boylan, |
| Réada Cronin, | Pauline O'Reilly. |
| Cormac Devlin, | |
| Alan Farrell, | |
| Darren O'Rourke, | |
| Christopher O'Sullivan, | |
| Bríd Smith, | |
| Jennifer Whitmore. | |

Teachta / Deputy Brian Leddin sa Chathaoir / in the Chair.

Energy - Ambition and Challenge: Discussion (Resumed)

Chairman: Today the committee continues its series of sessions on energy broadly, the wider ambition we have and the potential, opportunity and challenges we have in the area. We are thinking bigger than our domestic opportunity but also the international dimension. Today we will discuss offshore wind, floating and fixed, east coast and west, and the supply chain and logistics development as well as green hydrogen development. The first session is with Shannon Foynes Port Company. I welcome Mr. Pat Keating, chief executive, and Mr. Jerry Hallissey, head of business development, and thank them for coming before us to discuss this critically important topic.

Before we begin, I will read out the note on privilege. I remind witnesses of the long-standing parliamentary practice that they should not criticise or make charges against any person or entity outside the Houses by name or in such a way as to make him, her or it identifiable or otherwise engage in speech that might be regarded as damaging to the good name of the person or entity. If their statements are potentially defamatory in respect of an identifiable person or entity, I will direct them to discontinue their remarks. It is imperative they comply with any such direction.

Members of the committee are reminded of the long-standing parliamentary practice to the effect that they should not comment on, criticise or make charges against a person outside the Houses or an official either by name or in such a way as to make him or her identifiable. I remind members that they are allowed to participate in this meeting only if they are physically located in the Leinster House complex. In that regard, I ask all members joining us online to confirm, prior to making their contribution to the meeting, that they are on the grounds of the Leinster House campus. A number of members joining us online from their offices.

I invite Mr. Keating to make his opening remarks.

Mr. Pat Keating: I would like to thank the committee for inviting me to present today to discuss accelerating and achieving the full potential of Ireland's offshore wind resource, supply chain logistics development and green hydrogen, with a view to providing Ireland's needs but also contributing to the European and global demand for clean energy.

Shannon Foynes is Ireland's largest bulk port company and has statutory jurisdiction on the lower Shannon Estuary covering 500 sq. km. With channel depths of up to 32 m, it handles the largest vessels entering Irish waters and has capacity to handle more than 11 million tonnes per annum. Its activities have a trade value of €8.5 billion per annum supporting 3,900 jobs. It is noteworthy that both EU and national policies, including the national development plan, endorse the strategic importance of Shannon Foynes Port Company. Shannon Foynes is a tier 1 port of national strategic importance under national ports policy. In addition, under the EU's TEN-T guidelines, two of its core corridors, the Atlantic and the North Sea Alpine, have been extended to include Shannon Foynes. To date, Shannon Foynes has made several funding applications under the TEN-T funding budget, known as the Connecting Europe Facility, receiving grant aid of around €10 million supporting studies and works of more than €40 million. Importantly, the Shannon Estuary has a number of sites, extending to a total of 1,200 ha., ad-

joining deepwater zoned for maritime development, making it ideally suited for future national port infrastructure of scale for this country.

To fully realise these comparative advantages, expansion and development of the port is led by its 30-year master plan, Vision 2041. We are currently updating Vision 2041 to holistically plan for the future port infrastructure required to support Atlantic offshore renewable energy, ORE. Shannon Foynes has identified the following core growth areas in our strategic plans: establishing the Shannon Estuary as an ORE hub for supply chain location for floating offshore wind; facilitating alternative fuel trans-shipment and production of hydrogen and ammonia, for example, on the Shannon Estuary; establishing a logistics hub and global trans-shipment facility at Foynes for intermodal or unitised cargoes or both; organic growth; and implementing the Limerick docklands strategy.

The first two core areas are relevant to today's meeting and, accordingly, this presentation will focus on those areas. Due to our proximity to the Atlantic wind resources, considered the best in Europe, and quantified at up to 80 GW, our objective is to develop the Shannon Estuary as a marshalling and operations and maintenance port. Large-scale port infrastructure, together with associated supply chain infrastructure, is required if Ireland, and indeed Europe, is to meet its climate action targets by 2030 and reach net zero by 2050. The scale of industrialisation required to achieve this goal should not be underestimated. For example, commentators estimate that more than €100 billion of floating wind farm investment could be accommodated in our exclusive economic zone, EEZ, over the short, medium and long term. To enable this potential offshore investment of €100 billion, Shannon Foynes commissioned a report that found €12 billion in supply chain investment will locate in its harbour, the Shannon Estuary, by 2050.

To facilitate this investment, our plans include the development of an ORE assembly and marshalling facility at a new Foynes deepwater terminal. It is estimated to cost €350 million and to be completed by 2028, thereby enabling the deployment of floating wind projects by the end of this decade. Allied to the ESB's ambitions for Moneypoint, this will mean two large-scale facilities will be fully operational in the Shannon Estuary by 2030. The update of our master plan, Vision 2041, will be completed by quarter 3 of this year, and it covers the entire Shannon Estuary. This update will provide a collaborative roadmap of the ORE requirements for the duration of the plan. Encompassed in the plan as well is identification of port connectivity requirements for the ORE industry, including the completion of the Limerick to Foynes road scheme, the reopening of the Foynes to Limerick rail line to connect the port with the national rail network, consistent with Irish Rail's Rail Freight 2040 Strategy, the upgrading of fibre-optic connectivity to support large-scale supply chain requirements, and the identification of offshore grid connectivity points in the Shannon Estuary. An enterprise hub at Shannon Foynes for the co-location of the ORE supply chain on the Shannon Estuary is also included in the plan, as is an educational cluster to support an industry-led research and development working group, and a curriculum working group, facilitated by the universities. This cluster will focus on developing the next generation of talent and skills for the sector within the Shannon Estuary. Relevant stakeholder engagements will also form part of the plan.

Considering the distinct competitive advantage of Ireland's Atlantic floating wind resources, Ireland has the potential to produce significant amounts of green hydrogen. Now more than ever, there is a case for Ireland to increase its floating offshore wind ambition and to accelerate a green hydrogen industry to support national climate action objectives. Ireland needs to act fast to ensure the potential is captured, and the Shannon Foynes Port Company believes supporting floating wind as part of the phase 2 designation process is critical to this.

Shannon Foynes is implementing its plans to support the growth of floating offshore wind and green hydrogen production and understands from the sector that it is imperative the scope of phase 2 is broadened beyond grid-connected offshore wind; that at least 10 GW should be reserved for a competitive floating preference category in the marine area consent, MAC, process; that the route to market is progressing fast for green hydrogen and alternative fuels derived from floating offshore wind; that Ireland needs to act fast to ensure the hydrogen and alternative fuel export opportunity is realised, and the prioritisation of a hydrogen strategy for Ireland is central to this; and that financing avenues for ORE-related port infrastructure could and should be refined further.

I thank the committee.

Chairman: I thank Mr. Keating for his statement. This part of the meeting is confined to one hour, so I propose that each member of the committee takes two minutes to address questions to the witnesses. That will ensure we get through all the questions. We may then have time for a second and third round of questions.

When we talk about the west coast offshore potential, we are really talking about Ireland starting to play a role in providing clean energy for Europe and the global market. Given the crisis we have in Europe, it is all the more pertinent now that we figure out how to do this as quickly as possible. We organise these sessions thinking very much along the lines of our climate obligations, but what is happening in Ukraine now and the resulting energy security crisis has put our work centre stage. It is a coincidence the witnesses are here today because this meeting was scheduled before things kicked off in Ukraine. Nevertheless, though, the presence of Mr. Keating and Mr. Hallissey is very timely, as was the attendance of our witnesses in previous weeks and as will be the appearance of our other witnesses in the weeks to come.

Will Mr. Keating and Mr. Hallissey talk about the bigger opportunity in this regard? Shannon Foynes will play a role in bringing in energy from offshore wind resources to Ireland to meet our own needs. Our witnesses have forged a vision and a path that looks to that bigger scale of development that is possible. We used to talk about this aspect as a post-2030 opportunity, because that was what we used to see as being the realistic timeline. With everything going on now, though, not least the climate crisis but also the energy security crisis, it seems we need to accelerate and expedite the existing potential. Shannon Foynes Port, along with the Port of Cork, will play a crucial role in realising this endeavour.

Will the witnesses speak about this larger perspective and what is required to realise the potential in this regard? I note Mr. Keating stated in his concluding remarks that it was “imperative the scope of phase 2 is broadened beyond grid-connected offshore wind”. He is talking about producing green hydrogen and ammonia, offshore or onshore, not for conversion to electricity here but for transport overseas. It is an interesting and exciting idea. Perhaps Mr. Keating can speak to this bigger opportunity and say how realistic he thinks it is, how quickly he considers it can be achieved and what needs to be done to achieve that outcome.

Mr. Pat Keating: Looking at the scale of the resource, at 80 GW, and considering the current grid size demand in Ireland is approximately 5.5 GW, that is less than 10%. What we have is a huge natural energy resource that is too big for local demand in the Irish market. It is therefore a pan-European play. The question we need to ask ourselves as a country is how we can bring that 80 GW into play and assist in decarbonising not only our own economy but also that of Europe, while also feeding into security of supply. We must start from that point and then look at whether our approach is conducive to unlocking the full 80 GW right now. The answer

is it probably is not. We have geared the unlocking of our offshore resources based on looking at local Irish demand, while perhaps forgetting the elephant in the room of major European demand. If we look at it from a pan-European perspective, it brings more urgency to unlocking the resource. Perhaps some of this has been lacking to date. We are looking to increase the pace of the processes that are being implemented. No one in the industry has any issue with the processes that are being adapted or modelled, only the pace of implementation. A sequential approach is being taken to unlocking our offshore renewable resources to meet the 5 GW target by 2030. This is based on local demand but, in our view, it is inconsistent with where the sector is going, that is, floating offshore. In Scotland and elsewhere in the UK, the industry is moving apace. It has ditched the sequential approach and is considering going straight to floating. In Scotland, two thirds of applications are for floating - 74 applications, with the 16 successful applicants paying option fees of £700 million. This is the type of initial revenues that can be generated.

The Shannon Foynes Port Company has one of Ireland's other great resources, namely, the Shannon Estuary and its deepwater portal areas. We have our natural 80 GW resource side-by-side with the deep waters of the Shannon Estuary. They go hand in glove. One of the key criteria for unlocking the resource, apart from getting our strategic planning and our consent process right, is having sufficient deepwater port infrastructure to enable the deployment of the offshore floating wind farms in the first place. The scale of industrialisation in this context cannot be underestimated. If we are looking at 80 GW over the long term, it means an investment of €100 billion in today's money. Our report has shown that, in order to install a supply chain to support that investment, up to €12 billion will be required up to 2050. In referring to the supply chain, we are talking about facilities to build out the various components for the floating wind farms. Proximity is important because that electricity will have to compete at auction. The levelised cost of energy, or the cost of production of that electricity, is important. Therefore, the closer one's deepwater port infrastructure is to one's wind farms, the better. It cuts down on the transport costs of large-scale devices. In order for the Shannon Estuary to play a role, we need to ensure that we have the appropriate deepwater facilities to provide the location for that supply chain - fabrication yards for wind farm floating platform construction, cabling, anchoring systems, etc. The closer such facilities are to the wind farms, the more competitively and greenly we can handle the wind farms' manufacturing. This is important.

I mentioned 80 GW, but who will use it? Much of the demand for it will be non-Irish grid and could go into the production of alternative fuels, such as hydrogen and ammonia. In planning the delivery of green energy for Europe, one of the shortcomings of our current maritime area of consent, MAC, process is that it ties Irish grid connectivity to a MAC. This is not consistent if we want to develop this resource for the production of alternative fuels, given that such production does not need an onshore grid connection. This is one of the reasons we have stated that the MAC process should be opened up to floating offshore in order to facilitate investment in alternative fuel production. We have spoken to a number of interested parties, particularly from Germany. As the Chairman knows, the market is very active in the hydrogen oil space. Ireland lacks a couple of elements at the moment, although some of them are on the way, for example, a hydrogen policy. The demand is real.

We have a definitive resource in the 80 GW. It is not like oil and gas where we would have to go off, explore and spend a great deal of money only to perhaps get nothing. This resource of 80 GW plus is undisputed. We also have more than a route to market for the energy, in that there is a demand case to be made for it as well, be it local demand or export to Europe via alternative fuels. Normally in a business case, these are two of the main parts of the equation.

In this situation, they are definitive.

The challenge for Ireland is how to get there and implement. The first part of implementation is the legislative consent process, which we want changed, to fast-track floating offshore. This is important from a port perspective. To get the new deepwater jetty I mentioned, we will have to spend €350 million. Our timeline is to have planning for that by 2024 or 2025. In the later stages, we will be engaging in financing strategies for that. If auctions are not available for the market to interact and start planning for floating offshore wind farms, and if there is no definitive market out there, our infrastructure will be delayed because we will not be able to finance it. If Ireland has not opened the market for floating offshore, potentially run auctions or have a hydrogen policy strategy pricing mechanism in place, the market itself will not be able to complete its business case to develop this floating offshore. Given lead-in times of up to seven or ten years, everything will get backed up and what is widely noted as the best resource in Europe, if not the world, will become uninvestable. Consider everything that is happening - decarbonisation requirements, net zero by 2050 and security of supply issues. This resource is available to us and the technology and know-how exist now. The hurdle is how the country looks at developing this resource. The pace of unlocking the 80 GW is the issue.

Chairman: I am mindful of the time and I know that other members wish to contribute, but I thank Mr. Keating for his thorough answer.

Deputy Darren O'Rourke: I thank Mr. Keating for his presentation. I will ask two brief questions, the first of which is on ports policy. When I raised this matter with the Minister of State at the Department of Transport before Christmas, she spoke about a multi-port approach and different things being done at different ports depending on the environment. Are we in the right place with that policy? I have heard some people argue that we should designate ports and move ahead with identified ports. What is Mr. Keating's sense of national ports policy and the development of the Shannon Foynes Port?

The Shannon Foynes Port Company has identified a future role in the marshalling, operations and maintenance of offshore wind farms. Did this come on the back of some consideration by the company? Did it rule out other elements of the industry? Why did it land on this role instead of manufacturing or the like?

Mr. Pat Keating: Regarding the Deputy's first question, the Minister for Transport released an updated policy statement in December that called for a multi-port approach. He has examined extending and expanding the Connecting Europe Facility to fund future port investments in respect of offshore renewables. A multi-port approach is a good one to take. The resource is so large. To return to the scale of what is required, there is no port in Ireland that is large enough to do this alone. We are not really competing against other ports. There is room in this for everyone, given the scale. In any event, the market will examine the comparative advantages of each individual port. It will be like any site evaluation. It will include the likes of us and, potentially, the Port of Cork for floating offshore, with our deep harbours, plentiful supply of water storage, wet storage and existing deepwater port facilities. We have a supply chain that has already been built up for large-scale shipping. We have significant comparative advantage in that regard.

The funding aspect, from a ports policy point of view, needs to be refined further and there is no dispute in that regard. The Department of Transport has set up a co-ordination group among ports for the sector. The funding is one issue that relates to the time delay. For example, we know we will have to have new deepwater facilities available by 2030, and the facilities will

have to have been built before the industry starts using them. There is a timing funding gap that needs to be addressed. Ports are commercial bodies that base their investment appraisals on what is called the financial credit value adjustment, CVA. There is room to bring in a socio-economics CVA because the benefits of putting that port facility in place are broader than just those relating to the port finances. There is also the enabling of that €100 billion investment of offshore platforms. That will happen, but the multi-port approach is the way to go.

On the marshalling port question, our development and plans are guided by our master plan, which was first published in 2013. We called out offshore renewables as a potential then. Our approach is to create port facilities and we have a multi-site approach to this. It is not just Foynes but also Moneypoint and other zoned sites on the Shannon Estuary. We bring them all into play and provide a multi-site solution. In some areas, there might be supply chain fabrication yards, while other sites might have electrolyzers for hydrogen and ammonia production. That is why we are updating our master plan. We have appointed an international company, Bechtel, which is a global leader in port infrastructure development and energy development, to assist us on that and to provide a full, holistic plan for how we can sustainably develop the Shannon Estuary to accommodate this huge resource. It is about the supply chain. We will not see any wind farms on the Shannon Estuary. The supply chain will enable wind farms to develop and then we can, potentially, bring that power ashore to produce hydrogen, ammonia or alternative fuels.

Deputy Richard Bruton: I thank Mr. Keating for the excellent presentation. This is a significant export opportunity, as he rightly outlined, and it is pan-European infrastructure we are building. I have a few basic questions. Who are our competitors in respect of delivering Europe's needs in this sphere? How should the cost be shared for the development of a pan-European infrastructural project of this nature? It sounds as though Ireland has some responsibilities, perhaps in priming the pump, if I can use that phrase, and in having a grid option that will facilitate this. Should it fall on the State to deliver the construction of the significant necessary infrastructure we are talking about or should it fall on private investors, which no doubt have the capacity to build and contemplate the running of these technologies, to do so? Should there be a European-wide strategy similar to the TEN-T European-wide networks, as Mr. Keating mentioned earlier, where Europe plays a part?

If we go beyond what is a domestic need, whereby the gigawatt projection to 2030 is based on what we can provide into our own grid or through interconnectors for onward selling, will that become a significant cost on the State? Have our guests estimated the pump-priming cost faced by the State in the different elements of the strategy they are talking about?

Mr. Pat Keating: In regard to the competition, currently our main competition is international rather than domestic. For this floating offshore resource, the main competitor is currently the UK, which has two options for floating offshore up and running, namely, ScotWind and another off north Wales. The risk of those, with Ireland behind the curve by at least five or six years, is that supply chain investment will decide to locate to Scotland before Ireland. Given the scale of the investment required, even in respect of the supply chain, with fabrication yards and so on, it is probably a once-in-25-years investment decision. If we lose it, therefore, the risk to Ireland, notwithstanding the remarks we made earlier about transport, is that the supply chain will locate outside of Ireland and we will end up with a commodity resource rather than a value-added resource. We can learn a great deal from how the UK has approached this and what it has done through its crown estate and so forth.

As for who will pay for all this, I am not a pricing expert by any means but the crown es-

tate's approach has been to ask how the supply chain and the wind developers propose to build out their supply chain as part of their option process. Much can be gleaned from how the auction is set up and we can determine where the supply chain will, potentially, be located. As I said following the Minister's statement before Christmas, we should seek engagement with Europe to extend the Connecting Europe facility to include the funding of port infrastructure, which is 50% for studies or preliminary works and 30% for capital expenditure work. On the capital expenditure side, there has already been some sharing of the investment cost. There is no facility in Ireland for ports to apply to for such funding. It is through the pricing auction mechanisms that the costings can be shared.

In light of the level of bids for open auctions in the UK, and ScotWind in particular, the private sector is queuing up to fund this. The most recent auction comprised 74 applicants and there were 16 successful applicants, so it was totally oversubscribed. This is a queue of private sector money and there is a transition out of oil and gas among major companies into this space. The costs will, ultimately, be taken up by the sector but it is a question of timing. If we have to deliver large port capital expenditure in particular, we need it upfront. There is a timing issue there and the sector will pay for that capital expenditure as it consumes it over the long term. That is the funding gap we have to resolve for the ports. It is definitely doable, but it will need a bit of thought.

Deputy Cormac Devlin: I welcome our guests. I represent Dún Laoghaire, and I am sure they are very happy for Shannon Foynes Port to be a tier 1 port as opposed to a tier 2 one, given we went through that process previously. I also congratulate the Shannon Foynes Port Company on the funding it has drawn down from the Connecting Europe Facility.

Mr. Keating mentioned channel depths of up to 32 m and specifically referenced consistently floating offshore. Is any consideration being given to fixed wind farms? Is there a reason, such as cost or an infrastructural basis, for only floating being explored? In 2013, Shannon Foynes was exploring wave energy, which has not been mentioned yet. Mr. Keating might elaborate on that. He mentioned that the Shannon Foynes Port Company had commissioned a report and €12 billion in supply chain investment was earmarked. A copy of that report might be useful for committee members following on from today's engagement.

My third question relates to the other infrastructural projects mentioned in the opening remarks, which is the need for the completion of the Limerick to Foynes Adare bypass road scheme and the Foynes to Limerick railway line. Those two projects in particular are big asks and are running separately to what the port company will ultimately need. How are they progressing? Fibre-optic was also mentioned. Connectivity is obviously very important for the cluster to develop. Education was mentioned. Mr. Keating might give us an update on that. The identification of offshore grid connectivity points is crucial if we are to have floating or other types of wind farms in the estuary. What potential exists for connection to onshore grids?

Mr. Pat Keating: On floating versus fixed, we are listening to people in the sector very closely when they come to us. It is all about floating, given the efficiencies it is expected to provide and the scale it can provide. In addition, from a planning perspective, floating is further offshore. It is not on the near-shore environment so there is less interruption from leisure, fishermen and all of that. It is somewhat out of sight. All of our enquiries from the sector and the marketplace are about floating.

On wave energy, we had certain wave devices more than ten years ago. None of them really came to fruition. That technology is considerably behind floating offshore wind. We commis-

sioned a public report and we will provide a copy to the committee.

On the infrastructural projects, the Limerick-Foynes road is critical. We are a major port and maritime asset but we are connected by a secondary road. We spoke about offshore renewables and connectivity. We need to move people, machinery and goods to and from the port so we need adequate connectivity. The Deputy will have noted some of our other core objectives as regards the Irish unitised supply chain, which is bottlenecked towards the east. That road will help assist on that. We are working closely with Irish Rail on the rail line and the Rail Freight 2040 Strategy it launched last year. We are working very closely on that. A key priority for Irish Rail is not just the reinstatement of the Limerick-Foynes line but the upgrading of the Limerick-Limerick Junction line. We can balance our national supply chain through those hinterland connectivity projects as well as providing connectivity for offshore renewable resources.

I will ask Mr. Hallissey to come in on the other items the Deputy asked about.

Mr. Jerry Hallissey: That report on offshore wind is on our website but we will certainly release a copy of it to the committee after the meeting. Regarding fixed wind farms, the water depths off the west coast are not conducive to fixed base offshore. We have much deeper waters, which are more conducive to floating technology. As a result, it is the shallower waters on the east coast and the south-east coast that are primarily being targeted for fixed base.

The education cluster was set up. Engagement with industry and all stakeholders is part of what I do. It is an overall conversation about what needs to be done to bring forward and bring our ambitions to fruition. Part of the early engagement with manufacturers and developers was about the talent pool and where it was going to come from. We have not got a history of this in Ireland so it was very important, a year and a half ago at this stage, that we set up the education cluster primarily focused on the University of Limerick but with connectivity into Munster Technological University, the Technological University of the Shannon and the National Maritime College of Ireland. It was all about trying to put the requirements in place, including that connectivity to industry and other education institutions abroad that would be able to help us deliver the courses that will be required in future for today's school-leavers to have an ambition when it comes to offshore wind.

I spoke yesterday with Irish people abroad. When they wanted to get into offshore energy, they had to go away and never had an opportunity to come home. They went off, be it to Norway, Australia or wherever, did their coursework, got their jobs abroad and that was the end of it. We are putting together the requirements for each career profile through the curriculum working group we have put in place. That in turn will assign the opportunity. It might be a case of, let us say, an electrical engineer doing a number of semesters in Ireland who can then travel abroad to finish off the piece that would be required for offshore installation. Those young people who do those courses and do that travelling - we all wanted to do a little travelling in our time - have the opportunity, for the first time ever for that generation, to come back and have their job at home in the industry that will be evolving here. The curriculum working group is working well in defining those career paths and what is required.

The research and development working groups are working closely with industry to see what it will require as it moves forward. The perfect example of that is only last week I was at the University of Limerick, which is printing wind turbine blades and has a curing process. It will take a while to scale up to the size that will be required in the Atlantic, but that is what is happening at this stage. It is that connectivity with industry that will be required into the future.

Deputy Cormac Devlin: I also mentioned fibre-optic connectivity and grid connectivity. Will Mr. Hallissey or Mr. Keating reply regarding those items?

Mr. Pat Keating: On offshore grid connectivity, part of the work we have engaged in - I talked about the multisite approach we are taking because we have a number of sites - is to look, in consultation with EirGrid, at how potentially we could bring that grid ashore. We want to end up with a profile of how we will bring the offshore grid into the Shannon Estuary and not interfere with shipping channels, anchorages and all of that. A big part of the work relates to that. I am sure the Deputy is more than aware that a big part of the work in respect of the onshore grid relates to the two large fossil fuel stations on the Shannon Estuary. One is at Moneypoint, which is 918 MW, and the other at Tarbert Island is 650 MW. Those two stations are due to convert throughout this decade. There is, potentially, 1.5 GW or 1.6 GW connectivity already in place on the Shannon Estuary, which is important. There is existing onshore grid connectivity. We are doing work to see how the offshore grid will interact with the onshore grid and, not just that, how on those sites we can bring power onshore potentially for the production of alternative fuels for electrolyser usage.

Senator Pauline O'Reilly: I thank the representatives for their contributions so far. They have given thorough responses, which will be very helpful to us. I will raise a couple of matters. They have stated they aim to have the development of the offshore renewable energy assembly and marshalling facility completed by 2028. We require 5 GW of offshore renewable energy by 2030 in order to hit our targets under the climate action plan. The obvious question is whether that should be sped up in any way in order to help us in that regard? What is required in order for it to be sped up?

How important is it to have the rail freight strategy implemented by 2040 in order to help meet all these targets? Having been in Scotland and spoken to some of the companies involved, it is clear that a pipeline is very important for companies in order to be able to invest. Do our guests have thoughts on that? I refer to the importance of us not just focusing on what is there at the moment but actually doing everything in tandem so that we have short-, medium- and long-term plans. That is needed not just in order to get it done but also because it is what investors require to be able to invest in Ireland in the short term.

Mr. Pat Keating: I will address the Senator's first question and then hand over to Mr. Hallissey to deal with the question on rail freight. As regards our intentions for the marshalling facility to 2028, that is stage 1, if you like. As I stated, the scale of this is so large that it will require a multi-site approach. The ESB has the Moneypoint site, so there is potential to have two deepwater facilities ready and available on the Shannon Estuary by 2030. For the full 80 GW realisation, however, which is in the medium and long term, two will not be enough. We do have several other sites on the estuary that we are considering.

As regards the Senator's question in respect of speed, she is spot on. Investors need certainty. We need a pipeline. The lead times for this infrastructure on the port side but also on the wind farms side are seven to ten years. That is the type of window we need. That is why the ask today is to bring floating offshore wind front and centre of the stage right now. We cannot leave it until 2030. If we do so, we will not be ready to invest until 2038 or thereabouts because, as members are aware, the way it works is that when we go to fund our infrastructures, our funders will seek certainty. If there are no options for megawatts or gigawatts on Atlantic floating offshore wind generation, there will no demand even though we have the resource. That is why it is critical that the pace for floating offshore wind has to move up. As we pointed out, that 10 GW needs to be now put in for floating offshore wind to give certainty to the sector to be able

to plan against. At the moment, there is nothing there, so even though there is potential for 80 GW, there is no process to engage the market. That is why it is critical to speed up in the context of floating offshore wind generation. We kind of need to ditch the 2030 target of 5 GW. It is a local demand but this is a pan-European play and, in our view, it is not being considered in the right way. It is a bit like the tail wagging the dog. The big resource here is 80 GW, not 5 GW. What do we need to do to unlock 80 GW? We need to get floating offshore wind generation off the ground and facilitate it. The market is more than willing, as we have seen in Scotland where it is totally oversubscribed. As a country, we need to catch up with the market, set the stage and allow the market to engage with our system. We agree that is the right approach; the problem is the pace of the roll-out. That may answer the first part of the Senator's question.

Mr. Jerry Hallissey: It is important to note the speed of our reaction. The potential is there. We have all identified what it is. Only last weekend, the Global Wind Energy Council released a report that put Ireland front and centre as one of the pacemakers for offshore renewable energy in the next decade or beyond. The opportunity is there; it is about what we can do and the value we can add for ourselves across the board. If we miss the opportunities, the supply will be sourced elsewhere. Mr. Keating referred to the UK being our competition. The North Sea and ScotWind developments are potentially taking from our route to market for the product that is there in the Atlantic. It is important that we engage with that.

It also brings with it the opportunity to assist ourselves. There is potential to manufacture green fertilisers in Ireland, for example. The production of green ammonia can be brought to Ireland and that would assist farmers.

There is also potential in another area. This leads into my answer on the rail aspect of things. It is all interlinked. If we get global refuelling of shipping, let us say, that brings with it the potential to create a global trans-shipment hub that would shorten supply chain routes for Irish exporters and importers on their routes to market. We are trying to bring all this forward. If those supply chain routes are altered and moved elsewhere, we will miss that opportunity. As part of that, rail connectivity to the port is paramount. We are a strong advocate for not just the reopening of the Foynes to Limerick rail line that connects us with the national rail network, but also the developmental potential for the distribution hubs proposed as part of the Irish Rail developmental plan for rail freight. There is potential to assist in decarbonising Dublin by taking the likes of cargo from the west of Ireland down the western rail corridor to be exported out of a port in the west of Ireland. It is about the overall solution. The infrastructure has to be put in place in order to facilitate that, but we have it targeted.

Senator Pauline O'Reilly: The reference to the western rail corridor was music to my ears. I appreciate that.

Chairman: I was about to say that Senator Pauline O'Reilly will be making a video for her social media channels on the back of this. Deputy Cronin is joining us from her office.

Deputy Réada Cronin: I thank our guests for their presentation. In light of crisis temperatures at the North and South Poles, the risks to the Thwaites Glacier and the impact that would have on rising sea levels, and the fact that we are so far ahead of where we thought we would be in the context of climate change, has the modelling our guests used for their plans taken into account the effects of abrupt climate change and sea levels rising more quickly than previously anticipated?

Mr. Pat Keating: To answer that question, we have to look at the process we have been

speaking about. The process currently does not facilitate any faster roll-out, if one likes, of floating offshore wind generation in particular. That is probably the blockage in the system. The industry and the sector want to get at it, so to speak, but we do not have a consenting system for floating offshore wind with which one can engage with at the moment. We have a very investable and sustainable green energy resource that cannot be harnessed because the system does not facilitate the expedient unlocking of the resource. One must remember it is a two-stage process in the context of maritime areas of consent and An Bord Pleanála, so it will take time. We do not want to go down the road of dealing with issues with the planning system here today but the timing issues in that regard have been called out in this country.

Deputy Réada Cronin: Has the modelling taken into account the fact that much worse storms will be coming further north in the Atlantic?

Mr. Jerry Hallissey: It is more that developers are looking at it. The consistent wind speeds in the Atlantic may require a revised turbine. Currently, turbines are quite tall and geared for winds of 10 m per second. We are fortunate that consistent wind speeds in the Atlantic are approaching 14 m per second - or climate change is responsible for it; depending on how one wishes to look at it - with a much lower overall height. From a continuity point of view, the developers are considering that, which brings part of our potential forward. If they are considering replacing existing manufacturing facilities with new facilities for different blade lengths, tower height or gearing on the turbine itself, that affords us the opportunity to attract that business to Ireland. It is of concern to the industry that things are changing, but it has not identified anything beyond that at this point.

Deputy Réada Cronin: I thank Mr. Hallissey.

Chairman: If we find ourselves in that scenario of catastrophic climate change, all bets are off and we will be in a very different position. Hopefully, we do act quickly enough to forestall that possibility. We do not want to find ourselves in that position. The next speaker is Deputy Bríd Smith. I ask her to confirm that she is in her office.

Deputy Bríd Smith: I confirm that I am in my office. I thank Mr. Keating for his opening statement. I have two questions. There is huge emphasis here on private investment, investment by developers and how to facilitate them in the Shannon Estuary. What happens if that investment fails to deliver or to reach the targets envisaged in the presentation? It is a large-scale investment at €100 billion. If private investment fails, is there any role for State investment in delivering what is needed? Given the earlier conversation around the scale of the crisis and the rapidity with which the climate catastrophe is hurtling towards us, is there a role for the State?

My second question relates to the company's attitude to the possible development of a Shannon liquified natural gas, LNG, terminal. How does that fit with its plan? Is it seen as a help or a rival? Do the witnesses have an opinion on it in terms of our energy security? Is the location of an LNG terminal in the Shannon port factored into the company's overall plan?

Mr. Pat Keating: In regard to the State playing a role in the investment in energy infrastructure, the Deputy can correct me if I am wrong but I think the State has made the decision that it more or less wants the privatisation of energy generation, but that is probably a bigger question. That is the way the State has approached it in latter times. Across Europe, the private sector has been more than willing to step up to the plate to invest in this, which says that this is a commercial enterprise and the State need not necessarily be involved in the investment side, but obviously it has to be involved on the regulatory side. That is the approach as we see it.

There is significant private sector interest from large, global, multinational companies to invest and to unlock this potential resource. The State's role would be, as I said, more regulatory. The State can gain significant new revenue streams from this resource. It can be creative in how it does that. For example, in the UK, the Crown Estate generates revenues and pays dividends back into the UK Exchequer on an annual basis. Perhaps the maritime area regulatory authority, MARA, when established, could be given a commercial as well as a regulatory mandate and follow the Crown Estate as an example. There is a role for the State in this but much of the big money investment can be and will be made by the private sector.

Shannon LNG is a hugely topical issue. The Europeans have in their taxonomy included both gas and nuclear energy as part of the transition. There is ongoing debate on LNG in Ireland as part of security of supply. The Shannon LNG application is before An Bord Pleanála for adjudication later this year. Again, it is a question of how the country and, maybe, the committee sees the role of gas as part of the transition. Broadly speaking, it is well accepted that gas will be required as a transition. The issue is whether that gas can be LNG, which can be natural gas or fracked. The main issues around LNG in this country are probably on the fracked piece. There is a project on the Shannon Estuary, with planning live with An Bord Pleanála.

Chairman: My colleague, Deputy Christopher O'Sullivan, is unable to attend and has sent his apologies. The Deputy takes a very keen interest in offshore issues. He would like to know if Shannon Foynes Port Company is aware of any impediment to Irish fishers registering their vessels to take part and assist in the construction and maintenance of offshore floating wind farms and, if such impediment does exist, how we can adapt our legislation or guidelines to allow the sector to register their vessels and participate? Is that something Mr. Keating has come across?

Mr. Pat Keating: We have not been down to that level of detail. There will be huge opportunities, particularly on the operational and maintenance side. If one looks at the case studies on a number of European ports in terms of the level of traffic, there is no reason fishers should not be able to diversify into other areas. That is something that should be kept open because there probably will be, as there is today, a shortage of vessels at all scales or levels on the maritime side. As I said, it is something that should be kept alive.

Chairman: I thank Mr. Keating and Mr. Hallissey for their contributions, which were incredibly interesting. They have outlined to us the opportunities that are there but also what needs to be done to achieve them. The committee will draft a report in the coming weeks and will be keen to ensure that those points are included in it.

I propose to suspend the meeting for a couple of minutes to allow our guests to leave and the next witnesses to come in.

Sitting suspended at 12.07 p.m. and resumed at 12.12 p.m.

Chairman: On behalf of the committee, I welcome our witnesses. Some are new faces and some have been here a few times. From the Irish Energy Storage Association, we have: Mr. Paddy Phelan, president; Mr. Eugene Coughlan, former deputy commissioner at the Commission for Regulation of Utilities; and Mr. Frank Burke, technical adviser, who is joining us online. They are very welcome. From Energy Storage Ireland, we have Mr. Bobby Smith and Mr. Bernice Doyle. They are very welcome. From the Demand Response Association of Ireland, we have Ms Siobhán McHugh, CEO, and Dr. Paddy Finn, chairperson. They are welcome. From Eirgrid, we have some familiar faces. I welcome back: Mr. Mark Foley, CEO; Mr. Liam

Ryan, chief innovation and planning officer; and Mr. Padraig Slyne, who works on the public affairs side.

As usual, I will begin with the note on privilege. I remind our guests of the long-standing parliamentary practice to the effect that they should not criticise or make charges against any person or entity outside the Houses by name or in such a way as to make him, her or it identifiable or otherwise engage in speech that might be regarded as damaging to the good name of the person or entity. If their statements are potentially defamatory in respect of an identifiable person or entity, I will direct them to discontinue their remarks. It is imperative they comply with any such direction. For the one witness who is joining us remotely today, Mr. Burke, there are limitations to parliamentary privilege. As such, he may not benefit from the same level of immunity from legal proceedings as those who are physically present.

Mr. Paddy Phelan: This opening statement seeks to describe energy storage and explain its role in decarbonising electricity and hence energy overall. It describes the benefits of energy storage and raises the challenges and issues which need to be resolved so that it can make its key contribution to Ireland meeting its 2030 and 2050 targets.

Decarbonising electricity requires significant additional wind and solar generation and the phasing out of fossil fuel generation, with natural gas used largely as a transitional fuel until decarbonised biogas, green hydrogen or other measures come on stream. There are two main challenges to operating the grid primarily on wind and solar power. The first relates to grid stability. Up to now, big heavy fossil fuel-driven turbines and generators have had enough momentum to ride through the bumps. We now need to replace these with plant that can respond very quickly, going from zero to full output in a fraction of a second. The second challenge relates to the variable output from wind and solar generation. This variability creates the need for plant which can absorb energy when there is too much wind or solar generation to make up the deficit when there is insufficient wind and solar power to meet the demand.

On the role of energy storage, batteries with, for example, half an hour's worth of storage can provide a very fast response to provide grid stability. Plant capable of storing 350 MW is currently in operation and this capacity is expected to rise to 600 MW by 2023, which shows that the energy storage industry can deliver and is delivering. The variability in output from wind and solar generation can be managed by using different technologies offering different durations of storage. These include different types of batteries, pumped hydro storage like that used at Turlough Hill and compressed air or liquid air energy storage. These can provide output for up to 12 hours, which would cover most variations in wind and solar output.

Green hydrogen storage is seen as the main solution in the medium term for periods of longer duration when there is little or no wind for days, or even a couple of weeks, because of high pressure over Ireland. There will be a residual role for gas in the rare periods when low wind generation resulting from high pressure results in excess demand that exceeds green hydrogen storage capacity. Such periods occur approximately once every ten years. One of the biggest constraints on meeting the 2030 targets is the provision of sufficient grid connections. Strategically located energy storage can relieve grid congestion, remove constraints and obviate the need for some upgrades and can therefore contribute to the earlier provision of more grid connections.

On non-electricity forms of storage, thermal storage also has a role to play through mediums such as district heating and thermal storage at domestic and commercial levels. There is a role for green hydrogen, as I have mentioned, and natural gas will have a residual role in supporting

the integration of hydrogen. There are also significant roles for biomethane and optimising the gas infrastructure to receive and transmit energy from clean, nonfossil generated gas. Local energy supply chains from clean energy sources can play a particular role in decarbonising our culture.

How much energy storage is needed? The Irish Energy Storage Association, IESA, commissioned a report by AFRY called The Missing Link – the value of energy storage in the AllIsland market. This report was circulated to the committee in January of this year. It concluded that 1,900 MW of energy storage will be needed by 2030. This is almost double the capacity proposed under current plans. On other added benefits of energy storage, the AFRY report concluded that this 1,900 MW of energy storage would provide: a low-emissions source of firm capacity replacing fossil-fuelled peaking and standby plant; a reduction in curtailment; a reduction in emissions; a net benefit of €34 million per annum; and a reduction in the public service obligation levy of €10 million to €14 million per annum.

My final point is on energy security. To decarbonise electricity, we must replace fossil-fuelled standby and peaking plant. Energy storage can be used instead. This also has the benefit of reducing curtailment of wind. Markets must provide investment signals for this sector. The current market for delivering a secure sustainable electricity system, or DS3, services, which are used to stabilise the grid, is based on tariff rates which are paid when the plant is available. This market is due to be replaced in April 2024 by a competitive daily auction. This will introduce great uncertainty for market participants. New plant will not be built unless longer-term hedge contracts are provided to mitigate the price risk. This is a great concern for the industry and companies within it have jointly submitted their concerns to the regulatory authorities seeking resolution of this issue before the high-level design is signed off. EirGrid could run competitive auctions for such contracts for the volume it forecasts will be needed over the given period of years. Even if this is resolved for the system services market, this will only support short duration batteries. Longer duration batteries for energy balancing to manage the variability in wind and solar generation would still not be financially viable. The difference in price between charging and discharging is not high enough to provide sufficient revenue. The capacity market will not provide sufficient revenue to make up the difference required to make projects financially viable. The missing money could be made up by either increasing the capacity payments depending on the emissions, or possible supports such as RESS for wind and solar if there is a residual shortfall. As mentioned earlier, energy storage can relieve grid congestion and allow more grid connections at an earlier stage for the wind and solar generation needed to meet our 2030 targets. However, there is currently no market mechanism for this service. It is critical that a market is put in place urgently because it takes several years to develop and implement such projects.

There has to be a comprehensive and integrated policy on energy storage. This policy should have targets, just as there are targets for wind and solar. It must be integrated with policies on renewable generation, transmission and distribution connections, green hydrogen, the role of gas, sector couplings and so forth.

Ireland will not meet its 2030 or 2050 targets without energy storage to facilitate the required volume of wind and solar generation. It is needed to solve the problems of grid instability and also variable output from wind and solar. Furthermore, it can contribute to the provision of more grid connections while the infrastructure is being upgraded by relieving existing grid congestion. It is important that the roles and benefits of energy storage are understood by policymakers. Energy storage can contribute to energy security while also reducing curtail-

ment of wind and solar generation. The markets must be put in place so that all the types of plants required to meet the 2030 targets, and beyond towards 2050, can be financially viable. There is an urgency to provide clarity on the high-level design for the system services future arrangements, particularly with regard to longer-term hedge contracts. A solution must also be found as soon as possible on a set of market arrangements so that longer duration storage can be financially viable. There must be a comprehensive and integrated policy on energy storage, which we acknowledge has commenced. This must take account of thermal storage, green hydrogen, biomethane and optimising the gas infrastructure to receive and transmit energy from clean gas generation.

I thank the committee on behalf of the Irish Energy Storage Association, the independent energy storage association.

Chairman: Thank you. I invite Mr. Smith to make his statement.

Mr. Bobby Smith: Energy Storage Ireland, ESI, is a representative body for the energy storage industry in Ireland and Northern Ireland. We represent over 40 members from across the energy storage supply chain and all energy storage technologies that will play a vital role in decarbonising Ireland's energy sector.

The current price volatility in the energy market and the Ukraine crisis mean we must fundamentally rethink the structure of our energy system and our key policy goals - security of supply, affordability and sustainability. Energy storage can contribute to all three of these goals by reducing our CO₂ emissions, ensuring a secure and sustainable supply of electricity to Irish homes and businesses while reducing the cost of electricity for consumers. Energy storage, therefore, must become a vital tool in Ireland's response to the current energy crisis and our longer-term decarbonisation targets.

As has been mentioned, the Irish market has seen a very successful deployment of short duration lithium-ion battery storage, with over 350 MW of battery storage currently operational and providing important system stability services via the delivery by EirGrid of a secure, sustainable electricity system, DS3, framework. This number is expected to grow to approximately 600 MW by 2023. These batteries provide fast-acting reserves that ensure electricity supply and demand are constantly balanced. Analysis carried out by Baringa energy consultants on behalf of ESI in 2019 estimates that the provision of system services from battery storage, demand-side response and other low carbon technologies instead of traditional fossil fuel generators can reduce power sector emissions by nearly 2 million tonnes of CO₂ per year by 2030.

However, the market for short duration batteries is close to saturation and so the focus must shift to energy storage that can store and provide energy for multiple hours at a time. Energy storage in this space will play an important role in contributing to capacity adequacy by ensuring there is enough available electricity to meet existing and future demand. Multi-hour storage will also be more active in trading energy, thereby helping to smooth price volatility, and supplying power at times of high demand to displace fossil fuel peaking generation. There are many technologies that will play a role here. Lithium-ion batteries are proven at the scale and projects of up to eight hours duration are already in development in markets such as California.

Other established technologies such as pumped hydro and compressed air energy storage could also feature, while new emerging long duration battery technologies are likely to become more viable in the coming years.

In Ireland, while small volumes of lithium-ion batteries of up to four hours duration have secured contracts to construct in recent capacity auctions, more will be needed. EirGrid has assumed in its Shaping our Electricity Future roadmap that approximately 1.5 GW of two to six hours storage will be operational in 2030.

This should be considered a minimum target and we believe this target could even be doubled by 2030. However, there is a high degree of risk and revenue uncertainty for multi-hour projects at present which require further consideration and a co-ordinated policy effort to provide the correct investment signals. One of the key benefits of proven energy storage technologies such as lithium-ion batteries is that they can be deployed quickly relative to new fossil fuel generators. Our analysis shows that there are over 2.5 GW of storage projects in the development pipeline, with the majority already through the planning system and awaiting a grid connection and a stable revenue stream under which to construct.

Finally, in the long term, full decarbonisation of the electricity sector will require the deployment of long duration multi-day and multi-week energy storage, such as green hydrogen, to cover extended periods of low renewable output and provide generation capability at times of need. Recent analysis conducted by Baringa on behalf of ESI, and shared with the committee members, shows the benefits that energy storage of different volumes and durations can deliver to the Irish system and consumers by 2030. Energy storage of all durations can help to reduce CO₂ emissions with durations of between 24 hours and 100 hours providing the most benefit by reducing electricity system CO₂ emissions by approximately 50%. This would be a significant achievement considering emissions reductions post 2030 will be the most difficult to deliver.

In addition, Baringa's analysis shows that strategic deployment of long duration energy storage in transmission constrained regions of the network can reduce renewable constraints by 90% in a case study of County Donegal, one of the most congested areas of the grid. This would save approximately 250,000 tonnes of CO₂ per year just from being able to utilise this renewable generation in the Donegal region alone. Replicating this in other constrained regions would deliver even greater emissions reductions. It is therefore essential that the overall policy framework supports investment in a broad portfolio of technologies and enables the deployment of a comprehensive set of energy storage capabilities that can deliver the benefits we have outlined.

The Climate Action Plan 2021 sets out a number of actions relevant to energy storage. These are all welcome, but it will be important to ensure that the timelines for completion of these activities are met and that there is co-ordinated engagement with industry to achieve these targets. We urge that an industry liaison group be set up with key policymakers such as the Department of the Environment, Climate and Communications, the Commission for Regulation of Utilities, CRU, and EirGrid to ensure these actions are completed. Some of the immediate work streams that are needed are: resolution from the regulatory authorities on the future development of DS3 system services post 2024; fixes to existing EirGrid market systems and operational policies to allow the full integration of energy storage; a connection policy that allows a feasible and timely route to connect to the grid for the large number of storage projects that are through the planning system; and an investigation of the market signals that will drive investment in multi-hour and multi-day storage, as it is unlikely that the existing market will provide the long-term revenue certainty that these projects will require.

In conclusion, we ask the committee to consider energy storage as a proven, readily available and fast-to-deploy solution capable of delivering significant CO₂ emissions savings. In order to unlock these savings we ask for the actions I have outlined to be progressed with a sense of urgency by the Department of the Environment, Climate and Communications, CRU and EirGrid. The prize is huge, and it will be worthy of the effort.

Chairman: Thank you. I invite Dr. Finn to make his opening statement.

Dr. Paddy Finn: On behalf of the Demand Response Association of Ireland, DRAI, I thank the committee for the invitation to join the meeting today and for the opportunity to shine a light on the increasingly important role that demand response has been silently playing in the operation of Ireland's electricity system. The electricity system can be represented by the analogy of a seesaw, finely balancing customers on one side with generation on the other. The objective is to ensure a perfect balance between the two. Otherwise, there is a loss of equilibrium, which risks a blackout.

With customers being unconstrained in their use of electricity, balance has traditionally been managed by controlling the fuel supply to power plants in real time to match generation to demand. As we increasingly turn to the wind and sun as our sources of fuel, the availability of which is dictated by nature rather than by pipelines and financial contracts, we must look to supplement our ability to balance the grid by other means. The *raison d'être* of any electricity system is to deliver power to electricity customers reliably and cost-effectively. We must achieve this with minimum impact on our environment and natural resources.

Through the use of enabling technologies, demand response unlocks flexibility in how, when and where customers use electricity to turn consumption into a tool in the operation of the power system. After all, when balancing the grid, reducing electricity consumption has the same net effect as increasing generation, but uses the latent underlying capability of existing resources, minimising the need for additional infrastructure.

DRAI represents Ireland's leading demand response aggregators, which, between them, enable 700 MW of electricity customers' resources to provide services to the electricity system operators, with 200 MW being made available on average over the past 12 months, according to EirGrid's outturn availability data. Ireland's electricity system requires the top 200 MW of peak demand for approximately eight hours in a typical year. Building an open-cycle gas turbine peaking plant to meet this final 200 MW of annual demand would cost in excess of €120 million and, with no such generator manufacturer in Ireland, the majority of this value will leave the Irish economy.

Furthermore, according to data from the National Renewable Energy Laboratory, the construction alone of such a plant would result in the order of 100,000 tonnes of greenhouse gas emissions. This is significant in the life cycle of carbon emissions of a peaking plant that will only operate for a few hours per year and is often overlooked when considering the carbon intensity of our electricity supply.

Demand response leverages the latent capability of existing assets to minimise the considerable costs, resource depletion, and carbon emissions associated with building new infrastructure, and retains value in Ireland's economy. Unlike other technology types with characteristics that remain static over their lifetimes, demand response is flexible and responsive. Through technology enablement and portfolio management our members have evolved the characteristics that participating customers provide as the power system has evolved.

Among our members' portfolios are customer groups that are capable of: reducing consumption within 150 milliseconds to compensate for the tripping of other generation plant on the grid; reducing consumption on short-notice instruction to balance the power required by other customers at times of peak demand; increasing consumption to minimise the need to curtail renewable energy at times of abundance; and reducing consumption for long periods, in ex-

cess of 24 hours, if needed. These capabilities are typically sought from peaking power plants or energy storage systems but can be reliably and efficiently delivered by demand response also.

DRAI members' portfolios delivered time and time again throughout the past winter and were heavily utilised to mitigate the widely publicised generation constraints that Ireland experienced. We are being called upon to grow our portfolios and increase our availability in anticipation of further challenges next winter. However, current limitations on electricity market incentives for demand response remain an obstacle to growth. I will now hand over to Ms McHugh.

Ms Siobhán McHugh: The electric power system in Ireland is undergoing an unprecedented transformation as we seek to meet stretching targets for decarbonisation, climate action and electrification. Grid operators have acknowledged the technical challenges our power system will face in increasing the penetration of renewable energy. As the system transforms, flexibility across the grid will need to dramatically increase to deliver a safe and reliable service to all consumers. The Climate Action Plan 2021 sets a target that 20% to 30% of system demand is flexible by 2030. Demand response is, therefore, key to providing services to grid operators to rapidly adjust output, balance the system, maintain a secure power supply, and quickly respond to events.

Commercial and industrial electricity customers continue to be the richest source of demand response in Ireland, but greater incentives are required to stimulate increased participation by this evermore environment, social and governance focused sector, including energy payments and carbon credits to recognise the positive impact their local actions have on our national decarbonisation objectives.

The electrification of transport and heat will present new opportunities for demand response in the residential sector in the coming decade. These are opportunities to not only mitigate their impact on the local distribution system, but also to support the broader operation of Ireland's electricity grid. It is imperative that the future roles of these energy uses are considered now so we incentivise the integration of the right types of technologies as we approach 2030, so they return the maximum benefit to our energy system.

Market rules and policy have traditionally been designed for customers to flip a switch and pay for electricity used, but customers can play an active role in decarbonisation of the power system and supporting renewable generation through providing demand response and flexibility. National policy, regulation and system operation remain wedded to mimicking the model of traditional power generation, but need to move from the paradigm of how we have always done things to thinking about how electricity customers can become part of the solution. We need to first look towards what is already there and can be harnessed rather than what needs to be added.

To fully exploit demand response as a solution for our power system we need to: remove barriers that exist in current markets and system operation; develop robust markets for energy, capacity, system services and local flexibility that are technology inclusive; incentivise and empower the customer, provide carbon credits, correct levels of remuneration, and prioritise grid access for committed demand response participants to reward service provision; and most importantly, we need to deliver at speed. Ireland's climate action plan contains excellent initiatives to achieve this ambition, but we need to put the resources and co-ordination in place to deliver. The ambition of making 30% of demand flexible by 2030 can be achieved, if we put the right policy, incentives and operational capability in place to do so.

Chairman: I thank Ms McHugh. I move on now to Mr. Foley. Will Mr. Foley answer all of those questions?

Mr. Mark Foley: It is great to have the opportunity to be here before the committee again. We were here last October so I will not repeat the message from then. I will try to focus on what has changed and what is very much current. I will also add to the list of the attendees. Our chief operations officer, Mr. Rodney Doyle, is also with us today.

I will start with security of supply because it is one of the big topical issues. I will first acknowledge the Government's policy statement on the security of electricity supply, published last November. If we are to deliver the energy transition it is very important that we do not jeopardise the security of the system in the process. We welcome the Government's position paper. We are very supportive of it.

I wish to clarify our role versus that of the regulator. EirGrid's job as the transmission system operator is to advise on what we think needs to be done in protecting the integrity of the system guaranteeing security of supply. The CRU is responsible for making the necessary decisions to ensure security of supply is maintained. That is very important, because sometimes there can be some confusion around the two roles. We advise and they decide.

The last time we were in front of the committee there was a lot of concern about the winter and the possibility of blackouts. I am very pleased to say that we navigated it really well. I compliment my team and all of the other actors involved. Gas plants came back and we had a lot of wind. We successfully and thankfully got through the winter. We are currently in the process of procuring some temporary emergency generation to see us through the next number of winters, under the direction of the CRU. This is important. It is our insurance policy to ensure that we are not at risk over the next number of years. We are busy about getting that commissioned, contracted and installed.

I remind the committee of EirGrid's position on gas and dispatchable gas generation. Gas is essential to see us through this transition. I cannot overemphasise this. We are all committed to achieving the Government's climate action target of 80% renewables but gas is our backstop. This is what ensures that we can deliver this transition and get out the other end, and hopefully with hydrogen replacing gas in due course in the next decade.

Based on EirGrid's analysis, we need some 2,000 MW of dispatchable gas generation. We need it preferably by the end of 2026. This will do two things. It will backstop the system and ensure that we have security of supply, and it will help us to see off the old fossil-intensive plants, be they at Moneypoint, Tarbert or elsewhere, in the system. We should not apologise for it. It is necessary and it will get us to our goal. We are very focused on that and we have made very strong representations to the regulator in that regard.

Recent auctions for new capacity have not been as successful as we would have liked. Let us be honest about that. We have made recommendations to the regulators about how we believe we can improve the probability of better outcomes from those auctions in the months and years ahead.

I will conclude on the issue of security of supply by saying that none of us predicted four weeks ago that we would be in the horrible geopolitical crisis we are in and what has happened in Ukraine. This is making the picture more complex. It is leading to very significant risk and challenges ahead around the security of our electricity system. I can assure the committee that

working with the Department, the regulator and all other State actors, we are very much on the case in trying to look at what our contingencies are if, for example, there are interruptions to gas supply.

We launched the Shaping Our Electricity Future programme at COP26 in Glasgow in November last. Shaping Our Electricity Future is the seminal piece of work that gives us the pathway to 2030. It sets out the end game and sets out the pathway for how we are going to get there. While it is predicated on 70% renewables, because that was our original plan, we are actively working on the Government's recent ask of a target of 80%. We will publish the incremental pathway for that later in the year. We welcome the new CRU direction on data centres that came out just before Christmas. It has given us a framework within which we can work with the digital economy to ensure that there can be further investment in that sector and that we can deliver solutions to allow the centres to connect.

We really welcome the enactment of the Maritime Area Planning Act 2021 in December. It provides a very firm legislative context for the delivery and development of offshore wind energy in the Irish Sea, which is a key component of delivering the 80% target by 2030.

Our own transmission network development programme, which is ultimately what joins up all of the dots, incorporates more than 140 projects and includes new transmission lines, upgrades to existing lines, new substations and new technologies. I stress to the committee that we are listening to what communities are saying. Three recent decisions we made about the north Connacht line, the Kildare-Meath line and the convertor station for the Celtic interconnector all involve solutions that we believe are acceptable from a community perspective. We are walking the talk in that regard.

The 700 MW Celtic interconnector project between Ireland and France is on target and we are hopeful of a positive planning consent in the very near future. That is critical to security of supply and is also critical to ensuring we can achieve the 80% renewable target.

Moving on to supporting technologies and system services, we are in the final stages of trials on the power system and hope to be able to sign off on 75% renewables on an instantaneous basis very soon. We have been operating close to that level for the past couple of months and we will sign off and announce same within a matter of weeks. That is a critical milestone on the journey to 80% renewables. It is important to note a couple of other critical recommendations we are making in respect of technologies. A balanced portfolio of different types of technology is essential and we have recommended 1,000 MW of long-duration storage, which is very similar to what our colleagues have said here today. Storage is critical to making the system work by 2030. We have put forward proposals around market changes to support the investibility of new technologies. It is really important that the regulator comes up with proposals that incentivise the deployment of technology on the system to allow it to achieve our goals. We have made recommendations on new system services products and have made very strong recommendations around the redesign of system services and the capacity markets to ensure we get the right technology at the right time in order to deliver the 2030 objective.

The committee asked us for our view on demand response. At the end of 2021, there was 563 MW of demand-side unit capacity installed on the system, which equates to 364 MW on a de-rated basis. The availability of these units was, on average, only 160 MW and we are not happy with that. The market signals, therefore, need to be adjusted to incentivise the performance and ensure we get the service that we need on the system. By 2026, there will need to be at least 1,000 MW of industrial and commercial demand-side reduction capability in place.

Unlocking that necessary demand-side potential requires the evolution of the electricity market by the single electricity market, SEM, committee, as outlined in EirGrid's Shaping our Electricity Future roadmap. I remind the committee of the key role the committee plays in ensuring the regulatory environment and the incentives deliver the right solutions for the power system to enable us to deliver on our objectives for 2030. As Ms Marie Donnelly, chair of the Climate Change Advisory Council said, the greenest MW is the one we do not consume. In that context, we must maintain a national focus on energy conservation right across the whole ecosystem.

We must all remain focused on the objective of decarbonising the power system as a key pillar of the Government's climate action plan. Nothing has changed around the imperatives of that mission. The situation in Ukraine further illustrates the need to double down and deliver. Shaping Our Electricity Future provides a clear pathway for Ireland's decarbonisation ambition in the electricity sector and EirGrid has the capacity and capability and is determined to deliver that plan. We have identified short-term measures to protect security of supply and these are being expedited following regulatory direction and with Government support. The delivery of the appropriate dispatchable gas generation plant, battery technologies and the full range of necessary system services is required to be delivered by the regulatory authorities through a market design proposition that creates investor confidence in the near to medium term. EirGrid will provide what advice and support that it can but the decisions rest with the regulatory authorities.

Finally, additional short- or medium-term measures may very well be required in the context of the tragic and criminal events in Ukraine. We are working with all relevant State agencies to ensure, as best we can, that we put in place contingencies to deal with the possible outcomes of that geopolitical crisis.

I thank the Chairman and members for their attention. I was rather fast in my delivery of our opening statement but I wanted to leave plenty of time for questions.

Chairman: I thank Mr. Foley for his statement and for accelerating its delivery to leave more time for questions. I will now invite members to ask questions. If witnesses want to respond to a question that is not directly addressed to them, please indicate thus and I will bring them in. While the clerk to the committee is putting together the list of speakers, I will kick off the question and answer session.

We heard very interesting presentations from the two energy storage representative bodies and from the demand response association. I would like to tease out how these two sectors can work with each other. Do they pull against each other? I would like to think that they are complementary but perhaps the witnesses would address that question. I ask the DRAI representatives to comment on the capacity in the system, particularly the heavy-energy users such as data centres, which have significant battery storage and backup generation capacity. Is that capacity being utilised at the moment? If not, why not?

My next question is for EirGrid. I am constantly impressed by the company and what it achieves week in, week out, on our system. I have said it several times that it is the very best in the world and is not learning from anybody else. It is forging the way forward itself and other countries are learning from EirGrid. In terms of the challenge for 2030 and the domestic target of 80% of our electricity on an annual basis coming from renewables, questions are increasingly being asked regarding the bigger opportunity and role for Ireland in the pan-European electricity market. In my view, our interconnection development is very much for balancing purposes, to get us to that 80% instantaneously and on up to 100%, of course, so that we can buy power when we do not have renewable energy here and sell it when we have abundant re-

newable energy being generated. Are the right drivers there to develop further interconnection with Europe? I do not see it as EirGrid's role to do that but, at the same time, I do not see it as anybody else's role either. Is the State missing a really critical piece? It seems that further interconnection is required to take the renewable energy generation potential way beyond meeting our domestic needs.

I invite Mr. Phelan to respond first to the question on storage versus demand response.

Mr. Paddy Phelan: The Chairman asked whether we are working together and the answer is that we are. We are in regular conversation. We represent similar sectors and for that reason, we are in regular conversation and we jointly consult and contribute on various aspects from time to time. The Irish Energy Storage Association is an independent members' association and a company limited by guarantor. Its council is established from its membership and is run in that form. It represents energy storage separate from generation across the gambit of grid-scale storage, which is primarily what we are talking about today, and the power system with EirGrid, but also aligns with the Demand Response Association of Ireland on small-scale distribution system storage and its role in domestic and commercial storage. Significant conversations are under way to bring us even closer together in terms of work packages and workload to represent the storage industry.

Mr. Bobby Smith: All the speakers have mentioned that we will need a portfolio of technologies to 2030 and beyond to get where we want to get to. It will not be one technological solution that will deliver the change. We are removing fossil fuel generators and putting in the majority of generation from wind and solar. That will be supported by a variety of technology stores, demand-side responses and other measures. We are working with the other associations. There is enough of it to go around. We will need a lot of demand-side response and storage so that we do not have to compete with each other

Mr. Paddy Phelan: An important point goes back to 2017 or 2018 and my time on the board of SEAI working closely with Ms Marie Donnelly, when a number of associations identified the need for the renewable associations to work together rather than against each other. The establishment of Renewable Energy Ireland has been a positive development. All the renewable associations, whether electric, transport or heat, work under that forum umbrella to align the message.

Mr. Eugene Coughlan: I will give an example of how we work together. On a number of big issues, we have sent joint letters to the regulator. As a recent example, when the DS3 services tariff was cut by 10%, which we were not happy about, we worked closely together for that not to go ahead. Unfortunately, we were not successful but we are still focused on it and hopefully we can get an increase in the tariff at some stage.

Dr. Paddy Finn: I acknowledge the disparity in figures in demand response participation in the market. The source we used is published market data from a subsidiary of the Single Electricity Market Operator, SEMO. It is up to date to the end of February.

On the relationship between demand response and energy storage on the system, we all accept that a mosaic of solutions will get us to 2030. It is about finding the correct blend of solutions in terms of providing best economic value for the electricity customer and minimal impact on natural resources and on carbon emissions. There is little that demand response can do that storage cannot do but, with some of those characteristics, demand response presents a more economic and lower carbon form of delivery.

We spoke about high-speed systems services, which are sub-second responses to a frequency event in the power system that occurs when a power station or wind farm trips off the grid. The volume of that high-speed service is procured on the assumption that it will be the largest in-feed on the system, that is, the largest generator or connector that will trip at any point. That is typically 500 MW to 700 MW. In reality, 90% of power stations on the grid are less than 100 MW, so 90% of frequency events will be of 100 MW or less. The remaining 400 MW, which apply in only one tenth of events, play to the strength of demand response. Battery systems and other energy storage systems are good at providing constant frequency regulation and dealing with the little and often. If you use demand response all the time and impact participating customers all day every day, you end up with a shrinking pool of customers. If they are reserved for large events and used one tenth of the time, they can deal with four fifths of the magnitude of the events. That is the most economically balanced blend of storage systems and demand responses.

Chairman: I am hearing that they are very complementary.

Dr. Paddy Finn: Very complementary.

Chairman: Just on the-----

Dr. Paddy Finn: Data centres.

Chairman: I want to ask about how the market needs to be adjusted to support both. I will let the energy storage guys back in on that as well.

Dr. Paddy Finn: Demand response is not capital-intensive. Our deployment costs for an equivalent MW to batteries is about 1% to 2% of the capital cost. However, we have higher operating costs because of the need to pay participating clients. For energy storage systems, they need longer term incentives to procure the capital needed; for demand response, we need the market to be procured close to delivery time. A prime example of this being done successfully is Australia, where the electricity market is procured on a five-minute basis. Effectively, it is procured five minutes out. That gives demand response the most accurate figure for what it will be able to contribute to that next period. Rather than a day-ahead market or longer term procurement, demand response needs near-time procurement to maximise what it can deliver, however that would differ from the key signal needed for storage.

Chairman: Does Mr. Finn want to answer on latent capacity in the system and on data centres?

Dr. Paddy Finn: The industry has been largely disappointed with the level of participation from data centres, which present a substantial resource. They have considerable back-up uninterruptible power supply, UPS, systems, battery systems and generation, which is diesel but can be run on hydro-treated vegetable oil, a 10% carbon alternative to diesel with a ten-year shelf life. Unfortunately, the incentives the sector needs in order to participate are not reflected in the incentives that exist. The sector is very ESG-focused and there is no accountable carbon credit associated with providing these services from demand response.

If we provide DS3 services from demand response or storage systems, we avoid inefficient power plants being on line, spinning and ready to be used. We are avoiding that carbon. Having that acknowledged in a carbon credit would encourage that industry to participate. There have been a number of studies by UPS providers into that sector that have highlighted the ability of those systems to simultaneously provide security to data centres while providing these services

to secure the electricity grid. The incentives are not there to encourage data centre operators to participate. A key incentive would be to link the availability of connection agreements to a commitment to future participation in providing services to the electricity system.

Chairman: I am tempted to go to EirGrid but those questions might be more for the regulator. Is that fair?

Mr. Mark Foley: Yes. The new data centre policy framework speaks to a number of dimensions, including services. We hope that will deliver a more holistic response from data centres. You will not get a connection if you do not bring dispatchable gas generation and services. In fairness to the regulator, we have moved on significantly in terms of what we are asking of the data centre community in order to be part of the solution.

Chairman: Does Mr. Foley want to take the question on further interconnection?

Mr. Mark Foley: There were two questions. First, Shaping our Electricity Future sets up a clear pathway for 70% renewables. In doing that, we deal with the issues of engineering and physics. They will be dealt with and we will be able to handle 95% on an instantaneous basis in the power system. The trick in going from 70% to 80% is about economics. For every percentage above that, it is about what is the most economic pathway. It is not about physics. Dr. Ryan is leading on the project this year to figure out the most economic pathway. It can be done in many ways but economics is centre stage. It cannot be done at any price. It has to be done in a cost-effective way so it makes sense.

On interconnection, under the Minister's direction, we will launch a process later in the year to look at the opportunity for Ireland Inc. off the west coast. It is a question of how we deploy this wonderful natural resource that Ireland has. We will model the consultation on Shaping our Electricity Future which has gone down exceedingly well with stakeholders, without exception. We will look at how Ireland Inc. deploys that natural resource, not just for energy but also for economic benefit. I have no doubt that in that study a question that will arise will be how we will massively increase interconnection. Ireland cannot use all that energy because we do not have the demand. How Ireland connects that resource into western Europe will be a key part of that study. We will break cover on that later in the year. It will be managed out of the Minister's office but EirGrid will be the agent of the engineering studies, consultation, etc. We will consult widely on getting people's perspectives. This is about decades of opportunity for Ireland in terms of economic and social benefit. Next time around, we might be talking about how that study is framed and so on.

Chairman: That is good to hear. Separate from that opportunity, given the multiple crises now, there is an urgency that we did not appreciate before. I am tempted to ask how quickly we can do it all but it is probably not fair to put Mr. Foley on the spot. It seems that Europe is at war and a wartime approach is probably needed to build out the infrastructure. We will return to that issue.

Senator Lynn Boylan: I thank the witnesses for their informative opening statements and also the supplementary material that was circulated. I have two questions for EirGrid. Mr. Foley referred to a renewables target of 80% and EirGrid's Shaping our Electricity Future strategy. It has a figure for onshore wind to be connected by 2030 of 1,300 MW. On the basis of that figure, presumably the grid reinforcements outlined in the strategy were then identified. Where did that figure come from? It is different from the target in the climate action plan of around 4,000 MW of onshore wind by 2030. Industry figures indicate that between 600 MW and 700

MW of onshore wind are currently under construction and more than 1,000 MW are expected to compete for a RESS contract in the auction in May, with well in excess of a further 1,000 MW in the planning system. Is it possible that EirGrid has drastically underestimated the likely volumes of onshore wind energy that will connect this decade and, in doing so, is it failing to propose the grid reinforcements that are necessary for those projects to come on stream? That leads to increased prices for customers and high constraints. Will EirGrid amend its strategy to incorporate the additional onshore wind and solar between now and 2030?

On security of supply and the recommendations that are being acting on in the CRU, what analysis, if any, has been undertaken on zero carbon technology, such as energy storage, that could replace a significant proportion of that 2,000 MW? Has EirGrid looked at the alternatives on the table to replace some of that 2,000 MW?

For the other organisations, how many meetings, if any, have they had with the Department on the new demand-side strategy?

Mr. Mark Foley: My colleague, Dr. Ryan, will answer the Senator's two questions.

Dr. Liam Ryan: I thank Senator Boylan for her very good questions. On the 70% renewable target, we are looking at our demand increasing by about 50% over the 2030 time horizon. We are also looking at 5 GW of offshore renewables coming on to system, which is the most effective and efficient way of connecting the renewables to our main demand centres. Our main demand centre is in the Dublin region. We are looking to connect that demand directly into those regions. That leaves the additional megawatts needed to meet the 70% renewable target, which equates to 1.3 GW offshore, as the Senator noted. From that, we developed the grid that would need to be built around that. As we move towards the 80% target, we are looking at what the optimal gain is, as Mr. Foley said, around the grid that must be built to move us from the 70% target to 80% and where the most effective and efficient sources are, both between onshore wind and solar and offshore wind, to connect on to the system to meet the new targets. We will look at projects that are in flight and that do that to make sure we get that on the system as quickly as we possible can in the most effective and efficient way.

On the second question, we always look at other technologies. When we looked at the 70% renewable target we clearly called out that demand-side participation is needed between now and 2030 to meet the targets. We also looked at other technologies. We are looking at battery storage coming on to the system and we think 1.4 GW is needed by 2030. We are talking about balanced portfolios after 2026. We are saying that 1 GW of battery storage will be required in that time horizon. If other technologies come on, we will look at them.

We are calling out the need for conventional gas generation. We are making it clear that everything must be renewable gas-ready so that when hydrogen or other renewable gases come forward we will be able to decarbonise those technologies out of the system very quickly. That will give us the benefit as we move into the next decade. That gives us a clear security of supply. The reason we say that conventional generation is needed is that there are periods when the wind does not blow and the sun does not shine. In such situations we need to ensure we have enough generation on the system to meet the demand we have. There can be periods of perhaps a week where the output of the renewable sector is below demand. Having batteries and storage helps but we need to be able to charge those batteries. Therefore, we need to have some conventional generation to do that. That is why we have highlighted the conventional generation that we need. At the same time, the older, higher carbon intensity generators are also closing off the system in the next ten years or so.

Senator Lynn Boylan: By renewable gas, does Dr. Ryan mean blue hydrogen gas generators or purely green hydrogen?

Dr. Liam Ryan: We are saying that there can be either. We have not specified whether it is blue or green hydrogen. Ideally, we would use green hydrogen or green renewable gas. We would use the potential of the renewable industry to generate hydrogen or another renewable gas and use that in the generation fleet into the future.

Senator Lynn Boylan: Mr. Ryan is confirming that EirGrid will amend its strategy to incorporate the 80% target. Is it looking at cost specifically? Given that the cost of renewable energy in Ireland is the highest in the EU, we need to bring down the cost to incentivise people to come in and access the market.

Dr. Liam Ryan: We are very much looking at this from the economics perspective. In the past ten years, we have pushed the boundaries of technology and the technical challenges. The next ten years will move the boundary in both the technical and economic challenges. As my colleagues have said, the market needs to evolve and change so that we do this in the most economic and efficient manner. On the 70% target, in Shaping our Electricity Future, we were clear about highlighting the market changes that need to happen.

Senator Lynn Boylan: EirGrid supports establishing a high-level cross-government body to meet regularly and feed into the Department on how to bring down the cost of renewable energy. It is an ask from the wind organisations that there needs to be a cross-government high-level body that identifies the costs involved in renewable energy and how we reduce those costs. Would EirGrid be supportive of such a body being set up?

Mr. Mark Foley: It is important to remember that all future renewable projects will be based on competitive auctions. We will see interesting and helpful price points in coming years because they are competing with each other to get projects and, secondly, they are now deploying very interesting technology, which will drive the price down.

Senator Lynn Boylan: In order for green hydrogen to be economically viable, we have to bring down the cost of the renewables, which in Ireland is the highest compared with, for example, Poland, Greece, Spain, which is the lowest, but right across the board. Our renewable energy is more expensive in Ireland, and if we want a green hydrogen strategy that will be viable, we have to bring down the cost of renewables.

Mr. Mark Foley: Agreed, but all future renewable energy in this country will be based on a competitive auction process. The market will ultimately deliver very significant reductions in the cost of renewable energy, I have no doubt about that. We have seen some of that come through in the first renewable electricity support scheme auctions already. Let us remember, this is proven technology that has been deployed all over the world. I believe we will see very favourable and competitive prices, and it will completely change the landscape in terms of pricing for renewables in Ireland.

Chairman: There was a question on meetings.

Senator Lynn Boylan: How many meetings have been had by the demand reduction sector with the Department in regard to a new demand-side strategy?

Ms Siobhán McHugh: It is a very simple answer, zero, unfortunately. As we said in our submission, there have been some excellent actions in the climate action plan and, among them,

around demand-side strategy there are a number of different initiatives. Levels of engagement are extremely poor and have been extremely low, and we would also say the same as to a lack of consultation with the regulator, unfortunately. We are aware this is on the regulator's agenda as part of the climate action plan.

We need a whole-of-system thinking and approach. It is evident from many of the parties who have come before the committee that this is not for any one element of the sector to solve. It is something we need to do together. As we said, we come together as a part of Renewable Energy Ireland, REI, and look at how policy and markets and technical use of these solutions can be used to meet our targets. Demand response is a proven, reliable, efficient means of providing services to the grid. It is operating now and has been for the better part of a decade. Even before that, it provided services in more rudimentary forms. The question is how best it can be utilised. We give great credit to our colleagues for being world-leading in how they have integrated renewables into our power system. Our members and those in the sector, across response and storage and different technologies, operate globally and have global knowledge of the different types of markets as well as the technical capabilities, and that needs to be harnessed as part of that strategy.

Chairman: Up to this point, Demand Response Association of Ireland makes submissions on policy or regulation. Is that the only way of engaging with the system or are there no other ways of engagement for bodies such as this?

Ms Siobhán McHugh: There are various fora and stakeholders, among them the system operators, the regulatory authorities both North and South, or other peer organisations. We try to have regular stakeholder contact with them. It can prove difficult at times. Some processes have worked well with some organisations, and some do not. We hold formal consultation and through REI and various structures, we aim to cover the basis across everything from Departments downwards. With our colleagues across the industry, it is an extremely complex time. We need to be engaging more and more. That hand needs to be reached out to us as an association and not just always be knocking at the door. It needs to be more comprehensive and inclusive if we are to move on.

Chairman: It sounds like there needs to some kind of formalised mechanism for that ongoing engagement.

Dr. Paddy Finn: I wish to acknowledge that some of the fastest demand-response technology in the world has been developed in Ireland, to participate in the Delivering a Secure, Sustainable Electricity System, DS3, services programme and have been developed by some of the members of DRAI. Some of this can achieve a response of full output in as little as 60 milliseconds. This technology, which has been brought by those companies, is being brought to other markets around the world where demand response is somewhat better facilitated in terms of the market structures etc. However, it also gives us a key opportunity to bring back learnings from those markets to help us advance. Ireland and EirGrid, in particular in the work it has done in the past decade looking at DS3 system services, are viewed as an exemplar by those abroad. These markets, in which Ireland's demand-response industry is also operating, got to where they are looking at EirGrid and the example it set. I guess they had the opportunity to leap-frog in terms of the how some of the market integration worked. It is now our opportunity to take some of those learnings and bring them home and advance the market here to make it as facilitating to demand response as those other markets.

Mr. Bobby Smith: I wish to come in on the Senator's question around the cost of renew-

ables in Ireland. One of the main reasons renewables are very expensive in Ireland is because they face high levels of dispatch-down, which available wind generation that has to be turned down either due to transmission constraints, congestion in the network, or systems security limitations, which is the 75% instantaneous penetration that EirGrid referred to. The aim is to get that up to 95% to 100% by 2030. We fully support that. It would make a big difference in terms of the dispatch-down that wind and solar face, which would drive down the cost of renewable supports.

The other pillar of this, which will be key in the future, is the transmission constraints. Some projects in the west of the country, in particular, where there is high on-shore wind resource would face constraints of potentially 20% to 30% in the future, if the grid is not built out to accommodate that energy. The issue is that grid build-out is challenging. It takes a long time. These are infrastructure projects in the countryside, so they can take time to deliver. However, a potential solution, as highlighted in my statement, is that energy storage behind these constraints can provide the same result without the need for that large infrastructure and help drive down constraints by as much as 90%, in some of our analysis. That would have a huge impact on the cost of renewables in Ireland in driving down that price and utilising the available renewables generation at times when it would otherwise be lost. That is a key pillar. A more strategic location and more locational incentives for storage to build in these constrained regions would be ideal.

Chairman: Is that point captured in Shaping Our Electricity Future?

Mr. Mark Foley: Absolutely.

Dr. Liam Ryan: We talked about how we need 1.4 GW of battery storage coming in. We are looking at where they can be placed. One of the key areas in regard to Shaping Our Electricity Future is that we need to move towards a more plan-led approach in which demand is collocated with renewable generation. One of the challenges we face is that a significant potential of our renewables is in the west of Ireland, however, most of our demand is on the east coast. The communities in the midlands sometimes struggle with the infrastructure coming across the midlands. In essence, we need to look at how we can collocate the generation and demand so that the communities are benefiting from the renewable sources in their areas and having the demand customers connecting in those locations as well. That will help in regard to the amount of infrastructure we need to build.

As part of Shaping Our Electricity Future, we looked at a number of different options at the time. We engage widely with the communities in how we achieve the optimum solution. The final publication, as Mr. Foley said earlier, which we publish in November, called for the 70%. As we move to 80%, we will definitely need to include the technologies. We will be including demand-side participation, as we did in the last version of Shaping Our Electricity Future, and consider what we need to do around it. Key to this is that the economic signals need to be modified and the markets need to change so we can get the full potential in the next period of time.

If I may make one further point, which is that the 75% Mr. Smith referred to is world leading. Nobody else is currently operating a power system where 75% of their instantaneous electricity comes from non-synchronous sources. Even with the 55% target in Europe, non-synchronous generation will probably be approximately 35% to 40% in the 2030 time horizon. The work we are doing here is very much pushing the boundaries. That means we will have those curtailments until we are able to move that out to 95% which we will be doing in the coming period.

Chairman: Ireland is very much at the leading edge of this. Regarding locating storage close by, there is also the green hydrogen piece, which is separate from the battery piece. How evolved is the thinking on green hydrogen? Obviously, it needs to be put close to where the current gas generation capacity is. Has that part of the strategy evolved yet?

Dr. Liam Ryan: Not at this point. We are engaging with some of the developers who are pushing forward the hydrogen proposition on a regular basis to see what that can actually do for the proposition. Key to that will be how we couple the gas, hydrogen and electricity industries together to give us the optimum solution. Key to that will be that the generation of hydrogen is close to areas where we have high renewable penetration but also utilising the existing gas network and taking the opportunity to ensure that the gas network can accommodate the hydrogen. We know from our engagements with Gas Networks Ireland that the current infrastructure can take up to about 20% of blend of hydrogen on the system. We need to see how that will evolve into the future.

Mr. Frank Burke: Energy storage can reduce grid congestion. It would be very helpful if there was an outline of what the market for that would look like to reflect the value to the grid of reducing grid congestion. There is no indication of a market at the moment. That is one of the reasons energy storage is not being used for that. It could be used for that and it could help significantly because getting a grid connection is one of the constraints of meeting our 2030 targets; getting enough grid connections for all the plant that needs to come in.

Mr. Paddy Phelan: Senator Boylan spoke about the cost of renewables. In my role with the Irish Energy Storage Association in the south-eastern three counties I have worked with a number of the RESS 1 community projects. While we should not reduce the standard required, the cost of navigating through the enduring grid connection process and the costs that are lumped up on projects to achieve grid connection are very high. Although this just reflects a moment of time, I recently got back some costings in respect of one of those RESS 1 community projects. The cost was inflated by over 168% on the majority or average of those connection costs.

We find ourselves with the war in Ukraine and at the back end of the Covid pandemic. There are significant immediate challenges which will sustain for four or five years while it is anticipated that those RESS 1 projects will be built out and may also have an impact on the RESS 2 auctions coming in May. High connection costs and the cost of financing are resulting in higher auction costs. We should not undervalue the very valuable tool within the RESS system of the €2 per megawatt benefit fund that is provided. That is a really important tool in integrating renewables into onshore and offshore-----

Chairman: I thank Mr. Phelan. I am mindful of time. Six members are looking to contribute. Members have two minutes. I gave Senator Boylan latitude simply because I took latitude myself. I will try to keep it to the two minutes if I can. I ask witnesses to be as succinct as possible in their responses.

Deputy Darren O'Rourke: I thank all the witnesses. I ask for an assessment on the technologies in respect of storage. Could Ireland be leaders in promising technologies that are receiving less attention than others? How much consideration has been given to mineral intensity for batteries? The witnesses have indicated that there are areas where we are leading. Are they being sufficiently supported? What might a suitable forum for engagement be like? There is now a cross-Government group on offshore wind. Do we need something broader?

I have a question for EirGrid, one I raised at a previous meeting with departmental officials.

The Shaping our Electricity Future document contains 48 grid reinforcement projects but no timelines are associated with them. Has EirGrid defined timelines? For example, what is the timeline for the upgrade on the line between Castlebar and Cloone in Leitrim? Will EirGrid publish them, present them to the committee or make them publicly available?

It was reported over the weekend that the Great Island power plant would be closed for four months. Is there concern over that and what are the contingency plans?

Dr. Paddy Finn: When EirGrid introduced the DS3 system services programme, it also introduced a qualification trial process which acknowledged that what has got us to here will not get us to where we are going. We need to embrace new technologies which have had limited opportunities to be tried and tested on other power systems given that Ireland is operating on the leading edge. During that process, members of Ireland's demand response industry have developed technologies to meet the highest speed frequency response services which would require full response within 150 milliseconds. This is unprecedented anywhere in the world. Typically, the fastest services electricity markets seek to procure are at 5 seconds. We now see that electricity markets are following in Ireland's footsteps. We see that requirement for increasingly faster services in other markets as they become more highly renewable. It means that the technology developed in Ireland starts to bear fruit in other markets around the world.

Deputy Darren O'Rourke: I asked about what a forum for engagement might be like.

Ms Siobhán McHugh: I thank the Deputy for the question. At a minimum it would be useful to know where the actions lie and who is progressing them. Regarding the climate action plan, we have taken our own view and we have done a good part of what is meant to happen and when. It is very hard to understand whose desk that sits on and who to speak to. An organisation will be named but we do not know if something is set up already, if engagement is already happening but we have just been left out, or if it is just not happening. We need something to bring together that accountability and traceability at a high level first to understand where things sit and who is responsible. As we have done organically among industry participants, we tend to come together and thrash these things out. We need to get participants, including the regulator, our colleagues and the system operators, around the table. We also need people from academia who are well versed in these matters. We need an approach that gets those people around the table. We need to start by considering where is the ownership of the response and asking what action is taking place so we can engage with it. We need a structure to engage on these issues on an understood timeline.

Our members represent different interests within the industry and run their businesses. We have limited resources so we have to pick and choose what we engage with. These are very important actions and it is vital we get them right. As I have said previously, the climate action plan contains some excellent initiatives. We want to see the drive and ambition to move those initiatives on and we want to play our part in feeding into them.

Deputy Darren O'Rourke: Does the Department have to take the lead initially?

Ms Siobhán McHugh: The climate action plan breaks down across different agencies and Departments. It would sometimes be appropriate for actions to be led by different parties. Perhaps that is the root of where things sit and we can move them on from there.

Deputy Darren O'Rourke: I have questions for the IESA about the opportunity offered by technologies and where those technologies are at. What consideration is given to the mineral

intensity of batteries, for example?

Mr. Paddy Phelan: I thank the Deputy. I will refer his question to our technical adviser, Mr. Frank Burke.

Mr. Frank Burke: There are new types of batteries in development. Some semi-commercial light-flow batteries are available. The advantage of a flow battery is that the energy is stored in the liquid that flows so that if one wants longer duration, one just needs to put in more liquid. The plates and so on give the megawatts but the liquid gives the megawatt hours. We will see that sort of technology widely commercially available. The longer the duration of the battery, the more competitive it is.

There are also things such as liquid air energy storage. One of the advantages of liquid air energy storage is that the generators are synchronous and provide inertia and so on as well.

One of things we need to think about is whether we need more pump storage. The capital cost of pump storage is enormous but it is almost like an insurance policy because we would no longer be concerned about the supply chain for batteries and battery parts. It will mean a lifetime of 40 years. Turlough Hill has been around a long time. It had a half-life refurbishment approximately ten years ago and it will go for another 30 or 40 years. One of the strategic things the country should consider is whether there are things with very high capital costs that we should be putting in for the long term. If we decide to do so, we must also consider how to fund those projects because they cannot be funded on a six-year contract. There is a strategic issue there to be considered.

Ms Bernice Doyle: I will come in on the question about technology. I will try to add to what Mr. Burke has said about the range of technologies. The key thing to think about in terms of storage is that it has different applications for different technologies. We spoke about the short duration of fast-acting system services. They are ideally suited to electrochemical lithium ion batteries. Lithium ion has proved to be the most economic way of delivering those services for a six- or eight-hour period. That deployment is happening in other markets such as California, Spain and elsewhere. The duration of the battery deployment is increasing. A number of technologies can do that but lithium ion has won the race. High levels of recycling are being brought into that supply chain. It is a valuable supply chain. The level of recycling will reach 90% in this decade. That will help a lot in terms of materials.

When consider multi-hour, multi-day and multi-week batteries, there are other technologies, including compressed air and pumped-storage hydroelectricity, as Mr. Burke alluded to. The problem with those types of technologies is that they are large and lumpy capital expenditure investments that need to be planned for years, possibly a decade, in advance. The reality is that the cost curves for things such as lithium ion have been decreasing rapidly over the past decade. The cost of lithium ion battery packs has decreased by 90% and that is what we are competing with. Can we make a call today to say we are going to build a capital intensive and difficult to permit solution such as pumped hydro when we can deliver modular solutions in terms of battery technology from lithium ion in the space of years as opposed to a decade? That is a hard ask for us to proceed with. We do not have the kind of topography or geography that countries such as Norway have and where that kind of hydro technology can be used for multi-week and seasonal storage. We do not have that option in Ireland. Pumped hydro would provide perhaps six hours energy in Ireland. Lithium ion batteries can almost compete with that and we can expect to see a cost decrease in the next few years. I do not think pumped hydro is a solution for Ireland.

When we consider multi-week storage, other technologies coming through can provide storage for 100-plus hours. There are metal-air technologies and flow technologies, as Mr. Burke alluded to. They are coming and will present a much decreased cost because the chemical elements involved are much more common and cheaply available. To get to multi-week coverage to address the *Dunkelflaute* issue will require green hydrogen. When we talk about a blend of green hydrogen in the gas network and we say that the current network is capable of taking 20%, it is important to note that is 20% by volume but only 7% by energy because of the difference in energy density. That is an important point for people to be aware of.

Mr. Mark Foley: The Deputy asked two questions of us. I will answer the first one very quickly. There are 48 projects in Shaping our Electricity Future, on the back of a programme of more than 100 projects. We are going to publish all of them on our website before the end of the year. We will include projects, timelines, locations, etc. Mr. Doyle will speak about Great Island.

Mr. Rodney Doyle: Great Island has been out for a number of months. It was forced off the system because it has a fault. They are working on a fix and we are working closely with them. We hope the power station will come back online even more quickly than was initially indicated. When any large power plant goes out, it tightens our margins and causes us to be more cautious again. This case is no different. We will work with the remaining plant on the system and with our available renewables to manage our way through the summer months. During the summer months, we plan for a number of outages because that is the opportune time to take the outages before the winter. We will operate more tightly and will manage our way through this period.

Senator Pauline O'Reilly: I thank our guests for their contributions. It is good to see Mr. Foley before the committee again. On the most recent occasion he was here, I asked when was the last time a contract was signed for services with a data centre and he said it was a year prior to that meeting in December 2021. We now have a framework in place. Are more contracts for services being signed at the moment? Are they more sustainable? Would they allow for co-location? I was at the time keen to insist that if we are to have data centres, they must have a co-location element to them to allow us to have the energy capacity for the service. What other kinds of infrastructure or industry would Mr. Foley consider ideally suited for co-location? We want to make sure we have variety rather than just focusing on one service or industry.

Representatives of Shannon Foynes Port Company were before the committee during its previous session. They mentioned the focus on the target of 5 GW of offshore renewable wind energy by 2030. They believe there is a target of 80 GW in the new stakeholder engagement or consultation, whatever it is called, this year. Is there a focus more generally on the entire volume that is achievable off the Irish coast? If that is the case, where does that sit then for battery storage, for instance? I note from Mr. Smith's contribution that there are 2.5 GW, I think he said, in the pipeline at the moment. How much more is required if we are looking at something that is a much larger capacity? It is not even for our own energy security but instead it is that broader, pan-European or global market we are looking at. What is EirGrid's function within that as well?

Mr. Mark Foley: I will start with data centres. The new data centre policy was announced before Christmas. It has three new criteria, namely, you have got to be in the right place, you have got to bring generation and you have got to bring services. I am confident we will sign new contracts under that policy regime this year with data centre operators who comply with those three criteria. There are many discussions going on with operators but I expect there will

be a number of connection agreements signed this year. This policy framework is going to work. There is a lot of onus on them to bring something to the party and they will do so.

On the Senator's questions about offshore renewable wind energy, can we separate the two horizons? It is really clear for 2030, that is, 5 GW of offshore in the Irish Sea. It is the most cost-effective place to locate. The seabed is shallow. The developers have been out there for the past ten years developing their projects. We are really clear we need those 5 GW of projects. We need about 1.4 GW of batteries, I think. We need some onshore wind, some solar and subsistence services. That is really clear. The numbers might move a little bit but generally speaking that is what needs to be done. When we look beyond 2030 - and this is where the Senator mentioned 80 GW - the potential off the west coast is almost unimaginable. Our job later this year is to start the process to look with stakeholders at how Ireland Inc. exploits that opportunity. We will do so through a very engaging process with all the actors in the system, including bodies such as IDA Ireland that are looking at the long-term economic interests of Ireland. That will explore options, scenarios, etc., about how that can be deployed. It is important we separate the two. The 2030 target is about delivering what is front of us. Post-2030 is about realising a vision for Ireland in terms of the resource.

Have I answered the Senator's question?

Senator Pauline O'Reilly: Yes, except the point about it is, and what I was asking the previous contributor - although I grant Mr. Foley was not in the room - was about the importance of a pipeline beyond 2030 for investors into the Irish market. Even in the short term we need to be looking at a pipeline. That is why I am bringing in what is happening after 2030. Surely it all needs to be together within a strategic plan.

Mr. Mark Foley: Agreed and I think we are going to start that work this year. To be really clear about one point, it needs to be plan-led. There cannot be a free-for-all from Donegal to Cork. It just will not work. It will be inefficient. Our job, working with the Minister's office, is to come up with a master plan for the west coast. That will then allow developers to play their part in the context of that master plan. It is a top priority for us to start that process this year and to give everybody a voice in what that vision should be. We are going to need those developers but it needs to be in a planned context. It cannot be a free-for-all. It will not work.

Senator Pauline O'Reilly: On the battery storage element and the question of whether we have the capacity, Mr. Smith is saying there is 2.5 GW in the pipeline, which is beyond the 1.4 GW required currently for that 5 GW. Granted, there are different types of battery storage but what is needed from his own industry to facilitate the growth that is required? That is not just a question for Mr. Smith. I am not picking on him.

Mr. Bobby Smith: I can have a go first. I thank the Senator. It is important again to differentiate, similarly to Mr. Foley, between the 2030 horizon and post-2030. The 2.5 GW of battery storage in the pipeline at the moment that is pretty much ready to deliver would be more in the multi-hour space providing storage within a day. For instance, it would be charging at night when there is excess wind, then discharging that energy at the peak demand during hours, for example, between 5 p.m. and 7 p.m. and displacing fossil fuel peaking generation. That is where that 2.5 GW would play a big role. Going beyond 2030 and that final 10% to 20% we must decarbonise, that is when we get into the large and medium of storage such as green hydrogen or the other 100-hour plus energy storage technology that is going to play a role. That would be needed to cover these extended periods of low renewable output, for instance during winter when that energy storage medium is needed to cover those periods. That is where that

comes into play. That is quite a lot of storage. I could not put an exact figure on it myself but it is a lot when talking about the final decarbonisation of the electricity sector. To get to 80% and get there efficiently, that is where that 2.5 GW comes into play and can play a very effective role.

Ms Doyle might comment on the investment as well.

Ms Bernice Doyle: On the investment signal piece of it, maybe the blessing and the curse of battery storage is it can do different things. There is this concept of revenue stacking. A six-hour battery, say, can be used to cover amber alert capacity events in the market so capacity can be provided but this daily balancing function can also be done for renewables where companies can charge at times of excess renewables and discharge at time of low renewables. It can do both those things. It can also to the system service, that is, the very fast response, so it can do many different things.

In Ireland we have been very successful at delivering short-duration half-hour batteries to date. We are actually kind of done and dusted for the moment because of the technical requirement. That deployment has happened on the back of clear market signals there were two parallel markets, namely, a tariff market and an auction market, which were signalled way back in 2019 when we in Statkraft invested in the first battery project. Once developers have clear sight of a market, even for a few years, and they have a reasonable chunk of their capital expenditure that they can see a line of sight of getting a return on, they are an optimistic bunch and will invest. The pipeline is there.

The problem at the moment in getting from that short duration to the multi-hour, daily balancing-type application is we do not have any kind of anchor revenue stream. We need to do that either by way of a capacity market contract that will cover a portion of our revenue and then we will take some assumptions on what we can get in that daily trading market or the congestion product Mr. Ryan and Mr. Smith have talked about where one builds battery storage behind a constraint and use it to avoid network build-out. Those are two examples of how a product could be defined and a contract given that would give an amount of certainty to developers to go ahead and move on these projects. That is what we are missing at the moment and where we need to move.

Senator Pauline O'Reilly: I thank the Chairman.

Chairman: I thank the Senator. I am very mindful of time. There are quite a few members who wish to get in. To check with those online, Deputy Bruton had his hand up. Does he intend to ask a question, though not necessarily now?

Deputy Richard Bruton: I did but I am happy if the Chairman is constrained.

Chairman: We will try to manage it. I just wanted to find out if he was interested in asking a question. Is Deputy Bríd Smith there?

Deputy Bríd Smith: I am, and I would like to ask two brief questions.

Chairman: Okay. I will go to Deputy Whitmore now. I ask our guests, as enthusiastic as they are about their subject, to curtail their answers to allow everybody to ask questions.

Deputy Jennifer Whitmore: I thank the Chairman. My primary questions are to EirGrid. I was also going to ask about timelines for the grid as grid capacity is always an area raised with

me as a potential risk. If there is a plan, timelines are put in or else there is far too high a risk of overruns. I am concerned it will take EirGrid a year to get those timelines into a document where it could be tracked so we would know where we are at any point in time and whether any of the projects have been delayed.

On Mr. Foley's other comment on the west coast and exploiting the offshore wind and how it is a future project, it is a really big project to get under way. From EirGrid's perspective, does it have enough resources to deal with the increased challenges it faces and increased programmes it faces? A year is quite a significant time to take to produce a table with all timelines for different projects.

Bringing it back to consultation and engagement, I note he mentioned the offshore team is working closely with the developers of the phase 1 and phase 2 projects. My understanding is a grid connection assessment process has started for phase 1 projects and quite a lot of detailed engagement is required as part of that. Project managers have been requesting clarity on specific aspects of that, such as the operations and maintenance requirements EirGrid would have, the design review process, and the actual functional specifications EirGrid requires, but I understand this clarity is not being provided and there is no engagement or insufficient engagement, consultation or meetings taking place. When will EirGrid make that clarity available to the industry? Will it meet with industry representatives in the near future? I believe this all has to conclude by August. Investors need clarity when it comes to these large investments.

I may have picked this up wrong, but is there a disconnect between what the storage industry is talking about in terms of requirements and what EirGrid believes are the storage requirements? It could be the case I picked it up wrong and the types of storage are different. However, EirGrid is talking about 1,000 MW of medium- to long-term battery storage while I think the industry mentioned 1,900 MW. That is a significant difference. What is the reason for that? Does the industry believe Shaping Ireland's Energy Future reflects EirGrid's needs?

Mr. Mark Foley: On the Deputy's first comment on the timelines, I can say with absolute conviction that we have detailed programmes, but the issue of publishing them is another matter. We have some work to do in making that public domain. We are very focused on those projects and on delivery. Please do not equate us not publishing it until later in the year with the idea we do not have our foot on the gas; we have. It is a huge step. No other State authority of which I am aware has done this before. We are committed to transparency and we are committed to putting it all together. It needs to be perfect, and we will honour that commitment.

The Deputy's second question was about offshore and whether we have adequate resources. Yes, we have. We will start this process later in the year. We have substantially increased our offshore capability since the Government made the announcement in May of last year to make EirGrid the offshore transmission operator planner and owner. We will be in good shape to launch that process later in the year.

We are in very significant engagement with the operators on the Irish Sea. I am surprised and a little disappointed to hear some people suggesting to the Deputy there is inadequacy in that engagement. We are committed to getting those projects over the line.

Deputy Jennifer Whitmore: Do they have the information they need?

Mr. Mark Foley: I believe they have or it is coming. I am not aware we are on the critical path in this regard. We are working very closely with them. We have made it our business

to ensure we do not delay them. I can say to the committee that the offshore proposition is so important to Ireland Inc. and to the 2030 targets that we are going to be there and we will make sure we will not slow this down. I ask the Deputy to bear with us. However, I am satisfied my team is heavily engaged and we will meet our dates on that.

On the point about storage, we can separate this into two issues: what is needed and what is available. Whether it is onshore wind, offshore wind, solar, batteries or services, there is a lot more in the pipeline than is needed. That is a good thing and it is healthy, because projects fall over, so to speak. They do not get through planning, get funding or whatever else. There is no disconnect. I respect the industry and the fact many people in it have, from their perspective, very viable projects. Arguably, however, there are probably more than we need. The good projects will always get over the line, in my view. That is a healthy position for Ireland Inc., that across the whole space there is more than we actually need. That is good and the good projects will get done.

Mr. Paddy Phelan: I want to go back to the last question from Senator Pauline O'Reilly. I refer the Senator to the attached document that was provided by IESA. It lists the storage contracted amounts scaling up. It also leans back to the question about the 1.9 GW. It deals with the different types, such as short, long or medium. It also models out the gas that was suggested earlier that is the backstop for the system. The document details why we will need it. It scenario plans it out to 2030. I hope that will be helpful in understanding that a pipeline is required. I would not suggest for any reason that it is bigger than is needed, judging by this information.

Mr. Eugene Coughlan: ESI's studies have shown that about 2,000 MW are required. Maybe we are not that far apart. I was speaking to Dr. Ryan before meeting, who said that their 1,000 MW target is for 2026. We have planned until 2030. Have I quoted him correctly?

Dr. Liam Ryan: The 1,000 MW target is for 2026. The 1.4 GW target is for 2030. Again that is for the 70% renewables target. We will be doing the revised analysis around the 80% targets. The gap may not be as wide as people think.

Deputy Bríd Smith: First, particularly to those who are involved in trying to incentivise the market, I personally find it quite depressing and quite shocking that everything is about a business opportunity and the incentivisation of the market when the context of these discussions is the most shocking point of the crisis of our climate catastrophe that we have ever faced. It like not looking up while the comet is hurtling towards the planet. We are facing the possibility of human life not being able to exist on the planet within a matter of years, yet everything is about how we incentivise the market and how we create business opportunities. If the knowledge exists and the ability to do all this is available, it should be used for the common good and should not be seen as a business opportunity. That is why I have a problem with all of this being done by developers and markets. Although EirGrid has said it does the planning, it facilitates the market rather than seeing it right through to the bitter end. On that basis, I want to ask EirGrid, when it made that nice quote at the end of its intervention that "the greenest MW is the one we do not consume", could that be applied to data centres and could it be said the greenest data centre is the one that is not built, given the context of this crisis?

Maybe EirGrid could comment on how much the private developers and offshore energy have put back in. EirGrid and the national grid are doing a great job preparing for this, but how much do the others put back into the system relative to the so-called business opportunity gains from it?

Deputy Richard Bruton: It is not surprising that I come from a rather different perspective. In this uncertain world, when we are trying to cope with extreme contingencies and when there are uncertainties around big, upfront costs as well as infant technologies, it is extremely important we design the market well.

I have heard from nearly everyone who spoke that the market is poorly designed to deliver what we need. Having listened to the witnesses, I still struggle to understand what recommendation we should be making to the market designers, if you like. I am hearing we need better incentives for batteries, demand management, data centres and offshore floating wind and that there should be more rewards for these different providers. What are the guiding principles for the market design changes that are being sought? I heard that Australia provides us with a good model on demand management. Will the witnesses give the committee a little bit more guidance as opposed to just saying that battery can solve a lot more than it is doing now? What are the principles of changed market design we should now be advocating?

Mr. Mark Foley: I will take Deputy Smith's questions and my colleague, Dr. Ryan, will take Deputy Bruton's questions. On the incentivisation, Ireland has a proud track record. This is a matter of record. In 2020, Ireland achieved 40% of all its electricity from renewable sources. The ecosystem did deliver, and that was a combination of private companies and State companies. It was a great example of collaboration, private capital, public capital and ourselves as the orchestrator in making all of this work together. That ecosystem will get us to 80% by 2030. I am very confident of that. It is not unreasonable for those in the ecosystem to get a return on their investment. Technology and competition will produce very competitive prices. That is all I am going to say about incentivisation.

We have a new policy framework on data centres, as enunciated by the regulators before Christmas. We all left our offices in May 2020 for two years to work from home. Thanks to the digital economy, this country worked and performed economically. We must understand and respect that the digital economy is a really important part of how we live and business will be done over the coming years. The new policy will provide a better balance than we may have had previously. It will allow for growth, but only on the terms set out in the policy. We can continue to grow the digital economy but in a more ordered way. I do not believe we should apologise for that. It has served us very well. Companies in the Irish ecosystem have contributed greatly to the economy. This is Government policy. Our job is to deliver in the context of Government policy. It is a reasonable policy with a proper policy framework, as enunciated by the regulators before Christmas.

Chairman: Does Dr. Ryan want to respond to Deputy Bruton's question? It is probably more geared towards the other witnesses.

Dr. Liam Ryan: I will keep my reply very short because I am conscious of time. From an EirGrid perspective, the system services market needs to change and evolve. The system services arrangement was really good. It actually allowed us to bring on the right services to support the transition to meeting the renewables target of 40%. That now needs to evolve to the next level. We have outlined the requirements in this regard in detail and provided them to the regulators.

The capacity market needs to change to get the right capacity onto the system. To my mind, it entails very reliable generation with a low-carbon footprint and renewable gas in the future. The final element is that the energy market needs to change to send out the right short-term signals to unlock the demand-side potential.

Mr. Mark Foley: I am mindful of Deputy Bruton's economics pedigree and all the rest of it. If he wants a briefing on the very prescriptive information and specifics we have supplied to the regulator, we will be happy to give it to him.

Chairman: Does anyone from the DRAI want to contribute on specific signals?

Dr. Paddy Finn: I welcome the comments. On Deputy Bríd Smith's comment, I feel very privileged to work in an industry in which, when I meet colleagues representing other technology types, we look consistently towards the best outcome or solution. In no room I have ever been in has anybody tried to champion his or her technology type only. We have wanted to achieve the lowest-cost solution for decarbonisation.

Regarding Deputy Bruton's question, an answer would take considerably more time than we have. There is no energy payment for demand response, for example. As it is utilised, it does not get paid. The more it is utilised, the more it costs participating customers, which is a counter-incentive to participation. It clearly does not make good business sense, so it needs to be addressed.

With regard to the characteristics of the electricity system and what is being procured, an analogy is the best way to show where we are. When new services, DS3 system services, are being procured, the mind is always focused on how one is used to doing things. If we were looking for a mode of transport with two pedals, EirGrid, being used to driving a car, might specify that the pedals need to be an accelerator and a brake and ultimately preclude bicycles. That is possibly where demand response finds itself in that the characteristics being sought need to be more granularly specified in terms of what is being looked for rather than what one is used to.

Chairman: I am glad we are finally talking about bikes.

Mr. Eugene Coughlan: Our AFRY report, which we have copied to members and which they will have an opportunity to examine after the meeting, identifies several barriers to storage development. As Dr. Ryan said, the biggest one is uncertainty over the system services market. We do not know what the market for system services will be from 2024 onwards. How can people invest when they do not know what the market will be? The report identifies a few other issues. The grid connection policy is a big issue for anyone participating in the market. It is a question of a transmission network charging design that can incentivise flexibility. Storage and batteries can result in great flexibility and the provision of all sorts of services to the market.

Chairman: Do Mr. Smith and Ms Doyle want to contribute? If so, they should be as brief as they can be.

Mr. Bobby Smith: Ms Doyle mentioned the forum. We are talking about projects with high levels of capital and operating expenditure. They need long-term revenue support to deliver. We have had success so far in the DS3 market in respect of short-duration batteries because there was a framework of five to six years in which people had some visibility and a stable revenue they could build on. Right now, it is a lot more uncertain for multi-area projects. The only long-term contract that those associated with storage can get right now is through the capacity option. It is a ten-year contract. We recently saw in the T-3 option that there was around 1 GW or more of de-rated gas capacity to be cleared compared with approximately 150 MW of de-rated battery capacity. It goes back to why that is the case and how we can change the capacity market to deliver more low-carbon capacity. That entails emissions limits and treating the

storage and demand-side response more fairly in the markets so those concerned can compete and secure the long-term supports, because that is essential.

Ms Doyle mentioned congestion products. If we are looking to build storage in constrained areas of the grid, there is no locational signal right now to do so. Given the circumstances on storage and building, sending a clear signal to build in a given region of the grid to receive a contract with a given price support will incentivise development.

Chairman: To build on Deputy Bruton's question, when are we going to get clarity on the signals? Does it entail EirGrid or the CRU?

Mr. Bobby Smith: Both. The DS3 system services are related to the CRU. The locational signals and the review of the capacity market are probably more in the remit of EirGrid, but I can-----

Chairman: Does Dr. Ryan want to comment on that?

Dr. Liam Ryan: We are working with the CRU on the system services, so we expect that the CRU will publish the high-level design in the very near future. Once we get that, we can move to more detailed design around the future system services arrangements. The intention is that EirGrid will engage widely with the industry on how to make the proposition into one that will genuinely unlock the potential in the way we need.

Mr. Eugene Coughlan: To clarify the point on the CRU, it is in fact a matter concerning the SEM committee, the all-island regulatory body that includes the Utility Regulator in Northern Ireland. The decision-----

Chairman: I thank Mr. Coughlan.

Mr. Eugene Coughlan: It is slow from there as well.

Chairman: It is good to get that information.

Ms Bernice Doyle: To respond to Deputy Bruton, there are examples of markets where incentives have been put in place for zero-carbon providers in the capacity market. They include Spain and California. The British market is currently consulting on how to revise and reform the capacity market, also with a view to incentivising zero-carbon providers. Therefore, there are examples. Our industry would be happy to come forward with more detail on that should the committee desire it.

Chairman: I appreciate that offer. Three members are offering to ask questions. I propose to take all three together and then revert to witnesses so they may answer in the round. Is that agreed? Agreed. The three members are nodding politely. I apologise for leaving them until last. I call Deputy Cronin first.

Deputy Réada Cronin: I have been listening intently to the discussion. I thank the witnesses for their presentations. I have heard a lot of talk about auctions, price points, markets and opportunities but did not hear references to the centrality of the fact that energy provision is an essential public service and, therefore, I am a little concerned. My colleague, Senator Lynn Boylan, raised the issue of the lack of meetings and the consequent lack of whole-of-system thinking. What are the witnesses doing to actively address this? Where is the holistic thinking? The witnesses are all doing great work but it sounds as if it is siloed a little. The lack of meetings is worth bringing up again.

Given how important it is for the public to be part of the solution, could Ms McHugh elaborate on what needs to happen at Government and CRU levels to include customers in trying to reduce demand? If Ms McHugh were Minister, what policy or registry change or investment does she think needs to happen to allow customers and communities to be part of the solution?

Deputy Cormac Devlin: I thank the witnesses very much for that discussion and for their opening remarks. It has been a really useful discussion for us and certainly extremely interesting.

I have three questions, one of which is about energy security and relates to EirGrid specifically. It is good to have its representatives back before the committee. This is something we discussed during their previous time at this committee. Specifically, EirGrid mentioned there is a temporary emergency generation plan for the next three winters, which is extremely welcome considering where we were last October. There was concern about that winter. EirGrid stated then in the opening remarks, however, that this would be operated by relevant market participants outside of the electricity market and only run as required for system stability and system security purposes. The witnesses might elaborate on that to give the committee a sense of what is proposed for the next three winters.

Many witnesses referred to gas as a transitional fuel only. Do witnesses foresee gas being used post 2030 in our energy mix for energy security on the island? In terms of the up-front costs and outlay, many of the technologies we discussed today are somewhere in their infancy and others are expanding their capabilities. Will this ultimately mean a reduction in cost for the consumer? I know it is a bit early to say but given the plans that are before us, if it all pans out the way it should, could consumers ultimately see a reduction in the bills?

Deputy Christopher O'Sullivan: At the outset, I found this session incredibly informative, insightful and very interesting, particularly in and around the discussion on storage capacity. It answers those detractors to renewable energy who ask what we will do when the wind does not blow and the sun does not shine. There are clearly some pretty advanced solutions out there we can start looking towards. I also note the area of energy use and conserving energy.

This question is specifically for EirGrid. If other witnesses also want to contribute, they should please feel free to do so. Since the escalation of the price of fuel and energy, we have heard comments and statements by other Oireachtas Members within the walls of Leinster House such as that in order to ensure energy security, we should look at doing things like re-open the bogs, encourage the return of peat-powered energy stations, build liquefied natural gas, LNG, terminals, and ramp up oil and gas exploration of our own coast. These are all approaches with which I fundamentally disagree, by the way, and from which we should stay clear. I believe we should absolutely now focus on ramping up renewable energy, be that floating offshore wind, onshore wind or solar.

I would like to know EirGrid's response to those types of comments and suggestions and that policy. Obviously, gas has a role in terms of energy security and as a transition fuel but in the long-term, by the time we have done all those approaches, we would have significantly increased our renewable energy capacity. Would EirGrid or any of the other witnesses like to make a comment on that?

Chairman: There were quite a few questions for EirGrid, therefore, I will go to it first.

Mr. Mark Foley: Deputy Cronin talked about how energy is an essential service and that

maybe there is some confusion around what is out there. The Shaping Our Electricity Future programme gives a really clear roadmap. For the first time ever, we have real clarity about what 2030 will look like in respect of technologies, locations and consumers - the whole picture is presented there. That is our guiding roadmap for the future transition of the power system to one that can handle and will deliver 80% of electricity from renewable sources. We have got that clarity now. It is incumbent on all stakeholders to work to deliver that. There is no confusion about this; it is really clear. I would encourage everybody to get behind Shaping Our Electricity Future. It has that clarity.

The Deputy mentioned public communities. Developers of projects like onshore and off-shore wind farms etc. and ourselves have done huge work around communities in the last number of years. The money we are prepared to put back into communities to give them a stake in the transition is really quite phenomenal. Second, our willingness to listen to their views about our projects is at a level we would not have dreamed of ten years ago. The communities are very much engaged but there is clearly more that can and should be done. I refer to both the offering financially and the willingness to listen to the views of communities. We have walked the walk on this in the last two years in terms of some of the projects, which are very advanced. They are going into planning with community support because we listened to what the communities said to us. That will be the roadmap for the future - listen and then give back to communities. That is my answer to Deputy Cronin.

Mr. Doyle will answer on the energy security matter raised by Deputy Devlin, particularly about the market participants. Let me answer his other two questions. Regarding gas as a transitional fuel post 2030, the answer is "Yes". We will need gas well into the next decade. I cannot tell the Deputy whether it will be 2035 or 2038 but gas is vital. It is really important that Ireland secures its source of gas in order to see us to the Holy Grail, ultimately, of 100% renewables.

The Deputy asked a third question about technology and price. We got from zero to 40% renewables on the power system in 2020 with no increase in the wholesale price of electricity. That is a fact and a matter of public record. My view is that we can get the 2030 ambition. I believe we can do the same again. Nobody has a crystal ball on this but I think that with technology and competition, wholesale prices of electricity will stay there or thereabouts and we will take away the horrible volatility we are experiencing today with gas prices. The signs are very good in that regard.

Chairman: Should we reopen the bogs?

Mr. Mark Foley: I am trying to figure out my notes about what Deputy O'Sullivan asked. I think we should double down on the climate action plan and deliver the renewables proposition, but we need gas. The Minister's study on security around gas is a very important piece of work. We look forward to what that will say in terms of protecting Ireland's security. The renewables pipeline is incredibly healthy and very powerful and it will get delivered. We have just got to make sure we have enough gas. We will clearly support whatever Government policy and security study is going to emerge in that regard but we must make sure we have enough gas. We have no comment to make on bogs. That is history stuff. Let us make sure we have enough gas.

Deputy Christopher O'Sullivan: Mr. Foley said at the outset, and I listened intently, that EirGrid's role was to advise. We are hearing commentary that as opposed to focusing on and ramping up floating offshore wind, we should look at honouring the existing oil and gas exploration licences. By the time we explore for oil and gas and carry out those tests, we could be

well down the road of proper floating offshore energy and producing green hydrogen and clean renewable energy. In its advisory capacity, would EirGrid advise focusing on the renewables? Would Mr. Foley agree with some of those comments in relation to oil and gas exploration?

Mr. Mark Foley: I do not know about exploration. The honest answer is that we need both. The work we will do later in the year on the offshore opportunity off the west coast will be about floating technology and harnessing it to deliver economic and energy benefits for Ireland Inc. but we must make sure we have enough gas to see us through this transition into the next decade. I keenly await the Government's study on how we will manage that. We are committed to the renewables proposition and to harnessing energy off the west cost but we must make sure we have enough gas to keep things going as we get to that endgame. We need to have an honest, grown-up conversation about that. We can appreciate the precarious situation we are currently in with what is happening in Ukraine.

Deputy Christopher O'Sullivan: We will need the interconnectors

Mr. Mark Foley: The interconnectors will be key and clearly we are committed to that. We should remember, and climate science is clear on this, there will be significant periods when there is no wind or solar energy. How will we keep the system alive? We must make sure all of us protect it.

Deputy Christopher O'Sullivan: Storage will come into play.

Chairman: Perhaps it is the answer because I think-----

Mr. Mark Foley: Storage will not do it for two or three weeks. That is our problem. We are committed to storage and the technology. I used the term "backstop". We must back-stop the system, otherwise the whole ambition falls over.

Chairman: We do not want to pre-empt the outcome of the energy security review. It is only lately that we have been talking about green hydrogen as a serious prospect. It has similar characteristics to liquefied natural gas. Perhaps we are moving into a space where green hydrogen is the answer and LNG is not. Obviously, there are many challenges to be overcome.

Mr. Mark Foley: One of Deputy Devlin's questions, on the market participants' segment about emergency generators, has yet to be answered. Mr. Doyle will answer it.

Mr. Rodney Doyle: A process is under way so I will not go into much of the detail of that procurement process. We are hoping, however, to secure 200 MW. It will be in place for winters to come and we will have an option to keep it in place for a number of years. That will provide us with what will effectively be emergency generation such that when the system is tight we have the option to bring it on. That will be outside the current market because we would only use it for those emergency purposes.

Deputy Cormac Devlin: On a needs basis.

Mr. Rodney Doyle: Yes, it would very much be on a needs basis.

Mr. Mark Foley: The businesses for this are currently in the market and have the technological know-how, the science, etc.

Chairman: I thank the witnesses from EirGrid for those answers. I will move on to either of the energy storage groups. Does Mr. Phelan want to respond first?

Mr. Paddy Phelan: To return to Deputy Cronin's question, in terms of the forum, as we mentioned, Renewable Energy Ireland is working with fora across electricity, heat and transport under the chair of Dr. Tanya Harrington. There is a forum there which provides a route to, if you like, unsiloed activity. Much more work can be done to streamline that and ensure the age-old issue of technologies competing does not arise. It goes back to the words often used to describe this, namely, "mosaic" and "stained glass window". There are many different scales and sizes to deliver this energy transition by 2030.

On Deputy Devlin's question on gas resources post 2030, wearing my energy agency hat, I would point out we have done resource assessments in the south east on potential biogas and biomethane and we seem to be jumping out over that, as it were. In the assessments we have undertaken from research on demand and potential bioenergy in that space, we have found green gas provides both dispatchable and storage solutions similar to hydrogen. People would be amazed by the potential energy that sits there if that industry was supported to produce green gas on foot of local employment in rural areas and inject it or move to a virtual network. There are some interesting projects on that. This area has been overlooked for a long time. That is a potential onshore resource to add to the intention of Gas Networks Ireland of having 20% renewable gas in its system by 2030. We should not forget about the potential for biogas. Europe recently pointed to it as having a strong potential to decarbonise and also for producing organic fertilisers and, subsequently, supplying some storage as well.

On the issue of consumer price reduction, we all agree that auctions and markets have indicated for a long time the cost of energy reducing, particularly electricity, but obviously that is all changed in terms of security. To follow on from EirGrid's comments on making sure everything arrives at the right time, be it through generation, storage, transmission distribution and distributed demand-side reduction, both in terms of energy efficiency and integrated renewables, in those circumstances, the market should stay stable. I echo Mr. Foley's comments about being able to do that because everything needs to arrive at the right time. However, if there were any slips or trips along the road, we will see price increases in auctions.

Chairman: Does Ms Doyle or Mr. Smith wish to respond?

Mr. Bobby Smith: I will respond briefly to Deputy Cronin's question. I apologise for all the market-speak in the past few hours but I definitely think there is a lack of joined-up thinking in all of this. We need a whole-of-system approach. That is why, in our statement, we urge the creation of a industry liaison group with the different policymakers, ideally led by the Department of the Environment, Climate and Communications, and with EirGrid, the CRU and the industry on board, to tackle all these issues and ensure there is a whole-of-system thinking that delivers the broad portfolio of technologies we will need.

On Deputy O'Sullivan's point and on EirGrid's point, we need to be ambitious about how we will tackle this. There is a medium - green hydrogen and other forms of renewable gas - that will be needed for those extended periods of low renewable output, which can often be across Ireland, Great Britain and the Continent. Interconnection will only help us so much. What we need, ideally, is for the new generation being built to be hydrogen-fuelled ready at a point in time to convert to that medium of primary fuel and for existing generation to be retrofitted. We believe that is possible but that needs to be built to ensure we do not lock ourselves into a certain aspect of fossil fuel generation for decades to come.

Chairman: Does Ms McHugh from the Demand Response Association of Ireland wish to respond?

Ms Siobhán McHugh: I thank Deputy Cronin for her question. I was heartened to hear her mention the words “whole-of-system thinking”. That is exactly what we need. Her colleague, Senator Boylan, mentioned the demand-side strategy. This is where this comes in. Demand response is one element of a broader demand-side strategy. We have energy efficiency, which is the foundation of everything, the demand response, and then price-based and tariff-based mechanisms. Demand response, in its pure sense, is taking place with industrial and commercial customers. As we electrify heating, vehicles and transport, our homes will have batteries, solar panels, an EV charger outside and a heat pump. That becomes important in terms of the controllability of those to provide services in the future or to be incentivised by price. There is that ecosystem.

To note the number of agencies and different parties involved, there is the Sustainable Energy Authority of Ireland, which does excellent work, and our colleagues in ESB Networks, for which this will become an increasing challenge on its network because of the electrification of all these different sources and uses. It has a programme of work in place and is looking at that. The solutions are manifold. They are direct demand response, location based and price based and they need to be thoroughly considered in the round.

The Deputy asked what would be the one thing we would recommend to the Minister. We would say the Minister should take the excellent action included in the climate action plan of having 20% to 30% of demand as flexible and to be very specific about which routes some of that needs to take. Some of it will be a demand response providing services to the grid, as we discussed, some of it will be locational on the distribution network and some of it will be price based via tariffs and different controllability of devices in homes, SMEs, farms, etc. We need to make that work for what the system needs. We need that round view of it. We need a clear target to be set, that being the target we have already, but we need to make that actionable and accountable and to work with the other actors in the sector to drive it forward and make sure it delivers.

Chairman: Deputy Cronin’s question was what the witnesses advise if they were the Minister. I think Ms McHugh’s answer would be the same.

Ms Siobhán McHugh: That would be my advice to myself if I were Minister.

Chairman: You might be at some point. That brings us to the end. We have gone way over time. Apologies to our witnesses who I am sure have other engagements, and to staff. I thank the witnesses for coming in and giving us their valuable time. We appreciate it very much. It has been a most informative few hours for us. It is part of a series of sessions which will ultimately feed into an important report pressing Government on what the committee feels needs to be done in this area. The other main role of the committee is to get some of these thoughts, ideas and actions out into the public sphere. Many of us in this area can be accused of talking to each other all the time. There very much needs to be a public conversation about many of these issues. The committee is certainly helping in that regard.

The joint committee adjourned at 2.30 p.m. until 11 a.m. on Tuesday, 29 March 2022.