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Introductory Jingle

Innovate UK KTN connecting for positive change.

Mark

Welcome to this next instalment of Maritime Innovation Sound Waves podcasts, where we are exploring hot topics of a talk of those driving innovation in the ports and maritime sector. The maritime sector is responding to global and domestic ground challenges addressing a transition away from fossil fuels to net zero operations, along with ambitious plans to embrace automation, digitization, and striving to improve productivity and safety. We have assembled teams of leading experts in their fields drawn from our network to join us in discussions related to these grand challenges. In this episode, we'll be exploring how ports are looking to address a growing need to directly supply electricity, sometimes called Cold ironing, to resident and visiting vessels, allowing them to switch off their diesel engines whilst at berth, or to recharge their energy storage systems and power ancillary equipment. I'm delighted today to be welcoming David and Jonathan, who are sharing the virtual microphone and will bring with them a wealth of experience of delivering our energy networks across the UK. Gentleman starting if you wouldn't mind introducing yourself and give us a snapshot of what it is that you've got, what your installation was. So Jonathan, as further south would you like to start and then we'll work our way to the North?

Jonathan

Yes, of course. And thank you for the introduction, Mark. Great pleasure to be here. So my name is Jonathan Williams. I run a company called MSC International which has been working very closely with Portsmouth International Port. We have some very ambitious plans in place and now we're actually implementing their shore power system for supplying a range of vessels that visit Portsmouth.

Mark

Thank you, Jonathan, and David?

David

Thanks for having me on the programme. My name is David Hibbert, and I'm from Orkney Marine Services, which is the Harbour Authority in the Orkney Islands. We have control of all of the harbours in the Orkney Islands, which is 29 Pearson harbours in the authority area, including Scarpa Flow, one of the biggest natural harbours in the world and also the cruise port in Kirkwall, Harray. The project we're looking after at the moment or the other one we've delivered, is the points of a five megawatt permanent connection, the resident ferry runs back and forth for the mainland. Plus, we operate smaller outlets for a number of vessels up to up to 125 amps at the majority of our harbour installations. So that's where we're coming from.

Mark

Thank you, chaps. Thanks for that brief overview. So since you're both from different ends of the UK, and you've got quite different installations there, then, of course, is one thing that unites you, you are in an exclusive club of being the first and some of the only ones to install

commercial shore power systems in the UK, despite this technology have been available for for somewhat over over a decade. So what prompted you to take the plunge at your locations and what helped realise that?

David

I can sort of lead on that one. And certainly a collaboration is probably led by Orkney Islands Council policies to look to try and reduce the environmental policies and statements have come out with a need to net zero, eventually noticed that one of the biggest emitters in the area, was the biggest ferry that runs back and forth to the mainland. And add into that additional problems with actually too much renewable energy on the islands, with a lot of the suppliers are actually being cut off. So we look to try to find a way that would benefit everyone, ideally, sell more electricity off the grid to allow more people to generate onto it, and gain a carbon reduction in the harbour region and within the islands and try and bring the benefits to all as part of the council remit.

Mark

Excellent, thank you. And Jonathan?

Jonathan

I'm from Portsmouth and the real driver actually, when they started this journey, was air quality. It wasn't carbon at that time. The air quality in Portsmouth is poor. The monitoring systems which the port had installed was showing that certain vessels, certain activities, were responsible for very large contributions to that air pollution. So that was the original driver. Now of course, carbon is very much on the agenda and rising rapidly for the maritime sector. So that's an additional driver now to accelerate their ambitions.

Mark

Yeah. And because Portsmouth is one of the first places in the country to have a clean air zone, as well as introduce a clean air zone, which is followed by the port work, it wasn't in place before the port work started.

Jonathan

Yes, you're absolutely right. It was such a recent development, I have to say it wasn't primarily driven by the port, it was driven by other sources. But the port is a contributor to the problem. So yes, there's an agenda there, and everyone's having to play their part.

Mark

And both key drivers. For both of you air quality and carbon reduction, and certainly the opportunity to encourage more renewables coming onto the grid. Yeah, it is a great thing. But when we start to look at some of the other developed maritime nations, so when we start to consider places like the United States or Canada, Scandinavia, you notice that they have substantially more installations. So have you got thoughts on what their incentives were for those nations? We're all on the same time line in terms of the carbon reduction on the Paris Agreement. So have you got any insights into why those nations are substantially more advanced in their installations?

David

Certainly, on the America, or the US side, California, led the way with our air purification board, round that area, and mandated a number of vessels coming into Long Beach to have to go to zero emission. Basically, a lot of the regulation we see out today is from that advance that they had there. It's kind of interesting and IE regulation for the ships is that the container ships are allowed to put the cable from ship to shore, where the regulation is from shore to ship. And that was kicked off by the container ships coming into Long Beach and taking containers fitted with power equipment on board. And having that fitted to allow them to call the island when they were in Long Beach, which is transferred into the international regulation now. So they were first up to mandate these changes are what become sort of international regulation. The other big driver really is this cost, the cost of electricity. And in the UK, we'd have probably the most expensive electricity in Europe. At the end of the day that is the raw product, you sell electrons to ships. And then the bills they pay are what the raw material cost is, plus the cost of financing the infrastructure. So without, you know, we have no carrots and we have no sticks. And the UK at the moment, we have no legislation telling them they must do it. And we're not encouraged by high electricity costs, and pretty limited grant funding for infrastructure. Not only that, there's grid infrastructure as well. There's issues all over the UK on that. I know from the fact that the port of Aberdeen has been trying to look at cold ironing and they just can't get a connection.

Mark

Yeah, no, I think those are things we certainly want to unpick during this podcast. Jonathan, any thoughts on Scandinavia particularly?

Jonathan

Yes, I think I would, certainly from our experience, and we've done a lot of work with European ports actually, that shore power is not cost competitive, period, in any country. Simply because the cost of generating power from fossil fuels is substantially cheaper than the cost of buying electricity from the grid. So the work we've been doing on the continent, the driver there has been very much the fact that ports are publicly owned, a bit like Portsmouth actually, but Portsmouth is something of an exception in the UK, where most of the ports are privately owned. But on the continent, they're publicly owned, and there's political pressure to install these facilities. So they're doing it, at some considerable expense. The difficulty is persuading the vessel operators to use the shore power facilities. We even have situations in some ports where vessel operators are mandated to connect to the shore power, but they still operate their engines, they just don't, they don't buy any power through the shore power connection, completely defeating the purpose of the investment. So, this is a big problem. And there are really only two solutions. One is that you make it mandatory or you prohibit the running of fossil fuel or carbon and pollution emitting engines import. Or you introduce fiscal instruments which make shore power competitive. And if you don't do either of those, you're not going to get a widespread take up of shore power.

Mark

Yeah, certainly from the studies we've done over the last couple of years and talking with owners, and operators like yourselves, these are big, substantive capital projects when you're introducing new infrastructure, so you need good access to investment and funding to make them a reality. And that's certainly something that unifies most or if not all, of the early adopters is that they've received a fair slug of public and private money coming into them. So have you got any thoughts on how responsive are the investors and the private finance

bodies? How aware and alert are they to this opportunity? And, specifically on the public funding element, how crucially, do you view it? Is there enough of it? Is it accessible? And do we need that then for the foreseeable future? Do we need an element of public funding moving into this in the absence of legislation, and that mandate you mentioned.

David

Certainly, I think that there is no chance of being commercial without grant funding incentives. I mean, we sell electricity at cost to the ferry companies, which is negotiated on, you know, on a very large, local government footing. And we just get a return out of a charge that just takes in the minimum just to cover the cost of the infrastructure we put in. Notwithstanding the grant funding, which is about 80% of that, and it's still just about breaks even on the cost of running marine gas oil to generate power. So without significant funding, or mandating that through some sort of legislation or carbon charge, or pollution charge, I think there's going to be quite a sudden difficulty persuading shippers to take this up. Not only that, from the hardware point of view that ships move on without a non resident, you may invest several millions in infrastructure, and the ships that had agreed to use it, next thing they move on and you're left with a stranded investment. So it's quite a difficult business case to put forward. That's the way it is at the moment.

Mark

Yeah. So, David, just picking up on that point then, do you see it as perhaps lending itself more to where you have regular fixed travel or movement. So for example, at a ferry as opposed to perhaps looking then at cargo movements, as you say, that can frequently move from port to port and take their business elsewhere, depending where demand is,

David

Certainly you can get all the stakeholders together much more easily when you're using a ferry service. Ferry services tend to get dedicated ships. The routes are slightly longer terms and you know like cargo ships. And the oil port here we see different ships moving and barely the same one comes back twice. But you know the fact that ferry traffic gets... it's on a timetable. So they tend to be here for maybe decades, through their lives. So certainly working with, you know, the ship owner, the port, the harbour operator, and also, you know, the electricity supply company, you know, to get things moving, it's quite an essential and the core to move these sort of projects forward.

Jonathan

What I would I would add to that, I think I agree with everything that's been said. The only thing I would add, though, looking further ahead is that vessel operators are thinking to themselves, because their assets are very long life assets, they need to plan for the future and under rapidly evolving IMO regulations, there is a growing body of thinking within certainly the vessel operators that we talked to coming into Portsmouth, is that they are starting to invest in onboard shore power facilities, because they can see the writing on the wall really. And the carbon emissions that vessels emit when they're at birth do contribute to their overall carbon waiting so there are drivers now starting to push operators to invest. However, that puts the onus on the ports to provide the facilities which those vessels will need. And there's no, the ports have to find that very substantial capital investment themselves. So, that's really where the big problem lies, I think coupled with the fact that for certainly for some operators, they will be, they will need to be pushed before they will use

these facilities. So I think things are changing, but they are.. it's all a little bit unstructured, I would say at the moment, a little bit unstrategic, and certainly from a UK PLC perspective, it's you know, it's a little bit fragmented, I would say.

Mark

Yeah, talking to a couple of different port operators who have expressed a strong interest in taking forward some form of on site shore power system, a lot of their lot their concerns relate to the availability of energy, the cost of obviously bringing the connections in but also the availability, the intermittency, other demands from elsewhere and local areas. So in an area where there is possibly constraint to the amount of electricity that's available to the cabling and solution coming in, and the competitive competition, or the competition out there for that electricity, what are your thoughts in terms of the role therefore, for energy storage or energy sub distribution systems? What are your thoughts there, Jonathan, perhaps your experiences?

Jonathan

You're right Mark, that's very much where the work we've been doing in Portsmouth has been focused. Because Portsmouth is a very good example of a port that is very constrained in terms of its access to the sort of power levels that they will need from the local distribution network operator. So we have the projects that we've been doing. I've included some battery storage as a prototype battery storage system to essentially demonstrate how poor people can operate these types of facilities to optimise the way that they manage their energy resources. So new areas for the port, and I don't think we should underestimate the challenge for ports in becoming adept at doing this. But the role of battery storage is now becoming very, very clear and very critical in our view, not only because it means that the port can operate with a reduced requirements for power rating from the local network, but also, because they can optimise when they buy that power, within reason. And therefore avoid having to buy power when prices are very high. And instead buy it when prices are lower, so they can reduce the cost of the average cost of electricity that they need to supply to their visiting vessels. So I think there is a really crucial role for storage. But then of course, we're in competition with all the other demands on storage and the fact that storage is still relatively expensive.

Mark

David?

David

Yeah. So we've experimented in a number of a number of things, we're part of a software project, we have a fuel cell unit running on hydrogen in Cutler harbour area that's connected to the winner, the three of them and Ireland ferries, births there, found that the use of that was, it was problems on the generation side of the of the hydrogen, which was one of one of the islands. But the kit worked very effectively, and from what it did. But the problem with the hydrogen became quite more expensive than was originally envisaged. It was, you know, the cost went up, the reliability wasn't quite where it should have been. So there's quite a bit of work to do on that. But I think the key part of that whole project idea was the hydrogen fuel was generated from curtailed energy, that's when renewables are told to switch off because there was too much electricity being generated. As you see more and more renewables or wind farms and renewables coming onto the grid, we can see that becoming a problem

nationally. And looking for this thing called demand side management where you price electricity down and up depending on demand. And you can either turn that into hydrogen, put it into battery storage, using allsorts of other mechanisms for storing that. Now, no doubt there'll be grid scale solutions coming through to that being pumped storage and whether that feeds through to your particular electricity supplier. Apart from that we don't have any views on sales or batteries in the harbour area. I know some new renewables projects are using batteries to smooth out hydrogen production in other projects, which I think has been quite successful but at this point, the cost benefit of batteries versus grid is probably quite prohibitive at the moment. And what we do with the large operator, they run a half hourly tariff, which is fixed, so they can then choose if they want to use the electricity from us, which is obviously cheapest in the off peak time, and most punitive, and in the early evening, which actually coincides for them, it's when they're not actually in on the birth anyway. So they can, by the way they're operating their schedule, they are probably availing themselves of the best possible tariffs, to be able to use. So there are two ways of looking at that. If you can consume at the cheaper price times, good for you. And if you can't, you can either, you know, suck up the higher charges, or look at some storage systems on an individual basis. Well, so now, if you're a ship with possibly some hybridisation on it, you can choose to use your internal batteries, if you wish, at that particular time of the day, and top up your systems through the night, if you're still alongside, or it has a lot of flexibility. So also from the ship owner point of view, they have some flexibility, you know that this hybridization is making some traction into the shipowner side as well, so they'll have that flexibility. So they can maybe take down megawatts, so that the lowest peak or the lowest pricing time through the night and disconnect at the peak time. So there's quite a flexibility between what the harbour operator and what the ship owner is looking at. So that ideally, they need to be connected, so you need to do this together to get the best solution here.

Mark

It's really interesting to hear from both of you because you both represent seventy two of the four running technologies in terms of battery storage, and the use of hydrogen in fuel cells. They're certainly from our experience of the two front running technologies that are being developed at the moment, so it is great to hear more on those. You sort of lead me then into my sort of final question. And then the final thing I wanted to explore with you, was the government has made fairly substantive investments and certainly, in recent decades, it's the biggest investments that the maritime sector has seen into R&D projects and demonstrators through there. The Department of Transport's two hundred and six million pounds UK short programme. And I know that you've both benefited to some degree from those, so far. How do you feel that's gone so far? We're coming up to the last, or we're expecting the last round, round four to come out later this year. What would your advice be to DFT When thinking about what to invest in next? What sort of projects should they be encouraging forward? How do you feel the investments so far have gone? What would you be looking for as options for a clean maritime round?

Jonathan

Well, that's a very, very big question there, Mark. I think, what are the barriers, I suppose which need to be addressed? And one observation would be that the timescale for submitting proposals for support under these programmes has in the past been too short, in my opinion. And so I don't think there's been enough forward thinking and this may be a treasury, you know, constraint on DFT, it probably is. But it has the effect therefore of

militating against long term strategic planning of a programme which can evolve over time. So that's a pity. But having said that, some very good work has been done. I don't want to suggest otherwise. But the thing, which I think really needs to be recognised as well, is that some of the barriers are uncertainties, which are in the government's gift to start to address. So, for example, it's very unclear at the moment, when we were studying the role of the port supplying balancing services back to the grid, which is one of the spin off benefits from having storage in the port, it's extremely hard to make a business case because there is so little certainty on how those balancing services are going to be procured. They're all done by auction basically and there's an anticipation that the market will change very quickly over coming years as the generation becomes more intermittent and so on. So what that means for investors is a lot of question marks. And we really need to start to address that uncertainty in order to allow those kinds of investments to go forward with greater confidence in my opinion.

Mark 25:14

Yeah. And David, any further thoughts?

David

Yeah, I would just like to say about, you know timescale, it is really, really key on this, as I think Jonathan was pointing out, infrastructure takes years to put in place. I find that, you know, with a shortage of greater infrastructure to take your electrons to your key site. So no you apply for, you know, a 912 megawatt connection, particularly an area which we thought is relatively big, that you're probably looking at five to ten years from before, you know, the infrastructure of the national grid, as part of the you know, they have their strategic plans of wiring up taking power from wind farms, nuclear power stations, you know, wave and tidal all over the country, and how they connect all that up. And these are high levels of power, they're part of that. So getting a solution in one to two years out of that when there's no backbone infrastructure there, is just probably not going to happen. So that kind of pushes you down. If you have to deliver, you have to do something local, and trying to do something with what you can produce locally is quite difficult. If you've got land, you've got renewables. You've got maybe a wind, you might be able to put up some solar panels or just do something locally. But doing something nationally is very, very difficult in a short timeframe. And particularly getting all the stakeholders on board with that is challenging. It goes into shipbuilding plans, ship modification plans, planning for quay sides, you know, what sort of ships you're going to take on your birth planning. So it's really, you know, this is like, you probably need it, this needs to fit into a five year plan as a minimum. So, a lot of the funding calls have been one or two years, which is really missing the mark, apart from research that does very well in that, but in fact, to deliver a project of this sort of scale in two years, it is a big ask.

Mark

Yeah, no, absolutely. No, it's, you're right. Certainly, in terms of driving forward this agenda, certainly there's a place there for bringing together some of these strategies, the UK shipbuilding strategy, bringing together the UK energy networks strategy all together. So you know, a big piece of activity there is to stitch that lot together and get those departments engaged. Well, thank you, gentlemen. Thank you David and Jonathan for joining me today. I really appreciate you taking the time to share your insights and learning from the projects you've delivered down at Portsmouth and Orkney. Thank you again for joining me today. And

thank you to the listeners for joining us and do check out the rest of the podcasts in this series. And thank you again for joining us all.

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