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Simon

Connecting for positive change. So hi, everyone. So congratulations for making it to episode four and thanks very much for that. I'm Simon Buckley from the Transport Team at Innovate UK KTN and this is the Hydrogenerally podcast series, which is brought to you by Innovate UK KTN. We've had a number of really positive conversations in our first three episodes. Firstly was Sam on how hydrogen is produced, then we looked at where it could be used and then we explored how it could be used for aviation. So before we get into today's episode, just a reminder about the podcast and the network. So the Hydrogenerally Podcast Series is the voice of the Hydrogen Innovation Network. We're looking at applications, some of the opportunities and the challenges of the hydrogen economy. One of our core goals is to enable local clean hydrogen uptake and do that at scale, while also obviously reducing the costs. So it's more commercially deployable. And if you haven't already, please go to our website, Innovate UK KTN through the link in the description that will be at the end of this podcast and sign up to receive various newsletters and updates. You'll also be able to log back in and look through old episodes of this podcast there as well. And so today, I'm joined by two people, my colleague, Matthew Moss, who is our maritime expert at KTN. And also and thanks very much for joining Chester, Chester Lewis, Business Development Manager at Ryze Hydrogen. Chester do you just want to tell us a little bit about yourself and Ryze?

Chester

Well, firstly, thank you for having me on the podcast, I really appreciate it. As you say, I'm a Business Development Manager at Ryze Hydrogen. I'm responsible for developing projects with end users and production offtake opportunities. Just an intro to Ryze, Ryze Hydrogen is a low carbon hydrogen supplier. Our aim ultimately is to lower emissions by unlocking the UK's hydrogen economy. At the moment our focus is on heavy duty transport sectors and the first customers we have are in the bus sector. And we look to translate that experience that we have already with our customers into the new transport modes and new applications as they develop. Personally, my background is in Hydrogen CleanTech Consulting, where I focused on low carbon transport and heavy applications like maritime in particular.

Simon

Great, thank you. It must be a really exciting time in this space, which we'll get into in a bit more detail. Erm, Matt, really interested for you to give us a bit of an overview about where future fields are going in maritime.

Matt

Thanks very much, Simon. And once again, thank you very much, Chester, for joining us today. So yes, the maritime sector is a difficult beast. As an island nation, the UK relies on the maritime sector to import and export around 95% of all our goods. When it comes to fuels, the maritime sector is typically burnt the dirtiest fuel it can get its hands on because it's very cheap, although measures have come in recently to perhaps reduce at least some of the sulphur emissions related to that, but there's still substantial carbon dioxide emissions related to the maritime sector. If we were to add all them up globally, it would roughly equate

to the same CO2 emissions as a country the size of Germany. So moving forward, there's a clear need that we need to change those fuels to something that is less carbon emitting. And there's an array of options out there. So I think I'm going to throw Chester right in at the deep end with our first question and say, where do you find hydrogen fitting in this future fuel landscape for maritime?

Chester

Thanks, Matt. I appreciate the maritime puns and hope to hear more of the getting in at the deep end and those sorts of comments. So in terms of where I see hydrogen in the maritime and how it slots in, I think I see hydrogen having a large role both directly and indirectly and by indirectly I mean, as the basis for other fuels hydrogen derived fuels. There's in the maritime sector, very few applications I think, where battery electric will really be a viable option due to the size, power and energy requirements for maritime. Hydrogen offers a clean way to store more energy onboard a vessel, whether that's in a compressed form or in a liquid form, and I see gaseous hydrogen playing a role mainly in coastal and inland shipping, integrating with that surface transport infrastructure where possible. And then obviously, there's a much larger piece of shipping, which is for larger vessels, intercontinental routes, where you need a higher energy density again and I think either liquid hydrogen or more energy dense hydrogen carriers, like ammonia and methanol would be particularly interesting in that sense. And in terms of how it's used as a fuel, I think either a fuel cell or hydrogen combustion engines, there's an awful lot of work going on in both at the moment and places like JCB have huge innovation programmes going on in this space.

Matt

Thanks very much. Chester. Yeah, I completely agree. Hydrogen has a pivotal role to play. There's many different sort of fuels that are touted as the next future fuel for maritime, you mentioned ammonia and methanol but hydrogen is integral in all of those fields sort of going forward.

Chester

So for hydrogen combustion, you are probably looking at lower efficiencies and fuel cells. What you do get is a sort of a technology that is well understood and used today, and has actually got some benefits in terms of scale. So in terms of looking at hydrogen, from efficiency point of view, I think it's often a trap that we get caught into. How you really want to look at hydrogen is, using it as easily in applications as possible. I think having both fuel cell and hydrogen combustion engine options is really important, to service a range of sectors and different power and energy requirements.

Simon

What, so you mean, like longer range vessels might go combustion and shorter range vessels might use fuel cell? And is that how you might see that breaking down?

Chester

Yeah, I think so. That's one way to break it down. You could also look at it in terms of who needs certain zero emission characteristics. So hydrogen combustion engines are moving towards potentially getting to zero emissions. And that scenario the innovation but that obviously, having an electric powertrain within fuel cells allows you to have zero emissions at

the tailpipe, out of principle, so I think there are a variety of factors that will determine whether a fuel cell or hydrogen combustion engine is the way forward.

Matt

You talked a little bit there about different sectors and how, in specific use cases one type of fuel cell or hydrogen combustion engine might be more appropriate. Given that hydrogen is a relatively immature technology, are there any other sectors that are perhaps a little bit more advanced that maritime could leverage some expertise on? I know with electrification for example, the automotive is very far ahead. But in hydrogen space, is it an equal playing field? Or can we sort of bring some of those lessons across into maritime?

Chester

I think there's definitely some lessons to take for other sectors. So Ryze Hydrogen is active in a lot of the heavy duty transport sectors and beyond. The first application we'll be looking at is buses. And whilst there are obviously differences between maritime and buses, there are processes and learnings that you can take forward to allow you to understand how to tailor things to a new application. So I think in terms of operating in a space where you're trying to comply with new regulations, with technical challenges that haven't been seen before, allows you to sort of use that boot blueprint and imprint it on a different sector. I don't think we're starting from zero in maritime, there are very interesting pilot projects going on. And in the UK through the clean maritime demonstration competition but also in other countries such as Norway. So I think we've got some useful expertise in terms of adaptability to build on, we've got some useful experience from this country and other countries, that we can build on. I think really the point for us moving forward is just how we can start putting together the projects that utilise both the vessel and the infrastructure.

Simon

So on that infrastructure point, have you got some indicative costs about what hydrogen will need to be sold at to make it competitive and a good commercial option for operators?

Chester

It's always a difficult question to answer that, because you can look at what the hydrogen costs need to be, to reach parity with heavy fuel oil or marine gas or right now. And I think there is lots of studies and lots of work going on to show that it can get to that level in the future. I think, what where we're at in this sort of short term is really, proving the concept that it can work in maritime. I think there's lots of support in terms of how we can get to the scale where those hydrogen costs and prices are realised in the future. So it's not a simple question to answer, Simon, in terms of this is the cost that needs to be and you get straight to mass adoption. I think we'll go through a process in the short term of proving the concept of maritime, figuring out in which spaces what the the prices need to be. And then at that point, if hydrogen is a solution for certain areas of the maritime sector, then we can look at scaling and reducing the cost.

Simon

So I hear as well, that there might be potential from funding for maritime in hydrogen. Matt, do you want to bring us up to date on that?

Matt

Yeah, so it was announced in the latest spending view, that maritime would get a share of 300 million pounds of R&D money in order to build on the back of the successful clean maritime demonstration competition. We don't have word yet on exactly how much money will be given out to maritime or a timeline of when the next round of competitions are set to start. But later in 2022, I'm pretty confident that we will see the sort of first round of this next tranche of funding for the maritime sector. So it's a very much, watch this space, exciting news is coming and when Department for Transport are ready to make that announcement, hopefully we'll see lots of exciting projects that involve hydrogen in that mix.

Simon

Thank you. So my background is in heavy vehicles and one of the things I always notice when you're talking about new technology, batteries, hydrogen, whatever it is, getting the operators buying is really key. And I just wonder whether you had any thoughts regarding that for hydrogen deployment?

Chester

So in terms of the the maritime industry itself and getting the operators buying for that, I think it's really about moving to a system where the alternative fuels have been proven, as I've said before and they can be seen to be safe and can be used as an operational setting that works for their business. I'm not saying that is completely the same operation because you may need to refuel a bit more often with a slightly less dense fuel. It is certainly closer to the similar operation that they had before and say using a technology such as batteries. So I think what's really important for all of the clean technologies in maritime is that we spend a lot of effort in terms of demonstrating them at scale, in real world applications, with real operators, with real infrastructure providers, with the regulator's all in tandem so that you get to a point where, especially within the UK and in the context of this discussion that we have a maritime sector that needs to meet emission reduction goals and has options that it is comfortable in selecting and moving to, for the future.

Matt

Thanks, Jeff. And I think you've highlighted there the need to avoid that classic chicken and egg scenario that ports implement one technology, the shipping operators don't comply and that need to work together to a collective solution and bringing in the regulator's at the same time, to move this sort of common goal towards decarbonisation happen. Because it needs to happen on an international scale, we don't want just that to happen in the UK and then us being left stranded. So it's super important to get all those stakeholders involved to move us in the sort of right direction. So, I think my sort of final question would be, can the UK become a leader in both hydrogen and maritime technology more generally? We've seen good examples from the clean maritime demonstration competition, but there's perhaps other nations that are more advanced. So I'm thinking here, sort of the Port of Antwerp and their hydrogen hub, we've got the likes of Moller Maersk who have committed to I think it's 13 now, methanol fuel vessels for the future. Where does the UK stand? And what is the role of the UK in this international market? And I appreciate that's a very broad question.

Chester

No, no, it's a good question. I think the simple answer is the UK still has a massive opportunity, I think there are leaders and there's no point in, sort of ignoring that. So are our people further along in testing some of these clean technologies and developing the supply

chains around hydrogen and other fuels? I think the UK still has a huge opportunity to be able to come up the learning curve and really utilise, not only its position in the supply chain that it already has. I mean, we have some great companies and some great expertise in alternative fuels already in the UK, but also to utilise its position in the world, geographically the UK has always been a maritime nation, the UK maritime 2050 strategy in there, and then the follow on with the clean maritime plan really show some ambition to be a leader in the space again. I think we are well poised not only in the maritime sector, but in the supporting supply chain to really drive this forward over the next couple, five and through to ten years to become a leader.

Simon

Thanks very much, Chester and I think probably a good point to finish on, conscious of time. Really interesting to talk a bit more about the maritime sector. Now, if people have got further questions, how is it best to contact you?

Chester

So I'm on LinkedIn, you can find me just by searching Chester Lewis. My email is chester.lewis@ryzehydrogen.com and, yes, always open to hearing from people about how we can support going forward.

Simon

Great and thanks again so much for your time today and being part of this podcast. Thank you, everyone for listening. Any links mentioned today and a direct link to Innovate UK KTN website have been added to the description. Don't forget to sign up and receive the newsletters and the updates that we give out on a regular basis. And in the next episode, we're going to be exploring hydrogen combustion and some of its advantages and disadvantages across a range of sectors. So I think that'll be a really interesting topic, this is quite hot at the moment. So once again, thanks for following us. And please join us again goodbye. Connecting for positive change