Tower Group x UoE Research 2-20240809_110557-Meeting Recording

August 9, 2024, 10:05AM

39m 41s

Sew, Brandon started transcription

Sew, Brandon 0:07
OK, cool. That's fine.
Yeah. So thank you for taking time to for this interview. I'd really appreciate it.

Alex King 0:14
OK.

Sew, Brandon 0:16
Just a short introduction about myself and the project. Just to refresh your mind, so I'm Brandon. I'm currently studying global sustainability solutions at the University of Exeter and my research project is all about understanding the barriers that are currently preventing the diffusion of green hydrogen in the UK. So that's looking at, you know, technical barriers, economical and regulatory barriers.

Alex King 0:27
OK.

Sew, Brandon 0:41
With a specific interest in the shipping industry, because I'm doing my project alongside Emerald Green Power Limited, which are sort of the green hydrogen production company in basins. Yeah, based in the southwest. And they've got a project right now focusing on shipping and maritime. So I'm helping them work on that. And then in turn, they're supporting me with my dissertation.

Alex King 0:52
Yes, I know them. I know emerald green.

Sew, Brandon 1:05

And part of my research methodology is to sort of conduct expert interviews and to have in depth discussions with industry experts such as yourselves to sort of gain.

Alex King 1:05
Right.

Sew, Brandon 1:16
You know an industrial perspective on these barriers and then I'll use what I've learned in these interviews and compare, make comparisons with government reports that I've read as well as academic studies. And I hope to identify the sort of differences in perspectives and then using that information, I'm going to, you know, hopefully produce.

Alex King 1:19
Hmm.

Sew, Brandon 1:37
Recommendations to policymakers as to how they could address this in the UK. So yeah, I'm jump straight into the main questions if that's OK with you.

Alex King 1:44
Back.
Yeah, go ahead.

Sew, Brandon 1:48
Yeah.
So to begin with, just for like formalities, can you briefly introduce like yourself the company and like your role and what a brief overview of what the company does?

Alex King 2:01
Sure. So my name's Alex king. I'm chief exec of Tower group. We're a sustainable infrastructure developer based in the southwest of England.
Our initial focus over the last few years has been on electrolytic hydrogen and its application for decarbonisation in the Southwest.
We we initially were. We're pretty agnostic with regards to technology and sectors,

but through some some pretty, pretty valuable collaboration with the University of Exeter actually.
Maritime applications for hydrogen certainly became one of our top order priorities and the low hanging fruit for that is the flotilla of vessels needed to support floating offshore wind in out of walks in the southwest. So that's probably probably enough of an introduction on that.

SB **Sew, Brandon** 2:57
Yeah. So just building on like the maritime industry, so in the UK's Clean Maritime Plan, the government sort of stated that in order to achieve greenhouse gas emissions reductions required like set out by the International Maritime Organisation, the use of alternative fuels such as hydrogen will be required. So I wanted to ask in your opinion, what role do you see?

AK **Alex King** 3:14
Yeah.

SB **Sew, Brandon** 3:23
Hydrogen be that blue hydrogen or green hydrogen. What role do you see that playing in the UK shipping industry within the next couple of decades?
Until 2050.

AK **Alex King** 3:35
First thing to head up there is that I don't personally see a role for blue hydrogen anywhere.
The reason being that actually, you know, carbon carbon capture is not actually as efficient as is being said, so you are also not able to fully remove all of your organic compounds from your hydrogen, which therefore means it's not a fuel cell grade when it comes out and it needs further cleaning.
Now, I haven't verified this, but my understanding is that.
For the government to match its hydrogen targets by using blue hydrogen, we'd be importing 30% more natural gas than we do currently. If we were directly using it as fuel itself. So, I don't see that there's a role for blue.
And again, the really nice thing about, you know, green hydrogen is one term I like to use the term electrolytic because the power source is largely.

Not irrelevant but less relevant than the quality of the hydrogen that comes out of the other end. So, five nines hydrogen is the terminology 99.99% purity, which means it's air 4 fuel cell grade and that's important because when we're looking at hydrogen for maritime purposes, the fuel cell I believe is more favoured than direct combustion.

Sew, Brandon 4:41
We can send.

Alex King 5:03
So what role is it going to play? I think we'll see the original question.
So batteries will not be able to do everything in any terms of mobility, and that's certainly true for the maritime sector. On the actual technological front, actually what goes into the vessels, that's not my domain, I'm onshore and infrastructure and actually getting it into the boats. But obviously the work that I've been doing.

Sew, Brandon 5:26
Yeah.

Alex King 5:30
On actually how to get hydrogen to the ports and into the boats, that's something I can advise on. It (hydrogen) will be used as a fuel.
Now whether it is used as gaseous hydrogen on boats as a fuel remains to be seen. Whether hydrogen is actually used as a feedstock for production of high identity liquid fuels such as E-methanol for example.
That remains to be seen, too. There are some logistical and operational challenges to using gaseous hydrogen on a fuel on boats, but you're probably aware of that. But what I have to talk about that too it will. You know, it will have a role as a maritime fuel. I'm in no doubt about that.

Sew, Brandon 6:18
Perfect. Yeah. So on Tower Group's website, you've sort of stated that the UK urgently needs more investment in hydrogen infrastructure to deliver on their net 0 promises in relation to this, the government, they've recently launched their zero emissions vessels and infrastructure like funding competitions.

For alternative fuels and refuelling infrastructure, I wanted to ask what are your opinions on this? Like do you think it's enough funding to sort of make a significant difference in shipping or do you think it's, you know, just?

Alex King 6:43
Yeah.

Sew, Brandon 6:52
Sort of the government, you know, sort of creating these competitions to themselves look good in a way.

Alex King 7:02
Well.
My view on the Zevi fund is pretty poor given that we applied for it in consortium with the University of Exeter and we didn't get the funding, it had the potential to really make a difference.
But it totally depended on the projects that were funded and actually the projects that were funded through Zevi really aren't going to move the needle in my view.
Our project, I mean obviously I'm a little biassed would have done.
And what we were proposing for Zevi was a full ecosystem of green hydrogen refuelling infrastructure, production of hydrogen on site as well as two new boats with hydrogen fuel cell power trains in them. And to operate that,
You know, it's all very well getting these boats to work, but they have to work with an air of financial viability for the end user. So you know the vessel operators that
Were part of our consortium, they needed to be able to buy and use hydrogen at a price that would allow them to offer competitive charters to their customers. And it was effectively you can have your diesel boat at this price or you can have the 0 carbon version at this price and they needed to be comparative.

Sew, Brandon 8:15
Yeah.

Alex King 8:24
So my view on Zevi is pretty poor. You know, there are other innovate UK competitions like clean maritime demonstration competition, but they are.

Sew, Brandon 8:31
Yeah.

Alex King 8:35
Purely on tech development, you know, power trains, batteries, that kind of thing. Zevi was supposedly the next level up. Let's actually get some infrastructure in play. But that isn't actually what they delivered through Zevi.

Sew, Brandon 8:47
Hmm.
Yeah.

Alex King 8:52
So there's been a lot of fallout after after ZEVI.

Sew, Brandon 8:56
Yeah. So just building on what you said about how the projects that were chosen for the ZEVI competition, in your opinion, they're not going to be as effective in terms of development. Do you think there's an issue there with?
Like the way the government chooses the projects.

Alex King 9:13
Yes.

Sew, Brandon 9:15
Yeah. Can you expand on that a little bit?

Alex King 9:19
The world no. Look, so this is. This is on the record. So my own views on how the winners of that competition were chosen are probably not for.

Sew, Brandon 9:19
Because I'm not aware of the current processes.

Alex King 9:30
For discussion now, but.

Sew, Brandon 9:31
Yeah, this one.

Alex King 9:33
The winners of the competition.
What can I say?
It wasn't a clean process. Put it that way. It wasn't a clean process. And I mean, you know, let's look at the projects that we know got funding there was the and I'm talking through ZEVI. There's the big ticket. It was up to 20 million funding for projects.

Sew, Brandon 9:46
OK.

Alex King 10:00
Our project was a 35 million project with a full 20 million claim. So there was a big industry match to that as well.
The big ticket projects that got funding, Bibby (marine) got.
20 million to build an electric SOV. Do you know what SOV means? The support operations vessel?

Sew, Brandon 10:23
Not really, no.

Alex King 10:24
So it's a support operation vessel that is used to support offshore wind, and other offshore industries.

Sew, Brandon 10:34
OK.

Alex King 10:36
The bibby boat didn't work. They couldn't make it electric. It couldn't have enough batteries on it to make it fully electric. So they now had to change the design to a dual fuel, electric and methanol vessel.

Sew, Brandon 10:43
Mm hmm.
Yeah.

Alex King 10:50
But you know that's outside the scope of the competition, so by the rules of the competition, that should have been chucked out and that funding reallocated. But that doesn't seem to have been realised.

Sew, Brandon 10:53
Yeah.

Alex King 11:01
Then there was the Port of London authority that got 20 million to run autonomous vessels up and down the Thames Estuary. I believe hydrogen fuelled vessels.
But I'm not quite sure what stage of delivery that's at either.

Sew, Brandon 11:15
Yeah.

Alex King 11:16
So I'm yeah, I'm not particularly enamoured with innovate UK and that and that process, I think you could probably work that out.

Sew, Brandon 11:23
Hmm. Yeah, that's fine. So the Regulatory Horizons Council, which are an independent sort of expert committee focusing on technological innovation, they've said in one of their recent reports on maritime that there's like a chicken and an egg problem with infrastructure whereby port owners, they don't really want to invest in

the necessary well, this is to my understanding, they don't want to invest in the necessary infrastructure for to support hydrogen propulsion.

Alex King 11:35
Right.

Sew, Brandon 11:53
And then at the same time, shipbuilders are shown as don't really want to incorporate hydrogen technologies because of a lack of port infrastructure. So given tower groups, you know I see you're involved in the the Zero Boat Consortium. You guys lead it.

Alex King 12:01
Yeah.

Sew, Brandon 12:10
Can you provide any sort of first hand experiences or insights that you've had from these sort of stakeholders like boat builders and operators to sort of elaborate on this issue?

Alex King 12:21
Yeah, so the zero boat consortium was ours ZEVI bid. So, you know, our view on that was, you're right. You know the term chicken and egg gets massively overused, but it's there for a reason, isn't it?

Sew, Brandon 12:24
Yeah.

Alex King 12:36
Our take on it was we needed to demonstrate the commercial viability of teaming hydrogen production (supply of hydrogen) directly to the demand. So that's why we had, you know, in that one project 2 boats.
With the powertrains matched directly to the appropriate amount of hydrogen production, onshore etcetera, etcetera and to demonstrate that we could, with a subsidy in there, you know that's clear this hydrogen does need subsidy at this point

to make it stack up. But we had a very robust financial model that showed that we would be able to deliver hydrogen to the end users at a price that was comparative to diesel within three years and that would be £10 per kilo of hydrogen and that's the Holy Grail price. You know if you can get hydrogen pricing to £10 a kilo.
You are then competitive with diesel and that's the name of the game. You know, again what I said earlier.
To get the boats running on hydrogen, that's almost easy. That's done. You know, there are boats running on hydrogen now. To have them operating, competitive to fossil fuels that hasn't yet been done, and that's what ZEVI should have delivered, and that's what we offered to it.

SB **Sew, Brandon** 13:46
Yeah.

AK **Alex King** 13:53
So you know, there are a lot of complexities for having hydrogen refuelling infrastructure in the ports and you know, this is a bit of a rabbit hole that we can do. You want to do, you want to go down the rabbit hole now?

SB **Sew, Brandon** 14:07
Yeah. Well, my next question was how do you think?
This chicken and egg problem could begin to be addressed. So you've you've talked about.
Does every competition and something like that like?

AK **Alex King** 14:17
It's matching the demand to the supply to the demand.

SB **Sew, Brandon** 14:23
Hmm.

AK **Alex King** 14:24
And starting off with a closed loop ecosystem such as such as that I've just spoken about, yeah. What you do with that is you then you ramp it up, you and you add boats and you add boats, you add boats. Yeah, the almost what I would call the retail

offering to then just have the hydrogen infrastructure there for anybody to use. That's further down the line. You know, we need to get the ecosystem started.

Sew, Brandon 14:29
Yeah.

Alex King 14:46
By building the whole system and operating it together, that's the way in our view, to get it to work.

Sew, Brandon 14:53
Yeah.

Alex King 14:54
But you know, there are some complexities to that. You know, funding for it is difficult to get hold of.
And again, wouldn't it have been nice if ZEVI had actually delivered on any of that? But you know, consider this, you know, moving hydrogen is very expensive. So realistically you have to produce it where you're going to use it.

Sew, Brandon 15:13
Yeah.

Alex King 15:18
If we take the Southwest as an example, there aren't many of the ports that have the appropriate electrical infrastructure to allow you to produce any significant quantities of hydrogen on the dock side to then bunker it and transfer it to vessels. So that's one of the greatest challenges is how do you actually either get the power of an appropriate scale to the dockside, or how do you produce the hydrogen elsewhere and transport it to the port?

Sew, Brandon 15:33
OK.
Mm hmm.

Alex King 15:48
Without making the economics tip into the red?
That's one of the greatest challenges.
You know, the ports up towards Avonmouth, etcetera. The grid's not too bad around there but look at all of the other ports in the Southwest that could be supporting floating offshore wind. Falmouth is a prime example, they won money from the ZEVI fund to build electrical charging infrastructure, coal ironing at Falmouth Docks. But their grid connection wasn't coming until the late twenty 30s.

Sew, Brandon 16:21
Hmm.

Alex King 16:22
So you know it that's a massive challenge for getting it to work because you can't produce hydrogen without electricity if it's electrolytic.

Sew, Brandon 16:29
Yeah.

Alex King 16:33
So yeah, there are other ways of doing it. You can.

Sew, Brandon 16:33
OK.

Alex King 16:37
Take methane out of the gas grid and use pyrolysis. But again, you know that's a that's a whole different ball game, a whole different economic model. There are economies of scale you can't really do that on a pilot scale. The nice thing about electrolysis is if we use, so our electrolyzer manufacturers chose an electrolyzer manufacturer are called Oort energy. I don't know if you've come across Oort energy. They're based in Bristol.

Sew, Brandon 17:01

I think I've come across them in.
Some sort of it was either the G2 hydrogen hub group or another sort of GW shift group that they're a part of, but I've come across them.

Alex King 17:14
I don't know that first consortium you mentioned.

Sew, Brandon 17:16
Yeah, I've come. I've come across them before. I'm I think I've heard their name before.

Alex King 17:19
Right. OK. Yeah so they're electrolyzers use a 250 kilowatt stack. So what that means is you've actually got you know really, really granular amounts of production. You can say right this boat needs.

Sew, Brandon 17:26
Mm.

Alex King 17:36
600 kilos of hydrogen a week and you could really closely.
Build your electrolysis plant to match the demand for that vessel so you know that that boat's going to go out for five days and I'm going to produce 600 kilos of hydrogen over that five days so that it's ready to be transferred to the boat when it comes in. Do you see what I mean? You have to be really clever about how you how you mix that supply and demand.

Sew, Brandon 17:57
Yeah.

Alex King 18:04
Yeah. How would when we're gonna get to the stage where we just have availability of hydrogen like we currently do with bunker fuels.
That's going to be tricky.

And that's why we're also looking at the, you know, the liquid fuels that I mentioned to you previously because those can be transported.

Sew, Brandon 18:20
Hmm.
Yeah.

Alex King 18:23
And bunkered hydrogen is not that not that animal.

Sew, Brandon 18:29
Yeah, it's great. Umm, so moving aside from the infrastructure issues which are which are more technological and economical based, the Department of Transport, they've recently said in one of their reports that current hydrogen regulation and policy such as, you know, complex safety codes for the handling of hydrogen, they they've created uncertainty and confusion among stakeholders. I wanted to ask whether you've in any other projects that you've worked on had any first hand experience?

Alex King 18:49
Yeah.

Sew, Brandon 19:00
How margin policy or maybe even like the lack of policy or gaps in policy, have had a negative impact on hydrogen distribution?

Alex King 19:15
Hydrogen distribution the policies you're talking about are the framework for using hydrogen on vessels or is it?

Sew, Brandon 19:22
One of them is the IGF code, which I think it's.
The handling of hydrogen on ships, so I'm not sure how.

Alex King 19:30
Yeah, yeah, I mean, anything that once it gets onto the boat, I'm probably not the

right person to advise on because as I said, you know, my remit stops when the hydrogen gets transferred onto the boat, that's where my knowledge kind of ends. Yeah. What I do know is that the requirement to store hydrogen above deck is a limiting factor.

Sew, Brandon 19:36
OK. Yeah, that's fine.
Yeah, yeah.

Alex King 19:55
And that's one of the reasons why ships rather than boats will struggle to use gaseous hydrogen because they don't have the deck space to store containerised hydrogen.

Sew, Brandon 20:07
Yeah.

Alex King 20:07
So I mean, you can see the boats. One of the great examples, there's a company called CMB Tech. I don't know if you've come across them before, but they've got an SOV that I mentioned previously. They call it a CSOV. If you look it up.

Sew, Brandon 20:19
I haven't come across.

Alex King 20:27
It's an offshore wind support boat as I mentioned or ship I should say, 70 metre vessel, but it's got containerized hydrogen storage on the on the stern.
And it's just, I think 5 or 6 40 foot containers stacked up on top of each other because that's where you have to store it and that there is a real logistical challenge to say we're going to lose, you know, ten, 20, 30% of our working space on the deck of this vessel for storing the fuel. Whereas before it would all be below deck. Now that may well change.

Sew, Brandon 20:47
Yeah.

Alex King 21:02
The reason that that legislation is there is because hydrogen leaks. You're probably aware that you know, because it's such the H2 molecule is so small it'll come out not just through.

Sew, Brandon 21:11
Yeah.

Alex King 21:12
Joins and seals, but also, you know through steel of the inappropriate grade. And there's a brittlement and all the rest. So you know it will leak and if it leaks into a sealed you know fuel chamber or engine room then it will have you know potentially catastrophic consequences for the for the vessel. So it has to be able to vent into free air and that's a challenge.

Sew, Brandon 21:31
Yeah.
Yeah.
From the documents that I've sort of read and researched, one of the governments, well, we've already spoken about this, but the government's sort of main focus to address the lack of hydrogen distribution networks is to increase funding for projects. And the aim of these projects, as you said, is mostly on the technical side, you know, technical, technological development.

Alex King 22:02
Hmm.

Sew, Brandon 22:03
How important do you think technology development and technological limitations are?
With regards to developing hydrogen in the UK compared to other things like the

costs, or perhaps what you've mentioned just now with.
Hydrogen being stored like having to be stored on the upper deck like how how would you rank technological in terms of those other barriers?

Alex King 22:28
Technology and costs are intrinsically linked because you know the efficiency of electrolyzer.
Is obviously integral to the cost of the hydrogen that comes out the other side, and yet you need to look at the manner in which what's called the levelised cost of hydrogen is calculated and it does include the you know the capital cost of the equipment and amortising the cost of that capital over the life of the projects. Now that started off as a 30 year period. When the government's hydrogen strategy was brought out, they expected electrolyzers and all that equipment to last for 30 years and therefore you were. Are you familiar with the term amortisation, so effectively paying off the cost of capital over the life of a project? So that by the time you got to the end of the project, all of that capital had been paid for?

Sew, Brandon 23:18
Yeah.

Alex King 23:23
But Electrolyzers don't last 30 years.

Sew, Brandon 23:26
OK.

Alex King 23:27
Now the are you familiar with the hydrogen allocation round?
Which is the government's contract for difference mechanism for hydrogen projects?

Sew, Brandon 23:32
Umm.
Is that the the H AR-1?

Alex King 23:40

Yes, there's HAR1 so HAR2 is the most recent round, the contracts for the HAR process is 15 years. But electrolyzer stacks don't even last 15 years. You know if you get 10 years out of them before you don't have to start changing your stacks or refurbishing them.

SB **Sew, Brandon** 23:42
Yeah.

AK **Alex King** 23:59
So. The capital cost of the Electrolyzers, the storage, the compressors, everything, that's hugely important for the cost of hydrogen that comes out of the other end. So advancing the technology in terms of its efficiency, but also reducing the cost of capital that is incredibly important for getting hydrogen competitive and getting industry to pick it up as a fuel. So you can't, you can't discuss one without the other in my view. I mean what happens on the boat you know.

SB **Sew, Brandon** 24:15
Yeah.
Yeah.
Yeah. So you signed up.

AK **Alex King** 24:35
That's almost facilitating the roll out, but really the main factor here is reducing the cost of production and therefore the cost of the fuel. That's always priority number one.

SB **Sew, Brandon** 24:46
So 10. So technology is very closely linked to the costs of hydrogen, yeah.

AK **Alex King** 24:50
Absolutely, absolutely.

SB **Sew, Brandon** 24:52
Yeah. So aside from increased funding, which seems to be the government's main focus on addressing these.

Do you think there's an area that is sort of slowing down the development of hydrogen in the UK, that the government, they've not really focused on or largely? Have have largely dismissed because of what we've said just now of costs and technology being closely limited. Is there another area you know I've I've sort of looked a little bit into public perception, you know, maybe some sort of social issues issues. Do you think that the government actually focus on those?

Alex King 25:27
And I don't, I don't see social issues as actually much of a barrier to hydrogen. You know, they're they will always be the conversation of people who live very close to a proposed plant, you know, is it safe, et cetera, et cetera. And we've got that with our project in Exeter, but my view is that those are quite easily managed.

Sew, Brandon 25:43
Yeah.

Alex King 25:48
The real issue is the cost of power, because you know the cost of capital for producing hydrogen is important. But actually the greatest variable on the levelised cost of hydrogen production is the cost of the power that goes in.

Sew, Brandon 26:02
Yeah.

Alex King 26:02
And in the UK, you're probably aware that the cost of electricity is indexed to the price of gas.

Sew, Brandon 26:08
Hmm.

Alex King 26:09
Which is why we had such a surge in electricity prices when the when the gas price rocketed, well that's daft. That's absolutely daft. You know? Why should it be like that? The reason is that the UK historically produced a lot of its power from burning

gas in gas turbines. But that's reducing in its market share. But we still are in this scenario where the two are indexed.

Sew, Brandon 26:15
Yeah.

Alex King 26:34
So what should be happening is we should be decoupling the price of electricity from the price of gas and the knock on effect for hydrogen production is once that cost of electricity comes down, then the cost of hydrogen will come down.

Sew, Brandon 26:48
Yeah.

Alex King 26:49
So that's probably priority #1.

Sew, Brandon 26:52
Yeah.
Yeah, that's all the main questions I had for today. So for the last sort of few minutes, I just wanted to ask whether you know, are there any thoughts that you'd like to share that I didn't really specifically ask for in my main questions, anything that you'd like to elaborate on?
Because I tried to be as include as much as possible in my questions, but you know, I just wanted to hear whether you had any specific things.

Alex King 27:20
They were good questions. I mean, in terms of hydrogen for maritime, I mean, tell me more about your your study. I mean, I know you're working with Emeril Green, so there'll be some commercial sensitivities, but what's the, what's the link? Are they developing tech for for maritime purposes? Are they developing infrastructure? What's the, what's the general sector?

Sew, Brandon 27:41
So I'm helping them with their their clean maritime demonstration competition,

which is in they've got a project in Strand 3 which is techno economic feasibility study and so and then part of that is I'm helping them calculate sort of create a techno economic model for metal hydride compression which is related to storage. So mostly like the operational costs.

Alex King 27:52
Right.
Oh, right. OK, yeah.

Sew, Brandon 28:07
Required to produce the heat that's required for metal hydride compression.
It's not exactly linked to my dissertation, but I'm I'm taking elements from what I've learnt with them to implement into my project.

Alex King 28:20
OK. Interesting.

Sew, Brandon 28:21
That's what.

Alex King 28:24
That hasn't really, I mean the, the, the, the.
Specifically for the Southwest, for me I mentioned the vessels that serve as offshore wind because you're probably aware that there are some pretty monumental offshore wind projects proposed for the waters off the Southwest, Celtic sea floating offshore wind. Are you familiar with that?

Sew, Brandon 28:42
Yeah.
I'm not familiar with that specifically, but I am familiar that the Southwest does have like the wind and solar capabilities to have like huge electrolytic potentials.

Alex King 28:59
It could, but the key with hydrogen is and this is reflected in the hydrogen allocation rounds you know the allocation of subsidy for hydrogen, you have to have the off

taker as part of your proposal. So you can't just say we want to produce hydrogen here or we can produce it in X quantity because the government know there isn't the market for it. And we see this now so.

Sew, Brandon 29:00
Yeah.
Yeah.

Alex King 29:26
SSE and Equinor had a two GW wind to hydrogen project. I can't remember it was in the Dogger Bank or somewhere you'll be able to find the news article.

Sew, Brandon 29:36
Yeah.

Alex King 29:36
And they banned it because there was no market and you know, the bigger players are more guilty of this than others, but.
Too often, there are projects that are proposed that have no thought on actually who's going to buy the hydrogen and this is why, yeah, when I said you need to match the supply and the demand very closely, the government won't fund projects that don't have the off taker committed and that means, you know, heads of terms and detailed engineering thinking as to how they're actually going to use hydrogen versus their current fuel type etcetera, etcetera.
Maritimes a challenge because the vessels are almost in the test and demonstration stage still, you know there are other CMDC 3 projects retrofitting boats hydrogen power trains. The techs all there but what hasn’t been demonstrated is the commercial viability of using the fuel on the boats

Sew, Brandon 30:00
Hmm.
Yeah.

Alex King 30:26
So that's coming, but it means that that hydrogen for maritime purposes just isn't at

that level to really unlock that investment. And that's really frustrating because you know clearly, clearly the technology works.

Sew, Brandon 30:39
Hmm.

Alex King 30:41
But with regards to offshore winds, so Celtic sea floating offshore wind is its first phase is 4 1/2 gigawatts of generation by the mid 2030's is the current proposal with a chunk of power landing in Devon and a chunk landing in South Wales.
But 4 1/2 gigawatts is around 250 turbines, so the height of the Eiffel Tower floating in waters off North Devon and South Wales in the next 10 years. You know, that's huge.

Sew, Brandon 31:05
Yeah.
Hmm.

Alex King 31:10
With a full pipeline of 1000 Eiffel Tower high turbines, now what that needs to make it work is a whole load of new boats.
And we're talking everything from tugboats to crew transfer vessels all the way up to those SOVS that I mentioned.
You know, currently those boats will be built with a lifespan of 30 years. So building a boat that that will be burning diesel is a fool's errand currently. So this is this is one of the great challenges. Now we've got this, this amazing new renewable energy project that needs not just the existing boats, but new boats to be built. And let's not forget, you know, the 450 gigawatts of offshore wind pipeline in Europe by 2050. You know there's a huge amount of offshore wind development that needs boats to service it.

Sew, Brandon 31:32
Yeah.
Yeah.

Alex King 32:01
And those boats are going to have to be 0 emissions.

Sew, Brandon 32:04
H.

Alex King 32:04
So there is a challenge. Yeah. There's a point on the horizon. We know we need to get to, to have zero emissions vessels operating in the waters of the UK and Northern Europe.
There was a report done in 2021 by an organisation called Marine Capital Limited, you should look that up.

Sew, Brandon 32:27
Yeah.

Alex King 32:28
It was, I think it was commissioned by the Maritime Coast Guard Agency because I've spoken to them about it and right at the very back of the report, the one of the conclusions is that the vessels that service offshore wind are the low hanging fruit for decarbonising maritime in the UK. So it's not just my opinion, you know, this is this was all part of the submission for our ZEVI project.

Sew, Brandon 32:44
OK.

Alex King 32:50
Is that you know, the government itself has identified offshore wind support vessels to be where we should be focusing our efforts with hydrogen and batteries and other zero emissions propulsion technologies so that's justification for the for what we're doing with our zero boat project.

Sew, Brandon 33:08
Yeah, I'm just thinking of what you've said about Europe. From what I've read, the

Scandinavian countries, they've had a lot of success with hydrogen vessels recently. And I'm not quite, you know, I'm not. I don't exactly know a whole lot about what their governments are doing to support that development.
Do you know of any ways that the UK Government could learn from them?

Alex King 33:36
No, because I don't really understand either. To be honest. I mean, I've seen a lot of talk about liquid hydrogen ferries in Norway operating.

Sew, Brandon 33:43
Yeah.

Alex King 33:45
Liquid hydrogen is a challenge because one of the things you have to consider is anytime that you change the state of hydrogen, there is a cost, you know, compressing hydrogen is expensive, not just the equipment to do it.

Sew, Brandon 33:55
Yeah.

Alex King 34:00
A compressor for our Exeter project for example, there are £1,000,000 each and we need 3.
And it's a small 10 MW project, so you know and that's to compress hydrogen from 30 something bar to 350 or 700 bar liquid hydrogen is a whole different ball game. You've got to cool it to two degrees above absolute zero. Then you've got to keep it there, you know minus 273 Celsius or whatever it is. It's a massive energy requirement to do it. So I don't know why they're using liquid hydrogen for these boats.

Sew, Brandon 34:10
Good.
Mm.

Alex King 34:38

I suspect it's because I don't know if you've ever been to Norway, but these ferries run 24/7 just back and cross the fjords. It's a short distance, but they are constantly rolling, so refuelling times are a challenge.

Sew, Brandon 34:51
Yeah, yeah.

Alex King 34:52
But I don't know what the economic model is like because you can buy an electric ferry and you know there are eighty of them operating across Scandinavia, I believe currently.
But you know the whole thing with zero emissions boats is it's horses for courses. You know, there will be applications that that suit one technology better over the others we can't get tunnel visioned with regards to technology and application, we've got to make sure we consider everything but liquid hydrogen you know it's a challenge.

Sew, Brandon 35:22
Yeah.
Yeah. And then yeah, that's pretty much all the questions I wanted to ask. And then lastly, I just wanted to know whether because for my project, I'm sort of getting experts to interview from all different components of the supply chain and I've yet to find one, someone who specialises in hydrogen storage and I wanted to know whether you know of anyone that I could reach out to that sort of industry experts in hydrogen storage that perhaps maybe I could e-mail and.

Alex King 35:41
Yeah.

Sew, Brandon 35:57
Ask whether they're free for an interview.

Alex King 35:58
When you say hydrogen storage, what are you? What are you looking for? I mean,

you're looking for someone that manufacturers.
The the like composite tanks for example. Or are you looking just any storage?

Sew, Brandon 36:12
Yeah, someone who manufacturers the tanks or maybe a come. Yeah, something like that.

Alex King 36:19
Umm, I mean the immediate name that brings to mind is the National Composites Centre.

Sew, Brandon 36:25
Yeah.

Alex King 36:26
I bet you know them up in Bristol.

Sew, Brandon 36:29
No, I'm not aware of them.

Alex King 36:30
It's a massive place. You know, if you could, if you could wangle away to go on a tour of the NCC. It's an amazing facility.
They are doing a lot of research on hydrogen storage, a name to speak to. I couldn't give you.

Sew, Brandon 36:42
Yeah.

Alex King 36:46
But who's your? I mean, who's supervising your project?

Sew, Brandon 36:50
Professor. Oh, do you mean in exter or?

Alex King 36:53
You'll get your research. Yeah, extra. Yeah.

Sew, Brandon 36:55
Yeah. Professor Xiao Hong Li. She's yeah. Yeah, she's works on GW shift. And she's also done some work with Emerald green power. So she very kindly offered to supervise my project because it's within her sort of domain.

Alex King 36:57
Oh, show home. I know. Show home. Yeah, yeah, yeah.
Yes.
Yes.
Right, right. So, you know I said, well, let's say hi to Sheryl hung from me. I haven't seen her for six months or so, but no, I saw her at the last GW shift meeting, which was I can't remember when, but.
She may have a contact at the NCC that'll be worth you speaking to. Have you spoken to the Centre for Future clean mobility?

Sew, Brandon 37:29
I've not spoken to them, but I am aware of. I am aware of them.

Alex King 37:33
Right. Well, they are the University of Exeter Partners in all of our projects and they are the guys that that understand the maritime sector and the application there.

Sew, Brandon 37:38
Yeah.
Yeah.

Alex King 37:44
When's your project due for submission?

Sew, Brandon 37:46

2nd of September.
So yeah.

Alex King 37:50
It's because all the lecturers there are away on their summer Holly gobs.

Sew, Brandon 37:53
Yeah.

Alex King 37:56
But.
Let me make a call and I'll see whether I can find somebody at cfcm that would be worth talking to. But I mean, Shao honk can knows all those guys as well.

Sew, Brandon 38:04
Yeah, yeah. OK. So I'll ask her as well.

Alex King 38:06
What about me, Tian, who's one of the other mechanical engineering lecturers at University of Exeter, and she's doing a lot of hydrogen storage.
Certainly metal hydrides as well.

Sew, Brandon 38:19
Yeah.
I've I don't know who she is.

Alex King 38:22
I'll show up for an introduction to media.

Sew, Brandon 38:25
Yeah. OK. I will.

Alex King 38:26
And and yeah, she she's the, I would say the one to talk to about about story solutions.

Sew, Brandon 38:32
Yeah.
Yeah. So that's everything. Thank you again for taking the time today.

Alex King 38:39
No, no problem at all. You've got my e-mail address if you need. If you need to ask anything else then just drop me a note.

Sew, Brandon 38:40
In terms of.
Yeah. In terms of next steps, because you're obviously a participant, you're entitled to once I've finished my dissertation project, I'm entitled to sort of e-mail it to you, whether you read it or not is up to you. But there's no obligation, obviously, but seeing as you're an active participant, then I'll, I'm sure to, I'll be sure to send it to you. Just so you're aware of where your words and your knowledge is sort of going.

Alex King 38:57
Yeah.
What?
Yeah, yeah, yeah.

Sew, Brandon 39:09
Yeah. And then if for what if for whatever reason you no longer want me to include in this include this in my project then you can just send me an e-mail and then I'll be happy to sort of review it, but.

Alex King 39:19
It's fine.

Sew, Brandon 39:21
Yeah, that's that's everything. Yeah. Thank you very much.

Alex King 39:24

Like I said, let me know if you need anything else.
And yeah, I'll look forward to reading it.

SB **Sew, Brandon** 39:29
Yeah. OK. Thank you very much.

AK **Alex King** 39:31
No problem at all. Take care. Bye now.

SB **Sew, Brandon** 39:31
They can take care. Bye.

◉ **Sew, Brandon** stopped transcription