

Transcript

22 August 2024, 10:02am

SB **Sew, Brandon** 0:06

Alright, that's fine. Yeah. So just a short introduction about myself. Just to refresh yourself and the project that I'm working on. So my name is Brandon. I'm currently a global sustainability solutions student at the University of Exeter and my research project is sort of looking at the barriers of green hydrogen in the UK, specifically looking in the shipping industry. And my academic supervisor is Xiao Hong Lee, which you work with on GW shift and she recommended I reach out to. Some of the members of your team for the interview because she thought that you'd be.

Good participants for it. So part of my study is looking at you know the technical economical sort of the policy and regulatory barriers that currently exist in the UK facing green hydrogen and this part of my methodology is to sort of interview people within the industry. I know you're part of the academic team, but within the sort of realm of green hydrogen and sort of get their perspective on the barriers and compare those to what the government has said in their reports.

And hopefully make some sort of comparisons between the two and.

In my conclusion, I hope to make sort of recommendations list that policymakers could use to sort of drive the development of green hydrogen.

So just to start things off, can you briefly sort of introduce yourself, GW shift sort of your role within that and what GWSHIFT aims to achieve?

AM **Agustin Valera Medina** 1:49

Yeah, I'm Augustine Valera Medina. I'm a professor at Cardiff University working on combustion systems that rely on alternative fuels. Net zero.

Alternatives like hydrogen, ammonia and I've been working in different projects including GW Shift, where I'm also Co lead for the project and in charge of different areas, particularly the storage and use of hydrogen vectors.

So that including as well skills transfer training and areas to support the overall project. Right now we got some a spring projects related to techno economics.

That are looking into the use of a hydrogen vectors hydrogen itself as well for

substitutes of natural gas. And yes, it is then I've been working on this field for more than 15 years.

SB Sew, Brandon 2:33

Yeah.

OK, great.

So on GW shifts website, the sort of vision of the organisation is to maximise the potential of the region's hydrogen ecosystem and then, to my understanding, your specialty is in conversion right and a key concept of this is to sort of use green hydrogen to produce other high density fuels such as ammonia and E-methanol. So I just wanted to ask in the context of maritime in particular, what are your opinions on hydrogen's application? Do you sort of see it being used as a fuel directly in fuel cells?

Or do you sort of see hydrogen as a feedstock for the production of these alternative fuels?

AM Agustin Valera Medina 3:24

Well, actually the way that I see it is the other way around that you will have a molecules like ammonia or methanol that will help to transition from heavy oils into net-zero fuels in the maritime industry. So yeah, you will have the hydrogen that is coming from other places, green hydrogen that can be obtained from the Celtic Sea, Middle East, Morocco, Africa, even South America, et cetera.

Here, for us is the Northern Sea and other locations where there's plenty of renewable energy. And then be converted into what is ammonia, ammonia then helping into the fuelling of these systems as it's got higher energy density than hydrogen itself. So how they're going to work, it's going to be a combination of using the ammonia directly or partially cracking it and then delivering the hydrogen into fuel cells.

SB Sew, Brandon 4:21

So it's a sort of building on what you said about how ammonia has a higher energy density than hydrogen in a lot of the studies that I've read.

This in shipping sort of relates to that. You know it makes it more economically feasible because you're there's less capacity loss for cargo ships because you're able to store more energy and then less volume. So as aside from this?

Other benefits are there, so using ammonia, clean shipping because there's also there's also the added risk of gaseous hydrogen leaking through storage tanks and stuff like that. I just wanted to know what are the other benefits of using ammonia?

AM **Agustin Valera Medina** 5:01

Well, first, ammonia is a well known chemical we've used for a 150-180 years.

As a fertiliser. So there are a lot of guidelines and a lot of a regulations around the use of the chemical in that way. It's never been used as a fuel until now.

Demonstration systems are undergoing, but still we have the need of regulations that can help us into transition as a fuel, but then that being said, as a chemical in its own right, we have a lot of knowledge. Another thing is that you can convert it into liquid very easily.

You only need temperatures of minus 30-35 degrees Celsius or very low pressures of a 10 atmospheres to then convert into liquid compared to what you will need for liquid hydrogen that is minus 250-253 degrees Celsius, or pressures that go even into the hundreds of atmospheres 233-300 atmospheres, just to then have the energy density that is required for this type of systems not even converting into liquid.

So in that sense, when it comes to in comparison with what ammonia could deliver, ammonia is superior.

And you have another thing as well. And then particularly, I believe it's very important via health and safety aspect of having ammonia or hydrogen, ammonia we have, as I said all the regulations, alarm systems and health and safety procedures to actually recognise that you have a leak. This becomes more challenging when it comes to maritime applications because you're in the middle of the sea, there's nowhere to run.

So they will need. There will be a need to have the right systems to then cope with any leak of ammonia that you might have in the system storage and also final units - fuel cells or engines. I was in the hydrogen. If you have a leak, just as you said, you won't notice and by the time that you have reached high levels of a flammability, then it has the potential of exploding and then blowing the entire vessel so that that I think.

SB **Sew, Brandon** 7:14

Yeah.

AM Agustin Valera Medina 7:16

Is another important aspect of ammonia.

SB Sew, Brandon 7:21

Yeah. So looking more into how this is more into how green ammonia is produced. So using green hydrogen production and then after speaking with other industry experts and looking at literature, the government, the government's main approach to developing this is increased funding. So they have their hydrogen allocation rounds that sort of aim to funnel funding towards these low carbon hydrogen production projects in the UK.

I just wanted to ask what are your opinions on the government's approach to this? Like, do you think it's enough funding to sort of make a big difference or do you think they could be doing more to develop hydrogen in the UK?

AM Agustin Valera Medina 8:03

I believe that it depends on the context that we're evaluating. So for example, if we compare with other economies developing nations.

Where the word of Hydrogen has been barely spoken, then I think the UK is doing fantastically when it comes to locations, like in Scandinavia or probably Japan, now China, that is moving as well into a lot of infrastructure and a lot of developments using hydrogen and this derivatives. Then I think the UK is behind.

But in a fairway and then put it in a global scale, I see that we're doing fair, more funding would be ideal, obviously, to then speed up all transitions, making awareness, industries, and also connections that will be required that will take not not 5 or 10 years, sometimes 20 or 30, speed up and then be put into the system sooner than later. So I think in a general context, we're doing fine, we could do better.

SB Sew, Brandon 9:05

Hmm.

Umm. So I'm not sure how.

Much knowledge you have on green hydrogen production itself. I'm assuming you do because as you said, you've been in this for 15 years, but in the government recently published their hydrogen champion report in 2021 and that was sort of

discussing recommendations that the government should make to develop green hydrogen in the UK. And one of the main things they talked about was this idea of temporal correlation rules where.

If you're a project developer in the UK, you need to adjust the operation of your electrolyzer in accordance to the availability of renewables and.

You know, this has been seen as a big has a big impact on the capital expenditure costs of green hydrogen because you know you're it's constantly adjusting the operation of your electrolyzer and.

Economic feasibility has a big knock on effect on the levelized cost of hydrogen, which ultimately is what makes it competitive with diesel or aims to make it competitive. So given your involvement in the GW shift, you know what? What are your opinions on the government focusing on stuff like this that you know, it's kind of a niche topic that I've heard about. Do you think that temporal correlation is, you know, really that significant or do you think that there are other areas that should be prioritised first?

AM **Agustin Valera Medina** 10:31

I think we should start prioritising other areas, the levelized production I think is a very long way and inefficient method and costly approach to actually produce a green hydrogen. One of the main issues and most expensive component of producing green hydrogen is actually, as you said, the electrolyzer. Electrolyser is just too expensive and right now and producing hydrogen the way that we do it with steam, methane reforming, electrolysis costs two to three times what we are paying now. So that sounds really good to then tackle CO2. But when it comes to paying the bills, having your heating during the winter and then expecting to have electricity in the middle of December, then it's not realistic. It's just we will suffer it already. People complaining about natural gas and electricity for the increase that we've seen so far because of the post pandemic issues. Now considering that we could pay twice that amount.

SB **Sew, Brandon** 11:04

Yeah.

Hmm.

Yeah.

AM Agustín Valera Medina 11:32

Using green hydrogen, yes, people wants to save the planet, but they don't want to do it at the expense of not having enough food on the table. So my approach would be to then start thinking more in larger scale. Community based. Now it doesn't have to be nationally or a large companies producing it in a way that any renewable energy that it can be distributed in say for example farms or in small communities.

SB Sew, Brandon 11:42

Yeah.

Hmm.

AM Agustín Valera Medina 12:03

Districts, industrial districts and sectors that can then tap into a larger electrolyzers. So instead of thinking I'm going to levelize my electrolyzer to whatever I have available for renewables, I can then feed from all the different sources available to a bigger, large electrolyzer that can be paid between all of us. So having a community of 100 individuals or in 2030, whatever it is then paying and feeding to that system makes a better approach because they would be able to then fit more.

Then pay it faster and then finally having hydrogen in a larger scale. So I think that's where the government should be focusing on and that's what the companies saying large companies are doing trying to reduce costs on electrolysis by increasing size and improving mass production and reducing cost of components and things like that. So we're thinking about doing something real which leads to then something being larger scale again with probably community engagement to do so.

SB Sew, Brandon 13:03

Yeah, just building on what you said about how companies are trying to reduce their CAPEX costs of electrolyzers by, you know, increasing efficiency and you know making cheaper materials and stuff like that.

Do you feel like government industry share the responsibility of reducing cost? Because I have interviewed Alex King of Tower Limited recently and he mentioned how currently in the UK the price of electricity is indexed to the price of gas so resulting on what happened when Russia invaded Ukraine, gas prices skyrocketed and in the UK that.

Knock on effects of electricity prices were going up as well. Significantly. Do you think the government, you know, should decouple the price of electricity to gas to sort of reduce the cost of hydrogen production? Because this would make electricity cheaper? Just what are your opinions on that?

AM **Agustin Valera Medina** 13:57

Well, I think that's a very interesting thing. I believe yes yeah that the electricity price should go down.

And again, not at the expense of having to then ask for a higher debt to the one that we already got. If that's the case, if we're talking about bringing down the benefits of director CEOs of the companies and then making more efficient those electricity units, then definitely I think it should be shared. But then at the same time.

When it comes to supporting some of these ventures of having new electrolyzers paying and subsidising some of these systems, I think the industry as well needs to then be conscious that it's a business and then finally is not something that the government should pay entirely. They need to then make profit and finally find the best solutions that are sustainable and that help us think about the way you think about, for example, wind turbine systems that have been subsidised for a long, long time and then.

Is that again the right way to go? Yes, we're reducing CO₂, but at the expense of the public. So it's one of those cases that subsidising, supporting economically could be the way forward for a few years, demonstrating that eventually companies are going to be sustainable, to then continue their operations.

SB **Sew, Brandon** 15:21

Yeah. Yeah. So the Regulatory Horizons Council, which are an independent expert committee, they produce a report with the Department for Transport back in 2023. And it's sort of they in in that they stated that current hydrogen regulation and policy frameworks such as the lack of safety codes, they sort of create uncertainty and confusion among stakeholders. I wanted to ask you because GW shift works, you know, it's sort of.

Academics with industry and civic partners, I wanted to know whether you had any first hand experiences of how hydrogen policy, or perhaps the lack of hydrogen policy, has affected the projects that you've worked on, or whether you've heard something similar heard from the industry partners that DW Shift has worked with.

AM **Agustin Valera Medina** 16:13

Yes, absolutely. Is one of the major issues, if not probably the major, combined with public perception. And I think it goes back to what you were saying, stakeholders, being wary of actually investing or not in these proposals because they don't know how they're going to then perform once the systems, for example, when we do technology development, how this is going to progress into a commercial venture. So well, I mean it's nice that you're doing these tests, running these issues, but eventually, when it comes to them selling these devices, we don't have any regulation or any system that is possible.

SB **Sew, Brandon** 16:52

Yeah.

AM **Agustin Valera Medina** 16:54

With the current political framework, so that's one of the cases that, for example, we got in a project that is related to ammonia as a maritime fuel. It's exactly the same area. And the reason because we are not seeing anything apart from just talks and fundamental studies being conducted here in Europe is the lack of regulations, how are we going to be bunkering the ammonia? It has been done is done on a regular basis because of refrigerants and fertilisers. So again, those kind of regulations can be extrapolated to the use of fuels. But when it comes to introducing the chemical on board, cranking engines, issues, potential leaks, et cetera, then it just changes everything. The same happens with the case of hydrogen. Hydrogen being used for this type of system, again, is just a niche area. Demonstrators showing in several parts of the world that storing hydrogen is still unsafe. We have cases we've heard some situations, for example in Sweden, where a hydrogen stations essentially blew up and then companies investing in those were completely liquidated because investment was pull out from the resources. So these kind of things make it very

SB **Sew, Brandon** 18:16

Hmm.

AM **Agustin Valera Medina** 18:21

Very challenging for companies to jump onto the train of net-zero fuelling.

SB Sew, Brandon 18:27

Yeah.

Yeah. And then from everything I've researched, one of the main focuses of the government is to increase funding for projects and the main focus of these are to mainly improve the techno economic feasibility of hydrogen technologies. In your opinion, I wanted to ask you how important is techno economic feasibility in terms of developing hydrogen in the UK because you know, technology and economics are sort of intrinsically linked in my opinion.

So I wanted to hear your thoughts about that.

AM Agustin Valera Medina 19:04

I think it's essential. Before jumping into any event here or any potential project with a commercial future, I think the technical economics need to be right. They need to show that there's a possibility technologically, to sort out or come up with a solution of the particular problem we are seeing. At the same time, the economics need to be right. If we're thinking this is going to have legs for future support and going into a commercial future. So one of the things that for example, in our case, we tend to do is for every project large that we are now running, we tend to do some technical economic analysis beforehand before actually jumping into having the technology developed and setting up the systems. In particular to GW shift. We just won a Spring project, a small project that is going to allow us to then evaluate techno economically what is the possibilities of bringing ammonia to Cardiff's port delivery through WW Networks and then finally convert it into hydrogen close to a steel production system where there's going to then finally be used the hydrogen in furnaces. So that idea needs to then be feasible showing good techno-economics showing good potential and good comparison with natural gas before we're actually start investing in bringing those systems in real life.

SB Sew, Brandon 20:43

Perfect. And then just last question, I know I've touched upon this a lot already, but the government sort of main focuses are on funding and addressing current policy issues. Obviously there are, there are like many other components as part of developing a new technology such as hydrogen. So you think there is a particular

area that is slowing down the development of hydrogen that the government has not really focused on and they really should.

AM **Agustin Valera Medina** 21:10

I believe that when it comes to public perception analysis, the government is lacking good research and good communication with many communities and this I know because of one of the things that we've been trying to do as part of the project is to engage more with communities. For example, here in Wales. So we've been talking, for example, to the ports, they have a good understanding on what they need. But when it comes to the engagement with the government it has been very poor. It hasn't been at the level that they would love to have it. So then they started engaging into these transitional talks.

SB **Sew, Brandon** 21:20

Mm.

AM **Agustin Valera Medina** 21:44

Being told you need to then transition to hydrogen and ammonia. How are they going to do it if there's no guidance? Another thing that we've seen as well is communities. For example, we have some talks here with communities in the valleys and also close to the Brecon Beacon and they say well communities here mainly are farmers or pensioners, they don't want to transition into hydrogen that you know that this is a bomb just next to their doors and they say not in my backyard. And this is one of those cases that.

SB **Sew, Brandon** 21:51

Hmm.

AM **Agustin Valera Medina** 22:16

Probably the understanding on what is visible, what are the health and safety issues. And the cost involved has not reached those communities to then say yes, we're fully supportive to then go into this and then have it in our communities. So I think that's one of the major areas the government should be focusing on.

SB **Sew, Brandon** 22:34

Yeah.

Perfect. Yeah, that was all the questions I wanted to ask just for the last couple of minutes. Was there anything, any thoughts that you'd like to share that I didn't specifically ask for in my main questions?

AM **Agustin Valera Medina** 22:46

No, I believe that the questions were very good, were straight to the point and this is what we need more of these studies. So I'm really looking forward, the ones that you get the final report to see in it and then and see what you found because yes, it would be really nice to then see the difference between what we are saying and that's what the government is actually present.

SB **Sew, Brandon** 22:53

Yeah.

Yeah.

Yeah, of course. So, yeah, thank you very much for taking time to do this interview today. Yeah, just as you mentioned, in terms of next steps because you've obviously participated in the research. Once I finished my project, I will send it to you to read whether you do read it. You know, it's up to you. You don't have to do. But yeah, I just thought it would be a good, good gesture for me to send you my work, seeing as we're involved in it. Yeah. So if you have any more questions, just feel free to e-mail me about the project. Help me. I'll reply to you.

But yeah, once again, thank you for sharing your thoughts and.

I hope you have a good rest of the day.

□ **Sew, Brandon** stopped transcription