Transcript for #80. Scaling Up Waste-Based Drop-In Advanced Biofuels
Guest: Nicholas Ball, CEO, XFuel
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Introduction (00:01):

You're listening to Fueling the Future of Transport, hosted by Tammy Klein, the founder and CEO of Transport Energy Strategies. We'll talk all about the fuels and energy it takes to keep the world moving forward.

Tammy Klein (00:17):

Hi everyone. Welcome to the show today. I'm so pleased to have with me today Nicholas Ball. Nicholas is the CEO of XFuel and I'm really excited to have him on the show to talk about his technology and the company and what the company's doing. I'm really passionate about technologies in general...technologies for transport, energies that can help reduce greenhouse gas emissions and also improve air quality. So I'm always on the hunt, I'm on the lookout ,and I was so pleased to be able to meet the Xfuel team and I'm really happy to have Nicholas on the show today to talk a little bit about the Xfuel technology and what it could mean for the transport energy sector. So Nicholas, welcome to the program.

Nicholas Ball (01:12):

Thank you so much Tammy. Thank you for having me on the show.

Tammy Klein (01:16):

My pleasure. So for the listeners who may not be familiar, can you talk about what is Xfuel? What is the technology and what's the plan for the technology? Is the plan to license, develop production facilities or both? Tell us about it.

Nicholas Ball (01:34):

Yeah, so taking it from the top. At Xfuel, we kind of focus on producing advanced drop-in biofuels from waste cellistic cell biomass predominantly for the transportation sector, but basically any liquid fuel market. So when I say transportation, obviously that includes the marine sector, which is one of our core markets the road and aviation industries as well as different industries that you'd find with, for example, like the agricultural industry, the mining, drilling, construction, remote energy. And I think that's an important point. Most people don't realize that liquid fuel spans so much more beyond transportation. It's not just those things. So yeah, we focus on that. We've been developing our technology for over 10 years now. And I think the way that I would frame it is bringing a fundamentally different process to the market that converts solid biomass into fuels. So the most well-known being fast paralysis or gas fissure, we differentiate ourselves considerably from those kind of technologies and trying to bring a totally new approach to the market, which has obviously its benefits, which is why we're here.

(02:45):

In general, our technology focuses on production of high quality drop-in fuels, for the marine sector specifically, but also on road, as well as bringing them at very low CapEx and OpEx costs as well. So that's our core kind of motivation behind the company. High level takeaways of the company and what we're focusing on more would be basically ensuring that we are extremely sustainable in terms of the greenhouse gas intensity of our fuels. It's one of the key motivations about the company here. Obviously, we're using sustainable biomass and waste and biomass. Our technology is a modular

which has its own advances and decentralized, which I'm happy to go into later if interested as well as I think the most important thing is having a solution that is for now and having an immediate impact and not something that essentially we have to develop for the future with infrastructure. So that's in itself what XFuel does and what we provide. But yeah, I think your other question was around the licensing and how we're planning on that.

Tammy Klein (03:51):

Yeah,

Nicholas Ball (03:53):

So it's an interesting question because as we're starting out the commercialization phase of our technology now, I would say that the main impact that we're trying to do, well the main kind of priority is driven by the time to market, essentially making the biggest impact in the shortest time possible. And we see this as the initial strategies building our own production facilities. So providing our own plants and selling the much needed and highly demanded carbon neutral fuels for the market. But I think, and luckily enough, we've had some fantastic interest from corporates and some of the forward thinking corporate companies out there in the various sectors that want to align with us and potentially have long-term partnerships. But I think in the medium to long-term, there is a possibility where we see we can't build out these projects fast enough ourselves, especially with the capital requirements and such, where we'd be looking to potentially do more partnerships or licensing in the future. But the shorter term we're definitely going to build on an operation model is where we're approaching.

Tammy Klein (04:59):

So you would envision or let me see if I have this right, I mean it could be the off takers, large corporate entities that come in and partner with you on the CapEx portion and they do the offtake of whatever the production is that's coming out of one of your facilities.

Nicholas Ball (05:18):

Absolutely. And I think we're seeing that more and more.

Tammy Klein (05:22):

That's a big trend.

Nicholas Ball (05:22):

We get approached by that. Yeah, because I think at the end of the day, these kind of corporates really want to really have access to these fuels and it's quite hard to find access to these fuels. And we talk a little bit about HVOs in the future, maybe in a later question or so. But yeah, I think having access to those fuels is the forefront and how do they do that? Well, it's facilitating these partnerships earlier on with companies like us. So we're getting a lot of inbound for that and I think that's a growing trend. Absolutely.

Tammy Klein (05:51):

So for the real techies out there, or maybe even the non-techies when it comes to fast paralysis, what is the key difference? Have you figured out a better mass mouse trap in terms of the fast paralysis? Is it fast paralysis, sort of the product, but not actually the fast paralysis technology? What does that look like?

Nicholas Ball (06:17):

Yeah, no mean. Okay. So fast paralysis the main, I think disadvantages and that you would normally have, and of course I don't speak for every company, because there's many variations of this is essentially that you're producing a biocrude or bio oil, which then needs to be codified or upgraded. And that's quite a costly process. So what we've developed is technology that out of our core conversion technology actually produces drop-in marine fuel standards that fit with the fossil fuel standards actually in a one-step process. So we avoid a lot of the, let's say, side reactions and side issues with oxygen and such that you would typically find in a paralysis system. And that allows us to produce a very high quality fuel straight out of our core tech. So it's quite, in my perspective, quite a game changer I would say that. But I do believe it's a big difference in the industry's perspective also the level of efficiencies we have.

(07:12):

So how we can convert the amount of biomass needed is very little to convert quite high quantities of high quality fuel. So yeah, it's quite different to process system. And then on the flip side, very different to gas station shock technology, which is quite energy intensive high temperatures, high pressures. And with that you typically find very high CapEx requirements because the equipment has to withstand those temperatures and pressures and also {indiscernible} and cost gallon or lit because of the energy that you need to put into the system to produce these fields. So we have differentiate ourselves considerably in terms of the process and then develop that over the last 10 years. It's been a long journey, but we're at the commercialization phase.

Tammy Klein (07:57):

Yeah, you're out of the valley of death, the R&D valley of death as it were. Yeah, <laugh>. Exactly. Or the TRL valley of death.

Nicholas Ball (08:07):

<laugh>. The TRL one. Yes. The well-defined, well historically defined one. Yes,

Tammy Klein (08:12):

Yes, yes. So you talked about, or a little bit earlier of waste, no cellulase feed stock. So what is that like in terms of collection and procurement? Because that was always, at least in the cellulose ethanol world, one of the real difficulties was the developing that value chain and the collection and the processing and the treatment and the pretreatment and all that sort of stuff. What is that like for you all in this process today? I mean that's come a long way too, and over the last 10 or 15 years.

Nicholas Ball (08:52):

The pre-processing will always be a requirement for any biofuel producer. And I think that has come a long way. A lot of this is of standard technology in that, obviously it depends on the materials we're talking about. I think in our technology we're a little bit more forgiving in terms of the types of materials that we can use. We're quite robust. We've tested over 50 different feed stocks and a wide range of them. Obviously that needs to be pre-processed and that has its hurdles but something that you can easily get over. I think it's not the major hurdle the different type, I guess the various kind of feed stocks that we can use. And just going back to the original question there is anything from the different sectors that you would typically find, whether it be the agricultural residue sector, whether it be the construction waste from that perspective, manufacturing waste such as in furniture, waste and sawdust and things like that. As well as forest residues as well. So to give you an idea, olive kernels, arm and shells, pine, eucalyptus, sunflower halls, all sorts of different things

that we can use in our process. So it it's quite abundant. And talking about abundance, because I know you had earlier on, quite earlier on, but you had on your show Dr. Kyriakos and...

Tammy Klein (10:14):

Yes. Mm-hmm. <affirmative> Alba Soler and Yeah, <affirmative>.

Nicholas Ball (10:17):

<affirmative>, exactly. So they were talk about a great study at the Imperial College about the sources and we use that as well. And amongst other sources we do our investigation and it's pretty clear that in the EU and beyond, but EU specifically for this study, there is more than enough to supply the entire industry with biofuels with advanced fuels. And that's a really important point, especially when you're very efficient with how you use it, which is in our case.

Tammy Klein (10:46):

So I'm going to come back to that, but I want to ask you what are the biggest target markets you're seeing? Target regions, countries, sectors for the Xfuel product? And do you see fuel competing with the current HVO and renewable diesel and SAF producers today? How do you see that lining out?

Nicholas Ball (11:14):

Yeah, so as a company, we're currently focused in the UK and EU right now. We also have a pipeline of projects looking towards the US and Canada and then Australia as well which we're developing right now with different partners. I think that's on the geographical kind of region. And obviously I think one thing to mention, which I think is a really important point, and you did touch upon it in your last question and apologies I didn't answer that, but is around the distributed nature of feed stocks and biomass in itself. Yeah, that's one of the reasons why we approach this problem with a modular technology which is scalable in different modules because we fundamentally believe that if biomass is distributed and decentralized then so should the plants and the solution to convert them. Biomass is a very low energy density in there. So trucking around and you see this, you see biomass being shipped and trucked around the world to feed an enormous project somewhere that's multibillion dollars and that affects the carbon impact of the fuels and obviously it's not a very sustainable solution. So we believe that having multiple projects that are close to feed stocks is really a fundamental part of this solution and that's how we've developed our technology to support that. But yeah.

Tammy Klein (12:33):

So let me go back to what you were talking about be before and I want to ask you about there's abundant resources for production. Yes. That the Concawe study from the group that you mentioned has really clearly demonstrated that and there have been other studies that have supported as well. There's more than enough biomass even for different types of production pathways that that's out there. So it seems to me like in the EU, in your view, is there really full recognition of that and are the policies that are in place and are going to be put into place? So for example, Fit for 55, Red Two and Red Three come to mind are those policies recognizing that, I mean there really does seem to be a big push in the EU and other places towards electrify, electrify all day, all the time.

(13:52):

And I guess we'll have these renewable policies on the side as if at least for the transport side of the equation, that's sort the solution. And yet we have a legacy fleet, we have lots of reasons to look at other sources. So what's your view on that? Are the policies that are in place or will be coming into place in the EU and frankly elsewhere, even in the US here

with the Inflation Reduction Act, are those enough to help new technologies like Xfuel really scale up? What else might be needed there and how do you overcome that electrification perception?

Nicholas Ball (14:42):

Yeah, I think so first I should say that we're a firm believer in electrification. We think it is the very best solution for many applications. And I mean consumer cars, light trucks, I think it makes complete sense and it's something we should push towards always. I think the story's a little bit more complicated than people want to believe. What I mean by that is there is the kind of cradle to death calculations of moving an entire fleet that has just been bought to electric and what does that look and from a greenhouse gas perspective and energy intensity from obviously constructing and building, manufacturing these trucks and cars. So that has to be taken into account and something that I think not enough is looked at. But from a policy perspective, I think there is a push for advanced fuels in two ways. One is the phasing out of first generation biofuels which is being seen globally.

(15:38):

I say globally, US and EU predominantly. And I think the advanced fuels does have a bigger and bigger say. Two issues here is I believe that we have enough states, probably not enough that it should be. I think there has to be more recognition of what we can actually do. But having said that, I think that the advanced fuel space has lacked in performing, We've all had the false promise of producing advanced fuels for many, many years and we've been around for 10 years. So we know that, right? And I think we've never quite delivered a reasonable or large quantities, even though the promise is there. And if we can crack that and achieve that we're working on doing now and believe we can do that in large quantities. Policy is not going to catch, it's not going to believe, it won't align with what is actually happening in the market. And I think that's what we're seeing. HVOs are the closest or the only thing out there right now that are in that bracket. And that's obviously got issues on scalability as well. So that's probably one of the problems on policy. But I think we are doing a good job and I do think electrification is a huge part of that of course. And I don't think anyone who denies that is probably not understanding the space that's happening.

Tammy Klein (16:54):

So are you saying in a sense that we're building it, once we build it, they will come?

Nicholas Ball (17:03):

I believe so.

Tammy Klein (17:04):

There needs to be the demonstrated, really demonstrated full commercial volumes of these really advanced fuels beyond HVO. And once that's there will be, So it is a little chicken and egg because you kind of need the policy to scale up, but you also need to scale up to guarantee exactly the policy.

Nicholas Ball (17:28):

I think it is a chicken and egg problem. And we need one of the ways where this is going to solve that issue is the immediate requirements of the world, we need to decarbonize. It's an immediate threat, an extension threat. So I think that will push investment, it will push, especially if there's in the future other like a carbon tax or things like that might come in the future, I think that will push us towards all different avenues. But having said that, there are industries obviously outside of the ones we're talking about that can be electrified today at least, which we think we would be a

huge, huge win for. And marine sector being one, aviation being another clear one as well as other sectors that other people are not really thinking about. Having said all this, there is one thing that I like to consider an inconvenient truth yet, which is that we all talk about decarbonizing from a very privileged kind of perspective, which is major cities and air pollution as such. But there is an entire world out there that needs to decarbonizing. And whether you're burning a gallon or a list of fuel and in Lagos or in the middle of New York City, it's the same effect all of us. And I think that that perspective and realizing that actually we need solutions that are beyond our infrastructure, and I don't think electrification in those kind of regions and rural regions or hydrogen or anything like that is viable. Yeah. So we think we're a solutions for that as well which is great.

Tammy Klein (18:51):

I think that's really important too. It's something that I highlight a lot is when I look at emerging regions or countries in Africa, in Asia, in Latin America, there will be some electrification, but it will not happen probably as fast as some may like. And there's a huge legacy fleet and there is in the west as well. So it's, and people are going to continue, as electrification scales up, people will continue to buy internal combustion engines as well. Aviation demand will increase, marine fuel demand will increase. So we do need other options to address those emissions. And so yeah, I agree. And I do think that that does get lost in the shuffle. I think it's really hard to contemplate where we really are with fuel demand and how intertwined energy traditional oil products are in the fabric of our lives and never more so than in these regions where there's really a lot of scaling up and people coming into the middle class and things like that. So I do think that gets lost in the shuffle. It's simply unimaginable to, it's like a billion plus people <laugh> in these regions and some of these countries and beyond. Yeah, I do think that that's really, really important.

Nicholas Ball (20:41):

Absolutely. And aside from that, I mean I think we working towards achieving carbon neutral fuels. We're very close to going beyond that actually. But that's a whole other topic and probably something I shouldn't go into yet. But it's an exciting prospect where we can actually produce biofuel, which actually has no kind of emission impact. And I think that's something, being able to provide that to the emerging economies and saying the amount of infrastructure costs to switching things over, you can avoid or delay, depending on the sectors is a great opportunity for them and for the world. So I think that's the important part here, I think.

Tammy Klein (21:30):

So where do you see the company going in the next five to 10 years?

Nicholas Ball (21:36):

Yeah, it's a good question. I <laugh>, I

Tammy Klein (21:38):

Tell us all your plans, <laugh>.

Nicholas Ball (21:42):

Well, like we discussed before, I see the company delivering on the promise of solid biomass, advanced fuel technologies which I think has been there for a time and not quite achieved. What this really looks like is the rolling out of ambitious, an ambitious number of modular and scalable projects in various sectors. So the marine and aviation and beyond, and obviously in various regions as well. So I think that's what that looks like from that success. In the shorter term, I think

there are some things that are exciting me right now, which like I said potentially milestone in our byproducts and allowing us to not only avoid carbon emissions, but potentially sequester that. That's pretty exciting for the company. But aside from that, I would say aside from the expansion operating a projects, our roots are in the development and commercialization of technologies. So I think we probably would see us developing other technologies which we're already doing in the same space and providing the much needed solutions in our effort to towards net zero. So it might not be a very concrete answer, but basically many different projects in different spaces but also developing other solutions

Tammy Klein (22:52):

You mentioned carbon capture and storage, or at least the sequestration aspect of it. So are you saying that Xfuel might be able to reach not only carbon neutrality, but potentially net negativity as well? The holy grail potentially?

Nicholas Ball (23:17):

Yeah, we're working on this. Not something I should be announcing, but anyway, But yeah, we're working on this. It's something that is one of our top priorities in our company. I mean, anything we can do in bringing that down further the better. Absolutely. And regardless of the financial impact on a project, we think it's super important to be able to achieve this milestone. So yeah, it's something that's on the pipeline and hopefully soon be able to be to discuss more, say more.

Tammy Klein (23:47):

So fun and last question What excites you most about the space and why I mean, especially when you're doing R&D and you're trying to develop a company, create a company and a product and a production process and scale it up. I imagine in my own experience working with companies like yours mean are some, there's setbacks, there's disappointments, there's hard times. You're in that valley of death as they joke, now you're emerging. There's tough times and I imagine quite a lot of good ones. So what excites you most about the space and what's keeping you going?

Nicholas Ball (24:38):

Yeah, well I think one of the things that I've realized in the journey that we've had, especially now as we're kind of growing exponentially in terms number of people coming on board is this kind collective energy and interest we're seeing in the world right now. And to getting this right. I think the decarbonization effort is well on its way, and I think we're noticing that now. There may have been some hiccups along the way politically in different regions, but I think we're just seeing this kind of constant move really amazing talent, exceptional talent jumping ship, being part of the movement, deciding that actually regardless of remuneration or circumstances financially, that they want to be part of this movement and support in this. That really does excite me. And seeing the kind of people that are willing to make this jump and I think that's growing more and more every day.

(25:36):

I'm optimistic for the future. Obviously, there is a huge amount of work to be done well off our targets. There's very easy to get bogged down and feel slightly depressed about the situation. But at the same time, I think we have to remain optimistic and I think it's going to be a wave. It's going to be more and more people moving to all this and making it an inevitable kind of success for the world. So that excites me, seeing that energy, it keeps me going and seeing the passion behind the people that we have on board ourselves, but also people that want to join and outside and other companies as well. So that's really helpful. Aside from that, I personally just love that I get to do what I do, which is make a

potentially enormous impact in the world and also run a great company. So I'm personally very happy in the situation. It is not easy, as you can imagine. There are ups and downs, but yeah.

Tammy Klein (26:35):

Well that's what I'm seeing too, is I think that's what also gives me a lot of hope is I think there are, even in the oil companies or in traditional energy sectors, I think people do want to do something and they do want to make an impact. It's really just the pathways in which, and the various areas that people are working to get there, whether it is electrification or traditional oil and gas or novel new fuels and production processes like yours. So yeah, that's encouraging to me. So Nicholas, thanks so much for joining us, talking to us about XFuel today. It was a pleasure to have you. Come back.

Nicholas Ball (27:23):

Thank you so much, Tammy. Appreciate it. Speak soon.

Closing (27:30):

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