Podcast #81 - Saoradh

[00:25] **Brian:** Well hello everyone, and welcome to the Hydrogen Nowcast for January 26, 2024. I'm your host, Brian DeBruine, the director of the nonprofit Colorado Hydrogen Network. This is a podcast devoted to encouraging the deployment of hydrogen infrastructure throughout the world. Our intent is to encourage and motivate others to take charge to help deploy hydrogen as a means to decarbonize the transportation and other energy sectors and to accelerate the movement to stop climate change.

Well, on the podcast today, I'm going to feature Saoradh Enterprise Partners, also known as SEP, which is a clean tech venture capital and research firm right here in Boulder, Colorado. But SEP is so much more than just venture capital. They've built a robust clean tech research platform, too. And as part of that platform, they've spent over three years aggregating massive amounts of data and have created a one-of-a-kind, comprehensive north American hydrogen market model, which is complete with an amazing graphical user interface to look at the data from every angle conceivable.

Now, they've also built a global supply chain database which serves a consortium of leading startups, corporations, and research institutes, which includes Bill Gates, breakthrough energy, plug power, SoCalGas, and others.

And finally, they've created a hydrogen news feed which captures, breaks down, and curates hydrogen news so that subscribers can literally scan the day's global hydrogen news over their morning coffee.

So, wow . . . this is a lot to go over. But to help us unpack all that and give us an overview, I'm really pleased to welcome to the podcast Paul Nelson, who's the managing partner at SEP. Paul, welcome to the show!

[02:12] **Paul:** Hey, thanks, Brian. Really appreciate the opportunity to join you today and talk a little bit about SEP's unique approach to clean tech research and investing and of course, our current focus on our hydrogen practice area.

[02:26] **Brian:** Great. Well, thanks, Paul. And as I've said so many times on this podcast, to really understand the energy transition, you have to look at the numbers, not just concepts. And a good example of that, I think, is one thing that pops out of SEP's hydrogen data is that I was surprised to learn Colorado ranks number five in the nation as a clean tech innovation hub, which is behind only San Francisco (which of course includes Silicon Valley), Boston, New York, and Los Angeles. And of course, SEP is part of that Colorado clean tech hub.

Now, before we get into the description of all these market models and the data and so forth, and the graphical interface and the newsfeed, why don't you start by giving us a good overview of SEP?

[03:12] **Paul:** Great, Brian, happy to do so. As you mentioned, SEP is a very data-driven clean tech venture capital and research firm. Our focus is really on what I would call the innovation to commercialization space. So we start early looking at innovation at research institutions, national labs, pull that forward into startups, build those startups with an MVP, and get them out into the scaling capital market space.

So the research we do also is around that area. Let me give you a couple of examples. You mentioned that Colorado is the number five clean tech innovation hub. That was from a study we did in 2021 called the Clean Tech Innovation Hubs Survey. And what we did there, it was really a first of its kind. We developed a set of 13 data sets that helped us rank cities in the US for their strengths and weaknesses around clean tech innovation.

So imagine the 13 data sets are organized in three silos around research strengths, tech innovation and venture formation. So the idea was to really capture what metrics would

illuminate whether a hub was strong in say, research development or that in between space of tech dev before maybe a venture is fully launched. And the venture formation itself, that became a compass for us and our corporate partners and clients to help guide where we were looking to invest.

And it turned out emerging hubs outside of Silicon Valley, New York and Boston, where we're housing about 75% of the funding and the activity around research and tech dev – [however] the venture capital was really based in Silicon Valley, New York and Boston. That gave us a compass to look at the emerging clean tech hubs as places to focus future investing activities.

Another example, we created what are called clean tech sectors. So these are nine sectors where we track all the different investable opportunities and associated technologies in the clean tech space. And then we overlay what we call green metrics such as GRI reporting standards, UN standings, and project drawdown solutions.

Finally, we canvas various clean tech topics like ocean energy or lithium ion, battery recycling or direct air capture or cement, et cetera, to really understand each of these clean tech spaces to help us landscape spaces proactively before we start looking at investment opportunities. And we track the markets, the pricing, the innovation trends, green metrics, policy, and then finally investable opportunities and associated metrics. And it was from that work that we were doing around clean tech topics, canvassing these spaces, that hydrogen came out of that. And that really began in 2020 and of course has grown today as a big focus area and first practice area, if you will, at SEP.

[06:18] **Brian:** Well, thanks Paul. I really encourage listeners to go to the SEP website, which listeners is Saoradh.com and Saoradh is spelled S-A-O-R-A-D-H. So saoradh.com. And that's because this is an audio podcast. And unfortunately, so much of what we're talking about is graphical.

Now, when visitors go to the site, one of the first things they'll notice is that right at the main menu, at the top of every page, hydrogen is listed second right after home. So I guess, as Sayred puts it, hydrogen is the first practice area at Saoradh. And when visitors click on hydrogen, that's going to open a page that lists six practice elements. The hydrogen data consortium, hydrogen market model, hydrogen supply chain database, customized research services, and the hydrogen newsfeed. So the hydrogen market model and the hydrogen supply chain database are software tools, basically. And the consortium is a group of companies that use these software tools with help from SEP. Now, the customized research services are self-explanatory, and let's save the feed for discussion later. But first, could you walk us through these software tools and the consortium?

[07:38] **Paul:** You bet, Brian, just as a little bit of background, while I mentioned that the hydrogen practice area came out of our clean tech topical research, what happened was in 2020, we were investigating hydrogen, and we needed to look at hydrogen in North America at a granular level to really understand where it was being made, who was using it, what were the market dynamics. And we liked that approach, because before you start looking at the future, it's always important to look at what's going on today in a particular market and how is it structured, who are the players, that sort of thing.

So we created what we called Version 1.0 of the market model, and this eventually tracked 1,000 assets, essentially every plant that makes hydrogen or uses hydrogen in North America. And who's delivering the hydrogen? How are they delivering it? Is it truck? Is it liquefied? Is it pipeline? What are the pricing dynamics and that sort of thing?

And so at some point in 2022, working with some of our clients, like Sumatomo and others, they came back and they said, this is a great collection of information, but what we'd like to see is something that also includes all the potential and planned plants, both on the supply and

demand side, as well as thinking about the infrastructure issues and other criteria. So we said, okay, let's design what version two of this thing would look like and move it from sort of a mega Excel-based system to an online tool.

And then couple with it those other tools that you mentioned, Brian, which is the supply chain database that really tracks everything that everyone that is in the hydrogen ecosystem, in this case globally, that isn't supplying or using hydrogen, but is bringing some other product or service of error, like manufacturing electrolyzers, or is an EPC, et cetera.

And then the other tool you mentioned, which is newsfeed, really came out of just a frustration for us and our corporate clients, saying, hey, how am I really supposed to stay on touch of the hydrogen market every day when there are just multiple news sources and you're trying to sort out the wheat from the chaff? So we designed this tool that we'll get into a little bit later.

And then finally we said, how would this group of clients really work together? So we created this concept of a Consortium with complementary seats. So every seat is really designed to be a different perspective on the hydrogen ecosystem. So, for example, total holds the energy major seat. You mentioned plug power, they hold the fuel cell seat. Stanford University holds the research institute seat, et cetera. And this way, you have a very complementary group of companies. They're exchanging information relatively openly, and it really drives new supply and demand projects. Also within the consortium, we pulled events, bring in thought leaders every month.

This month, for example, we had the CEO of the Methanol Institute talking about how that product, which is really a hydrogen derivative, is growing significantly globally as a possible input to sustainable aviation fuels, otherwise known as SAF's and shipping fuels. So that was really the background of how we developed these three software tools, the consortium itself. And then we've coupled with that just recently, these innovation reports, tackling what we consider to be not fully answered questions yet, such as mobility applications for hydrogen. So I'll take a breath there, Brian, before I dive into the tools themselves, but I'm happy to do that as well.

[11:11] **Brian:** Thank you.. Well, you know, I'm sure the listeners are struck, as I was when I heard about this, at how comprehensive Saoradh's approach is and the amount of work you've done. I mean, as I said at the beginning, you've been at this for about three years and really put a lot of effort into collecting this data and then keeping it fresh, too.

But the graphical software tools and the databases aren't really that available to anyone outside the consortium, although I understand a few seats are being added this first quarter of 2024 in order to cover areas of the hydrogen ecosystem not represented by the other members. And I think it's important to stress that the members have been selected to address those different key areas of the hydrogen space. But could those that are interested also consult with SEP to answer maybe specific questions about the hydrogen market for a specific project and also, what about others joining the consortium after a few new seats are taken in early 2024?

[12:12] **Paul:** Yeah, you're right, Brian. The consortium currently is 20 seats. You mentioned a few. I've mentioned a few of the members. They're all up on our website. There is a set of slides. We call it the highlights. So we've got screenshots, some data points around the North American hydrogen market that are in those slides. Those are downloadable for free from our website, under the hydrogen section of our website. So I encourage the users to go there.

If a company has a hydrogen project and they're not part of the consortium or not able or interested in taking one of the new seats, they can always contact us. And essentially, SEP leverages these research tools to help answer project specific questions. And so we're happy to bring that sort of capability to individual projects for companies that aren't part of the consortium.

In terms of the seats, we are in the process of adding ten seats. So it'll be up to 30 seats by the end of this quarter, just as you described, really, to address those areas not yet covered. So, for example, we don't have a heavy truck manufacturer that would be making hydrogen trucks in the consortium. Some of the hydrogen derivative areas like SAF or ammonia, we'd like to develop seats in those areas, and some of the sectors of finance. So, for example, right now, SE Capital represents our private equity seat, breakthrough energy, the venture capital seat. But we don't have a project finance seat held or an investment bank seat yet in the consortium.

So those are some examples of the expansion in Q3. We're going to be presenting some unique ways to expand the consortium. I really can't go into that much right now, but stay tuned for that. In addition, we're also developing regions. So, as you mentioned, the market models for North America, the newsfeed, and the supply chain database are global.

So we've had a lot of questions about, well, what about developing the market model for Europe or select countries in Asia? And so we just formed a working group from among our existing consortium members that have an interest in Europe and some other companies who would like to be part or have access to that European information. And so we'll have that finished scope in March, and we'll get underway pretty quick thereafter. So we expect to have the European market model out this summer sometime, and then we'll dive into select countries in Asia, probably Japan, Singapore, and South Korea. So that's kind of where all that's going.

Now, what I thought I could do, Brian, if we have time is just sort of as best I can without any sort of visual tools. Just paint the picture of what's in these three data tools.

So the market model you mentioned is, of course, for North America. And as I mentioned, it was originally to track about a thousand assets on the supply and demand side at the plant level. So imagine we know where each plant is, who owns it, how much hydrogen they're using or supplying each year, who they're supplying it to, how it's being moved, what the likely price is, et cetera. Now, most of the data we have is from public sources. It took our team a couple years to get really, really good at finding that data. Everything from SEC filings, regulatory filings, all the way down to building permits, presentations in front of city councils to build plants. Now, we also sent out a survey to end users of hydrogen and gather information from them, as well as primary data source.

But the market model is very colorful. It's this online tool and it has a bunch of dashboards. So, for example, there's a dashboard that tracks market demand. You can map all the different demand sources, see it visually, see it in tables listing every plant. It also identifies who operates this plant. So we typically have four points of contact at every single plant and their emails and that sort of information, it aggregates the information in terms of market pricing for each of the segments.

So when you think about current market demand, it's not just refineries, ammonia plants, methanol plants, but it's also light industry applications. Like every semiconductor fab uses hydrogen as process gas. Every float, or also known as flat glass manufacturer uses hydrogen as a reducing agent. Metallurgy shops use it. Pharma, food, oil plants use hydrogen. So we map and track every one of those in this interactive dashboard.

The companion to that is the second dashboard, which is infrastructure. This is where we think about all of the infrastructure related to hydrogen and hydrogen derivatives. So all the CO_2 pipelines, all the co2 point source locations. So thinking about how blue hydrogen can evolve, we track all the renewable power plants and the nuclear plants to think about where the zero carbon power is coming from. That'll be enhanced this quarter. In an update, we're developing to incorporate age of the plants in light of the new the NOPER that was issued for the tax credit known as 45V for hydrogen production tax credits. So we'll be tracking age of plants, we'll be tracking the queues in the different ISO's and RTO's for renewable power plants that are being

teed up for connection to the grid. So all those points of infrastructure are in that part of the model.

Supply is another mapping environment, tracking tables, pricing details. What's interesting is this is primarily Merchant Supply. So these are companies like Air Liquide, or Linde or others that are making hydrogen at one location, moving it elsewhere to client locations, and that's become almost half of the market. So today, North America is about 15 million metric tons production and consumption of hydrogen. And almost half of that is merchant, because in part, demand locations outside of the Gulf coast really require hydrogen to be hauled by truck, typically. And so that comes off a merchant's facility, say to a semiconductor fab at Intel. But even around the Gulf coast, hydrogen end-users like refineries and ammonia plants, other petrochemical facilities generally stopped increase in their own on site capacity to make hydrogen. My guess is probably to limit their point source emissions of greenhouse gases. And so hydrogen growth among merchant suppliers has grown significantly the last ten to 15 years.

So we track all that, and then you can imagine if you want to just drop a pin anywhere in North America, take the supply and demand information, compare it to where that pin is going to be dropped for a new hydrogen production facility. There are two dashboards that dig into that and allow you to pick your production pathway, whether it's blue or green or turquoise. Whatever the technology is, whatever the location is, it pulls on local power costs and other tools to estimate production cost, identifies who exists today in the supply and demand ecosystem nearby, and who are the planned and potential demand sites in that area.

And then finally, there's a dashboard that looks at forecasting. So while we don't actually forecast at SEP, what we do do is identify all of the potential demand. So we track current demand and supply, planned demand and supply. These are announced projects and we track them at four different stages of development, up to construction. And then we track all the potential. So imagine steel plants. We track all the steel plants by type of production. And so you can just turn on steel plants and look at what that potential demand would look like. So in the forecasting tool, we show all the leading forecasts. DoE high-low, base-case, Lazard, McKinsey, others. So you can look at those forecasts, you can look at our current plan and potential demand and supply data, and then you can choose your own adventure, pick your year, pick your geography, and identify current market CAGR's, up and down penetration rates for potential markets, and essentially the probability of planned locations coming online.

So those are all the dashboards integrated into the market model. As I mentioned, the supply chain database also very graphical. We call it the best global phone book in the hydrogen market. You can see across maps where all the suppliers of services and products are located, or you can search them by keyword or what hub they're associated with, or any other criterion, see where they are, who is leading them, and points of contact at all those companies. So it's about 2000 companies we track globally in that system.

And then finally the newsfeed. I know, which we're going to get into here in a minute. Just a couple of other comments about the consortium. It is this organization which, as we've described, is complementary in nature. But we built a communications platform online which allows all the consortium members representatives to interact dm each other. We're constantly putting out questions of getting input and feedback from the consortium members about, hey, we're thinking about this new data set or a new tool. We'd love your feedback on this or that. We hold thought leadership events every month and networking events, linking everyone together. So it's a very interactive environment.

[21:15] **Brian:** Wow. I'm just not only over . . . yeah . . . I'm not only overwhelmed just by the amount of data and information that you've aggregated, but this feature,to be able to *interrogate* that database and to be able to do it graphically, is so powerful. As you pointed out, you could drop a pin and see what's around that area and different things. You could put up

maps of users, maps of suppliers, maps of pipelines. I've been so impressed with the demos that I've seen of this.

Y'know, one of the things you mentioned Paul, was this idea of a phone book. And that was kind of interesting that after contacting so many people in the industry, you probably have the best hydrogen phone book of anybody out there.

[22:01] **Paul:** Yeah, that really developed organically and from the exact process you described. So we built it out at sort of a first level, then said, wow, we have a lot of information here, we ought to put our shoulder in and kind of fill out the rest. And then, believe it or not, right now, as part of our innovation reports around hydrogen that are coming out starting this quarter, we did a deep dive and found more companies. And so we're doing a major update at the supply chain database that will be out in April.

[22:29] **Brian:** Okay. All right. Well, although the hydrogen market model, software and data aren't really open to those of us outside the consortium, one of the things that we all can subscribe to is SEP's global hydrogen news feed. And I'm sure everyone struggles, as I do, to try to keep up with hydrogen news. I mean, there's so much of it, and it seems like 95% of it is just fluff, which kind of reminds me of one of my favorite quotes, and that is, information consumes the attention of its recipients. Hence a wealth of information creates a poverty of attention. So let's talk a little bit about how SEP boils down that daily hydrogen news and also curates it so that subscribers can assimilate the important news in just a few minutes.

[23:16] **Paul:** Yeah, sure, Brian. Our approach to the HG newsfeed tool was, first of all, just to aggregate all that information. But like everything else we do, it was really oriented around what information can be used to drive transactional decisions, building a new plant, developing a new product, diligencing some activity.

And so I would not consider it the prettiest tool. There are a lot of folks that do some hydrogen news tracking and a lot of photos of just a few project announcements or something like that. This is like the rest of our tools – data. And so, imagine going into the hydrogen news tool, and we're curating two to 300 stories a day. This ranges from, say, scraping Reuters; all the way down to industry trade magazines, newsletters, everything we can get our hands on globally. And then from those 200 to 300 articles a day, we're selecting out maybe 10% of those that really have transactional information. Someone's announcing a project or an update to a project or a new product, say Alkaline electrolyzer, just hit a performance metric. That kind of really usable information then goes into the newsfeed, but then down below the newsfeed section, which you can sort based on keywords and buckets that we use, called make, move, store, or use hydrogen, which, quite frankly, we stole from Brian Pivovar at NREL. That concept we integrate that you can search in these different buckets or areas, or by keyword, or by company name or whatever, and see these stories and the links to them.

Jackson on our team describes it as "all the hydrogen news that matters over your cup of coffee in the morning". And it really is that. But as you scroll down from the newsfeed, we track all the published patents related to hydrogen globally. The titles, links to the abstracts, all the research papers globally that relate to hydrogen. Again, in the make, move, store use categories, we track all the hydrogen related conferences. There's a map, you can click on it, you can sort by date or location, and then you get into the US portion where we track all the hydrogen related SBIR / STTR grant announcements, historically back ten years. Same with ARPA-E and same with all the LPO DoE guaranteed loan awards. So it's a great way to track all the incentives happening in the US and all the news happening globally pretty quickly every morning. And it builds behind each of these pieces really an archive that you can consistently go back to and look up whatever you're after.

[25:52] **Brian:** All right, well, thanks, Paul. If the listeners want to subscribe to that newsletter, I assume they can just go to the Saoradh.com website, saoradh.com.

[26:01] **Paul:** That's right. They can just go there, click a button. They can subscribe at monthly, which is, I think, $40 or an annual price, 365 a buck a day. And get that, there's also corporate descriptions available there as well.

[26:17] **Brian:** All right. Well, listeners, I've been talking with Paul Nelson, who's the managing partner with Saoradh Enterprise Partners, which is a clean tech venture capital and research firm in Boulder, Colorado. And once again, SEP's website is Saoradh.com Saoradh. And I really encourage all of you to go to that website, take a look around. I think you'll really be impressed. Now, Paul, if listeners want to reach out and contact you or engage with SEP, what's the best way to do that?

[26:48] **Paul:** Always happy to take emails. Paul.nelson@saoradh.com you can call us 303-448-2115 or just go to our website and interact with us there, but we're always interested in talking with people in the clean tech space generally, and of course hydrogen specifically.

[27:06] **Brian:** Okay. All right. Well, before we wrap up the podcast, was there anything else that you'd like to add that we haven't really talked about yet?

[27:15] **Paul:** Sure. When we work in the hydrogen space, and quite frankly, in the clean tech space, we're always asking ourselves the question, how does this particular technology or group of technologies fit? And like, you know, Brian and many of the listeners, none of these are silver bullets. And hydrogen is in that same group. It is really something that can solve industry abatement in areas where green electrons can't solve it. So where you need a high energy-density fuel or high heat fuel in those areas. And so we really tried to be nuanced in our research, in our thinking around these various clean technologies like hydrogen to make sure we're focusing on where they fit the best. So that's my two-cents-worth on these technologies.

[28:00] **Brian:** Yeah, I absolutely agree. Well, Paul, thank you for taking the time to be with us today. I know you're on travel and appreciate you doing this remotely. Thank you so much. And I'm sure you're going to hear a lot from the listeners on the website.

[28:13] **Paul:** Great. Looking forward to it. Thanks again, Brian, for having me on your podcast.

[28:17] **Brian:** Absolutely, it was a pleasure. All right.

Well, listeners, if you enjoy listening to the hydrogen now cast, consider subscribing to the podcast and also give us a rating in your podcast app. A good rating helps us be discovered by other people. And of course, word of mouth recommendations are really important. So consider letting people in your own network know about the hydrogen nowcast. And if you'd like to contact me, I'm always happy to hear from you. And you can reach me through the website at Colorado-hydrogen.org or on Linked-In. So until next time, this is Brian DeBruine wishing you health and prosperity. Goodbye.