



Photo: LOREN ELLIOTT/AFP/Getty Im

TRANSCRIPT

SHARE [in](#) [f](#) [t](#) [e](#) [p](#)

How to Build a Hydrogen Hub: Houston

July 29, 2022

Conversation with Brett Perlman, CEO of Center for Houston's Future

Joseph Majkut:

Good afternoon. Welcome to this virtual event, hosted by the CSIS energy security and climate change program. My name is Joseph Majkut, and I'm the director of our program here at CSIS. I look forward to an interesting and spirited conversation today. My guest is Brett Perlman. He's the CEO of the Center for Houston's Future. Brett's had a long career in the energy and in the energy industry as a management consultant, and previously served as a commissioner on the Texas Public Utility Commission. But now Brett's leading the charge to establish Houston as a hub for clean hydrogen here in the United States. I was really interested to bring Brett here for this conversation because not only does it feel like globally hydrogen is having a moment in the US, we stand at the precipice of making some serious investments in clean hydrogen around the country through and all those things we'll be talking about.

But also because I think Brett really sees both the potential and the challenges associated with establishing this nascent industry in a particular location Houston in his case. So I'm very excited for our conversation. For those of you who are joining us live, feel free to use the question and answer box. We will try to address those questions on a more rolling basis rather than leave them all to the end. And we really look forward to your engagement. So thank you for joining us, Brett. Welcome to CSIS virtually and maybe a good place to start is what is the Center for Houston's Future and why is hydrogen such an area of attention for you?

Brett Perlman:

Well, Joseph, first, thank you for asking us to be part of this. We're very excited to be part of the dialogue, not only in Houston, but nationally and globally, as you'll probably hear today in this emerging area of hydrogen. The Center for Houston's Future is a nonprofit economic development organization that was started about 20 years ago. It spun off from our chamber of commerce, which is called the Greater Houston Partnership. Its job is really to look over the horizon to look at those major issues,

which are going to affect the Houston region. I came to the Center five years ago, really to work on this energy transition set of issues, among others. And the reason is because I saw the Center as an opportune platform basically to help move Houston forward in terms of becoming a low-carbon energy leader.

We've been down this path for the last five years, first in exploring this area with various companies through a series of conferences we did. And then through research that we did on various pathways for decarbonization in the Houston region, and then ultimately through an initiative which with our sister organization called the Greater Houston Partnership, as I mentioned, on the Houston Energy Transition Initiative. So this is a really a large effort, a regional effort, to think about how Houston can start to decarbonize its industrial sector. We are working specifically at the Center on the hydrogen ecosystem piece of this. I'll probably use the word ecosystem as opposed to the hubs, because I think that really what we're trying to create and we'll hear this. The hub is a part of the overall ecosystem that we're trying to create. So that's kind of a little bit about the Center who we are and why we started working in this area.

Joseph Majkut:

I'm already intrigued by something you've said that you want to use the phrase ecosystem and you see a hub as a part of an ecosystem. Now, when we're looking at clean hydrogen strategies around the world, everyone expects a lot of growth in that industry, but it's a very small industry today and it needs to move to scale and it seems like everybody wants a hub. So, when you think about a hub and let set aside the DOE definition, which we can talk about in a minute, what is a hub doing and how does it fit into an ecosystem?

Brett Perlman:

Well, I think I use the classical definition that DOE has or the infrastructure bill that a hub is supply and demand connected by infrastructure in close proximity. And so I think that's a pretty good definition. And it was certainly the definition that was adopted in the infrastructure bill. As a matter of fact, Houston already is a hydrogen hub. We're just not a queen hydrogen hub. We produce about a third of the nation's hydrogen, about 4 percent globally, about half of the pipeline infrastructure, hydrogen-dedicated pipeline infrastructure, is in and around the Houston region. And we have a number of both users and suppliers who are interested in helping to transition the market for hydrogen from gray to, I'm going to use the term low-carbon hydrogen, not to deal with the colors. But that's really what a hub is and how we're trying to work to create that. We're trying to basically build on the asset base that we already have and be not only a leader in decarbonization of Houston region, but also a global leader in helping to decarbonize other parts of the of the planet.

Joseph Majkut:

And so when you think about them, an ecosystem, what's the vision that you have for Houston and what elements does it have that don't fit into the producers, transmitters and users of clean hydrogen?

Brett Perlman:

Well, I won't say that they don't fit because I think they do fit, I think, but I think we have to start with the physical infrastructure, which is part of it. But we're thinking about this as kind of a model. So it's not only the physical infrastructure, the production of hydrogen, the consumption of hydrogen, the physical infrastructure that we connect. But we're thinking about both the innovation ecosystem and the market ecosystem and I'll explain what I mean by each of those. If you think about this as a three layer cake, you

have innovation, which is going to drive lower cost for projects. And then over time we'll start to develop markets you know, in clean hydrogen, just as we develop markets and almost every other energy commodity.

And so, this idea of connecting innovation to physical projects and the hub and to markets is what I call an ecosystem. And each of those has a role to play in the work we're doing. And I think that's consistent with where DOE wants to go. I think at the end of the day, what DOE is trying to do is create a national market you know, for all these products that will be part of the set of tools that need to happen to decarbonize the US. And so that I think this idea of an ecosystem or markets I think is very consistent with where DOE seems to be headed.

Joseph Majkut:

Yeah. Now there's lots of interesting things to talk about, but let's start with the production side of things. So when you think about it, these are regional objects, right? Close facilities. Houston's a huge center for the petrochemical industry, for the oil and gas industry in the United States, but you're sort of looking at a variety of potential sources of clean hydrogen. Maybe you could expand a little bit on how you see blue, green, or hydrogen that comes from electrolysis versus natural gas. How you see those different elements being part of a Houston effort?

Brett Perlman:

I think at the end of the day, and we're going to use the colors cause it's so easy, but at the end of the day, really what we're talking about is carbon intensity. And so we're really talking about a continuum of different products that have different characteristics, but at the end of the day, it all serves the same function, which is either as a feedstock or fuel for the energy industry. I think we have some advantages in terms of how we think about starting that in Houston, starting to create that physical infrastructure, because not only are we origin emitter of CO₂, but a lot of that CO₂ comes from SMR. It's about a quarter of the industrial emissions are from the steam methane reforming.

And so as we start to think about decarbonizing the Houston region and adding carbon capture to some of those existing steam methane reformers, we actually get something for free, which is blue hydrogen. And then we can start to use the blue hydrogen to replace gray hydrogen, switching out the fuel, very simple. It's the same, the molecule is now decarbonized and that's becomes the building block for the physical supply of hydrogen. The interesting thing I think about Texas though, is that we're not a one trick pony here. We have the largest renewables market in the country. When I was on the Public Utility Commission, looking back 20 years, it seems obvious that Texas would be a leader in wind and solar, but it wasn't so obvious 20 years ago.

But what has happened is we built this amazing renewables market. And I think that provides another pathway, if you will, to decarbonization. So one of the things that we did in our work is we studied the cost of both blue and green. And what we found when we did is that we are globally competitive on both of those supply chains. So if you look at the blue chain, the SMR based chain, you know prices are around a dollar a kilogram, 80 cents, one dollar. If moving to blue, will you maybe raise the price 50 cents to \$1.50? But what is surprising, I think to people was on the electrolysis based side, when you look at this at scale you could see prices in the CLO approaching the \$2 range or even close to the dollar a kilogram that DOE has put out as the moonshot by 2030, because of the significant, low cost renewable asset base that we have.

We have both opportunities here to both use the existing assets that we have, but then to help to drive down the cost of electrolysis over time. And I think what I see happening on the side, I'd be remiss if I didn't talk about some of the other things that are going on, kind of in that space, because we do really

have the rainbow of options here. And a number of other pathways to use hydrogen. For example, at Rice University, they are working on turquoise hydrogen. So hydrogen from methane paraffinization. And the interesting thing about that technology is that you effectively get the hydrogen for free, because what you're trying to do is you're trying to create carbon, which then you can use in creating new products using carbon nanotubes. And so there's a lot of exciting opportunities even beyond the two traditional ways that people have been thinking about hydrogen production. And I think we'll be able to capture that in the Houston region. And that's why this innovation piece is part of the value chain. It's not only reducing the cost of both blue and green, but it's also looking at these alternative pathways.

Joseph Majkut:

Last year, I made this observation that globally, there's a lot of support for producing hydrogen. A lot of countries want to be sellers of clean hydrogen in a global marketplace and the marketplace looks large. But that marketplace also looks like it might be 30 years away. And so how are you thinking about the market side of things? If supply has to meet demand, how do we build enough demand in Houston to start seeing scale effects that will drive down cost curves and start building an industry that can propagate itself?

Brett Perlman:

That is a great question. So I think in the work we did in our report, and McKinsey & Co. helped us with it, I just refer folks to our website to look at the report. What you'll see is we have identified several demand drivers, obviously refining in petrochemicals in the short term is an important, long-demand driver. But the one that I found that was most interesting is this idea of creating a global market. And so we do see opportunities. We're already having discussions with our colleagues in Europe and in Southeast Asia about opportunities to start to build a global market in hydrogen, through a hydrogen carrier, most likely like ammonia. So we do see this as an emerging global market. It'll be a local market first, and then hopefully we can start to build some of these pieces over time.

The real trick, I think, is the green premium. Who is going to pay the incremental cost for a molecule that is more expensive? And so a lot of our work has been done on the supply side which is in some ways is the easy side of the equation. The demand side is the harder side of the equation. We spend a lot of time starting to think about who the customers might be for this, whether they're in transportation, whether in energy storage, in export, in ammonia, for other uses like agricultural uses and to try to identify those early buyers of hydrogen. And we've been working with a group called Mission Possible Partnership, which was started by Matt Rogers, formerly of McKinsey & Co., and the Obama administration DOE. And he started this new nonprofit when he retired from McKinsey, basically to solve this problem, to figure out who are the types of companies that will sign advanced market commitments.

In other words, long-term offtake agreements are going to be above market at first, but will help drive the cost of hydrogen down. And so we are doing a lot of work to try to understand the buying behavior, who are those early adopters, who wants to be part of this market. And it's not only us. I think a lot of the existing energy companies in Houston are doing that same thing. So the industrial gas companies, the large integrated energy companies, are all trying to work on this problem. So collectively I think there is a real opportunity, not only to work on the supply of hydrogen and drive the cost lower, but to try to create this market demand, which is going to solve the chicken and the egg dilemma that we all talk about in creating clean hydrogen markets.

Joseph Majkut:

Do you think that there are interesting options for how – and here specifically, I'm thinking about DOE support through the hydrogen hubs program, which is meant to help resolve some of these coordination challenges. Do you think there are mechanisms that are going to allow companies to on the production side to sell into markets or to sell it to a variety of potential consumers where the consumption might be a little bit uncertain right now, but you could kind of think of them as bulk purchasers? And have you started to think about how those kinds of arrangements will work in practice?

Brett Perlman:

Well, what we've done is we started to look at how these markets have started to emerge in other parts of the globe. And so, for example, the UK is working on a contract for differences type of model. So basically a contract where the incremental price would be picked up by the government in the form of a subsidy. And that would be declining over time. So that over time, this would become market-based, but the idea would be to make the customers indifferent between what they're purchasing today and the idea of clean hydrogen. So, I think that's a potential opportunity to create these sorts of mechanisms. I don't have a sense of where DOE is headed on this, but these are, you know, if you wanted to do those sorts of things, those are types of mechanisms that I think other parts of the globe are looking at in terms of how we might try to get to solve the coordination, chicken-egg problem that we're talking about here.

Joseph Majkut:

Just one question for me, and this is sort of a personal curiosity. You know, you mentioned domestic markets are going to be the early ones, but you really want to think about a global market. And your work at the Center has talked a lot about Houston's cost advantages and the sort of slip streaming on already existing infrastructure, which ties to global energy markets ports and all that kind of stuff.

Brett Perlman:

Right.

Joseph Majkut:

The EU has, in the last six months, dramatically changed its energy strategy because of the Russian invasion of Ukraine. They now have like very ambitious hydrogen targets. Is the US under-thinking or not paying enough attention to how we can help resolve energy security challenges with hydrogen over the next decade? Not saying that it's available now, but should we be paying more attention to that?

Brett Perlman:

Well, I don't know if we're under-thinking it, but I definitely think we should be paying more attention to it. Because I think this is a tool and it's a tool that frankly addresses the Gordian knot that we're in now in Europe with being dependent on supplies from an unfriendly, in fact, enemy country. And so I think there is a strategic imperative here to start to develop new sources of energy, just like we developed LNG. This is not, in some ways, new. This is this the next verse of the same song. 20 years ago we were all thinking that the US was going to be an importer of LNG. And people started developing projects that were import projects.

But roll the clock forward. And now we have created this large export market, and in fact, it needs to grow faster so that it can help us to support the energy security needs of our allies. Roll the clock forward again, another 20 years, we may be in the same place, it could be in the same place with hydrogen and probably should be. And so in the timeframe that we're talking about, given the past

experience that we've had, for example, with LNG, I don't think it's inconceivable that we could start to create these global markets and start to improve, not only decarbonize the world, but also improve the energy security across the globe.

Joseph Majkut:

And do you think that the establishment of those markets, do we need to move away from sort of a taxonomy of blue, green, turquoise, and have a taxonomy that's focused on emissions intensity of a cargo or of the industry. The bipartisan infrastructure bill has a standard. Two kilograms of hydrogen per or of CO2 per kilogram of hydrogen produced. Is that a good standard? Should it apply globally?

Brett Perlman:

I think that we're better off or well-served going to some sort of carbon intensity standard and we have lots of analogs for how we might do that. California has standard a kind of carbon intensity standard with the low carbon fuel standard. You mentioned what's the standard in the infrastructure bill, so we already have you know, the models for doing this. I think the Europeans are somewhat in a different position, you know? I don't want it unless it's green, but now they've defined green a little bit more broadly. So, I think ultimately we're going to end up with some sort of carbon intensity standard just makes sense. Getting there is not easy though. We have to think about how do we create an open platform for measuring verification, so that people feel that they can trust the product that they're getting.

We have to create tradeable products. You know, we have to create kind of a "Henry hub" if you will, of hydrogen. So, we can know where the price is fat and the market is liquid and transparent. And so all those things don't come overnight. But there are things that we can do today to start working on those. And we are doing some of that work at the center. We're working with some of our colleagues. I'll just mention, because we started this relationship with high deal in LA to start thinking collaboratively about what a carbon intensity standard might be. And so I think that kind of work is really where we ought to be going. And if we can do this on an industry basis, then those standards could be adopted, by DOE or by FERC at some point, that's a traditional model for how standards tend to work in the energy industry. And so we're going down that path as well, to start to start the very first steps on this long road of thinking about how do we move from the colors to more of a common carbon intensity standard.

Joseph Majkut:

One of the reasons why I was so excited to talk to you, Brett, is that we've been doing some work here at CSIS on how do you design a hub. These are public, a lot of these are going to be public investments. And how do you design it to get maximum benefit for the public, and accumulate or draw in more private capital? How do we get really good innovation systems built out of such a program. And compliment to you, I think that the vision that you've set out for Houston includes a lot of really interesting things. It's not that we're going to make blue hydrogen and we're going to use it to our port infrastructure or something, right. Or use it to reduce emissions from petrochemical facilities. You've got things in there about setting up innovation, parks, creating an ecosystem for startups, and sort of what look like ancillary, but end up being very important parts of the innovation pipeline, as you've thought about building that ecosystem. What advice do you have for peers like me, who want to see hydrogen hubs, at least six or eight around the country? What do you think is missing when you talk to peers?

Brett Perlman:

Well, I'll just say that I think we ought to be thinking this of this as a collaborative, not competitive, exercise. There is a lot of jockeying for position going on right now, with different parts of the country, with political leaders, with companies. And at the end of the day, that will all sort of wash out in some ways and not. And I think if it doesn't, it does somewhat of a disservice because really what we're trying to do is create markets. And so you know, decisions will have to be made, there's a finite number of dollars obviously to be allocated, but at the end of the day, I think we're all served by trying to work collectively to build markets.

And that's what we're trying to do. And that's why we're reaching out to organizations, that might be regional organizations that across the country, that might be considered quote-unquote "competitors," because we don't look at it that way. We believe there's a lot of each of the regions of the country has something to contribute and we would like to work on these on the common issues across the country. And so we're doing that with our colleagues in in California. We're doing it with some colleagues in New Orleans and would obviously like to do it in other parts of the country. And so I guess my piece of advice, if I were to pick one thing, would be to let's think about this through the other end of the telescope. Let's not think about this as a "divide the pie" sort of thing. Let's think of this as a "create the pie" sort of thing. There will be lots of time to figure out how to compete about this, but we don't have a market for clean hydrogen yet. So, let's figure out how to do that first and create it as opposed to compete over it.

Joseph Majkut:

You mentioned this is a really appealing program, that the hydrogen hubs are a really appealing program. The formation of a hydrogen in industry is even a larger and more appealing issue, not just for decarbonization, but for economic opportunity in particular jobs. How do you think about workforce development in the context of a clean hydrogen industry? Are we looking at a source of transition for existing oil and gas workers? Are we looking at a whole new sector of employment and what should we be thinking about when we think about like national standards for certifications or licensing and portability in a national network?

Brett Perlman:

Yeah, we're at the very beginning of that journey, but as I started this conversation, as I described, we're a regional economic development organization. And so looking at how do we work on job growth and GDP growth. It's kind of at the core of what we do is as part of our DNA as an organization. And so this idea of workforce development is a big piece of it. And I have colleagues who have much more expertise in that area. But I do believe that what we can do is we can leverage the existing skill base, because we already have hydrogen industry today. This is not new. We have people who are producing and creating and selling hydrogen every day. So it's just a question of what are the additional skills and what are the additional technologies that we need to add and then how do we broaden and increase the workforce to meet that growing demand.

And then most importantly, and I think I it'd be remiss if we didn't talk about this at the end of the conversation, is how do we do this inclusively. And I think it's very important that if we think about this as regional economic development, that we include all communities in this journey. And I think DOE has been very visionary in how it's been thinking about things like justice, and so I think about this is this set of issues about regional economic development issues, not only is workforce, but about how we bring communities along that may have not had these sorts of opportunities been adversely affected frankly, by development. And so working on all those issues, I think are part of the challenge that have as a regional economic

Joseph Majkut:

I'm really glad you highlighted the regional economic development aspect of this, right? This is kind of funny. You think this is like potentially one of the biggest decarbonization projects we've got going at the moment, but Houston ends up being a place that has a lot of appealing attributes for being a first mover. I'd be remiss working in a public policy and organization if I didn't ask you, one of the challenges is market development is actually getting interested parties to sign contracts and make big investments alongside federal investments. What should we be thinking about on the policy side to secure certainty for investors.

Brett Perlman:

Clean hydrogen? Yes. I think there's a couple different things. I mean, clearly there was a framework that hasn't made it through yet and go back better, which I think was very important for creating the set of tools that we know you have worked in terms of production tax credits. So that is one piece that I think we know we need to get in place to make this work. And then the other one is, of course, just having a regulatory framework for how we're going to think about infrastructure. And I know for there's a hearing last week in Congress to, to start down that path. And I know that FERC is starting to engage in that. So I think those are, you know, kind of the low fruit in terms of the policy platform that needs to be in place and then many other things that we can do on the state and local level, hopefully to support that as well.

Joseph Majkut:

Well, Brett, we are going to try and stay disciplined, even though I feel like I'd love to talk to you about this for yet another 30 minutes and bring our event to a close. Thank you for those of us who you are giving you questions. I hope we covered at least some of them in spirit, if not verbatim, and Brett, I'd offer you a final word and with my thanks for joining us here today.

Brett Perlman:

Well, Joseph, just thank you so much for having me. I'm just going to put my email out there. It's BPerlman@futurehouston.org. Feel free to reach out to me. I'm happy to entertain these sorts of conversations or one-on-one conversations with different other organizations or other companies that are interested in being part of what we're trying to create here.

Joseph Majkut:

Great. Well, thank you very much, Brett, to our to our audience. Thank you for tuning in. We'll be archived on the CSIS website, and we look forward to seeing the fruits of your labor.

Brett Perlman:

Great. Thanks, Joseph.