

Cleaner Steel is Coming. Will the Communities That Built the Industry Benefit?

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Ariana Brocious: I'm Ariana Brocious.

Kousha Navidar: I'm Kousha Navidar.

Ariana Brocious: And this is Climate One.

Kousha Navidar: So Ariana, today we're talking about steel. And living in New York, I'm thinking about that classic photo of the workers sitting on a big steel girder, eating lunch as they look out over the city. You know it??

Ariana Brocious: Of course, it's iconic! And iron and steel workers, kind of like coal miners, are one of those jobs that's stamped right onto the American identity.

Kousha Navidar: Right, and it's an old image, because frankly it's an old industry. People have been forging steel for thousands of years, and blast furnaces specifically have been running in this country since... before it was a country. There was one operating in [Saugus](#), Massachusetts in the 1600s!

Ariana Brocious: That's pretty old! Unfortunately, steelmaking is also pretty carbon intensive. For decades the main fuel to heat and convert iron to steel has been coal.

Kousha Navidar: Right. There ARE ways of making cleaner steel. But this raises the question that's

at the heart of this episode: Even if a company wants to build a cleaner process, are they going to invest in retooling a hundred-year-old factory or start from scratch in another region? Maybe one where labor costs are cheaper, and union fights haven't already been hashed...

Ariana Brocious: And then what happens to the community surrounding the legacy plant? The stakes are high for people in these communities. Steelworking has been the economic engine in a lot of these places, and it's integral to the culture.

Kousha Navidar: That's especially true in Northwest Indiana, where steel has shaped the region for generations - and where a decision being made right now could shape what that industry looks like for the next hundred years.

Ariana Brocious: Northwest Indiana has been home to the U.S. steel industry for more than a century, supported by nearby coal producing regions. Three of the country's remaining coal-based steel mills sit along Lake Michigan. Together, these facilities produce nearly [half of the primary steel made in the US](#). That steel becomes things like skyscraper beams, car doors, and bridges. [But those three steel mills also create three-quarters of the carbon dioxide pollution from the US steel industry](#). Coal is a dirty fuel. And increasingly, the world wants **clean** steel - produced with less or no pollution. U.S. Steel's Gary Works is [one of these mills AND one of the country's biggest emitters of greenhouse gasses](#).

Right now a once-in-a-generation decision is on the table - to continue coal based steel practices there, OR transition to newer technology that could help decarbonize. Terry Steagall is a retired steelworker and United Steelworker Union activist. He was a machinist at Inland Steel, which is now operated by Cleveland Cliffs.

Terry Steagall: The steel industry is vital to Northwest Indiana, you not only have the jobs in the mill, you have all the, all the jobs that feed off of that, and then you have the economic benefit of all those things that are taking place to keep those mills running. If things don't go in the right direction, that could have a big impact on Indiana, period.

Ariana Brocious: Even though there's been job loss over the last few decades, steel remains the economic foundation across the area. [US Steel alone brings in \\$1.8 billion dollars annually across Indiana](#) - it generates tens of thousands of direct and indirect jobs in the region- many of them well-paid union jobs.

Steagall wants all of that to remain in the state.

Terry Steagall: If they don't transition in the, the way they should, it could be quite devastating

Ariana Brocious: The Japanese company Nippon Steel, which acquired US Steel about a year ago, has allocated \$3.1 billion dollars to Gary Works in Gary, Indiana.

With that money, the company can either extend the life of their aging blast furnaces for another 20 years by relining them and continuing coal-based production, or invest in cleaner, next-generation steelmaking for the even longer term.

Terry Steagall: We have the technology, and now US Steel has the money from Nippon. So there's no reason not to do this. We're looking for the hundred-year plan, not the twenty-year shutdown plan.

Ariana Brocious: US steel has committed to relining one blast furnace at Gary Works, but there are 3 others. Steagall says that relining the other blast furnaces, which use coke, a fuel made from

coal, would mean hanging onto a dying technology, rather than moving to modern direct reduction iron (or DRI) furnaces.

Terry Steagall: All these new companies that are building new steel mills, they're not building coke plants and blast furnaces, they're building DRI furnaces. Eventually these old blast furnaces and coke plants are gonna go away which is the high polluters that, that's very damaging to communities and, and the environment and everything like that.

Ariana Brocious: DRI furnaces use methane gas now and have the potential to someday use hydrogen, which could be produced without harmful emissions.

The choice between transitioning to DRI or keeping Gary Works on coal will have major implications - not just for the climate, but for the people who live and work around the mill.

During the Jim Crow era, thousands of Black workers came to Indiana for opportunities, and jobs in the steel industry helped create the Black middle class in the region.

But working with and living close to a blast iron furnace that burns coal has taken a staggering toll on the community's health and environment. Beryl Fitzpatrick, a resident and environmental justice advocate shared a panel with Steagall at a Gary Green Steel town hall earlier this year. She and her family have felt the impact of living near a coal-based steel facility first-hand.

Beryl Fitzpatrick: My father and mother came to Gary because my father got a job in the mill. they wanted to have a better life for their children and themselves.

They never moved to Gary thinking that two of their four children would be dead today as a result of complications from cancer.

Ariana Brocious: Fitzpatrick was diagnosed with stage 3 tongue cancer. In 2016, she had to have part of her tongue removed. But that hasn't stopped her from advocating for clean air and water in her community.

Beryl Fitzpatrick: Every time we tell our story, every time we partner, we demand to be seen, respected, and listened to. Right. Amen. That's right. That's why we're here today.

Ariana Brocious: [A study by Industrious Labs found that people living near steel mills have cancer rates 12% higher than the national average.](#) Air pollution from coal-based steelmaking has also been linked to increased rates of asthma, respiratory disease, heart disease, and premature death.

Terry Steagall: What I've tried to explain to people, there's no magic dome over the steel mill. The steel mill might be in Gary, or it might be in East Chicago, or it might be in Burns Harbor. But that pollution still goes all over Northwest Indiana. And basically what we're doing there, we're kinda poisoning the air, the land, the water, and the people.

Ariana Brocious: But with DRI, polluting coal can be completely removed from the process. And Nippon Steel and US Steel are already investing in that cleaner technology in other places. [They recently announced a 1.9 billion direct reduction iron facility in Arkansas.](#) Dave Burritt, President and CEO of US Steel, touted the company's investment in the state last year.

Dave Burritt: This state has become the beating heart of America's steel industry. Mississippi County, Arkansas, as you know, is now the number one steel-producing county in the entire United States

Think of that. Number one, not somewhere in Indiana, not Alabama, not even Pennsylvania, home of the Steelers. It's right here in Arkansas.

Ariana Brocious: But Back in Indiana, Terry Steagall wants to see those investments go to legacy steel communities, places like Gary and Pittsburgh, places where the steel industry has existed for more than a hundred years.

Terry Steagall: We built the industry, and we suffered through the bad times. Now that the good times are here, you know, the people in those communities need to benefit from that instead of abandoning them and just make it a steel mill desert.

Ariana Brocious: US Steel did not respond to multiple interview requests, but issued a statement after the town hall in Gary, Indiana. Here's an excerpt:

"The organizers of this meeting demonstrate little insight into the economic and technological realities of the steel industry, as well as zero concern for the job losses their recommendations would cause," ... "Our commitment to invest \$11 billion across our U.S. footprint by the end of 2028 will improve efficiency and make the steel we produce cleaner and higher quality. This historic investment is focused on modernizing and improving Gary Works as it operates today, ensuring generational job security rather than tearing it down."

Ariana Brocious: After 41 years working as a steel mill machinist, Steagall has seen what can happen to a community after disinvestments and closures.

Terry Steagall: You know, in South Chicago there and back in the early '90s, they shut down South Works, and that was basically a steel skeleton on the lakefront for many years. And they've just gotten now to the point where they're basically trying to redevelop it. So these can have dramatic impacts on the community economically, job-wise, psychologically too. I mean, when people lose thousands of jobs, it's not a good thing for the community.

Ariana Brocious: While Steagall has a lot of allies, not everyone agrees with the plan to decarbonize.

Terry Steagall: There's a group of people in the mill that basically work there and go home, you know, 10 to 20 miles away, and they don't really see the community impact. And, and some of them have had generations of families that worked in the mill and, and worked in the blast furnace. So they think you gotta hug this blast furnace till the end, and they need to realize there's gonna be a transition no matter what. And if you don't get on board with the transition, you're not gonna save jobs, you're gonna lose, the whole industry.

Ariana Brocious: Steagall is retired now. But he's still committed to helping the next generation have a strong and healthy steel economy.

Terry Steagall: And it's been hard to get the younger guys to educate them, and make them understand that. I mean, once you have a chance to really have a deep conversation with them, they start waking up. And then you have some older people their health has been impacted by their years of working or living near the mill, and they're a lot more easier to convince that the transition needs to happen.

Ariana Brocious: The United Steel Workers, the largest industrial labor union in North America, will soon enter into contract re-negotiations with Nippon Steel and Cleveland Cliffs, another steel giant, they haven't publicly taken a position on how Nippon Steel and US Steel should move forward at Gary Works. In the meantime, Steagall continues to advocate for Gary to receive the same

modernization investments being made in other places.

Terry Steagall: We have to get corporations and government and the unions on the same page to create these win-wins that benefits everybody. You know, US Steel and Nippon need to realize they need to show a little more corporate responsibility in how they treat communities. We want this thing to be cleaned up, so let's do it. Let's start this transition and, and build a future for everybody

Ariana Brocious: US Steel is expected to announce how it plans to spend the rest of the \$3.1 billion allocated for Gary Works within the next year.

Kousha Navidar: Coming up, why investing in renewable energy is the clearest path to decarbonize steelmaking.

Hilary Lewis: So the more that we invest in clean energy, the more the price will come down, and we'll have more available for really high energy-intensive industries like the steel industry.

Kousha Navidar: That's up next, when Climate One continues.

Kousha Navidar: This is Climate One. I'm Kousha Navidar. For centuries, making steel has required a lot of coal to generate heat. But there is a cleaner way to do it. Direct reduced iron furnaces can run on methane gas instead of coal. A handful of plants already use these furnaces. Methane gas doesn't produce as much carbon pollution as coal and it's readily available.

But if you want clean steel with zero emissions, it gets more complicated. Instead of methane gas, we need to use clean hydrogen. But scaling clean hydrogen is hard. There are serious logistical and infrastructural gaps, like the lack of ability to safely transport hydrogen around the country. Plus, making enough clean hydrogen to actually power this shift would require a massive buildout of cheap, renewable electricity.

I spoke with Hilary Lewis, steel director at Industrious Labs, to better understand the reality of decarbonizing a sector that accounts for roughly 11% of global carbon emissions.

Hilary Lewis: So 11%, that's the right number, um, which is staggering, right? I mean, that's a huge percentage globally that it's just one industry, and the culprit here, it's not gonna surprise a lot of folks, is coal. Um, so the way that we make iron and steel today is we use coal in these giant furnaces. They get really hot, they melt iron, uh, and then it's transformed into steel.

So we talk about iron and steel making. It's really like a two-step process. You start with iron ore from the ground. You're trying to get rid of that oxygen or rust. You heat it up in a really hot furnace. Um, that's where the coal is used first, and then you have, like, some finishing steps to make sure you have the right chemistry, uh, in a steel making furnace. So in general, we're not really using iron. We're using the final product, which is steel until somewhat recently, there haven't been alternative furnaces that we can use that don't require coal. The good news is we have new furnaces. Uh, new, I feel like, you know, mixed feelings about saying new, you know, new because it's innovative, but not that new in that it's, like, really an established technology. So there's, uh, blast furnaces are what we've been using for centuries, but what we've been using for decades is direct reduced iron, and that's a furnace that can run on gas. And I say gas generally because it could be natural gas, also known as methane gas or fracked gas, but it could also be hydrogen gas made from one hundred percent renewable energy. And so the opportunity here from the beginning is cleaner than coal with gas, but the real opportunity is moving to green hydrogen made with renewable energy and really getting those emissions down to near zero.

Kousha Navidar: Okay, so let's back up there 'cause I feel like those are two really important things

to, to kinda highlight. There's blast furnace technology, which is what you just talked about, uses coal, bad for the environment generally. And then there is this, like, proven decades-old technology, I guess, but it, it's, it's direct reduced iron where you could use a more sustainable form of gas to get the same product. Is that kind of... Did I capture that correctly?

Hilary Lewis: Yes, absolutely. And I think there are just, like, some funny terms here. Like, it is kind of a little funny to me to think about a blast furnace as technology just because they're so old. And when I

Kousha Navidar: ...they're so old.

Hilary Lewis: I think about like, a computer or something that does something cool. But, like, if you call a blast furnace technology, it's like calling a pot technology, right? It's like, sure, it can make something. You can, like make food in a pot on your stove, but, like, that's kind of what a blast furnace is.

Kousha Navidar: It's like first century AD in China in the West Middle Ages technology. Like, that's what we're talking about

Hilary Lewis: Yeah and I think if we're like being generous, just looking at the US because we just had, you know, the two hundred and fiftieth anniversary. So thinking about like, well, where's the oldest blast furnace in the US? But even before the country was founded in the early 1600s, there was a blast furnace in the US. So this is like, it's so basic.

Kousha Navidar: Yeah, right.

Hilary Lewis: Yeah

Kousha Navidar: And that tech basically unchanged up to 2026. Like we're blast heat, use coal, get steel.

Hilary Lewis: The basic, the basic principles are the same for sure.

Kousha Navidar: Okay, yeah. So they talk about disruption like it's long overdue. They have made new pots. They have made... Yeah. Yeah. Okay, so, so, uh, so we're talking about direct reduced iron. That dramatically reduces both the climate and health-harming pollution. But it's not like at scale yet, right? If you're talking about hydrogen steel-making facilities operating in the United States. Is-- Am I understanding that correctly?

Hilary Lewis: Yes, for hydrogen. But I think it's really important to remember that the facility, the furnace itself can use different fuels, and that technology is established. So today, twenty percent of iron made in the US is made via the direct reduction process. We have three plants built and operating, established, successful, profitable, um, and those are the Cleveland-Cliffs facility in Toledo, Ohio. There's a Nucor facility in, uh, Louisiana and an ArcelorMittal facility in Texas. So three different states, three different companies, right? Lots of different companies and people are working at and thinking about and operating these facilities successfully. Today, they're all using methane gas. But if you talk to the companies that build these facilities, and there are really just two, Midrex, uh, is one of them and the other is Tenova, they will tell you that a facility built today can be changed from running on natural gas to running on hydrogen with little to no change. So I think that's really important to keep in mind because this next step in the transformation from fracked gas to hydrogen gas is about being able to acquire that gas, not about a new technology that's needed on the iron-making side.

Kousha Navidar: So the thing that's getting in the way right now is on the fuel side is getting the sustainable hydrogen.

Hilary Lewis: I mean, to be honest, any kind of hydrogen. Hydrogen production is a huge barrier. If we want it to be clean, which of course we do, we need to be making clean hydrogen, but hydrogen is not really at scale for this type of industry

Kousha Navidar: So what's that path look like? Does it even exist if it's so difficult and it hasn't happened yet?

Hilary Lewis: I mean, ultimately it is cost, but like where do these high costs come from, I think is the question. So really it comes from the clean energy build-out. And so we have had, in the very, very recent past, pathways to get to more clean energy on the grid that would directly address, uh, you know, energy availability and accessibility for hydrogen and then for the steel industry through the Inflation Reduction Act and, you know, similar policies. So the more that we invest in clean energy, um, the more the price will come down, and we'll have more available for really high energy-intensive industries like the steel industry.

Kousha Navidar: So it all starts with kind of the, the, the clean from the grid energy that we are pulling and that the supply, it's like a domino effect that leads up to the steel that we're using.

Hilary Lewis: Yep, absolutely. Um, yeah, the more clean energy we have on the grid, the better for clean steel.

Kousha Navidar: Got it. You know, last year the US Department of Energy announced that the designation of coal that was used in steel production as a critical material under the Energy Act of 2020, and that's in accordance with President Trump's executive order of reinvigorating America's "beautiful clean coal" industry. The Trump administration is very pro fossil fuel, and they've either canceled or they've frozen much of the billions of dollars that were federally funding decarbonization projects. So when it comes to making steel, what does the push for "beautiful clean coal" actually mean?

Hilary Lewis: Yeah. Um, you know, I think what it means is that the industry is being, um, encouraged, although maybe not directly incentivized, to continue using coal when they could be using cleaner fuels. So maybe one of the ways that, like, incentivizing that shows up is that there were actual incentives to transition to cleaner fuels and to, direct reduction, uh, but those incentives were withdrawn. Um, and like how that might play out for a community is that every 15 to 20 years, these blast furnaces need to have their bricks replaced. The bricks kinda like line the furnace and keep it safe. Uh, this is like at its most basic level, a safety issue. If the bricks wear out from holding this really hot content, then the plant will explode. Um, so they need to be replaced as they wear out over time, and that's a really expensive process, like up to \$400 million.

Kousha Navidar: Wow

Hilary Lewis: A great time to decide, instead of spending \$400 million, we're going to invest in a new direct reduced iron plant. Um, and so if the administration is encouraging more coal use, that would discourage making that decision to switch to a cleaner facility overall.

Kousha Navidar: So it sounds like there is a determination that needs to be made about some point. I'm, I'm imagining, like, driving a car. Like, am I gonna replace the muffler over and over again, or am I gonna get, like, an electric car or something that's less environmentally harmful? Is that an analogy that holds any water?

Hilary Lewis: Yeah. I mean, I'd put it at something, a bigger piece of the car, maybe the engine. But yeah, absolutely. At some point it's just not worth replacing. And I think, yeah, and at some point you just can't replace it

Kousha Navidar: Fair enough. So what impact has this had on the transition to cleaner steelmaking? Like, is, is, is that an incentive that is pushing these, the two companies that you mentioned that really make all the plants? Is that, is that like, we can't just keep dumping \$400 million every decade or so into this. We should just do something that is, that is more, um, technologically feasible and sustainable. Is that, is that p- the, the right landscape that I'm drawing there?

Hilary Lewis: Yeah. So I think what we're seeing from, um, like the companies that own these facilities, Cleveland-Cliffs and U.S. Steel, is they are pretty set on continuing to invest in more coal.

Kousha Navidar: Mm.

Hilary Lewis: The problem is that that's not a great business decision because other companies are coming in interested in building direct reduced iron that's going to compete for their customers, and it's going to have lower emissions and be a newer, more efficient facility. Um, so I mentioned, you know, the, uh, the existing direct reduced iron plants in the US, but there are also planned direct reduced iron plants in the US. Um, so one is by Hyundai, which you might know from the car company. Um, but it's also a steel company, and they're planning to build a direct reduced iron plant in Louisiana. And their target market is the automotive industry. Um, and so that's going to be a direct competition to the existing coal-based furnaces, and I think that's, I think that's the writing on the wall.

Kousha Navidar: I see. I see. So there is more competition coming down, so they can't rest on their laurels. And I'm happy that you brought up that plant because, you know, when you were on the show last year, you mentioned that facility, the \$6 billion green steel facility in Louisiana. That, that had just been announced at this point. So this facility, you know, promises to be the cleanest in the world, supply metal to Hyundai's auto plants in Alabama and Georgia. It, it was called the catalyst for the hydrogen ecosystem. Where is it at? Is it on track to become that kind of anchor project that it was promised to be?

Hilary Lewis: Yeah, I don't think it's going to be the cleanest in the world, at least not in its current configuration. Um, they have talked about plans to get to hydrogen, um, and clean hydrogen, but those plans are honestly pretty vague right now. So we would love to see the, the company commit to a timeline, um, and be making, you know, direct investments and commitments to be purchasing clean hydrogen. Right now, the facility is going to start with natural gas. So as we discussed, that, you know, puts it on par with existing facilities in the US, but doesn't make it the cleanest. One of the interesting things that's been announced recently, um, is thanks to some questions from the Sierra Club, some of their finishing, um, processes that were going to run on natural gas are now gonna run on electricity, which could be clean electricity. Um, so they're continuing to make improvements and head in that direction, but there's definitely more work to do there to make sure that this is a globally leading facility. Um, and when we think about globally, like where are the cleanest facilities in the world, I just-- I would point us to Sweden. Um, so Sweden has a couple of companies that are looking at... not looking at, investing in building, you know, the cleanest facilities in the world that are going to start by using green hydrogen because of their access to renewable energy. Um, and so that's, that's kind of the bar that's been set, and it's also like, you know, the good example to follow, right? This isn't just it is technically possible that you can use hydrogen. There are companies that are proving it today.

Kousha Navidar: What's the difference between a facility in Sweden and a facility in Louisiana, like what's different about why is it happening in Sweden and not United States?

Hilary Lewis: There are some circumstances in Sweden that do make it like kind of the perfect place to be building these clean steel facilities, and that's because the northern part of the country has a very clean grid, uh, mostly because of hydro, and that electricity is trapped in the north because of transmission issues to the south where the population is. And so they have an uber abundance of clean energy, and that is really the sweet spot for something like cleaning up the steel industries. As I mentioned, in the US, like that's one of the bottlenecks is we need to be building so much clean energy to feed this, and they already have that. So they're at an advantage,

Kousha Navidar: So this is a great example of what you were talking about, where it's like further down the supply chain in terms of energy setting up these like second, third order projects to address decarbonization in, in the United States. You can see it in Sweden where they invested in it way back in the day, and now they're kind of bearing the fruit from it. That's really... I think it's, I mean, when I think about these, um, discrete technologies, green hydrogen, uh, clean energy on the grid, they're like separate things, but this is a great example of how they all kind of fit together. I think that's really interesting. So,

Hilary Lewis: interesting to think about also as you're mentioning, like the order of operations. Like Sweden had the clean energy first. We don't, but I think you can go in multiple directions on this issue, right? Building the direct reduced iron furnace is still a critical step, um, and doing it now makes a lot of sense, and we don't need to wait for clean energy to be on the grid to be making these investments

Kousha Navidar: Got it. So US Steel is investing \$1.9 billion into a direct reduced iron facility in Arkansas. And historically, American steelmaking has been concentrated around the Great Lakes and the upper Ohio River Valley, places like Northwest Indiana, places like Pittsburgh. But we're talking about new places in Arkansas, Louisiana. They're going south. Why?

Hilary Lewis: I think the most obvious reason is, uh, labor. You know, a lot of these legacy industries are very well represented by, um, prominent unions like United Steelworkers, and moving south, um, allows them to avoid union contracts, and that is a big problem. You know, there are lots of benefits to unions, obviously, to union workers, but there are also benefits to companies, and I think that shouldn't be overlooked. Unions have skills that non-union members don't have. Uh, they have, you know, a history of operating these facilities safely. Um, and so that's something that's lost when these industries move away from union workers. I think that's a big concern. Um, I think there are other reasons why they're moving south. The reason why a lot of facilities were gathered around the Great Lakes was about the ingredients needed for a blast furnace. So you needed iron ore, which came from Minnesota, and you needed coal to make, uh, coke, which was eventually for the blast furnaces, and that was coming from Appalachia, and they met in the middle at the integrated mills around the Great Lakes. Well, now we're looking for clean energy, as we were just talking at length about. Um, and so that changes the geographic calculus of where is best to have these facilities. Um, for U.S. Steel, you still wanna have access to your iron ore that's coming from Minnesota, although some of these newer companies won't be using those mines and might be importing iron ore. So then it's more important to be, um, near a port or have access to materials arriving from a port, and you need access to clean energy, and that is moving companies south.

Kousha Navidar: So Louisiana especially, huge port that was not necessary when you were looking at the, the, the blast furnace. In my mind, I see a lot of countervailing forces. We have technology that exists. It's difficult to create, uh, the, the hydrogen that we need to make it actually work, but there, there, there, there is the possibility of doing it. You see Sweden doing it. In your mind, when

we talk about decarbonizing the steel industry, is this a, a good story?

Hilary Lewis: I think this is actually a really exciting, hopeful story. Um, I think, you know, the big concern is if you don't have the technology. If you have the will, uh, but there's no way, and right now we have the way. I don't know that 100% we have the will, but we do have market forces that are pushing us in that direction. And so what we're seeing is that companies are choosing to invest right now. Um, and that gives me a lot of hope that even if the political winds are, you know, in our way, companies have found that the market is telling them that there is demand for a cleaner product, and it is worth their investment. Um, and the more that the companies do that, the more they're going to displace the legacy facilities that are running on dirty coal.

Kousha Navidar: Hilary Lewis is steel director at Industrious Labs. Hilary, thanks for your work and for explaining such an interesting, complicated topic so digestibly to us. I really appreciate it.

Hilary Lewis: Of course. Thanks for having me.

Kousha Navidar: Coming up, Nippon Steel hasn't invested much into decarbonizing their steel, but could their expansion into the US change that?

Roger Smith: I think there's a real urgency for Nippon Steel in the US and beyond to really invest in this next generation of low emissions capable capacity before other steelmakers steal their lunch.

Kousha Navidar: That's up next, when Climate One continues.

Kousha Navidar: This is Climate One. I'm Kousha Navidar.

Ariana Brocious: And I'm Ariana Brocious.

Ariana Brocious: Last year, in one of the biggest industrial deals in recent memory, Japan's Nippon Steel completed its acquisition of U.S. Steel – a century-old institution emblematic of an earlier era of the nation's industrial prominence. U.S. Steel posted this video to their YouTube page at the time of the announcement.

Breaking news Some more breaking news out of Washington Some really big breaking news just coming in. US Steel is skyrocketing right now President Trump announcing- A partnership Partnership Between US Steel and Japan's Nippon Steel The Nippon Steel deal with US Steel will go through After much negotiation Trump says it'll fortify US Steel The president also saying US Steel will keep its headquarters Keep its headquarters right here in Pittsburgh Extremely happy right now. It's like a early Christmas for the Mon Valley I feel for these families that can have this relief. I can take a breath today And I'm not much for crying, but I think I might've shed a couple tears. I'm happy for all the families that are gonna be able to keep sending their kids to college, paying their mortgages, and feeding their families. It's gonna create jobs, construction jobs, um, and it's gonna sustain jobs. I think this is great for our national security, great for our economic security, and, and frankly, for me, it's great for the workers. Let's keep our mill alive

Ariana Brocious: As part of the agreement, Nippon Steel pledged \$14 billion in new investment, with \$11 billion committed by the end of 2028. That's a lot of money, and a lot of promises, landing in steel towns that have heard promises before.

Kousha Navidar: So what happens next? Will this investment modernize aging, heavily polluting facilities like Gary Works in Indiana and the Mon Valley plants in Pennsylvania? Or will it lock in

decades more of coal-based steelmaking, even as competitors in South Korea and Sweden race ahead with cleaner technology?

Ariana Brocious: To help us make sense of it, I spoke with Roger Smith, Asia lead for the nonprofit SteelWatch, which tracks the global steel industry's progress toward decarbonization. We started talking about the scale of Nippon's acquisition of US Steel.

Roger Smith: So this is, uh, I mean, I think almost unprecedented in its scope. I mean, Nippon Steel buying US Steel now makes it the third largest steelmaker in the world. I mean, this is a, a potential juggernaut here, and they've pledged \$14 billion in new investment in the company, of which \$11 billion they plan to commit by the end of 2028. So these, these are very fast timelines. This is very ambitious. What we've really seen in the last year is the plans and ideas that US Steel had are now coming to fruition. So things that maybe they wanted to do a few years ago but just didn't have the financial wherewithal to do are now moving forward.

Ariana Brocious: What made it a good deal for both parties? U.S. Steel needed cash, Nippon Steel had it. Is that too reductive?

Roger Smith: I think that's, that's part of the story. So I think on the U.S. Steel side, they, you know, have been increasingly unprofitable, and especially struggling with these legacy facilities. They, they need a lot of money put into them. I mean, some of the recent news coming out on the Japan side talks about some of the equipment is ninety years old, that, you know, more than half of the steel produced in some of these facilities is literally defective because the, the processes haven't been maintained. So it seemed like U.S. Steel was really putting a lot of emphasis on their new facility down in Arkansas and de-emphasizing the old, in part because they didn't have the capital to do both. Well, Nippon Steel, at this point, they've taken a lot of debt to do the U.S. Steel, but they have the money to, to really do what they want. Um, so I, I think from Nippon Steel's side, they wanted to be inside the United States and have for a long time. I mean, in general, the Japanese steel industry and auto industry follow each other around the world, you know, from Southeast Asia to India to the United States. I mean, the U.S. is the only developed economy that's, still overall growing. And they saw it as an opportunity to really get on the inside and be able to deliver high quality steel at a good price for high-end uses like automobiles, like for electric motors. Uh, and, and also for things that can be the backbone of the, the clean energy transition. I mean, wind turbines, you name it. So this is all, you know, premium steel for a premium price. And U.S. Steel gives them that brand name, that trusted Made in America brand name, a proud legacy, a skilled workforce. So I think there are a lot of reasons that it was appealing for Nippon.

Ariana Brocious: Yeah. President Biden denied this deal in early 2025 'cause he was concerned about the national security and supply chain implications of putting one of the country's largest steel producers under foreign control. Nippon Steel made significant financial and operational concessions. Trump ultimately approved it. As part of the deal, President Trump has what's called the golden share, which allows him to veto decisions made by the company. That seems unusual. Is it?

Roger Smith: Well, I, I mean, I had never heard of golden share before, and I think that's true of a lot of others in the steel industry and in business in general. And the idea that, uh, administration for political reasons can veto a private company's business decisions is pretty out there. Um, you know, that said, Nippon Steel and US Steel were willing to accept this as a condition of the agreement to get it over the finish line.

Uh, what they've said publicly is that it hasn't had direct bearing on any of their business decisions to date. I don't know if that's entirely true, um, because I think it is tying their hands in terms of

retiring older facilities or, you know, moving investment from one to another. I don't think they wanna do anything that is perceived as being a political problem in the US, uh, because then it raises the specter of, you know, essentially getting that vetoed. And in the US, the administration has claimed that, you know, they saved Granite City Works, uh, through the, the use of the golden share. On the Japanese side, it was reported that they never actually had to invoke that, but there was kind of an understanding between the two, uh, about this. But the one thing I'll say is that this golden share isn't President Trump's golden share. Uh, you know, the day he leaves office, it then goes to the next administration, who may have very different priorities, including regarding having the steel industry transition to cleaner technologies, et cetera. So it could easily be used to push the company in an entirely different direction

Ariana Brocious: It is really interesting to have that lever on a private company, um, especially one that is now owned, uh, by, uh, you know, a foreign company. Yeah, think the administration is really just looking for them, for Nippon Steel to announce that it's following through on the investments that it's promised.

Roger Smith: And I think if they do that, they're more or less going to be okay. So when they announce new electric arc furnaces and new direct reduction, I mean, neither of those is coal-based technology. Uh, I think that they were applauded for that because it just shows that they're following through on, on their promise. So I, I think the, the bigger concern there is that it's actually not just Nippon Steel that showed up in the United States trying to expand, and, and the background on that is that the Japanese market has been in decline for decades as well. Japan's population is shrinking, fewer automobiles are being produced every year, and there's stiff competition globally for steel at the moment. So all those things led Nippon Steel to come to the US. Well, those same factors are also true in South Korea, and Korea's, uh, second-largest steelmaker, Hyundai Steel, is part of the Hyundai Motor Group, and they've been producing vehicles in the US for decades and have really doubled down on their production. Well, Hyundai Steel is building a state-of-the-art hydrogen direct reduction electric arc furnace plant in Louisiana. So, you know, like the Big River one in Arkansas, that's one that's capable of deep decarbonization, and that's clearly aimed at the auto industry given who the parent company of that is. And then beyond that, we've got another company, Nucor. They've got a new direct reduction facility that supports their, uh, you know, many electric arc furnaces. They're all going after the high end of this market. And then POSCO, Korea's biggest steelmaker, saw that, and then they decided to get a 20% share of this new Hyundai plant. And then they, they also have an MOU with Cleveland-Cliffs, which is the other legacy steelmaker in, in the North, uh, to potentially consider a partnership. So we're now seeing three of Asia's biggest steelmakers show up in the United States, and the, the future of this industry could end up being set in Tokyo and Seoul, which I think people haven't totally caught onto yet in the US

Ariana Brocious: Yeah, it is a really interesting moment. And, you know, the way that these companies are choosing to invest, the technologies that they're backing are really setting the tone, I think, for, um, what's gonna be the future of steel in the US. So as part of this deal, as you mentioned, Nippon Steel has committed to investing \$14 billion in US Steel. One of the first investments is relining a coal-fired blast furnace. Uh, have, have they indicated how they plan to spend the rest of that money?

Roger Smith: No. So we're one year in, and the company said that it's actually, uh, have board approval for maybe a third of the money at this point. So there's a lot that we don't know. So I think, you know, they've, they've followed the US Steel plan as far as it existed and are checking off some of those top priorities that frankly have been there for years, but they just couldn't do. But what are they going to do with the rest of the money, I think is the literally billion-dollar question. And that's where communities in, say, the Mon Valley in Pennsylvania, Indiana, uh, around Gary Works are really asking. So, you know, blast furnace relining, well, that's gonna continue the status quo for

however many years, could be two decades. What's the transition plan for this facility? How is it gonna stay competitive against Hyundai and Nucor and these other ones that are, you know, already able to compete on price? They have new equipment, and they're possible to decarbonize. And as we move into a world where there are limitations on carbon emissions and where buyers need to decarbonize, you know, their, their upstream emissions. So for example, automakers, most of their emissions are from the steel that goes into the car bodies. So as they're looking to buy these, these, you know, grades of high quality but also low emission steel, will Gary Works, will Mon Valley have anything to offer them? And I think that's where there's a lot of anxiety now that you're telling us about life extensions. Well, well, what's the transition? You know, where's, where's the clean future we were promised?

Ariana Brocious: Yeah, and I mean, these communities have borne the brunt of the pollution for the last century to make the steel that we all have in our buildings and, um, machines and cars now, and are really wanting that next generation. They want those jobs to stay. They want to continue to be the home of steel. Um, so with the Gary Works plant, Nippon Steel has announced it'll spend, you know, \$3.1 billion through 2028. About \$800 million is going to that blast furnace, which is coal-based, will keep those jobs, will also keep emitting and putting out pollution. Um, earlier in this episode, we hear from Terry Stegall, a retired Northwest Indiana steelworker. He and many others, um, including many organizations, are advocating that Nippon Steel use the remaining money to convert the other blast furnace to a direct, uh, reduced iron DRI facility. Is there enough money there to do that?

Roger Smith: Absolutely. I mean, they, you know, they, they, they still have several billion dollars unallocated for Garyworks. So assuming they're gonna follow the initial allocation, it's enough to get started. It-- and that's true, you know, looking at the cost to add DRI at Big River. Um, you know, begin, begin with one furnace, uh, you know, two furnaces, whatever it is. I mean, there's, there's four blast furnaces at Garyworks, in my recollection. If one of them's realigned, then what are you doing with the rest of them would be the question.

Ariana Brocious: Mm-hmm.

Roger Smith: And, you know, this is possible. I mean, other steelmakers have, have planned to integrate this into one site. Um, you know, that's true with the steelmaker in Germany and, and elsewhere. So it's not necessarily black or white, all or nothing. You don't have to transform the entire plant and shut down everything and build it from zero. You know, you can begin to add clean assets as you phase out the, the dirty ones. And I think if, if another year passes and we don't hear anything about either new direct reduction or a new electric furnace at a site like Garyworks, that's telling me that the company's not planning to be there in the long term

Ariana Brocious: Yeah. Yeah, and that's such an uncertain future for all these communities, all these people that have depended on this industry. So I wanna talk a little more about the decarbonizing aspect of all this. SteelWatch released a global scorecard a few months ago that ranks 18 of the major global steelmakers around the world. Two of those include Nippon Steel and U.S. Steel. I think U.S. Steel did, did okay, but, um, Nippon Steel ranked 17th, so second to last in terms of how ready it was to transition and decarbonize. Why did it score so low?

Roger Smith: So Nippon Steel is, is one of the world's largest steel makers and has among the highest blast furnace production capacity of any steel maker that we assessed. And unfortunately, they don't have any clear plan for the phase out of these coal-based blast furnaces. As a company, their coal consumption has actually been increasing even as their steel is declining. They've in part become a coal company, uh, investing in coal mines and coal production for themselves and also they can sell to others. They also have, at the time we did the report, no direct reduction production

capacity and nothing that's capable of producing low emissions iron. Uh, and then they also had no... Well, they, they didn't disclose any information about renewable energy consumption, but we, we think that they likely don't really have any, uh, uh, such consumption at present either. So all those things for us meant that this company is not where they need to be in terms of readiness for the transition. You know, the leaders in this score- scorecard, you know, companies like SSAB in Sweden, they're, they're also a legacy company with coal-based blast furnaces, but they've made clear commitments to new clean capacity, and they're beginning a phase out process. And that's, yeah, that's the difference between number one and number 17 out of 18.

Ariana Brocious: Yeah. Yeah. Well, I know Nippon Steel has been exploring the use of hydrogen in blast furnaces. Has that been shown to be feasible, technologically feasible, economically viable?

Roger Smith: So there's, there's two, two main commercial ways to make iron and steel at present. So there's this, uh, you know, coal-based blast furnaces, and then there's direct reduction, which uses gas, you know, today fossil gas, but it can also be hydrogen, and it can also be a mix of the two. So it's, it's flexible. Nippon Steel has been entirely in the coal-based side of this. And, you know, Nippon Steel, since 2008, has been working with the Japanese government on experiments of injecting hydrogen into blast furnaces, and their goal for that is fairly modest. They're only trying to get a 10% reduction by around 2030. And this year, they're planning to do tests for the first time at commercial scale, so in an actual, like, working blast furnace. So I'd say at this point, we don't know. Uh, the company hasn't shared the data of whether this is actually feasible at a commercial scale versus at a test scale. And then 10% as, you know, you know, while better than nothing, it isn't really on the road to deep decarbonization. And the company's claiming that in tests they can get up to 45%, but the timeline for that is somewhere between 2040 and 2050. So hydrogen is expensive. Um, hydrogen isn't today readily available. The analysis that we've done showed that the amount of hydrogen you need to displace coal in a blast furnace is enormous, and the amount of emission reductions you get out of that are way less than if you just used the hydrogen to reduce iron directly in a, in a, a DRI furnace. So we, we think it's, it's the priority-wise, it's misplaced, so it's a technology not capable of deep decarbonization, you know, fundamentally the blast furnace. And since they're gonna... Even if e- everything worked as planned, they still have half the emissions left. Well, what do you do with that? And then, you know, they, they raise the potential for carbon capture and storage, which is also enormously expensive, hasn't yet, ever been done.

Ariana Brocious: Not proven at scale.

Roger Smith: It's not proven at scale really with any industry. At, at the steel industry, uh, you know, there's no commercial steel plants that have CCS in operation. And then there's challenges. It's not like a power plant where you have, like, one smoke stack, and you can, in theory, capture from that. A blast furnace has multiple points of emissions, So at this point, you, you've got expensive hydrogen, you've got expensive carbon capture. Your blast furnace is no longer this cost-effective, tool. It's likely more expensive than if you had just switched to, you know, deeply decarbonizing, uh, you know, cap- capable technologies like the hydrogen direct reduction to begin with.

Ariana Brocious: Yeah, it does seem misguided to be directing, uh, resources into something, as you said, It's depending on technologies that are not there yet. I mean, the electric arc furnaces, the DRI technology, those are happening. Um, and even if they're using fossil gas, um, we're getting closer, right, to decarbonization. And hydrogen, yes, remains this kind of pipe dream for a lot of people. Could be, could be something we deploy.

Roger Smith: You know, US Steel, so one of the reasons it scored a little bit better than Nippon Steel did is that it saw the writing on the wall. So it put a lot of its, its money and resources into this

new Big River facility in Arkansas. It signed up for Responsible Steel, which is emissions, but it's also, you know, other social indicators. You know, do you treat your workers well? You know, are you a good partner for the community? What's your air and water pollution like? I mean, so the first certified Responsible Steel facility in North America was Big River. The first certified steel sold anywhere in the world with a Responsible Steel label is the Big River steel. And when you hear, you know, why they did that, it's because they, they know, they saw that markets are changing and that there's a real demand from buyers for steel that's, that's clean and that's also responsible. So US Steel already, already was aware of that. Now with Hyundai Steel showing up on the market, I think trying to compete with Big River and others for a high-grade automotive steel that's also clean, and they've talked about, um, you know, having a transition to green hydrogen at that facility. So I think with the, with new competitors showing up like that, I think the race is on, and I think the race has already started internationally. I mean, uh, we, we talked about hydrogen being, you know, difficult to procure and there's not great volumes of it today. Well, the first actual green hydrogen, so clean, you know, renewable energy producing the hydrogen, the first green hydrogen steelmaking plants are in construction and are being built in Sweden. So we're, we're going to actually have near zero emission steel on the market within the next several years. So this isn't fantasy land, like it's already happening. Uh, also China, you know, It has, you know, a heavy amount of coal-based capacity. But Chinese government and state-owned steelmakers are also experimenting with everything, all new technologies, different configurations of it, and they have renewable energy at scale, and they also have the electrolyzers that turn water into hydrogen. When they decide to go, they may be the cheapest green steel in the world. So in that sense, there isn't, like, a lot of time. So I think there's, there's a real urgency for Nippon Steel in the US and beyond to really invest in this next generation of low emissions capable capacity before other steelmakers steal their lunch.

Ariana Brocious: That is such a great place to end it. Roger Smith is the Asia lead for SteelWatch. Thank you for joining us on Climate One.

Roger Smith: Thank you so much for having me.

Kousha Navidar: And that's our show. Thanks for listening. Talking about climate can be hard, and exciting and interesting -- AND it's critical to address the transitions we need to make in all parts of society. Please help us get people talking more about climate by giving us a rating or review. You can do it right now on your device. Or consider joining us on Patreon and supporting the show that way.

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