The Weekly Take

SEASON 2 EP40

Electric Slide: The Increasing Value and Efficiency of Data Centers

10.19.2021

Spencer Levy

I'm Spencer Levy, and this is the weekly take. Our heads are in the cloud on this program and we're talking about a sector that's been on cloud nine for operators and investors. On this episode, we return to a topic that seems bigger than ever data centers. The powerful heart of the world's digital infrastructure.

Sureel Choksi

When we think about data centers. We think about them is communications infrastructure in a very similar way to what we've talked about in the fiber network business for the last 20 or so years.

Spencer Levy

That's Sureel Chicksi, the president and CEO of Vantage Data Centers, a wholesale, hyperscale provider with 18 campuses strategically located on five continents. Surreal is calling in from the Vantage Office in Denver in a Rocky Mountain region that's emerging as a hotbed of corporate data center headquarters.

Pat Lynch

As the industries evolve, these facilities have gotten significantly larger. The vast majority of them are built ground up in a purpose built environment.

Spencer Levy

And that's Pat Lynch in nearby Boulder, Colorado. An executive managing director for CBRE's Data Center Solutions. That's a 25 year veteran of the digital infrastructure business and a real voice of experience. We'll talk about what's powering the sector's surging success. And speaking of power, we'll talk about a lot of issues related to that as well, namely sustainability and scalability. Data centers as major consumers of energy and the need for speed. We'll also talk about cooling and connectivity, clustering, cloud computing and content streaming, and how data centers have impacted everything from business to James Bond. On this episode, how data centers have shaken and stirred industrial real estate is the subject of CBRE. Recently published 2021 Data Center Operation Index report. That's right now on The Weekly Take. Welcome to the weekly take. Well Sureel, let's start very basic, then we'll expand the conversation of just what is a data center, because when I started in this business back in the mid-nineties, the data center was the closet next to me with a bunch of blinking lights. Tell us what the data center is today.

Sureel Choksi

Yeah, so data centers have migrated in a pretty significant way over the last 20 years from being on premise facilities that usually large corporations would have in the back of their headquarters, a server room or even a dedicated room, to now, data centers are purpose-built facilities they typically at scale are 100, 200, 300 thousand square foot buildings that sit on a campus where you might have five or six of these buildings where the campus will take in 100 or 200 megawatts worth of power? And where these purpose built facilities offer space cooling, power, backup power, physical security. And ultimately, these data centers are where the cloud lives.

Spencer Levy

Pat, since we're in the real estate business and data centers are an important part of that -- just very basically, why is a data center different than, say, light industrial?

Pat Lynch

As Surreel touched on one thing that's key to this conversation, Spencer and different from your 20 years ago timeframe and that is purpose built, I think is as the industry has evolved, these facilities have gotten significantly larger. Vast majority of them are built ground up in a purpose-built environment. Several years back, we would see a lot of industrial conversions, maybe sites that were in close proximity to utility substations and fiber optic networks. There's still some of those types of assets in the portfolio. But again, the vast majority of what we're seeing built today are purpose-built data center facilities.

Spencer Levy

Well, it's interesting because data centers seem to sit in this world between real estate and infrastructure because they're so important. Do you agree with that real?

Sureel Choksi

Absolutely. You know, first and foremost, power is a key ingredient for data centers. A lot of these data centers are located very close to large scale substations and typically with a need to bring 100 or more megawatts of power, which is a lot more than you would need for a traditional office building or industrial type setting. The other key part of infrastructure is that a data center without excellent fiber connectivity, it really isn't a valuable data center. When we talk about the cloud and the infrastructure of the cloud, it's a data center that's connected to fiber networks that has massive amounts of power. And so when we think about data centers, we think about them as communications infrastructure in a very similar way to what we've talked about in the fiber network business for the last 20 or so years.

Spencer Levy

Now, infrastructure is a big term. It could mean anything from water power plants to parking meters. But in this instance, this infrastructure tends to -- not always -- cluster in certain places. Patrick, talk to us for a moment about this clustering effect. Why is it important and why do you think it's going to continue?

Pat Lynch

Yeah, I think a couple of examples, Spencer: thinking about it in a North America perspective, but we can provide others globally. You know, certainly Northern Virginia and Silicon Valley are examples of data center clusters. Northern Virginia really emerged early on in the fiber optic telecommunication days as a beachhead, if you will, for the industry. So you're looking at a location where you've got significant undersea cables that have landed in that area, continue to land, from a cost competitive market. You've got relatively low power and sales and personal property taxes, and then you do have a situation where so many data center requirements are coming out of there that they just tend to grow on themselves. We should also think about it in the context of other ancillary markets that have other purposes. And I think one thing that's changed in the last several years is the bifurcation of our clients' I.T. needs in their data center needs. So certainly our clients, many of them have requirements in northern Virginia, but they may also have a facility in Columbus, Ohio or Omaha, Nebraska, or someplace where they can store data more cost effectively. So I think diversification of I.T. platforms are key when we think about data centers and their location.

Spencer Levy

The word that keeps coming back to me when I talk about clustering is speed. How important is clustering to the speed of the transfer of information?

Sureel Choksi

It depends on the application and the use case. If you look at enterprise services and in particular, looking at the public cloud -- so the services offered by the likes of Microsoft and Amazon and Google and Oracle and many others -- these are mission critical services. You're essentially outsourcing an enterprise's IT infrastructure to the point where compute and storage is all happening off premise. The Microsoft Outlook or even the Microsoft Office applications that sit conventionally on a desktop now have thin clients that sit on the desktop. But ultimately, all of the compute, all of the storage behind these applications resides elsewhere in the public cloud. That's where latency and speed are critically important. That's why you see notwithstanding the higher costs of developing data center infrastructure in markets like London or Frankfurt or Silicon Valley or even in Ashburn, given land constraints in northern Virginia, you see a clustering of data centers. Because it's critical that this mission critical infrastructure is a very high performance, low latency service that's provided to businesses.

Spencer Levy

Pat, the word that keeps coming up here in this conversation is cost, and clearly the biggest cost is energy. Talk to us a little bit about some of the energy considerations and some of the energy innovations you're seeing.

Pat Lynch

It's definitely early stage. Spencer, I think the one common theme that Sureel and his peer group and then certainly the clients in the space are driving is a desire for sustainable, carbon neutral. As an industry, we have an obligation and I candidly, I'm just very thrilled that we've taken that on. Sureel's company has made some public comments about goals they've established and this pretty being broadly accepted across the industry. So I think you'll see locations that will have impacts, maybe because of water limitations or maybe because of some unique, sustainable offerings. Again, these are all early stages, but I think when we look at the industry globally, we're going to make a lot of headway over the next few years. And there's also some really interesting conversations broadly within the power industry that are looking at this. You know, back to your comment about infrastructure/ Power is a big infrastructure investment, much like data centers. So I do believe the two industries will work together to solve a better future for how we support and power these facilities.

Spencer Levy

Well, Pat, since I'm a big Star Trek fan, I just feel I have to say, Dammit, Jim, I need more power. And Sureel. I think you might agree with that statement, though you may not be a Star Trek fan. But since you've talked about this publicly about how you're trying to have a greener footprint, tell us about some of the strategies you're using to have a greener footprint, notwithstanding the fact you do need more power.

Sureel Choksi

Yeah, we definitely need a lot more power everywhere, and that's for the benefit of our customers. That said, we're focused on a few things to drive the most sustainable carbon neutral approach possible. So one is renewable power, which is plentiful in certain markets and is very difficult to come by and others. But markets like the Pacific Northwest, markets like Canada, where we operate, we have 99 or 100 percent renewable power, which is a great solution. Even in markets like northern Virginia or Silicon Valley, where there's only a portion of the power coming from the utility that's renewable, we do have the ability to procure 100 percent renewable power across, for example, all of our North American campuses, and we expect to be able to do this globally. Now, sometimes that comes at an additional cost. But what we've seen is that our customers, in many cases, are willing to put their money where their mouth is for the benefit of sustainability. And then maybe the last comment I'll make is around sustainability goals. So as Pat mentioned, Vantage recently announced a carbon net zero goal by 2030 for the emissions that we directly produce at Vantage. And so we've got a number of efforts underway, ranging from purchasing carbon offsets to looking at deploying renewable sources of power or backup power at our facilities, and of course focusing as much of the development as we can on areas that have renewable power for the benefit of our customers in order to be able to drive reduced carbon emissions.

Pat Lynch

I think Sureel made a really key point, which is something we've, you know, over the last few years has changed. And that's the back to my point about the industry really striving for sustainable alternatives and the willingness for clients to evaluate overall cost with the sustainability lean to it. And that's a big change. Whereas three or four years ago the client was asking the question, but they didn't want to pay any more for it. So I think that's a big change that I think is key to the industry. Relative to the types of power, I think it really depends on the geography that the site is being evaluated and what's available there. Things like hydro or solar or batteries or those types of things.

Sureel Choksi

Yeah, definitely, Pat. Agree with all of that. Hydropower, where it's available is very compelling -- Pacific Northwest, up in Canada, two examples where you can get effectively 100 percent renewable. Solar is definitely in the toolkit, although it is challenging to scale and it also requires a lot of land. I mean, typically what we see with these data center clusters, Spencer, that you were asking about earlier is that they're not in Iowa. Or they're not in South Dakota. These clusters are in major markets with high population density and high land cost. And so one of the challenges of solar, even in a market like, for example, Phoenix is a market that we develop data centers in is that solar consumes a lot of real estate. So it's actually quite difficult to deploy at scale, although can be deployed in a way that makes some modest impacts towards renewable solution. And then one of the areas people are talking a lot more about over the last couple of years, and I think there's some momentum in this regard, is nuclear. So nuclear used to be kind of a dirty word, you know, after some of the high profile accidents and events that occurred 20 and 30 years ago in the US and more recently in Japan, but nuclear is actually a very clean source of energy in particular, given some of the challenges in certain geographies of obtaining, for example, hydropower or scaling solar to a level where it really makes an impact. It's an area that I think the data center industry is starting to evaluate more seriously as a potential source or another source of clean power.

Spencer Levy

I think in addition to talking about 'we need more power' is also ways to use less power. What we've also seen is innovations in the construction of the data centers themselves, number one. Number two, some really cool ideas like putting them under water where it's frankly cold and cold is the number one cost of keeping down at data centers fully powered so real. What are some of these innovations you're seeing and maybe pursuing?

Sureel Choksi

There's a few. Number one is that for every kilowatt or megawatt of power that you deliver to the server to power up a computer, you need additional power to cool that server or cool that data center. And so there's been a lot of focus really over the last several years on the concept of minimizing your so-called PUE, or your power usage effectiveness, so that if it takes one kilowatt of power to power a server, then how much of a fraction of that do you need to call the servers? PUEs in the industry used to be two, two and a half or higher, which meant that for every kilowatt that went to go power the server, you would invest another kilowatt or a kilowatt and a half of power just to cool it. So very inefficient versus today, data centers typically require between 20 and 30 percent of the power required to power a server in order to cool a server. So a PUE not of two or two point five, but instead of one point two or one point three. So data center design and ensuring that these facilities are highly efficient -- so that you're only cooling what you need to cool, when you need to cool it with air conditioning and potentially taking advantage, for example, of ambient temperatures when it's cooler out -- that's one big area of focus just to reduce the sheer megawatts of power that are required for a data center. Another is new technologies such as liquid cooling. I mean, when you think about artificial intelligence, you think about machine learning and all of the computational intensity that comes from these emerging applications, it is just too difficult to cool these servers with air, just given the sheer amount of heat that they emit. So a number of companies are investing in liquid cooling technologies where you're bringing liquid to these racks that hold servers in order to be able to cool these very dense, computationally intensive workloads.

Spencer Levy

So Sureel, since you've mentioned kilowatt hours megawatts. I have to ask you, and since I'm only an amateur podcast host, I have to repeat a joke I did on a prior show. I have to ask you just how many gigawatts does it take to build a time machine?

Sureel Choksi

One point two one gigawatts.

Spencer Levy

Yes! That is why Sureel is the president and CEO of Vantage Data Centers.

Sureel Choksi

That's right.

Spencer Levy

We should end the show right there.

Sureel Choksi

All right.

Spencer Levy

Good answer, Sureel. Best answer of the show. So, Pat, let's turn now to the real estate side of this, and the real estate side of this is every one of my investors wants to buy data centers. They want to buy life sciences. All these alternative forms. What do you tell them?

Pat Lynch

Digital infrastructure is a fantastic place to invest. We think about what the future is going to hold for not just data centers, but 5G edge computing, fiber, undersea cables, towers. This world is going to be even more connected five years from now, 10 years from now. And so I think if you look broadly at a collection of the industry and I like to refer to it, as you've heard me say a couple of times Spencer, as digital infrastructure, I think there's some significant opportunities, particularly when you look at maybe countries and regions that are underinvested. Places like Asia Pacific or Latin America. Sureel's company just made some significant moves in Asia Pacific that he may want to talk about. So I think there's still a lot of room in the space. It's also gotten very crowded when you think about the number of large private equity companies that have moved into the space. There's a couple of questions, Spencer, that I would ask as a follow up to your comment. But I do think long term and there's a reason some of these large institutions are moving into the space is because of the opportunities with digital infrastructure globally. And then candidly, the need to connect them all globally. When you think about a company like ours, with one hundred and twenty thousand employees spread across the globe, the technology, the infrastructure, the investment it takes for all of us to be connected is absolutely incredible and massive.

Sureel Choksi

Yeah. The other thing about these digital infrastructure assets or data centers is these data centers are not like an office building where you move in and then potentially five or 10 years you move out. I mean, these are highly interconnected facilities. You know, there's compute and storage for hundreds or thousands of companies individually that's running in these data centers connected to both a local and national and in many cases, a global network. And so when you think about the fact that these purpose-built data centers are 40, 50-plus year assets, so long as you maintain the mechanical and electrical infrastructure on a regular basis, and you think about how high the switching costs are and how difficult it is to move out of a data center -- when you think about data centers from an investment standpoint, yeah, you start with the term of these customer contracts, which tend to be very long and let's say on average, 10 years. But when you actually think about the stickiness of these applications in these data centers and the longevity and difficulty of moving out, these are really assets that you want to think about in terms of decades as opposed to simply focusing on the term of a contract, whether that's five, 10 or 15 years.

Spencer Levy

Well, Sureel let me dig into that. My background is a capital markets guy, and I'm always looking for risk and return, and I'm trying to compare the dollar I can put into data centers versus the dollar I can put into an alternative real estate asset type. So when I talk to my friends about the life sciences sector as an example, I say I love the sector, but it's very hard to buy. It's much better to build today because the opportunities to buy are very hard to find. It's typically, older facilities. What's your point of view, Sureel? Build or buy, and where?

Sureel Choksi

Yeah, I think it really depends on what you're looking for. But I'll give you one perspective from an operator, which is Vantage. So as we've extended our platform over the last five years -- from the western U.S. to a broader U.S. footprint, then north of the border to Canada to Europe and now Asia Pacific -- we've done a combination of buying and building very deliberately. Our focus is always on building whenever we can. We like to build to the same design everywhere, provide the same level of service to our customers. But when we first extended into Canada, which was our first international market, or when we first extended into the UK in Europe a couple of years ago, or more recently with APAC, we determined that both in terms of accelerating time to market, also acquiring a team that can work with us to accelerate all of our green field and build plans, there's merit in, you know, acquiring assets in addition to to building. But of course, our preference is always to build. And if you look at our investment over the last five years, 80-plus percent of our investment has been in green field construction and building versus acquisitions.

Spencer Levy

So Pat, let's get a little bit more real estate-y here for just a moment. Where are you seeing yields there today? That's number one. And then fundamentally, I hate to bring up, what I think is a not well known issue is that the last couple of years we actually saw rents declining in data centers. Do you think that's changed and will that go in the other direction?

Pat Lynch

You know, Let me take the rent decline first because I think there's a clarification on that. And Sureel alluded to this earlier. When you think about scale, are rents declining, Spencer? Absolutely. But we're also building at a scale five to 10x what we were building at 10 years ago, and that scale is also being built more efficiently. When you think about sharing generators and backup systems and it just so it's not apples to apples, I do think and we're absolutely seeing in certain markets -- northern Virginia, Silicon Valley -- prices not just stabilizing, but starting to go up. And then the other component of pricing which we need to be clear about is what are we talking about? A very highly connected carrier facility in Dallas or northern Virginia or London -- rents have been going up pretty consistently because at that facility with cloud and cloud on ramps has become even more in demand. So I do think it's important we talk about pricing to think about the actual facility itself. And then when we think about yields and returns, it's kind of a similar discussion. On a single tenant, northern Virginia 10 year hyperscale credit leaseback. Those are trending below for what if I'm repurposing a corporate facility, maybe in Dallas that's twenty five percent occupied with the credit tenant, but I've got to invest several million to make it a multitenant asset. We're seeing investors still get returns in the mid to high teens. That's part of the guidance that we provide our clients is understanding what your return expectations are and then guiding them to the type of assets that can achieve that.

Spencer Levy

Sureel let me ask you another question. There's been a massive change in the way people live during the pandemic. Live, work and play, better stated. I think the biggest work challenge we have at the moment is that people are now live working from home. How do you think the changes due to the pandemic are going to change the demand for data usage and data centers?

Sureel Choksi

The pandemic has made us all much more reliant, both in our personal lives and in our professional lives, in particular on the cloud, right? If you think about distance learning for students. You think about working from home. Video conferencing, whether it's Zoom or Teams or some other application, all of these applications have really taken off and then some during the pandemic. And I also think during the pandemic, because of the restrictions and lockdowns and all of the challenges that enterprises have faced, it has accelerated the adoption of outsourcing to the public cloud. While it's true that we will -- fingers crossed -- return not too long from now to more of a normal environment as we get through this pandemic, or learn to live with the pandemic, I think it's very clear, for example, that we're going to be operating in a hybrid office environment. And I think a lot of what has driven acceleration of demand not only in North America but globally for cloud and the underlying trends during the pandemic are going to continue to enlarge. We're going to continue to see more and more infrastructure outsourced from enterprises. We're going to see more and more cloud applications, more and more powerful mobile devices with 5G and higher bandwidth mobile capabilities, all of which are going to continue to drive a need or a thirst for applications that live in the cloud.

Pat Lynch

We talk and CB talks about hybrid work and agility and agile and in my team, we talk about hybrid I.T. and we talk about agility and we talk about flexibility, and so I think there really is some scenarios that cross over between our traditional CB business and the I.T. data center business. The other piece I want to -- being an avid weekly take listener, I know you're a rock and roll guy. Sureel mentioned the cloud. I've mentioned the cloud. What I think is clear: Had we had this conversation five years ago, the mantra in the data center world was, everything's going into the cloud. And there were some early adopters of that. And what we're seeing is a lot of them that did that early are now unwinding that and going to a hybrid I.T. And we like to refer to the early adopters to a great Eagles Song "Hotel California", where it was -- what's the line? -- you can check out any time you like, but you can never leave. And I think that was the problem with the all in the cloud deployment and why we see companies like Vantage and other co-lo operators having some success because they offer those clients on and off ramps flexibility. And that truly is where the enterprise clients are driving today.

Spencer Levy

Well, 'hey, you get off of my cloud.' That has nothing to do with today's conversation, though it does use the word cloud. So Sureel back to you for just a moment here. I think that the other element of change during a pandemic -- there were so many -- change in offices is one. Another one is entertainment. Now I note with some chagrin, I'm a big James Bond fan and I was reading a list the other day and he named the number one all time James Bond movie as "Her Majesty's Secret Service" with George Lazenby, which would not make my top 20. I personally like "Goldfinger", but nevertheless the new James Bond movie just came out. It actually disappointed at the box office. So combined with the declining sales at the box office, even with a mega-hit like James Bond new movie, how much do you think streaming is going to keep the cloud going and data centers vibrant for years to come?

Sureel Choksi

I think streaming is huge and obviously has accelerated during the pandemic. And I think when you look at "No Time to Die" and the opening weekend, at least in the US, which, as you said, was a bit disappointing. You know, they were thinking maybe 80 or 100 million and they came in the mid 50s -- you know, the question is, is that because Daniel Craig is too old to be James Bond? Or is that because we've all, as consumers started to adapt to being perfectly comfortable and maybe preferring streaming, even if it's a couple of weeks or a couple of months later at home or on our mobile device while we're on a plane or on a train versus having to consume that content at a theater? What we're seeing is that the pandemic has really, for a period of time, created that dynamic where almost anywhere you lived around the world, whether it was for 12 months, 18 months or even still, you weren't able to go to a movie theater. And that doesn't mean that people weren't consuming content. Arguably, they were consuming a lot more content than they ever were, given the lockdowns and given they had extra time on their hands, not having to to travel, et cetera. I think streaming continues to be a very large source of content and not just from a theatrical perspective or a TV show perspective, but it's unbelievable when you think about short form video, Tik Tok and others Reels on Instagram, you know the kind of impact and scale those types of applications have. It's absolutely staggering to see how much usage those types of apps are getting.

Spencer Levy

Well, you know what else is absolutely staggering? My dad, early in his career was an electrical engineer, and his first computer was a UNIVAC, which was bigger than all three of our houses combined and was less powerful than all three of our watches, any one of them. But today, miniaturization of just about everything is advancing. Does that give you any concern about the future of data centers? Will they ever be as big as our wristwatch? Pat, what do you think?

Pat Lynch

Just the opposite. We can talk about 5G and edge, and certainly a lot of that is going to be driven by the content that needs to get there, but it's creating more data. One of the quotes I like to use is the idea that 5G, most of what we're going to use that for has not yet been invented. Think about your homes and what now is controlled electronically. That wasn't just even a few years ago. So we're going to drive more technology. We're going to drive more data. And that's going to need a place to be housed and stored. And I think long term, high quality facilities will need to continue to be built and will do very well.

Spencer Levy

Well, I think there is some risk to some measure of innovation, but I think the one thing that could change the game is superconductivity, where you're able to transmit electricity over tremendous distances, which would then enable you to use really green power for much further away. Because right now I understand that you can't transmit electricity any further than 300 miles and that within high density locations much, much shorter than that. So maybe that's the technology we should be looking at. Any words about that, Pat?

Pat Lynch

It's amazing that the money that's being invested into lots of different technologies in the space, some of it sustainability and a lot of the things you speak about. I should also make a comment, Spencer. While I'm bullish long term on the space because the demand has been so high, there are older assets, underpowered, maybe lacking connectivity that do not have a long term viability in the space. And maybe we've seen a couple of assets converted to grow facilities. We've seen some assets converted to electronic vehicle fleet charging stations. So you know, there are older assets that we'll find an alternative use and won't have a place long term in the data center and digital infrastructure space.

Sureel Choksi

You know, listen, for the 20 plus years that I've been in the communications infrastructure business and involved in and around data centers, I've continually gotten the question from investors: Isn't this miniaturization of devices and the fact that you're seeing, in your example, the big multiroom UNIVAC type computer or mainframe type computer getting distilled into a pizza box sized server -- and when you think about even GPUs, or graphical processing units, produced by

the likes of Invidia and others -- the amount of computational power that they can fit into very small footprints is really amazing. And isn't that going to diminish somehow demand for data centers? Or are we not going to need a lot of space anymore in data centers? I think the answer that we've seen over the last 20 years and I think is, you know, we think forward at least the next five or 10 year -- I'm not sure I can credibly look beyond 10 years -- is that the miniaturization coming with it is a need for more power. Right. The newer iPhone or Android device, the Apple Watch, the server, the GPU, all of this requires more and more computational power and storage, which requires fundamentally more power. One of the great things about our industry is that we don't charge on a dollars per square foot per month basis. We charge rent, but we charge it on a dollars per kilowatt per month basis. So while it's true that the data centers that we and others are building today are more quote unquote dense -- meaning all things being equal, there's modestly less square footage that we're building for the amount of power -- the way that our business model works. And frankly, the lion's share of the capex that we invest and others invest in data centers isn't the physical real estate, the industrial warehouse. It's the very expensive power and cooling infrastructure that is this very long term, long life asset. Yes, things are getting smaller. Yes, the data centers, I think 10 or 20 years from now will be marginally smaller. But if you look at the business model and where the investment is going, it's really all in power and cooling the denominator is power. And so it's more of an opportunity as we see power needs scale exponentially as opposed to a threat to the industry.

Spencer Levy

Well, I think that speaks to something I've been talking about for years. Infrastructure and real estate are two peas in the same pod. And maybe infrastructure is more important, more durable over the long term. So very well stated Sureel.

Sureel Choksi

One other comment If I could make Spencer just about the technology part of technology, real estate, because when you think about a data center, it's often described as technology real estate. People say, Well, isn't there a high risk of technological obsolescence in a data center? The answer is yes, but it's not the data center itself. The generators that we're deploying today, the engines that sit in these generator enclosures are identical to those that the industry was deploying 20 and 30 years ago. There have not exactly been massive innovations in backup power, in air conditioning cooling technologies over the last 20 years or so. So the technology part of technology real estate -- that is what the data center operator or developer is investing in -- is very low tech. The technological obsolescence comes from the servers, the storage arrays and some of the network equipment that sits and data centers, which are owned by the customers of the data center as opposed to the data center operator itself. So I think it's a very important distinction, which is long-life infrastructure, very low rate of technological change, which is what we as data center operators invest in and deliver to our customers. And in that, they put cutting edge servers, storage arrays, network equipment and technology, which is their responsibility to continue to upgrade and stay apace with the technological change that's occurring in the marketplace.

Spencer Levy

Sureel you took out your crystal ball for just a moment a moment ago, but I'm going to now turn to Pat to take out his crystal ball. What are the significant changes you expect in our industry over the next decade?

Pat Lynch

I alluded to it earlier. Spencer 5G edge computing, where the content business goes. Like you, I happen to be a big sports fan. And, you know, what is, you know, the ability to even over the last three or four years, the ability to to watch a sporting event while you're outside at the gym or watching a soccer game or something. It's just fascinating. So I think the things that we're going to see 10 years from now, at least for a gentleman on the back nine of his career and in terms of longevity, it's beyond my crystal ball to visualize. But I know one thing it's going to be a lot of fun

Sureel Choksi

When I think ahead 10 years. What's really clear and you know, Pat touched on this is that whether it's in a consumer or in a business setting, whether it's in a highly developed country or developing markets, the ubiquity of real time access to content of all forms is going to become more and more pervasive. So what does that mean for the data center industry? I think number one, it means a lot more data centers, including at the core of the network, massive hyperscale data centers that get larger and larger and larger. We've already seen a doubling or tripling in both physical size and the power of data centers over the last five to six years, and I think we're going to see more than a doubling in the core. But we're also going to see data centers increasingly at the edge. And there's going to be, like any industry as it develops, you're going to see a bifurcation of, you know, core edge, even micro edge, you know, smaller data centers that are as close as possible to the end user, whether that's an enterprise or a consumer. So I think what we're saying is you're going to see a proliferation of data centers. Not all data centers will be built the same way. Not all will serve the same applications. But ultimately, the amount of data, the amount of content, the amount of compute that's going to be required five or 10 years from now is going to be a massive multiple of what it is today, which I think bodes really well for our industry.

Spencer Levy

On behalf of the weekly take. I want to thank our friend and guest Sureel Choski, president and CEO of Vantage Data Centers. Sureel, great job. Thanks for joining the show.

Sureel Choksi

Thanks, Spencer.

Spencer Levy

And I want to thank, of course, Pat Lynch, the executive managing director of CBRE Data Solutions. Thank you for joining the show.

Pat Lynch

Spencer, you're too kind. Thank you.

Spencer Levy

For more information on digital infrastructure and our show, we've got plenty stored in our corner of the cloud, including a link to CBRE's recently published 2021 Data Center Operation Index. It's posted on CBRE.com/TheWeeklyTake. As always, please share the show, subscribe rate and review us wherever you listen. We'll be back next week to talk about the economy and the REIT sector -- a conversation on what could be a very interesting time for the markets and our business. For now, I'm Spencer Levy. Be smart. Be safe. Be well.