Transcript: Brookfield Listed Affiliates 2023 Investor Day – Digitalization and Decarbonization Panel

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MODERATOR:

- Natalie Hadad, Managing Partner, Infrastructure, Brookfield

SPEAKERS:

- Daniel Cheng, Managing Director, Renewable Power & Transition, Brookfield
- Udhay Mathialagan, Managing Director, Infrastructure, Brookfield

Natalie Hadad (00:01):

Well, good afternoon, everyone. My name is Natalie Hadad and I am a Managing Partner in our Infrastructure group. And today with me we have Udhay again and Dan Cheng, who is a Managing Director and is responsible for our investment activities in the Brookfield's Renewable and Transition Group in Asia Pacific. So, thank you for joining us.

(00:28):

So last year on this very stage, we unveiled the three Ds, digitalization, decarbonization and deglobalization. Each one of these macroeconomic themes is driving significant capital deployment opportunities for us. And today, we would like to focus on digitalization and decarbonization, specifically how we are positioned to benefit from very strong tailwinds across these segments created by the adoption of AI, specifically generative AI and language learning models.

(01:06):

In fact, I was reading a very interesting stat: when ChatGPT was first released back in November, it took two months for it to reach a hundred million subscribers. That is exponentially less than what it took Facebook and Instagram to reach that level. It took them years. So on that note, Udhay, perhaps we can start discussing what is the impact of generative AI and language learning models on our infrastructure platform?

Udhay Mathialagan (01:42):

Look, we can talk a lot about AI, so maybe I'll just start with a couple of points. One is the amount of processing power required to deal with these large language models is enormous, and it's sort of just exploded. What this means in practical terms is, in the past with data centers, we're producing a particular level of energy, which really translates to heat and cooling in a data center environment. There's a fivefold increase with these new NVIDIA chips that a lot of AI operators are using. So, there's a lot more capacity that's needed that we're seeing that come through in terms of the order book and the reservations that are being used. But also in terms of the type of dataset that need to be built. They need to be built at very large scale, so only few players I think will be able to do that. So we can chat a little bit more, but the first point I want to make is, lots more power, lot larger in size.

(02:44):

And maybe a second point, which will probably be a segue to talk more about energy management. It's like I think in the past, data centers were cited relatively close to urban centers, sometimes close and probably edges of cities. Now with the split of the training module, which is a bit different to where service is delivered in the end, it's possible to split the location. So you can use remote locations for large data processing and then you can use smaller locations. But anyway, look, I think that shifts the whole energy need. So maybe we can pass to... Dan, you can elaborate a bit more on what all that means for renewable power and it's-

Daniel Cheng (03:25):

Yeah, for sure. And I'm glad Natalie started with Udhay because it provides a really nice basis for some perspectives on the renewable power and transition side. And Udhay talked about the exponential increase in data center demand. And as a corollary to that, what we have seen on the renewable power side is a corresponding and also a very large step change in the very critical commodity that powers them. And that's electricity. And it's not any electricity, it's zero carbon electricity owing to their decarbonization benefits, their competitive economics, and also elements of attributes of energy security. Because there's no input or feedstock [inaudible 00:04:09]. I'm looking at Udhay here for a bit of validation because he's the CEO of a very large data center business himself. And you start to imagine, I think just the amount of growth and demand.

Natalie Hadad (04:20):

Can you give us a sense of that growth and demand?

Daniel Cheng (04:23):

Yeah, absolutely. And I think nothing serves better than a few examples. I think there's a lot, but the one mind-blowing statistics, and we all like statistics that captured my attention, is any language learning model today in AI. And this is a very standard one, we're not assuming any increases in complexity or growth that advances in itself. It takes more computations to run that model than there are grains of sand on earth. That's pretty amazing and crazy in itself. And so I think with digitalization and it being accelerated because of AI, there's a multiplicative impact on power demand. Because we're also seeing power intensity going up with ever-increasing computational math and algorithms that's going to be running.

Natalie Hadad (05:14):

Now this also means that the increase in demand for data centers is significant. So Udhay, what are you seeing in the ground? And when dealing with hyperscalers, what would you say are the challenges that you're having to encounter and face?

Udhay Mathialagan (05:31):

I think typically going back to the basics, finding the right site, making sure it's permitted. But what's changed I think in the last little while is just power and availability of power has moved front and center. And because as I mentioned earlier, the size has grown, so it's all about power. And if you're able to have powered sites, I think it's a huge advantage. In fact, I was going to flip it back a little bit to you, Natalie, if I could ask a question in reverse. You obviously, transmission businesses in a few places, so I think one of the things we're constantly dealing with in the industry is, how can you get the power to the sites we need? So, what are you seeing?

Natalie Hadad (06:11):

Well, you're not allowed to do that because I'm moderating the panel. So you can't ask me questions like I ask you questions. No, all kidding aside, anecdotally, through our transmission businesses, we're hearing firsthand the constraints in the grid and the increasing demand for interconnection and upgrades and the bottlenecking projects. It is a priority for data center operators and developers to have that visibility into interconnection. And in fact, it seems like there's more importance or more emphasis, I would say, on securing power supply than other traditional parameters such as specific market or water and land. Now, Dan, that's in your wheelhouse, that need for power supply. So, what are you seeing?

Daniel Cheng (07:05):

Yeah, I think it comes down to capabilities and the track record we execute on. And not every single demand for power is the same. When we kind of look at the people that are behind this driving force of data center demand, therefore power, it's the large tech company, the Microsoft, Meta, Amazon, Google, all of which are already the largest procurers of green power today. And so they're a very, very sophisticated counterparty. They know exactly what they want and they're quite demanding as well.

(07:35):

Maybe just to bring that to light, they don't just want a conversation around price and volume. They want the power to be delivered by a certain date to a specific location, on their particular load profile, usually 24/7. And that's a challenge in itself because renewables are still largely intermittent today. And increasingly, they're looking for an element of additionality because it's working to be part of their own decarbonization objectives. And I think how Brookfield Renewable has positioned itself is to try to just capture that increase in demand.

Natalie Hadad (08:09):

So 24/7, there's little to no margin for error or interruption. So, would you say that there is a premium ascribed for ability to execute and being a reputable operator? Maybe you can touch a bit on that.

Daniel Cheng (08:30):

Yeah, and I'm glad you asked that question because we're seeing data centers really being the driving force behind some of the elements or segments of these large tech businesses that have high growth trajectories, which are very critical and extremely valuable. And so, they're putting a lot of attention on people that can execute with the capabilities.

(08:54):

And just an example, and this speaks to hopefully Brookfield's diversified toolkit, is we signed a contract to deliver 24/7 power to a counterparty in the Pacific Northwest. And it was quite a creative solution because it really leaned into our multi technology portfolio where we use the solar to produce electricity during the day because that's when the sun shines. And then on the shoulders we're using wind because that's when the wind blows. And that gave a pretty even supply profile to match the load. And then we used our hydros to firm it up. And on the edges to really perfect it, we're leaning on our power marketing or trading capabilities to treat either small excess or shortages of power. So, I think we have to be really creative. It's a very complex problem to solve, but those with the capabilities and those who have done it before are going to be very well positioned to benefit.

Natalie Hadad (09:54):

Maybe switching gears a bit to the Brookfield ecosystem, which you briefly touched on that. So, we have the perfect trifecta with investments across clean energy data centers and real estate. Maybe it can provide some examples on how the ecosystem comes in action.

Daniel Cheng ([10:16](#)):

Yeah, for sure. Did you want to?

Udhay Mathialagan ([10:18](#)):

You go first.

Daniel Cheng ([10:18](#)):

Yeah, for sure. Yeah, sounds good. And we heard the ecosystem will come across a few times during the presentation, and then just now with Sam in the Q and A. I think the first point that we just wanted to quickly mention is certainly not out of coincidence and stylistic that we use the buzzword. It's really with 850 plus billion dollars of assets under management under Brookfield today, the various interplays and interconnectivity that we see across all of our assets and businesses gave us insight and the knowledge for us to be able to form a more informed objective view of the world. And when it comes to Udhay's business around data centers, that need for renewable power. There's a very synergistic opportunity for us to work together to explore opportunities to grow. And I saw in the video earlier, the rooftop solar, it brings it to life on data center roofs, the modules on the top of the data center rooftops. That's what we try to do and we bring a holistic solution to the customers. I don't know, Udhay, anything else? ?

Udhay Mathialagan ([11:25](#)):

Yeah, I'll pick it up. I think it's probably a couple of examples specifically how in practice, how I've seen the ecosystem works. So in Seoul, which is a very large city, quite difficult to find the right piece of land, the real estate team from Brookfield and our data team work hand in hand over a two-year period. You know what I mean? Solving very complex real estate problems and then transitioning into a development opportunity. Which means we now have a very high quality project on the ground in Seoul.

([11:58](#)):

And in the U.S. there's quite a lot of collaboration between our renewable power group and our data center businesses, particularly looking at greenfield sites where we're trying to figure out particularly... I mean AI has triggered lots of interesting, yet to play out, but really interesting opportunities saying, "You can locate the site away from the city. Maybe they can be close to our hydropower generation so we can get a clean green energy, but also lots of capacity available." So, these are happening all the time.

Natalie Hadad ([12:28](#)):

And you mentioned location of site, so let's focus on that for a second. How has generative AI and language learning models impacted where the data centers are getting built? And how is that affecting our ability to take advantage of this wedge of incremental growth?

Udhay Mathialagan ([12:50](#)):

Let me jump in first on that. I think the reality is it's still early days, so I think we are, at the end of the day, providers of really strong underlying infrastructure. So we need to just be close enough to the

market to make sure we're delivering solutions. So a couple of things we've noticed, which is really, really interesting. We hear about the big programs of AI from the hyperscalers, but there's a lot of new players coming into this space trying to provide almost AI on a rental basis. And so, there's quite a lot of innovation taking place.

([13:21](#)):

What that means is not all the demand is coming up in large chunks of 50 megawatts or a hundred megawatts. So the only retail Co-location business we own, Evoque, we're finding some interesting examples where we are able to reuse almost odd lots of capacity we have to support these sort of new players. So where it manifests itself, those are in big cities, so it could be large sites and remote locations, big cities in small sizes, big sizes. So, I think lots of opportunity coming up there.

([13:54](#)):

The other thing to note is particularly large language models and stuff, they're not connected live all the time. So the concept of how power is delivered to those could change. We're seeing a small example, but we'll come up with this commercial innovation that's possible. We're saying, "Hey, today you don't need to go to school. If the power fails, the model just stops learning for a day and then it can start again." This was not something that was possible two years ago. So, it's innovation like that. Or almost selling the spare energy that's available to somebody who will be turned off if something falls back. So, I think there's some interesting combinations that are popping up.

Natalie Hadad ([14:32](#)):

Dan, how about you? What are you seeing in terms of different trends or patterns in locations?

Daniel Cheng ([14:38](#)):

Yeah, It always gets me excited when Udhay talks about all these different geographies we can deploy his business and data centers. And I think when we think about AI today and generative AI, really the branch we're speaking about today is machine learning. And it's done through ongoing iterative processing of a lot of data. And Udhay can correct me if I'm stepping out of the line here, but that branch of AI has much less user interface. Then a lot of the data centers are in operations today that do, which need to be located near population centers, to Udhay's earlier point.

([15:19](#)):

That is a game changer for us because it opens up a new frontier of opportunities. And now we have two really robust growth pathways, the first one being the data centers near these population centers that will continue to grow at a very rapid pace. And where there's going to be scarcity of land, scarcity, interconnection to this point. It's why we acquired Urban Grid last year for its proprietary capabilities securing interconnection. And they've got a lot of pipeline projects that are ahead of the queue.

([15:50](#)):

But this new incremental opportunity that's not in our business, is these remote locations that have a lot of land and ideal resources for solar and wind. But at one point in the past was simply too far away from data centers for them to be technically and economically feasible, can now be developed and co-located with machine learning data centers. And this goes back to the ecosystem point a little bit, and your transmission capability and Udhay's business on data centers and our renewables is, we're already seeing the market where a lot of players are thinking, for example, building up a data center hub that's dedicated to machine learning in Wyoming, which is quite remote but there's a lot of land. But because of the amount of stress that the additional load places on the grid, the one caveat is they have to source their own power supply. And I think across the three of us, we can deliver that holistic solution.

Natalie Hadad ([16:48](#)):

I mean remote, that sounds like interconnection, which sounds like an opportunity for transmission. And when you think about what we've done, we're currently managing over 20,000 miles of electricity transmission lines, a quarter of which we built from scratch. So, we do have that capability and are excited about the prospect of continuing to leverage that. Now, one thing that we haven't really touched on is our approach to managing a construction risk. So maybe Udhay, turn it over to you. And how are you addressing these challenges on the data center buildup?

Udhay Mathialagan ([17:30](#)):

Excellent question. I think that's top of mind. Back to the speech a bit earlier, I talked about a modular approach, but just taking one step back, I think scale solves a lot of these challenges. By having a large volume to build over time, we're just able to get more attention from suppliers, get more attention from the builders. So we're engaging early and in some of our companies, this is a core skill. They've actually perfected it over time, just getting the right modular structure, the right set of partners, but watching it very carefully. So, I think it's that sort of combination. And from a customer's perspective, this also means I talked about power as being important, but this is kind of almost equally important, being able to deliver projects on time. Because they're fitting all this into a network of capacity for themselves. So, I think it's really those things.

Natalie Hadad ([18:27](#)):

And once you reach the operations phase, there's predictable contracted cashflow. So at that point, what are the types of, call it, operational considerations, that you focus on?

Udhay Mathialagan ([18:41](#)):

Well, look, I mean data centers are high spike products, so they need to keep working all the time. So you can't take your eyes off making sure you're delivering your service level guarantees, which usually is around making sure power is available all the time and temperature and other things. The environment is being managed and security, of course. That's getting very important. So, I think we pay a lot of attention to the operational aspects.

([19:04](#)):

And of course from a commercial perspective, just watching the lease terms and making sure when leases come up for renewal, you're well ahead of that. But to some extent, our business is shifting more and more into wholesale and hyperscale customers. So, weighted average leases are getting longer and longer. But we still watch it carefully to make sure we're managing churn, particularly in our retail sort of businesses.

Natalie Hadad ([19:28](#)):

Okay, great. So maybe to wrap things up, in addition to the opportunities that we're seeing in the data center segment, what broader opportunities are we seeing across our businesses?

Udhay Mathialagan ([19:46](#)):

I think if I zoomed out a little bit back on the broader topic of digitalization, beyond just AI, there's so much more workloads that are coming into everybody's life in terms of whether it's you're working from home or you're traveling. So I think a point that Sam touched on earlier, we have these three pillars. We've been focused on very much around data centers, but also wireless towers, which are absolutely

essential to connect with people on the move or any wireless device. And increasingly, you can't sit at home and not have fiber coming into the home, if you want to participate in all these new digital services. So we are very, very excited about all those businesses.

(20:32):

I'll give you an example, our tower businesses in Europe. We've got two businesses. And both those are experiencing some amazing opportunities beyond when we bought into the business. And what's driving that, it's companies like Deutsche Telekom deciding to accelerate their rollout of 5G or regulators in some cases actually pushing for greater coverage. So, that's very exciting. And we've got fiber businesses in France, in the UK, and Australia that David touched on earlier. So, these are all great opportunities for us. But thematically, I think again, all we're doing is making sure we've got amazing businesses that can benefit from greater digitalization. And so, I think it's a very exciting future.

Natalie Hadad (21:17):

And I mean outside the data infrastructure space, we're seeing opportunities across utilities and transportation. In our residential decarbonization platform, we see the opportunity of leveraging data analytics and automation. There's the prospect of autonomous vehicles, which will create tailwinds for transportation investments. Now Dan, what are you seeing more broadly?

Daniel Cheng (21:46):

Yeah. And I think one just on the comment on digitalization and then AI is because of advances in data analytics and computation, that's going to help drive improvements in software as well. And one of the trends we're seeing, this already exists in the world, it's at a nascent stage today, is the concept of virtual power plants or VPPs. And what that effectively does is they aggregate distributed generation resources and then they aggregate demand. And they try to optimize the two so that they alleviate stress on the grid. What that allows us to do is then reduce the amount of storage we need to build. That's a very strong tailwind for more renewables, which is great for our business.

(22:28):

I think aside from growth, this entire trend around digitalization and AI is also just going to help our existing assets as well. We own a portfolio of hydros in Tennessee in the U.S. called Smoky. And I know that probably doesn't ring a bell for many in the room, but maybe one way to contextualize that is, I'm not sure if a lot of people have watched the movie, The Fugitive, when the guy jumps off the dam. We own that hydro. That's not the reason why we bought the investment, but I just tried to set the stage. That hydro plant used to just sell power through 80 plus mile transmission line up north into PJM because that was the more attractive power market. With data center building out and Tennessee being one of those target locations, we're seeing more constructive power market signals in the TV or in Tennessee as well. That provides revenue optionality for that portfolio, de-risks it, and is good value for us.

Natalie Hadad (23:26):

Great. Okay. So, we've reached the end of what we had prepared for today. Thank you so much for your time. And with that, we're going on a break. No break. Sorry about that. We are moving on with Brookfield Renewable Partners.