

“Let’s Be Honest About Thermal”

View edited transcript from 2020 Virtual 12th Caribbean Renewable Energy Forum Town Hall Discussion

REPLAY SESSION

Password: CREFENERGY20
10-30-20 Discussion

As increasingly ambitious renewable energy targets are announced in the Caribbean, the vision for a clean energy transition occasionally minimizes the ongoing role of thermal (fossil fuels). Can solar, wind and storage alone maintain a reliable, resilient electricity grid? Here’s an honest discussion about thermal: do we need it, how much, and how do we frame it in national energy targets?

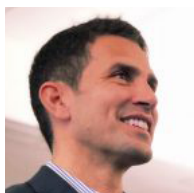
Featuring:



Murray Skeete, WRB ENERGY, Vice President of Engineering and Regulation, WRB Enterprises, and renewable energy developer WRB Energy. WRB has owned and operated vertically integrated utilities in the Caribbean. Owns and operates a 28MWp solar farm in Jamaica, and actively develops solar utility-scale and behind-the-meter projects in many other markets in the Latam region.



Edmund Phillips, WARTSILA, Business Development Manager, providing sustainable smart technologies and data analytics for the marine and energy markets.



Filipe Pinto, EAGLE LNG PARTNERS, Vice President, Business Development, providing bulk LNG energy solutions.



Moderated by **Christina Becker-Birck, CADMUS**, Vice President, providing energy expertise in planning, assessment, and policy development.

Edited transcript:

CB: Across the region, countries have set increasingly ambitious renewable targets. How does that impact thermal now and in the future? What is the role of thermal in today's energy market and diversification in the Caribbean?

MS: I would like to start by saying, wearing both hats, as a utility owner-operator and a renewable energy developer owner-operator, I see thermal playing a key role going forward for certainly the medium-term and potentially into the long-term. I say that because renewables and specifically intermittent renewables, which are being developed and certainly front and center in today's market, primarily solar and wind, present enormous challenges for utilities in basically keeping the lights on.

Thermal plays a role. It is going to continue to evolve. Battery storage technology is advancing. But I don't think battery storage technology is there yet for long-term storage. By that I mean, greater than four hours. To make intermittent renewables work at grid-scale and help utilities keep the lights on, we're going to need long-term storage at a reasonable price.

In summary, yes, I see thermal playing a role. What do we mean by thermal? It could be existing liquid fuels, distillate or heavy fuels, or LNG (liquid natural gas). I think either of them will work. LNG could be a very useful transitional fuel if we can solve some of the problems of getting LNG on the smaller islands economically in the quantities that we need.

I see a role for thermal going forward for quite some time. And of course, that will change over time, but it's here for the time being.



FP: To Murray's point, let's start with reliability. I think everyone agrees the future, and even the present, includes renewables. Everyone is looking to reduce their carbon footprint. But today, renewables represent intermittent power, and to keep a reliable grid you'll need to have thermal as a component of the grid. A great example existing today is Bonaire. They have 14MW in thermal, 10MW in wind, and 3MW of storage batteries. The system works great, perfect, reliable, utilizes renewables, but it could be even better. The 14MW in thermal is diesel. So conversion to LNG would further reduce their emissions. When we're talking about renewables, the goal is always to reduce carbon emissions, and there's always the division between the environment and the economy. We believe that LNG is the perfect balance because you can have a reliable system that utilizes renewables and thermal while reducing the existing carbon footprint. At the end of the day, we're displacing diesel. It's reducing CO2 emissions by 20-30%, depending upon which fuel is used previously.



MS: I'd like to add one more thing. We have heard of all these great, ambitious renewable targets. I don't want to come across as the person who says they can't be reached because without aspirational goals we will never get anywhere. I think everyone needs to take a long, hard look at how some of those targets are going to be achieved. I say this with a degree of caution, but for the politicians to say this is our renewable target, this is what we want to do, I strongly recommend that prior to making those renewable goals, you have deep conversations with not only your incumbent utility companies, but also potential suppliers of technology and potential suppliers of fuels. Try to come up with a workable plan. It's going to be unique to every different island. Develop a workable plan as to how you are going to achieve these targets. Otherwise, I think we're heading for a situation where we are just going to miss. It's not a case that the system will disintegrate, we're just not going to achieve the targets, and that would be a shame.

FP: To add to that, we're primarily talking about the islands in the Caribbean. All of them have been battered and will continue to be battered by hurricanes. While renewables are great, if you don't have a sturdy thermal back up as well, you will most likely be without power often. The resilience of the electricity infrastructure also comes into play with the inclusion and growth of renewables.

CB: When supporting governments who are thinking through how they can achieve their goals with 100% renewable energy, 50% or even 10%, to what extent are the ways you would like to be engaged? In goal setting, there are often interim goals set for solar, wind, or storage. It's less often that we see interim goals set for thermal. Should there be? If so, from a broad perspective, what types of goals would be helpful and necessary to think about as the energy supply in many countries is shifting over the years.



FP: I think Murray will be better suited to answer this question being on the grid side. However, I think to start, you will probably depend on the existing infrastructure, the existing location, the geographical landscape. There are several things that will affect how fast you can integrate renewables. You can't decide on a number, in my opinion, just because it's a great number. The grid must support the integration of renewables. Consider the economics, can the country afford to have the necessary energy storage to allow for the integration of renewables? Is there enough land available to integrate renewables? There are many things to consider.

MS: Yes, you've nailed the issues that we face as a utility trying to develop renewables. Specifically to the question, yes, the goals for thermal are not necessarily the same as set for renewables. Such as, we want X% of thermal energy. **I think the goals to be set for thermal are determined by what is the most efficient way and least-carbon-intensive way of providing thermal generation that is flexible and can effectively support the renewable integration that everybody wants and that we're all driving towards.**

The goals are not so much to say, okay, we want to put in X MW of thermal generation. It's what do we need to support our program of getting renewables in. We understand that Wartsila supports the philosophy of having reciprocating engines, potentially some working on gas and support infrastructure for renewable development. It's less setting a thermal goal as planning. It comes down to long-term planning and how do we support the infrastructure. How do we support our renewable energy development targets?

EP: It's only a matter of time that the traditional means of generating, as in thermal, will somehow go away. However, while we state that, a lot needs to happen for that to occur. First of all, there is still no sustainable way to provide balancing or even baseload in a world where renewables now takes over for the baseload. So, while I say the possibility certainly exists for thermal to be phased out, it might not happen in our lifetime, or any time soon, but considering the developments and where the technologies are going, it certainly creates the possibility that renewables will now be the new baseload for the future. Having said that, we have to be careful about how we make such statements. The facts are that today batteries are not enough in an area where you are trying to have huge renewable penetration. We are still seeing as a fact today that without traditional thermal, and for us, we're talking flexible thermal, not thermal planned to be baseload because that's gone. The thermal of the future has to be flexible, with the ability to work with the renewable penetration most governments are planning for the future.



CB: Interested to hear your thoughts regarding the audience question:

We need to have thermal; we need to have it flexible, we need planning, We need to take a holistic view, and decide what is the role of thermal as we're developing these large electricity supply diversification plans. What if we get to 80% renewables instead of 100%, or even 75%, engines will not be running as much. Is it worth making upgrades today? From your vantage point, looking at assets and how you manage them, how do you consider investments in light of some of the government goals where you operate?



EP: Investment in a new thermal plant, typically the design life, is anywhere between 25 to 30 years. So whatever you decide to do now you should be able to hold well with the future. Having said that, it is a big decision, however, it's a need as we see it now. Those are the facts. Yes, you can look toward installing 80% renewable in your system, but please consider the time after the hurricane passes and there is no sunshine or wind, and there is an extended period of no sunshine or no wind, no water, we still need something, to replace that 80% of renewables that just went out of your system. What we're saying today, thermal is still the best option for that because batteries are still not economically feasible to rely on over an extended period of time for storage. We have seen that the more renewables you install, you also need to look at a parallel amount of thermal. You still have to generate that power that's lost from the system for an extended period of time. So, I still see the need for thermal no matter what percentage of renewable you install.

The prices for renewables have come down, so we see more renewable-related projects going in than thermal. However, you still need to have a thermal equivalent somewhere in your system to take up that slack just in case.

MS: Edmund raises a good point there because if you were to have a target of getting to 80% renewables, then you've got a situation where **if your renewables don't produce for a significant period of time, you need to have thermal back up because there is no long-term, multi-day storage technology out there yet on a scale that we're talking about in the Caribbean. You need that thermal back up.**

So now what you've got is an investment in two different types of generation, one of which is not going to be running much under optimal conditions, but nevertheless, be paid for by the consumer. So I think we have to be very careful about how we approach these ambitious targets and phase in renewables. I can give you an example for those people that say for solar, "well, you're only going to be out for a day."

For example, we operate a solar plant in Jamaica. It is budgeted to produce 110 megawatt-hours a day in October. Due to that month's weather conditions, we went for six days and never made more than 50 megawatt-hours each day. Weather happens. If JPS were relying on renewables to provide the energy needed and retired a lot of their thermal plants, it would have resulted in outages. **We have got to be practical in the way we approach this and recognize that as the technology changes, we're going to long-term phase out the role of thermal but in the short-term it is effectively the cheapest way of energy storage.** We appreciate that thermal has a carbon impact, we appreciate it has a CO2 impact, but liquid fuels, gaseous fuels are effectively energy storage and are dispatchable immediately. I don't want to come across as being the one preaching for staying on oil or gas or any of the other carboniferous fuels, but I am trying to preach practicality here.



FP: I'd like to bring up another point. I think it's about goals versus timing, meaning if you have a carbon footprint or renewable goal, you can achieve those goals with LNG. You can do waste-to-gas (energy) and have bio-LNG. In some cases it will have a negative carbon footprint. Or neutral LNG where you're bringing carbon credits offset from the value chain. So if the goal is purely an environmental goal, there are ways to achieve those goals without necessarily going 100% renewables. And, if your goal is purely economic, based on the assumption that the output of renewables is zero, not quite, but let's say that's what it is. The fact is that today it's not economically feasible between batteries and the cost of the solar installation, and reliability. It's just not feasible. Goals and timing come to play in this discussion.

CB: How do you monetize the cost of thermal and especially in context where it's not operating as much, or investing in thermal today knowing that ten years from now it may not be operating as much in the future because there's a greater amount of variable renewable energy? How do you monetize it? Who pays for it? Utility-owned? Rate-based? How do you factor in those dynamics and what do you think is the pragmatic approach to take?



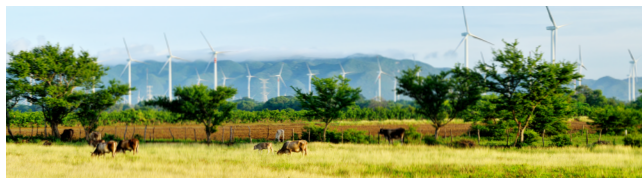
FP: A keyword for me in life is balance or compromise. You can't run a utility without compromising, planning for the future. You're not always going to be right. You need to bring in renewables as it makes sense and not set a goal based on a number or a political goal or a banner that looks great to say, 80% renewable by 2035. That's not the way you plan. There are people running models that will understand. This is grid specific. For this specific grid, what makes sense? How is the grid prepared to take on renewables? What makes sense for the next 5, 10, 15, 20 years? It should not be a plan based on the next year, but on the next 50 years. It's all about balancing and coming up with the right plan that will need to be revised every five years.



MS: You are absolutely right. **Let me cut to the chase, who pays for it?** Consumers pay for it. There is ultimately no other source of revenue for a utility company apart from customers. **The mandate of a utility company in the Caribbean is least-cost service to its customers.** That is a very delicate balancing act between trying to implement the very laudable targets of shifting generation away to renewables, while maintaining reliability and doing it at a least-cost basis. The question is very valid. It's difficult to plan and install assets that may require 20 years to amortize the cost of those assets, knowing that in 10 years technology may have completely changed the playing field. I think that's where everyone needs to be on board. Regulators, governments, consumer stakeholders, and utilities all need to be on board and be talking about this and understand what goes into providing reliable electricity service at the least cost.

FP: The principle goes both ways. If you're thinking about how you amortize a large investment in thermal today that may not be necessary in 20 years, you also have to think about how do you justify spending X amount of upfront now knowing that it won't cover your energy needs for the next five years. You're going to need thermal. How you spend the capital when customers ultimately pay for it is key.

EP: You hit the nail on the head. Who pays for this? A couple of years ago I gave a presentation at a conference. The title of the paper was "The true cost of renewables." These are some of the things I was discussing. The customer is paying for this. If you take a holistic view of renewable integration what we're seeing in the industry today is that you have various renewable promoters offering renewables as a least-cost solution. While that can be true, if you look at it as a stand-alone system, installation costs on a dollar-per-kilowatt basis are much lower now, even lower than thermal today. However, to hit the nail on the head here, once you take that installation and put it in your system, then from our view, the right way to assess the impact is to look at it (renewables) on a system-wide basis instead of a stand-alone basis. By that I mean, how does the injection of renewables affect the bottom line to the end-user. This is often overlooked.



Planners these days are not looking at the fact that injecting renewables in the system now changes the upgrading profile of the existing plants. To the negative, now that you have renewables in the system, an intermittent form of generation, then the existing thermal is forced to operate at sub-optimal points. They are forced to operate at points in their operating profile where they are least efficient. Because of that, again, that affects the overall production costs. From the utility perspective and when viewed with renewables in the system, you'll see the true impact of renewables to the customer. Having said that, what we propose to our clients is that: one, we believe in renewables and we say it and we're doing it. But please take a holistic approach to it. Look at how injecting a certain percentage of renewables in your system affects the overall operation and the overall operating costs of your system. If you do that, the technology of choice will become evident. You will notice that gone are the days where you are installing technologies that are inflexible. It will become evident that you want to look at thermal technology that's flexible. There's no impact with frequent starts and stops. The machine is able to ramp up fast and ramp down very quickly to follow the intermittency of renewables. This addresses technology and planning.

CB: Filipe, could you shed some light on where you're seeing high demand for conversions to LNG.

FP: Everywhere, globally. In the region we're focused on, any island country, Central America, South America, places dependent on mostly Venezuela-based heavy fuel oils and diesel. If you think about it, all these countries have been stranded for years, depending on diesel or other fuel oils. Even if we were to take aside the environment, which we cannot, just costs alone, it doesn't make any sense. Given the opportunity, every country in the region is looking to conversion as a first step from their current fuel to LNG. Not long ago we were talking internally, looking at the map of the Caribbean, Central America, North and South America, and the countries that have converted and the ones looking to convert. If you look at it, several countries have already converted. There are RFPs ongoing in the region, and then several RFPs ran in the region that went nowhere. One of the conclusions we got to is that those countries that make a decision because they run their models and believe in what they're doing and go and get a deal to convert, they get it done. Then you see all these RFPs go on for 3, 4, 5, 7 years and go nowhere. To answer your question, I think everyone who is running on LNG today is looking to run on LNG. Or, they have more ambitious goals for renewables so the timing impacts.



MS: I want to address a question that came from the audience. It relates to effectively the utilities falling back on the fact that they can pass through fuel costs. I am absolutely an advocate of changing that. I think that's the job of where regulators, utilities and stakeholders can get together and come up with much better formulas and much better methods of figuring out how we integrate that thermal generation in the renewable space and not effectively say, the utilities have carte blanche just to fall back on thermal generation and pass the cost on to the customer.

I don't believe that the old-style regulation where fuel costs automatically go through, whatever it is just gets passed on to the customer. That seriously needs to change.

CB: Final question, when we look to the future, all three of you have highlighted the need for flexibility, holistic planning, and looking at systems in a different way. You've all directly or indirectly alluded to the importance of stakeholder engagement. When we look to a more holistically flexible future, what role and how would you like to shape that, and how do you think you could best engage stakeholders to achieve this more flexible, holistic system?

FP: First of all, it's about education. All the market players have a job to educate those who need to make decisions in the next few years. We have observed that while people have great goals and even if we don't agree on the goals, or how aggressive those goals are, the goals are good goals. People are driven by something positive. For the most part, many people making decisions are not educated enough on, or don't fully understand the supply chain, the value chain behind those decisions.

As Murray said, it's going to fall a lot more on the regulator than it will on the government to decide.



MS: I think the key here is to get all stakeholders to fully understand what it takes to provide a 24-7 electricity supply at the lowest possible cost on an island situation where you're not interconnected with another large utility that you can rely on as back up. In my experience over the years that is one area where I feel it is always underestimated as to what the utilities face in doing their job by multilaterals, consultants, by government, by regulators. They don't fully understand what goes into everything the utilities do. I do agree, education is the key. As this trend progresses, we're all going to understand a lot more about how it all works together. And how together we can effectively come up with a solution.



EP: Basically, I think we need to be truthful from day one. We need to make sure all the necessary stakeholders are at the table and telling them the facts. And, not necessarily, what they want to hear so they could sound intelligent in the media. They need to hear the truth. They need to hear what is realistic. If you look now at what's happening in South Australia, they are having over-generation of renewables in their system. The utility there has the right to automatically disconnect existing rooftop solar to maintain stability in the system. It would have been good if they had communicated early in the process rather than install all the renewables and now educate the customers about that eventuality. From our perspective, as we educate stakeholders, we believe in a hybrid approach. We believe the solutions are all of the above. All we are saying is plan it right, and we believe, take the subjectivity out of it. Don't start an IRP (integrated resource plan) with preconceived results. Before you start the IRP, we believe in letting the model objectively help you strategize your future instead of hindering the model with your preconceived ideas on what you would like to see in the future.

About WRB Energy

WRB Energy develops renewable energy projects in the Caribbean and Latin America to help stabilize electricity prices and reduce dependence on imported fuels to drive economic growth and sustainability.

WRB Energy manages the entire project lifecycle, including site selection, design, permitting, financing, construction, and operation.

To learn more, visit wrbenenergy.com.



1414 W. Swann Ave. #201 Tampa, FL 33606 | 813-251-3737

© 2021 WRB Energy. All rights reserved.