

**MARTY ROSENBERG**  
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**NATE JOHNSON INTERVIEW**

Hi, and welcome to GridTalk. Today we have with us, Nate Johnson, who's the Vice President of Development of ORPC and we're going to talk about some exciting new news in the area of marine energy development in the United States.

Q: Hi, Nate. How are you today?

A: I'm terrific. How are you?

Q: Good, so I focused on you when a news blurb came out several weeks ago about the Department of Energy deploying \$16 million dollars in seed money to get two projects really underway in terms of tidal and marine energy. Tell me what that grant's going to enable you to do and tell us a little bit about ORPC; where you've come from, what you're doing. Are you in start-up mode? Are you in production mode? Are you bringing money in the door by your projects? Give us a picture.

A: Yeah, that's a lot to cover in less than a half an hour but I'll give you a little bit of background on ORPC. We were actually founded in 2004 so we've actually been around for a while now. What we do is that we develop technology that produces

electricity from moving waters so rivers, tides, ocean currents and we also have a development team that I'm part of that's responsible for inserting that technology into a marketplace where it's economically and environmentally and socially appropriate. And that's a new technology and a new industry so finding those right early adopters is really important and has been a big part of our success.

Q: So, help us understand what you mean by new because two decades when I was running a couple of energy magazines we had articles about Verdant Power, sticking the turbine into the East River in Manhattan and trying to learn about capturing electricity from rivers and tides. How has the technology changed since then and why is it still considered a need of support from the federal government?

A: That's a great question and you're right that for decades folks have been trying to harness marine energy and I would say it's still new because there's only a handful of companies around the world that have achieved that and it's a harsh environment, it's complex. Certainly, the need is and the uniqueness of marine energy is of a huge value especially on tidal river technology where it can be considered baseload power for the grid so really a unique aspect of renewable energy source where compared to wind and solar where it's intermittent and less predictable so I

think there's always been an intrigue about how to harness that but it's not easy to do. I think ORPC's really focused on how do we continue to refine a core tech technology that we call our cross-flow turbine so unlike others, like burdens that you mentioned, that can look like an underwater wind turbine, ours looks like; we call it a helical cross-flow turbine so it kind of looks like the old-fashion push mowers . It has foils that are shaped like an airplane wing that create lift that are connected by struts to a shaft and that shaft turns the generator to produce electricity which is then sent to shore so, I think that where we are, and where an industry are is continuing to get those devices in the water, learn from getting devices in the water and the other aspect when you mentioned about an event, a new technology is, I think generally building market awareness. A lot of folks aren't aware that there are technologies out there than can produce electricity from tides or from rivers that aren't dammed so we really focus on not only getting the device in the water but working with communities or customers to build awareness in different regions and try to grow that marketplace so that's a big part of what we do.

Q: I think it would guide us all if you just really quickly address the question: are you profitable or are you in startup mode right now?

A: Well, yeah, that's...we can still call ourselves a 20-year-old startup because of a lot of the elements in the industry. We have generated revenue both through initial power purchase agreement which we continue to maintain in Maine but also through device sales as well as other elements, consulting elements, so I think as we grow there will be different ways that we'll generate revenue so that would be sales of electricity generation so power purchase agreements. Again, we have one of those in Maine for tidal energy. We have one and we're negotiating in Alaska for a river project and then as the industry grows, I think there will probably be an addition of outright device sales as well.

Q: So, we're to sum it up, we're still in the pioneer stage. This is the Wild West in terms of getting this off the ground?

A: I think we're somewhere between the pioneers; I would say those are two separate things, the pioneer stage and the Wild, Wild West. I think that we might be beyond; I think ORPC as a company is beyond the Wild, Wild West stage. There may be others that are out that are still at that stage but certainly we are continuing to pioneer, especially in various markets.

Q: Okay. So, just to help people get excited about this as I am, it doesn't take long to scratch around on the Internet before you read things like, "Alaska has the potential of getting 100% of

its energy needs from tides.” Is that true and what does that mean? Is this something that could be addressed in 50 years or a shorter time wise?

A: That is somewhat true. I would add to it, it actually; Alaska has an opportunity to produce way more than it needs and produce other forms of electricity, transportable electricity from tidal energies so, I'll try to quantify that and it has to be done over time and responsibly but Alaska is characterized through the National Labs as 18 gigawatts of tidal energy potential in Cook Inlet alone. There's more outside of Cook Inlet. We're really focused on Cook Inlet at this time.

Q: So, in really, where is Cook Inlet and how close to population is it?

A: So, the head of Cook Inlet is Anchorage and it kind of goes out towards the southwest, down the Kenai Peninsula on the eastern shore. There's a lot of activity, energy exploration activity already in terms of oil and gas in the inlet. That gas supply's actually dwindling rapidly whereas by the end of the decade, the Cook Inlet may be out of gas and so there's really an urgent need to kind of look at alternatives so when you talk about a gigawatt, Alaska has a main electrical grid that they call the Railbelt Grid that runs from Homer down on the Kenai Peninsula which is adjacent to Cook Inlet up through Anchorage and up

north to Fairbanks, and that major grid is the vast majority of the population in Alaska, peaks at about 900 megawatts, a little less than a gigawatt, so when you look of 18 gigawatts of tidal energy potential, there's not only an opportunity to really supplement the grid because there's other forms of renewables as well, but to look at what are some of the other uses of power, especially as the industry scales, costs come down. You can look at things like production of hydrogen, production of green ammonia or other applications, and that's really exciting and then Alaska is real excited about the opportunity around tidal energy.

Q: So, let's get to the news now. We've been focusing on a lot on the federal government dedicating a lot of resources through the Bipartisan Infrastructure Act and the Inflation Reduction Act, and the DOE is specifically giving you \$9.5 million for the first phase of this project, and as I understand it, you and an organization in Washington State will be competing for funding for a second broader phase for \$35 million dollars.

A: I'll clarify that a little bit. So, each proposal for phase one is \$3 million and then after that first roughly one-year of phase one, one proposal is selected for an additional 29 months.

Q: Okay.

A: So, it's up to the \$32 million in federal funding for..

Q: So, tell us what you hope to do in the first year and when does that start? And if you're successful, what would you do with the second phase?

A: Yeah, so the first phase is really to a; there's a number of smart goals, metrics that DOE requires. It really is focused on advancing a technology selection, advancing knowledge of the site, advancing the permitting and licensing process to what's called a Draft License Application, and then also working with the community to identify community benefits, supply chain opportunities, economic development employment opportunities. I would say those are the big, big pieces of that. We feel that our opportunity in Cook Inlet is very much aligned with the work that we've already done to date so we've had a joint development agreement for a number of years with the utility that's adjacent to the site. We have what's called a FERC Preliminary Permit for the site itself. We've already worked with the National Labs to do some high-fidelity site characterization of the resource so we feel like we have a really good position to move that forward and really continue to build on that in phase one, so it's really about what does that project ultimately look like and in phase one, the outcome of that will be a big part of that. One of the unique things that we've done in phase one and it was somewhat dictated by the nature of the funding opportunity is,

we're looking at actually multiple tidal energy technologies and going through a process of determining which ones are best for that site, or it could be one or it could be two, but we're looking at what we consider to be the three leading tidal technologies, U.S. tidal technologies and we think that's important because as you said, this is funded through the Bipartisan Infrastructure Law. We really wanted to try to maximize U.S. manufacturing content, U.S. content period. So, in addition to ORPC, we've actually brought in Verdant Power which you mentioned had a project in the East River previously, and another company called Aquantis which is based in California, which is also developing tidal energy. And so, we'll go through a process and select, after phase one, likely two technologies to continue to work towards ultimately implementation at that site.

Q: So, this is going to be two different devices that will generate one to five megawatts?

A: Yeah.

Q: And it's a remote community. Is the community on the grid right now?

A: Community's on the grid and it's where the cable comes ashore, it's a community call Nikiski and Nikiski is very heavily involved in the oil and gas industry. There's supply chain



companies there now. They have vessels, port facilities and we're working very closely with them so we're working very closely with one of the oil and gas companies to support the project. Working very closely with the utility which is Homer Electric to define what the value is to their grid and what that looks like. And then ultimately, as you said, we want to demonstrate multiple technologies. DOE has a target of one to five megawatts under this program so that could be a combination of different technologies on a number of devices. And then we want to be, and this is a strong emphasis as well, want to show a path towards commercialization so it's one thing under this project to get several devices in the water. It's another to really show the path to having many devices in Cook Inlet really having large penetration onto the grid and the benefits that come along with it but also evaluating some of the other opportunities, economic development opportunities, energy opportunities associated with tidal energy so those are all big, big projects with a lot of different partners but we feel very good about that.

Q: So, help paint the big picture right now. You talk about wanting to raise awareness of all of these potential new sources of energy and that 10% of European power by 2050 they hope to get off from tidal power. I've been to Scotland and the U.K. and

they've been experimenting with wave energy technologies as well as tidal energy. Is the U.S. behind the eightball in terms of other parts of the world ahead of us and if so why, and how fast can we close that gap?

A: Sure. I think the upside potential is huge. Just in the U.K., they announced that their target is 11% or the potential for 11% of tidal energy by 2050 which is roughly 11½ gigawatts.

Q: That would be 11% of their energy?

A: That would be 11% of their energy needs?

A: Yes.

Q: Okay.

A: As a potential from tidal energy and in terms of what could be harnessed. Now putting that in perspective, France is a really good European country that has targets towards tidal energy as well but in Cook Inlet alone in Alaska, we have the potential for 18 gigawatts so I think the potential in the U.S. is very high. I will say there's been more types of devices and different devices deployed in Europe. They have an entity up in Orkneys in the islands called the European Marine Energy Center that has deployed quite a few different technologies. There's been a project that's now being commissioned in Northern Ireland with it that was one of the first so I think that they're doing some good things including some of the government incentives. In

the U.K. they have contracts for difference, which is a ring fence around tidal energy, for above market price incentives. I think those are the types of things that really stimulate the new industry. I think the U.S. has; we may be behind a number of devices, tidal energy devices that in our water right now but I think there's an opportunity to catchup on that very quickly and I think we've learned a lot. I think we have a lot of experience; ORPC has a lot of experience in how to deploy devices and how to operate devices. We probably have put more devices in the water than any company in the world.

Q: So, let me ask you real quick if there's a danger here of getting tagged with same kind of negative imagery that wind power got, particularly off of Cape Cod when the late Ted Kennedy and others said, "We don't to be looking at turbines when we're sailing on our boats." Ostensibly we could be putting tidal and wave energy off the East Coasts and the West Coasts and that would avoid the need for a lot of land-based transmission by just having this stuff carried ashore right off population centers. Do you think there's a big hurdle to get acceptance of that? Do you see that being washed away with this major push to really get our grid redefined and reconfigured?

A: Yeah, I think there's some; I think ORPC has done a terrific job on in terms of social acceptance. I think one of the things

that's different about tidal energy right now and the wave energy industry as well compared to wind is, wind has kind of coalesced around a single type of turbine design. You see the three-bladed axial flow turbine. Tidal and wave, there's many different configurations so I think that having social license around all those isn't quite there yet but from ORPC's perspectives and you're right, there's a huge opportunity in the Northeast: Maine, Nova Scotia. In the West in Washington State and then certainly in the Pacific Northwest and Alaska, our devices are fully submerged so we don't have the visual or the noise considerations that wind does.

Q: Any environmental impact with fish?

A: That's a great question. We have not seen any negative effects to fish. The project that we have in a river environment in Alaska is actually has the highest concentration of sockeye salmon in the world, certainly in North America. We've seen tens of millions of adult salmon; hundreds of millions of smolt that have gone through this section of the river and we've yet to see any injured mortality. That doesn't mean there's zero impact or zero risk but we think it's very small, both based on the design of our turbines but also based on where we site them in the water column and then obviously the innate ability of fish to avoid devices so we've done a lot of work on that. Every region

we go to we get asked those questions but I think that between the lack of visual aspects, and there are some tidal devices that are on surface so that doesn't go for all companies, the lack of environment effects. But then also, I mentioned kind of previously on the benefit to the grid, there's been a study that Pacific Northwest National Lab did recently and there's been some in Europe as well, when you can have a predictable form of baseload power, renewable power, that's a big differentiator between wind and solar.

Q: But the tides run 24/7 and there's periods where it maximizes and periods when it's flat.

A: Yeah, but...

Q: But you're saying that cycle's predictable?

A: Absolutely, it's predictable for a hundred years in the future and that gap where you're not generating can be pretty easily filled in with battery technologies because it's a short duration and it's a known duration. In fact, in the project in Alaska, the tidal line project they're working on, Homer Electric has the largest battery system in Alaska and it's already in place so, that's another benefit where tidal energy really complements what's there already.

Q: There's talk also of putting marine and tidal in conjunction with solar complexes. Are you looking at that or is that down the road?

A: I would say it's not a core focus of ours but we do vision where there's some river or tidal environment where our technology's kind of the anchor of renewable energy technology because of all the reasons I just mentioned and that really enables solar or wind to come on and really supplement that grid and reduce the amount of need for batteries and reduce the amount of need for other renewables so, yeah, certainly I think there's an opportunity to integrate with other former renewables as well but there's that increased value from tidal overall can holistically provide a better solution.

Q: Give us, for those of us who are not fully conversant with what we're talking about here, what's the relative potential of wave versus tidal energy, because I once saw that saying that waves alone has the potential of generating two times what the world currently produces in electricity?

A: Yeah, the wave energy resource energy is significant. In fact, it may in theory be a larger global resource than tidal. It's challenging trying; I think there's the diversity in the amount of wave energy technologies out there is very wide right now, hasn't coalesced at all around certain types of technologies. I

think that in general the technology readiness for wave technologies are behind tidal globally.

Q: Well, the last I checked in there was a device in Scotland called Pelamis that looks like a sea serpent that articulated and as it undulated in the waves it was able to capture the kinetic energy. Are there other devices out there and do you see potentially this merging of putting devices out there that will capture tides and waves, or is there a possible synergy here?

A: There's definitely synergies. Pelamis is no longer operational. They have been gone for a little but there are numerous tidal technologies; Europe and in the U.S. as well. The West Coast and in particular California , Washington...

Q: You talking about wave now?

A: Wave, yeah.

Q: Okay.

A: There are numerous technologies. Some are point absorbers, some are integrated into the breakwaters; there's a wide range. I think the areas where you get high tidal flows and predictable consistent wave action are not always overlapped and so, I don't think there's on a single site putting both tidal and wave energy converters may not happen all that frequently but what I think is something that you'll see is developers that have approach to really engaging with the communities and working

through the project development process, I think there's a lot of overlap between wave and tidal and so, you may see some of those same folks involved in both of those segments but the technologies would be very different.

Q: Take a minute now and this is really my last major point I'd like to discuss with you. If you're successful in these two phases in Alaska, where do you see this technology and your company going? Will this be remote parts of the country? Will you be coming to New York? Will you be doing Chesapeake Bay? How does this rollout in the next decade if everything proves its merit?

A: Yeah, I think that the opportunity and the funding opportunity in Alaska really could be the catalyst to tidal energy in general. A lot of it again is building awareness and scaling the technology which brings down costs which opens up other markets as well so I think you certainly would see growth within the Alaska market for sure. Certainly, growth in the Northeast and Maine along in the way of funding. Certainly, wouldn't discount putting something in the East River. That's a site that doesn't have the technology at the moment. But the other thing to think about is that this could be a U.S. export opportunity as well so, we are actually looking at projects in Europe and we're looking at projects pretty much on every; we are looking at



projects on every continent of the world, with the exception of Antarctica. And we just are in the processes of assembling our first device in Chile. We have lots of interest in other areas of the world so it's Africa on the river side mostly, Indonesia, Southeast Asia, Australia; so, we think that there's an opportunity to really grow globally, and we have a footprint in many of those areas already so really looking forward to getting our devices out into those marketplaces and really becoming more of a recognized solution in the energy world.

Q: Thanks, Nate. We look forward to checking back with you and seeing what you're doing in Alaska and beyond.

A: Absolutely. Thank you for your time.

We've talking with Nate Johnson, who's the Vice President of Development for ORPC involved in a startup project in Alaska, a two-phase project that hopefully will show the capabilities of tidal power.

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END OF TAPE