APR chief on the challenge of powering post-hurricane Puerto Rico

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Florida-based APR Energy are fully immersed in the challenge of helping Puerto Rico back to its feet, following Hurricane Maria. Executive chairman, John Campion, a former roadie with the Rolling Stones and David Bowie among others, spoke to Decentralized Energy about the company's involvement in deploying temporary power to areas hit by natural disaster and energy shortage.

Hurricane Maria struck Puerto Rico on September 20th and a month later two GE TM2500 Gen 8 mobile gas turbines had connected to the local grid, helping to restore partial power to the capital San Juan. It is one of three simultaneous emergency on-site power projects the company is providing, the others being in Mexico and Australia.

"We've been busy – we've been standing up turbines (with capacity of around 276 MW) in Australia as the South Australian grid has had problems (notably a blackout). We're also in Mexico for Pemex, the big oil refinery who had their existing power plant destroyed in an earthquake and two more going to Puerto Rico to help stabilise the grid in San Juan, based on the last hurricane. No other company in the fast-track power sector has been called on to deliver emergency power to so many locations at the same time."

The US Army Corp of Engineers called Campion's outfit, after an analysis of conditions in the country showed severe damage to grid infrastructure. At the moment, APR's units are providing 60 MW of power for around 300,00 people. Because of the uniquely difficult characteristics to how the grid is laid out in the Caribbean country, it may mean a lengthy stay for APR.

"We have to see what happens. Ultimately our machinery is a lot more efficient than some of the GE Frame 5 machines that've been in Puerto Rico since the time of Adam. Some of those units are only 23-24 per cent efficient. They are firing on diesel fuel that's not clean and not very efficient. Our units are 38 per cent efficient and much cleaner. Ultimately as the grid becomes more stable and more power comes back and more customers on the grid start using more electricity it'll be a conversation we'll have but the focus right now is simply to bring power online to the people of Puerto Rico and we'll figure out the economics after the fact."

“If we fire our units on propane or work with any number of companies on LNG it’ll be significantly cheaper than anything they have on the island at the moment, apart from maybe the combined cycle in the south of the country.”

“The problem with Puerto Rico is the majority of the generation is in the south and in terms of the generation in the north there’s a bunch of 100 MW units and a couple of 200 MW combined cycle units. They don’t have anything to peak against so if they are bringing on circuits or closing faults those units can’t meet the default current and what’s going to happen is it’ll fall offline.”

As it stands, San Juan had a pre-hurricane demand on its already dilapidated power generation infrastructure for about 1200 MW of base power and 1500 MW peak load.

“There is only about 650 MW of that working – that and the 40 MW working in Palo Seco gives you around 700 MW. To compound that, there’s quite a lot of power in the south and that power must come over the mountains on three transmission lines.”

“Those transmission lines were wiped out during the hurricane so to bring back sufficient power into San Juan it’s going to be about fixing those lines as fast as possible and when those are back up there’ll be a lot more stability on the grid. Prior to that, they need the balance from us to remain on the grid.”

“We’ll be there until they finish fixing the transmission, we don’t know how long that is going to take. You’re building a transmission line over mountains, which is not the easiest thing in the world.

Puerto Rico is situated in an area of the world not unfamiliar to catastrophic weather conditions, yet its energy resiliency planning to date has fallen somewhat short. Immediately in the wake of the latest superstorm, 90 per cent of the country was without electricity. In developing nations, there is often a fall-back to diesel generators in such circumstances, with all the limitations this equipment involves.

“Here is a situation where you have got very little electricity and a lot of the hospitals and hotels were operating off standby gensets. Those were never designed to run 24-7. When a general contractor is asked to build a school or hospital and there’s a call for a standby generator he will generally go out and buy the cheapest available. These units are designed to run maybe 500 hours in their entire life.”

The attributes that make APR most attractive to states with power problems show why it’s in demand as a solution. It’s GE’s latest turbine technology, similar to what is used in jet aircraft engines. It’s fuel flexible, offering a higher power density and lower emissions than competing solutions using diesel reciprocating engines, and it has the ability to switch from diesel to natural gas if necessary.

Based on GE's proven LM2500 product family with over 90 million operational hours of experience, the TM2500 can be transported via land, sea or air and can be commissioned in days. It can ramp up to full power within minutes to support grid security during periods of high demand, and the latest unit can generate more than 35 MW of power using gas and/or distillate liquid fuels for greater flexibility.

GE builds the turbines and APR operate and maintain them and it’s an approach that works well. Since formation in 2004, Campion’s company has earned an enviable pedigree.

The company notably delivered 210 MW of power to Fukushima 45 days after contract and 90 days after the earthquake and tsunami in 2011, and they have been consistently called upon to help out nations in need of a power quick fix time and again.

The equipment is also, by some distance, more environmentally suitable, than the diesel gensets that are often called into emergency action, and Campion had, while originally with GE, a significant role in developing it.

“Your standard rental genset is a kilowatt or a kilowatt and a half, typically in a 20 or 40 foot container, typically burning diesel fuel, typically got to 600-800 parts per million of NOx so it’s not exactly the cleanest technology whereas our units are aero derivative turbines so even when burning diesel fuel its 42 parts per million of NOx. We’re 15 to 20 times cleaner than diesel engines in terms of NOx emissions.”

“The story of the TM2500 is quite interesting. It’s an aeroderivative gas turbine and it’s a trailer-mounted version of the LM2500. The LM2500 was a stationary unit and I was at GE in 2000 and helped to spearhead its development. Even though I’m not with GE any more, it was originally a unit I developed when I was at GE back in 1999 /2000. The very first job we with did those units with GE was in Chicago, Illinois followed by another siting in Ringaskiddy, Cork for ESB.”

“That (being relatively clean energy) was one of the biggest drivers in south Australia. We didn’t need scrubbers, water injection and we’re extremely clean. Also from a purely practical standpoint, trying to take 50 1 MW units and getting them to regulate on a power grid is like herding cats. Think about getting 50 of anything to do what you want to do. The technology is quite good in the electronics of engines but if you’re trying to get 50 units to react, you’re not going to provide the stability to a dynamic grid as you will with a couple of gas turbines, especially aero derivatives which react very fast and can offload and blockload quite well and can take 5 per cent to 7 per cent fluctuations on the grid.”

What’s perhaps even more interesting about APR Energy is the origins of the company. Campion and a colleague Laurence Anderson were, for many years, professional roadies for some of the biggest names in the music business. They worked for David Bowie, Metallica, U2, Rolling Stones and Guns n’ Roses, and as a result of their experiences on the road, eventually formed the company Showpower specifically to provide power for that business.

Their first major client was Michael Jackson, whose power requirements for the Bad tour exceeded the capacity of most local venues. In 1999 they sold Showpower to GE Energy Rentals. A few years later the pair moved to Alstom, where they created a temporary power rental service, Alstom Power Rentals. In 2004 they bought the business from Alstom and eventually turned it into APR Energy. It is now worth $1.2bn.

One of the key features to the operation taken from their days serving live concerts is the core competence of modularity. When they built Showpower, Campion and Anderson designed their equipment with transportability in mind. Their generators, designed by Campion’s brother Edmund, were built so that two could fit into a 20-foot air-freight container for Michael Jackson’s tour. That principle has served them well in the temporary energy sector.

As Anderson told Forbes in an interview three years ago, “What we were able to do is take a large power plant and break it down into smaller components. If a client needs a large power plant, APR will configure it from ten or more of these blocks. For a medium-sized plant, they might use five. We can arrange them in almost any way that we need to, thereby staying with the standard we’ve

created, yet be flexible enough to meet the customer's needs using the space that they have available."

Back to the present, and Campion bemoans the lack of a balanced and holistic approach to the energy system generally, when considering why Puerto Rico isn't more resilient in the face of frequent storm seasons.

"The funny thing about it is, if you read the news and the blogs, everyone is talking about renewables but look at the state of Puerto Rico after renewables. There are pictures of broken wind turbines with the blades sheared off, and a 100 MW solar site where it looks like someone threw a deck of cards on the ground. In a world of ever increasing global warming and severe hurricanes, solar and wind are not the godsend everyone thought they would be".

However it is that very vulnerability in grids worldwide that provides the need for APR, and its essential role in maintaining power, when it is most needed.