THE MAGAZINE WITH INSIGHT

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GHANA NATIONAL PETROLEUM CORPORATION

EXPLORING & PRODUCING

Exclusive interview with GNPC's Chief Operating Officer, Mr. James Yamoah.

SPECIAL FEATURE:

BUSINESS IN **TIME OF CORONAVIRUS**

SHOPRITE

Generating sustainable growth for over 40 years in the retail sector.

CAPSTONE TURBINE CORPORATION

Green, reliable and compact microturbines for a range of industries.

YAMAZAKI MAZAK UK

One of the world's largest manufacturers of CNC machine tools is set to drive growth through innovation.


Capstone
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WE LOOK AT THE ACHIEVEMENTS OF CAPSTONE TURBINE CORPORATION AS THEY OFFER GREEN, RELIABLE AND COMPACT MICROTURBINES TO A RANGE OF INDUSTRIES.

A CAPSTONE ACHIEVEMENT

PROJECT MANAGED BY: TIM GARWOOD

The official definition of a "Capstone" is a stone on top of a wall, monument, or building. In addition, it is a phrase often used to denote high quality, or a crowning achievement. This is why the founders of Capstone selected the name as Capstone Turbine with its patented air bearing technology, one moving part and state-of-the-art power electronics, they are unrivaled for quality in the sub 10MW energy market.

"Capstone Turbine Corporation has shipped over 9,000 microturbines into 73 countries worldwide. With international growth and geographic diversification into countries such as India, where demand for primary energy will increase significantly over the next several years, there is an enormous opportunity that Capstone is planning to capitalise on to the fullest extent by growing their unique technology offerings into this rapidly evolving market.

"We're changing the way the world acquires its energy," says Darren Jamison, President and CEO of Capstone Turbine. "We're all about lowering energy costs, carbon footprint, and Capstone Microturbines can run in parallel with the grid or stand alone." ››


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PURE WORLD ENERGY

Pure World Energy (PWE) is a specialist in distributed power generation. Established in 2013, PWE delivers on-site energy generation solutions to customers from commercial and industrial sectors throughout the UK and Ireland, powered by Capstone microturbines.

Thanks to the versatility of Capstone technology, a broad mix of businesses are able to enjoy the benefits of more cost-effective, reliable and environmentally friendly energy. The most popular application offered by PWE is 'Combined Heat and Power' (CHP), whereby businesses can benefit from utilising the heat produced during energy generation. The financial merits are a particularly attractive aspect of this, with savings of 20-40%, whilst quiet operation, a small footprint and a near-zero emissions profile often prove equally appealing.

In addition to CHP there are a number of other popular deployments, including 'Combined Cooling, Heat and Power' (CCHP), steam, direct exhaust heating, critical power and biogas utilisation.

PWE is very much an engineering-based company, focussed on delivering integrated energy generation solutions. They take an analytical approach and provide full turnkey solutions, including design, build, operation and maintenance. Finance is another attractive part of the offering, whereby PWE is able to fully fund projects on a client's behalf. For some clients this can be the key enabler for the project, whilst for others it frees up much-needed capital for other areas of the business.

After-sales service is a priority for PWE. The company's CEO, Sean Fitzpatrick, comments: "The installation of any Capstone microturbine is the beginning of a long-term relationship with our clients. Many are highly reliant on the energy our systems provide and, as such, we maintain the very highest levels of post-installation service and support under a 'Factory Protection Plan' (FPP), which is back to back with our manufacturer, Capstone".

From food processing plants to data centres, and from large scale construction projects to manufacturing facilities, there is an extraordinary variety of businesses that can benefit from PWE's Capstone-centred energy solutions.

You can learn more about PWE at:

www.pureworldenergy.com

Pure World Energy

A TECHNOLOGICAL BREAKTHROUGH

The business is built on the Microturbines themselves, originally developed as automotive turbochargers that are built very small, with a fuel agnostic combuster that can process a wide range of fuels including natural gas, landfill gas, biodiesel and kerosene. There are also thermal energy and solar versions of the turbine in development. The high-speed microturbine can convert power to AC or DC, offering a smaller, more compact version of the full functionality of a large-scale power plant for homes, hospitals and universities, aiding them in reducing their carbon footprints.

These turbines are backed up by extensive R&D to create a product that is as robust and reliable as it is environmentally friendly.

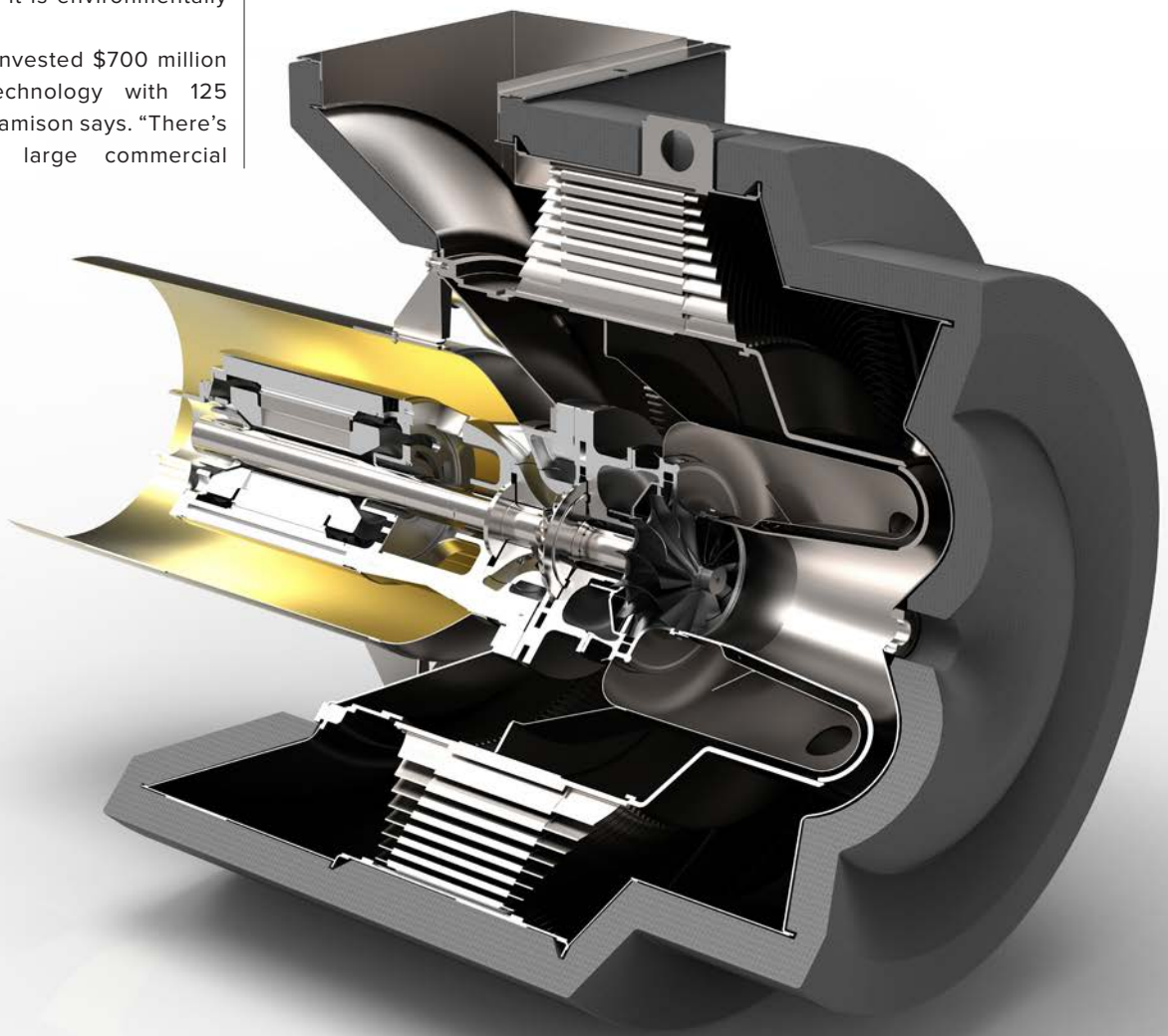
"We've invested $700 million in the technology with 125 patents," Jamison says. "There's no other large commercial microturbine manufacturer in the world. Our technology has one moving part, it's robust, small, has a low carbon footprint, no grease, lube oil, or antifreeze is necessary - so it's reliable as well as low emission. There's no biproduct to take away."

SPREADING THE WORD

Of course, introducing a new technology into a market where things "have always been done a certain way" is a challenge in and of itself.

"Capstone is no different than most industrial start-ups with disruptive technology in the cleantech or energy space," Jamison points out. "Capstone looks to compete with large-scale big brand energy competitors like Jenbacher,

"WE'VE INVESTED $700 MILLION IN THE TECHNOLOGY WITH 125 PATENTS. THERE'S NO OTHER LARGE COMMERCIAL MICROTURBINE MANUFACTURER IN THE WORLD."



Siemens, and Caterpillar, who enjoy large populations of fielded industrial energy products and a loyal customer base as well as lower initial cost, albeit inferior power generation products. Capstone has already overcome many of its biggest challenges, which were centred around ramping manufacturing, improving quality, direct material cost reductions, building a global supply chain, developing channels to global markets, scaling high margin recurring sources of revenue, and developing a global image and brand."

In terms of spreading the message about that global brand, Capstone Turbine has over 60 distributors worldwide, with 800 individuals working to market the brand through partner companies.

"We do our own business activities and marketing from sponsoring a IndyCars to attending trade shows and being active on social media," Jamison says. "We use as many different avenues as we can."

THE WAR FOR TALENT

Of course, as well as finding customers, Capstone Turbine is also constantly at work trying to source new employees.

"AT CAPSTONE, WE RECOGNIZE THAT OUR CUSTOMERS ARE GLOBAL, OUR DISTRIBUTORS ARE GLOBAL AND AS A RESULT, **WE HAVE EMPLOYEES REPRESENTING 39 DIFFERENT COUNTRIES."**

"Yes, the global war for talent is real," Jamison tells us. "Sourcing high-quality talent is definitely an international effort. At Capstone, we recognize that our customers are global, our distributors are global and as a result, we have employees representing 39 different countries. In order for a company our size to compete with much larger competitors, Capstone must have 'A players' at every level of the organization from the manufacturing floor to the Boardroom."

Fortunately, the work that Capstone is engaged in attracts a great deal of top shelf talent at every level.

"Because we're making a product that improves the world with clean energy and new technology, we have good luck attracting top talent," Jamison admits. "We have facilities in the U.S. and U.K. and sales and distribution around the ››

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BRIO GROUP

Paving the way for Distributed Power And Energy Efficiency In India and other countries of South Asia:

Brio Group, Mumbai, India, is committed to deliver state of the art , cutting edge technology products in diverse domains such as Energy ,Life Sciences, Engineering, Automations etc.

After a toiling journey through tough terrains Brio could transform the user industry perception about distributed power generation and created awareness about energy efficiency through cogeneration and trigeneration , thus paving the way for breakthrough in select applications sectors such as Oil & Gas , Biogas, Critical Power, Retail Commercial etc.

With a vast geography, regional diversity and demanding client mindset, the challenges are significant, yet the potential is enormous. The government initiatives are conducive and in tandem with SDG goals for reducing carbon footprints and environmental impacts

Government Initiatives	Current installations	Type of Fuel
Gas Based Economy	Mahanagar Gas Ltd, Mumbai	Piped Natural Gas
Flare Gas Mitigation	Oil & Natural Gas Corporation, Assam & Mehsana	Flare Gas
Utilization of biogas	Chitale Dairy , Sangli	Biogas
Waste To Energy	Gas Authority Of India Ltd, at Gazipur, Delhi	Landfill gas

Our ongoing projects include Offshore ventures in partnership with ONGC and Larson & Toubro Hydrocarbon Engineering for reliable onsite power with wellhead gas, utilization of biogas from cowdung generated at large cowsheds and poultry farms at different locations across India.

Brio is looking forward to joining global league with trusted handhold of Capstone and would be keen to work in tandem with transnational global players for their India and South Asian ventures.

www.brioenergy.in

IBT CONNECTING ENERGIES

IBT Connecting Energies GmbH since 2001 is the Exclusive Partner for the Italian market of Capstone Turbine, leader in energy systems with oil-free gas turbines that allow to obtain co- and trigeneration plants which guarantee a significant reduction in consumption (over 30%), low maintenance and near zero emissions. 2020 marks the 20th anniversary of the founding of IBT, an engineering company born from the intuition of Ilario Vigani, President and CEO, with the goal of developing high efficiency solutions in the sector of energy production in any type of company or industry.

Those innovative applications ensure maximum efficiency in industries who need thermal vectors (i.e. saturated steam or sub-zero glycol water), such as Food & Beverage or companies that use hot "waste" gas on direct drying processes, for their productive process.

Furthermore, the recent use of the FORSU (Organic Fraction of Municipal Solid Waste) in wastewater treatment plants sees the optimal use of Capstone turbines fuelled by biogas, which is produced in high quantities more and more from this type of plants.

The turbo-s application allows to use all the usually wasted thermal energy of the Capstone gas turbine, unlike what normally happens with reciprocating engine technologies, where the mix of the thermal energy produced is mainly concentrated in the production of hot water at 90°C.

It is therefore possible to maximize the production of steam by using a post-combustion technology of the exhaust gases which, due to an 02 content of about 17%, allows their use as combustive air at 300°C inside air-vein burners that raises the temperature of the gases up to a maximum of 700°C. These gases are therefore used in a recovery steam generator to produce saturated steam.

www.ibt-connecting-energies.com

"BECAUSE WE'RE MAKING A PRODUCT THAT IMPROVES THE WORLD WITH CLEAN ENERGY AND NEW TECHNOLOGY, WE HAVE GOOD LUCK ATTRACTING TOP TALENT."

world. When we're looking for direct labour we tend to look at ex-military personnel. Our microturbines turn at up to 90,000 rpm with high tolerances, so ex-air force and ex-navy people tend to do well with this type of product. We also recruit a lot of aerospace engineers."

Staff also receive training and recruitment through the company's strong relationships with universities. Capstone Turbine has a long history working with universities to explore new technologies, enhance product development, and to perform basic research and development activities. >>


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"REALLY, WE'RE DEVELOPING INTO THE ENERGY-AS-SERVICE MODEL BECAUSE THE TURBINE WILL LAST LONGER THAN MOST ITS SERVICE AGREEMENTS."

Capstone's early history involved a Technical Advisory Board consisting of leading combustion, power electronics, and aerodynamic professors representing several highly ranked national research universities. The knowledge from this alliance became the foundation for what developed into Capstone's large portfolio of turbomachinery, controls, and combustion patents. This initial work evolved into extremely close partnerships with local universities. Collaborations ranged from student educational opportunities testing microturbine performance under a number of different environmental conditions to the integration of the Capstone microturbines with alternative technologies.

Of course, retaining talent is also critical, and this is an area where Capstone has seen a great deal of success.

"Unwanted employee turnover at Capstone is approximately 6% annually, which is actually quite low for a California based technology company. I try to focus on high levels of employee engagement and empowerment," Jamison says. "I have found that this approach is more effective in the long-term than traditional compensation and employee benefits. Also, I have established a Capstone Cares program to organize employee events and to provide service opportunities to give back to the local community and Capstone Culture Club which is an employee established group within the company to develop fun and unique Capstone sponsored employee events."

MOVING INTO SERVICE

As the company is growing it's also evolving, not just in terms of the technologies and products it offers, but how it offers them.

"Really, we're developing into the energy-as-service model because the turbine will last longer than most its service agreements," Jamison explains. "We're also looking into owning the systems ourselves and selling the output. Recouping revenue is important to us to make the company sustainable long-term. Really it's about getting the company profitable, with strong reoccurring revenue and higher adoption rates."