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Technology Terragon Environmental: The Trash Transformers

MARITIME REPORTER AND ENGINEERING NEWS



Montreal's Terragon Environmental Technologies is not only seeking to change the way in which the maritime industry manages its diverse waste streams; it is trying to change the world. By Greg Trauthwein, editor

Dr. Panayotis (Peter) Tsantrizos, President, CEO and founder of Terragon Environmental Technologies Inc. is obsessed with trash. Well not the physical product itself, rather the accumulation and handling of it, particularly in confined habitats that have few, if any, viable means to dispose of, transport and treat waste.

"What the world does now for waste management is collect the waste from everyone and bring it to a place where it can be treated or disposed of," Dr. Tsantrizos said. "This is not sustainable. As long as the 'waste generator' is separated from the 'waste processor,' we don't have the potential to use the waste as a resource."

WASTE ... AS A RESOURCE?

Dr. Tsantrizos and his team have been working since 2004 on a pair of technologies – one designed to handle solid, the other liquid waste – that extends far beyond traditional waste handling methods, and in fact is a process whereby waste is literally "cooked" using its own energy, resulting in nothing more than water, clean air and a miniscule (by comparison to the original volume of trash) volume of "Bio-Char."

"The alternative is to have people treat their own waste. Ships have been doing it for a long time, but they have been doing that with technologies that are simply miniature versions of larger technology." Tsantrizos said. "That is not the proper way to do it. We started with the concept of enabling every habitat, and by habitat we mean a ship, we mean a hotel, and eventually every home, to treat their own waste and recover resources from the waste."

MEET MAGS

"My parents, or more accurately my parent's generation, were more sustainable than we are today," Tsantrizos said. "What were they doing? They had a little house, they would bury their organic waste in the field, composting it; the remainder they placed in a drum and they burned it. This was the right thing to do, as there was no waste pick-up and it was the only option that they had. The only problem was they had the wrong technology. So I started (Terragon) with the basic idea to provide a better 'drum' for waste disposal that could be used on a personal scale."

Founded in 2004, Terragon represents a new vision in waste management where it transfers the ability and responsibility of waste management back to the waste generator. Today the company is refining and bringing to market a pair of future generation technologies – MAGS & WETT – which are designed individually and in tandem to enable a "zero waste discharge habitat."

MAGSTM, or Micro Auto-Gasification SystemTM, is Terragon's solution to solid waste management that today is ready for commercialization. **The system, now in its sixth iteration, has been involved in**

some broad based real-life field testing, including MAGS' V4 installations onboard the commercial vessel Maersk Laser and the Canadian Navy's HMCS Protecteur, while its V5 installations include the U.S. Marine's Camp Smith base on Hawaii, and soon an onshore oilfield operation for Saudi Aramco. V6 models, according to the company, are destined to ship this year to a diversity of entities, including commercial ships, industrial operations, work camps and hospitals.

MAGS accomplishes its mission to "cook" a wide variety of waste using Terragon's Auto Gasification Process, a patented technology which thermally breaks down hydrocarbons into sold carbon and synthesis gas, and uses the synthesis gas to fuel the process. The result? A small pile of "Bio-Char" that is many magnitudes less volume than the original waste.

"In the simplest way of putting it, we want to 'cook' the waste using the fumes that are produced as the fuel," Dr. Tsantrizos said. "If you use the energy that is in the waste to cook the waste, you have Auto Gasification. The main objective is not to burn the waste, but to fracture the waste back to carbon and water. By sequestering the carbon, this also goes a long way in minimizing the greenhouse gases," as Dr. Tsantrizos proudly pointed to the invisible emissions emanating from the exhaust stack while in process.

The WETTTM technology – under development for four years with support from the U.S. and Canadian Navies – is the system to handle liquid waste onboard ships. WETT removes suspended solids and contaminants, and produces clean water that is safe for discharge or reuse. This technology – which today is targeted to both landside and marine applications, specifically habitats with fewer than 300 people – is approximately a year behind the MAGS technology, with commercialization expected by 2013.

Separately, the technologies are an impressive means to efficiently and environmentally handle a diverse waste stream. Together, they represent a 'leap ahead' technology that will be designed to handle nearly any waste found onboard a commercial vessel.

ZERO WASTE DISCHARGE SHIP

While the MAGS and WETT systems are developed and will be offered separately, the "big picture" according to Tsantrizos is to package them together for use on a ship, offering a seamless and efficient waste handling operations.

"You have many different systems (and procedures) for handling waste onboard a ship, different technologies for bilge water, different technologies for grey water and black water, for plastics and food, paper and cardboard, to metals and glass," Tsantrizos said. "Everything is sep-

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Dr. Panayotis (Peter) Tsantrizos, President, CEO and founder of Terragon Environmental Technologies Inc.

arated, and you end up having different systems to treat waste. From our conversation with ship owners, many of those appliances don't even work properly, but even when they do, it requires a lot of labor to separate the waste."

Terragon's intention is to integrate the solid and liquid waste handling systems into a homogenous unit using MAGS and WETT technologies, where you can take all the waste of the ship and end up with only clean water, thermal energy and Bio-Char. The approach is captured in the acronym STEPTM, which stands for 'System for Total Environmental Protection" and is the approach combining MAGS and WETT.

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"The synergy is very interesting," Tsantrizos said, "because WETT produces sludge which can be treated by MAGS, and MAGS generates process water which can be treated by WETT to become reusable water ."

"The proposal is much more than a concept, as Terragon will be conducting a trial of the combined technology with support from Sustainable Development Technology Canada (SDTC), and in conjunction with naval architect support from Alion Science and Technology Corp., on two applications: one of them on a Canadian Coast Guard Icebreaker and another at a small military outpost in the Arctic."

".. A VERY SMALL COMPANY ON A VERY BIG MISSION ..."

Tsantrizos fully recognizes the inherent logistical challenges to produce, deliver and service Terragon's innovative waste handling systems globally to the maritime industry, let alone to individual communities and even households. Based in Montreal with 50 employees today, he said that to maintain its innovative edge he doesn't envision the company growing much larger.

"We started with two people (in 2004) and today we are 50 people," he said. "I don't want the company to grow much larger, as we will commercialize through partnerships with various other large, global companies. "I want the company to stay small because our ideals, our principles, our way of operating are not suitable for larger companies."

Summing up his company succinctly, Tsantrizos said "We are a very





small company on a very big mission."

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Small companies, however, are not inherently equipped to service a global business model, particularly one that will potentially require installation and maintenance with the world as its operational footprint. To rationally expand, the company has devised a two-step process, the first of which is happening right now. Companies large and small are assisting the commercialization process either by industry sector or world region, whereby they will help with assembly, distribution and maintenance. This is targeted to the technology's 'early adopters' of the technology (ie. those with difficult or non-existent options), including marine, hotels and resorts, military and security, hospitals, isolated communities and work camps. Part two of the commercialization process will be the global commercialization effort, whereby the com-

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pany will seek large corporate partner(s) that are positioned for global manufacturing, delivery and service.

CHALLENGES AHEAD

While adoption of new technology can be painfully slow, particularly in markets such as maritime where a conservative gene seemingly pervades nearly every vessel owner, Tsantrizos reasons that he doesn't see this as much of a challenge for one reason:

"(Arguments for the technology) are actually presented by the shipowners themselves. They themselves know what they don't want to have," he said.

Regardless, Tsantrizos still sees a few challenges ahead: Bringing down the cost and raising the system's ease of use.

"My final vision is always focused on low cost and simple operation," Tsantrizos said. "The issue here is the technology is still relatively expensive, and we need to find ways to reduce the cost."

Cost reductions will come in part through a rationalized manufacturing strategy. Today the company manufactures exclusively in Canada, but as it rolls out operations globally it will be able to take advantage of much lower manufacturing costs. The ability to produce more machines, too, will help to drive costs down.

In addition, he said the waste handling system must deliver commercially with an interface which allows anyone to operate it efficiently and safely. While the current (V5) version features a high-tech electronic interface with a series of buttons and lights, Tsantrizos envisions a simplified control system, something akin to a washing machine, which will have the tandem benefit of reducing costs, too.

Through all of the technical talk, government partnerships and business challenges, Tsantrizos eye remains on sustainability. "We started – and maintain our course – with a singular vision and mission; enabling people to take care of their own waste."



Pictured, from Top Down

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TOP Dr. Panayotis (Peter) Tsantrizos, President, CEO and founder of Terragon Environmental Technologies Inc., in his Montreal-based facility.

CENTER The Auto Gasification process, which essentially uses the energy from the waste to "cook" the waste.

BOTTOM

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The latest iteration of the MAGS technology — V5 — undergoing final testing before its deployment into the field with Saudi Aramco.