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THE SHIPYARD EDITION

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In February 2012 Maritime Reporter introduced to you Terragon Environmental Technologies and its vision to transform solid and liquid waste handling operations on ships and rigs. Recently we caught up with Dr. Panayotis (Peter) Tsantrizos, President, CEO and founder of Terragon, to discuss the next "STEP."

– by Greg Trauthwein

"A journey of a thousand miles begins with a single STEP."

This quote attributed to Chinese philosopher Lao-tzu (604 BC - 531 BC) (Source: www.quotationspage.com) is applicable today when discussing the work being conducted by Dr. Panayotis (Peter) Tsantrizos and his team at Terragon Environmental Technologies in Montreal Canada. Dr. Tsantrizos, CEO, President and Founder of Terragon Environmental Technologies is embarked on the noble challenge to make sustainable the world's processing and resource recovery of trash. While the concept is scalable to communities large and small, land-based and sea-based, for the context here we will focus on work about to begin that will mate the solid waste handling unit with the liquid waste handling unit – or STEP – identifying and addressing the challenges to make it a safe, efficient, sustainable and cost-effective means to handle trash on the high seas.

One STEP Back

MAGS, or Micro Auto-Gasification System, is Terragon's solution to solid waste management that today is available commercially. 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, as well as an onshore oilfield operation for Saudi Aramco. V6 models are shipping this year to a diversity of users, land and sea-based. To put it succinctly, 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.

The WETT 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. It is currently in field trials aboard Amelia, a 108.2 x 14.94 m, 4,433 GRT Lloyd's classed bulk carrier owned by Transport Desgagnes.

Together MAGS and WETT are transformational: together – as STEP – they have the potential to be revolutionary.

Two STEP's Ahead

The System for Total Environmental Protection (STEP) is the current mission focus of the Terragon Environmental crew, as they seek to identify and eliminate the challenges inherent in marine operations. 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. According to Dr. Tsantrizos, there are many questions that still need answers, including:

- **What do you do with the extra water?** The easy answer is to send it overboard, but in sticking with his mission toward sustainability, Dr. Tsantrizos would like a solution which puts it to use on the ship, as potable water or utility water.
- **What do you do with the thermal energy generated?** As Dr. Tsantrizos points out, ships already have an abundance of thermal energy recovery via its main machinery. His preferred solution regarding the use of STEP generated thermal energy is to 'keep it in the box,' or more specifically to use it fully in the solid and liquid waste management loop.
- **Integration of MAGS & WETT:** The ultimate challenge, however, remains the seamless integration of two proven technologies: MAGS and WETT. Dr. Tsantrizos noted that today WETT creates more liquid waste than MAGS can handle.

STEP Timeline: September 2013

Terragon Envrionmental Technlogies and its partners, both corporate and government, have embarked on a series of actions to make the STEP a commercial reality, with all indicators pointing toward September 2013. A nine-month study is set to commence that will compare STEP to conventional waste management options in terms of economic, operational and environmental impacts. Specifically the study – which is being conducted with Alion Canada and a number of other partners – will consider three applications, including: [a] a commercial ship with a crew of less than 25; [b] a research vessel with a crew of less than 60; and, [c] a military ship with a crew of about 250. Teekay Corp. will participate in the study and will be the independent reviewer of the assessment for the research vessel. Finally, the Naval Engineering Test Establishment (NETE) will participate and review the evaluation of the military vessel.

The Canadian Coast Guard Ice Breaker Pierre Radisson will be the first to host the STEP demonstration in December 2012. STEP will be installed within its ISO container (see picture page XX) on the deck of the ship for six months, treating bilge water, solid waste and used oils generated by the ship, as well as most of the gray water. Black water will not be treated for this demonstration, but will be incorporated on subsequent STEP demonstrations. Ultimately, the success of the system in the maritime realm is a story to be told years from now, as trash handling rules become more oppressive to ship owners and innovative solutions must be found. Regardless of its ultimate fate, by focussing its

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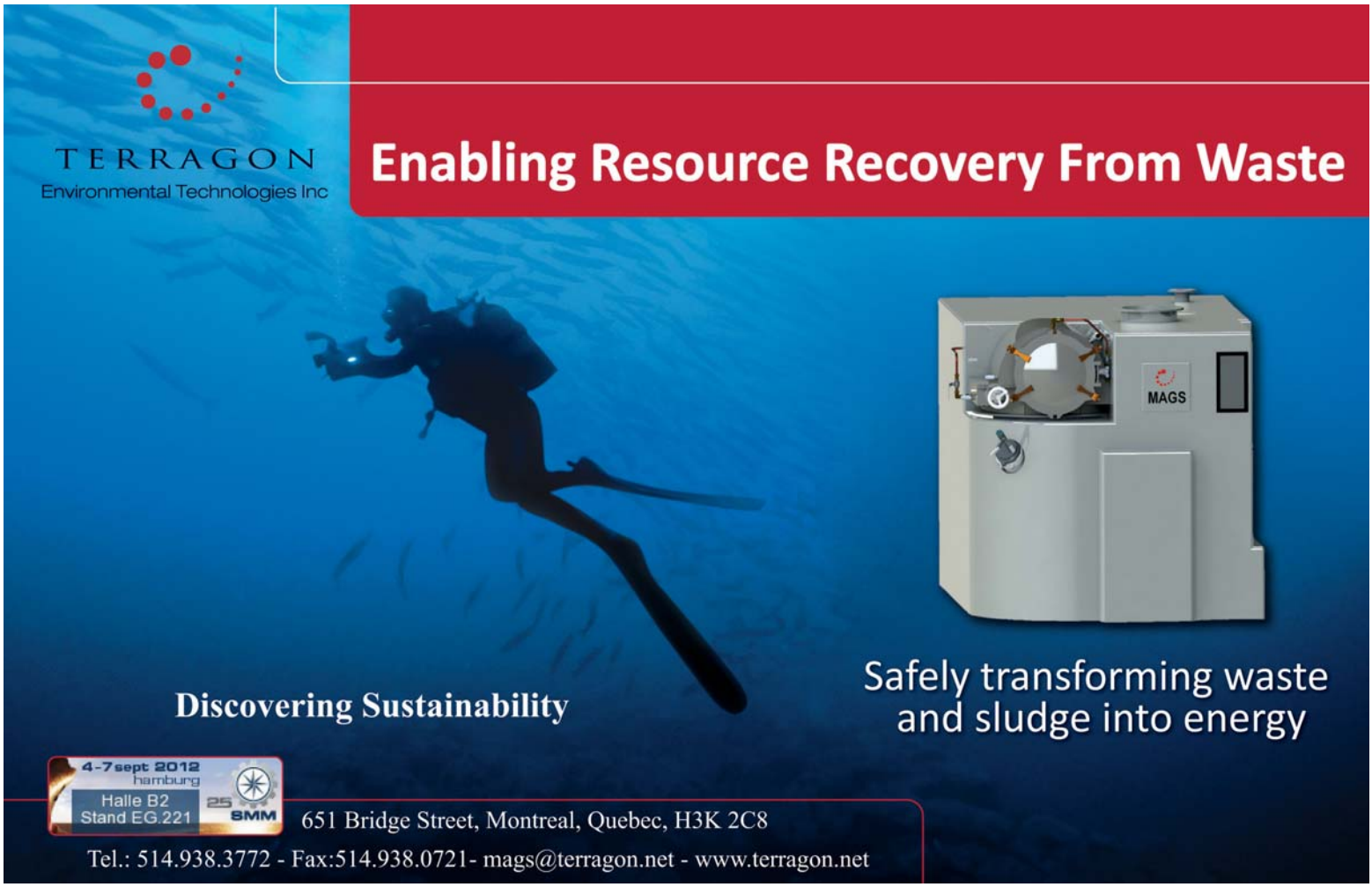
efforts on creating sustainable trash handling practices with residual benefits for communities large and small is surely a STEP in the right direction.



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