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Focusing on innovation in the global cruise industry

Slops refining boosts cruising's environmental performance



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Vincent Favier, Chief Executive, Ecoslops, explains how to turn cruise ship slops into viable products.

As the cruise industry looks set for a record number of passengers in 2018, according to 'Cruise Industry Outlook', there is likely to be increased scrutiny of shipping's environmental performance.

With sustainable cruising tipped for growth in the same survey, it is clear that operators are recognising the commercial benefits of 'clean' shipping.

At last year's Seatrade Europe, reducing the industry's environmental impact was one of the top three priorities identified by cruise executives against a backdrop of changing legislation and increasing regulatory and consumer pressure.

In August, 2017, new ballast water regulations took effect to combat the threat posed by the transfer of invasive aquatic species from one marine environment to another. Further change lies ahead with a global reduction in the sulfur content of marine fuel from the current 3.5% to 0.5%, which takes effect from January, 2020 to reduce air pollution from ships. This will dramatically change the marine fuel supply chain.

While cruise operators are used to complying with the 0.1% sulfur content in current Emission Control Areas (ECAs), the global regulation will have a significant impact on bottoms lines. There are three main options; expensive distillates and distillate-based products; installing scrubbers (and burning HFO) or switching to Liquefied Natural Gas (LNG). All three involve increased costs.

Another area of sustainability, which has hit the headlines recently on the back of significant fines for owners and operators ignoring the regulations, is the disposal of slops.

Slops and sludges are hydrocarbon-rich industrial waste, produced in engine rooms through purifying fuels, bilge waters from mechanical systems, and oily ballast water and tank cleaning waters.

How much each vessel produces depends on the nature of its operations, the size of the vessel, its maintenance and age, as well as



Vincent Favier, Chief Executive of Ecoslops

various other factors. Millions of tonnes of maritime hydrocarbon residues are created every year, and it is estimated that they account for between 1% and 2% of annual maritime bunker volumes. All of this waste needs to be disposed of in line with IMO and EU regulations.

In its most recent environmental survey (March 2016), the European Sea Ports Organisation (ESPO) ranked port waste and ship waste among its top 10 environmental concerns, demonstrating the radical need for reform in the shipping industry.

Environmental damage

Although many shipowners dispose of their slops in accordance with MARPOL Convention 73/78 and European Directive 59/2000 regulations, the United Nations Environment Programme (UNEP) estimates that in European waters alone, at least 3,000 incidents occur each year in which slops are deliberately dumped, causing significant ecological and social harm. Illegal discharge in the Mediterranean is anticipated to be 1,000 tonnes per day.

The scale of this issue becomes apparent when we consider how high this figure may be if it was expanded to encompass all global trading routes. In December, 2016, Princess Cruises

was fined a record \$40 mill for illegally discharging oily waste to sea via a 'magic pipe' fitted to bypass pollution prevention equipment.

Slop reception and treatment facilities vary from port to port, with the initial aim of removing the oil from the water to produce an effluent which meets discharge standards. Treatment methods can be by gravity separation, physical or chemical separation and biological or chemical treatments.

The oily residues can then be treated or disposed of at or away from the port. Incineration is another option, which results in the waste of valuable natural resources with little or no profitability in waste collection.

Low cost environmental improvement

Ecoslops has developed pioneering technology, which sustainably treats slops through a micro-refining process, in order to regenerate the waste into valuable fuel and light bitumen, which can be sold back for use in different markets,, including the shipping industry. While the principle and design of the technology was well established, Ecoslops conducted further research to develop the concept of a new innovation; the P2R (Petroleum Residue Recycling).

After the water and sediment is removed, the slops are sent to the vacuum distillation column. Under vacuum conditions, the hydrocarbons are vaporised and at the end of the distillation process, several fuels are produced, including light fuel, distillates and IFO. Due to the vacuum distillation process, Ecoslops is able to regenerate the heaviest part of sludges into light bitumen, which provides a new supply route to the construction and waterproofing industries.

This circular economy developed by Ecoslops enables slops to be disposed of sustainably, and regenerated into useful commercial products, with benefits for all levels of the slops supply and disposal chain.

Cruise ship owners and operators benefit from the reassurance that their waste is treated appropriately and at a cheaper cost than traditional methods. In addition, they can also improve their brand and reputation from the sustainable disposal and regeneration of their waste products.

The infrastructure challenges of slops' disposal are also removed for ports, regenerating the waste product rather than burning it. This has a positive impact in reducing pollution in local port communities. It also helps ports to improve their sustainability profile, and enhance their competitiveness and reputation



The Ecoslops refinery in Portugal

in the eyes of their customers, and wider stakeholders.

Product is purchased from slops' collectors at a fair price, providing commercial benefits, as well as alleviating the pressures on storage capacity. This also results in a decrease in the fees slop collectors charge to shipowners, as they once again have a valuable output for their slops.

Consumers receive high quality commercial products for their needs across various markets, such as transportation, petrochemical and building industries. Adopting recycled material boosts their own corporate responsibility and reputation.

Proven technology

The P2R process is the result of five years' R&D, plus continuous assessment and improvement. In 2012, Ecoslops won a tender at Sinès in Portugal to construct the company's first refinery, where it has a 15-year sub-concession agreement for the exclusive rights to collect slops, as well as solid waste within the port.

Since operations began, the unit has proven its industrial efficiency by recycling and upcycling over 98% of the hydrocarbon residue collected. The micro-refinery is now on course to reach its capacity of regenerating 30,000 tonnes annually.

The validation of the technology and the company's business model is further proven by Ecoslops securing buyers for the refinery's products. One major client is the SOPREMA Group, who use the refined light bitumen in the manufacture of bituminous waterproof roofing membranes for use in the building industry.

Last year an agreement with Portuguese energy company Galp involved the commissioning of a dedicated pipeline, which connects the Ecoslops and Galp refineries and is expected to deliver up to 10,000 tonnes annually.

The success of Sinès has enabled Ecoslops to enter discussions with various parties to install the technology at other ports in Europe and in other key global locations. An agreement with Total at La Mède-Marseilles was confirmed in June, 2017 and the 30,000 tonnes capacity unit should be operational by early 2019.

In addition, a tripartite Memorandum of Understanding (MoU) was signed with ATPC (a subsidiary of VITOL group) and the Antwerp Port Authority to install a 60,000 tonnes per year unit on the ATPC site in Antwerp in order to address the ARA zone (Amsterdam, Rotterdam and Antwerp).

In January, 2018, another MoU was signed with the Egyptian authorities for the Suez Canal region, most likely Port Said, and a feasibility study is currently on-going.

A 30,000-tonne capacity refinery has a capital cost of \$12-15 mill. Each unit requires 10 to 12 (full time equivalent) qualified staff capable of operating the sophisticated system. Processing takes place 365 days a year, 24 hours a day.

Mini-refinery for mid-size ports

The proven success of the Sinès refinery has attracted great interest from ports and maritime authorities and its applicability to other locations.

As a result of market feedback and continuous R&D, Ecoslops is planning the development of a mini-unit with a capacity of 4,000 – 8,000 tonnes annually. The mini-P2R will produce the same end product but requires less land and operational resource. Designed to fit the same footprint as a 20 or 40-foot container, the unit requires between two and four staff and features simpler controls and is run on a batch basis.

The mini-P2R is an efficient and affordable option for mid-size ports who will operate the technology under license, with Ecoslops being responsible for installation and maintenance. Projects are under discussion in Oman, Morocco and locations around the Indian Ocean.

The proven validation and tangible success of micro-refining technology for slops is now recognised as a viable, commercial and sustainable solution, benefiting cruise operators and ports.

Ecoslops' technology provides a circular, sustainable and traceable solution for the collection and treatment of hydrocarbon waste while producing new refined fuels without the consumption of additional fossil fuels.