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'Slim returns on investment must force operators to be extremely diligent when it comes to fuel and environmental cost management'

Squaring the circle

Chris Thorpe takes a fantasy ride aboard Disney's new cruise liner, but can't help pondering the tension between environmental restrictions and profit margins

Claiming to be pro-economy and pro-environment often creates a paradox for both business leaders and politicians. Can the two promises be mutually compatible? For the shipping industry in general, higher oil prices have had a negative impact on profit margins. Increasing environmental restrictions on fuel and emissions could only erode margins further. Could emerging management practices within the cruise ship industry provide a solution to the environmental challenge? Though these floating resorts have had their share of problems, industry leaders appear to be embracing change with measured cost and benefit analysis for the business and passengers.

To put this analysis in perspective, a first-hand onboard look at the industry seems appropriate. What could be a better choice for research than aboard the *Disney Fantasy*, the newest addition to Disney Cruise Line? While no first time mariner would fear such an experience, this writer was more than a little hesitant about cramming three children under the age of 10 into a stateroom of 350 square feet. On the other hand, New York living prepares one for this kind of accommodation.

Imagine 4,000 passengers arriving and embarking within a few hours of each other – nothing short of organised chaos – and add to that the excitement of being greeted by a Disney princess! Children and adults were equally bedazzled. Yet, there was a moment when I wondered whether the experience would be a fantasy or a nightmare.

The *Disney Fantasy* is 340 metres (m) long and 66 m high. To put this length in perspective, a large chemical tanker may be 180 m and a Very Large Crude Carrier (VLCC) would be 330 m. The *Disney Fantasy* is so large that you may not even know you are on a ship aside from an occasional feeling of imbalance. Beyond the size and splendour of a large, modern cruise ship, the technical aspects were just as interesting to this newly minted cruiser. I was probably the only passenger to wonder how the ship was being powered. The other passengers seemed more than content to sip mojitos or eat ice cream while I was left to ponder the technical questions.

Since Disney has mastered show business production, it was not surprising that backstage technical aspects were completely concealed from passengers. Nonetheless, I walked around the ship and tried to discern the mechanics behind the scenes. Visible environmental concerns were minimal to the naked eye. Almost cloaked in plain view are the exhaust funnels of the ship which the architects managed to use for the water slide, appropriately named 'AquaDuck'. The forward funnels are also used as staging for live theatre in the evening. For the most part, there is little evidence of ship exhaust visibly or by odour.

Although some cruisers claimed they could see that garbage incinerators were burning while in port, a Disney Cruise Line's representative claimed that is not the case. In fact, cruise lines are now especially conscious of the environment, recycling solid waste and reclaiming heat and condensation as normal practice. While the technical and environmental issues surrounding engines and fuel remain obfuscated to passengers, they remain one of the most challenging areas for the business.

Modern cruise ships run very efficient fuel

and energy systems powering forward motion as well as onboard electricity for the floating hotels. Both marine diesel oil (MDO) or marine gasoil (MGO) and residual fuel oil are used simultaneously, however residual fuel oil is the most widely used for vessels running at slow speeds and older vessels using direct drive

sulphur oxide (SOx) and nitrogen oxide (NOx) emissions which are limited within 200 nautical miles (nm) of most coast lines now defined as emission control areas (ECAs). Since cruise ships are often within the 200 nm of ECAs, many will burn the lowest sulphur (1.00%) fuel oil or MGO 100% of the time, avoiding fuel

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propeller systems. By contrast, military vessels run higher horsepower motors that use MDO all the time in order to reach higher speeds.

The *Queen Mary 2*, currently the fastest passenger ship in service, consumes 261 metric tonnes (mt) of residual bunker fuel and 237 mt of MDO per day when travelling at full speed. Regardless of fuel type, modern cruise ships have a very high demand for electrical power requiring a series of diesel motors, according to the Cruise Lines International Association (CLIA), the world's largest cruise industry trade association. In terms of fuel and exhaust requirements, CLIA claims its members must 'meet or outperform all applicable international and federal air emissions requirements wherever their ships operate'. Indeed, this claim comes with significant associated costs.

While economically advantageous, running residual bunker fuel results in higher

switching whilst steaming. This is sometimes a problem in areas where these fuels are not readily available at refuelling time. More importantly from a business perspective is the cost, which could more than double taking into account multiple fuels onboard, switching or employing exhaust cleaning systems.

The latest ECA fuel and emission rules do not go into effect until 1 January 2015, so cruise lines are still working hard to prepare. In fact, the cruise industry may lead the marine industry in terms of scrubber testing. 'There are a small number of scrubber designs approved for service and there are a few dozen now in service which will permit operation in an ECA using residual fuel up to 3.5% sulphur,' says Nigel Draffin, Technical Manager at LQM Petroleum Services Inc.

Draffin adds that 'The ECA sulphur limit falling from 1.00% to 0.10% as of 1 January 2015 will be a real game changer.'



It is no surprise that the two largest cruise industry players have begun or plan to install new scrubbing equipment this year. Royal Caribbean, for one, is adding exhaust scrubbers to its newest vessels when they are built and has already commenced testing on vessels currently in service. Carnival Cruise Lines is adopting the same strategy, investing \$400 million to install scrubber technology on 70 ships.

The investment in new scrubbers is significant at a cost of \$2 million per unit with ships being equipped with multiple units according to Tom Dow, VP Public Affairs at Carnival Cruise Lines.

Dow adds that: 'Depending on the port of purchase and the time of year, the premium on MGO is between 70% and 100%. It is well worth the investment.'

Despite tighter emission regulations, busy ports report cruise ships belching visible exhaust while in port. The most acute example may be Hong Kong, where it is said that 40% of greenhouse gases (GHG) are created by the ships berthed there. That should be no surprise when some of the largest cities in the world still burn residual fuel and coal for heat and power. Take New York City, for example, where even today close to

10,000 buildings burn residual fuel oil for heat.

By contrast, the new ECA requirements are requiring vessels to meet very strict emission limits far outside major city centres. Some argue that ships should plug into electric power sources while at berth. And for many cruise lines, including Disney, they do that when power is available.

However, though they are major global ports, Hong Kong and New York are dominated by the less sophisticated container ships, not cruise liners. By contrast, the 14 States and 16 Dependent Territories of the Caribbean Basin are more dependent upon tourism. Due to the proportion of cruise ships versus other commercial traffic, cruise ships are more easily identified as visible polluters while in these ports.

Cruising is big business dominated by two industry players – Carnival and Royal Caribbean – which tend to lead both environmental policy and practice. This apparently comes at a cost, with returns to shareholders' of only about 5%-6% (return on average equity invested), according to JP Morgan's latest equity research. Slim returns on investment must force operators to be extremely diligent when it comes to fuel and environmental cost management.

Can these businesses continue to be

profitable given tightening environmental regulations? Fortunately, it seems that the cruise industry may have already discovered a model that unravels an apparent paradox between profit and environmental consciousness. What was once painful environmental legislation may have resulted in a product improvement that is having real impact on customer experience.

At least for Disney Cruise Line, an environmentally sensitive cruise product complemented by world-class entertainment is very profitable business. The improved experience for cruisers tends to result in repeat business. Improving margins are likely to follow.

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