



New regulation intensifies demand for decarbonisation

By Chris Ashcroft

A new and complex IMO regulation – The Carbon Intensity Indicator (CII) – has accelerated the cruise industry's drive to reduce fuel usage (for both propulsion and hotel functions) and emissions through new technology and other operating efficiencies.

The CII requires owners to demonstrate improvements to a ship's operational carbon intensity by submitting

evidence of its reduction and emissions data on an annual basis to the IMO to enable it to rate a ship's energy efficiency.

The new regulation, which will be implemented next year, has been introduced to support the IMO's long-term objectives of reducing the carbon intensity of international shipping by 40% by 2030 but few owners are satisfied with its current format.

The CII measures ships' operational efficiency in grams of CO₂ emitted according to deadweight tonnage and nautical miles travelled. Because the CII primarily looks at a ship's time at sea and concentrates on propulsion efficiency, this unfairly penalises the cruise industry where a cruise ship spends proportionately more time in port and also uses a much higher percentage of its onboard power on hotel-related generation.

For example, a cruise itinerary of 3-4 days with short distances between ports will have low absolute emissions but high carbon intensity while a much longer itinerary with a greater period at sea will deliver low carbon intensity but high absolute emissions.

While the industry (through CLIA) seeks to correct such anomalies in the way CII is applied to their ships, cruise companies will continue to focus on improving fuel



Rendering of the Silverstream® System's carpet of microbubbles coating the flat bottom of a vessel's hull

economy and reducing emissions by adopting the myriad new technologies being designed to achieve these goals.

MSC Cruises has been at the forefront of driving such technical developments with Energy Efficiency Management Officer Andrea Crosetti confirming that the company "is investigating many types of these technologies, both for newbuilds and also – potentially – to retrofit our fleet."

"The reduction of drag is one important aspect of our approach. The smooth coating on all our ships and the hull cleaning schedules are designed to maximise performance.

"Monitoring and analysis using Artificial Intelligence



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MSC Cruises Andrea Crosetti

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"Our next generation of newbuilds will optimise hydrodynamics through the re-design of the hull and propeller systems."

One new technology that continues to evolve is air lubrication which can reduce a ship's resistance to water by inserting a tiny amount of air into the boundary layer around the ship and hull. This creates bubbles around the hull resulting in a reduction in frictional resistance to enable the ship to move more smoothly and quickly through the water without any additional power.

MSC's Crosetti says: "Our inclusion in (EU-funded) Project CHEK is allowing us to investigate this and how it can work in synergy with numerous other technologies to reduce our emissions substantially."

Founder and Chief Executive Officer of CHEK consortium member Silverstream Technologies, Noah Silberschmidt says: "With our system, we typically talk about 5% net fuel and emissions savings but on all our contracts we are overdelivering. We are seeing more than 6% savings on all the Carnival Corporation brand ships using it.

"We use low pressure compressors – also known as blowers – which are typically used in water treatment plants so the technology has been proven for more than

30 years. They work 24/7, 365 days a year with very little down time. Routine servicing only requires oil and filter changes after many thousands of hours with overhauls not needed for at least 10 years.

"The maintenance cost is insignificant – about €6,000 for the first two years – and it can be carried out by the crew onboard."

One compressor typically services two air release units which are also able to blend air and water intuitively. The complete system comprises these units, the compressors and the control monitoring system.

He says: "As a stand-alone technology, no other else has delivered the same level of efficiency gains in terms of net performance. From a measurement point of view, it's relatively easy to see the growth in performance – typically between 10% and 12% – from which we deduct the power we put into our compressors. For a cruise ship, we see 9% gross and a 6% net savings. As a stand-alone technology, our system deliver the best energy efficiencies and payback."

If a cruise ship uses \$15m a year on fuel for just the propulsion then the owner would save in the region of \$900,000.

He says: "This means payback in three years – taking into account the installation cost which covers our involvement as well as the shipyard cost – but it is also possible for some ships to produce an even quicker payback."



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Looking to the future and based on current market rates, Silberschmidt believes fuel rates will increase because there will probably be a carbon emissions tax and whatever alternative fuels are developed will almost certainly be even more expensive not least because fuel tanks will need to be larger as the alternative fuels won't have the same calorific value as diesel. This evaluation underlines the industry's need for more efficient ships.

He says: "Our technology is fuel type agnostic so reduces consumption whatever fuel a vessel uses. That's important because – whatever future fuel is invented or produced to increase decarbonisation – it is going to be more scarce and therefore more expensive. Also, for the same storage capacity onboard, the vessel will not be able to travel as far.

"As we own the technology (the intellectual property), we do the design with the owner and classification societies but then the owner will usually employ an integration company to do the physical installation."

Silverstream technology can also be switched on and off temporarily at any time which allows its performance to be more accurately measured than simply comparing year-on-year consumption figures.

He says: "Over the course of a year, we have 30-40 tests where the system is on for one hour and then off for one hour which allows clients immediately to see the difference in speed and consumption.

"For Carnival Corporation ships, the propulsion is on 92% of the time and off for the remaining 8% when the vessel is moving slowly in and out of ports with a pilot."

"We have been able to prove our system's viability with lots of data and a straightforward methodology programme.

"The industry is under public pressure because cruise passengers also want to make sure that owners are doing the right thing.

"It is also under regulatory pressure as CII means owners have to be able to verify that their vessels are creating – proportionately – fewer emissions year on year. This requires them to have a strategy in place to exploit any innovation that can help achieve those increased efficiencies." 9