



Fueling The Future of Cruise

By Fran Golden

Cruise is a small segment of the global maritime industry, yet mighty as an early adopter and innovator for the entire sector in decarbonization. Even with the unknown of which alternative, non-fossil fuels will propel ships in 25 years, cruise lines are well on their path to a sustainable future.

In pursuing net-zero emissions by 2050, cruise lines are investing tens of billions of dollars in new ships, sustainable and adaptable propulsion, and the testing of new fuels.

“Our commitment has moved to the place where investments are aggressive, and the technology is being developed at a sufficient and reasonable pace,” says Bud Darr, President and CEO of the Cruise Lines International Association (CLIA). “There are challenges. Fuel supply remains by far the controlling factor as to how quickly we can decarbonize. We need competitively priced safe and affordable fuels that do not exist today at scale.”

Lower-emissions pathways

Cruise lines are not waiting for off-the-shelf solutions to decarbonization. They are building ships with fuel-flexible engines as a bridge to the increased use of zero- and near zero-emissions fuels in the future. Little or no engine modifications will be needed as new fuels emerge.

Carnival Corporation pioneered the use of Liquified Natural Gas (LNG) for dual-fuel cruise ships in 2018. LNG-powered ships are now in the fleets of several CLIA members including Carnival Cruise Line, Disney Cruise Line, MSC Cruises, Norwegian Cruise Line, Princess Cruises, and Royal Caribbean International. LNG is the cleanest burning fossil fuel, reducing carbon emissions by up to 20 percent. LNG may be replaced by sustainable bio- or synthetic versions when supply is available.

Several lines are preparing for the use of green methanol in the future such as TUI Cruises, Disney Cruise Line, and Norwegian Cruise Line. The Celebrity Xcel for Celebrity Cruises debuted in 2025 as the first tri-fuel ship able to run on LNG, green methanol, and conventional fuel.

Through 2039, 41 dual-fuel ships are forecast to launch, including five capable of using methanol and 26 capable of using LNG, according to CLIA.

Testing new fuels

Major cruise companies are actively testing new fuels in partnership with engine companies and fuel suppliers, with early results already showing that existing ship engines are adaptable to the fuels, with little modification.

While biofuels are expensive, they can be blended in with traditional fuels, and several ships today are supplementing their power supply with biofuels.

Projects underway also include using hybrid batteries and hydrogen for supplemental power. Solar and wind may play a supplemental role in the future.

Trials are taking place too with carbon capture, where a ship can reduce its carbon footprint by using technology to capture carbon dioxide in liquid form so it can be offloaded in port, rather than releasing it into the atmosphere. “It’s seen as a transitional tool,” Darr says.

Supply challenges

Darr predicts a broader emergence of alternative fuels in the next five years, but not likely at a scale needed by the shipping industry – which represents about 4% of the world’s fuel consumption (with cruise only 0.04% of the global fuel total).

A lack of a mid-stream distribution infrastructure is a challenge, and larger users of fuel – such as the transportation sector (including roads), manufacturing, and agriculture – are all competing with the maritime sector for sustainable fuels.

Cruise lines may be able to meet their decarbonization goals with solutions such as purchasing bio-fuel credits – where their ton of fuel would be used by someone else on the common grid, Darr says. “It’s kind of like a swap, and the environmental benefit may be better as you may not have to transport the fuel,” he explains.

Despite challenges, Darr is optimistic that the cruise industry will meet its target of net-zero emissions by 2050.

“It’s going to take multiple pathways, and there will be multiple correct answers on how to solve this puzzle,” Darr says. “It really starts with where we are now, which is commitment, investment, and courage, with CLIA members moving forward strongly even in an uncertain future fuel environment.”

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