

Catching fuel cell fever

“Fuel cells have been the next big thing for 25 years,” says Jostein Bogen, Product Manager in ABB Marine & Ports. “Now it’s really happening.”

The industry has obviously missed the mark on that claim before, but Bogen has two tangible reasons for believing that this time it’s for real: “Fuel cell technology has matured dramatically, and the push for zero emission power solutions is only getting stronger.”

According to the 2016 Fuel Cell Industry Review by E4tech, shipments of fuel cell units were up once again in 2016, Japan is pushing development hard, Europe and the US are keeping the pressure on, and in China, “slumbering dragons” are awakening.

There could be major changes in society.

“There is a lot of movement in the market, and various technologies are being developed in parallel,” says Bogen. “We believe the Proton Exchange Membrane, or PEM technology shows the most promise, and is the most sustainable.” ABB’s own fuel cell program involves market studies, R&D, and program participation together with leading players.

ABB believes hydrogen is a good solution in fuel cells, but Bogen acknowledges that hydrogen must be produced sustainably in order to make it a green fuel. Done right, the advantages start to add up: “Fuel cells have higher efficiency than a combustion engine, and the technology allows energy to be concentrated more densely than in

petroleum fuels. And if you use renewables to produce the hydrogen, the entire energy chain is clean.”

While pilot projects have been completed in shipping, and more are on the way, other industries are further along on fuel cell implementation. In particular heavy transport on longer routes is gaining momentum fast, a good indicator that fuel cells should be a good fit for shipping. Hydrogen trucks and busses are already on the roads, and Bogen tells of one fuel cell manufacturer that claims they will install the same capacity in fuel cells in the next two years as they did for the last 20.

Deliveries for trains are expected to follow soon, and Royal Caribbean Cruise Lines has announced plans to work with Meyer Turku in Finland on fuel cell use in its new LNG-powered cruise ships, with testing already underway.

Complementary technologies

For ABB, their Onboard DC Grid solution has served as a platform for expanding into fuel cells, as the technology is compatible with a wider range of energy storage solutions. “We have had good help from shipowners in advancing the technology, and we are now looking into larger vessels, like cruise ships and ferries.”

Because of fewer moving parts, fuel cells represent huge savings in maintenance, Bogen points out, and the first projects would not have to be exclusively hydrogen. He envisions a hybrid solution for cruise, with traditional fuel for propulsion



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Jostein Bogen,
Product Manager,
ABB Marine & Ports

and fuel cells supplying the hotel functions. “Fuel cells could be used for hotel needs in port too. Cruise owners could skip the step of equipping for shore power by simply having a zero-emission power source on board.” The next step would be pure fuel cell technology, once it becomes competitive with fossil fuel.

Bogen adds that the marine industry has also learned a lot from the development of LNG as fuel. “Just as the big shipowners went in for LNG and the infrastructure eventually followed, the same could happen with fuel cells and hydrogen.”

Small steps toward big changes

Hydrogen handling techniques and infrastructure are also improving. ABB is participating in the Maranda research vessel fuel cell project, where a mobile hydrogen storage container will be developed, improving access to hydrogen for marine applications.

“Maranda will be operative next year, with others following closely, both newbuild and retrofit projects. There are four or five commercial marine projects underway right now, with three in Norway alone,” he notes.

With this steady progress on fuel cells, what are the implications for society, and the shipping industry?

“There could be major changes,” Bogen observes. “If hydrogen emerges as a significant fuel, it could even mean a shift in the geopolitical map. If we move away from big oil, then the oil nations lose influence, and oil companies lose power. Virtually anyone can produce hydrogen.”

As for the shipping industry, moving hydrogen could emerge as a new business, in addition to hydrogen fueling greener ships. “Overall, the scenario with hydrogen and fuel cells is that shipping becomes greener and more attractive.”

The EU, Japan, the US and now China are all moving on hydrogen fuel cell technologies and promoting their use in various applications. Does this mean we are seeing the emerging contours of a hydrogen society?

Jostein Bogen’s reply is measured, but optimistic: “For ABB, the future is electric power. In this scenario, the ideal ship would be hydrogen electric. This would allow us to move away from combustion in 20-30 years, probably with a combination of batteries and fuel cells.”

There is much to accomplish, he assures, noting that the entire value chain needs to mature, and rules and regulations for marine applications need to be further developed. “But this is the trend of the future, and it is really happening. It’s not just a vision any more.”