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Navigating global shipping's way to carbon zero: An interview with Bo Cerup-Simonsen

The CEO of the Mærsk Mc-Kinney Møller Center for Zero Carbon Shipping explains what it will take for the industry to decarbonize.

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Since the invention of the steamship, in the early 19th century, seaborne trade has been the lifeblood of the global economy. Today, more than 70,000 vessels sail the high seas to ferry goods of all types to nearly every corner of the globe, making up 80 percent of international trade by volume.

Although the sector plays an indispensable role in keeping the movement of goods flowing, it does so at a cost to the environment. Every year, the sector consumes 300 million tons of fuel, releasing around 3 percent of the world's carbon-dioxide emissions into the atmosphere.

The Mærsk Mc-Kinney Møller Center for Zero Carbon Shipping—an independent, not-for-profit research-and-development center[1] based in Copenhagen—was established in 2020 to chart feasible decarbonization pathways for shipping-industry players. Bo Cerup-Simonsen, an industry veteran of nearly three decades in roles ranging from the head of Mærsk Maritime Technology to director of the Danish Hydrocarbon Research and Technology Centre, is captaining this mission as the center's founding CEO. McKinsey is contributing to the center as a knowledge partner by providing analytical support.

In a March interview with McKinsey's Matt Stone and Jason Li, Cerup-Simonsen outlined the main challenges facing the industry as it transitions toward cleaner operations and explained the importance of leadership and multistakeholder collaboration to innovate feasible solutions that benefit customers, shipping companies, and the environment.

McKinsey: Why has decarbonization become so important for the shipping industry?

Bo Cerup-Simonsen: There is such a strong realization now in the world, regardless of sector, that climate challenge is real and we need to act on it. It's no longer a question of whether we have a problem or not; it's a matter of how fast we can solve it. This is true even in the so-called hard-to-abate sectors, including shipping, which I think has a chance to play a leading role.

A lot of primary stakeholders in shipping are seeing an opportunity—and a responsibility—to act. Increasingly, customers want to see green transportation, employees want to see their companies act responsibly, and new talents come into the industry calling for greater decarbonization. Technology and energy providers are also saying that it's actually possible to decarbonize. So a number of pieces are starting to emerge that make it possible to put the puzzle together. And this is happening at an accelerated speed.

McKinsey: What are the main challenges in the transition to zero carbon—and what solutions have caught your attention?

Bo Cerup-Simonsen: The challenges are equally about creating a demand for decarbonized shipping as well as developing the energy and technical solutions for the supply. Right now, we're keeping all channels open and are still gathering ideas and exploring new opportunities. We're not converging the funnel yet to focus on specific solutions. The way we're working involves seeing decarbonization in shipping from two sides.

On one side, we need to understand the opportunities to bring clean fuels to shipping. We're living in a world where the energy mix is changing, and we know there's going to be a scarcity of renewable-energy resources because demand will exceed supply. Looking at the next three decades, one big question is how shipping is going to secure its share of clean fuels.

On the other side, there's the technical aspect of implementing these new types of clean fuels. We're seeing five to ten different energy options, from hydrogen and ammonia to methanol and ethanol. Not to mention the various kinds of biofuels that could be made available—and, of course, solar, wind, hydro, maybe even nuclear. How can more than 70,000 ships decrease their reliance on carbon-based sources and actually take advantage of these new fuel types as they become available? And as we build new ships, how do we decide on the multifuel options and mitigate the risk of stranded assets?

[1] Partners of the center include Alfa Laval, American Bureau of Shipping, A.P. Møller – Mærsk, Cargill, Environmental Defense Fund, Danish Shipping, Haldor Topsoe, MAN Energy Solutions, McKinsey, Mitsubishi Heavy Industries, NORDEN, NYK Line, Seaspan Corporation, Siemens Energy, and Total.

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McKinsey: Right, because decarbonization has to make business sense, too.

Bo Cerup-Simonsen: Yes, we have to add new business models. We can only imagine that there will be completely new ways of setting up the supply chain. We need to understand the different options.

We’re seeing many different early developments, such as financing schemes, starting to move into place. There’s a lot of private capital available, actually, and we’re seeing financial institutions and investors who are seeking out green investments. There’s also a drive in the public sector to make more money available and absorb at least some of the marginal risks in these new investments.

We’re starting to see customers who are willing to pay a premium to get green transportation. Obviously, this is something we have to stimulate, and we need to understand how we can grow that. We know that at the end of the day, the price of the end product is not really influenced by shipping costs. The cost of shipping in general is miniscule relative to the price of the end product; you can double shipping costs and still hardly see it reflected on the price tag. So there’s an opportunity there, but that needs to be thought through very carefully. We want to give the customers a green-delivery option that they can happily pay a slight premium for.

If you put all these elements together, you can see the opportunity to build a green supply chain. The customers want it, the energy resources and technologies are available, as is the financing for investment. We’re already at a point where we can kick-start the transition. We’ll have to start small at first. At the end of the day, we’ll need global regulation as the final lever to pull the rest of the industry along. That’s why we’re working very closely with the UN member states and the IMO [International Maritime Organization].

McKinsey: How do you go about creating international consensus?

Bo Cerup-Simonsen: The vast majority of shipping takes place in international waters, which presents a unique challenge. There’s an interesting intersection between the shipping sector and countries. International shipping doesn’t count toward national counts of greenhouse-gas emissions in the individual countries. So who’s responsible for global emissions in the shipping industry? Fortunately, the International Maritime Organization has agreed on a strategy to address climate change and greenhouse-gas emissions.

But progress in IMO is slow, and one of the reasons is the uncertainties in the implications of decarbonization. Member states need to have some level of understanding about what it means for their countries when shipping decarbonizes—what does it means for their own energy productions, for the competitiveness of exports in global markets, and so on?

The good news is, many countries are on board. In Asia, for example, where around half of the world's maritime trade takes place, we know that China, Korea, Singapore, and Japan want to step ahead and lead the drive toward zero-carbon shipping. The next step is for them and other member states to support processes and strong effective regulations in the IMO. It's really up to member states to go to the IMO to make things happen. Opportunities are emerging. COP26 [26th UN Climate Change Conference], in Glasgow, features shipping very visibly on the agenda. Member states are supporting a discussion around this very issue, which should lead to a stronger drive within the IMO to promote decarbonization.

McKinsey: What kind of leadership is needed to galvanize this change?

Bo Cerup-Simonsen: Leadership here is everything, and we're seeing a lot of companies and individuals stepping up and wanting to lead this. Our center is the result of leadership from a number of large companies that have worked together to establish a collaborative platform for the wider industry. It takes leadership to understand that decarbonization is not something any single company can do on its own, yet every company has a role to play.

Leadership is very much about shaping a vision and an overall narrative of how the shipping sector is going to get to carbon zero and then act accordingly. This vision has to be equally shared by a small shipping company with five ships and by a big shipping company with a fleet of 1,000 ships. To do that, you need to bring decarbonization down to a concrete level and be able to understand the risks and implications of transitioning from the technical and financial points of view, and find solutions to mitigate them.

McKinsey: While it's still early days, do you envision a single, winner-takes-all solution for all vessel types, or do you expect a variety of solutions to emerge?

Bo Cerup-Simonsen: We will not see a silver-bullet solution doing it all. We need to recognize that there's a time dimension to this, that shipping is composed of many different types of ships and operations and that there is a multitude of competing solutions. The sequence starts with picking the low-hanging fruit, which has already started. We're seeing, for example, ferries that run on batteries. Soon, we'll see more ships powered by fuel cells. And further down the line, we will see larger commercial vessels decarbonizing—for example, Mærsk will launch a ship that will run on methanol. Other vessels will run on ammonia. We'll see more such solutions come into play.

Then, while we are implementing available solutions onshore and at sea, I think we'll see a parallel track of new competing solutions. I know we're still very far from this stage, but if you look historically, we know that the better solution—one that has better reliability, lower cost, greater efficiency—will win out and the industry will implement it. Companies will compete to find and innovate radically different solutions. It'll be a long time before the technical and commercial solutions have scaled and matured, and the transition period will require the flexibility and modularity to experiment and test new energy sources and technologies to whatever extent is possible.

McKinsey: What's the center's role in this move toward decarbonization?

Bo Cerup-Simonsen: Our status as an independent cross-industry, cross-competitor organization presents a unique opportunity. We have designed the center with an open architecture so players across the shipping value chain, including competitors, can join and collaborate on this important social mission. We don't own and protect IP [intellectual property], which, for commercial reasons, would make us biased toward any technology or any fuel or any shipping type. We're able to wholly dedicate our work to this purpose of decarbonization to find out what the best solutions are for the industry and wider society.

We're able to work with all the different parts of the ecosystem and the entire supply chain to enable a big change. There are many players in this ecosystem, including the academic side and the regulatory side, with whom we're already working. And there are a lot of companies that are trying to contribute solutions that can make a difference. We want to work across the supply chain and find partners in both the public and private sectors that are willing to step forward, lead, and invest in making this transition happen. We can play a role in establishing the overall narrative for the sector, as well as help remove the gaps and barriers to enable the industry to move forward.

I hope the center will create the trust, the credibility that will allow us to interact with government agencies and regulators to develop regulations that are good for society. We also want to advise industry leaders and investors on the kinds of developments and solutions that would be good for decarbonization.

McKinsey: Where do you predict the industry will be in a decade's time?

Bo Cerup-Simonsen: We are already starting to see big, so-called demonstration projects—pilot, early-stage projects that transport maritime cargo using zero-carbon fuels and technologies. There are so many developments being launched at the moment, and I strongly believe this is going to accelerate within the next five years.

The next question would be how do we scale this up to something that's global, and thus impactful? When we start to transport cargo using ammonia or methanol or whatever new fuel technology, our confidence will grow, and we'll get used to not just the technology but also a new way of doing business. We'll get used to customers paying a premium for this new way, which includes processes that certify, document, and verify the sustainability of the whole supply chain. We'll be able to implement changes safely and reliably, and we'll do so with a better understanding of the commercial and financial risks involved. But to get to a point of true impact and materiality in 2030, we need to increase decarbonization efforts and investments by a factor of 100 compared with what we are seeing at the moment.

So this decade is about building confidence, getting started, and accelerating. At 2030, we'd hopefully be at a point where investors would have confidence that this market is going to come, and it'll stay. Certain customers are [already] paying a premium for decarbonized shipping services. Existing ships are running partly on green fuels, new ships will be built with zero-carbon multifuel capability, green fuels will be produced at scale, and port infrastructure will be outfitted so that ships can be refueled with green energy. And, finally, we'll also see global regulation being enforced in a routine manner, and the transition toward zero carbon will start unfolding in a predictable manner.

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McKinsey: While we work toward the long term, what can small or midsize shipping companies do in the meantime to decarbonize?

Bo Cerup-Simonsen: First, everyone should have a basic understanding of the big picture and what is happening. While there are many moving parts and it's quite a complex issue, it's possible for everyone to get an overview. If you're the owner of a medium-size shipping company, you don't need to be all over everything, but you should be able to identify a few opportunities and be aware of the risks for your company. And understand that one of the risks is not doing anything.

The picture will look different for every shipping business, and it depends on whether you own or operate your assets, the kind of vessels you have, or which region you operate in. It also comes down to finding the customer base that's willing to pay a premium to get zero-carbon transportation.

Everyone should also look at their market, their assets, their operation and supply chain. Shipowners would look at their existing ships or new ships that are being built. Are there opportunities to sell green shipping services and to run accordingly on green fuels? You don't have to jump all in to be part of the transition. You can take small steps that don't require a lot of betting or a lot of risks. This involves awareness, engaging your customers and suppliers, and finding out what decarbonization would potentially mean for your specific business.

Bo Cerup-Simonsen is the CEO of the Mærsk Mc-Kinney Møller Center for Zero Carbon Shipping. This interview was conducted by **Matt Stone,** a partner in McKinsey's London office, and **Jason Li,** a senior editor at McKinsey Global Publishing in the Shanghai office.

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