

ZERO EMISSIONS PORT CALL

Green House Gas (GHG) emissions from sea going vessels are mainly released away from the coast, but the impact of GHGs is global since it affects the entire atmosphere regardless of where the gases are released.

The shipping community, led by the UN agency with responsibility for the safety and security of shipping and the prevention of marine pollution by ships - IMO, has recently implemented measures to significantly reduce the amount of CO₂ produced by ships. IMO has also introduced regulations to reduce Sulfur Oxides (SOX), Nitrogen Oxides (NOX) and Particulate Matter (PM). The latter, along with black carbon, are very small airborne particles that tend to concentrate close to where they are emitted; they are linked to premature deaths because the particles are small enough to get into the lungs and into the blood.

Despite the fact that maritime transport is by far the most environmentally friendly of all transport modes - in terms of CO₂ produced by unit of cargo transported per unit of distance - there are certainly improvements that can be made to reduce emissions from ships further.

Over the last 40 years the number of (non-naval) ships in operation with electrical propulsion has grown from 54 units to 1,694 units. This impressive growth has been driven mainly by the flexibility offered by electrical

propulsion and, in certain cases, led to reductions in fuel consumption. Although electrical propulsion is emission free, shipboard electricity is generated by internal combustion engines - unless the power source is nuclear - which in turn release GHGs.

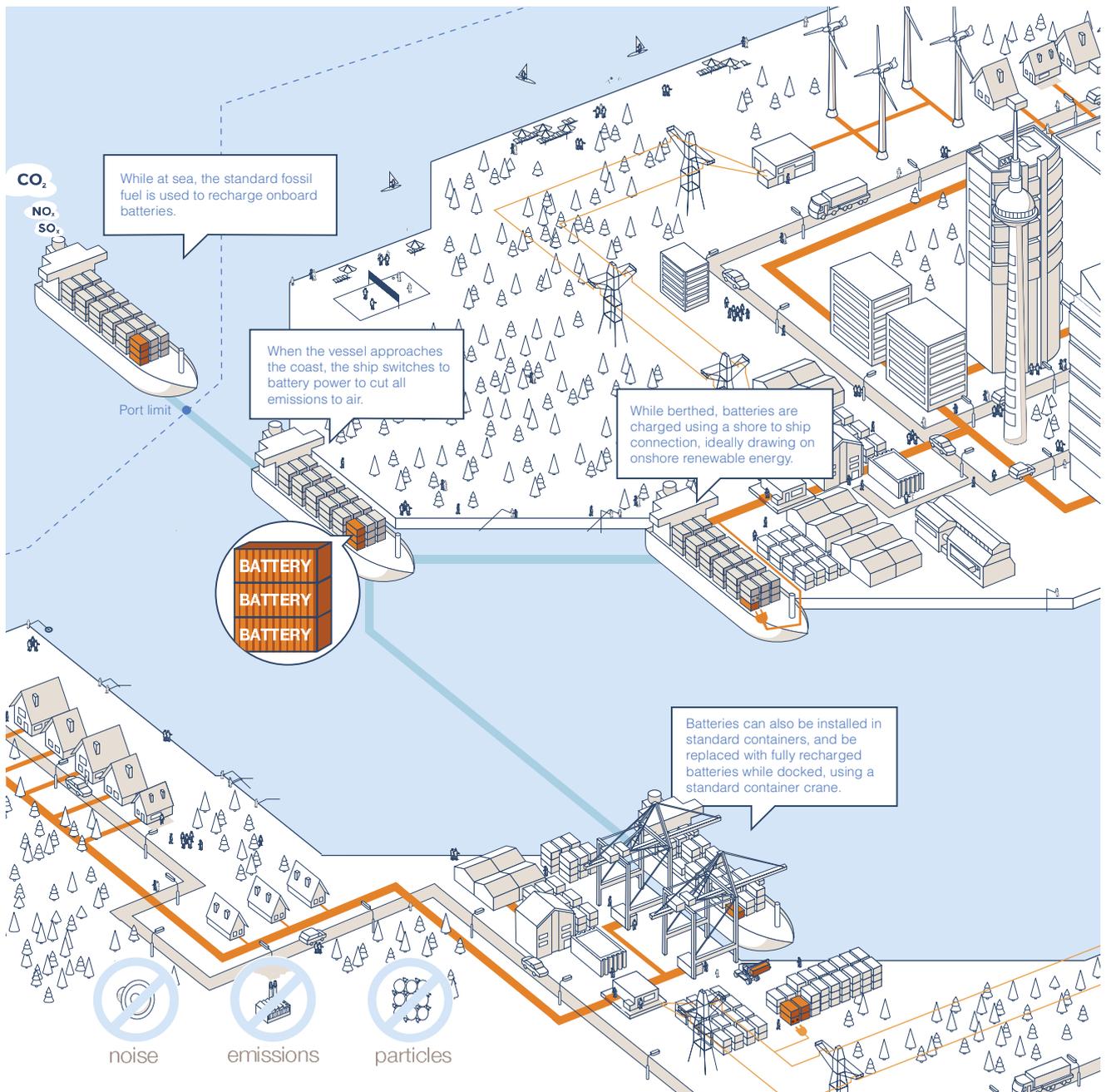
We are possibly on the verge of a breakthrough in marine propulsion, mainly driven by recent developments of battery technology. Today, it is already possible to install battery packs on board ship with enough capacity to run the ship on batteries alone for a few hours. This is not only technically feasible, but in some cases economically appealing. ABB Marine has recently developed solutions based on hybrid propulsion, i.e. electrical propulsion facilitated by a combination of electrical generators and batteries. The fuel savings attained by such a combination generates positive cash flow within a few years, despite the fact that the cost of batteries remains high.

There are other drivers that work in favor of including batteries in the ship power mix. ABB technology that is available today makes it possible to build a ship that switches off the main engine a few miles before entering the port and sails exclusively on batteries from that point to the dock. Once alongside the dock the ship would connect to the shore grid and charge the battery packs.

Alternatively, battery packs can be made interchangeable so that drained packs are swapped with charged ones during port-side cargo operations. The empty batteries can then be re-charged at the terminal, taking advantage of electricity from sources available via the grid - gas, solar, coal, fuel, wind, nuclear, hydro, waves. Electricity from the grid is greener and cheaper than that generated under ship's own power. In addition, batteries can be charged from the grid during off-peak periods when prices are lower.

Ships that operate within harbor areas are definitely the first candidates for battery propulsion technology. Typically, these are small ferries, river vessels and tugs. Tugs, for example, could benefit from the approach because they mostly operate at very low loads - while installed power is high, full power is not often required. River ferries could run solely on batteries, with charging points at each end. The battery option also offers significant potential for container carriers operating in harbor areas and city ports to reduce emissions; these vessels feature high installed power, but rather inefficiently use only a small part of that power when navigating within harbor areas.

Such a solution would allow a ship to produce no emissions whenever sailing very close to urban centres. That is to say, the ZERO EMISSIONS PORT CALL is possible, practical, and available today. ●



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