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Decarbonising Short Sea Shipping Operations: Examining the Efforts and Outcomes of a Finnish Shipping Line's Relevant Initiatives

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Towards a SUSTAINABLE BLUE ECONOMY

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Introduction:

- Decarbonisation of maritime transport operations has become a main priority for shipping companies around the world
  - Initial International Maritime Organization's (IMO) Strategy on Reduction of Greenhouse Gas (GHG) Emissions from Ships in 2018
  - European Union's (EU) Green Deal initiative in 2019 and proposed, among others, the inclusion of shipping in the EU Emissions Trading Scheme (EU ETS) as an additional tool for the achievement of climate neutrality in Europe by 2050.

Scope:

- This paper discusses the efforts and initiatives undertaken by a Finnish shipping line (Viking Line) for the improvement of its fleet energy efficiency, along with the decarbonization of its operations; initiatives that encompass various ***technical and operational measures along with the employment of alternative fuels and/or energy sources*** (such as wind power).

Decarbonisation initiatives

- The vast majority of shipping companies around the world have proceeded with the adoption of a number of measures and initiatives in order to improve the energy efficiency of their fleet and reduce their carbon footprint.

- Several *proactive* shipping companies have proceeded with the introduction of *voluntary* initiatives in order to reduce further their emissions and promote their ***sustainable development***, but also gain a ***competitive advantage*** in the market where they operate.

THE CASE OF VIKING LINE

- Viking Line provides passenger and cargo carrier services between Finland, Sweden and Estonia.

Viking Line's route network. Source: Viking Line

- All the company's vessels are certified in compliance with ISO 14001 standards and sustainability is a very important priority for the company.

Onshore Power Supply (OPS)

- In 4 terminals located in Sweden, Estonia and Finland (Stockholm, Tallin, Helsinki and Mariehamn).
- Saving ***1200 tonnes of fuel and reducing 3800 tonnes of CO2 emissions by connecting 4 of its vessels to OPS***
- in the two Swedish terminals (Stockholm and Mariehamn) and Tallinn, vessels use ***100% green electricity*** while at berth :
- In the case electricity used for the provision of OPS is sustainably produced (green), there's basically ***no carbon footprint*** and the environmental benefits are not compared to the electricity coming from coal or other resources.

Onshore Power Supply (OPS)

- The *installation and operational cost* for the vessels is extremely high and requires *large investments* :
- around ***500 to 700,000 euros per vessel***, while the ports needed to pay to install the necessary equipment from their side.
- *30% allocation from the EU* through a project in Tallinn port for the installation of OPS that was divided between Viking Line and the ports.
- ***national subsidies*** to incentivize and promote the installation of OPS
- the electricity needed is in high loads for the provision of OPS and, as a result, it is cheaper to use bunker fuel

Onshore Power Supply (OPS)

- ***port environmental discounts*** that reward cleaner vessels and the use of OPS consists one of the criteria for the vessels' certification with maritime environmental performance indices (e.g. Environmental Ship Index (ESI), Clean Ship Index (CSI)) that form the basis for the provision of these discounts in a number of ports.

- However, although OPS helps in order to receive these discounts, the costs will never be returned *unless bunker fuel prices go up a lot or the electricity price comes down or there are subsidies*.

Wind power and LNG conversion

- Viking Line equipped in 2018 Viking Grace – a RoPax vessel operating in the Turku-Stockholm route - with a *rotor sail* that turned her into the *world's first hybrid ship of its size to run on both LNG and wind power.*
- Viking Grace was a RoPax vessel running on LNG fuel from the start, so there were no conversion costs.
- From the use of LNG fuel, the vessel already has some ***20-25% less CO2 emissions*** than conventional fuel.
- In the case of Viking Grace, the methane slip is estimated close to 1.5%, but it's still comparatively less emissions for using LNG than for using regular fossil fuels or bunkers.

Wind power and LNG conversion

- The rotor sail was installed in 2018 in cooperation with the supplier *Norsepower* with the *installation costs being low*, as it was basically an investment from Norsepower to gain experience and build their reputation.

- the progress of using the rotor sail has been tracked, but the data obtained is not really measurable,
  - This is the reason why the company is still in testing for two years although they were initially going to be testing for one year.

Construction of new vessels

- The construction of a new vessel – ***Viking Glory*** – that is expected to use ***up to 10% less fuel than Viking Grace***
- A huge investment as its construction costs ***around 200 million euros.***
- Viking Glory will be replacing the vessel that's currently with Viking Grace on the Turku-Stockholm route – Amorella - so that we will have both these ferries complimenting each other.
- The ***Turku-Stockholm route is the most important market*** for Viking Line and it makes sense for the company to have two comparable vessels operating against each other and ***offering a product that is the most environmentally friendly way to travel from Finland to Sweden***.

Energy efficiency improvement projects

- Since 2016, Viking Line has proceeded with the investment of ***more than four million euros in different projects*** to improve the energy consumption of its vessels.

- The most effective investments have been in ***ventilation***; the use of frequency converters resulted in the optimization of the engine's operation.
  - For example, on Viking Gabriela these improvements in ventilation resulted in ***fuel savings of almost 600 tons per year***.
  - Similar improvements in ventilation were applied on Viking Grace, but not at full-scale, and the ***energy savings were equal to all the energy consumption of all the offices and warehouses of the company in Mariehamn where their headquarters is.***
- ***up to 800,000 euros with an expected return on investment in one and a half years***.
- *The most costly energy efficiency project* Viking Line invested in is ventilation, *but also the most effective*.

Energy efficiency improvement projects

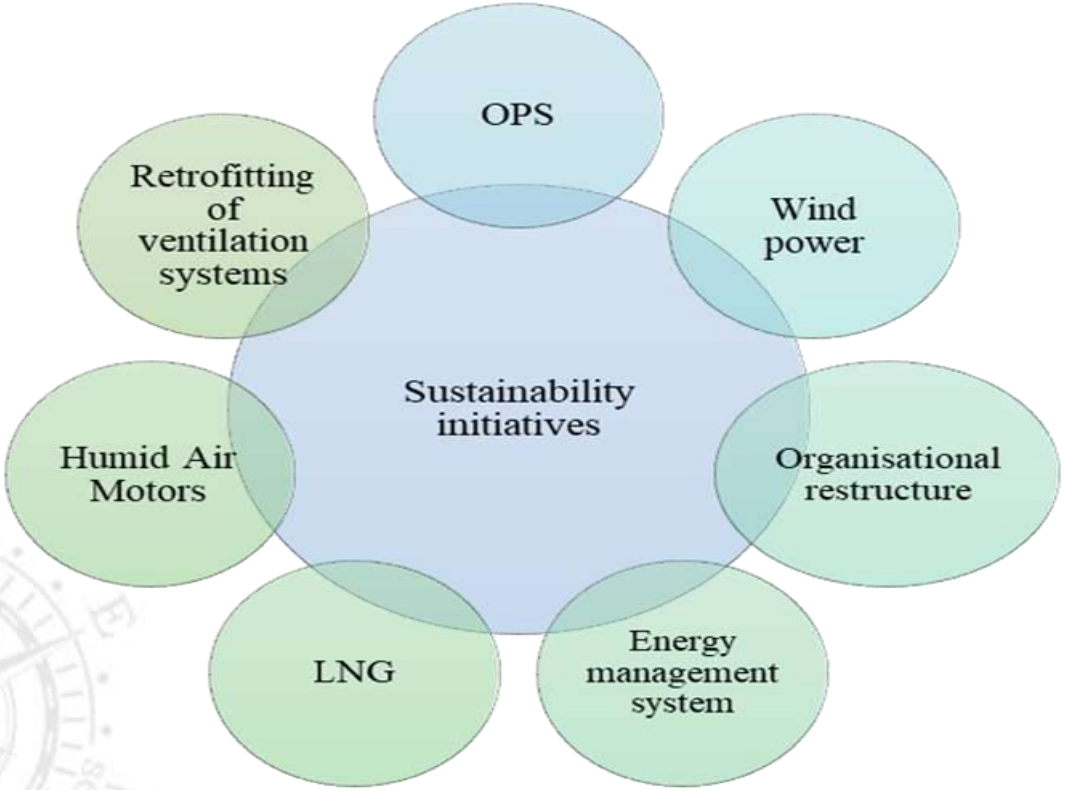
- even tiny energy improvements onboard the vessels – in this case this ventilation tweak on board the vessel - save that much energy compared to investments onshore.

- This successful project also shows that ***even on old vessels there's a lot of ways that energy consumption can be optimized with the retrofitting***

- On the one hand- energy consumption climbs basically because the company puts in stuff for the passengers and comfort and – on the other hand - at the same time it keeps optimizing the energy consumption so *a marked reduction in the total has been achieved but not of the required magnitude to have the desired effect on the climate*.

- The company needs to fight on both fronts: of the technical reduction of having the engines and everything operating as well as they can and then it needs to combat the climbing consumption.

Viking Line's sustainability initiatives related to the improved energy efficiency and decarbonization of its fleet



Conclusions:

- In this paper, the efforts and initiatives undertaken by a Finnish shipping line were discussed in order to shed light on the ***potential of private companies' initiatives for the reduction of their GHG emissions***.

- significant energy consumption reductions can be achieved at the company level from the implementation of a number of energy efficiency initiatives that presuppose ***a company organization model focused on sustainable development***.

- Global and regional regulations/guidelines definitely initiate the introduction of energy efficiency measures, but their effective implementation depends largely on the ***organizational structure and priorities of individual shipping companies.***

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Thank you very much for your attention!

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Thank YOU

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