



Wattlab PV-system on general cargo vessels

Green Deal Validation

The International Maritime Organization (IMO) and the Dutch Green Deal have set ambitious targets for reducing CO₂ emissions from shipping, aiming for a 70-100% reduction by 2050 compared to 2008 levels. This study focuses on the application of Solar Flatracks, which are modular PV systems installed on the deck of vessels to generate sustainable energy. In this study, conducted by TNO, the potential of Wattlab's Solar Flatrack photovoltaic (PV) system for reducing greenhouse gas (GHG) emissions on general cargo vessels is evaluated.

Key Findings

1. Environmental Impact

- The Solar Flatrack system was piloted on the general cargo vessel Vertom Anette. Over seven months, the system generated 496 kWh of energy, leading to a fuel saving of 123 litres.
- The study used a mixed methodology, combining data from the pilot with a modelling approach to assess the environmental impact on a broader scale. The average annual energy production was estimated at 866 kWh per kilowatt-peak (kWp) of installed PV capacity.

2. Technical and Safety Aspects

- The Solar Flatrack is designed to fit into the corner castings of vessels, making installation straightforward. Each panel is equipped with a microinverter for optimal power output.
- The system complies with relevant safety standards, including SOLAS and IEC 60092, ensuring it does not interfere with the ship's main power supply or critical equipment.

3. Economic Viability

- The business case for the Solar Flatrack system appears promising, with a payback period of approximately 9,6 years based on fuel savings and CO₂ emission pricing under the EU Emission Trading System (ETS). This is based on a price of the Solar Flatrack system between € 1,5/kWp- € 1,9/kWp.
- The system's cost-effectiveness improves when the FuelEU Maritime GHG intensity limits are taken into account. Compared to meeting these limits by blending HVO into the fuel mix, the Solar Flatrack becomes the more cost-effective option after 5,1 years.
- The breakeven point between installing the Solar Flatrack and instead meeting the GHG limits by blending HVO into the fuel mix depends strongly on two factors: the PV system CAPEX and the assumed HVO price. To capture this uncertainty, a sensitivity analysis was carried out.

4. Scalability and Future Proofing

- The scalability of PV systems on vessels is primarily limited by available deck space. General cargo vessels, with their large deck areas, offer significant potential for PV deployment.
- The long-term supply of materials for PV module production, such as silicon, glass, and aluminium, is not a major concern.

Conclusion

The Wattlab Solar Flatrack system is a suitable and effective option for reducing GHG and pollutant emissions on general cargo vessels. The system's energy yield and resulting fuel and emission reductions depend on the vessel's operational area. The study concludes that the Solar Flatrack can provide both a positive financial return and a meaningful contribution to reducing CO₂ emissions in the maritime sector.

