



Retrofitting towards climate neutrality

D3.1 Summary report on SepaRaptor with UV operation

Programme: HORIZON EUROPE

Grant agreement number: 101096522

Project acronym: Green Marine

Project title: Retrofitting towards climate neutrality

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Date: 27/09/2023

Report version: v1.0



Funded by the
European Union

Funding acknowledgement

Funded by the European Union; funding from the European Union's Horizon Europe

EXECUTIVE SUMMARY

Smart Material Printing b.v., has developed and tested the SepaRaptor technology with UV operation. This report summarises the findings that support the effectiveness of the SepaRaptor + UV. In brief, the SepaRaptor technology comprises of piezo electric modules that emit high frequency waves to agglomerate and cluster particles. The main goal of the basic SepaRaptor technology is to clean up air/exhaust from ultra-fine particles (including viruses) $< 0.3 \mu\text{m}$, as well as PM 2.5 ($< 2.5 \mu\text{m}$). Conventional filter technology, including HEPA filters, are not effective at particle sizes $< 0.5 \mu\text{m}$. Therefore, the SepaRaptor extends the current filter gap, while also agglomerate particles at ranges that conventional filters can filter out. Agglomerated particles have a lower relative surface area making these less harmful to humans. Agglomerated particles can also contain viral and bacterial particles. For this, we have introduced the SepaRaptor with UV operation. The SepaRaptor with UV utilizes the same piezo technology of the base SepaRaptor, but we have added light-emitting diodes that radiate UV-C photons. This combination of agglomeration and UV is effective in inactivating $\gg 99\%$ of bacteria and viruses within an hour. Moreover, this setup can still remove up to 75% of ultra-fine particles and $\gg 80\%$ of particles between 0.3 and $10 \mu\text{m}$.

The aim of our technology within Green Marine, is to use SepaRaptor with UV to be introduced as a manner to clean air, in one or multiple confined spaces in a marine vessel. This allows for the air to be reused without potentially harming the passengers or workers on the vessel. Reusing air will eliminate reheating or cooling air, and thus lower the energy demand and reduce the fuel consumption and CO_2 emissions of the auxiliary engines.