



Demonstration of ship-based carbon capture on LNG fuelled ships

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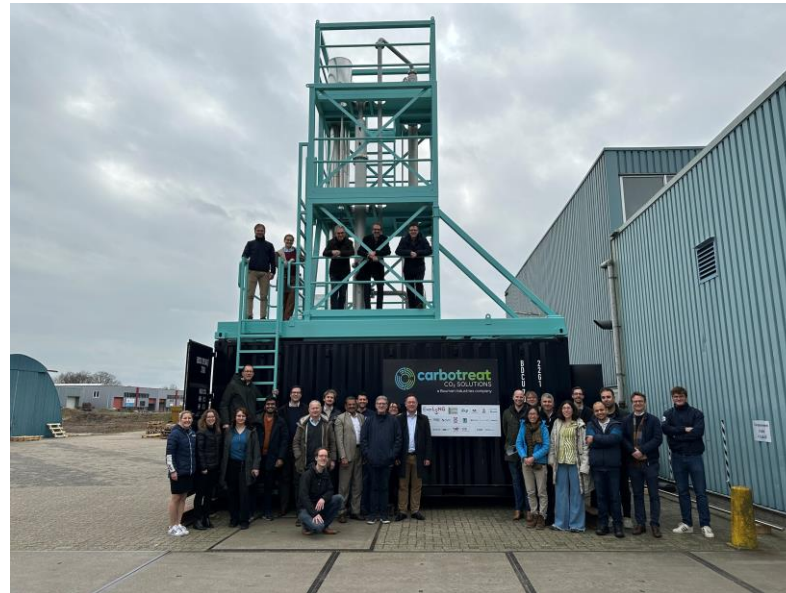
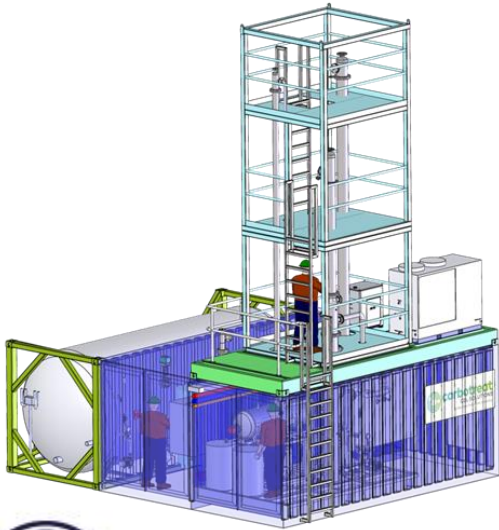
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Objective & Impact: (i) Demonstration SBCC on-board LNG fuelled ships

- Prototype unit successfully designed, engineered and constructed
- Prototype unit installed at TotalEnergies' chartered LNG carrier Seapeak Arwa
- Demonstration campaign ongoing; Heerema's Sleipnir to follow Q3-2024

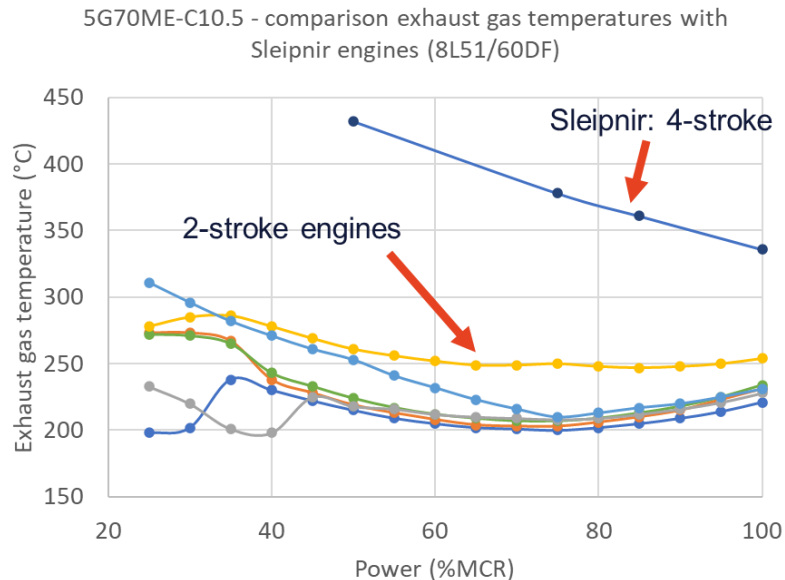


EverLoNG team and CO₂ capture prototype



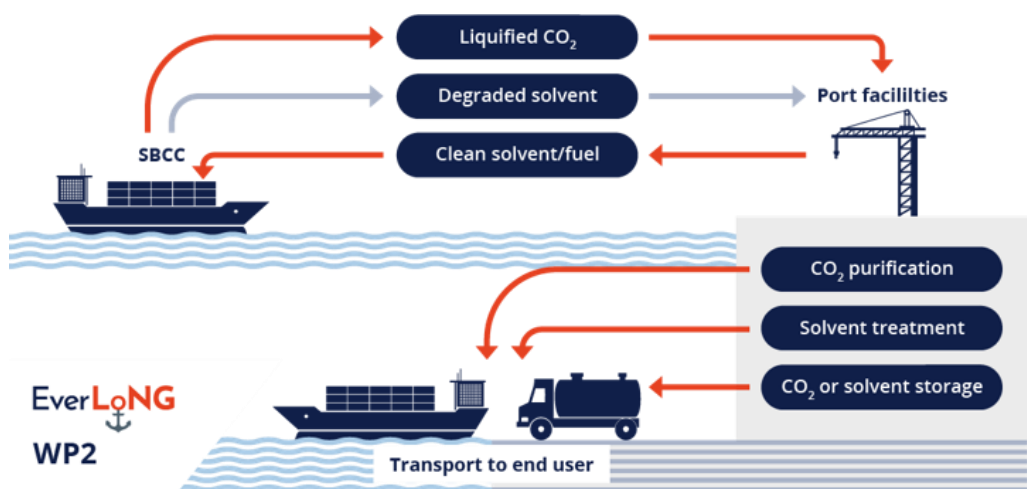
Objective & Impact: (ii) optimising SBCC integration to existing ship

- Optimization of SBCC system, specifically heat integration: Heat from exhaust gas is recovered and used for CO₂ capture process, LNG vaporization is used as heat sink for liquefaction of CO₂
- Valuable insights gained into configurations of machinery, enabling both better assessment of feasibility of SBCC for different ship types and optimization of machinery for SBCC (how much heat available, at what temperature)
- Heat supplied to CO₂ capture system should be above ~120°C
- More heat availability means higher capture rate can be achieved
- 4-stroke: sufficient heat for capture rates in excess of 90%
- 2-stroke:
 - Lower bound of recoverable heat only sufficient for capture rate as low as about 15%
 - Engine can be configured for higher exhaust gas temperatures



Objective & Impact: (iii) facilitating development of SBCC-based full CCUS chains

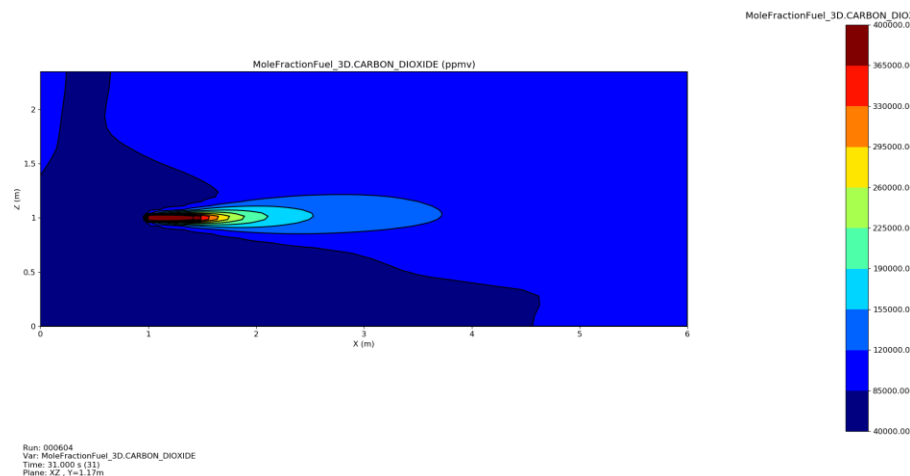
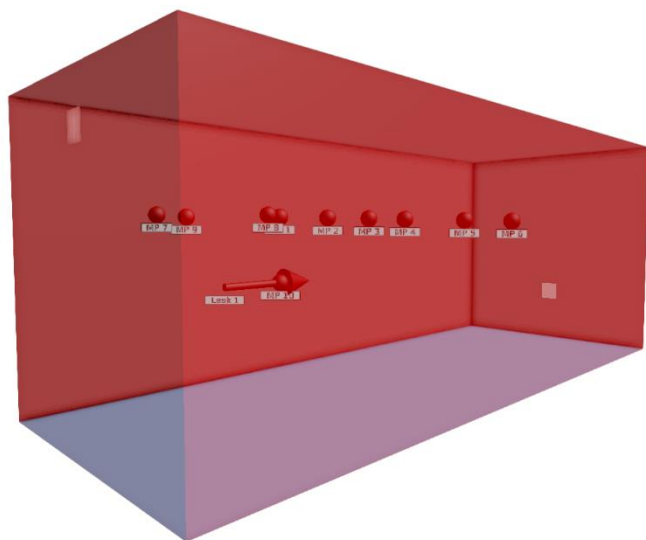
- Develop offloading strategies and establish guidelines for CO₂ shipping interoperability, port readiness, port infrastructure and CO₂ specifications; also solvent handling
- To this purpose a CO₂ Shipping Interoperability Industry Group (CSIIG) has been established
- Use of captured and liquified CO₂ will prove the CO₂ quality produced, which is critical for the development of CCUS chains.



- Utilization: synthetic fuel production at RWE Niederaussem, greenhouses in NL
- Storage: Northern Lights, Porthos, Acorn

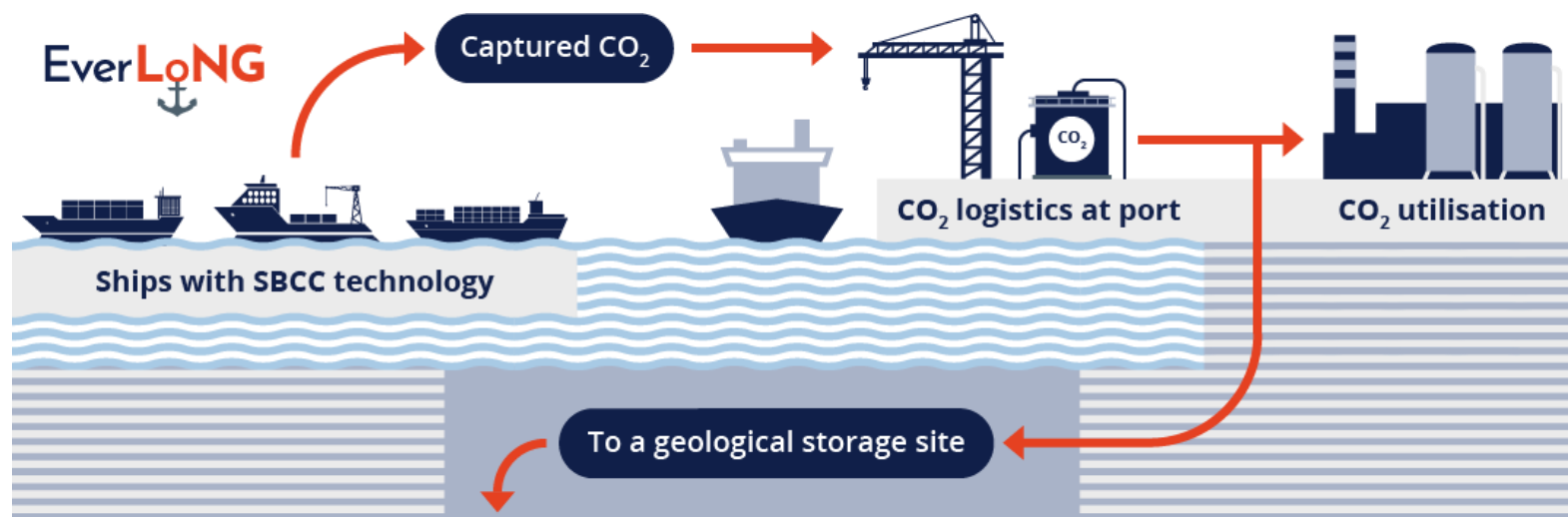
Objective & Impact: (iv) facilitating regulatory framework for technology

- The research performed by the class societies in our consortium concluded that there are no obstacles in the existing Rules and Regulations to introduce and implement Ship-Based Carbon Capture (SBCC) today.
- Report 'Regulatory review and CO2 hazards' is publicly available: designers, shipyards, ship-owners & -operators obtain detailed insight in risks of SBCC, leading to inherently safer designs and a smooth approval process.
- Indoor releases (20ft container 60, 40, 10 barg releases), outdoor releases, weather conditions
- Presentation at IMO CCC 9 where decisions on international shipping regulations are made



Other expected impact

- Life cycle assessment and techno-economic evaluation: to show the impact of this technology, both from an economic viewpoint as from an environmental viewpoint, to enable comparison of SBCC with alternative decarbonization technologies.



- Define standardized SBCC sizes: an important step in the exploitation plan of SBCC.
- Significant chances for commercializing this technology: increasing market attractiveness, even more interesting market is foreseen for HFO fueled vessels. Change in maritime regulations, both in Europe as well as worldwide, push forward the interest of ship owners in carbon capture onboard vessels.



Partners



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Thank you for listening

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