Avoiding Greenhouse Gas Emissions

The Essential Role of Chemicals

A comparative life cycle study of three fouling control systems for marine vessels

An AkzoNobel case study

Intersleek 1100SR is a biocide-free fluoropolymer fouling control system, which improves the coating's performance compared to the silicon based fouling control system Intersleek 700 and the biocide fouling control system Intersmooth 7460HS.

Intersleek 1100SR ensures lower surface hull roughness, better coefficient of friction and better foul release properties, which relatively to the Intersmooth 7460HS system, leads to reduced fuel consumption and avoided in-service emissions of up to 9%. This lifecycle study covers the vessel's full life-cycle. Fuel and lube oil consumption have been considered separately.

The settlement of fouling organisms on the underwater hull is well known to adversely influence the fuel consumption of vessels. A layer of slime (multi-culture comprised of bacteria and phytoplankton) is said to result in increased fuel consumption of between 2%-10%, weed growth in the region of 10%-30%, and animal growth (such as tubeworms or barnacles) in excess of 40%.

This study focuses on three products:

1. Intersleek 1100SR, a biocide-free fluoropolymer fouling control system;
2. Intersleek 700, a silicon-based fouling control system;
3. Intersmooth 7460HS, a widely used biocide fouling control system.

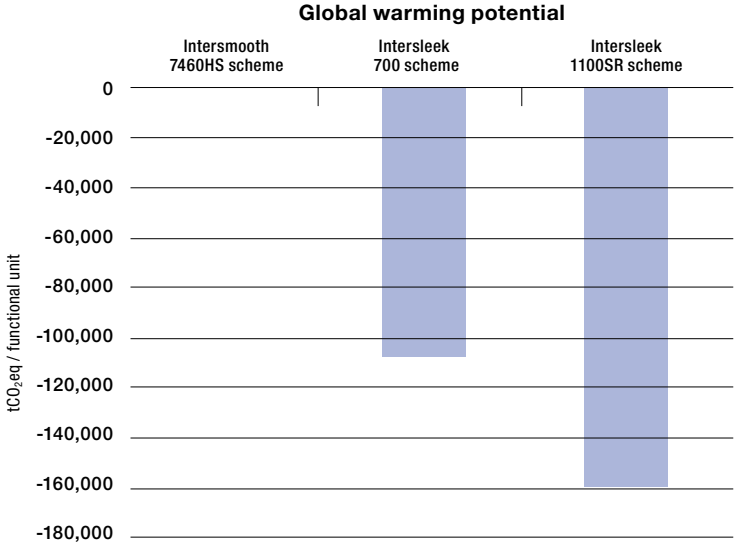
Differences in fuel consumption between the considered solutions by far outweigh environmental impacts from production, distribution, application, maintenance and end-of-life. The ratio between the emissions to create the solution and the avoided emissions during use can be up to 600:1, and only slightly differs between solutions (1) and (2).

Full study available at: www.icca-chem.org/energy-climate

GHG emissions during the entire life cycle of fouling control system

Avoided emissions relative to the reference system

Functional unit for the 3 systems considered: travelling 2,365,200 nautical miles of a 300 meter long container ship, with an underwater area of 12,000 m^2 and a loading capacity of 70,000 dead weight tonne, during 15 years of operation, including 3 maintenance cycles.



	Intersmooth 7460HS scheme*	Intersleek 700 scheme*	Intersleek 1100SR scheme*
Production of ingredients	-	- 81	- 84
Trp of ingredients and thinner	-	- 12	- 12
Paint and thinner manufacturing	-	- 2	- 2
Containers manufacturing	-	- 3	- 4
Trp of paint and thinner	-	- 3	- 3
Application NB	-	- 33	- 31
In service	-	- 106,550	- 159,819
M&R and removal	-	- 106	- 105
Waste treatment end of life	-	-	-
SUM	-	- 106,790	- 160,060
Avoided emissions (rel.)	**0%**	**- 4%**	**-6%**

*** Unit: tCO_2eq / functional unit**

This case study illustrates how the reduction of greenhouse gas (GHG) emissions can be enabled by chemical products, as part of a series of case studies brought to you by ICCA. Chemical industry members offered Life Cycle Assessment [LCA] case studies for the purpose of showing illustrative examples on how to calculate avoided greenhouse gas emissions. The avoided emission calculations were based on the guidelines developed by ICCA and WBSCD (World Business Council for Sustainable Development) - Chemical Sector, with the support of Arthur D. Little and Ecofys. Other life cycle environmental impacts such as water and land use change were outside the scope and usually not considered.