Environmental assessment of weight-optimized components with complex geometries for trucks and other heavy machinery in the transport sector.

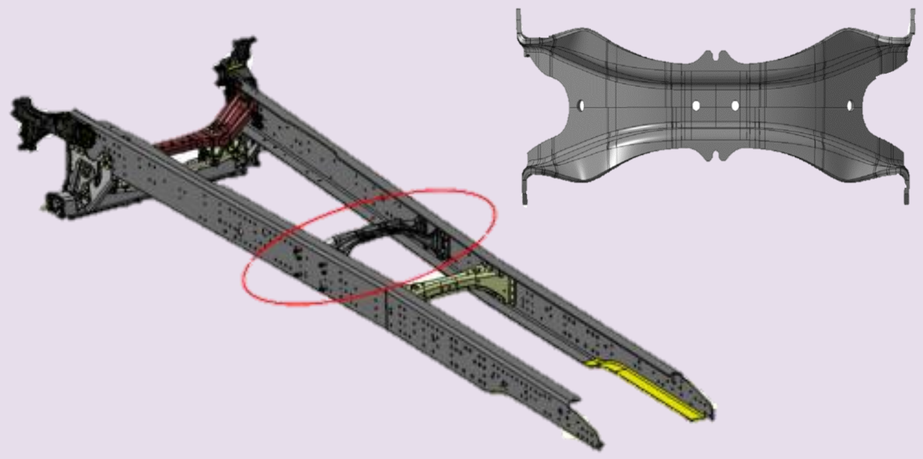
Clarens F. [1] Espí J.J. [1] Berzosa J. [1] Parareda S. [2] Arcos R. [1] Sieurin H. [3] Larsson J. [4]

INTRODUCTION

WARMLIGHT Project aims at enabling weight-optimized components with complex geometries

The components are manufactured with a **thermo-mechanical forming** process (warm forming), and, as a result, the **weight is reduced** of some parts made from AHSS (Advanced High-Strength Steel)

The purpose of the study is to perform a complete and detailed LCA to demonstrate that the solutions provided by the project have a **better environmental profile** while **maintaining the technical characteristics** of the parts under study



Demonstrator: Cross beam member

GOAL AND SCOPE

LCA study is applied to a **40 metric ton HDV** (Heavy Duty Vehicle) during its lifespan of 1.400.000 km

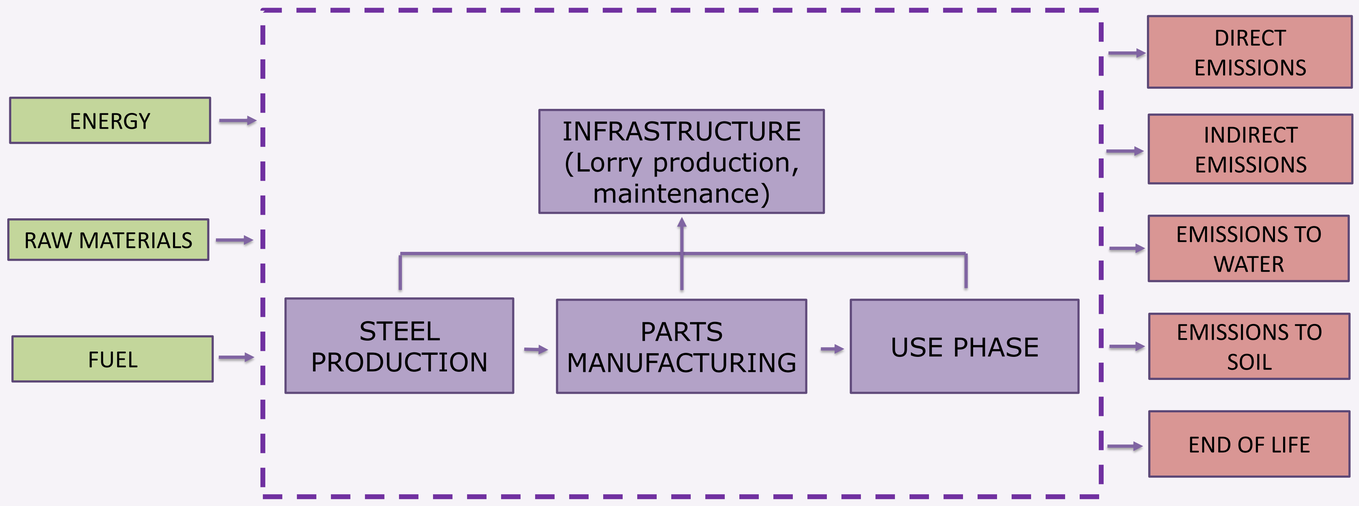
Functional unit (FU): (Tn*km) as the effort associated for the transportation of 1 ton of goods each kilometer covered during the HDV useful lifetime.

THE STUDY CONSIDERS 4 STAGES

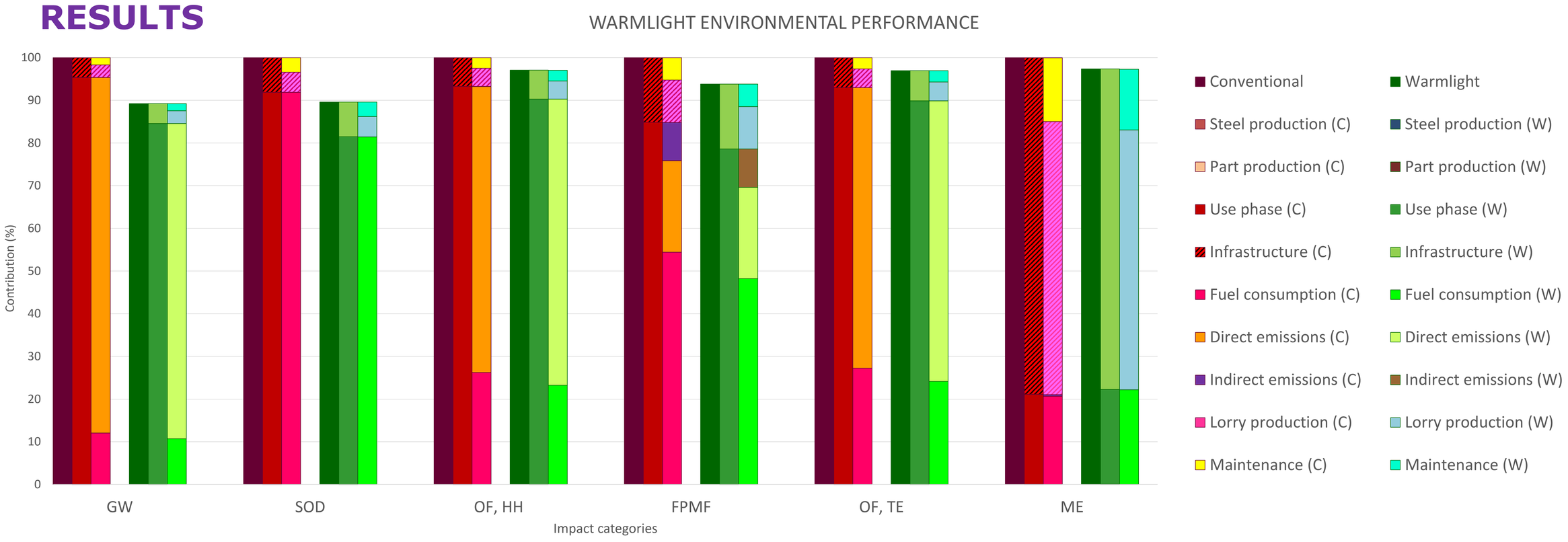
(A) Steel production
(B) Parts manufacturing
(C) Use phase
(D) Maintenance

WARMLIGHT UPDATES REGARDING CONVENTIONAL SYSTEM

(A) Optimize a thermo-mechanical forming process (**warm forming**) for manufacturing of HDV components.
(B) Develop demonstrator components fulfilling stated requirements and with 20% **weight reduction** compared with traditional technologies.
(C) Test the influence of the weight savings during use phase of HDV and the consequent environmental benefits associated to the **fuel saved.**



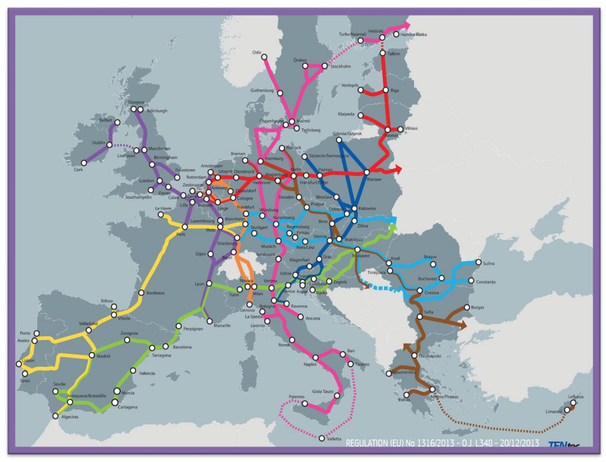
RESULTS



GW: Global Warming | ***SOD:*** Stratospheric ozone depletion | ***OF, HH***: Ozone Formation, Human Health | ***FPMP:*** Fine particulate matter formation | ***OF, TE***: Ozone Formation, terrestrial Ecosystems | ***ME:*** Marine eutrophication

CONCLUSIONS

1. Warmlight forming technology allows to reduce the overall impacts of HDV transport by circa 7% as average in the different impact categories analyzed.
2. Despite warm forming process developed in Warmlight has slightly higher impacts in parts production, use phase counteracts the impacts by decreasing fuel consumption and associated atmospheric emissions
3. The benefits associated with the implementation of Warmlight technology can have a multiplier effect reducing total transport emissions at European level.



Project partners

eurecat Centre Tecnològic de Catalunya

LULEÅ UNIVERSITY OF TECHNOLOGY

SCANIA

CRF

voestalpine ONE STEP AHEAD.

CONEX

LCM 2021

1 Eurecat, Centre Tecnològic de Catalunya, Waste, Energy and Environmental Impact Unit, 08243 Manresa, Spain
2 Eurecat, Centre Tecnològic de Catalunya, Metal & Ceramic Materials, 08243 Manresa, Spain
3 Scania
4 Conex