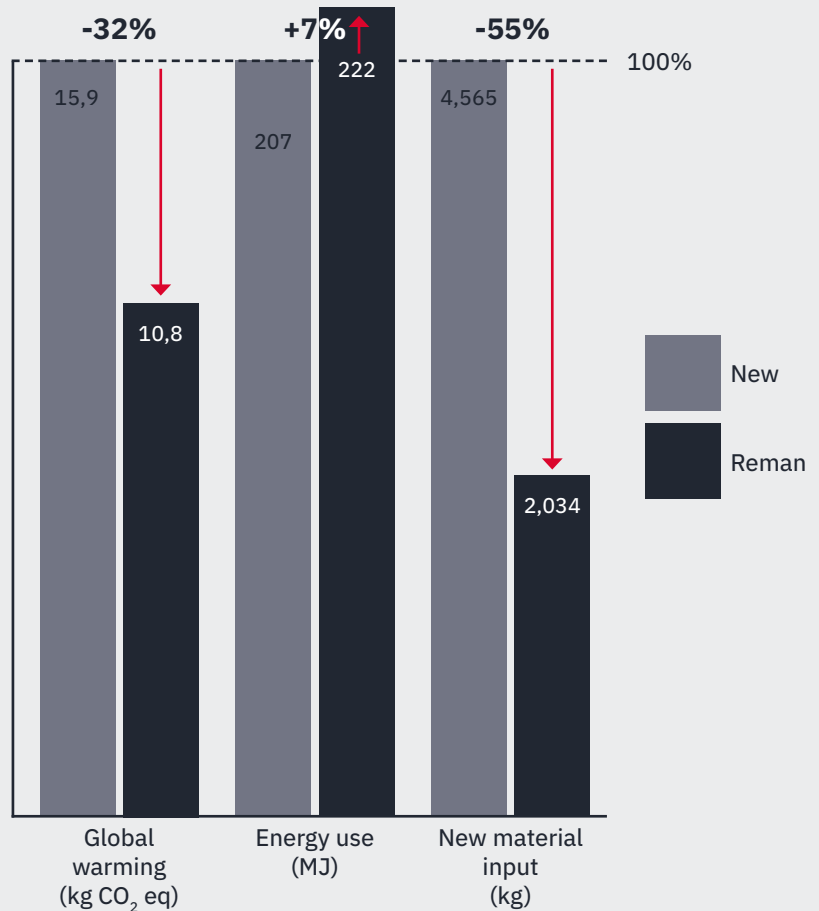




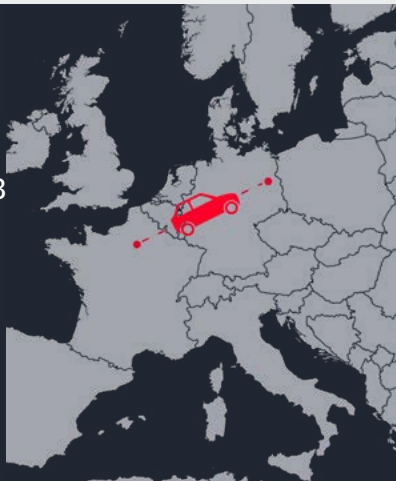
# LIFE CYCLE ASSESSMENT FOR TURBOCHARGERS

A remanufactured **turbocharger** from BORG Automotive Reman saves the environment 32% CO<sub>2</sub> eq and 55% of the new materials compared to a newly manufactured turbocharger despite the 7% higher energy consumption\*.



## DID YOU KNOW?

When we remanufacture 68 turbochargers compared to 68 newly manufactured ones, we avoid emitting around 345 kg CO<sub>2</sub> eq. For comparison, this is the same amount of CO<sub>2</sub> that an average petrol car emits on a journey from Paris to Berlin.



\*The increased energy consumption is mainly due to the fact that the production process is only included for reman, as the data is not available for newman.

### How did we find out?

Linköping University has performed a life cycle assessment of a turbocharger from BORG Automotive Reman. The environmental assessments will consider the potential benefits of remanufacturing regarding global warming, resource use, and energy use compared to a newly manufactured product of the same design. The report has been critically reviewed by a sustainability consultant at SustainX (LCA expertise and head of the critical review).

### Method

Life cycle assessment (LCA) is a standardized and widely used method for evaluating the environmental impact of a product or service. It includes the whole life cycle, from extracting raw material, material production, product manufacturing, and product use to end-of-life treatment. With this approach, an LCA can expose what stage, process, or material causes the main environmental impact.

The aim of the life cycle assessment is to evaluate the environmental impact of a remanufactured product and to compare it to the environmental impact of a new product. To achieve this, an attributional modelling approach is used, where the input and output flows of the processes of a system are inventoried for a specified period based on historical data.

The environmental assessment of the turbocharger is performed through LCA methodology according to ISO 14040 and ISO 14044, where the principles and structure and the requirements and guidelines are described. Limited compliance on ISO 14044 due to critical review done by one expert and not by a panel. SimaPro Professional Version 9.4.0.2 software is used to perform the LCA, the inventory database Ecoinvent 3.8 is used for the life cycle inventory, and the Cumulative Energy Demand (CED) and EPD(2018) methods are used for the impact assessment.

