

Environmental Report BMW 320d

Abstract

Goal and scope:

The scope of the study is the life cycle assessment of the BMW 320d, Model Year (MY) 2012. Its purpose is to assess the environmental impacts of the entire vehicle and its components according to the product responsibility strategy of the BMW Group. The comparison of the previous and the new model of BMW 3series clearly states the improvements in terms of environmental impact reduction. These results are important for the further development and optimization of the next BMW 3series generation.

System boundaries:

The system boundaries consist of all material and energy flows, input and output collected according to ISO 14040 with the following level of detail:

- From sourcing and production of raw materials to production, to use phase, to recycling (incl. transport logistic).
- Use phase: assumed mileage 200.000 km (new European driving cycle)
- Software and database GaBi 4©.
- Material data from material balance of the BMW 320d.
- The impact assessment is based on the CML-method (November 2009) developed at Leiden University in the Netherlands (Guinée and Lindeijer 2002).
- A critical review of the environmental report is done by an external auditor.
- The compilation and assessment process was verified by TÜV SÜD assessing compliance with the internal process description as well as verifying data and environmental information used (validation attached).

The functional unit and the reference flow are defined as the BMW 320d vehicle, at SOP (start of production) in 2012 and 2005, with a 4-cylinder diesel engine as an ECE-basis version with a use phase of 200.000 km according to the new European driving cycle.

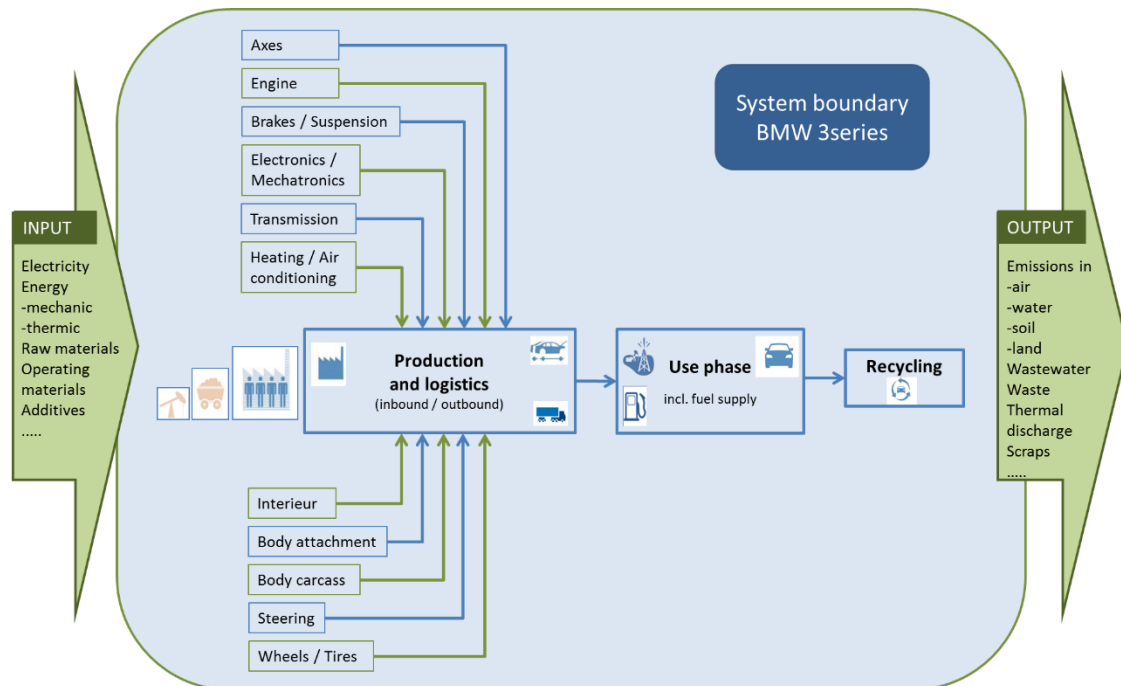


Fig. 1: Flowchart input / output data of the BMW 3series

The LCA according to ISO 14040/44 refers to environmental aspects and potential environmental impacts along the life cycle of a product from the raw material extraction to the manufacturing process, to the use phase, and to the recycling at the end of the vehicle's life.

Facts:

The life cycle assessment (LCA) of the BMW 320d and its predecessor shows the following environmental impacts across the whole life cycle in terms of Global Warming Potential (GWP) (fig. 2). The environmental impacts determined by the LCA are measured in different units. The GWP, for example, is stated in kilogram CO₂-equivalents (kg CO₂e).

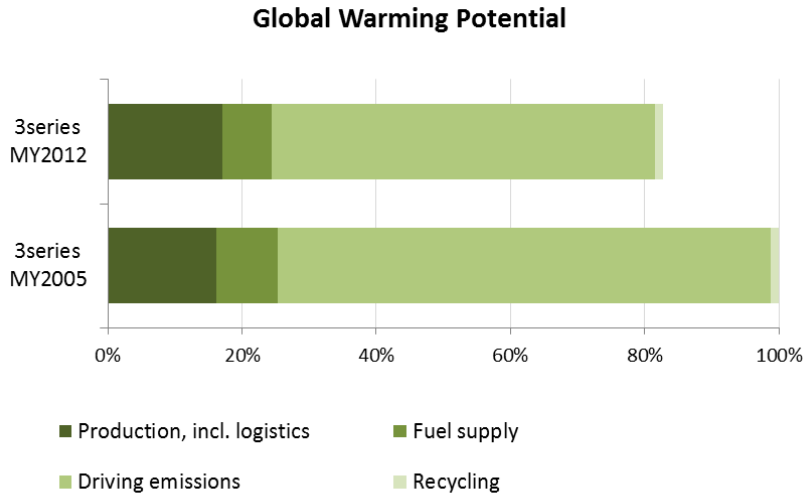


Fig. 2: Distribution of global warming potential over life cycle of BMW 3series

Although the considered BMW 320d shows slightly higher loads in the manufacturing phase compared to its predecessor, these are overcompensated by lower environmental impact during the use phase. The overall result for the BMW 320d is a significant reduction of about 15% of global warming potential (fig. 3). This effect is mainly due to the new generation of diesel engines, which has been installed since 2007 in the BMW 3series.

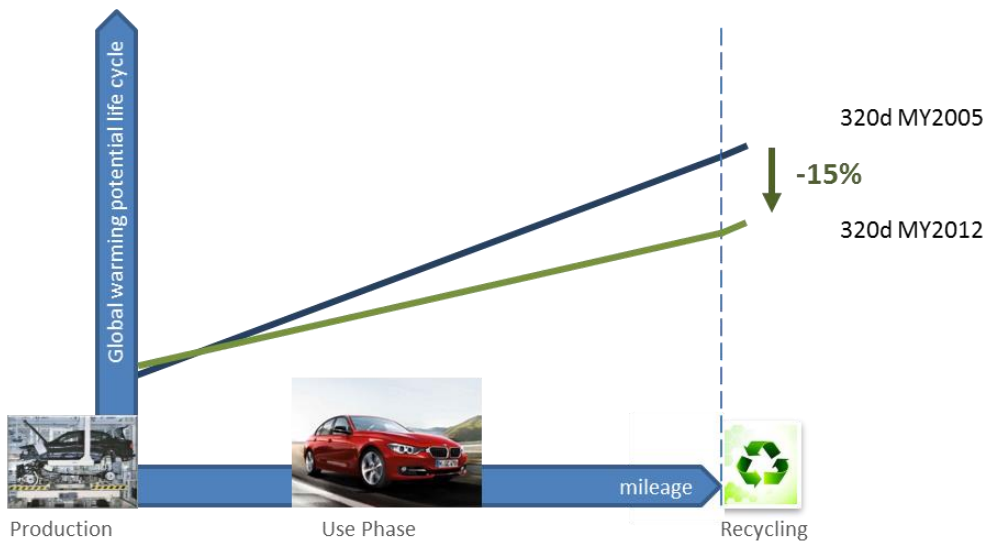


Fig. 3: Global warming potential of BMW 320d along the life cycle



Management Service

Validation

TÜV SÜD Management Service GmbH has verified the Life Cycle Assessment (LCA) study for the following passenger vehicle type

**BMW Limousine 320d
model year 2012
(by predecessor-successor-comparison)**

of

**BMW AG
Petuelring 130
D-80788 München**

and herewith, **declares it valid.**

Basis of verification:

- **The standards ISO 14040:2006 / ISO 14044:2006** for the statements to LCA study in the revision of 2012-04-24 (principles and general requirements, definition of goal and scope as well as inventory analysis, life cycle impact assessment, interpretation, critical review)
- **Process instruction for generating a LCA study for a complete vehicle with the help of GaBi 4.4 Dfx-Tools (BMW Group, revision 11/2011)**

Scope of verification:

- **External critical review of LCA study regarding compliance with requirements of ISO 14040/14044**
- **Review of compliance of the specific LCA process with the related BMW process instruction**
- **Verification of LCA input data and other relevant environmental information**

Results of verification in detail:

- **This LCA study meets the requirements of above mentioned standards. The applied methodology is consistent with the scientific state of technology.**
- **The LCA study was prepared in line with the related BMW process instruction. The used input data and other environmental information therein are correct. (Report no: 70788172/LCA)**

TÜV SÜD Management Service GmbH

Munich, 2012-05-02

Michael Brunk
Environmental Verifier

Dipl.-Ing. Ulrich Wegner
Head of certification body

Independence and objectivity of verifier:

TÜV SÜD Group has not concluded any contracts regarding consultancy on product-related environmental aspects with BMW AG neither in the past nor at present. TÜV SÜD Management Service GmbH is not economically dependent or otherwise involved in any way with BMW AG.

Responsibilities:

BMW AG has full responsibility for the content of the LCA study. TÜV SÜD Management Service GmbH had been assigned to review the fulfilment of the methodical requirements regarding LCA realisation as well as to verify and validate the available information for correctness and credibility.