

# 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) 2011. The purpose is to assess the environmental impacts of the entire vehicle and its components according to the responsibility strategy of the BMW Group. A comparison of the previous and new model of BMW 3series clearly states the improvements of environmental impact. These results are important for the further development and optimization of the BMW 3series.

### System boundaries:

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

- ◀ From sourcing and production of raw materials to production, to use (purchase, to repair and transport logistic).
- ◀ Use phase: assumed mileage 100,000 km (new European driving cycle)
- ◀ Software and database: GaBi
- ◀ Material data from material balance of BMW 320d
- ◀ The impact assessment is based on the GEM (November 2009) developed at Leiden University in the Netherlands (Gundis 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 according to the internal process description as well as verifying data and environmental information (attached)

The functional unit and the reference are defined as BMW 320i vehicle at SOP (start of production) 2012 and 2015 with a 4-cylinder diesel engine on ECE basis version with a use phase of 200.000 km according to the new European cycle

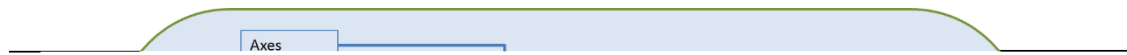


Fig. 1: Flowchart input / output data of the BMW

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

Facts:

The life cycle assessment (LCA) of the BMW 320i and its predecessor shows the following environmental impacts across the whole life cycle. Global Warming Potential (GWP) (the environmental impacts determined by LCA are measured in different units. The GWP, for example, is stated in kg CO<sub>2</sub>-equivalents (kg CO<sub>2</sub>e))

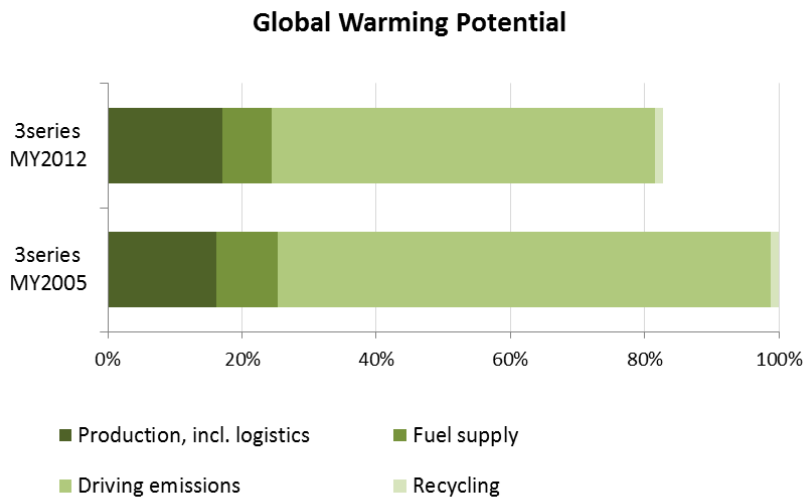


Fig. 2 Distribution of global warming potential over the life cycle of BMW 3series

Although the considered BMW 320d shows slightly higher loads in the manufacturing phase than 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 in the BMW 3series.

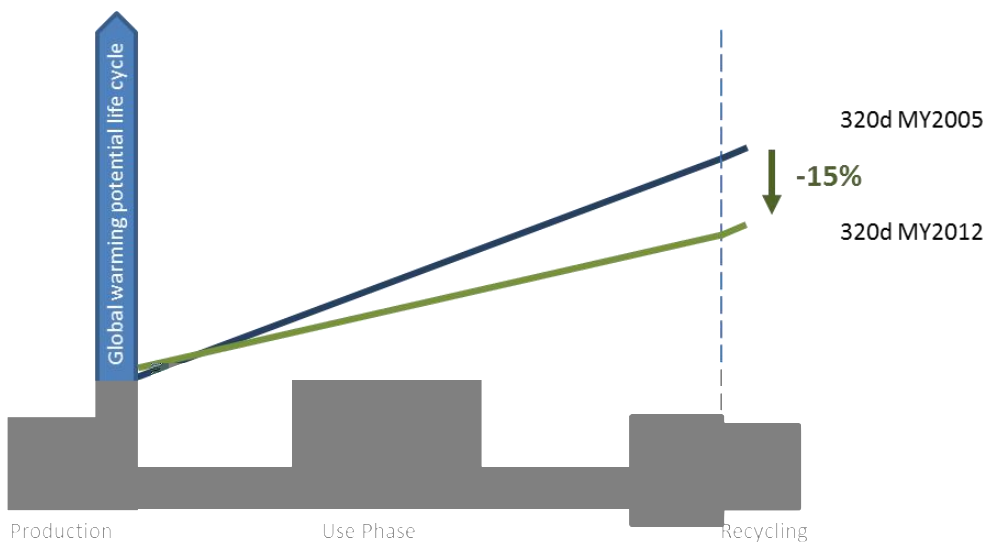


Fig. 3 Global warming potential of BMW 320d along the life cycle

