

## **Life Cycle Assessments and Environmental Commendations**

The brands of the Volkswagen Group use Life Cycle Assessments (LCA) to assess the environmental impacts of new vehicles under development over the entire life cycle from raw material extraction through production and use to recycling. 2014 we offered 416 efficient cars with 120 g CO<sub>2</sub>/km or less. The average CO<sub>2</sub> emissions (EU fleet) dropped from 159 to 126 g CO<sub>2</sub>/km (2008 and 2014). That means monetary saving for our EU customers and about 1,500,000 metric tonnes less CO<sub>2</sub> (from 2013 to 2014). The decrease in total cost of ownership will lead to more customers buying our most efficient vehicles. Based on our 2014 financial year figures an increase of 0.1 % in sales would imply a rise of >200 Mio.€ of revenue for us.

### **Life Cycle Engineering**

“Life Cycle Engineering” aims to improve the environmental footprint of a vehicle from cradle to grave. This process begins with a Life Cycle Assessment (LCA), in which the environmental impacts of the vehicle under development are assessed across the full life cycle – from resource extraction, through production and operation to eventual recycling. The LCA analysis makes it possible to identify those areas where improvements will have the biggest effect. These are the areas we then prioritize in our innovation activities. In 2013 the Corporate Steering Group “Life Cycle Engineering” was set up, comprising experts from the brands. Their goal is to harmonize the guidelines and methodology for Life Cycle Assessments across the entire Group and to support best practice-sharing between successful Life Cycle Engineering projects.

### **Key information for product development**

By considering the entire life cycle, it is possible to identify quantitative and qualitative differences between environmental impacts in the various phases of a vehicle’s life. For example, in the case of conventional internal combustion engines, CO<sub>2</sub> emissions are relatively high during vehicle use but almost insignificant in the recycling phase. Through Life Cycle Assessments, the Group and its brands obtain information on the most environmentally beneficial solution at an early stage. Measures aimed at achieving the greatest possible environmental effect over the entire life cycle are derived from the findings. Volkswagen calls this approach Life Cycle Engineering.

### **How a new Life Cycle Assessment is produced**

The analysis of an entire vehicle over its full life cycle is a complex process. The first step is to obtain data for all components and processes needed at the production stage. This involves research using

vehicle parts lists, the Volkswagen Material Information System (MISS) and external databases. A Life Cycle Inventory model is then generated from these data sources using IT tools developed in-house by Volkswagen. The Life Cycle Assessment also includes the vehicle use phase with fuel consumption and emissions over the entire service life of the vehicle being taken into consideration. Calculations are based on the statutory New European Driving Cycle (NEDC). In addition to emissions from vehicle use, the entire fuel supply chain is assessed as part of this phase. In the final stage of the vehicle life cycle – recycling – energy consumption and emissions for the dismantling and recycling of the end-of-life vehicle are calculated. Finally, all the emissions listed in the Life Cycle Inventory are assigned to potential environmental impacts. For example, carbon dioxide and methane contribute to the global warming effect. Other environmental impact categories considered include photochemical ozone creation, acidification, ozone depletion and eutrophication.

### **Environmental Commendations provide customer information**

For selected models, the Volkswagen Passenger Cars and Volkswagen Commercial Vehicles brands publish Environmental Commendations. These inform customers and the general public about the environmental progress achieved by the new model in comparison to its predecessor over its entire life cycle. The comparison is based on Life Cycle Assessments of the type described above. The detailed analysis is certified by the independent inspection agency TÜV NORD, confirming that the LCAs are based on reliable data and meet the requirements for Life Cycle Assessments set out in ISO standards 14040 and 14044.

LINK Volkswagen Passenger Cars Environmental Commendations

<http://www.volkswagen.de/de/markenwelt/verantwortung/Umweltpraedikate.html>

LINK Volkswagen Commercial Vehicles Environmental Commendations

<http://www.volkswagen-nutzfahrzeuge.de/de/unternehmen/nachhaltigkeit/Produkte/umweltpraedikate.html>

LINK Audi Life Cycle Assessments

[http://www.audi.de/de/brand/de/unternehmen/corporate\\_responsibility/produkt/gesamthaft--die-umweltbilanz.html](http://www.audi.de/de/brand/de/unternehmen/corporate_responsibility/produkt/gesamthaft--die-umweltbilanz.html)