

## **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.

### **Group-wide harmonisation**

The Life Cycle Engineering working group was established in 2013 at Group level and includes experts from the various Group brands who work on uniform guidelines and methods for harmonised LCAs throughout the Volkswagen Group. The LCAs we produce are in accordance with the content requirements of the International standards for Life Cycle Assessments ISO 14040 and 14044. In 2013, LCAs were produced for the Volkswagen up!, eco up! and e-up! models. The Audi brand produces Life Cycle Assessments for all new model series and publishes them on market launch. Such LCAs are now available for the Audi A3, the Audi A6 and the Audi e-gas project. SEAT is also working on Life Cycle Assessments for its vehicles.

### **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.

By the end of 2013, the Volkswagen Passenger Cars and Volkswagen Commercial Vehicles brands had issued a total of 18 Environmental Commendations. These are available online and also from dealers.

LINK Volkswagen Passenger Cars Environmental Commendations

<http://www.volkswagen.de/de/Volkswagen/nachhaltigkeit/service/download.html>

LINK Environmental Commendation for the e-up!

<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)