

# The Audi Q7 e-tron quattro\*

## Life Cycle Assessment



Fuel consumption and emission values:

\* Audi Q7 e-tron 3.0 TDI quattro (Audi Q7 e-tron quattro): Fuel consumption, combined: 1.9 – 1.8 l/100 km;  
electricity consumption, combined: 19.0 – 18.1 kWh/100 km; CO<sub>2</sub> emissions, combined: 50 – 48 g/km; efficiency category A+  
Fuel consumption and CO<sub>2</sub> emission values as well as efficiency classes given in ranges depend on the tyres/wheels used.

# Audi Q7 e-tron quattro\*\* – the life cycle assessment



Audi has compiled a detailed life cycle assessment (LCA) for its second model with standard plug-in hybrid, the Audi Q7 e-tron 3.0 TDI quattro\*\* (hereinafter: Audi Q7 e-tron quattro). As part of this assessment, the Audi Q7 e-tron quattro\*\* has been compared with its purely diesel-powered stablemate, the Audi Q7 3.0 TDI quattro 200kW tiptronic\* (hereinafter: Audi Q7 3.0 TDI).

The following pages describe how the additional hybrid components, first and foremost the lithium-ion battery of the Q7 e-tron quattro\*\*, affect the life cycle assessment in the production phase, and how operating the vehicle in electric mode influences the life cycle assessment.

Running the vehicle with the EU power mix is modelled and a scenario involving the use of renewable energy is also included. In this case, electric mode using electricity generated from hydroelectric power is modelled.

Fuel consumption and emission values:

\* Audi Q7 3.0 TDI quattro 200kW tiptronic (Audi Q7 3.0 TDI): Fuel consumption, urban: 6.5 – 6.2l/100km, country: 5.8 – 5.4l/100km, combined: 6.1 – 5.7l/100km; CO<sub>2</sub> emissions, combined: 159 – 149g/km; efficiency category A

\*\* Audi Q7 e-tron 3.0 TDI quattro (Audi Q7 e-tron): Fuel consumption, combined: 1.9 – 1.8l/100km; electricity consumption, combined: 19.0 – 18.1kWh/100km; CO<sub>2</sub> emissions, combined: 50 – 48g/km; efficiency class A+

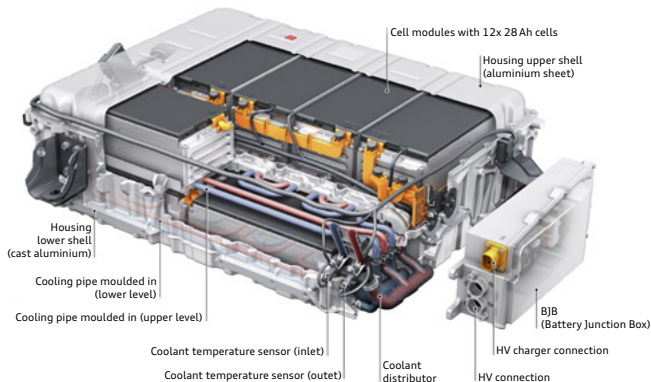
Fuel consumption and CO<sub>2</sub> emission values as well as efficiency classes given in ranges depend on the tyres/wheels used.



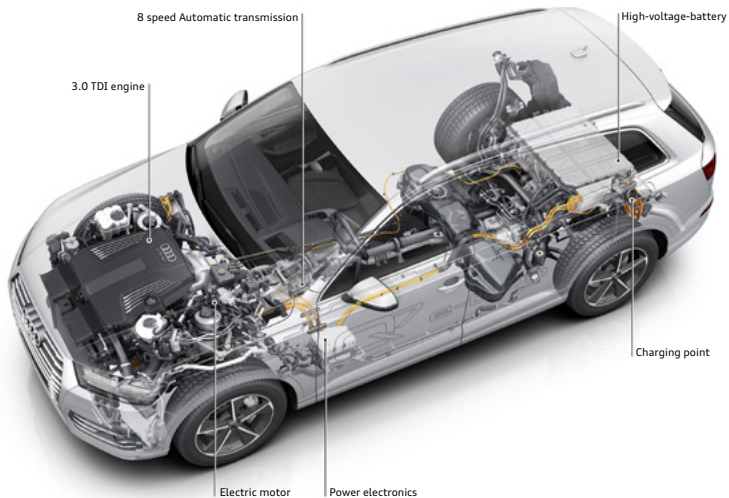
# Audi Q7 e-tron quattro\* – the battery system

The Audi Q7 e-tron quattro\* is designed as a highly efficient parallel hybrid. Its 3.0 TDI and the electric motor achieve system values of 275 kW (373 hp) of power and 700 Nm of torque\*. In all-electric mode the SUV has a range of 56 kilometres in the NEDC. In conjunction with the TDI engine and its 74-litre fuel tank, the Audi Q7 e-tron quattro\* has a total range of up to 1,320 kilometres.

The high-voltage battery in the Audi Q7 e-tron quattro\* is efficiently installed beneath the luggage compartment so that it barely affects the space for luggage. With a rated voltage of 308V it provides 17.3 kWh of energy. Its housing shells are made of robust aluminium sheet or cast aluminium. The large lithium-ion battery, which together with the electronic components weighs 202 kg, comprises 168 prismatic cells, arranged in 14 modules with twelve cells each. There are seven modules per level.



## Drivetrain of the Audi Q7 e-tron quattro\*



Fuel consumption and emission values:

\* Audi Q7 e-tron 3.0 TDI quattro (Audi Q7 e-tron quattro): Fuel consumption, combined: 1.9 – 1.8l/100km;  
electricity consumption, combined: 19.0 – 18.1 kWh/100 km; CO<sub>2</sub> emissions, combined: 50 – 48 g/km; efficiency category A+  
Fuel consumption and CO<sub>2</sub> emission values as well as efficiency classes given in ranges depend on the tyres/ wheels used.

# Audi Q7 e-tron quattro\*\* – the materials

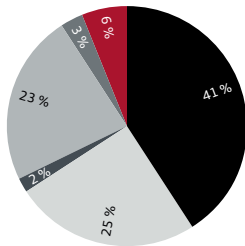
The materials used have a major influence on the results of the life cycle assessment. Light metals such as aluminium and magnesium are more energy-intensive to produce than steel, so their production process has a greater impact on greenhouse gas emissions. However, thanks to their superiority for lightweight construction and thus their contribution to cutting fuel consumption, they can have a positive impact in the use phase. Likewise, the battery materials for the lithium-ion battery, which in turn have a substantial influence on the result of the car production, have major environmental impacts, as can be seen on the following pages.

The inventory of materials was determined for the models under consideration and summarised according to VDA classification 231–106, as illustrated in the charts on the next page.

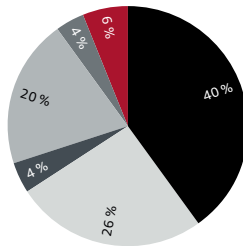
As a result of the additional components in the hybrid drive, the proportion of light metals used in the Audi Q7 e-tron quattro\*\* has increased by one percentage point compared with the Audi Q7 3.0 TDI\*, the proportion of non-ferrous and special metals by two percentage points, and the proportion of other materials and electrical systems/electronics similarly by one percentage point. By contrast, the proportion of iron and steel materials has been reduced by one percentage point and the proportion of polymer materials by three percentage points.

## Material inventory of the analysed models

**Audi Q7 3.0 TDI quattro  
200kW tiptronic\***



**Audi Q7 e-tron  
3.0 TDI quattro\*\***



- 1. Steel/iron
- 2. Light metals
- 3. Non-ferrous
- 4. Special purpose metals
- 5. Polymers
- 6. Process polymers
- 7. Other materials
- 8. Electronics/electrics
- 9. Fuels and auxiliary means

Fuel consumption and emission values:

\* Audi Q7 3.0 TDI quattro 200kW tiptronic (Audi Q7 3.0 TDI): Fuel consumption, urban: 6.5 – 6.2 l/100 km, country: 5.8 – 5.4 l/100 km, combined: 6.1 – 5.7 l/100 km; CO<sub>2</sub> emissions, combined: 159 – 149 g/km; efficiency category A

\*\* Audi Q7 e-tron 3.0 TDI quattro (Audi Q7 e-tron quattro): Fuel consumption, combined: 1.9 – 1.8 l/100 km; electricity consumption, combined: 19.0 – 18.1 kWh/100 km; CO<sub>2</sub> emissions, combined: 50 – 48 g/km; efficiency category A+

Fuel consumption and CO<sub>2</sub> emission values as well as efficiency classes given in ranges depend on the tyres/ wheels used.

# Audi Q7 e-tron quattro\*\* – the results of the LCA

The chart on the next page shows the greenhouse gas emissions of the two analysed models throughout their entire life cycle. Overall, the Q7 e-tron quattro\*\* with EU electricity mix generates approximately five percent lower greenhouse gas emissions than its diesel-powered stablemate, the Audi Q7 3.0 TDI\*. In all-electric mode using renewable electricity generated from hydroelectric power, the Q7 e-tron quattro\*\* reduces the greenhouse gas impact by a considerable 39 percent compared with the Audi Q7 3.0 TDI\*.

Initially, the production phase of the Audi Q7 e-tron quattro\*\* generates approximately 4.2 t of additional greenhouse gases due to the additional battery and the hybrid drive. The car is subsequently driven around two thirds in electric mode and around one third with the diesel engine. As such, the extra emissions from the production phase are offset in the case of electric mode with the EU power mix after around 128,000 km (break-even point – EU power mix). From this point in time, the life cycle assessment of the Audi Q7 e-tron quattro\*\* improves with each kilometre. When running the vehicle on renewable energy generated from hydroelectric power, the break-even point is as low as around 38,000 km.

The results of the other environmental impact categories are illustrated on the following pages.

Fuel consumption and emission values:

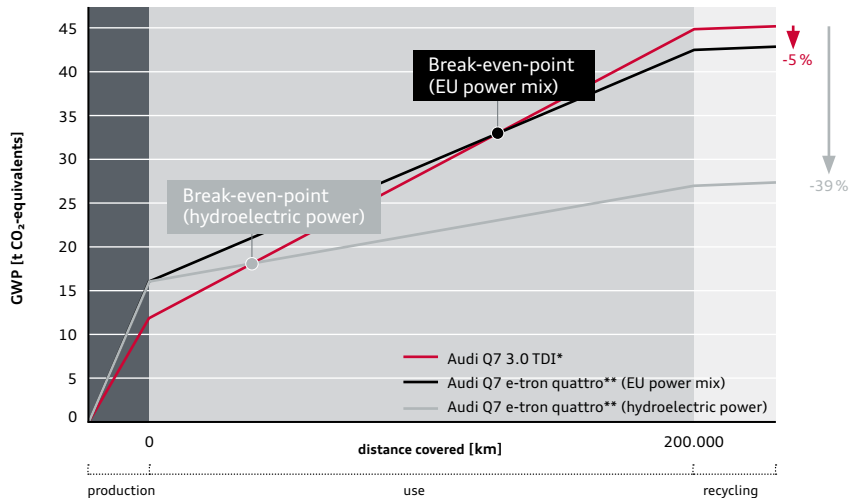
\* Audi Q7 3.0 TDI quattro 200 kW tiptronic (Audi Q7 3.0 TDI): Fuel consumption, urban: 6.5 – 6.2 l/100 km, country: 5.8 – 5.4 l/100 km, combined: 6.1 – 5.7 l/100 km; CO<sub>2</sub> emissions, combined: 159 – 149 g/km; efficiency category A

\*\* Audi Q7 e-tron 3.0 TDI quattro (Audi Q7 e-tron quattro): Fuel consumption, combined: 1.9 – 1.8 l/100 km; electricity consumption, combined: 19.0 – 18.1 kWh/100 km; CO<sub>2</sub> emissions, combined: 50 – 48 g/km; efficiency category A+

Fuel consumption and CO<sub>2</sub> emission values as well as efficiency classes given in ranges depend on the tyres/wheels used.



## Greenhouse gas emission values of the Audi Q7 e-tron quattro\*\* compared with the Audi Q7 3.0 TDI\* over the entire life cycle



The additional costs associated with the hybrid drive system on the Audi Q7 e-tron quattro\*\* are offset after approximately 128,000 km when running the vehicle on the EU power mix and after just approximately 38,000 km when running the vehicle on electricity generated from hydroelectric power.

# Audi Q7 e-tron quattro\*\* – the results of the LCA

The results of the greenhouse potential have shown that electromobility only brings significant environmental benefits if renewable electricity is used to power vehicles. The results of the other environmental impact categories also confirm this.

In the scenario where the Audi Q7 e-tron quattro\*\* is run on the EU electricity mix, all the other analysed environmental impact categories are above those of the Audi Q7 3.0 TDI\*. The potential for acidification rises by around 93 percent, for ozone depletion by around 35 percent, for 'summer smog' by around 15 percent and for eutrophication by around one percent.

By contrast, the results when running the vehicle on electricity generated from hydroelectric power are much better (see chart). The ozone-depleting potential is not shown, which is increased in this case by around 29 percent compared with the Audi Q7 3.0 TDI\*.

Fuel consumption and emission values:

\* Audi Q7 3.0 TDI quattro 200 kW tiptronic (Audi Q7 3.0 TDI): Fuel consumption, urban: 6.5 – 6.2 l/100 km, country: 5.8 – 5.4 l/100 km, combined: 6.1 – 5.7 l/100 km; CO<sub>2</sub> emissions, combined: 159 – 149 g/km; efficiency category A

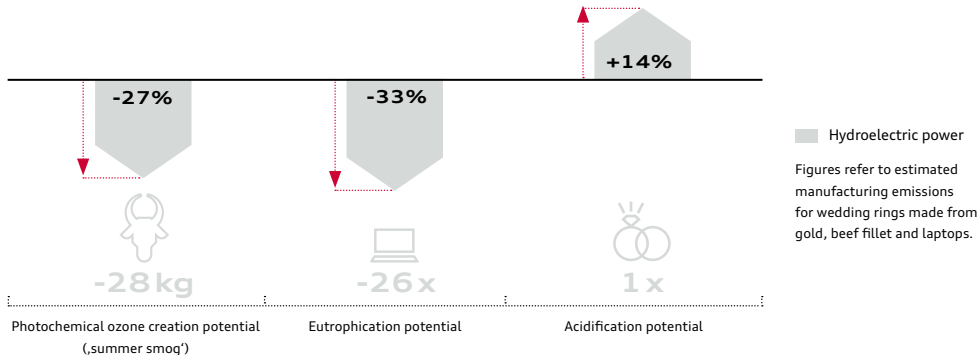
\*\* Audi Q7 e-tron 3.0 TDI quattro (Audi Q7 e-tron quattro): Fuel consumption, combined: 1.9 – 1.8 l/100 km; electricity consumption, combined: 19.0 – 18.1 kWh/100 km; CO<sub>2</sub> emissions, combined: 50 – 48 g/km; efficiency category A+

Fuel consumption and CO<sub>2</sub> emission values as well as efficiency classes given in ranges depend on the tyres/wheels used.

## Results of the other environmental categories compared with the Audi Q7 3.0 TDI\*

The results of the Audi Q7 e-tron quattro\*\* in all-electric mode using electricity generated from hydroelectric power are compared with the Audi Q7 3.0 TDI\* and also with the environmental impacts associated with manufacturing everyday products. This presentation aims to make the results easier to understand.

For instance, the potential of the Audi Q7 e-tron quattro\*\* for creating 'summer smog' is 27 percent lower than the figure for the Audi Q7 3.0 TDI\*. This is equivalent to the emissions associated with producing 28 kg of beef fillet.



Electromobility is only able to make a significant environmental contribution if the vehicles in question are run on electricity generated from renewable sources.

# Conclusion

The public today tends to judge vehicles to a large extent by their fuel consumption. Here too, Audi looks one step ahead. Its life cycle assessment analyzes effects on the environment for the vehicle's entire lifetime. The use of sustainable materials and manufacturing processes can greatly reduce these effects.

The life cycle assessment which Audi has produced for the new Audi Q7 e-tron quattro\*\* shows that greenhouse gas emissions from partial electric mode in the Audi Q7 e-tron quattro\*\* can be reduced compared with the Audi Q7 3.0 TDI\*. The results of the other environmental factors also show that electromobility will only be able to make a significant environmental contribution if the vehicles in question are run on renewable energy. The results also clearly show the considerable influence of the hybrid components – first and foremost the lithium-ion battery – on the environmental impacts. As a result, Audi is investing a great deal of time and energy in continually fine-tuning the battery technology in order to reduce the environmental impact right from the manufacturing phase.

The overall analysis of the car's life cycle plays a decisive role at Audi. This applies to all models and forms part of the basic strategic approach on the way to sustainable mobility that saves resources.

Fuel consumption and emission values:

\* Audi Q7 3.0 TDI quattro 200 kW tiptronic (Audi Q7 3.0 TDI): Fuel consumption, urban: 6.5 – 6.2 l/100 km, country: 5.8 – 5.4 l/100 km, combined: 6.1 – 5.7 l/100 km; CO<sub>2</sub> emissions, combined: 159 – 149 g/km; efficiency category A

\*\* Audi Q7 e-tron 3.0 TDI quattro (Audi Q7 e-tron quattro): Fuel consumption, combined: 1.9 – 1.8 l/100 km; electricity consumption, combined: 19.0 – 18.1 kWh/100 km; CO<sub>2</sub> emissions, combined: 50 – 48 g/km; efficiency category A+

Fuel consumption and CO<sub>2</sub> emission values as well as efficiency classes given in ranges depend on the tyres/wheels used.



**AUDI AG**

Total Vehicle Development  
and Product Communication  
85045 Ingolstadt, Germany  
Tel. +49 841 89-32100  
Fax +49 841 89-32817  
[www.audi.com/lifecycleassessment](http://www.audi.com/lifecycleassessment)  
Status: April 2016

Further information on official fuel consumption figures and the official specific CO<sub>2</sub> emissions of new passenger cars can be found in the 'Guide on the fuel economy, CO<sub>2</sub> emissions and power consumption of all passenger car models', which is available free of charge at all sales dealerships and from DAT Deutsche Automobil Treuhand GmbH, Helmuth-Hirth-Str. 1, 73760 Ostfildern-Scharnhausen, Germany ([www.dat.de](http://www.dat.de))

