German Environment Agency

20. November 2025

AutoRess Factsheet 1: Project Overview

Results from the project 'Resource efficient and circular electric cars' (AutoRess) - FKZ 3722 57 101 0

There are four relevant outputs from the AutoRess project

- A model based analysis of fields of action for GHG saving and resource efficient car transport
- Definition of and Criteria for a resource efficient vehicle compatible with the circular economy
- Overarching and topic specific policy measure recommendations
- The Circular Economy Roadmap

1 Background and Scope of AutoRess

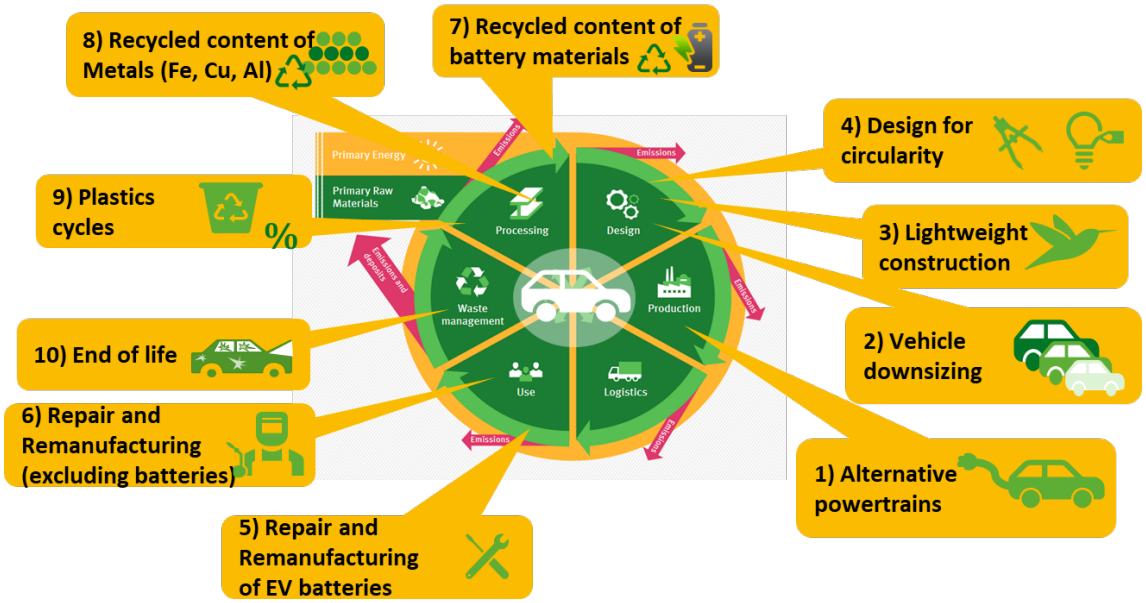
The Paris agreements and the Climate Protection Plan 2050 also set clear CO_2 reduction targets in the transport sector. These can only be achieved with an ambitious electric vehicles transition. Electric vehicles are characterised by special components such as the electric drive motor, the battery, the fuel cell or the power electronics. The project focussed on battery electric vehicles. In the course of the project, technical and non-technical options for reducing the impact of transport on climate and resource use were analysed across all vehicle life cycle phases (see figure). Based on this, suitable instruments and measures were developed and evaluated with the model and a definition of and criteria for a resource-efficient vehicle were developed. All together were combined to form a Circular Economy Roadmap for battery electric vehicles.

The results were fed back to the project advisory board as well as external experts and internal UBA experts in different workshops. The project was being carried out by Oeko-Institut e. V. together with ifeu gGmbH, Mehlhart Consulting and team ewen from November 2022 to August 2025.

2 GHG and material savings potentials in various fields of action along the vehicle life cycle

10 technical and non-technical topics for additional GHG and material savings were defined and then analysed in depth. They were selected based on a systematic analysis of key levers along all life cycle phases of motor vehicles including factors directly affecting the vehicle usage and production itself as well as indirect influencing factors. Each selected topic addresses a specific aspect of the transport system that can be influenced by technological, social or political measures. A model of German passenger car traffic was developed that maps all stages of the vehicle life cycle. This model was used to quantify comparable savings potential for all analysed topic areas in terms of GHG emissions and primary materials up to 2045. The analysed ten topic areas as technical and social options in different life cycle stages are shown in the figure.

Figure 1: The analyzed 10 topic areas in AutoRess



Source: Own figure Oeko-Institut / ifeu based on Müller et al 2020[1]

Individual topics also offer very diverse technical starting points and various design options. In addition, the intensity of implementation has a decisive influence on the possible effects. For this reason, up to five variants were modelled for each topic and ranges of GHG and material effects were estimated.

Detailed information on the topic areas and the modelled GHG and material savings potentials is given in the final report in Chapter 3 as well as in additional summarising papers for selected topic areas.

3 Definition and Criteria: What makes a vehicle resource efficient and compatible with the circular economy?

Based on the model results, researches and expert exchanges, a vehicle is considered resource-efficient and circular economy compatible if it satisfies the following requirements:

a) The least amount possible of primary raw materials is consumed over the entire lifecycle

b) The least amount possible of greenhouse gases are emitted over the entire lifecycle

c) The least amount possible of energy is consumed over the entire lifecycle

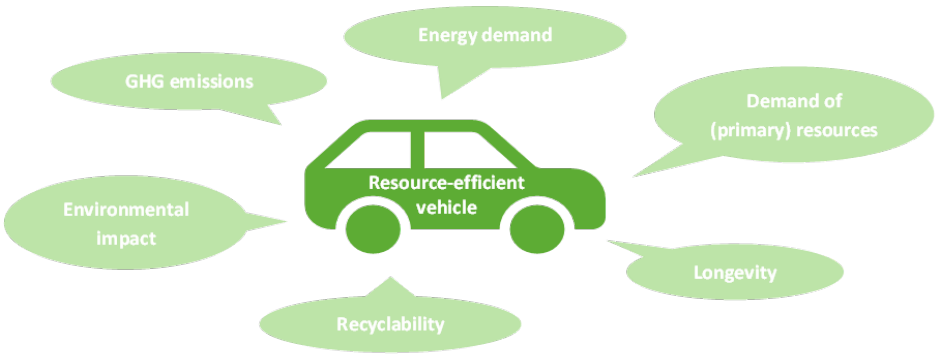
d) The vehicle's life span is as long as possible

e) The vehicles' components can be recycled in the most efficient way possible without the need for downcycling

f) Additional negative environmental as well as social impacts are minimized

[1] Müller,F.; Kohlmeyer, R.; Krüger, F.; Kosmol, J.; Krause, S.; Dorer, C.; Röhreich, M. (2020): 9 PRINCIPLES FOR A CIRCULAR ECONOMY; Umweltbundesamt; https://www.umweltbundesamt.de/sites/default/files/medien/1410/publikationen/2020_10_23_leitlinie_kreislaufwirtschaft_englisch_bf.pdf

Figure 2: Aspects of the definition of a resource-efficient vehicle



Further detailed information in final report of AutoRess in Chapter 4 on criteria for a resource-efficient vehicle
Source: Own figure Oeko-Institut

Fulfilling these requirements of a resource-efficient vehicle main criteria were developed. Using the results from the model combining with expert knowledge and further research, criteria were formulated. For example, reducing the GHG emissions, the vehicle size is one criteria to reduce the energy use and material demand of a vehicle. An overview of the criteria is given in the following table.

Table 1: Proposed criteria that cover the aspects of the definition of a resource-efficient vehicle

Demand of (primary) resources	GHG emissions	Longevity	Recyclability	Energy consumption	Environ-mental impact
Raw materials index[2]	Product Carbon Footprint[2]	Modular design	Modular design	Product Carbon Footprint	Due diligence obligations
Vehicle dimensions	Recycled content targets	Lifetime guarantee for batteries	Raw materials index[2]	Energy demand in use	Raw materials index[2]
Battery capacity	Vehicle dimensions	Provision of spare parts and software updates	Recycled content targets	Vehicle size	Vehicle dimension
Recycled content					

Source: Final report AutoRess

Detailed information on the definition and criteria including concrete values for different ambition levels are provided in the final report (Chapter 4) as well as in an additional summarising paper (Criteria for resource-efficient, circular economy-conforming vehicles).

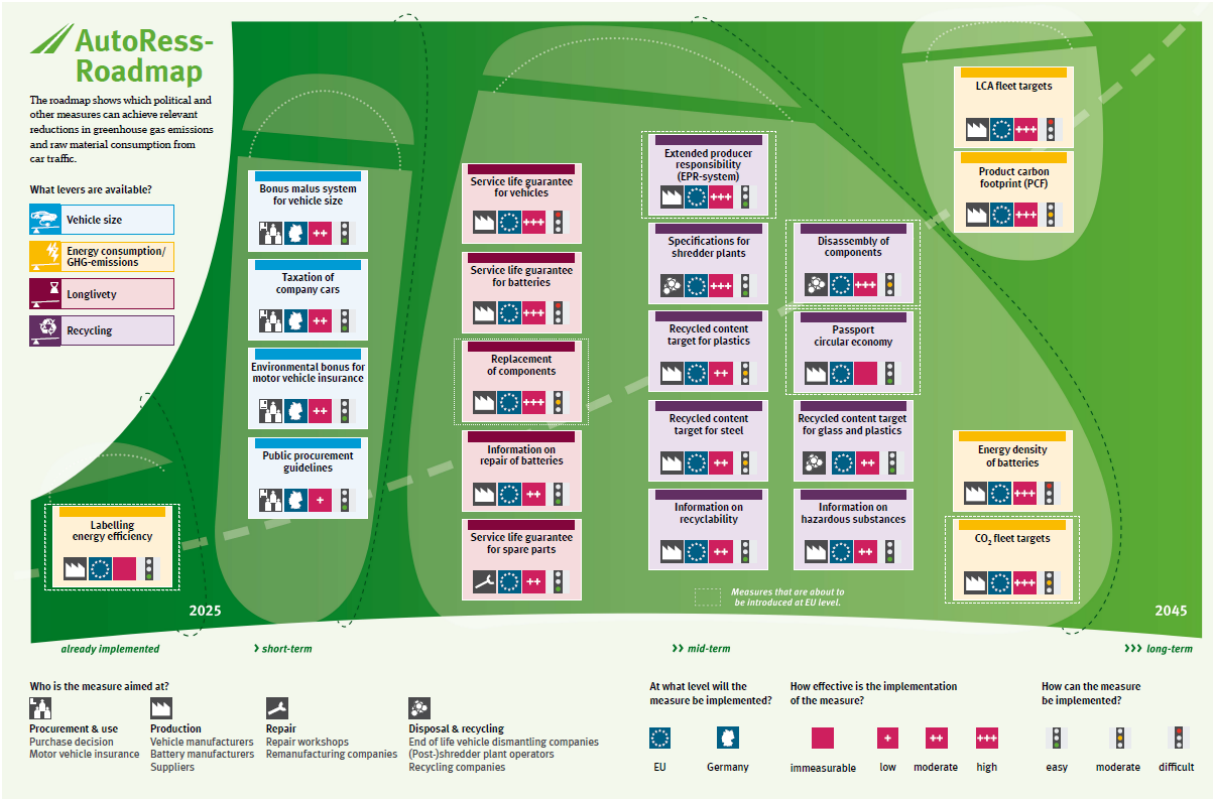
[2] Future criterion for as soon as calculation standards are set

4 The Circular Economy Roadmap for vehicles

Based on the developed criteria the identified measures and instruments were classified, evaluated and prioritized according to specific criteria (e.g. current status of implementation of the measure; life cycle phase; affected stakeholders; impact mechanism; time horizon; geographical level of action; level of obligation).

The roadmap shows which measures and instruments can make a significant contribution to the reduction of greenhouse gas emissions and resource consumption and in which time horizon and by which stakeholders these can be achieved.

Figure 3: The Circular Economy Roadmap

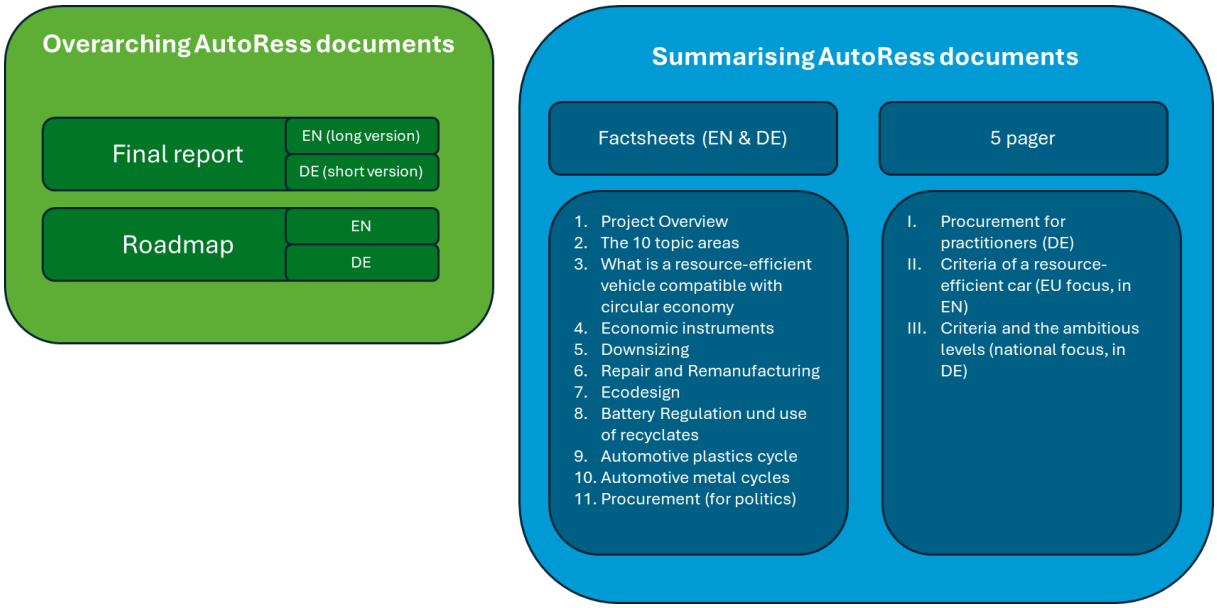


Further information is given in the AutoRess brochure and in chapter 5 on the development of instruments and measures as well as in chapter 6 on circular economy roadmap for passenger cars of the final report of the AutoRess project.
Source: AutoRess brochure. Published by Umweltbundesamt

The roadmap is provided in an additional brochure (see Sutter 2025). Further information and all measures are detailed in the final report (Chapter 5).

All publications of the AutoRess project are available on the UBA-website. An overview of the published AutoRess documents is given below.

Figure 4: The AutoRess publications



Source: own illustration Oeko-Institut

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Based on the final AutoRess report. All AutoRess documents are published on http://umweltbundesamt.de/themen/verkehr/ressourcenschonung-im-verkehr

Project partners: Oeko-Institut, ifeu gGmbH, Mehlhart Consulting, team ewen GbR

Project long title: Motor vehicles in support of sustainable resource use and circularity: Instruments and measures to reduce the demand for raw materials in the transport sector through circular economy in parallel with an energy transition in transport

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