

Research for TRAN Committee

Lifecycle GHG emissions of battery-powered electric vehicles

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DIRECTORATE-GENERAL FOR INTERNAL POLICIES
POLICY DEPARTMENT **B**
STRUCTURAL AND COHESION POLICIES

- Agriculture and Rural Development
- Culture and Education
- Fisheries
- Regional Development
- Transport and Tourism**

**Research for TRAN Committee -
Battery-powered electric
vehicles: market development
and lifecycle emissions**

STUDY

EN

2018

European Parliament

PART 2

**Resources, energy, and lifecycle
greenhouse gas emission aspects of
electric vehicles**

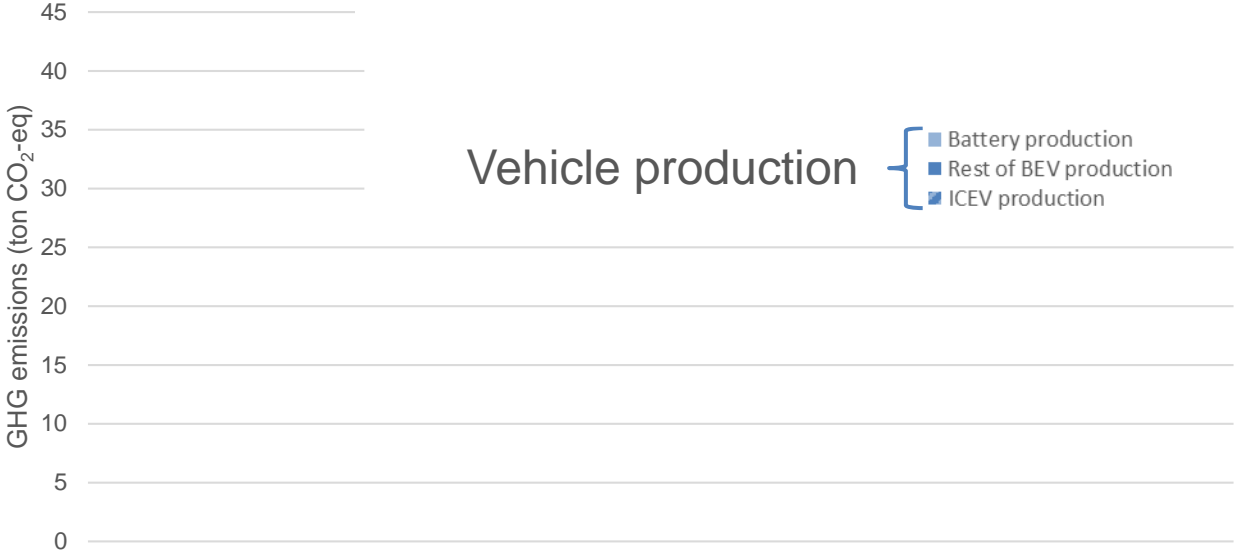
Abstract

This report covers topics associated with the production and recycling of lithium-ion traction batteries and lifecycle greenhouse gas emissions of fully battery-powered electric vehicles. It describes in particular material and energy use in battery production, and the climate change impacts of electric vehicles. The effects of the battery, vehicle size and the sources of charging electricity are discussed. Prospective developments in battery production and the power sector and their effect on lifecycle greenhouse gas emissions are also discussed.

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PE 602.015 EN

Lifecycle GHG emissions of mid-sized passenger vehicles



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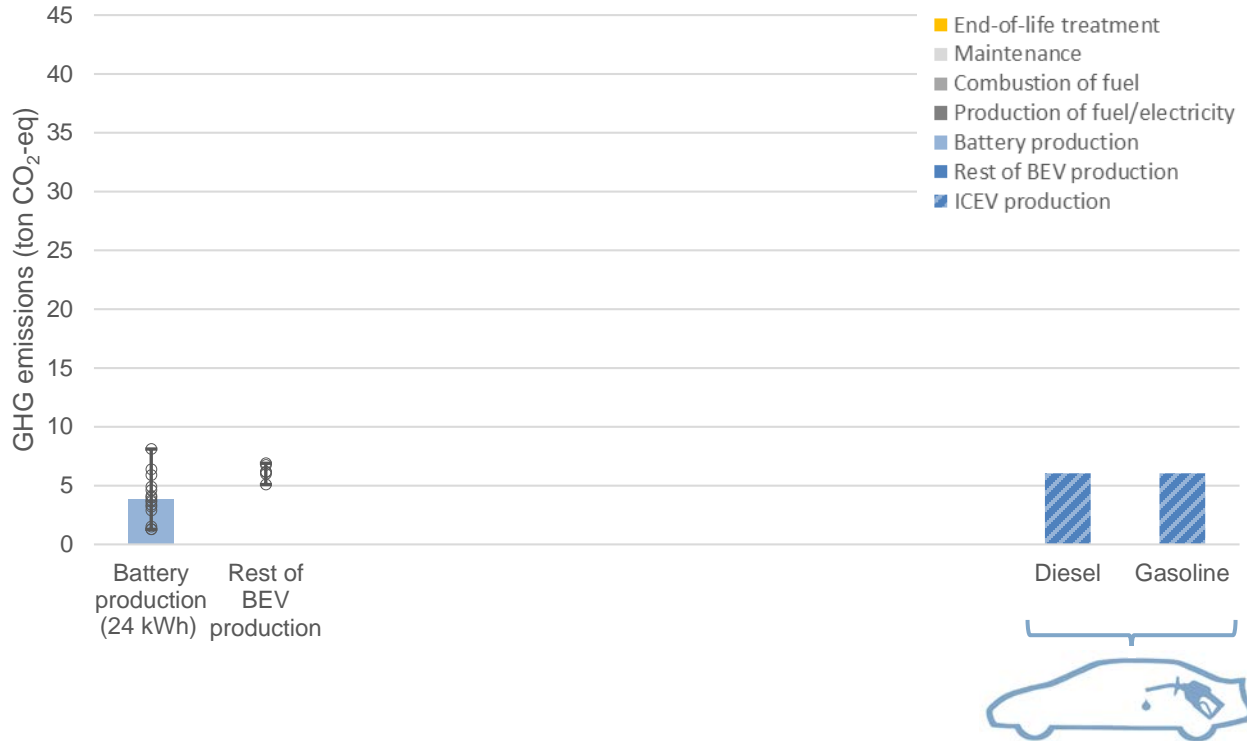
Lifecycle GHG emissions of mid-sized passenger vehicles



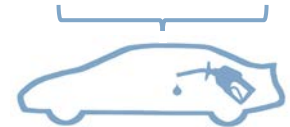
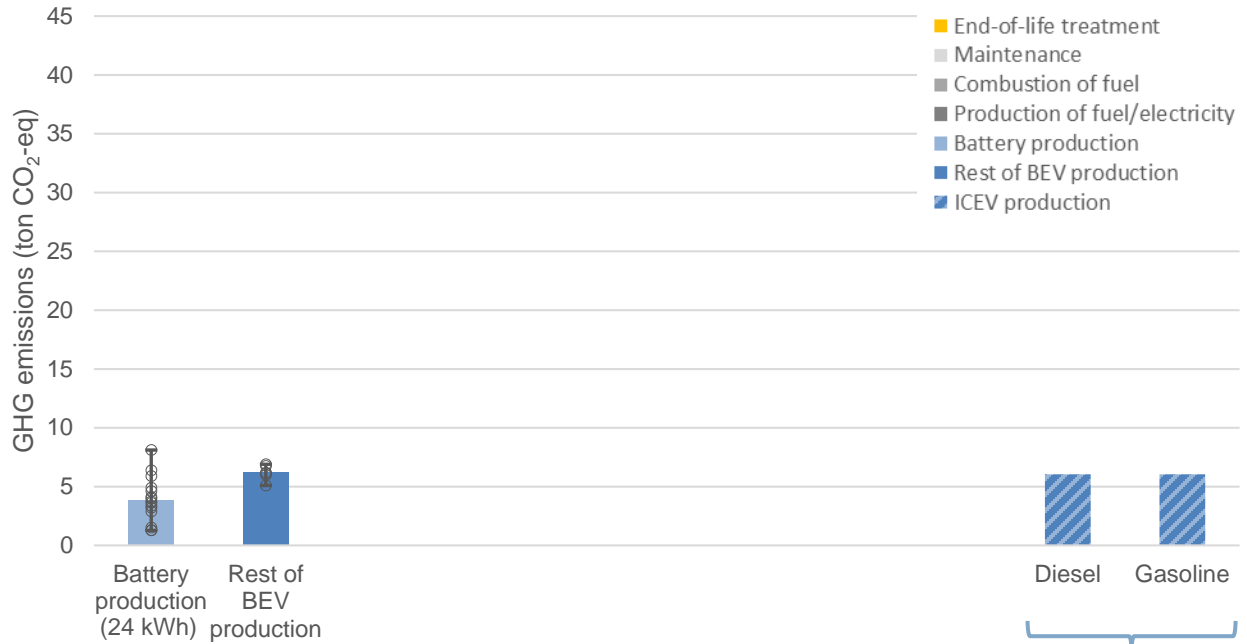
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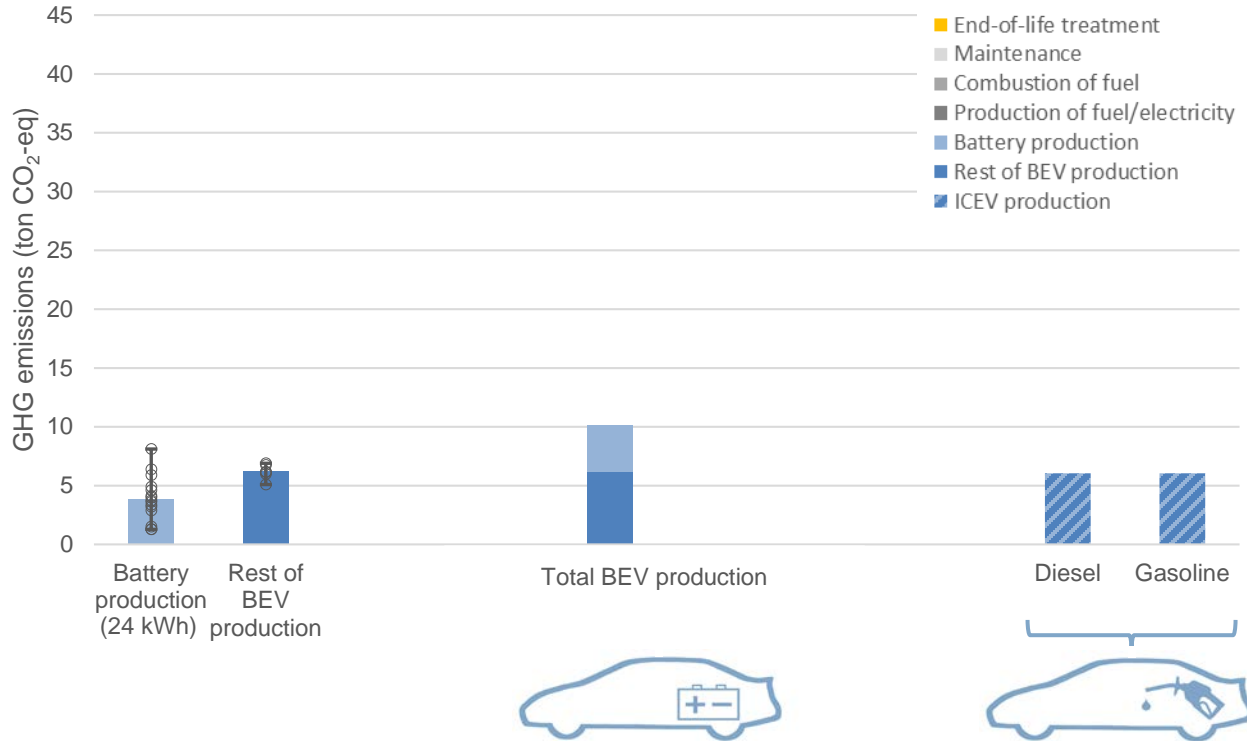
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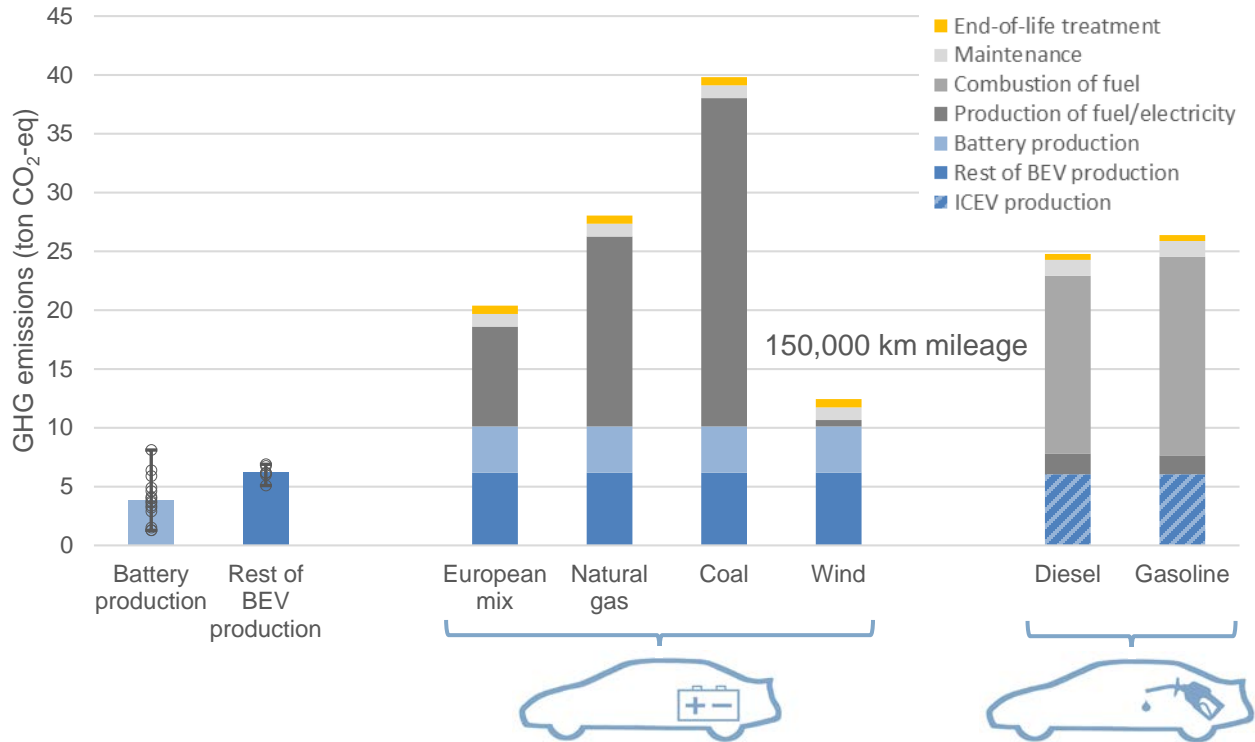
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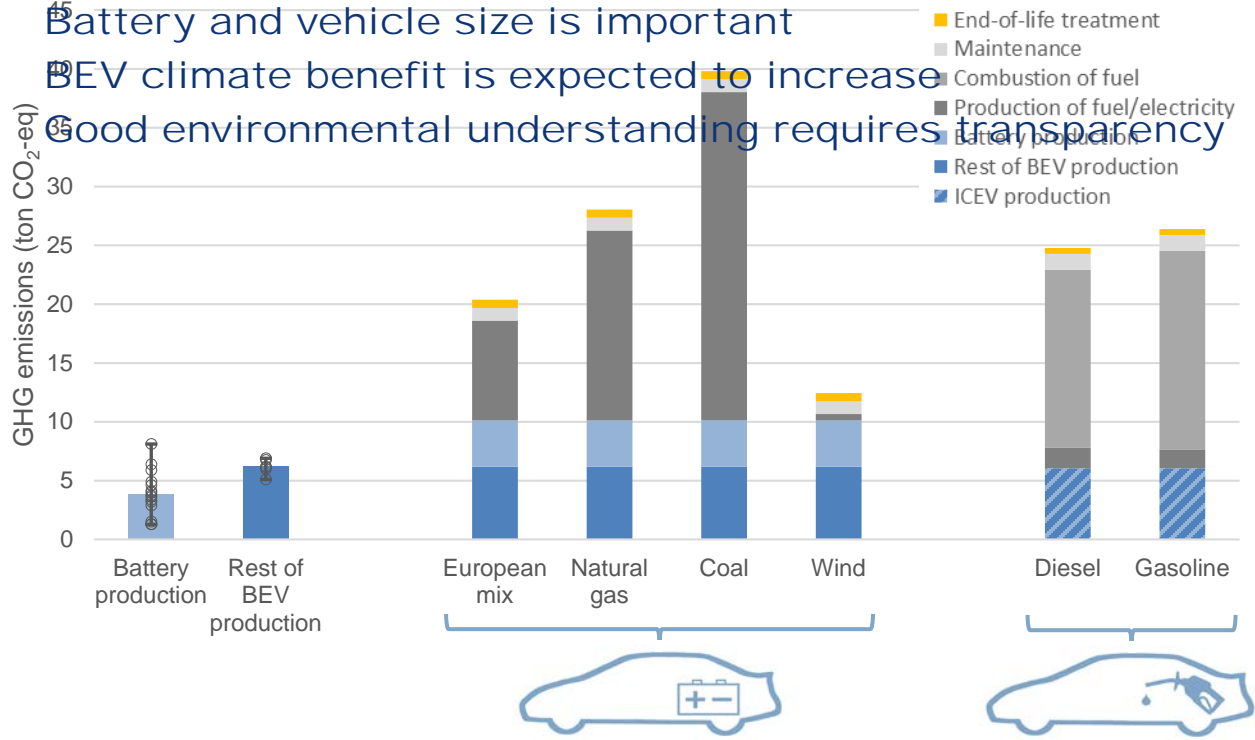
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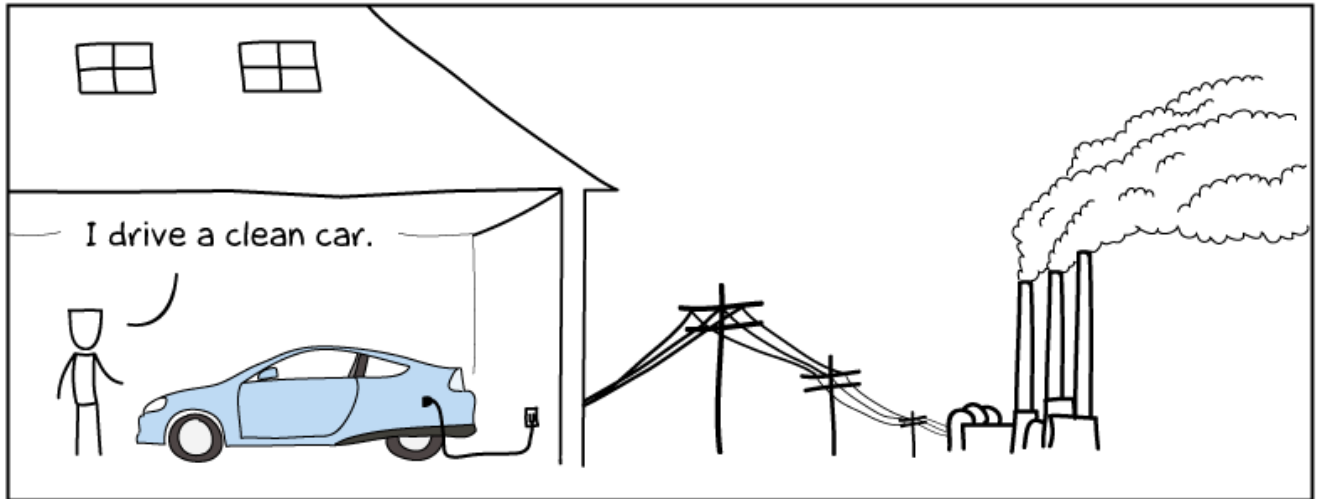
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- Battery and vehicle size is important
- BEV climate benefit is expected to increase
- Good environmental understanding requires transparency



Thank you!



Underlying data and assumptions

Lifetime: 150,000 km

Energy consumption based on Ford Focus and VW Golf (electric and conventional)

- 16.0 Wh/100 km for the BEVs (accounting for efficiency of the battery (95%), electric motor (95%), and inverter (97%))
- 3.8 l/100 km for the diesel vehicle
- 4.8 l/100 km for the gasoline vehicle

Electricity carbon intensity (including transmission and conversion losses)

- European electricity mix: 353 g CO₂-eq/kWh
- Natural gas-based electricity: 671 g CO₂-eq/kWh
- Coal-based electricity: 1160 g CO₂-eq/kWh
- Wind-based electricity: 23 g CO₂-eq/kWh

Fuel carbon intensity

- Gasoline:
 - WTT: 225 g CO₂-eq/l
 - TTW: 2371 g CO₂-eq/l
- Diesel:
 - WTT : 308 g CO₂-eq/l
 - TTW: 2653 g CO₂-eq/l

Li-ion battery pack: 24 kWh