



INTRODUCTION

You may know from your own experience that high computation load reduces the battery range of our cell phones.

But what about vehicles?

That's the question we were asking ourselves: to which extent does high payload reduce the driving range of electric vehicles?

Our domain experts team looked at this for you and conducted a short study on the influence of payload or vehicle mass on the driving range of a sedan passenger car, light and heavy commercial vehicles.

To give you a short answer: yes, payload significantly impacts battery range.

We found a relative loss in driving range of around 5% to almost 40%, at the maximum allowed payload, for different types of vehicles.

METHODOLOGY

We studied the following vehicles based on publicly available specifications when available:

- Compact executive sedan passenger car
- Small van with curb mass < 2t
- Short wheelbase van with curb mass > 2t
- Long wheelbase van with curb mass close to 2,5t
- 7,5 t truck
- 18 t truck
- 26 t truck
- Articulated truck

Through simulation, we computed a representative trip profile for each vehicle type, as follows:

- The sedan passenger car virtually drove a total of 100 km in 2 hours, in a typical mix of city driving, country roads and highways in Germany with a peak speed of 180 km/h.
- All light commercial vehicles (LVCs) drove a simulated 3,5-hour trip with 267 km in length including highway driving.
- The trucks did a typical long-distance trip of 4,4 hours and 313 km.

We have made assumptions for some of the vehicles that are not available on the market yet.

We generally computed the impact of the maximum allowed payload. For the LCVs, we kept the gross vehicle weight below 3,5t. For the passenger car, we examined realistic real-life scenarios.

RESULTS

Passenger car (Tesla Model 3 Performance)

Passenger car scenario	Additional mass	Driving range impact
Driver alone	Reference point	0
Driver + adult passenger	+ 70 kg	-2%
Driver + 2 passengers (1 adult, 1 child)	+ 110 kg	-3%
Driver + 3 passengers (1 adult, 2 children)	+ 150 kg	-4%
Driver + 4 passengers (1 adult, 3 children) + luggage	+ 290 kg	-9%

Commercial vehicles

Vehicle type	Typical vehicle model	Payload	Range impact
Small van	E-Berlingo (Citroen)	350 kg	-5%
Short wheelbase van	E-Dispatch (Citroen)	1 000 kg	-11%
Long wheelbase van	E-Relay (Citroen)	1 000 kg	-8%
Luton box van	*	700 kg	-4%
7.5-ton truck	*	2 800 kg	-12%
18-ton truck	*	9 000 kg	-25%
26-ton truck	*	1 5000 kg	-32%
Articulated truck	E-Actros (Daimler)	24 000 kg	-39%

*At the time of the study, there was no vehicle on the market. Assumed specifications.

Our Virtual Mass Sensor measures vehicle mass continuously, enabling reliable range prediction.

Read more about [COMPREDICT's Virtual Sensor for vehicle mass and payload](#).