evs 27

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Electric vs Conventional vehicles for logistics: a Total Cost of Ownership

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Vrije Universiteit Brussel

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In collaboration with EVAAP EDTA

Supported by European Commission

Solution for sustainable city distribution?

Emissions of local polluants	Emissions of noise	Emissions of greenhouse gas
		
→50% of fine particles emissions →30% of nitrate oxides emissions	→5dB louder than cars	→25% of CO2 emissions

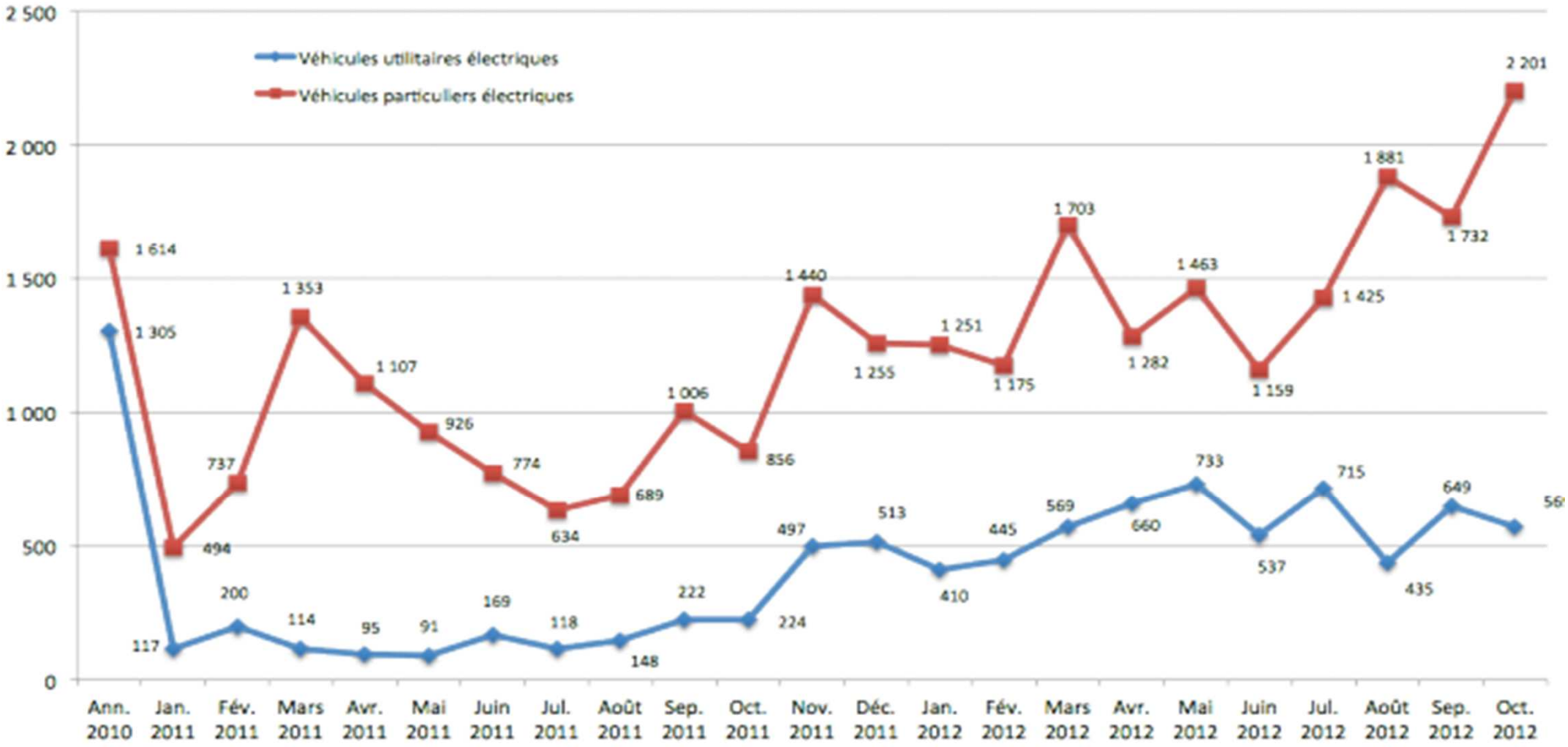
Solution for sustainable city distribution?

Emissions of local polluants	**Emissions of noise**	**Emissions of greenhouse gas**
		
✓Emissions free	✓Noise free	✓Depends on energy mix of the grid

Solution for sustainable city distribution?

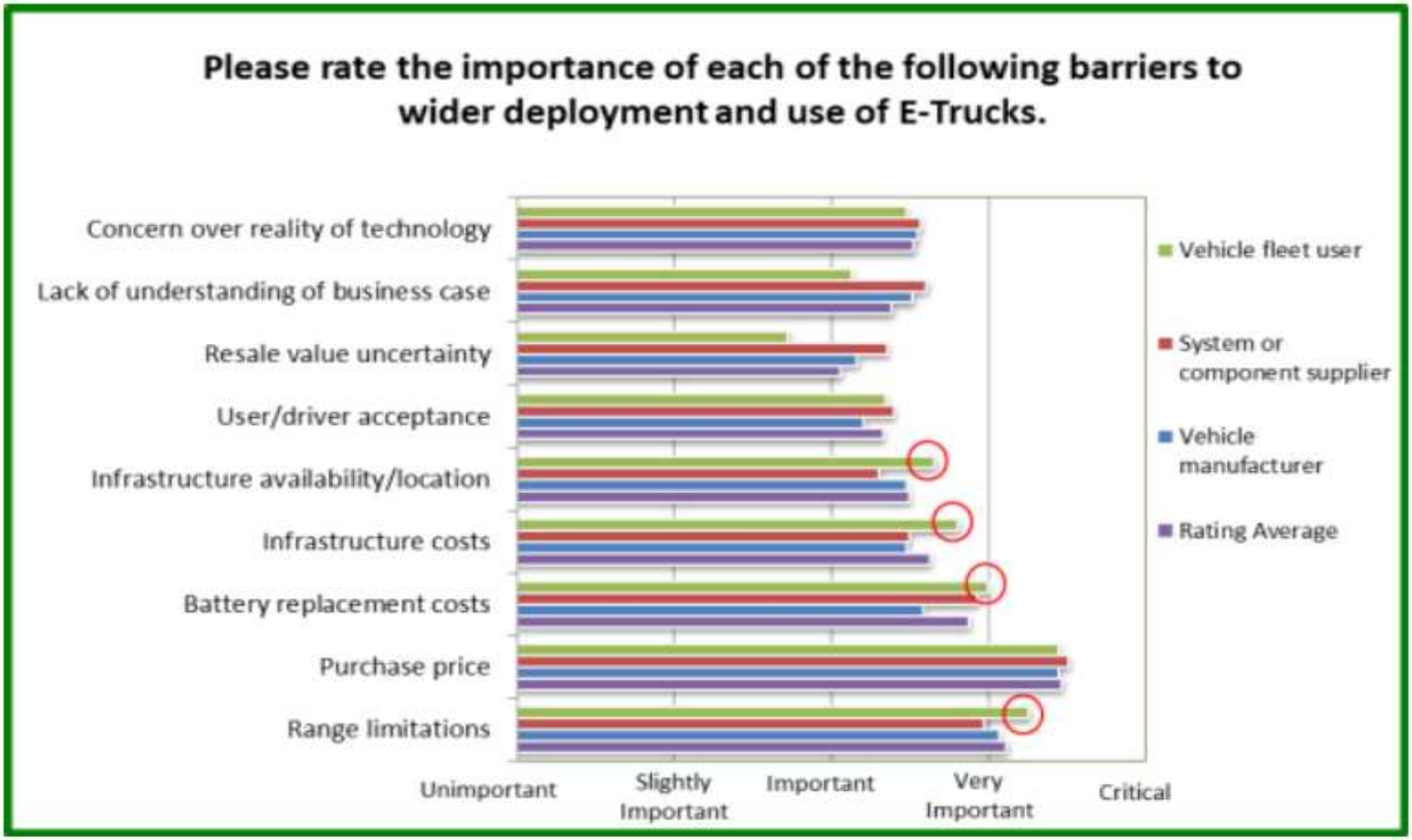
- **Limited range** is not a problem for operating the last miles
- More **efficient energy consumption** in urban environment
- **Low operating costs**

Solution for sustainable city distribution?



Source: AAA (2012)

Main barrier: purchase price



Source: Amburg & Pitkanen (2012)

Total Cost of Ownership methodology

Objective:

Comparing the different cost structures of the vehicles, based on the Present Value (PV):

$$PV = A^t \times \frac{1}{(1+I)^t}$$

I = Real discount rate

t = Time (expressed in number of years)

A^t = Amount of one-time cost at a time t

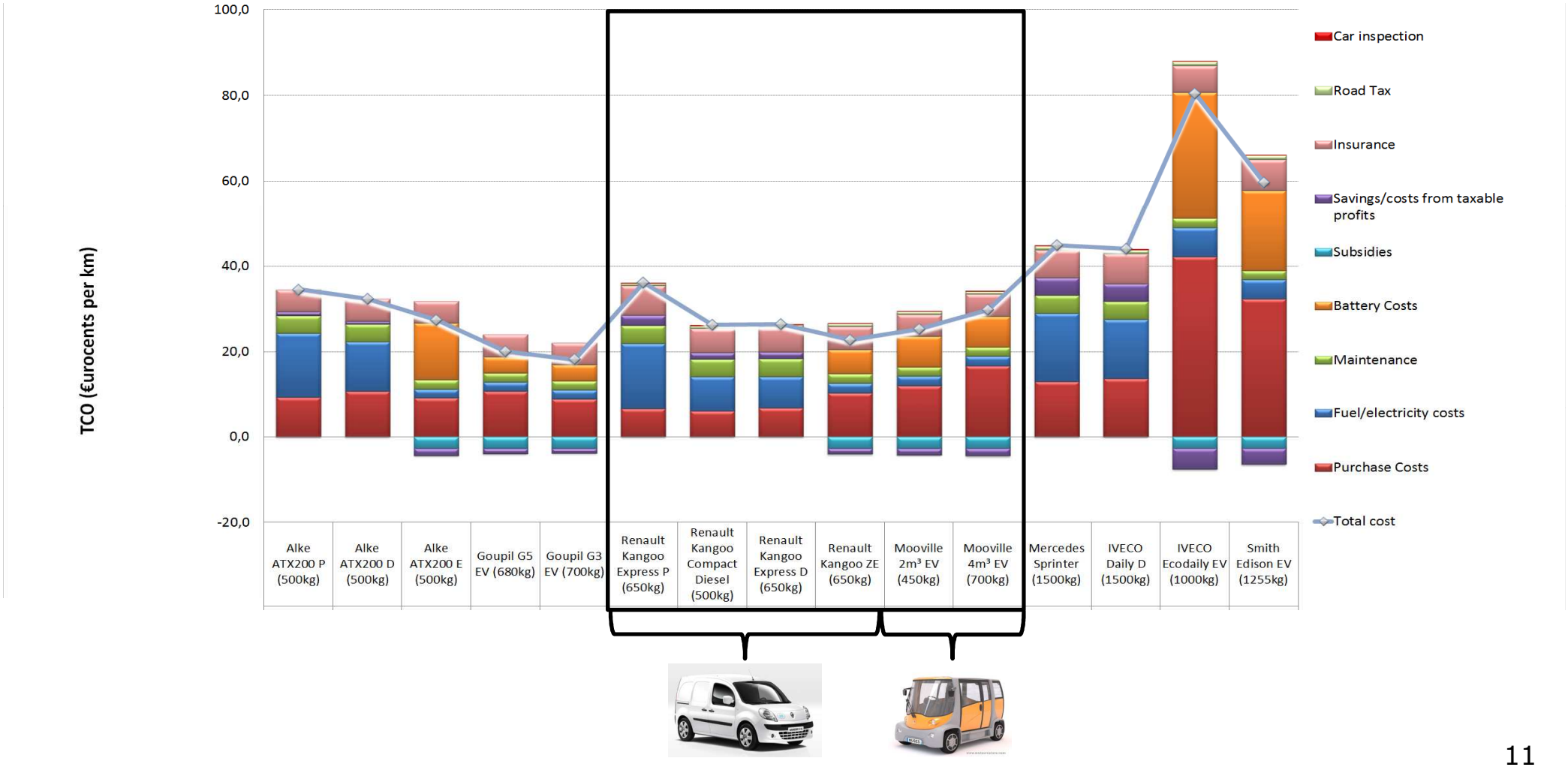
Electric Vehicles assessed in the TCO model

Results in three categories

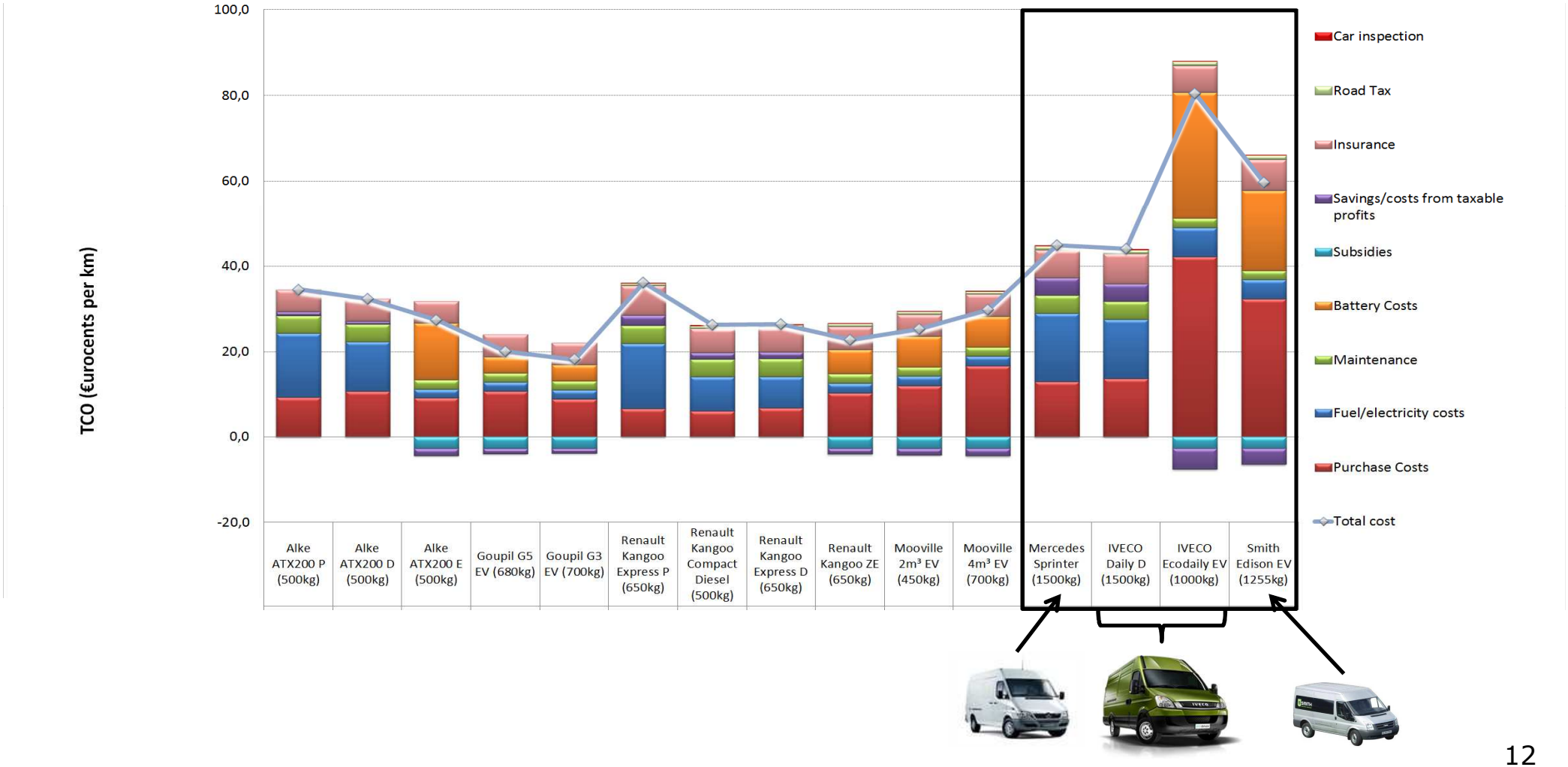
- Category of quadricycles
- Category of light LCVs (paylaod less than 1.000 kg)
- Category of heavy LCVs (payload more than 1.000 kg)

Results: category of Quadricyles

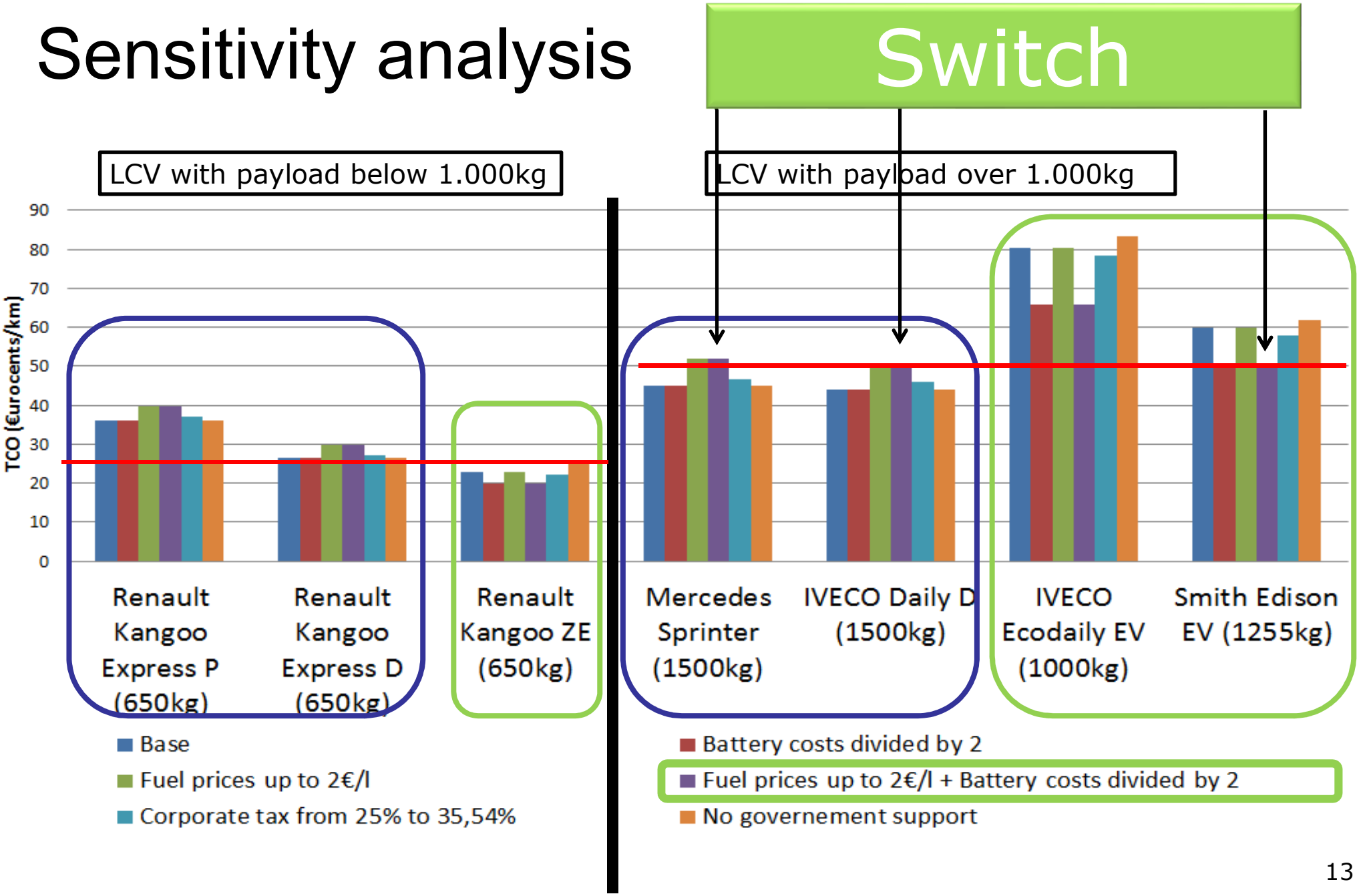
Results: category of LCV (payload **less** than 1,000kg)



Results: category of LCV (payload **more** than 1,000kg)



Sensitivity analysis



Possibility of a scenario with a combination of:

- Fuel prices up to 2€/l and

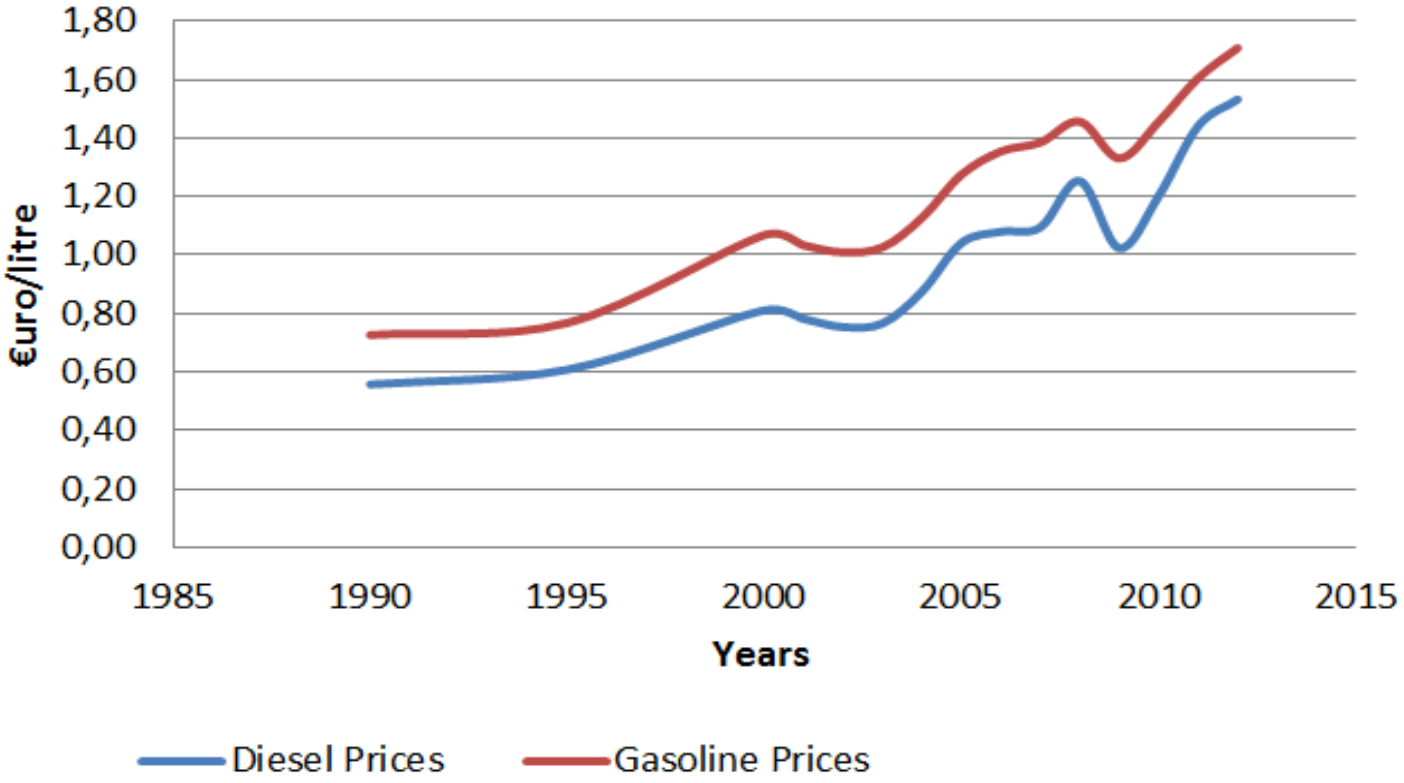
- Battery cost divided by 2

?

Battery costs devided by two: expected by 2020

Source: PRTM Analysis (2010)

Fuel prices up to 2€/l: ?



Source: Statbel (2013)

Conclusions

- Quadricycles: competitive
- LCV below 1,000kg payload: competitive
- LCV over 1,000kg payload: not competitive yet

The cost barrier start being tackled for the segment of LCVs

Big OEMs coming for LCVs

Mercedes-Benz

NISSAN

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MOBI research team (VUB)