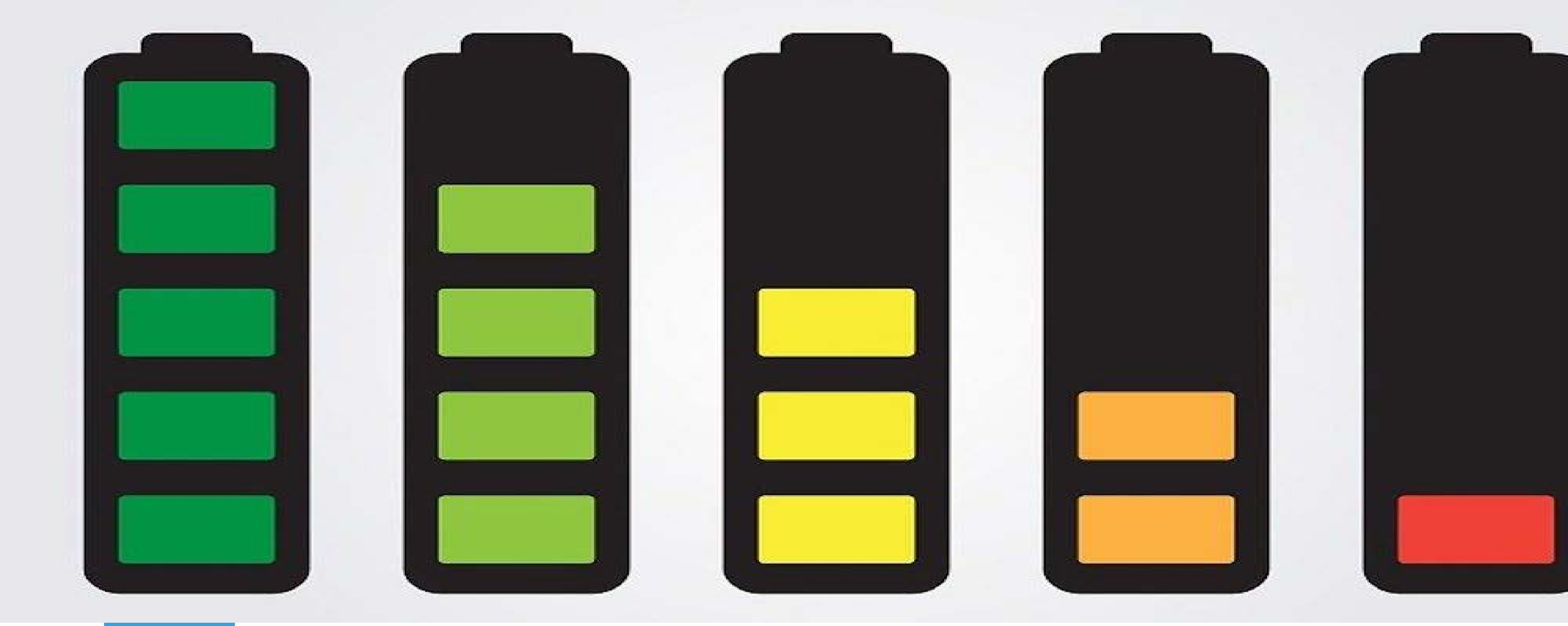

ECODESIGN BATTERIES – 2ND STAKEHOLDER MEETING
CHANGES TO DRAFT OF TASK 3

Cornelius Moll
May 2nd, 2019 – Albert Borschette Centre - Brussels

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TASK 3:

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May 2nd, 2019 – Albert Borschette Centre - Brussels

OBJECTIVES AND SCOPE OF TASK 3

Objective of Task 3

- provide an analysis of the **actual utilization of batteries**
  - in different applications
  - under varying boundary conditions

- provide an analysis of the impact of applications and boundary conditions on batteries' **environmental and resource-related performance**

Thank you for your comments!

STRUCTURE AND MAIN CHANGES IN TASK 3

3.1 System aspects in the use phase affecting direct energy consumption

- Calculation of QFU and AS
- Base Case Selection for EVs
- Base Case Parameters for EVs and ESS
- Functional system approach

3.2 System aspects in the use phase affecting indirect energy consumption

- Calculation of Losses

3.3 End-of-Life behaviour

- Parameters for Product Use & Stock Life

3.4 Local infrastructure

- Barriers & Opportunities

3.5 Summary of data and Recommendations

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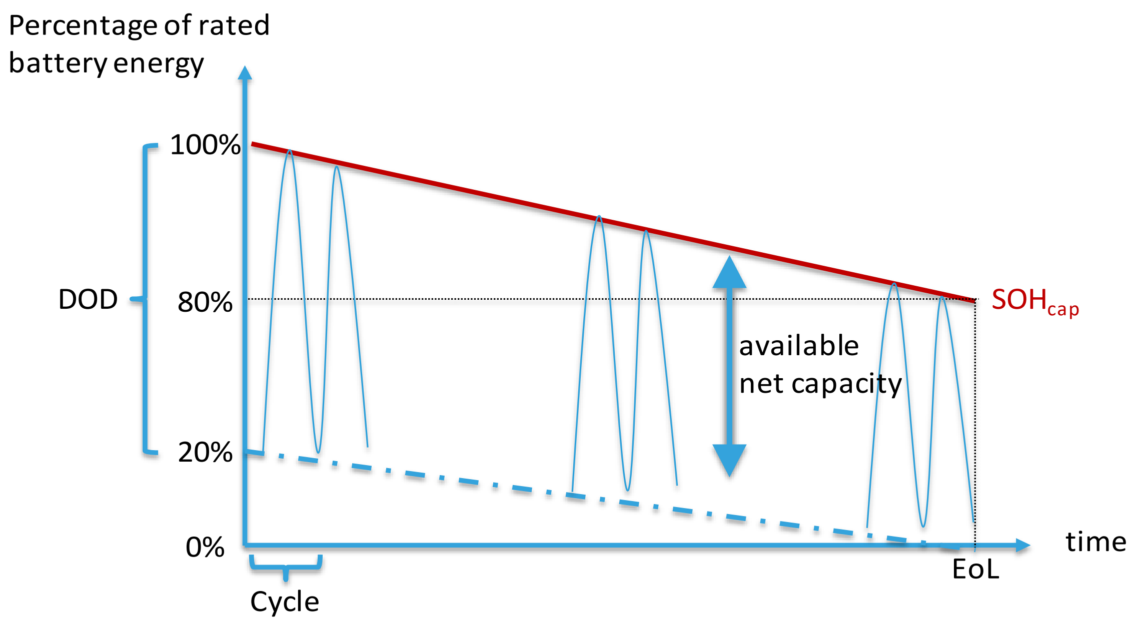
3.1. CALCULATION OF QFU

QFU = Quantity of functional units of a battery [kWh]

Maximum number of kWh a **battery** can deliver during its lifetime



$$Q_{FU} = \underbrace{\underbrace{E_{rated}}_{rated\ battery\ energy} * \underbrace{DOD}_{depth\ of\ disharge}}_{PEF\ energy\ delivered\ per\ cycle} * \underbrace{\underbrace{FC}_{full\ cycles}}_{PEF\ number\ of\ cycles} = 80\text{kWh} * 80\% * 1{,}500$$

$$= 96{,}000 \text{ FU (kWh per battery lifetime)}$$

3.1. CALCULATION OF AS

AS = Application Service Energy [kWh]

Total energy required by the **application** over its lifetime

$$AS = Lifetime\ application * \underbrace{FC_a}_{annual\ full\ cycles} * E_{rated} * DOD$$

$$= 13a * 60 * 80kWh * 80\% = 49{,}920\ kWh$$

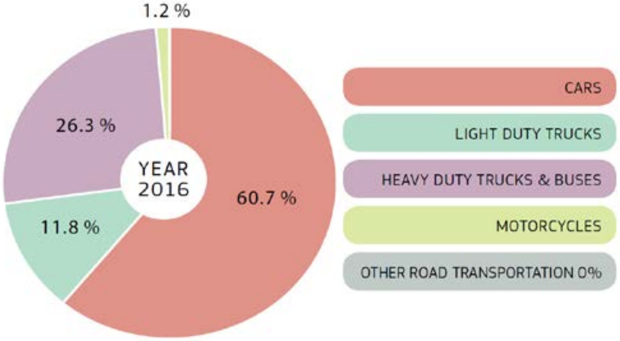
$$AS_{EV} = Lifetime\ application * annual\ all\text{-}electric\ VKT * energy\ consumption * (1 + recovery\ braking)$$

$$= 13 * 14{,}000 * 0{,}20 * (1 + 20\%) = 43{,}680\ kWh$$

3.1. SELECTION OF BASE CASES

Stakeholder comment:

"Buses and heavy duty trucks are listed as the second largest GHG emitter, but buses are excluded... Batteries for buses should form part of this study."



Registration figures of buses and trucks in the EU28 in 2017: 42,000 buses vs. 370,000 trucks → buses not included

Stakeholder comments:

"While a value of 40 kWh is certainly valid as today's base case, battery capacity is fastly evolving ..."
"We still are in the early stages of BEV offering. But as this market develops, it makes sense that passenger cars and light commercial vehicles share the same platforms, ..."
Suggestion of differentiating short-, mid- and long-range BEV

We substituted base case "Light commercial vehicles" and "Passenger BEV" with small passenger BEV (40 kWh) and medium to large passenger BEV (80 kWh)

Stakeholder comment:

"The study needs to also consider HDTU BEV in addition to HDTU PHEV. ... with battery capacities of ~800 kWh"

To our knowledge, besides Tesla, no other truck manufacturer has announced BEV HDT or HDTU with such high battery capacities → HDT BEV capacity increased to 360 kWh

3.3. END-OF-LIFE BEHAVIOUR

End of life behaviour product use and stock life

	Service life (in full cycles)			Service life (in years)		
	Application	Maximum battery performance		Application	Maximum battery performance	
passenger BEV (medium to large)	683	1,500		13	20	
passenger BEV (small)	924	1,500		14	20	
passenger PHEV	2,730	2,000		13	20	
HDT BEV	3,267	2,000		14	20	
HDTU PHEV	9,275	3,000		12	20	

THANK YOU FOR YOUR ATTENTION

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