



eLCAr

Chapter 6

Scope and LCI modelling framework

Second eLCAr Workshop
Aachen, October 9th 2012

A. Del Duce, T. Dettmer, P. Egede, G. Öhlschläger, H.-J. Althaus

Project Consortium:



This project is supported by the European Commission under the Environment (including climate change) Theme of the 7th Framework Programme for Research and Technological Development.

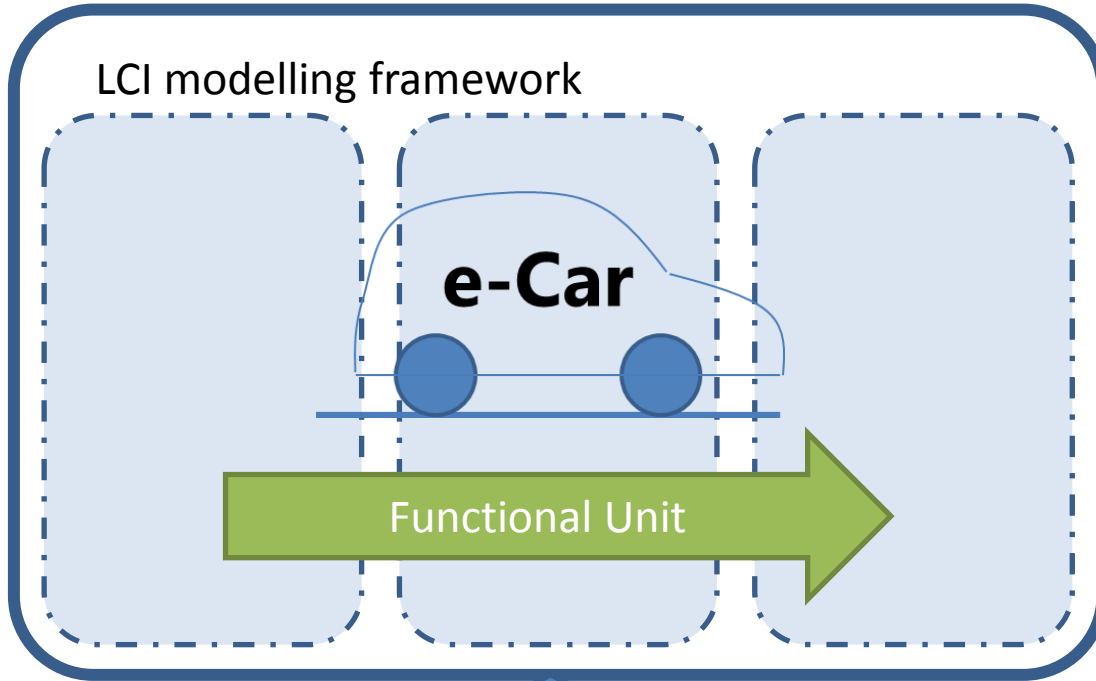


Agenda

System boundaries

LCI modelling framework

Data

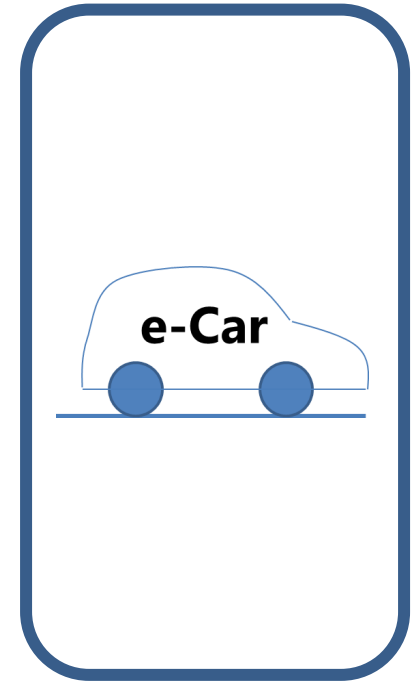


Preparing IA

Impact assessment

Comparison

vs.



Review
needs



Planning
reporting

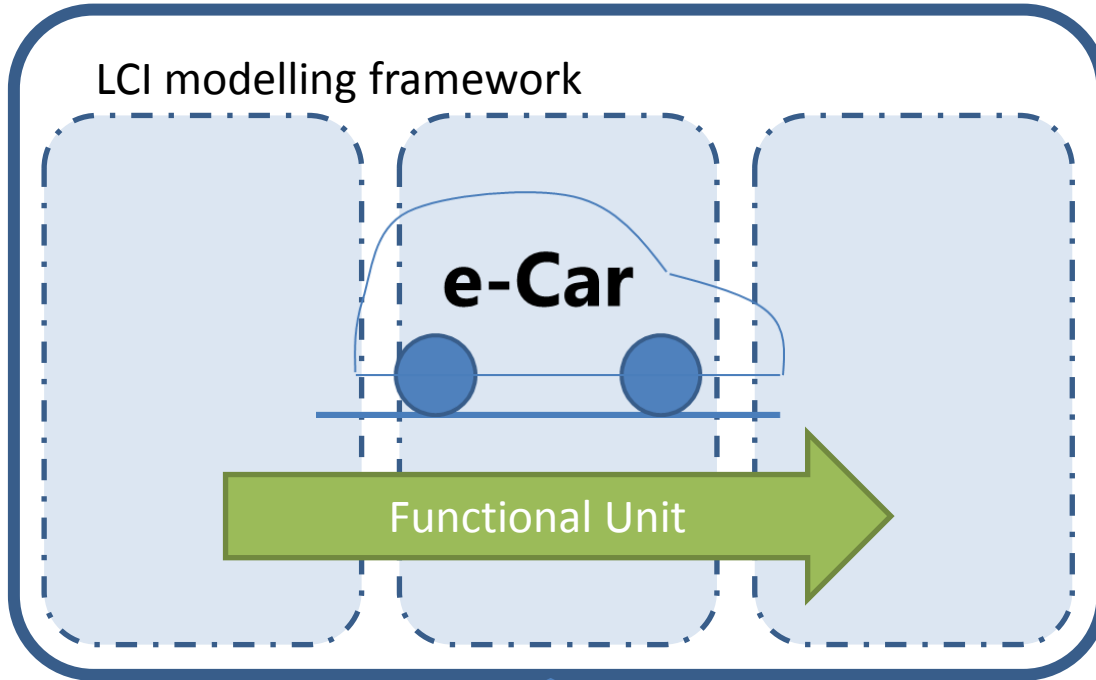


Agenda

System boundaries

LCI modelling framework

Data

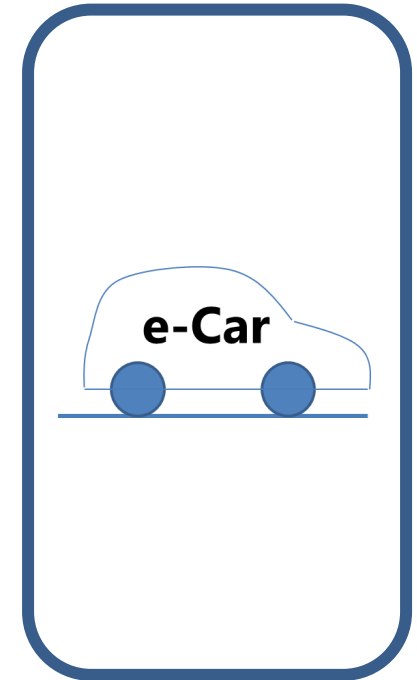


Preparing IA

Impact assessment

Comparison

vs.



Review
needs



Planning
reporting



Function, Functional Unit and Reference Flow

- A product or service might have several functions with corresponding functional units.
- For one LCA only one functional unit can be selected for which the reference flow must be defined.

Example: Comparison of batteries for EVs

Functions: Transport, Prestige, ...
 Functional unit: Transport of 240'000 km
 Battery types:

Battery A
240'000 km

Battery B
180'000 km

Reference flow

1 Battery A

1,33 Battery B

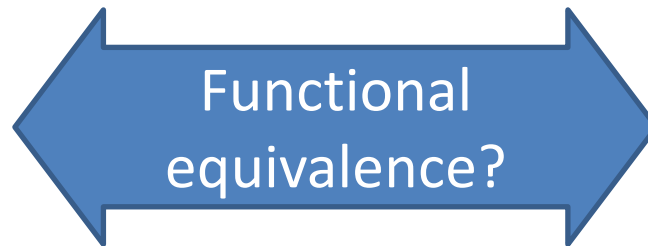
Function, Functional Unit and Reference Flow

Lead acid car battery

- 12 V
- 100 Ah
- 23 kg
- 52 Wh/kg

Tesla roadster battery

- 375 V
- 140 Ah
- 450 kg
- 118 Wh/kg



Function, Functional Unit and Reference Flow

Lead acid car battery

- Range: 400 km
- Battery mass: 2120 kg
- Battery life: 50'000 km
- Vehicle mass: 2910 kg
- 27.3 kWh/100 km

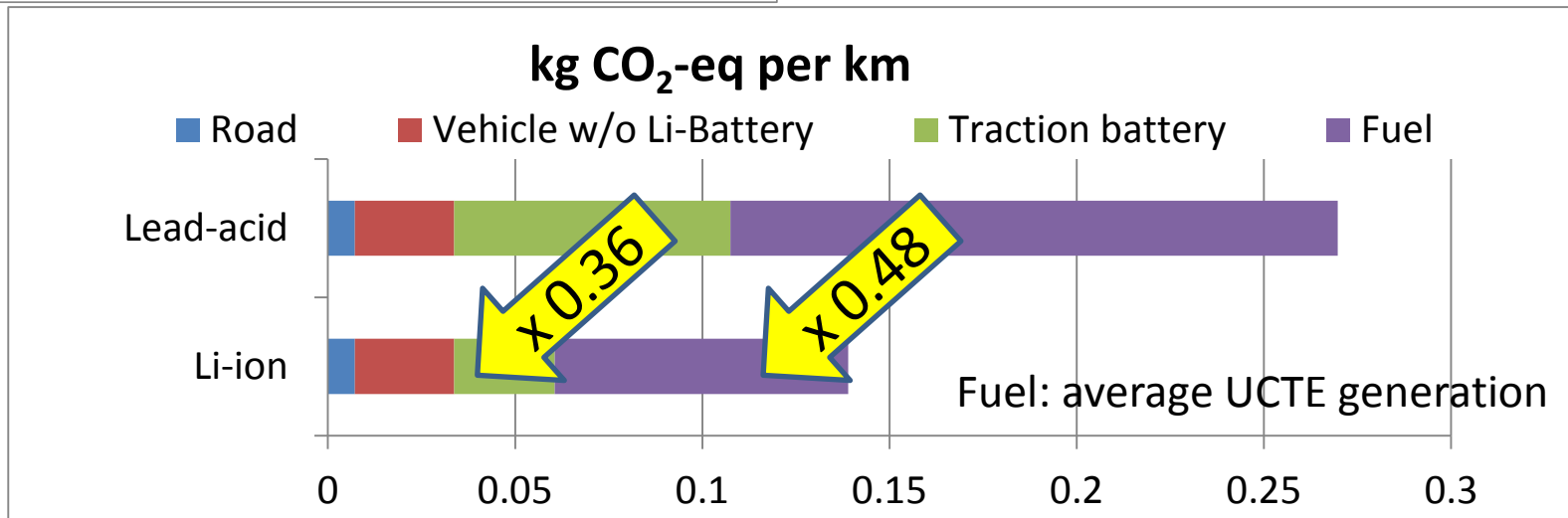
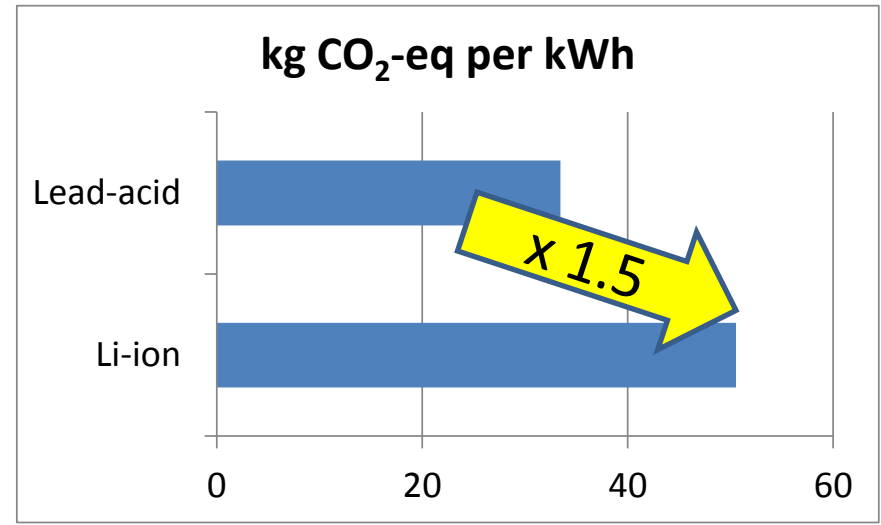
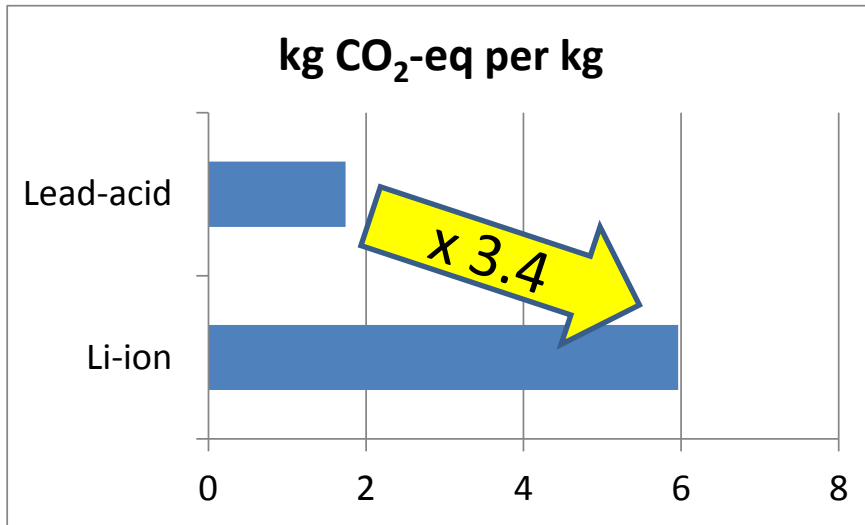


Tesla roadster battery

- Range: 400 km
- Battery mass: 450 kg
- Battery life: 100'000 km
- Vehicle mass: 1240 kg
- 13.2 kWh/100 km

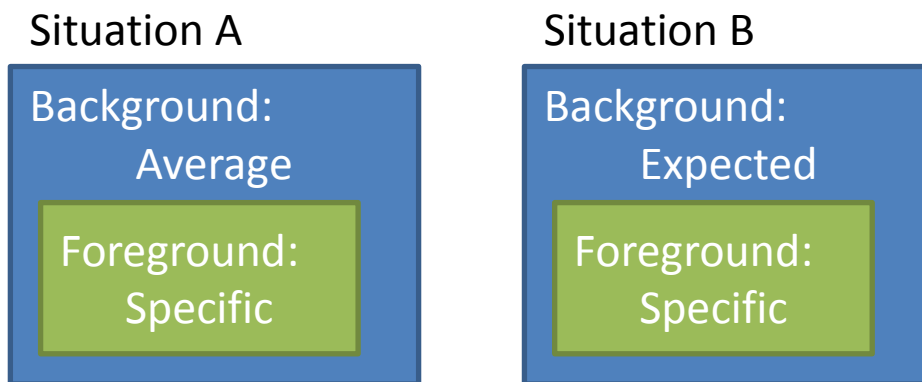


Function, Functional Unit and Reference Flow



Life Cycle Inventory Modelling Framework

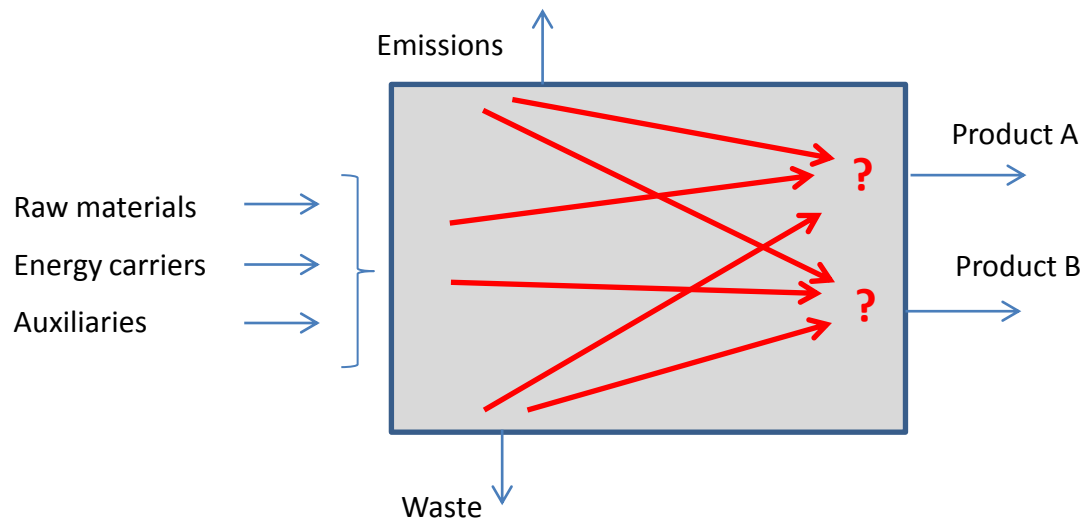
- General Life Cycle Model
 - Choose situation A or B



- Comparative studies
 - Include best and worst case scenarios
- Multifunctionality

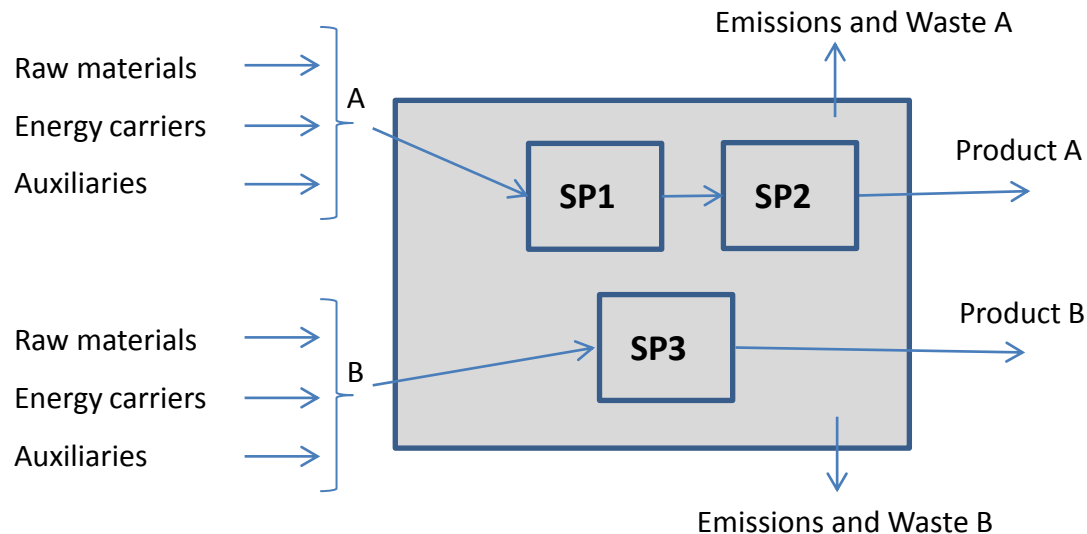
Multifunctionality

- 1st: Subdivision (including virtual subdivision)
- 2nd: System expansion and substitution
- 3rd: Allocation



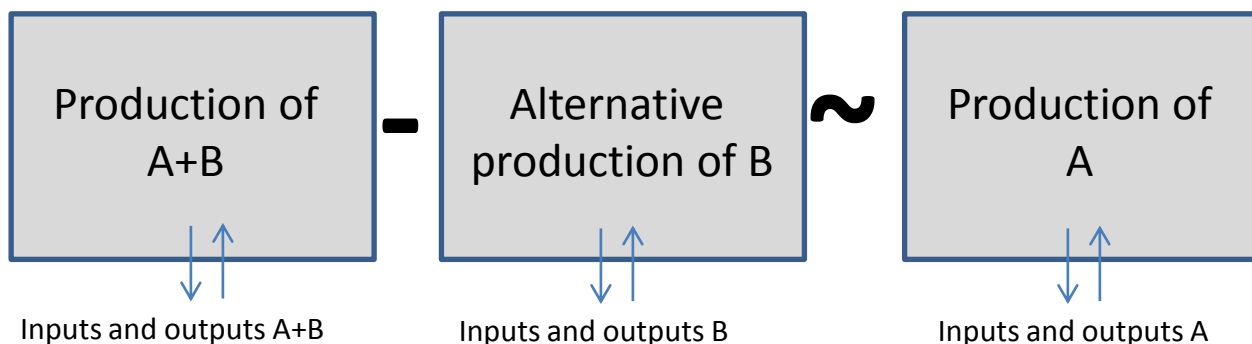
Multifunctionality

- **1st: Subdivision (including virtual subdivision)**
- **2nd: System expansion and substitution**
- **3rd: Allocation**



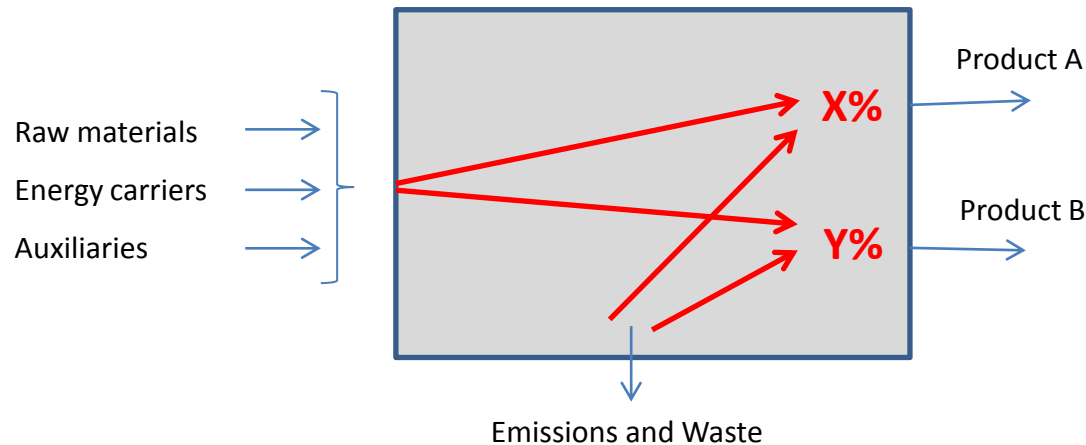
Multifunctionality

- 1st: Subdivision (including virtual subdivision)
- **2nd: System expansion and substitution**
- 3rd: Allocation



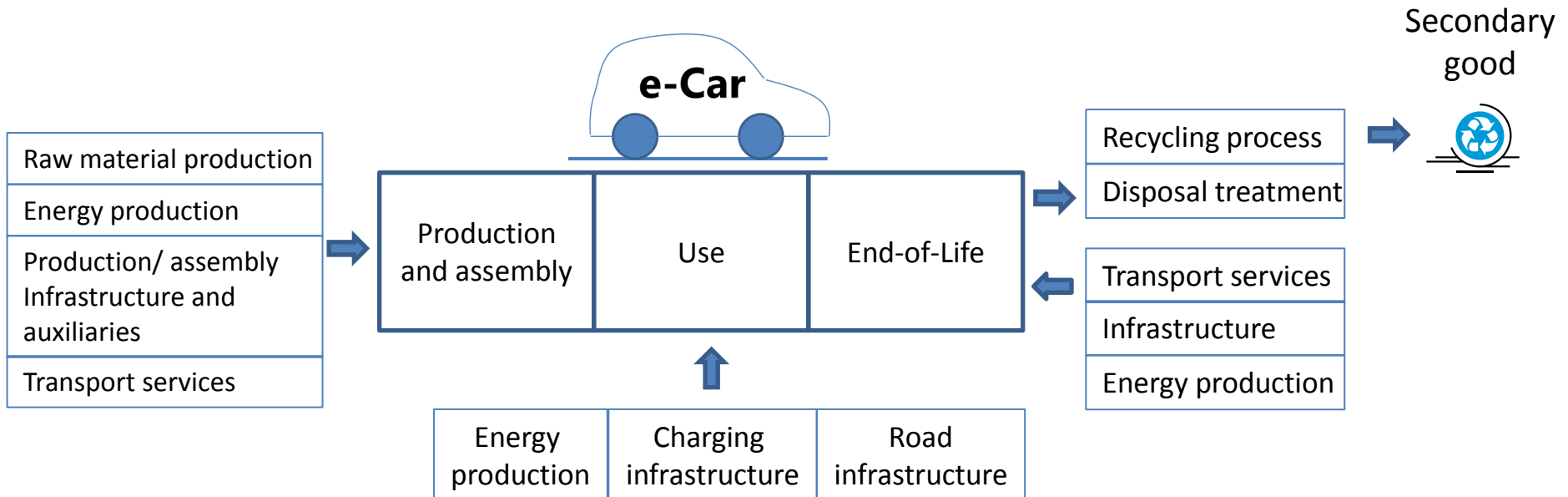
Multifunctionality

- 1st: Subdivision (including virtual subdivision)
- 2nd: System expansion and substitution
- **3rd: Allocation**

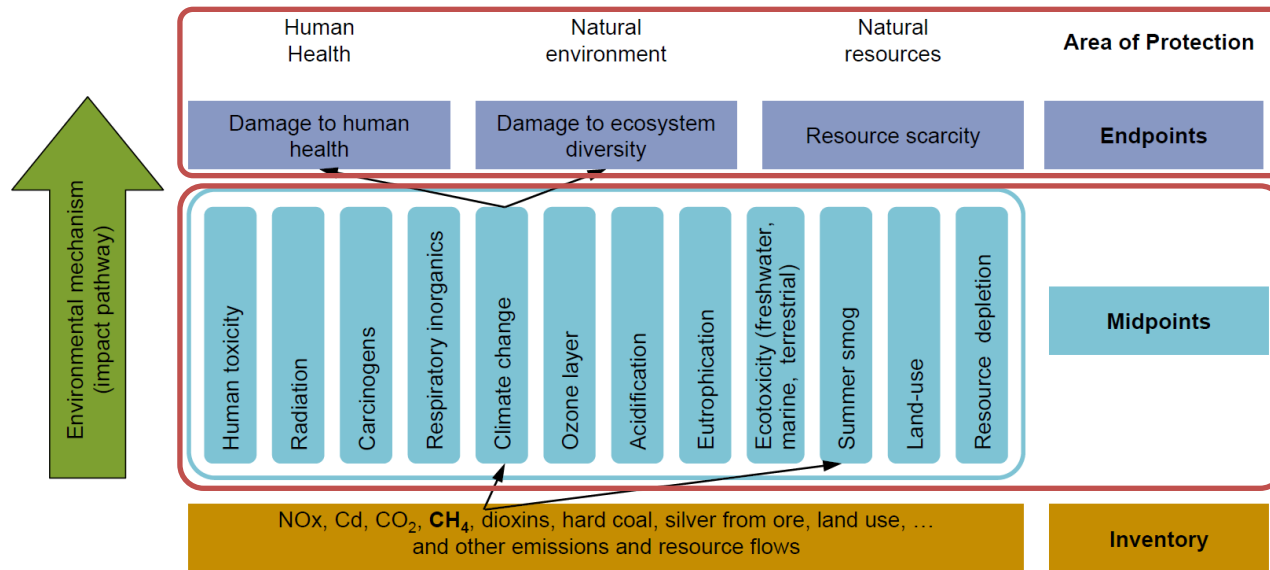


System boundaries

- All processes required to provide function
- Whole vehicle must be considered
- Cradle to grave analysis
- Normal behavior should be modelled
- Cut off criteria defined in iterative approach



Preparing the basis for the impact assessment



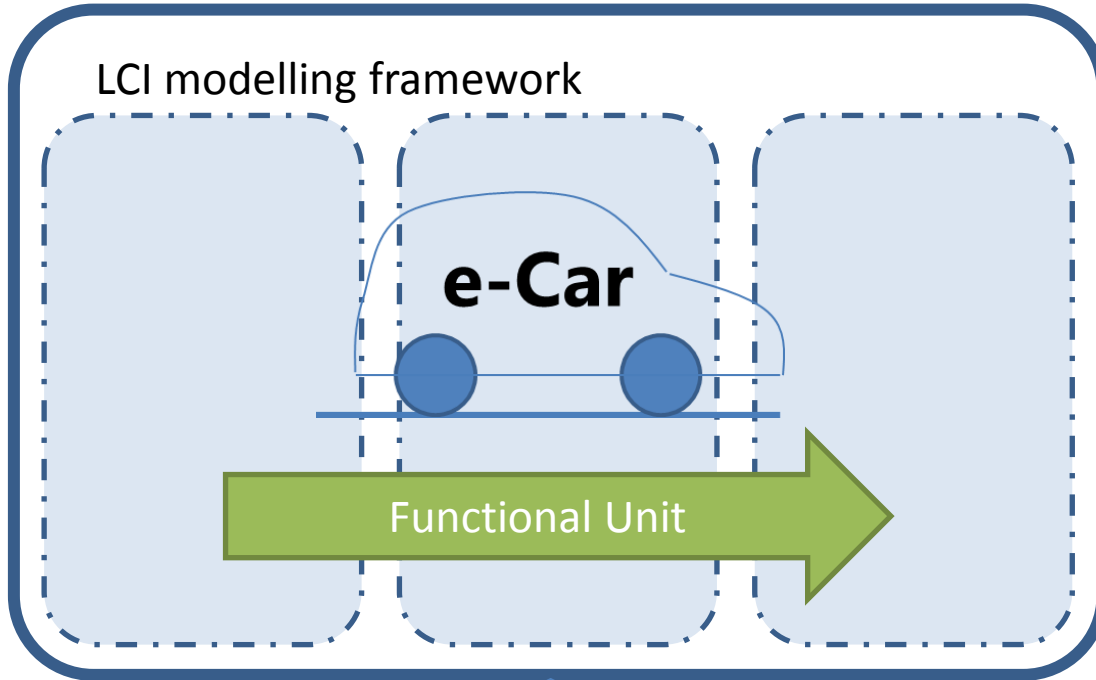
- Framework and requirements for LCIA models indicators
 - Recommendations for LCIA in the European context
- As discussed in Workshop 1:
- For comparisons: Focus on categories with large differences
 - If possible no use of single score methods

Agenda

System boundaries

LCI modelling framework

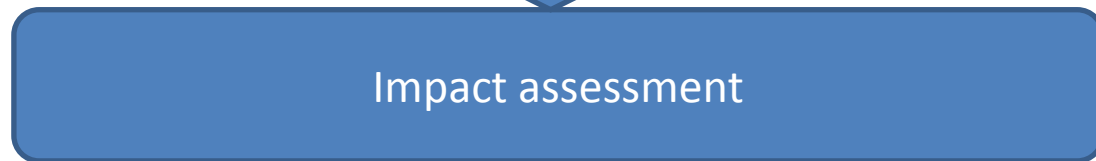
Data



Preparing IA

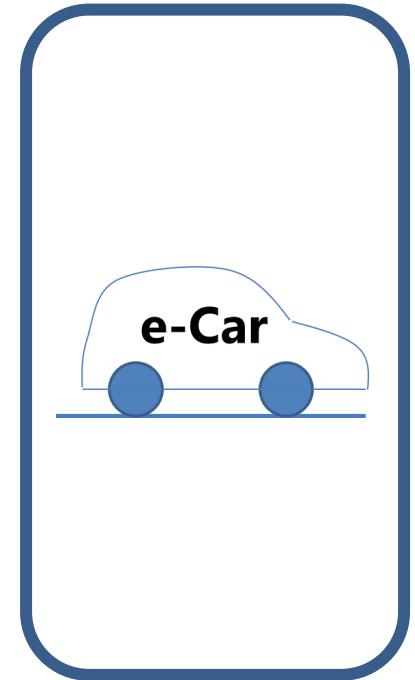


Impact assessment



Comparison

vs.



Review
needs



Planning
reporting



Technological, Geographical and Time-related scope and data representativeness



Technological representativeness



Geographical representativeness



Time-related representativeness

Comparison between systems

- Comparisons and comparison assertions
- Functional unit should be the same
- No exclusion of existing better alternatives
- No misleading goal and scope definition or assumptions
- Consistency for both systems regarding system boundaries, data representativeness, data quality, cut-off criteria, LCI modelling, LCIA methods
- Include best and worst case scenarios
- Replacement over time
- Include interested parties

Identifying critical review needs

- Goal: Identify errors, problems, inconsistencies, etc.
- Mandatory for comparative assertions
- Plan during scope definition

- „Review schemes for LCA“
- „Reviewer qualification“

- **Special review chapter to be developed**

Planning reporting

- Should be defined during scope definition
- Depends on:
 - Type of deliverables
 - Purpose and intended applications
 - Intended target audience
- Types:
 - Classical project report addressed at LCA experts
 - Data set for electronic exchange addressed at LCA experts
 - Executive summary for classical project report and publication
- Levels of reporting:
 - For internal use
 - For external use
 - Comparative assertion
- **Special reporting chapter to be developed**

Agenda

System boundaries

LCI modelling framework

Data



e-Car



Functional Unit

Preparing IA



Impact assessment

Comparison

vs.

e-Car

Review
needs



Planning
reporting





eLCAr

Chapter 6

Scope and LCI modelling framework

Thank you for your attention!

Project Consortium:



This project is supported by the European Commission under the Environment (including climate change) Theme of the 7th Framework Programme for Research and Technological Development.

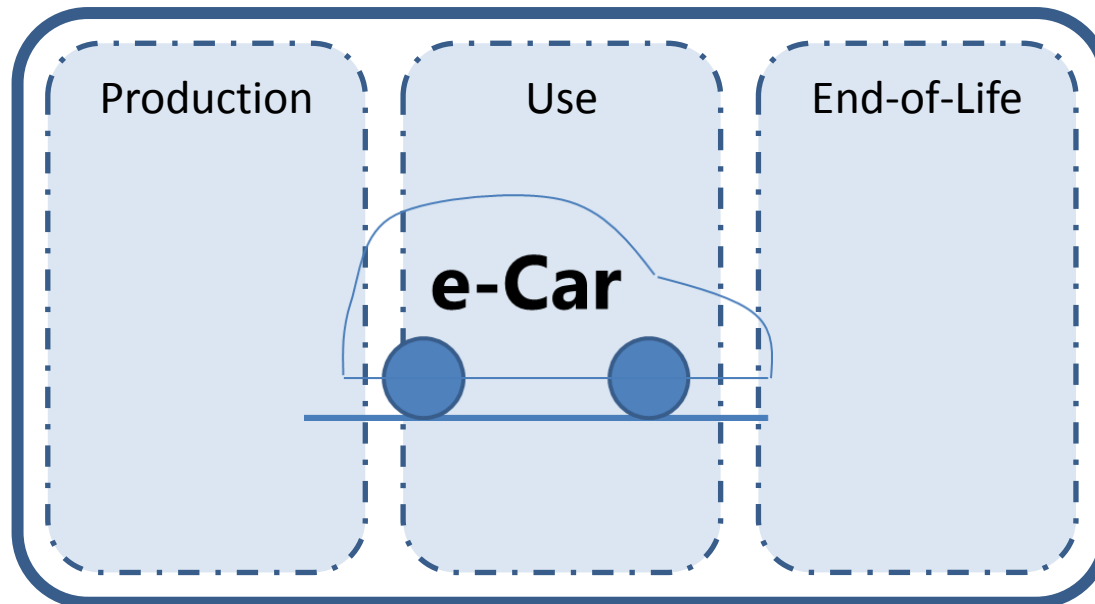


Preview of Chapter 7

LCI Analysis

- Identifying processes with the system boundaries
- Planning data collection
 - Foreground and Background System
- Collecting data
 - Unit processes
 - Data gaps and future technologies
- Solving multifunctionality
- Modelling the system
 - Scaling and double counting
- Calculating LCI results

Preview of Chapter 7 LCI Analysis



Example of Scope Definition

- Vehicle:
- Weight: 1200 kg
 - Range: 120 km
 - Life expectancy: 240'000 km
- Battery A: Life expectancy: 240'000 km
- Battery B: Life expectancy: 180'000 km
- Functional unit: 240'000 km driving in compact car of 1200 kg mass without battery, fuelled with average European electricity generated between 2012 and 2022, with a battery A or B and a range of 120 km per charge in real world driving

Example of Scope Definition

Multifunctionality:	ISO hierarchy
Scenarios:	-/+15% energy density and -/+30% life expectancy including all combinations
System boundaries:	Cradle to grave, initial cut-off criteria of X%
LCIA methods:	Carbon Footprint
Data:	Current technology, 2012-2022, European market
Critical review:	Technical internal audience, independent external review
Reporting:	internal detailed report