

## Consideration of LCA for Vehicle CO<sub>2</sub> Emissions

9 December 2014, Brussels



# Consideration of LCA for Vehicle CO<sub>2</sub> Emissions

## Today's Presentation

- The problem of embedded emissions
- The concept of LCA
- LCA in current practice
- Investigating policy options

# An example of embedded emissions – electric vehicle manufacturing



Vehicle manufacturing  
74 g CO<sub>2</sub>/km



Battery production  
33 g CO<sub>2</sub>/km



Basic vehicle and electric  
components 41 g CO<sub>2</sub>/km



Battery cells  
27 g CO<sub>2</sub>/km



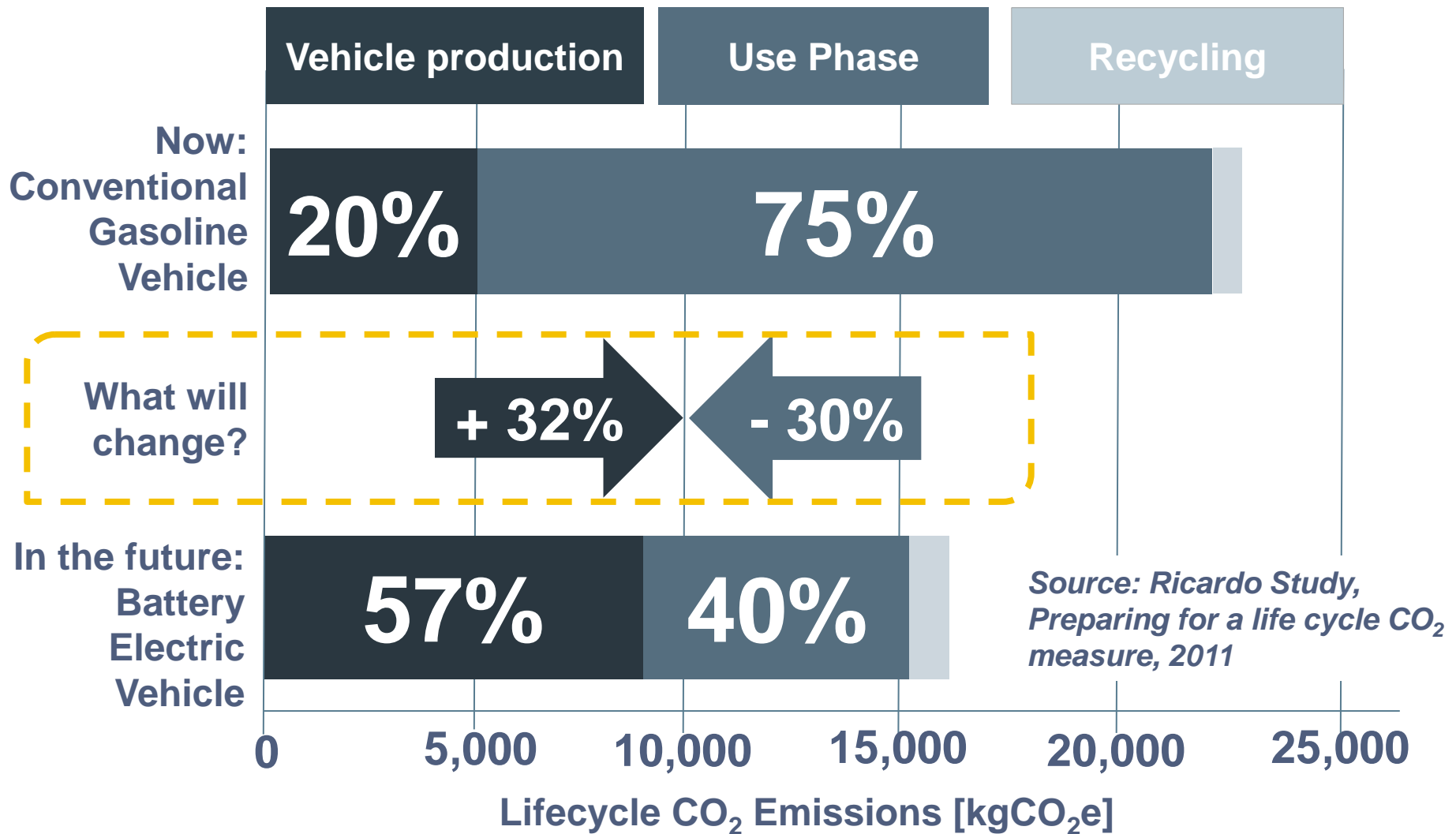
Peripherals  
6 g CO<sub>2</sub>/km



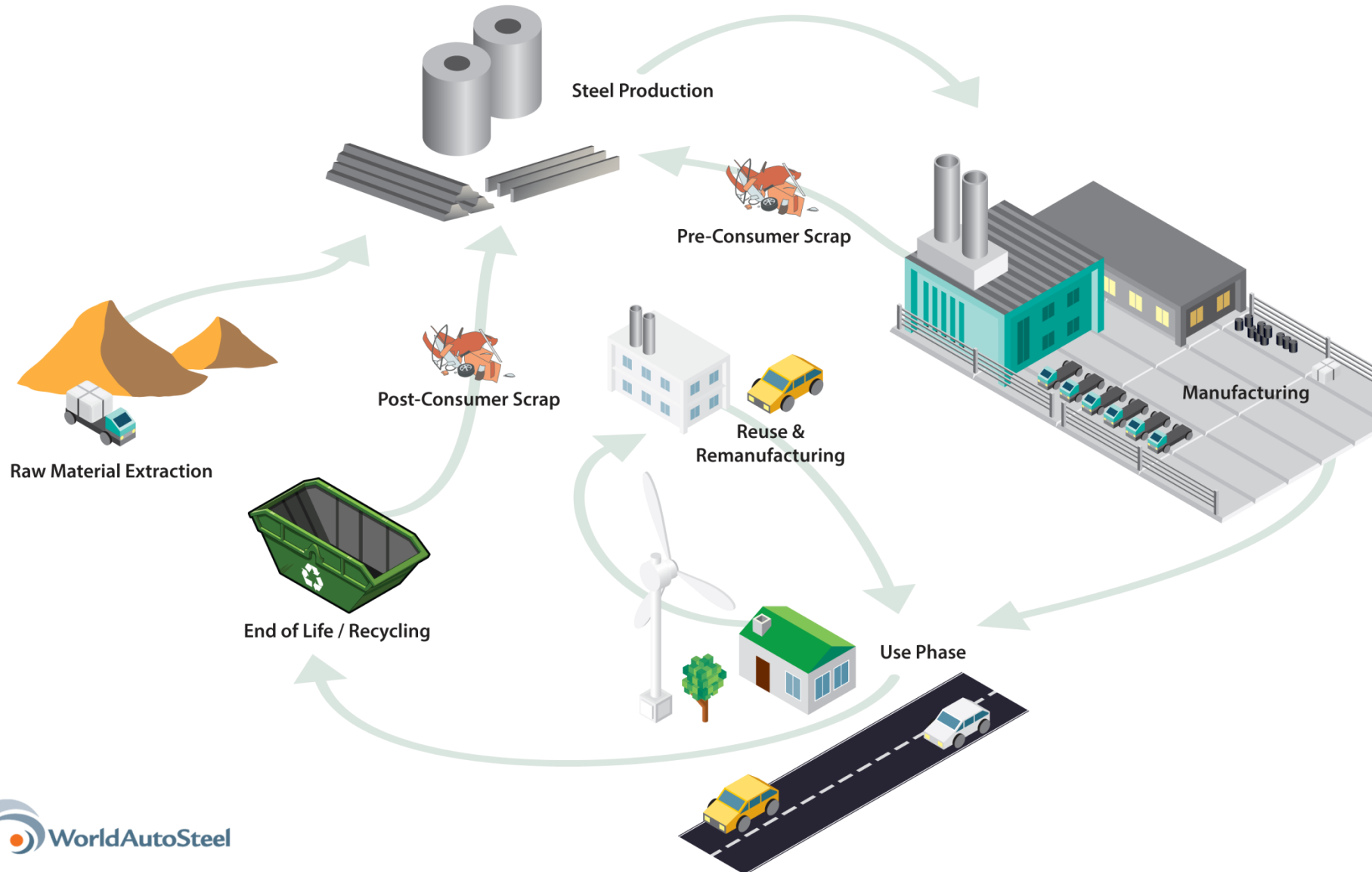
A new “fuel tank” for a new type of energy – the complexity of a lithium-ion battery pack is evident at a glance.

Source: VW

# The problem of embedded emissions – burden shift



# The concept of LCA



## LCA in current practice



Mercedes-Benz



TOYOTA



RENAULT



mazda

PSA PEUGEOT CITROËN

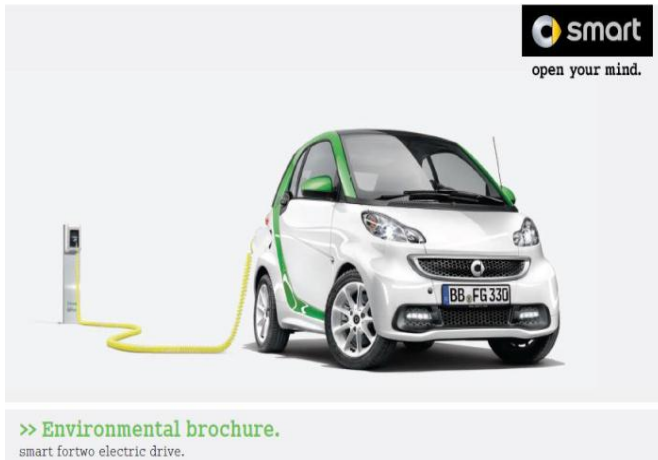
VOLVO



Audi

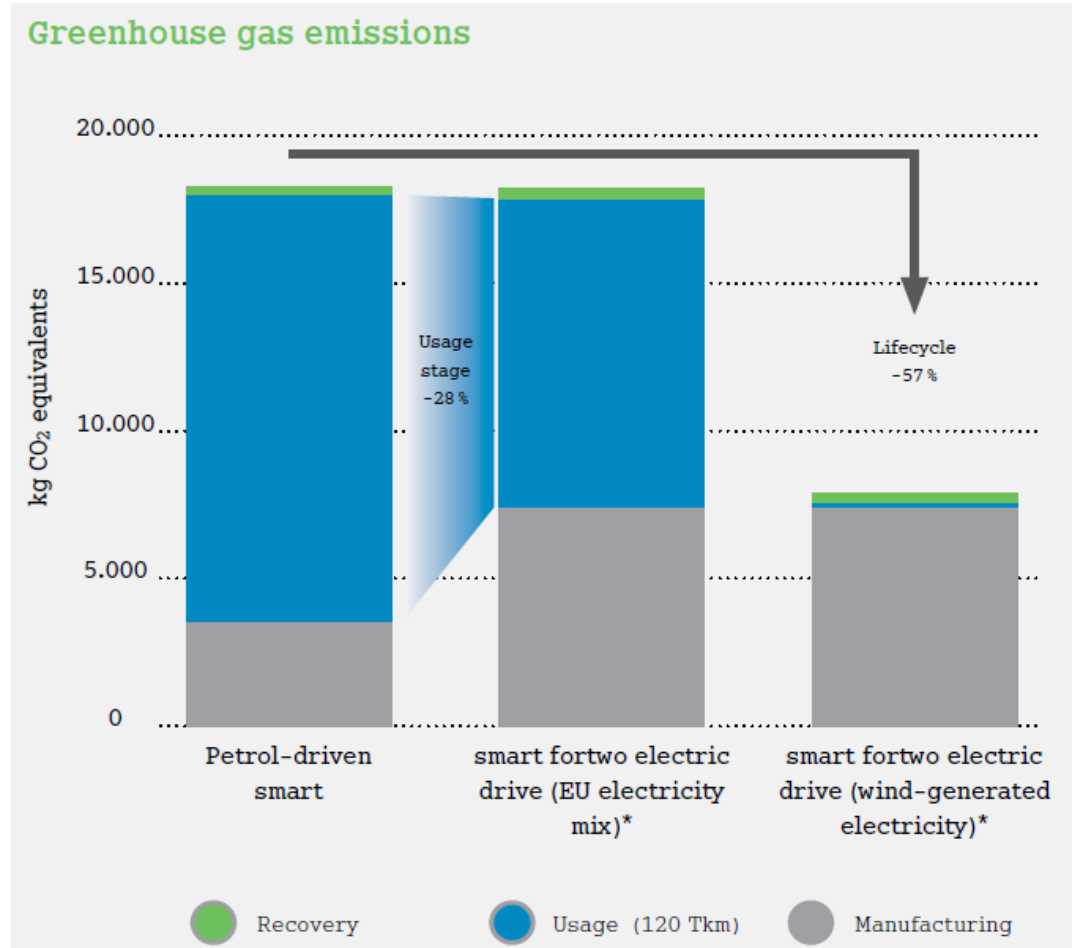
*Virtually all OEMs use LCA in their product strategies.*

# LCA in current practice



Daimler AG: Environmental brochure.  
smart for two electric drive

[https://www.daimler.com/Projects/c2c/channel/documents/2243139\\_Environmental\\_brochure\\_smart\\_fortwo\\_electric\\_drive.pdf](https://www.daimler.com/Projects/c2c/channel/documents/2243139_Environmental_brochure_smart_fortwo_electric_drive.pdf)



showing an unintended consequence and the growing relevance of production (embedded) emissions.

# LCA in current practice

Dr. Stephan Krinke: Environmentally friendly vehicles and environmental strategy of the brand Volkswagen, 19.11.2009

VOLKSWAGEN  
AKTIENGESELLSCHAFT

## Environmental Protection over the entire Life Cycle

VOLKSWAGEN  
AKTIENGESELLSCHAFT

### Volkswagen Group Environmental Principles Products

The Volkswagen Group's Environmental Principles serve as a guideline for all the Group's marques and regions, taking into account the regional possibilities. To live up to our responsibility towards customers, society and the environment, we have made the continuous improvement of the Group's products in respect of their environmental compatibility and resource conservation an integral part of our corporate policy. Our activities and processes are shaped by a prudent approach to ecological challenges.

In line with this approach, we have defined the following objectives:

- 1. Climate protection**
  - reduce greenhouse gas emissions
  - reduce fuel consumption in the driving cycle and over the vehicle's service life with the customer
  - support fuel-efficient styles of driving
- 2. Resource conservation**
  - improve resource efficiency
  - attain optimum recyclability by taking account of innovative recycling technologies
  - use renewable and secondary raw materials
  - develop and make available alternative powertrain technologies
  - enable the use of alternative fuels and other energy storage systems, taking account of regional circumstances
- 3. Healthcare**
  - reduce regulated and non-regulated emissions
  - avoid the use of hazardous and harmful materials – wherever possible in line with the world's strictest materials legislation
  - minimise interior emissions including odours
  - attain best possible exterior and interior noise levels

In future, we will develop each model in such a way that, in its entirety, it presents better environmental properties than its predecessor. As we do so, we will make sure that improvements are attained over the entire product life cycle.

In this process, the Volkswagen Group will take particular account of the changes in mobility and environmental aspects resulting from growing levels of urbanisation.

The environmental objectives set out above also serve to differentiate us from the competition to the benefit of our customers. The Volkswagen Group aims to rank among the leaders in respect of environmental matters.

Prof. Dr. Martin Winterkorn  
Chairman of the Board of Management of Volkswagen AG

01.12.2009



Volkswagen is the high-volume brand that stands for innovation and engineering excellence.

Dr. Martin Winterkorn, Chairman of the Board of Management of Volkswagen AG

In future, we will develop each model in such a way that, in its entirety, it presents better environmental properties than its predecessor. As we do so, **we will make sure that improvements are attained over the entire product life cycle.**



# LCA in current practice - other Industry

## Consumer Products Manufacturers





## Material Producers



## Industry Associations



# LCA in current practice – the Steel industry

- WorldAutoSteel vehicle modeling 
  - Goal – to enhance technical credibility via modeling with external expert collaboration
  - UCSB Automotive Materials Greenhouse Gas Comparison Model
    - Vehicle modeling development since 2004
    - Now on Version 4.0
    - Model and Comprehensive User Guide freely available
  - autoLCA™ – GaBi version of the UCSB Model
- World Steel Association 
  - LCI inventory database (since 1995) and methodology development
  - buildLCA™
  - LCA Expert Group – cross-industry collaboration

## Progress towards method harmonization

# Harmonization of LCA Methodologies for Metals

**A whitepaper providing guidance for  
conducting LCAs for metals and  
metal products**

**February 2014**

Aluminum Association

Cobalt Development Institute

Eurometaux

Euromines

International Aluminium Institute

International Copper Association

International Council on Mining and Metals

International Lead Association

International Lead Management Center Site

International Lead Zinc Research Organization

International Manganese Institute

International Molybdenum Association

International Stainless Steel Forum

International Zinc Association

Nickel Institute

World Steel Association

# Progress towards method harmonization

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# Investigating policy options - Working with academia

- To further understand and explore
  - Possible policy frameworks
  - Technical methodologies



# Investigating policy options – Study by TU Berlin Study

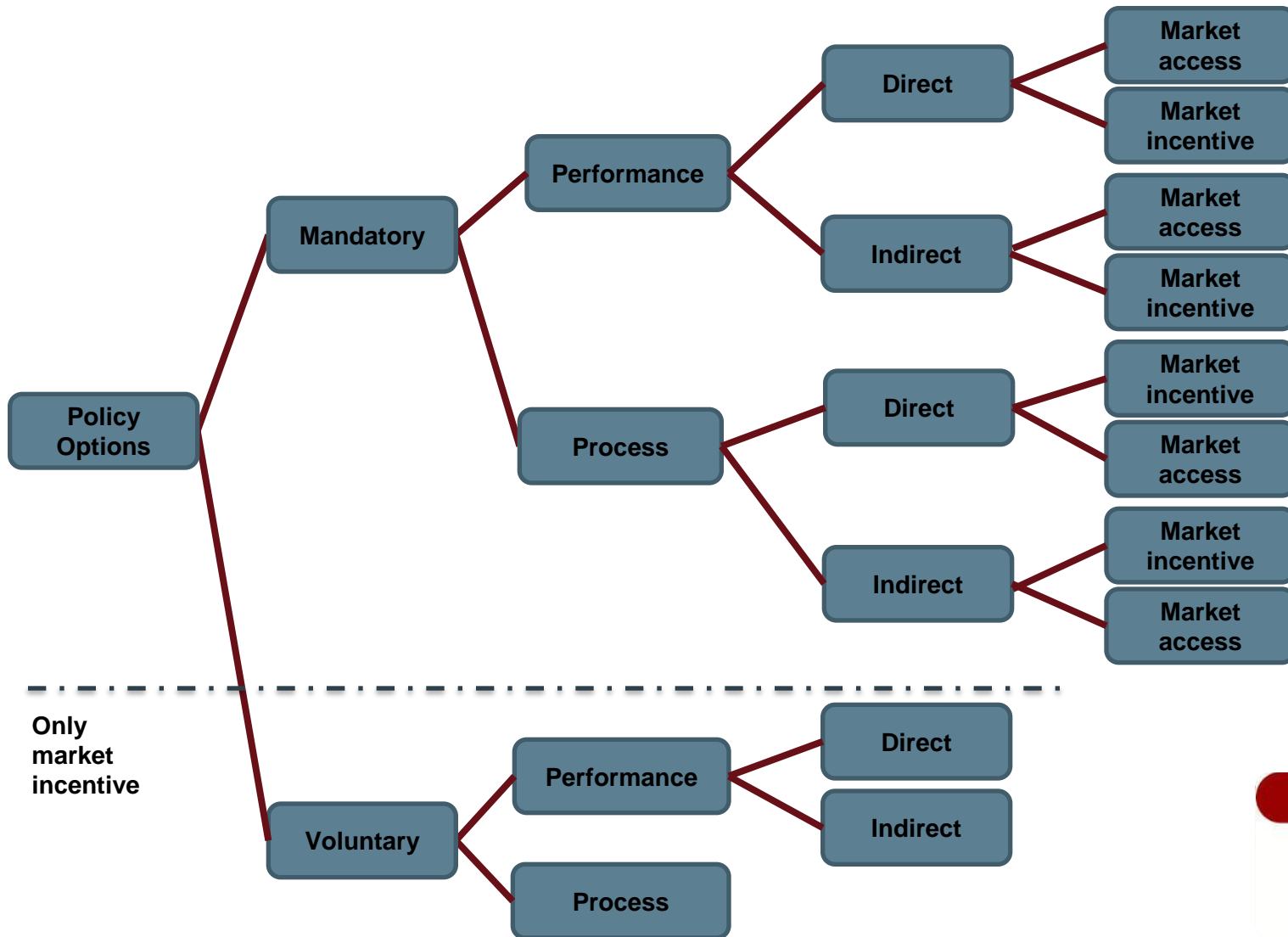
- Professor Dr. Matthias Finkbeiner and team are developing policy options that consider the entire vehicle life cycle.
- Range extends from voluntary labeling that may influence market behaviors to mandatory performance metrics that must be met to allow market access.

## Qualifiers:

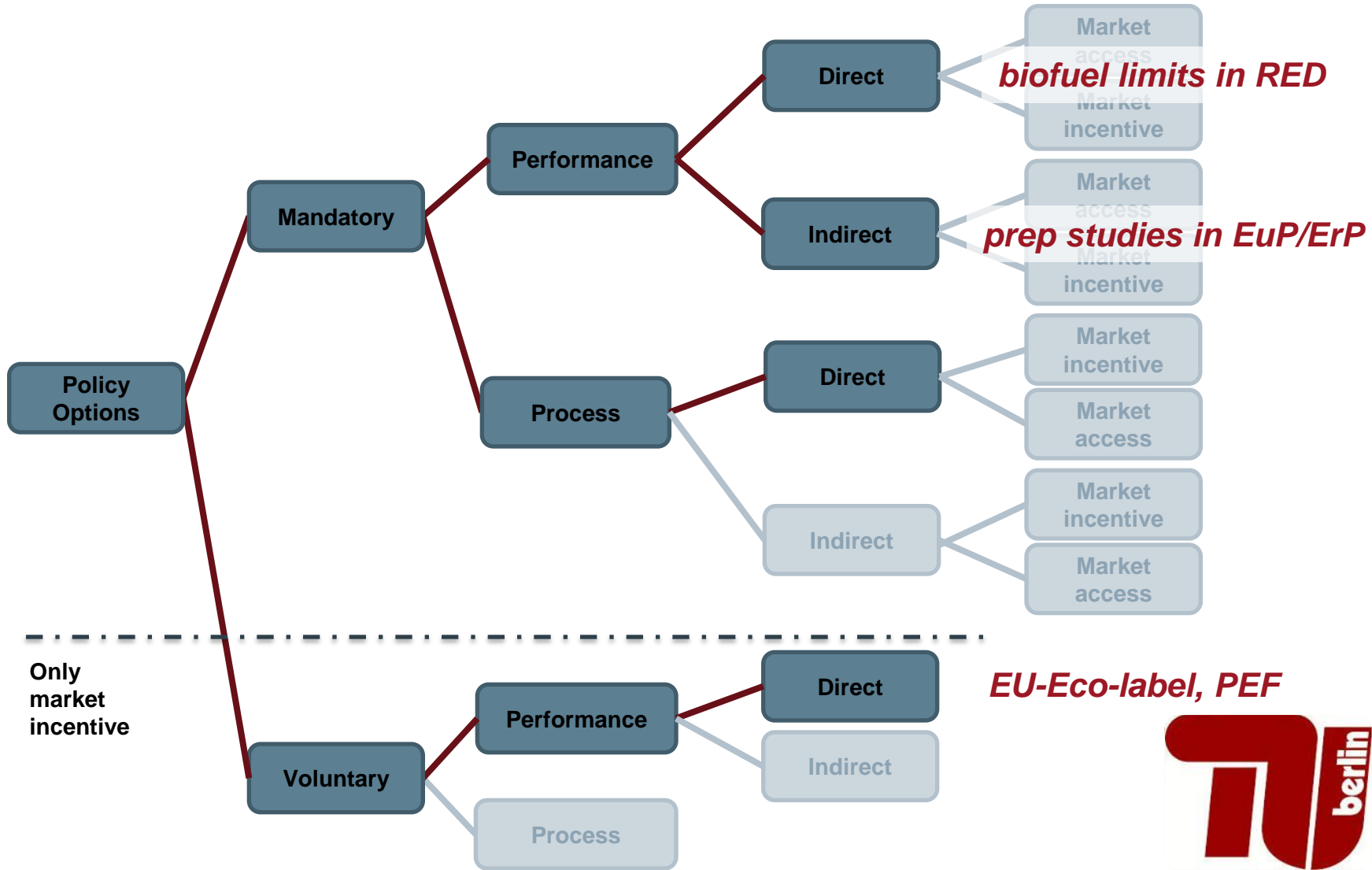
- Voluntary vs. Mandatory
- Product Performance (Direct) vs. Process Requirement
- Use of LCA: Direct full use of LCA vs. Backoffice (Indirect)
- Market Access vs. Market Incentive



# Investigating policy options



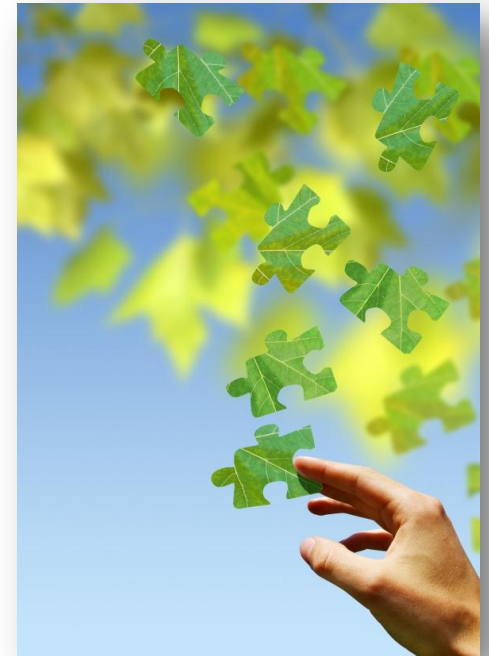
# Investigating policy options





# Summary

- TODAY - LCA has been adopted as a comprehensive tool to measure the CO<sub>2</sub> impact of materials and technology choices in many industries, throughout the globe.
- Embedded emissions are a considerable concern to policy regulators and the automotive supply chain
- LCA is the regulatory tool that can address this issue:
  - LCA is doable, as shown by current industry practice.
  - LCA ensures that CO<sub>2</sub> reduction targets are realized.
  - LCA prevents unintended consequences.



**Thank you for your attention.**

**We are looking forward to your feedback and questions.**

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