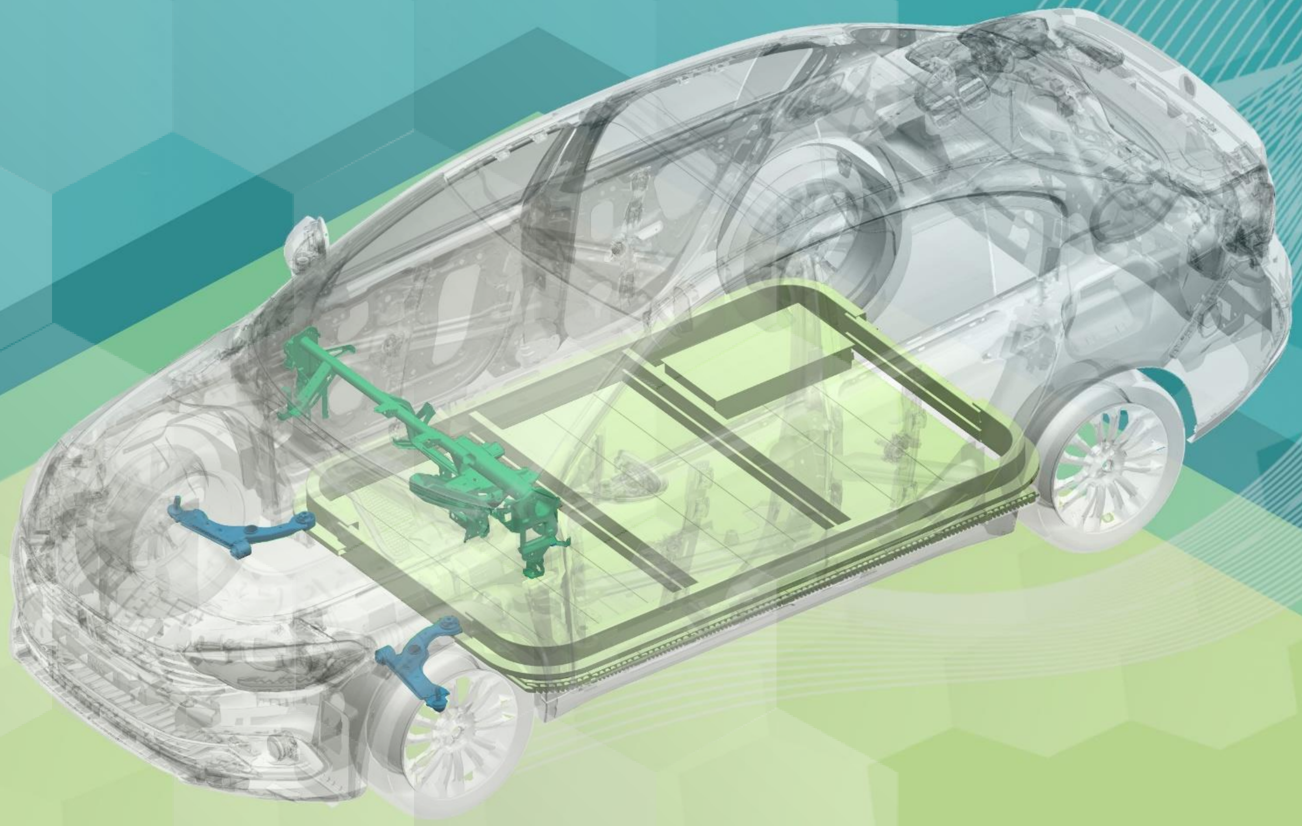

LEVIS

LIGHT MATERIALS FOR ELECTRIC VEHICLES

LEVIS Project & strategy on LCA

Floris Teunissen

cenex nederland

09/02/2023

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101006888.

CONTENT

LIGHT MATERIALS FOR ELECTRIC VEHICLES

- Intro to LEVIS
  - Objectives
  - Approach and technologies
- LEVIS strategy on LCA
  - Eco-design toolkit
  - Life Cycle Analysis
- Q&A

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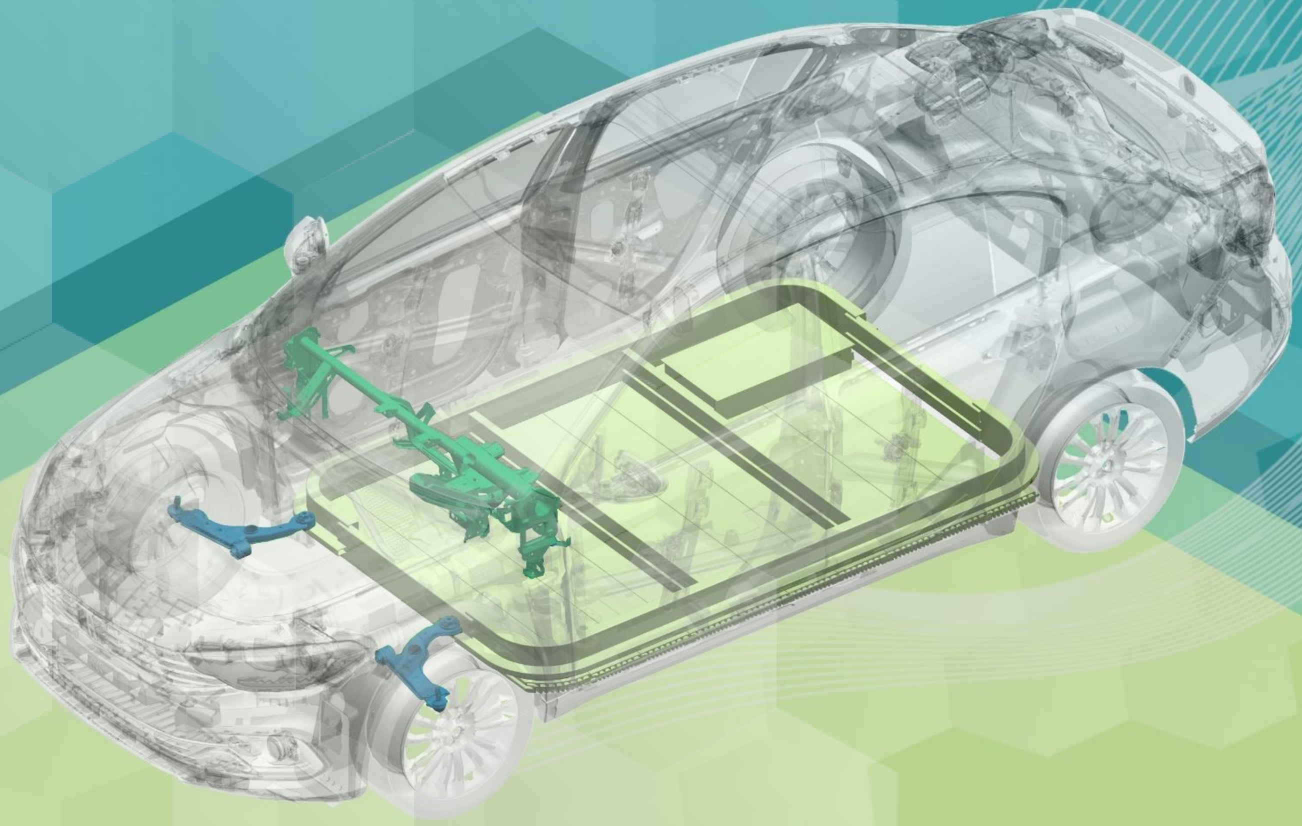
LIGHT MATERIALS FOR ELECTRIC VEHICLES



Advanced Light materials for sustainable Electrical Vehicles by Integration of eco-design and circular economy Strategies

www.greenvehicles-levis.eu

Greenvehicles LEVIS

@EUProject_LEVIS

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LEVIS HORIZON2020

LIGHT MATERIALS FOR ELECTRIC VEHICLES

- **Grant agreement ID**: 101006888
- **Topic:** LC-GV-06-2020 –
  Advanced light materials and their production processes for automotive applications
- **Timing:** 02/2021-01/2024 (36 months)
- **EU contribution:** € 4 990 113,63
- **Coordinator:** ITAINNOVA

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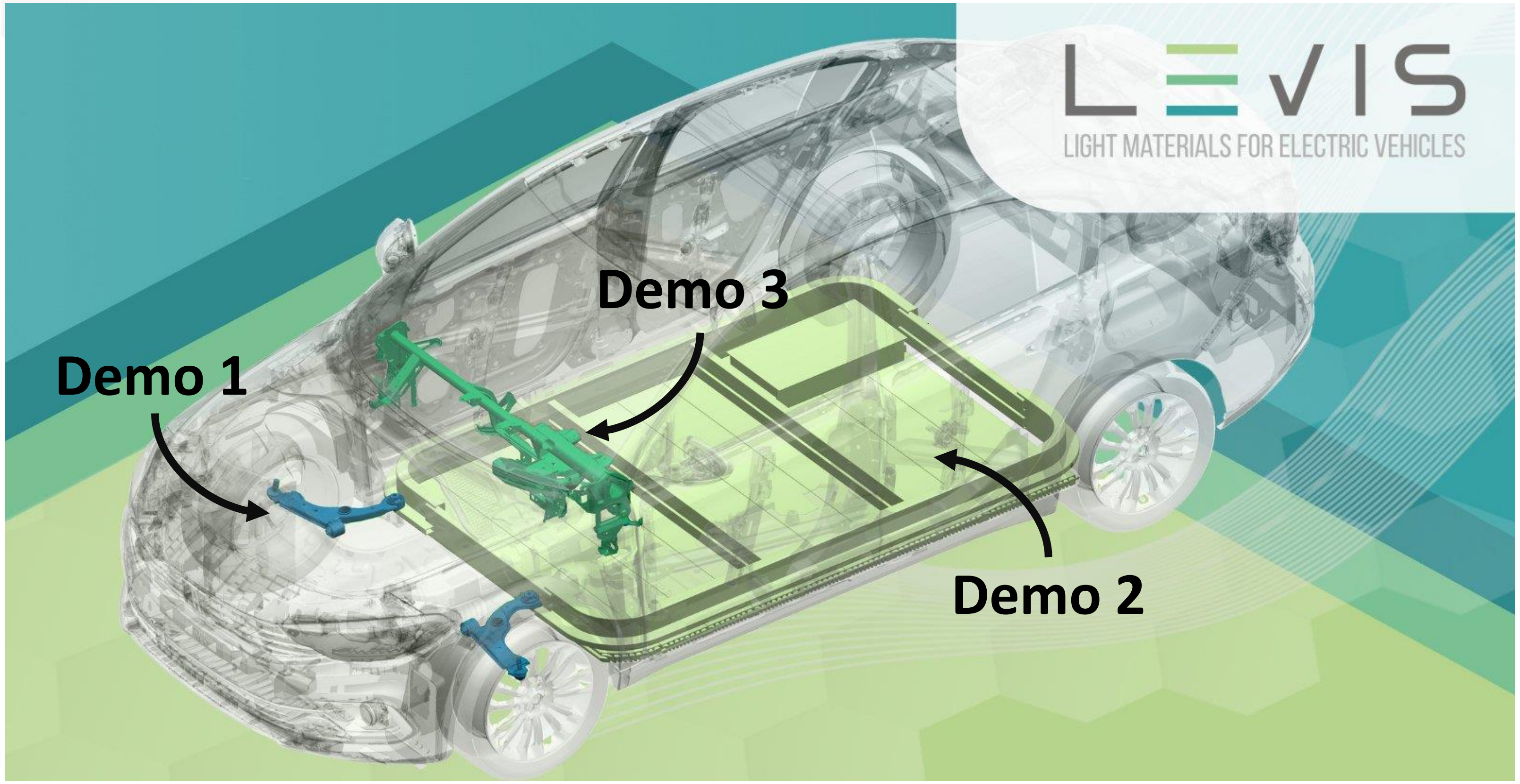
LEVIS Consortium & Demonstrators



Materials & Technologies

ITAINNOVA · Leartiker · aimen · RISE · canoe · liten

Demo 1: Suspension control arm

MARELLI

Demo 2: Battery holding set

MERSEN · YEŞILOVA · prive

Demo 3: Cross car beam

TOFAŞ

Integration & Replication

prive

Circular Economy Approach & LCA

cenex nederland

Exploitation & Stakeholder Engagement

Steinbeis Europa Zentrum

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OBJECTIVES

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LIGHT MATERIALS FOR ELECTRIC VEHICLES

LEVIS will develop, verify & demonstrate lightweight components in EVs by adopting an eco & circular design concept from the design phase to the end-of-life stage.

1. Advanced lightweight and sustainable materials.
   25% reduced Global Warming Potential at component level, 7% at vehicle level.
   Replication potential leading to a reduced overall structural weight reduction of 25%^.
2. Cost-effective production and assembly processes capable to produce multi-material solutions in an efficient way.
   Comparable in terms of cost efficiency to any current available solutions.
3. Advanced simulation methodologies-workflows for improved structural integrity/life predictions and highly optimized designs,
4. Novel sensorisation and monitorisation technologies for superior functionalities, and
5. Suitable end-of-life approaches for the materials and processes considered.

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LEVIS strategy on LCA

ECO-DESIGN

LIFE CYCLE ANALYSIS

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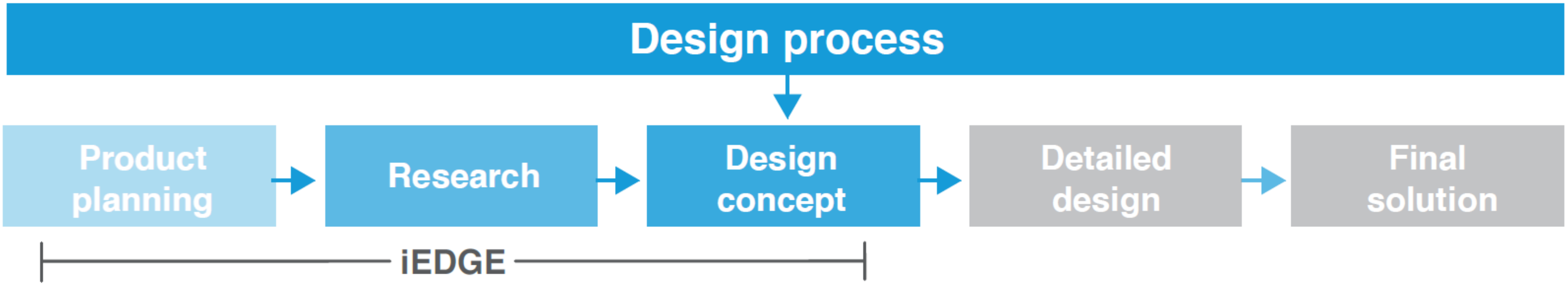
LEVIS INTRODUCTION AND INTEGRATION OF ECO-DESIGN

LIGHT MATERIALS FOR ELECTRIC VEHICLES

LEVIS developed an Eco-Design toolkit: **iEDGE** (integrated Eco-Design guidelines and evaluation)

- **Goal**: To integrate life cycle thinking and related circular economy principles into the design process.
- **When**: The early stages of the decision-making process for product designs.
- **How**: Focus on considering the four main focus areas:
  - Environmental
  - Economic
  - Technical
  - Social
- **Output**: Documentation and justification for a set of chosen design improvement options.



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RESULTS OF IEDGE TOOLKIT

LIGHT MATERIALS FOR ELECTRIC VEHICLES

- **Identified feasible improvement** options based on the highest priority KPIs
- Better understanding of the **balance between all the life cycle categories** as well as the four focus areas: environmental, economic, technical, and social
- Partners' feedback proved key in making the **tool easier to use** and **reducing investment time** to learn the tool
- All partners expressed their interest in using the tool for **future applications**!

Identified challenges & lessons:

- Toolkit has a **learning curve**. First time use needs support and additional time.
- Partners were reasonably new with these eco-design tools and concepts, resulting in the need for **examples, explanations and feedback** throughout the use of iEDGE.
- Throughout the project, **additional follow-up moments** will be held to see longer term effects of the iEDGE toolkit

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LEVIS STRATEGY ON LCA

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LIGHT MATERIALS FOR ELECTRIC VEHICLES

Life Cycle Assessment: Compare the environmental performance of the LEVIS design and technologies vs. current common practises as baseline.

Life Cycle Costing: Assess the cost implication from a Life Cycle perspective.

Replication opportunities within the scope of the BiW based on the requirements of the components vs. the charasteristics of the LEVIS technologies

Studying the impact of LEVIS technologies on **EV motor efficiency**

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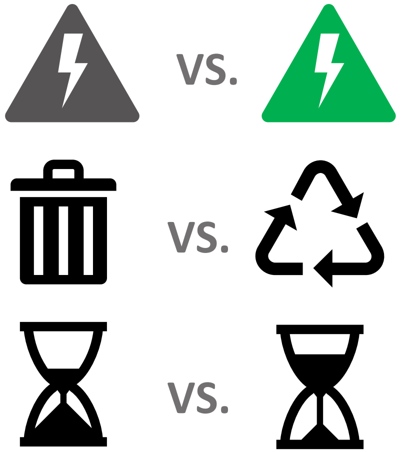
LEVIS STRATEGY ON LCA

Life Cycle Assessment: Compare the environmental performance of the LEVIS design and technologies vs. current common practises as baseline.

Quantified environmental impact of the **demo cases** & **benchmark products**

Perform **Sensitivity** analysis using multiple parameters



Evaluation and link to **eco-design toolkit**

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LEVIS STRATEGY ON LCA

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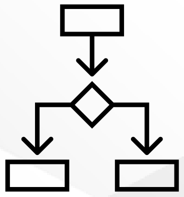
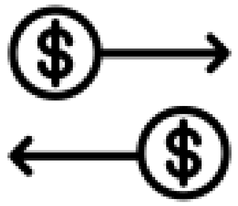
Life Cycle Costing: Assess the cost implication from a Life Cycle perspective.

Design the **process flow diagrams** for LCC in GaBi in a similar method as done for LCA



Acquire **data** from partners concerning

- Flow costs
- Machine costs
- Personnel costs



Demonstrate **techno-economic feasibility** of demonstrators over the whole product value chain

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LEVIS STRATEGY ON LCA

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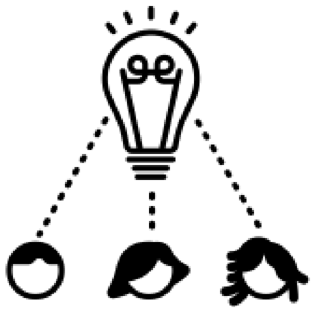
LIGHT MATERIALS FOR ELECTRIC VEHICLES

Replication opportunities within the scope of the BiW based on requirements of components vs. charasteristics of LEVIS technologies

Establish **criteria** based on LEVIS **material properties**

Identifying alternative candidates by **brainstorm session** with task partners



Create **modelling framework** to **rank** the alternative candidates

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LEVIS STRATEGY ON LCA

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LIGHT MATERIALS FOR ELECTRIC VEHICLES

Studying the impact of LEVIS technologies on **EV motor efficiency**

Consider as input the **weight reduction** and the results of the **replication study**

Use modelling tools to carry out **a dynamic analysis** of the full vehicle

Evaluate the impact of new applications **on EV motor efficiency**

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Q&A

Icons from: https://thenounproject.com/

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LIGHT MATERIALS FOR ELECTRIC VEHICLES

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