



WP 6 – Environmental and Economic Evaluation

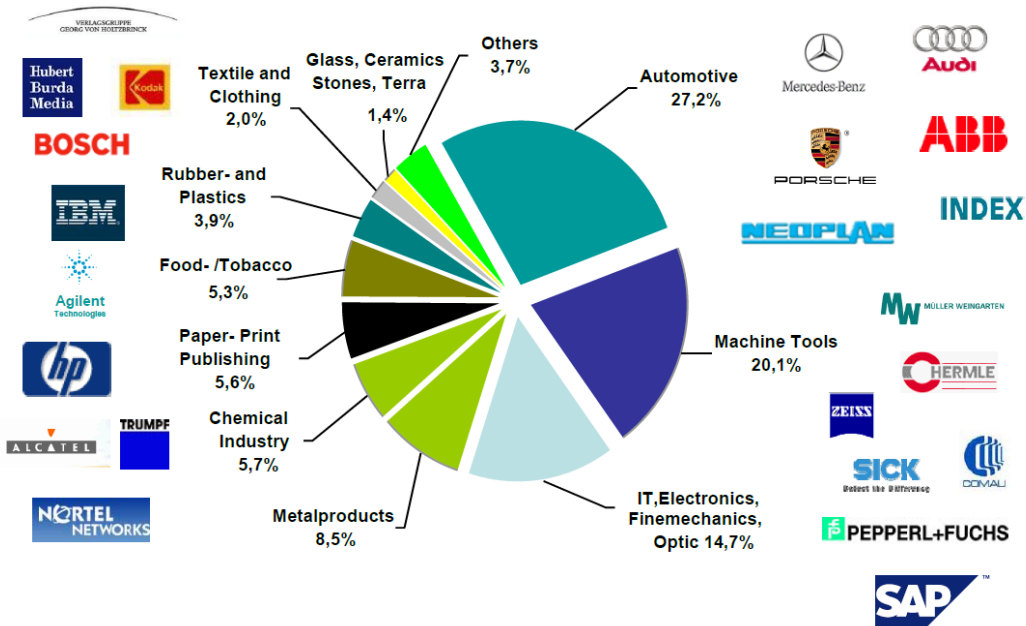
Gözde Kara, Steinbeis R-Tech
March 2, Brussels



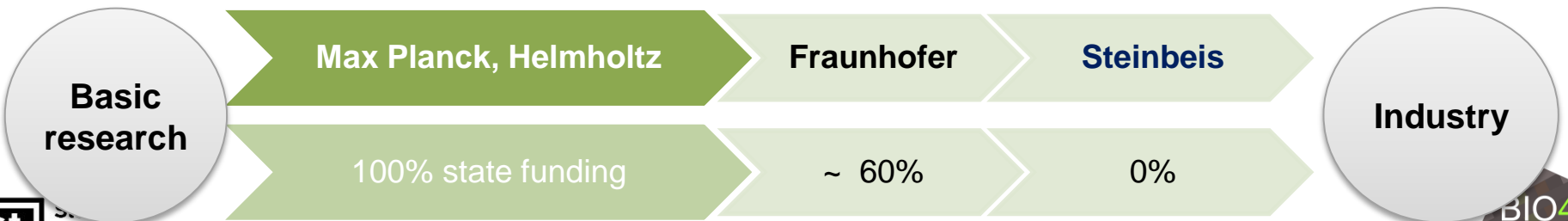
Content

- Steinbeis Network
- Steinbeis R-Tech
- WP6 Environmental and Economic Evaluation
 - Current state-of-the-art / starting point
 - Objectives
 - Involved Partners & Timing
 - Tasks
 - Needed input from previous WP's
 - Key output and decision points
 - First actions

Steinbeis Network



Franchise-Enterprises



Steinbeis Network

Services

- Consulting
- Research and development
- Evaluation and expert reports
- Training and employee development

Transfer Network

- **1,006 enterprises** and subsidiary companies as well as cooperation and project partners worldwide.

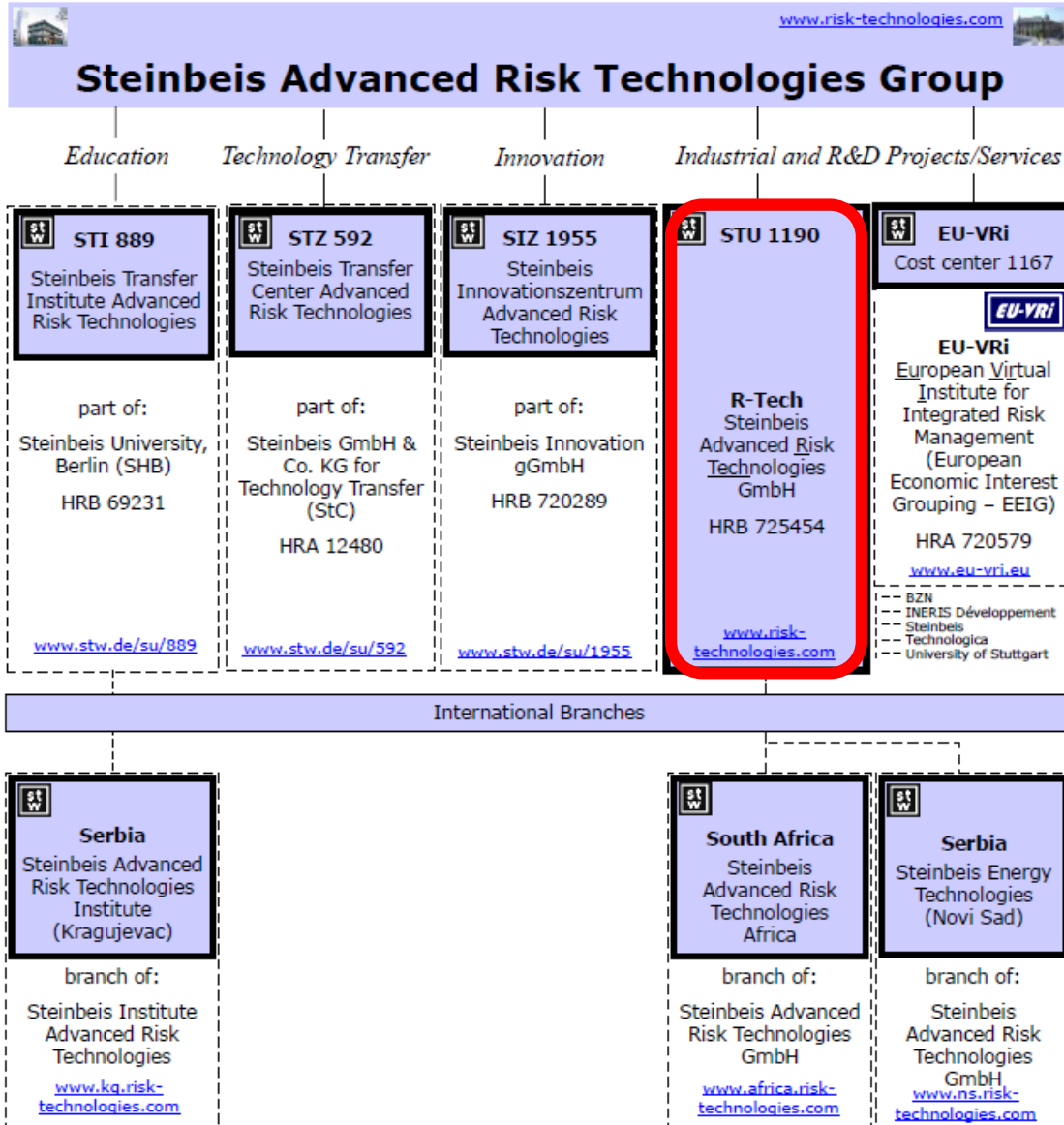
Staff

- About **717 professors, 1,744 employees** und **3,691 contractors**

Customers

- more than **10,000** per year; companies, organizations of all sizes and areas of business, individuals

Steinbeis R-Tech



Steinbeis R-Tech

- R-Tech is working in the area of “Advanced Risk Technologies” deals with multiple aspects of risks, risk engineering and risk management appearing in:
 - petro-chemical and process plants
 - power plants and energy supply
 - material technologies, especially advanced material technologies
 - new & alternative technologies (CO₂, H₂, nano, ...)
- R-Tech has a large experience in participating in European funded projects especially for the development of new materials (e.g. polymer matrix composite, ceramic matrix composites, metal matrix composites, coatings for high temperatures applications, fully graded materials)
- R-Tech has successfully contributed the horizontal activities of the projects with Life Cycle Assessment, Life Cycle Costing, Cost Benefit Analysis and Risk Analysis.

Steinbeis R-Tech

Bio4Self relevant previous projects or activities (under FP7):

- **ExoMet**: Physical processing of molten light alloys under the influence of external fields.

| | |
|-------|-------------------------------------|
| QRA | <input type="checkbox"/> |
| UNC | <input checked="" type="checkbox"/> |
| HSE | <input checked="" type="checkbox"/> |
| LCA | <input type="checkbox"/> |
| OTHER | <input checked="" type="checkbox"/> |



- **HELM**: High-frequency electro-magnetic technologies for advanced processing of ceramic composites

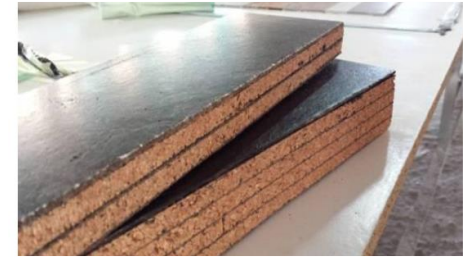
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Steinbeis R-Tech

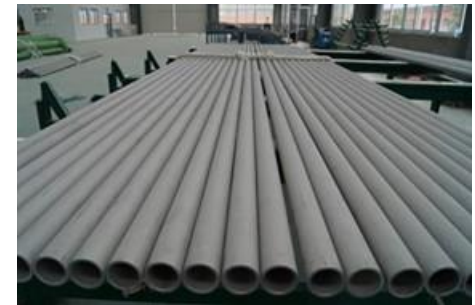
- **FIRE-RESIST:** Developing novel fire-resistant high performance composites.

QRA
UNC
HSE
LCA
OTHER



- **POEMA:** Production of coatings for new efficient and clean power plants materials.

QRA
UNC
HSE
LCA
OTHER

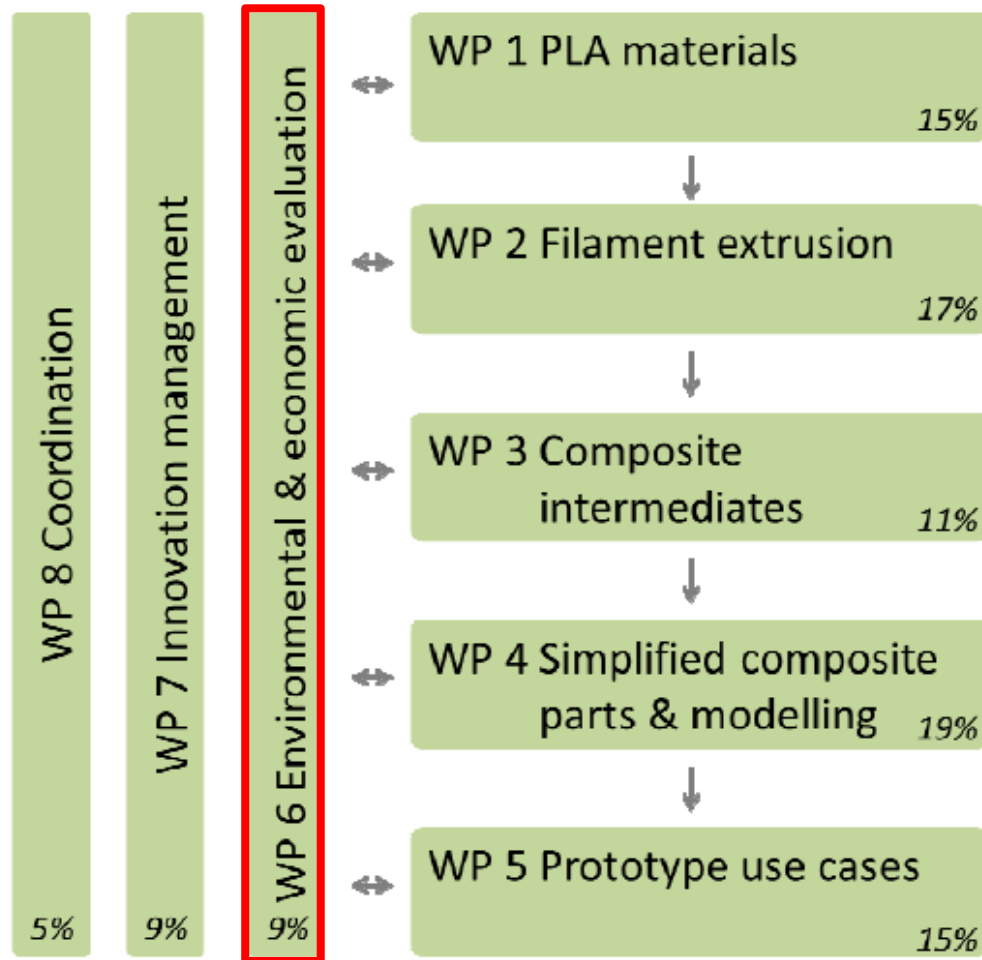


- **MATRANS:** Micro and nanocrystalline functionally graded materials.

QRA
UNC
HSE
LCA
OTHER



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WP 6 - Environmental and Economic Evaluation



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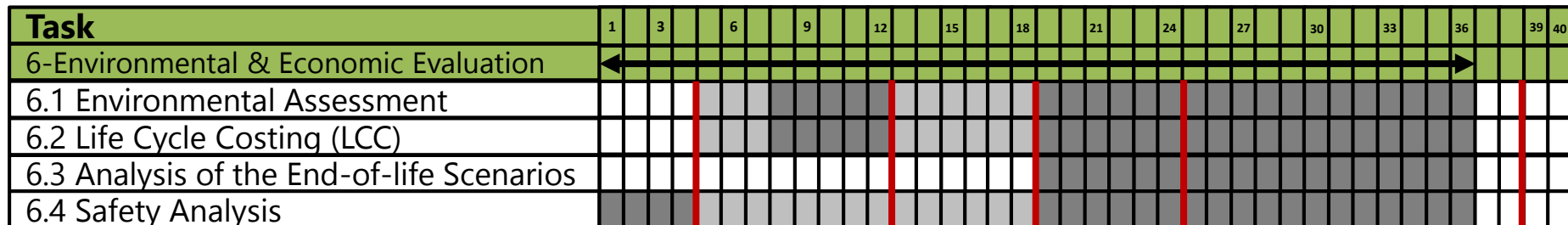
Objectives of WP6

- Development of the environmental assessment for SRPC composite materials and advice the material selection from an environmental point of view.
- Calculation of the total costs along the life cycle of the materials and applications developed in BIO4SELF.
- Analysis of the end-of-life scenarios of the SRPC composites and alternatives for recycling the materials.
- Development of safety guidelines in order to ensure safe-handling of the materials developed and safe-use of the structural applications.

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Involved Partners & Timing

| | | | | | | | | | |
|--------------------------------|---------------------------------------|--------|------------------------------|-----------|--------|-----|--------|-----|--|
| Work package number | 6 | | Start Date or Starting Event | | | | M1 | | |
| Work package title | Environmental and economic evaluation | | | | | | | | |
| Participant number | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | |
| Short name of participant | CTB | DTU | ITA | ICT | UM | NTT | MAIER | OSM | |
| Person/months per participant: | 2 | 2 | 3 | 2 | 2 | 15 | 6 | 6 | |
| Participant number | 9 | 10 | 11 | 12 | 13 | 14 | 15 | | |
| Short name of participant | ARCELIK | COMFIL | TECNARO | FIBROCHEM | MIRTEC | IBA | R-TECH | | |
| Person/months per participant: | 6 | 2 | 1 | 2 | 2 | 2 | 27 | | |



Legend:

Low activity

Intense activity

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Tasks

- 6.1 Environmental Assessment
- 6.2 Life Cycle Costing (LCC)
- 6.3 Analysis of the End-of Life Scenarios
- 6.4 Safety Analysis

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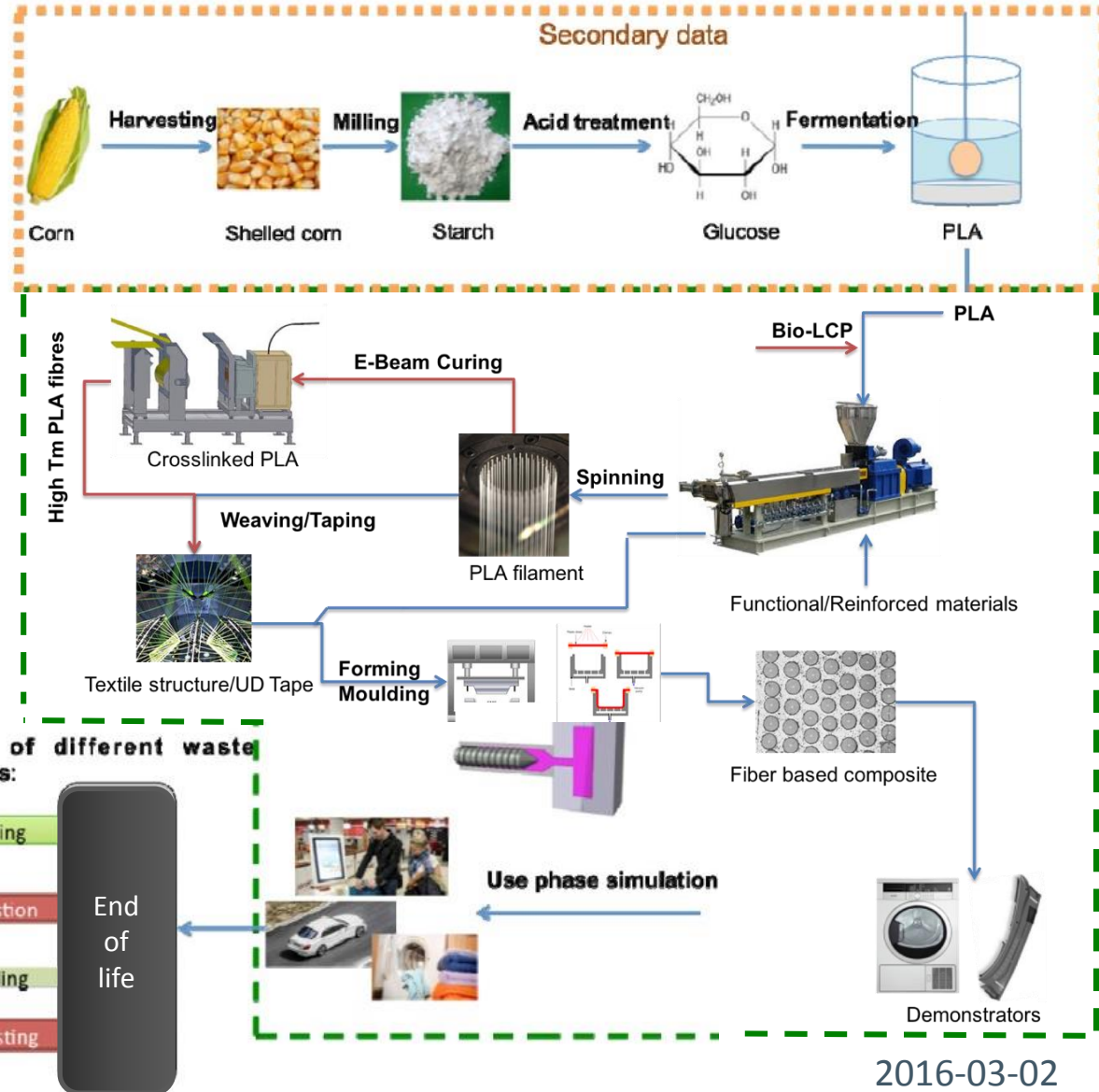
Task 6.1: Environmental Assessment (M5-M36)

Task leader: NTT

- The environmental assessment within BIO4SELF will be carried out by applying the internationally and recognized methodology (ISO 14040 / 14044) Life Cycle Assessment (LCA).
- The LCA will be developed in two stages:
 1. Developed at composite material level with the information from WP1, WP2, WP3 and WP4.
 2. Developed at product prototype level (automotive and home appliances) with the information from WP5.
- Involved partners: NTT and all partners

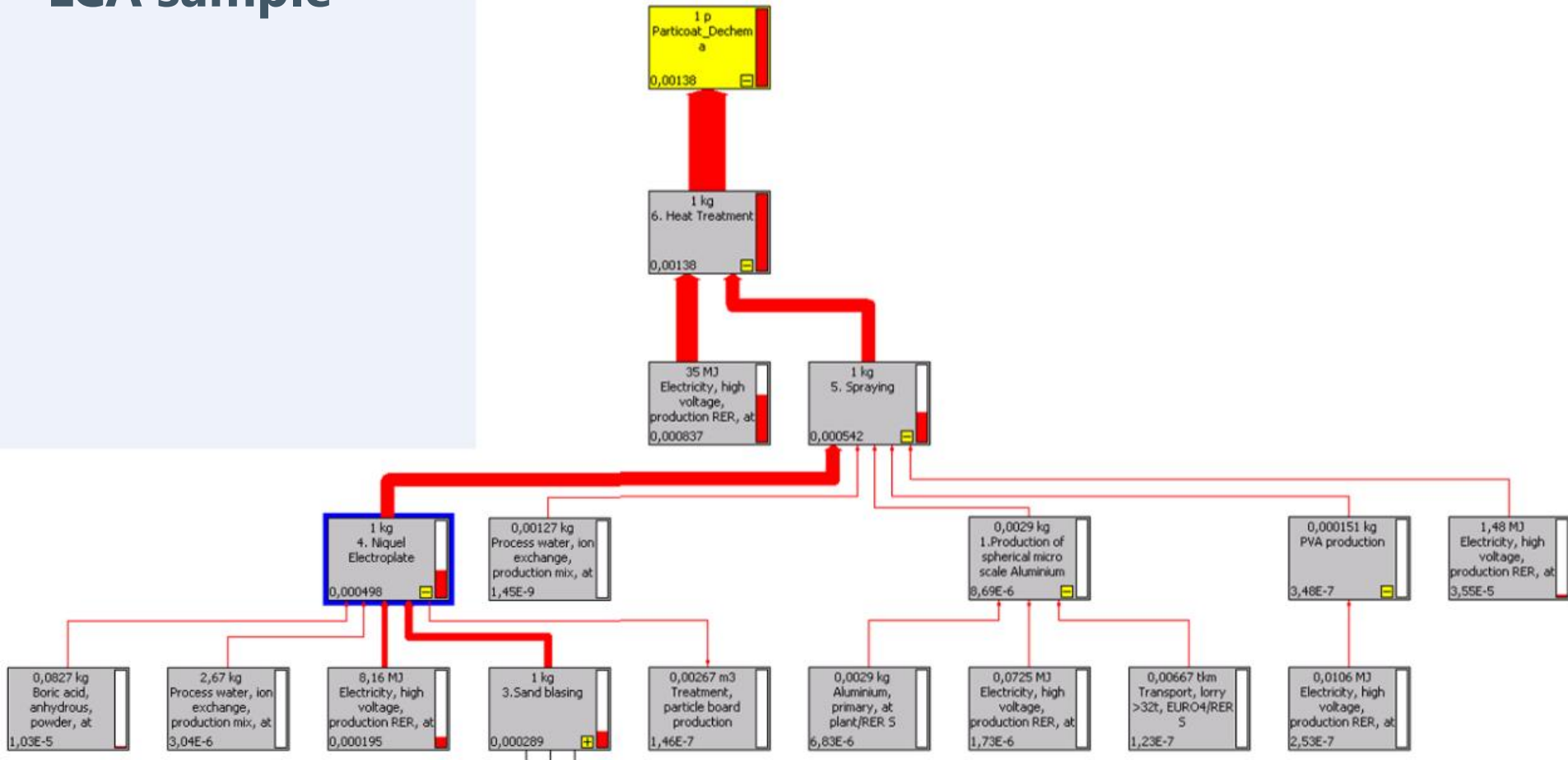
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LCA



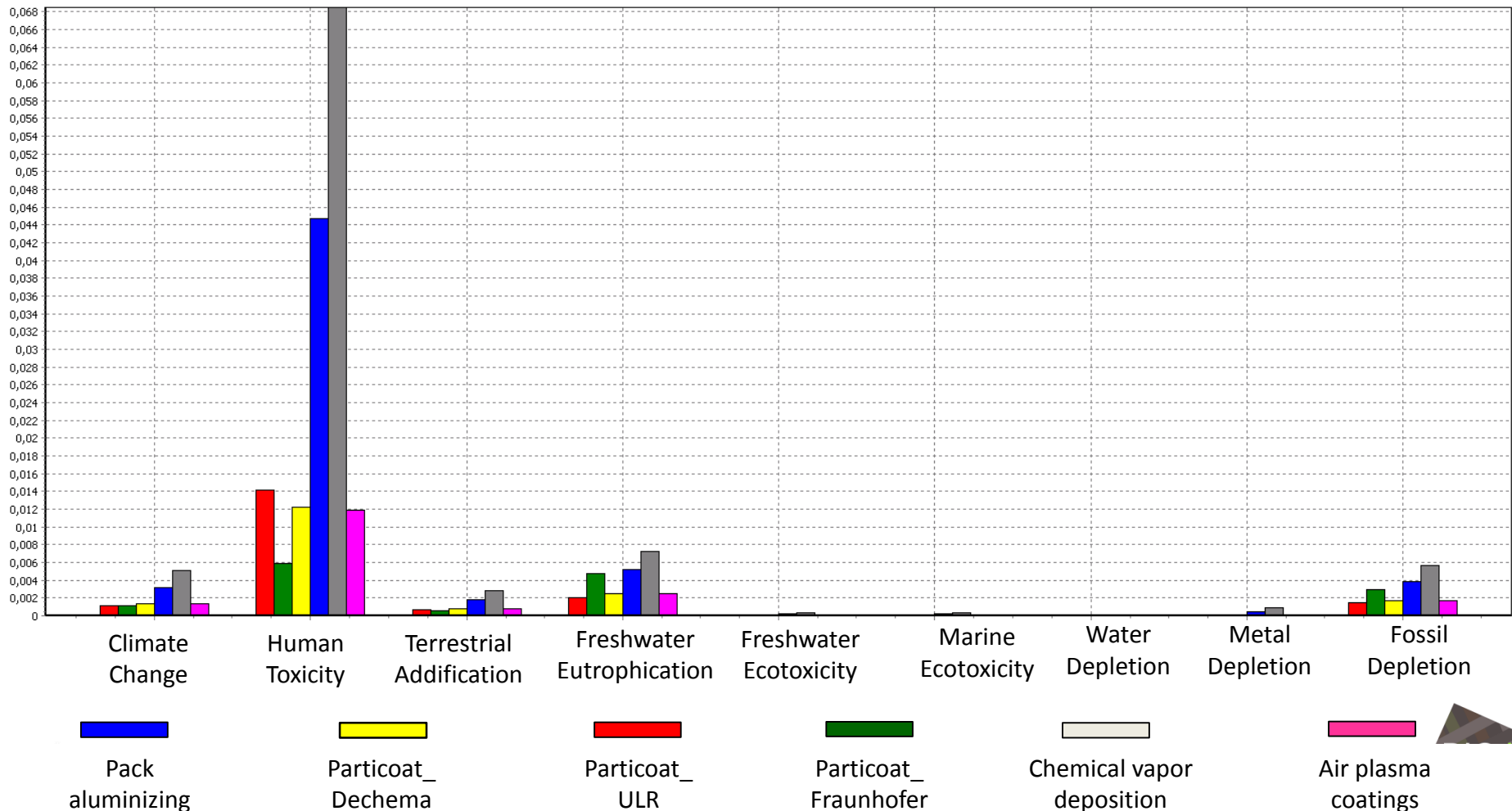
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LCA sample



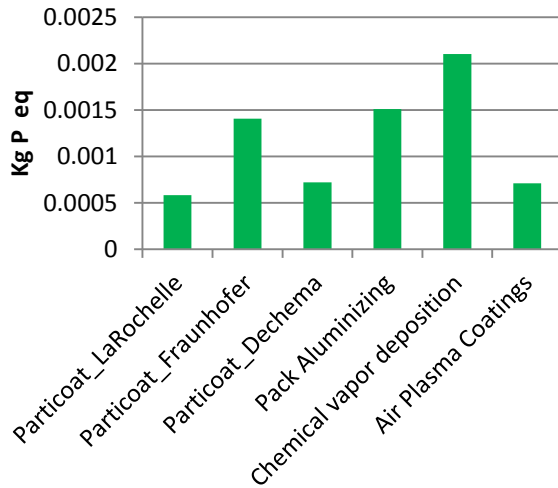
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LCA sample

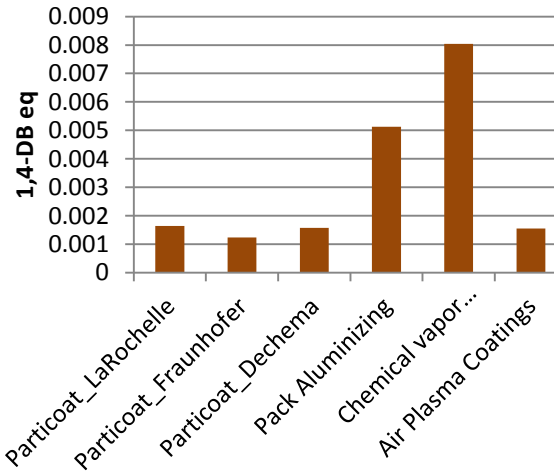


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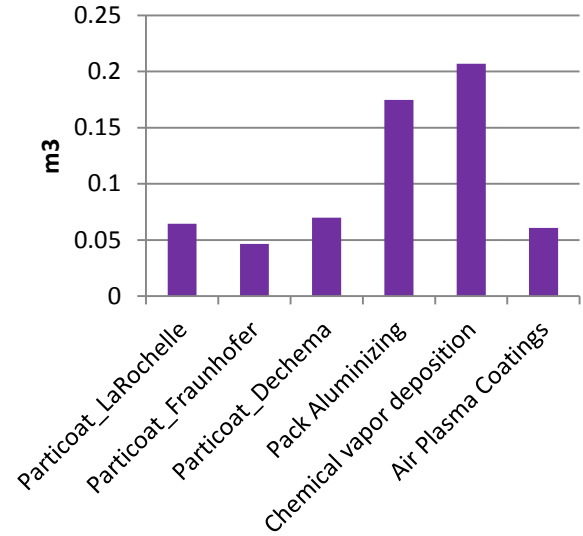
Freshwater Eutrophication



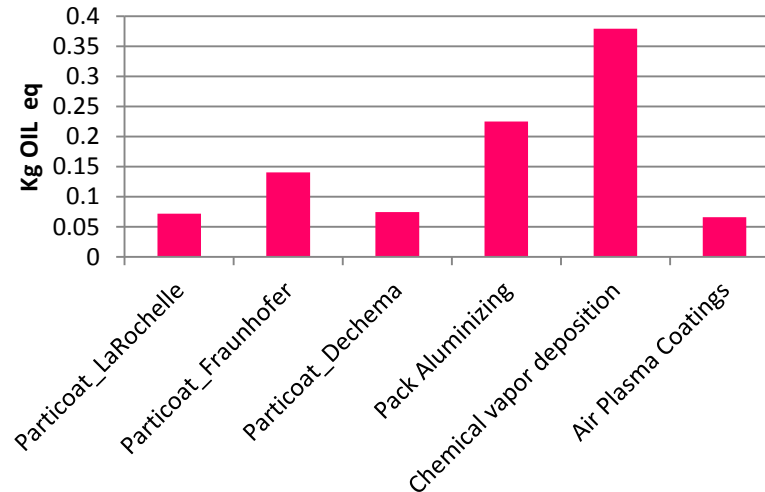
Freshwater Ecotoxicity



Water Depletion



Metal Depletion



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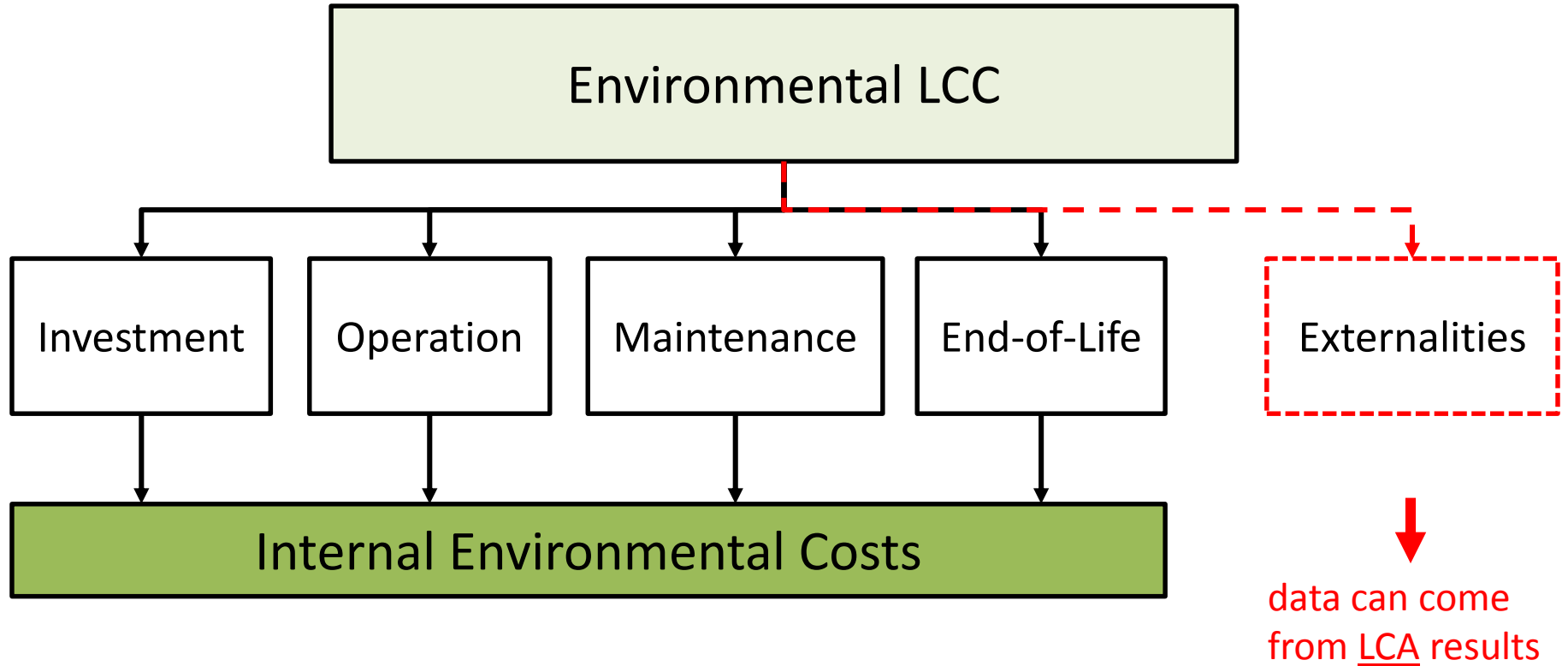
Task 6.2: Life Cycle Costing (LCC) (M5-M36)

Task leader: R-Tech

- LCC will provide the cost profiles of the systems analyzed and contribute to the selection and design of materials. The LCC will be developed in two stages:
 1. Devoted to the cost analysis at composite material level. This analysis will allow deciding which of the composite materials developed have higher economic benefit for the end users.
 2. Developed at product prototype level in collaboration with the end users. This stage will provide to the end users with a set of economic indicators of the prototypes for further optimization and future investment.
- Case study → automotive industry
- Involved partners: R-Tech and MAIER

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LCC



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LCC Tool

LCC & CO₂ - Calculation for Procurement Activities

A user guide has been developed to help you use this tool. You can download it at www.smart-spp.eu.



General Information Input

Tender ID



Comments of the Procurement Coordinator

Information to be specified by the procurer

Your location

[country]

[CHOOSE]



Currency

Planning horizon

[years]

Discount rate (nominal)

[%]

Inflation rate

[%]

CO₂ emission factors

[Click to specify emission factors]

For more product columns click on the expansion button [+] at the top

Information to be specified by the supplier

Product Offers



Personal offer ID



Number of units to be purchased/leased

[#]

Lifespan



[years]

| Product A | Product B | Product C | Product D | Comments / Explanations |
|-----------|-----------|-----------|-----------|-------------------------|
| | | | | |
| | | | | |

WP 6 - Environmental and Economic Evaluation

Task 6.3: Analysis of the End-of Life Scenarios (M19-M36)

Task leader: NTT

- This task will focus in the analysis of the end of life scenarios of the materials and products developed within the project, e.g. re-use, disposal, recycling. The different scenarios and related assumptions will be made for the analysis are listed:
 - Landfill (anaerobic digestion)
 - Composting aerobic digestion
 - Chemical and mechanical recycling
 - Incineration
- Involved partners: NTT, R-Tech, MAIER, Arcelik

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Task 6.4: Safety Analysis (M1-M36)

Task leader: R-Tech

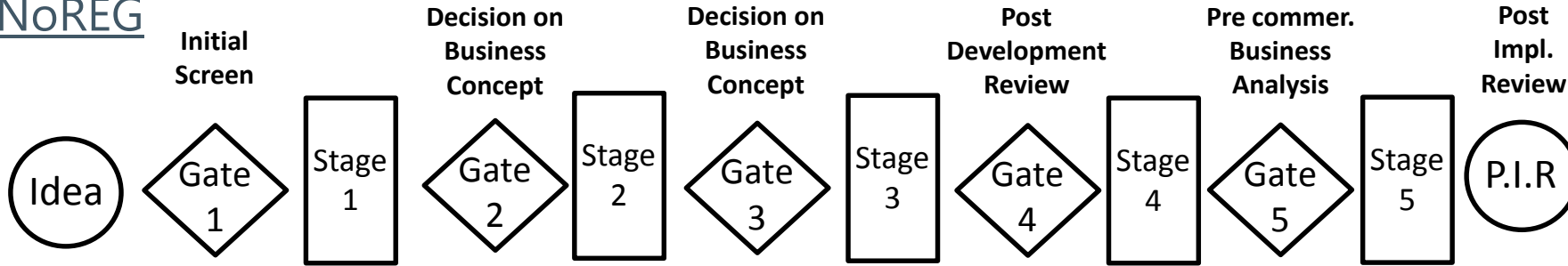
- Safety guidelines will be produced for a safe-handling of the materials developed and safe-use during the structural applications.
- The best-practice approaches developed in EU Project NANoREG and in the EU Nanosafety Cluster will be followed to advice the BIO4SELF consortium on the safety-by-design approaches as well as to provide guidance in handling of nanomaterials.
- The guidelines will be produced at the early stages of the project (M4) to ensure awareness of the partners about the safety-by-design approaches.
- Involved partners: R-Tech and all partners

WP 6 - Environmental and Economic Evaluation

Safety Guidelines

Safe-by-design concept

NANoREG



| | | | | | | | | | |
|---|-------------------------------|---|--|---|--|--|--|-----------------------|-------------------|
| Industries innovation processes | Product idea | <ul style="list-style-type: none"> - Preliminary investigation - Estimation of benefits and costs - Sketch business concept | <ul style="list-style-type: none"> - Detailed investigation - Prove of principles - Socio-economic assessments - Competitiveness benchmarking - Build business case | <ul style="list-style-type: none"> - Product R&D - Feasibility - Prototype | <ul style="list-style-type: none"> - Market tests - Product validation (functionality and costs) - Business plan validation | Market launch | | | |
| | Technology idea | | | | | | Applied R&D | Technology evaluation | Technology launch |
| | Process idea | | | | | | Process R&D | Upscaling | Full production |
| Industrial risk mgng. | No risk management activities | List of potential risks | Theoretical risk analysis | Experimental risk analysis | Risk assessment before launch | Update risk assessment after launch | | | |
| Safe-by-Design process integration in industries innovation process | No safe-by-design activities | <ul style="list-style-type: none"> - Reduction of nano related uncertainties - List of potential nano related risks - Analysis of alternatives - Risk reduction | <ul style="list-style-type: none"> - Theoretical nano related risk analysis - Nano related risk mitigation - Grouping principles - Read across | Experimental nano related risk analysis | Nano related risk assessment before launch | Update nano related risk assessment after launch | | | |
| | | | | | Occupational and product safety, Consumer safety, Environmental safety | Nano related risk management | Occupational health management during production | | |
| | | | | | Comparison with pre-defined safety levels | | | | |
| | | | | | Organized Dossier shared by stakeholders (Pre-regulatory information) | Reach Dossier | | | |

WP 6 - Environmental and Economic Evaluation

Needed input from previous WP's

- Task 6.1: Environmental Assessment

- The first one will be at composite material level with the information from **WP1**, **WP2**, **WP3** and **WP4**.
- The second stage will be developed at product prototype level (automotive and home appliances) with the information from **WP5**.

WP 6 - Environmental and Economic Evaluation

Key outputs and decision points

- D6.1 - Preliminary assessment of LCA and LCC (R-Tech, M12)
- D6.2 - LCA at composite material level (R-Tech, M24)
- D6.3 - LCA at product prototype level (R-Tech, M36)
- D6.4 - LCC at composite material level (R-Tech, M24)
- D6.5 - LCC at product prototype level (R-Tech, M36)
- D6.6 - Analysis of the End-of-Life Scenarios (NTT, M36)
- D6.7 - Safety Guidelines (R-Tech, 1st release M4, 2nd release M36)

WP 6 - Environmental and Economic Evaluation

First actions

We will deliver the first guideline at M4 in order to ensure awareness of the partners about the safety-by-design approaches.

- In NANoREG project, case studies are searched in order to test safety-by-design concept → Bio4Self

An updated version of the safety guidelines will be delivered at project end containing safety aspects during production, use and decommissioning of SRPC.

THANK YOU

Contact

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