



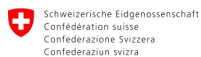
FILTRATION OF BRAKE WEAR PARTICLES

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Project funded by



Swiss Confederation



FILTRATION OF BRAKE WEAR PARTICLES

- In the context of Horizon Europe →



RTR CONFERENCE
09/11/2024 Conference

AeroSolfd -

Fast track to cleaner, healthier urban Aerosols by market ready Solutions of retrofit Filtration Developed for tailpipe, brake systems and closed environments

AeroSolfd is a Horizon Europe project supported by the European Commission under grant agreement No 101056661.

2024 ZERO+ CCAM ETRAC European Commission

[Link to Video](#)

WELCOME TO TEAMWORK

- AeroSolfd – Fast track to cleaner urban air by market ready filtration solutions

Reducing

1. tailpipe emissions



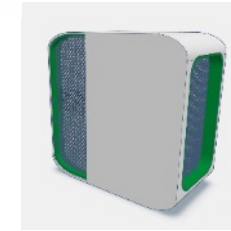
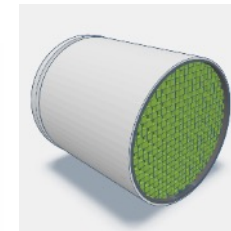
2. brake emissions



3. pollution at metro stations



Measure	Assess	D&C&E	Demo-site	Retrofit
 EXCELENCIA SEVERO OCHOA 	 	<p>Lead:</p> <p>all</p>	 	



Budget in Mio€

- EU: 5.0
- Swiss: 2.2
- Industry: 1.0
- 8.2**

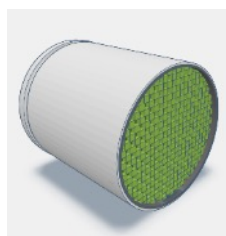
2022/05 – 2025/04

WELCOME – MAJOR OBJECTIVES

- AeroSolfd – Fast track to cleaner urban air by market ready filtration solutions

Reducing

1. tailpipe emissions



13:00 – 14:00
HORIZON Europe AeroSolfd
– Gasoline Retrofit
(3 presentations)

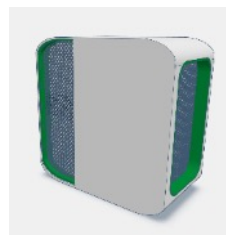
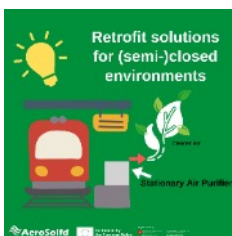
Focus:
gasoline fleet
(EURO 6c
and earlier)

2. brake emissions



- Develop representative brake cycle for urban busses in a city (Valladolid, Ancona, Ljubljana)
- Measure baseline emissions of raw emissions of a typical brake on a dynamometer
- Design and validate virtual twin of brake dust particle filter & test prototypes
- Demonstrate application on test vehicle on road and in winter conditions
- Define type approval process

3. pollution at metro stations



- Identify how to trace emissions of typical metro brakes (disc, block brake)
- Measure exposure level at demo-sites w/o and w/ filter at metro Lisbon and Sofia
- Optimize design of stationary air purifiers and manufacture prototypes for demonstration
- Demonstrate the potential of air purifiers to improve IAQ at a bus depot (3 different setups)
- Define best practice for applying air purifiers as retrofit solution to metro stations
- **Develop Framework for Environmental-Social Life-Cycle-Assessment of retrofit solutions**
- **Overall sustainable assessment of the three retrofit solutions**

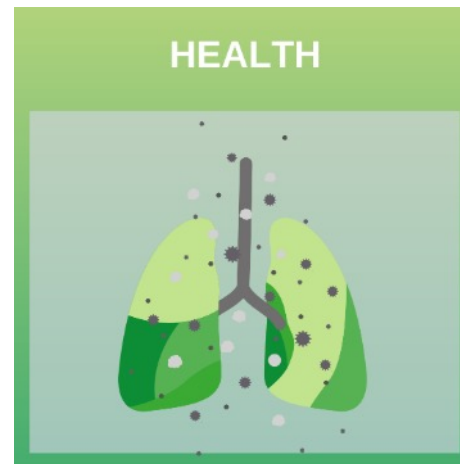
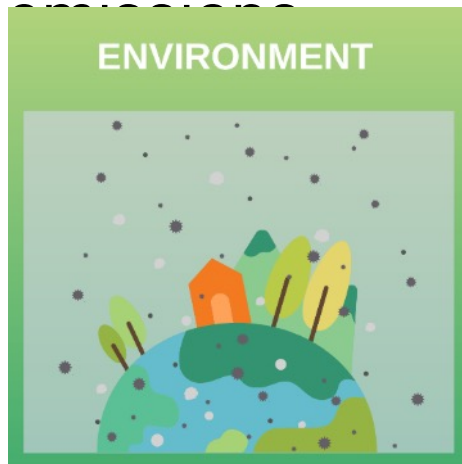
RESULTS

– FILTERING BRAKE WEAR PARTICLES



CHALLENGE & PROPOSAL

- Traffic is a significant contributor to air pollution
- Harmful effects of traffic-related ultrafine particles
→ Aim/Proposal: reducing traffic-related



- HORIZON-CL5-2021-D5-01-15 - Development and demonstration of cost affordable and adaptable retrofit solutions for tailpipe and brake polluting

emissions

Project funded by



Schweizerische Eidgenossenschaft
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Swiss Confederation

Federal Department of Economic Affairs,
Education and Research EAER,
State Secretariat for Education,
Research and Innovation SERI



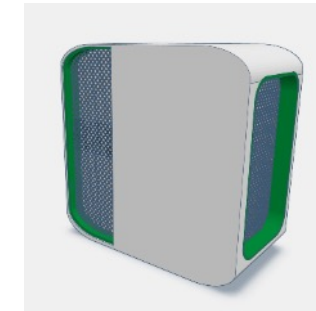
CONCEPT

- AeroSolfd Solutions – Filtration of Brake Wear Particles:

- Reducing brake emissions at source
(direct at the source filtration)

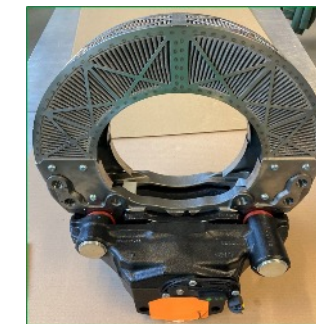
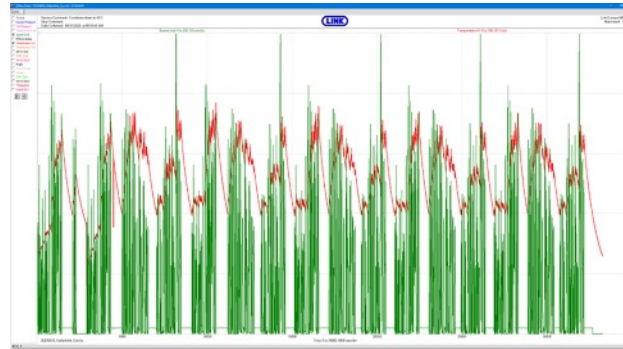
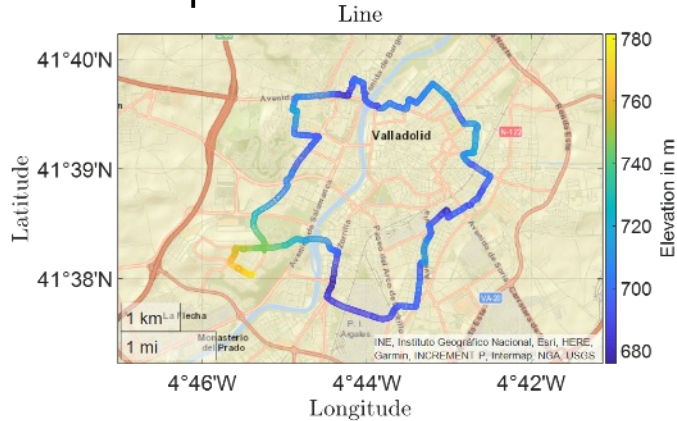


- Reducing pollution in (semi-)closed environments
(limiting the resulting exposure level)



RESULTS: BRAKE DUST FILTER

- Representative Brake Cycle for an urban bus in a city



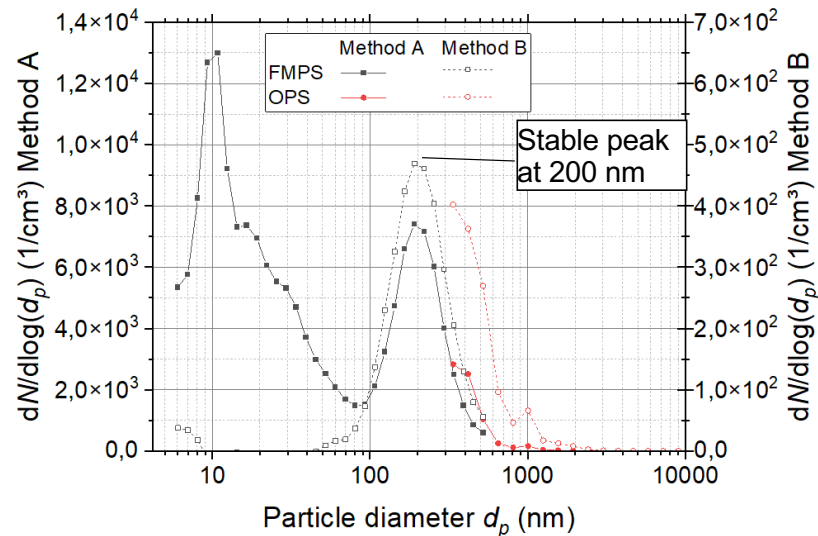
- ✓ Valladolid, ES • Ljubljana, SI
- ✓ Ancona, IT

- (Virtual) Design of Brake Dust Particle Filter and Connector for Retrofitting to ZF Air Disc Brake MAXX 22 (Transfer of passenger car concept)



RESULTS: AIR PURIFIER @ METRO

- Emissions of metro brake (disc type) characterized → Tracer: Sb(Antimony) 200 nm



up to 100% reduction of emissions from metro brakes only below 10 km/h)

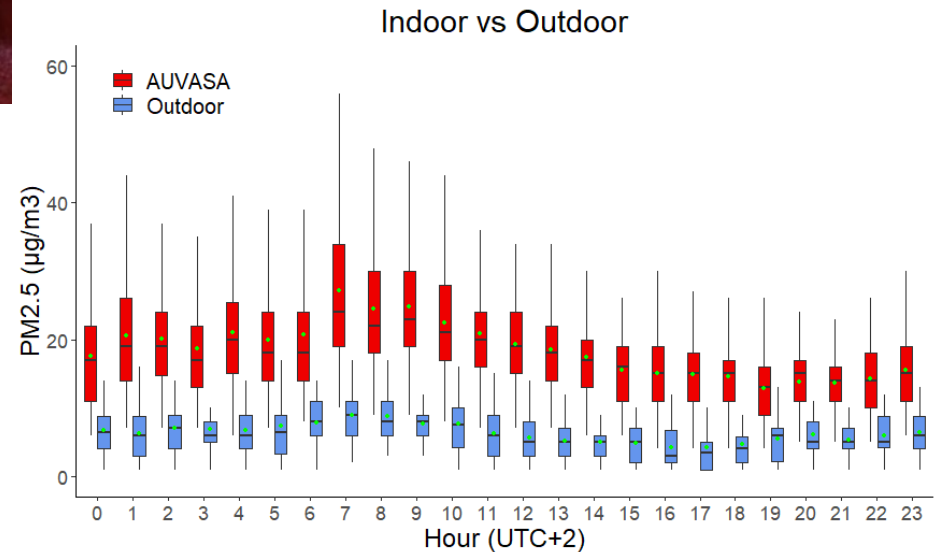
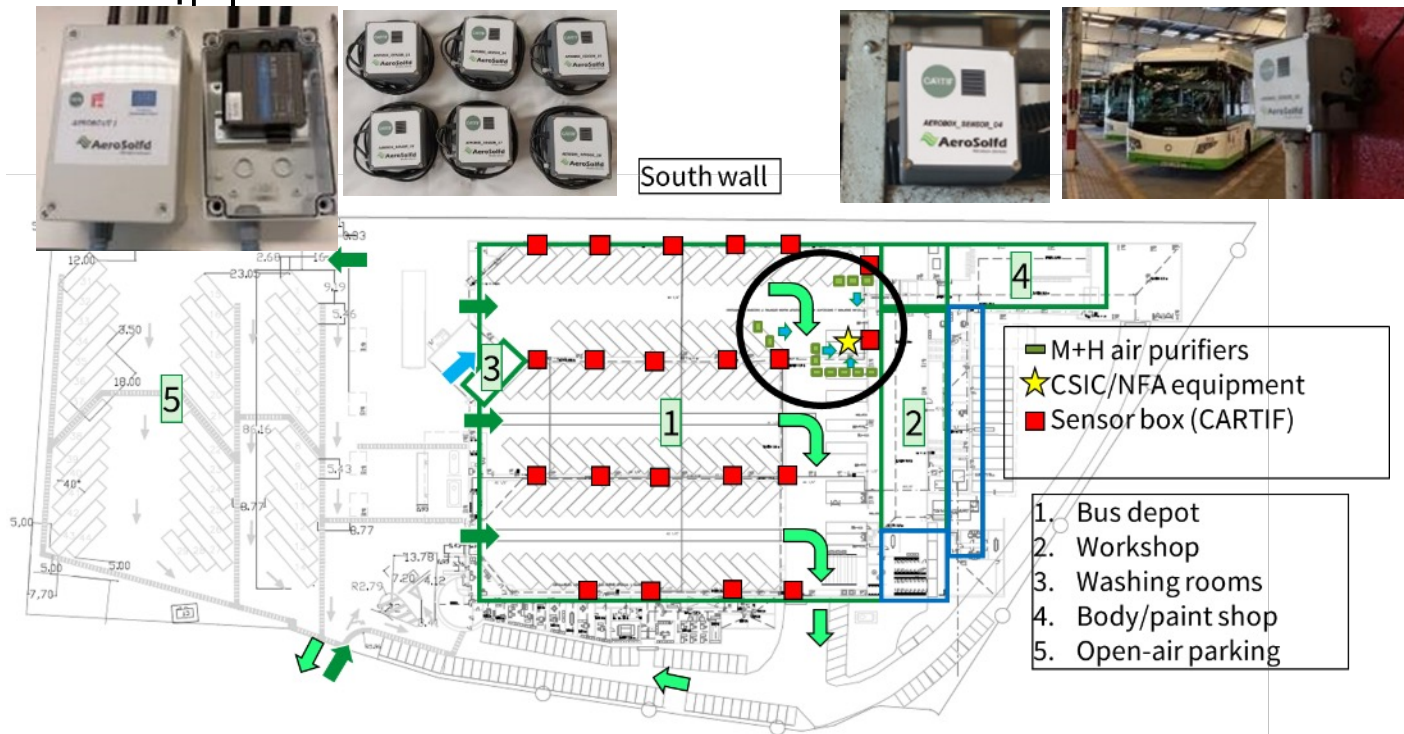


- Metro stations for installation of air purifiers identified at Lisbon and Sofia (Filter delivered, installation ongoing, test equipment and protection defined)

RESULTS: AIR PURIFIER @ BUS DEPOT AeroSolfd

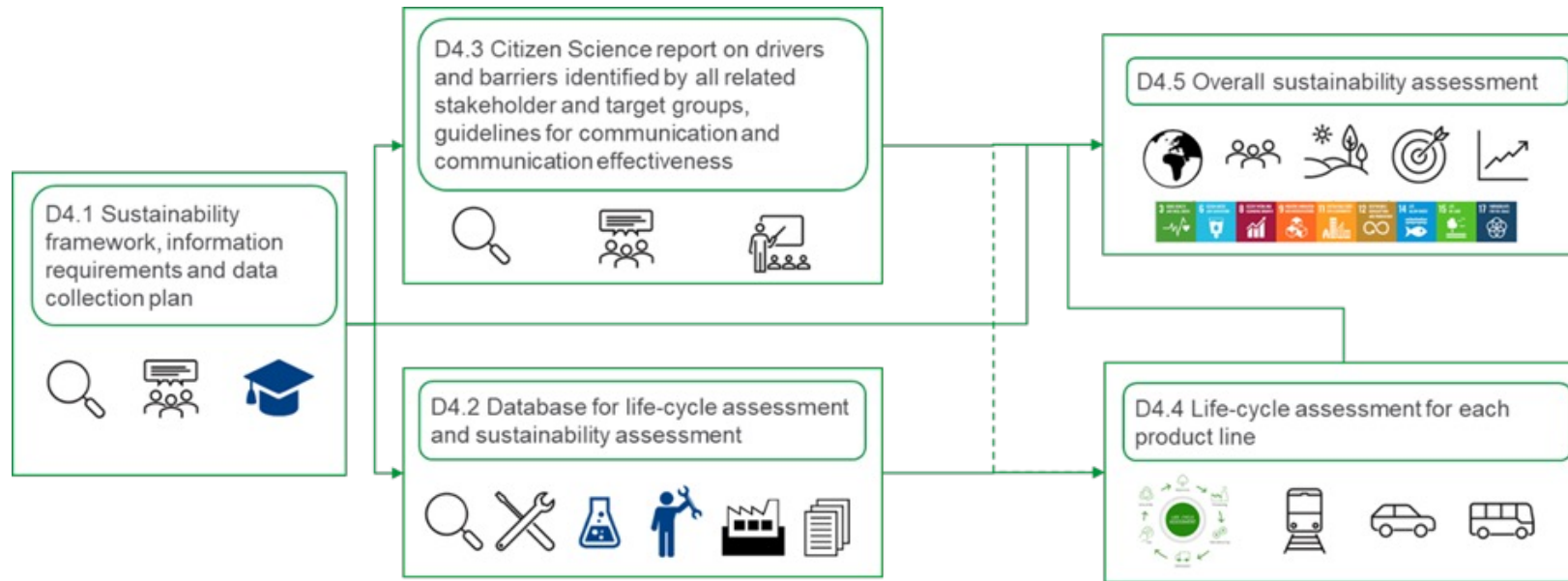
filtration devices

- Air Quality Measurements at semi-closed environment of a bus depot
- Advantage: public restricted area, low cost and scientific grade equipment



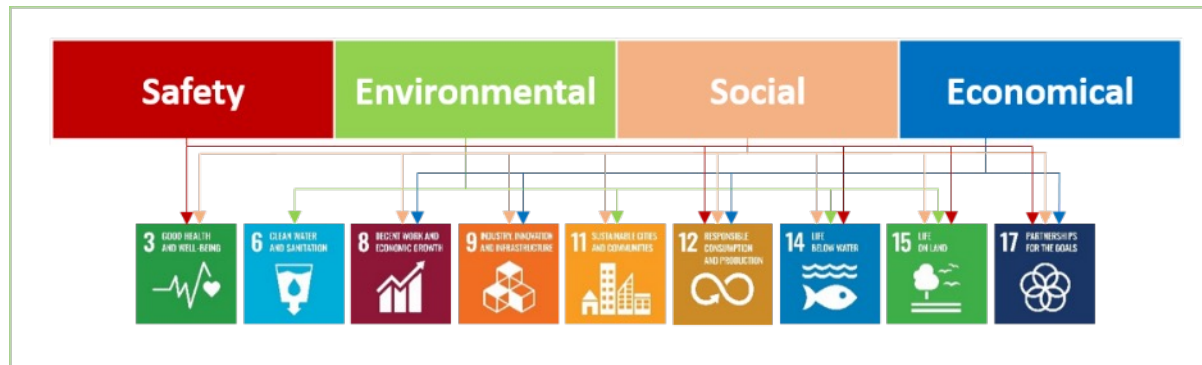
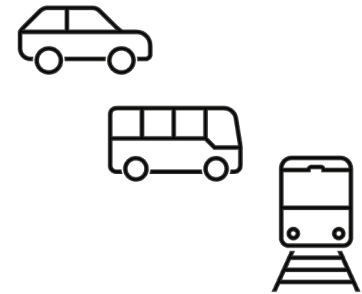
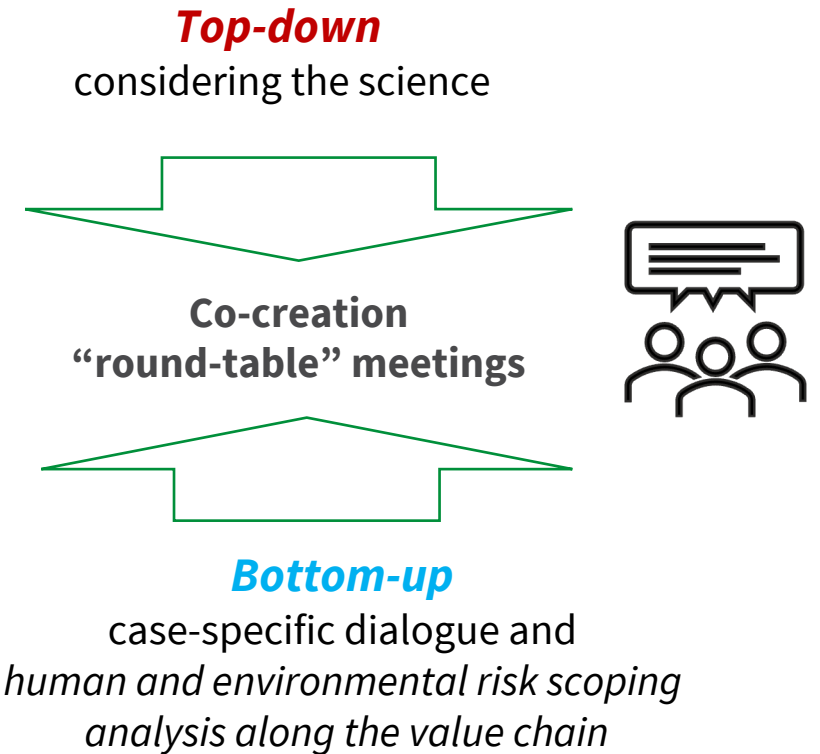
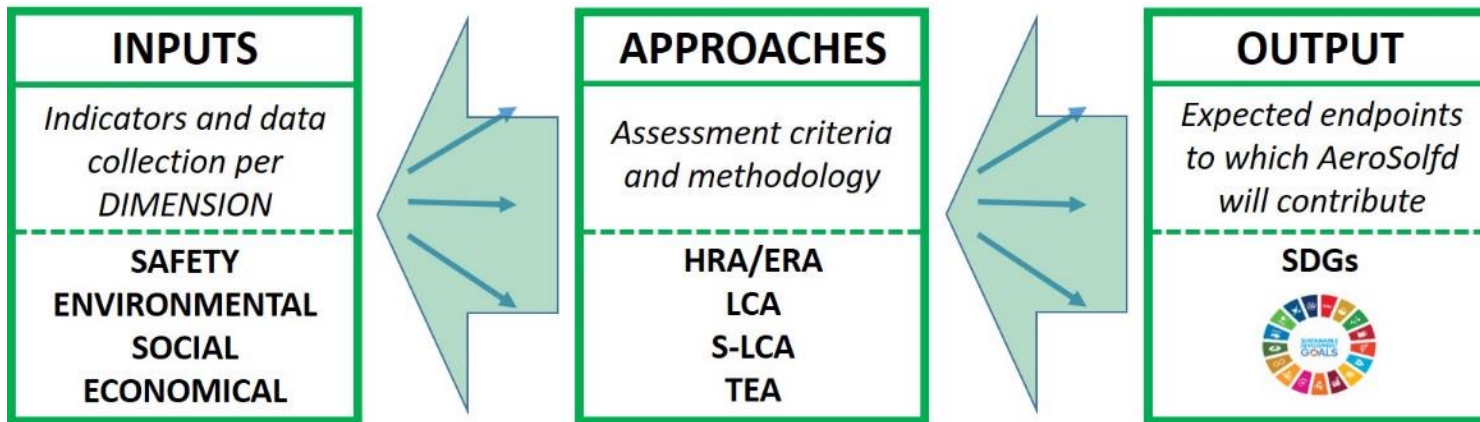
Daily distribution of BL PM_{2.5} at AUVASA bus depot and outdoor environment.

RESULTS: SUSTAINABILITY



DEFINING THE FRAMEWORK

- for the sustainability assessment



LCA – DATA COLLECTION THEORY

1. Raw materials.

- mostly secondary sources (databases and literature).
- BOM templates to identify amount of raw material.

2. Parts in product manufacturing

- Process flow templates by suppliers and manufacturers.
- If no primary data, e.g.interviews with project partners.

3. Transportation to the manufacturing sites.

- Data gathered using the BOM template. (Data owners are likely to be the procurers at the product manufacturers.)

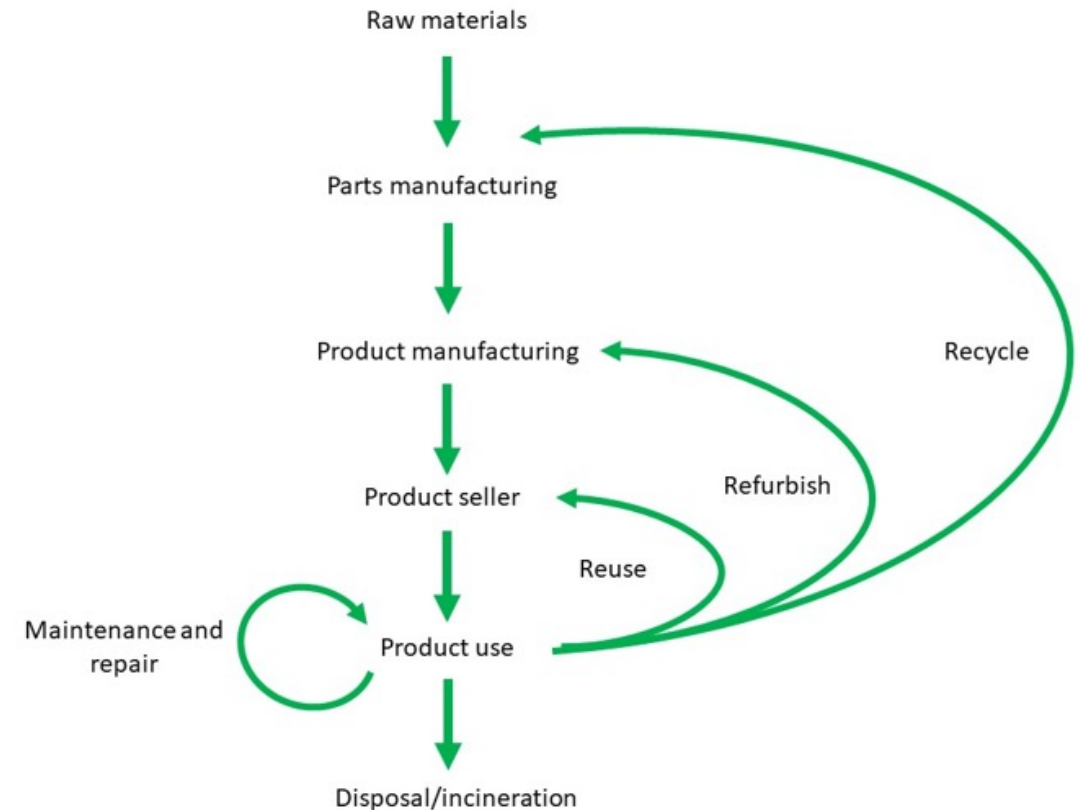
4. Product use

- Compare data use phase of the business-as-usual scenario and the demonstration case scenario

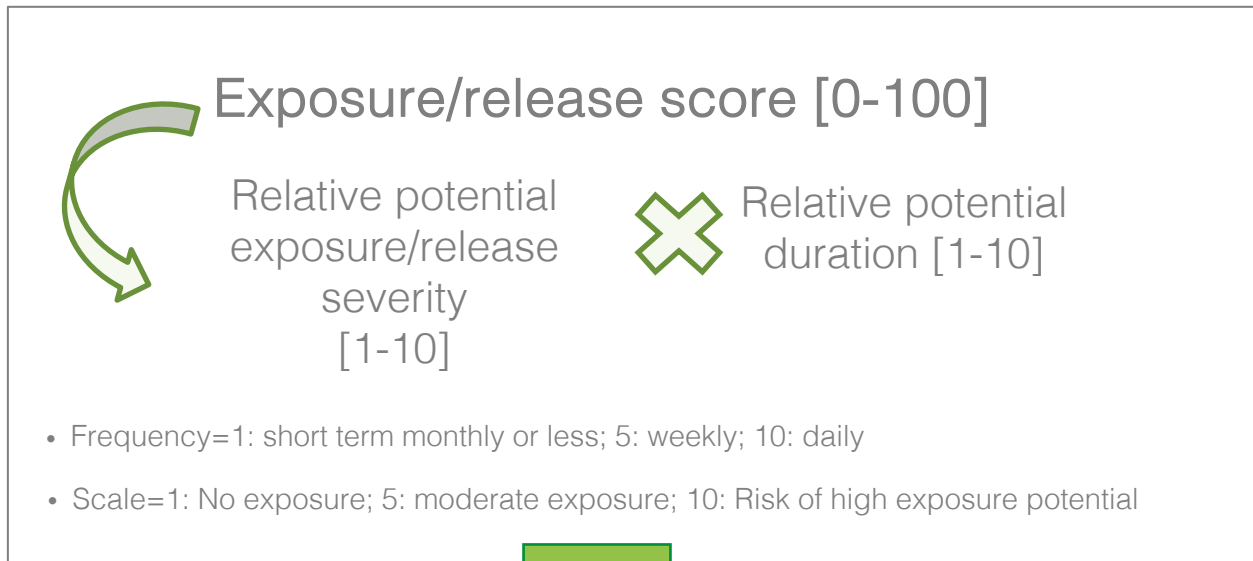
5. The end-of-life of the products themselves.

- Process flow template on processes for waste disposal.

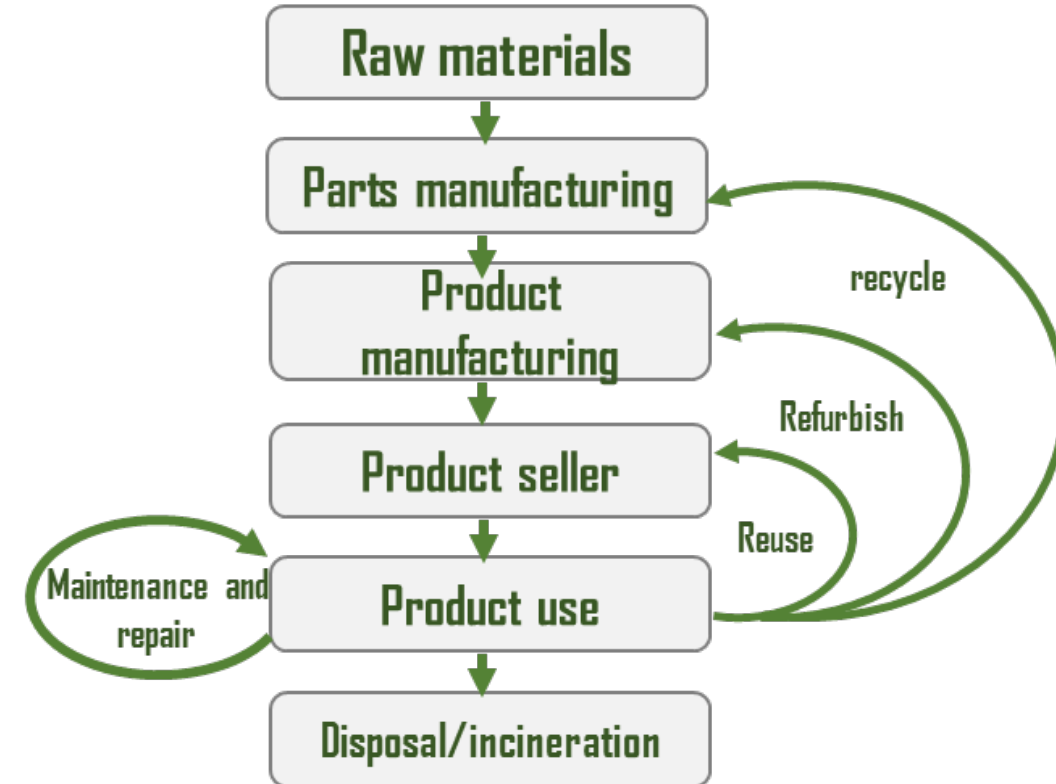
The five life cycle phases



RISK SCOPING APPROACH

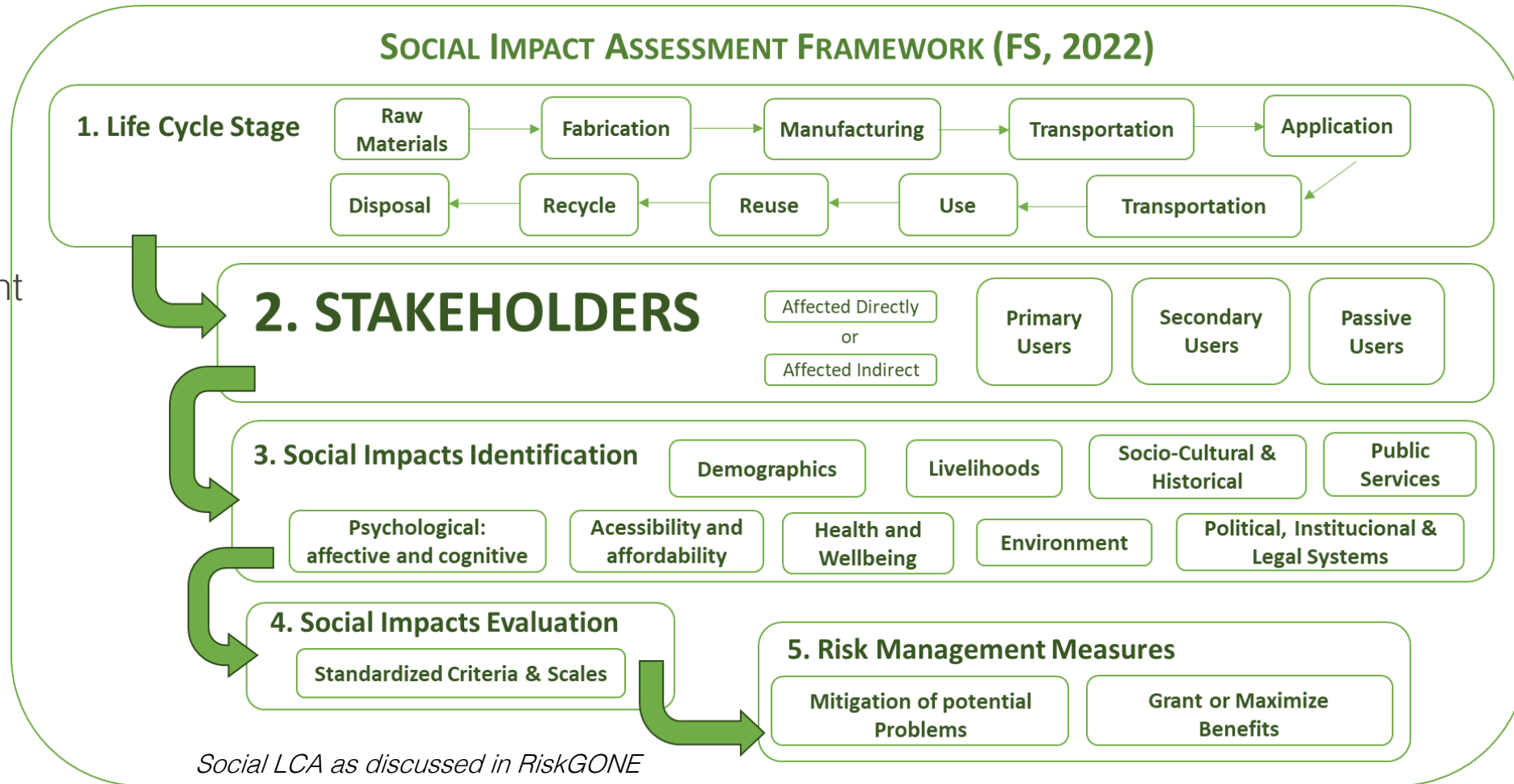


Identification of potential human and environmental risks for further qualitative to quantitative risk assessment



SOCIAL LCA

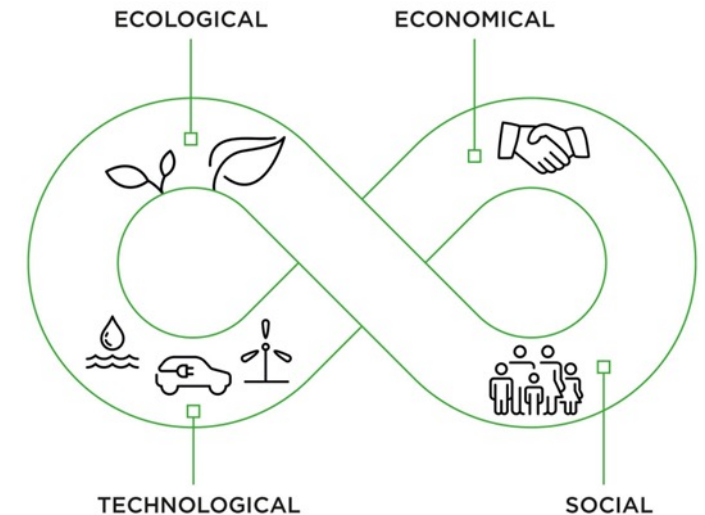
- § UNEP/SETAC Life Cycle Initiative
 - § ISO 14040 and 14044
 - § CSR (GRI, ISO26000...)
 - § Social Impact Assessment (IAIA)
 - § Social LCA Framework proposed in RiskGONE
- ## STAKEHOLDER GROUPS
- key difference for Environmental LCA



CORPORATE SOCIAL RESPONSIBILITY **AeroSolfd** filtration devices

Example: [MANN+HUMMEL Sustainability Report 2022](#).

- Common definitions of sustainability usually encompass three dimensions: **environmental**, **economical** and **societal**.
- At MANN+HUMMEL, we see ourselves as pioneers, adding a fourth dimension to these existing concepts: **technology**. As a technology-driven company, we have been developing innovative, cutting-edge solutions for eight decades now. We firmly believe that the dimension of **technology** is an essential component of sustainability. And for MANN+HUMMEL, the dimension of technology is, more concretely, the **dimension of filtration**.
- As leader in Filtration, we enable our customers to be more sustainable.
- We develop solutions that enable cleaner mobility, air and water and deliver key technologies that pave the way to a cleaner planet.



ES-LCA AS GAME CHANGER?

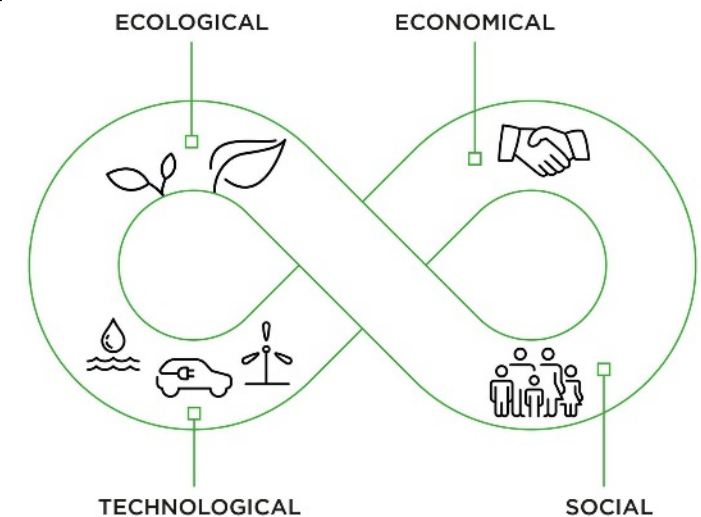
- Environmental-Social Life Cycle Assessment (ES-LCA) as holistic approach
- Not only focusing on GHG emissions, but a broader environmental and social scope

Company View: Environmental-Social-Governance (ESG)

- How to improve your ESG-score?

Financial Impact beyond reporting?

- ESG-linked financing and responsible investments
- Social-Investors / -fundraising



■ Public financing

A VISUAL & AUDIBLE SUMMARY



PROJECT PARTNERS



AEROSOLFD – A GREAT TEAM!

www.aerosolfd-project.eu



Let's stay connected!

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Question for Lunch Break:

**How can ESG as Environmental-Social-Governance
Become a Positive Game Changer**

**By Creating Financial Impact
To Boost Retrofit Solutions for Cleaner Urban Air?**

