

Lowering transport environmental impact along the whole life cycle of the future transport infrastructure-LIAISON

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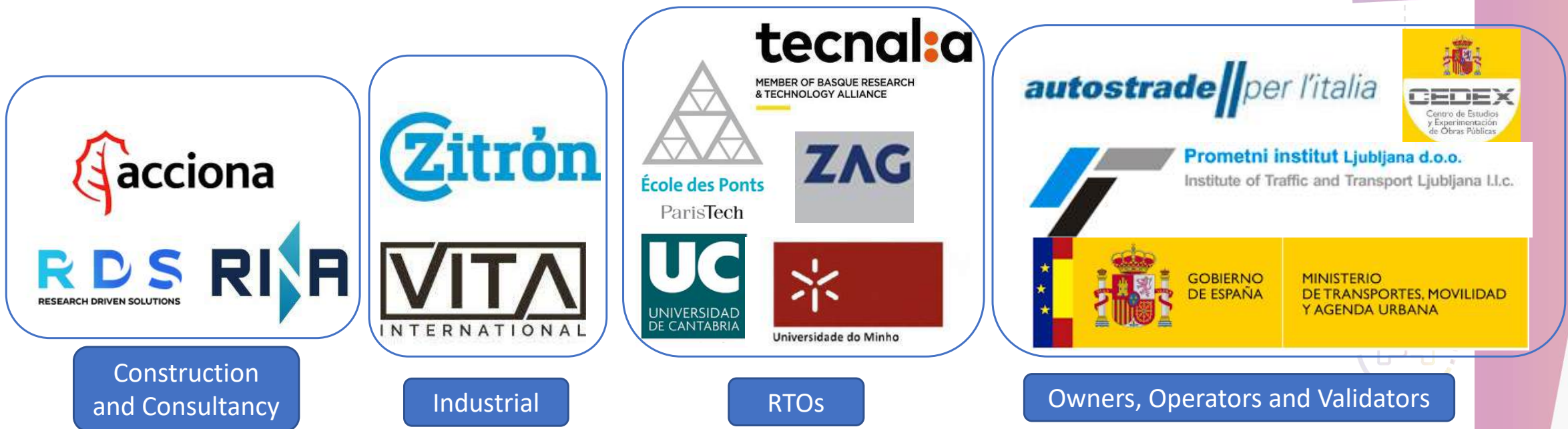


Overall project presentation

Lowering transport environmental Impact along the whole life cycle of the future transport infrastructure-LIAISON means...

...DECARBONISATION

Consortium, project Partners and budget



Total Budget: 5M €

Overall objective of the LIAISON project



To develop a methodology, support tools and close to market technological solutions to transform EU Transport Infrastructure into a more sustainable and low carbon economic activity. LIAISON will implement four main lines of action:

- 1) minimizing the **consumption** of resources (**√20%**),
- 2) **reusing (100%)** available ones,
- 3) evolving towards a **prosumer (√0%)** (infrastructure, and
- 4) actions to facilitate market uptake by supporting **procurement, legislation and standardisation** processes.

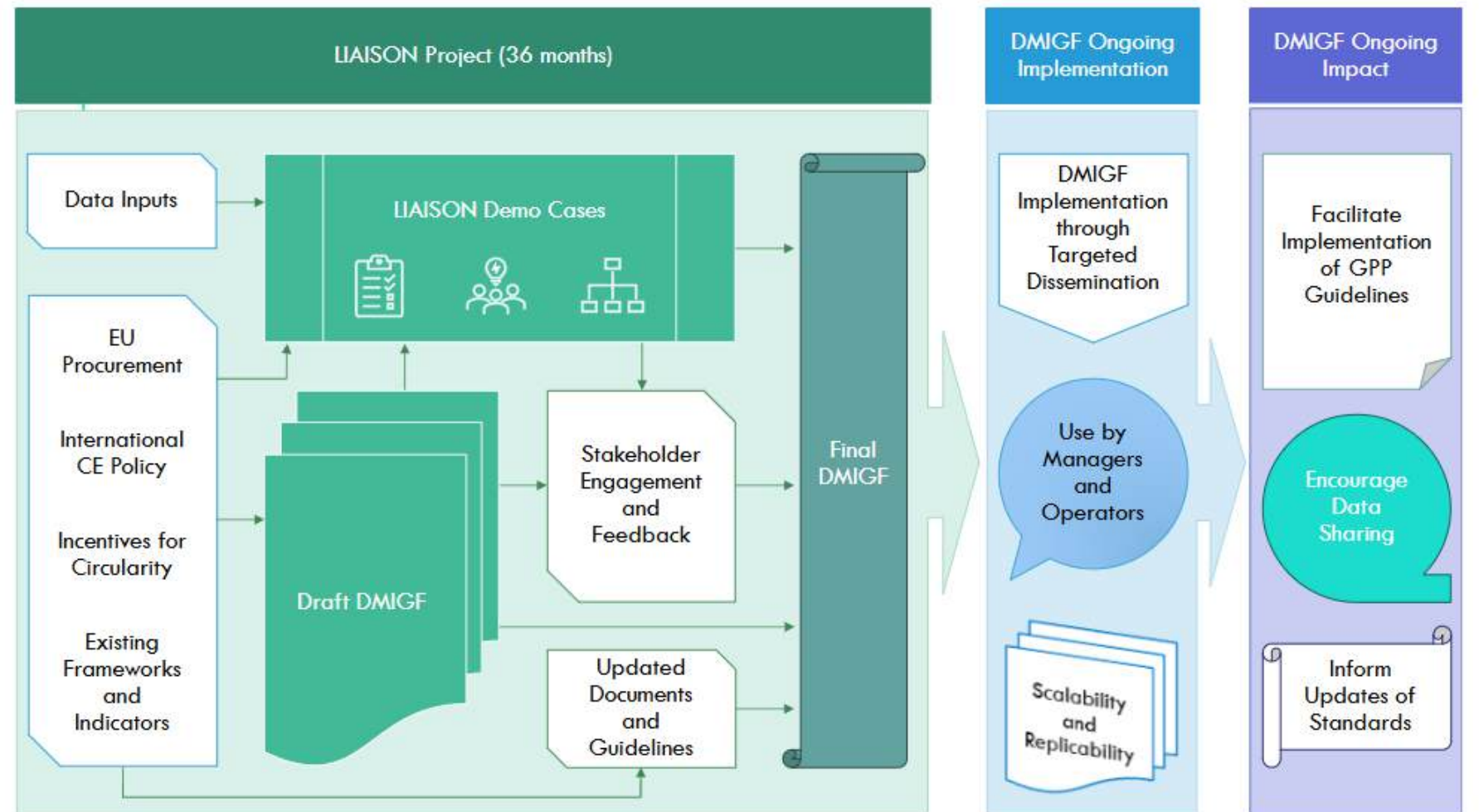


Results presentation

Industrialised, Circular and Smart O&M Solutions for Transport Infrastructures (TI) for...

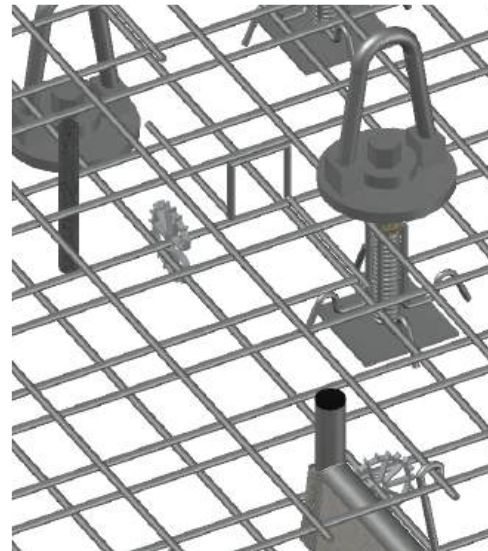
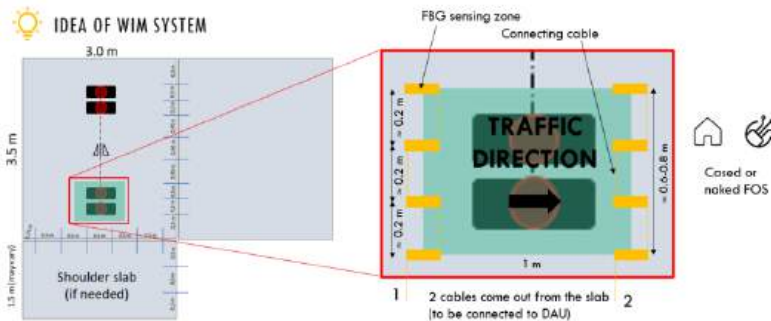
...DECARBONISATION

LIAISON Dynamic Multi-Infrastructure Governance Framework (DMIGF) methodology

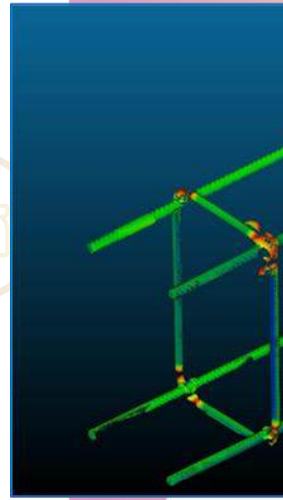


Industrialised Solutions

- *Modular rigid pavement for roads*



- *Optimised-smart beam manufacturing*



Circular Solutions

• Bioasphalt pavement

Different sources for biobinders



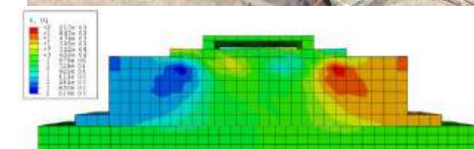
Category	KPI	Traditional AC16	Bioasphalt AC16
TECNHICAL	Comply with technical specifications?	YES	YES +
CIRCULARITY	Can it be recycled? (Y/N)	YES	In progress
COSTS	Direct costs (€/ton)	54.7	49.2 (-10%)
	Life cycle cost (1km)	In next stage	In next stage
ENVIRONMENTAL	Carbon Emissions (KgCO ₂ -eq/ton)	75.7	14.4 (-81%)
	ECI (€/ton)	9.2	5.4 (-41.5%)
	ECI (€/km)	In next stage	In next stage
SOCIAL	Safety at work (volatiles)*	-	NO

Bio-asphalt#2: Bio-AC16 with bio-binder#2
100% replacement of oil-based bitumen.
40% bio-based.

shoulder element

railway sleeper with rails

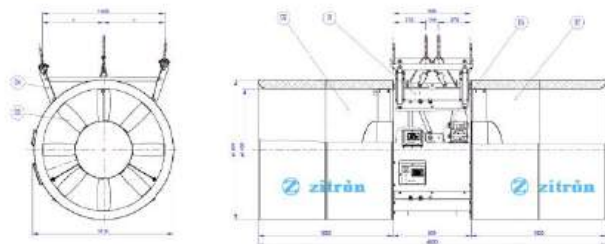
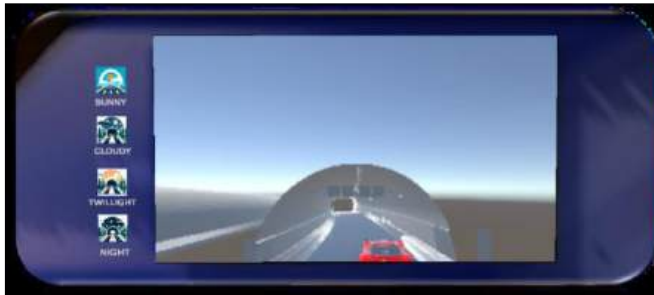
geosynthetic



- Low noise & vibration circular railway track

O&M Solutions

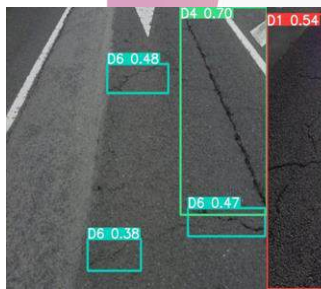
- *Tunnel energy optimisation for digital asset management environments*



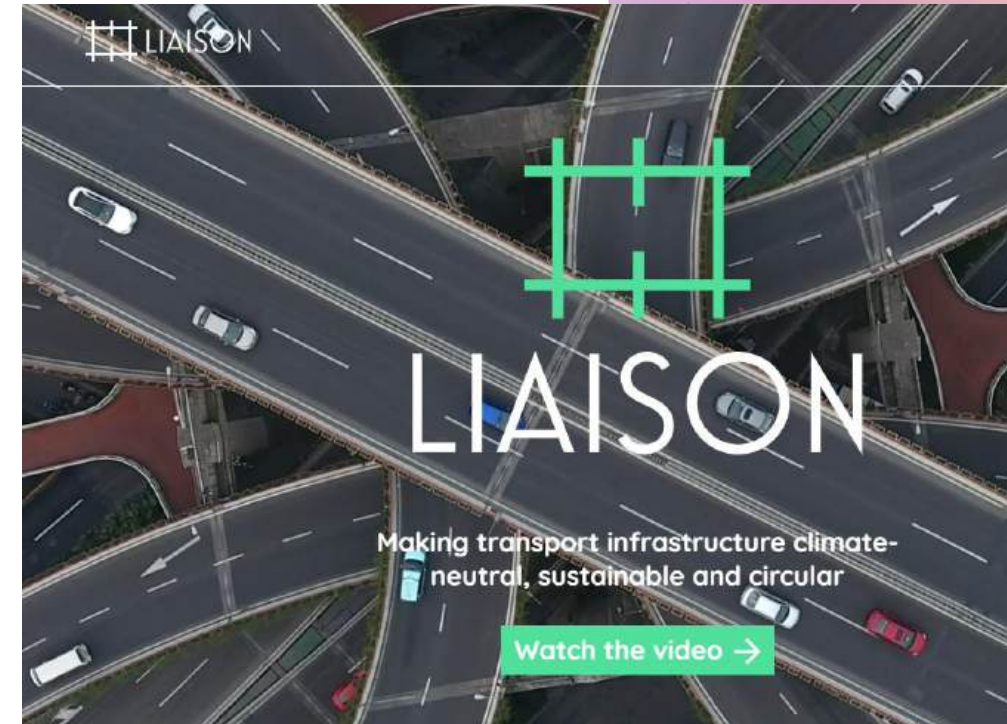
- *Photovoltaic guardrail*



- *Pavement detection*



Cross-projects cooperation





Mid to long term expected impacts of the project

Industrialised, Circular and Smart O&M Solutions for Transport Infrastructures (TI)

LIAISON Dynamic Multi-Infrastructure Governance Framework (DMIGF) methodology



- The LIAISON Dynamic Multi-Infrastructure Governance Framework (DMIGF) methodology will facilitate the **transformation of Infrastructure** into a more circular and low carbon economic activity.
- The DMIGF will provide organisations (Administrations and Contractors) with a **quantitative risk-based assessment** to evaluate the circular economy potential of TI carbon-neutral construction, operation and maintenance, and decommissioning.
- With its circular approach, the new governance framework will have the capability to foster scalability and replication of innovative solutions. **Tender Processes.**

LIAISON is fostering of green, sustainable and innovative public procurement and Tender processes (proposals for all the solutions)



Industrialised solutions

• *Modular rigid pavement for roads*

- The production of **precast pavement slabs** made with geopolymer concrete, equipped with **Weight In Motion (WIM)** systems, represents a significant advancement in the field of civil engineering and materials science.
- The use of **geopolymers**, which leverage waste materials, promotes a circular economy and reduces pressure on natural resources. Furthermore, new formulations of geopolymer concretes simplify the construction process by requiring fewer chemicals and eliminating the need for heat curing, without compromising the material's mechanical properties.

Design for **assembly/dissassembly**.

• *Optimised-smart beam manu*

- **Shape optimization** allows that **material savi** allow that material savings

Technology	Mould reusability	Mould recyclability
Precast beam	∞	∞
Collaborative concrete mould	∞	∞
Lost concrete mould	0	0
Steel mould	1000	100
Timber mould	10	0
Thermoplastic mould	20	10
Clay mould	0	∞

Standard proposal: Contribution/Non-contri

Circular solutions

• *Bioasphalt pavement*

- The use of the Cashew Nut Shell (CNS) – based biobinder to replace 100% of the conventional oil-based bitumen allows **reducing carbon emissions in about 80% per ton of asphalt** mixture without compromising the performance of the mixture. All the mechanical tests carried out at the laboratory obtain similar or better results than the conventional material.
- In addition, all the category impacts according to the CML-IA methodology present lower environmental impact when this biobinder is used.

Barrier: **Supply Chain.** Biobinders are sometimes difficult to access.

• *Low noise & vibration circ track ballast*

- The reduction of the permanent deformation of ballasted railway track by more than 50% means **saving costs** in maintenance work.
- The use of **waste rubber from recycled** worn aggregate from old railway track allows the **reutilization of construction materials** in ballasted track construction. Tests indicate that the hysteretic damping of this material could increase significantly in wet conditions, with potential gains of up to 50% in noise reduction scenarios (at a vertical stress of 350 kPa). Consequently, a 50% reduction in ground vibration from railway traffic is achievable.

Impact: **East European** railway managers.

O&M Solutions

- ***Tunnel energy optimisation in a digital asset management environments***

- The digital twin of the tunnel will allow **cost savings** associated with **energy consumption**, significantly reducing electricity costs thanks to the optimisation. The savings can be substantial depending on the usual consumption of the tunnel.
- The optimisation of the usage of lighting fixtures will reduce the frequency of the luminaire replacement, resulting in a lower cost over the time. In addition, having a more controlled system by an intelligent implementation will allow to apply predictive maintenance procedures, which will **minimise downtime** and **reduce the frequency of costly repairs and replacements**.
- Impact: Tunnel fans in **road/rail/metro/mining/industrial**

- ***Photovoltaic guardrail***

- **Fewer accidents**, especially for motorcyclists, due to better visibility and impact absorption.
- **Renewable energy contributions** can power roadside infrastructure, further supporting carbon reduction goals.
- The PV Guardrail project shows the potential to **revolutionize road safety and renewable energy generation**.
- Impact: applicable for other road/rail components

- ***Pavement detection***

- Reduce the inspection **frequency** **assessment**
- **Optimal resources.** update of and its ea an efficient
- **Better av** road pa damages repaired.



THANK YOU

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