CLOSING THE LOOP: ENHANCING RAILWAY ASSETS CIRCULARITY THROUGH SUSTAINABLE LIFECYCLE MANAGEMENT

CircularRail

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Nyttor och effekter

This project aims to extend the lifetime of railway assets through predictive maintenance, reducing life cycle costs and environmental & societal impacts while implementing the CE framework.

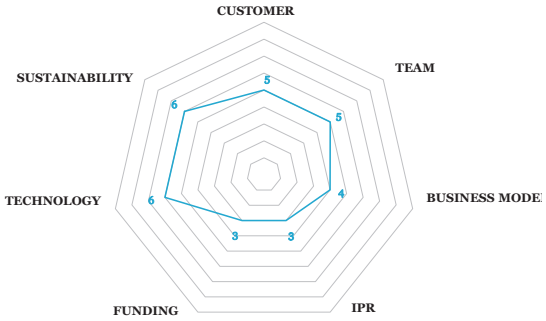
Objectives in this context are as follows:

- Mapping the railway assets life management process, highlighting circular model requirements, data aggregation, and MFA,
- Developing new Circular Predictive Maintenance by incorporating sustainability measures and future climate scenarios into maintenance practices.
- Identifying optimal CE scenarios for railway assets by integrating MFA and LCSA factors.

Leveranser

- Increasing railway asset efficiency by extending asset service life.
- Improving environmental sustainability by integrating environmental factors into predictive maintenance decisions.
- Incorporating climate change impacts into the proposed DSS to address future demands & support long-term planning/development.
- Supporting infrastructure managers in increasing the circularity of railway assets by selecting appropriate CE models.

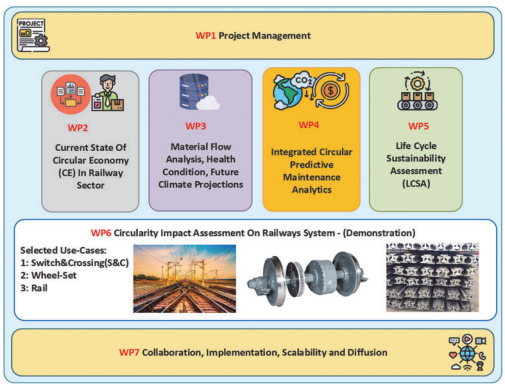
Innovationsstatus



Vidareutveckling och implementering

- ❑ Replicate and extend the concept to other assets at railway network level
- ❑ Transferring the methodology, tools, and knowledge produced by this innovation to other linear assets such as roads, pipelines, and grids
- ❑ High potential for full-scale implementation of the solution in Environment division at TRV within 3-5 years after project completion
- ❑ Empowering stakeholders towards circular economy initiatives and fulfill government policies on sustainability and climate neutrality in the Swedish transport sectors.
- ❑ Scaling the circularRail framework at network level.





Målbild 2040

By 2040, circular and climate-informed asset management is standard practice in the railway sector. CircularRail's framework support longer asset lifetimes, predictive and sustainable maintenance, increased reuse and remanufacturing, and reduced resource consumption, waste and CO_2 emissions. The approach contributes to a resource-efficient, climate-neutral and resilient railway system.

The initial benefits of the proposed CE methodology are estimated at a 5–10% reduction in resource consumption and CO_2 emissions. With successful implementation of the CE models developed in CircularRail and their scalability across the railway network, these benefits could potentially increase to 15–20%.

Aktörskonstellation

❑ Luleå Tekniska Universitet (LTU) , Trafikverket , Järnvägstekniskt Centrum (JVTC), Luleå kommun , Duroc Rail AB and Alstom

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