

RAILWAY RENEWAL DECISIONS TODAY SET CARBON TRAJECTORIES FOR DECADES

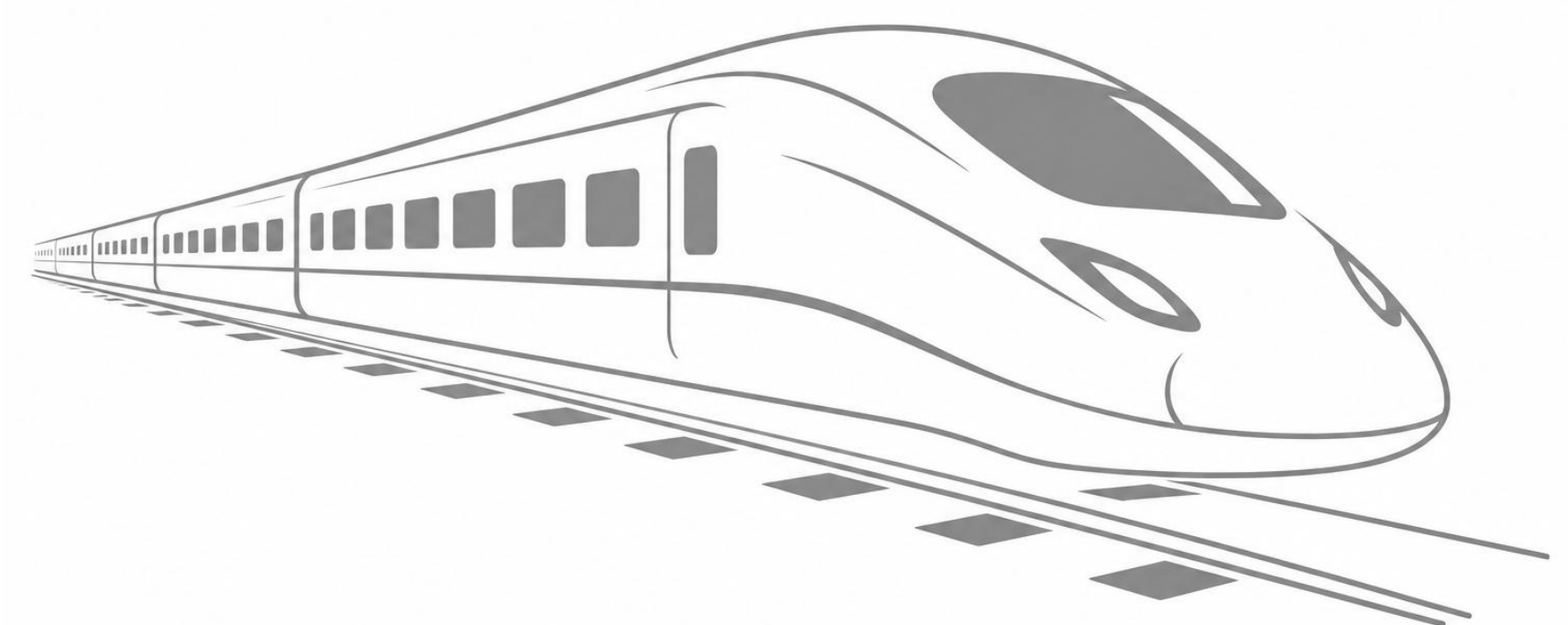
Prospective LCA for portfolio-scale railway asset management, FORMA project

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1 BACKGROUND

- Railway asset management decisions lock in emissions and material use for decades.
- Renewal and maintenance dominate the life cycle impacts of railway assets.
- Digital asset management tools do not account for environmental impacts
- There is growing pressure on asset owners to reduce environmental emissions while accommodating higher utilization rates and fewer resources.



2 RESEARCH QUESTION

How can a time-explicit prospective LCA be used in asset management so that environmental performance sits alongside cost and other metrics? And which maintenance plan can result in the lowest emissions?

3 FINDINGS

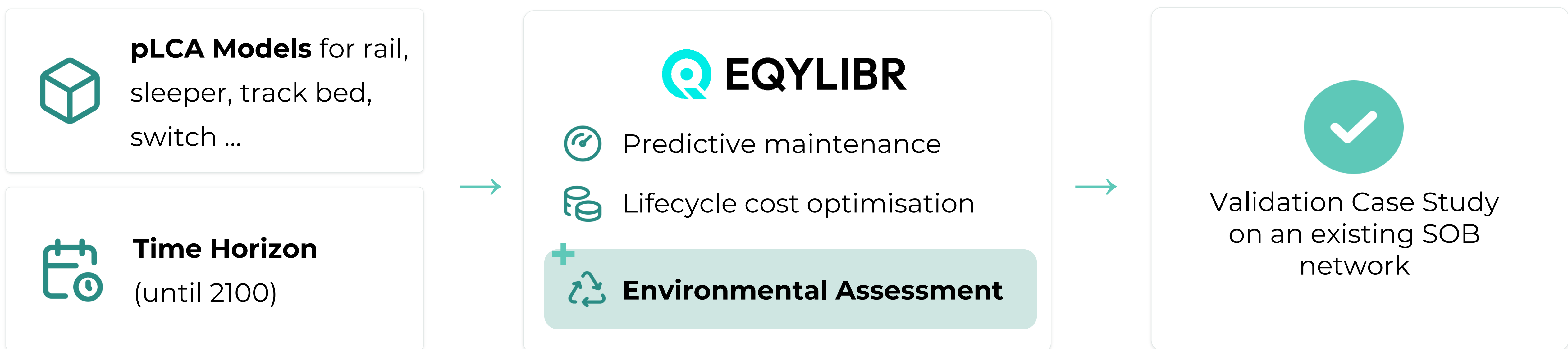
≈ 4 tCO₂e

Saved by deferring renewal of a 50 m switch by 5 years under a REMIND NDC scenario (2030–2035).

4 APPROACH

1. Bill of materials per asset: component-level bills of materials collected based on Swiss data
2. Scaling engine: convert each planned intervention into material and energy quantities.
3. Link to prospective emission factors: using REMIND pathways via PREMISE.
4. Portfolio-level comparison: Intervention impacts aggregate to compare maintenance and renewal

5 OUTCOMES



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