Cost and Benefit Risk Framework for Modern Railway Electrification Options

Project Introduction

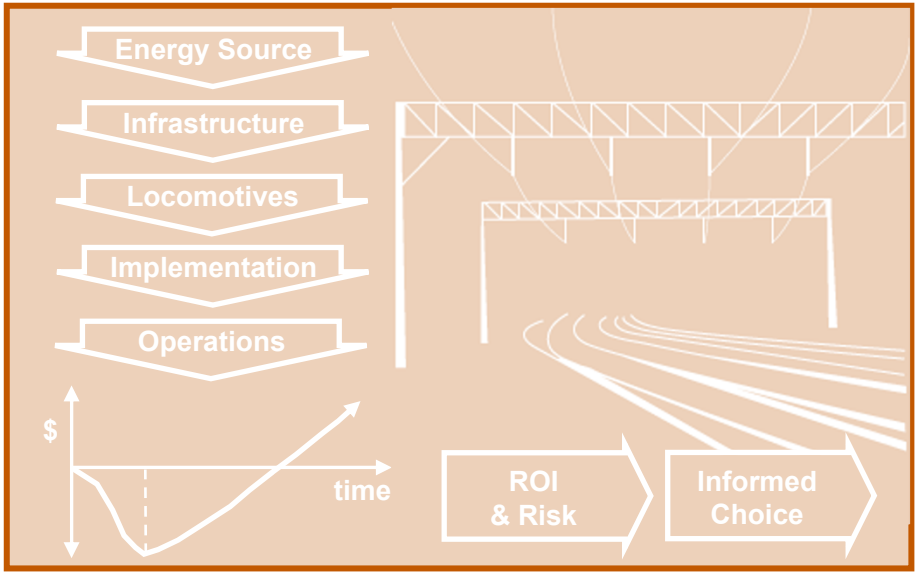
TRAIN
TEXAS RAILWAY ANALYSIS & INNOVATION NODE

TEXAS
The University of Texas at Austin

Michael Iden, P.E.
Tier 5 Locomotive LLC

Jim Blaze
Railroad Economist

High-level Overview



Project Description and Objectives:

- develop updated costs and benefits for modern innovative approaches to railway electrification
- review previous electrification studies to identify critical technical and economic barriers
- scan alternative technologies and operation and implementation approaches to identify solutions
- develop an updated cost-benefit framework that considers carbon-focused decision environment plus uncertainty and risk in return on investment
- case study to show benefit and cost sensitivities

Expected Outcomes Improving Railroad System:

- holistic understanding of primary barriers
- comprehensive evaluation of new approaches to operations and implementation that improve benefits and reduce costs, timelines and risk will also guide future research and development
- novel Monte Carlo framework for analyzing updated electrification benefits/costs will yield a return on investment distribution to quantify risk
- more informed technology decisions and greater certainty in feasibility of new options to electrify

Schedule:

- Schedule: 12 months with interim deliverables
- Deliverables: Interim technical memos on past study review and new electrification options; updated benefit-cost framework analysis tool; case studies in final report and presentation

FRA Task Monitor: Melissa Shurland

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Project Team & Contact Info

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U.S. Department of Transportation
Federal Railroad Administration

Project Objectives

- Holistic understanding of the primary technical and economic barriers to railway electrification

- Identification of innovative technologies and approaches to operations and implementation that will
  - Improve benefits,
  - Reduce cost and risk, and
  - Eliminate or lessen operational limitations and impacts

- Updated benefits and costs of modern electrification options

- New risk-based framework for evaluating the sensitivity of electrification decisions to cost uncertainty, considering:
  - Current railroad operating situation
  - Carbon-focused environmental decision context

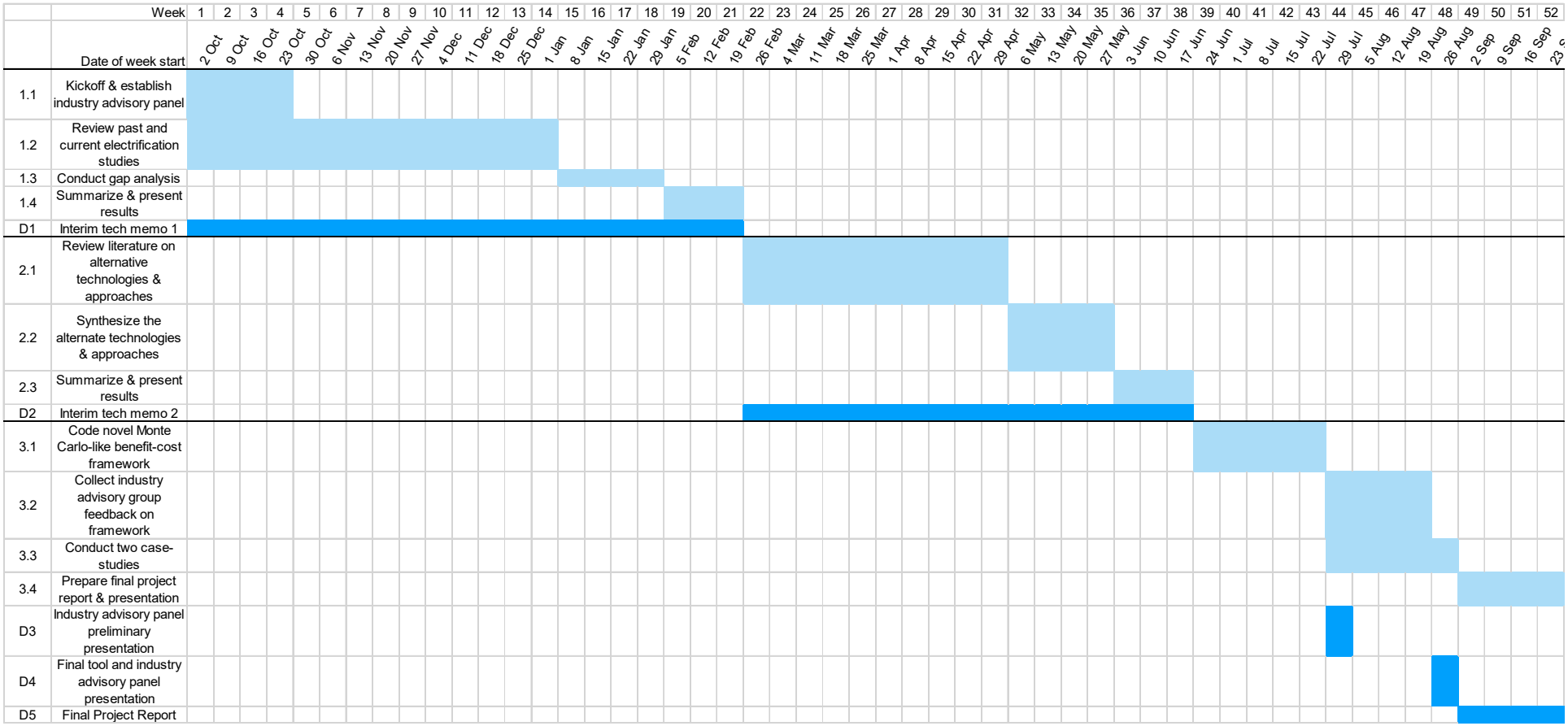
Tasks & Work Packages

- **Task I – Review past/current railway electrification studies**
  - Catalog key technologies and their limitations
  - Identify the primary factors influencing costs, benefits, and risks
  - Completed February 2024

- **Task II – Review alternative technologies and strategic implementation approaches**
  - Identify innovative solutions that would improve the cost-benefit-risk assessment of electrification
  - In-progress

- **Task III – Develop and demonstrate an updated risk-based electrification benefit-cost framework via case study**
  - Analyze two representative types of rail corridors
  - Accommodate different policy frameworks, such as Carbon taxes or Carbon reduction commitments
  - Consider variability & uncertainty

Project Schedule



Project Milestones & Deliverables

Kickoff Meeting with FRA	Oct 20, 2023
Tech Memo 1 (Economics)	Week 21 (~Feb 23, 2024)
Presentation to IAP on Task 1	TBD (~May 2024)
Tech Memo 2 (Technology & Strategy)	Week 38 (~Jun 21, 2024)
Presentation to IAP on Task 2	TBD (~June 2024)
Preliminary Framework Presentation	Week 44 (~Aug 2, 2024)
Final Code & Presentation	Week 48 (~Aug 30, 2024)
Final Report	Week 52 (~Sep 27, 2024)

Thank you for your attention!

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This project is sponsored by the US Federal Railroad Administration

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