The Combined Line Planning and Vehicle Scheduling Problem for a fleet of Electric Buses

This metaInnovation introduces a two-stage approach on the scheduling of a fleet of electric buses and the modification of existing bus line routes, while considering the charging needs of the vehicles and the passengers' demand.

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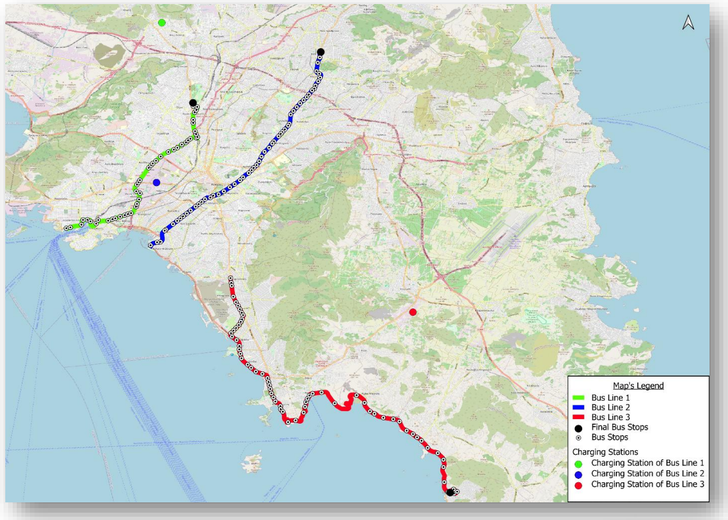
Data Requirements

- Electric bus trip schedules and routes.
- Number of required vehicles.
- Battery capacity and energy consumption.
- Charging station locations.
- Passengers' demand.

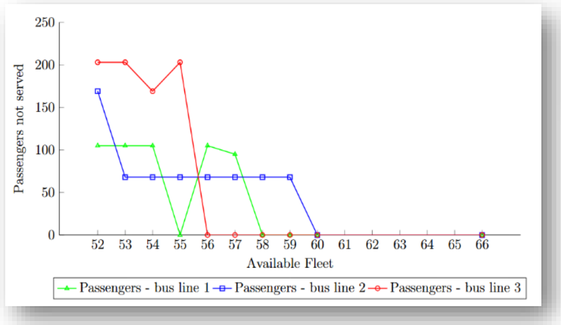


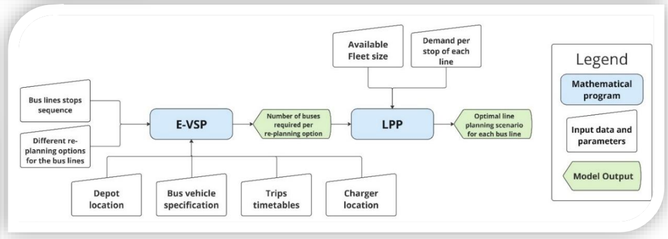
Methods

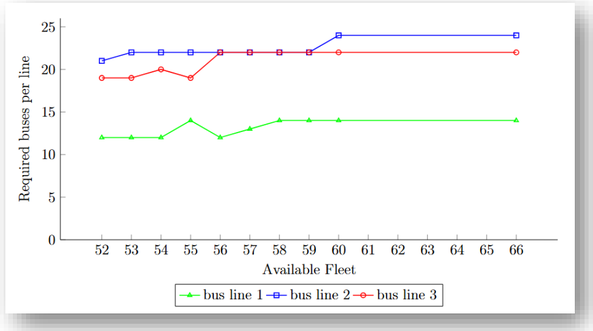
- The tool uses Mixed-Integer Linear Programming and Mixed-Integer Quadratic Programming and results in locally optimal solutions.

Decisions

- Selection of the locations for charging stations.
- Scheduling of charging sessions.
- Possible modifications of bus line routes.
- Determination of energy transferred per charging session.







Scalability

- Has been tested for 3 bus lines but can support a larger network (applicable to mid-sized urban transit networks).
- This tool requires to be handled in sub-problems. Each sub-section of the main problem needs approx. 4.4 minutes to be solved.

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