AI for charging scheduling and moving assets components optimization for EV transport

Yancho Todorov, Senior Scientist, VTT
Sebastiaan DePeuter, Doctoral candidate, Aalto University
Background

- There is no straightforward approach for optimal scheduling of the charging services for EVs fleets. Any adopted methodology is dependent on the city’s planning agendas towards deployment of EVs transportation and related services.

- The current penetration of EVs on the market is still relatively low and no problems are faced, but in the near future the exponential growth could place challenges.

- The expansion of electrification towards different transportation areas, as logistics, freight, public transportation, private cars, shared mobility services and etc. could lead to problems as unavailability of charging slots or congestions around chargers, as well as implications to power supply and etc.

- Additional challenges arise in setting priorities for different transportation modes in a city context, varieties of service scenarios and potential economic effects on different key players in the landscape e.g. transportation service providers, electricity distribution network, charging service providers and etc.
Problem

- How to optimally schedule the charging service for a mix of vehicle fleets, maximize the lifecycle of EV assets, and manage the pricing model for the end user?

- From the perspective of electricity distribution provider: How to manage efficiently the power demand for a certain charging location according to the grid constraints and maximize the profit from selling electricity.

- From the perspective of charging service provider: How to increase the utilization rate of the charging infra at the charging locations and maximize the profit from mix of transportation modes.

- From the perspective of transportation service provider:
  - Public transportation – to assure available slot for charging for every e-bus, to ensure reliable and uninterrupted service.
  - Logistics vehicles – how to flexibly schedule the charging service in case of inner-city logistics, according to the vehicle’s mission profile.
  - Private/shared vehicles – how to find a charging spot on optimal price, whenever needed
  - City utility services – how to schedule the charging service, whenever needed
Benefits & Partners

- Needs
  - The penetration of EV’s is increasing in different transport sectors.
  - The need of charging management will increase with adoption of EV in freight and logistics areas till 2030, as well as with the continuous growth in electrification in public transportation and private cars.

- Approach
  - Utilize the potential of a novel AI framework to tackle the complexity of the charging management task, from various stakeholder perspectives.
  - Utilize simulation tool/digital twin for fast prototyping of potential scenarios
  - Scale up, test and integrate the overall solution.

- Benefit
  - Increase the utilization rate of the charging infra and provide flexible pricing to end users based on TOU.
  - Decrease the negative impact on the grid infrastructure and maximize the profit from the wholesale.
  - End users to benefit from fair price for charging according to their needs.
  - Ensure the resilient growth of EV adoption and curb the CO2 emissions

- Competition
  - Lack of integrated type of solutions for various transport modes.

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<tr>
<th>Charging service provider</th>
<th>Grid service provider</th>
<th>Fleet/vehicle owner</th>
<th>AI integrator</th>
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<td>- Charging queue management</td>
<td>- Power line time/demand management</td>
<td>- Assign charging spot</td>
<td>- Prototyping and building a full-scale solution</td>
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<td>- Pricing management</td>
<td>- Price management</td>
<td>- Asset management</td>
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VTT – beyond the obvious
Don’t hesitate to contact me!
Yancho Todorov,
yanco.todorov@vtt.fi
+358 40 164 98 27