TRIPLEF
FOSSIL FREE FREIGHT

Agent-Based Investigation of Charger Queues and Utilization of Public Chargers for Electric Long-Haul Trucks

About the study

Investigates charging needs and charger utilisation between Helsingborg and Stockholm in Sweden, if all long-haul trucks are battery electric.

Agent-based model simulates a typical day with current levels of truck traffic.

Traffic flow is based on hourly truck flow data during a day, and the annual flow of trucks.

Charging rules for the trucks

1. Only charge when needed to complete the mission.

2. Not charge more times than necessary.

3. If more than one charge is needed, charge full the first time.

4. Avoid long queues if possible.

5. When it is possible to choose between stations, while following the above rules: choose to charge at the lowest price. If the price is the same, select the nearest one.

Results

Potential for a well-functioning system of public chargers for long-haul trucks:

- High charger utilization, 30 %
- Few queuing problems at charging stations
- Cheap public fast charging possible
- The system is robust to queues caused by peaks or increases in the traffic flow.
- 140 chargers of 900kW needed for Long-Haul trucks, between Helsingborg and Stockholm.

With a constant number of chargers there is less queues if there are few charging stations with many chargers, rather than many charging stations with few chargers.

Figure 1 shows the queuing conditions when the chargers are spread over three stations.

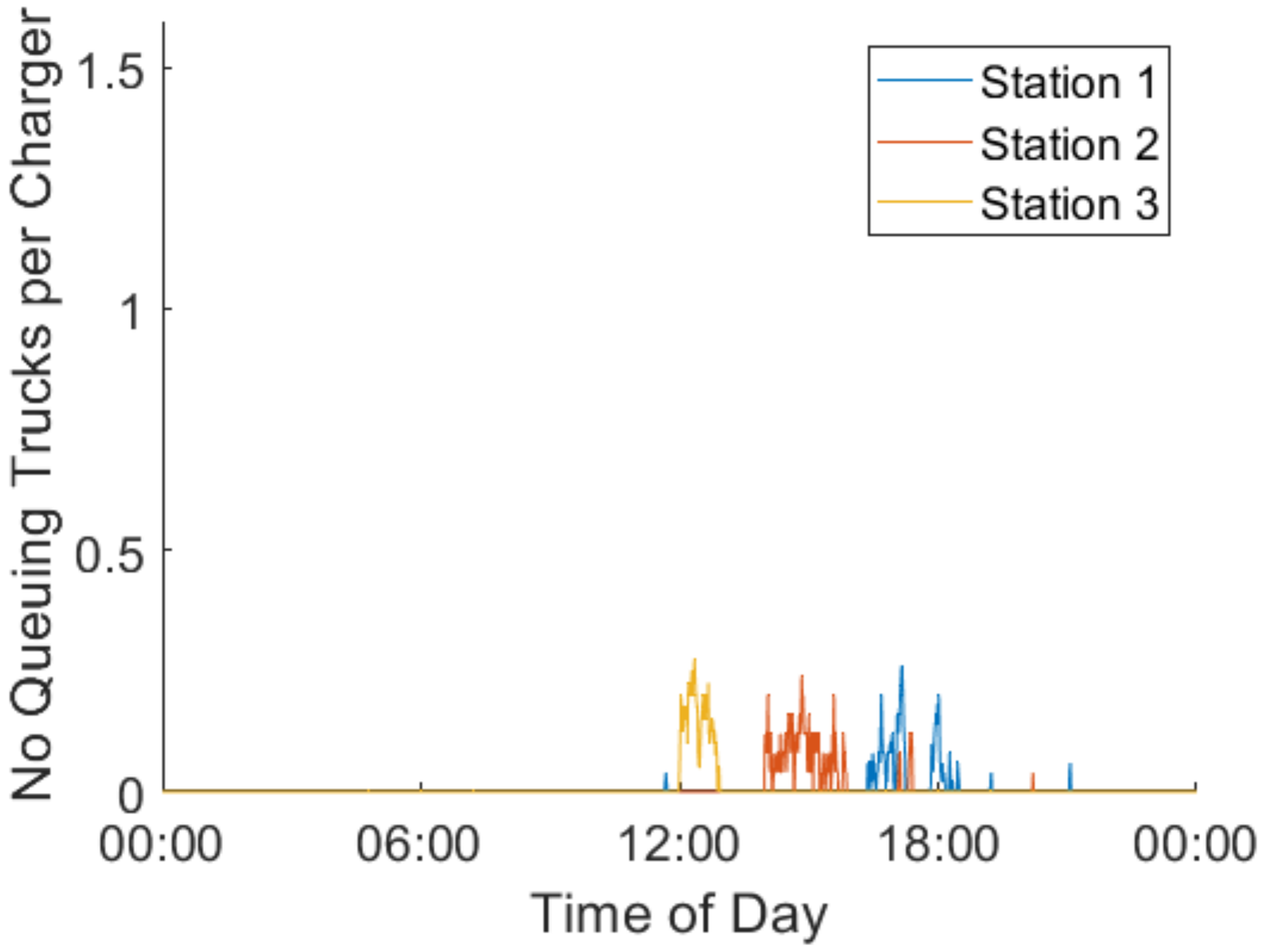

Figure 1: The number of queuing trucks per charger as a function of time, when the chargers are spread over three stations.

Name of the study: *Agent-Based Investigation of Charger Queues and Utilization of Public Chargers for Electric Long-Haul Trucks.*

Published in: *Energies, 2023.*

Authors: Johannes Karlsson och Anders Grauers at Chalmers University of Technology.

Cooperation partner: Volvo Trucks.

Funding: The Swedish Transport Administration, TripleF.

Johannes Karlsson
johannes.karlsson@chalmers.se

Linkedin: TriplefSE
www.triplef.lindholmen.se

TRIPLEF
FOSSIL FREE FREIGHT