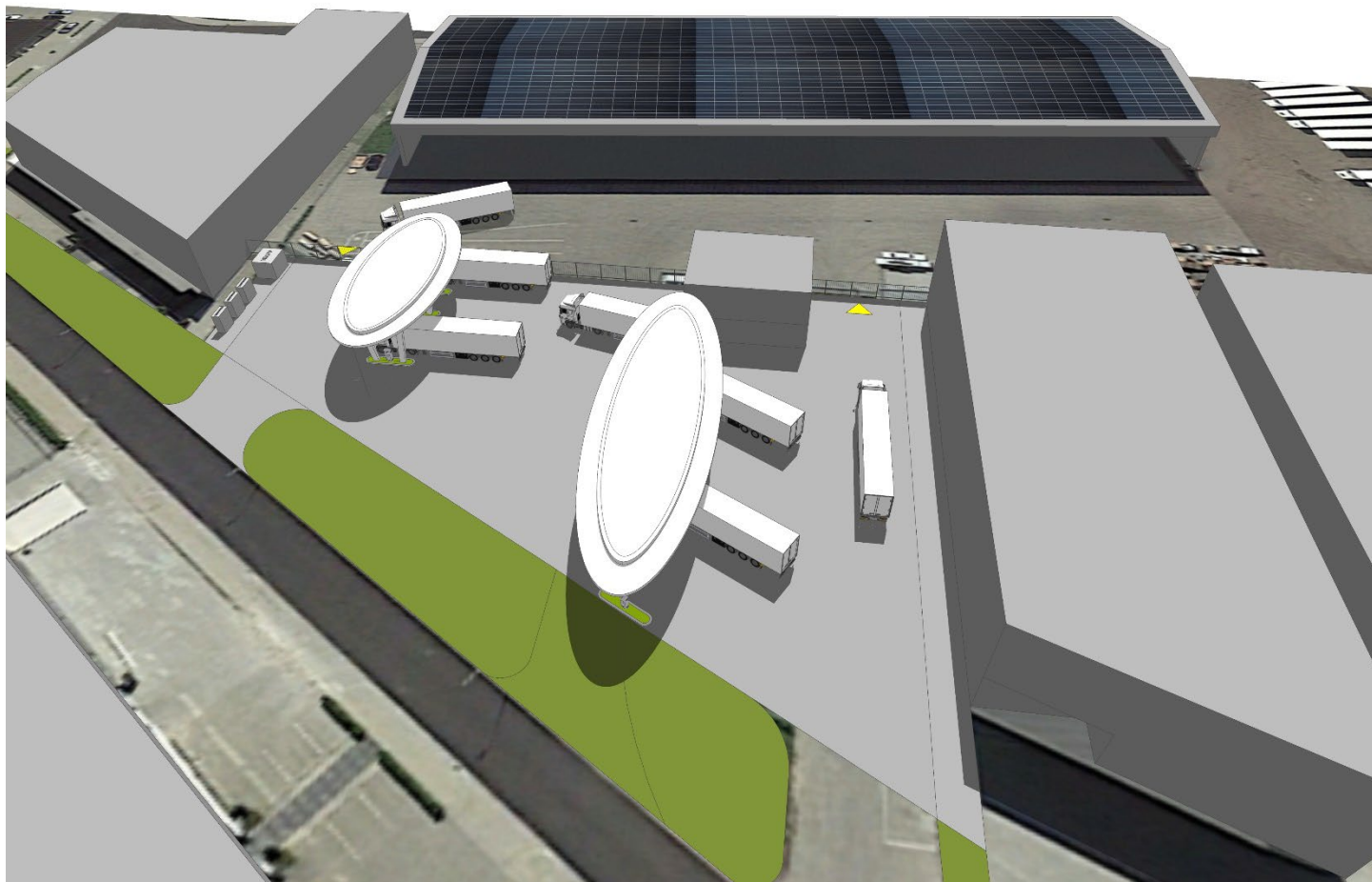


Energy system for public truck charging

Master internship project



Summary:

The project in the picture concerns a public charging station for heavy transport/trucks. Given the challenges that exist, it is crucial to handle available energy efficiently. This includes what is available from the electricity grid, from self-generation, and what the potential for energy storage is in this context.

Problem definition:

Planning for this specific project: we will realize the charging station Q2 2024. This only applies to 6 chargers for phase 1. In a second phase the amount of charging points will be expanded and the required power can exceed the available grid connection. As the available grid connection of the charging station is not sufficient to supply peak loads, renewable energy resources like PV and energy storage can help lower the peak loads on the grid connection and allow for more frequent and cost-effective charging. The goal of this project is to develop a reference model using this project that can be used for other charging stations in the future.

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Method:

Several factors play a role in the efficient design of a charging station like this. Point 1: Sizing of the amount of energy generation and storage systems based on the predicted load profiles and available grid power. A cost-benefit analysis of the proposed additions can be used to find the optimal amount of generation and storage. Point 2: An energy management system is required to operate the future system. This management system decides when and how much energy should be stored or when it should be consumed. Decisions can be based on fluctuating energy prices or solar irradiation forecasts for example. The management system can optimize the cost of electricity during operation or minimize the amount of energy storage required.

Research objectives:

- Design an optimal energy system for a truck charging station
 - Characterize the energy demand during charging
 - Determine the required power generation
 - Determine the required energy storage
- Design an energy management system to control the system
 - Consider the influence of solar irradiation and energy prices
 - Consider peak shaving through charge scheduling
- Create a generalized model for future scenarios
 - Describe how the system could be scaled

Courses and supervision:

Supervision is done by the AVIA VOLT Team located in Enschede.

Some beneficial but not compulsory courses are:

Courses on energy storage systems like [201600252](#) for point 1.

Courses on optimization in smart energy systems like [202200263](#) for point 2.

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