

# Powering the Future: Charging Infrastructure to Enable the Fleet Electrification of Swiss Post

Degree programme : BSc in Industrial Engineering and Management Science  
Thesis advisor : Prof. Dr. Jörg Grimm  
Expert : Dr. Maria Franco Mosquera  
Industrial partner : Swiss Post, Dintikon

Swiss post wants to reduce greenhouse gas emissions, by electrifying the vehicle fleet in the logistics hub in Dintikon AG. The main challenge is to build charging infrastructure, which can sustain an electric fleet all year and is still economically viable. A combination of solar energy and fast charging stations might be the solution. In conclusion, an electric fleet is likely to be financially worthwhile even without government incentives.

## Introduction and Objectives

Swiss Post has ambitious climate targets and wants to be climate-neutral by 2040. To achieve this, the fleet of 150 vehicles in Dintikon is to be electrified, among other things. This requires the construction of an electric charging infrastructure at the Dintikon site. The aim of this study is to assess the necessary measures and the costs for such a project.

## Research Design

In the pre-study the problems associated with the electrification of vehicles and the construction of infrastructure were identified through a literature review and expert interviews. The bachelor thesis focuses on data collection and evaluation. The data originated either from Swiss Post, literature, vehicle and infrastructure offers and further expert interviews. The data was used to determine the extent of infrastructure requirements and what costs are incurred when installing charging stations, photovoltaic (PV) and battery storage. A base scenario with data for 2024 and three scenarios with predictions for the year 2030 were created.

## Results

The full electrification of 150 vehicles results in a high energy demand of up to 50 MWh per working day. The vehicles and the building together require up to 4 MW of power at peak times in winter, since electric vehicles consume more energy with cold temper-

atures. With complete coverage of the roof with solar modules, more power is produced during the midday than is consumed by the building. The vehicles are all on the road at this time. The calculated load profile of vehicles and solar energy production is shown in figure 1. Estimated investment costs for the project are almost CHF 11 millions. Part of this can be saved through lower energy prices for electricity compared to diesel and incentives, but some of the subsidies for electric vehicles will be discontinued after 2030. Operating an electric fleet will be 12% cheaper until 2030. After 2030, the annual costs for an electric or diesel fleet will reach parity. Table 1 summarizes the estimated total cost of ownership in 2030 of a diesel fleet or electric fleet with 45 charging stations and complete coverage of the warehouse roof with PV modules. A battery storage is not included in any scenario since it can not compensate the cost over the estimated lifetime of 5 years.



Luca Dominic Hänni  
Supply Chain and Process  
Engineering

## Implications and Recommendations

This study shows that the switch to an electric fleet is possible, as the necessary components are available on the market. Even without incentives, an electric fleet can be financially viable in 2030. Still there are risks, like changing energy prices or electricity availability in the future, that could have a negative impact on the costs of an electric fleet, but the same risks apply when continuing with diesel powered trucks.

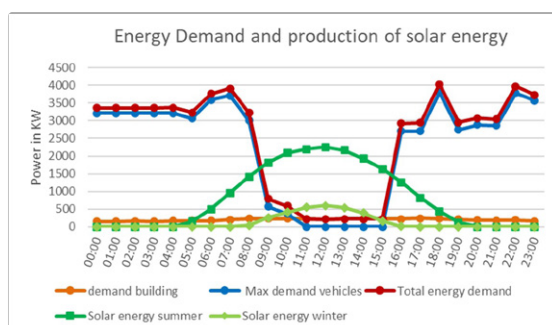


Figure 1: Power demand of the fleet and warehouse compared with solar energy production in summer and winter

TCO 2024			
	All Diesel	All Electric	
Vehicles fixed costs per year	CHF 2'371'000	CHF	4'520'000
Vehicles variable costs per year	CHF 8'252'000	CHF	4'659'000
Infrastructure investment per year	CHF -	CHF	521'000
Fixed costs grid	CHF -	CHF	204'000
Savings with solar energy and battery	CHF -	CHF	571'000
Total costs per year	CHF 10'623'000	CHF	9'333'000
TCO 2030			
	All Diesel	All Electric	
Vehicles fixed costs per year	CHF 2'550'000	CHF	3'338'000
Vehicles variable costs per year	CHF 8'268'000	CHF	7'011'000
Infrastructure investment per year	CHF -	CHF	521'000
Fixed costs grid	CHF -	CHF	204'000
Savings with solar energy and battery	CHF -	CHF	571'000
Total costs per year	CHF 10'818'000	CHF	10'503'000

Table 1: Total cost of ownership of an electric fleet in 2024 and 2030 compared with a diesel fleet