

UPPSALA
UNIVERSITET

UPTEC STS 25003
Examensarbete 30 hp
Juni 2025

Electrifying a Commercial Vehicle Fleet

A case study of Omexom Stockholm Distribution Substation

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Civilingenjörsprogrammet i system i teknik och samhälle

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Abstract

This thesis supports the transition to a fossil-free vehicle fleet at Omexom Stockholm Distribution Substation. By the end of 2025, the business unit (BU) has set two internal targets: 50% of its vehicles should be battery electric (BEVs), and at least 85% of diesel consumption should be replaced with the renewable fuel HVO100.

A case study approach was applied, combining quantitative and qualitative methods. The quantitative part involved mapping the current vehicle fleet and comparing costs for different vehicle alternatives. The qualitative part was based on interviews, field observations, and informal conversations with employees to identify practical challenges and understand how employees perceive and respond to the transition.

The results show that the fleet is currently dominated by diesel vehicles, and that 42 out of 63 vehicles are scheduled to be replaced in 2025 as their lease contracts expire. If 23 of these are replaced with BEVs, the BU can meet its target of a 50% electric fleet by the end of 2025. The cost comparison shows that among the electric vehicle alternatives, passenger cars are generally the cheapest option for the company, particularly when they can be charged at the workplace. For light commercial vehicles (LCVs), diesel models are currently more affordable than electric models, and HVO100 is slightly more expensive than diesel. In addition to the cost and replacement considerations, the qualitative findings identified several organisational challenges, including uncertainty around vehicle selection, limited experience with BEVs, reluctance to change routines, and a need for clearer communication.

In conclusion, the findings suggest that the BU's climate targets are achievable, but the outcome will depend on how the transition is planned and supported in practice.

Teknisk-naturvetenskapliga fakulteten

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Populärvetenskaplig sammanfattning

Omexom arbetar med att minska klimatpåverkan från sin verksamhet, där omställningen av fordonsflottan utgör en central del. Inom affärsenheten Omexom Stockholm Distribution Substation har två interna mål satts upp inför slutet av 2025: hälften av fordonen ska vara helt eldrivna och minst 85% av dieselförbrukningen ska ersättas med det förnybara bränslet HVO100. Syftet med examensarbetet har varit att ta fram ett underlag som kan användas som stöd i planeringen av denna omställning.

Studien har genomförts som en fallstudie med både kvantitativa och kvalitativa metoder. Den kvantitativa delen omfattade en kartläggning av den nuvarande fordonsflottan samt en kostnadjämförelse mellan olika fordonsalternativ för att ersätta de fordon vars leasingavtal löper ut under 2025. Kostnaderna beräknades för en fyraårig leasingperiod och inkluderade leasing- och bränslekostnader för eldrivna och dieseldrivna modeller. Den kvalitativa delen baserades på intervjuer, samtal med fordonsförare och fältobservationer för att skapa en bild av hur fordonen används i praktiken och vilka utmaningar som en fordonsomställning kan innebära för affärsenheten.

Resultaten visar att fordonsflottan idag består av 63 fordon, varav 42 har leasingavtal som löper ut under 2025. Detta innebär ett konkret tillfälle att förändra sammansättningen i linje med klimatmålen. För att uppnå målet om 50% eldrivna fordon behöver minst 23 av de 42 fordon som ska bytas ut ersättas med elfordon. Kostnadsanalysen visar att bland de eldrivna fordonen är personbilar det billigaste alternativet för företaget, särskilt när laddning kan ske på arbetsplatsen. Bland lätta lastbilar är dieseldrivna modeller idag billigare än motsvarande eldrivna modeller sett till totalkostnaden, och HVO100 innebär något högre bränslekostnader än diesel.

De kvalitativa resultaten pekar på flera organisatoriska utmaningar. Bland annat uttryckte vissa fordonsförare osäkerhet kring vilka elfordon som passar verksamheten, en viss ovilja att ändra invanda arbetssätt samt ett behov av tydligare kommunikation kring förändringen.

Sammanfattningsvis visar studien att affärsenhetens klimatmål är möjliga att nå men utfallet av omställningen kommer sannolikt att bero på hur den planeras, kommuniceras och får stöd inom företaget.

Acknowledgements

This master's thesis was carried out in the spring of 2025 as part of the Master of Science programme in Sociotechnical Systems Engineering at Uppsala University. The work was conducted in collaboration with Omexom Stockholm Distribution Substation.

Firstly, I would like to thank everyone at Omexom for their warm welcome and the great support I received throughout my time at the company. I am equally grateful to all employees who took the time to share their experiences and perspectives, your contributions were essential to this study. Special thanks to Maria Zander, business unit manager, for making this collaboration possible, and to my supervisor Magnus Lindqvist, business unit assistent, for his encouragement and thoughtful guidance. I also sincerely thank Gustav Läth, fleet manager. Our weekly meetings were an important part of the work, providing both essential data and continuous input that helped shape the direction of the thesis.

Secondly, I would also like to thank my academic supervisor, Jennifer Leijon, at Uppsala University for her helpful feedback and support throughout the thesis process. Her encouragement, positivity, and pep talk made a huge difference and helped me stay motivated during the more challenging phases of the work.

Finally, I want to thank my opponent Märta Strømme for valuable feedback, which contributed to improving the quality of the thesis.

Uppsala, Spring 2025
Isabelle Kembro

List of abbreviations

AC	Alternating Current
BEV	Battery Electric Vehicle
BU	Business Unit
DC	Direct Current
EV	Electric Vehicle
GHG	Greenhouse Gas
HVO100	100% Hydrotreated Vegetable Oil
ICEV	Internal Combustion Engine Vehicle
kWh	Kilowatt-hour
LCV	Light Commercial Vehicle
LDV	Light-Duty Vehicle

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1 Introduction

The electrification of the transport sector is widely recognised as a key strategy for reducing the environmental footprint of conventional transportation systems [1]. Among the available alternatives, battery electric vehicles (BEVs) have received particular attention for their potential to eliminate tailpipe emissions and contribute to a more sustainable future [2]. However, despite increasing policy support and technological advances, the adoption of BEVs has progressed more slowly than anticipated [3]. Barriers such as concerns about driving range, the availability of charging infrastructure, and psychological resistance continue to slow the transition [4].

While much of the existing research focuses on private individuals' adoption of BEVs [4, 5], the transition within commercial vehicle fleets presents a different set of challenges and opportunities. In this context, decision-making is divided between fleet managers, who evaluate strategic and financial considerations, and employees, who prioritise practical aspects and usability in their daily routines [6]. A comprehensive understanding of both perspectives is crucial for a successful transition to BEVs in commercial fleets.

This case study focuses on Stockholm Distribution Substation, a business unit (BU) within Omexom, which provides a practical example of fleet electrification. The BU's vehicle fleet plays a central role in enabling employees to access and service substations throughout Stockholm County. In response to national climate policies and internal sustainability goals, the BU has committed to two primary targets for its fleet by 2025: (1) 50% of its vehicles should be BEVs, and (2) at least 85% of the fuel used in diesel vehicles should consist of HVO100. Achieving these targets requires more than simply replacing vehicles, it demands a structured strategy that addresses economical and operational realities, while also supporting employees in adapting to new technologies.

1.1 Purpose & research questions

This thesis aims to support Omexom Stockholm Distribution Substation in meeting its climate targets by mapping the current vehicle fleet and developing a comprehensive transition plan toward fossil-free alternatives. The study introduces available BEV options, compares their costs to conventional vehicle alternatives, and addresses the practical challenges associated with fleet electrification. Additionally, this study contributes to the broader discourse on sustainable fleet management by presenting a framework applicable to

other companies aiming to reduce their environmental footprint.

The key research questions guiding this work are as follows:

- What is the current composition of the BU's vehicle fleet?
- What vehicle alternatives are available to meet the BU's needs, and what are the associated costs?
- What factors influence the practical adoption of BEVs within the BU?

1.2 Scope of the research

This thesis focuses on supporting the transition to a fossil-free vehicle fleet at Omexom Stockholm Distribution Substation. The study is limited to the BU's operational vehicles and does not cover private use beyond work-related travel. Some broader cost components, such as parking fees, car wash, and damage-related costs, were not included. These may be relevant in other contexts, but were excluded in this study in order to highlight cost differences between vehicle types that are not influenced by individual user behaviour. Aspects such as charging infrastructure and environmental impact were considered briefly, but not analysed in depth. The focus was instead on the practical choices the BU is currently facing regarding vehicle replacements.

2 Technical background

This chapter provides an overview of the technical context relevant to the thesis. It describes different types of vehicle technologies, fuel options, charging infrastructure, and environmental aspects.

2.1 Fuel types and their environmental impacts

2.1.1 Diesel and petrol as conventional fuels

Diesel and petrol are the most widely used fuels in the global transport sector [7]. Both are derived from crude oil and are used in internal combustion engine vehicles (ICEVs), with petrol used in spark ignition engines and diesel in compression ignition engines [8]. The combustion of petrol and diesel contributes significantly to greenhouse gas (GHG) emissions, particularly carbon dioxide (CO_2), which drives climate change. They also release harmful air pollutants, such as nitrogen oxides (NO_x), carbon monoxide (CO), sulfur dioxide (SO_2), and particulate matter (PM), all of which negatively impact air quality and human health [9, 10].

2.1.2 Hydrotreated vegetable oil as a renewable alternative

Hydrotreated vegetable oil (HVO) is a renewable diesel fuel produced through the hydrotreatment of vegetable oils and animal fats [11]. Chemically similar to conventional diesel [12], HVO can be used in existing diesel vehicles without requiring engine modifications [13]. HVO is considered a cleaner alternative to conventional diesel, as it can reduce emissions and improve combustion efficiency [11, 13]. HVO100 refers to 100% pure HVO, whereas lower-percentage blends, such as HVO30, contain a mix of 30% HVO with conventional diesel [14]. All diesel vehicle models at Omexom Stockholm Distribution Substation are capable of running on HVO100, and the BU's climate target specifies that at least 85% of the diesel consumption should be replaced with this fuel.

2.1.3 Electric vehicles as an emission-free alternative

Electric vehicles (EVs) provide an alternative to conventional vehicles. They are typically classified into four categories: hybrid electric vehicle (HEV), plug-in hybrid electric vehicle (PHEV), battery electric vehicle (BEV), and fuel cell electric vehicle (FCEV) [7, 10, 15]. HEVs and PHEVs combine an electric motor with an internal combustion engine (ICE). BEVs and FCEVs operate exclusively on electric power and do not produce tailpipe emissions

[16]. This study focuses on BEVs, which store electricity in rechargeable batteries and are charged by connecting to the power grid [7]. They are particularly relevant in the context of this study, as the BU has set a target for 50% of its vehicle fleet to be battery electric by 2025. In contrast, FCEVs generate electricity onboard using hydrogen fuel cells [15]. Although FCEV offer zero-emission driving, their adoption is limited by a lack of hydrogen infrastructure. BEVs, on the other hand, benefit from a more established charging network, making them the more viable alternative in the current market [17].

2.2 Comparison of fuel prices

A standardised method for comparing the cost of different fuel types is to express fuel prices as cost per 100 km. According to the European Alternative Fuels Observatory (EAFO) [18], electricity was the cheapest energy source per 100 km in 2022, followed by petrol and diesel. See Table 1 for a comparison of fuel costs in Sweden in 2022.

Table 1: Fuel cost per 100 km in Sweden during the first to third quarter of 2022 [18].

Fuel	**Price (SEK)**
HVO100	157,83
Diesel	136,88
Petrol	131,44
Electricity	36,43

2.3 Definitions and classifications of light-duty vehicles

Passenger cars and light commercial vehicles (LCVs) are the two primary vehicle types in the BU's fleet, both classified as light-duty vehicles (LDVs) with a maximum gross vehicle weight (GVW) of 3,500 kg [19]. A passenger car is primarily used for the transport of passengers, while an LCV is primarily used for the transport of goods [20, 21, 22]. Figure 1 illustrates typical examples of each vehicle type.

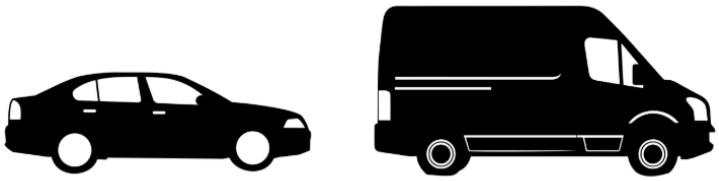


Figure 1: Illustration of a typical passenger car (left) and an LCV (right), for size and design comparison. Relative proportions are illustrative and not to scale.

2.4 Standards for measuring fuel and energy consumption

The Worldwide Harmonised Light-Duty Vehicle Test Procedure (WLTP) is a global standard for measuring fuel and energy consumption, as well as pollutant emissions, in passenger cars and LCVs [23]. Fuel and energy consumption refer to the amount of fuel or energy a vehicle uses to travel a specific distance. For ICEVs, consumption is typically expressed in litres per 100 kilometres (L/100 km) [24], while for EVs, it is measured in watt-hours per kilometre (Wh/km) [25]. Several factors influence a vehicle's fuel or energy consumption, including its size and age, fuel type, driving style, and road conditions [26]. Continuous improvements in vehicle design and engine technology aim to reduce consumption and minimise environmental impact [23].

2.5 Composition of the Swedish vehicle fleet by fuel type

By the end of 2024, the number of LDVs in traffic in Sweden was 4,977,791 passenger cars and 618,274 LCVs [27]. Among these, 356,359 were electric passenger cars and 28,516 were electric LCVs [28]. Table 2 presents the fuel distribution for both vehicle types. Despite a gradual increase in electrification, petrol and diesel remain the dominant fuel types. LCVs remain particularly dependent on diesel, while passenger cars exhibit a more varied fuel mix. Overall, fossil fuels continue to dominate the vehicle fleet [27].

Table 2: Distribution of fuel types among passenger cars and LCVs in Sweden by the end of 2024 [27].

Fuel Type	**Passenger Cars (%)**	**LCVs (%)**
Petrol	47.0	6.7
Diesel	31.3	86.3
Fully Electric	7.2	4.6
Plug-in Hybrid	6.3	-
Hybrid Electric	4.2	-
Ethanol	3.4	1.1
Gas	0.7	1.2

2.6 Charging technologies and infrastructure for BEVs

The availability of reliable charging infrastructure is crucial for the increase of BEVs. There are three primary methods for charging BEVs: conductive charging, inductive charging, and battery swapping. Among these, conductive charging is the most widely used and developed [10], and is therefore the focus of this section.

2.6.1 Conductive charging systems

Conductive charging transfers electricity from the power grid to the EV's battery using a cable and connector [29]. Since the power grid supplies alternating current (AC), while the battery requires direct current (DC) to charge, a conductive charger is constructed as an AC/DC converter [30]. There are two primary types of conductive charging systems: AC and DC charging. The distinction lies in where the AC/DC conversion takes place. In AC charging, the conversion occurs on-board (inside the vehicle), whereas in DC charging, it takes place off-board (inside the charging station) [31].

2.6.2 Conductive charging standard in the EU

Various international standards exist for conductive charging, which outlines requirements to ensure safety and interoperability in charging infrastructure. The European Union (EU) follows the IEC 61851 standard, developed by the International Electrotechnical Commission (IEC) [32]. This standard defines multiple charging modes based on factors such as power level and charging speed [10, 30, 33], meaning that charging time can vary significantly depending on the type of charger being used. An overview of charging times and power levels is shown in Table 3.

Table 3: Charging modes according to IEC 61851-1 standard [34].

Charging Mode	Charging Type	Maximum Current	Maximum Power	Charging Time for 50 kWh	Km from a 15 min Charge
Mode 1	Slow	16 A, AC, Single-Phase	3.7 kW	14 h	5 km
Mode 2	Fast	32 A, AC, Single-Phase	7.4 kW	7 h	9 km
	Fast	32 A, AC, Three-Phase	22 kW	>2 h	27 km
Mode 3	Rapid	62 A, AC, Three-Phase	43 kW	>1 h	54 km
Mode 4	Ultra-Rapid	400 A, DC	200 kW	15 min	250 km

2.6.3 Charging connector standards in the EU

The type of connector influences how and where a vehicle can be charged. Within the EU, charging connector standards are defined by IEC 62196, where Type 2 is the standard connector for AC charging and the Combined Charging System (CCS) Type 2 is the standard connector for DC fast charging [35]. The CCS Type 2 connector builds on the Type 2 design with two additional contact points for DC charging, allowing the same inlet to be used for both AC and DC charging [36]. A visual example of the connectors is shown in Figure 2.

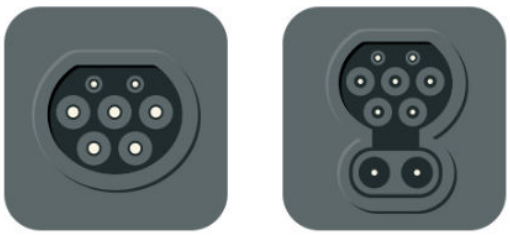


Figure 2: Illustrations of charging connectors (IEC 62196). Type 2 AC charging connector (left) and the CCS Type 2 DC fast charging connector (right).

2.6.4 Charging locations

Charging can be done at different locations, such as home, at work, or in public spaces [33]. In Sweden, approximately 80% of EV users live in individual houses. For many, charging at home is the most convenient option, although

it depends on access to a private parking space with a charging point [37]. Home chargers typically provide lower power, which suits the longer periods vehicles are parked, for example overnight [38].

Workplace and public charging provide alternatives for individuals without access to home charging. Workplace charging allows charging during the day while the car is parked and can also support EV adoption within companies. Public charging is especially important for long-distance travel and for users without access to private parking [33, 39].

2.6.5 Expansion of public charging in Sweden

In recent years, Sweden has expanded its public charging infrastructure to support the growing number of EVs. According to the report *Elbilsåret 2024* by Power Circle [28], there were approximately 4,700 public charging stations by the end of 2024, providing a total of around 45,000 charging points. The majority of charging points in Sweden are AC chargers, which accounted for 87% of the total in 2023 [40]. Stockholm County has the highest concentration of charging infrastructure, with 1,712 charging stations and 13,607 charging points [28].

2.7 Environmental impacts throughout the BEV lifecycle

While BEVs do not contribute to emissions directly, they contribute to pollution through various stages of their lifecycle, including the manufacturing and disposal of batteries, and during the generation of electricity [41].

The production of BEVs require extraction of raw materials like lithium, cobalt, and nickel, which contribute to environmental damage and carbon emissions during mining and battery manufacturing. As BEV adoption increases, so does the challenge of the supply chain. The end-of-life disposal and recycling of batteries remains a challenge [41].

The electricity required for charging the battery may be generated from non-renewable sources depending on the region's energy mix. Therefore, the overall environmental impact of BEVs can vary significantly based on how the electricity is produced in different areas [17]. In Sweden, approximately 98% of electricity production comes from fossil-free sources [42].

3 Contextual and organisational background

This chapter provides an overview of the contextual and organisational background relevant to the thesis. It describes factors influencing BEV adoption, presents the structure and operations of the studied company, and summarises internal goals and company vehicle policies.

3.1 Adoption of BEVs in commercial fleets

ICEVs are gradually being replaced by BEVs both privately and within commercial fleets [43]. Commercial fleets, which include vehicles owned by companies and organisations, play an important role in accelerating BEV adoption, as they tend to replace vehicles more frequently than private owners [6, 44].

The adoption of BEVs in commercial fleets involves both fleet managers at the organisational level and employee at the individual level, each with different priorities and concerns when it comes to integrating BEVs into their operations [6]. Fleet managers typically base their decisions on strategic and financial factors, including long-term cost savings, available government incentives, regulatory compliance, emissions reduction targets, and opportunities to improve the company's sustainability image [45]. In contrast, individual employees focus more on day-to-day usability. Their acceptance of BEVs is shaped by practical factors such as driving range, charging infrastructure, charging time, and vehicle comfort [6]. Understanding employee acceptance is therefore crucial for the successful integration of BEVs within companies [46].

3.1.1 Range anxiety and charging behaviour among BEV users

Two major barriers to the widespread adoption of BEVs are longer charging times and shorter driving range compared to ICEVs [47, 48]. These limitations contribute to range anxiety, which refers to the fear of running out of battery before reaching a charging point [49]. Understanding operational habits and mobility patterns could therefore be important, as these factors influence range requirements and charging needs [43].

Beyond practical barriers, driver experience and behavioural patterns also affect how drivers interact with BEVs. Previous studies have found that drivers with more experience using BEVs tend to make longer trips and charge less frequently than those with less experience [50]. Charging be-

haviour may also very depending on local infrastructure. Previous studies have found that in areas with limited charging access, drivers tend to charge whenever possible to avoid running out of battery [51]. In contrast, drivers in regions with more developed infrastructure are more flexible in their charging decisions. These finding suggest that both infrastructure availability and driver experience influence charging behaviour, factors that can be relevant when introducing BEVs at Omexom Stockholm Distribution Substation.

3.1.2 Organisational strategies to promote employee acceptance

In addition to technical and behavioural challenges, barriers such as lack of trust, information, and knowledge about BEVs can hinder employee acceptance [52]. Organisational strategies may play an important role in addressing these types of concerns. For example, [44] emphasise the importance of fostering a supportive organisational culture, where employees feel confident and comfortable using BEVs in their daily work. Similarly, [39] found that employee attitudes toward BEVs improved after a three-month trial period, highlighting the value of hands-on experience in reducing initial skepticism.

3.2 Company description and fleet operations

This section outlines the company structure. It explains how Omexom is part of VINCI Energies and the larger VINCI Group, introduces the BU studied in this thesis, and provides background on its vehicle use.

3.2.1 Operations and environmental commitments of the VINCI Group

VINCI Group is a French multinational company headquartered in Nanterre, operating in over 120 countries with around 280,000 employees [53]. VINCI Group operates within three main areas: concession, energy, and construction. The company has committed to achieving net-zero GHG emissions by 2050, with goals of a 40% reduction in direct emissions by 2030 (compared to 2018) and a 20% reduction in indirect emissions by 2030 (compared to 2019) [54].

3.2.2 Organisational structure of VINCI Energies and Omexom

VINCI Energies, a subsidiary of VINCI Group, employs around 97,000 people across 2,000 BUs in 61 countries [55]. Its environmental goals are aligned with the broader climate targets of the VINCI Group, and each BU is encouraged to define region-specific initiatives, such as transitioning to fossil-free

vehicle fleets [56]. Omexom is the VINCI Energies brand focused on energy infrastructure. It operates in 37 countries and employs over 24,000 people across 470 BUs. In Sweden, Omexom consists of 18 BUs and employs 600 people [57].

3.2.3 Vehicle usage at Omexom Stockholm Distribution Substation

Stockholm Distribution Substation is one of the 18 BUs within Omexom Sweden and is responsible for operation and maintenance of approximately 4,000 substations across Stockholm County, ensuring safe and reliable delivery of electricity from high-voltage networks to local distribution systems. The BU is organised into five operational groups: Apparat, Fastighet, Lokalnät, and Storstation, which mainly work at substations, and Tjänstemän, who primarily work from the office. Employees working at substations use company vehicles for daily travel, with the number of location visits ranging from one to several per day depending on operational demands. The vehicles also function as mobile storage for essential tools and equipment. Commonly transported items include fire extinguishers, safety harnesses, grounding devices, operating rods, crimping tools, voltage testers, among other equipment.

3.3 Policies related to company vehicles

This section describes the policies and practices that govern vehicle use within the company. It includes an overview of lease arrangements, ownership types, taxation, and how costs are allocated between work-related and private driving. Unless otherwise stated, the information in this section is primarily based on internal company documents and information from the fleet manager.

3.3.1 Lease agreement

Omexom leases its vehicles through the company Ayvens under an operational lease agreement. Each contract runs for four years or until the vehicle reaches the mileage limit specified in the agreement, whichever comes first. The fixed monthly lease fee includes a comprehensive package of services such as road tax, registration fees, maintenance, repairs, standard insurance, and tyre changes. Costs related to vehicle use that fall outside the agreement, including fuel, car washing, and parking fees, are paid separately by the company.

3.3.2 Vehicle ownership types

The company provides four types of vehicle ownership for employees, each with specific rules for private and work-related use:

- **Benefit Car:** A vehicle used for both work and private purposes.
- **Service Car:** Primarily intended for work, but private use is permitted.
- **Home Car:** Used exclusively for work and assigned to employees who start and end their workday at home.
- **Zero Car:** Parked at the workplace and used only for work-related purposes.

3.3.3 Taxation of company vehicles

Company vehicles used for private driving are classified as taxable salary benefits, as they provide financial value to the employee. Private use refers to any trips not related to work. Employees are responsible for paying the tax on benefit and service cars. The taxable value is determined based on standardised criteria, including the vehicle's price, additional equipment, environmental classification, annual mileage, and vehicle tax [58]. The taxable value can be reduced if private use is significantly limited. A condition for this could be if the vehicle's interior is permanently equipped with drawer systems, cabinets, or shelves, or that it contains heavy tools that are difficult to unload [59].

The company also pays employer social security contributions on the taxable value of the benefit. These contributions are currently set at 31.42% of the taxable amount, which increases the overall cost of benefit and service cars for the company [60].

Home and zero cars are used exclusively for work and are not taxed as a benefit. In some cases, a small amount of private driving is allowed without the car being taxed. This is defined as no more than 10 occasions and a maximum of 1,000 kilometres per year [58].

3.3.4 Mileage tracking for work and private use

All company vehicles are equipped with a tracking system that records the distance driven for both work-related and private purposes. The system

enables daily monitoring of driving activity through a digital driving logbook, which is also used to allocate fuel costs. The company covers expenses for work travel, while employees are responsible for fuel related to private driving.

3.3.5 Fuel reimbursement

For home and zero cars, the company covers all fuel costs. These vehicles are provided with a fuel card, and all fuel expenses are paid directly by the company. For benefit and service cars, fuel costs are split based on the driving logbook. For instance, if the total monthly fuel cost is 1,000 SEK and 30% of the distance was for private use, the employee pays 300 SEK and the company pays the remaining 700 SEK.

3.3.6 Support for home charging installations

If an employee has the possibility to charge the vehicle at home, the company covers the installation cost of the charging point as well as the electricity costs for work-related charging. Reimbursement is provided at a fixed rate to ensure the employee is not financially disadvantaged.

4 Theory

This chapter presents the cost calculation formulas used to compare electric and diesel vehicle alternatives in the study.

4.1 Cost calculation formulas

The analysis focuses on the total cost over a four-year lease period. To make the calculations easier to follow, intermediate steps such as fuel and electricity cost per kilometre and the combined lease and fuel cost for one year are also included. These steps clarify how the total four-year cost is calculated but are not used directly in the final results.

The structure of the calculations is inspired by earlier studies and public sources, including [61, 62], which provided guidance on what cost components to include and how to calculate driving costs based on distance, fuel price, and fuel consumption.

4.1.1 Total lease cost for BEVs

The electricity cost per kilometre is given by:

$$C_{\text{el}} = E_{\text{c}} \cdot P_{\text{el}} \tag{1}$$

where E_{c} is the energy consumption for the vehicle [kWh/km] and P_{el} is the electricity price [SEK/kWh].

The total annual lease and fuel cost for BEVs is given by:

$$C_{\text{tot,BEV}} = M_{\text{BEV}} \cdot 12 + F_{\text{BEV}} + C_{\text{infra}} \tag{2}$$

$$F_{\text{BEV}} = C_{\text{el}} \cdot D \tag{3}$$

where M_{BEV} is the monthly lease fee [SEK/month], F_{BEV} is the annual electricity cost [SEK/year], C_{infra} is a one-time investment in home charging infrastructure, and D is annual driving distance [km/year].

The total cost over a four-year lease period is:

$$C_{4,\text{BEV}} = (M_{\text{BEV}} \cdot 12 + F_{\text{BEV}}) \cdot 4 + C_{\text{infra}} \tag{4}$$

4.1.2 Total lease cost for diesel vehicles

For diesel and HVO100, the fuel cost per kilometre is calculated as:

$$C_{\mathrm{f}} = F_{\mathrm{c}} \cdot P_{\mathrm{f}} \tag{5}$$

where F_{c} is the fuel consumption for the vehicle [litres/km] and P_{f} is the fuel price [SEK/litre].

The total annual lease and fuel cost for diesel vehicles is given by:

$$C_{\mathrm{tot,f}} = M_{\mathrm{f}} \cdot 12 + F_{\mathrm{f}} \tag{6}$$

$$F_{\mathrm{f}} = C_{\mathrm{f}} \cdot D \tag{7}$$

where M_{f} is the monthly lease fee [SEK/month] and F_{f} is the annual fuel cost [SEK/year].

The total cost over a four-year lease period is:

$$C_{4,\mathrm{f}} = C_{\mathrm{tot,f}} \cdot 4 \tag{8}$$

5 Methodology

This chapter outlines the methodology used in the study. A mixed-methods case study approach was used [63], combining qualitative and quantitative data [64] to provide a broad understanding of the vehicle transition.

5.1 Qualitative data collection

The qualitative component of this study aimed to develop a deeper understanding of operational challenges and employee perspectives on the transition to BEVs. Data were collected through a literature review, meetings with company stakeholders, field observations, semi-structured interviews employees, and informal conversations.

5.1.1 Literature review

A literature review was conducted to support the design of the study by identifying key challenges related to fleet electrification. These insights served as background and are not presented separately in the results. Sources included peer-reviewed articles, master's theses, industry reports, and policy-related documents retrieved from DiVA, ScienceDirect, IEEE Xplore, and Google Scholar. Key search terms included battery electric vehicles, charging infrastructure, fleet management, commercial fleet electrification, and barriers to BEV adoption.

5.1.2 Meetings with company stakeholders

Meetings were held with the company's fleet manager and sustainability coordinator to gain insights into strategies and policies relevant to the transition process.

- The fleet manager, who is responsible for coordinating vehicle leasing and managing the company's fleet, provided information on current vehicle policies, fleet data, existing lease agreements, and available charging solutions.
- The sustainability coordinator, whose role includes implementing and monitoring the company's sustainability goals, described the overall sustainability objectives of the Omexom brand and clarified the expectations placed on each BU to transition to BEVs.

5.1.3 Field observations

Two field visits were conducted to observe daily operations and vehicle use in practice, with particular focus on equipment, driving distances, work routines, and factors influencing attitudes toward BEV adoption.

The first visit took place in Nynäshamn, a remote area south of Stockholm, alongside an employee from the Storstation group driving a plug-in hybrid benefit car. Several substations were visited along small, uneven roads. The second visit occurred in central Stockholm with an employee from the Fastighet group using a diesel-powered LCV. While the substation visits were similar, the urban setting provided a contrasting operational context.

5.1.4 Semi-structured interviews

Two semi-structured interviews [65] were conducted to gain insight into employee perspectives on the transition to BEVs. The participants were recommended by the fleet manager because they had different experiences with BEVs. One had access to home charging, while the other did not, and their attitudes toward the transition also differed.

The interviews were conducted digitally via Microsoft Teams and lasted approximately 45-60 minutes. Notes were taken during the interviews and the content was then thematically organised for analysis. Semi-structured interviews were chosen to allow for open-ended responses and allowed flexibility in following up on interesting insights while still covering key areas of interest [65]. The main themes that emerged were charging access and its effect on work, employee experience of the transition, and suitability of vehicle capabilities to work tasks. Table 4 presents background information on the interview participants.

Table 4: Background information of employee interview participants.

	Interviewee 1	**Interviewee 2**
Business unit	Stockholm Distribution	Stockholm Distribution
Job title	Distribution electrician	Distribution electrician
Years of employment	24 years	6 years
Previous company vehicle	Used diesel vehicle until three years ago; has driven BEVs since	Used diesel vehicle until six months ago; currently drives a BEV
Current vehicle	Volkswagen ID Buzz	Volkswagen ID Buzz
Company vehicle type	Home car	Home car
Charging access	Home charging	Public charging
Attitude toward BEVs	Positive	More critical

5.1.5 Informal notes

In addition to formal data collection, time was spent in the office engaging with employees and observing general attitudes toward the transition to BEVs. Informal notes were taken during spontaneous conversations, for example when introducing the study to employees in the office or while accompanying them on visits to substations. These notes were later reviewed to identify recurring themes, which were compared with the interview data to highlight similarities and differences in employee perspectives.

5.2 Quantitative data collection

The quantitative component of the study aimed to gain an overview of the current vehicle fleet and compare the costs of suitable vehicle alternatives for replacing vehicles with lease contracts expiring this year. Data were provided by the fleet manager and analysed in Microsoft Excel to create tables, figures, and cost calculations.

5.2.1 Fleet data analysis

The collected data was used to create a structured overview of the current vehicle fleet, which the BU did not previously have. The unprocessed fleet data were categorised based on key characteristics such as ownership type, fuel type, vehicle typ, and organisational group.

The resulting dataset was organised as follows:

- Total number of vehicles within the BU
- Number of vehicles with lease contracts expiring in 2025
- Fuel types used in the fleet (petrol, diesel, and electric)
- Vehicle ownership types (benefit cars, service cars, home cars, and zero cars)
- Vehicle types in the fleet (passenger cars and LCVs)
- Distribution of vehicles across BU groups (Storstation, Apparat, Fastighet, Lokalnät, and Tjänstemän)

The resulting overview serves as a basis for identifying which vehicles are due for replacement and for selecting relevant vehicle alternatives to include in the cost comparison.

5.2.2 Cost comparison

This section presents a cost comparison between different vehicle alternatives that could replace those with lease contracts expiring in 2025. The comparison includes both passenger cars and LCVs and focuses on two main cost components: leasing cost and fuel or electricity cost. To calculate the total cost, each vehicle alternative was evaluated based on five input parameters: vehicle choice, driving distance, vehicle ownership, fuel type, and charging infrastructure. The overall structure of the calculation is illustrated in Figure 3, and each parameter is described in the following part of this section and visualised in Figures 3 - 8.

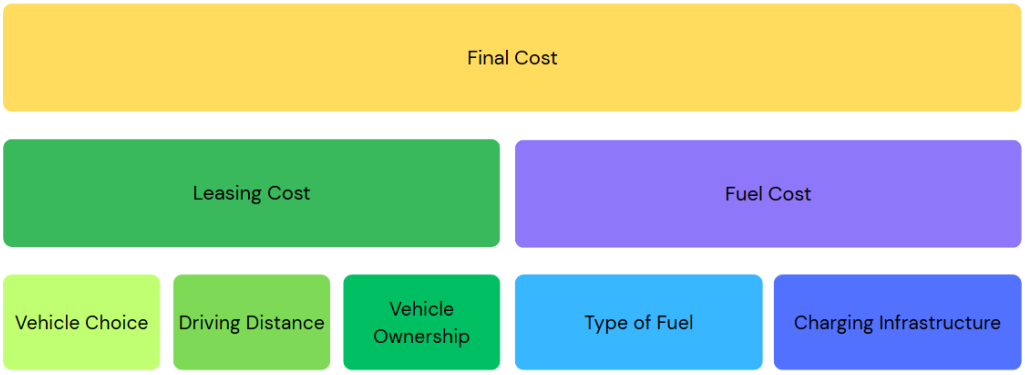


Figure 3: Structure for calculating total vehicle costs, illustrating the relationship between cost components and influencing parameters.

Vehicle Choice

Five different vehicle configurations were included in the comparison (Figure 4). These configurations affect the leasing cost, since both the vehicle type and whether a drawer system is included influence the monthly leasing fee. Drawer systems refer to built-in storage units used to organise tools and equipment. They are often installed in service vehicles to support daily work tasks and to prevent items from moving around during transport. All LCVs were assumed to include a drawer system. For passenger cars, three alternatives were considered: no drawer system, a small drawer system placed in the trunk where the back seat remains usable, or a larger drawer system that requires removing the back seat.

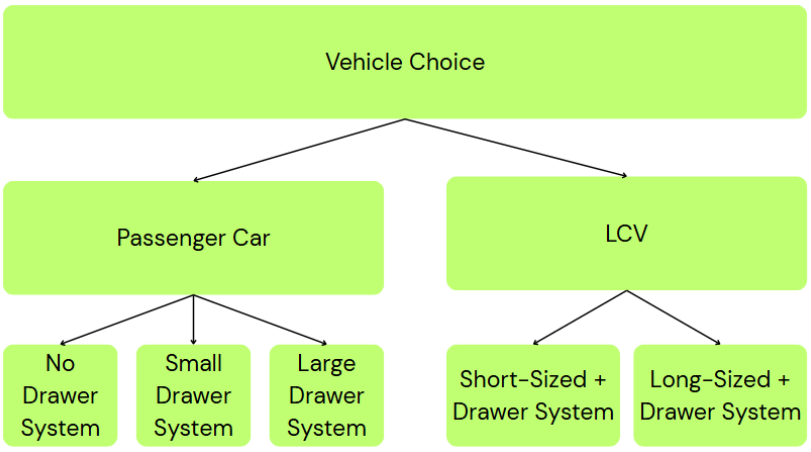


Figure 4: Overview of vehicle configurations, including different vehicle types and drawer system options.

Driving Distance

Two annual driving distances were used in the calculations: 15,000 km/year and 35,000 km/year (Figure 5). These distances were suggested by the fleet manager based on mileage levels used in previous leasing contracts. The leasing company provided cost estimates for both levels. To ensure the distances were reasonable, an average annual distance was calculated based on driving data from tracked vehicles in the fleet. Driving distance affects both fuel or electricity cost and leasing cost. Fuel and electricity costs increase proportionally with distance, and leasing costs increase when higher mileage limits are included in the contract.

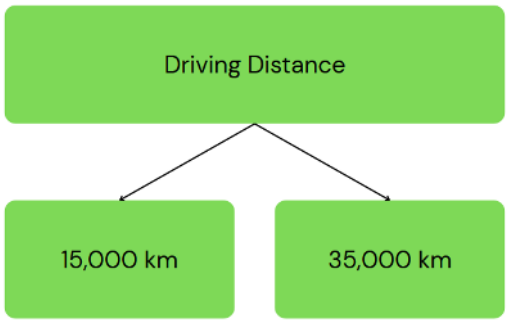


Figure 5: Annual driving distances used in the cost comparison. Two distance categories are used to capture cost variability.

Vehicle Ownership

Vehicle ownership was divided into two categories depending on whether the vehicle is considered a taxable benefit (benefit and service cars) or not (home and zero cars), as shown in Figure 6. This affects the total cost for the company, as benefit and service cars result in additional costs through employer's social security contributions.

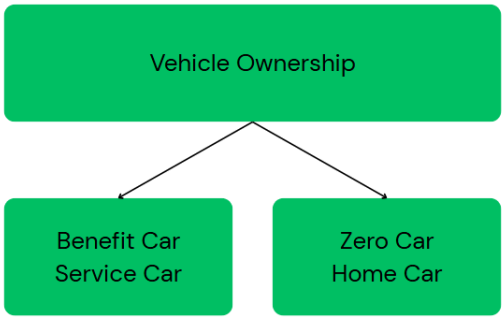


Figure 6: Distinction between vehicles that provide taxable benefits (left) and no taxable benefit (right).

Type of Fuel
The vehicle models included in the analysis are powered by diesel, HVO100 or electricity (Figure 7), and fuel type affects the total cost due to price differences.

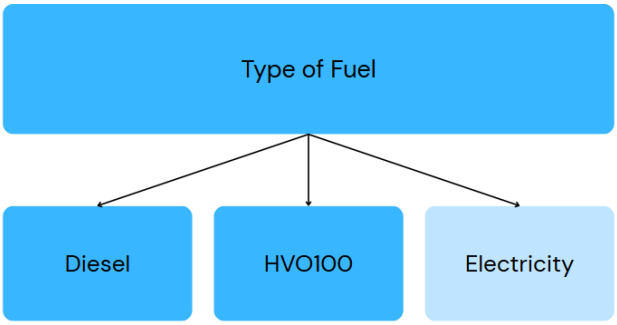


Figure 7: Fuel types included in the cost comparison.

Charging Infrastructure
For BEVs, different charging methods were included: home charging, public charging, and workplace charging (Figure 8). Charging method influences the electricity cost, as public charging is generally more expensive than home or workplace charging. In cases where home charging is used, a one-time installation cost of 31,000 SEK was added to reflect the purchase and installation of a charging point.

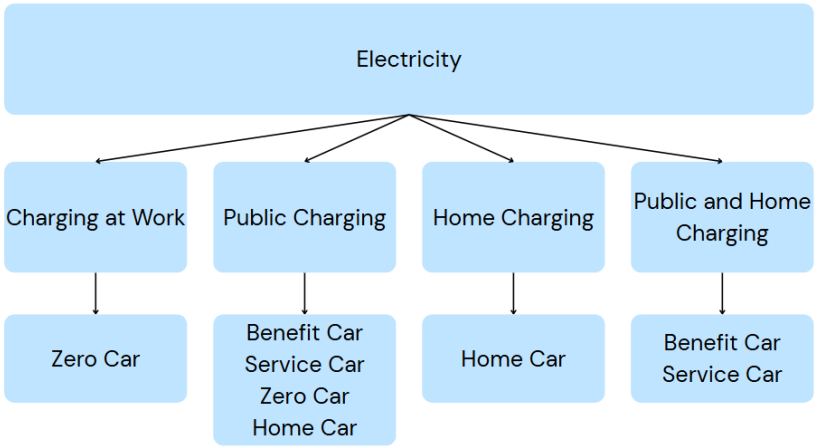


Figure 8: Charging options for BEVs linked to vehicle ownership.

Cost Scenario Construction
Cost calculations were performed in Excel using the formulas presented in Section 4.1. For example, one scenario might include a monthly lease cost for a passenger car with a large drawer system, driving 35,000 km per year, and owned as a benefit car. The electricity cost in this scenario would be based on the vehicle's specific energy consumption, a fixed electricity price representative of public charging, and no cost for home charging infrastructure. These input values were entered into the formulas to calculate the total cost of the vehicle over a four-year lease period. The input values for fuel and energy consumption are shown in Tables 21 - 23 in Appendix, and average fuel and electricity prices used in the calculations are presented in Table 24.

5.3 Project management and reporting

To ensure structured progress, reporting framework was established:

- Weekly check-ins with the company supervisor and fleet manager to discuss findings, challenges, and next steps.
- Monthly meetings with the BU manager to ensure alignment with company goals and make necessary adjustments.
- Monthly meetings with the academic reviewer at Uppsala University to discuss findings, challenges, and next steps, and to ensure research and academic quality.

6 Results

This chapter presents the main findings of the study. The results begin with an overview of the current vehicle fleet and replacement needs, followed by a cost comparison of available vehicle alternatives. Finally, key practical factors that influence the adoption of BEVs are highlighted, based on interviews and informal conversations with employees.

6.1 Overview of the current vehicle fleet

The BU currently has 63 vehicles in use (Figure 9). Most vehicles run on diesel or petrol, while electric vehicles make up a small portion (Figure 10). Of these, 42 vehicles have lease contracts that expire in 2025. This includes 16 petrol, 22 diesel, and 4 electric vehicles.

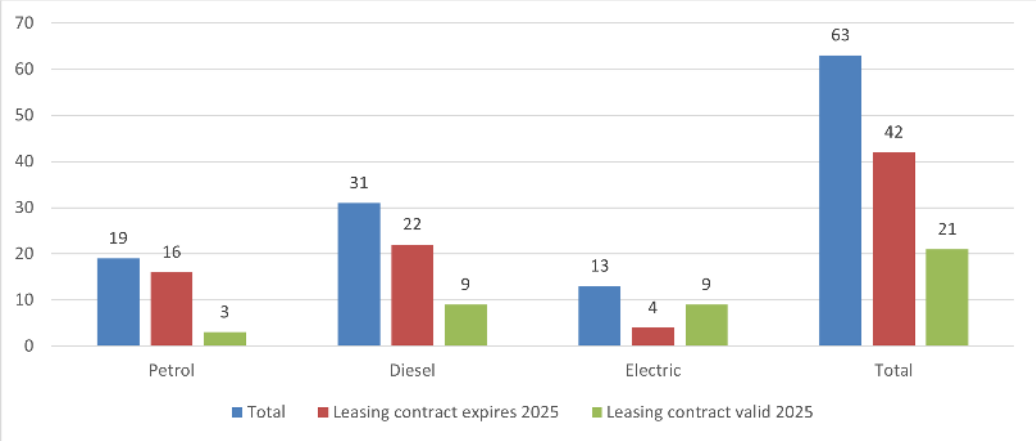


Figure 9: Total number of vehicles in the BU's current fleet.

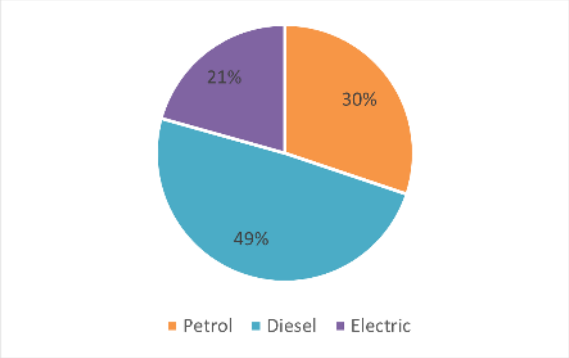


Figure 10: Distribution of fuel types in the current fleet.

If all 42 replacements were electric, the BEV share of the fleet would increase to 81%. To meet the climate target of 50% electrification, at least 23 of the 42 replacements would need to be BEVs.

6.1.1 Fleet composition by ownership

The majority of vehicles in the fleet are classified as either benefit cars or home cars (Figure 11). These two ownership types also account for most of the vehicles with lease contracts expiring in 2025 (Figure 12).

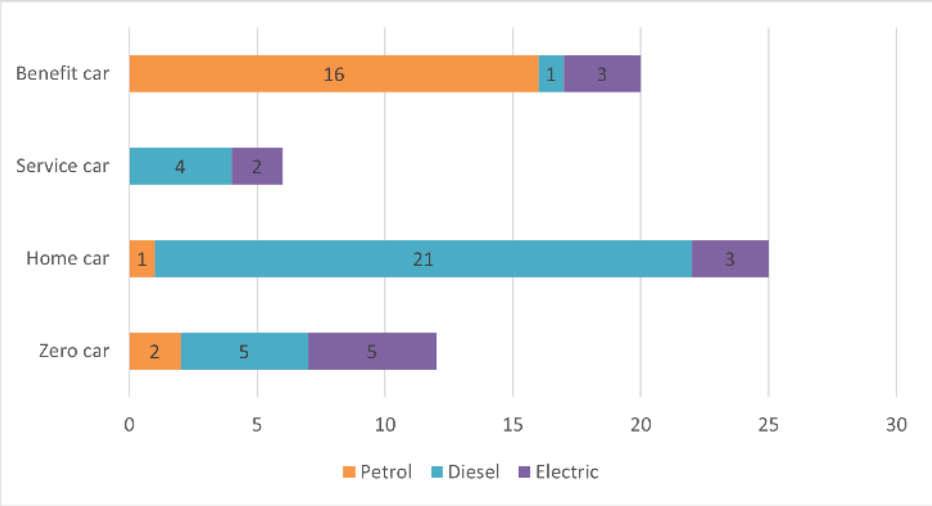


Figure 11: Current fleet composition by ownership type.

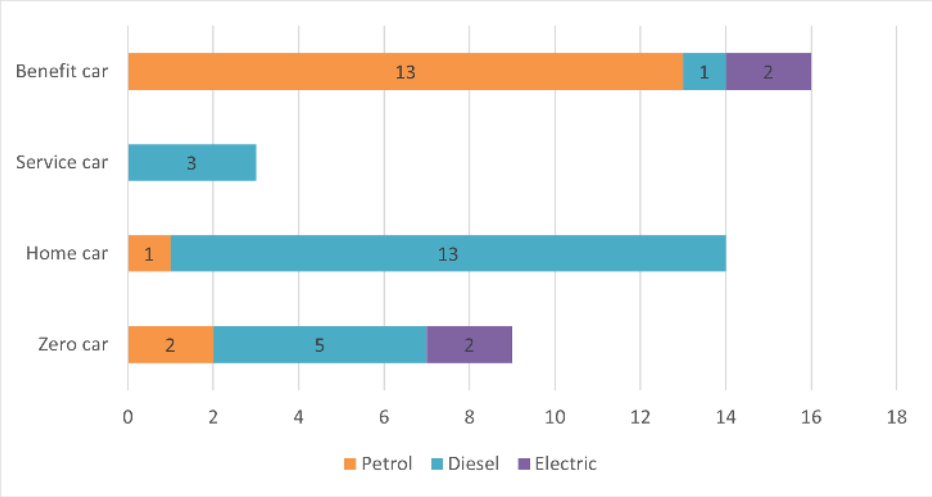


Figure 12: Vehicles with lease contracts expiring in 2025, by ownership type.

6.1.2 Vehicle types in the fleet

Figure 13 shows the distribution of vehicle types in percentages, with LCVs making up the largest share of the fleet.

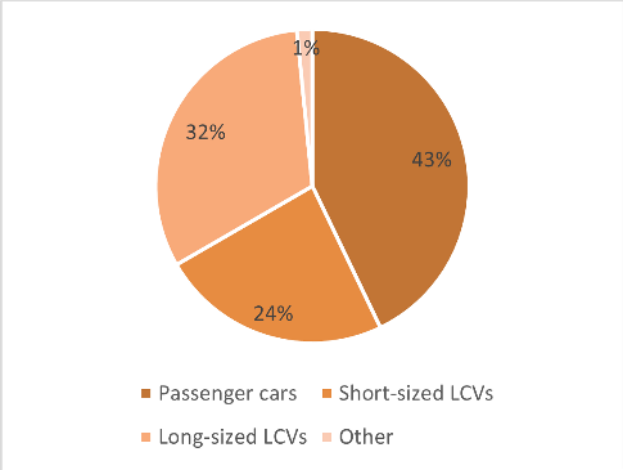


Figure 13: Vehicle type distribution in the current fleet in percentage.

The fleet consists of 27 passenger cars, 20 long-sized LCVs, and 15 short-sized LCVs. One additional vehicle, classified as "other", is a small vehicle used only within a substation area. It is included to give a complete overview but not analysed further.

6.1.3 Vehicle fleet by business group

The vehicles are distributed across five business groups: Tjänsteman, Apparat, Fastighet, Lokalnät, and Storstation. Table 5 shows the total number of vehicles per group.

Table 5: Number of vehicles in each group.

Group	**Vehicles**
Tjänsteman	7
Apparat	15
Fastighet	9
Lokalnät	18
Storstation	14
Total	**63**

Tables 6 - 10 provide a more detailed breakdown by ownership, fuel, and vehicle type for each group.

Table 6: Vehicle overview in Tjänsteman group.

Tjänsteman				
Ownership type	**Vehicle type**	**Fuel type**	**Number of vehicles**	**Lease contract expires 2025**
Benefit car	Passenger car	Petrol	1	1
	Passenger car	Electric	1	0
Home car	Short LCV	Diesel	1	0
Zero car	Passenger car	Petrol	1	1
	Passenger car	Electric	2	2
	Short LCV	Diesel	1	1

Table 7: Vehicle overview in Apparat group.

Apparat				
Ownership type	**Vehicle type**	**Fuel type**	**Number of vehicles**	**Lease contract expires 2025**
Benefit car	Passenger car	Petrol	2	2
Service car	Short LCV	Diesel	2	2
Home car	Short LCV	Diesel	2	2
	Long LCV	Diesel	5	4
	Long LCV	Electric	2	0
Zero car	Short LCV	Diesel	1	1
	Long LCV	Electric	1	0

Table 8: Vehicle overview in Fastighet group.

Fastighet				
Ownership type	**Vehicle type**	**Fuel type**	**Number of vehicles**	**Lease contract expires 2025**
Service car	Long LCV	Diesel	1	0
	Long LCV	Electric	2	0
Home car	Short LCV	Diesel	2	0
	Long LCV	Diesel	3	2
Zero car	Other	Electric	1	0

Table 9: Vehicle overview in Lokalnät group.

Lokalnät				
Ownership type	**Vehicle type**	**Fuel type**	**Number of vehicles**	**Lease contract expires 2025**
Benefit car	Passenger car	Petrol	7	6
	Passenger car	Electric	2	2
Service car	Short LCV	Diesel	1	1
Home car	Passenger car	Diesel	1	1
	Short LCV	Diesel	1	1
	Long LCV	Diesel	1	0
	Long LCV	Electric	1	0
Zero car	Passenger car	Diesel	1	1
	Short LCV	Diesel	2	2
	Long LCV	Electric	1	0

Table 10: Vehicle overview in Storstation group.

Storstation				
Ownership type	**Vehicle type**	**Fuel type**	**Number of vehicles**	**Lease contract expires 2025**
Benefit car	Passenger car	Petrol	6	4
	Passenger car	Diesel	1	1
Home car	Passenger car	Petrol	1	1
	Short LCV	Diesel	2	1
	Long LCV	Diesel	3	2
Zero car	Passenger car	Petrol	1	1

Table 11 provides an estimate of charging access based on employees' living situations and vehicle types.

Table 11: Estimated number of vehicles by primary charging option.

Charge at work	12 vehicles
Home charging	20 vehicles
Public charging	31 vehicles

Of the 63 vehicles, 20 are assumed to have access to home charging, primarily based on vehicles used by employees living in houses. Another 12 vehicles are expected to be charged at the workplace, based on the number of zero cars in the fleet. The remaining 31 vehicles are expected to rely on public charging, as they are used by employees living in apartments.

Table 12 presents daily driving distances for 56 tracked vehicles.

Table 12: Daily driving distances based on tracking data of 56 vehicles.

Metric	**Distance [km/day]**
Average distance	82.0
Maximum distance	222.7
Minimum distance	14.8
Total vehicles analysed:	**56**

The average daily driving distance was 82.0 km, based on the total distances driven by all tracked vehicles and the total number of tracked days. This corresponds to approximately 21,300 km per year for a vehicle, assuming 260 working days. The shortest and longest daily distances recorded were 14.8 km and 222.7 km, and these values illustrate the range of daily driving patterns within the fleet. Although the maximum value does not reflect the typical daily driving distance, it confirms that a fully charged BEV provides sufficient range for a workday.

6.2 Cost comparison between vehicle alternatives

This section presents the cost comparison for different vehicle alternatives that could replace the 42 vehicles with lease contracts expiring in 2025. The total cost is calculated over a four-year lease period and includes lease fees, fuel or electricity costs, and a one-time investment in home charging infrastructure. Results are presented for two annual driving distances: 15,000 and 35,000 kilometres.

To make the results easier to interpret, the tables are presented by vehicle type: first electric passenger cars, followed by electric LCVs, and finally diesel- or HVO100-fuelled LCVs. However, the result discussion is structured in two parts. The first part compares the total cost of BEVs, including both passenger cars and LCVs. The second part focuses on LCVs and compares the cost differences between electric, diesel, and HVO100 alternatives.

6.2.1 Total cost of electric passenger cars

Tables 13 - 16 show the total cost of electric passenger cars, including models with and without drawer systems. The results are grouped by ownership type and charging option, and presented for both annual distances.

Table 13: Total cost of electric passenger cars (no drawer system), 15,000 km/year over a four-year lease period.

Vehicle ownership and charging option	**ID.7 Tourer Pro S**	**ID.7 Tourer GTX**
Home car		
Home charging	238,984	251,899
Public charging	231,744	248,454
Zero car		
Office charging	191,136	201,360
Benefit car		
Home + Public charging	362,397	376,494
Public charging	321,917	343,604

Table 14: Total cost of electric passenger cars (no drawer system), 35,000 km/year over a four-year lease period.

Vehicle ownership and charging option	**ID.7 Tourer Pro S**	**ID.7 Tourer GTX**
Home car		
Home charging	376,024	398,415
Public charging	400,464	431,710
Zero car		
Office charging	305,712	321,824
Benefit car		
Home + Public charging	543,757	562,270
Public charging	490,637	526,860

Table 15: Total cost of electric passenger cars (with drawer system), 15,000 km/year over a four-year lease period.

Vehicle ownership and charging option	**Ford Explorer**	**Skoda Enyaq**
Home car		
Home charging	326,569	269,743
Public charging	321,474	264,318
Zero car		
Office charging	277,200	220,608
Benefit car		
Home + Public charging	452,992	385,072
Public charging	416,802	348,222

Table 16: Total cost of electric passenger cars (with drawer system), 35,000 km/year over a four-year lease period.

Vehicle ownership and charging option	**Ford Explorer**	**Skoda Enyaq**
Home car		
Home charging	483,317	415,251
Public charging	512,762	443,926
Zero car		
Office charging	409,456	341,936
Benefit car		
Home + Public charging	651,200	572,480
Public charging	608,090	527,830

The total costs for ID.7 Tourer Pro S and ID.7 Tourer GTX, which are not equipped with drawer systems, range from approximately 191,000 SEK to 563,000 SEK. Ford Explorer and Skoda Enyaq, which are equipped with drawer systems, are slightly more expensive than the ID.7 models. Their costs range from around 220,000 SEK to 652,000 SEK.

6.2.2 Total cost of electric LCVs

Tables 17 and 18 present the cost of electric LCVs (Volkswagen Transporter 2WD, short and long versions), both of which are equipped with drawer systems. These models represent the most expensive vehicle alternative overall, with costs ranging between approximately 578,000 and 880,000 SEK.

Table 17: Total cost of electric LCVs (with drawer system), 15,000 km/year over a four-year lease period.

Vehicle ownership and charging option	**Transporter 2wd Short**	**Transporter 2wd Long**
Home car		
Home charging	637,012	643,576
Public charging	645,480	652,704
Zero car		
Office charging	578,026	584,122
Benefit car		
Home + Public charging	729,952	735,856
Public charging	720,888	728,112

Table 18: Total cost of electric LCVs (with drawer system), 35,000 km/year over a four-year lease period.

Vehicle ownership and charging option	**Transporter 2wd Short**	**Transporter 2wd Long**
Home car		
Home charging	733,316	741,096
Public charging	794,408	803,728
Zero car		
Office charging	637,014	643,702
Benefit car		
Home + Public charging	849,632	855,872
Public charging	869,816	879,136

Among the electric passenger cars and LCVs, the lowest total costs are consistently found for zero cars charged at the workplace. In contrast, benefit cars using public charging are the most expensive option. The cost difference between these two configurations ranges from approximately 130,000 to 250,000 SEK per vehicle over the four-year lease period. Passenger cars without drawer systems are consistently cheaper than electric LCVs, regardless of ownership type or annual driving distance.

One question raised during the study was whether some electric LCVs could be replaced by passenger cars with drawer systems. For employees who do not need to transport large or heavy equipment, but still require organised storage for smaller tools, this may be a relevant alternative. In these cases, the potential cost savings are estimated at 200,000 to 380,000 SEK per vehicle over the lease period.

Although home charging is often assumed to be the most cost-effective solution, the results show that this is not always true from the company's perspective. In some cases, public charging is cheaper than home charging. This is partly due to the investment required for installing home charging infrastructure. Another contributing factor is the low energy consumption of modern electric vehicles. Since the company reimburses drivers at a fixed rate, which appears to be better suited for BEVs with higher energy consumption, the reimbursement often exceeds the actual electricity cost for home charging. As a result, home charging can in some cases be 5,000 to 50,000 SEK more expensive than public charging per vehicle over four years.

6.2.3 Total cost of LCVs fuelled with diesel or HVO100

Tables 19 and 20 present the cost of LCVs fuelled with diesel or HVO100 (Volkswagen Transporter 4WD, short and long version), which are also equipped with drawer systems. The costs for these vehicles range from around 475,000 to 724,000 SEK.

Table 19: Total cost of diesel LCVs (with drawer system), 15,000 km/year over a four-year lease period.

Vehicle ownership and fuel option	**Transporter 4wd Short**	**Transporter 4wd Long**
Home/zero car		
Diesel	480,232	475,960
HVO100	495,213	490,941
Benefit car		
Diesel	571,475	568,259
HVO100	586,457	583,240

Table 20: Total cost of diesel LCVs (with drawer system), 35,000 km/year over a four-year lease period.

Vehicle ownership and fuel option	**Transporter 4wd Short**	**Transporter 4wd Long**
Home/zero car		
Diesel	597,020	592,748
HVO100	631,977	627,705
Benefit car		
Diesel	688,264	685,048
HVO100	723,221	720,004

The same pattern observed among zero cars and benefit cars is seen among LCVs powered by diesel or HVO100. Zero cars have the lowest total cost, while benefit cars are the most expensive. When comparing fuel types, HVO100 is slightly more expensive than diesel, with a difference ranging from approximately 5,000 to 35,000 SEK per vehicle over the lease period. Electric LCVs remain the most expensive option. There is no consistent cost difference between short and long models; for diesel LCVs, the short version is even slightly more expensive than the long version.

6.3 Insights from interviews and observations

The results in this section are based on two semi-structured interviews and informal conversations conducted with employees during field visits and time spent at the office. While a variety of reflections were shared, three themes emerged as the most recurring across conversations: charging access and its effect on work, employee experience of the transition, and how well BEVs meet the demands of daily operations.

6.3.1 Charging access and its effect on work

One of the most notable differences between the two interviewees was their access to charging. The employee with a home charger described the use of a BEV as straightforward and well integrated into daily routines, requiring no major adjustments. The vehicle could be fully charged overnight, which was typically enough for a full workday, and the experience was described as comparable to previously used diesel vehicles. In contrast, the employee who relied on public charging explained that workdays were sometimes planned around charging opportunities, occasionally requiring pauses during working hours. The estimated time spent charging during work was around two hours per week, depending on availability. Although some of this charging could be done during lunch breaks, the slower process compared to diesel refuelling were described as a noticeable change.

In informal conversations, some employees mentioned that the workplace chargers were often too slow to be of practical use during working hours, since vehicles are typically needed throughout the workday and not parked long enough to gain a sufficient charge. Employees without direct experience of BEVs also expressed concerns about the lack of charging options at substations, where many of them spend a significant part of their working hours.

6.3.2 Employee experience of the transition

For some employees, the shift to a BEV might involve certain changes in how work is planned, particularly around charging. In the interviews, these adjustments were described as manageable and not disruptive to completing daily tasks. However, both interviewees noted that the process would likely have been easier with more structured support from the organisation, such as clearer information and practical guidance early on.

Similar perspectives were shared in informal conversations with other employees. Several described uncertainty about which vehicle to choose, when and where to charge, and how the transition might affect their work routines. These concerns appeared to relate more to the lack of structured communication than to the vehicles themselves. While the exact communication process was not explored in detail, the comments suggest that some employees experienced the guidance as unclear or insufficient.

6.3.3 Suitability of BEVs to work operations

Both interviewees agreed that a fully electric fleet seems realistic in most cases, especially for employees working primarily within Stockholm County. They described the available range, interior space, and access to public charging as sufficient for most needs. The main adjustments involved rethinking how tools and equipment are stored in BEVs and developing new habits around charging.

Several employees in informal conversations mentioned that diesel vehicles often felt like a safer or more reliable option in certain situations. This was especially the case for work situations involving longer distances, rough terrain, or heavier equipment. While these situations are not necessarily unmanageable with BEVs, diesel vehicles are generally seen as the more familiar and dependable choice.

7 Discussion

This chapter discusses the main results based on the three research questions. The focus is on what the findings mean for the BU and how the BU could move forward with its vehicle replacements.

7.1 Overview of the current fleet and upcoming replacements

The results show that the BU's current vehicle fleet is dominated by ICEVs, with diesel being the most common fuel type. Only a small share of the fleet is electric, reflecting the relatively recent shift toward electrification. This pattern is also seen nationally (Table 2), where ICEVs continue to dominate, particularly diesel among LCVs.

Several factors help explain the continued dominance of diesel in the BU. Diesel vehicles are well-established in the company, and many employees are familiar with how they perform in a wide range of work scenarios. This familiarity contributes to a sense of reliability. The supporting infrastructure for diesel, including fuel stations and well-known refuelling routines, is also fully integrated into existing workflows. In contrast, BEVs introduce some uncertainty regarding charging access, range, and vehicle suitability. These uncertainties can contribute to hesitation, even when the environmental benefits are clear. Additionally, suitable electric models have only recently become available for the BU's operational needs, which has limited earlier adoptions.

Despite this, the upcoming renewal of 42 out of 63 vehicles in 2025 presents a significant opportunity to increase the share of BEVs. If 23 of these are replaced with electric models, the BU can meet its internal target of 50% electrification. Replacing an even larger share would contribute to the VINCI Group's broader sustainability goals and allow the BU to lead by example.

At the same time, replacing two-thirds of the fleet in a single year introduces a level of organisational risk. If replacement choices do not suit operational requirements or if employees are not adequately supported during the transition, the change could disrupt daily work. While the scale of this replacement window offers a unique chance to advance sustainability goals, it also requires careful coordination and planning to avoid inefficiencies or resistance.

7.2 Cost and suitability of different vehicle alternatives

From a financial perspective, the results indicate that replacing LCVs with electric passenger cars equipped with drawer systems would significantly reduce costs. These vehicles appear to offer a similar level of functionality for employees who transport smaller tools and materials, while being much less expensive to lease and operate compared to LCVs.

At the same time, this shift brings other considerations. Many employees have worked at the company for a long time and are used to a particular type of vehicle and established routines. Moving from larger vehicles to smaller electric passenger cars may be a major adjustment, and the transition is likely to affect employees differently depending on their situation.

Charging access is another important factor. Around 20 employees currently have the possibility to charge their vehicle at home, while the rest would depend on workplace or public charging. This creates unequal conditions within the organisation. Home charging offers more convenience, as employees can charge overnight and begin the day with a fully charged vehicle. This removes the need to plan around charging during the workday and avoids time spent refuelling during working hours.

The current reimbursement model also plays a role. Employees with home charging access are compensated at a fixed rate that often exceeds their actual electricity expenses. This seems to be intended to support the transition to electric vehicles, but it also reduces the financial advantage of home charging for the company. As the number of electric vehicles increases, the long-term cost of this approach is uncertain.

In cases where an electric passenger car is not a feasible option, LCVs may still be necessary. For those situations, HVO100 is a suitable alternative. The fuel is slightly more expensive than diesel, but the difference is relatively small, and the vehicles can be used without requiring changes to routines or infrastructure. HVO100 also supports the BU's internal climate targets and remains the most reasonable option when electrification is not suitable in practice.

7.3 Practical conditions and organisational support

A recurring theme throughout the study has been the uncertainty surrounding the vehicle replacement process. Based on interviews and conversations, many employees do not feel fully prepared to make decisions about which vehicle to choose. Given the scale of the transition and how different the alternatives are from what employees are used to, it may not be reasonable to place full responsibility on the individual at this stage. In the future, when electric vehicles are more established within the organisation and have become a normal part of operations, similar to how diesel vehicles have been for several decades, this responsibility could gradually shift back to the individual level. For now, additional support and clearer guidance appear necessary.

One possible improvement would be to involve group leaders more actively in the replacement process. With their operational insight, they are well placed to assess which configurations are appropriate for each group. If their input is used to narrow down the alternatives and present a limited number of well-matched options, the process may become more manageable for both managers and employees.

There is also a need for a clearer and more widely shared understanding of the purpose behind the transition. If the BU defines specific goals and communicates how different vehicle alternatives relate to those goals, it may become easier for employees to engage with the process. Research suggests that acceptance depends not only on performance but also on knowledge, experience, and trust in the solution [44, 52, 39]. In this case, the uncertainty observed within the BU may reflect a need for more structured support rather than resistance to change.

Another aspect that may influence how the transition is received is the role the vehicle plays in the employee's work identity. For some, the vehicle is closely connected to their role in the field and to how they carry out their tasks independently. Changing vehicle type may therefore affect more than just daily logistics. These kinds of perspectives are not captured in technical or financial evaluations but may still influence how employees respond to the transition in practice.

8 Conclusion

This thesis set out to support Omexom Stockholm Distribution Substation in its transition to a fossil-free vehicle fleet. The work has included a review of the current fleet, a cost comparison between different vehicle alternatives, and an examination of practical and organisational aspects that may influence the outcome of the transition.

The results show that 42 of the BU's 63 vehicles are scheduled to be replaced in 2025. This presents a strategic opportunity to increase the share of BEVs and reduce the climate impact of the fleet. If 23 of the replacements are electric, the BU's internal target of 50% BEVs can be met.

The cost comparison indicates that electric passenger cars have the lowest total cost over a four-year leasing period. In particular, passenger cars equipped with drawer systems may offer a suitable and more cost-effective alternative to LCVs. For work that involves longer distances or heavier equipment, LCVs powered by HVO100 remain a relevant option. The most suitable vehicle type will depend on the demands of the work.

At the same time, the results show that the change involves more than technical and financial considerations. The shift to BEVs influences daily work practices and employees' sense of familiarity. This underlines the importance of clear communication and practical support during implementation.

The BU's internal targets appear to be achievable, but the outcome will likely depend on how the transition is planned, communicated, and supported. This thesis does not offer final answers, but rather a foundation for continued work. The conclusions should be regarded as input to ongoing discussions and decisions as the BU moves forward with its vehicle replacements.

8.1 Suggestions for further research

Future research could examine more closely how different types of vehicles are used in daily work and what specific needs they are expected to meet. This kind of insight could support more informed decisions in future replacements. It would also be valuable to follow up on how BEVs are experienced after implementation, including how well they meet operational needs and what forms of support have been most helpful during the transition. These findings could inform other companies undergoing similar changes.

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Appendix

Table 21: Fuel consumption rates for mixed driving for diesel LCVs.

Model	**Fuel consumption [litres/100km]**
Transporter 4wd Short	8,7
Transporter 4wd Long	8,7

Table 22: Energy consumption rates for mixed driving for electric LCVs.

Model	**Energy consumption [kWh/km]**
Transporter 2wd Short	0,239
Transporter 2wd Long	0,243

Table 23: Energy consumption rates for mixed driving for electric passenger cars.

Model	**Energy consumption [kWh/km]**
ID.7 Tourer pro S	0,144
ID.7 Tourer GTX	0,167
Ford Explorer	0,157
Skoda Enyaq	0,155

Table 24: Average fuel prices for 2024/2025.

Fuel	**Cost**
Diesel	SEK 16,78 / litre
HVO100	SEK 19,65 / litre
Office charging	SEK 0,80 / kWh
Home charging	SEK 2,75 / kWh
Public charging	SEK 5.50 / kWh
Home + Public charging	SEK 0,95 / km