

REEL

Regional Electrified Logistics

Case overview report
2023:12



CONTENTS

Case Descriptions..... 05

ALLTRANSPORT..... 08

BOLIDEN..... 09

BÖRJE JÖNSSON ÅKERI... 11

DAGAB..... 14

DEROME..... 16

DFDS..... 18

DHL..... 20

ELIS..... 21

ERIKSSONS ÅKERI..... 22

FALKENKLEV..... 24

FLYGFRAKT..... 25

GLC..... 26

GTS..... 27

HÖGANÄS & DANIA C. 28

ICA..... 29

JULA LOGISTICS..... 32

LBC FRAKT..... 34

LB TRANSPORT..... 36

MARTIN & SERVERA..... 37

M-LAB..... 38

NORDISK ÅTERVINNING.... 40

POLFÄRSKT..... 41

POSTNORD..... 42

RAGNSELLS & FORIA..... 44

RENOVA..... 46

SCA SKOG..... 47

SWEROCK..... 49

VGT I GÖTEBORG..... 50

WIBAX..... 52

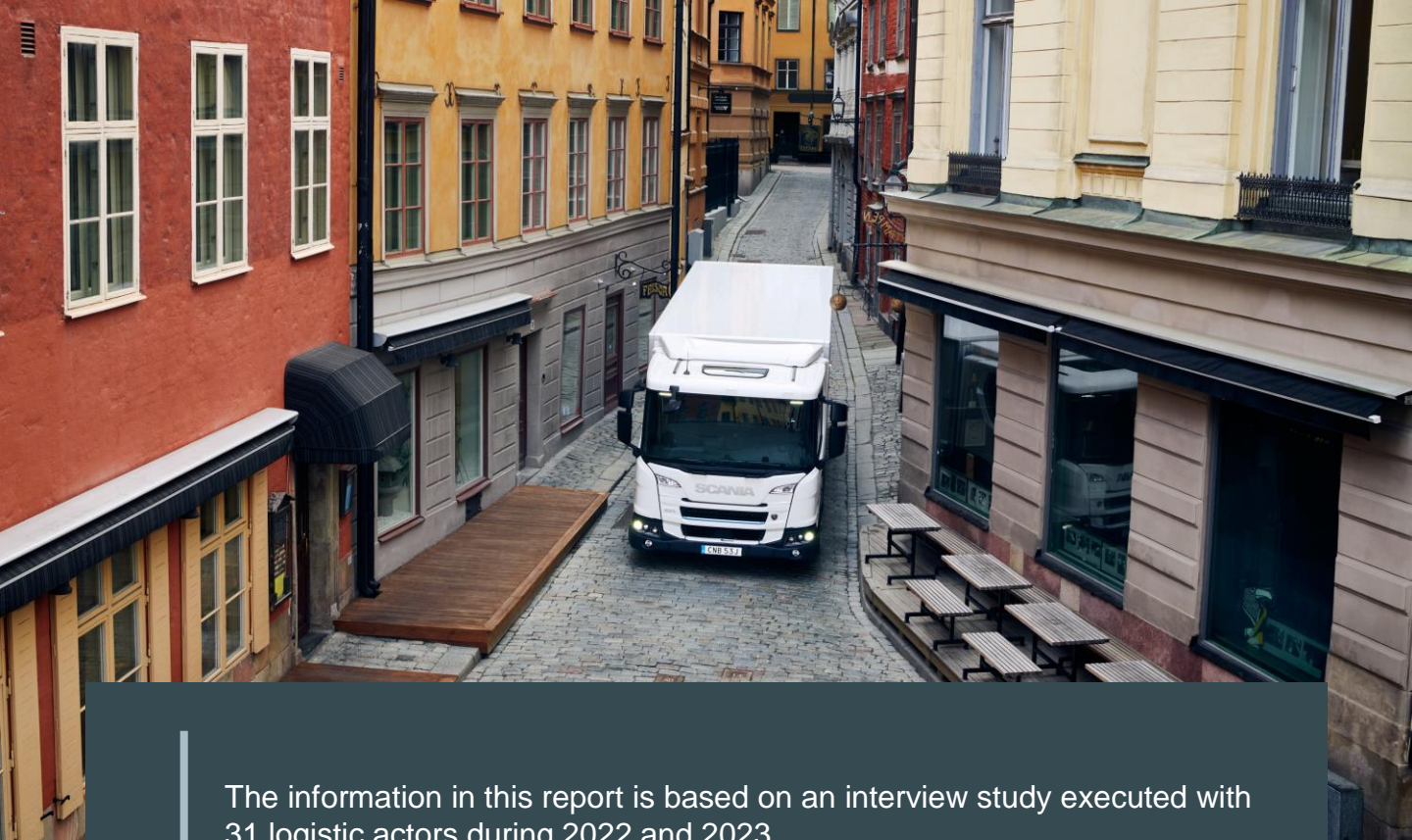
ÖHRLUNDS..... 53

Case Summaries..... 54

REEL is a national initiative where leading Swedish players have joined forces to accelerate the transition to electrified emission-free regional heavy road transport

Within the REEL initiative, the parties establish, operate and evaluate around 70 different regional logistics flows for various types of transport assignments. REEL gathers transport buyers, freight forwarders and distributors, hauliers, terminal operators, charging point operators, grid network companies as well as suppliers of trucks, charging equipment, energy and management systems. In addition, regions, national authorities and universities participate in the initiative.

REEL receives co-funding from the Strategic Vehicle Research and Innovation program (FFI) through Vinnova, the Swedish Energy Agency and the Swedish Transport Administration.



The information in this report is based on an interview study executed with 31 logistic actors during 2022 and 2023.

The interviews have been performed by CLOSER at Lindholmen Science Park in a semi-structured manner covering the following aspects: general organizational info, logistic & operational set-up, hard- and software specifications, policy, business models, working environment, system architecture, and scale-up potential.

The 175 interview questions were designed in collaboration between CLOSER and the academic partners participating in REEL i.e. Chalmers, Linköping University, and Lund University.



The REEL consortium consists of 45 organizations

The REEL project targets the over-all mission to significantly reduce CO₂, noise, particulate and gaseous emissions through electrification of regional road transport. It is centered upon performing demonstrations of regional electrified logistics systems. By developing and operating these demonstrations, insights are obtained on how different system concepts and architectures perform and need to be dimensioned considering the electric truck performance, requirement on charging, and iteratively need to be revised, to meet the logistics needs in a cost effective and energy efficient way.

Participating actors



Public co-financing



The logistic solutions in REEL are designed for various types of goods



Ash

see Ragnsells & Foria
p. 44



Food

see Börje Jönsson Åkeri p. 11,
Dagab p. 14, Erikssons Åkeri i
Tomelilla p. 22, GLC p. 26,
ICA p. 29, Martin & Servera
p. 37, Polfärskt p. 41



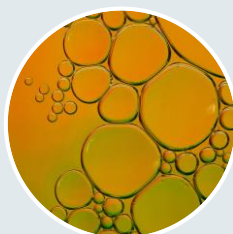
Building materials

see Derome p. 16,
LBC Frakt p. 34



Industrial goods

see DFDS p. 18,
GLC p. 26



Chemicals

see Wibax p. 52



Pallets and parcels

see DHL p. 20, Falkenklev
p. 24, Flygfrakt p. 25,
GTS p. 27, LB Transport
p. 36, Postnord p. 42, VGT i
Göteborg p. 50



Concrete

see Swerock p. 49



Textiles and laundry

see ELIS p. 21



Containers

see Alltransport p. 8,
Jula Logistics p. 32,
Höganäs & Dania
Connect p. 28



Timber

see SCA Skog p. 47



Excavated materials

see Boliden p. 9,
LBC Frakt p. 34 ,
M-Lab p. 38,
Öhrlunds p. 53



Waste and recyclables

see Nordisk Återvinning p. 40,
Renova p. 46

The transport flows in REEL are spread across Sweden

In the REEL project the parties establish, operate and evaluate around 70 different regional logistics flows in various types of transport assignments. The geographical location of these flows are presented in the map.

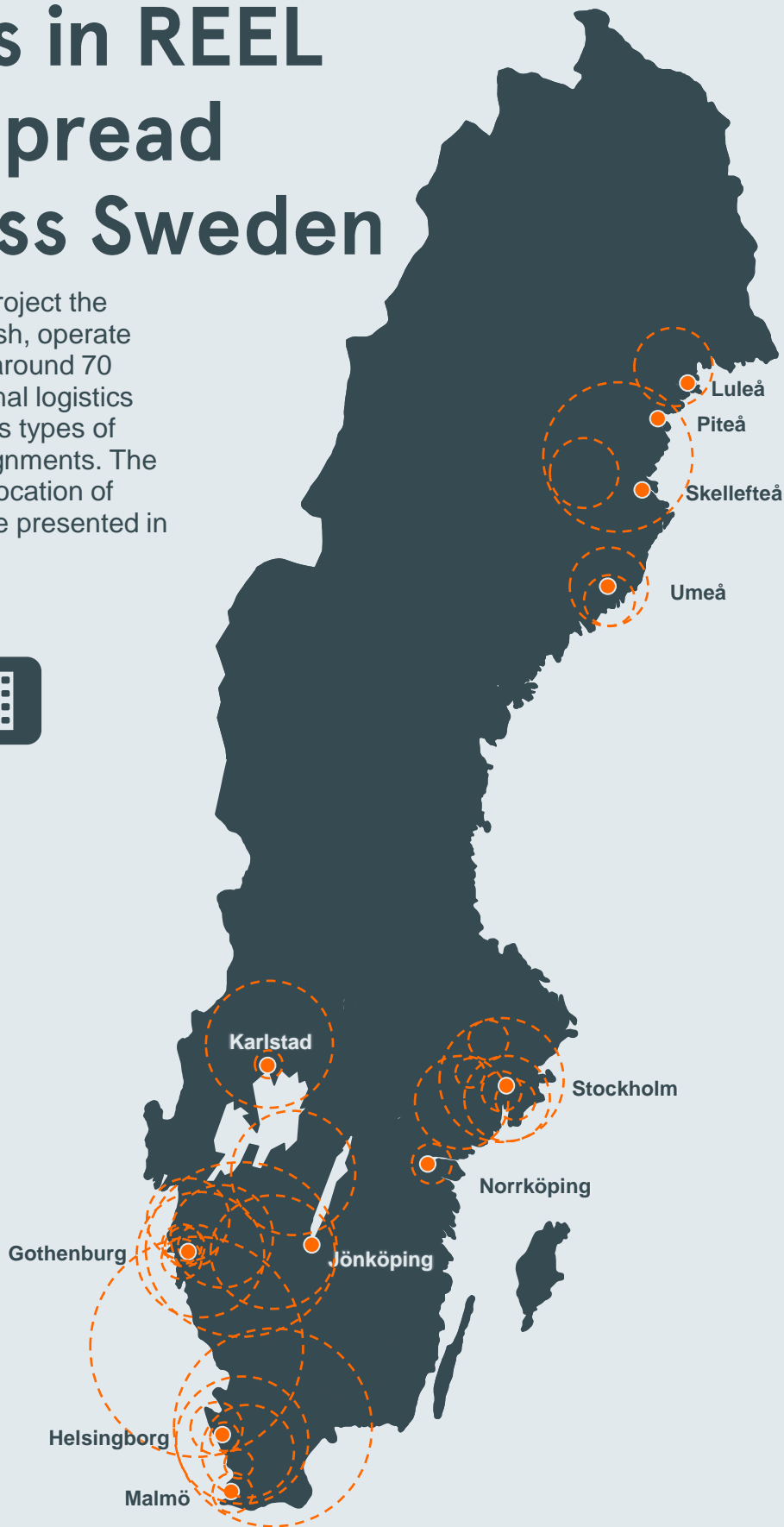




Image: Scania, Volvo Trucks

ALLTRANSPORT

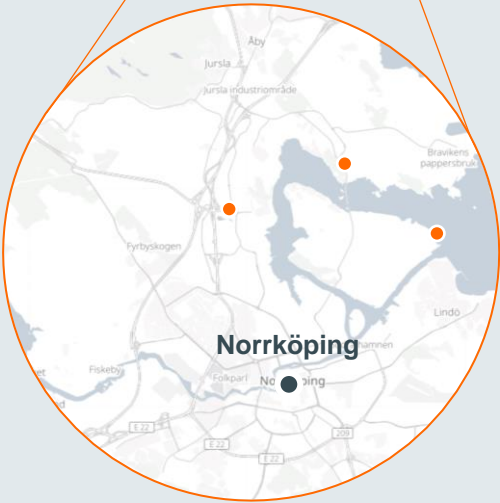


Transportation of containerized consumer goods from Port of Norrköping to customers' warehouses.

Alltransport is a major carrier based in Östergötland consisting of various smaller transport companies i.e., a haulier network organization. All of them are co-owners of Alltransport. In total there are approx. 350 trucks in the fleet.

Since spring 2022 they operate an electric truck from Scania for two of their customers; Rusta and Stadium. The truck transports 40 ft containers, normally with a weight of maximum 14 tonnes. The transport runs between the Port of Norrköping and the customers' warehouses. In addition to the electric truck another three trucks are utilized in the same operation. The total daily mileage for the electric truck adds up to 200 km with an average consumption of 1.2 kWh/km.

The truck is charged during night at Alltransport's depot. The charger can provide 44 kW. However, the truck is currently charged at 33 kW as this is sufficient to fully charge the batteries before the shift starts in the morning.



Vehicle	SCANIA 25P 4x2, 300 kWh
Body	Tractor
Total weight	29 t
Type of goods	Containers
Charging	At home depot (33 kW)
Localization	Norrköping

BOLIDEN

One of the heaviest electric road trains in the world.

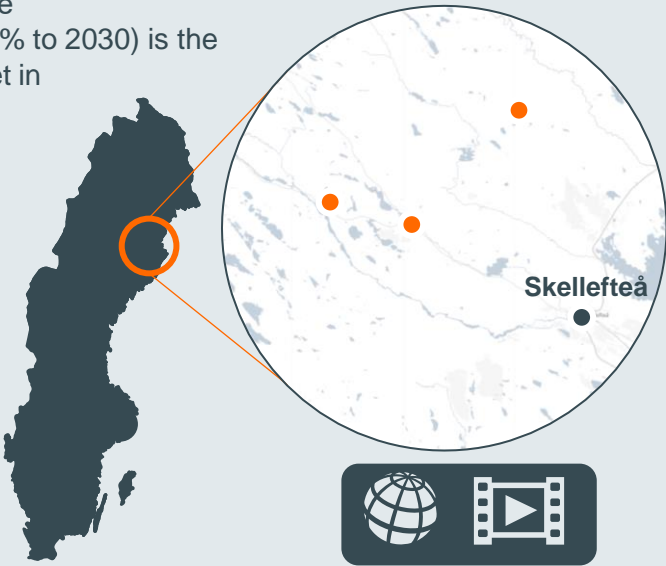


Boliden is a company specializing in extracting base metals and precious metals as well as processing them. Besides Sweden, the company is also present in Finland, Norway and Ireland. It is also the owner of one of the heaviest electric road trains in REEL with a total weight of 74 tonnes. Up to 46 tonnes of complex ore is being loaded at a mine in Renström onto a combination of a tractor and customized trailers adapted for this transport assignment.

The ore, usually being zinc, copper, gold or lead, is transported to an enrichment plant in Boliden, 15 km east of the mine. The truck is mostly dedicated to the shuttle route and is operated two shifts a day. A second route has been on trial as the vehicle's performance has been upgraded, with a total distance of 94 km per trip. As the loading and unloading time is rather short, charging takes place during drivers' breaks, drivers' change, and during the night at the plant in Boliden.

Boliden wanted to electrify the most challenging transports in terms of weight within the company's scope. The test of the electric truck is a first step for Boliden towards establishing a charging infrastructure across Boliden's transport network. As most flows start and end in the company's confined areas, there are good prerequisites for supplying a potential electric fleet with energy. The company's ambition to reduce CO₂ emission across all areas of operation (40% to 2030) is the main driver for scaling up the electric truck fleet in the future together with its transport suppliers.

Vehicle	Scania 25P 6x2*4 300 kWh (Prototype)
Body	Tractor
Total weight	74 t
Type of goods	Ore
Charging	During driver's breaks
Localization	North-East Sweden





BÖRJE JÖNSSON ÅKERI

500,000 electrically driven kilometers in two years of operation.

Stay Fresh is a subsidiary of Börje Jönsson Åkeri specializing in transporting temperature controlled and non-temperature controlled food products with several depots across the country. Börje Jönsson Åkeri owns the truck while Stay Fresh is the operator. Both companies are providing transport services.

For almost a year, a Volvo FM Electric with trailer has been operating on a route between two warehouses located in Helsingborg and Gothenburg, with a one-way distance of 240 km. In addition, the truck is used for local distribution to grocery stores in Gothenburg. By utilizing the vehicle on this fixed route, for 2-shifts six days a week, the daily milage adds up to approximately 1000 km. Day seven, the truck is driven for half a day and then has its batteries recharged for the rest of the day. Most of the other vehicle combinations utilized in the company are driven around 800-900 km/day on fixed routes, repeated every week.

The truck is charged at both ends of the flow. Charging is performed after offloading at each node, four times each day. This strategy ensures that the truck leaves the warehouse with full battery every time. In order for this to work, the time slot at customer's warehouse required adjustment.

Stay Fresh and Börje Jönsson Åkeri aim at always testing new technologies. Both companies were early-adopters of biofuel and biogas trucks previously. The electric way is yet another example of a haulier testing and implementing new technology together with the OEM.



Vehicle	Volvo FM 4x2
Body	Tractor
Total weight	50 t
Type of goods	Food
Charging	Between offloading and loading
Localization	Western Sweden

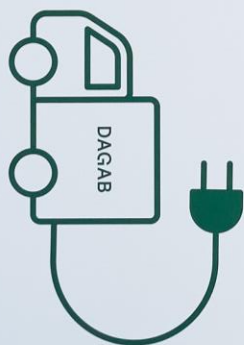




DAGAB

En del av Axfood

LADDAS ⚡ MED
TANKE PÅ MILJÖN!
DAGAB Kör på EL
för en Grönare miljö

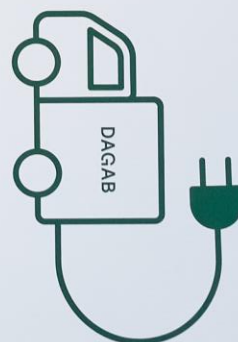


WGL 28Y

DAGAB

En del av Axfood

LADDAS ⚡ MED
TANKE PÅ MILJÖN!
DAGAB Kör på EL
för en Grönare miljö



XXG 99M



DAGAB

DAGAB delivers to Axfood's supermarkets around Sweden. Two demonstrators are set-up in the project: one in Greater Stockholm and one in Västra Götaland County.

Greater Stockholm Demonstration

When designing this demonstration, DAGAB wanted to explore ways to utilize the trucks as much as possible to reduce the cost per km. In order to achieve that, the ability of providing additional charging during unloading and/or reloading was seen as crucial. Two trucks were put into operation, a plug-in hybrid (PHEV) and an all-electric truck (BEV, rigid, 6x2*4, 28 tonnes, 300 kWh). The trucks deliver refrigerated and frozen food. Thus, the total energy demand of the vehicles consists of propulsion of the truck and operation of cooling units.

A 175-kW high-power charger was installed between two loading gates at DAGAB's warehouse in Jordbro, where both trucks return several times a day for reloading. In addition, two night-chargers of 22 kW each were installed at the parking lot at the warehouse premises where the vehicles are parked from around 22:00 to 05:30. By charging during reloading for about 30-45 minutes logistics losses were minimized while total daily mileage was increased. It also enabled two-shift operation with 2-3 rounds per shift, with a total daily mileage of around 350 km per vehicle. The charging station at the loading gates was dimensioned to be able to meet future needs from external hauliers, with electrified transports, serving the DAGAB warehouse. Prior to the installation of the charger, the insurance company of the warehouse facility demanded additional measures with regards to fire safety. The insurance company required some adaptation of the gate to minimize the consequences in the event of a fire while charging the truck. The following adaptations therefore had to be made: fire-resistant surface on the gate and absence of fire-sensitive construction closer than 10 meters from the charger, fire alarm with smoke detectors and sprinkler system in the gates, and emergency exits to prevent drivers being trapped in the gate in case of fire and fire blinds to prevent the fire from spreading.

The specific energy consumption for the BEV is about 1.25 kWh/km and the truck has a range of about 180 km on a single charge. For the PHEV, the combustion engine's fuel consumption was reduced by about 30% by using electric power as a complement to HVO and RME during the urban distribution round in the city and by being able to utilize braking energy to charge the batteries during operation. Apart from plugging in and out the charger the operation has been carried out in the same way as with a conventional vehicle.





A refrigerated rigid truck and trailer is the most common type of truck being operated by DAGAB around Sweden.

Västra Götaland County Demonstration

A second demonstration by DAGAB and Scania is based at Dagab's site in Gothenburg. This is a fully electrified rigid truck and trailer with cooling units being powered by the vehicle's and trailer's batteries.

The vehicle operates in two shifts each day performing distribution from DAGABs warehouse to grocery stores in the county of Västra Götaland. The daily driving distance varies from 200-300 km. Charging is carried out during on- and offloading, for around 1.5 hours each time as well as between the shifts. Charging infrastructure is installed at several warehouse gates in Gothenburg.



Vehicle	SCANIA 25P 6x2
Body	Rigid refrigerated
Total weight	64 t
Type of goods	Food
Charging	At DAGAB warehouse in Gothenburg (130+ kW*)
Localization	Västra Götaland County

* The charger can deliver 300 kW, and charging of up to 200 kW will be tested during REEL.



DEROME



The first electric truck with a crane.

Derome is a family-owned company offering a variety of wooden products from boards, planks & panels to finished residential houses. It is based in Derome, in the Halland county and owns several sawmills and fulfilment centers across Sweden. From these fulfilment centers, finished products are being delivered to various construction sites. Derome operates a substantial part of the transports themselves with their own vehicles. Since 2016, the company has made its fleet fossil free by refueling their trucks solely with HVO.

Many of Derome's trucks are equipped with a crane to allow for delivering goods to customers construction sites which can often be in residential areas. Since June 2023, Derome operates its first electric truck of this kind around Gothenburg and its outskirts. The truck is being used during one shift, based at the fulfilment center in Mölndal. As the truck is returning to Mölndal several times a day, there are many opportunities to recharge. The company has invested in a 350-kW charger which has been installed at its premises. Quiet deliveries in residential areas in the early morning hours is seen as one of the greatest benefits of electrifying crane trucks.

Vehicles	Volvo FM 6x2*4 450 kWh
Body	Rigid
Total weight	29 t (50 t with trailer)
Type of goods	Building material
Charging	At home depot (150 kW)
Localization	Gothenburg area





ELECTRIC
Derome

Derome

Derome

Här rullar ett
lyft för miljön

XLP 04Z

DFDS

The aim of the demonstrator is to study electrified "just in time" transports, between logistics terminals and factories.

In the demonstrator a repetitive "hub to hub" transport is performed between Hisings Backa and Tuve in Gothenburg. The truck runs 4 to 6 laps per day and the total daily mileage sums up to 180-250 km. As a next step, a second shift in the evening with more varied and longer flows will be added.

Between shifts, DFDS plans to charge the vehicle with DC at high power. Based on available battery capacity, the energy consumption for two shifts, downtime, etc., a charging concept was designed consisting of a 350 kW charger at DFDS's terminal in Arendal. The high charging power was chosen to be able to quickly charge several future vehicles in sequence between shifts to get a high degree of utilization of the vehicles.

The charging station is designed to meet DFDS's requirements of being located at a suitable distance from buildings to minimize the risk of possible collisions etc., while being able to charge two vehicles simultaneously. The vehicle combination consists of a two-axle Volvo FM tractor and a standard 3-axle semi-trailer. Nominal battery capacity is 540 kWh and maximum charging power is 250 kW DC. The service weight of the vehicle is slightly heavier than that of the corresponding diesel truck. However, the higher total weight is not a constraint for this particular transport assignment.





DHL

The goal of DHL's demonstration is to study heavier transports over slightly longer distances between logistics terminals in different regions, so called line-haul.

In Sweden, this type of driving is most often performed with a flatbed truck and trailer. The line-haul route in this demonstration between Gothenburg-Jönköping is just over 150 km one-way and is challenging with regards to topography. The route is mainly on motorway, and since it is a truck with a trailer, 80 km/h applies. The return journey from Jönköping begins with a continuous climb of about 130 meters, which makes it possible to test the vehicle's propulsion under high load on the driveline.

A normal day starts with the truck departing from Gothenburg at approximately 19:30 and arriving in Jönköping at 22:00. After that, the vehicle is charged and loaded, departing from Jönköping around midnight and ending the shift in Gothenburg shortly after 03:00, when charging is initiated. To increase the utilization of the truck, it also runs a second shift during the day with bulk goods for DHL Express. On this route the truck is used without a trailer starting just after 06:00 when the truck is driven up to Landvetter for loading. Unloading of the goods is done in the Gothenburg region at various customers. The mileage varies but is normally just over 100 km. This shift ends at 15:00.

The two shifts result in a daily driving distance of over 400 km. Based on available battery capacity, the energy need for the two shifts, downtime etc., a charging concept was designed consisting of a 175-kW charger at Volvo Truck Center in Bäckebo (right next to DHL's terminal in Gothenburg) and a 350-kW charger at DHL's terminal in Jönköping. The available time for charging between the two shifts is slightly longer than in the middle of the night shift, hence the different power levels for the chargers. The high charging power in Jönköping was chosen to minimize downtime.

The charging stations are designed to be spacious enough to charge the vehicle with a trailer and at a suitable distance from buildings to minimize the risk of potential accidents. The vehicle combination consists of a three-axle Volvo FH straight loader and a standard 4-axle trailer. The truck is equipped with a swap body, i.e. the cabinet can easily be mounted on and off the flatbed. This is used during loading and charging, the cabinet is loaded at the terminal gate at the same time as the vehicle is parked at the charger.

Nominal battery capacity is 510 kWh and maximum charging power is 350 kW. The service weight of the vehicle is slightly heavier than that of a corresponding diesel truck. As this logistics flow is limited by volume and not weight, the increased service weight has not affected the capacity to transport goods.



ELIS

ELIS transports textiles and laundry in roll-cages to healthcare providers, hotels, and restaurants.

ELIS’s business model is based on renting out textiles to businesses such as healthcare units, hotels, and restaurants. About four years ago, they chose to insource most of their transports to enable a better customer experience by having their own drivers meeting the customers. The shift also provided greater opportunities to choose vehicle type. This gives ELIS a better ability to reach its goal of having climate neutral transports by 2030, with the transition to an electric vehicle fleet as an important factor.

ELIS has a fleet of approx. 225 trucks where the majority are vans (LDVs). In REEL they operate three HDVs from their sites in Helsingborg, Huddinge, and Stockholm. The goods are transported in roll cages where each truck can carry 36 cages. All trucks operate in one shift on designated routes over a week’s time. The total daily mileage for each electric truck adds up to 150-200 km with an average energy consumption varying between 1.1-1.4 kWh/km, depending on the route, vehicle body, and time of the year.

The trucks are charged during evenings and nights at ELIS’s home depots. They charge with 22 kW, and this is sufficient to reach a full battery before the shift starts in the morning.

The truck in Stockholm operates for the City of Stockholm in an assignment where emission free transport was required when transports of laundry to healthcare units were tendered in a public procurement.



Vehicles	3 Volvo FL 4x2 265 kWh
Body	Rigid
Total weight	16 t
Type of goods	Textiles and laundry
Charging	At home depot (22 kW)
Localization	Helsingborg, Huddinge and Stockholm



ERIKSSONS ÅKERI I TOMELILLA



One of the largest electrified fleets.

Erikssons Åkeri i Tomelilla (EÅ) has been operating electric tractors since October 2020, making them one of the most experienced companies in the country regarding electric trucks. EÅ has previously established several electrified logistics flows together with the oat-based dairy company, Oatly by using four EMOSS trucks, provided by Einride.

The company was also the one that received the first series-produced Volvo FH Electric in the fall of 2022. Currently, nine Volvo electric tractors are operated by EÅ on various flows in the southern part of the country. The vehicles are used in various logistics flows between productions sites for food products (often temperature controlled) and retailers. EÅ has tested cross-border operations with electric trucks to Denmark.

The charging takes place at public and semi-public charging stations in proximity of the on- and offloading facilities. For instance, EÅ uses the Rifil charging station (see p. 24), daily for some of its flows. The REEL project has also enabled cooperation between EÅ and other project partners in terms of finding joint electrified logistics flows since the companies share similar ambitions in terms of reducing their environmental impact.



Vehicles	9 Volvo FH 4x2, 6x2*2 540 kWh
Body	Tractor
Total weight	44 t
Type of goods	Food
Charging	Helsingborg (250 kW) Malmö (250 kW) Tomelilla (250 kW)
Localization	Skåne, Halland and Småland regions





Image: Erikssons Åkeri i Tomelilla, CLOSER



Five electric trucks at the largest charging station in Sweden.

Falkenklev Logistik (Logistics) is a family-owned transport company with high ambitions in electrifying goods transport. For over a year, the company has been operating five Scania battery electric trucks for local distribution in the city of Malmö on behalf of DHL. The company has also made a major investment in charging infrastructure. Falkenklev has established what is currently the largest charging station for heavy-duty vehicles in Sweden. It is being operated through its Rifil subsidiary.

The station consists of 22 charging points and has a grid connection of 2.5 MW. Further on, a 2 MWh energy storage is connected to the site. The energy storage accompanied by software ensures low power outtake from the grid and enables a revenue stream from the FRR (Frequency Restoration Reserve) market. The site is open to the public. Variable pricing applies based on the electricity spot price.

Falkenklev Logistik continuously updates its fleet with new electric vehicles. Currently, the company operates 14 electric vans, and 6 more heavy electric trucks will soon be added to the fleet, to ensure electric transports for all distribution performed in the city of Malmö.



Vehicles	5 Scania 25P 4x2 165 kWh
Body	Rigid
Total weight	20.5 t
Type of goods	Pallets and parcels
Charging	Malmö (max 150 kW)
Localization	Malmö and suburbs



FLYGFRAKT



Electrified air cargo deliveries in western Sweden.

Flygfrakt is based at Landvetter Airport near Gothenburg. The haulier performs transports for multiple customers. Flygfrakt's main business is to transport goods from incoming flights and collecting air-cargo from customers around western Sweden.

The electric vehicle in REEL operates in one shift. A normal day the truck departs from Landvetter around 10:00 and is driven 130 km to Jönköping. In Jönköping, palletized goods are delivered and collected at multiple customer points. During driver's break the truck is charged with up to 350 kW at DHL's terminal in Jönköping for approximately 20-30 minutes. The truck and its driver then returns to Landvetter. In total this operation adds up to a daily mileage of 300 km.

During nighttime, the truck is parked at Flygfrakt's premises and charged with a 44-kW charger.



Vehicle	Volvo FH 4x2
Body	Tractor
Total weight	44 t
Type of goods	Pallets and parcels
Charging	Landvetter (44 kW) Jönköping (350 kW)
Localization	Western Sweden

GÖTEBORGS LASTBILSCENTRAL



Four electric distribution vehicles from two manufacturers.

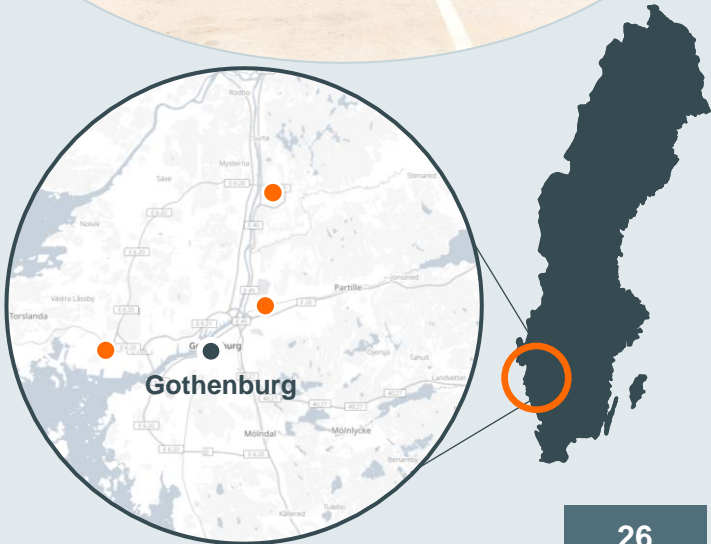
Göteborgs Lastbilscentral (GLC) is a major carrier based in Gothenburg consisting of various smaller transport companies. All of them are co-owners of GLC, i.e. a haulier network organization. As a part of the company's sustainability work, GLC has introduced several alternative fuels. In the REEL project GLC is currently operating vehicles from Volvo and Scania.

Two Volvo FL rigid trucks are operated for ICA, one of the largest grocery retailers in Sweden. The vehicles are distributing groceries from ICA's e-commerce warehouse to a dozen ICA stores for its self-pickup service. The trucks are equipped with cooling units. They are operated 6 days a week and are parked on GLC's premises between shifts.



In addition, GLC operates two Scania rigid trucks for their long-term customer SKF. The vehicles are driven mostly within SKF factory area, distributing material between the various warehouses and assembly lines. One of the vehicles makes an additional round trip to Alingsås. The trucks are operating during weekdays and are parked on SKF's premises between the shifts.

Several other electric vehicles have been put into operation during the last year. GLC has also installed a charging hub at their premises where 14 vehicles can charge simultaneously with a total power of 1 MW.



Vehicles	2 Volvo FL 300 kWh 2 Scania 25P 165/300 kWh
Body	Rigid refrigerated / Rigid
Total weight	18 t / 26 t
Type of goods	Food/ Industrial components
Charging	At home depot At customer
Localization	Gothenburg

GODSTRANSPORTSERVICE I UMEÅ (GTS)



The first local distribution truck in northern Sweden.

GTS is a local logistics company based in the city of Umeå. The company is a transportation supplier for DB Schenker.

The vehicle is operating on weekdays on 8-hour shifts. One of the transport assignments is distributing building materials for renovation and extension of the University Hospital of Umeå. Most of the material bound for the site is consolidated onto this electric truck, reducing the number of vehicles distributing to the site significantly. The consolidation has been set up through a project between GTS and Region Västerbotten, the public authority responsible for healthcare. The other assignments is distribution of parcels and pallets in Umeå and its surrounding areas within the DB Schenker transport network.

The vehicle’s performance during the long and tough winters, which northern Sweden is known for, will provide valuable insights for the REEL project.



Vehicle	SCANIA 25P 4x2 300 kWh
Body	Rigid
Total weight	18 t
Type of goods	Pallets and parcels
Charging	At home depot (76 kW)
Localization	Umeå



HÖGANÄS AB & DANIA CONNECT



Electrifying High-Capacity Transport.

Höganäs AB is a company specializing in metal and iron powder solutions, located in a town sharing the same name. In partnership with transport company Dania (Dania Connect), a shuttle container flow is operated between Höganäs and the port of Helsingborg to enable distribution of metal powder products around the world. By introducing HCT road combinations of up to 74 tonnes and double containers, the number of trucks in this flow has been reduced.

A year ago, Höganäs AB and Dania have jointly introduced an electric Scania tractor in this shuttle flow. The electric truck, like the other ones in this flow, is being driven on a fixed route between Höganäs and Helsingborg, a one-way trip of 35 km. As the electric vehicle completes four loops each day, the total daily distance of 280 km is coached, five days per week. Metal powder is transported in containers to the port of Helsingborg while empty containers are returned from the port to Höganäs. Charging takes place in Höganäs between loops, during lunch and nighttime.



Vehicle	SCANIA 25P 6x2*2 300 kWh
Body	Tractor
Total weight	74 t
Type of goods	Containers
Charging	At Höganäs AB (150 kW)
Localization	Region Skåne



ICA

Electrified distribution from two different warehouses.

ICA is one of the largest grocery retailers in Sweden, with approximately 1300 stores around the country. Currently, the company operates three electric trucks, manufactured by Volvo, for distribution of temperature-controlled groceries from the warehouses in Kungälv (outside Gothenburg) and Årsta (Stockholm) to ICA's stores in these cities and surrounding areas.

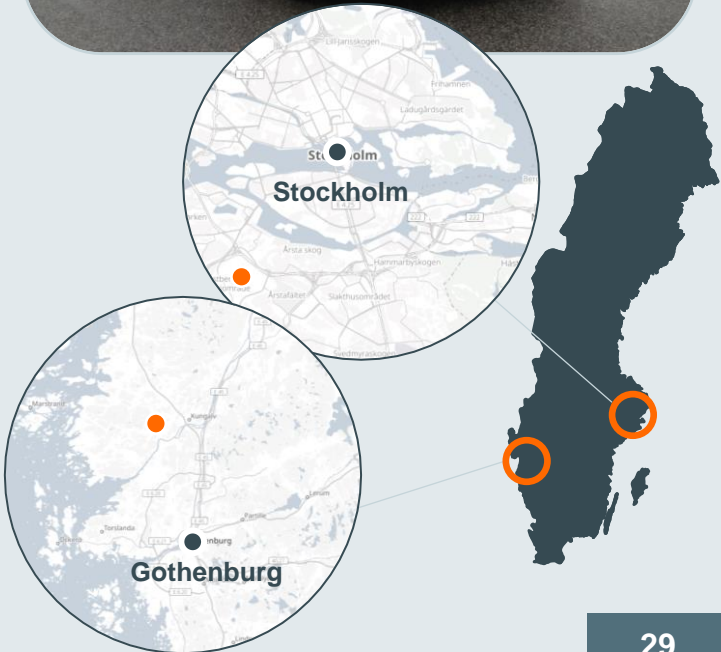
The vehicles have been designed for frozen goods although they are delivering only refrigerated goods. Therefore, the vehicles have thicker walls than an ordinary distribution vehicle to minimize energy consumption as the cooling unit is powered by the vehicle battery and impacts the range.



The distribution is performed during daytime. Trucks are utilized 6 to 7 days each week covering up to 250 km daily. As the vehicles are parked at a terminal during nighttime, slow charging is sufficient for most of the energy used. One of the vehicles receives additional charging at public charging locations in Gothenburg when required.

ICA pursues a strategy of using the electric trucks as much as possible, partly to exploit the low noise advantages of the trucks but also to improve the business case for the vehicles.

Vehicles	3 Volvo FE 6x2*4 265 kWh
Body	Rigid refrigerated
Total weight	27 t
Type of goods	Food
Charging	At home depot (22 kW) Public charging (150 kW)
Localization	Gothenburg, Stockholm





Since the winter of 2023, an additional vehicle is being operated by ICA in Region Skåne. A rigid truck pre-series prototype with a cooling unit has been delivered by Volvo. Out of all transports generated by ICA, a substantial part of regional and long-haul flows is performed by rigid truck and trailer combinations. This vehicle is based at ICAs regional distribution warehouse in Helsingborg and delivers to various ICA stores across the region on a weekly schedule, covering up to 350 km every day. Most of the deliveries are done with the truck and trailer combination, with a total length of 25.25 meters, making the test of these deliveries important due to strong presence of this vehicle configuration in the logistics network of ICA and Swedish road transport in general.

Vehicles	Volvo FH 6x2 540 kWh
Body	Rigid
Total weight	28 t (50 t with trailer)
Type of goods	Food
Charging	At Volvo Truck Centre Helsingborg and Rifil Malmö (up to 230 kW)
Localization	Helsingborg

Most of the charging occurs at Volvo Truck Centre Helsingborg where the first public truck charging in Sweden was opened in the spring of 2022 in collaboration with the local grid company Öresundskraft. The site is located a short drive from ICAs warehouse and is equipped with fast chargers and slow chargers located in a secure parking area on the premises of Volvo Truck Centre. In addition, some of the charging is occasionally done at Rifil station in Malmö (see p. 24).

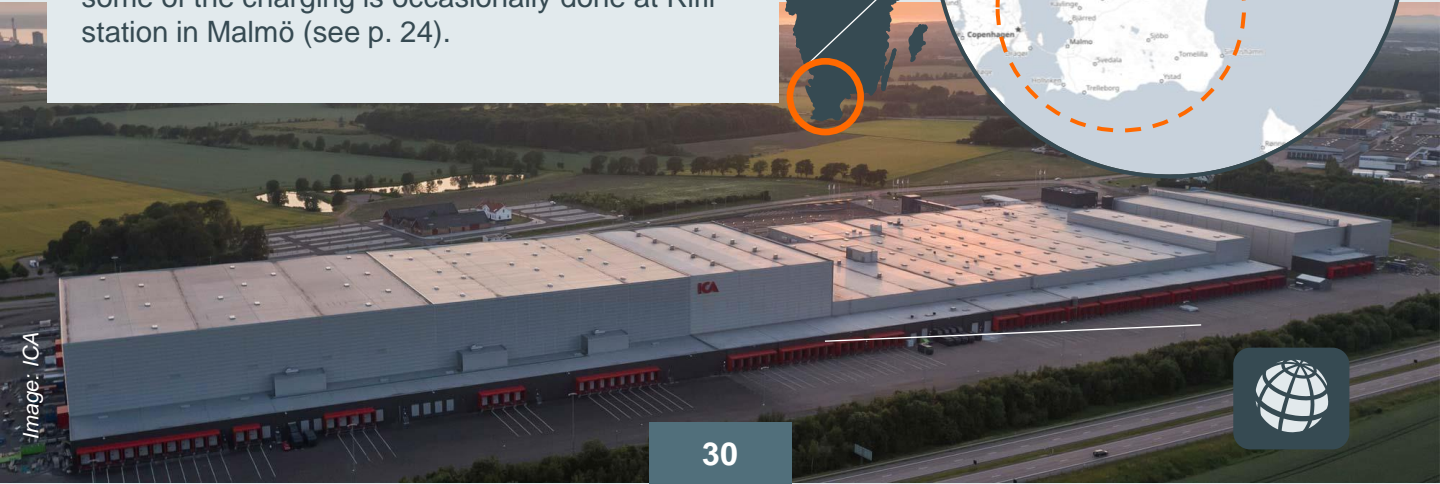




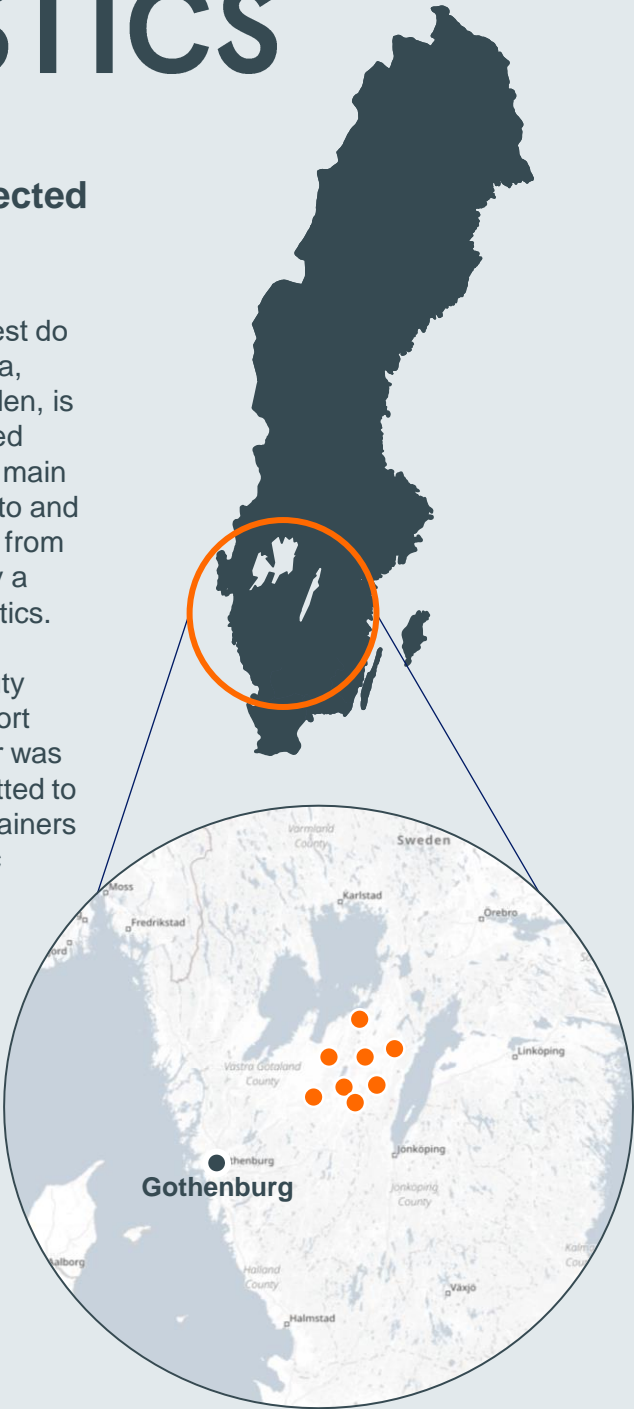
Image: Volvo Trucks

JULA LOGISTICS

Since 2013 Julia Logistics operates an intermodal terminal in Falköping connected to Port of Gothenburg by railway.

Julia Logistics is a part of Julia, one of Sweden’s largest do it yourself (DIY) retailers. The main warehouse of Julia, which is also the largest logistics warehouse in Sweden, is located in Skara. Each day, containers are transported between the railway terminal in Falköping and Julia’s main warehouse in Skara, a distance of 30 km, as well as to and from other customers within a radius of up to 200 km from the railway terminal. The transports are performed by a carrier working in a close relationship with Julia Logistics.

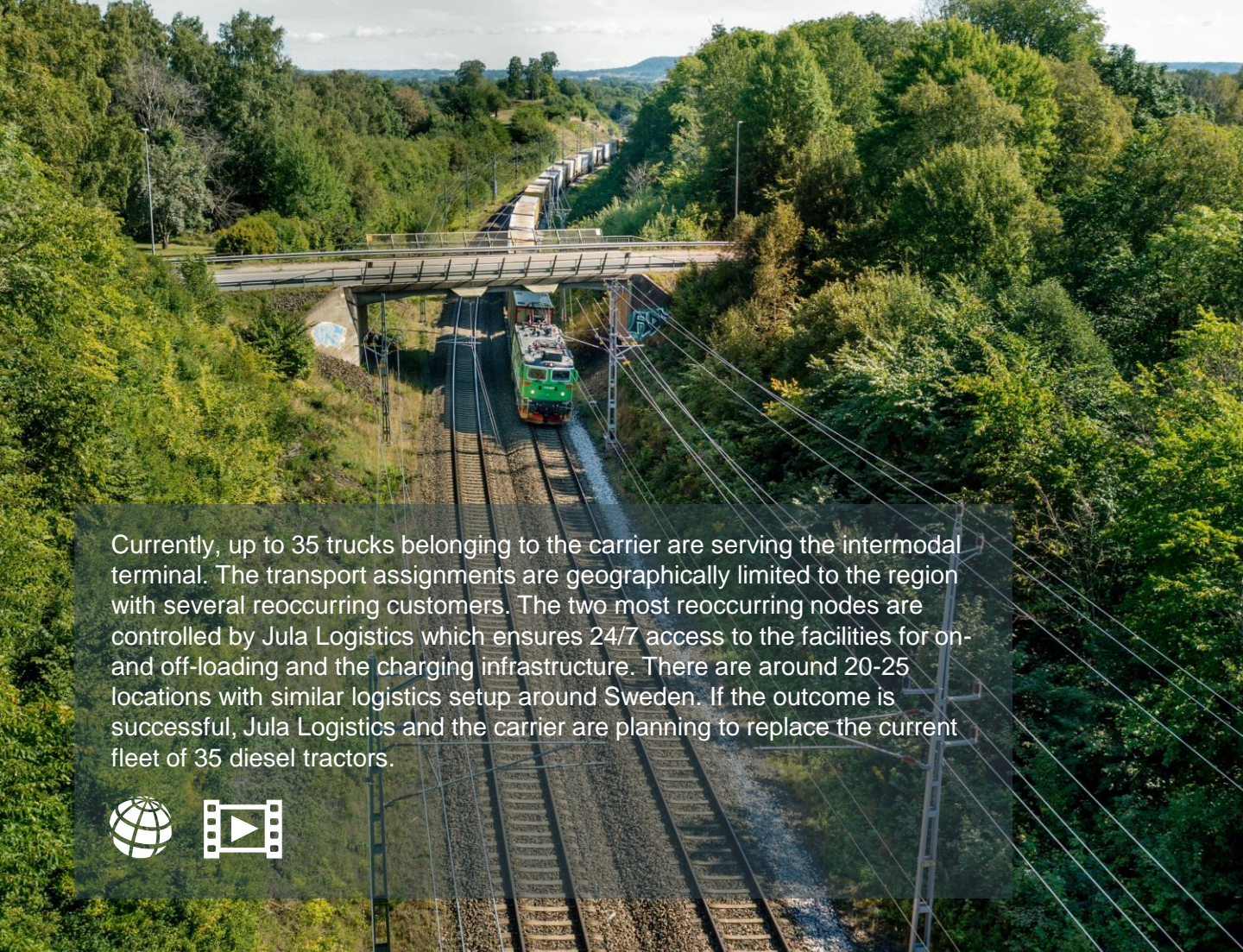
The parties have decided to deploy electric heavy-duty vehicles for these transports to make the total transport chain even more sustainable. The first electric tractor was put into operation in June 2022. The vehicle is permitted to haul a trailer combination consisting of two 40 ft containers with a total length of 33 meters. An additional electric tractor has been put in operation in early 2023.



Vehicle	2 SCANIA 25P 6x4-2 300 kWh
Body	Tractor
Total weight	64 t
Type of goods	Container
Charging	At terminals in Skara and Falköping (150 kW)
Localization	Västra Götaland County



Image: Scania



Currently, up to 35 trucks belonging to the carrier are serving the intermodal terminal. The transport assignments are geographically limited to the region with several reoccurring customers. The two most reoccurring nodes are controlled by Jula Logistics which ensures 24/7 access to the facilities for on- and off-loading and the charging infrastructure. There are around 20-25 locations with similar logistics setup around Sweden. If the outcome is successful, Jula Logistics and the carrier are planning to replace the current fleet of 35 diesel tractors.



LBC FRAKT

A major local transport company soon to be operating three Scania BEVs in different applications.

LBC Frakt is based in Värmland county and consists of 50 small and individual carriers that co-own LBC Frakt, i.e. a haulier network organization. The company's vehicles mostly operate within Värmland transporting general cargo, bulk products, refuse, concrete, and other.

The first electric truck delivered to LBC Frakt is a rigid Scania 25P. Since the start, it operates for the wholesale and trading company Bevego, distributing sheet metal and other materials related to roofs. The truck is utilized between 06:00 and 16:00, distributing on a designated route that is repeated weekly. The truck is being charged during drivers' lunch break at 150 kW and slow charges during night, while parked, at 40 kW. The daily covered distance for the truck varies between 200-300 km.

A second electric truck operates for Stora Enso, at their paper production facility, transporting refuse in specialized containers about 340 days per year and is charged at Stora Enso.

The third truck transports excavated material between the construction site of a new hospital in Karlstad and LBC Frakt's rock quarry. It transports rock to and clay from the construction site. The truck is charged during breaks and between shifts at LBC Frakt's charging hub near the quarry.



Vehicles	2 x Scania 25P 4x2/6x2 Scania 40P 6x2 300 kWh
Body	Rigid
Total weight	19, 29 and 55 t
Type of goods	Building materials, refuse, excavated material
Charging	At home depot, customer's site and at quarry
Localization	Värmland County





LB TRANSPORT



City distribution in the city of Borås.

LB Transport is transport company based in Borås with most of its operations in Region Västra Götaland. Through collaboration with Volvo Group, the company has acquired an electric rigid prototype truck equipped with a superstructure and cooling unit designed for transporting refrigerated and frozen food products. The truck is not transporting refrigerated nor frozen products in the current assignment. However, the cooling equipment is set to 4 C° to simulate the truck performance with the cooling unit on.

The field test truck is used during one shift each day. Every morning food products are loaded at a terminal which are then distributed around Borås. The average speed is rather low, and many stops are being made which is typical for urban distribution. Returning cargo such as pallets, packing material is being picked up during the stops. The average goods weight is rather low thus the volume is the limiting factor. The truck is fully charged every morning and additional charging is not required during the shift.

Vehicles	Volvo FM 4x2 360 kWh
Body	Rigid
Total weight	18 t
Type of goods	Food
Charging	Depot charging, 22 kW AC
Localization	Borås



MARTIN & SERVERA

Martin & Servera delivers food to both privately owned and public restaurants and cafeterias around Sweden.

Martin & Servera (M&S) has 22 cross-dock hubs and four main warehouses in Sweden. For the transports, the company has an internal fleet of approximately 100 trucks, and an additional external fleet of 300-400 trucks. In general, the trucks operate 200 km daily in one-shift. M&S's strategy fleet transition is to replace two diesel trucks with one electric truck while also adding a night shift. The company has managed to do this with several private and public customers and has also been provided permits to deliver during night in the cities of Malmö, Stockholm and Västerås. This implies that M&S in the long run can improve the inventory turnover rate, reschedule warehouse personnel from night to daytime and achieve a more efficient distribution in the cities during night by avoiding peak traffic.

In the project we track six of M&S's electric trucks. Their total electric fleet is continuously growing when old diesel trucks are replaced at the end of their lifetime either to new electric or biogas powered vehicles. Each electric vehicle has a cooling unit that is powered by the vehicle's batteries. The dayshift runs between 08:00-15:00, and the nightshift between 01:00-08:00. Each shift consists of 2-3 rounds and 10-12 stops per round. When the trucks return to the terminal for reloading, they are also charged for about 45 minutes. Chargers with a capacity of 44 kW are installed at the terminal gates. During the longer breaks, they utilize a wall-box charger of 22 kW placed in the parking area.



Vehicles	5 Volvo FE 6x2 265 kWh 1 Scania 25P 6x2 165 kWh
Body	Rigid refrigerated
Total weight	27 t
Type of goods	Food
Charging	At terminal gates (44 kW) At terminal parking (22 kW)
Localization	Enköping, Malmö, Stockholm, Norrköping, Halmstad



M-LAB

An electric tractor prototype for construction applications.

M-lab is a local transport company specializing in transporting excavated material and bulk material for construction. 18 trucks, both tractors and dumper trucks with bogie axles, make up the company fleet. The tractors are often used two shifts per day while the dumpers are usually used during one shift. M-lab is a co-owner of the haulier network organization Mårsta förening.

As the trucks are serving various construction sites around the Stockholm area, the electric truck has been used in many different construction projects, on variable routes. The combination of tractor and trailer is well-suited for city driving as it provides good manoeuvrability. The electric truck has been mostly used in a two-shift operation five days a week. The only fixed location for the prototype is Volvo Truck Centre in Kungens Kurva, south of Stockholm, where the vehicle is charging between the shifts and on weekends. Variable routes have resulted in dependency for heavy-duty truck public charging infrastructure which is still lacking in the Stockholm area.



Vehicles	Volvo FM 6x4 600 kWh
Body	Tractor
Total weight	50 t
Type of goods	Excavated material
Charging	Volvo Truck Centre (250 kW)
Localization	Greater Stockholm Area





Image: M-Lab

NORDISK ÅTERVINNING

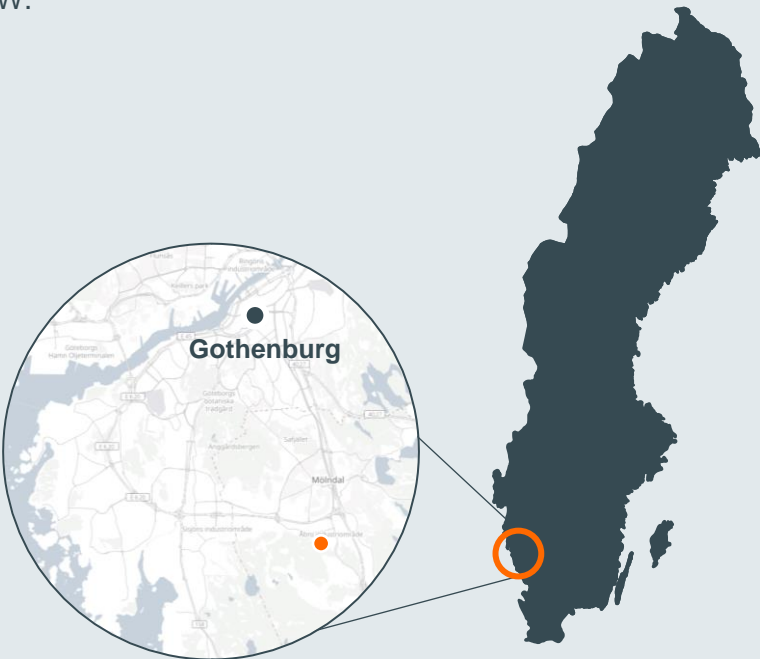


Nordisk Återvinning is responsible for collecting waste and recyclables from households in South-West Gothenburg on behalf of the City of Gothenburg.

Nordisk Återvinning (NÅ) currently operates five electric trucks, four of which (Volvo FE) have a split body rear loader for waste while the fifth one (Volvo FL) is a box unit truck for collection of recyclables. The trucks operate on fixed weekly schedules with a daily mileage of about 100 km. The operation starts around 06:30 and finishes around 15:00 and includes a lunch break. The remaining time the vehicles are parked at the home depot and are charged with 22 kW.

In wintertime and at some other occasions, the vehicles also utilize a public charger at Volvo Truck Center in Mölndal in order to manage a full day's tasks. The energy consumption varies between routes and time of the year. The super-structure is powered by the vehicles' batteries and impacts the range. For the Volvo FE trucks, the bodies require a lot of energy which put a strain on the operation. NÅ has observed energy consumption varying between 2 - 2.5 kWh/km.

Vehicles	4 Volvo FE 6x2 260 kWh / 1 Volvo FL 4x2 200 kWh
Body	Split body rear loader for waste / Rigid
Total weight	27 t / 17 t
Type of goods	Refuse
Charging	At home depot (22 kW) At VTC Mölndal (150 kW)
Localization	Gothenburg area



POLFÄRSKT

Polfärskt is one of the major suppliers of baked goods in Sweden.

Polfärskt is responsible for distributing products from brands such as Polarbröd, Skogaholm, and Fazer.

Their Volvo FL vehicle is operated 6 days a week, delivering between 06:00 and 15:00, serving six stores in the southern Stockholm area. The vehicle is charged during the evening and night. While charging, the truck's cargo space is being preheated, as the bread arriving to Polfärskt's terminal is frozen. The products are defrosted during the night and while being distributed by the Volvo-truck during the day. Thus, the products arrive to the stores in perfect condition. The drivers of Polfärskt's vehicles are responsible for delivering the products all the way to the store shelf. Thus, the vehicle often stands still for several hours at the stores, while the driver organizes the bread shelves in the store. By utilizing this stand-still time for charging the scope of routes could be expanded, although not yet explored.



Vehicle	Volvo FL 4x2 200 kWh
Body	Rigid
Total weight	16 t
Type of goods	Food
Charging	At home depot (22 kW)
Localization	Southern Stockholm



POSTNORD

One of the largest logistics companies in Sweden is testing two types of vehicles for two different applications in the Stockholm area.

One of the cases is based at PostNord's terminal in Årsta in southern Stockholm. The transport assignment is carried out for Apotek Hjärtat, a pharmacy retailer in Sweden. The vehicle distributes pharmaceuticals around Stockholm and Södertälje during two daytime shifts. A third shift, which is conducted during night, is based on distribution of parcels to various parcel collection points around Stockholm.

Since the vehicle is on the road for most of the day, there is very little time for charging. The vehicle is charged between the shifts at the terminal in order to avoid logistics losses. The vehicle is being operated by haulier Tempcon, a large group consisting of various transport companies specialized in temperature-controlled goods.



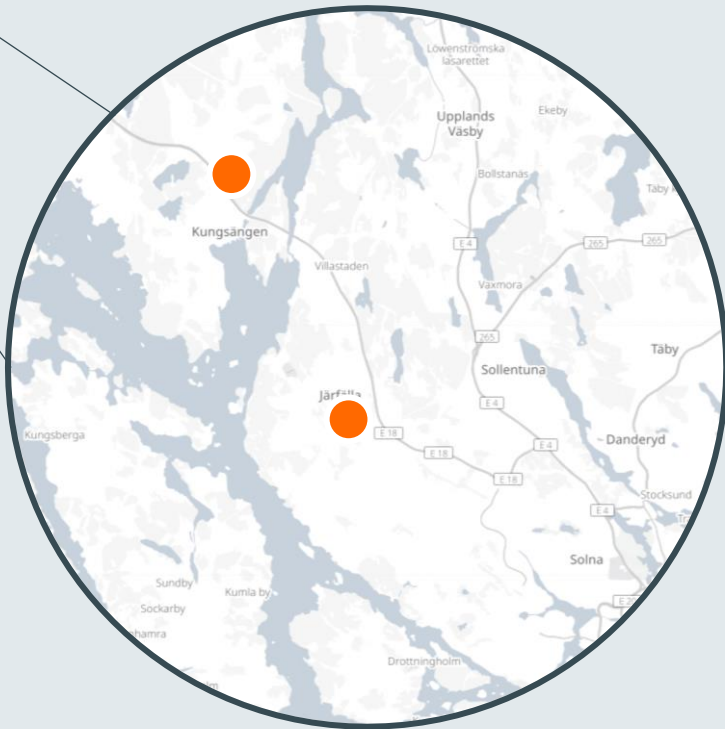
Vehicle	Scania P230 6x2 300 kWh
Body	Rigid refrigerated
Total weight	28 t
Type of goods	Pharmaceuticals, pallets and parcels
Charging	At terminal (150 kW)
Localization	Stockholm

A lot of regional and long-haul traffic performed in the PostNord network are based on static routes.

Static routes is one of the main motivations for testing an electric truck and trailer within the network. The second flow of PostNord included in REEL is based on shuttle traffic between a warehouse operated by Zalando, a large clothing retailer, and a PostNord terminal in Veddesta. The truck is driven between these two sites up to 5 times a day. The distance between the logistics nodes is 17 km. Total covered distance during the day is around 140 km. Currently, the truck is operated during the day and is charged during driver's break and outside the shift. There are plans for adding a second shift for the vehicle.



Vehicle	Scania 25P 4x2 300 kWh
Body	Tractor
Total weight	19 t
Type of goods	Pallets and parcels
Charging	At terminal (150 kW)
Localization	Stockholm



RAGN-SELLS & FORIA



Two companies combine their strengths to prove that electrification of regional heavy-load logistics flows is possible.

Ragn-Sells is a privately held corporate group involved in waste management, environmental services and recycling. In this case Ragn-Sells will be responsible for providing cargo volumes and Foria will be operating the truck. Foria is a publicly traded transport operator, and the truck will be the first battery electric heavy-duty vehicle of Foria’s 1200 vehicle fleet.

Vehicle	Scania 25P 6x4 300 kWh
Body	Tractor
Total weight	75 t
Type of goods	Flying bottom ash and wood chips
Charging	During on- and offloading (150 kW)
Localization	Stockholm County

The Scania truck transports primarily fly ash from e.g. energy and heating plants in the Stockholm area to Ragn-Sells’ plant outside Bro, where recovery of valuable raw materials from the fly ash takes place. When flue gas from waste incineration is scrubbed and filtered, fly ash is formed. The Ash2Salt method makes it possible to extract salts out of the ash. Usage for the salts includes e.g., road salt, potassium fertiliser, plastics, glass, paper and building materials.

The Scania truck is allowed for a total weight of 75 tonnes. A one-way trip from Södertälje to Bro is around 80 km. The vehicle is operated during two shifts each day to maximize the use of the truck. Therefore, the charging takes place during the night (8 hours) and during on- and offloading in Bro. This particular Scania truck is a prototype. A key criteria when choosing charging equipment was that it had to be adapted to the industrial and corrosive environment at the plant.





Image: Ragn-Sells

RENOVA

An electrified hook-lift truck transporting waste and recyclables in the Gothenburg area.

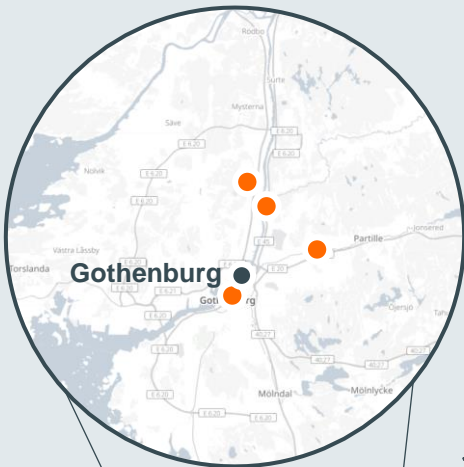


Renova is a waste management company owned by 10 municipalities in western Sweden. They collect and transport waste and recycling materials from private and public customers for further processing at different facilities such as Sävenäs waste-to-energy plant, treatment facilities, transshipment stations, landfills and recycling centers. About 1.3 million tonnes of waste and materials are handled on a yearly basis.

In total, Renova has a fleet of about 325 vehicles of which approx. 250 are heavy duty vehicles. The company has a goal to electrify 30 percent of its fleet by 2026, and the ambition that the entire fleet will be either electrified, or using other alternative technologies, within the next 10-15 years. Therefore, Renova has actively participated in projects aiming to test and demonstrate electrified transports, such as the use of a fully electric refuse truck in 2018 and the launch of a hydrogen-fueled refuse truck in 2021.

Since January 2022 Renova operates a fully electric hook-lift truck carrying open containers with about 10-11t of recyclables, mainly between Gullbergsvass and Alelyckan. The vehicle is used five days a week, in day-shift, with a daily driving distance of maximum 80 km. Charging, using a 22-kW charger, is done at the depot after the working day. No additional charging during the day is done.

Vehicle	Scania 25P 6x2 300 kWh
Body	Tractor with hook-lift
Total weight	30 t
Type of goods	Refuse
Charging	At depot (22 kW)
Localization	Gothenburg area





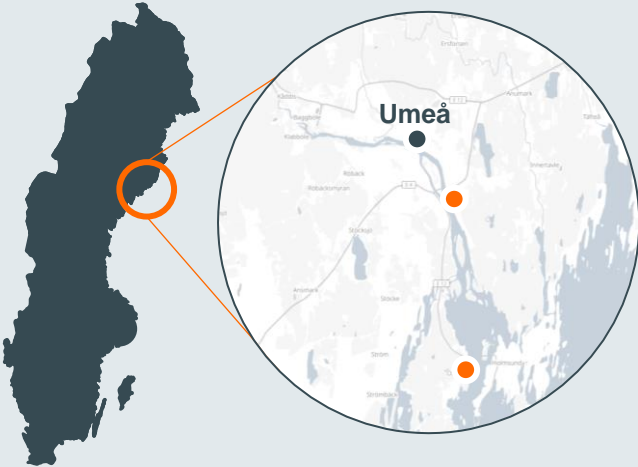
World’s first battery electric logging truck operating in the challenging climate of the northern Sweden.

Since June 2022, a Scania rigid truck and trailer combination has been hauling round wood between the rail cargo terminal in Umeå and a paper mill in Obbola. The wood is being transported from the forests across northern hinterland on rail to Umeå. As the paper mill does not have rail access, the last stretch of the route is conducted on road, a round trip of 30 km. The trip is repeated up to 6 times every weekday depending on the volumes arriving to the terminal. Charging takes place in Obbola during driver’s breaks.

Another research project is being conducted in parallel with the REEL project in which SCA Skog, Scania and Skogforsk use the REEL vehicle to evaluate the feasibility of electric logging trucks by measuring various parameters. This flow requires lifting equipment at the terminal and the paper mill as the prototype truck is not equipped with a lift.

As for many logistics and transport actors in REEL, the truck provides an opportunity to gain insights within electromobility and test the new technology together with the long-term business partners and suppliers. Although SCA does not usually own trucks themselves, the project makes way for learning together with one of the many transport companies operating for SCA to be prepared for the upcoming transition.

Vehicle	Scania 25P 6x2 300 kWh (Prototype)
Body	Rigid
Total weight	70 t
Type of goods	Round wood
Charging	During driver breaks (150 kW)
Localization	North-East Sweden





SWEROCK



The electric truck enables 80 tonnes CO₂ reduction per year and truck compared to a diesel-powered truck.

The four electric trucks with concrete mixers are based at Swerock's concrete factory in Västberga south of Stockholm City. The trucks deliver concrete to construction sites in and around the Stockholm area. In connection to the concrete factory, a charging hub with four chargers has been installed where the trucks are charged during night and if needed during the day.

Swerock highlights that the electric trucks are very well suited to use in projects where the customers have high ambitions with regards to both reduction of emissions and improved working environment. Another benefit is that they can also be used in the city center of Stockholm when zero emission zones will be introduced 2025.

Vehicle	4 x Volvo FE 6x2
Body	Rigid with concrete mixer
Total weight	27 t
Type of goods	Concrete
Charging	During night and breaks
Localization	Stockholm area



VGT I GÖTEBORG

Electric prototype on a shuttle route in the Gothenburg area.

The transport company VGT i Göteborg is a subcontractor to DHL Freight, performing pick-ups and distribution. VGT serves local areas north of Gothenburg.

In this particular flow linked to the REEL project, tires are transported from a warehouse in the city of Kungälv just outside Gothenburg to a DHL terminal in Gothenburg. The length of a round trip is around 40 km.

The vehicle is utilized during one shift between 9:00 and 18:00. Each shift, six round trips are performed, three before lunch break and three after.

The charging is done mainly during night, at low power (22 kW). Additional fast charging occurs during the driver's lunch break at 150-175 kW. All of the charging is being done at a public location in proximity to the premises of VGT. As the company has limited space on its premises and since the space is rented, investing in and installing own charging infrastructure on the premises is a challenge.

The drivers speak for the improvement of working environment, especially around the vehicle. As this particular case utilizes trailers, coupling and decoupling of the trailer is performed several times a day. This implies working close to the tailpipe which of course is absent in the electric Volvo. Electric trucks are seen as advantageous when recruiting new drivers in the future.



Vehicle	Volvo FM 4x2 540 kWh
Body	Tractor
Total weight	44 t
Type of goods	Tires
Charging	During night (22 kW) and lunch (175 kW)
Localization	Gothenburg area



WIBAX

Wibax is a chemical supplier with head office in Piteå. In collaboration with Scania, they are demonstrating an electric ADR-approved truck that can haul 64 tonnes.

Wibax sells, purchases, processes and distributes liquid chemical products and bio-oils to the base industry. The company operates 19 terminals and depots around Sweden, Finland, Estonia and Norway.

Their first electric truck is adapted to drive in the area between Piteå and Skellefteå. Bio-oils, sulfuric acid, lye, and other chemicals are transported. The truck operates in 2-shift with a daily mileage around 300 km. The electric truck fits well to Wibax's transport set-up since the loading and unloading of chemicals normally takes around 45-60 min at their terminal or at customers. Wibax has therefore installed a charger next to their chemical silo in Piteå in order to charge the vehicle at the same time as chemicals are loaded in the trailer. Initially the vehicle will charge at 150 kW, however higher power charging will be used later on in the project.

The company has through collaboration with other actors in the region also managed to get a charger installed in the Port of Skellefteå. Currently, Wibax is looking for similar collaborations with more customers in order to create opportunities for additional electric vehicles in their operation.

Vehicle	Scania 25P 6xX 300 kWh (Prototype)
Body	Tractor
Total weight	64 t
Type of goods	Chemicals
Charging	During on- and offloading (150+ kW)
Localization	Piteå, Skellefteå

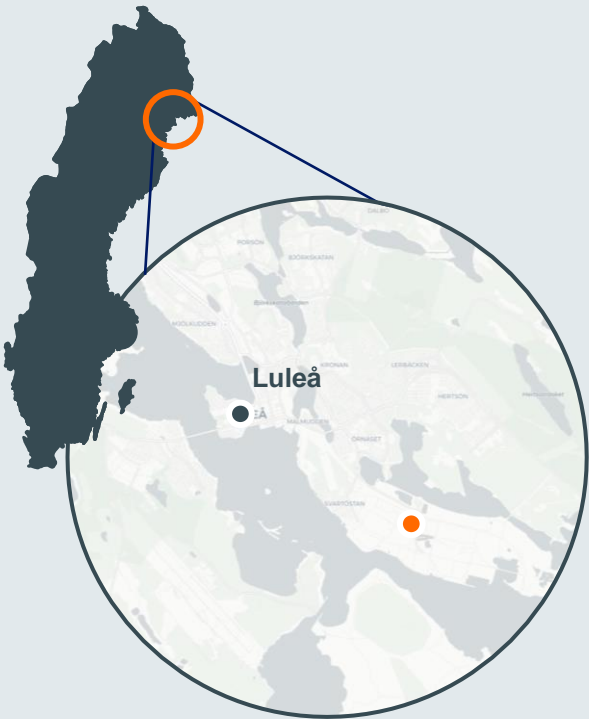


ÖHRLUNDS

An electric light weight tipper in northern Sweden.

Öhrlunds Industritransporter is a local carrier specializing in transportation of steel and iron products. The company is a part of BDX, a major provider of transport and logistics services in northern Sweden consisting of former haulier network organizations and local transport companies. Recently, Öhrlunds has received an electric truck prototype from Volvo which has been deployed in the city of Luleå, making it the most northern logistics case in the REEL project.




The truck is being used in a confined area, a steel production site of SSAB. It is used in a short repetitive flow within the production facility, rarely exceeding speeds over 40 km/h. The vehicle is being used during a day-shift and is charged with a 160 kW DC-charger during lunch and prior to the shift start in the morning. The production facility offers a dry and dusty environment for field testing.



Vehicle	Volvo FMX 8x4R 360 kWh
Body	Rigid tipper
Total weight	32 t
Type of goods	Fractions for steel production
Charging	Lunch and night-time (160 kW)
Localization	Luleå




Case summary (1/6)

	All-transport	Boliden	Börje Jönsson Åkeri	DAGAB Stockholm	DAGAB Gothenburg	Derome
Truck	Scania 25P 4x2	Scania 25P 6x2*4	Volvo FM 4x2	Scania 25P 6x2	Scania 25P 6x2	Volvo FM 6x2*4
Body	Tractor	Tractor	Tractor	Rigid refrigerated	Rigid refrigerated	Rigid
Battery size	300 kWh	300 kWh	N/A	300 kWh	300 kWh	450 kWh
Gross weight	29 t	74 t	50 t	28 t	64 t	29 t (50 t)
Type of goods	Containers	Ore	 Food	 Food	 Food	Building material
Logistic flow	Port-to-Hub	Shuttle flow	Hub and spoke	Urban & Suburban Distribution	Regional Distribution	Urban & Suburban Distribution
Daily milage	200 km	400 km	1000 km	350 km	300 km	300 km
Shifts per day	1	2	2	2	3	1
Charging up to 49 kW	100%	0%	0%	40%	0%	0%
Charging between 49–149 kW	0%	100%	0%	60%	100%	10%
Charging from 150 kW	0%	0%	100%	0%	0%	90%
Public charging	0%	0%	100%	0%	0%	10%
Charging at customer	0%	0%	0%	0%	0%	0%
Charging at own premises	100%	100%	0%	100%	100%	90%

 Refrigerated goods

Image: Volvo Trucks




Case summary (2/6)

	DFDS	DHL	ELIS	EÅ	Falkenklev	Flygfrakt
Truck	Volvo FH 4x2	Volvo FH 6x2	3 Volvo FL 4x2	9 Volvo FH 4x2/6x2	5 Scania 25P 4x2	Volvo FH 4x2
Body	Tractor	Rigid swap-body and trailer	Rigid	Tractor	Rigid	Tractor
Battery size	540 kWh	510 kWh	265 kWh	540 kWh	165 kWh	N/A
Gross weight	44 t	64 t	16 t	44 t	20.5 t	44 t
Type of goods	Industrial	Pallets and parcels	Textiles and laundry	 Food	Pallets and parcels	Pallets and parcels
Logistic flow	Hub-to-Hub	Line-haul & Suburban Distribution	Urban & Suburban Distribution	Hub-to-Hub	Urban Distribution	Regional Distribution
Daily milage	250 km	450 km	150 - 200 km	300 km	120 km	300 km
Shifts per day	1	2	1	2	1	1
Charging up to 49 kW	N/A	0%	100%	5%	100%	95%
Charging between 49–149 kW	N/A	0%	0%	0%	0%	0%
Charging from 150 kW	N/A	100%	0%	95%	0%	5%
Public charging	0%	65%	0%	15%	0%	0%
Charging at customer	0%	0%	0%	75%	0%	5%
Charging at own premises	100%	35%	100%	10%	100%	95%

 Refrigerated goods



Image: Volvo Trucks

Case summary (3/6)

	GLC	GLC	GTS	Höganäs/Dania Connect	ICA	ICA
Truck	2 Volvo FL 4x2	2 Scania 25P 4x2	Scania 25P 4x2	Scania 25P 6x2	3 Volvo FE 6x2	Volvo FH 6x2
Body	Rigid refrigerated	Rigid	Rigid	Tractor	Rigid refrigerated	Rigid refrigerated
Battery size	300 kWh	165 kWh & 300 kWh	300 kWh	300 kWh	265 kWh	540 kWh
Gross weight	18 t	26 t	18 t	74 t	27 t	28 t (50 t)
Type of goods	 Food	Industrial comp.	Pallets and parcels	Containers	 Food	 Food
Logistic flow	Urban & Suburban Distribution	Local & Regional Distribution	Urban & Suburban Distribution	Hub to Hub	Urban & Suburban Distribution	Regional Distribution
Daily mileage	200 km	120 km	110 km	280 km	150 km	350 km
Shifts per day	1	1	1	1	1	1
Charging up to 49 kW	80%	100%	100%	0%	95%	10%
Charging between 49– 149 kW	0%	0%	0%	0%	0%	0%
Charging from 150 kW	20%	0%	0%	100%	5%	90%
Public charging	20%	0%	0%	0%	5%	100%
Charging at customer	0%	100%	0%	0%	0%	0%
Charging at own premises	80%	0%	100%	100%	95%	0%


 Refrigerated goods

Case summary (4/6)

	Jula Logistics	LBC Frakt	LBC Frakt	LBC Frakt	LB Transport	Martin & Servera
 Truck	2 Scania 25P 6x4	Scania 25P 4x2	Scania 25P 6x2	Scania 40P 6x2	Volvo FM 4x2	3 Volvo FE 6x2
Body	Tractor	Rigid	Rigid	Rigid	Rigid	Rigid refrigerated
Battery size	300 kWh	300 kWh	300 kWh	300 kWh	360 kWh	265 kWh
Gross weight	64 t	19 t	29 t	55 t	18 t	27 t
Type of goods	Containers	Building material	Refuse	Excavated material	Food	 Food
Logistic flow	Dry port-to-Hub	Regional Distribution	Confined area	Construction	Urban Distribution	Urban & Suburban Distribution
Daily mileage	300-400 km	200-300 km	150-200 km	N/A	N/A	200 km
Shifts per day	2	1	1.5	1	1	2
Charging up to 49 kW	50%	70%	70%	50%	100%	100%
Charging between 49–149 kW	0%	0%	10%	0%	0%	0%
Charging from 150 kW	50%	30%	20%	50%	0%	0%
Public charging	0%	0%	0%	0%	0%	0%
Charging at customer	0%	0%	0%	0%	0%	0%
Charging at own premises	100%	100%	100%	100%	100%	100%

 Refrigerated goods

Case summary (5/6)

	M-lab	Nordisk Återvinning	Polfärskt	Postnord	Postnord	Ragn-Sells / Foria
Truck	Volvo FM 6x2	Volvo 4 FE 6x2 1 FL 4x2	Volvo FL 4x2	Scania P230 6X2	Scania 25P 4x2	Scania 25P 6x4
Body	Tractor	Split body rear loader for waste / Rigid	Rigid	Rigid refrigerated	Tractor	Tractor
Battery size	600 kWh	260 kWh / 200 kWh	200 kWh	300 kWh	300 kWh	300 kWh
Gross weight	50 t	27 t / 17 t	16 t	28 t	19 t	75 t
Type of goods	Excavated material	Refuse	 Food	Pharma. / Pallets and parcel	Pallets and parcels	Fly and bottom ash, wood chips
Logistic flow	Construction	Urban & Suburban Waste collection	Urban & Suburban Distribution	Urban & Suburban Distribution	Hub-to-Hub	Hub-to-Hub
Daily mileage	250-300 km	100 km	100 km	200 km	140 km	400-600 km
Shifts per day	2	1	1	3	1	2
Charging up to 49 kW	10%	90%	100%	0%	0%	0%
Charging between 49–149 kW	0%	0%	0%	0%	0%	0%
Charging from 150 kW	90%	10%	0%	100%	100%	100%
Public charging	100%	10%	0%	0%	0%	0%
Charging at customer	0%	0%	0%	0%	0%	0%
Charging at own premises	0%	90%	100%	100%	100%	100%

 Refrigerated goods

Case summary (6/6)

	Renova	SCA Skog	Swerock	VGT	Wibax	Öhrlunds
Truck	Scania 25P 6x2	Scania 25P 6x2	4 Volvo FE 6x2	Volvo FM 4x2	Scania 25P 6xX	Volvo FMX 8x4
Body	Tractor (with hook-lift)	Rigid	Rigid with concrete mixer	Tractor	Tractor	Rigid tipper
Battery size	300 kWh	300 kWh	N/A	540 kWh	300 kWh	360 kWh
Gross weight	30 t	70 t	27 t	44 t	64 t	32 t
Type of goods	Refuse	Round wood	Concrete	Tires	Chemicals	Fractions for steel production
Logistic flow	Hub-to-Hub	Shuttle flow	Urban and Suburban distribution	Shuttle flow	Urban & Regional Distribution	Confined area
Daily mileage	80 km	150 – 200 km	N/A	250 km	300 km	N/A
Shifts per day	1	1	N/A	1	2	1
Charging up to 49 kW	100%	0%	N/A	90%	0%	0%
Charging between 49–149 kW	0%	100%	N/A	0%	0%	0%
Charging from 150 kW	0%	0%	N/A	10%	100%	100%
Public charging	0%	0%	0%	100%	0%	0%
Charging at customer	0%	0%	0%	0%	0%	100%
Charging at own premises	100%	100%	100%	0%	100%	0%

Contact & info

If you would like to know more about REEL and this report, please contact:



Andreas Josefsson

andreas.josefsson@lindholmen.se



Nikita Zaiko

nikita.zaiko@lindholmen.se

Further information can also be found at REEL's webpage:
www.closer.lindholmen.se/reel





Together for a transport-efficient society. CLOSER is a neutral collaboration platform, knowledge node and project workshop for increased transport efficiency and well-functioning logistics. CLOSER's goal is to contribute with new solutions to the freight transport system for a sustainable society.

CLOSER at Lindholmen Science Park AB
Lindholmospiren 3-5
Box 8077
SE-402 78 Gothenburg, Sweden
www.closer.lindholmen.se