

Preliminary plan for electric vehicle charging in the City of Turku for 2024–2030

Abstract

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1. Background

The transformation of the vehicle power systems has accelerated since the early 2020s, when electric cars and rechargeable hybrids have rapidly increased their market share, and it is estimated that by 2030 more than one third of the automobile stock will have been electrified. The pace of this change depends on a number of factors, such as fuel prices, the economic situation and the evolution of electric car prices. The EU's decision to ban the sale of new fossil fuel cars from 2035 onwards supports the transition towards electric and hydrogen vehicles. The City of Turku strives to be carbon neutral by 2029, which puts transport emissions reductions at the center, as emission reductions in electricity and district heating have already been achieved. The city aims to limit the share of private car use to up to 33 per cent of all journeys and to promote electric car use by improving vehicle charging infrastructure. The number of cars to be charged in Finland is expected to increase to 700,000 by 2030, which requires a significant increase in the number of charging stations. The European Union's AFIR Regulation and the national road transport distribution infrastructure programme also steer the construction and development of electric vehicle charging infrastructure in Turku. The Preliminary plan for electric vehicle charging in Turku is part of the wider USER-CHI project in 2020–2024.

2. Process of participation

The City of Turku set up a wide-ranging internal working group to guide the preparation of the Preliminary plan for electric vehicle charging. The working group includes representatives of the urban environment service area and other experts related to the project from other service areas. The working group is managed by representatives of the development of urban logistics unit.

An electric charging survey carried out in spring 2023, to which 516 people responded, mostly city residents and representatives of housing associations, highlighted the need for charging stations in the city centre and the high interest of residents in electric cars. The survey revealed that about one third of residents with electric cars did not have the possibility of charging at home, and they hoped for more charging possibilities on the streets. The most important factors in choosing the charging station were location, charging power and price. The additional services did not play a major role.

Market dialogues with charging operators revealed that long-term contracts and key locations are valued in the sector. Fast and high-power

3. Public charging stations on streets

The efficiency of the public network of charging stations is defined in relation to the number of electric cars and rechargeable hybrids, assuming 3kW of power for each electric car and 0.66kW for each hybrid. According to the estimate of the Ministry of Transport and Communications, Finland must reach the number of 700,000 rechargeable cars by 2030, which would set the power requirement of the Turku charging network to 44MW, or about 2,000 basic charging stations. Due to unpredictable developments in the number of electric cars, the number of charging stations must be monitored annually.



Although this network scope is a minimum requirement, the actual number of charging stations depends on the need to use them and the utilisation rate that operators regularly monitor. Faster charging stations can partially replace slower ones, but the need for long-term parking and night-time charging remains, which requires a combination of different types of charging stations.

The location of charging stations in Turku has been planned with the working group, drawing on the results of the electrical charging survey and the CLICK tool developed in the USER-CHI project, which enables optimal locations and quantities of charging stations to be determined using geographic datasets. Among other things, the tool considers existing charging networks, parking data and the attractiveness of different service areas, such as shops and office centres. It can be used to prioritise different charging needs regionally and according to the speed of the charging stations. The results of the electrical charging survey support the simulations of the CLICK tool, which together show that there is the greatest need for additional charging stations in the city centre, but there are also charging needs in the suburbs and in the surroundings of shopping centres that must be met. The plan also considers all charging stations built on private land. However, in the city centre and Kupittaa area, it is the main responsibility of the city to implement charging stations. The follow-up plan specifies the street plans for charging stations and includes, for example, electricity network capacity needs and the marginal conditions for traffic planning.

In its charging network, the City of Turku applies a charging street model with 4-20 charging points at a single charging station. The functionality of the model has been tested in Stockholm with positive experiences. Charging streets increase customer satisfaction and findability of charging stations, as more than one station in the same place increases the likelihood of finding a free spot, reduces the inconvenience of malfunctions and facilitates guidance. Thus, drivers can use so-called standard charging stations, which reduces unnecessary driving and promotes smooth traffic flow and reduces emissions. As faster charging stations are more profitable for operators, they will be prioritised in the city's competitive tendering processes at suitable sites. As compared to basic charging stations, fast ones can also reduce the total number of stations. However, basic charging stations will be put out to tender especially for charging during the working day and overnight.

In the future, customers parking at charging stations will have to pay parking fees similarly to other parking places, which ensures that the city's parking income does not decrease due to charging stations. The elimination of parking charges at charging stations may be considered in specific cases, such as for high-speed charging stations, where fast charging times and high car turnover may justify exemption. This will be decided on a case-by-case basis when preparing tendering documents. The charging of parking fees also enables effective monitoring, preventing the misuse of charging stations in the hope of free parking, thus reducing unnecessary charging and parking at charging stations.

Special charging stations are planned for taxi services in downtown Turku so that taxis do not burden other fast charging stations. This would free up capacity for private transport. These taxi charging stations would potentially be superfast above 300kW in order to provide efficient charging during short stops. The charging infrastructure in the logistics sector requires special attention in the planning of land use and cooperation with various actors in order to meet the AFIR requirements set by 2025 and 2030. The electrification of logistics has been slower than the achievement of passenger cars and targets may require state support. The City of Turku will focus particularly on planning charging stations for urban logistics, and the development of a wider logistics network will require the expansion of the charging infrastructure.

The City of Turku has actively tried out different solutions for charging light-duty electric vehicles, but the diversity of charging plugs, fire safety and lack of standardisation pose challenges for the



implementation of public charging stations. The unwillingness of users to carry their own charging cord and home charging reduces the need for public charging stations, although the growth of cycling tourism may change the situation in the future. The need for safe bike parking is emphasised as electric bikes become more common, because users want to park their bikes so that the battery can be safely left on the bike. The City of Turku strives to improve safe bicycle parking and to test charging solutions, at the same time guiding housing companies and employers in organising safe charging, and to continue investigating the charging needs of light-duty electric vehicles.

4. Tendering

The City of Turku implements the tendering process for the charging network in stages, tendering 1-3 charging streets at a time so that most charging operators can participate and offer a competitive price. The tendering packages are designed to attract operators by offering a sensible business opportunity by combining profitable and less profitable objects into separate entities. This ensures that competitive tendering is interesting for operators and ensures the implementation of a wider vehicle charging network.

The terms and conditions of the tendering process ensure that the participating companies have the necessary experience and financial resources to manage and maintain charging stations throughout the contract period. The city's goal is to keep charging station activities economically positive by creating a competitive tendering process that attracts several participants and combines productive and less productive sites. At the same time, efforts are made to cover and maintain the city's investment costs through the development of the charging network.

5. Objectives and monitoring

The number and development of charging stations in the City of Turku will be actively monitored through the data of charging station operators and the change in the power distribution of cars, considering different forecasts of the increase in the number of electric cars. According to estimates, Turku could have a charging network corresponding to approximately 2,000 basic charging stations by 2030 if the objectives of the Ministry of Transport and Communications are met, but the actual development will be monitored annually. Tendering will be planned and implemented by forecasting the long ordering times of charging stations. In addition, the implementation ensures that new charging stations are not implemented before the existing capacity is filled, starting with the busiest parking areas in the city centre. The development of the public charging network is continuously monitored, and the city participates in the planning of the national electric vehicle charging network, especially from the perspective of the electrification of logistics and public transport, as an enabler of activities and supporting the private sector in the development of the charging network.