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Electric bus deployment in Utrecht - current state and future plans



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The Province of Utrecht is at the eve of a large scale introduction of zero emission public transportation. In 2016, the Province of Utrecht adopted the 'Energy Agenda 2016-2019', in which the energy and climate ambitions of the province of Utrecht are formulated (PU, 2016). The province's ambition is to become climate neutral by the year 2040. To be able to reach this ambition the public transport sector will need to change its fleet of vehicles towards a completely emission-free (from tank-to-wheel) public transport in 2028. This goal is also formulated in the 'Provincial Coalition agreement' (PU, 2015).

The Province of Utrecht

The Province of Utrecht is located in the center of the Netherlands. With an area of approximately 1,400 square kilometers, the Province of Utrecht is one of the smallest of the 12 provinces in the Netherlands. The province consists of various urban areas (the municipalities of Utrecht and Amersfoort being the main urban areas), flat rural areas on the west side and modest hilly area (national park) on the east, see Figure 1.

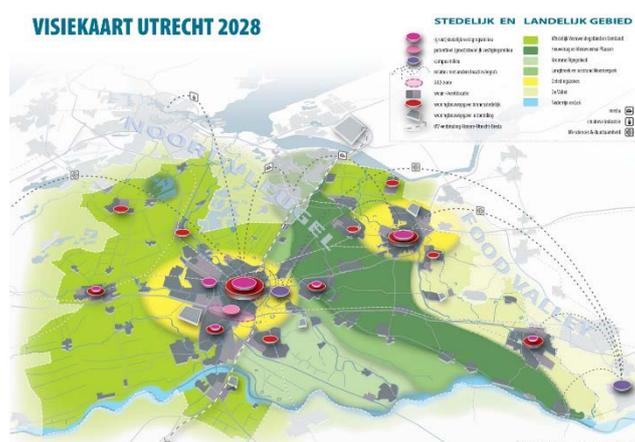


Figure 1: Geographical map of Utrecht province.
Source: PU (2012)

The Province of Utrecht is characterized by a growing economy, a subsequent large inflow of new inhabitants and thus increasing amounts of regional traffic. The total population of the province is about 1.3 million, with a population density of about 916 inhabitants/km², peaking to 3.600 inhabitants/km² in the Utrecht Municipality.

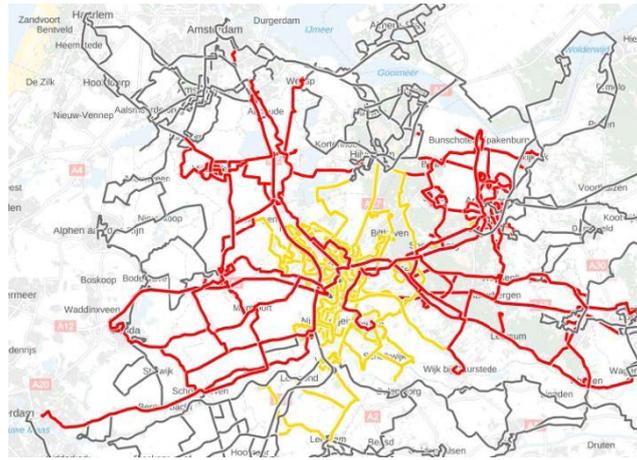


Figure 2: Public transport network in the Utrecht region.

Source: Nationaal Georegister (2020).

Different modes of transport in the region

Table 1 shows the different modes available for travelling in the Province of Utrecht, for travelling within the city of Utrecht and for travelling to the city center of Utrecht in 2017. There are several interesting observations. First of all, within the Province of Utrecht, the car is the most dominant mode of transport (43%) with cycling being second (32%). Secondly, within the municipality of Utrecht, the most important mode of transport is cycling (47%). Third, up to 59% of the people travelling to the city center of Utrecht go by bike. Finally, it also becomes clear that public transport is relatively a quite important mode of transport to move to the city center of Utrecht (24%), whereas public transport for travelling within the province or the municipality plays a minor role.

Transport mode	Movements within the Province of Utrecht	Movements within the Utrecht municipality	Movements to the city center of Utrecht
Car	43%	19 %	4 %
Train	5%	4 %	5 %
Bus/tram/metro	2%		19 %
Bicycling	32%	47 %	59 %
Walking	17%	27 %	12 %
Other	0%	3 %	1 %

Table 1: Modal split in the Province of Utrecht and Utrecht Municipality 2017.

Source: CBS (2019), GU (2019).

Public bus transport services available in the region

The public bus transport service in the region is divided into two contracts, or concessions, granted to different transport companies, see Figure 2. The U-OV contract (operated by Qbuzz, which is fully owned by Bus Italia / Italian state railways) covers the public bus transport in the city of Utrecht and the suburban towns directly around Utrecht (yellow lines in Figure 2). U-OV serves around 180.000 travellers per day, owns 350 buses, and annual operation costs are 95 million euro. The Syntus Utrecht contract (operated by Syntus, which is fully owned by the French company Keolis) consists of the parts of the province not included in the U-OV contract (red lines in Figure 2). The Syntus concession carries 100.000 travellers per day with 300 buses, against 60 million euro operation costs per year.

The Current state of electric bus deployment

In Utrecht, the first three electric buses were introduced by operator U-OV/Qbuzz at the start of their new operating contract in December 2013, see Table 2. These buses (Optare Solo midi) operate a bus route in the historic city center. They have been plagued by problems from the start, especially regarding recharging during operation. These buses are recharged (opportunity charging) with an induction plate at Utrecht Central Station, which often malfunctions, either because of technical issues or erroneous handling by drivers. In addition, there are several other technical issues with these buses, including the electric engines. Because of these issues, the bus line is partly operated with diesel buses, and Qbuzz is seriously considering replacing the Optare buses with new electric buses. The second batch of 10 electric buses was introduced in 2017 for urban bus route 1 in Utrecht. The 10 buses replaced 10 diesel buses, which is made possible through fast opportunity charging at one of the terminuses. However, charging times turned out to be longer than expected, so an 11th bus had to add in 2019, in order to effectively operate the

Number of e-buses	Year of introduction	Vehicle type	Vehicle type	Capacity (kWh)	Capacity (kWh)	Bus Operator	Bus line
3	2013	Optare Solo	36 seats ¹ 58 total ¹		250 ¹	U-OV (Qbuzz)	Line 2
11	2017 (10) 2017 (1)	Ebusco 2.1	90 total	311	250	U-OV (Qbuzz)	Line 1
35	2020*	Heuliez GX437	107 total	250	120-150	U-OV (Qbuzz)	Line 3, 7, 8
20	2020*	Ebusco 2.2	90 total ³	362 ³	300 ³	U-OV (Qbuzz)	Ulink 34
7	2018 2019	BYD K9	37 seats ⁴	352 ⁴	250 ⁴	Syntus	Different lines

Table 2: Characteristics of the current e-bus fleet in the province of Utrecht

Source: 1 Optare (2020); 2 Delivery expected spring / summer 2020; 3 Ebusco (2020); 4 BYD (2018).

* Delivery expected spring / summer 2020.

entire line with electric buses. The performance of these buses is improving, but still not at their target of 95%. In 2018 Syntus introduced 2 electric buses for different routes in the Amersfoort region. At the end of 2019 another 5 electric buses were taken into operation in the Amersfoort region.

Future plans

As of the summer of 2020, 55 new electric buses will be taken into operation by U-OV/QBuzz. These consist of 35 city buses, to be used on three urban routes that will be fully zero emission (charging via opportunity charging) and 20 standard regional buses (charging via overnight charging), to be used flexibly for several regional bus routes, combined with diesel buses. Meeting the ambition to have a fully zero emission bus fleet in the Province of Utrecht in 2028 would mean a deployment of around 500 Zero Emission buses in the new concession(s) from 2023 till 2028.

INTERREG Europe e-Bussed project

This work is funded by the Interreg Europe e-Bussed project. The e-Bussed project supports the transition of European regions towards low carbon mobility and more efficient public transport. The regions involved are Turku (Finland), Hamburg (Germany), Utrecht (The Netherlands), Livorno (Italy), Tolna (Hungary) and Malta/Gozo. It promotes the uptake of e-buses in new regions and supports the expansion of existing e-fleets. The e-Bussed project will deliver 6 regional action plans and produce 4 thematic best practice reports, a set of readiness level indicators and policy recommendations to be used in partner regions.

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eBussed project supports regions in the transition towards low-carbon mobility and more efficient public transport in Europe by promoting the use of e-buses.