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ACTION PLAN UTRECHT REGION (Final Version, 21 June 2022)

provincie :: Utrecht

HOGESCHOOL UTRECHT

1. The Action Plan in a nutshell

1. The Action Plan aims at the transition to a complete zero emission bus fleet in the Utrecht area in 2028. Actions encourage the upscaling of innovations and better operation results for e-buses. The plan focuses on the short term - operational in the eBussed Phase 2: 2022-summer 2023 - with an outlook to future steps up to the start of the new concession period in 2028.
2. The actions are not only focused on the procurement of new buses, but have a broader scope to connect e-bus development with the environmental and climate goals and the development of the electric energy network.
3. The present Action Plan, aimed at promoting the adoption of electric public transport in the provincial territory, is composed of 3 main lines of action:

   Action 1: Monitoring Zero Emission bus-performance

   Action 2: Storage at e-Bus depot (battery management systems)

   Action 3: Midi e-bus TRIBUS

4. The first action provides necessary operational and management information to evaluate progress and quality of the actions in this Action Plan, assess impacts and take additional actions if necessary. The monitoring action also informs about how new practices contribute to e-bus performance. The current management information by Dutch CROW is too general and is made available only once a year. The aim of this action is to draft a monitoring plan to further disclose the existing management & monitoring (data)information on zero emission public transport. Monitoring requirements will be established and will be included in the procurement contracts for new concessions. The monitoring tool will provide new information on e-buses (performance, energy savings by innovations and the impact on Climate/Urban Development). This information can influence the Policy Instrument 'Kansen for West III' by increasing the awareness of e-bus development in this program and by showing how other mobility modes can learn from the e-bus operations/projects.
5. The purpose of Action 2 is to investigate whether the battery pack of (old) electric buses can be used as reserve capacity for electric buses. Electricity prices fluctuate and are directly related to energy consumption. PT companies should therefore charge e-buses while electricity is relatively cheap. Surplus electric power can then be temporarily stored in the batteries of buses that are not (or no longer) in operation. Energy storage at e-bus depots by a battery management system will also reduce the maximum charging capacity and increase the use of more sustainable energy from natural regional sources (wind & sun). Initially, the action will be launched on a small scale and, proving successful, it can be expanded to other e-bus depots in the Netherlands and other e-vehicles. The link with the Policy Instrument 'Kansen voor West III' is clear: in this programme new (upscaling) projects on Climate and Innovations are encouraged to make the transition to sustainable energy-use and grid-balancing. E-bus development is not particularly in focus so far; a good action can stimulate the programme and e-bus development in the region.
6. The third action is a project for using a small electric bus for daily operation in Utrecht's historic city centre. The action monitors the performance of an electric midi bus (Tribus Movitas) vis-a-vis technical challenges combining electric driving with comfort and space. As yet, there is no practical experience with this type of midi bus, which has some innovative features, like its light weight and its 4-wheel steering system. The midi bus will be used on a route through parts of the historic centre and the 'Museum Quarter', encountering small

streets, lots of pedestrians (including tourists) and bikers and a busy part of the shopping centre. During the trial period, the performance of the bus will be monitored on several important features like manoeuvrability, vibration nuisance, range, performance among bikers and pedestrians and passenger experiences, including comfort, accessibility and 'green' image.

NOTE: on 13th June we received a message from the Tribus-company to stop with the Movitas project. At this moment it's unclear if this action can be conducted as planned or has te be cancelled. In that case we will look if an alternative scenario is possible within the framework of this eBussed Action Plan.

2. General Information

Project: E-Bussed

Partner organisations: Province of Utrecht and University of Applied Science Utrecht

Country: The Netherlands

NUTS2 region: Province of Utrecht

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3. The INTERREG Europe e-Bussed project

The INTERREG-Europe project e-Bussed 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 eBussed project contributes to the INTERREG Europe programme, objective 3.1 "Improving low-carbon economy policies", by encouraging regions to develop and deliver better policies related to the deployment of e-buses. The project also facilitates the integration of electricity production based on renewables and low carbon electrified public transport. Through new ideas and better policies, the project promotes both the demand and supply side of electricity from clean renewable sources and the subsequent transitioning towards a low carbon economy. eBussed will engage regions throughout Europe with and without practical experience on e-buses. The 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. The project will increase capacities and knowledge among its partner regions via a multi-level exchange of experiences and cross-regional pollination of ideas to better support the transition towards fully electrified bus fleets and low carbon mobility.

4. The policy instrument addressed: "Kansen voor West"

In the Western Part of the Netherlands all regional and local public authorities are working together in the " Kansen for West"-Programme (opportunities for west-programma). This programme is funded by the European Regional Development Fund (ERFD). The Province of Utrecht is one of the participants.

The 'Kansen voor West II' policy instrument is facilitates four goals:

(1) strengthening research, technological development and innovation;

(2) supporting the transition to a low-carbon economy in all sectors;

(3) stimulating employment and supporting labour mobility; and

(4) stimulating social inclusion and fighting poverty.

An important focus of the Kansen voor West II policy instrument is the transition towards a low carbon economy. Fossil fuels become scarce, while their use results in CO2 emissions. Of the 27 EU Member States, the Netherlands in 2010 was ranked 24th in terms of the share of renewables in the total energy mix. In view of the high population density, the high concentration of economic activity and the equally high traffic density, the challenge of reducing CO2 emissions in public transport is of particular importance, as is e-bus deployment to realize the regional profile of healthy urban living and the CO2 ambitions of the region. The E-Bussed project mainly addresses the ERDF policy instrument by further supporting the second goal: transition toward a low-carbon economy.

The improvement of the ERDF policy instrument is envisaged along the following lines:

- update of the state of the art of new relevant concepts, techniques and implementation approaches on f.e. (case of INTERREG) zero emission within public transport. This information will be used to evaluate policies and to develop new business models.
- new insights and perspectives will be translated into enhanced governance models from the perspective of asset ownership and asset management with regard to mobility and energy.
- Result of all initiatives (among which the new INTERREG Europe project) will contribute to structural change in the region as they will be incorporated as part of the policy instrument on the transition to the low carbon economy. The structural changes will not be limited to the offices of the Province of Utrecht, but will include change at all participating parties ERDF within the policy instrument of Kansen voor West II.

Kansen voor West II supports various, generally long-term, policy visions and implementation strategies aimed at realizing low carbon economy objectives on local or regional level. This has allowed us to identify specific targets requiring an extra boost to realise a smart roll-out of e-buses, towards a sustainable generation.

Operational Programme ERDF 2021-2027 Western Netherlands

In October 2021, the Kansen voor West III became operational. This is a further development and update of Kansen voor West II. Kansen voor West III is connected to the following 3 main policy targets from the ERDF Programme:

- Cleaner Europe, innovation & smart economic transformation
- A greener, lower-carbon Europe by promoting clean and fairer energy transition, green and blue investments, the circular economy, adaptations to climate change, risk prevention and risk management. (With full circularity in 2050 and as much as possible in 2030)
- Bringing Europe closer to its citizens and promoting local innovation

The entire programme will be used for the transition goals that require an integrated approach to innovation, climate and urban development. Only with an integrated, mutually reinforcing effort can the tasks associated with this transition be fulfilled. In Kansen voor West III, the following program goals are:

- Strengthening research and innovation capacity and reducing CO2 emissions by advanced technologies
- Promoting renewable energy
- Developing the transition to a circular economy
- Promoting integrated economic/sustainable development, cultural heritage, tourism and security in urban areas

The Programme identifies a number of actions of strategic importance (Article 22(3)(d)):

- Actions aimed at innovates that ensure digitization and sustainability of products and production processes in an entire value chain towards fully circular;
- Trial or concept and further development towards the market and digitail innovations and smart technologies
- Development of fully digital controlled drones and non-fossil powered other vehicles
- Innovation (further) development of field labs, proof of concept valorisation and further development of circular concepts.
- Development of innovative concepts for sustainable energy systems storage and hydrogen.

The programme mentions the contribution of Smart Mobility and the Mobility Sector, but the contribution of (urban) Public Transport in general or specifically e-buses (including charging infrastructure, e-depots and the operational process from whell to wheel) is missing.

The actions in this Action Plan are aimed at stimulating the role that public transport plays in achieving the programme goals (on the themes of Innovation, Climate, Urban Development) and bringing it to the attention of the participants of the KvW programme. With a possible follow-up with e-bus projects or e-busknowlegde can be part of the 2021-2027 programme.

Kansen voor West and the Province of Utrecht Mobility Programme:

The Mobility Policy in the Province is elaborated in a 4-year mobility programme. The provincial policy goals for the longer term - such as fully zero emission public transport by 2028 - are elaborated here. The following themes are included:

- Regional Road
- Public Transport
- Cycling
- Freight Transport
- Smart Mobility
- Hubs
- Sustainablity, Climate & Enviroment
- Finance
- Monitoring & Evaluation

The current Mobility-programme runs from 2019 to 2023. In the current programme the connection with the ERDF-programme Kansen voor West III has not been made explicit. Also the e-bus development in this Mobility-programme needs an update to a next level due to new technological, finance and organisatial insights. The overall target to increase the zero emission bus fleet from the current 15% to the total of 100% in 2028 (about 525) is still on track, but not the actions and measures to be taken in the upcoming years. End 2022 the current Mobility-programme will be updated for the period 2022-2028. The e-busdevelopment will be a main part in this programme: not only within the Public Transport-chapter, but also in the other chapters (e.g. Hubs, Climate, Monitoring). The aim is to adress the Good Practices learned in the Interreg eBUssed-programma and the actions in this Regional Action Plan as a part of the new Mobility Programme 2022-2028. In this new Mobility Programme the link with

the Kansen voor West III-programme can be made mare specific: the e-busdevolpment in the Utrecht area (lessons learned/actions planned) is the linking-pin between this programmes.

5. The context of public transport in the Utrecht region

Province of Utrecht: a short tour

The province of Utrecht is one of the 12 provinces of the Netherlands and centrally located (see Figure 1). The province has fairly urbanised areas (the Utrecht agglomeration including Zeist and Nieuwegein and the city of Amersfoort), but also has extensive forests in the east (Utrechtse Heuvelrug). The west of the province is characterised by flat meadows, peat bogs and lakes.

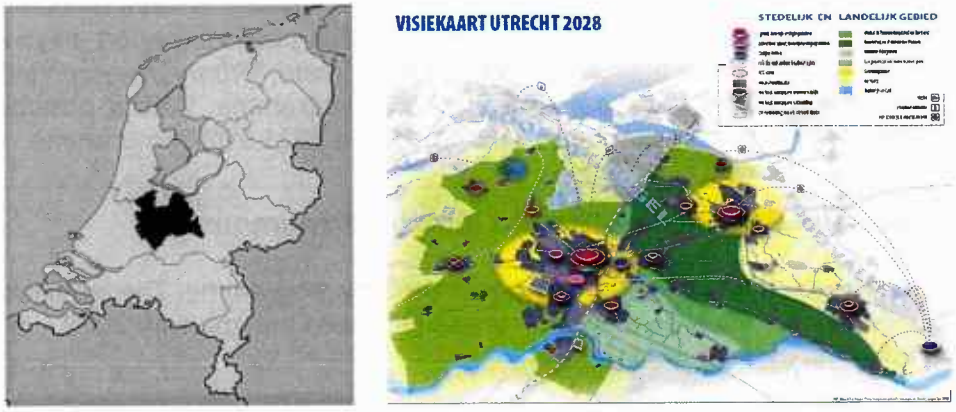


Figure 1. Geographical location of the province of Utrecht (source: Wikipedia / Utrecht Province)

The province of Utrecht has over 1.36 million inhabitants (CBS, 2021) on a surface area of 1,560 km², or 873 inhabitants per km2. The province has its own democratic government, consisting of Provincial States with elected representatives and Gedeputeerde Staten (executive committee). The province comprises 26 different municipalities. The two largest cities are Utrecht, with almost 360,000 inhabitants, and Amersfoort, with over 157,000 (CBS, 2021). Regionally the province can be divided into 4 regions:

- Utrecht and surroundings: The beating heart of the province.... Almost half of all inhabitants of the city of Utrecht work within their own municipality and most of the surrounding municipalities are also focused on the city of Utrecht.
- Amersfoort and surroundings: For the eastern part of the province, Amersfoort is the centre municipality and people are more focused on Amersfoort than on Utrecht. In addition to Utrecht, Amersfoort is also an important economic and transport junction with good travel possibilities to Utrecht, Amsterdam and the rest of the Randstad.
- North-west: The north-west of the province is economically more focused on Amsterdam than on Utrecht. Amsterdam (centre and Zuid-as) and Schiphol are therefore the most important destinations from this area.
- Food Valley: The Food Valley region is a cross-border area with two main focal points: the city of Ede and 'Wageningen University'. The main public transport nodes are the Ede-Wageningen and Veenendaal-De Klomp stations, both are stations where regional trains as well as intercity trains do stop.

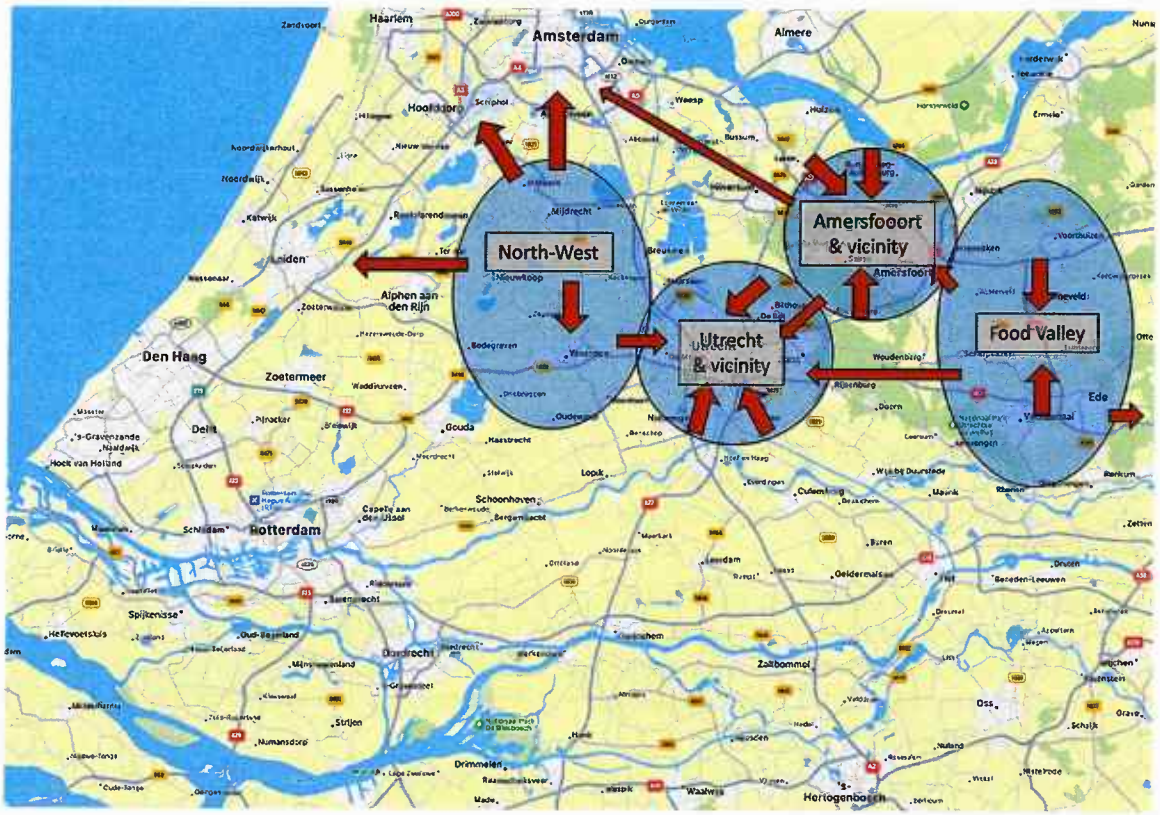


Figure 2. Four economic regions within the province of Utrecht and their most important economic relations (source: Utrecht Province)

The province of Utrecht is largely part of the 'Randstad'; the urbanised area in the west of the country, which also includes the three other major cities of Amsterdam, Rotterdam and The Hague. Partly due to its central location in the country, the city of Utrecht is an important hub for national and international connections for traffic by road, water and rail. Utrecht CS station is one of the busiest stations in the country with more than 200,000 passengers embarking and disembarking each day. In the Netherlands, the main rail network has not yet been put out to tender and the 'N.V. Nederlandse Spoorwegen' is the operator. It operates national intercity connections and sprinter connections (stopping trains) on the main rail network. Elsewhere in the country, regional rail transport has been put out to public tender and there are other -regional- operators.

Public transport in the province of Utrecht

Public transport in the Netherlands is divided into 33 area concessions (and 8 line concessions). In the province of Utrecht there are two concessions for the entire bus and tram transport. The province of Utrecht is the concession grantor for both concessions and thus the commissioning authority. One concession (U-OV) serves the region around the city of Utrecht; it is operated by Qbuzz with a total of 48 city and regional lines. The other concession covers the rest of the province, including urban transport in Amersfoort; it is operated by Syntus Utrecht, with 70 lines. To cover the difference between costs and revenues, the province of Utrecht gives both concessionaires an annual operating contribution totalling approximately €90 million.

As mentioned, the city of Utrecht is an important national and international hub. The city of Utrecht is part of a larger agglomeration in which a dense network of public transport lines is in operation. Besides Central Station and the Utrecht city centre, the university grounds

(Utrecht Science Park) are an important destination and therefore also an important node for the region. Three tram lines run in and around the city: IJsselstein - Utrecht, Nieuwegein-Zuid Utrecht and Utrecht - USP.

The bus network in the province is basically fine-meshed (93% of all inhabitants within a 600-metre radius of a public transport stop) and hierarchical. Here, there is also a role for the train connections; especially the sprinter connections (local trains) in the province.

For the long distance in the province, we have the U-liner. These are high-quality bus connections that link the most important destinations and nodes. On the longer travel connections in and around the city of Utrecht, there is high-quality public transport in the form of U-link.

In addition to the above-mentioned product formulas, BRT (Bus Rapid Transit) and regular regional lines operate throughout the province. At the lower end of public transport, there is a safety net in the form of neighbourhood buses (driven by volunteers) and flexible public transport (a system that operates on demand) on travel links where regular public transport is not profitable.

Although the Corona pandemic resulted in a sharp drop in the use of public transport, public transport in the province experienced significant growth until the end of 2019. In the period 2014 - 2019, there was over 23% increase in passengers. Of these, 75% travelled in or around the city of Utrecht. About 1/3 of all passengers in the province are students and about 80% of all passengers are younger than 45.

Table 1: Public transport figures in the province of Utrecht (2019)

Annual figures:	**Concession Agglomeration Utrecht (U-OV)**		**Concession Region**	**Total**
	U-OV bus	**U-OV tram**	**Syntus**	
Number of boarders	41,157,000	5,577,000	15,950,000	62,684,000
Number of passenger km	221,000,000	32,100,000	133,800,000	387,000,000
Customer rating	7,8	7,7	7,9	
Cost coverage	71%		49%	
Number of operating hours	905,000	45,000	600,000	1,550,000

Sustainability and circularity

Zero emission

From 2028 onwards, all the buses in our public transport concessions will be zero emission. Although we are fully committed to achieving this ambition, we cannot avoid the imminent limitations of the energy network.

The concession holders will make the decisions about the size of the fleet and the composition of the fleet. They can then fill in and optimise the transport offer, the equipment fleet, the energy carriers (size of battery pack/hydrogen) and recharging infrastructure themselves in relation to

the daily operational process. A sophisticated planning with good detours is necessary to make zero emission possible in 2028.

The province does not prescribe any type of technology when purchasing electric buses. The possibility of choosing a different technology, such as hydrogen for example, remains open to concession holders. Promoting hydrogen as an energy carrier is not a specific aim of the Province of Utrecht, but we are not making it impossible. The expectation is that hydrogen will only become feasible on a (large) scale during the lifetime of this concession.

Energy and electric power policy

The province of Utrecht wants concession holders to be smart about how they use energy, keep their use (and costs) as low as possible and make the best possible use of the energy network. We prefer that concession holders make use of sustainably generated energy from the region.

The entire purchase of energy and the use of all related assets (including energy generation and storage) are the responsibility of the concession holders. The entire chain is important when it comes to energy consumption. The transport model and choice of equipment affect the entire chain and the load on the energy network (avoid loading at peak times).

Energy management/strategy (needs and costs) must be an integral part of operations if it is to be done efficiently. The concession holders have the best overview of the whole energy process and the most interest in a good energy strategy and procurement. Moreover, the transport company is a major consumer and has the best market position to realise the best price. This is in contrast to the current way of purchasing energy for the tram via a provincial contract.

Circularity

As a granter of the concession, the province steers the promotion of circularity in public transport by means of circular award criteria and by defining the scope in the Schedule of Requirements. In doing so, attention is paid, for example, to the questions: How do we reduce the use of primary abiotic raw materials (e.g. batteries and charging infrastructure) in the equipment? Which solutions ensure that we need fewer new buses and parts to make operation possible? Which solutions ensure that improved driving behaviour and smart charging scenarios will extend the life of batteries and other components? Which solutions ensure that innovative chain cooperation occurs whereby discarded batteries from the buses are used as 'second-life batteries' for the storage of locally generated energy? Which solutions ensure that materials (such as company clothing or bus furnishings) remain in use and do not become waste?

Public transport concessions in the province of Utrecht and the new tender

The current concessions initially ran until December 2023. Because of the Corona crisis and all the uncertainties that this entails, both concessions were extended by two years until December 2025. The province is currently busy with the preparations for the new tenders. Many choices still need to be made, but the approach is that 2 concessions will be awarded in the future, similar to the current concession boundaries. The main goals and more strategic choices in the tendering process are described in the Nota van Uitgangspunten (note of principles). This document has been in consultation by our stakeholders, all the private transport companies and to the public. In April 2022 this document will be adopted by the General board of the Province of Utrecht.

In any case, the main focus points of the new concession to be awarded will be:

- Collaboration: Strive for continuity in personnel and team compositions at both the transport company and the province and maintain mutually accessible "short lines".

Intensify, for the benefit of the cross-concession connections, the mutual cooperation with concession granters and concessionaires from adjacent concession areas as much as possible.

- Organisation: Clarify the mutual roles and responsibilities within the triangular relationship Province (policy) Carrier - Tram Company and investigate where the (internal) organisation could possibly be filled in more efficiently.
- Involving stakeholders: Maintain the participatory processes and involve stakeholders in development plans at an early stage (in order to gain support).
- Development task: Provide sufficient flexibility and space in the concessions to enable the development task to respond to the dynamics of the region and spatial, social and technological developments.
- Fines and bonuses: When determining the form and amount of a fine or bonus, consider which elements and associated KPIs it should be based on. In doing so, ensure that SMART criteria are formulated as much as possible, so that fines and bonuses can be applied in an unambiguous manner.
- Sustainability: Consider whether additional sustainability requirements to the procurement policy, also on aspects other than the equipment fleet, could be of added value.
- Accessibility: In cases where changes in the line management locally lead to a substantial decrease in the accessibility of public transport, investigate the possibilities of compensating for this with customised transport or other creative forms of transport (as part of the development task).

Ultimately, the province of Utrecht has two important public transport goals: 1. More satisfied public transport passengers; and 2.An efficiently organised public transport system for the entire province.

(Developments in) the bus fleet in the province of Utrecht

In 2013 the province of Utrecht began replacing diesel buses with electric vehicles. The first three electric buses were in service in the city of Utrecht on city line 2. All diesel buses have also been replaced on city line 1, and 35 electric buses now run on lines 3, 7 and 8 in the city of Utrecht. Twenty electric buses also run on one of Qbuzz's regional lines. Since 2018, Syntus has been operating 7 electric buses in the city service of Amersfoort. In 2021 the fleet looks as follows:

Table 2: Overview of bus equipment in the province of Utrecht

Total number of buses	525
Of which diesel buses	*449*
Of which electric buses	*76*

In the current situation, the concession holders are responsible for bus management and maintenance. This increasingly applies to energy-charging infrastructure and zero emission operation, where the connection with energy planning is crucial. We want to keep the concession holder ultimately responsible for the entire operation process. This means that procurement, management, maintenance and ultimate use of the buses remain the responsibility of the concession holder. This also applies to the circularly responsible disposal of buses, charging infrastructure and parts (especially batteries). There must, however, be guarantees that the equipment and charging infrastructure will remain available in the event of

an early termination of the concession and that the investments can be written off in accordance with their economic life.

Bus parking and charging infrastructure

In addition to being the principal of public transport, the Province of Utrecht is also the owner of a number of bus parking facilities. Transport companies rent these sheds, but the province is responsible for their management and maintenance.

Partly in view of the fact that by 2028 the entire fleet of vehicles must be electric, the province of Utrecht has an important task and a major responsibility in the realisation of a charging infrastructure and the safe storage and charging of electric vehicles. This is an important spearhead for management and maintenance.

The larger urban parking facilities will be offered to concessionaires as a (mandatory) rental facility. With the aim of achieving zero emissions in 2028, it is desirable to expand this number to include medium-sized depots. This means that the Province of Utrecht will take on the acquisition, development (and pre-financing) of a number of new locations parallel to the further tendering process for the concessions. The province of Utrecht will ensure the presence of a network connection. The realisation of charging infrastructure in the depot is the responsibility of the concession holders in accordance with the applicable regulations and procedures.

The main reason for this is that the lead times for realising a grid connection are long and uncertain. Acquiring a storage location is also not always easy and takes a lot of (procedural) time. A timely start to this process is therefore necessary. If we make the new concession holders responsible for this, they can only start acquiring stabling locations after the concession has been awarded. This involves a risk. This risk is greater the larger the scale of the zero emissions transition. And in the province of Utrecht, with the introduction of 450 ZE buses, the scale is considerable.

Recent experience shows that the charging strategy is a very delicate matter and that the concession holders have the best practice and knowledge. The range of the buses to be purchased, in combination with the design of the timetable, largely determines the charging infrastructure needed for recharging. The province's complete pre-determination and installation of charging infrastructure can lead to unnecessary investments. However, at crucial locations, junctions and endpoints, it is advisable to take charging infrastructure into account beforehand. Consider, for example, the presence of cables and pipes.

We leave the responsibility for and implementation of Opportunity Charging or refuelling facilities to the concession holders, as well as the realisation of the charging infrastructure in the parking facility.

User interface

Utrecht Province obtains a near average score (7.6 on a 10 point scale) in the Dutch nationwide survey on passenger satisfaction Training and education of busdrivers and maintenance personnel is executed through the manufacturer of the e-busses (Ebusco) and the public transport provider. There is no specific survey or other research conducted about customer satisfaction and the attitude to switch to e-busses from a passenger and drivers perspective.

6. Action Plan

Actions and their interlink with Good Practices

The Action Plan, aimed at bringing the transition to a complete zero emission bus fleet in the Utrecht area at 2028, is encouraging the upscaling of innovations and better operation result by e-busses. The actions are focused on the short term -operational in the eBussed Phase 2: 2022-summer 2023-, but with a strong eye on the future steps: the end of the current PT-concessions end 2025; the tender and implementation of the new PT-concessions in the same period and -finally- the start of the new concessions with a full zero emission-requirement in 2028 for all 525 buses in the Utrecht area. The actions are not only focused on the procurement of the new buses, but have a broader scope to connect the e-busdevelopment with the environment/climate-goals and the energy-network. By doing this, the Actions listed in this Action Plan can be more interesting as good practices or innovations to others (other public transport in the Netherlands, freight transport and so on). This makes the innovative e-busdevelopment more a linking-pin to influences our Policy Instruments: the programma's Kansen voor West and the (next) Mobility Programme of Provincie Utrecht.

The first action (Monitoring) is more a general requirement to improve and evaluate all the next actions and has a "top down" approach over all the (e-)busoperations in the Utrecht area. The other 3 actions are more stand-alone actions and have an innovative character, which can be upscaled by a positive result:

Action 1: Monitoring Zero Emission bus-performance

Action 2: Storage at e-Busdepot (battery management systems)

Action 3: Midi e-bus TRIBUS

In line with the approach of INTERREG EUROPE Programme to promote the identification and exchange of good practices in a cross-partnership context, the Actions here identified wish to capitalise on specific contents of a basket of Good Practices and other thematic documentation prepared during the eBussed project. The following table interfaces the four Actions with the Good Practices of corresponding interest and value for the planning activity.

N.	Action	Coordinator	Relevant Good Practices (GP)
1	Monitoring Zero Emission bus-performance	Utrecht Province	▪ Germany | Hamburg (GP PP2 3) Implementation of data-driven processes ▪ + Documented thematic articles and reports on specific topics
2	Storage at e-Busdepot	Utrecht Province	▪ Hamburg (GP PP2 5) of "Pre-Heating" e-buses at busdepots ▪ Hungary: STRIA PPG-2 Smart Grid, Smart City ▪ Hamburg (GP PP2 3) of "Charging infrastructure" ▪ Netherlands | New bus depot "Westraven ▪ *+ documented thematic articles and reports on specific topics*
3	Midi e-bus TRIBUS	Utrecht Province	▪ Hungary: STRIA PPG 9-05 "The Green Bus Demonstration Pilot Project" ▪ Malta: Gozo PPG3-3 "logbook & monitoring pilot e-bus"

	▪ Germany |Marketing and communication activities related to the introduction of e-buses ▪ *+ documented thematic articles and reports on specific topics*

Justification for GPs being adopted/transferred

In the Netherlands, the Province of Utrecht is one of the PT-areas operating with e-busses. Some other regions have even bigger e-busfleets in operations. These experiences from the Netherlands are transferred to the eBussed-project. eBussed, in bringing together tested, innovative good practices as documented by the other European project partners, has provided a contribution to replicate and contextualise innovative practices in the Utrecht provincial area, focusing on specific areas such as:

- Barriers and opportunities for the adoption of electric buses
- Technological needs
- User interface
- Procurement and tenders
- Other areas not included above

Almost all of the BPs identified contain innovative aspects, ideas and approaches relevant to the lead theme of each Action here. The transferability and sustainable aspects of each BP have been analysed and the selected BPs have been found applicable/adaptable to the Utrecht context. They are also coherent with the regional policy concerning the improvement of sustainable transport in Utrecht. More details on the individual BMPs of interest and their added value are provided in the four Action Sheets.

6.1 Action 1: Monitoring Zero Emission bus-performance

MAIN FEATURES	Title	Monitoring Zero Emission bus-performance	
	Location	Province of Utrecht	
	Typology	Type 1: implementation of new projects	**Type 2: change in the management of the policy instrument (improved governance)**
		Type 3: change in the strategic focus of the policy instrument (structural change)	
	Good Practice references	The good practice of Hamburg (GP PP2 3) of "Implementation of data driven process" shows us, that information on operational and management level could increase the performance of e-busses (including the operational aspects and the performance of the charging infrastructure and energy-use).	

	Brief Desription	The current provincial policy aims at a completely emission-free (from tank-to-wheel) public transport in 2028. It is obvious that this requires detailed, more frequent insight in the CO2 and other emissions, and other performance measurements of zero emission busses. This operational and management information is needed to evaluate progress / quality, assess impacts and take additional actions if necessary. And how new practices contribute to the e-bus performance. Although such data are mostly available, the current management information reaches the province only once a year through the reporting systems of CROW, the Province on a more general level. So the aim of this action is to draft a monitoring plan to further disclose the existing management & monitoring (data)information on zero emission public transport. In relation to this monitoring plan, monitoring requirements will be drafted to be included in the procurement contracts for new concessions. This monitoring tool with new the information on e-buses (performance, lower energy consumption by Innovations and the impact on Climate/Urban Development) and general lessons on the electrification of public transport have led to a structural improvement of the can influence the Policy Instrument "Kansen for West III" by increasing the awareness of e-busdevelopment in this program and how other mobility-modes can learn from the e-busoperations/projects. . Through a series of consultations between those involved in the Interreg eBussed project and stakeholders in the "Kansen for West" managing authorities they have gained a more clear understanding of the challenges related to the electrification of public transport and the complications involved with the stimulation of innovation in the modal shift of the energy sector. The experiences and learnings of the project participants have proven useful in achieving a structural improvement of the 'Kansen voor West III' program in regards to the stimulation of sustainable energy solutions. Said improvement can for instance be seen in the *Regional Smart Specialisation Strategy for innovation* of West-Netherlands (RIS3), which underpins the 'Kansen voor West III' program. The RIS3 mentions the need for future-proof mobility systems in general and the opportunities for further electrification of public transport specifically. In line with the eBussed learnings special attention is paid in RIS3 to the necessity of providing adequate charging infrastructure so as not to hinder the trend towards electrification. The 'Kansen voor West III' program, which can be seen as an operationalisation of the aforementioned RIS3, also focusses on the need to stimulate sustainable energy solutions. Partially based on the experiences gained in the eBussed project the 'Kansen voor West III' program will open new calls for innovation in June 2022 and new specific calls related to the energy transition in the fall of 2022."
IMPLEMENTA-TION GROUP AND POLICY REFERENCES	**Action leader**	Province of Utrecht
	Other players	CROW (National Knowledge Organisation on Mobility), Public Transport companies Qbuzz (U-OV) and Syntus Utrecht (Keolis)

	Programs	X Operational Programme ERDF 2021-2027 Western Netherlands	
STRATEGY	**Action Scope**	The action aims to ensure effective implement the Monitoring tool by: 1. Drafting a new monitoring plan: E-Monitoring 2.0. 2. Implementing the monitoring tool in Utrecht, with information about the e-bus development and monthly performances of the years 2022-2023 3. Evaluation the tool in 2023 with all partners. 4. Inclusion of the tool in tender 2023 for the Public Transport Concession 2025-2035 in the Utrecht area, thereby influencing the management of the policy instrument (improved governance).	
ACTIVITIES	**Activity coordinating players**	**Activity description**	
	Province of Utrecht	To develop a monitoring plan containing the type of data, timing of delivery, responsibilities etcetera. Province of Utrecht role is to deliver a monthly dashboard with the Key Performance Indicators for the management. Evaluation of the tool in 2023 Including the Tool in the PT-Tender Deliver the information gained by the Monitoring tool about E-bus development in the Policy Instruments	
	CROW	The role of the Nation Knowledge Authority on Mobility is to: support the Monitoring tool with their knowledge in the making of and evaluation of this tool. Second role is to link the Utrecht monitoring tool with the annual monitoring reports for all public transport concessions in the Netherlands.	
	Qbuzz and Keolis	The role of the Public transport operators are to advise about the tool and the evaluation of it; and to carry out their part in the actual monitoring and deliver data.	
COSTS	**CAPITAL COSTS**	**Amount (euro)**	**Note**
	Development of Monitoring tool 2.0	About 20.000	**(in kind)**
	Recurrent Costs		
	Monitoring per year	About 10.000	**(in kind)**

FINANCING	Financing source	**Source**	**Capital Costs (€)**	**Recurrent Costs (€)**
		Provincial funding	20,000	5,000
		Qbuzz		2,000

		Regional funding		1,000
		CROW		2,000
		Total	**20,000**	10.000 (in kind)
	Actions to be taken to ensure adequate inflows to cover costs	Action taken in the latter period of 2022 and covered by internal resources from the provincial PT-budget and the PT-budget by external partners.		
OTHER RESOURCES	Non-financial	1. Internal staff of the Province of Utrecht 2. Internal staff of the PT-companies 3. CROW support		
IMPLEMENTATION PERIOD	Starting date	September 2022: Drafting a new Monitoring plan and building it. Implementation starts at the end of 2022 with monthly reports. In early 2023 the evaluation is planned and the start the link the information gained by the e-bus tool with other projects: the PT-tendering and Policy Instruments.		
	Completion date	End 2023		

INDICATOR	**N°**	**Self-defined Indicator**	**How monitored (mode, frequency...)**	**By whom**	**N°**
	1	E-bus information to Policy Instruments	Summer 2023	Project teams KvW West-Netherlands and in the new Mobility-programme 2024-2028	Province of Utrecht

ACTIVITY TIMETABLE	**PHASE 2 (August 2022 - July 2023)**					
	Aug-Sept 2022	Oct-Nov 2022	Dec 2022-Jan2023	Feb-Mar 2023	Apr-May 2023	Jun-Jul 2023

1. Drafting a new monitoring plan (Monitoring 2.0)	
2. Implemented the monitoring tool in the Utrecht (monthly),	
3. Evaluation the tool in 2023 with all partners.	
4. Inclusion of the tool in tender 2023 for the Public Transport Concession 2025-2035 in the Utrecht area.	

6.2 Action 2: Storage at e-Busdepot

MAIN FEATURES	Title	Energy storage at bus depots	
	Location	Bus depots in Province of Utrecht	
	Typology	**Type 1: implementation of new projects**	Type 2: change in the management of the policy instrument (improved governance)
		Type 3: change in the strategic focus of the policy instrument (structural change)	
	Good Practice references	STRIA PPG-2 Smart Grid, Smart City Hamburg (GP PP2 3) of "Charging infrastructure" Hamburg (GP PP2 5) of "Pre-Heating" e-buses at busdepots (thematic article) Utrecht (GP PP8-03 of new bus depot Westraven PU/HU: peak shaving	

	Brief description	The purpose of this action is to investigate whether it makes sense to use the battery pack of (old) electric buses as reserve capacity for electric buses. The underlying idea is that the price of electricity fluctuates and is directly related to energy consumption. Energy is a substantial cost item in the operation of electric buses. Transport companies should therefore charge as much as possible at the moments while electric power is relatively cheap. An overcapacity of electric power can then be temporarily stored in the batteries of buses that are not (or no longer) used for operations. So the aim is to charge only when electric power is relatively cheap and partly store it for moments while electric power is more expensive. With storage at e-Busdepot by a battery management systems it's also possible to reduce the capacity on the electric grid and use (storage) more - substainble- energy from natural regional sources (wind & sun). The action has a twofold function: 1. On the one hand, the battery pack of old electric buses is used as a battery (continuous reserve); 2. on the other hand, the capacity of regular buses is used as storage for other buses. For example, articulated buses can serve as storage during the period when only regular or mini-buses are used (temporary reserve). Initially, the action will be launched on a small scale, but if it proves successful, it can be expanded to more e-buses/e-busdepots in the Netherlands and other e-mobility (heavy vehicles). The link with the Policy Instrument "Kansen voor West III" is clear: in this programme until 2027 they are looking for new (upscaling) projects on Climate and Innovations to make the transition to substainable energy-use and grid-balancing. E-busdevolpment is not particlaire in the focus so far; a good action can stimulate the programme and e-busdevolpment in the region. Because existing buses are used and in our area e-busses and e-busdepots are avaible, the start-up time of the action can be relatively short. Prior to the action, a picture of the current energy consumption including costs will be drawn.

		As part of the start-up process, attention is also paid to: • Smart charging procedures • (fire) safety at the bus depot. During the action, the charging strategy and the charging process will be closely monitored, also using the most up-to-date data possible to determine whether there are actually any cost savings.
IMPLEMENTA-TION GROUP AND POLICY REFERENCES	**Action leader**	University of applied sciences Utrecht and province of Utrecht
	Other players	Qbuzz (Transport Company in the province of Utrecht)
		X Operational Programme ERDF 2021-2027 Western Netherlands
		□ Other (specify…)
STRATEGY	**Action Scope**	The action aims to ensure effective: ▪ To investigate the possible benefits of storing electric power at bus depots in order to charge buses when electricity is relatively cheap and to use electricity when electricity is relatively expensive. Part of this action is to integrate this charging strategy in the daily operation of public transport. ▪ The surplus of energy charged in the off-peak hours will be stored in battery packs and used in the expensive hours, so no charging should take place on peak hours
ACTIVITIES	**Activity coordinating players**	**Activity description**
	Province of Utrecht together with University of applied sciences	1. Detailed elaboration of the action plan as currently presented in outline form first contact with public transport company 2. 2. Define location of bus depot where this action should take place

	Province of Utrecht together with University of applied science and Qbuzz (public transport company)	3. Establish a protocol on the basis of which the action ultimately will assessed. Elements of this protocol are (at least) • Requirements of the test facility • Effectiveness • Actual savings • Safety at the bus depot (safety measurements related to fire risk) • Practical workability in daily operartion related to actual savings • Influence of wheather conditions (winter and summer) on energy consumption according to the action 4. Installation of a battery-package on a e-busdepot 5. Monitoring and –if necessary- readjustment of the procedures

COSTS	**1. CAPITAL COSTS**		**Amount (€)**	**Note**
	Battery pack (old e-bus)		About 100.000	
	Safety measures		About 20.000	
	Other costs related to the location (charging infrastructure)		**About 20.000**	
	Regularly charging and safety management and procedures			
	Other costs related to charging		-	
	Data analysis		**About 10.000**	
FINANCING	Financing source	**Source**	**Capital Costs (€)**	
		Province Utrecht	40.000	Source: energy transition fund /in kind
		Qbuzz	110.000	Source: smart solar charging fund / in kind
	Actions to be taken to ensure adequate inflows to cover costs	The province of Utrecht and the University of applied science will write a user protocol for the public transport company and monitoring of the action will take place at least once a month. First to monitor will be if the action will be representative, but also to check if the transport company seriously co-operates in this action in the daily operation of public transport. The transport company should sign the protocol in order to assure that the action will take place as defined.		
OTHER RESOURCES	Non-financial	Qbuzz, the transportation company should also make efforts during the course of the action to ensure that the action is actually feasible. It is stated that this efforts are part of the daily operations and therefore no additional costs are charged.		
	Starting date	August 2022		

IMPLEMENTATION PERIOD	Completion date	July 2023

INDICATOR	**N°**	**Self-defined Indicator**	**How monitored (mode, frequency...)**	**By whom**
	1	Energy Use Cost reduction	monthly	Qbuzz

ACTIVITY TIMETABLE	**August 2022 – July 2023**		
	Aug 2022	Aug-Sept 2022	Oct 2022 – July 2023
Detailed elaboration of the action in collaboration with Qbuzz and regarding the GP's			
Define location of bus depot where this action should take place			
Inventory of current power consumption in brief historical perspective			
Define all relevant items according to this action, including (fire) safety, daily operation, etc.			
Pilot with energy storage at the bus depot			
Installation of a battery-package on a e-busdepot			
Monitoring of usage based on actual data and protocol			

6.3 Action 3 Midi e-bus TRIBUS

NOTE: on 13th June we received a message from the Tribus-company to stop with the Movitas project. At this moment it's unclear if this action can be conducted as planned or has te be cancelled. In that case we will look if an alternative scenario is possible within the framework of this eBussed Action Plan.

MAIN FEATURES	Title	Electric mini – Bus (light weight)	
	Location	City of Utrecht and/or Amersfoort (NL)	
	Typology	Type 1: implementation of new projects	**Type 2: change in the management of the policy instrument (improved governance)**
		Type 3: change in the strategic focus of the policy instrument (structural change)	
	Good Practice references	STRIA PPG 9-05 "The Green Bus Demonstration Pilot Project" Gozo PPG3-3 "logbook & monitoring pilot e-bus"	
	Brief description	This Action is about using a small electric bus for daily operation in an old historic city center (Utrecht, the capital of the province of Utrecht). The development of small, lightweight, innovative buses for public transport lags behind that of regular buses. There are technical challenges while combining electric driving with comfort and space. This new bus (Tribus Movitas) gives a good opportunity in promotion Zero Emission PT for a broad public: passengers as well as residents as well as tourists in our region. With this action, we therefore want operate PT line with a small light weight electric bus. Experiences of this action leads to improved governance by: (1) strengthening research, technological development and innovation; (2) supporting the transition to a low-carbon economy in all sectors; (3) stimulating social inclusion.	
	Action leader	Province of Utrecht / University of applied Sciences	

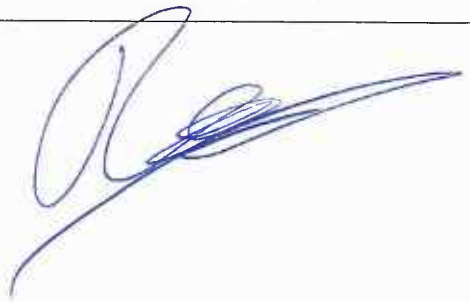
IMPLEMENTATION GROUP AND POLICY REFERENCES	**Other players**	Tribus (bus manufacturer) Qbuzz (Transport Company in the city of Utrecht) Keolis (Transport Company in the city of Amersfoort) Municipality of Utrecht ROCOV (Passenger representation group)
	Programs	X Operational Programme ERDF 2021-2027 Western Netherlands
		□ Other (specify…)
STRATEGY	**Action Scope**	The action aims to ensure effective: • Detailed protocol to perform the action as aimed • Mid-term monitoring of the action, related to daily operation of the mini bus. The transport company will declare to operate the mini bus as much as possible for daily operation; • Mid-term monitoring of the action, related to the items to be investigated
ACTIVITIES	**Activity coordinating players**	**Activity description**
	Province of Utrecht and University of applied Sciences	1) Implementation of the action in coördination between University and Province with Municipality of Utrecht, Tribus and Qbuzz 2) Monitoring of the action according to success factors yet to define and interim meetings with all stake holders according to the progress and interim results 3) Meeting with ROCOV according the results of the action
	Qbuzz	Daily operation of electric bus in Utrecht according to the protocol

COSTS	**2. CAPITAL COSTS**		**Amount (€)**	**Note**
	Total costs		About 40.000	
	Total		**40.000**	
FINANCING	Financing source	**Fonte**	**Capital Costs (€)**	
		Qbuzz	5.000	In kind

		Keolis	5.000	In kind
		TRIBUS	10.000	In kind
		HU/PU	10.000	In kind
		PU	10.000	Own budget
	Actions to be taken to ensure adequate inflows to cover costs	First preparing actions to be taken in the latter period of 2022. To ensure adequate inflows to cover costs we will monitor the complete operation of the action and we will weekly check the monitoring of the action and operation of the mini bus.		
OTHER RESOURCES	Non-financial	Internal staff of the Province of Utrecht Internal staff of the University of Applied Science Utrecht Municipality of Utrecht, Qbuzz and Tribus Available media: portals, social channels		
IMPLEMENTATION PERIOD	Starting date	January 2023 (preparation of the action will take place in November/december 2022)		
	Completion date	July 2023		

INDICATOR	**N°**	**Self-defined Indicator**	**How monitored (mode, frequency. ..)**	**By whom**	**N°**
	1	Operational excellence	weekly	Province, University and Transport Company	
	2	Customer satisfaction	weekly	Province, University and Transport Company	

ACTIVITY TIMETABLE	(January 2023 - July 2023)					
	Jan-May 2023	May-Jul 2023				
Preparation of the action						
Execution of the action						

Date:	21-06-2022
Organisation:	Province of Utrecht (Mobility-Team Public Transport & Hubs)
Name:	Rob van Hout (Manager Public Transport & Hubs)
Signature:	
Stamp of the organisation:	provincie Utrecht