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## **Webinar on Clean Buses for Tyrol 06.07.2021- Availability and ownership of vehicles and infrastructure**

Summary of relevant experience and concepts among public transport authorities and transport operators in AT, DE and DK

1. **RMV** (Verkehrsverbund Rhein-Main, Transport Association Rhein-Main) is responsible for ordering regional bus transport. So far, procurement of bus PSO (public service obligation) contracts was based on services performed with conventional diesel buses. The duration of the relevant PSO contracts was compatible with the economic life of the vehicles. In the future, due to the provisions of the CVD (implemented in the Clean Vehicles Procurement Act - SaubFahrzeugBeschG), an increasing proportion of e-buses will be required, also for the operation of regional bus transport. The duration of the transport contracts remains unchanged. Nevertheless, it is assumed that the useful life of e-buses is longer than that of diesel buses. The useful life of the required charging infrastructure will exceed the contract duration by far longer. This time incompatibility means that (ceteris paribus) transport companies who are responsible for their own procurement would have to claim higher specific costs (acquisition plus risk of re-use). For this reason, consideration is being given to the establishing a bus pool owned by the RMV, at least in the transitional phase until a market based on e-buses is operational. The existing vehicle management subsidiary of the RMV "Fahma" may take this task on. Fahma was established for rail rolling stock purposes to ensure fair competition between smaller and larger companies (including the recently ordered 27 fuel cell EMUs trains). So far, Fahma has only owned few buses, all of which have been procured or ordered for pilot purposes - for fully automatic shuttle operation or for fuel cell bus tests. To evaluate different technical and procurement options, the RMV commissioned a feasibility study, which is intended to serve three purposes:
  - a) Examination of the purely technical suitability of various alternative drive concepts on over 90 regional bus routes as well as X-Bus concepts in the responsibility of the RMV, taking into account the competitive awards, the line data, the timetable data and the (fictitious) vehicle schedules,
  - b) the examination of the economic and ecological effects taking into account the operational, economic and ecological parameters as well as a cost comparison,
  - c) the review of the organizational effort for various concepts and the outline of possible organizational concepts / business models. Upon completion RMV will make available a public version of the feasibility study.

2. **MVV** (Münchner Verkehrs- und Tarifverbund, Transport and Tariff Association Munich): Is responsible for the coordination of public transport in the Munich area, consisting of the city of Munich and the eight surrounding counties. Demographic and especially local transport development is dynamic in all parts of the metropolitan area. Population growth in the last 20 years included 500,000 people more to now 3 million inhabitants, about half each due to increases in the core city and in the surrounding area. During the same period, there was a strong increase in order volume and mileage in regional bus transport commissioned by MVV: from 21.1 M bus km in 2001 to a planned 50.5 M bus km in 2021. Order volume rose nominally from 46.8 M in this period € to a planned 151 M €. Currently around 290 regional bus routes are operated with 810 buses and around 3350 stops served. Strongly dominant share of mid-sized private companies are handling the relevant transport tasks.

One bus line has so far been converted to E-bus operation. The pilot project started with a preliminary announcement at the end of 2016. With the support of a public project manager, the transport service was put out to tender in December 2017, with a response period of two months. After two months of examination, the contract was awarded to the best bidder (change of previous transport operator). One month later, the winning company was responsible for tendering the parallel buses and charging infrastructure (depot loader). At the same time, the municipality concerned tendered the charging infrastructure along the route. The basic technical requirements were worked out by the MVV project manager and the procurement process was closely monitored by him. Delivery and assembly took another 10 months, immediately after which a three-month trial operation began. Regular operation since the end of 2019.

The operation is carried out by a medium-sized bus company with 3 standard e-buses. The company (Ettenhuber) operates various lines in Munich county (i.e. one of the eight counties surrounding the city of Munich) with around 150 (so far) diesel buses from various manufacturers. The company organizes the bus operation from three depots, which cover the entire district with almost no overlap in a maximum driving distance of 20 minutes. Additional investment costs for all three e-buses compared to diesel were approx. 1 M (i.e. approx. € 550,000 per bus, i.e. € 330,000 more than a comparable diesel bus). A full service contract (including batteries) for € 100,000 per year has also been concluded with the manufacturer. Three 150 kW charging stations were set up in one depot. Total investment costs for this charging equipment with a capacity of 300 kW amounted to almost € 350,000 (including connection costs for energy suppliers).

The conversion to E-bus operation is concretely planned for seven more lines. Furthermore, basic studies (similar to the Tyrol decarbonisation concept) have started to investigate the conversion possibilities for us transport on 160 lines that require new PSO contracts until 2028. 10 fuel cell buses are also being introduced for test operation (as part of a research project).

Conclusion - under the premise of maintaining the existing supplier market: The responsible authorities have to face additional tasks in ramping up the decarbonisation of bus services, which impact operational planning, require additional (external) knowledge and additional time for planning and procurement and lead to higher costs for the procurement of public bus services. It is important to

adjust the current public subsidy and funding framework. Based on the experience gained so far, procurement tasks for vehicles and charging infrastructure should remain with the transport company, even though this way "integrated solutions" as for municipal in-house transport companies are not possible.

Those conditions and conclusions may change once more straightforward technical solutions may be available in the future and once all players will become more familiar with the new technology; this depends on future market developments.

- MOVIA** (Sealand Region Public Transport Agency): The transport association of the Danish island of Sealand, which together with the capital Copenhagen has approx. 2.7 M inhabitants, is responsible for the organization of the local public transport in 2 regions and 45 municipalities. Currently, 1375 buses are used for public transport, 114 of them are electric buses. Until the end of 2021, the proportion of e-buses is expected to increase to 12% and by the end of 2022 to 24% of the total fleet. The goal is to ensure fossil-free bus operation by 2030, minimum 50% of which is emission-free.

Bus services are ordered on the basis of gross cost contracts. Mainly large (international) private operators serve the market. They are expected to have greater procurement and operational competence for vehicles and charging infrastructure. The tender concept was adapted to the new requirements on the basis of recommendations from an EIB advisory body (ELENA). Modifications include emission related elements (0 g PM/km, 0 g NOx/km and 0 g CO<sub>2</sub>/km) to the functional specifications, the extension of initial contract periods (from 6 to 10 years), financial incentives/disincentives when adding/reducing in-service buses etc. MOVIA allows a certain extent of diesel bus operation in the first year of the contract, ensures, if possible, the availability of municipal land close to the line for the construction of depots, and provides on request charging infrastructure along the line for opportunity chargers.

The additional costs of ordering e-bus operation are borne by the municipal authorities. It is expected that the cost difference between the procurement and the operation of electric buses versus diesel buses will decrease significantly (almost equal already in the total cost of ownership, TCO, gradual reduction of the initial investment costs).

- Lippe County** (DE, NRW): Is the competent authority for regional transport in the Lippe County. On behalf of the county public the municipal transport company (Kommunale Verkehrsgesellschaft, KVG) Lippe organizes transport in the entire county (350,000 inhabitants), with the exception of local transport in the cities of Bad Salzuflen, Detmold and Lemgo. 12 M bus kilometers are provided with 280 buses (during peak hour). Bus transport is organized and tendered within five line bundles, three of them currently are operated based on public service contracts (i.e. requiring public subsidies), two based on commercial authorizations (i.e. no specific subsidy).

The aim is to award transport services competitively among local small and medium-sized as well as other transport companies. In that, it is necessary to build a sustainable infrastructure for zero-emission traffic, to develop know-how in the region and to make optimal use of available funding for zero-emission bus traffic. The challenges in this process are the technology that is not yet sufficiently marketable, the high investment costs (financing/funding of which has to be "Maastricht" compatible), the relatively long procurement periods for vehicles and

infrastructure and the discrepancy between the duration of the public service contracts and the lifetimes of electric vehicles and the required (charging) infrastructure.

In order to enable small and medium-sized transport companies to take part in the competition under these new conditions, the establishment of a company for decarbonised mobility owned by the county of Lippe is being considered. This may take the form of an "infrastructure unit" of KVG Lippe. This unit should become the owner of both, vehicles and charging infrastructure. It should leave their operation and maintenance to the manufacturers or transport companies. The exact assignment of tasks is the subject to an ongoing study. The infrastructure unit is intended to reduce costs and contribute to the transition to future zero-emission bus traffic, which is neutral under state aid law. Concrete steps and decisions are expected by the end of this year or in the course of 2022.

5. **KCW** (Consultancy specialized in the organization of Public Transport): From the perspective of numerous projects and strategies for the decarbonisation of bus traffic, draw the following conclusions:

The switch to clean or zero-emission drives is complex and should not be confused with simple replacement of vehicles (from diesel to clean drives). Depending on the line characteristics, different vehicles and charging technologies are suitable. It is likely that different propulsion technologies will be implemented and corresponding infrastructures will have to be set up. The decisions to be made are costly, have a long-term effect on transport offers and the design options of cities, countries, and transport companies.

The strategy for decarbonisation should therefore be developed on the basis of the transport policy objectives. The conversion processes are based on this. At the same time, there is pressure to act due to the legal framework (climate protection; in local and regional public transport, especially the requirements of the Clean Vehicles Directive). Therefore, the question arises as to what market share of local public transport - as a result of the "mobility transition" - new infrastructures for vehicles with clean drives have to be dimensioned for.

It makes sense to develop the conversion strategy on the basis of economic and technological synergies at least on a regional scale. It must be clarified which technology (s) are suitable and economical in each case, when and in which sequence a changeover can optimally take place against the background of existing contracts, existing vehicle fleets and political priorities. Land (reserves) and "green" energy from renewable sources must be available.

The budgets for the initial investments and possibly permanent additional costs must be secured, funding opportunities must be used. A clever financing concept is required, especially for the high investments at the beginning of the changeover. With the investments to be made, the market structure also changes. A decision has to be made as to who builds infrastructure, procures vehicles, if necessary in a non-competitive manner, who bears cost and maintenance risks, how lead times are minimized and which organizational structures are available for this on the part of the public transport customers. They have to adapt their public transport procurement procedures to the new requirements.

Ultimately, broad approval from politics and the population is required for planning security over the long implementation period, also in order to avoid obstacles and

economically counterproductive stop-start processes (e.g. fundamental decisions, qualified citizen participation). The latter is highly relevant precisely because of the construction of infrastructure in the public space.

Finally: The practical implementation at the company level should not be underestimated: Staff training and further education; Vehicle procurement, testing and flooding; Adaptation / construction and commissioning of the infrastructure. Most companies will continue to operate diesel and electrically powered vehicles in parallel for a longer period and will keep systems, processes and spare parts in stock for this purpose.

The substantial changes of the business model and organization due to the decarbonisation of bus transport can best be managed with a planned approach.

6. **JASPERS** (EIB/JASPERS): Highlights the range of procurement and organizational options in the transition towards low and zero emission bus public transport service. Bus procurement and ownership options:
- a. Each PT operator in charge of the service makes its own (traditional) tender for the purchase of vehicles and owns them  
Pros: straightforward organization, definition of tech specs, contractual management  
Cons: higher technological risk & financial risk/burden, possible issues of State-Aid if public funding is sought
  - b. Same as above but tender and ownership with each municipality:  
Pros: straightforward organization, definition of tech specs, absence of State-Aid issues (practically)  
Cons: higher technological risk & financial risk/burden, additional layer of contract management (with bus manufacturer and for provision of buses to operators)  
Neutral: must be considered in the PSC (absence of overcompensation and risks)
  - c. Consortium of operators makes the (traditional) tender for the purchase of vehicles and owns them  
Pros: decreases financial risk/burden & to a lower extent technological risk (higher numbers of the procurement)  
Cons: still a certain level of technological risk, more difficult to establish tech specs, ownership structure to be defined (of the consortium or for each lot?) – added contractual issues, possible issues of State-Aid if public funding is sought
  - d. Consortium of municipalities/region/transport authority makes the (traditional) tender for the purchase of vehicles and owns them  
Pros: decreases financial risk/burden & to a lower extent technological risk (higher numbers of the procurement); (practically) no issues of State-Aid  
Cons: still a certain level of technological risk, more difficult to establish tech specs, additional layer of contract management (with bus manufacturer and for provision of buses to operators)  
Neutral: must be considered in the PSC (absence of overcompensation and risks)
  - e. No traditional procurement/tender for the purchase of buses but procurement of an availability payment PPP scheme  
Pros: decreases dramatically the technological risk and therefore also the financial and availability risk  
Cons: tender much more complicated to organize and to define all necessary



documentation, ownership and contractual structure to be decided, how to handle this within PSC; risk of no manufacturers presenting bids as they still see too much risk; need of adequate capacity within the tendering subjects (operators and/or public side)

Neutral: must be considered in the PSC (absence of overcompensation and risks/management of issues related to unavailability underperformance etc.); ownership structure to be decided – can stay with a fully private SPV (that therefore provides vehicles to operators or to the transport authority/the region VS a leasing fee); can be a PPP structure; in both cases there might be the opportunity for a blending structure where available/potential EC funds (ESIF/CEF/...) are used to decrease the availability fees

All options to be analyzed and verified VS technical/economic/financial viability and legal/eligibility compliance and rules (also of the different potential sources of financing/funding) plus impact on PT service competition

- f. Charging infrastructure – in the same tender as buses or in separate tenders?  
(Same ownership structure or different – more with the public side/infra manager?)