



## Trolleybuses for agglomerations - the Hallwang-Esch example

### Trolleybuses in Salzburg

In approximately 60 cities of the European Union, trolleybuses form an integral part of public transport. In Salzburg, the trolleybus network (that consists of 10 lines) and 3 tram lines provide the backbone of public transport. Salzburg's transportation service is complemented by several gas and diesel bus lines. Currently, the trolleybus network of the Salzburg AG has a length of approx. 100 kilometres (61.24 miles).

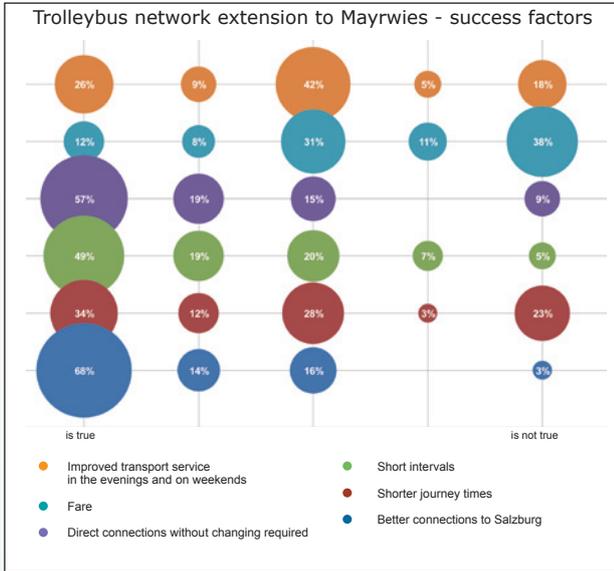
### Network extension into surrounding area

The Salzburg AG/Salzburg Local Railways is a lead partner of the EU project „Trolley“. This project is concerned with questions of energy consumption optimization, efficiency enhancement in public transport and improvement of the trolley bus image.

To meet the focus on „efficiency enhancement“, the Salzburg AG and the Hallwang municipality authorized the investigation of a trolleybus network extension into the surrounding area. As since trolleybus line 4 was successfully extended to Hallwang Mayrwies in 2007, the question was raised whether further extensions of the network into the agglomeration would make sense.

Starting point of the investigation was a general comparison between the diesel bus and trolleybus systems. Based on these findings, concrete use cases were applied to shed light on the effects of network extensions, including extension of the trolleybus network within the municipality Hallwang from Mayrwies to Esch. Then the impact on the environment, passenger volumes and economic viability could be investigated. The results of a passenger and citizen survey conducted in Hallwang could be used to gain information on acceptance of the trolleybus service and its network extension.

# Promoting *electric* public transport



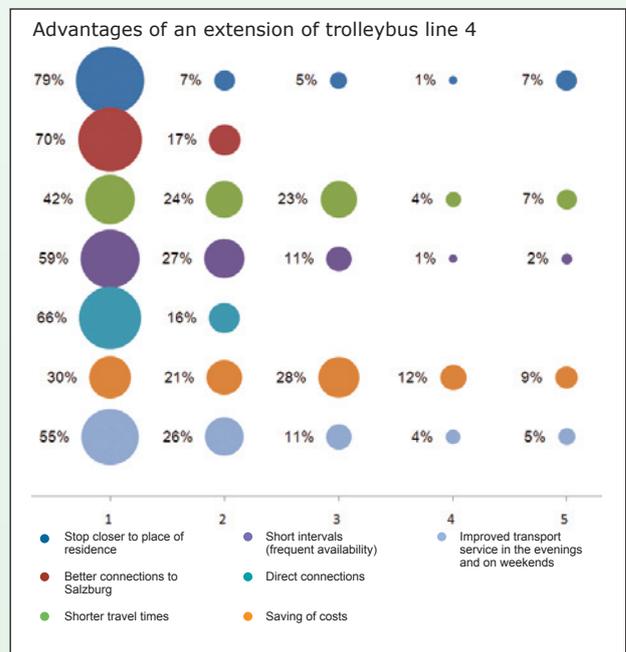
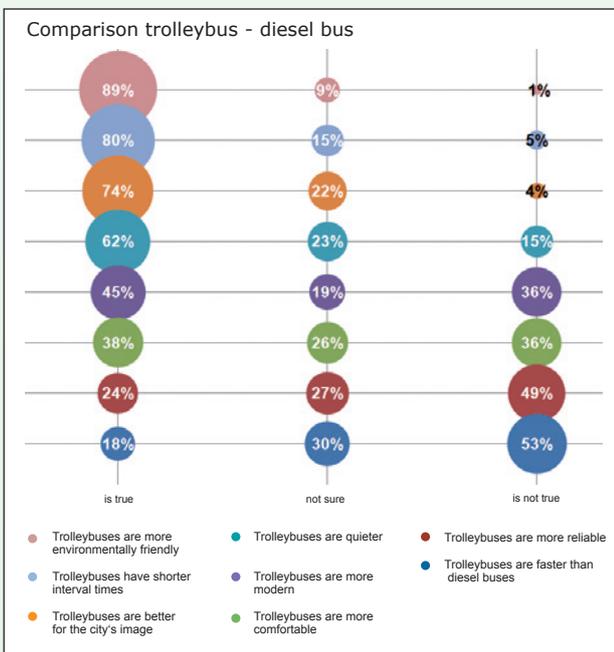
## Trolleybus passenger survey

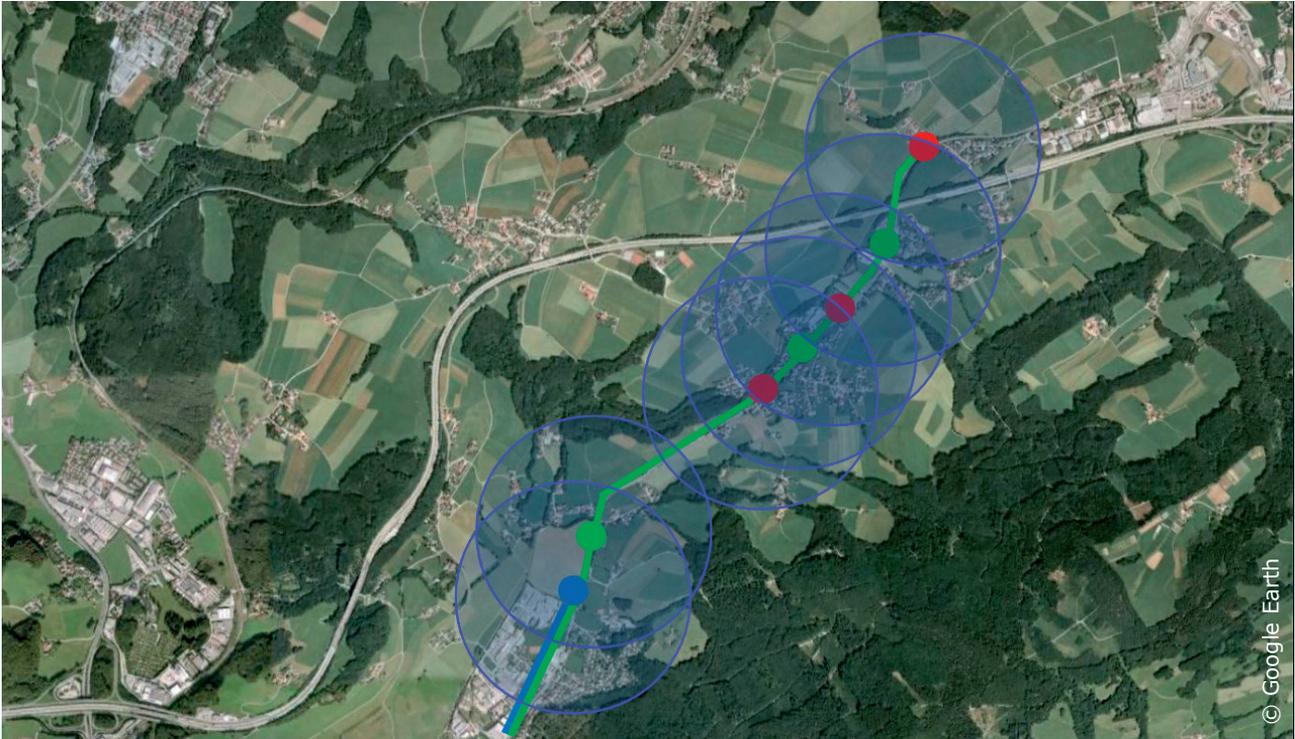
The extension of trolleybus line 4 to Hallwang Mayrwies has led to a considerable increase in passenger volume in the last few years. A passenger survey on the new line section of trolleybus line 4 was conducted to interview passengers about the success factors. Passengers especially found the better to connection to Salzburg, the direct connections and the short intervals very positive. Compared to diesel buses, trolleybuses are considered more environmentally friendly. They are also expected to run more often, are thought to be more modern and quiet. In addition, passengers believe that trolleybuses contribute to a more positive image of Salzburg.

The passengers were further asked about their opinion on further improvement measures for public transport. The majority are in favour of an extension of the trolleybus network, but in general consider the bus network sufficient to meet their needs. The passengers surveyed clearly disapprove of a conversion of the trolleybus lines into diesel bus lines.

## Citizen survey in Hallwang-Esch

82% of the citizens interviewed were in favour of an extension of trolleybus line 4 to Hallwang-Esch and said they would use it. 13% of the interviewees were not sure about using line 4. They could be further potential passengers in addition to the 82%.





Stop catchment areas (500m) at trolleybus line extension to Hallwang-Esch

The surveys show that especially a stop closer to the place of residence, the better connection to Salzburg and direct connections are evaluated as very positive. Improved transport service in the evenings and on weekends, plus shorter intervals are also connected with the line extension. Shorter travel times and saving costs are considered lesser advantages.

## Comparison between diesel bus and trolleybus

First the operating costs of diesel buses and trolley buses were compared. The cost information on trolleybuses was based on current cost rates.

A comparison between the two shows that the running costs (energy, vehicle maintenance and depreciation) for trolleybus operation are lower for average mileages than for comparable diesel bus operation. This is mainly due to the considerably lower energy costs. The maintenance costs for diesel buses and trolleybus, however, are similar. Only the vehicle depreciation costs are slightly higher for trolleybuses. The higher purchase price of trolleybuses can, however, be mostly offset by their longer average life time.

On the other hand, trolleybus operation does require investments in power supply.

For a system comparison between diesel bus and trolleybus, the impact on the environment is also relevant. Trolleybus operation has the advantage that it is locally emission-free. As the Salzburg AG operates their trolleybuses with water-generated power, no emissions are produced for power generation either.

## Extension of trolleybus line to Hallwang-Esch

With the extension of trolleybus line 4 in Hallwang from Mayrwies to Esch the residential and industrial areas between Mayrwies Brunnenweg and Esch are connected to the existing Salzburg trolleybus network.

For the extension of trolleybus line 4, the route must be extended by another 3 kilometres (1.7 miles). This means the infrastructure, including overhead wires, overhead line masts, switch connections and electric rectifier station need to be installed. Infrastructure investments amount to approx. € 2.8 m.

On the new line section between Mayrwies and Esch, trolleybuses are scheduled to run every 20 minutes.

## Advantages for passengers

An extension of trolleybus line 4 to Hallwang-Esch provides several advantages for passengers.

- ▶ With an extension of the trolleybus line, the transport services offered between Hallwang-Esch and Salzburg are enhanced.
- ▶ Three new stops are set up to improve access to the trolleybus.
- ▶ This also creates attractive inner-city PuT services for Hallwang's districts along the route.
- ▶ New direct connections between Hallwang-Esch and Salzburg are provided. This is true for destinations served by trolleybus line 4 that currently require changes to reach them. An example is the direct connection to the Salzburg historic centre, as trolleybus line 4 serves the central Hanuschplatz.

All in all, an additional 77,000 passengers are expected to use public transport between Hallwang-Esch and Salzburg. These are mainly current car drivers whose switchover to public transport will also have a positive effect on the environment.

## Economic viability

An extension of trolleybus line 4 to Hallwang-Esch requires additional investments in the infrastructure (approx. € 2.8 m.) and the purchase of an additional trolleybus (€ 670,000).

Moreover, additional costs incur for operation of the extension of the trolleybus line. The running costs are based on personnel requirements, power consumption, maintenance of the additional vehicle and the power generation facilities. The total additional costs per year amount to approx. € 360,000.

These costs are partly offset by the additional revenue. As with an extension of trolleybus line 4 to Hallwang-Esch, current car drivers will be won as passengers. This means an additional potential revenue of approx. € 70,000 per year.

In addition, intermodal shifts within the public transport system are expected. Previous passenger volumes on this axis and the impact of the trolleybus line extension on future PuT services are not known. However, it is estimated that the trolleybus revenue will increase by another € 80,000 to € 120,000 per year. There is further the possibility of using existing regional lines as express routes (also via new routes, e.g. the highway). This would make the PuT system even more attractive to passengers.

## Conclusion

The extension of the trolleybus line broadens the PuT services offered. It thus makes PuT services more appealing and helps win new customers. It also reduces car volumes and their negative effect on the environment. Broadening the service offer involves additional costs.

These can partly be offset by the additional revenue generated. The survey showed that the citizens of Hallwang-Esch evaluated the extension of trolleybus line 4 as mostly positive.

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