

# Trolley

Promoting **clean** public transport



## TROLLEY – What was achieved and what is the way forward after TROLLEY?

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TROLLEY Final Conference



This project is implemented through the CENTRAL EUROPE Programme co-financed by the ERDF



Szeged, January 2013



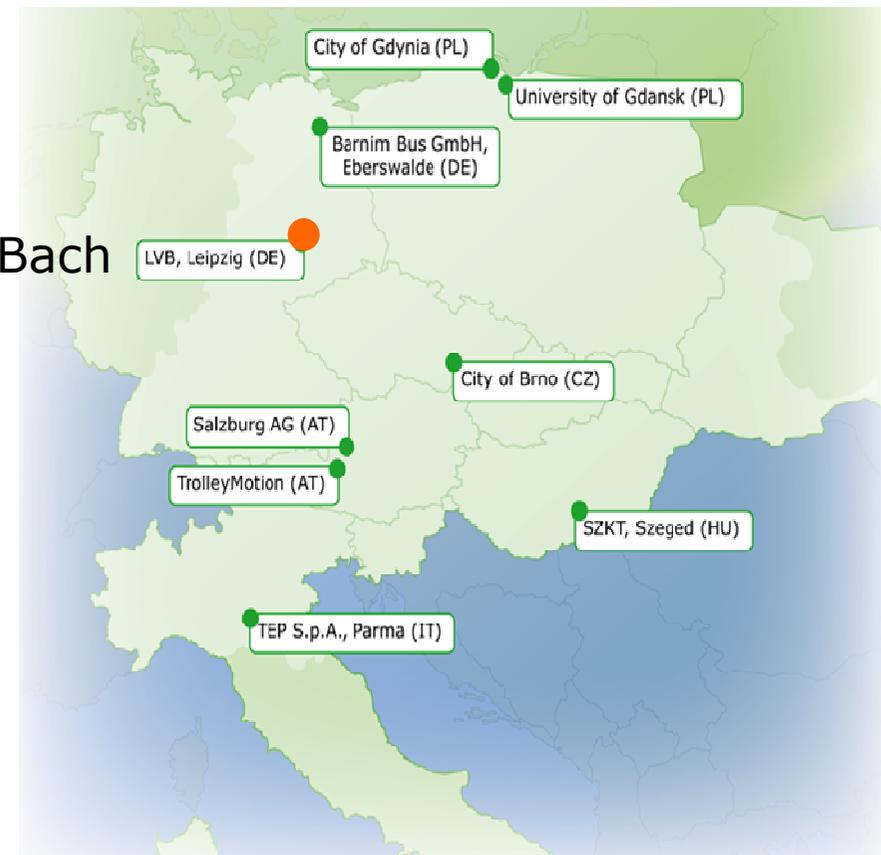
# Starting point

Leipzig is located in the east of Germany, in the north- western part of Saxony. It is the most populous city in Saxony with around 500,000 inhabitants. The city covers an area of 297.6 km<sup>2</sup>.

The city of Leipzig is a fair city with a long tradition. It is famous for:

- The hometown of Johann Sebastian Bach
- Goethe and Auerbachs Keller
- The Gewandhaus Orchestra & the Leipzig Gewandhaus
- Leipzig Main Station

On behalf of city of Leipzig, the Leipziger Verkehrsbetriebe (LVB) GmbH is responsible for the long term with the provision of regular services in public transport until at least 2028.



# Starting point

**1703**

First use of litter carriers

**1872**

Opening of the horse-drawn tram

**1896**

Implementation of Electric trams through GLSt. and LESt

**1919**

Municipalization of GLSt and LESt after fusion in 1916

**1925**

Re-launch of omnibus operation

**1938**

Implementation of trolleybus operation and renaming the company as LVB

**1951**

First newly-made tram vehicles since 1931

**1969**

First application of Tatra-Trams

**1975**

Cessation of trolleybus operation

**1992**

First use of low-floor busses

**1993**

Foundation of Leipziger Verkehrsbetriebe as limited company

**1995**

First implementation of low-floor trams

**1996**

Opening of tram line to „Neue Messe“

**1998**

Begin of restructuring the LVB

**2001**

Implementation of the new network

**2004**

First operation of „LEOLINER“ - prototypes

**2006**

Completion of modernisation infrastructure before the Football World Cup

**2007**

111 years Electric tram operation in Leipzig

**2012**

30 „Classic XXL“ ; 50 „LEOLINER“ and 19 hybrid buses in operation

# Starting point

## The Trolleybus in Leipzig: 1938- 1975



# Starting point



## Current LVB network- tram and bus

### Number of passengers (2011):

134,4 Mio

### Number of lines

Tram lines: 13

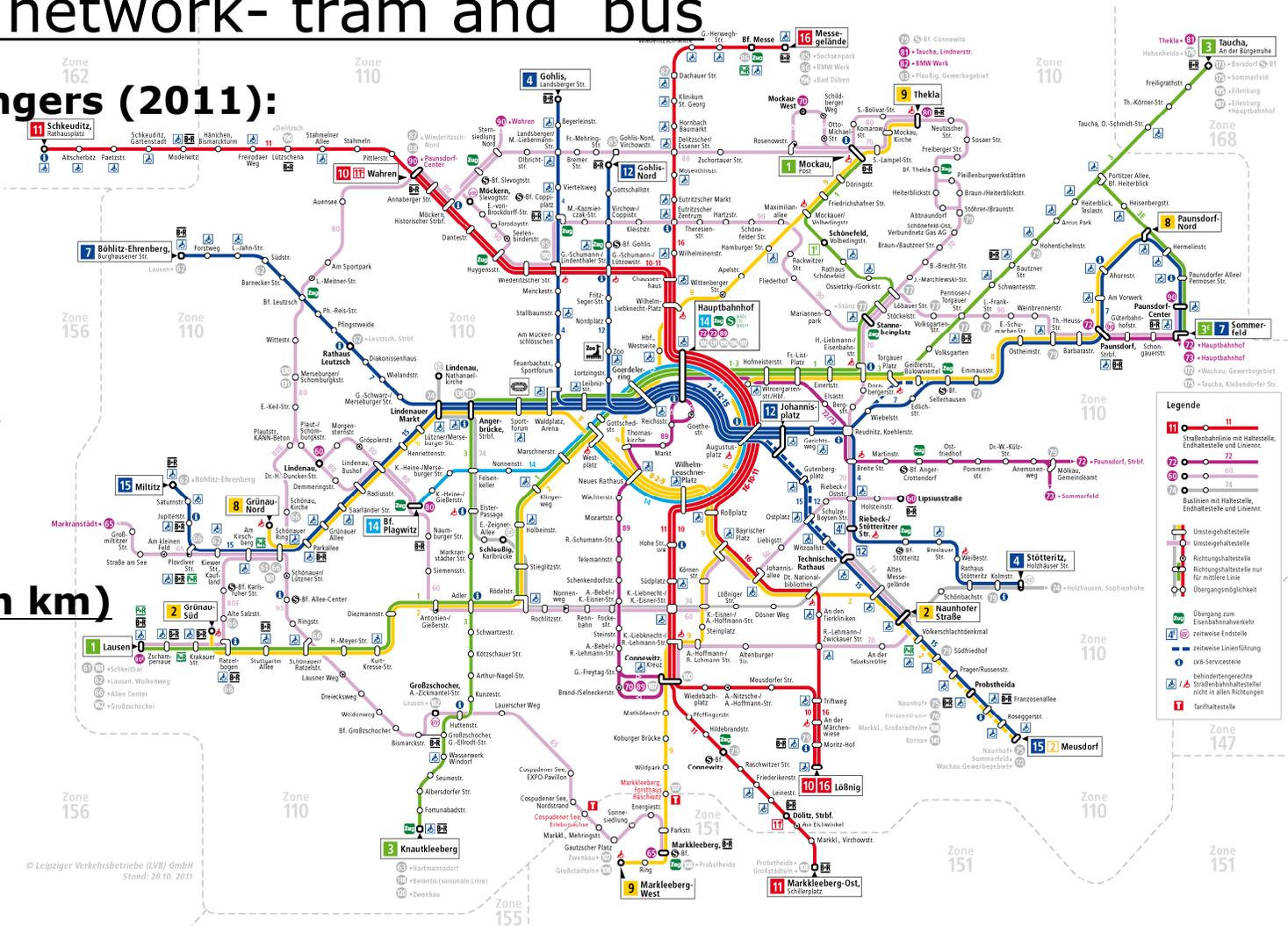
Omnibus lines: 61 <sup>1</sup>

### Length of lines (in km)

Tram 319,0

Omnibus 1050,5 <sup>1</sup>

<sup>1</sup> with the lines of Leobus



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## ► Fleet of vehicles

### Tram

| Type         | 2012       |
|--------------|------------|
| T4DM/B4D-NF  | 139/4      |
| NB4          | 38         |
| NGT8         | 56         |
| LeoLiner     | 50         |
| Classic XXL  | 33         |
| <b>Total</b> | <b>320</b> |

### Buses

| Type                  | 2012       |
|-----------------------|------------|
| Articulated bus (18m) | 43         |
| Standard bus (12m)    | 62         |
| Midibus + Sprinter    | 8          |
| Hybrid bus (18m)      | 14         |
| Hybrid bus (12m)      | 5          |
| <b>Total</b>          | <b>132</b> |

# Starting point

## Feasibility study on establishing a electric city bus system in Leipzig

Why was it done?

- ▶ LVB was faced with the task, to renew the bus fleet (18m articulated buses) over the next years
- ▶ Global requirements: urgent need to reduce the greenhouse gas emissions of the public transport

We had to face the question:

- ▶ What is the best environmentally friendly and appropriate technology?
- ▶ **Focus on electromobility**

The study on bus line 60 was done in 2009.

## Feasibility study on establishing a electric city bus system in Leipzig

### Summary:

- ▶ the trolleybus was at the time of the study the onliest immediately available technology of a zero-emission vehicle
  - ▶ very good operating and infrastructure conditions
  - ▶ high synergy effects with the tram network
- } **positiv**
- ▶ the operation of a trolleybus system requires a completely existing infrastructure - investments needed (ca. 900.000 €/km)
  - ▶ question of affordability - trolleybuses are more expensive than dieselbuses
- } **negativ**

# Pilot Action I

## Sustainable mobility in Leipzig

*The serial hybrid buses- our first step to a modern electric bus service*

- ▶ Funding for hybrid buses were available
- ▶ 2011: Commissioning of 13 articulated hybrid buses (EvoBus, HESS / VK) by LVB GmbH under the projects "SaxHybrid" and "RegioHybrid"
- ▶ 2011: Commissioning of 5 standard hybrid buses (MAN) by LeoBus GmbH as part of the project "RegioHybrid"

# Pilot Action I

## Our hybrid buses



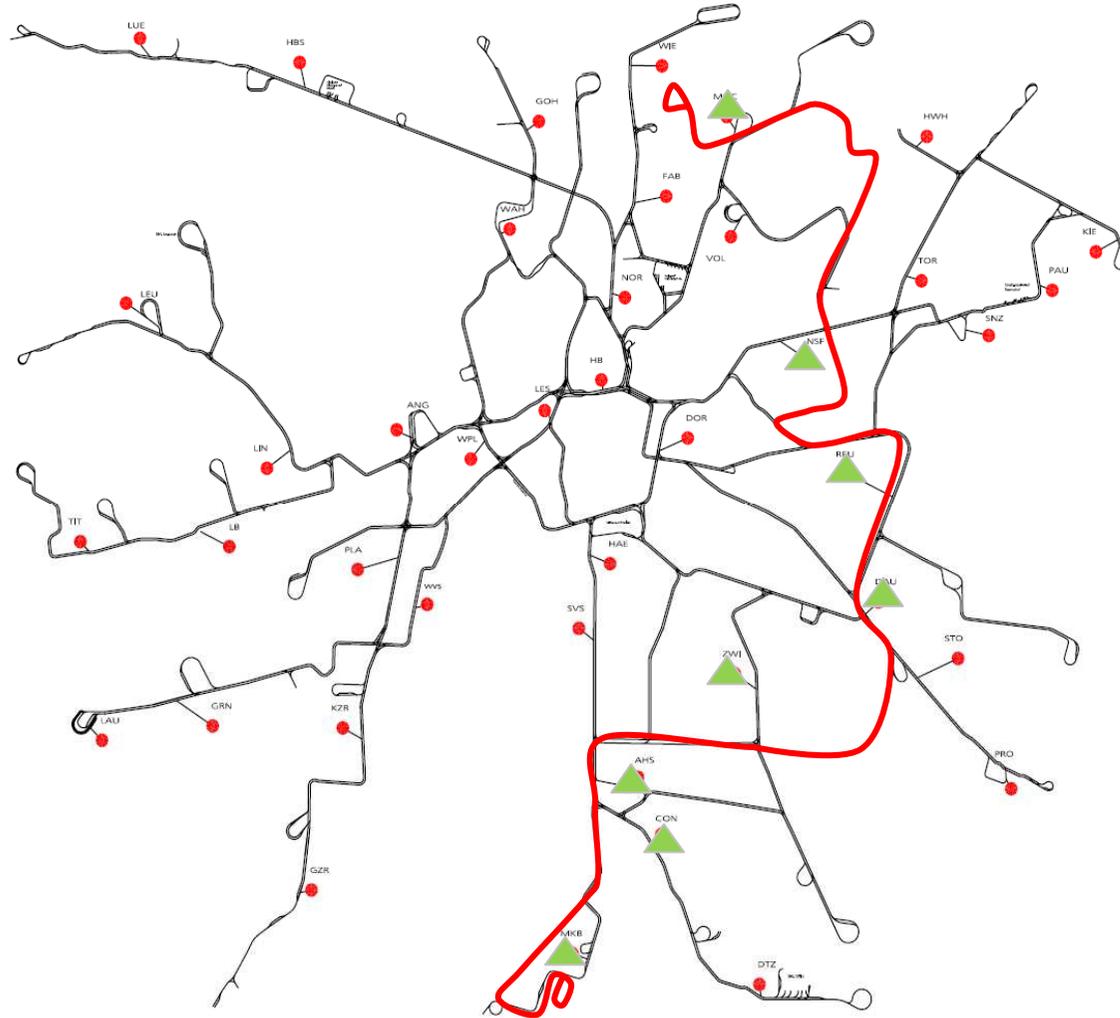
## EU-Project Trolley: excerpt of the main activities

- ▶ **WP 3:** Draw up of a compendium for the setup of new electrical bus systems or for conversion into electrical bus systems within an existing urban or tram network
- ▶ **WP 4:** Feasibility study for the conversion into electrical operation on the example of the city bus line 70

➔ An existing **infrastructure** and **know-how** from the **operation and maintenance** of electric railways provide important **synergies** for the conversion of bus lines into electrical operation

# Pilot Action II

- ▶ Investigation of the chances to convert the diesel bus line N° 70 to an electric bus service
- ▶ Analysis of synergy effects due to the possibility to use the tram power supply network
- ▶ 8 rectifier substations along the course available



# What has changed in Leipzig through TROLLEY



*increased awareness by the international conference week of electromobility in Leipzig October 2012*

- ▶ to showcase the trolleybus as a smart, innovative and sustainable transport mode, as in particular in Germany the trolleybus is often not considered as a future- looking transport mode
- ▶ trolley buses → high purchase costs → it is much more difficult to exchange diesel into e buses buses, since the system start-up costs are too high
- ▶ construction of a new eBus system (with Trolley buses) = less financial effort required than for the construction of a new tram system
- ▶ Our analysis shows that here in Leipzig it is only possible to electrify an inner- city bus line

# How can others benefit?

Leipzig's investigations provide information for other interested stakeholders, as part of the

- ▶ Reference Guide on Combination of Trolleybus and Tram Systems
- ▶ Transnational Take-up Guide on Diesel Bus Replacements
- ▶ impulses are set for the implementation of trolleybus systems with partial catenary lines by analyzing the local situation
- ▶ Hybrid buses as a requirement for this process

# What is the way forward after TROLLEY in Leipzig

- ▶ Search for financing options
- ▶ Germany- electromobility program by the government

## Project „eBus Butterfly“

- ▶ Conversion and extension of the existing bus system in Markkleeberg in a fully electric operating system
- ▶ System implementation and field testing of 2 electric buses with recharging at selective points

## Projectline „eBus 70“

- ▶ Implementation of the results & stepwise conversion of bus line 70 in an electric operated bus line
- ▶ Extension of bus line 70 towards Markkleeberg

# Thank you for your attention!

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