Polis Annual Conference – Madrid – 28 November 2014

ZeEUS – Stockholm Case Study

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Introduction by Stephanie Leonard UITP

Electromobility in Public Transport

Electrification already produced a revolution in Public Transport…

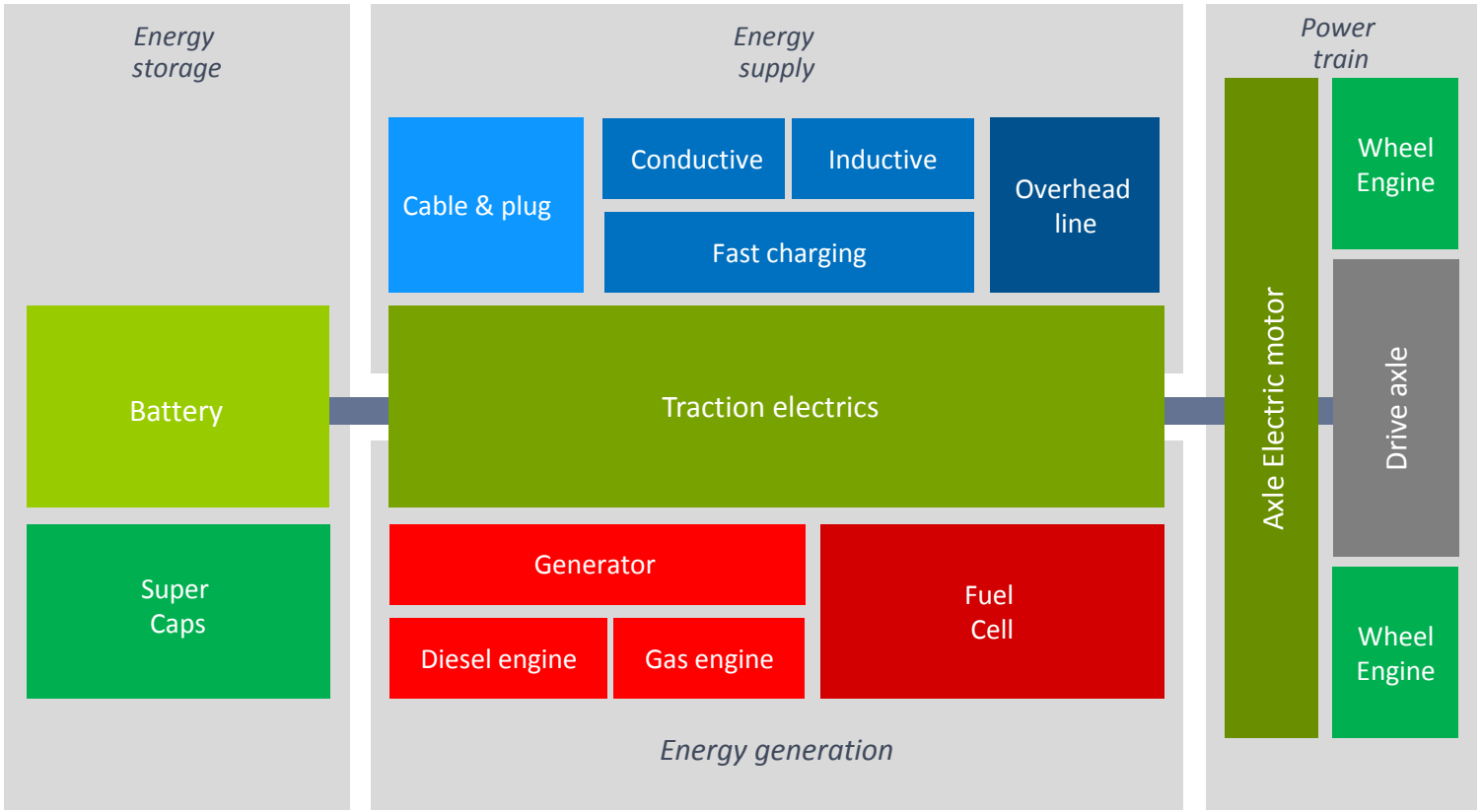
From horses-powered to electrical trams

UITP was already following such trend:

- *The high cost of horses' maintenance vs. electricity traction was one of the key topics discussed at the UITP's Berlin Congress in 1886.*

Why a project on Electric Buses?

2 – Large set of technologies available



Technologies promising if put in their "***best operational conditions***"

ZEEUS - Zero Emission Urban Bus Systems

Evaluate the **economic**, **environmental** and **societal** feasibility of **high capacity electric urban bus systems** through **demonstrations**

Provide decision makers with **Guidelines** and **Tools** to support decision on "**if**" "**how**" and "**when**" to introduce electric buses in the ***core*** bus network

Facilitate the market uptake of urban electric buses

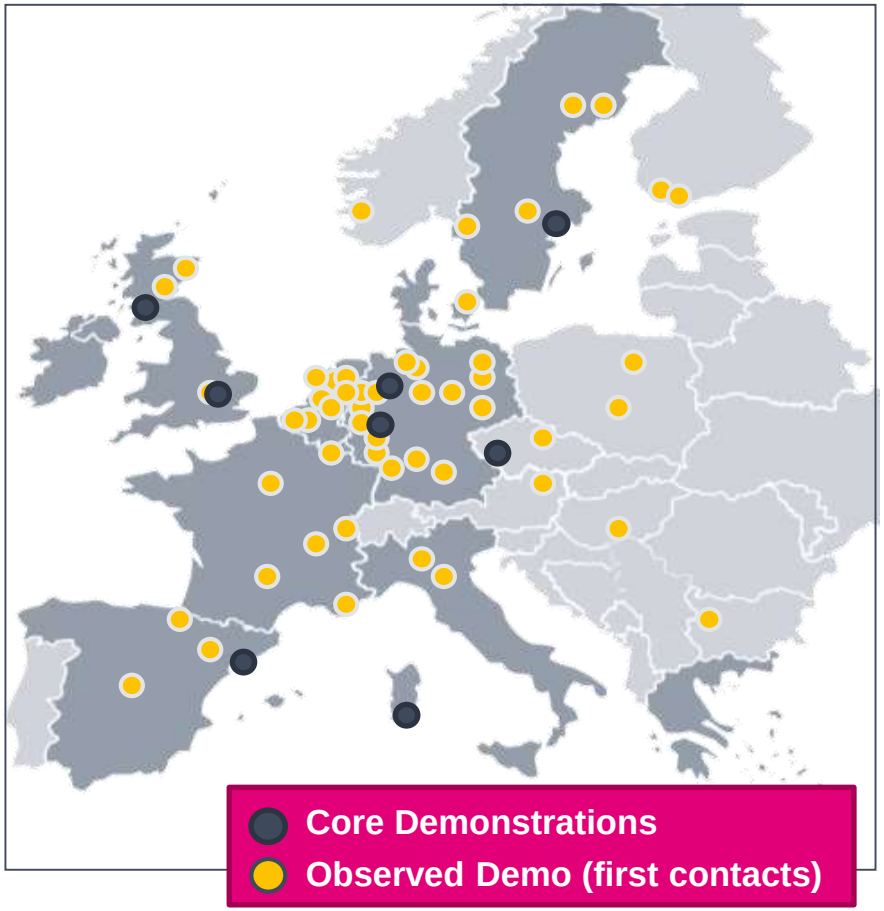
40 partners, 10 Countries, Coordinator: UITP
Total budget: 22Meuro / EU funding 13.5 Meuro
42 Months (until March 2017) www.zeeus.eu

ZeEUS

SEVENTH FRAMEWORK PROGRAMME

UITP ADVANCING PUBLIC TRANSPORT

ZeEUS Demonstrations



8 Core Demonstration

- Barcelona, Bonn, Cagliari, Glasgow, London, Münster, Plzen, Stockholm

~35 electric buses

- 12 meters, articulated, double-deckers
- Plug-in Hybrid, Full-electric, Battery Trolleys

Energy supply modes:

- plug-in, conductive, inductive, overhead

Fast and slow charging strategies

- Overnight (depot)
- Opportunity(terminals, bus-stops)

Observed / Monitored Demos

- **50** contacts already!
- Annual publication & workshops

ZeEUS - Guidelines and Tools to support Decision Makers on ‘if’, ‘how’ and ‘when’ introduce e-Bus in cities

ZeEUS Observatory

Collect information about activities about e-Buses worldwide
Linked to **UITP FTSO**

ZeEUS Observed and Monitored Demonstrations

Yearly publication, workshops - data collection and evaluation

Funding schemes, tools and procurement guidelines

Interaction with European funding entities
Update of **UITP tender structure** to include electric Buses

Standardisation of electric buses

ZeEUS/UITP Steering Group about standardisation of electric buses

- Harmonise EU activities on eBus standards
- UITP COMs, project partners, PT associations, Standardisation bodies...
- *Link with EC Directive on Alternative Fuels Infrastructure*

E-SORT validation and tuning

- New chapter of UITP SORT cycle for full-electric buses
- Consolidation and validation of SORT-E through the project Demonstrations
- Coordination with the UITP SORT working group

Regulatory frame

Include operational aspects
Guidelines for including electric buses in National Policy Framework definition

ZeEUS Vision

“demystifying” electric buses

ZeEUS Electrification Roadmap

research and implementation

Implementation aspects

Recommendations for urban / spatial planning
Operational concepts
Fleet migration scenarios
Drivers and maintenance staff training

Network with emobility activities

Projects / Initiatives
Urban mobility and energy stakeholders

Strategy for optimised interaction with the power grid

- Optimised **overnight charging** strategy / business model
- Strategy for **re-using existing PT power network** for fast charging at bus-terminal / stop

ZeEUS Buses

IRIZAR

VOLVO

SOLARIS

SKODA

VDL

VAN HOOL / VOSSLOH

ALEXANDER DENNIS

Trafikförvaltningen
STOCKHOLMS LÄNS LANDSTING

Stockholm ZeEUS work

Battery Bus 1984

Electric Hybrid 1996-00

Flywheel 1984

Multiflex 1993

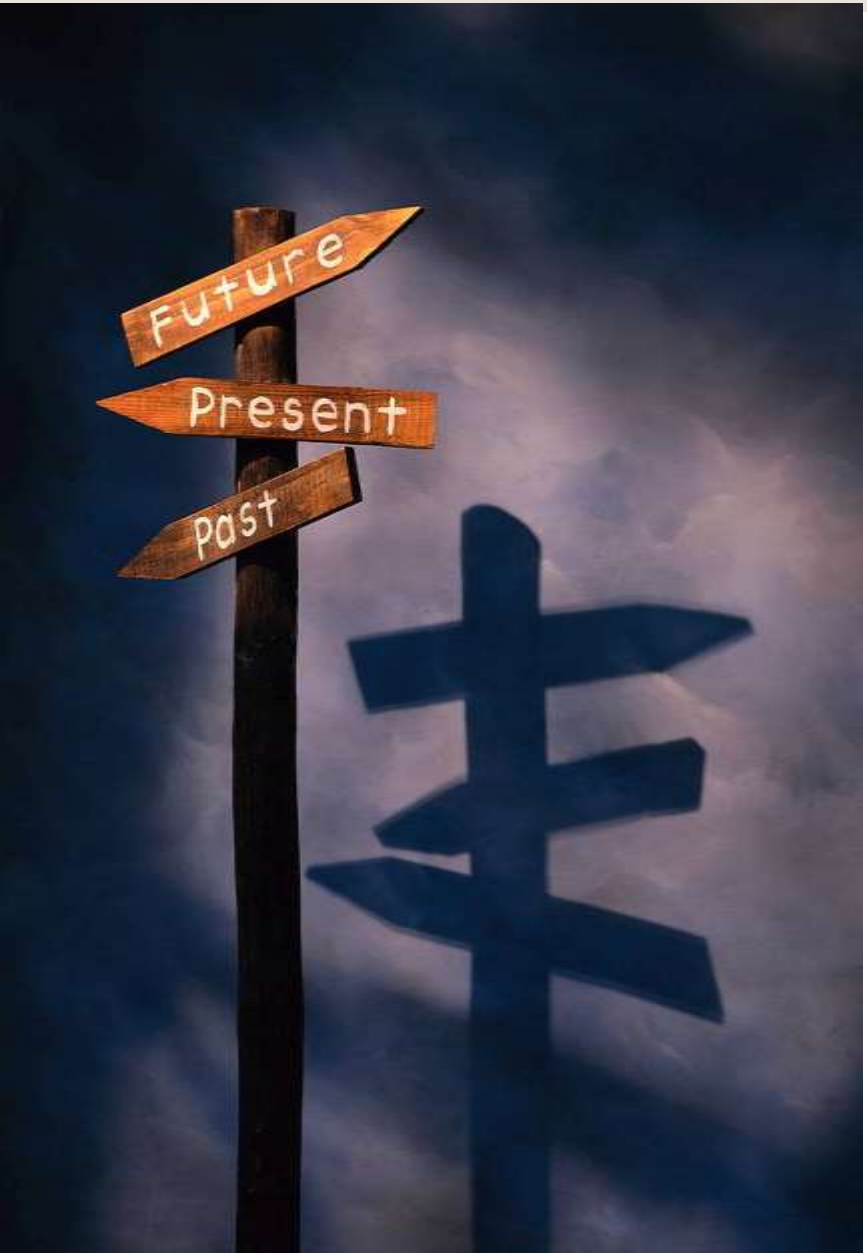
Gas 1984

Biogas 2003-

Accumulator 1989

Fuel Cell 2004-06

Ethanol, 1990-



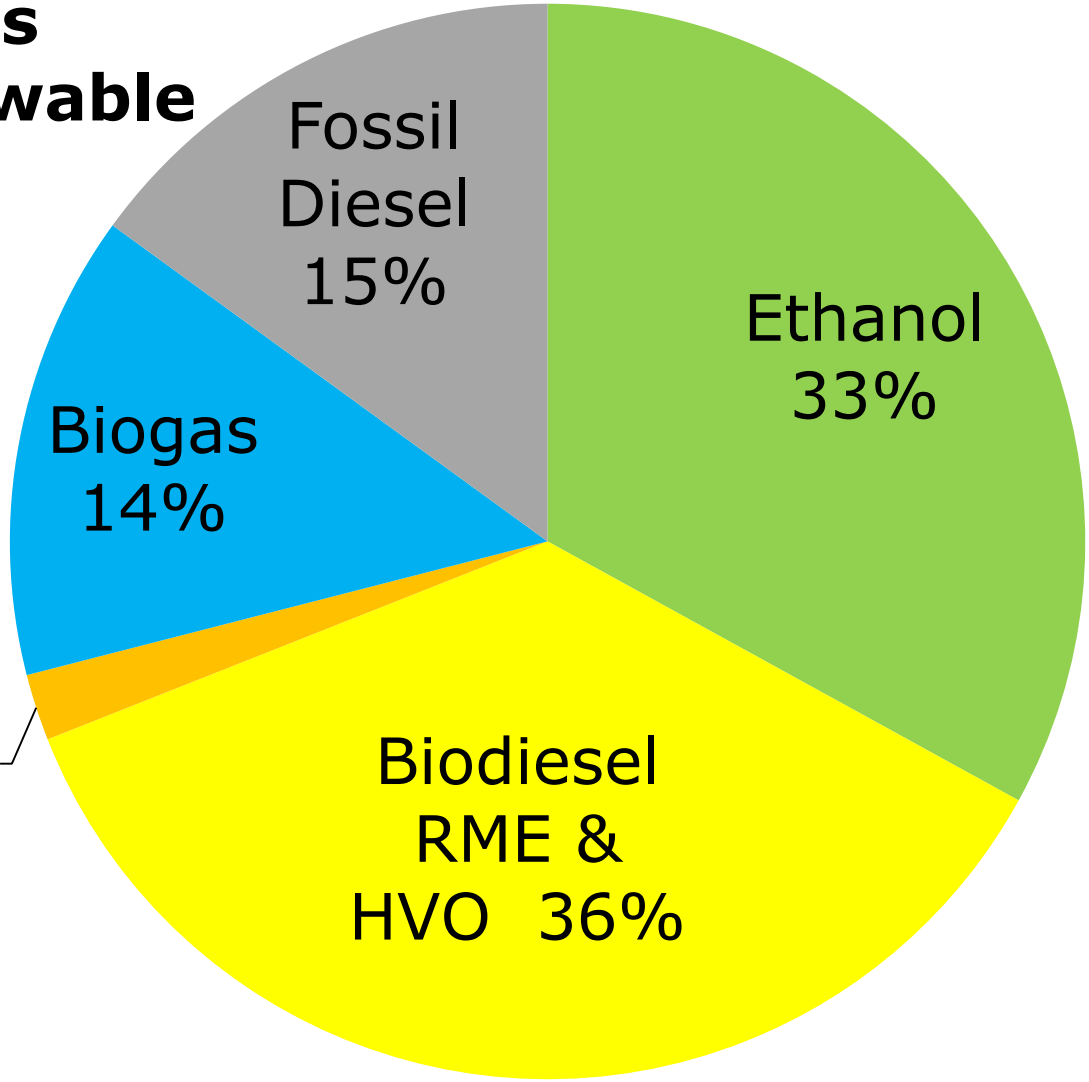
Stockholm's Philosophy

- Use best available commercial technology – NOW!!
- Support and engage in projects for future technology (hybrids, electric, fuel cell etc)

Trafikförvaltningen
STOCKHOLMS LÄNS LANDSTING

Distribution of bus technologies

2,100 buses
85 % renewable



Trafikförvaltningen
STOCKHOLMS LÄNS LANDSTING

The bus

Volvo 7900 Plugin 4x2 12m Hybrid bus

ZeEUS
Zero Emission Urban Bus System

8 Plug-in electric hybrid buses

- full scale traffic conditions
- replacing existing buses on established route

- **6 min charging at end stations**
- **Electric drive approx. 7 km**
- **Geo-fencing**
- **Normal hybrid if no charging**

- **85 % CO2 reduction w HVO**
- **Low noise, no exhaust emissions**
- **60 % Energy saving**

Technical objective

demonstrate

- low emissions
- low energy consumption
- low noise level
- high performance and cost efficiency

Buses by Volvo

- "Hybrids with larger batteries" + charging
- HVO (advanced biodiesel) for range extender

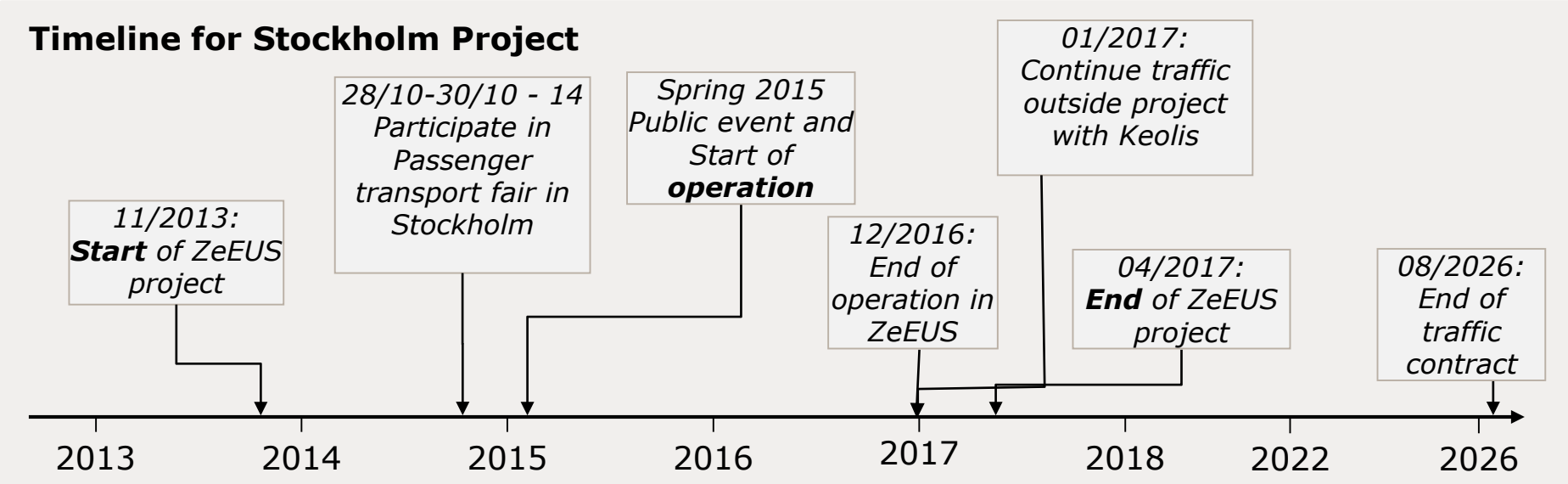
Charging system by Vattenfall

- Fast charging at end stops
- Slow charging at depot

Operation by Stockholm Transport

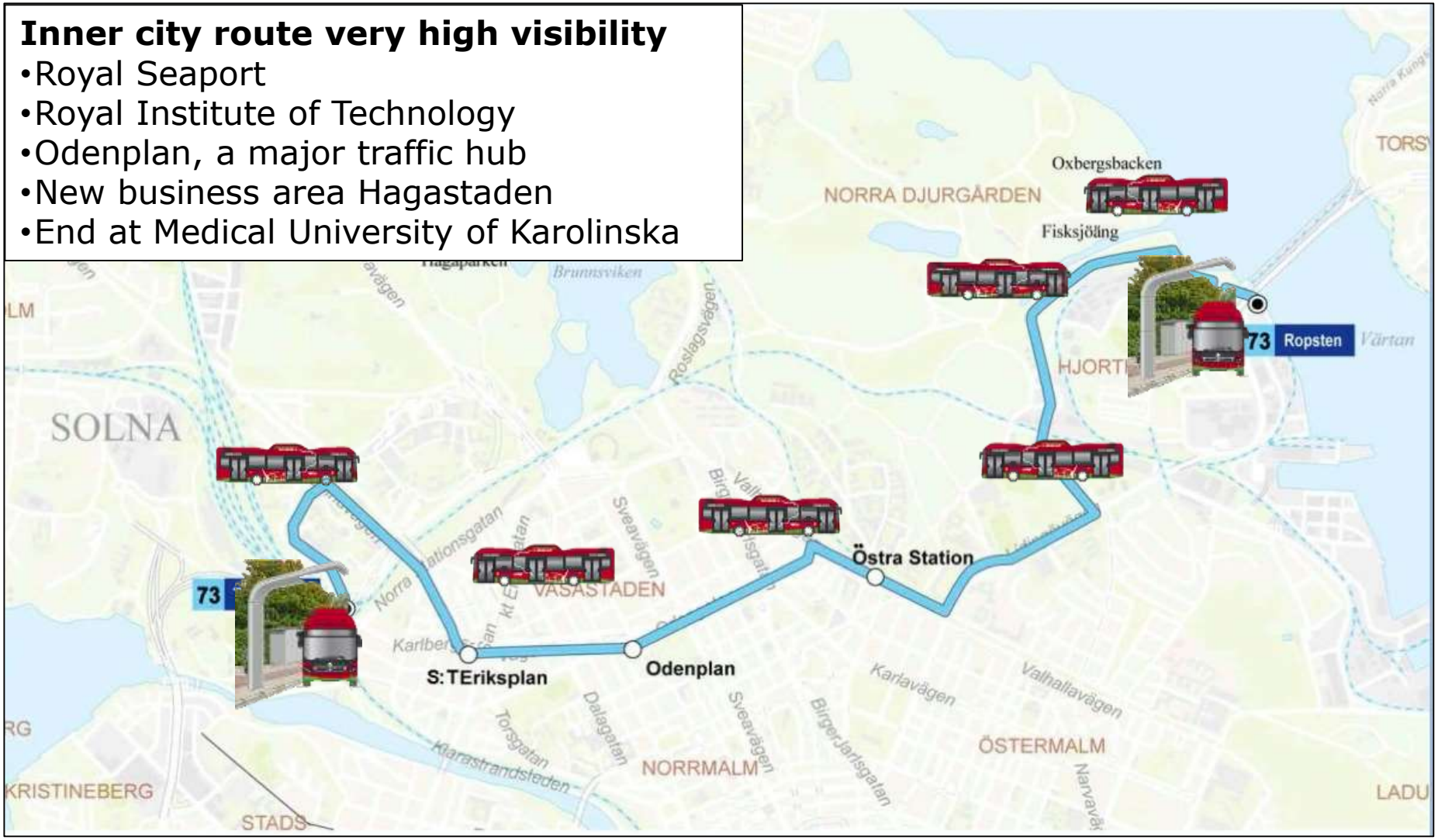
- Operation costs
- Depot adaption
- Evaluation

Partners and Timeline



Route 73 Ropsten – Karolinska approx. 8,5 km

Inner city route very high visibility
- Royal Seaport
- Royal Institute of Technology
- Odenplan, a major traffic hub
- New business area Hagastaden
- End at Medical University of Karolinska



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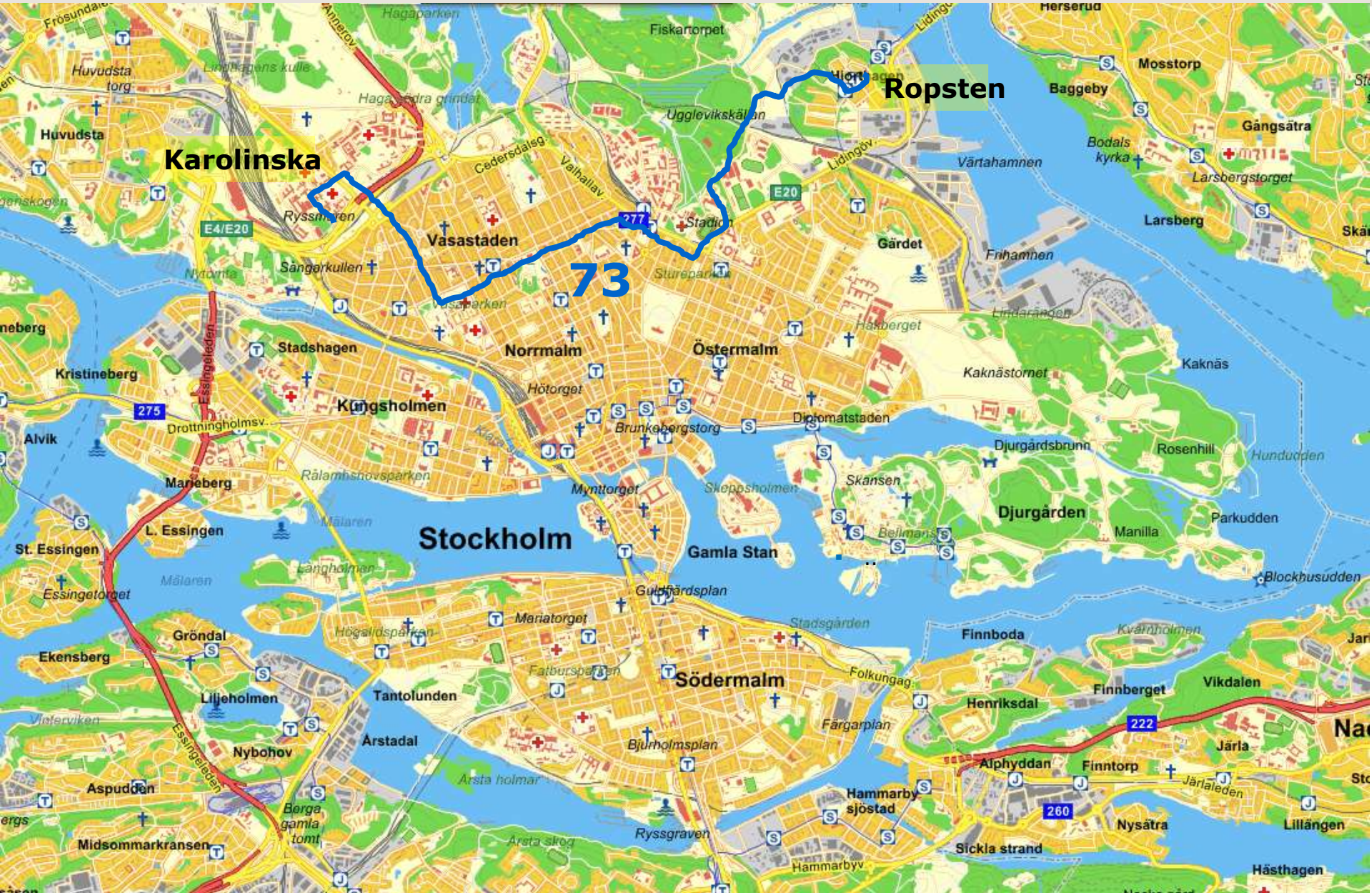


ZeEUS presentation at the Passenger transport fair in Stockholm 28th October

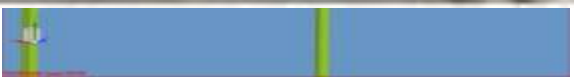
Strategic issues

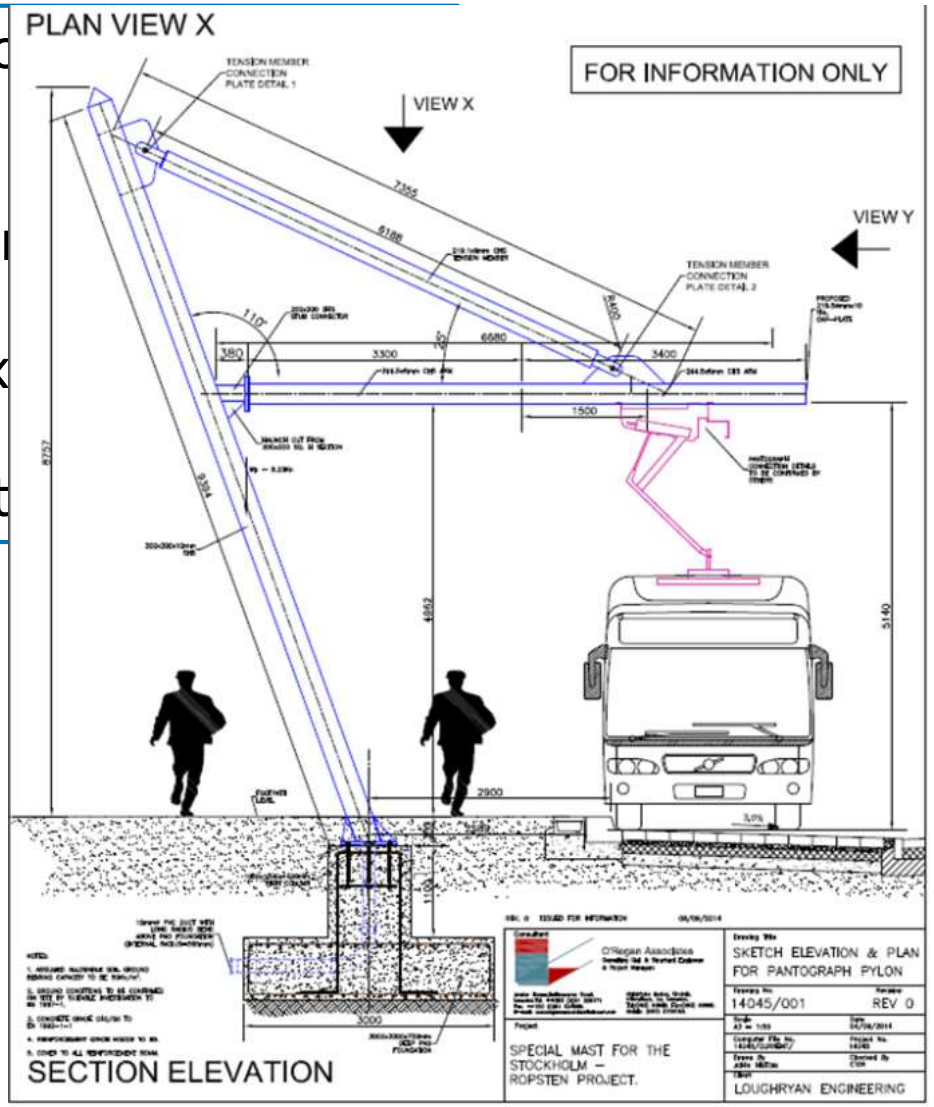
- What is needed for electrification?
- Balance batteries – infrastructure?
- Who should finance, own, set up infrastructure? Authority? Operator? City?
- Where?

ZeEUS
Zero Emission Urban Bus System

Charging infrastructure

- **Two charging stations**, end c





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Gäller detta rör.

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