

# **Trolleybuses: an affordable mode of transport?**

**Guido Bruggeman**

Salzburg 20 April 2006

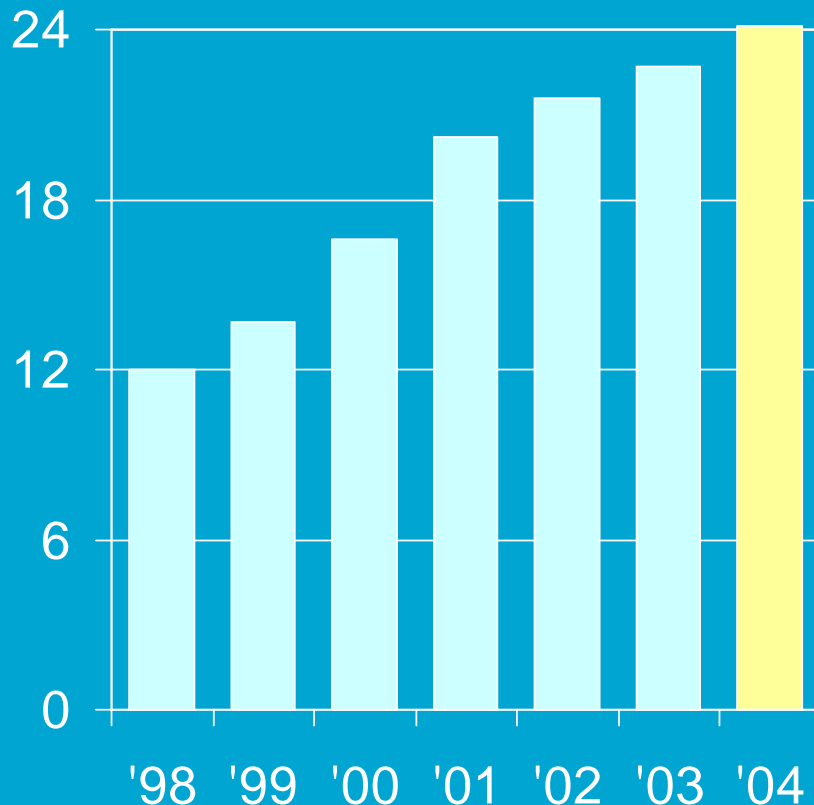


# Presentation

- What is EBRD?
- Trolleybus systems of the world
- Is the trolleybus cheaper and why?
- Or is the trolleybus more expensive?
- Financing of trolleybus investments



# What is the EBRD?



*Cumulative commitments  
€24.1 billion*

- International financial institution, promotes transition to market economies in 27 countries from central Europe to central Asia
- Owned by 60 countries and two inter-governmental institutions
- Capital base of €20 billion



# 27 countries of operations

- ◆ Croatia
- ◆ Czech Republic
- ◆ Estonia
- ◆ Hungary
- ◆ Latvia
- ◆ Lithuania
- ◆ Poland
- ◆ Slovak Republic
- ◆ Slovenia
- ◆ Albania
- ◆ Bosnia & Her.
- ◆ Bulgaria
- ◆ Macedonia
- ◆ Moldova
- ◆ Romania
- ◆ Serbia
- ◆ Russia
- ◆ Ukraine
- ◆ Belarus
- ◆ Caucasus (3)
- ◆ Central Asia (5)



# What are the EBRD's objectives?

- To promote transition to market economies by investing mainly in the private sector
- To mobilise significant foreign direct investment
- To support privatisation, restructuring and better municipal services to improve peoples' living standard
- To encourage environmentally sound and sustainable development



# What investments can EBRD finance?

- public transport
  - *new rolling stock; vehicle refurbishment; track infrastructure; ticketing systems; depots, workshops and equipment*
- traffic management
  - *urban traffic management and control systems; public transport priorities & management systems; parking systems*
- station redevelopment and area regeneration
- street improvements



# Project examples

- Gdansk: rolling stock and tram infrastructure
- Kaunas: new buses and restructuring
- Sofia and Belgrade : public transport fleet renewal
- Sibiu, Arad and Brasov : road rehabilitation and public transport
- Krakow : light rail project
- Tomsk : traffic management project
- Krasnodar : tram rehabilitation
- Astana : modern public transport system
- Tbilisi : second hand buses and reorganisation
- Bucharest: rehabilitation city centre



# Is the EBRD interested in trolleybuses?

- Yes, because:
- 72% of trolleybus systems in the world are in our countries of operation
- EBRD has to a role to play in discussions about affordability and financing of trolleybus systems
- ....but discussion should be based on facts



# Trolleybus systems of the world

- How many systems are left?
- Where can we find them and why?



# Trolleybus systems of the world (1)

Total	366
EBRD countries	262
Western Europe	47
Asia	37
South America	12
North America	7
Australia & Oceania	1



# Trolleybus systems of the world (2)

EBRD countries of operations (Central and Eastern Europe and former SU)

Armenia	2	Lithuania	2
Azerbaijan	4	Moldavia	5
Belarus	7	Mongolia	1
Bosnia & Herzegovina	1	Poland	3
Bulgaria	15	Romania	19
Czech Republic	13	Russian Federation	93
Estonia	1	Slovakia	5
Georgia	12	Tajikistan	2
Hungary	3	Turkmenistan	1
Kazakhstan	9	Ukraine	48
Kyrgyz Republic	4	Uzbekistan	10
Latvia	1	Serbia & Montenegro	1



# Trolleybus systems of the world (3)

## Western Europe and Asia

<i>Western Europe</i>		<i>Asia</i>	
Switzerland	15	China	25
Italy	15	North Korea	8
France	5	Japan	2
Austria	4	Iran	1
Germany	3	Nepal	1
Belgium	1		
Greece	1		
Netherlands	1		
Portugal	1		
Sweden	1		
<i>Total</i>	<i>47</i>	<i>Total</i>	<i>37</i>



# Trolleybus systems of the world (4)

EU (incl. EU accession countries)

<i>Western Europe</i>		<i>Central Europe</i>	
Italy	15	Romania	19
France	5	Bulgaria	15
Austria	4	Czech Republic	13
Germany	3	Slovakia	5
Belgium	1	Hungary	3
Greece	1	Poland	3
Netherlands	1	Lithuania	2
Portugal	1	Estonia	1
Sweden	1	Latvia	1
<i>Total</i>	<i>32</i>	<i>Total</i>	<i>62</i>



# Russian federation (former USSR)

- Trolleybuses in operation 1933-1994: 79.327
- 1980: 1929 new trolley buses
- 1985: 2419
- 1990: 2308
- 1995: 340
- 1996: 127



# Trolleybuses: policy or politics?

- Nearly 300 out of the 366 trolleybus systems are in former communist countries
- What is the rationale behind this?
- Do these countries care more about environment?
- Are these countries just “behind” the rest of the world?
- Or are trolleybuses just cheaper and better?



# Cost structure public transport

- Salaries
- Energy (fuel and electricity)
- Materials
- Depreciation
- Other
- (Infrastructure)



# Cost comparison bus and trolley

Breakdown of costs	Bus	Trolley
Salaries	o	o/-
Fuel	-	+
Maintenance	o	o
Depreciation	o	o/-
Other	o	o
Infrastructure	+	-



# Cost structure bus operator

Breakdown of costs	Georgia	Russia
Fuel	37%	23%
Salary	19%	50%
Maintenance	18%	11%
Depreciation	13%	4%
Other	13%	12%



# Energy costs main cost issue

- Energy costs per trolley kilometre are often much lower than diesel price per bus kilometre
- Electricity price often artificially low (not covering cost price)
- Oil price is linked to world market prices (although electricity prices often linked to oil prices)
- Tax policy strongly influences prices
- Uncertainty about development energy prices
- Differs from country to country



# Cost structure Kaunas transport 2004

Breakdown of costs	Bus	Trolley
Fuel	31%	14%
Salary	44%	59%
Maintenance	7%	5%
Depreciation	7%	12%
Other	12%	10%



# Cost structure Kaunas transport up to date Vehicles

Breakdown of costs	Bus	Trolley
Fuel	21%	9%
Salary	29%	39%
Maintenance	5%	4%
Depreciation	37%	43%
Other	8%	6%
price per km		



# Is the trolleybus cheaper (than bus)?

- Most likely not, despite lower energy costs
- Under investment infrastructure
- Trolleybuses often fully depreciated
- Current (km) costs are not reflecting real costs (but historic cost level)
- Investment decisions influenced by industry (trolleybus suppliers)
- Sound analysis and investment plans needed



# One transport mode too much?

- Often one transport mode too much (especially in smaller cities < 500,000 inhabitants)
- Bus, trolleybus, tram, metro (and minibus)
- No network hierarchy
- No clear justification why bus, trolleybus or tram



## ...and how about environment

- The “environment” argument is often used as a justification for (partly) uneconomic investments
- Nevertheless the environmental benefits should be taken into account but only in combination with transparent cost analysis.



# Conditions for financing trolley buses

- Clearness about (real) cost structure
- Fleet renewal *and* infrastructure (integrated project)
- Affordability demonstrated
- Transport policy in place
- Restructuring company in order to increase efficiency
- Restructure PT network (integrated network)
- Considering merger of bus and trolleybus company
- Introduction of public service contracts

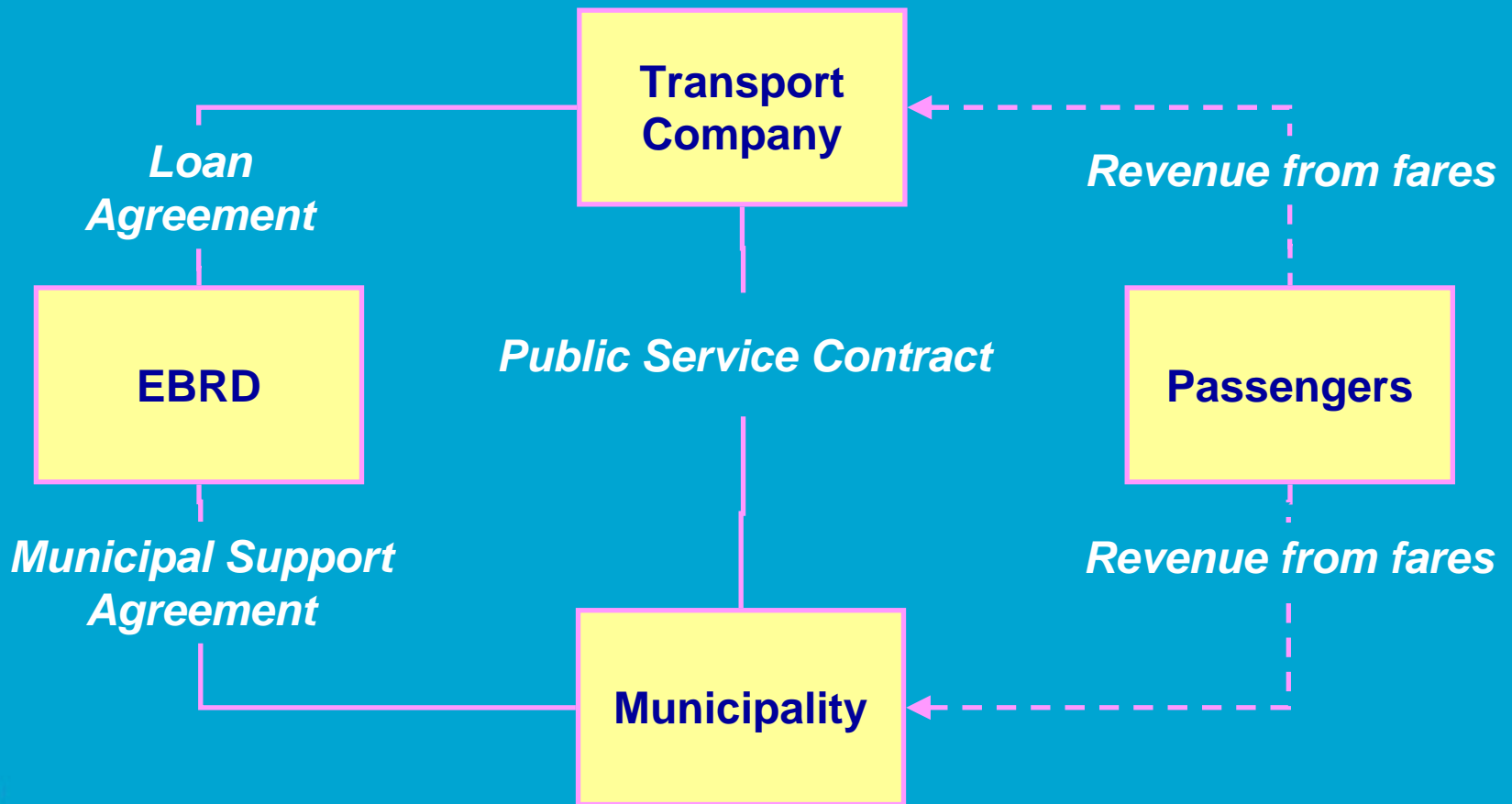


# Kaunas Trolleybus Modernisation Project

- EBRD loan € 15 million
- 50 low floor trolley buses
- Upgrading infrastructure
- Restructuring network
- Introduction PSC
- New ticketing system
- Discussion on corporate structure (merger)



# Financing structure: Corporate loans



# Elements of Public Service Contract

- end of 'subsidy', introduction of 'financial compensation' for Public Service Obligations
- clarity of responsibilities by separation of ownership, operations and financing source
- definition of quantity and quality of service to be provided
- service payments should include capacity for investment
- payments provide incentives and penalties
- can be used with public or private operators



# Summary

- EBRD can finance trolleybus projects
- Energy costs seems to be advantageous to trolleybuses
- Current costs of trolleybuses does not reflects real costs
- Focus on fleet renewal and infrastructure rehabilitation
- Sound transport policy and investment proposals required
- Environmental aspect could be taken into account
- More research needed in order to determine
  - comparable cost levels (bus vs trolleybus)
  - environmental impact
  - impact on patronage

