Wuppertal Institute
for Climate, Environment
and Energy

Need for a holistic assessment of urban mobility measures

- Review of existing methods and design of a simplified approach -

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Sustainable Mobility in Metropolitan Regions

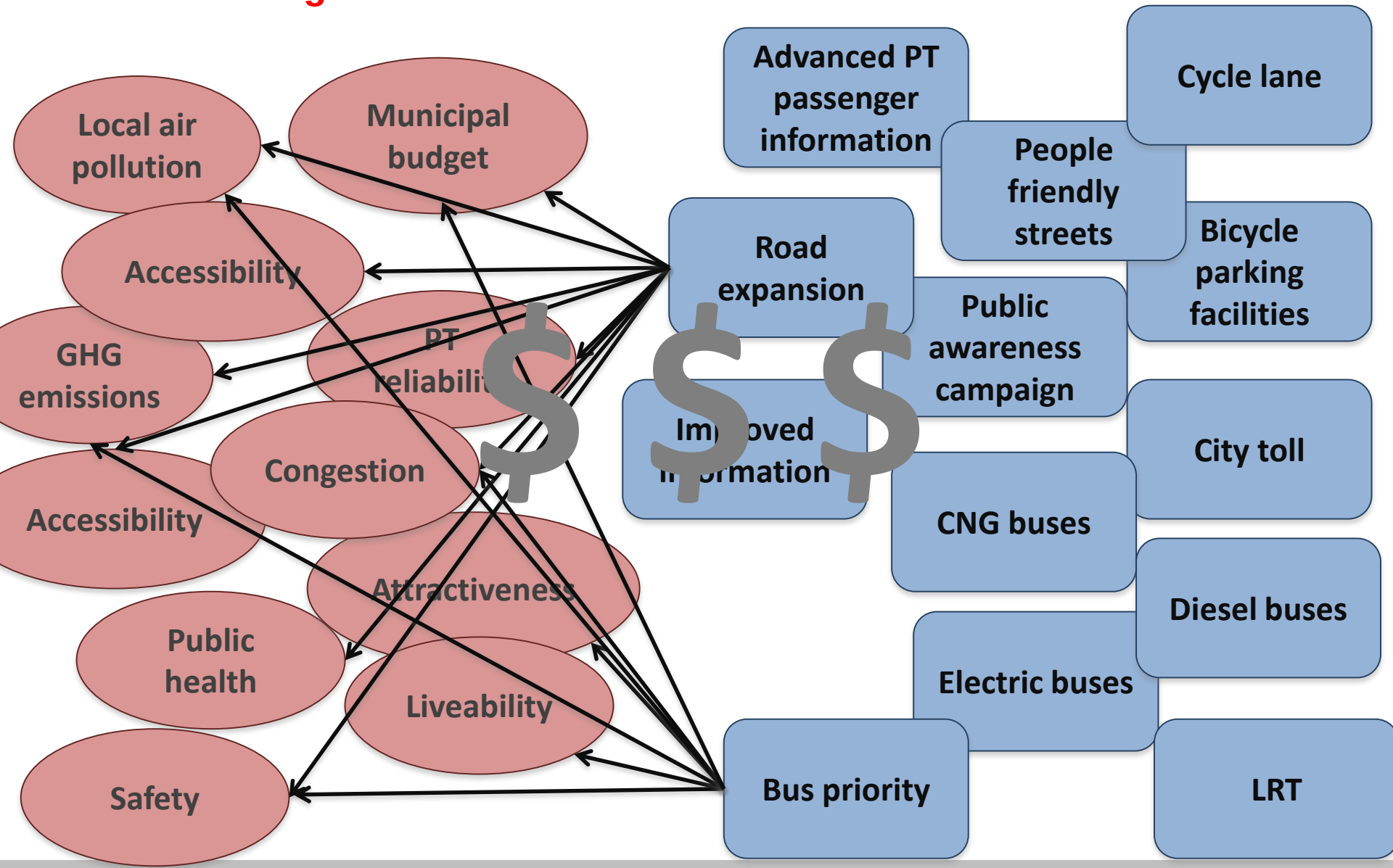
Assessment urban mobility projects

- **Why** do cities need a holistic approach for (ex-ante) assessment?
- **What** is the current practice?
- **Which** measures do cities need to assess?
- **How** can be done?

WHY

do cities need a holistic approach for (ex-ante) assessment?

The Challenge



WHAT

is the current practice?

Existing methods for transport project appraisal (from a city perspective)

We don‘t have a standard appraisal method for transport projects.

Cost-benefit analysis (CBA)

- Highlights economic efficiency
- Extensive data needs
- Difficulties in monetization
- Dominance of travel time savings

Multi-criteria analysis (MCA)

- Applicable to soft measures
- Allows to include qualitative impacts

The major challenge will be to monetise qualitative externalities and not-clear impacts.

The major challenge is data availability.

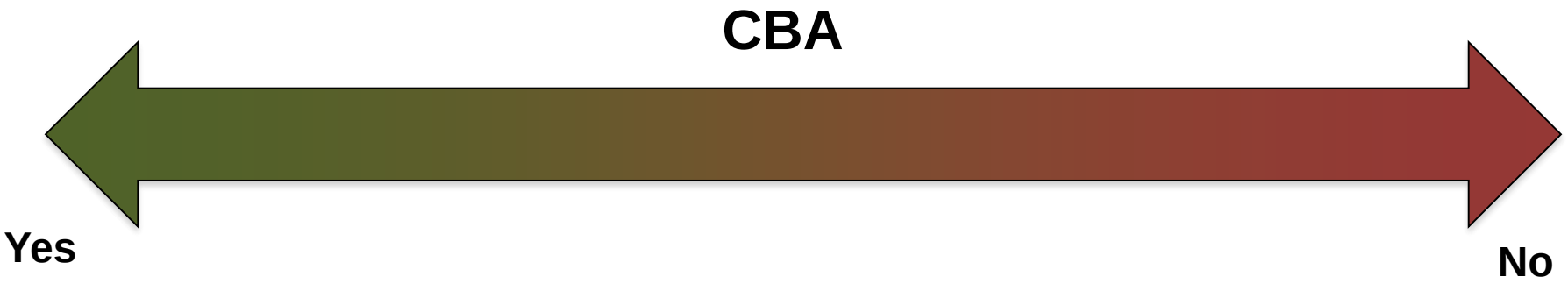
A regular CBA usually ignores advanced benefits to a measure.

Financial viability checks are conducted for important projects but no CBAs.

WHICH

measures do cities need to assess?

Sustainable urban transport measures



Congestion charge:
- Transek (2006), Eliasson (2009) →Stockholm
- Prud'homme and Bocarejo (2005), Transport for London (2007), →London
- Rotaris et al. (2010) →Milan

Cycling infrastructure:
- Sælensminde (2004) →Norway
- Gotschi (2011) →Portland
- Guo and Gandavarapu (2010)→Dane County

Bus priority:
- Gardner et al. (2009)

People friendly streets:
?

HOW

can it be done (better)?

The proposed approach

- Simplified method based on MCA and optional CBA
- Steps:
  1. Describe project and alternatives
  2. Identify effects and indicators
  3. Impact assessment
  4. Normalisation
  5. Criterion weighting
  6. Visualisation and interpretation
  7. Sensitivity analysis
  8. Communicate results

Effects	Impact* (assessment duration, 14y)	
	Diesel buses	CNG buses
Bus purchase	-€6.22m	-€7.71m
Refilling station	0	-€2.01m
Fuel costs	-€4.39m	-€2.39m
Maintenance	-€2.43m	-€3.56m
NOx emissions	706t	712t
CO emission	296t	74t
HC emissions	93t	36t
PM_{10} emissions	7t	0.6 t
CO_2 emissions	60.2kt	57.6kt
CH_4 emissions	2.33t	12t
N_2O emissions	0.04t	1.35t
Noise (qualitative)	-6	-2
External city image (ql)	1	+3
PT user comfort (ql)	-4	-1
PT non-user comfort (ql)	-5	-1

Normalisation

- Translate the performance figures to a comparable scale
- Maximum score approach:

$$Score\ C1(A) = \frac{x_{C1(A)}}{\left|x_{C1(mox)}\right|} \times F_{scale}$$

- Example:

	Impacts		Normalised score	
	Diesel	**CNG**	**Diesel**	**CNG**
Investment	- €6.22m	-€9.72m	-6,4	-10
Operation/Maintenance	- €6.82m	- €5.95m	-10	-8.72
CO_2 emissions	-60.2kt	-57.6kt	-10	-9.6
Passenger comfort	-4	-1	-10	-2.5

Example - Results

	Impacts		CBA	Normalised score		Weights	Weighted normalised scores	
	Diesel (BAU)	CNG		Diesel	CNG		Diesel	CNG
Monetary								
Investment	- €6.22m	-€9.72m	-€3.5m	-6,4	-10	26	-166.4	-260
Maintenance	-€2.4m	-€3.6m	-€1.1m	-6.8	-10	8	-54.4	-80
Fuel expenditures	-€4.4m	-€2.4m	+€1.9m	-10	-5.4	8	-80	-43.2
GHG emission	-€1.22m	-€1.16m	+€0.06m	-10	-9.6	7	-70	-67.2
Local air pollution	-€5.4m	-€4.6m	+€0.8	-10	-8.4	23	-230	-193.2
Economic results	∑-€19,6m	∑-€21,4m	**BCR: 0.63**				**-600.8**	**-643.6**
Non monetary								
Noise	-6	-2		-10	-3.3	10	-100	-33.3
External city image	1	+3		3.3	10	9	29.7	90
Passenger comfort	-4	-1		-10	-2.5	5	-50	-12.5
PT non-user comfort	-5	-1		-10	-2	4	-40	-8
						Overall scores	**-699.5**	**-607.2**

Conclusion

- No standard method for transport project appraisal exists among European cities
- A combined approach for the appraisal of local transport measures:

Needs to

- Reflect different kinds of impacts (holistic approach)
- Applicable to the majority of urban mobility policies/measures
- Able to reflect economic viability esp. of large scale projects (CBA optional!)

Addressed by

- Allows to include quantitative (monetary) and qualitative effects
- Efforts can be adapted to the magnitude of the measure under investigation (in terms of costs)
- An economic assessment can be integrated (supplementary, not replacing holistic results)

→ Further work is required to test the method and its influence in the decision making process

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THANK YOU

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Example - Results