Wuppertal Institut
für Klima, Umwelt, Energie
GmbH

New fuels – the need for urban planning and new infrastructure

Local Renewables Freiburg 2010
Changing fuels or changing patterns? – The role of renewables in sustainable urban mobility

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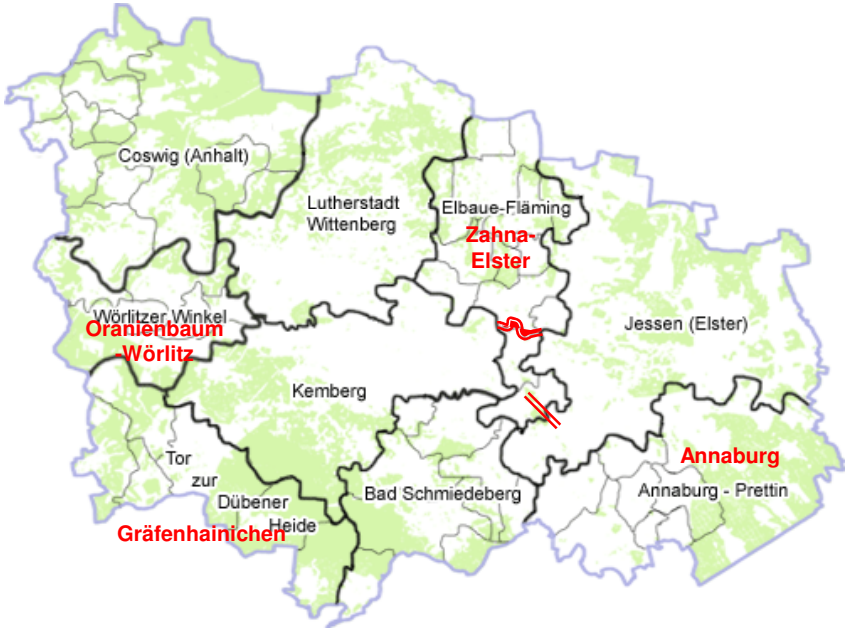
What Is A City?

Wittenberg,

a county in Sachsen-Anhalt (Eastern Germany),
is divided into 9 cities (from Jan 1, 2011)



Delhi,

the Union Capital Territory is divided into 9 districts incl.
3 Statutory Towns, 59 Census Towns and 165 Villages

1930 km^2	**area**	1483 km^2
0.14 mill.	**population**	18.10 mill.
72 pers/km^2	**density**	12208 pers/km^2

Re-urbanization:
Options @ 100 inhabitants per hectare (10,000 sqm)

SMALL: 5,000 inhabitants, diameter 800 m

kindergarden, elementary school

full scale basic supply with products and services

pedestrian area; outbound p.t. connection

MEDIUM: 50,000 inhabitants, diameter 2,5 km

full scale educational supply

well differentiated supply with products and services

traffic calmed; basic supply with internal p.t., fast and frequent outbound p.t. connection

LARGE: 500,000 inhabitants, diameter 8 km

full scale educational supply incl. university

highly specialized supply with products and services

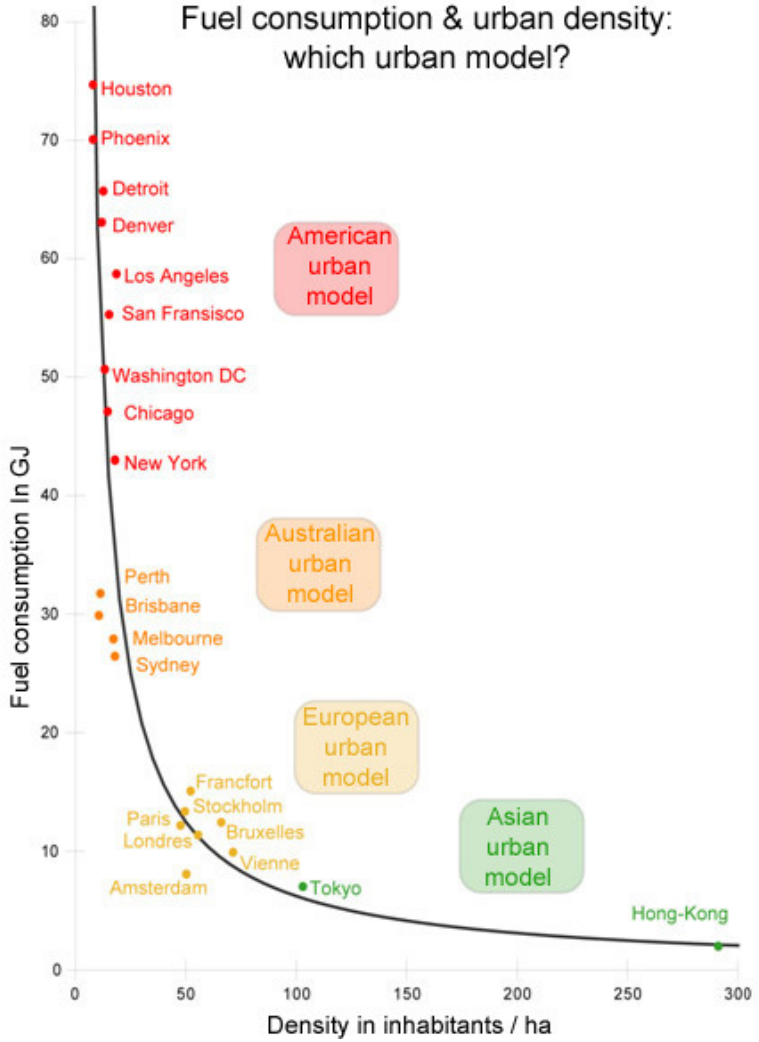
predominantly non-motorized transport; fast and frequent internal and outbound p.t.

Empirical evidence:
Newman & Kenworthy's curve

Newman/Kenworthy's finding:

The higher the population density,

the lower the car density, car use, and energy consumption



Source: Taken from Newman & Kenworthy, 1989, quoted in planet-energy.com

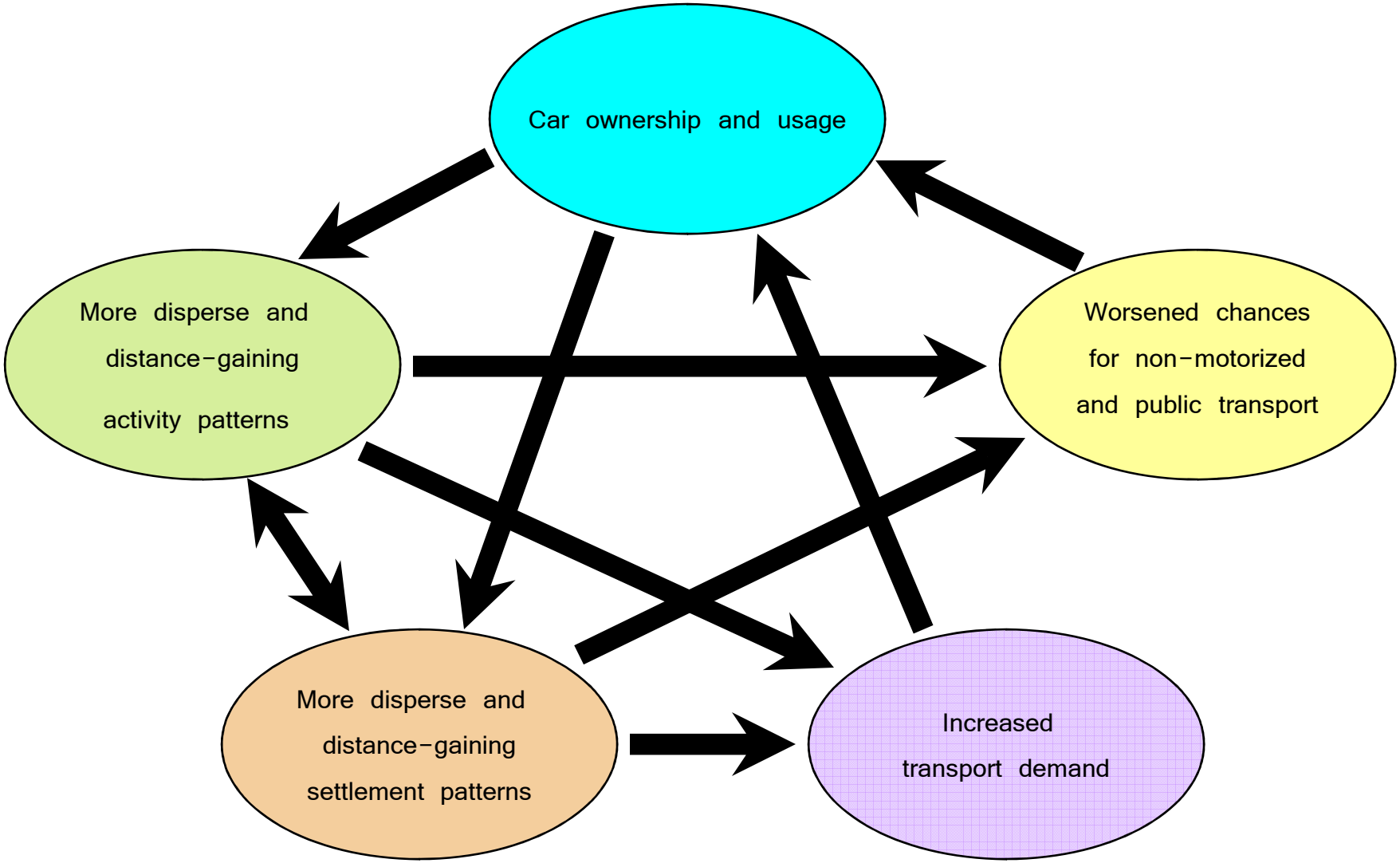
The current model of urban development: A wooden iron

„A car-aligned city cannot exist. It is a concept similar to that of wooden iron. Building a city fully suitable for cars, it isn‘t a city anymore.“

(Hans Paul Bahrdt, own translation K.O.S.; originally:

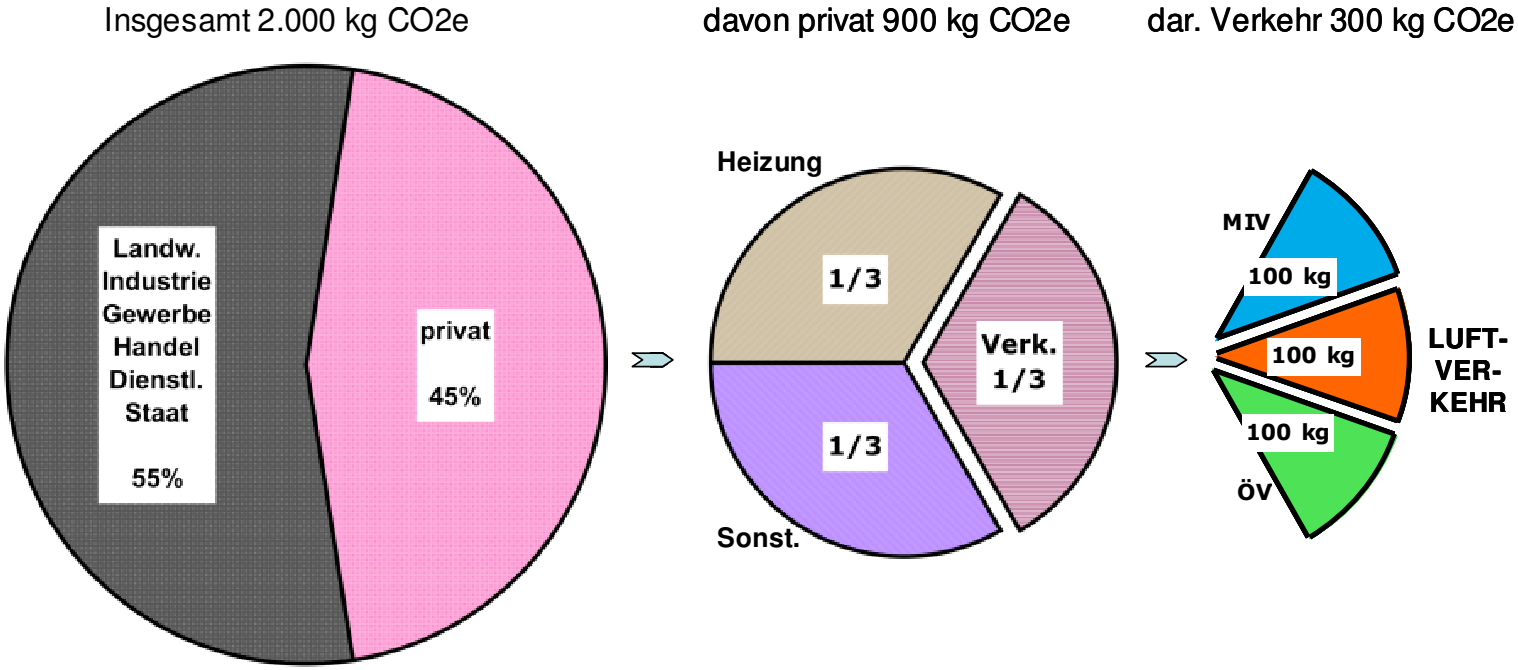
„Eine autogerechte Stadt kann es nicht geben. Der Begriff ist der eines hölzernen Eisens. Baut man eine Stadt so, dass sie dem Auto voll gerecht wird, dann ist sie keine Stadt mehr.“, Bahrdt, H. P.: Die Zähmung des Autos, in: Holzapfel, H.; Lichtenthäler U., ed.: Flächenverbrauch und Verkehr. Dortmund 1987)

Car transport and desurbanisation:
A vicious circle of positive feedbacks



The overwhelming climate challenge

Where to allocate the conceded annual 2-t-CO2 burden, opposite to the overall target-figure a non-binding perspective:



Nach aktuellen WBGU-Daten stehen weltweit pro Kopf und Jahr im Zeitraum 2010-2050 etwa 2.000 kg CO2 zur Verfügung, sowie im Zeitraum 2051-2100 etwa 300 kg, oder im Gesamtzeitraum 2010-2100 rd. 1.000 kg, um das 2 °C-Klimaziel zu halten.

Zum Vergleich: 1 l Benzin entspricht etwa 2,37 kg CO2, 1 l Diesel, Kerosin oder Heizöl etwa 2,65 kg CO2.

Climate: Lessons to learn in transport

In the OECD-countries, we had to reduce our GHG-footprint by some 80 per cent, not by the year 2050, but ***by now***.

Any additional emissions require compensatory action, may it be emission trading or even stronger reductions a few years later.

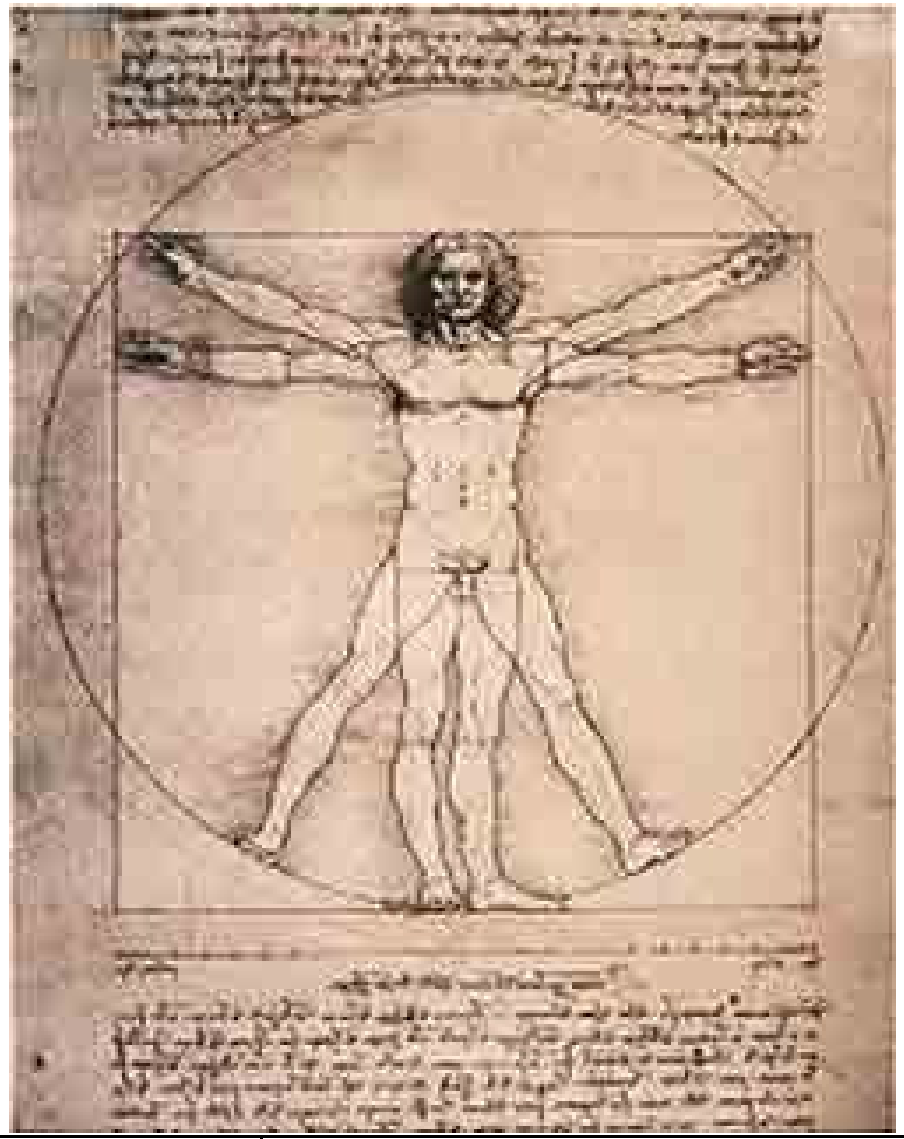
For transport, this means:

- Reduction of motorized road traffic (and air traffic as well) a.s.a.p., and as far as possible;
- Reduction of the specific energy consumption of the transport means, particularly of the cars.

As well it makes sense

- To research alternative propulsion technologies and fuels, additionally.
- However, for the time being it is not clear, whether hydrogen, electricity, 2nd generation biofuels or what else will be most considerable.
- The determination of the respective infrastructures therefore is not a topical issue.

Leonardo da Vinci‘s Vitruvian man (1492)



Working & Thinking Area

Walking & Reproduction Area

e.g. Bremen Climate Protection Case: Condensation of 119 suggested provisions in transport

11 bundles of action

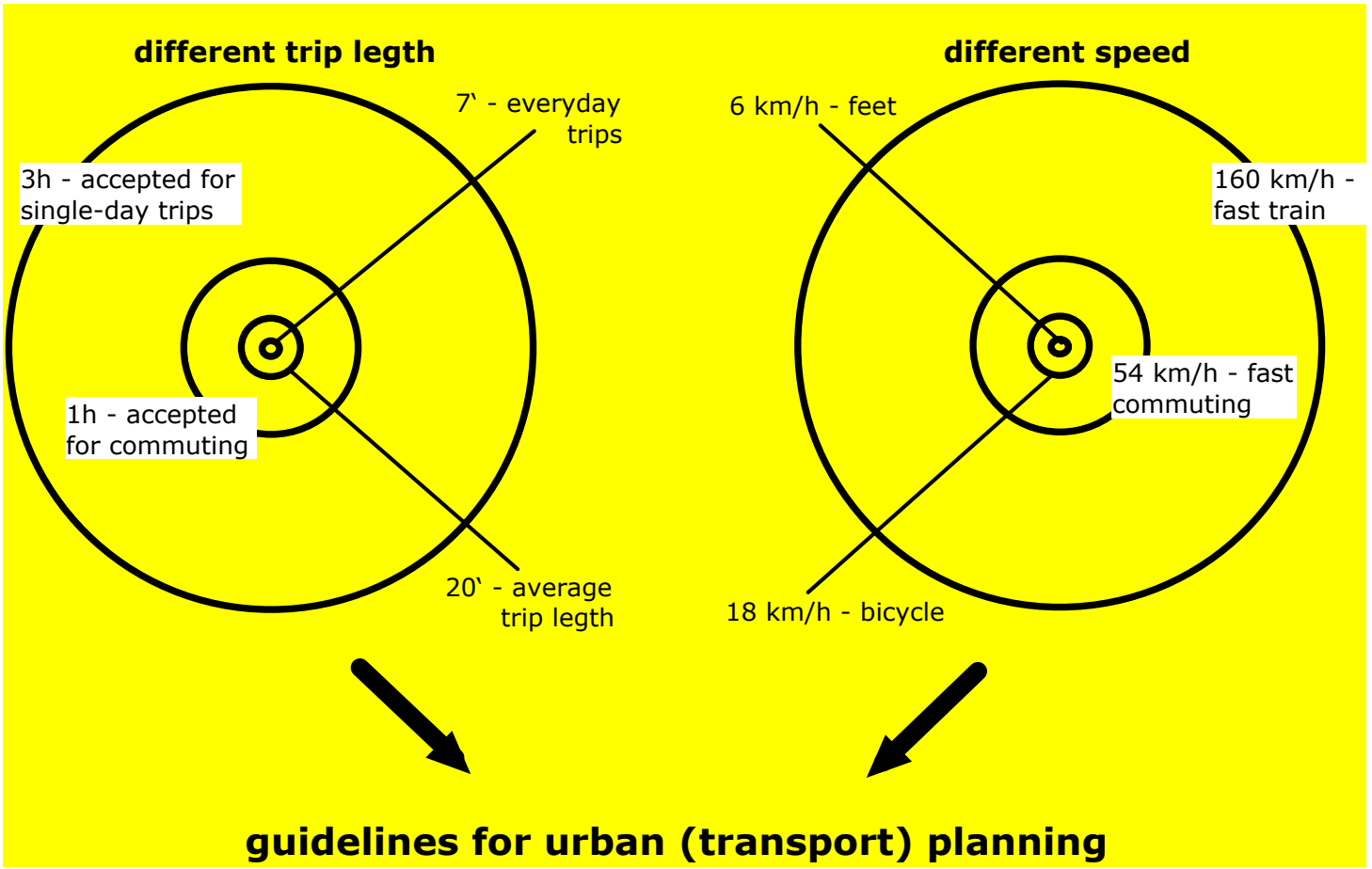
- „promotion of walking“
- „promotion of bicycling“
- „traffic calming and management of parking space“
- „additional offers in regional rail transport“
- „net-extension for street-cars“
- „enhancing energy efficiency in public road transport“
- „attractivity enhancement and marketing in local p.t.“
- „car sharing“
- „municipal fleet and mobility management“
- „optimisation of traffic flows“
- „elektro-mobility“ (to be extended or not)

Additional provisions:

- „implementation of low-emitting vehicles in regional rail transport“
- „reduced pulse intervals for street cars“
- „implementation of trolley-busses in Bremerhaven“

Enhancing Urban Structures: The factor π in transport

Accepted trip lengths can be graded stepwise by factors of approx. 3, or Pi, as well as different transport systems in terms of speed. Thus one step modifies the respective accessible area by a factor of 10.



Bottom line

Sustainable regenerative energy use in urban transport is

1st: Human energy use by pedestrians

2nd: Human energy use via bicycles and suchlike, maybe incl. some marginal extension by – regeneratively fuelled – propulsion

3rd: Use of regenerative fuels incl. electricity by p.t.

4th: Use of regenerative fuels incl. electricity by other transport means incl. cars

The appropriate planning, infrastructural and regulatory provisions thus might concentrate on

- Adequate size patterns and densities of the cities with respective balanced facilities
- Road and path networks optimized for pedestrians and bicyclists incl. places for lingering, and calming of motorized traffic
- Improvement of p.t. optimizing the usability as well as minimizing the environmental footprint

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Vielen Dank für Ihre Aufmerksamkeit !

Further information on our website:

www.wupperinst.org