TECHNISCHE UNIVERSITÄT WIEN
Vienna University of Technology

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Sustainable intermodal Mobility Concepts for Suburban Areas

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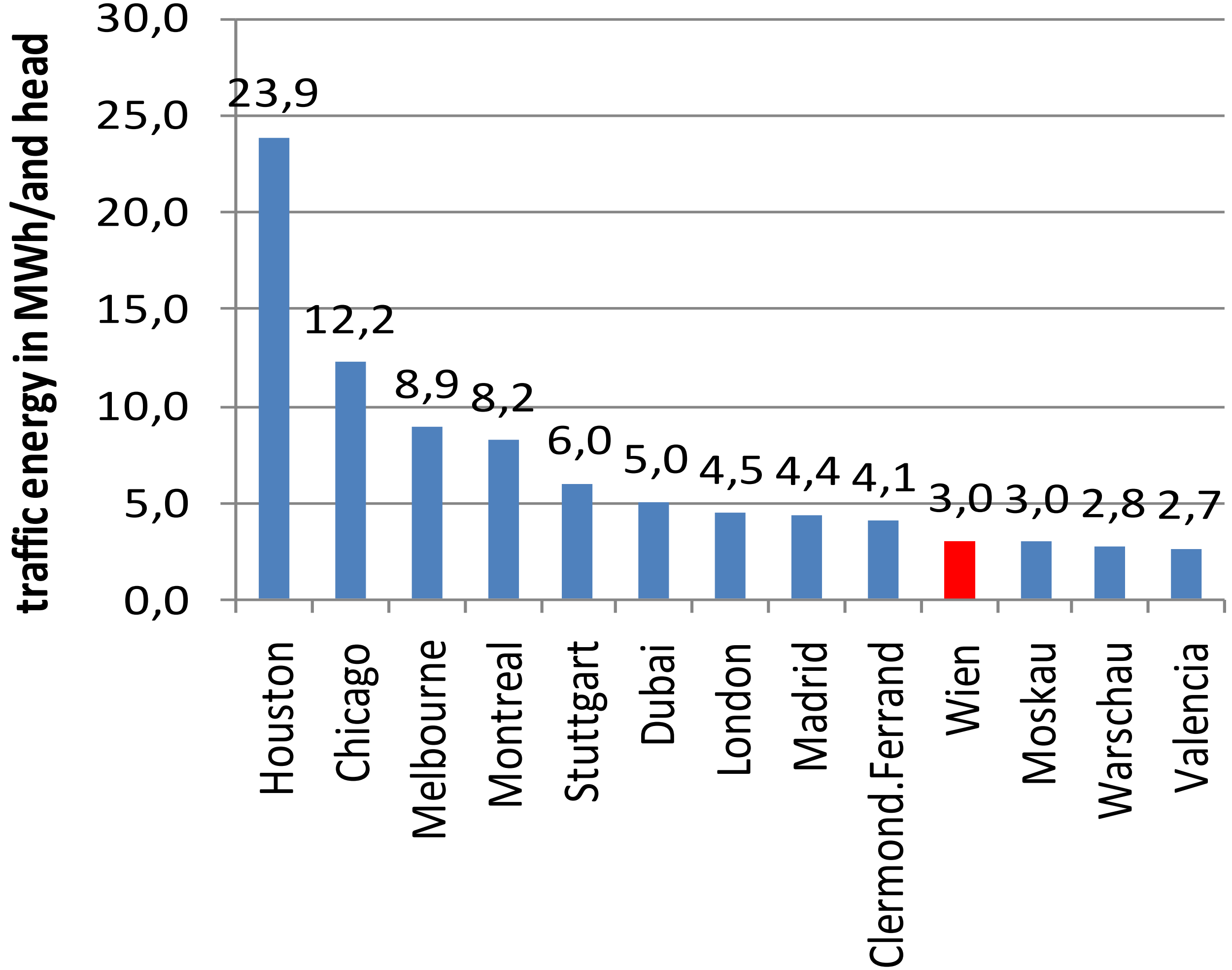
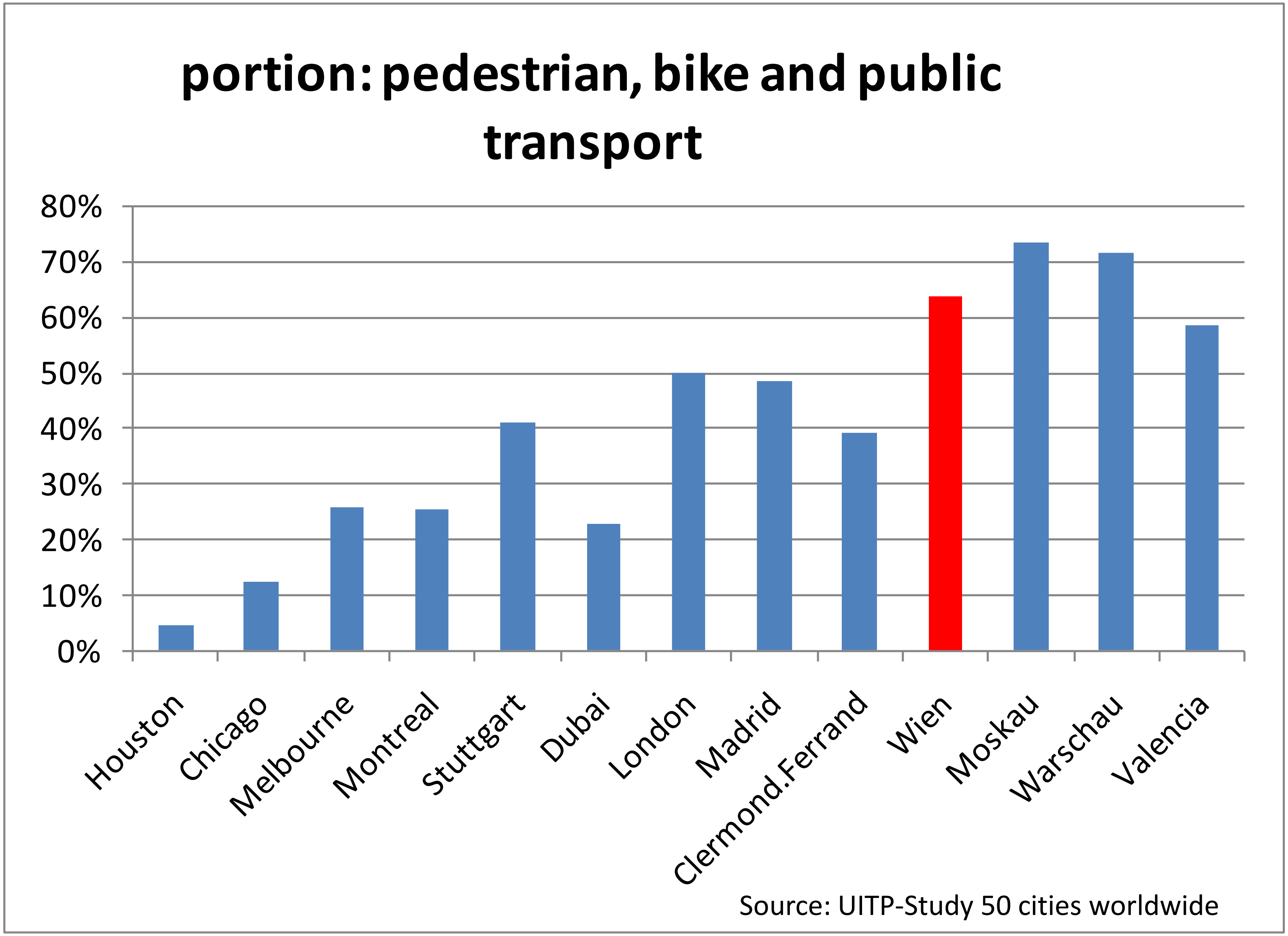
Vision: Mobility

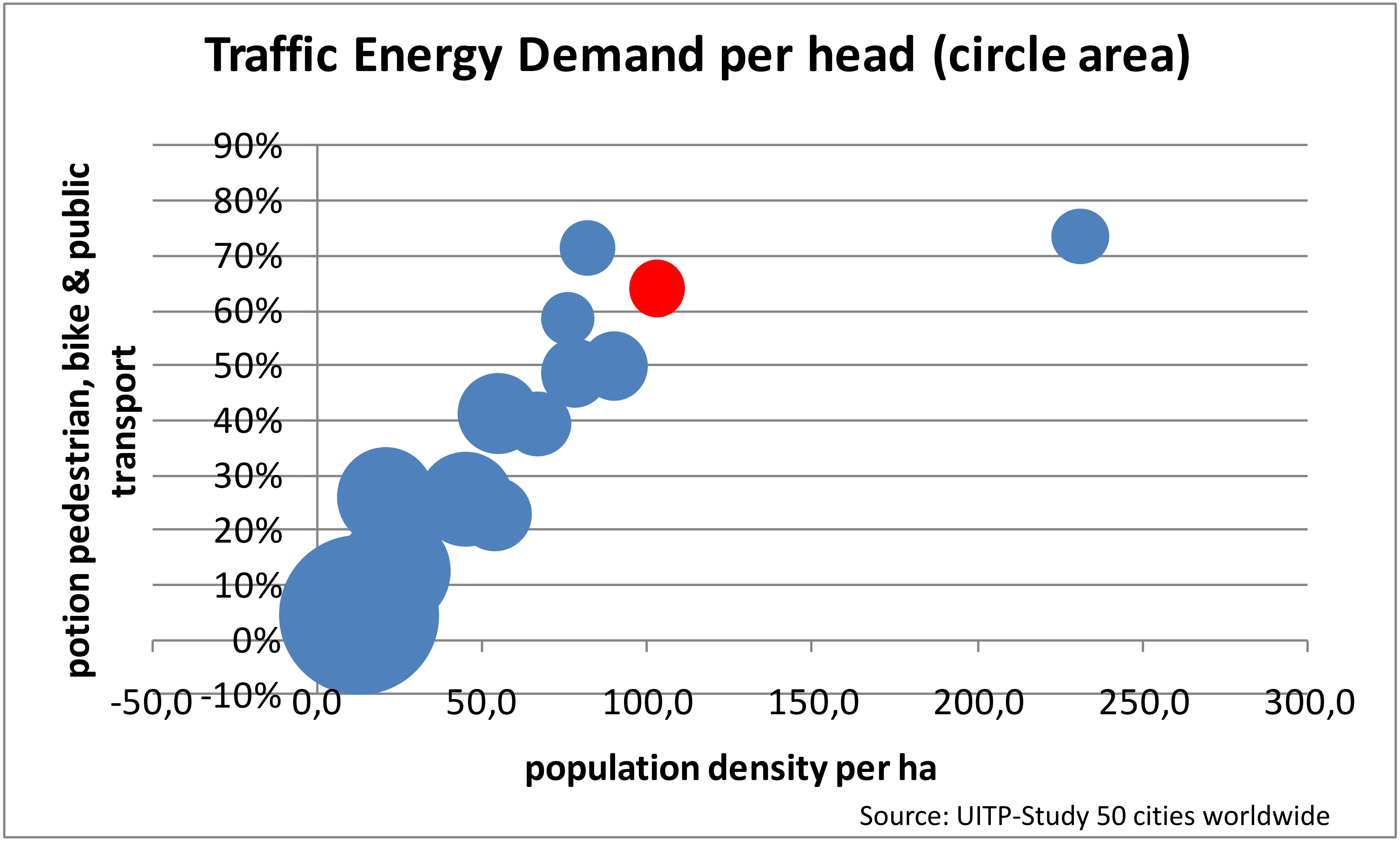
- Megacities with large suburban areas
- Tendencies for sustainability and zero emission
- Sustainable mobility in energy active settlements
- Intermodal sustainable mobility concepts
- Future role or e-vehicle for grid support (storage)

energy of traffic per head

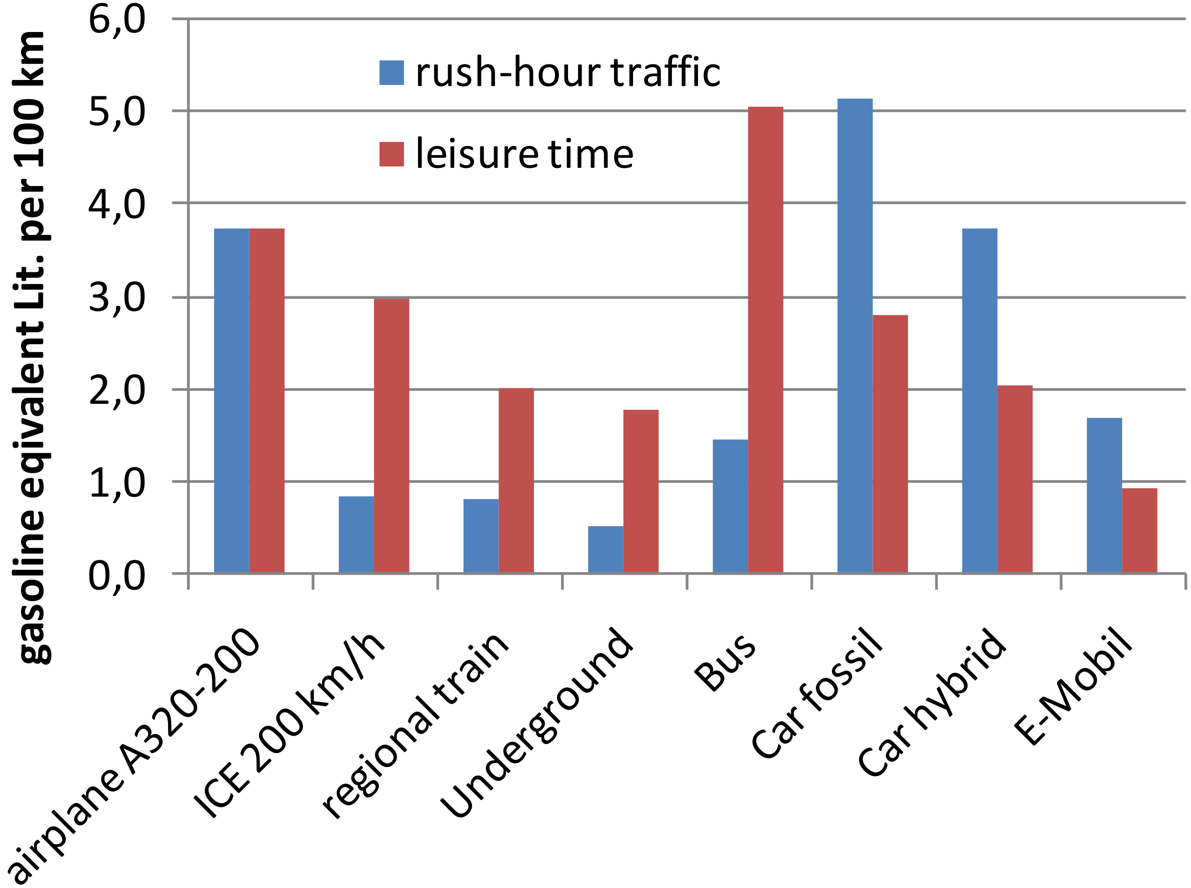


Source: UITP-Study 50 cities worldwide

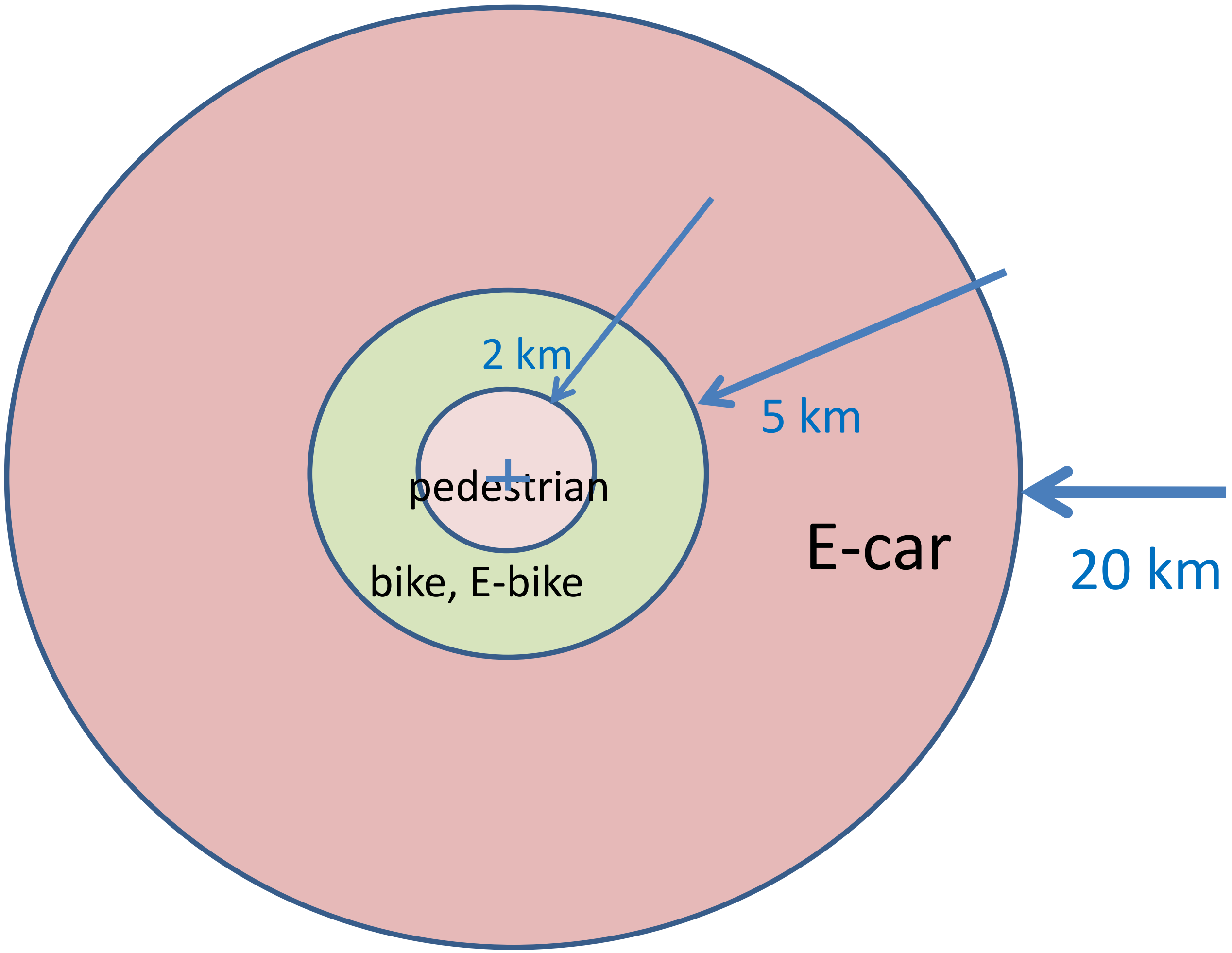

portion: pedestrian, bike and public transport
80%
70%
60%
50%
40%
30%
20%
10%
0%
Houston
Chicago
Melbourne
Montreal
Stuttgart
Dubai
London
Madrid
Clermond.Ferrand
Wien
Moskau
Warschau
Valencia
Source: UITP-Study 50 cities worldwide


Traffic Energy Demand per head (circle area)
potion pedestrian, bike & public transport
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
-10%
-50,0
0,0
50,0
100,0
150,0
200,0
250,0
300,0
population density per ha
Source: UITP-Study 50 cities worldwide

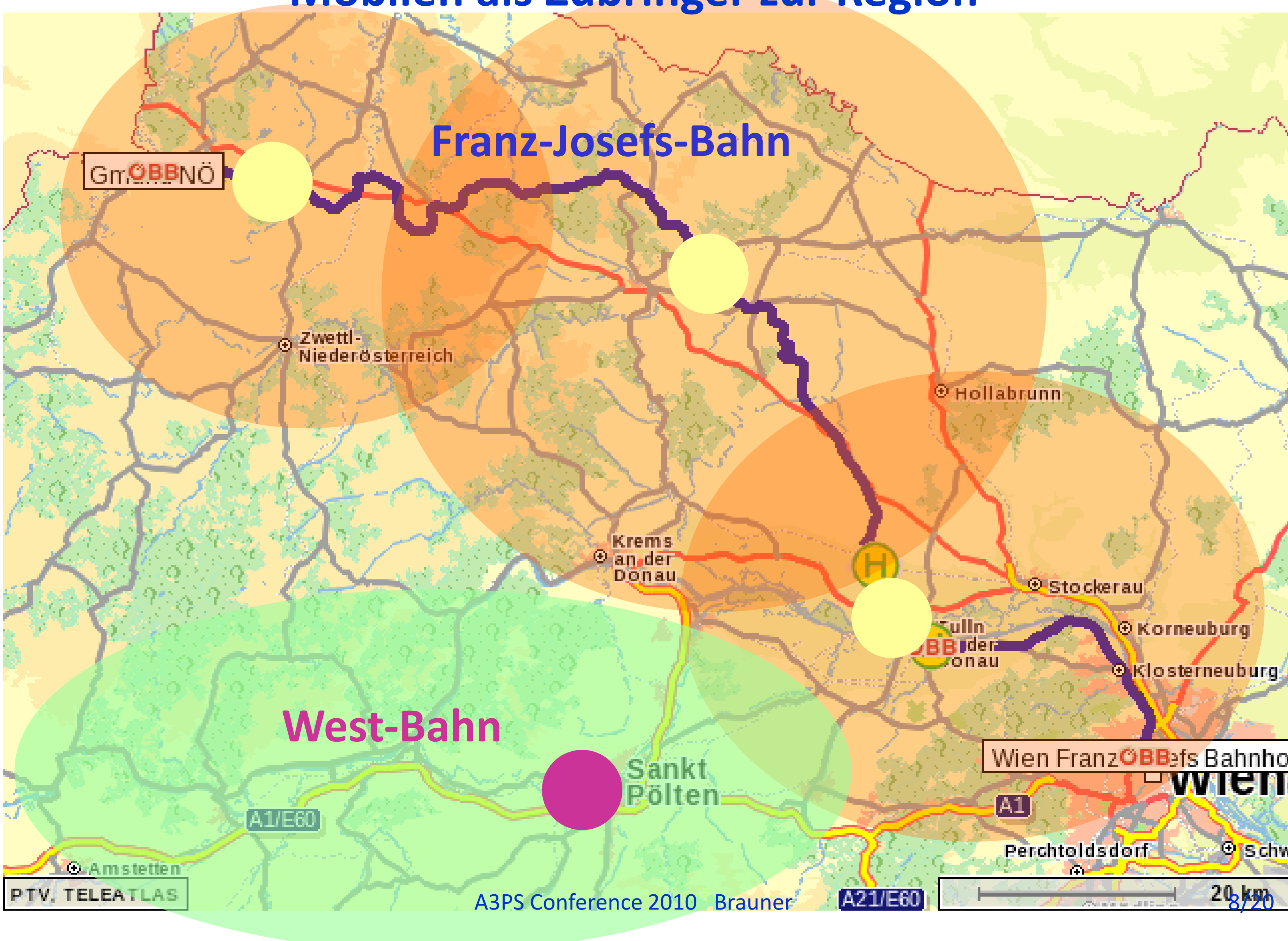
Specific Energy Demand of Suburban Traffic (rush-hour versus leisure)



Mean Distance of suburbanen Individual Traffic



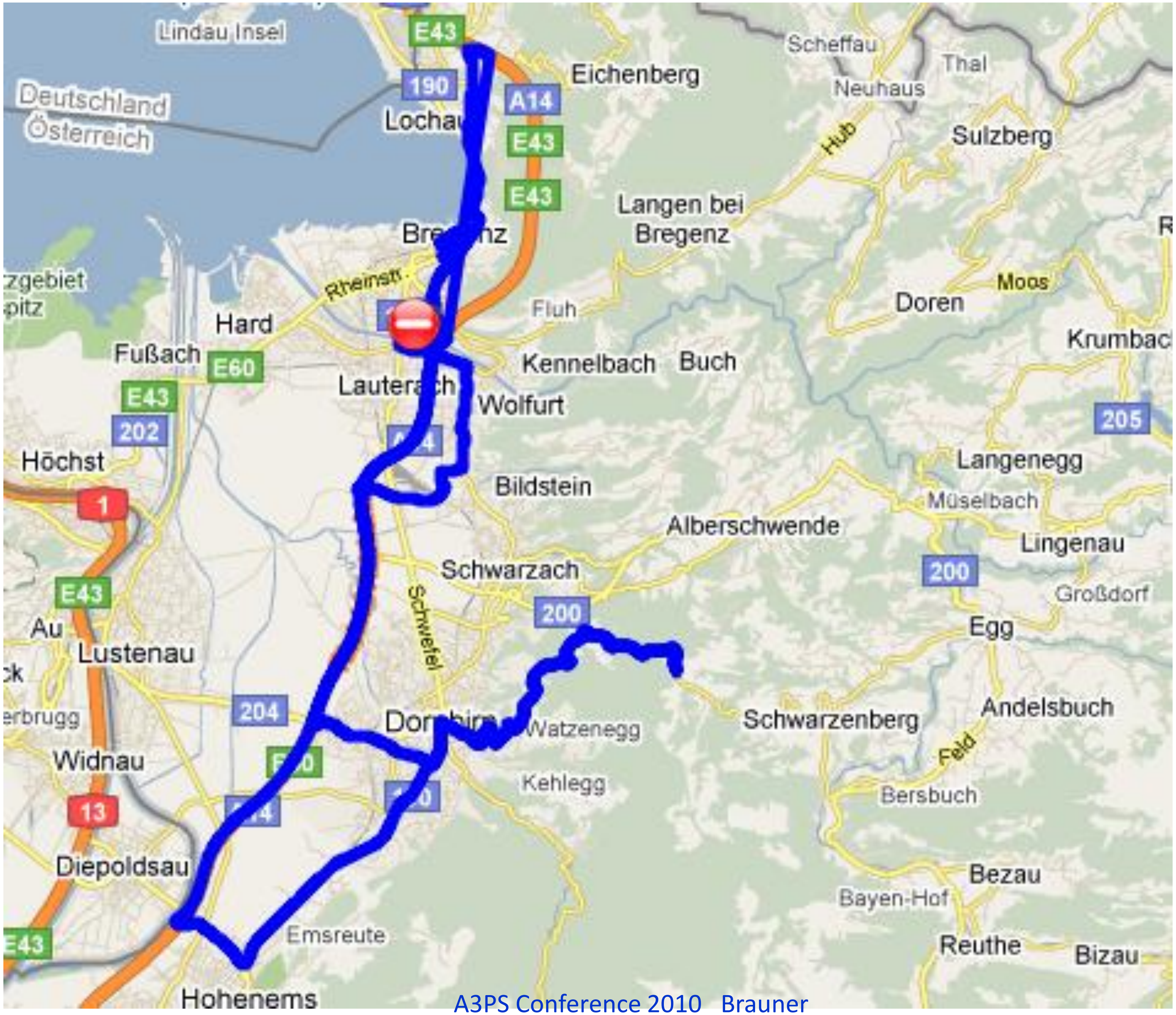
Strategie: Nebenbahnen zu Schnellbahnen machen mit E-Mobilen als Zubringer zur Region



1. Modell Region E-Mobility „VLOTTE“: 100 E-Mobiles

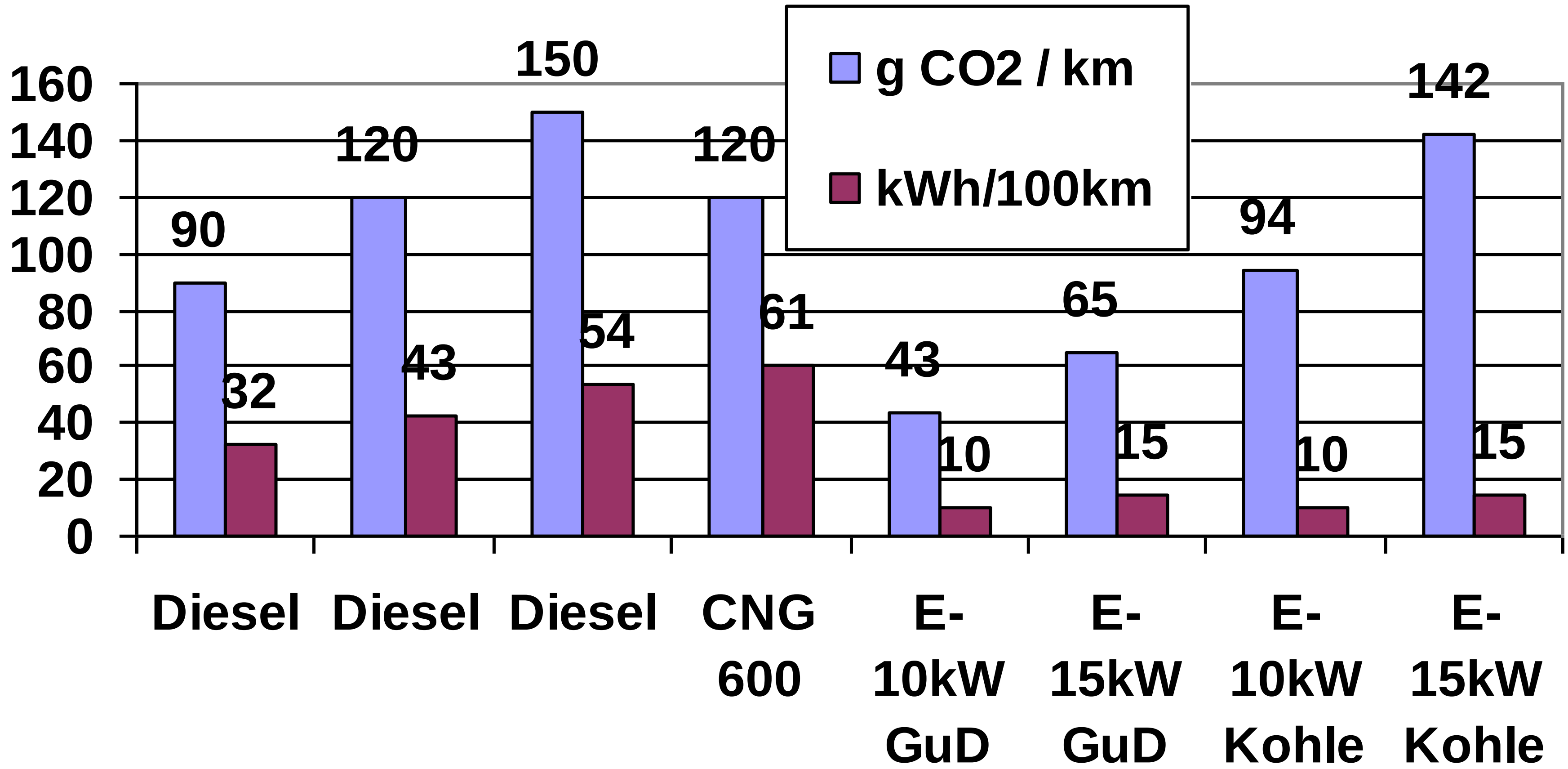
- Monitoring of car- and charging
- Energy system design
- Analysis of efficiency

VLOTTE: Analysis of Energy Demand

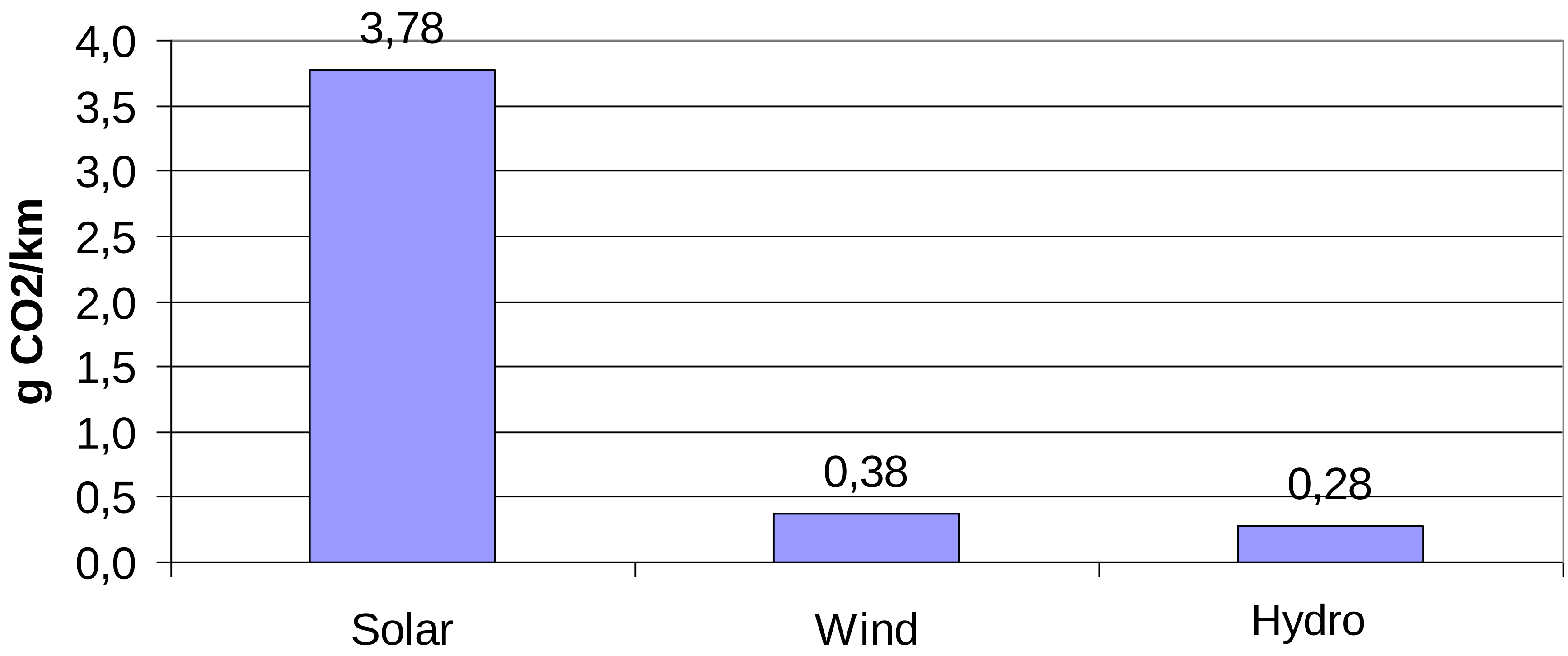


Specific emissions of Combustion Car and- und E-Mobile (Elektrizity from fossile power stations).

η(CC) = 60%, η(coal)=46% η(grid) = 95%, η(charging) = 80%. η(total CC) = 45%, η(total coal) = 35%,

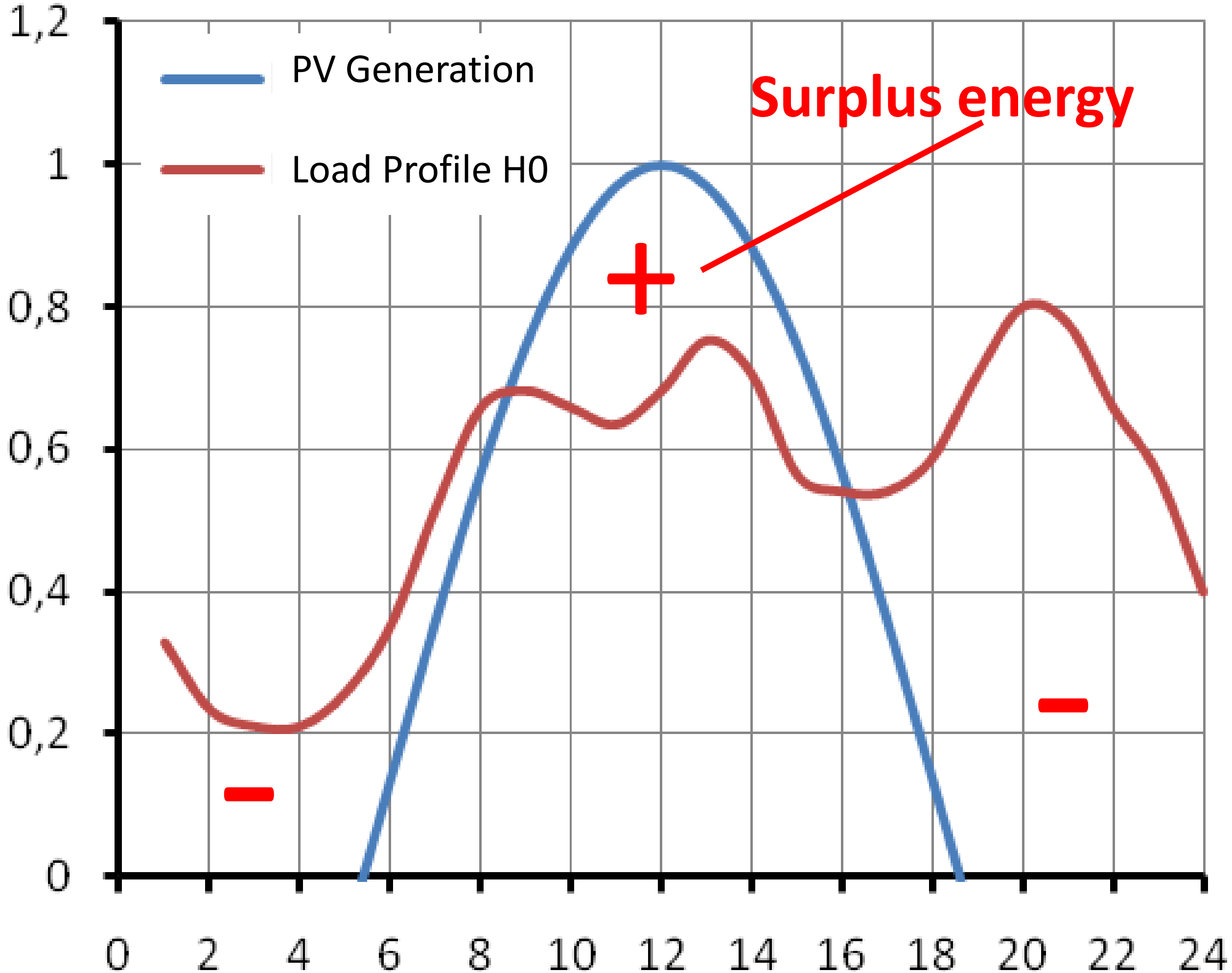


Spezifische Emissions from Sustainable Energy Sources



Energy Active Settlement with Photo Voltaic

PV-Generation and Load in an Energy Activ Settlement

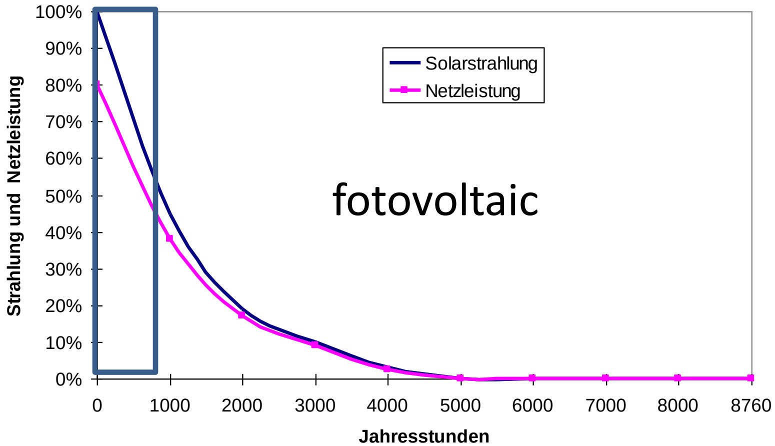


Fotovoltaic in low voltage grid

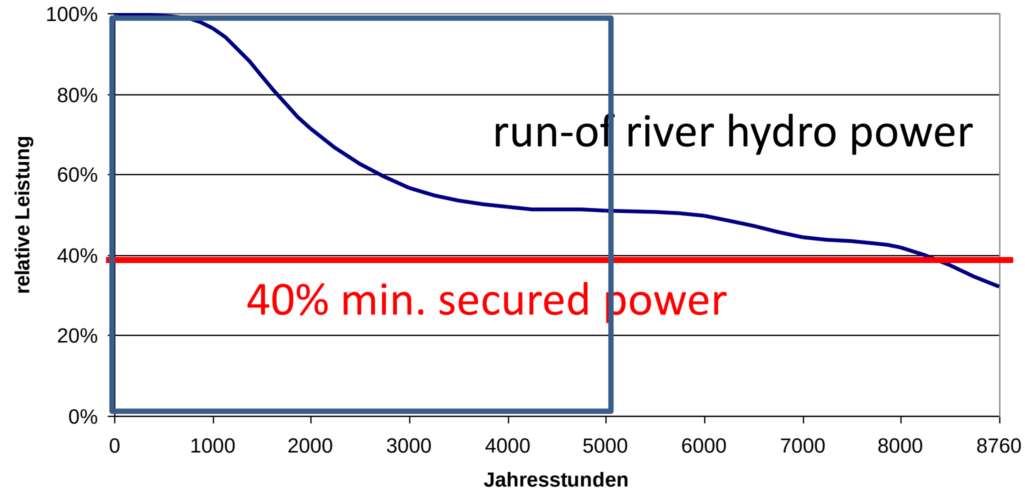
- Per car about 3 kW PV installation needed for 10.000 km/a
- Low Voltage Grid design: 2 - 3 kW PV per Household possible
- Higher installation power results in overloading of the grid if exported via the transformer
- Grid extension uneconomic, as usage only some 100 hours
- Solution:
  - Battery charging of E-Vehicles, results in reduced grid loading
  - Local generation of hydrogen by electrolysis and storage (Home Elektrolyseur) for fuel cell car

Sustainable Energy and C
(annual energy = installed power * full load hours)

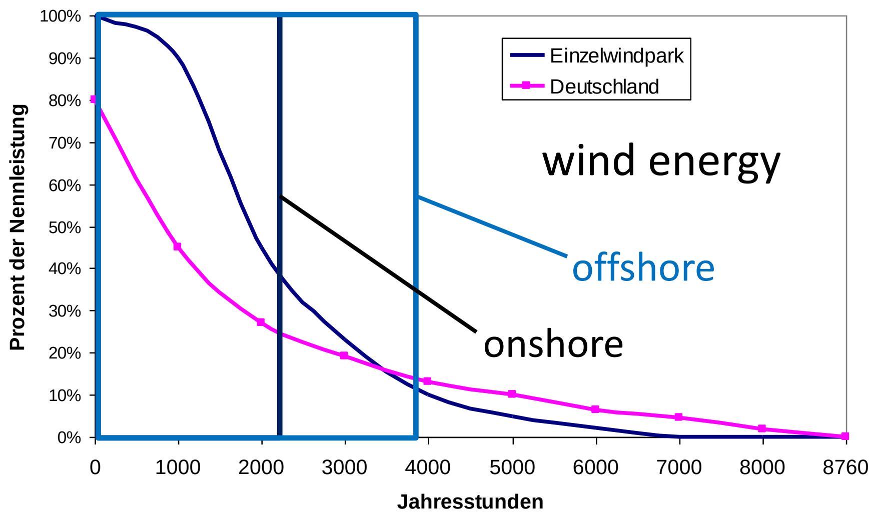
900 – 1.300 h/a   full load hours



4.500 -5.000 h/a



1.900 - 2.200 h/a



Future Influence of RES on the electrical power system

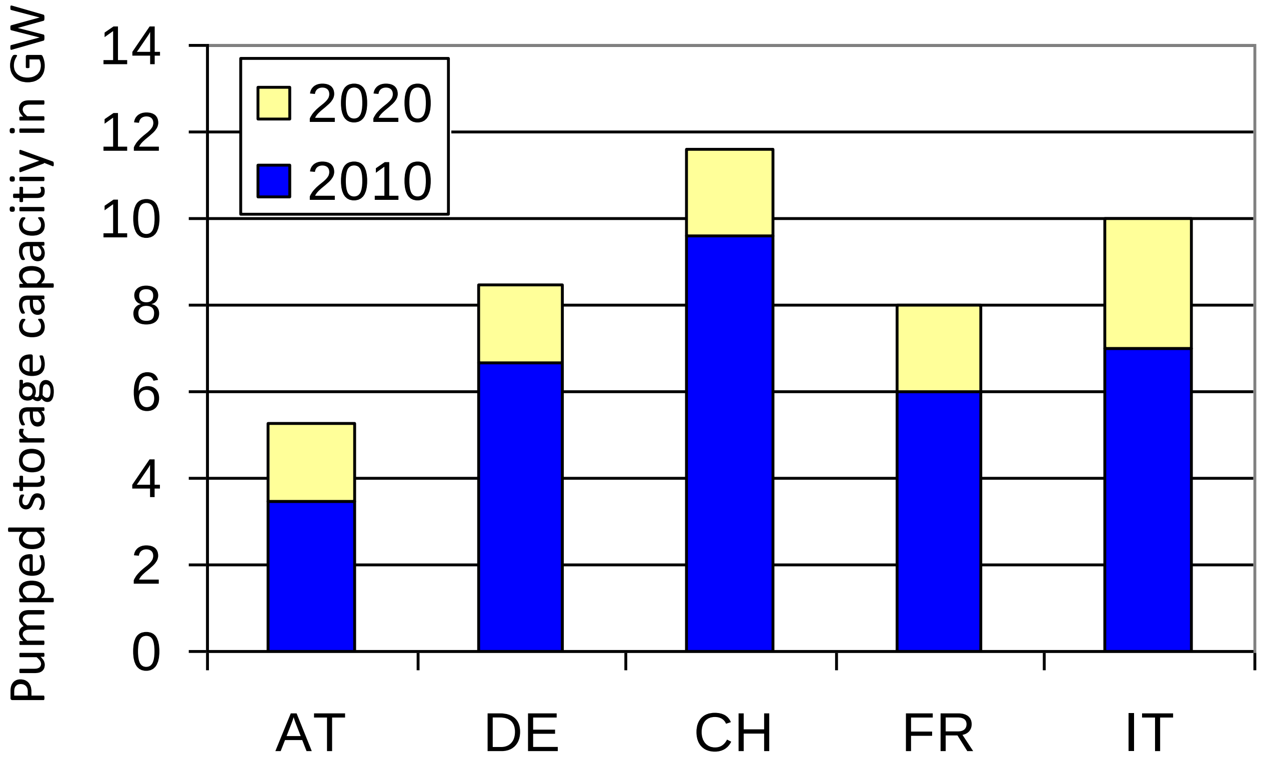
Annual energy = installed power * full load hours

RES	full load hours	inst. Power necessary for 1 GWh per year	
hydropower	5.000	0,20 MW	*Factor 1*
Wind power	2.000	0,50 MW	*Factor 2,5*
Photovoltaic	900	1,11 MW	*Factor 5,6*

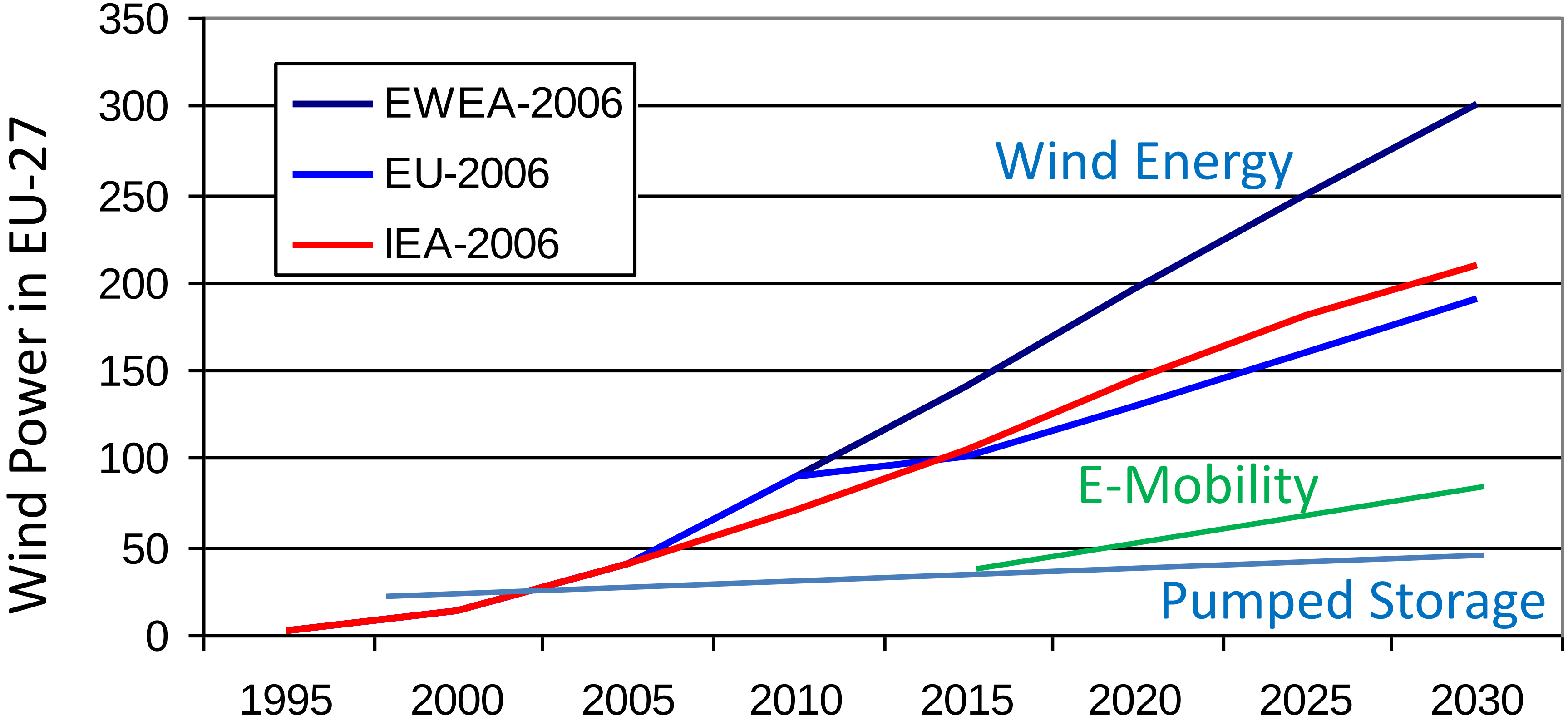
RES results in high installed power.

Problem of the future: surplus energy !

Pumped Storage Capacieties in Center Europe



Prognose des Ausbaus der Windenergie in EU-27 und des Speicherausbaus



Thank You for our Attention !

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