Wuppertal Institute
for Climate, Environment
and Energy

Sustainable urban infrastructure development

At the example of Munich 2058

Trade, urbanization and the environment

Beijing October 2009

Prof. Dr. Manfred Fischedick
Vice President

Cities have to deal with many challenges on the way to a sustainable develoment

Urbanization

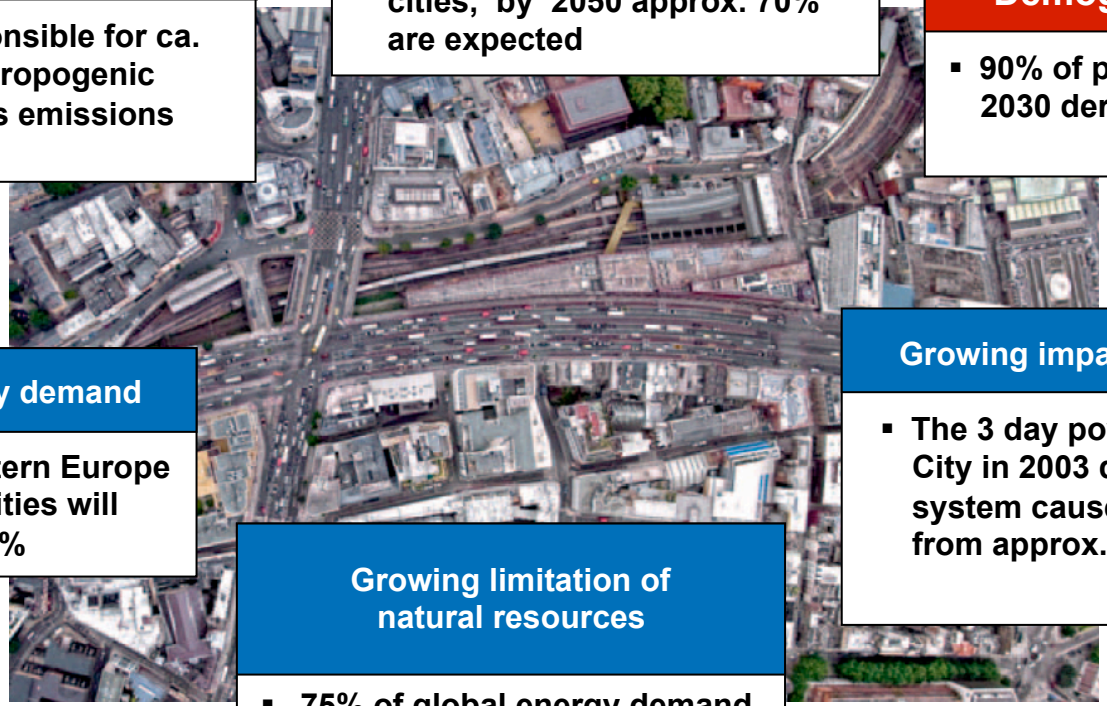
- Since 2007 more than 50% of the world population lives in cities, by 2050 approx. 70% are expected

Climate Change

- Cities are responsible for ca. 80% of the anthropogenic greenhouse gas emissions

Demographical change

- 90% of population growth until 2030 derives from cities



Growing mobilty demand

- By 2010 in Western Europe traffic jams in cities will increase by 188%

Growing impacts on the infrastructure

- The 3 day power shortage in New York City in 2003 due to overheating the system caused an economic damage from approx. 1 Mrd. US Dollar

Growing limitation of natural resources

- 75% of global energy demand comes from cities

Why Cities are crucial for climate protection

Cities...

- cover 1% of the Earth‘s surface
- are the home of about 50% of the Earth‘s population (soon 60%)

➢ Urban infrastructures …..

- use about three quarters of all energy
- emit 80% of the greenhouse gases

➢ Cities ….

- are strongly affected by climate change
- are the brains of our economies and centres of creativity and power
- 50% of cities of 2050 are still to be built
- 50% have already been built (incl. infrastructural backbones): these determine due to less efficiency to a large extent even the future energy demand
- **We need blueprints for sustainable low carbon cities**

Sustainable Munich – how to create a blueprint?
Munich 2058 – Pathways to a Carbon Free Future

- **Munich will be affected by climate change**
  - Particularly by hot summers and tropical nights
  - Potentially by severe weather events

- **Project components of concept study:**
  - Technology matrix (+100 local technologies for a CO2 free future)
  - Scenario analysis „Vision Munich 2058“
  - *Economic chances of being a low carbon frontrunner*

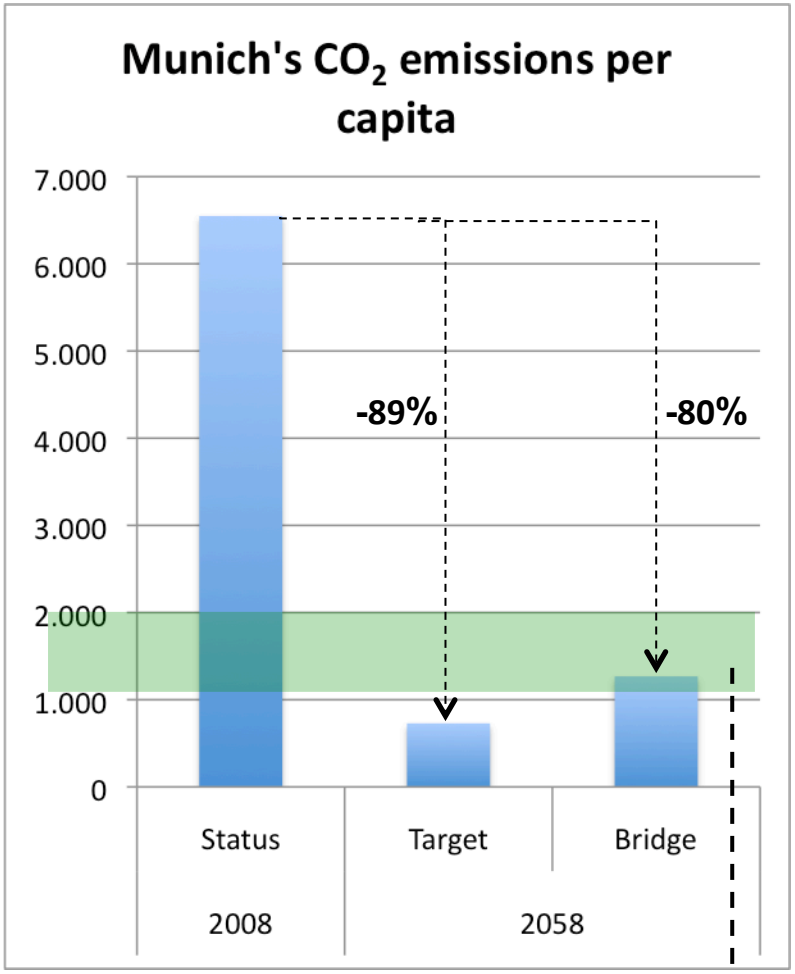
- **Munich as one of the major cities in the developed world has the responsibility to go ahead (to be a cutting-edge)**

Example Munich:
Two pathways to a carbon free city

- **We analysed the period up to 2058 (the cities 900 anniversary)**
- **As ambitious climate protection goal orientation on the EU decisions took place: The EU Environment Ministers target: 2t CO_2 equivalents per capita!**
- **We described two different ways cutting down $CO_{2,eq}$ emissions to 2 tons per capita annually**

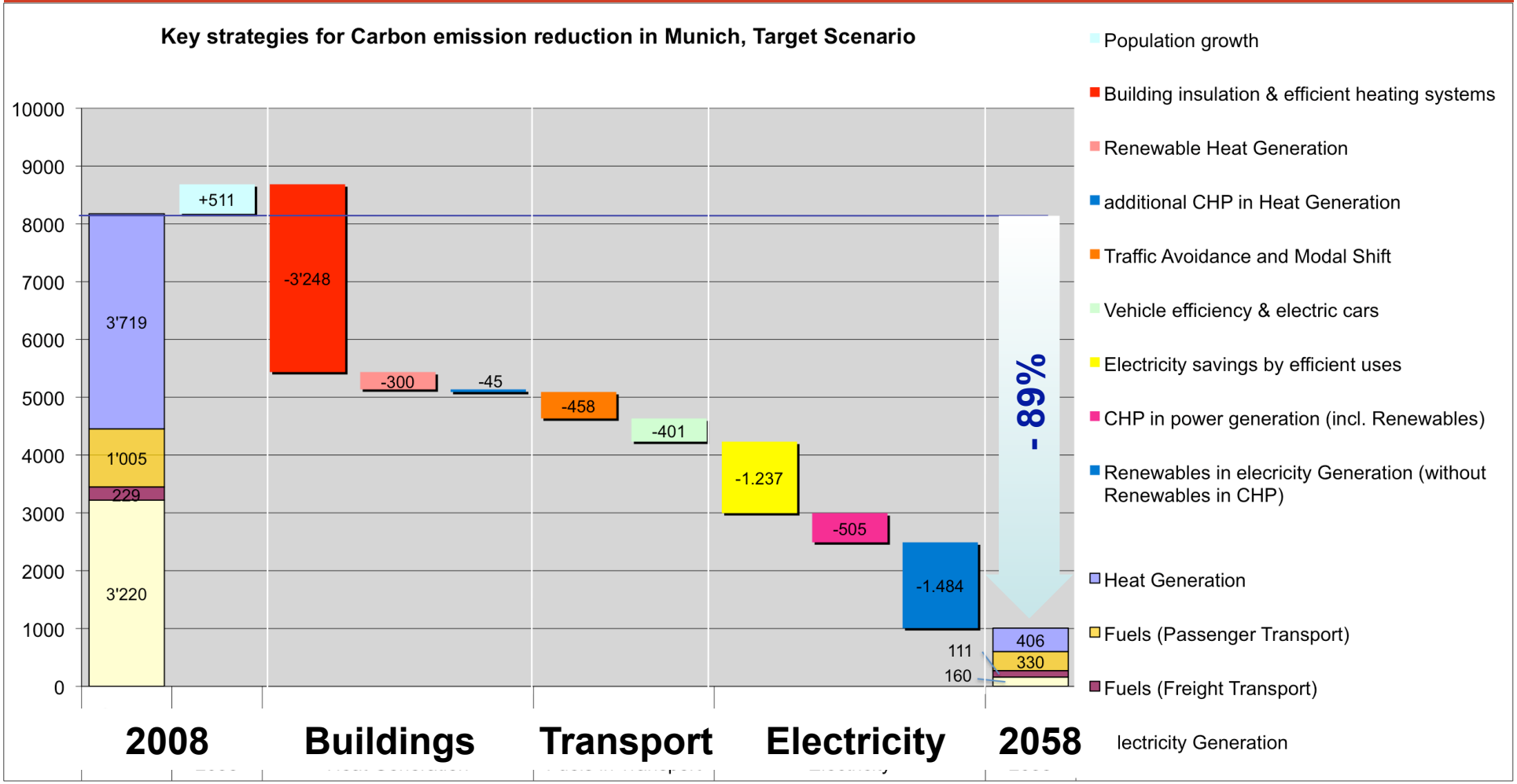
750 kgs in the „Target“ Scenario (more ambitious target)

1.300 kgs in the „Bridge“ Scenario (corresponds to 2 t CO_{2eq}/a



There is no silver bullet: Key levers to reduce CO_2 in Munich

in the „Target“ Scenario



Source: Wuppertal Institute 2009

Three Guiding Principles for
Redesigning Urban Infrastructures

- Become **highly efficient in all sectors** of demand (households, service sector, industry if relevant and transport); i.e. significantly less energy is consumed to achieve the same level of convenience and utility.

- **Adapt** their heating, electrical, and transport **infrastructures** to accommodate a demand that has been substantially reduced (appropriate and adapted infrastructure solutions, e.g. district heating systems).

- **Convert** their **energy base** to renewable and low-carbon energy sources.

Climate protection is not only a challenge but may be a success story from economic point of view

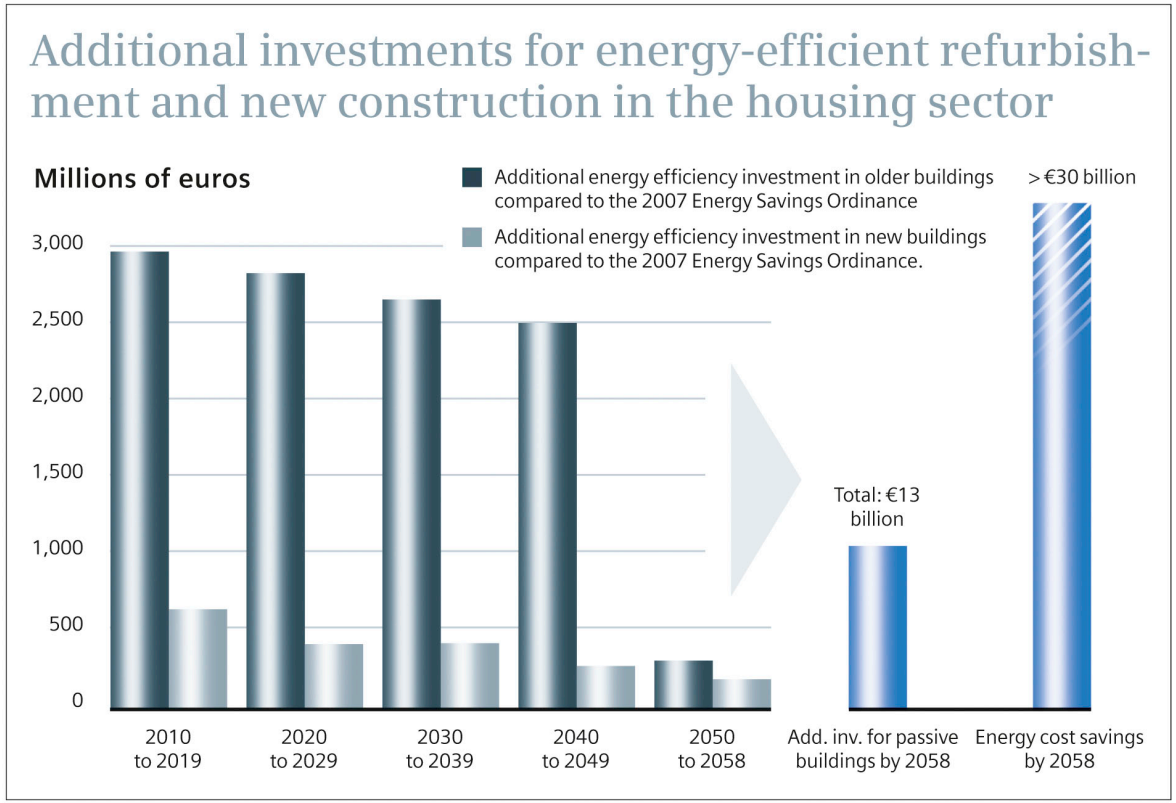
Investments in energy saving technologies often due to energy cost saving

Example: improving the insulation of private dwelling

- **Marginal investments from 200 EUR**
- **Annul energy cost saving per capita until 2058:**

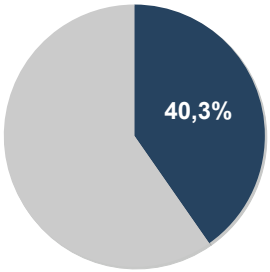
  1.200 – 2.000 € per capita

- **Energy saving helps to reduce energy dependence (insurence against increasing energy prices)**

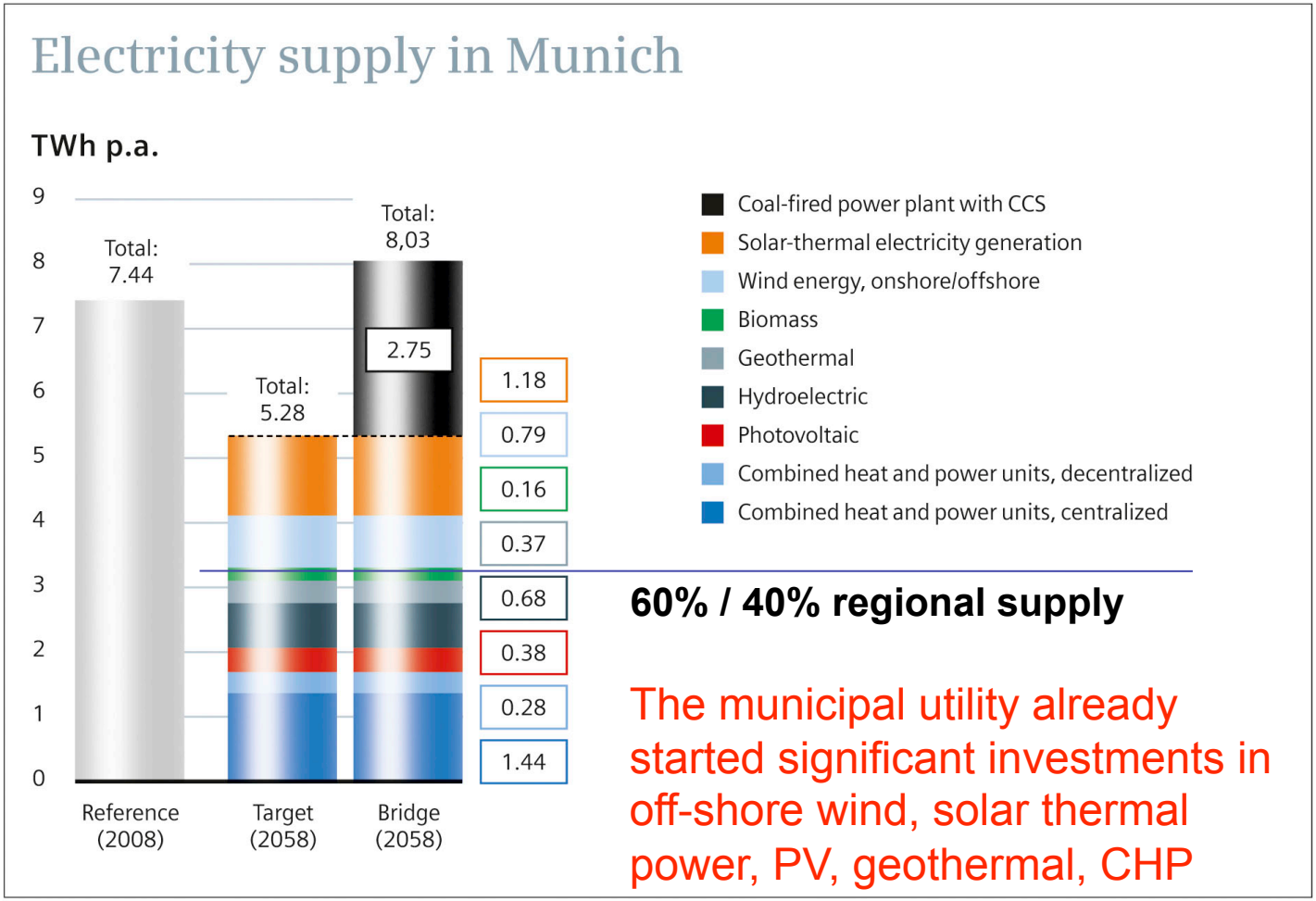


Electricity Generytion can be almost completely converted to Low Carbon Supply

First real steps have been taken

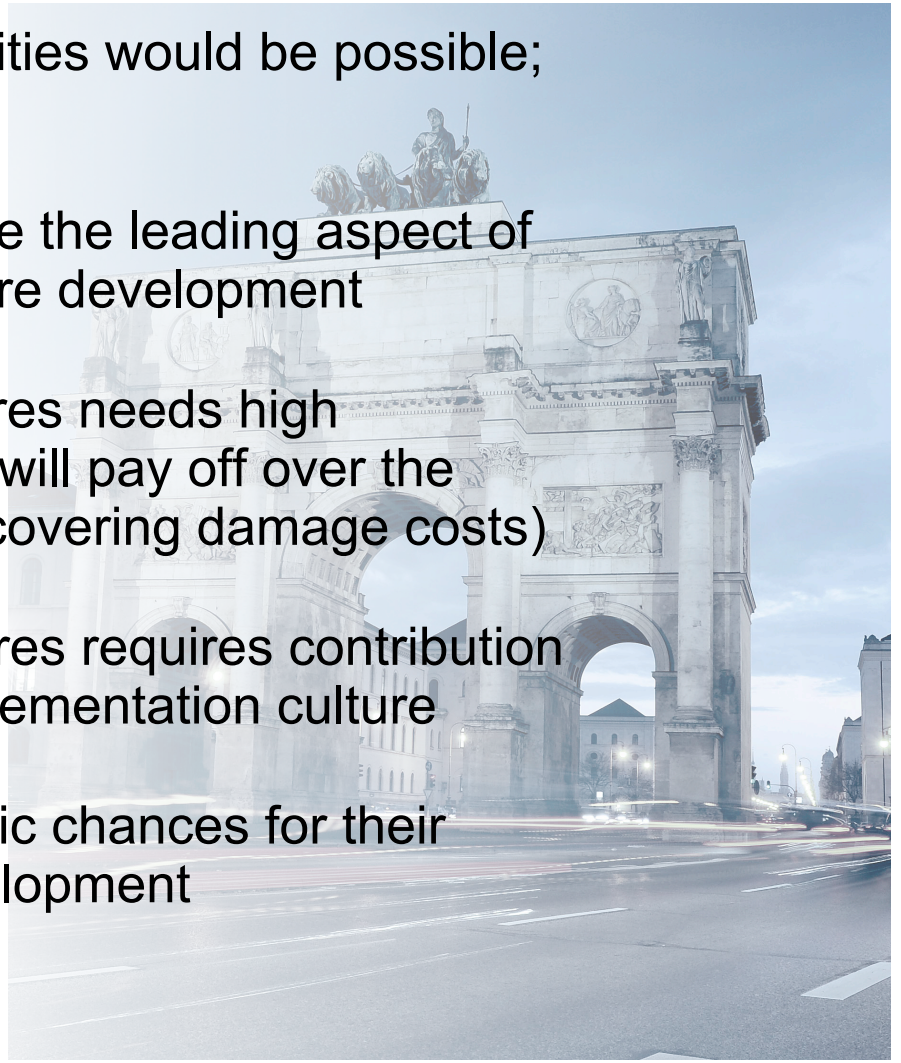


Electricity: 40.3% of CO_2-Emissions



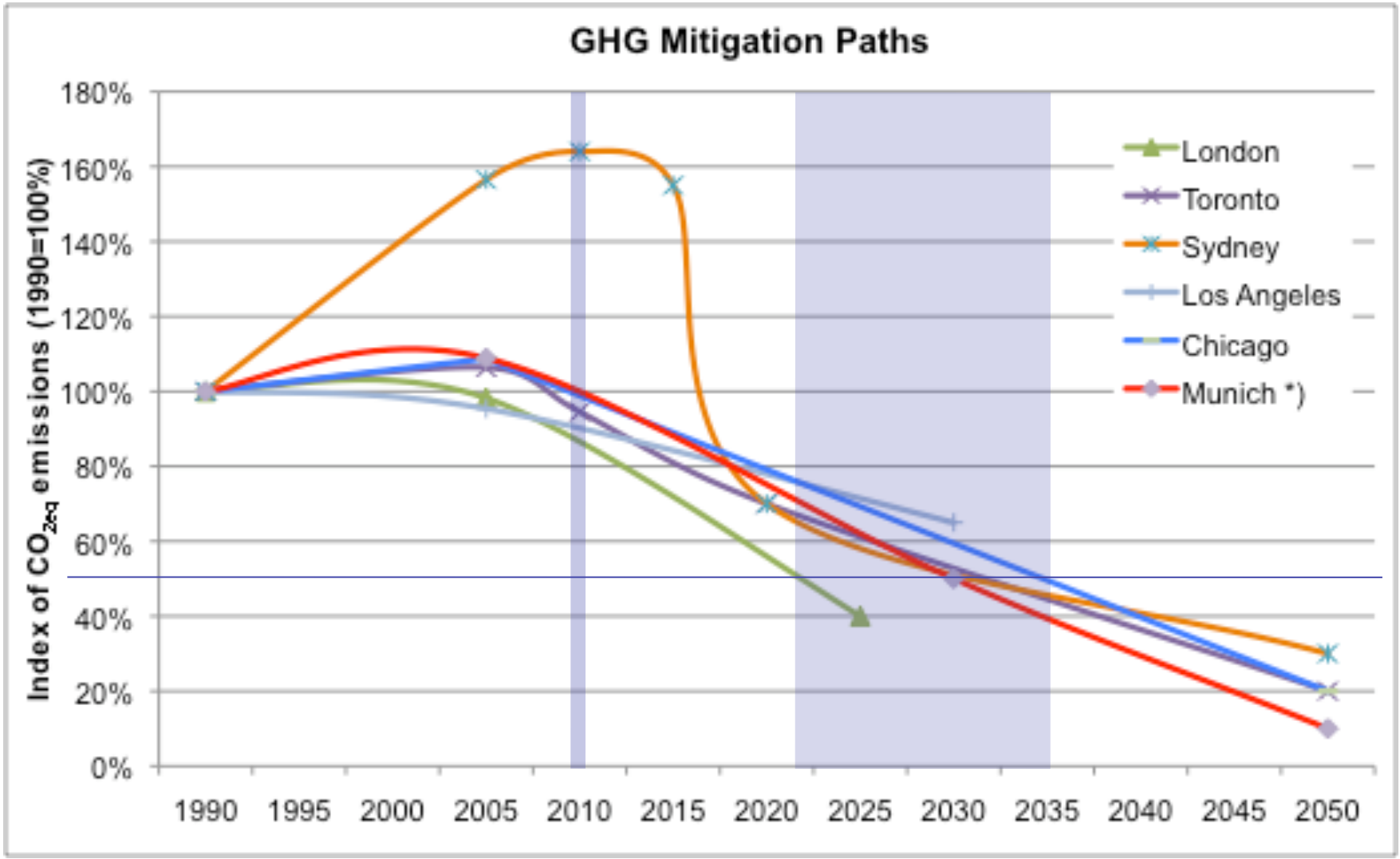
We need to Convert our Cities Infrastructures Towards Sustainable Low Carbon Metabolisms

- From a technology point low carbon cities would be possible; but technology alone won‘t do the job
- Low carbon strategies have to become the leading aspect of urban planning and urban infrastructure development
- Low carbon redesign of urban structures needs high investment, however, this investment will pay off over the lifetime (avoid adaptation needs and covering damage costs)
- Transformation of (urban) infrastructures requires contribution of all stakeholders and a suitable implementation culture
- First movers can secure high economic chances for their economy and their overall urban development



Munich is not alone - low Carbon Targets of Major Cities

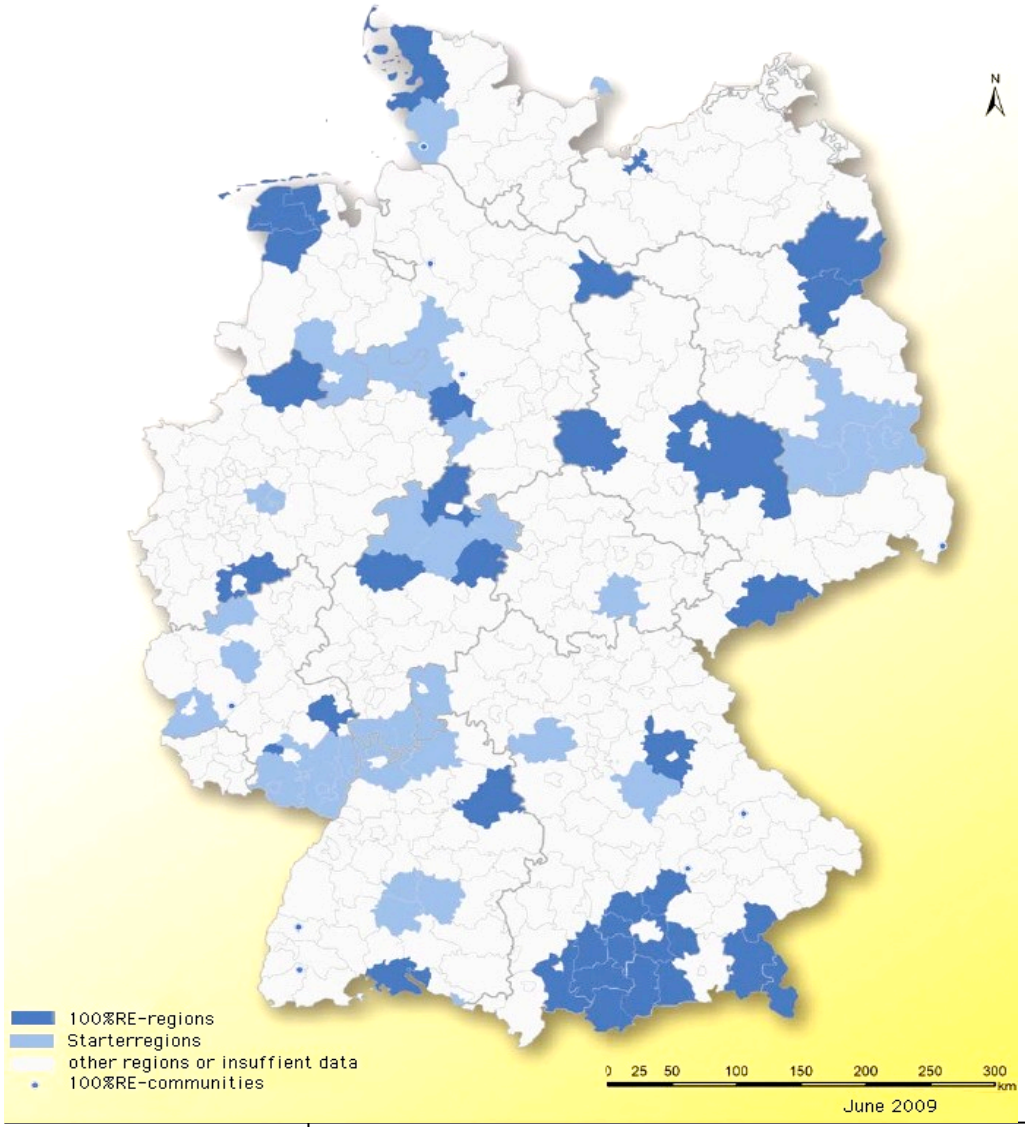
CO_2 Reduction relative to 1990

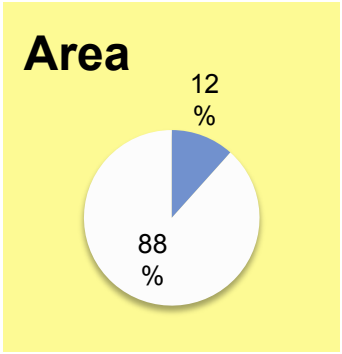


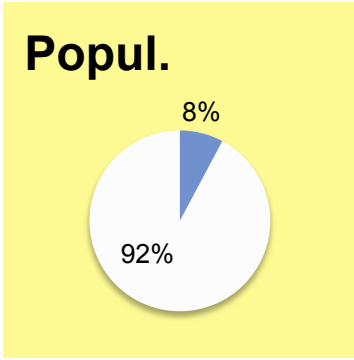
*) 2050: Study by WI

Munich is not alone - smaller Cities Try to Get Energy Autonomous

100%-Renewable-Energy-Regions in Germany







- Political decision towards 100% renewable energy
- Main barriers are co-ordination and lack of funds
- Aim: sustainable and complete change towards renewable energy as well as reducing energy use
- Using regional sustainable energy sources

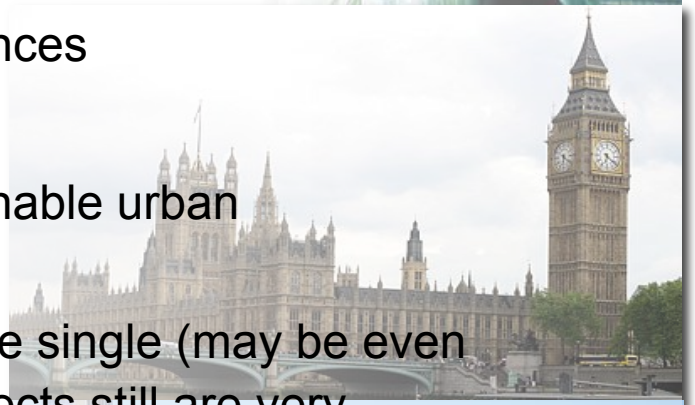
Munich is not alone - low Carbon Cities in China

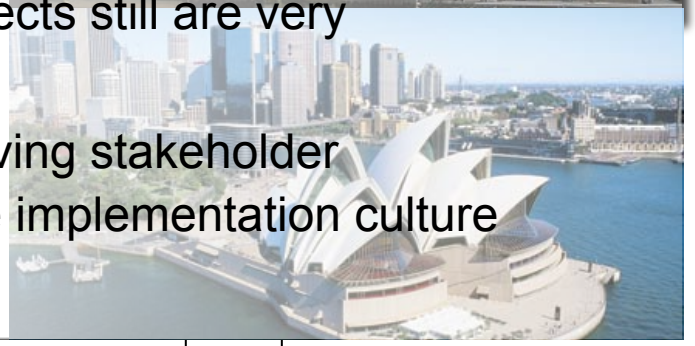
Nowadays, "low-carbon cities" are favorable across China. Many cities, such as Zhuhai, Shenzhen, Hangzhou, Guiyang, Jilin, Nanchang, Guangyuan, Ganzhou, Wuxi, have put forward the concept of low-carbon cities.

Zhuhai and Jilin have applied for setting up low-carbon economy pilots. Hangzhou has put forward to develop low-carbon industry and a low-carbon city and plans to build a low-carbon museum.

Conclusion
Current Status of Discussion and steps to go

- **Cities: From targets to concrete roadmaps**
  - Many cities have already set themselves ambitious goals
  - However, they are lacking
    - clear ideas what low carbon cities are
    - a already very well defined implementation road map to get there
    - the funding power and personal compentences
- **Urban planning:**
  - Is a crucial actor to redesign low carbon sustainable urban infrastructures
  - However, low carbon urban design is not yet the single (may be even not the leading) goal: social and economic aspects still are very important
  - Urban planning can only be successful with having stakeholder preferences in mind and establishing a suitable implementation culture





Conclusion
Current Status of Discussion and steps to go

- **Specific aspects at the urban level:**
  - How to empower infrastructure planning to push low carbon investment?
  - How to regulate and organise sector policies like transport? (e.g. London's congestion charge)
  - How to exploit the local potentials of communication, awareness rising and network creation? (including issues of lifestyle change)
  - How to improve multi level governance with cities as important actors?
  - How to determine the economics of shifting urban development to a different pathway? (including co-benefits)

There are many questions left, of course, but we are at the beginning of a dynamic movement

Wuppertal Institut
für Klima, Umwelt, Energie
GmbH

Thank you for your attention!

Have you visited our website?
http://www.wupperinst.org