Wuppertal Institute
for Climate, Environment
and Energy

LCS and sustainable urban development

At the example of Munich 2058

LCS-Research Net

1st Annual Meeting, Bologna

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Structures

Overview

- Why cities?
- Core strategies for low carbon urban infrastructures
  – The example of Munich 2058
- What is the current discussion on the urban level?
- Some ideas on the current status of research and research questions

Wy Cities…

Cities...

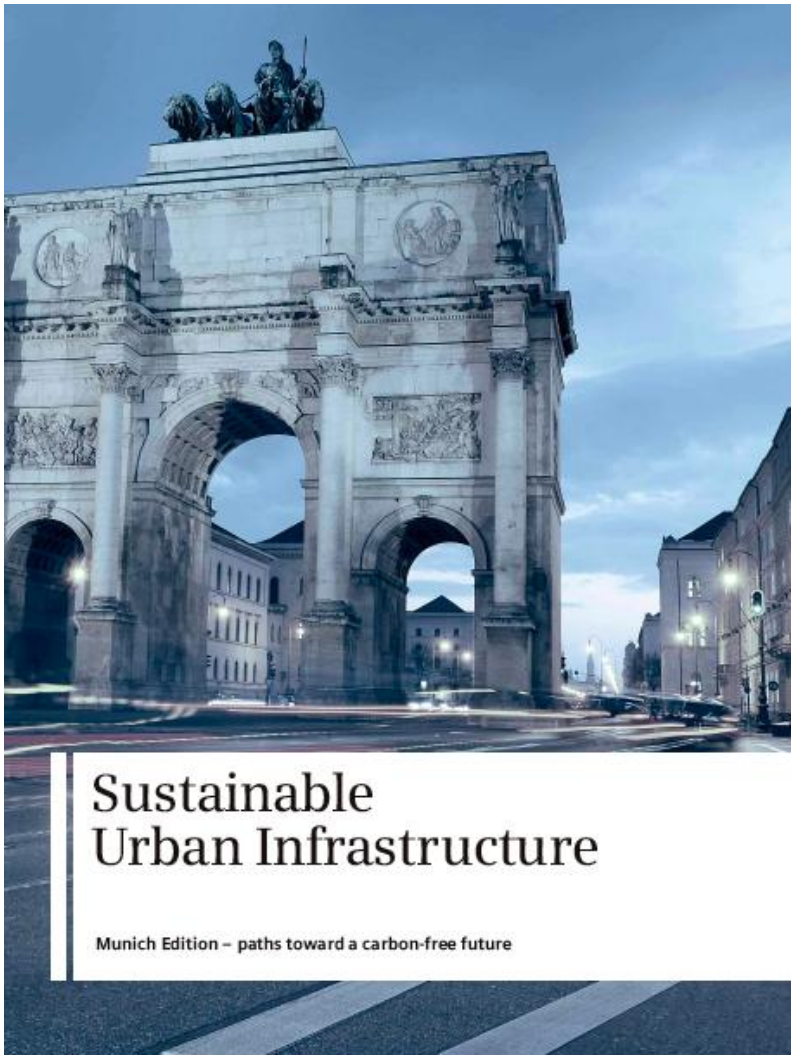
- cover 1% of the Earth‘s surface
- are the home of about 50% of the Earth‘s population (soon 60%)

- 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
  - We need blueprints for sustainable low carbon cities

Example:
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:**
  - Technology matrix
    (+100 local technologies for a CO2 free future)
  - Scenario analysis „Vision Munich 2058“
  - Two scenarios (Target & Bridge)
    750 / 1300 kg CO2/cap
  - Pilot district „CO2 free“ by 2038
  - *Economic chances of being a low carbon frontrunner*
- **Blueprint for the restructuring of cities**
  - 50% of cities of 2050 are still to be built
  - 50% have been already built (including infrastructural backbones) and these determine to a large extent the new

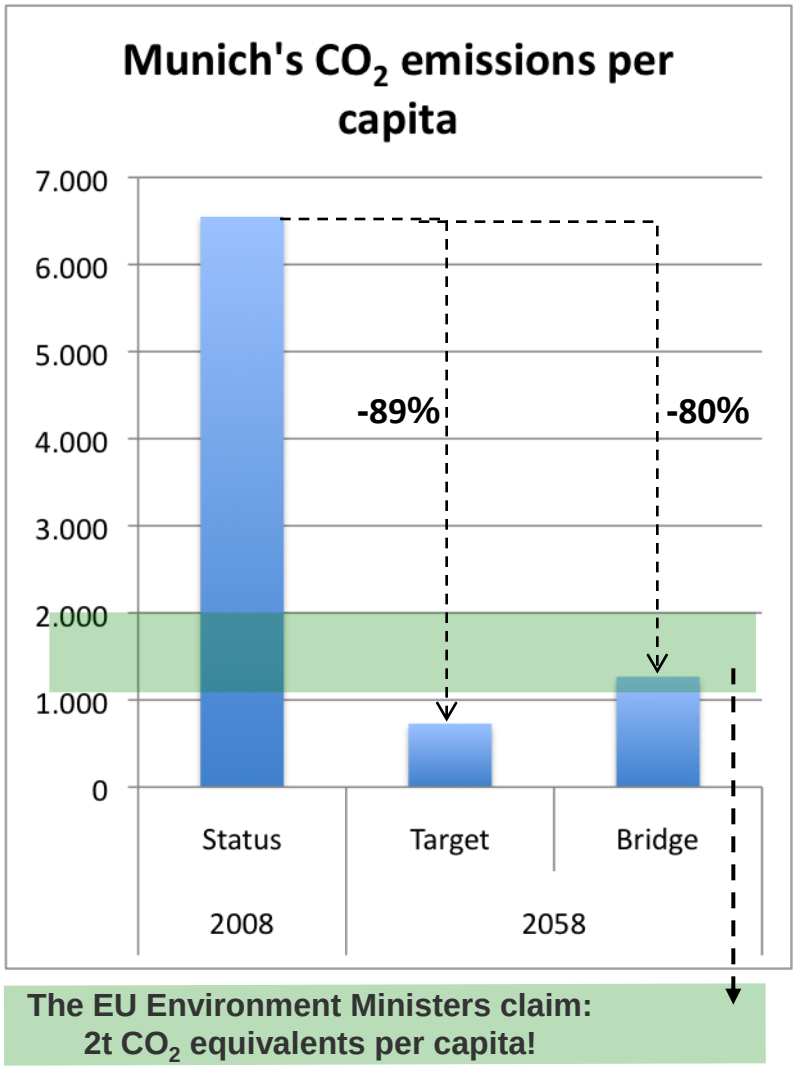


Example Munich:
Two pathways to a carbon free city

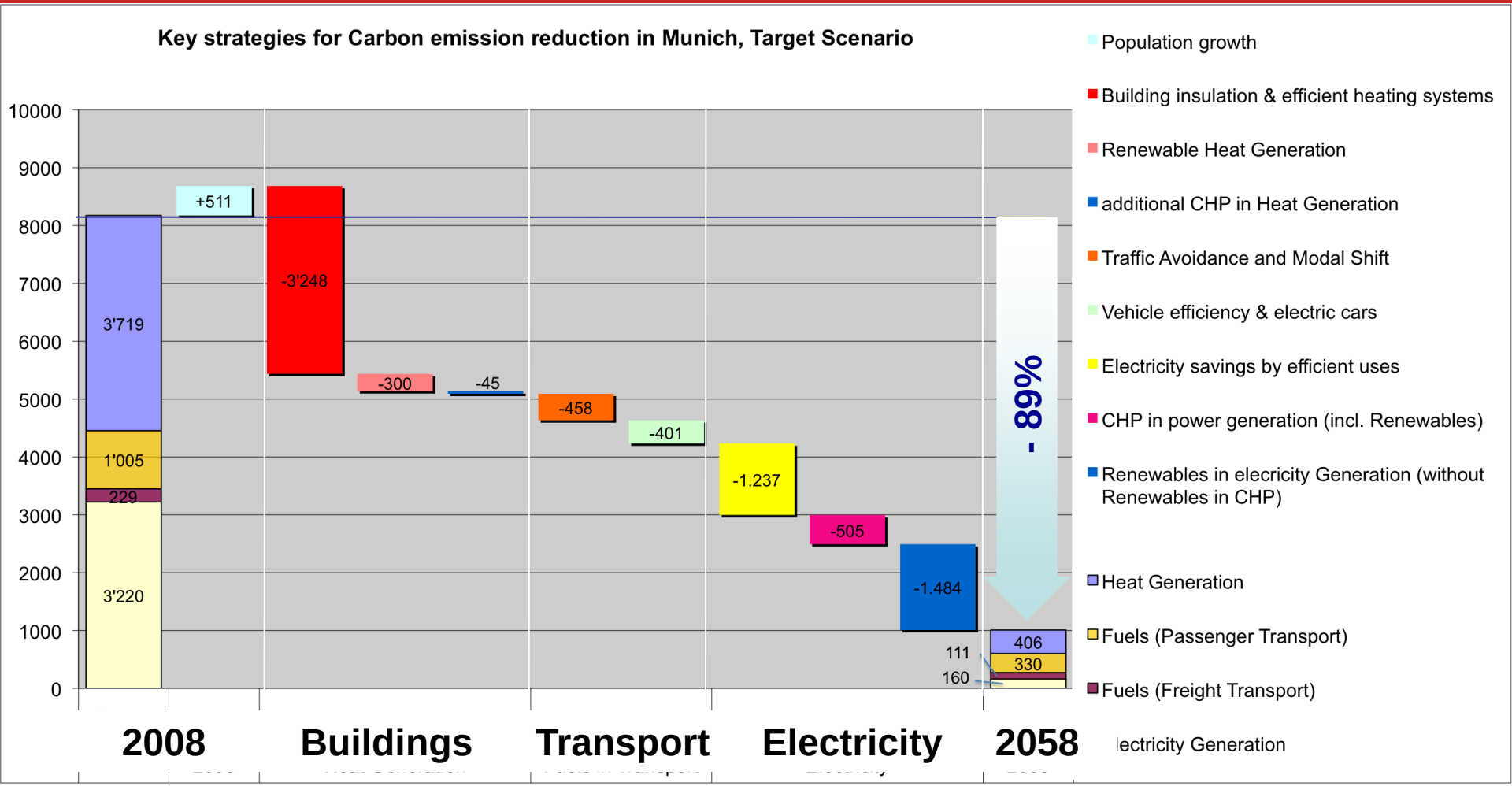
- **There are different ways to cut down CO_2 emissions to 2 tons per capita annually**
- **We analysed the period up to 2058 (the cities 900 anniversary**

750 kgs in the „Target“ Scenario

1.300 kgs in the „Bridge“ Scenario

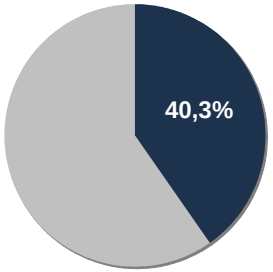


Key levers to reduce CO_2 in Munich
in the „Target“ Scenario

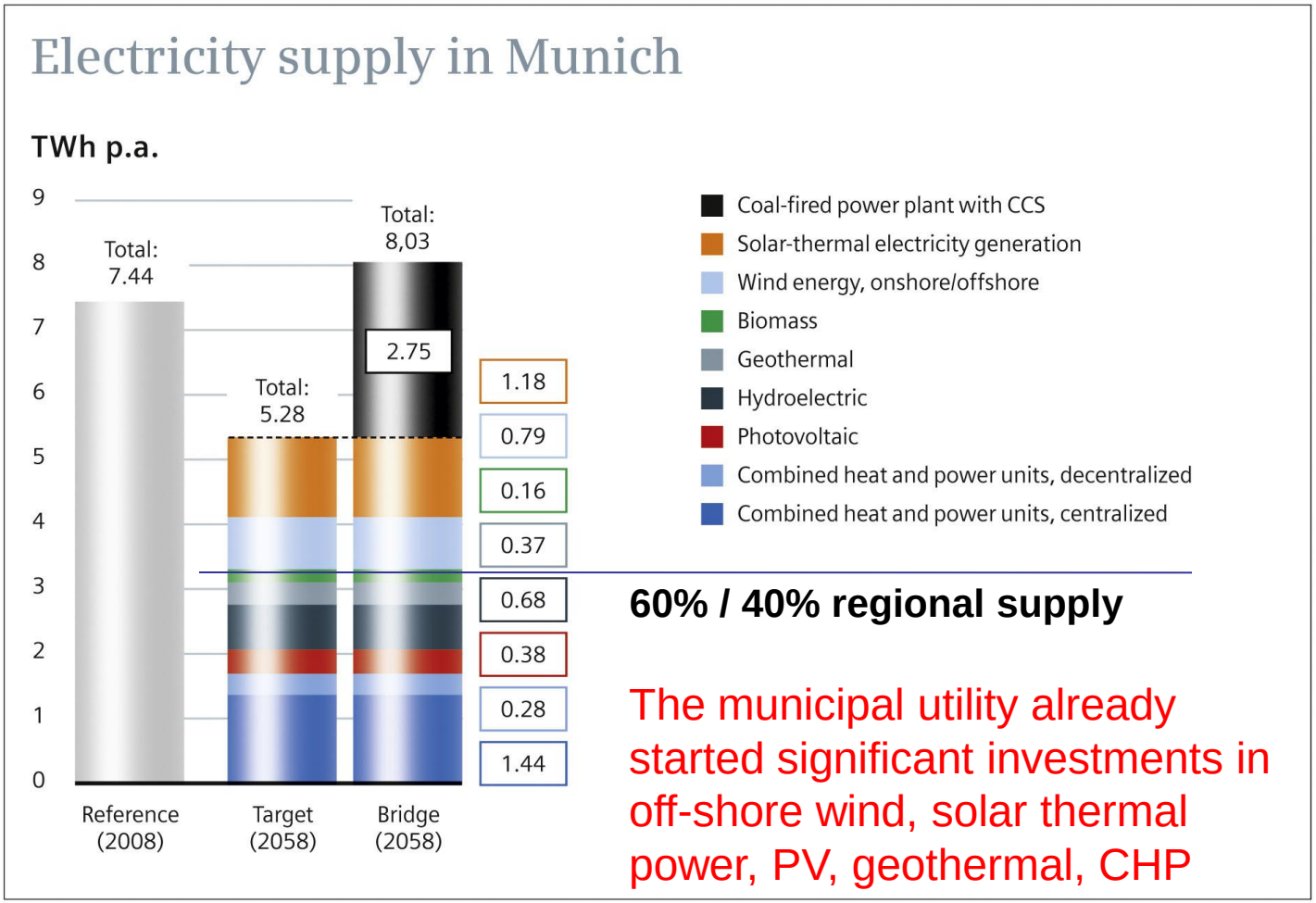


Source: Wuppertal Institute 2009

Electricity Generytion can be Almost Completely Converted to Low Carbon Supply



Electricity: 40.3% of CO_2-Emissions



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 through greater efficiency and to support this demand reduction by appropriate infrastructure solutions.

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

What are Cities Already Doing?

plaNYC A Greener, Greater New York

London CO_2: Action Today to Protect Tomorrow

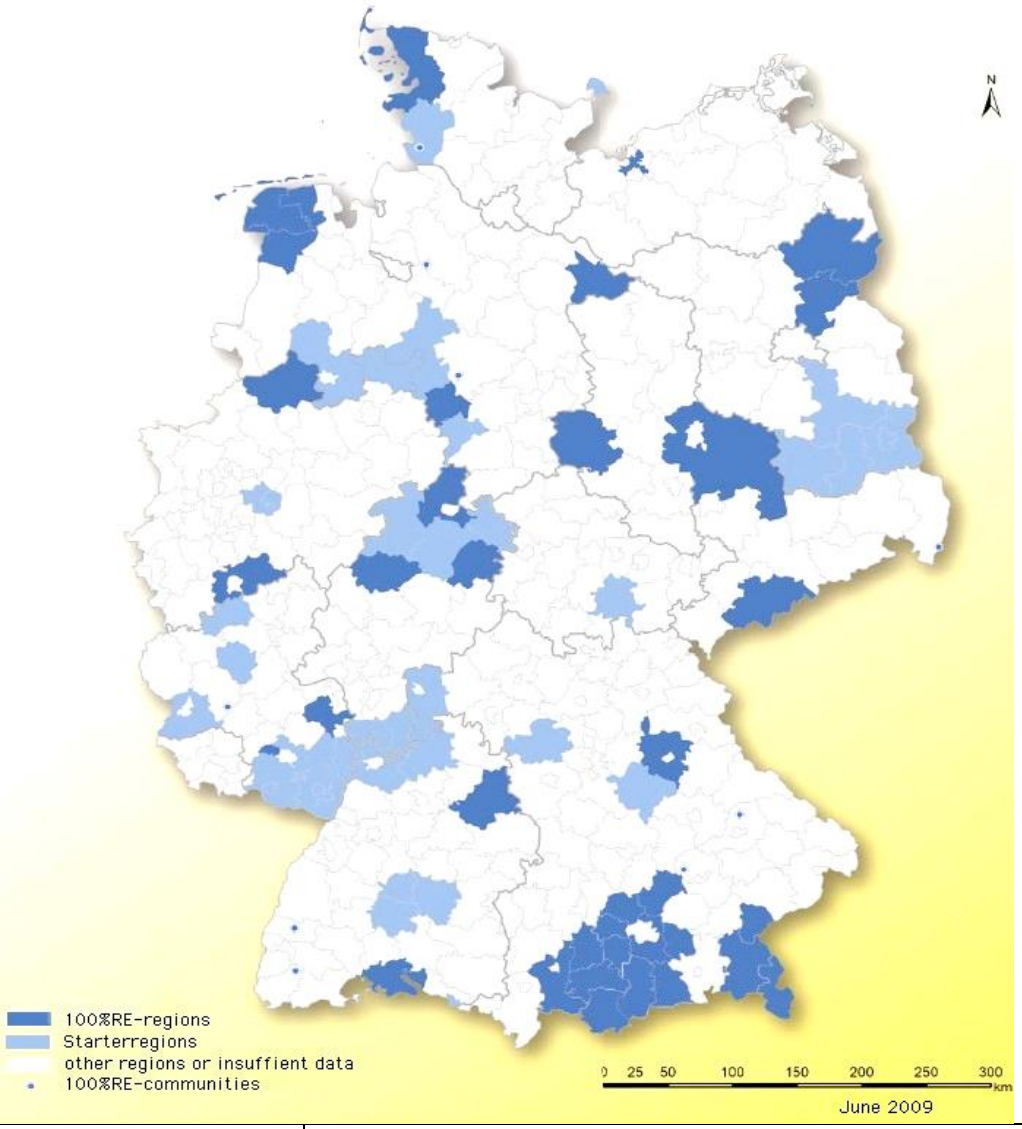
City of Boston Climate Action Plan

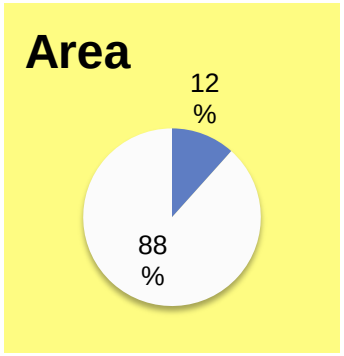
City of Sydney: Environmental Management Plan

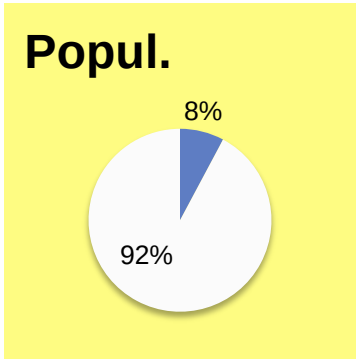
City of Melbourne: Zero Net Emissions by 2020

Toronto: Climate Change, Clean Air and Sustainable Energy Action Plan

Smaller Cities Try to Get Energy Autonomous
e.g. 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

Low Carbon Targets of Major Cities

		New York City	Los Angeles*)	Chicago	Toronto	Paris	London *)	City of Melbourne	City of Sydney **)	Munich *)
Initial Situation	CO_{2eq}/a [Mt/a] ***); currently	58,3	51,6	36,2	23,4	6,6	44,3	3,75	3,6	ca. 9,8
	CO_{2eq}/a Capita [t/cap/a]	7,2	13,5	12,5	5,1	3,1	5,9	6,6	23,7	7,3
Base Year	Base Year	2005	1990	1990	1990	2004	1990	1996	1990	1990
	CO_{2eq}/a[Mt(a]	58,3	54,1	32,3	22,0	6,6	45,1	3,5	2,3	9,0
Targets	Target Year	2030	2030	2050	2050	2050	2025	2020	2050	2030
	Relative Reduction Target	30%	35%	80%	80%	75%	60%	100%	70%	50%
	CO_{2eq}/a [Mt/a]	40,8	35,2	6,5	4,4	1,7	18,0	0,0	0,7	4,5
CO_{2eq}/a [Mt/a] (BAU-Scenario, Target Year)		89,2	n.s.	n.s.	n.s.	n.s.	51	4,5	n.s.	8,0
Member of C40		√	√	√	√	√	√	√	√	x

* Targets related to CO2 only. In the case of Los Angeles all data are related to CO2 and not to CO2eq.

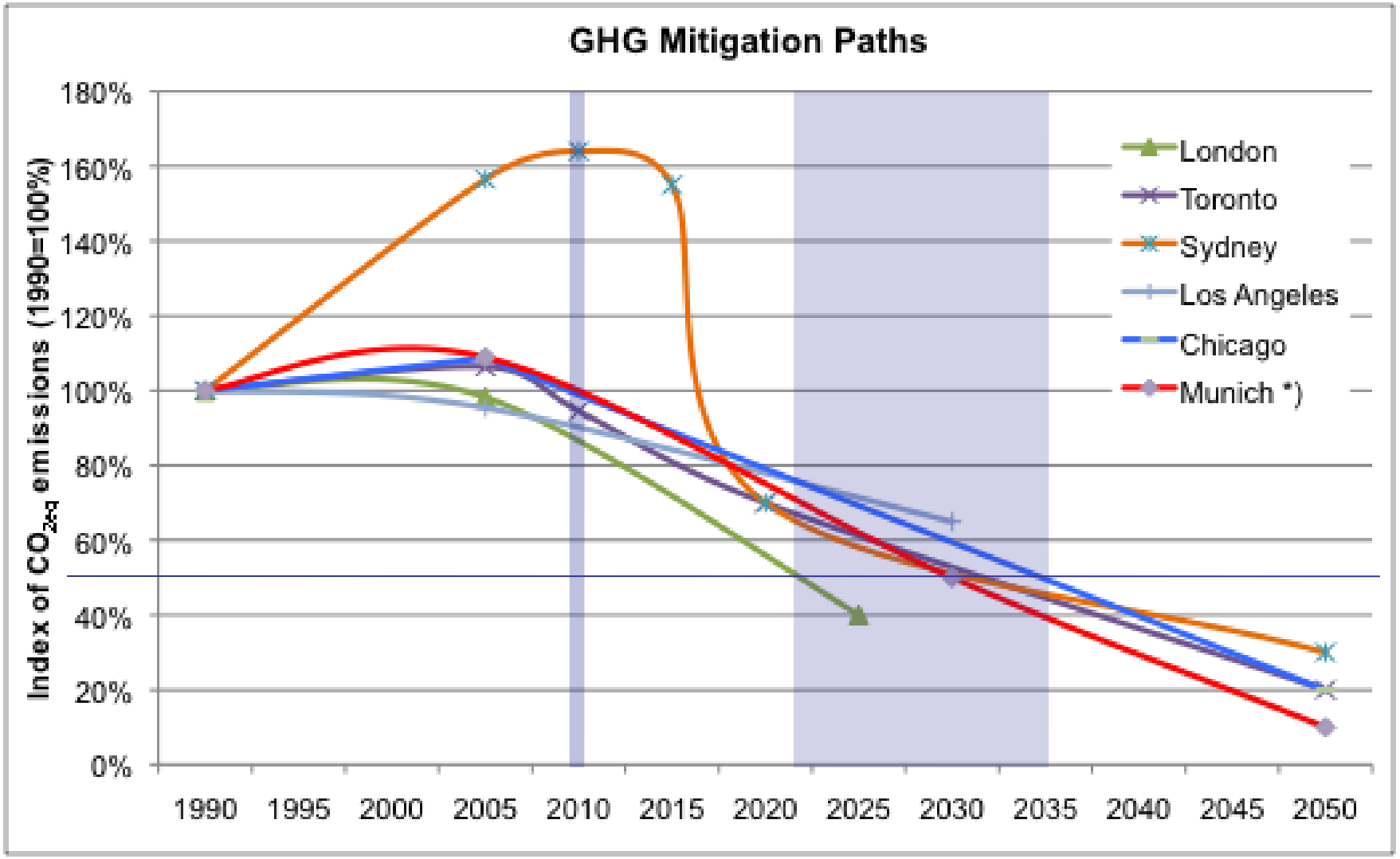
**Related to the Local Government Area (LGA) only

*** Data of the years 2000-2006

Source: cities' climate change action plans; own compilation.

Low Carbon Targets of Major Cities

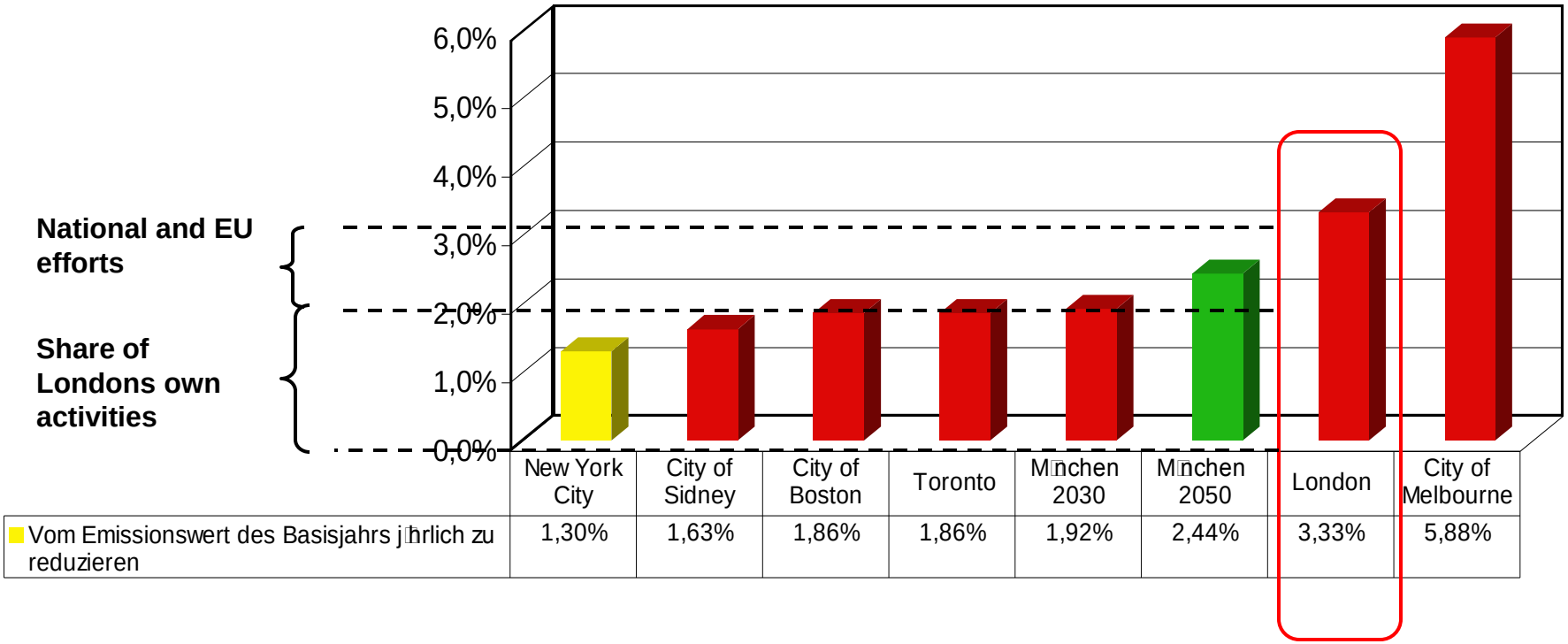
CO_2 Reduction relative to 1990



*) 2050: Study by WI

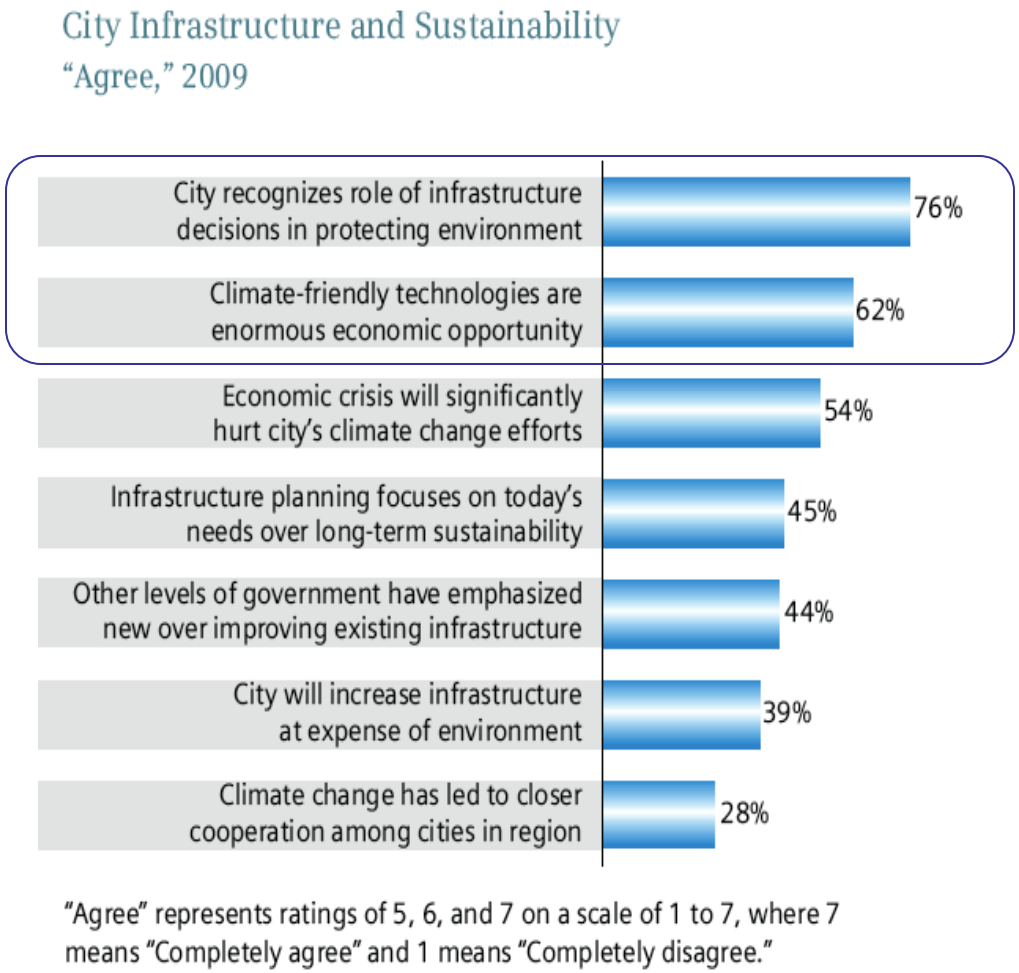
Low Carbon Targets:

CO_2 Emission Reduction Targets in % per Year



Example: US cities see climate friendly technologies as an enormous economic opportunity

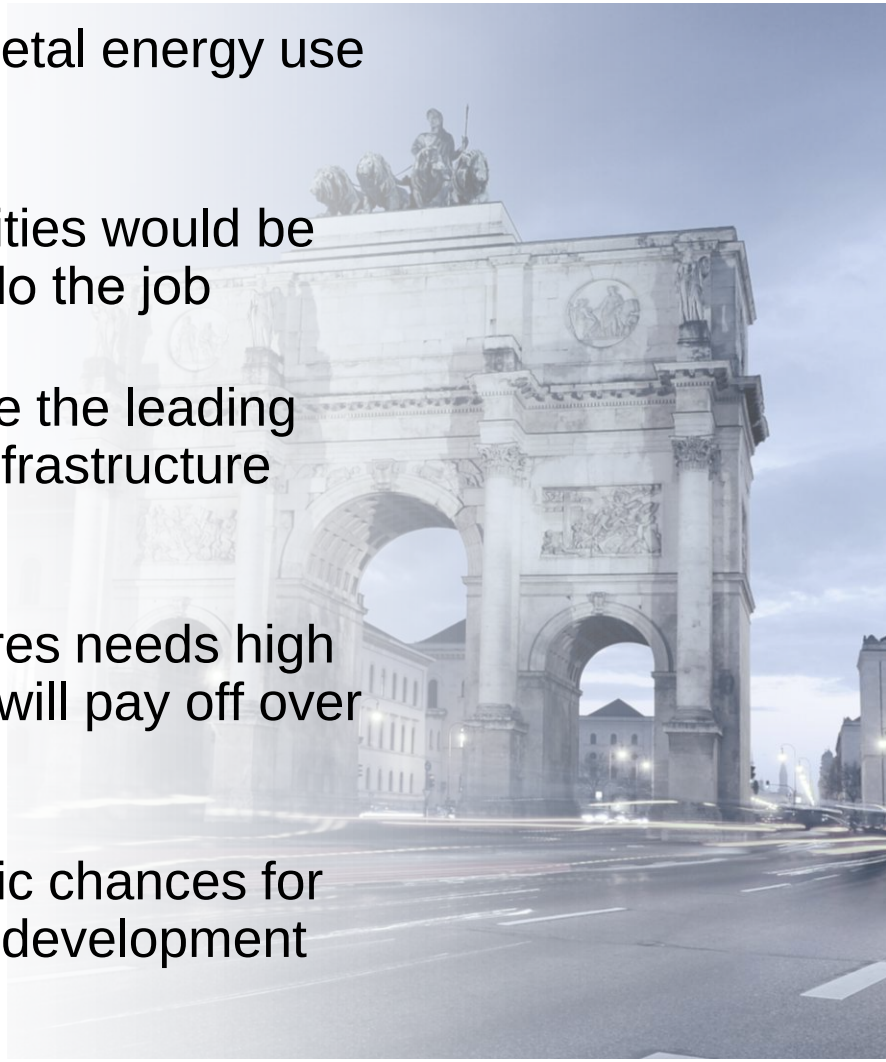
- **Public transportation is seen as the core field of public investment**
- **A lack of finance is seen as the major threat to municipal infrastructure investment**
- **79% agree that higher decision making power has to be assigned to cities**



Source: United States Conference of Mayors 2009

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

- (Urban) infrastructures determine societal energy use and emissions
- 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
- First movers can secure high economic chances for their economy and their overall urban development



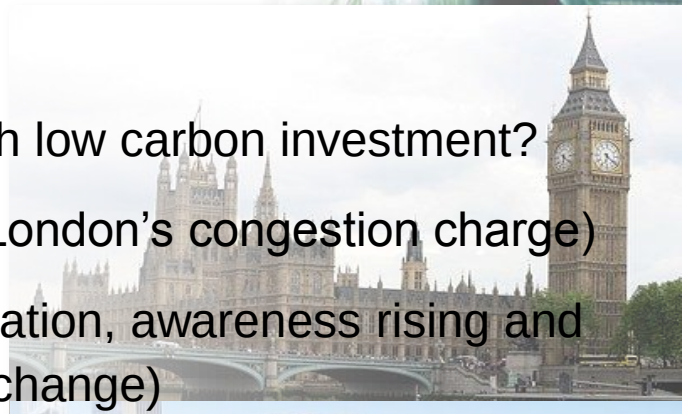
LCS and Sustainable Urban Development
Current Status of Discussion

- **Cities: From targets to concrete roadmaps**
  - Many cities have already set themselves ambitious goals
  - However, they are lacking
    - the funding and compentences as well as
    - clear ideas what low carbon cities are and roadmaps to get there
- **Climate policy:**
  - The overall long term goals are quite present
  - Ideas are still missing on how a low carbon society would look like
  - Particularly on how to redesign infrastructures (IPCC discusses a special report on that topic)
  - Cities can lead here -> LCS becomes concrete at the urban level

- **Urban planning:**
  - Is a crucial actor to redesign low carbon sustainable urban infrastructures
  - However, low carbon urban design is not yet the leading goal social and economic aspects still are more important
  - Urban planning can only be successful whith strong support from the national level

LCS and Sustainable Urban Development
Research Questions

- **Are very much the same as in general**
  - (More) visions of low carbon cities are needed
  - Roadmaps for getting there
  - Policies and institutions to implement the strategies
  - Theories and models of change
- **Specific aspects at the urban level:**
  - How to empower infrastructure planning to push low carbon investment?
  - How to regulate and organise 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)



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Thank you!

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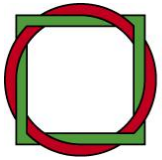

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LCS and Sustainable Urban Development
Current Role of Cities in the Climate Discussion

- **Cities are becoming increasingly aware of their role in climate mitigation**
  - They already have been an important actor in the Agenda 21 already
  - Are feeling the relevance of the topic for their strategic development
  - Vacuum in (US) national politics
  - Actions of Climate Alliance, the C40 Initiative and many others
- **Cities feel affected by climate change**
- **Fields of urban action**
  - Urban energy infrastructure policy – if the city can decide here
  - Transport policy / mainly passenger transport
  - Urban planning
    - Energy efficient / short distance settlement structures
    - Low energy buildings and use of local RES
  - Public buildings

Investitionen in energiesparende Technik zahlen sich häufig durch Energieeinsparungen aus

Beispiel energetische Gebäudesanierung:

- **Mehrinvestitionen pro Jahr und Einwohner: 200 EUR**
- **Jährliche Einsparungen im Jahr 2058: 1.200 – 2.000 € pro Einwohner**
- **„Versicherung“ gegen steigende Energiepreise**