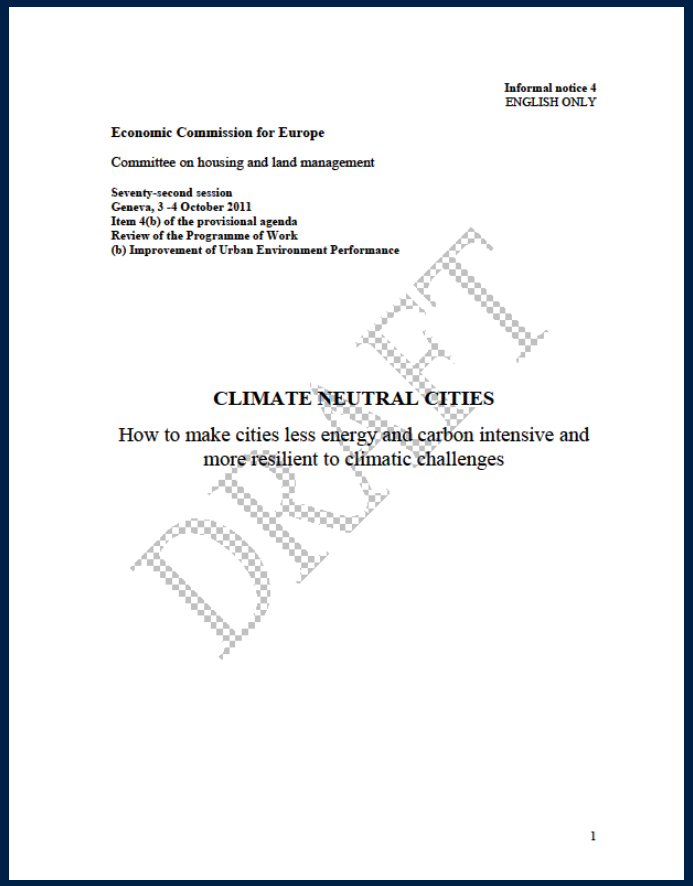
UNECE

72nd Session of the Committee on Housing and Land Management

3-4 October 2011, Geneva

Climate Neutral Cities

How to make cities less energy and carbon-intensive and more resilient to climatic challenges



Informal notice 4
ENGLISH ONLY

Economic Commission for Europe

Committee on housing and land management

Seventy-second session
Geneva, 3 -4 October 2011
Item 4(b) of the provisional agenda
Review of the Programme of Work
(b) Improvement of Urban Environment Performance

DRAFT

CLIMATE NEUTRAL CITIES

How to make cities less energy and carbon intensive and more resilient to climatic challenges

1

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University of Birmingham , UK

1. Climate change

- Increasing natural hazards
- Heat waves
- Floods
- Hazard-prone locations
- GHG emissions
- Carbon emissions policies

Climate-related vulnerabilities

2. Energy "crisis"

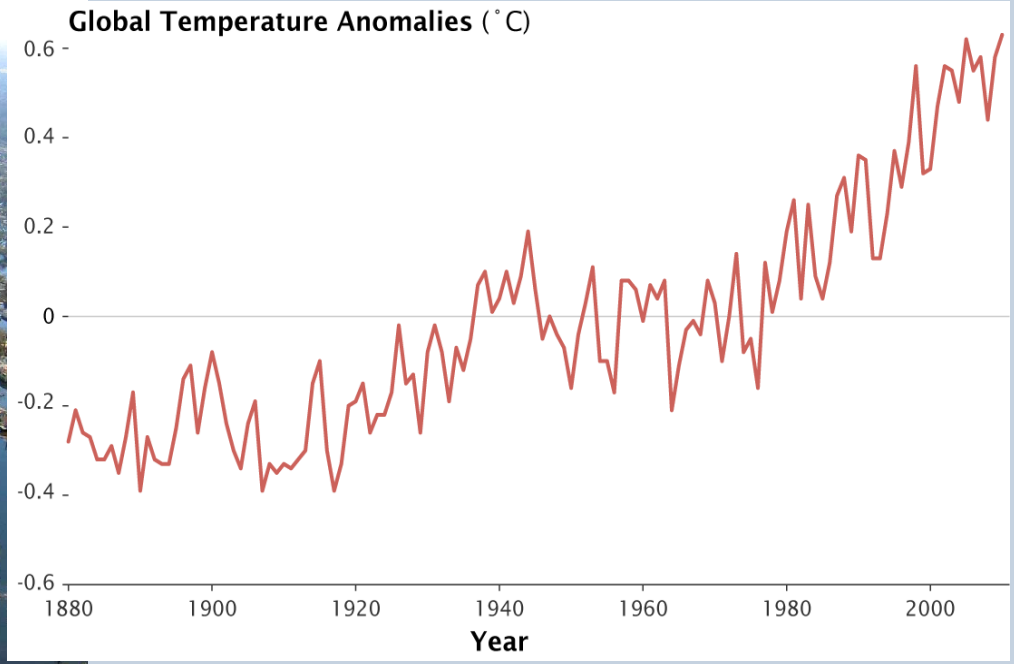
- Peak oil extraction
- Energy security
- Energy price volatility
- Energy efficiency policies
- Energy affordability
- Energy/fuel poverty

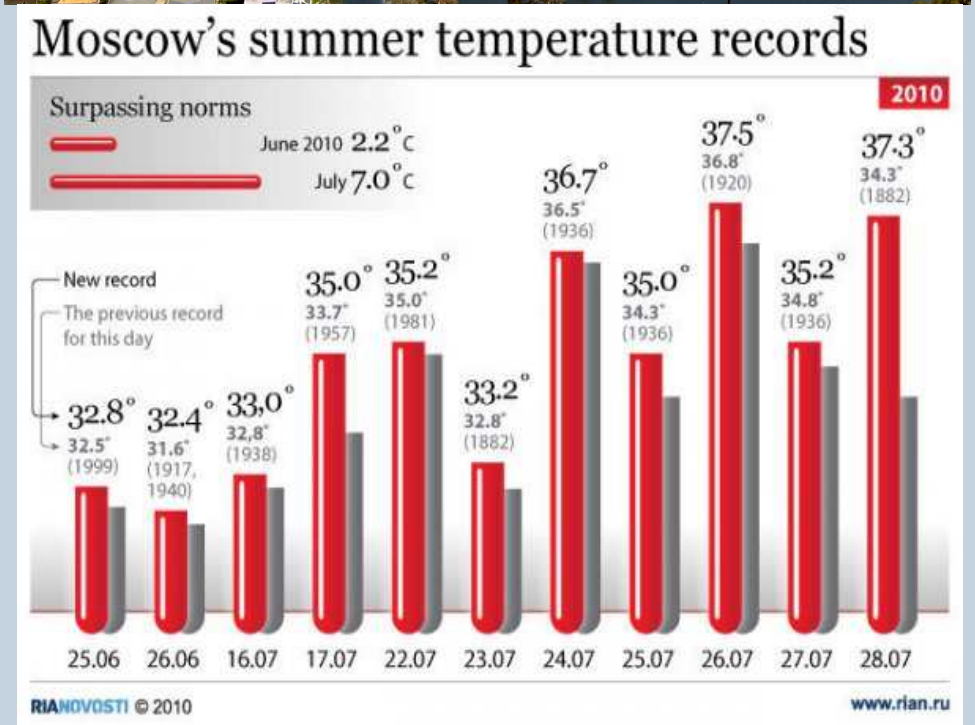
Energy-related vulnerabilities

3. Socio-economic inequality

- Different levels of economic wealth and consumption
- Poverty and deprivation
- Underdeveloped services
- Lack of infrastructure
- Informal settlements

Social vulnerabilities


Global Temperature Anomalies (˚C)
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
1880
1900
1920
1940
1960
1980
2000
Year


Moscow's summer temperature records
2010
Surpassing norms
June 2010 2.2°C
July 7.0°C
New record
The previous record for this day
32.8° 32.5° (1999)
32.4° 31.6° (1917, 1940)
33,0° 32,8° (1938)
35.0° 33.7° (1957)
35.2° 35.0° (1981)
33.2° 32.8° (1882)
36.7° 36.5° (1936)
35.0° 34.3° (1936)
37.5° 36.8° (1920)
35.2° 34.8° (1936)
37.3° 34.3° (1882)
25.06
26.06
16.07
17.07
22.07
23.07
24.07
25.07
26.07
27.07
28.07
RIANOVOSTI © 2010
www.rian.ru

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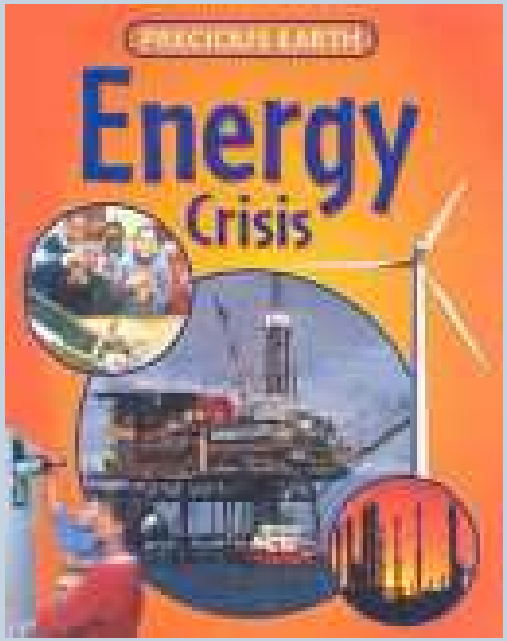
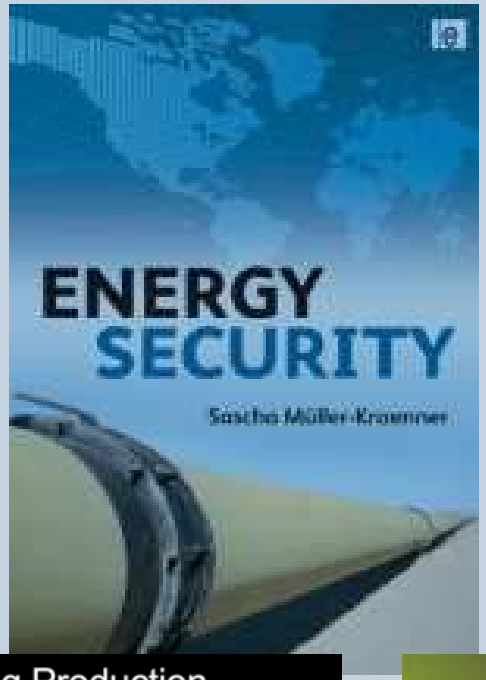
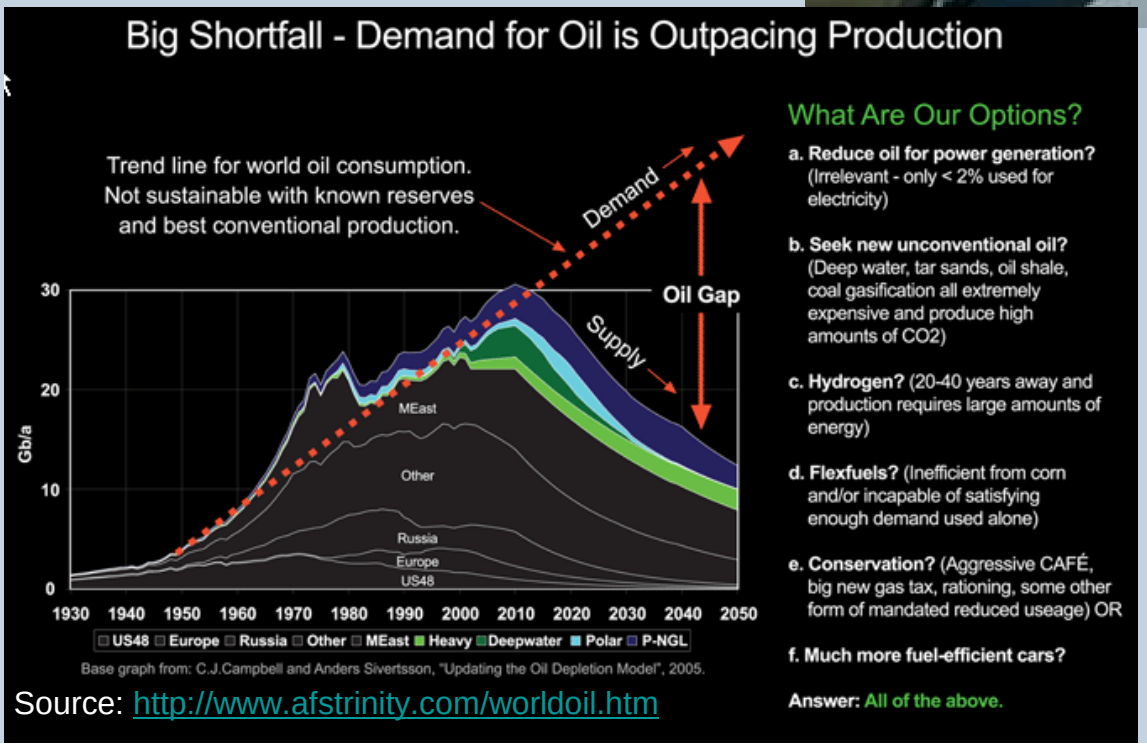
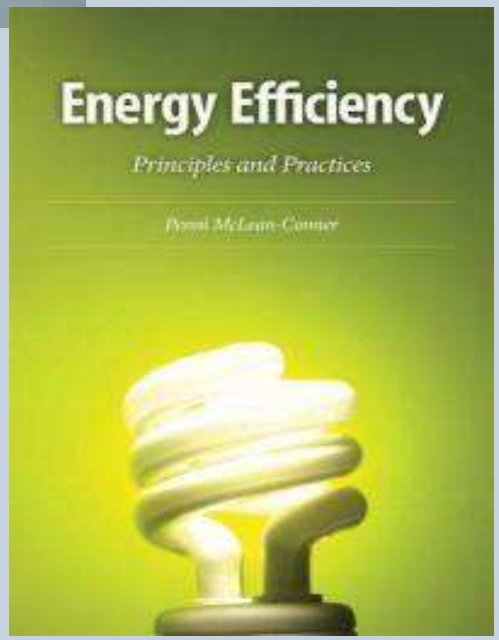






Source: http://www.afstrinity.com/worldoil.htm



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Climate Neutral Cities

Decarbonising urban economy

(limiting CO2 emissions)

Adapting cities to climate and other natural risks

(future proofing)

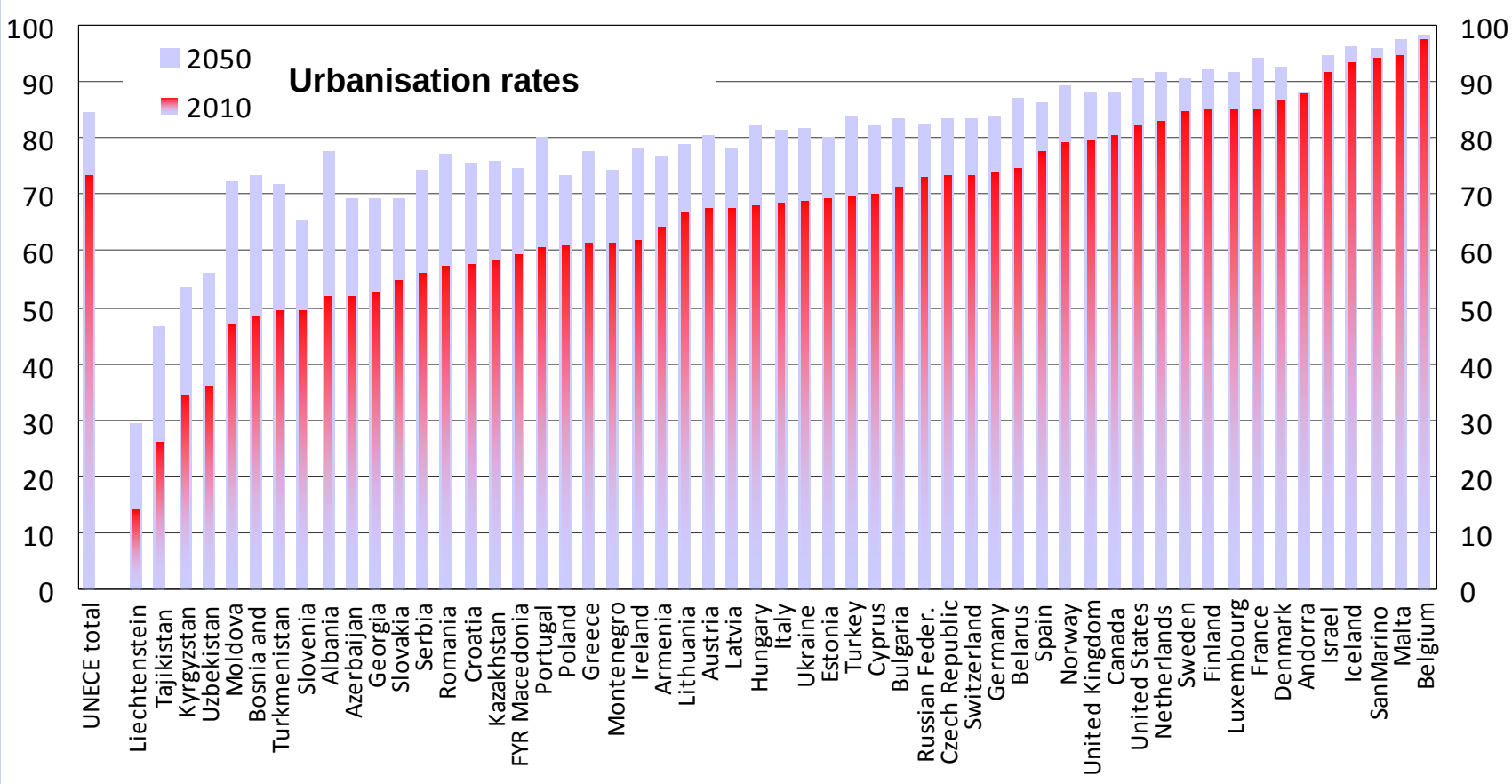
- Less energy use
- Energy efficiency
- Fuel switch
- Prepared-ness
- Resilient infrastructure/capital stock
- Disaster manage-ment

Sustainable development of cities

and multiple benefits for economy, society, environment

UNECE region

- 20% of the world's population,
- 60% of the world's GDP
- 45% of energy consumption
- 40% of GHG net emissions



City, Country	Base year (CO2e)	Reduction target, year (CO2e)	Principal document, year
Copenhagen	2005 (2.5 Mt)	20%, 2015 (2.0 Mt) carbon neutral, 2025 (1.15 Mt offset)	Climate Plan, 2009
Stockholm	1990 (3.7 Mt or 5.4 t per capita)	37%, 2015 (2.3 Mt or 3.0 t per capita), carbon neutral, 2050	Stockholm action plan for climate and energy 2010–2020
Hamburg	1990 (20 Mt)	30%, 2012 (14 Mt) 40%, 2020 (12 Mt) 80%, 2050 (4 Mt)	Hamburg Climate Action Policy, 2007 (revision 2009/2010)
London	1990 (45 Mt)	22%, 2015 (35 Mt) 38%, 2020 (28 Mt) 60%, 2025 (18 Mt)	The Mayor's draft Climate Change Mitigation and Energy Strategy, 2010 (proposed)
Rotterdam	1990 (24 Mt)	50%, 2025 (12 Mt)	Climate Initiative, 2007
Vancouver	1990 (2.9 Mt)	6%, 2012 33%, 2020 80%, 2050	A Community Climate Change Action Plan for the City of , 2005; 's Climate Leadership, 2009
Chicago	1990 (32.3 Mt)	25%, 2020 (24.2 Mt) 80%, 2050 (6.5 Mt)	Climate Action Plan, 2008
Paris	2004	30%: City, 2020 25%: Region, 2020	The Climate Protection Plan, 2007
Madrid	2004 (15 Mt)	20%, 2020 (12 Mt) 50%, 2050 (7.5 Mt)	City of Plan for the Sustainable Use of Energy and Climate Change Prevention, 2008

Institutions of urban governance

- Clear vision, strategy and leadership
- Purposeful and coherent policy - action plans
- Multilevel governance, cooperation and participation
- Stakeholders involvement
- Sustainable sources of income

- Spatial planning and building control (shaping cities, urban regeneration, but also ensure socio-spatial integration) – need to be integrated with policies for climate-smart growth

Priority sectors for CNC

1. Urban energy infrastructure
2. Built environment/ buildings
3. Urban form and mobility
4. Green/water spaces
5. Waste management

Energy balance and corresponding climate neutrality policies

Energy Balance	Urban-Level Policies
SUPPLY Production + Imports – Exports = Total Primary Energy Supply	REDUCE CO2 IN SUPPLY Decarbonising energy supply (e.g. renewable microgeneration, fuel switch)
TRANSFORMATION Total Primary Energy Supply – Energy transformation – Losses – Energy Industry Own Use = Total Final Consumption	REDUCE LOSSES IN TRANFORMATION Efficiency of transformation and distribution (e.g. cogeneration, improving efficiency of networks)
CONSUMPTION Total Final Consumption = Industry + Transport + Buildings + Agriculture/Forestry + Fishing + Others + Non-Energy Use	REDUCE ENERGY DEMAND User efficiency and demand management (e.g. improving building energy performance, reducing the need for motor vehicle use)

1) Energy supply and transformation: the role of urban energy infrastructure

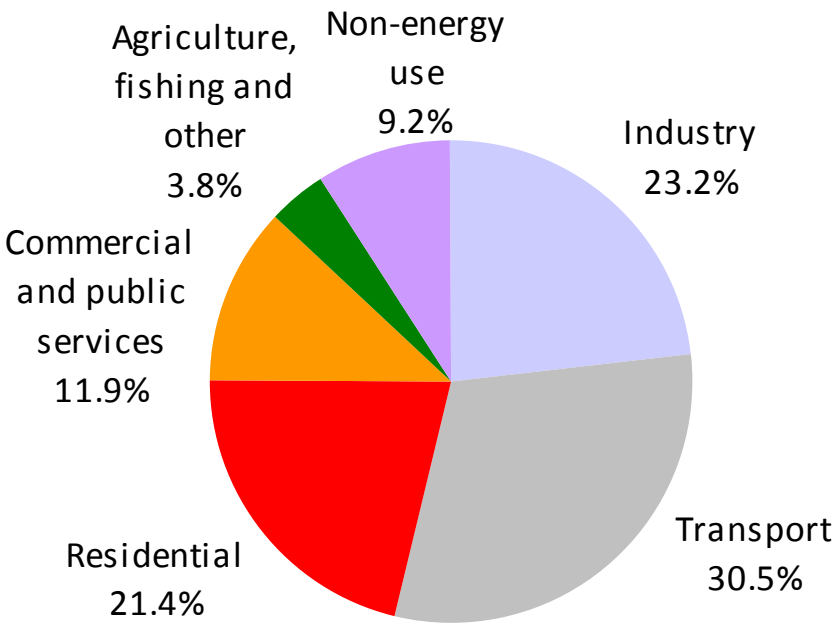
Examples:

- Transformation losses in UNECE =32% of TPES
- Thermal losses from all power stations in the UK = ½ UK total gas demand

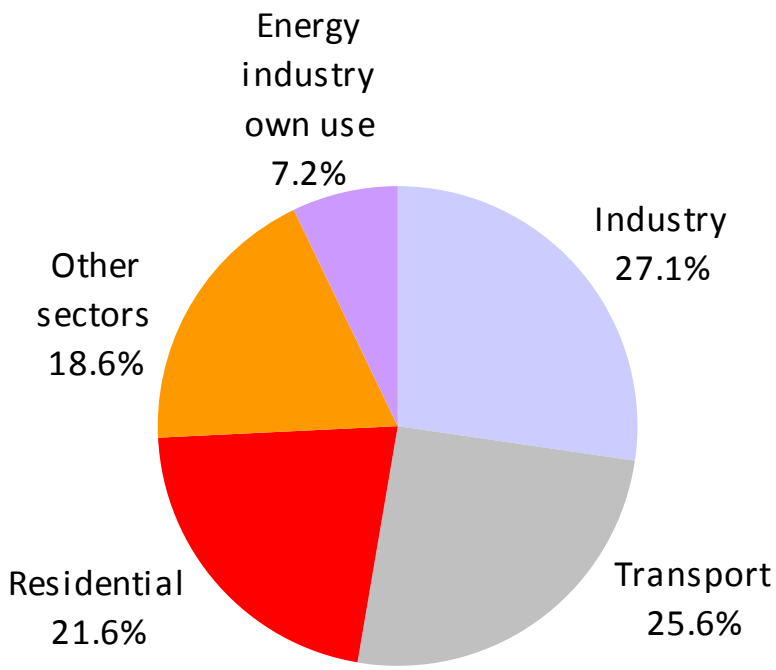
Some principal actions for cities:

1. Lower-carbon technologies, co-generation and tri-generation;
2. District heating and cooling systems (based on ICT);
3. Off-site renewable power installations, e.g. wind turbines, solar farms, energy from biomass and waste plants;
4. On-site micro-generation of heat and electricity in the buildings sector (heat pumps, solar roofs, biomass micro CHP, etc) – bidirectional electricity flows/feed-in tariffs are the key
5. Developing smart grid and efficient municipal energy services.

Total final energy consumption in UNECE by sectors



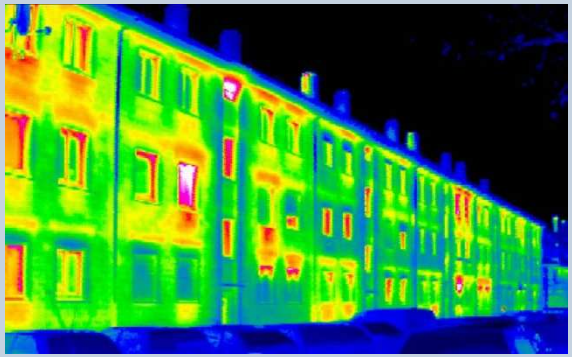
Energy-related CO2 emissions in UNECE

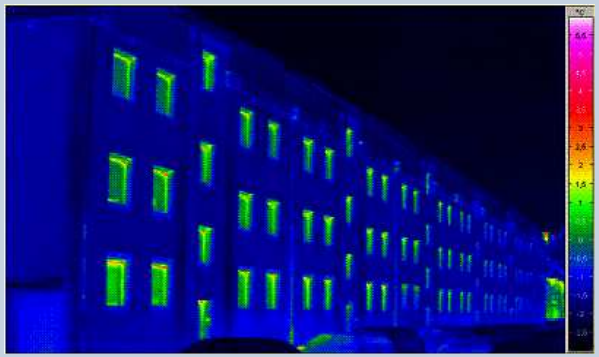


Data for 2008, IEA

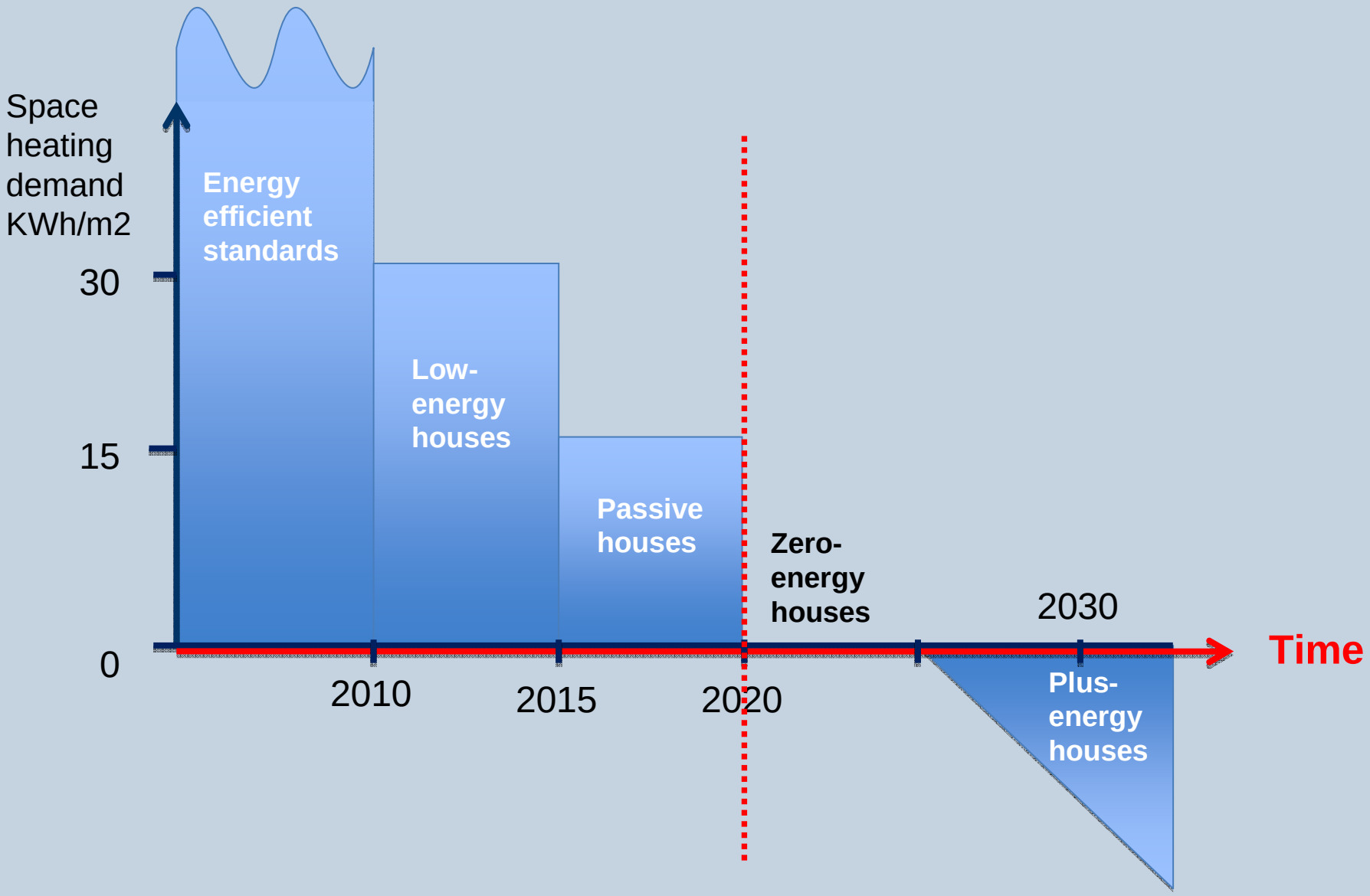
2) Housing and service buildings

- Energy performance standards/zero-energy buildings
- Retrofitting existing buildings/regenerating the built environment
- Integrating with on-site microgeneration
- Improved property management and maintenance
- Energy pricing incentives
- Planning and building control





Performance standards for buildings in EU



UNECE Action plan for energy efficient housing

3 policy areas		12 goals	vision 2020
Policy Area I	Energy efficiency governance & financial infrastructure	1. Organisational leadership, energy planning and monitoring 2. Fnancial incentives 3. Housing management and maintenance 4. Utility services and energy pricing	Incentives and capacities to close "energy efficiency gap"
Policy Area II	Energy performance standards & technology integration	5. Energy performance requirements for homebuilding and existing housing 6. Low-energy and low-carbon technology 7. Spatial planning, district heating-cooling 8. Research, innovations, best practices	Zero-energy zero-carbon homes & pathway to carbon-neutral cities
Policy Area III	Access to energy efficiency & public housing	9. Public housing sector 10. Energy affordability and social integration 11. Awareness-raising and capacity-building 12. Geographical access to energy efficiency, cooperation and technology transfer	Inclusive energy efficiency, affordable warmth, energy-aware culture

3) Urban form, land use and mobility

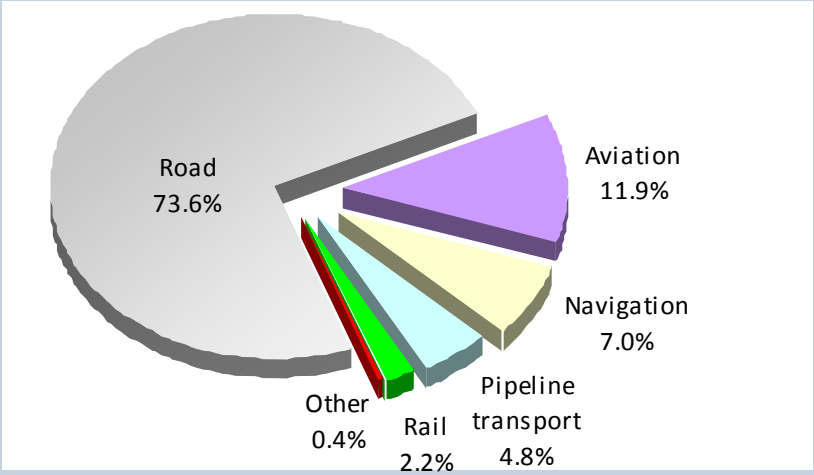
1. Reducing average travel distances - land use planning and sprawl control

2. Modal shift and transportation demand management - walking, cycling, public transport

3. Cleaner and more efficient technologies in transport

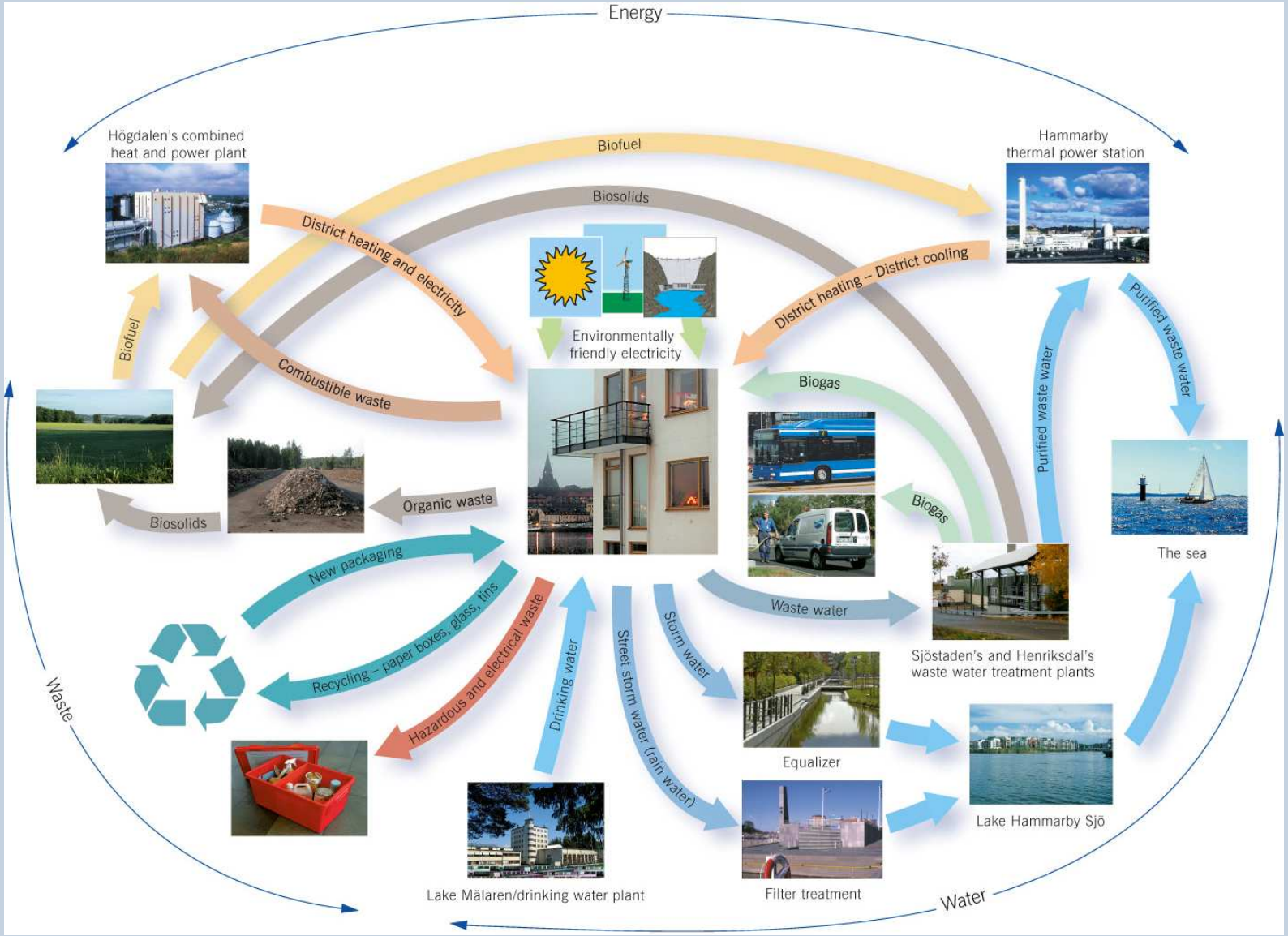
4. Eco-towns/eco-districts

Energy use in the UNECE transport sectors



4) Green areas

5) Waste management – “Hammarby model”



Concluding remarks

- Climate Neutral Cities = cities for the majority, not the few
- Prioritise collective consumption not elitist projects
- Consider wider social implications