EU Smart cities initiative

- Changing Europe's Energy System
  according to Climate Policy Needs (energy efficiency, renewable integration)

- Safe, secure and affordable energy supply (*)

- Europe`s leadership in energy technology and innovation (*)

- Strengthening the role of cities
  ◦ High living standards for citizens
  ◦ Sustainable environment for next generations
  ◦ High competitiveness of the cities

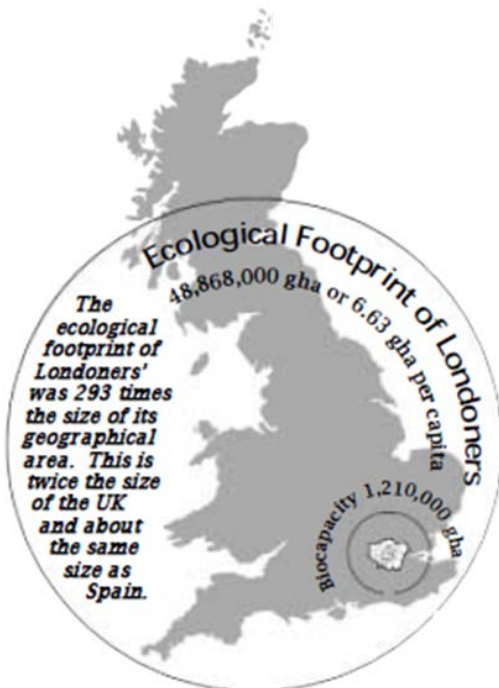# New challenges for the cities

– Vision on cities...

Inevitable – 50% of world population in urban areas in 2010; 75% in 2050

Dependent - Cities are nodes of concentrated consumption (3% of earth's surface, 75% of global resource consumption and waste output)

An opportunity - increased human density leads to lower environmental impacts

"Urban sustainability multiplier" – William Rees
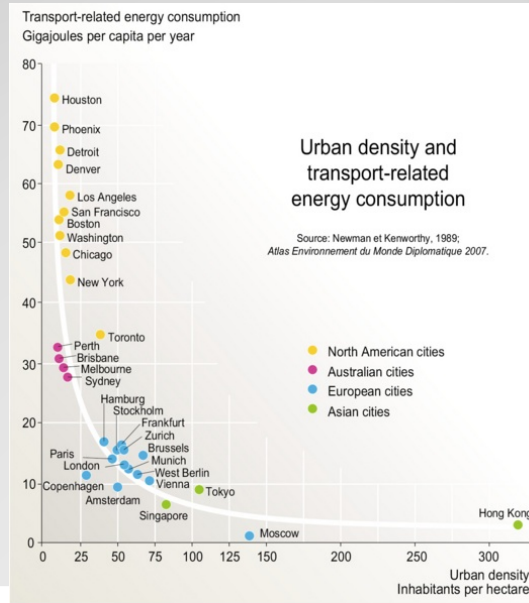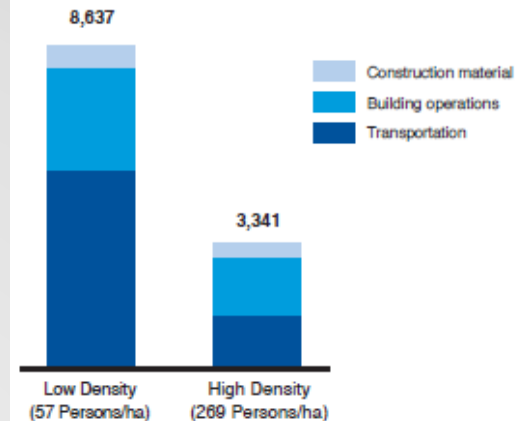

Source: Best Foot Forward, 2002

Transport-related energy consumption
Gigajoules per capita per year

Urban density and transport-related energy consumption

Source: Newman et Kenworthy, 1989; Atlas Environnement du Monde Diplomatique 2007.

● North American cities
● Australian cities
● European cities
● Asian cities

Urban density
Inhabitants per hectare

Exhibit 9
Higher Density, Lower Emissions Per Capita

Estimated Greenhouse Gas Emissions/Person
(Kg CO_2 Equivalent/Year, Toronto)

8,637

3,341

Construction material
Building operations
Transportation

Low Density (57 Persons/ha)
High Density (269 Persons/ha)

Source: "Comparing High and Low Residential Density: Life-Cycle Analysis of Energy Use and Greenhouse Gas Emissions," Journal of Urban Planning and Development, March 2006

3

– Vision on cities...

From 50% of world population in urban areas in 2000 to 75% in 2050
+2.7 billion urbanites in less developed regions by 2050
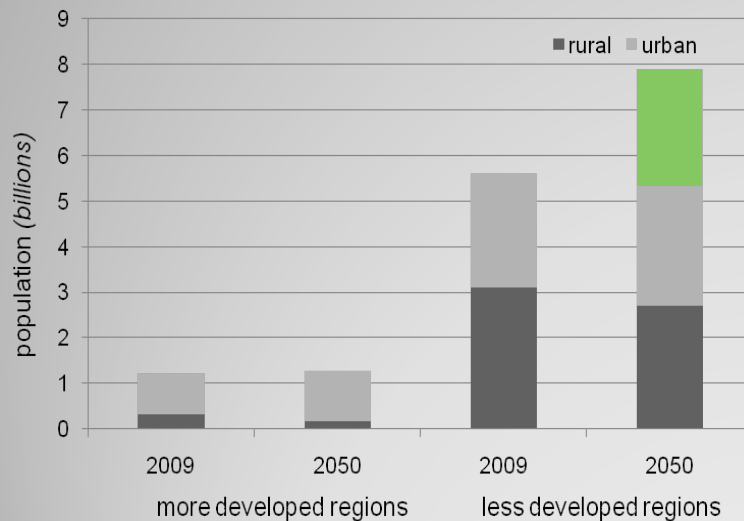
Challenges for urban areas
-Socio economic segregation
- Urban congestion
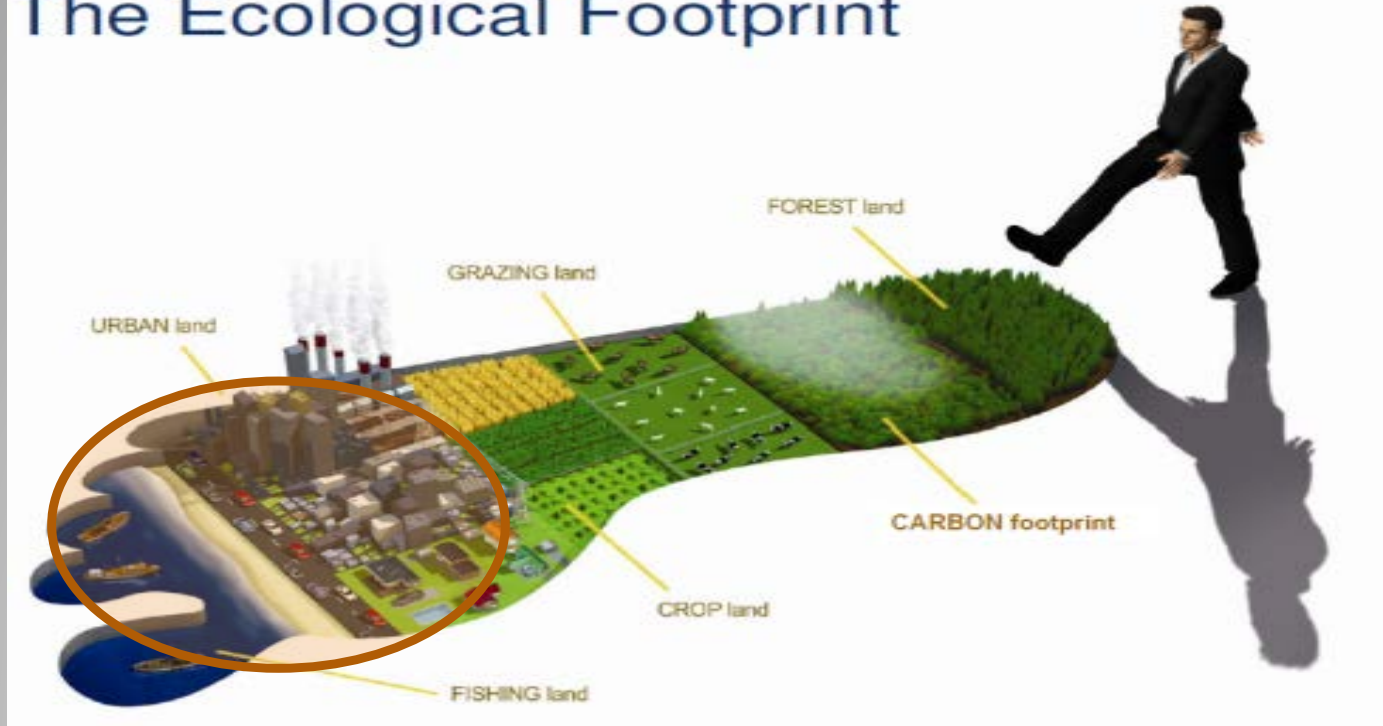- Environmental degradation
- Climate change

Opportunities for urban areas as
- Innovation centers, attracting new jobs
- Geographic control centers
- Nodes for interconnectivity (eg. mobility, ICT,...)

(JPI Urban Europe (March 2011)

Key elements of a smart energy city

The Ecological Footprint

"Until now the main focus of EU climate policies, as well as of the Europe 2020 strategy, has been on the period until 2020. However, the 2 Degrees goals which guides EU's and the world's climate action has major implications for the long term. In line with the UN International Panel on Climate Change (IPCC), the European Council has agreed to the objective to reduce GHG emissions of industrialised countries by 80-95% in 2050 compared to 1990, ... " (DG CLIMA, 03/2010)

INTEGRATION IS ESSENTIAL

- **On strategic energy planning level**
  Multi energy vector approach: heat, cold, electricity
  Integrated urban and energy system planning
  Socio-economic factors when planning and implementing

- **On technology level**
  Combined reduction of final AND primary energy use
  Physical integration of renewable energy in urban built environment
  Integrated energy management : match supply and demand during
  time/temperaturelevel: energy management

- **On process level**
  Planning and implementation processes for different project types

- **On stakeholder level**
  Key driving stakeholders: public authorities, housing associations and utilities
  High political commitment supports the achievement of goals
  PPP-'s guarantee the fulfilment of objectives in projects requiring private capital
  Private developers could guarantee fulfillment of energy performance targets
  Government: member states – regional - local
  Participation and support of inhabitants

Lessons learned (CONCERTO)
Technology approach

6

- **Smart Cities** require new approaches

  - Fully integrated designed and intelligent managed energy systems

  - From a single technology perspective to multi technology perspective
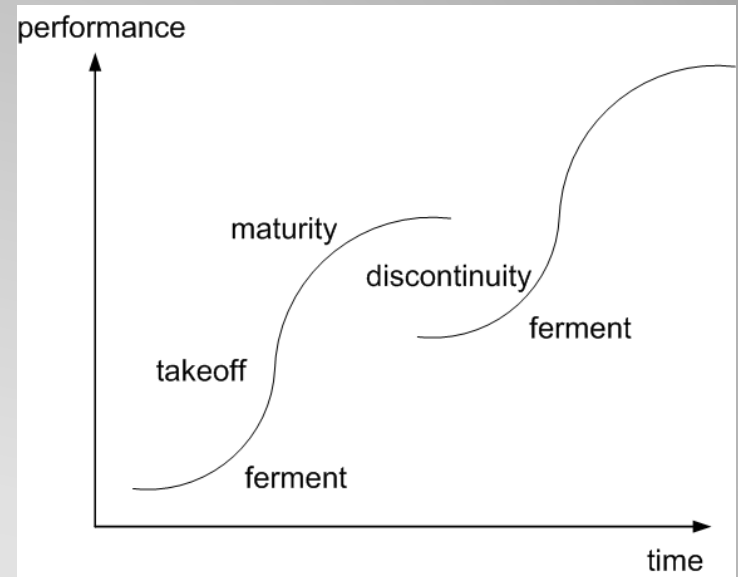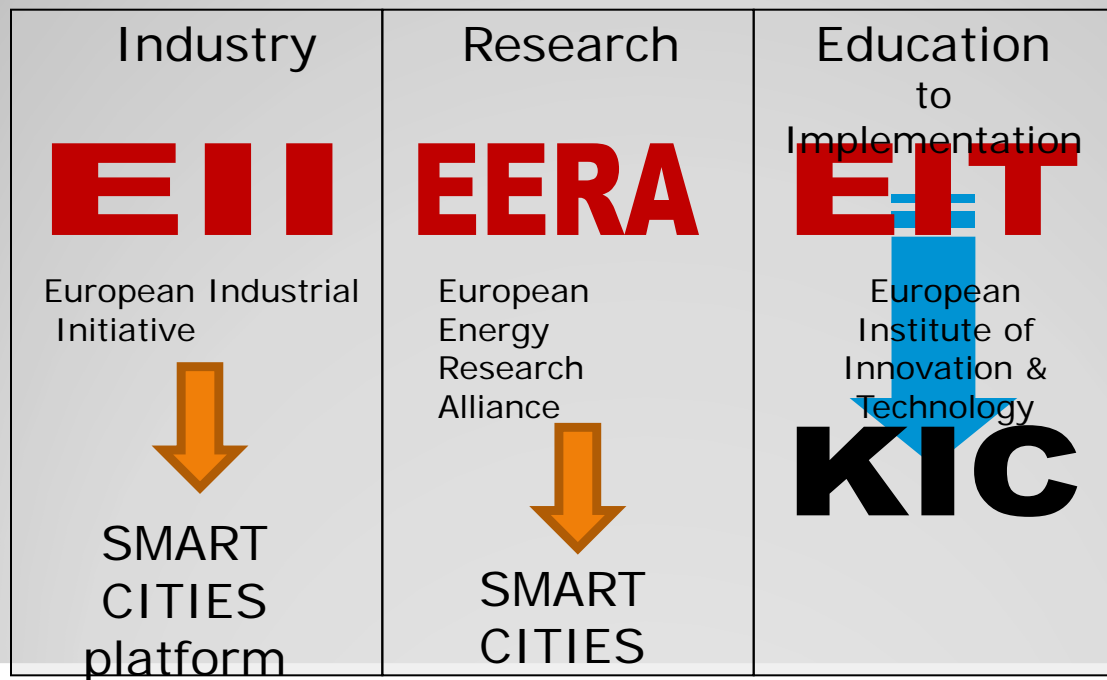

The step towards smart cities

Key elements of a smart energy city

• Energy innovation pole as urban transition labs/living innovation labs with highly visible pilot projects

• Pilot projects as integrated part of a coherent transition plan

• Towards CO_2 neutrality with trias energetica

• Energy systems linking different functions: mobility, living, distribution and public spaces

• Energy systems linking several energy sources: heat, electricity, cold,...

• Energy systems balancing demand and supply of energy with energy storage on different system levels (central and local)

• Maximum integration of distributed renewable energy sources

• Strong focus on end-user participation and acceptance
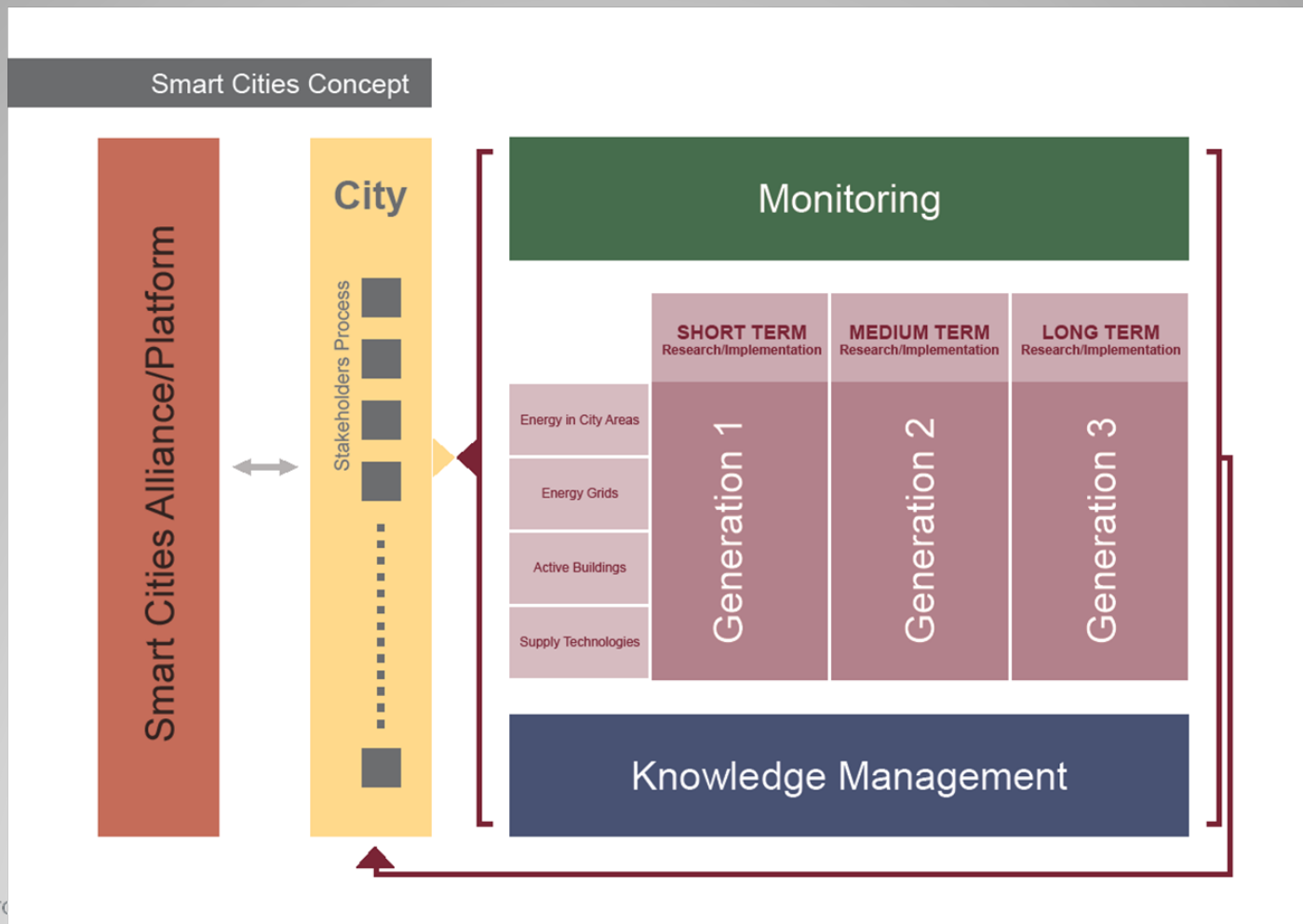
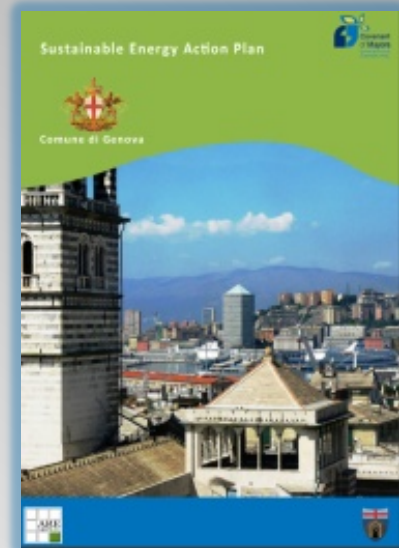# In the focus of the EU Energy innovation plan

SET-plan

Industry	Research	Education to Implementation
EII	**EERA**	**EIT**
European Industrial Initiative	European Energy Research Alliance	European Institute of Innovation & Technology
		KIC
SMART CITIES platform	SMART CITIES JPI	

Co-location intelligent and efficient cities

Industrial Initiative Concept

The convenant of Mayors
Political approach

* Source: G. Öttinger, 10.11.2010