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European Regional Development Fund

# SMART CITIES Conference

## Smart cities in Europe

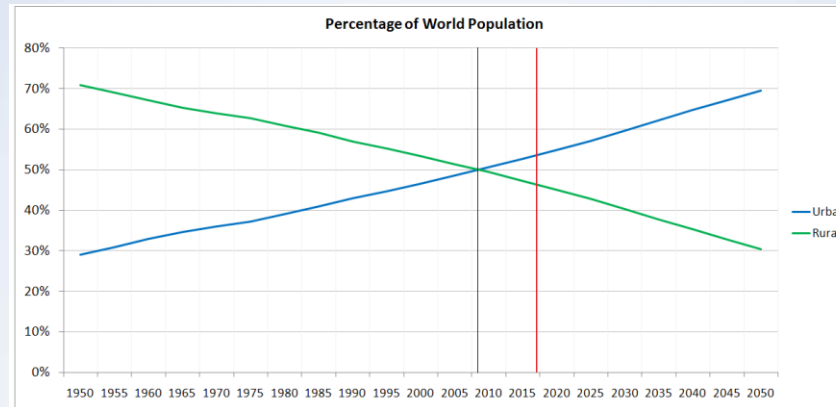
### An overview of existing projects and good practices

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- More than 50% of global population lives in urban areas (75% by 2050) ; EU: 76% urban, 23% rural population (2011)



Data source:  
United Nations

- Urban performance of a city
  - Traditional view: hard and soft infrastructure
  - Modern view: intellectual and social capital also very important
- Smart city concept: many different definitions

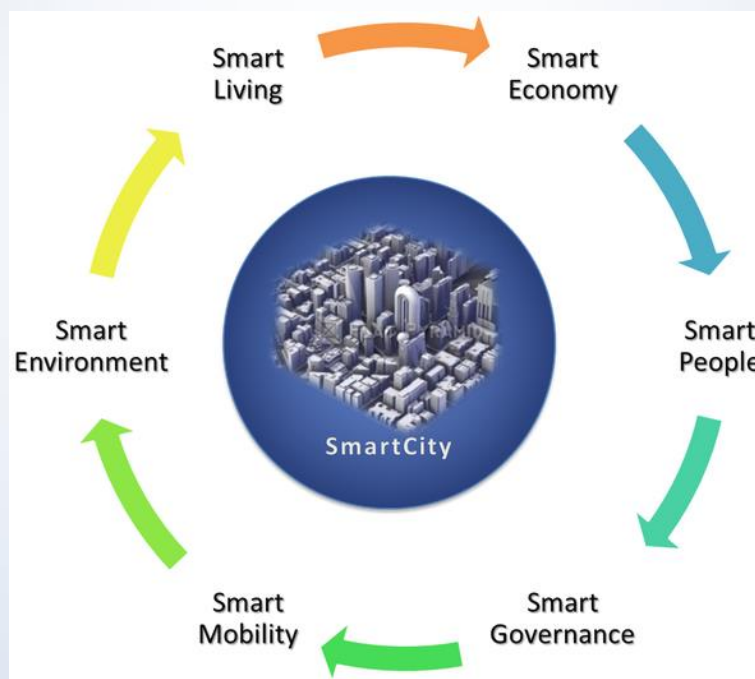
- Initially (1980s and 1990s), the concept was based on the idea of information and communication technologies (ICT) to make cities “smart”
- 2000-2010: implementation of ICTs in smart city infrastructure (e-governance, e-learning etc.); the Internet becomes dominant information exchange medium
- Present decade (2010-2020): wireless sensor networks (e.g. WikiSensing); Internet of things (IoT) to become the new standard





- So, what is a smart city?

- Caragliu (2009): A city is smart when investments in human and social capital and traditional (transport) and modern (ICT) infrastructure fuel sustainable economic growth and a high quality of life, with a wise management of natural resources, through participatory governance.



- The role of the human capital (education and skills)
  - A positive correlation between the city growth and the share of highly educated and skilled workforce (Berry and Glaeser, 2005)
  - Higher education levels lead to better environment for new enterprises, creating new knowledge, jobs and business opportunities
  - Concentration of human capital may lead to increasing economic inequality between “smart” and the rest of cities (Glaeser and Berry, 2006) – “brain gap”
- Business-friendly cities usually exhibit a good socio-economic performance (Caragliu et al., 2009), but at a risk due to the mobility of the global capital (Hollands, 2008)



- **Social and relational capital:**
  - Social inclusion of various resident groups in the public services (public transport, governance, education...)
  - All social classes should benefit from the success of the high-technology and creative business to prevent social polarization
  - A smart city community should be taught to learn, adapt and innovate to allow for a long-term sustainability of people capital and well-being (Coe et al. 2001)
- **Environmental sustainability:**
  - Crucial for long-term prosperity and quality of life in a world of scarce natural resources and fragile ecosystems
  - Smart energy production and consumption (improvements in energy efficiency, reduction of environmental footprint)
  - Smart water and waste management

- The number of smart city projects is growing worldwide
- The highest ranking cities (Fastcoexist.com, 2013)
  - **Europe:** Copenhagen, Amsterdam, Vienna, Barcelona, Paris, Stockholm, London, Hamburg, Berlin, Helsinki, Lyon
  - North America: Seattle, Boston, San Francisco, Washington, New York, Toronto, Vancouver, Portland, Chicago, Montreal
  - Latin America: Santiago, Mexico City, Bogota, Buenos Aires, Rio de Janeiro, Curitiba, Medellin, Montevideo
  - Asia and Oceania: Seoul, Singapore, Tokyo, Hong Kong, Auckland, Sydney, Melbourne, Osaka, Kobe, Perth





## Selected cities

- 13 large and medium-sized cities were selected

CITY	COUNTRY	POPULATION (year)	POP. DENSITY (km <sup>-2</sup> )
Amsterdam	Netherlands	813,562 (2014)	4908
Barcelona	Spain	1,620,943 (2012)	5390
Berlin	Germany	3,517,424 (2013)	3900
Copenhagen	Denmark	569,557 (2014)	6600
Graz	Austria	269,997 (2014)	2100
Hamburg	Germany	1,751,775 (2013)	2300
Helsinki	Finland	614,074 (2014)	2873
Ljubljana	Slovenia	282,994 (2013)	1678
London	UK	8,416,535 (2013)	5354
Lyon	France	491 268 (2011)	10263
Paris	France	2,249,975 (2011)	20520
Stockholm	Sweden	905,184 (2014)	4800
Vienna	Austria	1,781,105 (2014)	4002

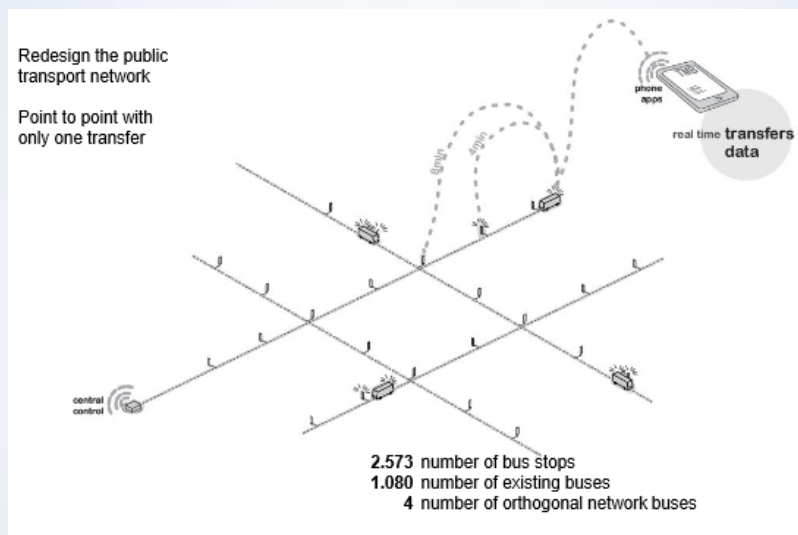
Data source: Wikipedia



## Smart mobility

- Public transport solutions

- Barcelona: Orthogonal bus network (point to point with only one transfer)



- Ljubljana: Urbana – non-cash payments of public transport and parking fees; Introduction of hybrid and CNG-powered buses to reduce emissions
- London: Oyster card – non-cash payments of public transport

## Smart mobility

- Bicycling and bike sharing

- Amsterdam: 67% comutes by cycling or walking
- Barcelona: Bicing – bike sharing project (6000 bikes, only for residents)
- Copenhagen: 40% of all comutes by a bike
- Ljubljana: BicikeLJ – bike sharing network
- London: Barclay's bike rental scheme



- Lyon: Geovelo – GPS for cycling with route calculator
- Paris: Velib – bike sharing network (20000 bikes, 5% traffic reduction)
- Stockholm: 800km of cycling paths

## Smart mobility

- **Electrical vehicles (EVs) solutions**
  - Barcelona: Live Barcelona project – electric mobility plan for the city; charging points for electrical cars and bikes (part of the Urban Lab)
  - Berlin: City of electromobility (EMO Berlin) – EV sharing, public transportation, company fleets, freight transport
  - Ljubljana: half of Slovenian 34 EV charging stations and 80% of EVs; fast charge versions planned
  - Lyon: Bluely – electric car sharing (50 charging stations, 130 vehicles)  
Optimod Lyon – central intermodal traffic control system, traffic prediction
  - Paris: Autolib – EV sharing (3000 EVs, partnership with Bolloré)
  - Vienna: 440 charging stations to be operational by 2015



# Smart cities in Europe

## Smart mobility



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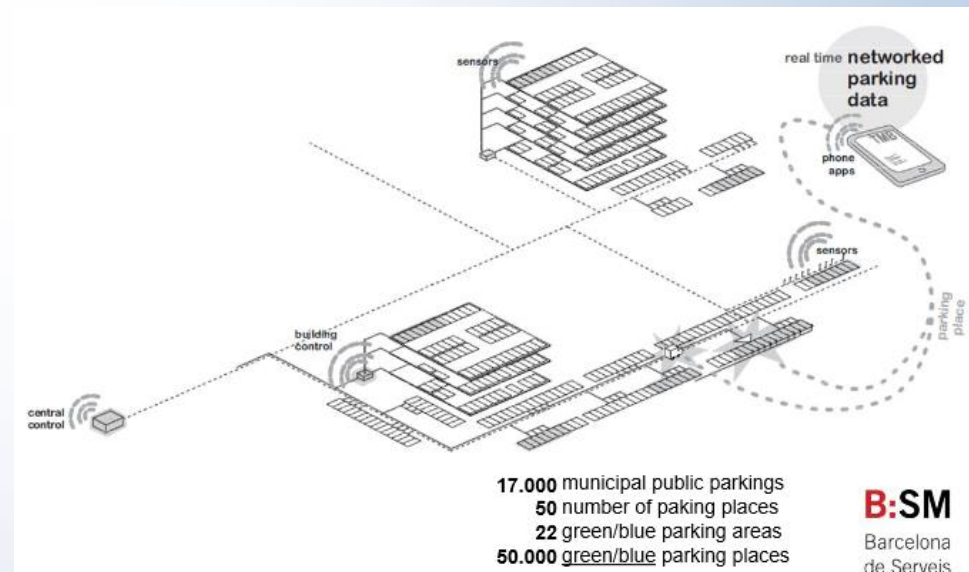
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## Smart mobility

- Traffic reduction/management solutions

- Amsterdam: Smart parking project (parking spot booking – Mobypark app), smart traffic management (10% less vehicle loss hours)
- Barcelona: Smart parking network
- Berlin: Research on self-driving car (FU Berlin)



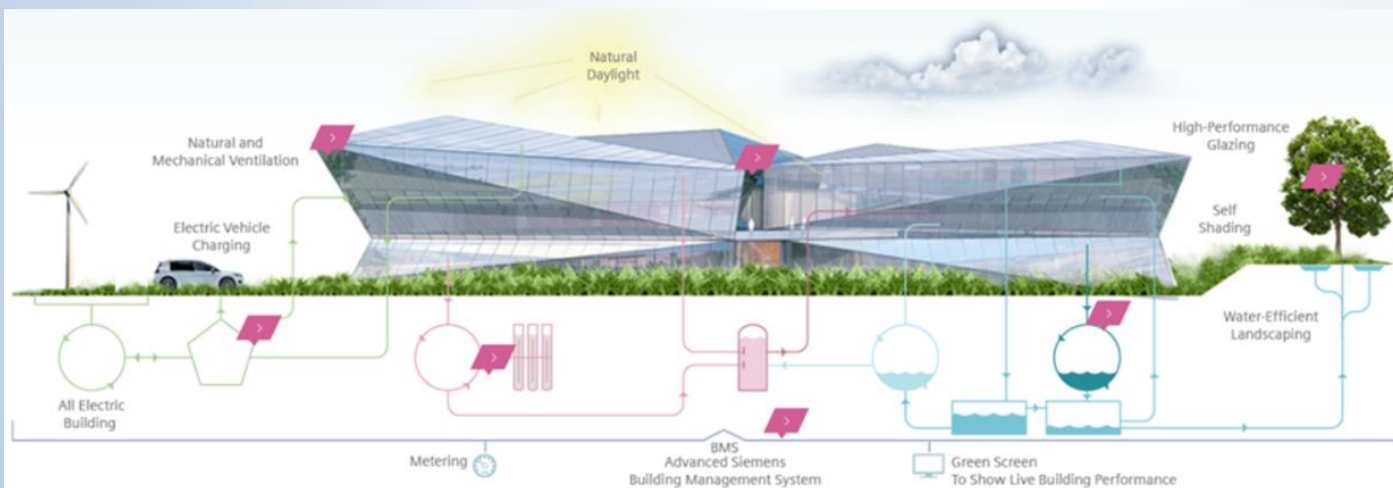
## Smart mobility

- Hamburg: intelligent traffic management/parking space control systems, monitoring of port infrastructures to ensure safe and efficient operations
- Ljubljana: Closing of the city center for vehicle traffic to reduce noise and emissions; 2 park-and-ride parking areas
- London: Congestion charge zone (traffic reduction in the urban core)
- Lyon: covoiturage-grandlyon.com – carpooling (33000 carpoolers/day)  
Contactless parking fee payment
- Vienna: Zero-parking residential buildings



## Smart living

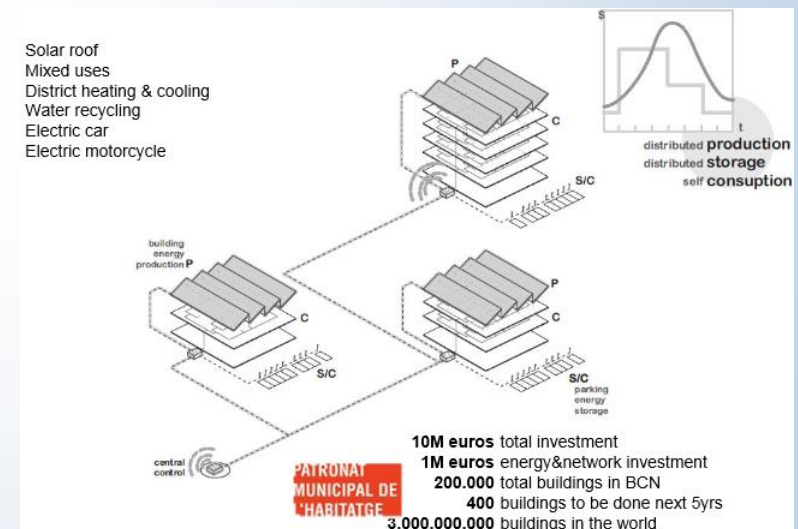
- City utility infrastructure (water/electricity/heating grid, lighting, waste disposal...)
  - Amsterdam: Citi-zen – smart energy lab (smart grid, home energy storage, sustainable district heating)
  - Berlin: LED street lighting, smart gas, electricity and water meters; (Urban Lab)
  - London: the Cristal (a green building built by Siemens)





## Smart living

- Barcelona: Self sufficient buildings network  
Easy access to service network through underground galleries  
Garbage recovery optimization (optimized paths, automated waste collection)  
Pay per lighting – intelligent lighting system
- Vienna: Citizens' solar power plant (crowd-funding model, 50% renewable energy by 2030)

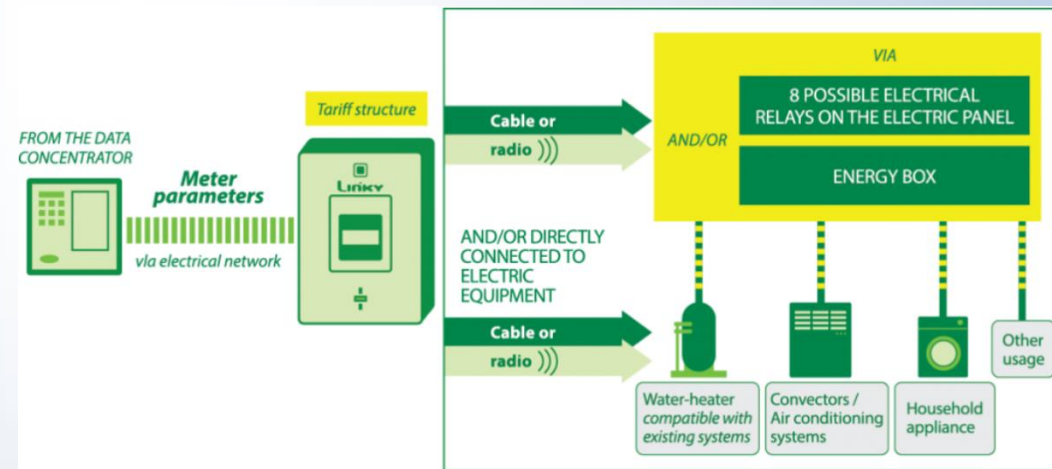
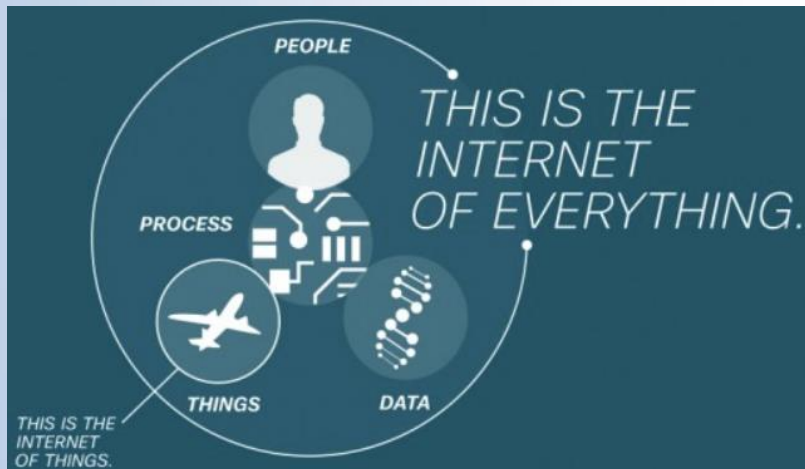


## Smart living

- Smart sensor grid

- Hamburg: Internet of Everything project (partnership with Cisco Systems)
- Lyon: Grizzly sensors – wireless, autonomous sensors for road condition analysis and optimizing winter road maintenance

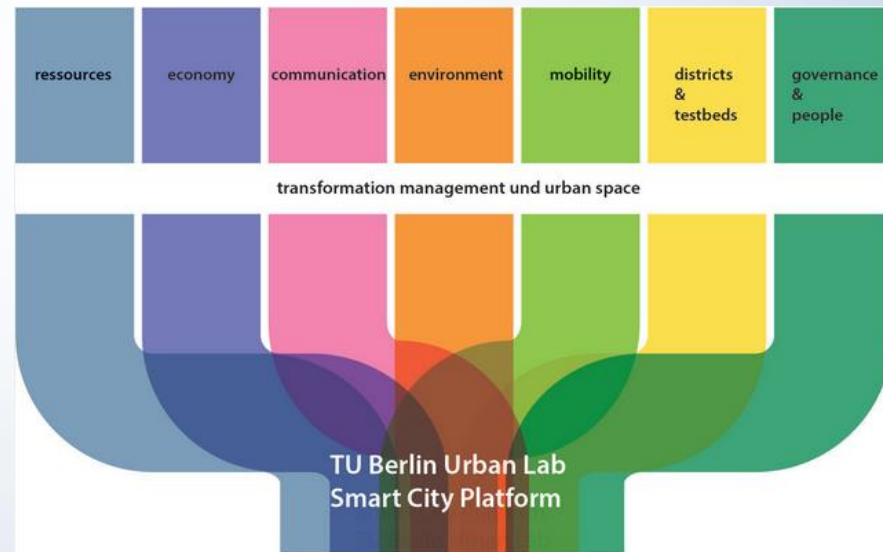
Linky - smart meter, remote services (meter readings, service activation...)



## Smart living

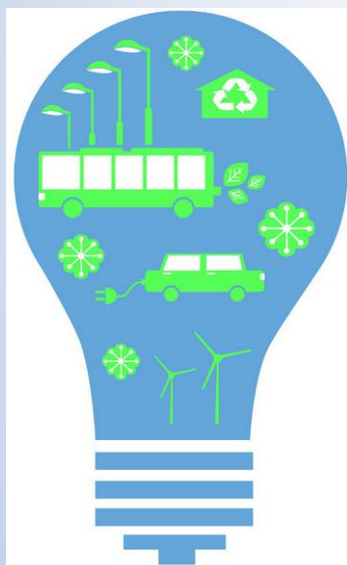
- Smart city labs and PPPs

- Amsterdam: Amsterdam Smart City – PPP to use the city as an urban lab (open data, new mobility solutions, improved quality of life)
- Barcelona: Fab Lab – Innovation in manufacturing and sustainable architecture
- Berlin: Smart City Urban Lab (founded by TU Berlin)
- Hamburg: Cisco's Smart & Connected Communities



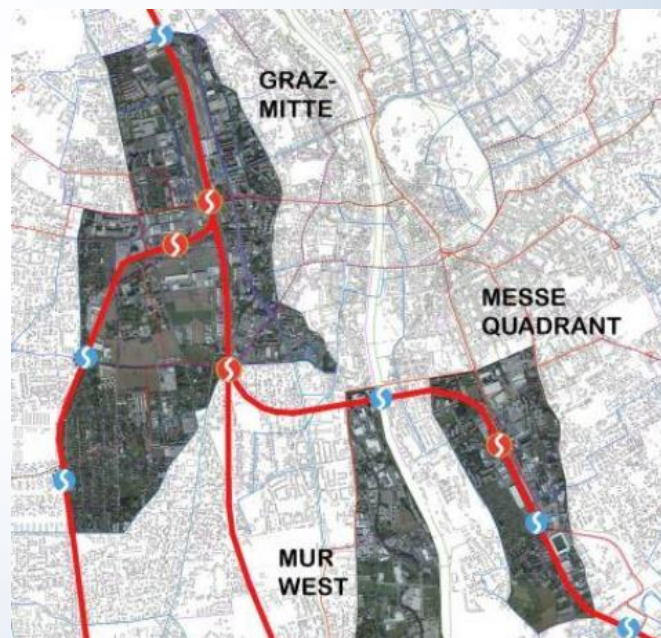
## Smart living

- Ljubljana: Ljubljana, a smart city – a common initiative between Siemens and the City of Ljubljana
- Lyon: Lyon smart community – positive energy buildings, shared EVs, person consumption monitoring on touchpads, community management system (energy-related data management and storage)
- Vienna: TINA Vienna – PPP for co-developing smart city strategies/solutions



- Urban development projects

- Berlin: Urban Tech Republic – shaping the future of Tegel airport site
- Graz: Graz Mitte project – PPP for conversion of 400ha city area to a low energy consumption, low emission and high quality of life district



# Smart cities in Europe

## Smart living & smart economy

- Hamburg: HafenCity – urban regeneration project (EU largest – 175ha) with a university, port, mixed used residential/commercial development, green transit
- London: iCity London – development plan for former QE Olympic Park area (7500 jobs)
- Vienna: Aspern Urban Lakeside (240ha urban development project, 20000 residents, 20000 jobs)



- Innovation districts

- Barcelona: 22@ innovation district
- Berlin: City of the Future center (founded by Beuth University of Applied Sciences Berlin)

Clean tech business park

WISTA Technology park



# Smart cities in Europe

## Smart living & smart economy

- London: Centre for London – a city's new think tank
  - Stockholm: Kista science city – a cluster of over 1000 ICT companies
- Stockholm Royal Seaside (SRS): a testbed for new ICTs to improve the quality of life and grow the local economy







## Smart people & smart governance

- Lyon: Forcity (4CT) – Urban planning-decision making tool  
Grand Lyon smart data – platform for accessing the region's digital data  
Lyon Urban data: large-scale urban laboratory, PPP for developing new products and services and conducting user tests
- Stockholm: Stokab – world's largest open optical fiber network  
e-Stockholm – strategy for e-services and technology of the future



## Smart environment

- Environmental projects and goals

- Copenhagen: carbon neutral by 2025 (new buildings by 2020)
- Graz: 100% regional & renewable energy production, zero emissions by 2050
- Stockholm: Urban tooling and pollution control (meets strict WHO's air contamination standards)  
40% area is green space  
Carbon neutral by 2050
- Vienna: EcoBuy Vienna (ecologically sustainable enterprises, 30000t CO<sub>2</sub>/17 million € annual savings)



- In Europe, smart city concept is best implemented in following areas: mobility (public transport/traffic management), utility infrastructure and knowledge (open data access & innovation)
- Some of the other smart city goals are still far from realization: energy self-sufficiency, carbon neutrality, electromobility etc. These areas will require large investments and significant adaptation of business and other related models.
- The size of the cities does not significantly affect their overall “smart” performance

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# Thank You

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