

# Smart Grids, Smart Regions and Smart Cities

Smart Grids Week 2011

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# The European Industrial Initiatives

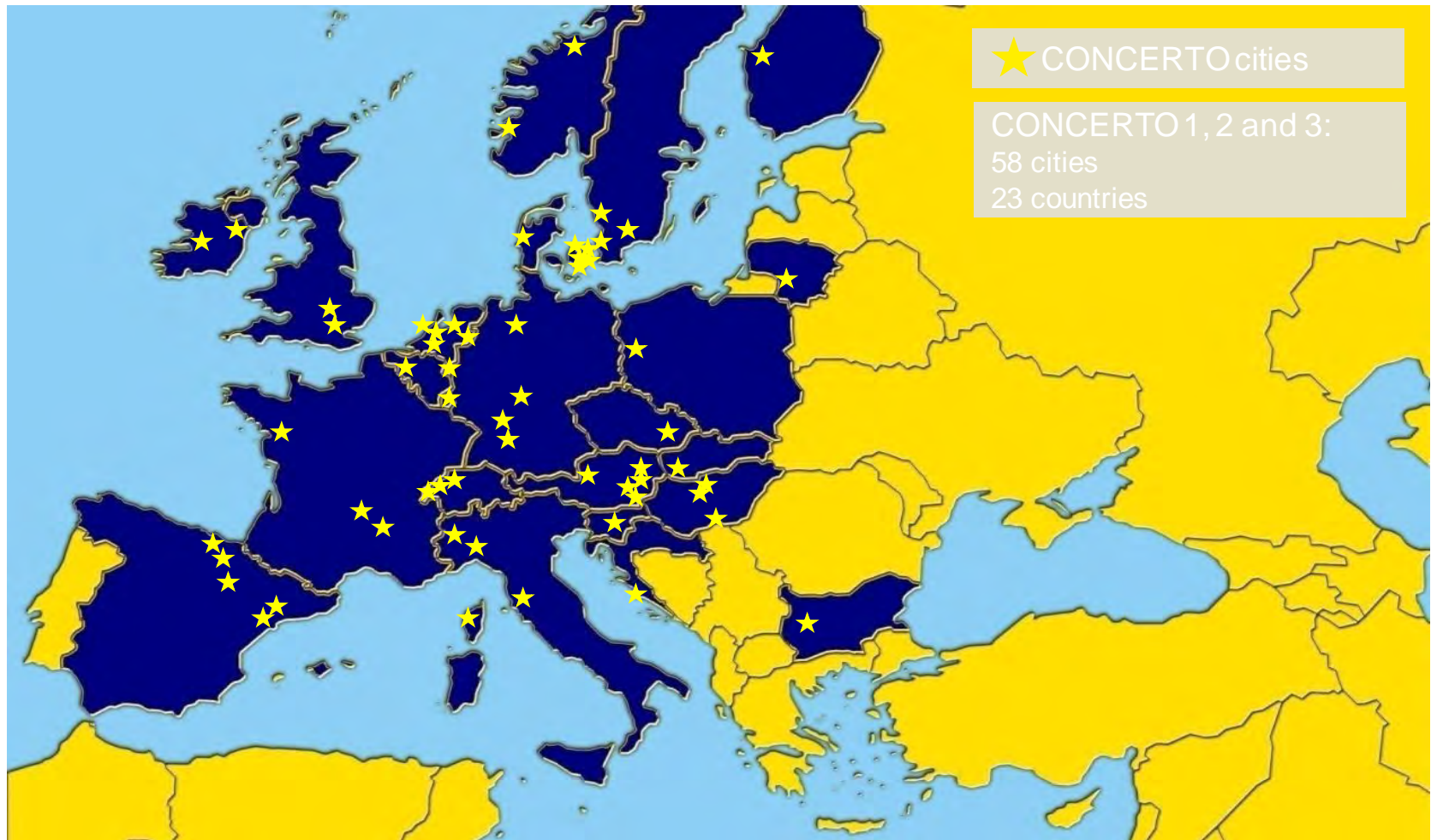
## A Roadmap towards 2020

Industrial-Initiative	€- Investment R&D, demonstration, early market penetration	Targets	Quantification
Wind	6 Bln. €	Kosten,, Offshore, Netzintegration; 5-10 Prüfanlagen, 10 Demoprojekte, 5 Prototypen offshore Fundamente	20% of EU electricity consumption
Solar (PV/CSP)	16 Bln. €	PV: 5 Pilotanlagen f. automatisierte Massenfertigung, Demo zentral und dezentral; CSP: 10 Prototyp-Kraftwerke	15% of EU electricity consumption
Electricity Grid	2 Bln. €	Echter Binnenmarkt, Integration volatiler Erzeugung, Management der Wechselbeziehung zw. Lieferanten. und Kunden; 20 Demoprojekte	50% of networks „Smart“
Bioenergy	9 Bln. €	Fortgeschrittene Biokraftstoffe, Biomasse KWK; 30 Demoanlagen	14% of EU energy mix
CO <sub>2</sub> – Capture	13 Bln. €	Demonstration der vollständigen CCS-Kette in industriellem Maßstab	Costs 30-50 EUR/TCO <sub>2</sub>
Nuclear	7 Bln. €	Generation IV Reaktoren, erste KWK-Reaktoren	First prototypes
Smart Cities Initiative	11 Bln. €	Introduction of smarter networks and smarter more efficient buildings	5-10 demo- cities

# Targets

- 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

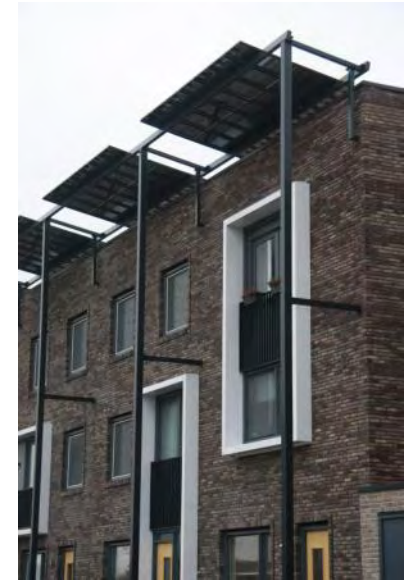
# CONCERTO – knowledge base for new research



# Integrated Approach in practice

## Lessons learned - CONCERTO

- Technical integration:
  - Combined reduction of final AND primary energy use
  - Physical integration of renewable energy systems in urban built environment
  - Considering to match supply and demand during time: energy management
  - Considering to match supply and demand in terms of temperature



# Masterplanning

## Lessons learned - CONCERTO

- Strategic planning integration:
  - Integrated urban and energy planning
  - Socio-economic factors considered when planning and implementing demonstration measures
  
- Process integration:
  - planning and implementation processes for different project types



# Involving the right mix of Stakeholders

## Lessons learned - CONCERTO

- Key stakeholders needed to drive the process are public authorities, housing associations and municipal utilities
- Participation and support of inhabitants
- High political commitment supports the achievement of goals and participation in international networks
- Private Public Partnerships guarantee the fulfilment of sustainability objectives in projects requiring the contribution of private capital
- Private developers could guarantee fulfillment of energy performance targets

# Stakeholder

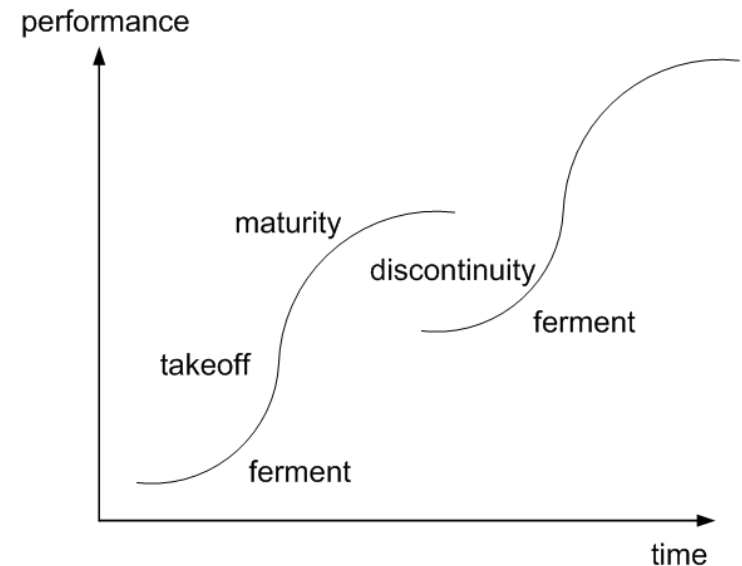
- Mayors, politicians
- City administration
- Utilities, energy service companies, grid operators (electric, thermal)
- Developers, architects, planners
- construction companies
- Component manufacturers
  - Windows, facades, VAC components
  - On site renewables – PV, solar thermal, heat pumps,.....
- ICT companies
- Financial Institutions
- **R&D institutes and universities**
- **Inhabitants.....**





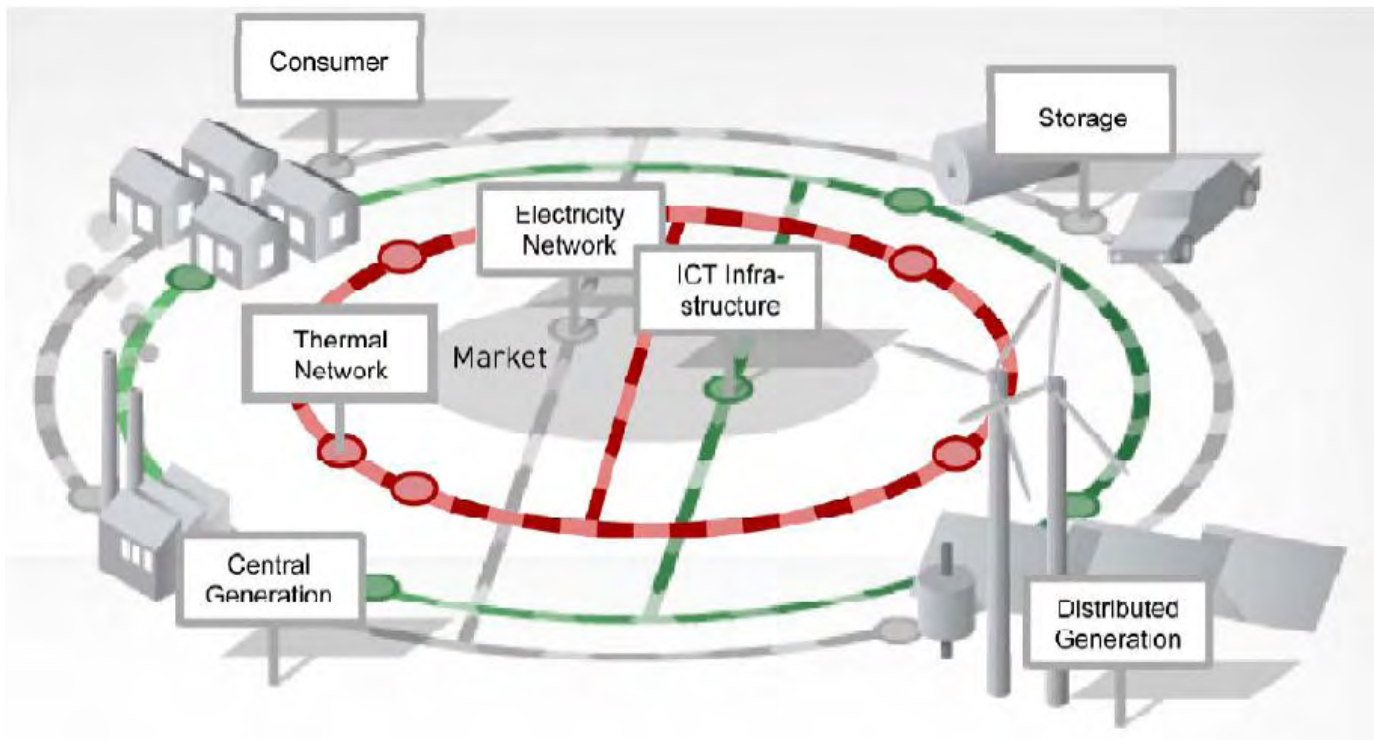
# Radical Innovation for Urban Energy Supply

- **Smart Cities** require new approaches
  - Fully integrated designed and intelligent managed energy systems
  - From a single technology perspective to multi technology perspective



# Future Urban Energy Systems

## Smart Cities



# Smart Cities

## Research and Implementation topics

- Energy Planning
  - Performance characteristics of city areas
  - Morphology, end use mixes, building energy performance characteristics etc.
  - Methods and tools for simulations (scientific level, city management level)
  
- Smart Grids
  - New methods for energy networks planning and operation
  - Smart electric grids (including energy management)
  - Smart thermal grids (heating-, low temperature heating, cooling)
  - Use of potential for shift between thermal and electric load
  - Load management for optimized power station performance
  - E-Mobility grid integration

# Smart Cities

## Research and Implementation topics

- Active Buildings (i.e. housing, industry)
  - Energy efficient, passive houses
  - Energy generation (on site-renewables)
  - Active demand side management, supply & demand profiles optimization (building to grid)
  
- Supply technologies
  - On-site renewables (i.e. solarthermal, PV, heat pumps, small wind)
  - Integration in District Heating and Cooling Networks
  - Cascade use of resources



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