UNIVERSITY OF WESTMINSTER

psi

Policy Studies Institute

# Transition to sustainable cities

## a sociotechnical approach for transformative innovation

Fred Steward

Sustainable Innovation 2014, Copenhagen

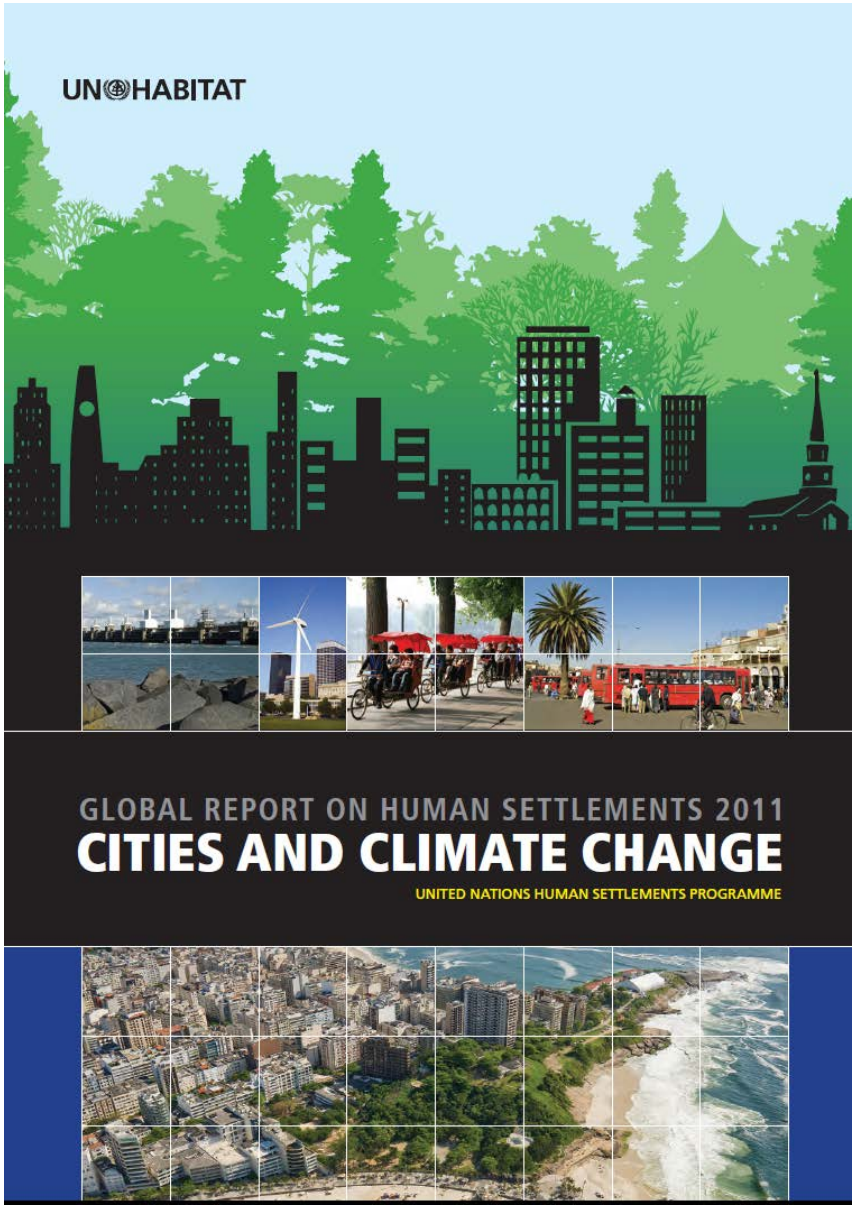
eit Knowledge & Innovation Community
Climate-KIC

# New focus on cities & climate change

- engagement of cities throughout the world in the promotion and pursuit of climate mitigating innovations
- expanding commitments to create city level climate change policy
- The growth of extensive transnational learning networks between cities such as ICLEI, the Covenant of Mayors, C40 etc
- increasing range and diversity of climate change experiments at city level which are ‘purposive interventions which attempt to reconfigure urban sociotechnical systems in the name of climate change

# City wide sociotechnical systems

- the presence at city level of the key sociotechnical systems of buildings, mobility and urban infrastructure (energy, waste & water) which are critical contributors to greenhouse gas emissions, along with local political and business responsibilities and influence on these




- key sectors for mitigation initiatives

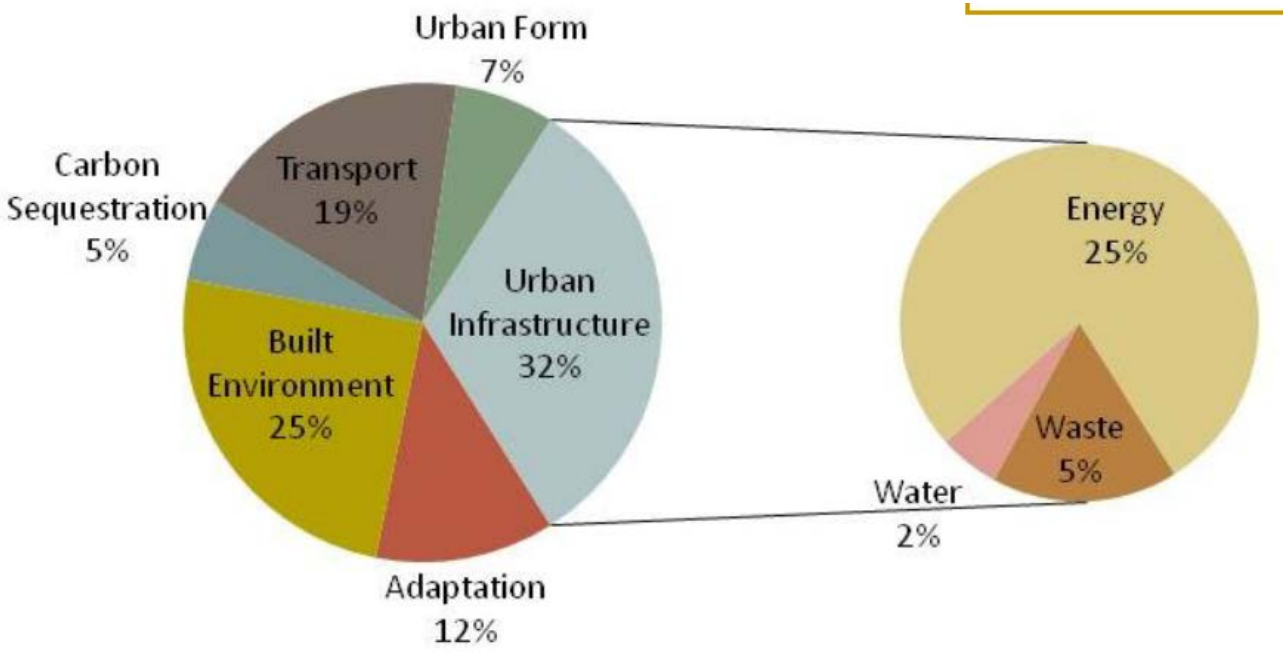
- built environment
- transportation
- urban infrastructure (energy, waste, water)
- urban form/spatial planning

# Subnational political dynamics

- the continued initiation of climate mitigation actions at city level which suggests a persistence of political enthusiasm at the subnational levels of governance in contrast with some faltering by national governments

Bulkeley (2010):
627 climate change
Experiments in 100 global cities

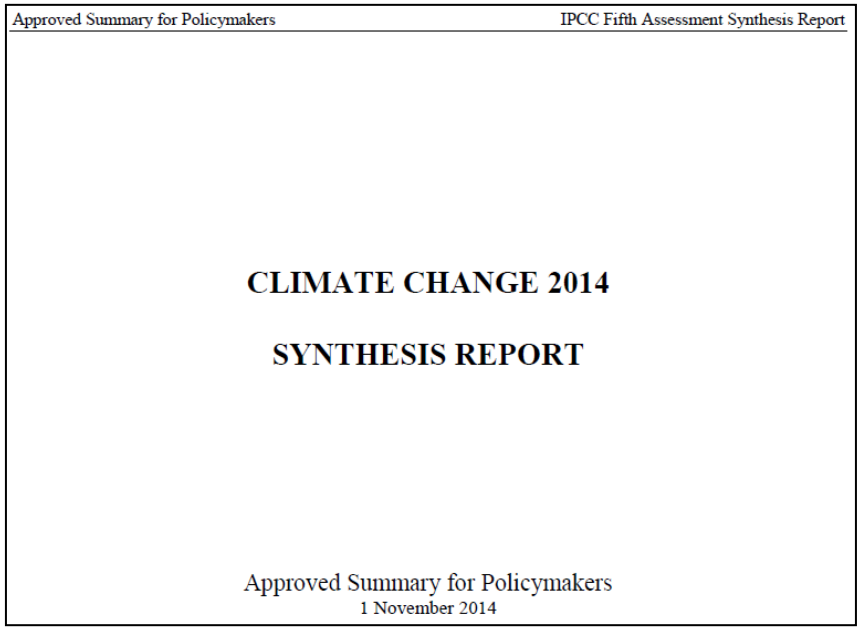
Climate change experiments are purposive interventions which attempt to reconfigure urban socio-technical systems in the name of climate change.



# Impact on global policy unclear

- Although this is an impressive range of achievements, if we take stock of their impact on the world’s strategy for addressing climate change we see a rather mixed and contradictory picture

# IPCC AR5 Synthesis report




- Systemic mitigation options are more cost effective than a focus on individual technologies or sectors
- Policy linkages among regional, national & subnational offer mitigation benefits

# IPCC 5th assessment report

- The IPCC Fifth Assessment Report from Working Group III on Mitigation of Climate Change includes for the first time a specific chapter on Human Settlements, Infrastructure and Spatial Planning
- Yet the experts remain cautious about cities overall contribution to the global challenge of climate change and remains focused on technology driven sectors such as electricity production.

# EU 2030 Framework for climate & energy policy


- First draft had no mention of cities and regions
- Following submissions fro Climate-KIC and others they are now mentioned
- Focus on national and sectoral

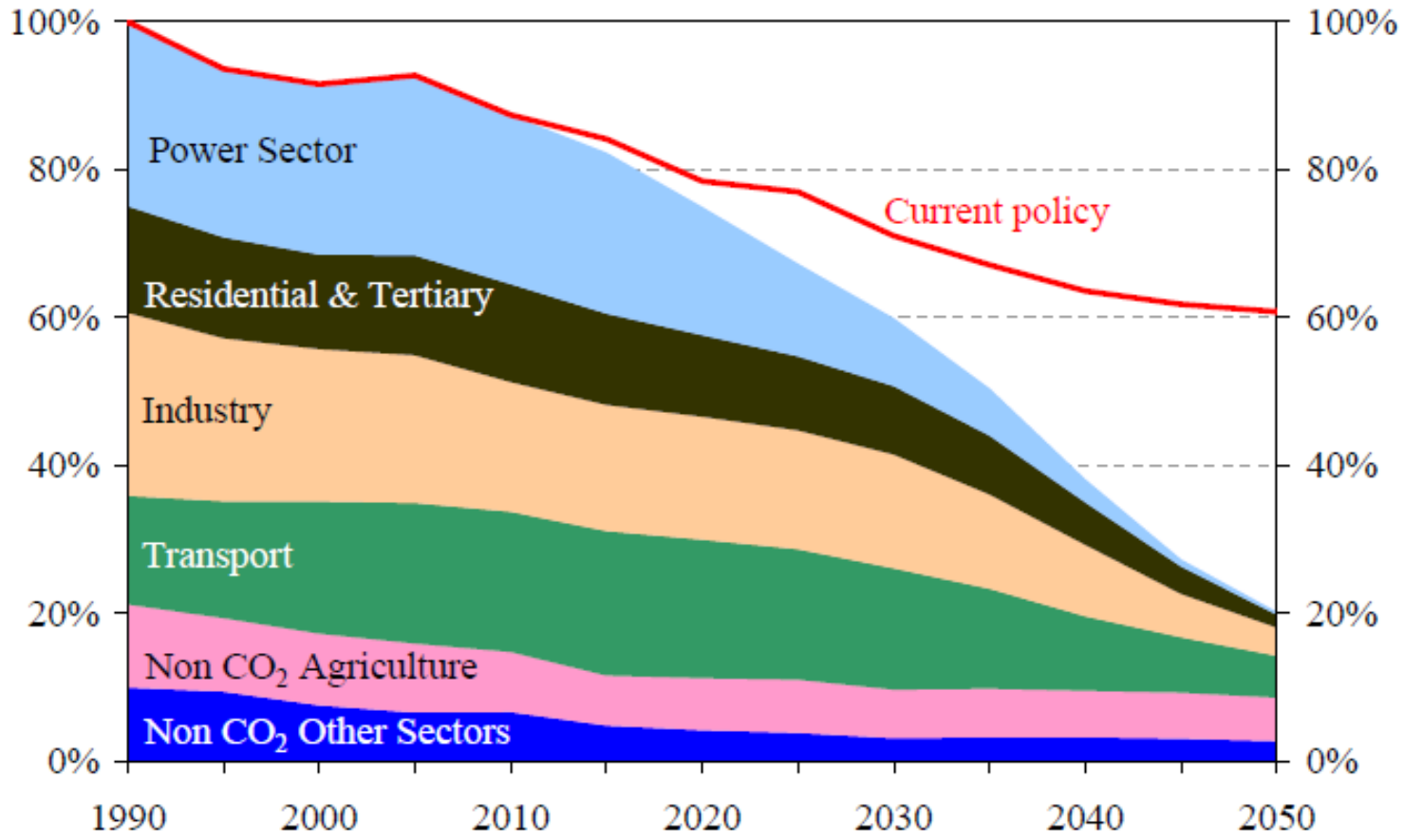
# Global governance

- International events such a Rio+20 show a very prominent presence of city authorities from across the world yet their formal role in climate change governance or innovation policy remains very limited
- these spheres remain dominated by national governments and their priorities and do not express the aspirations of the international network of cities.

# Need to reconfigure innovation policy

- At the national and international level it is important to promote a new strategy for the transformation of place based system innovation.
- reconfiguring of innovation and climate change policy from their current one dimensional perspective.
- elements of this are all being promoted by important players - it needs integration with a higher general policy profile.

# The transition to a competitive low carbon economy 2011



# Transition & transformation need innovation

- the key to the transition to a green and low carbon economy is ‘significant innovation’. (COM(2011) 571)

- ‘our economy will require a fundamental transformation within a generation…in producer and consumer behaviour’. (COM(2011) 571

# New mode of innovation

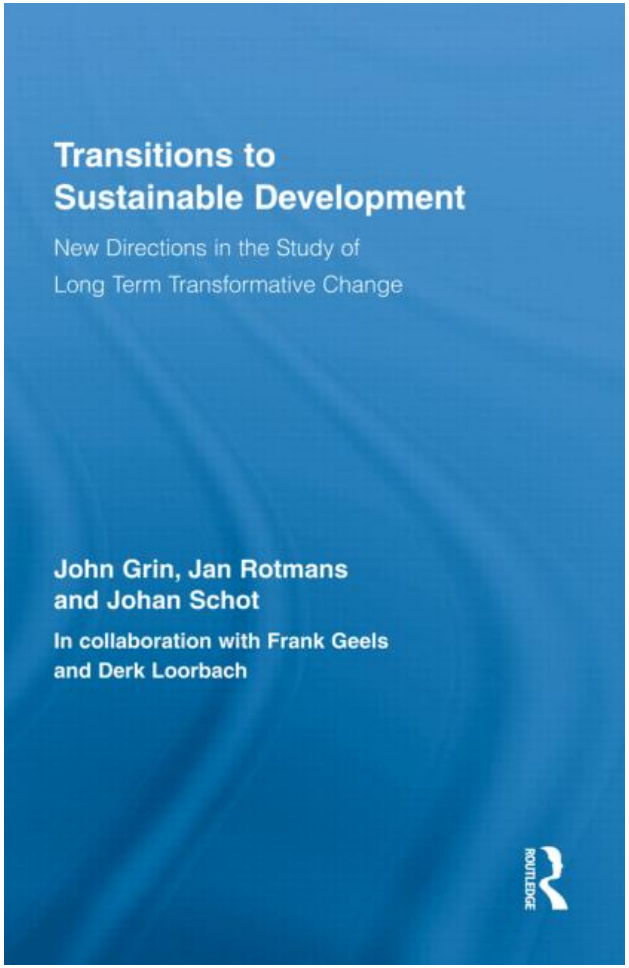
- new mode of challenge led, broad based transformative innovation which needs the interaction of a diversity of organisations and individuals through multiple types of technological, organisational, behavioural and business model innovation

# Modes of innovation

- A new interest in a diversity of modes of innovation
- Lundvall contrasts 2 modes of innovation:
- *STI – Science, Technology & Innovation*
- *DUI – Doing, Using & Interacting*

- Lundvall et al ‘Forms of knowledge and modes of innovation’, *Research Policy* 2007

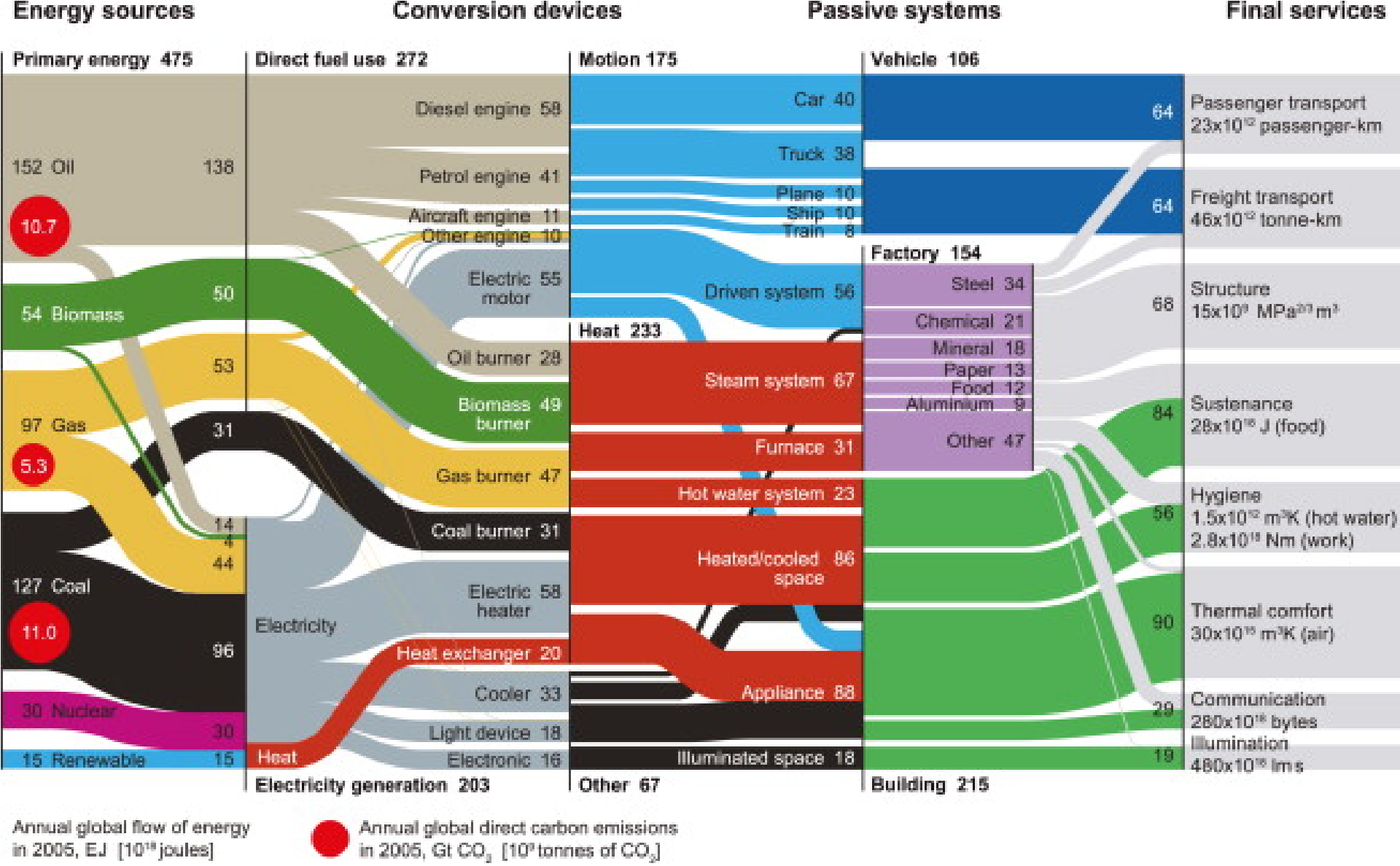
# New transitions thinking




- Dutch programme on transitions
- Multilevel perspective
- Historical transitions
- Transition management
- Governance of transitions

# Transition needs system innovation

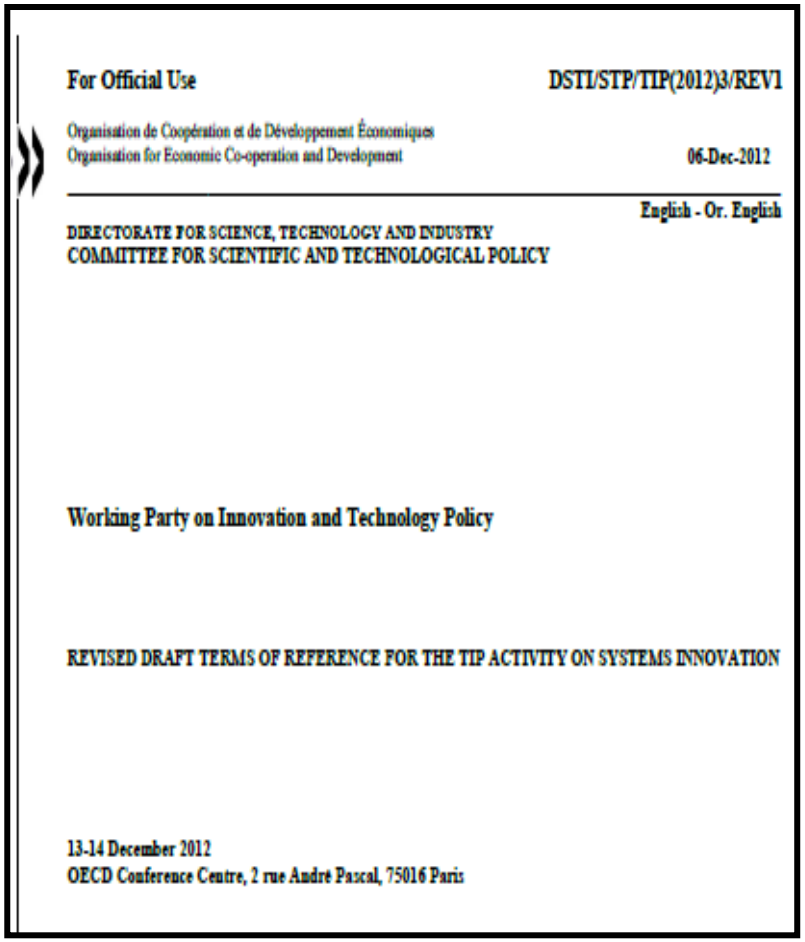
- transformative innovation to address the challenge of climate change will be systemic in nature
- ‘system innovations’ involve different technologies, a variety of social/behavioural innovations, and a diversity of societal actors
- better seen as ‘sociotechnical’ innovations rather than either technological or social innovation
- most sustainability/innovation policy and practice remains focused on singular technologies and needs to be reoriented




# Global energy flows 2005

Cullen & Allwood 2010

# Systems innovation



For Official Use DSTI/STP/TIP(2012)3/REV1

Organisation de Coopération et de Développement Économiques
Organisation for Economic Co-operation and Development 06-Dec-2012

English - Or. English

DIRECTORATE FOR SCIENCE, TECHNOLOGY AND INDUSTRY
COMMITTEE FOR SCIENTIFIC AND TECHNOLOGICAL POLICY

Working Party on Innovation and Technology Policy

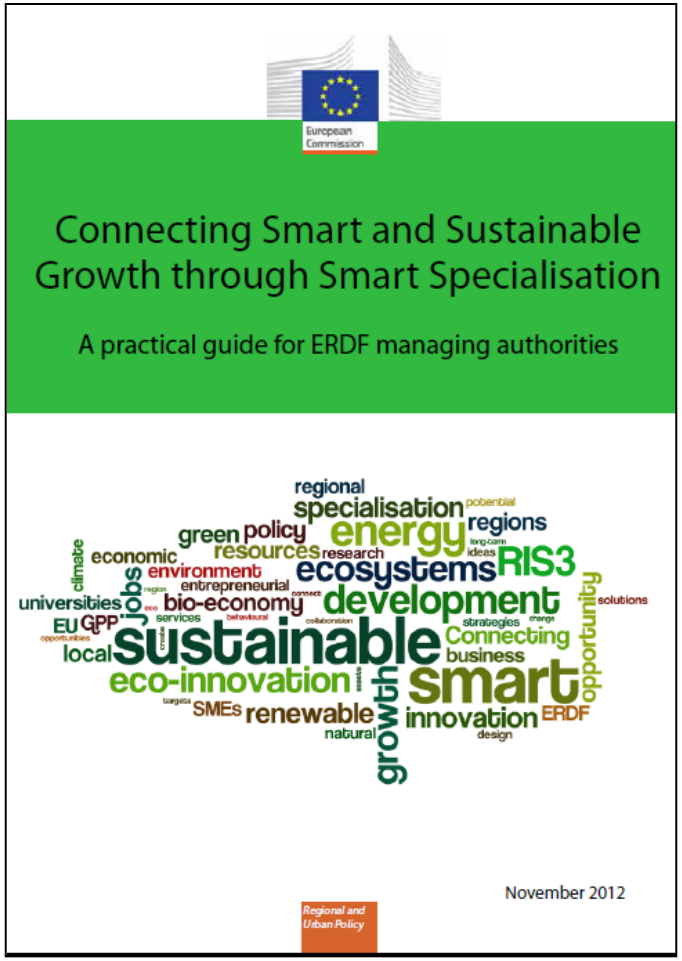
REVISED DRAFT TERMS OF REFERENCE FOR THE TIP ACTIVITY ON SYSTEMS INNOVATION

13-14 December 2012
OECD Conference Centre, 2 rue André Pascal, 75016 Paris

- OECD
- climate challenge calls for new thinking on innovation policy
- sociotechnical systems
- demand side… behavioural, technological, policy and business practices among different actors

# Multilevel governance

- DG Regio
- Regional and local authorities
- transformative innovations and systemic change
- far beyond the boundaries of one company or organisation



# Policy implications – a change in the dominant mode of innovation?

- Shift in focus from producer/technologies to consumers/use
- Attention to new social actors
- Engagement with new knowledge practices

# New place based actors

- leaders will be the institutions and organisations who deal with the key systems of mobility and household living.
- different to traditional product focused innovators
- regional players are well placed for this
- key responsibilities for transport, housing, waste and energy systems
- enable the participation of the diversity of actors involved in system innovation

# New practice based knowledge

- more integrated and practice based than conventional academic science
- learning by doing - innovative approaches to mobility and household living in practice
- experimentation is often more feasible at regional - scale is manageable yet significant resources can be leveraged.
- challenge is to move from the specific to the general.

# City level transition capacity

- At the city level we need to develop and embed a more explicit and knowledgeable capacity to monitor and enable sustainability transitions in city wide sociotechnical systems.
- Need a transition policy capability to facilitate transformative low carbon innovation in major end use sectors – buildings, transport, and energy networks.

European Institute of Innovation & Technology

- EIT Established 2008: 3 Knowledge and Innovation Communities (KICS) established 2009
- Climate KIC to pioneer new innovation models to address climate change bringing together diverse actors – triple helix/knowledge triangle
- EIT is key delivery strand in Horizon 2020
- will strongly contribute to tackling societal challenges under Horizon 2020 and bring about systemic change
- close co-operation with regional authorities (EIT Strategic Agenda)

# Horizon 2020 COM (2011) 808

- **Part III: Priority 'Societal Challenges'**

- a challenge-based approach, focusing on policy priorities without predetermining the precise choice of technologies or solutions
- a new focus on innovation related activities, such as piloting, demonstration, test-beds, support for public procurement,design, end-user driven innovation, social innovation

**West Midlan**

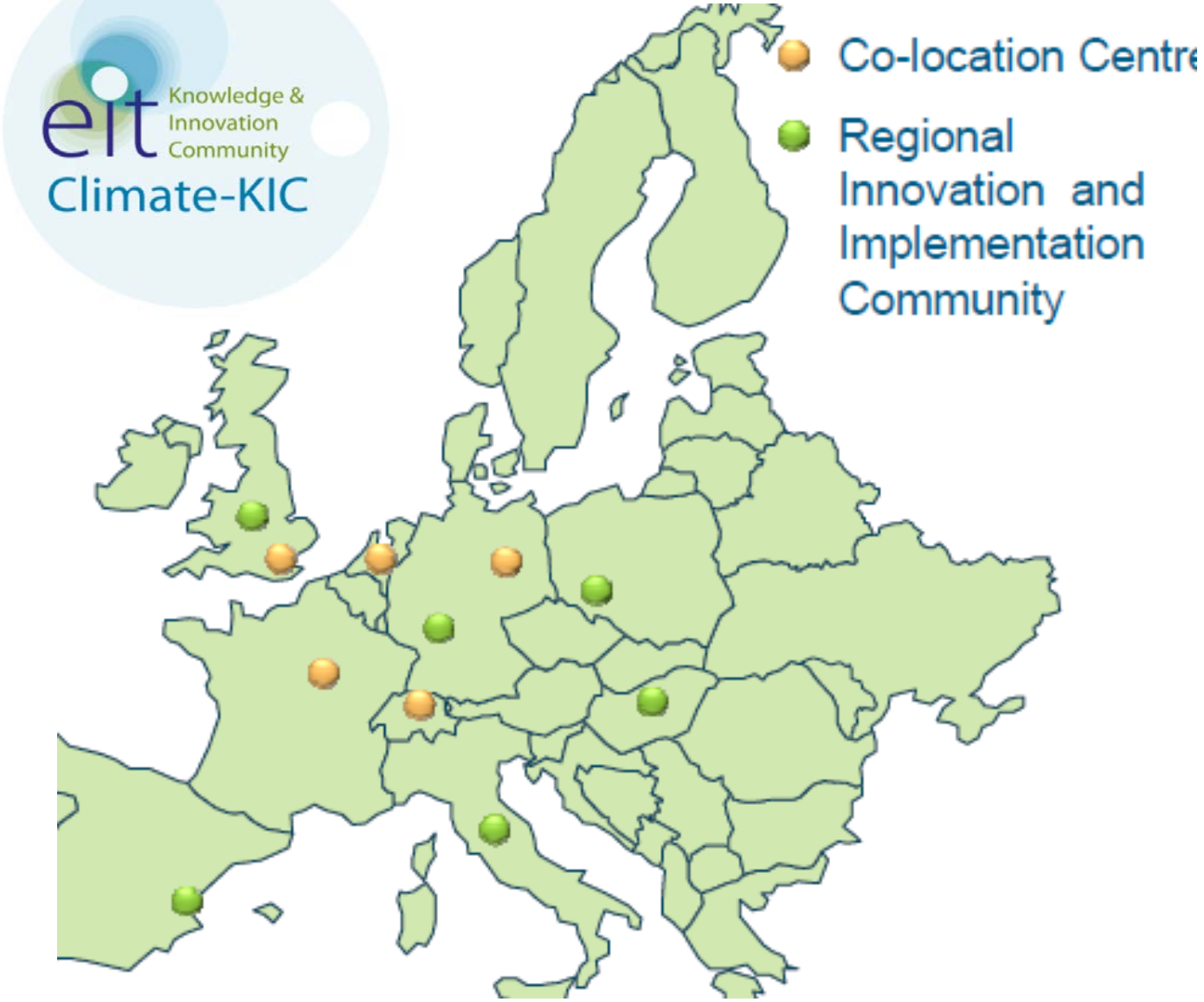
**Valencia**

**Hessen**

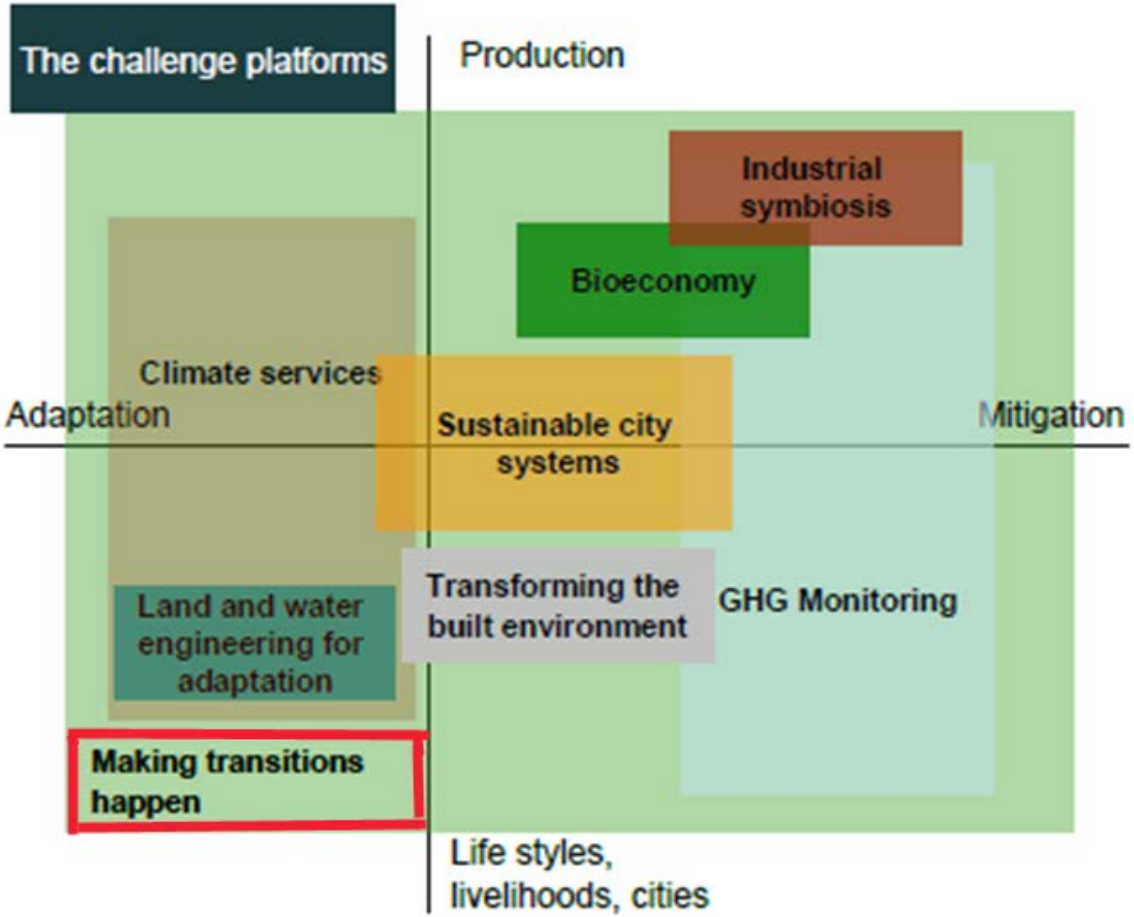
**Emilia Romagna**

**Lower Silesia**

**Central Hungary**



# Challenge platforms



- To play a leading role in the transformation of regional innovation policy and practice in Europe on climate change’
-

(Ritter, Nature Climate Change 2011).

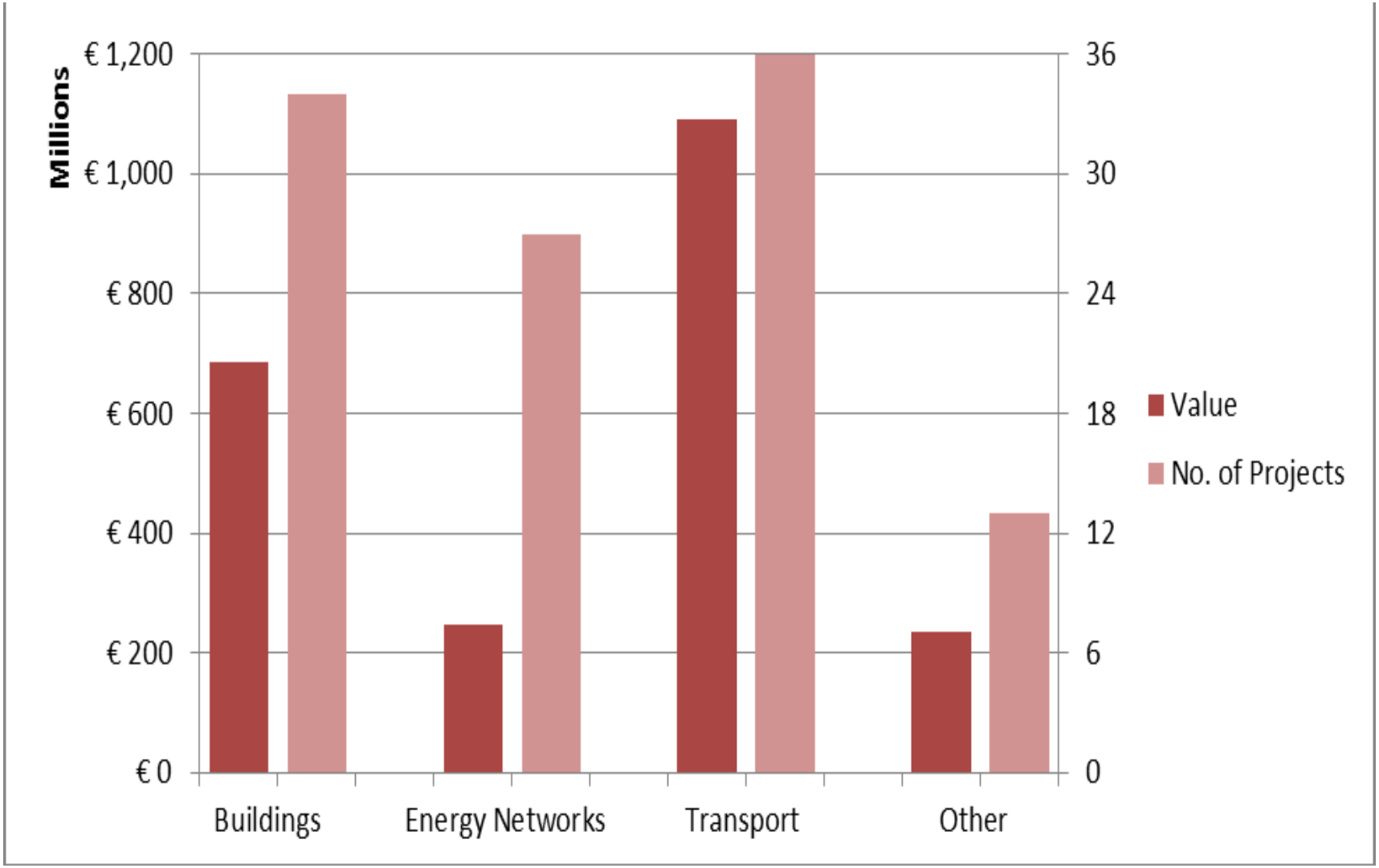
# Transition Cities

- Birmingham, Frankfurt, Wroclaw, Budapest, Bologna/Modena, Castellon/Valencia
- partnership of city authorities and transition researchers
- aim is to ensure that they contribute effectively to the transition to a low carbon society
- enable challenge led socio-technical innovation for low carbon transformation

# City innovation projects

- low carbon innovation projects active since 2011
- mitigation oriented
- buildings, transport, energy networks
- 'broad definition' of innovation - technology, service, organisation and business models.
- range of novelty and scale
- upstream and downstream

# 110 projects, €2 billion



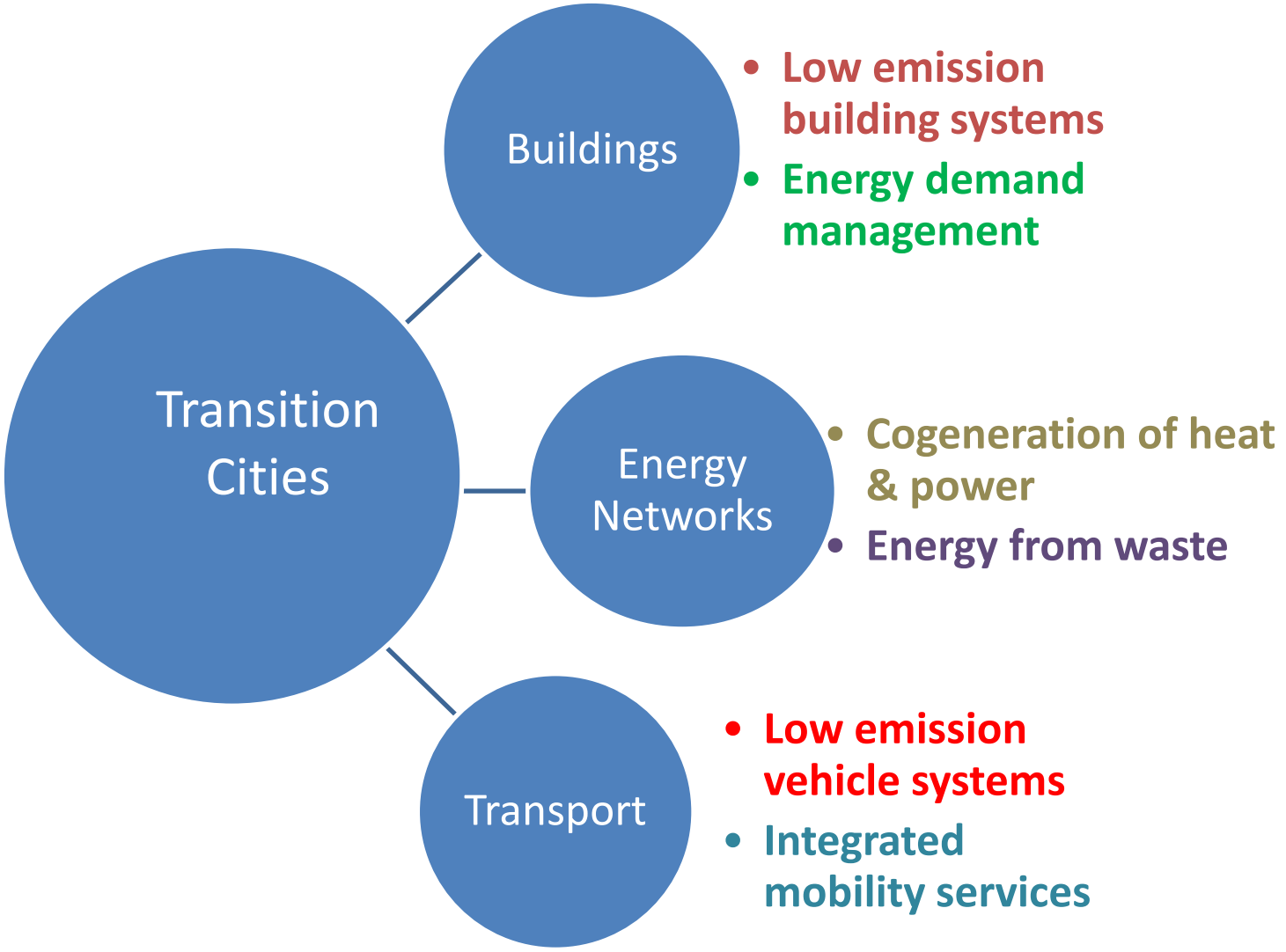
# Challenge led clusters

- low carbon innovations usually treated separately from each other in a stand alone project management fashion
- by clustering projects, cities can deepen their understanding and gain a wider awareness of transition thinking
- how can the diversity of innovation projects be strategically managed in a more effective way
- to promote low carbon transitions in city-wide sociotechnical systems.

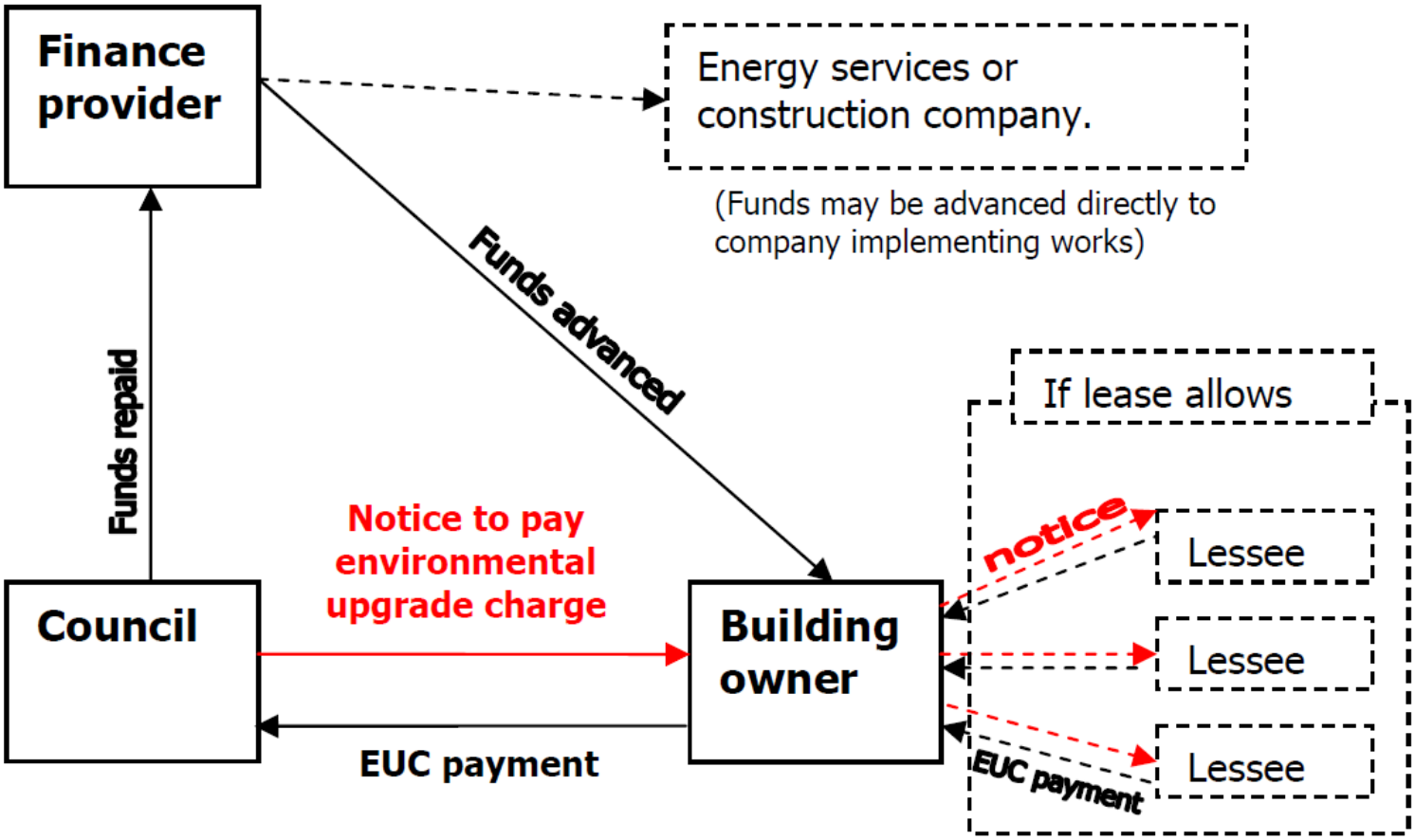
# From innovation projects to transition experiments

- An innovation project is usually technology driven, singular and solution focused
- A transition experiment is challenge led, systemic and learning oriented
- Projects become experiments through selection, clustering within arenas, and developing transition awareness
- This involved the grouping of different projects into a *challenge led cluster* of organisations and activities relevant to a particular sociotechnical system transition

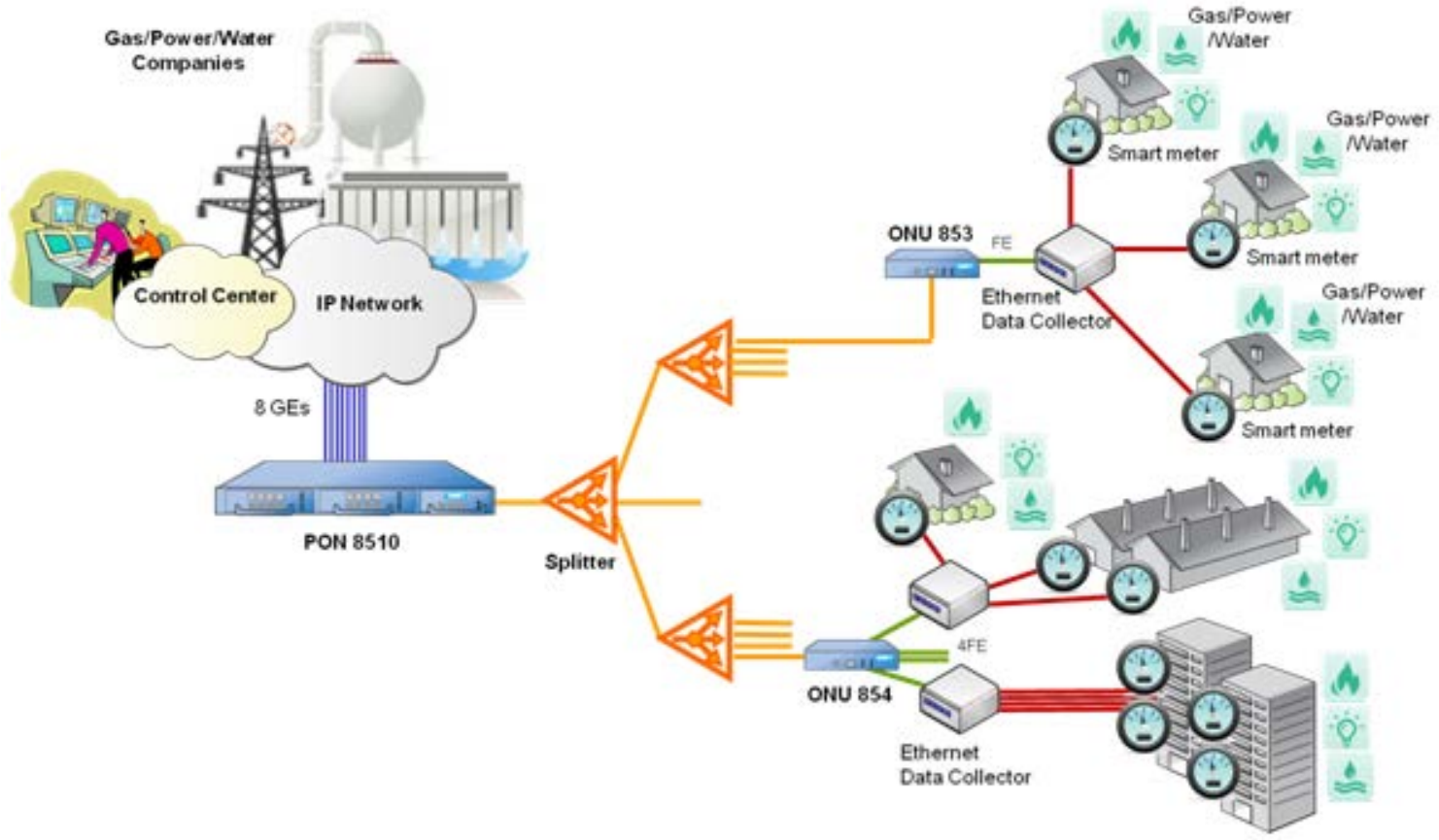
# Sociotechnical systems



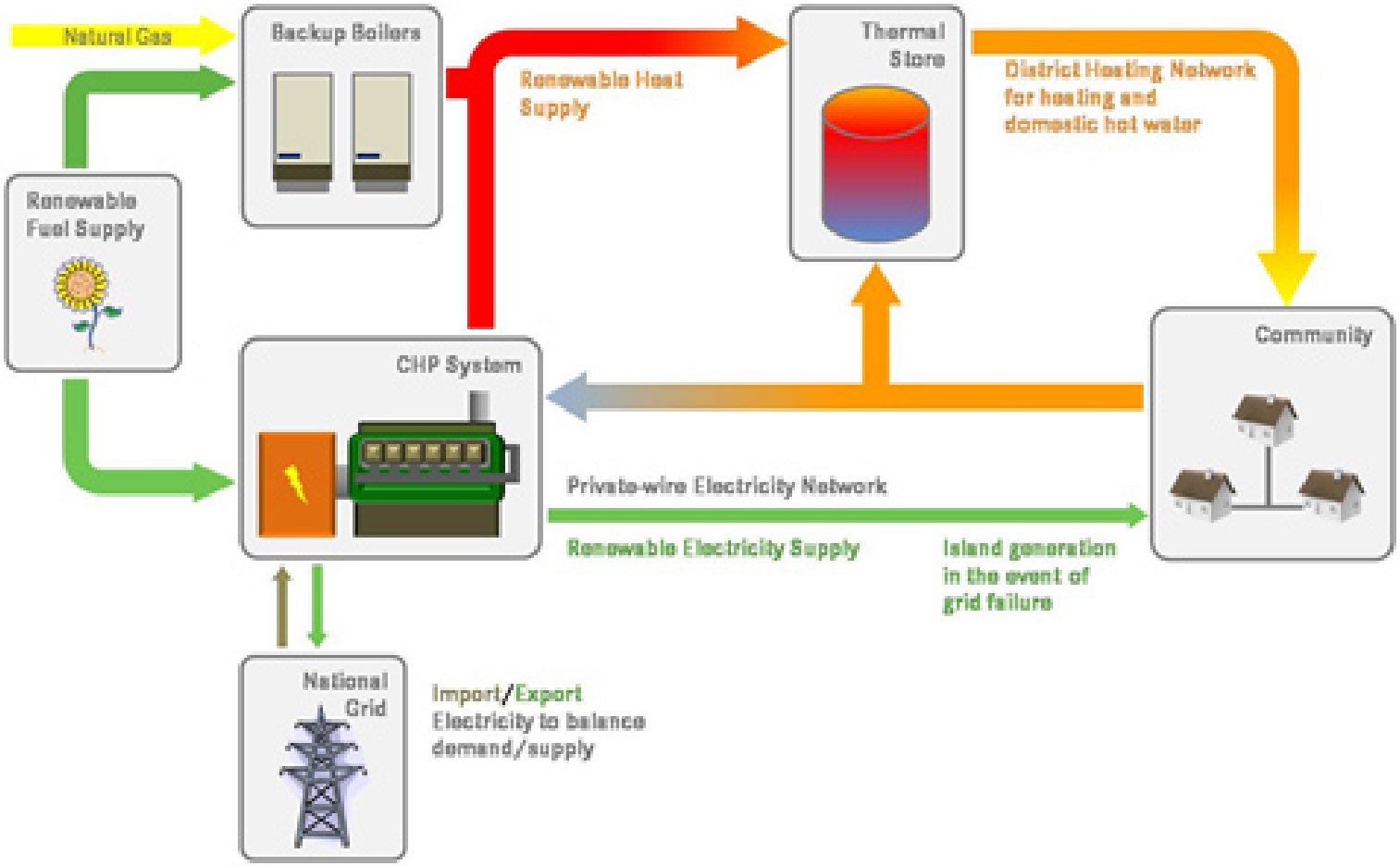
# Arena 1: Energy efficient buidings



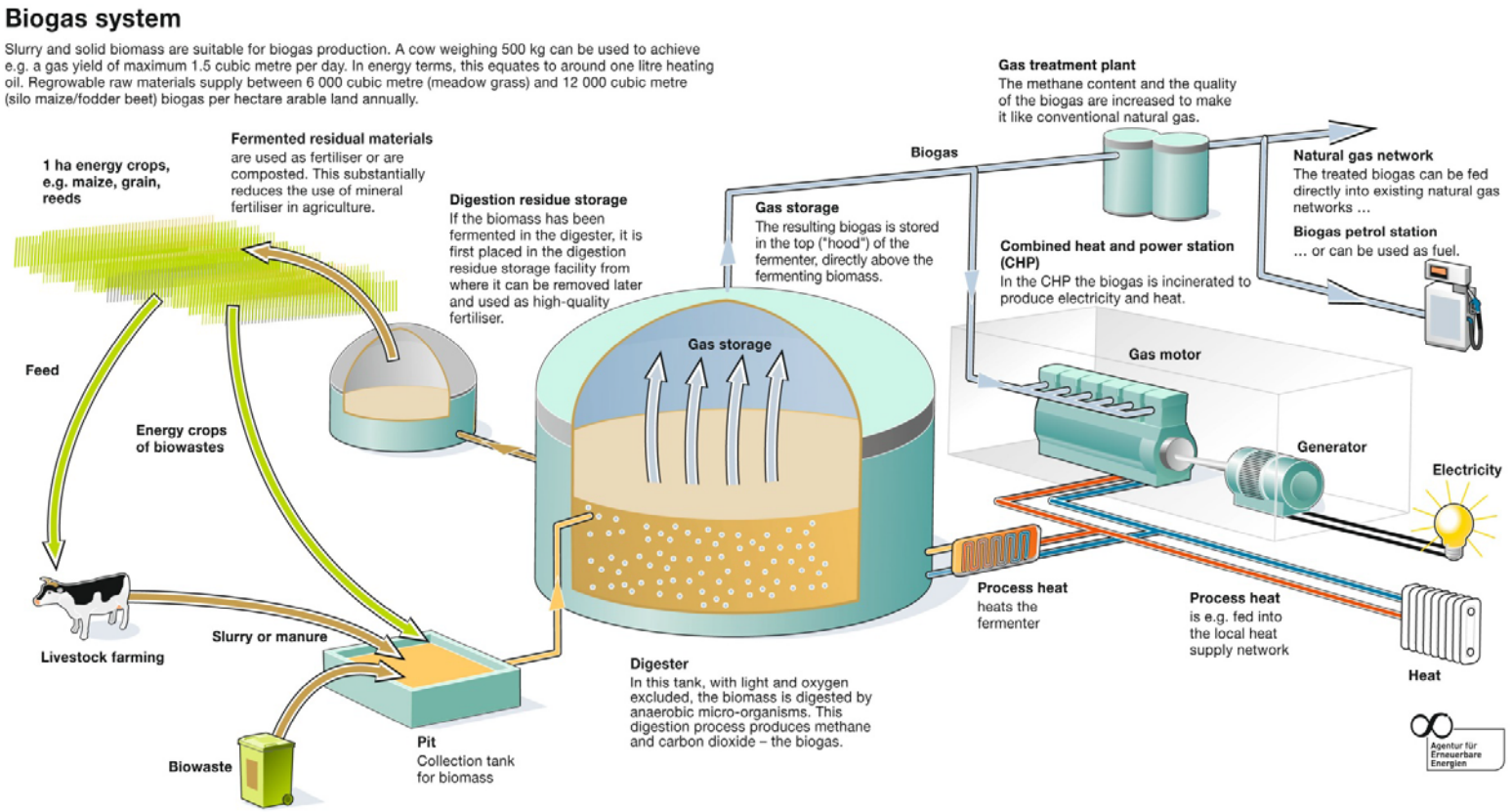
# Arena 2; Energy demand management



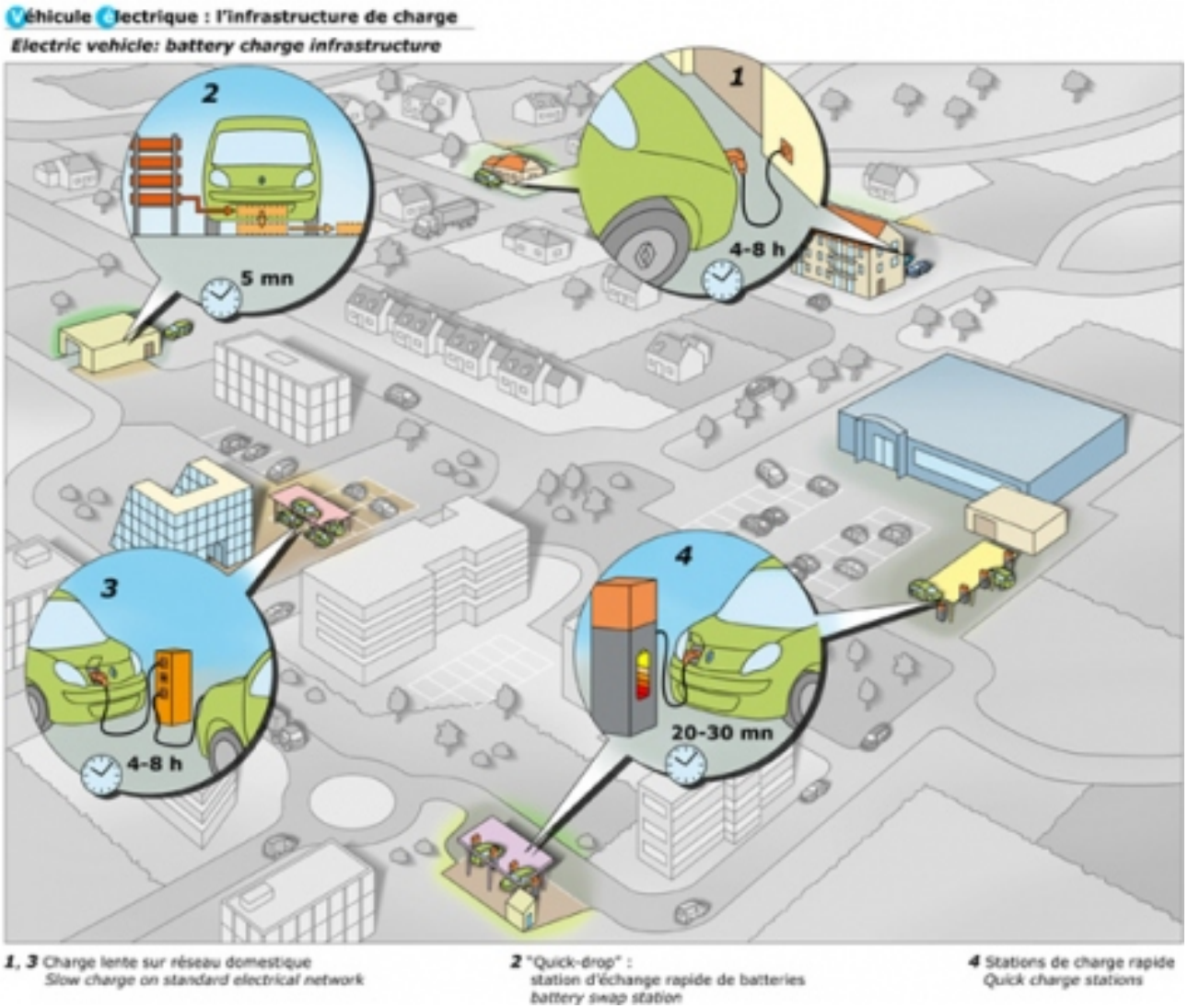
# Arena 3: Cogeneration



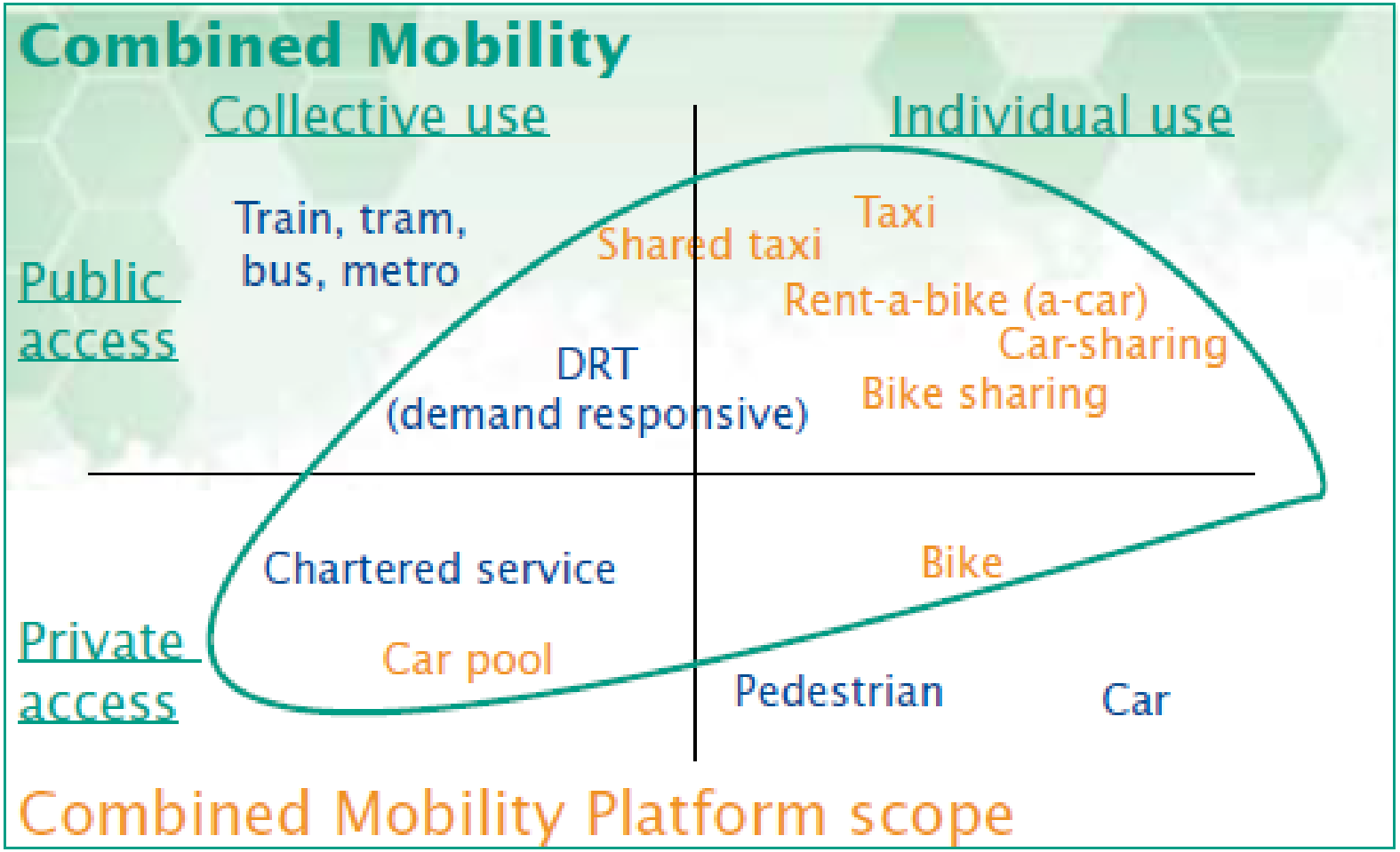
# Arena 4: waste into energy



# Arena 5 Low emission vehicles



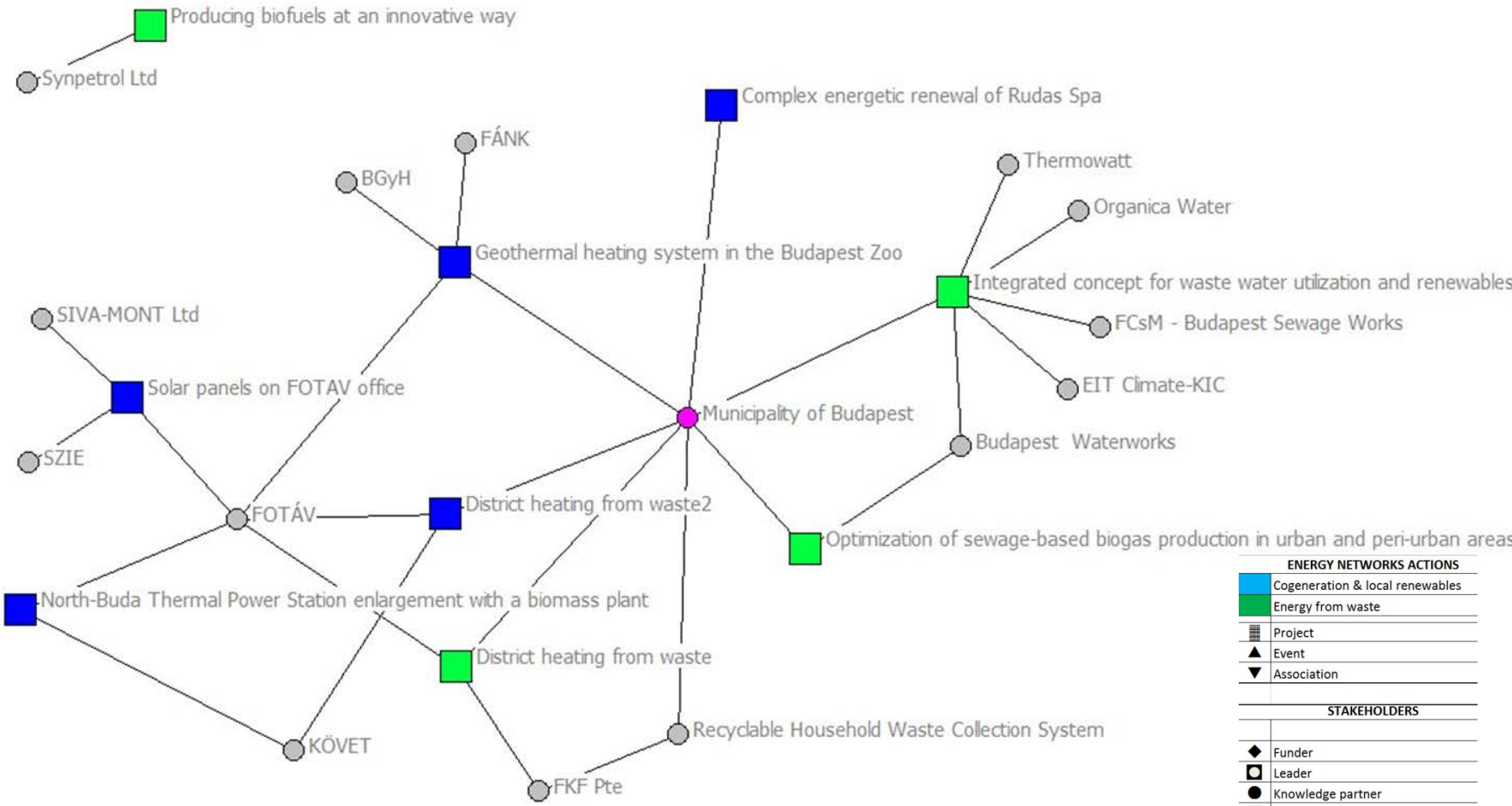
# Arena 6: Integrated mobility system



# Network mapping to support transition clusters

- sociotechnical network maps based on a set of low carbon innovation actions implemented (since 2011) in each Transition City.
- A sociotechnical network includes both social stakeholders and technological  projects.
- The way in which the network is mapped represents stakeholders as one type of node and actions as another type of node.

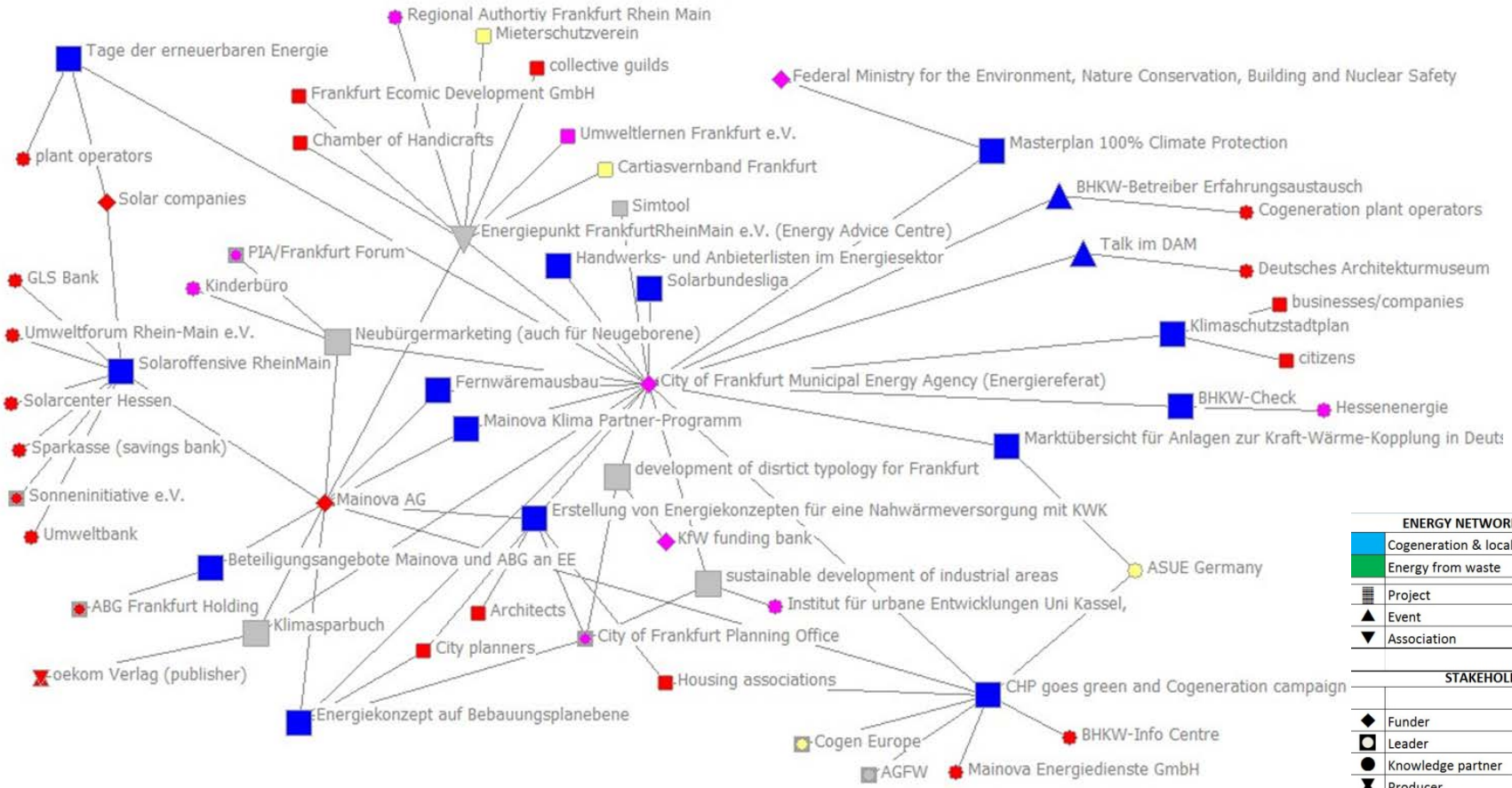
# Budapest energy transition cluster




| ENERGY NETWORKS ACTIONS |
|---|
| Cogeneration & local renewables |
| Energy from waste |
| Project |
| Event |
| Association |

| STAKEHOLDERS |
|---|
| Funder |
| Leader |
| Knowledge partner |
| Producer |
| User |
| Private |
| Public |
| Not for profit |
| Academic |
| Unknown |

# Frankfurt energy transition cluster

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| User |
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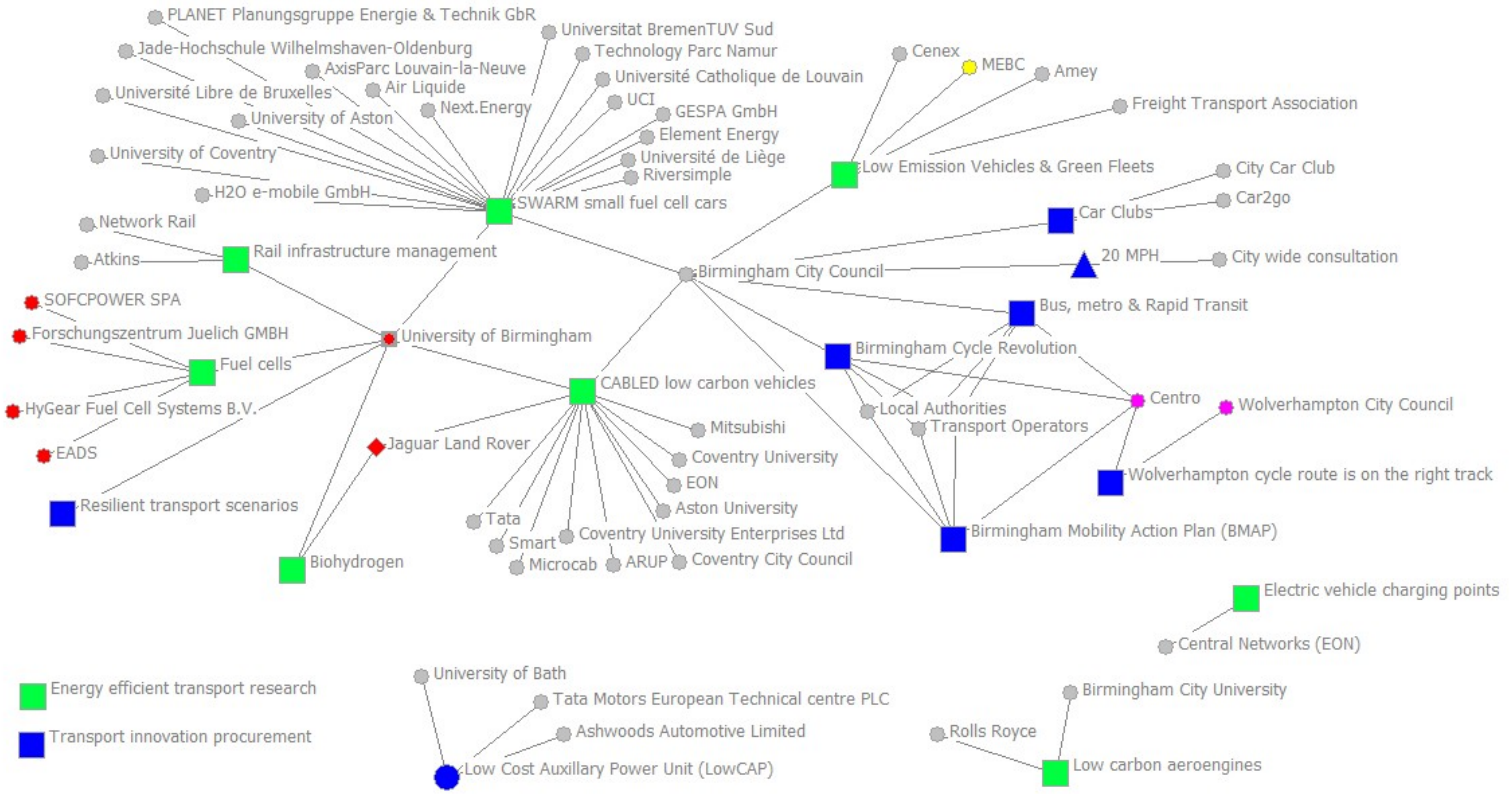
| Unknown |

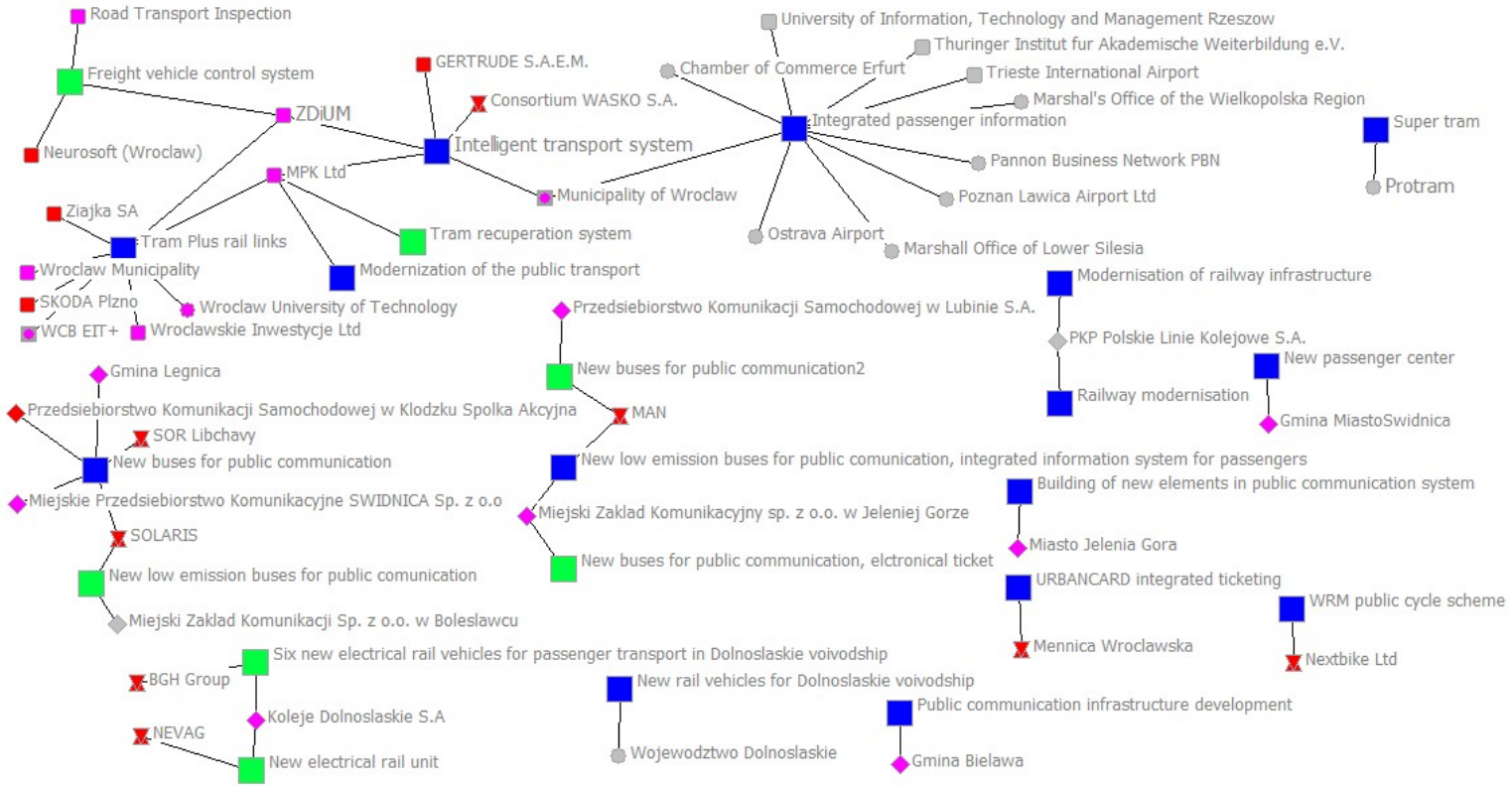
# Birmingham mobility transition cluster




| MOBILITY ACTIONS |
|---|
| Integrated mobility |
| Low emission vehicles |
| Project |
| Event |
| Association |

| STAKEHOLDERS |
|---|
| Funder |
| Leader |
| Knowledge partner |
| Producer |
| User |
| Private |
| Public |
| Not for profit |
| Academic |
| Unknown |

# Wroclaw mobility transition cluster




| MOBILITY ACTIONS |
|---|
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| Public |
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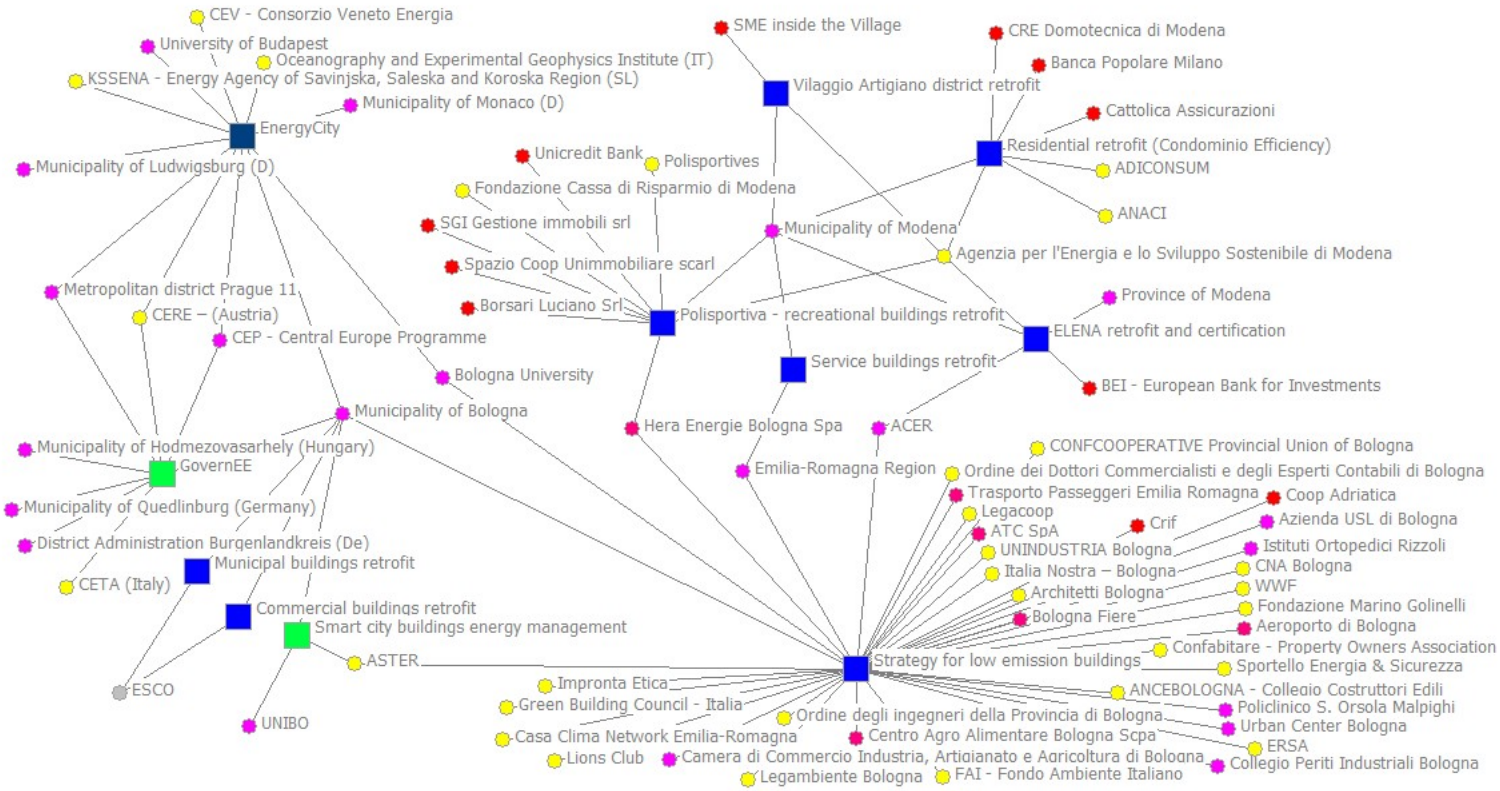
| Unknown |

# Bologna Modena buildings transition cluster



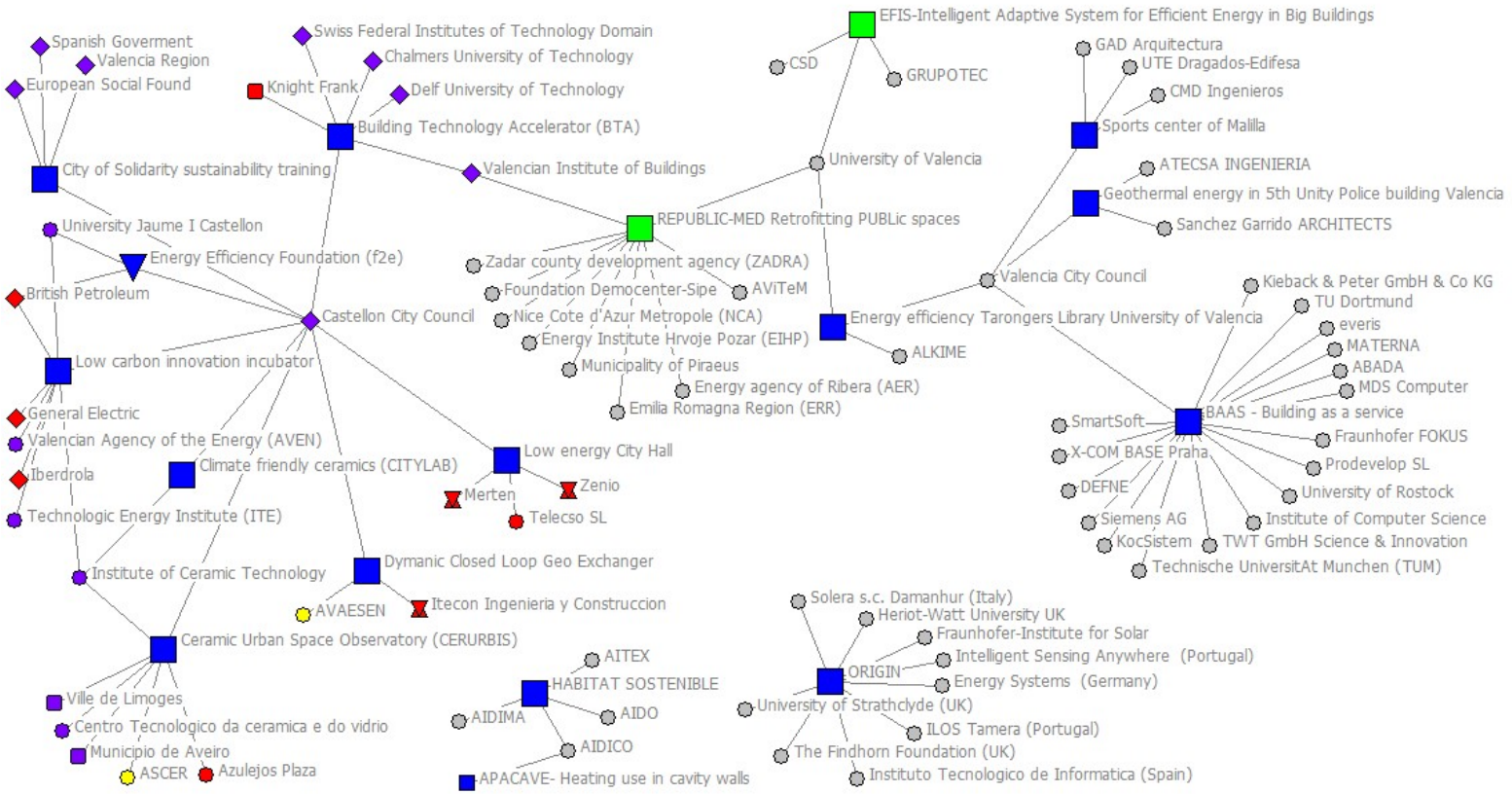

**BUILDING ACTIONS**

- Low Emission Buildings
- Energy demand management
- Project
- Event
- Association

**STAKEHOLDERS**

- Funder
- Leader
- Knowledge partner
- Producer
- User
- Private
- Public
- Not for profit
- Academic
- Unknown

# Valencia Castellon buildings transition cluster




**BUILDING ACTIONS**

- Low Emission Buildings
- Energy demand management

- Project
- Event
- Association

**STAKEHOLDERS**

- Funder
- Leader
- Knowledge partner
- Producer
- User

- Private
- Public
- Not for profit
- Academic
- Unknown

# Sociotechnical network mapping of transition clusters

- The purpose of the network maps is to develop a new framework for understanding the patterns of system wide change.
- It uses a relational approach designed to reveal interlinkages and the role of different actors in the process of change.
- The layout of the network maps uses techniques from social network analysis to place more prominent actors at the centre of the map and to place closer linked actors nearer to each other
- It is a new type of ‘language’ for addressing the dynamics of transition.

# Coproducing clusters

- Brings ‘analysts’ and ‘actors’ together to co-produce a shared ‘map’ of each transition cluster as a socio-technical system network.
- The analysts use state of the art social network analysis software to map out the pattern of social actors and low carbon innovation projects in a particular city.
- The actors comment on the transition cluster maps in order to clarify the system configuration found in each partner city

# Conclusions

- The challenge of climate change needs systemic rather than singular innovation, and offers a broader definition of innovation which highlights social, organisational, and business model novelty
- Prospects for transformative innovation can be addressed through a focus on the place based sociotechnical networks of mobility, buildings and energy

# Conclusions

- Need policy recognition of a new mode of innovation and the inportance  place based innovation actors
- the Climate-KIC Transition Cities project seeks to make transition happen through building new new transitions capabilities for the system mode of innovation in practice.