

# Energy Efficient Communities

Case studies and strategic guidance for urban decision makers, IEA ECBCS Annex 51

IEA Committee on Energy Research and Technology (CERT)

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Bundesministerium  
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## Urban energy planning: motivations and opportunities

- High levels of energy performance reached now in the building sector, but:
  - The **actual** building energy performance depends on the local energy system **configuration and performance** (infrastructure availability...)
  - **Urban parameters** (morphology, availability of natural heat sources and sinks, functional mix...) affect the overall energy performance of buildings
  - Decisions at community level have **long-lasting impacts** on the energy balance of cities (decisions on energy infrastructure, implications on mobility... )
- Many questions to be answered by urban energy planning:
  - At **strategic** level: which measures to be **implemented at city scale**? (targeted building renovation initiatives, energy infrastructure improvements, coherent funding mechanisms, etc.)
  - At **operational** level: planning and design of integrated energy systems for neighbourhoods and districts
- Opportunities:
  - Cities generally **committed** to energy and environmental targets
  - New neighbourhood development projects: possibilities to **include energy criteria** and plan/implement **integrated energy systems**
  - Urban regeneration projects: possibilities to plan and implement **large-scale thermal renovation measures**

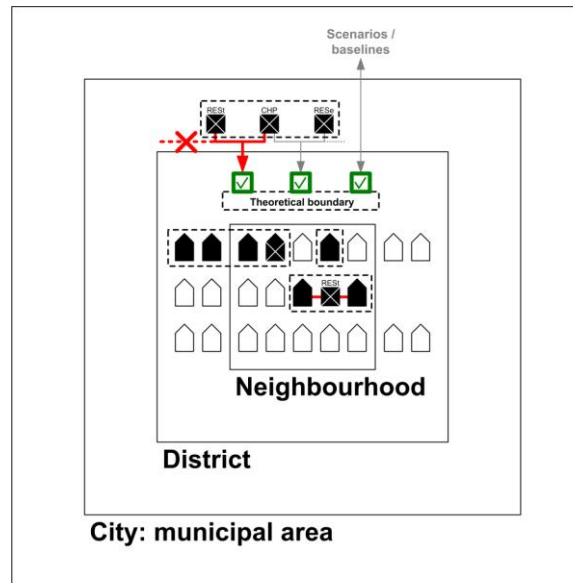
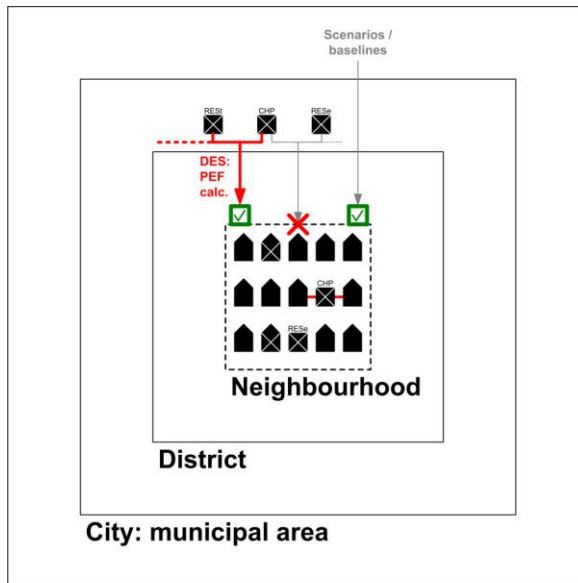
## Urban energy planning: challenges

- Major differences with the building sector:
  - **Complex decision-making, planning and implementation processes**  
*e.g. **Which** questions are to be answered by **whom** and **when**? How to deal with **diverging economic interests** of stakeholders?*
  - High **complexity** of effects considered  
*example 1: urban planning → energy use for buildings and mobility → urban heat island → energy use for buildings*  
*example 2: considering optimized building energy performance in planning and designing energy supply infrastructure*
  - **Long-term planning**: general recommendations might be **revised** in future  
*e.g. consider **knew** technological developments, development of energy prices etc.*
  - **Complex monitoring framework**:  
*e.g. high number of actors involved, key performance indicators depending on chosen boundaries etc.*

# Challenges: energy system boundaries









## NEIGHBOURHOOD ASSESSMENT

## PROJECT ASSESSMENT



Urban areas: metropolitan area  
Rural areas: regional area

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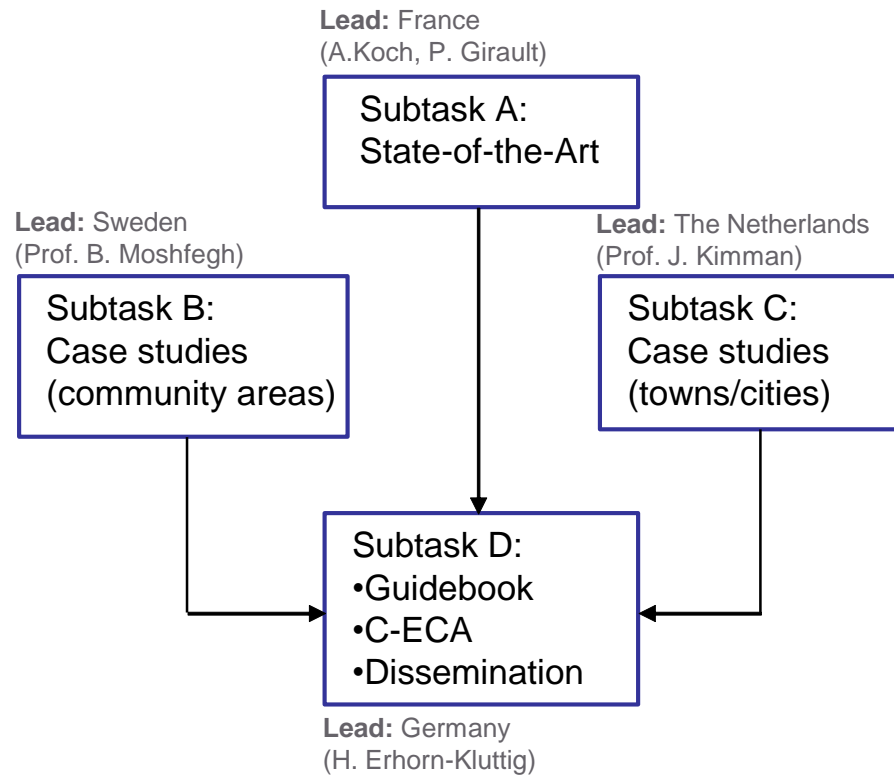
-  Heat from district heating network
-  Electricity from grid
-  Energy flow **not** considered into energy balance
-  Energy flow considered into energy balance
-  Energy system **boundary** for assessment
-  Building available in **CONCERTO** area, but **not** considered in assessment
-  **CONCERTO** demonstration building
-  **CONCERTO** demonstration energy plant

Geographical boundaries vs.  
Energy system boundaries

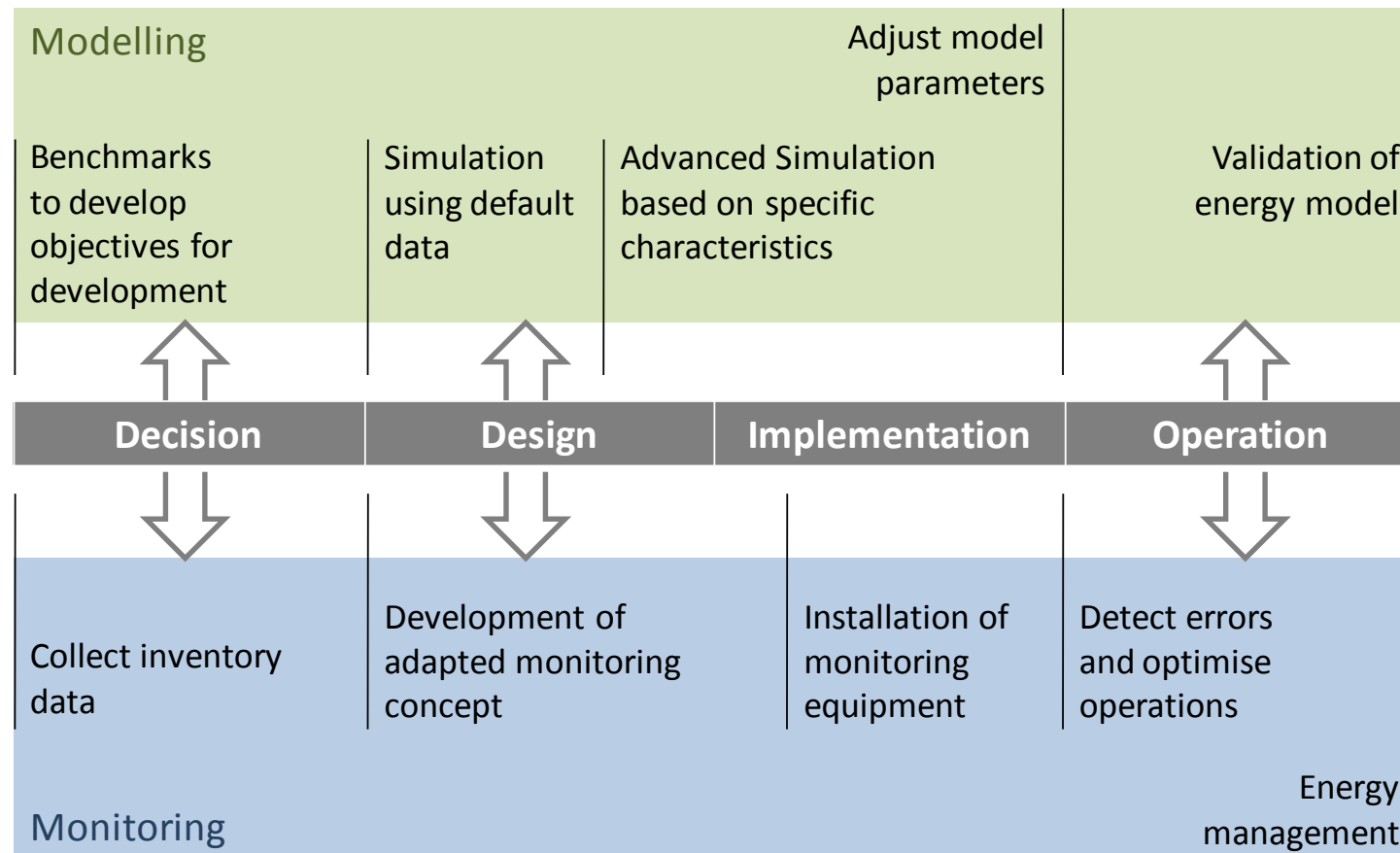
# IEA ECBCS Annex 51: energy efficient communities

Operating Agent: R. Jank

- Austria
- Canada
- Denmark
- Finnland
- France
- Germany
- Japan
- The Netherlands
- Switzerland
- USA

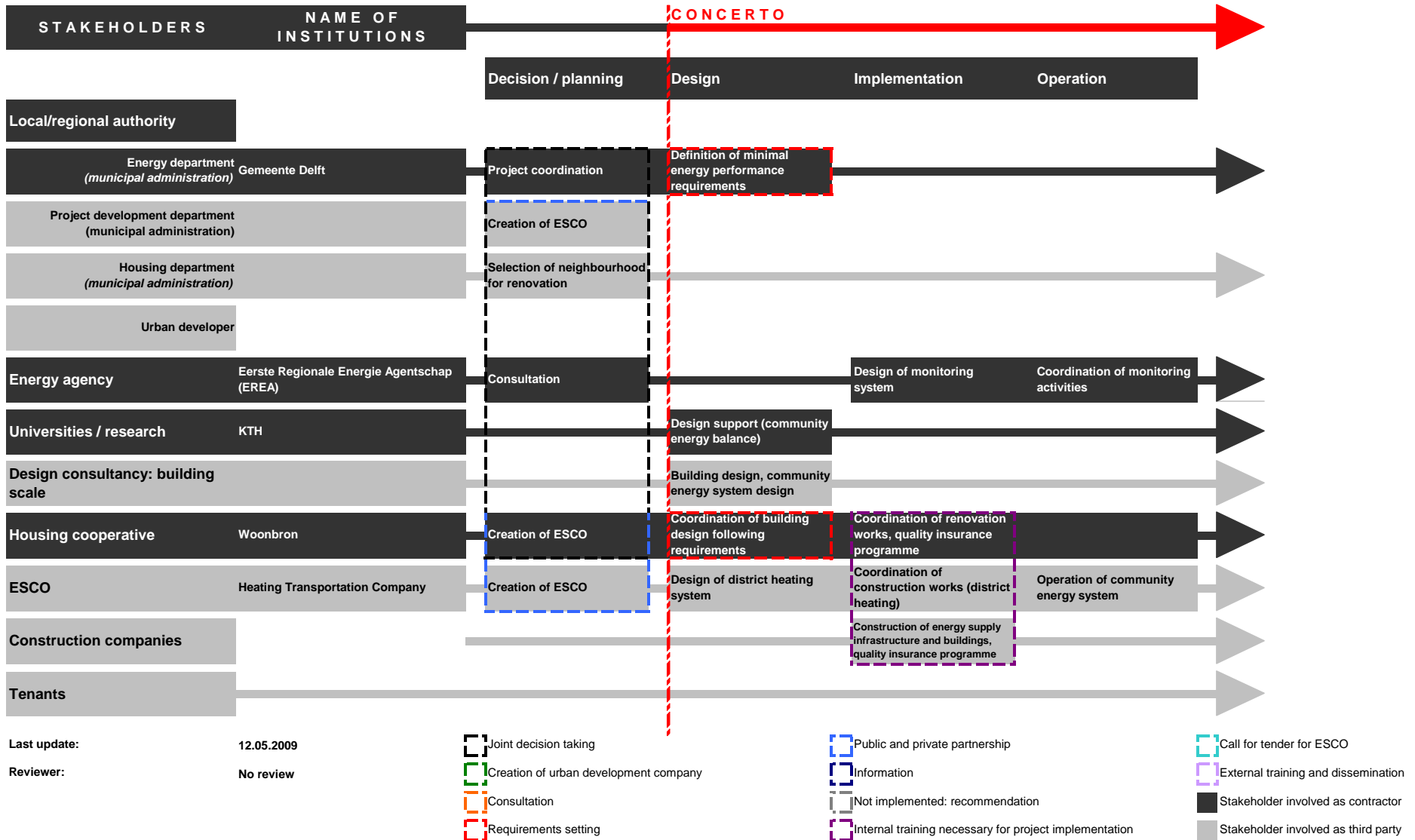


# Modelling and monitoring in planning and implementations processes



# Planning and implementation processes

## 1) Process mapping in CONCERTO



Last update: 12.05.2009  
 Reviewer: No review

# Planning and implementation processes

## 2) Identifying key mechanisms

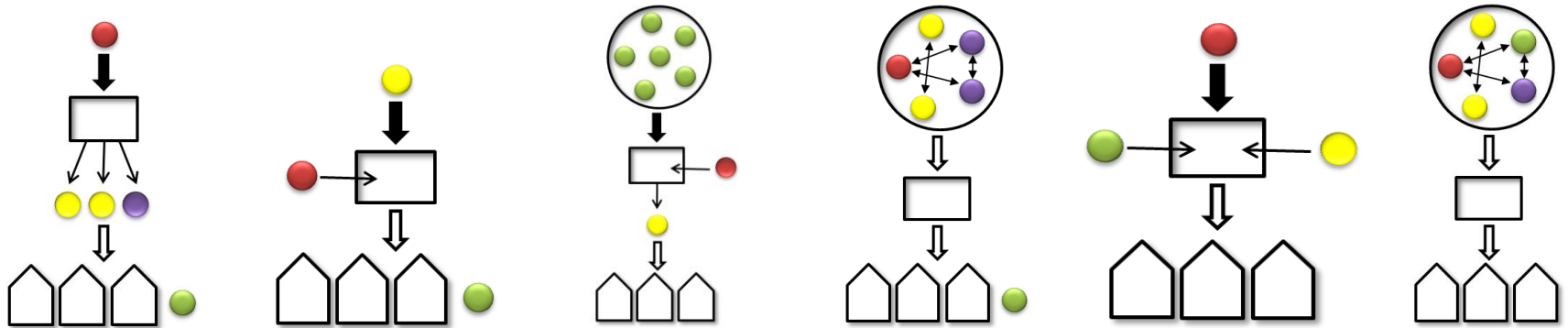
- **Joint decision taking** (agreement)
- **Consultation** (in decision making phase)
- **Creation of urban development company** (for new neighbourhood developments)
- **Requirements setting** (the different strategies for requirements settings, see Di Nucci&Pol, 2011)
- **Call for tender for ESCO** (to award the energy utility which will plan, build and operate the district energy system in the framework of a concession)
- **Public and private partnership** (in some cases done after the awarding company answering the call for tender has been chosen)
- **Information** (e.g. informing end-users or private house owners)
- **Internal training necessary for project implementation** (e.g. training of site workers)
- **External training and dissemination**



# Planning and implementation processes

## 3) Drivers and steering procedures

Government driven	Private sector-driven	User-driven	Public-private partnership	Participation model	Front-runner model
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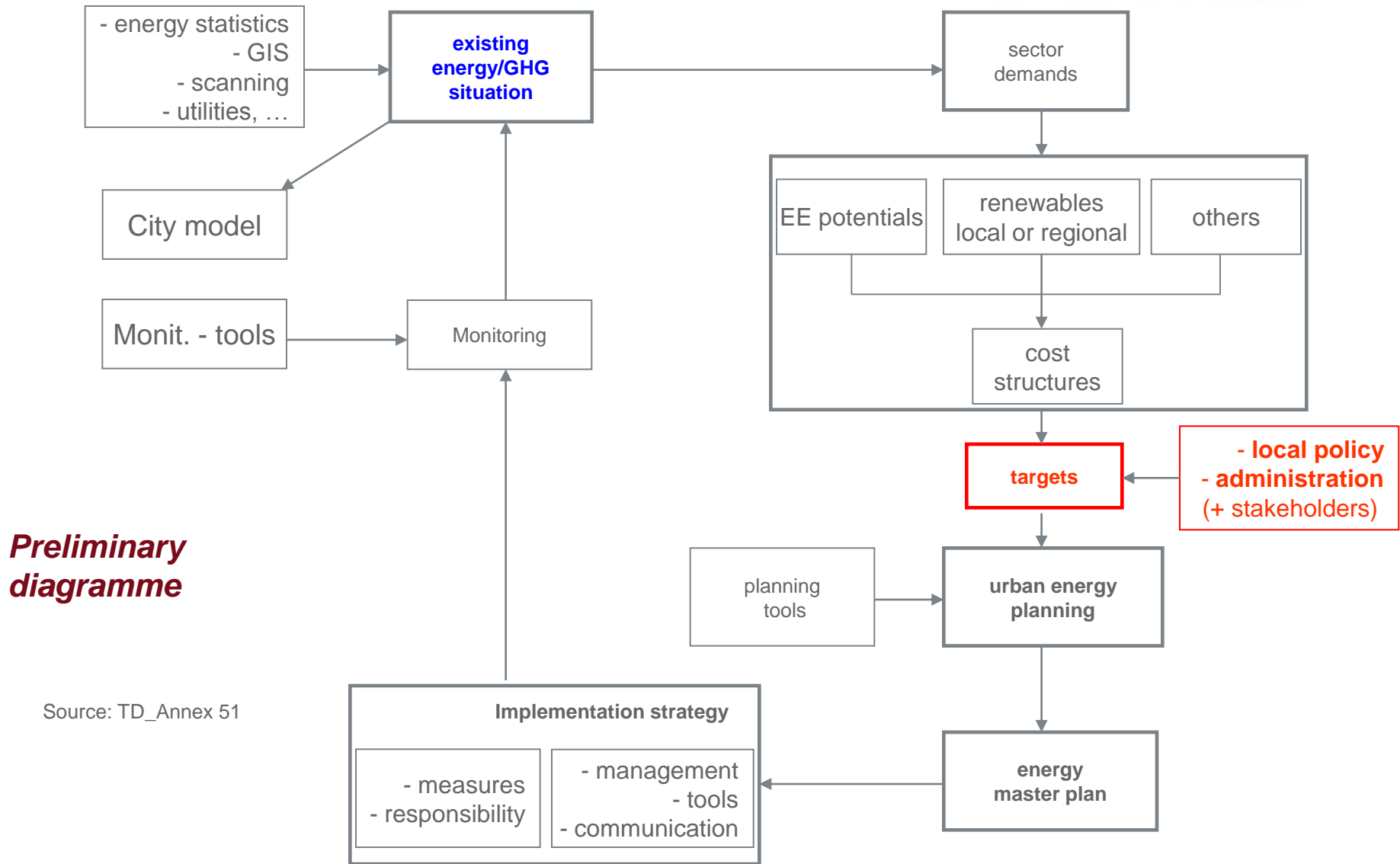
Each steering procedure shows advantages and inconvenients

Solution: balance and combinations between different procedures, depending on the targets followed and type of project

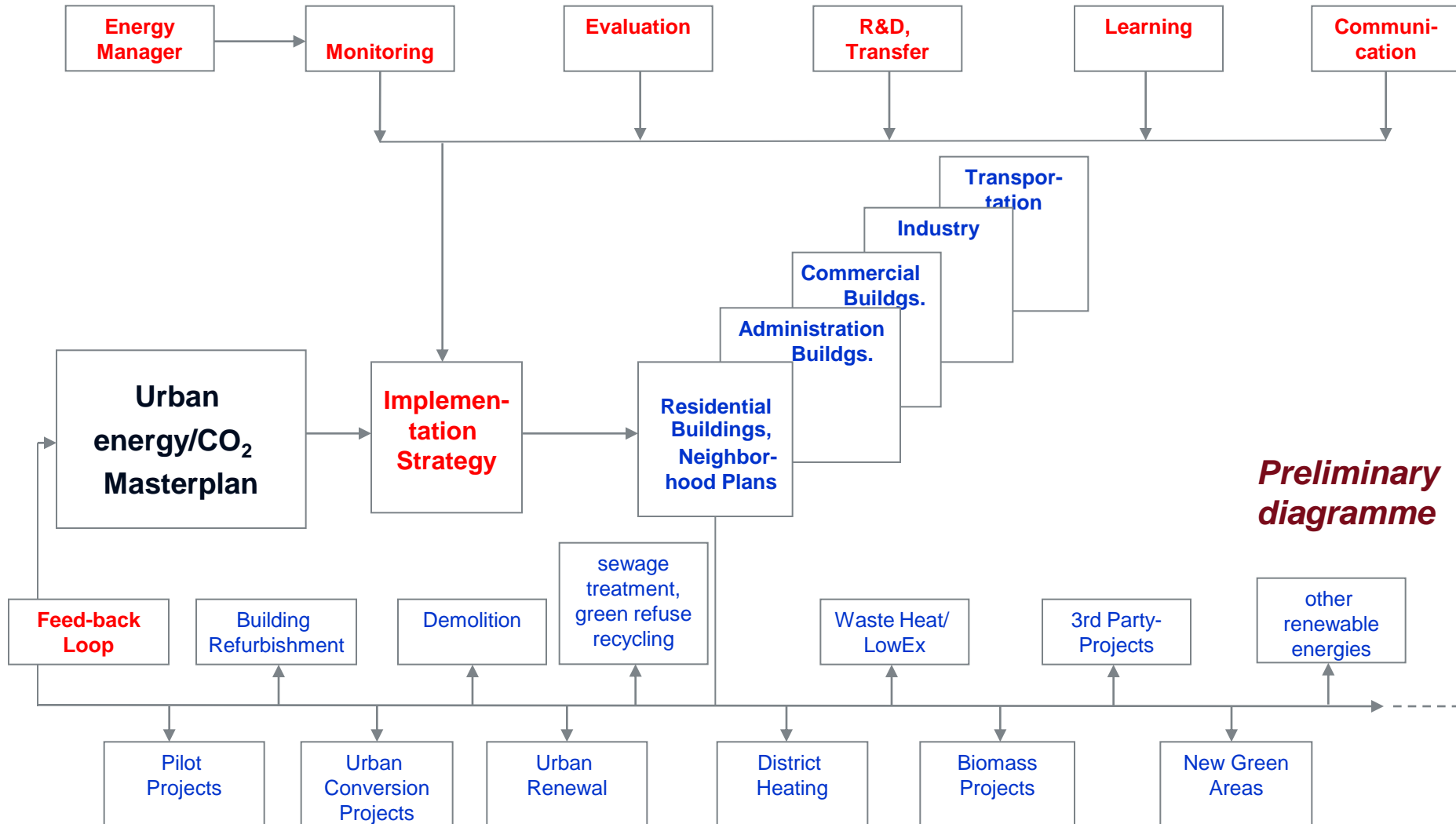
- Municipality
- Project developer
- Private/ other
- End-user

Broers, 2010 (Dutch project EOS LT TRANSEP DGO)

# Energy action plan and Implementation



# Continuous process



## Conclusions: key issues

CONCERTO “cities guide to a sustainable built environment” available, but further need to:

- define **key performance indicators for communities** and set-up a general **monitoring** framework
- understand **planning and implementation processes** for community projects and their implications for **urban energy planning**
- understand **the complexity of economic issues at community level**
- combine **different energy policy instruments**

>> Annex 51 guidebook for successful urban energy planning

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Thank you for your attention!

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