

# **Towards Energy Efficient Housing – the importance of local energy planning**

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UNECE

Second Workshop on Energy Efficiency in Housing

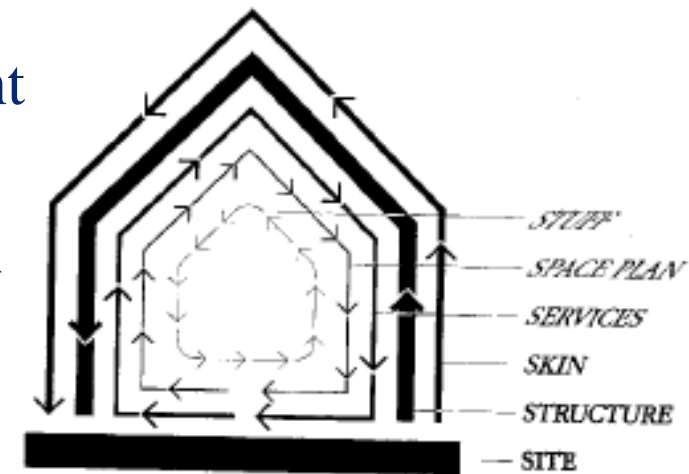
Vienna, Austria, 23-25 November 2009

# Existing energy infrastructure – turnover in capital stock



## ...important to understand and consider the existing infrastructure

- Window of opportunities (e.g. renovation of buildings)
- Turnover times in capital stock (different for different subsystems “layers”)
  - Appliances
  - Renovations
  - Replacement of heating systems
  - Building envelope
  - etc...
- Policies and strategies must be put in place in order to transform the system
- Building sector cannot be treated in isolation



*eccee: Approved recast of buildings Directive overlooks existing buildings potential*  
“Knowing how Member States have been implementing the current directive, it is now up to stakeholders on the national level to make sure the potential in existing buildings is not overlooked” said Nils Borg, eccee’s Executive Director.

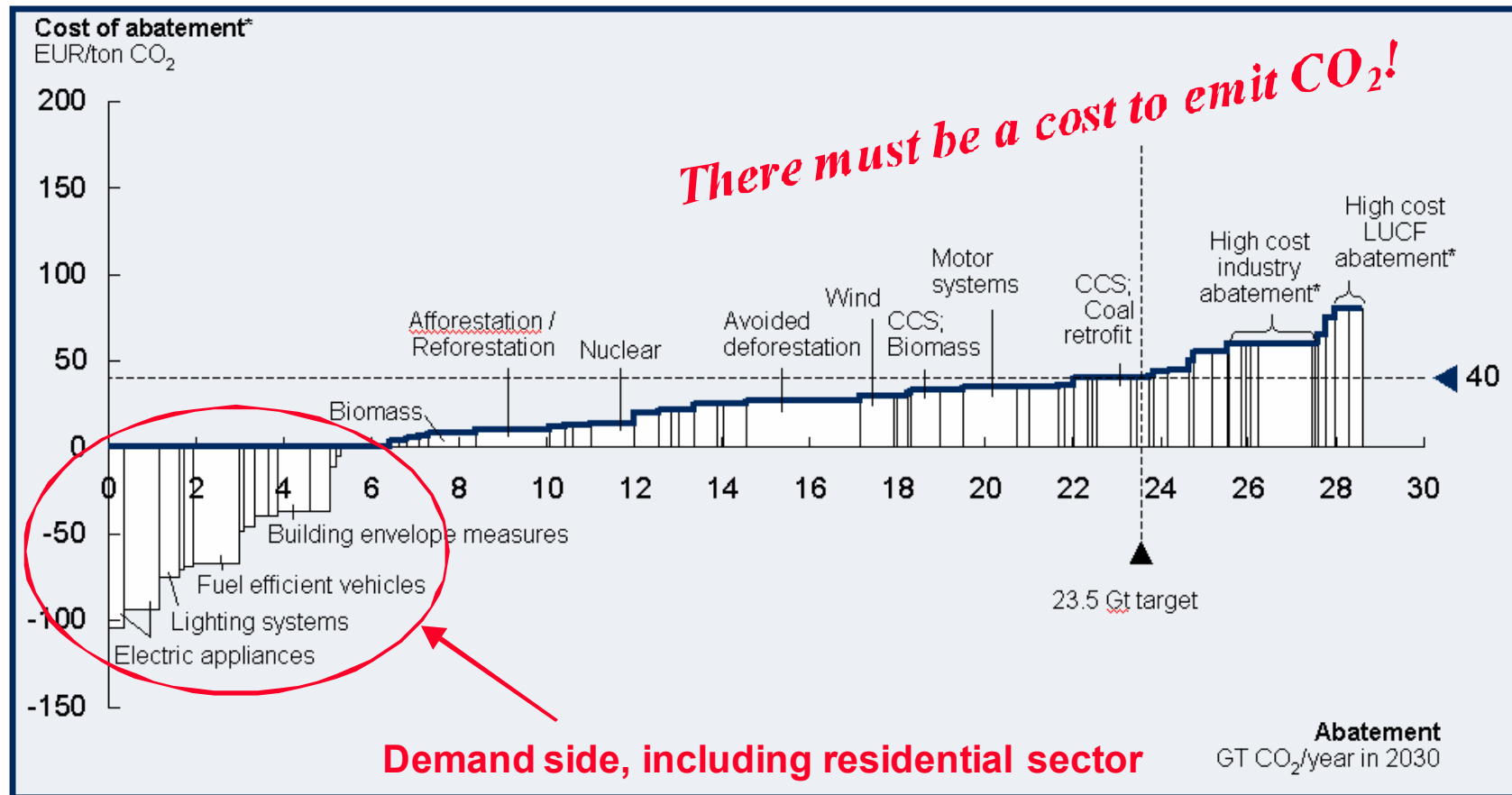
**Eceee press release Nov 18, 2009:**

See [www.eccee.org/press/Approved\\_recast\\_of\\_buildings/](http://www.eccee.org/press/Approved_recast_of_buildings/)

# Overcome energy efficiency gap

Marginal cost curve (global) for CO<sub>2</sub> abatement

Technologies are available – cost ~ 40€/tonCO<sub>2</sub>



Source: Vattenfall (2007) , See

[www.mckinsey.com/client/service/ccsi/pathways\\_low\\_carbon\\_economy.asp](http://www.mckinsey.com/client/service/ccsi/pathways_low_carbon_economy.asp) for a refined and updated curve



# Energy and climate policy must be in place on several levels

1. International level
2. National level
3. Local/regional/municipal level

The third level, the topic of this talk, is of great importance

- Many decisions are taken at this level
- Near the daily life of the general public
- This level often overlooked
- **There is a need to develop tools to support local energy planning**

# PATH-TO-RES project

Developing and assessing a tool to support  
local/regional energy planning

Based on case studies



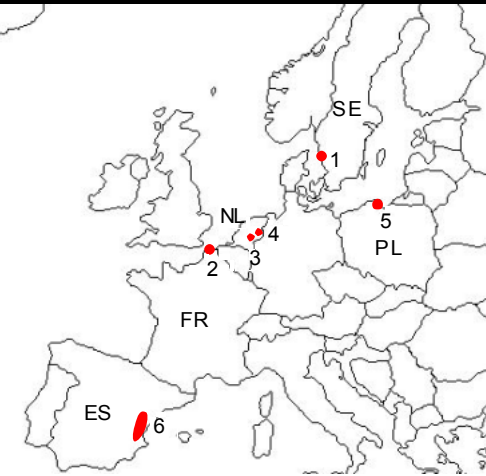
**Main objective:**

To develop a **checklist**, which can be used to evaluate and define pathways to renewable and efficient energy systems

Based on data from **six local energy systems** within the European Union

**The check list**

1. Analyze and formulate initial conditions
2. Establish a detailed description of the present system
3. Assess local, EU and global goals on sustainable development
4. Identify and assess key technologies
5. Identify key actors in the region
6. Formulate and analyze **pathways** towards a more sustainable energy system
7. Establish pathway (e.g. in political context)

**The 6 cases studied****1. Göteborg, SE**

Area [km<sup>2</sup>]: **451**  
 Population: **490 000**  
 Density [capita/km<sup>2</sup>]: **1086**

**2. Dunkerque, FR**

Area [km<sup>2</sup>]: **255**  
 Population: **263 200**  
 Density [capita/km<sup>2</sup>]: **1032**

**3. Arnhem, NL**

Home owner association "De Stoere Houtman" with **138 apartments** in Arnhem.  
**Smallest**

**4. Lochem, NL**

Area [km<sup>2</sup>]: **216**  
 Population: **32 800**  
 Density [capita/km<sup>2</sup>]: **152**  
**Lowest**

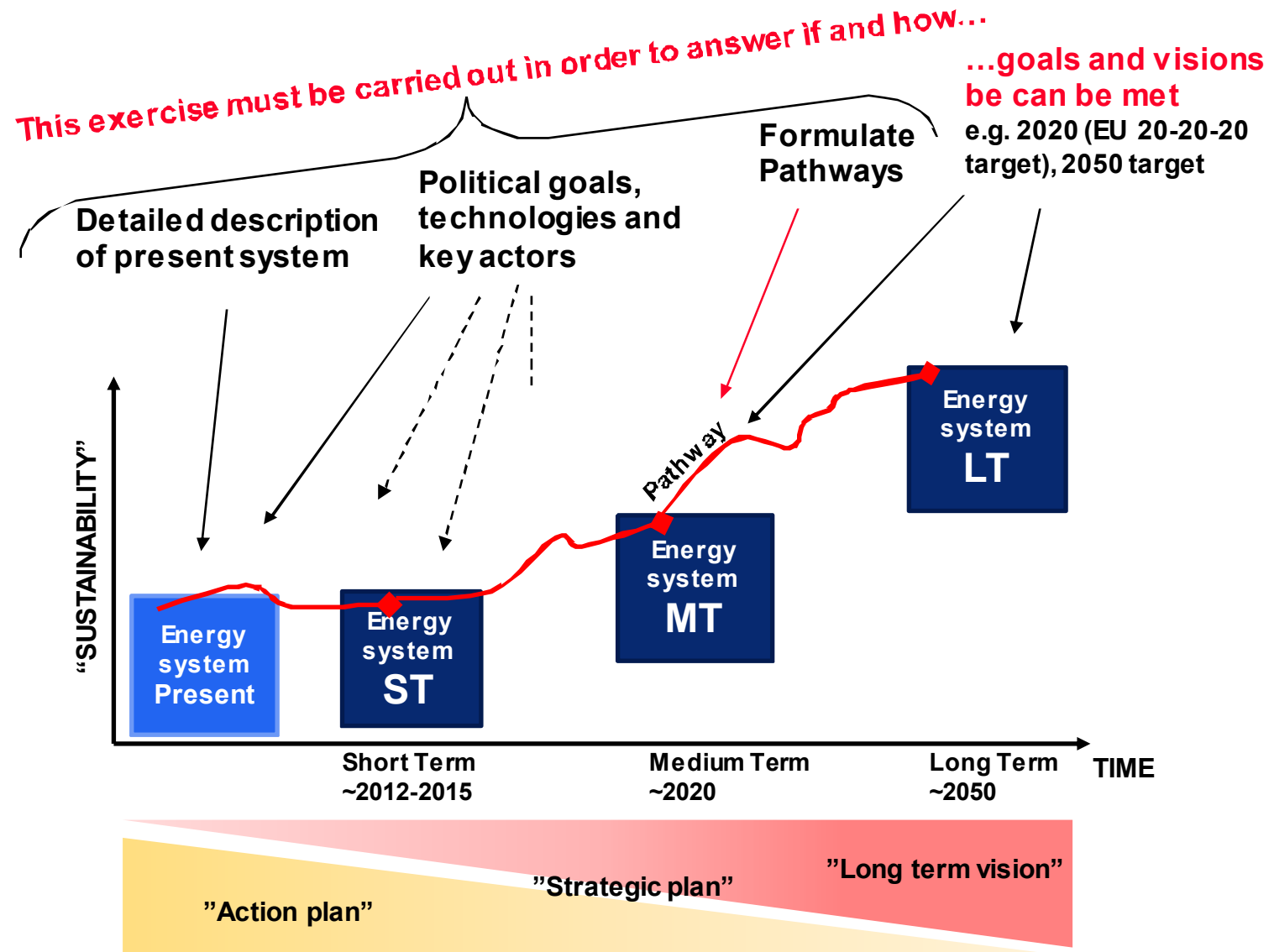
**5. Gdansk, PL**

Area [km<sup>2</sup>]: **262**  
 Population: **460 000**  
 Density [capita/km<sup>2</sup>]: **1756**  
**Highest**

**6. Valencia, ES**

Area [km<sup>2</sup>]: **10 563**  
 Population: **4 874 800**  
**Largest**  
 Density [capita/km<sup>2</sup>]: **461**

## Exercising Pathways towards a sustainable energy system



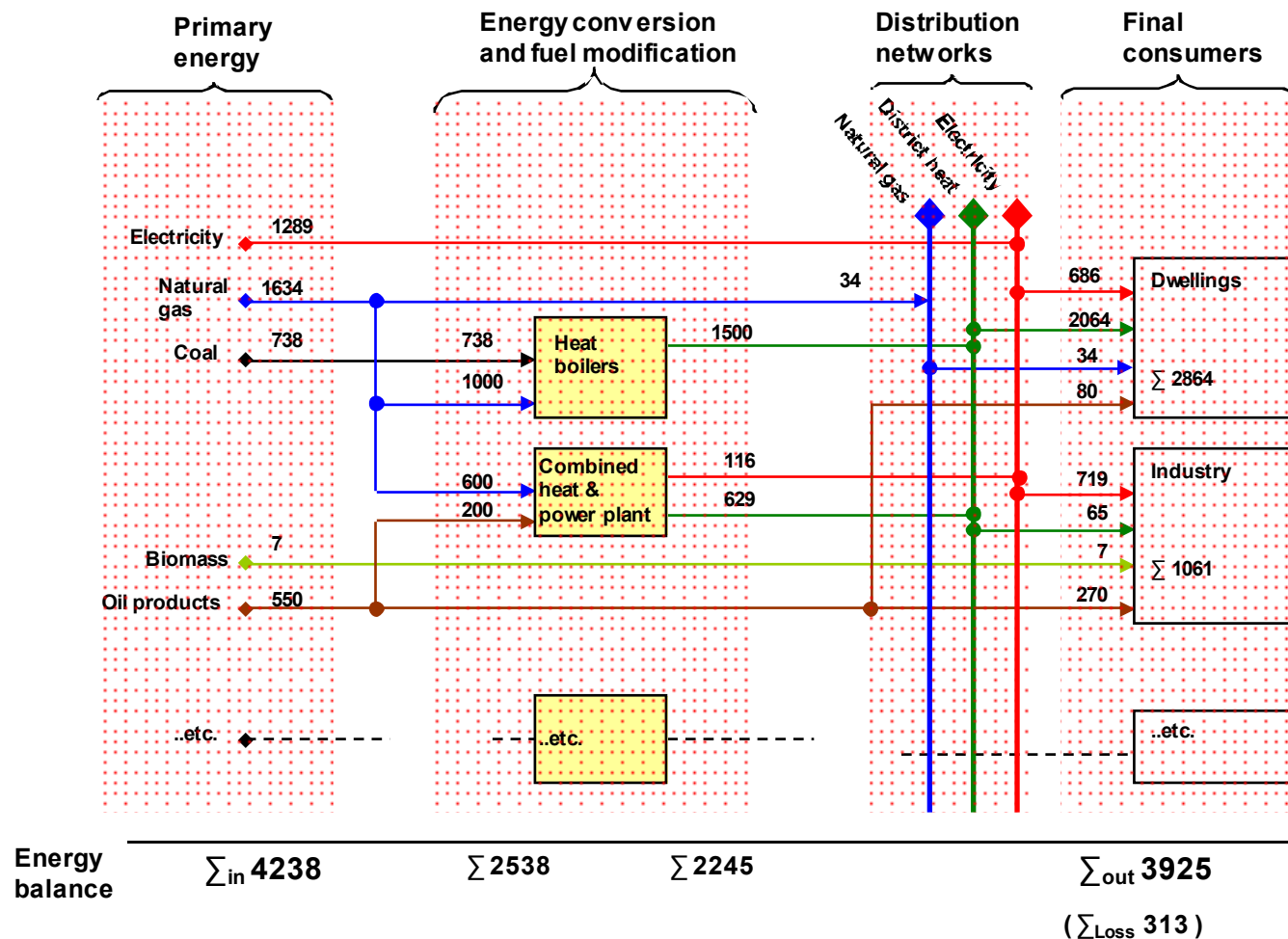
Year **2020** is **not far away** when it comes to transformation of the energy system!

Year **2050** is useful as a Compass for the direction of change (and is **not far away** when it comes to transforming the the building stock, road infrastructure, power plants ...)



# Detailed description of existing and future system

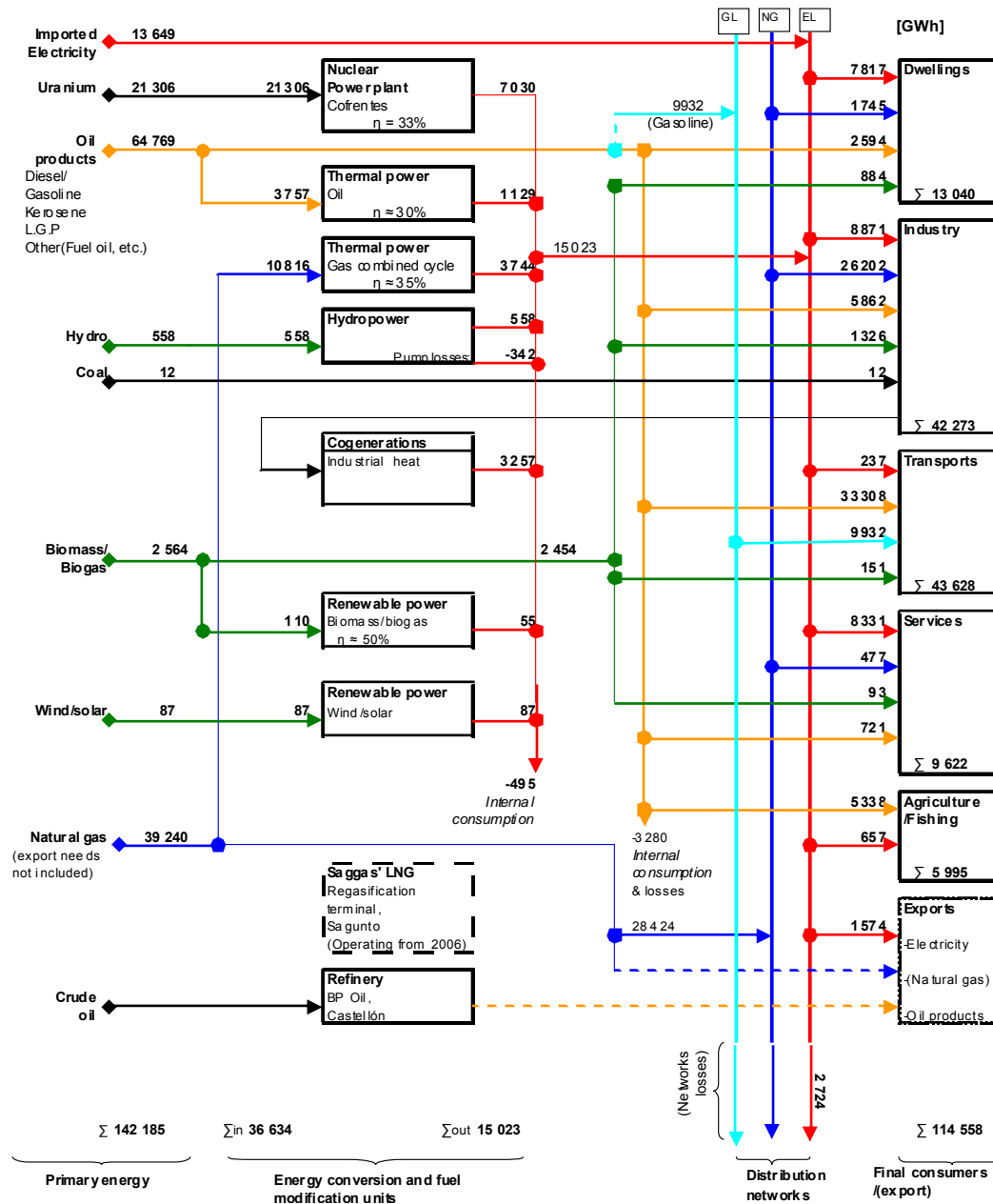
## Reference Energy System (RES)



### Advantages with RES

- Compact overview
- Defines system boundaries and energy balance
- No specific software required
- Indicators can easily be derived
- Easy to modify in order to analyse changes
- Can be applied on different levels of aggregation

## Example from case studies: Valencia



### GENERAL CONSIDERATIONS:

- Consumer categories
- Statistics availability
- Transport sector
- Ongoing projects
- National resources
- Electricity, refinery, etc
- Level of detail

## Network and exchange of experiences are important

- Covenant of mayors
  - a commitment by signatory towns and cities to go beyond the objectives of EU energy policy in terms of reduction in CO<sub>2</sub> emissions through enhanced energy efficiency and cleaner energy production and use.
  - 964 cities have signed (Nov 19, 2009)
- UNECE action plan
- National networks, e.g. “Sustainable community” (Uthållig kommun), Swedish initiative



## *Vision*

*To create a world leading Mistra center in Göteborg that provides innovative solutions for sustainable Urban development in it's global varying forms and contexts that are academically excellent, practically effective and socially relevant.*

- 1) ***Socio-economy and Culture***: to uncover the plurality of fundamental needs, qualities and mechanisms that shape social life.
- 2) ***Urban Metabolism and Land Use***: to interlink diverse urban spatial scales and functions.
- 3) ***Understanding Urban Complexity***: to facilitate the capacity to grasp and manage complex system interdependencies.
- 4) ***Urban Governance***: to ensure that knowledge and capacity are turned into concrete policy action for the benefit of all citizens.



Start 1st of January 2010

## Experiences from assessment of 7-step methodology

- Background and experience of case study representatives vary between case studies - valuable in order to evaluate and develop the methodology (which must be flexible).
- Good exercise to define existing energy system – not as obvious and easy as one may expect!
- In some cases lack of data. For example, the residential sector only given on an aggregated level (as opposed to division into apartment blocks and single family houses).
- Understanding of the systems perspective varied between case studies - initially too much focus on a few technologies (technology preference vaguely motivated)
- Less problem for case studies to perform inventory over key organizations, goals and key technologies.
- In several cases difficult to identify relevant plans and goals (politically safe to formulate long term visions, but politically brave to formulate short term actions).
- Organisational structures and decision patterns differ between the case studies.
- To formulate roadmaps and Pathways a very healthy exercise! Forces region to show how to fulfil goals and visions.



## Conclusions

- Local energy planning is of crucial importance for sustainable development - to show Pathways which fulfil goals and visions (also to help identify local goals if such are not available) ⇒ support the process to get political commitment to real actions (not only visions)
- Large benefits from greening the residential sector (environment, GHG reduction, living conditions, economic benefits etc)
- Yet, residential sector cannot be treated in isolation (links to urban mobility, heating sources/fuels, private consumption, security of supply)
- Both short term action plans and long term visions are required for a successful energy strategy (not enough with visions!)
- Technologies are not limiting the transformation of the energy system
- Involvement of all key organizations/decision makers at an early stage in the planning process is of great importance to reach a high level of commitment and to increase likelihood of real action
- If municipalities have a well developed and clear energy strategy, it is believed to have a positive impact on national and EU policies (and help communicate the need of support from national (or EU) boards)

# Acknowledgement

- This work is in part funded by the European Commission, Intelligent Energy – Europe (IEE), contract EIE/07/068/SI2.466697



# Extras

## Experiences from residential sector

- The residential sector is the largest energy consumer in most case study locations
- The RES-diagrams provide valuable information on overall impact of energy efficiency improvements and impact from different choices of heating systems
- Several integrated solutions such as CHP-units and recovery of industrial heat from which the residential sector can benefit can be assessed.
- Conflicting goals between residential sector and other sectors can be analyzed and visualized
- Socio-economic benefits from which the housing sector indirectly can benefit can be identified (e.g. reduced fuel cost for heating)
- Good examples are important (*cf* de Stoure Houtman)  $\Rightarrow$  knowledge transfer
- For a small system (*cf* de Stoure Houtman) the exercise made it possible to study interaction with surrounding energy system