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08/10/2014

Strategies towards Energy Performance in Urban Planning

3rd meeting Flemish Smart Energy Cities Network – October 8, 2014

STEP UP

SEVENTH FRAMEWORK PROGRAMME

Flemish Smart Energy Cities Network

Step Up
www.stepupsmartcities.eu

Agenda meeting October 8, 2014

- 10:30 Welcome and introduction + tour de table (15')
- 10:45 Coaching trajectories – short presentations and discussion (45')
- 11:20 introduction on 'Financiering van Klimaatplannen'
- 11:50 additional agenda items:
  - Belfius Fund
  - Voortzetting Netwerk
- 12:00-12:30 Meeting close
- Lunch break
- 13:00 – 16:00 Afternoon workshop

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Dynamic District Development

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Ostend

» **Aim:**
- Focus on residential heat networks (case study: Oosteroever)
- Identification of opportunities, barriers and 'lock-ins' in the development of district energy systems
- Looking at both the technical & non-technical aspects
  - Technical, financial, legal

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Dynamic District Development

opportunities, barriers and 'lock-ins' in the development of district energy systems

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1 Case study based on the features of the new construction project 'Oosteroever'
- » Design exercise on building level
- » Technical and financial feasibility study

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Dynamic District Development

opportunities, barriers and 'lock-ins' in the development of district energy systems

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		Scenario 1 Individual Boilers	Scenario 2 Central Boilers	Scenario 3 Heating Grid	Scenario 4 Central Boilers + HG ready	Scenario 5 Central Boilers, future switch
Investment	Payback Time [years]		8	3	10	8
Exploitation costs	Yearly cost Single apartment [€]	997	761	761		
	Difference wrt scenario 1 [€]		236	236		
	Difference wrt scenario 1 [%]		24%	24%		
Total Costs 20 years	Total Cost [€]	854.754	721.987	671.163	743.206	732.694
	Difference wrt scenario 1 [€]		132.767	183.591	111.548	122.060
	Difference wrt scenario 1 [%]		16%	21%	13%	14%

Heating grid versus base case (individual boilers)
Payback Time = 3 - 8 years
Yearly savings/apartm. = 236 €

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Dynamic District Development

opportunities, barriers and 'lock-ins' in the development of district energy systems

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» Lessons learned from case study Oosteroever

- Economy of scale, optimisation opportunities!
- Best scenario → immediate connection to heating grid
  payback time 8 years, apartment owners yearly save 236€ on energy and maintenance costs
- Second best → Central Boilers / future switch to heating grid (delayed investment)
  Preparing for future solutions in heating grids and sustainable energy
- Third best → future switch to heating grid (immediate investment)
- Worst scenario → Individual Boilers
  = Lock-in, preventing future switch to heating grids and sustainable energy

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Dynamic District Development

opportunities, barriers and 'lock-ins' in the development of district energy systems

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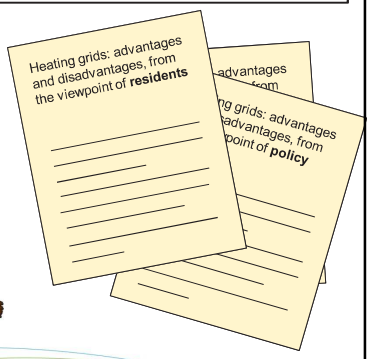
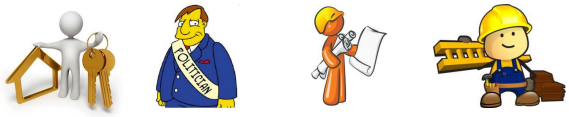
2 Identification of advantages/disadvantages for stakeholders, and their role in preventing lock-ins

Information sheets for
- Residents
- Project developers and investors,
- Public utility companies (and ESCOs)
- Suppliers of (residual) heat
- Policymakers (urban, regional)





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Energy Maps and GIS: Wastewater to energy Potential Mapping

- Wastewater to Energy
  - Heat from sewer via heat pump for low-temperature applications
- Steps:
  - Descriptive research on wastewater to energy
  - Development of a wastewater-to-energy potential map for the city of Antwerp – selection of potential project areas
  - *Practical guidance document*
- Deliverable:
  - A Map spanning the city's territory with the heat supply from wastewater
  - Indication of potential project (sufficient supply closeby sufficient demand))
  - *Description of critical succes factors for a wastewater to energy project*

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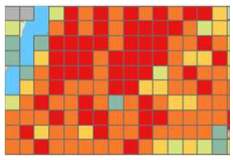
Energy Maps and GIS: Wastewater to energy Potential Mapping

Heat Map → **Potential Map for wastewater to energy**



Map with dry weather flow rates → Map with potential energy supply

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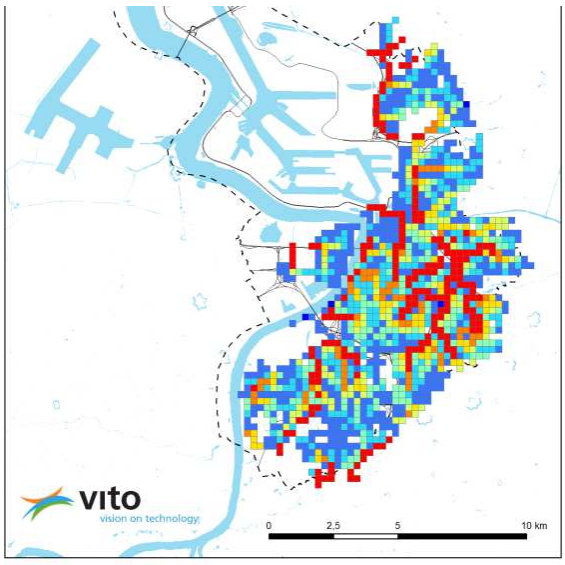
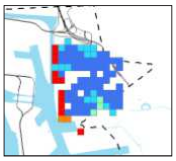
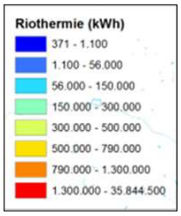
Energy Maps and GIS: Wastewater to energy Potential Mapping





Supply map



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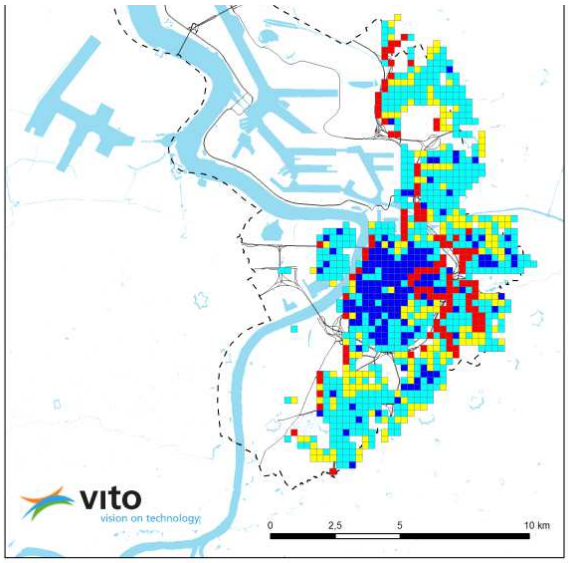
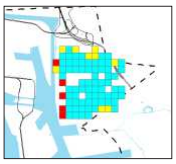
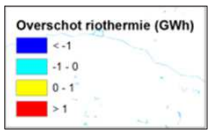
Energy Maps and GIS: Wastewater to energy Potential Mapping





Potential map



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Energy Maps and GIS: GIS-based energy mapping

- Energy Map
  - GIS-tool with different energy-related data layers
- Steps:
  - Description of the necessary data layers
  - *Listing of the data sources*
  - How to use these maps for urban areas?
  - *How to keep your atlas up to date?*
- Deliverable:
  - *Guidance document*

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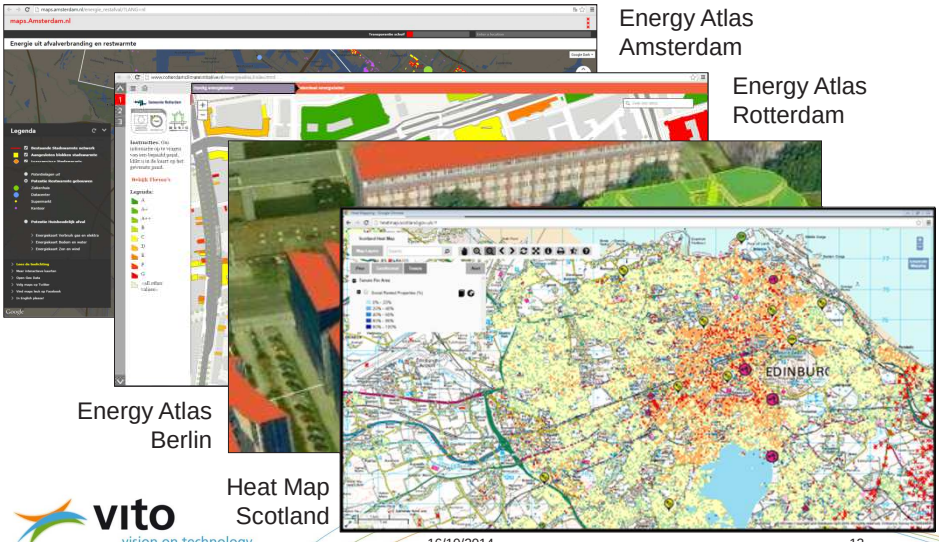
Energy Maps and GIS: GIS-based energy mapping



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Energy Maps and GIS: GIS-based energy mapping

	Amsterdam	Rotterdam	Berlijn	Schotland
Energy consumption	Gas Elektricity		Heat	Heat
Buildings	Energy label Connection district heating? Construction date Value	Energy label (current/future)		
Population	Income Density Social housing			Social housing
Infrastructure	Disctrict heating/cooling Sewers Ø >1m Drinking water Ø >0,3m		Elektricity Gas District heating	District heating (current/ planned)

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Energy Maps and GIS: GIS-based energy mapping

	Amsterdam	Rotterdam	Berlijn	Schotland
Installations	Suppliers of steam, heat, cooling, storage, wind turbines, solar PV,			Solar boilers, heat pumps (air, soil), solar PV, wind biomass, geothermal
Potential	Waste heat, waste, heat/cooling storage, geothermal, wastewater to energy, wind, solar PV	Solar PV	Geothermal Solar PV Solar boiler	
Traffic			Traffic flows	

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Energy Maps and GIS: GIS-based energy mapping

» References

	Amsterdam	Rotterdam	Berlijn	Schotland
Smallest geographical unit	Block Installation	Individual dwelling	Individual dwelling	50m x 50m Installation
Active components	Y	Y	Y	N

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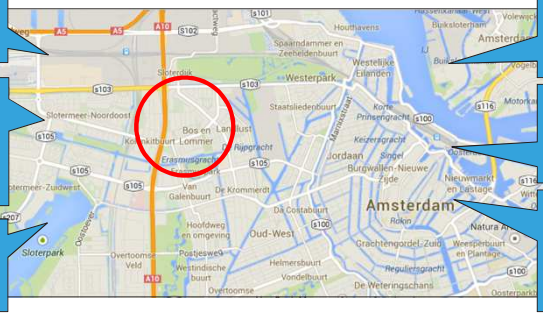
Energy Maps and GIS: GIS-based energy mapping

» The use of an energy atlas to guide policy

Residential
High population density

Small dwellings
Most from 1945-1975
Energy label average F

Low income, mainly rented houses



Natural gas use above average
Electricity use: average

No district heating, but closeby
10 individual PV
1 heat/cool storage

Potential PV, waste water to energy, heat/cool storage, geothermal, wind: Low or inexistant

Possible conclusion for this area:
Focus on renovation for heat efficiency – connection to District Heating

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Collective retrofit

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Aim:

» establishing a science-based approach to collective renovations in the residential sector as a basis for a LKN 2030 pilot

» Leuven (and Mechelen, as follow-up on SEAP development)

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Challenge: Scaling up deep retrofit

Main threats:

- **Organisational:** in particular in a context of multiple individual home owners
- **Financial:** upfront investment with long payback time
- **Regulatory:** barriers, e.g. social housing sectorial rules

Main opportunities:

- **Scale advantages:** substantial reduction of transaction & building costs
- **Mobilisation potential:** involving parties that would otherwise not turn to action – 'unburdening'

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Done so far: Leuven

- Literature study on supporting methodology, presented by VITO
- Identification of neighbourhoods with potential for intervention, by city of Leuven
- 2 meetings with field actors on 27/06/2014 and 03/10/2014, organised by city of Leuven (attended by VITO)
- Final decision: working on one real neighbourhood and one virtual neighbourhood

To come soon: Leuven

- Work sessions on 20 selected climate projects, among which the two collective renovation projects, to be organised by the city of Leuven on 22/10/2014 and 01/12/2014
- Survey of inhabitants of potential (real) neighbourhoods by students of KH Leuven, planned for November 2014 and early 2015. At the same time informing inhabitants on possibilities of collective renovation
- Grouped purchasing of insulation for virtual neighbourhood project, supported by IGO Leuven, first information meeting in February 2015

Intermediate conclusions: Leuven

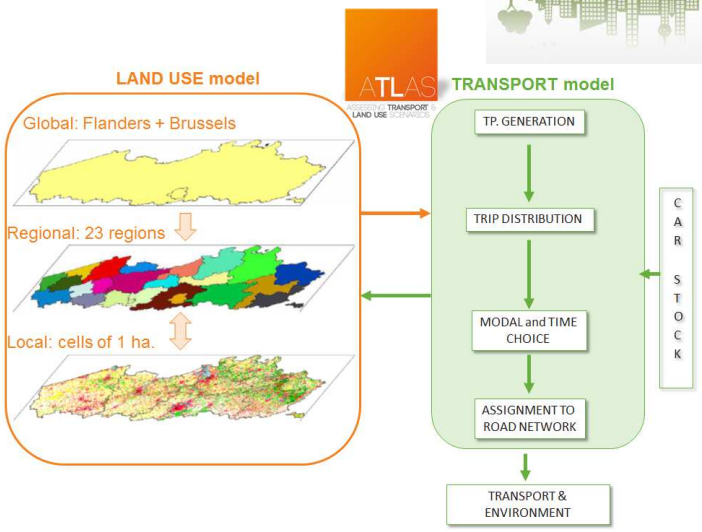
- As expected, very difficult process
- Leuven Climate Neutral 2030 as an umbrella facilitates setting up these 2 projects
- Bringing together relevant actors for brainstorming helps to identify most feasible scenarios (actors: city of Leuven, KBC bank, specialized contractors, Belgian ESCO platform Belesco, local ngo's, VITO, local knowledge institutions like KH Leuven)

Transport: Long run scenarios for Ghent using the ATLAS model

Aim:

- assess the impact of 2 scenarios for the long term development of passenger transport flows (and the associated emissions and energy use) and land use in Flanders, with focus on the Ghent area
- Long term horizon (2030)
- Using the ATLAS-model

Transport: Long run scenarios for Ghent using the ATLAS model



Transport: Long run scenarios for Ghent using the ATLAS model

- Comparison of BAU scenario with 2 alternative scenarios
  - Demographic trends
  - Economic trends
  - Policy changes: strategic policies concerning transport and land use
    - Regional level
    - Fundamental (not day-to-day management)
- Scenarios to be defined in cooperation with STEP UP partners for Ghent

Transport: Long run scenarios for Ghent using the ATLAS model

- Further steps
  - Update and extension of data for calibration of ATLAS-model, based on newly acquired data from VVC: ongoing
  - Workshop with STEP UP partners: 13 October 2014
    - Introduction of ATLAS model
    - Determination of scenarios
  - Model simulations
  - Reporting
- Timing: Finalisation in December 2014

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Thanks!

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