COST Action TD1408

TRANSFORM: Experience from Smart Urban Labs
TU Delft, April 21 2016

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Austrian Institute for Regional Studies and Spatial Planning (ÖIR, Vienna)
Smart Urban Labs in TRANSFORM

- 6 urban quarters with a (energy-transformation) vision
- Concept and Process of making ‘Implementation Plans’
- Local working processes - stakeholder integration -
- Interventions: 6 Intensive Labs Sessions
- 6 Implementation Plans
- Synthesis Report:
  Comparisons, learnings, recommendations
Amsterdam - Energiel Zuidoost
Development Type:
Urban transformation of existing mixed-use area (300ha), incl. Ajax stadium, offices, leisure, shopping, city hospital, datacenters and energy plant. Transformation of energy grids (thermal and electric) towards smart grids.

Expected Outcome:
Guided process with major stakeholders, leading to commitment of 20220 goals, by renewable energy production and use of latest technologies in existing building stock.

Copenhagen – Nordhaven
Development Type:
Brownfield development port area under transition. On a long term basis room for 40k inhabitants and 40k jobs. Vision for the area is to be CO2 neutral and a green lab for new solutions in energy and building construction. The area should at the same time be sustainable socially and economically as well as environmental.

Expected Outcome:
Integrated energy system ind. district heating, cooling biomass, geothermal energy production, seasonal heat storage and smart grid. Low energy buildings

Hamburg – IBA / Wilhelmsburg
Development Type:
Urban transformation and expansion, combining housing, industry, port, water, green and open space; one of 19 Excellent Climate neighborhoods; stepwise growth from 55,000 to 75,000 inhabitants;

Expected Outcome:
Guided process with 100 stakeholders; 100% renewable electricity by 2025, 100% renewables for heating & cooling by 2050

Lyon – Part Dieu
Development Type:
Urban transformation of a 1960ies development district close to the centre of Lyon. This is the 2nd business district of France covering 900,000 m² (40,000 work places, 5,500 residents, commercial and logistic areas included).

Expected Outcome:
Construction of 1 Mio. m² of additional floor space and renovation of 40% of existing building stock (offices, commercial, residential). Upgrading and extension of the heating and cooling district infrastructure

Genoa – Mela Verde
Development Type:
Port area - Brownfield development, part of comprehensive CO2 reduction strategy and Technology Masterplan.

Expected Outcome:
Guided stakeholder process, New technology buildings, PV energy production, e-mobility

Vienna – (1) Seestadt, (2) Liesing
Development Type:
(1) Greenfield & Brownfield development, incl. 20k apts., 20k work places; new public transport, social & smart technical infrastructure
(2) Urban transformation in residential, industrial & service district Liesing. Close coop. between city, energy & trans.
Supplier & district management

Expected Outcome:
(1) State-of-the-art passive house & office space, energy production (geo-thermic, photovoltaic, bio-mass), smart grid, e-mobility & reduced car dependency
(2) Integrated mobility concept based assessed needs incl. Car sharing, e-car, (e-)bike services and public transport.
# The SULs: Greenfield and Transformation areas

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<thead>
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<tbody>
<tr>
<td><strong>G</strong> = Greenfield</td>
<td><strong>T</strong> = Transformation</td>
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<tr>
<td>Amsterdam, Energiek Zuidoost <strong>T</strong></td>
<td>300 ha</td>
<td>18,000</td>
<td>20,000</td>
<td>18,000</td>
<td>18,500</td>
<td>2025</td>
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<tr>
<td>Copenhagen, Nordhavn <strong>G</strong></td>
<td>250 ha/350 ha</td>
<td>0</td>
<td>40,000</td>
<td>5,100</td>
<td>40,000</td>
<td>2040</td>
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<tr>
<td>Genoa, Mela Verde <strong>T</strong></td>
<td>280ha</td>
<td>12,758</td>
<td>12,800</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
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<tr>
<td>Hamburg, Wilhelmsburg <strong>T/G</strong></td>
<td>3,500 ha</td>
<td>55,000</td>
<td>69,160</td>
<td>n/a</td>
<td>n/a</td>
<td>2050</td>
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<tr>
<td>Lyon, Part-Dieu <strong>T</strong></td>
<td>135 ha</td>
<td>5,000</td>
<td>7,100</td>
<td>45,000</td>
<td>80,000</td>
<td>2030</td>
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<tr>
<td>Vienna, aspern Seestadt <strong>G</strong></td>
<td>223 ha</td>
<td>0</td>
<td>26,000</td>
<td>1,200</td>
<td>23,000</td>
<td>2030</td>
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Stages of SUL development process

CONCEPTION (ENERGY) PLANNING (RE)CONSTRUCTION (incl. revision loops) MONITORING

Buildings, infrastructure and energy systems

general concept/studies, stakeholder involvement, publicity
integrated energy system plan
partial implementation
(revision of concept/plans)
realisation of SUL investments/construction
monitoring and evaluation

Amsterdam, Energiek Zuidoost
Copenhagen, Nordhaven
Genova, Mela Verde
Lyon, Part Dieu
Vienna, aspern Seestadt
Vienna, Liesing

Source: OIR

April 21, 2016
AMSTERDAM SOUTH EAST
Gas consumption per building block
VISION

40,000 LIVING
40,000 WORKING
3,500,000 SQM
SOCIAL
CULTURAL
ECONOMICAL
ENVIRONMENTAL SUSTAINABILITY
Hamburg: SUL Wilhelmsburg
Urban space and building typologies in Wilhelmsburg
Strategic Operational Fields of the Future Concept

Refurbishing into New Building Standard

Energetically Excellent New Buildings

Regenerative Heating Network

Renewable Energies
Hamburg District Heating

Energy Carriers in Heat Provision

- Gas: 55%
- Oil: 17%
- Electricity: 8%
- Strom: 8%
- Fernwärme: 19%

District Heating: 19%

Shares of District Heat Providers

- E.ON: 12%
- RWE: 4%
- Urban: 2%
- Vattenfall: 82%

New Providers:
- Dalkia; Hamburg Energie; Cofely
The Energy Bunker
Vision: aspern_Seestadt
Lyon Part Dieu: Overview of the SUL area

Today:
- 45,000 jobs
- 2,200 places of work
- 3,500 homes and a population of 5,000 people
- 7,500 public parking spaces
- 500,000 journeys per day
- 125,000 railway station users

For the horizon of 2030:
- 650,000 m² additional office space
- 150,000 m² additional homes
- 200,000 m² additional structures for services, shops, leisure and the hotel and catering trade.
- 35,000 additional jobs
- Double number of travellers in railway station.
Status quo, planning and implementation of the energy system, energy standards

- District served with: electricity, gas, district heating and cooling

District urban heating

Lyon / Villeurbanne system:
- 45,000 housing equivalents from
- 390 substations

District cooling concentrated on the district of Part-Dieu.
Energy system planning, pilot actions and important projects

Energy diagnostics for the district
Genoa
Mela Verde

New gateway
Perimetro dell’area
Il territorio di Voltri, identificato come "Mela verde" nell’ambito del progetto europeo Cat Med, è definito da un ampio perimetro che comprende la fascia costiera che va dal torrente Cerusa all’inizio dell’ambito portuale, inglobando a monte l’edificato storico fino alla linea ferroviaria che lo delimita. L’area di interesse è comprensiva anche delle aree produttive dimesse a ridosso del parco della Villa Duchessa di Galliera. In totale quindi una superficie territoriale di oltre 38 kmq, al cui interno si contano circa 2750 abitanti e 300 numeri civici.
Unbundling traffic flows – improving environmental quality and saving energy
Implementation Plans (IPs) for Smart Urban Labs:

Framework and road map &
Outcome: 6 Implementation Plans
Main content of IPs

- Basis of decisions – available data, open knowledge
- Relevant legal frameworks
- Visions, goals and main strategies
- Energy system strategy, actions and projects
- Process and methods used - Stakeholder involvement during making of IPs and implementation
- Future management of implementation
- Monitoring
- Political commitment
Methodological outcome:

Toolbox for making IPs
SUL Methodology for making IPs: Power model & Mapping of Stakeholders
Intensive Lab Sessions (ILS):

3-day interventions on the road to making IPs
Interventions: Intensive Lab Sessions

Implementation Plan process

SUL Intensive Lab session(s) at different points in time within the process
Stakeholder involvement
Amsterdam

Saving Energy in the built up area: ESCO Energy Service Company?

facilitators
Ronald van Warmerdam & Geert den Boogert

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Vivienne Bolsius, Amsterdam Smart City

Udo Alphart EnergieComfort Vienna

Monika Sturm Siemens

Daiva Walangitang AIT

18, 19 juni aanwezig

design team 2

18, 19 juni aanwezig
## ILS themes = key questions for SUL development

<table>
<thead>
<tr>
<th></th>
<th>Heating and cooling</th>
<th>Governance and planning</th>
<th>Behaviour and participation</th>
<th>Technology &amp; smart</th>
<th>Other</th>
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</thead>
<tbody>
<tr>
<td>Amsterdam</td>
<td>Heating and cooling</td>
<td>Role private sector in retrofitting</td>
<td>Public action</td>
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<tr>
<td>Copenhagen</td>
<td>Energy systems and networks</td>
<td>Early dialogue with developers</td>
<td>Sharing Copenhagen</td>
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<tr>
<td>Genoa</td>
<td>Governance</td>
<td></td>
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<td></td>
<td>Smart energy: technologies and smart grids</td>
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<tr>
<td>Hamburg</td>
<td>District heating</td>
<td></td>
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<td>architecture</td>
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<tr>
<td>Lyon</td>
<td>Heating and cooling network</td>
<td>Integrated energy planning</td>
<td>Operation and maintenance and users behaviour</td>
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<tr>
<td>Vienna</td>
<td>Energy scenarios (demand, RES production, energy systems)</td>
<td>Framework conditions</td>
<td>Living and participation</td>
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</table>
Hamburg-Wilhelmsburg

- “Implementation Plan 2050” shown at the “Energy Desk”
Wrap up Amsterdam

- ESCO logic: Change agent & energy supplier, facility manager, developer …
- Heating & cooling: high potential, legal framework as barrier
- Public events: key players involvement (IKEA, Ams Arena, ..)
‘Climate change agent’
→ Dissemination
Dissemination: ‘Climate change agents’ live
Implementation Plans (IPs) :

Visions & main strategies
## Overview on SUL strategies

<table>
<thead>
<tr>
<th>Existing areas</th>
<th>New areas</th>
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<tbody>
<tr>
<td><strong>Stakeholder involvement</strong></td>
<td>Stakeholder participation</td>
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<tr>
<td><strong>Buildings</strong></td>
<td></td>
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<tr>
<td><strong>Renewable energy production</strong></td>
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<tr>
<td><strong>Electricity (demand, smart grids)</strong></td>
<td>demand supply management, storage and e-car charging</td>
</tr>
<tr>
<td><strong>District heating</strong></td>
<td>use of local waste heat</td>
</tr>
<tr>
<td><strong>Transport infrastructure and mobility</strong></td>
<td>charging infrastructure: electricity and green gas</td>
</tr>
<tr>
<td><strong>Public participation</strong></td>
<td>key element of development approach</td>
</tr>
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</table>
Top down versus Bottom up

Top down approaches
(also: ability of the city to influence?)

Bottom up approaches
(also: dependency on local stakeholders?)

Minimum requirements / support from the city?

Minimum grade of involvement of stakeholders

NEW URBAN DEVELOPMENTS → TRANSFORM EXISTING URBAN QUARTERS

AMS

HAM

LYO

COP

VIE

GEN
Synthesis, conclusions and recommendations

TRANSFORM  WP 4
Smart Urban Labs
Synthesis: Urban systems transformation needed
aspern Urban Lakeside: Energy supply – EIA scenario

CO2 Emission < 150 g/kWh

- Dachfläche für Photovoltaik
- Industrie
- Wärmennetz Ost inkl. Industrieabwärme
- Nutzung Grundwasser für Wärmepumpen
- (Bio-)Gaskesselanlage für Wärmennetz Ost
- Wärmennetz West
- Abwärmenutzung aus Industrie
- Erdgasnetz
- Sekundäre Wärmennetze
- Verbundnetz

C. Schremmer

April 21, 2016
Governance needed – example aspern Seestadt

Energy planning
- City energy strategy MA 20
- City Energy monitoring MA 20
- Energy planning MA 20
- TINA: Energy planning

Housing & Urban development
- Housing aid: Funding & quality processes (WohnInnungs)
- Housing policy & aid: MA 50
- Urban development planning: MA 18
- Zoning & building codes: MA 21

Energy system
- Heating & cooling
- Gas
- Electricity
- Grids
- Individual providers (PV etc.)

BINDING AGREEMENT

City of Vienna or Development Corporation Masterplan

- Developers
- Offices Dev.
- Commercial Dev.
- Industrial Dev.

Instruments: Individual Contract agreements?
Main conclusions from SULs

Governance for Integrated Energy Planning
- Masterplan, holistic view, bottom up approach – per SUL (per city .. )
- Institutional and procedural integration in the administration and between public and private actors

Institutional and organisational requirements for the integration of urban development and energy planning
- City targets - break down for sectors (‘silos’), carriers and areas
- Development agencies as key promoters and actors

Energy system transformation: Development process
- Area-specific energy system transformation approach: vision & development targets, tender for integrated area systems - concessions for full service!
- Full-service approach as key option (ESCO approach, integrating carriers)
- Holistic calculation of energy infrastructure costs (investment, operation) for providers, city, consumers, environment ..
Interdisciplinarity

Governance for Integrated Energy Planning (Climate change, sustainable development etc. ..)

- Integrated, holistic approach essential
- Overcome institutional barriers (parallel systems logic)
- Bridging political ‘silos’
- … and ‘knowledge’ milieus
- … without adding on new components to an already complex administration and policy making system

(Energy) system transformation:

- Change agent ?
- Contributors ?
- Objectives and incentives ?
- (legal, economic, technological, social …) Framework conditions ?
Co-creation

Preconditions
- Working process framework, e.g. Intensive Lab Sessions
- Clear targets – solution orientation
- Moderators and interpreters with experience
- Documentation and follow-up process needed (continuity)

Research and ‘real life’
- Temporal settings possible and effective
- New ideas and procedures can be established
- New ‘cooperation culture’ can be experienced
- Systemic changes depending on the communication with top-level decision makers
- → strategy changes and institutional framework changes needed
Thank you!

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