



Linköpings universitet

# Energy Conservation and Low-Energy Strategy for Communities

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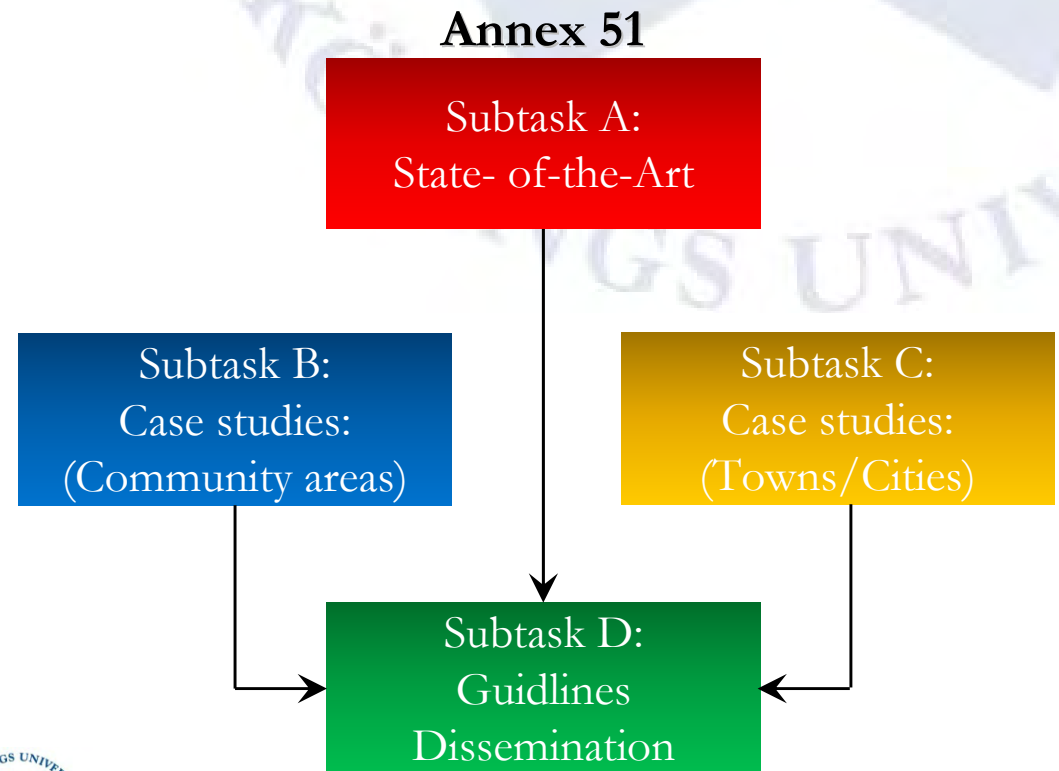
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# Outline

- Case studies from Subtask B - *Case Studies on Energy Planning and Implementation Strategies for Neighborhoods, Quarters and Municipal Areas* under IEA/Annex 51
  - *Advanced refurbishment projects*
  - *New neighborhoods*
  - *Neighborhood development*
- Findings from Subtask B
- Lessons learned



# Case studies

| Case   | Refurbishment | New development | Neighborhood development |
|--|---------------|-----------------|--------------------------|
|  Lehen          |               |                 | ×                        |
|  Petite Rivière |               | ×               |                          |
|  Lystrup        |               | ×               |                          |
|  Peltosaari     |               |                 | ×                        |
|  Franklin       | ×             |                 |                          |
|  Rintheim      | ×             |                 |                          |
|  Bad Aibling  |               |                 | ×                        |
|  Kumugaya     |               |                 | ×                        |
|  Heerlen      |               |                 | ×                        |
|  Brogården    | ×             |                 |                          |
|  Fort Irwin   | ×             |                 |                          |



# Selected examples – Advanced refurbishment projects



Franklin  
120/6 000



Brogården  
300/18 500



Rintheim  
1350/65 000



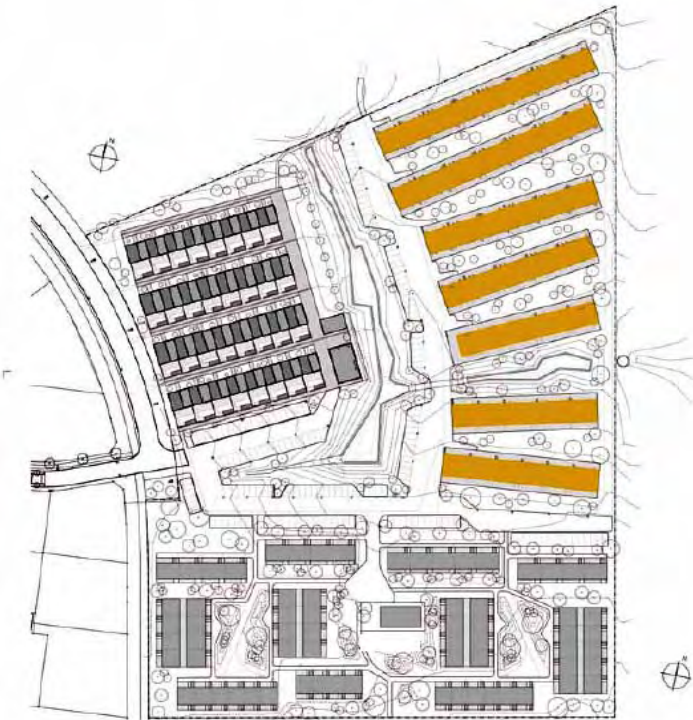
Fort Irwin  
5 Bdg/16 000

Number of dwellings/m<sup>2</sup>





# Selected examples – New neighborhoods projects



 Lystrup  
122/12 150



 Petite Riviere  
1461/156 400

Number of dwellings/m<sup>2</sup>



# Selected examples – Neighborhood development projects



Lehen, new 40, existing 60



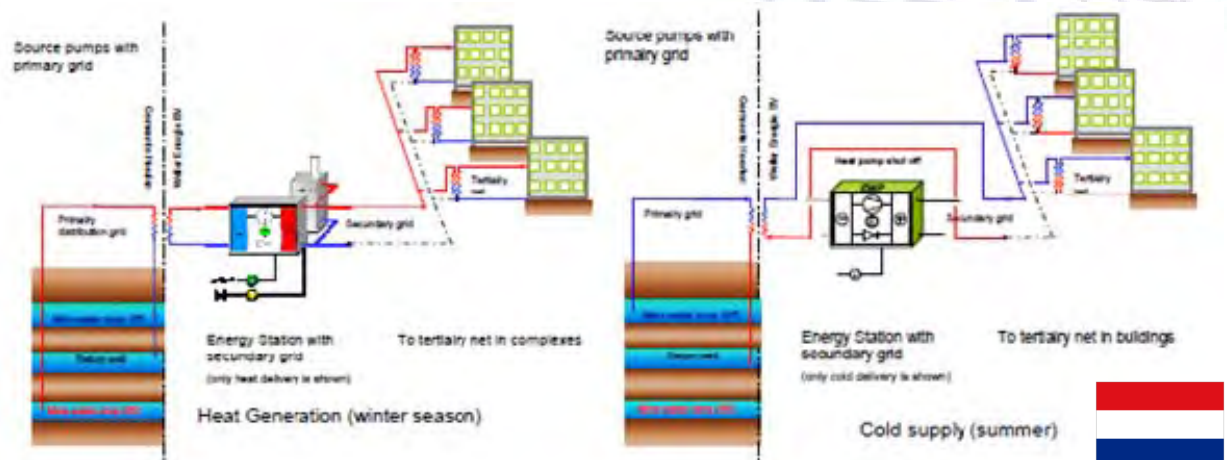
Bad Aibling, new 18, existing 27



Kumagaya, existing 2



Peltosaari, new 65, existing 60








Heerlen, existing ~40

Number of buildings





# Selected examples – Neighborhood development projects

|  |           | Lehen<br> | Peltosaari<br> | Bad Aibling<br> | Kumagaya<br> | Heerlen<br> |
|--|-----------|--|--|--|---|--|
| <b>No. of Buildings</b>                | New       | 40   | 65   | 18 +3  |   |  |
|  | Existing  | 60   | 60   | 27   | 2   |  |
| <b>No. of Dwellings</b>                | New       | 550  |  | 18   |   | 440  |
|  | Exist-ing | 623  |  | 183  |   |  |
| <b>Living area (m<sup>2</sup>)</b>     |           | 90 000   | 130 000  | 28 200   |   | 44 000 new   |
| <b>Commercial area (m<sup>2</sup>)</b> |           | 20 000   | 75 000 <sup>2)</sup>   | 49 200 exist.  | 10 340 exist.   | 41 000 new<br>84 500 exist.  |

<sup>2)</sup> Commercial and or public



# Successful neighborhood development

## Main phases of development projects





# Decision processes

**Strong leadership – efficient organization**

## Organization

|             |  |
|-------------|--|
| Initiator   | Owner/Housing company/Association<br>City – Planning office                                |
| Investor    | Owner/Housing company/Association<br>Developer grants/ Funds administration                |
| Coordinator | Owner/Housing company/Association<br>City – planning office<br>Development/Planning agency |
| Other       | Constructor, Utility<br>Customer/Tenants organization                                      |

➤ Involvement of **ALL STAKEHOLDERS**

➤ **QUALITY AGREEMENT**

➤ **EDUCATION AND INFORMATION**

➤ Contracts with **PROFIT SHARING**



# Decision processes

**Strong leadership – commitment to common goals**

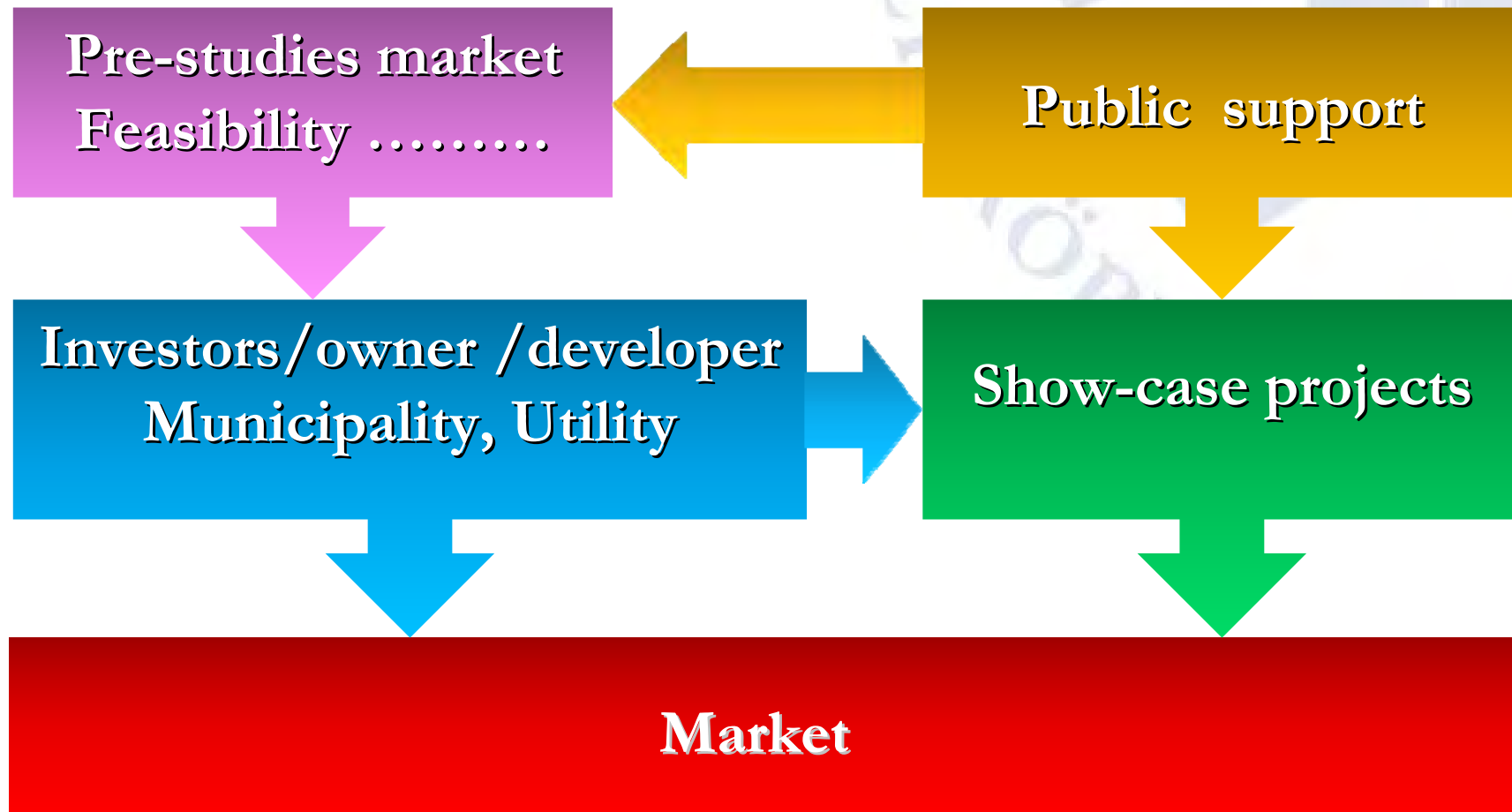
## Example of stakeholders in urban development projects

- Governmental or regional authorities/agencies
- Local/city authorities/offices
- Utilities
- ESCOs
- Universities/institutes
- Technical consultants
- Architects
- Developers/housing companies
- Construction companies
- Tenant organizations



# Decision processes

Public support is a catalysator for development





# The planning process

## Neighborhood development

### Why neighborhoods?

- **NEIGHBORHOODS** is often a **MORE ECONOMIC** than single building project
- **RUNDOWN AREAS** can be easier regenerated
- **NEW AND MORE EFFICIENT** energy concepts
- **ATTRACTIVNESS OF A WHOLE AREA** can help to save investments and capital





# Planning processes

## *Multiple goals in Neighborhoods:*

- Energy and environment
- Restoration of areas or grounds
- Economic and social revitalization of neighborhoods
- Sustainable building materials
- Indoor environment: thermal comfort, air quality, noise reduction



Franklin  
120/6 000





# Planning processes

## Policy instruments

Target setting

**Planning of Neighborhoods** should be able of including other important aspects of sustainability, f. i. transport.

Carrots/Subsidy schemes

**Public support and Subsidies** play an important role in risky projects with innovations.

Sticks/Regulatory schemes

**Regulatory systems** are important for achieving changes which are not economically justified.

Promotion

**Pilots and show-cases** have a big impact on development.



# Implementation

- **EDUCATION OF CRAFTSMEN** and quality assurance necessary
- **CONTRACT WITH INCENTIVES** for both owner and contractors
- Involve and inform **THE TENANTS**
- Take care of **THE TENANTS**
- **MONITORING** and **EVALUATION**
- Do the work **SUCCESSIVE**



# Technologies

- **NEIGHBORHOODS** facilitate implementing *central or local heat distribution* systems:
  - District heating
  - Renewable energy
  - Low-ex solutions
- **LOW TEMPERATURE** heat distribution systems
- New **CONSTRUCTION TECHNOLOGIES**



Kumagaya



# Success factors for neighborhood development

## ➤ Factors

- Commitment to common goals through transparent decisions
- Strong leadership, communication and information
- Quality agreements
- International competition
- Public support (subsidies and/regulations)



## ➤ Results

- Achieved sustainability goals
- Improved capital security



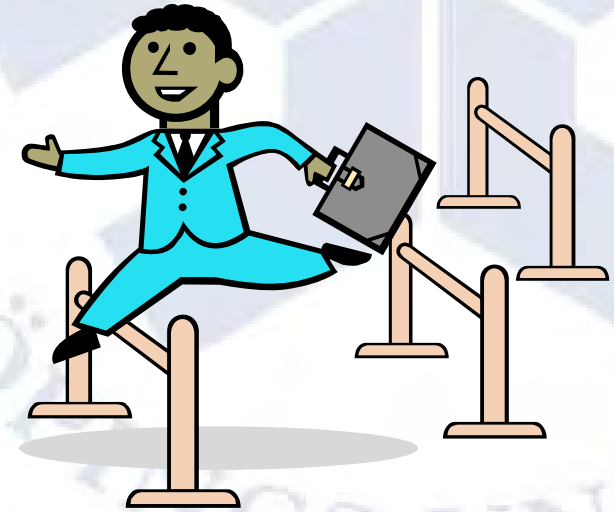
# Critical issues to be solved

- Unclear goals when many stakeholders – must be coordinated
- Total economy for both tenants and investors (higher rents, lower RoI)
- To reach economic solutions for commercial premises (low occupancy time)



# Barriers and hurdles

- The role of tradition
- Not in my backyard
- Legislative and political hurdles
- To many wishes - Cost rising factors



**Strong leadership needed !!**



# The social component

➤ COMMUNICATION

➤ FEEDBACK

➤ CARE-TAKING

*Important instruments*

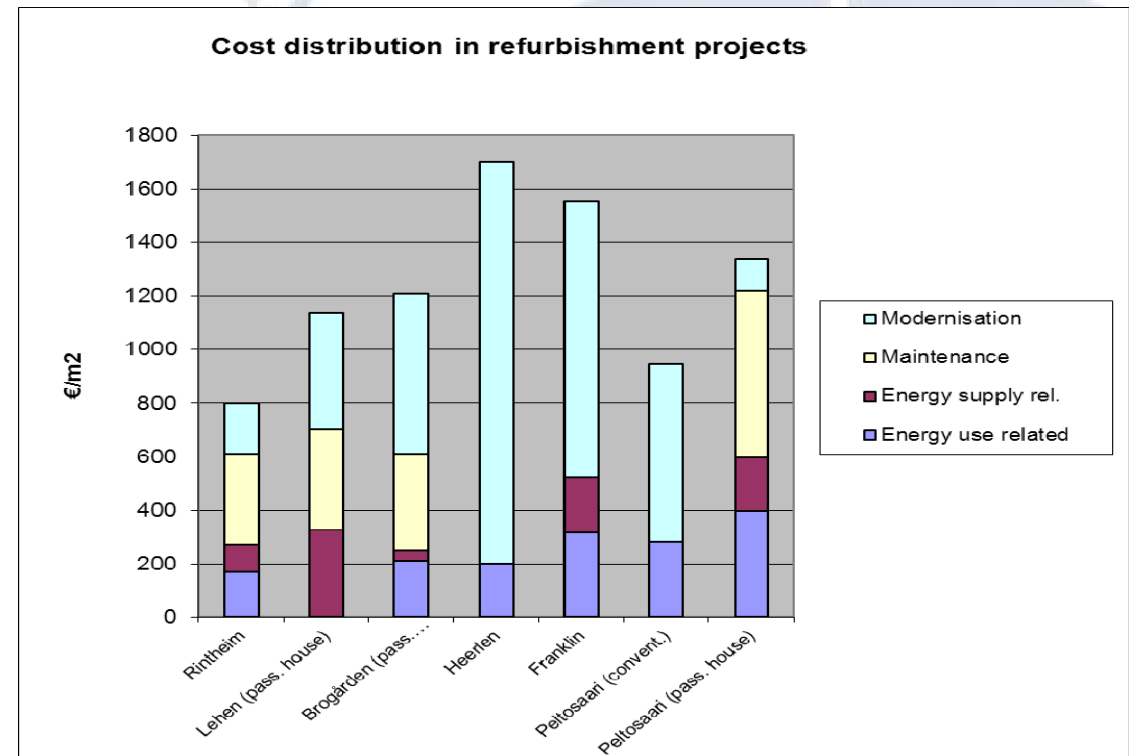
- The tenants got aware of the **IMPORTANCE** of the project.
- The attention of the media lifted the **ATTRACTIVNESS** of certain areas.



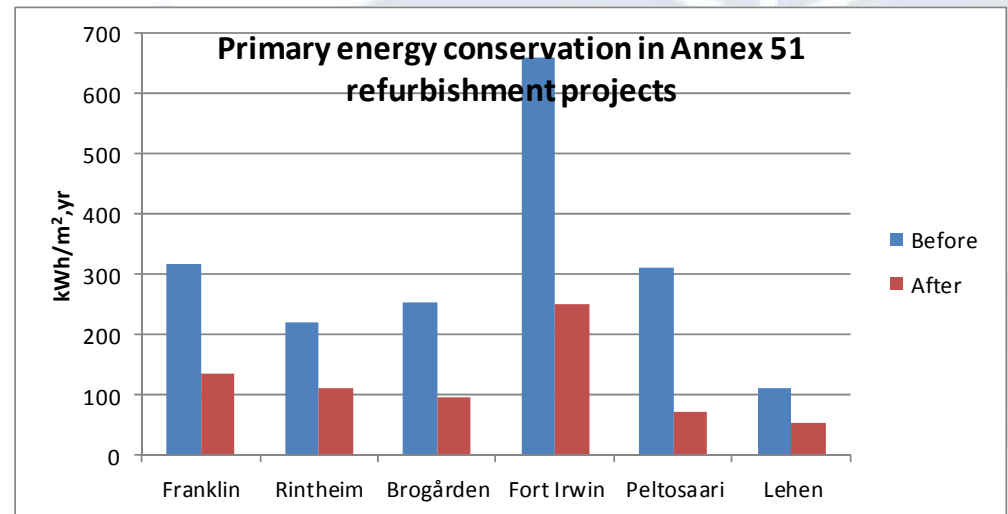
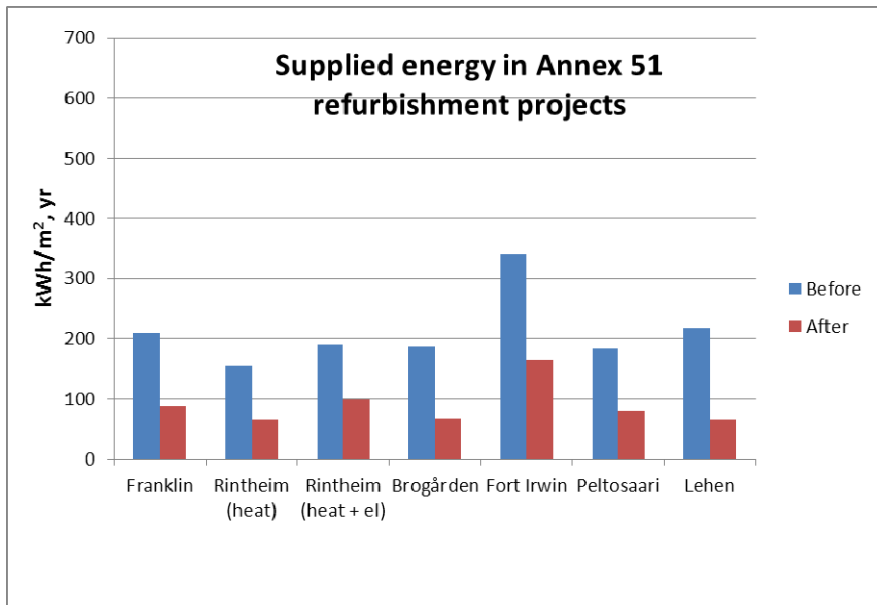


# The economical facts

- **SUBSIDIES** are important for show-cases
- **ENERGY SAVING DOES PAY** part of the investment
- Rents – **NOT** or **ONLY SLIGHTLY INCREASED**
- **ECONOMIC SOUND CONDITIONS** need optimization

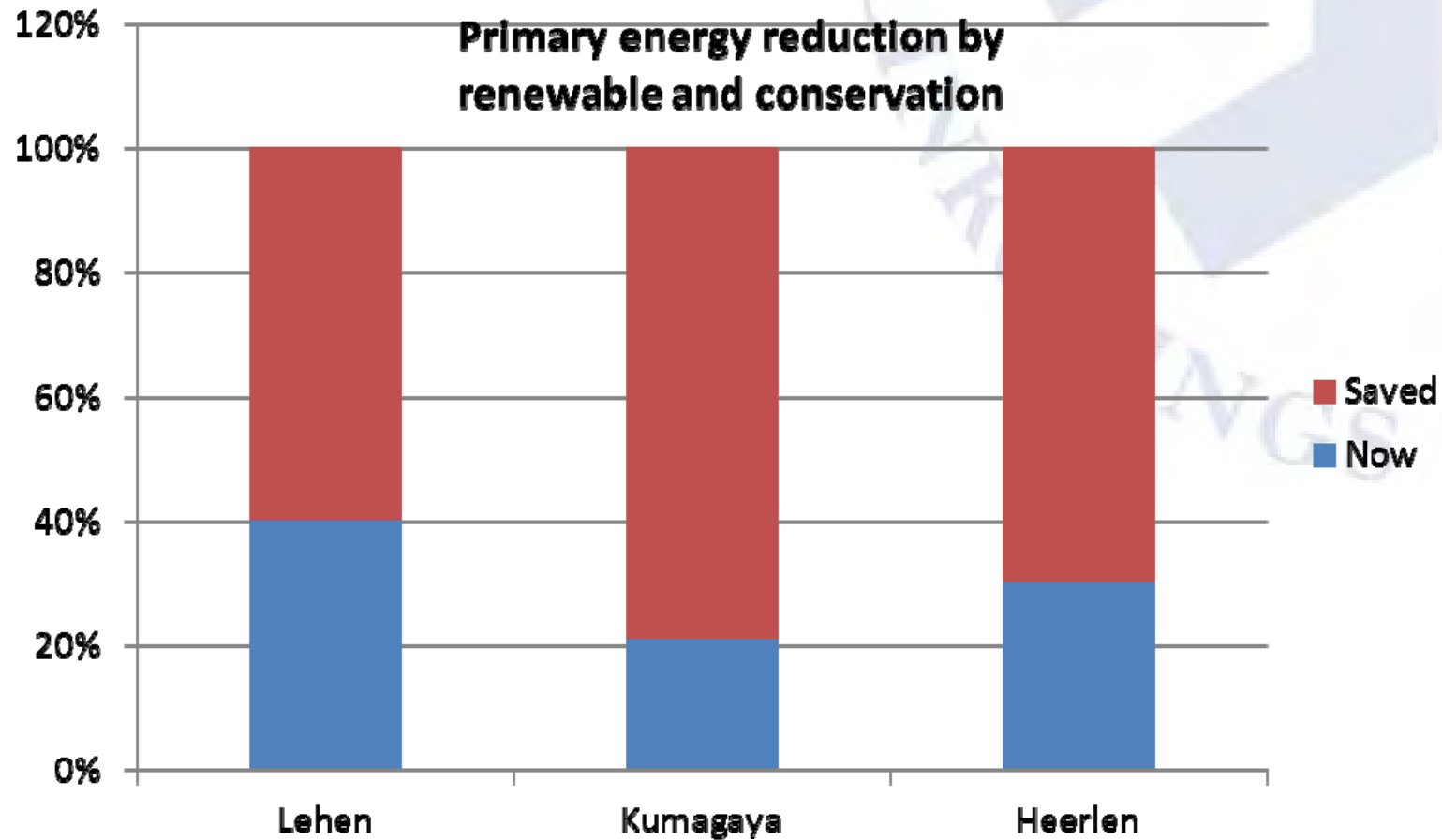


# Monitoring and Verification



- Only **FEW PROJECTS** so far evaluated - ongoing projects.
- Often a separate university project in showcases.
- In the case where **MONITORING WAS PART OF THE CONSTRUCTION** program, monitoring could contribute to improvement of techniques during construction.
- Important **ENERGY SAVING** has been or will be achieved.

# Achievements due to energy conservation and renewable energy



# Key findings – Decisions & Planning

- **TRANSPARENT DECISION PROCESSES** are important to achieve a common goal “**STRONG LEADERSHIP**”.
- **TOOL SUPPORTED PLANNING** towards optimized system is very important.
- **INTEGRATED PLANNING** is needed to find e.g the trade-off between energy saving and energy supply.





# Key findings – Multi-criteria planning

- **PLANNING OF NEIGHBORHOODS** will in the future include other important sustainability aspects such as transport, air quality, water treatment a.s.o.
- Such planning tools were not used and are probably not commonly available.



# Key findings – Financing

- **SUBSIDIES** support cases with pioneering character “higher risk taking and more innovation”
- With low public funding, market conditions prevail  
“**OPTIMIZATION IS A MUST**” less risky projects
- **HOLISTIC NEIGHBORHOOD APPROACH** can help to make a neighborhood economically successful (f. i. architecture, local services, transportation, recreation, security a.s.o.)



# Key findings – Policy instruments

- **POLICY INSTRUMENTS** such as subsidies, tax reduction or simply local or national regulations are important success factors.
- However, these policy instruments are **AD HOC** and cannot be accounted for in all cases of neighborhood development.



# Further research

- **Definition of neighborhood/communities:** What is the most cost-efficient size for area development economics? What size and complexity should be aimed for?
- **Decision-making:** What are the relevant benchmarking indicators for energy-optimized communities and for sustainable communities?
- **Planning tools:** Development of a simple-to-use optimization tool for communities with different sustainability aspects is highly desirable.
- **Coordination with other sustainability goals:** How should energy-efficient neighborhood development be coordinated with all the other sustainability issues such as transport, water and waste treatment, clean air, etc.? Can a priority or hierarchy list be developed? What synergy effects arise from such coordination?





A black hole is depicted with a blue accretion disk and a bright yellow-orange jet of light extending from it. The background is a dark, starry space.

**End!**

Thank you!  
Questions / Comments?