Design strategies for energy interventions in historic buildings
• Context: research project *Energieke Restauratie*

• Research Problem

• Method
  – Literature: current strategies
  – Three case studies

• Suggested design approach with four strategies
PROJECT ENERGIEKE RESTAURATIE

- Centre of Applied Research NoorderRuimte
- Sustainable Building

- SIA RAAK MKB Project
  - 2 years of research
  - North of the Netherlands
  - 4 research themes

- 40 (7) participating enterprises, owners and governmental organisations
- 50 (15) participating students
- 25 (3) in depth case study projects

- Researcher
- Lecturer
- PhD student at University of Technology Delft
RESEARCH PROBLEM

New demands

Unique buildings
- A tailor made approach
- A robust approach?

What generic strategies can be used as a addition to the tailor made approach?

Method
- Literature study (strategies)
- New approach: three cases
INTEGRAL ENERGY STRATEGY

Three steps
1. Energy efficiency
2. Renewable energy
3. Clean use of fossil fuels

Source
- Erik Lysen (1996)
ADAPTIVE REUSE STRATEGY

Phases

- Idea for reuse
- Support and stakeholders
- Heritage qualities
- Design and feasibility
- Implementation

Sources

- Nelissen ea (1999)
- Renes (2000)
- RCE (2009-2013)
5 basic strategies

• Traditional use, restraint, reversibility, adaptive reuse, adapted user demands

15 theme related strategies

• Material, energy, water, indoor climate, maintenance, design
  (rating = Du * Mo-index)

Source

- Nusselder ea (2008)
## DuMo AS AN INDICATOR

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<th>Build</th>
<th>Category</th>
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<th>Mo</th>
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Integrating strategies: six steps
1. Heritage qualities
2. Technical condition
3. Causes energy use
4. Current complains
5. Owner demands (activities)
6. Energy potential

Three projects
• Dairy factory ‘De Dongeradelen’
• Strawboard factory ‘Free & Co’
• ‘Der Aa’-church
1. Heritage qualities
   Industrial age: ornaments

2. Technical condition
   High degree of decay

3. Current complains
   Vacancy: drops economic value; lack for investing

4. Causes energy use
   No heating / insulation, no windows

5. Owner demands (activities)
   Reuse that generates income

6. Energy potential
   Large size spaces, insulation, solar energy
‘DE DONGERADELEN’

- Heritage qualities: basements, decayed walls
- Feasibility: initiatives in nearby area
- Technical condition: renew
- Bases energy system: activities
1. Heritage qualities
   Industrial age: ornaments, steam engine

2. Technical condition
   Partly in bad condition

3. Current complains
   Vacancy: influencing the companies image; it doesn’t generate income

4. Causes energy use
   No heating / insulation, broken windows

5. Owner demands (activities)
   Reuse that generates income

6. Energy potential
   Large size spaces, partly insulation, solar energy, adjacent factory: bio energy
‘FREE & CO’

- Heritage qualities: route, machine room
- Feasibility: initiatives in nearby area
- Technical condition: renew
‘DER AA-’CHURCH

1. Heritage qualities
   Authentic materials / art, organ (listed)

2. Technical condition
   Good

3. Current complains
   Cold draughts, high energy costs

4. Causes energy use
   No insulation, broken windows, inefficient heating of spaces

5. Owner demands (activities)
   Comfort for clients (concert, fair, event)

6. Energy potential
   Use of large size spaces, secondary glazing, potential exchange energy
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- Individual interventions?
- Activities: local heating
- Building as context (secondary glazing, separation)
- Energy potential area (support, split incentive, legislation)
SUGGESTED APPROACH

Approach in 3 phases

1. Use of the building
   a. Use complains
   b. Causes energy consumption
   c. Owner preferences

2. Building properties
   a. Heritage qualities
   b. Technical condition
   c. Energy characteristics

3. Four strategies

Users (need attractive space)
Buildings (facilitate use)
SUGGESTED APPROACH

7. Four strategies

I. Individual comfort
   - Friendly heating

II. Minor improvements
   - Efficient current situation

III. Major improvements
   - Add new energy interventions

IV. Generate energy
   - Exchange of energy
   - Use property owned by others

Office chair heating, blankets
Secondary glazing
Thank you for your attention

Do you have any questions?