Drivers and barriers in high ambition retrofitting of non-residential buildings.

Experiences from decision-making processes in projects from six countries.

Findings from Subtask B - IEA SHC Task 47
The Jostedal glacier is diminishing!
AGENDA

1. Scope of work in Subtask B – Market & Policy Issues
2. Building stock analyses pointing out the potential?
3. Study of decision making processes
4. Recommendations
OBJECTIVES FOR SUBTASK B

• Identify segments with high potential for energy efficiency savings and which type of owners are most likely to go for such projects.
• Identify the most important barriers and driving forces in decision making processes
• Develop knowledge about which boundary conditions are important to overcome the barriers
• Increase the understanding of how improved NEB’s increase the value of the building
Building Stock Analyses

Few complete analyses

- **Europe**: Europe's Buildings under the Microscope (2011) BPIE
- **Denmark**: Building stock analysis – Danish non-residential buildings, (2013) SBI
- **Australia**: Baseline Energy Consumption and Greenhouse Gas Emissions In Commercial Buildings in Australia, (2012), COAG
- **Italy**: Building stock analysis of Italian schools, (2013) ENEA
EUROPEAN BUILDING STOCK ANALYSIS

Distribution of m2 gross floor space per building category in EU27+ Switzerland and Norway

- Wholesale & retail 28%
  - Detached shops, shopping centres, department stores, large and small retail, food and non food shops, bakeries, car sales and maintenance, hairdresser, laundry, service stations (in gas stations), fair and congress buildings and other wholesale and retail.

- Offices 23%
  - Offices in private companies and offices in all state, municipal and other administrative buildings, post-offices.

- Educational 17%
  - Primary and secondary schools, high schools and universities, research laboratories, professional training activities and others.

- Hotels & restaurants 11%
  - Hotels, restaurants, pubs and cafés, canteens or cafeterias in businesses, catering and others.

- Hospitals 7%
  - Public and private hospitals, medical care, homes for handicapped, day nursery and others.

- Sport facilities 4%
  - Sport halls, swimming pools, gyms etc.

- Other 11%
  - Warehousing, transportation and garage buildings, agricultural (farms, greenhouses) buildings, garden buildings.
IDENTIFYING POTENTIAL

SHARE OF TOTAL ENERGY USE PER BUILDING TYPE

- Wholesale and retail trade; 28%
- Offices; 26%
- Educational; 12%
- Hotels and restaurants; 12%
- Hospitals; 10%
- Sport facilities; 6%
- Other types of energy-consuming buildings; 6%
Realistic scenario for Denmark?

- Scenario analysis for energy savings in the Danish building stock towards 2050:
  - Reduction by 22% in yearly energy consumption for the non residential building stock.
  - Assumptions; additional insulation is added and building components are replaced only when they are worn out, and then upgraded according to the actual building code.
  - The greatest savings are found in offices/commerce and educational/research buildings built before 1960. These buildings can save from 28% to 34% depending the construction year.

- Source: "Varmebesparelse ved løbende bygningsrenovering frem til 2050" (heat savings by continuously retrofitting towards 2050), Netværk for energireновering, SBi (2013).
Decision making processes

Learning from demo projects
- 10 projects studied in 6 countries
- Key actors interviewed
- Same template for questionnaire
- Cross analysis
GOOD INNOVATION PROJECTS NEED FIVE DISCIPLINES TO SUCCEED

1) There must be a clear **need** as a customer value
2) You need a **value proposition**
3) passionate and **committed people**
4) Innovation **teams**, i.e. collective intelligence
5) Organizational alignment, i.e. **supported by top management** and strategies

Carlson & Wilmot (Innovation: The Five Disciplines For Creating What Customers Want, 2007)
HOW WERE THE 5 DISCIPLINES COVERED IN THE DEMO PROJECTS?

- Holistic understanding of the tenant's and owner's needs – which encompass more than energy efficiency
- Added value solutions which fulfilled the needs
- One or more enthusiastic persons who are committed to the process
- Multi disciplinary teams (also involving owner/tenant)
- Supported by the top management and in line with organizations' strategies
DRIVERS AND BARRIERS IN THE VARIOUS PHASES
Initiating

Defining needs

Tender 1

Planning

Design

Tender 2

Construction

Completion – hand over

Evaluation

Lack of experience

Poor access to knowledge

Economy

Traditions (public)

Achieve energy label

Energy savings

Image as frontrunner

Financial support

Increase value

Green image (private)

Focus on energy efficiency in media

Experienced actors

Knowledge support

Achievement

Profitability

Competitive advantage in market

Involvement and decision making

Freedom to create dream team (trust)

Experienced actors

Knowledge support

Achieve energy label

Learning opportunities

User involvement

Model project

Enthusiasm and pride among users

Feasibility

Conflict with basic needs

Disturbing noise & dust

Strict tender

Conflict with basic needs

Lack of good examples

Skepticism

Poor access to knowledge

Lack of good examples

Skepticism

Experienced actors

Knowledge support

Achieve energy label

Learning opportunities

User involvement

Model project

Experienced actors

Knowledge support

Achieve energy label

Learning opportunities

User involvement

Model project

Enthusiasm

Pride among users

Publicity in media

Freedom to create dream team (trust)
## Recommendations to authorities

<table>
<thead>
<tr>
<th>How to...</th>
<th>increase attractiveness</th>
<th>improve competitiveness</th>
<th>improve affordability</th>
<th>improve availability</th>
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<tbody>
<tr>
<td><strong>Strengthen drivers</strong></td>
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<tr>
<td>As part of information campaigns use relevant media and conferences to show good examples.</td>
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<td>Particular spotlight on the enthusiasts Actors receiving grants, see it also as an confirmation of a good decision and see this an strengthening of the organization's image.</td>
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<td>Increased tax on energy.</td>
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<td>The energy labelling systems give a neutral reference for comparing buildings on energy performance and thereby increase the focus on this as an competitive advantage.</td>
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<td>Stronger subventions programs for owners upgrading towards nZEB (driver in some projects).</td>
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<td>Make sure that the top management of landlord companies see the benefits of nZEB upgrading and as a consequence will be open for such initiatives within their own projects.</td>
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<td>Endorse serious frontrunners.</td>
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<td>In some countries it is obligatory that companies have a statement about their impact on the environment. This could be extended by an obligation of stating what energy labels their buildings hold. This increases the awareness of the issue of the energy efficiency of buildings.</td>
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<td>Put on place training programs for all relevant crafts to be updated on nZEB upgrading.</td>
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<td>Announce stepwise enforcement of building codes.</td>
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<td>When public bodies upgrade their own buildings, it should be required nZEB ambitions. In this way both experience and good examples are developed locally. Tender processes must be defined adequately to avoid pure focus on price. A partnering contact for the design phase seems to be a good solution for this.</td>
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<td>Facilitate arenas for the industry to meet with researchers and other companies to share experiences.</td>
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## Recommendations to the construction industry

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<td>• Identify the owner segments which focus on sustainability.</td>
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<td>• Involve users in planning phase</td>
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<td>• Particular spotlight on the enthusiasts (both within owner organization and advisors).</td>
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<td>• Research projects which focus on combining best innovations on component level in order to make more efficient retrofitting processes.</td>
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<td>• Smart changes of floor plan can improve the area efficiency per employee. Also smart extensions of the existing building, for instance add an extra floor on the top may also improve the economy of the project.</td>
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<td>• Offer of ESCO contracts where the owner pays in accordance with the energy savings obtained.</td>
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<td>• Spread the experiences to new regions so new potential clients can see good examples in their neighbourhood.</td>
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<td>• Develop convincing arguments for nZEB.</td>
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<td>• Better initial audits of the building will reduce the amount of unforeseen challenges.</td>
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<td>• Systematic training programs to update the skills of all personnel involved in the projects; from planning, construction and hand over/use.</td>
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<td>• Use of QA tools to assure the quality of a) products/systems, b) competence of the involved actors and c) processes.</td>
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<td>• Offer of financing as part of the upgrading package.</td>
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<td>• As it is a challenge to do deep retrofitting while the tenants stay in the building, use of prefabricated solutions may reduce the level of disturbance as well as the length of the on-site retrofitting process.</td>
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Thank you for your attention!

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