Healthy Buildings Day – Velux  #HBD19

Mette Mogensen,
Director of urban and residential development
Social housing in Denmark
Social Housing Public housing, Denmark

DK Public housing:
• 1 million tenants
• 513 social housing organisations
• 560,000 dwellings
Beboerne i almene boliger

Waiting lists

100 housing organizations
58,000 homes in 76 communes
Approx. 70,000 tenants

55%
45%
3 main pillars of Public housing

✓ Non-profit
✓ Tenant democracy
✓ Stable financial model
Our Vision

...is to create the most attractive homes.

We achieve our goals by assuring:

• Good homes, outdoor areas and neighborhood
• Pride, ambition and identity in the architecture
• Sustainable buildings
• Comply with time schedules and budget
Aging population

Number of Danes older than 65 years

- 850,000 in 2008
- 1,050,000 in 2015
- 1,160,000 in 2020
- 1,266,000 in 2025
- 1,379,000 in 2030
Loneliness

104,000 older people feel involuntarily lonely. And the number is increasing...

Communities for both families as well as for seniors.
Healthy public housing
*Short overview of Scandinavian policy objectives*

The whole population should be offered healthy, well designed and well equipped dwellings of good quality at affordable costs.

Good and healthy dwellings for all. This should be obtained by a varied supply of housing that give all groups in the population the possibility to find a suitable dwelling in accordance with their needs and financial ability.

Everyone should be in possession of a good and reasonable dwelling in a good housing environment.

All groups in society should have access to an affordable dwelling, which fulfil certain criteria concerning size and standard, and is located in a good and functional environment.
Indoor Climate Incentive Programme

Indeklimaet på et gennemsnitsdøgn
CO₂ fordeling på timer og klimaklasser

Mean CO₂: 590 ppm
Hope to gain:

• Healthier indoor climate $\Rightarrow$ Healthier tenants $\Rightarrow$ increase in quality of life

• Healthier buildings $\Rightarrow$ prolonging the life of buildings $\Rightarrow$ better CO2 print $\Rightarrow$ better economy $\Rightarrow$ cheaper rent

GOAL 3: Good Health and Well-being

Goal 11: Make cities inclusive, safe, resilient and sustainable

Goal 12: Ensure sustainable consumption and production patterns
What is the problem with the ordinary way of measuring?

• Very large difference in price interval (kr./m2) and an option to gain up to 70% heat from neighbours heating system*

• unfair cost distribution

• Increasing problems with indoor climate shortening the life of the buildings

Change of behaviour requested

* Op til 70%. Reference: Anker Nielsen, Professor, Jørgen Rose, Ph.D.1 Danish Building Research Institute, Aalborg University,
**Basic problems**

- **Ineffective heating** – tenants experiencing much lower degrees than wanted.
- **Tenant shutting down heat**, gaining from neighbours - up to 70%.
- Difference up to 1 - 17 kr. per sqm.

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Energy renovation – ideal scenario

Healthy indoor climate + Healthy buildings
"Rebound-effect"

- From SBi report 2016:09
- (Figure based on data from approx. 135,000 houses)
Risk that the energy renovation will lead to a consumption increase.
Understanding the client

Renters:
Decisions are made in a democratic process: Not all agree with the decisions
Expenses to maintenance are meant to give value not only to the existing but also to future tenants
Person driven maintenance activity both concentrate on avoiding penalties and to preserve
Decisions regarding rent increase tends to concentrate on a short term gain rather than a long-term strategy
Experience rules and regulations others have decided and that do not make sense

Owners:
Decisions area made by the owner himself: 100% agreement with the decisions
Maintenance gives 100% value to the owner either now or when selling
Person driven maintenance activity aims to preserve and modernize the home
Decisions involving expenses holds both short term and long-term strategies
Own house rules – makes sense
Choose the right solutions – not just good ones

• Choose easy-understandable solutions and products

• Make sure the idea of the product/solution is understandable – and understood

• Make products that intuitively makes sense...not just for the caretaker
Make sure the idea of the product/solution is understandable – and understood, when… installing closed balconies

Klaus Petersen (15.11.2003, 11:10)

Hej NG.

Jeg leder p.t. efter en god måde, jeg kan varme min lukkede altan op på. 
I'm looking for a good way to heat up my closed balcony...
Altanen er ca. 18 m².

Varmekilden skal dog være flytbar.

Jeg overvejer selv en gas ovn, men da jeg ikke har så meget forstand på det, spørger jeg jer.

Hvad er den mest effektive måde at varme den op på?
Hvad er den billigste?
What is the most effective and cheapest way?
Harald Nyborg har f.eks. denne gasovn [...].

mvh.
Klaus.
Make products that intuitively makes sense... not just for the caretaker

• Make it easy to do the right thing
The indoor climate project = a Development Project

500 – 1.000 homes

Testing period:
2017 – 2022
1. Phase started feb. 2017

Billing phase starts 1.1.2019

Final results from development project not ready until 2021

All 4 testing areas have been or are at the moment being renovated.
As the tenants moves back the plan is to start the new dynamic heating account system
2. Phase starts 1.1.2019
Change of legislation and subsidize policy
General knowledge

- Rarely profitable only to make energy renovation
- Possible to bring public housing to a good level, but difficult to take it even further
- Energy renovations meets the goals on certain conditions
- Lack of tools to follow up
- Be aware of the ”Rebound Effect”
- Planning before implementing
- Visualize
- Communicate
- A strong focus helps
The project: Dynamic heating accounts

**Indeklima:**
- Temperatur: 17°C, 19°C, 22°C, 25°C
- Fugt: 20%, 30%, 50%, 60%
- Frisk luft/CO₂: 800 ppm, 1013 ppm

**Vandforbrug:**
- Varmt brugsvand: 50 l/døgn, 100 l/døgn, 150 l/døgn, 200 l/døgn, 250 l/døgn
- Koldt brugsvand: 50 l/døgn, 210 l/døgn
Indoor climate of the month – February 2019

- **Temperature (Temp.):**
  - GNS: 23.5 °C
  - Februar 2019
  - 25% (red), 29% (yellow), 46% (green)

- **Fugt % (Fugt %):**
  - GNS: 30.7%
  - Februar 2019
  - 6% (red), 0% (yellow), 94% (green)

- **CO₂ (CO₂):**
  - GNS: 589 ppm
  - Februar 2019
  - 94% (red), 5% (yellow), 1% (green)

Procenterne angiver månedens fordeling på grøn, gul og rød. 4% svarer til ca. én time pr. døgn.
### Indoor Climate

**Status**

<table>
<thead>
<tr>
<th>Building</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dømea Landscen</td>
<td>ANR mæler</td>
</tr>
</tbody>
</table>

**Date and Time**

15:14 Sep 28, 2019, Timezone: Europe/Copenhagen

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<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature</td>
<td>23.0 °C</td>
</tr>
<tr>
<td>Humidity</td>
<td>55.6 %</td>
</tr>
<tr>
<td>CO₂</td>
<td>515 ppm</td>
</tr>
<tr>
<td>Noise Avg./Peak</td>
<td>36.0 / 43.0 dB(A)</td>
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</tbody>
</table>

**Activity Index**

- Saturday 14:00 - 15:00
  - Low

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**Indoor Climate Classes***
A look at a report

**CO₂**

Gennemsnit CO₂: 892 ppm
God: 50% under 800 ppm
Mindre God: 9% imellem 800–1,000 ppm
Ringe: 41% over 1,000 ppm
Price estimation

Februar 2019

Bygning: Frilandsvej 31 - 35
Enhed: Adresse
Areal: 76.0 m²
Lejlighedsnr.:  

Samlet indeklima indeks – februar 2019

Indeklima Indeks beregnes som gennemsnit af den relative fordeling for Temp., Fugt og CO₂.

<table>
<thead>
<tr>
<th>Indeklima Indeks</th>
<th>Fast betaling for indeklima komfort 3.50 kr./m²:</th>
<th>Ekstra betaling Gul: 13% 2.00 kr./m² Rød: 16% 4.00 kr./m² I alt:</th>
<th>Samlet betaling for indeklima komfort for februar 2019:</th>
</tr>
</thead>
<tbody>
<tr>
<td>71%</td>
<td>266.00 kr.</td>
<td>68.40 kr.</td>
<td>334.40 kr.</td>
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<td>13%</td>
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<td>16%</td>
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</table>

* Placering i forhold til resten af ejendommen
<table>
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<tr>
<th>Indeklima</th>
<th>Tarif 1: Den 'forsigtige'</th>
<th>Tarif 2: 'Middel'</th>
<th>Tarif 3: Den 'skrappe'</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grøn - fast betaling</td>
<td>3,5 kr./mån og m²</td>
<td>3,0 kr./mån og m²</td>
<td>2,5 kr./mån og m²</td>
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<tr>
<td>Ekstra for % gul</td>
<td>2,0 kr./mån og m²</td>
<td>4,0 kr./mån og m²</td>
<td>6,0 kr./mån og m²</td>
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<tr>
<td>Ekstra for % rød</td>
<td>4,0 kr./mån og m²</td>
<td>6,0 kr./mån og m²</td>
<td>8,0 kr./mån og m²</td>
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Status and results

Project Copenhagen, status:
• The first testing period has run for 1½ years
• The development-project shows a change in behavior, as in letting in more fresh air
• The testing period has just begun linking behaviour to the bill
• This startet 1.6.2019
• Signs of more fair distribution of expenses
Learning points so far

• Big attention on which colour zone you are in – size of bill comes in second

• Development project reveals over dimensioned ventilation system – call for the engineers!

• Until now: A lot of questions from the tenants

• A spread from 1 kr. per sqm to 17 kr. to a spread from 3,5 kr to 5,5 kr per sqm

• Communication cannot be over estimated
3 points from the current evaluation:

Changing from consume reduction to healthy indoor climate thinking is a cultural paradigm shift

The building can work against you

Who looks after my indoor climate, when I’m not at home?
Hope to gain:

• Healthier indoor climate ➔ Healthier tenants ➔ increased lift quality
• To reduce energy consumption and at the same time optimize indoor climate
• Enable adequate behavior to enhance balance between energy consumption and letting in fresh air

• Healthier buildings ➔ prolonging the life of buildings ➔ better CO2 print
• Establish effective and cost reduced administration ➔ better economy ➔ cheaper rent

Attention on:
Communication - dialogue – information: lots and lots
Onboarding the tenants the right way
change in subsidize changes focus and result
Thank You for listening