Influence of occupant behavior and operation on performance of a residential Zero Emission Building in Norway

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Building description

Architecture

- Zero emission building with the ambition level ZEB-
- Operation and Maintenance
- Two story family home with a floor area of 202 m²
- IDA-ICE simulation program was used to perform the

http://www.multikomfort.no/prosjekthuset-i-larvik/
Energy supply system
Electricity use and production

- The total specific electricity demand was 5,869 kWh/year or 29 kWh/m²
- Heating contributed with 17.8 kWh/m²
- PV area of 37.75 m²
Mismatch factors on hourly level

- Hourly mismatch factors varies a lot over the year
- A problem for the energy system due to ZEBs is that ZEB may cause big stress at the energy infrastructure

Winter day – ZEB behaves as a usual building

Summer day – ZEB produces much more energy than it uses
Influence of setpoint temperature on ZEB performance

Annual mismatch factors

<table>
<thead>
<tr>
<th>Scenario</th>
<th>-1K</th>
<th>Reference</th>
<th>+1K</th>
<th>+2K</th>
<th>+3K</th>
<th>+4K</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mismatch factor</td>
<td>1.02</td>
<td>1.00</td>
<td>0.98</td>
<td>0.95</td>
<td>0.93</td>
<td>0.91</td>
</tr>
</tbody>
</table>
Influence of electrical equipment use on the ZEB performance

Mismatch factor

<table>
<thead>
<tr>
<th>Scenario</th>
<th>EQ -20%</th>
<th>EQ -10%</th>
<th>Reference</th>
<th>EQ +10%</th>
<th>EQ +20%</th>
<th>EQ +50%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mismatch factor</td>
<td>1.07</td>
<td>1.04</td>
<td>1.00</td>
<td>0.97</td>
<td>0.93</td>
<td>0.85</td>
</tr>
</tbody>
</table>

Annual mismatch factors
Overall influence of occupant behavior on ZEB performance

### Annual mismatch factors

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conservative</td>
<td>EQ and DHW decreased 20% and Tin lower for -1K</td>
<td>1.16</td>
</tr>
<tr>
<td>Reference</td>
<td>Standard values</td>
<td>1</td>
</tr>
<tr>
<td>Wasteful</td>
<td>EQ and DHW increased 20% and Tin higher for 2 K</td>
<td>0.85</td>
</tr>
</tbody>
</table>
Thank you for your attention!

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