Hvordan er de svenske regler for dokumentation af boligers energiforbrug?

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Why Sweden has chosen measured values

- Measured values are the recommended source for verification of energy requirements and EPCs.
- Calculated energy consumption can be used only if measured values are not available (EPC).
- Measured values show the real energy consumption including building quality, heat generator efficiency, cold bridges, ageing etc.
- Utility bills are the primary source for the data.
  - 12 months consumption
- Energy consumption has to be corrected for user behaviour and climate.
Difference between measured and calculated consumption

Uppmätt specifik energianvändning

- Uppvärmning
- Tappvarmvatten
- Fastighetsenergi
- Solenergi
- Krav
- Projekterat

Specifik energianvändning (kWh/m²-år)

Byggnad

- S100
- S101
- S105
- S107
- F105
- F106
- F107
- F114
- L101
- L103
- L104
- L105
Data handling – user behavior

- A crucial part is correction of measured values to **reflect normal user behaviour**.
- The building shall be assessed, not the users.
- A new regulation in 2016 with method normalise the consumption, standardized values. Correction for:
  - Hot tap water use,
  - Indoor temperature, and
  - Waste heat från residential energy consumption.
- Shall be applicable to
  - New buildings, and
  - Existing buildings with various degree of measurement details.
3 steps to correct for user behaviour

1. Distribute measured values between heating, cooling, hot tap water, property energy and domestic energy.

2. Identify and determine user dependent values and replace them with standard values

3. Calculate normalised energy consumption and energy performance
Into the details

- The parameters chosen that have an influence and possible to identify also when the data is limited in details
- Standardized values for hot water consumption, indoor temperature and domestic energy.
Hot tap water determination

Options
• Direct energy measurement
• Annual water volume for hot tap water
• Overall water consumption. 35 % assumed to be hot tap water

Normalisation
Change the real value to normalised value
• 20 kWh/m², year for single-family buildings
• 25 kWh/m², year for multi-family buildings
• 2 kWh/m², year for non-residential buildings
Indoor air temperature

Correction is made if the deviation exceeds 1°C
- 21°C standard value indoor temperature for residential buildings
- Other buildings – indoor temperature determined by the activity

Normalisation
5 % correction of heating energy per °C deviation
Domestic energy

- The residential energy used for cooking, washing refrigerators, freezers etc is also subject to normalisation. The difference between actual and normal residential energy is determined. The normal energy consumption is set to 30 kWh/m², year for residential buildings.

- 70 percent of the difference may be used to adjust the heating energy during the heating season.
Normalisation results

**Uppmätt och normaliserad specifik energianvändning**

- **Uppvärmning**
- **Tappvarmvatten**
- **Fastighetsenergi**
- **Solenergi**
- **Energikrav**

**Energianvändning (kWh/m², år)**

**Byggnad**

1. **S1**
   - Normaliserat: 23
   - Tilkört: 20
   - Total: 43

2. **S2**
   - Normaliserat: 13
   - Tilkört: 20
   - Total: 33

3. **F3**
   - Normaliserat: 5
   - Tilkört: 5
   - Total: 10

4. **F10**
   - Normaliserat: 22
   - Tilkört: 25
   - Total: 47

5. **L2**
   - Normaliserat: 6
   - Tilkört: 25
   - Total: 31

6. **L7**
   - Normaliserat: 25
   - Tilkört: 25
   - Total: 50

**Notes:**
- Total values for each byggnad include both normalised and tillkört values.
- The chart shows the comparison of measured and normalised energy consumption.
The user response

- The construction industry prefer measured values. Afraid that calculated values are not accurate enough and underestimate the actual energy consumption.
- Actual values are also the preferred choice for compliance check in new buildings.
- Active feed-back from the users.
Challenges using measured values

- Actual data is not always easy to include in a regulation.
- No software issued from Boverket or other governmental authority.
- The certified energy expert has learn how to use calculations and measurement handling in an accurate fashion.
Links

Boverkets byggregler, BBR (Building code)
https://www.boverket.se/sv/lag--ratt/forfattningssamling/gallande/bbr---bfs-20116/

BEN (Normalisering)
https://www.boverket.se/sv/lag--ratt/forfattningssamling/gallande/ben---bfs-201612/