Input data for building energy performance calculation

Which are they? What about their compliance?

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Focus of this presentation:

• Short introduction on:
  
  • input data for the calculation of energy performance resulting in the Energy Performance Certificate (EPC)
  
  • compliance aspects
  
  • with the focus on renewable technologies
  
• Illustration by an example from Austria
Need for robust procedures

An exemplary problematic situation, highlighting the need for robust compliance frameworks:

An investor orders a very energy efficient building. The Energy Performance Certificate (EPC) shows that this objective is met.

Compliance checks highlight errors in the calculation, whereby the energy performance result is worse than stated but still meets the legal requirement.

There is no sanction as the legal requirement is met. However, the investor does not get the building expected.

Trust in EPC? Market acceptance? 2030 Targets?

Compliance framework needs improvement.
Types of non-compliance

- **NO REPORTING:** The reporting requirements of the procedures (e.g., certificate, database transfer, test report, etc.) or specifications of the works (e.g., test report, photo archives, etc.) are not met.

- **WRONG REPORTING:** There are substantial differences between the data reported and the correct data according to the agreed procedure or specifications of the works.

- **NOT MEETING THE ENERGY PERFORMANCE REQUIREMENTS:** The required energy performance or specifications of the works are not achieved. This may happen for instance if:
  - the minimum building energy performance level is not met;
  - a minimum performance requirement for a system or component is not met;
  - a non-certified contractor has performed work which required certification.
### Types of input data

Three ways for classifying input data for calculating energy performance:

<table>
<thead>
<tr>
<th>Data describing the building envelope</th>
<th>Data describing the building services systems</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data independent of the specific building considered</td>
<td>Data that depend on the specific building and its construction</td>
</tr>
<tr>
<td>Data classified following the way they are made available (by manufacturer, through database, recorded by an expert, measured on site, fixed by legislation)</td>
<td></td>
</tr>
</tbody>
</table>

Description of approaches: see QUALICHeCK fact sheets!
Data of building systems

Data describing the building services systems (heating, cooling, ventilation, domestic hot water production, lighting...) including renewable energy technologies:

• types of energy sources used;
• energy efficiencies;
• power or capacity;
• energy input, energy output;
• flow rates;
• operating temperatures;
• type of controls.
What to check and why

• The Energy Performance Certificate (EPC) will be only as good as the input data used for calculating energy performance minimum requirements and renewable energy minimum requirements.
  • Input data determined according to the rules?
  • Input data updated reflecting design changes and as-built situation?
• Renewable energy technologies gain in importance

<table>
<thead>
<tr>
<th>Revised EPBD (amended)</th>
<th>Revised RED (recast)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Definition of technical building systems extended to on-site electricity generation and on-site infrastructure for electro-mobility (Article 2 (3))</td>
<td>Scope extended to self-consumption of renewable electricity (Article 1)</td>
</tr>
<tr>
<td>Minimum levels of renewable energy in new and existing buildings subject to renovation based on cost-optimal calculations according to EPBD (Article 15 (5))</td>
<td>Enabling consumers to self-consume electricity from renewables without undue restrictions (Article 21)</td>
</tr>
</tbody>
</table>

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## Determining input data

Simplified comparison of compliant input data options for solar thermal systems in two approved Austrian EPC calculation programs: **Software 1** and **Software 2**

<table>
<thead>
<tr>
<th>Specific input data</th>
<th>Default value; optional: specific input data</th>
<th>Choice of given default values</th>
<th>Fixed default value (cannot be changed)</th>
<th>Input not possible</th>
</tr>
</thead>
<tbody>
<tr>
<td>Collector efficiency</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aperture surface</td>
<td>X X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pipe length</td>
<td>X</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Pipe outer diameter</td>
<td>X</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Pipe insulation thickness</td>
<td></td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Azimuth</td>
<td>X X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Angle of tilt</td>
<td>X X</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Challenges and solutions

**Challenge:** In Austria, there are different options how to determine input data - what to check?

**Solution:** The Energy Performance Certificate (EPC) is cross-checked with a document called “Building Services Systems Declaration” which is based on data which must be retrieved from the GET product database (see next slide).

The “Building Services Systems Declaration” should be an attachment to the EPC (currently in test stage). It represents the as-built stage.

<table>
<thead>
<tr>
<th>Icon</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>🔄</td>
<td>Data stated in the EPC and in the Declaration are the same</td>
</tr>
<tr>
<td>🔄</td>
<td>EPC result is improved by data stated in the Declaration</td>
</tr>
<tr>
<td>🖐️</td>
<td>EPC result is worsened by data stated in the Declaration</td>
</tr>
<tr>
<td>✗</td>
<td>Different systems in EPC and Declaration</td>
</tr>
<tr>
<td>-</td>
<td>Comparison not possible</td>
</tr>
</tbody>
</table>
Checking compliance

Austrian Province of Salzburg: Connecting EPC-database called ZEUS and product database called GET-database (under development)

Building services systems in the updated completion EPC will be cross-checked with product data in the GET database by means of the “Building Services Systems Declaration”:

- To check whether EPC was actually updated and represents the as-built situation
- To check whether input data are correct (GET data are checked by the authority)

[Image link to www.produktdatenbank-get.at]
The solar thermal system is integrated in the heating system (space heating and domestic hot water) as planned ("Systemwirkung"): the EPC corresponds with the Declaration. While the EPC states the installation of a highly selective collector type, the Declaration reveals that a flat plate collector is installed ("Kollektorart") with a smaller area ("Aperturfläche"), a worse conversion rate ("Konversionsrate"), a different orientation ("Südausrichtung") and a different horizontal inclination ("horizontale Neigung") than stated in the EPC.
Overview of the Source Book

Designing or improving compliance frameworks: find food for thought in the Source Book

The Source Book contains all elements of an effective **EPC compliance framework** in 3 parts:

- **Part 1:** Clear procedures how to determine EPC input data
- **Part 2:** Checking compliance
- **Part 3:** Compliance enforcement in practice
Structure of the Source Book

Which element of the compliance framework (topic) is presented in this chapter: Appropriate resources to implement compliance checking (example)

Why to deal with it: What is the motivation and the challenge

What to avoid: Examples of problematic situations to avoid

What to consider when making decisions on the compliance framework

How to implement: Good examples from other countries - how they deal with the challenge

The Source Book contains more than 40 topics described the way presented in this example.
Thank you for your attention!

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