Compliance and quality of the works in relation to renewables in multi-energy systems

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Multi-energy systems

- Heating, domestic hot water, cooling, ventilation
- Fossil fuels, biomass, electricity (heat pumps), solar thermal

Quality chain:
- Quality of products, quality of product information
- Quality of system design (integrated to building)
- Quality of installation and commissioning

- Checking quality
- Compliance of EPC input data

Blue: examples documented in Qualicheck
Quality of products

- Quality management systems of manufacturers (ISO 9001 certified)
- Certification of products by a third party:
  - Testing according to standards - usually EN - by an accredited laboratory (ISO 17025)
  - Audits of manufacturing plants
  - Accredited certification bodies (ISO 17065)

Examples: Eurovent certified performance, Solar Keymark

Test for the certification of a boiler in CETIAT laboratory

Quality of product information

- Manufacturers documentation
  (example: French voluntary scheme for harmonised publication of ventilation product data)
- BIM files
- Product database:
  - Those of certification bodies
  - Sometimes implemented from a will of public authorities (example: in Belgium and in the U.K.)
  - Sometimes managed by professional associations (example: French database for heating systems)

BIM files for download
Source: www.polantis.com
Quality of system design

- Training of engineers
- Qualification of persons or companies
- BIM to reduce the risk of non-quality in system design?

Quality of the works

EPBD related administrations → Cost-optimal and nZEB requirements → TRAINING: Need for more and/or improved training? → COMPETENCE: Need for checking competence of workers?

- Yes → TRAINING: New offers of training Upgrading existing training...
- No → COMPETENCE: Examinations... Certified Workers...

- Yes → BUILDINGS: Need for checking quality of the works?
- No → High probability of good workmanship

- Yes → BUILDINGS: Inspection of works... Reports for each building...
Quality of installation and commissioning

- Training of workers:
  - By product manufacturers
  - By training bodies
  - Role of public authorities
- Qualification of persons or companies:
  - Example: French scheme RGE
- Professional rules, guidelines:
  - Example: French PACTE programme
- Commissioning procedures
- Role of BIM, smartphones and tablets, internet of things?

Checking quality

- Self-control
- Check by an independent third-party
- Check by the customer (or his representative)

- When to check?
- How to check? Random checking?
- Penalties in case of non-quality?
Source book on quality of the works

Extract from contents:

3. Reasons for good/poor quality of works
4. Overall philosophy regarding improved boundary conditions for a better quality of the work
5. Best practice (Part 1) - Procedures to obtain and prove good quality of the works
6. Best practice (Part 2) - Robust legal procedures for handling non-compliance
7. Best practice (Part 3) - Operational framework for better compliance and effective penalties

EPC input data

- Operation data (e.g., occupant schedule, ...)
- Environment (e.g., climate data, orientation, ...)
- Physical characteristics (e.g., floor area) May account for quality of the works
- Systems characteristics (e.g., efficiency of heating system) May account for the quality of the works

EPC software

- EPC results
- Issuance of EPC certificate
## Compliance of EPC input data

<table>
<thead>
<tr>
<th>Source of information on product/system</th>
<th>Declaration that procedure has been followed</th>
<th>Independent third-party control</th>
<th>Proven competence of persons/companies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manufacturer documentation, BIM files</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Product database</td>
<td>X</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Recorded on site</td>
<td>X</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Measured on site</td>
<td>X</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Fixed by legislation (default values, fixed average values, pre-calculated values)</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

*If foreseen by the applicable legislation*

## Source book on the compliance of Energy Performance Certificates
Thank you for your attention