Stakeholder related fields of action for process optimization of nearly zero energy and plus energy buildings

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Introduction

Climate change and its consequences:

Building sector:

- 40% of total energy consumption and 30% of greenhouse gas emissions in Europe can be attributed to buildings

=> Solution: nZEB and PEB
Problem identification

Common problems in the implementation of nZEB and PEB:

• focus only on concrete view of stakeholders

• using the same procedures like in projects with lower requirements of energy consumption
Implementation problems

Results of the Mentimeter survey

https://www.mentimeter.com/

What are the main challenges (barriers) to realise a nearlyZEB?

- Lack of communication / documentation: Planner 4, Researcher 33, agree 33, disagree 56
- Too many regulations / lack of support from authorities: Planner 3.3, Researcher 33, agree 33, disagree 56
- Excessively high costs: Planner 3.3, Researcher 33, agree 33, disagree 56
- Lack of knowledge about technologies and costs: Planner 3.3, Researcher 33, agree 33, disagree 56

What is needed for a market uptake of nearlyZEBs?

- More technical knowhow: Planner 3.4, Researcher 3.6, agree 30, disagree 47
- Earlier collaboration of the planning team: Planner 3.8, Researcher 4.1, agree 27, disagree 50
- Strengthened legal binding building requirements: Planner 4.2, Researcher 4.4, agree 27, disagree 50
- Self-sufficient and secure energy supply / system: Planner 3.7, Researcher 3.6, agree 27, disagree 50

Own illustration based on the Mentimeter survey
Implementation problems

Results of the Mentimeter survey https://www.mentimeter.com/

What is the added value of building nearlyZEBs?

- Decentralized energy generation (vs. Centralized)
  - Planner: 5%, Researcher: 12%
  - Life-cycle / future value of the property
    - Planner: 13%, Researcher: 11%
  - Less energy dependency
    - Planner: 16%, Researcher: 18%
  - Lower operational costs
    - Planner: 17%, Researcher: 17%
  - User satisfaction and comfort
    - Planner: 17%, Researcher: 9%
  - Image / role-model
    - Planner: 8%, Researcher: 7%
  - Indoor air quality
    - Planner: 6%, Researcher: 4%
  - Resource saving / climate protection
    - Planner: 22%, Researcher: 23%

Own illustration based on the Mentimeter survey
## Methodology

- **Correlations**
  - identify correlations who is responsible

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### Methodology Diagram

- **Actions**
  - energetic and economic target definition
  - timetable and organization chart
  - energetic basic determination
  - financing plan
  - assignment of actors
  - construction mass distribution
  - construction system and design
  - spacious and energetic flexibility
  - daylight concept
  - thermal quality
  - renewable energy
  - storage devices for relieving the network load
  - economic efficiency
  - regulation concept
  - heat output / cold output
  - detail models for the implementation of nZEB and PEB
  - quality control
  - achievement of energy and economic targets
  - documentation
  - user behaviour
  - monitoring

### Correlation Matrix

- **Bilateral Correlation** (25%)
- **Partial Correlation** (25%)
- **No Correlation** (0%)

Own illustration based on PLENAR
Methodology

• Correlations
  identify correlations
  who is responsible

• Optimization methods
  to optimize the whole planning process

• Supporting processes
Optimization methods

Two basic types:
- Radical methods
- Successive methods

Three strategies:
- Process reengineering (Business Process Reengineering)
- Process optimisation (Total Quality Management, Lean Management)
- Continuous improvement process (Kaizen, Six Sigma)
Supporting processes

• Artificial intelligence

• Integral planning

• Building Information Modeling
Results

Main results:
- Interaction of all stakeholders and actions
- Temporal reorganization of actions
- Locate sources of error

Effects after optimization:
- Time efficient
- Cost reduction
Conclusion

• The new process has to be tested

• It will be a long time process to replace common methods
Renewable Heating and Cooling in Integrated Urban and Industrial Energy Systems

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