Using renovation concepts for mass housing energy renovation

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Working at Delft University of Technology since 1991. Teaching and research interests: methods and instruments for asset and property management, supply chain integration and collaborative relationships, circular public procurement strategies, service-life-thinking and business models for sustainable transformation. Focus existing housing stock and housing associations.

- Member Editorial Staff Dutch property management journal Renda
- Member Editorial Advisory Board of the International Journal of Building Pathology and Adaptation
- Member Advisory Board Platform Performance-Based Partnering Renovation and Maintenance
- Member NEN 2767 Committee Dutch Standard Condition assessment Built Environment
- Ambassador Sustainable Housing Route Netherlands
- Member Circular Built Environment Hub
- Project coordinator CHARM
Outline

- Challenges
- Knowledge gaps and expectations BTIC
- Research objectives
- Renovation concepts
- Conditions demand-side
- Conditions supply-side
- Conclusions and Discussion
- Research agenda
Challenges

Policy EU
➢ Transition to a competitive, secure and sustainable energy system by 2050 and reducing greenhouse gas emissions > 80%
➢ Transition towards a circular economy

Dutch climate agreement
➢ Phasing out natural gas 2030
➢ 2030 - 49% CO2; 2050: 0 CO2
➢ Circular Economy 2050
Challenges (2)

Housing associations NL

- Deep renovations. Most renovations are aiming energy label B
- Higher renovation rates
- Cost reduction of deep home renovation (50%?)
- New climate systems, renewables etc.

Challenges (3)

Building Industry

- Integrated Project Delivery (IPD) and New Services
- Total Cost of Ownership – Total Cost of Use
- Digitisation: Building Information Modelling (BIM), use of Big Data, IoT, Sensoring, Drones, A.I. etc.
- Circular Business Models
- Prefabrication, Robotics, 3-D Printing, …
Knowledge gaps

Dutch Building Agenda

→ Building and Technology Innovation Centre (BTIC)
  • Flywheel to achieve the Dutch policy aims for a climate neutral built environment in 2050

→ Program *Integrated energy transition existing buildings*
  • Disruptive and open innovations to make the transition feasible, scalable and affordable
    ➢ Healthy, profitable construction sector
    ➢ Affordable, quality solutions for building owners
Knowledge gaps: Expectations BTIC

Synchronizing and Upscaling Demand

Low cost housing renovation with guaranteed performance (whole-life cost)

Accelerating Innovations (standardized renovation products and renovation concepts with related processes and services)
Research objectives

- Critically reflect on the intertwined expectations and underlying assumptions
- To draft an agenda for further research

- Explorative literature review that unravels the interdependencies of demand for renovation, and innovations at the supply-side causing cost reduction
Renovation concepts

Integrated prefabricated renovation measures for dwelling types, making use of standardisation, a standard process, combining innovative products and technologies, plug-and-play components and on-site assembly

- Dutch Energiesprong programme, ‘net-zero energy retrofitting concepts’, being followed up by International research projects and experiments
- Market diffusion very low caused by high cost per renovation
- Industrial economic effect producing a large number of identical or highly similar products (off-site) unknown
Conditions demand-side

- Large series of relatively homogeneous properties
- Professional organisations, long-term perspective, repeat clients of (deep) renovation

- Project-focus
- Lack of a strategic partnering approach in renovation
- Inequalities in strategic policies and financial resources
Barriers innovations supply-side

- Fragmented market of SME’s
- Lack of inter-organisational cooperation
- Lack of investments in R&D caused by finance difficulties caused by risks
Conclusion and Discussion

From a unique project approach to an industrial product-centred approach necessitates:

• univocal functional product specifications
• securing production flows
• strategic partnering and cooperative tendering by housing associations
• smart coalitions and risk-sharing supply-chain networks

❖ integrated project delivery models?
❖ innovation contests?
Research agenda

Research questions:

• *What is the critical mass for the business case of a renovation concept?*

• *What economies of scale and cost reduction can be expected by synchronising and upscaling demand?*

• *What conditions enable and encourage housing associations for (inter)organisational synchronising and upscaling demand for deep renovation*

• *What tendering methods and market conditions encourage successful innovative supply-side networks?*
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Thank you for your attention!