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Development and advanced prefabrication of innovative, multifunctional building envelope elements for MOdular REtrofitting and smart CONNECTions

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MORE-CONNECT:

solving barriers to come to deep (NZEB) retrofitting

- European building sector is fragmented and not able to offer holistic, integral solutions for nZEB deep renovation toward nearly Zero Energy Building (nZEB) for reasonable costs and good quality
- European building process is based on a 'layered' structure:
  - many labour actions on the buildings site
  - many sub disciplines involved
  - leading to extra costs and failure risks
- European building market is top down and supply driven: mismatch between the offered products and the end-user's needs and the affordability
- Due to long-lasting renovation process and failures risks customers hesitate to renovate their property
- High operating costs are still more acceptable for owners-residences than deep renovation with low exploitation/ energy costs
- Faster and quality guaranteed renovation solutions needed.

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MORE-CONNECT: challenge and solution

- Deep retrofitting by using *prefabricated multifunctional* renovation elements which have the potential to:
  - reduce costs
  - reduce the renovation time and disturbance for occupants
  - enhance *quality and performances*
    - energy efficiency
    - indoor climate
- The *challenge* of MORE-CONNECT is to make a major step forwards by a combination of:
  - product innovation,
  - process innovation
  - innovative market approach
  - in a process of cost and quality optimization
  - driven by motivated and innovation-driven *SME's*.
- Why SME's?
  - Large building companies are very traditional and have no specific economic interest in this transition
  - Transformation in building practice will be initiated by motivated innovative SME's, combined with production-line-design specific experience

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The four qualitative MORE-CONNECT objectives

1. *The development of cost optimal deep renovation solutions towards nZEB concepts with the possibility of extra customize (cost-effective) features*
   - Development of optimal configurations of energy efficiency and renewable energy systems, as one of the quantitative objectives is the offering of nZEB renovation concepts.
   - Concepts will be preselected in balance between demand reduction and renewable production,
   - Most optimal mix within the range of term 'nearly' in Nearly Zero Energy.

2. *The development and demonstration of prefabricated multifunctional modular renovation elements in series of 1 concepts, in a mass production process*
   - Development and demonstration of a platform for prefabricated, multifunctional renovation elements for the total building envelope (facade and roof) and installation/building services.
   - These elements can be combined, selected and configured by the end-user, based on his specific needs.
   - The configuration can be made on the basis of a pre-selection of elements, based on the specific properties and measures of his home inventoried by advanced geomatics with various aesthetic and architectonic appearances.
   - As input into advanced Building Information Modelling systems it can control and steer the further production process of these elements.

3. *The development and demonstration of new fully automated production lines for multifunctional modular renovation elements*
   - Development of new designed automated production lines supporting a line production that is effective on series-1 as well as large series
   - Demonstrated that a model for one common platform for a fully automated production line can be used in different geo-clusters

4. *The offering of a one-stop-shop to the end-user to renovate their homes*
   - End-user will deal with only one party, responsible for the total renovation, starting from an inventory of the existing situation, inventory of specific end-user demands, translation into modular renovation kits, mounting and installing, financing and aftercare
   - Limiting the actual renovation time on site to a maximum of 5 days with a goal for an average of two days, including the complete or partial removal of the existing facades and roofs or other elements

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The six quantitative MORE-CONNECT objectives

1. Deep renovation toward NZEB, with a basic reduction of the primary energy consumption by at least 80 % compared to the original consumption.

2. New fully automated production lines with a cost/output optimization leading to >35% improvement compared to the traditional construction realization process.

3. Construction site workload reduced to less than 10% of the total workload of a retrofit compared to traditionally more than 50%.

4. Total installing time on site of with a maximum of 5 days with a final goal of 2 days.

5. Return of investment of less than 8 years for the end-user.

6. Construction failure costs reduced to less than 5% compared to the traditional 15 to 20%.

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The MORE-CONNECT pillars

- **Product innovation**
  - Modular façade elements
  - Modular roof elements
  - Modular ‘engines’
- **Process innovation**
  - Advanced geomatics to make inventories and gauging of buildings and buildings stock.
  - Web-based and/or digital decision tools will link building characteristics, building (energy) potentials, end-users demands to program requirements, technical solutions, component combinations in concepts, production automation.
  - This will be processed in BIM systems for the steering of industrial processes and for enhanced quality assurance.

- **Optimization** between costs, environmental aspects and quality
  - Integration of components and systems
  - Re-design
  - Smart connectors

- Based on NZE concepts <> perception of end-user

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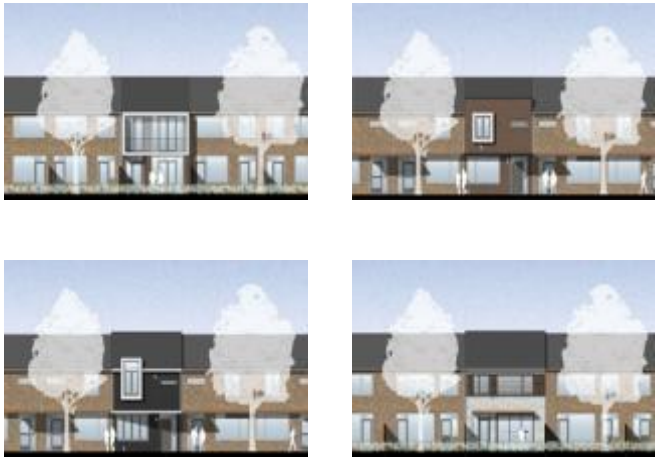
Perception of end-user

- End user has three basic questions:
  - *What do I get?*
  - *What does it cost?*
  - *And what does it gain to me?*
- How does MORE-CONNECT respond to this?
  - Development of a **one stop shop concept**
    - Offered as an 'advanced energy service'
    - User can make his own renovation configuration
    - User can add extra qualities / options
    - End-user deals with only one party, responsible for total renovation, inventory, mounting, installing, financing, after care and performance guarantee



  - Development of a system of performance guarantee
    - In production process
    - In practice ('remote diagnostics')
  - Development of energy cost guarantee proposition to end-users

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Customers are able to make their own choises and configurations!


Achterzijde
Delen op Facebook
Vorige
Volgende

MORE-CONNECT technical developments

- Modular façade elements

- Modular roof elements
- Modular ‘engines’

….which one is more expensive?

~ € 900

~ € 25.000

MORE-CONNECT solution: prefab modular 'engine' for retrofitting

- Combining heating, ventilation, DHW, storage, PV inverters etc. in one compact platform
- Version 1.0: combination of existing components
- Version 2.0: redesigned components, 35% more compact and lighter

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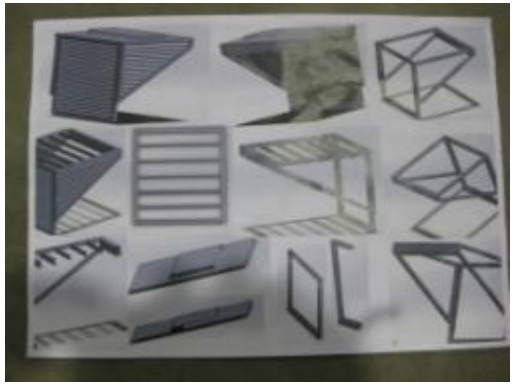
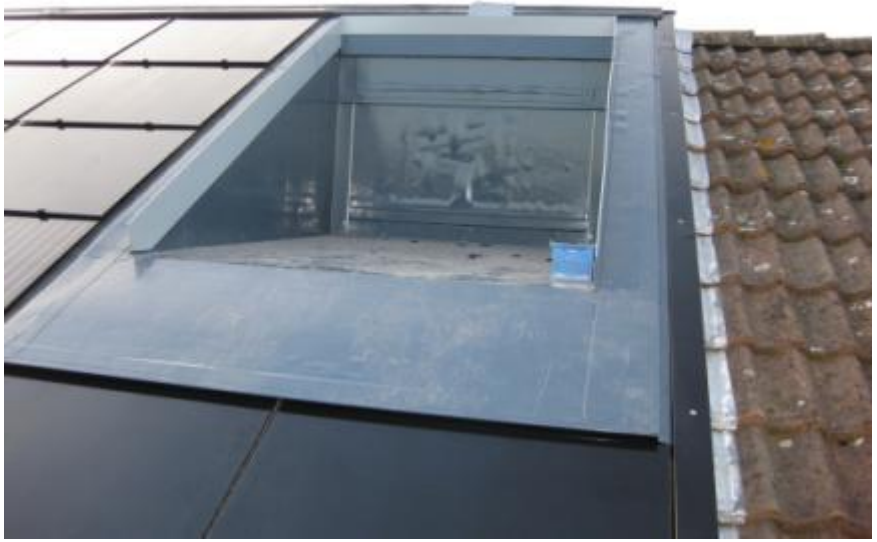
….making the engine 1.0 (still ‘hand-made’)



…placing the engine on/in the (integrated PV) roof



New development and redesign engine(2.0)

CO2 controlled MVHR
Storage
Heat pump
PV

Optional:
Solar thermal
PCM storage
E-storage
(DC?)

Plug & Play
Maintenance and repair off site
Scalable up/down

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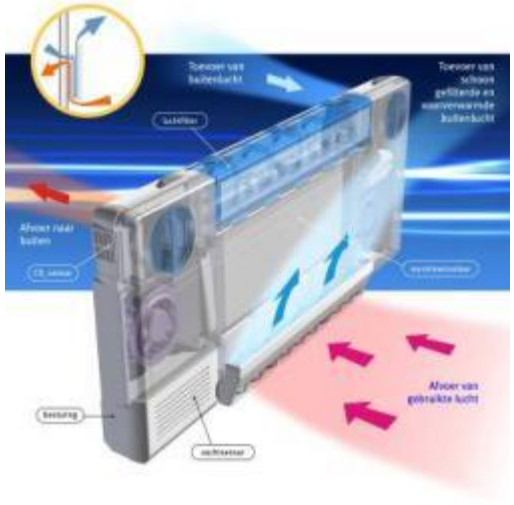
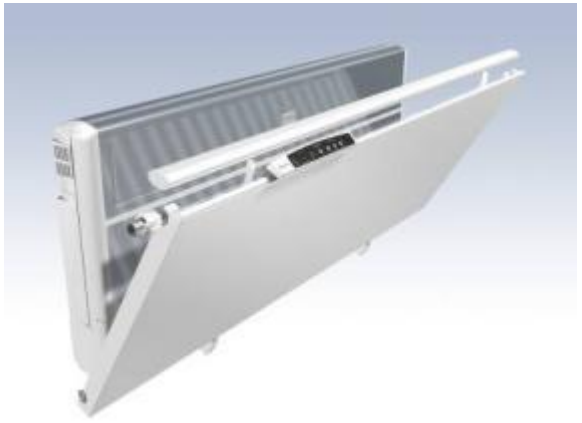
Ventilation: two options for prefab retrofitting

- In the engine: Central MVHR, CO2 controlled

- In the façade elements :Decentral combined with radiator or convector
  - MVHR, CO2 controlled (standard in living room)





or

  - Mechanical supply (optional for bed rooms)

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MORE-CONNECT approach:

one philosophy – different solutions for several geoclusters

- Geo-cluster 1: Northern.
  - NZE renovation concepts for post-war multifamily dwellings in Denmark.
- Geo-cluster 2: Continental Northern East.
  - focusing on a collaboration between Estonia and Latvia. Focus on application of prefabricated products for typical post-war Soviet multifamily buildings
- Geo-cluster 3: Continental Centre.
  - focusing on Czech Republic on solutions for continental climates.
- Geo-cluster 5: Mediterranian.
  - focusing on solutions for mild and warmer climates, with a pilot for the Portuguese market.
- Geo-cluster 6: Western Central.
  - focuses on modular prefab concepts for mass built single houses (50's – 7-'s) for the Dutch/Belgium markets

- Reflected in the consortium: one 'research partner' (university or SME with research capacities) with one or two (SME) industrial partners.

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MORE-CONNECT pilots

< Denmark

Estonia >

Latvia >

< The Netherlands

Czech Republic>

< Portugal

The MORE-CONNECT consortium

Participant No	Participant organisation name	Short name	Country	Type
1	Huygen Installatie Adviseurs	HIA	NL	SMEres
2	Zuyd University	ZUYD	NL	RES
3	BJW	BJW	NL	SME
4	WEBO	WEBO	NL	SME
5	Riga Technical University	RTU	LV	RES
6	Latvia Wood Construction Cluster	LWCC	LV	SME
7	Technological Centre of Zemgale	ZTC	LV	SME
8	Tallinn University of Technology	TUT	EE	RES
9	AS Matek	Matek	EE	SME
10	REF Ehitustööd	REF	EE	SME
11	University of Minho	UMinho	PT	RES
12	Darkglobe	DGlobe	PT	SME
13	Cenergia	Cenergia	DK	SMEres
14	Innogie ApS	Innogie	DK	SME
15	Invela ApS	Invela	DK	SME
16	Czech Technical University in Prague	CVUT	CZ	RES
17	RD Rýmařov	RDR	CZ	IND
18	Econcept	Econcept	CH	SMEres

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