

# Call: H2020-EE-2014-1-PPP

## Innovation actions

Topic: EE-01-2014

Type of action: IA

**Project acronym: MORE-CONNECT** - Development and advanced prefabrication of innovative, multifunctional building envelope elements for MODular RETrofitting and smart CONNECTions

**Grant Agreement number:** 633477 — MORE-CONNECT — H2020-EE-2014-2015/H2020-EE-2014-1-PPP

**Official website** - <http://www.more-connect.eu/>

**Coordinator:** Huygen Installatie Adviseurs, The Netherlands

### **Budget**

Total Budget: 5 557 263 €

UMinho Budget: 311 485 €

**Duration of the project:** 01.12.2014 - 30.11.2018. (48 months)

### **1. Abstract**

#### **Excellence and Objectives**

The social and environmental urgency of large-scale integrated retrofitting of the European building stock is widely acknowledged and supported by Member States. However, the European building sector has not been able yet to devise a structural, large-scale retrofitting process and systematic approach.

The main reasons for this deadlock are:

- the 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;
- the European building process is typically based on a 'layered' structure, with many labour actions on the buildings site, with many sub disciplines involved, leading to extra costs and failure risks;
- the European building market is typically top down and supply driven, with a mismatch between the offered products and the end-users needs and the end-user's affordability;

- due to long-lasting renovation process and failures in it, customers hesitate to renovate their property; sometimes larger running cost are more acceptable owners-residences than deep renovation with small running costs; a faster and high quality renovation solution is needed.

Yet there is a challenge to overcome these barriers by applying prefabricated multifunctional renovation elements which have the potential to reduce costs, reduce the renovation time and disturbance for occupants and, at the same time, enhance quality and performances (both in terms of energy efficiency as indoor climate). As the larger building companies are usually very traditional and have no specific economic interest in this transition, it is most likely that this transformation in building practice will be initiated by motivated innovative SME's, combined with production-line-design specific experience.

The challenge of the MORE-CONNECT project to make this major step forwards by a combination of product innovation, process innovation and innovative market approach, in a process of cost and quality optimization, driven by motivated and innovation-driven SME's.

This leads to the following four main qualitative objectives for MORE-CONNECT:

1. *The development of cost optimal deep renovation solutions towards nZEB concepts with the possibility of extra (cost-effective) features*

The first objective is the development of optimal configurations of energy efficiency and renewable energy systems, as one of the quantitative objectives is the offering of nZEB renovation concepts. These concepts will be preselected, i.e. in balance between demand reduction and renewable production, looking for the most optimal mix within the range of term 'nearly' in Nearly Zero Energy. Next to it, a life cycle approach will be used to assess the modular renovation solutions.

2. *The development and demonstration of prefabricated multifunctional modular renovation elements in series of 1 concepts, in a mass production process and in minimal series of 1 concepts*

The second objective is to develop and to demonstrate 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. In this way unique series of one can be made in a mass production process for the same reduced price of mass production.

3. *The development and demonstration of new fully automated production lines for multifunctional modular renovation elements*

The third objective is the development of new designed automated production lines that effortlessly support line production that is effective on series-1 as well as large series and seamlessly combine into mass customization principles; aimed at supporting prefabrication for extreme retrofitting of homes.

Extreme automation makes it possible to produce end-user-defined (by choice) integral products efficient in small (1) as well as large series. Machine instructions then need to come from automated computerized numeric control instruction generation based on Building Information Modelling BIM and in-situ measurements. Plant management is organized in software solutions that support line-balancing as well as JIT (just in time) and flow. Line design needs to support scalability in product complexity, support of more than

one product-market combination and output. This will lead to a blueprint for the design and structure of a platform for a fully automated production line, as a further basis for product-market-combinations in several countries.

4. *The offering of a one-stop-shop to the end-user to renovate their homes*

The fourth objective is the development of a one-stop-shop concept for the end-user, but also for the production. In this 'one-stop-shop' proposition the 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. The high level of prefabrication and the use of smart connectors (mechanical, hydraulic, air, thermal, electrical, ICT) will limit 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. During the renovation the occupants can stay in their homes and have a minimum disturbance. The end-users will get a guaranteed energy cost proposition for their renovated homes, based on their individual household profiles. An energy cost and performance guarantee is possible by the high level of quality control during the production process and the monitoring of performances of the most essential parameters related to energy use (ventilation, heating, indoor air temperature, micro climate conditions, electric appliances etc.) and remote diagnostics of the most important installations and building services.

The related quantitative objectives of MORE-CONNECT are:

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 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 2 days (or less), with a maximum of 5 days in extreme difficult situations.
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%.

The specific scope of MORE-CONNECT is residential buildings.

MORE-Connect will focus on mass production with a minimum series of one to allow the development of specific solutions, honouring individual customer requirements in different geo-clusters with distinctive climate zones and building traditions across Europe.

## List of Participants

Participant	Participant organisation name	Short name	Country
1 (Coordinator)	Huygen Installatie Adviseurs	HIA	NL
2	Zuyd University	ZUYD	NL
3	BJW	BJW	NL
4	WEBO	WEBO	NL
5	Riga Technical University	RTU	LV
6	Latvia Wood Construction Cluster	LWCC	LV
7	Technological Centre of Zemgale	ZTC	LV
8	Tallinn University of Technology	TUT	EE
9	AS Matek	Matek	EE
10	REF Ehitustööd	REF	EE
11	University of Minho	UMINHO	PT
12	Darkglobe	DGlobe	PT
13	Cenergia	Cenergia	DK
14	Innogie ApS	Innogie	DK
15	Invela ApS	Invela	DK
16	Czech Technical University in Prague	CVUT	CZ
17	RD Rýmařov	RDR	CZ
18	Econcept	Econcept	CH

Huygen Installatie Adviseurs, Zuyd University, Riga Technical University, University of Minho, Czech Technical University in Prague, Tallinn University of Technology, Latvia Wood Construction Cluster, Technological Centre of Zemgale, AS Matek, REF Ehitustööd, Darkglobe, Cenergia, Innogie ApS, Invela ApS, RD Rýmařov, Econcept, BJW, WEBO