Housing 4.0 Energy Newsletter 3

ISSUES ADDRESSED

The EU 2050 Framework for climate and energy sets targets for a carbon neutral economy, which can be reached by increasing the share of renewable energy to greater than 27% and providing at least 27% energy savings across Europe by 2030. The North-West Europe (NWE) region is the most industrialised region—as well as the most prolific CO_2-emitting region—in Europe. Within this region, the private housing sector alone accounts for nearly one-third of all CO_2 emissions, as there is currently no great push within this industry to achieve EU targets. Meanwhile, decreasing household size, changing patterns of regional population density and other social factors have led to a significant decline in demand for large, expensive and energy-inefficient homes; and in turn, this has led to the increased desire for smaller, more affordable energy-efficient high quality living spaces.

AFFORDABLE & SUSTAINABLE HOUSING THROUGH DIGITISATION
HOUSING 4.0 ENERGY

PROJECT GOALS

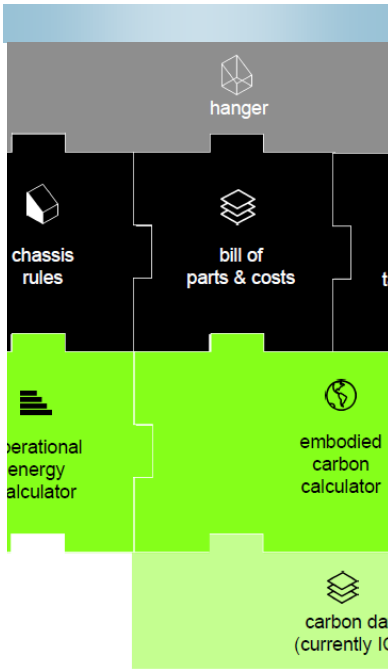
The main goal of Interreg North-West Europe (NWE) **Housing 4.0 Energy** is to offer small (1-2 person) households in North-West Europe access to new affordable near-zero energy/low carbon homes (NZEHs) and zero energy/low carbon homes (ZEHs), ultimately **reducing home building costs by 25% and carbon emissions by 60%**. Housing 4.0 Energy (H4.0E) will develop an affordable ZEH market by adapting and applying new technologies, thus creating both consumer and supplier interest. Digitisation (4.0) techniques and the development of a H4.0E digital platform ignite fundamental changes in design, manufacturing and construction within the housing industry to meet both EU climate targets and the needs of residents in North-West Europe.

WHAT'S INSIDE?

PROJECT DETAILS

Total Budget: **€4.23 Million**
ERDF Funding: **€ 2.54 Million**

@Housing4.0Energy
@H4E_NWE
www.nweurope.eu/h40e



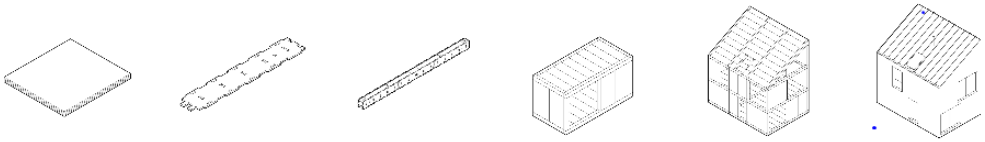
The H4.0E Digital Platform

The Open Systems Lab team have been developing the digital platform, aiming to make it easier to adapt and replicate low-energy, low-carbon housing based on H4.0E pilot models. The team has been focusing on the back-end of the platform, which can accommodate a range of manufactured building systems and design parameters. Some recent updates include

Simplified dashboard – A basic table to make it easier for partners to input key data about their house types so the engine can run calculations and generate a 3D model 'hanger' for each house type.

Structural schema – Initially assisting the Almere team with formatting data on their WikiHouse chassis modules into the platform to enable users to customise designs while accounting for materials, labour and embodied carbon.

Integrated energy calculator – Working with South West College to integrate their own Nearly Zero Energy building (NZEB) calculation tool with the platform datasets.



THE H4.0E PLATFORM'S ENERGY CALCULATOR

The H4.0E Digital Platform will integrate with an operational and embodied energy/ CO_2 calculation tool to help users to optimise their modular home designs.

The energy tool will enable users to select from several heating options (for example, heat pumps), while the calculator works out expected running costs and operational and embodied energy demand specific to their house design.

WikiHouse designs approved in Almere pilot

The H4.0E pilot in Almere has taken great strides since the first design session on September 4th, during which the future residents ''built'' their homes with WikiHouse building elements. During the past six months, the party that realises the pilot site has been contracted and the construction team is completed with a constructor and contractor for foundations. Furthermore, the participants of the H4.0E WikiHouse pilot have completed the designs of their homes with help of a local architect.

The building permit in Almere was granted on the 2nd of June 2020. Participants are expected to start building their homes between the months of July and October this year.

Future WikiHouse residents design their new low carbon homes with the help of a local architect in September 2019. These designs have since been approved.

Updates from the Belgian housing pilot

On December 4th, the housing team of the Province of Flemish Brabant (PFB) participated in an info market organised by the urban planning department of the PFB aimed at informing both stakeholders, local governments and citizens about the draft of the spatial policy plan of the province.

At the housing info stand, the H4.0E partners also presented the H4.0E brochure to inform the audience on the project and its goals. Flanders, and more specifically the province of Flemish Brabant, is facing a demographic change that has brought about some problems: the total population is growing, and at the same time, families are getting smaller with a lot of single person families. Flanders has a historically grown scattered spatial planning, because of this building plots have become scares. The policy is now to reinforce the city and villages centres and accessible locations like neighbourhoods of train stations. At the same time, the demand for small-scale houses is growing. Many elderly people are still living in their now too large family houses. Also, at the social housing market, there is a lack of sufficient housing stock, with long waiting lists as a result.

All of these challenges require innovative solutions. For the PFB housing department, small-scale houses is one of these solutions — it has been an important policy instrument for a few years now — with the goal to stimulate small-scale housing among the population and local authorities. For this, PFB supports the development of various small-scale housing types and its application in different contexts. The PFB does this by allocating subsidies for pilot projects in collaboration with social housing companies, private investors and social rental offices to demonstrate new applications. H4.0E is a welcome opportunity to elevate the level of small-scale houses, lift up their climate neutrality and expand the awareness of small-scale houses.

Exposure for H4.0E in Belgium

In Flanders, H4.0E partners Kamp C and Province of Flemish Brabant (PFB) have been making strides in the promotion of Housing 4.0 Energy. On the 5th of December, H4.0E was represented at the Green Deal Circular Building Event, an inspiration day for the green deal for circular building. Financing, procurement and business models were covered via a plenary session and workshops.

Green Deal Circular Building Event

NZEB TRAINING COURSE

This February, Ralf Kampe and Shane Faulkner of Irish partner, 3CEA, attended a one-day Nearly Zero Energy Building (NZEB) Fundamental Awareness course in Enniscorthy. At the WWETB's Waterford and Wexford Education Training Centre, the partners received a comprehensive overview of the new NZEB legal standards and regulations. Also, the training gave an overview of the general principles and practices of NZEBs.

Key topics included building physics and fabric, continuous insulation, thermal bridging, air permeability and window and door techniques and installation. The course also covered a basic understanding of building services such as: space heating and domestic hot water, controlled ventilation, lighting, ICT and smart technology, as well as renewable energies, photovoltaics, Smart Metering and electric vehicles.

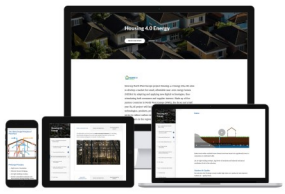
(Continued on p. 4)

(Continued from p. 3)

THE H4.0E ONLINE COURSE FOR FUTURE BUILDERS

The development of the H4.0E Online Course, overseen by South West College (UK), covers both the Construction Industry and the Occupants guide to Near-Zero Energy Homes (NZEH). The course includes:

- Unit 1: Construction Industry Guide to NZEH
- Unit 2: Occupants Guide to NZEH
- Unit 3: User Guide to Housing 4.0 Energy User Platform



Each section within the course looks at different ways of making the content more visually appealing and interactive for the user. Animated videos have been designed to complement the content, which too will be available in various languages. Short quizzes are also to be added after each section, so that users can do a quick recap on what they've just learnt. The course is designed to be used on PC, Tablet or Smartphone, ensuring it is user friendly on all systems.

In December 2019, H4.0E attended a symposium on the role of digitalisation in a circular building economy in the Netherlands. Keynotes and workshops addressed the importance of reversible building, circular building models and the residual value of building materials.

On the 31st of January, the Kamp C team visited the circular/innovative buildings of Zutphen (Kaumera factory from Waterschap Rijn en IJssel), and the 3D printed building in Teuge (concrete with lime hemp isolation, bio composites etc.), in the Netherlands. Two weeks later, Kamp C held the CHARM inspiration day. Here presentations and discussions were held on digitalisation for circularity, alongside a workshop on tendering for circular buildings.

Pivoting as a result of the COVID-19 pandemic, the partnership has not been able to communicate H4.0E at national/international level events — in person. On the 27th of April, the Belgian partners attended a webinar by C-Bouwers on ''Principles of Circular building (VIBE)'' and ''Biological cycle (BAS Bouwen)''.

Pilot site progress

The location for the Flemish pilot houses is a former private camping site in the rural municipality of Huldenberg, Flemish Brabant, with a large percentage of the inhabitants staying permanently in their chalet or caravan. As a part of this project, six affordable small-scale houses with a low CO_2 footprint will be built. They will be semi-detached and terraced. End users for the six pilot homes in Huldenberg are the small households on the waiting list of the social letting agency 'Spit', to which

Modular homes at the Rustenberg pilot

priority for the allocation of the homes is given. The design plans for the four smallest houses (approx. 47 m²) are final, the building permit was submitted in March. The quotation request for the realisation of the modules sent to contractors in April, and the building permit for the other two small-scale houses with two bedrooms (approx. 65m²) was submitted in May. Following this, the Belgian pilot partners looked into which building system is most suitable for the demo houses in view of affordability and sustainability. This summer, the Flemish team together with the landowner will meet to decide which contractor can realise the pilots.

In the preparation phase of the final plans, the Flemish H4.0E team spoke with the residents of the site to collect their needs and concerns. They have been able to give feedback on the preliminary design of the small-scale houses. The social housing companies have also been consulted and their recommendations and concerns are taken into account.

The Rustenberg pilot site in PFB

Updates from Ireland

3CEA Energy Transition Strategy to 2030 Launch

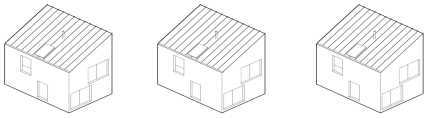
In recent news, the 3 Counties Energy Agency (3CEA) has attended some interesting events on behalf of Housing 4.0 Energy, including 3CEA's Energy Transition Strategy to 2030 Launch, a networking and lobbying event that took place earlier this year. On January 31st in Castlecomer, Kilkenny, 3CEA launched its Energy Transition Strategy to 2030, which includes large scale energy efficiency measures across the housing sector. The launch event brought together nearly 80 attendees and key players in the energy and housing sectors, as well as Oireachtas Members, local authorities, government departments, CEOs, wider community and other important decision makers. Attendees from all three H4.0E Irish pilot partners were in attendance on the day, which offered the opportunity to promote the H4.0E project within the pilot county of Kilkenny.

The event offered a unique opportunity to engage with the three Chief Executives from all three pilot partners and to promote the H4.0E project. All three pilot partners are highly engaged with current housing and environmental issues and work hard to promote sustainability within the housing industry and to meet both EU and national carbon targets in the region. Speaking as a keynote speaker at the launch event, climate expert and Climate Council Advisory Council Chairman, John FitzGerald, said that transforming Irish society to become carbon neutral will be a massive challenge. While it is the right thing to do, it must be profitable for households to invest in change —and the households also need help, advice and encouragement. He added that without this assistance, change will happen very slowly. The role of local actors like 3CEA and projects such as H4.0E is to provide expert technical advice and encouragement to homeowners and the social housing sector who do not have the expertise to know what the right answer is.

Mr. Chris Chapman of Change Exploratory moderating the 3CEA launch event

3CEA's new energy transition strategy will underpin the capacity to deliver Ireland's Climate Action Plan at the regional level, through public and private actors supported by the 3CEA as the Trusted Intermediary. It was underpinned by the message that everyone has a key role to play in the Energy Transition and success in reaching 2030 targets will depend on how we all work together to deliver energy efficiency, clean energy, behaviour change and ultimately greater sustainability.

News from the three Irish pilots



The Ireland pilot of H4.0E will be located in South East of Ireland (Carlow, Kilkenny and Wexford), with each region committing to the delivery of four zero energy homes (ZEHs) each — twelve in total. This pilot will develop and utilise digitisation, 4.0 technology and integrate renewable energies.

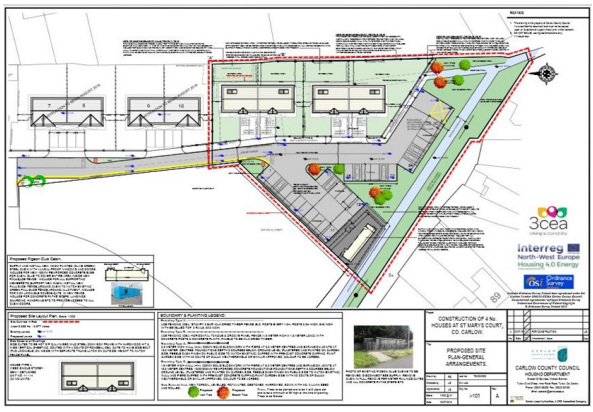
(Continued on p. 6)

(3CEA continued…)

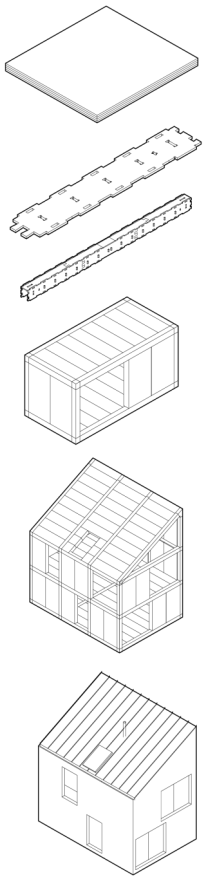
The main construction principles will be prefabricated Timber Frame and Insulating Concrete Formwork (ICF) with the aim to use renewable building materials. Innovative technologies for sourcing renewable energy will be Air to Water Heat Pumps, Mechanical Ventilation with Heat Recovery (MVHR), PV and Thermal Solar Panels. Local Authority Social Housing tenants are the intended end users, with the aim of addressing fuel poverty.

All pilots have granted planning permission and are currently in procurement for final design. This process has taken longer than normal due to the additional targets and standards being addressed in the H4.0E project, which is over and above the standard requirements of the Local Authorities.

Because of the COVID-19 crisis there will be delays in completion. The current timeline for Substantial Completion is May 2022 for Wexford, the first quarter of 2021 for Carlow and the first quarter of 2022 for Kilkenny. All pilots will be monitored for the uptake of low carbon and digital techniques, products, processes and services and the resulting reduction in embodied and operational energy.



Proposed site plan, Carlow Town, Carlow (Ireland)



Report on barriers and drivers to the implementation and uptake of H4.0E dwellings

Despite efforts to promote and accelerate the adoption of innovative, affordable, and zero-energy dwelling solutions, the number of dwellings complying with standards such as the EPBD remains relatively low as we reach year 2020. Studies have already explored potential challenges and opportunities to the uptake of such designs. However, despite previous findings and recommendations, the market's response remains slow. Building on existing knowledge, the Housing 4.0 Energy project investigates current financial, cultural, legislative and technical barriers and drivers to the implementation and uptake of small, innovative, affordable, zero-energy dwellings in small towns in Almere in the Netherlands, in Huldenberg in Belgium and in Wexford, Carlow and Kilkenny in Ireland. Focus groups gathering housing providers, decision makers, stakeholders, and contractors were conducted in Almere, Leuven and Kilkenny. Outcomes revealed that participants' general perceptions around barriers and drivers are similar between the three pilots and are validated by previous research findings. However, a closer look at context specific barriers reveals considerable differences. The identification of these contextual differences enabled a better apprehension of the current situation in every location leading to the formulation of context specific recommendations and a better allocation of precedence. Thus, this demonstrates the importance of context specific investigations not only in the identification of challenges to energy efficiency innovations but also in establishing more effective implementations. **Visit our website for the full report on *Institutional, financial, and technical barriers and drivers to the implementation and uptake of H4.0E dwellings*.**

ONLINE H4.0E PARTNER STEERING COMMITTEE MEETING

Due to COVID-19, the H4.0E consortium has convened online for their 5th international Steering Committee Meeting and exchange event in May 2020. The partners discussed pilot updates, financial management, project communication and more.

Housing 4.0 Energy Animation

The Housing 4.0 Energy partnership has finalised the project-wide animation, which visually demonstrates the short-term and long-term objectives and goals of the project. A task overseen by EIfI-Tech, the animation video is now available in three languages: English, German and Dutch.

Project Partners

The Housing 4.0 Energy partnership includes eight organisations from five different countries in North-West Europe. The H4.0E partners are:

- **Province of Flemish Brabant (Belgium)**
- **European Institute for Innovation-Technology (Germany)**
- **Gemeente Almere (Netherlands)**
- **TU Delft (Netherlands)**
- **3 Counties Energy Agency (Ireland)**
- **South West College (United Kingdom)**
- **Open Systems Lab (United Kingdom)**
- **Kamp C (Belgium)**

Contact Information

Provincie Vlaams-Brabrant
Lead Partner
H40E@vlaamsbrabant.be

@Housing4.0Energy

@H4E_NWE

www.nweurope.eu/h40e

Interreg North-West Europe Housing 4.0 Energy
European Regional Development Fund