

Housing 4.0 Energy Newsletter 2

ISSUES ADDRESSED

The EU 2030 Framework for climate and energy sets targets for cutting 40% of CO₂ emissions, increasing the share of renewable energy to greater than 27% and providing at least 27% energy savings across Europe. The North-West Europe (NWE) region is the most industrialised region—as well as the most prolific CO₂-emitting region—in Europe. Within this region, the private housing sector alone accounts for nearly one-third of all CO₂ 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.



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.OE) 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.OE 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.



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PROJECT DETAILS

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



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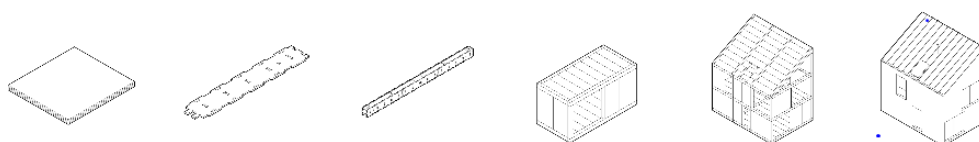
Kamp C launches their modular WikiHouse scale model in Flanders

This October, H4.0E partner **Kamp C** organised an open house in Flanders. Approximately 2,000 visitors came to Kamp C to take a look at the different innovative and sustainable projects – including Housing 4.0 Energy. Outside of the project demonstrations, Kamp C also offered building advice and gave presentations of circular economy buildings.

Housing 4.0 Energy was demonstrated to the public by means of a presentation on the project, as well as a **scale model** of WikiHouse. The



Wikihouse demo set shows one of the possible technologies for small, low energy and modular homes. Kamp C is supporting with the roll-out of the Flemish H4.0E pilot.



TRANSNATIONAL DIGITAL PLATFORM WORKSHOP

On the 28th-29th of November, a transnational workshop regarding “Work Package 5 - Develop, use and improve the digital H4.0E platform” was held in Almere, Netherlands. Pilot partners were invited to brainstorm together on topics such as design, backend features and upcoming challenges. The workshop also allowed partners a peek into virtual reality designing. Next steps were established to ensure H4.0E digital platform development is on track.

First WikiHouse design session of the Almere pilot

The future residents of WikiHouse **De Stripmaker** in Almere have made a great start to their pilot! During their first design session, the residents “built” their homes with WikiHouse building elements.

In the next months, the residents will work on their designs with help of an architect. This first general meeting of the housing pilot members marks the first of a series of monthly meetings. At this general meeting, architects explained how the toolbox works in an initial design exercise: building first ideas with WikiHouse elements on a plot map.

After their plot map exercise, residents made appointments for individual design sessions with the architects, during which they will work together to determine the dimensions of the houses. From October onwards, the members will continue with their design of the WikiHouse floor plan and layout.



Future WikiHouse residents design their new low carbon homes with the help of a local architect in September



Obstacles and Bottlenecks in Belgium

The regional stakeholder group (RSG) meeting of the Flemish H4.0E pilot gathered to discuss the regional institutional barriers on the path to develop small affordable near-zero energy/low carbon homes (NZEHS) and zero energy/low carbon homes (ZEHS). This article explores the results, as reported by Lead Partner, the Province of Flemish Brabant.

Building permits for small-scale housing

The obstacles can be found in the current quite difficult to get a building permit for independent, small residential buildings. There are various reports available in which concepts for small-scale living are developed, but in practice little is being achieved. The question is not how to build a single small-scale residential unit on a building plot, but rather how to build a number of units on a plot. This can also be a better solution for many elderly people who now live in large, detached and poorly insulated houses in the countryside. They would be better off in much smaller energy-efficient homes, closer to facilities. In terms of typology, such houses will often deviate from the traditional detached house and be realised as stacked or linked.

Affordability

The realisation of affordable housing clashes with current economic models of municipalities, which focus on profit maximisation. The realisation of affordable housing for certain target groups could, and should, be a reason for municipalities to make semi-public and public land available in the form of long-term lease instead of selling the land to project developers. Flemish housing policy tries to facilitate such developments—for example, by supporting experiments—but the most important local bottlenecks lie in the field of spatial planning and the granting of permits. A framework and a vision are provided from the housing policy, but it is very important that this is managed at the local level.



The Rustenberg pilot site in PFB

At the local level, the image of small-scale housing is also important. The majority of households already consists of one or two people, so it is important that the small houses are affordable. There are various ways to break through this image and, moreover, to increase economic feasibility. For example, old existing larger buildings such as schools do not have to be demolished, but can be converted into small residential units, whereby the energy quality can also be improved. The realisation of a mix of small and larger homes in rent and sale can also contribute to the acceptance and the economic feasibility of small-scale living. Compact and clustered construction also makes it easier to realise affordable and energy-efficient homes.

Energy performance

The H4.0E Huldenberg pilot involves a limited number of homes, so the outcome of the monitoring cannot be translated directly into policy recommendations.

VOLTA'S ENERGY STUDY

Volta, H4.0E sub-partner, recently published a study on heating, cooling, domestic hot water and ventilation for small-scale houses. An important component of achieving overall CO₂ reduction in buildings by 60% is the technology which is used for **heating, cooling, domestic hot water (DHW) and ventilation**.

Various technologies have different impacts on a building's CO₂ footprint, but this selection also has an impact on the installation of the heat distribution system, and the way inhabitants should use the system with energy usage should be considered.

Therefore, H4.0E partners asked energy specialists to perform a study to determine the impact of multiple combinations of systems, so each partner in the project can make a well-informed decision when selecting the technologies they will apply in the small scale houses.

Visit the H4.0E website to check out the [study results](#) in relation to:

1. Heat loss
2. Radiators
3. Floor heating
4. Heating/cooling profile
5. Systems analysis

THE H4.0E DIGITAL PLATFORM

A main outcome of the project is a **digital platform** that will help future builders to optimise the house designs used in the pilots. The platform will allow parametric models of the pilot technologies to be created, so that the cost of subsequently replicating each design (with variations) can be radically reduced. This platform will also be able to take datasets provided by the partners—such as cost of building materials and labour, measures of operational energy and embodied carbon, projected energy usage in a home—and link these to the parametric models to support future optimisation and ultimately **reduce building costs by 25% and CO₂ emissions by 60%**. Additionally, an operational and embodied energy/CO₂ calculation tool will be integrated into the digital platform to help builders identify how much energy is used by a given design tested within the Housing 4.0 Energy project.

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Specific to small homes is that there is a very limited need for thermal energy, or heating. Electric heating is then strongly preferred over gas condensation, while the costs for the transition to renewable energy are paid via the electricity bill. More effective would be a shift from charges for electricity to charges for combustion, or gas and fuel oil.



Modular homes at the Rustenberg pilot

Attempts are being made to equip the houses in the pilot in Huldenberg with PV panels. The energy generated can then be used to heat the home. However, there should be more possibilities for sharing generated electricity. The digital meter that is being introduced in Flanders offers new possibilities, the European directive on "local energy communities" also offers opportunities.

Applying new techniques to live in an energy-efficient way also has consequences on the use of the home. A major part of the problems that arise in this regard are caused by the fact that the various systems for heating and ventilation, for example, are not yet well integrated. Residents should not coordinate everything themselves; rather, the applied systems should take care of it. It is important for residents that the integrated system is clear and easy to use so they are not over-burdened.

Within the social housing rental sector, it is generally the case that the

landlord invests in energy technologies and the tenant then has lower energy costs. Rather, energy costs should be part of the total rent as an incentive for a renter to invest in making rental homes more energy efficient. Social housing companies have recently been able to offset some form of energy correction when they install solar panels.

Hurdles to overcome in the social housing sector

The social rental sector in Flanders has traditionally been focused on building spacious, traditional homes. There are changes in progress, but the pace of those change is rather slow. This has to do with the legal conditions—such as tenders which mainly attract traditional contractors. Efforts to address the market in a targeted manner can change this.

Unfortunately, low carbon building is not yet part of the applicable standards within social housing in the region. There is room for initiatives where low carbon building is important, but these initiatives are tested with the requirements of the Flemish government social housing company.



To read further into detail on the insights of the second Belgian regional stakeholder meeting, and to review the findings of other partners' regional stakeholder meetings, visit [our website](#).

3 Counties Energy Agency (3CEA)

In the past six months, 3 Counties Energy Agency (3CEA) and the three Irish pilots located in the southeast of Ireland have progressed to the stage where base designs are in place and planning approval has been granted by the State to proceed. The designs have been assessed against Passive House Planning Package (PHPP) software to ensure at this early stage that the layout, orientation, building elements are optimised to align with their Passive House standard target.



The 3 Counties Energy Agency is an organisation with the mission to “lead and support Co. Kilkenny, Co. Carlow & Co. Wexford and beyond to reduce its CO₂ emissions by stimulating, driving and contributing to the implementation of best practise in the field of sustainable energy”. The 3CEA is a member of all relevant national energy networks in Ireland.

The 12 homes planned to be built range from an apartment block of 4 x 2 bedroom units (80 m²), 4 x 2 bed bungalows (66 m²), 2 x 1 bedroom apartments (50 m²) and 2 x 2 bedroom bungalows (78 m²). This offers a broad overview on smaller homes and how 3CEA can best optimise design, technology and innovation to deliver

affordable and sustainable housing to the social housing sector in Ireland and internationally.

3CEA are working with each pilot partner to integrate material selection, renewable heating/cooling, hot water and power solutions to these homes, which will drive down the carbon emissions and building costs. Various solutions will be piloted to allow for a more thorough cross-comparison of what solutions worked best in what context. All 12 units will be monitored post occupancy to assess energy usage, behaviour, cost and emissions. Once the technology and materials brief has been finalised then each pilot partner will initiate their public procurement to acquire the professional services required to deliver the 12 units.

It is planned to have all 12 homes delivered by the end of 2020. The units will then be offered to people on the social housing waiting lists within each county (Carlow, Kilkenny & Wexford).

Irish Regional Stakeholder Meeting

3CEA hosted their second Regional Stakeholder Group (RSG) meeting in the summer of 2019, which focused on the financial, institutional and legal barriers to implementing the Housing 4.0 Energy model across Ireland. 3CEA invited a broad range of parties, such as housing associations, the State Housing Department, banks, the Regional Assembly, architects, etc. This session highlighted many areas which could be barriers but also opportunities within Ireland to roll out the model to deliver affordable and sustainable housing. The findings will feed into the overall project results and future actions. TU Delft, who witnessed the session, has compiled a report for future reference and information.



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3CEA & H4.OE at the Thermohouse headquarters

Alex Hamilton, 3CEA Senior Engineer, also presented on the Housing 4.0 Energy model to partners of **Federane**, a collection of energy agencies located across Europe. The presentation and strategy of the model was very appealing to the European counterparts, who were very interested in the results and findings of the project once delivered.

3CEA arranged a site visit to a **Thermohouse** building

site (61 units), design office and factory in Killarney, South West Ireland with one of the pilot partners, **Carlow County Council**. The purpose of this visit was to experience their ICF (Insulated Concrete Formwork) product first-hand and offer the opportunity to assess the products against the H4.OE approach by speaking with designers and building professionals, witnessing the different stages of construction of the product. Below is an image of Thermohouse's ICF product.



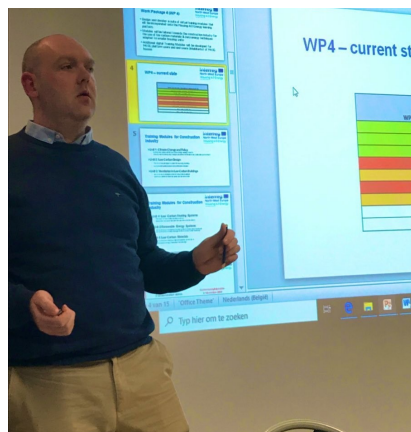
Elfi-Tech

The **European Institute for Innovation—Technology (Elfi-Tech)**, H4.OE's German partner, is an applied science organisation supporting the adaptations of regions to respond to the fast pace of development, in a variety of sectors. Elfi-Tech is responsible for the German H4.OE pilot.

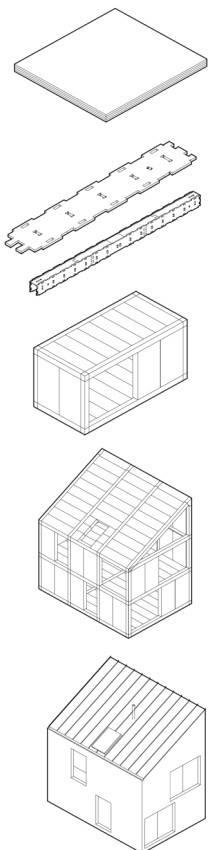
platform. An operational and embodied energy/CO₂ calculation tool will be integrated into the digital platform.

South West College

South West College's role in the H4.OE project is to work with partners to develop the digital platform and training packages for future builders.



Barry McCarron (SWC) presenting on the digital training packages in Brussels



Open Systems Lab

The role of **Open Systems Lab (OSL)** in the H4.OE project is to develop the H4.OE digital platform, which will help construction companies in making the right choices in materials, techniques, etc. to reduce building costs by 25% and CO₂ emissions by 60%.

Data and calculations from the various Housing 4.0 Energy pilots sites will be used to assist OSL in the production and implementation of the digital

INTERNATIONAL H4.0E PARTNER STEERING COMMITTEE MEETING

The diverse H4.0E consortium will convene for the fifth international Steering Committee Meeting and exchange event in spring 2020 in London, United Kingdom. Here, the partners will discuss pilot updates, financial management, project communication and more.



Interreg NWE “Making an impact!” Event

The **Interreg North-West Europe (NWE)** programme will be hosting its first ever impact event from 4-5 December at the Lille agglomeration, Hauts-de-France, in Tourcoing. The transnational event will focus on the results achieved by the 83 Interreg NWE projects funded so far, and how to further support their uptake and impact. The H4.0E project will be present to showcase its results in a variety of sessions, workshops and exhibitions. View the [current programme](#).



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)



Gemeente Almere



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