



syn.ikia

Sustainable  
plus energy  
neighbourhoods

Dear friends and colleagues,

As the world debates actions to combat climate change, the success of reducing greenhouse gas emissions relies largely on the transition to a low carbon and energy-efficient built environment. Increasing population and economic growth also reveals a greater need for buildings. The challenge is how we boost access to affordable housing while at the same time reducing emissions.

The energy and building sector has an important role to play in progressing towards a zero emission society. Buildings represent 30% of global final energy consumption and 28% of energy-related GHG emissions worldwide (IEA, 2019).

The syn.ikia innovation project within the EU Horizon 2020 framework involves [13 partners from six countries](#) and aims to enable the development of sustainable plus energy neighbourhoods in different climates, contexts and markets in Europe.

Over the course of the project, [four real-life plus-energy demo neighbourhood projects](#) tailored to four different climatic zones will be developed, analysed, optimized and monitored, demonstrating the functionality of the plus-energy neighbourhood concept for the rest of Europe.

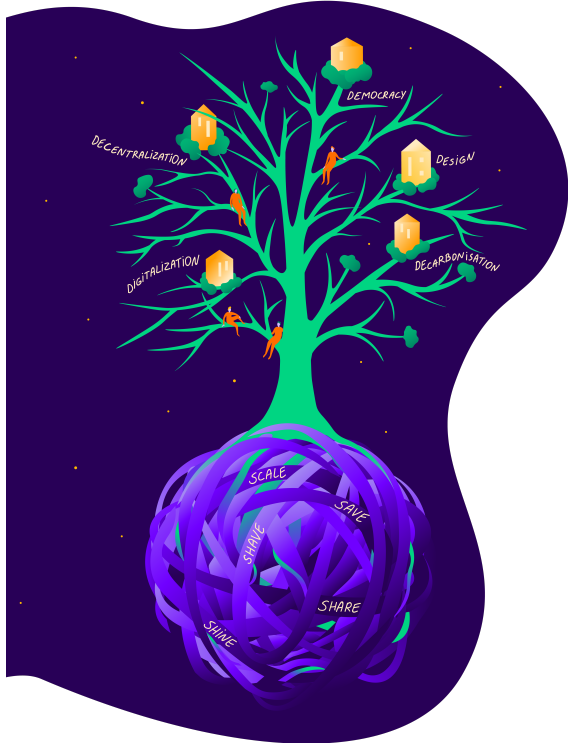
[Syn.ikia's concept](#) relies on the interplay between novel technologies at the neighbourhood scale, energy efficiency of the buildings, energy flexibility, high architectural and spatial qualities, social sustainability and citizen engagement.

New designs and efficient operation of sustainable plus energy neighbourhoods through integrated energy design, energy- and cost-efficiency measures, local renewables, local storage, energy flexibility, and energy sharing and trading, will be conducted. The project will encourage community engagement and will empower user's control facilitated by digital platforms and driven by housing affordability, improved quality of life, and environmental consciousness to inform and enable behavioural change.

Syn.ikia has already started its exciting journey. Welcome on board!

The syn.ikia coordinator  
Niki Gaitani, NTNU

[Syn.ikia](#) is a four-year Horizon 2020 funded project whose mission is to increase the share of plus energy neighbourhoods with surplus



renewable energy in different contexts, climates and markets in Europe to reduce energy poverty, improve health and well-being, increase asset value, and reach climate goals.

[13 partners](#) across the EU have teamed up to contribute towards environment-friendly, healthy, resilient, secure, safe, and affordable living places and communities.

Over the next four years, the syn.ikia consortium will pilot Sustainable Plus Energy Neighbourhoods to demonstrate the functionality of the plus-energy neighbourhood concept for the rest of Europe with the aim of achieving:

- More than 100% energy savings
- 90% renewable energy generation
- 100% GHG emission reduction
- 10% life cycle cost reduction

compared to the 2020 nearly zero-energy buildings (NZEB).

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### The syn.ikia concept

Syn.ikia's concept relies on the interplay between novel technologies at the neighbourhood scale, energy efficiency & flexibility of the buildings, good architectural & spatial qualities, sustainable behaviour, & citizen engagement.

A **Positive Energy Building** produces at least as much renewable energy as it uses in a year, when accounted at the source. Source energy refers to the primary energy used to generate and deliver energy to the site.

In a **Sustainable Plus Energy Neighbourhood**, the geographical boundary is expanded to the entire site of the neighbourhood and includes Local Storage and Energy Supply Units.

Users, buildings and technical systems are all connected via the neighbourhood digital cloud (HUB).

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### How?

Four real-life plus-energy demonstration cases tailored to the four different climatic zones (Subarctic, Marine, Continental and Mediterranean) and development projects

of Europe will be developed and analysed. Located in Norway, The Netherlands, Austria and Spain, the demo cases neighbourhoods will demonstrate the functionality of the plus-energy neighbourhood concept for the rest of Europe.

**Discover the Demo Neighbourhoods!**

## VISIT THE WEBSITE

Website is now up and running! We invite you to learn more about the project by visiting <https://synikia.eu/>. You will get a deeper insight into the syn.ikia concept, the Demo neighbourhoods in Norway, The Netherlands, Austria and Spain, get access the latest reports and much more.



## NEWS FROM PARTNERS

### News from our Norwegian demo neighbourhood – developed by OBOS

Currently at the planning stage, the Norwegian demo neighbourhood, representing the subarctic climate, is shaped as a circle to emphasise the idea that sustainable neighbourhoods are about sharing spaces, functions, energy, and infrastructure. The project has high symbolic value as it shows the importance of community issues in neighbourhood developments.

With its 144 flats, the O is the first housing project in Norway at this scale, with a renewable energy production that compensate for greenhouse gas emissions from the building operation (ZEB-O).

To draft the project, the team is taking into consideration:

#### **Technologies:**

- Highly efficient solar panels
- District heating
- Ventilation system with heat recovery
- Passive House standard

**Innovations:**

- Smart charging of EV and battery storage
- Smart house technology
- BREEAM certified
- Low carbon design
- Shared spaces
- Technical IT platform to initiate activities and create a vibrant neighbourhood

Learn more about the Syn.ikia demo neighbourhood in Norway [here](#).



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**News from our Dutch demo neighbourhood – developed by AreaWonen:**

Thanks to a multidisciplinary team, [AREA](#) succeeded in designing a zero-energy building and is now working together with [TNO](#) to develop the concept at the neighbourhood level.

At building level, the demo-project will be equipped with high insulation, ground source heat-pump, 195 PV -panels and active ventilations units. The team now studies load balancing at building level by actively using household devices and sensors, allowing for smart control and diagnostics. The team also considers using thermostats to have modular indoor temperatures thanks to algorithms.

At neighbourhood level, load balancing will be the next step in the development of the Dutch demo-project.

Construction is predicted to start during the fourth quarter of 2020 and is planned to be concluded during the first quarter of 2022.

Learn more about the Syn.ikia demo neighbourhood in the Netherlands [here](#)

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**News from our Spanish demo neighbourhood – developed by INCASÒL**

[INCASÒL](#) is already drafting the executive project that will be finished in July, using the Integrated Energy Design methodology and working together with a multidisciplinary



team and IREC's support, among other energy specialists.

To draft the project, the team is taking into account:

- Design of the openings that will help reach the maximum potential for energy efficiency.
- Shadows study by using walkways and protections.
- Glazing both resistant to cold and heat.
- Inertia materials and constructive solutions that respond to summer/winter requirements.
- Absorptivity colours depending on the sunlight.

Learn more about the Syn.ikia demo neighbourhood in Spain [here](#)



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### **News from Abud: “Energy Modelling as a Trigger for Energy Communities: A Joint Socio-Technical Perspective”**

Mainstreaming energy communities has been one of the main challenges in the low-carbon transition of cities. In this sense, urban building energy modelling (UBEM) has an untapped role in enabling energy communities, as simulations on urban models provide evidence-based decision support to reduce risks, engage, motivate and guide actors, assert wider policy goals and regulatory requirements. The study, written by ABUD and the University of Pécs, explores whether UBEM is a technological trigger for energy communities and provides a guide for energy community planners to UBEM.

**Read the full report**

**News from sister projects**



[Cultural-E](#) is approaching the topic of Plus Energy Buildings (PEBs) by looking at cultural and climatic differences in Europe. The project started in autumn 2019, and during the following five years it will build four new Plus Energy Buildings in France, Germany, Italy and Norway. Cultural-E will also produce design tools, smart technologies, methodologies and policy recommendations, freely available for all stakeholders along the value chain.

**The project is currently running a survey for designers and other stakeholders in the construction sector interested in PEBs.** Would you like to know how to handle energy simulation and other performance indicators during the design process? If so, please fill in Cultural-E survey [here](#) and help the team create an easy-to-understand data visualisation library for the design of the future Plus Energy Buildings.

[Fill in the survey](#)

[Learn more about Cultural-E](#)



### **A presentation of the EXCESS demo site in Granada, Spain**

Four ambitious demonstration projects - in which innovative yet cost-competitive building technology packages will be tested - lie at the heart of the EXCESS project. Through these projects, located in four main climate zones - Continental, coastal climate, nordic and mediterranean climates, **EXCESS seeks to test, validate and share PEB solutions with potential replicability across Europe.**

[Learn more about the Spanish Demo project](#)

### **Rolling out Plus Energy Buildings - views from an urban planner**

Energy-efficient urban planning is state of the art and an important part of sustainable urban planning. It forms the prerequisites for the emergence or implementation of PEB. In the meantime, considerations on the PEB topic in urban planning should be a normal case.

Through energy-efficient urban planning, especially in PEB residential construction, unnecessary structural constructions can be avoided in advance. It forms the basis for sustainable, energy-optimised building planning, which is characterized by regenerative energy generation and an efficient energy supply.

This article lays out some **key requirements of urban building planning for successful spatial implementation of PEBs.**

[Read the full article](#)

## Academic publications

- Backe, Stian (2020). [Comparing individual and coordinated demand response with dynamic and static power grid tariffs](#). Energy. Vol. 201, 15. juni 2020.
- Backe, Stian; Kvellheim, Ann Kristin (2020). [Zero emission neighbourhoods – Drivers and barriers towards future development](#). ZEN Report 22. NTNU/SINTEF.
- Carlucci, Salvatore et al. (2020). [Modeling occupant behavior in buildings](#). Building and Environment. Vol. 174, mai 2020.
- Gohari, Savis, Baer, Daniela, Nielsen, Brita F., et al. [Prevailing Approaches and Practices of Citizen Participation in Smart City Projects: Lessons from Trondheim, Norway](#). Infrastructures 2020, 5(4), 36.
- Homaei, Shabnam, Hamdy, Mohamed (2020). [A robustness-based decision making approach for multi-target high performance buildings under uncertain scenarios](#). Applied Energy, 267, 114868.
- Petersen, Sobah Abbas; Koundouri; Phoebe (2020). [The Climate Action: Mathematics, Informatics and Socio-Economics Accelerating the Sustainability - Introduction to the Special Theme](#). The Climate Action, 13. april 2020.
- Stokke, Raymond A.; Kvellheim, Ann Kristin (2020). [ZEN case study: Strategies and business models to support the transition to low-carbon concrete](#). ZEN Report 23. NTNU/SINTEF.



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