syn.ikia | Sustainable plus energy neighbourhoods

Dear friends and colleagues,

It is the time of the year for reflection and future casting, that is planning ahead and taking the steps to make the vision -in our case SPENs- happen.
Our newsletter is dedicated to our neighbourhoods. We know that focusing solely on individual buildings can lead to suboptimal solutions when aiming for a zero-emission target due to high power peaks and fast load fluctuations - which fails to achieve synergy effects between energy use and generation. Moreover, the concept of SPENs differs from zero energy buildings given its renewable energy contribution to the surrounding environment, subsequently reducing the carbon footprint from neighbouring buildings.

Starting with Design, how can we make SPENS i.e., neighbourhoods with resilient, sustainable and affordable living places reach climate neutrality and energy surplus? Our report on design and performance prediction for the syn.ikia demo neighbourhoods in Norway, Spain, Austria and the Netherlands shares inspiring results of integrated energy and future proof design.

Looking into the regulations, what are the main challenges and possibilities of energy-plus neighbourhoods at the local, national and EU level?
The policy window of the Fit-for-55 package and related reforms of the EU climate and energy architecture, in particular the revision of the EPBD should utilise the synergies and potential of neighbourhoods and community approaches. Our report on current policies at European and national level identifies a trend to move towards an integrated and sustainable built environment supporting SPENs.

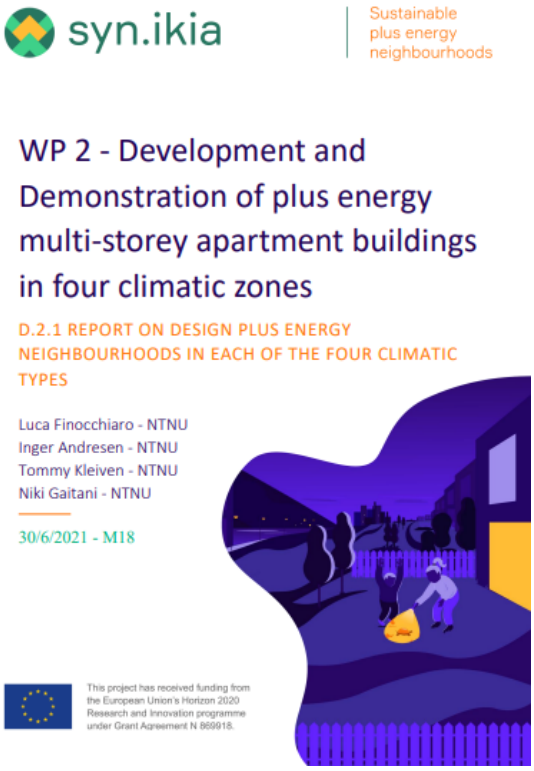
How can we voice our individual needs while at the same time enhancing healthy lifestyles, rational consumption behaviour, and strengthening the development of an equitable and climate neutral society?
With our SPEN community, educational and awareness raising campaigns, green ambassadors and through new forms of user engagement as digital tools, we invite

Finally, we are working systematically to develop and promote our innovative solutions across the European communities. During the first two years of the project, we have developed more than twenty reports, participated in a great number of events such as the Sustainable Places Conference, facilitated synergies with the ZEN Research Centre and the sister projects.

With best wishes for the new year!

The syn.ikia Coordinator
Niki Gaitani, NTNU

HIGHLIGHTS



Designing Plus Energy Neighbourhoods in each of the four climatic types
The overall aim of the report is to show how to design sustainable plus energy neighbourhoods in different climate and contexts. In doing this, we are answering the following questions:

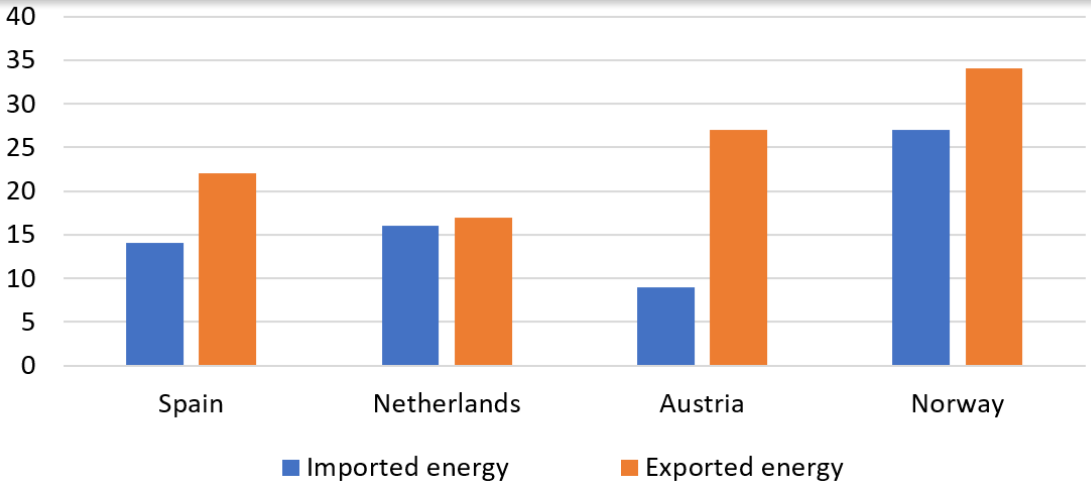
- What passive measures can be implemented to reduce the energy need and optimize indoor environment and life cycle costs?
- How can local renewable energy sources and storage be utilized most efficiently?
- How robust are the designs with respect to future scenarios of changing weather patterns, different user behaviour, and energy/power tariffs?
- How can flexibility measures be implemented to respond to the various scenarios?

What passive measures can be implemented to reduce the energy need and optimize indoor environment and life cycle costs?
An important passive measure is the performance of the building envelope. Firstly, thermal insulation of the envelope is an efficient strategy to reduce energy demand for space heating. All demo projects will have insulation values significantly lower than the local building code, with U-values of exterior walls ranging from 0.27 W/(m2K) for

Secondly, another crucial aspect for the heat loss is the air tightness of the building envelope. Again, all demos have ambitions that are significantly lower than the building code. Good air tightness is achieved through careful design with attention to details and good workmanship, together with air leakage testing during the commissioning of the building.
Thirdly, passive cooling strategies with natural ventilation have the potential to significantly reduce the energy consumption for cooling while providing good thermal comfort for the occupants. The Spanish case relies wholly on natural ventilation for cooling, together with effective exterior solar shading, utilization of thermal mass, and light colors. In other demos the users will have the opportunity to open windows for cross ventilation. All demos are designed with high-efficient heat recovery in the winter.

How can local renewable energy sources and storage be utilized most efficiently?
Within the demos there are three different types of renewable thermal energy supply systems; ground source heat pumps in two of the demos, air source heat pump in one, and district heating. The systems are optimized and controlled to cover most of the heating and cooling needs with a minimum need for auxiliary energy. For renewable electricity supply, all demos rely on efficient photovoltaic systems. The photovoltaic panels are mostly placed on the roof, where solar access is maximized and access for maintenance is easily accommodated. Efficient utilization of local renewable energy is accommodated by building energy management systems and user engagement to facilitate intelligent controls to match the supply and demand of energy. Excess electricity from the PV systems can be stored in the DHW tank, in the buildings thermal mass, in the ground, or it can be used for electric car charging in the neighbourhoods.

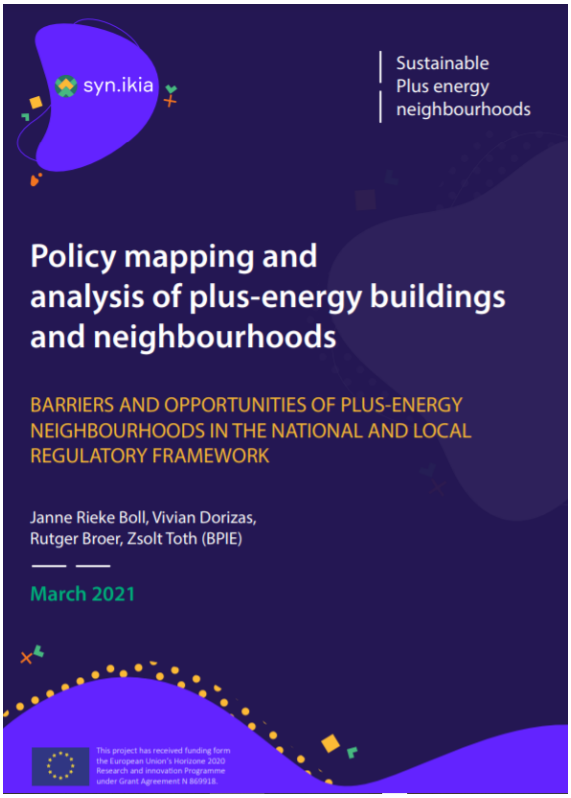
How robust are the designs with respect to future scenarios of changing weather patterns, different user behaviour, and energy/power tariffs?
The performance of the plus energy neighbourhoods was predicted using dynamic simulation tools for the following parameters; indoor climate, energy, power, and greenhouse gas emissions. Present conditions and future scenarios were simulated with combinations of state-of-the-art materials, components, technologies, and smart control systems. Design options and future scenarios were built considering climatic context, user behaviour, and regulatory framework of each demonstration project. After adjustments and applying solutions identified through integrated design approaches, the performance analyses indicate that the four demonstration projects will be able to fulfil the targets of sustainable plus energy neighbourhoods in a wide range of conditions. All of the four projects will have a positive energy balance, while providing high quality indoor comfort and a healthy social environment for inhabitants.



How can flexibility measures be implemented to respond to the various scenarios?

Flexibility measures, such as varying the setpoint of the storage systems and the indoor air temperature, as well as utilizing the storage capacities in EV batteries, were studied. The simulations showed that such measures can reduce the peak power demand and enhance the self-consumption of renewable energy, while satisfying occupant comfort requirements.

Download the report



Barriers and opportunities of plus-energy neighbourhoods in the national and local regulatory frameworks

SPENs can have a strategic contribution to achieve climate and energy targets as they tackle larger-scale projects, simultaneously improving community facilities, health, wellbeing, safety and public spaces.

What is the existing legislative landscape impacting the development of sustainable positive energy buildings and neighbourhoods in Europe?

Netherlands, Norway and Spain.

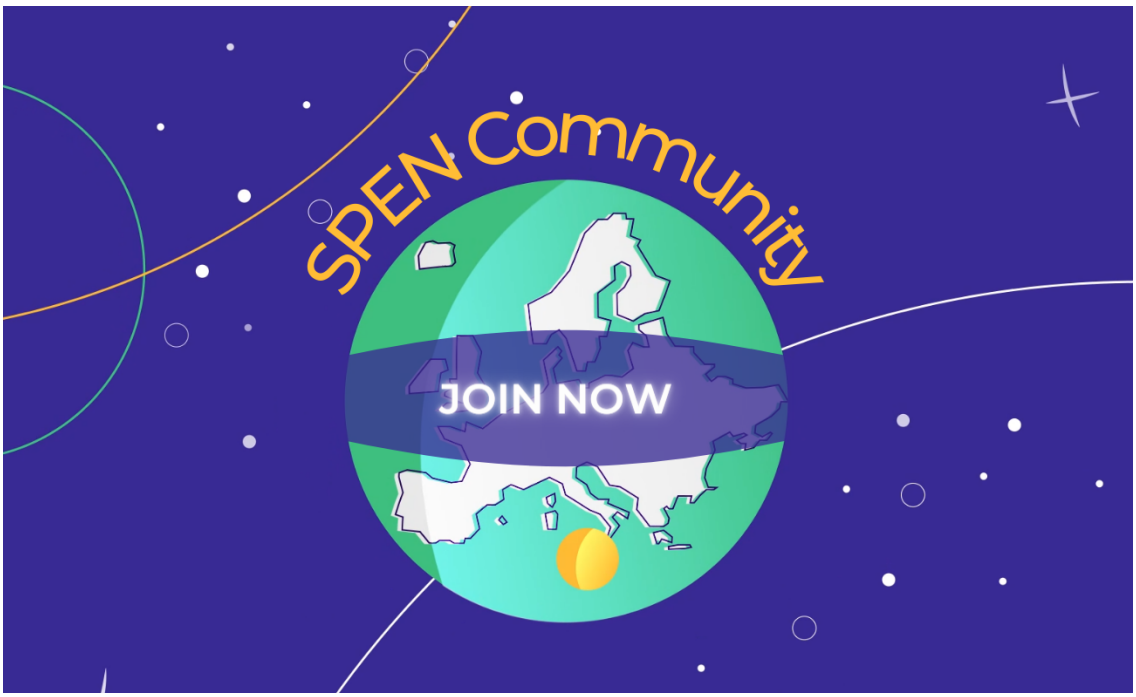
It also identifies its gaps and weaknesses, providing a robust basis for the ongoing efforts to redefine integrated strategies to the deep decarbonisation of buildings.

Download the report

The Sustainable Plus Energy Neighbourhood Community

The **SPEN Community** is an online meeting space designed to **connect, inspire and create synergies** among a wide range of stakeholders involved in the development of Sustainable Plus Energy Neighbourhoods.

The community is already active, we are just waiting for you!



Join the SPEN community now!

Why join?

- **Network** with other SPEN experts across Europe
- Learn about **best practices** and exchange on **various topics**, such as communities and citizen engagement, policy development, energy sources and much more
- Look at existing **SPEN solutions, methods and technologies**
- Engage in syn.ikia's activities and stay alert on **upcoming events**
- Learn more about the community and what you can get out of it here

Positive Energy Buildings and Neighbourhoods: definition, policies and implementation:

Syn.ikia partners organised two workshops at the Sustainable Places conference (28 Sept to 1 Oct.):

- **How to define Positive Energy Buildings?** With the aim of reaching a wider agreement on the terminology and boundaries for PEBs, the three projects (syn.ikia, EXCESS, Cultural-E) discussed their findings with a larger group of stakeholders. Recording available here and article here.
- **Positive Energy Buildings and Neighbourhoods - from policies to implementation:** This workshop dived into the barriers and opportunities that the EU, national and local regulatory frameworks provide for the development of SPENs on the ground and highlighted concrete and successful examples of SPEN implementation at local level. Read here the outcomes of this policy workshop, and have a look at the recording here.

Syn.ikia partner IREC presented the evaluation framework at the Annex 83 Positive Energy Districts Subtask C workshop on 22th of October. The event aimed at sharing experience between the Annex and several other international PEDs initiatives on the topic of PED performance assessment. Around a hundred participants joined the discussion on current state and potential future development of PEDs. More information here.

EUSEW2021 | Buildings at the heart of the EU's new energy system

This policy session sheds light on the potential that buildings offer for a successful transformation of the energy system by 2030 by empowering citizens at all levels and enabling the scale-up of holistic energy renovations. Syn.ikia was presented among other inspiring initiatives and best practices that are already in place at neighbourhood, city and community level.

The speakers highlighted ways to empower residents to play a role in the energy transition while responding to their needs, especially lower-income households. These solutions place buildings in a broader and more interlinked context by reducing their energy use, acting as storage and ensuring a balanced grid, integrating renewables, using smart energy management systems as well as offering people a comfortable environment where to live.

Watch the recording

On the 1st of December, syn.ikia coordinator Norwegian University of Science and Technology (NTNU) together with FutureBuilt, organised a breakfast event with the aim of promoting the concept of Sustainable Plus Energy Neighbourhoods (SPEN), our main mission. Each of the four speakers contributed in English or Norwegian to the main topic, presenting different dimensions of SPEN. The panel was composed of representatives from NTNU, and two of the demo sites: Arca Nova Grupen from Norway and Area Wonen, from the Netherlands.

Read the full article here. The recording is available below.

Breakfast meeting in Oslo on Plus Energy Buildings and Neighbourhoods in Europe (in Norwegian and English)

News from partners

AreaWonen: Symbolic handover marks topping out of Loopkantstraat apartments in Uden, Netherlands

The construction of 39 apartments located at Loopkantstraat in Uden (Netherlands) has reached its highest point. On Friday, 24 September, former site residents Bart Hendriks and Ageet Reith were joined by three

The developer is Hendriks Coppelmans Bouwgroep, carrying out the building work on Area's instructions. This exceptional project is the first to incorporate the concept of 'Maatschappelijk Mooi', which brings together housing, work and social care. Construction began in December 2020 and is expected to be completed in the first quarter of 2022.

Read the press release

INCASOL: News from the Spanish demo

The tender for the works for the Demo located in Santa Coloma de Gramenet has ended and the winning company, Abolafio, signed the contract. The contractor is managing the previous tasks of the initial demolitions, which are expected to be executed in January 2022.

Housing Europe: Impact of the Recovery Plans on the Social and Affordable Housing Sector

This report investigates the areas of activity in which Member States will be engaged in order to make the

is encouraging that several Member States have also dedicated funds for the provision of social housing and Housing First, totalling more than €5.5 billion. However, as the individual country profiles and analysis in this report will also show, the money that has so far been committed will not be enough to achieve the EU's targets.

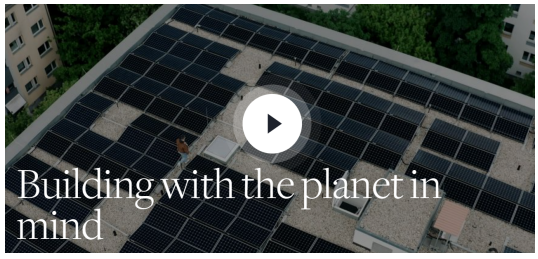
Read the full report

Academic publications

- Jaume Salom, Meril Tamm, Inger Andresen, Davide Cali, Ábel Magyari, Viktor Bukovszki, Rebeka Balázs, Paraskevi Vivian Dorizas, Zsolt Toth, Clara Mafé, Caroline Cheng, András Reith, Paolo Civiero, Jordi Pascual and Niki Gaitani An Evaluation Framework for Sustainable Plus Energy Neighbourhoods: Moving Beyond the Traditional Building Energy Assessment
- Ala-Juusela, Mia, Cristian Pozza, Jaume Salom, Iván Luque Segura, Andreas Tuerk, Roberto Lollini, Niki Gaitani, and Annamaria Belleri Workshop on Positive Energy Buildings—Definition

Inspiring examples

Renovating Norway shared ownership homes.
Narvik was one of many Norwegian towns destroyed during WW2. As part of the rebuilding effort the co-operative housing movement was created to provide mass housing. Now almost 1/4 of Norway's population lives in shared ownership housing. OMT Housing Association, is committing to renovating



Germany: Building with the planet in mind.
Faced with the urgent needs of climate change, the team at one of Berlin's municipal housing companies – HOWOGE - recognised their obligation to protect the environment. By embracing technology, the housing company has managed to significantly reduce the carbon emissions

cost efficiency and improve the quality of the homes. Watch the video.

About syn.ikia