Fra nullutslippsbygg til nullutslippsområder -hva skal til for å få det til? -nytteverdi for samfunn og byggenæring?

Forskningsleder Birgit Risholt,
FME Zero Emission Buildings og SINTEF Byggforsk

Frokostmøte Bergen 14.10.2015

Innhold

- Nullutslippsbygg
  - hva er det?
- Nullutslippsområder
  - hva er det?
  - hvorfor trenger vi nullutslippsområder?
  - hva kreves for å få det til?
  - hva er nytteverdien?

ZEB Living Lab
Photo: Ole Tolstad/NTNU

The ZEB Research Centre and Pilot Buildings

Zero Emission Buildings forskningssenter og pilotbygg

ZEB Research Activities

WP1 Advanced materials technologies

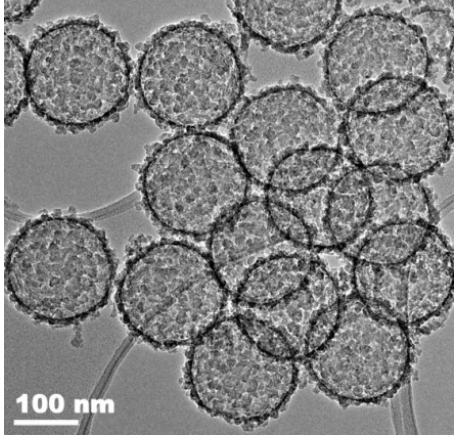
WP2 Climate-adapted low-energy envelope technologies

WP3 Energy supply systems and services

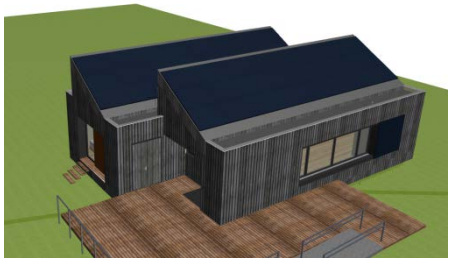
WP4 Use, operation, and implementation

WP5 Concepts and strategies and Pilot buildings

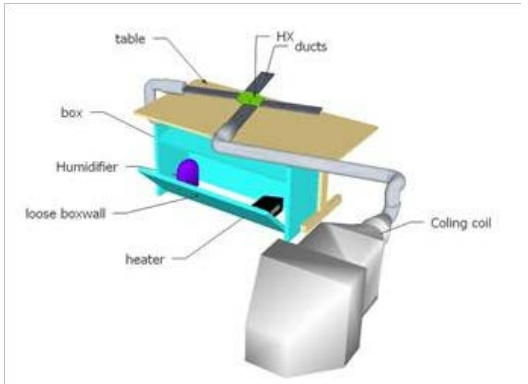
VIP Leca Isoblokk



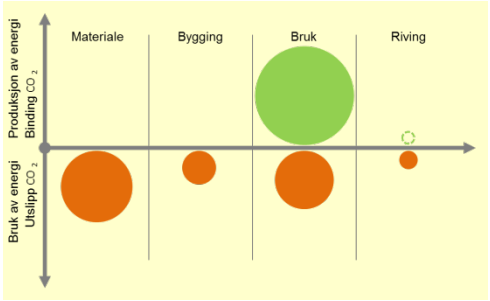
Nano insulation materia



ZEB Living Lab



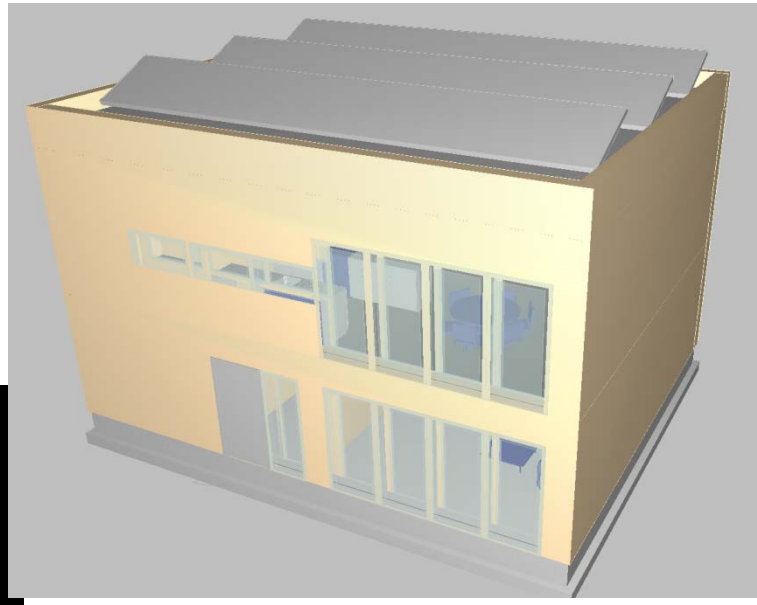
Membrane heat exchange

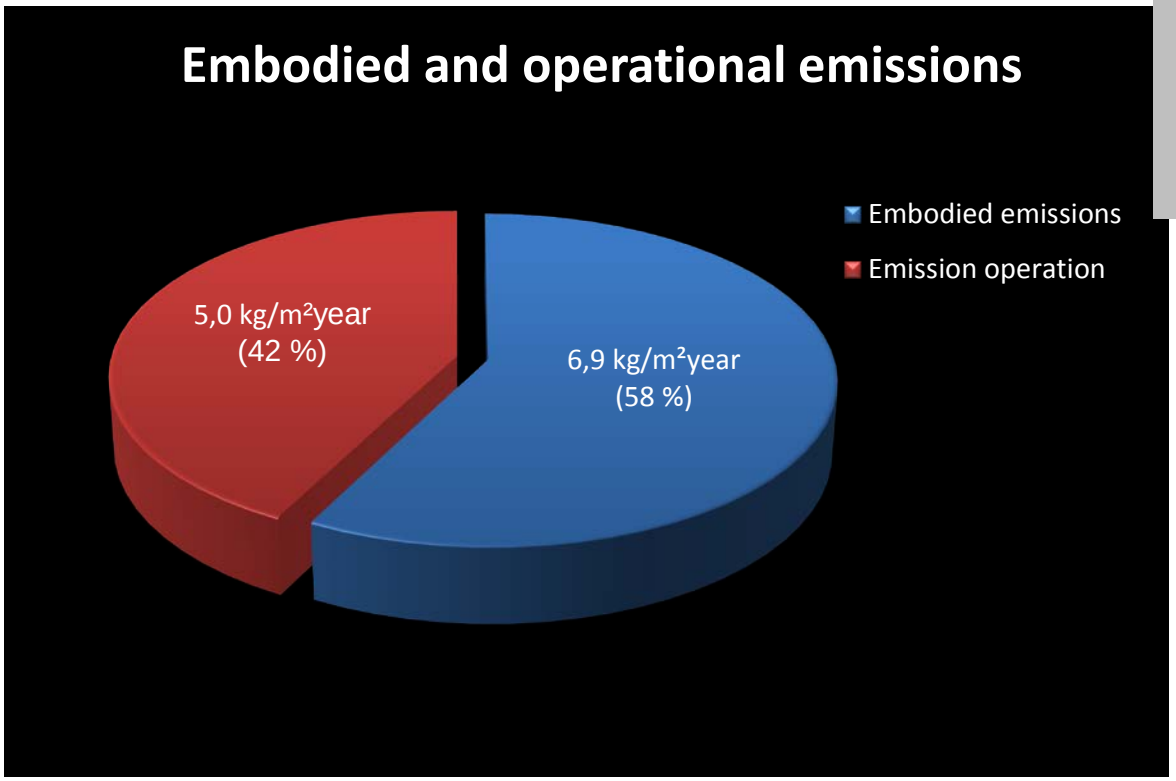


ZEB Definition

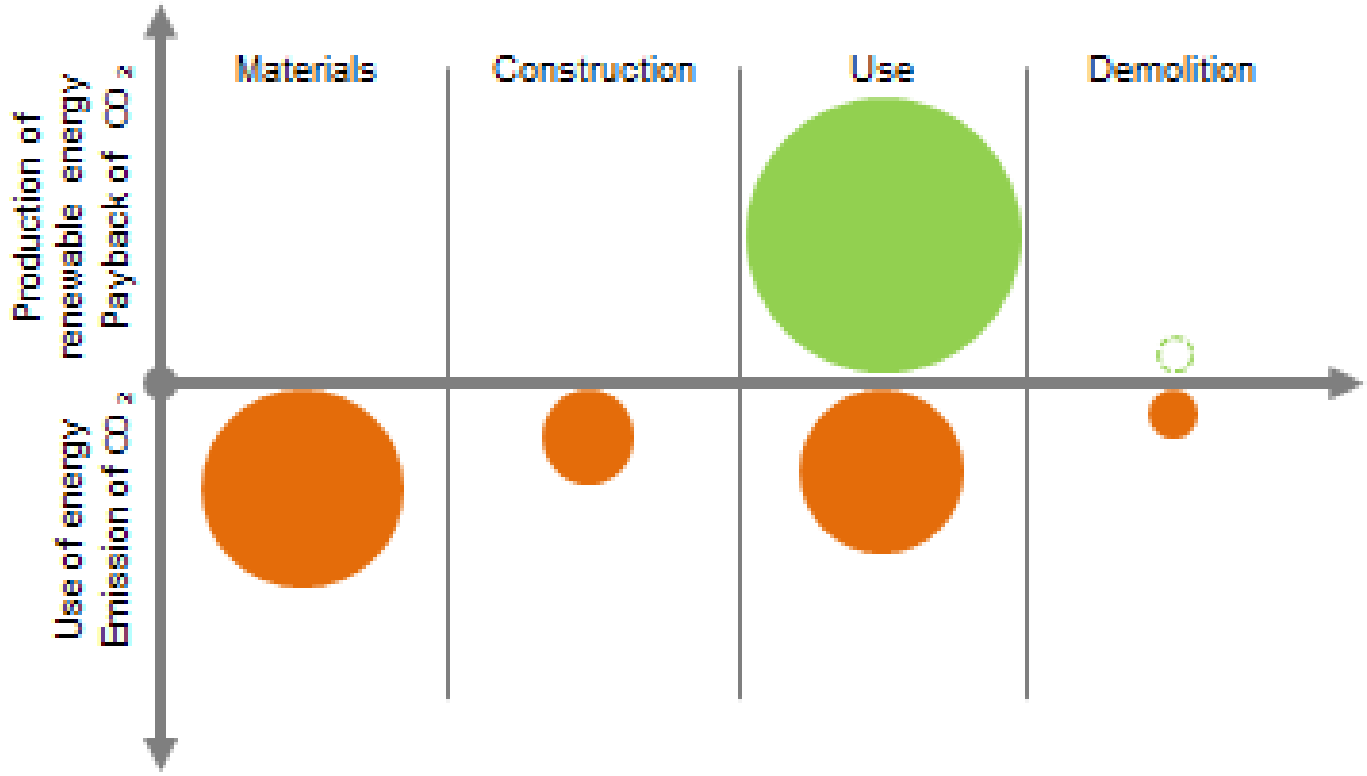
ZEB Pilot buildings

Concept Work - Dwelling



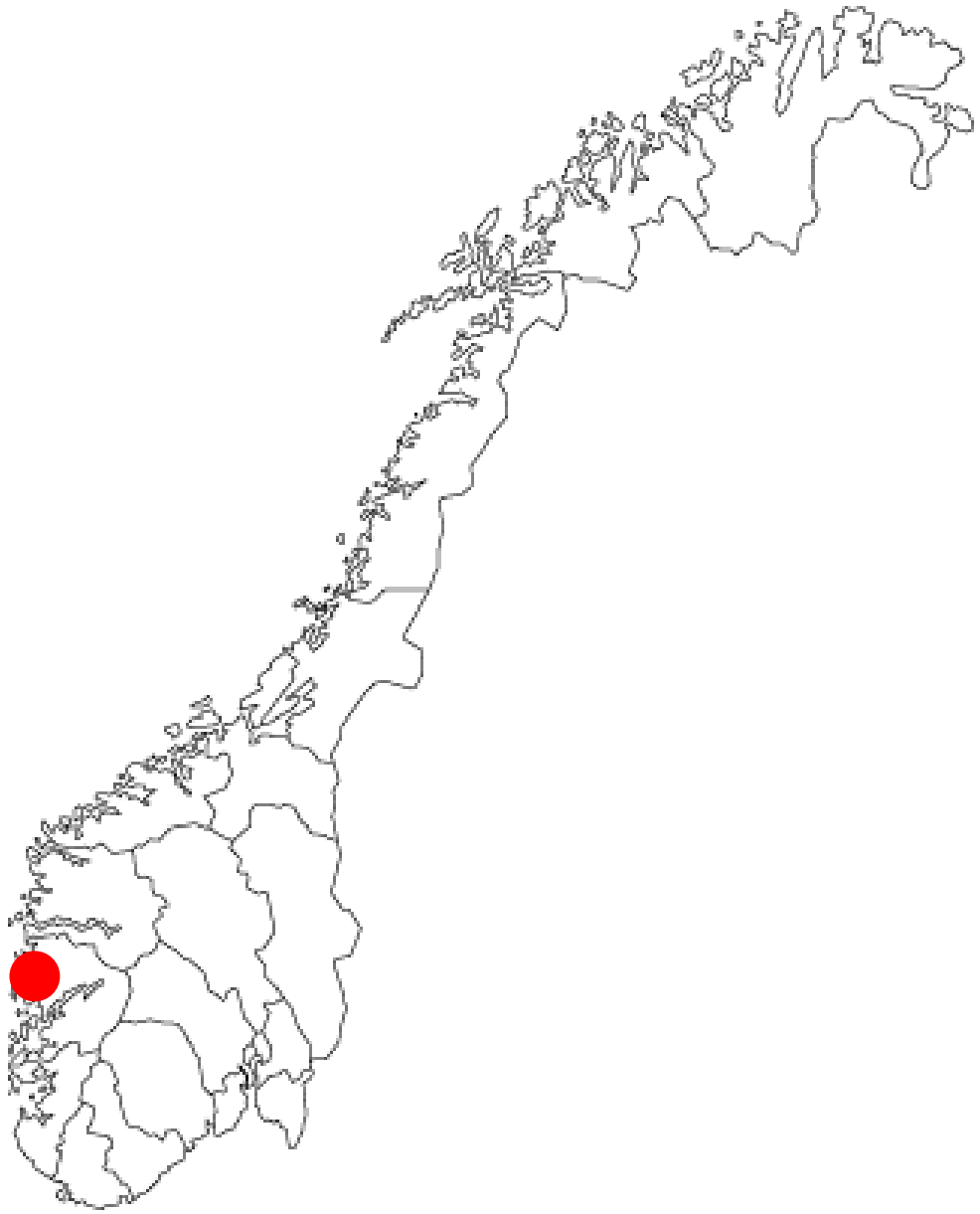


Zero Emission Building Definition



ZEB Pilot Buildings

Pilot Building	Type of Building	ZEB-ambition	Built area
1. Skarpnes, Arendal	20 new apartments and 20 new detached houses	ZEB-O	4 500 m^2
2. Powerhouse Kjørbo, Sandvika	Renovation of two office buildings	ZEB-COM÷EQ	5 000 m^2
3. Multicomfort, Larvik	New detached demonstration house	ZEB-COM	200 m^2
4. Ådland, Bergen	720 new dwellings	ZEB-O (område) ZEB-OM (bygg)	80 000 m^2
5. Haakonsvern, Bergen	New office building	ZEB-O÷EQ	2 000 m^2
6. Powerhouse Brattøra, Trondheim	New office building	ZEB-O	14 000 m^2
7. ZEB Living Lab, Trondheim	New research dwelling	ZEB-O	100 m^2
8. Heimdal VGS, Trondheim	New upper secondary school	ZEB-OM	25 000 m^2
9. Campus Evenstad	New office building	ZEB-COM	1 100 m^2



A Zero Emission Neighbourhood Development at Ådland, Bergen

Why is Zero Emission Neighbourhoods a solution for future sustainable cities and communities?

- Energy solutions for more than one building – available ond coming technologies
- Local and central energy grid (and renewable energy generation and storage)
- Different building typologies – flexibility in energy demand
- Cost effectiveness – systemic solutions

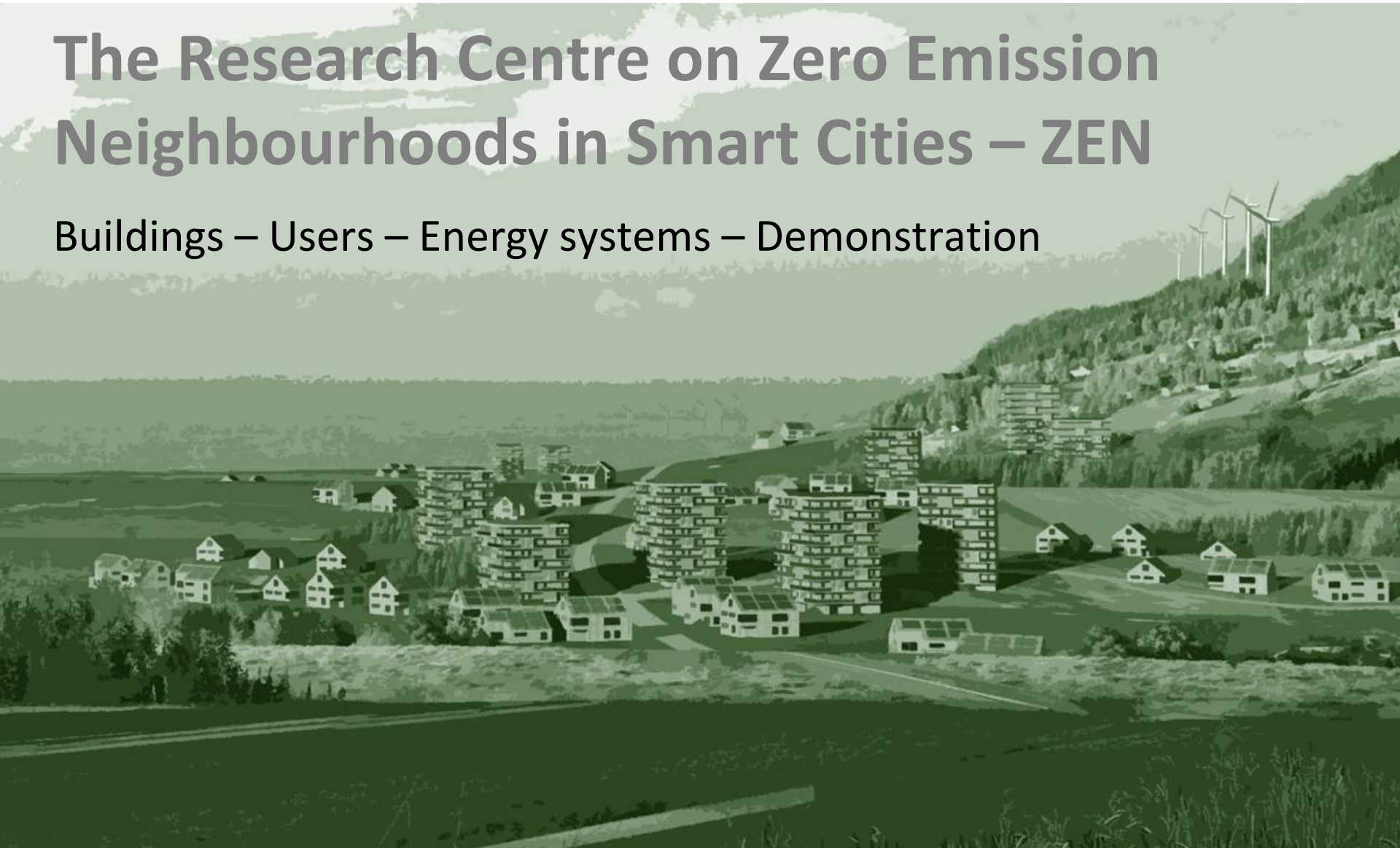
- Planning for efficient land use, mobility needs and quality of living

- Neighbourhoods are the building blocks of Smart cities

New centre application (FME):

The Research Centre on Zero Emission Neighbourhoods in Smart Cities – ZEN

Buildings – Users – Energy systems – Demonstration



Forskningssentre for miljøvennlig energi

- De overordnete målene for FME-ordningen er å
  - bidra til å løse sentrale utfordringer på energiområdet,
  - bidra til å utvikle løsninger for lavutslippssamfunnet og
  - styrke innovasjonsevnen i næringslivet.

- De overordnede kriteriene for utvelgelse av FME er:
  - potensial for innovasjon og verdiskaping
  - søknadens og søkernes vitenskapelige kvalitet
  - søknadens relevans i forhold til spesielle strategiske og tematiske føringer i utlysningen

The Research Centre on High quality Zero Emission Neighbourhoods – ZEN

Vision

High-quality neighbourhoods with zero greenhouse gas emissions

The Centre will focus on multi-disciplinary research, innovation and demonstration to realize zero emission neighbourhoods as crucial elements of a smart and sustainable future

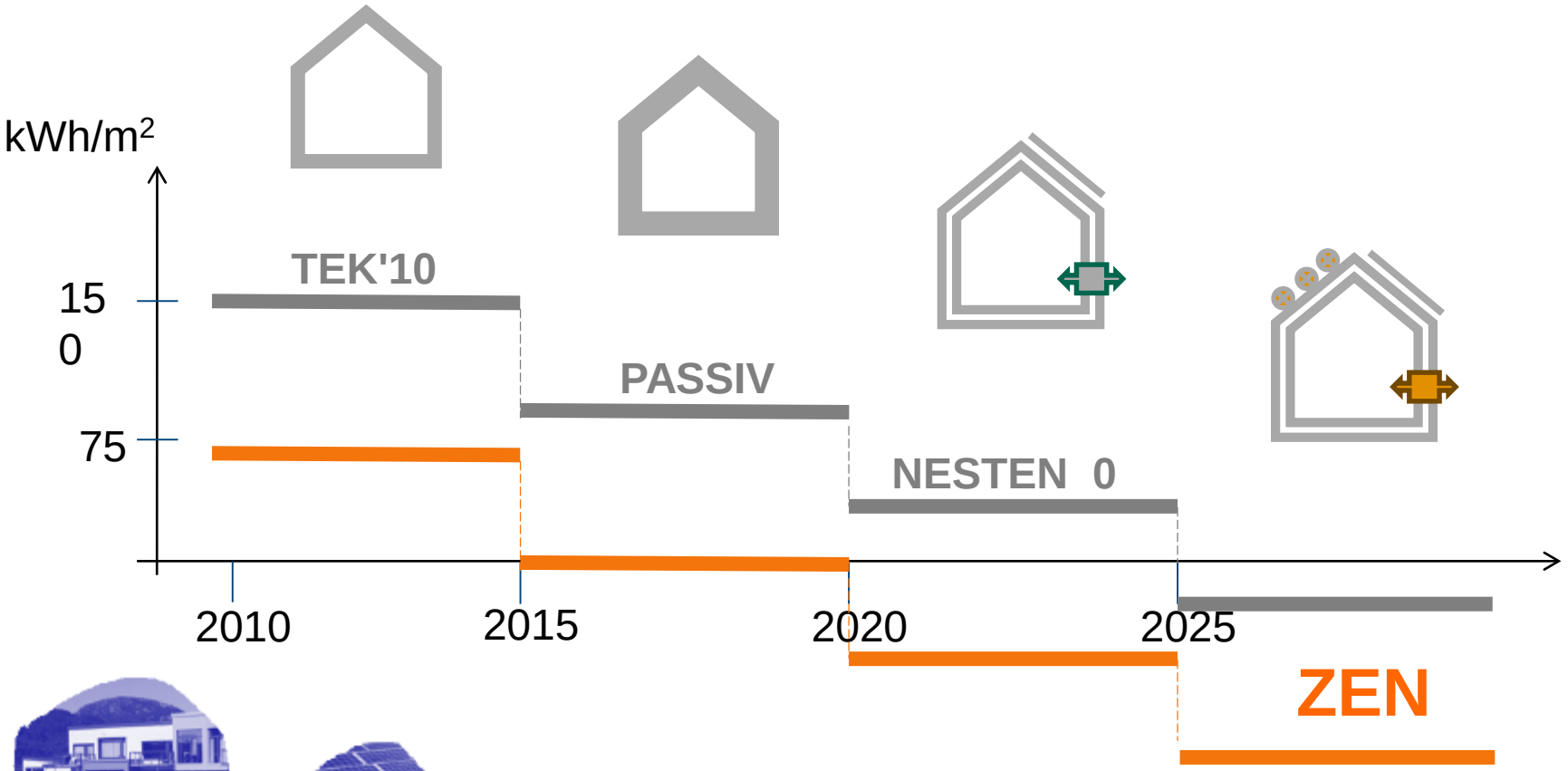
- The centre will work with new and existing neighborhoods with different building typologies, infrastructures, mobility and users

- **Duration** 2016-2023

Illustration: Snøhetta
Project: Zero Village Bergen by ByBo

Utvikling - fra Forskning og Utvikling til Teknisk forskrift

Ref: I. Andresen 2015



Løvåshagen

FLO
Haakonsvern

Powerhouse
Kjørbo

Campus
Evenstad

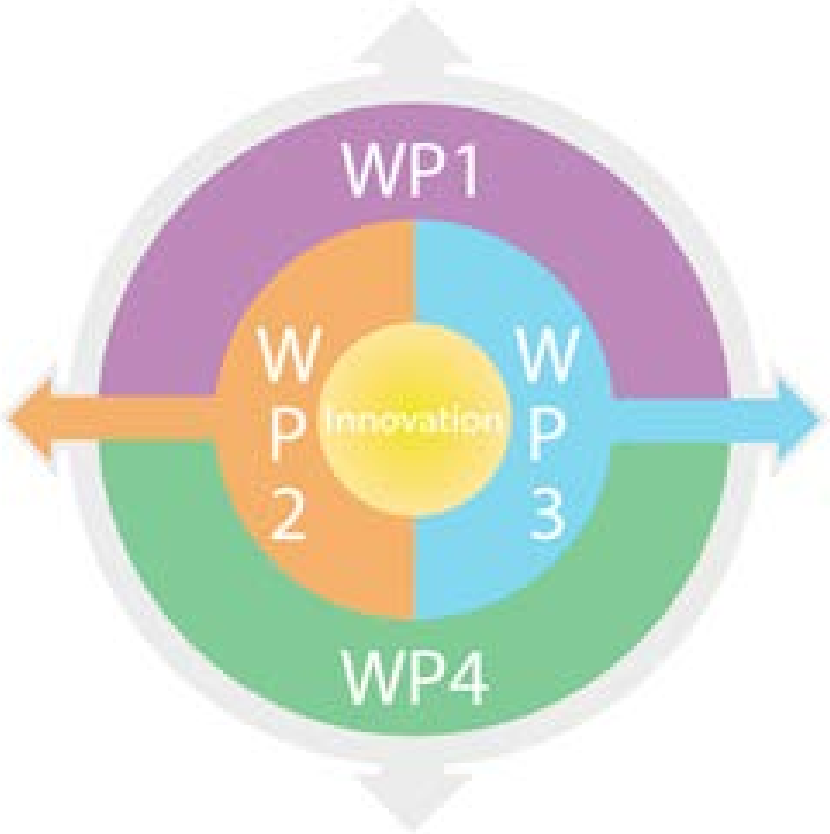
Zero Village Bergen

Objective

The ZEN centre will develop the ***high-quality neighbourhoods that are designed, transformed and managed to reduce their greenhouse gas emissions towards zero***. More precisely stated the objectives are:

1. To create integrated decision support to transform GHG emission data into high-quality neighbourhood design, planning and management
2. To to optimize buildings for low energy demand, low GHG emissions as well as high flexibility towards smart energy grids
3. To develop energy systems and services (thermal, electric, e-mobility) that contribute towards reducing GHG emissions at the neighbourhood level towards zero
4. To develop ZEN pilot areas (living labs) help to demonstrate, test and bring to market the most promising processes and solutions

Working packages



- WP 1 Decision support, definitions, planning, design, policy, business
- WP 2 Buildings and building components
- WP 3 ICT and energy solutions
- **WP 4 Living Labs**

WP4 Pilot projects and living labs

Goal

*To realize at least **5 pilot projects / living labs** in Norwegian municipalities that will serve as living labs to enable **experimentation** and **co-creation** with real users in real life environments, where researchers together with users, industry and public institutions look together for new solutions, new products, new services and new business models.*

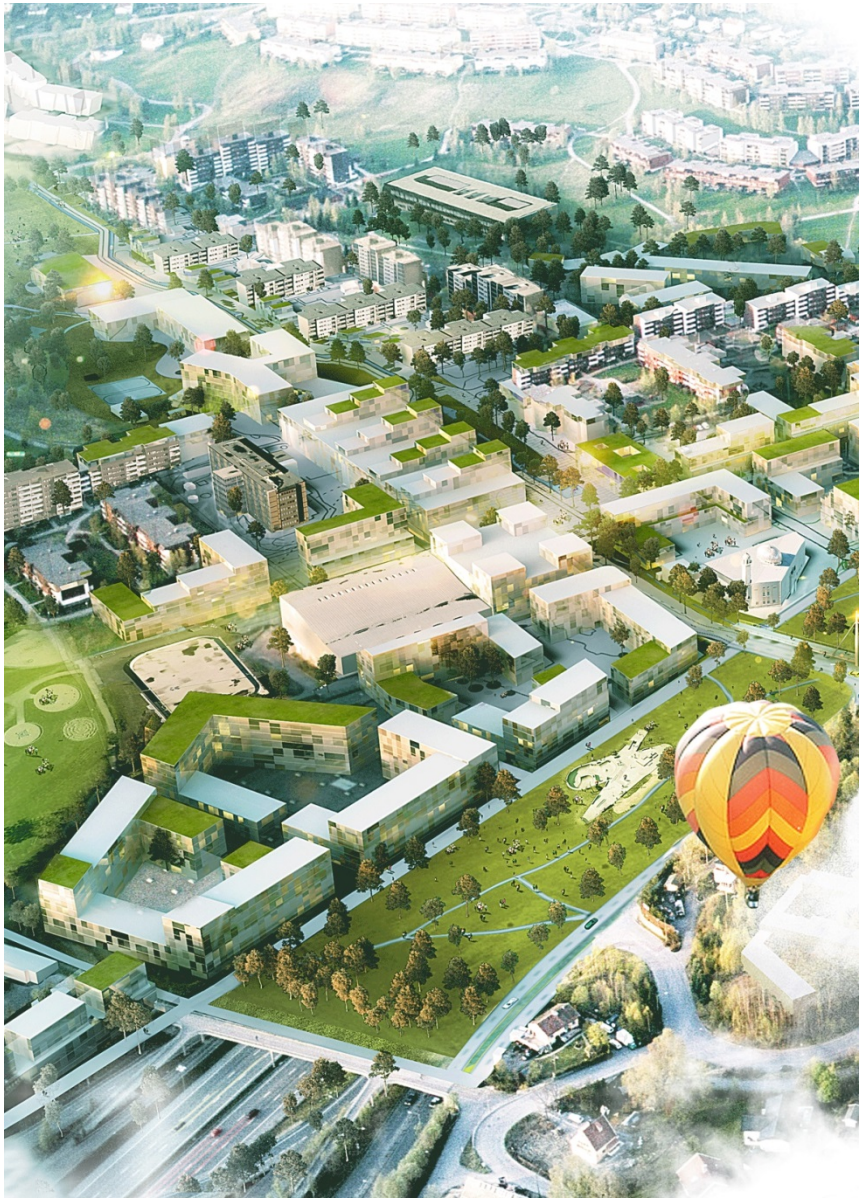


Illustration: FutureBuilt

WP4 Pilot projects and living labs

Sub-goals

To **test, verify and optimize** the performance of the solutions developed in the Centre.

To **integrate** different disciplines and serve as meeting places between researchers, building professionals, property developers, municipalities, building owners, and users.

To **learn, inspire, and disseminate** knowledge about solutions for zero emission neighborhoods

Why is ZEN important?

Government	They determine the content of regulations (buildings, energy and mobility systems), develop incentives for conducting pilot projects and control development in terms of legal framework for planning regulations as well as local and central electric/thermal energy production.

Why is ZEN important?

Municipalities and regional governments	They have ambitious goals for lowering the greenhouse gas emissions and improving the sustainability of their cities and communities. They set the framework conditions for neighbourhood/district and city development, while also being building owners and developers themselves.

Why is ZEN important?

Property owners and developers	They own and develop districts, and will be key players in testing and implementation of the zero emission neighbourhood concepts in real demonstration projects. It is they who decide whether they will build on the areas they own / control according to the terms set by the authorities.

Illustrasjon av bomiljøet i klyngetunet. Illustrasjon: Snøhetta

Innovation process

Why is ZEN important?

Public	They will be important from two perspectives; as customers and potential buyers of developers' projects and as neighbours and inhabitants and workers in the zero emission neighbourhoods.

Why is ZEN important?

Consultants and architects	They will develop market-based knowledge and competence in close collaboration with the research partners, and make sure that this knowledge is utilized in the centre demonstration projects as well as outside the centre (ensuring wider implementation).

Why is ZEN important?

ICT companies and software start-ups	They will develop apps and software solutions enabling beneficial citizen behaviour

Why is ZEN important?

Contractors	They will help industrialise the building process and develop new technologies and construction principles, in particular for new buildings as well as for large-scale energy-efficient renovation.

Why is ZEN important?

Energy companies	They will ensure that the energy systems developed for the neighbourhoods will work in synergy with the thermal and electric grids outside the neighbourhood.

Zero Village Bergen – Integrert energidesign med energifleksible løsninger

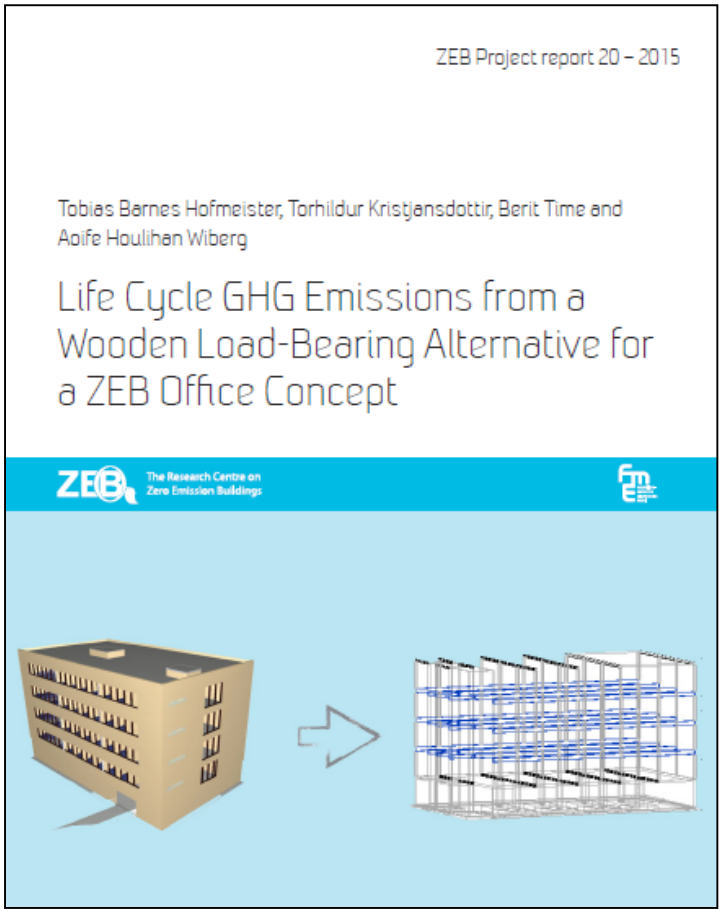
- Kompetanseprosjekt finansiert av Husbanken
- Bybo, i samarbeid med BKK, ZEB, CMR og Proxll
- Fornybar energiproduksjon og energiutveksling med nettet. E-mobilitet
- Forretningsmodeller

Why is ZEN important?

Manufacturers of materials and products	They will develop new products and integrated solutions.

Eksempel på innovasjonsbehov: Parkeringskjeller av tre

- Innovasjonsprosjekt i samarbeid mellom ByBo, SINTEF Byggforsk, Splitkon, OsloTre
- Trebaserte konstruksjonsløsninger for nullutslippsbygg
- Etasje skillere for store spenn
- Veggelementer i tre-betong
- Utfordringer: Stivhet, brannmotstand, fukt, bestandighet



Why is ZEN important?

Public institutions and trade organisations	They will ensure that the research activities and demonstration projects are relevant for the Norwegian situation, and aligned with development of Norwegian and European standards.

Potential Partners (as of October 10)

CATEGORY	PARTNERS
Municipalities	Oslo, Bergen, Trondheim, Bodø, Elverum, STFK
Property owners/developers	TOBB, ByBo, Statsbygg, Kjeldsberg Eiendom, Elverum Tomteselskap AS, Oslo S Utvikling, GC Rieber
Consultants and architects	Snøhetta, Multiconsult, Reinertsen, Asplan Viak, Civitas, SWECO
Contractors	Caverion, Skanska, GK
Energy companies	Energi Norge, Norsk Fjernvarme
ICT companies	Numascale
Manufacturers of materials and products	Siemens, Saint Gobain, Hunton, Norcem
Public institutions	NVE, Husbanken, Miljødirektoratet, DiBK
Trade organizations	Bygg21, FutureBuilt, Trefokus, NGBC
Research organizations	NTNU and SINTEF (incl. architecture and buildings, ICT, energy, social sciences)

Utvikling - fra **Forskning og Utvikling** til **Teknisk forskrift**

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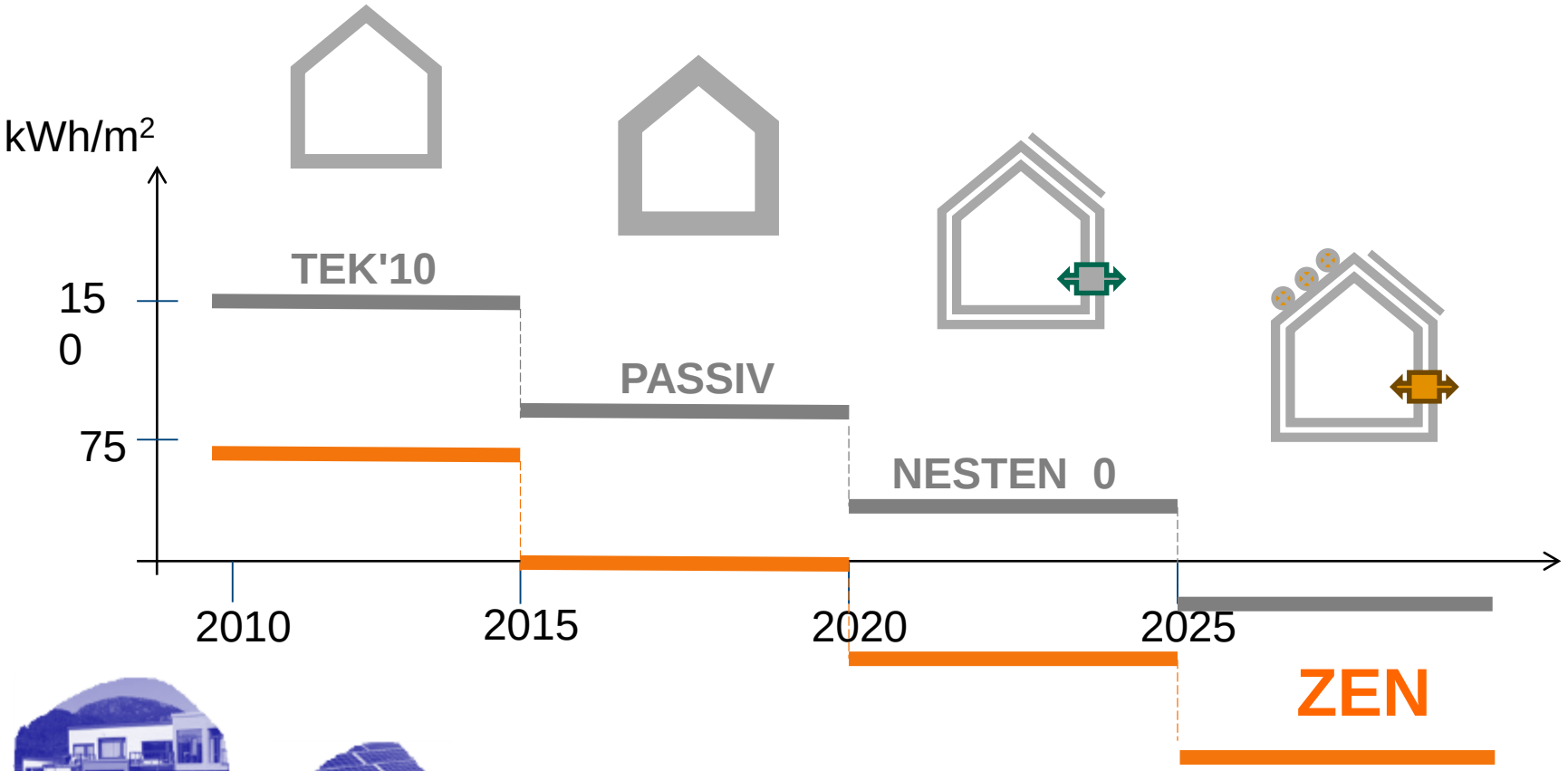

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