



The ZEB Research Centre and Pilot Buildings

Zero Emission Buildings forskningscenter og pilotbygg

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The Research Centre on
Zero Emission Buildings



ZEB's Main Objective

is to develop competitive products and solutions that will lead to market penetration of buildings with **zero greenhouse gas emissions related to their production, operation, and demolition.**

The centre will encompass both residential, commercial, and public buildings.

www.zeb.no



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ZEB Facts

- ZEB is a Centre for Environment-friendly Energy Research (FME), funded by the Research Council of Norway (RCN) and 26 partners.
- Host institution is NTNU with SINTEF Building and Infrastructure and SINTEF Energy Research as research partners.
- Centre started in November 2009, and RCN funds the Centre for 8 years. 50% funding from industry.
- Total budget: ca. 290 MNOK (+ additional to research infrastructure)



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ZEB Centre Partners

- **Users (the reference group)**
- **Contractors**
- **Producers of materials and products for the building industry**
- **Consultants, architects**
- **Property managers**
- **Public administration**
- **Trade organizations**
- **University and research institutions**
- **The Research Council**

Skanska
Caverion
Weber
Isola
Glava
Protan
Sapa Building Systems
NorDan
Velux
DuPont
Brødrene Dahl
Multiconsult
Snøhetta
ByBo
Entra Eiendom
Forsvarsbygg
Statsbygg
Sør-trøndelag fylkeskommune
Enova
Husbanken
Direktoratet for byggkvalitet
Byggenæringens landsforening
Norsk Teknologi
NTNU
SINTEF Byggeforsk, SINTEF Energi
Norges forskningsråd



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Other Institutions Cooperating with ZEB

International partners

- VTT (Finland)
- Chalmers (Sweden)
- Fraunhofer (Germany)
- TNO (The Netherlands)
- LBNL (USA)
- MIT (USA)
- University of Strathclyde (Scotland)
- Tsinghua University (China)
- Shanghai JiaoTong University (China)
- Politecnico di Torino (Italy)
- EMPA (Switzerland)
- ..

Reference group

- Lavenergiprogrammet
- NBBL
- NVE
- Forbrukerrådet
- EcoBox
- Driftsforum
- Arkitektbedriftene



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ZEB Research Activities

WP1 Advanced materials technologies

WP2 Climate-adapted low-energy envelope technologies

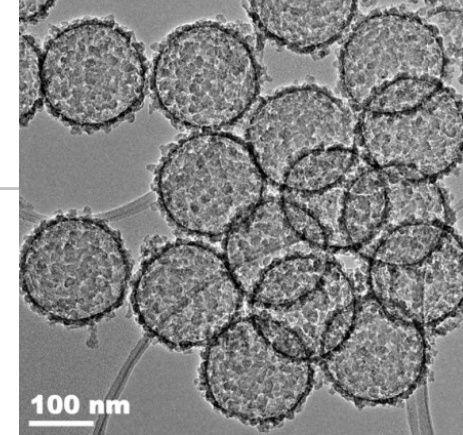
WP3 Energy supply systems and services

WP4 Use, operation, and implementation

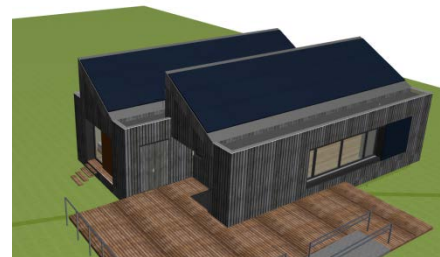
WP5 Concepts and strategies and Pilot buildings



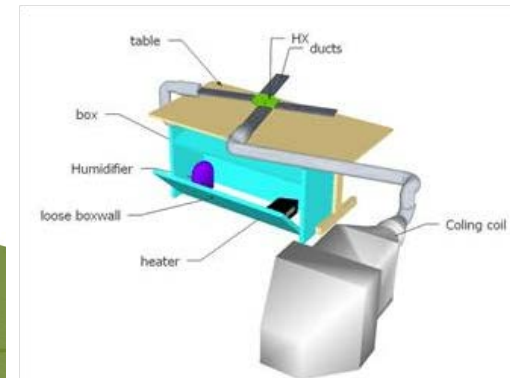
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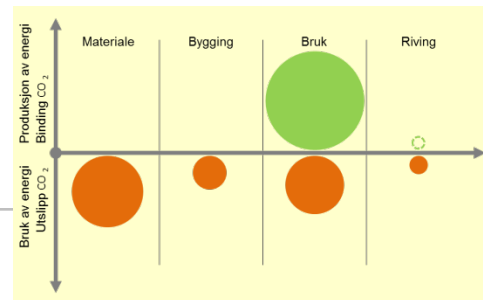
Nano insulation material



ZEB Living Lab



Membrane heat exchanger



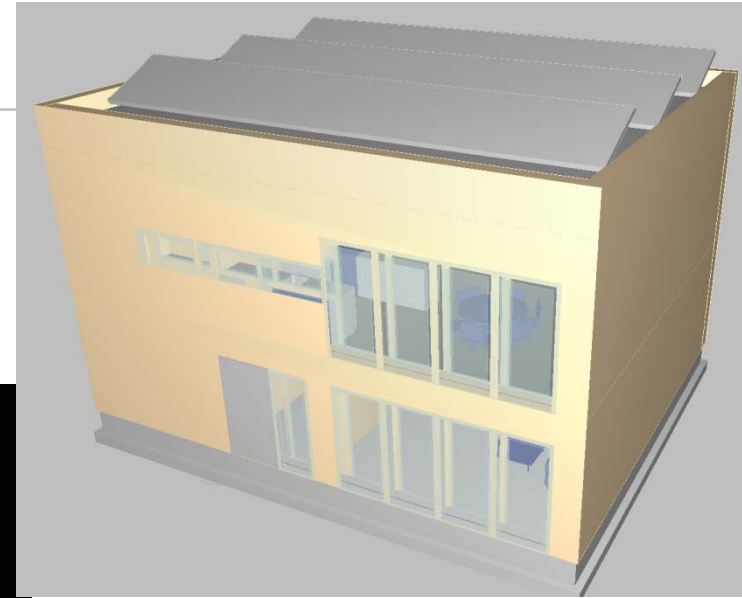
ZEB Definition

ZEB Pilot buildings

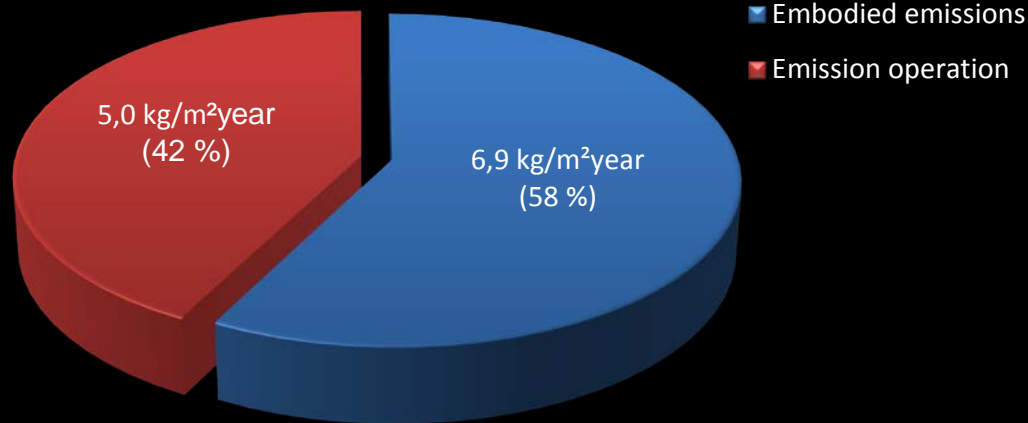


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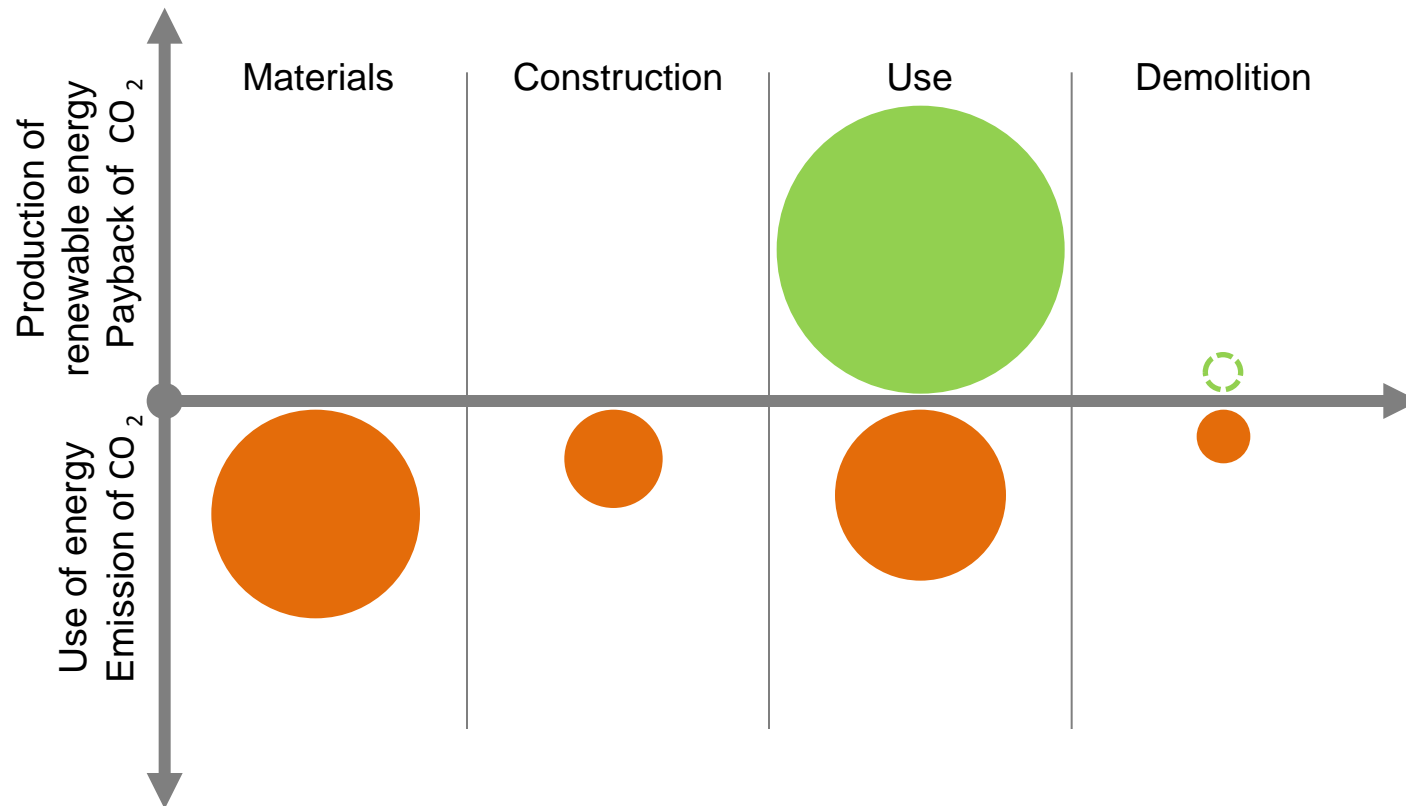
Concept Work - Dwelling



Embodied and operational emissions



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



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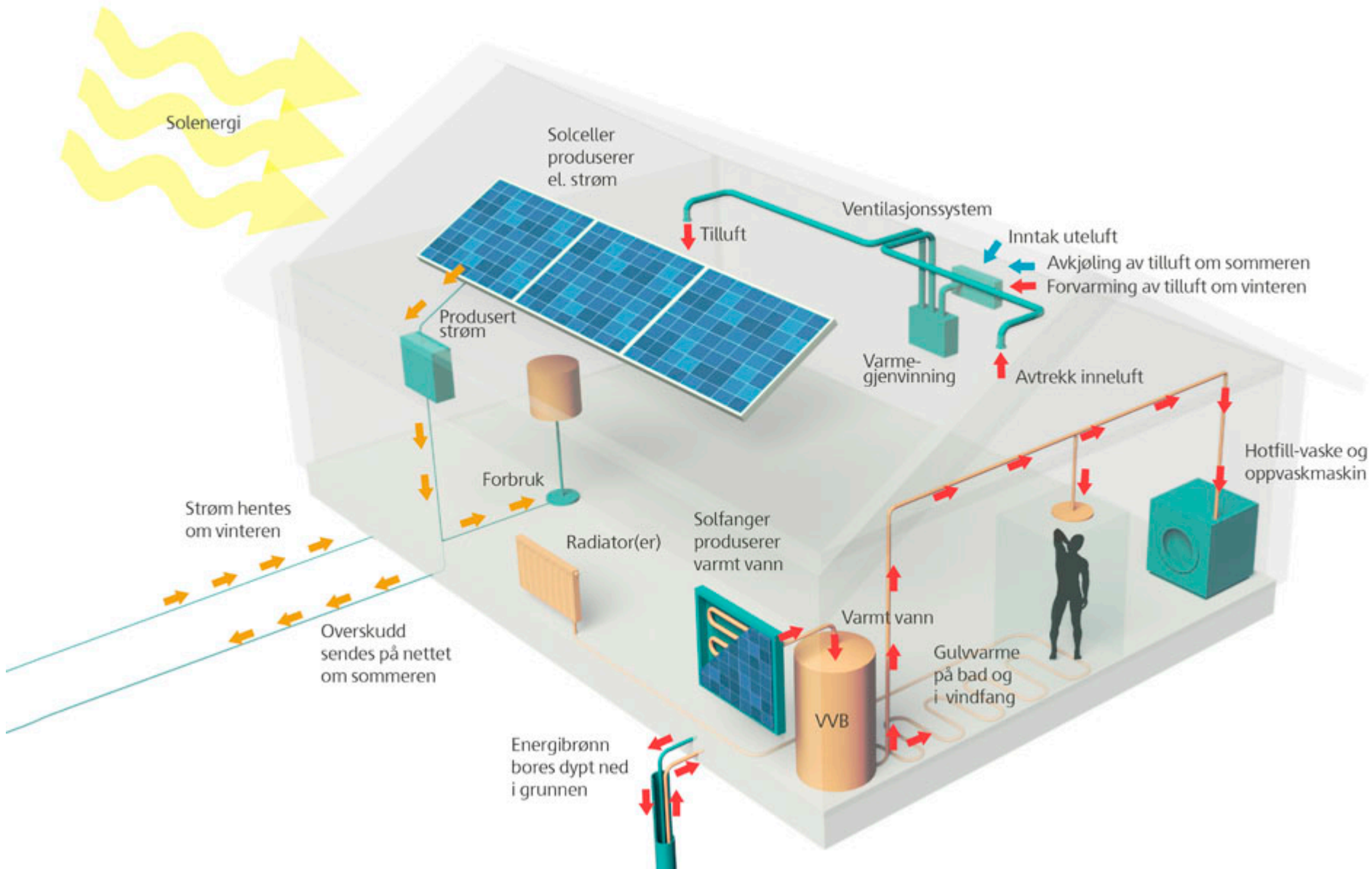


ZEB Pilot building Skarpnes Dwelling area, Arendal



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ZEB Pilot Building: Powerhouse Kjørbo, Sandvika



Illustrasjon: Snøhetta/MIR



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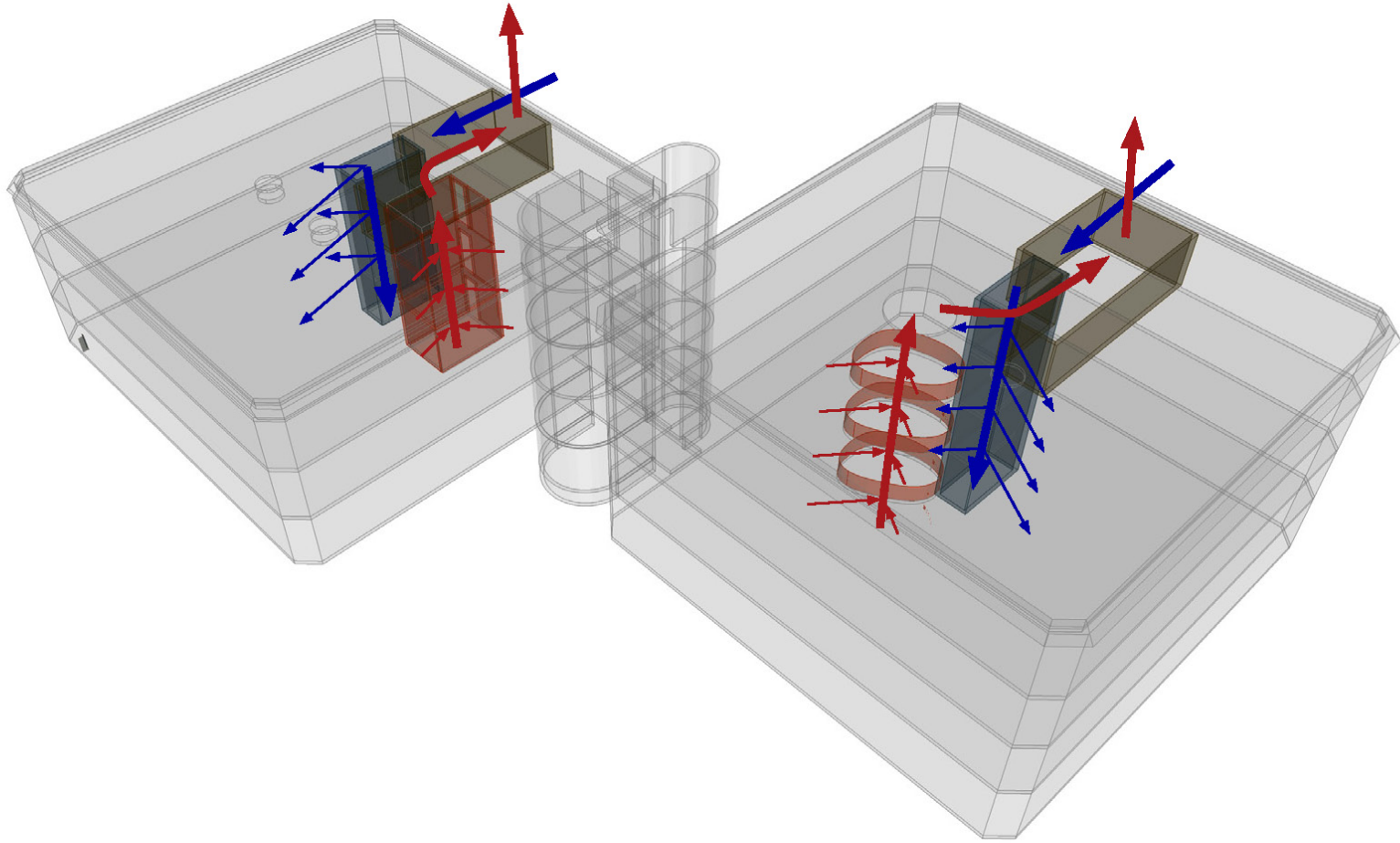










Foto: Caroline Drefvelin



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Multikomfort Larvik - demonstration home

Owner: Brødrene Dahl and Optimera, Architects: Snøhetta, Illustration: MIR



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Multikomfort Larvik - demonstration home.
Reuse of brick. Use of wood.

Owner: Brødrene Dahl and Optimera
Architects: Snøhetta
Illustration: MIR

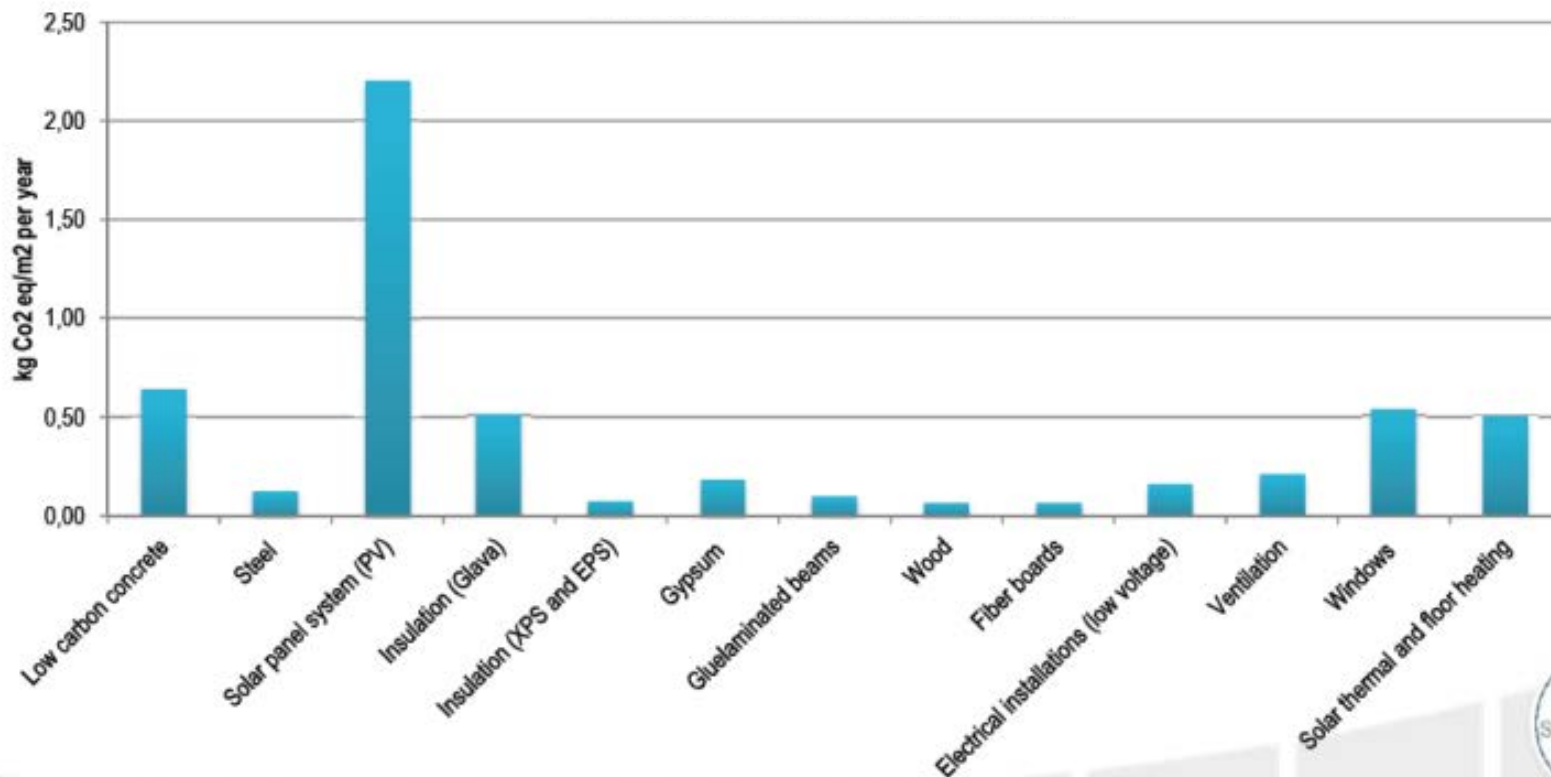


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Multikomfort Larvik - demonstration home

Material usage



 BRØDRENE DAHL



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A Zero Emission Neighbourhood Development at Ådland, Bergen

Developer: Bybo AS
Architect: Snøhetta
Illustration: MIR/Snøhetta

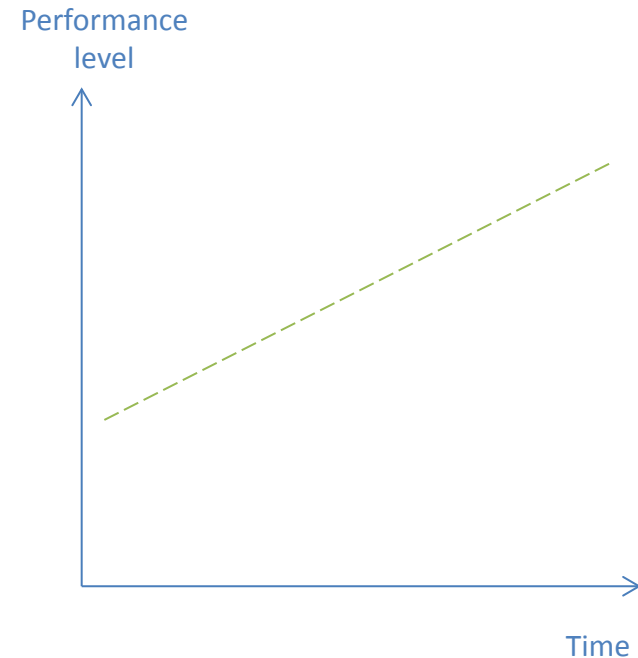


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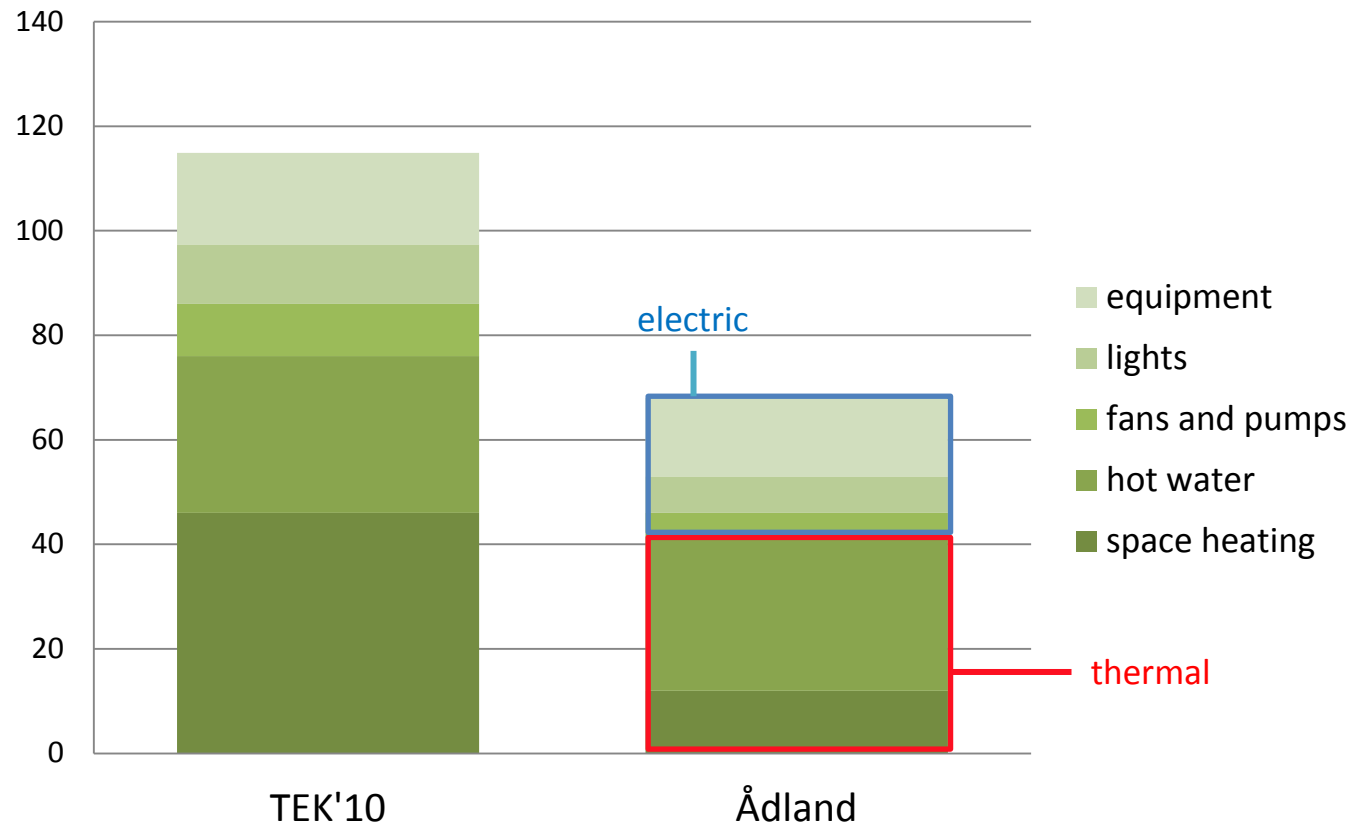


ZEB Challenges for Zero Village Bergen

- Setting more and more ambitious energy performance goals for each construction phase
- Exchange of energy between buildings, to/from grid, storage, and with electromobility
- Business models: Co-operation with local utility company (BKK)



Yearly net energy demand for operation [kWh/m² HFA]





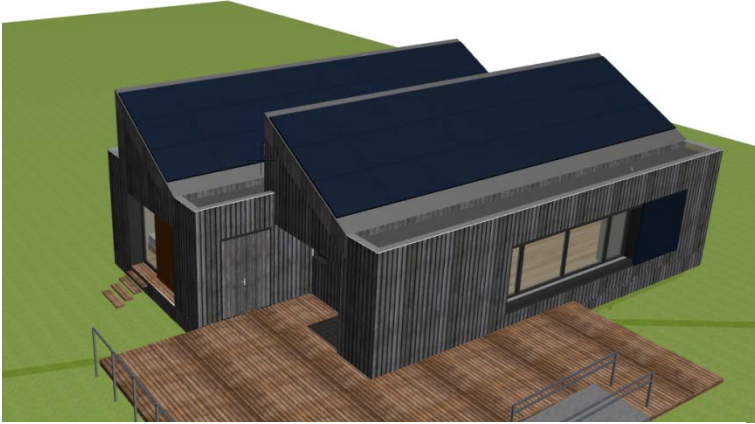
Illustrasjon av bomiljøet i klyngetunet. Illustrasjon: Snøhetta



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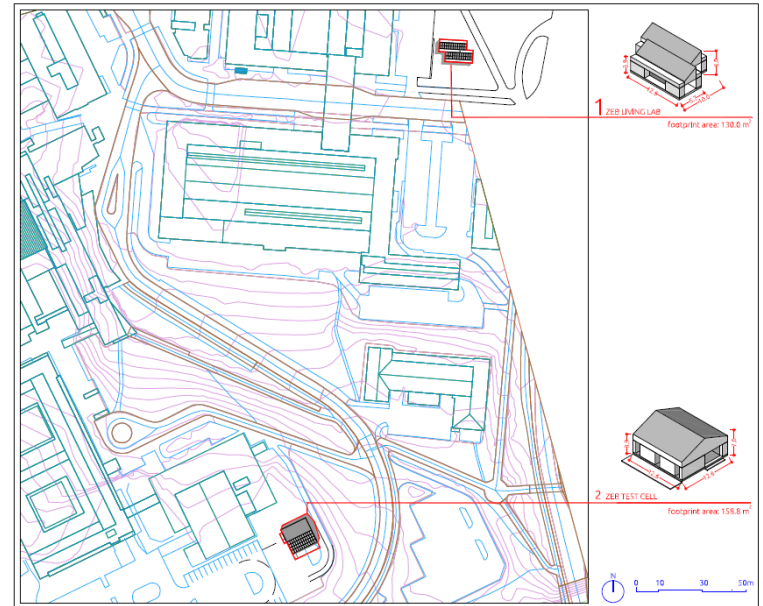
ZEB Living Lab and Research Cell



ZEB Living Lab – A dwelling for user-technology studies



ZEB Test Cell for testing av different technologies



Thank you for your attention

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