Student family housing, Kringsjå Village, Oslo
ZEB-COM – FutureBuilt project

Eivind Selvig, Civitas, ZEB+ Conference 6.-7. Nov 2019

The developer and owner: SiO - The Student Welfare Organisation of Oslo and Akershus

Architects and landscape: LMR Architects

Contractor: SEBY Veidekke

Sustainability: Civitas

GHG/LCA calculations: Erichsen&Horgen

Financed by the Ministry of Education and Research and Loan from Husbanken. Energy solutions supported with grants from Enova

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The team creating the feasibility study

LMR | arkitektur | as	PGL Prosjekteringsleder ARK Arkitekt IARK Interiørarkitekt LARK Landskapsarkitekt
COWI	RIB Rådgivende ingeniør byggeteknikk og bygningsfysikk
siv. ing. Erling Bjartnes a.s.	RIV Rådgivende ingeniør VVS-teknikk
BJØRN JØRGENSEN AS	RIE Rådgivende ingeniør elektroteknikk
Roar Jørgensen as	RIBR Rådgivende ingeniør brannteknikk
BREKKE STRAND	RIA Rådgivende ingeniør akustikk
CIVITAS	RIM Rådgivende ingeniør miljø
iTRE	Massivtre - prosjektutvikler
	Med underrådgivere:
LØVLIEN GEORÅD	RIG Rådgivende ingeniør i geoteknikk

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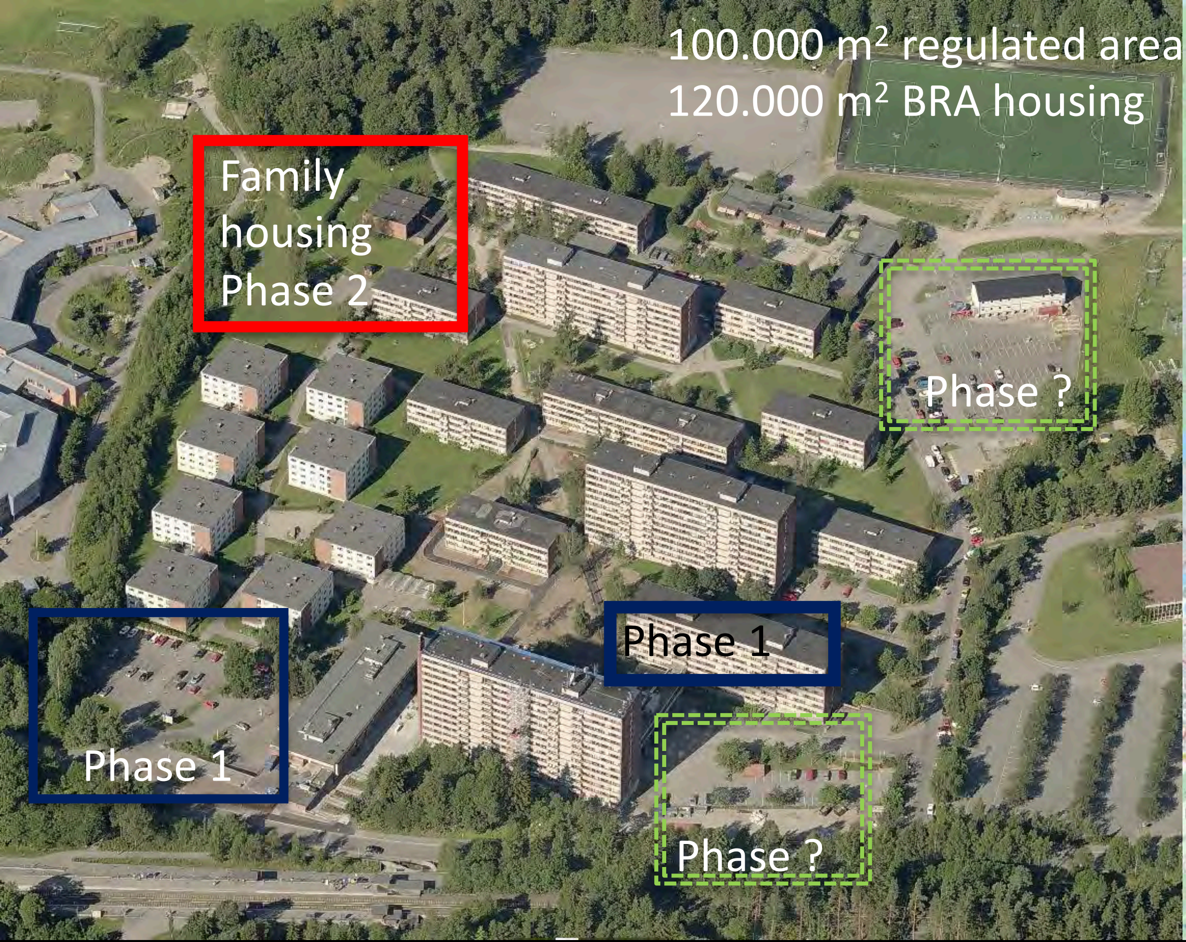

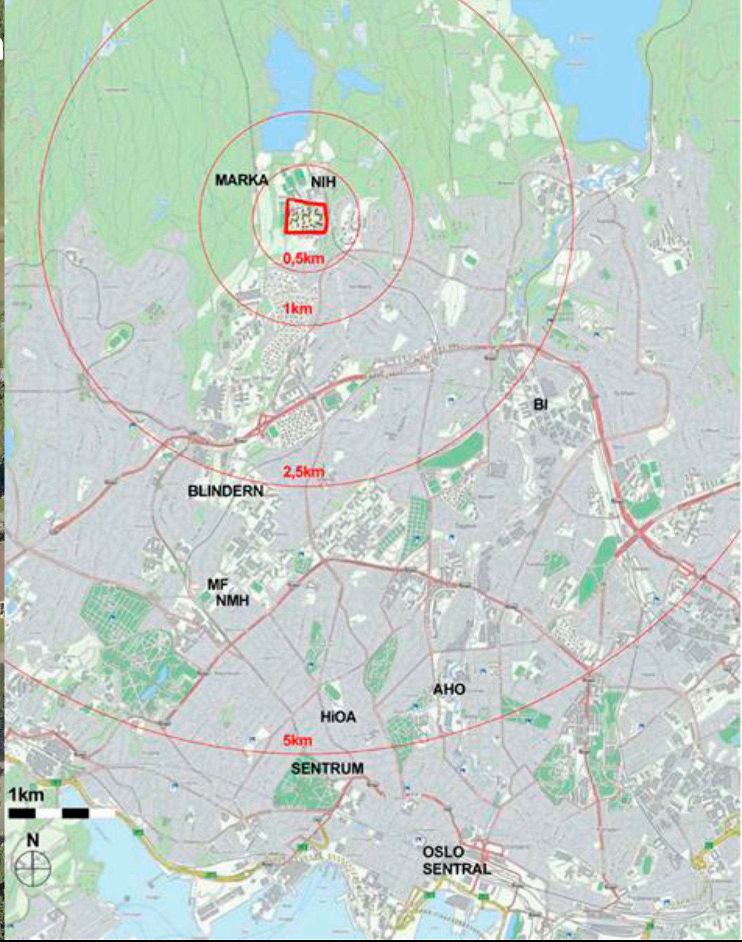

Kringsjå Village, student housing in Oslo's outskirt but only 5 km from city center

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Phase I of transforming Kringsjå to a ZEN village, …?

Two new buildings 9 and 11 storeys, Oslos tallest CLT-wooden buildings.
Rebuild and refurbish several of the old multi story buildings
Transforming the outdoor spaces; rain beds, activity zones, play grounds etc.

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Phase II is the Family housing

Three new buildings 4-5 storeys, 82 flats, each 50 m², total ca 6.000 m² BRA

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The Future Built criteria’s – the ambitions – the goals

- 50 % GHG reduction compared to a reference
- Passive house towards nZEB
- Central localization, low carparking, biking and waking
- Urban qualities – quality document
- Inovation , documentation, demonstration and sharing

SiOs climate, energy and sustainability strategy and goals -

- Developers Road map 2050, …
- At least 40 % reduction in 2030 GHG (total)
- Environmental performance goals, indicators, …
  (MP, MOP)

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Transport emissions in the use phase (B8)

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Oslo T-bane
1
5
6
Frognerseteren
Holmenkollen
Sognsvann
Ringen
4 6
Nydalen
Storo
Sinsen
Ullevål stadion
Forskningsparken
Blindern
Carl Berners plass
Vestli
Haugerud
Tveita
Ellingsrudåsen
Bergkrystallen
Mortensrud
Avløs
Majorstuen
Nationaltheatret
Stortinget
Jernbanetorget
Tøyen
Grønland
2
3
4


3166

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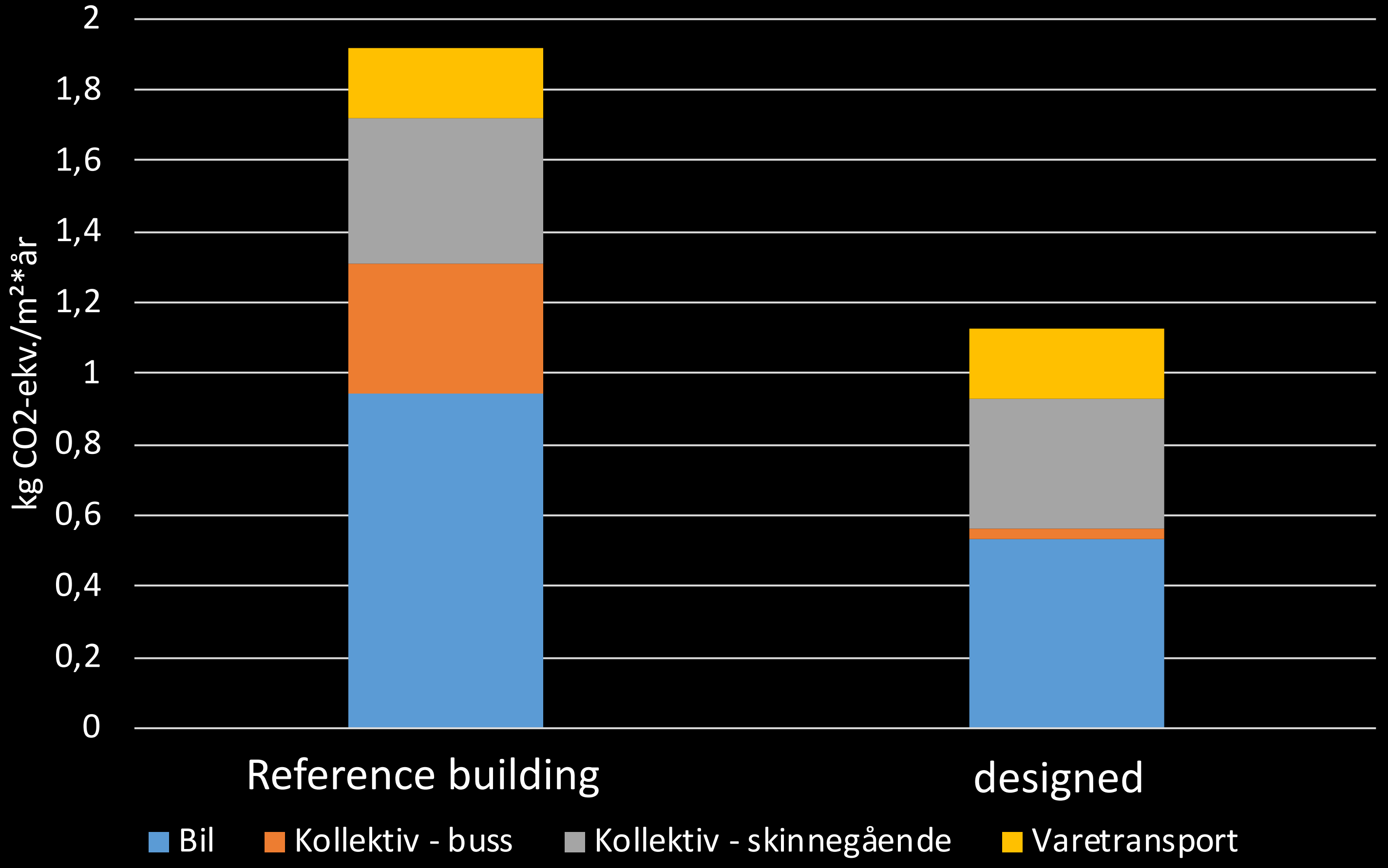

2
1,8
1,6
1,4
1,2
1
0,8
0,6
0,4
0,2
0
kg CO2-ekv./m²*år
Reference building
designed
Bil
Kollektiv - buss
Kollektiv - skinnegående
Varetransport

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Construction (A5)

Fossil free construction site
90-95% vaste sorting

The next step is zero emission construction sites incl. transport to/from site

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Embodied emissions materials (A1 – C4 and D1)

Minimizing groundwork and foundations

Minimizing amount of concrete
Low carbon concrete, class A
99% res. reinforcement steel

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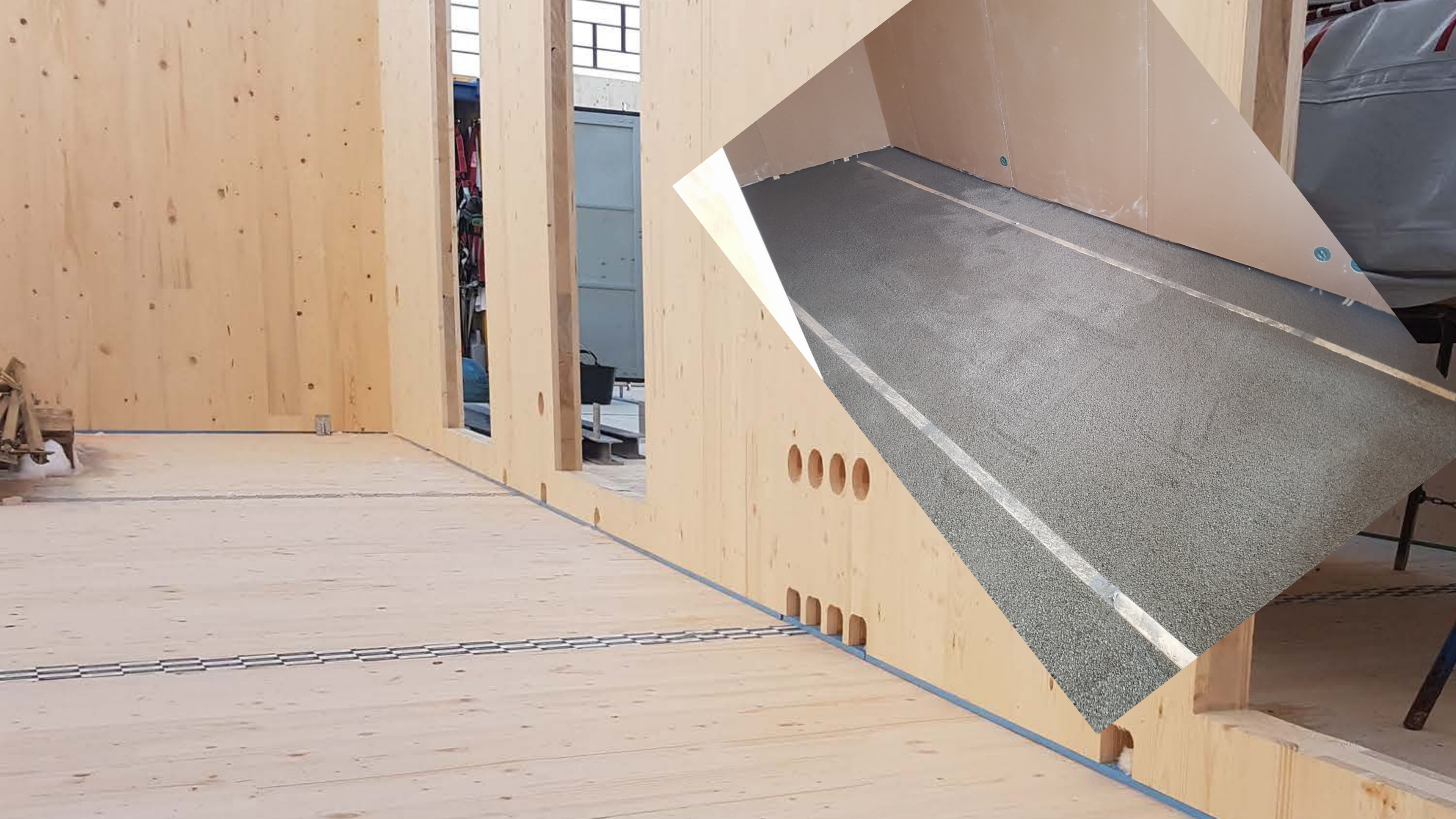
CLT (Austeria)
Glava insulation
Facade – thermo pine

Slabs: CLT, gravels(7 cm) with technical infrastr., acoustic underlay, wood floors, linoleum/vinyl



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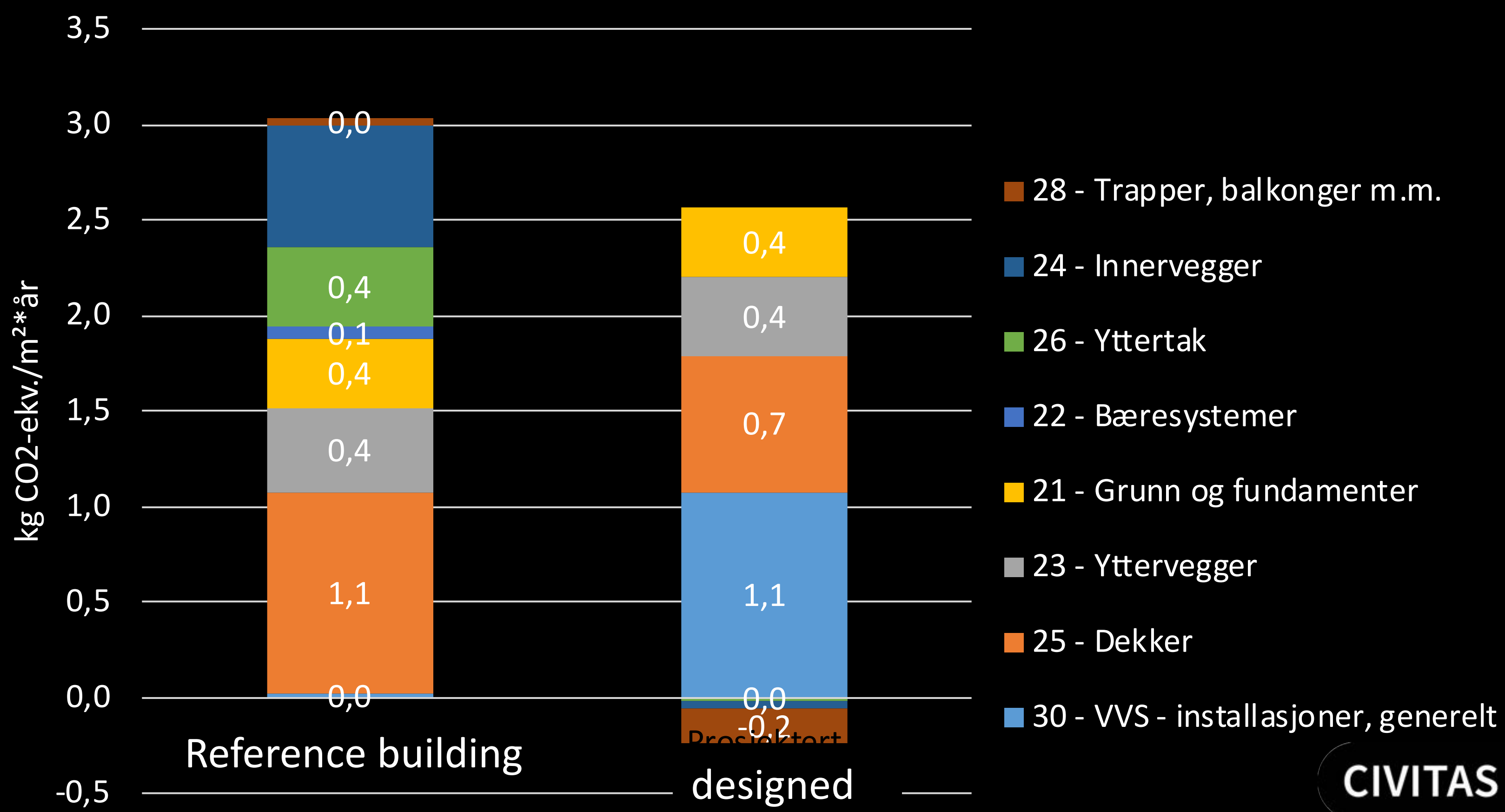
GHG-emissions - Student family housing Kringsjå Village
Embodied emissions materials - A1 - D1



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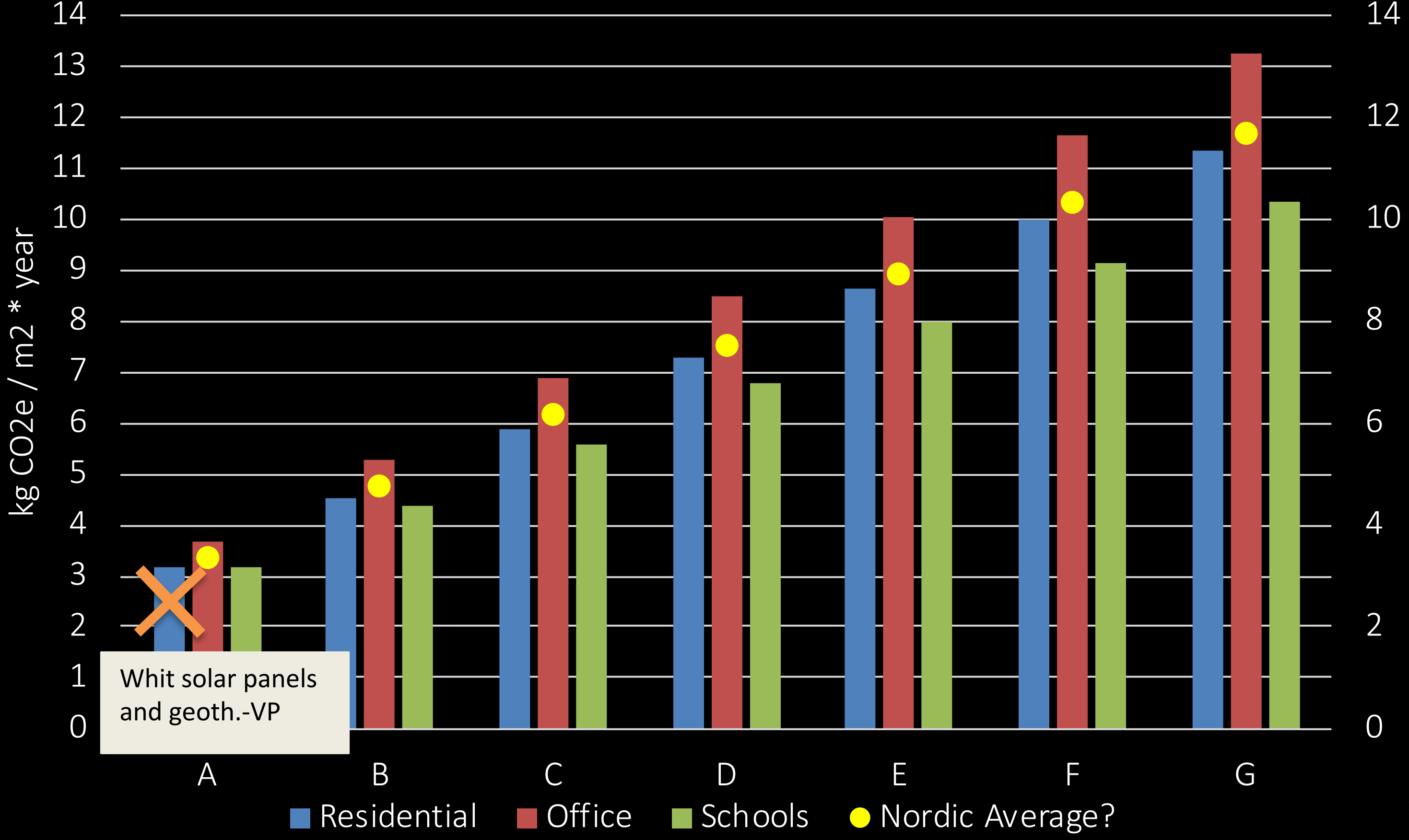
GHG-emission - benchmark - Materials Embodied GHG Nordic countries – One Click LCA (june 2019)



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Energy use (B6)

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Passive house – positive energy

16 geothermal wells, each 36.000 - 40.000 kWh/year => 570 000 og 640 000 kWh/year

Three different PVs; PV (roof and facade), bi-facial PV and PV-Th (roof).

Geoth. and PV-Th. Covers 100% of the heat demand

El from solar panels used near 100% to run the HP

Export of heat to the neighbourhood heat plant

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Energibudsjett (NS 3700)		
Energipost	Energibehov	Spesifikt energibehov
1a Romoppvarming	21531 kWh	11,8 kWh/m²
1b Ventilasjonsvarme (varmebatterier)	4517 kWh	2,5 kWh/m²
2 Varmtvann (tappevann)	54136 kWh	29,8 kWh/m²
3a Vifter	7833 kWh	4,3 kWh/m²
3b Pumper	1390 kWh	0,8 kWh/m²
4 Belysning	20701 kWh	11,4 kWh/m²
5 Teknisk utstyr	31860 kWh	17,5 kWh/m²
6a Romkjøling	0 kWh	0,0 kWh/m²
6b Ventilasjonskjøling (kjølebatterier)	0 kWh	0,0 kWh/m²
Totalt netto energibehov, sum 1-6	141968 kWh	78,1 kWh/m²

Resultater av evalueringen

Evaluering mot NS 3700:2013	Beskrivelse
Varmetapsramme	Bygningen tilfredstiller kravet for varmetapstall
Energiytelse	Bygningen tilfredsstiller krav til energiytelse
Minstekrav	Bygningen tilfredsstiller minstekrav til enkeltkomponenter
Luftmengder ventilasjon	Luftmengdene tilfredsstiller minstekrav gitt i NS3700:2013
Samlet evaluering	Bygningen tilfredstiller alle krav til passivhus

Energiytelse

Beskrivelse	Verdi	Krav
Netto oppvarmingsbehov	12,8 kWh/m²	15,1 kWh/m²
Netto kjølebehov	0,0 kWh/m²	0,0 kWh/m²
Energibruk el./fossile energibærere	35,5 kWh/m²	61,4 kWh/m²

Levert energi til bygningen (NS 3700)

Energivare	Levert energi	Spesifikk levert energi
1a Direkte el.	163492 kWh	38,1 kWh/m²
1b El. til varmepumpesystem	54795 kWh	12,8 kWh/m²
1c El. til solfangersystem	0 kWh	0,0 kWh/m²
2 Olje	0 kWh	0,0 kWh/m²
3 Gass	0 kWh	0,0 kWh/m²
4 Fjernvarme	0 kWh	0,0 kWh/m²
5 Biobrensel	0 kWh	0,0 kWh/m²
6. Annen energikilde	0 kWh	0,0 kWh/m²
7. Solstrøm til egenbruk	-66046 kWh	-15,4 kWh/m²
Totalt levert energi, sum 1-7	152242 kWh	35,5 kWh/m²
Solstrøm til eksport	-38080 kWh	-8,9 kWh/m²
Netto levert energi	114162 kWh	26,6 kWh/m²

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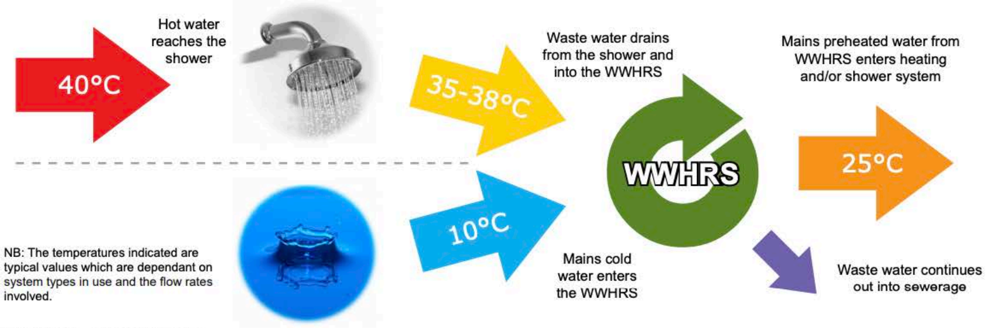
PIPE+HE PRODUCT OVERVIEW

- DOUBLE-WALLED COPPER HEAT EXCHANGER
- NO PLANNED MAINTENANCE
- DESIGNED FOR FIRST-FLOOR SHOWERS OR ABOVE
- FITS WITHIN STANDARD UK CEILING HEIGHT
- UP TO 67% HEAT RECOVERY EFFICIENCY
- 3 RECOGNISED INSTALLATION METHODS
- NO-END USER INTERACTION REQUIRED
- HIGH QUALITY EU MANUFACTURE
- FIRST-FIX FRIENDLY DESIGN
- SAP LISTED
- WRAS APPROVED
- LEGIONELLA CONTROL RISK ASSESSED
- COST-EFFECTIVE SAP POINTS FOR PART-L COMPLIANCE

WASTE WATER HEAT RECOVERY

WWHRS is the abbreviation of Waste Water Heat Recovery System. In the simplest terms a system or technology that uses a heat exchaging process to transfer the remaining heat from shower waste water and increase the heat of cold mains water coming into the system. Less energy is then used to increase the heat of the preheated mains water to the required temperature.



NB: The temperatures indicated are typical values which are dependant on system types in use and the flow rates involved.

Solar panels – Three different products

Solcellearealer	Tak (Dual Sun Spring)	Tak (JA Solar 315)	Tak (Solitek Bifacial)	Fasade (JA Solar 315)
OMT 38	166 m²			
OMT 38+40		465,8 m²		
OMT 40 + 42				118,1 m²
OMT 42			176 m²	

Tekniske data	OMT38 (Dual Sun Spring)	OMT38+40 (JA Solar 315)	OMT42 (SoliTek Bificial)	OMT40+42 (JA Solar 315)
Nominell virkningsgrad	0,172	0,193	0,1811	0,193
Tapsfaktor panel	0,889	0,908	0,987	0,897
Tapsfaktor inverter	0.976	0,972	0,963	0,972/0,963
Hellningsvinkel	15	10	15	90
Himmelretning	196	106 47%/286 53%	196	106

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LG NeON 2 BiFacial
315W
Double-sided Generation
Better Performance in any Weather
BOS Saving
Grass
Sand
Snow
White Paint
Additional

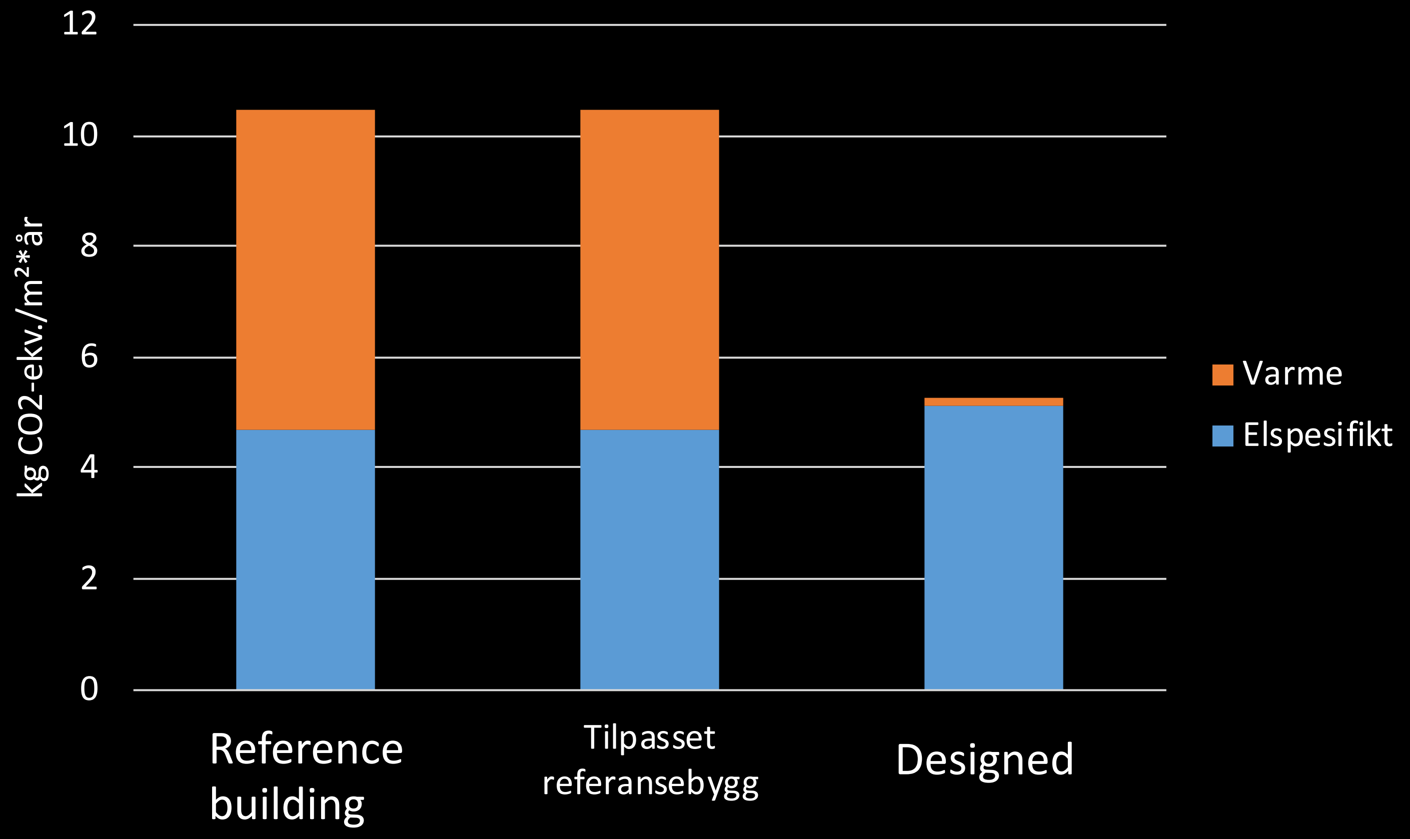
Hybrid Sky

The intelligent combination of solar thermal energy and photovoltaics

Higher electrical yield due to cell cooling

- Space-saving and energy-efficient system through the combination of solar thermal energy and photovoltaics
- High-efficiency monocristalline cell technology
- Up to 17.7 % electrical module efficiency
- Ca. 10% higher electrical yield than with conventional PV modules due to efficient cell cooling
- 60 % thermal module efficiency
- Optimized for operation in the low temperature range
- Very high load carrying capacity thanks to 5 mm toughened solar glass
- Successfully certified for hail resistance class HW 4 (40 mm diameter hailstones)
- A Swiss quality product from Thun
- Punctual delivery

GHG-emissions - Student family housing Kringsjå Village
Energy use



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ZEB-COM – definitions and constraints

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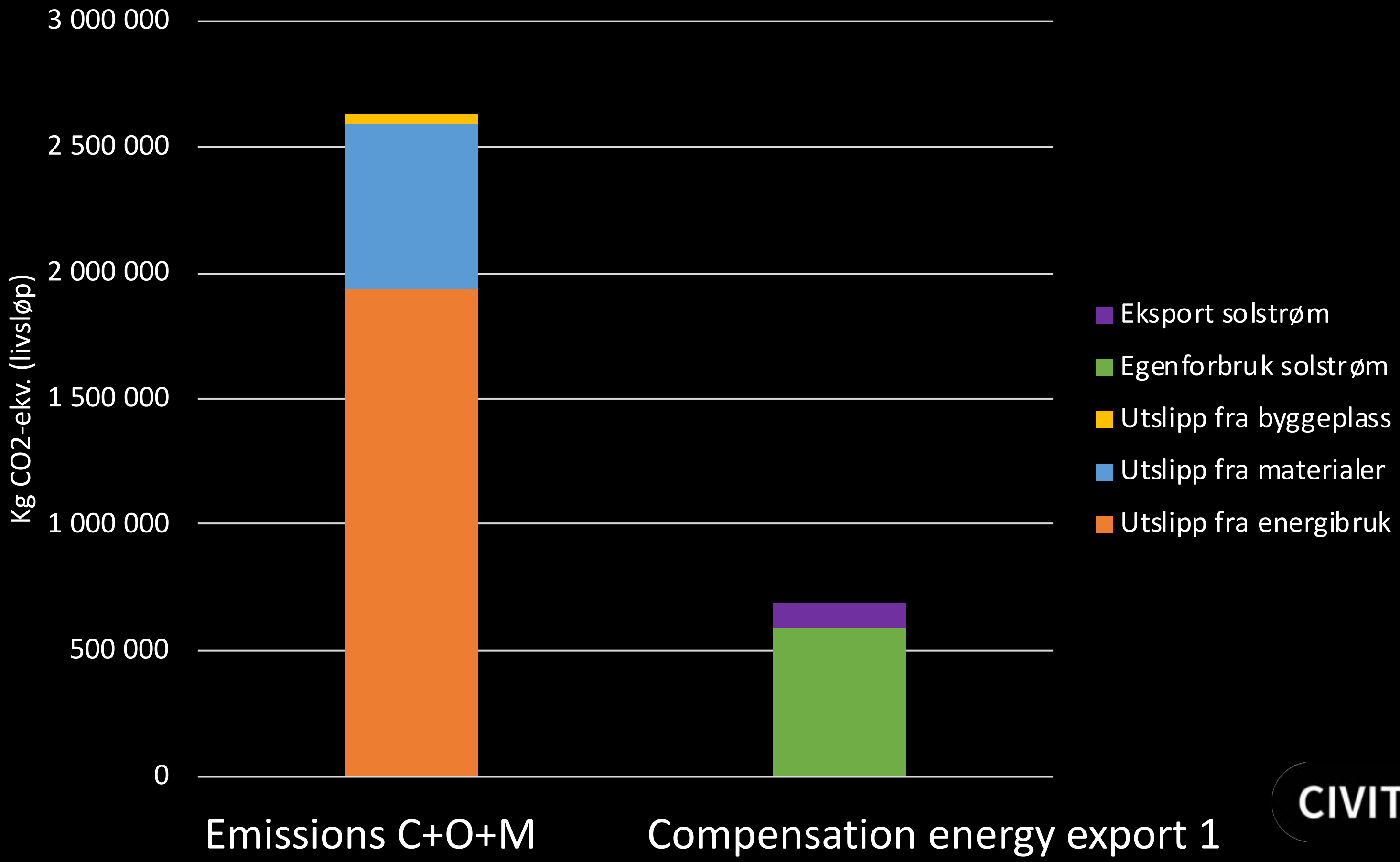
GHG-emissions - Student family housing Kringsjå Village
Zero Emission Building – ZEB-COM



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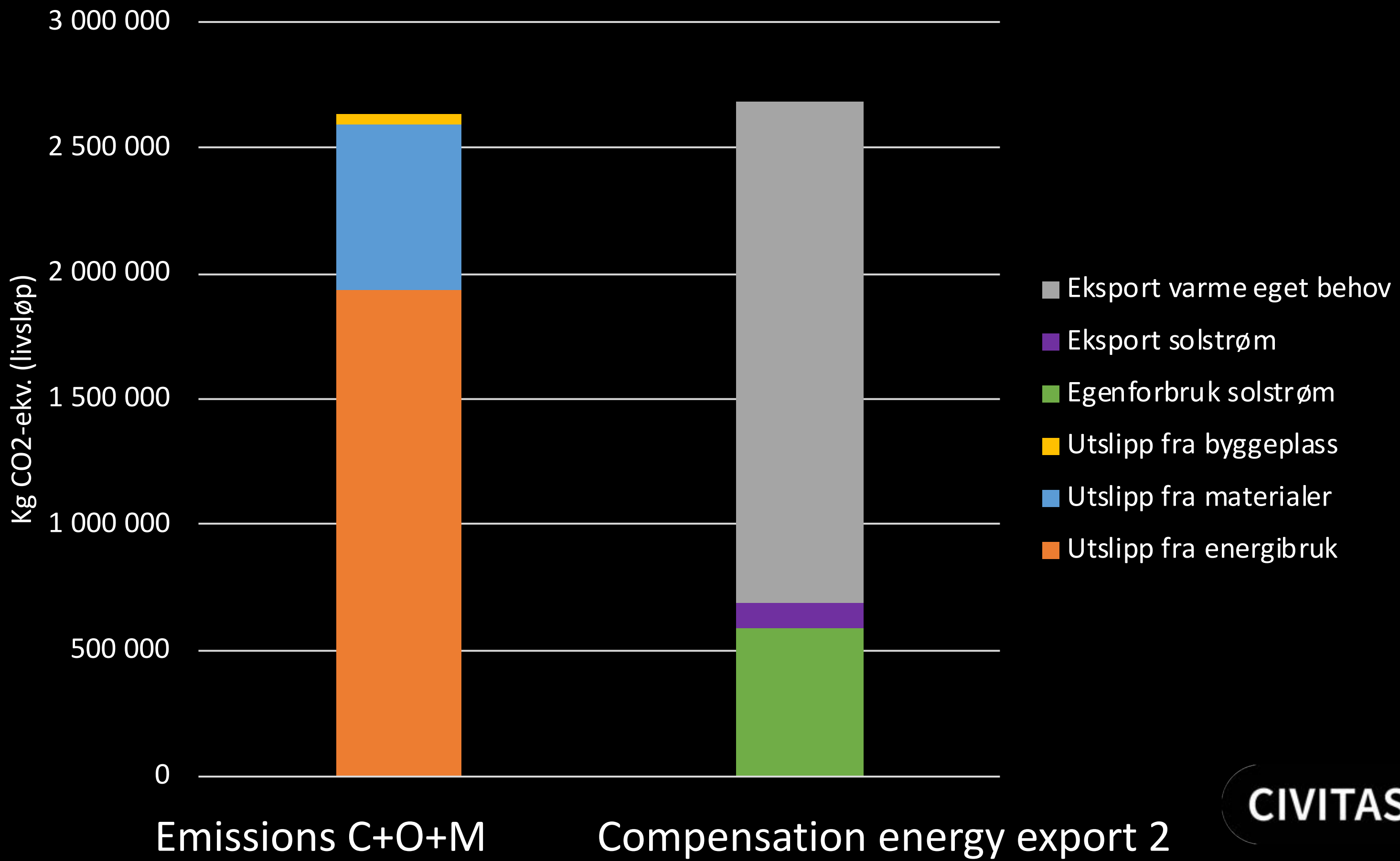
Zero Emission Building – ZEB-COM



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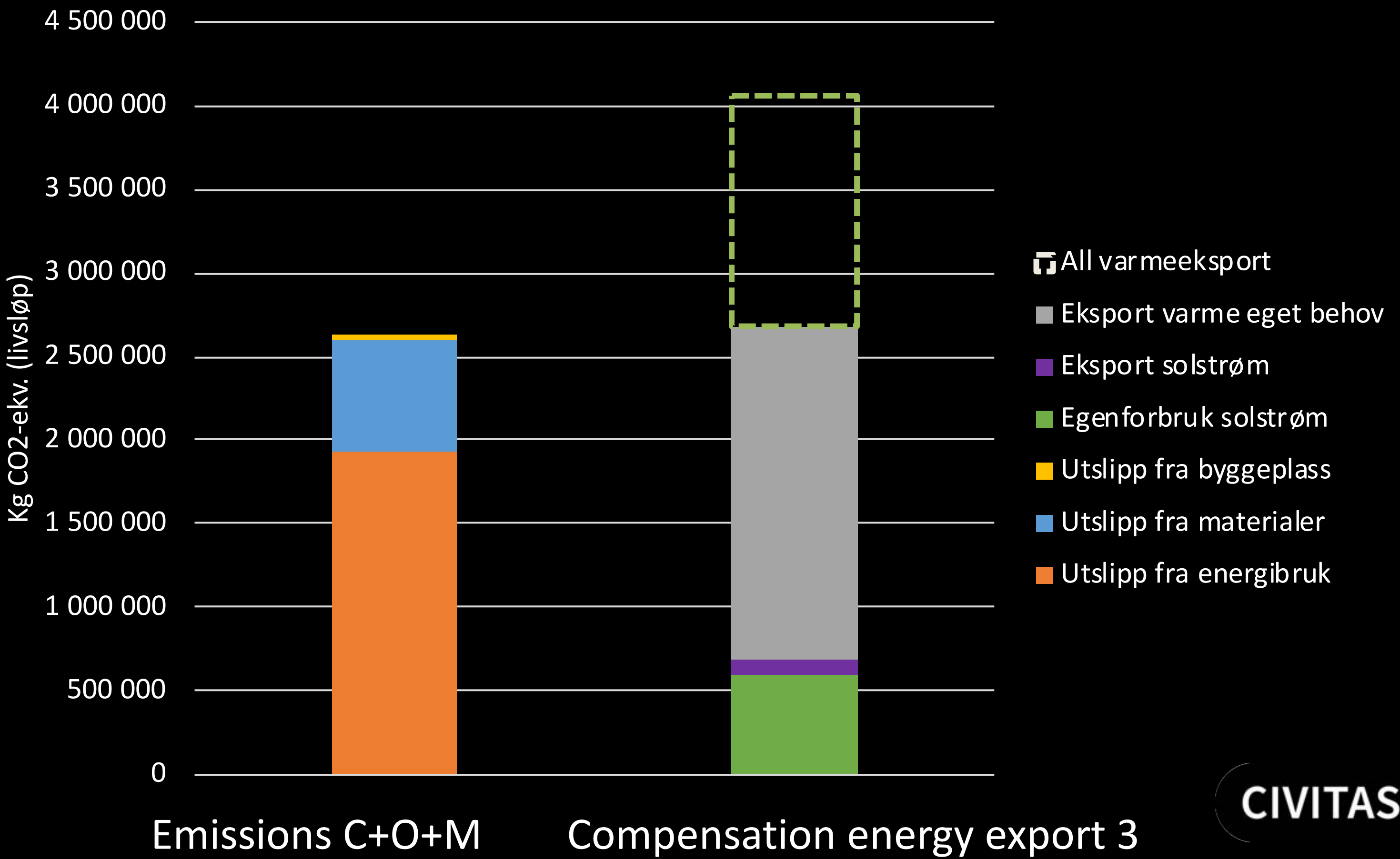

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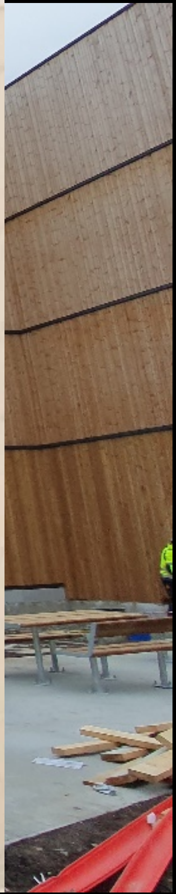

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