

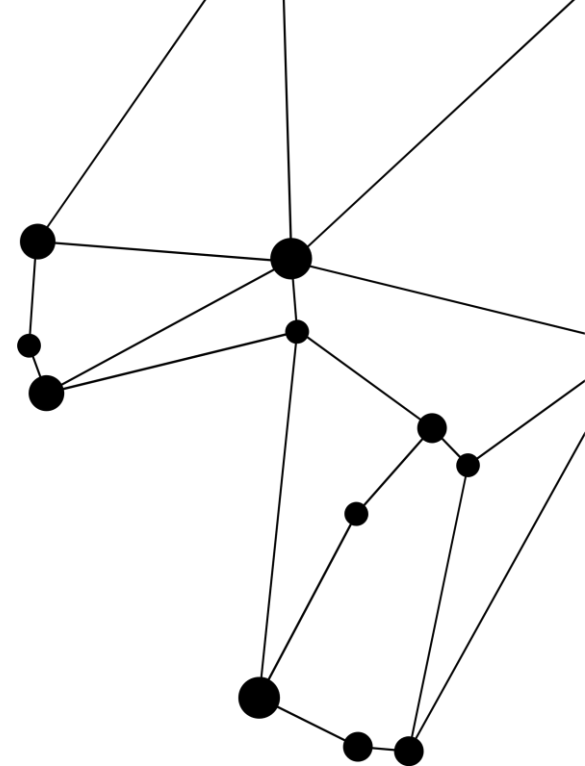
# Horten upper secondary school

– Collaboration is the key to success



# ■ Grethe Brox-Nilsen

Nationality	Norwegian
Education	Master in Architecture
Firm	LINK arkitektur AS
Position	Architect and project leader
Main gig	Worked with housing, nursing homes and offices. Special field is schools.
Also	Middle manager at LINK arkitektur AS



## ■ Arnkell Jónas Petersen

**Nationality** Icelandic

**Education** Sheet Metalworker 3rd. gen.  
M.Sc. Indoor Environmental Engineering at Aalborg

**Firm** Erichsen & Horgen A/S

**Position** Section lead Indoor Climate, Daylight & Energy

**Main gig** Consultancy and projecting of energy-efficient buildings, optimizing building in regard to daylight, energy use, indoor climate, energy supply, environmental goals, etc.

**Also** Professor II at AHO



**Collaboration is the key to success...**



# Game theory

- The study of interaction between rational actors

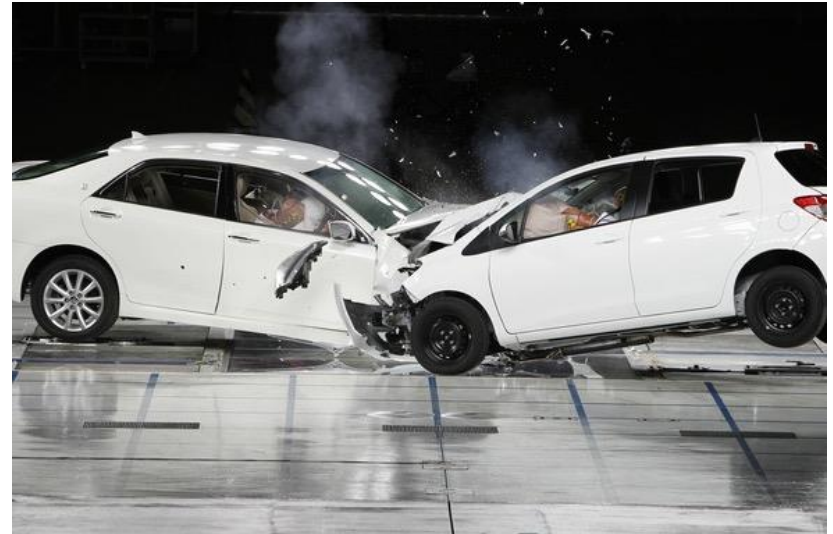




# Game theory

■ The study of interaction between rational actors

	Viker	Holder fast
Viker	0,5 / 0,5	0 / 1
Holder fast	1 / 0	0 / 0



# Game theory







## ■ Hunting scenario

- 2 on hunting can hunt hare (1 p) or deer (2 p)
- choices are
  - to work together to take a deer
  - take the first best hare
- Results
  - Cooperate => both win big
  - if both partners cooperate to get the deer, but one of them takes a hare => only he gets a win, but a small win
  - If both go for the hare => both get a small win

	Deer	Hare
Deer	2 / 2	0 / 1
Hare	1 / 0	1 / 1



**Collaboration is the key to success...**



## Collaboration in other projects



Kilden kindergarden



Tvedestrand upper secondary school



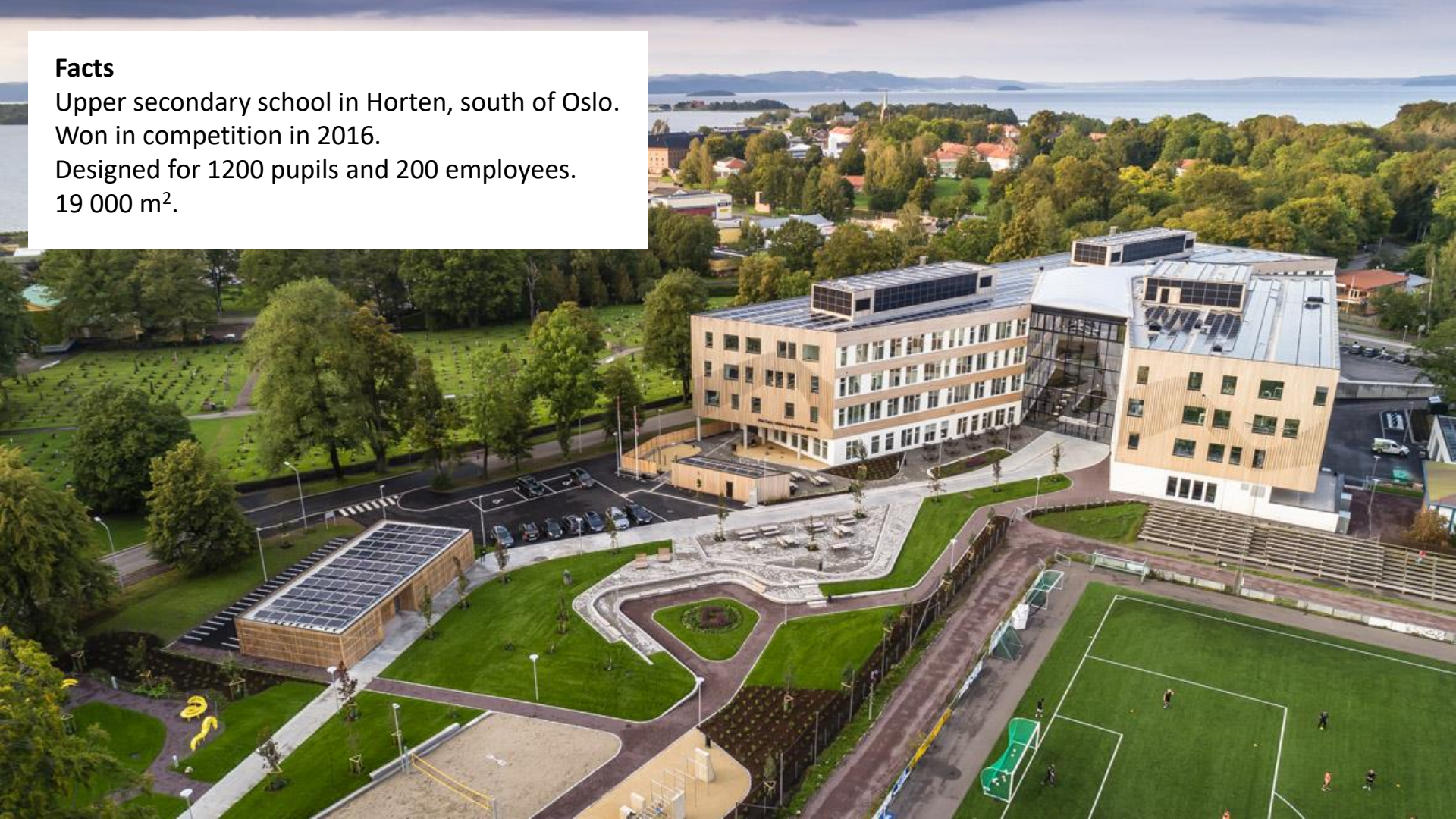
## Facts

Upper secondary school in Horten, south of Oslo.

Won in competition in 2016.

Designed for 1200 pupils and 200 employees.

19 000 m<sup>2</sup>.

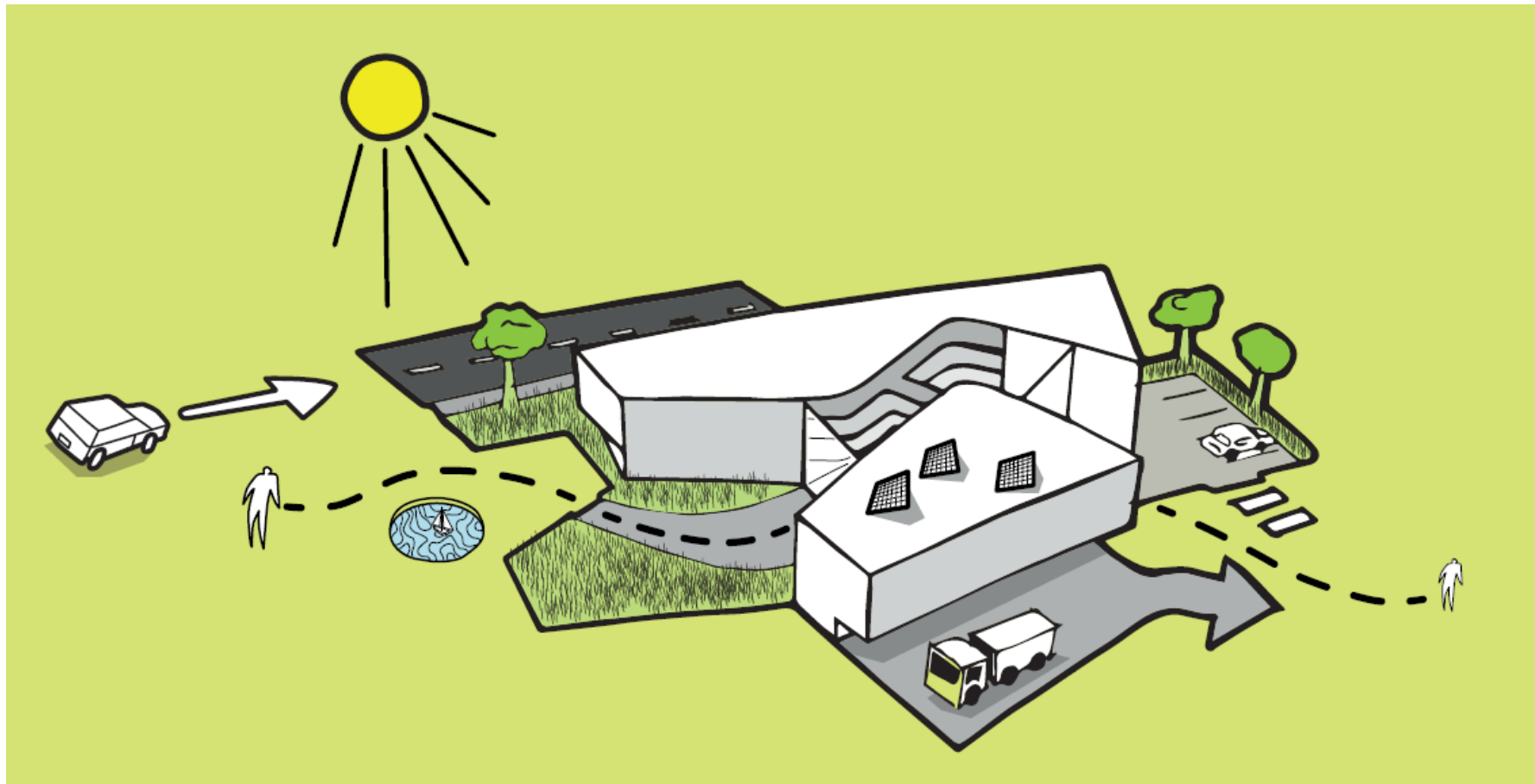
















DELPLAN 1: Se tegning L-03

DELPLAN 2: Se tegning L-04

DELPLAN 3: Se tegning L-05

DELPLAN 4: Se tegning L-06

HORTEN KIRKEGARD

OREGATA

NY HORTEN VGS

HORTENSHALLEN

Hovedinngang Ny Fjærbrukshall

ØRN FELTET

STRANDROMMEN

OREGATA

Forpl

HL Uteareal

Koktekniske Saksage

AL Uteareal

Leskur

Parkareal

Blomstereng

Parksti

Personarom

Kantine

Hovedinngang C+5,0

Inngang TIP / verksted C+2,5

Inngang TIP / verksted C+2,5

Oppstilling Avfall soppebil

Ny innkjøring

Snuplass minibus / Dropoff

Forpllass

Hovedgang sykkel

Leskur

Parksti

Kantile terrassen

Hovedinngang C+5,0

Inngang TIP / verksted C+2,5

Inngang TIP / verksted C+2,5

Kalt kjøp

TIP materiallager

Oppstilling Avfall soppebil

Trikk

Existerende trapp bevaras

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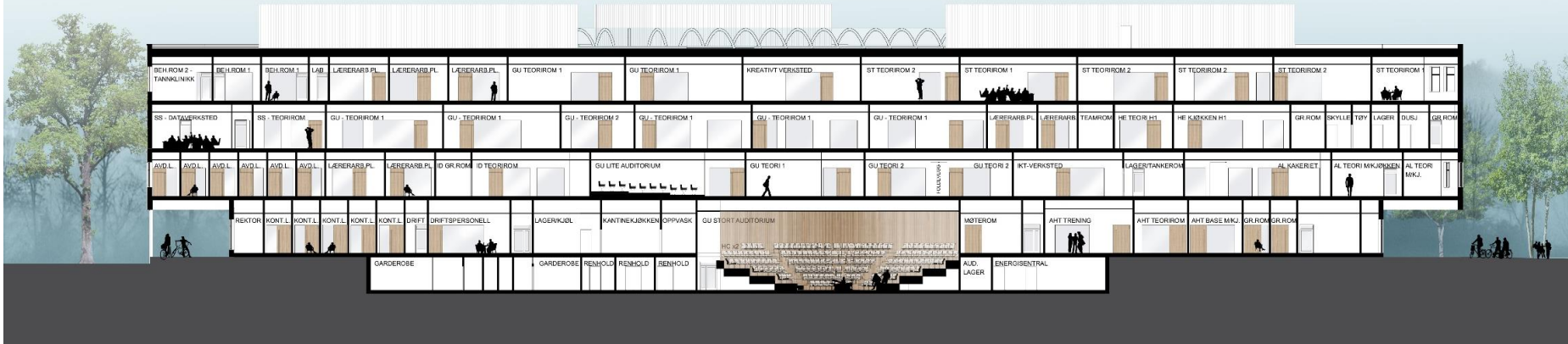
Existerende trapp bevaras

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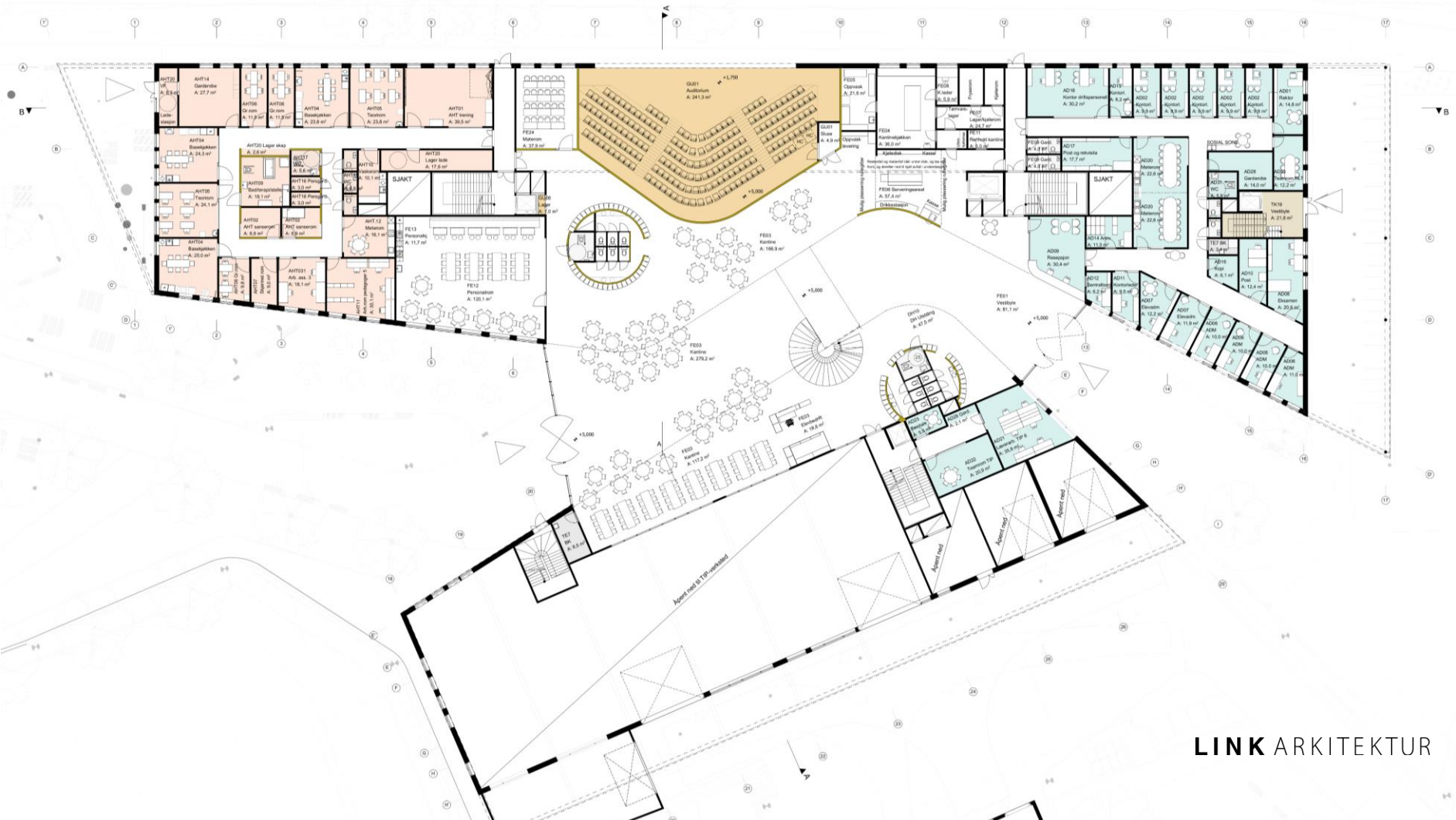
Existerende trapp bevaras





















Horten videregående skole



# The staircase

Designed by Risa Meyer

6,5 meters in diameter

13,5 meters high

Weight 20 tons





# Environment certifications

- Passive house
- 40 % savings on climatic gasses
- Plus house as the FutureBuilt-definition
- BREEAM NOR Outstanding certification





Horten was as the only Norwegian project nominated to BREEAM Awards 2019, and in the class of «public sector; design stage award ...»

... we won!

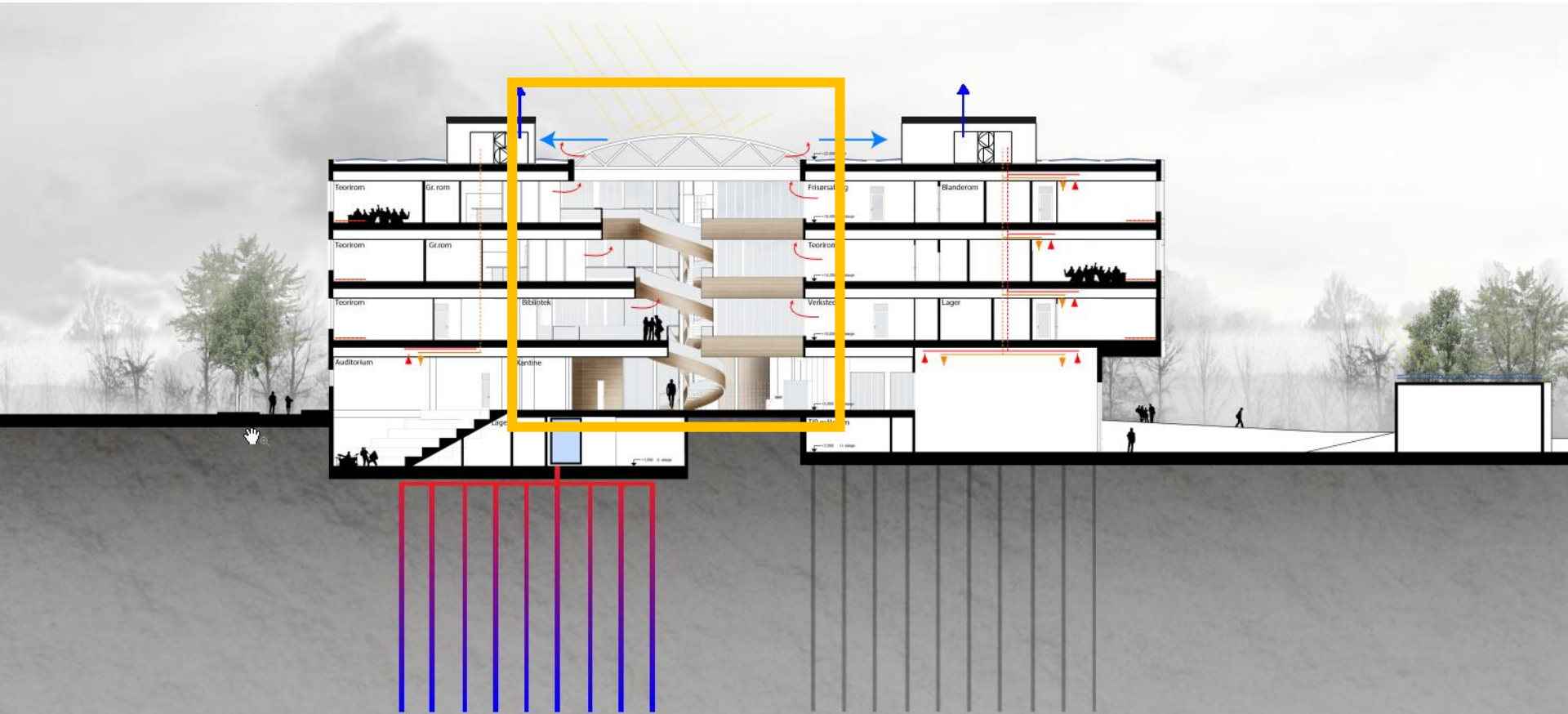


# Technical overview – Centralized ventilation

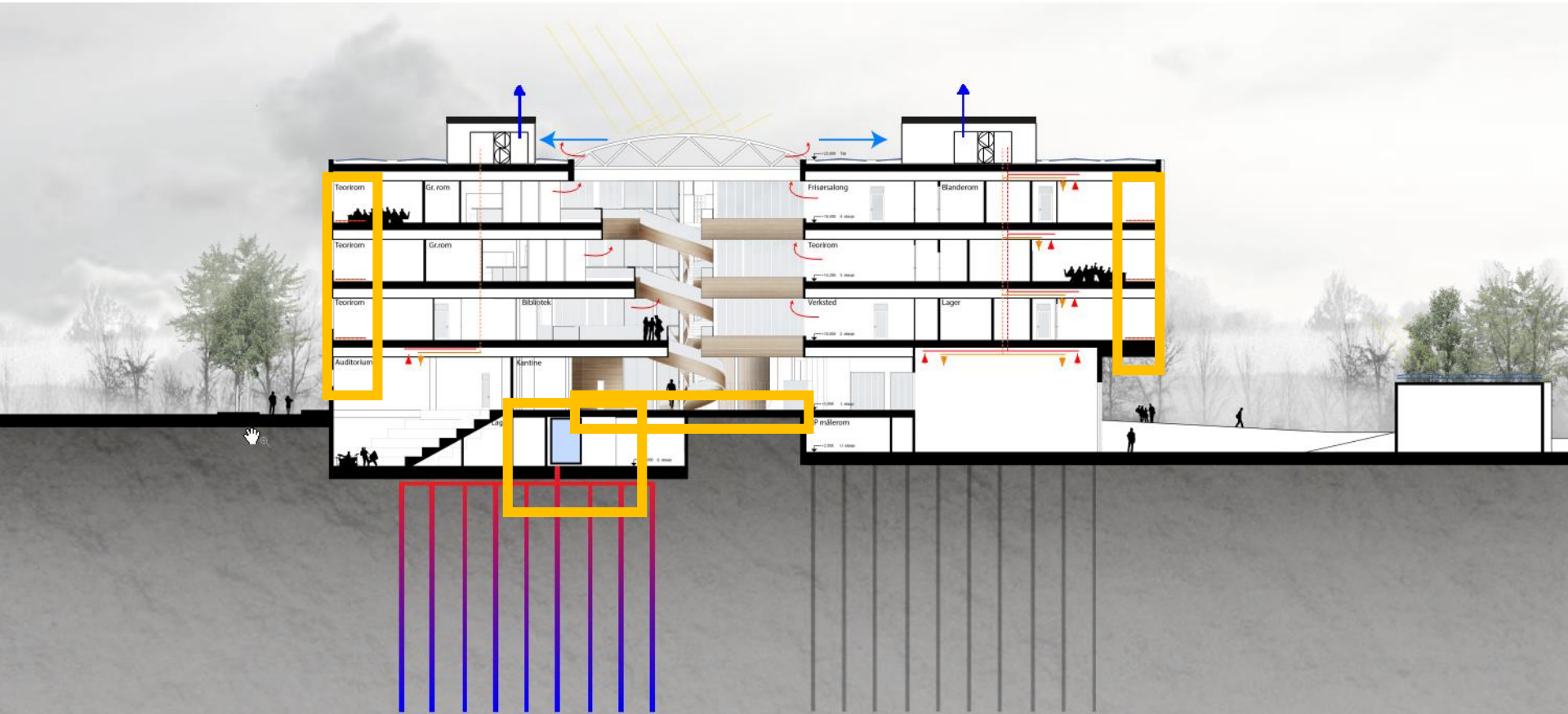




# Technical overview – The atrium

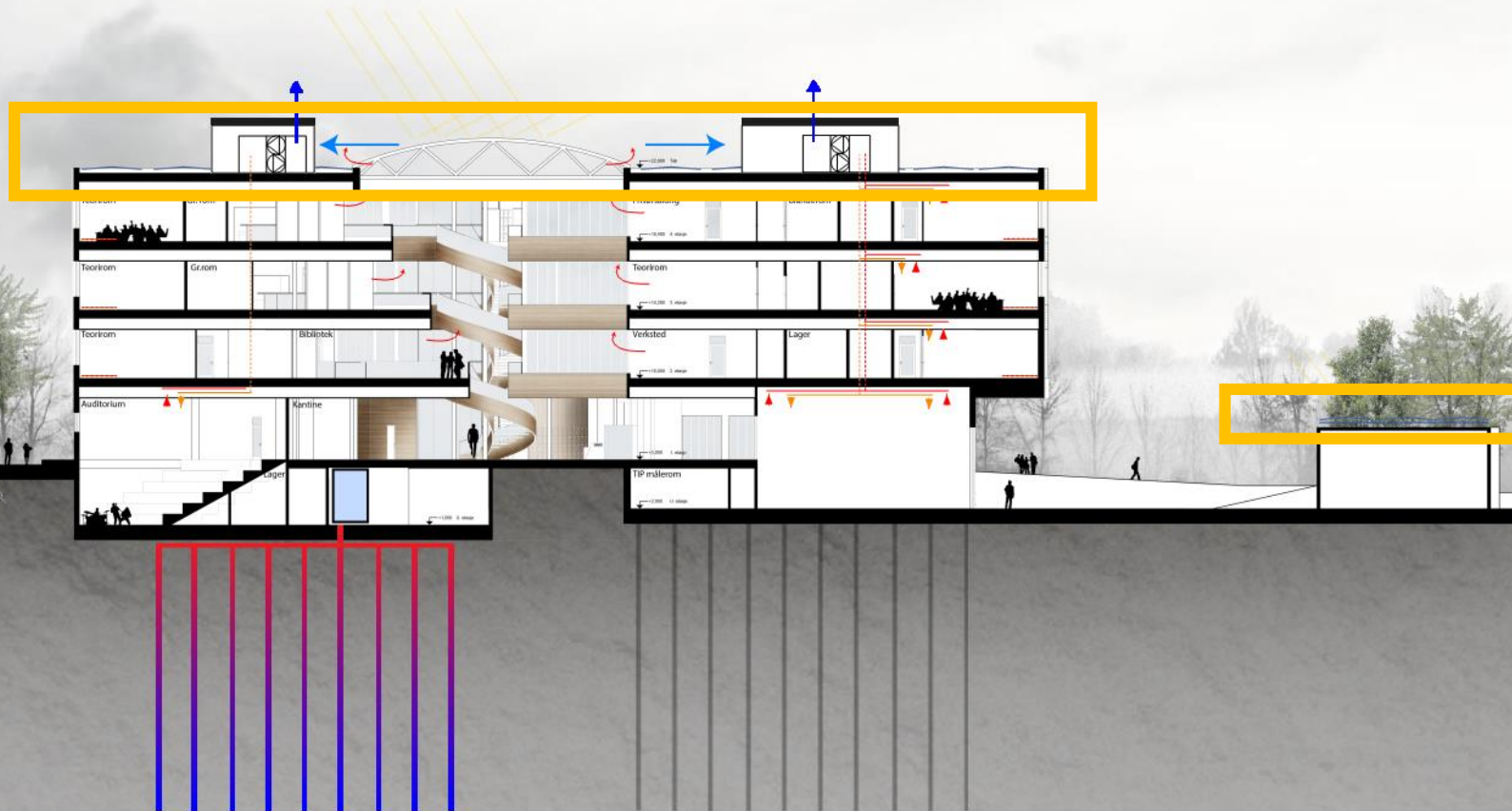


# Technical overview – Heating & cooling





# Technical overview – Photovoltaics



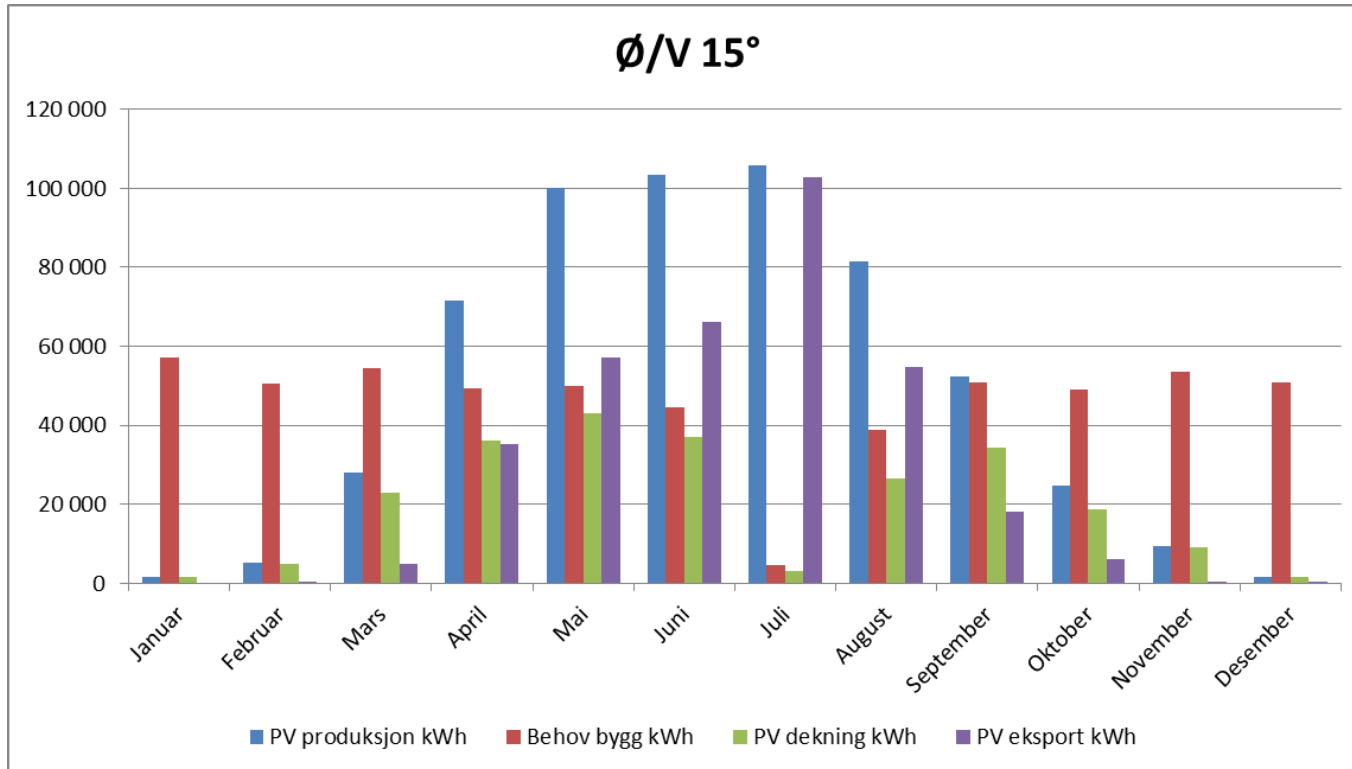
## At room level

- Good daylight utilization
- LED lighting
- External sun screen
- Low-exergy hydronic floor heating & cooling
- Ceiling based displacement ventilation
- Manual opening of windows





# Energiproduksjon vs. behov => mismatch => local buffering?



# LINK ARKITEKTUR

UENDELIGE MULIGHETER



ERICHSEN HORGEN