

BEST-konferansen, Oslo 10.02.2015

# Fremtidige krav til utforming av bærekraftige bygninger og energiforsyning

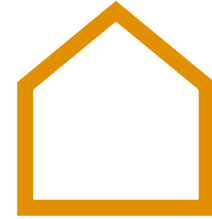
Av Inger Andresen, sjefsforsker SINTEF Byggforsk



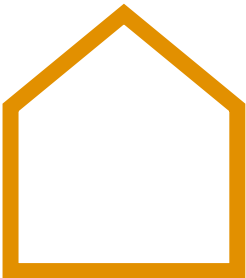
The Research Centre on  
Zero Emission Buildings

# Innhold

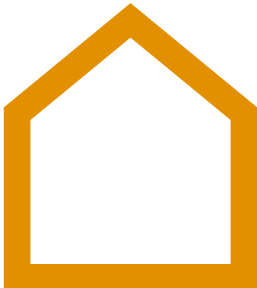
- Energikrav fra myndighetene
- Utvikling av energibehov
- Nye materialer og teknologier
  
- Et eksempel for fremtiden:
  - Bygningsutforming og tekniske løsninger
  - Energiforsyningsløsninger
  - Utveksling av energi



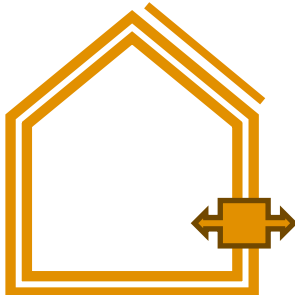
# Utvikling av energikrav fra myndighetene



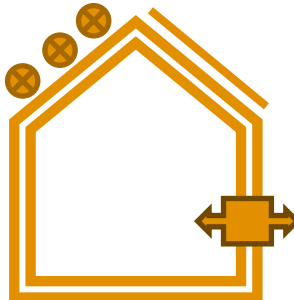
STANDARD



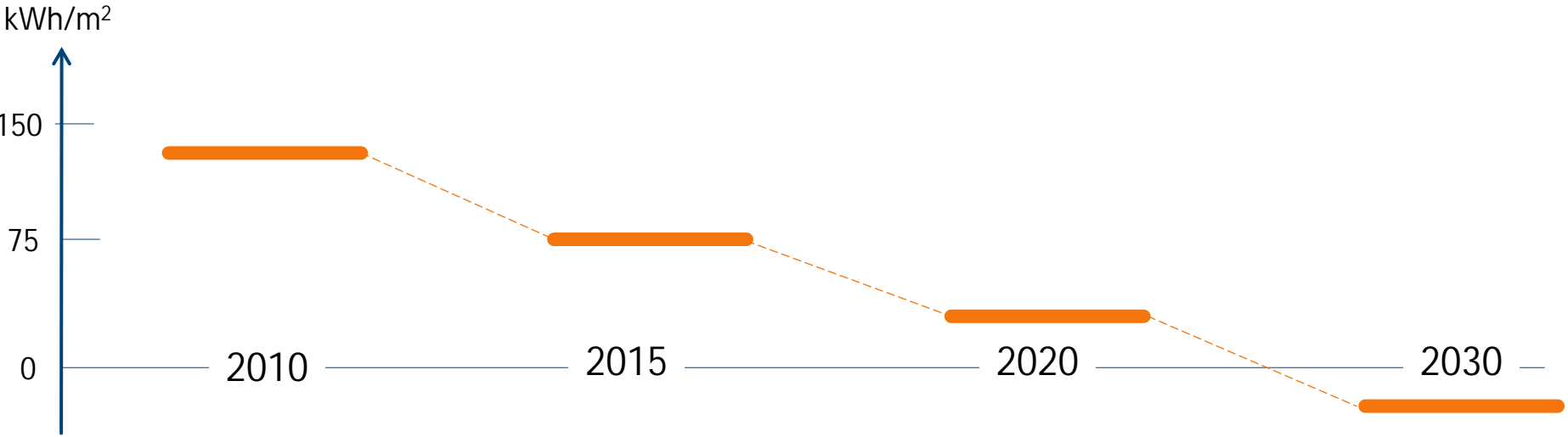
PASSIVHUS



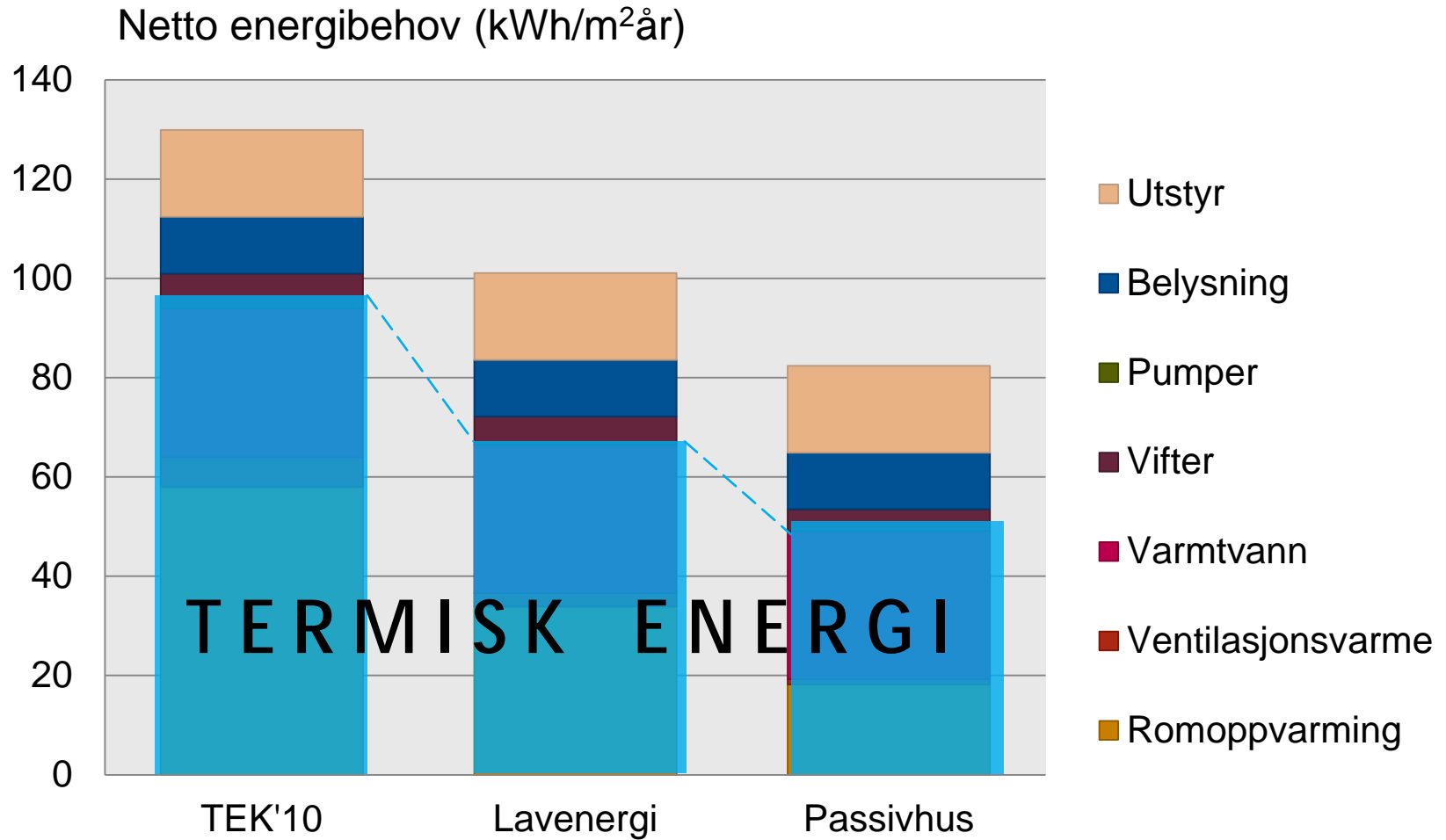
'NULL'ENERGI



PLUSSENERGI

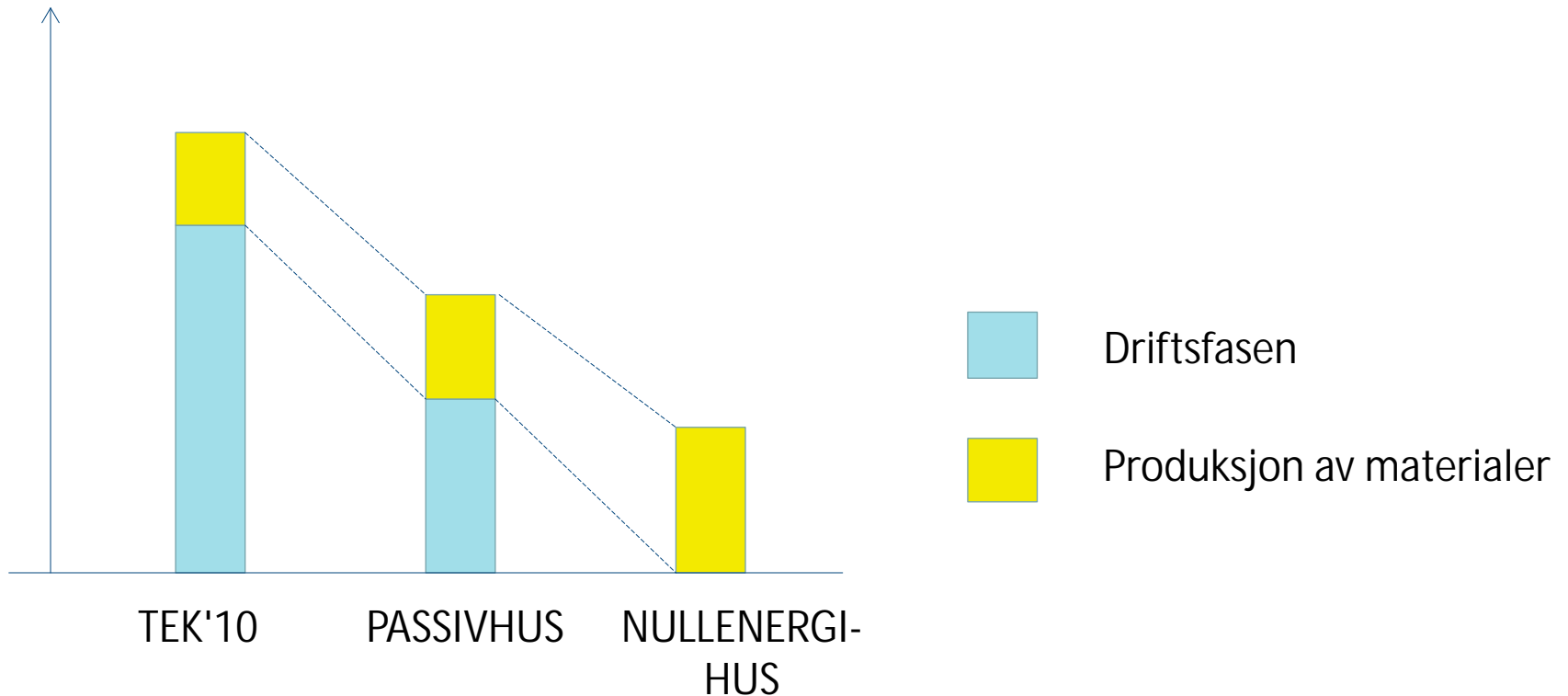


# Fra TEK'10 til passivhus – hva går energien til?



# Fra energibruk i drift til klimagassutslipp i livsløpsperspektiv

klimagass-  
utslipp



# Fra passivhus til karbonnøytrale områder

- Redusere energibehovet ytterligere, både til drift og materialbruk
- Lokal produksjon av fornybar energi (elektrisitet, varme, kjøle)
- Styring, utveksling og lagring av energi



## Eksempel – ZEB Pilot



The Research Centre on  
Zero Emission Buildings



# Fremtidens boligområde

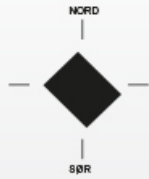
An aerial architectural rendering of a residential development. The scene shows a large, green, forested hillside with a winding road and a small blue stream. Numerous modern, multi-story apartment buildings are scattered across the slope, some in clusters and others more isolated. The buildings have light-colored facades and dark roofs. The surrounding landscape is lush and green, with some existing structures and roads visible on the left side. The overall impression is of a sustainable, integrated housing project in a natural setting.

6-800 boliger ved  
Ådland utenfor Bergen

Illustrasjon: Snøhetta



TAKETS HELNING 20 GRADER



VINDUER  
M/HØY U-VERDI

SOLCELLER (STRØM)

SOLFANGERE (VANN)

PASSIV  
UTVENDIG  
SOLAVSKJERMING

OVERSKUDDSVARMEN  
FRA INNELUFTEN  
BLIR BRUKT TIL  
Å VARME  
TILLUFTEN  
OG TAPPEVANN

VARMEGJENVINNING  
FRA SLUK OG GRÅVANN

VARMTVANNSS- TANK  
FÅR OPPVARMET VANN FRA  
GEOBRØNN,  
VARMEGJENVINNING  
OG SOLFANGERE

VANNBÅREN  
VARME I GULV  
VARMER OPP  
HUSET

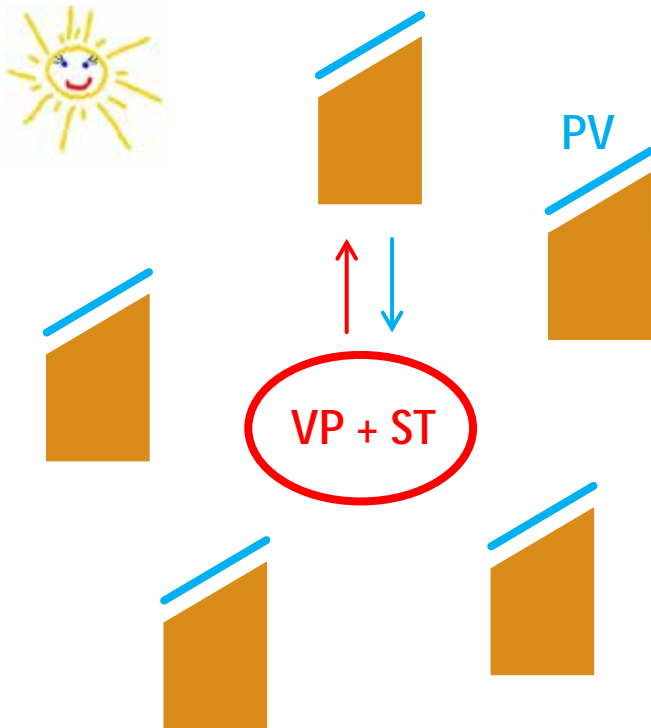
BEHOVSBASERT  
STYRING AV  
VARME OG LYS

OPPSAMLING  
AV REGNVANN

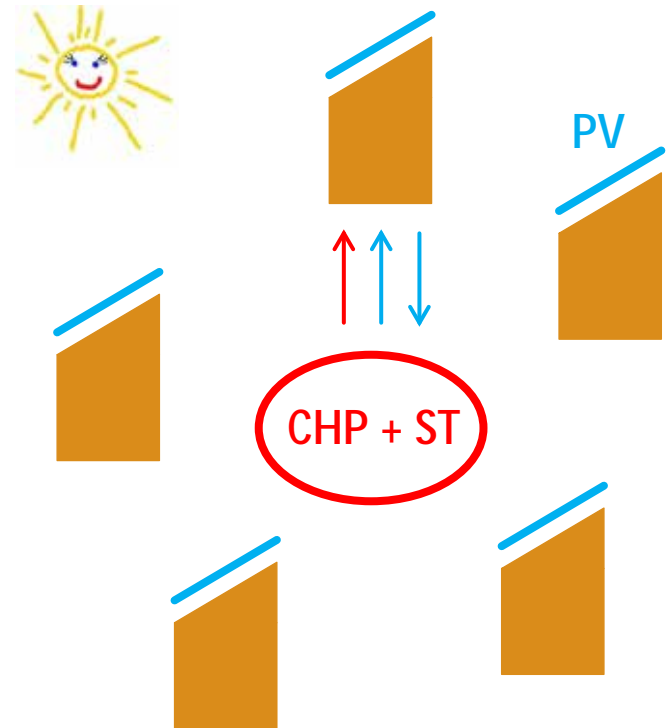
TOALETT  
HAGE

# Zero Village Bergen - energiforsyning

- Alternativ 1

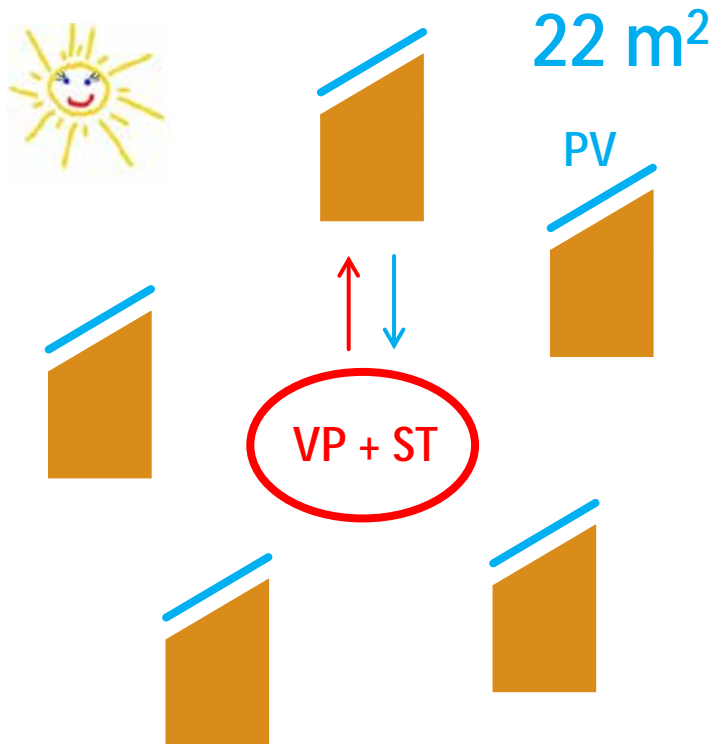


- Alternativ 2

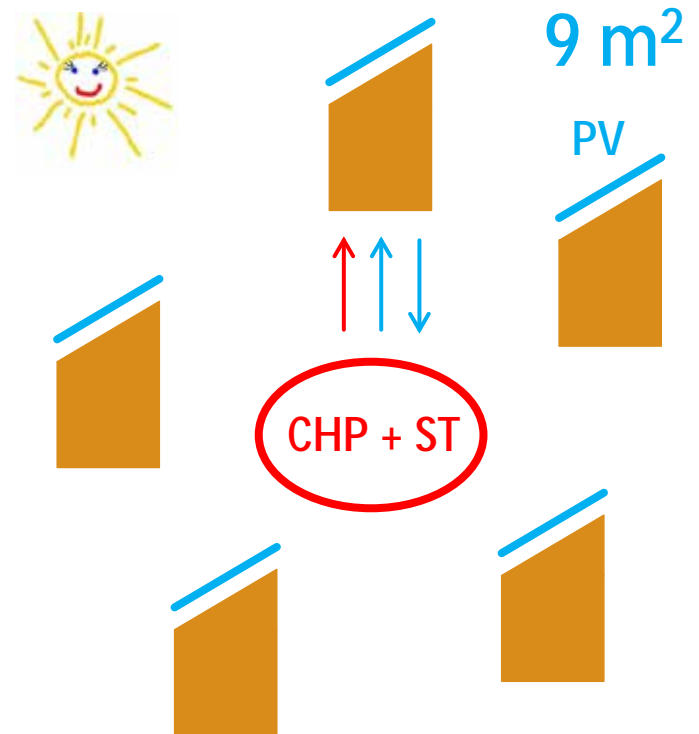


# Zero Village Bergen - energiforsyning

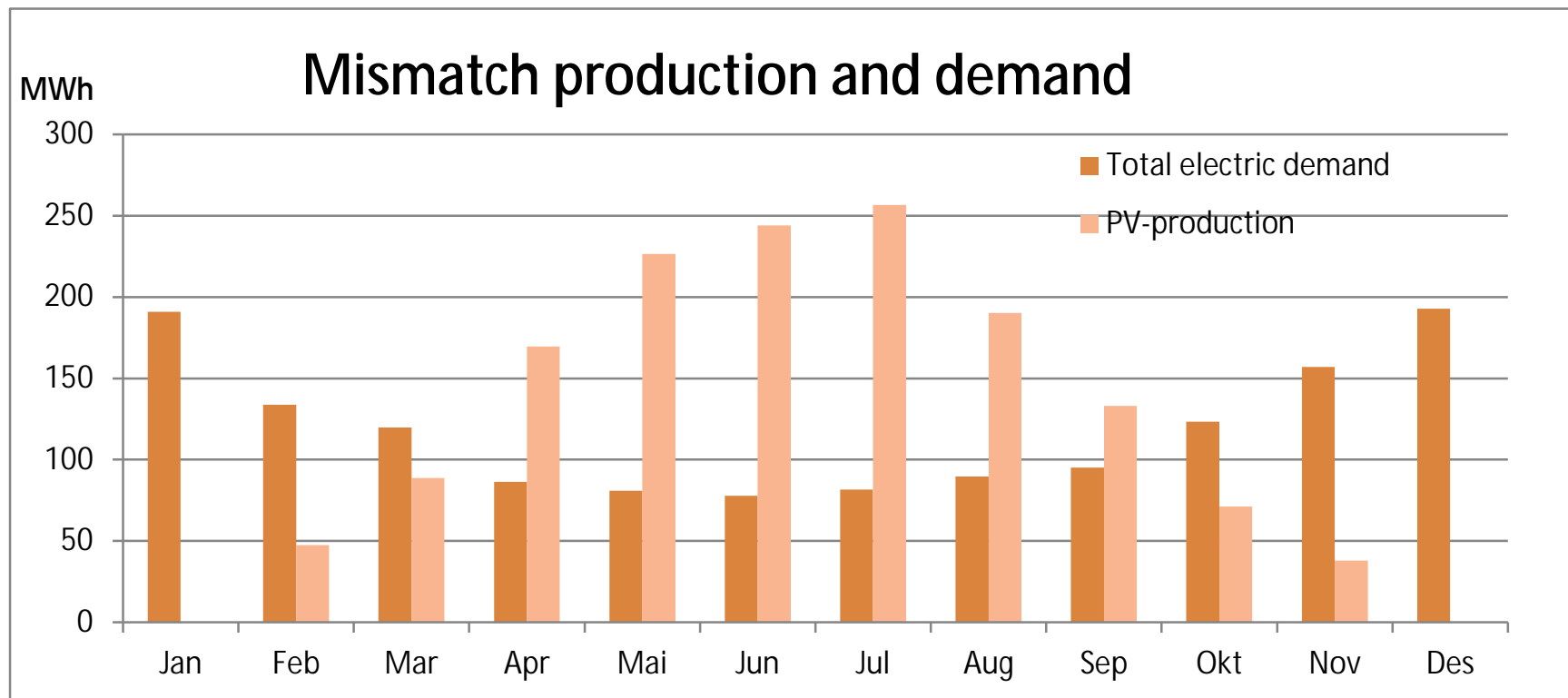
- Alternativ 1



- Alternativ 2



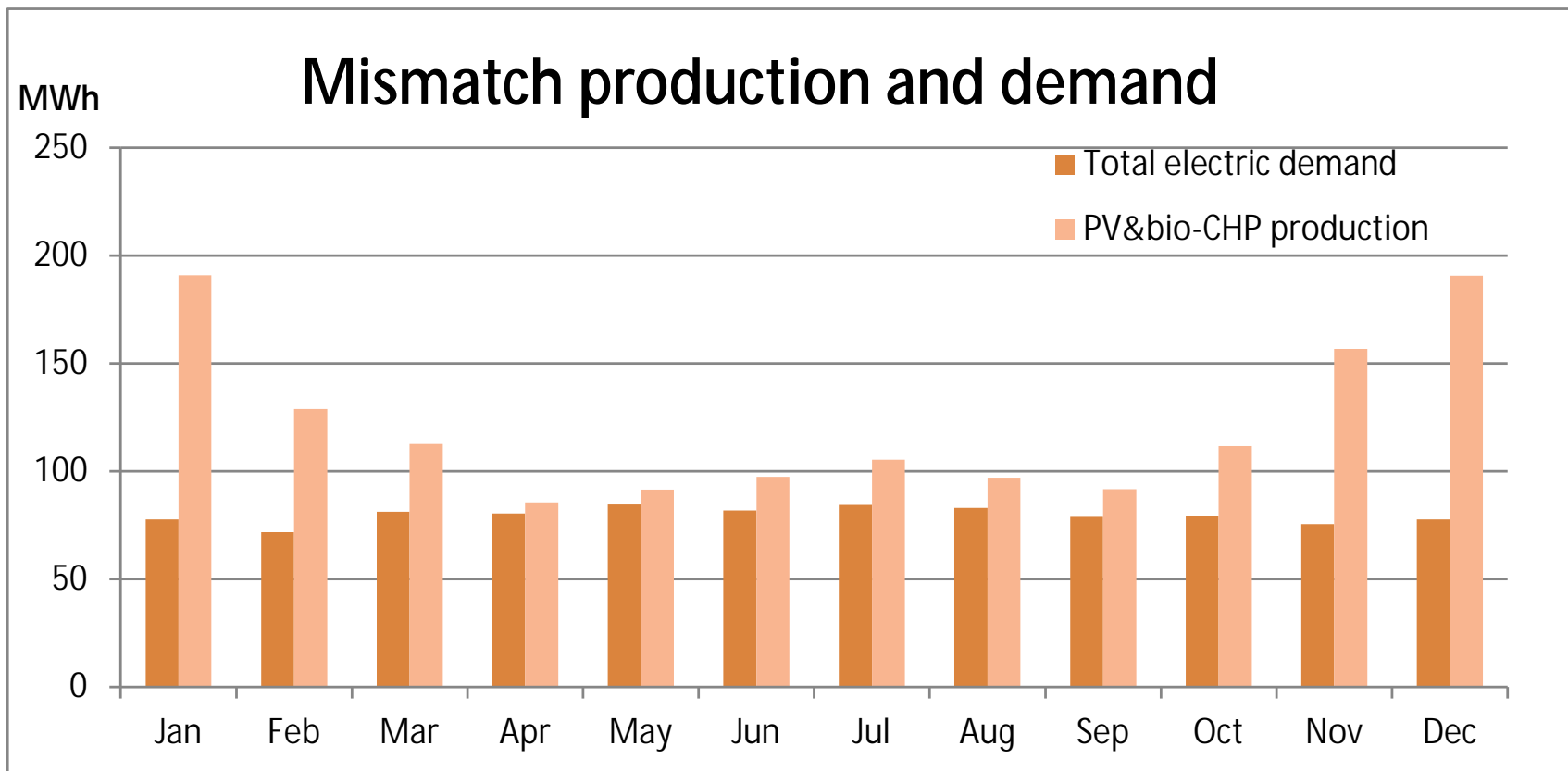
# Alternative 1: Solar collectors + Ground source heat pump + PV



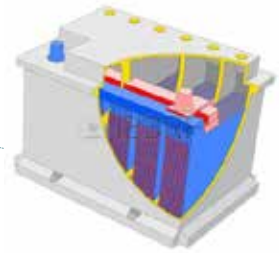
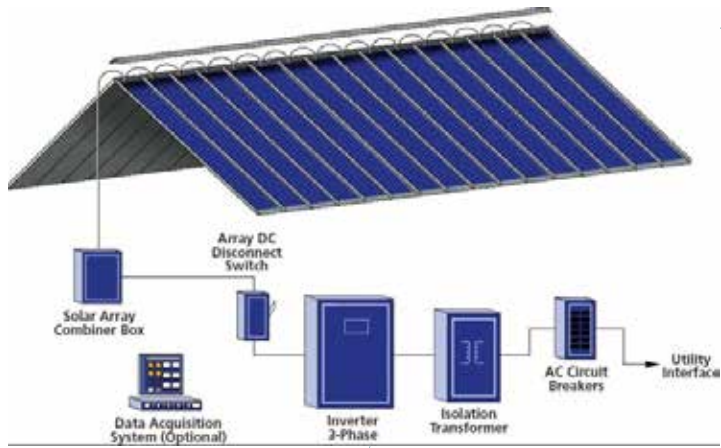
Monthly calculation: 50% electricity exported/imported from grid  
Larger if hourly calculations



## Alternative 2: Solar collectors + CHP + PV

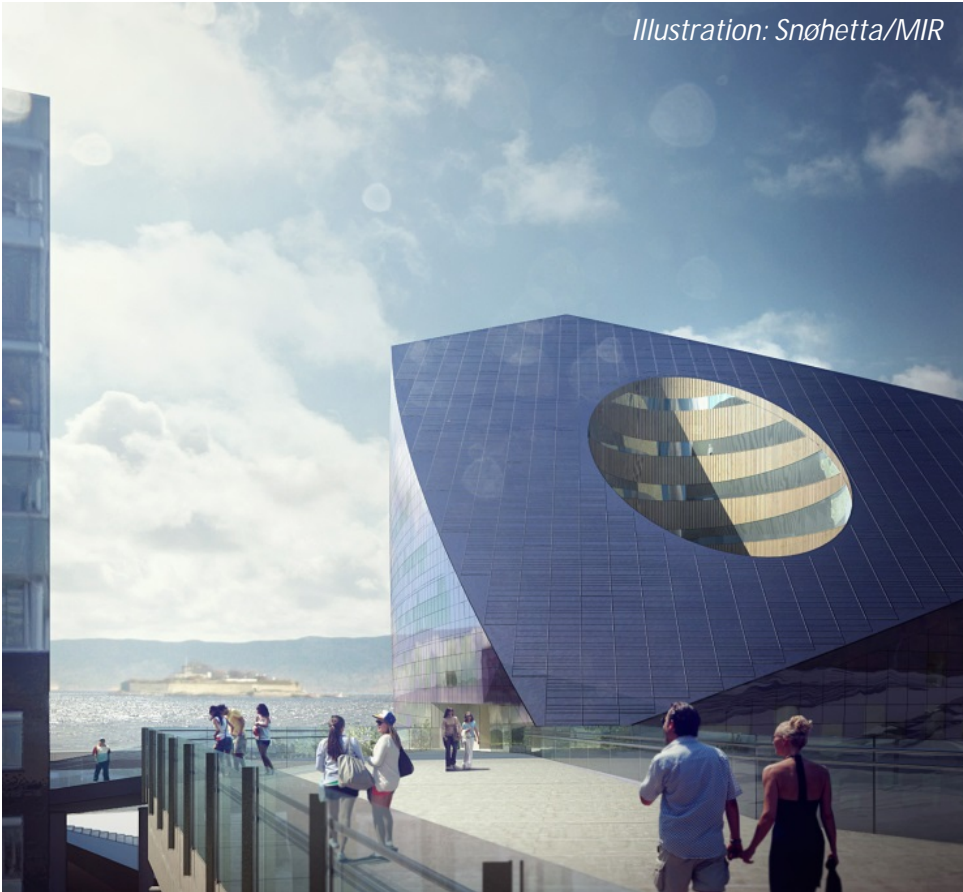


Monthly calculation: 35% electricity exported/imported from grid  
Larger if hourly calculations



# Power House Areas

Illustration: Snøhetta/MIR





*"en verden hvor bygninger ikke  
bidrar til klimagassutslipp"*

[www.zeb.no](http://www.zeb.no)

Illustration: Snøhetta/MIR

