

Solar energy – GC Rieber Eiendom – Marineholmen Research Park

Tor Instanes
Adm. Dir.



www.marineholmen.com

www.gcrieber-eiendom.no/



GCRIEBER

Et innovasjonsdistrikt med over 8000 arbeidsplasser



Helhetlig områdeutvikling

For å skape gode byer er det viktig å tenke helhetlig bydelsutvikling hvor man skaper gode opplevelser hele døgnet hele året.

Vår målsetting er å skape områder hvor man kan bo, leve, leke, lære, arbeide og ha det moro. Det handler om å bygge bærekraftige bygg, byrom og for mennesker.



250 00 m2 commercial real estate today 8- 10 000 m2 newbuild each year

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Vinner av
Bærekraftsprisen 2019



GC Rieber 140 år

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In the forefront in sustainable building

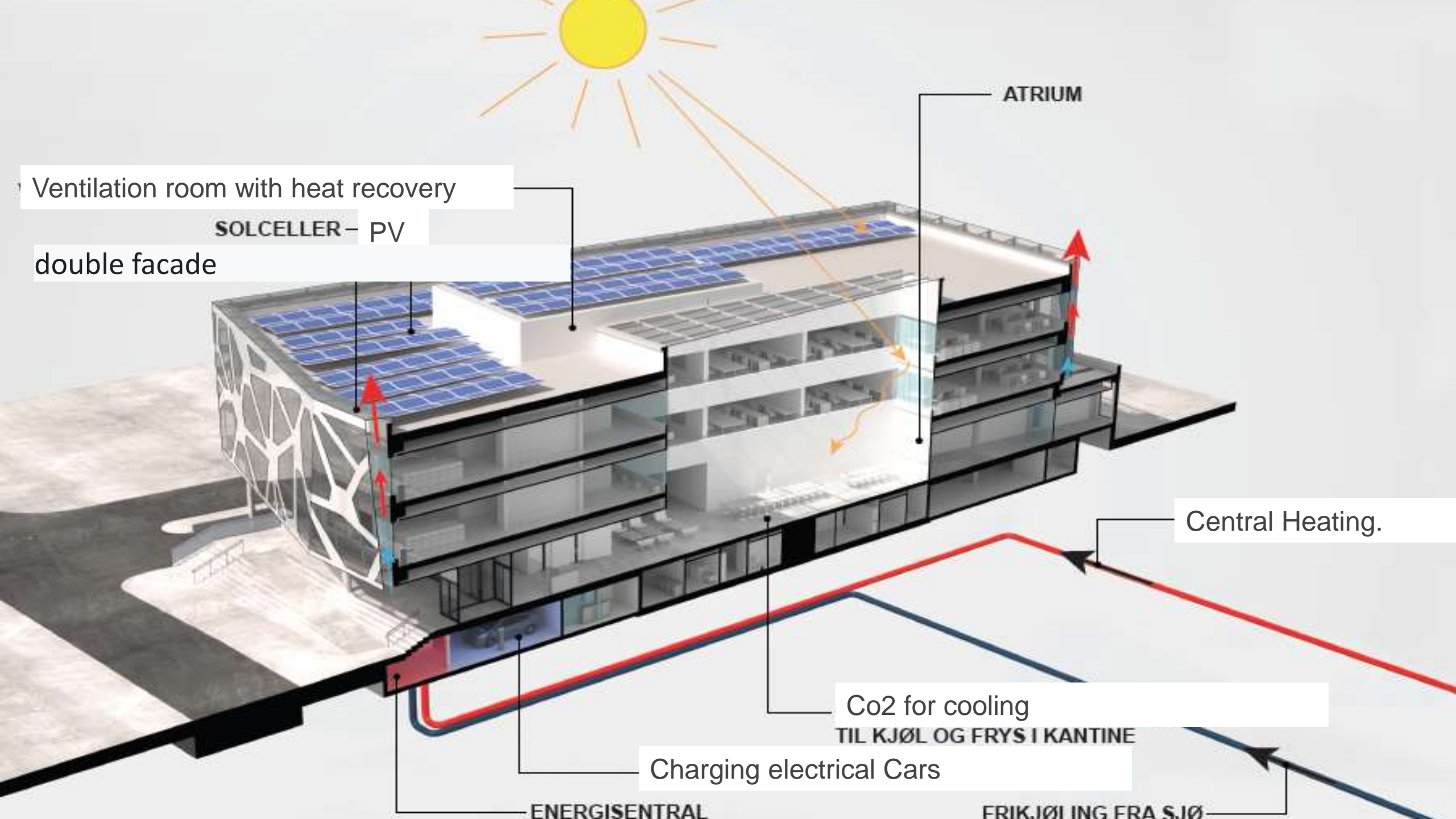
BREEAM® NOR



Solar energy - an important energy source in the energy mix of the future.

- New Energy Outlook (NEO) 2019 (Bloomberg)
 - 20% of all electricity will come from solar energy by 2050.
- Cost reduction of 10% each year.
 - At the level of corresponding energy saving measures and extra insulation etc.
 - Will in a few years be competitive compared to electricity from the grid
- Roofs and facades of new buildings will be an important host for solar cells





Ventilation room with heat recovery

SOLCELLER - PV

double facade

ATRIUM

Central Heating.

Co2 for cooling
TIL KJØL OG FRYSS I KANTINE

Charging electrical Cars

ENERGISENTRAL

FRIKJØLING FRA S.IØ

Current Power

0 W

Energy today

176.26 kWh

Energy this month

3.67 MWh

Lifetime energy

345.82 MWh

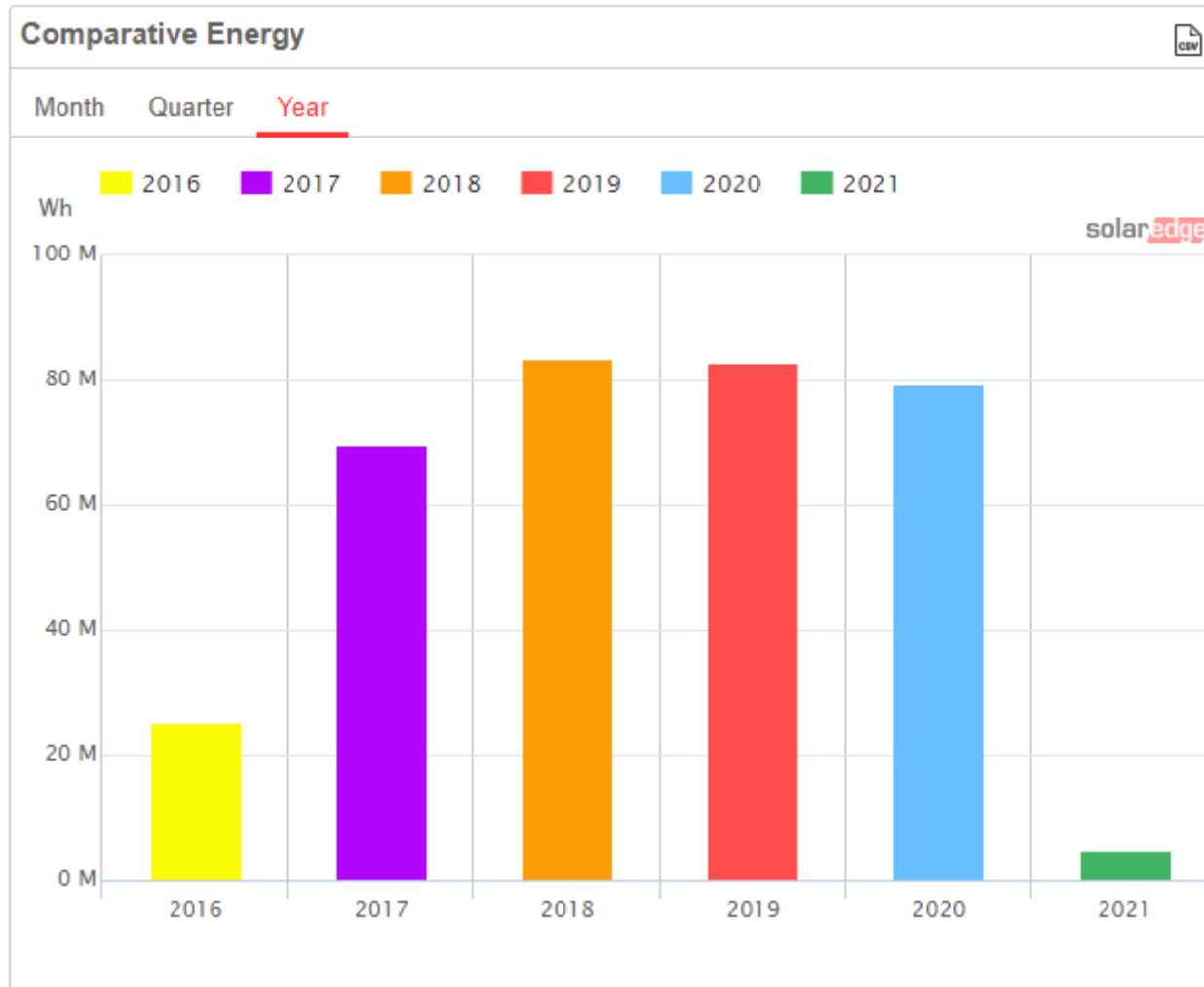


Energy this month
3.67 MWh

Lifetime energy
345.82 MWh

345.82 MWh
of energy

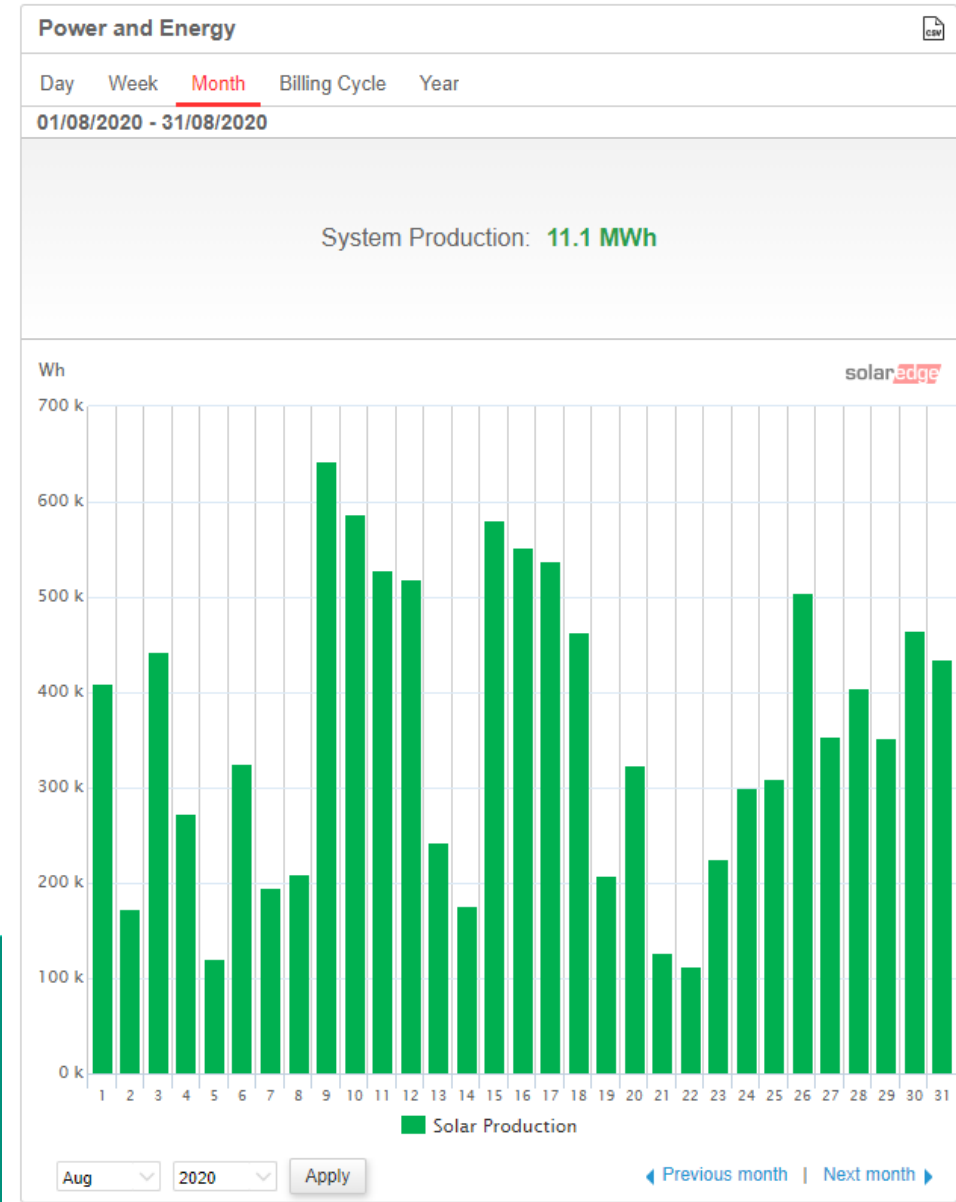
Energy production



- Production for almost 5 years
- Little maintenance.
- Even production of approx 80 000 kWh / år
- Ca 20% of the building's electricity needs
- Little problems with leaves, birds and rocks.



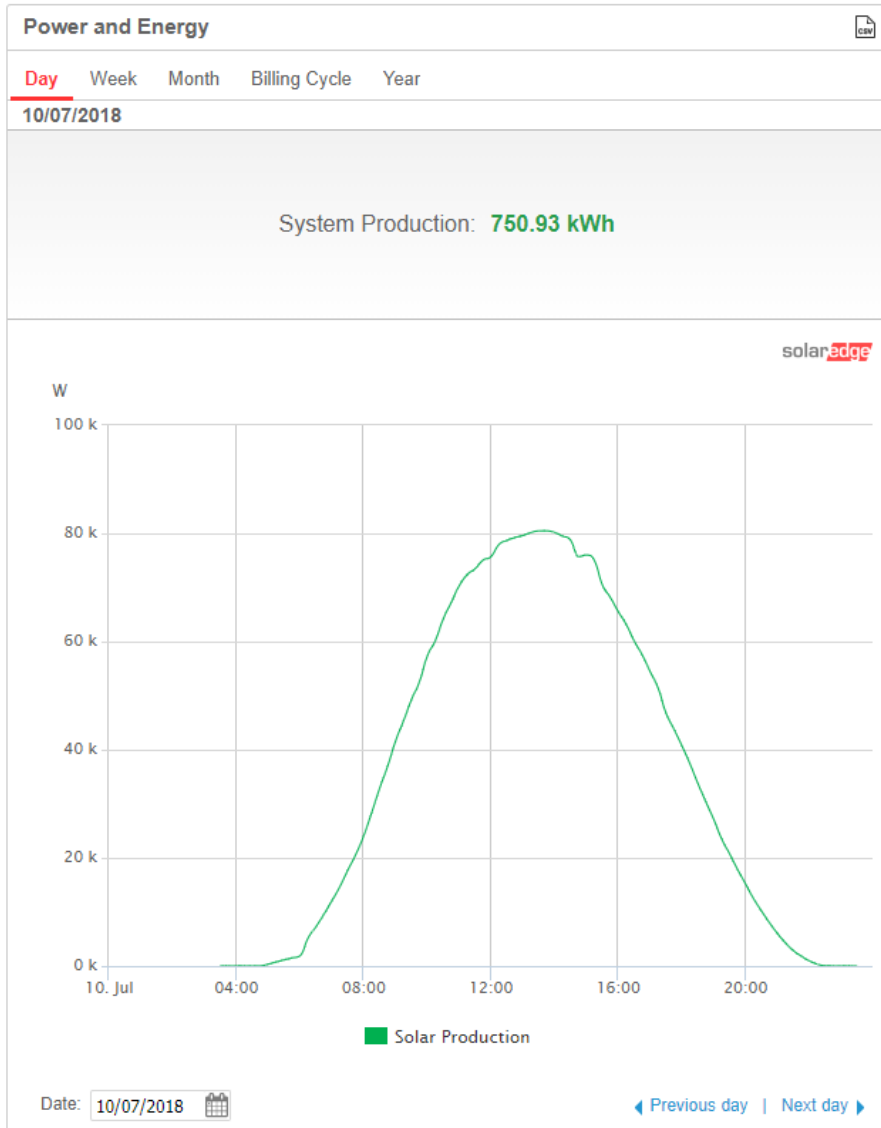
Variation through a month (aug 2021)



- Large variations in production from day to day.
- From 100 kWh to 600 kWh

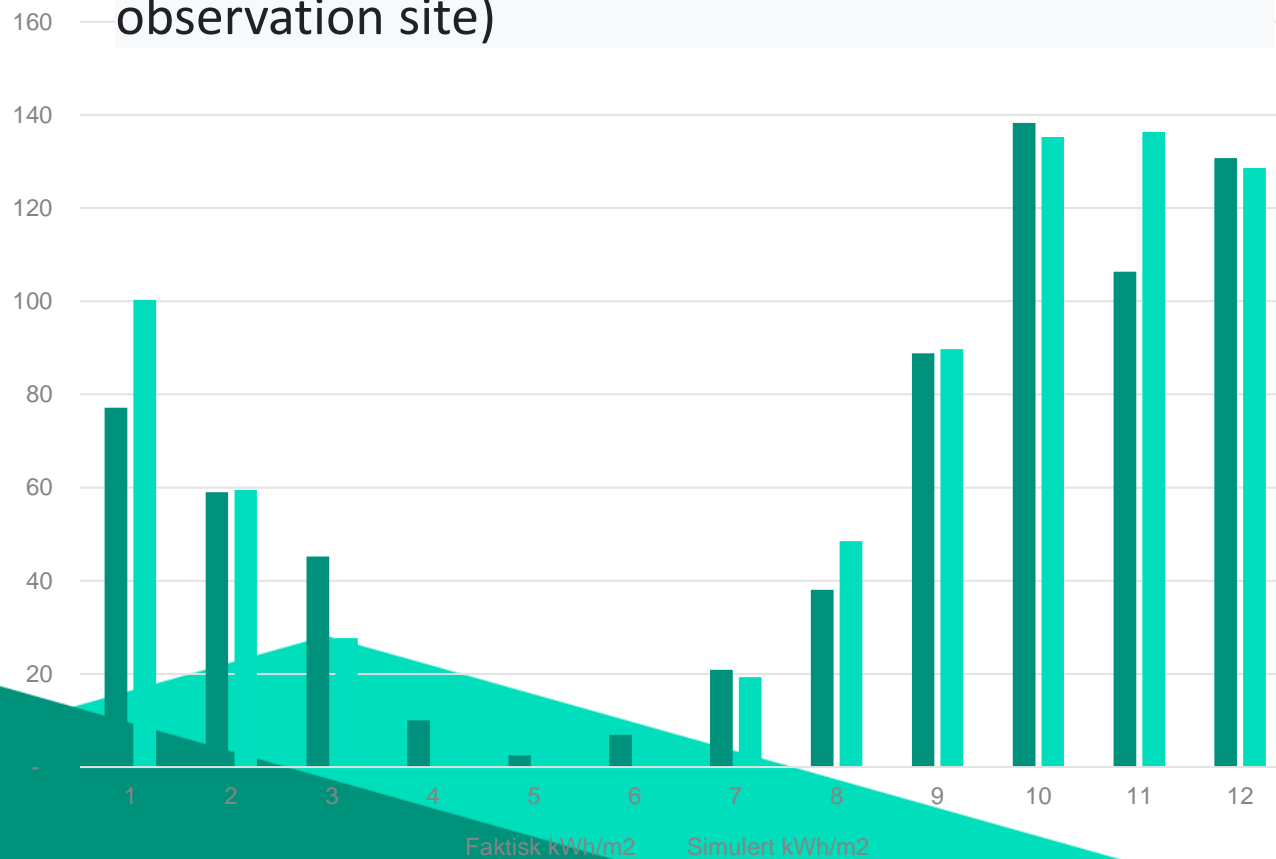


Variation from day to day. Clouds or clear sky

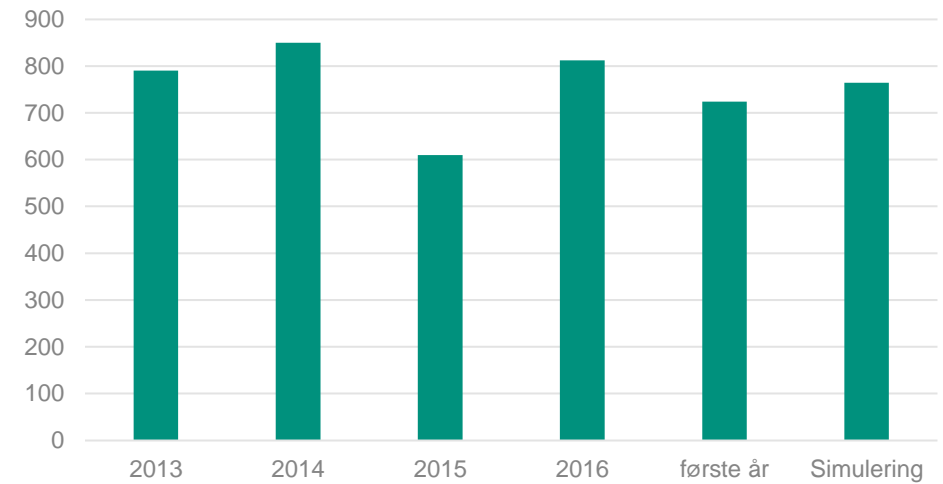


Production depends on annual solar radiation, which naturally varies.

Solar radiation first year of production actual vs simulated [kWh / m²] (data retrieved from Florida observation site)



Global solinnstråling Florida [kWh/m²]



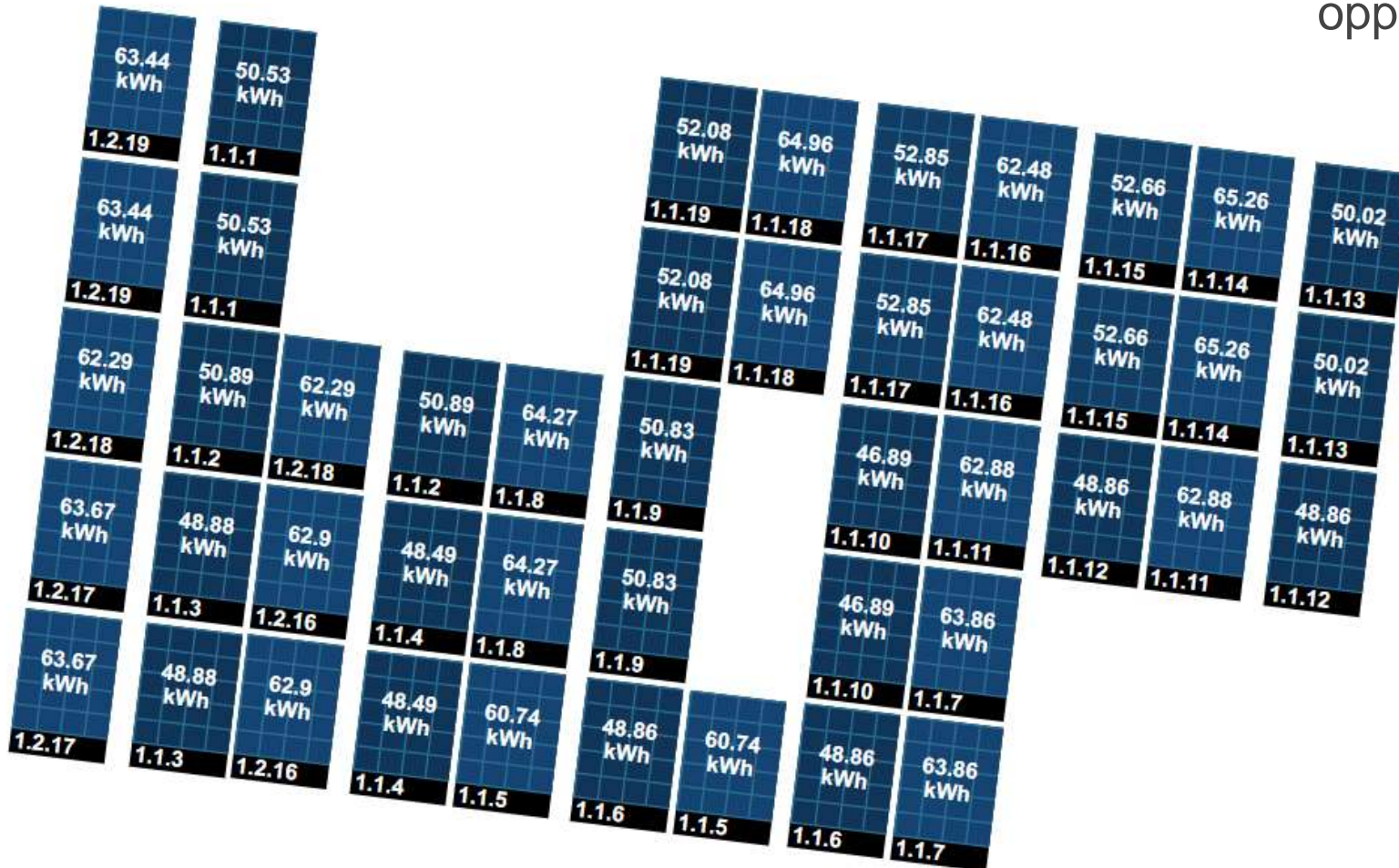
Differanse faktisk og simulert = 5%

Differanse år til år = ca 28 %



Production from each panel in a given time.

- Panels that are tilted to the west (and somewhat south) produce more than the opposite way



Cost is decreasing

Solceller:

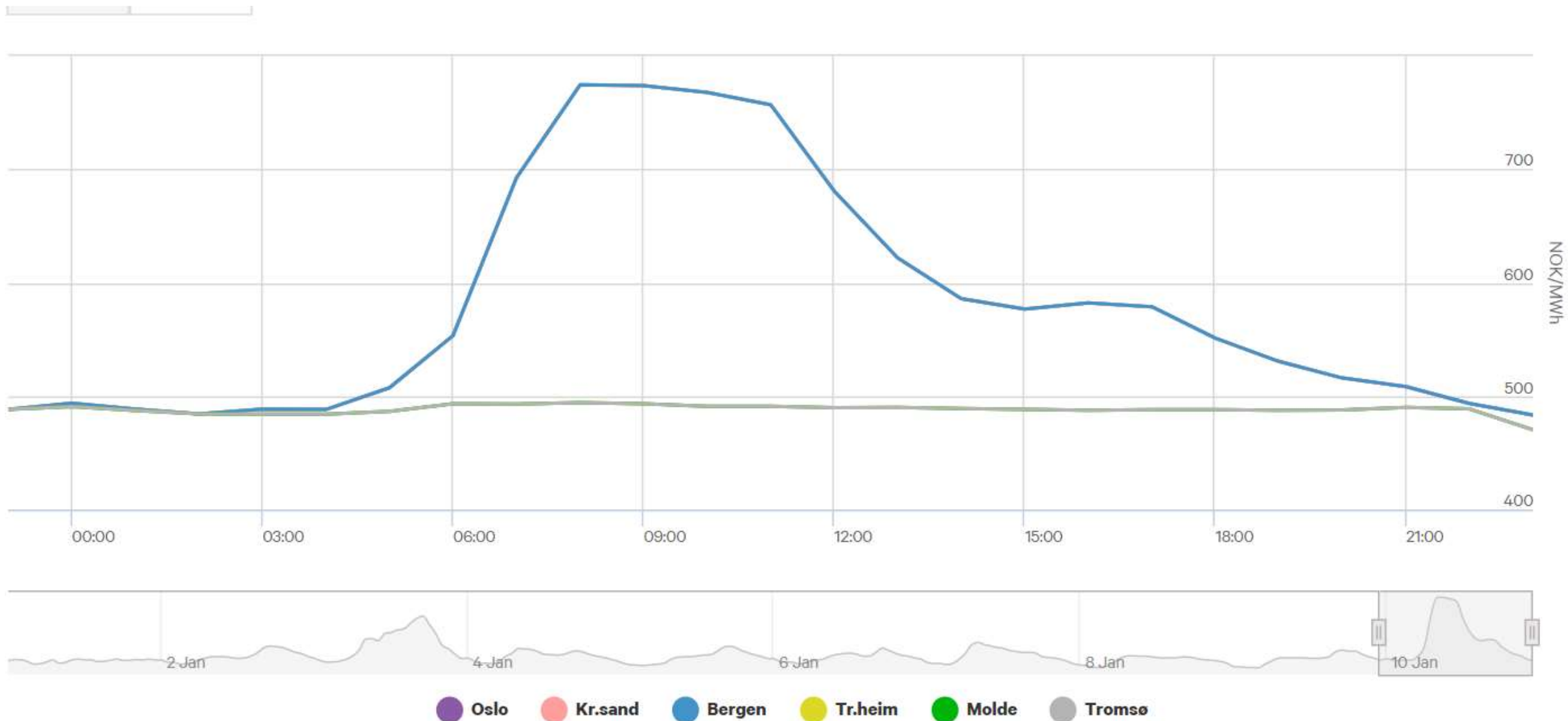
2018 «Skipet» 0,65 mill.kr - 30 000 kWh - 50 kWp 13 000 kr/kWp

2015 «Basen» 2,5 mill.kr - 80 000 kWh - 131 kWp 19 000 kr/kWp





Varying spot price throughout the day



Cost of grid - Effektledd

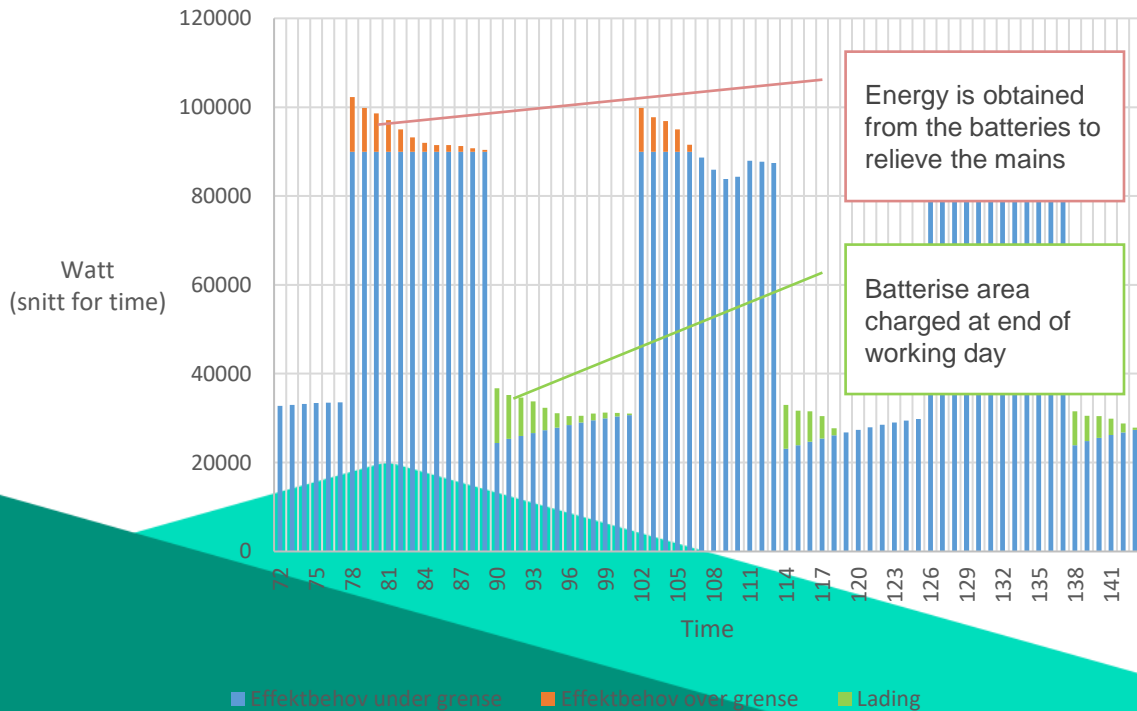
	Fastledd kr/mnd	Energiledd sommer øre/kWh	Energiledd vinter øre/kWh	Effektledd sommer kr/kW/mnd	Effektledd vinter kr/kW/mnd
Nettleie effekt	62,50	26,16	26,16	44,58	133,75

kW effect are measured on the basis of the highest hourly average per month.

Battery storage and smart control

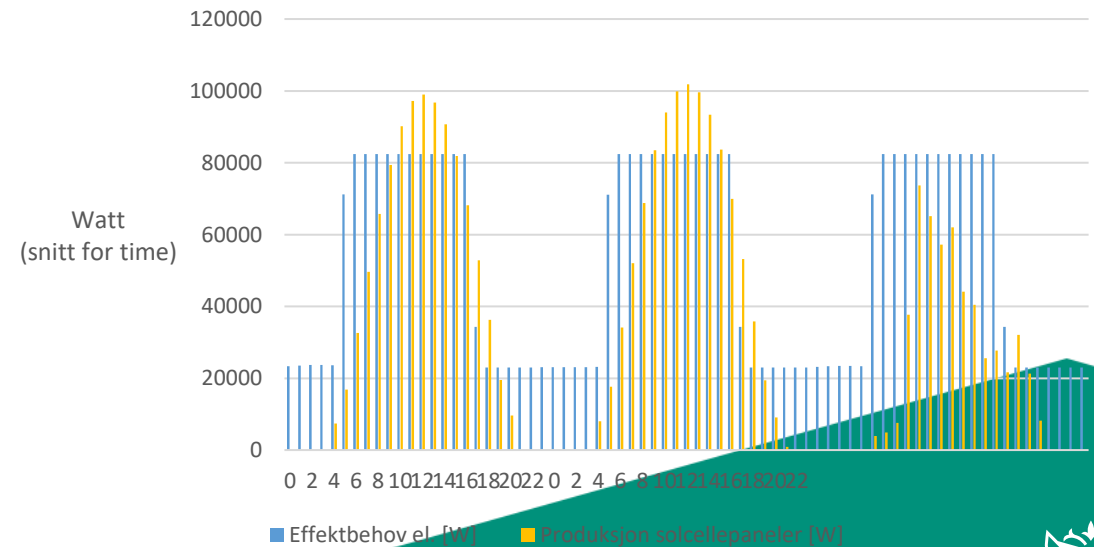
Winter

Peak shaving



Spring - Fall

Charging batteries with excess solar power for later use





- Second Life – Batteries from 10 stk Nissan Leaf
- 50 kWp – 150 kWh



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