



Digital and electric = Lean and clean

Solar and battery & Energy efficiency

Ove Guttormsen, Nelfo – NEPU 23. Aug 2023

*Software Is Eating
The World
- Marc Andreessen, HP*



From banks to banking. From humans to software

Solving the needs of customers in new and better ways



Organise the queue as efficiently as possible



Install ATMs



vipps



*Software challenging banks
(ApplePay, AliPay, Meta, Vipps)*

Adapt to rapid competitive changes to succeed

It's those 'in front of the counter' who want the changes, not those behind



Apple Pay

支付宝
ALIPAY

vippss

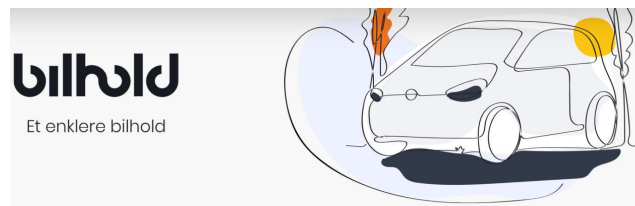
Smartphone software replaced many gadgets with services

1 Newspapers
2 High quality camera (for photography)
3 Video camera
4 Cookery book
5 English dictionary
6 Foreign phrasebook
7 Portable games console
8 Digital weighing scales*
9 Colouring book*
10 TV remote*
11 Novel*
12 Diary
13 Notebook
14 Address book
15 Train/bus timetables
16 Tape measure
17 Playing cards
18 Calculator
19 Ruler
20 Debit cards
21 Cheque book
22 Pen
23 Alarm clock
24 Watch
25 Crayons
26 CDs*
27 DVDs*
28 Compact mirror
29 Polaroid camera
30 Telephone
31 OS route maps*
32 World atlas
33 Takeaway menus
34 Photo album
35 MP3 player (iPod)
36 Fitness tracker
37 Compass
38 Stop watch
39 Torch
40 Clock
41 Television*
42 Board games*
43 Encyclopaedia
44 Road map
45 Spirit level*
46 Portable speaker
47 Magazines*
48 Holiday brochures
49 Lifestyle book*
50 Satnav

*Features you may have to pay extra to download

Combined weight: 75lb

Make it easy for our customer – like we book service and repairs for cars



Available 24/7 on all digital platforms

Verksted

Verkstedtjenester
Service, reparasjon og skift av slitedeler, EU-kontroll, hjulskift, vedlikehold med mer.

Velg tjeneste →

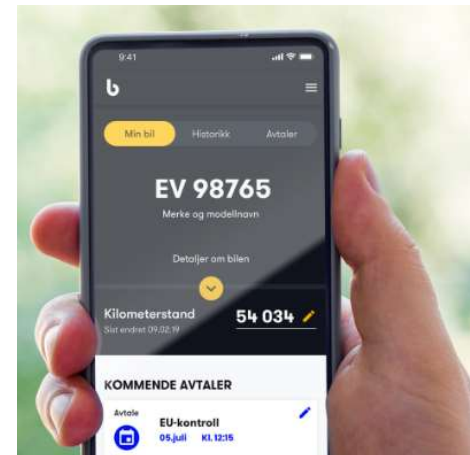
Skadereparasjon

Steinsprut eller glasskade?
Vi vurderer raskt din glasskade og tilbyr reparasjon eller ruteskift.

Bestill time →

Karosseri og lakkskader?
Vi takserer bilskaden din raskt og tilbyr time til reparasjon.

Takser min skade →



Assess the damage - and get an instant repair proposal and price



Three drivers for our business environment

Digitalisation changes everything

Moves value creation from building sites to offices and factories

... and facilitates

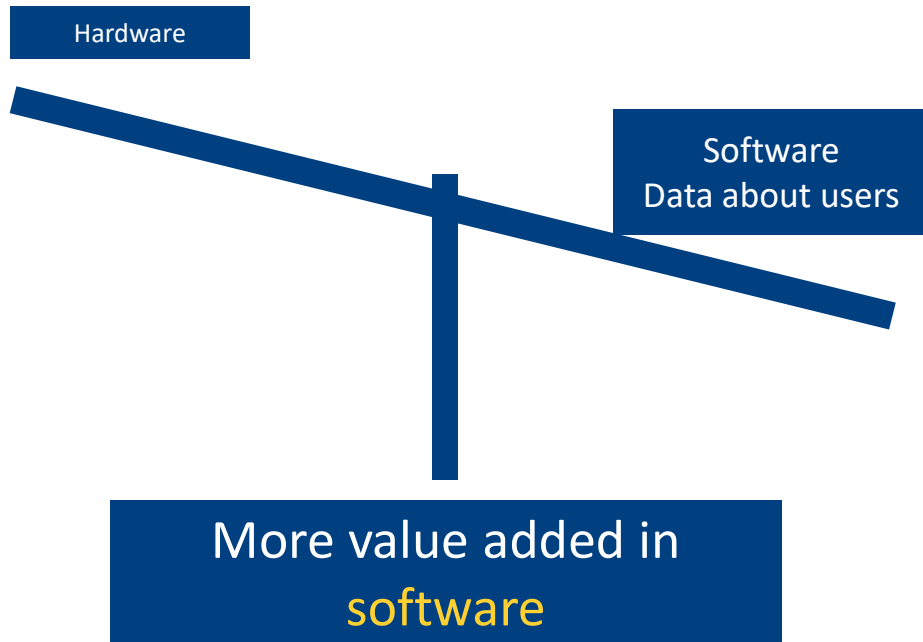
Electrification and Distributed Energy Resources

To be on top ...

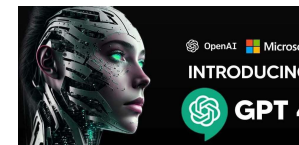
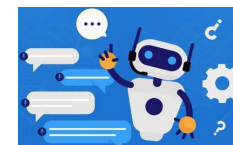
Develop digital skills and digital availability for customers



Platform companies are getting a bigger share



Locks users in with **simplicity** og
positive user experiences



Platform companies
uses **software** and
brand to take new
positions (e.g. Tesla)



Digitalisation brings disruptive competition

- Taxi Über og Lyft
- Hotel Airbnb
- Telephone Apple
- Car Tesla
- Production 3D Systems (3D printer)
- Smart house IKEA og Amazon
- **Tech. installations** **???**



Nordic prop-tech startups



Kilde: Nordic Proptech 2023

Software spreads ever more rapidly

Artificial intelligence can change how customers obtain information

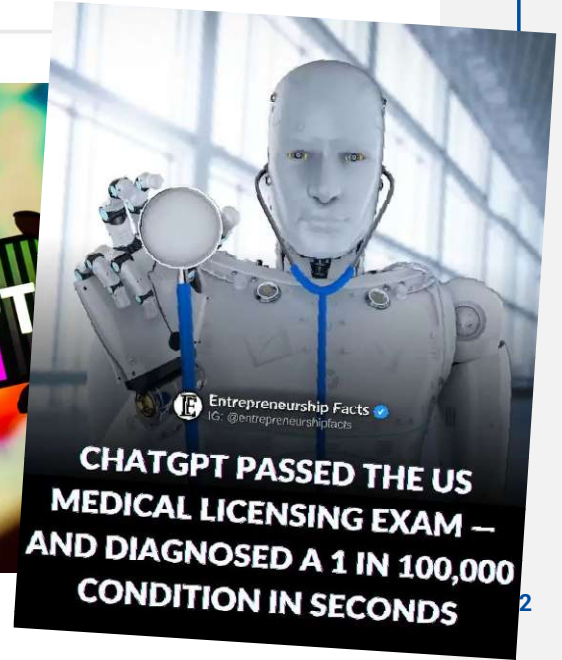
NUMBER OF YEARS IT TOOK FOR EACH PRODUCT TO GAIN 50 MILLION USERS




HOME > TECH

ChatGPT may be the fastest-growing consumer app in internet history, reaching 100 million users in just over 2 months, UBS report says

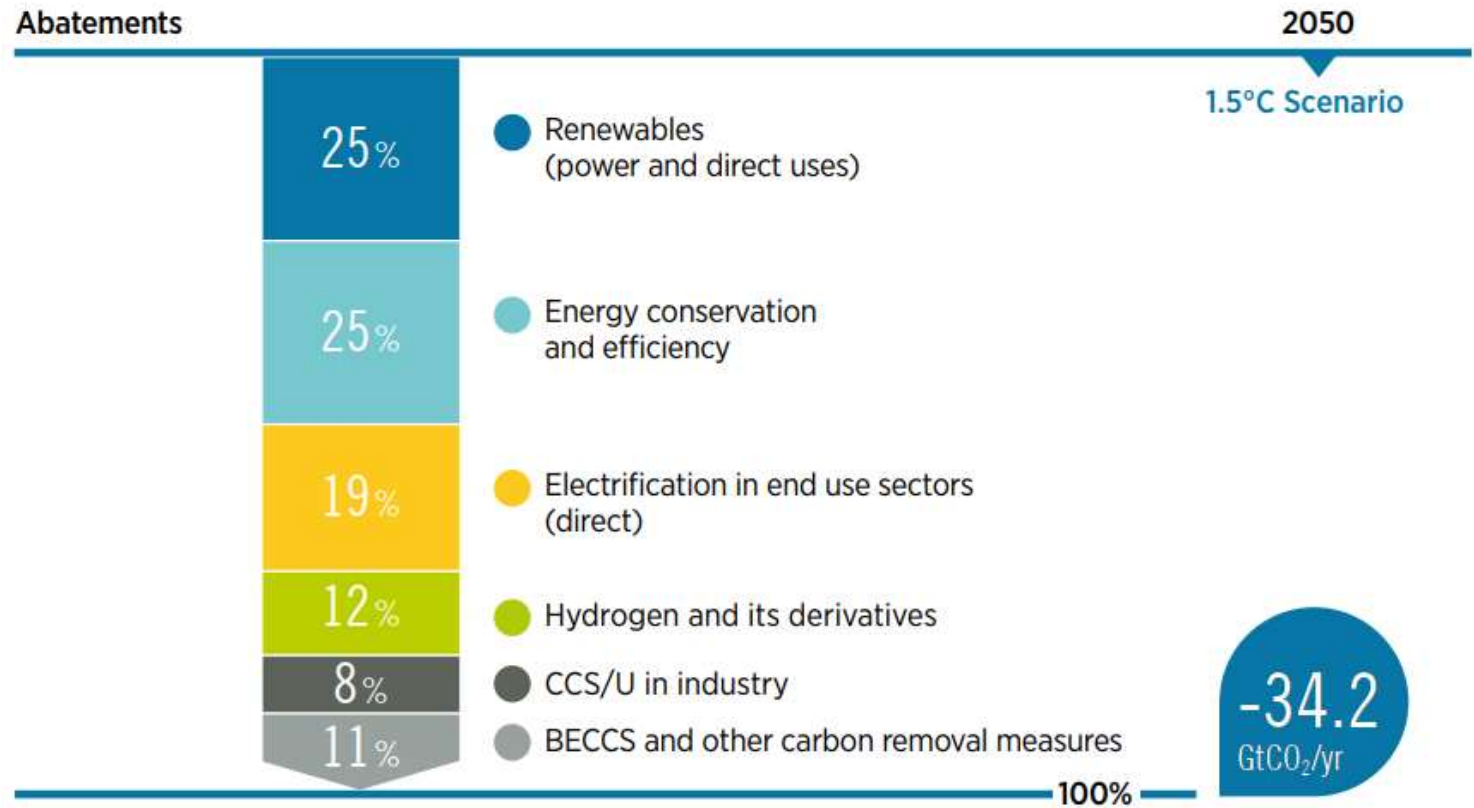
Sawdah Bhaimiya Feb 2, 2023, 12:45 PM



A man in a light blue suit and yellow tie is pointing at a digital interface. The interface features a network of white lines connecting glowing white nodes. Various icons are displayed within hexagonal frames: a power line tower, a house with a battery and lightning bolt, and a house with solar panels. The background is a soft blue gradient.

Electrification is the most important climate measure. **Smart and efficient energy use** is necessary to free up power for growth and the green transition

Where to cut CO2 emissions – and reach 1.5°C Scenario



Notes: BECCS = bioenergy with carbon capture and storage; CCS/U = carbon capture and storage/utilisation; GtCO₂/yr = gigatonne of carbon dioxide per year.

Source: The International Renewable Energy Agency (IRENA) 2023

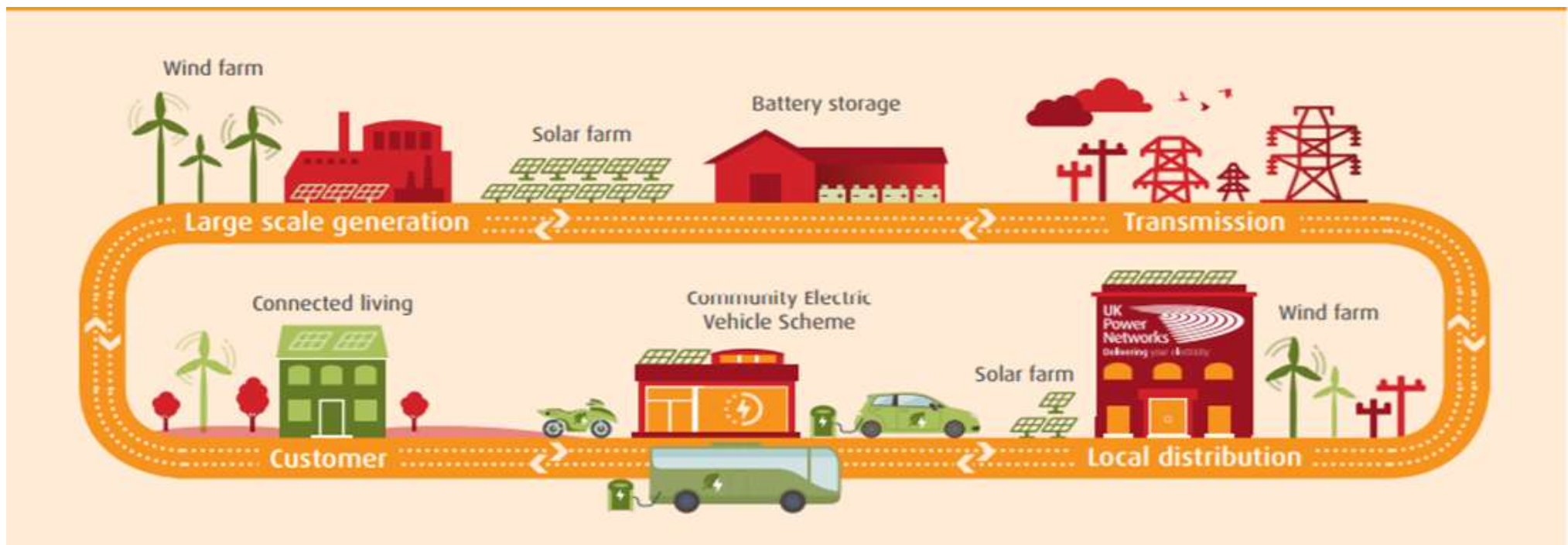
Power system of the **past**



- Large-scale production fed into the central grid
- One direction of electricity flow
- "Passive" end customers
- Limited use of digital tools

Kilde: UK Power Networks og Pöyry

And power system for the future



- More distributed production
- Two-way flow of electricity
- Integrated solutions
- Local storage
- End-user flexibility
- Large investments

Kilde: UK Power Networks og Pöyry

Batteries balancing the grid

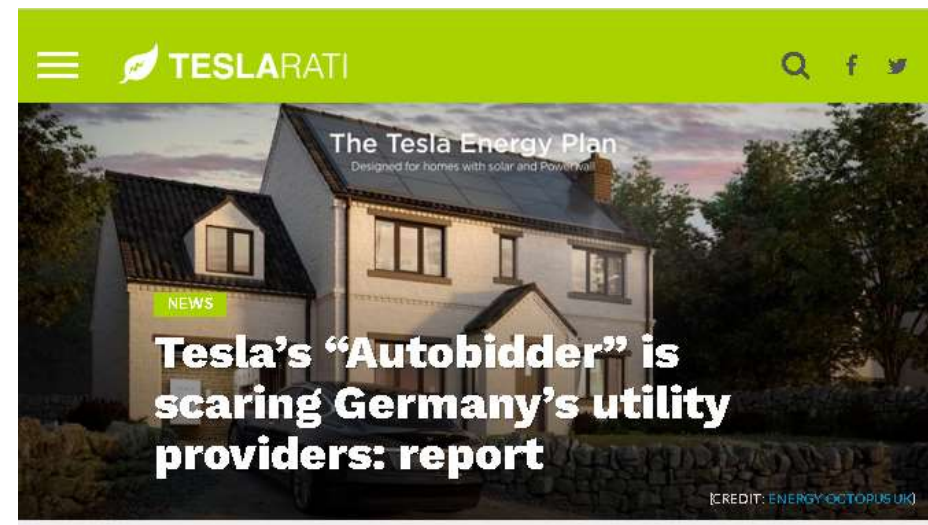
Is Tesla Becoming A Threat To The World's Largest Utilities?

The electric utility industry is on the verge of a revolution, and Tesla is at the forefront.



Sep 29, 2021 at 9:42am ET

55



By [Simon Alvarez](#)

Posted on August 25, 2021

Germany's players in the utility sector are starting to feel quite nervous about Tesla's expansion into the country's energy market. This is especially true when it comes to the deployment of Autobidder, which could very well make Tesla a serious utility provider.

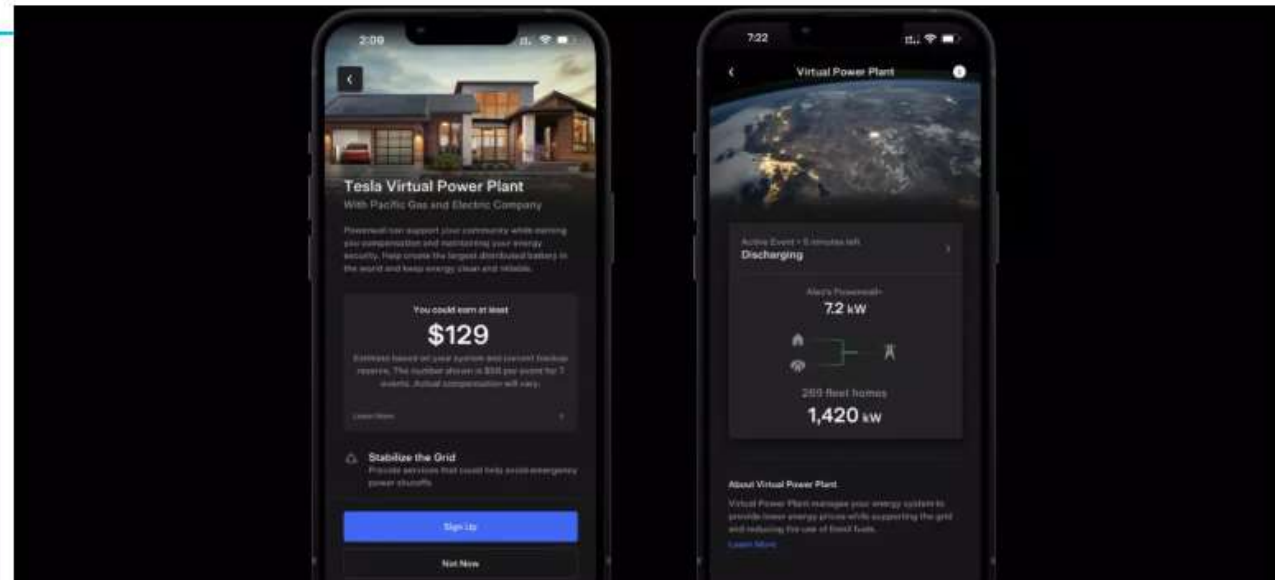
Smaller scale
Virtual Power Plants
are bringing business
to end customers

electrek

Tesla partners with EnergyHub to build 'largest virtual power plant in Northeast'



Fred Lambert | Aug 8 2023 - 9:46 am PT | 7 Comments



In short, Tesla Powerwall owners will be able to join EnergyHub's ConnectedSolutions VPP program directly from Tesla's app if they meet some eligibility criteria.

Tesla Powerwall owners who participate in the ConnectedSolutions program can earn for every kilowatt of benefit they provide to the grid—up to \$1,500 per year

California: 7.500 end users with PV/Batteries = Power Station of 30 MW



Sunrun and PG&E Collaborate on Residential Battery-Powered Virtual Power Plant to Support Grid Reliability for Electric Customers - PGE Currents

Besek

All Sunrun solar and battery customers in single-family homes can participate.

Enrolled battery systems will be directed to discharge every day from 7 p.m. to 9 p.m. during the months of August through October, a critical window when energy needs are highest in California.

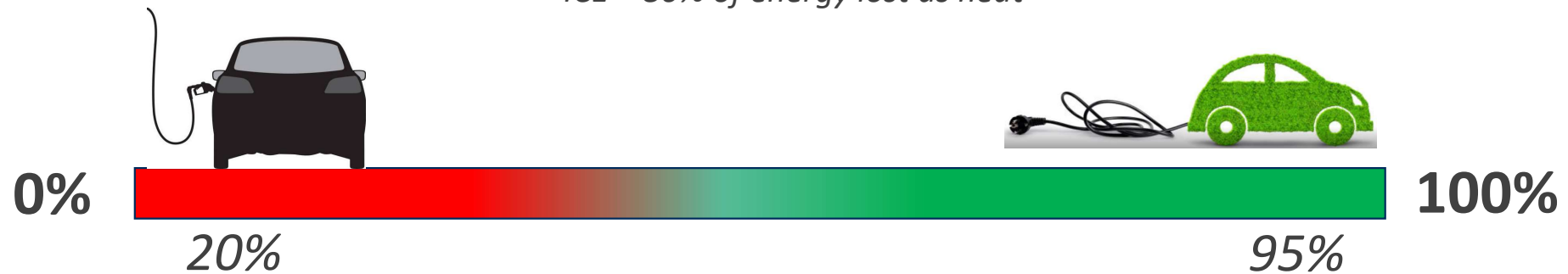
In exchange, customers will receive an upfront payment of \$750 and a free smart thermostat for participating.

Batteries enrolled in the program will retain enough energy to meet personal, essential needs in the event of a local power outage in their area.

Battery Electric Cars (BEV) = Clean and energy efficient transport

BEV are 5x more energy efficient compared to Internal Combustion Engine cars (ICE)

ICE = 80% of energy lost as heat



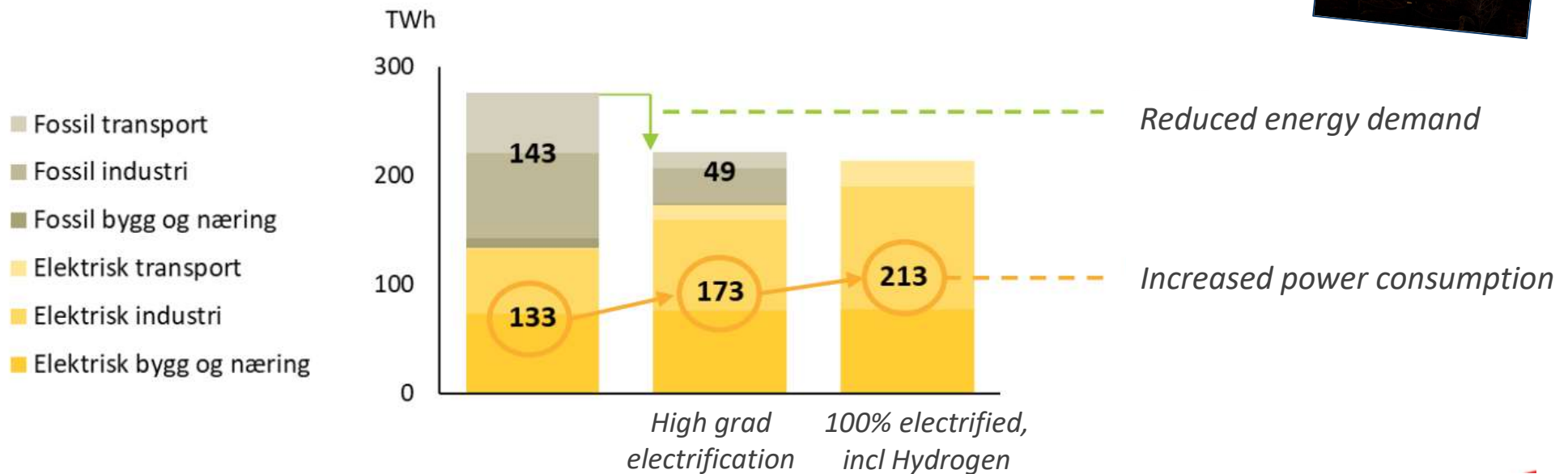
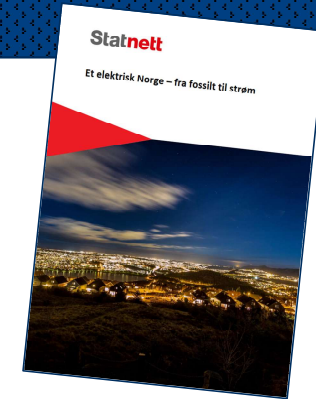
Many and moving parts



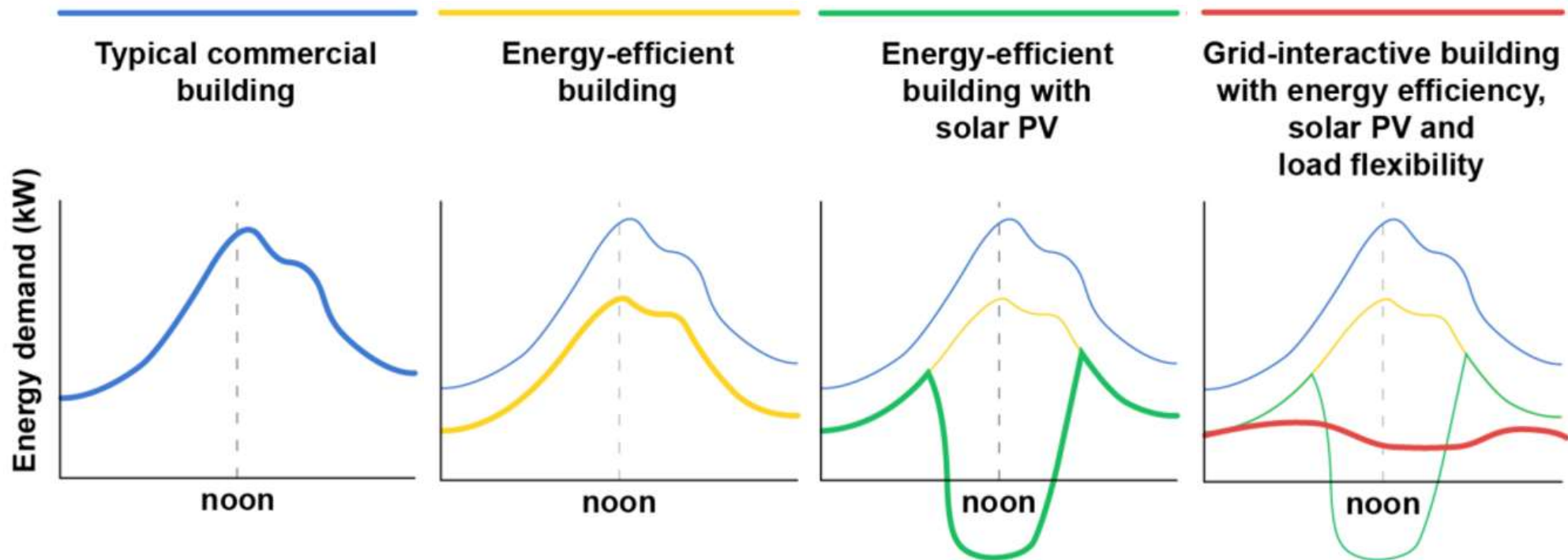
Simpler design. Fewer parts

Electric transport increases power usage, but reduces energy demand

e.g. Norway



Grid-interactive efficient buildings, with PV and battery



Heat pumps Repower EU ambition: 60 million heat pumps in 2030



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Efficiency & Environment, Top Stories

European heat pump market smashes new record

Nearly three million heat pumps were sold in 2022, according to a new report



Dimitris Mavrokefalidis

More Articles

Tuesday 21 February 2023



60 million European buildings predicted to be using heat pumps by 2030

22ND JUNE 2023 | BY NEIL MERRETT

Market analysis provided by the European Heat Pump Association predicts western European markets will drive growth for low carbon heat if sufficient policy is in place

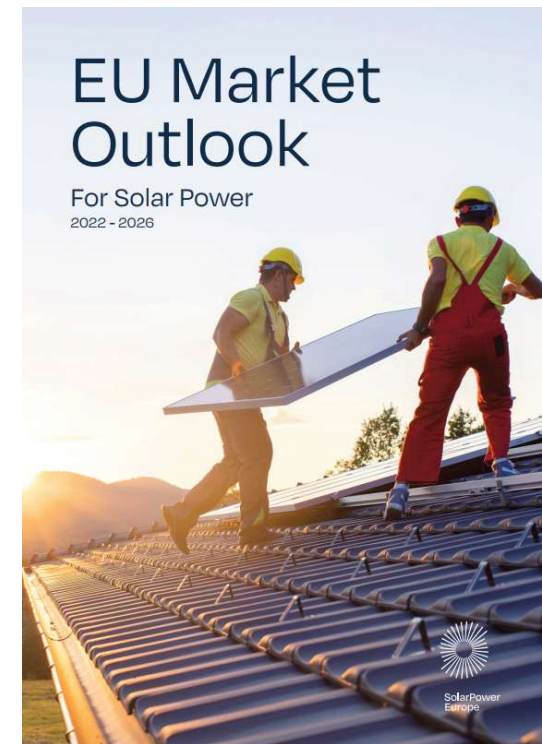
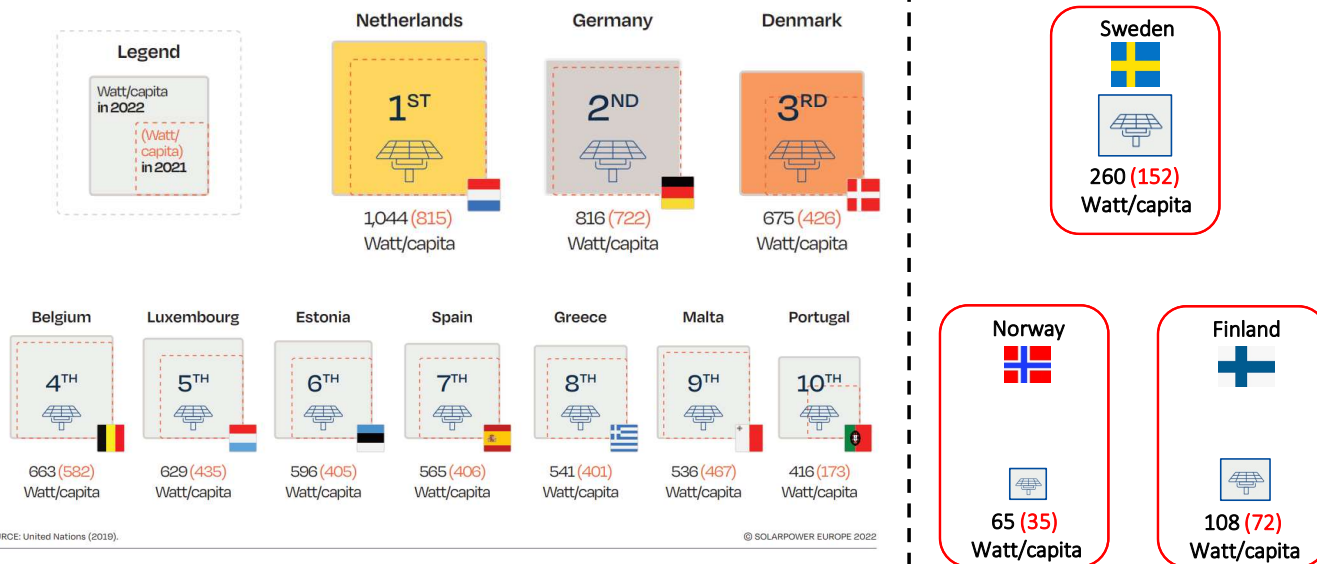
Industry projections suggest that up to 60 million heat pumps could be in use across the Europe by the end of the decade with the right policy and incentives. The predictions have been made in new research published by the European Heat Pump Association (EHPA) that highlighted the importance of encouraging heat pump use across the UK and EU and addressing barriers such as the current operating costs of the technology compared to natural gas systems.

The EHPA said [aggregated research from its member organisations](#) has concluded that half of Europe's building were predicted to be using heat pumps by 2030 to provide heating and cooling.

These predictions would mark a significant increase on the 20 million heat pumps estimated to be in use across Europe at present, with the potential for 43.2 million new systems fitted over the next eight years.

Installed solar capacity per capita in Europe in 2022: Denmark in top 3!

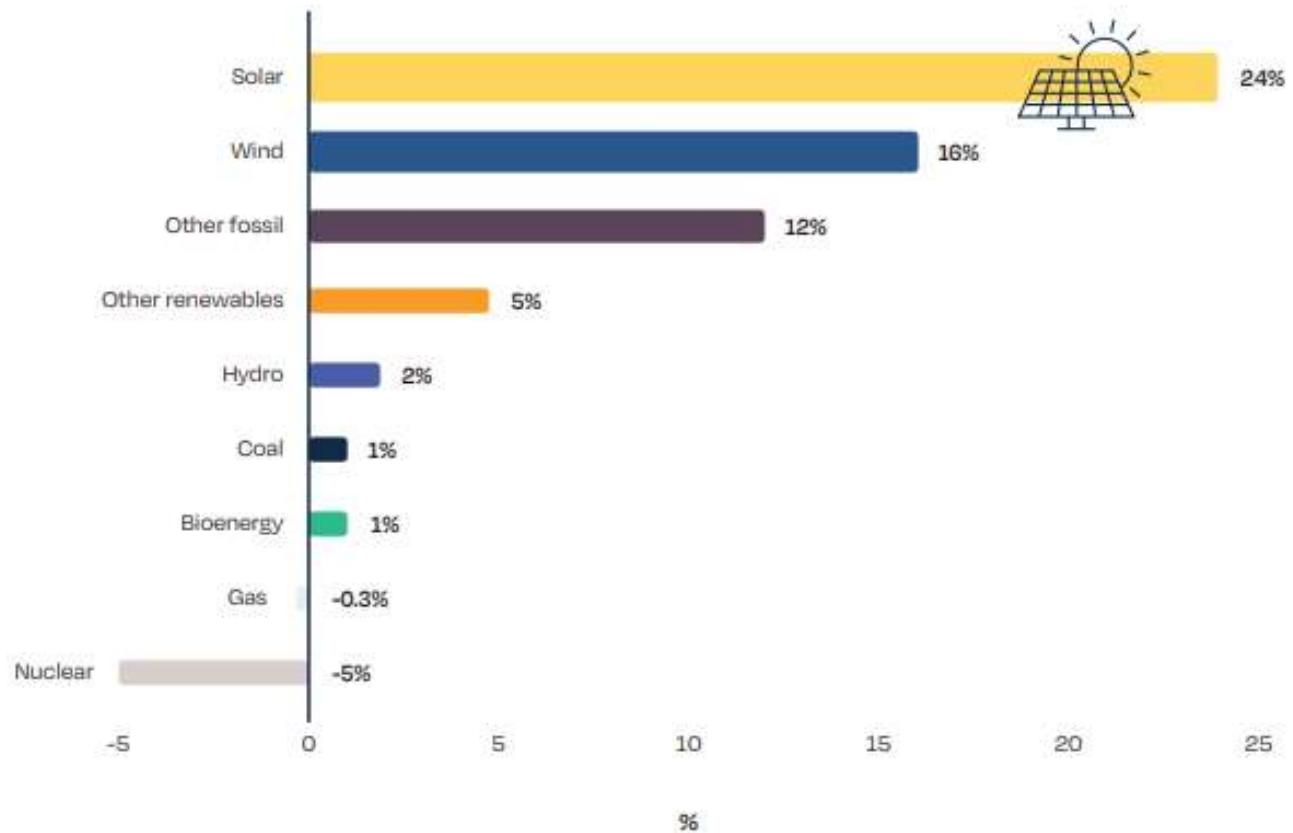
FIGURE 5 EU27 TOP 10 COUNTRIES SOLAR CAPACITY PER CAPITA 2022



Electricity production growth rates 2022



FIGURE 3 ELECTRICITY GENERATION GROWTH RATE FROM 2021 TO 2022, BY TECHNOLOGY

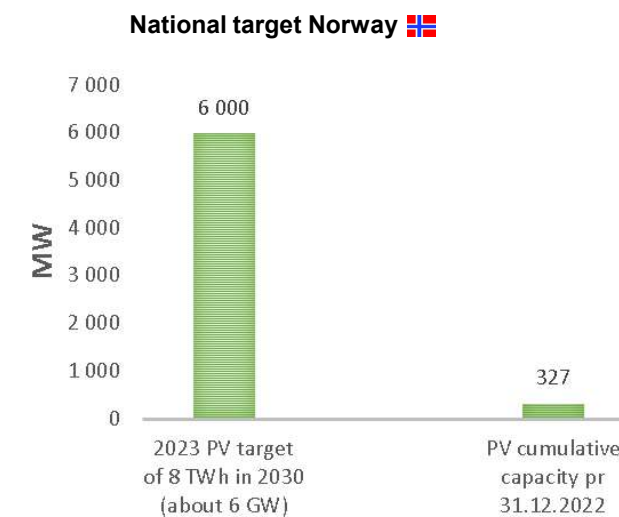
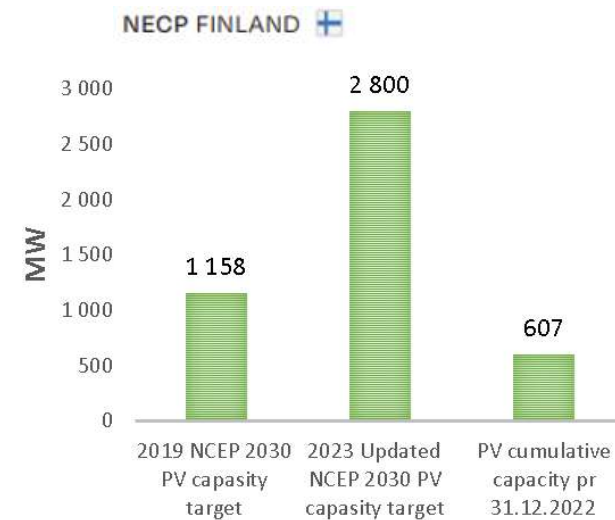
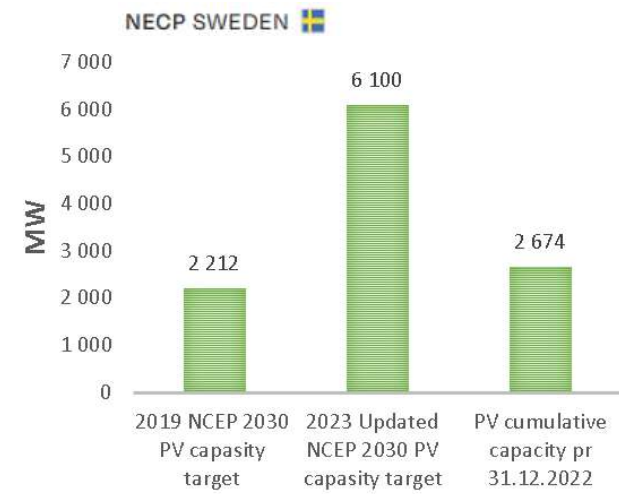
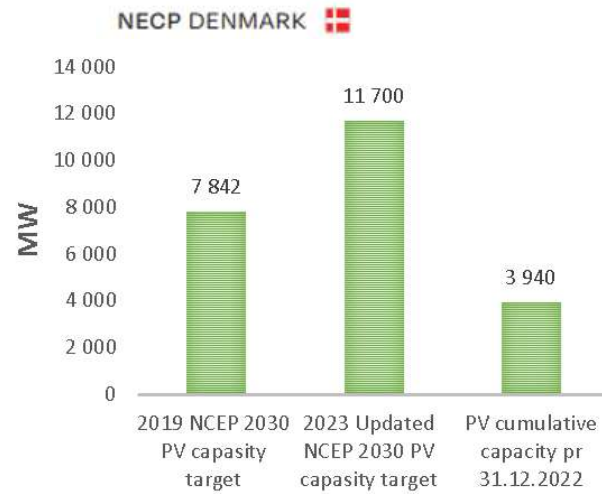


SOURCE: Ember (2023).

SOLARPOWER EUROPE 2023

Kilde: SolarPower Europe: Global Market Outlook for Solar Power 2023-2027.

Outlook for the Nordic PV markets, based on existing policy (missing numbers from Iceland)

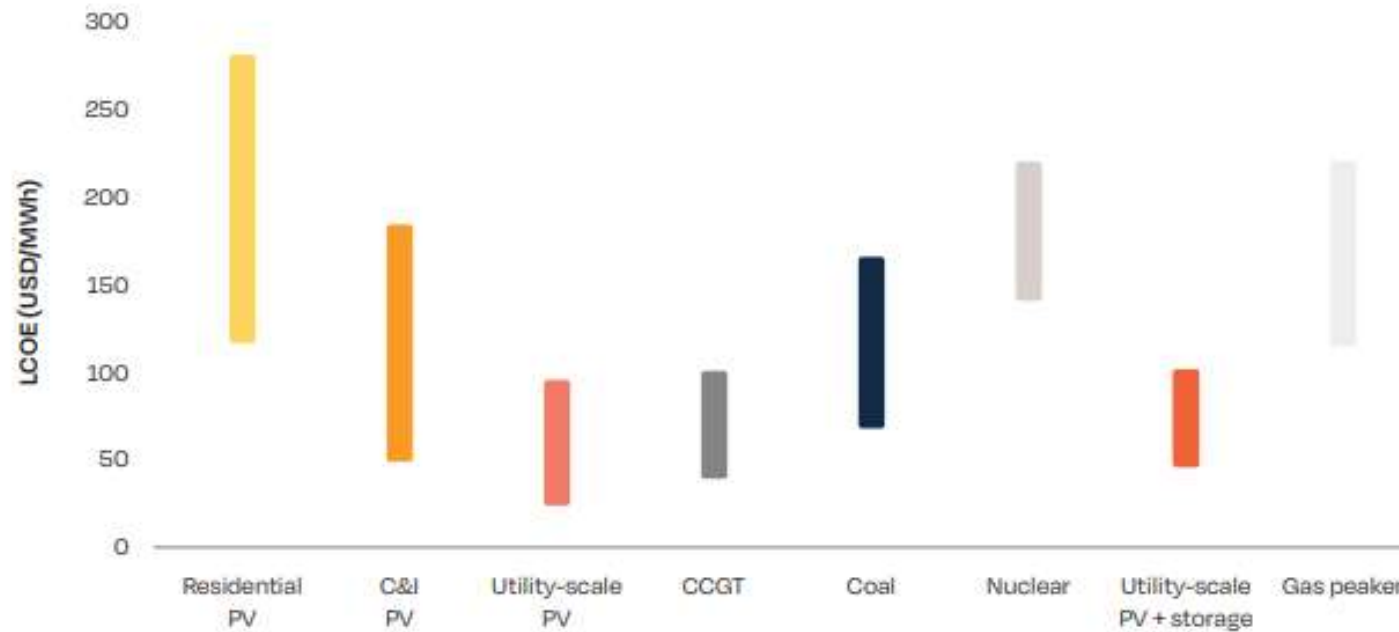


Kilde: SolarPower Europe: EU Market Outlook for Solar Power 2022-2026 [Politico](#) and EU NECP: [National Energy and Climate Plans](#)

Electricity production LCOE 2023



FIGURE 5 SOLAR ELECTRICITY GENERATION COST IN COMPARISON WITH CONVENTIONAL POWER SOURCES 2023



SOURCE: Lazard (2023), Nominal terms, post-tax.

© SOLARPPOWER EUROPE 2023

Kilde: SolarPower Europe: Global Market Outlook for Solar Power 2023-2027.

Mineral and metal ESG Challenges must be handled

Apple, Tesla and other sued over child labour in cobalt mining in Africa



Artisanal miners work at a cobalt mine-pit in Tulwizembe, Katanga province, Democratic Republic of Congo

Forbes

Apr 29, 2021, 08:25pm EDT | 4 386 views

Why Won't Environmentalists Speak Out Against Forced Labor For China-Made Solar Panels?



Michael Shellenberger Contributor

Energy

I write about energy and the environment.

America's leading climate and environmental groups including Natural Resources Defense Council (NRDC), Energy Foundation, and Environmental Defense Fund have not responded to repeated queries about evidence that China is forcing Uyghur Muslims to choose between forced labor at factories which make solar panels which all three groups promote, or being sent to concentration camps.

USA/EU legislations



Uyghur Forced Labor Prevention Act

It establishes a rebuttable presumption that the importation of any goods, wares, articles, and merchandise mined, produced, or manufactured wholly or in part in the Xinjiang Uyghur Autonomous Region of the People's Republic of China, or produced by certain entities, is prohibited by Section 307 of the Tariff Act of 1930 and that such goods, wares, articles, and merchandise are not entitled to entry to the United States. The presumption applies unless

An official website of the United States government [Here's how you know](#)



[Home](#) » [Topics](#) » [Trade and Economic Security](#) » [Uyghur Forced Labor Prevention Act](#) » [UFLPA FAQs](#)

UFLPA Frequently Asked Questions



EU will propose ban on products made by forced labour, says EU Commission President von der Leyen

[See all tags](#)



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July 19, 2022
12:45 AM GMT+2
Last Updated 2 months ago

China

Allies seek to follow U.S. lead on Xinjiang forced labor ban -U.S. official

Roles to play for an electrical contractor

Main contractor

- Does both design and installation of the PV system
- Is responsible for the whole PV system

Sub contractor

- Does parts of the PV installation:
 - AC-side
 - DC-side
 - Grid connection
- Reports to main contractor

Partner

- Providing the PV system
- Designing the system
- The Otovo model
- Leasing

How to succeed in different segments? E.g.: Agriculture



Guide: How to get financial support



Guide: Terms for contracts between farmer and EC



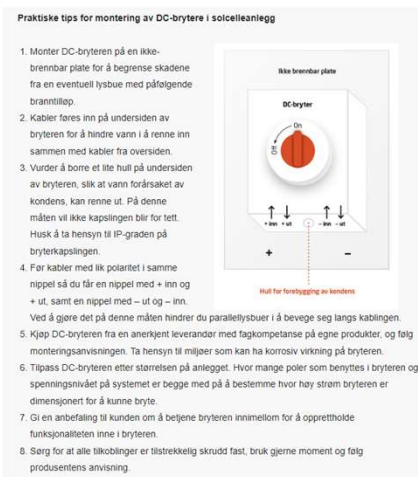
Guide: How to build a profitable agricultural PV system



Guide: What should a farmer know before investing in a PV-system?

Key: A toolbox for the electrical contractor *AND* the farmer

Toolbox for Nelfos members: PV systems



Mounting a DC-switch safely



Guideline: How to install a PV system, with chapters for different segments:

- Residential
- Agriculture
- Industry/commercial
- Off-grid

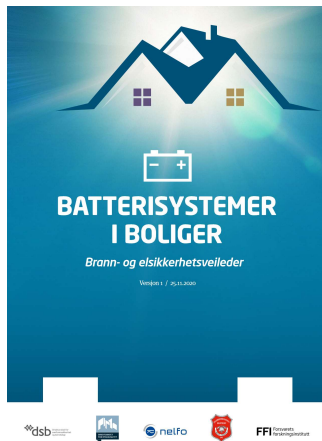


Labelling and identification of a PV-system



Documentation of a PV-system: 6 schemes that together fulfils the requirements

Toolbox for Nelfos members: Battery systems



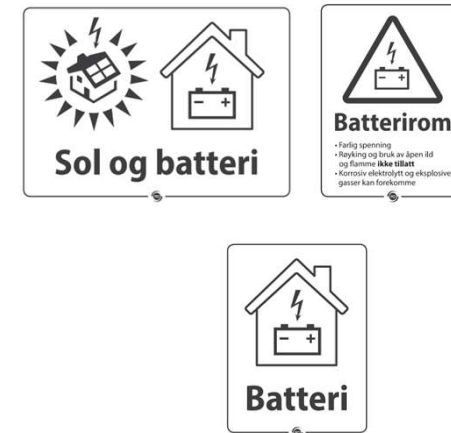
Guideline: Designing and installing a residential battery system



Digital folder: Information for the installer to give to the customer buying the battery system



Documentaion guide: 4 schemes that together fulfills the requirements



Signs: Examples for labeling a battery system/battery room with/without a PV system

Different segments (examples from Norway)



Off-grid (Hardangervidda)



Schools/Commercial (Vestviken, Kongsberg)



Industry (Asko Vestby)



Agriculture (Låke Gård)



Parks (Sola Lufthavn)



Residential (Drammen)

Opportunities arising from the nordic climate



Floating PV: Exploits the cold Nordic water to increase efficiency in the solar modules. Can also be combined with hydro power.



BiPV: Exploits the snow and the latitude for reflecting light from the sun when its low on the sky to produce electricity during winter.



PVT: Exploits the heat from the solar modules to increase the efficiency of a heat pump and the modules in itself.

Other opportunities within solar



- Exploiting a balcony in Germany for PV production



- Combining vertical bifacial solar modules with green roofs for biodiversity and water retention (Over Easy Solar, Norwegian Company)

Gain competitive advantage by making life easy for the customers – and build digital competences



Thank you.

