

# DESTINATION EARTH

## The On-Demand Extremes DT and solar energy

Kristian Pagh Nielsen  
&  
The On-Demand Extremes Team

2nd Destination Earth User Exchange Meeting, Bonn, 2023-11-14

# Why solar energy

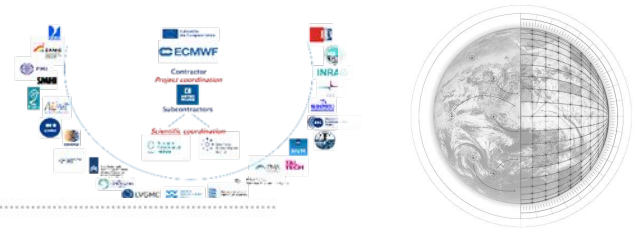
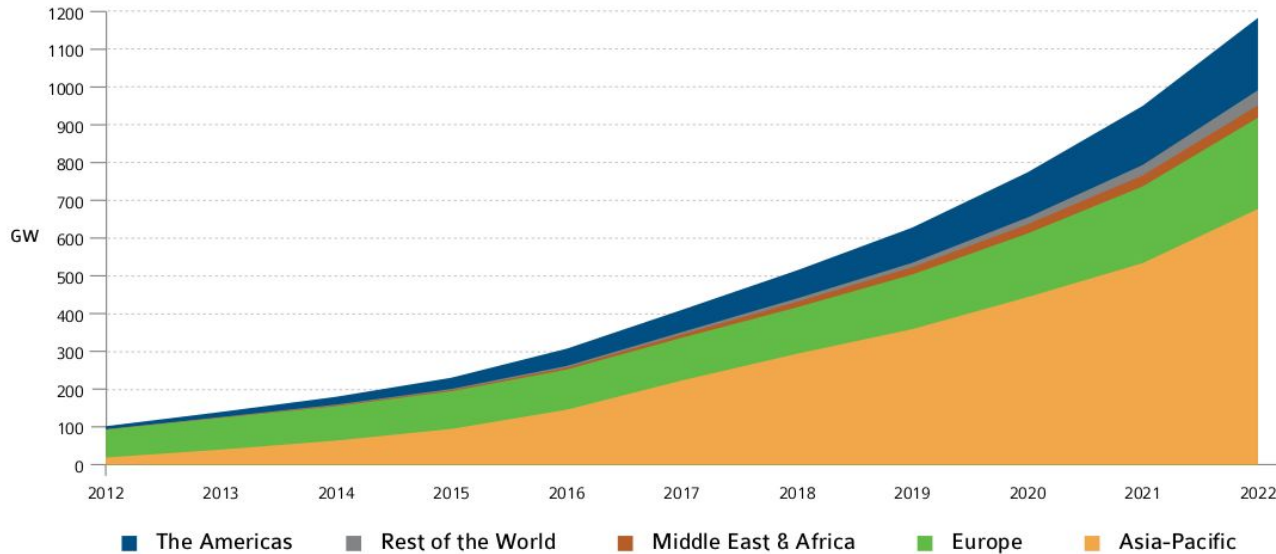
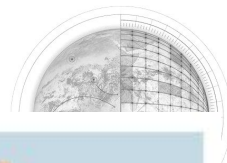


FIGURE 2.7: EVOLUTION OF REGIONAL PV INSTALLATIONS



Source: IEA  
PVPS  
Trends in  
photovoltaic  
(PV)  
applications  
2023

SOURCE IEA PVPS & OTHERS



## TRENDS IN PHOTOVOLTAIC APPLICATIONS // 2023

PHOTOVOLTAIC POWER SYSTEMS PROGRAMME [WWW.IEA-PVPS.ORG](http://WWW.IEA-PVPS.ORG)



TOTAL BUSINESS VALUE IN PV SECTOR IN 2022

**\$230** BILLION USD



**TOP 5**  
PV MARKETS IN 2022

	CHINA	105.5 GW
	EU	40.0 GW
	USA	21.1 GW
	INDIA	18.1 GW
	BRAZIL	9.9 GW

PV CONTRIBUTION TO  
ELECTRICITY DEMAND

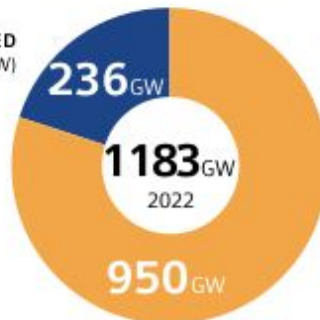


**6.2%**

Share of PV in the  
global electricity  
demand in 2022

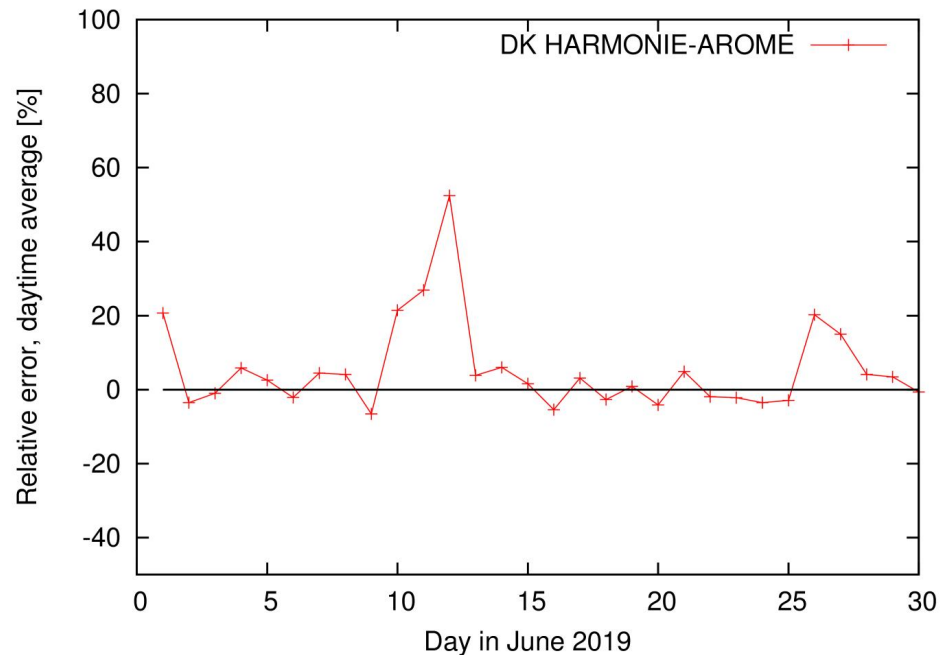
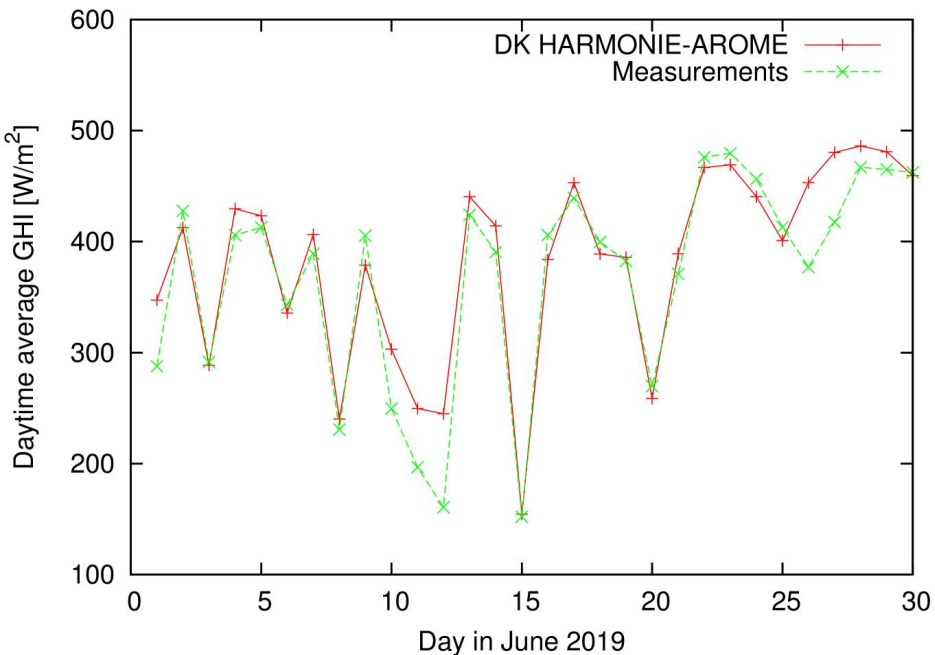
ANNUAL INSTALLED  
CAPACITY IN 2022 (GW)

GLOBAL PV  
CAPACITY  
END OF 2022



GLOBAL PV CAPACITY  
END OF 2021 (GW)

# Solar test case: 11-12 June 2019



Original 2.5 km HARMONIE-AROME forecast performance

# Solar test case: 11-12 June 2019

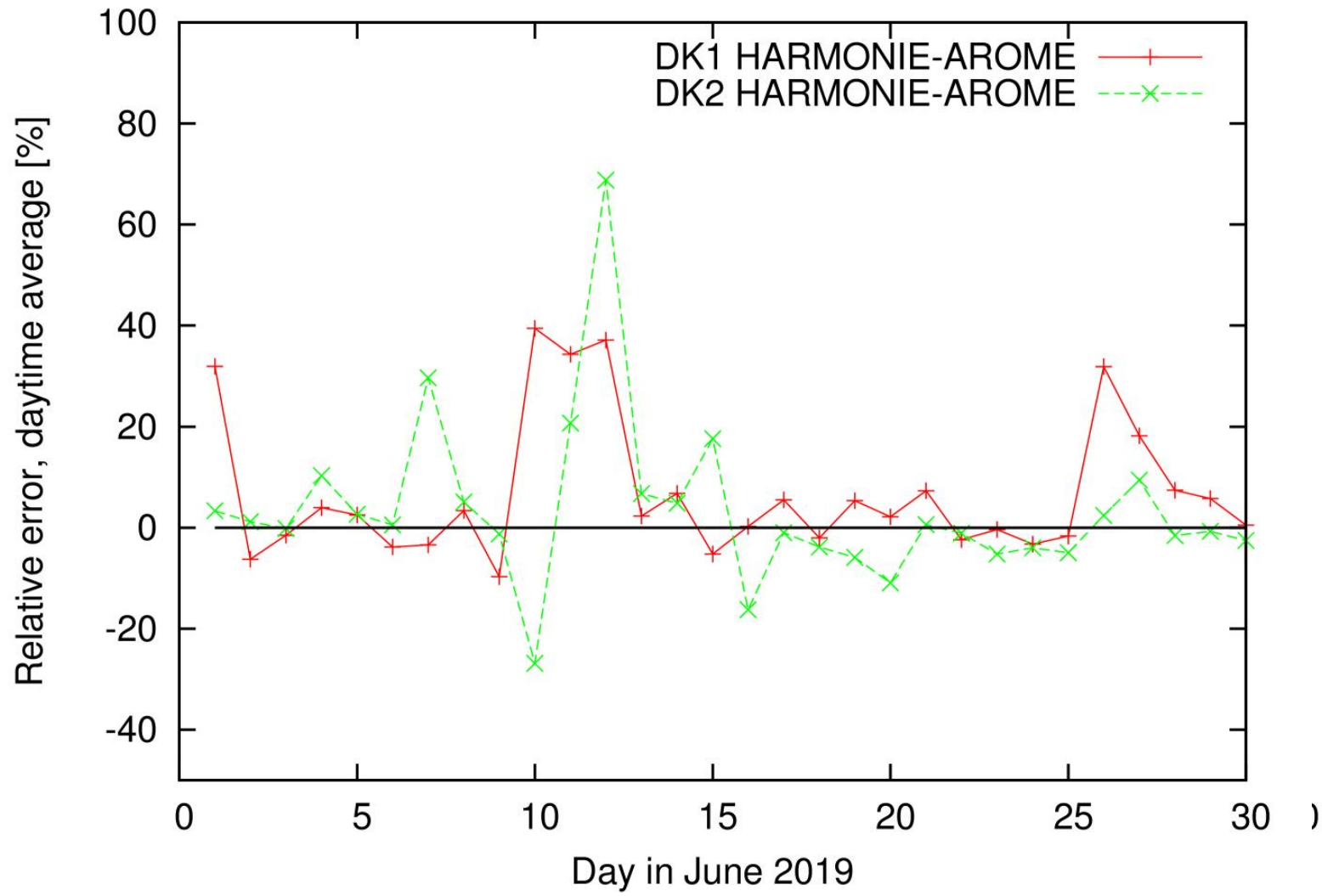


“During 3 days in June, four year ago, the electricity shortage in Germany’s high voltage cables was so excessive that the grid, according to the German authorities, was about to collapse”

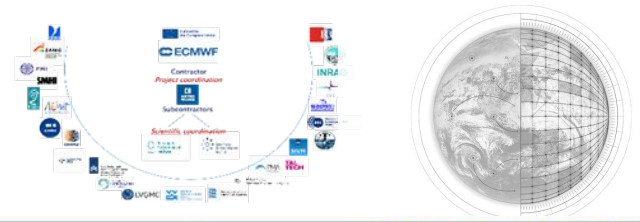
DR Nyheder

<https://www.dr.dk/nyheder/penge/danske-elhaendlere-fik-advarsler-da-tysklands-elnat-var-taet-paa-kollaps>





## Model setup and test domain



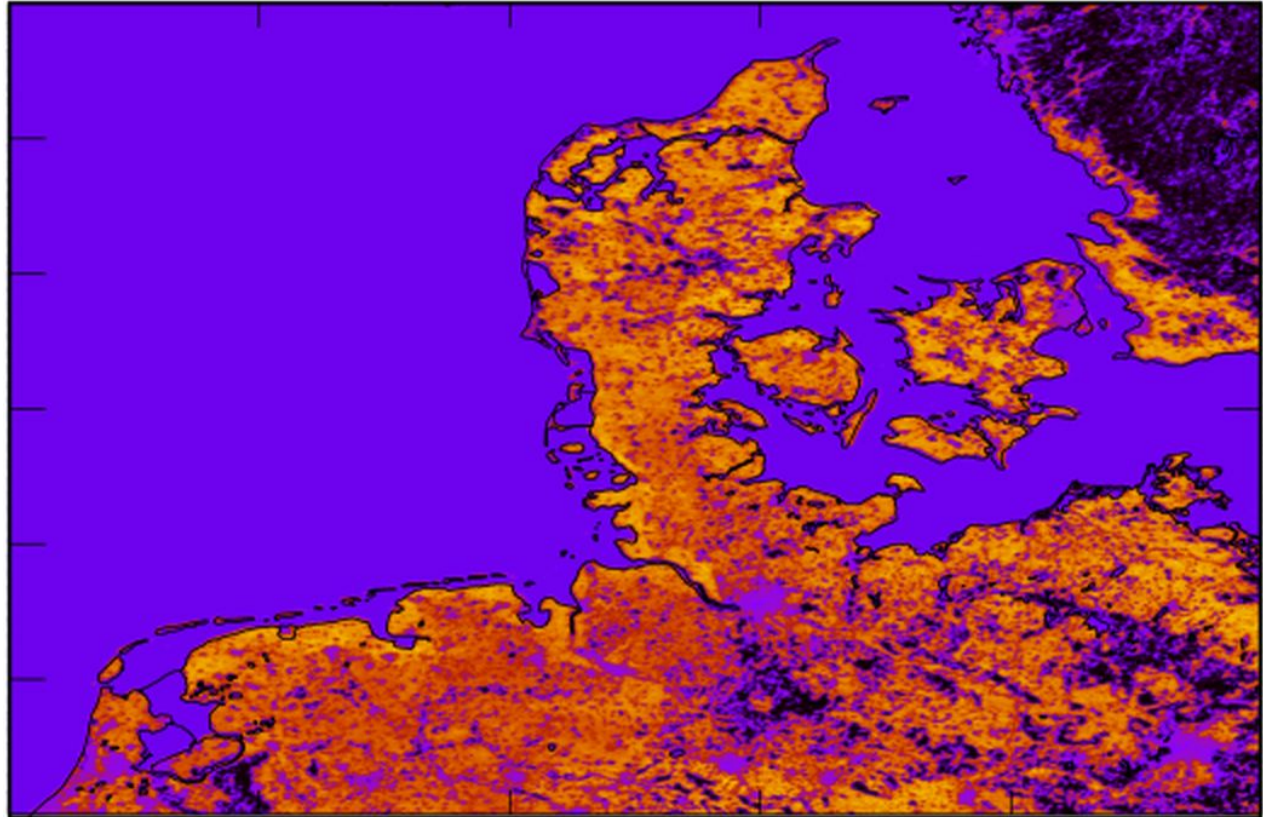
Resolution: 750 m

Frequency: 15 min

Configuration:

HARMONIE-AROME

CY46h1



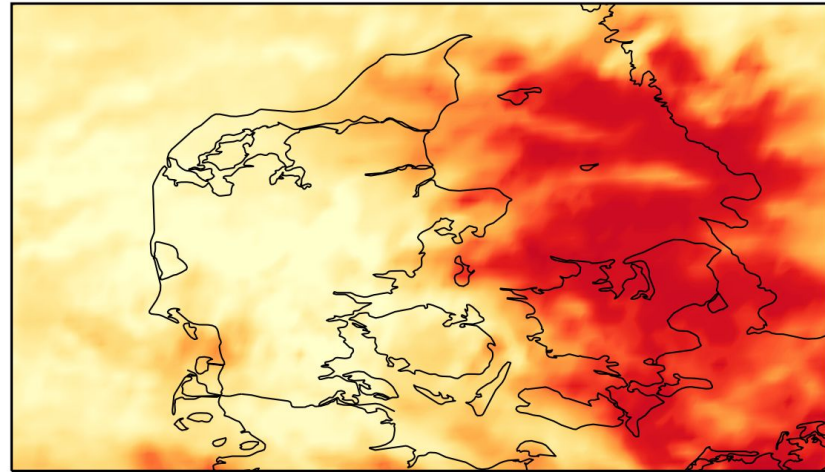




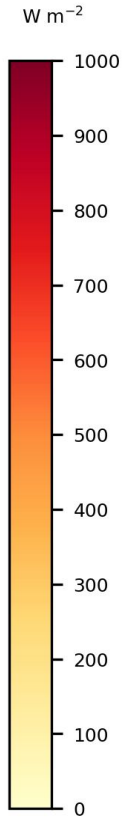
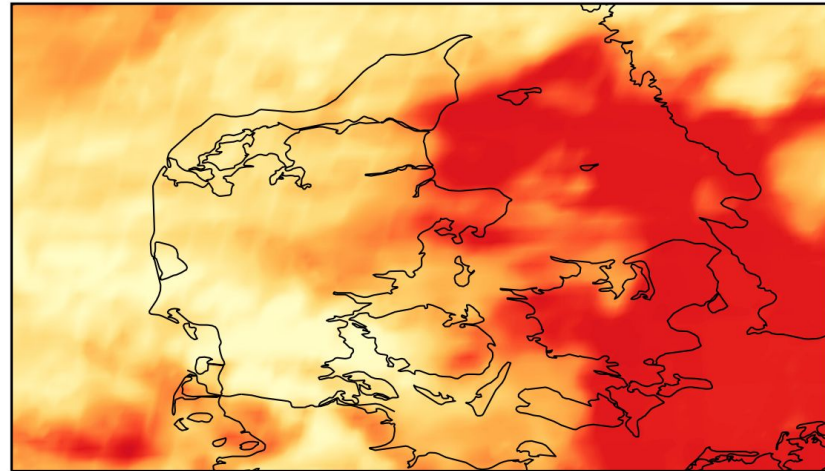
# Solar nowcast Denmark, 11/6/2019

<https://msgcpp.knmi.nl/>

Global radiation Observed 20190611 1200



Global radiation Forecast 20190611 1000 +120 min



# Solar nowcasting for Denmark case, 11/6/2019

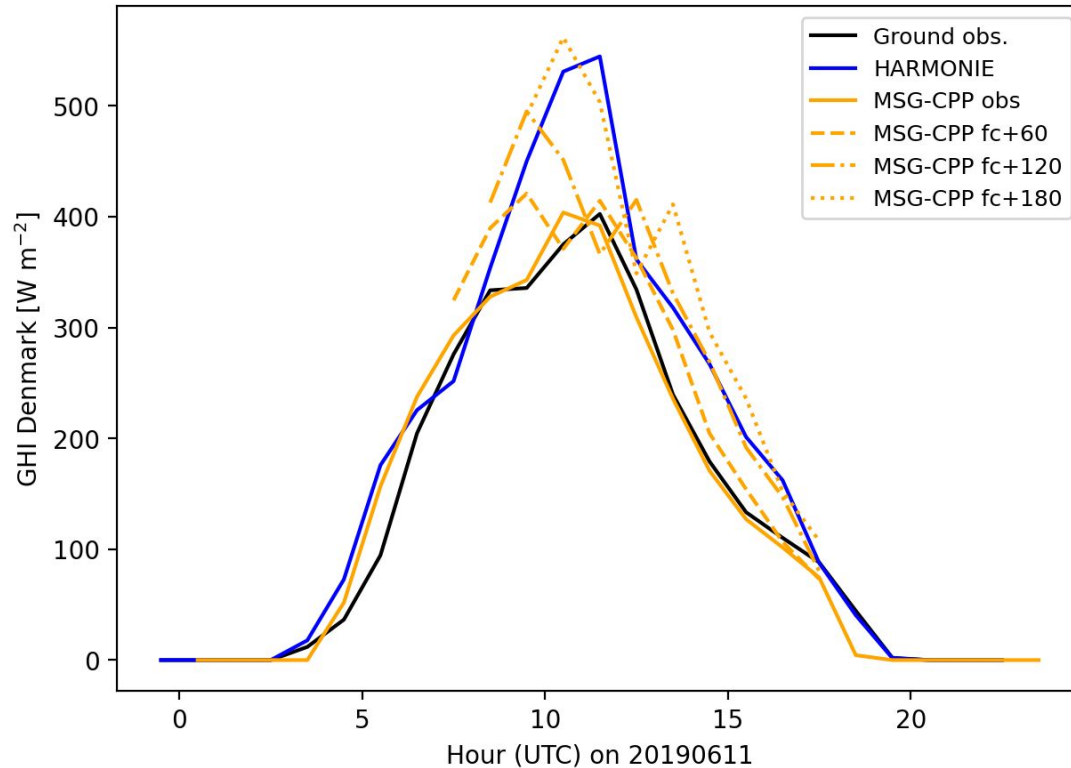


Figure provided  
by Jan Fokke  
Meirink, KNMI

# Solar nowcasting for Denmark case, 12/6/2019

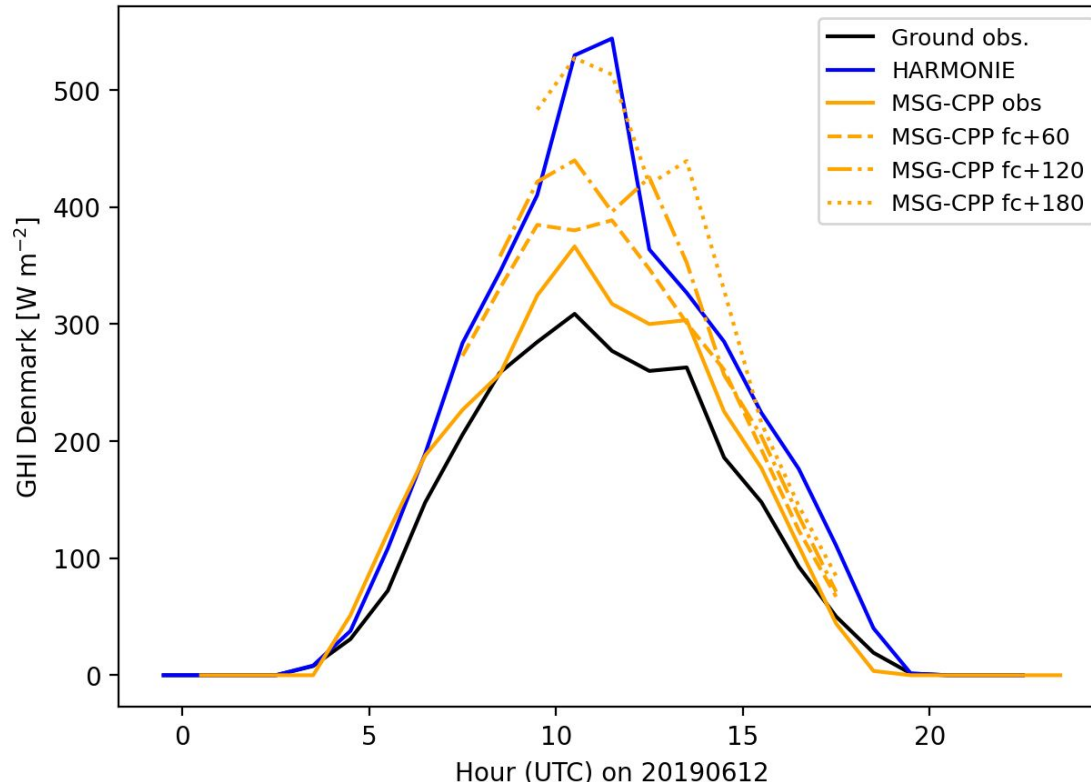
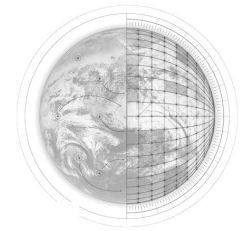


Figure provided  
by Jan Fokke  
Meirink, KNMI

# Users of DE On-Demand Extremes



- Energy traders
- Transmission System Operators (TSO)
- Consultants
- Researchers
- ...



## User needs

- PV production data
- Distributed on tilted surfaces
- Newer systems are often tracking

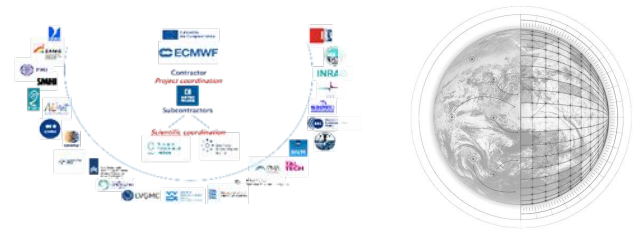
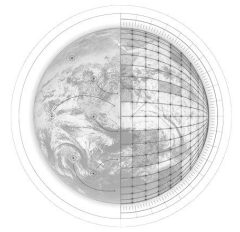
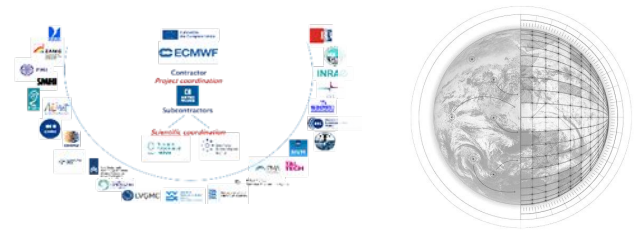


Image from  
[iea.pvps.org](http://iea.pvps.org)




## Co-development - *what we need*



- Continuously to updated PV capacity
- ... metadata, and power production
- Curtailment data



Image from  
[iea.pvps.org](http://iea.pvps.org)



Thank you for your attention!

Contact: [kpn@dmi.dk](mailto:kpn@dmi.dk)