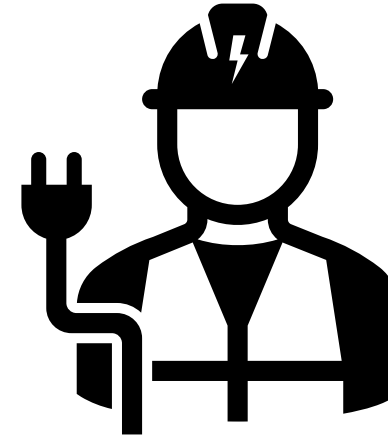
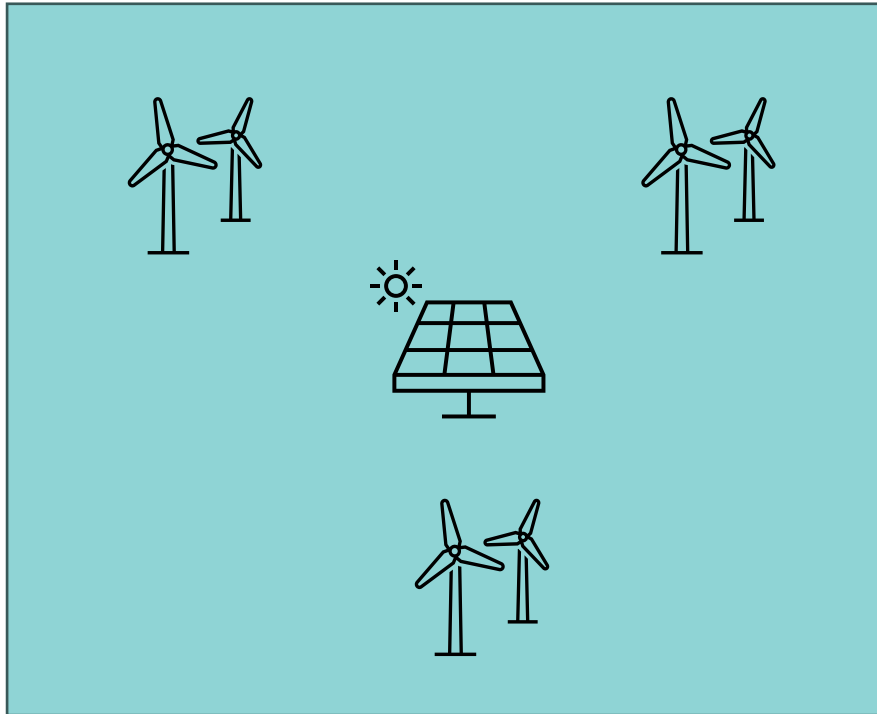




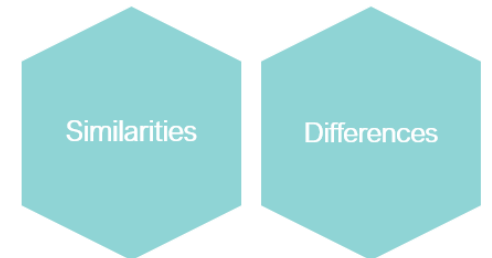
WinterSolar: Similarities and differences between developing solar and wind power in cold climates – From a KVT prespective

Sigbjørn Grini, Kjeller Vindteknikk

Why develop solar PV in cold climates as a wind developer?



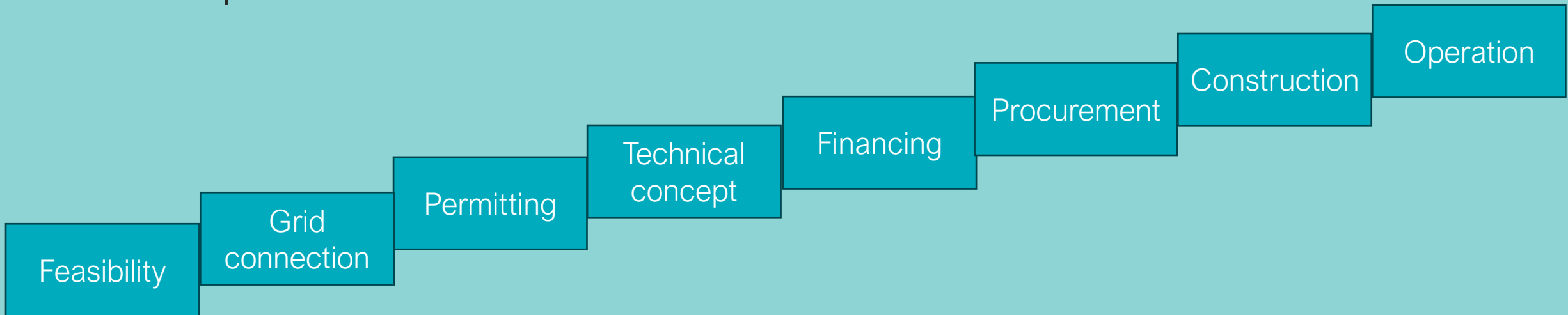
Problem: You don't know the technology and what you can adapt from your prior knowledge



Similarity #1 - You know all the steps

Similarity #1 - You know all the steps

Wind energy
development



Similarity #1 - You know all the steps

Solar energy
development

Feasibility

Grid
connection

Permitting

Technical
concept

Financing

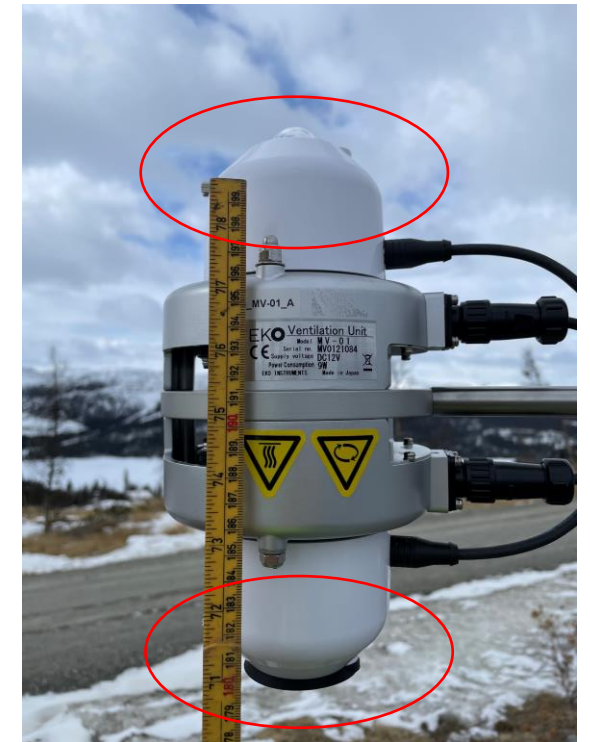
Procurement

Construction

Operation

Similarity #2 – Measurements are still the golden standard

Similarity #2 – Measurements are still the golden standard



Similarity #3 - You know that things are not that straight forward in cold climates

Similarity #3 - You know that things are not that straight forward in cold climates



Difference #1 – Snow loss instead of ice loss

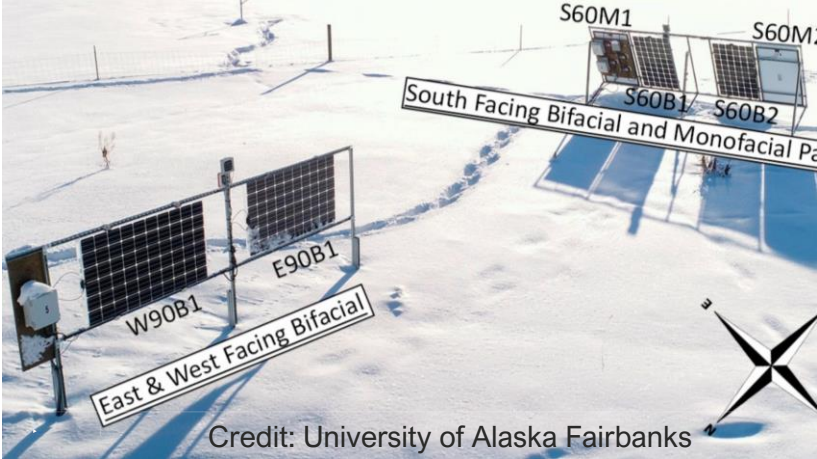
Difference #1 – Snow loss instead of ice loss



[Link to project](#)

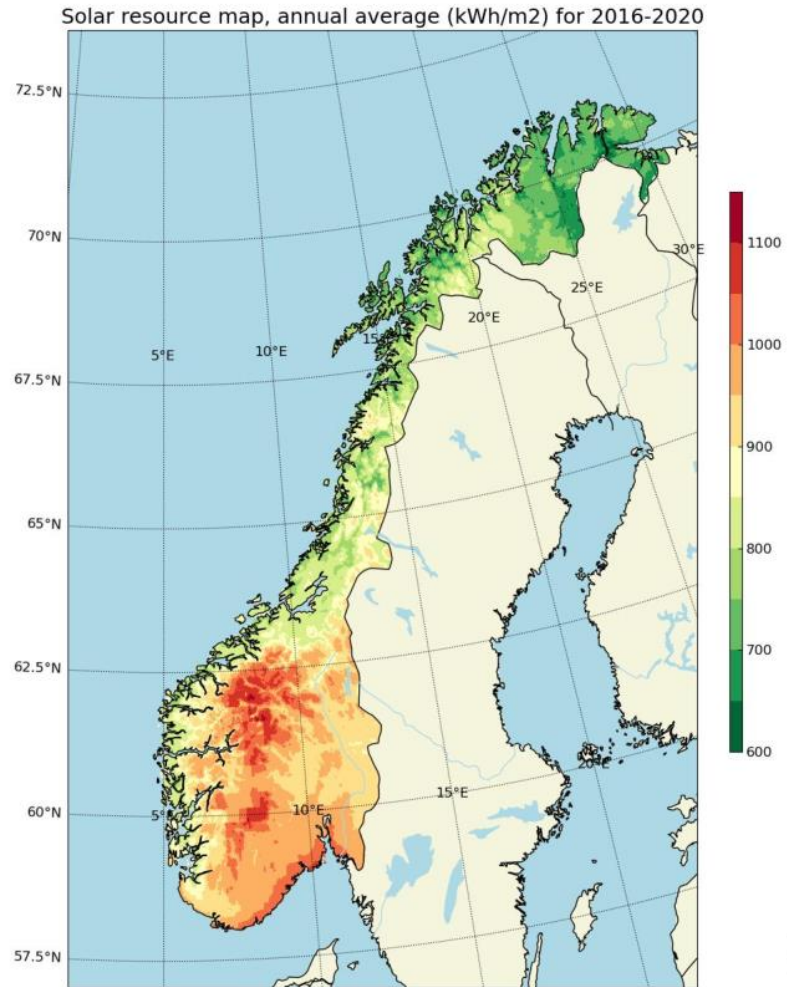
Difference #2 – Snow is actually your friend

Difference #2 – Snow is actually your friend



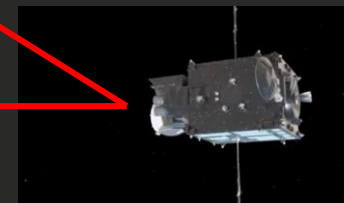
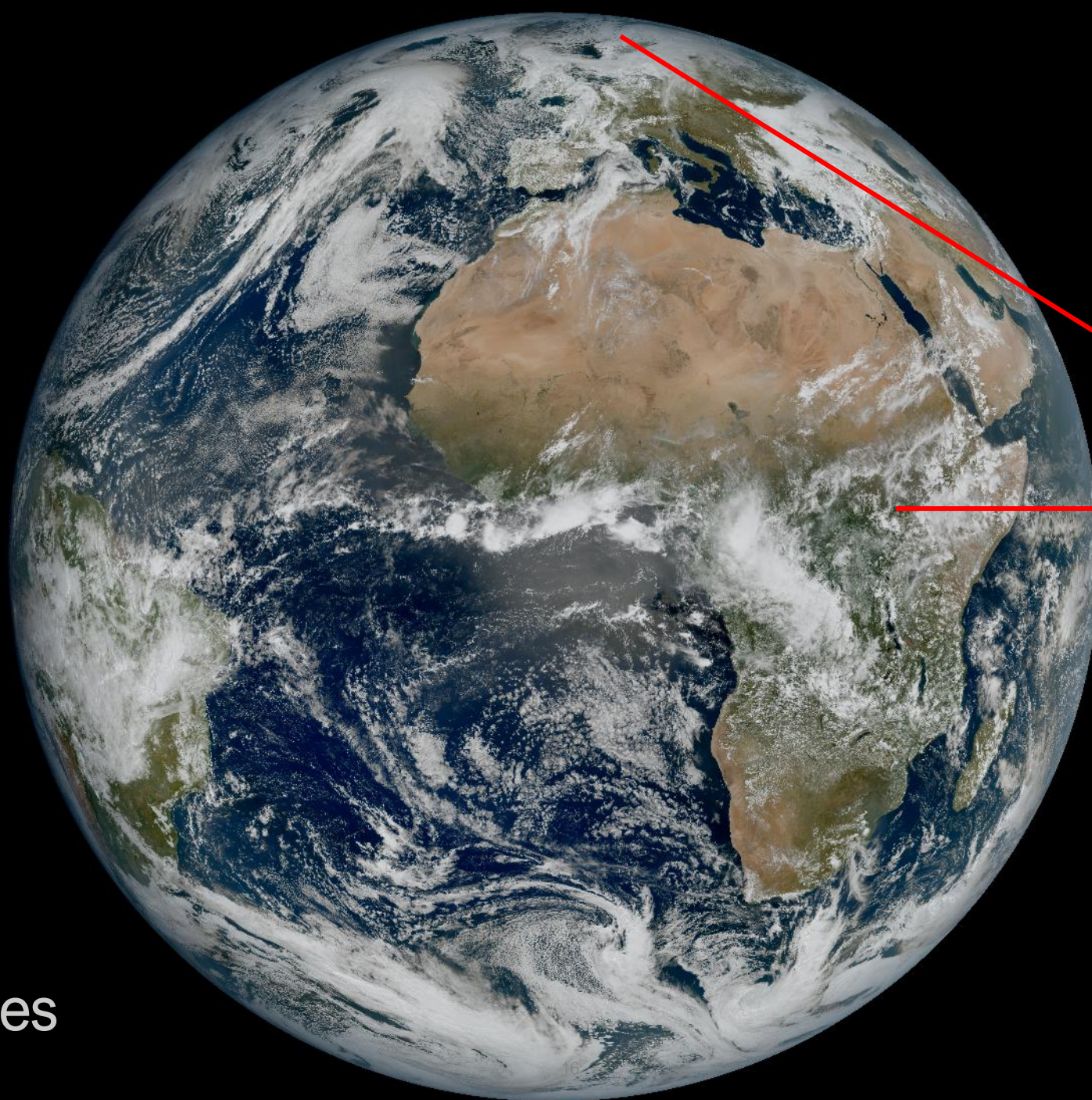
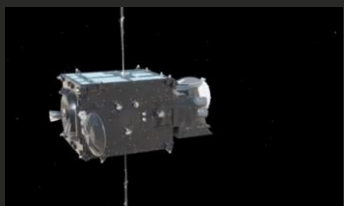
Difference #3 – Higher latitude usually means less yield and more uncertainty

Difference #3 – Higher latitude usually means less yield and more uncertainty



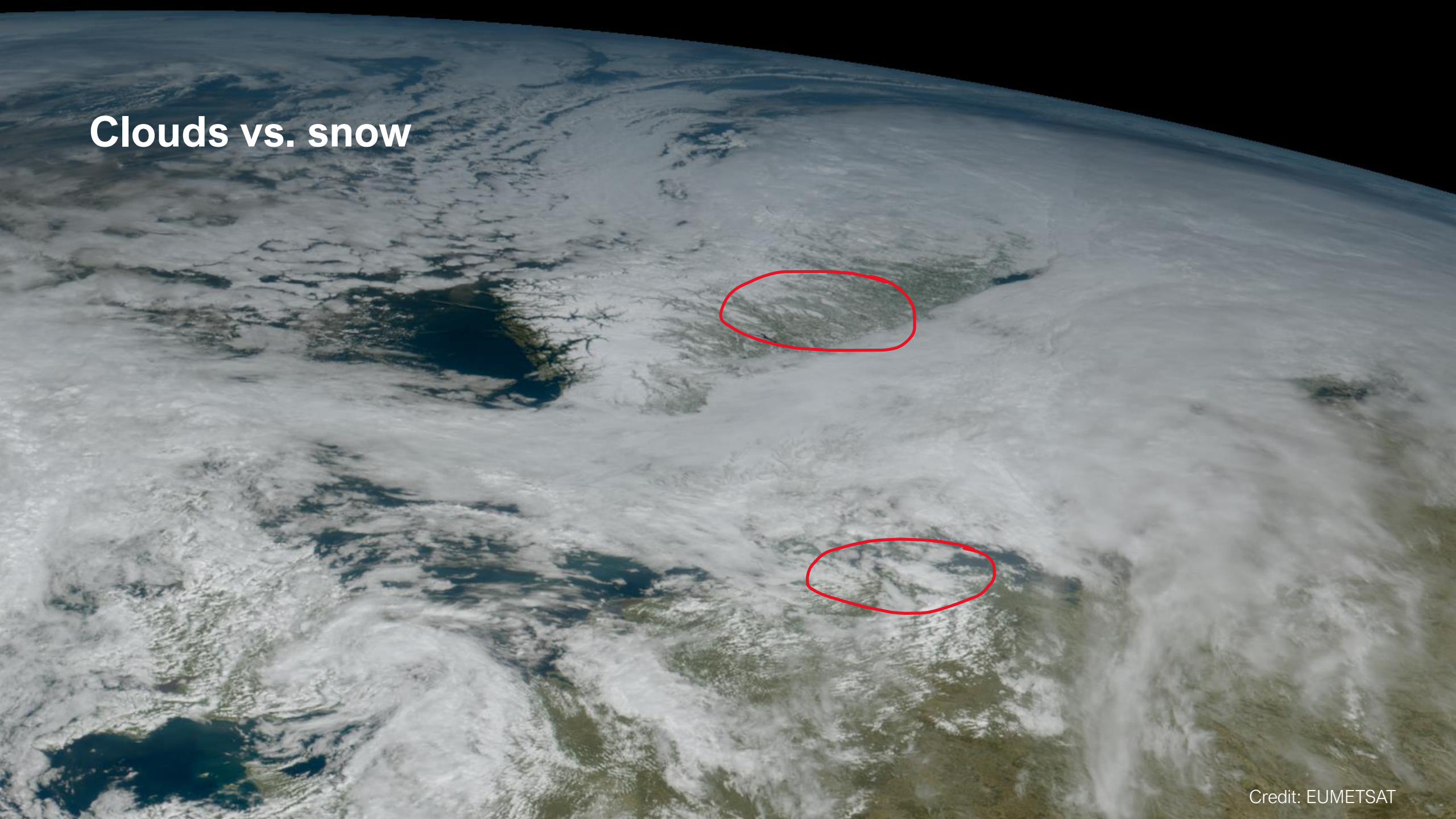
SUNPOINT research project

1. Further away from the equator
2. More clouds



Satellite images

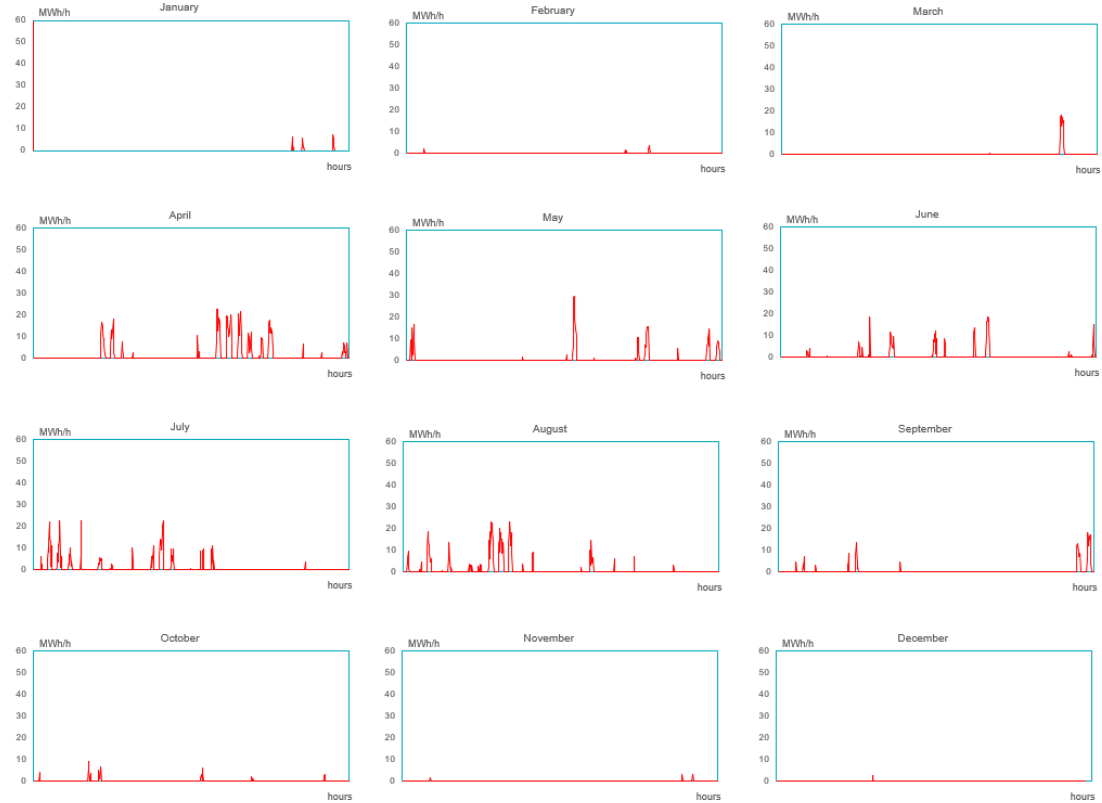
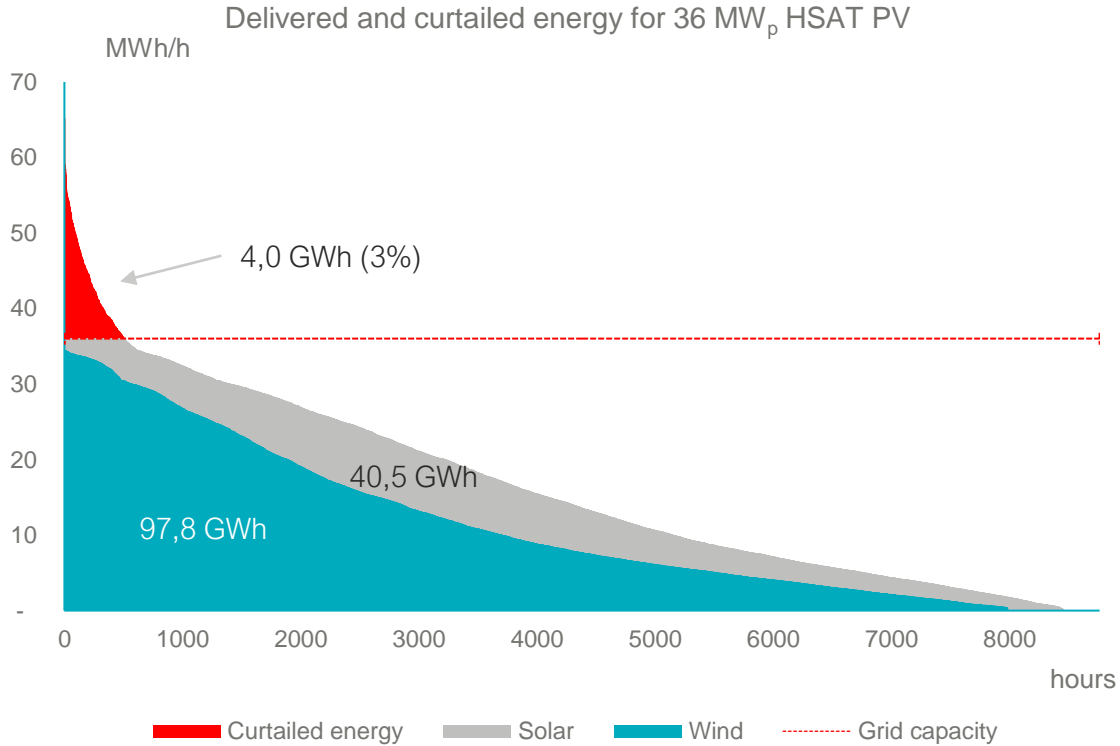
Clouds vs. snow



Difference #4 – Your power production is completely different, and that is great

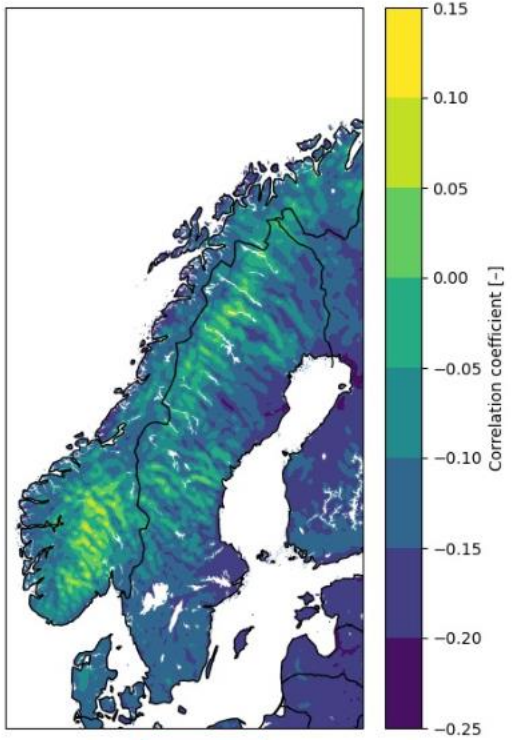
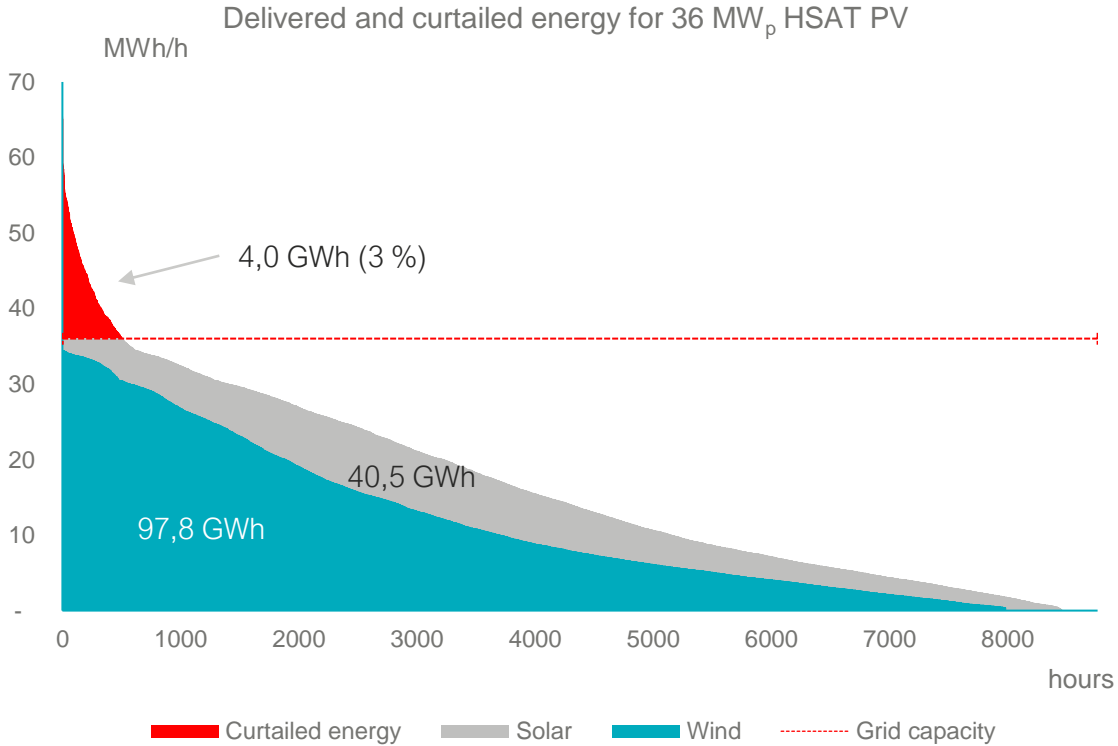
Difference #4 – Your power production is completely different, and that is great

Grid connection



Difference #4 – Your power production is completely different, and that is great

Grid connection



x_{corr}

Klyve, Øyvind Sommer, et al. "Assessing Trends in the Techno-Economic Feasibility of Retrofitting On-Shore Wind Power Plants into Hybrid Pv-Wind Power Plants." Available at SSRN 4743260.

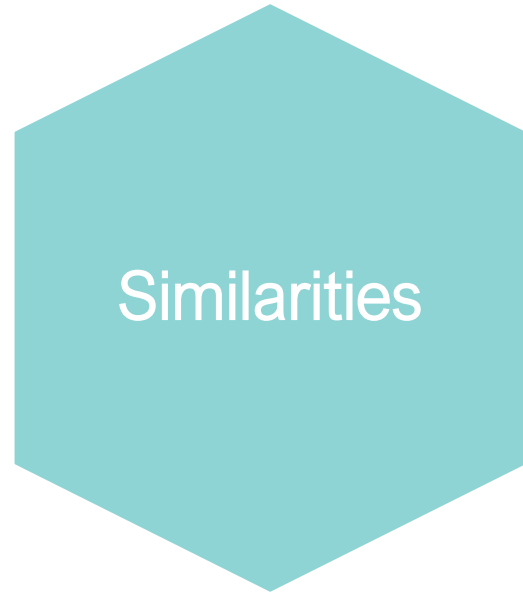
Conclusions

You know all the steps

Measurements golden standard

Things are not straight forward

in cold climates



Snow loss instead of ice loss

Snow is also your friend

Higher latitude usually less yield and more uncertainty

Power production is completely different



Every day we improve everyday life