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Velkommen til Teknologisk Institut AVANCERET ENERGILAGRING 2017 2017-11-30

Frank Elefsen, Centerchef Transport og Elektriske
Systemer, Teknologisk Institut

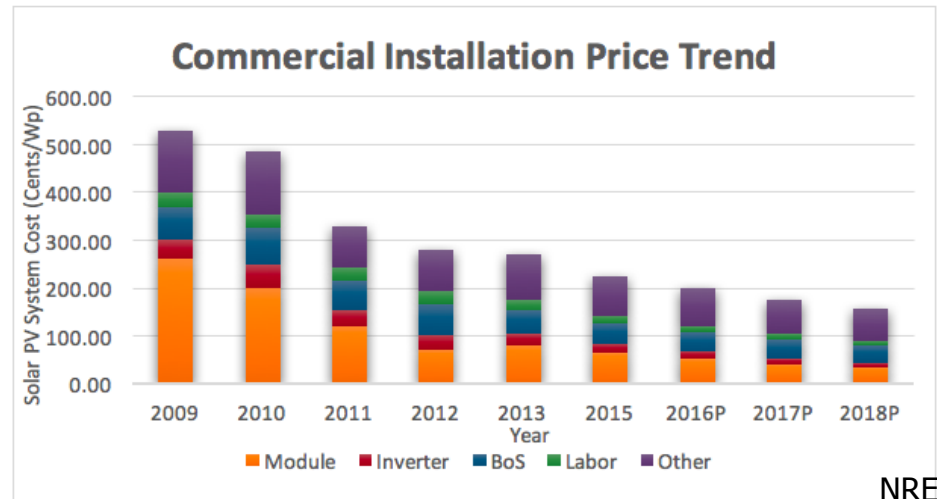


Hvorfor er der behov for energilagring?



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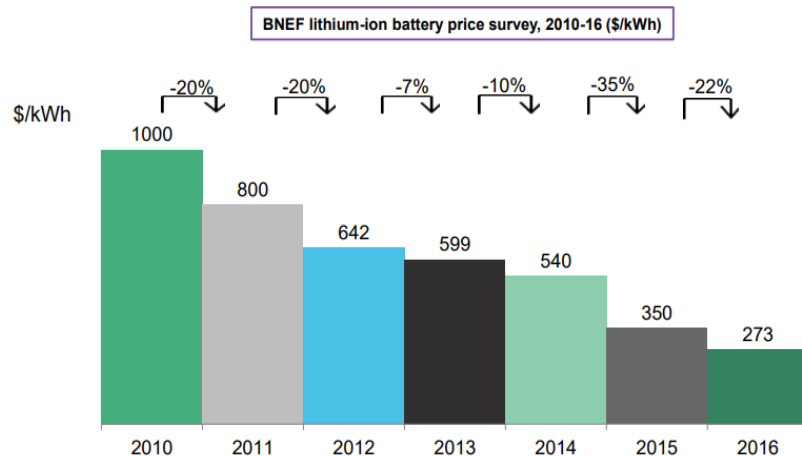
- VE er billigere end fossile alternativer
- "Bud på tysk landvind helt ned til 16,4 øre/kWh"¹⁾
- Solcellepriserne falder eksponentielt
- Mere fluktuerende el medfører behov for lagring i el-nettet, i fjernvarme, i gas-nettet, i bygninger og i transporten



¹⁾ Energiwatch 22-11-2017

Batterier, en disruptiv teknologi

- Prisen på Lithium-ion batterier er faldet 73% siden 2010

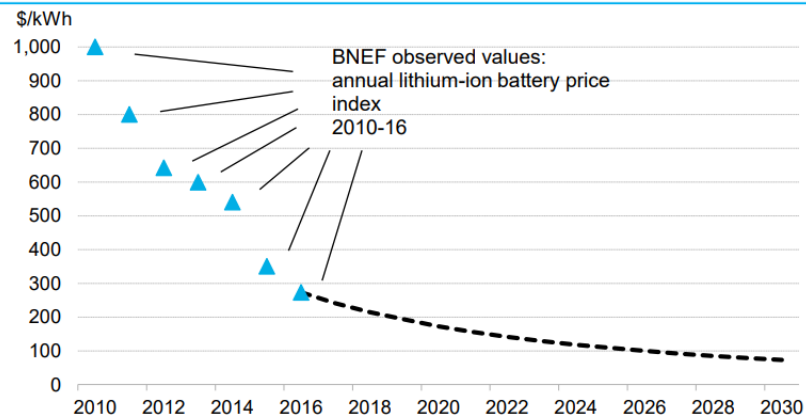


Notes: This includes cells plus pack prices. For years where there were two surveys, the data in this chart is an average for the year.

Source: Bloomberg New Energy Finance

- Intense price competition is leading manufacturers to develop new chemistries and improved processes to reduce production costs.
- Production costs have also come down significantly. Our models calculate that producing a battery in a Korean manufacturing plant in 2017 costs \$162/kWh, dropping to \$74/kWh in 2030.
- The BNEF battery price survey provides an annual industry average battery price for EVs and stationary storage. The learning rate (the price decrease for every doubling of capacity) is 19%.

- Bloomberg forudser fald til \$73/kWh i 2030



Source: Bloomberg New Energy Finance

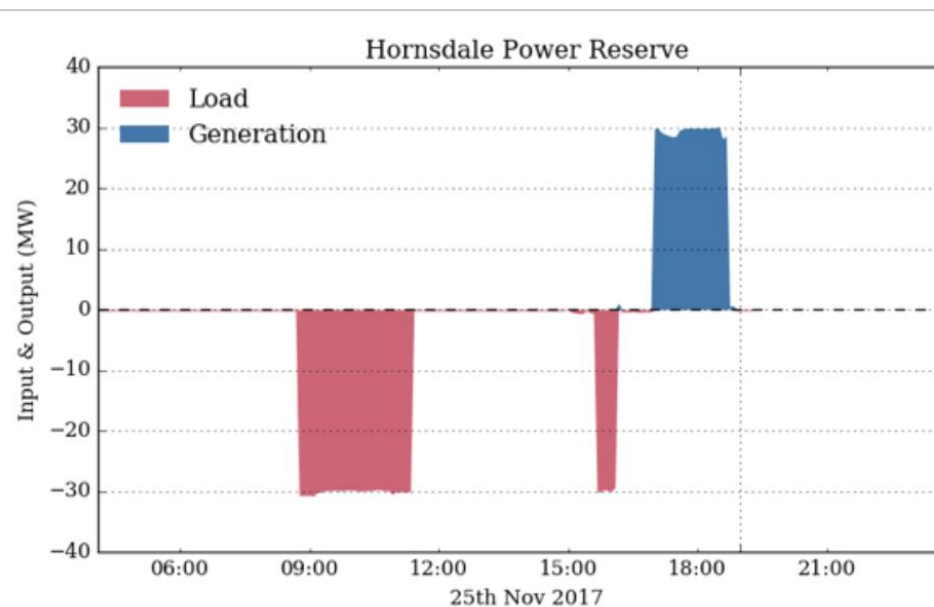
Det går hurtigt Down Under

Tesla big battery – world's biggest – charges up for first time



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- The 100MW/129MWh battery is the largest lithium ion battery storage plant in the world
- Being built next to the Hornsdale wind farm in South Australia
- In operation December 1st
- Three other large battery projects in Australia
- South Australia four different projects, lithium ion battery storage, flow batteries, hydrogen fuel cells, and thermal storage.
- AUD 150 million Renewable Technology Fund



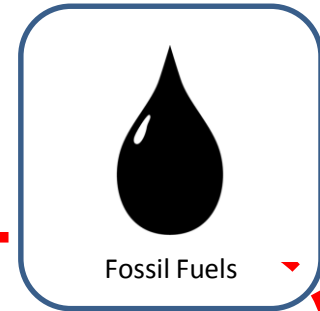
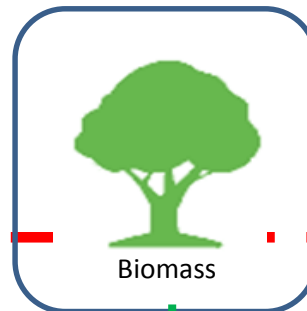
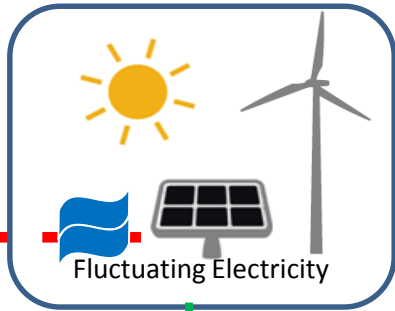
Existing battery projects



TI Energilagringssystemer

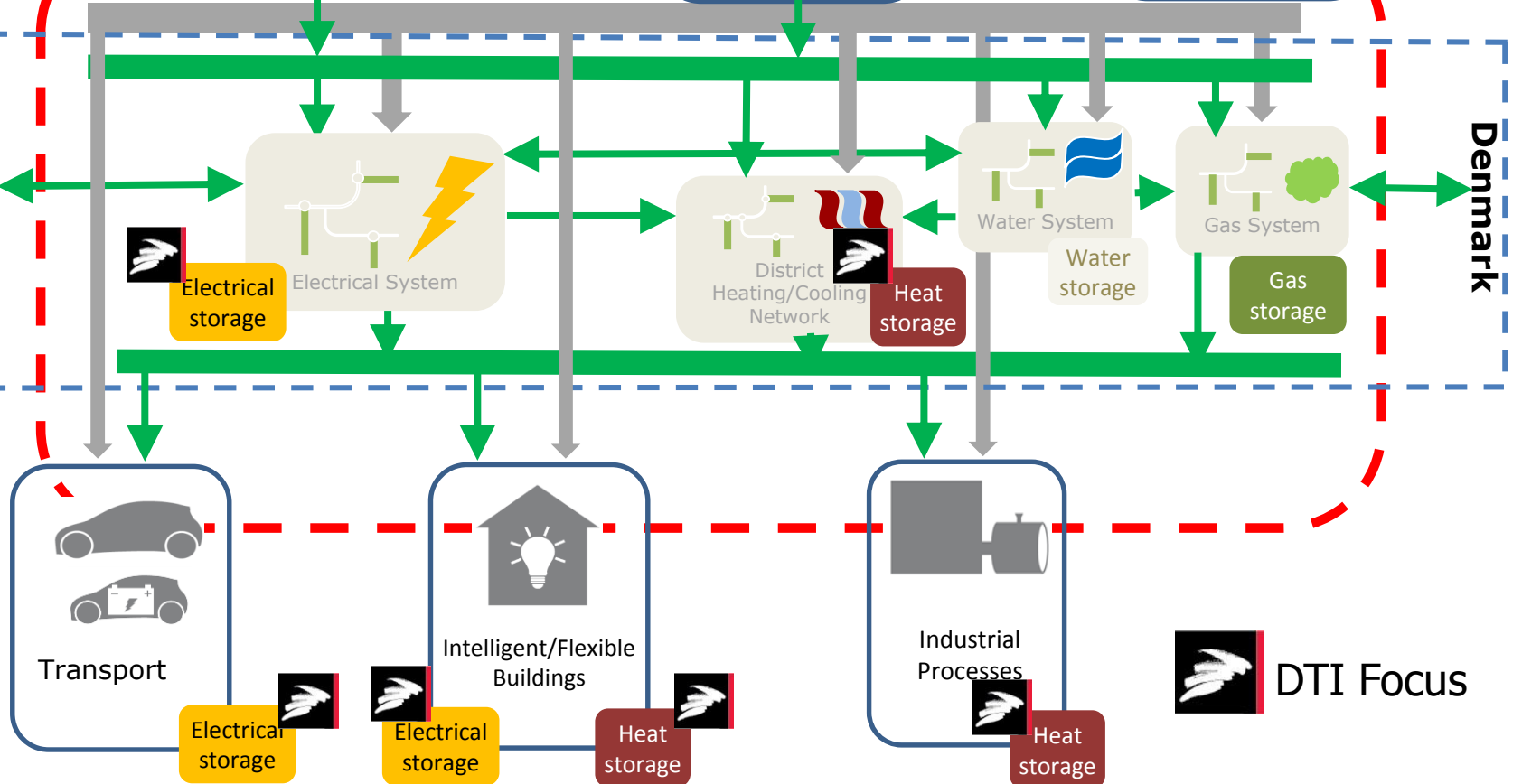


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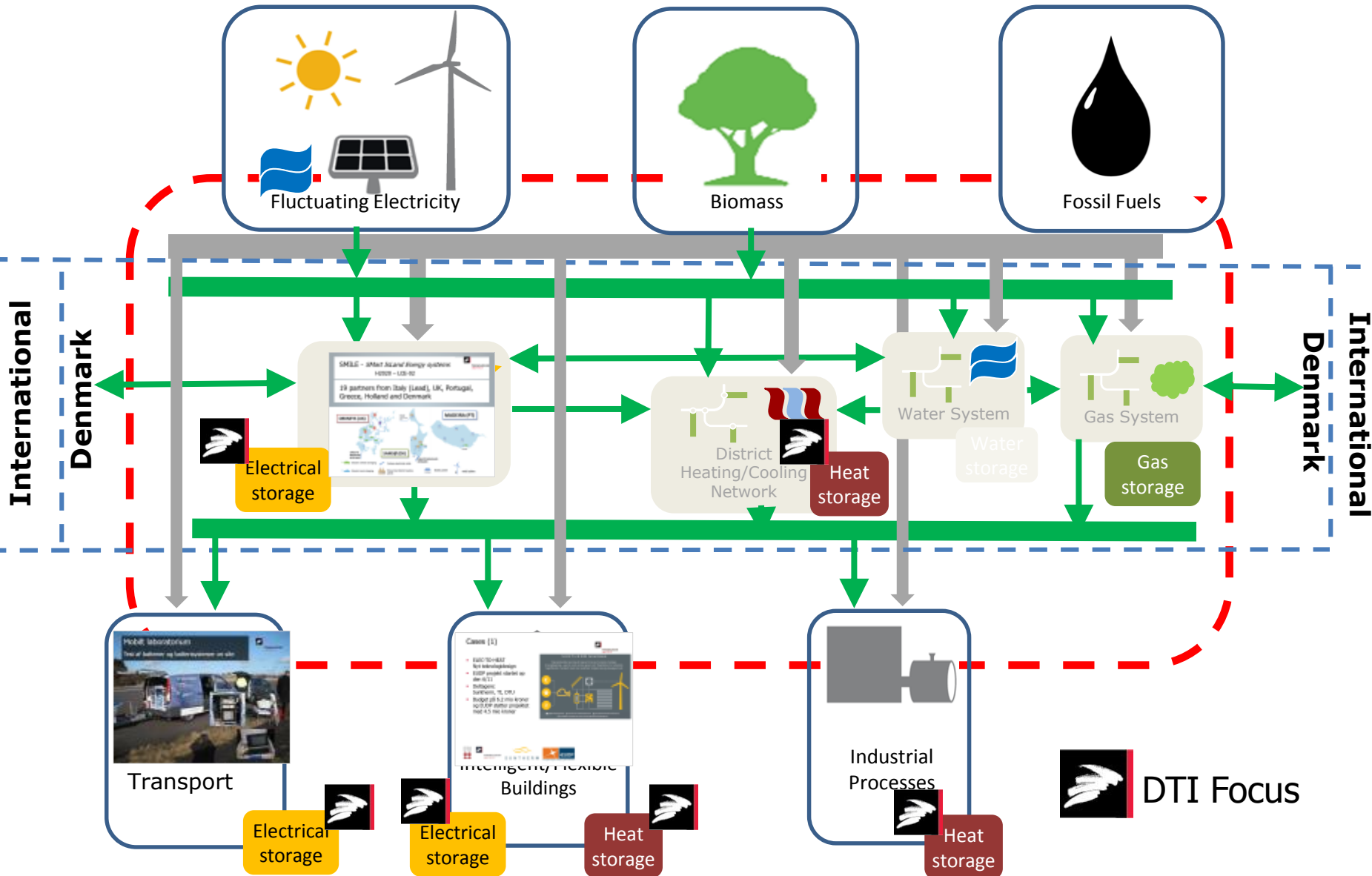
International
Denmark

International
Denmark



DTI Focus

TI Energilagringssystemer, Cases

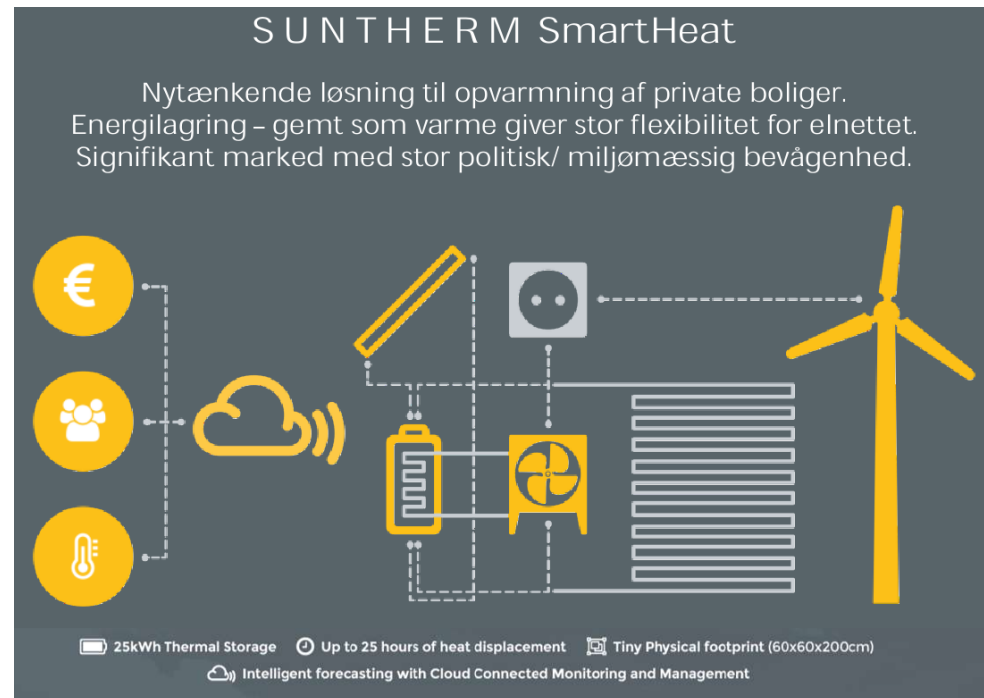


Cases (1)



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- ELEC-TO-HEAT
Nyt teknologidesign
- EUDP projekt startet op den 6/11
- Deltagere:
Suntherm, TI, DTU
- Budget på 6.2 mio kroner og EUDP støtter projektet med 4.5 mio kroner



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Mobilt laboratorium

Test af batterier og batterisystemer on site



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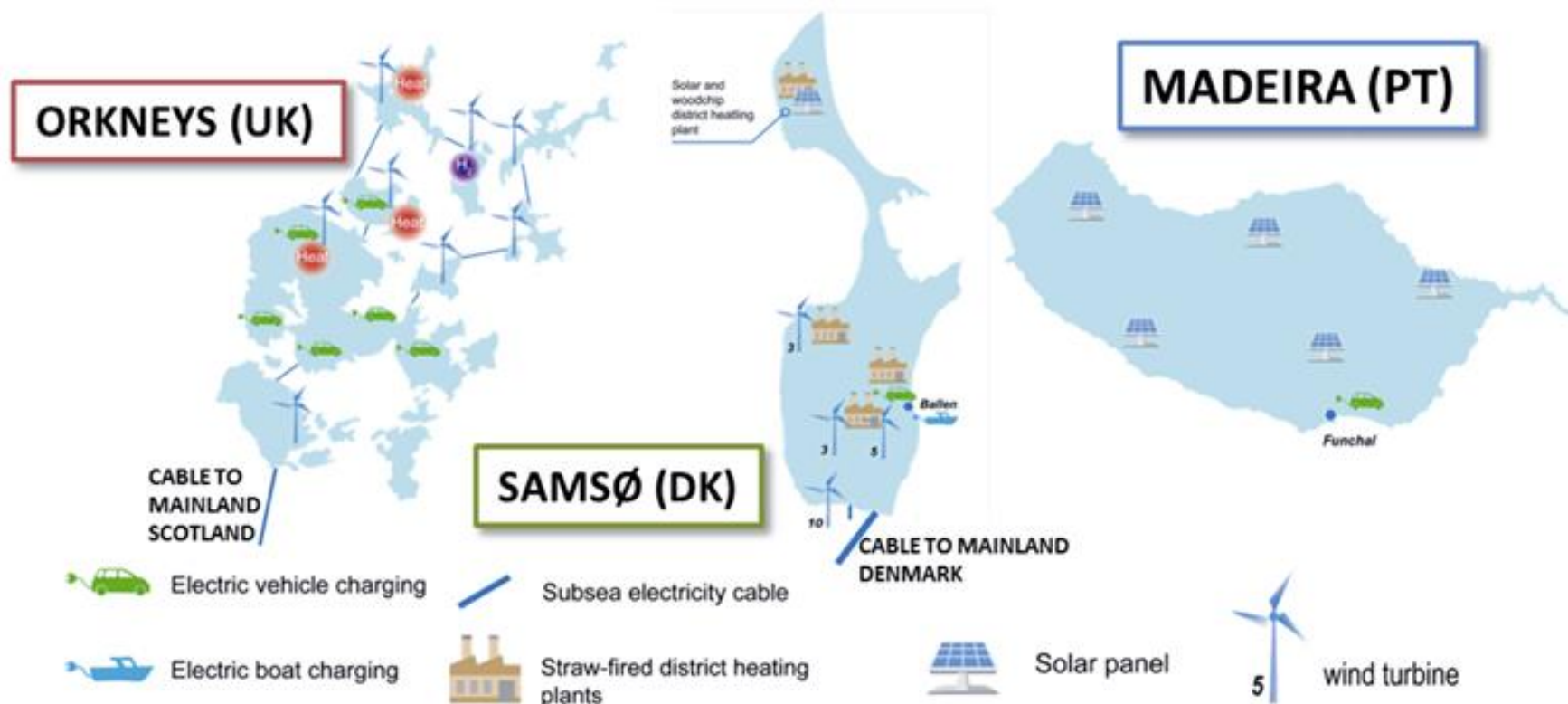
SMILE - *SMart IsLand Energy systems*

H2020 – LCE-02



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19 partners from Italy (Lead), UK, Portugal, Greece, Holland and Denmark



Program formiddag



- 09.00 – 09.30 Registrering og morgenkaffe med brød
- 09.30 – 09.40 Velkommen v/*Frank Elefsen, Teknologisk Institut*
- 09.40 – 10.00 Markeder og behov for lagring v/*Loui Algren, Energinet.dk*
- 10.00 – 10.20 Er energilagring vejen til effektiv vedvarende energi?
v/*Kim Behnke, Dansk Fjernvarme*
- 10.20 – 10.40 Hvilken rolle kan energilagring spille i Danmark
v/*Sune Thorvildsen, Dansk Industri*
- 10.40 – 11.00 Pause
- 11.00 – 11.20 Fremtidens omkostningseffektive lagringsteknologier
v/*Thea Larsen, EUDP*
- 11.20 – 11.40 Energilagring - et væsentligt tema i Innovationsfondens nye investeringsstrategi 2018 til 2020
v/*Niels Langvad, Innovationsfonden*
- 11.40 – 12.10 Paneldiskussion. Moderator: Eva Ryberg, formand, NRGi
- 12.10 – 13.00 Frokost

Program eftermiddag

Spor 1: Termisk lagring

- 13.00 – 13.20 Rundvisning af Vanddamlaboratoriet – **bygning 16**
- 13.20 – 13.45 Store VE energisystemer med indbyggede lagre v/*Knud Erik Andersen, European Energy*
- 13.45 – 14.10 Store højtemperaturlagre: Udvikling og driftserfaringer v/*Peter Badstue, Aalborg CSP*
- 14.10 – 14.35 Store langtids- og sæsonvarmelagre: Typer, erfaringer og muligheder v/*Niels From, PlanEnergi*
- 14.35 – 15.00 Højtemperaturlagring i smeltet metal samt status på IEA ECES Annex 48 v/*Lars Reinholdt, Teknologisk Institut*
- 15.00 – 15.25 High temperature energy storage in rock bed v/*Kurt Engelbrecht, DTU Risø*
- 15.25 – 16.20 Rundvisning i laboratorierne i bygning 14, se bl.a.:
- Lagring i smeltede metaller – vi viser en ovn til test af lovende aluminiumslegeringer
 - Demonstration af is-lagring
 - Optimering af varmepumpedrift ved hjælp af lagre

Program eftermiddag

Spor 2: Elektrisk lagring

- 13.00 – 13.25 Danske batteriaktiviteter v/*Lars Barkler, Lithium Balance*
- 13.25 – 13.50 Managing massive wind integration in islands with battery storage - et case study på Færøerne v/*Terji Nielsen, SEV (Færøernes elforsyning)*
- 13.50 – 14.15 ABB's erfaringer med batterier i Danmark og udlandet v/*Rasmus Theill, ABB*
- 14.15 – 14.40 Krav til sikre batterianlæg med bl.a. sikkerhedskrav til transport af Li-Ion batterier v/*Kjeld Nørregaard, Teknologisk Institut*
- 14.40 – 16.05 Rundvisning i laboratorierne i bygning 22 – se bl.a.
- Batterilaboratorium
 - El-laboratorium
 - Elektroniklaboratorium
 - Se husstands batterier, brændte batterier og hør om batterirelevante projekter

Sådan finder du rundt efter frokost



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