



Edinburgh workshop 14-15/10

Energy Planning for Islands

SCOTTISH & DANISH ISLANDS
& their role for decarbonising the heat sector

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CONTENT

Why focus on islands (role in DK & SCT)

Smart Island Energy systems (SMILE H2020)

Danish Energy Island(s): Samsø

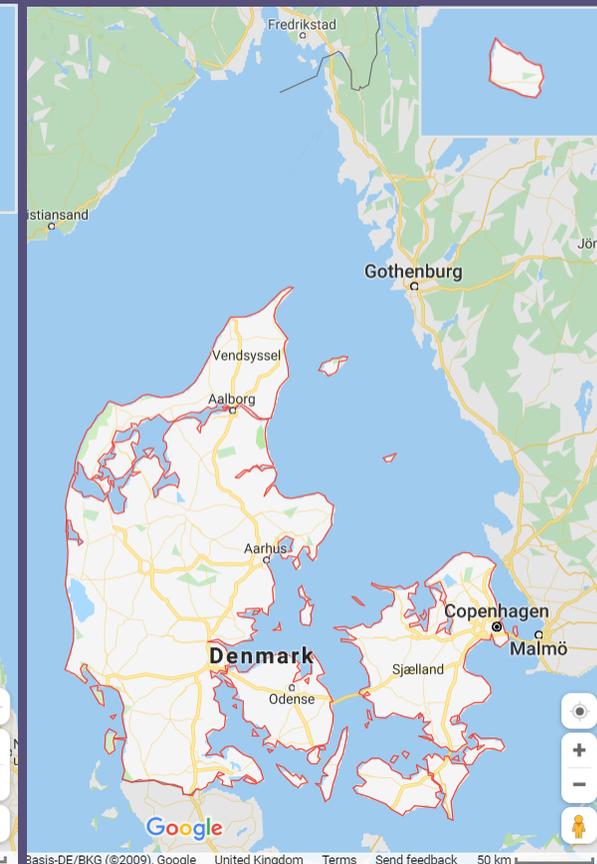
Experiences with Orkney

Things to learn from islands



WHY ISLANDS?

- ▶ Part of the bigger picture
- ▶ ☹ Remote, Isolated, Complex, Dependent, Importing, Bottlenecks
- ▶ 😊 Resources, Necessity, Knowledge, Self-sufficient, Small, Test size, Focus
 - Island Secretary, islands conferences, island projects, tests (Micro-grid), etc.



- PES 2050: 150 TWh/year
 - 60-80% wind
- 10-16,500 km coastline
- 790 offshore islands
 - 94 residential
- PES 2050: 160 TWh/year
 - 40-60% wind
- 8,750 km coastline +FO, GL
- 406 islands, excl. FO, GL
 - 70 residential

SMILE H2020



- ▶ Smart IsLand Energy project 2017-2021
- ▶ Islands: Samsø, Orkney, Madeira
- ▶ Testing smart grid technologies in various island locations
- ▶ Adapted to local circumstances
- ▶ Relevant for similar energy systems
- ▶ Power-to-heat, power-to-transport, wind-, PV, hydro-optimisation, storages, EVs, boats, DSM, predictive algorithms, (heating, sector integration)



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H2020-LCE-2016-2017

EUROPEAN COMMISSION

Innovation and Networks Executive Agency

Grant agreement no. 731249

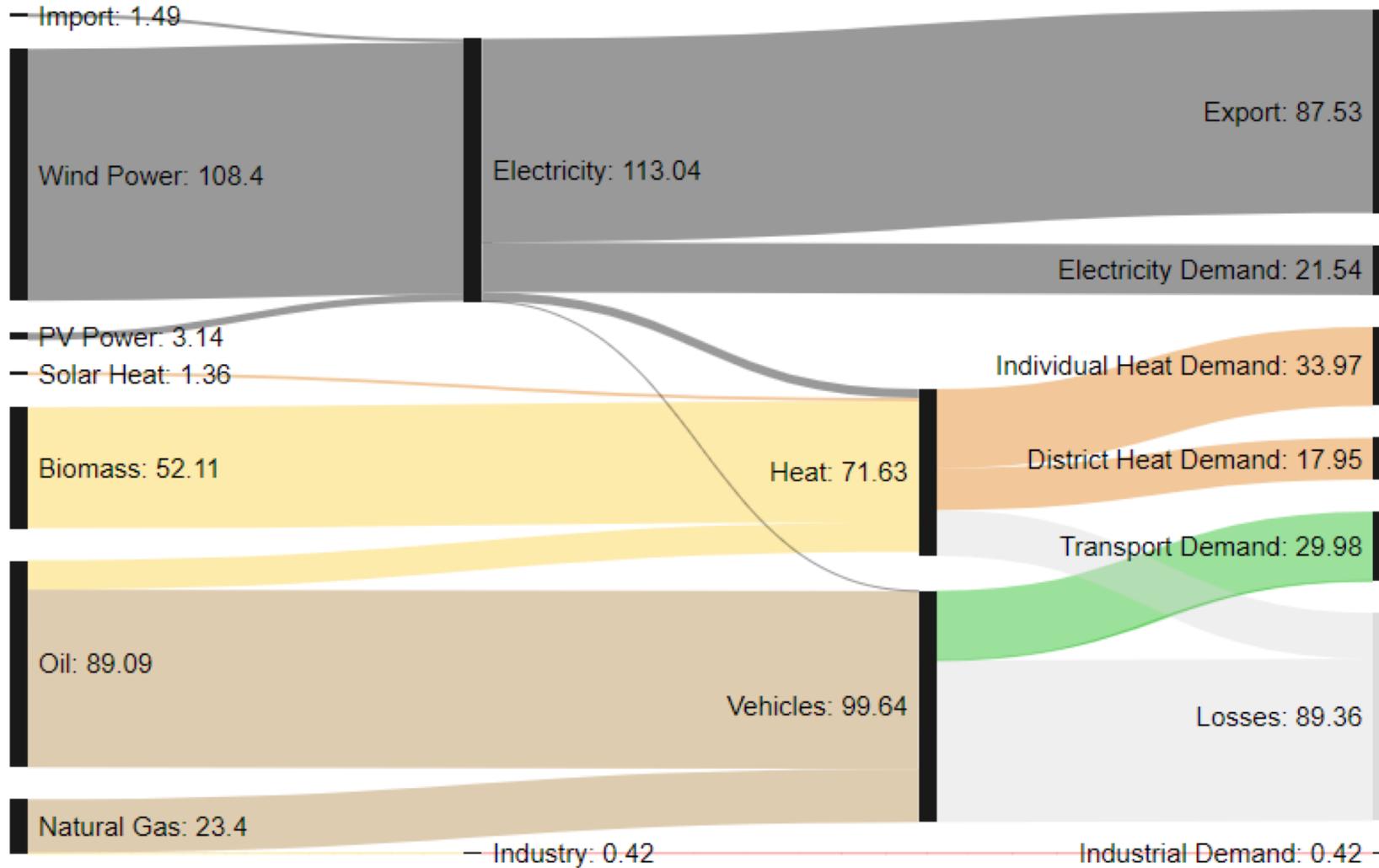
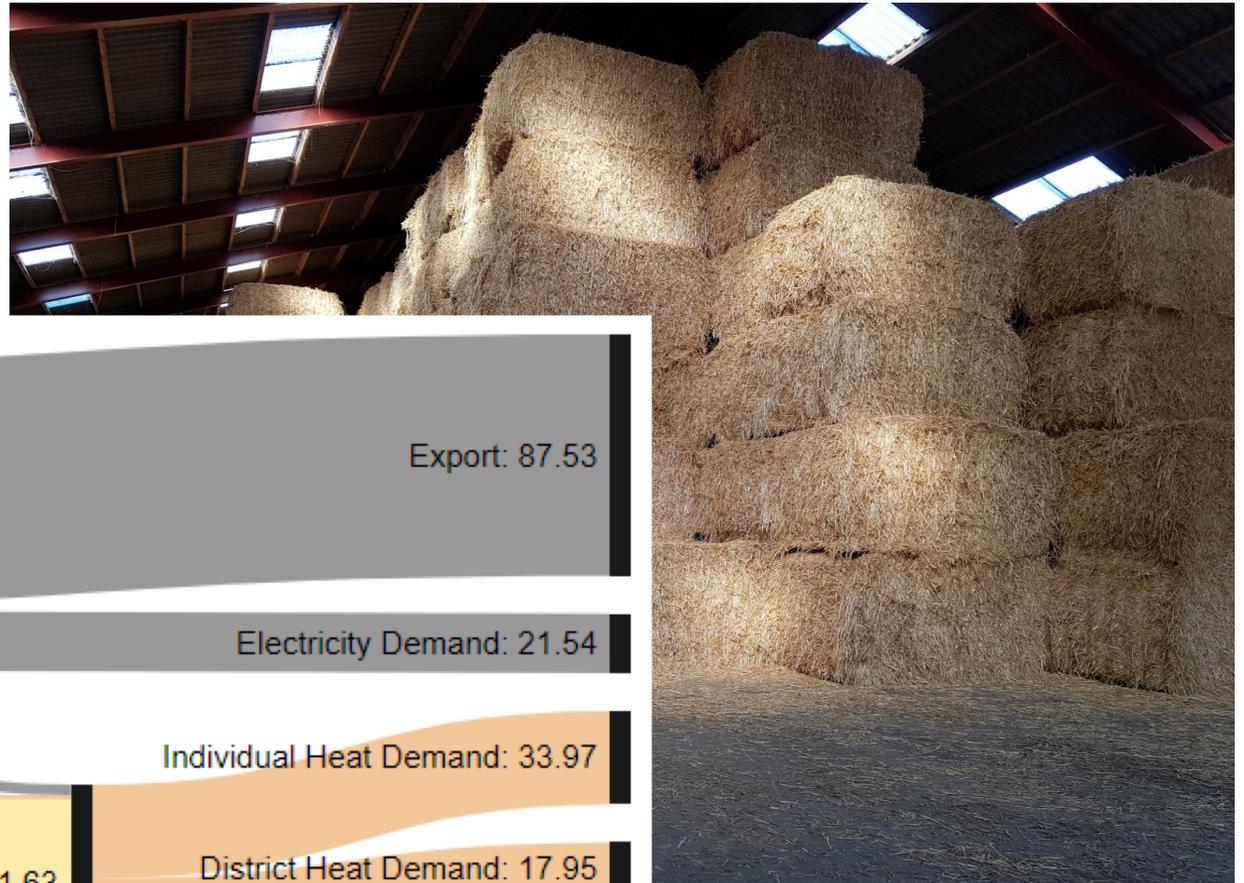


SAMSØ

- ▶ "Denmark's energy island"
- ▶ "running on wind and biomass"
- ▶ 4 district heating networks, support for individual heating
- ▶ Hybrid ferry
- ▶ EVs for municipal + private use
- ▶ Samsø Energy Academy
- ▶ SMILE: smart marina (transport and heat from PV)
- ▶ TBD: local biogas plant, upgrade DH



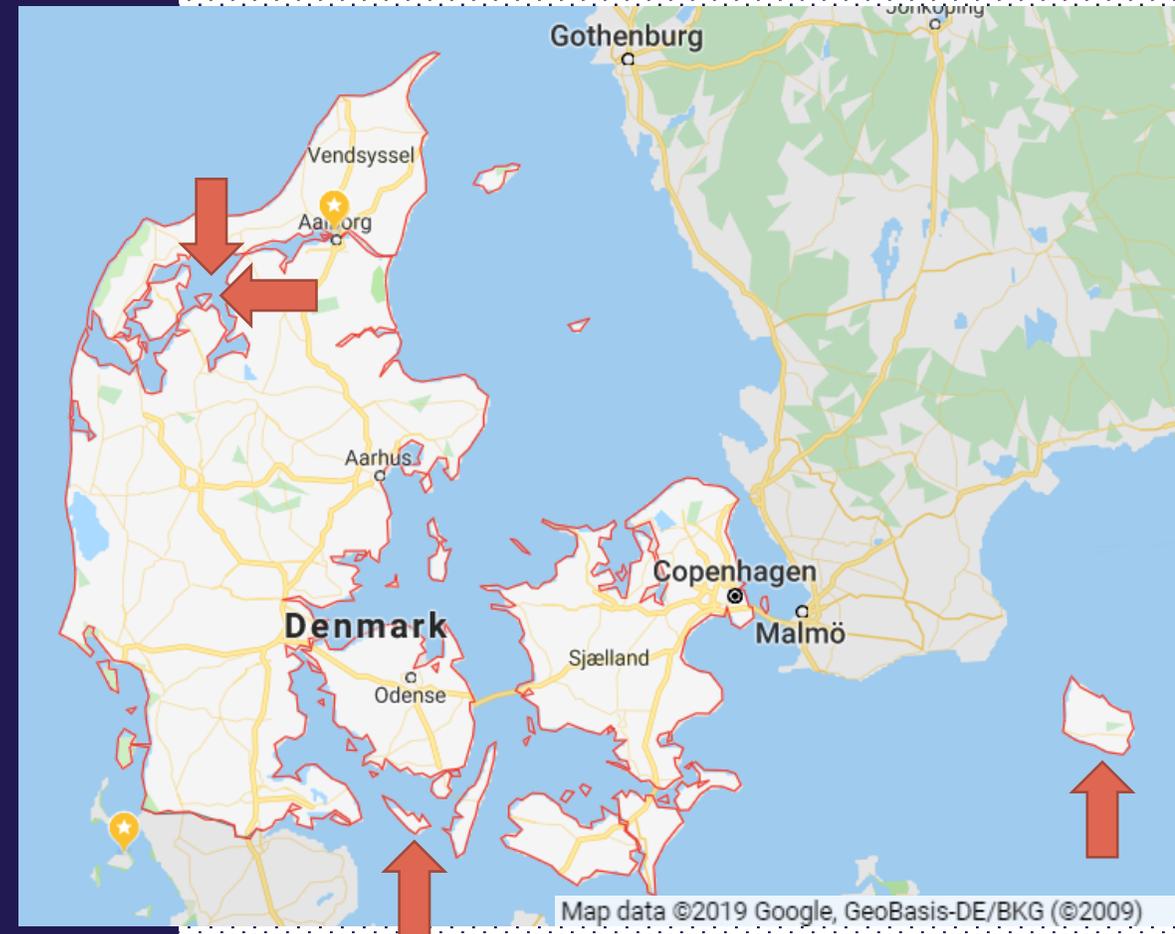
SAMSØ: showing the way



- 4 District heating networks
- ▶ 120-400 houses
- ▶ 35% island coverage
- ▶ 99% sustainable
- ▶ But... ⚡

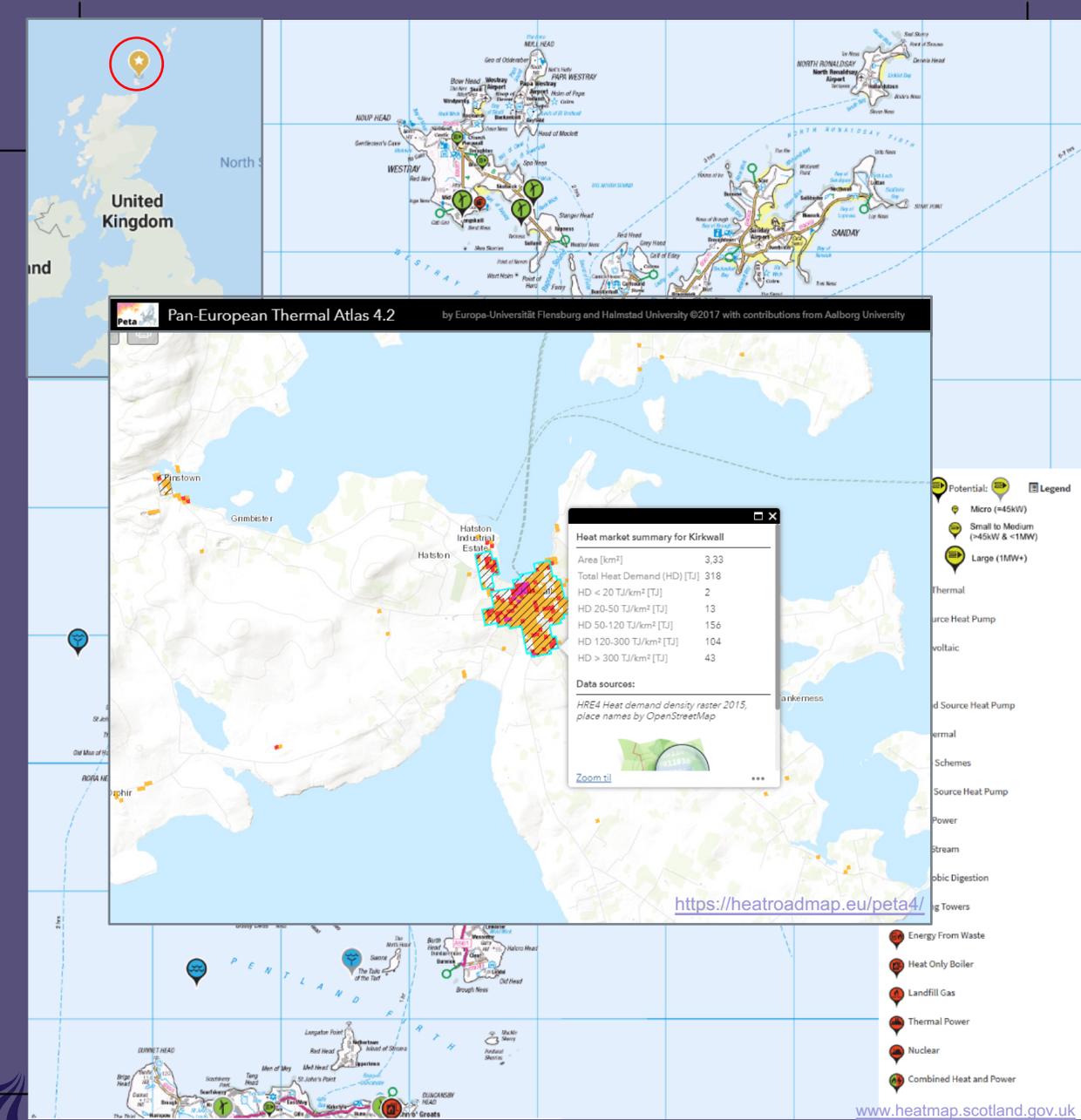
Other Danish islands (examples)

- ▶ Competition from the "Danish Energy Island"
- ▶ Livø & Fur in the Limfjord (7 & 700 inhabitants) – AAU projects
- ▶ Ærø (6 000 inh.) – first electric ferry
- ▶ Bornholm (40 000 inh.) – EcoGrid lab
- ▶ All well connected to mainland, ferry transport remains
- ▶ Local resources & community crucial in local energy production



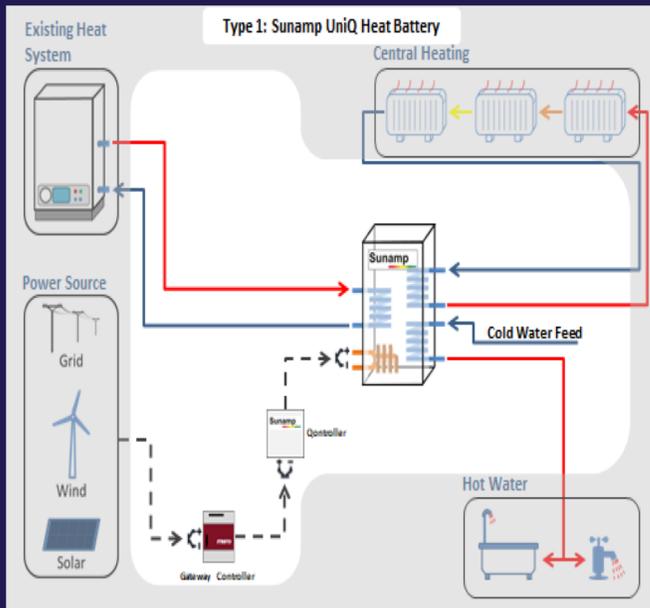
ORKNEY

- ▶ Wind, tides, waves & the community, 875 km from London
- ▶ "Lighthouse", testing and showing the "right way", frontrunners ("but don't know what works yet")
- ▶ Marine energy centre and island technology research
- ▶ Hydrogen to storage/transport/heat/power
- ▶ ⚡ Bottlenecks, curtailment, heat poverty
- ▶ "Heat Smart Orkney", SMILE & other research / projects
 - Addressing local challenges in small steps
 - "can't do it alone"

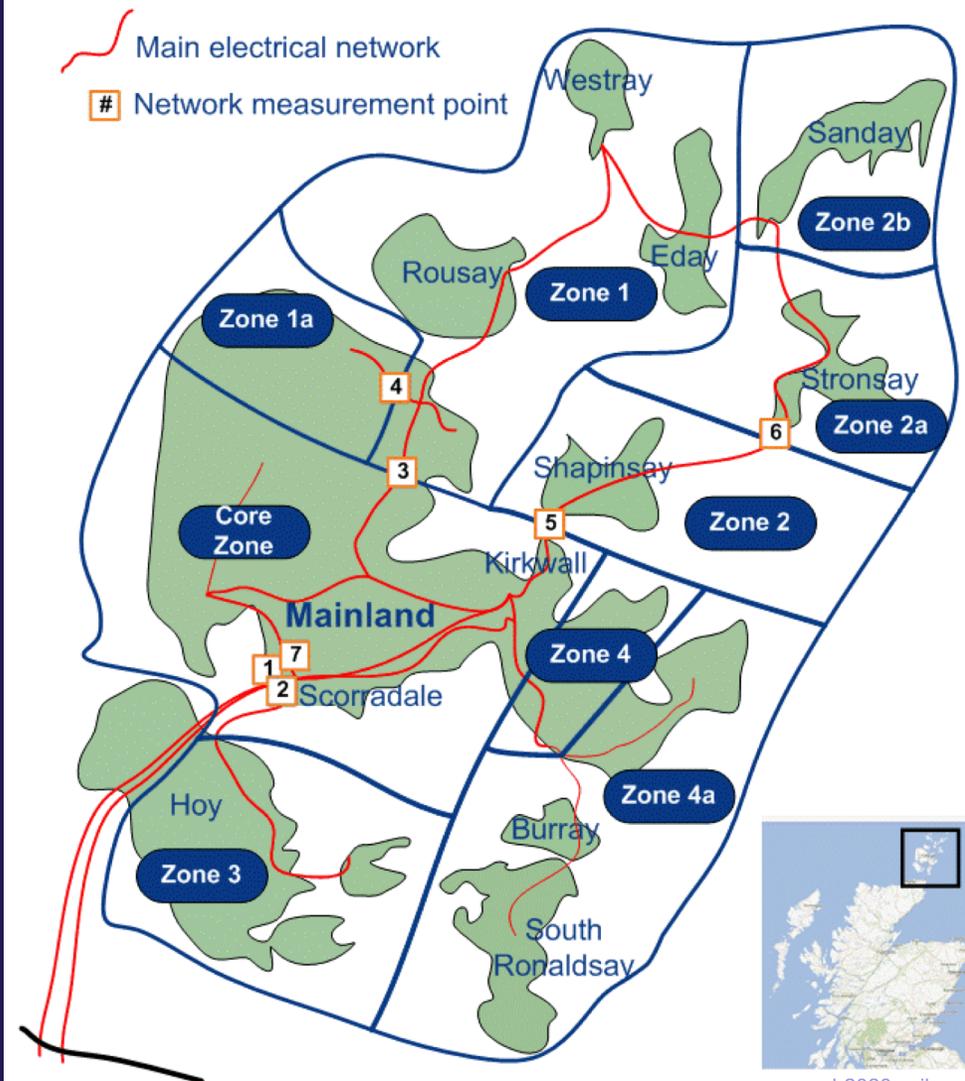


SMILE ORKNEY

- ▶ FROM Curtailment and heat poverty (<40%)
- ▶ TO Smart EV charger, Heat pumps, thermal storage (PSM), "control equipment to match RE production" in remote areas



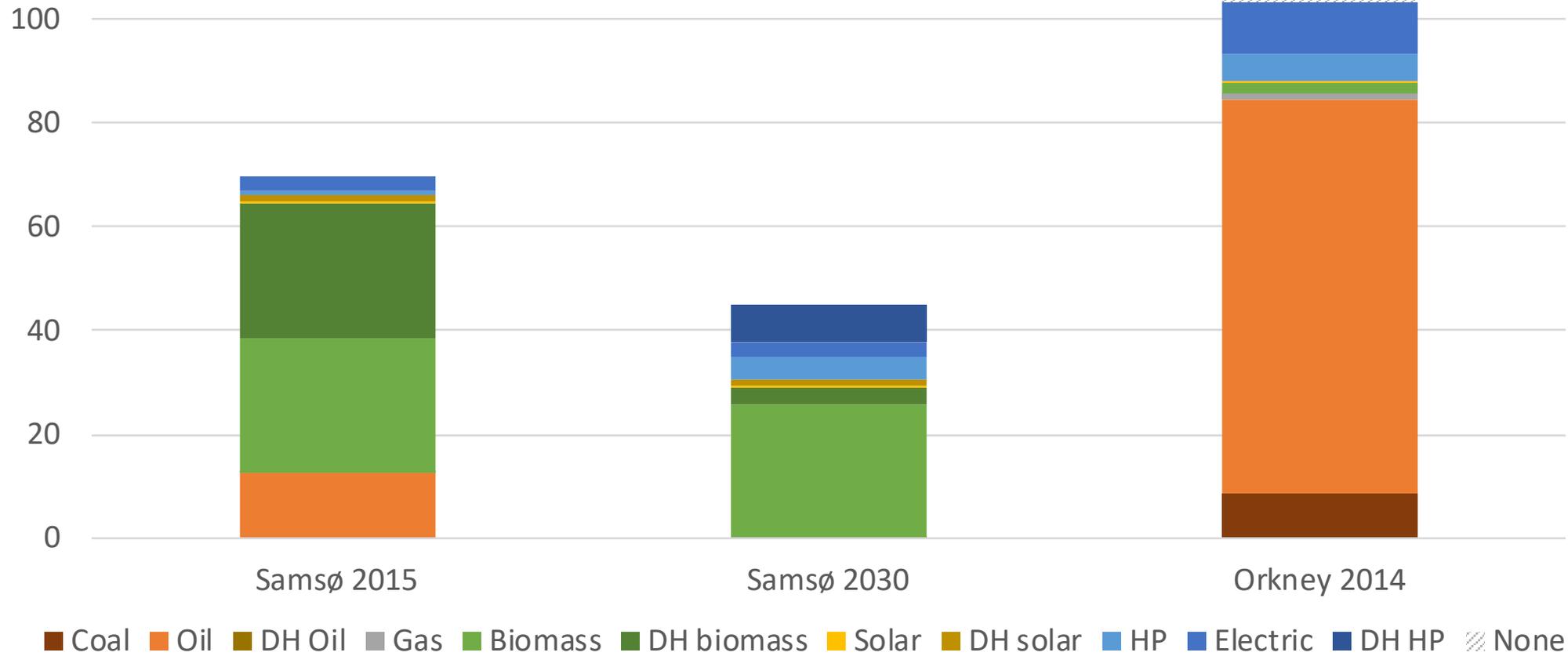
- Result from Heat Smart Orkney (from local Development Trust, Zone 1)
- 1 out of 9 zones
- 45 households in northern islands
- 4 types / constellations tested
- ↓ curtailment, costs, CO2



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SAMSØ & ORKNEY heat supply

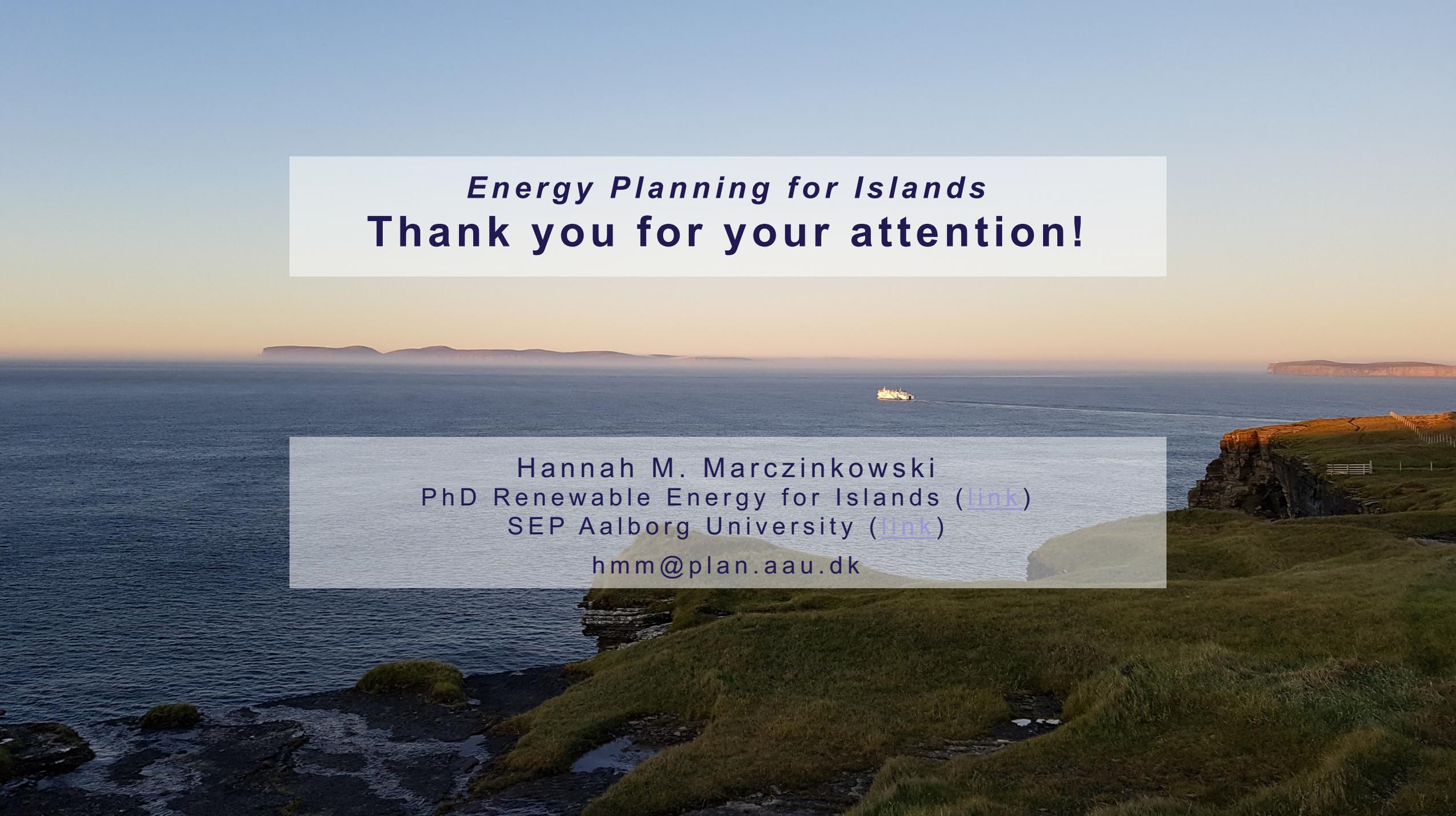




What can we learn from islands & each other?

- Significant (though with varied integration) part of our nations
- "Lighthouse" energy systems – "storms" hitting them first, yet (makes) small scale tests possible
- How much RE power makes sense (with and without connection)
- What to do with excess RE (curtailment vs. sector integration)
- Testing feasibility of technologies that are essential for islands (transport, flexibility, integration, local resource management, etc.) where otherwise they would not be tested
- As popular destinations, islands should present the future for every visitor to take the experience home
- "If it can work there, it must work everywhere else" - EMEC





Energy Planning for Islands
Thank you for your attention!

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