

Orkney and alternative fuels why needed and how delivered – so far!

Presented by Gareth Davies, CEO Aquatera.

(please email gareth.davies@aquatera.co.uk for further information)

Expert sustainability services

Building from our core environmental competence in ecological, social and physical sciences we have assembled a comprehensive capacity across all major areas of sustainability including:

- Strategic planning
- Option evaluation
- Project impact assessment & permitting
- Surveying & data management
- Technology development support
- Deployment and operations support
- Performance evaluation & management
- Education, training & public awareness
- Biodiversity management
- Community & societal development
- Sustainable business & supply chain development
- Facilitating carbon transition

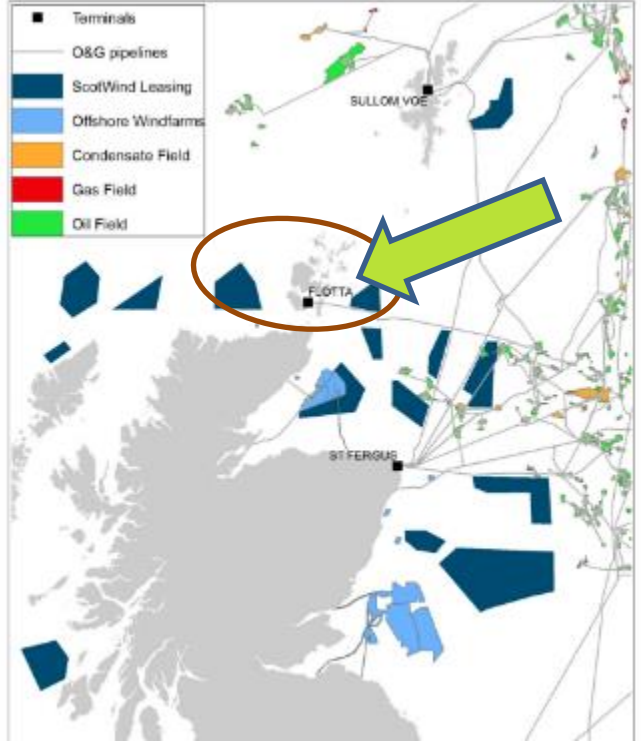


Over 900 total projects completed
300 marine energy studies
Over 100 wind energy studies
10 solar and floating solar projects
5 hydro studies
Over 60 oil and gas studies



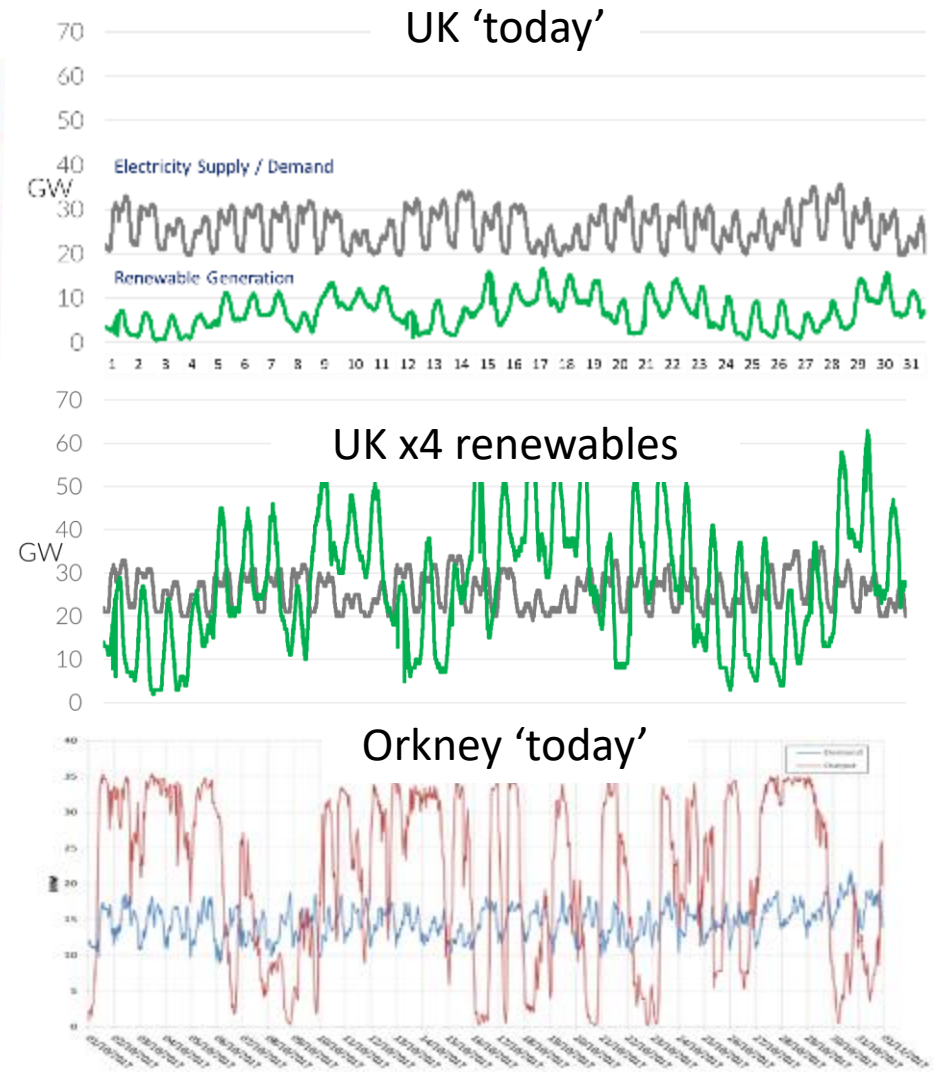
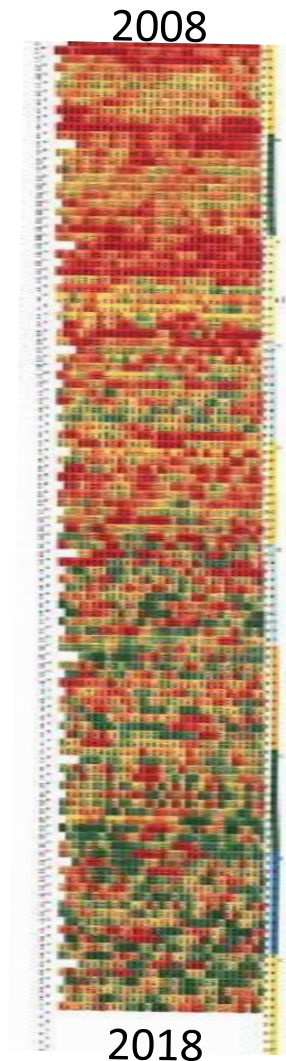
Work across 40 Countries
50 Staff and associates
Over 60 EIA projects
Over 100 environmental surveys
Over 50 R&D studies
10 UK aid related Projects
50 RADMAApp studies

Orkney - the energy hub



Microcosm – Orkney today is the world of tomorrow

- As the energy system becomes more renewables supported it will have to deal with increasing variability
- The Orkney system already does this and the supply chain community is exploring ways to better harness available resources
- We have been on an electrical system transition – now we are moving to total energy transition
- Our today is your tomorrow!



Orkney Energy 2030 and beyond?



Industry



Private Housing



Electric Vehicles



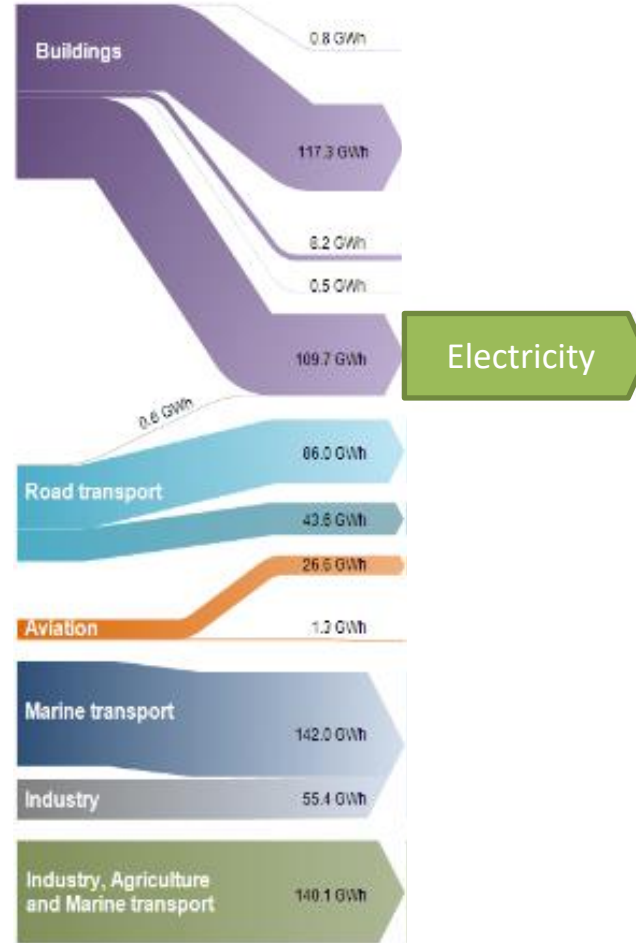
Public Housing



Transport



Public and Commercial Estate



Onshore wind turbines – Orkney’s core electricity source



55 MW of installed wind typically supplies over 110% of present local demand.

The next 135 MW will start to displace other carbon rich energy sources

Marine Energy – we are still trying



Tidal



Credit: Colin Keldie

Wave



Credit: Colin Keldie

Floating solar – reworking of an established technology



**10s W Orkney,
since 1990s**

**‘Football pitch’
100 m x 50 m = ~1MW**



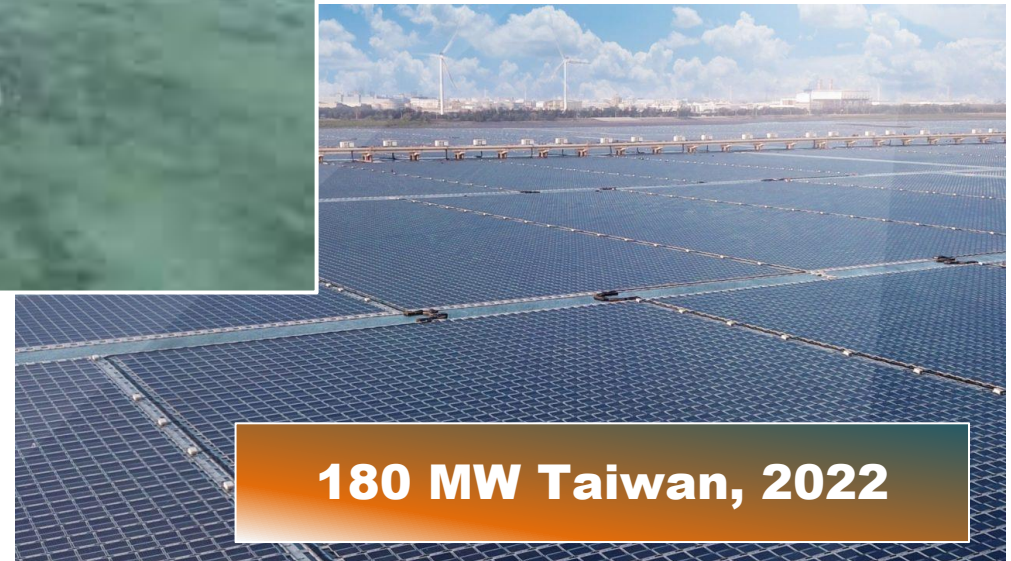
10s kW Maldives, 2015



Sangat, Philippines, TODAY



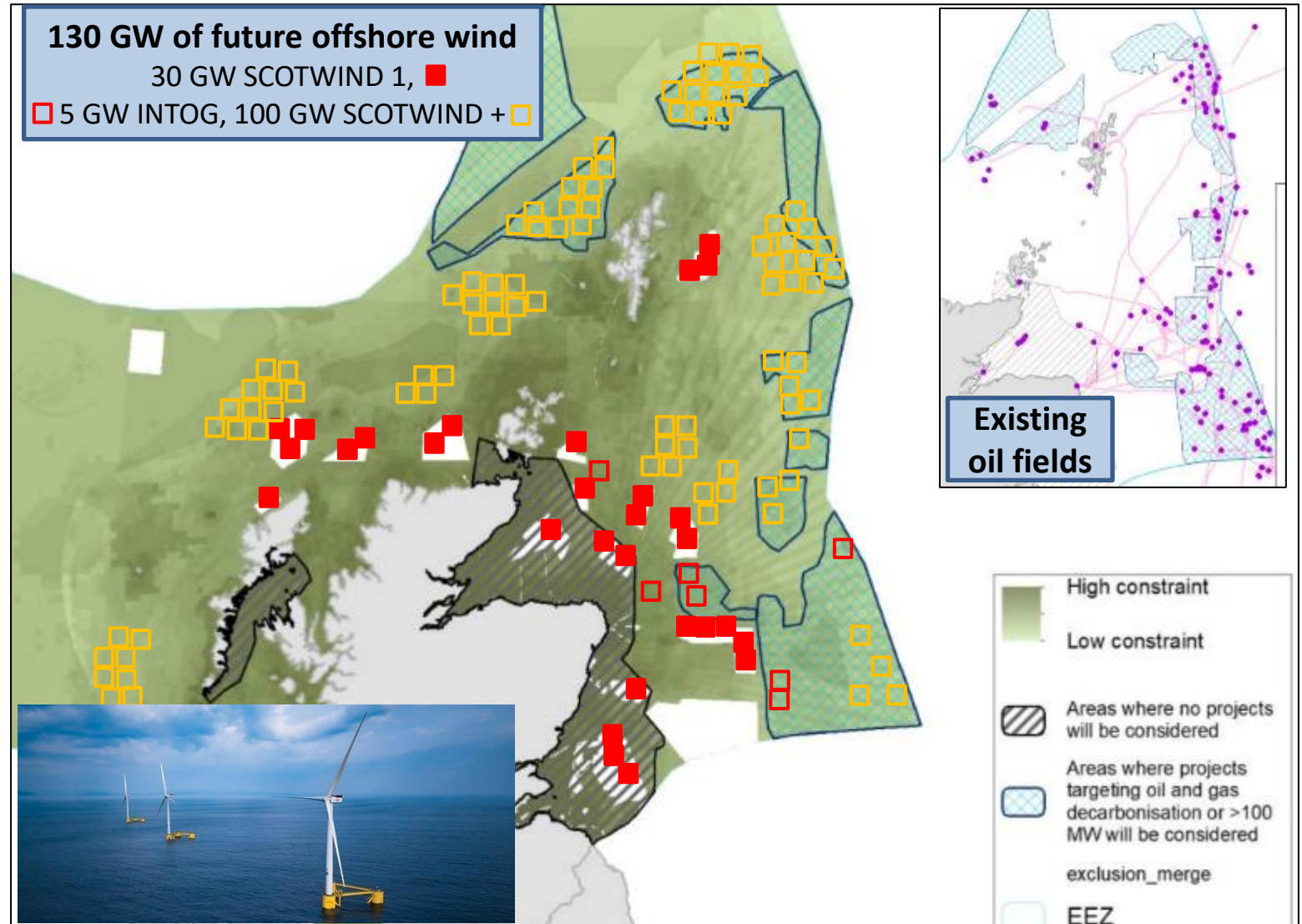
1 MW Singapore, 2019



180 MW Taiwan, 2022

Existing and future offshore wind development area

- UK needs 150+ GW of offshore wind
- 120-150 GW around Scotland?
- At 15 GW turbines = ~8,000 units
- 7300 days between 2025 and 2045
- Need to assemble 1+ turbines per day for 20 yrs
- With weather down time need capacity to install 3-6 per day
- + 'wet storage' for another ~6-12
- + parts ready for the next ~6-12
- **There is simply only 1 harbour that can deal with this – Scapa Flow**
- **But even Scapa Flow may need multiple facilities to deliver this potential.**



Scapa Flow – the key that unlocks SCOTWIND for Scotland

Deepdale, deepwater quay



Scapa Flow Wind Mega Hub Transitioning Scapa Flow from tankers to wind turbines



Basic start-up
single jack-up crane assembly
(1-20 turbines/yr;
Cost £60 million; 2023-2024)

Early growth
multiple jack-up crane
assembly (eg x 4)
(20-100 turbines/yr;
Cost £200 million; 2026-2027)

Consolidation
<10 ha floating port & jack-up
cranes
(100-150 turbines/yr;
Cost £0.5 billion; 2028-2030)

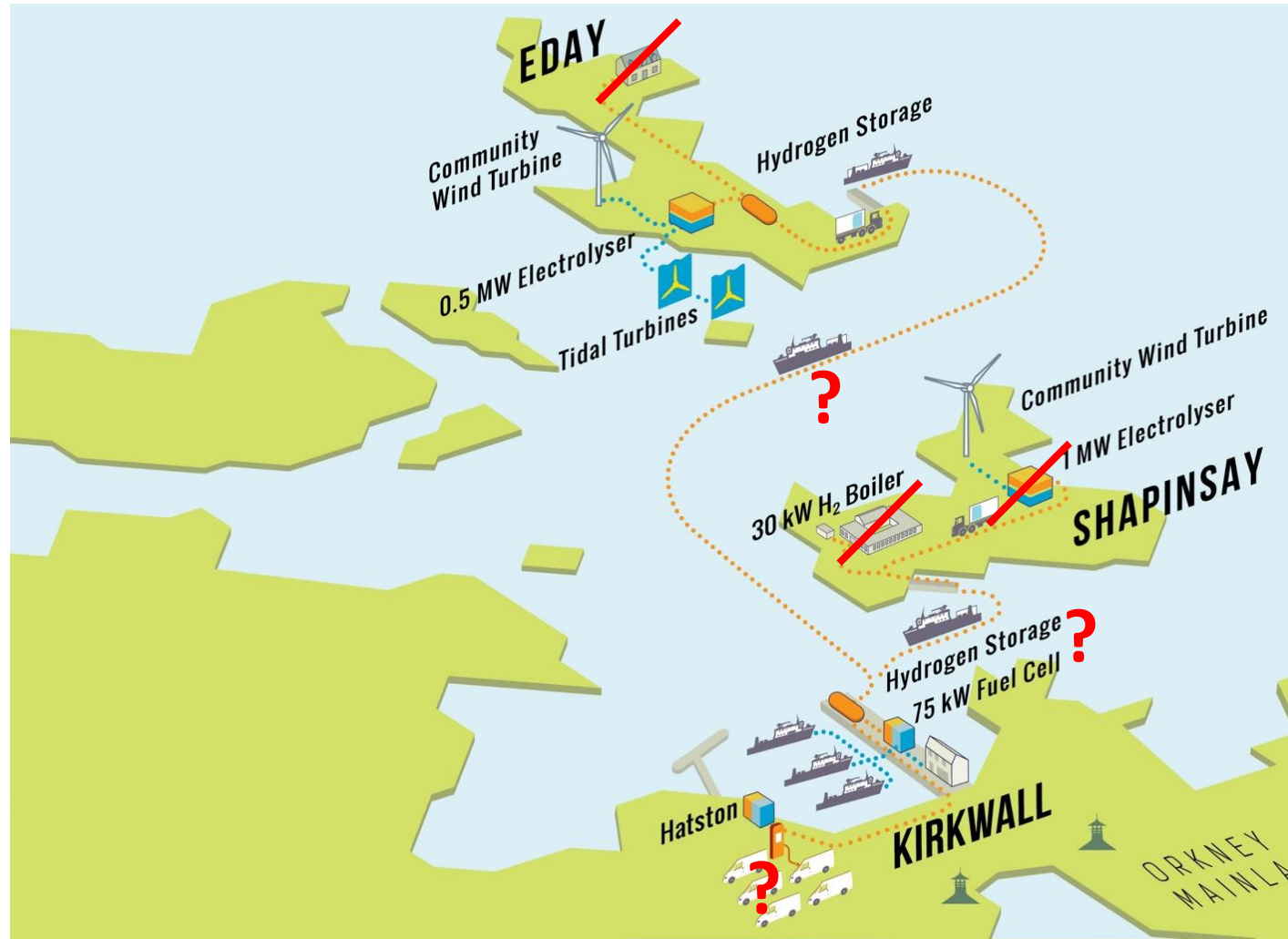
Expansion
<50 ha floating port and jack-
up cranes
(200-300 turbines/yr;
Cost £1.5 billion; 2030-2032)

Full capacity
200 ha floating port and jack-
up cranes
(500+ turbines/yr;
Cost £2.5 billion; 2032
onwards)

Other prospective deepwater sites

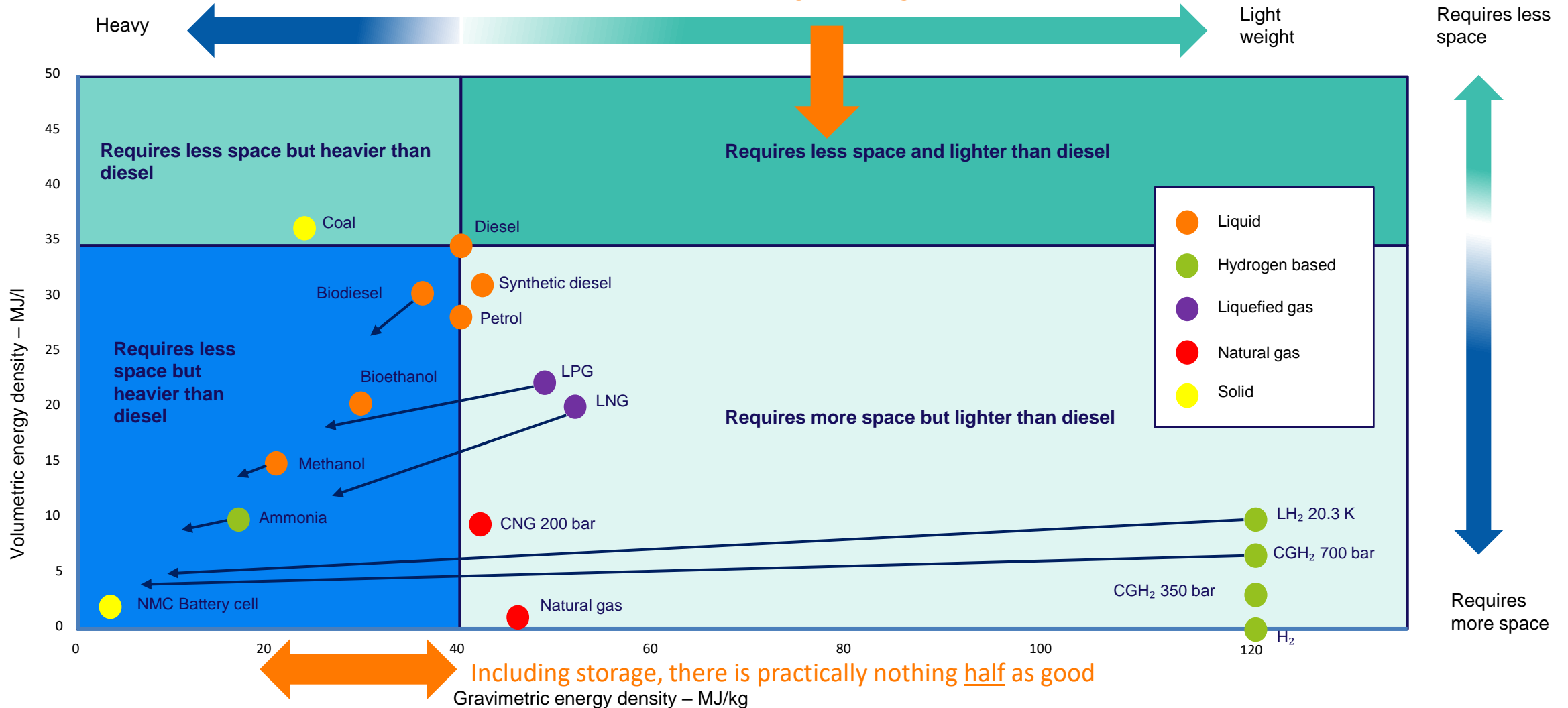


Orkney hydrogen – a developing story



The alternative fuels plus storage capacity

There is nothing to the right and above diesel



E-fuels

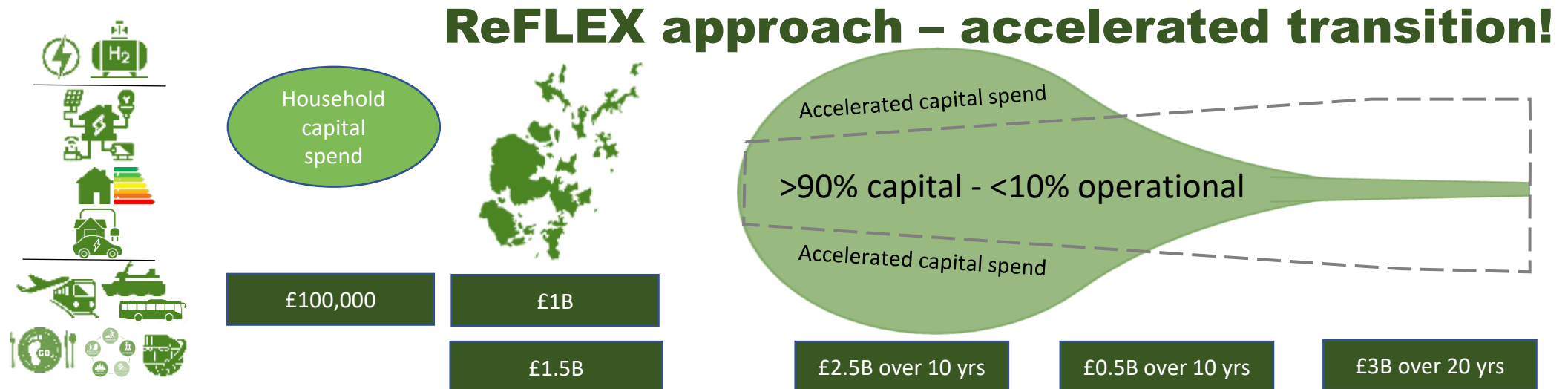
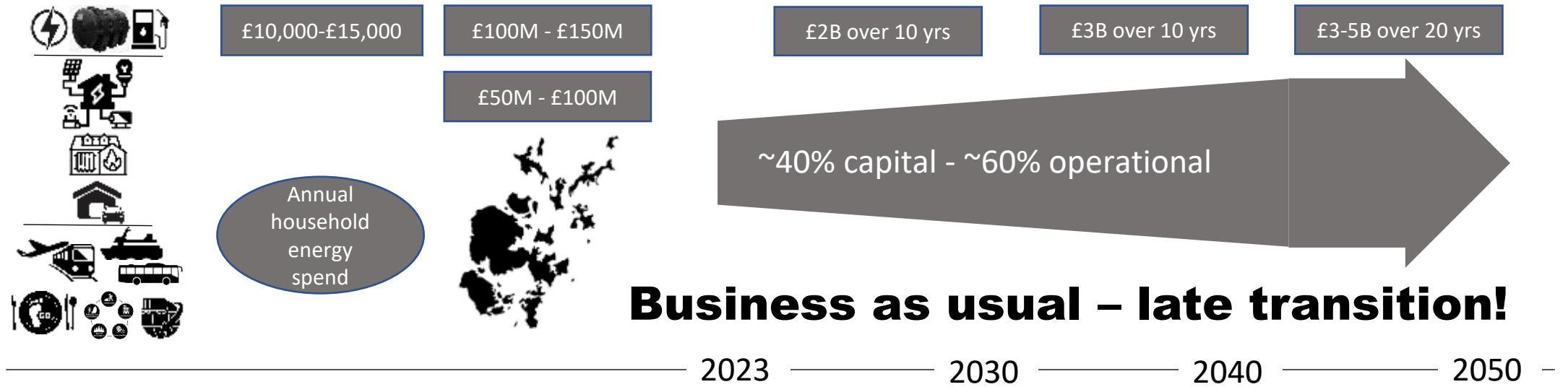
- Pete Oswald's company iGTL & Zero Petroleum demonstrated the creation of synthetic gasoline;
- Temporary plant installed onshore at EMEC's wave test site;
- EMEC supplied H₂ produced from water by electrolysis;
- Royal Air Force used gasoline for their first synthetic fuel flight.
- This might be the best way to export Orkney's energy



~~Flotta hydrogen hub~~ E-fuels



The ReFLEX approach to carbon transition finance



Focus on impact investing

- Urgent need for major transformational investment
- Sustainable impact-based investment works but has added needs and responsibilities
- These 'extras' are increasingly essential in a resource and climate limited world
- This investment can work at individual, business, community, local authority, government & major investor levels
- Caribbean is likely currently spending \$95 Billion (19M @ \$5000/yr) on energy, machines and infrastructure or \$2 Trillion over 20 years
- The Caribbean needs to invest similar amounts to achieve accelerated transition over the next 5-10 years in clean energy to off-set a much more risky and expensive business as usual future

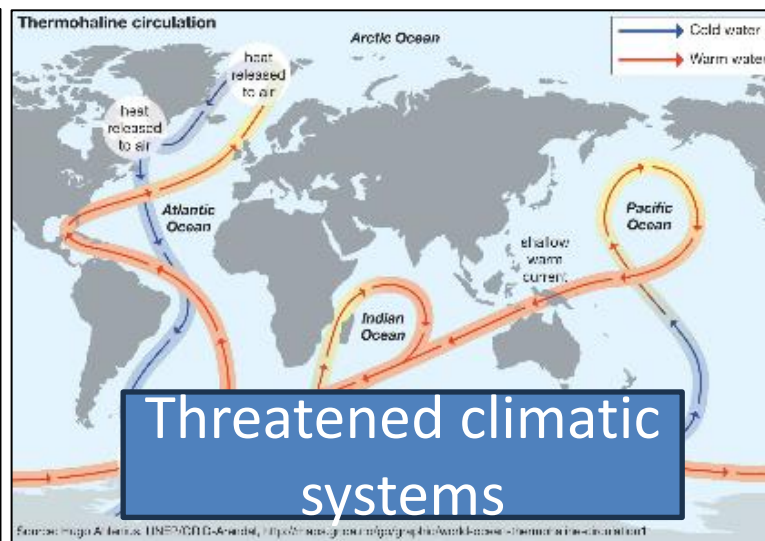
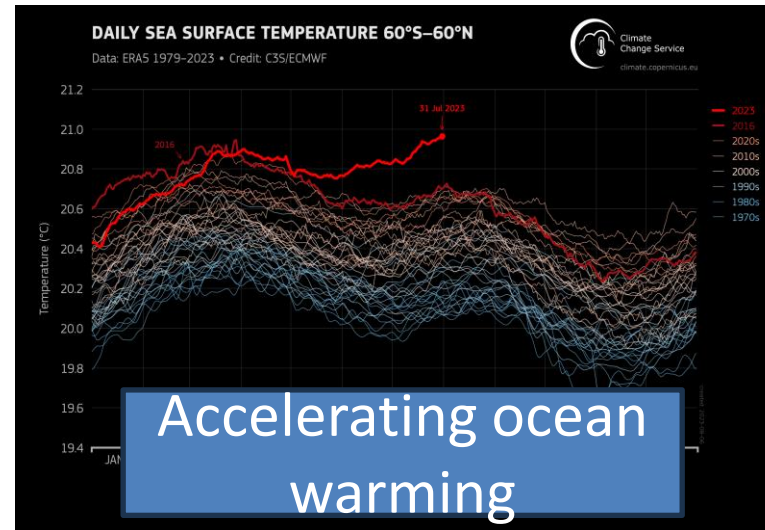
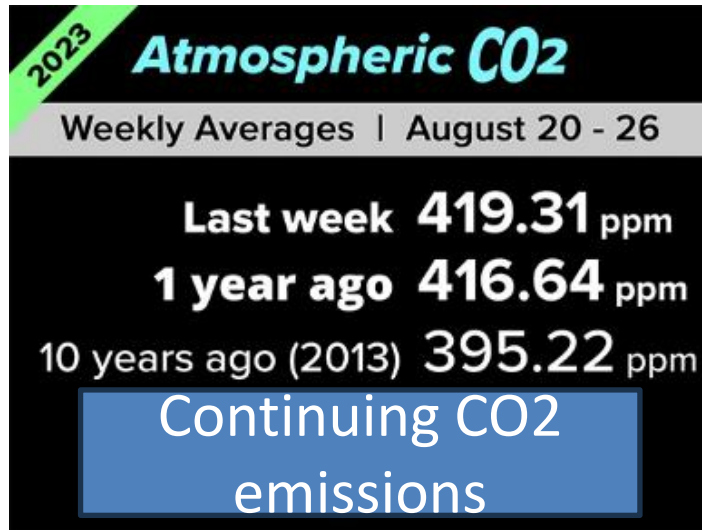
Target areas



The climate crisis - what crisis? Is it worth it???

What do
Caribbeans think
about Climate
Change

Maybe we
should organise a
poll and find
out?



94%
Believe its happening
73% will pay more to stop it