

# Energy, Renewables & Fuel Poverty Event 2019

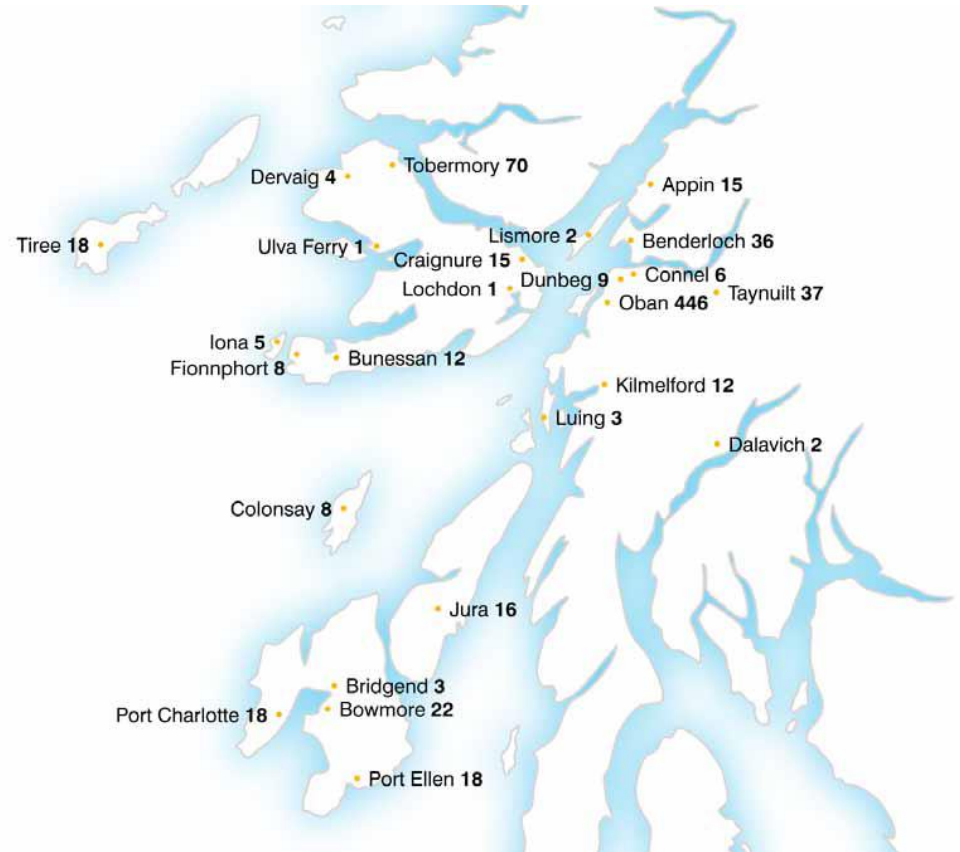


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# Who are West Highland Housing ?

- Link Group Subsidiary
- Based in Oban
- 787 units own stock
- 83 units managed for Link Group
- Stock in rural and across 8 islands
- 20 Staff members



# Challenges in Argyll

- Rural and island environment
- Off the gas grid
  - No gas main beyond Helensburgh
  - Town gas in Oban & Campbeltown
  - WHHA - 6 units with gas
- High incidence rate of fuel poverty across Argyll
  - 45 % HH in fuel poverty
  - 14% HH in extreme fuel poverty
  - 75% of single pensioners



# Causes of Fuel Poverty in Argyll

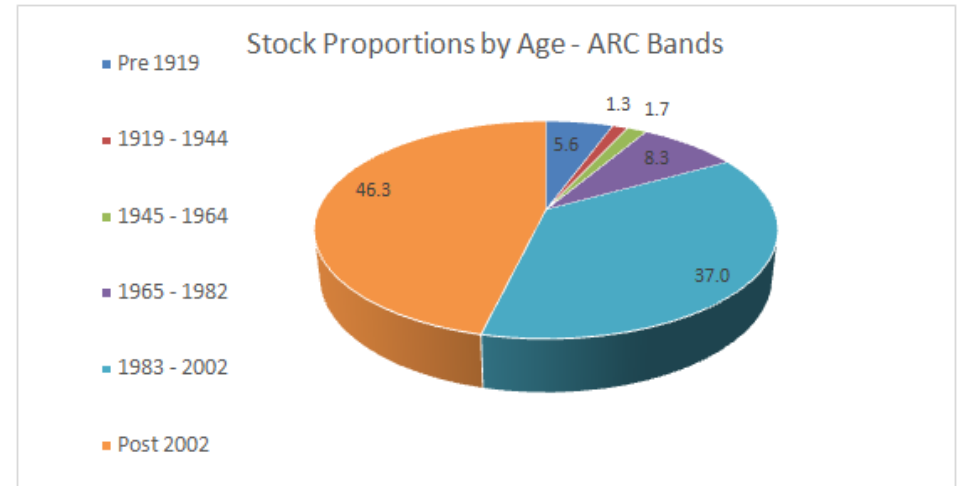


## Causes of Fuel Poverty

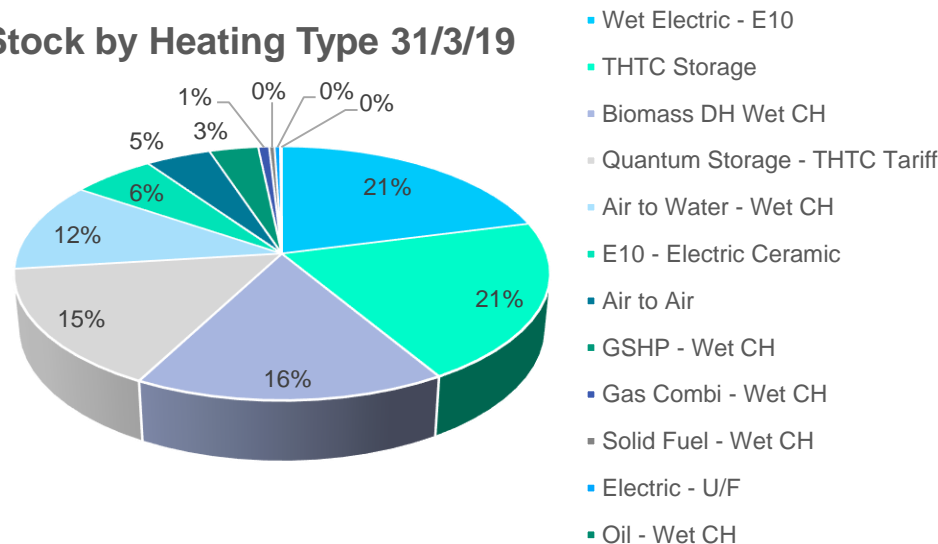
- 48% of houses off the gas grid
- Heating by oil or electric
  - Gas c4.0 p/kWh
  - THTC "heat" 12.08p/kWh PAYG
  - THTC "heat" 16.51p/kWh DDPB
  - E10 similar
- Larger and detached houses
  - More heat loss walls
- Lower proportion of flats
- Exposure – wind and rain
- Low switching rates

# Challenges for West Highland Housing

- 75% stock less than 25 years old
- Timber kits from 97mm
- Room in Roof construction
- Traditionally installed electric/electric storage



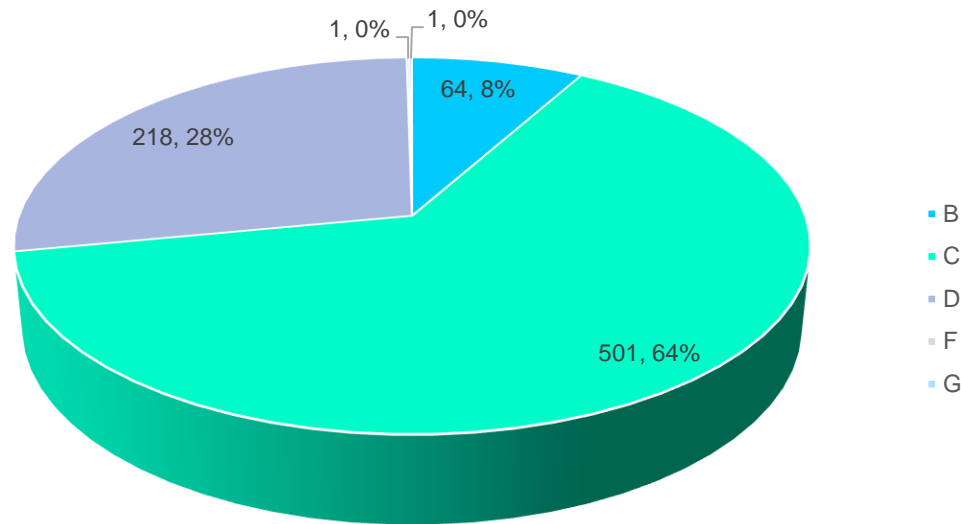
Stock by Heating Type 31/3/19



# Stock by EPC Band

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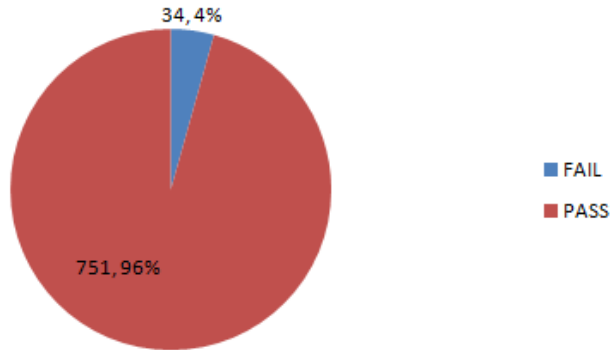
## Stock by EPC Band 31/3/19



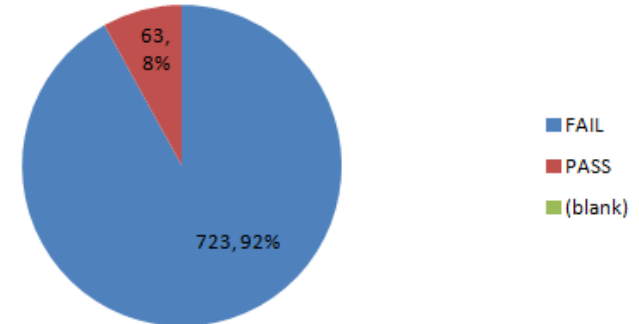


# SHQS, EESSH and EESSH2

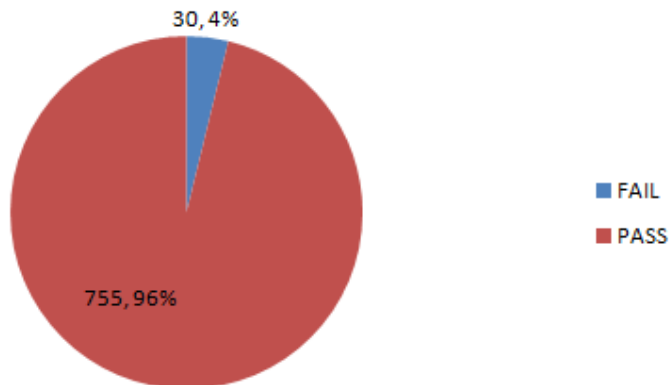
WHA - SHQS PASS/Fail



WHA - EESSH2



WHA EESSH Pass/Fail



# WHHA – Renewables Deployment

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- Started deploying low carbon/renewables in 2004
- 60% of stock has either a primary or secondary measure
- Heat Pumps
  - GSHP
  - Air to Air Heat Pumps
  - Air to Water Heat Pumps
- Solar Thermal
- Biomass District Heating





# What we learned ! - GSHP

- GSHP (2005)
  - Grant driven
  - New technology and remote locations don't work
  - Contractor led design was not cohesive
  - Poor quality installation and commissioning
  - Lack of understanding with staff and users
  - Failed compressors
- What would we do differently
  - Increased site supervision - boreholes
  - Develop local support networks
  - Understand availability of parts
  - Single point of responsibility for design
  - Robust commissioning



# What we learned ! – Solar Thermal

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- Solar Thermal (2007-2012)
  - Driven by grant availability
  - Mixed success rates
    - Installer dependant
  - Panels warped with heat
  - Leaks
  - Wrong additives added
  - Annual Service required
  - 4 Yearly glycol changed
    - Requires roof access



# What we learned ! - Biomass

- Biomass District Heating
  - Use of a subsidiary for commercial heat sales where RSL is a Charity
  - Boiler sizing is key
  - Metering can be challenging
  - Metering is expensive
  - HIU insulation is key to reduce heat loss
    - Improvements since 2012
  - Management of sites is time consuming
  - Small scale sites are financially marginal
  - Tariff at 10.31 p/kWh is perceived as expensive by customers



# Decarbonisation Fund 2018/19

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## **Decarbonisation Fund for Social Housing**

- SG £3.5 M funding pot through to March 2020
  - Bids August 2018
  - Award September 2018
- Energy Efficient Scotland Transition Programme
- Innovative technologies considered favourably.
- Allows for measures that are not fully recognised by SAP methodology subject to:
  - effective monitoring and evaluation,
  - tenant engagement,
  - landlords are satisfied that the innovation provides tangible benefits for energy efficiency

# WHHA Decarbonisation Bid

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- Scope

- 145 Off Gas grid units due to have heating upgrades (EPC Band C & D)
- Installation of High Temperature Air to Water Heat Pumps
- Installation of wet central heating systems
- Installation of sufficient Sunamp heat batteries to facilitate “load Shifting”

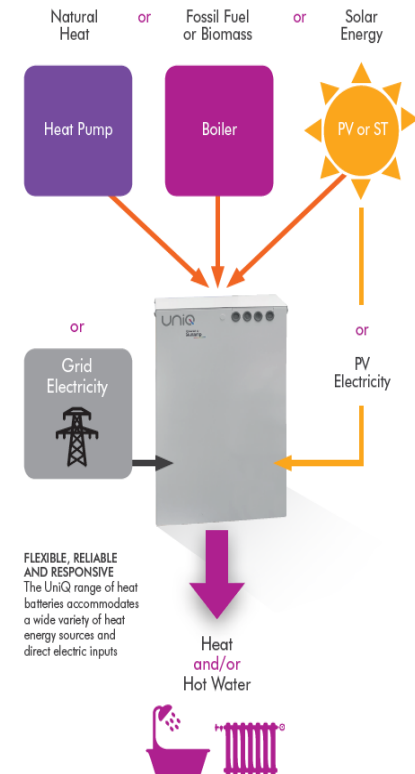
- Outcomes

- Reduce direct and indirect carbon associated with properties
- Reduce energy consumption and energy cost for tenants
- Achieve EESSH 2 (SAP 81)



# What is a Sunamp Heat Battery ?

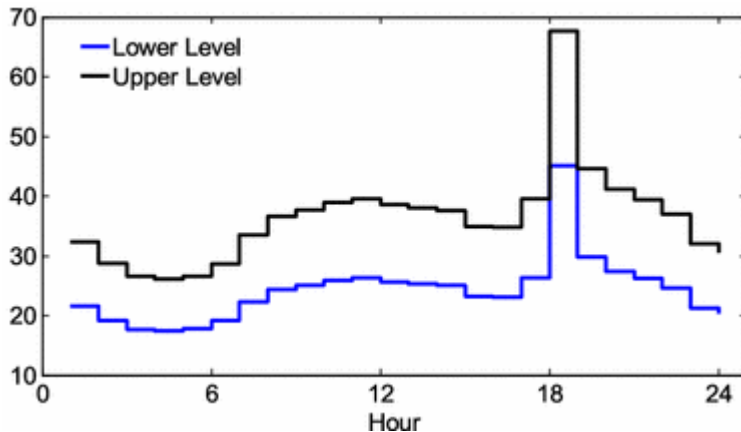
- Modular Unit
- Contains a phase change material
- Material changes state as it heats up
- Variety of heat sources possible
- Delivers heat for hot water and space heating
- Stores 4 times more heat than water
- Minimal standing losses (A+ rated)
- Life of over 40,000 cycles



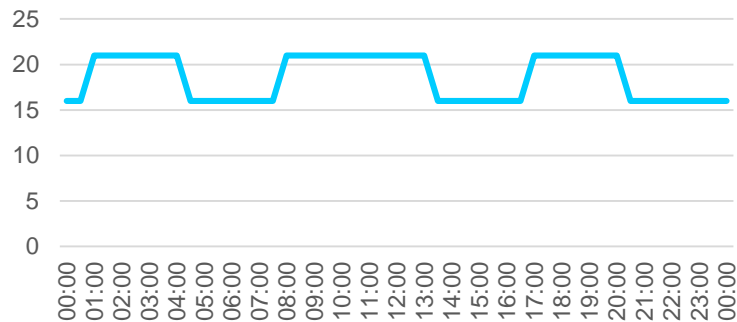
# What is “Load Shifting” ?

- Reducing electrical demand or purchase of energy at certain time
- Helps balance the grid
- Contracted or incentivised (£) to knocking off loads at certain times
- Changing world with more renewables- Solo Energy, Octopus Agile

Typical 24 Hour Cost of Energy Profile



E10 Tariff by Time of Day



# Design Phase

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- Challenges

- Identify a suitable High Temperature Monoblock Heat Pump
- Must work in west coast winter climate – cold (-15oc ) and damp (high humidity)
- Develop a deliverable and replicable design for sector
- Batteries
  - Hot water (notionally 2 \* 3kWh – c 170 ltrs @ 40 degrees)
  - Space heat (notionally 2 \* 9 kWh – c 600 ltrs @ 40 degrees))
- Develop and validate a model to demonstrate
  - SAP increase,
  - Carbon savings
  - Energy cost reduction
- Simple controls for users
  - Separate charging from consumption. Heat pumps configured to run at E10 times
  - Simple time clock for heating, TRV's on rads
  - Instantaneous hot water

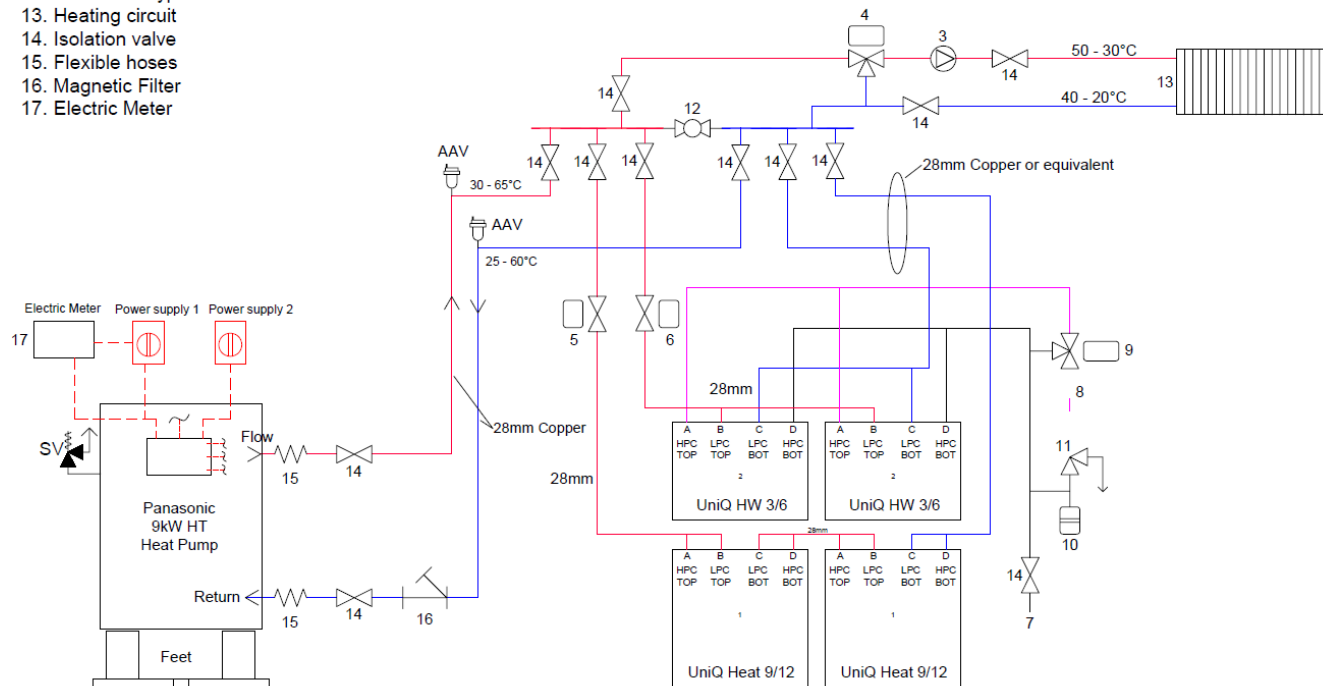
# Control Strategy

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- Minimise use of Peak Rate Energy
  - Model shows 90% heat delivered from off peak rate
- Off Peak Strategy via Sunamp Controller
  - calls heat pump to run at E10 times
  - if space heat demand direct to radiators – surplus to heat battery
    - Mixing valve modulates moving more heat to battery as rooms are satisfied
  - if no heat demand direct to battery till battery charged
- Peak Rate Strategy
  - Demand for hot water
    - Battery charged – heat from battery
    - Battery empty – run heat pump to charge battery to 50%
  - Demand for space heating
    - Battery charged – heat from battery
    - Battery empty – run direct to radiators in weather compensation till room satisfied

# Final Design

1. Heating batteries: 1 & 2
2. Hot water batteries: 1 & 2
3. Heating Pump
4. Heating circuit mixing valve
5. Heating batteries zone valve
6. Hot water batteries zone valve
7. Mains cold water supply
8. Hot water supply
9. Hot water thermostatic blending valve
10. Hot water circuit expansion vessel (0.5Litre)
11. Hot water circuit expansion relief valve  
(Setting: 6 - 10 bar)
12. Automatic bypass valve
13. Heating circuit
14. Isolation valve
15. Flexible hoses
16. Magnetic Filter
17. Electric Meter





# Project Funding and Monitoring

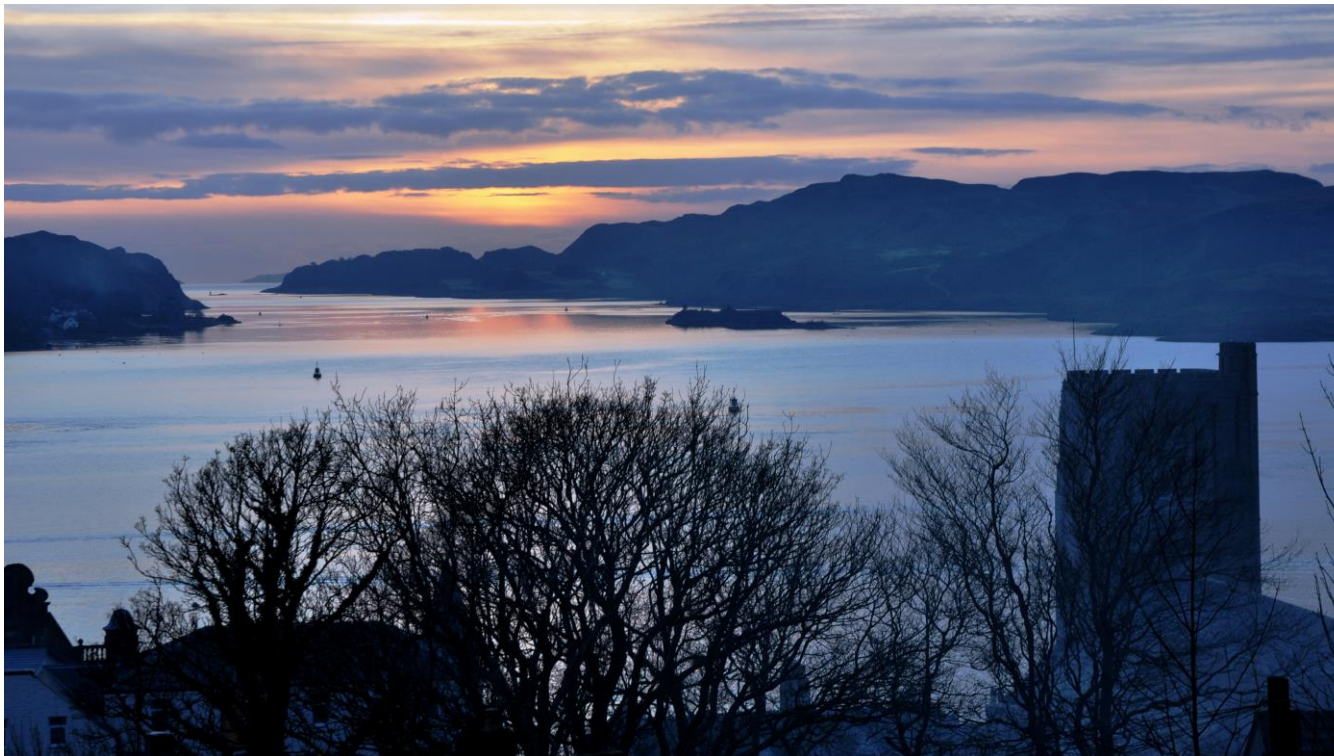
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- Funding
  - £2.3 M Project
  - £1 M WHHA Business Plan contribution
  - £800K Decarbonisation Fund
  - £500K RHI (WHHA forward fund)
- Monitoring and Evaluation
  - Appointed Changeworks
  - Pre, Post and 1 year surveys
  - Tinytag data – Heat and Humidity from sample properties
  - 12 month bill information
  - Detailed monitoring at a sample property

# Project Outcomes

- Model showing (based on initial 39 Units)
  - 59% reduction in carbon
  - 55% reduction in running costs
  - 24 SAP increase (average) – range 17-28 points
  - 52% will achieve EESSH 2 – SAP 81
  - 48% will be short of EESSH2 by 1-2 SAP points





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