Heat from Sound

…and other unusual interventions in creating a Local Energy System on a remote rural island

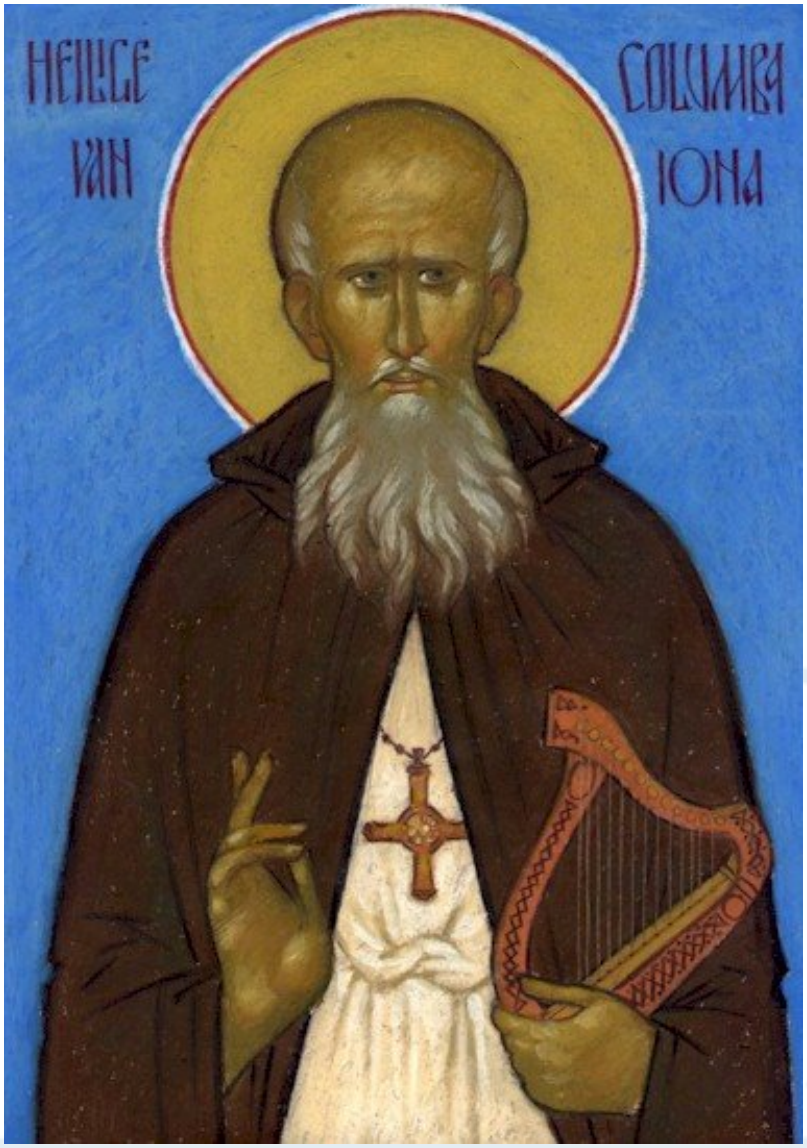
SCENE

Community Empowerment

Iona (and the Sound of Iona)

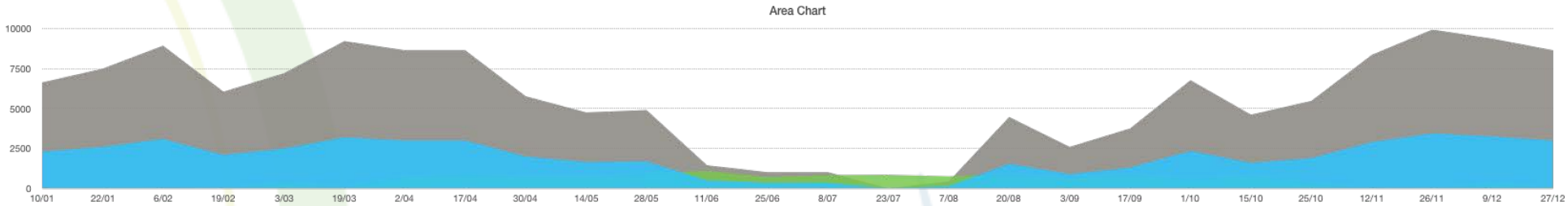
Iona village

St. Columba



Why do tourists come?

Heat Demand



Non-electrical (includes cooking) – oil, coal, gas

Cost (in 2013) of £98,109.17

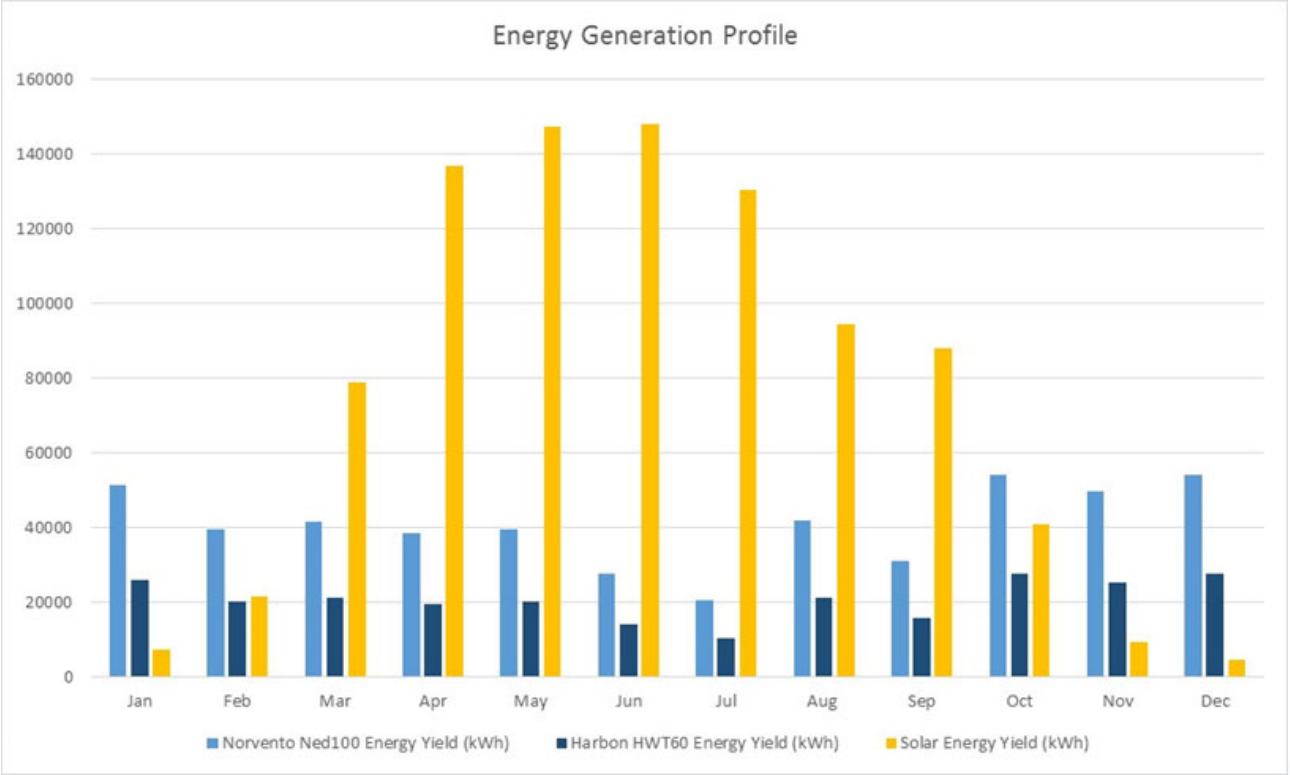
Including electricity (estimate) TOTAL energy costs for Island of >£250,000/year

Energy Generation

Wind speeds >9m/s

Irradiation levels >10% capacity factor

760 hectare community owned forest (on Mull)



Pipes and manholes

St. Columba (again)

Corncrakes on Iona

rspb giving nature a home

The Scottish Government

Background - Introduction

Corncrakes have been actively conserved on Iona and further afield for the past 30 years following their rapid decline due to the reduction in breeding habitat and the mechanisation of agricultural cropping methods.

In the UK, the corncrake is listed in the Red list of birds of high conservation concern because of major population declines both historically and recently. Europe wide the species is threatened due to major declines through much of its range.

Habitat management

This field provides early and late cover for the corncrake via the small corner immediately behind this board. The area is closed off from livestock from 1st March until 30 September to ensure sufficient vegetation is available. In the summer, corncrakes utilise the cover provided by silage meadows adjacent to this corner for breeding and the areas of uncut vegetation around the field also provide late cover. The crop is not cut until 1st August which is important for successful nesting. The corncrake on Iona also benefits from the trapping of North American Mink by local volunteers.

Current position on Iona

The number of calling males on Iona has risen from a low of two in the early nineties to stabilise at between 20 and 30. Other areas where corncrakes can be heard and sometimes seen are shown on the map below.

Where might I see a corncrake?

1 Here at Ruanaich!
2 Along the unpaved road towards Maol Ferm
3 Between the Fire Station and the Village Hall
4 In either of the hotels gardens
5 Around the St Columba Steadings
6 In the fields between the Abbey and Bishop's House
7 At the north end.

The Corncrake's year

1 **Arrival from Africa begins**. Birds are likely to return to the area in which they bred or were born in the previous year.

2 **Males start calling** from early in May. They call occasionally by day and almost continuously at night.

3 **First nests**. Females lay 8-12 eggs and incubate them alone. Nests are so well hidden that they are rarely found by predators.

4 **Females stay with chicks** from the first brood for about 12 days. Young birds are unable to fly until they are just over a month old.

5 **Males call from early cover** or hay and silage fields. Most females mate again and lay a second clutch. They stay with chicks for about 17 days.

6 **Males stop calling**. Independent young from the second brood are flightless for just over a month.

7 **Adult males and females moult their wing feathers** and are unable to fly for about two weeks.

8 **Migration to Africa begins**. Most second brood chicks should be able to fly by the end of September.

APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER
Females lay and incubate eggs		First nests	Second nests		
Females accompany chicks					
Flightless, independent chicks					

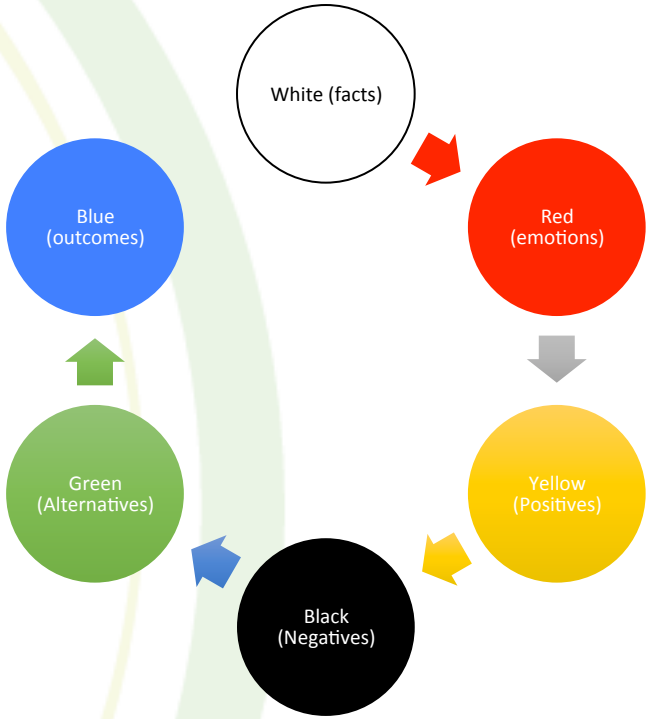
Grid

People = Risks and Solution

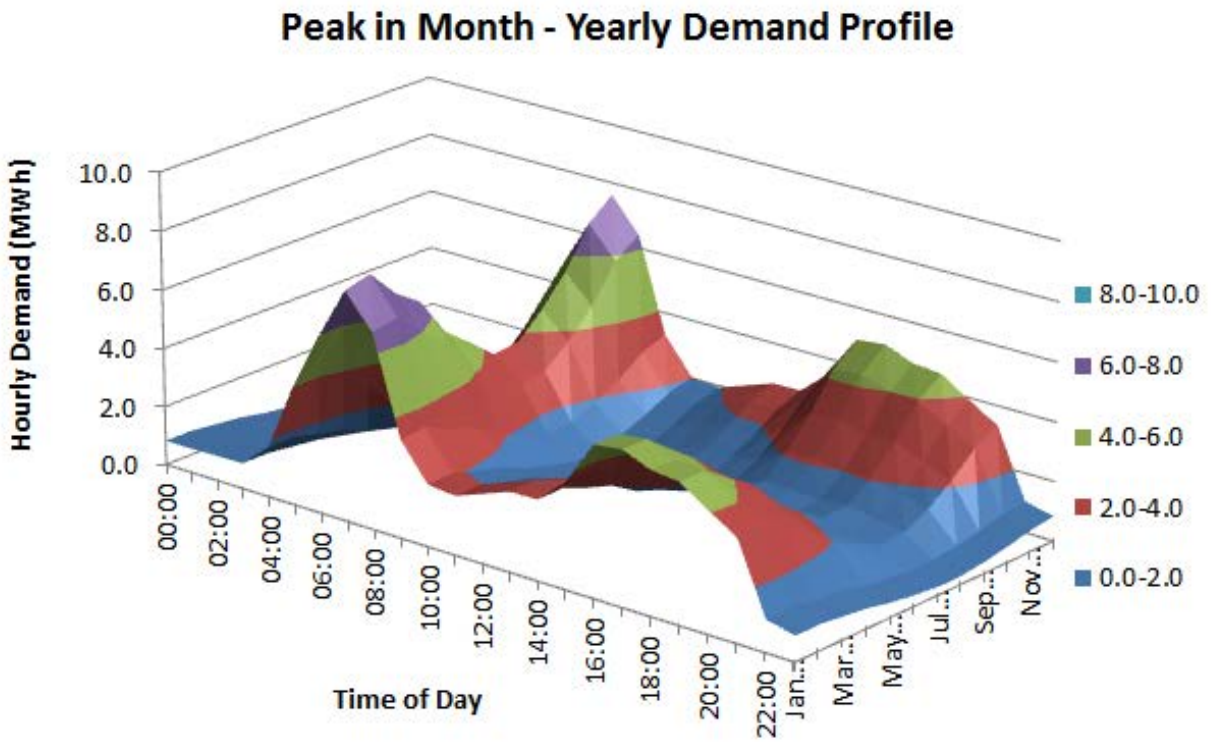
Higher level risks – people, people, people…

Level of Risk (1 low – 10 high)	Risk	Risk Descripption	Management Strategy
7	Stakeholder Objections	Objection of any development on the land by key stakeholders.	Carry out full ***consultations*** to ensure there are no key barriers to the development. Inbuilt ***break points*** to ensure no overspend on non-viable options.
7	Stakeholder Participation	Risk key stakeholders will not participate, due to social factors: e.g. confidence levels, energy security, flexibility, timescales etc.	Ensure energy solutions are fully understood by key stakeholders to achieve critical mass to establish ***deliverable and scaleable,*** and benefits of collaborative system.
7	Wider community benefits not secured	Direct benefits of reduced energy costs secured without wider community benefits.	Engagement and reporting includes consideration of appropriate ***business models*** to ensure community ownership and priorities are integrated at the project planning stage.

Engagement



Demand Modelling



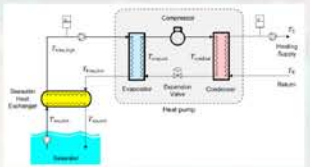
Four Dimensional Data

- **Location**
- **Type**
- **Quantity**
- **Time**

Supply and Storage

Heat-pump

The theoretical model assumes 8,760 operational hours per annum (365 days x 24 hours). In practice, there will be periods in which the turbines are not operational which do not relate to the wind data – for planned and unscheduled maintenance, and during periods of grid constraint. Periods when the turbines are not operational due to very low or very high wind speeds would be accommodated in the model. Over the 2 year period, the Tiree turbine was operational ~76% of the maximum theoretical value. It may therefore be reasonable to apply a reduction the annual theoretical energy yield, to reflect actual operation and uncertainties within the data.

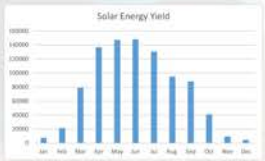


Solar

The solar PV panels would be arranged in ground mounted frame panels in clusters of 20 modules, in a 5 by 4 landscape format, each of approximately 250 Watts peak power. Calculations of the energy yield were done using the panel type Renesola Virtus®II.

Calculations have been carried out on the software package PV*Sol®, using a separation distance of 8 metres between rows to avoid over shading from the low angle of the sun. The panel structures are no greater than 3 m height and south oriented. The location is assumed to be relatively flat areas. Some areas may require localised landscaping to make them suitable for the solar meadow. Works could include removing topsoil; flattening the site and constructing a mounded area for increased security and/or reduced visual impact (this is taken into account when calculating the useful land area).

To provide an indication of energy yield, a nominal installation size of 1MW was modelled. Once a preferred location and scale of development has been defined, the modelling can be updated to take this into account. The minimum development footprint of a 1MW installation, incorporating access tracks, spacing to minimise yield reduction due to shading, and associ-



Not viable options

Biomass

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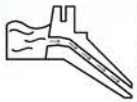
Hydro



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Wind

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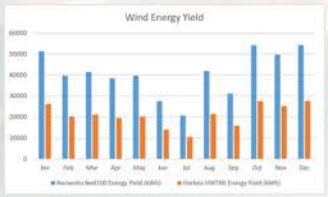

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Generation

Winners!