



# Circular Economy Potential on Scottish Islands

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# Circular Economy Potential on Scottish Islands

- What is the circular economy?
- Why Scottish Islands?
- What are the opportunities?
- What next?



# Roland Arnison - independent consultant



Some recent work -

- Beer-Whisky-Fish circular economy study for Scottish Government
- Case studies and development support for Scottish bio-economy innovators
- Circular economy potential studies for Small Isles and for Orkney: HIE and ZWS

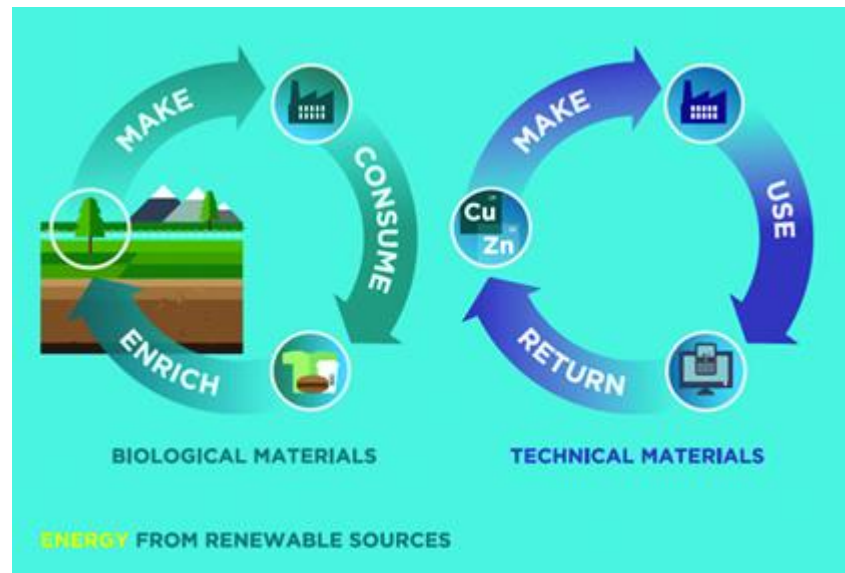
*Previous work on renewable energy, composting, anaerobic digestion, waste options... and closed loop shrimp cultivation*



# Circular economy in a nutshell

“The circular economy is an alternative model to our ‘make, use, dispose’ culture which means re-using products and materials continually”

“Developing a circular economy in Scotland will help to protect our economy against exposure to resource supply risks and volatile commodity prices”



# Why Scottish islands?

- Most circular economy development so far is in centralised /urban supply chains. Insight needed into dispersed /rural opportunities.
- Higher supply costs for imported resources - oil, animal feeds, fertilisers, etc
- Surplus renewable electricity
- Natural resources / wastes available



# Objectives

- Grow and protect island economies
- Future proof against rising costs of key imports

## How?

New bio-production based on island resources

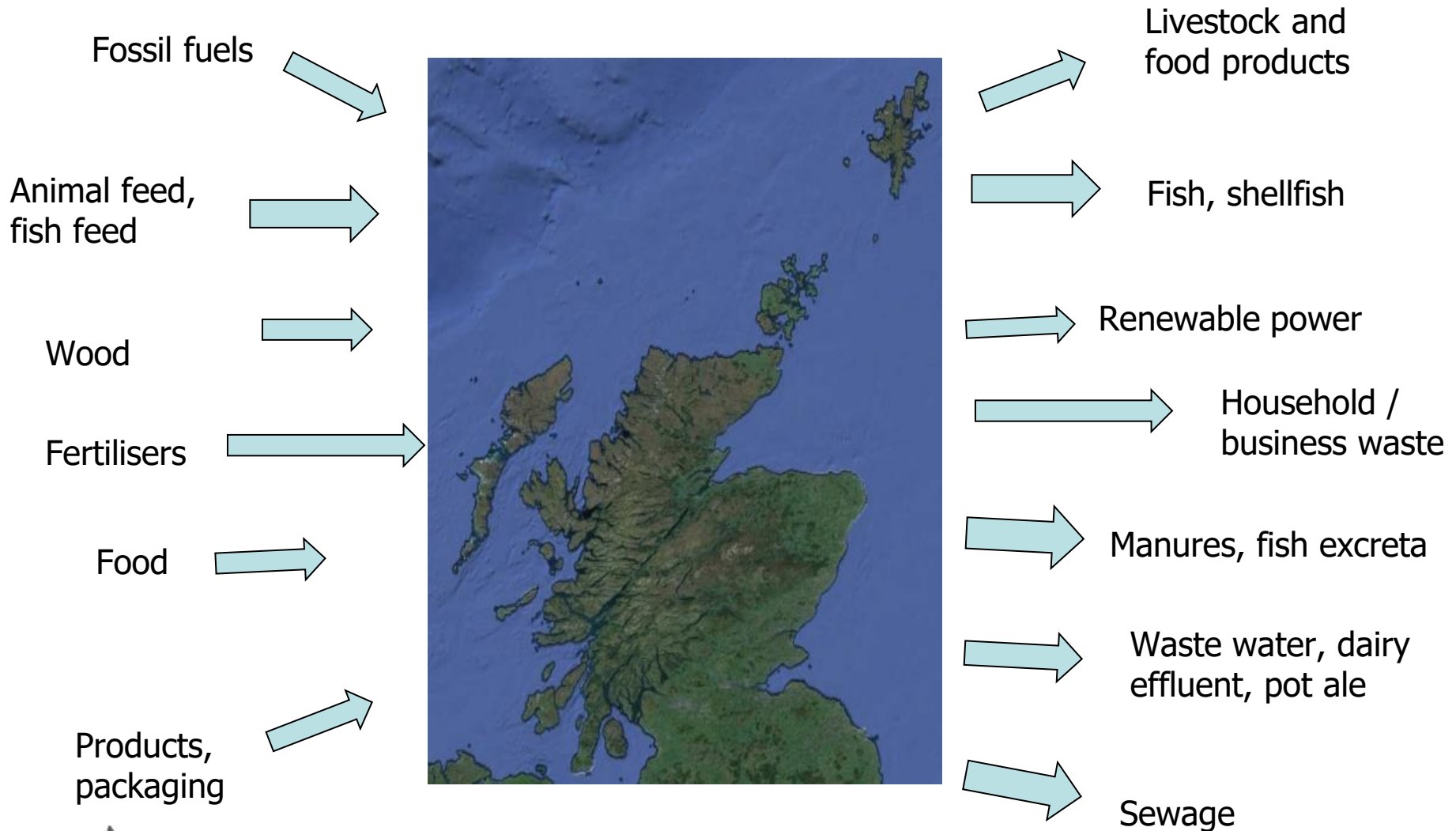
Uses for waste heat and surplus electricity

Waste from one business = feedstock for another

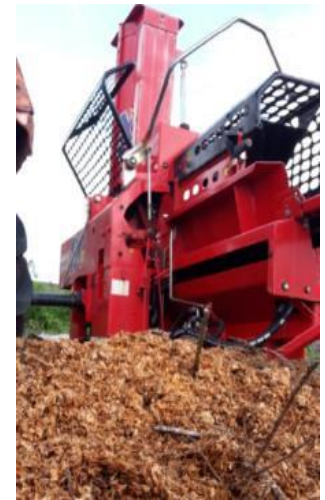
Small scale local solutions



# Scottish islands key resources



# Renewable heating fuel



## **Brackettes: biomass briquettes made from bracken**



Brackenburn manufacture briquettes from bracken, as a fuel for domestic fires and log burners. These Brackettes are claimed to burn hotter than oak due to higher calorific value and lower moisture content.





# Electric vehicles



Solution for renewable electricity generation storage?



# On-island recycling of waste plastics



## **ECOCYCLE Cube: 3d printing with recycled plastics**



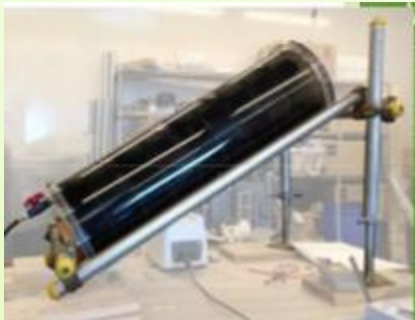
“Exclusively printing in post-consumer waste, the EKOCYCLE Cube 3D printer recycles what you use, so you can remake into new, meaningful, beautiful and better things”



# Nutrient recovery from sewage

## Microbial Fuel Cells

Small scale heat and power from sewage



## Nutrient separation

Small scale low energy separation into nutrient liquor and clean water



# Biogas



Food wastes  
Manures  
Distillery, dairy, brewery effluents  
Seaweed

Anaerobic Digestion

**DIGESTATE**

Plant nutrients as  
solid or liquid

Agriculture, biomass growing

Biogas

CO<sub>2</sub>

Renewable power

Renewable heat

*High  
productivity  
protected food  
growing ?*





# Seaweed



## **Marine Biopolymers, Argyll**

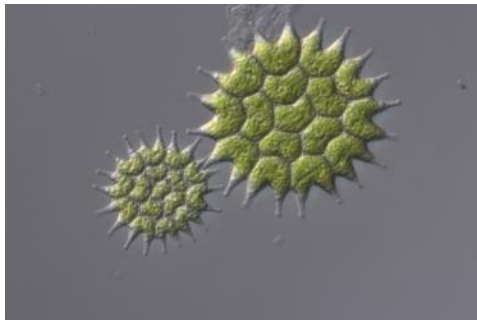
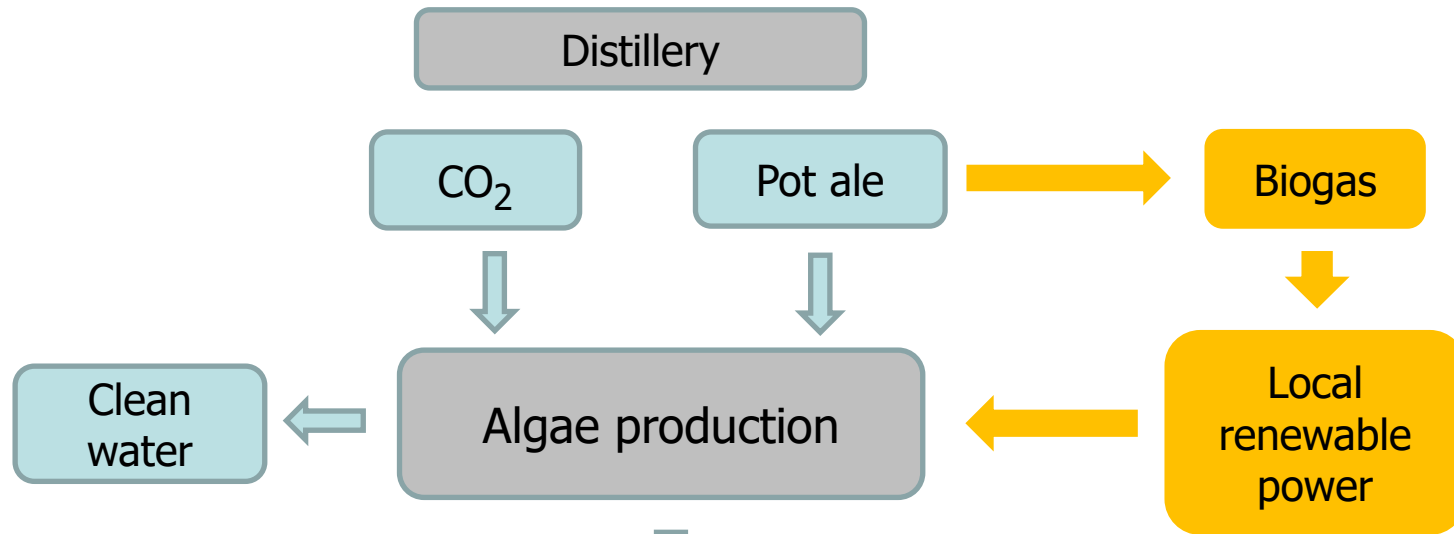
Seaweed processing facility that will produce alginates at a commercial scale, along with cellulose-rich residue, using renewable heat and power.

## **Uist Asco**

Harvests and dries seaweed using renewable heat to sell as animal feed and for agricultural use



# Microalgae



## ALGAE PRODUCTS

- Animal feed
- Aquaculture feed
- Biogas feedstock
- Biofuels
- Food supplements
- Pharmaceuticals
- Proteins
- Omega 3 oils
- Commodity chemicals
- Bioplastics



# Animal and fish feeds

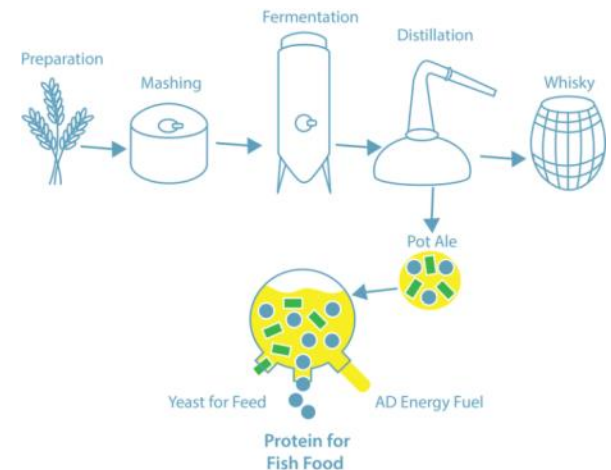


Commercial scale technology to produce pig, poultry and fish feed ingredients from Black Soldier Fly larvae grown on various low grade organic wastes.



High value protein extracted from food industry effluents.

Designed to work at small scale.



# Over to you: What next?

- Grow and protect island economies
- Future proof against rising costs of key imports
- Make use of local renewable resources

## **Wide range of opportunities – How to develop them?**

Eg A practical circular economy development programme with trials of most promising technologies – Scottish islands as test beds and pioneers

### **Key people**

Island Community Trusts

Development agencies

Technology providers /innovators

Entrepreneurs

Investors

Researchers





# Contact



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