Food waste options for St Agnes, Bryher and St Martin's, Isles of Scilly.

Preface

The co-design process that this report is based on was undertaken in order to support communities in a process of specifying a preferred way of addressing food waste on their islands. At the time of writing (July 2025), the Isles of Scilly Community Venture and Isle of Scilly Wildlife Trust are actively pursuing funding for food waste management.

There will be a final round of engagement with the off-island communities in Autumn 2025 to discuss the options set out in this report and – should funding have become available – to select between them.

A separate process will take forward the planned pilot biodigester for St Mary's, should funding become available.

This report was prepared by Jonathan Ensor, at the University of York, and is intended to reflect the views expressed in the co-design workshops that took place in September 2024 and February 2025.

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At present, food waste is transported from the Isles of Scilly to the mainland at significant financial and environmental cost, and involving the loss of nutrients that could be used in farming and gardening on the islands. To address this, a pilot biodigester is planned for St Mary's, to test the potential for local processing and compost production. While Tresco operates its own biodigester, the remaining off-islands lack a solution for food waste.

In this context, workshops were held on St Agnes, Bryher and St Martin's in September 2024 and February 2025, engaging members of the community on each island in a process of 'co-designing' options for processing food waste within the Isles of Scilly.

Summary of findings

The co-design process has revealed key principles that any solution to food waste needs to align with, and four concrete options for addressing food waste. Unresolved issues that remain the focus of ongoing study are: how to tailor composts to match the needs of different island users; and how to deal with large animal bones and crab and lobster shells. This report is intended to support communities in selecting a preferred solution for food waste management. While a comparison of costs for different options is provided, this report does not provide a fully costed business case.

Common principles for food waste options

Discussions across each island revealed the following common principles that any approach to food waste would need to adopt. More details of each principle can be found on page 7.

1. Technology *must be* robust, repairable, flexible
2. Waste collection and storage *must be* island-appropriate, easy for users, bio-secure
3. End product *must be* valuable for use on Scilly
4. Costs *must not* exceed current charges for commercial and residential users

Food waste options

Four options for food waste emerged from the co-design process. More details of each are on pages 2-5, with a cost comparison on page 6.

Option 1: Off-island digesters

Eliminates waste transport, but with high costs and duplication of operational challenges.

Option 2: St Mary's digester

Manageable waste site operational complexity but significant biosecurity and resilience challenges associated with waste transport.

Option 3: Off-island dehydrators

Small volumes of dehydrated waste to transport, with significantly lower costs and operational challenges than installing off-island biodigesters.

Option 4: Combination

Different options adopted on each off-island, with some loss of overall system resilience.

Option 1: off-island digesters

The solution

Each off-island has its own biodigester, enabling food waste to be dealt with locally, without the need for transport between islands. Food waste is collected or delivered to the biodigester, where it is processed at high temperature, retaining nutrients but killing potentially harmful bacteria. The output is essentially odourless, with the consistency of coffee grounds. This 'digestate' can then be combined with green waste in a conventional composting container to produce a potentially valuable soil improver. The digester is relatively small, fitting in a large shed.

Challenges

Site and operation: an indoor site with mains electricity and drainage is required. Some islands will need to find a new location if there is no room at the existing waste site. Requires a regular supply of food waste to operate, although some variability is acceptable. Existing waste management systems may be disrupted by new tasks, time and labour overheads; this may require employment of a new operative.

Maintenance: will require Scilly-based skilled individuals with phone support from supplier. Need to avoid one individual being the only source of expertise. Planned servicing by the manufacturer and preventative maintenance is a priority. Use of similar systems on all islands would enable shared skills and parts. Spares would need to be stored locally. Restarting the digester requires time after e.g. the off season, or if the input waste stream becomes too low to run the digester.

Access: where residents deliver waste, arrangements would need to be developed to allow access (ideally) at all times, but restricted to residents only. The system would need to be accessible for all residents, and easy to use.

Waste separation: user training will be required to support compliance, with different strategies for businesses, residents and tourists (e.g. stickers on bins). Containers are required for food waste transport to the aggregation point. Containers must be sealed, biosecure and suitable for handling by individuals. Screening of the waste input may be required to prevent cutlery (for example) entering the system.

Costs and economics: initial capital and installation costs would require grant funding. Ongoing costs arise for the rental of land and/or building for the digester, electricity supply, operative salary, insurance, testing and certification required for regulatory compliance, and allowances for maintenance and repair, and end-of-life replacement. Costs are offset via gate fees (which will need to be at or below existing commercial waste management charges), and an agreement would be needed for resident fees to be paid for by the council. Ownership, liability and accountability will need to be agreed.

Conclusion

Eliminates waste transport, but with high costs and duplication of operational challenges.

Option 2: St Mary's digester

The solution

Food waste is separated and collected from each off-island and transported for processing in the St Mary's biodigester. The digestate is composted on St Mary's and the resulting soil improver would need to be transported for use on off-islands.

Challenges

Container design: Containers for use on the boat will need to be biosecure, including being cleaned and rat-free on return. A waste aggregation site will be required, with sealed containers of sufficient volume and security to cope with delays in boating of up to four weeks, including during hot weather. Containers also need to be small enough to be handled when full. An estimate for St Martin's suggests this requires twenty-five 60 litre bins per week during peak season. In addition, the same waste stream separation and handling challenges arise as set out for option 1.

Shipping: shipping company will need to be happy with container design, including for use on a boat (and substitute boat) that also carries fresh food. Peak season will produce maximum food waste, but coincides with maximum demand for freight transport, requiring food waste transport to fit into a tight freight transport schedule. Resilience might require policy changes at the council (to guarantee waste transport), Steamship Company (to transport waste in more than one slot per week), and St Mary's harbour (to receive waste at the required frequency).

St Mary's collection: harbour (and local population) will need to be prepared to receive and transport food waste, including in large volumes after delays in boating due to weather or mechanical failure.

Costs and economics: gate fees at St Mary's would provide income as in option 1, but additional costs arise from waste transport between islands, handling on St Mary's, and return of compost to off-islands if required. Offsetting this increase in costs is economies of scale in relying on a single biodigester installation on St Mary's, including for site rental, servicing and maintenance, insurance and regulatory compliance. Moreover, year-round use on St Mary's would simplify storage of parts and provide sufficient continuity of supply.

Conclusion

Manageable waste site operational complexity but significant biosecurity and resilience challenges associated with waste transport.

Option 3: Off-island dehydrators

The solution

Food waste is separated and collected at each off-island. The food waste dehydrated, removing the water content and reducing volume by around 80%. The dehydrator is a large drum, similar in operation to a tumble drier, requiring power to turn the motor and generate the required heat. The residue is a sterile, dry, manageable granulated powder, suitable for storage and subsequent local composting or transporting to St Mary's for adding to the input waste stream of the biodigester.

Challenges

Site and operation: an indoor site is required with 16A single phase (small dehydrator, up to 40kg food waste per day) or 32A three phase (for larger volumes) electricity supply. The dehydrator requires a standard drain outlet within 2m. Time for dehydration is 10-14hrs depending on waste volume. Additional waste management tasks will include feeding the dehydrator and collecting dehydrator output. Operation is significantly simpler and more resilient than a biodigester.

Maintenance: local technicians familiar with electrical and mechanical systems should be able to carry out routine maintenance and basic repairs. Supplier provides detailed maintenance guidance and remote technical support (e.g. they have provided online support for machines operating in Falkland Islands and Isle of Skye). The supplier also provides a recommended spares kit including components most susceptible to wear over time (e.g. sensors, belts, heating elements).

Access and waste separation: the same waste stream separation and handling challenges arise as set out for option 1. Screening of the waste input may be required to prevent cutlery (for example) entering the system, although this is less critical than for the biodigester as the waste is agitated in a drum rather than by a screw-thread.

Containers and shipping: the residue is sterile and low volume, but needs to stay dry during storage or transport.

Costs and economics: lower initial capital and installation costs, and similar ongoing costs and gate fee income, to Option 1. Final costs are to be confirmed, but operative time, insurance, testing and, and allowances for maintenance, repair, and end-of-life replacement are all anticipated to be significantly lower than for an off-island biodigester (see page 6).

Conclusion

Small volumes of dehydrated waste to transport, with significantly lower costs and operational challenges than installing off-island biodigesters.

Option 4: Combination

The solution

Off-islands may choose to adopt different food waste management options. For example, it may be possible to operate a biodigester on one off-island, with dehydrators on the remainder. Of those with dehydrators, one may adopt local composting and the other storing and transporting residue to the St Mary's biodigester. Any combination of options 1-3 is possible.

Challenges

While there may be some additional resilience offered if all off-islands adopt the same technology option (through sharing of expertise and parts), a mixed approach to technology options offers no significant downsides over and above those set out for the options 1-3 above.

Estimated cost comparison for off-island biodigester and dehydrator options[1]

	Biodigester	Dehydrator
Assumptions	PRM BioProcessor P250 (250litres/day) *Peak Season:* Enough food waste to run continuously (some variability is acceptable) 26.9kWh/day *Off Season:* Not in use Food waste sent to home compost or transport to St Marys (low volumes)	Bergmann ES60 Food Waste Dryer (20-40kg/day) *Peak Season:* 25kg/day average (no minimum) Runs once per day for 13hours @ 1.2kW/h = 15.6kWh/day *Off Season:* 25kg per week food waste input Runs once per week for 13hours @ 1.2kW/h = 15.6kWh/week
	25p/kWh electricity cost 180 day peak season Saving vs. current food waste transport costs is the same for both options	
Electricity	Total annual cost: **£1,200**	Total annual cost: **£800**
Operator	Skills and experience required to start machine each season 2.5hr per day (average) => **450 hours per year**	1 hr per day (average) when operating => **205 hours per year**
Compliance	Assume exemption. Requires biosecure composting arrangement before spreading output on land	None if at existing waste site
Insurance	Requires broker to quantify	Requires broker to quantify. Assume **half the cost** of biodigester insurance.
Maintenance	Main risk – paddles break due to non-food input (e.g. cutlery) Assume same costs for both options	No known points of failure (plastic bag in input stream?) Assume same costs for both options
Servicing	Requires mainland technician – cost of travel	Can be serviced by local skilled operator with phone guidance
Replacement	Assume 20 year life £45k replacement cost **£2,250 per year**	Assume 10 year life £10k replacement cost **£1,000 per year**
Site rent	No additional cost	No additional cost
Other	Digester needs **feeding twice per day:** requires collection of food waste twice daily, or biosecure storage at processing site sufficient for twice daily feeding. Wood chip and/or other amendments required to balance biodigester input. **Off season food waste shipping** requires biosecure container; assume £10/trip: 25kg per week = **£260**	**Shipping of output to St Mary's:** Volume of waste reduced by 80% Secure container required for transport Shipping costs assumed as £5 per trip, weekly during peak season / monthly during off season = £260+£60 = **£320**
SUMMARY	**£3,710 per year** **450 hours operative time** **Insurance cost** **Servicing cost**	**£2,120 per year** **205 hours operative time** **Half insurance cost** **Zero servicing cost**

[1] This table is not intended to provide accurate costs that would apply to all off-islands; rather, the stated assumptions provide a reasonable means for comparison of the relative cost of the options if deployed.

Common principles for food waste options – details from co-design workshops

1. Technology *must be* robust, repairable, flexible

    a. Must accept a wide variety of waste.
    b. Avoid "feeding errors" caused by incorrect waste types.
    c. Resistant to breakdowns that could create backlogs.
    d. Simple, maintainable, and scalable (e.g., for seasonal population fluctuations).
    e. Corrosion-resistant and UV/rainproof.
    f. Operable without regular oversight; robust even if left unused in winter.
    g. Short, quick, and reliable supply chains for parts and repairs.
    h. Avoid reliance on specialist skills or individuals with unique skills on Isles of Scilly.
    i. Common technology across islands for ease of repair and compliance.
    j. Aim for redundancy – if one fails, use another (e.g. on another island).
    k. Cannot require water input due to shortage on islands.

2. Waste collection and storage *must be* island-appropriate, easy for users, secure

    a. Avoid prolonged waste storage at homes, businesses or collection points.
    b. Accessible location for waste collection.
    c. Secure, rat-proof, and gull-proof waste collection and storage.
    d. Quality containers for transport and storage of waste.
    e. Inter-island waste transport must meet regulatory compliance and avoid contamination.
    f. Collection and storage bins need cleaning and / or disposal of plastic liners.
    g. Need to be compatible with existing island recycling practices.
    h. Collection systems tailored to island-specific challenges (e.g., lack of vehicular access).
    i. Flexible schedules for seasonal waste volumes (e.g., daily during high season for businesses).
    j. Address waste separation compliance, including for visitors.
    k. Need to address meat bones and crab/ lobster shells as inputs.
    l. Collection and storage cannot be an eyesore for visitors.

3. End product *must be* valuable for use on Scilly

    a. Produce usable outputs such as soil improver, high-quality compost or energy.
    b. Avoid mismatch between compost production and local demand.
    c. Need to organise sales as big producers (e.g. pubs) are not big compost users.
    d. Systems should reduce overall waste volume to cut disposal costs.
    e. Compost or outputs must meet regulatory standards for use.
    f. Need to allow for large volumes of green waste to enable composting.

4. Costs *must not* exceed current charges for commercial and residential users

    a. System must be cost-effective and not exceed current waste management expenses.
    b. The system should pay for itself, including maintenance and repair costs.
    c. Resolve whether waste charges are for weight or volume.
    d. Reduce transport and disposal costs, particularly the fee for black bag waste removal.
    e. Need to meet public procurement rules and compliance.
    f. Address resistance to change by demonstrating financial and environmental benefits.
    g. Ownership must be clear, so that e.g. repairs can be paid for.
    h. Remember that green cones are free to use.