



GOING TO WASTE ?



Investigating the Feasibility of a Domestic Food Waste Collection in Plymouth.

Including key findings from the Education Research programme undertaken by Growing Sustainable Futures CIC. Although some compost their organic waste, the majority of households in Plymouth currently have no option other than to dispose of their food waste in their brown general waste bins even though a successful anaerobic digestion plant lies right on their doorstep. The Plymouth Food Waste Partnership investigates the potential for a domestic food waste collection, the opportunities presented for a sustainable solution and the barriers to its introduction.

Going to Waste ?

INVESTIGATING THE FEASIBILITY OF A DOMESTIC FOOD WASTE COLLECTION IN PLYMOUTH.

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EXECUTIVE SUMMARY

The Plymouth Food Waste Partnership was created in 2014 with the aim of supporting the introduction of a food waste collection for Plymouth's households; a service that is currently not available from the local authority. Like many, PFWP's founder, Penny Tarrant, had been surprised to find that her new home in Plymouth would not have such a collection, unlike her former home in Surrey. Following initial discussions, the Partnership was quickly created and found support from over twenty interested parties. It soon became clear that further research would be required to establish the argument for a food waste collection and a bid was made to lottery funded 'Awards for All' for a Feasibility Study. The bid was successful and this report sets out the findings of the Study.

The Study aimed to:

- Review the reasons for and against a food waste collection given by the City Council.
- Establish the understanding required to persuade local residents, including the city's students, to participate.
- Assess the actions taken by other local authorities in terms of justifying a collection – Plymouth is one of only two local authorities in Devon not to offer this service.
- Support a number of pilot projects that were intended to 'test' the assumptions made about the cost effectiveness of a collection and the willingness of different local populations to participate.

However, the dynamic and complex world of food waste management, and its role in determining broader environmental change, soon became very clear. Timescales were particularly important and, although it was initially decided to report findings up to and including August 2016 a number of emerging changes prompted further consideration and an extension of the Study's time scale. The impacts considered included:

- the potential impact of Brexit on UK environmental policy – including potential changes in legislation, waste to energy subsidies and an increased interest in food waste management at Government level
- the continuing promotion of Plymouth as a 'green city' and the significance of this to broader citywide interests in low carbon economies, corporate social responsibilities and the potential impact of negative press coverage in the run up to the internationally significant Mayflower 400 celebrations.
- the introduction of a fortnightly general waste collection proposed by the City Council,
- evidence from other local authorities that such changes benefited from food waste collections
- proposed changes to the recycling collections,
- continuing concerns about both budgets and recycling targets (to which food waste contributes),
- renewed interest in commercial food waste collections,

- the introduction of new waste management staff
- the inclusion of PFWP members in formal consultations.
- the potential introduction of food waste collections by Exeter City Council (the only other Devon authority not to offer this service)

Given the evidence already collected and the potential of food waste collections to ensure the successful change to fortnightly collections (benefits experienced by other local authorities across the UK), it was decided to extend the Study slightly to consider renewed opportunities.

The final report therefore addresses :

- The role of food waste in the 'bigger picture' of environmental change in the UK.
- The background to a potential food waste collection in Plymouth – the arguments made and possible solutions.
- The possible costs and cost effectiveness of introduction.
- The findings of a survey of other local authorities – including the arguments used to justify introduction.
- The outcome of a specifically designed Education Programme that has been tested with Plymouth's communities and is being promoted as a replicable and highly adaptable solution to the awareness raising required to accompany the introduction of a collection.
- The potential for a collection and for the development of ongoing 'pilot projects' as these were not funded by the grant.

INTRODUCTION

Launched in 2014, the **Plymouth Food Waste Partnership** (PFWP) champions the potential for food waste projects in Plymouth; driven initially by the realization that, unlike many other local authority areas, Plymouth City Council makes no provision for a local authority led, household (or domestic) food waste collection in its Waste Management Strategy. In less than two years, the Partnership has grown to encompass the many and varied aspects of food waste within the waste hierarchy; with a membership of over twenty key organisations, a leading role in raising awareness and waste education and a supportive role for Food Plymouth's broader commitments (which includes seeking Silver Sustainable Food City status for Plymouth).

The Bigger Picture

The eradication of extreme poverty and hunger is the focus of the very first global Millennium Development Goal (<http://www.un.org/millenniumgoals/>) and, although this may seem very far removed from the interest in introducing a household food waste collection in Plymouth, it is impossible to ignore the increasing interaction between food production, its global distribution, its influence on global markets and security and its impact on global waste management. Indeed, statistics suggest that one third of the total amount of food produced within the global system, 1.3 billion tonnes is never eaten (<http://www.foodsecurity.ac.uk/issue/facts.html>). Rejected for a variety of reasons, it is generally consigned to landfill sites or incineration; with both options contributing to the emissions that contribute to global climate change.

Methane (CH₄), one of the key gaseous outcomes of the landfill process is considered to be a key contributor to human induced climate change. Its importance is second only to the often better understood impact of carbon dioxide (<http://www.eci.ox.ac.uk/research/energy/downloads/methaneuk/chapter01.pdf>).

Whilst methane exists in a far lower atmospheric concentration than carbon dioxide, it is a particularly powerful greenhouse gas, and is deemed responsible for around 20% of postindustrial global warming. Its potential to contribute to emissions footprints – even when carefully managed – should not, therefore, be overlooked.

In every case, the global sustainability of food management and its disposal should be considered in context – especially where local commitments to future sustainability have gained national recognition (see <https://www.forumforthefuture.org/project/sustainable-cities-index/overview>). In addition, it is no surprise that the topic of food waste is attracting progressive levels of attention at both European and national levels. Even allowing for the changes expected from the Brexit decision, the need to reduce the 15% of food and drink *purchases* that are never consumed (WRAP 2015 and an example of the confusing food waste statistics quoted) through prevention, reduction and alternative means of disposal are now the subject of a national Government Inquiry; with outcomes and further recommendations expected in 2017. At the time of writing new legislation on the use of surplus food from retailers is being rolled out in both France and Italy and changes are being proposed to the EU subsidies that support waste to energy

plants. Both will have a significant impact on the waste management industry and, potentially, on the options and behaviour of consumers across the UK.

A Broader Perspective in Plymouth

Plymouth has a growing reputation for sustainable food. From its popular Flavour Fest and Seafood Festival celebrations to its Fairtrade City status and ambitions to gain silver Sustainable Food City status, its market-gardening and fisheries heritage and its concerns for those in food poverty, the city has a keen interest in all things food related. This includes a strong affinity with the fate of surplus edible food (managed through Devon and Cornwall Food Action, the Food Bank and their many partner organisations), the impact of food education on reducing food poverty (acknowledged as a growing problem) and, ultimately, the role of food waste in disposal systems.

Embraced by Food Plymouth (the citywide food partnership), the Plymouth Food Waste Partnership is therefore able to bring an independent voice and broader expertise to the food waste theme and has very quickly established a reputation for its professional approach. This, in turn, has led to opportunities for wider engagement and awareness initiatives.

For example, in late 2015, the Partnership nominated Plymouth for the Sainsbury's 'Waste Less, Save More' related Discovery Communities initiative; a proposal that resulted in Discovery City status for Plymouth and its wealth of food related interests and the potential to bid for a share of £1 million of food waste related funding from February 2017. It soon became clear that the Partnership had promotional potential in its own right and the opportunity to contribute to 'best practice, through UK-wide projects. Participation in a 'surplus food lunch' for a local conference, produced in partnership with cooks drawn from Plymouth's refugee community, and, in early November 2015, a 'pumpkin rescue' party, in liaison with the UK-wide Hubbub project, were to follow. Individual interests have also resulted in links with Toast Ale (a new real ale brewed with 'surplus' breadcrumbs) and local projects to promote Real Junk Food projects and the food waste pilot projects that will take this Awards for All funded study in to Phase 2 of its delivery.

Given the extent of interest in food matters, and the Council's stated support for sustainable approach to food projects, the absence of a food waste collection was notable. It was felt that its introduction would effectively created a closed-loop management system that would offer a cost effective and sustainable solution to a waste management theme that was growing in popularity across the UK.

The Feasibility Study

Above all, PFWP's key driver remains access to a functional, cost effective domestic food waste collection. Founding members of the Partnership, including Transition Plymouth who support the Partnership as a 'working group', shared the Partnership's Chair's concern at the lack of a functional service; considering it an oversight that could be addressed through improved partnership working and, potentially, with the benefit of a social enterprise working with the local community, the Council and other interested parties. It was felt that the scope and demand for such a service could be 'tested' through the completion of a one-off Feasibility Study that would include, where possible, cost benefit analyses and pilot collections.

Building on active support from Partnership members and BIK funding from the City Council, a successful application to Awards for All for funds to support the development of this Study and its associated education programme was made in early 2015 and, with action being taken against a background of heightened awareness of both food waste and food poverty, work began to draw together the evidence required to inform ongoing recommendations. The aim was to achieve an investment that will have a lasting impact on behaviour change and awareness as well as providing the building blocks for further food waste initiatives and future decision making.

The Initial Project Outline

The original basis for the Feasibility Study sought to extend the current provisions of Plymouth's Waste Management Strategy and its recycling targets by providing evidence of the potential for a food waste collection. It acknowledged that the Council was reluctant to introduce a citywide household food waste collection itself due to its financial implications; indeed the Council made it clear from the outset that their focus would be on food waste reduction rather than disposal, but the Partnership felt that the potential for an innovative social or community enterprise or partnership could be identified. It was felt that this, in turn, would mitigate the impact of cuts in public spending, extend the waste management 'offer' in the city and drastically reduce the city's food waste footprint.

After all, food waste collections were offered by every other Devon-based local authority with the exception of Exeter City Council and it became apparent that many of these services were introduced in support of changes in collection frequencies. Indeed, towards the end of the project, the Partnership was pleased to received evidence of Exeter City Council's consideration of a local collection contained in Council minutes from the Place Scrutiny Committee meeting of the 10th November which stated under item 45 (Recycling Plan Review) the Council's change of heart in terms of a food waste collection introduction and the development of a report due in December 2016

(" Food waste makes up 36% of the waste currently sent for disposal. **The Council has expressed a preference for introducing food waste collection** and a business case is being prepared, due for completion in December 2016. The Cleansing and Fleet Manager also responded to Members' questions:- The implementation of a food waste collection would include a combination of a standard caddy to hold the daily food waste and larger receptacle for a weekly food collection. The rigid plastic caddies had lockable lids, and were more resistant to seagulls or other

animals. The scheme could also include food waste being disposed of in its original plastic packaging or contained in an inner plastic bag for transfer to the larger collection box. The scheme would be costed against the waste disposal savings formula as part of a supporting business case. It was planned to run a series of workshops with key stakeholders and involve Exeter Food Network to promote more recycling and food waste reduction.”).

The arguments set out here appeared to support the evidence offered by a number of other local authorities and, particularly, to reflect the value of food waste collections to improvements in recycling targets and overall waste management during times of change.

After consideration it also raised questions on the beneficial impact of waste education on behaviour change, the impact this might have on recycling targets and any potential ‘fines’ for poor performance and, in the long term, broader impacts on reducing the environmental impact of waste and, in the case of food waste, the impact on food poverty and citywide social sustainability.

A range of reasons for not introducing a food waste collection – including the practicalities and logistics of collection, topographical influences, housing density, the response of Plymouth’s student population, the challenge of disposal and cost effectiveness were to be challenged by the Study but the relatively short term cost of implementation remained the main barrier to a household collection throughout. From the outset the Partnership held the view that the introduction of a food waste collection would reflect both best practice in modern waste management and value for money.

Footnote :

By the Autumn of 2016 new proposals were being made to the Council on the theme of budget cutting. The proposed amendment of waste management rounds to allow for fortnightly collections of general waste and changes to recycling collections in certain areas of the city were set against proposals to improve the city’s failing recycling targets even though many of the arguments appeared to negate each other and the proposals themselves met with considerable public opposition. Concerns were raised about the mixed messages promoted (often in the local press and, in some cases, in Council letters to residents about changes to their recycling collections) and the impact these might have on local willingness to recycle waste correctly given that cuts have also been experienced in the Council’s budget for awareness education; an element of leadership that has a fundamental impact on leading and maintaining the behaviour change required to improve both targets and local conditions. In terms of public understanding, it was felt that this introduced the sentiment of ‘what’s the point...it’s all going to be incinerated anyway !’ and that this would only add to the sometimes poor understanding of the function of the waste to energy plant in Devonport and the Council’s overall approach to waste management.

Agreed for introduction in 2017, the fortnightly collections also raised additional questions for the Partnership as initial research appeared to suggest that such changes could only be successfully introduced with the addition of a more regular food waste collection; thus reducing the impact of smells and degradation on a more regular basis. Nationally reported concerns focused on proposals from Manchester and Scotland; whilst discussions through the national Discovery Communities Partnership have suggested that reductions in collection rotas can only be applied successfully if food waste is addressed as it continues to be the key concern for most householders (along with nappies and pet/animal waste).

Going to Waste ?

Although the Partnership has been involved in the Council's discussions and decision making process, we have been unable, as yet, to review how many UK local authorities have reduced their collection frequency with, or without, the addition of a food waste collection and what the implications of these decisions in terms of costs and resources might be. Evidence of the benefits is available subject to further research time.

The Partnership maintains its view that further research is required as initial indications suggest a food waste collection should now be considered despite concerns of the cost of introduction (which also need to be verified).

Tangible Outcomes :

Throughout the Study it was essential for the Partnership to maintain a sense of reality and to evidence the proposals with as much background data as possible; a commitment that proved challenging as the Study developed as the details required to evaluate cost effectiveness, in particular, proved difficult to obtain. For example, comments on definitions would have benefited the study at a much earlier stage as there is a clear difference between the content of 'municipal waste' and 'household waste'.

Similarly, it became clear that data sources were often out of date or gave conflicting information. Different national advisory groups appeared to dispute the exact percentage of food waste in the general waste stream; which made calculations difficult.

Lastly, so much of the background information appeared to be the subject of commercial confidentiality that the study was unable to access the figures required to calculate the impact of reduced gate fees or the provision of equipment. A number of Council reports and surveys were quoted (home composting, the impact of food waste on the local WtE plant, bin composition etc) but, as yet, the Partnership has not had sight of many of the 'studies' used to back up the recent decision making process. In turn, this makes the assessment of potential, financial viability and the development of recommendations extremely difficult and renders them open to criticism and inaccuracies.

Therefore, whilst the research provided just enough to suggest a way forward, it has become clear that a second phase of development will be needed to consolidate and test the assumptions being made about costs, the impact of a fortnightly collection, the role of food waste management in Plymouth and the alternatives available (through practical management or contractual targets).

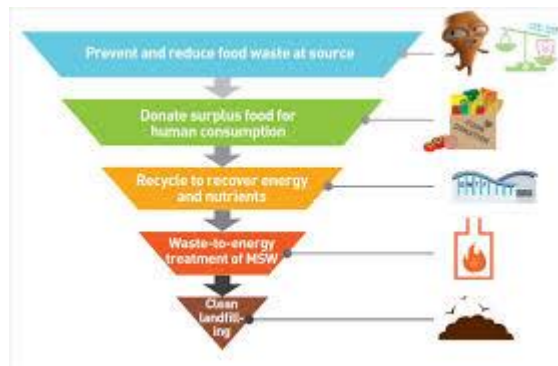
Although pilot projects were initially refused funding, it is hoped that further support will be secured, with the support of the Feasibility Study's outcomes, to take the further action(s) outlined later in this Report as key recommendations.

Why Food Waste ?

Throughout 2015 the national profile of both food waste and food poverty saw unprecedented media attention. Prompted, perhaps, by the use of figures related to the household cost of wasted food, it was significantly enhanced in November 2015 by the BBC's decision to broadcast two programmes featuring celebrity chef Hugh Fearnley Whittingstall. Almost overnight, the emphasis on tackling food waste changed; with almost every national retailer introducing a surplus food donations scheme or a review of their own, in-house, food waste and food surplus policies.

For those working in surplus food or food waste initiatives, the additional promotional opportunities this brought about also allowed a greater emphasis on the application of solutions to the food waste hierarchy and the role played by producers and growers in addition to the retailers themselves.

Their role was also supported by the 2014 Feeding Britain report on food poverty that also drew attention to the links between 'wasted' food and its disposal in terms of costs to household budgets and the environment.



This focus also drew attention to the need to promote the 'reduction' message as strongly as the disposal options – mainly to emphasize the fact that food supplies are a resource that is often taken for granted. It became very clear during the Study that many households expect supplies to be available and that they pay very little attention to what happens to waste after it goes in to the bin.

What drives the change ?

The Government supported WRAP initiative remains one of the best sources of background information on the collection and disposal of food waste. Their research and background papers, including the 2016 Food Waste Recycling Action Plan (<http://www.wrap.org.uk/content/food-waste-recycling-action-plan>) suggesting a greater commitment to food waste recycling from local authorities, can be found at <http://www.wrap.org.uk/content/collection-and-recycling-food-waste-0>.

However, much of the available evidence is confusing; allowing for misinterpretation and, potentially, conflicting assessments subject to the concerns driving the justification for change. For example, it is clear that there are significant economic and environmental benefits from the use of anaerobic digestion rather than straight forward 'incineration' and that the calorific value of food (and other organic) waste in this is a vital component of the 'wet waste/dry waste' equation required for efficient operation. One of the key benefits of AD for example, is the potential to return nutrients to the soil

rather than losing them in an incineration process. Further, in depth, research is needed to evaluate the impact of food waste in the stream managed by the WtE plant at Devonport, the potential for refuse derived fuels and the potential savings this might create. When combined with the need for far greater public awareness of the role of the plant, this creates a significant incentive for investment in both education and revised services.

Information from 2011 suggested that 47% of UK local authorities offered a food waste collection. In the South West the percentage is slightly higher with only Exeter City, Plymouth City and Cornwall Council's missing out on food waste collection. Whilst it proved difficult to confirm how many local authorities have withdrawn their service as a result of the austerity agenda, it is clear that food waste remains a significant contributor to both municipal and trade waste. In many cases it is a waste resource that could be handled far more sustainably. It has therefore been considered, and introduced, by many of the local authorities introducing changes to collection frequencies – an approach recently agreed by Plymouth City Council.

Cost Effectiveness – ensuring value for money from the Council Tax.

How much does this cost us

Nationally ?

Estimates for food waste appear to vary; with Food Aware suggesting the total from household, manufacturing and post production is closer to 18 million tonnes per annum in contrast to WRAP's May 2016 estimate of 10 million tonnes (from all sources) with a value of £17 billion and a greenhouse gas emissions footprint of 20million tonnes ghg equivalent. (see <http://www.wrap.org.uk/sites/files/wrap/UK%20Estimates%20May%2016%20%28FINAL%20V2%29.pdf>).

In the latest estimates they also suggest that 85% of this total (8.5 million tonnes) emerges from household waste arisings but there is some confusion as to whether these figures are improving or getting worse. It also suggests that 710,000 tonnes of food is redistributed with 660,000 tonnes becoming animal feed and the remaining 50,000 tonnes as surplus through charitable or other initiatives (such as food banks or charities such as the Devon & Cornwall Food Association). Increasingly, these forms of food waste 'disposal' are being used to reduce the impact on traditional disposal methods and to alleviate the growing incidence of food poverty highlighted by the 2014 Feeding Britain Report (see <https://feedingbritain.com/>).

The confusion does not support the establishment of a definitive baseline for Feasibility Studies.

For example, a further WRAP website suggests that, in 2011, reductions in annual UK household food and drink waste between 2006/7 and 2010 was around 1.1 million tonnes or 13% and that the total was then 7.2 million tonnes per annum (1/5 of all food and drink purchased). The claim, then, was that avoidable food waste had reduced by 950,000 tonnes, or 18%, from 5.3 to 4.4 million tonnes annually. By 2013, 'Love Food Hate Waste' was reporting that between 2007 and 2012 avoidable food waste had been reduced by 21% in over 1 million homes.

If these figures are accurate, WRAP's 2016 Report suggests that food waste has risen from 7.2 million tonnes p.a. in 2011 to the current total of 8.5 million tonnes and that the disposal of food waste is a growing problem. Even the suggestion that food waste makes up 19% of the 'municipal waste' disposed of by local authorities has been questioned with WRAP suggesting it makes up 19%, Foodwise suggesting up to 35% and the UK Government Waste Statistics https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/487916/UK_Statistics_on_Waste_statistical_notice_15_12_2015_update_f2.pdf suggesting a rather complicated 26% of the 1995 'baseline value' for 'biodegradable' waste. This figure may, possibly, account for other organic waste such as garden trimmings.

Locally ?

From the outset, the different definitions used to describe 'waste' were to confuse the research undertaken. In particular the difference between 'municipal waste' (which includes a much wider range of waste materials from both household and commercial sources) and 'household waste' (collected as general waste from households in the area) was considered to be essential to the calculation of both tonnage and costs. It was noted, for example, that municipal waste could also contain the waste collected from schools where, in Plymouth, a food waste collection is available.

However, on checking with the UK's leading food waste initiatives, WRAP and 'Love Food, Hate Waste', it proved difficult to establish exactly what the percentage of food and organic deposits in household waste might be. WRAP clearly states that the percentage in municipal waste is 19% but this is disputed by other evidence bases (see previous section). However, on further research the 2015 Government Digest of Waste and Resource Statistics provided evidence that, by 2013, food and organic waste could make up one third (33%) of the household waste collected.

(See https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/482255/Digest_of_waste_England_-_finalv3.pdf)

As the municipal waste is 'diluted' by the addition of other waste streams, it is therefore very likely that both the 19% food waste stated for municipal waste and the 33% stated for household waste could be used to give an indication of the impact on Plymouth's waste stream but, as figures for 2016 (the most up to date available) had been provided for household waste collections, these were used for the sake of consistency. The calculations and assumptions made are set out below.

However, one recommendation for the Study will be the completion of a far more accurate analysis of both waste streams and their comparison with the impact of food waste on the operation of the newly opened Waste to Energy plant at Devonport where, it is clear, the composition of the waste is essential to effective combustion.

Considering Plymouth's Household Waste

As household (kerbside) food waste collections would focus on the residual waste stream collected from Plymouth's brown bins and black bags the city's household waste figures were considered for this Study. It should be noted that, at the time of writing (Nov 2016), a compositional analysis of the waste was being undertaken.

Figures used :

Year	Tonnage arising – household residual waste kerbside collection	Potential tonnage of food/organic waste at 33% (DEFRA statistic)
2013/14	57,303	18,909.99
2014/15	57,758	19,060.14
2015/16	59,745	19,715.85

Sources : Plymouth City Council and DEFRA Digest of Waste and Resource Statistics

Assumptions Made (based on 2016 figures) :

- That the city has 116,230 households (PCC 2016).
- That, on average, each household produced 6kg of food waste a week (WRAP 2016/16)
- That food waste potentially makes up 33% of household waste collections (DEFRA 2015)
- That household food waste could be reduced by up to 1.5kg per week using awareness prompted by improved education (WRAP 2015) – a potential reduction of 9,065.94 tonnes p.a.

Potential tonnage of food waste per annum = 6kg x 116230 (no of h'holds) x 52 (weeks) = 36,263.76 tonnes p.a

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However, using the Government's estimations, the Council's household waste figures would suggest that only 20,000 tonnes of the waste collected constitutes food or organic waste.

Whilst it is accepted that other solutions may be applied to household food and organic waste (home composting for example), the outcome for Plymouth, at 20,000 tonnes, seems very low against the potential tonnage suggested by WRAP at 36,263.76 tonnes.

We suggest that these figures are reviewed for their accuracy.

The Broader Costs of Disposal ?

Nationally

Similarly, there is little agreement on the costs of food waste and food waste disposal. Here the 'Love Food, Hate Waste' (see <http://www.lovefoodhatewaste.com/content/about-food-waste-1>) initiative suggests that in 2013 that the 7 million tonnes of food waste emerging from households was valued at an average of £470 per household per year; rising to £700 if the household included children. This equates to £60 a month of wasted household budget. The figures also make it clear that even though tonnages may be reducing (a suggestion that cannot be verified), inflation will negate any potential savings.

“ As food inflation over this period has been around 20%, although the amount we throw away is much lower (overall 4.4Mt vs 5.3Mt), it is still costing us about the same (ca. £12 billion). Had the reduction in food and drink waste not occurred, consumers would have been spending at least £2.5 billion a year more on food and drink bought and thrown away “. (HM Govt)

Locally

Using the figures quoted for this Study and locally provided data for waste disposal, a number of costs can be assessed.

1. Cost savings per household

With 116, 230 households, and on the basis of an average taken from the £400 basic and £700 family costs of £585), the average cost of food waste to Plymouth's residents can be calculated at £6,799,455.00. ($116,230 \times £585 = £6,799,455$).

Using a potential reduction of 1.5kg, savings of 25% (*from 6kg by 1.5kg per week*) could save £1,699,863.70 (25% of £6,799.455) or £14.6 per household.

2. Disposal costs – gate fees

Although clarification on actual gate costs for disposal proved difficult to obtain, the Study was informed that gate fees for Langage’s AD plant are approximately £34 per tonne of organic waste. At the new Waste to Energy plant this fee can be in the range of £90 per tonne. Again, further research is recommended to clarify and confirm these figures and to fully assess the impact but, given the possibilities, the following can be suggested :

Tonnage of food/organic waste disposed of in 2016	Gate costs for AD treatment (£34)	Gate costs for WtE plant (£90)
19, 715.85	£670,338.90	£1,774,426.50

Even a simple assessment would suggest that in terms of gate fees, the disposal of food and organic waste to the AD plant would make financial sense and a return on investment, if the estimated costs are applied, of 100% within 12 months (1 year). Even allowing for contractual commitments from the Waste to Energy plant (a further set of figures we were unable to review), it is suggested that the potential savings to the city could be up to £1,104,087.60.

3. Collection Logistics :

Throughout it proved impossible to establish the potential costs for the collection and transportation of the food waste or for the investment required for new, standardise food waste collection vehicles but figures, used by the City Council to justify the lack of a food waste collection, suggested that the introduction of such a service would add £750,000 to the start up costs. At a later date, and as part of the debate about fortnightly collections, this figure was increased to £1,000,000. Whilst the sensitivity of budget savings is fully understood by the Partnership, it is felt that the full implications of such a collection have yet to be calculated and that, on reflection, the balance of the investment required against the potential cost savings would render the introduction viable. After all, the argument for the introduction of fortnightly collections quoted a potential of £1,000,000 in potential savings but, as yet, no assessment has been made of the knock on impact of food waste on local quality of life.

Some figures were, however, made available from the city’s commercial waste management sector and they are set out here by way of example.

4. Food Waste ‘caddy’ provision

Another cost would be the purchase and introduction of simple food waste caddies (estimated at 50p per household) which would allow for the collection of food waste in situ (in the kitchen areas), and ‘snap shut’ or ‘lockable’ food waste bins for use outside (avoiding pests such as vermin and seagulls) or bigger food waste bins for communal areas. Cost estimates are needed for these.

No of households	Initial provision of kitchen caddies at 50p each (allowing for two per household) – lockable and external bins to be costed.
116,230	£58,115.00 (£116,230)

It was also noted that, in certain communities within the city, collection points would be preferable to allow for locations with high rise accommodation, houses in multiple occupation (HMOs) and student accommodation or halls. Again it proved very difficult to clarify what the potential investment might be to provide these sites. Once again, it is hoped that Phase 2 of the Study will enable the Partnership to work with some of the city’s ‘hard to reach’ communities (including students in both private and university managed accommodation , HMOs and high rise accommodation) in a series of pilot studies that will test the introduction of the suggested collections. In terms of participation in the schemes, clear communication on how to use caddies would be required and would need to address the use of the locking mechanism to avoid tampering by animals and how to keep the caddy clean. At this stage schemes that require the use of caddy liners and schemes that empty straight in to bigger collection containers were considered as there are drawbacks and benefits to the use of both. Some schemes enable rolls of liners to be provided. Others offer them for reduced costs. These costs, and the costs of any central collection and cleaning processes, will also need to be factored in to final proposals.

5. Vehicle Provision

Again, no absolute figures could be obtained for the potential cost of adaptable collection lorries although it is clear, from the evidence of other local authorities, that their provision is possible. As the Council’s fleet is continually being upgraded, it is possible to consider this investment on a longer term basis and to plan ahead for the introduction of new services.

It is hoped that, here too, a small pilot project based on commercial food waste collections, will inform Phase 2 of the study and that this will lead to a further assessment of the investment required against the budgets available and the cost savings targets applied.

Evaluating Plymouth's Challenge ?

Ultimately it proved extremely difficult to fully assess the economic viability of a household food waste collection in Plymouth as the accuracy of the figures and the assumptions made could not be guaranteed. Equally, access to data was limited by commercial confidentiality and, in some cases, a limited willingness to consider the potential.

However, it is fair to say that what little information we were able to assess appears to conflict with the Council's assessment concerns about the costs of introduction and ongoing logistics as it appears considerable savings could be made in terms of gate fees alone. The Partnership would suggest that these objections are now reviewed in the light of the introduction of the fortnightly waste collection, the public reaction it attracted and the savings that will be brought about from its efficiencies. In times of austerity it is, perhaps, understandable to look for short term gains at the expense of longer term plans but the threat of 'mixed messages' that could be considered as misleading should be taken in to account here. For example, in recent months the Council has seen fit to invest in expensive property deals whilst arguing that waste collections need to be reduced to save money. In addition, the Council has been warned that recycling targets have not been met whilst actively advising householders that kerbside recycling facilities (green bins) will now be withdrawn in favour of communal waste bins....thus making a mockery of recycling advice, national trends and the investments made in over twenty years of waste management education.

In Plymouth this concern is heightened by the lingering controversy surrounding the use of the Waste to Energy plant and the contractual agreements governing its operation. In particular, the lack of information available on the impact the removal of food and organic waste would have on the contracted tonnage targets and the calorific efficiency of the plant are of considerable interest as there is now evidence that the 'quality' of the waste through-put is variable and additional wet and dry sources have been required to balance its efficiency.

This in itself is a potential subject for a further study and a great deal more openness and transparency would be required if a full evaluation were to be successfully completed.

Given that waste management is often the subject of considerable competition within the private sector, it was not surprising to find that many potential participants were unwilling to reveal the background to local decisions as these often involve substantial sums of public money and/or private investment, long term contracts and their inherent legal and confidentiality clauses and, in many cases, the development of waste management facilities that remain 'unpopular' with local communities.

Whilst this doesn't limit the potential to suggest what the economic viability of an ongoing service might be, it does limit the extent to which up to date information can be provided. For the purposes of this study 'Freedom of Information' requests were not applied but it became clear that a reluctance to commit to the addition of new services dominated the Council's approach. They were, however, quite open about the fact that a domestic food waste collection would require a far greater investment and that their commitment remained with a waste reduction message rather than a collection service.

Possible Solutions

For the duration of this Study, it has been made clear, by the Council, that a citywide domestic food waste collection is considered financially challenging despite growing evidence that it could provide a solution to successful fortnightly waste collections and the reversal of failing recycling targets. The Study is also in a position to suggest that, subject to a transparent review of issues such as gate fees and contractual obligations, a food waste collection might pay for itself within as little as two years – the sort of cost effective investment that is highly recommended in other circumstances.

In addition the Partnership is now in a position to suggest a number of supporting actions that might be taken. These included learning from the experience of other local authorities, taking account of the findings of the Education Programme funded within the Feasibility Study and the communities who participated in the related workshops, considering how smaller scale social or community enterprises might benefit areas of the city and, in particular, addressing the challenge of waste management in both managed and private student accommodation. It is this research that has resulted in the 'pilot projects' set out in the following sections :-

Supportive Approaches :

Throughout the Study, the Partnership was keen to establish how, and why, other local authorities managed their food waste collections. It was clear from Government statistics that 47% of the UK's councils applied such a collection but little evidence was available to assess which of these had introduced this service in response to reductions in weekly collections; information that would significantly support Plymouth's potential.

1.0 Learning from Others :

Early in the research PFWP began a survey of some of the 47% of local authorities identified as supporting domestic food waste collections. A simple survey was created and circulated for completion following internet research to establish which of the local authorities might be able to respond. Although financial and contractual details were not requested, the survey asked how the collections, if applied, were funded, how they were made, how long they had been applied and, perhaps most useful of all, what they felt would assist an urban food waste collection.

Twenty local authorities were also targeted directly or through the South West Recycling Partnership and we would like to record our thanks to those who responded so positively. Unfortunately the response rate was not significant. Only ten completed surveys were returned; representing the interests of fourteen local authorities. However, support came from as far away as Durham City, Breckland in Norfolk, Cambridgeshire, Poole, Adur and Worthing in West Sussex, the five authorities that make up the Somerset Waste Partnership, Fareham, Bristol City and Teignbridge. Of the fourteen responses,

nine operated domestic food waste collections (64.2%). Many, however, did not give detailed responses and it was noted that, as many local authorities appeared to be undertaking reviews of their current strategies, many felt it inappropriate to comment.

Despite the poor response, the responses given were extremely helpful in determining the bigger picture in local authority food waste management :

Somerset Waste Partnership :

At the moment a partnership approach provides a weekly, kerbside sorted, food waste and dry recycling collection using compartmentalised MayGos 5 vehicles that were developed for our service (originally in 2002 and adapted in 2004 to take food waste, and in 2009 to add more dry recycling materials). The recycling vehicles are 12 tonne and the fleet includes long and short wheelbase. Details of the vehicles can be seen at: www.somersetwaste.gov.uk/business/developers

During 2014/15, a new Anaerobic Digestion plants at Walpole, near Bridgwater, Somerset and Swang Farm, Cannington were introduced and, previously, multiple outlets were used including In-Vessel Composting. Details of the end uses for all our recyclable materials can be seen at: <http://www.somersetwaste.gov.uk/about/end-use/>

Incentives for the collections included UK legislation and EU Directives, budget availability, pressure from the local community. The weekly food waste collections were introduced as part of package – with more recycling and changes to a fortnightly residual waste collection. In many cases the extended collections were only introduced with the support of weekly food waste collections and it has become clear that recycling rates have been improved as a result. The weekly food waste collections allow more scope to explore the reduced frequency of residual waste collection and the SWP, for example, is currently exploring new service package options, including more recyclables and 3-weekly refuse collections.

In terms of participation, clear communication on how to use caddies was considered important, including how to use the locking mechanism to avoid tampering by animals and how to keep the caddy clean. Similarly, explaining the benefits of segregating food waste and its end use encourages participation. This supports a role for PFWP's proposed Food Waste Education Resource Pack.

Communal recycling collections do not include food waste, except areas which can use caddies. A one year trial was carried out using adapted wheeled bins in a range of types of properties, such as privately owned, tenanted, good sites, and difficult sites (for both infrastructure and behaviour). Resources were invested in engaging these hard to reach households, and there was an improvement in use of the dry recycling and tidiness of the sites. However, participation in the food waste collection was very low – only a few food bags in the wheeled bins – and the trial proved very costly for little return. Interestingly, contamination of food waste was not an issue. It seems people either separated food waste well or not at all. Communal food waste collections are extremely challenging to implement successfully and this is an area we continue to review.

Poole Borough Council has recently explored the possibilities of providing a food waste collection in Poole but this has been rejected due to the associated collection costs. Overall this would cause a net cost to the authority

Durham City Council : Do not operate a collection as the Council has no statutory requirement to collect food waste. A collection system and the relevant gate fees are considered to be too costly.

Teignbridge : Have operated a collection for 11 years comingling food waste collection with garden waste and cardboard fortnightly in 240 Litre bin. For the last five months a standalone weekly food waste collection has been in operation with food collected in blue lockable food container

Breckland : Due to the high financial cost associated with this type of collection the authority (members) decided instead to focus on waste minimisation in relation to food by joining WRAP's "Love food hate waste" campaign. This supports Plymouth's decision to focus on food waste reduction.

Fareham : Was influenced mainly by the cost, both environmental and financial. The nearest AD plant for re-processing food waste is in Dorset, which would be very costly to deliver the waste to. There are no plans currently to build one nearer. There would also be significant collection costs. They moved to alternate weekly collection for refuse and recycling in 2005, so the practice is well bedded-in; with food waste going in the general waste. Our refuse is incinerated with energy recovery so we recover some energy from it in that way.

Adur & Worthing : All collection authorities in West Sussex send black bag waste to an MBT plant that provides for the anaerobic digestion of the organic fraction of the waste at the back end of the plant.

Bristol : Food waste is collected in 25 litre boxes and collected in kerbside sort stillage vehicles. The food waste collections were introduced in 2009 and are local authority funded.

Conclusions from the Research :

It is clear that approaches to food waste collections vary across the UK but it appears that those that have been introduced are working well and are substantially reducing the impact of food waste far more sustainably. In areas where collections have been extended with the support of a food waste collection recycling rates have clearly benefitted.

However, the ongoing threat to local authority budgets, and the lack of any clear legislation supporting food waste collection, clearly influence many of the decisions made at a local level. The Council continued to argue that if budgets continue to be cut and savings are still needed, it will not be cost effective to introduce a new collection. However, if fortnightly waste collections are to be introduced, there is evidence that the introduction of a food waste collection could boost efficiency. This has been tested elsewhere and further research would be welcomed to establish how the changes were applied and/or funded. It has been suggested that further research might be possible with the support of the Sainsbury's Discovery Communities Network where many of the UK initiatives on food waste are led by respective local authorities (unlike Plymouth).

Emerging Recommendations :

Further liaison with the authorities applying a successful domestic food waste collection is recommended to establish how best practice might be applied in Plymouth in due course. The link between food waste and fortnightly collections also merits further investigation if this is the strategy to be applied in Plymouth (a topic of discussion currently underway between the Partnership and the City Council).

Regardless of the potential to address food waste, it is now extremely clear that improved recycling rates rely heavily on awareness and understanding. It is here that the Education Resource Pack, initiated by the Feasibility Study, tested with local communities and summarized in the next section, is vital to the 'recycling' message regardless of the extent of collections or their focus. Its further development is a key recommendation for Phase 2 of this project.

2.0 : Improving awareness and changing behaviours

Education Research Background

From the outset education and awareness was considered to be vital to the success of any potential outcomes. The importance of its inclusion was boosted by initial feedback on attitudes to waste and recycling that included views on the willingness of the community to participate, their understanding of the issue and their potential reaction to food waste in general. Initially, for example, the Council felt that Plymouth's student population, in particular, would be unwilling to participate in successful food waste collections despite background research from the University that suggested otherwise. The Partnership were keen to 'test' the assumption that participation would be unpopular and sought the views of the general public through a series of educational workshops.

Commissioned from locally based sustainable education consultancy Growing Sustainable Futures, the awareness and education element of the feasibility project was designed to identify existing habits, knowledge and understanding about food waste from across a range of groups and individual residents within the Plymouth City Council area and to test some of the views expressed during initial discussions. The process was developed with replication in mind given that awareness raising is an ongoing process intended as a mean of reminding participants of the best way of managing their food waste.

Workshop Content

The education workshops undertaken were developed to give a chronological process of learning, starting with an overview of general waste and then focusing down to food waste. Each participant was requested to complete a survey before and after to identify existing habits against how the workshop impacted their future choices in generating waste and most specifically options to prevent and reduce food waste in their own households. Although the numbers participating were not sufficient to be considered as significant by the City Council, the outcomes highlight a clear appetite for further education – a resource that has experienced funding cuts in Plymouth's Street Service's domain.

The content and progress of the awareness element of this study are set out below :

- **Workshop 1: The Waste Hierarchy**
 - Participants worked in teams to identify the correct order of the waste hierarchy.
- **Workshop 2: Getting Creative with Waste**
 - Participants identified ways of reusing and recycling a range of waste items to develop their understanding of the waste hierarchy.
- **Workshop 3: Food Waste: The Reality!**
 - Participants worked in teams to put 11 items of food in the correct order of most wasted to least wasted. WRAP research figures were shared to show the extent of food wastage and identify the correct order. Discussion triggered by three questions to reflect on food waste reality.
- **Workshop 4: Food Waste Solutions**
 - Participants were introduced to the idea of 'closed loop systems' and what is already in place across Plymouth. From these discussions participants note down their ideas on what could be put in place across Plymouth to prevent, reduce, compost and as a final option what food waste collection systems might work.

Education Research Participants

Plymouth Food Waste Partnership and Growing Sustainable Futures CIC identified a specific sample to ensure a range of age groups and to ensure participation from a range of areas in the city.

The sample groups identified were:

1. Primary School (Pennycross)
2. Secondary School (St Budeaux)
3. FE College (Plymouth City College)
4. HE University (Plymouth University)
5. 2 Community Groups
 - a. Hoe Residents Society, Plymouth Hoe
 - b. Peverell Meditation Group (attendees from a range of areas in Plymouth)
6. Additional groups included:
 - a. Tea and Toast Morning Group, Ernesettle

Unfortunately participation from Plymouth University was not achieved during the study but Phase 2 has already included engagement with the University's Accommodation and Sustainability staff and the involvement of the Students Union in further workshops is under discussion.

Total participants in workshops: 69

Age Range of workshops: 5 – 80 years old

Education Research Ethics and considerations

The research element was designed to be anonymous and all participants were informed their contributions would be published in a final report.

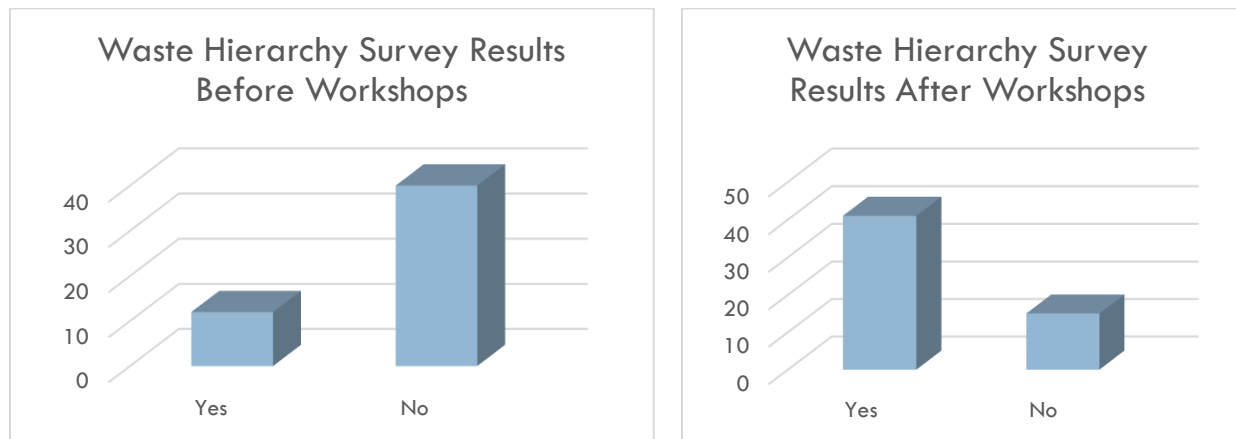
As the research was conducted at a range of venues with voluntary participation some surveys were not completed in full due to absence at the end of the sessions. In order to calculate trends in the research only surveys with part 1 and part 2 completed have been included in the analysis. Total surveys being analysed = 56.

Education Research – The Outcomes

Question1: Waste Hierarchy

As the first activity was a team building task to place the waste hierarchy in the correct order – ‘most desirable’ to ‘least desirable’ methods of disposing of waste the survey results illustrated a marked increase in overall understanding of prevention, minimisation, reuse, recycling, energy recovery and disposal.

Before/After Survey Results – Waste Hierarchy:



The task took 10-15 minutes for groups participating and enabled a 30% increase in the understanding of changing habits to encourage prevention and minimisation before waste is even generated through purchasing choices, food wastage and not recycling.

Question2: Waste Activities undertaken by residents

Participants were requested to identify methods of prevention, reuse and recycling they were already doing to decrease their household residual waste.

Going to Waste ?

The following methods were identified (highest to lowest) in the before survey:

1. 98% are recycling
2. 68% are giving to second-hand shops
3. 66% are reusing products as often as possible
4. 48% are buying second-hand products
5. 41% are taking items to the dump
6. 39% are buying products/food with the least packaging
7. 30% are composting food waste

When participants were asked to identify methods they would now consider doing after the workshops, the results were:

Method	Before	After	% increase
Buy products/food with least packaging	22	45	18%
Reuse products as much as possible	37	39	4%
Recycle products	55	56	2%
Buy Second-hand	27	32	9%
Give to second/hand shops	38	43	9%
Take items to the dump (reuse/recycling)	23	31	14%
Compost food waste	17	44	48%

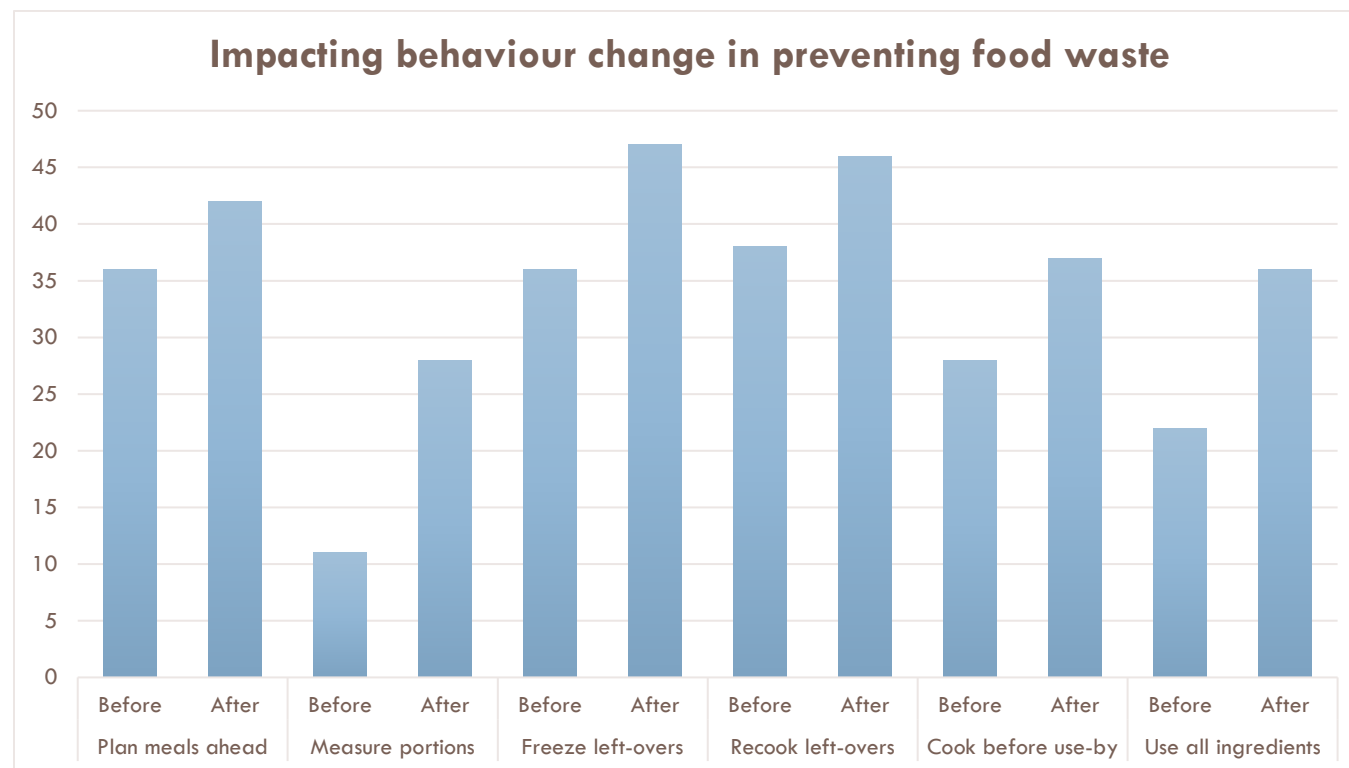
Emerging Actions :

The education research shows that through learning programmes a range of habitual changes can be developed as participant's awareness illustrated a deeper understanding of the importance of reducing residual waste and using alternative methods of reuse and recycling. Although not the focus of the Study, the largest increase being in composting food at home. At the end of the workshops 48% of participants considered having food composting as an

alternative to using residual waste bins – an outcome that provides an alternative option for citywide consideration despite the identification of numerous barriers to participation (details available).

Question3: Food Waste prevention and reduction undertaken by participants

An important element of the research given that the City Council has already stated its willingness to consider greater investment in food waste reduction and prevention, this question also revealed some solutions.



Emerging Actions :

Going to Waste ?

As the graph shows the majority of participants were already undertaking a range of prevention and minimisation choices that actively reduce food waste in their households. However, the workshop still had a marked impact on more participants considering increasing these choices, most notably *measuring portion sizes* and ensuring they *use all ingredients*.

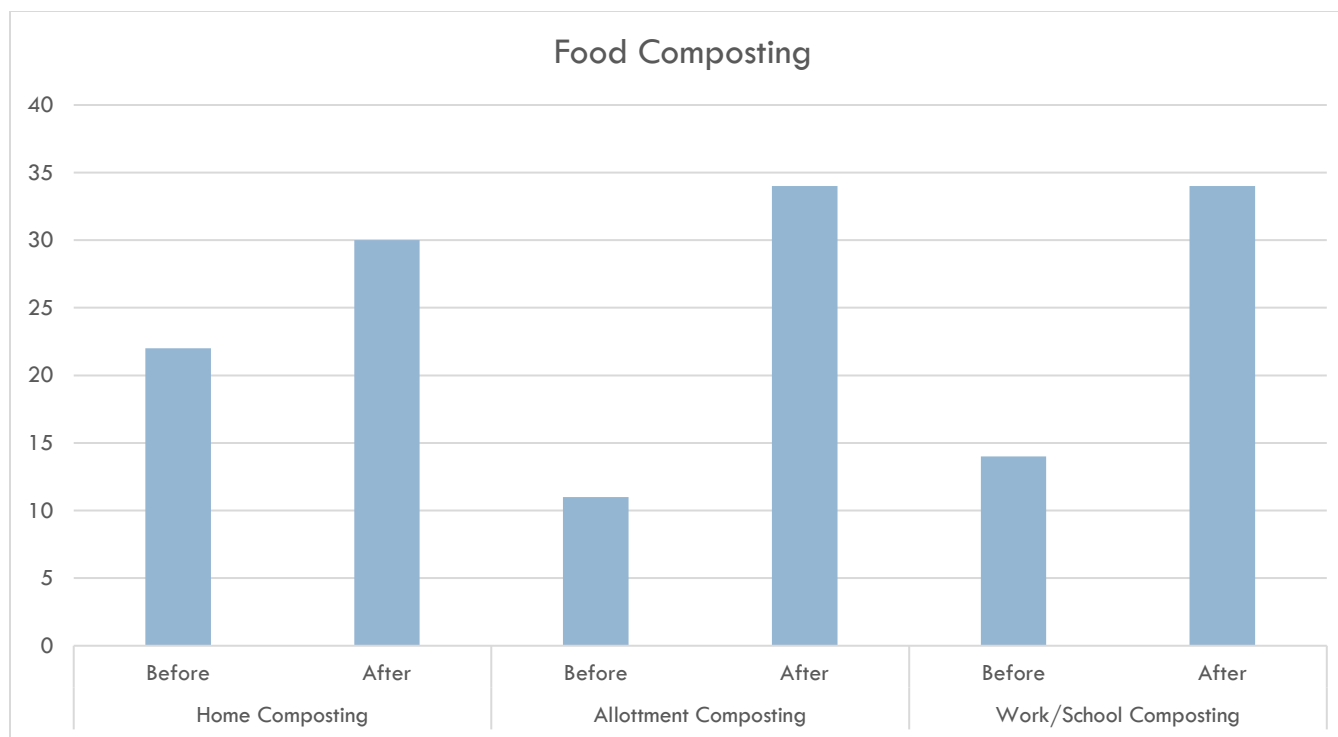
It is excellent to see how much prevention and minimisation of food waste is already occurring and many participants noted during the workshops that this was due to primarily economic influences and, secondly, to ethical considerations.

Participants noted during the workshop that again there were certain barriers to achieving prevention and minimisation that were out of their direct control, these included:

- How food is sold:
 - Packet sizes – single people or couples noted packages are too large for certain items in shops and supermarkets.
 - Fruit and Veg usually sold in bulk at supermarkets rather than an option to buy loose and purchase what you want.
 - Supermarkets/Shops offer reduced prices for the bulk packages rather than for buying loose.
- Time availability to plan, prepare and cook when you have a family or work varying hours.

Question4: Composting

Although not the focus of the Study, it was clear from the workshops that composting could be a solution.



Emerging Actions :

The graph above reinforces the 48% increase in participants considering composting in the city. And also again highlights the willingness to stop food waste going into residual waste bins. The practicalities and barriers remain as stated previously.

Although not intended as the focus of the workshops, the most popular increase was identified as *community composting*, many residents stated that if a locally based collection could be established then this would be something they would be interested in contributing to. In due course, this may be an avenue open to the Council subject to the availability of the funding and resources required to support an active citywide composting project. It was noted, however, that many areas of Plymouth would be unable to support home composting due to the design and construction of their open space (paved courtyards for example) and that access to any community composting sites could be considered limiting as many would be unwilling to transfer food waste any distance.

NOTE : Although a report on composting was commissioned by the Council, it was not made available to the Partnership for consideration. It was also noted that, although a number of small scale community composting projects operate in the city, many similar initiatives have closed and numerous

home composting projects have met with a limited reaction over the years. **It should be noted that, whilst the Partnership supports the concept of community composting, it is not thought to be an alternative solution to a food waste collection and that any large scale investment would not, at this stage, be cost effective on the same scale.**

Big Ideas for Plymouth

At the end of all the workshops participants were requested to note down in groups all the methods and approaches to preventing, minimizing, recycling/composting or accessing energy recovery from food waste. The participants looked at examples of 'Closed Loop Systems' and how these could be established in simple and practical ways.

The following five approaches to preventing/minimising food waste were identified as the most popular across all participants, in descending order:

1. Education

There was a range of key areas in education identified:

1. Preventing and minimising food waste
 - a. Education on portion sizing, preparing meals, using left overs
 - b. Education on the environmental impact of waste and food waste
 - c. Education on the ethical impacts of wasting food
 - i. Food miles
 - ii. Global impact
 - iii. Economic impact
2. Composting at home, work or school
 - a. How to do it and advice



3. Primary and secondary school education awareness programmes
4. Growing Schools – field to plate programmes
5. On-going community awareness programmes
6. City wide raising awareness campaigns

2. Local Markets/Changing Supermarkets

Key points:

1. Promoted loose purchasing of food items, people could buy what they actually want.
2. People would have a closer relationship with the food they were purchasing if bought locally.
3. It would encourage more closed loop system thinking if produce was coming from local farmers, and could even establish composting systems linked to local farms.
4. No packaging in shops/supermarkets – dry products. To buy what you want.
5. Reduce overall packaging of any items in shops/supermarkets, would reduce overall price and promote prevention and minimisation of not only food waste, but residual and recycling waste.
6. Get supermarkets to offer 'flat-rate' prices on fruit/veg rather than bulk buy discounts.
7. More supermarkets to use the 'Wobble' box idea – stop only selling perfect looking fruit/veg – include all shapes and sizes to purchase.

3. Community Composting

As the research shows the participants considered composting to be an option to stopping food waste in residual waste bins. During this final part of the session participants were asked to identify how to overcome barriers to composting but many of these would require the additional introduction of related transport logistics and added costs.

4. Home Composting /School/Workbased Composting

Participants also identified non-domestic options but noted that these would not be applicable for all residents of the city despite the potential to share access.

5. Local Food Waste Collections

Participants stated that education and promoting prevention would be the main focus of ensuring any real change to food waste behaviours. A range of options on how this might work were identified and could be incorporated in to future schemes subject to cost effectiveness :

- a. Cooperative Organisation for food waste collections – residents wanting to participate could buy into the scheme. Food waste would hopefully be in adequate quantities to be used by Langage Anaerobic Digester.

Going to Waste ?

- b. Supermarkets could host a centralised food waste drop-off zone, similar to having glass, can/tin and paper recycling.
- c. Introduce incentives to households for reducing residual waste bin weights – encouraging residents to actively recycle more, change purchasing habits and therefore hopefully minimise and reduce food waste.

6. Additional Ideas

The top 5 already discussed were ideas that nearly all groups noted in the final activity, but the following ideas were mentioned:

1. Food Banking – Fresh produce or left-overs. If people have this food is there a way to donate to a community kitchen?
2. Community Kitchen(s) – Open to anyone and using unused food from households, as well as food about to be beyond use-by in supermarkets. It could become its own café/restaurant and run on donations only. Everyone pays a donation to eat or its free – soup kitchens. Healthy and inexpensive food where older people, single people, families and homeless could access food.
3. Community Cooking Groups – linked again to the idea of receiving donations of food and preparing healthy/cheap meals around the city with residents. Education links included as it could teach about portion sizing, reusing left-overs etc.
4. Food Chaining – If you going away or have extra food could local projects be set up to give food to neighbours or a central food bank – Phone Tree system?

The outcomes of all the workshops and the surveys have been taken in to account in the compilation of this Report and its recommendations.

Conclusions and Recommendations

Plymouth Food Waste Partnership maintains its support for a domestic food waste collection in Plymouth and that this is particularly important to the success of the proposed fortnightly collection.

Regardless of its limitations, the research conducted for the Study and the feedback received from participants to date suggests that the following recommendations should be considered :

Overall Recommendation(s) :

In the light of the decision to introduce fortnightly collections for general waste, Plymouth City Council should now seriously review their strategy for the management of food waste and introduce a complementary service that will build on the efficiencies and cost savings identified in this Study. The Partnership considers this to be critical to the success of their proposal.

Together with a renewed focus on the education and awareness required to inform local behaviour change, the City Council would benefit from :

- **Improved recycling rates.**
- **Greater cost effectiveness.**
- **A vastly improved waste footprint**
- **Improved social and environmental sustainability**
- **Active best practice and an improved reputation.**

Based on the assumption that.....

1. Further work is required, from both the Partnership and the City Council, to consolidate the cost benefit analysis and the statistics required to inform decisions (at both a local and national level). This would support the Partnership's view that the introduction of food waste collection would greatly enhance the potential success of the city's fortnightly waste collection as well as further evaluation of the role food waste collection could play in improving the city's recycling rates.
2. **Further liaison with the authorities applying a successful domestic food waste collection is recommended to establish how best practice might be applied in Plymouth in due course. The link between food waste and fortnightly collections also merits further investigation if this is the strategy to be applied in Plymouth (a topic of discussion currently underway between the Partnership and the City Council).**
3. **Regardless of the potential to address food waste, it is now extremely clear that improved recycling rates rely heavily on awareness and understanding. It is here that the Education Resource Pack, initiated by the Feasibility Study, tested with local communities and summarized in the next section, is vital to the 'recycling' message regardless of the extent of collections or their focus. Its further development is a key recommendation for Phase 2 of this project.**

4. Greater transparency would be welcomed in future decisions on waste management – a suggestion informed by the ongoing debate about the waste to energy plant but supported by the potential to develop a new, community enhanced ‘working group’ to review the progress of fortnightly waste collections. Recommended as a key contributor to overall sustainability, consensus is vital to the success of what has already proved to be a politically and financially contentious debate. The development of such a ‘working group’ could be assigned to the newly created citywide ‘Environment Board’ and could lead to vastly improved community relations; if only to improve levels of communication and understanding.
5. Phase 2 of this study merits further investment in the development of the successful Food Waste Education Resource Pack that is already being used within the community. The Council’s support for further funding bids would be welcomed and further funding applications will follow with a view to supporting the actions identified in this Section but, the value of education and awareness cannot be overlooked. If local recycling rates are to be improved, there is a need for consistency in the messages carried by both the City Council and the local Press. Greater partnership working is recommended together with a vastly improved awareness strategy. Whilst the lack of resource to support this is recognized, concern should also be raised about the potential impact of failing to support what is commonly an ongoing need for the majority of successful environmental initiatives. Once again, the community’s support for such an initiative is essential here.
6. That Phase 2 of this study should support the following developments designed to ‘test’ the potential for the development of smaller scale social or community enterprises in food waste management :-
 - a. Local community involvement – Mount Wise
 - b. Student accommodation – University of Plymouth Halls of Residence
 - c. Student accommodation – Private rented student houses
 - d. Learning from commercial opportunities – Pedal Bin – introducing food waste collections for food outlets on the Barbican.

Phase 2 Potential

1. Mount Wise Community Collection.

Mount Wise is a recently completed development of town houses on the site of a former Ministry of Defence base in Plymouth. It provides an enclosed community where a food waste collection could be tested and a pilot collection has been suggested by one of the community’s residents.

If the residents agree to participate, a small caddy would be used to collect food waste from their kitchens. The waste could include cooked and uncooked food such as potato and vegetable peelings, the peel from any fruit, salad waste, meat, fish and bone, rice, pasta and bread, tea bags and coffee grounds, used tissues and kitchen towels

Working with local zero to landfill company, Devon Contract Waste, a collection arrangement would be developed to test efficiency and participation. The food waste would be stored in biodegradable bags in a special green bin (stored in the bin stores around the estate). DCW would collect the food waste each week.

Drivers for the proposal

The support of the community would be secured through workshops based on the Study's Education Programme and would test the initial, community derived, perceptions of food waste and waste management in the City which have been suggested as :

- *Plymouth City Council does not collect food waste. Currently it goes into the general waste which then goes to the waste to energy plant at Devonport.*
- *This is not considered to be the most sustainable solution as many still view 'incineration' as **harmful to the environment**.*
- *Food waste creates a great source of energy through the release of gasses by 'rotting' and the potential for compost. This approach can be scaled up or down depending upon circumstances.*
- *Food waste in general rubbish reduces the amount which can be recovered and recycled because of contamination.*
- *Plymouth and Exeter are the only two councils in Devon who do not offer kerbside food waste collection.*
- *The plant used by PCC is located in Devonport - the ash created is shipped to Holland where it is recycled.*
- *If you are trying to burn general rubbish with wet food, it will be less efficient than if the food is left out of general rubbish. This is expensive!*
- *If the incinerator has a stoppage, the smell around the area is really bad – an unacceptable community impact.*

Recovery methods such as anaerobic digestion (which is supported by DCW and which could be undertaken at the nearby AD plant at Langage) is stipulated as preferable to landfill in the Waste (England and Wales) Regulations 2011. The biogas generated during anaerobic digestion - mostly methane and carbon dioxide - can be used as chemical feedstock or as a fuel. At Langage this is used to power the factory which makes Language Farm ice cream. The compost (fertilizer) that is left feeds the grass that the cows eat to produce the milk to make the ice cream and cream.

Finally, if food waste is actively collected it could save money – This promote awareness as, if you notice how much food you are throwing away by putting it into a food waste scheme, you might buy less and, therefore, throw less away.

Cost/Benefit Analysis :

DCW will be able to work with the community to advise on the costs per household. Initial estimates include the costs to buy the caddies (between £8 and £20 but possibly as little as 50p if purchased collectively), the costs of the liners (estimated at £5 for 20) and the costs of collection (estimated at 68p per household per week). The limited initial costs could be paid for by those households who wish to take part.

First Steps ?

Initial discussions have been held with DCW and there are plans to hold the first of a series of community workshops on food waste and the food waste collection project.

2. Collections from Student Accommodation – University Halls of residence (University of Plymouth)

One of the City Council's key reasons for rejecting the introduction of a domestic food waste collection (after costs, the difficulties presented by a wide range of housing development types and narrow back lanes) was the alleged reluctance of Plymouth's 33,000 strong student population who are housed in a variety of managed halls of residence and privately rented houses. It was felt that 'student life' would detract from the need to manage the caddies and their regular emptying. However, following discussion with the University's management team, it emerged that a previous, six month pilot scheme had, in fact, returned a participation rate of 100%, the Student's Union supports a food waste initiative called Unicycle and engagement with students to date has proved extremely effective.

Initial discussions with the University, which is noted globally for its commitment to sustainability, have revealed the potential to trial a food collection within the independently managed halls of residence. Negotiations are ongoing – as legal and contractual details will need to be agreed together with the provision of bins, collection procedures and the costs of staffing the project – but a food waste collection on site (possibly using a central storage area and collections made by cargo bike) has been suggested for introduction in the Autumn Term of 2017.

3. Student Accommodation – Privately rented student houses

Similar arguments were put forward for the inclusion of privately rented or managed student houses which are often Houses in Multiple Occupation or HMOs.

Initial discussions with one of Plymouth's leading student accommodation management companies, Clever Student Lets, has revealed a willingness to participate in a scheme that would see the development of a series of awareness workshops and the introduction of collections in 2017/18. Discussions are ongoing and will be pursued by DCW and the Partnership.

4. Learning from commercial opportunities : Tackling food waste from popular eateries.

The Feasibility Study has prompted the development of a potential social enterprise that is based on the combination of a sustainable food waste collection for eateries and collection using cargo bikes in the city's more access-limited areas.

One of the challenges for a local specialised food waste collection will be the narrow streets and backlanes such as those found in Plymouth's Barbican. Based on the city's original Elizabethan street pattern, the Barbican is a tourist area with numerous cafes, bars and restaurants as well as relatively dense housing. Much of the housing is separated in to flats with communal bin areas.

Although extremely popular with tourists, the Barbican's food enterprises often struggle with disposal; leaving overflowing commercial bins for marauding gulls and, as the areas surrounds a natural harbour, a rodent population. One of the key aims of this proposal would be to clean up the area; reducing the risk and improving its appeal to visitors.

Plymouth already benefits from a fleet of cargo bikes. This project, being promoted as 'Pedal Bins', proposes the use of these bikes to provide regular collections of food waste and its collection at a communal site prior to transfer to the AD plant at Langage.

Felt to be a cheaper, more effective and more sustainable option for local firms, the project is currently being developed and it is hoped that support can be sought from the Waterfront Business Improvement District and local outlets. If the use of cargo bikes can be successfully proven in a commercial sense, it is hoped that similar collection systems could be developed elsewhere in hard to access areas of the city.

It is estimated that a dedicated bike would require investment of approximately £5000 but, above all, this pilot project would inform the potential for a food waste collection social or community enterprise operating in partnership across the Barbican and elsewhere if successful.

5. Education and Awareness

The Education Programme developed within the Feasibility Study has already been tested with communities across the city and is proving extremely effective in raising awareness of the issue of food waste and its disposal. The Partnership will continue to test its effectiveness as further workshops are planned for 2017/18 in Mount Wise, with Plymouth College of Arts, the University's Student Union and a number of additional communities.

One of PFWP's continuing aims is to secure the funding required to develop the workshop as a formal Resource Pack and to roll it out to local schools and community groups and, if possible, to a wider audience as a best practice case study through Sainsbury's Discovery Communities initiative which, in November 2016, announced the establishment of a £1million fund to be shared amongst Discovery Projects in 2017.

All of the pilots are already in development, pending funding for Phase 2 of this Study, and will build on the evidence collected and the Partnership's ongoing role as a partner in related environmental and sustainability initiatives. As such, both the Study and the ongoing work will support the Partnership's role in advising local decision making and raising awareness of food waste within the local community.

Plymouth City Council is encouraged to consider the solutions outlined in this Report and to actively support the introduction of a household food waste collection in support of its move to fortnightly collections. In doing so, it is believed that a cost effective solution can be provided that will have long term and ongoing benefits for the Council's Waste Management Strategy, budget management and role in educating the city in respect of enduring behaviour change. In every aspect, the addition of a food waste collection will support the Council's ongoing commitment to environmental sustainability and best practice.

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PFWP would also like to thank Awards for All for making the Study possible.

Key Websites :

WRAP : <http://www.wrap.org.uk/>

Love Food, Hate Waste : <http://www.lovefoodhatewaste.com/>

FoodWISE : <https://www.foodwise.life/about-us>

DEFRA : <https://www.gov.uk/government/organisations/department-for-environment-food-rural-affairs>

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Joseph Rowntree Foundation : Counting the cost of UK Poverty, (Bramley, Hirsch, Littlewood and Hopkins)

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UN Food and Agriculture Organisation : Food Wastage Footprint. 2013.

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Exeter City Council's Place Scrutiny Committee – Minutes of 10th November 2016.