

Plastics Recycling Feasibility Study for Pembrokeshire

A review of plastics wastes arisings and the opportunities for stimulating recycling and local enterprise



PLANED Plastics Recycling Feasibility Study

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Planed

PLANED is a community led local development partnership, with its role being to encourage the widest possible participation of local people. It is a non-profit-making company and a registered charity. PLANED is a locally led organisation bringing communities together with a range of supporting agencies and networks for the benefit of local people.

Recoup

Recoup – Recycling of Used Plastics Limited, is a leading international authority on household plastics recycling. Recoup has been active since 1990 in promoting and researching the recycling of plastic bottles. It has played a major part in encouraging and assisting local authorities, waste management companies and voluntary organisations that have set up and operated plastic bottle collection and sorting operations.

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Appendix 1 - Report from BASRAP initiative – commercial plastics recycling project

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Disclaimer

Recoup has made every effort to ensure that the information provided in this report is accurate. Assessment of business opportunities in this report are provided in good faith, based on information available at the time of writing. It is important for anyone considering implementing a business opportunity to undertake appropriate due diligence. Recoup gives no condition, warranty, expressed or implied about the contents of this report.

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Executive summary

PLANED commissioned Recoup to undertake a plastics recycling feasibility study for Pembrokeshire, as waste plastic items were identified as a concern by the local communities and businesses with which PLANED is involved.

In line with the brief provided by PLANED, the purpose of this study is to quantify the amount of plastic waste in Pembrokeshire and identify opportunities for local recycling that would create jobs and money into the local economy.

As stated in the brief, the study will:

- Identify the amount of plastic being disposed of as waste by households, businesses and in agriculture, dividing the wastestream into currently accepted categories of identification.
- Identify current disposal and collection systems.
- Research and describe recycling opportunities for an end use that will address opportunities that can be pursued within the county.
- Identify collection methods that would link to identified local recycling opportunities.
- Research and recommend existing markets for plastics giving details of the financial implications of the options.

The study concentrates on plastics in four sectors, including household, agricultural, commercial & industrial, and tourism.

Pembrokeshire is largely rural in nature, with a low population density and a diverse landscape, ranging from coastline to open hills, valleys and woodland. The transport network within the County is limited, with only three principle trunk roads and there is a high concentration of micro-businesses; some 83% of all firms have less than 5 employees and a further 9% have only 6-10 staff. This will affect the types and quantities of plastic available for recycling.

Whilst, in theory, it is possible to recycle all plastics, it is not currently feasible to do so in practice, due to the many different applications and polymer types. The following table summarises the main applications found in the different sectors, highlighting those most suitable for recycling. Estimates are given for waste arisings and the quantities that could reasonably be expected to be available for recycling.

Main polymer applications, suitability for recycling and estimated arisingsⁱ

Sector	Plastic application	Practicality of recycling	*Plastic arising (tonnes/annum)	Assessment of plastic recyclable if effective facilities provided ⁱⁱ (tonnes/annum)
Household	Refuse sacks and carrier bags	Low-Fair potential for carrier bags	717	Not applicable
	Packaging film	Low	698	Not applicable
	Other plastic film	Low	82	Not applicable
	Dense plastic bottles	Good	926	385
	Other dense plastic	Low	571	Not applicable
Subtotal	All household sources		2994	385
Agricultural	Agrochemical packaging	Low	6	Not applicable

ⁱ See full report for details of how this data is derived.

ⁱⁱ Assessment assumes 'high performance' of collection facilities, based on current experience

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	Fertiliser bags	Good	189	95
	Seed bags	Good	2	1
	Animal feed bags	Good	245	124
	Animal health packaging	Low	19	Not applicable
	Oil containers	Low	10	Not applicable
	Miscellaneous packaging	Low	64	Not applicable
	Silage plastic	Fair	1,924	962
	Greenhouse and tunnel film	Fair	20	10
	Mulch film and crop cover	Fair	29	15
	Cores for silage wrap	Low	64	Not applicable
	Other horticultural plastics	Low	21	Not applicable
	Bale twine and net wrap	Low	157	Not applicable
	Tree guards	Low	101	Not applicable
Subtotal	All agricultural sources		2851	1207
Commercial & industrial	Refuse sacks and carrier bags	Low-Fair	410	Not applicable
	Packaging film	Good	851	638
	Other plastic film	Low-Fair	126	Not applicable
	Dense plastic bottles	Good	473	354
	Other dense plastic	Variable	725	Insufficient data
Subtotal	All C&I sources		2585	992
Tourism	Dense plastic bottles	Good	254	75
	Other plastics	Low	Insufficient data	Not applicable
Subtotal	Other plastics	Low	>254	75
TOTAL	All plastics		>8684	2052

Household

Pembrokeshire County Council's Direct Services Organisation (DSO) operates household waste collections throughout Pembrokeshire, providing householders with a weekly black bag collection. The Council recently introduced a pilot kerbside collection for dry recyclables that includes plastic bottles and intends to extend this service to 40% of households during 2005 and to 80% of households by 2010.

The Council has plans to house a 'clean' Materials Recycling Facility (MRF) within the County by spring 2005. This facility will have the capacity to receive all the dry recyclables collected from the kerbside, at which point they will be sorted and baled ready for transportation to reprocessors for recycling. The Council is currently at the tendering stage and intends the MRF to come online in April 2005.

Recycling collections are only truly successful, however, if they are effectively promoted. The best option for increasing plastics recycling from the household waste stream would be through supporting the Council's existing and planned kerbside collection activities.

Members of the public need to be aware of the scheme and understand how to use it correctly. Although Pembrokeshire Council will be undertaking their own promotional activities, a well thought out and executed campaign, with an emphasis on plastic bottles, would certainly have a positive impact on plastic bottle recycling in the region.

There is also potential for a high quality bring-bank scheme to complement the kerbside service and to offer facilities to those not covered by kerbside. It is unlikely this would be viable, however, without the Council paying for this service as part of its recycling programme.

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Agricultural

Second Life Plastics, based in Llandeilo, already collect farm films, feedbags, and liners from fertiliser bags from 376 farms in Pembrokeshire and is keen to offer the service to other farms in the area.

Second Life Plastics is a fully commercial enterprise; the company weighs film on farm and charges the farmer £85 per tonne pro rata for the weight of films collected from the farm. The charge to the farmer covers the cost of collection, baling and transport. Once collected, the film is transported to the BPI reprocessing plant in Dumfries in Scotland, where it is recycled to produce a product range including posts and boards. Second Life Plastics have established that there is an end market for these products and have marketed them for several years.

Second Life Plastics is now implementing plans to construct its own local reprocessing facility in Wales, close to its existing site at Llandeilo. It is placing a bid for European funding towards the capital and if successful hopes to be operational by spring 2005. This is an ambitious schedule but even allowing for possible delays, there is potential for a polyolefin film reprocessing plant to be operational in close proximity to Pembrokeshire farmers during 2005.

In addition to on-farm collections, bring-sites for farm film have been established in Carmarthenshire. Subsidised by Carmarthenshire County Council, these have on-site facilities to weigh film that is brought in by farmers. Instead of the £85 per tonne charge made for on-farm collections, farmers that use the bring-sites are only charged £42.50 per tonne. Carmarthenshire County Council made the decision to subsidise the bring-sites, in order to encourage a greater level of farm film recycling in the County.

There is a good opportunity to promote the existing collection service provided by Second Life Plastics and to identify and establish bring-sites for farm film. Farmers need to be made aware of the scheme and the advantages and mechanics of participating.

In addition, interested parties are advised keep up-to-date with the work being undertaken by the Agricultural Waste Stakeholders Forum (<http://www.defra.gov.uk/environment/waste/agforum>). The Forum sees a national farm-recycling scheme as being the best way forward for the UK.

Commercial and Industrial

Pembrokeshire County Council offers a commercial waste collection and currently services approximately one third of the businesses in Pembrokeshire. Other waste management companies operating in the area include Shanks and Biffa. There are companies that offer a trade recycling service in Pembrokeshire, but there appears to be no well-organised, affordable and well-publicised collection scheme for plastics.

Pembrokeshire County Council has employed a Commercial Recycling Officer, with the intention to provide a recycling service for the commercial and industrial sector. The Council has recently undertaken a countywide survey to find out how businesses are currently disposing of their waste and the materials they would like to be able to recycle. This was sent to approximately 5,500 commercial premises within Pembrokeshire and the Council is now in the process of analysing the results. Whether the Council decides to include plastics in the service, and the types of plastic application that might be considered, will depend on the outcome of the analysis.

There is an opportunity to offer a comprehensive, affordable recycling-led waste collection service to commercial premises in Pembrokeshire. Generally businesses prefer to deal with one organisation that will take all of their recyclables and / or waste, as this is easier than dealing with different organisations for each recyclable material. In addition to the collection of plastic packaging film and plastic bottles, it is therefore recommended that any recyclables collection also include drink cans, paper, card and possibly toner cartridges and plastic vending cups.

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Organisations with existing collection infrastructure, access to central handling sites and an existing customer base will be best placed to progress such as service. Current waste management contractors should be encouraged to offer such services, although any organisation considering this should be aware of the Council's own plans to launch a commercial recycling service.

Local requests for this kind of service from individual customers will, collectively, influence the service developed. There is a role for local campaigning by businesses directly or through, for example, their representative bodies to stimulate the development of such services by contractors.

Tourism

A majority of plastics arising from Pembrokeshire's tourist industry are currently being disposed of to landfill, either via the Council's commercial waste collection, or through a private waste management service.

There is thus an opportunity to collect plastic bottles arising from tourism in Pembrokeshire. Bring-banks can be placed at locations frequented by tourists, such as caravan parks, campsites and tourist attractions.

In addition to plastic bottles, there is potential to include drink cans in this type of collection. The higher price that can be obtained for aluminium helps to offset the overall cost of collection, making the scheme more economically viable.

Given the large number of tourist attractions, caravan parks and campsites in Pembrokeshire, this type of collection scheme has great potential.

As Pembrokeshire County Council does not provide bring-banks for plastics bottles, there is also potential to site these at key locations for householders to use, such as supermarkets.

Potential for reprocessing and manufacturing

Reprocessing

Based on analysis of the arisings potentially available in Pembrokeshire alone, the volumes of materials available are very unlikely to justify any significant investment in local reprocessing. When broad assessments of potential arisings in Carmarthenshire and Ceredigion are incorporated, this suggests that up to 3,000 tonnes of agricultural film (including contamination) may be available, along with 1,500 tonnes of C&I film. This would equate to a maximum of around 3,000 tonnes of reprocessed plastic – a sufficient basis to justify further consideration for a polyolefin film reprocessing operation.

Second Life Plastics are already at an advanced stage of planning a reprocessing operation for this type of film. If this project is successful, in our view it is highly unlikely that a second local facility would be justifiable.

It is highly unlikely that any more than 1,000 tonnes of plastic bottles could be sourced from a combination of high performing household, commercial and tourist collections in Pembrokeshire, Carmarthenshire and Ceredigion. Given the relatively low potential level of local supply and other challenges posed by location, it is extremely improbable that a dedicated plastic bottle recycling operation would be successful.

Although the reprocessing equipment for size reducing and cleaning plastic films and rigid containers have some differences, it is technically possible for the processing line being planned by Second Life Plastics to be expanded to handle HDPE rigid containers (e.g. plastic milk and laundry liquid bottles). If progressed, this could provide a relatively local market for around half the plastic bottles available for collection in Pembrokeshire during 2005.

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Manufacturing

A wide range of products can be made from recycled plastics. In reviewing product manufacturing potential, consideration, in broad terms, has been given to both the existing manufacturing activity and types of enterprise in Pembrokeshire that might serve as markets.

The largest sectors for employment relate to service/public sector, farming and tourism. The long stretch of coastline, much of which falls within the boundary of Pembrokeshire Coast National Park, is also relevant to market considerations. In our view it therefore appears that the greatest potential for a distinctive, high volume, local market for recycled plastic products in Pembrokeshire lies with the agricultural sector and the National Park.

Products targeted at these sectors include fencing, acoustic shielding, marine defence systems, animal feeders, animal pens, stables, mangers, poultry house linings and other products fabricated from extruded profiles of recycled plastics.

The main potential buyers of these kinds of products will be farmers, the County Council, Environment Agency and National Park. It has been highlighted, however, that there may be conflicts with the sustainable forestry work of the National Park – i.e. plastic products would be substituting locally grown timber in some applications.

There are three distinct enterprise opportunities in this area: manufacture of profiles & products; assembly of products from profiles made by a third party; acting as a sales agent for third party products in the area.

The nature of businesses in Pembrokeshire will preclude certain types of product manufacture – for example large scale moulding activities to produce high-volume product lines. There may be opportunities, however, to use recycled plastics within businesses providing 'design-led' products. For example, manufacture of finished products with distinctive aesthetic appeal from recycled plastic sheets. This kind of enterprise could be considered by any size of business, from the individual craftsperson upward. It is believed that enterprises offering a product with high aesthetic value would not have the same disadvantages that bulk component/product businesses may experience.

The products that can be produced from recycled plastics sheets are primarily limited by the imagination of the designer. Products such as lampshades, work surfaces, benches and coasters have been produced using distinctive recycled plastic sheets.

Next Steps

A detailed assessment of the business opportunities outlined above would require a thorough market analysis, which is beyond the scope of this report. Funding sources may be available to support an enterprise seeking to develop a business plan or take forward a business start-up in this area. Further information on potential funding sources, such as the Sustainable Development Fund (SDF), Strategic Recycling Scheme (SRS) and Enfys, are provided in the main report.

PLANED Plastics Recycling Feasibility Study

Introduction

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- Identify current disposal and collection systems.
- Research and describe recycling opportunities for an end use that will address opportunities that can be pursued within the county.
- Identify collection methods that would link to identified local recycling opportunities.
- Research and recommend existing markets for plastics giving details of the financial implications of the options.

The study concentrates on plastics in four different sectors, including:

- Household
- Agricultural
- Commercial and industrial
- Tourism

Plastics make up approximately 7% by weight of the household waste stream¹. Agriculture, tourism and public sector services dominate Pembrokeshire's economy, so plastics in these sectors are also of importance.

Background

The County of Pembrokeshire is located in Southwest Wales and covers a total area of 160,979 hectares, which includes the Pembrokeshire Coast National Park. Established in 1952, this includes a majority of the 259km long coastline².

The area is largely rural in nature with a diverse landscape, ranging from coastline to open hills, valleys and woodland. The most significant upland areas are in the north-eastern part of the County, where the mountains rise to over 1,500 feet above sea level³.

The transport network within the County is limited. The principle trunk roads into the County are the A40 (from Carmarthen and South Wales beyond), the A487 (from Cardigan and Mid-Wales beyond) and the A477 (from St. Clears). There is a main line railway connection from South Wales with links to Fishguard, Milford Haven and Pembroke. There are also the Docks at Pembroke Dock and Milford Haven, where the ferry terminal is located³.

The population of Pembrokeshire was recorded as 114,131 by the 2001 Census, with the number of households given as 48,176⁴. The County is mainly rural with a low population density. Areas of higher population density include the larger towns of Pembroke, Milford Haven, Haverfordwest and Fishguard.

Agriculture, tourism and public sector services dominate Pembrokeshire's economy, where there is a high concentration of micro-businesses. Some 83% of all firms have less than 5 employees and a further 9% have only 6-10 staff⁵.

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What plastics can be recycled?

Whilst, in theory, it is possible to recycle all plastics, it is not currently feasible to do so in practice, due to the many different applications and polymer types. **Table 1** summarises the main applications found in the different sectors, highlighting those most suitable for recycling.

Table 1: Main polymer applications and suitability for recycling

Sector	Plastic application	Currently suitable for recycling
Household	Refuse sacks and carrier bags	Some potential for carrier bags
	Packaging film	Low
	Other plastic film	Low
	Dense plastic bottles	Good
	Other dense plastic	Low
Agricultural	Agrochemical packaging	Low
	Fertiliser bags	Good
	Seed bags	Good
	Animal feed bags	Good
	Animal health packaging	Low
	Oil containers	Low
	Miscellaneous packaging	Low
	Silage plastic	Fair
	Greenhouse and tunnel film	Fair
	Mulch film and crop cover	Fair
	Cores for silage wrap	Low
	Other horticultural plastics	Low
Bale twine and net wrap	Low	
Tree guards	Low	
C&I	Refuse sacks and carrier bags	Some potential
	Packaging film	Yes
	Other plastic film	Some potential
	Dense plastic bottles	Yes
	Other dense plastic	Some potential - variable
Tourism	Dense plastic bottles	Yes
	Other plastic film	Some potential
	Other dense plastic	Low

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Household

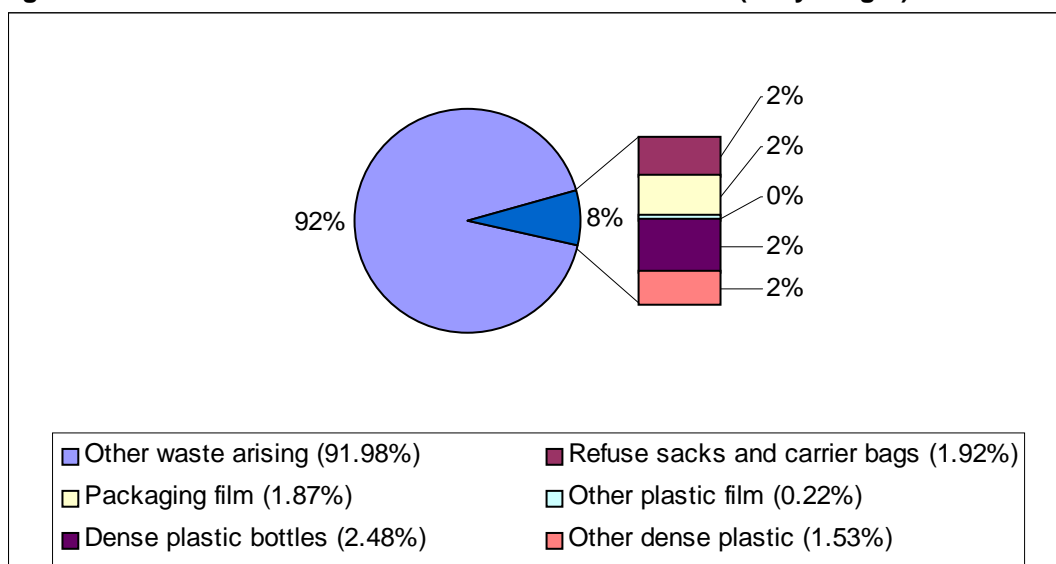
Plastic waste arisings

When developing its waste strategy "Wise about Waste" the Welsh Assembly identified the need for data on the composition of municipal waste. Consequently the Assembly commissioned a programme of work which was undertaken between November 2000 and October 2003 by AEA Technology, supported by M.E.L Research, Waste Research Ltd and WRc¹.

Data was collected for 9 out of the 22 local authorities in Wales, including Pembrokeshire and 174 tonnes of waste was analysed. The Welsh Assembly published the final report "The Composition of Municipal Solid Waste in Wales" in December 2003.

The report provides a comprehensive set of data, providing information on the types and quantities of plastic in the household waste stream (Figure 1).

Figure 1: Plastics in the household waste stream in Wales (% by weight)



The quantity of plastics in the household waste stream in Pembrokeshire can be estimated using the:

- Percentages by weight of plastics in the household waste stream¹ (Figure 1)
- Total waste arisings per household for Wales¹ (Table 2)
- Total number of households in Pembrokeshire⁴ (Table 3)

Table 2: Waste arisings per household in Wales

Waste arisings	kg/hh/wk	kg/hh/annum	tonnes/hh/annum
Newspapers and magazines	1.6	83.2	0.0832
Total paper	3.9	202.8	0.2028
Glass	1.1	57.2	0.0572
Ferrous metal	0.6	31.2	0.0312
Dense plastic	1	52	0.052
Organics and fines	6.7	348.4	0.3484
Total	14.9	774.8	0.7748

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Table 3: Household plastic waste arisings in Pembrokeshire

Plastic application	% by weight	Kg/hh/annum	Tonnes per annum
Refuse sacks and carrier bags	1.92	15	717
Packaging film	1.87	14	698
Other plastic film	0.22	2	82
Dense plastic bottles	2.48	19	926
Other dense plastic	1.53	12	571
Total	8.02	62	2994

There are strong end markets for plastic bottles and it is easy for the householder to identify and separate them. Other plastic applications in the household waste stream are more difficult to find end markets for due to issues of contamination and the wide range of polymers used to produce them. At this time, it is therefore practical to target plastic bottles for recycling from the household waste stream, but not other plastic applications. There are low value and irregular markets in Asia for wider mixes of post-consumer plastics. We do not recommend these as a sustainable proposition. In the longer term (2008-2010), as technology is developed in the UK, there may be potential for mixed plastics recycling, with associated collections.

Current system of collection and disposal, and existing recycling facilities

Residual refuse

The Council's Direct Services Organisation (DSO) operates household waste collections throughout Pembrokeshire. Householders are provided with a weekly black bag collection, which is undertaken using rear-end loading collection vehicles (RCVs). The collection crews deliver waste directly to Withyhedge Landfill site at Rudbaxton near Haverfordwest.

Bring sites

Pembrokeshire County Council manages a network of bring-banks and civic amenity sites throughout Pembrokeshire. There are 6 civic amenity/recycling centres, 4 in the north operated by the Council and 2 in the south operated on the Councils behalf by Shanks Waste Solutions. The sites accept domestic waste arising from domestic premises and small quantities of domestic waste arising from commercial undertakings. They also provide recycling facilities for a range of materials including cans, newspaper and magazines, glass, and textiles. The sites do not currently accept plastic bottles.

In addition to the 6 civic amenity sites Pembrokeshire County Council also provides some 70 sites for recycling the same range of materials as the civic amenity sites. They are located mainly in supermarket and public house car parks, and in the heart of rural communities.

A small-scale plastic bottle collection scheme was funded by the Sustainable Development Fund, then known as the Environment Development Fund, with the main collection site at a supermarket car park in Haverfordwest. The scheme was very popular, but encountered difficulties due to its small scale, logistical problems, and a lack of end markets for the material, which was transported loose rather than being compacted. Due to these difficulties, the scheme had to be discontinued.

Kerbside recycling collections

In March 2004, the Council introduced a pilot kerbside collection of recyclables to just over 3,000 households in Pembrokeshire. Camarthen Waste Management Ltd is operating the service.

Areas chosen to take part in the pilot include⁶:

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Urban Areas : Hakin, Milford Haven

Rural Areas : Freystrop Cross, Hook, Pill Road, Furzy Hill, Nash Road, Llangwm, Blackstar, Guildford, Ashdale Lane, Sardis, Troopers Inn Road, Johnston Road, Rosemarket, Waterston, Coombes Road, Black Bridge, Barnlake, Burton, Houghton, Hill Mountain.

Householders in the pilot areas are supplied with translucent orange bags, in which they can place clean and dry recyclables, including plastics, cans and paper. These orange bags are collected on the same day as the black bags for residual refuse. Separate collection vehicles are used for recyclables and residual refuse to prevent the recyclables from becoming contaminated. Cage vehicles are used instead of compaction vehicles in order to keep material as clean as possible.

To promote the pilot the Council provided each participating household with a 'starter pack'. This included an introductory letter, a fridge magnet listing which items should go in the recycling bag and which shouldn't, an information booklet, a recycling questionnaire and a pencil made from recycled vending cups.

The Council also provides information on their website (<http://www.pembrokeshire.gov.uk>) and has a service line that residents can call if they need advice or information.

The pilot will last until March 2005, after which the collection of recyclables will either continue in the same way or be replaced with an alternative collection system, depending on its success. During the pilot the Council is collecting all plastics, but is considering targeting plastic bottles only, when the scheme is expanded.

Planned activities

Pembrokeshire County Council plans to expand the kerbside collection of recyclables across Pembrokeshire. The Council's Waste Strategy states that 40% of households will have a kerbside collection scheme by 2005, and 80% of households by 2010³. It is intended that this kerbside collection will include plastic bottles, cans and paper.

The Council has plans to house a 'clean' Materials Recycling Facility (MRF) within the County by Spring 2005. This facility will have the capacity to receive all the dry recyclables collected from the kerbside, at which point they will be sorted and baled ready for transportation to reprocessors for recycling. The Council is currently at the tendering stage and plans for the MRF to come online in April 2005.

It is envisaged that the MRF will be part of a Materials Reclamation Employment Park. This park may also contain outlets that focus on the reuse of materials and will be key to raising awareness and educating the public on waste reduction, reuse and recycling⁶.

The availability of a central facility capable of handling a mixed stream of dry recyclables, including plastics, is likely to offer new opportunities for collections of plastics from homes and businesses. It would be helpful to establish details of likely available capacity and toll handling arrangements at the planned MRF as soon as this is available.

There are companies and organisations in the area involved in handling waste and, in some cases, recyclables. None of these has any apparent plans however to collect recyclables from households, or to set-up a bring-bank network for plastic bottles.

Opportunities to increase plastics recycling and potential for enterprise

Although plastic bottle recycling facilities are currently only available to a small proportion of the population through Pembrokeshire Council's kerbside recycling collection, there are firm plans to expand the service in line with the Council's waste strategy. This would mean that at least 40% of the households in Pembrokeshire would have access to plastic bottle recycling facilities by 2005 and 80% of households by 2010.

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Therefore, as the council plan that recycling facilities for plastic bottles will soon be in place for a significant proportion of the community, an important option for increasing plastics recycling from the household waste stream would be through supporting the Council's existing and planned kerbside collection activities and seeking to exploit common infrastructure and communication campaigns.

Pembrokeshire Council will have access to funding sources for communications programmes and will be undertaking community promotion for the new recycling service. It is suggested that any parties planning to undertake promotional work liaise with the Council to ensure the same key messages are used and that Council activities and future strategies with regard to kerbside collections are taken into account, in order to avoid confusion among members of the public. During the research phase of this report, the Council expressed willingness to consider partnerships with other groups to deliver an improved, professional recycling service.

Educational and promotional campaigns can range from the production and distribution of basic information leaflets and posters to direct mailings, advertising and media editorial work, through to door-knocking, holding events, or arranging activities in schools, shopping centres and local events. Some successful campaigns have involved the use of a 'recycling bus', whereby a vehicle is kitted-out with information and recycling related activities and driven around to visit locations across the region.

Promotional activities and communication with members of the public is vital if a recycling scheme is to be successful. Although Pembrokeshire Council already has some promotional activities planned, a well thought out and executed campaign would almost certainly have a positive impact on plastic bottle recycling and the recycling of other materials in the region.

Although the quantity of plastic bottles collected for recycling varies widely between different collection schemes, 4kg per household per annum is fairly typical for a UK scheme⁷. The quantities of plastic bottles that can be expected to arise from planed collections in Pembrokeshire are outlined in Table 4.

Table 4: Household plastic waste arisings in Pembrokeshire

Year	Planed number of households receiving kerbside collections	Anticipated quantity of plastic bottles (tonnes per annum), based on comparisons with typical UK schemes	Anticipated quantity of plastic bottles (tonnes per annum), with good scheme promotion
2005	19,270	77	193
2010	38,541	154	385

Higher performance can be achieved through increasing participation in the collection scheme. Good scheme promotion increases participation and high-performing schemes can collect over 10kg of plastic bottles per household per annum⁷.

As Pembrokeshire County Council does not provide bring-banks for plastics bottles, there is also an opportunity to offer this service at key locations such as supermarkets. This would cater for the 60% of residents without a kerbside service in 2005. The plans for increasing kerbside collections to 80% of households will limit the scale of a bank scheme for plastics in the longer term. A household bank collection combined with other services, however, could be attractive for at least a 5-year period. The potential to offer a bring-bank collection service is discussed in more detail in the section on tourism.

For a complementary collection bank system to be attractive to a customer such as the Council it will be important that the collection banks are aesthetically appealing and – vitally – that the supplier can demonstrably offer a high-quality collection service. The potential contractor should be able to ensure collection sites are emptied in a timely manner and sites remain clean and tidy.

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It is highly unlikely that a household plastic bottle bank collection initiative would represent a full time business opportunity, as collections would probably only be made 1-3 times per site per week. We believe that it is more likely that such a service would be provided by a waste management business as part of a wider portfolio of services that efficiently utilised capital equipment.

Selling collected plastic bottles

Collected bottles can either be sold once sorted by polymer type (which commands the highest value) or can simply be marketed as a mix of all types of bottle - 'mixed bottles'. The key factors for maximising income are: quantity of non-bottle contamination, tonnage commitment and tonnage shipped per load (a function of bale density and loading arrangements).

As a guide the 5 year average market value of PET bottles is £110/tonne. This payment would be made for mixed colourless and light blue tinted bottles, baled to recyclers' specifications and delivered to a recycler. An equivalent ex-works price from Pembrokeshire would be approximately £80/tonne based on 20 tonne shipments.

Recoup will buy collected plastic bottles meeting specifications. Contact information for UK recyclers of post-use plastics is available on a free 'reprocessor locator' on www.recoup.org. Our quarterly newsletters, also downloadable from the website, contain relevant market updates.

Regular updates on the market value of plastic bottles are available from several sources, for example www.LetsRecycle.com, Materials Recycling Week and the recently launched Wrap materials pricing service.

Price range indicators covering the July - September 2004 period for mixed plastic bottles, HDPE natural, HDPE all colours, PET clear, and PET coloured are given below. The table is derived from prices reported through public price guides provided by MRW and Letsrecycle.com during the past 3 months and through our own market contacts.

The prices are based on material meeting established quality and form specifications. Sales for Asian export markets may need to be rebaled if densities are low - e.g. loads under 18 tonnes - and this will incur additional costs that will be deducted when buyers provide ex-works pricing.

On the basis of review of available information, the guide prices below reflect guide ex-works prices in Wales for material meeting established quality and form specifications available in full loads, loaded on a trailer or into a shipping container

Type of plastic bottle	July-September 2004 £/t (baled)
clear and light blue PET	80 - 105
coloured PET	35 - 50
HDPE single colour	80 - 100
HDPE mixed colour	75 - 90
PVC	10 - 20
Mixed	20 - 40

Typical end products produced from recycled plastic

There are products that householders can buy that contain recycled plastics. Professional promotion of 'buy recycled' messages locally could be beneficial. From Autumn 2004 onwards there will be national and regional recycling campaign work highlighting the value of recycling and the products made from recycled materials. The inclusion of examples of quality recycled

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plastic products in any local work will both encourage positive attitudes to recycling and stimulate purchasing of products containing recycled materials.

A range of products are currently being produced from recycled plastic for the household sector, including:

- Pillows
- Clothes hangers
- Coasters
- Indoor furniture, such as tables and chairs
- Key-rings
- Lampshades
- Picture frames
- Clothing, such as gloves, hats and jackets
- Garden furniture, such as tables, benches and seating
- Other garden products, such as fencing, plant pots and containers, trellis and decking
- Bags and bin liners

Some of the products made from recycled plastics could be used as promotional tools within wider campaigns to promote recycling – for example recycled fleeces or furniture as prizes for participating in collection schemes. Details of products and product manufacturers are available from the Recoup website (www.recoup.org) and on the the Wrap 'recycled products guide' (www.recycledproducts.org.uk).

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Agricultural

Plastic waste arisings

The type and quantity of plastics arisings from the agricultural sector are difficult to estimate. They will vary widely from farm to farm, depending on the size of holding and activities undertaken. Generally, the types of plastic found on farms include packaging plastics such as feedbags and fertiliser bags and non-packaging plastics such as silage wrap and mulch film.

According to the National Assembly Statistics for Wales there are 144,000 hectares of agricultural land in Pembrokeshire and a recorded 3,591 agricultural holdings of varying size, including main and minor holdings. This compares to 36,473 agricultural holdings recorded for Wales as a whole⁵.

The Environment Agency recently published a report 'Agricultural waste survey 2003', which provides estimates of agricultural waste arisings for Wales as a whole. From this, it is possible to obtain an approximation of the quantity of plastics arising from the agricultural sector in Pembrokeshire. This can be achieved by considering the proportion of Welsh agricultural holdings that are located in Pembrokeshire (Table 5).

Table 5: Plastics waste arisings from the agricultural sector

Type	Wales (tonnes/year) ⁸	Pembrokeshire (tonnes/year) est.
Packaging		
<i>Plastic</i>		
Agrochemical packaging	30	3
Fertiliser bags	984	97
Seed bags	15	1
Animal feed bags	1,283	126
Animal health packaging	105	10
Oil containers	47	5
Miscellaneous packaging	331	33
Total plastic packaging	2,794	275
Non-packaging		
<i>Plastic films</i>		
Silage plastic	5,016	494
silage plastic + contamination	10,032	988
Greenhouse and tunnel film	10	1
Mulch film and crop cover	30	3
Mulch film and crop cover + contamination	148	15
Total films	5,055	498
Total films + contamination	10,189	1,003
<i>Other non-packaging plastics</i>		
Cores for silage wrap	339	33
Other horticultural plastics	114	11
Bale twine and net wrap	821	81
Tree guards	532	52
Total non-packaging plastics	6,860	675
Total non-packaging plastics + contamination	11,994	1,181
TOTAL PLASTICS	9,654	950
TOTAL PLASTICS + CONTAMINATION	14,788	1,456

As can be seen, for Wales as a whole, silage plastic and animal feed and fertiliser bags, make-up the largest proportions of the plastics waste arising. Pembrokeshire is a mixed farming county, however, including dairy, crops, beef and sheep⁵. It is therefore difficult to confirm how closely the figures estimated in Table 5 will match the material that is actually arising. The

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quantity and type of plastic arising from agricultural practices also varies depending on the season, as different activities are undertaken at different times of the year. Fertiliser bags will be prevalent in Spring and Autumn, silage wrap will be used in May-June and then become waste during the Winter. Anecdotal information that 6 tonnes of silage wrap are used per 500 cows per year.

Information supplied by Second Life Plastics, a company already operating a farm film collection in Wales, indicates that an average of 1 tonne of contaminated film can be expected per farm, per year. This produces a figure of approximately 3,591 tonnes of 'dirty' plastic arising in Pembrokeshire per year, compared to the 1,227 tonnes estimated using data from the Environment Agency⁸.

It is likely that the actual figure lies somewhere in between, as not all farms will generate silage films. As the information supplied by Second Life Plastics has been derived from actual collected quantities, however, this figure could be expected to be more accurate than that derived from the Environment Agency data.

It is therefore assumed that in Pembrokeshire there is the potential to collect around 2,500 tonnes of farm films with residual soiling for recycling. This equates to approximately 1,250 tonnes of plastics.

Current system of collection and disposal, and existing recycling facilities

Very little recycling of agricultural plastics is currently taking place in Pembrokeshire. It is suspected that a large majority of the plastics are burnt or buried on farm. These practices will have to be phased out when new waste management regulations are introduced later this year⁹.

There is a positive side to the legal change, as it has drawn attention to the scale and nature of the waste produced in agriculture and the limited infrastructure currently available for cost-effective waste recovery.

Pembrokeshire is already in a good position to make changes in line with the new regulations, as Second Life Plastics operate out of Llandeilo, just over the border in Carmarthenshire. The company already collects farm film, feedbags, and liners from fertiliser bags from 376 farms in Pembrokeshire and is keen to offer the service to other farms in the area.

Second Life Plastics came about as a result of a collection scheme introduced by British Polythene Industries (BPI), a major supplier of plastic films to the agricultural sector. In 1989, BPI set up a national voluntary scheme for the recovery and recycling of waste silage film, feed and fertiliser bags, at no cost to the farmer. The National Farmers Union, MAFF and DOE supported this scheme. Second Life Plastics was established as one of a number of regional collection agencies for BPI.

Material was collected and transported to the BPI reprocessing plant in Dumfries in Scotland. By 1996 Second Life plastics was collecting from 4,000 farms. The scheme was now financed by a voluntary levy on producers, and when some producers decided to seek commercial advantage through not paying the levy, in 1997 the scheme had to be abandoned.

Second Life Plastics persevered, however, and obtained funding from Europe in 1999. The operation is now a fully commercial enterprise. Film is weighed on farm and farmers are charged £85 per tonne, which covers the cost of collection, baling and transport.

Reprocessing plants for farm films require specialised washing facilities to deal with the high levels of contamination associated with such materials. The plant in Dumfries is currently the only one in the UK capable of accepting farm film. Thus the material collected in Wales is still being transported there, where it is reprocessed and used to produce a range of products including benches, picnic tables, fence posts and so on (<http://www.recycledproducts.bpipoly.com>).

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Planned activities

Second Life Plastics in Llandeilo has established that there is an end market for products such as posts and boards made from the recycled farm film and has marketed these products, produced from the Dumfries plant, for several years. Second Life Plastics is now implementing plans to construct its own local reprocessing facility in Wales, close to its existing site. The company is placing a bid for European funding towards the capital and if successful hopes to be operational by spring 2005. This is an ambitious schedule but even allowing for possible delays, there is potential for a polyolefin film reprocessing plant to be operational in close proximity to Pembrokeshire farmers during 2005.

In addition to on-farm collections, bring-sites for farm film have been established in Carmarthenshire. Subsidised by Carmarthenshire County Council, these have on-site facilities to weigh film that is brought in by farmers. Instead of the £85 per tonne charge made for on-farm collections, farmers that use the bring-sites are only charged £42.50 per tonne. Carmarthenshire County Council made the decision to subsidise the bring-sites, in order to encourage a greater level of farm film recycling in the County.

Pembrokeshire Coast National Park is already working with Second Life Plastics to identify potential bring-sites in Pembrokeshire, which farmers can take film to; however, this infrastructure has yet to be established.

With new waste regulations being introduced to the agricultural sector later this year, an Agricultural Waste Stakeholders Forum has been established by DEFRA to tackle the issues of disposing of farm waste. The Forum are currently assessing existing collections and investigating the potential for a national collection scheme. Further information on the group and their activities can be found at <http://www.defra.gov.uk/environment/waste/agforum>.

Opportunities to increase plastics recycling and potential for enterprise

While most farmers would welcome a plastics collection scheme, dealing with waste in an environmentally beneficial manner is not seen as being a high priority at present. Cost is a limiting factor when trying to bring farmers onboard. Second Life Plastics undertook a telephone survey to assess the value of the collection service to farmers before they implemented their charging system. It is a fine line, however, between making collections economically feasible and making the cost acceptable to farmers.

Collecting and recycling farm film is relatively expensive, and specialised equipment is required to collect and process it. Second Life Plastics is already operating a well-established, successful collection scheme. It therefore makes sense to use the company's knowledge and expertise in this area to expand the service in Pembrokeshire, rather than trying to set-up a completely separate scheme.

If Second Life Plastics is successful in its funding bid and develops a local recycling plant in 2005, it is highly unlikely that there would be any business case for further investment in a similar recycling operation in Pembrokeshire.

There is a good opportunity to promote the existing collection service provided by Second Life Plastics and to identify and establish bring-sites for farm film. Farmers need to be made aware of the scheme and the advantages and mechanics of participating.

In addition, interested parties are advised keep up-to-date with the work being undertaken by the Agricultural Waste Stakeholders Forum. The Forum see a national farms recycling scheme as being the best way forward for the UK and will be holding a conference on the 14th of October, although this is by invitation only¹⁰.

Typical end products produced from recycled plastic

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A range of products are currently being produced from recycled plastic for use in the agricultural sector. Many of these are particularly effective when compared to products made of wood which require more maintenance and are more prone to damage from animals and 'the elements'. Products include:

- Stiles, gates and fences
- Flooring slats
- Feeders and mangers
- Rearing houses
- Pen and cubicle divisions
- Poultry house lining
- Stable wall lining

Details of products and product manufacturers are available from the Recoup website (www.recoup.org).

Local development work could encourage farmers and local wholesalers to consider use/supply of these recycled plastic products on the basis of the functional benefits that they provide. This would support the efforts of Second Life Plastics to develop their farm films collection business.

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Commercial & Industrial

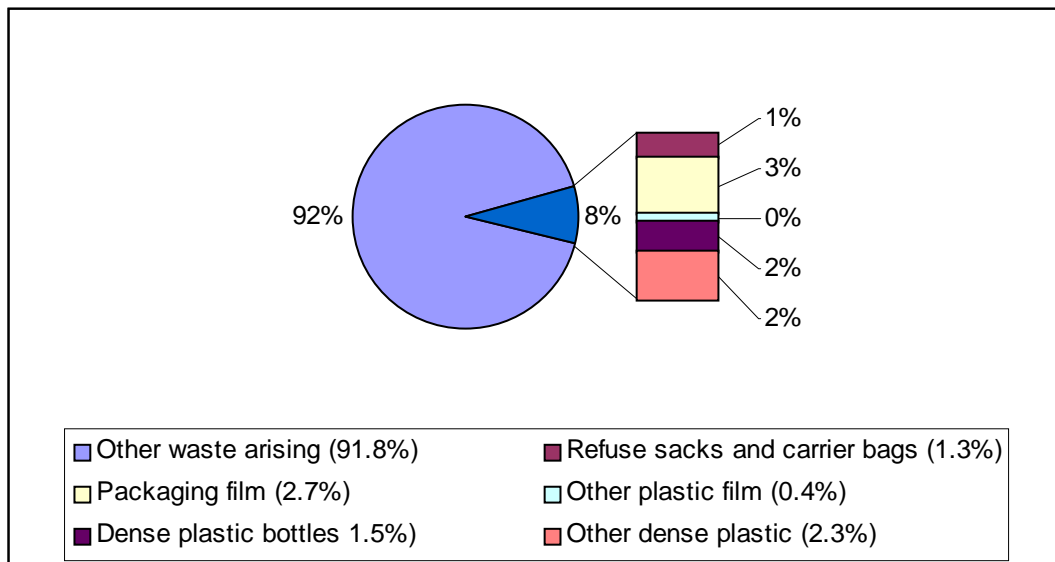
Plastic waste arisings

Plastics waste arisings from the commercial and industrial sector tends to include film, bottles and other dense plastics. Other dense plastics can include manufacturing scrap, pallets, trays, barrels, plant pots, car bumpers and a variety of other items. A large majority of dense plastics comes from manufacturing industries, however, and this is a relatively small sector of commerce and industry in Pembrokeshire.

One source of information on waste arising from businesses in the area is ARENA Network. ARENA Network is an independent organisation, providing practical support to businesses and other organisations, primarily on environmental issues. As part of this service, ARENA also provides waste analysis to businesses.

Indications are that plastic packaging film is the main source of plastics waste arising from businesses in Pembrokeshire. This fits in with figures for Wales as a whole (Figure 2), which show that packaging film represents the largest proportion of plastics in the commercial and industrial waste stream¹.

Figure 2: Plastics in the commercial and industrial waste stream in Wales (% by weight)



There is also a relatively substantial proportion of plastic bottles in the commercial and industrial waste stream.

Two methods have been used to estimate the quantity of plastic packaging film and plastic bottles likely to arise from the commercial and industrial sector in Pembrokeshire (Table 6).

The first estimate is based on the fact that there is approximately 455,000 tonnes per annum of packaging film entering the C&I sector in the UK¹¹. Dividing this by the total number of people employed in the C&I sector in the UK⁴ and multiplying by the number employed in the C&I sector in Pembrokeshire¹² provides a rough estimate of the total packaging film entering the C&I sector in Pembrokeshire. As this accounts for 2.7% of the waste stream, the quantity of plastic bottles, 1.5% of the waste stream, can be inferred from this figure.

The second estimate is based on the total commercial and industrial waste produced in Wales. Dividing this by the number employed in the C&I sector in Wales¹², then multiplying by the number employed in the C&I sector in Pembrokeshire¹² provides an estimate of the tonnage of

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C&I waste produced in Pembrokeshire. The proportion of this that is plastic can then be calculated using the data from Figure 2.

Table 6: Commercial and Industrial plastic waste arisings in Pembrokeshire

	Method 1	Method 2	Our assessment
Disposal rate (tonnes/employee/annum)	-	1.36	
Number of employees	30,500	30,500	
Total produced (tonnes/annum)	-	41,493	
Total tonnage of plastic produced (tonnes/annum)	-	3,402	
Plastic packaging film produced (tonnes/annum)	582	1,120	500
Dense plastic bottles produced (tonnes/annum)	323	622	500
Refuse sacks and carrier bags produced (tonnes/annum)	-	539	400
Other plastic film produced (tonnes/annum)	-	166	75
Other dense plastic produced (tonnes/annum)	-	954	700

On the basis of the above assessments, between 582 and 1120 tonnes of packaging film could be generated per annum, and a further 323 to 622 tonnes of plastic bottles.

The review of the types of businesses in Pembrokeshire has identified there are very few packaging or plastic related enterprises of scale. Only three businesses registered in Pembrokeshire are identified as having a turnover of more than £2m a year and using over 50 tonnes of packaging (all materials) per year. The major employment is in micro businesses and office environments (including public sector facilities).

The largest companies operating in Pembrokeshire are the refineries at Pembroke (Texaco) and Milford Haven (Total). These were contacted to find out if they produced large amounts of plastic waste that could be targeted for recycling.

The refinery at Pembroke stated that its main source of plastic waste was plastic wrap and sheeting arising in the stores area. Pembroke refinery already has this material collected for recycling by Biffa. The only other plastic waste produced in any quantity is plastic vending cups, which Pembroke refinery recycle through the Save-a-Cup collection scheme.

The refinery at Milford Haven stated that it produced very little plastic waste, the main source being plastic vending cups, which are currently sent to landfill.

The port and ferry waste was also investigated. The port generates 'very little' plastics waste packaging, as much of the imported material is wood. In the case of the passenger ferries, whilst there is plastic waste available, the ferry waste management system is strictly controlled. It is not currently possible to separate plastics for recycling due to the design of integral waste management systems on the ferries.

As a result of these local features, it seems likely that packaging film and other dense plastics availability will tend towards the low end of average data and there will be a relatively high level of plastic bottles generated (see 'our assessment' in Table 6).

Annual plastic packaging film in Pembrokeshire waste from these sources may represent 500 tonnes per annum, bottles a further 500 tonnes, refuse sacks and carrier bags 400 tonnes and other dense plastics 700 tonnes, with each category having a wide confidence interval estimated at 150 tonnes. A large proportion of the refuse sacks and carrier bags will not be recoverable as they are used to contain other waste.

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Current system of collection and disposal, and existing recycling facilities

Residual refuse

Pembrokeshire County Council offers a commercial waste collection and currently services approximately one third of the businesses in Pembrokeshire. The Council are therefore particularly well placed to lead a change in waste management practices for businesses. Other waste management companies operating in the area include Shanks and Biffa. One contractor provided indicative costs for its general waste collection service (Table 7), although these vary depending on the area.

Table 7: Indicative collection costs for general trade waste

Collection container	Collection cost
1100 litre wheeled bin	£8.50 per lift
14 cubic yard rear end loader (REL)	£47.00 per lift
Skip	£80.00 per lift
35 cubic yard roll-on-off	£45.00 per tonne £115.00 per lift

A typical 1100l wheelbin will hold around 25kg of plastic bottles when full. This means that, broadly, businesses throwing away plastic bottles are paying £340/tonne to landfill plastic bottles that could be recycled. Given our assessment of plastics in the C&I wastestream this means that businesses in Pembrokeshire spend well over £250,000 per annum on the disposal of potentially recyclable plastics.

Recyclables

There are companies that offer a trade recycling service in Pembrokeshire, but few offer an affordable plastics collection. Shanks have recently taken over Greenacres Waste, which offered recycling services catering to the needs of individual companies. Other companies that offer a trade recycling collection include Biffa, Pembrokeshire Recycling and LAS Waste Limited. Charges are made on a case-by-case basis, depending on location and service required, so the charges made for the collection of plastics for recycling may be prohibitive.

There appears to be no well-organised, affordable and well-publicised collection scheme for plastics.

Planned activities

Pembrokeshire County Council has employed a Commercial Recycling Officer, with the intention to provide a recycling service for the commercial and industrial sector. The Council has recently undertaken a countywide survey to find out how businesses are currently disposing of their waste and the materials they would like to be able to recycle. This was sent to approximately 5,500 commercial premises within Pembrokeshire and the Council is now in the process of analysing the results.

The initial council survey did not question businesses on the main categories of plastic waste generated. This would be a useful addition to any future survey.

Whether the Council decides to include plastics in the service, and the types of plastic application that might be considered, will depend on the results of the survey.

Opportunities to increase plastics recycling and potential for enterprise

With regard to the commercial and industrial sector generally, plastic packaging film has been tentatively identified as the main plastic application that businesses would like to recycle. There

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also appears to be a substantial quantity of plastic bottles being generated in the workplace, which could be targeted for recycling.

There is an apparent opportunity to offer a comprehensive, affordable recycling-led waste collection service to commercial premises in Pembrokeshire. Generally businesses prefer to deal with one organisation that will take all of their recyclables and/or waste, as this is easier than dealing with different organisations for each recyclable material. In addition to the collection of plastic packaging film and plastic bottles, it is therefore recommended that any recyclables collection also include drink cans, paper, card and possibly toner cartridges and plastic vending cups.

It is generally best to collect plastic packaging film separately from other materials, as it is not easily sorted at a MRF. Plastic bottles, drink cans, card and paper can either be collected together and sorted at a MRF, or collected separately and taken to a central facility for baling prior to transport to end market.

There are schemes in the UK that already collect plastics from commercial premises for recycling. Examples include:

1. Newport Wastesavers and Northeast Recycling

Newport Wastesavers and Northeast Recycling both operate multi-material collections from commercial premises on an ad hoc basis.

Newport Wastesavers operate collections in the Newport and Cardiff areas. Internal boxes are provided for the separate collection of plastic bottles, drink cans and paper. Bags of material are then stored until a suitable quantity has been collected. The business then contacts Newport Wastesavers to arrange a pick-up.

Northeast Recycling operates in the Newcastle area, providing a similar service. Both organisations have recently agreed to take part in a pilot scheme 'Recycling Zone' aimed at monitoring the impact of branded resources and associated promotional activities on recycling. Further details of the collection schemes and the Recycling Zone pilot can be found at <http://www.recyclingzone.info>.

2. BasRap

Remade Essex initiated this scheme, designed to collect plastic packaging film from businesses. Initial funding was gained for a 3-year period to research the viability, methodology and user participation in providing this service. Based on findings, a cost-effective recycling scheme was introduced and now continues as a self-sufficient service¹³. Further details of the scheme can be found in Appendix 1 of this report.

3. South Norfolk District Council

South Norfolk District Council operates an alternate weekly collection for households, with dry recyclables collected one week and residual refuse collected the following week. The scheme was so successful that the Council decided to investigate the possibility of offering a recyclables collection service to businesses in areas where the twin bin scheme was in operation. The new Trade Recycling Collection was developed and has since been implemented in more than 10 collection areas. The scheme accepts plastic bottles, paper, card and cardboard and food and drink cans. The charge made for collecting recyclables is lower than the charge for collecting residual mixed waste.

A collection scheme in Pembrokeshire would need to be designed to target small to medium sized enterprises (SMEs), as a majority of businesses in Pembrokeshire are micro-businesses, employing 10 people or less. This kind of business model would have a large number of potential customers. Many of which would have limited time to invest in a scheme, but could make decisions to quickly adopt a new recycling service, if a convenient and financially attractive proposition was presented.

There are existing markets within the UK for suggested materials. As long as materials are of an acceptable quality and have been compacted ready for transport, it should be possible to find outlets for discrete supplies of baled plastic film, bottles and vending cups, plus other items

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such as crates or cores, providing they did not have untypically high levels of contamination and were available in economic quantities: ideally in loads of 20 tonnes.

Clean, separated film could typically achieve prices of £100-200/tonne; separated plastic bottles could be sold for £100-120/tonne on average. Prices are indicative for baled materials sold in 20 tonne lots.

There appears to be a good opportunity to offer a comprehensive, affordable recyclables collection to commercial premises in Pembrokeshire. Organisations with existing collection infrastructure, access to central handling sites and an existing customer base will be best placed to progress such a service. Current waste management contractors should be encouraged to offer such services, although any organisation considering this should be aware of the Council's own plans to launch a commercial recycling service.

Save-a-Cup already offers a collection for vending cups in the area. We believe it would be worthwhile exploring the potential of Save-a-Cup providing an extended offering to collect other recyclables.

Local requests for this kind of service from individual customers will, collectively, influence the service developed. There is a role for local campaigning by businesses directly or through, for example, their representative bodies to stimulate the development of such services by contractors.

Typical end products produced from recycled plastic

Stimulation of both recycle demand and business awareness of recycling opportunities could be achieved by promoting 'buy recycled' opportunities to businesses and to public sector organisations. A range of products are currently being produced from recycled plastic for use in the office, commercial and industrial sector, including:

- Casings for electrical equipment
- Binder and folders
- Desk tidies
- Magazine racks
- Envelopes
- Notebooks
- Pens and pencils
- Rulers
- Crates and containers
- Pallets
- Packaging materials
- Sections, cores and sheets
- Pipes
- Insulation
- Membranes and sheeting
- Ground stabilization systems
- Car parts

Details of products and product manufacturers are available from the Recoup website (www.recoup.org).

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Tourism

Plastic waste arisings

In Pembrokeshire visitor spending supports some 9,154 actual jobs directly and indirectly. This is equivalent to approximately 6,672 Full Time Equivalent jobs, providing work for around 28% of the total number of people in employment in Pembrokeshire¹⁴. This can be broken down into accommodation, catering, retail, and attractions and entertainment.

There are some 90,000 bed-spaces in commercially operated tourism accommodation outlets in Pembrokeshire, with some 72% being in the caravan and camping sector¹⁴.

It is difficult to determine, with certainty, the quantity of plastics likely to arise from tourism in the area. Arisings will almost certainly vary seasonally, with an estimated 80% occurring between late spring and early autumn (April-September).

As with plastics in the household waste stream, plastic bottles are the main application that could be collected for recycling (Table 8).

Table 8: Estimated tonnage of plastic bottles consumed at tourist attractions and accommodation in Pembrokeshire

Type	Plastic Bottles (tonnes)	
	Low estimate	High estimate
Tourist attractions		
Countryside and Natural Attractions	1	5
Gardens	1	4
Historic Properties	3	11
Industrial, Craft and Visitor Centres	0	1
Museums and Art Galleries	1	3
Themed Attractions, Leisure Parks and Centres	5	19
Wildlife Attractions	2	10
Sub-total	13	52
Accommodation		
Camping and caravan sites	52	208
Hotels, guesthouses & self-catering	36	145
Sub-total	88	353
TOTAL	101	406

Calculations based on data from the following sources: 14, 15, 16, and the assumptions listed as follows: Low Estimate Assumptions: 1. When visitors go to a specific attraction 25% consume 1 drink from a plastic bottle; 2. 25% of those taking up a bedspace will consume a drink in a plastic bottle per day; 3. There are 30 500ml plastic bottles per kg. High Estimate Assumptions: 1. When visitors go to a specific attraction 100% consume 1 drink from a plastic bottle; 2. 100% of those taking up a bedspace will consume a drink in a plastic bottle per day; 3. There are 30 500ml plastic bottles per kg

Current system of collection and disposal, and existing recycling facilities

A majority of plastics arising from Pembrokeshire's tourist industry are currently being disposed of to landfill, either via the Council's commercial waste collection, or through a private waste management service.

Planned activities

There appear to be no plans to deal specifically with plastic waste arising from Pembrokeshire's tourist industry in the near future.

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Opportunities to increase plastics recycling and potential for enterprise

There is an opportunity to collect plastic bottles arising from tourism in Pembrokeshire. Bring-banks can be placed at locations frequented by tourists, such as caravan parks, campsites and tourist attractions.

The New Forest in the South of England is one example of where this type of system is already operating. The New Forest District Council has placed 1100 litre wheeled bins at 12 tourist locations for the collection of co-mingled drink cans and plastic bottles, which are then sorted at a materials recycling facility (MRF). They are now looking to expand this bring-bank network to include a greater number of caravan sites in the New Forest.

The containers are usually emptied once per week during the summer months using a converted refuse collection vehicle. Collections amount to approximately 15 tonnes of mixed cans and plastic bottles per year. The cost of collection is approximately £6 per container per collection, which is therefore equal to about £100 per tonne of material. Drink cans are included in the collection, as the higher price that can be obtained for aluminium helps to offset the overall cost of collection, making the scheme more economically viable. The market value of PET bottles, once sorted and baled, typically achieves over £110/tonne and Aluminium cans achieve £650-700/tonne.

Given the large number of tourist attractions, caravan parks and campsites in Pembrokeshire, this type of collection scheme has great potential.

As Pembrokeshire County Council does not provide bring-banks for plastics bottles, there is also potential to extend the coverage of banks by securing a contract to provide bottle bank collection at key locations for householders to use, such as supermarkets.

In Canada and Germany, business have been able to sell advertising space on recycling banks located in leisure facilities and sites of interest to tourists. Although there is limited experience of such an approach in the UK, we believe there may be potential to develop such an approach in Pembrokeshire to act as another revenue stream for the scheme. For example, collection banks at camping sites could carry advertising for local tourist attractions; and banks at tourist attractions could carry advertising for products sold on the premises, such as ice creams and soft drinks.

Typical end products produced from recycled plastic

A range of products are currently being produced from recycled plastic that could be marketed with appeal to tourists. These are worthwhile products in their own rights and could be used to boost awareness of local recycling. Products include:

- Notebooks
- Pens and pencils
- Rulers
- Key rings
- Coasters

Details of products and product manufacturers are available from the Recoup website (www.recoup.org).

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Potential for reprocessing and manufacturing

The opportunities for reprocessing and manufacturing have been considered based on the information on available arisings and local business activity.

Plastic recycling businesses typically range from small enterprises employing 5-10 people, through to larger scale, integrated manufacturing operations with turnover of more than £10m per annum.

Small recycling enterprises are often built around the technical skills of one or two owner/operators. For example, a business that would source scrap plastics from industrial sources and dry granulate this material into a marketable product suitable for remoulding.

More developed businesses would incorporate extrusion lines to produce homogenous pellets of plastics which could include colour and performance-enhancing additives.

Larger businesses, processing more contaminated plastics, may invest in washing facilities to clean plastics as part of the upgrading process. Many of the the largest recycling businesses have integrated product manufacture within the business, turning 'waste plastics' into new products such as pipes, street furniture, fibre products and industrial strapping.

Some of the key success factors for a reprocessing business are:

- Availability of competitively priced supplies of plastic
- Appropriate capital equipment
- Technical skills – understanding how to engineer appropriate quality of output product in a competitive manner
- Commercial skills – understanding the markets for reprocessed plastics and how to maximise commercial returns, understanding how to efficiently source supplies

Formalised industry training is limited, and so much of the skills development comes from experience working within the industry.

Plastics recycling businesses typically have a lower capital entry point than, for example, paper, glass or aluminium recyclers do. A small enterprise can potentially be established with under £50,000 of capital equipment to granulate and supply regrind materials back to manufacturers.

Businesses that move into compounding (producing pellets of plastics with particular colour/physical properties) require additional extrusion equipment. This will increase capital costs by upwards of £100,000 for a new extruder. A well-specified 1 tonne per hour extruder with ancillary equipment would potentially represent £400,000 of capital.

A plastics recycling plant with washing capability, producing flake, would typically range from £1-1.4m for a 2,000 tonne per annum unit, up to £3-5m for an 8,000 tonne per annum operationⁱⁱⁱ.

A review of opportunities in Pembrokeshire has highlighted some particular challenges for development of local reprocessing activity, namely:

- Lack of established supplies of recyclables plastics
- Relatively low potential volumes, given supply infrastructure
- Profile of businesses in area suggests limited plastics processing skills, experience, or local buyers of recycle
- Distribution arrangements likely to be less competitive than other sites in South Wales

ⁱⁱⁱ Throughputs based on single shift operation.

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Based on analysis of the arisings potentially available in Pembrokeshire, the volumes of materials available are very unlikely to justify any significant investment in local reprocessing. When broad assessments of potential arisings in Carmarthenshire and Ceredigion are incorporated, this suggests that up to 3,000 tonnes of agricultural film (including contamination) may be available, along with 1,500 tonnes of C&I film. This would equate to a maximum of around 3,000 tonnes of reprocessed plastic – a sufficient basis to justify further consideration for a film reprocessing operation.

Second Life Plastics is already at an advanced stage of planning a reprocessing operation for this type of film. If this project is successful, it is highly unlikely that a second local facility would be justifiable.

It is highly unlikely that any more than 1,000 tonnes of plastic bottles could be sourced from a combination of high performing household, commercial and tourist collections in Pembrokeshire, Carmarthenshire and Ceredigion. Given the relatively low potential level of local supply and other challenges posed by location, it is highly unlikely that a plastic bottle recycling operation would be successful without subsidies.

Although the processes for recycling of plastic films and rigid containers have some differences, it is technically possible for the processing line being planned by Second Life Plastics to be expanded to handle HDPE rigid containers. If progressed, this could provide a relatively local market for around half the plastic bottles available for collection in Pembrokeshire. This would provide improved economies of scale and we believe would be a commercially viable approach, particularly compared to a local 'stand alone' bottle recycling plant.

Product Manufacture

A wide range of products can be made from recycled plastics. In reviewing product manufacturing potential, consideration, in broad terms, has been given to both the existing manufacturing activity and types of enterprise in Pembrokeshire that might serve as markets.

The largest sectors for employment relate to service/public sector, farming and tourism. The long stretch of coastline, much of which falls within the boundary of Pembrokeshire Coast National Park, is also relevant to market considerations.

It therefore appears that the greatest potential for a distinctive, high volume, local market for recycled plastic products in Pembrokeshire lies with the agricultural sector and the National Park.

Extruded profiles

There is good potential to use recycled plastic to produce fencing, acoustic shielding, marine defence systems, animal feeders, animal pens, stables, mangers, poultry house linings and other products fabricated from extruded profiles of recycled plastics¹⁷.

The benefits of using plastic in the applications described above are that the products typically have a longer life, require less maintenance, are easy to clean and are unlikely to be chewed by animals. The main potential buyers of these kinds of products will be farmers, the County Council, Environment Agency and National Park. It has been highlighted, however, that there may be conflicts with the sustainable forestry work of the National Park – i.e. plastic products would be substituting locally grown timber in some applications.

There are three distinct enterprise opportunities in this area: manufacture of profiles & products; assembly of products from profiles made by a third party; acting as a sales agent for third party products in the area.

Manufacturing profiles will require both supply of, primarily, plastic films and processing equipment. Based on the likely supply of film locally (from agricultural sources) a wash plant

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would be necessary and then equipment for profile extrusion would be added to the end of the process. It is understood that Second Life Plastics envisages this kind of approach in its planned operation.

Once extruded profiles (e.g. interlocking boards or posts) are available (either manufactured in house or purchased from a third party supplier), these can then be engineered and assembled into finished products such as stabling, feed pens etc as noted above. The initial outlay to establish an assembly operation would be significantly less than establishing a full processing line; essentially this is a business that a well-equipped fabrication shop could develop.

A key element for success in this kind of enterprise, as in any business, is to have a very good understanding of the needs of the customer, appropriate price points and channels to market.

It may also be possible to fabricate products under contract/license from an established supplier, such as Centriforce Products (see endnote reference 17).

The Environment Agency is a large purchaser of marine defence systems and may also be a ready market for extruded recycled products.

Pembrokeshire County Council, through its highways, play areas and street furniture provision, could also be a buyer of similar products.

There may also be markets in irrigation and non-pressure pipe systems that could be fulfilled using recycled plastics.

This report is designed to identify realistic potential opportunities for the development of plastics recycling and recycled product use in the area. For any individual product area identified, a more detailed assessment of the specific market and business opportunities outlined above would be required before making any investment in production capacity. Funding sources may be available to support an enterprise seeking to develop a business plan or take forward a business start-up in this area.

Other products

The nature of businesses in Pembrokeshire is likely to preclude certain types of product manufacture; for example large scale moulding activities to produce high-volume product lines.

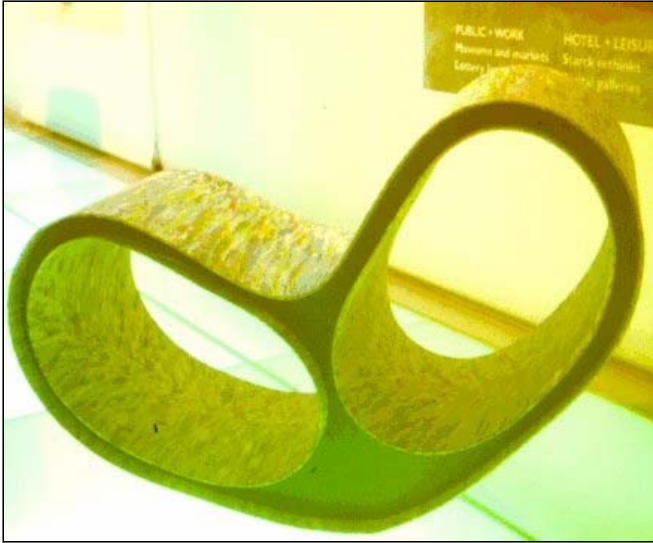
There may be opportunities to use recycled plastics within businesses providing 'design-led' products. For example, manufacture of finished products with distinctive aesthetic appeal from recycled plastic sheets. This kind of enterprise could be considered by any size of business, from the individual craftsperson upward. We believe that enterprises offering a product with high aesthetic value would not have the same disadvantages that bulk component/product businesses may experience.

The products that can be produced from recycled plastics sheets are primarily limited by the imagination of the designer. Products such as lampshades, work surfaces, benches and coasters have been produced using distinctive recycled plastic sheets; see examples (Figure 3).

We believe, as in earlier examples, that it is unlikely a local sheet manufacturing operation would have the necessary volumes to develop a viable local enterprise and that a first stage should be to develop and sell profitable products from third party sheet suppliers.

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Figure 3 – Design-led products



”Rocking Lounger” by Isabelle Moore; source: www.smile-plastics.co.uk



Café interior – chairs & table top from recycled plastics – by Feast; source: www.smile-plastics.co.uk

There may be opportunities for local SMEs moulding or specifying plastic products/components to source recycled content within their products. This could be encouraged broadly through business education initiatives, such as the Green Dragon scheme. Detailed recommendations for specific businesses are not possible at this stage. It appears unlikely, based on the information obtained, that there are high volume applications available in this category.

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Table 9 - Summary of Plastics Arisings in Pembrokeshire

Sector	Plastic type	Plastic available (tonnes/annum)			Plastic likely to be available for reprocessing if collections implemented (tonnes/annum)			Plastics potentially available from surrounding local authorities (tonnes/annum)	
		Low	Average	High	Low	Average	High	Carmarthenshire	Ceredigion
Household	Refuse sacks and carrier bags		717						
	Packaging film		698						
	Other plastic film		82						
	Dense plastic bottles		^a 926		^b 77	^c 154	^d 385	^e 292	^f 124
	Other dense plastic		571						
	Total		2,994						
Agricultural	Agrochemical packaging	3	6						
	Fertiliser bags	97	189	282	19	47	95	84	56
	Seed bags	1	2	3	0	1	1	1	1
	Animal feed bags	126	245	366	25	61	123	109	73
	Animal health packaging	10	19						
	Oil containers	5	10						
	Miscellaneous packaging	33	64						
	Silage plastic + contamination	988	1,924	2,868	192	481	962	855	571
	Greenhouse and tunnel film	1	20	29	2	5	10	1	1
	Mulch film and crop cover + contamination	15	29	44	3	7	15	13	8
	Cores for silage wrap	33	64						
	Other horticultural plastics	11	21						
	Bale twine and net wrap	81	157						
	Tree guards	52	101						
	Potential to be collected for recycling	^g 1,227	^h 2,851	ⁱ 3,591	^j 241	^k 602	^l 1,205	^m 1,062	ⁿ 710
	Total	1,456							
C&I	Refuse sacks and carrier bags	280	410	539					
	Packaging film	^o 582	^p 851	^q 1,120	^r 213	^s 426	^t 638	^u 682	^v 289
	Other plastic film	86	126	166					
	Dense plastic bottles	323	473	622	118	236	354	285	161
	Other dense plastic	496	725	954					
	Total	1,767	2,584	3,401					
Tourism	Dense plastic bottles	^w 101	^x 203	^y 406	^z 16	^{aa} 47	^{ab} 75	^{ac} 47	^{ad} 47
	Aluminium cans	76	190	304	16	47	75	47	47
	Total	177	393	710	31	94	150	94	94

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Notes on assumptions for Table 9 - Summary of Plastics Arisings in Pembrokeshire

Household

- a. Calculated using data from "AEA Technology, supported by M.E.L Research, Waste Research Ltd and WRc (2003) *The Composition of Municipal Solid Waste in Wales*, Welsh Assembly" and the number of households in Pembrokeshire, taken from the "National Statistics Online (2001) *Census 2001*"
- b. Calculated based on 80% of households (38,541) producing 2kg of plastic per household per annum (low)
- c. Calculated based on 80% of households (38,541) producing 4kg of plastic per household per annum (average)
- d. Calculated based on 80% of households (38,541) producing 10kg of plastic per household per annum (high)
- e. Calculated based on 100% of households (73,112) producing 4kg of plastic per household per annum (average)
- f. Calculated based on 100% of households (30,972) producing 4kg of plastic per household per annum (average)

Agricultural

- g. Calculated using data from the "Environment Agency (2003) *Agricultural waste survey 2003*, Environment Agency", which provides estimates of agricultural waste arisings for Wales as a whole. From this, it is possible to obtain an approximation of the quantity of plastics arising from the agricultural sector in Pembrokeshire. This can be achieved by considering the proportion of Welsh agricultural holdings that are located in Pembrokeshire. Data on the number of holdings was obtained from the "National Assembly Statistics for Wales (2004) *Digest of Welsh Local Area Statistics*, National Assembly for Wales"
- h. Application of proportions from breakdown in 'Low' scenario applied to higher estimates of arisings
- i. Calculated based on the assumption that an average of 1 tonne of contaminated film can be expected per farm per year (information supplied by Second Life Plastics). Data on the number of holdings was obtained from the "National Assembly Statistics for Wales (2004) *Digest of Welsh Local Area Statistics*, National Assembly for Wales"
- j. Calculated based on a 10% capture rate (including contamination). This might be expected in the first year of introducing a collection scheme.
- k. Calculated based on a 25% capture rate (including contamination). This is a low estimate 5 years after scheme introduction.
- l. Calculated based on a 50% capture rate (including contamination) This is a high estimate 5 years after scheme introduction.
- m. Calculated based on a 25% capture rate (including contamination). This is a low estimate 5 years after scheme introduction.
- n. Calculated based on a 25% capture rate (including contamination). This is a low estimate 5 years after scheme introduction.

C&I

- o. Packaging film calculated based on 455,000 tpa of packaging film entering UK C&I sector in 2001. Used total employees in the C&I sector in the UK (23,856,200) and in Pembrokeshire (30,500) to calculate proportion. Estimates for other plastics calculated based on proportions taken from "AEA Technology, supported by M.E.L Research, Waste Research Ltd and WRc (2003) *The Composition of Municipal Solid Waste in Wales*, Welsh Assembly"
- p. Average of o & q
- q. Calculated based on the total C&I waste produced in Wales. Dividing this by the number employed in the C&I sector in Wales, then multiplying by the number employed in the C&I sector in Pembrokeshire provides an estimate of the tonnage of C&I waste produced in Pembrokeshire.
- r. Calculated based on 25% capture rate of material (average) available (low)
- s. Calculated based on 50% capture rate of material (average) available (average)
- t. Calculated based on 75% capture rate of material (average) available (high)
- u. Calculated based on 50% capture rate of material (average) available (average)
- v. Calculated based on 50% capture rate of material (average) available (average)

Tourism

- w. Calculations based on data from the following sources: "Geoff Broom Associates (2001) *Pembrokeshire Tourism: Local Area Tourism Model Final Report*, Geoff Broom Associates", "Wales Tourist Board (2004) *Tourism Trends Digest*, Wales Tourist Board" and "Wales Tourist Board (2002) *Visits to Tourist Attractions 2002*, Wales Tourist Board", and the assumptions listed as follows: 1. When visitors go to a specific attraction 25% consume 1 drink from a plastic bottle; 2. 25% of those taking up a bedspace will consume a drink in a plastic bottle per day; 3. There are 30 55l plastic bottles per kg.
- x. Average of w & y
- y. Calculations based on data from the following sources: "Geoff Broom Associates (2001) *Pembrokeshire Tourism: Local Area Tourism Model Final Report*, Geoff Broom Associates", "Wales Tourist Board (2004) *Tourism Trends Digest*, Wales Tourist Board" and "Wales Tourist Board (2002) *Visits to Tourist Attractions 2002*, Wales Tourist Board", and the assumptions listed as follows: 1. When visitors go to a specific attraction 100% consume 1 drink from a plastic bottle; 2. 100% of those taking up a bedspace will consume a drink in a plastic bottle per day; 3. There are 30 55l plastic bottles per kg
- z. Calculated based on the performance of New Forests collection of 1.2 tonnes/bank/annum (weekly collections during 6 months of the year). Assuming 25 sites, 50% plastic.
- aa. Calculated based on the performance of New Forests collection of 1.2 tonnes/bank/annum (weekly collections during 6 months of the year). Assuming 75 sites, 50% plastic
- ab. Calculated based on the performance of New Forests collection of 1.2 tonnes/bank/annum (weekly collections during 6 months of the year). Assuming 125 sites, 50% plastic
- ac. Calculated based on the performance of New Forests collection of 1.2 tonnes/bank/annum (weekly collections during 6 months of the year). Assuming 75 sites, 50% plastic
- ad. Calculated Based on the performance of New Forests collection of 1.2 tonnes/bank/annum (weekly collections during 6 months of the year). Assuming 75 sites, 50% plastic

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Issues Analysis

Sector	Education & Awareness	Collection	Reprocessing	End Products
Household	<p>There is potential for an educational and promotional campaign to complement the Councils existing and planned kerbside collections.</p> <p>This is most likely to prove successful in partnership with the Council. Model campaigns and funding sources are available from, for example, Wrap.</p>	<p>Pembrokeshire Council is operating a pilot kerbside scheme that includes plastic bottles. This will be extended to include 40% of households during 2005 and will be extended to 80% of households by 2010.</p> <p>There is potential for a high quality bring-bank scheme to complement the kerbside service, to offer facilities to those not covered by kerbside. It is unlikely this would be viable without the Council paying for this service as part of its recycling programme.</p> <p>In longer term (2008-2010) potential for mixed plastics recycling with associated collections.</p>	<p>Competitive market for collected plastic bottles</p> <p>Mixed plastics reprocessing unproven</p> <p>Insufficient volumes available to justify local investment</p>	<p>Competitive market for reprocessed plastic bottles into new products.</p> <p>Manufacturer using large volume of PET bottle flake located in Swansea.</p> <p>Limited, low value end markets for mixed plastics</p> <p>Lack of local plastics manufacturing enterprises, skills, supply & distribution network will restrict primary manufacturing opportunities. No obvious, distinctive local benefits.</p>
Agriculture	<p>There is potential for a campaign aimed at raising awareness among farmers with regard to the options that are available for waste disposal, with an emphasis on plastics.</p>	<p>Second Life Plastics operate a farm films collection throughout Carmarthenshire and other areas of Wales, including 376 farms in Pembrokeshire and is interested in expanding the service in Pembrokeshire. There is also potential to identify and establish bring-sites for farm film collection.</p>	<p>One reprocessor currently in Dumfries</p> <p>Second Life Plastics planning relatively local plant in 2005. Insufficient volumes for further reprocessing investment if this is successfully implemented</p>	<p>Many products suitable for use in agricultural industries made from recycled plastics.</p> <p>Opportunities to manufacture and assemble products for this sector.</p> <p>Opportunities to sell products made from recycled plastics into the sector.</p> <p>Second Life Plastics planning manufacturing and distribution activity from 2005.</p>
Commercial & Industrial	<p>Develop register of business and plastics wastes arisings to improve scheme planning</p> <p>Raise awareness of plastics that can be recycled and of existing recyclers of plastics in South Wales</p> <p>If a collection is established this will need to be publicised and promoted.</p>	<p>There is potential to establish a comprehensive trade recycling collection from C&I premises. There are existing markets within the UK for materials.</p>	<p>Several plastics reprocessors in South Wales</p> <p>Insufficient tonnage to justify significant local investment</p> <p>Potential for small scale 'custom granulation' business highly dependent on detailed knowledge of local waste generators.</p>	<p>Lack of local plastics manufacturing enterprises, skills, supply & distribution network will restrict primary manufacturing opportunities. No obvious, distinctive local benefits.</p> <p>Some opportunity for niche aesthetic/green premium products</p>
Tourism	<p>If a collection is established this will need to be publicised and promoted.</p>	<p>There is potential to establish a plastic bottle and aluminium drink can bring-bank style collection from tourist attractions, such as theme parks, and tourist accommodation, such as caravan parks and large hotels.</p>	<p>Competitive market for collected plastic bottles</p> <p>Insufficient volumes available to justify local investment</p>	<p>Lack of local plastics manufacturing enterprises, skills, supply & distribution network will restrict primary manufacturing opportunities. No obvious, distinctive local benefits.</p>

Potential to take forward

Potential – plans/ development underway

Limited potential

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Summary of opportunities and potential for local enterprise

Based on the research and analysis carried out, we have identified areas of activity that we believe would be required for a highly successful local recycling system. These actions could be taken forward by different groups, to progress both the recycling of plastics generated as waste in Pembrokeshire, and to stimulate the use of recycled plastic products in the area.

The key recommendations are identified in **Table 10** below. Some of the points are developed further in the remainder of this section.

Table 10: Key recommendations/potential actions

Who?	What?	Comments
Local community	<p>Make full use collection facilities provided</p> <p>Ask council officers and councillors to provide plastic bottle collection bank service for those not covered by the kerbside collection</p> <p>Investigate opportunity for plastic recycling in own workplaces through facilities manager/waste contractor</p>	<p>Requires local champions, 'grass roots' encouragement and sustained local awareness raising campaign.</p>
County Council	<p>Identify sites and tender for plastic bottle collection bank service for communities not covered by the new kerbside collection</p> <p>Share relevant information on results of local trade waste survey</p> <p>Incorporate specific questions on types of plastic waste generated during next trade waste survey (in particular add film and bottle categories)</p> <p>Incorporate & promote plastic bottle and film collection facilities in trade waste/recyclables collection service</p> <p>Add specific guidance on plastics recycling opportunities to websites and includes features in any magazines/leaflets distributed.</p> <p>Support work to provide local collection centre(s) for agricultural film waste</p> <p>Promote use of collection facilities locally directly and in wider local partnership projects</p> <p>Review opportunities to use products made from recycled plastics & ensure that tender arrangements do not discriminate against these products.</p>	<p>Council is main potential customer to make plastic bank collections viable.</p> <p>As DSO is the main commercial waste collector, and council will be instrumental in the development of a local MRF which could handle domestic and commercial recyclables, the council has a key leadership role.</p>
Local businesses generating waste plastics	<p>Local businesses should be encouraged to review the types and volumes of plastics waste generated. If significant quantities of plastic film, bottles or clean rigid plastics are available they should contact their waste management contractor and or groups that can assist (eg. Council, ARENA Network)</p> <p>Ask waste contractors for wider recycling service including plastics generated</p> <p>Adopt Save a Cup scheme for plastic vending cups</p> <p>Embed use of service with staff within the business</p> <p>Review opportunities to use products made from recycled plastics.</p> <p>Develop 'live' database that builds and maintains local information identifying types and volumes of plastics waste generated, and where possible locations of arisings</p>	<p>Organisations such as Arena Network, the Council or Planed could collate data over time to build up profile of waste generated.</p> <p>Need for convenient, visible and competitive local collection service for recyclables.</p> <p>Success is likely to be through organic, sustained growth.</p>
Waste management	<p>Waste management service providers are encouraged to review availability of recyclables within existing trade</p>	<p>Organisations such as Arena Network, the Council or</p>

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contractors	<p>waste customer's waste arisings. Where streams of film, bottles or clean rigid plastics are available, contact organisations that can identify markets for this material (e.g. Recoup, Wales Environment Trust).</p> <p>Develop trade waste collection service for small businesses, offices, camping and tourist sites based around collection of range of dry recyclables, including plastic bottles and plastic films.</p> <p>Promote availability of recycling services to NGOs/agencies to accelerate take-up of services</p>	<p>Planed could collate data over time to build up profile of waste generated.</p> <p>Need for convenient, visible and competitive local collection service for recyclables.</p> <p>Potential finance for initial feasibility work or pilot projects.</p>
Existing businesses & entrepreneurs	<p>Offer recycling-led waste collection service for small businesses, offices, camping and tourist sites</p> <p>Assemble and sell products for agricultural buyers made from recycled plastics (e.g. stables, cattle pens etc)</p> <p>Add specific guidance on plastics recycling opportunities to websites and includes features in any magazines/leaflets distributed.</p>	<p>Need for convenient, visible and competitive local collection service for recyclables.</p> <p>Potential finance for initial feasibility work or pilot projects.</p> <p>Consider channels to market through wholesalers, existing business networks – e.g. FUW, NFU etc.</p>
NGOs/agencies	<p>Catalyse action by other stakeholders</p> <p>Co-ordinate communications work and local education; co-ordinate stakeholder development work - could establish quarterly forum for sharing developments/joint working.</p> <p>Communicate available facilities to own network members (e.g. NFU highlight local film collections; Arena Network highlight local business recycling services)</p> <p>Add specific guidance on plastics recycling opportunities to websites and includes features in any magazines/leaflets distributed.</p> <p>Develop partnership projects communicating availability/use/ potential of recycling facilities – make use of available grants and funds.</p> <p>Develop & maintain register of local sources of plastics waste and interested parties re collection/handling/processing</p>	<p>Need to maintain focus on main opportunities and encourage ongoing communication and coherent work between stakeholders.</p> <p>NGOs and agencies can identify 'gaps' in skills/facilities available and investigate opportunities to fill these gaps.</p>

Bring bank collection scheme for tourist locations and supermarkets

There is an opportunity to collect plastic bottles arising from tourism in Pembrokeshire. Bring-banks can be placed at locations frequented by tourists, such as caravan parks, campsites and tourist attractions.

The New Forest in the South of England is one example of where this type of system is already operating. The New Forest District Council has placed 1100 litre wheeled bins at 12 tourist locations for the collection of co-mingled drink cans and plastic bottles, which are then sorted at a materials recycling facility (MRF). The Council is now looking to expand this bring-bank network to include a greater number of caravan sites in the New Forest.

The containers are usually emptied once per week during the summer months using a converted refuse collection vehicle. Collections amount to approximately 15 tonnes of mixed cans and plastic bottles per year. The cost of collection is approximately £6 per container per collection, which is therefore equal to about £100 per tonne of material.

Drink cans are included in the collection, as the higher price that can be obtained for aluminium helps to offset the overall cost of collection, making the scheme more economically viable.

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Given the large number of tourist attractions, caravan parks and campsites in Pembrokeshire, this type of collection scheme has great potential.

As Pembrokeshire County Council does not provide bring banks for plastics bottles, it may also be possible to site these at key locations for householders to use, such as supermarkets.

The way forward:

1. Undertake a survey to assess the potential take-up of this type of scheme by the tourist sector. The following should be assessed: level of interest; whether businesses would be prepared to pay for the service and if so how much (based on comparison to current costs of waste management); type of collection bank that would be most suitable/acceptable; whether collections would be required all year round, or only during the main holiday season; acceptability of on-bank advertising.
2. Identify a company/organisation that can operate collections and any additional resource/infrastructure requirements.
3. Establish with Pembrokeshire County Council, the possibility of linking the collection in with established bring-bank sites (public sites financed by the Council).
4. Investigate the potential for the use of advertising on banks at tourist attractions to help finance the collections.
5. Compile a business plan, including capital investment, expected revenue and time-scale for rollout.
6. Identify potential funding sources that are available to cover initial start-up costs.

Education and promotional raising campaign targeting householders

Pembrokeshire Council is already operating a pilot kerbside collection that includes plastic bottles and is planning to extend this to 40% of households during 2005. Plans are in place to extend the service further, so that it is offered to 80% of households by 2010.

Recycling collections are only truly successful, however, if they are well promoted. Members of the public need to be aware of the scheme and understand how to use it correctly. Although Pembrokeshire Council will be undertaking its own promotional activities, a well thought out and executed campaign, with an emphasis on plastic bottles, would certainly have a positive impact on plastic bottle recycling in the region.

Educational and promotional campaigns can range from the production and distribution of basic information leaflets through to door-knocking, holding events, or arranging activities in schools. Some successful campaigns have involved the use of a 'recycling bus', whereby a vehicle is kitted-out with information and recycling related activities and driven around to visit locations around the region.

The way forward:

1. Identify a group or organisation that could undertake such a campaign
2. Decide on the scope of the campaign and determine time-scales and costing
3. Investigate potential funding
4. Co-ordinate key messages with Pembrokeshire County Council

Identifying bring-sites and raising awareness among farmers

Very little recycling of agricultural plastics is currently taking place in Pembrokeshire. It is suspected that a large majority of the plastics are burnt or buried on farm. These practices will have to be phased out when new waste management regulations are introduced later this year.

Pembrokeshire is already in a good position to make changes inline with the new regulations, as there is a farm film collection, Second Life Plastics, operating out of Llandeilo, just over the

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border in Carmarthenshire. The company already collects farm film, feedbags, and liners from fertiliser bags from 376 farms in Pembrokeshire and is keen to offer the service to other farms in the area.

There is an opportunity to promote the existing collection service provided by Second Life Plastics. Farmers need to be aware of the scheme and the advantages of participating.

In addition to on-farm collections, bring-sites for farm film have been established in Carmarthenshire. Subsidised by Carmarthenshire County Council, these have on-site facilities to weigh film that is brought in by farmers. Instead of the £85 per tonne charge made for on-farm collections, farmers that use the bring-sites are only charged £42.50 per tonne. Carmarthenshire County Council made the decision to subsidise the bring-sites, in order to encourage a greater level of farm film recycling in the County.

Pembrokeshire Coast National Park Authority is already working with Second Life Plastics to identify potential bring-sites in Pembrokeshire, which farmers can take film to; however, this infrastructure has yet to be established. There is therefore an opportunity to take this forward.

The way forward:

1. Hold discussions with Second Life Plastics to establish what efforts have already been made to engage local farmers in the collection scheme and why there has been only a limited up-take to date.
2. Hold discussions with Second Life Plastics and Pembrokeshire Coast National Park Authority to establish what efforts have been made to identify potential bring-sites and how this could be taken forward. Film would need to be weighed when brought to these sites and the sites would need to be manned. There may be potential to collect farm film at existing civic amenity sites; this would need to be discussed with Pembrokeshire County Council.
3. Run an awareness-raising campaign to promote the existing collection service provided by Second Life Plastics. Farmers need to be aware of the scheme and the advantages of participating.

Collection of recyclables from commercial premises

Plastic packaging film and plastic bottles are the main sources of plastic entering the commercial and industrial waste stream that are suitable for recycling.

There is an opportunity to offer a comprehensive, affordable recyclables collection to commercial premises in Pembrokeshire. Generally businesses prefer to deal with one organisation that will take all of their recyclables and/or waste, as this is easier than dealing with different organisations for each recyclable material. In addition to the collection of plastic packaging film and plastic bottles, it is therefore recommended that any recyclables collection also include drink cans, paper, card and possibly toner cartridges and plastic vending cups.

It is generally best to collect plastic packaging film separately from other materials, as it is not easily sorted at a MRF. Plastic bottles, drink cans, card and paper can either be collected together and sorted at a MRF, or collected separately and taken to a central facility for baling prior to transport to end market.

The collection scheme would need to be designed to target small to medium sized enterprises (SMEs), as a majority of businesses in Pembrokeshire are micro-businesses, employing 10 people or less.

Multi-material recycling collections for the commercial and industrial sector have already been successfully implemented in other areas of the UK and, once established, can operate self-sufficiently.

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There are existing markets within the UK for suggested materials and as long as materials are of an acceptable quality and have been compacted ready for transport, it should not be difficult to find outlets for them.

While there is an opportunity to offer a comprehensive, affordable recyclables collection to commercial premises in Pembrokeshire, any organisation considering this should be aware of the Councils plans to launch a commercial recycling service.

The way forward:

1. Assess the potential take-up of a trade recycling collection. It is important to establish what businesses are willing to pay for a separate recyclables collection and the perceived convenience of the service offered, as this will affect up-take.
2. Assess the existing and planned activities of companies and organisations offering a similar service to ensure competitiveness.
3. Identify 'in house' resource needs or company/organisation that can operate collections and any additional resource/infrastructure requirements.
4. Compile a business plan, including capital investment, expected revenue and time-scale for implementation.
5. Identify potential funding sources that are available to cover initial start-up costs.

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Potential Funding Sources

The list of funding sources outlined below is not comprehensive, but is designed to highlight the potential that currently exists to obtain funding for recycling projects in the Pembrokeshire area.

Sustainable Development Fund (SDF)

The Sustainable Development Fund (formerly known as the Environment Development Fund) is a grant made available by the Welsh Assembly Government. In Pembrokeshire the grant is administered by the Pembrokeshire Coast National Park Authority, with £250,000 having been made available over the period 1st April 2003 to 31st March 2006.

The fund is open to projects that show a commitment to the principles of sustainable development, and demonstrate innovation and good environmental practice. Projects can be aimed at raising awareness of sustainability through education programmes, or be practically focused, involving local people and organisations.

Eligible projects should include some or all of the following:

- Awareness raising about sustainability and the need to change lifestyles, plus/or meet needs in different ways.
- Working in partnership with other organisations to bring about sustainable solutions
- Projects that involve young people either through theory or practice
- Training to develop skills for sustainable solutions

Further information on the SDF is available from the Pembrokeshire Coast National Park Authority (<http://www.pembrokeshirecoast.org.uk/sdf/index.asp>).

Strategic Recycling Scheme (SRS)

The Strategic Recycling Scheme (SRS) has been set up to fund partnership-based projects across Wales in areas such as re-use, recycling and composting.

The initiative will be supported through £6.8m in funds that have been allocated by the Welsh Assembly Government to support sustainable waste management in Wales. The £6.8m will in turn attract around £13m of EU funds for projects worth a total of £30m.

The SRS is being managed by the Wales Council for Voluntary Action (WCVA) in partnership with the Environment Agency, Cylch, the Welsh Local Government Association and the Welsh Assembly Government.

Grants of up to £1.5m are available for projects designed to create wealth from waste and which meet the following priorities:

- To increase the amount and range of materials diverted away from final disposal.
- To increase the number of households participating in waste recycling, re-use and composting projects.
- To develop sustainability in communities.

The preferred approach is partnership working between the public, private and community sectors and all applications must involve the local authority.

Further information on the SRS is available from the Wales Council for Voluntary Action (http://www.wcva.org.uk/content/grants/dsp_grant_scheme.cfm?display_sitetextid=64&grantid=24).

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Enfys

Enfys is part of the New Opportunity Fund's Green Spaces and sustainable Communities UK-wide programme, which has currently allocated more than £4m of lottery money to over 200 projects throughout Wales.

WCVA is managing the scheme in partnership with the Environment Agency, the Princes Trust and Environment Wales. The scheme aims to award 365 grants between 2001 and 2005.

These will include:

- Process grants: 200 grants up to £5,000 each for activities such as feasibility studies or establishing partnerships).
- Community grants: 140 grants up to £25,000 each (for community led initiatives enabling disadvantaged communities in particular to develop large scale projects.
- Partnership grants: 25 grants up to £100,000 each (for substantial projects that demonstrate true partnership between public, private and voluntary organisations).

Further information on Enfys is available from the Wales Council for Voluntary Action (http://www.wcva.org.uk/content/grants/dsp_grant_scheme.cfm?display_sitetextid=64&grantid=5).

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Summary

Although the study has shown that there are relatively limited quantities of plastics waste available in Pembrokeshire there are several potential initiatives that will be environmentally beneficial and provide enterprise opportunities in the area.

There are three main opportunities to increase collection of recyclable material:

- Offering a new plastic bottle bank collection service for households without access to kerbside collection under contract from the council.
- Offering a new collection service to businesses, public-sector and tourism sites for collection of plastic bottles and other recyclables.
- Supporting the collection of farm films by Second Life Plastics by establishment of local bulking centres in Pembrokeshire for farmers to access.

The collections of bottles and packaging films will require access to facilities to sort and bale the plastics. A new MRF will be developed in the County during Spring 2005 which may have capacity available for handling material from the above schemes. If capacity is unavailable or uneconomic then there may be a business case for further investment in this kind of facility.

Our research indicates that Second Life Plastics are at an advanced stage in developing a film reprocessing line. It is unlikely that further investment in relatively local reprocessing capacity will be justifiable although this position could be reviewed when there are high levels of plastic bottle collection in Pembrokeshire and surrounding council areas or if the Second Life Plastics project does not progress.

Successful recycling programmes require sustained involvement of communities – either as householders using bottle banks or kerbside systems, or as employees in businesses that generate waste. Good quality, sustained communication to improve take up and participation is an essential feature of successful recycling programmes. We believe there are good opportunities to develop local projects that promote recycling within the community. These should link closely with the work of the council.

Clearly competitive product manufacturing opportunities appear limited. We believe that the are best opportunities are:

- Supply of products for the farming sector (e.g. cattle sheds, fencing, animal feeders) using locally manufactured recycled plastic profiles. Second Life Plastics have experience in this area.
- Fabrication of products using recycled plastic profiles from a third party supplier.
- Use of recycled plastics in distinctive, 'design led' products

There are a number of organisations and enterprises with an interest in developing plastic recycling activities – for example, Second Life Plastics, Pembrokeshire County Council – or supporting development – e.g. PLANED, ARENA Network and the Pembrokeshire Coast National Park Authority. Wrap, the Wales Environment Trust and the Welsh Assembly also are active in this area. We believe that these organisations have skills, facilities and contacts with the community in Pembrokeshire that, if focussed in a co-ordinated manner, will enable a significant improvement in plastics recycling locally.

There are several potential sources of funding to develop business plans and pilot projects, and to finance local communications work. We believe that there is a need for pump priming new projects of the kind described here. Any enterprise or consortium developing new projects relating to plastics recycling could benefit from access to one or more of these funds.

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References

Useful Links

Agricultural Waste Stakeholders' Forum: <http://www.defra.gov.uk/environment/waste/agforum>

Arena Network Services: <http://www.arenanetwork.org>

Cylch (Wales Community Recycling Network): http://www.cylch.org.uk/home_eng.htm

Environment Agency Wales: <http://www.environment-agency.gov.uk/regions/wales/?region=wales&lang=e>

Farmers' Union of Wales (FUW): <http://www.fuw.org.uk>

National Farmers Union Wales: <http://www.nfu-cymru.org.uk>

Pembrokeshire Coast National Park: <http://www.pembrokeshirecoast.org.uk>

Pembrokeshire County Council: <http://www.pembrokeshire.gov.uk>

PLANED (Pembrokeshire Local Action Network for Enterprise & Development): <http://www.planed.org.uk>

Remade Essex (BasRap): <http://www.remadessex.org.uk/page.asp?categoryID=17>

Statistics for Wales: <http://www.statswales.wales.gov.uk>

Wales Council for Voluntary Action: <http://www.wcva.org.uk>

The Strategic Recycling Scheme (SRS):

http://www.wcva.org.uk/content/grants/dsp_grant_scheme.cfm?display_sitetextid=64&grantid=24

Wales Tourist Board: <http://www.wtbonline.gov.uk>

Welsh Development Agency (WDA): <http://www.wda.co.uk>

West Wales ECO Centre: <http://www.ecocentre.org.uk>

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Consultations

Meetings

PLANED

Dewi Smith, Community Entrepreneurship Officer

Joan Asby, Co-ordinator

Sarah Worby, Tourism Officer

Sue Mackie, Environment Officer

Others

Dave Harries, Environment Department, Pembrokeshire County Council

Jonathan Hampson, ARENA Network

Julian Orchard, operated plastic bottle bring scheme in Pembrokeshire

Marilyn Birch, Managing Director, Second Life Plastic

Mike Hughes, EMC

Ruth Cook, Pembrokeshire Coast National Park

Sarah Downs, Wales Liaison Officer, WRAP

Steve Alderman, National Farmers Union (NFU)

Telephone / E-mail

Bernard Sulek, General Manager - Sales and Marketing, Wales Region, Shanks

Ceri Hughes, Marketing Analyst, Research Department, Wales Tourist Board

Dafydd Williams, Milford Haven Refinery (Total)

Dylan Morgan, Policy Advisor, National Farmers Union (NUF)

Nick Ward, Directory of Environmental Goods and Services providers

Rebecca Williams, Executive Officer, Farmers' Union of Wales (FUW)

Roger Sired, Waste Management Officer, New Forest District Council

Sheila Paine, West Wales Eco Centre

Stuart Pardoe, Environment Agency

Biffa

Greenacre Waste Management Ltd - recently taken over by Shanks

LAS Waste Limit

Milford Haven Port Authority

Pembroke Refinery (Texaco)

PIFA (Packaging & Industrial Films Association)

PLANED Plastics Recycling Feasibility Study

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- ⁵ National Assembly Statistics for Wales (2004) *Digest of Welsh Local Area Statistics*, National Assembly for Wales
<http://www.wales.gov.uk/keypubstatisticsforwales/content/publication/compendia/2003/dwlas2003/dwlas2003-e.htm>
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- ¹⁴ Geoff Broom Associates (2001) *Pembrokeshire Tourism: Local Area Tourism Model Final Report*, Geoff Broom Associates
- ¹⁵ Wales Tourist Board (2004) *Tourism Trends Digest*, Wales Tourist Board
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- ¹⁷ For examples of products see <http://www.centriforce.info>

Appendix 1

**Report from BASRAP initiative – commercial plastics recycling project,
Basildon - source: Remade Essex**