

## 5 Material Flow Analysis of Production in the South East

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### 5.1 Volumes of Production in the South East

The basic approach of deriving UK production numbers has been described in Chapter 2.2.5 (“Assessing the material production of UK regions”).

Within SIC(92)<sup>1</sup> and the PRODCOM list the 2-digit codes 14 to 36 are relevant for the industrial production of goods. Volume units from items listed in these categories have been converted into ‘tonnes’ by estimating average weights (8-digit level). This was possible for SIC codes 14 to 29. It was impossible however, for the SIC codes 30 to 36 as these codes contain machinery, transport equipment and furniture – items for which it was difficult or impossible to obtain average weights<sup>2</sup>.

After the unit conversion it was possible to calculate totals for SIC codes 14 to 29. However, half of all the data within the PRODCOM list is either not available or suppressed for reasons of confidentiality (only 48 % of all data entries contain numerical data). In some cases it was possible to use the average price for “Net Supply” to calculate a substitute volume (in tonnes), assuming the same price for production and consumption.

To establish the tonnage of materials that are produced in a particular region is notoriously difficult. The method that has been employed in this project is based on employment numbers. National data concerning production by SIC 2-digit code has been generated as described above. In order to proxy down the national production figure to the regional level, information concerning the number of

<sup>1</sup> Standard Industrial Classification, 1992

<sup>2</sup> Example: SIC code 35111000 includes warships and submarines.

individuals employed within these industrial sectors both on the national and regional level was used<sup>3</sup>. The assumption behind the proxy is based on the fact that if someone is employed within a particular industry in the local area then a product will be produced there. All results from these calculations are given in Table 5.1.1.

**Table 5.1.1 Total amount of materials produced within the UK and the South East by SIC(92) industry classes (2-digit level) using a proxy method based on employment numbers**

SIC 2-digit code and description	Number of Employees (SE)	Number of Employees (UK)	Proportion for SE	UK Production from PRODCOM 2000	Total SE Production	Units
14: Other mining and quarrying	3,420	a) 16%	a)	165,645,785	26,221,973	t
15 + 16: Food, beverages, tobacco	27,040	200,250	14%	156,323,014	21,108,486	t
17: Textiles	4,795	117,325	4%	8,491,402	347,038	t
18: Apparel; dressing/dyeing fur	3,040	81,925	4%	262,396	9,737	t
19: Tanning/dressing of leather, etc	1,060	20,125	5%	135,244	7,123	t
20: Wood/products/cork, etc	11,440	105,450	11%	5,858,639	635,589	t
21: Pulp, paper and paper products	12,120	69,175	18%	21,057,373	3,689,416	t
22 : Publishing, printing, repro media	63,160	357,800	18%	589,403,546	104,043,399	t
23: Coke, refined petroleum products	1,825	4,625	39%	b)	b)	
24: Chemicals and chemical products	25,565	109,125	23%	25,478,771	5,968,979	t
25: Rubber and plastic goods	28,770	184,050	16%	6,323,965	988,538	t
26: Other non-metallic products	14,190	91,425	16%	128,042,695	19,873,403	t
27: Basic metals	5,790	68,775	8%	23,629,723	1,989,329	t
28: Fabricated metal products, etc	52,240	455,725	11%	5,563,476	637,744	t
29: Machinery and equipment nec	50,280	284,850	18%	45,938,911	8,108,859	t
30: Office machinery and computers	9,455	22,200	43%	c)	c)	mixed
31: Electrical machinery/apparatus nec	29,960	126,275	24%	c)	c)	mixed
32: Radio, tv/communications equipment	19,645	98,500	20%	c)	c)	mixed
33: Medical, precision instruments,etc	32,315	98,500	33%	c)	c)	mixed
34: Motor vehicles, trailers, etc	11,565	81,750	14%	c)	c)	mixed
35: Other transport equipment	14,515	43,875	33%	c)	c)	mixed
36: Furniture; manufacturing nec	30,725	239,375	13%	c)	c)	mixed
<b>Total (and actual accuracy)</b>				<b>1,180 Mt</b>	<b>195 MT</b>	

Notes:

- a) As no UK employee number was available the same proxy as for the construction industry was applied (see Chapter 3.5)  
b) Data from PRODCOM 2000 suppressed or not available.  
c) SIC code 30 to 36: it was not possible to convert all units to 'tonnes'. Therefore, production numbers could be worked out at the 8-digit-level but cannot be presented at a 2-digit level.

Production figures have also been worked out using the Combined Nomenclature classification system (CN) which is a requirement for all Mass Balance projects under the "Mass Balance

<sup>3</sup> The preferred proxy method for generating production statistics is through labour market statistics based on the SIC(92) classification (Source: SEEDA, Economic Development Group)

Framework”<sup>4</sup>. The Combined Nomenclature is the system used by HM Customs and Excise to classify and monitor the movement of goods in the EU. This scheme is comprehensive (~16,000 types of product) and includes all the material and product types likely to be included in the mass balance framework.

In this project we have been working to CN level 1 (2-digit coding). For the conversion from PRODCOM to CN a conversion table available from Eurostat’s Classifications Server has been used<sup>5</sup>. This table converts on a 8-digit level the 5,000+ entries of the PRODCOM list to 16,000+ CN codes. A software tool has been developed by SEI to automatically filter CN numbers of any digit level (1 to 8) connected with the corresponding entries for production volumes in the PRODCOM list. Thus it was possible to allocate production numbers to the 99 industrial categories of CN (2-digit level, see table). One has to bear in mind however, that – due to data gaps in PRODCOM – a significant amount of data is not available or suppressed and that for the CN categories 84 to 92 and 94 to 96 no unit conversion to ‘tonne’ could be performed.

Employment numbers in CN classification are not available. Therefore, for each CN 2-digit class employment proportions for the South East have been derived from the best matching SIC 2-digit classes. Results for this procedure are displayed in Table 5.1.2.

**Table 5.1.2 Total amount of materials produced within the UK and the South East by CN industry classes using a proxy method based on employment numbers**

Best matching SIC codes (2-digit) <sup>a)</sup>	Proportion for SE	CN code (8-digit)	CN description	UK Production 2000 (converted from PRODCOM)	Total SE Production	Units
		<b>Section I</b>	<b>Live animals; animal products</b>			
b)		0100 00 00	Live animals	-	-	-
15	14%	0200 00 00	Meat and edible meat offal	3,521,324	475,489	t
15	14%	0300 00 00	Fish and crustaceans, molluscs and other aquatic invertebrates	358,570	48,418	t
15	14%	0400 00 00	Dairy produce; birds’ eggs; natural honey; edible products of animal origin, not elsewhere specified or included	2,601,623	351,300	t
15	14%	0500 00 00	Products of animal origin not elsewhere specified or included	625,683	84,487	t
		<b>Section II</b>	<b>Vegetable products</b>			
b)		0600 00 00	Live trees and other plants; bulbs, roots and the like; cut flowers and ornamental foliage	-	-	-
15	14%	0700 00 00	Edible vegetables and certain roots and	200,748	27,107	t
15	14%	0800 00 00	Edible fruit and nuts; peel of citrus fruits or melons	20,735	2,800	t
15	14%	0900 00 00	Coffee, tea, mate and spices	158,286	21,374	t
15	14%	1000 00 00	Cereals	146,082	19,726	t

<sup>4</sup> See <http://www.massbalance.org>

<sup>5</sup> [http://europa.eu.int/comm/eurostat/ramon/cgi/SimWWWFrame.SimBottomFrame?p\\_nID=&p\\_llD=&p\\_pID=&p\\_langnom=&p\\_frameType=11&p\\_asso=&p\\_emp=&p\\_language=EN](http://europa.eu.int/comm/eurostat/ramon/cgi/SimWWWFrame.SimBottomFrame?p_nID=&p_llD=&p_pID=&p_langnom=&p_frameType=11&p_asso=&p_emp=&p_language=EN)

Best matching SIC codes (2-digit) <sup>a)</sup>	Proportion for SE	CN code (8-digit)	CN description	UK Production 2000 (converted from PRODCOM)	Total SE Production	Units
15	14%	1100 00 00	Products of the milling industry; malt; starches; inulin; wheat gluten	5,881,158	794,140	t
15	14%	1200 00 00	Oil seeds and oleaginous fruits; miscellaneous grains, seeds and fruit; industrial or medical plants; straw and Lacs <sup>6</sup> ; gums, resins and other vegetable saps and extracts	c)	c)	t
b)		1300 00 00		-	-	-
15	14%	1400 00 00	Vegetable plaiting materials; vegetable products not elsewhere specified or included	c)	c)	t
<b>Section III</b>			<b>Animal or vegetable fats and oils and their cleavage</b>			
15, (17), (24)	14%	1500 00 00	Animal or vegetable fats and oils and their cleavage products; prepared edible fats; animal or vegetable waxes	1,877,306	253,495	t
<b>Section IV</b>			<b>Food products</b>			
15	14%	1600 00 00	Preparations of meat, fish or crustaceans, molluscs or other aquatic invertebrates	1,903,249	256,998	t
15	14%	1700 00 00	Sugars and sugar confectionery	1,502,358	202,865	t
15	14%	1800 00 00	Cocoa and cocoa preparations	641,779	86,660	t
15	14%	1900 00 00	Preparations of cereals, flour, starch or milk; pastrycooks' products	3,833,771	517,679	t
15	14%	2000 00 00	Preparations of vegetables, fruit, nuts or other parts of plants	2,857,777	385,889	t
15	14%	2100 00 00	Miscellaneous edible preparations	2,149,596	290,263	t
15	14%	2200 00 00	Beverages, spirits and vinegar	107,657,677	14,537,147	t
15	14%	2300 00 00	Residues and waste from the food industries; prepared animal fodder	4,052,530	547,218	t
16	14%	2400 00 00	Tobacco and manufactured tobacco substitutes	410,405	55,418	t
<b>Section V</b>			<b>Mineral products</b>			
14, (26)	16%	2500 00 00	Salt; sulphur; earths and stone; plastering materials, lime and cement	182,285,783	28,856,109	t
14	16%	2600 00 00	Ores, slag and ash	1,003,918	158,922	t
(23), (24), 26	16%	2700 00 00	Mineral fuels, mineral oils and products of their distillation; bituminous substances; mineral waxes	241,146	37,428	t
<b>Section VI</b>			<b>Products of the chemical or allied industries</b>			
24	23%	2800 00 00	Inorganic chemicals: organic or inorganic compounds of precious metals, of rare-earth	2,872,275	672,895	t
24	23%	2900 00 00	Organic chemicals	5,684,203	1,331,653	t
24	23%	3000 00 00	Pharmaceutical products	c)	c)	t
24	23%	3100 00 00	Fertilizers	4,756,737	1,114,373	t

<sup>6</sup> Lac is a resinous substance produced by certain tropical Asian insects and deposited on the twigs of various trees, used to make varnish, especially *shellac*.

Best matching SIC codes (2-digit) <sup>a)</sup>	Proportion for SE	CN code (8-digit)	CN description	UK Production 2000 (converted from PRODCOM)	Total SE Production	Units
24	23%	3200 00 00	Tanning or dyeing extracts; tannins and their derivatives; dyes, pigments and other colouring matter; paints and varnishes; putty and other mastics; inks	1,758,865	412,054	t
24	23%	3300 00 00	Essential oils and resinoids; perfumery, cosmetic or toilet preparations	128,246	30,045	t
24	23%	3400 00 00	Soaps, organic surface-active agents, washing preparations, lubricating preparations, artificial waxes, prepared waxes, shoe polish, scouring powder and the like, candles and similar products, modelling pastes...	1,797,694	421,151	t
15, (24)	14%	3500 00 00	Albuminous substances; modified starches; glues; enzymes	235,273	31,769	t
24, 36	18%	3600 00 00	Explosives; pyrotechnic products; matches; pyrophoric alloys; combustible materials	35,228	6,387	t
24	23%	3700 00 00	Photographic or cinematographic products	115,827	27,135	t
24	23%	3800 00 00	Miscellaneous chemical products	62,849,070	14,723,816	t
<b>Section VII</b>			<b>Plastics and rubber and articles thereof</b>			
(24), 25	16%	3900 00 00	Plastics and articles thereof	8,057,594	1,259,533	t
(24), 25	16%	4000 00 00	Rubber and articles thereof	1,992,493	311,459	t
<b>Section VIII</b>			<b>Hides and skins; articles of leather etc.</b>			
(15), 19	5%	4100 00 00	Hides and skins (other than furskins) and	369,657	19,470	T
(18), 19	5%	4200 00 00	Articles of leather; saddlery and harness; travel goods, handbags and similar containers; articles of animal gut (other than silk-worm gut)	41,771	2,200	T
18	4%	4300 00 00	Furskins and artificial fur; articles thereof	525	19	T
<b>Section IX</b>			<b>Wood and articles of wood etc.</b>			
20	11%	4400 00 00	Wood and articles of wood; wood charcoal	5,855,397	635,237	t
20	11%	4500 00 00	Cork and articles of cork	678	74	t
20	11%	4600 00 00	Wickerwork and basketwork	2,564	278	t
<b>Section X</b>			<b>Paper and paperboard; pulp of wood etc.</b>			
21	18%	4700 00 00	Pulp of wood or of other fibrous cellulosic material; waste and scrap of paper or paperboard		c)	c) t
21	18%	4800 00 00	Paper and paperboard; articles of paper pulp, paper or paperboard	14,018,195	2,456,097	t
22	18%	4900 00 00	Books, newspapers, pictures and other products of the printing industry; manuscripts, typescripts and plans	101,475	17,913	t
<b>Section XI</b>			<b>Textiles and textile articles</b>			
17	4%	5000 00 00	Silk	527	22	t
17	4%	5100 00 00	Wool, fine and coarse animal hair; yarn and fabrics of horsehair	44,389	1,814	t
17	4%	5200 00 00	Cotton	7,171	293	t
17	4%	5300 00 00	Other vegetable textile fibres; paper yarn and woven fabrics of paper yarn	8,642	353	t

Best matching SIC codes (2-digit) <sup>a)</sup>	Proportion for SE	CN code (8-digit)	CN description	UK Production 2000 (converted from PRODCOM)	Total SE Production	Units
17, 24	14%	5400 00 00	Man-made filaments	142,417	19,593	t
17, 24	14%	5500 00 00	Man-made staple fibres	249,204	34,283	t
17	4%	5600 00 00	Wadding, felt and nonwovens; special yarns; twine, cordage, rope and cable and articles thereof	199,754	8,164	t
17	4%	5700 00 00	Carpets and other textile floor coverings	139,121	5,686	t
17	4%	5800 00 00	Special woven fabrics; tufted textile products; lace; tapestries; trimmings; embroidery	10,479	428	t
17	4%	5900 00 00	Impregnated, coated, covered or laminated textile fabrics; articles for technical use, of textile materials	35,034	1,432	t
17	4%	6000 00 00	Knitted or crocheted fabrics	54,902	2,244	t
17, (18)	4%	6100 00 00	Articles of apparel and clothing accessories, knitted or crocheted	485,048	19,824	t
18	4%	6200 00 00	Articles of apparel and clothing accessories, not knitted or crocheted	167,002	6,197	t
17	4%	6300 00 00	Other made up textile articles; sets; worn clothing and worn textile articles; rags	5,566,432	227,497	t
<i>Section XII Footwear, headgear, umbrellas etc.</i>						
19	5%	6400 00 00	Footwear, gaiters and the like; parts of such articles	8,443	445	t
18, (25)	4%	6500 00 00	Headgear and parts thereof	69,756	2,588	t
36	13%	6600 00 00	Umbrellas, sun umbrellas, walking-sticks, seat-sticks, whips, riding-crops and parts thereof	2,380	306	t
36	13%	6700 00 00	Prepared feathers and down and articles made of feathers or of down; artificial flowers; articles of human hair	2,558	328	t
<i>Section XIII Articles of stone, plaster, cement, asbestos,</i>						
26	16%	6800 00 00	Articles of stone, plaster, cement, asbestos, mica or similar materials	36,762,068	5,705,811	t
26	16%	6900 00 00	Ceramic products	9,888,952	1,534,856	t
26	16%	7000 00 00	Glass and glassware	2,309,647	358,478	t
<i>Section XIV Natural or cultured pearls, precious or semi-precious stones, ...</i>						
(27), 36	13%	7100 00 00	Natural or cultured pearls, precious or semi-precious stones, precious metals, metals clad with precious metal, and articles thereof; imitation jewellery; coin	11,702	1,502	t
<i>Section XV Base metals and articles thereof</i>						
27	8%	7200 00 00	Iron and steel	711,760	59,921	t
(27), 28, (29)	11%	7300 00 00	Articles of iron or steel	5,725,495	656,317	t
27, (28)	8%	7400 00 00	Copper and articles thereof	330,374	27,813	t
27, (28)	8%	7500 00 00	Nickel and articles thereof	13,519	1,138	t
27, (28)	8%	7600 00 00	Aluminium and articles thereof	1,552,181	130,674	t
b)		7700 00 00	(reserved for possible future use in the harmonized system)	-	-	-
27	8%	7800 00 00	Lead and articles thereof	376,022	31,656	t
27	8%	7900 00 00	Zinc and articles thereof	69,154	5,822	t

Best matching SIC codes (2-digit) <sup>a)</sup>	Proportion for SE	CN code (8-digit)	CN description	UK Production 2000 (converted from PRODCOM)	Total SE Production	Units
27	8%	8000 00 00	Tin and articles thereof	7,789	656	t
27	8%	8100 00 00	Other base metals; cermets; articles thereof	10,026	844	t
28	11%	8200 00 00	Tools, implements, cutlery, spoons and forks. of base metal: parts thereof of base	102,845	11,789	t
28	11%	8300 00 00	Miscellaneous articles of base metal	134,766	15,448	t
<i>Section XVI Machinery and mechanical appliances; electrical machinery ...</i>						
29	18%	8400 00 00	Nuclear reactors, boilers, machinery and mechanical appliances; parts thereof	d)	d)	mixed
mixed	18%	8500 00 00	Electrical machinery and equipment and parts thereof; sound recorders and reproducers, television image and sound recorders and reproducers, and parts and accessories of such articles	d)	d)	mixed
<i>Section XVII Vehicles, aircraft, vessels and associated transport equipment</i>						
25, 35	24%	8600 00 00	Railway or tramway locomotives, rolling-stock and parts thereof; railway or tramway track fixtures and fittings and parts thereof; mechanical, including electro-mechanical, traffic signalling equipment of all kinds	d)	d)	mixed
34, (35)	14%	8700 00 00	Vehicles other than railway or tramway rolling-stock, and parts and accessories thereof	d)	d)	mixed
(25), 35	33%	8800 00 00	Aircraft, spacecraft, and parts thereof	d)	d)	mixed
35	33%	8900 00 00	Ships, boats and floating structures	d)	d)	items
<i>Section XVIII Optical, photographic, cinematographic, measuring ...</i>						
33	33%	9000 00 00	Optical, photographic, cinematographic, measuring, checking, precision, medical or surgical instruments and apparatus; parts and accessories thereof	d)	d)	items
33	33%	9100 00 00	Clocks and watches and parts thereof	d)	d)	items
36	13%	9200 00 00	Musical instruments; parts and accessories for such articles	d)	d)	items
<i>Section XIX Arms and ammunition; parts and accessories thereof</i>						
29	18%	9300 00 00	Arms and ammunition; parts and accessories thereof	1,027,833	181,427	t
<i>Section XX Miscellaneous manufactured articles</i>						
(17), (31), 36	13%	9400 00 00	Furniture; medical and surgical furniture; bedding, mattresses, mattress supports, cushions and similar stuffed furnishings; lamps and lighting fittings, not elsewhere specified; illuminated signs...	d)	d)	mixed
36	13%	9500 00 00	Toys, games and sports requisites; parts and accessories thereof	d)	d)	mixed
36	13%	9600 00 00	Miscellaneous manufactured articles	d)	d)	mixed
<i>Section XXI Works of art, collectors' pieces and antiques</i>						
b)		9700 00 00	Works of art, collectors' pieces and antiques	-	-	mixed

Best matching SIC codes (2-digit) <sup>a)</sup>	Proportion for SE	CN code (8-digit)	CN description	UK Production 2000 (converted from PRODCOM)	Total SE Production	Units
b)		9800 00 00	Complete industrial plant exported in accordance with commission regulation (eed) no 518/79	-	-	- mixed
<b>Total (and actual accuracy)</b>				<b>500 Mt</b>	<b>81 Mt</b>	

## Notes:

- a) Second and third best matching SIC codes in brackets.
- b) None of the SIC codes 14 to 36 match this CN code.
- c) Data from PRODCOM 2000 suppressed or not available.
- d) CN code 84 to 96: except for CN code 93 it was not possible to convert all units to 'tonnes'. Therefore, production numbers cannot be presented at a 2-digit level.

Obviously, total numbers for production differ significantly between SIC and CN classifications (195 Mt compared to 81 Mt). There are a couple of reasons for that. Firstly and most important, the categories for which there are no consistent units are different for both classifications: they contain different types and amounts of materials. Secondly, as there are no employment numbers for CN, assumptions on the SE proportion had to be made based on the best matching SIC codes. This might lead to a different proportioning of product categories. As there are many data gaps within PRODCOM the calculated numbers have to be seen as underestimates of the real production figures.

These production numbers can be compared to the arising of waste from industrial production. As outlined in Chapter 4.10, 5.8 million tonnes of industrial waste were produced in the South East in 2000. The largest part of this (3.2 Mt or 56%) were brought to landfill whereas 1.4 Mt (25%) were re-used or recycled (see Table in Chapter 4.10.1).

## 5.2 Linkages to the REWARD Project

In order to assess resource productivity in English Regions and in Wales a project called REWARD (Regional and Welsh Appraisal of Resource Productivity and Development Database) has been initiated by the Environment Agency and the regional governments. The environmental data held within this database were generated as part of the WRERP (Wales and Regions Economic Resource Productivity) project and comprise four core datasets: air emissions, energy use, water consumption and waste arisings. The 'sector' parameter enables the selection of a specific industrial sector for which data can be generated. The 'region' parameter enables the selection of a RDA region. The 'unit' selection enables the user to view the data in either original units (e.g. tonnes of emissions), in terms of global warming potential (GWP) if a greenhouse gas has been selected, and in units per GVA (Gross Value Added) (e.g. tonnes of emissions per unit of economic output).

With the help of REWARD data it is possible to work out the impact of production in the South East. By using sector specific data for production (see above) and emission/consumption (from REWARD) it is possible to derive an 'impact per tonne' figure. These "embodied" impact figures (embodied



energy, embodied CO<sub>2</sub> emissions etc.) are very important for the calculation of environmental impacts of resource consumption. In particular, embodied energy data are crucial for all MFA and EF calculations as they rely on embodied energies of products. Embodied emission figures can be used in future resource productivity projects to include other impacts such as health risks from air pollution.

Table 5.2.1 provides an example of how REWARD data can be combined with data from the Taking Stock project. As we know from the production calculations about 4.5 million tonnes of paper are produced in the South East (see Table 5.1.2 above). REWARD provides estimates of the annual emissions from the paper production sector<sup>7</sup>. Combining these numbers results in emission factors for different pollutants specific to the production of paper in the South East.

**Table 5.2.1 Pollutant emission factors for the production of paper in the South East**

Pollutant	Annual emissions from the production of 4.5 Mt of paper in the South East (tonnes)	Emission factors (g/t)
CH <sub>4</sub>	58.5	13.0
CO	698	156
CO <sub>2</sub> (as C)	434,527	96,867
HFC	0.03	0.0067
N <sub>2</sub> O	40.4	9.01
NO <sub>x</sub>	1,211	270
PM <sub>10</sub>	98.5	21.9
SO <sub>2</sub>	112	24.9
VOC	2,565	572

The same approach can be applied to other data from the REWARD project:

REWARD provides data on the emissions of **air pollutants from road transport** in four extra categories, illustrating analysis of transboundary emissions. These categories include: emissions generated by road transport remaining within the region (*Internal*); emissions generated by road transport travelling to the regional boundary and exiting into another RDA region (*Origin*); emissions generated by road transport travelling from another region into the region (*Destination*); and emissions generated by road transport travelling through the RDA region (*Through*). By looking at *Internal* and *Origin* emissions, emission factors for air pollutants from the transport of paper produced in the South East can be derived (in g/t). Similarly, **water** and **waste** data from the REWARD database can be used to estimate air pollutant emissions from these sectors as well.

The REWARD database suggests that the ‘pulp, paper and paper products’ sector in the South East consumes 26 petajoules of **energy**. This equates to an embodied energy of 5.80 GJ per tonne of paper products. So far, embodied energy data were used from various sources including e.g. the Energy Analysis Program from IVEM<sup>8</sup>. More locally-specific data will make the calculations more accurate and valuable.

<sup>7</sup> More precisely, the detailed sector defined by REWARD is “Pulp, paper and paper products”. Production data refer to the sector with CN code 4800 00 00: “Paper and paperboard; articles of paper pulp, paper or paperboard”

<sup>8</sup> IVEM (1999) Energy Analysis Program, Research Report no.98. Interfacultaire Vakgroep Energie en Milieukunde, Groningen, March 1999

## 5.3 Reducing the Impact of Production – Cases Studies from the South East

Manufacturing accounted for almost 500,000 jobs in 2001. By 2010, total manufacturing employment in the South East is expected to be equal to that in the West Midlands, and higher than any other UK region<sup>9</sup>. Therefore, as a region the South East has the potential to make a considerable contribution to improvements in resource productivity. A number of case studies have been given below to provide an understanding of the gains in productivity that can be made within some key industrial sectors. Where possible the ecological footprint has been applied to demonstrate the beneficial reduction in environmental impact. In some cases it is a particular scheme that has been explained relating to a number of businesses and in other cases a specific organisation is referred to.

### 5.3.1 Case Study 1 – West Sussex betre programme<sup>10</sup>

The West Sussex betre programme was established to provide support for SMEs in connection with resource efficiency and waste minimisation.

#### Summary

Over 300 diverse small and medium sized businesses (SMEs) in West Sussex have taken part in the betre project to reduce their waste, water and energy use and many made significant cost savings. Betre stands for **business excellence through resource efficiency** – the programme offered free support and advice over an 18 month period up to June 2002 which included workshops, newsletters, environmental audits, grants and a technical helpline. Run by EcoSys for the West Sussex Sustainable Business Partnership, the betre programme disseminated information on legislation and best practice for waste minimisation and recycling, energy saving and water efficiency, linking to the government's environmental best practice programmes. Betre was very successful in encouraging businesses to start taking action, and leaves a significant base of interested businesses in West Sussex.

#### Key Facts

Three people were employed to run the project – a project manager, assistant and a part-time auditor. 308 businesses took part, 158 were trained and 64 implemented 214 different actions to improve efficiency and reduce waste. Waste disposed to landfill was reduced by 1437 tonnes per annum, and annual water use went down by 63,000 m<sup>3</sup>. Energy savings of 1,558,921 KWh per annum were made, reducing CO<sub>2</sub> emissions by 668 tonnes. Cost savings totalling £215,357 were identified, of which around half were achieved by June 2002, and based on the experience of other similar projects future savings could potentially top £1 million as businesses continue to identify and implement further

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<sup>9</sup> SEEDA (2003) An Economic Profile of the South East

<sup>10</sup> West Sussex betre Waste Minimisation Programme, Project Review, Janette Stringer and Ben Coulter, EcoSys Environmental Management and Education, August 2002. West Sussex betre Newsletter, Ecosys, Summer 2002. The Benefits of Greener Business, Cambridge Econometrics & AEA Technology for the Environment Agency, April 2003.

For further information: Janette Ackroyd, East Sussex betre Project Manager, EcoSys, Units A-C Level 7 South, New England House Business Centre, New England Street, Brighton BN1 4GH. Tel 01273 245587. E-mail jackroyd@ecosys.org.uk.

actions. Environmental compliance was also improved with the potential to save a further £204,000 in avoided fines.

Table 5.3.1 Reductions achieved in the West Sussex betre programme

Main Category	Subcategory	No of Actions	Quantity Saved p.a.	Units	Cost Saved p.a. (£)	Cost to implement (£)
Solid Waste	Waste Reduced	10	89	tonnes	£4,254	£1,000
	Waste Exchanged	2	0.5	tonnes	£500	£0
	Waste Recycled	22	861	tonnes	£16,801	£34,832
	Waste Management	17	487	tonnes	£44,925	£10,000
	<b>Total waste</b>	<b>51</b>	<b>1438</b>	<b>tonnes</b>	<b>£66,480</b>	<b>£45,832</b>
Energy – insulation	Roof	1	40,000	kWh	£1,000	£0
Energy Control	Timers/Switch off	7	178,848	kWh	£8,942	£0
	Thermostatic controls	1	3,440	kWh	£86	£0
Energy – Electricity	Lighting	21	199,185	kWh	£9,027	£3,036
	Heating	2	123,270	kWh	£5,914	£1,100
	Process Equipment	8	871,234	kWh	£43,666	£38,705
Energy – Gas	Heating	5	56,120	kWh	£1,700	£3,500
	Process equipment	2	85,376	kWh	£854	£0
Fuel	Heating	1	1,448	kWh	£256	£0
Energy – Tariff	Electricity	13	0.0	n/a	£20,223	£0
	<b>Total energy</b>	<b>62</b>	<b>1558921</b>	<b>KWh</b>	<b>£91,668</b>	<b>£46,341</b>
Water savings	Urinals	7	2549	m3	£3,120	£250
	Taps	2	87	m3	£70	£0
	Toilets	5	146	m3	£88	£0
	Leaks	5	4,185	m3	£2,924	£800
	Process	7	55,966	m3	£37,205	£3,686
	<b>Total water</b>	<b>26</b>	<b>62,933</b>	<b>m3</b>	<b>£43,407</b>	<b>£4,736</b>
Sustainable Transport		2	n/a		£7,000	£0
EMS		5	n/a		£300	£0
Environmental Policy		6	n/a		£0	£0
Green Publicity Gained		3	n/a		£0	£0
Monitoring		15	n/a		£6,500	£0
<b>TOTAL ALL</b>		<b>214</b>	<b>n/a</b>		<b>£215,357</b>	<b>£96,909</b>

### Replication potential/extrapolation

Taking the savings achieved by 64 SMEs as outlined above, rough estimates can be made of the potential savings at regional level if all SMEs were to take similar actions. The great majority of those taking part in West Sussex betre were companies with 11–199 employees. Using SIC code data the number of SMEs in the region can be obtained. For 2000 (excluding SIC codes 75–99 which are non-

business organisations) the total is 34,376 businesses with 11–199 employees. This gives a multiplication factor of 537 to arrive at regional figures.<sup>11</sup>

**Table 5.3.2: Potential Savings for the South East region**

Main Category	Betre W Sussex total savings (From 64 SMEs, 11 – 199 employees)	Estimated potential regional savings (Based on 34,376 SMEs in SE region, giving multiplication factor of 537)
Waste reduced per annum	1,437 tonnes	771,800 tonnes
Energy saved p.a	1.559 million KWh	837 million KWh
CO <sub>2</sub> emissions reduced p.a	668 tonnes	359,000 tonnes
Water saved p.a	62,900 m <sup>3</sup>	33,795,000 m <sup>3</sup>
Cost saved p.a	£215,357	£115,700,000
Cost to implement actions (Note some costs are one-off, others are ongoing annual costs, making it hard to gross up.)	£96,909	

### Barriers and opportunities/problems and drivers for replication

The Waste Strategy for England and Wales (DETR 2000) places waste management and resource efficiency at the centre of efforts to deliver sustainable development. The Government is also committed to uncoupling the link between economic growth and increased waste production and disposal, and has taken many opportunities to emphasise the link between sustainable business practice and competitiveness. Increasingly onerous waste legislation and increasing waste disposal costs are added incentives for action.

It is estimated that in the last decade some 1,500 companies nationally have been involved in waste minimisation initiatives, but of these only 700 have undergone any training or achieved successful actions. This means that less than 0.1 per cent of UK companies have undergone successful waste minimisation training – clearly there is a real need to help businesses tackle the challenge of improving resource efficiency. The potential for savings is clear – a recent report on the Benefits of Greener Business estimated that if all manufacturers invested in best practice waste minimisation techniques they could achieve around £347 million savings in the South East and £2–2.9 billion savings nationally in annual operating costs, equivalent to 5–7 per cent of profits in 2000.

The West Sussex betre programme was set up and run by the West Sussex Sustainable Business Partnership (WSSBP), a collaboration of all West Sussex Local Authorities, the Environment Agency and EcoSys. The partnership provided a strong base for this initiative, and also creates a focus for ongoing action to build on the success of the programme. Funding required was £125,000 that came mainly from the Landfill Tax Credit Scheme, with match funding from WSSBP and other support from West Sussex County Council, the Environment Agency and the Government Office for the South East.

<sup>11</sup> It is acknowledged that this is a rough calculation to give some idea of the potential reduction in energy use and waste production. Further work is required to gain a more realistic assumption of potential reduction.

Recruitment of businesses was a challenge, particularly early on in the project, and this required considerable amounts of staff time. The effectiveness of different methods varied greatly, with engagement via business organisations proving most successful. Use of Green Action Awards was useful in prompting action and recognising achievements, and this also enabled local case studies to be developed. The project also found that a lack of available recycling services was a real barrier for many small firms which don't generate large quantities of recyclable material. It is important this improves as recycling is often the first step a small company will consider.

### 5.3.2 Case Study 2 – Woking Borough Council Energy Services<sup>12</sup>

Woking Borough Council Energy Services have undertaken a programme of energy efficiency measures and local sustainable energy generation.

#### Summary

Over the past 11 years Woking Borough Council has implemented a series of sustainable energy projects, including the UK's first small-scale combined heat and power (CHP) heating and heat fired absorption cooling system, the first local authority private wire (direct supply to householders) residential CHP and renewable energy systems, the largest domestic integrated photovoltaic/CHP installations, the first local sustainable community energy system, the first fuel cell CHP system and first public/private joint venture Energy Services Company (ESCO). These have resulted in savings of nearly £4.9 million for the Council, and further savings for householders and businesses in the Borough. Woking is recognised as the most energy efficient local authority in the UK, and in recognition of its pioneering energy services work the Council gained the Queen's Award for Enterprise: Sustainable Development 2001, the only local authority ever to be awarded a Queen's Award for Enterprise.

#### Key Facts

Since the Council implemented its energy and environmental policies in 1990/91 (the base year), it achieved its target to reduce energy consumption by 40% in 10 years from 1991/92 to 2000/01. In 2002, the Council's energy efficiency policy was replaced by the Climate Change Strategy for Woking, not just for Council buildings and transport but for the Borough as a whole, shifting the focus from energy savings in kWhs to savings in tonnes of CO<sub>2</sub> emissions as well as adapting to climate change. The key target from this is to achieve an 80% reduction in Woking's CO<sub>2</sub> equivalent emissions of its 1990 level by 2090, in line with the Royal Commission on Environmental Pollution's targets.

Table 5.3.3 Summary achievements against target over 11 years from 1991/1992 to 2001/2002 – energy and emissions savings from Council buildings and transport

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<sup>12</sup> Climate Change Strategy, Woking Borough Council, March 2003; An Innovative Climate at Woking, Woking Borough Council, 2002

Woking: Local Sustainable Community Energy and Fuel Cells, Allan Jones MBE, Woking Borough Council, April 2003.

Website: [www.woking.gov.uk](http://www.woking.gov.uk)

For further information: Allan Jones MBE, Energy Services Manager, Woking Borough Council, Civic Offices, Gloucester Square, Woking, Surrey GU21 6YL. Tel 01483 743490. E-mail [allan.jones@woking.gov.uk](mailto:allan.jones@woking.gov.uk)

<b>Energy consumption savings</b>	<b>170,170,665 KWh</b>	<b>43.8% saving</b>
<b>Carbon dioxide CO<sub>2</sub> emissions savings</b>	<b>96,588 tonnes</b>	<b>71.5% saving</b>
<b>Nitrogen oxides NO<sub>x</sub> emissions savings</b>	<b>319.1 tonnes</b>	<b>68 % saving</b>
<b>Sulphur dioxide SO<sub>2</sub> emissions savings</b>	<b>976.6 tonnes</b>	<b>73.4 % saving</b>
<b>Water consumption savings</b>	<b>340,011,000 litres</b>	<b>43.8% saving</b>
<b>Savings in energy and water budgets</b>	<b>£4,889,501</b>	<b>34.3% saving</b>

### Replication potential/extrapolation

To get a rough estimate of the potential impact in the South East region if all Local Authorities introduced similar measures to Woking, households have been used as a proxy. Woking has 40,027 households compared to a total of 3,388,838 households in the rest of the region (2002 ACORN figures), giving a multiplication factor of 85 to arrive at regional estimates.

**Table 5.3.4 Estimated Potential Reduction in Environmental Impact**

<b>Category</b>	<b>Savings over 11 years - Woking</b>	<b>Potential savings over 11 years – South East</b>
<b>Energy consumption savings</b>	<b>170,170,665 KWh</b>	<b>14,413.5 GWh</b>
<b>Carbon dioxide CO<sub>2</sub> emissions savings</b>	<b>96,588 tonnes</b>	<b>8,181,000 tonnes</b>
<b>Nitrogen oxides NO<sub>x</sub> emissions savings</b>	<b>319.1 tonnes</b>	<b>27,000 tonnes</b>
<b>Sulphur dioxide SO<sub>2</sub> emissions savings</b>	<b>976.6 tonnes</b>	<b>82,700 tonnes</b>
<b>Water consumption savings</b>	<b>340,011,000 litres</b>	<b>28,799,000 m<sup>3</sup></b>
<b>Savings in energy and water budgets</b>	<b>£4,889,501</b>	<b>£414,141,000</b>

### Barriers and opportunities/problems and drivers for replication

Woking regards climate change as a reality that cannot be ignored, and sees local authorities having a key role to play in setting ambitious but achievable targets. The various national and international targets that have been set are all likely to be inadequate, and if strong action is not taken to reduce greenhouse gases over the next 30 years there will be an irreversible effect on the global climate. Already weather patterns have become more extreme with high winds, floods and high temperatures affecting Woking and many other parts of the UK, and there has been a blurring of seasonal changes in recent years.

The Royal Commission on Environmental Pollution has predicted that the target reduction in greenhouse gases, expressed as CO<sub>2</sub> equivalent emissions, should be 60 per cent by 2050 and 80 per cent by 2100. These targets have been adopted by Woking's Climate Change Strategy. Having been pioneers in this field it is now possible for others to learn from Woking's experience. For example the outcome of a decade of innovative work was the formation of an Energy and Environmental Services Company called Thameswey Ltd to take forward the work. The key concept of this is the provision of energy services (i.e heating, cooling, lighting and power etc) rather than just electricity or gas. Thameswey is wholly owned by Woking Borough Council and it works by entering into public/private joint ventures to deliver energy and other environmental strategies and targets.

Although green electricity tends to be more expensive than conventional 'brown' energy, Thamesway can be competitive by the sale of heating, cooling and electricity directly to the customer. Locally supplied combined heat and power (CHP) can provide efficiencies of up to 90%, in comparison with the central power stations/national grid system which can be as little as 22% efficient at the point of use due to thermal energy wasted at power stations and losses in the grid.

Although Woking has avoided incurring penalty costs by utilising private wire networks and a local trading system, the existing regulatory regime limits the size of the local sustainable energy system and also the number of domestic customers that can be supplied with low cost green energy. This in turn limits the number of fuel poor households which could be provided with affordable energy. Locally embedded generation could supply all of the country's energy needs, and Woking argues that what is needed is a progressive move towards this goal. A key easy step for the government would be to increase the supply limits for local exempt suppliers to supply more customers, particularly domestic customers, with local sustainable and renewable energy.

### 5.3.3 Case Study 3 – The Beacon Press<sup>13</sup>

#### Summary

Printing can be a dirty business – analysing a sample of print can show up to 40 elements and compounds, including heavy metals and arsenic. Most printing processes use large quantities of cleaning solvent, industrial alcohol, film materials and volatile inks, and energy and water use are also high. Beacon Press have been publicly committed to environmental management for over a decade. This has become a primary feature of the company culture that has led to a distinctive trading identity and helped with business growth. Established in 1976, the company employs 65 staff and has an annual turnover in excess of £6.5 million. Beacon has won many awards including the Overall Winner of the SEEDA Sustainable Business Awards in 2002, and the 2003 Queens Award for Sustainable Development.

#### Key Facts

Beacon's environmental programme has achieved a 95% reduction in chemical use since 1995, by introducing waterless printing, solvent-free inks and solvent recycling. The new print technology has also resulted in a reduction of around 30% in paper wastage. Through careful monitoring and control energy and water use have also been reduced, and around 84% of all waste material is now recycled at zero cost to the company. Electricity comes from a 'green' supplier, generating from renewable

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<sup>13</sup> The Beacon Press Environmental Statement 2002

Beautiful Print for a Beautiful World, The Beacon Press Environmental Report 2003

E-mailed information from Mark Fairbrass, Company Chairman

How to convert to waterless printing – good practice guide, Envirowise, 2003

The Benefits of Greener Business, Cambridge Econometrics & AEA Technology for the Environment Agency, April 2003.

For further information:

Mark Fairbrass, Chairman, The Beacon Press, Brambleside, Bellbrook Park, Uckfield, East Sussex TN22 1PL. Tel : 01825 768611. E-mail: [print@beaconpress.co.uk](mailto:print@beaconpress.co.uk)

sources, and Beacon are the world's first printers to gain Carbon Neutral® status by sponsoring tree planting to offset its carbon emissions.

- CO<sub>2</sub> emissions reduced from 510 tonnes in 2001 to 158.6 tonnes in 2002.
- Gas consumption (mainly for space heating) reduced from 0.57 therms per square foot per annum in 1995 to 0.25 therms per square foot in 2002.
- Special waste disposal reduced from 31155 litres in 2001 to 11535 litres in 2002.
- Dry waste disposal (tonnes): Number of impressions printed 2001 – 5,706,700; 2002 – 5,640,600

**Table 5.3.5 The Beacon Press reduction in environmental impact**

Waste material	Recycled 2001	Recycled 2002	Landfilled 2001	Landfilled 2002
Paper	243	220		
Print plates (aluminium)	5	8		
Paper based packaging	3.92	3.67		
Polythene	0.46	0.43		
Other waste (estimated from number of 1100 litre bins, av weight 250kg)			97.5	78
<b>Total</b>	<b>252.68</b>	<b>232.34</b>	<b>97.5</b>	<b>78</b>

### Replication potential/extrapolation

While it is difficult to compare an individual business example with the potential for regional impact, a recent study on the Benefits of Greener Business estimated possible annual savings from waste minimisation process improvement in manufacturing industry generally. This came up with an estimated annual saving for the South East of £347 million, out of a total for the UK of around £2.4 billion. Clearly there are major potential benefits from improving resource productivity, not least improving overall productivity and competitiveness which are at the forefront of the government's economic policy agenda.

### Barriers and opportunities/problems and drivers for replication

It is clear from Beacon's experience that waterless printing technology delivers high quality print at no extra cost and with dramatically reduced impact on the environment. As Beacon have also found, there can be real business benefits from making environmental management a high priority. As large companies take these issues more seriously, purchasing decisions will increasingly depend on suppliers meeting environmental standards.

In a report for Envirowise the experience of a number of companies making the conversion to waterless printing has shown that the following benefits are typically achieved:

- improved print quality;
- increased press productivity and production efficiency;
- cost savings on material purchases and waste disposal;
- significant reductions in both hazardous and general waste;



- less harmful environmental impacts;
- a safer working environment;
- enhanced business opportunities.

Conversion requires commitment and acceptance that new skills need to be learned quickly. There is, however, no evidence from the Envirowise examples of major barriers to any company wishing to improve competitiveness by making such a conversion. Investment needed to replace or convert machinery can usually be offset by savings achieved through more efficient use of resources, but the benefits would need to be assessed for each individual case.

### 5.3.4 Case Study 4 – Global Action Plan – Action at School<sup>14</sup>

Global Action Plan – Action at School. Helping schools and colleges to reduce waste and resource use and save money.

#### Summary

Action at School is a unique mixture of training, information and support to help improve resource management in schools. Schools select one of the following topics – waste, energy, water or transport – to focus on initially. A lead teacher is appointed and an action team then drawn from the entire school community – from students, teachers, parents and governors. They are trained to carry out the project over 3 terms with ongoing support from Global Action Plan and where possible from locally trained volunteers. The programme links in with the National Curriculum and with other environmental initiatives. In addition to improving resource efficiency, Action at School encourages school students to become actively involved in the environmental decision making of the school community.

#### Key Facts

Action at School contains the following elements:

- A training event for the Action Team – comprising representatives from the whole school community: students, teachers, caretakers, governors and parents.
- An initial environmental audit.
- A communication campaign including a launch event.
- £1000 in supply costs to enable teachers to run the programme effectively.

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<sup>14</sup> What is Action at School ?, Global Action Plan, 2003.

Action at School case studies, Global Action Plan, 2003.

E-mail correspondence with Chantelle Hoppe, Global Action Plan.

For further information:

Chantelle Hoppe, Global Action Plan, c/o East Sussex County Council, County Hall, St. Anne's Crescent, Lewes, BN7 IUE. Tel: 07799 740 218. E-mail: [chantelle.hoppe@globalactionplan.org.uk](mailto:chantelle.hoppe@globalactionplan.org.uk) Website: [www.globalactionplan.org.uk](http://www.globalactionplan.org.uk)

- Free membership of Global Action Plan for 150 parents. This includes a membership magazine, discounts at national stores and the 'Greenscore' system allowing families to see how green their home is.
- A curriculum theme week, or series of themed curriculum activities.
- A second audit to measure improvements.
- A celebration of the school's achievements and the presentation of a United Nations certificate.

Work in most schools has focused initially on waste, and the following summarises waste reduction achieved at a number of schools around the country. Action at School has only recently begun to be applied to schools in the South East – 16 schools are currently being worked with but no results are available yet.

**Table 5.3.6 Reduction in waste in schools in the South East**

School	Area	1st Audit	2nd Audit	% waste reduction	Tonnes/ year reduction
Prestwich Community High	Bury	Oct-00	Jul-01	41	4.95
Cloughwood Residential	Cheshire	Oct-01	Jul-02	87	5.53
Dartmouth Community College	Devon	Sep-97	Jul-98	64	10.90
Ferryhill Comprehensive School	Co Durham	Sep-01	Jul-02	58	11.36
Kingshill School	Glos	Jan-02	Feb-03	37	49.80
Dene Magna High School	Glos	Jun-99	Jul-00	59	18.20
Somerville Primary	Wirral	Sep-02	Jul-03	80	4.46
Overchurch Primary	Wirral	Sep-02	Jul-03	33	1.50

### Replication potential/extrapolation

Significant achievements and positive feedback from participants have been reported from all the schools so far involved. Linking in with the National Curriculum means many different subject areas can get involved and potentially large numbers of students. Taking waste as an example, reductions of 50 per cent or greater have commonly been achieved and if this was repeated across all schools in the region this would make a significant impact on waste arisings. In addition, involving all sections of the school community can encourage environmental action beyond the school gates.

### Barriers and opportunities/problems and drivers for replication

The mixture of training, information and support included in Action at School, which includes teacher supply costs, enables the programme to operate successfully in schools normally restricted by time and cost. Clear linkage with the National Curriculum, particularly with Citizenship and Personal Social and Health Education (PSHE) elements, provides further incentive for involvement. To enable Action at School to take place, funding of £7,000 plus VAT is required. Fundraising is carried out by Global Action Plan and the cost is usually met by some combination of companies, local authorities and charitable trusts.

### 5.3.5 Case Study 5 – ReMaDe Kent and Medway<sup>15</sup>

Recycling – developing markets for recyclable material collected in Kent and Medway.

#### Summary

Turning waste into resources by creating new markets for recycled products is the challenge faced by ReMaDe Kent and Medway – ensuring future demand is essential as we aim to recycle more waste material. Its primary objective is to divert recyclable materials from Kent and Medway's waste streams into alternative uses through innovative approaches and the development of new markets. The first full year (2002) was mainly spent on promotion and engagement with a wide range of stakeholders, and seminars were held focusing on particular materials. Project activities have been developed in 2003 based on the outcomes of these seminars, and new market opportunities are now being created with waste diverted from existing streams. Four priority materials were initially highlighted – glass, organic waste, plastic and paper – and to these have been added construction and demolition waste, electrical waste, end of life vehicles and tyres in response to new opportunities and developing legislation.

#### Key Facts

The project target is to recycle or compost at least an additional 77,000 tonnes of waste by the end of 2004. Actual diversion for 2003 will not be known until the end of the year, but the table below estimates the tonnage for the year from the halfway point in June, as well as showing the targets for 2004 and the small amount of diversion achieved in 2002. In 2002, 273 businesses were assisted or advised and 6 seminars or training events were run, which together involved engaging with 335 waste professionals. In terms of promotion 14 presentations were made, 14 publications produced, 3 case studies created and a website set up.

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<sup>15</sup> ReMaDe Kent and Medway Steering Group Annual Report, Dec 2001 to Dec 2002.

ReMaDe Kent and Medway Business Plan January 2003 to December 2003.

E-mail correspondence and telephone conversations with Diana Lock and Stuart Storton, ReMaDe Kent and Medway.

For further information:

Diana Lock, Programme Manager, ReMaDe Kent and Medway, C/o Invicta Innovations,

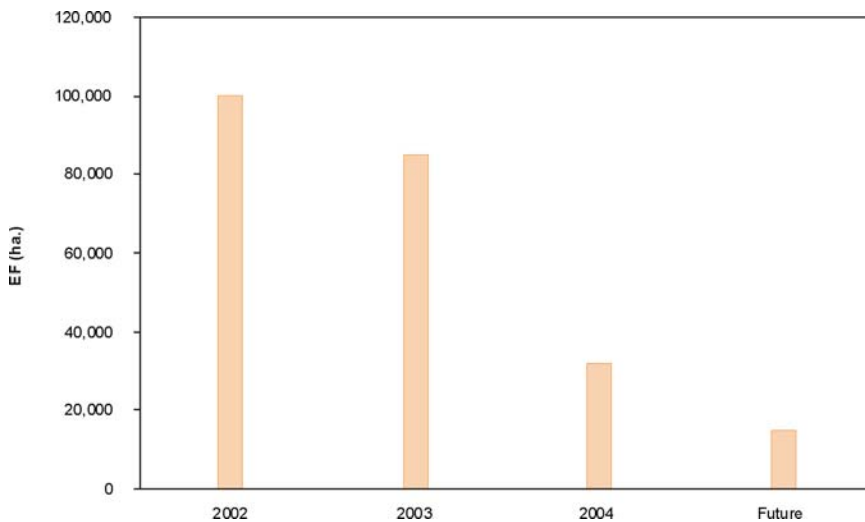
Horticulture Research International, East Malling, Kent, ME19 6BJ. Tel: 01732 876618. E-mail: [diana.lock@remade-kentmedway.co.uk](mailto:diana.lock@remade-kentmedway.co.uk). Website: [www.remade-kentmedway.co.uk](http://www.remade-kentmedway.co.uk)

The following table shows estimated waste diversion for the region if all eight county areas were to introduce ReMaDe projects which achieved similar results to ReMaDe Kent and Medway.

**Table 5.3.7: Reduction in Waste Production achieved by the ReMade Kent and Medway project**

Material	Tonnes diverted in 2002	Tonnes diverted in 2003 (year total estimated in June 2003)	Target diversion tonnage for 2004 (from 2003 business plan)	Total target diversion tonnage
Glass	1,000	2,000	5,500	8,500
Organic waste / wood	50	6,000	15,000	21,050
Plastic	25		775	800
Paper / card		1,850	1,500	3,350
Electrical equipment (Mainly IT)	30	65	3,500	3,595
Other waste materials	500	1,850	14,000	16,350
Tyres			9,000	9,000
Vehicles			2,500	2,500
Construction			10,000	10,000
<b>Total</b>	<b>1,605</b>	<b>11,765</b>	<b>61,775</b>	<b>75,145</b>

The ecological footprint has been used below to show the reducing impact of the 75,000 tonnes of materials that are being shifted from landfill to be recycled. The methodology for calculating the ecological footprint of waste can be found in Chapter 4. Figure 5.1 provides an insight into the reduction of the ecological footprint that the scheme has achieved and can achieve in the future.



**Figure 5.1 Ecological Footprint reduction achieved ReMaDe Kent and Medway**

The scheme identifies the possibility of achieving an 85 per cent reduction in the ecological footprint if the future targets are achieved.

### Replication potential / extrapolation

The following table shows estimated waste diversion for the region if all eight county areas were to introduce ReMaDe projects which achieved similar results to ReMaDe Kent and Medway.

**Table 5.3.8: Potential reduction for the South East (applying results from the ReMade project)**

Material	Tonnes diverted in year 1	Tonnes diverted in year 2	Target diversion tonnage for year 3	Total target diversion tonnage
Glass	8,000	16,000	44,000	68,000
Organic waste / wood	400	48,000	120,000	168,400
Plastic	200		6,200	6,400
Paper / card		14,800	12,000	26,800
Electrical equipment (Mainly IT equipment)	240	520	28,000	28,760
Other waste materials	4,000	14,800	112,000	130,800
Tyres			72,000	72,000
Vehicles			20,000	20,000
Construction			80,000	80,000
<b>Total</b>	<b>12,840</b>	<b>94,120</b>	<b>494,200</b>	<b>601,160</b>

### Barriers and opportunities/problems and drivers for replication

The landfill tax is increasing annually, making the disposal of waste more costly for businesses, thus encouraging more recycling. European legislation has also created a number of mechanisms to reduce specific aspects of the business waste stream, and these are gradually being introduced in the UK. Key measures include:

- The Producer Responsibility Obligations (Packaging Waste) Regulations
- The Aggregates Levy
- The European Directive on the Landfill of Waste
- The End of Life Vehicle Directive
- The Waste Electrical and Electronic Equipment Directive

Projects like ReMaDe Kent and Medway have a vital role in encouraging the shift from a waste disposal mentality to a resource management focus, by working to increase reprocessing capacity in an area, and promoting new uses of recyclables. This can contribute to strengthening the local

economy and creating jobs, as well as reducing impact on the environment. A network of ReMaDe programmes has the potential to multiply the benefits and achieve significant regional impact.

The impetus for ReMaDe Kent and Medway came from the Kent Sustainable Business Partnership (Kent SBP), a strategic body involving Kent and Medway Councils, the Environment Agency, Business Link Kent, the Government Office for the South East (GOSE), and a wide range of other partners who contribute to SBP projects. The challenge of funding was met by raising £200,000 per year for 3 years from the Landfill Tax Credit Scheme (LTCS), with 10% match funding coming from Kent County Council, Medway Council and Business Link Kent. Additional project support has been obtained from partnership members and M-real Paper.

### 5.3.6 Case Study 6 – The Earth and Stars Pub, Brighton<sup>16</sup>

#### Summary

Brighton-based independent pub operator Zelgrain launched its first eco-balanced pub The Earth and Stars in 2001. The pub was refitted as far as possible with reclaimed materials, solar panels have been installed to heat water, and glass and cardboard are recycled. Operation of the pub is carbon neutral and The Earth and Stars goes further by selling only organic drinks and food and avoiding major brands. While acknowledging that operating in this way can be less profitable than conventional practice, Gavin George, Zelgrain's founder, believes businesses need to reduce their impact and repay what they take from the environment. The more businesses that do this the more level the playing field will become.

#### Key Facts

The Earth and Stars pub is carbon balanced – local consultancy C Level regularly audits CO<sub>2</sub> emissions from energy use, travel, transport and waste, and these are compensated for by tree planting. Their energy supply has been switched to renewable sources and measures have been taken to improve lighting and heating efficiency and to recycle as much waste as possible. By introducing these measures a reduction of 45 per cent in The Earth and Stars' carbon emissions was achieved between 2001 and 2002 (See table below).

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<sup>16</sup> "Climate Balanced Drinking?", article Greenleaf magazine, Green Party Brighton and Hove, 2002.

Earth and Stars Carbon Footprint Comparison, Ben Messer, C Level, 2003.

Zelgrain Carbon Footprint Comparison, Ben Messer, C Level, 2003.

Conversations and e-mail correspondence with Gavin George, Zelgrain and Ben Messer, C Level.

For more information:

Ben Messer, C Level, 17 Denmark Terrace, Brighton BN1 3AN. Tel: 08707 659891. E-mail: [ben@clevel.co.uk](mailto:ben@clevel.co.uk) Website: [www.clevel.co.uk](http://www.clevel.co.uk)

**Table 5.3.9 Earth and Stars – carbon footprint comparison (tonnes CO<sub>2</sub> per year):**

<b>Footprint component</b>	<b>2001</b>	<b>2002</b>
<b>Electricity</b>	<b>2.7</b>	<b>0</b>
<b>Gas</b>	<b>12.9</b>	<b>8.7</b>
<b>Travel</b>	<b>1.1</b>	<b>1.1</b>
<b>Transport</b>	<b>1.2</b>	<b>0.1</b>
<b>Waste</b>	<b>7.7</b>	<b>3.9</b>
<b>Recycling</b>	<b>0</b>	<b>0.2</b>
<b>Total</b>	<b>25.6</b>	<b>14</b>

### **Replication potential/extrapolation**

Although most effort has been made in the case of The Earth and Stars, all 32 pubs in the Zelgrain group are carbon balanced and compensated. Improved lighting and energy efficiency measures are being introduced into other pubs in the group, and a fleet of bicycles has been provided for managers to visit pubs. It is estimated that for other pubs in the group an average reduction of 16% in carbon emissions was achieved between 2001 and 2002.

### **Barriers and opportunities/problems and drivers for replication**

There are clear incentives for reducing energy use and waste needing disposal, since these reduce costs and therefore directly benefit profitability. Carbon balancing at the moment is an individual decision taken for environmental reasons, but such measures may become more important as carbon emissions are controlled and traded as part of attempts to reduce global warming.

Demand for organic produce has increased markedly in recent years, making this an important market niche. It is relatively undeveloped in the pub sector, although successful examples elsewhere show there is potential for this to succeed. Location is an important factor, and considerable marketing effort may be needed to create sufficient awareness in the target clientele.