

Waste & Energy Research Group

Summary Tables of Contracts 1999 - 2009

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1. Sustainable Development

Below are projects undertaken recently which involve expertise from the University but with great impact in society; the Sustainable Development approach is dominant. Some of the projects are novel and leading internationally (especially ESDinds); others are novel developments in capacity building of importance to local communities near the University – which also provide examples of approaches of interest to other communities nationally and internationally.

Project Title and sub-projects	Funding	Funders	Knowledge Transfer Impact
United Nations Regional Centre of Expertise in Education for Sustainable Development (UN RCE) Development of a UN RCE led by University of Brighton for the UN Decade of ESD UN Approval is achieved: funding is now being sought	Not yet achieved	Various	Expertise in University to coordinate and capacity build across SE England and participate in a world-wide network
Sustainable Schools Strategy Development Working with the School of Education at the University, to develop a strategy for a County Council 2010-11	c£38,000	UK Department of Trade & Industry	Expertise in University to County Council and for national use
Commercial & Industrial Waste: Development of a Strategy for a County Council 2010-11	c£38,000	UK Department of Trade & Industry	Expertise in University to County Council and for national use
ESDinds: The Development of Indicators & Assessment Tools for CSO Projects Promoting Values-based Education for Sustainable Development 2009-11	c£553,000	European Union: Framework 7 Research: Environment programme	Novel development of useful indicators for Civil Society Organisations
Waste in Action: French-English training of waste officers 2009-11	c£65,000	European Union: INTERREG programme	University expertise used for capacity building
Clean Development Mechanism (CDM) calculations and scenarios for Domestic Anaerobic Digestion Systems in Bangladesh 2009-12	c£2,700	Chartered Institute of Waste Management	University expertise used for capacity building and national policy
R&D into use of Recycled Glass for Arsenic Filtration in Bangladesh 2009-12	Not yet achieved	tbc	University expertise used for capacity building and national policy

Better Tomorrows: various contracts for community engagement in waste, recycling and minimisation A not-for-profit body set up by a local authority 2007-11	c£80,000	Better Tomorrows	University expertise used for capacity building
Waste Prevention Advisors Training of volunteers to actively engage in community action in waste reduction 2007-11	c£30,000	West Sussex County Council	University expertise used for capacity building
Carbon Reduction Consultancy Responsibility for developing Carbon Reduction programmes, monitoring and evaluation of existing use, of large organisation 2009-12	c£80,000	Confidential	University expertise used for carbon reduction
TOTAL FUNDING:	£ 886,700		

2. Waste Stream Determination and Flow Modelling

Below are projects undertaken in the analysis and modelling of waste streams. They begin with rigorous work to establish the then-unknown data on streams of waste arising at landfill and civic amenity sites, and then reflect the maturation of the field as studies were carried out on flows across a county, or on specific waste flows in preparation for transforming them into a resource.

Project Title and sub-projects	Funding	Funders	Knowledge Transfer Impact
BEB 1: Sussex Waste Strategy Development: Materials flows into Landfill sites Material flows into Civic Amenity sites Heterogeneity of waste arriving at Landfill 1999-2002	£82,000	Landfill Tax Credit Scheme Viridor Waste Management	Industry previously only estimated this data
Investigations of Waste Fractions at Civic Amenity Sites 2001-2003	£1,279	East Sussex County Council	Relative fractions of materials now known
Survey & Analysis of Materials Flow to a Landfill Site: 2001-2004	£2,859	confidential	Industry previously only estimated this data
BEB 11: Packaging Life Cycles; Identifying Bottlenecks in Minimisation Waste Materials Flows Life Cycle Analysis 2001-2004	£83,947	Landfill Tax Credit Scheme Biffaward PIRA International INCPEN British Packaging Federation VALPAK	Allowed shared exploration of bottlenecks with stakeholders
BEB 7: Sussex Waste Strategy: Data Materials flows into Landfill sites Material flows into Civic Amenity sites Heterogeneity of waste arriving at Landfill 2002-2004	£68,448	Landfill Tax Credit Scheme Viridor Waste Management East Sussex County Council	Industry previously only estimated this data
University Material Waste Flows at two sites 2002-2003	£500	University of Brighton	Client previously not aware of savings possible

Study of Waste Flows across a UK County 2003-2004	£4,000	Viridor Waste Management	WERG analysis expertise assisted decisions
Surveys of Trade Waste mingled with Household Waste 2005	£10,000	West Sussex County Council	Client previously only estimated this data
Survey of Specific Forestry Wastes in the SE 2006	£1,050	Forestry Commission	
Determination of Baseline Data for Consideration of combined household and commercial recyclates collection 2006	£1,000	Viridor Waste Management Ltd.	Preparation for bid for pilot programme for county
Consultations on various waste flow and current issue matters 2006-7	£13,000	Centre of Excellence in the South East, (Waste Division)	WERG analysis expertise assisted decisions
Study of Waste at County Council Properties 2007	£9,900	West Sussex County Council	WERG analysis expertise to assist decisions
TOTAL FUNDING:	£277,983		

3. End-of-Life Vehicle (ELV) shredder residues: characterisation and recycling

This single, huge project, listed above, spawned several others, spanning many scientific disciplines. For example, it was crucial to determine the relative proportions of different families of polymers present in the shredder residue, and the academic literature would lead one to believe that numerous systems exist such as infra-red and x-ray, which can do that. When trials of these showed them not to be useful, the group devised its own system of identification using a combination of several techniques from physical and chemical sciences. The extended piece of work detailing the findings of the materials present in shredder residue is in preparation for publication in academic journals, but its results have already been made use of in the related UK industries, as the key stakeholders were collaborators in this work.

Project Title and sub-projects	Funding	Funders	Knowledge Transfer Impact
BEB 2:Development of Automotive Products from Polymer Wastes: Determination of materials composition in shredder residue(SR) Determination of different polymer contributions in ELV and mixed shredder residues (SR) Investigation of mechanical methods of separating fractions of SR Development of recycled household polymers for automotive use Determination of physical characteristics of recycled polymer blends Development of manufacturing tools for use of recycled polymers 1999-2003	£357,534	Landfill Tax Credit Scheme Viridor Waste Management CARE (Consortium for Automotive Recycling) Ford, Rover, BMW, SIMSmetals, European Metal Recycling, Independent Shredders, BMRA (British Metal Recycling Association)	Car industry became willing to use recycled polymers in volume; SR was characterised; quantitative analysis of SR materials now known
TOTAL FUNDING:	£357,534		

4. Household waste: characterisation, minimisation and recycling

These projects show a variety of large, systematic studies which have been used to advise national (and international) policy, as well as small, focussed projects designed to assist particular clients with specific research expertise and solutions.

Project Title and sub-projects	Funding	Funders	Knowledge Transfer Impact
Development, Execution and Evaluation of Pilot Kerbside Trials for County Rollout Design of three pilot schemes for the County Execution of Pilot Studies and Collection of Data Evaluation of Results and Recommendations to the Council 2002-2004	£23,250	DEFRA Horsham District Council	Direct Transfer of applied Uni expertise to a District problem
3-Month Trials of Food Digesters in 120 Households 2002-2003	£9,900	Green Cone Ltd	Results suggested Govt Could consider endorsing it.
Crawley Household Waste Survey 1999-2004	£1,200	Crawley Borough Council	
Scoping Study on Waste Funding 2004-2005	confidential	confidential	Academic expertise advised client
Survey of Satisfaction of Clients at Household Waste Recycling Centres 2004-2005	confidential	confidential	Academic expertise allowed appropriate survey
Trials of Green Cone Food Digesters in users across a County Validation of reductions in household waste Determination of public response Analysis of use against demographic parameters Comparison with composter use 2004-2005	£64,613	DEFRA West Sussex County Council Horsham District Council Worthing District Council Arun District Council Crawley Borough Council	Academic expertise on robust sampling and data was required; results allowed trials to 15,000 households
Development of a new infrastructure for kerbside collections Consultations on options Development of a Materials Recycling Facility 2004-2005	£42,000	DEFRA Hastings Borough Council	Uni expertise used to advise and assist
Surveys of Public Satisfaction with Communal Residual Bins 2004-2005	confidential	confidential	Independent Analytical expertise given
Surveys of Household Satisfaction with Kerbside Recycling Scheme 2004-2005	confidential	confidential	Independent Analytical expertise given
Material Flows in Packaging: Life cycle analysis 2004-5	confidential	confidential	

Surveys of Household Participation in Kerbside Recycling Scheme 2004-5	£20,256	Eastbourne District Council	
Surveys of Household Participation in Kerbside Recycling Scheme 2005	£5,458	Crawley District Council	
Surveys of Household Participation in Kerbside Recycling Scheme 2005	£5,000	Mid Sussex District Council	
Assistance with setting up of new MRF Development of processes for collecting and sorting kerbside waste 2005	£53,243	Hastings Borough Council	Knowledge allowing 40,000 householders a recycling scheme.
Consultation regarding Composting Sites 2005	confidential	Environment Agency	Expertise used to advise EA and public
Systematic Trials of Green Cone Food Digesters offered to 2000 households Validation of reductions in household waste Determination of public response Analysis of use against demographic parameters Comparison with composter use 2005	£60,000	DEFRA West Sussex County Council Horsham District Council	Academic expertise on robust sampling and data was required; results to be used to decide on national programme
Household Incentivisation Pilot Studies: Designing a suite of medium scale pilot studies to increase public recycling Consultation with two County Councils and twelve district Councils Execution of four types of Incentives Schemes in fourteen sub-studies Trials of impacts of use of: vouchers for participation for use in local shops or leisure centres, schemes to trigger funds to local primary schools, publicly reported competitions between sets of three neighbouring communities 2005-6	£203,000	DEFRA West Sussex County Council East Sussex County Council Arun District Council Mid Sussex District Council Adur District Council Horsham District Council Chichester District Council Crawley Borough Council Worthing District Council Lewes District Council Eastbourne District Council Hastings Borough Council Rother District Council	Overall expertise with household recycling issues was used to put Sussex at forefront of government schemes trialling new incentives. Results will feed into national plans.
Studies and surveys of Household Participation in Kerbside Recycling Scheme - focus on multiple-household buildings 2006	£33,200	Crawley District Council	
DEFRA: Post-evaluation of a nationwide programme of studies on household recycling incentives 2006	confidential	DEFRA (Department for the Environment, Food and Rural Affairs)	Commisioned to advise the UK Waste Strategy Review
TOTAL FUNDING:	£573,090		

5. Public Education in Waste & Recycling issues

Although I had initially focussed on technology and knowledge transfer to businesses and authorities, I found that more social issues in sustainable resource management required support and development. From 2004 I fully embraced this work, and have not only expanded to the specific requirements of clients but have also started incorporating such teaching into undergraduate and now postgraduate modules.

Project Title and sub-projects	Funding	Funders	Knowledge Transfer Impact
West Sussex County Council Public Education on Waste Awareness Design and production of education newsletters to householders 2004-5	£12,000	DEFRA West Sussex County Council Horsham District Council	Direct application of knowledge to 10,000 households
Development of a County Waste Awareness Strategy Chairing consultations with Districts Devising and collecting consultations from businesses and householders Public Education via Newsletters to 20,000 householders 2004-5	£40,250	DEFRA West Sussex County Council Mid Sussex District Council Arun District Council Horsham District Council Chichester District Council	Direct Transfer of applied academic expertise to a District-wide problem
WSSC Public Waste Awareness Programme Monitoring, execution and evaluation of door-to-door education on waste and recycling awareness Surveys of pre & post-event participation rates 2004-6	£58,000	DEFRA Horsham District Council Worthing District Council Arun District Council Crawley Borough Council	
Public Education in Waste Awareness: Door-to-door education to 5,000 households 2005	confidential	confidential	Direct public education to 5,000 houses
Public Education in Waste Awareness: Development and delivery of a Campaign for Hastings Delivery of Public Education to every household door-to-door Design of PR campaign to town Design of text in printed information 2005	£143,000	WRAP Hastings Borough Council	Direct application of expertise to design suite of Activities to educate all householders
Review of newly Developed CIWM accredited modules in Waste Management Diploma, Certificate and MSc levels 2005	confidential	confidential	Application of knowledge to assist national training programme
Training Waste Advisors for Voluntary Work Development of a course with University Credit Recruitment to and delivery of course over three years Provision on ongoing support for Volunteers in the Community 2006	£60,000	West Sussex County Council	Application of knowledge to assist county training programme

Public Education of Use of Green Cone Food Digesters 2006	£50,000	West Sussex County Council	Direct application of expertise to tutors and the 15,000 householders they will tutor
WRAP Public Questionnaires on Recycling Habits 2006	£1,500	Adur District Council	Application of expertise to assist a council to collect robust data
Support for Volunteer Waste Advisors Development of a support course with potential University Credit Provision on ongoing support for Volunteers in the Community 2006	£5,500	West Sussex County Council	Application of knowledge to assist county training programme
Specialist development of CIWM accredited MSc modules in Waste Management MSc level 2006	confidential	confidential	Application of knowledge to assist national training programme
TOTAL FUNDING:	£382,557		

6. Pyrolysis of shredder residues and issues of heavy metal contamination

The projects below represent my work on pyrolysis of wastes – an example of how I have had to move across disciplines like mechanical engineering for the separation of shredder residue, to chemical engineering for pyrolysis and physics for X-ray fluorescent spectroscopy, because this flexibility is needed to pursue problems in waste/resource management to a solution.

Project Title and sub-projects	Funding	Funders	Knowledge Transfer Impact
BEB 5: End-of-Life (ELV) Automotive Shredder Residue (ASR) Pyrolysis Development of shredding and separation techniques for ASR Development of continuous feed and exit pyrolysis unit Development of seals for rotating continuous feed Development of milling and crushing techniques for pyrolysis char Development of metal recovery techniques from char Chemical characterisation of char and its contaminants 2000-2002	£149,875	Landfill Tax Credit Scheme Biffaward CARE (Consortium for Automotive Recycling) Ford, Rover, BMW, SIMSmetsals, European Metal Recycling, Independent Shredders, BMRA (British Metal Recycling Association)	A feasible process for the recovery of significant amounts of metals from SR developed, opening options for meeting new EU Directives
BEB 14: Levels of Lead in ASR Characterisation of pyrolysis ash Detailed comparison of material composition of ASR from different UK sites Characterisation of raw SR & ASR Development of methods for determination of lead contamination in SR Development of processes to reduce lead contamination 2001-2004	£82,554	Landfill Tax Credit Scheme Biffaward CARE (Consortium for Automotive Recycling) Ford, Rover, BMW, SIMSmetsals, European Metal Recycling, Independent Shredders, BMRA (British Metal Recycling Association)	Knowledge was developed in this project on lead speciation in complex SR material; info used by DTI to determine non-hazardous nature of SR subject to further developments.

Delivery of a Conference on Products from Waste 2004	confidential	confidential	Sharing of applied academic findings
Scoping Study on Commercial Viability of Pyrolysis of ASR 2005-6	confidential	confidential	Use of expertise to assist direction of development of SME
TOTAL FUNDING:	£236,429		

An issue that was brought to light with this above work was the unexpected lead content as a contaminant in the resultant ash. The level found prevented immediate consideration of the material as a substitute raw material for brick making, but even more importantly was an indicator of the hazardous nature of the automotive shredder residue. This became a crucial issue for the industry, the Environment Agency and the DTI, who later quoted my work in making their borderline decision to categorise SR as non-hazardous. A fundamental question was the speciation of the lead present, in order to determine its source, e.g. from wheel weights (metallic) or compounds used in older polymers. We are currently developing a novel approach to resolve this problem, working with manufacturers of specialist analytical equipment.

As SR is mixture of many materials whose composition varies by the hour, I have also helped the field develop a better understanding of statistical sampling, and am working to show that the use of a portable XRF spectrometer to take multiple (hundreds), approximate readings of SR contaminants is more useful than a few sent to precision labs. This work is currently the focus of a large DTI Technologies bid, with the manufacturer of the PXRF. It is also the subject of several academic papers which are in preparation for academic journals.