

Consortium Title:	Measurement, Modelling, Mapping and Management (4M): An Evidence-Based Methodology for Understanding and Shrinking the Urban Carbon Footprint	Start Date:	January 2008	End Date:	December 2011
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Subject areas:

Global warming is a serious threat to mankind and is exacerbated by the release of greenhouse gases, in particular carbon dioxide (CO₂). In the UK, as in other developed countries, homes, and the activities in them, businesses and transport generate significant carbon emissions. The sequestration of carbon by living plants can 'lock' carbon in soils and ameliorate carbon dioxide emissions. Carbon footprints are a useful framework for representing CO₂ emissions.

Key issue / problem:

The 4M project will:

- (i) calculate the carbon footprint of the entire city of Leicester;
- (ii) measure, model and map the effect on the city's carbon budget of: road layouts, traffic volumes and traffic speeds; the way we use energy in our homes and places of work; and the way we look after green spaces;
- (iii) conduct management studies to investigate how to shrink the city's carbon footprint;
- (iv) investigate the operation of individual carbon trading schemes, to understand the tradeoffs that people might make and the likely impact on the life-styles and well-being of city dwellers.

Key findings:

Main outputs:

As a result of their work, the team will:

- provide a methodology, data sources, models, data collection techniques, analysis methods and validation approaches that can use to benchmark and manage the carbon sources and sinks in any UK city; and
- produce ways of representing carbon sources and sinks in a form suitable for visualisation and interpretation by policy makers, local authorities and the general public.

Target stakeholders:

The UK beneficiaries of our work span from government policy makers, through planning and urban management organisations, to individuals who will ultimately feel the impact of the measures taken to reduce CO₂ emissions. The partners that support the project represent this wide range of interests.

Consortium Title:	Accessibility and User Needs in Transport for Sustainable Urban Environments (AUNT-SUE)	Start Date:	May 2004	End Date:	October 2009
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Subject areas:

Transport, Urban Design and Social Inclusion.

Key issue / problem:

The need for inclusive accessibility benchmarks and planning tools, and 'whole journey' design guidance at micro, meso and macro scales.

Key findings:

Current accessible transport benchmarks and design guidance are neither integrated nor genuinely inclusive. There is a requirement for decision-support tools that will establish new benchmarks and incorporate inclusion and user-needs into policies, transport plans and the design and operation of sustainable journey environments and facilities. A whole journey ('systems') approach is required linking disciplines/professions and all tiers (scales) of agency responsibility.

Main outputs:

The AUNT-SUE consortium has developed new accessibility benchmarks (Transport Policy & Planning), an 'Inclusive Transport Consultation Tool' (GIS-based); an Ergonomics based capability tool (CAD); a 'Street Design Index and Planning Tool' (GIS/ GIS-P and CAD based), and is prototyping an integrated 'Accessible Journey Planner' (CAD/GIS based). Interim findings have been presented and discussed with end-users and experts in the field, e.g. through annual symposia, workshops, bi-annual newsletters, website: www.aunt-sue.info.

Target stakeholders:

The main research programme is working with a wide network of beneficiaries including central and local government (planning, transport, engineers, housing), transport operators, designers (architects, urban, industrial) and user groups (community transport, disability groups, resident groups). Our testbed areas and facilities include St Albans (Hertfordshire C.C.), Somerstown & Elm Village, King's Cross (L.B. Camden), Finsbury Park Interchange (L.B. Islington/TfL), Docklands Light Railway and Transport for London stations. A Practitioner Network includes PTEs and LAs, e.g. Brighton & Hove, Bristol, Sheffield, Greater Manchester, and Met and Transport Police, MerseyTravel, Transport for London.

Consortium Title:	CITYFORM: Sustainable Urban Form Consortium	Start Date:	October 2003	End Date:	October 2007
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Subject areas:

Sustainable Urban Form; Social, Economic, Environmental and Transport Sustainability. Integrated approach to key sustainability factors

Key issue / problem:

The key issue tackled by the consortium is to ascertain to what extent and in what ways urban form contributes to sustainability.

Key findings:

- For most aspects of social sustainability, (particularly pride/attachment, stability, neighbourhood and home satisfaction and perceived environmental quality) lower density suburbs appear 'best'
- Some aspects of social sustainability are neutral (e.g. participation), some favour more compact forms, particularly access to services; social interaction is best at medium densities
- Services like supermarkets play a significant role in social & community life and proximity of services to home and workplace were found to be positively associated with use
- Change in density and land use mix form found to influence car use after accounting for personal circumstances and transport mode attitudes
- Access to green space varies dramatically across society, with the distribution of distances being strongly right-skewed such that for some households these distances are particularly large, well beyond statutory recommendations
- Key measures of biodiversity show hump-shaped relationships with urban density, for example, bird species richness at first increases with household density, then declines very rapidly at high densities. This suggests that increase in urban density will lead to reductions in both the abundance and species richness of urban biological assemblages
- Tradeoffs will have to be made between aspects of sustainability, e.g. transport and social sustainability, in overall evaluations (analysis still ongoing)

Main outputs:

- Book entitled 'Dimensions of the Sustainable City' is due for publication in the first quarter of 2008 covering all parts of the project
 - Journal articles (currently 13 have been accepted/ published)
 - Conference papers (currently over 40 have been presented at a variety of conferences)
 - Dissemination events including research seminars in Oxford (May 2006), and forthcoming in London and Delhi as well as input to other seminars and workshops
- For more details, go to www.city-form.org

Target stakeholders:

Local Authority - planners/ urban designers/ housing
Private sector - housing developers/ architects
Academia

Consortium Title:	DISTILLATE	Start Date:	April 2004	End Date:	March 2008
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Subject areas:

Urban transport and land use policy

Key issue / problem:

Barriers to the implementation of sustainable transport and land use strategies; in particular: lack of clarity in performance indicators; failure to generate a wide range of policy options; ineffective use of sources of finance; poor use of predictive models; inadequate appraisal methods; poor collaboration within and between organisations

Key findings:

Evidence is available on the scale of each of these barriers, and this is being reviewed in a current follow-up survey. Research has focused on the development and testing of solutions (see outputs).

Main outputs:

A set of 18 products related to the barriers above. These include guidance on the selection and use of indicators; new tools for option generation; a financing toolkit; a new sketch planning model and enhancements to existing transport models; improved approaches to appraisal; and guidance on effective collaboration.

Target stakeholders:

Local authority transport and planning departments; consultants and transport operators; government departments.

Consortium Title:	AN INTEGRATED APPROACH TO SUSTAINABLE URBAN REDEVELOPMENT: BIRMINGHAM EASTSIDE AS A NATIONAL AND INTERNATIONAL DEMONSTRATOR	Start Date:	May 2003	End Date:	April 2008
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Subject areas:

The Universities of Birmingham (UoB) and Central England (UCE) studied urban regeneration of Eastside within four workstreams: Social & Economic (UoB); Natural Environment & Biodiversity (UoB); Built Environment & Open Space Provision (UCE); and, Infrastructure, Energy & Utility Provision (UoB).

Key issue / problem:

Phase I (May 2003 - Nov 2004) - Feasibility Study: (1) identify critical constraints and enablers to the integration of sustainability in the context of the Eastside regeneration programme; (2) highlight where and how sustainability issues might best be approached in urban regeneration projects; (3) set a framework of cross-disciplinary knowledge and key partnerships to develop Eastside as a regional demonstrator; and (4) make recommendations for essential research. Phase II (Nov 2004 - Dec 2006) (1) identify the sustainability and innovation choices available to decision-makers during the decision-making processes; (2) identify when barriers to sustainability appear in the decision-making process and identify ways of overcoming them; (3) investigate how the complexity of the 'three-pillars' approach to sustainability generates barriers within that decision-making process and what impact this has on sustainability outcomes; (4) identify where 'three-pillar' sustainability innovations can be incorporated into decision-making processes and how they can be realised to achieve sustainability objectives; and (5) create a comprehensive, longitudinal, and cross-cutting dataset for Eastside. Phase III (Dec 2006 - Apr 2008) (1) develop the Development Timeline Framework (DTF) model to understand path-dependency and the influence of timing on sustainability outcomes; (2) develop an interdisciplinary tool to evaluate sustainability outcomes and performance of developments; (3) identify the 'windows of opportunity' for satisfactorily achieving sustainability objectives; (4) identify 'quick-win' sustainability solutions for urban development decision-makers; (5) maintain and deepen the cross-cutting baseline dataset of developments in Eastside to measure change over time.

Key findings:

Phase I: (1) Identification of barriers and enablers to sustainable urban regeneration. Barriers are categorised as: economic; perceptual or behavioural; and, institutional or structural. Enablers identified included: provision of clear, easily obtainable information to decision-makers at all levels; standards that include sustainability requirements; demonstrator projects and government structures that accommodated long-term decision-making. (2) In order to achieve sustainable urban regeneration a better understanding of the decision-making process is needed. (3) New and interdisciplinary ways of conceptualising and implementing urban sustainability were developed. Phase II: (1) Developed a series of hypotheses about the timing of decisions for sustainability in a range of decision-making fora, and examined the extent to which path-dependency becomes problematic. (2) Timing and context of decisions (i.e. sustainability and innovation choices) were found to be critical, and attributed to the formation of path-dependency which then limits how sustainability features in final development plans. Phase III: (1) The complexity of the decision-making process is being further studied through the Development Timeline Framework tool, which enables critical decision nodes/conflicts and path dependency aspects for different sustainability objectives to be identified, together with 'windows of opportunity' for sustainability.

Main outputs:

To date, the team has published 7 research papers in academic journals and 3 further papers have been submitted. Researchers involved in the project have also presented 5 keynotes in international conferences in addition to the presentation and publication of 12 further papers in international conferences deriving wholly from the research.

- Hosting of the EPSRC SUE Research Fellows Conference (Birmingham 28th February - 2nd March 2005).
- World-wide dissemination with presentations to practitioners, stakeholders and scientists by the PI to events in the US (Washington DC, 2006), UK (Warwick, 2006), Ireland (Belfast, 2006), Netherlands (Delft, 2005) Australia (Sydney, 2006)
- Website used for dissemination and access to information: www.esr.bham.ac.uk
- Contribution by the PI and the Eastside Sustainability Advisor to the EPSRC video on the SUE Programme (Feb 06)
- CPD course on Green Roofs and Biodiversity (Nov 2006) and training day for managers focusing on relevance of sequencing and interdependencies of environmental sustainability policies in development projects (Jul 2007)
- Dissemination through lectures and seminars to undergraduate and MSc students at UoB and UCE.
- Contribution to the development of a "Biodiversity Points System" and a "Planting Design Guide" for Eastside.
- Sharing of Habitat Survey and land use mapping data with land owners and Birmingham City Council
- RF advised project managers for the Festival of Extreme Building (2007).
- The sustainability base room at UoB is now starting to be used by visiting researchers and Eastside practitioners.

Target stakeholders:

- Local community in Eastside.
- Local Authorities, Regional Development Agencies and international bodies involved in urban redevelopment.
- National (including EPSRC SUE and IEP programme) and international academic community.
- Environmental technologies industrial cluster in the West Midlands, and the sector UK-wide.
- Government (DCLG, BCC, AWM), NGOs (Groundwork) and developers (ISIS)

Consortium Title:	FUTURES	Start Date:	April 2004	End Date:	March 2009
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Subject areas:

Transport

Key issue / problem:

How can transport and transport-related technologies be utilised to support more sustainable travel choices in urban environments?

In particular FUTURES is looking at the following issues:

1. How can wayfinding services better support the unfamiliar traveller in the urban environment?
2. What role will bespoke transport services (specifically liftsharing) play in supporting more sustainable personal travel?
3. How can we better understand the environmental impact of new and emerging vehicle technologies?
4. What are the barriers to the use of traveller information services and how might they be addressed?
5. In what ways do people engage in location independent working (teleworking) and what might be the implications for travel behaviour?
6. What are the likely impacts of innovative uses of roadspace (specifically Bus and Toll lanes) on the urban travel environment?
7. What are the impacts of the increasing use of satellite navigation technologies on urban traffic management?

Key findings:

FUTURES research shows how transport and transport-related technologies might be used to enable people to make better informed and smarter travel choices. By supporting people's travel choices, FUTURES research also enables people to mitigate the impacts of travel demand management policies necessary for sustainability on their access to opportunities and quality of life.

Because people make travel choices in different ways and according to different needs a range of services are required (underpinned by transport and transport-related technologies). Whilst considerable progress has been made in this respect in recent years much more remains to be done, particularly to enable more bespoke travel choices to be supported.

There is limited knowledge regarding the likely impact of new and emerging transport and transport-related technologies on travel behaviour and the sustainability of urban environments. FUTURES is contributing to the development of understanding in this area, but further research will be essential.

New knowledge generated in FUTURES must be fed into Local Authority decision making to positively influence strategy for LTP3 (2011-2016).

Specific key findings to emerge so far from the seven FUTURES research activities outlined above include:

1. There has been a slow uptake of technology-based wayfinding services by the public and this has implications for those providing wayfinding services.
2. In recent years there has been a significant growth in the use of liftsharing services by females and by those undertaking regular, short distance journeys.
3. The environmental impacts of new and emerging vehicle technologies are currently poorly understood, but the enhancement of noise and air quality modelling techniques is beginning to address this issue.
4. People tend to have a default source of travel information that they use for all types of trips and attitudes, perceived behavioural control and past experience are key determinants of travel information use.
5. There is a high incidence of varied spatio-temporal working in the UK, which suggests there is a significant underestimation of teleworking and its associated impacts on travel behaviour.
6. Improved understanding of the likely environmental, social and traffic impacts of the deployment of a Bus and Toll lane will be critical factors in determining the feasibility of the concept.
7. Currently, the most serious impacts from satellite navigation technologies upon urban traffic management are associated with freight and service vehicles. Impacts from private cars are modest at present, but this may change if accurate real time information supports routine use for dynamic routing in congested conditions, which would pose serious threats to urban traffic management.

Main outputs:

Achieved - publications in academic and popular journals, national and international conference presentations

Planned - Local Authority Conference, seminars, workshops, guidance notes for policymakers, further publications

Target stakeholders:

Local Authorities - Transport

Department for Transport

Service providers - Transport and related

Academic community

Wider transport industry

Consortium Title:	IDCOP : Innovation in the Design, Construction and Operation of buildings for People	Start Date:	July 2004	End Date:	February 2009
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Subject areas:

built environment, user behaviour, energy and comfort, building refurbishment decision making process, microgeneration, façade technologies, intelligent buildings, sustainability assessment methods, climate change impacts

Key issue / problem:

- How to create and operate spaces in which people wish to live and work in a sustainable manner?
- What are smart façade technologies and which, if any of these can be applied to building refurbishment?
- How to use people (the users of spaces) as sensors to better manage buildings - provide more than just the traditional building management system feedback approach? How do we ensure that users requirements are correctly captured and interpreted by the system which adapts to meet their ongoing needs?
- How can we change the way investment in refurbishment is viewed to reflect the true value of sustainability? What is driving the decision making process in building refurbishment and how can new technologies such as 'smart' facades be assessed?
- What type of sustainability indicators are most effective in measuring the sustainability performance of intelligent façade systems and how can they be selected?

Key findings:

- Case study buildings and developments have highlighted problems across the entire building refurbishment process.
- Even companies with sustainability policies often have (i) lack of connection with end users, (ii) poor management of expectation, (iii) weak knowledge pool and (iv) incoherent prioritisation and delivery.
- In residential sector programmes such as 'decent homes' can distort priorities, skew actions and does not always match user needs or expectations.
- Existing UK sustainability models rarely consider whole impacts of dwellings, they are purely building focussed ignoring social and economic issues.
- New building legislation (Part L, England & Wales interpretation of EU EPD) drives design to achieve energy compliance - does this compromise future energy performance - climate change?
- Building simulation uses weather files which do not represent current UK climate (2000 onwards) - raises the risk of failure in passive buildings.
- Understanding of the interplay between the stakeholder and the Intelligent Building and how their requirements can be represented in relation to productivity in the work place.
- Current sustainability tools do not address the interaction between technology and users.

Main outputs:

- Building performance simulations that use IDCOP developed climate change weather files based on UKCIP scenarios (files in standard data format compatible with majority of building simulation packages).
- B-Space, building refurbishment assessment tool to classify a building portfolio in terms of comfort and energy - enable facilities managers to prioritise intervention need.
- A multi-criteria decision making model for building refurbishment - making the business case from the facilities manager's perspective.
- Field testing of emerging façade technologies - technical performance and future market appraisal.
- Conceptual design of an intelligent building that meets individuals' preferences and enhances personal satisfaction. A physical model to verify the hypothesis of personalisation and validate the functionality of the intelligent agent-based system.
- AHP based assessment model of sustainability of intelligent façade systems across environmental, socio-cultural and economic groupings.

Target stakeholders:

- Building designers, local authorities and M&E contractors - utilisation of IDCOP developed climate change weather files for building simulation - free software download (near release)
- B-Space - facilities managers assessment tool - (currently under development), for both public and private sectors
- Intelligently controlled personalised workspace - end users, facilities managers & M&E engineers
- Critical appraisal of near market façade technologies - ARUP
- Multi-criteria decision making and sustainability models - asset and facilities managers
- Building refurbishment & microgeneration - numerous seminars and briefing documents to housing associations, city councils, development agencies, private house developers

Consortium Title:	Pollutants in the Urban Environment: An Integrated Framework for Improving Sustainability of the Indoor Environment (PUrE Intrawise)	Start Date:	January 2008	End Date:	January 2011
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Subject areas:

Indoor pollution
Energy use in buildings
Environmental impacts
Human health

Key issue / problem:

The aim of the consortium is to develop an integrated decision-support framework for more sustainable management of indoor pollution associated with the provision, conservation and use of energy in buildings. The framework will be applied to a number of case studies that will compare environmental, health and economic implications of the principal options for future home energy provision as an aid to policy development.

Key findings:

N/A

Main outputs:

1. Decision-support framework to enable sustainability comparisons and trade-offs of different options for household energy over varying spatial scales and time horizons
2. Case studies and quantitative sustainability comparisons of main options for home energy provision; and
3. Guidance on building regulations, indoor pollution control and policy for more sustainable provision and use of energy in households

Target stakeholders:

Government departments and agencies
Local authorities
Engineering companies and trade associations in the energy sector
Energy efficiency and health advisory groups
General public

Consortium Title:	PURe (Pollutants in the Urban Environment)	Start Date:	February 2005	End Date:	March 2009
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Subject areas:

The main subject area of the PURe project is sustainable management of urban pollution.

This includes the following specific subject areas:

- sources of urban pollution
- fate and transport of pollutants
- life cycle environmental and health impacts of pollution
- evaluation of risks and uncertainty
- multi-criteria decision analysis.

Key issue / problem:

The main aim is to "enable valid and transparent assessments of sustainable development scenarios by providing an improved scientific understanding of the behaviour and impacts of pollutants in the urban environment".

The decision-support framework is being developed within the project for these purposes and will help the user to identify the main issues and key questions for their pollution problem, for example:

- What are the major sources of pollutant X in an urban area?
- How would changes to a process X affect the local environment and population?
- How could product X affect the urban environment and urban society?
- Would activity X have any negative effects on the health of urban dwellers?
- What are the implications of policy X?
- Which management options X, Y or Z are likely to be effective and more sustainable?

The main sustainability issues identified by the stakeholders are used as the decision criteria in the framework application.

The decision criteria (sustainability indicators) are quantified and used to compare the sustainability of different options for more sustainable management of urban pollution.

Key findings:

1. There is a need for a better understanding of the sources, behaviour of pollutants and their impacts on human health and the environment
2. Urban pollution problems must be addressed in an integrated way
3. This requires an integrated decision-support framework
4. The framework must be robust yet simple enough to use as well as tailored for the needs of different stakeholders

Main outputs:

The main deliverables for the PURe project are the decision-support methodology, a modelling platform (software) incorporating different models and tools, example applications and case studies, and users' guidance manual. The guidance will include a range of examples developed in the project, which explore specific issues and sectors, for example: thermal treatment of municipal solid waste (MSW); use of coal versus biomass for energy; contaminated soil and groundwater; and transportation as well as other urban activities. There will also be case studies illustrating different city locations: Avonmouth, London, Sheffield, and Siracusa (Sicily). These outputs will be available as journal and conference papers as well as project reports. Future marketing material will be tailored for the specific groups of potential users.

Target stakeholders:

The PURe framework is being developed for four key groups of stakeholders and potential users: (1) Regulators, policy-makers/implementers, local authorities; (2) Industrial and commercial companies and consultants; (3) Researchers and students; and (4) NGOs (Non-governmental organisations), special interest groups, associations, and the urban public. All of the key stakeholder groups are represented within the PURe consortium, by the many partners and members of the Steering Group. These include: research institutions, commercial research organisations, industrial companies, policy-makers, regulatory agencies, and associations. External stakeholders such as Local Authorities and NGOs are also being consulted.

Consortium Title:	Re-VISIONS	Start Date:	October 2007	End Date:	September 2007
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Subject areas:

Sustainable regional spatial development of the building, energy, transport, water and waste sectors.

Key issue / problem:

What are the spatial interactions between the building, transport, and infrastructure sectors? What are the potential conflicts and synergies between these sectors when designing measures to improve the sustainability of urban areas?

How does this depend on density of development and regional spatial development patterns? (For example, there are economies of scale from large dense urban areas such as centralised heat and power, waste incineration, and public transport systems. Whereas, lower density developments allow more space for local decentralised generation and supply of renewable energy from wind, biomass, and solar gain; the collection, recycling and treatment of water; waste composting; etc.)

What measures are appropriate for retrofitting existing urban areas?

What measures are appropriate when planning new developments?

How can this knowledge be made available to end users at each stage of the regional planning process so that more sustainable outcomes can be achieved across the regional to neighbourhood scales?

What patterns would emerge from a target-led bottom-up approach to sustainable urban development and would this be more sustainable than the current top-down approach to spatial planning?

How will spatial planning and design measures affect the attractiveness, health and social conditions and other quality of life factors within urban areas and what will be the effects on the location of households and firms, travel and regional economy?

Key findings:

This SUE2 project has not started yet

Main outputs:

The main outputs are expected to include guidance on improving the sustainability of spatial planning for the main end users of this research. This will be a series of reports targeted at the needs of different stakeholders with emphasis on achieving more integration between sectors.

Decision support tools for testing development options including an integrated modelling framework for use by regional agencies for testing the sustainability of regional spatial development.

Specific reports for the Non-academic Partners on the findings for each case study region.

A book describing the role of spatial infrastructure development for improving the sustainability of regional development, demonstrating the value of the integrated methodology, and international collaborations.

Refereed journal articles and conference papers: A regularly updated web-site: Project seminars, symposia, and a final conference.

Interact with KT-SUE on knowledge transfer

Target stakeholders:

Regional Development Agencies - officers responsible for policy on sustainable development

Central government (DfT) - transport planners

Central government (DCLG) - housing planning policy

Local government - transport planners

Local government - housing planners

Environment Agency - water management and flood risk

Health authorities

Private sector - developers and investors, energy, water, waste utility companies and practitioners; transport operators, urban design and transport planning consultants

Voluntary sector - housing associations, transport groups, countryside protection, and nature conservation

International collaborators carrying out similar studies of the city regions of Beijing, Sao Paulo, and possibly Los Angeles

Consortium Title:	SOLUTIONS	Start Date:	April 2004	End Date:	September 2008
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Subject areas:

Land use and transport

Key issue / problem:

To what extent can suburban areas be sustainable?

Is there interaction between sustainability at the strategic and local scales when planning housing and transport?

Can different spatial patterns of land use development in conjunction with appropriate transport policies improve the sustainability of urban areas?

Key findings:

The current trend of development in the Greater South East of England will result in increased traffic congestion, and economic costs due to the spatial disparity between economic growth of jobs and the supply of new dwellings.

Preliminary results so far indicate that concentrating new development within existing urban areas at higher densities in areas with good public transport, jobs and services would reduce average travel distances and car travel but increase economic costs to households and firms. It would also result in a greater proportion of flats which result in lower quality of life especially for families.

A more dispersed market-led pattern of development would make a slight improvement in economic costs and provide more housing space, but would result in longer travel distances and more car travel.

The project is currently testing a planned urban expansion and new settlements option that will aim to achieve the benefits of the compaction and dispersal options but with fewer disbenefits. The options will also be tested for Cambridge and Tyne and Wear to assess the transferability of the findings. The study is also carrying out studies at the neighbourhood scale in the case study cities to assess the interaction between strategic and local design.

Main outputs:

The current outputs so far are papers on work in progress that can be downloaded from the project website www.suburbansolutions.ac.uk

The main outputs of the project will be policy guidance on spatial land use and transport strategies; practice guidance on spatial design of suburban neighbourhoods; typologies of urban layout patterns at different scales; integrated method of sustainability assessment for spatial plans; reports and recommendations on spatial land use and transport for each case study city; conference presentations; refereed journal articles and conference papers: A regularly updated web-site: Project seminars, symposia, and a final conference.

Interact with KT-SUE on knowledge transfer.

Target stakeholders:

Central government (DfT) - transport planners

Central government (DCLG) - housing planning policy

Local government - transport planners

Local government - housing planners

Private sector - urban design, transport planning consultants

Voluntary sector on transport policy, countryside protection, and nature conservation

Consortium Title:	SUBR:IM (Sustainable Urban Brownfield Regeneration: Integrated Management)	Start Date:	July 2003	End Date:	July 2007
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Subject areas:

Engineering
 Science
 Property and planning studies
 Sociology

Key issue / problem:

The Consortium aimed to develop technical solutions and tools for restoring brownfield land in urban areas, whilst at the same time increasing the knowledge base of all stakeholders involved in such development. The key objectives were therefore

1. To enhance the robustness of technical solutions and tools for the restoration of brownfield land and its infrastructure in urban areas.
2. To increase the knowledge base of investors, developers, planning agencies, local authorities, the public, scientists and other stakeholders involved in brownfield development, to integrate their needs within a sustainable framework and seek to encourage investment.
3. To establish best environmental practice in the development of brownfield land in urban areas, which will extend existing knowledge and set benchmarks and sustainability indicators.

Key findings:

- Better governance structures, policies and forms of regulation are required more effectively to deal with the multi-faceted issues raised by brownfield regeneration.
- Private developers still see contamination as a challenge, but consider infrastructure constraints, density and governance issues to be more important obstacles to development. In many instances, with some notable exceptions highlighted in the research, the practical reality does not match the rhetoric of sustainability for this group.
- There was little evidence from the case studies that public participation had had any significant impact on the technical processes and practices of brownfield development.
- Importance of climate change impact on brownfield land: scientists and technical experts should develop new ways of monitoring and measuring the effects of change on physical processes and containment technologies, and also develop new modes of communication and knowledge transfer.
- An important outcome of the interaction between the technical and social science work packages was that remediation costs were not usually a critical issue for typical brownfield development. That is, for housing and other high value land-uses, remediation of contaminated land might only be 5% of the site value.

Main outputs:

As well as our website, three public conferences and three annual newsletters, we published 29 magazine articles and gave 52 conference presentations to complement the 29 journal papers published (with many in submission or preparation). We gave evidence to the Royal Commission on Environmental Pollution for their report on the Urban Environment, and a seminar to the Treasury's Property Taxation team. We are particularly proud of four of our dissemination activities (contents, lists, pdfs, etc associated with these are on www.subrim.org.uk):

- A SUBR:IM book called Sustainable Brownfield Regeneration: Liveable Places from Problem Spaces will be published by Blackwells in October 2007.
 - Twelve bulletins to be published and circulated by CL:AIRE to 4500 people on their specialist mailing list. These are typically 4 A4 pages and designed to get the basic messages from all aspects of SUBR:IM across to informed end-users.
 - A roadshow. External organisations were invited to select from a menu of talks and arrange an audience. The four events (Reading, Birmingham, Leeds, Bath) had 27 presentations tailored to fit the specialised audiences which would not have attended a more general, public event.
 - With almost no public domain information on acid tar lagoons available, our website acidtarlagoons.co.uk has become a worldwide focus of interest and contacts.
- Other knowledge transfer activities have included patents, a spin-out company, and much closer working relationships with a range of external bodies.

Target stakeholders:

Developers
 Engineers and scientists in remediation arena
 Planners
 Local authorities
 Remediation consultants
 Government (DCLG, DEFRA) and NGOs (Enlsh Partnerships, Environment Agency)

Consortium Title:	Metrics, Models and Toolkits for Whole Life Sustainable Urban Development	Start Date:	May 2005	End Date:	April 2009
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Subject areas:

Integrated sustainability assessment for urban development projects; whole life economic, environmental and social issues of an urban development; stakeholder values; full cost accounting; evaluating environmental equity; assessing the effects of urban developments on social capital; knowledge in an assessment context; bio-physical measures of sustainability.

Key issue / problem:

Work Package 1: The ISAT- to develop a framework that encourages key decision-makers to systematically assess the sustainability of urban developments taking account of scale, life cycle, location, context and all stakeholder values, preferably with the use of a 'common currency' to aggregate the output of various approaches.

Work Package 2: Capturing and Integrating Stakeholders' Values in Sustainability Assessment- examining how to capture and integrate the values of stakeholders into the urban sustainability assessment process generically, and into the ISAT.

Work Package 3: Urban Development Sustainability Accounting - internalising the externals. How do we express in cash terms the effects of our actions on third parties?

Work Package 4: Assessment for Environmentally Equitable Urban Developments- to examine the environmental equity implications of a proposed urban development and promote community involvement in that process.

Work Package 5: Assessing the Impact of Urban Developments on Social Capital- how to measure and predict social capital in urban developments, and how to assess its relationship with their key physical features.

Work Package 6: Knowledge in an Assessment Context- defining the requirements for a knowledge management system that supports sustainability assessment during urban development projects.

Work Package 7: Investigating Barriers and Incentives to Sustainability Assessment- what are the barriers to sustainability assessment and the adoption of assessment tools and what approaches and incentives are needed to overcome these?

Work Package 8: The Quest for a Common Currency- is it possible to measure the sustainability of an urban development with a single metric (common currency)?

Key findings:

WP1: There are some 700 tools in existence. No new tool is required: rather, a means of selecting those that are appropriate and integrating their outputs.

WP2: Four techniques (snowballing, power/interest mapping, probing questions, generic stakeholder categories) can be utilised in the early stages of stakeholder engagement in order to identify the context-specific stakeholders.

WP3: It appears to be feasible to develop an acceptable accounting framework embracing only some 25 of the 900 or so sustainability indicators reported in the literature.

WP4: Identified similarities underlying the US and emerging UK concepts of environmental equity. Identified 10 headline local environmental equity issues associated with urban developments.

WP5: The built environment can encourage or hinder the emergence of social capital. The determinants of social capital in an urban development context revolve around those design parameters that encourage physical interaction.

WP6: Identified a sustainability knowledge assessment management protocol. Identified key blockages and constraints to knowledge generation, flow and use during assessment.

WP7: Identified perceptual, institutional, economic, technological barriers and incentives to sustainability assessment.

WP8: Biophysical measures including ecofootprint, emergy, exergy and well-being have been analysed but none seems capable of capturing the progress towards sustainability in a non-controversial manner so a reductionist approach is unlikely to succeed.

Main outputs:

A prototype integrated assessment software tool that will demonstrate the decision-making framework developed in the project is under development and will be ready for use outside the consortium in mid-2008.

The number of papers published so far is 2 journal papers, and 14 conference papers. 8 posters have been presented at various events. The consortia has organised an international conference on whole life urban sustainability and its assessment which was attended by 96 delegates with 69 papers presented and published in the conference proceedings.

Various reports and workshop outputs can be found on the consortium website www.sue-mot.org.uk. Eight papers are currently submitted for publication in various journals, and 4 workshops are scheduled before the end of the year.

Target stakeholders:

Academics and Researchers; Architects; Building contractors; Government departments, Consultancies/advisors; Decision makers in urban developments; Developers; Local authorities; Local communities; NGOs; Urban Planners & Planning authorities; Project teams; End users of built environment; Sustainability Professionals

Consortium Title:	SURegen	Start Date:	November 2007	End Date:	October 2011
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Subject areas:

Sustainable Urban Regeneration (SUR).

Key issue / problem:

Urban regeneration is a “comprehensive vision and action which leads to the resolution of urban problems and which seeks to bring about a lasting improvement in the economic, physical, social and environmental conditions of an area that has been subject to change” (Roberts and Sykes 2000). A key word in this definition is “lasting”. However, there is little consensus in how to achieve lasting, sustainable regeneration beyond the common understanding that urban areas characterised by high levels of multiple deprivations, derelict buildings, crime, social disorder, etc., are clearly unsustainable (Ekins and Cooper 1993; Wates 2006). Recent approaches have tended to address only the symptoms, rather than looking at the underlying causes. Addressing such deep seated problems is the main focus of the Government’s Neighbourhood Renewal Strategy which aims to deliver long term sustainable improvements to people’s quality of life - including economic prosperity, provision of safe and secure places with high quality schools, decent housing and better health (ODPM 2003). However when faced with the complexity, uncertainties and ambiguities of delivering on all these ambitions the actors involved lack the skills and understanding necessary to implement a fully integrated approach (Bentivegna et al 2002; Egan, 2004; Curwell et al, 2005; Deakin et al, 2007).

The overall aim of the SURegen is to explore the concept and reality of a digital decision support aid, the Regeneration Simulator Workbench (RSW), that will meet the regeneration decision-making challenges which SUR poses, i.e., multiple stakeholder interests, complexity, uncertainty and ambiguity. The knowledge of good practice in SUR is to be captured within a collaborative workspace to function as a learning laboratory and library of good practice to provide a new training vehicle for regeneration leaders and their professional advisors to learn about SUR and to use the knowledge the RSW generates to close the skills gap identified in the Egan Review (2004). This shall be done by constructing the RSW and its ontology around the core set of regeneration competencies included in RENEW NW’s 8point development of the “Egan Wheel” for Sustainable Communities. This seeks to tackle three skills gaps: a) within disciplines, a gap in technical skills to deliver SUR; b) between disciplines, a gap in collaborative skills to deliver integrated multi-disciplinary working on SUR; and c) between professionals, elected members and the general public, a gap in engagement and envisioning skills to enable common goals to be identified and achieved.

Key findings:

Main outputs:

The Regeneration Simulator Workbench (RSW): a prototype multi-perspective collaborative digital workspace.

It is anticipated that the RSW will enable members of regeneration teams to collaborate more effectively to:

1. Simulate the regeneration process, especially the early phases of diagnosis and visioning when key decisions are taken so that professional actors can gain experience and become better prepared to face the complexity of real-time decision-making when they enter the live regeneration environment, enabling transfer of good practice to help fill the skills gap described in section 2;
2. Understand the dynamics of regeneration by identifying the main decision points in the process and at these points to evaluate some of the key outcomes and how the planning and development stages of SUR programmes should be managed before committing to the expense of full implementation;
3. Build appropriate teams and engage all stakeholders including business and citizens in diagnosing the regeneration need, developing and continuously updating the local vision, scenarios and indicator requirements;
4. Be advised on the best assessment tools to evaluate alternatives for the various steps and stages of the regeneration process against the agreed vision, scenarios and indicators supporting decisions taken on what constitutes the appropriate course of action to deliver the most satisfying SUR outcome to all parties.

Target stakeholders:

All regeneration stakeholders including regeneration professionals, local authority planners and engineers, economic development officers, local authority housing, developers, house builders, constructors, local politicians, local businesses, energy service providers, waste management, transport engineers and providers, social workers and community groups. It could also embrace others indirectly engaged, but who can influence the perception of the process and outcomes such as investors, insurance companies, health professionals, education providers and local news media organisations, etc.

Consortium Title:	SUSTAINABLE REGENERATION: FROM EVIDENCE-BASED URBAN FUTURES TO IMPLEMENTATION	Start Date:	April 2008	End Date:	April 2012
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Subject areas:

The Universities of Birmingham, Central England, Lancaster, and Exeter propose to study sustainable urban regeneration within eight workstreams: Biodiversity; Atmosphere; Water & Waste Water; Sub-Surface Built Environment Infrastructure & Utility Services; Surface Built Environment & Open Spaces; Organizational Behaviour & Innovation; Density & Design Decision-Making; Social Needs, Aspirations & Imposed Policy.

Key issue / problem:

Sustainability, no matter what definition is used, is all about the future – putting in place now solutions that will yield a positive rather than negative future legacy. The essential underlying question is “how sustainable are these solutions?”, while the answer inevitably is “it depends on how the future develops”. This project has the primary underpinning aim to develop a series of alternative futures, predicated on different bases and using the most advanced current thinking for the projections, against which to test the sustainability of proposed solutions for urban regeneration. If the outcomes from a proposed solution are similar, regardless of the future against which it is tested, and they deliver a positive legacy, then they can be adopted with confidence. Where there are very different outcomes depending on the future, the solutions can be modified to the point at which an optimum outcome regardless of the future is created, or at the very least planning can be based on knowledge of the likely impacts if the future develops towards one of the series of extremes investigated in this project. Whichever of these is chosen, planning will be immeasurably strengthened as a result of the knowledge base created since decisions will be evidence based.

Key findings:

Main outputs:

The aim of this research is to establish and test, with respect to sustainability, alternative urban futures in the context of urban regeneration, to meet four high-level objectives, and to transfer knowledge to stakeholders, notably policy/decision makers regarding:

- to create a variety of futures, building on prior, as well as new, research and predicated on different fundamental assumptions and priorities;
- to assess those futures in terms of design, engineering implementation and performance;
- to refine them, in terms of mitigation and adaptation measures, incorporating novel solutions; and ultimately
- to provide alternative solutions, with an associated evidence base, and strategies for their implementation.

Target stakeholders:

- The people who will live and work in the case study areas, and all who visit or use the areas, now and in the future.
- The City Councils, who are responsible for managing the sustainable redevelopment of the areas under their control and who will be able to make direct use of the findings.
- Practitioners in the field of urban regeneration, ranging from developers, architects, environmental and built environment consultants, contractors and utility service providers to economists and housing groups.
- The regional development agencies directly associated with the case study sites, as well as other regional development agencies, since one of their core, stated collective objectives is to engender sustainable practices.
- Local authorities and equivalent international bodies in the process of undertaking urban redevelopment, who may wish to adopt the project outcomes to identify best approaches to implementing sustainable urban development.
- The international academic community, which will gain insight into the challenges associated with the implementation of sustainability principles and new technologies to urban redevelopment programmes.
- The EPSRC SUE (and IEP) Programme, by providing case study facilities for other consortia to make use of. While this matter has been specifically omitted from the SUE 2 Call, there are strong possibilities for cross-consortia working on the Eastside datasets as the consortia projects develop, particularly given the base room facility at UoB.
- The developing environmental technologies industrial clusters in the UK, which will gain insight into the needs and potential for new technologies in the urban regeneration context.
- Policy makers, including the Department for Communities and Local Government, regulators and non-governmental bodies with interest in sustainability issues, who will gain insight into means of bringing about sustainable practices (e.g. symbiosis) in urban regeneration projects under a range of challenging alternative futures.
- The nine RFs and their future employers, who will gain invaluable experience of this truly cross-disciplinary study.

Consortium Title:	URSULA - Urban river corridors and sustainable living agendas	Start Date:	January 2008	End Date:	December 2011
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Subject areas:

Urban design, brownfield redevelopment, urban river ecology, multiple uses of floodplains, sustainable urban drainage (SUDS), decision-making

Key issue / problem:

The URSULA hypothesis:

There are significant social, economic and environmental gains to be made by integrated and innovative interventions in urban river corridors

Key findings:

Main outputs:

Annual newsletter
Up to 100 short articles on interim results and news
A set of end-user bulletins
At least two national URSULA conferences
A roadshow
Website
Local events

Target stakeholders:

Environment Agency - flooding, sustainable development, Water Framework Directive, Science Group, Regional staff
Local government - planning, drainage, environment
DEFRA and DCLG
RDAs
Consultants
Landowners, occupiers and developers in urban river corridors
Community organisations
Natural England and Wildlife Trusts
Residents and employees in urban river corridors

Consortium Title:	VivaCity2020	Start Date:	May 2003	End Date:	April 2008
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Subject areas:

Urban sustainability for the 24-hour city: decision-making, form, policy and experience

Key issue / problem:

VivaCity is seeking to understand the trade-offs city dwellers and city developers make everyday and how they can make more sustainable decisions. VivaCity aims to provide an overall picture of urban sustainability, by integrating research on: (1) The urban design decision-making process and ICT support solutions, (2) The generation and evolution of diversity, (3) Crime and fear of crime, (4) Environmental quality, (5) Housing provision, and (6) Public conveniences

Key findings:

1 The urban design decision-making process and ICT support solutions – Development of a new urban design decision-making process showing that the process is iterative and cyclic, not linear, and there is a real and current need for a legacy archive of information to assist decision-making.

2 The generation and evolution of diversity – Most mixed-use is often only dual use with residents and businesses. Mixing of uses works best at the horizontal level of streets and neighbourhoods and does not seem to work as well at the vertical level of high rise buildings, and the mix cannot be socially or economically engineered.

3 Crime and fear of crime – The research clearly demonstrates relations between density and crime, mixed-use and crime, and temporal patterns of incidents, many in opposition to current orthodoxy and policy. The research also highlights a range of difficulties when residential areas and local amenities co-exist.

4 Environmental quality – VivaCity's researchers developed an innovative methodology to engage local residents and businesses in deliberations about their local environment, asking people to be conscious of their sensorial experiences including sight, sound, smell, taste and touch. The results have challenged assumptions about positive and negative aspects of environmental quality and at the same time identified their interdependency.

5 Housing provision – The emergence of a 'developer's' model of a mixed use urban block as a new residential typology which, along with a twenty-first century model of streets and squares, has come to represent a culturally specific response to the perceived need to reintroduce housing into the inner city.

6 Public conveniences – Decisions made at the very local level can have a definite and measurable impact upon how people perceive and use the city. The research found that although well-designed toilets are an important amenity within any building or urban environment and the way they are designed should meet everyone's needs, current toilets fail to meet legislative requirements such as the British Standards and users have rarely been consulted regarding the design of these facilities.

Planned outputs:

(1) **Book** and (2) **Public conveniences guidelines** (3) Further **project literature** and **academic outputs**

Achieved outputs:

(1) **Launch Event**, (2) **Stakeholder Conference**, (3) **London Architecture Biennale 2004**, (4) **Sustainability City Conference 2007**, (5) **Being There Exhibitions**, (6) **Project Literature** – VivaCity has produced one leaflet, three newsletters and two booklets with the aim of disseminating research results to project partners and interested parties. The Public Conveniences research group has produced four newsletters and the Housing Provision research group has produced one newsletter, (7) **Academic Outputs** – A full list of academic outputs (journal articles, conference papers etc.) is available on the project website: www.vivacity2020.org. As of August 2007 the list included: 20 journal papers, 22 conference papers, 7 book chapters, 1 journal special issues edited, 22 conference presentations, 6 articles, 7 case study reports, 2 workshops, and 3 speaker invitations, (8) **Website** – www.vivacity2020.org,

Target stakeholders:

(1) Public sector – local authorities, planners and the Government (2) Private sector – architects, urban planners, urban designers, urban developers (3) Academia – universities and departments including current and future researchers (4) EPSRC (5) Local communities and the general public

Consortium Title:	WaND	Start Date:	April 2003	End Date:	September 2007
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Subject areas:

Water cycle management for new developments

Key issue / problem:

How do we reduce the demand for potable water and the impact on the environment of surface (flood) water and wastewater from new housing developments in a sustainable way?

Key findings:

- We cannot continue with traditional approaches to water management in new developments.
- Achieving savings by installing water efficient devices in new homes will not be sufficient to reach sustainable water use levels. Water efficiency improvements must also be implemented in existing housing stock.
- A new ultra-low flush toilet and wastewater collection system saved 87% of water use with no downstream blockage problems
- Rainwater harvesting systems have a negligible impact on health. However, grey water tested contained numbers of indicator bacteria as well as the opportunistic pathogens. The presence of such organisms demonstrates the potential health risk of grey water reuse, particularly for the vulnerable members of a household.
- Rainwater harvesting can potentially not only save water, but can also reduce the flow rate and volume of surface water runoff from a developed site.
- Modelling work has shown that it is difficult to achieve high water saving efficiencies in grey water recycling systems because large tanks are needed to achieve this, yet small tanks are needed to minimise water quality degeneration.
- Membrane bio-reactors are the most robust technology for the treatment of urban water – they perform well and are scalable, making them an alternative at promising at household level
- The use of infiltration SUDS in new developments should be exercised with caution, due to the interaction between infiltrated flows and foundation of houses and to prevent flooding associated with changes in groundwater levels.
- There are tradeoffs between water use, energy use and land use. These have an equilibrium point associated with technology's state of the art
- Low levels of financial support can boost learning and innovation in relation to sustainable water management.
- Sustainability will not work if left as a "voluntary" alternative
- Sustainable water management works best with organisations trusted by people

Main outputs:

- An intelligent portal, which contains all of the project outputs including guidance notes, reports, papers and models. This is available on CD-ROM for project funders and will be made more widely available after the end of the project via the project website: www.wand.uk.net.
- Practitioners' guide published by CIRIA
- A 'flexible framework' for sustainability assessment
- A water systems planning and design toolbox
- A water demand forecasting tool
- A set of urban water futures and their water cycle implications
- Health impact assessment method applied to water cycle management

Target stakeholders:

- Environment Agency
- Water companies
- Private sector consulting engineers
- Local authority planners
- Homebuilders and developers

Consortium Title:	Strategies and technologies for sustainable urban waste management	Start Date:	February 2004	End Date:	January 2008
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Subject areas:

Waste management, resource recycling, renewable energy, waste transport, material flows through the urban environment

Key issue / problem:

To address the problem of waste management in urban environments with particular reference to waste as a resource. This includes the issues of bulky item waste, analysis of economic, environmental and social impacts of waste schemes and technological approaches to waste processing as an energy source.

Key findings:

Resource use and future waste arisings for local neighbourhoods can be estimated according to socio-economic groups. These estimates show varying consumption levels and resultant waste arisings according to group.

Scalability of waste processing is largely site-dependent. Economics improves with scale-up but local land-use and local urban planning policy remain as defining factors. Diversified strategies deploying medium to large-scale technology would meet the Landfill Directive. Co-location leads to optimisation in the use of outputs of one process as inputs to another. Coordinated efforts across Local Authority departments with an overview of different EU directives can lead to balanced strategies.

Life cycle analysis suggests that recovery of energy through anaerobic digestion has the lowest environmental impact of any centralised method of treatment or disposal for urban biowaste.

The particular problems for collection of waste/recyclates associated with dense high- and low-rise social and rented housing can be overcome by, for example, secured storage in communal corridors, regular collections, common collection receptacles across boroughs/WCAs, more consistent communication strategies, increased utilisation of chute-recycling schemes, use of building regulations and guidelines to enforce more effective collection and disposal mechanisms. Collection schemes should cover as many materials as possible to encourage participation.

Current collection and disposal operations for household and bulky waste in England are often not conducive to the recovery of items that can be reused or recycled. Public communication of the availability of bulky waste collections needs to be simpler and more consistent. Householder decisions on disposal route are related to affluence, and the proximity of a HWRC. Many operational and organisational factors for effective furniture re-use schemes are locally-specific. Food minimisation (redistribution) schemes are effective but highly dependent on retailers' logistics. Evaluation and comparison of the full social, environmental and economic impacts of recycling operations requires a combination of approaches, no single method is adequate.

An estimated 4,677,000 visitors travel 40 million km per year to HWRCs in Hampshire. 21% of this could be saved if green waste was consolidated locally through a network of bring sites. 10% could be avoided if visitors used their nearest facility rather than a preferred site. In a 9 day period, 148 waste collection vehicles travelled a total of 27,000 km emitting 9 tonnes of CO₂.

Main outputs:

Published papers, reports, policy recommendations. Input parameters and output metrics defining the purpose, scale and contributions of various waste processing options. Technical feasibility studies. Economic assessments at different scales. Models for transport, waste processing and energy footprints. Interactive computer based questionnaire for auditing waste generation. A special issue of the Proceedings of ICE, Waste and Resource Management (WARM) is planned for 2008.

Target stakeholders:

Waste management industry
 Local authority - planners
 Local government - planners, policy makers
 National government - strategic planners
 Environment agency - waste processing
 DEFRA, WRAP