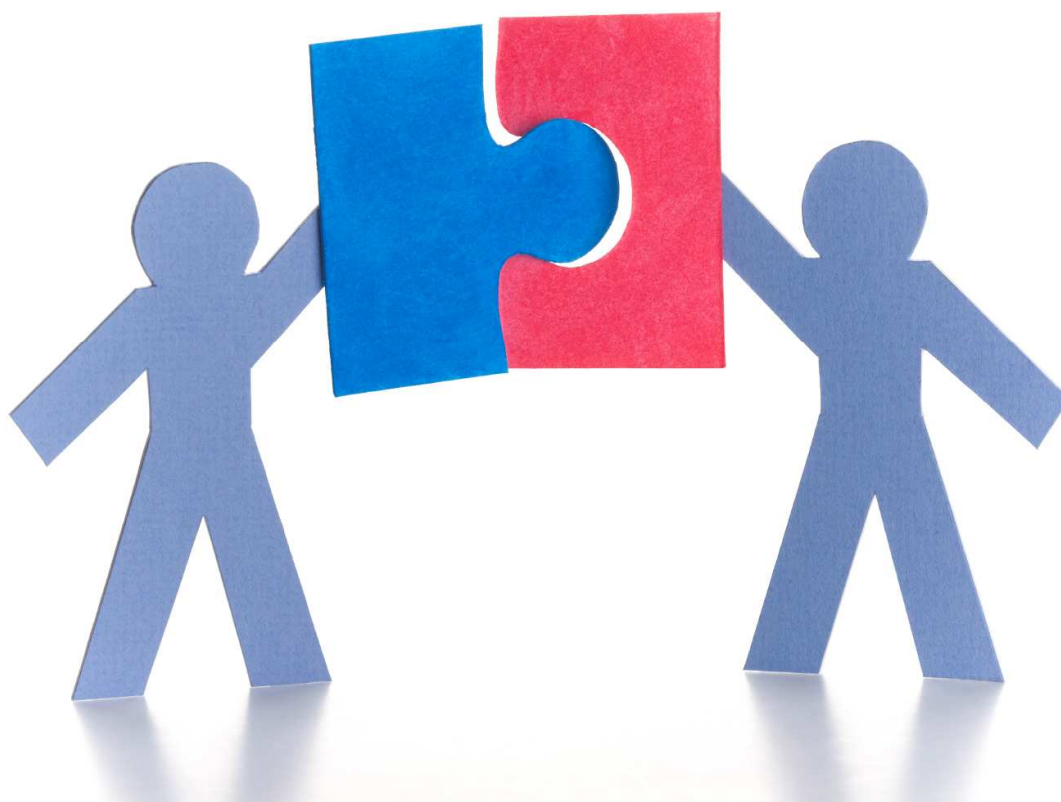


Integration for Sustainable Development

A Report for Practitioners

June 2011



**A report based on research undertaken for the Ashford's
Integrated Alternatives (AIA) Project, 2009-2011**

Forward.....



“This report is an important output of a government-funded research project under EPSRC’s Sustainable Urban Environment programme. Details of other projects can be found at:

<http://www.urbansustainabilityexchange.org.uk/>

The aim of this project – Ashford’s Integrated Alternatives – was to examine the benefits and difficulties of planning, specifying and delivering more integrated utility provision as a component of sustainable development (specifically water and energy) through the lens of the delivery of substantial housing targets in Ashford, Kent (a designated growth area).

From it you will see that there is more to integration than immediately meets the eye! We have framed our work around the four themes of understanding, adapting to, assessing and delivering integration. You will also find specific recommendations under each of these headings and a vision for a more ‘integrated future’.

The project was carried out over a 2-year period by a team of researchers from five universities and involved extensive engagement with stakeholders in the Ashford Area. I would like to offer my thanks to all our partners and in particular to Laurienne Tibbles of Ashford’s Future for facilitating access to people, places and data.”

.....Professor David Butler, AIA Principal Investigator

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Ashford and the AIA Project

Ashford, Kent, is a designated growth area in the South East of England. A medieval town, selected by the UK Government to host approximately 31,000 new homes and 28,000 new jobs, Ashford sits at the confluence of four rivers (Great Stour, Upper Great Stour, East Stour and Beult). The planned development not only held implications for these watercourses in terms of water supply to meet increased demand, but also in generating runoff with the potential to cause local flooding and generate additional sewage, with implications for river quality. Impacts would also not be limited to the water sector: the energy sector also estimated a huge increase in demand, requiring new infrastructure. Consequently, custodians for Ashford's development, Ashford Borough and Kent County Councils (including the special purpose vehicle, Ashford's Future), had aspirations to be at the forefront of sustainable development. In 2005 the Greater Ashford Development Framework (GADF) was published, setting out a masterplan for Ashford's Future.

Between April 2009 and March 2011, the Engineering and Physical Sciences Research Council funded a consortium of researchers from the Universities of Exeter, Bradford, Surrey, Cranfield and Imperial College London, to examine the ongoing sustainable development delivery process in Ashford. The 'Ashford's Integrated Alternatives' project had a particular focus on the integration of water and energy utilities and aimed to identify challenges and opportunities for water-energy integration and sustainable development, from social, technical and organisational perspectives.

A range of approaches were used during the research, including interviews with recipients of a community water-energy efficiency scheme and interviews with figures in key delivery organisations, as well as analysis of integrating technologies such as photovoltaic power generation and rainwater harvesting systems. Themes central to the research findings include improving the decision making process, encouraging collective action, the scale and value of integration and organisational practicalities of integration. These themes are explored in this report, illustrated with case studies and practical recommendations throughout. It is hoped this report will provide useful pointers for those trying to implement integrated approaches to the sustainable development process across a range of scales.



Locomotive wheel fountain in the centre of Ashford

Integration: The Four Challenges

In examining the sustainable development and utility integration process in Ashford, four general challenges emerged. These are outlined below and discussed in detail in the following sections of the report.

1. Understanding Integration
2. Adapting to Integration
3. Assessing Integration
4. Delivering Integration

Of course these challenges do not stand alone, but interact and influence each other throughout the integration and sustainable development process. The interactions are summarised in Figure 1, where the process of integration starts by thoroughly understanding it in a project's context and where feedback in the form of evaluative processes directly influences the potential success of the other challenges.

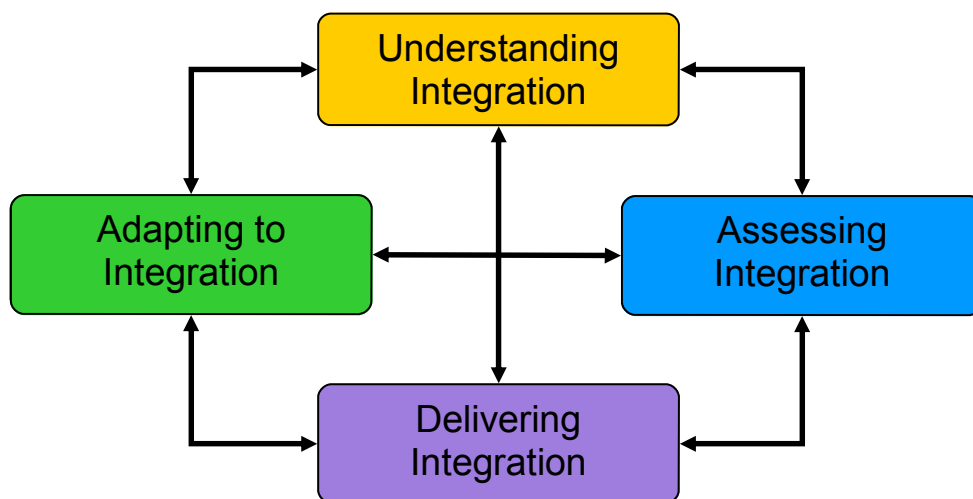


Figure 1. Interactions between the four integration challenges identified through AIA research

Challenge One: Understanding Integration

Significant differences exist in the interpretation of the terms ‘integrated’ and ‘integration’, depending on the context in which sustainable development is being pursued. A number of definitions of these terms were identified and are summarised in Figure 2. The selection and application of one of these definitions to a particular context results in issues and tasks being framed in a particular way. Right from the outset, the appropriate selection of a definition is crucial for successful delivery of project objectives. Case Study Box One illustrates how the definition of integration was selected by Ashford’s stakeholders and its subsequent impact on framing integration in the delivery of sustainable development.

Each definition is not necessarily mutually exclusive to the others,

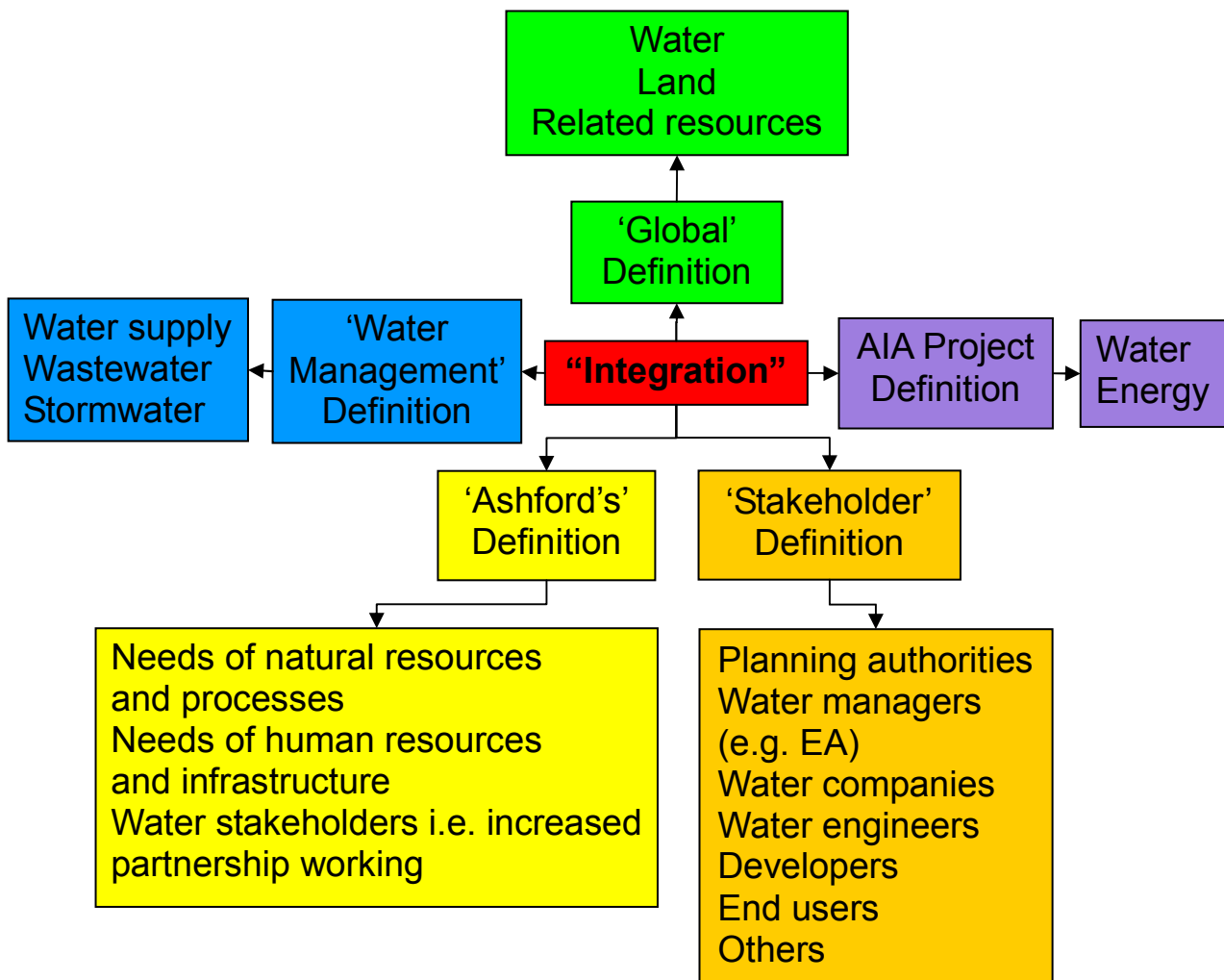


Figure 2. Definitions of 'integration' identified through AIA research

Case Study Box One

Integration: Impact of Definition and Framing in Ashford

The absence of national policy in relation to integrated water management in 2001, when Ashford Borough Council was beginning to formulate its sustainable development policies, led to the Water Framework Directive being taken as the driver for the definition of 'integration' selected for water management. This framed the sustainable development process and objectives were derived with Directive compliance as their focus. This was beneficial in ensuring that water and sewerage companies followed a partnership working approach and undertook socially and environmentally appropriate steps towards new infrastructure provision. However, the approach also meant that other, innovative techniques, including some for integrating water and energy, were eliminated, as it could not be guaranteed (without significant financial commitment for impact studies) that these alternatives would facilitate the water quality objectives set by using the WFD as the primary framing driver. From 2002, national policy documents placing greater emphasis on different types of integration began to emerge, such as Defra's 'Directing the Flow', but integration definitions and framing were not revisited or revised by delivery partners in Ashford, resulting in missed opportunities for water-energy integration.

though care should be taken where multiple definitions are used not to introduce sources of conflict between subsequently derived project or sustainable development objectives.

Part of the challenge in implementing most of the definitions of integration is in overcoming real and perceived *risks*, resulting from embarking on innovative and novel approaches, both technologically and organisationally. Risks currently stem from uncertainties in technological performance and un-trialled modes of implementation (e.g. multi-utility service companies, 'MUSCos').

Finally, regular revision to selected definitions and frames is also vital, to take into account revisions that may be required to incorporate contemporary policy and legislation and that is where adapting to integration becomes important.

Challenge One Recommendation

Careful thought should be given, at the start of any development project, to the drivers behind the selection of a definition or combination of definitions of integration. How the definition is framed in subsequent objective formulation should also be given adequate consideration and both definition and framing should be regularly revised to accommodate contemporary policy and legislation.

Challenge Two: Adapting to Integration

Discussions on and assessments of urban sustainability are often based on the assumption that there is only one pathway to sustainability. However, different strategies are likely to co-exist, which might lead to different but equally sustainable urban futures. Adapting to a more flexible, context-sensitive approach to integration may allow delivery partners involved in implementing sustainable developments to devise effective, locally adapted sustainability solutions. Case Study Box Two illustrates how such approaches can reduce conflict in implementing sustainable and integrated strategies.

Decision-making is often about being in possession of the right facts at the right time - sometimes decisions are made when the facts are right at the time, but then the facts change, but decisions or plans do not. Effective integration strategies depend on continually assessing what is new, evaluating alternative possible pathways and updating plans to reflect these insights - and having suitable processes integrated into everyday working.

Case Study Box Two

Integration: National Adaptation - Impacts for Ashford

Ashford is a prime example of the limitations of a 'one size fits all' planning framework, where national frameworks (imposed housing targets) can result in inappropriate strategies and counter-productive policy outcomes (unwelcome high density rural housing developments). National and local agendas clashed as development funding was trying to be secured, where local representatives felt pressured to comply with Government demands:

"...it became very obvious that if we'd put in for seven-fifty [houses] we wouldn't have, it wouldn't have been acceptable and government would have stepped in."

Despite this conflict, it was clear that local planning would continue to reflect local aspirations:

"What we're delivering in Ashford is what Ashford wanted not what the Government told us to do..."

The value of adapting to a more locally-driven approach was highlighted in late 2010, following a change of Government in the UK. The Conservative-Liberal coalition devised the 'Big Society' concept implemented through the Localism Bill, which would aim to put residents and councillors in control of their local areas. In the case of Ashford, this could allow conflicts to dissipate and greater focus to be placed on assessing appropriate integrated options.

The emergence of new policy drivers (such as climate change and sustainability in the mid-1990s, low-carbon in the mid-2000s) should act as motivators for continual adaptation, rather than viewed as hurdles to be overcome. Adaptation requires all delivery partners to adopt these flexible and reflective styles, where regular reviews, evaluations and revisions to plans and approaches should be integrated into the development process - right from the start, even before masterplanning has commenced.

Anticipating the next 'challenge', by providing opportunities for partnership working and knowledge exchange is one way in which proactive rather than reactive strategies can be developed. Effective delivery of sustainable development relies on the active involvement of a range of public and private organisations, both during the design and implementation of policies and development. Convincing delivery partners to adopt new practices, can involve having to demonstrate their costs and benefits. Knowledge Brokering Partnerships (for example between national and local governments or research institutes and housing developers, or between all four) could provide much needed support, where best practice and evidence on sustainable development can be shared, encouraging delivery partners to champion novel practices: an example of best practice is illustrated in Case Study Box Three.

Case Study Box Three

Integration: Partnership Working - Ashford's Water Group

Established early in the sustainable development process, the Ashford Water Group formed to ensure integrated water management topped the list of priorities in growth plans. Meeting quarterly and composed of representatives from all relevant water infrastructure delivery partners (including the EA, both incumbent water companies, local and regional authorities and academic researchers), the group discussed issues and formulated strategies to address them and deliver required water infrastructure projects. Although informal, the partnership yielded significant benefits, such as increasing the visibility of water management issues, generating a high level of participation and cooperation, development of an extensive SuDS implementation programme and addressing deficits in current knowledge.

Challenge Two Recommendation

An adaptive approach should be adopted on the pathway to integration and sustainable development decisions and strategies should be proactively revised and informed by best practice. Knowledge Brokering Partnerships should be undertaken, as they are a good way of identifying emerging challenges and embedding adaptive, reflexive processes.

Challenge Three: Assessing Integration

One of the biggest challenges in implementing integrated approaches, is knowing how to assess which aspects of a design, plan or technology can be integrated. Suitable methods need to be identified and consistency in application across all options needs to be ensured. Case Study Box Four outlines an example of where inconsistency in approach lead to mixed successes for integrated resource efficiency initiatives.

Assessing different components for integration may take social, technical or organisational viewpoints and may have differing sustainability priorities. For example, assessment of particular options for integration may reveal that something is environmentally and socially valuable, but not financially viable. In this case balancing the three pillars of sustainability becomes subject to locally defined priorities and limitations. In conducting assessments of integrated strategies a range of methods and tools are available, some of which are summarised in Figure 3 in the context of water-energy resource efficiency. Figure 4 illustrates an output from a technical feasibility assessment showing how wastewater disposal and energy generation could be integrated and the amount of heat and electricity generated per unit of wastewater processed.

Case Study Box Four

Integration: Social vs. Technical Assessment in Ashford

Water-energy resource efficiency in Ashford was assessed from both social and technical perspectives. The demand-side householder-based 'Savings at Home' retrofit pilot project was undertaken to assess the benefits of tackling water and energy efficiency in parallel. Home visits were undertaken to provide advice and practical gadgets to reduce water and energy consumption, with optional referral services for installing more complex items (e.g. a water meter/loft insulation). Significant time and money was invested in the project, with contributions from water and energy companies and the project was subject to post-implementation evaluation and revision. In contrast, the supply-side assessment of water and energy use was undertaken separately, with individual feasibility assessments being conducted into water and energy production technologies (both conventional and contemporary). Limited links were made between water production, wastewater disposal and energy generation and the assessments were not revisited to incorporate emerging dual-resource technologies that could have been relevant for Ashford. Significantly, in this case water and energy companies had a minimal input and resources to evaluate, thus options that could yield some form of integration were limited. At present, customer-side water-energy efficiency is incentivised by regulators, whereas exploration of integrated supply-side approaches is not. This may explain the different levels of water company involvement in the assessments and their differing levels of success, indicating that supply-side integration may need to be incentivised by regulators.

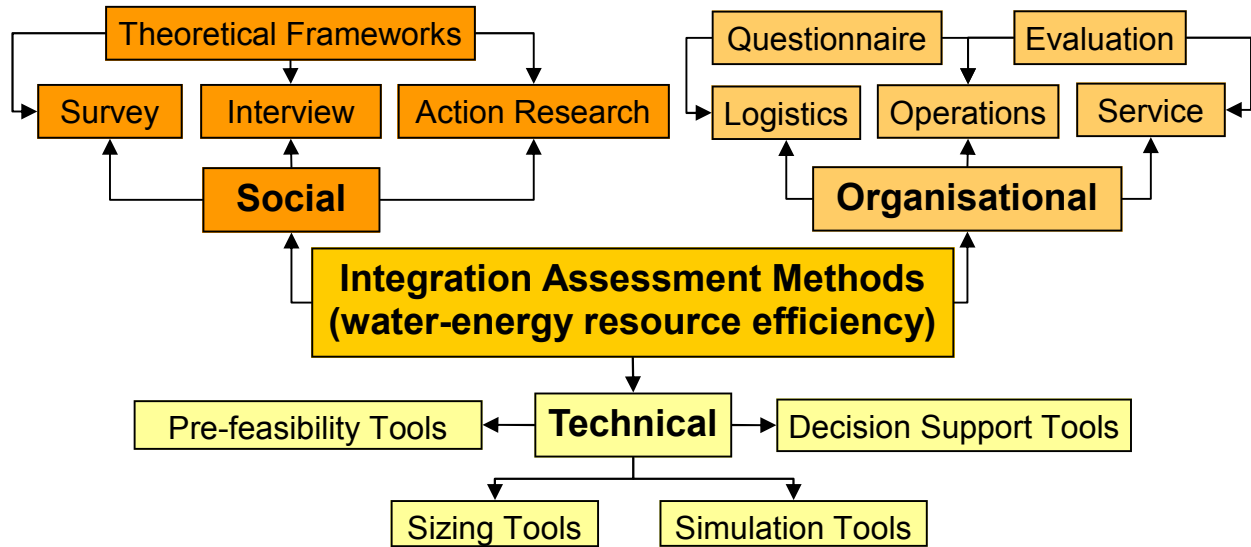


Figure 3. Example assessment methods for water-energy integration

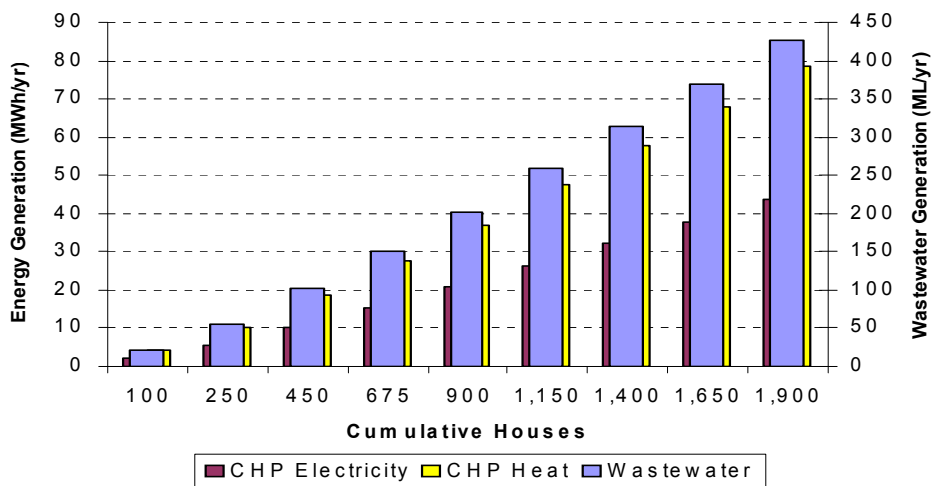


Figure 4. Technical feasibility assessment of integrated wastewater disposal and energy generation techniques in Ashford

As well as ensuring adequate assessment is undertaken, the *mode of implementing or delivering* an integrated project also requires careful consideration - this is discussed in the next section.

Challenge Three Recommendation

Appropriate assessment methods should be identified and applied to options under consideration for integration, to ascertain both complementarities and conflicts in the likely achievement of sustainable development objectives. Where conflicts arise, compromises may be required based on local priorities and circumstances.

Challenge Four: Delivering Integration

In order to successfully deliver integrated approaches to sustainable development, the possible modes of managing assessed or selected options must also be considered right from the start of a project i.e. during the masterplanning phase. Additionally, momentum (and resource provision) needs to be sustained throughout the masterplanning, design, delivery and operation phases, otherwise a plan that started off as integrated may get diluted and not achieve what was set out at the start.

In terms of utility provision, there are a number of modes by which integration can be achieved. These include: private supply agreements, inset agreements, special purpose vehicles (SPVs) and Multi-Area Agreements. The formation of SPVs is receiving increasing attention, such as multi-utility service companies (MUSCOs), which can include WESCOs (Water/waste-energy service companies). When an increasing number of utilities are integrated, the complexity of organisational integration also increases - this is where reconfiguration into a MUSCO can help streamline processes including (i) operation and maintenance of onsite assets, (ii) interface with wider resource markets and (iii) customer billing and support. This relationship is illustrated in Figure 5, where the organisational complexity increases as the number of utilities integrated increases.

Sustainable development delivery partners need to liaise with a number of different utility companies, as well as local planners. This process is often complicated (Figure 6), time-consuming, costly and may not offer much integration across the utility provisions. Creation of a SPV could be the answer, but their formation is also a resource-intensive and time-

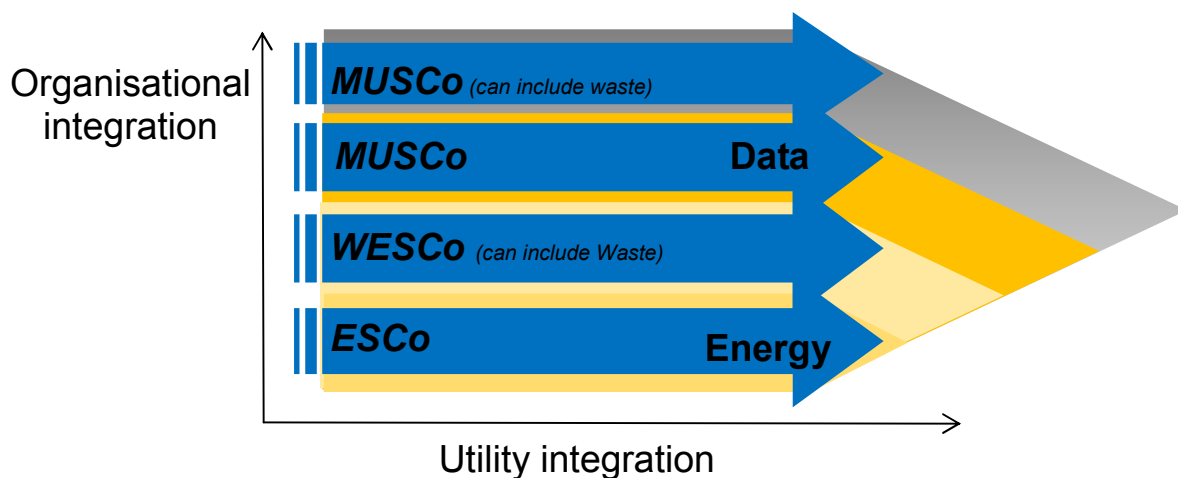


Figure 5. The relationship between organisational and utility integration

Energy

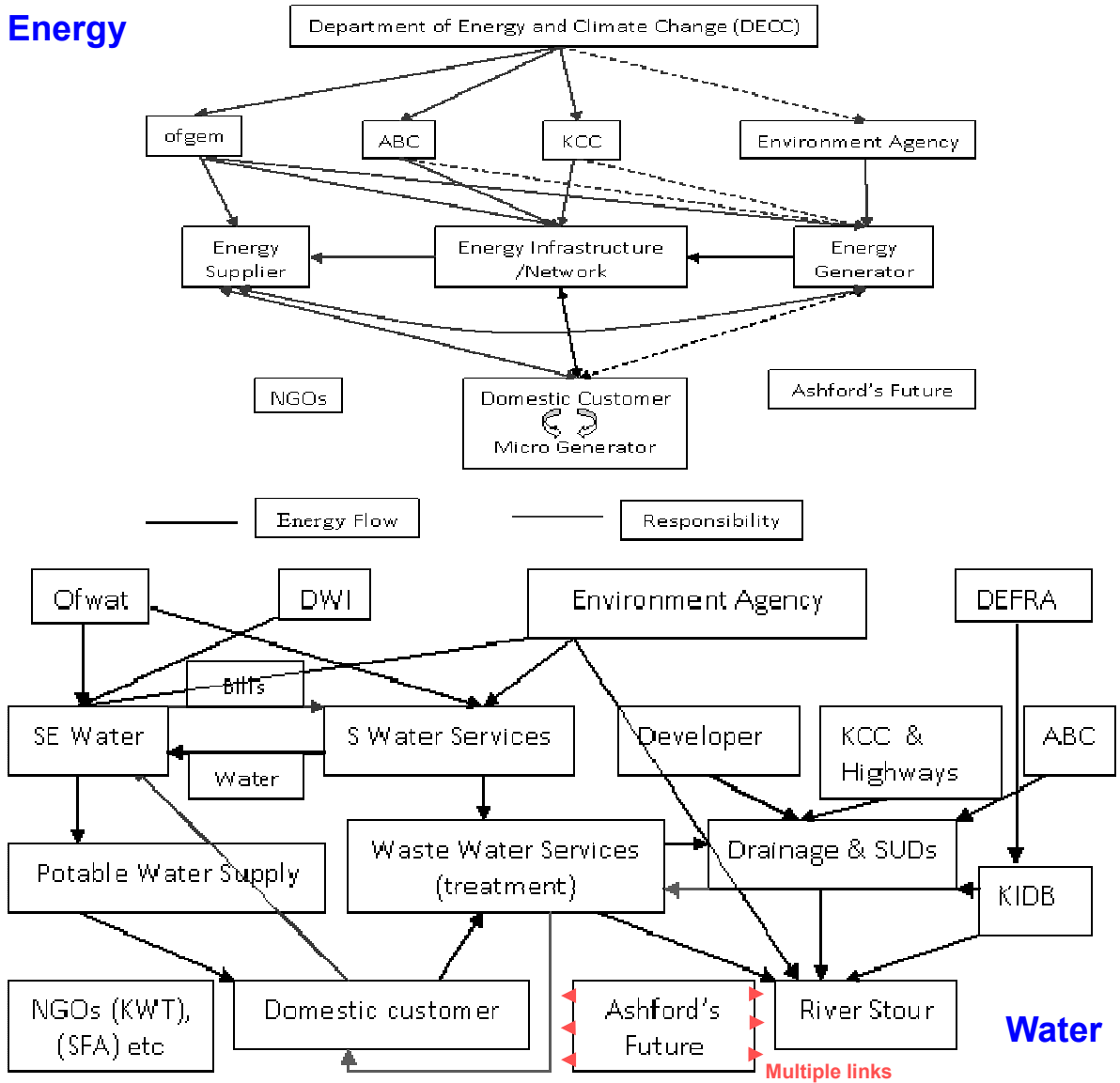


Figure 6. The complex web of interactions between delivery partners in water and energy resource provision. Successful integration relies on open cooperation between individuals, communities and organisations within these sectors.

consuming process, requiring appropriate legal and commercial frameworks to be established. Understanding the costs, liabilities and implications *before* deciding on the degree of integration is crucial to avoid over-commitment in the initial stages, which may then be rescinded during the delivery phase:

“... the attitudes of the two [water companies]...were can’t do that it’s too difficult and [water company] were like yeah put that in the plan, we’ll have a look at it no problem. But when it comes to doing it that disappears.”

A municipal push is required to establish innovative delivery vehicles such as MUSCOs, but open partnering between manufacturer, distribu-

tor and other project delivery organisations is vital to project realisation. Delivery partners need to cooperate extensively with inter-firm relationships playing a significant role in strategic performance. Organisations must not focus on the individual company or industry, but the whole resource-utilising system and adopt a network (or in the case of public engagement, community) approach. As discussed in Challenge Two, *adaptive capacities* of both people and organisations, as well as individuals and communities, are vital for delivery of both integration and sustainable development. An example of this is described in Case Study Box Five, where the importance of viewing resource users as both individuals and members of communities is highlighted.

Case Study Box Five

Integration: 'Individual' vs. 'community' ownership in Ashford

The 'Savings at Home' retrofit project conveyed the importance of water-energy integration to individual householders, as a financial incentive, rather than as a community initiative generating an appreciation of the value and importance of their local environment as producers of the resources they utilise. The individualistic approach meant that other channels for exploring resource using practices were not pursued and participants were not encouraged to be involved in decision making about their water and energy systems. This one-directional provision of information prevented consideration of broader social influences on resource use and by focussing on end-user behaviour alone, perpetuated existing perceptions of water and energy as personal commodities rather than shared resources. Communally aware householders thought involving people's experiences of domestic practices and being involved in decision making about how local water and energy services are organised were key components of delivering integration. One comment on the management of water and energy services was that:

'You can't manage it from the top and not get it to the bottom, it won't work and likewise if you don't listen to the people and what they require it won't work' .

Challenge Four Recommendation

Modes of managing delivery and operation should be identified from the start of a project. Establishment of cooperative working processes and awareness of the commitment required to follow through an integrated strategy, are vital for successful delivery.

Summary of Challenges and Recommendations

As well as identifying the challenges in utilising integrated approaches for sustainable development, recommendations for best practice have been outlined in the preceding sections of this report. These are summarised together over the page for easy reference.

Challenge One:**Understanding Integration****Recommendation:**

Careful thought should be given, at the start of any development project, to the drivers behind the selection of a definition or combination of definitions of integration. How the definition is framed in subsequent objective formulation should also be given adequate consideration and both definition and framing should be regularly revised to accommodate contemporary policy and legislation.

Challenge Two:**Adapting to Integration****Recommendation:**

An adaptive approach should be adopted on the pathway to integration and sustainable development decisions and strategies should be proactively revised and informed by best practice. Knowledge Brokering Partnerships should be undertaken, as they are a good way of identifying emerging challenges and embedding adaptive, reflexive processes.

Challenge Three:**Assessing Integration****Recommendation:**

Appropriate assessment methods should be identified and applied to options under consideration for integration, to ascertain both complementarities and conflicts in the likely achievement of sustainable development objectives. Where conflicts arise, compromises may be required based on local priorities and circumstances.

Challenge Four:**Delivering Integration****Recommendation:**

Modes of managing delivery and operation should be identified from the start of a project. Establishment of cooperative working processes and awareness of the commitment required to follow through an integrated strategy, are vital for successful delivery.

Responding to and Evaluating Integration

Whether at an individual, community, organisation or societal level, the pathway to integration for sustainable development is based on interactions requiring trust and fairness. Scale is vital, as while an individual undertakes a practice that uses a resource, systems and processes of varying complexity combine to provide the service that delivers that resource, allowing that individual to carry out that practice. Consequently, integration across scales is vital for the sustainable development decision-making process.

Integration across scales requires a facilitator, however and successful urban redevelopment projects illustrate that local authorities are the single most important organisation when initiating and supporting utility services integration. This is only natural as local authorities are the leaders of development projects and at the same time the recipients of the (potentially) integrated responses. In all cases, they either enable or hinder innovation in delivering integrated resource strategies.

Local authorities should ensure that sufficient capabilities and resources are available to actively drive innovative integrated delivery vehicles from the outset of a project planning phase. Capabilities could be built up by sharing learning and experiences and by formalising engagement with a wider network and other delivery partners early in project planning phases. Resource users and delivery institutions need to work together to design resource efficiency interventions, where users are actively engaged in the implementation phase, rather than just being recipients of information designed and compiled by the development delivery partners.

At present, it is widely noted that aspirations still outstrip achievements, with no local authority having successfully implemented a MUSCo. For example, during the course of the project, it was announced that Southwark Council would no longer work with its MUSCo. Partner. This is unsurprising as, to date, there has been little critical evaluation of what can be done in planning practice that will help promote the uptake of sustainability principles in local development plans and encourage the implementation of innovative and integrated practices (e.g. integrated service delivery arrangements). Findings show that sustainable policies are key drivers for integration in development projects, but a myriad of challenges have been identified in successfully delivering integrated utility services.

Integration for the Future

At the time of undertaking the AIA research and writing this report, UK policy and regulation arenas were undergoing significant change. A strong low-carbon agenda had emerged, a new Flood and Water Management Act had been introduced, Regional Spatial Strategies had been revoked, Ofwat had introduced a revenue correction mechanism (for any revenue over or under recovered at the end of a price review period), renewable energy technology funding was subject to much controversy, a host of Governmental QUANGOs (quasi-autonomous non-governmental organisations) had been abolished and the EA and Ofwat were undergoing reviews. In relation to the latter a Water White Paper was expected in the Autumn of 2011, which would potentially outline an integrated and sustainable strategy for the water sector.

From a policy and planning perspective, all of the above changes bring with them an inherent degree of uncertainty as to what could be delivered using integrated approaches to sustainable development. However, as discussed throughout this report, the presence of adaptive capacities and proactive process planning, would view this uncertainty as a way by which to update and overhaul current practice and to implement new and innovative approaches.

In adapting to such uncertainties, integration for sustainable development also will bring with it changing approaches to engagement with the general public. Adopting more inclusive ways of managing our resource utilisation systems, which allow individuals and communities to contest decisions, could help society to renegotiate its resource demands. In an integrated future, organisations too must not think of themselves as individuals, but as members of communities - communities of resource provision - with a shared responsibility for ensuring that those resources (whether water, energy, waste or transport) are produced, utilised and disposed of in the most sustainable way.

The future may not be orange, but it is certainly bright, with immense potential for cooperative working to bring not only value from efficiencies generated via integration, but for a new era of sustainable development. We just have to make the right connections and must not be afraid to take a few risks to step out into the unknown.

List of Abbreviations

AIA - Ashford's Integrated Alternatives
Defra - Department for Environment, Food and Rural Affairs
EA - Environment Agency
EPSRC - Engineering and Physical Sciences Research Council
ESCo - Energy Service Company
Ofwat - economic regulator for the water and sewerage industry in England and Wales
QUANGO - quasi-autonomous non-governmental organisation
SuDS - Sustainable Drainage Systems
MUSCos - Multi-Utility Service Companies
WESCO - Water/waste-Energy Service Company
WFD - Water Framework Directive

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To download copies of presentations given in a collaborator workshop in Ashford in February 2011, please visit:

http://centres.exeter.ac.uk/cws/downloads/cat_view/38-presentations/71-aia-project