ALDERSGATE GROUP

BEYOND CARBON:
TOWARDS A RESOURCE EFFICIENT FUTURE

Foreword

It is increasingly evident that resource efficiency – that is, the systematic reduction in the quantity of resource employed to produce goods and services in the economy – will be one of the key determinants of economic success and human well-being in the 21st century.

On the one hand, this is the inescapable general conclusion from the science which demonstrates that human societies are already depleting the physical and biological resources of the earth at an unsustainable rate, a problem which is deepening with rising population and per capita consumption.

This general observation does not, however, tell us much about the pace at which resource efficiency will have to be driven, nor about which resources will most immediately require management. In general we know that markets respond to short-term supply restrictions as was the case with the global spikes in commodity prices between 2006 and 2008[1]; they do not anticipate constraints in natural resource stocks. Therefore a prudent economic policy would promote low resource consumption as a vital part of securing future competitive advantage, in advance of the market. Such a policy is also essential for an efficient transition to a low carbon economy. A more efficient transition will be enabled by long-term policy mechanisms that are implemented before resource-constraint shocks force change in the economy. Advocacy of such policy has been a core position for the Aldersgate Group since its formation.

What would a resource-efficient economy look like, and what public policies would be needed to enable the transition to such an economy? This is the third paper in a series which has tried to address these questions. The previous papers have considered the financial and skills aspects of transition. In this report we describe the possible features of a resource-efficient economy by considering three contrasting economic sectors:

Food

Water

Materials

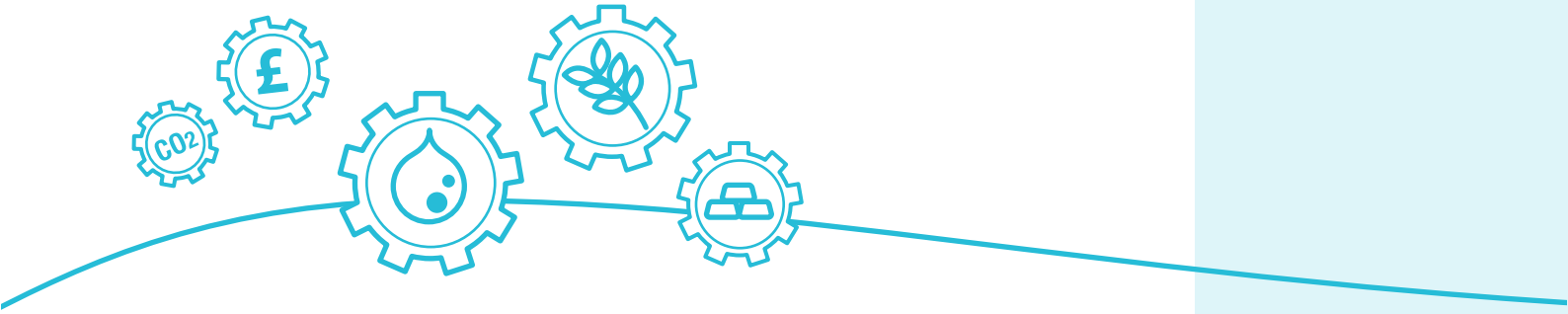
We asked practitioners with an interest in these sectors to think about what their sector would be like in a resource-efficient economy, and brought those insights back for discussion in a series of roundtable sessions. One strong feature that emerged from these discussions is that resource use has to be considered sector by sector. There are some very clear common issues – which we try to bring out in the next section – but these common principles work out differently in different sectors because of the nature of the resources in question.

So this paper has four main sections; the three sectoral exemplifications preceded by the over-arching lessons which can be expected to apply in one way or another across all economic activity.

1
FAO (2008) High-level conference on World Food Security.
Rome 3–5 June 2008.
www.fao.org/fileadmin/user_upload/foodclimate/HLCdocs/HLC08-inf-1-E.pdf

It would be well to clarify one point from the beginning; the issue of resource use is not predominantly driven by fears that finite resources will run out. This is not a "peak oil" paper, which is one reason why we decided not to use oil as an example. Resource use may have to be moderated for a number of reasons; water because of local availability even though there is a renewing water cycle; some metals because of scarcity and rising demand; carbon because of its impact in the atmosphere, and so on. Most biological resources are capable of being husbanded to provide a sustainable supply, and the issue there is the balance between use and replacement. Therefore it is often more accurate to think of resource use in terms of sustainable and balanced cycles than in terms of rate of exhaustion or even intensity of use.

While our work on the sectors told us that they would look quite different under a future resource efficient regime, they would not be unrecognisable. Many of the features and technological approaches that we will need are already in existence. This is why we have consistently talked about a transition in the economy; a deep transition, and one that we need to plan for, but one which is essentially within our grasp. The Aldersgate Group since its inception has urged business and government to address themselves to how the UK economy and UK businesses can ride that transition with least damage and most benefit, and emerge in a strong position for a world in which resource price and availability would render current patterns of production obsolete. We do not think that this can happen by waiting for the market, which is why we have been calling for an economic strategy and sectoral strategies for transition.



For that reason we were much encouraged by the Government's publication, in summer 2009, of its Low Carbon Industrial Strategy (LCIS). For the first time one of the economic ministries had begun to show how it wished explicitly to promote and shape Britain's economic transition to a low-carbon future. The last section of this report contains further comment on the LCIS and urges more comprehensive action on this most immediately critical form of resource efficiency in the economy, namely carbon efficiency.

Carbon may be the most immediate resource issue but it is not the only one. Today's political interest in carbon is wholly justified, and we believe that the politics of carbon will be a theme replayed in a series of variations, in one resource area after another; most obviously in a range of physical resources but soon biological ones as well. It would be well for us to begin to work out how we will manage our entire economy in resource efficient ways, and not by serial attention to each problem resource as the problem becomes critical. And this is particularly true because the political economics of resource use will not be a series of arithmetical propositions but a question of weighing up a whole basket of linked resource demands; water resources against energy use, food production against biofuels, natural habitats against agricultural intensification, and so on. The issue we present as a present economic imperative carries within it the shape of politics to come.

Sir John Harman
Director, Aldersgate Group
February 2010

Executive Summary

Resource Efficiency (RE) will be one of the key determinants of economic success and human well-being in the 21st century. This report describes what a resource-efficient economy might look like and what policies would be required to enable the effective transition to such an economy.

Building on the outcomes of three high level roundtables and consultation with industry stakeholders, this report finds that:

RE policies require a lifecyle approach

Policy interventions usually apply at one point of a resource cycle, but isolated interventions are rarely effective and often create unintended consequences elsewhere.

Prices must reflect environmental realities

There must be sufficient political will to price externalities effectively.

Pricing policy alone is insufficient

Effective management of resources requires a mix of price, regulation, demand reduction and innovation policies.

Resource management has many bottom lines

Physical accounting for the use of key resources on an economy wide basis, alongside monetary accounting, would help to make more balanced decisions.

Global resource constraints will raise issues of availability and security of supply as well as price escalation

Stimulating take up of innovation

The Government must do more to promote R&D into RE science and technology, into resource measurement and into resource economics.

RE is essential to enable a low carbon economy

Substantial cuts in carbon emissions will require changes to the use of natural resources with significant indirect carbon impacts.

While these are general RE principles that can be applied across the economy, it is also clear that RE works out quite differently depending on the nature of the resource. Three working groups were asked to consider what RE means in their sector, how the sector might be expected to look in a future resource efficient world, and what policy approaches could best encourage the transition.

1 Water

A resource efficient water sector would ensure that water supply meets appropriately managed demand in all regions of the country and at an acceptable and stable price to the consumer. We recommend that the financial regulator should have a statutory duty to promote water conservation and efficiency; there needs to be a proper inclusion of social, environmental and carbon costs into the economic valuation process for water; the regulators must overcome an institutional resistance to adopting innovation; and more needs to be done to educate the public in order to reduce water demand from consumers.

2 Food

The world will need to produce more food from roughly the same land area, with much less water, using nutrients produced from sustainable sources while generating 80% less greenhouse gas emissions. What can governments do to help bring these changes about? Regulation has a key role to play to encourage the efficient use of resources. This must be combined with tackling the economics of food supply, stimulating innovation to change the way in which we grow, produce, consume and dispose of food and driving sustainable consumption. Reducing waste throughout the supply chain and in the home should be an early area of focus. While a resilient food system must optimise the use of land, water and nutrients and minimise greenhouse gas emissions, trade-offs between each factor are inevitable. No single issue can be ignored without introducing significant vulnerability to the system.

3 Materials

The UK must develop an integrated policy framework that locks resource use/conservation, production, consumption and waste management firmly into a “virtuous circle” (rather than the current linear model, targeting the rights of extraction at one end of the chain and waste regulation at the other). To help achieve this, a “material flows” framework is required which includes flows into and out of the economy, embedded carbon, and materials being re-introduced into the economy via reuse and recycling. The specific example of metals illustrates the point that an RE economy would require a whole life re-evaluation rather than treating each phase of the industrial process (such as extraction, production, use, reuse/recycling/disposal) as a separate entity.

Conclusion

As RE and related innovation increasingly become primary benchmarks of a successful economy, it is clear that the UK needs an industrial strategy to address critical resource challenges. The Government has started this process with the publication of the Low Carbon Industrial Strategy, which is welcome. But we need to go “beyond carbon” and adopt general RE principles through practices such as resource pricing and life-cycle management. RE policies should become key objectives for HM Treasury’s management of the economy and be supported across government departments.

An effective RE industrial strategy would ensure that British business significantly increases its efficient use of the world’s limited resources and the economy can maintain employment and competitive advantage now and in the future.

A Resource Efficient Future

What would a resource-efficient economy look like, and what public policies would be needed to enable the transition to such an economy? Clearly, the principle of RE works out quite differently depending on the nature of the resource.

In the case of the water sector (page 12), the very purpose of the industry is the management of a natural cycle – the water cycle – for human and environmental needs. To do this, the industry draws on other resources, notably in construction materials but predominantly energy. The sector is a major contributor to our carbon footprint, and even within this relatively simple picture of an industry balancing two main resources we find tensions between the two. Water is a necessity for life and its management is done on a societal scale, with few but large enterprises operating in a closely regulated manner.

Food (page 16) is a more complicated sector from the RE point of view. As with water, we are dealing with a necessity of life, yet the sector has a huge number of small enterprises, regulation is less all-encompassing and the market dominates. As the case study shows, food production employs a variety of natural resources and exploits both biological processes and some natural physical cycles – water, carbon, nitrogen – that it is part of. The four main resource issues identified in the example all have different characteristics. Land is a finite resource, though soil quality is subject to human management; water availability for agriculture is a vexed question wherever water resources are under pressure; nutrients (and other "inputs") can derive from natural processes or from extractive ones, and so combine features of renewability and exhaustion; and food production is a major contributor to greenhouse gas emissions[2]. This complexity creates many more decision points at which RE considerations need to be balanced against one another, both within the sector, and between food production and other sectors, for example water.

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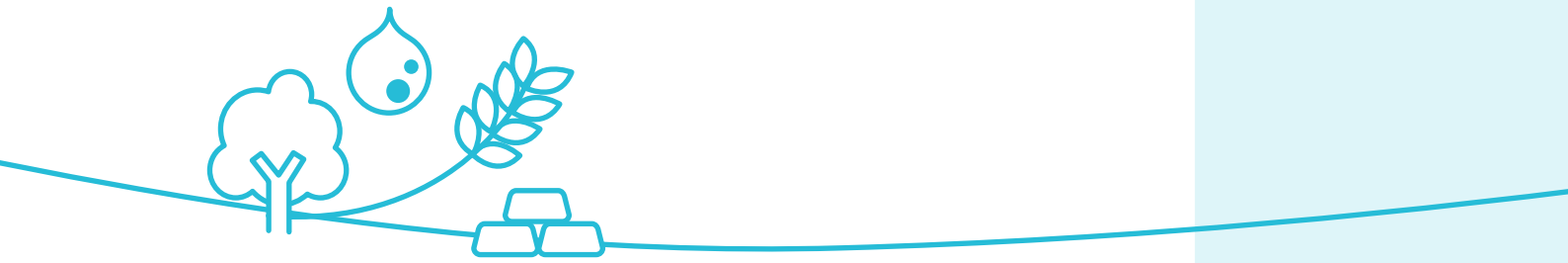
For the EU, 29% of all consumption-derived GHG emissions are food related. See European Commission (May 2006) *Environmental Impact of Products (EIPRO).*



The various materials sectors (page 20), which we have taken together, generally rely on the extraction of raw material, its processing and working into products for consumption. The main RE issue is usually seen as the availability and cost of extraction of the raw materials. For that reason, almost all economics have presented these processes as essentially linear and regulation of the resource flows has largely dealt with rights of extraction at one end of the chain and waste regulation at the other. Extraction of finite resources (and its associated cost drivers) remains an important feature of these sectors, as illustrated by the metals example. The case study makes clear that this linear model is unhelpful from the RE point of view and that we should now begin to look at material flows as a "circular economy". Another key feature of all materials sectors remains the use of energy at various points of the cycle and the way in which resource pricing that ignores environmental externalities creates large inefficiencies; this is well illustrated by the example of construction steel.

Given this diversity between the sectors that our working groups discussed, is there anything useful that can be learnt in the way of general principles in RE? Are there common features which would help us to navigate through the transition to a resource efficient economy and manage it well when we get there?

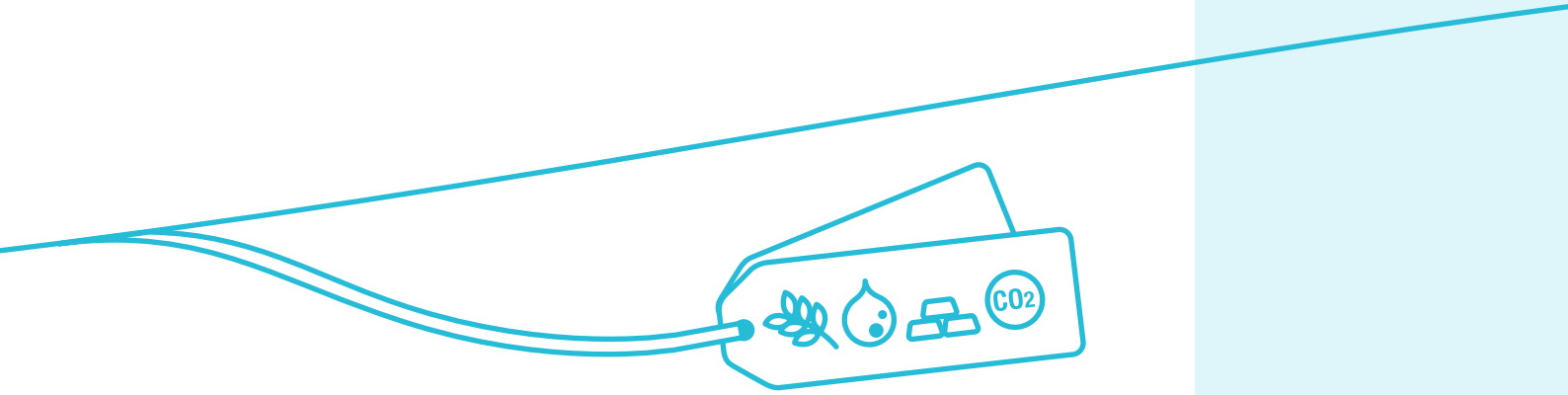
Our roundtable work answered both these questions with a firm "yes". There are indeed general principles of economic management for a resource efficient world, though some of them require us to step away from traditional economic thinking. We list those that emerge from our case studies in what follows.

RE policies require a lifecycle approach

Policy interventions usually apply at one point of a resource cycle, but isolated interventions are rarely effective and often create unintended consequences elsewhere. Effective management of resources necessitates a consideration of the whole cycle, and often a suite of measures. A good example is the Government's Waste Strategy[3], which in all parts of the UK sets out a hierarchy of options for waste minimisation, material re-use, recycling and disposal. Over time, a number of policy interventions have been introduced to reinforce this strategy, from tax on one form of disposal (landfill), and EU prohibitions on the landfilling of some materials, to various initiatives to create demand for secondary materials and campaigns to change public and commercial attitudes to "waste". Policy interventions in other fields have impinged on this strategy, as for example in subsidies for various forms of energy recovery. While it could not be claimed that the regime is comprehensive or that it guarantees RE, it does illustrate that, over time, resource management has called for a range of different interventions at various points of the cycle, and that the more coordinated these can be, the better[4].

Pricing resources and the environment

To make the market work more effectively for RE, the first requirement must be to ensure that prices reflect environmental realities and contribute to the achievement of policy targets, such as those for greenhouse gas emissions. This is usually expressed by saying that environmental externalities, by which we mean environmental changes that affect human welfare but are not reflected in markets, are incorporated into prices. This is undeniably desirable, but there are many problems and difficulties in implementing this in practice.



For many environmental issues, a key difficulty is how to quantify and price the externalities. There are at least two significant reasons why this approach is not implemented to a greater extent. Firstly, lack of political will means that available policy tools are not utilised. The Stern Review[5] concluded that the future costs of inaction on atmospheric concentrations of greenhouse gases far outweighs the present cost of mitigation, yet there are unused opportunities (namely higher carbon taxation

3
Defra (2007) *Waste Strategy for England*, Scotland's Zero Waste Plan (to be launched in 2010) and Welsh Assembly Government (June 2002) Wise about Waste.

4
A recent report by the EFRA Committee finds that Defra's Waste Strategy leaves 90% of waste without specific recycling targets and government knowledge of commercial and industrial recycling rates is patchy and outdated (January 2010) *Waste Strategy for England 2007.*

5
Nicholas Stern (2006) *The Economics of Climate Change, The Stern Review.*

and emissions trading with more tightly auctioned allocations and greater coverage) by which this future cost could be internalised into prices. Therefore, most of the cost of current action is borne by the taxpayer through public spending, rather than consumers who could respond to more resource-efficient sources of supply[6].

Secondly, some key externalities are not fully understood. For example, a current major international research effort on the economics of ecosystems and biodiversity (TEEB)[7] draws attention to the long term costs and benefits of ecological systems, and it is obvious that the way we draw on these systems is an important "externality". Yet we are a long way from being able to calculate the size of the external costs concerned, which is required if they are to be internalised into the price.

The effort to reflect environmental costs in price is an essential one, not least because getting price to be a more accurate measure of resource and environmental cost will help to remove some of the perverse price effects noted in the examples. But for complex environmental problems like climate change and biodiversity loss, thresholds may exist beyond which damage to human welfare is irreversible. A policy approach that relies simply on factoring external costs – to the extent they can currently be measured – into prices risks failing to avoid serious impacts on human welfare.

An alternative approach is explicitly to specify the target outcome (e.g. the quantity of the resource consumed or pollution emitted), and establish prices accordingly. For example, the approach recently adopted by government economists in respect of carbon pricing, whereby the shadow price of carbon is taken to be the point at which enough carbon abatement would result to meet the Government's carbon reduction targets, which are intended to avoid dangerous climate change[8]. Such an approach could be applied to other environmental issues, but still brings risks of failure because there is no guarantee that the use of the resource will adjust to the desired level in response to the price set.

The language of 'externalities' makes explicit the failings of market systems to consider some environmental impacts, and therefore to provide adequate incentives to drive RE. Neither including estimates of external costs in prices, nor setting prices to achieve certain outcomes are secure means of addressing this failing.

Pricing policy alone is insufficient

Sustainable use of the environment and its resources should be at the centre of economic policy and analysis. Each of our examples illustrate that pricing policy, however necessary for sustainable use of environmental resources, is not by itself sufficient to achieve it. The reason, of course, is that prices only work through markets and depend for their effect on markets working efficiently. There are many examples, not just in the field of resource use, where this does not happen and other policy instruments are then necessary to correct the resulting market failures.

6
A green tax shift would ensure that taxes on the things that are valued by society; like jobs, incomes and profits are reduced and the lost revenue is replaced by taxes on things society does not like, such as pollution and environmental degradation. For more information, see Green Fiscal Commission (October 2009) *The Case for Green Fiscal Reform.*

7
The Economics of Ecosystems and Biodiversity (TEEB) for National and International Policy Makers (November 2009).

8
To be effective, the carbon price must be set at a high enough level. For current figures, see DECC (July 2009) *Carbon Valuation in UK Policy Appraisal: A Revised Approach.*

The case studies demonstrate that regulation also has a key role to play. In the water sector, the role of the regulator is key to ensure there is a business case for companies to innovate. For food, standards need to be better defined and implemented; and policy in the metals sector must encourage re-use as well as recycling. In each case, the regulatory framework has the potential to create economic and environmental benefits, as well as to drive UK competitive advantage.

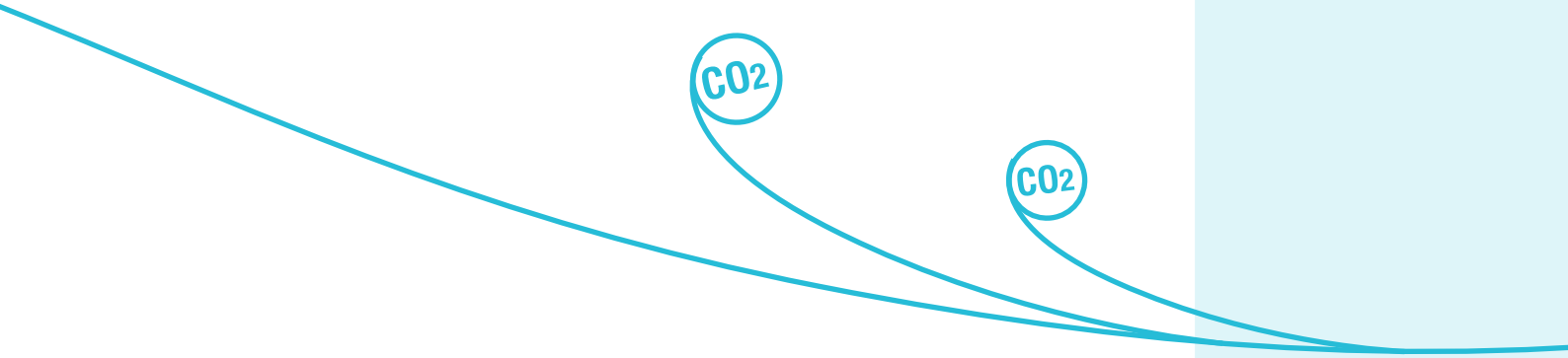
While many of the measures outlined in this report focus on increasing RE through supply side measures, policies to reduce demand must also be pursued with vigour. Changing consumer, producer and investor behaviour are all important for a successful RE strategy, supported by the traditional policy levers of price and regulatory drivers. Historical evidence from WRAP supports the view that the UK cannot rely on RE improvements alone to reduce carbon emissions, but must pay attention to what and how much we consume[9].

In summary, good resource management requires a combination of price, regulation and information, to achieve the desired behavioural change. The mix is perhaps easiest to see with our water example, where water management is effected by regulation of water rights, pricing of water services, and campaigns aimed at general attitudes to water use or metering in areas of water stress. The recent Walker Review undertaken by Defra deals with the balance between at least two of these elements[10].

The mix of regulation, price and information is different in each sector, but it is present in all of them. A resource management policy has to consider all three together.

Resource management has many bottom lines

We conclude from our discussion on pricing that optimisation of resource use cannot be done solely on the basis of monetary value. There will need to be some form of physical accounting for the use of key resources on an economy-wide basis and economic decisions will have to balance measures of these resources alongside more familiar monetary measures. The resource measures which appear on the nation's economic dashboard will have to be carefully chosen; even today we see the beginning of such an approach with carbon accounts managed by statute. Various policies to manage carbon emissions require that the emissions must be measured and these requirements should be strengthened[11].



9
WRAP (November 2009) *Meeting the UK Climate Change Challenge: The contribution of resource efficiency*, p36.

10
Anna Walker (December 2009) *The Independent Review of Charging for Household Water and Sewerage Services.*

11
See Aldersgate Group (May 2007) *Carbon Costs* and related campaign for mandatory carbon reporting.

This is in fact a rather fundamental issue. Our examples show that the single-minded pursuit of efficiency for one resource will often work to the opposite effect for another. While pricing mechanisms can give incentives to resolve these complex RE issues at a whole-economy level, they are inevitably imperfect. The balancing of economic and social considerations to manage resource use across the economy will require considerable political judgement, allied to, and aided by, usable measures of resources.

Social equity

A world in which the use of resources is more closely managed will throw up more issues of equity of access to those resources, if productive efficiency fails to keep pace with resource pressures. This effect is already very present in the debates about water pricing, or fuel poverty and would be exacerbated exactly in proportion to the degree to which price is used as the primary control. The conclusion is that RE decisions cannot be taken in isolation from consideration of their equity effects.

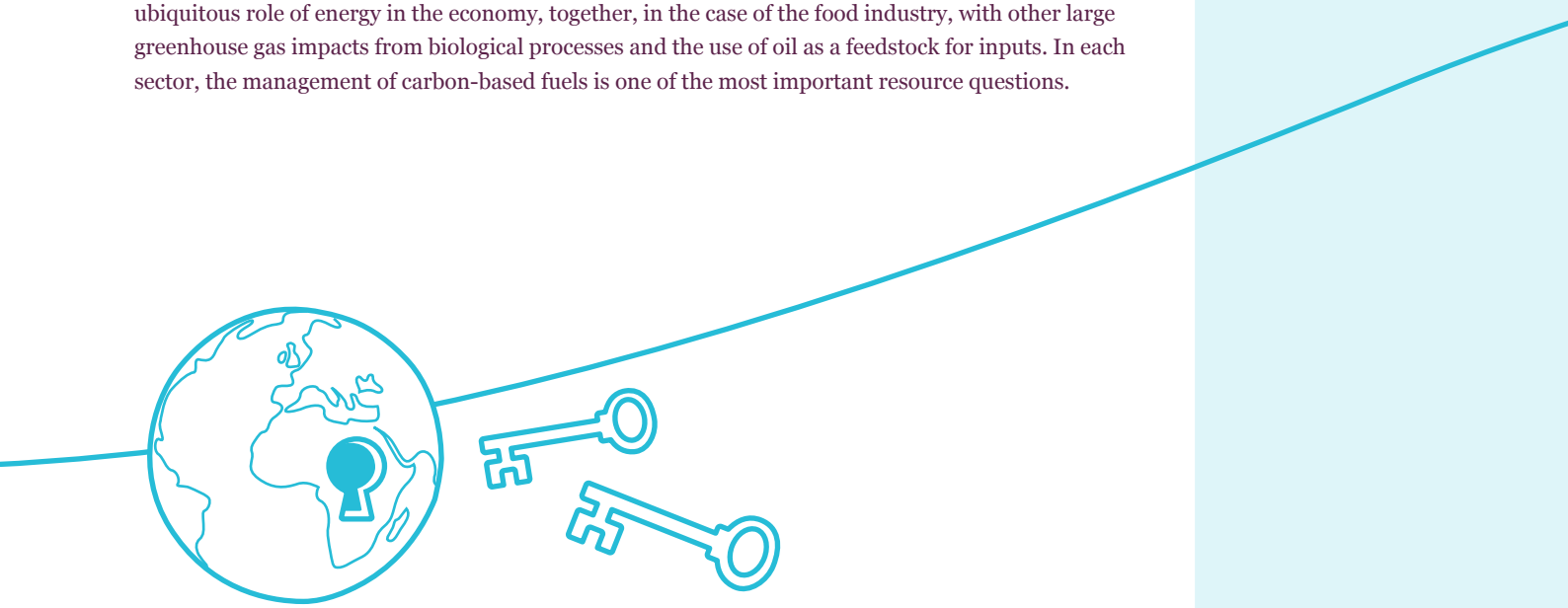
Resource security

A striking feature of government strategy on two important resource themes over the last decade has been the reappearance of security of supply as a major strategic theme. In both energy and agricultural policy, the prevailing assumptions of the 1990s about globalisation led policy makers and economists to dismiss concerns about energy and food security. These concerns have now re-emerged[12]. This is not a reaction against globalisation but a recognition that global resource constraints may raise issues of availability and price escalation that require the attention and response of national governments.

Security considerations are likely to strengthen as resource constraints tighten and to become significant for a number of other resources. Elsewhere in the world, water is already a strategic problem, while our metals case study illustrates another sort of concern, both about the price of bulk metals and the strategic availability of rare materials.

Carbon

Each of our case study groups found itself considering carbon impact. This is inevitable because of the ubiquitous role of energy in the economy, together, in the case of the food industry, with other large greenhouse gas impacts from biological processes and the use of oil as a feedstock for inputs. In each sector, the management of carbon-based fuels is one of the most important resource questions.



This reinforces the Aldersgate Group's previous arguments in *Trading for Growth*[13] that stronger carbon constraints within the EU ETS would stimulate innovation and therefore economic activity in the EU. It also underlines two of our earlier points.

12
For example, food security is a major part of Defra's recent food strategy (January 2010) *Food 2030: How we get there.*

13
Aldersgate Group (November 2007) *Trading for Growth: The role of the EU ETS in cutting emissions and stimulating wealth creation.*

Firstly, it underlines the interdependencies between various resource management regimes. Carbon cuts across everything, but so, for example, does water use. While individual sectors will have rather different circumstances and characteristic approaches to resource management, and therefore sectoral approaches are necessary, a resource efficient economy cannot treat the sectors as independent.

Secondly, in order to be able to make sense of these interdependencies, the price signal has to be as aligned to environmental priorities as possible. Even though price by itself is not enough to ensure that carbon concentration targets are met, it is key to ensuring that rational economic decisions are made on such things as the transportation of foodstuffs or recyclates. The alternative would be to make inappropriate regulations which control quantities, and will often fail to anticipate the needs of a dynamic economy. Where carbon enters other resource calculations it must do so at an accurate price to reflect the 'real' environmental cost which will drive progress towards the targets of environmental policy.

Innovation

The need for innovation is highlighted in each sector study. It is by definition hard to describe what is yet undiscovered, but we are aware that increasing RE will depend on improving our processes and that innovation must play a large part in this. Yet the sectors we looked at are not hotbeds of innovation.

This leads us to conclude that, whether through direct sponsorship or market signals, governments wishing to adopt RE strategies need to promote research and development (R&D) into RE science and technology, into resource measurement and into resource economics. Because the benefits of such investment will take time to materialise, a vigorous R&D effort must be an early part of an RE strategy, as well as the development of measures to enable and stimulate uptake of innovation.

The Aldersgate Group has previously argued that market failures which result in under-investment in environmental innovation are further compounded by a regulatory failure that provides energy and water suppliers with little incentive to innovate to meet environmental challenges[14]. In the water sector, a low level of R&D expenditure (varying from 0.02 per cent to 0.66 per cent of turnover[15]) is constraining productivity. It is unlikely that significant improvements will be made unless Ofwat is given a statutory duty to promote innovation, as recommended by the independent review of competition and innovation by Professor Martin Cave. To meet carbon and resource challenges, public and private spending on R&D for environmental technologies will have to increase dramatically. This must be combined with more focus on uptake, as entrepreneurs are discouraged to innovate in an impenetrable and cautious market.

14
Aldersgate Group (June 2009) *Commission Statement: Driving investment and enterprise in green markets.*

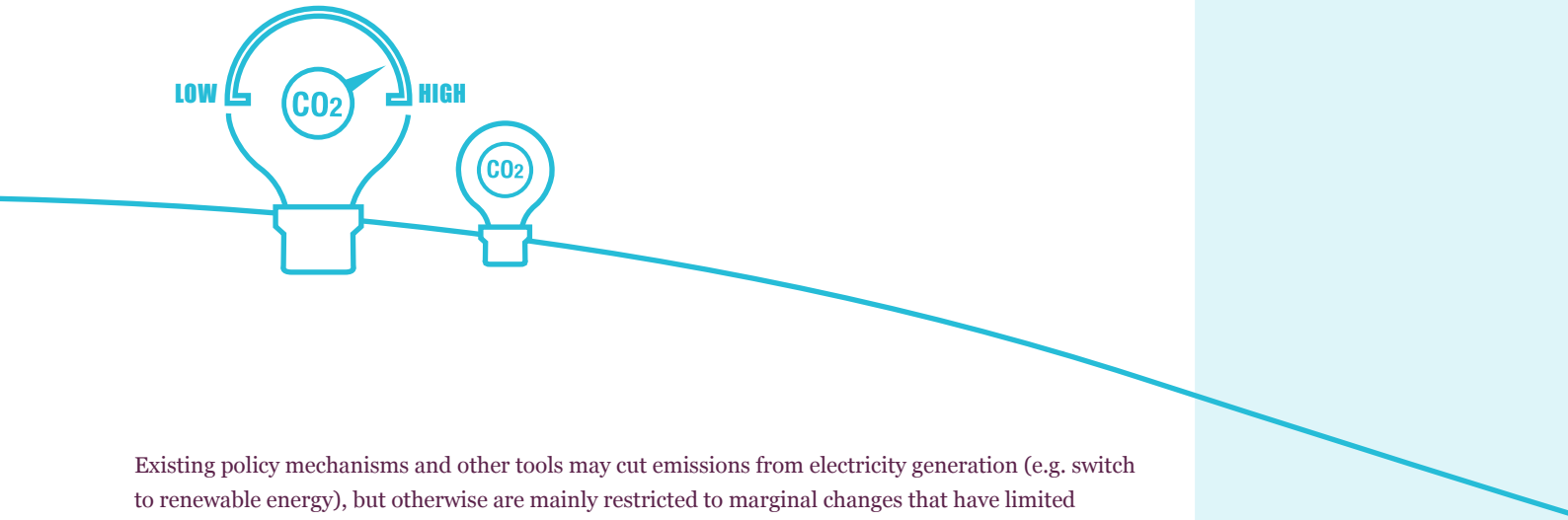
15
Martin Cave (April 2009) Cave Review: Competition and innovation in water markets, p6.

Sometimes it is not 'innovation' in the technological sense that counts as much as innovative practice, which could mean large scale capital expenditure solutions based on incremental improvements to existing ways of working[16], or reverting to traditional practices. A good example of this can be found in the materials case study which recommends that steel girders should be re-used as girders in new buildings rather than melted down and re-formed as girders or other materials. This has been suggested before and could lead to significant energy and resource savings.

Resource efficiency to enable a low carbon economy

There are a number of market failures that militate against efficient resource use, and some of them are visible in our sector examples. These are not just a problem for a future RE economy. They also undermine today's efforts to achieve a low carbon economy.

We are arguing for a resource policy "Beyond Carbon", but even if we were to concentrate solely on the low carbon transition, as reflected in the Low Carbon Industrial Strategy, we would end up going beyond carbon in our search for solutions.



Existing policy mechanisms and other tools may cut emissions from electricity generation (e.g. switch to renewable energy), but otherwise are mainly restricted to marginal changes that have limited potential to reduce emissions (e.g. energy-efficient lightbulbs, or real-time energy consumption monitoring in commercial premises). These measures are an important start but are unlikely to drive the substantial cuts in emissions that are specified by the Committee on Climate Change[17].

More substantial cuts in emissions will require significant changes to carbon use in many sectors, involving restructuring of some activities and changes to the use of natural resources with significant indirect carbon impacts. Market signals (e.g. prices and other information) are an important part of these changes, but there are limits to how well market signals can work. For example, price elasticity can be low due to lack of information, or due to a disconnect between where the price changes impact on the market and where consumption decisions are made (for example the landfill tax has not changed, for practical and political reasons, the market price of consumption that results in household waste generation; the costs of use of agro-chemicals and of higher household water consumption do not reflect the resulting increased costs of water treatment). In other words, natural resource consumption is subject to a range of market failures and these may hinder efficient response to higher carbon prices.

Identifying and overcoming these market failures requires government intervention beyond that which directly impacts on carbon emissions. It is both necessary and desirable to embed a serious low-carbon economic policy within a wider regime of RE.

16
Ibid, p7.

17
Climate Change Committee (October 2009) *Meeting Carbon Budgets – the need for a step change.*

Case Studies

Our three working groups were asked to consider what RE means in their sector, how the sector might be expected to look in a future resource efficient world and what policy approaches could best encourage the transition.

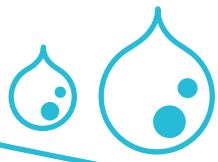
Here are their summary reports. The longer reports from the working groups can be accessed via the Aldersgate Group website[18]. These reports represent the thinking of the working groups – the Aldersgate Group does not present them as its own policy recommendations – but we have used them to illustrate the issues that emerge from a resource efficient mindset.

1 Case Study: Water

Introduction

The water industry in England and Wales is a highly regulated sector with an economic regulation process based on financial analysis, modelling, review and questioning and an environmental regulation process designed to ensure appropriate protection of the environment and to allocate water rights fairly. Together, the economic and environmental regulators aim to ensure that water companies deliver security of supply to customers at 'least all-in cost' to people, society and the environment. There have been high levels of investment in the past twenty years following privatisation of the industry. The system offers investors stable and long term returns.

However, the sector is resource inefficient at a national scale and the economic regulation of the sector is not designed to promote resource usage that is truly sustainable in the long term; the sector is very fiscally efficient but inefficient in taking sustainability indicators into account. The impact of climate change and increasing carbon emissions mean that the economic regulation of the sector requires an urgent and comprehensive review.



A resource efficient future

Essentially, a resource efficient water sector would ensure that water supply meets appropriately managed demand in all regions of the country and at an acceptable and stable price to the consumer. It would also deliver low carbon and resilient solutions and have acceptable environmental impacts.

Water resources are already under pressure in many parts of the country, with some twenty five million people living in areas where there is less available water per person than Spain or Morocco. Although climate change will lead to more intense rainfall events and increase the risk of flooding, overall it could reduce the amount of water available in rivers in England and Wales by ten to fifteen per cent by 2050, and up to as much as eighty per cent during summer months. This, along with the potential increase in the population of England and Wales, will put greater pressure on the UK's limited water supplies. There is a need to use water more wisely, to store it for use when it is less plentiful and to reuse treated water.

18 www.aldersgategroup.org.uk

Views from water companies in their current twenty five year Strategic Direction Statements vary significantly, demonstrating that there is no 'one-size-fits-all' solution of what a resource-efficient and low carbon UK water industry might look like - except to say that it would vary regionally. The most appropriate regional solution depends on the topography and water availability of the area along with the social make-up, population density and distribution (rural, semi-urban, urban, mega-urban). These differences may be compounded by the impacts of climate change, but there are common issues in a model of a resource efficient water industry, which are as follows:

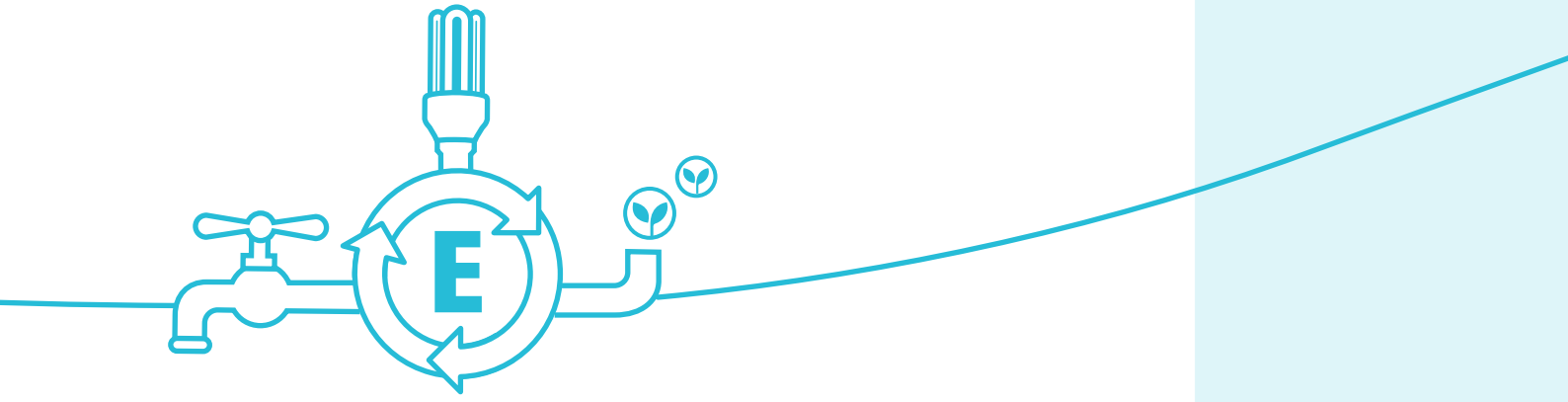
– More water efficiency;
– More energy efficiency and renewable energy sources;
– An increase in reuse in domestic and commercial buildings; and
– More direct reuse of water - both at development level or new resource level

Regulatory framework[19]

The economic regulator should have a statutory duty to promote water conservation and efficiency, and a duty to ensure that companies provide water, sewerage and environmental services. The current economic regulation process is primarily price and asset-driven, not resource driven. It is unsustainable environmentally, especially given likely climate change impacts, to the degree that water shortages may be common in some parts of the UK unless there is a co-ordinated and strategic approach. Periods of high rainfall are not sufficiently exploited for optimal water storage and supply.

The financial regulatory process also creates 'boom and bust' in terms of spending profiles across the regulatory period, and is loaded towards adding new 'bolt on' solutions rather than fundamental design solutions. There is also a dichotomy between the environmental regulator (the Environment Agency) pressing for near-universal household metering in water-stressed areas and lower leakage and the economic regulator (Ofwat) which rejects these measures when proposed by water companies on the grounds that they are not cost-justifiable. There are also tensions within each regulator's requirements – the classic case being that environmental standards for water and wastewater treatment are made more stringent through new legislation but there is a consequence of increased emissions.

There is a significant issue in that the economic regulation cycle does not readily tie in with the key directive governing the water environment (The Water Framework Directive). There is poor integration of measures in water supply, treatment and environmental management and there is little emphasis on innovation and low carbon intensive solutions.



The Government has to be the source of strategic planning. Climate change affects water demand, water resources and the environment. If there are forecast to be fewer and more intense rainfall events then there may be an issue with resilience – and over-reliance on water storage rather than demand management could result in greater vulnerability if those events don't materialise, so we need to 'design' for an ensemble of different scenarios. Resilience of infrastructure to flooding is also a major issue – our biggest interruption to water supplies in recent years was due to flooding rather than drought.

19
The Chartered Institution of Water and Environmental Management (CIWEM) has developed a work stream on 'Regulation of a Sustainable Water Industry' which will consider how water regulation can be developed to be resource efficient with regard to existing structures and realistic variants thereof; and for there to be a greater focus on sustainability, education, integrated and holistic solutions. The work stream will include policy papers, seminars and conferences during 2010.

Government strategy should include stronger incentives to reward water companies to reduce the amount of water provided; better sharing of water across company boundaries; water usage reduction targets for different categories of use (for example, the food industry already has a target of a 20 per cent water demand reduction by 2020); and the introduction of a catchment/whole water cycle approach to water storage and management.

Water pricing

The water industry is tightly regulated by Ofwat. The key financial and pricing issue is that water pricing alone does not effectively encourage efficiency and a reduction in 'wastefulness'. There are currently low levels of metering in many parts of the country that make measurement of usage and a greater consumer understanding of water issues very challenging.

The recent Walker Review[20] suggests that Ofwat and the EA must come together to sort out a proper valuation methodology for the provision of water services, are correct and urgently needed. A better valuation of the real cost/value of water underpins a good deal of the process towards a resource efficient future. For example, reducing leakage below its currently calculated "sustainable economic level" depends on a change in valuation or advances in technology. The current government is trying to make progress on this with its 'ecosystem services' work, but is finding it complex and difficult.

There also needs to be proper inclusion of social, environmental and carbon costs into the economic valuation process for water and an end to the 'predict and provide' model for water supply and treatment. Water charges should be based on the true marginal resource cost of water ensuring that all the related costs of water are included in the final cost to customers. Pricing should take into account water availability or scarcity, so as to include all-in costs and time/location specific costs that cover shortage in cases of drought.

Incentivising innovation

Technological investment in the sector is inflexible. There is an institutional resistance to adopting innovation and a lack of incentives for innovation. Also, innovation in the sector needs to factor in the real cost of operation emissions. It is unfortunate that the recent Cave Review[21] of innovation and competition in the water sector did not come up with firm recommendations to address this issue.

Innovation and 'green' technology (such as low carbon water treatment) must be 'driven forward' by financial incentives and support – there are benefits to the UK economy and this will lead to greater exportation of technology. Leakage will be reduced by technology and innovative solutions, which will make it easier to find and/or fix leaks and therefore make it more economic to do so.

20
Anna Walker (December 2009) *The Independent Review of Charging for Household Water and Sewerage Services.*

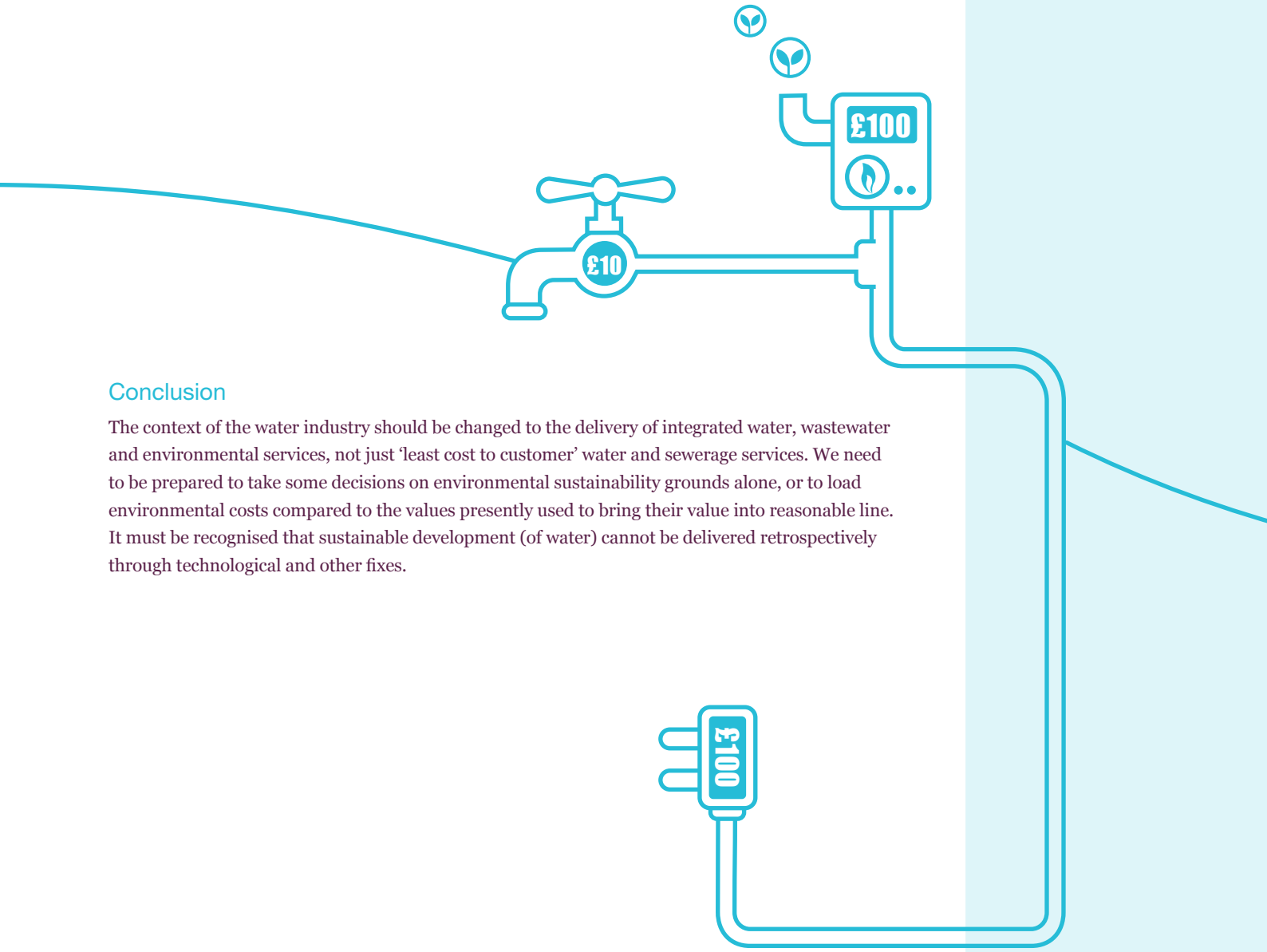
21
Martin Cave (April 2009) Cave Review: *Competition and innovation in water markets*

Engaging with consumers

The consumer base for the water sector in England and Wales is poorly informed. There is a paucity of public education, knowledge and interest in water efficiency and the technical aspects of water supply and treatment. As such, there is an urgent need for awareness-raising, for action or for acceptance of policy change (a mandate for change), or widespread participation (recycling, purchasing etc). Public education should encourage a better understanding of the water environment as well as the complexity of water supply, treatment and management – to encourage a 'waterwise' consumer base where water demand is low and water is valued and priced at a level which will enable solutions to be funded, which thereby provides incentives for action.

A low level of household metering in some parts of the UK means that consumers are unaware of their usage and related costs. There must be fairer and more equitable social tariffs combined with smart metering, social protection, product labelling, a Water Efficiency Scheme and enhanced communication and education. Smart metering should increasingly be linked to gas and electricity metering so that data standards and technology are shared.

Measures must also reduce the energy used to heat water in the home. There should be an active encouragement of techniques such as low flow showers and washing machines; dishwashers should be more energy and water efficient and there should be widespread implementation of low flush toilets.



Conclusion

The context of the water industry should be changed to the delivery of integrated water, wastewater and environmental services, not just 'least cost to customer' water and sewerage services. We need to be prepared to take some decisions on environmental sustainability grounds alone, or to load environmental costs compared to the values presently used to bring their value into reasonable line. It must be recognised that sustainable development (of water) cannot be delivered retrospectively through technological and other fixes.

2 Case Study: Food

If the prospect of feeding a global population, expected to reach 9 billion by 2050, seems to be a return to the traditional Malthusian challenge, it is in the context of 21st century knowledge. We now know more about resources of all kinds, about environmental degradation and about global systems. The constraints are clearer and some of them – particularly the climate constraint – are new. WWF estimates that food supply accounts for 23% of the global ecological footprint[22], with the sector having the highest impact per dollar spent.

What are the key resource issues for food production and how can we feed more – with less?

Land – 'Buy land, they're not making it any more' Mark Twain.

According to the ecological footprint the global area of land and water available to produce the resources an individual consumes (biocapacity) is currently 2.1 global hectares (gha) per person[23]. Current UK demand for these resources is running at 5.2 gha – twice the world average. The UK's own biocapacity is only 1.7 gha per capita[24]. Increasing global population will reduce the per capita availability of land resources while competing uses, such as biofuels, and human habitation will squeeze the amount of suitable land available for food production. Similarly, we must recognise that expanding our agricultural areas into natural spaces will impact on environmental functions that are essential for maintaining a healthy global ecosystem. To deal with this there needs to be a focus on utilising 'waste' land, increasing field productivity, improving soil fertility and reducing waste.

Water – 'When the well's dry, we know the worth of water.' Benjamin Franklin

The average water footprint of a UK citizen (defined as the total amount of water that is used to produce the goods and services they consume) is 1,245,000 litres per capita per year – of which 70% falls outside the country[25]. The current global demand of 6,390 billion m3 of water per annum for food production cannot be maintained, particularly in increasingly water-depleted and climate-stressed environments. The variability of water availability across regions and countries makes consistent measurement difficult, but increasingly sophisticated 'water footprinting' is enabling a quantitative measurement approach to be taken to the social and environmental cost of its supply by location and source.

A sustainable solution must ensure locally-sensitive water resource management and prevent the export of 'virtual water' from arid areas. At home, it is estimated that the UK's current requirement of almost 1,700m^3 per consumer for food supply must be reduced by over 40% to reduce water usage to more sustainable levels.

22 WWF (October 2008) *The Living Planet Report.*

23 Ibid.

24 Ibid.

25 Hoekstra, A.Y. and Chapagain, A.K. (2008) *Globalization of Water: Sharing the planet's freshwater resources.*

Nutrients – 'We are fertilizing the world on a global scale and in a largely uncontrolled experiment'. UNEP Global Environment Outlook

Crops require a range of chemical elements in order to grow – particularly the primary nutrients nitrogen, potassium and phosphorus. Rather than relying on local 'recycling' of these nutrients, intensified forms of agricultural production have grown to rely on imported 'artificial' sources. These applications provide short-term yield benefits to crop systems, but can have detrimental long-term impacts on soil condition, water resources and associated greenhouse gas emissions, and demand high volumes of oil and energy for production.

The current model of using fossil energy to create inorganic agricultural fertilizers and the reliance on finite sources of mineral phosphate cannot be sustained. Instead, the abundance of nutrients in 'waste' streams must be captured and recycled as nutrient-rich inputs for our food production systems.

Greenhouse gases – 'The climate system is an angry beast and we are poking it with sticks." Dr. Wallace Broecker

Food systems – from agricultural production through to consumer cooking and disposal – are estimated to contribute almost 20% of the UK's greenhouse gas footprint[26]. Emissions primarily consist of carbon dioxide from fossil fuels, methane from livestock and landfill, and nitrous oxide from fertiliser application and soil cultivation. Some of these gases such as nitrous oxide are potent contributors to global warming. UK targets to reduce greenhouse gas emissions by 80% by 2050 will affect this sector as a significant contributor to the UK GHG account. To deliver this all parts of the food chain will need to find ways of reducing their impact.

A resource efficient future

Thus there are four priority areas for action, to deliver a more resource efficient food system. What is required is to produce more food from roughly the same land area, with much less water, using nutrients produced from sustainable sources and with 80% less greenhouse gas emissions. What can government do to help bring these changes about? Some ideas are given below.

Regulation

Government policies and regulation must encourage the efficient use of resources. In the food sector, this means policies covering diverse areas such as renewable energy, climate change, agriculture, sustainable consumption and production, collection and recycling of food waste, as well as soil, land and water management. All must consider impacts on the key resources of land, water, nutrients and climate. The potential for legislation and policy to affect these four critical factors is immense, but policy changes in any one area have to be evaluated against their impact on the whole.

The key for government is to act as a lead towards achieving the strategic goal of a more resource efficient food system. For example, government could set targets for reducing food waste on its own estate, it could set regulations that encourages the collection of source segregated food waste from households and businesses, encourage renewable energy generation from that collected waste using fiscal instruments, and then use the existing cross-compliance scheme to encourage farmers to use the outputs from food waste processing as a bio-fertiliser where it is safe to do so. This example illustrates the need for cross-government support and specific co-ordinated actions delivered by DECC, DCLG and Defra. Some of this has been addressed in the recent Defra Food 2030 Strategy[27].

26
Cooking up a storm: *Food, greenhouse gas emissions and our changing climate.* Food Climate Research Network.

27
Defra (January 2010) *Food 2030: How we get there.*

Food chain economics

The economics of the food chain is at the heart of the drive to more sustainable practices. On the supply side, improving productivity makes economic sense and yet there is still significant waste in the supply chain. Maintaining soil quality, preserving biodiversity and conserving water are not widely incentivised. More could be done to ensure that food pricing reflects the true environmental cost of production.

There are a number of ways to approach this. For example, eliminating resource-use subsidies and reforming the Common Agricultural Policy to focus much of the payment on driving a less resource intensive, more sustainable and more productive agricultural system is an important next step. It should incentivise farmers to reduce greenhouse gas emissions, reduce water use, manage soils sustainably and use recycled nutrients where it makes scientific sense.

Tackling the economics of the supply side will need action at many levels, ranging from global agreements to local incentives. For example, fiscal incentives are needed at a global level to preserve the key ecosystems, improve marginal land and to reduce the unsustainable use of "fossil" water from underground aquifers. Locally, changes in VAT and for more resource efficient technology or extension of existing capital allowance schemes could all be used to drive efficient production.

On the demand side how could consumers be incentivised to make sustainable product choices, while the supply chain is encouraged to produce them? Reliance on the markets and consumer choice alone may not deliver the necessary short-term change, and some difficult decisions need to be taken to drive change. Consumer awareness is not helped by the diverse range of sustainability metrics. There needs to be a simple basket of such metrics, which may in the end need to be defined in policy or through legislation to ensure consistent measures are adopted and used.

Producing more with less

To make our food production systems more efficient we must produce more food on roughly the same area of land using fewer resources. Innovation and new technology will play a crucial role in helping to achieve that required reduction. Changing the way in which we grow, produce, consume and dispose of food and food waste can have a significant impact, so we need to focus supply chains on delivering the maximum output at all stages in the food production and use cycle.

For growing food a key element will be to optimise inputs such as water and nutrients using, for example, precision farming techniques involving Geographic Information System (GIS). Greater and better use of biotechnology and plant breeding techniques should increase plant and animal yields without the need for additional energy intensive inputs such as pesticides and fertilisers.

In manufacturing, the sector must ensure that the maximum proportion of food that is grown moves through the production process to the consumer's table. Currently 40% of harvested food in the developing world never reaches the consumer[28] Also, improving energy efficiency and making use of the large quantities of waste heat associated with food processing will reduce costs and carbon emissions.

28
World Resources Institute
(www.wri.org)

Reducing food waste after purchase must be a key focus and can be helped by improved technologies such as packaging innovations. Waste food must also be recognised as the important resource that it truly represents. If treated by anaerobic digestion it can generate renewable energy and both composting and digestion of waste food will yield products that can be used as soil improvers and fertilisers.

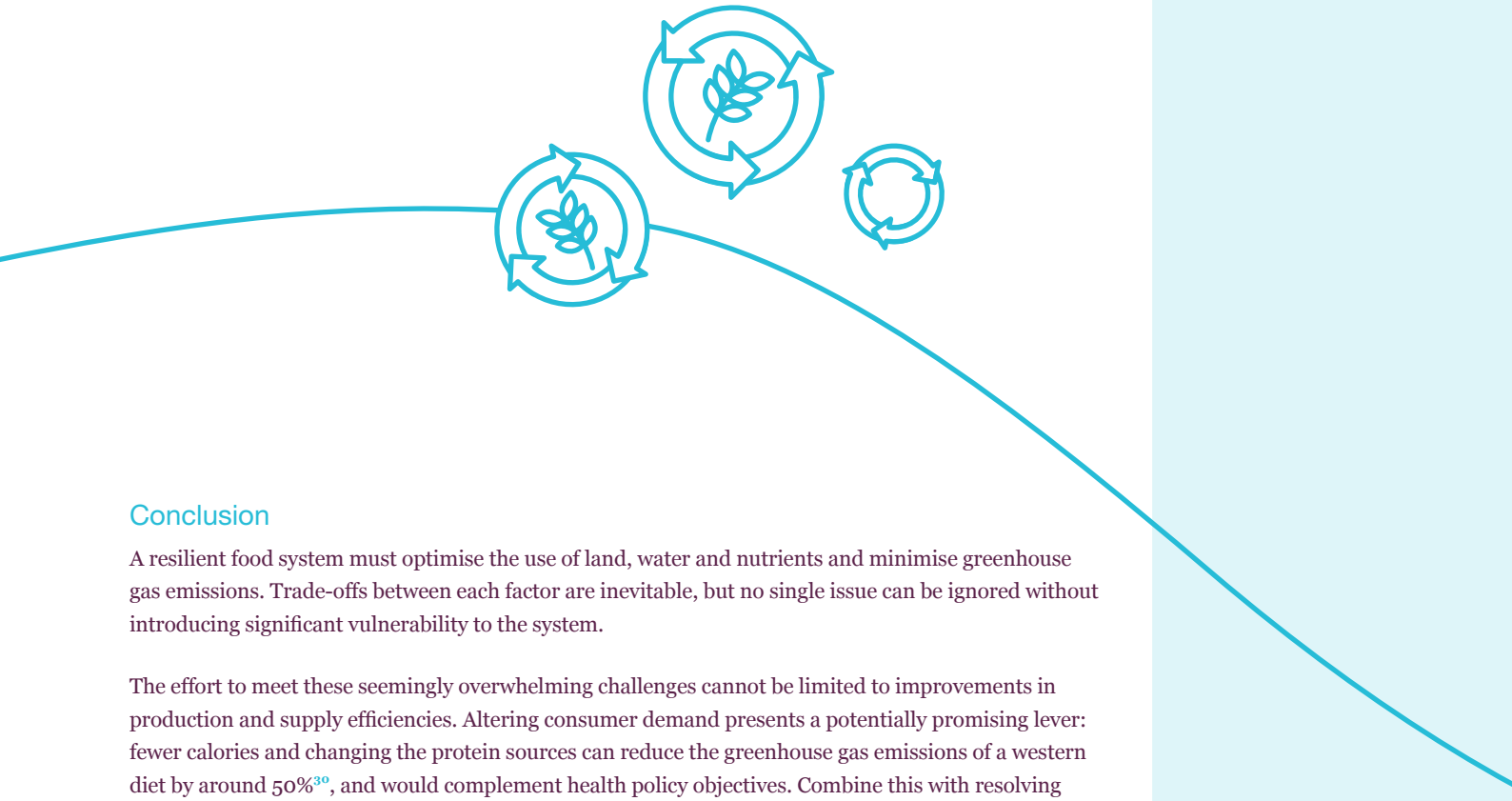
Further technological ideas can be found on the online version of this document.

Driving sustainable consumption

We spend nearly £80 billion a year on food and drink to consume at home in the UK. Using this purchasing power to buy food that helps us to be fit and healthy, that we can make full use of and that comes from genuinely sustainable sources will help reduce resource use. Driving sustainable consumption can be delivered with simple messages delivered to consumers by a range of routes, as used by the "Love Food Hate Waste" campaign[29] for example.

But communications won't always work in isolation. Consumers also need the food industry to help, for example by providing a range of portion sizes appropriate to their needs; clearer and more consistent date labelling; and clear advice on product storage and use. Anecdotal feedback also suggests that introducing local authority kitchen waste collections helps households to see how much good food is wasted and encourages them to waste less of it.

Thus driving more sustainable consumption patterns could be done by providing consumers with information to help them choose between products, through more effective labelling, and through direct campaigning. Given the ingrained behaviours that need to be tackled this is likely to require sustained investment.



Conclusion

A resilient food system must optimise the use of land, water and nutrients and minimise greenhouse gas emissions. Trade-offs between each factor are inevitable, but no single issue can be ignored without introducing significant vulnerability to the system.

The effort to meet these seemingly overwhelming challenges cannot be limited to improvements in production and supply efficiencies. Altering consumer demand presents a potentially promising lever: fewer calories and changing the protein sources can reduce the greenhouse gas emissions of a western diet by around 50%[30], and would complement health policy objectives. Combine this with resolving food wastage and collecting and recycling the nutrients in the waste that is produced and these challenges start to, very gradually, enter the realm of the achievable. But consumption changes must be underpinned by changes to the fiscal environment and to government and EU policy. Taxation, regulation and procurement policy must all be aligned to drive a more resource efficient food system, otherwise feeding an increased global population and tackling climate change will not be possible.

29
This has been supported by retailer campaigns, like Sainsbury's Love your Leftovers and Morrisons' Great Taste Less Waste and campaigning at a local level by many local authorities

30
UN GRID Kicking the Climate Habit, 2006

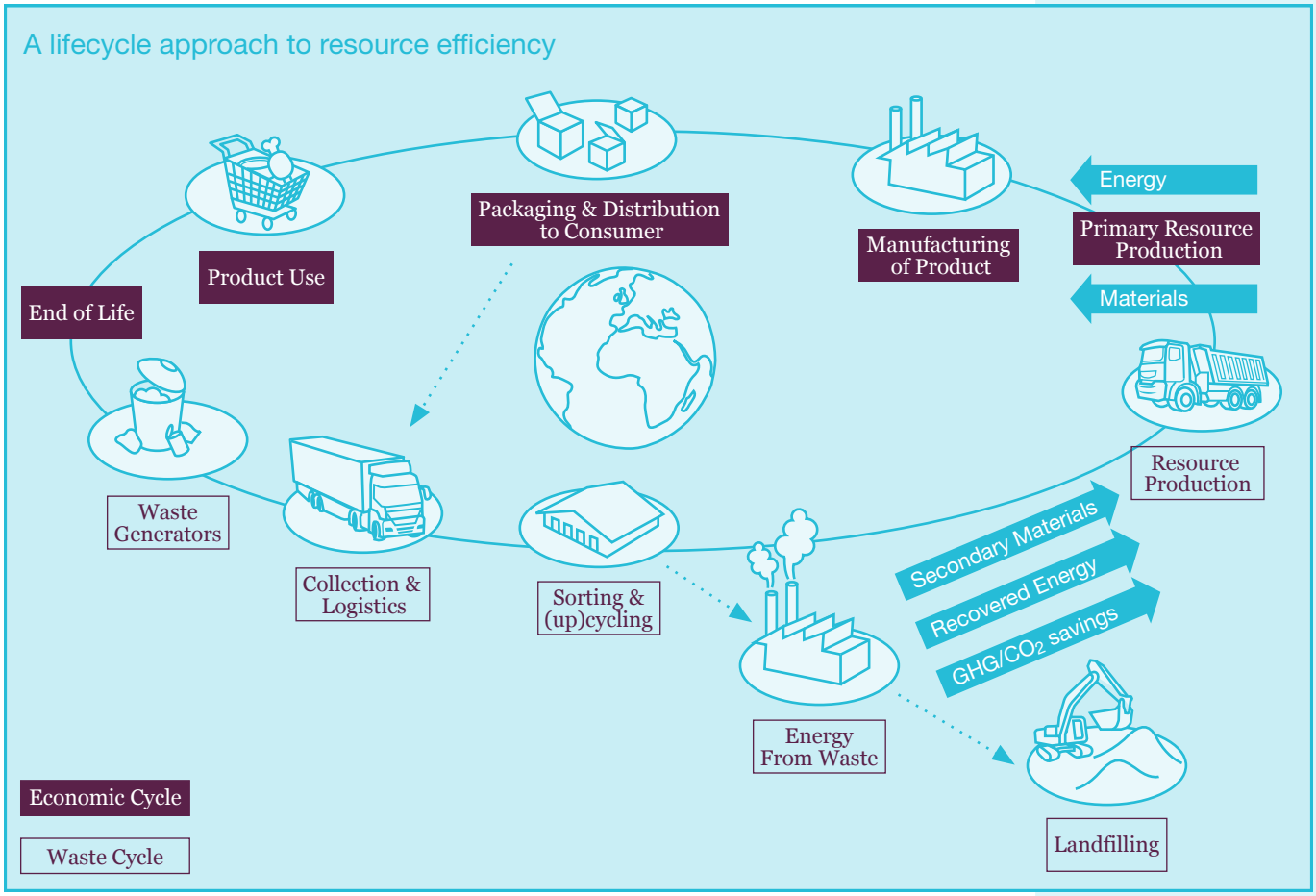
3 Case Study: Materials

Introduction

The UK's low carbon economy initiative primarily focuses on energy and transport; however material flows throughout the UK economy also have a significant carbon impact. If we can manage these material flows more efficiently, we will be able to make a considerable contribution to reducing the UK's carbon footprint, while managing our resources more effectively and making our economy more efficient.

A resource efficient future: lifecycle approach

Currently, UK policy is generally based on a linear model, targeting the rights of extraction at one end of the chain and waste regulation at the other. The development of a RE industrial strategy is an opportunity to create an integrated policy framework that locks resource use/conservation, production, consumption, and waste management firmly into a "virtuous circle" (as shown in the diagram below).



A resource efficient approach will ensure the conservation of existing resources through the extraction of only that which is strictly necessary for sustainable consumption and through the return of secondary materials back into the production cycle, either through reuse, recycling or transformation into energy. The best approach to developing a resource efficient economy would be to re-use waste products (scrap plastics, metals, cloth and electronics) as replacement feedstock for organic and inorganic secondary applications.

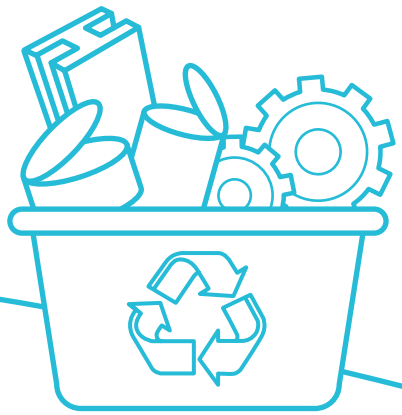
Such an economic framework would require: the elimination of the unnecessary use of primary resources; promoting the use of secondary materials in the supply chain; sustainable design; process efficiency; waste prevention; re-use of products; and recycling of secondary materials (waste). Understanding the flow of materials through the UK economy is obviously an important part of such a framework. Such an analysis, including flows into and out of the UK, should not only deal with the materials themselves, but in a RE economy would include an analysis of embedded carbon in the materials flow. This would enable policy to engage with the carbon impacts of the wider material economy, for instance by allocating a carbon price to actions at each stage of the economic cycle, or credits generated for each sector of the materials flow process – to be credited back when a secondary resource is used in manufacturing.

Defra is already doing work in this area under the Sustainable Consumption and Production (SCP) Programme[31]. Effective economic transformation will require a coherent body of evidence that can be reviewed/expanded as knowledge grows, rather than a piecemeal approach which may result in either contradictory messages or communication of the same message. Once that data has been ascertained, we need to prioritise key areas.

A resource efficient future in metals

To illustrate the RE challenges relating to material flows, the example of metals is provided. Ferrous and non-ferrous metals have high embedded supply chain carbon intensity where the ratio of input mass to final product sold is the highest of any commodity within the economy. By changing our approach to the use of metals we can have an immediate impact on resource consumption and carbon emissions.

For the metals sector, an RE economy would require a whole life re-evaluation rather than treating each phase of the industrial process (such as extraction, production, use, reuse/recycling/disposal) as a separate entity. This approach would define the physical material impact at each of the discrete stages in the current economic system for the UK sector, define the most appropriate point (or points) of intervention in the delivery chain to achieve the greatest reduction in overall mass of consumption and establish the most effective policy interventions to deliver the targeted improvements.



31 www.defra.gov.uk/Environment/business/scp

The economy would:

1 Re-use as much material as possible,

without re-melting, because of the great energy savings that this would generate. For example, significant energy savings could be made if structural steel girders in construction (which are often in very good condition when buildings are demolished after 20 or 30 years) could be re-used as girders in new buildings rather than melted down and re-formed as girders or other materials.

2 Significantly improve resource conservation and reduce its dependency on primary ore mining.

Too much scrap metal is exported, for example 60% in the case of aluminium. These scrap exports are undertaken at low economic value (around £60million for steel) whilst our deficit demand for re-imported materials is at high economic cost (around £6 billion for steel).

3 Increase recycling rates for both ferrous and non-ferrous metals where products cannot be re-used.

The four-year experience of the National Industrial Symbiosis Programme (see box below) has shown that opportunities for cost-effective recycling by businesses are still being missed. Considerable improvements must be made to ensure that metals are uniformly extracted at high rates from the household waste stream.

4 Adopt leaner production processes in the UK

as insurance against steep increases in commodity prices which have occurred over the last decade and are likely to return as global demand recovers following the recession. This will improve competitive advantage and may also represent export opportunities for UK business.

The experience of the National Industrial Symbiosis Programme (NISP)[32] and the Waste and Resources Action Programme (WRAP)[33]

These government-funded programmes both promote RE in UK businesses. WRAP works across the whole waste hierarchy from prevention through to creating markets for materials and sustainable consumption. NISP is a business opportunity programme in which companies co-operate to optimise their use of resources.

Since its inception in 2000, WRAP estimates that its projects have diverted over 110 million tonnes of waste from landfill and leveraged £180m of private sector investment. One recent project – the Love Food, Hate Waste campaign – is thought to have saved the UK £400m and greenhouse gas emissions equivalent to 725,000 tonnes of CO_2.

NISP has been operating since 2005 and estimates that, by identifying opportunities for the re-use of materials, it has helped the 12,500 companies in its network to divert over 7 million tonnes of business waste from landfill, collectively reduce carbon emissions by 6 million tonnes and cut the use of virgin materials by 9.7 million tonnes. The programme has generated over £176 million in additional sales for its members as well as cutting their costs by £156 million on disposal, transport, storage and purchasing and has also been instrumental in attracting £131 million in private investment, creating and safeguarding 8,770 jobs. It is estimated that the extra economic activity that NISP has stimulated has contributed £148 - £247 million in tax revenues to the UK Treasury.

From April 2010, WRAP will become the Government's lead delivery body for RE in England, bringing the work of NISP and a number of other bodies under a single umbrella.

32 www.nisp.org.uk

33 www.wrap.org.uk

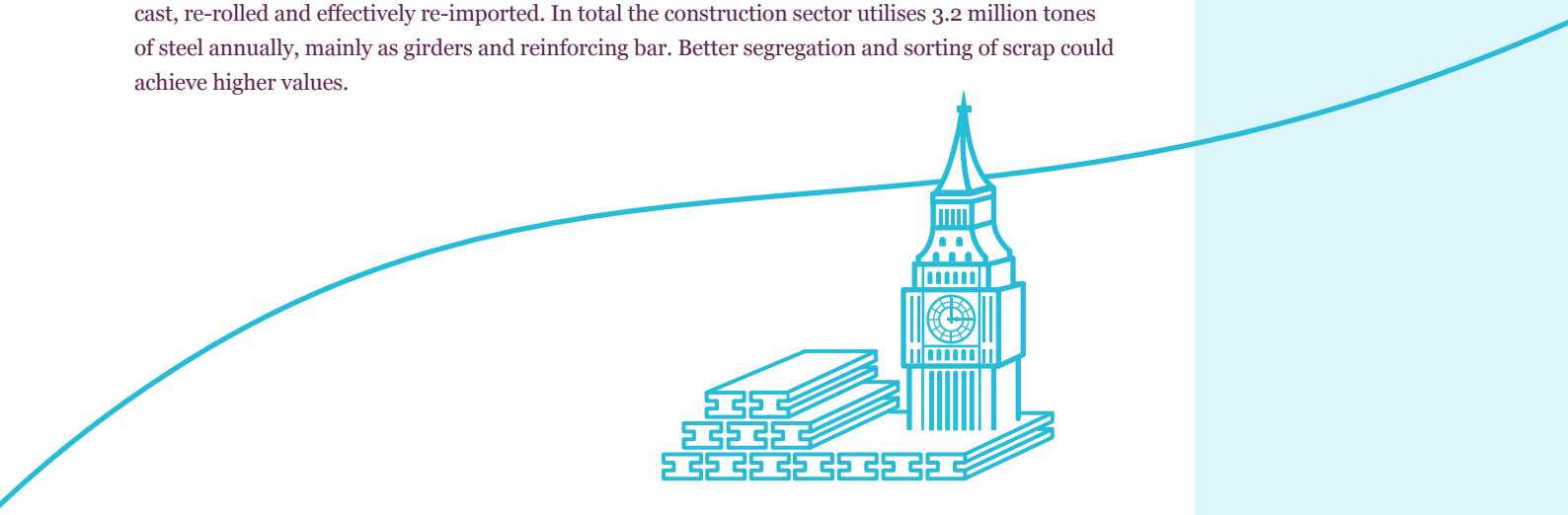
More targeted government policy

The Government has introduced a number of policies to increase RE in this sector but these need to be better targeted and more stringently implemented. Policies to encourage remanufacturing and re-use rather than recycling are still largely absent and most focus on behavioural change rather than re-thinking products and production processes (particularly across supply changes outside the UK).

Landfill costs are a good example of this. Despite significant increases, the price does not discriminate between high or low-impact materials. Perversely, landfill costs as much for hedge clippings and plastic bags as it does for high-impact metals. Product standards should also be related to embedded carbon and recyclability, whereupon it would soon become evident that metals are an unacceptably high-carbon choice for applications where recycling is not possible. Currently, there is no differentiation of product standards to take account of environmental impact.

As the introduction to this section demonstrates, an analysis of embedded carbon in material flows is an important component of a RE economy. Research into the flows of scrap materials is essential to determine the embedded global energy flows taking into account overseas smelting and all other lifecycle factors. The whole picture must be examined to ensure that the impact of hidden carbon emissions from imports is not underestimated. Primary aluminium production in the UK may compare favourably because although the plants are relatively small they have hydro and nuclear power sources with substantially reduced carbon footprints.

Greater analysis of types of scrap and sources would aid assessment into whether sector specific actions could contribute to re-use of large items or whether changes in procurement and specifications could substantially cut scrap exports in favour of re-use options. This could apply to large beam girders and structural steel from the construction and demolition sectors which may be cut, exported, re-melted, cast, re-rolled and effectively re-imported. In total the construction sector utilises 3.2 million tones of steel annually, mainly as girders and reinforcing bar. Better segregation and sorting of scrap could achieve higher values.



A more effective model to evaluate both economic and non-economic policy impacts on the existing sector profile at different stages of the overall supply chain could be achieved through a basic consolidated materials map for the input, end use and recovery phases. The benefit of this mass-based approach would be that it establishes greater transparency (today's financial price levels are failing to deliver appropriate signals to achieve targets for material efficiency), assists in crystallising priorities across competing options based on existing scales of product intensity and operates within the existing asset and investment structures.

Economic benefits

Many aspects of an RE economy would lead to significant financial savings. For example, two million tonnes of steel and 0.16 million tonnes of aluminium are landfilled each year in the UK at an economic cost of £140m and £12m respectively[34]. As scrap these materials have an economic value of £200m and £110m and this represents a direct economic loss to the economy of £450m annually[35].

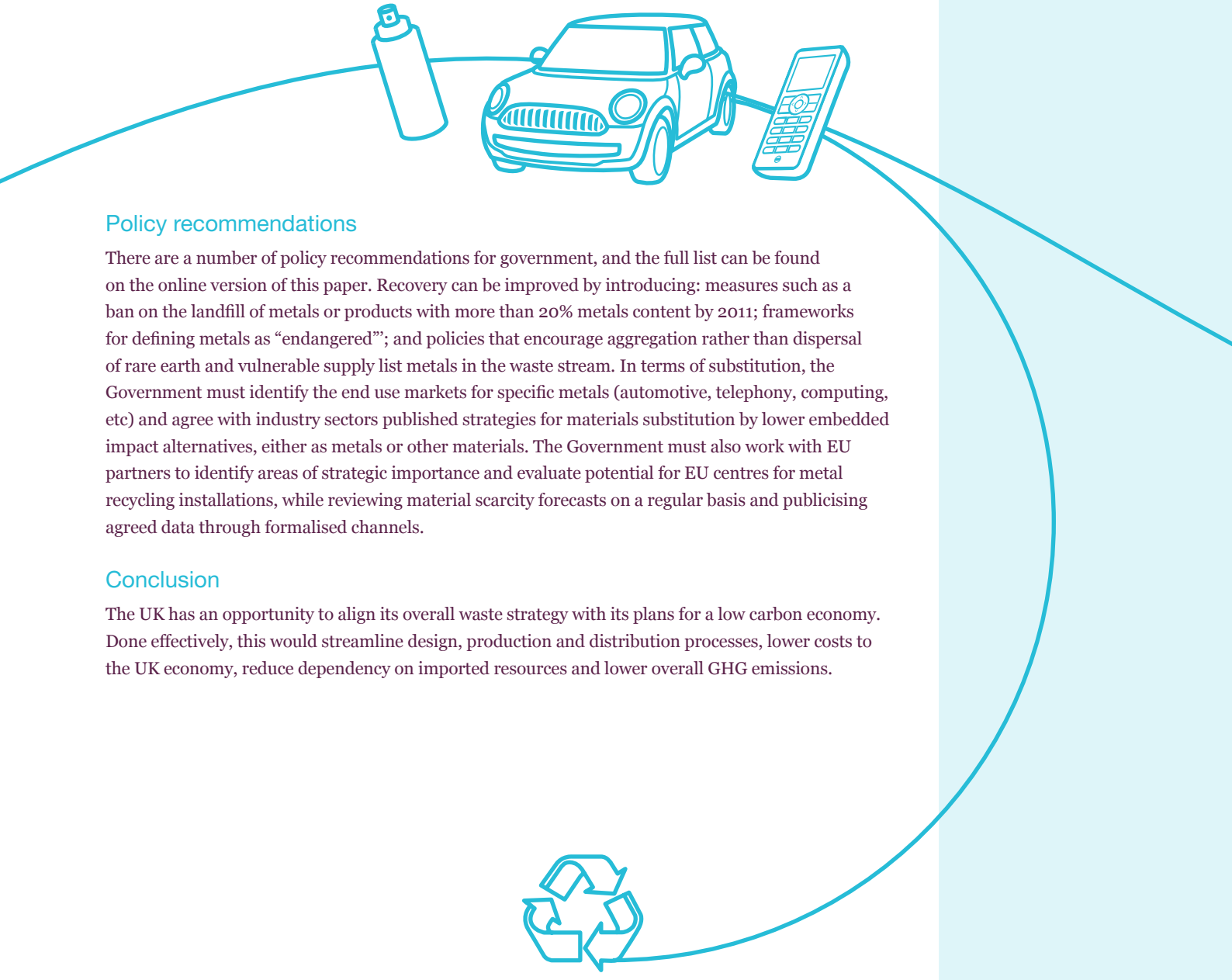
34
Biffaward (April 2004): *Iron, Steel and Aluminium in the UK: Material flows and their economic dimensions.*

35
The embedded carbon impacts globally of this loss are approximately 8.2 million tonnes per year.

The most effective point of intervention can be identified by modelling the impact of an increase in energy prices (either at extraction, as a levy on maritime fuels, at conversion stage or as a recycling subsidy). In material terms, one can model the impact of non-financial policy instruments. These comprise assessments of cross sectoral material substitution or re-design (such as ferrous metals substituted for non-ferrous metals or other low-impact materials like ceramics or timber), the likely impact of product material substitution or re-design (such as engines, consumer goods and concrete), and the physical impact of process redesign (for example, changing UK energy primary feedstocks from coal to renewables).

Towards a RE industrial strategy

The Government, with advice from the Knowledge Transfer Networks, WRAP and Technology Strategy Board, should formulate an industrial strategy for material, product and sectoral opportunities for targeting 100% recovery (such as mobile phones, aerosols, catalysts and automotive electronics) and re-manufacture based on particular scrap streams. It should also work with appropriate precious metals refiners to define the technology, economic, regulatory and policy blockages limiting decentralised re-refining and improve its knowledge of material flows of scrap ores particularly in relation to rare earth metals and/or those associated with high embedded carbon dioxide impacts (priority metals might comprise indium, copper, zinc, palladium, lead and tin).



Policy recommendations

There are a number of policy recommendations for government, and the full list can be found on the online version of this paper. Recovery can be improved by introducing: measures such as a ban on the landfill of metals or products with more than 20% metals content by 2011; frameworks for defining metals as "endangered""; and policies that encourage aggregation rather than dispersal of rare earth and vulnerable supply list metals in the waste stream. In terms of substitution, the Government must identify the end use markets for specific metals (automotive, telephony, computing, etc) and agree with industry sectors published strategies for materials substitution by lower embedded impact alternatives, either as metals or other materials. The Government must also work with EU partners to identify areas of strategic importance and evaluate potential for EU centres for metal recycling installations, while reviewing material scarcity forecasts on a regular basis and publicising agreed data through formalised channels.

Conclusion

The UK has an opportunity to align its overall waste strategy with its plans for a low carbon economy. Done effectively, this would streamline design, production and distribution processes, lower costs to the UK economy, reduce dependency on imported resources and lower overall GHG emissions.

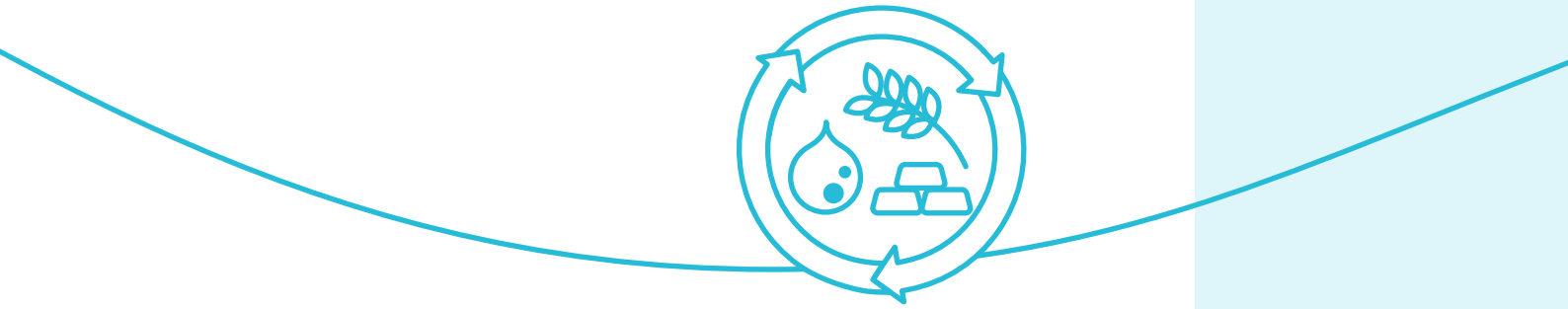
An industrial strategy beyond carbon

*The water, food and materials case studies clearly demonstrate the need for a sectoral approach to RE, but there are also more general principles of resource management that must be addressed, as identified in the **"A Resource Efficient Future"** section.*

As RE and related innovation increasingly become primary benchmarks of a successful economy, the UK will need an industrial strategy to address critical resource challenges. This is one of the leading conclusions from the TEEB analysis[36] which finds that policy makers who factor the planet's multi-trillion dollar ecosystem services into their national and international investment strategies are likely to see far higher rates of return and stronger economies in the 21st century.

The UK has started this process with the publication of an industrial strategy nearly exclusively focusing on carbon, the resource which is arguably the most pressing and politically acceptable for strong policy intervention. It is also where the strongest case for pragmatic and intelligent intervention to stimulate new jobs and industries can be made.

Now that the Low Carbon Industrial Strategy (LCIS) has been published and the relevant government departments are focusing on implementation, the Aldersgate Group believes that the Government's industrial strategy needs to go beyond carbon and to address other resource challenges comprehensively. While the LCIS acknowledges that businesses lose 2% of annual profit through inefficient management of energy, water and waste, with the potential for British businesses to save £6.4 billion per year from RE measures that cost little or nothing, the section on RE spans less than three pages and encompasses sparse policy commitments[37]. As resource constraints increasingly come under stress, the Government needs a more comprehensive strategy to ensure competitive advantage and maximise economic opportunities.



What would a resource efficient industrial strategy encompass? Based on the case studies and analysis in this report, it would adopt general RE principles (such as resource pricing, lifecycle management and innovation). It would aim to stimulate economic growth and jobs for wider environmental industries, in areas such as air pollution control, marine pollution control, environmental management and waste management, recovery and recycling. It would address specific RE challenges on a sectoral basis (we have looked at water, food and materials but there are further areas that merit consideration).

Above all, it would ensure sustained economic growth and competitive advantage as the demand for increasingly scarce global resources grows.

36 The Economics of Ecosystems and Biodiversity (TEEB) for National and International Policy Makers (November 2009).

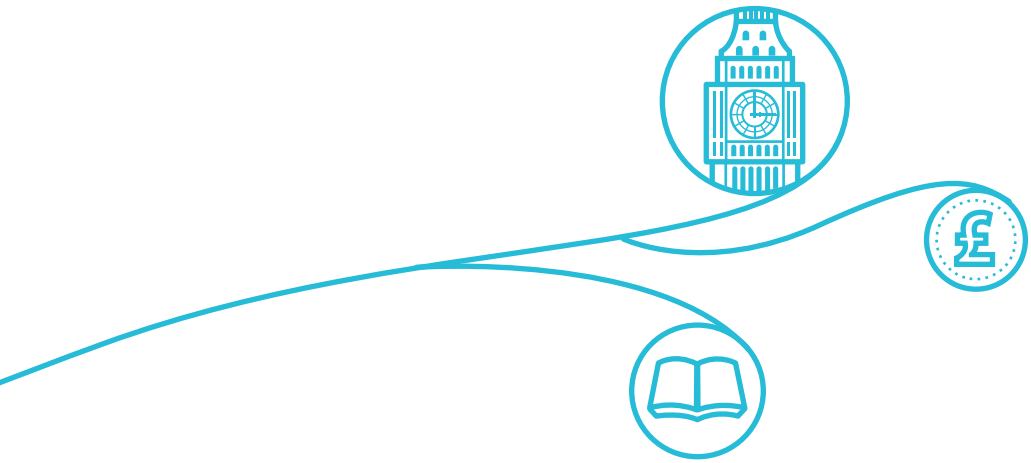
37 HM Government (July 2009) *The Low Carbon Industrial Strategy, p72-4.* See also Defra (October 2007) *Quantification of the business benefits of resource efficiency.*

Conclusion

The publication in 2009 of the UK Low Carbon Transition Plan and related strategies demonstrate that the Government is genuine in its commitment to reduce carbon emissions significantly over the next decade and beyond.

One of the key messages emanating from our high level roundtables is that acting on RE ahead of the market is essential to support this transition. Market failures in resource management must be overcome to reduce the natural resources with significant indirect carbon impacts (including in the water, food and materials sectors examined in this report).

Quite apart from the contribution of resource usage to carbon emissions, an effective RE strategy will lead to more productive use of resources and therefore higher welfare than would otherwise be available. As pointed out in the previous section, British businesses could save £6.4 billion per year from RE measures that cost little or nothing. Our report argues that the desired behavioural change cannot be delivered effectively by price alone, but needs to be driven by a combination of price, regulation and information.



To achieve this, RE needs to be led from the top of Government. RE should become a key objective for HM Treasury's management of the economy. It should be supported across government departments through policies on spatial planning and business support, the remits of regulators, and specific targets for RE in key sectors such as those analysed in this report. This will ensure Britain significantly improves the efficiency of its use of the world's limited resources and the economy maintains employment and competitive advantage now and in the future.

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Please note that the views and opinions expressed in this report are not attributable to any one person or organisation.

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Aldersgate Group

Providing the economic case for high environmental standards.

Who We Are

The Aldersgate Group is a high level coalition of progressive businesses, environmental groups and MPs who believe that high environmental standards will be a major part of future economic growth and international competitiveness.

By presenting objective evidence based on the diverse experience of our members, we promote the case that there is no inherent contradiction between regulating for high environmental standards at the same time as maintaining economic growth and stimulating wealth creation. Quite the reverse: no economic policy which sacrifices environmental quality can succeed in the long term.

Our Aim

To engage actively with government and other key decision makers to contribute to the future development of UK economic, environmental and sectoral policies, as well as providing a distinct voice that advances the better regulation and sustainability agendas.

Our Members

The Group brings together a broad range of players including major corporations, professional bodies, industry leaders, public sector organisations, NGOs, Parliamentarians and others who press for better, smarter environmental regulation that will help manage the transition to a more eco-efficient economy. By combining resources and expertise, the Aldersgate Group is an authoritative and distinctive voice which influences current political debates and government policy.

Key Messages

1 Our long-term economic success depends on a healthy environment and the sustainable use of natural resources.

2 At the company level, good environmental performance translates to tangible economic benefits and is a major source of competitive advantage.

3 Better environmental regulation creates new business and employment opportunities in a fiercely competitive global marketplace.

4 Policy appraisals must accurately assess environmental costs and benefits.

5 The better regulation agenda must not lose sight of the need to maximise outcomes in the drive to reduce unnecessary costs.

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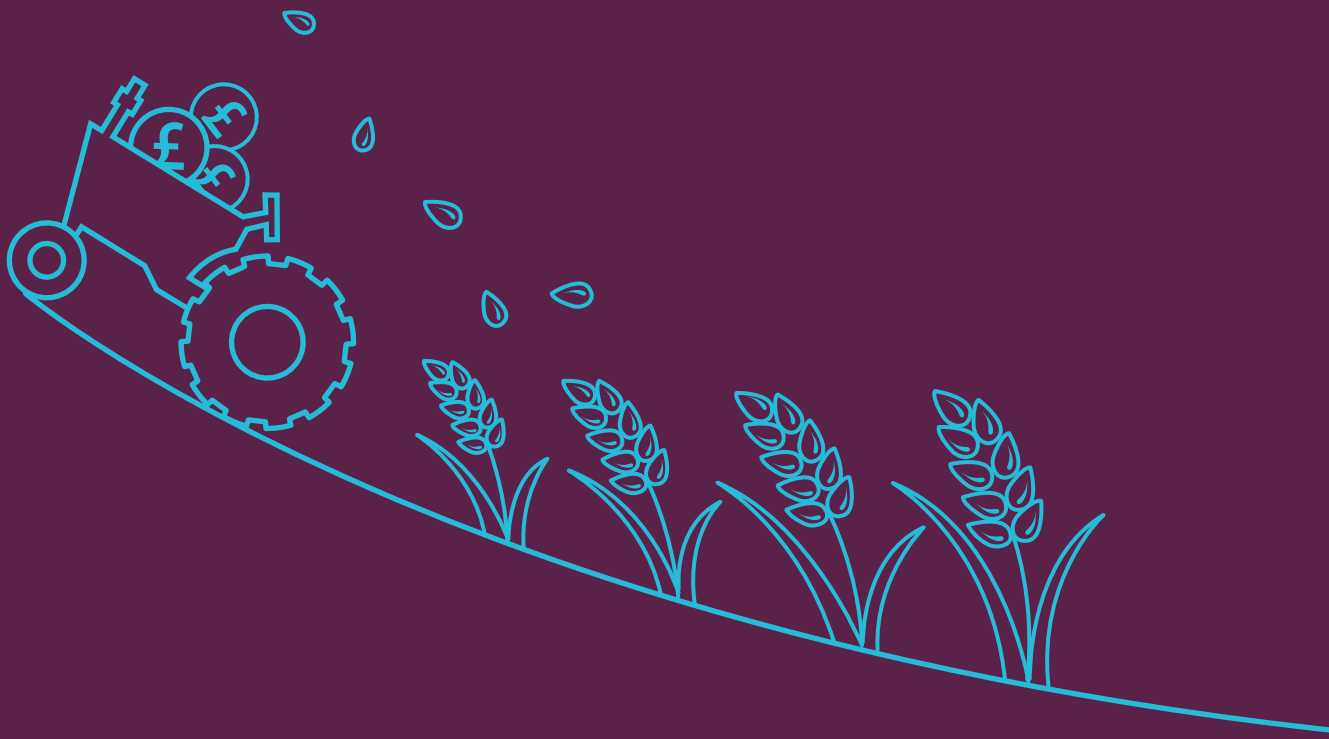

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