



# OPPORTUNITIES FOR UK BUSINESS THAT VALUE AND/OR PROTECT NATURE'S SERVICES

## FINAL REPORT - ATTACHMENT 1

### ELABORATION OF PROPOSALS FOR POTENTIAL BUSINESS OPPORTUNITIES

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# FINAL REPORT - ATTACHMENT 1

## ELABORATION OF PROPOSALS FOR POTENTIAL BUSINESS OPPORTUNITIES

This attachment contains more detailed versions of 15 of the 20 ideas presented in Annex 1A of the Final Report.<sup>1</sup>

An overview of the proposals contained in this Attachment is given in the table on page v.

The proforma used to prepare these proposals is given in Annex 1 to this Attachment.

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<sup>1</sup> Duke, G., Dickie, I., Juniper, J. ten Kate, K., Pieterse, M., Rafiq, M., Rayment, M., Smith, S. and Voulvoulis, N. (2012) Opportunities for UK Business that Value and/or Protect Nature's Services. Final Report to the Ecosystem Markets Task Force and Valuing Nature Network. GHK, London.



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**Table: Summary of catalogue of ideas for business opportunities: (A) Ideas generated by study team**

No.	BUSINESS IDEA	Short version		Long version
		Annex 1A	Annex 1B	Attachment 1
<b>1. Product markets</b>				
T1.1	Expanding the reach and value of sustainability certification	X		X
T1.2	Global Centre of Excellence for Ecosystem Services Certification	X		X
T1.3	Enhanced productivity of fish stocks	X		no
T1.4	Woodland enhancement through a larger market for wood fuel	X		X
T1.5	Designing packaging as fuel	X		X
<b>2. Offsets</b>				
T2.1	Biodiversity offsets, including through conservation banking	X		X
T2.2	Soil carbon enhancement via changed grazing practices.	X		X
T2.3	Peatland carbon code*	X		X
<b>3. PES</b>				
T3.1	Carbon sequestration PES as an 'Allowable Solution'	X		X
T3.2	Layered PES	X		X
T3.3	Baselining ecosystem services provision	X		X
T3.4	Ecosystems restoration	X		X
<b>4. Environmental technologies</b>				
T4.1	Water reuse technologies	X		X
T4.2	Production redesign for generating secondary outputs (SOs)	X		X
<b>5. Cultural services</b>				
T5.1	Optimizing the ecological and economic benefits of Sustainable Tourism	X		X
<b>6. Financial &amp; legal services</b>				
T6.1	Reducing risk for insurers through investment in green infrastructure	X		no
T6.2	Developing environmental bonds as vehicles for investment in nature	X		no
<b>7. Ecosystem knowledge economy</b>				
T7.1	Developing the UK Ecosystems Knowledge Economy	X		X
<b>8. Corporate ecosystem initiatives</b>				
T8.1	Business to business ecosystem services assurance	X		no
T8.2	Assurance of corporate reporting activity	X		no
<b>9. Other including incentives, subsidies, grants</b>				
	none			

\* Idea T2.3 was developed by external stakeholders at the request of the study team



# 1 PRODUCT MARKETS

## *T1.1 Expanding the reach and value of sustainability certification*

### SUMMARY

This proposal is for expanding the reach and value of sustainability certification as a promising business opportunity related to the UK National Ecosystems Assessment. The idea sets well and complements another key opportunity listed as 'Global Centre of Excellence for Ecosystem Services Certification' in this report.

The proposal is premised on the consideration that the market for certified products is growing. Ethical spending in UK grew from under £ 15 billion in 1999 to more than £ 45 billion in 2010. This growth was experienced across all the key sectors of food and drink, home making, travel and transport, personal products, local shopping, charitable giving and investment and finance. Parallel was a supporting change in peoples' behaviour towards greater ethical purchase decisions. Re-use and recycling increased. More people asked and cared about a company's ethical credentials.

Globally, both the supply and demand for certified products grew. All major international voluntary certification systems have recorded significant growth. Yet, the full potential remains untapped. For example, 82% of the world forests and 85% of the world coffee production remained to be certified.

In the UK, there are multiple commodity assurance systems in place broadly covering agriculture, forest and dairy as the main land based economic sectors. There would be business opportunities in further strengthening these systems. The business opportunity resides in redefining and strengthening the value proposition of the certifications, in expanding certification systems to sectors that are not currently covered by robust standards, and in securing UK share in the global export market that will increasingly demand sustainability assurance.

The ecosystem potential is huge and for all major ecosystems: forests, farmland, fresh water resources, and marine ecosystems. Certification lends itself to use in any production or manufacturing systems irrespective of the sector. From an ecosystem point of view, it will best serve those sectors that are biodiversity dependent or have a large ecosystem foot print.

There are some uncertainties and risks but these can be addressed through research and development and through market tools such as value chain finance and insurance products.

## A. DESCRIPTION OF THE OPPORTUNITY

### 1. What is the business opportunity?

*Provide a brief description*

The business opportunity resides foremost in improving existing certification systems. These systems are currently focussed mainly on quality and safety, but only varyingly on the health and resilience of ecosystems. Adapting these systems to the more inclusive concept of sustainability is the business opportunity.

The growth in demand for biomass will increase the competition for land. The security of food supply to retailers will be at risk if the rising fuel prices and EU policy on renewable energy skewed land allocation. In any event, the reliance of the UK on imports will increase with associated costs and risks in security of supply.

Certification as a tool and mechanism allows the bundling of various economic, social, environmental and business attributes to address dilemmas such as the UK is facing. However, it will require that certification is pursued more as strategic option than a mere verification tool. It will entail pursuing a redefined value proposition of certification. The voluntary standard systems such as that of the Rainforest Alliance have demonstrated, for example, that verification must be accompanied and preceded by competent technical assistance to producers to adopt their production systems and that the benefit to producers stem more from savings in costs, increases in productivity and healthful environment. Companies like Nestle are seeking to mitigate supply risks by increasing productivity along with certification. Mars is looking at opportunities to additionally bundle carbon benefits in certification.

With the large carbon footprint of the UK and its businesses, there are opportunities for business to save money on mitigating their own footprints and generate additional economic activity through farm and forest based carbon finance. The increased returns from soil and bio-carbon may also help in returning UK farming to a more viable and attractive enterprise.

Equally important are business opportunities in expanding sustainability certification to other sectors currently not covered adequately such as pasture lands, extractive industry and shipping industry. Certification is increasingly viewed or desired by business beyond the acquisition of green credentials to mitigating risks in their supply chain and market exposure.

Finally, producers, traders and exporters in the UK that depend on UK exports to Europe and beyond will increasingly face policies and regulations in importing countries requiring sustainability assurance. Robust sustainable production standards backed by credible, preferably third party independent assurance systems will help UK business to secure and expand its share of the global market.

**2. Does this opportunity relate to new markets or greening of existing markets (or both)?**

*Provide a brief explanation*

This applies to both existing and new markets. Certification is a strategic option putting sustainability to practice on the ground in ways that few other approaches do. For example, some of the standards in the agriculture sector combine soil fertility, water conservation, pesticide use, biodiversity, riparian protection and social development through hundreds of indicators that they help producers with and conform to. Therefore, certification is not bound to a particular market and can be usefully employed in both existing and new markets.

**3. What type of market opportunity or type of instrument/intervention does this business opportunity involve?**

*Insert an 'X' in the relevant box*

Product markets	Offsetting	Payments for ecosystem services	Environmental technologies	Markets for cultural services	Financial and legal services	Ecosystem knowledge economy	Corporate ecosystem initiatives	Eco-taxes, charges, levies, subsidies, grants	Other
x	x	x		x			x		

*Briefly explain the 'type' classification of the business opportunity*

Standards and assurance are prerequisites of successful sustainability markets. This is inherent in the nature of sustainability that demands a long term view. Production Standards seek to capture the complexity of sustainability and define its parameters in a given production system. Certification provides not only assurance that a standard is complied with but over time can contribute to understanding that the standards do achieve the goal of sustainability that they are meant to serve. Therefore, certification can be applied across a variety of sectors; however, its dominant use thus far has been in the sectors dependent on the use of nature and the goods they produce.

## B. MARKET POTENTIAL

### 4. What is the market potential for this business opportunity with reference to the EMTF criteria?

*Insert an 'X' in the appropriate box (0 = none, 10 = massive)*

0	1	2	3	4	5	6	7	8	9	10
									x	

*Briefly explain the above score, with reference to the EMTF criteria*

From the available evidence both in UK and globally, it is obvious that ethical production, and its assurance that certification systems embody, are in growing demand.

Ethical spending in the UK grew from under £ 15 billion in 1999 to more than £ 45 billion in 2010. This growth was experienced across all the key sectors of food and drink, home making, travel and transport, personal products, local shopping, charitable giving and investment and finance. Parallel was a supporting change in people's behaviour towards greater ethical purchase decisions. Re-use and recycling increased. More people asked and cared about a company's ethical credentials.

Globally, both the supply and demand for certified products grew. For example, against 20 million hectares of forest certified in 1999, more than 300 million hectares were certified by 2010 under FSC and PEFC alone. About 125,000 metric tons of coffee certified under four major voluntary schemes was sold on the market in 2005. It nearly tripled by 2009, each of the certification schemes growing in the range of 19-64% annually. Yet, 82% of the world forests and 85% of the world coffee production remained to be certified. These trends are indicative of the growing market demand for certified products and the vast untapped potential that the uncertified production represents.

As outlined with respect to the other idea of a 'Global Centre of Excellence for Ecosystem Services Certification', the market potential is several-fold. First, certification as an assurance mechanism is imperative for sustaining the UK ecosystems resilience'. It reduces risks in supply chain, secures customers' loyalty and market share, benefits producers and gives UK and its businesses competitive advantage. . Scaling up and across of the certification movement requires intellectual capital and skilled human resources that the UK could be building and supplying to ecosystems markets internally and globally.

This opportunity will create jobs in businesses committed to ethical and sustainable sourcing as well as in the strengthening or creation of the new certification related institutional infrastructure required to implement the systems. These will among others include managers, assessors and provider of technical assistance to producers.

Sustainable production standards and assurance mechanisms have proven to be feasible and scalable both within UK and globally. In the tropical countries and developing world, where much of the international certification experience comes from, they have been specifically targeted at Small and Medium Enterprises (SMEs). In

fact, some certification systems such as Fairtrade are born out of concerns for small disadvantaged producers. The scientific underpinning of certification system varies but the main sustainability-focussed standards such as IFOAM, FSC, MSC and Sustainable Agriculture Network are known for their foundation in science.

Depending on the production systems, the benefits of certification can accrue within a year and continue over the years if producers are able to continue stay certified. The benefits to ecosystems grow with time while benefits to business can peak and would require continuing innovation and reinforcement of the value proposition to the extent certification operates in the voluntary market. The move over time from a voluntary to regulated market will lead to internalizing the cost of externalities that certification captures as a cost of doing business.

Sustainability certification is premised on concerns for ecosystems. The benefits of an adequately designed and robustly implemented sustainability standard to ecosystems are therefore large and given.

Potential for scalability and growth is large but pace of likely growth uncertain. It will depend on leadership by business stimulated by consumer awareness and demand enabled by a supportive policy.

The market potential and benefits are likewise large but there are limits on how certification can capture the value of ecosystem services. The services that can be commoditized and segregated to enable tracking through the chain of custody are more amenable to certification. Others such as watershed services that are influenced by multitude of factors such as regulation of water flow in rivers may be harder to certify but research and development on traceability of ingredients in composite products may provide useful learning to develop similar systems for more defused and yet important ecosystem services such as river flows and ground water recharge.

Other risks associated with this opportunity are that producers may become unable to maintain certification and thus the supply of sustainably produced products to the market may be disrupted. Consumers may not be willing to pay any marginal increase in associated prices. However, based on current experience these risks are not highly likely to materialize at a scale as to undermine the prospect or can be mitigated with a combination of existing and new tools.

**5. What important characteristics of ecosystems and ES might be of relevance to this business opportunity?**

*Insert a score from 0 (irrelevant) to 10 (extremely relevant)*

Scale of externalities involved	Nature of market failures involved	Business' (& sectors') dependency on the ES involved, and costs and availability of substitutes	Opportunity costs related to ES provision	Nature of property rights over the ES or environmental assets underpinning them	Feasibility of managing the ES, and speed and predictability with which they respond to management	Capital costs of altering ES management and provision	Spatial and socio-economic distribution of ES beneficiaries (are they organised in coherent group that can take part in	Spatial and economic distribution of ES providers	Spatial and temporal relationships between ES providers and beneficiaries	Nature of existing cultural, regulatory or market management structures
<b>6</b>	<b>8</b>			<b>7</b>	<b>5</b>	<b>7</b>	<b>7</b>	<b>8</b>	<b>8</b>	<b>7</b>

*Briefly explain the above scores and to what extent these characteristics might affect the market potential*

The above scores are the factors that drive potential for verification. The highest scores are the factors that determine whether a product with ES benefits can be defined, have a distinct production process and a distinct product that can be presented to consumers as a certified alternative.

**C. ECOSYSTEM POTENTIAL**

**6. How significant might this opportunity be for protecting/enhancing ecosystems, enhancing ES, enhancing goods derived from ES, and/or positively affecting drivers of ecosystem change?**

*Insert score(s) from 0 (no significance) to 10 (extremely significant)*

Drivers of (Ecosystem) Change	Ecosystems	Ecosystem Services	Goods derived from ES
<b>7</b>	<b>4</b>	<b>4</b>	<b>7</b>

*Briefly explain the above scores, provide page references to any relevant NEA evidence*

The potential is highly significant in all areas of influencing drivers of change, maintaining ecosystems' resilience, and enhancing the provision of corresponding services and goods. How for this potential can be realized will largely depend on how this opportunity is captured. If it is pursued as a narrow verification activity to tick the box, it will have a limited value of any eco-label. On the other hand if it is implemented

as a robust mechanism to mitigate risks in the supply chains it will be much more useful. Its full potential however will come from understanding and implementing certification as a strategic option that uniquely bundles sustainability to optimize land use backed by credible verification mechanism.

**7. To which UK ecosystems (broad habitats as per the NEA) is this opportunity of relevance?**

*Insert score(s) from 0 (irrelevant) to 10 (extremely relevant)*

Mountains, moorlands & heaths	Semi-natural grasslands	Enclosed farmland	Woodlands	Freshwaters - openwaters, wetlands, floodplains	Urban	Coastal	Marine
6	10	10	10	8	3	8	8

*Briefly explain the above scores in relation to state and trends of relevant habitats – provide page references to any relevant NEA evidence*

Certification is potentially relevant to all ecosystems subject to significant human intervention. Grassland farming systems are judged to have highest potential as there are ES enhancing actions in widespread products (meat, dairy) that have long term net benefits for farmers (e.g. improved nutrient management).

This idea also has significant potential impacts on ES internationally.

**8. To which ecosystem services are this opportunity of relevance?**

*Insert score(s) from 0 (irrelevant) to 10 (extremely relevant)*

<b>Supporting</b>	<b>Regulating</b>	<b>Provisioning</b>	<b>Cultural</b>
<b>5</b>	<b>6</b>	<b>9</b>	<b>8</b>

*Briefly explain the above scores in relation to state and changes in relevant ES in the UK – provide page references to any relevant NEA evidence*

Certification can apply to all types of ecosystem services but its greatest promise would appear to be in provisioning and cultural services.

**9. To which drivers of change is this opportunity of relevance?**

*Insert score(s) from 0 (irrelevant) to 10 (extremely relevant)*

INDIRECT DRIVERS					DIRECT DRIVERS				
Demographic	Economic	Sociopolitical	Cultural and Behavioural	Scientific and Technological	Habitat Change	Pollution & Nutrient Enrichment	Overexploitation of Resources	Climate Variability & Change	Invasive Species
8	8		8		8	8	8	6	

*Briefly explain the above scores in relation to drivers of ecosystem change in the UK - provide page references to any relevant NEA evidence*

The certification movement has evolved from just verifying a production process to enhancing productivity, quality and climate change mitigation and adaption that standards such as of Rainforest Alliance seek to internalize mainly through both redefining the standards and through technical assistance that precedes or accompanies certification processes. Such standards are developed in recognition of the demographic imperative and aimed at enhancing the sustainability and economic benefits of exiting production landscaped to spare natural ecosystems from further degradation and for other ecosystem services.

**10. For the ecosystems, ES and drivers of change of ecosystems of which countries (England, Northern Ireland, Scotland, Wales) is this opportunity relevant?**

*Insert score(s) from 0 (irrelevant) to 10 (extremely relevant)*

England	Northern Ireland	Scotland	Wales
9	9	9	9

*Briefly explain the above scores – provide page references to any relevant NEA evidence*

Certification can be local, regional, national or international. On the basis of distribution of production land and seascapes, England and Wales may relatively benefit more but it is of equal relevance and importance for all the countries.

**11. Does this opportunity have international significance (for UK business, beyond the UK)?**

*Briefly explain the market and ecosystems potential beyond the UK*

UK is a major player in the global market. It both imports and exports ES services and goods. The tourism market perhaps best exemplifies this as does the market for agriculture and forest products. Ethical and sustainable sourcing policies and legislation are on the rise globally and in Europe in particular. As a key trading partner with other members of the European Union, sustainability standards and corresponding assurance systems will serve UK well both at home and in the global market. UK based businesses such as Unilever, M&S, Mars and others are leading the way and UK has a strong opportunity to build on this leadership.

**D. SECTOR RELEVANCE**

**12. What sectors is the business opportunity of relevance to, on a scale of 0 (no relevance) to 10 (very relevant)?**

*Insert score(s) from 0 (irrelevant) to 10 (extremely relevant)*

Agriculture	Forestry	Fishing	Mining & Quarrying	Food Manufacture	Pharmaceuticals	Other manufacturing	Energy	Water, Waste Water	Construction	Transport	Tourism & Recreation	Wholesale & Retail	Creative, Media & Marketing	Financial Services	Public Administration	Education
10	10	10	5	10	5	5	7	2	2	2	9	10	7	3	3	7

*Briefly explain the above scores*

Key sectors are those that depend on or impact natural resources directly or are related through production process, supply chains, trade and retail.

## E. ENABLING ACTIONS

### 13. What kinds of enabling actions are of relevance to this business opportunity?

*Insert score(s) from 0 (irrelevant) to 10 (extremely relevant)*

FOUND- ATIONAL	ENABLING			INSTRUMENTAL		
Knowledge	Legislation	Policies, Institutions & Governance	Changing Social Attitudes	Markets & Incentives	Technologies & Practices	Voluntary Actions, Education & Awareness
10	5	10	10	10	5	10

*Briefly explain the above scores, describing the actions needed, by whom (government, business, other) and what constraints, if any, these actions are designed to overcome*

Certification provides information which connects all these areas. Enabling policies will be critical for the realization of this opportunity. These will include among others value chain finance to enable producers invest in sustainability and earn requisite credentials and certification. There would be space for new farm insurance products to address any fluctuations in the market for sustainably produced products that can be caused by global economic and political trends. Investment in research and development would be required to continually build and redefine the value proposition of certification. Likewise academic and vocational trainings such as in developing and implementing certification systems, sustainability assessments and other related skills may also need to be provided.

## F. FURTHER WORK TO BE DONE

### 14. What further research work might be required to explore the market and ecosystems potential of this opportunity and the required enabling actions?

*Briefly explain*

Perhaps the most important opportunity for research and development rests in redefining sustainable production standards. All current standards are premised on the current land-use being the best land-use. A new standards system that takes into account the land-use potential could be fundamentally game changing.

Additionally, business case for UK need to be more clearly made in terms of the current and potential ES services best amenable to certification and their corresponding market size. It remains to be clarified what commodity sectors are parts of them are adequately covered for sustainability assurance systems, where these can be strengthened and to which sectors these may be extended anew.

## ***T1.2 Global centre of excellence for ecosystem services certification***

### **SUMMARY**

There are now a number of successful voluntary ethical certification schemes (e.g. FSC, MSC, Rainforest Alliance, Fairtrade, Utz, Soil Association, Organic, etc) seeking to provide assurance to buyers that the commodities they buy are ethically produced. The different schemes have different ideological underpinning but many seek to address concerns over impacts on ecosystems, some more than others. Each of these schemes is administered by a professional administrative body. The UK has a cluster of these bodies (e.g. MSC, Rainforest Alliance, Soil Association). Several of the schemes are members of ISEAL Alliance that aims at maintaining rigor and integrity in the development and implementation of these schemes, scaling them up and encouraging their impact assessment. ISEAL is also based in London.

While ISEAL is focussed on the processes of setting up and scaling up of certification there is an institutional vacuum to drive excellence in the contents of certifications schemes. The various certification schemes compete with each other. They try to improve individually but there is no institution that can rise above the individual interest of these schemes and pursue and support assurance of sustainable production as a global imperative. There has been a sprinkling of intermittent case studies, but very little by way of what the certification movement has collectively achieved, what can be learnt from it, what more can and should be done for certification to maintain natural ecosystems and enhance the benefits they provide.

The suggestion is for the UK to step up, grab the leadership opportunity and create the much needed global Centre of Excellence for Ecosystem Services Certification (CEEC) and harness the business potential it offers.

Establishing such a body would build on the UK's existing knowledge base. It could generate economic activity through:

- research and analysis at the cutting edge of the certification movement and creating intellectual property and resulting economic benefits that UK becomes known for;
- providing services that add value to existing bodies;
- creating capacity such as of audits and verifications; the lack of these capacities globally and constraints to building them at affordable costs to producers is stifling assurance of sustainable production and the ability of the market to meet its sustainability commitments;
- exporting UK expertise,
- encouraging new UK ecosystem services certification bodies, fostering ES market development, and
- helping attract new international certification bodies to choose the UK as their global base (complementing the UK's existing expertise/cluster in ecosystem services analysis).

UK government has previously intervened to ensure good practice and reliable information from environmental product classifications (e.g. carbon offset gold standard, green claims code). This intervention is merited in order to build confidence in environmental markets. The centre could effectively perform this function for Government in relation to PES and certification schemes. This would help the growth of nascent ES markets in the UK, such as for biodiversity offsets and PES.

## **A. DESCRIPTION OF THE OPPORTUNITY**

### **1. What is the business opportunity?**

*Provide a brief description*

Sell professional services to foster best practices in certification of products with associated ES benefits. These services would add value to the certification process. It would appeal to existing certification bodies in demonstrating their good practice, to companies and governments internationally wishing to develop market opportunities in this area, and to altruistic funders wishing to see greater uptake of certified products.

Create intellectual property of economic benefit over the long term.

Attract investment and create employment expansion of UK based certification bodies and attraction of new certification bodies as UK builds its reputation as the hub of the certification movement.

### **2. Does this opportunity relate to new markets or greening of existing markets (or both)?**

*Provide a brief explanation*

Both. It is based on standardising the way existing markets are greened through certification, but this understanding can help foster new certified markets.

**3. What type of market opportunity or type of instrument/intervention does this business opportunity involve?**

*Insert an 'X' in the relevant box*

Product markets	Offsetting	Payments for ecosystem services	Environmental technologies	Markets for cultural services	Financial and legal services	Ecosystem knowledge economy	Corporate ecosystem initiatives	Eco-taxes, charges, levies, subsidies, grants	Other
x	x	x		x		x	x		

*Briefly explain the 'type' classification of the business opportunity*

Certification cuts across several markets, its main function is to provide reliable information to buyers about products such as fruits, dairy products, coffee and processes such as chain of custody and offsetting

**B. MARKET POTENTIAL**

**4. What is the market potential for this business opportunity with reference to the EMTF criteria?**

*Insert an 'X' in the appropriate box (0 = none, 10 = massive)*

<b>0</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>	<b>10</b>
								x		

*Briefly explain the above score, with reference to the EMTF criteria*

The market potential is twofold. First, certification as an assurance mechanism is imperative for stimulating sustaining and growing the markets for sustainable produced products and services. In the absence of it, markets for any ecosystem product or service are unlikely to thrive due to inherent complexity of the concept of sustainability; certification is best of the available tools to capture and communicate this complexity to buyers. Second, scaling up and across of the certification movement requires intellectual capital and skilled human resources that UK could be building and supplying to ecosystems markets domestically and globally.

The potential market is large, but there are limits on how certification can capture the value of ecosystem services – it needs to reflect a change to existing product production activity (e.g. modified primary production practices like shade-grown coffee) and also requires a product that can be tracked through the supply chain separately from non-certified produced product (e.g. for MSC fish, fish wholesalers and retailers must be certified as well as fishermen themselves). By contrast catchment

management practices that improve river or groundwater quality are unsuitable for certification of water, because the water services they supply cannot be kept separate from other catchment flows before they are extracted for public supply. (NB, although bottled water market is an exception).

Potential for global growth is very large, but likely speed of growth uncertain.

**5. What important characteristics of ecosystems and ES might be of relevance to this business opportunity?**

*Insert a score from 0 (irrelevant) to 10 (extremely relevant)*

Scale of externalities involved	Nature of market failures involved	Business' (& sectors') dependency on the ES involved, and costs and availability of substitutes	Opportunity costs related to ES provision	Nature of property rights over the ES or environmental assets underpinning them	Feasibility of managing the ES, and speed and predictability with which they respond to management	Capital costs of altering ES management and provision	Spatial and socio-economic distribution of ES beneficiaries (are they organised in coherent group that can take part in	Spatial and economic distribution of ES providers	Spatial and temporal relationships between ES providers and beneficiaries	Nature of existing cultural, regulatory or market management structures
5	5			7	5	7	7	8	8	7

*Briefly explain the above scores and to what extent these characteristics might affect the market potential*

The above scores are the factors that drive potential for verification. The highest scores are the factors that determine whether a product with ES benefits can be defined, have a distinct production process and a distinct product that can be presented to consumers as an alternative with a certification...

**C. ECOSYSTEM POTENTIAL**

**6. How significant might this opportunity be for protecting/enhancing ecosystems, enhancing ES, enhancing goods derived from ES, and/or positively affecting drivers of ecosystem change?**

*Insert score(s) from 0 (no significance) to 10 (extremely significant)*

Drivers of (Ecosystem) Change	Ecosystems	Ecosystem Services	Goods derived from ES
7	4	4	5

Briefly explain the above scores, provide page references to any relevant NEA evidence

The main benefit of certification is that it distinguishes a production process that is less damaging to ES. It is almost impossible for any ecosystem services to be provided sustainably to the satisfaction of buyers without some assurance as to their impact of the production and supply processes on environment and people. This can be done in different ways for different products and services. Certification is the most tested and widely applicable mechanism.

**7. To which UK ecosystems (broad habitats as per the NEA) is this opportunity of relevance?**

Insert score(s) from 0 (irrelevant) to 10 (extremely relevant)

Mountains, moorlands & heaths	Semi-natural grasslands	Enclosed farmland	Woodlands	Freshwaters - openwaters, wetlands, floodplains	Urban	Coastal	Marine
<b>6</b>	<b>10</b>	<b>10</b>	<b>10</b>	<b>8</b>	<b>3</b>	<b>8</b>	<b>8</b>

Briefly explain the above scores in relation to state and trends of relevant habitats – provide page references to any relevant NEA evidence

Certification is potentially relevant to all ecosystems subject to significant human intervention. Grassland farming systems are judged to have highest potential as there are ES enhancing actions in widespread products (meat, dairy) that have long term net benefits for farmers (e.g. improved nutrient management).  
  
This idea also has significant potential impacts on ES internationally.

**8. To which ecosystem services are this opportunity of relevance?**

Insert score(s) from 0 (irrelevant) to 10 (extremely relevant)

<b>Supporting</b>	<b>Regulating</b>	<b>Provisioning</b>	<b>Cultural</b>
<b>5</b>	<b>6</b>	<b>9</b>	<b>4</b>

Briefly explain the above scores in relation to state and changes in relevant ES in the UK – provide page references to any relevant NEA evidence

Not sure the relevance of the service varies by type of ES, as it involves whole-ES production processes, however, as some market good is required to certify, a provisioning service is essential.

**9. To which drivers of change is this opportunity of relevance?**

Insert score(s) from 0 (irrelevant) to 10 (extremely relevant)

INDIRECT DRIVERS					DIRECT DRIVERS				
Demographic	Economic	Sociopolitical	Cultural and Behavioural	Scientific and Technological	Habitat Change	Pollution & Nutrient Enrichment	Overexploitation of Resources	Climate Variability & Change	Invasive Species
8	8		8		8	8	8	6	

Briefly explain the above scores in relation to drivers of ecosystem change in the UK - provide page references to any relevant NEA evidence

Certification must link to purchasing decisions, and can alter drivers connected to production processes. In fact, the certification movement has evolved from just verifying a production process to systems that verify and enhance productivity, quality and climate change mitigation and adaption. Certification standards such as Rainforest Alliance seek to internalize these factors by both redefining the standards and through technical assistance that precedes or accompanies certification processes. Such standards are developed in recognition of the demographic imperative, and are aimed at enhancing the sustainability and economic benefits of existing production in a way that spares natural ecosystems and other ecosystem services from further degradation and for.

**10. For the ecosystems, ES and drivers of change of ecosystems of which countries (England, Northern Ireland, Scotland, Wales) is this opportunity relevant?**

Insert score(s) from 0 (irrelevant) to 10 (extremely relevant)

England	Northern Ireland	Scotland	Wales
9	9	9	9

Briefly explain the above scores – provide page references to any relevant NEA evidence

Equally relevant to all countries. Certification can be local, regional, national or international.

**11. Does this opportunity have international significance (for UK business, beyond the UK)?**

Briefly explain the market and ecosystems potential beyond the UK

YES, significant potential to export best practice to other countries production processes. International standardisation highly relevant to due to international markets for many ecosystem-based goods (e.g. coffee, fish, timber).

Unique and many opportunities for UK to learn from and contribute to the global certification movement. Also an opportunity for UK to fill the intellectual leadership vacuum that wouldn't remain open for long. Other countries such as Switzerland, Holland, and Germany are already positioning themselves.

**D. SECTOR RELEVANCE**

**12. What sectors is the business opportunity of relevance to, on a scale of 0 (no relevance) to 10 (very relevant)?**

Insert score(s) from 0 (irrelevant) to 10 (extremely relevant)

Agriculture	Forestry	Fishing	Mining & Quarrying	Food Manufacture	Pharmaceuticals	Other manufacturing	Energy	Water, Waste Water	Construction	Transport	Tourism & Recreation	Wholesale & Retail	Creative, Media & Marketing	Financial Services	Public Administration	Education
10	10	10	5	10	5	5	7	2	2	2	9	10	7	3	3	7

Briefly explain the above scores

Key sectors are those in the resource extraction and production process, supply chains, trade and retail.

**E. ENABLING ACTIONS**

**13. What kinds of enabling actions are of relevance to this business opportunity?**

*Insert score(s) from 0 (irrelevant) to 10 (extremely relevant)*

FOUND- ATIONAL	ENABLING			INSTRUMENTAL		
Knowledge	Legislation	Policies, Institutions & Governance	Changing Social Attitudes	Markets & Incentives	Technologies & Practices	Voluntary Actions, Education & Awareness
10	5	10	10	10	5	10

*Briefly explain the above scores, describing the actions needed, by whom (government, business, other) and what constraints, if any, these actions are designed to overcome*

Certification provides information which connects all these areas.

**F. FURTHER WORK TO BE DONE**

**14. What further research work might be required to explore the market and ecosystems potential of this opportunity and the required enabling actions?**

*Briefly explain*

Define business case more clearly and identify ES whose sustainable management can be enhanced by a corresponding effective assurance/certification system.

Measure existing size of domestic and global market as well as the investment and supply potential of UK activity.

Define what makes ES suitable for certification and identify scale of ES that meet these criteria but not currently in certified markets.

### ***T1.3 Woodland enhancement through a larger market for wood fuel***

#### **SUMMARY**

Not available

#### **A. DESCRIPTION OF THE OPPORTUNITY**

##### **1. What is the business opportunity?**

*Provide a brief description*

A recent trend toward the installation of wood burning stoves for heating homes is leading to growing demand for fuel wood. Delivering cut logs to domestic properties is in some parts of the country a growth market, as is the installation of burners. Many householders are finding that an efficient wood-burner is a pleasant way to heat their homes. Some are aware of the carbon benefits of switching to a renewable resource and away from fossil energy, for at least part of their energy. Meeting this demand, both for stove installation and wood supply, presents a considerable business opportunity.

##### **2. Does this opportunity relate to new markets or greening of existing markets (or both)?**

*Provide a brief explanation*

Both. It is a way to green the market for warmth (by reducing dependence on coal, gas or fossil-generated electricity) and a potential new growth market from a presently small base.

**3. What type of market opportunity or type of instrument/intervention does this business opportunity involve?**

*Insert an 'X' in the relevant box*

Product markets	Offsetting	Payments for ecosystem services	Environmental technologies	Markets for cultural services	Financial and legal services	Ecosystem knowledge economy	Corporate ecosystem initiatives	Eco-taxes, charges, levies, subsidies, grants	Other
x			x					x	

*Briefly explain the 'type' classification of the business opportunity*

The products in question are efficient wood-burners (environment technologies and a product market) and 'sustainably' sourced fuel (product market). Both of these could be incentivised by various financial incentives. Two environmental outcomes that could be sought through the allocation of incentives are lower carbon heating and enhanced woodland biodiversity. A certification scheme of some kind could also help, especially if backed by some kind of market building activity (for example and official website linking woodland owners to households with burners).

**B. MARKET POTENTIAL**

**4. What is the market potential for this business opportunity with reference to the EMTF criteria?**

*Insert an 'X' in the appropriate box (0 = none, 10 = massive)*

0	1	2	3	4	5	6	7	8	9	10
									X	

*Briefly explain the above score, with reference to the EMTF criteria*

The market for sustainable wood fuel is potentially huge as many urban homes adopt wood burning as a means of heating. The financial rewards for woodland owners could be considerable.

The scale of this market could be vast if built in the right way. There are already innovators supplying sustainable wood and fitting super-efficient burners. Potential third party brokers include some of the conservation NGOs who might set up some kind of light touch certification process.

Most woodlands are under the control of private landowners, many of whom are SMEs. Bringing unproductive woodlands into management for wood fuel and

conservation could lead to quick financial returns. Over time it could also lead to major employment creation opportunities.

According to one report prepared for the Forestry Commission, bringing neglected woods into productive rotation could kick-start local lower-carbon development, boost rural employment, and create better conditions for wildlife. Realising the potential for wood fuel could create at least 15,000 new jobs, deliver carbon cuts equivalent to the emissions of 250,000 households, and generate £200 million of new business in the countryside.

As acknowledged by Wildlife Link (the umbrella body for the UK’s conservation organisations) commenting on the Forestry Commission’s Woodfuel Strategy for bringing an additional 2 million tonnes of woodfuel to market by 2020, *“The Woodfuel Target could play a key role in contributing to a new low-carbon economy and in addressing the urgent need for positive management of many woods and forests across the country.”*

Building a bigger market for wood fuel derived from the UK’s native woodlands could help meet energy security goals too, and thus play a small part in helping aid UK competitive advantage (by having less reliance on external resources that are subject to price volatility).

**5. What important characteristics of ecosystems and ES might be of relevance to this business opportunity?**

*Insert a score from 0 (irrelevant) to 10 (extremely relevant)*

Scale of externalities involved	Nature of market failures involved	Business' (& sectors') dependency on the ES involved, and costs and availability of substitutes	Opportunity costs related to ES provision	Nature of property rights over the ES or environmental assets underpinning them	Feasibility of managing the ES, and speed and predictability with which they respond to management	Capital costs of altering ES management and provision	Spatial and socio-economic distribution of ES beneficiaries (are they organised in coherent group that can take part in transactions?)	Spatial and economic distribution of ES providers	Spatial and temporal relationships between ES providers and beneficiaries	Nature of existing cultural, regulatory or market management structures
		<b>7</b>		<b>7</b>	<b>8</b>	<b>5</b>	<b>6</b>	<b>6</b>	<b>7</b>	<b>5</b>

*Briefly explain the above scores and to what extent these characteristics might affect the market potential*

Woodland productivity underpins a major new market in wood burning heaters. Most of the woodland that can fuel this growing market is in private hands. This resource can be mobilised if the market can be built. The proximity of woodlands to areas where

demand exists will be a major factor in determining the viability of this growth market in different areas.

**C. ECOSYSTEM POTENTIAL**

**6. How significant might this opportunity be for protecting/enhancing ecosystems, enhancing ES, enhancing goods derived from ES, and/or positively affecting drivers of ecosystem change?**

*Insert score(s) from 0 (no significance) to 10 (extremely significant)*

Drivers of (Ecosystem) Change	Ecosystems	Ecosystem Services	Goods derived from ES
<b>8</b>	<b>8</b>	<b>8</b>	<b>9</b>

*Briefly explain the above scores, provide page references to any relevant NEA evidence*

A major driver of negative change in British woodlands is lack of management. These ecosystems can be enhanced through better management. The productive service of wood provisioning could be considerable. Other goods derived from managed woodlands could include cultural services and food (for example fungi).

**7. To which UK ecosystems (broad habitats as per the NEA) is this opportunity of relevance?**

*Insert score(s) from 0 (irrelevant) to 10 (extremely relevant)*

Mountains, moorlands & heaths	Semi-natural grasslands	Enclosed farmland	Woodlands	Freshwaters - openwaters, wetlands, floodplains	Urban	Coastal	Marine
			10				

*Briefly explain the above scores in relation to state and trends of relevant habitats – provide page references to any relevant NEA evidence*

This is potentially a powerful way to improve woodland management.

**8. To which ecosystem services are this opportunity of relevance?**

*Insert score(s) from 0 (irrelevant) to 10 (extremely relevant)*

Supporting	Regulating	Provisioning	Cultural
		10	6

*Briefly explain the above scores in relation to state and changes in relevant ES in the UK – provide page references to any relevant NEA evidence*

Wood fuel provision would be the main output from building on this market opportunity. Cultural services could also result – for example in more opportunities to enjoy woodland wildlife and tranquillity.

**9. To which drivers of change is this opportunity of relevance?**

*Insert score(s) from 0 (irrelevant) to 10 (extremely relevant)*

INDIRECT DRIVERS					DIRECT DRIVERS				
Demographic	Economic	Sociopolitical	Cultural and Behavioural	Scientific and Technological	Habitat Change	Pollution & Nutrient Enrichment	Overexploitation of Resources	Climate Variability & Change	Invasive Species
			8	7	6			7	

*Briefly explain the above scores in relation to drivers of ecosystem change in the UK - provide page references to any relevant NEA evidence*

Many people wish to have a more pleasant and sustainable source of heat and this is leading to a cultural preference toward more wood burning. New burners are very efficient and enable a lot of heat from less wood. By joining up this cultural preference with a technological opportunity it might be possible to improve the quality of the habitat in British woodlands. At the same time climate change and energy security objectives would be advanced.

**10. For the ecosystems, ES and drivers of change of ecosystems of which countries (England, Northern Ireland, Scotland, Wales) is this opportunity relevant?**

*Insert score(s) from 0 (irrelevant) to 10 (extremely relevant)*

England	Northern Ireland	Scotland	Wales
8	8	8	8

*Briefly explain the above scores – provide page references to any relevant NEA evidence*

It is relevant across the whole UK, especially where there are lots of small woods adjacent to urban areas.

**11. Does this opportunity have international significance (for UK business, beyond the UK)?**

*Briefly explain the market and ecosystems potential beyond the UK*

Possibly, if there were ways to build some domestic manufacturing capacity in wood burners. Most of these devices seem to be Scandinavian at the moment. The potential market is, however, huge. As gas prices rise there might be a new market driver toward efficient wood use for heating.

**D. SECTOR RELEVANCE**

**12. What sectors is the business opportunity of relevance to, on a scale of 0 (no relevance) to 10 (very relevant)?**

*Insert score(s) from 0 (irrelevant) to 10 (extremely relevant)*

Agriculture	Forestry	Fishing	Mining & Quarrying	Food Manufacture	Pharmaceuticals	Other manufacturing	Energy	Water, Waste Water	Construction	Transport	Tourism & Recreation	Wholesale & Retail	Creative, Media & Marketing	Financial Services	Public Administration	Education
	10						10				5					

*Briefly explain the above scores*

Self explanatory, although perhaps there is more to be said on the potential synergies between woodland management schemes and recreation.

**E. ENABLING ACTIONS**

**13. What kinds of enabling actions are of relevance to this business opportunity?**

*Insert score(s) from 0 (irrelevant) to 10 (extremely relevant)*

FOUND- ATIONAL	ENABLING			INSTRUMENTAL		
Knowledge	Legislation	Policies, Institutions & Governance	Changing Social Attitudes	Markets & Incentives	Technologies & Practices	Voluntary Actions, Education & Awareness
9	8	8	7	7	6	5

*Briefly explain the above scores, describing the actions needed, by whom (government, business, other) and what constraints, if any, these actions are designed to overcome*

Building market knowledge is essential, in for example linking woodland owners to buyers of wood fuel. Legislation could help, for example by finding a way to incentivise wood burning for heat via something like the Renewable Heat Incentive (although that particular tool has been deemed as inappropriate for this purpose). However there might be policy or institutional changes (e.g. through a new national forestry agency) that could help. Changed attitudes and more cultural affinity to wood burning is already a major driver. This could get much bigger. Some market based incentives could help too, for example some kind of certification scheme. New efficiency standards for stoves might drive the market in a good direction.

**F. FURTHER WORK TO BE DONE**

**14. What further research work might be required to explore the market and ecosystems potential of this opportunity and the required enabling actions?**

*Briefly explain*

Most of the research that is needed is already done. What are needed now are some market building interventions to get scale. The Forestry Commissions, NGOs, stove designers, manufacturers and woodland owners could be encouraged to collaborate in designing how best to do this.

## ***T1.4 Designing packaging as fuel***

### **SUMMARY**

This opportunity would address two environmental challenges: management of the significant volumes of packaging waste generated by consumers and business, and the need to move alternative (non-fossil-fuel) sources of energy generation. Vegetation-based materials (card, cellulose) are often used in packaging and these can have calorific content. The suitability of packaging materials as a fuel for energy generation could be specifically defined and marked on packaging so they can be separate in the waste stream, allowing their use as fuel. This could apply to packaging made from virgin resources or from recycled materials, and the resulting environmental benefits gains will depend on where in different resource flows it is utilised.

### **A. DESCRIPTION OF THE OPPORTUNITY**

#### **1. What is the business opportunity?**

*Provide a brief description*

To define standards for packaging waste (like other end-of-waste) that makes them suitable as a fuel for domestic heating (e.g. stoves), local heating/generation and/or grid-level generation. This would then feed into the design of packaging, be clearly marked to allow its separation from the waste stream, and allow its post-consumer use as a fuel in local generation facilities (e.g. alongside woodfuel and other vegetation-based fuels).

#### **2. Does this opportunity relate to new markets or greening of existing markets (or both)?**

*Provide a brief explanation*

It is a new market, as a subset of existing markets for re-using and recycling packaging waste, and as a complement to growing markets for woodfuel. Markets could develop between households to redistribute the waste arising across all households to the minority of households with domestic fuel burners (e.g. wood burners).

**3. What type of market opportunity or type of instrument/intervention does this business opportunity involve?**

*Insert an 'X' in the relevant box*

Product markets	Offsetting	Payments for ecosystem services	Environmental technologies	Markets for cultural services	Financial and legal services	Ecosystem knowledge economy	Corporate ecosystem initiatives	Eco-taxes, charges, levies, subsidies, grants	Other
x			x					x	

*Briefly explain the 'type' classification of the business opportunity*

The products in question are a standard for the energy-generation-suitable packaging, waste-handling capacity to supply this to generation facilities, and ability to use it alongside other fuels in heat/generation facilities.

**B. MARKET POTENTIAL**

**4. What is the market potential for this business opportunity with reference to the EMTF criteria?**

*Insert an 'X' in the appropriate box (0 = none, 10 = massive)*

<b>0</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>	<b>10</b>
										X

*Briefly explain the above score, with reference to the EMTF criteria*

The market for sustainable packaging as fuel is potentially huge the volume of waste in large and demands for energy are enormous. Waste cannot be reduced substantially in some areas (e.g. it is necessary to maintain product condition for the market) and so in future sustainable uses of waste must be found.

The scale of this market could be very large, and would build on recent increased waste separation and re-use/recycling activities. Some of the parts of the waste stream that cannot be re-used could be designed to use combustible waste, and would provide a steady flow of fuel. Packaging waste arises around the point of consumption which is also where the majority of demand for energy is located. Rather than transporting packaging materials and woodfuel separately from rural to urban areas, this change would mean that some of the fuel is processed and transported as packaging.

**5. What important characteristics of ecosystems and ES might be of relevance to this business opportunity?**

*Insert a score from 0 (irrelevant) to 10 (extremely relevant)*

Scale of externalities involved	Nature of market failures involved	Business' (& sectors') dependency on the ES involved, and costs and availability of substitutes	Opportunity costs related to ES provision	Nature of property rights over the ES or environmental assets underpinning them	Feasibility of managing the ES, and speed and predictability with which they respond to management	Capital costs of altering ES management and provision	Spatial and socio-economic distribution of ES beneficiaries (are they organised in coherent group that can take part in)	Spatial and economic distribution of ES providers	Spatial and temporal relationships between ES providers and beneficiaries	Nature of existing cultural, regulatory or market management structures
		<b>7</b>			<b>7</b>	<b>8</b>	<b>8</b>	<b>8</b>	<b>7</b>	<b>5</b>

*Briefly explain the above scores and to what extent these characteristics might affect the market potential*

The ability to generate materials that can be used to make combustible packaging is important. Then this material must be supplied to locations where goods are being packaged for distribution to point of sale. These relationships could work well in the food sector. Rural areas can be sources of wood/vegetation matter that can be used in packaging and also sources of food production.

**C. ECOSYSTEM POTENTIAL**

**6. How significant might this opportunity be for protecting/enhancing ecosystems, enhancing ES, enhancing goods derived from ES, and/or positively affecting drivers of ecosystem change?**

*Insert score(s) from 0 (no significance) to 10 (extremely significant)*

Drivers of (Ecosystem) Change	Ecosystems	Ecosystem Services	Goods derived from ES
<b>7</b>	<b>6</b>	<b>8</b>	<b>7</b>

*Briefly explain the above scores, provide page references to any relevant NEA evidence*

A major driver of negative change in British woodlands is lack of management. These ecosystems can be enhanced through better management. The productive service of materials provisioning could be considerable.

**7. To which UK ecosystems (broad habitats as per the NEA) is this opportunity of relevance?**

*Insert score(s) from 0 (irrelevant) to 10 (extremely relevant)*

Mountains, moorlands & heaths	Semi-natural grasslands	Enclosed farmland	Woodlands	Freshwaters - openwaters, wetlands, floodplains	Urban	Coastal	Marine
			10				

*Briefly explain the above scores in relation to state and trends of relevant habitats – provide page references to any relevant NEA evidence*

This is potentially a strong way to improve woodland management.

**8. To which ecosystem services are this opportunity of relevance?**

*Insert score(s) from 0 (irrelevant) to 10 (extremely relevant)*

Supporting	Regulating	Provisioning	Cultural
		10	6

*Briefly explain the above scores in relation to state and changes in relevant ES in the UK – provide page references to any relevant NEA evidence*

Packaging materials and fuel provision would be the main output from building on this market opportunity. Cultural services could also result – for example in more opportunities to enjoy woodland wildlife and tranquillity.

**9. To which drivers of change is this opportunity of relevance?**

*Insert score(s) from 0 (irrelevant) to 10 (extremely relevant)*

INDIRECT DRIVERS					DIRECT DRIVERS				
Demographic	Economic	Sociopolitical	Cultural and Behavioural	Scientific and Technological	Habitat Change	Pollution & Nutrient Enrichment	Overexploitation of Resources	Climate Variability & Change	Invasive Species
			7	9	6			7	

*Briefly explain the above scores in relation to drivers of ecosystem change in the UK - provide page references to any relevant NEA evidence*

Many people wish to have a more pleasant and sustainable source of heat and this is leading to a cultural preference toward more wood burning. A key factor is the technological development of effective packaging materials that fit with standards for combustible material. At the same time climate change and energy security objectives would be advanced.

**10. For the ecosystems, ES and drivers of change of ecosystems of which countries (England, Northern Ireland, Scotland, Wales) is this opportunity relevant?**

*Insert score(s) from 0 (irrelevant) to 10 (extremely relevant)*

England	Northern Ireland	Scotland	Wales
8	7	7	7

*Briefly explain the above scores – provide page references to any relevant NEA evidence*

More relevant in England because it has a relatively smaller areas of woodland that is remote from where goods are supplied to consumers.

**11. Does this opportunity have international significance (for UK business, beyond the UK)?**

*Briefly explain the market and ecosystems potential beyond the UK*

Yes, the design and process ideas could be exported.

## D. SECTOR RELEVANCE

### 12. What sectors is the business opportunity of relevance to, on a scale of 0 (no relevance) to 10 (very relevant)?

*Insert score(s) from 0 (irrelevant) to 10 (extremely relevant)*

Agriculture	Forestry	Fishing	Mining & Quarrying	Food Manufacture	Pharmaceuticals	Other manufacturing	Energy	Water, Waste Water	Construction	Transport	Tourism & Recreation	Wholesale & Retail	Creative, Media & Marketing	Financial Services	Public Administration	Education
	10						10									

*Briefly explain the above scores*

Self explanatory.

## E. ENABLING ACTIONS

### 13. What kinds of enabling actions are of relevance to this business opportunity?

*Insert score(s) from 0 (irrelevant) to 10 (extremely relevant)*

FOUND-ATIONAL	ENABLING			INSTRUMENTAL		
Knowledge	Legislation	Policies, Institutions & Governance	Changing Social Attitudes	Markets & Incentives	Technologies & Practices	Voluntary Actions, Education & Awareness
10		8	7	7	9	5

*Briefly explain the above scores, describing the actions needed, by whom (government, business, other) and what constraints, if any, these actions are designed to overcome*

Building market knowledge is essential, in relation to technological development of suitable materials that can be sourced from UK woodland. Governance can help by defining materials standards (like end of waste standards) that are important for market activity in waste management.

## **F. FURTHER WORK TO BE DONE**

### **14. What further research work might be required to explore the market and ecosystems potential of this opportunity and the required enabling actions?**

*Briefly explain*

Some input based on technological knowledge of how plant materials can be used to produce packaging, and the qualities of these materials as fuels. Exploration of symbiosis pilot linking a small number of businesses using large volumes of packaging to incinerators for energy generation

## 2 OFFSETTING

### *T2.1 Biodiversity offsets, including through conservation banking*

#### SUMMARY

The opportunity is to stimulate the creation of a range of new companies and new business models for existing companies (or non-profit organisations) to provide biodiversity offsets in the UK.

This is essentially creating a new market, since (a) offsets are presently optional and are only just starting to happen in the UK, and (b) they are not delivered to an agreed standard by conservation banking companies or any other entities that can meet the standard.

An important part of this opportunity is that a set of new, small and medium-sized enterprises (including individual farmers) would evolve to meet a clear demand for offsets in the UK (which will require regulatory stimulus and clarity, as below).

In addition, this new market would create business opportunities for a range of supporting service providers, including: environmental consultants (to advise developers on application of the mitigation hierarchy to minimise their offset needs and to design offsets); one or more independent broker(s) to match developers needing offsets with conservation banking companies and other potential suppliers of offsets; registry/ies to record offsets to provide legal certainty and ensure that 'credits' are not sold twice to different developers; certifiers to monitor delivery of offsets either through bespoke arrangements or through conservation banks; and financial services ranging from loans to start conservation banks to insurance products.

Current estimates include that for housing development alone (on the basis of 250,000 houses being required annually), a conservation banking market would generate GBP 50-300 million per annum in credits. (Source: pers.comm. Tom Tew, The Environment Bank.) (Annual markets for biodiversity offsets aggregated globally are now in the order of US\$3bn, with projections to 2020 for mandatory offsets to reach over \$10bn. Source: Ecosystem Marketplace and TEEB.)

The potential for marine, aquatic and terrestrial ecosystems is considerable, since offsets are based on delivering 'no net loss' on a 'like for like or better' basis. This goes beyond current UK requirements and practice, and would result in developers taking responsibility for rectifying their footprints and contributing additional funding to deliver measurable conservation outcomes. The ecosystems that would benefit are those which are suffering impacts from development projects. Ecosystem gain would include significant contributions to conservation investments in the UK, greater connectivity, avoided fragmentation, and landscape level planning to avoid impacts on high conservation value areas and to devote offset investments to these areas.

This approach is most relevant to sectors with significant residual impacts on habitat, such as aggregates, mining, house building, infrastructure development, port development, etc.

The principal enabling action that is required is regulation or unambiguous policy interpretation by government that clarifies that biodiversity offsets are necessary in defined circumstances, and that establishes a framework for implementation to a particular standard, including through conservation banks. A further enabling action would be support for a brokering system which can provide national, regional and local choice against desired spatial delivery, and can provide transparency and ease of purchase of credits and management of contracts with those providing offset sites, all of which would reduce risk.

Further research necessary: basis for defining biodiversity credits; definition of standards for conservation banks and individuals/organisations supplying offsets; specific policy intervention(s) needed to stimulate a viable market for offsets such as a requirement for all local planning authorities to deploy offsetting with appropriate legal documentation linked to the planning permission.

## A. DESCRIPTION OF THE OPPORTUNITY

### 1. What is the business opportunity?

*Provide a brief description*

The creation of a range of new companies and new business models for existing companies (or non-profit organisations) to provide biodiversity offsets in the UK, stimulated by unambiguous requirements. A set of new, small and medium-sized enterprises (including individual farmers) would evolve to meet a clear demand for offsets in the UK (which will require regulatory stimulus and clarity, as below).

In addition, this new market would create business opportunities for a range of supporting service providers, including: environmental consultants (to advise developers on application of the mitigation hierarchy to minimise their offset needs and to design offsets); one or more independent brokers to match developers needing offsets with conservation banking companies and other potential suppliers of offsets; registry/ies to record offsets to provide legal certainty and ensure that 'credits' are not sold twice to different developers; certifiers to monitor delivery of offsets either through bespoke arrangements or through conservation banks; and financial services ranging from loans to start conservation banks to insurance products. One model that might reduce risk in the system would be for the broker to hold a contract with the offset provider and to manage delivery for a fixed term period.

### 2. Does this opportunity relate to new markets or greening of existing markets (or both)?

*Provide a brief explanation*

Although Defra has an approach to biodiversity offsets<sup>2</sup> and half a dozen voluntary pilot projects with local authorities are starting now<sup>3</sup>, the opportunity described in this

<sup>2</sup> <http://www.defra.gov.uk/environment/natural/biodiversity/uk/offsetting/>

document is essentially creating a new market, since (a) offsets are presently optional and are only just starting to happen in the UK, and (b) they are not delivered to an agreed standard by conservation banking companies or any other entities that can meet the standard. Movement from a currently voluntary approach, to a mandatory approach, would have minimal effect on the economics of development but would stimulate investment through a market for offsets. Under a voluntary regime, a market will be extremely difficult to establish, slow to grow and will create an inconsistent, uncertain and unlevel level playing field for developments.

**3. What type of market opportunity or type of instrument/intervention does this business opportunity involve?**

*Insert an 'X' in the relevant box*

Product markets	Offsetting	Payments for ecosystem services	Environmental technologies	Markets for cultural services	Financial and legal services	Ecosystem knowledge economy	Corporate ecosystem initiatives	Eco-taxes, charges, levies, subsidies, grants	Other
	X				X				

*Briefly explain the 'type' classification of the business opportunity*

The proposal is for the systematic and consistent delivery of biodiversity offsets throughout the UK. In addition to business opportunities arising from the provision of the offsets themselves (e.g. agreed conservation actions on land), there are opportunities for the providers of associated financial and legal services.

**B. MARKET POTENTIAL**

**4. What is the market potential for this business opportunity with reference to the EMTF criteria?**

*Insert an 'X' in the appropriate box (0 = none, 10 = massive)*

0	1	2	3	4	5	6	7	8	9	10
									X	

*Briefly explain the above score, with reference to the EMTF criteria*

**Ability to tackle risk facing the business:** Developers have complained for over 10 years that they are unable to anticipate the likelihood of success of planning

<sup>3</sup> <http://www.defra.gov.uk/environment/natural/biodiversity/uk/offsetting/pilots/>

applications, nor the costs of social and environmental conditions of operation. Removing the present ambiguity<sup>4</sup> concerning biodiversity mitigation would alleviate uncertainty and financially material risk for the companies concerned. It would also remove the risk facing small and medium sized enterprises which currently have no clarity as to demand for their services in providing offsets, thus stimulating a market to deliver stable and long-term conservation outcomes

**Potential demand underpinning the opportunity:** Provided the current ambiguity surrounding the need for offsets was removed, there would be considerable demand for them for all projects resulting in a significant residual impact on biodiversity after avoidance and minimisation measures had been taken. Early estimates of the demand of the UK housing industry suggest an annual demand of some £50-300 million per annum and to this can be added demand by other sectors affecting habitat (aggregates, oil and gas, wind, hydro, transport, infrastructure, commercial property development, ports, etc.) Analyses by The Environment Bank Ltd (pers.com.) using development areas published by DCLG, estimate a market that could provide up to £1.2bn per annum. Impacts on a range of ecosystem services such as water quality and quantity, carbon storage, flood risk mitigation and even nutrients, could be captured and offset by a variant of the biodiversity offset protocol once developed. Investment into the natural environment would then be substantial. Companies could offset their business impacts locally, regionally and nationally, and the investment would support the green growth agenda and jobs, especially in rural areas.

**Scalability and transferability of good practice:** The opportunity is scalable in several ways. First, if a clearer requirement for offsets (i.e. mandatory offsetting) were introduced for particular categories of project (for instance, by significance of impact, by country or by sector), this could later be scaled up by applying to other categories. Second, the conservation outcomes are scalable, in that aggregated offsets and banking allow for larger areas to be conserved as offsets for multiple projects. In addition, the clearer guidance needed to establish consistent, high quality offsets would help transfer good practice, as would documented experience with offset projects.

**Feasibility of overcoming any barriers:** The principal barrier is the lack of clear policy direction requiring offsets. This is a question of political will. It is perfectly feasible and simple to overcome this particular barrier if to do so is a priority for government. Offsets are not without other challenges. For instance, there are technical challenges, such as settling on appropriate metrics (though government has developed one approach to support offsetting), spatial challenges, such as ensuring there are adequate offset sites, and social challenges, such as incentivising companies,

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<sup>4</sup> A new National Planning Policy Framework issued in March 2012 by the Department for Communities and Local Government. Currently, there is a great deal of uncertainty as to its meaning and how it will be implemented. (See for example BBC Radio 4 'Unreliable Evidence' 20:00 Wednesday, 11th April, IEMA correspondence with members, etc.) It appears that the NPPF has eliminated former Planning Policy Statement 9: Biodiversity and Geological Conservation (<http://www.communities.gov.uk/documents/planningandbuilding/pdf/147408.pdf>) which sets out planning policies on protection of biodiversity and geological conservation through the planning system

communities and landowners to provide offsets (though appropriate pricing of the offsets, set by the market, which would be much quicker to develop and grow under a mandatory approach, and which would incentivise landowners and farmers). These challenges have been met and overcome in a number of other OECD countries, and the UK can learn from this experience.

**Strength of underpinning evidence:** Evidence commissioned by Defra in 2009 and subsequently received by Defra during its consultation on biodiversity offsets provides some evidence, as does experience from overseas. Informal evidence received from members of this study team who have worked in this field interviewing UK stakeholders for many years can add to this. There has not yet been any study that has quantified what the market would be were the government to introduce mandatory offsetting; however, TEEB estimated that mandatory offsets would be worth 100 times the value of voluntary offsets because of the market stimulation that a mandatory approach would generate.

**Potential role for SMEs:** The most likely implementers of biodiversity offsets and conservation banking and related support services are SMEs (ranging from individual farmers to companies set up to establish conservation banks throughout the country, environmental consultancies, etc.) Broker(s) could integrate the delivery and hold contracts with offset providers, thereby reducing delivery risk.

**Short-term payback potential:** Business transactions would start as soon as the market signals creating demand for offsets were clear. Offset opportunities would start once the policy was introduced and providers could be in business from there on. Other countries have developed offset business opportunities within the year of policy requirements. In addition, the entire system can be run on a cost-recovery basis so it is revenue neutral for government.

**Job creation potential:** Many jobs could be created in offset design, implementation and monitoring. Business opportunities in offset design include advising developers on application of the mitigation hierarchy (i.e. avoidance of high priority habitats, minimisation activities, on-site restoration) as well as the loss-gain calculations, offset site selection, and definition of offset activities and implementing organisations. Offset implementation would create jobs in conservation, rehabilitation, restoration and monitoring. In addition, a number of businesses would provide legal, accountancy, registry and financial services.

**Long-term potential for competitive UK advantage:** This approach would lead to a competitive, sustainable economy, since needed development could proceed, internalising environmental costs and removing uncertainty and risk currently faced by developers. The Environment Bank has been consulting widely within the development sectors and has concluded that there is general consensus that offsetting would lead to greater transparency, clarity, certainty, reduced programme timing costs, a less adversarial planning system and greater net developable areas. Further to the benefits to the economy from these domestic activities, the expertise on mitigation, including biodiversity offsets and conservation banking as a method of implementing them would provide business opportunities for advisory services in the growing international biodiversity offset marketplace.

**5. What important characteristics of ecosystems and ES might be of relevance to this business opportunity?**

*Insert a score from 0 (irrelevant) to 10 (extremely relevant)*

Scale of externalities involved	Nature of market failures involved	Business' (& sectors') dependency on the ES involved, and costs and availability of substitutes	Opportunity costs related to ES provision	Nature of property rights over the ES or environmental assets underpinning them	Feasibility of managing the ES, and speed and predictability with which they respond to management	Capital costs of altering ES management and provision	Spatial and socio-economic distribution of ES beneficiaries (are they organised in coherent group that can take part in)	Spatial and economic distribution of ES providers	Spatial and temporal relationships between ES providers and beneficiaries	Nature of existing cultural, regulatory or market management structures
<b>9</b>	<b>9</b>	<b>8</b>	<b>7</b>	<b>9</b>	<b>8</b>	<b>9</b>	<b>9</b>	<b>9</b>	<b>9</b>	<b>7</b>

*Briefly explain the above scores and to what extent these characteristics might affect the market potential*

<p><b>Scale of externalities involved:</b> Presently, the externalities are very high, since projects are entitled to go ahead with coarse filter requirements to avoid impacts only in the most sensitive areas and no requirement to 'make good' the residual impacts after avoidance and minimisation. Cumulatively, this has led to significant residual impacts and continues to do so. This is sometimes characterised as the 'death by 1000 cuts' nature of biodiversity loss in the UK. There are also significant externalities in terms of loss to development of sites with low perceived, but high potential, biodiversity value, such as arable land. These externalities can be captured by offsetting involving 'trading up' to a higher quality habitat.</p> <p><b>Nature of market failures involved:</b> High, for the reasons explained above. With no incentive for landowners and farmers to put land into restoration schemes, there is no market to provide sites. Developers could pay for offset credits through deductions from the residual land value of development land (which has high uplift in value when planning permissions are obtained) so a market based approach could enable the costs of offsetting to be absorbed through changes in residual land values.</p> <p><b>Business' (&amp; sectors') dependency on the ES involved, and costs and availability of substitutes:</b> The companies and sectors needing access to land for development in the UK (whether house builders, aggregates companies or ports) and government backed developments (e.g. infrastructure provision) are utterly dependent on securing development rights on specific parcels. Some developers may have possible substitutes (e.g. relocating to a lower biodiversity priority area), but others (e.g. ports and extractives) may have little choice. In terms of policy substitutes, there either are, or there are not, requirements for developers to take responsibility for their</p>
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biodiversity footprint. However, there are a number of different ways in which such requirements could be fulfilled.

**Opportunity costs related to ES provision:** SMEs or other landowners or land managers providing biodiversity offsets face opportunity costs relative to other productive land uses. However, many land-owners/managers with high conservation value land suitable for offsets could face constraints in seeking alternative productive land uses (e.g. planning permission for building on the land may not be granted). Consequently, to be attractive to offset providers, offset income must be competitive with allowable alternatives (such as farming, or purely passive management of woodland etc). History from other countries suggests that offset provision can be competitive with alternatives, and sometimes not mutually exclusive, so that the land-owner/manager could enjoy offset income and other (e.g. agricultural) income. A market based mechanism, e.g. delivery of habitat conservation and land restoration for ecosystem service provision, would incentivise landowners to bring forward more land for that purpose. At present, under S106 rules developers may provide funds to the local authority to 'mitigate' impacts, but there is limited or no enforcement, the mitigation rarely gets delivered, the pricing structure is inadequate and the system is effectively a voluntary, philanthropic contribution.

**Nature of property rights over the ES or environmental assets underpinning them:** UK land law, with provision for covenants and easements that run with the land, as well as contract and other mechanisms allow clear property rights over the environmental assets in question (land and associated biodiversity). While covenants can be an important tool for offsets, it will be important to ensure that land where offsets may take place are not encumbered by covenants that run counter to the offset activities and purpose.

**Feasibility of managing the ES, and speed and predictability with which they respond to management:** This depends on the specific biotope in question and its regional context, but the breadth of potential offset interventions (ranging from restoration activities to the aversion of risk), allow for a range of ways in which ecosystems can respond relatively rapidly to qualifying interventions. In addition, the conservation banking approach allows the ecosystem response to be underway prior to the impact to be offset, enabling conservation outcomes to be at least partially 'banked' in advance. With conservation banking, loans or private capital can be invested in creation and restoration of land in anticipation of the requirement for developers to purchase offset credits. In a voluntary market, this is unlikely to occur as there is a lack of certainty of demand. In a mandatory market, offset providers can borrow against the predicted demand. Only under a mandatory scenario is it likely that offsets will be provided prior to development being undertaken (and thus avoiding temporal loss). Under voluntary approaches, offsets are developed once the development is underway, so there is a lag between the loss of biodiversity from the development site and the gain in biodiversity on the offset site.

**Capital costs of altering ES management and provision:** These vary according to the specific offset intervention, but can range from fairly passive management (e.g. allowing an ecosystem to regenerate or evolve naturally) through more active interventions (e.g. positive restoration measures on land already owned by the offset provide), to purchase of the land as well as conservation management. In the UK it is

unlikely that land purchase will be a predominant mechanism as farmers and other landowners will wish to maintain ownership of their land as a heritage asset. A more viable mechanism for delivery is likely to be contracts and covenants covering payment for the delivery of restoration and conservation management of land such as farmland. Under this mechanism, title to the land is not transferred. Brokers can help identify offset sites and landowners prepared to enter into such arrangements.

**Spatial and socio-economic distribution of ES beneficiaries (are they organised in coherent group that can take part in transactions?)** The ecosystem service beneficiaries in this case include the developer (meeting its requirements) and the UK public broadly (gaining from the offset since it maintains biodiversity in the face of development). Another beneficiary is the provider of offsets (paid for conservation outputs). Offset policy requires 'like for like or better' conservation outcomes and should also ensure local people are left no worse off as a result of the project and offset, so offset providers tend to be in the same area as the development project.

**Spatial and economic distribution of ES providers:** Biodiversity offsets need to be ecologically equivalent to the impacts they address, so will be distributed according to the extent of biotopes. Their providers will be distributed according to where such demand can be met, and where the economic drivers for offsets (i.e. pressures for development whose residual impacts need offsets) are distributed. There are a number of spatial aspirational plans in the UK which can help focus where it would be particularly beneficial to provide offsets; these include Nature Improvement Areas, Living Landscapes and Integrated Biodiversity Delivery Areas etc.

**Spatial and temporal relationships between ES providers and beneficiaries:** Spatial relationships are explained in the preceding bullet points. Temporal relationships depend on whether conservation banking is established as a basis for implementing offsets, in which case some of the biodiversity and ecosystem outcomes can be accomplished prior to the impacts they will meet. Experience in most countries is that offsets should endure at least as long as the impacts themselves, and preferably in perpetuity. This can thus either be a long-term management obligation of the developer itself (or those organisations to which it delegates implementation), or liability can be transferred to a conservation bank or other third party. Most contracts with offset providers are structured in two phases: an active management phase, usually for 10-15 years depending on the response time of the particular ecosystem, and then an enduring maintenance requirement which runs for many decades or in perpetuity.

**Nature of existing cultural, regulatory or market management structures:** A variety of regulatory provisions at the EU, national UK, and local authority discretionary levels exist within the UK. Save for species and habitats designated under EU Directives (especially the Birds and Habitats Directives), currently offsets are a purely voluntary option in the UK<sup>5</sup>. Much of the underlying UK law lends itself to delivering market management structures needed for the delivery of biodiversity offsets, including through conservation banking. Culturally, the concept of 'polluter pays' and

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<sup>5</sup> While the implications of the National Planning Policy Framework are yet to emerge (see Footnote 5), it appears that PPS9, which set out government's 'Biodiversity Duty' is no longer in effect.

'compensation' is familiar to UK stakeholders. 'Trading' in biodiversity would undoubtedly be new, and people can often mistrust biodiversity offsets, as they do with carbon offsets. However, when they see that the goal of 'no net loss' involves more investment in the avoidance, minimisation, restoration and tackling of residual impacts than currently takes place, they are often in favour.

### C. ECOSYSTEM POTENTIAL

#### 6. How significant might this opportunity be for protecting/enhancing ecosystems, enhancing ES, enhancing goods derived from ES, and/or positively affecting drivers of ecosystem change?

*Insert score(s) from 0 (no significance) to 10 (extremely significant)*

Drivers of (Ecosystem) Change	Ecosystems	Ecosystem Services	Goods derived from ES
9	9	7	6

*Briefly explain the above scores, provide page references to any relevant NEA evidence*

Habitat transformation and fragmentation is a major driver of ecosystem change, as evidenced throughout the NEA. Biodiversity offsets can and should apply to all ecosystems, including terrestrial and marine. Biodiversity offsets result in improved ecosystem services, although it is biodiversity itself (at the species, communities/assemblages and ecosystem levels, and incorporate existing, socioeconomic and cultural values) which offsets tackle, rather than just the services they provide. Good offsets are designed to address ecological function and process, and some offset methods quantify biodiversity-related ecosystem services (e.g. recreation).

#### 7. To which UK ecosystems (broad habitats as per the NEA) is this opportunity of relevance?

*Insert score(s) from 0 (irrelevant) to 10 (extremely relevant)*

Mountains, moorlands & heaths	Semi-natural grasslands	Enclosed farmland	Woodlands	Freshwaters - openwaters, wetlands, floodplains	Urban	Coastal	Marine
10	10	10	10	10	4	10	10

Briefly explain the above scores in relation to state and trends of relevant habitats – provide page references to any relevant NEA evidence

As described above, biodiversity offsets can and should be applied to residual impacts in all habitats.

**8. To which ecosystem services are this opportunity of relevance?**

Insert score(s) from 0 (irrelevant) to 10 (extremely relevant)

Supporting	Regulating	Provisioning	Cultural
10	10	8	9

Briefly explain the above scores in relation to state and changes in relevant ES in the UK – provide page references to any relevant NEA evidence

Biodiversity offsets are designed to ensure no net loss of biodiversity at the species, communities/assemblages and ecosystem levels, and incorporate existing, socioeconomic and cultural values. In a developed country such as the UK, biodiversity offsets are likely to address structure, function and persistence of biodiversity (most closely associated with supporting and regulating services) a little more than they are to make good losses in provisioning services (e.g. loss of access to firewood or medicinal plants), but measures that address cultural values (e.g. sense of place, recreational and spiritual values – whether associated with dog walking or general health and well-being) are of great importance to UK stakeholders, and can be addressed in biodiversity offsets .

**9. To which drivers of change is this opportunity of relevance?**

Insert score(s) from 0 (irrelevant) to 10 (extremely relevant)

INDIRECT DRIVERS					DIRECT DRIVERS				
Demographic	Economic	Sociopolitical	Cultural and Behavioural	Scientific and Technological	Habitat Change	Pollution & Nutrient Enrichment	Overexploitation of Resources	Climate Variability & Change	Invasive Species
8	10	8	5	5	10				

*Briefly explain the above scores in relation to drivers of ecosystem change in the UK - provide page references to any relevant NEA evidence*

Demographic changes (e.g. population growth and smaller household sizes) drive more house building in rural areas, affecting biodiversity. Economic development (e.g. new houses, mines, roads, railways, ports, etc) drives habitat conversion, leading to direct, indirect and cumulative losses of biodiversity. People's aspirations (for country houses) and consumption patterns (e.g. of peat and agricultural produce) also place pressures on UK biodiversity. Scientific and technological changes are associated with greater mobility, consumption and other pressures on biodiversity. Habitat change is perhaps the most direct and greatest driver of biodiversity loss to which biodiversity offsets can respond.

**10. For the ecosystems, ES and drivers of change of ecosystems of which countries (England, Northern Ireland, Scotland, Wales) is this opportunity relevant?**

*Insert score(s) from 0 (irrelevant) to 10 (extremely relevant)*

England	Northern Ireland	Scotland	Wales
10	10	10	10

*Briefly explain the above scores – provide page references to any relevant NEA evidence*

Biodiversity offsets are equally applicable to all countries in the UK.

**11. Does this opportunity have international significance (for UK business, beyond the UK)?**

*Briefly explain the market and ecosystems potential beyond the UK*

Yes. This opportunity has international significance, for instance: helping the UK meeting the Aichi Targets of the Convention on Biological Diversity; helping the UK implement the EU's biodiversity strategy to 2020 (and within this, contributing to the EU No Net Loss Initiative due in 2015).

## D. SECTOR RELEVANCE

### 12. What sectors is the business opportunity of relevance to, on a scale of 0 (no relevance) to 10 (very relevant)?

*Insert score(s) from 0 (irrelevant) to 10 (extremely relevant)*

Agriculture	Forestry	Fishing	Mining & Quarrying	Food Manufacture	Pharmaceuticals	Other manufacturing	Energy	Water, Waste Water	Construction	Transport	Tourism & Recreation	Wholesale & Retail	Creative, Media & Marketing	Financial Services	Public Administration	Education
10	10	8	10	7	0	0	10	7	10	8	7	4	3	8	10	7

*Briefly explain the above scores*

Mining & Quarrying (10), Energy (10) and Construction (10) are the sectors whose impacts on biodiversity are best addressed by applying the mitigation hierarchy, including biodiversity offsets. The most straightforward application of offsets and conservation banking is likely to be with these sectors. Transport (8) is another key sector, as biodiversity offsets under development for projects like HS2 show. However, these are public sector developments and would require political will from government that public developments would need to internalise the costs of offsets just as private developments should.

Agriculture (10) and Forestry (10) are ranked high since the forestry sector may be able to supply biodiversity offsets, although they are unlikely to have a demand for offsets related to their land use.

Fishing (8) is a sector where 'no net loss' policies have been applied in other countries (e.g. Canada) and could be considered in the UK.

Offsets are relevant to the Food Manufacture (7) sector as supply chain offsets may be envisaged, so that food manufacturers and retailers would need to demonstrate biodiversity was taken into consideration in order to access certain markets and as a result of consumer demand.

Water and Waste Water (7) sectors may need biodiversity offsets to address their footprints (demand side) and may be able to generate offset credits on their land. The utilities have experience in the UK with voluntary biodiversity offsets. The development of tourism infrastructure (Tourism & Recreation (7)) may need offsets, and the tourism sector may be able to work with land-owners/managers to generate conservation credits to boost their revenue streams and enhance the tourism experience for customers.

A variety of financial products, from loans to insurance, may be in demand for the offsets market, creating opportunities for the Financial Services (8) sector.

All offset systems that involve markets need a level of Public Administration (10), and

offer a variety of roles for government in biodiversity offsets (including as purchaser, vendor, regulator, and in some countries, even broker).

Education (7) may benefit since there is a knowledge economy supporting offsets. University departments can provide the biodiversity data and methodologies needed for offset design and monitoring, and implementation of biodiversity offsets in the UK will stimulate training needs in a variety of sectors (e.g. environmental impact assessment, offset design and implementation, and administration).

Wholesale & Retail (4) and Creative, Media & Marketing (3) are scored low since these sectors may need offsets for infrastructure development (covered under 'Construction') or could be service providers to the offset industry, but this is unlikely to be a financially material growth area for them. If offsets are expanded to address impacts through supply chains, they are likely to become more relevant for the wholesale and retail sectors.

There is no immediate link between Pharmaceuticals (0) and Other manufacturing (0) and biodiversity offsets, unless those sectors are undertaking construction for which they would need offsets.

## E. ENABLING ACTIONS

### 13. What kinds of enabling actions are of relevance to this business opportunity?

*Insert score(s) from 0 (irrelevant) to 10 (extremely relevant)*

FOUND- ATIONAL	ENABLING			INSTRUMENTAL		
Knowledge	Legislation	Policies, Institutions & Governance	Changing Social Attitudes	Markets & Incentives	Technologies & Practices	Voluntary Actions, Education & Awareness
8	10	10	6	10	7	5

*Briefly explain the above scores, describing the actions needed, by whom (government, business, other) and what constraints, if any, these actions are designed to overcome*

An unambiguous and clear requirement for offsets (and no net loss – or preferably net gain) and provision for conservation banking as a means to implement offsets, is vital if the mechanism is to make a contribution of any scale to biodiversity conservation and business opportunity in the UK. This will require a level of policy, supporting institutions and governance. One of the most efficient forms of delivery is likely to be a market-based approach such as conservation banking. Offset design, implementation and administration requires a certain level of knowledge and understanding, ranging from adequate biodiversity data to suitable methodologies for assessing and designing offsets. While voluntary actions (on the part of local authorities or of developers) may in a few circumstances lead to offsets, a clearer

policy framework will be needed for an offset system to make any significant contribution to sustainable development in the UK. This may require a change in attitude among certain developers and members of the public, who may either not see the reasons for going beyond current voluntary practice or the merits of using market based approaches to biodiversity conservation.

If there were a requirement on the part of government for local authorities to follow the mitigation hierarchy and ultimately use offsets to address significant residual impacts to achieve no net loss or preferably a net gain, then developers would factor this into their cost structures and land values. This approach is important to the UK, because if we do not internalise these costs needed to address these impacts, unsustainable cumulative losses of biodiversity and ecosystem services will continue, and the cost of remediating them in the future (if this were even possible) would be proportionately higher and have a more significant negative impact on GDP. The public are very concerned about the loss of natural capital and habitats caused by development in the densely developed UK and would support a mandatory approach that allows needed development on the condition that it plans for no net loss or a net gain.

## **F. FURTHER WORK TO BE DONE**

### **14. What further research work might be required to explore the market and ecosystems potential of this opportunity and the required enabling actions?**

*Briefly explain*

A study of the potential scale and nature of demand for biodiversity offsets if they were to be required under a couple of scenarios would help establish the specific nature and extent of business opportunities. A comparative analysis of the market for offsetting under a mandatory (vs a voluntary) regime would be important. A project to gather experience of the legal and institutional documentation needed for offset implementation (such as Biodiversity Offset Management Plans, Land Management Agreements, Conservation Banking Agreements etc) should be undertaken, drawing on experience internationally and the work of the Environment Bank in the UK. Specific work might be done on the necessary legal form of wording to require offsets in Section 106 agreements.

A study of the current policy framework (since the advent of the NPPF and Localism Act 2011) and experience to date with Defra's voluntary pilot projects would help refine the required enabling actions.

## **T2.2 Soil carbon enhancement via changed grazing practices**

### **SUMMARY**

The Savory Institute has set out 'holistic management' methods whereby livestock can be managed in ways that enhance soil carbon and biodiversity. See for example <http://www.savoryinstitute.com/holistic-management/>. While the approaches used so far have been in the tropics, there is potential in temperate regions too. By increasing soil carbon, benefits for water supply can also be achieved.

### **A. DESCRIPTION OF THE OPPORTUNITY**

#### **1. What is the business opportunity?**

*Provide a brief description*

Livestock-based products are under increasing pressure from carbon and wildlife perspectives. Market access might be improved for companies supplying products with better carbon and biodiversity credentials.

#### **2. Does this opportunity relate to new markets or greening of existing markets (or both)?**

*Provide a brief explanation*

Potentially it is both. Manufacturers of products using dairy and livestock supplies can help meet their own and official carbon reduction targets. This might be geared into voluntary and perhaps official carbon markets. In addition there would be benefits in greening sectors presently being criticised for being high carbon and poor for biodiversity. The reputational benefits could be considerable. There could also be benefits for water supply and potential opportunities for collaboration with water utilities.

**3. What type of market opportunity or type of instrument/intervention does this business opportunity involve?**

*Insert an 'X' in the relevant box*

Product markets	Offsetting	Payments for ecosystem services	Environmental technologies	Markets for cultural services	Financial and legal services	Ecosystem knowledge economy	Corporate ecosystem initiatives	Eco-taxes, charges, levies, subsidies, grants	Other
X	X	X							

*Briefly explain the 'type' classification of the business opportunity*

Low carbon dairy products could produce a product marketing opportunity. A 'by-product' in the form of increased biodiversity could similarly help to 'green' what are increasingly criticised market segments.

Increased carbon in soil could be claimed as a legitimate offset against other aspects of the product cycle – for example in the manufacturing and transport of product

Changed management of soils under livestock might attract payments from, e.g., water utilities.

All of the above would depend on more research and development, but it does seem that opportunities do exist.

**B. MARKET POTENTIAL**

**4. What is the market potential for this business opportunity with reference to the EMTF criteria?**

*Insert an 'X' in the appropriate box (0 = none, 10 = massive)*

0	1	2	3	4	5	6	7	8	9	10
							X			

*Briefly explain the above score, with reference to the EMTF criteria*

There is a potential to achieve quick benefits for carbon, water and biodiversity, in some places at least. There are some good opportunities for SMEs and for building value in supply chains. For example Danone and Nestle would find advantage in the market and in so doing create value for small farming enterprises. There is considerable scope for innovation and proving of concept.

**5. What important characteristics of ecosystems and ES might be of relevance to this business opportunity?**

*Insert a score from 0 (irrelevant) to 10 (extremely relevant)*

Scale of externalities involved	Nature of market failures involved	Business' (& sectors') dependency on the ES involved, and costs and availability of substitutes	Opportunity costs related to ES provision	Nature of property rights over the ES or environmental assets underpinning them	Feasibility of managing the ES, and speed and predictability with which they respond to management	Capital costs of altering ES management and provision	Spatial and socio-economic distribution of ES beneficiaries (are they organised in coherent group that can take part in)	Spatial and economic distribution of ES providers	Spatial and temporal relationships between ES providers and beneficiaries	Nature of existing cultural, regulatory or market management structures
<b>8</b>	<b>8</b>	<b>7</b>	<b>5</b>	<b>6</b>	<b>6</b>	<b>3</b>	<b>6</b>	<b>7</b>	<b>7</b>	<b>5</b>

*Briefly explain the above scores and to what extent these characteristics might affect the market potential*

To be developed...

**C. ECOSYSTEM POTENTIAL**

**6. How significant might this opportunity be for protecting/enhancing ecosystems, enhancing ES, enhancing goods derived from ES, and/or positively affecting drivers of ecosystem change?**

*Insert score(s) from 0 (no significance) to 10 (extremely significant)*

Drivers of (Ecosystem) Change	Ecosystems	Ecosystem Services	Goods derived from ES
<b>4</b>	<b>7</b>	<b>7</b>	<b>4</b>

*Briefly explain the above scores, provide page references to any relevant NEA evidence*

A driver that might be affected is the extent to which livestock affect freshwater. Ecosystems in the form of grasslands could be enhanced, so could their ability to deliver carbon and water services. Goods derived from the ES are as before, in the form of dairy and livestock, only now with several ecosystem benefits.

**7. To which UK ecosystems (broad habitats as per the NEA) is this opportunity of relevance?**

*Insert score(s) from 0 (irrelevant) to 10 (extremely relevant)*

Mountains, moorlands & heaths	Semi-natural grasslands	Enclosed farmland	Woodlands	Freshwaters - openwaters, wetlands, floodplains	Urban	Coastal	Marine
6	9	8		9			

*Briefly explain the above scores in relation to state and trends of relevant habitats – provide page references to any relevant NEA evidence*

Many areas in the above broad habitat types are grazed and could benefit from altered grazing practices.

**8. To which ecosystem services are this opportunity of relevance?**

*Insert score(s) from 0 (irrelevant) to 10 (extremely relevant)*

<b>Supporting</b>	<b>Regulating</b>	<b>Provisioning</b>	<b>Cultural</b>
<b>7</b>	<b>9</b>	<b>4</b>	<b>3</b>

*Briefly explain the above scores in relation to state and changes in relevant ES in the UK – provide page references to any relevant NEA evidence*

Soil health is a major supporting service. There is considerable opportunity to enhance regulating services in the form of carbon and water. Provisioning services in the form of food production remain. There would be potential to build synergy in keeping cultural services (landscape appearance) intact.

**9. To which drivers of change is this opportunity of relevance?**

*Insert score(s) from 0 (irrelevant) to 10 (extremely relevant)*

INDIRECT DRIVERS					DIRECT DRIVERS				
Demographic	Economic	Sociopolitical	Cultural and Behavioural	Scientific and Technological	Habitat Change	Pollution & Nutrient Enrichment	Overexploitation of Resources	Climate Variability & Change	Invasive Species
						6		8	

*Briefly explain the above scores in relation to drivers of ecosystem change in the UK - provide page references to any relevant NEA evidence*

The enhancement of soil carbon can mitigate climate changing emissions while rendering soils more resilient to the impacts of climate change (water retention up, erosion down, for example). There might also be opportunities to simultaneously reduce run off of nutrients to water courses.

**10. For the ecosystems, ES and drivers of change of ecosystems of which countries (England, Northern Ireland, Scotland, Wales) is this opportunity relevant?**

*Insert score(s) from 0 (irrelevant) to 10 (extremely relevant)*

England	Northern Ireland	Scotland	Wales
6	7	7	9

*Briefly explain the above scores – provide page references to any relevant NEA evidence*

Changed livestock management to enhance water and carbon services would be most impactful in those regions of the UK where grazing is a dominant land use practice.

**11. Does this opportunity have international significance (for UK business, beyond the UK)?**

*Briefly explain the market and ecosystems potential beyond the UK*

Yes. If it would be possible to successfully trial holistic management methods to UK grasslands there might be lessons that could be deployed elsewhere. For example global brands that are based or present in the UK might find that they could work with similar methods in other moist temperate regions.

## D. SECTOR RELEVANCE

### 12. What sectors is the business opportunity of relevance to, on a scale of 0 (no relevance) to 10 (very relevant)?

*Insert score(s) from 0 (irrelevant) to 10 (extremely relevant)*

Agriculture	Forestry	Fishing	Mining & Quarrying	Food Manufacture	Pharmaceuticals	Other manufacturing	Energy	Water, Waste Water	Construction	Transport	Tourism & Recreation	Wholesale & Retail	Creative, Media & Marketing	Financial Services	Public Administration	Education
10				10				8				6				

*Briefly explain the above scores*

It is self-explanatory

## E. ENABLING ACTIONS

### 13. What kinds of enabling actions are of relevance to this business opportunity?

*Insert score(s) from 0 (irrelevant) to 10 (extremely relevant)*

FOUNDATIONAL	ENABLING			INSTRUMENTAL		
Knowledge	Legislation	Policies, Institutions & Governance	Changing Social Attitudes	Markets & Incentives	Technologies & Practices	Voluntary Actions, Education & Awareness
10	6	8	5	8		8

*Briefly explain the above scores, describing the actions needed, by whom (government, business, other) and what constraints, if any, these actions are designed to overcome*

Knowledge is key. Holistic grazing methods have, as far as I know, been mainly developed in the tropics. How this approach could best work in a temperate region needs to be assessed. Legislation might have a role at some point, for example in how land-use change might be included in some form of official carbon market. Policies are more likely to make a quicker impact, for example in how farm subsidies are allocated. Attitudes might be important, if some major private sector actors can raise consumer awareness about the possible ways to mitigate the carbon impacts of livestock rearing.

## **F. FURTHER WORK TO BE DONE**

### **14. What further research work might be required to explore the market and ecosystems potential of this opportunity and the required enabling actions?**

*Briefly explain*

A technical assessment is required to assess the scale of the opportunity to store carbon and improve water services on British grasslands. Work is also needed to see how these opportunities might be garnered at the same time as conserving and enhancing biodiversity and conserving or improving the cultural values of landscapes.

## **T2.3 Peatland carbon code**

### **SUMMARY**

There is an opportunity to develop a peatland carbon code, similar to the woodland carbon code developed by the Forestry Commission, which provides the framework for companies to purchase carbon credits to support the **restoration and re-wetting of degraded peatlands**. This opportunity recognises the increasingly degraded nature of peatlands and the negative impacts this has on a range of ecosystem services, such as carbon, biodiversity, water quality and amenity. To reverse this trend the peatland carbon code would provide a transparent and verifiable approach to re-habilitating peatlands based on sound science. Carbon savings associated with these measures could then either be sold on the voluntary carbon market or, assuming the UK government recognised peatland in its greenhouse gas (GHG) accounting procedures, presented in company reports as part of their CSR initiatives.

The creation of a peatland carbon code would complement the woodland carbon code and would generate capital to support the restoration of peatlands. This would have a positive impact on a range of ecosystem services including carbon sequestration, biodiversity, water quality and recreation. The market potential for the identified opportunity is significant. Market research suggests demand from UK companies and individuals wishing to voluntarily support land-based carbon reduction projects is likely to exceed 1million tons of carbon reduction per year (and could potentially exceed 10 million tonnes). Demand is likely to come from both individuals (e.g. offsetting flights, a service that is increasingly offered to customers by the travel industry) and corporations.

The creation of a peatland carbon code is the logical next step to activate a national carbon market with greater emphasis placed on nationally appropriate guidance and mechanisms for reducing emissions and creating carbon credits. The regionalisation of carbon markets has been supported by the potential and actual application of the Kyoto Protocol accounting activities under the Land Use, Land Use Change, and Forestry (LULUCF). Parallel to this, the European Commission is applying new carbon accounting procedures covering 90% of peatlands, and in mid-April the EU produced a new carbon reduction sector-based mechanism that would be run primarily by host countries (a regionalisation approach). The regionalisation of carbon markets offers the UK the opportunity to build a leadership position and then export its expertise to other countries interested in setting up regional carbon markets.

There is a range of enabling conditions that would facilitate the creation of a peatland carbon code. These relate to the need to market the mechanism to businesses and to continue improving the science and carbon accounting methodology. While not a pre-requisite to establishing the code, the inclusion of peatland re-wetting and restoration in the UK governments GHG accounting procedures, would encourage greater uptake among businesses.

## A. DESCRIPTION OF THE OPPORTUNITY

### 1. What is the business opportunity?

*Provide a brief description*

Research by the IUCN UK Commission of Inquiry on Peatlands suggests that less than 20% of UK deep peatlands were undamaged. This is due to a range of anthropogenic pressures such as drainage, overgrazing, acid deposition and peat extraction. As a result many peatlands have turned from being a net sink of carbon to a net source.

There are opportunities to expand the range and reach of PES schemes in peatlands that can deliver benefits to investors while providing important societal benefits, including carbon sequestration and the restoration and conservation of important habitats. Voluntary carbon markets and Corporate Social Responsibility (CSR) schemes are already operating at a small scale, enabling the restoration of some UK peatlands.

There is a clear interest from companies and individuals motivated by CSR and good public relations, who are willing to pay for peatland work as a climate and biodiversity benefit. For some potential investors, however, there is still doubt about the benefits of peatland restoration, and for others there are concerns to ensure that claims can be officially validated.

Individuals and land managing organisations have expressed interest in selling the carbon benefits from peatland management, but they too wish to see a properly verified approach, to maintain their credibility.

To move forward, both peatland managers and investors will require a system in place that provides standards, verification and accreditation, with an effective and standardised methodology for calculating carbon savings under different peatland management. There is also a need to monitor such activity through a national register to ensure transparency and allow checks against the Government's own national greenhouse gas (GHG) accounting procedures.

A Peatland Code would:

- Provide an open, consistent, credible and verifiable basis for peatland managers and traders to work to
- Provide a register to allow projects to be accounted for and avoid double counting
- Establish standards to ensure projects are of high environmental quality and genuinely additional
- Provide the technical guidance to allow projects to calculate emissions savings

By being designed to be consistent with international standards such as the Verified Carbon Standard (VCS), the UK Peatland Carbon Code would provide investors with the confidence necessary to invest in peatland restoration, for both CSR purposes and via voluntary carbon markets. The Voluntary Carbon Market (VCM) allows for the sale of carbon credits from emission reductions (ER) from the restoration of degraded peatlands. The VCS (VCS Standard Association) has approved a new Peatland Restoration and Conservation (PRC) Standard that is fully in-line with all other AFOLU

(Agriculture, Forestry and Other Land Use) activities. A new ER estimation approach has been developed and peer-reviewed – this is the Green House Gas Estimation Site Type (GEST) approach [Hydrobiologia 2011). A new AFOLU category – the Rewetting of Drained Peatlands (RDP) – Category 14 PRC-RDP is in its final stages of approval by the VCS. At the UNFCCC Durban Conference a new Kyoto Protocol Activity was approved, namely Wetland Rewetting and Drainage which adds further rigour to the peatland rewetting activity. With a Standard, an ER Approach and a Methodology in place all restoration activities on peatland are able to provide verifiable ER estimates and offer them to the VCM (and most likely to the EC Member States markets as accountable categories). The VCS provides the registry for voluntary carbon offsets.

This business opportunity allows for the creation of regional and national registries that use the PRC, the GEST and the RDP for selling carbon credits from restored peatlands.

## **2. Does this opportunity relate to new markets or greening of existing markets (or both)?**

*Provide a brief explanation*

The opportunity exists to use the Standard and Methodology as approved by the Voluntary Carbon Association, until such time as mandatory accounting covering peatlands is rolled out across the EU Member States.

There are some complexities relating to the way that the carbon savings can be used. At present, they could only be sold on the VCM, but it is possible that the Government might include peatland rewetting as part of its Greenhouse Gas Accounting Guidelines and therefore allow carbon savings to be reported in company accounts.

Formal ‘compliance’ carbon markets under the Kyoto Protocol (Emissions Trading, Joint Implementation, and Clean Development Mechanism) currently do not apply to land use projects in the UK (Annex I country) and this is unlikely to change in the near future. Therefore the Peatland Carbon Code would not, at least in the short to medium term, lead to the creation of carbon credits for use in the main global compliance market. The potential to create carbon credits for the use in the domestic compliance market is also unlikely in the short to medium term. Instead the carbon saved as a result of purchasing credits under the Peatland carbon code could be used in one of two ways. They could either be sold on the voluntary carbon market, or they could (if the UK Government includes peatland rewetting projects under its Greenhouse Gas Accounting Guidelines) be bought by companies seeking to reduce their carbon footprint and enhance their ‘brand image’.

By giving investors the ability to officially include peatland restoration in their carbon accounts as part of their efforts to become carbon neutral, or alternatively giving them the confidence to invest in projects that could generate trade-able carbon credits in future (with a registry to prevent double-counting of carbon under Kyoto), it may be possible to significantly expand this fledgling market and achieve peatland restoration on a much greater scale than is currently seen.

**3. What type of market opportunity or type of instrument/intervention does this business opportunity involve?**

*Insert an 'X' in the relevant box*

Product markets	Offsetting	Payments for ecosystem services	Environmental technologies	Markets for cultural services	Financial and legal services	Ecosystem knowledge economy	Corporate ecosystem initiatives	Eco-taxes, charges, levies, subsidies, grants	Other
		x	x			x			

*Briefly explain the 'type' classification of the business opportunity*

The Peatland Carbon Code would be classified as a PES scheme. It would involve the beneficiaries of the ecosystem services paying the providers of the ecosystem service to re-habilitate degraded peatlands in the UK.

The opportunity also relates to environmental technologies in terms of the mechanisms used for peatland restoration and the ecosystem knowledge economy in terms of the technical aspects of implementing the code.

**B. MARKET POTENTIAL**

**4. What is the market potential for this business opportunity with reference to the EMTF criteria?**

*Insert an 'X' in the appropriate box (0 = none, 10 = massive)*

<b>0</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>	<b>10</b>
							X			

*Briefly explain the above score, with reference to the EMTF criteria*

The market potential for the Peatland Carbon Code depends on how the carbon credits generated can be used (as explained above). Market research suggests demand from UK companies and individuals wishing to voluntarily support land-based carbon reduction projects is likely to exceed 1million tons of carbon reduction per year (and could potentially exceed 10 million tonnes). Demand is likely to come from both individuals (e.g. offsetting flights, a service that is increasingly offered to customers by the travel industry) and corporations.

If carbon savings can be reported in company's accounts it is arguable that their impact will be greater. The woodland carbon code, which is the most similar mechanism currently set up in the UK, has secured the sequestration of 1 million tonnes of CO2

from the atmosphere through registered projects, covering 2733 hectares.

Under the assumption that 1km<sup>2</sup> of peatland rehabilitation delivers 250 tonnes CO<sub>2</sub> per year savings then 30km<sup>2</sup> of bog rewetting could deliver 0.75 million tonnes CO<sub>2</sub> saving (in a 100 year period) , which is equivalent to the carbon benefit provided by woodlands. There is a potential for 1.8 million ha rewetting of bogs in UK.

A number of factors increase the potential for this businesses opportunity (to follow the order in the conceptual framework):

- 1) The GEST methodology has significantly improved the accuracy with which carbon savings can be estimated. It uses vegetation type as a proxy for water levels, which in turn reflects GHG emissions. Monitoring/measurement costs are therefore reduced.
- 2) Carbon prices on the voluntary carbon market vary significantly but given the added biodiversity and water co-benefits could be in the range of \$6-10 t/yr
- 3) Demand from large corporates could be significant;
- 4) Once the system is in place the project could be scaled up quickly;
- 5) There are already a number of peatland restoration programmes in the UK that are undertaking some degree of monitoring and evaluation;
- 6) A trusted intermediary would be required, which administered the code and provided investors with confidence that their money is having an impact;
- 7) There are few reasons to prevent rewetting of peatlands and no vested interests in maintaining peatlands in a degraded state have been identified;
- 8) Payment can be front-loaded.

In terms of taking the opportunity further, and selling the approach to a peatland carbon code abroad, two facts are promising:

- 9) The original operational example of regionalise carbon marketing (in NE Germany) has already sold the template to neighbouring German Lander. The approach should be scalable to any regions/countries that have a) degraded peatlands; b) access to these areas; and c) authorities that would act as registries for carbon credits.
- 10) Leaders of this approach are Germany's Greifswald University, the International Mire Conservation Group, APB's Centre for Sustainable Peatland Management –Belarus and a number of organisations in the UK.

**5. What important characteristics of ecosystems and ES might be of relevance to this business opportunity?**

*Insert a score from 0 (irrelevant) to 10 (extremely relevant)*

Scale of externalities involved	Nature of market failures involved	Business' (& sectors') dependency on the ES involved, and costs and availability of substitutes	Opportunity costs related to ES provision	Nature of property rights over the ES or environmental assets underpinning them	Feasibility of managing the ES, and speed and predictability with which they respond to management	Capital costs of altering ES management and provision	Spatial and socio-economic distribution of ES beneficiaries (are they organised in coherent group that can take part in	Spatial and economic distribution of ES providers	Spatial and temporal relationships between ES providers and beneficiaries	Nature of existing cultural, regulatory or market management structures
<b>9</b>										

*Briefly explain the above scores and to what extent these characteristics might affect the market potential*

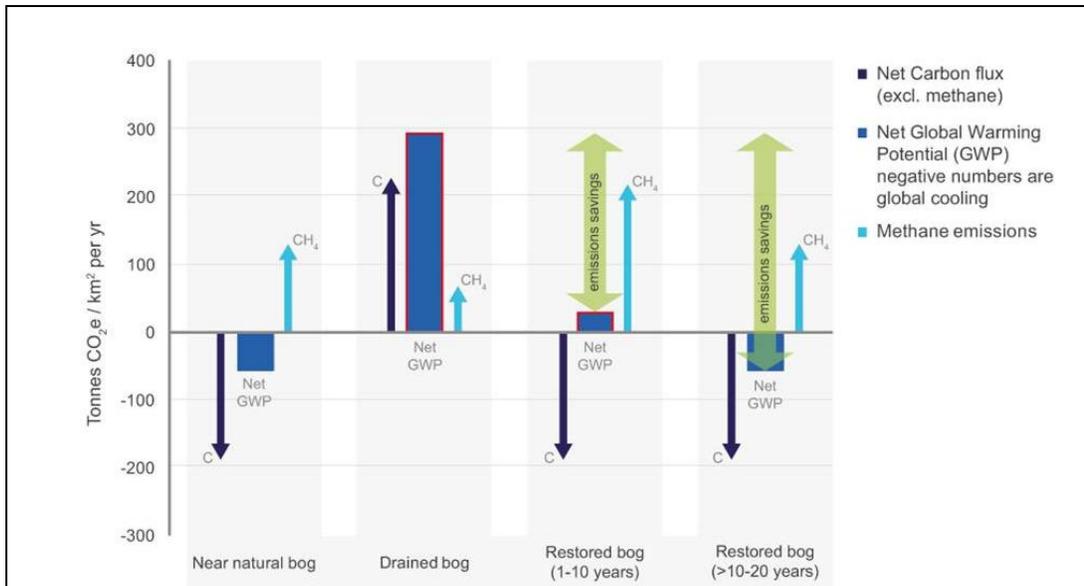


Figure 1: Carbon balance of bog in different conditions (from IUCN UK Commission of Inquiry on UK Peatlands 2011).

The main characteristic which is of relevance to the development of a Peatland Carbon Code is the scale of the externalities involved. Research by the IUCN UK Commission of Inquiry on Peatlands suggests that less than 20% of UK deep peatlands were

undamaged. Figure 1 above is a conservative estimate of the significant carbon savings which can be achieved through restoration and management of both upland and lowland\* peatlands.

\*The figure illustrates carbon balance for both upland and lowland bogs. However, in practice the majority of data to substantiate the figure has been derived from upland bog.

**C. ECOSYSTEM POTENTIAL**

**6. How significant might this opportunity be for protecting/enhancing ecosystems, enhancing ES, enhancing goods derived from ES, and/or positively affecting drivers of ecosystem change?**

*Insert score(s) from 0 (no significance) to 10 (extremely significant)*

Drivers of (Ecosystem) Change	Ecosystems	Ecosystem Services	Goods derived from ES
	<b>10</b>	<b>8</b>	

*Briefly explain the above scores, provide page references to any relevant NEA evidence*

Creating a peatland carbon code could be significant in restoring degraded peatlands and enhancing the wide range of ecosystem services they provide, which include carbon storage and sequestration, erosion and wildfire control, water regulation (water quality regulation and to some extent run-off retention), cultural services, such as recreation, landscape aesthetics and conservation of the paleo-environmental archive, as well as provision of habitat for wildlife in one of the largest remaining semi-natural ecosystems in the UK.

**7. To which UK ecosystems (broad habitats as per the NEA) is this opportunity of relevance?**

*Insert score(s) from 0 (irrelevant) to 10 (extremely relevant)*

Mountains, moorlands & heaths	Semi-natural grasslands	Enclosed farmland	Woodlands	Freshwaters - openwaters, wetlands, floodplains	Urban	Coastal	Marine
9			1	3			

Briefly explain the above scores in relation to state and trends of relevant habitats – provide page references to any relevant NEA evidence

Primarily mountains, moorlands & heaths. However, it could also apply to the smaller number of lowland peatlands in freshwater systems (fenlands and lowland bogs) and the areas of woodland which were grown on peatlands in the past.

**8. To which ecosystem services are this opportunity of relevance?**

Insert score(s) from 0 (irrelevant) to 10 (extremely relevant)

Supporting	Regulating	Provisioning	Cultural
5	10	1	3

Briefly explain the above scores in relation to state and changes in relevant ES in the UK – provide page references to any relevant NEA evidence

The peatland carbon code is of primary relevance to regulating services (carbon sequestration), but also has a range of important co-benefits for supporting (biodiversity and water quality) and cultural ecosystem services (recreation). A further minor impact is that peatland restoration restores heather over grassland and therefore supports red grouse (game) and therefore has a minor impact on provisioning services.

**9. To which drivers of change is this opportunity of relevance?**

Insert score(s) from 0 (irrelevant) to 10 (extremely relevant)

INDIRECT DRIVERS					DIRECT DRIVERS				
Demographic	Economic	Sociopolitical	Cultural and Behavioural	Scientific and Technological	Habitat Change	Pollution & Nutrient Enrichment	Overexploitation of Resources	Climate Variability & Change	Invasive Species
		3	5		5			8	

*Briefly explain the above scores in relation to drivers of ecosystem change in the UK - provide page references to any relevant NEA evidence*

- 1) Socio-political (in terms of providing the UK government with the opportunity to use carbon savings from peatland restoration projects to meet their international and national commitments and alongside this help meet other international and national Gov biodiversity obligations)
  - 2) Cultural and Behavioural (in terms of CSR becoming much more prominent and the possibility of carbon reporting becoming mandatory)
  - 3) Habitat change (the restoration of peatlands would support greater biodiversity)
- Climate variability & change (climate variability and change will lead to further desiccation of peatlands and thereby release of carbon into the atmosphere and into water courses; wet peatlands are more resilient to climate variability & change and have endured a range of climate conditions in the past as peat cores show)

**10. For the ecosystems, ES and drivers of change of ecosystems of which countries (England, Northern Ireland, Scotland, Wales) is this opportunity relevant?**

*Insert score(s) from 0 (irrelevant) to 10 (extremely relevant)*

England	Northern Ireland	Scotland	Wales
7	7	9	5

*Briefly explain the above scores – provide page references to any relevant NEA evidence*

The peatland carbon code would apply to all countries. However, the predominance of peatlands in Scotland would make this opportunity of particular relevance. Northern England and Northern Ireland also have substantial areas of peatlands.

**11. Does this opportunity have international significance (for UK business, beyond the UK)?**

*Briefly explain the market and ecosystems potential beyond the UK*

A peatland carbon code could be replicated in any country with degraded peatlands. There is significant export potential for the code. The issues involved on monitoring/verification are very similar to those being addressed in REDD+. The UK is already exporting carbon restoration expertise to elsewhere in Europe. It could also be of interest to international businesses wishing to invest in UK peatland projects.

## D. SECTOR RELEVANCE

### 12. What sectors is the business opportunity of relevance to, on a scale of 0 (no relevance) to 10 (very relevant)?

*Insert score(s) from 0 (irrelevant) to 10 (extremely relevant)*

Agriculture	Forestry	Fishing	Mining & Quarrying	Food Manufacture	Pharmaceuticals	Other manufacturing	Energy	Water, Waste Water	Construction	Transport	Tourism & Recreation	Wholesale & Retail	Creative, Media & Marketing	Financial Services	Public Administration	Education
5	5		3					8	3					3		

*Briefly explain the above scores*

The peatland carbon code would be of particular relevance to the tourism & recreation sector, the water and wastewater sector, the agriculture and forestry sector. Potentially the wind energy sector would be interested as well.

Furthermore, all sectors interested in climate change mitigation (e.g. the retail, construction and financial services sectors) would be interested in this opportunity.

## E. ENABLING ACTIONS

### 13. What kinds of enabling actions are of relevance to this business opportunity?

*Insert score(s) from 0 (irrelevant) to 10 (extremely relevant)*

FOUNDATIONAL	ENABLING			INSTRUMENTAL		
Knowledge	Legislation	Policies, Institutions & Governance	Changing Social Attitudes	Markets & Incentives	Technologies & Practices	Voluntary Actions, Education & Awareness
8	8	7		7		

*Briefly explain the above scores, describing the actions needed, by whom (government, business, other) and what constraints, if any, these actions are designed to overcome*

A number of enabling actions are necessary. These include:

- 1) Knowledge: The current state of the science allows us to provide best practice on peatland restoration for carbon and other benefits, to enable relatively rapid initiation of a Code. However, more comprehensive baseline flux data on

GHG, vegetation and water level change, particularly for managed and restored peatlands, is required to develop a quick remote sensing model for GHG emissions from different peatland types.

- 2) Legislation: The code can operate under current conditions for CSR schemes. In order for companies to report their efforts in their carbon accounts, the UK government would need to recognise carbon savings from peatland restoration as suitable for inclusion under the Greenhouse Gas Accounting Guidelines
- 3) Policies, Institutions & Governance: The peatland carbon code would need to be transparent. Both peatland managers and investors will require a system in place that provides standards, verification and accreditation, with an effective and standardised methodology for calculating carbon savings under different peatland management. There is also a need to monitor such activity through a national register to ensure transparency and allow checks against the Government's own national greenhouse gas (GHG) accounting procedures.

Markets and Incentives: Research suggests some businesses would be willing to invest in peatlands under a voluntary market as a way of offsetting their own carbon emissions or simply under corporate social responsibility. The research suggests businesses would be happy to pay for peatland restoration as a contribution to climate change and biodiversity, provided the claims could be justified. With improved awareness raising among the business community there are opportunities for even greater investment.

## F. FURTHER WORK TO BE DONE

### 14. What further research work might be required to explore the market and ecosystems potential of this opportunity and the required enabling actions?

*Briefly explain*

Further research is required into developing the Peatland Carbon Code. This includes:

- Setting up a scientific and main group to drive this process.
- Undertaking research into the attitudes of businesses to the code and their willingness to contribute
- Setting up meetings with senior CEOs of banks, retailers etc. to hear about the importance of peatlands and to create momentum behind the idea.
- Application of the GEST approach to all peatland vegetation types across all regions/countries that have degraded peatlands.
- Awareness raising with governmental (regional and national) authorities on their potential role as registries.

### 3 PAYMENT FOR ECOSYSTEM SERVICES

#### ***T3.1 Carbon sequestration PES as an ‘allowable solution’***

##### **SUMMARY**

In 2007, the Government announced that all new homes will be zero carbon from 2016. Although developers will promote in-built energy efficiency and on-site renewable energy generation, a range of additional, mostly off site solutions will be made available as ways to meet the zero carbon standard. These so-called Allowable Solutions will need (from 2016) to account for a significant amount of the emissions from a typical new home: for flats in the order of 56% and for detached homes about 40%. A recent framework for Allowable Solutions proposes technology focused solutions rather than opportunities centred on the natural environment. The business opportunity in this case is for private developers to contribute to carbon sequestration through purchasing Allowable Solutions Certificates generated through measures such as woodland creation or peatland restoration (which would also likely yield biodiversity and other co-benefits). The opportunity is clearly of most relevance to the construction sector but also to landowners/managers willing to give over or manage land for carbon sequestration/storage.

#### **A. DESCRIPTION OF THE OPPORTUNITY**

##### **1. What is the business opportunity?**

*Provide a brief description*

In 2007, the Government announced that all new homes will be zero carbon from 2016.<sup>6</sup> The definition of zero carbon was originally envisaged to be Level 6 of the Code for Sustainable Homes, which, according to the Zero Carbon Hub<sup>7</sup>, has only been achieved in practice by a handful of exemplar schemes.<sup>8</sup> According to the Hub, this definition presented considerable difficulties in mainstream roll out, not least because it treated every home as an individual energy ‘island’ that must generate all the power and heat it needs.<sup>9</sup> As such, in December 2008 the Government launched a

<sup>6</sup> Communities and Local Government (2007). *Building a Greener Future: policy statement* [online] available at: [www.communities.gov.uk/publications/planningandbuilding/building-a-greener](http://www.communities.gov.uk/publications/planningandbuilding/building-a-greener) (accessed 1 April 2012).

<sup>7</sup> The Zero Carbon Hub is a public/private partnership established to take day-to-day operational responsibility for co-ordinating the delivery of low and zero carbon new homes. The Hub supports and reports to the 2016 Taskforce which was established in 2007 and is chaired by the Housing Minister and the Executive Chairman of the Home Builders Federation. For more information see [www.zerocarbonhub.org](http://www.zerocarbonhub.org).

<sup>8</sup> [www.zerocarbonhub.org/definition.aspx](http://www.zerocarbonhub.org/definition.aspx) (accessed 1 April 2012).

<sup>9</sup> [www.zerocarbonhub.org/definition.aspx](http://www.zerocarbonhub.org/definition.aspx) (accessed 1 April 2012).

consultation on the definition of zero carbon homes in response to concerns that the level 6 definition was expensive and unattainable on many sites.<sup>10</sup> This proposed that, in addition to reliance on in-built energy efficiency and on-site renewable energy generation, a range of additional, mostly off site solutions (called Allowable Solutions) would be made available to developers as ways to meet the zero carbon standard. The Zero Carbon Homes policy hierarchy is therefore composed of three parts, Fabric Energy Efficiency, Carbon Compliance and Allowable Solutions.<sup>11</sup>

The Government has yet to define what will constitute an Allowable Solution, however on-site, near-site and off-site carbon-saving projects are expected to be available. In July 2011, the Zero Carbon Hub launched proposals for a delivery framework for Allowable Solutions.<sup>12</sup> This emphasises that Allowable Solutions will need (from 2016) to account for a significant amount of the emissions from a typical new home: for flats in the order of 56% and for detached homes about 40%. The proposals indicate that the developer will make a payment to an Allowable Solutions provider, who will take the responsibility and liability for ensuring that Allowable Solutions, which may be small, medium or large scale carbon-saving projects, deliver the required emissions reductions. Importantly, for developers the framework acknowledges that the house building process must not be tied to the delivery time of an Allowable Solutions project, which may be long term; the proposed verification process allows the early release of an Allowable Solutions Certificate, so that Building Control approval (to Part L 2016) should never be delayed by the use of Allowable Solutions.

The framework indicates that several expectations have become associated with Allowable Solutions:

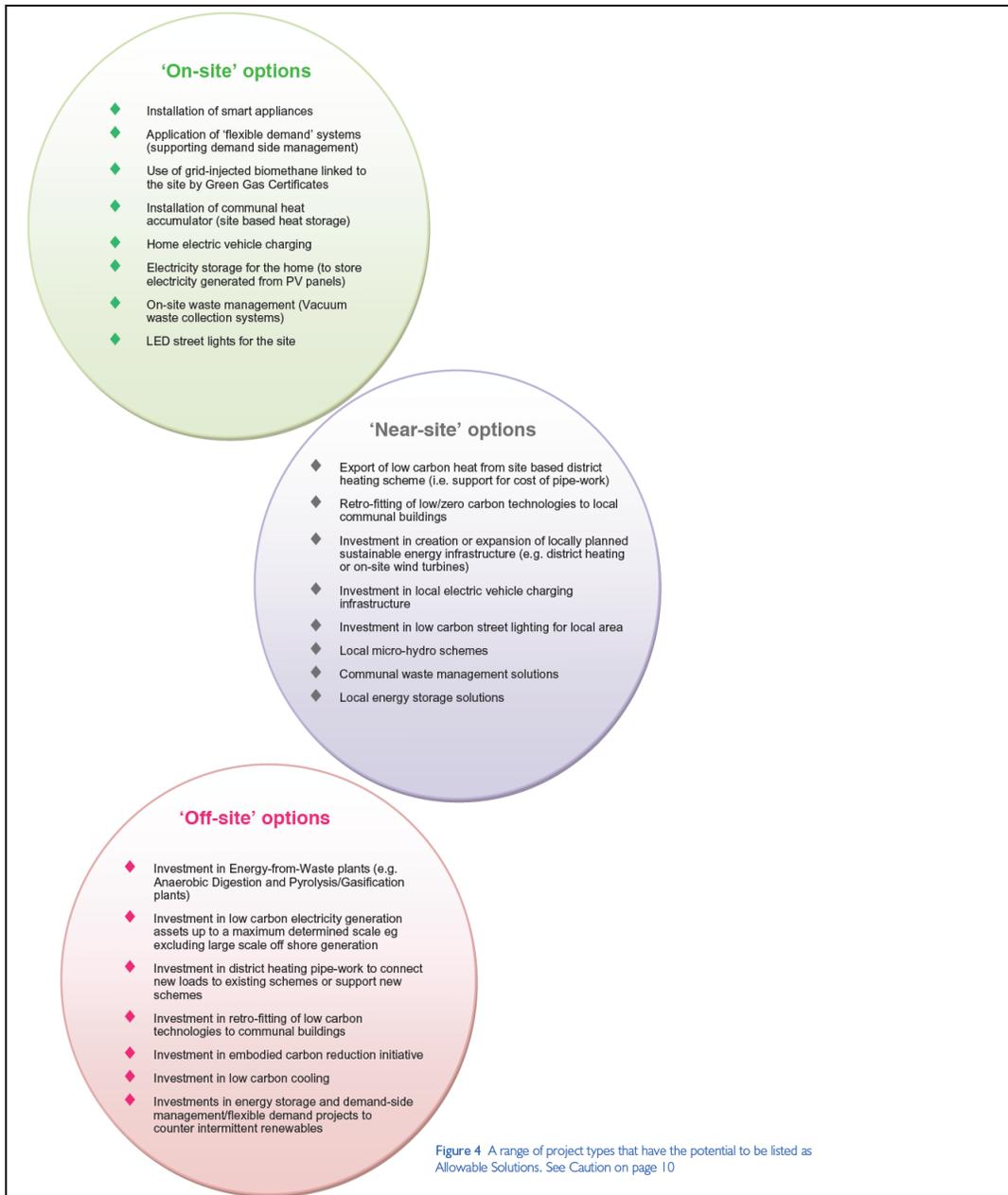
1. that the developer would make a payment to secure emissions reductions through (largely) near-site or off-site, carbon-saving (Allowable Solutions) projects;
2. that, independent of the developer, there would be an opportunity to aggregate a number of Allowable Solutions payments to deliver larger scale carbon-emission reduction projects;
3. that Allowable Solutions would be affordable and (per unit of carbon) would cost, at least initially, less than Carbon Compliance; and
4. that wherever possible, Allowable Solutions would be linked with local projects that would bring local benefits.

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<sup>10</sup> Communities and Local Government (2008). *Definition of Zero Carbon Homes and Non-Domestic Buildings* [online] available at: [www.zerocarbonhub.org/resourcefiles/1101177.pdf](http://www.zerocarbonhub.org/resourcefiles/1101177.pdf) (accessed 1 April 2012).

<sup>11</sup> It should be noted that following the March 2011 budget, emissions from unregulated energy use (e.g. from plug-in appliances) are no longer in the definition of zero carbon; Allowable Solutions are still needed, however, to bridge the gap between the Carbon Compliance levels proposed for 2016 Part L and the zero carbon target (now defined as 'no emissions from regulated energy use', e.g. heating, hot water).

<sup>12</sup> Zero Carbon Hub (2011). *Allowable Solutions for Tomorrow's New Homes: Towards a Workable Framework* [online] available at: [www.zerocarbonhub.org/resourcefiles/Allowable\\_Solutions\\_for\\_Tomorrows\\_New\\_Homes\\_2011.pdf](http://www.zerocarbonhub.org/resourcefiles/Allowable_Solutions_for_Tomorrows_New_Homes_2011.pdf) (accessed 1 April 2012).



Although the Government has made no formal announcements as to what will constitute an acceptable 'Allowable Solution', the framework illustrates some possible options/projects that could qualify as credible, cost-effective, carbon-saving initiatives (see below). Potential Allowable Solutions that capitalise on the capacity of the natural environment to sequester carbon are notable by their absence. As such, there is clearly the potential to explore the possibility of developers making payments to landowners / managers willing to give over parcels of land to, for example, woodland creation and peatland restoration, so long as the carbon sequestration benefits can be adequately quantified and verified. Moreover, solutions centred on the natural environment would likely yield important co-benefits in relation to biodiversity,

landscape, and recreation.

The business opportunity in this case is for private developers to contribute to carbon sequestration through purchasing Allowable Solutions Certificates generated through measures such as woodland creation or peatland restoration. The Woodland Carbon Code provides an existing mechanism vis-à-vis woodland creation and a Peatland Carbon Code has been mooted.

The idea of including woodland creation as an ‘Allowable Solution’ was proposed in a 2011 report by EnviroMarket for the Forestry Commission.<sup>13</sup>

\*it should be noted that as the conceptual framework developed by the Zero Carbon Hub currently stands, the ‘Allowable Solutions’ do not include carbon sequestration from the natural environment.

**2. Does this opportunity relate to new markets or greening of existing markets (or both)?**

*Provide a brief explanation*

Allowable Solutions measures will be needed to meet the zero carbon Building Regulations in 2016 but the proposed widening of these to encompass natural environment solutions would arguably lead to a further ‘greening’ of the market.

**3. What type of market opportunity or type of instrument/intervention does this business opportunity involve?**

*Insert an ‘X’ in the relevant box*

Product markets	Offsetting	Payments for ecosystem services	Environmental technologies	Markets for cultural services	Financial and legal services	Ecosystem knowledge economy	Corporate ecosystem initiatives	Eco-taxes, charges, levies, subsidies, grants	Other
	7	3							

*Briefly explain the ‘type’ classification of the business opportunity*

Allowable Solutions is essentially a means to offset residual carbon emissions associated with new development. However, Allowable Solutions Certificates could be

<sup>13</sup> EnviroMarket (2011). *Future Funding Models for Woodland Creation*, a report to the Forestry Commission [online] available at: [www.forestry.gov.uk/pdf/Future\\_Funding\\_for\\_Woodland\\_Creation-Final\\_report\\_4-05-11.pdf/\\$FILE/Future\\_Funding\\_for\\_Woodland\\_Creation-Final\\_report\\_4-05-11.pdf](http://www.forestry.gov.uk/pdf/Future_Funding_for_Woodland_Creation-Final_report_4-05-11.pdf/$FILE/Future_Funding_for_Woodland_Creation-Final_report_4-05-11.pdf) (accessed 1 April 2012).

generated through Payments for Ecosystem Services (PES) schemes such as the Woodland Carbon Code<sup>14</sup> and the mooted Peatland Carbon Code.<sup>15</sup>

## B. MARKET POTENTIAL

### 4. What is the market potential for this business opportunity with reference to the EMTF criteria?

*Insert an 'X' in the appropriate box (0 = none, 10 = massive)*

0	1	2	3	4	5	6	7	8	9	10
							X			

*Briefly explain the above score, with reference to the EMTF criteria*

The Zero Carbon Hub argues that “The right framework for Allowable Solutions could stimulate innovation and create huge opportunities for leveraging secondary funding from businesses, debt financiers and private investors that are looking to invest in carbon-reduction projects”<sup>16</sup>; obviously this depends on natural environment solutions such as woodland creation and peatland restoration being included as ‘Allowable Solutions’.

<sup>14</sup> For further information on the Woodland Carbon Code see [www.forestry.gov.uk/carboncode](http://www.forestry.gov.uk/carboncode) (accessed 1 April 2012).

<sup>15</sup> For example, see [www.publications.parliament.uk/pa/cm201011/cmselect/cmenvfru/556/556vw16.htm](http://www.publications.parliament.uk/pa/cm201011/cmselect/cmenvfru/556/556vw16.htm) (accessed 1 April 2012).

<sup>16</sup> Zero Carbon Hub (2011). *Allowable Solutions for Tomorrow’s New Homes: Towards a Workable Framework* [online] available at: [www.zerocarbonhub.org/resourcefiles/Allowable\\_Solutions\\_for\\_Tomorrows\\_New\\_Homes\\_2011.pdf](http://www.zerocarbonhub.org/resourcefiles/Allowable_Solutions_for_Tomorrows_New_Homes_2011.pdf) (accessed 1 April 2012).

**5. What important characteristics of ecosystems and ES might be of relevance to this business opportunity?**

*Insert a score from 0 (irrelevant) to 10 (extremely relevant)*

Scale of externalities involved	Nature of market failures involved	Business' (& sectors') dependency on the ES involved, and costs and availability of substitutes	Opportunity costs related to ES provision	Nature of property rights over the ES or environmental assets underpinning them	Feasibility of managing the ES, and speed and predictability with which they respond to management	Capital costs of altering ES management and provision	Spatial and socio-economic distribution of ES beneficiaries (are they organised in coherent group that can take part in	Spatial and economic distribution of ES providers	Spatial and temporal relationships between ES providers and beneficiaries	Nature of existing cultural, regulatory or market management structures
		<b>8</b>	<b>5</b>	<b>5</b>						

*Briefly explain the above scores and to what extent these characteristics might affect the market potential*

“Business’ (& sectors’) dependency on the ES involved, and costs and availability of substitutes” and the “Nature of existing cultural, regulatory or market management structures” will be important in this case. In particular, the Zero Carbon Hub emphasises that there is an expectation that Allowable Solutions will be affordable and (per unit of carbon) cost, at least initially, less than Carbon Compliance.

**C. ECOSYSTEM POTENTIAL**

**6. How significant might this opportunity be for protecting/enhancing ecosystems, enhancing ES, enhancing goods derived from ES, and/or positively affecting drivers of ecosystem change?**

*Insert score(s) from 0 (no significance) to 10 (extremely significant)*

Drivers of (Ecosystem) Change	Ecosystems	Ecosystem Services	Goods derived from ES
	<b>8</b>	<b>8</b>	

*Briefly explain the above scores, provide page references to any relevant NEA evidence*

Including carbon sequestration projects centred on the natural environment as Allowable Solutions could be potentially significant in terms of increasing woodland creation and promoting peatland restoration and the ecosystem services they provide

(particularly in terms of biodiversity, landscape, water and recreational co-benefits).

**7. To which UK ecosystems (broad habitats as per the NEA) is this opportunity of relevance?**

*Insert score(s) from 0 (irrelevant) to 10 (extremely relevant)*

Mountains, moorlands & heaths	Semi-natural grasslands	Enclosed farmland	Woodlands	Freshwaters - openwaters, wetlands, floodplains	Urban	Coastal	Marine
10			10	5		5	

*Briefly explain the above scores in relation to state and trends of relevant habitats – provide page references to any relevant NEA evidence*

Woodlands and mountains, moorlands and heaths (with respect to peatland); could conceivably affect coastal habitats such as saltmarsh (a significant UK habitat) as these can act as important carbon sinks<sup>17</sup> and saltmarsh restoration projects could potentially be included as an ‘Allowable Solution’. Peatlands also occur in lowland bogs and fenlands so there is a potential impact on wetlands.

**8. To which ecosystem services are this opportunity of relevance?**

*Insert score(s) from 0 (irrelevant) to 10 (extremely relevant)*

<b>Supporting</b>	<b>Regulating</b>	<b>Provisioning</b>	<b>Cultural</b>
<b>5</b>	<b>9</b>		<b>5</b>

*Briefly explain the above scores in relation to state and changes in relevant ES in the UK – provide page references to any relevant NEA evidence*

This opportunity relates primarily to regulating ecosystem services, due to the focus on carbon sequestration. However, if the opportunity resulted in the creation of woodland and the rehabilitation of peatland a range of co-benefits will also be produced. These relate to cultural services (recreation, amenity etc) and supporting

<sup>17</sup> See for example

[www.marineclimatechange.com/marineclimatechange/bluecarbon\\_3\\_files/Carbon%20Sequestration%20in%20Coastal%20Marshes%20\(Megonigal\).pdf](http://www.marineclimatechange.com/marineclimatechange/bluecarbon_3_files/Carbon%20Sequestration%20in%20Coastal%20Marshes%20(Megonigal).pdf) (accessed 1 April 2012).

(nutrient cycling etc).

**9. To which drivers of change is this opportunity of relevance?**

*Insert score(s) from 0 (irrelevant) to 10 (extremely relevant)*

INDIRECT DRIVERS					DIRECT DRIVERS				
Demographic	Economic	Sociopolitical	Cultural and Behavioural	Scientific and Technological	Habitat Change	Pollution & Nutrient Enrichment	Overexploitation of Resources	Climate Variability & Change	Invasive Species
6	6	6		6				6	

*Briefly explain the above scores in relation to drivers of ecosystem change in the UK - provide page references to any relevant NEA evidence*

House building to zero carbon standards is driven by the need to comply with international obligations vis-à-vis climate change and the drive to increase house building is governed by economic imperatives, demographic changes (growing population, changing household composition) and social issues (the housing crisis).

**10. For the ecosystems, ES and drivers of change of ecosystems of which countries (England, Northern Ireland, Scotland, Wales) is this opportunity relevant?**

*Insert score(s) from 0 (irrelevant) to 10 (extremely relevant)*

England	Northern Ireland	Scotland	Wales
10			

*Briefly explain the above scores – provide page references to any relevant NEA evidence*

The Zero Carbon Hub's work only covers England; the situation in Scotland, Wales and Northern Ireland requires further research.

**11. Does this opportunity have international significance (for UK business, beyond the UK)?**

*Briefly explain the market and ecosystems potential beyond the UK*

No

## D. SECTOR RELEVANCE

### 12. What sectors is the business opportunity of relevance to, on a scale of 0 (no relevance) to 10 (very relevant)?

*Insert score(s) from 0 (irrelevant) to 10 (extremely relevant)*

Agriculture	Forestry	Fishing	Mining & Quarrying	Food Manufacture	Pharmaceuticals	Other manufacturing	Energy	Water, Waste Water	Construction	Transport	Tourism & Recreation	Wholesale & Retail	Creative, Media & Marketing	Financial Services	Public Administration	Education
3	3								10							

*Briefly explain the above scores*

This opportunity is primarily of relevance to the construction sector. However, if it increases funding for woodland creation and peatland rehabilitation then it will also be relevant to agriculture (tree planting), and forestry. Monitoring compliance will also require technical consultants.

## E. ENABLING ACTIONS

### 13. What kinds of enabling actions are of relevance to this business opportunity?

*Insert score(s) from 0 (irrelevant) to 10 (extremely relevant)*

FOUNDATIONAL	ENABLING			INSTRUMENTAL		
Knowledge	Legislation	Policies, Institutions & Governance	Changing Social Attitudes	Markets & Incentives	Technologies & Practices	Voluntary Actions, Education & Awareness
		10			7	

*Briefly explain the above scores, describing the actions needed, by whom (government, business, other) and what constraints, if any, these actions are designed to overcome*

Policies, Institutions & Governance – action needed to ensure that carbon sequestration projects centred on the natural environment (woodland creation, peatland restoration etc.) are included as ‘Allowable Solutions’.

Technologies & Practices – action needed to ensure that the carbon sequestration benefits from woodland creation, peatland restoration etc. can be adequately quantified and verified for the purposes of issuing Allowable Solutions Certificates.

## **F. FURTHER WORK TO BE DONE**

### **14. What further research work might be required to explore the market and ecosystems potential of this opportunity and the required enabling actions?**

*Briefly explain*

The possibility of including carbon sequestration projects centred on the natural environment as Allowable Solutions needs to be explored with Government departments (CLG, Defra, DECC) and bodies such as the Zero Carbon Hub and the Forestry Commission.

## T3.2 Layered PES

### SUMMARY

The opportunity relates to the potential of layered Payment for Ecosystem Services (PES) schemes to increase funding targeted at protecting and enhancing the natural environment. In layered PES schemes different ecosystem services, which arise from the same plot of land, are sold to different buyers. On a small scale this would involve community groups, local businesses, the local authority and other interested parties purchasing those ecosystem services they were interested in from a local resource (e.g. a river). On a larger scale, it could involve reforming the existing grant system (Environmental Stewardship and the England Woodland Grant Scheme) to improve their effectiveness. Government financed PES are currently 'bundled'. There is the opportunity to 'unbundle' the grants system and re-structure them to align them with PES best practice, where payments are differentiated, spatially targeted, and conditional. In this way the provision of grants could be made conditional on the provision of ecosystem services and different ecosystem services could be bought by different user groups. In this way private equity could be leveraged to support the natural environment.

This opportunity is at an early conceptual stage and a range of enabling conditions ranging from pilot studies to market research would be required to assess its potential. However, the widespread application of layered PES schemes at both the small and large scale would significantly increase the revenue flowing to the protection and enhancement of a range of ecosystem services across a range of broad habitat types.

### A. DESCRIPTION OF THE OPPORTUNITY

#### 1. What is the business opportunity?

*Provide a brief description*

Layered PES represents an opportunity to combine revenue streams from different sources, as well as expertise, to increase support for a range of ecosystem services.

Layered PES refers to a situation where a bundle of ecosystem services (e.g. water quality, carbon sequestration and recreation) that arise from the same land area are sold to different buyers.

Different ecosystem services can be commodified, marketed and paid for by different beneficiaries. This might involve contributions from both public and private beneficiaries through a variety of funding instruments, such as a Public-Private Partnership (PPPs).

For example, a small scale layered PES scheme would involve selling the different ecosystem services derived from a river to different buyers. Improvements to the river might lead to 1) enhanced fishing opportunities, 2) reduction in crime 3) enhanced health benefits 4) an increase in values for riverside properties. These different

ecosystem services could be sold to 1) local anglers (private), 2) local police authority (public), 3) local health care trust (public) and 4) developers (private). While revenue from any single source may not be sufficient to pay for the management actions necessary to secure these ecosystem services, the combination of different types of public and private revenue may be.

At a larger scale, layered PES may be used to improve the effectiveness of government-financed, multi-service PES schemes such as Environmental Stewardship or the England Woodland Grant Scheme (EWGS). The opportunity to change “subsidies and support structures for agriculture and forestry” is highlighted as an opportunity in the UKNEA (3.3.3.2).

Government-financed PES overall tend to be more diffuse than user-financed PES. On the whole they are less targeted, involve uniform payments, and often have slack monitoring and sanction systems. As a result they are not efficient in delivering environmental improvements. However, government-financed PES operate at larger scales and are often the only mechanism for financing environmental outcomes whose values are diffusely spread across large numbers of people (e.g. biodiversity conservation). Moreover, they can be cost-effective due to administrative economies of scale and can be made more efficient through improvements in targeting rules and contract designs.

Government financed PES is typically ‘bundled’. There is the opportunity to re-structure these schemes to align them with PES best practice, where payments are differentiated, spatially targeted, and conditional.

Rather than grants from the EWGS, for example, providing undifferentiated payments for ‘woodland creation’ or ‘woodland management’ payments could be made conditional on the provision of different ecosystem services (e.g. public access, carbon sequestration, biodiversity, flood protection, prevention of erosion etc). Different beneficiaries (both public and private) could then provide payments for the different ecosystem services provided by the creation of the woodland. This would have distinct advantages:

- 1) Payments would be linked to the provision of ecosystem service, rather than a weak proxy (e.g. number of hectares) and thus allow particular ES hot-spots to be targeted (e.g. access to peri-urban woodlands).
- 2) Private investment could be leveraged to pay for certain types of relevant ES;
- 3) Beneficiaries with different investment horizons/objectives could provide finance to cover different costs and stages of the project. While funding from one investor might be constrained, different funding streams may make access more flexible. Furthermore, while private investors may prefer to make a one-off investment to meet capital costs they may be less willing to pay for on-going maintenance costs. Public funds can then be used to pay for O&M costs.
- 4) Ecosystem services which are truly ‘global’ (e.g. carbon) can be bought by governments on behalf of society while ecosystem services, which can be used exclusively by private individuals/organisations (e.g. water quality) can be bought by them.

**2. Does this opportunity relate to new markets or greening of existing markets (or both)?**

*Provide a brief explanation*

There are two variations on the opportunity on increasing the uptake of layered PES schemes:

One relates to reforming and expanding the current government-financed PES schemes in the UK both to better target the improvement of different ecosystem services and to open them up to investment from private sources.

The other relates to using layered PES schemes to combine different sources of revenue on a smaller scale to improve the flow of ecosystem services.

**3. What type of market opportunity or type of instrument/intervention does this business opportunity involve?**

*Insert an 'X' in the relevant box*

Product markets	Offsetting	Payments for ecosystem services	Environmental technologies	Markets for cultural services	Financial and legal services	Ecosystem knowledge economy	Corporate ecosystem initiatives	Eco-taxes, charges, levies, subsidies, grants	Other
		X						X	

*Briefly explain the 'type' classification of the business opportunity*

- 1) PES – the opportunity relates to increasing the uptake of layered PES schemes in the UK
- 2) It also relates to reforming existing grant schemes (government financed PES) to use public money to better effect and to open them up to private finance.

**B. MARKET POTENTIAL**

**4. What is the market potential for this business opportunity with reference to the EMTF criteria?**

*Insert an 'X' in the appropriate box (0 = none, 10 = massive)*

0	1	2	3	4	5	6	7	8	9	10
						X				

*Briefly explain the above score, with reference to the EMTF criteria*

*1) Contribution to tackling risk facing business (including policy risks)*

Layered PES has the potential to help businesses reduce risks posed to them from the natural environment. Where businesses cannot afford to pay for an enhanced ecosystem service on their own (e.g. flood risk reduction), other sources of finance (including public money) could be used to purchase a different ecosystem service from the same land and make the project viable.

*2) Financial viability of the opportunity (source of profit, risk/reward balance)*

The opportunity seeks to increase the viability of PES schemes and to reform existing government-financed PES schemes.

*3) Potential demand underpinning the opportunity (number of beneficiaries and values to them)*

Demand is currently unknown for layered PES systems.

*4) Scalability and transferability of good practice, including public action leveraging private activity*

Each potential PES scheme will have a different range of potential ES and potential purchasers of those ES. However, lessons learnt about structuring layered PES in terms of overcoming legal, contractual and other barriers could be transferrable.

*5) Presence/availability of leaders and innovators (who will do proof of concept?)*

*6) No successful layered PES schemes have been identified. Presence/availability of 3rd party brokers and intermediaries (can providers and beneficiaries be connected?)*

Context-dependent. It may be difficult to link different sources of revenue. Transaction costs may be high and it would require a dedicated intermediary.

*7) Feasibility of overcoming any barriers (e.g. what are vested interests in retaining barriers?)*

It may be difficult to reform government-financed PES schemes. Transaction costs involved in identifying and dividing areas up into the ecosystem services they provide and then making payments conditional on the improved flow of those different ecosystem services will be costly.

*8) Potential role for SMEs*

Layered PES might be an effective way to introduce and encourage SMEs to contribute towards efforts to enhance ecosystem services.

**5. What important characteristics of ecosystems and ES might be of relevance to this business opportunity?**

*Insert a score from 0 (irrelevant) to 10 (extremely relevant)*

Scale of externalities involved										
Nature of market failures involved	<b>4</b>									
Business' (& sectors') dependency on the ES involved, and costs and availability of substitutes										
Opportunity costs related to ES provision	<b>4</b>									
Nature of property rights over the ES or environmental assets underpinning them	<b>4</b>									
Feasibility of managing the ES, and speed and predictability with which they respond to management					<b>8</b>					
Capital costs of altering ES management and provision						<b>4</b>				
Spatial and socio-economic distribution of ES beneficiaries (are they organised in coherent group that can take part in							<b>4</b>			
Spatial and economic distribution of ES providers								<b>8</b>		
Spatial and temporal relationships between ES providers and beneficiaries									<b>8</b>	
Nature of existing cultural, regulatory or market management structures										

*Briefly explain the above scores and to what extent these characteristics might affect the market potential*

1. Capital costs of altering their management and provision. High up-front cost of some PES schemes and the need to provide sustainable levels of finance over the long term make the use of layered PES structures appropriate. Layering ES provides clarity of what is being provided and is a potentially attractive means of leveraging private investment.
2. Spatial and temporal relationships between ecosystem service providers and beneficiaries. The different spatial and temporal scales that ecosystem services are provided over influence the type of organisation/individual willing to pay for them. Public goods are typically paid for by governments, while more excludable goods, such as water quality, can be financed by private companies. Layering the PES scheme, allows different organisations/individuals to pay for their preferred ES.
3. The nature of existing cultural, regulatory or market management structures. The existing government-financed PES schemes suffer from a range of inefficiencies, which mean that they are not optimally supporting ecosystem services. Reform to the ES and EWGS is likely to be beneficial.

**C. ECOSYSTEM POTENTIAL**

**6. How significant might this opportunity be for protecting/enhancing ecosystems, enhancing ES, enhancing goods derived from ES, and/or positively affecting drivers of ecosystem change?**

*Insert score(s) from 0 (no significance) to 10 (extremely significant)*

Drivers of (Ecosystem) Change	Ecosystems	Ecosystem Services	Goods derived from ES
	<b>4</b>	<b>8</b>	

*Briefly explain the above scores, provide page references to any relevant NEA evidence*

This opportunity is specifically targeted at increasing the flow of ecosystem services from a single area of land to multiple beneficiaries. It will allow ecosystems to be protected/enhanced where previously single revenue streams were insufficient.

**7. To which UK ecosystems (broad habitats as per the NEA) is this opportunity of relevance?**

*Insert score(s) from 0 (irrelevant) to 10 (extremely relevant)*

Mountains, moorlands & heaths	Semi-natural grasslands	Enclosed farmland	Woodlands	Freshwaters - openwaters, wetlands, floodplains	Urban	Coastal	Marine
8	8	8	8	8	8	8	8

*Briefly explain the above scores in relation to state and trends of relevant habitats – provide page references to any relevant NEA evidence*

This opportunity is relevant to all broad habitat types.

**8. To which ecosystem services are this opportunity of relevance?**

*Insert score(s) from 0 (irrelevant) to 10 (extremely relevant)*

Supporting	Regulating	Provisioning	Cultural
<b>2</b>	<b>8</b>	<b>8</b>	<b>8</b>

Briefly explain the above scores in relation to state and changes in relevant ES in the UK – provide page references to any relevant NEA evidence

It is perhaps easier to commodify, market and sell regulating, provisioning and cultural ecosystem services. It is less easy to sell different supporting services. Furthermore within these broad ecosystem services, some will be more easily commodified and marketed than others.

**9. To which drivers of change is this opportunity of relevance?**

Insert score(s) from 0 (irrelevant) to 10 (extremely relevant)

INDIRECT DRIVERS					DIRECT DRIVERS				
Demographic	Economic	Sociopolitical	Cultural and Behavioural	Scientific and Technological	Habitat Change	Pollution & Nutrient Enrichment	Overexploitation of Resources	Climate Variability & Change	Invasive Species

Briefly explain the above scores in relation to drivers of ecosystem change in the UK - provide page references to any relevant NEA evidence

Relevant to all – depends on the PES scheme

**10. For the ecosystems, ES and drivers of change of ecosystems of which countries (England, Northern Ireland, Scotland, Wales) is this opportunity relevant?**

Insert score(s) from 0 (irrelevant) to 10 (extremely relevant)

England	Northern Ireland	Scotland	Wales

Briefly explain the above scores – provide page references to any relevant NEA evidence

All

**11. Does this opportunity have international significance (for UK business, beyond the UK)?**

*Briefly explain the market and ecosystems potential beyond the UK*

If layered PES schemes can be piloted and their potential proven there is an opportunity for the UK to export this knowledge to other countries.

**D. SECTOR RELEVANCE**

**12. What sectors is the business opportunity of relevance to, on a scale of 0 (no relevance) to 10 (very relevant)?**

*Insert score(s) from 0 (irrelevant) to 10 (extremely relevant)*

Agriculture	Forestry	Fishing	Mining & Quarrying	Food Manufacture	Pharmaceuticals	Other manufacturing	Energy	Water, Waste Water	Construction	Transport	Tourism & Recreation	Wholesale & Retail	Creative, Media & Marketing	Financial Services	Public Administration	Education
10	10	5		3	3		3	8		3	3		3		6	3

*Briefly explain the above scores*

Principally relevant to agriculture, forestry and water, given that these are currently covered by the government-financed PES schemes and the sectors in which user-financed PES schemes are most likely to arise.

The initial complexities in setting up layered PES schemes would likely require advice from external consultants. Changes would also be required in the way government financed PES schemes are administered (public administration).

Other sectors, such as food manufacture and pharmaceuticals could play a role in purchasing ecosystem services from layered PES schemes.

**E. ENABLING ACTIONS**

**13. What kinds of enabling actions are of relevance to this business opportunity?**

*Insert score(s) from 0 (irrelevant) to 10 (extremely relevant)*

FOUND- ATIONAL	ENABLING			INSTRUMENTAL		
Knowledge	Legislation	Policies, Institutions & Governance	Changing Social Attitudes	Markets & Incentives	Technologies & Practices	Voluntary Actions, Education & Awareness
		10		10		

*Briefly explain the above scores, describing the actions needed, by whom (government, business, other) and what constraints, if any, these actions are designed to overcome*

Policies, institutions and governance – (in terms of reforming the grant scheme, which would involve a radical change in the way the funds are administered, monitored and reported).

Markets and incentives (in terms that the incentive structures (i.e. grants) for farmers and other land managers will need to be changed in order to include and leverage money from the private sector).

**F. FURTHER WORK TO BE DONE**

**14. What further research work might be required to explore the market and ecosystems potential of this opportunity and the required enabling actions?**

*Briefly explain*

In terms of layered PES at small scales, further research could involve pilot studies, market research into the appetite for such systems and research into the barriers and opportunities.

In terms of reforming government financed PES, work needs to be undertaken to understand the costs, benefits and challenges to such a proposal.

### **T3.3 Baseline ecosystem services provision**

#### **SUMMARY**

There are many potential market opportunities to sell ES, but each relies on some identification of additional (enhanced or avoided deterioration) provision of ecosystem services. This in turn requires a clear understanding of the current baseline of ES provision, against which such additional impacts can be assessed.

Our knowledge of ES baselines is improving, but is still uncertain, and is often self-assessed by ES providers. This creates an incentive for them to measure baselines with bias, and also inconsistency in how baselines are measured. It also can create barriers where expertise is needed (to measure baselines) that is not readily available to ES providers.

Detailed baseline information can be developed and sold by people with appropriate research expertise. It will need to be developed through transparent methods using best-available data (e.g. from UKNEA, satellite imagery and modelling such as that by Fezzi et al. reflected in UKNEA). Purchasers will be companies making decisions about investments in ecosystem services, who require accurate baseline information in order to assess the commercial returns on changes to those services. For example, if looking to utilise the peatland carbon code (see that proposal) an assessment of the baseline in terms of carbon emissions from a peatland area is essential to assess the potential to reduce GWP impacts.

#### **A. DESCRIPTION OF THE OPPORTUNITY**

##### **1. What is the business opportunity?**

*Provide a brief description*

Provide information to ES providers and purchasers to clearly and reliably measure baselines. This can help identify what is marketable and/or has commercial returns, and help confidence in ES products offered.

##### **2. Does this opportunity relate to new markets or greening of existing markets (or both)?**

*Provide a brief explanation*

Both. It will improve existing markets and initiate new markets through increased confidence in potential ecosystem service changes.

**3. What type of market opportunity or type of instrument/intervention does this business opportunity involve?**

*Insert an 'X' in the relevant box*

Product markets	Offsetting	Payments for ecosystem services	Environmental technologies	Markets for cultural services	Financial and legal services	Ecosystem knowledge economy	Corporate ecosystem initiatives	Eco-taxes, charges, levies, subsidies, grants	Other
x	x	x	x	x	x	x	x	x	

*Briefly explain the 'type' classification of the business opportunity*

Baselines are relevant to all ES markets.

**B. MARKET POTENTIAL**

**4. What is the market potential for this business opportunity with reference to the EMTF criteria?**

*Insert an 'X' in the appropriate box (0 = none, 10 = massive)*

<b>0</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>	<b>10</b>
						X				

*Briefly explain the above score, with reference to the EMTF criteria*

There are scientific uncertainties that limit ability to measure baselines. Buying baseline data may also be a difficult up-front cost for investors to bear, so the ability to sustain a commercially viable market size is uncertain.

**5. What important characteristics of ecosystems and ES might be of relevance to this business opportunity?**

*Insert a score from 0 (irrelevant) to 10 (extremely relevant)*

Scale of externalities involved	Nature of market failures involved	Business' (& sectors') dependency on the ES involved, and costs and availability of substitutes	Opportunity costs related to ES provision	Nature of property rights over the ES or environmental assets underpinning them	Feasibility of managing the ES, and speed and predictability with which they respond to management	Capital costs of altering ES management and provision	Spatial and socio-economic distribution of ES beneficiaries (are they organised in coherent group that can take part in	Spatial and economic distribution of ES providers	Spatial and temporal relationships between ES providers and beneficiaries	Nature of existing cultural, regulatory or market management structures

*Briefly explain the above scores and to what extent these characteristics might affect the market potential*

Baseline situation is effectively baselines state in terms of all these ES characteristic.

**C. ECOSYSTEM POTENTIAL**

**6. How significant might this opportunity be for protecting/enhancing ecosystems, enhancing ES, enhancing goods derived from ES, and/or positively affecting drivers of ecosystem change?**

*Insert score(s) from 0 (no significance) to 10 (extremely significant)*

Drivers of (Ecosystem) Change	Ecosystems	Ecosystem Services	Goods derived from ES
<b>6</b>	<b>6</b>	<b>6</b>	<b>6</b>

*Briefly explain the above scores, provide page references to any relevant NEA evidence*

Understanding of baselines is a necessary but insufficient for all these factors.

**7. To which UK ecosystems (broad habitats as per the NEA) is this opportunity of relevance?**

*Insert score(s) from 0 (irrelevant) to 10 (extremely relevant)*

Mountains, moorlands & heaths	Semi-natural grasslands	Enclosed farmland	Woodlands	Freshwaters - openwaters, wetlands, floodplains	Urban	Coastal	Marine

*Briefly explain the above scores in relation to state and trends of relevant habitats – provide page references to any relevant NEA evidence*

The approach is relevant to all habitats. It is particularly important where habitats provide multiple ecosystem services. This is because there can be barriers to simultaneous market opportunities for multiple ecosystem services (double dipping) due to questions over additionality. These barriers can be tackled through accurate ex-ante measurement of ES baselines and explicitly separating the market products of different services.

**8. To which ecosystem services are this opportunity of relevance?**

*Insert score(s) from 0 (irrelevant) to 10 (extremely relevant)*

<b>Supporting</b>	<b>Regulating</b>	<b>Provisioning</b>	<b>Cultural</b>

*Briefly explain the above scores in relation to state and changes in relevant ES in the UK – provide page references to any relevant NEA evidence*

This issue is relevant to all services. It faces greater challenges in relation to non-market ES, as a lack of markets means there is often a less reliable measure of ES levels.

**9. To which drivers of change is this opportunity of relevance?**

*Insert score(s) from 0 (irrelevant) to 10 (extremely relevant)*

INDIRECT DRIVERS					DIRECT DRIVERS				
Demographic	Economic	Sociopolitical	Cultural and Behavioural	Scientific and Technological	Habitat Change	Pollution & Nutrient Enrichment	Overexploitation of Resources	Climate Variability & Change	Invasive Species
	5			5	6	6	6	6	6

*Briefly explain the above scores in relation to drivers of ecosystem change in the UK - provide page references to any relevant NEA evidence*

Baselines are important to assessing economic and technological interactions. They are relevant to measuring the effects of all direct drivers

**10. For the ecosystems, ES and drivers of change of ecosystems of which countries (England, Northern Ireland, Scotland, Wales) is this opportunity relevant?**

*Insert score(s) from 0 (irrelevant) to 10 (extremely relevant)*

England	Northern Ireland	Scotland	Wales

*Briefly explain the above scores – provide page references to any relevant NEA evidence*

This issue is relevant to all ES markets.

**11. Does this opportunity have international significance (for UK business, beyond the UK)?**

*Briefly explain the market and ecosystems potential beyond the UK*

Yes, if well-developed, there is potential for export of services and expertise.

## D. SECTOR RELEVANCE

### 12. What sectors is the business opportunity of relevance to, on a scale of 0 (no relevance) to 10 (very relevant)?

*Insert score(s) from 0 (irrelevant) to 10 (extremely relevant)*

Agriculture	Forestry	Fishing	Mining & Quarrying	Food Manufacture	Pharmaceuticals	Other manufacturing	Energy	Water, Waste Water	Construction	Transport	Tourism & Recreation	Wholesale & Retail	Creative, Media & Marketing	Financial Services	Public Administration	Education

*Briefly explain the above scores*

Relevant to all sectors. It may be more important for primary production activities and other sectors directly managing land, which therefore can benefit from understanding current levels of ES from the land areas their operations influence.

## E. ENABLING ACTIONS

### 13. What kinds of enabling actions are of relevance to this business opportunity?

*Insert score(s) from 0 (irrelevant) to 10 (extremely relevant)*

FOUNDATIONAL	ENABLING			INSTRUMENTAL		
Knowledge	Legislation	Policies, Institutions & Governance	Changing Social Attitudes	Markets & Incentives	Technologies & Practices	Voluntary Actions, Education & Awareness
8		6				6

*Briefly explain the above scores, describing the actions needed, by whom (government, business, other) and what constraints, if any, these actions are designed to overcome*

Baselines effectively mean better information, so this is a foundational activity developing market knowledge.

**F. FURTHER WORK TO BE DONE**

**14. What further research work might be required to explore the market and ecosystems potential of this opportunity and the required enabling actions?**

*Briefly explain*

Interdisciplinary scientific-economic work to understand baselines more accurately.

### **T3.4 Ecosystems restoration**

#### **SUMMARY**

Ecosystems restoration is a tested concept that has found a new currency in the context of ecosystem services. Its business and economic viability has been proven across the world. One of the best examples is of the UK Eden Project established on 160 years old mining pit with in investment of USD 250 million that has played a major role in the regeneration of Cornwall economy and serves as a major educational and tourism attraction.

Ecosystems restoration can be achieved through enrichment of a degraded ecosystem, restoration of converted lands to their previous uses, and creation of all together new habitats. Spread across the UK and spanning all ecosystems types, these opportunities are in public private partnerships, in saving costs associated with fulfilling companies obligations for restoration as in the mining sector or for waste disposal as in the construction and transport sector, and generating new revenue streams as in case of Eden Project. The restoration will provide direct benefit in terms of ecosystems and, with creative thinking, enable other benefits such as carbon sequestration and waste management.

These opportunities have not been mapped and quantified which would be essential to understand the size of the business opportunity, the investments required and benefits entailed. It will also require the creation of an enabling framework including access to actionable information and supporting policy.

#### **A. DESCRIPTION OF THE OPPORTUNITY**

##### **1. What is the business opportunity?**

*Provide a brief description*

The opportunity is multifaceted. Degraded forest and heath lands can be restored with ecosystems benefits of soil, water and biodiversity conservation and business benefits through sustainable harvest of biomass and possibly other ecosystem provision services. The decline fish landing in UK is pretty well documented. Restoration of ecosystems supporting fisheries can enhance fisheries contribution to the UK economy. Restoration degraded farm and pasturelands can improve productivity. Perhaps some of the most and best potential is in restoration of abandoned mine sites, also called orphan or legacy sites.

The business and economic viability of such restoration has been proven across the world from Kenya, to Australia, Canada, USA and UK. One the best examples is of the Eden project established on 160 years old mining pit with in investment of USD 250 million that has played a major role in the regeneration of Cornwall economy and serves as a major educational and tourism attraction. A more recent example is of the project that Royal Society for the Protection of Birds (RSPB) is developing with Crossrail – the company building new underground rail for London. The idea is to use

excavation from the project to create a new habitat on a neglected island. It will save company costs in waste disposal and create an ecological resource with benefits for generation to come.

A matching example is of a quarry owned by one of the world largest cement companies – Holcim near Lusanne in Switzerland. The company is by contract bound to rehabilitate the quarry to its previous use of a mix of farm and forest land. However, the community has a pressing need for waste disposal site. It emerges that the mine site can be more beneficially used for a combination of waste disposal and recreation (rock climbing). It will save the company large sums in restoration costs, save the community costs in financing another waste site, prevent further land take for waste disposal and generate income from tourism.

Finding mutually beneficial linkages between infrastructure and other development projects and ecosystem restoration projects would be important as in the case of London Crossrail. There would be other cases for win-win partnerships around profitable restorations. This will require mapping and quantifying ecosystem degradation and associated restoration needs across the UK – particularly old mining sites - which by itself would be an interesting business opportunity.

Returns would be quick and significant on investments that can be large. However, natural regeneration can be allowed and supported with low cost and steady return over a longer period of time.

**2. Does this opportunity relate to new markets or greening of existing markets (or both)?**

*Provide a brief explanation*

We are essentially talking of new market opportunities through restoration ecology although the concept has been successfully tested in several places.

**3. What type of market opportunity or type of instrument/intervention does this business opportunity involve?**

*Insert an 'X' in the relevant box*

Product markets	Offsetting	Payments for ecosystem services	Environmental technologies	Markets for cultural services	Financial and legal services	Ecosystem knowledge economy	Corporate ecosystem initiatives	Eco-taxes, charges, levies, subsidies, grants	Other
	X	X	X	X		X			

Briefly explain the 'type' classification of the business opportunity

This is essentially an opportunity in restoring and harnessing ecosystem services for the benefit of business, society and environment. However, depending on what is restored to what, it also has an offsetting dimension as would be the case for mining sites.

## B. MARKET POTENTIAL

### 4. What is the market potential for this business opportunity with reference to the EMTF criteria?

Insert an 'X' in the appropriate box (0 = none, 10 = massive)

0	1	2	3	4	5	6	7	8	9	10
							X			

Briefly explain the above score, with reference to the EMTF criteria

The market potential is significant but the size of the total market will need to be established. It is amenable to high and low investments and can generate both short and long term benefits. It is scalable considering the large number of degraded land and seascapes. By its nature, restoration resembles a construction project that would employ people in restoration effort. Depending on the restoration effort, there would be opportunities both for big and small businesses.

### 5. What important characteristics of ecosystems and ES might be of relevance to this business opportunity?

Insert a score from 0 (irrelevant) to 10 (extremely relevant)

Scale of externalities involved	8
Nature of market failures involved	8
Business' (& sectors') dependency on the ES involved, and costs and availability of substitutes	2
Opportunity costs related to ES provision	9
Nature of property rights over the ES or environmental assets underpinning them	2
Feasibility of managing the ES, and speed and predictability with which they respond to management	8
Capital costs of altering ES management and provision	8
Spatial and socio-economic distribution of ES beneficiaries (are they organised in coherent group that can take part in	9
Spatial and economic distribution of ES providers	9
Spatial and temporal relationships between ES providers and beneficiaries	2
Nature of existing cultural, regulatory or market management structures	2

Briefly explain the above scores and to what extent these characteristics might affect the market potential

The opportunity embodies most of the characteristics of ecosystem services. Most relevant are the externalities and market failures that caused the degradation of ecosystems in the first place. Saving in opportunity costs in some known cases as of the Holcim quarry and Cross rail examples in terms of waste disposal and restoration can be huge. Management of the opportunity is feasible and capital costs requirements can vary along a wide range depending on how soon the eventual outcomes are desired or what pay-back period is desired. . The opportunity and the services and benefits it will provide will cover all regions of UK.

### C. ECOSYSTEM POTENTIAL

- 6. How significant might this opportunity be for protecting/enhancing ecosystems, enhancing ES, enhancing goods derived from ES, and/or positively affecting drivers of ecosystem change?**

Insert score(s) from 0 (no significance) to 10 (extremely significant)

Drivers of (Ecosystem) Change	Ecosystems	Ecosystem Services	Goods derived from ES
3	10	8	9

Briefly explain the above scores, provide page references to any relevant NEA evidence

The opportunity will address some drivers of change but its main benefits will accrue from restoring and possibly expanding ecosystems and from the services and goods that they will provide.

- 7. To which UK ecosystems (broad habitats as per the NEA) is this opportunity of relevance?**

Insert score(s) from 0 (irrelevant) to 10 (extremely relevant)

Mountains, moorlands & heaths	Semi-natural grasslands	Enclosed farmland	Woodlands	Freshwaters - openwaters, wetlands, floodplains	Urban	Coastal	Marine
9	9	5	9	7	3	7	7

Briefly explain the above scores in relation to state and trends of relevant habitats – provide page references to any relevant NEA evidence

The opportunity is relevant to all ecosystems and habitats because degradation has not been confined to a particular ecosystem. Some ecosystems may have degraded more than others and by that measure presumably most and best opportunities would be in mountains, moors and heath lands, semi natural grasslands, woodlands and coastal and marine environments.

**8. To which ecosystem services are this opportunity of relevance?**

*Insert score(s) from 0 (irrelevant) to 10 (extremely relevant)*

Supporting	Regulating	Provisioning	Cultural
2	7	9	8

*Briefly explain the above scores in relation to state and changes in relevant ES in the UK – provide page references to any relevant NEA evidence*

Assessing from the available examples within and outside UK, the opportunity is most relevant for providing provisioning services as in waste disposal, cultural services as in recreation and tourism, and regulating services as in purifying and improving quality of fresh water.

**9. To which drivers of change is this opportunity of relevance?**

*Insert score(s) from 0 (irrelevant) to 10 (extremely relevant)*

INDIRECT DRIVERS					DIRECT DRIVERS				
Demographic	Economic	Sociopolitical	Cultural and Behavioural	Scientific and Technological	Habitat Change	Pollution & Nutrient Enrichment	Overexploitation of Resources	Climate Variability & Change	Invasive Species
4	8		4		10	6	8	3	

*Briefly explain the above scores in relation to drivers of ecosystem change in the UK - provide page references to any relevant NEA evidence*

Demographic pressures and cultural behaviours will have contributed to degradation but much of it is often driven by the economic imperative of earning income and sustaining livelihoods. Habitat change would be the most relevant direct driver. Equally important would be the related overexploitation of resources. To the extent, a restoration effort would aim at water quality, the driver of pollution would also be relevant

**10. For the ecosystems, ES and drivers of change of ecosystems of which countries (England, Northern Ireland, Scotland, Wales) is this opportunity relevant?**

*Insert score(s) from 0 (irrelevant) to 10 (extremely relevant)*

England	Northern Ireland	Scotland	Wales
7	5	5	5

*Briefly explain the above scores – provide page references to any relevant NEA evidence*

The opportunity is applicable to all countries of United Kingdom. If it is assumed that degradation and potential restoration opportunities commensurate with the size of the countries, the market size will vary accordingly. With the history of coal and other open pit mining, longer coast line, the opportunity may be relatively more relevant for England.

**11. Does this opportunity have international significance (for UK business, beyond the UK)?**

*Briefly explain the market and ecosystems potential beyond the UK*

The opportunity is focussed on domestic ecosystems and opportunities for restoration, although the skills and experiences acquired might be of global application and exportable.

**D. SECTOR RELEVANCE**

**12. What sectors is the business opportunity of relevance to, on a scale of 0 (no relevance) to 10 (very relevant)?**

*Insert score(s) from 0 (irrelevant) to 10 (extremely relevant)*

Agriculture	Forestry	Fishing	Mining & Quarrying	Food Manufacture	Pharmaceuticals	Other manufacturing	Energy	Water, Waste Water	Construction	Transport	Tourism & Recreation	Wholesale & Retail	Creative, Media & Marketing	Financial Services	Public Administration	Education
9	9	9	10					9	2	2	5	2				6

*Briefly explain the above scores*

Most restoration needs and opportunities would appear in farming, forestry, fisheries and mining and waste management sectors as indicated by the evidence available in NEA and the examples mentioned before.

**E. ENABLING ACTIONS**

**13. What kinds of enabling actions are of relevance to this business opportunity?**

*Insert score(s) from 0 (irrelevant) to 10 (extremely relevant)*

FOUND- ATIONAL	ENABLING			INSTRUMENTAL		
Knowledge	Legislation	Policies, Institutions & Governance	Changing Social Attitudes	Markets & Incentives	Technologies & Practices	Voluntary Actions, Education & Awareness
10	5	10	3	7	4	2

*Briefly explain the above scores, describing the actions needed, by whom (government, business, other) and what constraints, if any, these actions are designed to overcome*

Most pressing is the requirement to ascertain the factual positions as to how many and how large the restoration needs and opportunities and how they are distributed across the Kingdom. Also required will be enabling policies that incentivize restoration and leverage the market interest and investment for the purpose.

**F. FURTHER WORK TO BE DONE**

**14. What further research work might be required to explore the market and ecosystems potential of this opportunity and the required enabling actions?**

*Briefly explain*

As mentioned above. Scoping and mapping out the ecosystems restoration needs and opportunities across the Kingdom for the government to make informed policy choices and for business to confidently partake in implementing those policies.

## 4 ENVIRONMENTAL TECHNOLOGIES

### *T4.1 Water reuse technologies*

#### SUMMARY

The business opportunity presented is water reuse technologies. Production systems usually function in a linear way as they receive clean water for a water provider and discharge effluent (often of a high pollutant load) to the environment. Water reuse which is enabled by appropriate treatment technologies<sup>18</sup> compares favourably to the traditional linear use of water.

From an environmental perspective, it can lead to a reduced need to extract water from the environment, reduced energy consumption for water abstraction, treatment and transportation, and a significant reduction or elimination of pollution from effluent discharge to the water environment. From a business perspective, water reuse reduces dependencies for the supply of clean water (encourages self-sufficiency), can generate income from the sale of water to third parties, allows savings on wastewater discharge, and reduces business risks related to spatial and temporal water availability and possible changes in regulations regarding wastewater management and discharge (which can entail additional costs for a business). Water related restrictions on production expansion are removed, and this is a critical benefit given the increasing pressures of water scarcity internationally. Finally, it is an initiative that can improve the profile of a company by making it more sustainable and innovative and thus more appealing to public and potential industrial partners.

This opportunity is very relevant for the entire UK, most habitats and all ecosystem services (provisioning, supporting, regulating and cultural). The market potential is judged as very significant. Knowledge, technologies and practices, institutions and governance, change in public perception, and awareness are among the very relevant enabling actions for this opportunity.

In order for implementation to be successful the setting has to be appropriate in terms of extant policies, economic, social and environmental aspects. An in-depth investigation of how these conditions are structured for the UK is necessary in order to identify sectors that are more suitably placed for this opportunity and what future actions are required.

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<sup>18</sup> Technologies that deliver the highest grade water for reuse – ultrafiltration, reverse osmosis and ultraviolet disinfection – have become cheaper and more effective.

## A. DESCRIPTION OF THE OPPORTUNITY

### 1. What is the business opportunity?

*Provide a brief description*

Water reuse is a sustainable practice that can be financially profitable. Recycled water can satisfy most water demands, as long as it is adequately treated to ensure water quality appropriate for the intended further use. Common industrial practice typically consists of end-of-pipe solutions that will allow the effluent to meet certain discharge standards before being released into the environment, and the separate sourcing of clean water for their operations. Such linear modes of production are unsustainable and costly. By reusing water a number of benefits can be achieved: contribution to alleviating water scarcity problems, pollution prevention through decreased effluent discharge, enhancement of the status of wetlands and other habitats, water conservation from the reduced need to extract and treat freshwater, reduced energy costs from the separate treatment of freshwater and wastewater, and a business opportunity from exporting the recovered water to other end uses (agricultural and landscape irrigation, cooling water for power plants and oil refineries, other industrial uses, drinking water, boiler make-up water etc), enhanced self-sufficiency for water, reduction of wastewater discharge costs, elimination of business risks related to water availability and possible future regulatory changes on wastewater discharge and management (that could entail additional costs), and 'greening' of the business and increasing its brand value.

Examples of technologies that deliver the highest grade water for reuse are ultra filtration, reverse osmosis and ultraviolet disinfection (often in combination).

The application of water reuse technologies is very limited in the UK. There is a lot of potential from establishing such practices both from a business point of view as well as from an environmental one. Managing impacts of production activities alone is not enough. Innovation is required in the form of water reuse. If we take into account that the quality of raw water for drinking water production is often worse than effluent discharge, and that the cost of wastewater treatment is as high as for drinking water then it makes sense to close the loop. Rather than releasing high quality wastewater effluent back into the environment and then paying to retreat it for drinking water purposes it is more sustainable and energy efficient to close the loop.

A wide range of applications of this approach can be found in the literature, with some companies having a very strong presence in this field. Intel Corporation (intel) has developed water sustainability measures to reduce fresh water consumption which is inherently high for its operations (e.g. need for large amounts of ultra pure water for washing silicon wafers). The resulting water savings have been estimated at 3 billion gallons of water annually<sup>19</sup>. Water reuse technologies have significantly contributed to this outcome. Intel's facility in Albuquerque, New Mexico is an example of water reuse practice. Depletion of groundwater reserves in Albuquerque's primary aquifer had created strong pressures for businesses to minimize water use. By installing a high-

<sup>19</sup> <http://www.intel.com/content/dam/doc/report/corporate-responsibility-2008-report.pdf>

recovery reverse osmosis water purification process, improving chip washing and rinsing techniques, and using water-efficient landscaping, the Intel facility has reduced water use by 47 percent since 1994. Intel also reuses water from semiconductor rinsing in other industrial processes. In addition, the company pre-treats wastewater and returns it directly to the city treatment facility. Seventy five to eighty five percent of all water Intel uses in manufacturing at this facility is eventually returned to the Rio Grande River.<sup>20</sup> Similarly, in its Ocotillo Campus, Intel applies Reverse Osmosis to treat production effluent in order to recharge the underground aquifer. It is estimated that more than 3.5 billion gallons of drinking quality water to the underground aquifer for eventual reuse since project inception<sup>21</sup>.

**2. Does this opportunity relate to new markets or greening of existing markets (or both)?**

*Provide a brief explanation*

Both. This opportunity will lead to the greening of existing markets as it will make industries more efficient in the way they manage water and less polluting. At the same time it will create new markets as the treated for reuse water will be made available for other parties. The type of demand will need to match with the quality of the recycled water.

**3. What type of market opportunity or type of instrument/intervention does this business opportunity involve?**

*Insert an 'X' in the relevant box*

Product markets	Offsetting	Payments for ecosystem services	Environmental technologies	Markets for cultural services	Financial and legal services	Ecosystem knowledge economy	Corporate ecosystem initiatives	Eco-taxes, charges, levies, subsidies, grants	Other
X			X						

<sup>20</sup> <http://www.gemi.org/water/intel2.htm>

<sup>21</sup> <http://www.epa.gov/region9/waterinfrastructure/docs/Intel-Ocotillo-Arizona.pdf>

*Briefly explain the 'type' classification of the business opportunity*

The opportunity consists is an innovative technological solution that will generate a marketable product (water).

## **B. MARKET POTENTIAL**

### **4. What is the market potential for this business opportunity with reference to the EMTF criteria?**

*Insert an 'X' in the appropriate box (0 = none, 10 = massive)*

0	1	2	3	4	5	6	7	8	9	10
									X	

*Briefly explain the above score, with reference to the EMTF criteria*

The market potential is very significant given the huge amounts of water that are required to sustain the diversity of production activities and the wastewater that is subsequently produced, especially if some measures were to influence issues linked directly to global water security as the overseas component of the UK's "water footprint" may be as high as 65%. The benefits of this approach have been demonstrated in practice by successful examples.

The current challenges are to achieve a shift in perceptions regarding water, the incorporation of innovative thinking in business practice and institutional changes that will allow for a favourable implementation framework. The economic viability of the option is context specific, and a cost-benefit analysis for the various parties involved would need to be carried out.

**5. What important characteristics of ecosystems and ES might be of relevance to this business opportunity?**

*Insert a score from 0 (irrelevant) to 10 (extremely relevant)*

Scale of externalities involved	Nature of market failures involved	Business' (& sectors') dependency on the ES involved, and costs and availability of substitutes	Opportunity costs related to ES provision	Nature of property rights over the ES or environmental assets underpinning them	Feasibility of managing the ES, and speed and predictability with which they respond to management	Capital costs of altering ES management and provision	Spatial and socio-economic distribution of ES beneficiaries (are they organised in coherent group that can take part in	Spatial and economic distribution of ES providers	Spatial and temporal relationships between ES providers and beneficiaries	Nature of existing cultural, regulatory or market management structures
<b>9</b>	<b>8</b>	<b>10</b>	<b>5</b>	<b>5</b>	<b>8</b>	<b>8</b>	<b>9</b>	<b>9</b>	<b>8</b>	<b>10</b>

*Briefly explain the above scores and to what extent these characteristics might affect the market potential*

The business's dependence on water, the scale of externalities involved (wastewater discharge) as well as existing cultural, regulatory and market management structures (determining the viability and prospects of success for each such project) are judged as extremely relevant for this opportunity. The capital cost is also a substantial aspect.

**C. ECOSYSTEM POTENTIAL**

**6. How significant might this opportunity be for protecting/enhancing ecosystems, enhancing ES, enhancing goods derived from ES, and/or positively affecting drivers of ecosystem change?**

*Insert score(s) from 0 (no significance) to 10 (extremely significant)*

Drivers of (Ecosystem) Change	Ecosystems	Ecosystem Services	Goods derived from ES
<b>7</b>	<b>10</b>	<b>10</b>	<b>10</b>

*Briefly explain the above scores, provide page references to any relevant NEA evidence*

Although high quality freshwater is the most apparent service provided, this opportunity can enhance the quality of all ecosystems and ecosystem services as improved water availability (through reduced water extraction or augmenting water flow in streams that have been dried up by water diversion) and quality is a

fundamental element of all ecosystem functions and ecosystem services.

**7. To which UK ecosystems (broad habitats as per the NEA) is this opportunity of relevance?**

*Insert score(s) from 0 (irrelevant) to 10 (extremely relevant)*

Mountains, moorlands & heaths	Semi-natural grasslands	Enclosed farmland	Woodlands	Freshwaters - openwaters, wetlands, floodplains	Urban	Coastal	Marine
8	8	8	8	10	9	8	7

*Briefly explain the above scores in relation to state and trends of relevant habitats – provide page references to any relevant NEA evidence*

Freshwaters are extremely relevant for this opportunity as these are affected by water extraction and effluent discharge. Freshwater can however be sourced from and/or is required for the function of all ecosystems (mountains moorlands and heaths, semi-natural grasslands, woodlands). Marine ecosystems benefit from reduced industrial discharge.

**8. To which ecosystem services are this opportunity of relevance?**

*Insert score(s) from 0 (irrelevant) to 10 (extremely relevant)*

<b>Supporting</b>	<b>Regulating</b>	<b>Provisioning</b>	<b>Cultural</b>
<b>10</b>	<b>10</b>	<b>10</b>	<b>10</b>

*Briefly explain the above scores in relation to state and changes in relevant ES in the UK – provide page references to any relevant NEA evidence*

Being an essential resource for all ecosystem functions, water is extremely relevant to all services.

The NEA evidence notes the decreasing importance (the direction of change in the flow of services is deterioration) of freshwaters in delivering all types of provisioning services. The trend is similar (deterioration or no net change) for freshwaters and regulating services (NEA synthesis report, page 11). The qualitative and quantitative water improvements that will arise from this opportunity can help reverse these negative trends.

**9. To which drivers of change is this opportunity of relevance?**

*Insert score(s) from 0 (irrelevant) to 10 (extremely relevant)*

INDIRECT DRIVERS					DIRECT DRIVERS				
Demographic	Economic	Sociopolitical	Cultural and Behavioural	Scientific and Technological	Habitat Change	Pollution & Nutrient Enrichment	Overexploitation of Resources	Climate Variability & Change	Invasive Species
8	7	8	9	10	10	10	10	10	0

*Briefly explain the above scores in relation to drivers of ecosystem change in the UK - provide page references to any relevant NEA evidence*

This opportunity is essentially linked with reducing water pollution and overexploitation. Climate change is also placing increasing pressure on freshwater resources and therefore water re-use offers an opportunity for improvement in this area. Habitat change can be profound as a result of pollution and water extraction.

The importance of the opportunity for the UK context is supported by the NEA evidence. More precisely, overexploitation is noted as having increasing impact (current and ongoing trend) on the extent and condition of freshwaters (openwaters, wetlands and floodplains), and water provision. Pollution and nutrient enrichment are also increasingly impacting water (provisioning service) and water cycling (supporting service). A very rapid increase of impact of climate change on water and water cycling is also identified by the NEA (NEA synthesis report, page 28). Improvements in these aspects are within the scope of the proposed opportunity.

Ofwat’s attitude towards water industry innovations is a critical factor and this is reflected in the score for the socio-political driver.

**10. For the ecosystems, ES and drivers of change of ecosystems of which countries (England, Northern Ireland, Scotland, Wales) is this opportunity relevant?**

*Insert score(s) from 0 (irrelevant) to 10 (extremely relevant)*

England	Northern Ireland	Scotland	Wales
10	10	10	10

Briefly explain the above scores – provide page references to any relevant NEA evidence

This is an opportunity very relevant to all of the countries above, but more so for England due to water shortages and higher population densities.

**11. Does this opportunity have international significance (for UK business, beyond the UK)?**

Briefly explain the market and ecosystems potential beyond the UK

The opportunity is of international importance. Water reuse is of relevance for a wide range of water consuming industries, and particularly so for those consuming great quantities of this resource (e.g. oil sector) and/or generating highly contaminated effluents. Moreover, arid regions could exceptionally benefit from water reuse schemes.

The UK could export expertise in other countries and have a leading role in establishing markets for this opportunity.

**D. SECTOR RELEVANCE**

**12. What sectors is the business opportunity of relevance to, on a scale of 0 (no relevance) to 10 (very relevant)?**

Insert score(s) from 0 (irrelevant) to 10 (extremely relevant)

Agriculture	Forestry	Fishing	Mining & Quarrying	Food Manufacture	Pharmaceuticals	Other manufacturing	Energy	Water, Waste Water	Construction	Transport	Tourism & Recreation	Wholesale & Retail	Creative, Media & Marketing	Financial Services	Public Administration	Education
10	4	7	8	9	7	10	10	10	9	6	9	4	2	3	6	6

Briefly explain the above scores

The water and wastewater sector are highly relevant and will be changed by the introduction of water reuse technologies.

The energy sector is a major water consumer and is therefore also highly relevant.

The food and beverages industry is also very relevant for this opportunity.

Agriculture is a great consumer of water and could displace its freshwater demand with recycled water.

Construction is also a suitable user of recycled water (concrete mixing).

Recreation is a main sector affected, for example suitability of water for swimming and fishing etc.

**E. ENABLING ACTIONS**

**13. What kinds of enabling actions are of relevance to this business opportunity?**

*Insert score(s) from 0 (irrelevant) to 10 (extremely relevant)*

FOUND- ATIONAL	ENABLING			INSTRUMENTAL		
Knowledge	Legislation	Policies, Institutions & Governance	Changing Social Attitudes	Markets & Incentives	Technologies & Practices	Voluntary Actions, Education & Awareness
9	5	10	9	8	10	9

*Briefly explain the above scores, describing the actions needed, by whom (government, business, other) and what constraints, if any, these actions are designed to overcome*

The most important enabling actions are: policies, institutions and governance, changing social attitudes (understanding that water generated through such technologies can be of very high standards and safe for use etc), knowledge generation and exchange (importantly making best use of existing knowledge and technologies), technologies and practices, markets and incentives, voluntary actions and education and leadership. While large companies with an international presence are more likely to engage in such opportunities as part of their long term planning and in the interest of creating a sustainable profile (as is currently the case), SMEs may be more reluctant to adopt this technology as they may not perceive the potential benefits. The collection and dissemination of information in order to make a business case for this opportunity is therefore very crucial. Developing a clear agenda of business needs across all sectors would help drive innovation and any necessary research.

**F. FURTHER WORK TO BE DONE**

**14. What further research work might be required to explore the market and ecosystems potential of this opportunity and the required enabling actions?**

*Briefly explain*

The successful application of water reuse requires a combination of appropriate regulatory, economic, technological, social and environmental conditions. The presence of suitable water policy and public support, the right correspondence between water treatment technologies and intended uses (in order to reduce risks for secondary users) and accounting of the ecological effects of such projects are success prerequisites.

Research into the current UK context on water (shifting due to the need to cope with short term extremes and long term trends towards scarcity driven by climatic factors and demographic issues) and how it can be improved in order to achieve the

appropriate balance of regulatory, economic, technological and socio-political conditions is needed. This research would help ensure business attitudes and decisions on water were fully conversant with supply chain opportunities and customers' social profiles, and might be targeted on opportunities for developing customer awareness of how to manage their water use and local, in-house and in-garden resources more sustainably.

Developing more clarity on how different businesses value and see their dependencies and vulnerabilities to water extremes and long term trends and changes to the regulatory regimes presaged in the Water and Natural Environment White Papers (e.g. changes to abstraction regimes) may point up business opportunities.

Decision making should be evidence based, and aligning the work of EMTF and the UK Water Research and Innovation Partnership (chaired by the Government Chief Scientific Adviser) is important and would help improve access to and influence over the research base and innovation opportunities (such as those provided through the Technology Strategy Board).

Scoping how to develop and share knowledge on how water is currently used in business will allow for the development of appropriate models of water use with outputs that can be used to inform decision-making.

Scoping studies developing on-site demonstrations of water efficiency will encourage customers to purchase scaled down (or scaled-up versions) of the technologies and products involved (e.g. to maintain gardens during dry periods and reduce time needed for maintenance).

Data and information requirements that will enable this opportunity need to be identified and then addressed.

**The role of Ofwat is regarded as critical in encouraging innovation for water reuse.**

## ***T4.2 Product redesign for generating secondary outputs***

### **SUMMARY**

The proposed business opportunity consists of redesign of production processes or new technologies to produce secondary outputs of value instead of the waste normally generated during production.

For companies, optimising the use of resources is an axis of innovation, which can be integrated into the product development and process design stages. While current eco-design practices usually suggest the minimisation of waste, it might be more profitable and eco-friendly, under certain conditions, to design innovative products so that valuable waste (secondary outputs) is generated. Important business benefits that this approach can deliver include: revenue generation from the sale of secondary outputs, savings on discharge costs, savings on the purchase of raw materials, minimisation of environmental compliance costs, security of supply of critical materials, production expansion despite restrictions in the natural availability of certain resources etc.

The opportunity is relevant for all parts of the UK and affects the quality of all ecosystems due to the broad environmental improvements that can be achieved (both in terms of reductions in resource extraction and need for pollution control). It is relevant to most extractive and manufacturing industries, the energy sector and water management. Other sectors can also benefit such as agriculture, while others will undoubtedly be involved to enhance implementation, such as consultancy.

Foundational, enabling and instrumental actions are required for successful implementation of this opportunity, given the multitude of its elements (e.g. issues of perception, legislation, policies, technologies etc). SOs can be reutilised in other processes of the same firm, sold to the market or exchanged through bilateral partnerships within industrial networks. The influence of local social contexts is significant. The domination of product-based approach, the risks of dependency and the waste legislation are among the prominent obstacles to SO reutilisation; they may be overcome through effective communication and stakeholder interactions. The potential of reflexive policies guiding regional industrial networks can be critical for this opportunity.

### **A. DESCRIPTION OF THE OPPORTUNITY**

#### **1. What is the business opportunity?**

*Provide a brief description*

The material intensity and associated natural resource dependency, and the ever increasing cost of managing waste generated of production processes raise concerns over how to sustainably manage resources and protect the environment.

Current industrial practice focuses on minimising the environmental impact through

the reduction of the amount of waste generated. However, if the discarded 'waste' could be used as a valuable resource for another production activity, this would result in reducing both the need to extract resources from the natural environment and the amount of pollution released with waste generation.

There is therefore a business opportunity with this profitable and environmentally desirable approach to generate secondary outputs of better quality that can be reutilised in other processes. This approach aims to maximise the value generated from each raw material entering the economy, in addition to reducing cost associated with waste minimisation or management, while decoupling production from natural resources where possible. According to whether a secondary output is used within the company that produces it, sold to the market or used by other firms through a partnership, a number of benefits can be derived. These include:

- minimisation of environmental compliance costs;
- savings on the purchase of raw materials;
- savings (and possibly elimination) on disposal costs;
- risk minimisation in the supply chain (e.g. by ensuring the supply of critical materials);
- overcoming the local scarcity of resources, which under other circumstances could limit production expansion;
- maximisation of operational efficiency with regard to the use of energy, the handling of materials etc;
- diversification of products resulting in revenue generation from the sale of secondary outputs, and reduction of vulnerability to market volatility;
- improved access to technology through mutualisation (in the case of industrial networks);
- generation of 'green' brand value; and
- maximisation of the value generated per unit input in the production process.

This approach is already practiced, and a range of case studies can be found in the literature:

- DuPont presents an example of how process modification can enable product reuse, delivering a series of benefits for the company. The company operates a nylon and polyethylene manufacturing plant in Victoria, Texas along the Guadalupe River and Victoria Barge Canal. The plant (in operation since 1951) used to rely on deep well injection as its sole wastewater discharge method. Although this is an approved by the US EPA practice, DuPont was concerned about the business disruption that could arise from increasing community concerns and potential regulatory changes that would restrict this technique in the future. Working closely with experts and the local community, it developed an innovative water treatment system and a constructed wetland system to replace the need for deep well injection. The modification of the production process allowed DuPont to recover and reuse over 250,000 pounds of material

formerly lost to wastewater streams daily. Of this material, 75% is sold to customers or recycled as catalyst and raw material, and the other 25% serves as fuel and offsets natural gas use at the plant. The remaining wastewater is then treated in an on-site biological treatment facility, before being released to the newly constructed wetlands for further polishing prior to its return to the Guadalupe River.<sup>22</sup>

- Eco-industrial parks are an example of how material and energy flows between different production processes can be adjusted to maximise efficiency, produce revenue and reduce environmental impact.
- The Kalundborg industrial complex is a characteristic case study. Located about 110 km from Copenhagen, Denmark, this industrial system has evolved over the past 35 years and has developed a complex network of material flows. There are six main industrial units in this complex: a coal-fired power plant, an oil refinery, a plasterboard factory, a pharmaceutical plant, an enzyme producer as well as a recycling company, a waste company and the municipality. With the 19 secondary output exchanges that take place, an annual profit of US\$15 million is made mostly through resource savings. Although this revenue alone favourably compares to the US\$75 millions that were invested<sup>23</sup>, main reported gains relate to the security of supply, technological improvements, and the ability to expand production despite the groundwater scarcity which formerly constrained production.

## **2. Does this opportunity relate to new markets or greening of existing markets (or both)?**

*Provide a brief explanation*

This opportunity relates to both new markets and greening of existing ones. Existing markets can become more resource efficient and profitable through the modification of production processes and the exchange of valuable materials.

Currently such material exchange practices are a niche technology. This is an opportunity to establish material exchange networks and markets in the UK.

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<sup>22</sup> <http://www.gemi.org/water/dupont.htm>

<sup>23</sup> Jacobsen, N. B. & Anderberg, S. (2004) Understanding the Evolution of Industrial Symbiosis Networks: The Case of Kalundborg. In: van den Bergh, J. C. J. M. & Janssen, M. A. (eds.) *Economics of Industrial Ecology*. Cambridge, MA, MIT Press, pp. 313-335.

**3. What type of market opportunity or type of instrument/intervention does this business opportunity involve?**

*Insert an 'X' in the relevant box*

Product markets	Offsetting	Payments for ecosystem services	Environmental technologies	Markets for cultural services	Financial and legal services	Ecosystem knowledge economy	Corporate ecosystem initiatives	Eco-taxes, charges, levies, subsidies, grants	Other
x			x						

*Briefly explain the 'type' classification of the business opportunity*

The suggested opportunity is an environmental technology.

A wide definition of technology is used (in accordance with the EU) based on the OECD definition for environmentally sound technologies. This contrasts with an older approach of environmental technologies, covering traditional end-of-pipe technologies, e.g. water supply and sanitation, waste treatment, air pollution abatement, soil remediation and monitoring techniques, etc. The new approach, now widely accepted, covers also cleaner production processes in all industrial sectors, energy-saving techniques and renewable energies, and also new products, services and business methods having less impact on the environment than their current alternatives.

**B. MARKET POTENTIAL**

**4. What is the market potential for this business opportunity with reference to the EMTF criteria?**

*Insert an 'X' in the appropriate box (0 = none, 10 = massive)*

<b>0</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>	<b>10</b>
								X		

*Briefly explain the above score, with reference to the EMTF criteria*

The market potential is significant. As there is a very wide range of production activities (many types of materials and very large quantities generated), the possibilities for creating synergies are numerous. The scalability of this business opportunity is potentially huge. Moreover, the presence of leaders in this innovative technological approach would be very influential.

Although there is experience from applying such practices in different parts of the

world, the potential benefits need to be better communicated. This would help overcome the risk of cooperation which would likely be of concern to participants. Current risks mostly relate to the policy framework which seems to be more aligned with the waste minimisation principle.

This is an opportunity that can yield important financial gains and also ensure the security of supply for industries, if the setting is well structured.

**5. What important characteristics of ecosystems and ES might be of relevance to this business opportunity?**

*Insert a score from 0 (irrelevant) to 10 (extremely relevant)*

Scale of externalities involved	Nature of market failures involved	Business' (& sectors') dependency on the ES involved, and costs and availability of substitutes	Opportunity costs related to ES provision	Nature of property rights over the ES or environmental assets underpinning them	Feasibility of managing the ES, and speed and predictability with which they respond to management	Capital costs of altering ES management and provision	Spatial and socio-economic distribution of ES beneficiaries (are they organised in coherent group that can take part in	Spatial and economic distribution of ES providers	Spatial and temporal relationships between ES providers and beneficiaries	Nature of existing cultural, regulatory or market management structures
<b>7</b>	<b>8</b>	<b>9</b>	<b>8</b>	<b>4</b>	<b>5</b>	<b>5</b>	<b>3</b>	<b>3</b>	<b>4</b>	<b>3</b>

*Briefly explain the above scores and to what extent these characteristics might affect the market potential*

The proposed opportunity aims to decouple production from natural resources and ecosystem services and reduce costs of managing its impacts to the environment.

**C. ECOSYSTEM POTENTIAL**

**6. How significant might this opportunity be for protecting/enhancing ecosystems, enhancing ES, enhancing goods derived from ES, and/or positively affecting drivers of ecosystem change?**

*Insert score(s) from 0 (no significance) to 10 (extremely significant)*

Drivers of (Ecosystem) Change	Ecosystems	Ecosystem Services	Goods derived from ES
<b>7</b>	<b>9</b>	<b>9</b>	<b>9</b>

Briefly explain the above scores, provide page references to any relevant NEA evidence

The proposed opportunity will significantly enhance all the above components. The benefits will be delivered through: less waste released to the environment as it will be turned into a valuable resource for other processes; reduced need for resource extraction, processing and transportation; encouragement of sustainable business practice.

**7. To which UK ecosystems (broad habitats as per the NEA) is this opportunity of relevance?**

*Insert score(s) from 0 (irrelevant) to 10 (extremely relevant)*

Mountains, moorlands & heaths	Semi-natural grasslands	Enclosed farmland	Woodlands	Freshwaters - openwaters, wetlands, floodplains	Urban	Coastal	Marine
8	6	5	8	8	8	5	5

Briefly explain the above scores in relation to state and trends of relevant habitats – provide page references to any relevant NEA evidence

The proposed opportunity will be of relevance for all the above ecosystems. Reduced pollution and a lesser need for extracting resources from the natural environment (with its associated emissions and impact on landscape) will help improve environmental quality overall. For example the reduction of atmospheric CO<sub>2</sub> emissions and the resulting change in the climate is an outcome that affects to some extent all habitats. From the above ecosystems the ones that are perhaps less relevant than the others are the marine, semi-natural grasslands and enclosed farmlands.

The proposed opportunity can alleviate the overexploitation of resources, which as suggested by the NEA evidence is increasingly impacting mountains, moorlands and heaths, freshwaters (open waters, wetlands and floodplains), semi-natural grasslands and the marine habitat (NEA, synthesis of key findings, page 27).

**8. To which ecosystem services are this opportunity of relevance?**

*Insert score(s) from 0 (irrelevant) to 10 (extremely relevant)*

<b>Supporting</b>	<b>Regulating</b>	<b>Provisioning</b>	<b>Cultural</b>
<b>10</b>	<b>10</b>	<b>10</b>	<b>7</b>

Briefly explain the above scores in relation to state and changes in relevant ES in the UK – provide page references to any relevant NEA evidence

This is a business opportunity extremely relevant for supporting, regulating and provisioning services. For example, regarding provisioning services, there is less need to extract water, fibre, timber and minerals and these resources are preserved.

In terms of regulating services there is a positive contribution to water quality, less pressure on natural ecosystems’ capacity to degrade waste and reduction of the climate change potential of production activities. Supporting services are also enhanced through the improved environmental quality.

Finally, cultural services are of considerable relevance as recreational activities are favoured by decreased pollution and fewer human interventions which modify the landscape.

**9. To which drivers of change is this opportunity of relevance?**

*Insert score(s) from 0 (irrelevant) to 10 (extremely relevant)*

INDIRECT DRIVERS					DIRECT DRIVERS				
Demographic	Economic	Sociopolitical	Cultural and Behavioural	Scientific and Technological	Habitat Change	Pollution & Nutrient Enrichment	Overexploitation of Resources	Climate Variability & Change	Invasive Species
5	5	7	10	10	8	10	10	10	0

Briefly explain the above scores in relation to drivers of ecosystem change in the UK - provide page references to any relevant NEA evidence

This is mostly covered in other sections. The opportunity is relevant to most drivers with the exception perhaps of demographic drivers.

According to the NEA, a socio-political and cultural change towards a focus on local access and proximity i.e. ‘localism’, instead of long distance mobility which has been the dominant approach, could reduce the negative impacts of transport on ecosystems (NEA chapter 3: The drivers of change in UK Ecosystems and Ecosystem Services, page 43). The proposed opportunity is particularly relevant in this sense, as it builds on site-specificity and the development of synergies among local actors for the exchange of materials. Materials can attain a great local value if there are identified suitable uses for them.

**10. For the ecosystems, ES and drivers of change of ecosystems of which countries (England, Northern Ireland, Scotland, Wales) is this opportunity relevant?**

*Insert score(s) from 0 (irrelevant) to 10 (extremely relevant)*

England	Northern Ireland	Scotland	Wales
10	10	10	0

*Briefly explain the above scores – provide page references to any relevant NEA evidence*

Equally relevant to all.

**11. Does this opportunity have international significance (for UK business, beyond the UK)?**

*Briefly explain the market and ecosystems potential beyond the UK*

It definitely has international significance. It would be relevant wherever production activities of any scale take place. The UK could develop expertise and export these technologies and practices to other countries. The opportunity is of particular relevance to the EU, as a closed economy, with the potential to facilitate this more circular mode that could deliver synergies across sectors.

**D. SECTOR RELEVANCE**

**12. What sectors is the business opportunity of relevance to, on a scale of 0 (no relevance) to 10 (very relevant)?**

*Insert score(s) from 0 (irrelevant) to 10 (extremely relevant)*

Agriculture	Forestry	Fishing	Mining & Quarrying	Food Manufacture	Pharmaceuticals	Other manufacturing	Energy	Water, Waste Water	Construction	Transport	Tourism & Recreation	Wholesale & Retail	Creative, Media & Marketing	Financial Services	Public Administration	Education
5	8	4	10	7	6	10	9	9	8	7	1	4	1	1	5	8

*Briefly explain the above scores*

Turning waste into a resource is very relevant for a wide range of production activities. Sectors involving resource extraction would be highly impacted (forestry, mining, energy). The construction industry is also of relevance as it is particularly demanding in resources and generates a tremendous amount of waste. Reusing materials could decrease the raw material input.

Agriculture is an example of a slightly less relevant sector but still important for consideration. The recycling of composted or digested organic material ('waste') back to agricultural land is an example of turning waste into a resource, while displacing the need for primary production of fertilisers.

## E. ENABLING ACTIONS

### 13. What kinds of enabling actions are of relevance to this business opportunity?

*Insert score(s) from 0 (irrelevant) to 10 (extremely relevant)*

FOUND- ATIONAL	ENABLING			INSTRUMENTAL		
Knowledge	Legislation	Policies, Institutions & Governance	Changing Social Attitudes	Markets & Incentives	Technologies & Practices	Voluntary Actions, Education & Awareness
10	8	9	9	10	9	9

*Briefly explain the above scores, describing the actions needed, by whom (government, business, other) and what constraints, if any, these actions are designed to overcome*

Information and resulting knowledge are very important for establishing this environmental technology as one needs to know the location, nature, quality and quantity of resources that could be exchanged (material flows and stocks). Best practices and technologies also need to be well developed and understood.

Current waste legislation has also been identified as a limiting factor for such initiatives as it tends to favour the term 'waste' and is more aligned with the idea of 'less' rather than 'better' waste.

The nature of this opportunity means that it has multiple requirements: to change people's attitude to consider 'waste' as a resource; to create a favourable setting thorough market initiatives, policies, institutions; to sophisticate and showcase practices and technologies; and to skilfully collect information and coordinate actions.

In this complex situation, policies based on neutral thinking about SO can play a strategic role in 'context building'. A key instrument is the use of regional platforms to facilitate the development of industrial networks. They have the potential to effectively disseminate information, stimulate innovations and interactions between potential partners, and therefore facilitate trust-building. It helps companies to understand and adapt to their industrial environment. The role of such platforms is also to steer the system towards sustainability. In particular, informed by regional resources policies, they should aim to close the loop of strategic materials.

## F. FURTHER WORK TO BE DONE

### 14. What further research work might be required to explore the market and ecosystems potential of this opportunity and the required enabling actions?

*Briefly explain*

Even though reutilising industrial waste is an ancient practice, it is not a dominant approach in the 'green' manufacturing and design guidelines. Business can improve significantly their performance by creating new pathways of materials and energy between complementary processes. This may require investments to adjust production processes and operating procedures, but can in return reduce materials/energy imports and the costs of waste disposal. Furthermore, companies open to sale diversification can also invest to turn a low-value SOs into products with an established market. What may appear as distracting revenue is in fact strongly linked with the company's competency: to maximise value creation from a combination of resources. Creating diversity in the value chain increases profitability, but also its complexity.

Companies can gain in competitiveness by looking for opportunities outside of their boundaries, across the supply chain and within other sectors. While selling materials to secondary markets is subject to price volatility, a firm might find better use of their SOs by establishing partnerships with companies located in the same region. The price can be negotiated and the SO adapted to the needs of the two parties in this way. It can be part of a strategy to secure the supply of a critical material and to generate 'green' brand value.

However, this practice is not widespread: some companies have little awareness of their SOs or they do not perceive it as potentially valuable. The product life-cycle approach, which is present in most guidelines, tends to overlook opportunities outside the main supply chain and target market. Moreover, once a SO has been labelled as waste, legislation can make it harder to reutilise directly.

Adding a 'geographical approach' to industrial management implies the understanding of the industrial environment to uncover opportunities, and the engagement in counter-intuitive industrial partnerships (e.g. refinery and fertiliser producer in Kalundborg). It may require a form of decentralisation, even a sense of community, to recognise and embrace site-specificity. Although these partnerships

would be beneficial, most companies are not ready to increase their dependency for 'non-core' profits. 'Positive business atmosphere', in other words trust, is a key-component to overcome these difficulties.

These ambitious objectives require strategic thinking and reflexivity. In that sense, research is fundamental to critically evaluating development paths and to readjust the objectives to catalyse the emergence of islands of sustainability.

## 5 MARKETS FOR CULTURAL SERVICES

### ***T5.1 Optimizing the ecological and economic benefits of sustainable tourism***

#### **SUMMARY**

Sustainable tourism is among the most significant business opportunities that benefit the economy, premised on maintaining and enhancing natural ecosystems. It is already playing a very important role in the UK economy and from the evidence in the NEA it appears more can and should be done. Opportunities exist in existing markets alongside potential for creating new markets and products. These opportunities rest in enabling the British public to better realize their aspirations of recreation in green spaces as well as in better distribution of visitation and income from domestic and international tourism. New opportunities can be found in diverse sectors such as construction, real estate, waste management and ecological restoration. The estimates of benefits from recreation and sustainable tourism vary. A lot of research has been done to inform decision making but firmer valuation of different opportunities will be needed for business to invest in these opportunities. Also the potential negative impacts of tourism are fairly well documented but what is less known is how the current level of tourism and recreation activities compares with the carrying capacities of the Kingdom's ecosystems capacity. A better understanding of this relationship will greatly add in realizing the full potential of tourism as the multipurpose vehicle to grow business, strengthen the economy and maintain ecosystems.

#### **A. DESCRIPTION OF THE OPPORTUNITY**

##### **1. What is the business opportunity?**

*Provide a brief description*

NEA indicates that housing in the proximity of national parks is pricier. Likewise houses around lakes and canals are in greater demand with buyers willing to pay a premium. Opportunities therefore exist for construction and real estate industry in providing housing around natural ecosystems in a way that protects and enhances than erodes the ecosystems values which attract home makers in the first place. Well-sited and well designed housing with optimal densities respecting carrying capacities of the ecosystems will be win-wins.

People are travelling more for leisure and other purposes (estimated at more than 40% of all travel) compared to for example commuting for work, shopping, personal reasons and education. 74% of people in UK consider green space very important and a similar number visits green spaces at least a fortnight or more frequently. Yet only about 9% of UK residents indulge in nature related sport activities such as angling and cycling. Adding outdoor swimming will increase this number by a few percentage points but the bulk of the 75% population valuing green spaces but not indulging in

significant outdoor activity represents largely untapped potential for business.

According to one estimate, in 2000, UK habitats received 3.2 billion visits estimated to be valued at over £ 10 billion. Another estimate puts English recreation alone at 2.858 billion visits with direct expenditure of £ 20.4 billion. According to this estimate UK wide values would exceed £ 30 billion. Despite the large variations in numbers, the size of the market and business opportunities are obvious.

NEA also shows that foreign visitors spend £16 billion in UK. It is not clear what part of this revenue is tourism related and what proportion it makes of the total tourism revenues. What is clear is that about 50% or more of the inbound tourism revenues accrue to London with most other parts of the UK largely relying on domestic and day tourism but yet creating tourism related jobs. A more even distribution of visits would offer opportunities for both business and ecosystems' maintenance. This would entail promoting existing attractions and creating new sustainable tourism infrastructure that will attract international tourists to other parts of UK and multiply opportunities for domestic tourism. This can be financed in part from assessing travel foot prints and having them offset by visitors through pricing, levies and pay back schemes. Environmentally conscious tourists are increasingly willing to pay for their environmental foot print.

The synergy in economic opportunities and environmental protection through sustainable tourism is exemplified by sheep farming attracting more birds, and potential bird watching and tourism.

UK outbound tourism is increasingly linked to inbound tour operators in countries frequented by UK tourists. The extent to which UK natural endowments and recreational assets are marketed abroad is less known. There would appear to be business opportunities to use the outbound tourism relationships to attract reciprocal visits from such countries. This would be particularly of interest in countries and regions such as Latin America where the tourism industry is getting organized while its populace becomes more affluent and travelling. One potential tool would be of reciprocal visitation credits. This would mean tour operators hosting British visitors abroad earning travel credits that they would be able to grant to any potential visitors from those countries to the UK and which can be redeemed by way of discounts or other offerings when the grantee of credits books a tour to UK or actually visits the UK.

**2. Does this opportunity relate to new markets or greening of existing markets (or both)?**

*Provide a brief explanation*

The opportunity relates to both current and new markets as outlined above.

**3. What type of market opportunity or type of instrument/intervention does this business opportunity involve?**

*Insert an 'X' in the relevant box*

Product markets	Offsetting	Payments for ecosystem services	Environmental technologies	Markets for cultural services	Financial and legal services	Ecosystem knowledge economy	Corporate ecosystem initiatives	Eco-taxes, charges, levies, subsidies, grants	Other
x	x	x		x				x	

*Briefly explain the 'type' classification of the business opportunity*

The opportunity involves putting some new tourism products on the market and mobilizing financing through offsetting of travel foot prints. The owners of landscapes receive tourism revenues for the recreational non consumptive uses of ecosystem services although some services such as water will be consumptive. It doesn't explicitly call for taxes and levies but it does talk of creating incentives for businesses and consumers and eventually a tax-levy-subsidy response may be entailed.

**B. MARKET POTENTIAL**

**4. What is the market potential for this business opportunity with reference to the EMTF criteria?**

*Insert an 'X' in the appropriate box (0 = none, 10 = massive)*

<b>0</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>	<b>10</b>
									X	

*Briefly explain the above score, with reference to the EMTF criteria*

The market for tourism is growing globally, and there is an obvious trends toward nature based sustainable tourism. The evidence in the NEA as briefly outlined above is indicative of similar trends in the UK. There is potential for both expanding the domestic market and harnessing tourism dollars that are becoming available with the growingly mobile public of emerging economies. However, the tourism market in UK is a mature one. Therefore this proposal is not for more tourism instead the focus is on sustainable tourism that has a low ecosystem foot print and contributes to maintaining and enhancing ecosystems through better distribution of the travel foot print in UK and enhancing the equality of experience and related business opportunities.

This would entail augmenting tourism infrastructure and developing and marketing new tourism products and services. The pay-back time on investment is relatively short

and tourism remains one of the largest employers globally. More employment is inherent in the relatively small size of most tourism operations that involve families or groups of small entrepreneurs. Information and other technologies have led to automation also benefiting the tourism industry but human touch industry that remains relatively labour intensive. The opportunity is easily scalable for it doesn't require large investment or sophisticated technology. By the same measure the risks are fewer and smaller, mostly by way of more and better information as to the feasibility of different opportunities that can be addressed through pre-feasibility assessment and some research.

**5. What important characteristics of ecosystems and ES might be of relevance to this business opportunity?**

*Insert a score from 0 (irrelevant) to 10 (extremely relevant)*

Scale of externalities involved	Nature of market failures involved	Business' (& sectors') dependency on the ES involved, and costs and availability of substitutes	Opportunity costs related to ES provision	Nature of property rights over the ES or environmental assets underpinning them	Feasibility of managing the ES, and speed and predictability with which they respond to management	Capital costs of altering ES management and provision	Spatial and socio-economic distribution of ES beneficiaries (are they organised in coherent group that can take part in	Spatial and economic distribution of ES providers	Spatial and temporal relationships between ES providers and beneficiaries	Nature of existing cultural, regulatory or market management structures
<b>4</b>	<b>5</b>	<b>10</b>	<b>10</b>	<b>7</b>	<b>8</b>	<b>4</b>	<b>7</b>	<b>8</b>	<b>8</b>	<b>7</b>

*Briefly explain the above scores and to what extent these characteristics might affect the market potential*

Sustainable tourism is premised on the existence of nature with all its bounties and it would take colossal investment if ecosystems assets or their alternatives (which in this case are hardly any) were to be created to any degree of sophistication that nature has blessed us with. Indoor ski and mini golf facilities have demonstrated their costs, limitations and lack of consumer uptake. Unclear tenure or the common property regime for many of the recreational services that nature provides could be potential barriers but will better defined property rights and management structures that have evolved over the years, it is less likely to be an issue in UK. The costs and benefits of the UK recreational services from nature have been shared locally and globally for centuries. By that measure, further augmenting UK's sustainable tourism potential and opportunities will remain a joint enterprise between the UK citizens and the global market place.

### C. ECOSYSTEM POTENTIAL

6. How significant might this opportunity be for protecting/enhancing ecosystems, enhancing ES, enhancing goods derived from ES, and/or positively affecting drivers of ecosystem change?

*Insert score(s) from 0 (no significance) to 10 (extremely significant)*

Drivers of (Ecosystem) Change	Ecosystems	Ecosystem Services	Goods derived from ES
6	8	9	3

*Briefly explain the above scores, provide page references to any relevant NEA evidence*

Sustainable tourism is largely premised on the non-consumptive use of nature recognizing that some activities such as water supply to tourism facilities and sport hunting could be consumptive. For most part, nature based tourism can only thrive in ecosystems that are intact or well-managed for visitors to appreciate nature in all its bounties. By extension, protecting ecosystems and enhancing their service potential would be of inherent interest to business and an integral part of its business plan.

7. To which UK ecosystems (broad habitats as per the NEA) is this opportunity of relevance?

*Insert score(s) from 0 (irrelevant) to 10 (extremely relevant)*

Mountains, moorlands & heaths	Semi-natural grasslands	Enclosed farmland	Woodlands	Freshwaters - openwaters, wetlands, floodplains	Urban	Coastal	Marine
10	10	7	10	8	3	9	8

*Briefly explain the above scores in relation to state and trends of relevant habitats – provide page references to any relevant NEA evidence*

The opportunity is relevant to all habitats but more so to rural than urban landscapes.

8. To which ecosystem services are this opportunity of relevance?

*Insert score(s) from 0 (irrelevant) to 10 (extremely relevant)*

Supporting	Regulating	Provisioning	Cultural
2	3	6	9

Briefly explain the above scores in relation to state and changes in relevant ES in the UK – provide page references to any relevant NEA evidence

This opportunity combines provisioning and cultural services that ecosystems provide and together make the dominant ingredients of sustainable tourism. It may indirectly contribute to supporting and regulatory services but these would neither be the focus nor the determinants of success of this opportunity.

**9. To which drivers of change is this opportunity of relevance?**

*Insert score(s) from 0 (irrelevant) to 10 (extremely relevant)*

INDIRECT DRIVERS					DIRECT DRIVERS				
Demographic	Economic	Sociopolitical	Cultural and Behavioural	Scientific and Technological	Habitat Change	Pollution & Nutrient Enrichment	Overexploitation of Resources	Climate Variability & Change	Invasive Species
8	8		8		8		8		2

Briefly explain the above scores in relation to drivers of ecosystem change in the UK - provide page references to any relevant NEA evidence

Sustainable tourism is a growingly popular and effective tool for sustaining and developing economies especially in the rural areas. Its attraction in comparison to the alternatives of exploitative use of nature comes from its promise to prevent and possibly ameliorate environmental degradation and attendant adverse changes in climate and loss of global biodiversity. It seeks to protect habitats because it needs them to succeed as a business enterprise. However, this doesn't happen by itself, and will require a combination of payback schemes and remuneration to host environments and communities providing the nature-based recreation services.

**10. For the ecosystems, ES and drivers of change of ecosystems of which countries (England, Northern Ireland, Scotland, Wales) is this opportunity relevant?**

*Insert score(s) from 0 (irrelevant) to 10 (extremely relevant)*

England	Northern Ireland	Scotland	Wales
10	10	10	10

Briefly explain the above scores – provide page references to any relevant NEA evidence

All countries of the United Kingdom need and can benefit more from the untapped potential of sustainable tourism. However, Scotland and Wales may have more untapped potential and opportunity. Northern Ireland may have to do more to promote itself as a tourism destination in the context of its geographic, political and development realities.

**11. Does this opportunity have international significance (for UK business, beyond the UK)?**

Briefly explain the market and ecosystems potential beyond the UK

Yes indeed. The international context, political and economic, not only affects the flow of international visitors, it also shapes the behaviour of outbound and domestic tourists in UK as well as the response of the domestic tourism industry.

**D. SECTOR RELEVANCE**

**12. What sectors is the business opportunity of relevance to, on a scale of 0 (no relevance) to 10 (very relevant)?**

Insert score(s) from 0 (irrelevant) to 10 (extremely relevant)

Agriculture	Forestry	Fishing	Mining & Quarrying	Food Manufacture	Pharmaceuticals	Other manufacturing	Energy	Water, Waste Water	Construction	Transport	Tourism & Recreation	Wholesale & Retail	Creative, Media & Marketing	Financial Services	Public Administration	Education
6	6	2	2	4			4	4	4	8	10	2	2	3	3	2

Briefly explain the above scores

This is essentially an opportunity in the tourism sector. However, to the extent it relies on other sectors such as agriculture and forestry for maintaining ecosystem services, it is very relevant to them. Likewise the sectors which provide the infrastructure such as transport and public administration that enable tourism area also highly relevant. Besides direct tourism related spending of tourists, Tourism also contributes to national economy through indirect expenses that tourist make such as in purchasing UK products. To that extent, these other sectors area also relevant.

## E. ENABLING ACTIONS

### 13. What kinds of enabling actions are of relevance to this business opportunity?

*Insert score(s) from 0 (irrelevant) to 10 (extremely relevant)*

FOUND- ATIONAL	ENABLING			INSTRUMENTAL		
Knowledge	Legislation	Policies, Institutions & Governance	Changing Social Attitudes	Markets & Incentives	Technologies & Practices	Voluntary Actions, Education & Awareness
10	5	10	10	10	5	10

*Briefly explain the above scores, describing the actions needed, by whom (government, business, other) and what constraints, if any, these actions are designed to overcome*

Public policy, regulatory and financing infrastructure for tourism is pretty well established in UK and not much would be needed here additionally. Recent green policies such as biodiversity offsets and others contribute to the enabling guidance. However, some policy adaptation may be required to harness the newly identified opportunities and to better distribute the environmental costs and economic opportunities associated with sustainable tourism. These would include among others, PES / payback schemes to strengthen the link between those who benefit and those who manage ecosystems, thus encouraging investment in ecosystems, promotional schemes AND international marketing efforts that use economies of scale to promote UK ecosystems to potential visitors.

## F. FURTHER WORK TO BE DONE

### 14. What further research work might be required to explore the market and ecosystems potential of this opportunity and the required enabling actions?

*Briefly explain*

There are two key uncertainties here. One relates to the valuation of ecosystem services in relation to nature based tourism. A lot of research has been done but estimates still vary and at times widely. A more accurate estimate will increase business confidence in underlying public policies.

Second, the feasibility of various opportunities needs to be more accurately established. Some ideas are very promising but costs and benefits associated with them need to be better measured. This can be achieved through a combination of pre-feasibility studies in the private sector and related supporting research and development in the public sector.

## **6 FINANCIAL AND LEGAL SERVICES**

None.

## 7 ECOSYSTEMS KNOWLEDGE ECONOMY

### *T7.1 Developing the UK Ecosystems knowledge economy*

#### SUMMARY

Ecosystems provide opportunities to develop knowledge based businesses providing high quality employment and growth opportunities. The UK plays a leading role internationally in ecosystem related knowledge and is the first country to have published a national ecosystem assessment. There is an opportunity to build on this knowledge base and to strengthen collaboration between business and knowledge based institutions in order to maximise business opportunities relating to ecosystems. The aim would be to position the UK as an international leader in knowledge based goods and services contributing to the protection of ecosystems and the sustainable use of ecosystems and their services. The aim would be to build on existing initiatives to maximise the opportunities for the green economy from the UK ecosystems knowledge base.

This is a broadly based opportunity that could have a number of different elements: ecosystems based research and development, skills and training, business/ HE collaboration, knowledge for market creation (e.g. knowledge underpinning certification, PES, offsets etc). This opportunity will create business opportunities itself (in research, training, R&D, consultancy etc) as well as supporting other ecosystem based business opportunities (including most of the other ecosystem market opportunities we will identify).

#### A. DESCRIPTION OF THE OPPORTUNITY

##### 1. What is the business opportunity?

*Provide a brief description*

Ecosystems provide opportunities to develop knowledge based businesses providing high quality employment and growth opportunities. The UK plays a leading role internationally in ecosystem related knowledge and is the first country to have published a national ecosystem assessment. There is an opportunity to build on this knowledge base and to strengthen collaboration between business and knowledge based institutions in order to maximise business opportunities relating to ecosystems. The aim would be to position the UK as an international leader in knowledge based goods and services contributing to the protection of ecosystems and the sustainable use of ecosystems and their services. The aim would be to build on existing initiatives to maximise the opportunities for the green economy from the UK ecosystems knowledge base.

This is a broadly based opportunity that could have a number of different elements: ecosystems based research and development, skills and training, business/ HE collaboration, knowledge for market creation (e.g. knowledge underpinning

certification, PES, offsets etc). This opportunity will create business opportunities itself (in research, training, R&D, consultancy etc) as well as supporting other ecosystem based business opportunities (including most of the other ecosystem market opportunities we will identify).

**2. Does this opportunity relate to new markets or greening of existing markets (or both)?**

*Provide a brief explanation*

This would be a new initiative building on and developing the existing knowledge base on ecosystems in the UK and promoting new business opportunities through collaboration between business, higher education and research institutes. The UK already has numerous knowledge based businesses focusing on ecosystem related issues – the intention would be to encourage further business growth focusing on the UK knowledge base.

**3. What type of market opportunity or type of instrument/intervention does this business opportunity involve?**

*Insert an 'X' in the relevant box*

Product markets	Offsetting	Payments for ecosystem services	Environmental technologies	Markets for cultural services	Financial and legal services	Ecosystem knowledge economy	Corporate ecosystem initiatives	Eco-taxes, charges, levies, subsidies, grants	Other
X	X	X	X	X	X	X	X	X	X

*Briefly explain the 'type' classification of the business opportunity*

This is about the ecosystem knowledge economy and it underpins and supports all other types of business opportunity, most of which are knowledge based.

**B. MARKET POTENTIAL**

**4. What is the market potential for this business opportunity with reference to the EMTF criteria?**

*Insert an 'X' in the appropriate box (0 = none, 10 = massive)*

0	1	2	3	4	5	6	7	8	9	10
								X		

Briefly explain the above score, with reference to the EMTF criteria

Very wide ranging initiative with huge potential. However outcomes are uncertain and achieving major change that achieves substantive business opportunities (as opposed to a more hollow branding initiative) would be a challenge.

**5. What important characteristics of ecosystems and ES might be of relevance to this business opportunity?**

Insert a score from 0 (irrelevant) to 10 (extremely relevant)

Scale of externalities involved	Nature of market failures involved	Business' (& sectors') dependency on the ES involved, and costs and availability of substitutes	Opportunity costs related to ES provision	Nature of property rights over the ES or environmental assets underpinning them	Feasibility of managing the ES, and speed and predictability with which they respond to management	Capital costs of altering ES management and provision	Spatial and socio-economic distribution of ES beneficiaries (are they organised in coherent group that can take part in	Spatial and economic distribution of ES providers	Spatial and temporal relationships between ES providers and beneficiaries	Nature of existing cultural, regulatory or market management structures
<b>9</b>	<b>9</b>	<b>7</b>	<b>5</b>	<b>5</b>	<b>5</b>	<b>5</b>	<b>5</b>	<b>5</b>	<b>5</b>	<b>5</b>

Briefly explain the above scores and to what extent these characteristics might affect the market potential

Knowledge is relevant to all these issues. Particularly relevant in relation to externalities and market failure – positive externalities are an established market failure rationale for intervention to support R&D, while knowledge development will also tackle negative externalities.

**C. ECOSYSTEM POTENTIAL**

**6. How significant might this opportunity be for protecting/enhancing ecosystems, enhancing ES, enhancing goods derived from ES, and/or positively affecting drivers of ecosystem change?**

Insert score(s) from 0 (no significance) to 10 (extremely significant)

<b>Drivers of (Ecosystem) Change</b>	<b>Ecosystems</b>	<b>Ecosystem Services</b>	<b>Goods derived from ES</b>
<b>10</b>	<b>10</b>	<b>10</b>	<b>10</b>

Briefly explain the above scores, provide page references to any relevant NEA evidence

Knowledge underpins all of these aspects.

**7. To which UK ecosystems (broad habitats as per the NEA) is this opportunity of relevance?**

Insert score(s) from 0 (irrelevant) to 10 (extremely relevant)

Mountains, moorlands & heaths	Semi-natural grasslands	Enclosed farmland	Woodlands	Freshwaters - openwaters, wetlands, floodplains	Urban	Coastal	Marine
10	10	10	10	10	10	10	10

Briefly explain the above scores in relation to state and trends of relevant habitats – provide page references to any relevant NEA evidence

Knowledge is equally relevant to all habitats.

**8. To which ecosystem services are this opportunity of relevance?**

Insert score(s) from 0 (irrelevant) to 10 (extremely relevant)

<b>Supporting</b>	<b>Regulating</b>	<b>Provisioning</b>	<b>Cultural</b>
<b>10</b>	<b>10</b>	<b>10</b>	<b>10</b>

Briefly explain the above scores in relation to state and changes in relevant ES in the UK – provide page references to any relevant NEA evidence

Knowledge equally relevant to all services.

**9. To which drivers of change is this opportunity of relevance?**

*Insert score(s) from 0 (irrelevant) to 10 (extremely relevant)*

INDIRECT DRIVERS					DIRECT DRIVERS				
Demographic	Economic	Sociopolitical	Cultural and Behavioural	Scientific and Technological	Habitat Change	Pollution & Nutrient Enrichment	Overexploitation of Resources	Climate Variability & Change	Invasive Species
10	10	10	10	10	10	10	10	10	10

*Briefly explain the above scores in relation to drivers of ecosystem change in the UK - provide page references to any relevant NEA evidence*

Knowledge is equally relevant to all of these issues.

**10. For the ecosystems, ES and drivers of change of ecosystems of which countries (England, Northern Ireland, Scotland, Wales) is this opportunity relevant?**

*Insert score(s) from 0 (irrelevant) to 10 (extremely relevant)*

England	Northern Ireland	Scotland	Wales
10	10	10	10

*Briefly explain the above scores – provide page references to any relevant NEA evidence*

All countries have a knowledge base and businesses capable of benefiting from knowledge based opportunities relating to ecosystems. The strength of opportunity would depend on the strength of intellectual capital in each country – would need further evidence to score this.

**11. Does this opportunity have international significance (for UK business, beyond the UK)?**

*Briefly explain the market and ecosystems potential beyond the UK*

Yes, it is all about positioning the UK internationally as a leader in ecosystem knowledge and related business opportunities.

## D. SECTOR RELEVANCE

### 12. What sectors is the business opportunity of relevance to, on a scale of 0 (no relevance) to 10 (very relevant)?

*Insert score(s) from 0 (irrelevant) to 10 (extremely relevant)*

Agriculture	Forestry	Fishing	Mining & Quarrying	Food Manufacture	Pharmaceuticals	Other manufacturing	Energy	Water, Waste Water	Construction	Transport	Tourism & Recreation	Wholesale & Retail	Creative, Media & Marketing	Financial Services	Public Administration	Education
10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10+

*Briefly explain the above scores*

Equally relevant to all sectors – with an added plus for education and consultancy.

## E. ENABLING ACTIONS

### 13. What kinds of enabling actions are of relevance to this business opportunity?

*Insert score(s) from 0 (irrelevant) to 10 (extremely relevant)*

FOUND-ATIONAL	ENABLING			INSTRUMENTAL		
Knowledge	Legislation	Policies, Institutions & Governance	Changing Social Attitudes	Markets & Incentives	Technologies & Practices	Voluntary Actions, Education & Awareness
10	3	8	3	5	8	8

*Briefly explain the above scores, describing the actions needed, by whom (government, business, other) and what constraints, if any, these actions are designed to overcome*

Based on knowledge. Institutional arrangements are important (e.g. HE business collaboration). Technology, education and skills play an important role. There may be a role for grants and incentives (e.g. for R&D). The opportunity is less likely to depend on legislation and public attitudes, but may inform knowledge in this area (as well as others)

To move this opportunity beyond a concept and to deliver real benefits, it is likely that a broad agenda for action will be needed, involving partnerships between government, the research and education sectors, and business. As well as actions designed to

develop and apply knowledge on ecosystems and their services, the opportunity would be more likely to be realised if further steps were taken to integrate ecosystems based knowledge into decision making, e.g. by:

- Developing and implementing initiatives on biodiversity offsets, Payments for Ecosystem Services, and ecosystems related certification schemes.
- Requiring assessments of impacts on ecosystems and their services as part of Environmental Impact Assessments;
- Engaging with major companies on ecosystems issues. This would benefit from the involvement of other Government departments (BIS and HM Treasury as well as Defra).

## **F. FURTHER WORK TO BE DONE**

### **14. What further research work might be required to explore the market and ecosystems potential of this opportunity and the required enabling actions?**

*Briefly explain*

Further elaboration of types of opportunity, key players, potential actions and arrangements to stimulate this opportunity.

## **8 CORPORATE ECOSYSTEM INITIATIVES**

None.

# ANNEX 1 – PROFORMA FOR BUSINESS OPPORTUNITY PROPOSAL

**NAME OF PROPOSER**

**TITLE OF BUSINESS OPPORTUNITY**

**SUMMARY**

*Max. 1000 characters (with spaces)*

*To be prepared last, summarising the details presented in the proforma, including: what is the opportunity, new or greening of existing market, what type of opportunity, what is the market potential, what is the ecosystem potential (to which ecosystems and ES is it most relevant, what potential ecosystem gain), to which sectors is it most relevant, what key enabling actions required, what further research required*

## A. DESCRIPTION OF THE OPPORTUNITY

### 1. What is the business opportunity?

*Provide a brief description*

### 2. Does this opportunity relate to new markets or greening of existing markets (or both)?

*Provide a brief explanation*

### 3. What type of market opportunity or type of instrument/intervention does this business opportunity involve?<sup>24</sup>

*Insert an 'X' in the relevant box*

Product markets	Offsetting	Payments for ecosystem services	Environmental technologies	Markets for cultural services	Financial and legal services	Ecosystem knowledge economy	Corporate ecosystem initiatives	Eco-taxes, charges, levies, subsidies, grants	Other

<sup>24</sup> See Conceptual Framework

Briefly explain the 'type' classification of the business opportunity

**B. MARKET POTENTIAL**

**4. What is the market potential for this business opportunity with reference to the EMTF criteria?<sup>25</sup>**

*Insert an 'X' in the appropriate box (0 = none, 10 = massive)*

0	1	2	3	4	5	6	7	8	9	10

*Briefly explain the above score, with reference to the EMTF criteria*

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<sup>25</sup> See EMTF call for evidence – the criteria listed as being under consideration are: ability to tackle risk facing the business; potential demand underpinning the opportunity; scalability and transferability of good practice; feasibility of overcoming any barriers; strength of underpinning evidence; potential role for SMEs; short-term payback potential; job creation potential; long-term potential for competitive UK advantage.

**5. What important characteristics of ecosystems and ES might be of relevance to this business opportunity?<sup>26</sup>**

*Insert a score from 0 (irrelevant) to 10 (extremely relevant)*

Scale of externalities involved	Nature of market failures involved	Business' (& sectors') dependency on the ES involved, and costs and availability of substitutes	Opportunity costs related to ES provision	Nature of property rights over the ES or environmental assets underpinning them	Feasibility of managing the ES, and speed and predictability with which they respond to management	Capital costs of altering ES management and provision	Spatial and socio-economic distribution of ES beneficiaries (are they organised in coherent group that can take part in	Spatial and economic distribution of ES providers	Spatial and temporal relationships between ES providers and beneficiaries	Nature of existing cultural, regulatory or market management structures

*Briefly explain the above scores and to what extent these characteristics might affect the market potential*

**C. ECOSYSTEM POTENTIAL**

**6. How significant might this opportunity be for protecting/enhancing ecosystems, enhancing ES, enhancing goods derived from ES, and/or positively affecting drivers of ecosystem change?**

*Insert score(s) from 0 (no significance) to 10 (extremely significant)*

Drivers of (Ecosystem) Change	Ecosystems	Ecosystem Services	Goods derived from ES

*Briefly explain the above scores, provide page references to any relevant NEA evidence*

<sup>26</sup> See Conceptual Framework, Table 2

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**7. To which UK ecosystems (broad habitats as per the NEA) is this opportunity of relevance?**

*Insert score(s) from 0 (irrelevant) to 10 (extremely relevant)*

Mountains, moorlands & heaths	Semi-natural grasslands	Enclosed farmland	Woodlands	Freshwaters - openwaters, wetlands, floodplains	Urban	Coastal	Marine

*Briefly explain the above scores in relation to state and trends of relevant habitats – provide page references to any relevant NEA evidence*

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**8. To which ecosystem services are this opportunity of relevance?**

*Insert score(s) from 0 (irrelevant) to 10 (extremely relevant)*

<b>Supporting</b>	<b>Regulating</b>	<b>Provisioning</b>	<b>Cultural</b>

Briefly explain the above scores in relation to state and changes in relevant ES in the UK – provide page references to any relevant NEA evidence

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**9. To which drivers of change is this opportunity of relevance?**

*Insert score(s) from 0 (irrelevant) to 10 (extremely relevant)*

INDIRECT DRIVERS					DIRECT DRIVERS				
Demographic	Economic	Sociopolitical	Cultural and Behavioural	Scientific and Technological	Habitat Change	Pollution & Nutrient Enrichment	Overexploitation of Resources	Climate Variability & Change	Invasive Species

Briefly explain the above scores in relation to drivers of ecosystem change in the UK - provide page references to any relevant NEA evidence

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**10. For the ecosystems, ES and drivers of change of ecosystems of which countries (England, Northern Ireland, Scotland, Wales) is this opportunity relevant?**

*Insert score(s) from 0 (irrelevant) to 10 (extremely relevant)*

England	Northern Ireland	Scotland	Wales

Briefly explain the above scores – provide page references to any relevant NEA evidence

**11. Does this opportunity have international significance (for UK business, beyond the UK)?**

Briefly explain the market and ecosystems potential beyond the UK

**D. SECTOR RELEVANCE**

**12. What sectors is the business opportunity of relevance to, on a scale of 0 (no relevance) to 10 (very relevant)?**

Insert score(s) from 0 (irrelevant) to 10 (extremely relevant)

Agriculture	Forestry	Fishing	Mining & Quarrying	Food Manufacture	Pharmaceuticals	Other manufacturing	Energy	Water, Waste Water	Construction	Transport	Tourism & Recreation	Wholesale & Retail	Creative, Media & Marketing	Financial Services	Public Administration	Education

Briefly explain the above scores

**E. ENABLING ACTIONS**

**13. What kinds of enabling actions are of relevance to this business opportunity?**

*Insert score(s) from 0 (irrelevant) to 10 (extremely relevant)*

FOUND- ATIONAL	ENABLING			INSTRUMENTAL		
Knowledge	Legislation	Policies, Institutions & Governance	Changing Social Attitudes	Markets & Incentives	Technologies & Practices	Voluntary Actions, Education & Awareness

*Briefly explain the above scores, describing the actions needed, by whom (government, business, other) and what constraints, if any, these actions are designed to overcome*

**F. FURTHER WORK TO BE DONE**

**14. What further research work might be required to explore the market and ecosystems potential of this opportunity and the required enabling actions?**

*Briefly explain*