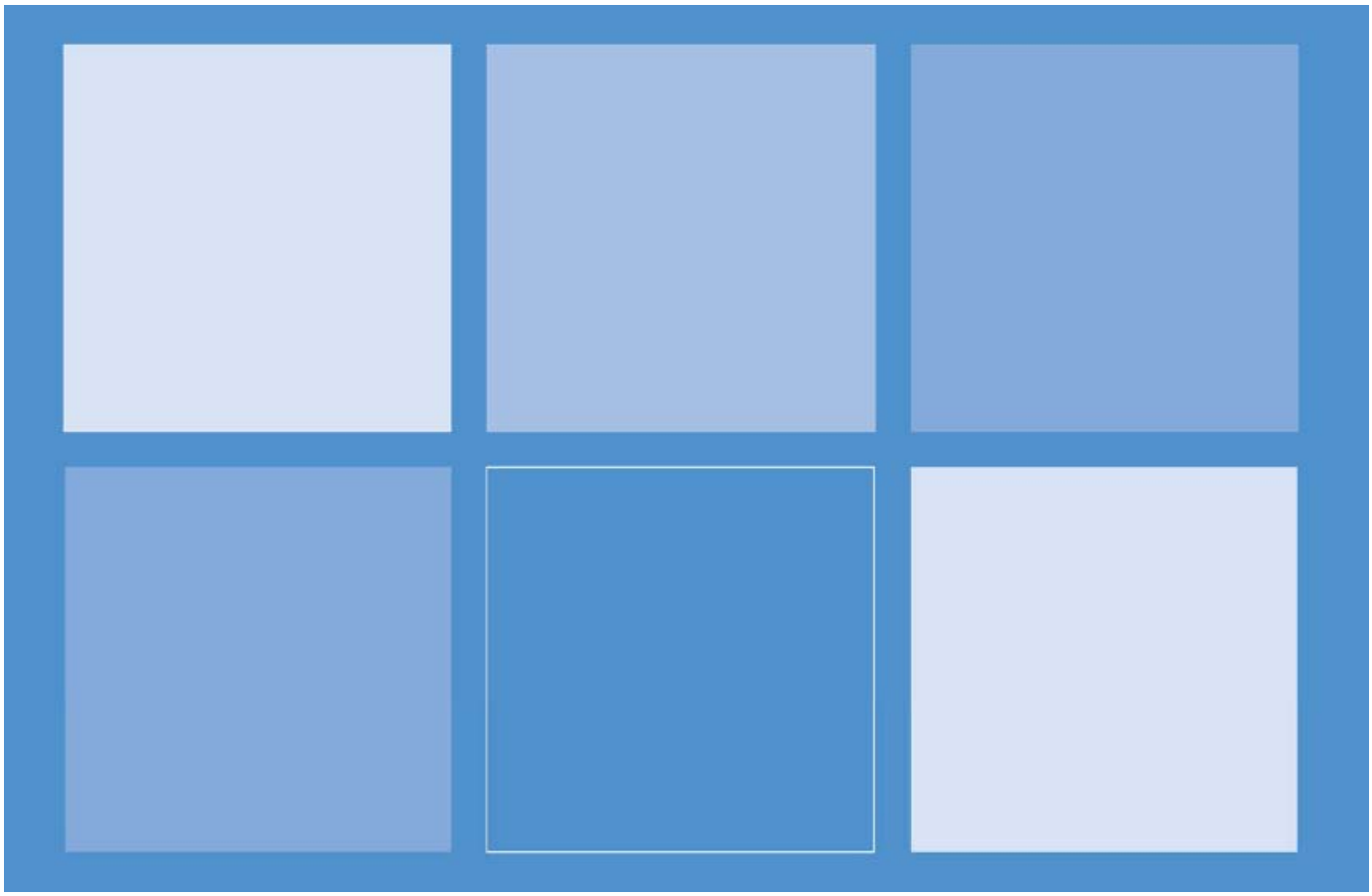
Marine Renewable Energy Strategic Framework

Review of the Policy Context for Sustainable Marine Renewable Development

On Behalf of

Welsh Assembly Government



Quality Management

Prepared by:	Dr Tessa McGarry	
Authorised by:	Nicola Simpson	
Date:	March 2011	
Revision:	V5	
Project Number:	JER3688	
Document Reference:	JER3688R100831 MRESF Stage 3 Sustainability Policy v5 (re-dated)	
Document File Path:	O:\JER3688 - Marine Renewable Strategy for Wales\STAGE 3\Policy Context for Sustainable Marine Renewable Development\JER3688R100831 MRESF Stage 3 Sustainability Policy v5 (re-dated).doc	

RPS Planning and Development Ltd. Registered in England No. 02947164
Centurion Court, 85 Milton Park, Abingdon, Oxfordshire, OX14 4RYA Member of the RPS Group Plc

RPS Planning & Development Ltd
Conrad House
Beaufort Square
Chepstow
Monmouthshire
NP16 5EP
T: +44 (0) 1291 621821
F: +44 (0) 1291 627827
E: rpssw@rpsgroup.com
W: www.rpsgroup.com

Contents

Tables

Tables

Figures

1 Introduction

1.1 What is Sustainable Development?

Living beyond our means

1.1.1 As the global population expands so the pressure on the planet increases with our growing demand for natural resources and requirement for absorption of the CO_2 that is produced. We are living well beyond our means: for the last three decades our demand for these 'ecological services' has outweighed their availability (World Resource Institute, 2005). Recent estimates suggest that it takes approximately 18 months to generate the ecological services required for one year (Global Footprint Network, 2010, www.footprintnetwork.org). Climate change is a significant factor when understanding the interaction with and impact of human activities on the environment. In order to reduce the level of impact means tackling the way in which we generate and use energy; but there are other factors that make a difference: the way we produce goods and services; how we protect our natural environment; and our engagement and partnership with local communities and stakeholders.

1.1.2 Measurements of resource use and CO_2 production in our 'ecological footprint' are calculated as global hectares (gha) per person and refer to the average biologically productive area needed by each person. This area represents the amount of land necessary to provide raw materials, energy and food, as well as the area needed to absorb pollution and waste generated. This amount varies by country and recent estimates in Wales show an average ecological footprint of 5.16 gha per person (Dawkins *et al.,* 2008). Whilst this is lower than that of Scotland, England or any English region, it still exceeds the availability of land on a global level of only 1.88 gha per person. This equates to a global use of 2.7 planets worth of resources, assuming everyone lived the same way as a person in Wales, and this is predicted to rise to 3.3 planets worth by 2020 if left unchecked (Welsh Assembly Government, 2009).

A more secure future

1.1.3 In September 2002, the World Summit on Sustainable Development (WSSD) was hosted in Johannesburg, South Africa. Building on the fundamental sustainable development principles discussed at the United Nations Conference on Environment

and Development (Rio de Janeiro, 1992), this important meeting marked a commitment by World Leaders to achieve internationally agreed sustainable development goals.

1.1.4 Sustainable development can be defined as:

"Development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (World Commission on Environment and Development, 1987).

1.1.5 This means some changes in our way of living are necessary in order to secure our future on this planet. A common purpose of the UK government and the devolved administrations of Scotland, Wales and Northern Ireland is a new framework goal (Defra, 2005) that will be pursued in:

"An integrated way through a sustainable, innovative and productive economy that delivers high levels of employment, and a just society that promotes social inclusion, sustainable communities and personal well-being. This will be done in ways that protect and enhance the physical and natural environment, and use resources and energy as efficiently as possible.

1.1.6 In order to achieve this, the UK Government, Scottish Executive, Welsh Assembly Government and Northern Ireland Administration have agreed on a set of five shared principles for sustainable development and four priority areas for immediate action.

1.2 Principles and priorities of sustainable development

Shared principles

1.2.1 Five principles are at the core of sustainable development in the UK (Figure 1-1); translating through to the sustainable development strategies proposed by each Nation.

1.2.2 They also form the basis of the High Level Marine Objectives (HLMOs) developed by the UK Government and devolved administrations (Defra, 2009a). The HLMOs represent a means to achieving a UK-wide vision of safe, healthy, productive and biologically diverse oceans and seas in twenty years time, attaining the merits of 'Good Environmental Status' required by the European Marine Framework Directive, and 'Good Status' required by the European Water Framework Directive.

1.2.3 One vision for the marine environment, via these HLMOs, is for a change in the way we tackle climate change, through widespread renewable energy developments and Carbon Capture and Storage (CCS) ventures. Renewable energy developments form a key component throughout the HMLOs, and consequently throughout the five principles of

Sustainable Development in the UK, and Wales as a nation. Thus, the HMLOs are drivers for this current work on marine renewables commissioned for the Welsh Assembly Government (Table 1-1).

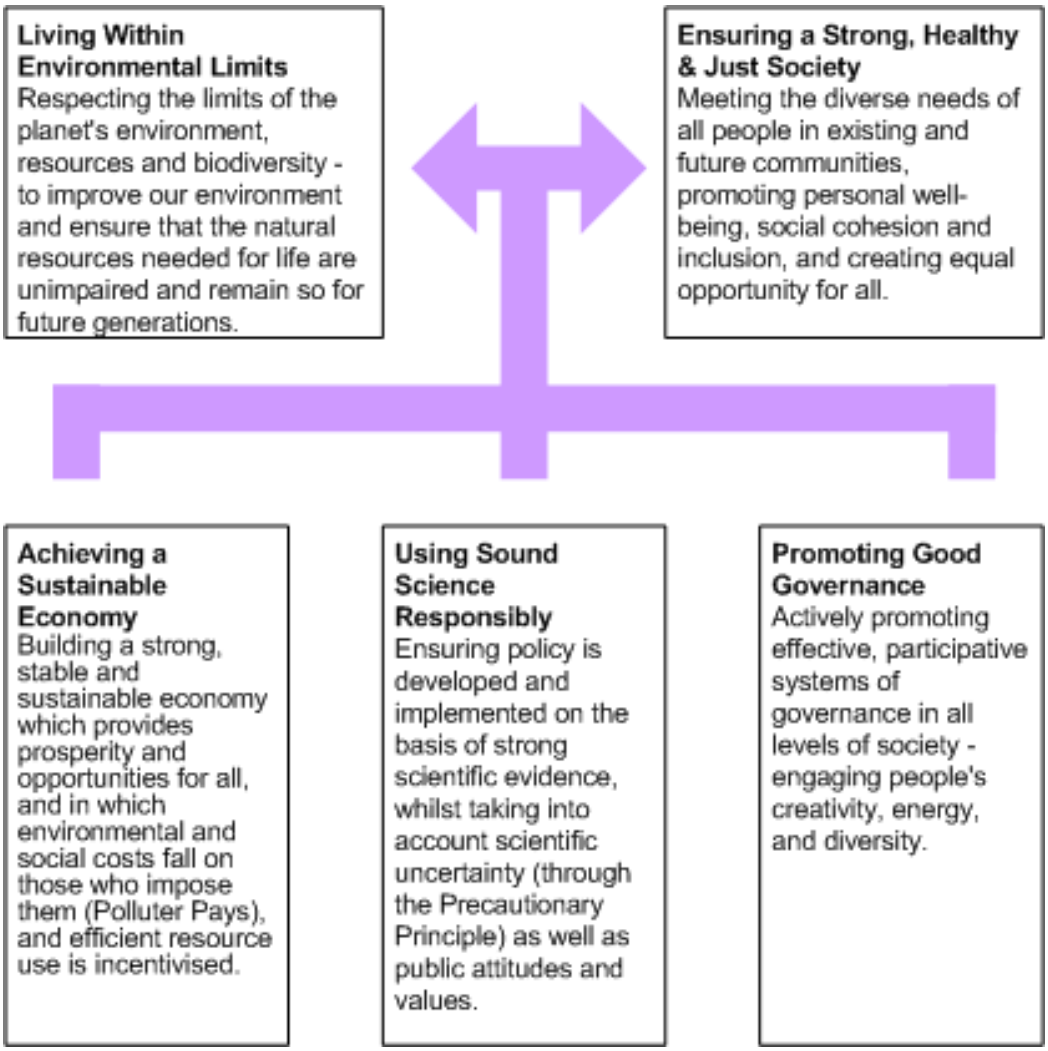


Figure 1-1 Five key principles of sustainable development for the UK (Defra, 2005)

Table 1-1 Guiding principles of sustainable development as interpreted for the Welsh Assembly Government's Sustainable Development Scheme (WAG, 2007) and the UK High Level Marine Objectives (Defra, 2009a).

Sustainability Principle	Wales Assembly Government Sustainable Development scheme for the UK SD principles	Components of the High Level Marine Objectives	Relevance to renewable energy developments
Living within environmental limits	By setting out a pathway to using only our fair share of the earth's resources, and becoming a One Planet nation within the lifetime of a generation	• Biodiversity is protected, conserved and, where appropriate, recovered, and loss has been halted; • Healthy marine and coastal habitats occur across their natural range and are able to support strong, biodiverse biological communities and the functioning of healthy, resilient and adaptable marine ecosystems; and • Our oceans support viable populations of representative, rare, vulnerable, and valued species.	By reducing our production of CO_2 from burning of fossil fuels to produce energy, renewable energy developments can mitigate climate change impacts potentially resulting in indirect positive effects on biodiversity. For example, there is evidence of shifts in species distributions, abundance patterns, and range changes in both terrestrial and marine systems attributable to climate change.
Ensuring a strong health and just society	Our focus on how a sustainable approach will improve the quality of life and wellbeing of the people of Wales, and especially those in our less well off	• People appreciate the diversity of the marine environment, its seascapes, its natural and cultural heritage and its resources and act responsibly; • The use of the marine environment is benefiting society as a whole, contributing to resilient and cohesive communities that can adapt to coastal	Society as a whole can benefit from energy produced by renewable sources, both directly by offering an alternative energy sources and indirectly through mitigating climate change impacts. For example,

Sustainability Principle	Wales Assembly Government Sustainable Development scheme for the UK SD principles	Components of the High Level Marine Objectives	Relevance to renewable energy developments
	communities	erosion and flood risk, as well as contributing to physical and mental wellbeing; • The coast, seas, oceans and their resources are safe to use; • The marine environment plays an important role in mitigating climate change; • There is equitable access for those who want to use and enjoy the coast, seas and their wide range of resources and assets and recognition that for some island and peripheral communities the sea plays a significant role in their community; and • Use of the marine environment will recognise, and integrate with, defence priorities, including the strengthening of international peace and stability and the defence of the United Kingdom and its interests.	reduction of greenhouse gases (GHGs) from the use of renewable devices, can contribute to actions against global warming, one aspect of which is sea level rise. Sea level rise has been a major contributing factor to coastal erosion which has led to the loss of coastal habitats (e.g. salt marshes and sand dunes) which themselves act as natural coastal defences. In addition, an understanding of the benefits of renewable energy sources can help to build a better appreciation of our environment that we rely on and the future welfare of our planet.
Achieving a sustainable economy	By setting out how we want to transform our economy so that it is low carbon, low	• Infrastructure in place to support and promote safe, profitable and efficient marine businesses; • The marine environment and its resources are	The renewables industry represents an opportunity for growth of new marine-related businesses, regeneration of existing infrastructure (e.g. ports &

Sustainability Principle	Wales Assembly Government Sustainable Development scheme for the UK SD principles	Components of the High Level Marine Objectives	Relevance to renewable energy developments
	waste	used to maximise sustainable activity, prosperity and opportunities for all, now and in the future; • Marine businesses are taking long-term strategic decisions and managing risks effectively. They are competitive and operating efficiently; and • Marine businesses are acting in a way which respects environmental limits and is socially responsible. This is rewarded in the marketplace.	harbours, marine vessels). Employment opportunities would arise both within the marine renewable sector and throughout the supply chain, with an economic value of £5 billion in the UK in total.
Using sound science responsibly	Through confirming sustainable development as the central organising principle of the Welsh Assembly Government, and through encouraging and enabling others to embrace sustainable development as the central organising principle	• Our understanding of the marine environment continues to develop through new scientific and socio-economic research and data collection; • Sound evidence and monitoring underpins effective marine management and policy development.; • Development of the MRESF as a framework for sustainable marine renewable development in Welsh waters; and • The precautionary principle is applied consistently in accordance with the UK Government and Devolved Administrations' sustainable development policy.	The UK is one of the leaders in marine renewables research with a purpose-built test centre for new devices in Orkney, Scotland. In Wales the Low Carbon Resource Institute (LCRI) represents 6 Welsh universities and aims to encourage partnerships between academia, government and industry. Planning law in the UK is such that marine environmental baseline data is a prerequisite for development. Ongoing monitoring work will help to increase our

Sustainability Principle	Wales Assembly Government Sustainable Development scheme for the UK SD principles	Components of the High Level Marine Objectives	Relevance to renewable energy developments
			understanding of potential impacts of these devices.
Promoting good governance	Through the use of our SD principles, as part of our evidence-based approach to policy making.	• All those who have a stake in the marine environment have an input into associated decision-making. • Marine, land and water management mechanisms are responsive and work effectively together for example through integrated coastal zone management and river basin management plans. • Marine management in the UK takes account of different management systems that are in place because of administrative, political or international boundaries. • Marine businesses are subject to clear, timely, proportionate and, where appropriate, plan-led regulation.	The application and consenting process will be streamlined under the new Marine and Coastal Access Act 2009 making the decision-making process for marine renewables more transparent. Marine spatial planning is at the forefront of the marine management agenda meaning that an integrated approach will be taken to balance conflicts between potential user groups in the marine environment. This current work commissioned by the WAG is addressing this issue by looking at the policy context of marine renewables.

Priorities for action

1.2.4 The UK government has identified four main priorities for action based on the five key principles of sustainable development described in Figure 1-1 (Defra, 2005). These describe the changes we need to make in how we live in order to secure our future on this planet, and can be summarised as follows:

Sustainable Consumption and Production

1.2.5 Sustainable consumption and production is about achieving more with less and includes:

- Changing how goods and services are produced, including the impact of products across their whole lifecycle;
- Building people's awareness of social and environmental concerns; and
- Increasing the efficiency of resource use, in order to help boost the economy through business competitiveness and break the link between economic growth and environmental degradation.

Climate Change and Energy

1.2.6 The effects of a changing climate can already be seen with rising temperatures, increased frequency of extreme weather events, sea level rise and coastal erosion. Efforts must be made to reduce the amount of Greenhouse Gases (GHGs) into the atmosphere by:

- Seeking to secure a profound change in the way we generate and use energy, and in other activities that release GHGs; and
- Setting a good example thereby encouraging others to follow.

Natural Resource Protection and Environmental Enhancement

1.2.7 Natural resources are an intrinsic part of the lifestyle of people throughout the world. In order to preserve our natural environment we need:

- A better understanding of environmental limits, environmental enhancement and recovery particularly where the environment is most degraded to ensure a decent environment for everyone; and
- A more integrated policy framework.

Sustainable Communities

In order to create sustainable communities, which embody the principles of sustainable development at the local level, we must:

- Work to give communities more power and say in the decisions that affect them;
- Work in partnership at the right level to get things done; and
- Apply the same principles of engagement, partnership, and programmes of aid that are used to tackle poverty and environmental degradation in the UK to the overseas communities to ensure good governance.

1.2.8 The Welsh Assembly Government has devised its own set of priorities for meeting the key principles outlined in the sustainable development framework. These visions are described in Box 1. Within each vision is a list of outcomes that the Welsh Assembly Government hopes to achieve, together with a number of headline indicators of sustainable development. These are discussed later in this report (Section 3).

Box 1. Welsh Assembly Government's vision of sustainable development in line with the 5 overarching principles of the UK shared framework:

- Sustainable development will be the central organising principle of the Welsh Assembly Government;
- Within the lifetime of a generation we want to see Wales using only its fair share of the earth's resources;
- Wales has healthy, functioning ecosystems that are biologically diverse and productive and managed sustainably;
- A resilient and sustainable economy for Wales that is able to develop whilst stabilising, then reducing, its use of natural resources and reducing its contribution to climate change;
- Safe, sustainable, attractive communities in which people live and work, have access to services and enjoy good health and can play their full roles as citizens;
- A fair, just and bilingual Wales, in which citizens of all ages and backgrounds are empowered to determine their own lives, shapes their communities and achieves their full potential.

*Source: Chapter 1 (p13-15) in **One Wales: One Planet**, Welsh Assembly Government (2009)*

1.3 Conflicts in the Marine Environment

1.3.1 The difficulty is that whilst we can strive to achieve sustainable development, often our path to meeting targets is hindered by conflicts between different user groups in the marine environment, and in some cases between the principles of sustainable development (i.e. delivering on one may comprise another). Direct conflicts may occur over an area considered suitable for several uses or indirectly if activities undertaken by one user group affect the activities of another user group. In fact, marine renewable developments represent their own internal conflict by both contributing to biodiversity conservation targets (by reducing CO_2 emissions) and potentially affecting biodiversity due to their location within the marine environment.

1.3.2 The purpose of this report is to provide a policy context for renewable energy in Wales focussing on sustainable development. A review of international, UK and Welsh policies dealing with renewable energy and climate change is included in the MRESF Technical Addendum Section 4 (WAG, 2010). Here we deal with how these policies may integrate or conflict with other marine interests, such as the natural environment or other user groups (fisheries, aggregate extraction etc.), all of which have an overarching principle of sustainable development.

2 Policy Framework

2.1 Introduction

2.1.1 Sustainable development is about adopting an ecosystem-based approach to managing the environment. Marine policy therefore has to cover a suite of ecosystem goods and services, including, but not limited to, nature conservation; shipping and ports; oil and gas exploration; renewable energy and climate change; fisheries; and aggregate extraction.

2.1.2 The marine environment is protected by a number of international and national policies and legislations. Two key pieces of European legislation are the Marine Strategy Framework Directive and the Water Framework Directive (Section 2.2). In the UK, the objectives of each directive are being achieved under various legislative measures; primarily the Marine and Coastal Access Act (MCAA) 2009 and the Marine Policy Statement (MPS) and a series of Marine plans (currently being consulted upon) which will interpret and present the carbon policies within the MPS.

2.1.3 This section sets out the key legislation that is relevant for renewable energy developments in the UK, and specifically Welsh waters. First an overview of general marine policy in Europe and the UK is given in Sections 2.2. and 2.3. Then, the policies relating to the different ecosystem goods and services are described with the main focus on renewable energy and climate change (Section 2.4) and marine nature conservation (Section 2.5). Two sectors are then used as examples to investigate the potential policy conflicts of other user groups with marine renewables, namely fisheries (Section 2.6) and aggregates (Section 2.7).

2.2 European Marine Legislation

Marine Strategy Framework Directive

2.2.1 The Marine Strategy Framework Directive (2008/56/EC) came into force in July 2008 and states that member states must put measures in place to achieve Good Ecological Status (GES) for their marine waters by 2020 using an ecosystem approach to marine management (Defra, 2009b). Strategies will therefore be required that protect the marine environment, prevent further deterioration and where possible restore marine ecosystems.

2.2.2 The directive was transposed into UK legislation on 15 July 2010 with an assessment of UK waters due in 2012. The UK has addressed the requirements of the directive through a single MPS for the whole UK area (see Section 2.3) and there is a clear link between this directive and the UK MCAA 2009. The marine strategy area covered by the regulations is defined to include the whole of the UK's inshore and offshore waters, including the Renewable Energy Zone and includes "coastal waters" but not "transitional waters" as defined by the Water Framework Directive (WFD) (Defra, 2009b). Therefore relevant aspects of marine renewable devices deployed in estuaries (transitional waters) will be covered by the WFD. Current work being aimed at establishing what good environmental status means for UK seas, followed by the development of targets and indicators to ensure it is achieved.

Water Framework Directive

2.2.3 The Water Framework Directive (WFD) (2000/60/EC) is the most substantial piece of EU water legislation to date and is designed to improve and integrate the way water bodies are managed throughout Europe. In the UK, the Environment Agency (EA) is the competent authority responsible for the implementation of the Directive. The Directive came into force on 22 December 2000, and was transposed in 2003. Under the WFD, Member States must aim to achieve good chemical and ecological status in identified water bodies by 2015. This includes transitional (estuarine) and coastal waters out to one nautical mile. A marine protected area network will make a contribution to UK waters reaching good ecological status where they are covered by the WFD.

2.3 UK Marine Policy

2.3.1 The maritime environment of the UK is an important natural resource. The UK boasts 12,429km of coastline (the second largest in the EU) and approximately 1 million jobs are associated with marine industries. Marine industries include, but are not limited to, energy (oil, gas and renewables), aggregates, ports, cables, carbon capture and storage (CCS), fisheries, marinas and recreational boating. User groups are represented by various umbrella organisations, many of which advocate the concept of sustainable development in what can often be a competing environment. The Seabed User and Developer Group (SUDG) represents most of the large marine industries in the UK, with the exception of fisheries, and works closely with Government, regulators and conservation bodies to deliver an integrated approach to managing the seas, as

highlighted in the MCAA 2009. Examples of sustainable management within marine industries include (SUDG, 2010):

- Self regulation within the shipping and ports industry to ensure ongoing monitoring of environmental conditions at ports and collecting and publishing data on air and water quality;
- Cooperation between different aggregate extraction companies to ensure a regional scale approach to environmental assessment;
- Gaining a good understanding of the environment, through a 3 year baseline monitoring survey prior to deployment of new tidal turbine technology; and
- Closely monitoring a CCS facility in the North Sea to determine movement of CO_2, paving the way for more CCS developments in the fight against climate change.

2.3.2 Under the Marine and Coastal Access Act 2009, the Marine (Scotland) Act 2010 and Northern Ireland Marine Bill (likely to be enacted in 2012), a new system of planning will be introduced in the UK with sustainable development as a key objective. In order to achieve this, the MPS has been drafted to provide a high level policy context for development in the marine environment, and introduce a new formula for marine licensing and other relevant authorisation systems (Defra, 2010).

2.3.3 The MPS addresses the implications of policy objectives within each of the key sectors to planning and development in the marine environment. The marine renewables sector is linked to many other sectors and therefore planning for wave and tidal devices would have cross-sectoral policy implications. For example, the potential impacts (positive or negative) of marine renewable devices on habitats and species will need to address nature conservation policy and legislation. Similarly potential conflicts with other user group, such as fisheries and aggregate extraction, will need to balance policy objectives in these sectors with the renewable energy targets.

2.4 Renewable Energy and Climate Change

2.4.1 Climate change is a global problem, requiring a multinational approach. In 1988, The Intergovernmental Panel on Climate Change (IPCC) was established to deal with this enormous challenge. Through various international meetings, a number of key legislative measures have been put in place to help tackle climate change, the most important of which is the UN Convention on Climate Change (Box 2).

Box 2. United Nations Framework Convention on Climate Change (Rio and later Kyoto)

Adopted in 1992 in Rio de Janeiro, Brazil the convention set a non-binding goal to stabilise GHG emissions to 1990 levels by 2000. As parties were failing to commit to measures to reduce GHGs, a subsequent meeting was held in 1997 in Kyoto, Japan. The outcome was a strengthening of obligations in which developed nations set legally binding commitment to collectively reduce GHG emissions by at least 5% compared to 1990 levels for the period 2008-2012.

The UK ratified the Climate Change Convention in 1992 and the Kyoto Protocol in 2002. In 2000, the UK government (Department of Energy and Climate Change) published its first Climate Change Programme, setting out a national strategy for climate change including measures to deliver its targets of GHG reductions. A second Climate Change Programme was subsequently published in 2006.

2.4.2 Section 4 of the MRESF Technical Addenda (WAG, 2011) describes the International, European, UK National and Welsh policies that underpin the renewable energy sector and set climate change targets. In brief, the international community has agreed a set of global targets for reducing CO2 emissions which have been transposed into UK policies and integrated into the climate change strategies of the UK and devolved administrations (DECC, 2009). Table 2-3 within the MRESF Technical Addenda (WAG, 2011) sets out the policies and agreements from international through to Welsh Assembly Government policies giving the climate change targets for each. In summary, Wales is committed to a UK-wide target of a 34% reduction in GHGs by 2020 and an 80% reduction by 2050. These targets aim to exceed the internationally and EU agreed targets by 2050. These targets aim to exceed the internationally and EU agreed targets over the same time period. The Welsh Assembly Government hopes to meet their commitments through a 3% annual reduction in GHG emissions from 2011 onwards. The strategies for achieving these targets are set out in various energy policy documents and strongly advocate marine renewable as a key approach (Table 2-1).

Table 2-1 Renewable energy and climate change strategies for Wales.

Year	Document	Overview
2002	Review of Energy Policy in Wales Part 1: Renewable	Outlines the need to reduce CO_2 emissions with one solution being the use of low-carbon fuel sources, in particular renewable energy. Stresses need to facilitate

	Energy	development of on-shore and offshore renewables projects.
2005	Energy Wales: Route map to a clean, low carbon and more competitive energy future for Wales	Commitment to marine renewable developments and CCS. A number of priority actions were given, including opportunities for marine renewables.
2007	One Wales: A Progressive Agenda for the Government of Wales	Four year programme aimed at improving the quality of life in Wales, including tackling climate change, achieving sustainable energy production and consumption, and improving the local environment.
2008	Renewable Energy Route Map for Wales	Built on 2005 document, aiming to drive towards self sufficiency in renewable energy, includes a programme to assist in meeting an annual reduction of 3% in GHG emissions from 2011.
2010	Welsh Assembly Government Energy Policy Statement	Outlines how WAG aims to achieve the UK target, under the Climate Change Act 2008, of reduction in GHG emissions of 80% by 2050.

2.5 Marine Nature Conservation

2.5.1 The UN has declared 2010 the International Year of Biodiversity. Conservation of biodiversity is at the route of sustainable development, with nature's valuable services (food, fuel, fibre and medicines, regulation of water, air and climate, maintenance of soil fertility, and cycling of nutrients) contributing to our economic growth and employment and improved livelihoods.

2.5.2 The UK is a signatory to a number of UN Conventions and international agreements (Multilateral agreements), as well as being required to implement applicable EU directives, which relate to our natural marine environment and therefore are of relevance to offshore marine renewable developments (Table 2-2). Consequently, nature conservation underpins many of the UK's International priorities for sustainable development.

Table 2-2 Nature conservation conventions, agreements and legislation.

Convention/Agreement/Legislation	Overview	UK Policy and Legislation
Convention on Biological Diversity (CBD)	Adopted at the Earth Summit in Rio de Janeiro 1992, this convention is a global treaty to provide a legal framework for conservation of biodiversity	The UK ratified the CBD in 1994 and subsequently launched the UK Biodiversity Action Plan (UK BAP), a national strategy for broad conservation activities.
Convention on International Trade in Endangered Species (CITES)	Adopted in Washington D.C. in 1973, aiming to regulate international trade is species that are endangered or may become endangered if their exploitation is not controlled.	The UK ratified CITES in 1976 through the Endangered Species Act 1976. This has now been superseded by European regulations The Control of Trade in Endangered Species (Enforcement) Regulations 1997.
Convention on the Conservation of European Wildlife and Natural Habitats (Bern)	Adopted in Bern, Switzerland in 1979 to ensure protection of wild plant and animal species and their natural habitats (listed in Appendices I and II) and to regulate exploitation of species (including migratory species) listed in Appendix III. The EC subsequently adopted the Birds Directive[1] and Habitats Directive[2] and provides for the establishment of a European network of protected areas (Natura 2000)	The UK ratified the Bern convention in 1992 and was implemented into UK law by the Wildlife and Countryside Act (1981 and as amended).
Convention on the Conservation of Migratory Species of Wild Animals (Bonn)	Adopted in Bonn, Germany in 1979, to ensure that contracting parties work together (multilateral agreements and cooperative research) to conserve migratory species and their habitats, providing strict protection for those species listed on Appendix I of the convention.	The UK ratified the Bonn convention in 1985 with legal requirement for Appendix I species provided under the Wildlife and Countryside Act (WCA) (1981 as amended). This was further strengthened under the Countryside and Rights of Way Act 2000. The UK currently has 4 legally binding agreements under the Convention for bats,

Convention/Agreement/Legislation	Overview	UK Policy and Legislation
		migratory birds, cetaceans, and albatrosses and petrels.
Convention on Wetlands of International Importance especially as Waterfowl Habitat (Ramsar)	Adopted in Ramsar, Israel in 1971 and covers all aspects of wetland conservation and wise use. Ramsar sites receive protection under the EC Birds and Habitats Directives as part of the EU Natura 2000 network.	The UK ratified the Ramsar convention in 1976. Ramsar sites are protected as European sites (as set out in The Conservation of Habitats and Species Regulations 2010 (SI No. 2010/490) which supersede The Conservation (Natural Habitats, &c.) Regulations 1994 (as amended)). Other activities that support Ramsar sites include the UK BAP and EC Water Framework Directive's 'Good Ecological Status'.
United Nations Convention on Law of the Sea (UNCLOS)	This convention resulted from the third UN conference on Law of the Sea, convened in New York in 1973 and ending in 1982 with the adoption of this convention. It covers all aspects of the sea – from navigational rights and territorial limits to conservation and management of marine resources.	UNCLOS came into force in November 1994 and was ratified by the UK in July 1997.
The Convention Concerning the Protection of the World Cultural and Natural Heritage (UNESCO World Heritage Convention)	Adopted in Paris, France in 1972 and defines the type of sites (biological, geological, archaeological) which can be considered for inscription of the World Heritage List.	The UK ratified the World Heritage Convention in 1984 and the nomination of sites and compliance with the Convention is governed by the Department for Culture, Media and Sports (DCMS).
Protection of the marine environment of the Northeast Atlantic (OSPAR)	Adopted in Paris, France in 1992, to replace the Oslo and Paris conventions to provide a simplified approach to	The UK ratified OSPAR in 1998 with UK implementation coordinated by the Department for Environment Food and

Convention/Agreement/Legislation	Overview	UK Policy and Legislation
	addressing all sources of pollution, which otherwise might affect the maritime area, and protection of marine environment in general e.g. through selection of Marine Protected Areas and identification of species and habitats needing protection.	Rural Affairs (Defra).
Council Directive 79/409/EEC on the Conservation of Wild Birds	This Directive seeks to protect, manage and regulate all bird species naturally living in the wild within the European territory of the Member States, including the eggs of these birds, their nests and their habitats, and to regulate the exploitation of these species.	In the UK, the provisions of the Birds Directive are implemented through the Wildlife & Countryside Act 1981 (as amended) and The Conservation (Natural Habitats, &c.) Regulations 1994 (as amended).
Council Directive 92/43/EEC on the Conservation of Natural Habitats and Wild Fauna and Flora	This Directive, known as the Habitats Directive, is intended to help maintain biodiversity in the Member States by defining a common framework for the conservation of wild plants and animals and habitats of Community interest. The Habitats Directive established the "Natura 2000" network.	The Conservation (Natural Habitats, &c.) Regulations 1994 (as amended) transpose the Habitats Directive into national law. The Regulations provide for the designation and protection of 'European sites', the protection of 'European protected species' and the adaptation of planning and other controls for the protection of European Sites.
Directive 2008/56/EC on the Establishing a Framework for Community Action in the Field of Marine Environmental Policy (Marine Strategy Framework Directive)	The Marine Strategy Framework Directive (MSFD) requires Member States to determine Good Environmental Status (GES) for their marine waters, and design and implement programmes of measures to achieve or maintain GES by 2020, using an ecosystem-based approach to marine	The Marine Coastal and Access Act (2009) aims to deliver a positive improvement in the marine environment in order to meet obligations under the MSFD. The Act includes a new system of marine planning that will cover all key marine activities.

Convention/Agreement/Legislation	Overview	UK Policy and Legislation
	management. It takes account both of socioeconomic factors and the cost of taking action in relation to the scale of the risk to the marine environment.	

[1] Council Directive 79/409/EEC on the Conservation of Wild Birds . [2] Council Directive 92/43/EEC on the Conservation of Natural Habitats and Wild Fauna and Flora.

2.5.3 One of the key commitments made for nature conservation was in 2001, when the EU heads of state in the Göteborg Council agreed to halt the decline to biodiversity (in the EU) by 2010 (Commission of the European Community, 2006). A summary of the key policy areas and their objectives outlined in this communication is given in Table 2-3. This was further supported by the international community during the 2002 World Summit on Sustainable Development (WSSD) with a commitment to significantly reduce the rate of biodiversity loss by 2012.

Table 2-3 Four key policy areas and their objectives presented by the European Commission (Commission of the EC, 2006).

Policy Area	Priority Objectives	Key Actions
1. Biodiversity in the EU	Safeguard the most important habitats and species.	Propose, designate, protect and effectively manage Natura 2000 sites. Strengthen coherence and resilience of the network.
	Conserve and restore biodiversity and the wider EU countryside.	Optimising the use of available measures under the reformed Common Agricultural Policy (CAP) to protect high nature value farmland and under the reformed Common Fisheries Policy (CFP) to restore fish stocks, reduce impacts on non-target species and reduce damage to marine habitats. Also, advance key directives which reduce pressures on biodiversity.
	Conserve and restore biodiversity and the wider EU marine environment.	
	Reinforce compatibility of regional and territorial development with biodiversity.	Effective treatment of biodiversity in Strategic Environmental Assessment (SEA) and Environmental Impact Assessment (EIA); ensuring community funds for regional development benefit (not damage) biodiversity; and building partnerships between planners, developers and biodiversity interests.
	Substantially reduce the impact on biodiversity of invasive alien species and alien genotypes.	Address policy gaps in prevention and control of alien species; develop a comprehensive EU strategy for this purpose.
2. The EU and global	Substantially strengthen	EU should focus on more effective

biodiversity	effectiveness of international governance for biodiversity and ecosystem services	implementation of Convention on Biological Diversity (CBD) and related agreements.
	Substantially strengthen support for biodiversity and ecosystem services in EU external assistance.	EU should enhance 'earmarked' funds for biodiversity and strengthen mainstreaming of biodiversity into sector and geographical programmes.
	Substantially reduce the impact of international trade on global biodiversity and ecosystem services.	Measures to address tropical deforestation, including trade in commodities which drive deforestation.
3. Biodiversity and Climate Change	Support biodiversity adaptation to climate change.	Honour Kyoto agreements and set more ambitious targets post 2012 to limit further increase in global mean temperature; secure coherence of the Natura 2000 network and take care to prevent, minimise and offset potential damage to biodiversity arising from climate change adaptation & mitigation.
4. The Knowledge Base	Substantially strengthen the knowledge base for conservation and sustainable use of biodiversity in the EU and globally.	The key to understanding biodiversity and ecosystem services is strengthening research and promoting the science-policy interface. Subject to funding the Commission will establish a mechanism for independent research-based advice to inform further policy development..

2.5.4 Following the 2002 WSSD, progress has been made at the national level and within Wales to meet the biodiversity conservation targets. For example, the UK published its first Marine Stewardship Report describing a coherent and integrated approach to conserving marine biodiversity (Defra, 2002) and subsequently conducted the Review of Marine Nature Conservation (Defra, 2004). Under the MCAA (and OSPAR), the UK is

looking to establish a network of marine protected areas (MPAs) to protect biodiversity, whilst balancing the needs of other user groups.

2.5.5 Similarly, in their Environment Strategy for Wales (ESW) the Welsh Assembly Government outlined their own commitments to the International/European targets for 2010 (Welsh Assembly Government, 2006). In particular, ESW target 32 notes that sites of international, national and local importance in Wales should be in favourable condition to support the species and habitats for which they have been identified. By 2010, 95% of international sites should be in favourable condition; by 2015, 95% of Welsh SSSIs should be in favourable condition and by 2026, all sites should be in favourable condition.

2.5.6 Recognising that these targets will not be met by the end of 2010, a new Natural Environment Framework is under development (Welsh Assembly Government, 2010), whose purpose is:

"To secure a stronger focus on sustainable land and marine management by moving away from a specified focus on sites and species to stronger support and action on ecosystems and their services – thereby ensuring that Wales' natural capital is maintained and enhanced."

2.5.7 However, Wales already has a very high percentage of protected marine areas already and therefore, the Welsh Assembly Government are focusing at developing a Network of Highly Protected Marine Conservation Zones.

2.5.8 The strongest link between renewable policy and marine nature conservation policy is the commitment to reducing climate change impacts, which affect marine ecosystems. The greatest potential for policy conflict would be in terms of the commitment to designate a network of MPAs, which may compete for space with marine renewable sites.

2.6 Potential for Synergy with Sustainable Development Policies for Some Example Sectors

Fisheries

2.6.1 Fisheries are dependant on access to maritime space and on healthy and resilient marine ecosystems. Competition for marine space has become more intense with other user groups demanding larger areas. With this increased activity, the pressures on the natural marine environment have increased, and together with the effects of climate

change, the result is a degraded marine ecosystem, with knock-on effects on fish distribution and abundance. The impacts also go full cycle: ecosystems degraded by damaging fishing methods and overexploitation of fish stocks are less able to adapt to climate change effects.

2.6.2 The marine fisheries sector encompasses all activities that deal with the fish and shellfish industry from catch to processing. The fisheries sector is important to the UK socio-economy, accounting for approximately 33,500 jobs in 2006 (European Commission, 2007) and providing up to 20% of jobs in coastal areas (Defra, 2010). Measures to promote sustainable fisheries across Europe are outlined in the Common Fisheries Policy (CFP), but so far this has been unable to deliver a sustainable fishing industry. The CFP is therefore currently undergoing reform to deliver an ecosystems approach to management, integrating with other maritime policy, such as the Integrated Maritime Policy (IMP), which engages with all sectors through the Marine Strategy Framework Directive (Commission of the European Communities, 2009).

2.6.3 Key policy objectives for the delivery of sustainable fisheries were also agreed at WSSD 2002. One key objective is: "to *maintain or restore stocks to levels that can produce the MSY [maximum sustainable yield], where possible not later than 2015*" (Defra, 2006b). The UK's focus will be to work at EU levels to agree policies that will deliver long term sustainability of fish stocks. The future of the CFP will look towards a synergistic approach at the European, national and regional level to fisheries research and an integration of fisheries policy with other maritime issues, in particularly the ecosystem approach and climate change (CEC, 2009; Defra, 2007).

2.6.4 The consideration of synergy between the sustainability aspects of fisheries policies and renewables policies does need to include potentially differing views. For example, development of offshore renewables is viewed by some as 'squeezing' the fishing industry, with the argument for the ecological benefits of fishery exclusion zones within renewable energy areas not accepted by all interested parties. As such, while synergies between fishery and renewable policies can be drawn, it should be noted that for a sustainable route to be found, room needs to be made for both industries. (see 3.2 for Marine Spatial Planning).

Aggregates

2.6.5 Marine sand and gravel are important commodities in the UK, providing a fifth of all sand and gravel used in Britain today (BMAPA, 2010). In South Wales, marine aggregates account for 80% of the regional demand for sand and gravel (Defra, 2010). Also, marine

aggregates represent the only source for the maintenance of coastal defences required for climate change adaptation (Defra, 2010). The marine aggregate industry is an important part of the supporting industry for marine renewable projects, mainly through the provision of material for developing the necessary coastal infrastructure. Although Wales accounts for just a small proportion (1.25%) of the total marine aggregate landings in Great Britain (BMAPA, 2009), the economic value of this sector to the UK is estimated at £114 million, with exports valued at £56 million (Defra, 2010).

2.6.6 In Wales, the marine aggregate industry is guided by the Interim Marine Aggregate Dredging Policy (IMADP) which seeks to ensure sustainable, objective and transparent decision-making for dredging programmes in the Bristol Channel, Severn Estuary and River Severn (Welsh Assembly Government, 2004). This document sets out a list of policies related to sustainability, for example, the policies specify: the need to target areas further offshore and to the west of Bristol Channel; an upper limit of 2 million tonnes per annum (mtpa) extraction in total and 1mtpa for the Severn Estuary and Inner Bristol Channel, decreasing to 0.8mtpa by 2015; and the need to address cumulative and in-combination effects to appraise the regional environmental capacity.

2.6.7 In order to embrace the concept of sustainable development the IMADP sets out its key objectives to:

- Identify areas where dredging for marine aggregates is likely to be acceptable;
- Protect the marine and coastal environment – landscape, habitats, ecology and heritage;
- Control the impacts of marine dredging to acceptable levels;
- Encourage efficient and appropriate use of dredged aggregates;
- Safeguard resources from sterilisation; and
- Protect the interests of other users of the area.

2.6.8 These policies, in particular the first, integrate with renewable energy policies through their commitment to protect the interests of other user groups. Such a commitment would, however, need to ensure that there is recognition of the need for aggregate dredging areas, to ensure sustainability for both industries. In addition, under the Welsh Assembly Government the spatial conflict may decrease as the industry seeks more offshore area and also moves to decrease the quantity of aggregates extracted.

3 Sustainable Development in Practice

3.1 Sustainable Development Indicators

3.1.1 Sustainable development indicators are a set of user-driven, quantitative, scientifically sound values that can be used to measure the progress towards sustainable development. In 2004, the EU Integrated Coastal Zone Management Expert Group chose a set of 27 coastal zone indicators that would meet these requirements and that fit in with the overarching goals of sustainable development (WG_ID, 2004).

3.1.2 This indicator approach has since been adopted and adapted by the UK government and devolved administrations such that for each sustainability principle (e.g. HLMOs in Table 1-1) there are a suite of measurable indicators. The Welsh Assembly Government has outlined its headline and supporting indicators for each sustainability principle (Box 1) in the publication One Wales: One Planet (WAG, 2009a). Whilst there are some overlaps in the indicators these are not cross-comparable (Table 3-1).

Table 3-1 List of key sustainability indicators relating to relevant sustainability principles/indicators.

EU ***To protect, enhance and celebrate natural (and cultural)* diversity***	**UK HLMOs** ***Living within Environmental limits***	**Wales** ***Sustaining the Environment***
Amount (area) of semi-natural habitat; Area of land protected for nature conservation, landscape and heritage; Change to significant coastal and marine habitats and species: • Status and trends of specified habitats and species	Bird population indices: annual population of farmland birds; Biodiversity conservation (priority species and priority habitats): % favourable condition of nationally important sites; Fish stock status around the UK (Defra's sustainable limits programme)	<u>Headline indicator</u>: % of Biodiversity Action Plan habitats and species recorded as stable or increasing. Stabilise the public sector's ecological footprint by 2020 then reduce. <u>Supporting indicators</u>: • Trends in bird populations

EU ***To protect, enhance and celebrate natural (and cultural)* diversity***	**UK HLMOs** ***Living within Environmental limits***	**Wales** ***Sustaining the Environment***
• Number of species per habitat type • Number of Red List coastal area species		• Ecological impacts of air pollution • Air quality • Water quality • Soil quality • Sustainable water resource management <u>Headline indicator</u>: Wale's ecological footprint <u>Supporting indicators</u>: • Total resource use • Greenhouse gas emissions • Waste arisings <u>Headline indicator</u>: Gross value added (GVA) and GVA per head <u>Supporting indicators</u>: • Electricity from renewable resources

* indicator of cultural diversity not included

3.2 Marine Spatial Planning

3.2.1 Marine spatial planning (MSP) is decision-making tool, with a primary focus of providing an integrated ecosystem-based approach to marine activities. Marine spatial planning adopts a cross-sectoral and geographic approach to decision making about the use of resources, development and management of marine activities. In this way, MSP meets the objectives of sustainable development. Some of the key benefits of this approach include: providing a more coherent approach to consenting and planning; enabling integrated management of the sea that incorporates cumulative and in-combination effects; and improving the quality of decision-making enabling better regulation of the marine environment (WWF, 2004).

3.2.2 In order to investigate the potential for developing, implementing and managing MSP in the UK, a study of the Irish Sea was undertaken by the MSPP Consortium. The project highlighted potential tensions that may arise, such as whether the MMO may have an industry bias or an environment bias, the extent to which MSP should intervene in rights to sea space, and how to balance requirements for certainty with those for flexibility (MSPP, 2006). The pilot also emphasised the need for integration as an essential pre-requisite for achieving sustainable development. Eight key recommendations were given as a result of this study, the first of which was the need to implement MSP as a statutory system with the purpose of achieving sustainable development in the marine environment. The system should include a national marine planning policy framework, supported by Marine Policy Planning Statements.

3.2.3 Furthermore, MSP could be seen as a driver for increased economic competition in the marine environment, making Europe more attractive for investors (European Commission, 2010). This is because by improving cross-boundary coordination and simplifying the decision-making framework, the costs of investigation are decreased and the legal certainty for investors increased, thereby facilitating marine investments in Europe.

3.3 Information Gateway

3.3.1 A number of data sources are available to support sustainable development strategies for the marine environment. These are summarised in Section 5 of the MRESF Technical Addenda (WAG, 2011). The caveat with using existing sources is of course that the methodologies and the scale (temporal, spatial and geographic) of data collection will vary considerably.

4 Discussion

4.1.1 Since WSSD 2002 the UK government has made an ongoing commitment to sustainable development, producing a number of policy documents to outline its strategy. As the lead department for sustainable development, Defra has defined a primary Public Service Agreement (PSA 1) to:

" promote sustainable development across government and in the UK and internationally, as measured by the UK's progress towards delivering the WSSD commitments, notably in the areas of sustainable consumption and production, chemicals, biodiversity, oceans, fisheries and agriculture". (Defra, 2006a)

4.1.2 The main priorities of PSA 1 relating to marine renewable energy include:

- Sustainable consumption and production (SCP): including development of a 10 year framework of SCP and reversing the trend in loss of natural resources;
- Urgently and substantially increase global use of renewable energy and increase energy efficiency;
- Significantly reduce the rate of biodiversity loss by 2010;
- Restore depleted fish stocks by 2015; and
- Establish networks of marine protected areas by 2012.

A Sustainable Wales

4.1.3 The marine environment is important to the livelihood and well being of the Welsh population. The marine and coastal environment is worth 2.5 billion GDP and contributes to 40% of the tourism revenue in Wales (Welsh Assembly Government, 2009). Wales as a nation is very proud of its natural heritage and there is concern that the current way of living is unsustainable, as indicated by the ecological footprint (see Section 1.1.2). In its 20-year environmental strategy, the Welsh Assembly Government emphasises that sustainable development will underpin decision-making in the marine environment (Welsh Assembly Government, 2006).

4.1.4 The most recent environmental narrative of the Welsh Assembly Government (WAG, 2010) describes how to take this forward. For nature conservation, this means a shift of focus from protected species and habitats to a more holistic approach, with priorities directed towards habitat and ecosystem resilience and long-term sustainable

management. This produces a more effective approach to meeting Wales' commitment to halt biodiversity loss under the European CBD and the UK's PSA 1 than simply protecting some sites and rare species. However, whilst this may be the approach, the sustainability indicators still propose to use protected species and habitats as measures of success. At present, these are likely to be the most measurable values for biodiversity, but given the focus on an ecosystem approach, it may be necessary to adapt the indicators to reflect ecosystem resilience, that may otherwise not be apparent through simply measuring certain species/habitats.

4.1.5 For the most part, the sustainability strategies presented here – renewable energy and climate change, marine nature conservation, fisheries and aggregates – appear to compliment each other at the strategic level, by virtue of the fact that they all have a common goal: to protect the natural marine environment while ensuring the continuation of the associated interest. Useful tools, such as SEAs, EIAs and marine spatial planning, will enable authorities to disseminate information at a wider scale than simply within the defined 'impact zone' of a proposed development. The key to the success of these tools is the robustness of the underlying data. At present there are substantial gaps in our knowledge of the marine environment. Initiatives to collate, quality assure, and analyse existing datasets and to support international and national long-term monitoring programmes of the marine environment will be important to the effectiveness of sustainable management. For example, the Working Group on Indicator Data (WG-ID) is working towards this by facilitating collaboration between organisations throughout the EU working in the indicator field and providing an inventory of data available at regional, national and European levels (WG-ID, 2004). Without good data, marine spatial planning becomes little more than drawing circles on a map.

4.1.6 Given the above, it is important to recognise that although individual sustainability plans are complimentary in that they generally have the common aims of ensuring sustainability of the natural environment and the activity of relevance to the document, there is potential conflict when considering sustainability across all sectors, activities and interests. This is particularly relevant on the site specific basis, since most sustainability documents are aimed at the strategic level (as for the MRESF project itself). For example, a marine renewable energy development at the strategic level can be viewed as both sustainable for the industry and the natural environment – e.g. it is enabling continuation of the industry while contributing to climate change targets and the green economy. However, at the site specific level, such a development could be viewed as being in conflict with biodiversity targets and protection. It is the balance and potential need for trade off between the requirements of the various sectors and interests that is

required for true sustainability to be achieved. For this to be implemented in practice, a linkage between the strategic level and the site specific is required and applied through a system of marine planning.

References

BMAPA (2010) British Marine Aggregate Producers Association – key issues on sustainabiliy http://www.bmapa.org/issues_sustain01.php

BMAPA (2009) *Strength from the depths: Third sustainable development report for the British marine aggregates industry* http://www.bmapa.org/downloads/BMAPA_SD_Report2009.pdf

BMAPA (2006) *Strength from the depths: A sustainable development strategy for the British marine aggregates industry.* http://www.bmapa.org/downloads/bmapa_sd_strategy2006.pdf

Commission of the European Communities (2006). *Halting the Loss of Biodiversity by 2010 – and beyond: Sustaining ecosystem services for human well-being.* Communication from the Commission, Brussels 22.5.2006 COM/2006/216 final. http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2006:0216:FIN:EN:PDF

Commission of the European Communities (2009). *Reform of the Common Fisheries Policy*. Brussels. 22.4.2009. COM/2009/163 final. http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2009:0163:FIN:EN:PDF

Commission of the European Communities (2010) http://ec.europa.eu/maritimeaffairs/press/press_rel130910_en.html

Defra (2002) *Safeguarding Our Seas: A Strategy for the Conservation and Sustainable Development of Our Marine Environment.* http://www.defra.gov.uk/environment/marine/documents/marine_stewardship.pdf

Defra (2004). Review of Marine Nature Conservation (www.defra.gov.uk/environment/biodiversity/marine/documents/rmnc-report-0704.pdf)

Defra (2005) *One future – different paths: The UK's shared framework for sustainable development.* Department for Environment, Food and Rural Affairs. www.sustainable-development.gov.uk/publications/uk-strategy/framework-for-sd.htm

Defra (2006a) *Beyond Johannesburg: Delivering our International Oceans Commitments*. Department for Environment, Food and Rural Affairs http://www.defra.gov.uk/sustainable/government/international/documents/biodiversity-2006.pdf

Defra (2006b) *Beyond Johannesburg: Delivering Our Fisheries Commitments*. Department for Environment, Food and Rural Affairs http://www.defra.gov.uk/sustainable/government/international/documents/fisheries-2006.pdf

Defra (2009) *Fisheries 2027: a long-term vision for sustainable fisheries*. Department for Environment, Food and Rural Affairs. http://www.defra.gov.uk/foodfarm/fisheries/documents/fisheries2027vision.pdf

Defra (2009a) *Our seas – a shared resource: High level marine objectives*. Department for Environment, Food and Rural Affairs. 2009 update. http://www.defra.gov.uk/environment/marine/documents/ourseas-2009update.pdf

Defra (2009b) *Marine Strategy Framework Directive: Putting in place the legal framework for implementation*. Department for Environment, Food and Rural Affairs. October 2009. http://www.defra.gov.uk/corporate/consult/msfd-legal-framework/consultation.pdf

Defra (2010). *Pre-Consultation on the Draft UK Marine Policy Statement: A Paper for Discussion.* Department for Environment, Food and Rural Affairs. March 2010. http://www.defra.gov.uk/environment/marine/documents/legislation/ mps-discussion.pdf

European Commission (2007) EU Maritime Policy: Facts and Figures – United Kingdom. http://ec.europa.eu/maritimeaffairs/pdf/country_factsheets/uk_en.pdf

HM Government (2009) *Our seas – a shared resource: High level marine objectives.* http://www.defra.gov.uk/environment/marine/documents/ourseas-2009update.pdf

MSPP (2006) *Marine Spatial Planning Pilot (Final Report). MSPP Consortium, February 2006* http://www.abpmer.net/mspp/docs/finals/MSPFinal_report.pdf

SUDG (2010) *Sustainable development and the sea*. Seabed User and Developer Group. July 2010. http://www.sudg.org.uk/downloads/SUDG-A5-brochure.pdf

Welsh Assembly Government (2004) Interim Marine Aggregates Dredging Policy. November 2004 http://wales.gov.uk/docrepos/40382/epc/planning/403821/4038211/1427206/madp-e.pdf?lang=en

Welsh Assembly Government (2006). *Environment Strategy for Wales* http://wales.gov.uk/docs/desh/publications/060517environmentstrategyen.pdf

Welsh Assembly Government (2009a). Ones Wales: One Plant, a new Sustainable Development Scheme for Wales. May 2009

Welsh Assembly Government (2009b). *Protecting Welsh Seas: A draft strategy for Marine Protected Areas in Wales*. September 2009. http://wales.gov.uk/docs/desh/consultation/090916marineprotectareasen.pdf

Welsh Assembly Government (2010) *The Natural Environment Framework for Wales: Narrative 3.* http://new.wales.gov.uk/topics/environmentcountryside/consmanagement/conservationbiodiversity/publications/nefnarrative3/?lang=en

Welsh Assembly Government (2011) *Marine Renewable Energy Strategic Framework for Wales – Stage 3. Technical Addendum*. Produced by RPS On Behalf of the Welsh Assembly Government. Doc Ref. JER3688R101118SK Version 7.

WG-ID (2004) *Report to the EU ICZM Expert Group.* Working Group on Indicators and Data http://ec.europa.eu/environment/iczm/pdf/report_final_wgid.pdf

World Commission on Environment and Development (1987) *Our Common Future, Chapter 2: Towards Sustainable Development*. June 1987. Geneva, Switzerland. A/42/427 http://www.un-documents.net/ocf-02.htm

World Resources Institute (2005) *Millennium Ecosystem Assessment: Living Beyond our Means: Natural Assets and Human Well Being*. http://www.wri.org/publication/millennium-ecosystem-assessment-living-beyond-our-means-natural-assets-and-human-we