

# Avoiding conflicts in the marine environment

Effective planning for marine renewable energy in Scotland



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## Summary

The threat of climate change, the abundance of marine renewable energy sources (wind, wave and tide), and a combination of political and economic factors make a strong case for the urgent development of marine renewable energy in Scotland.

At the same time there is an equally strong case for a precautionary approach. This is due to the extraordinary value of the marine environment, the unknown impacts of some of these technologies, the poverty of knowledge about marine ecosystems, our poor history of rapid developments in coastal waters (e.g. aquaculture) and the frailty of marine conservation measures.

The Marine (Scotland) Act 2010 creates a hugely improved regime for strategic planning of all marine and coastal developments, including precautionary measures. However, in the case of renewable energy, the pressure for rapid development risks forcing the pace, ahead of the Act's provisions.

Here, Scottish Environment LINK makes proposals which would help to secure public confidence that the promotion, development and regulation of the nascent marine renewable energy industry is truly to be sustainable, despite these pressures.<sup>1</sup> This paper focuses on living resources, but it is acknowledged that cultural resources will require similar consideration.

Our vision is of a thriving industry that will help reduce the causes of climate change and bring secure long-term jobs while safeguarding a diverse, productive sea. Rarely has a new industry presented such remarkable potential. Members of Scottish Environment LINK want to help and support the industry in realising this vision. By proactively setting out clear objectives from an environmental perspective along with simple, practical solutions, LINK aims to avoid potential damage or conflict from the outset.

Our recommendations focus on dealing with the tension between wanting urgent development and yet needing to know more about its potential impacts. The aim is to safeguard the environment, so bolster the sustainability and reputation of the burgeoning industry, and help rather than hinder the potential growth of responsible development.

Recommendations include calls on decision makers and industry to work together to:

- establish **realistic expectations** of growth, allowing time for proper care to minimise impacts on the marine ecology
- guarantee **adequate resources** to fund the necessary environmental research and monitoring, to match the pace of development;
- appoint a wholly **independent committee** to scrutinise scientific research and advice given to regulators;
- publish without delay **zones of particular sensitivity** where there should be a presumption against development;
- adopt an **adaptive management** and planning approach, to build early findings into future plans and practices;
- improve arrangements for constructive **stakeholder engagement**.

# Full list of recommendations

**1 The importance of the marine environment** should be acknowledged in:

- declarations by **government**; emphasising the importance of environmental protection alongside pursuit of economic goals;
- **the stance adopted by the renewables industry**; helpfully affirming its commitment to protecting marine life, as well as in tackling climate change;
- a commitment by the **Crown Estate Commission** to allocate a higher proportion of lease income to underfunded baseline survey and post consent monitoring, as part of a long term strategy to protect the public interest.

**2 An independent committee** should be appointed by the Scottish Government, with a brief to audit the scientific validity of research, assessments and advice in a random sample of cases and report publicly. This independent scrutiny would validate and promote good practice and would protect the reputation of all involved in a process which is otherwise largely inaccessible to stakeholder scrutiny.

**3 Government should take action to:**

- **allocate appropriate resources** for bodies undertaking research and regulation to meet statutory national obligations and objectives, as well as those of EU Habitats Directive and Marine Strategy Framework Directive, and to minimise the risks of infraction proceedings;
- **financially support project level environmental assessment for novel technologies**; this would help to secure the findings for wider use and to reduce regulatory burdens on novel technologies and pioneering companies;
- **include strong representation of environmental science** in high level strategic planning groups;

**4** The aim should be to move as soon as possible to a **strategy-led consenting process**, with benefits to all interests involved. Meanwhile, the greatest care should be taken not to compromise the process by encouraging developers to invest prematurely in preparations for sites which may have to be ruled out at a later date, due to the findings of survey work.

**5** The programme for survey and **designation of a completed network of Natura 2000 sites** should be accelerated to inform spatial planning processes.

**6** SNH should lead in the urgent preparation of an open access **GIS of all known sensitive marine sites/features**, drawing on the scientific knowledge of NGOs and others as appropriate, to be made publicly available, updated as appropriate, and used to inform decisions on the location of renewable energy installations and their associated infrastructure (transmission lines, construction, shipping etc). This map should also include landscape designations (National Scenic Areas), areas of high wildness quality where the seascape is an important visual amenity in the total landscape experience, and cultural features such as historic wreck sites.<sup>2</sup>

**7** Meanwhile the programme for preparation of a **statutory, effective network of well-managed MPAs** should continue with renewed urgency.

**8 Research on wildlife baseline data and impacts** should be strongly promoted, and international research findings monitored and disseminated widely, with close attention to cumulative impacts at a larger scale, and adoption of best practice assessment, management and mitigation techniques.

**9** In this early phase, while spatial plans are in preparation, developers should be strongly, openly and officially discouraged from commitments to any sites where **potentially significant adverse environmental impacts** would expose the sector to reputational risk.

**10** Marine Scotland and the Crown Estate Commission should move urgently to lead on much improved **collection, management and sharing of environmental survey and monitoring data**.

Lessons from the experience gained in the COWRIE (Collaborative Offshore Wind Research Into the Environment) initiative should be reviewed and implemented beyond wind to wave and tidal.

**11** A 'Deploy and Monitor' policy should be adopted as part of **an adaptive management approach** to regulation of the nascent wave and tidal industry (details subject to consultation). The following presumptions will help to sustain the precautionary principle and the reputation of the industry:

- adequate baseline survey and subsequent monitoring to identify sensitivities, assess impacts and develop management and mitigation procedures;
- ensuring that sites/species/features with particular sensitivities are protected (which may mean they need to be avoided at this exploratory stage in the development process)
- explicit commitment that in these cases consent to continue is strictly subject to evidence that there is no significant adverse impact;
- acknowledgement that this is a risk-based approach which may allow early development, but may equally lead to withdrawal of this and further consents;
- all baseline data collected as part of licensing requirements are made publicly available, and updated at least annually, so that they can be reviewed and fed into an adaptive management process (similar to the process that JNCC oversees for the implementation of the UK seismic survey guidelines);
- close attention to advice of statutory consultees, particularly SNH and JNCC.

**12** Marine Scotland should commit to and set out a **timetable for periodic updates** of SEAs, and of the Scottish Marine Plan and Regional Marine Plans to take account of new knowledge and feedback.

**13 Means of engaging with stakeholders** should be seriously improved and strengthened without delay, with financial support offered to enhance their capacity to participate, especially during the heavy diet of consultations on implementation of the Marine Act.

**14 Greater representation** should be offered to key environmental NGOs at a strategic level – eg FREDS,<sup>3</sup> Scottish Energy Advisory Board - to ensure that environmental concerns relating to the development of marine renewables are raised at an early stage, and can be integrated in to planning appropriately.

**15** Opportunities should be taken to **enhance biodiversity/productivity through design and siting** of installations where this is both possible and appropriate, and research into understanding these potential benefits should be strongly supported.

## Introduction

On the face of it, the urgent deployment of renewable energy technologies at sea is self-evident – Scotland’s extraordinary wealth of these resources could provide an abundant, secure and indefinite supply of low carbon electricity, contribute handsomely to Scotland’s economy, and may even help restore damaged marine habitats.

However, the sea’s complex ecology and its valuable productive systems are also vulnerable to unforeseen damage. Regulating this massive new growth industry to ensure environmental protection is a tricky but vitally important business. Scotland’s history of natural resource exploitation is littered with cautionary tales. This time we must get it right.

LINK’s objective in this paper<sup>4</sup> is to contribute to the design and implementation of a regulatory framework which will secure both a thriving renewables industry and *“a clean, healthy, safe, productive and biologically diverse marine and coastal environment, managed to meet the long term needs of nature and people”*.<sup>5</sup>

## 1 Why is marine renewable energy a good idea?

The case in favour of developing renewable energy generation technologies in Scotland’s marine environment is very compelling from several points of view:

- **Climate change.** This is perhaps the most severe threat to the future stability of life on Planet Earth; the marine ecosystem itself and the various cultural and biological assets of the coast, are seriously at risk;
- **Moral obligation.** The UK and other developed countries carry a heavy burden of responsibility for their part in causing climate change in the first place, and therefore for contributing to solutions;
- **Legal obligation.** Scotland has ambitious targets for the reduction of greenhouse gas emissions under the Climate Change (Scotland) Act 2009.
- **Growth in role of green electricity.** Energy from renewable sources will be needed to replace the output of fossil fuel power stations and to replace fossil fuels in heating and transport.
- **Abundant resources.** Scotland is rich in renewable resources in the form of offshore wind, wave and tidal energy;
- **Energy security.** Both the finite nature of fossil fuel reserves and the unpredictability of the international energy market place a high premium on security of domestic supply;
- **Economic benefit.** Sustainable use of these resources could benefit the economy indefinitely into the future; and an early lead in new technologies will attract international trade.
- **Relatively low risk.** Most of the technological options for harvesting this energy appear to present much less environmental impact than alternative fossil fuel or nuclear technologies, if appropriately sited.
- **Potential gain in marine productivity.** Installations may provide localised protection from other pressures (eg bottom trawling and dredging), boosting productivity in a way which may more than compensate for any adverse impacts.

## 2 What is the risk?

The very strength of this case creates a danger of a gold-rush mentality. Eye-popping statistics are already attracting sensational headlines. But this is a living environment, and these developments are not free of environmental risk.

Our main concern is that inappropriately sited or designed development could place in jeopardy aspects of the **marine ecosystem**. Scotland's marine and coastal environment is enormously rich, diverse and valuable, contributing to the wider ecology of the north Atlantic well beyond the level which its geographical scale would suggest. This includes, for example, 45% of the breeding seabirds of the whole of the European Union.

A healthy marine ecosystem is vital also to:

- Key **productive industries** (fisheries, fish farming) and their contribution to food health and food security.
- **Cultural heritage**. These coastlines possess highly valued historic and cultural resources, including thousands of historic wrecks, and other features of marine and coastal archaeology.
- **Scenic amenity**. The open seascape and landscape as experienced from the land and the sea is a significant aspect of Scotland's spectacular coastal scenery, valued by both local residents and visitors and worth protecting for future generations to enjoy. It also contributes to the tourism industry which is an important component of an otherwise fragile rural economy.
- **Scotland's reputation**. Aspirations to lead the world in renewable energy production need to be tempered with parallel commitments to protect Scotland's marine and coastal environment in the process.

## 3 What can be done to effectively manage the risk?

The danger here is that a headlong rush to development – it has accelerated very markedly in the last two-three years - means that the potential for damage or conflict is overlooked. Earlier growth phases of natural resource exploitation in Scotland provide a salutary history of misjudgements that have blighted the environment, and also the reputation and potential success of the industries concerned.<sup>6</sup>

It is in everyone's interest to learn the lessons of the past and address potential concerns now, not wait for damage to the marine environment to occur and/or for conflict to undermine or stall developments.

As the analysis below suggests, there are many encouraging signs that old lessons have been learned, but there are also concerns from the way that the pace is being forced by the pressure of development. So the question now, is whether the regulation of this burgeoning new industry is fit for purpose. In hastening to address one environmental problem, are we taking enough care to avoid causing another? Is the level of investment in research and good spatial planning commensurate with the investment made in the promotion of development? And what improvements to the system now emerging would help to ensure the proper resolution of potential conflicts at an early stage?

## 4 Taking stock – the current picture

### 4.1 Scale

It's important to grasp the scope, scale and speed of what is currently envisaged in terms of marine renewable energy developments; this helps to underline the importance of the need for proper and urgent safeguards.

The current estimate of potential electricity production from marine renewable energy in Scotland is 46.5 GW – roughly seven times Scotland's current domestic demand.

Over half of this is expected to come from the established technology of offshore wind turbines. With construction beginning by 2014-15, if projects are approved as proposed, about 3700 turbines will be installed by 2020.<sup>7</sup> The remainder is expected from the emerging sector of 'wet' renewables (a third from wave power and a sixth from tidal power).<sup>8</sup>

All this development will need manufacturing, construction, maintenance and support infrastructure. Eleven Scottish 'first phase' locations have been identified for rapid development to provide manufacturing, maintenance and port facilities. Planning and consenting will have to take place quickly to meet the installation timelines suggested.<sup>9</sup>

### 4.2 Planning and regulatory measures

The development of marine renewables presents the first major test of a whole swathe of new measures<sup>10</sup> introduced to facilitate harmonious developments at sea. This is a very significant advance in regulation of an ever widening range of activity, including cable-laying, navigation lanes, commercial fishing, fish farming and dredging, as well as marine renewables<sup>11</sup> All these activities affect marine ecology - negatively or positively, individually or in combination. The new measures include:

- Integration of a number of planning and regulatory functions under the heading of Marine Scotland within Scottish Government, overseeing:
- A National Marine Plan (NMP) and regional plans based on national and regional Marine Ecosystem Objectives (MEOs) along with social/economic and climate change objectives;
- An effective network of well-managed Marine Protected Areas (MPAs);
- A new integrated licensing regime.

Also:

- The EU's Marine Strategy Framework Directive requires member states to secure 'good environmental status' of marine waters by 2020;
- As part of the preparation for this, major exercises are underway to assess the state of our seas (OSPAR Quality Status Report, UK's 'Charting Progress 2' and Scotland's 'State of Scotland's Seas' review).

### 4.3 Responsible attitudes

Attitudes adopted by current officials and industry representatives are refreshingly positive about environmental responsibility as a *sine qua non* for development - wisely so, since the reputation of the industry hinges on successful demonstration of its green credentials.

### 4.4 That's OK then?

On paper, it may appear that there is little cause for concern. However it is actions on the ground that matter. In practice, there are concerns because in some cases the cart appears to be before the



horse. We expect the spatial planning measures of the Marine (Scotland) Act to be implemented by 2012, but, in response to the urgency of the development agenda, provisional areas for renewables are already being allocated pre-emptively, in advance of a comprehensive Strategic Environmental Assessment (SEA) or proper strategic planning process.

It is in this context of a 'double u' dilemma (urgency and unknowns) that the following analysis is presented.

## 5 Achieving the vision – securing LINK support

Collectively, member bodies of Scottish Environment LINK strongly support the urgent development of a robust framework for the expansion of marine renewable energy. But this support is not unconditional.

With adequate reassurances, LINK bodies could be confident that development is seriously predicated – as it should be in order to be sustainable in the long term - on protection of the environment. Notwithstanding many reasons to be optimistic, there are causes for concern that an indiscriminate headlong rush for development, and for the major profits which will accrue to developers, could sell the environment short.

Scotland can fulfil an ambitious marine renewables development programme whilst protecting and possibly even enhancing the quality and health of the marine environment, **if** these safeguards are observed. They are aimed at ensuring an appropriate level of precaution in the circumstances, without being unduly burdensome in time or expense.

## 6 The key test

The key test for sustainable development, underpinning the following analysis, is:

- living within environmental limits, that is within the assimilative and regenerative capacity of the biophysical environment. This requires:
- compliance with the ecosystem approach and the principles of the EU Marine Strategy Framework Directive – 'achieving and maintaining good environmental status';
- strategic planning – location of developments based on adequate and timely research/information;
- appropriate protection of sites/species/habitats;
- appropriate precaution where certainty is lacking.

## 7 Principal concerns and recommendations

Tackling climate change is a must, and marine renewables can make a major contribution. Nothing in this paper takes away from that imperative<sup>12</sup> and the desire for urgent action.<sup>13</sup> This section addresses the challenge of preventing climate change without detracting from another crucial imperative – marine biodiversity conservation.

### 7.1 Maintaining the integrity of the decision-making process

The sudden and urgent demand for growth in this industry has required the rapid construction of a new decision-making framework, much of it operating in very unfamiliar and untested territory. To make matters even more challenging, judgements have to be made regarding the changes to the marine environment which are justifiable in the face of the global threat of climate change, when the level of risk from these technologies is largely unknown.

We acknowledge that enormous efforts are being made to measure up to this task conscientiously. But this is the time when precedents are set. So here we register concern that respect and confidence in the process, which depends on its being fair, well-informed and open to scrutiny, is in danger of being compromised for the following reasons.

### **i) A strong push for development**

There are strong forces promoting development, led vigorously by Scottish Government Ministers, in the context of widely praised ambitious targets in the Climate Change (Scotland) Act. The Crown Estate Commission, Scottish Enterprise, Highlands and Islands Enterprise and the whole renewables industry are helping to drive development. Scottish Natural Heritage (SNH) carries most of the responsibility for conservation of the marine environment and informing the debate on precaution.

This imbalance is reflected in the hyperbole used to describe economic benefit ("*...the Saudi Arabia of marine power*"<sup>14</sup>) compared with the low profile given at the same time to safeguarding the life of the sea. The Scottish Government's recently announced Saltire Prize offering £10m to the company which delivers the most energy (above a very challenging target) from wave or tidal technologies between 2012 and 2017,<sup>15</sup> while sending important signals to the global market, also adds to the political drive behind growth.

All these factors lead to risks of:

- inflated expectations of progress, where this is still at a very early and risky stage of development (especially wave and tidal);
- pressure on officials to accelerate development within electoral timescales, playing down the statutory obligations on public bodies to act sustainably and on Ministers *to protect and, where appropriate, enhance the health of Scotland's marine area*<sup>16</sup>;
- pressure on SNH (a government agency) not to object or obstruct;
- inadequate provision of resources for timely research;
- implicit pressure on scientists (commissioned by industry or government) to produce favourable assessments;
- internalisation of the tension between industrial and environmental policies within Marine Scotland, and isolation of these contentious issues from public view/debate (the downside of otherwise beneficial integration of regulatory powers);
- an assumption that the undoubted advantages of tackling climate change justify adopting relaxed standards of environmental protection in the sea;
- a development strategy which favours a homogeneous pattern of big-industry investment, rather than a heterogeneous pattern which also allows smaller scale and more sensitive installations for local benefit.

### **ii) poor quality of data and conservation measures**

In comparison with the land-based environment, our understanding of the state of the marine environment is poor. Research to improve it is very slow and expensive and has often concentrated wrongly on 'rare species, birds and mammals with intrinsic appeal rather than ecosystem structure and processes and key functional species'.<sup>17</sup> Also monitoring and enforcement of industrial activity is difficult. As a result conservation measures are patchy in both coverage and effectiveness.

### **iii) lack of accountability**

In this context accountability and transparency are very important, but weaknesses arise because currently there is:

- difficulty of independent observation/monitoring by stakeholders;

- lack of opportunity for third party participation as provided in the local authority planning system;
- the role of The Crown Estate Commission as an interested party (manager of sea bed property rights, issuing leases, and even on occasions investing as a co-developer, part funding development activity) whilst also acting as quasi-regulator, allocating sites for potential development;
- the location of Marine Scotland inside government, rather than as an executive agency with independent board;

These factors all lead to risks of a public interest deficit. If, in the context of all the above factors, stakeholders are excluded from effective engagement and contentious issues are isolated from public view/debate, this could provoke dangerous levels of scepticism regarding the impartiality / independence of the regulatory process.

In response to these factors which tend to place consideration of environmental protection at a disadvantage, jeopardising the integrity of the decision-making process, we recommend three remedies:

### **1 The importance of the marine environment** should be acknowledged in:

- declarations by **government**; emphasising the importance of environmental protection alongside pursuit of economic goals;
- **the stance adopted by the renewables industry**; helpfully affirming its commitment to protecting marine life, as well as in tackling climate change;
- a commitment by the **Crown Estate Commission** to allocate a higher proportion of lease income to underfunded baseline survey and post consent monitoring, as part of a long term strategy to protect the public interest.

**2 An independent committee** should be appointed by the Scottish Government, with a brief to audit the scientific validity of research, assessments and advice in a random sample of cases and report publicly. This independent scrutiny would validate and promote good practice and would protect the reputation of all involved in a process which is otherwise largely inaccessible to stakeholder scrutiny.

### **3 Government should take action to:**

- **allocate appropriate resources** for bodies undertaking research and regulation to meet statutory national obligations and objectives, as well as those of EU Habitats Directive and Marine Strategy Framework Directive, and to minimise the risks of infraction proceedings;
- **financially support project level environmental assessment for novel technologies**; this would help to secure the findings for wider use and to reduce regulatory burdens on novel technologies and pioneering companies;
- **include strong representation of environmental science** in high level strategic planning groups.

## **7.2 Minding the gap – development and proper control**

A series of issues arise from the problem that the pressure for development is causing plans to run ahead of the kind of regulatory preparations which, ideally, should be in place well before specific development proposals are made. In a situation which is not ideal, a practical and pragmatic approach is required, but short-cuts carry risks.

### **i) Avoiding pre-emptive decisions where possible**

While recent legislation requires orderly spatial planning based on clear ecosystem objectives, the Crown Estate Commission leasing rounds are proceeding apace. So the pattern of future development is already being set.

Measures designed to ensure a proper consideration of conflicting issues (including the design and location of marine renewable devices) include the Marine (Scotland) Act's requirements of a Scottish

Marine Plan and regional plans, Marine Ecosystem Objectives and other objectives on which these plans should be based, and an effective network of well-managed Marine Protected Areas. None of these measures will be in place until 2012, following lengthy processes of research, survey, drafting and consultation.

Another set of measures aimed more at the general health and vitality of marine ecosystems, which could well be affected by the cumulative effect of numerous installations, are required by the EU Marine Strategy Framework Directive, scheduled to be implemented between 2012 and 2020, preparations for which are barely off their starting blocks.

Meanwhile, the current (May 2010) tally of areas already earmarked by the Crown Estate Commission and allocated with exclusivity agreements to developers includes 12 areas for offshore wind and 10 for wave and tidal energy (with seven more open to bids off the west coast of Scotland). Ten of the offshore wind areas (in Scottish Territorial Waters) have even been allocated before the independent Strategic Environmental Assessment (SEA) itself, which should be identifying whether the sites are generally suitable in the first place.

In an attempt to bridge the gap, these agreements have been made subject to the relevant environmental assessments and provisions of the Marine Act. This is understandable, but presents real risks, and must be reinforced with an adaptive management approach (see section 7.3 below). The danger is that a developer in this position, optimistically commissioning an EIA and baseline research in anticipation of a favourable SEA, places considerable pressures both on those preparing the assessments and on the likes of SNH not to frustrate the proposal.

The asymmetric nature of this process – with provisional leases and consents running ahead of environmental research and assessment – is unsatisfactory, adding to problems by allowing potentially damaging activity into areas which with adequate preparation would have been scheduled for greater protection.

**4** The aim should be to move as soon as possible to a **strategy-led consenting process**, with benefits to all interests involved. Meanwhile, the greatest care should be taken not to compromise the process by encouraging developers to invest prematurely in preparations for sites which may have to be ruled out at a later date, due to the findings of survey work.

## ii) Improving marine nature conservation

Investment in progress with a number of environmental protection measures appears to be running behind the pace of development activity.

The current principal tool for protection of habitats and species - the Natura 2000 suite of designations under the EU Habitats and Birds Directives - is still incomplete.

Thirty-four inshore Special Areas of Conservation (SACs) have been designated, but there is also a need to establish SACs for harbour porpoise (*Phocoena phocoena*) as none currently exists in spite of the fact that parts of Scotland's waters hold a significant portion of the European population of this species.<sup>18</sup> Porpoises and dolphins are commonly associated with areas of high tidal streams and it is very likely that important feeding sites may conflict with potential locations for tidal energy devices as well as wind turbines. Several further offshore SACs are also under consideration. It should also be recognised that under Annex IV of the EU Habitats Directive, all cetacean and turtle species are recognised as being '*in need of strict protection*' in all Scottish waters.

As for seabird protection, marine extensions have been announced to 31 Special Protection Areas (SPAs) for breeding colonies, but a further suite of SPAs to cover offshore feeding areas need yet to be designated. It is these feeding zones that are likely to be the most sensitive in the face of marine renewables - tidal devices in the case of diving seabirds and windfarms for those in flight. This situation leaves the development planning process poorly informed and potentially exposed to statutory intervention in the event of evidence of adverse impacts arising. Many of the Crown Estate Commission leasing areas already identified could be affected in this way.

It is important to note that proper conservation of marine biodiversity will not be achieved by implementation of the Habitats and Birds Directives alone, even when the coverage of the relevant sites and species is completed. A variety of other sites and species, as well as general ecosystem integrity, will also need protection. A large number of Nationally Important Marine features/sites currently remain uncharted and unprotected. Some of these may in due course be covered in the network of Marine Protected Areas, for completion in 2012, but in the meantime it would help to assemble all known information of this kind into a publicly available GIS of areas of sensitivity, for the sake of transparency and to help guide scientific advice. Information of this kind is available from a number of conservation organisations as well as from SNH.

It is not suggested here that all sensitive sites should necessarily be exclusion zones for renewables (in some cases these structures may benefit the marine ecology), but it is important that knowledge of possible sensitivities is shared amongst all stakeholders, especially developers. And sensitivities may include aspects connected with landscape and cultural features, as well as marine ecology.

**5 The programme for survey and designation of a completed network of Natura 2000 sites should be accelerated to inform spatial planning processes.**

**6 SNH should lead in the urgent preparation of a GIS of all known sensitive marine sites/features, drawing on the scientific knowledge of NGOs and others as appropriate, to be made publicly available, updated as appropriate, and used to inform decisions on the location of renewable energy installations and their associated infrastructure (transmission lines, construction, shipping etc). This map should also include landscape designations (National Scenic Areas), areas of high wildness quality where the seascape is an important visual amenity in the total landscape experience and, under the remit of Historic Scotland or RCAHMS, cultural features such as historic wreck sites.**

**7 Meanwhile the programme for preparation of a statutory, effective network of well-managed MPAs should continue with renewed urgency.**

### **iii) Gathering baseline data and clarifying evidence of impacts**

This is another area where knowledge is very rudimentary and where urgent investment is required. Potential threats to marine ecology vary with location and technology. Papers by Whale and Dolphin Conservation Society<sup>19</sup> and Scottish Wildlife Trust<sup>20</sup> review areas of concern, including evidence of specific impacts on, for example, cetaceans from pile driving noise in the construction phase of wind turbines (an area of very active research in Denmark and Germany).<sup>21</sup> This is an important issue where several development areas for wind energy are already identified. For birds, baseline and impact data also lag seriously behind need.<sup>22,23</sup>

Most impact work so far on cetaceans has been done in the waters of mainland European countries, where a limited range of species (mainly porpoises) occur. A wider range of species are found on the Scottish west coast, where they are the focus of a small but important nature tourism economy. These species include some, such as minke whales, which are low frequency specialists and thus likely to be much more sensitive to low frequency noise.<sup>24</sup> There have been no attempts to assess how these populations might be impacted. Adequate mitigation procedures have not been developed or proven for any marine mammal species, and there is a concern that regulators are only requiring developers to make assessments at very limited spatial and temporal scales.

Wave and tidal technologies present a special suite of difficulties related to the 'double u dilemma', with so many of the dimensions of both technology and environment in such early stages of exploration. Most conspicuously, there may be a significant risk to marine species including cetaceans, seals and basking sharks from collision with the moving parts of tidal turbine devices. Adequate baseline survey and monitoring – even of this limited range of impacts – will be extremely demanding for the pioneering companies engaged in wave and tidal energy developments.

Tidal barrage technology – with interest being shown in the Solway Firth – raises a different suite of issues. These will demand especially detailed scrutiny due to its wide range of serious impacts on estuarine ecology.

As regards the wider points of 'good environmental status', there is no obvious threat currently. Provided that the above issues are properly addressed, and developments are sensitively sited/ managed, there is little evidence so far of risk of serious jeopardy for the coastal marine ecosystem as a whole. But the absence of evidence is not evidence of absence. Rigorous research of wide-scale, cumulative, as well as local impacts, is essential, if conflicts and controversies are to be avoided.

**8 Research on wildlife baseline data and impacts** should be strongly promoted, and international research findings monitored and disseminated widely, with close attention to cumulative impacts at a larger scale, and adoption of best practice assessment, management and mitigation techniques.

**9** In this early phase, while spatial plans are in preparation, developers should be strongly, openly and officially discouraged from commitments to any sites where **potentially significant adverse environmental impacts** would expose the sector to reputational risk.

#### **iv) Improving environmental data<sup>25</sup>**

Well organised systems for gathering, managing and sharing data (which is difficult and expensive to gather at sea) are key to effective planning. However there is no single co-ordinated data collection and management system for data on the marine environment in Scotland, never mind how it relates to marine renewable energy developments, and no consistency in what data are required, and how these data are collected, stored, accessed and maintained.

The costs of collecting baseline data are a particular issue with smaller-scale wave and tidal sites, where testing the technology is a high proportion of developer costs. The developer has to pay in advance for data required by the EIA.

Knowledge exchange and accessibility are a major issue, central to the ability of this industry to compete globally and especially to avoid damage to another industry or a feature protected by international designation.

Even where data are available there is often a charge, for example from organisations like the Sea Mammal Research Unit or Seazone. While the Crown Estate Commission holds developers' data and has the GIS decision support tool Marine Resource System (MaRS), there is no single accessible source of developer information, in part due to commercial confidentiality.

There is currently little collaboration between developers on data collection on environmental impacts for wave and tidal technologies, although The Crown Estate Commission intends to improve this situation. Knowledge exchange is poor across government and between developers and researchers. Research, baseline data collection and monitoring is not yet accompanied by effective and accurate communication of its results. It is crucial that this is improved not only to the mutual benefit of government, developers and stakeholders, but also so that cumulative impacts can be properly assessed.

COWRIE is one welcome example of such co-ordination between developers, decision-makers and stakeholders, lessons from which could inform an improved model of co-ordination for wave and tidal development.

**10** Marine Scotland and the Crown Estate Commission should move urgently to lead on much improved **collection, management and sharing of environmental survey and monitoring data**. Lessons from the experience gained in the COWRIE initiative should be reviewed and implemented beyond wind to wave and tidal.

## 7.3 Make use of adaptive management<sup>26</sup> techniques

There is currently little reference in Marine Scotland policy papers to the concept of adaptive management, by which progress can be made in the face of uncertainty by frequently adjusting plans in the light of experience gained. This should be a crucial component of the approach adopted in this area of development, especially in locations such as the Pentland Firth where rapid expansion of entirely new wave and tidal technologies with unknown impacts are proposed in a very poorly researched environment with largely unknown sensitivities.

In such circumstances where current knowledge suggests no significant threat of serious or irreversible damage, we accept that it is justifiable to adopt a risk-based approach, provided that adequate safeguards are observed.

'Deploy and Monitor' is the Scottish Government's policy response to a 'double u' dilemma in this type of situation. The approach is to feel the way ahead in gradual steps, starting with low risk devices operating at a small scale in low sensitivity locations, but with close monitoring to assess environmental impact before consents will be considered for larger arrays and/or more sensitive areas if this is justified by research findings. Meanwhile wider environmental research (eg bathymetric mapping) will help to build up knowledge of the ecology of the area concerned, on which SNH and others can base preliminary sensitivity advice. This policy, along with interim development plans and locational guidance, are being prepared for imminent consultation (March 2010). Adaptive management requires a strong and transparent feedback loop to ensure that the lessons are adopted in revisions of future plans.

Special care is justified in relation to tidal sites. While wind and wave power are fairly widely distributed, tidal power is concentrated in a relatively small number of locations. These sites of high tidal currents are ecologically very distinct. There needs to be particular scrutiny of the installation of tidal devices because they have the potential to damage a significant proportion of what is already a special and limited ecological resource.<sup>27</sup> Tidal rapids are globally rare and Scotland has a disproportionate number of them.

**11** A 'Deploy and Monitor' policy should be adopted as part of **an adaptive management approach** to regulation of the nascent wave and tidal industry (details subject to consultation). The following presumptions will help to sustain the precautionary principle and the reputation of the industry:

- adequate baseline survey and subsequent monitoring to identify sensitivities, assess impacts and develop management and mitigation procedures;
- ensuring that sites/species/features with particular sensitivities are protected (which may mean they need to be avoided at this exploratory stage in the development process)
- explicit commitment that consent to continue is strictly subject to evidence that there is no significant adverse impact;
- acknowledgement that this is a risk-based approach which may allow early development, but may equally lead to withdrawal of this and further consents;
- all baseline data collected as part of licensing requirements are made publicly available, and updated at least annually, so that they can be reviewed and fed into an adaptive management process (similar to the process that JNCC28 oversees for the implementation of the UK seismic survey guidelines);
- close attention to advice of statutory consultees, particularly SNH and JNCC.

## 7.4 Reviewing Strategic Environmental Assessments

The current suite of SEAs, examining the strategic impacts of development, have been prepared in an atmosphere of great urgency, in advance of the setting of Marine Ecosystem Objectives (MEOs), and in the context of extremely poor levels of environmental data in the areas concerned. As a result, their findings fall short of desirable levels of accuracy, confidence and detail.

As the MEOs are set, and environmental knowledge improves, and as the experience gained from adaptive management gets fed back into the data set, it will be important to review and update the SEA periodically to refresh its assessment of strategic impacts and the potential for development. Once the Scottish wind SEA has been completed in 2010, the wave and tidal SEA should be updated. This should then prompt a review of the Marine Plans at National and Regional levels

**12 Marine Scotland should commit to and set out a timetable for periodic updates of SEAs, and of the Scottish Marine Plan and Regional Marine Plans to take account of new knowledge and feedback.**

## 7.5 Improving stakeholder engagement

Many of the above points illustrate the value of participation by the fullest range of stakeholder interests, all of whom have an interest in the establishment of a successful industry with a reputation for high quality development. This is about identifying opportunities as well as potential problems.

Marine Scotland is making excellent progress in preparing a number of policies, licensing manuals, plans, guidance notes etc to ensure that all necessary requirements will be met before development proceeds, and that risks of environmental damage are minimised.

A plethora of consultations on these aspects of compliance with the Marine Act will be published in the next weeks and months, placing significant pressure on stakeholder representative groups. Arrangements for engagement with these groups (the 'Marine Strategic Studies Forum') has to date been unsatisfactory, with one meeting and poor attendance due to diary changes. If the processes and machinery for engagement do not work, this undermines the value of stakeholder input in identifying both problems and opportunities for the benefit of all interests. Most seriously, if stakeholders lose confidence in the processes and machinery for engagement, there will be no confidence in the outcomes.

**13 Means of engaging with stakeholders should be seriously improved and strengthened without delay, with financial support offered to enhance their capacity to participate, especially during the heavy diet of consultations on implementation of the Marine Act.**

**14 Greater representation should be offered to key environmental NGOs at a strategic level – eg FREDS, Scottish Energy Advisory Board – to ensure that environmental concerns relating to the development of marine renewables are raised at an early stage, and can be integrated in to planning appropriately.**

## 7.6 Seizing the opportunity for enhancing biodiversity and productivity

This paper is necessarily focussed on the potential risks of development but we recognise that there is a real opportunity to contribute positively to marine ecology. In a recent paper Inger *et al.*<sup>29</sup> suggest that if appropriately managed and designed, at least some types of marine renewable energy installations may increase local biodiversity and potentially benefit the wider marine environment. But the detail is still very unclear. These benefits may occur where installations have the capacity to act both as artificial reefs/fish aggregation devices, which have been previously used to help restore damaged ecosystems, and as *de facto* marine reserves which have proven successful in enhancing biodiversity and fisheries (see below). The authors note however that siting marine renewable energy installations in pristine habitats not threatened by human activity would be unlikely to produce any benefits.



- **Artificial reef effects:** It is highly likely that marine renewable energy installations have the potential to provide structural diversity favouring a range of biota otherwise absent from more homogenous substrates. Wind turbines<sup>30</sup> and the foundations of wave energy converters<sup>31</sup> become rapidly colonised by epibenthic assemblages and greater abundances of fish.
- **De facto marine reserves:** The possibility of collision and gear entanglement means that even without enforcement the immediate vicinity of marine renewable energy installations will not be able to be fished using many gear types. Larger installations with multiple arrays of devices, especially wave energy and tidal stream generating devices, will probably be enclosed within enforced exclusion zones for both safety and protection of the installations and may act as *de facto* marine reserves. The conservation value of this will clearly depend on the location and habitat types protected. A synthesis of previous studies<sup>32</sup> found that, in general, marine reserves (where all extractive activities were removed) were effective in increasing density, biomass, size of organism and diversity within reserves when compared to surrounding areas. LINK also considers that consequential displacement of fishing effort would need to be considered in marine planning and inshore fishery management.

Inger *et al.* concluded that despite this recognised potential, the evidence base for both positive and negative impacts of marine renewable remains poor and there is an urgent need for additional biodiversity-orientated research, especially given the already seriously degraded nature of our coastal seas. This kind of research would greatly improve the industry's capacity to enhance biodiversity in degraded marine habitats.

**15 Opportunities should be taken to enhance biodiversity/productivity through design and siting of installations where this is both possible and appropriate, and research into understanding these potential benefits should be strongly supported.**

## Conclusion

**LINK bodies strongly support the responsible growth of the marine renewable energy industry. In its recommendations, LINK proposes some restraint of the development drive, not to hinder it unduly, but to bring it into a sensible relationship with the principles of precaution, which should also receive more proportionate investment. Nothing proposed here should delay responsible development or hinder the potential of this industry to contribute to preventing climate change. Far from it. If these recommendations are taken forward, the industry would be on a more transparent and sustainable footing, better able to proceed without the setbacks of controversy and failure which have blighted other growth sectors in the past.**

## Current signatories

Archaeology Scotland	National Trust for Scotland
Association for the Protection of Rural Scotland	Ramblers Scotland
Buglife - the Invertebrate Conservation Trust	Royal Zoological Society of Scotland
Friends of the Earth Scotland	RSPB Scotland
Hebridean Whale and Dolphin Trust	Scottish Wildlife Trust
John Muir Trust	Whale and Dolphin Conservation Society
Marine Conservation Society	WWF Scotland
Mountaineering Council of Scotland	

## Notes

- 1 This paper draws heavily on Scottish Wildlife Trust's report TOWARDS LIVING SEAS – Marine renewables and healthy marine ecosystems (in press).
- 2 Cultural features such as wrecks should fall under the remit of Historic Scotland where nationally designated and local authority archaeology services where of regional or local importance.
- 3 Forum for Renewable Energy Development.
- 4 The paper concentrates on the living resources but it is acknowledged that there is a suite of cultural resources in and around our seas that will demand similar considerations if they are to be preserved for the future.
- 5 This is the Scottish Government's marine vision.
- 6 See: Learning lessons from large-scale developments, Crofts, R. (August 2004), report for WWF Scotland  
[www.rogercrofts.net/files/newfiles/wwflessonslargedevelopments.pdf](http://www.rogercrofts.net/files/newfiles/wwflessonslargedevelopments.pdf)
- 7 Scottish Enterprise & Highlands and Islands Enterprise (2010).
- 8 The first planning stages of this development are already underway. Crown Estate Commission (manager of sea bed property rights) has given developers security of access to the sea bed on 12 wind sites (totalling 11GW) around Scotland and on ten sites for wave/tidal power (1.2GW) in the Pentland Firth and Orkney Waters, allowing them to start the process of securing consent.  
<http://www.thecrownestate.co.uk/newscontent/92-pentland-firth-developers.htm>  
<http://www.thecrownestate.co.uk/newscontent/92-r3-developers.htm>  
<http://www.thecrownestate.co.uk/newscontent/92-scottish-offshore-windfarm-awards.htm>  
Stop press: invitations of interest for a further seven wave/tidal areas off the west coast were announced on 23 March.  
<http://thescotsman.scotsman.com/news/Second-wave-of-renewable-projects.6175069.jp>
- 9 Scottish Enterprise & Highlands and Islands Enterprise (2010).
- 10 In the UK Marine and Coastal Access Act 2009 and the Scottish Parliament's Marine (Scotland) Act 2010.
- 11 But not oil/gas developments which are controlled under the Petroleum Act.
- 12 Although it should be noted that public investment in energy production is wasted if the energy thus produced is wasted, so energy efficiency is a key component of any climate change mitigation strategy. This is "perhaps the most cost effective way of meeting our obligations to cut greenhouse gas emissions" (Sustainable Development Commission, 2005).
- 13 As acknowledged in earlier joint NGO reports eg The Power of Scotland Renewed.  
[http://assets.wwf.org.uk/downloads/powerofscotland\\_renewed.pdf](http://assets.wwf.org.uk/downloads/powerofscotland_renewed.pdf)

- 14 First Minister Alex Salmond.  
<http://news.scotsman.com/scotland/New-era-for-Saudi-Arabia.6150241.jp>
- 15 Already attracting 140 expressions of interest from 27 countries, within days of its announcement.
- 16 Marine (Scotland) Act 2010.
- 17 Gill, A. (2005), Offshore renewable energy: ecological implications of generating electricity in the coastal zone. *Journal of Applied Ecology*, 42, 605-615.
- 18 Evans, P G H and Wang, J (2003) Re-examination of distribution data for the harbour porpoise around Wales and the UK with a view to site selection for this species. Unpublished Report to Countryside Council for Wales - CCW Science Report (634).
- 19 Dolman, S. & Simmonds M. (2010) Towards best environmental practice for cetacean conservation in developing Scotland's marine renewable energy. *Marine Policy* 34: 1021-1027.
- 20 SWT Policy Futures 2: TOWARDS LIVING SEAS – Marine renewables and healthy marine ecosystems (in press).
- 21 Whale and Dolphin Conservation Society.
- 22 See Offshore Windfarms and Birds; RSPB (in press).
- 23 See Gill, A.B. Offshore renewable energy: ecological implications of generating electricity in the coastal zone. *Journal of Applied Ecology* 2005 42, 605–615.
- 24 Croll, D.A., Clark, C.W., Calambokidis, J., Ellison, W.T., and Tershy, B.R. 2001. Effect of anthropogenic low frequency noise on the foraging ecology of Balaenoptera whales. *Animal Conservation* 4:13-27.
- 25 For more details see SWT Policy Futures 2: TOWARDS LIVING SEAS – Marine renewables and healthy marine ecosystems (in press).
- 26 Adaptive management is the process of testing assumptions, learning from the results of such testing, and subsequently revising and improving management practices – sometimes described as 'learning by doing'. It is a requirement of the Marine Strategy Framework Directive (MSFD) which states under Article 3(5): 'Adaptive management on the basis of the ecosystem approach shall be applied with the aim of attaining good environmental status'.
- 27 <http://www.ukbap.org.uk/ukplans.aspx?id=39#1>  
Tidal power generation has been suggested in conjunction with bridge construction in areas with strong tidal flow as a means of generating electricity. Depending on scale and local circumstances, these could have a devastating effect on communities of organisms in rapids and within enclosed bodies of water.
- 28 Joint Nature Conservation Committee.
- 29 Inger, R., Attrill, M.J., Bearhop, S., Broderick, A.C., Grecian, W.J., Hodgson, D.J., Mills, C., Sheehan, E., Votier, S.C., Witt, M.J., Godley, B.J. (2009) Marine Renewable Energy: potential benefits to biodiversity? An urgent call for research. *Journal of Applied Ecology* 46: 1145-1153.
- 30 Wilhelmsson, D., Malm, T., Ohman, M.C. (2006) The influence of offshore windpower on demersal fish. *ICES Journal of Marine Science* 63: 775-784.
- 31 Langhamer, O. & Wilhelmsson, D. (2007) Wave power devices as artificial reefs. Proceedings of the 7th European Wave and Tidal Energy Conference, 11-13 Sept 2007, Porto, Portugal (Cited by Inger et al. 2009).
- 32 Halpern, B.S. (2003) The impact of marine reserves: do reserves work and does relative size matter? *Ecological Applications* 13: S117-S137.

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