



# INTO THE BLUE

FINANCING THE FUTURE  
OF THE EMERGING WAVE  
& TIDAL POWER SECTOR

MAY 2004

THE BRITISH  
**WIND ENERGY**

ASSOCIATION

Climate Change Capital



## Summary

This report was commissioned by the British Wind Energy Association in order to address the financing and support needs of the emerging UK wave and tidal energy industries.

**“If the government gets it right, then it could push the UK into the lead position”**

- investor

Climate Change Capital was engaged to undertake the project, in the course of which it interviewed over 45 organisations involved in the development of the wave and tidal industry.

The study found a significant appetite for investment in the sector amongst both the financial and industrial communities. However, it did reaffirm the existence of a gap in government support which needs to be filled in order to bring that investment forward.

**“There is an appetite in the capital markets [for this technology]”**

- investor

A four point plan is presented which will support the wave and tidal energy industry through the next period of its development:

- Research and development funding similar to that of the past 4-5 years;
- A Marine Performance Fund from which supplementary support payments are made to wave and tidal generators based on their production of Renewable Obligation Certificates (ROCs);
- Delivery Grants that provide grant funding for ‘device blind’ elements of early projects (e.g. grid and decommissioning);
- An indication from government that additional transitional support will be forthcoming should the industry continue to succeed as it has in recent years.

**“Government does need to support the industry”**

- investor

These measures would require the allocation of around £130m of government funds which would be spent over the remainder of the decade. By filling the first stage of the current gap in funding for these technologies, it is envisaged that this programme of support would be sufficient for some 50MW of wave and tidal energy projects to be deployed.

Over 70% of this funding is likely to be dependent on the industry succeeding in delivering on the promise it is currently showing.

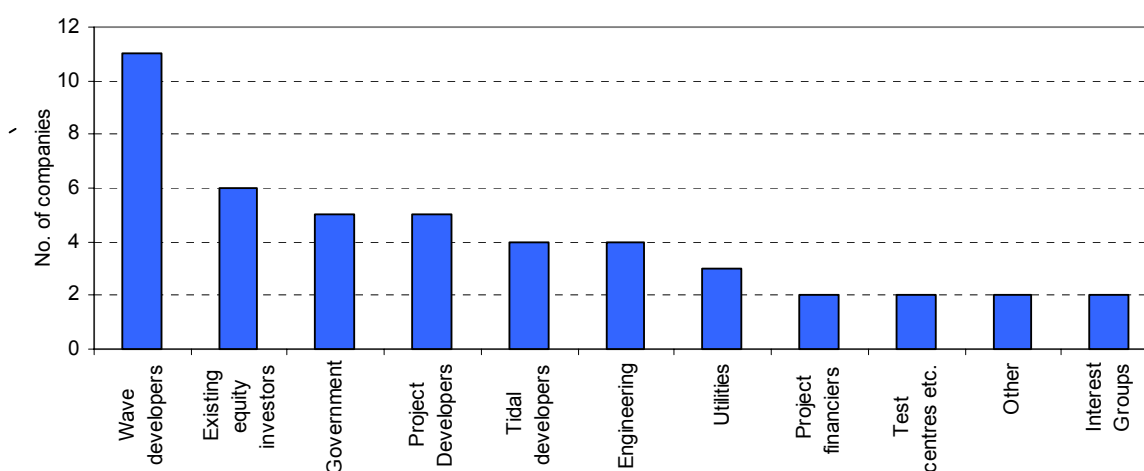
Some further work and consultation is required on the detailed design of the programme proposed herein.

## The Study

This study was commissioned by the British Wind Energy Association following the lively debate on financial support mechanisms which occurred at its Bristol conference in February 2004.

Climate Change Capital was engaged to perform the work and has completed over 45 interviews with interested parties over the last two months.

The graph below shows the distribution of the type of companies which have been surveyed during the study.



A steering group was formed to review and critique the work of the study. This group comprised:

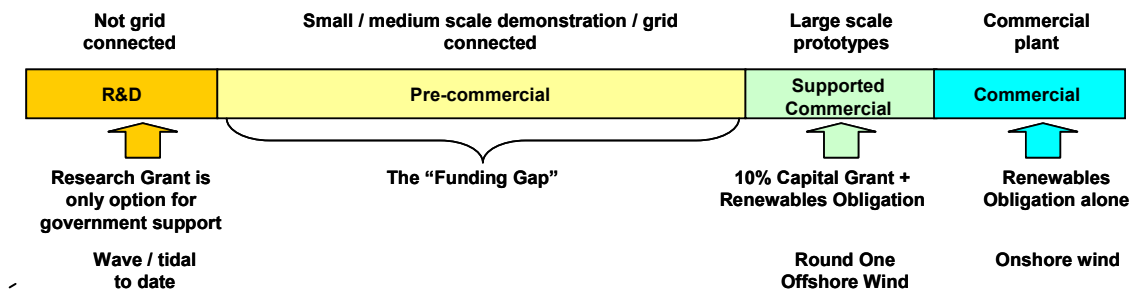
- Simon Roberts – CEO Centre for Sustainable Energy / Renewables Advisory Board member;
- Robert Gross – Research Lecturer, ICEPT, Imperial College;
- Alan Moore – Chairman BWEA / RWE Innogy / Renewables Advisory Board;
- Marcus Rand – CEO BWEA;
- Michael Hay – Marine Renewables Development Manager, BWEA.

The study has drawn on the work of the DTI Renewables Innovation Review (published in February 2004). The Innovation Review highlighted the need for “accelerated staged trials to discover whether feasible cost-effective solutions can be developed”. Furthermore it identified the existence of a “funding gap” in the support for these technologies through such a programme of development.

## The Funding Gap

Participants in the study unanimously confirmed the existence of the funding gap identified by the DTI Innovation Review.

The diagram below defines the funding gap in terms of technology development and the relevant support mechanisms.



The survey showed that the Renewables Obligation was providing the right long-term investment signal for the industry, with the UK being the location of choice for the majority of companies surveyed. However, there is a clear market failure, whereby the Renewables Obligation does not provide sufficient incentive for the levels of investment required in wave and tidal technologies over the coming years.

**“We could potentially see violent cost reductions over the coming period given the opportunity to develop”**

- investor

## The Need for Action Now

The rate of the development of the industry is the subject on which survey participants’ views varied the most. However, there was agreement that a mechanism needed to be put in place now which provides the opportunity for the industry to grow, without attempting to impose a rate of growth which might prove inappropriate.

The survey showed that in order for wave and tidal energy to provide a significant contribution to the UK’s renewable energy targets in the next decade, there is much which needs to be achieved during this decade.

Technology must be proven, costs must be reduced and there must be sufficient experience of operations and resource estimation in order for future projects to be able to attract the financing which they will require.

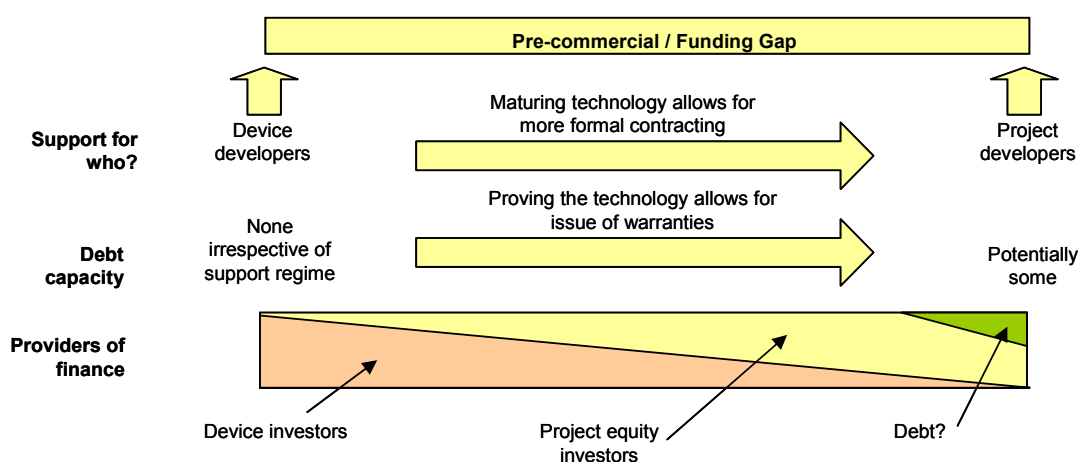
## Financing through the Funding Gap

**“Industrial equity will fund early projects”**

- bank

It is important to differentiate between financing mature commercial renewable energy technologies, such as onshore wind, and nascent technologies, such as wave and tidal energy.

Survey participants agreed that wave and tidal projects in the funding gap would be financed via equity; debt would not play a role. There are currently no debt financed offshore wind farms in the UK, and hence it is unreasonable to anticipate debt finance in other offshore power generation technologies which are at a much earlier stage of technological development.



The above diagram shows how, currently, prototype devices are being funded primarily by device developer’s own equity, how this might broaden to bring in alternative sources of equity into projects, and then how debt might have a small role to play in the latter stages of the pre-commercial phase.

**“These projects will be equity financed through partnerships”**

- project developer

Over this period there will also be a transition in who effectively receives any government support. At the single prototype stage, government support is directed at device developers, but by the time these technologies are at the same stage of development as offshore wind these devices will be being sold on a world market. Any government support will then be focused on project developers, as it is for offshore wind.

These transitions in both financing source and the target of any support system are facilitated by increased certainty in the cost and performance of the devices, and hence in the ability to contract effectively.

**“Revenue support gives high operating margin which is important for early projects with uncertain operating costs”**

- project developer

## **Grants vs Revenue Support: Filling the Gap**

There has been much debate in the industry about whether the funding gap should be filled via a grant or revenue support system. The survey and study focused very heavily on this subject. The issues facing device developers, investors and government turn out to be broadly the same.

### *What device developers said and why.*

In the vast majority of cases people in the industry were in favour of a combined grant and revenue support system over a grants-only system.

It may seem strange for companies to turn away “free money” in the form of a solely grant-based system, but it turns out to be entirely rational.

Firstly, all in the survey were well aware that government support is inherently limited. Secondly, they are entrepreneurs who believe in themselves, their teams, and their technologies.

Hence quite rationally, all individually support a scheme which rewards success (i.e. revenue support). They believe that they will get a greater share of the limited government support available if it rewards success than if it is distributed as grant aid in some equitable, but arbitrary, way.

### *What investors say and why*

Current investors in device companies are concerned to limit the amount of their equity which goes into high fixed cost items such as the grid connection for early projects, and are hence in favour of revenue support in combination with grant aid. However, investors and potential investors in device companies and projects were strongly in support of a significant role for a revenue based system.

Again, surely grants save investors’ money, so this might appear a little irrational. It isn’t, because as companies in this industry grow and mature investors need to have increasingly clear signals about which companies are succeeding and which are not. Grant aid, awarded ahead of success, does not provide the kind of solid, success-based information on which investors need to rely when deploying additional capital into the sector.

**“Revenue support rewards success in device operations”**

- investor

**“Too much grant aid leads to a developer welfare state”**

- utility

### **Information Costs**

Some have argued that whether support money is distributed via grant aid or a revenue-based system, it all comes to the same thing, if the net present value of the revenue support is equal to the grants awarded. In other words, the structure of support is irrelevant.

As is shown by the comments of investors in the survey, this is not true practically and it is not true theoretically, due to what financial economists call information costs<sup>1</sup>.

One of the key results of the transition through the funding gap will be the establishment of successful designs of devices and successful companies in harnessing wave and tidal power. In other words the transition should yield to investors, and to government, information as to which devices / companies are being successful.

**“There are no experts in wave and tidal energy, so how can they award grants?”**

- device developer

If funding is awarded ex-post of that success then it is properly directed and it yields real information to both government and the investment community as to the progress of the industry and the companies in it.

If funding is awarded ex-ante of success, as is the case with grants, then the award of support is not based on success, and yields no information except for that the recipient of the support is good at applying for grants.

With the best will in the world, a government committee awarding taxpayers’ money for no expected return will always be a less rigorous judge of a company’s plans than an investor who risks loss of capital in the case of failure.

**“I hate grants. A support mechanism should reward success .... Not just being there”**

- large industrial company

Given this argument, then, this is not actually a “grants versus revenue support” debate, it is a debate about whether government support should be awarded ex-ante or ex-post of success. Given the merits of an ex-post solution, the design of any revenue support system is crucial. If the government were to award revenue support contracts by decree of a committee, ex-ante of success, then this would have all the failings of grants and would be as information deficient.

<sup>1</sup> The study used parallels to theories of capital structure and capital structure irrelevancy to explore this issue in detail with policy makers. This is not explored in depth here.

**“These are high risk projects,  
but for the right incentive we  
are prepared to invest”**

- utility

### **Government as a Capital Provider?**

If the government does not provide transitional support for the industry in the form of grants, then it must be confident that capital can and will be attracted to the industry under a system of revenue support.

As previously stated, the survey showed that too much dependency on grant aid might actually put off investment in the industry.

Furthermore, even given the funding gap, wave and tidal energy companies have been relatively successful in raising money in the venture capital, industrial and public markets.

The survey showed that a number of developers were in the process of raising capital despite there being no clear solution to the funding gap issue. Furthermore, funds dedicated for investments in wave and tidal energy have remained un-invested.

**“These investments have to  
compete for capital with other  
investments in the sector”**

- utility

Hence this study has concluded that the government does not have to consider itself the capital provider for the industry in the funding gap stage. In fact, to do so might hold back the development of the industry.

However, in designing any support regime the government does have to recognize that any investor will consider the wave and tidal industry to be a high risk investment, and hence for the successful, it needs to be appropriately remunerative.

**“15p/kWh is required as a  
support tariff for early projects”**

- developer

### **The Amount of Support Required**

Fortunately, the Portuguese government is in the process of market testing a support regime paying approximately 15p/kWh for early wave and tidal projects.

The majority of the participants in the survey were of the view that the Portuguese scheme was set at about the right level, and many device developers were actively pursuing projects in Portugal.

**“The Portuguese tariff level  
makes development very  
interesting”**

- a number of device developers

However, most participants agreed that if support could be front-loaded into roughly the first five years of a project then that would be more appropriate than the 12 years used in the Portuguese system.

**“Banding the ROC would disturb investment in onshore wind”**

- utility

## Designing Revenue Support

In designing a scheme of “revenue support” to fill the funding gap for wave and tidal energy it is important to consider the following points:

- Compatibility with existing policy;
- Maintaining confidence in investment in commercial renewable technologies;
- Maintaining low information costs (as discussed earlier);
- Ensuring that the additional support is temporary.

The fourth point above is very important. No-one in the survey suggested that 15p/kWh was an acceptable price for the large-scale production of electricity, however it is a price worth paying, over a short period, and a relatively small number of projects, in order to provide the opportunity to realise the cost savings in wave and tidal power generation which everyone in the survey hopes and believes can be achieved.

## Detailed Recommendations

The diagram below illustrates the combination of grant aid and revenue support for the wave and tidal industry through its various stages of development.

R&D	Pre-Commercial	Supported Commercial
Research Grants	Revenue Support Grants for Delivery	Capital Grants

The following sections go on to discuss the detailed recommendations of this study in each area.

### *R&D Grant Funding Should Continue*

The DTI grants programme has successfully helped develop the wave and tidal energy industry up to, in a number of cases, the large-scale prototype stage.

There are still many potentially good ideas in the research or development phase, and hence research grant support should continue at or above its past levels of £15m over several years. The aim of this is to help bring forward another batch of developments to the full scale prototype stage.

A number of people in the survey commented on the difficulty of getting grant aid. There is potential for improvement in the process of grant award at

**“Delays in grant award or payment can cause us severe financial problems”**

- number of developers

this early stage. In particular some commented on the difficulties caused by the lack of continuity in funding from the grant agencies, and some issues in the release of funds.

**“Grants have a role for non-device related elements**

- device developers

***Delivery Grants***

There are a number of elements of delivering early wave and tidal energy projects such as the grid, consenting and decommissioning, which satisfy the following general criteria:

- They are “device blind”;
- They have the potential for re-use or shared use;
- They have limited potential for innovation or significant cost savings;
- They have low information costs.

**“We are now entering the funding gap in our UK activities”**

- developer

Those surveyed generally agreed that grant aid would be effective for these elements of early projects, although whether grant aid should be specifically targeted at these costs is an issue meriting further discussion within the industry.

This study has suggested that a grant fund targeted at supporting the development of these elements of around 50MW of wave and tidal energy projects might have a value of approximately £40m.

***A Marine Performance Fund***

The main proposal of this study is a system of revenue support awarded ex-post of success.

A Marine Performance Fund is proposed as a mechanism for providing success-based supplementary support of £100/MWh<sup>2</sup> for the first 5 years of the first 50MW of projects deployed in the UK.

**“We should plan for success”**

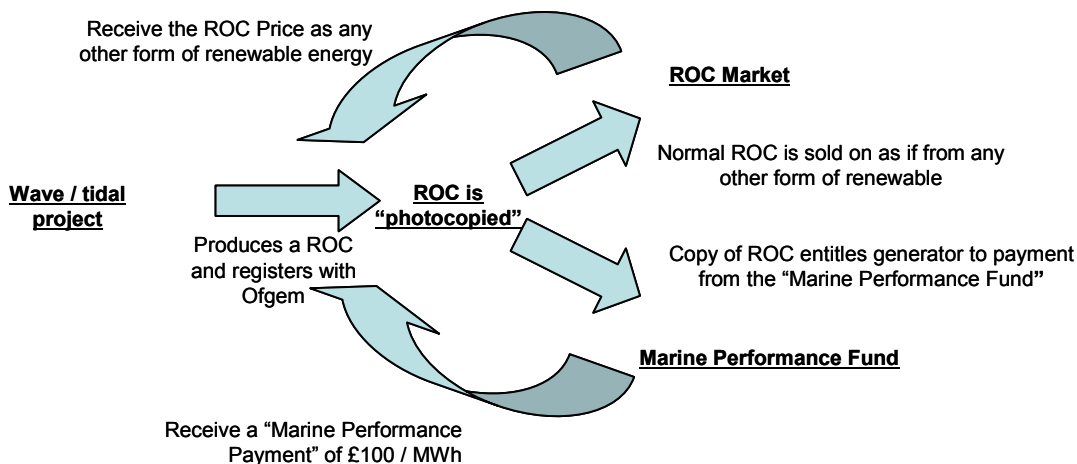
- survey participant

In order to receive these supplementary payments wave and tidal projects would simply register ROCs, as does any other renewable energy generator. However, these ROCs would then be “photocopied”.

The original ROCs would be traded in the ROC market, and would be indistinguishable from any other ROCs in the market. However the “photocopied ROCs” would entitle the generator to a supplementary payment directly from the Marine Performance Fund.

<sup>2</sup> £100/MWh plus £30/MWh ROC buy-out plus around £20/MWh for power gives £150/MWh or 15p/kWh.

The mainstream ROC market would be unaffected by this proposal, as a ROC from a wave or tidal project would trade in the same way as any other ROC.



The system could be administered as a series of "smart, nano-grants" of £100 / "photocopied" ROC to wave and tidal generators who have succeeded in producing them.

Crucially the system has low information costs, as no generator can reserve their right to the fund ahead of production. While the fund is visible to investors, there is no award of support ex-ante of the successful production of ROCs. Hence the system creates an incentive to invest without committing the payment of government support until after success has been achieved.

The cost of the fund to the taxpayer would be limited by the value of the money in it, hence ensuring that the supplementary support, at this level, is temporary.

**"We have plans to deploy small scale farms if the financial conditions are right"**

- developer

Assuming a 35% load factor for wave and tidal energy the fund would need to contain around £75m in order to provide the amount of support described above. This amount of money is a success-based payment of funds which might otherwise be allocated as grant aid.

#### *Indications of Further Support*

This programme will not see wave and tidal power through to the same stage of development as offshore wind. Hence the study recommends that the government state that a successful industry should expect appropriate transitional support in the future.



## Further Work and Consultation

BWEA will be soliciting views from its members and a range of organisations on the ideas and recommendations in this report. We have already presented preliminary findings to key government departments and will be putting the report's formal proposals to the Energy Minister over the coming weeks. If you have any views on this work then please contact:

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BWEA would also like to thank the external members of the Steering Group: Simon Roberts and Robert Gross, for giving their time and for providing valuable insights throughout the study.

### About the British Wind Energy Association

BWEA was founded in 1978. With over 300 company members it is the UK's largest renewable energy trade association. As well as championing the development and growth of the UK wind industry, the BWEA also champions the emerging wave and tidal sector.

For more information on BWEA's activities please see [www.bwea.com](http://www.bwea.com)

### About Climate Change Capital

Climate Change Capital is a specialist merchant banking firm providing financial services and products to organisations affected by the convergence of laws and policies on energy and the environment.

We understand energy and environmental policy, as well as energy and environmental markets. By interpreting and anticipating policy developments, we provide our clients with insight and comprehensive financial solutions, enabling them to make superior investment and trading decisions. For more information please see [www.c-c-capital.com](http://www.c-c-capital.com)