

The npower juice fund 2003 to 2010: A path to power

A short review of the juice fund by the Centre for Energy Policy and Technology at Imperial College -
Managers of the fund applications assessment programme from 2004 to 2010

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Introduction

In 2003, npower set up the 'juice' green electricity tariff, with endorsement from Greenpeace. npower committed to contribute £10 per customer per year to the juice fund, which would be available to support the UK renewable energy industry. Greenpeace and npower agreed that funds should be directed towards the wave and tidal power sector as it was considered that this was where juice could add the most value, and fill some of the funding gaps that hamper the development of emerging technologies.

In 2004 Imperial College was invited to help define the work of the fund. The Centre for Energy Policy and Technology (ICEPT) hosted a series of workshops with device developers and other funders to assess how the fund might operate and where it could best add value. Imperial College went on to assess applications for juice funds, collaborating with Edinburgh University. The two overriding criteria applications were assessed against were that the project should have the potential to advance the long term development of wave and tidal power, and that juice funding created new knowledge or enabled project development to go ahead that would otherwise founder.

In the period between 2003 and 2010 the juice fund supported a total of 26 high quality, innovative wave and tidal projects. Without the fund some projects either would not have gone ahead at all, or would have been significantly delayed.

The fund grew to a peak of around £450k per year and disbursed a total of over £2m to a wide range of projects; from novel concepts in device engineering, to testing and proving of designs, and studies of wildlife impacts, resources and policy needs.

In 2010 npower and Imperial College experts agreed that it was not possible to make the wave and tidal focus of the fund compliant with Ofgem rules on green tariff marketing. The research driven agenda that is relevant to wave and tidal power is not compatible with the short run carbon saving required by Ofgem and the juice fund is no longer available for wave and tidal generation technology. This document provides an historical record of the projects that the fund supported.

Juice: A short history

2004/5

In 2004 ICEPT ran workshops and provided analysis to help Greenpeace and npower scope the work of the fund and decide what sort of projects to fund. Device developers, funders, independent experts and investors were consulted.

Two pilot projects were funded. The first project the fund supported was the 'wave-buoy', part of the Regen Southwest 'Wave Hub' project. A second pilot project, the BWEA 'path to power' policy needs report was supported in early 2005.

During 2005 ICEPT and npower developed a formal funding evaluation system to assess applications. The fund opened its first call for proposals, publicised at the annual marine energy conference and via the npower website. Funds were awarded to Pulse Generation and Edinburgh designs.

2006 - 2008

In 2006 the fund got into operation in earnest. A total of 27 applications were received, of which 7 were funded, to a total of over £600k.

In 2007 17 applications were received and 6 were funded, with around £260k awarded.

In 2008 30 applications were evaluated and funding was given to 8 projects, totalling £424k.

2010

In 2010 Juice made its last award to a wave/tidal project. £400k was allocated to EMEC working with Voith hydro.

A full summary of funded projects is provided in Table 1.

The juice niche

Initial discussions with device developers and other funders indicated that the wave and tidal industry needs the following forms of support:

- R&D stage technology development contract or engineering fellows scheme
- Due diligence linked support for demonstration stage options
- Funding for an element of a grid connection hub
- A revenue support scheme
- Generic activities - EIA, resource mapping, public perception/dissemination work, grid research

Due diligence was subsequently ruled out on grounds of complexity, and revenue support exceeded the funds available. Juice therefore proceeded to fund RD&D, grid connection and a range of supporting activities. Table 1 indicates the wide range of activities supported by Juice.

Table 1: juice funded projects summary

<u>Category</u>	<u>Year</u>	<u>Projects funded</u>	<u>Total</u>
Pilot phase	2004	Regen Southwest – Wave-hub BWEA – ‘Path to power’ policy needs analysis	£249k
1 st funding round	2005	Pulse Generation Tidal – technology demonstration Edinburgh Designs - Tidal Stream Turbine development	£124k
2 nd funding round	2006	Sea Mammals Research Unit, University of St Andrews - interactions of marine turbines with sea mammals ABP Marine Environmental Research Ltd – Tidal Resource Evaluation University of Edinburgh – air cooled linear generator	£626k

		<p>Wave-hub – further development of wave bouy</p> <p>Garrard Hassan – marine measurement system</p> <p>Embley energy Ltd – ‘Sperbuoy’ device development</p> <p>Ocean Power Delivery – operational support for device testing</p>	
3 rd funding round	2007	<p>ABP Marine – Marine Protected Areas conflict management strategies</p> <p>EMEC – Analysis of WEC impacts on cetacean, sea mammals and birds</p> <p>Garrard Hassan – Assessing the climatological impacts on Wave Hub operation using Wave Buoy data</p> <p>Pulse Generation (Tidal) Ltd – Pulse Stream 100 grid connection</p> <p>Aquamarine Power Ltd – Oyster WEC prototype development</p> <p>Tidal Generation Ltd – Grid connection study for tidal power farms</p>	£262k
4 th funding round	2008	<p>Edinburgh University – Detail design of CGEN generators</p> <p>SMRU – Passive acoustic monitoring buoy</p> <p>EMEC – Analysis of impacts from WECs on cetaceans, sea mammals & birds</p> <p>EMEC – Formulation and dissemination of EMEC ADCP Deployment and Retrieval Methodology</p> <p>Green Ocean Energy Ltd – Adaptation of Wave Treader WEC to wind turbine mounting</p> <p>Black & Veatch – Tidal resource assessment Significant Impact Factor study</p> <p>Pelamis – Northern Scotland Wave Farm Development</p> <p>Aquamarine Power Ltd – Oyster WEC Value Engineering and Performance Optimisation</p>	£424k
5 th funding round	2010	<p>EMEC Tidal Stream Demonstration Turbine – Voith Hydro Ocean Current Turbine</p>	£400k

Selecting projects: the juice criteria

Applicants to the juice fund were provided with an application form and guidelines aimed at both assisting the applicant and ensuring the assessment process was manageable at minimum cost.

Primary criteria included:

- The Juice Fund would support device development work of the following nature:
 - R&D or early demonstration support
 - Support for a specific element of technology for advanced demonstration stage devices. This should take the form of targeted support that seeks to overcome specific obstacles or technical problems.
- The Juice Fund would also consider the full range of ‘supporting activities’ necessary for marine renewable energy technology to proceed to commercial feasibility, such as:
 - Support for EIA or SEA (or elements thereof, including wildlife impacts), at local, regional or national level.
 - Resource mapping or site characterisation.
 - Public information, outreach and dissemination work.
 - Market development activities (technology road-maps, policy needs assessment, etc)
 - Grid integration related research, or an element of grid connection
- The outcomes and deliverables should be made clear and should be of direct benefit to the development and deployment of marine energy
- Proposals involving co-funding should clearly identify what niche or enabling activity the elements proposed for Juice funding represent
- The financial resources sought and physical resources necessary should be in keeping with the scale of the project and should be enabling for the project
- Appropriate professional/industrial /academic competence should be demonstrated clearly

The difference juice made

Juice funding made a material contribution to many projects and it is clear that without it projects either would have not gone ahead at all, or would have been significantly delayed. Examples of projects which would not have happened at all without Juice funding include (quotes from funded projects):

- Regen South West WaveBuoy “The project would not have gone ahead without Juice funding”
- Sea Mammals Research Unit interaction of marine mammals with tidal turbines “suspect that the project would not have been possible without the support of the Juice Fund”
- ABP Marine Resource Evaluation “This research would not have been possible without the support of npower Juice”

Projects where juice added value or avoided delay include:

- Pulse Generation Tidal pulse stream generator “Juice funding has been fundamental to our project. The overall level of funding from Juice is 5 -10 % of the total project value. An RD &D project for a marine renewable technology is extremely difficult to fund given that the technology is by definition unproven and is likely to be several years from any commercial return. Government grants will only ever be awarded at 50% for RD&D which leaves a big gap. Without Juice I doubt that we would have been able to fill the gap but an early award from Juice delivered prestige and positive publicity to the project which has certainly helped in bringing in further funding. I believe that our project would really have struggled without Juice funding.”

- Edinburgh Designs tidal stream turbine “The Juice funding was critical to our vertical axis tidal project. The DTI provided funds for the study to see if the device was economically feasible but said the project was too small for their next round of funds. We asked Juice to help fund the first prototype so that we could show that the hardware actually worked. This has enabled us to present the concept to investors as a running machine rather than a paper concept. So far things are looking very positive for the next phase of development. EU regulations limit the proportion of funding that government agencies can supply. In the case of prototype devices this is 35%; so the remaining 65% has to come from other sources. Without Juice funding or some other similar non-governmental funds the project would not have gone ahead. The Juice fund came at exactly the right point and is providing help just where it is required.”
- University of Edinburgh air-cored linear generator “The Juice Fund allowed the team to investigate the performance of the machine without any commercial pressures and are now in a stronger position when dealing with potential commercial partners”.
- Garrad Hassan marine measurement systems “Juice funding has allowed the development of the measurement system to be undertaken early enough to be ready for application to early ‘proof of concept’ prototype devices”.

Juice kept the application process simple and avoided complex negotiation over intellectual property (IP), important to SMEs whose primary asset is often their IP. Juice could fund projects which deliver benefit ‘for the good of the industry’ that would otherwise fall between the funding gaps, and allow for the dissemination of findings that would otherwise be subject to commercial control.

A number of funded projects have made it clear that these were significant benefits associated with Juice funding. Examples include:

- University of Edinburgh air-cored linear generator project where “IP became an issue” with other potential funding sources.
- Sea Mammals Research Unit interaction of marine mammals with tidal turbines where “the only alternative funding would be to try to attract a commercial sponsor but this would have meant that we might not have been able to disseminate the information for the broader community”.
- Regen South West WaveBuoy “Another important element of the contribution that Juice funding has made was to give credence to the Wave Hub concept and Juice support has probably helped sway opinion in the RDA and Government. So the Juice funding has specifically helped the RDA and four device developers and in a broader sense the wave energy industry”.

Overall it is clear that the juice fund made, for a while, a very meaningful contribution to the nascent marine energy industry. It complemented other sources of funding and brought funds from the utility sector and electricity consumers directly to device developers for the first time.