

Checkmate Seaenergy

Rubber snakes seek to slash cost of wave power

Taking advantage of the Carbon Trust's Marine Energy Accelerator (MEA), Checkmate Seaenergy is developing what could be the future of wave energy – a novel device resembling a giant rubber snake. Durable and with the potential to deliver a significant cost reduction for wave energy devices, the Anaconda is set to help make wave power a commercially viable option.

The challenge

As its name suggests, the Anaconda is a long, snake-like rubber tube – 200m in length and 5.5m in diameter. Filled with water, it is positioned just below the surface of the sea, tethered to the seabed. As each wave hits the front of the tube, a pulse is created in the water inside. This is forced down the tube by the wave, increasing the pressure as it goes, and ultimately powering a turbine in the 'tail' of the tube to generate electricity.

Stronger and longer

"We believe the Anaconda offers distinct advantages over other wave energy systems being developed, not least because there are few moving parts, helping to reduce maintenance costs relative to other wave energy systems" says Checkmate's Chief Executive Des Crampton.

"Being made of rubber, it is quite flexible and can cope with harsh wave climates. Rubber is a natural material and will not be in conflict with a marine environment. Plus, the Anacondas will be fitted with wireless

technology, which will enable technicians to monitor each part and spot any problems quickly – before they become more serious and costly to repair".

Since Anaconda is a long device it is able to capture more energy from passing waves.

Generating more for less

Checkmate estimates it will need up to £17 million to create the first full-size prototype. Once the demonstration phase is complete and the Anaconda is deliverable on a commercial scale costs will be significantly reduced.

The company believes each Anaconda will generate an output of 1MW of electricity – enough to power over 1,000 houses.

Making the business case: Marine energy

Still in its infancy, marine energy could provide up to 20% of the UK's electricity needs.

The Carbon Trust's Marine Energy Accelerator (MEA) aims to help reduce the cost of marine technology, bringing forward the time when it becomes commercially viable. We are offering financial support – as well as advice and market expertise – to help companies and academic organisations develop better and more cost-effective technology components for marine energy devices.

[Find out more about MEA.](#)

“The support and consultancy we’ve received from the Carbon Trust – from both a technical and business perspective – has been invaluable. We are now in a strong position to secure investment for the Anaconda.”

Des Crampton, Chief Executive, Checkmate Seaenergy



[Watch the Anaconda promotional video.](#)

The approach

Having licensed the patent from its inventors and secured sole rights, Checkmate entered Anaconda into the Carbon Trust’s Marine Energy Challenge, which invited submissions from companies developing new systems for harnessing wave power.

All entries were evaluated by consultants with expertise in this area, and the Anaconda was seen as a very promising and potentially cost-effective solution. As a result of this, it was accepted onto the Marine Energy Accelerator (MEA).

Making the snakes

A key piece of consultancy carried out as part of the MEA was to investigate the feasibility of actually creating the 200m-long, 500-tonne Anaconda – believed to be the largest man-made rubber structure ever assembled. The Carbon Trust brought together a number of experts in rubber technology who determined the best way to manufacture the Anacondas and what

sort of rubber compound would give maximum durability in a marine environment.

A welcome finding was that they have the potential to be assembled using existing technologies and vulcanizing techniques. The investigation also found that the most cost and time-efficient method would be to assemble the Anacondas as close to the shore as possible, and tow them out to pre-fixed tether points and electrical systems.

Scaled down success

A second piece of work funded by the Carbon Trust was tank testing, to confirm whether the initial concept actually held up. For this, the Checkmate team used scale models of the Anaconda, just 8m long.

Stage two of the testing will use a number of 50m models. “We’re creating a series of scale prototypes,” explained Des, “and we’ll use each to try and refine different aspects of the design. In particular, we need to find the optimal way of smoothing the pulses inside the tubes to get the best performance from the turbines.”

Making the case for investment

Further support came in the shape of the Carbon Trust Incubator, which has a track record of turning clean tech innovations into high-growth businesses.

The Carbon Trust is helping Checkmate prepare a compelling business case that will help it attract the investment needed to create the first full-size prototype.

If the company secures the necessary funding, it hopes to have the first full-size Anaconda ready by 2014. The ultimate goal is to create farms of around 50 in west-facing coastal areas, such as the Hebrides and the South West Peninsula, which benefit from rougher seas and more energetic waves.