

COMPANY  
**Wello Oy**  
wello.eu

LOCATION  
**Espoo, Finland**

SOFTWARE  
**Autodesk® Product Design Suite Ultimate**  
**Autodesk® Inventor®**  
**Autodesk® Alias®**

# Harnessing the power of the wave

## Wello is converting power from our oceans to provide a sustainable future

Wello has gone from simple conception to technological development and commercial piloting of clean technology and will soon be able to make a difference, not just in the field of clean energy, but in the lives of people who want to make a smart change.

—Aki Luukainen  
CEO Wello



Preparing The Penguin on site in Orkney, Scotland

Oceans cover two-thirds of the Earth's surface and are integral to all life on the planet, impacting on climate and weather patterns. Our oceans are home to 230,000 known species and, for many, are a sacred place. Relatively untouched and unexplored, while heavily protected by governments and agencies around the world, our oceans are one of our greatest assets and have long been one of humanity's most trusted partners. But oceans now stand to deliver far more to us. As we look to a future where gas, coal and oil are no longer central to our energy sources, the Wello team has created a design that leads the way in generating energy from waves in the ocean, producing an innovative, green solution to one of the biggest challenges we face.

### Powering the Future

Heikki Paakkinen was confident his idea of a wave energy converter would create a sustainable source of energy for future generations and founded Wello, a company devoted to producing an ecological and commercially viable energy solution, built upon an extensive background in marine engineering and sustainable energy technology.

The pioneer programme, the Wello Penguin, is a patented wave energy solution, designed to work in harmony with the ocean to provide

an ecological means of tapping into a source of pure, unlimited energy. The Penguin vessels float on water and capture kinetic energy, which is then turned into electrical power, with no emissions. The vessels are placed so they do not disrupt the water's natural rhythm or disturb marine life and are reliable and extremely durable. The devices produce no visual or noise pollution and they can be used on almost any ocean coast, with the power to generate enough electricity to power 400 homes from one device. It is an idea that Wello believes has the potential to make a dramatic impact on the way in which the world can harness the power of the ocean.

### Leading the Wave

Like many of the best ideas, Wello's technology relies on its philosophy of making a complex solution, simple. Wello engineers have developed a converter that contains only one moving part inside the actual hull of the device. This is vital as the internal parts are not exposed to sea water meaning they avoid corrosion, which is essential for durability. The asymmetrical design of the device is also important to the conversion from continuous rotational movement to electricity.

The Penguin's design also uses off-the-shelf commercial components for the converter and the steel hull and, as the actual device

The Autodesk Cleantech Partner Program supports clean technology innovators with design and engineering software they can use to accelerate their development of epic solutions to the world's most pressing environmental challenges. For more information, visit [autodesk.com/cleantech](https://autodesk.com/cleantech).

# The devices produce no visual or noise pollution and they can be used on almost any ocean coast

is built like a ship, the manufacturing can be completed locally by ship yards using existing tools and manufacturing processes. In addition, the generator is the same as used in wind turbines. All of this ensures low manufacturing and installation costs, as well as minimal maintenance outlays. It also enables Wello to reach its target market of energy companies in most countries with significant wave resources. Instead of complex fixed structures which can cause damage to the sea bed, the Penguin converter floats on the surface with only minimal anchoring attached to the bottom, making it also easier to install and disassemble. The 30m x 15m vessel is nine meters in height but since less than two meters are above the waterline, it is barely visible from the shore and floats in a discreet and non-disruptive manner without making any sound. The actual energy is generated in one step only as there is a direct conversion from the movement of the vessel to electricity which is then fed directly into the onshore grid through a 2 km long cable. "The Penguin is a truly unique way to harness the waves with all of the components inside the device, ensuring that they are protected against the force of the sea. Wello has gone from simple conception to technological development and commercial piloting of clean technology and will soon be able to make a difference, not just in the

field of clean energy, but in the lives of people who want to make a smart change" says Aki Luukkainen, CEO Wello.

## Swimming in Sync

Throughout the design process, the team wanted to maintain a balance between form and function, to ensure that any resulting device was beautifully designed and wouldn't take away from the grace of the sea, as well as delivering an innovative solution to future energy shortages. Working within the Autodesk Cleantech Partner Program, and using the free design software which it provided them with, the Wello team were able to achieve this balance, without compromising the success of the project. Working with Autodesk over the past four years, Wello's team of ten engineers and designers used Autodesk® Inventor® from the Autodesk® Product Design Suite to create the mechanical components and mechanisms. The key design challenge for the Wello team was keeping the product simple, with simplicity one of the main elements of the company's philosophy. Autodesk® Alias® was used for the form of the design, allowing the innovative three dimensional curved hull design to be sketched using the digital tool. These professional design tools have become invaluable in

Autodesk helps with the design and visualisation of innovations, a critical part of the process, as well as creating a beneficial link from design to manufacturing of prototypes.

—Aki Luukkainen  
CEO Wello

reaching the company goal of installing ten Penguin wave converters around the world in the next three to five years. "Autodesk helps with the design and visualisation of innovations, a critical part of the process, as well as creating a beneficial link from design to manufacturing of prototypes," says Luukkainen. "We had to create a new category of wave power converters and having the design tools free of charge thanks to Autodesk's Cleantech Partner Program enables us to use software we wouldn't otherwise have been able to provide to our designers and engineers. This in turn has significantly reduced our time to market."

## Powering the Future

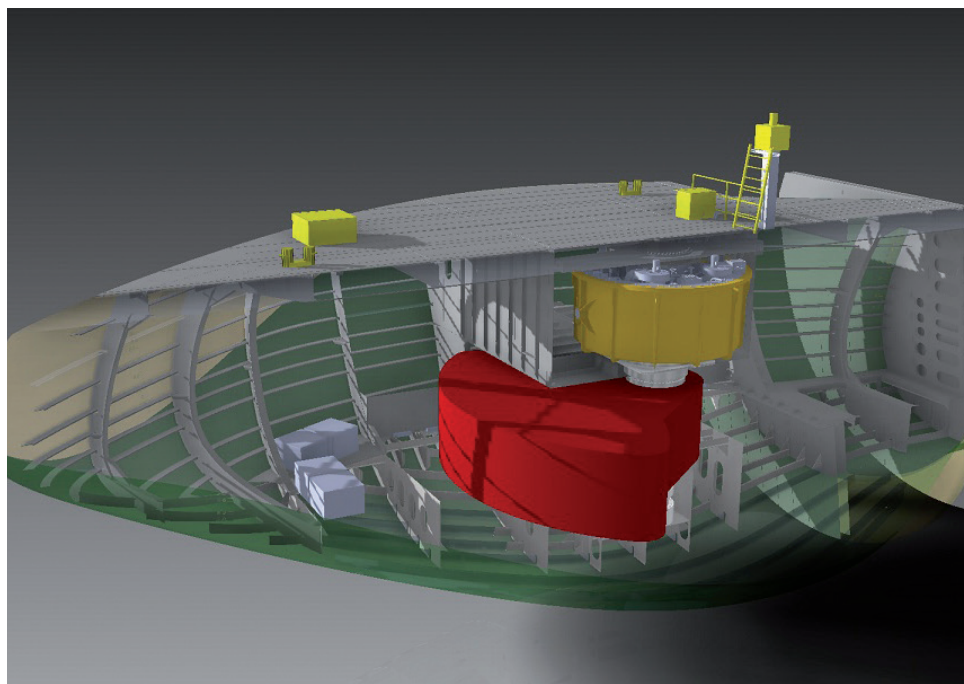
Looking ahead, the Wello team are planning to expand on the tools which they use, particularly drawing on simulation tools to better understand how the Penguin can be refined and rolled out successfully across the globe. Heikki Paakkinen's vision for a future powered by the waves is a breakthrough in innovative energy solutions. As an untapped source of power and with the potential to deliver significant energy to our world, the Wello Penguin is ideally placed to create an even closer alliance with our oceans in the future.

## For more information

To learn more about the Autodesk Cleantech Partner Program, visit [autodesk.com/cleantech](http://autodesk.com/cleantech).

## Learn more about Autodesk products

- Autodesk® Product Design Suite Ultimate: [autodesk.com/productdesignsuite](http://autodesk.com/productdesignsuite)
- Autodesk® Inventor®: [autodesk.com/inventor](http://autodesk.com/inventor)
- Autodesk® Alias®: [autodesk.com/alias](http://autodesk.com/alias)



Inside the Penguin hull: the rotating component is directly connected to the generator