

Key Findings:

By using Exceedence FINANCE we were able to prove the following for a vessel using a 100kW diesel generator:

- Hi-GEN 5kW is a viable solution for marine vessels in port from a minimum of 50% per year
- Diesel offsetting to a minimum value of €15.5k
- A minimum of 3,700 hours saved on operating the generator
- A minimum of 34 tons CO₂ emission saved

“We need robust metrics when approaching marine vessel owners with our technology. Exceedence have independently verified our technology using Exceedence FINANCE, giving us the convincing arguments, we were looking for.”

- DARE Technology

For more information on Exceedence FINANCE please visit:

Exceedence.com



For more information on Hi-Gen 5kW please visit:

Daretech.ie



DARE Tech offsetting diesel energy in port. Image courtesy of DARE Technology

Exceedence FINANCE

Case study: DARE Technology Hi-GEN 5kW

Proving wind generation to offset diesel on marine vessels in port

Environmental limits restrict operations of marine service vessels in periods of high winds. This occurs in the North Sea more than 50% of the year and is known as downtime. During this time the wind conditions are perfect for generating wind energy. Fishing vessels can spend a significant portion of its time in harbour either running an expensive generator or using shore power, due to quotas and time needed for servicing and preparation.

DARE Technology have created the Hi-GEN 5 - 20kW wind turbine for marine vessels that can be used in combination with hybrid systems whilst in port. These vessels have diesel generators between 40 and 100kW. The usually required base load in port is 4 - 15kW to be able to perform basic functions on the vessel. The Hi-GEN 5kW turbine can replace this base load, thus saving money on fuel consumption but also extending the service life of the generator. In this case, it is assumed that service is performed at every 10,000 hours of operation at a cost of €10,000 (whether in port or at sea).

DARE Technology have therefore asked Exceedence to independently verify:

- The levelised cost of energy (LCOE) for the Hi-GEN 5kW
- The break-even point for at what stage the Hi-GEN 5kW becomes economically viable in a hybrid (diesel) system
- The potential diesel offset by using the Hi-GEN 5kW
- The potential CO₂ emissions that is saved by using the Hi-GEN 5kW

Exceedence FINANCE was used to calculate the LCOE of the Hi-GEN 5kW, at four different sites in the North Sea, using the power curve for the Hi-GEN 5kW. The variables were availability, and CAPEX. An LCOE curve is estimated based on the availability, and the resulting curve will shift with a lower/higher CAPEX.

The LCOE curves were then compared to the estimated diesel fuel consumption in three different scenarios, and the break-even points were found. Based on this break-even point, a minimum and maximum diesel offset, and CO₂ emission savings could be estimated.



Four locations were investigated based on best fit with the Hi-GEN 5kW. These are (from left to right): Port of Cork, Port of Southampton, Port of Rotterdam, and Port of Hamburg

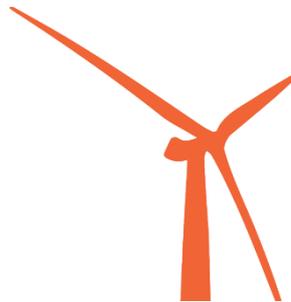
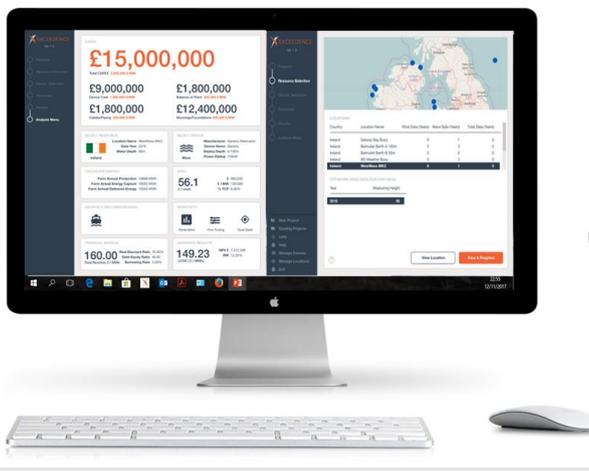


HI-GEN TURBINE SPECIFICATION

The initial Hi-GEN will be a 5kw model; this will soon be expanded to a 10, 15 and 20kw range.

Hi-GEN Wind Turbine specification (5kW)

No of Blades	3
Diameter:	5 meter
Rated Power:	5kw
Operational Wind Speed	3-25 m/s
Survival Wind Speed	70 m/s
Yaw Capacity	0 - 270° (Adjustable)
Design Life:	20 years



- + Focus on Analytics
- + Standardised
- + Identify and Reduce Risk

Key benefits of Exceedence FINANCE:

Accurate financial metrics

Financial projections based on detailed engineering models and real-world wave resources

Accelerated project development

Screen out weaker concepts earlier, and accelerate the development and refinement of innovative designs with genuine prospects

Design optimisation

Explore potential advances in energy generation and identify opportunities for cost reduction

Detailed understanding

Key insights into annual energy production, local power fluctuations, loads in structural members and fatigue life expectancy, based on detailed engineering simulation

Clarity

Complete transparency of both financial and engineering design processes

Consistency

Suitable for all stages in the design process, from concept development, to model scale prototypes, and right through to full scale versions

Unlock investment

Increase investor confidence by de-risking projects

Recognised by industry

Validated via industry case studies and technical papers

Environmental and societal benefits

Reduces entry barriers to new developers and facilitates growth of wave energy sector in general

“Exceedence FINANCE brings to us a new level of user friendliness to handling vast amount of hourly resource data to quickly match our device to a location.”

– DARE Technology