

Revolutionising 24/7 green power for data centres

Wave energy: Unlocking continuous
renewable energy at lowest cost

The impossible choice

Why wave power completes the clean energy equation.

Imagine standing at the edge of two worlds. In one, massive fields of solar panels stretch to the horizon, alongside forests of wind turbines spinning in the breeze—yet half of all this energy vanishes into thin air, wasted.

Batteries the size of buildings struggle to bridge the gaps when the sun sets and winds calm. This is the paradox of today's renewable energy landscape for data centres: abundance and scarcity existing simultaneously, with

eye-watering costs for both. In the other world, a seamless symphony of renewables works in perfect harmony—sun, wind, and waves combining to deliver constant, reliable power with minimal waste and dramatically lower costs.

This isn't a fantasy. By 2032, Spain has the opportunity to transform how data centers achieve 24/7 carbon-free energy (CFE) through the power of ocean waves.

The current reality:

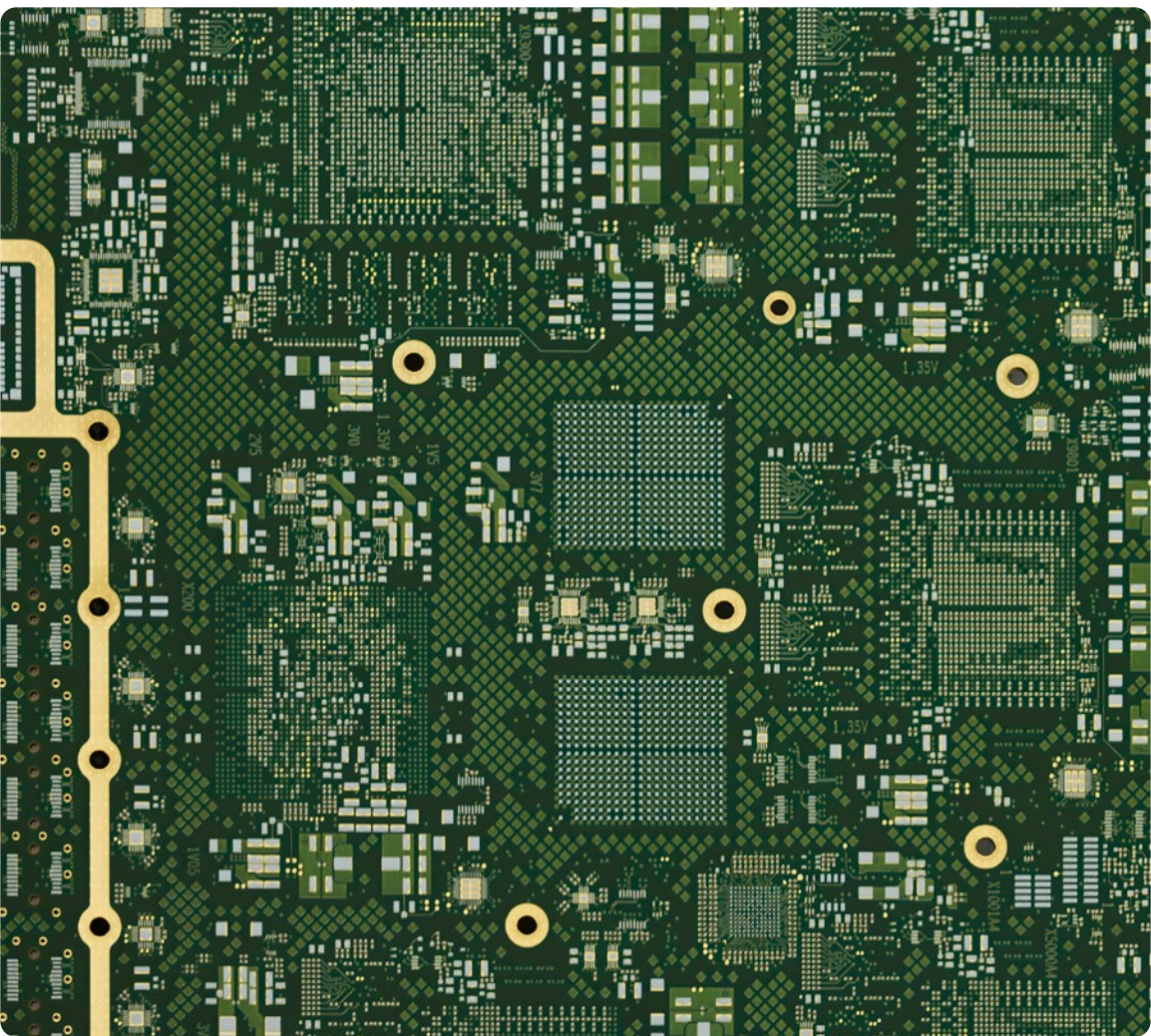
For a data center with a flat 100MWh annual demand profile in Spain, the traditional renewables-only approach reveals a troubling picture:

- A staggering 1,936 GWh of total annual energy must be generated
- 1,060 GWh—enough to power thousands of homes—gets wasted as surplus
- Massive infrastructure requirements: 1,035 MW of installed capacity
- Financial burden: €103 million in annualized costs
- Levelized Cost of Electricity (LCOE): €117/MWh

These aren't just numbers. They represent real-world constraints fundamentally forcing data centers to choose between sustainability goals and economic realities. The overbuilt capacity consumes excessive land, materials, and capital, while still struggling to deliver truly efficient, stable and reliable power.

Something has to change.

“In today's renewable energy landscape for data centers, abundance and scarcity exist simultaneously—with eye-watering costs for both.”



The ocean’s untapped potential

Completing the renewable puzzle.

Picture ocean waves rolling toward shore—constant, powerful, predictable. Unlike the sun that sets or winds that calm, waves carry energy day and night, through changing seasons, creating a perfect complement to existing renewables.

This is the missing piece in the renewable puzzle.

By introducing just 54 MW of wave energy into Spain’s renewable mix, the entire 100% renewable data centre system transforms.

A balanced symphony of sources:

Wave energy doesn’t just add another source—it fundamentally rebalances the entire renewable portfolio:

- Wind capacity can be reduced from 655 MW to 354 MW
- Battery and solar PV systems are sized correctly, and not oversized
- The generation profile smooths, with one renewable source filling in when others naturally dip

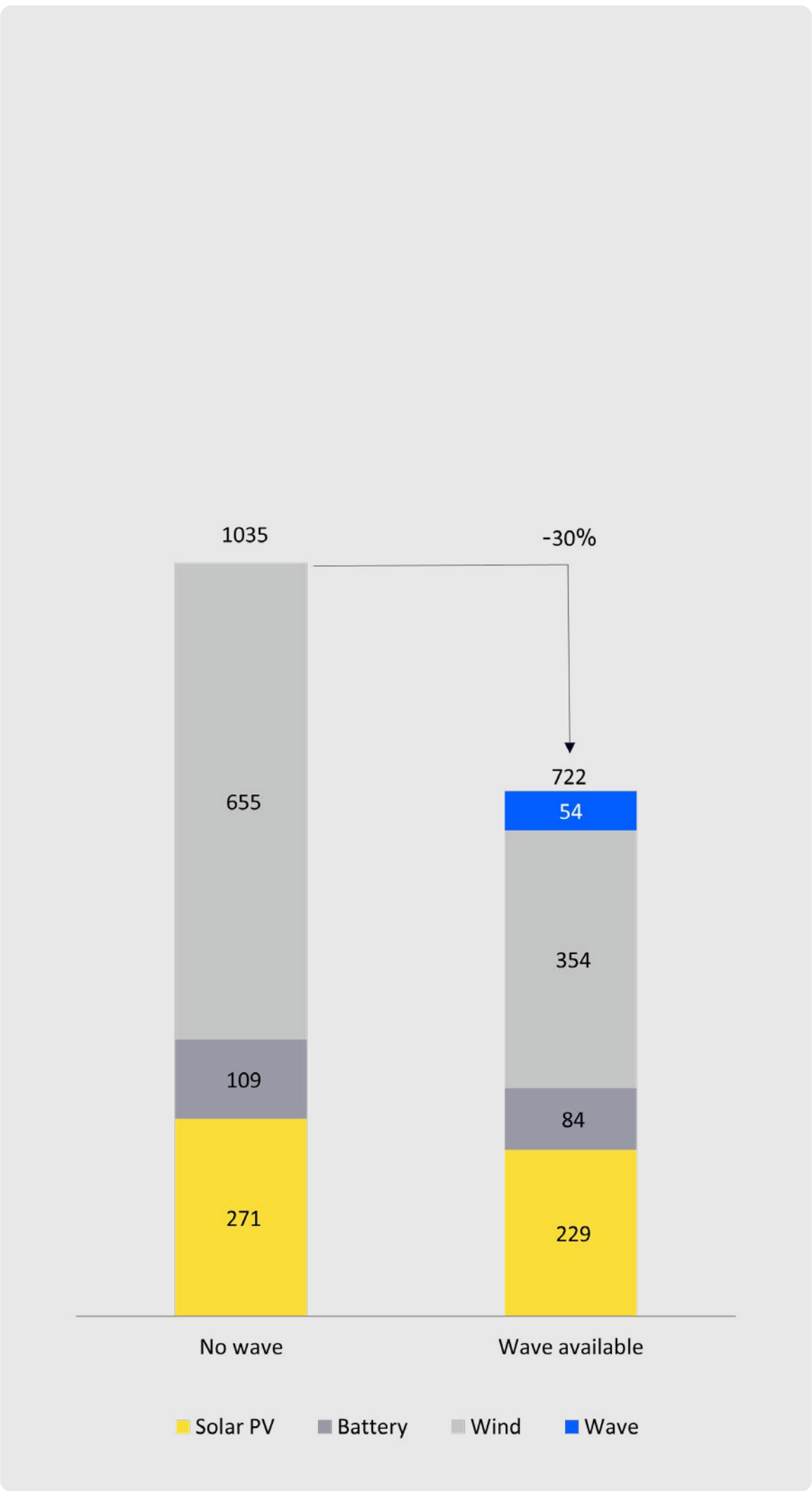
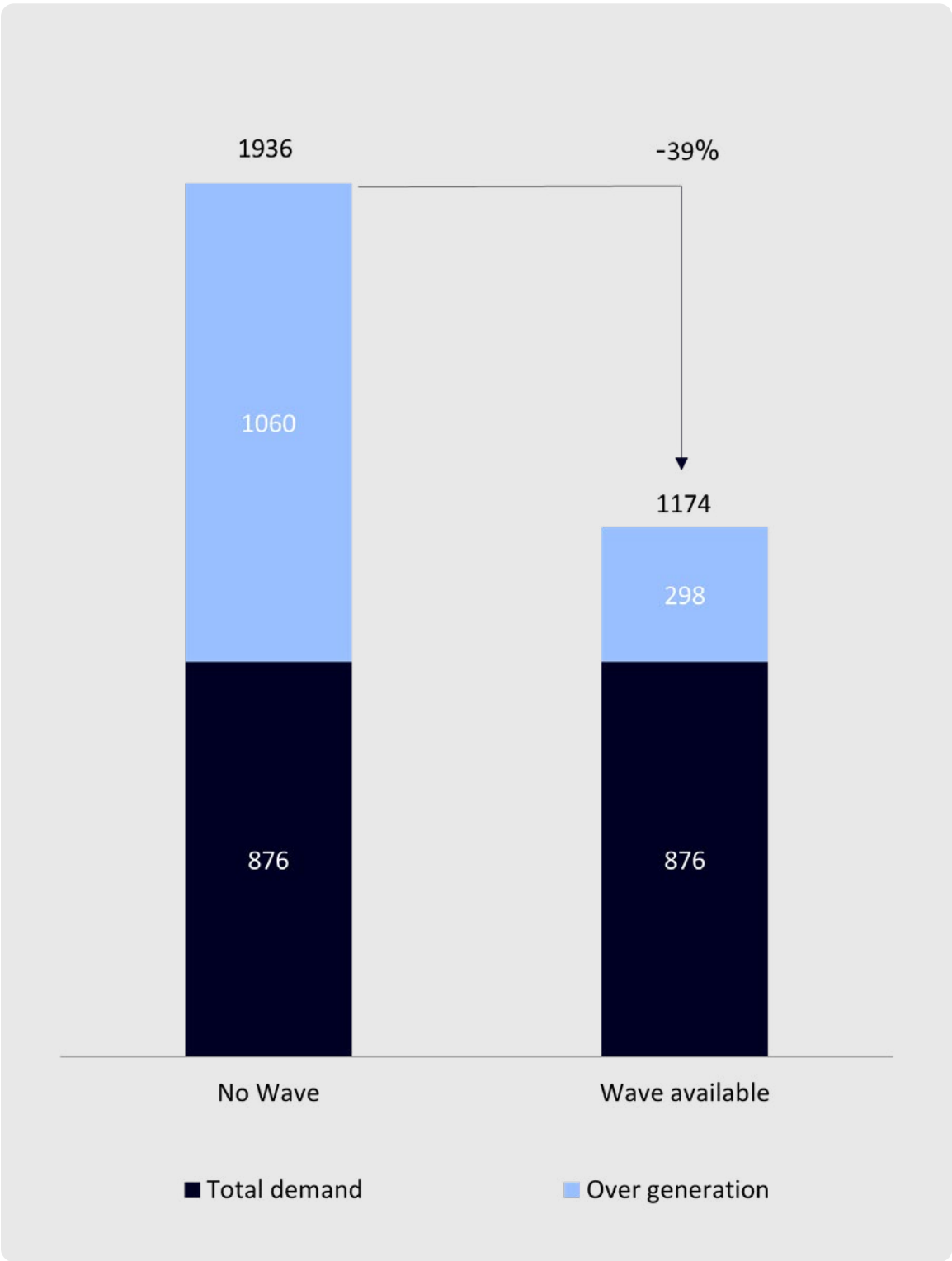
The technology in action:

When the morning sun hasn’t yet risen and night winds are calm, wave energy continues producing. During stormy periods when solar production drops, waves actually increase their output. This natural complementarity creates a responsive system that:

- Reduces total generation produced to 1,174 GWh (a 39% improvement)
- Cuts surplus energy waste to just 298 GWh (a 72% improvement)
- Shrinks total capacity requirements by 30% to 722 MW
- Lowers the infrastructure footprint and resource consumption

Wave energy provides a steady, predictable foundation, enabling other renewables to excel without overbuilding.

“Wave energy provides the steady, predictable foundation that lets other renewables excel—without massive overbuilding.”



The triple bottom line transformation

How wave energy unlocks savings, stability, and sustainability.

For data center operators, wave energy integration delivers three profound benefits that resolve the impossible choice between sustainability and economics:

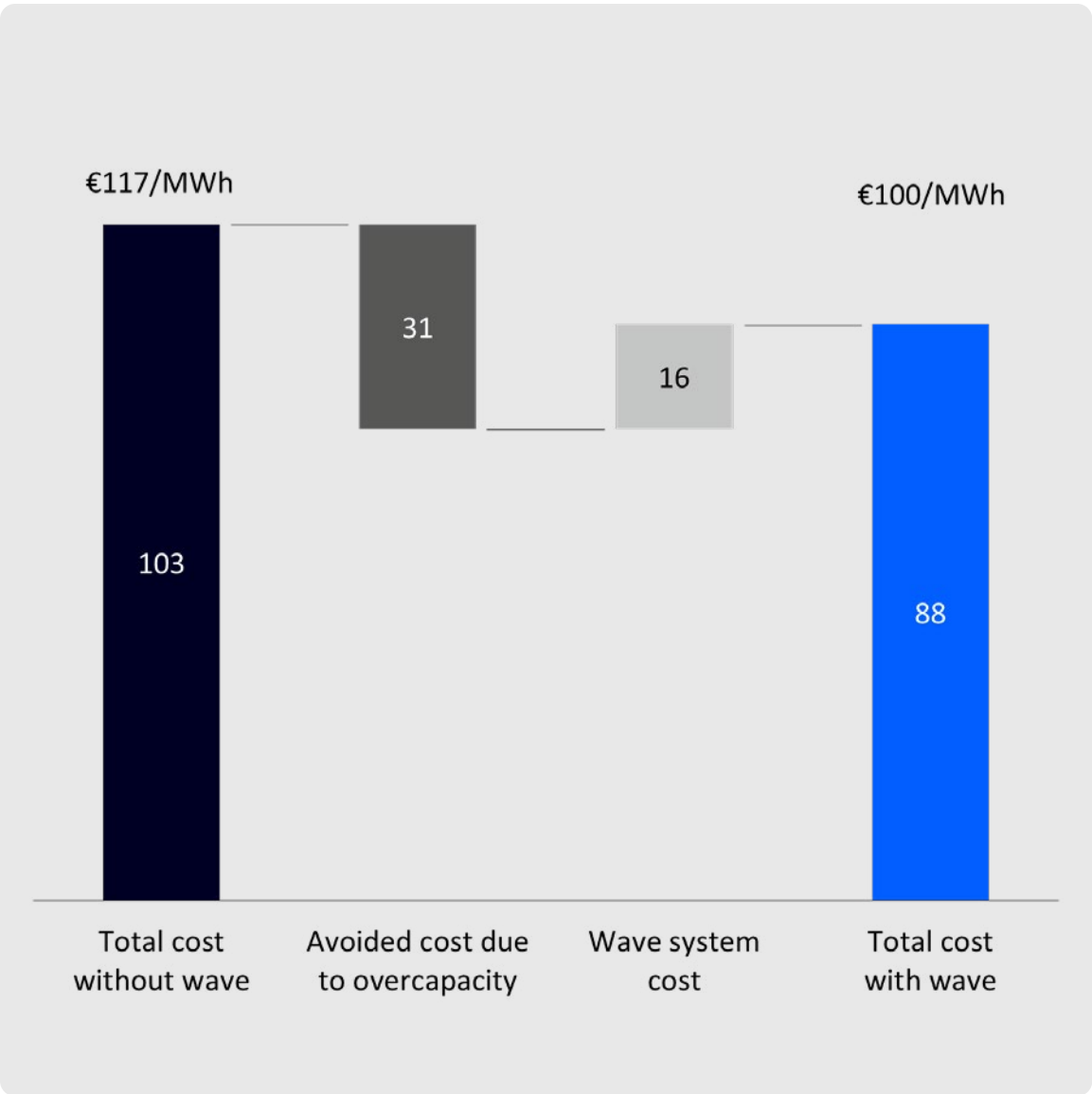
1. Economic Revolution

The financial impact is immediate and substantial:

- €31 million saved annually by avoiding wasteful overcapacity
- Wave system costs of only €16 million annually—far less than the savings they enable

- Net annual savings of €15 million—money that strengthens competitiveness
- LCOE reduced to €100/MWh—a 15% improvement that compounds year after year

Imagine reinvesting these savings into your core business rather than overpaying for inefficient energy infrastructure. This isn't incremental improvement—it's economic transformation.



2. Operational excellence

For facilities that never sleep, power reliability isn't optional—it's existential:

- Smoother, more consistent renewable generation throughout the day and year
- Reduced dependence on massive battery systems and their associated costs
- Greater predictability for energy procurement and operational planning
- Enhanced resilience against seasonal fluctuations in any single renewable source

These benefits translate to fewer sleepless nights for operations teams and greater confidence in efficiently maintaining the 100% uptime that critical data services demand.

3. Leadership position

As regulations and customer expectations evolve, wave energy positions data centres at the forefront:

- Full alignment with EU Renewable Energy Directives (RED II & III) requirements
- Authentic sustainability leadership with tangible results, not just good intentions
- Differentiation in a competitive market where green credentials increasingly matter
- A compelling story of innovation that resonates with stakeholders and customers

This isn't just regulatory compliance—it's a powerful competitive advantage.

“The future of data centers isn't just renewable—it's resilient, efficient, and wave powered.”



Spain: A case study in the new energy era

One country's transformation—offering a blueprint for Europe's renewable future.

Zoom out, and the impact extends far beyond data centres. In Spain, where solar potential is abundant but seasonal, and wind resources fluctuate daily, wave energy provides the stability that transforms the entire energy landscape:

- Coastal regions gain a new economic engine through wave energy development
- Grid infrastructure becomes more efficient and less overbuilt

- Energy independence strengthens as imported fuels decrease
- The national renewable portfolio becomes more reliable and cost-effective

The ripple effects touch every sector, accelerating Spain's transition to a truly sustainable energy future while enhancing economic competitiveness. And these results not only reflect the potential value to Spain, but are transferable to many other regions in Europe and beyond.

The choice is clear

Without wave energy, global data centers face a future of excessive costs, wasted energy, and massively overbuilt infrastructure in their relentless pursuit of 24/7 green power.

With wave energy, they gain a more balanced, efficient, and economical path to the same goal—saving €15 million annually while reducing surplus electricity by 39% and shrinking capacity requirements by 30%.

By 2032, this won't be just a theoretical possibility. It will be the new reality for forward-thinking organizations that recognize wave energy's immense transformative potential.

The numbers tell the story. The economics make the case. The opportunity is clear.

The next wave of renewable energy innovation isn't coming—it's already here.



References

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- 2. CorPower Ocean, 2024. Internal analysis on renewable energy technologies and cost optimization. [Unpublished report].
- 3. McKinsey & Company, 2024. Wave Energy Market Assessment. [Internal report].

Disclaimer: This analysis was conducted for CorPower Ocean using the Green Power Procurement Optimizer tool developed by THEMA Consulting, in collaboration with NREL. It models the cost-optimal electricity mix for a 100 MW flat-load data center in Spain, using hourly time series of wave, wind, and solar PV generation. For more technical details or questions, feel free to reach out to: contact@corpowerocean.com.

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