

Reference case: Pure DC and AVK + Wärtsilä

Powering Europe's first large-scale, off-grid data centre microgrid

Dublin, Ireland

Ireland has become one of Europe's most important hubs for data centres, driven by the rapid growth of cloud services, digitalisation and artificial intelligence. At the same time, grid capacity constraints, especially around Dublin, have made it increasingly difficult to connect new large-scale facilities to the electricity network. For data centre operators, ensuring reliable and resilient power has become a critical challenge.

Pure DC, a global data centre developer and operator, and AVK, a specialist in mission-critical power solutions, addressed this challenge together at Pure DC's facility in Dublin. Rather than relying on the constrained national grid, the project team took a different approach: developing Europe's first data centre microgrid designed to operate fully off-grid.

To make this possible, Pure DC and AVK implemented an on-site energy system centred around Wärtsilä engines as the primary power source, supported by battery energy storage. Chosen for their fast response, modularity, and efficient low-load operation, the engines enable precise matching of power supply to demand while ensuring the high reliability required for off-grid, mission-critical data centre operations.

This is what we delivered

60MW

total output

6x W34DF

gensets for two energy centres

Challenge	Solution	Benefit
• Limited available grid capacity in the Dublin region • Need for fully on-site, grid-independent primary power • Requirement for data centre-grade reliability without external backup • Constrained site footprint and complex delivery logistics	• Two on-site energy centres powered by Wärtsilä 34DF engines (up to 30 MW each) • Enabled fuel flexibility with gas as primary fuel and HVO for backup • Designed for future-readiness with hydrogen blending and CHP capability	• Grid-independent, uninterrupted power • High reliability for mission-critical workloads • Lower-carbon alternative to diesel-only backup systems • Proven, scalable microgrid concept for future off-grid data centre developments

On completion, the Pure DC site will have a total capacity of 110 MW. The primary power system will be delivered through three interconnected energy centres (EC1, EC2 and EC3) complemented by a 20 MW battery energy storage system. EC1 and EC2 are currently being commissioned and will each provide up to 30 MW using Wärtsilä 34DF dual-fuel engines while the scope for EC3 is being finalised.

The microgrid is designed to operate completely independently from the national grid while meeting data centre resilience standards. The Wärtsilä engines will run primarily on gas, with the ability to seamlessly switch to hydrotreated vegetable oil (HVO) if required, ensuring continuity of supply even in the event of gas disruptions.

Beyond immediate resilience, flexibility and future readiness were key design principles. The energy centres are hydrogen-blend ready, requiring only minor modifications to operate with hydrogen-enriched fuels as availability increases. The system is also combined heat and power (CHP) -ready, meaning waste heat from the engines can be recovered and used in a district heating network should local demand arise.

A 20 MW battery energy storage system supports the microgrid by stabilising power delivery and managing load variations, enabling efficient and resilient off-grid operation of Wärtsilä's engine-based generation.

The project was delivered in partnership with AVK, who acted as the system integrator and project delivery partner for Pure DC, with Wärtsilä supplying the engine-based power generation technology at the core of the microgrid.

> "Chosen for their fast response, modularity, and efficient low-load operation, the engines enable precise matching of power supply to demand while ensuring the high reliability required for off-grid, mission-critical data centre operations."

Customer
Pure DC

EPC partner
AVK

Where
Dublin, Ireland

Type
Data centre primary power

Operating mode
Baseload

Gensets
6 x Wärtsilä 34DF

Fuel
Gas as primary fuel, HVO as backup

Total output
60 MW (30+30)

Scope
Equipment delivery

Delivery
2026

wartsila.com/energy

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