

Grid-interactive UPS supports Ireland's renewable energy transition



Award-winning collaboration with Enel X helps Digital Realty avoid over 24,000 tonnes of CO2 emissions and supports Ireland's renewable energy transition.



Digital Realty

Digital Realty is the largest global provider of cloud- and carrier- neutral data centre, colocation and interconnection solutions. Headquartered in Texas, USA. Digital Realty operates over 300 data centres in more than 25 countries across six continents.

As a leading colocation provider in Dublin, Digital Realty operates nine highly connected data centres that host critical infrastructure and interconnect digital ecosystems for tech giants, financial institutions and corporations that have made Dublin their European home.



The challenge

The global drive to decarbonise energy by replacing fossil fuel electricity generation with renewable sources presents challenges for electricity grids. Because these sources are intermittent and non-programmable, national grids like EirGrid, the Irish Transmission System Operator (TSO), need to find alternative sources of flexibility to guarantee a constant balance between supply and demand, and to avoid grid inefficiencies.

EirGrid's 'Delivering a Secure, Sustainable Electricity System,' known as the DS3 programme, has been developed to create the right conditions to transition the Irish power system to renewable sources and to avoid relying exclusively on traditional power stations for backup.

DS3 works by balancing the frequency of the grid as it fluctuates in response to variations in the amount of renewable energy generation. Such frequency response programmes rely on standby energy assets stepping in to maintain the frequency of the grid at 50 Hz to prevent damage to grid hardware. These assets must be able to react to grid signals within seconds or even milliseconds.



EirGrid DS3: Objectives

- > **Deliver a secure sustainable electricity system**
- > **Achieve renewable electricity targets of 80% by 2030**
- > **Securely manage the voltage and frequency of the electricity system**

“Our work with Enel X is helping Digital Realty give back to, and support, Ireland’s grid through dynamic frequency balancing services.”

**Evan Barker, Manager
Facilities Engineering, Digital Realty**

The solution

Data centres need to be able to maintain high levels of availability, as downtime can be devastating for businesses and whole economies. A reliable power supply is essential, and backup power systems provide resilience to keep critical infrastructure online.

Digital Realty's Dublin Metro data centres offer 99.999% availability. They are equipped with uninterruptable power supplies (UPS) to provide power conditioning and backup electricity for the facility, in the event of an electricity grid failure.

With response times below 0.5 seconds, these UPS systems are fast enough both to prevent the data centres from losing power during an outage and to respond to grid signals from EirGrid to maintain the 50Hz frequency required.

Dynamic Frequency Management

Under normal conditions, data centre demand for energy remains constant. If the frequency on the electricity grid drops below 50Hz, instead of drawing the full amount of energy required to power the data centre from the grid, it can safely draw some power from its batteries instead. This reduces demand on the grid and helps balance the frequency. This happens almost instantaneously in response to signals from the grid, turning an idle asset into an active supporter of electricity grid stability.

Enabling technology

In normal conditions, UPS sit on standby in case of a utility failure. While being 100% available to Digital Realty's data centre customers, the assets can support grid frequency through advanced control technology.

Core to meeting the requirements of a grid-interactive UPS is a dynamic controller developed by IoT technology company, EpiSensor, in collaboration with Enel X. The solution tracks millisecond-by-millisecond grid frequency variations and, during moments of grid frequency instability, increases or decreases battery output to the required level. This helps to restore balance to the grid.

The dynamic controller devices were designed and built to meet the requirements set out by the TSO. Grid compliance testing ensured that the system adhered to the standards specified by EirGrid before being approved for use. By creating a solution that was compliant with EirGrid's strict programme rules, Digital Realty's data centre batteries now provide 6 MW of UPS critical frequency balancing support to the electricity grid.



For a grid-interactive UPS to provide frequency balancing support, it must meet essential criteria:

- > 20 millisecond event data
- > GPS time synchronisation of +/- 2ms
- > 1 second real-time data
- > 5 second data latency
- > Response time <2 seconds

“... data centre owners and partners can provide valuable resilience to grid operators; enabling them to fulfil the green energy needs of a growing population and economy.”



The result

Enel X's work with Digital Realty is actively supporting the grid through dynamic frequency balancing services. Typically, the addition of 1 MW of power to a dynamic frequency programme has the potential to save the grid approximately 4,000 tonnes of CO₂ per annum.

Initially, Digital Realty has integrated 6 MW of UPS capacity into the programme; helping the grid save more than 24,000 tonnes of CO₂ annually, depending on customer load. Further available capacity is planned.

The project is setting a scalable precedent that will pave the way for data centres and other large energy consumers to use their UPS to bolster the electricity grid they rely on. As data centres are an intrinsic part of Ireland's electricity system, this novel approach is helping Digital Realty give back to, and support, Ireland's grid through dynamic frequency balancing service.

Digital Realty and Enel X's DS3 Dynamic Frequency Project won both the Data Centre Power Project of the Year and Sustainable Project of the Year at the 2024 ER & DCR Excellence Awards and the Private Sector Project of the Year at the 2024 Tech Excellence Awards.

John Byrne, Managing Director, Ireland, at Enel X said: "Electricity grids of the future will become increasingly reliant on the formation of mutually beneficial relationships between user, technology and local regulations. By adopting this mindset, data centre owners and partners can provide valuable resilience to grid operators; enabling them to fulfil the green energy needs of a growing population and economy. Digital Realty is paving the way for other large energy consumers to help solve the challenges facing our electricity grids – today and into the future."

For further information, please contact:

Michael Mahon
Commercial Solutions Sales Lead, Enel X

Email: michael.mahon@enel.com

Phone: +353 87 358 3754

