



Case Study

Co-creating a dynamic containment solution

Customer
Origami Energy

Location
United Kingdom

Industry
Energy

Origami Energy needed to comply with the National Grid Electricity System Operators new services for managing frequency response. It partnered with Zenitech to work on the project for a one-year collaboration.

Preparing the business to comply with new regulations

In late 2020, the NG-ESO rolled out its dynamic containment frequency response service in Great Britain. It's a service that manages frequency and ensures the national power supply is more resilient. Its job is to help keep the energy supply stable and send power where needed.

Ideally, the power supply would run at a steady 50Hz - the dynamic containment service keeps the frequency within one per cent of 50Hz at all times.

While the electricity systems operator (ESO) sought to control the frequency of organisations participating in the balancing mechanism and the dynamic containment programme, now it wants to control the frequency response of all dynamic containment assets, whether in the balancing mechanism or not.

From 31st March 2023, battery energy storage systems (BESS) participating in dynamic containment had to follow three requirements to continue making money from the service.

They were required to:

1. Stop and start providing the dynamic containment service as and when the ESO instructs.
2. Send a 'heartbeat' signal every five minutes to let the ESO know they were ready to take rapid action if necessary.
3. Notify the ESO of the expected level of its import and export activity.

With Origami's globally scalable BESS Portfolio Management platform already supporting the delivery of Dynamic Containment, Origami needed to extend its service to comply with the additional market requirements introduced by the GB ESO.



Zenitech's technical approach

Origami and Zenitech came together to form an Agile development team. The team collaborated throughout discovery & delivery in what is a highly transformational market with constantly evolving needs. Supported by Origami's common platform services & guardrails:

- Infrastructure as code - De-coupled and containerised microservices
- Security frameworks
- Continuous delivery pipelines

Zenitech provided Origami with a team of three developers - a Java expert (who also acted as the team lead), a senior Java developer and a mid-level Java developer. They worked with Origami's product owner, system architect and Agile delivery manager.

The Origami product owner managed the business requirements, while the Zenitech team handled the development work.

The development team was involved in each implementation phase, from gathering information to implementation, testing and deployment.

Zenitech's work focused on four main areas:

1. The Short-term Operating Reserve (STOR).

It provides the National Grid with additional power when actual demand on the National Electricity Transmission Network is higher than forecast and/or there is unforeseen generation unavailability.

2. Dynamic Containment (part of Dynamic Firm Frequency Response services).

Dynamic Containment is a fast-acting post-fault service to contain frequency within the statutory range of $\pm 0.5\text{Hz}$ in the event of a sudden demand or generation loss.

3. The Balancing Mechanism (BM).

The primary tool to balance supply and demand on GB's network. Where National Grid predicts that there will be a discrepancy between supply & demand, they may accept a 'bid' or 'offer' to either decrease or increase generation

4. Static Firm Frequency Response.

Static Firm Frequency Response is the most widely used form of frequency balancing services, where participants pre-agree to reduce their consumption for a period of 30 minutes in the event of a significant drop in frequency.

For each of these implemented services, the integration between NG-ESO and actual generators, batteries or power supplies is done automatically by the Origami platform supported by the GB-specific NG-ESO integrations developed with Zenitech's support. The functionality for these complex integrations includes declaration of availability based on auction results or manual declaration, start/stop signal sent by National Grid where adjustments in the network are needed, real-time metering sent to grid regularly to inform them that the batteries are working within parameters.



This ensures timely delivery of sub-second response time services that are critical to the successful management of GB power network/infrastructure:

- High availability
- Suitable levels of redundancy
- Ability to react to a rapidly evolving sector

Following on from 'DC Additional Requirements', Origami and Zenitech have worked together to successfully integrate Origami's global platform with NG-ESO and several third-party platforms to support participation across markets of Great Britain. Each requirement required thorough

discovery work and a collaborative effort to identify the best technical solution to meet the requirements/needs from:

- ESO - Functional, non-functional and thorough testing requirements
- Customers - Ability to access, manage and visualise data.
- Support - Ensuring Origami's support teams had the information they needed to manage the day-to-day delivery of services to customers and investigate any anomalies as required (e.g. alerts, manual overrides, data access).

The result: Origami was ready ahead of schedule

The Dynamic Containment implementation was a first in the industry and done ahead of schedule. Origami was the only company in the industry to pass all testing for the new requirements by the 31st of March 2023 and the first technology provider to pass the National Grid's Market Participant Testing.

Zenitech continues to support Origami with dynamic frequency response and the balancing mechanism short-term operating reserve.

The Origami BESS portfolio management platform constantly evolves with the industry, and Zenitech continues to partner with Origami to aid delivery. Both companies hope to expand the platform into other markets and countries with systems that reflect each geographic area's market rules and data flows.

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