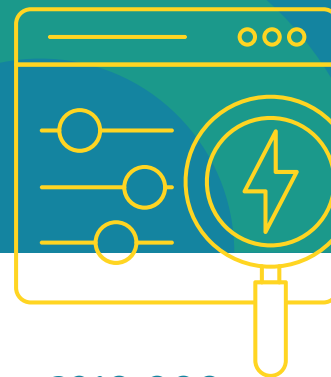




Boliden Aitik

Using Grinding Mills for Demand Response



PARTICIPATION



8 MW

MARKET



FCR-D Up

ACTIVATION <5 SECONDS

GROSS REVENUE



€175 000 - €210 000
PER MW PER YEAR

BOLIDEN

Boliden Aitik is Sweden's largest open-pit copper mine, mining and enriching around 45 million tonnes of ore annually. In partnership with Vattenfall, Boliden has been participating in demand response since May 2023, using their primary mill to earn additional revenue while balancing the Swedish grid and restoring its frequency.

Identifying the right energy assets

Boliden Aitik uses two energy-intensive lines with primary and secondary mills to grind the crushed ore, forming copper, gold, and silver metal concentrates. We worked closely together to identify which of their existing equipment could alter their consumption quickly enough to **meet the FCR-D Up requirements of being activated in under 5 seconds without drastically impacting their processes.**

This determined that the primary mills were the most suitable assets, as their power could be reduced quickly when required.

Testing out set-up for optimised revenue

Since Boliden's processes are sensitive to disturbances and the primary mills used for demand response are crucial to the production's operation, we worked closely with their team to test and identify the ideal set-up. This reassured Boliden regarding the cost-benefit of demand response by **demonstrating to which extent the financial benefits outweighed the production loss during occasional disturbances.** Following this process, Boliden decided to connect 8MW to the FCR-D Up.



TEST 1

Identifying how much production Boliden could afford to lose during the activation.

Result: the extra revenue earned from being available and activated far surpassed the production loss.

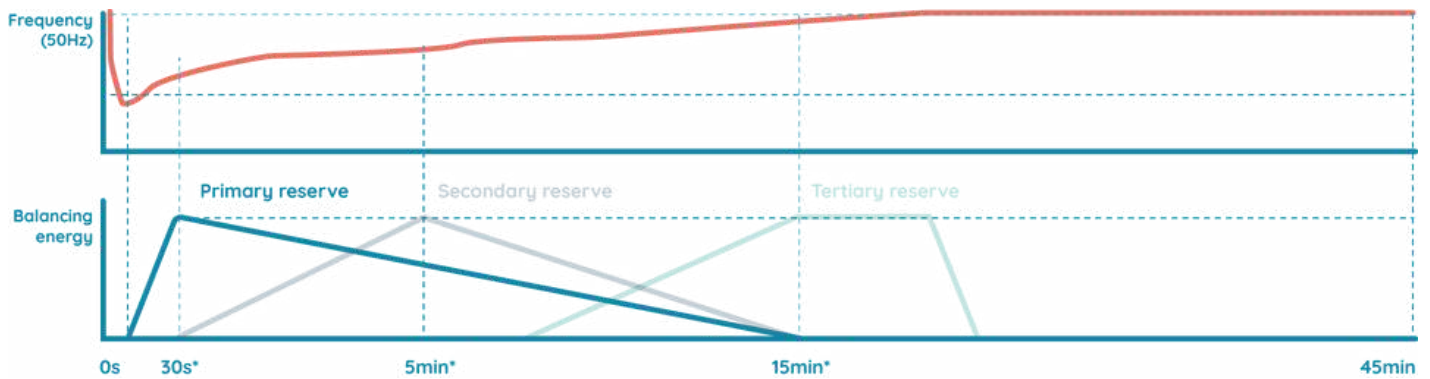
TEST 2

Examining whether such a rapid change in production would cause disturbance downstream.

Result: determined that 8MW was the optimum set-up.

FCR-D Up market

Boliden Aitik is active on the FCR-D Up market. The Frequency Containment Reserves for Disturbances (FCR-D) are primary control reserves and the **first to be activated** to fix disturbances in the grid's frequency. When participating in FCR-D Up, customers must **reduce their electricity consumption for a few minutes** until the grid frequency is back in balance. Because FCR-D is the first defensive layer to prevent blackouts, the **energy assets connected to it must be able to be reduced significantly within 5 seconds**.



Revenue model

Boliden is compensated by the TSO for every hour they are available and able to deliver, regardless of whether the assets are activated. In the first eight months of participation, **Boliden has earned several hundred thousand euros in gross revenue from being activated five times**.



*"We all need a stable grid to be able to operate. It feels good to play a part in helping to stabilise the grid and support its normal operation. **We want to do more, that's why we're now looking into the flexibility potential of the new equipment we're acquiring.**"*

Johannes Sikström | Head of Process Control, Boliden's Technology Department



*It is crucial for us to find the ideal solution that works for our customers. It's a delicate but rewarding process to identify the optimal amount of megawatts we can use to balance the grid and that will **bring our customer an optimised revenue with the least amount of disruption possible.**"*

Jacob Voghera | Technical Sales Engineer, Sympower

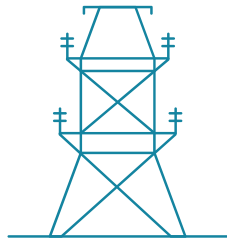


Benefits of demand response



New Revenue Streams

Businesses can **unlock new revenue streams** by offering their energy flexibility to the grid during periods of peak hours.



Reliable Grid

The flexibility of businesses, ensures that grid frequency stays balanced. Everyone connected to the grid **benefits from this reliable energy supply**.



Sustainable solution

The energy transition needs demand response to help phase out fossil fuels, making it **essential to a sustainable energy system**.

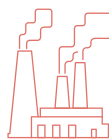
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