Enhancing Wind Farm Economics with Data Center Integration

Flexionics Vision

Concept Presentation

November, 2025

FLEXIONICS

Flexible data centers are the best solution to improve the economics of windfarms despite market challenges

Situation: **Wind farms are struggling**

- Many countries in Europe are experiencing frequent negative electricity prices
- Wind farm operators must curtail during periods of negative prices, making 0 revenues during this time
- As a result, windfarms are not realizing their full economic potential due to poor market conditions and lack of flexible demand sources

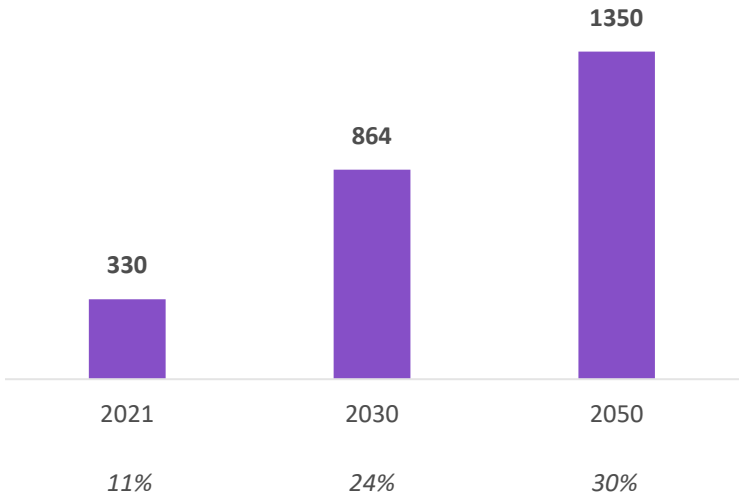
Complication: **High imbalances and curtailment risk**

- European energy market has suffered from frequent negative spot prices, leading to underutilization of many renewable assets
- Unpredictable fluctuations in the grid are leading to even higher imbalances and imbalance penalties
- Due to storage limitations, conventional solutions such as batteries (BESS) cannot address the accumulation of imbalances & GWh of “overproduction”

Wind farms need an unlimited flexible consumer that can turn volatility into value

The demand for flexibility in electricity consumption is immense – with BESS not able to keep up with the challenge due to its scale in TWhs

Demand for flexible energy consumption in the EU in TWh[1]
2021-2050



Share of flexibility of total electricity demand

- BESS dominates headlines, but remains limited to **<4** hours of discharge, high capex, and safety risks
- Conventional thermal and hydro plants cannot ramp within sub-second timescales
- Ancillary services markets like FCR-D, mFRR, and FFR are growing at over **30% CAGR** across Europe and Asia

1) Ariadne Analyse: German Energysystem until 2045

Flexionics has created the “Flexbox”, an efficient , scalable, and flexible alternative to BESS systems with higher ROI, lower setup costs, no activation limits, and hedged revenue

„Gridbox“ in real life
Sweden, 2024

With flexible data centers (“Gridboxes”) these challenges can be addressed:

- **Curtailment:** earn compute revenue during negative spot prices instead of shutting down
- **Floor price:** only utilize when profitable, guaranteeing a higher revenue than selling at the spot price
- **Imbalance trading:** turn penalties into revenues by participating in real time balancing markets

Flexible data centers are a superior solution than BESS, requiring less Capex and providing unlimited support on demand

Key Metrics Across Flexibility Technology
Table

	Flexible Data Center	BESS Solution
Illustration		
Activation time	< 1 s	< 1 s
Support duration	**Unlimited**	1–4 h
Safety	No chemicals	Fire / explosion risk
Capex per **fully flexible** MW*	**~€325**	€500k - €1m
Revenue streams	Ancillary + arbitrage + compute	Ancillary + arbitrage
Endoflife recycling	Standard IT	Hazardous waste
Activation time	< 1 s	< 1 s

Due to support duration limit, BESS has restrictions in its flexibility

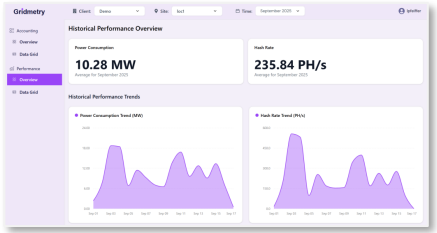
Source: Gridmetry internal research; * Includes electrical equipment & low-voltage transformer

Flexionics partner Gridmetry's software solution turns a modular data center into a flexible asset ("Gridbox"), designed to control hundreds of servers with a <1 second response time

„Gridbox" in real life
Component Overview

Software

Gridmetry's proprietary software is the differentiating factor to enable a modular data center to become a flexible asset, steering hundreds of servers inside the container to respond in <1 second



Hardware

Container fits all required physical technology inside, with 1 MW of servers and various internal components

Internal Components

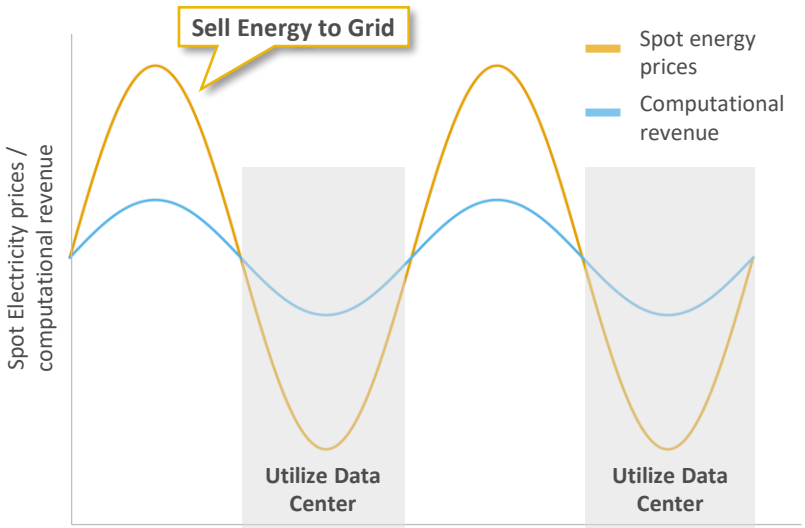
Various components inside the container are specifically chosen and designed to optimize the efficiency and output of servers, while remaining as affordable as possible

Hundreds of servers

Trays, cables, PDUs, network cable

Whenever spot prices are lower than computational revenues, renewable asset owners can shift their power production into the data center

Floor price optimization
Schematic



- **Redirect production** from the grid into the data center to capture higher computational revenues
- **Operate the data center load** as a flexible offtake, running only when it outperforms the market
- **Switch back to selling to grid** once spot prices rise above computational revenues, ensuring optimal revenues

During **periods of curtailment**, as much capacity is sent to the data center as possible

By ramping data center demand up or down in real time, forecast errors are absorbed and imbalances are eliminated

Imbalance Matrix

***CR** = computational revenue in €/MWh; **IP** = imbalance price in €/MWh*

Imbalance Price

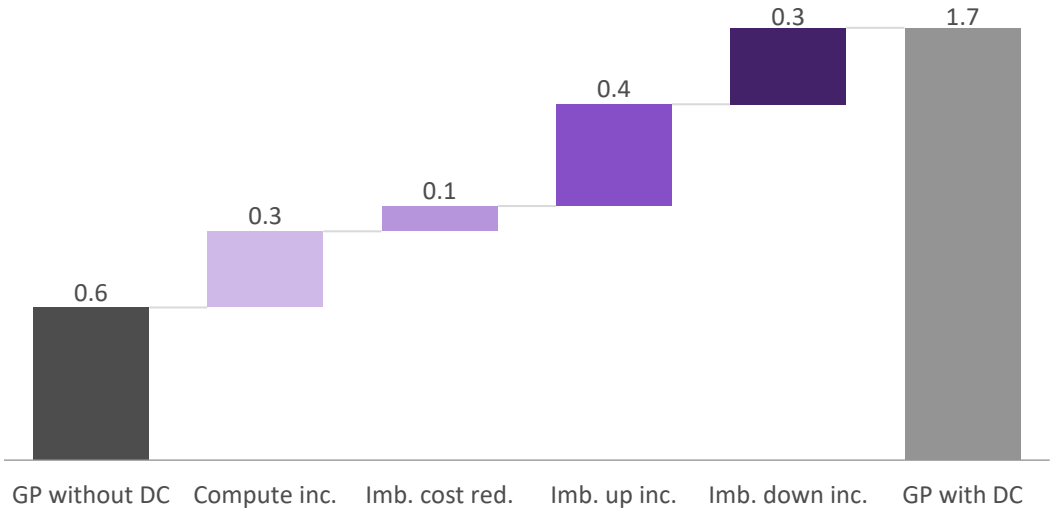
Production	Positive Imbalance	Negative Imbalance
Over-production	Compare CR vs. IP: • **if IP ≥ CR:** Sell energy to grid • **if CR > IP**: Ramp up data center	Compare CR vs. IP: • **if imbalance profit ≥ CR:** Sell energy to grid • **if CR > imbalance profit**: Ramp up data center
Under-production	Compare CR vs. IP: • **if imbalance profit < CR:** Run data center • **if Imbalance profit ≥ CR:** Purchase energy from grid	Compare CR vs. IP: • **if CR > Imbalance cost:** Run data center • **if CR < Imbalance cost**: Shut down data center

- The option to **eliminate almost all imbalances**
- **Potentially profit from imbalances** through optimized bidding and trading

Example windfarm in Finland 13MW peak installed capacity with 5MW gridbox behind the meter allocation in 2025 and optimal bidding behavior

Economic Impact of 5 MW Data Center
Jan-Sept 2025, in EURm

resembles optimal DC behavior Jan 01st to Aug 26th, (8m), 2025



Value Drivers

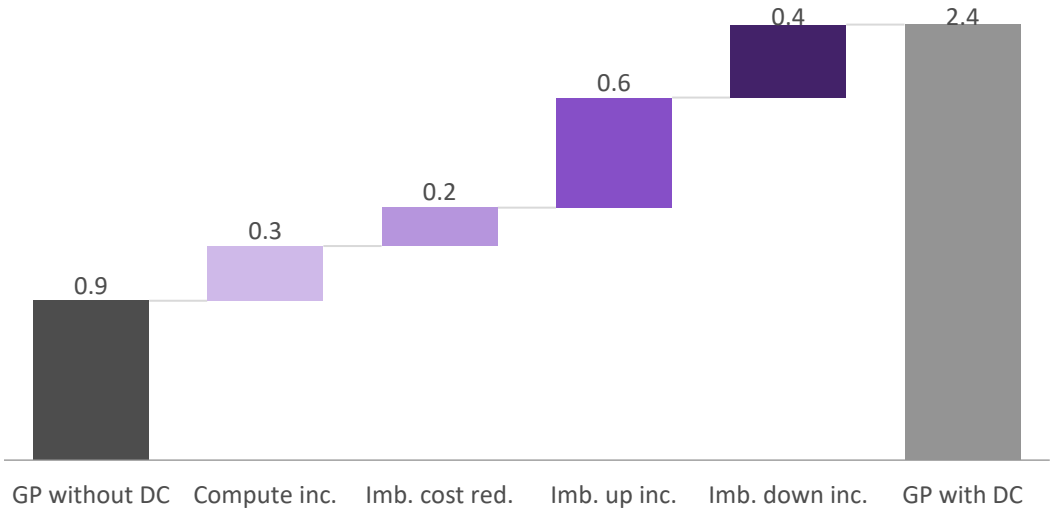
- **Compute income:** Data center sets floor income of €32/MWh[1] that serves as an *optional hedge*. DC can be utilized for €32/MWh, but without obligation
- **Imbalance cost reduction:** at the recommended DC size of 5MW, ~€0.1m of occurring imbalance costs can be eliminated[2]
- **Imbalance up income:** Beyond imbalance cost avoidance, while utilizing the datacenter, the windfarm can also profit by helping the grid. The “up”-direction means that the datacenter was scheduled to run, and is activated to shut down
- **Imbalance down income:** The “down” direction means that the datacenter was scheduled to be off, and is activated to ramp up

Source: Gridmetry internal research, 1) fluctuates based on daily profitability - €32/MWh is past 12month avg. 2) based on this specificly traded windfarm

Example windfarm in SE3 26MW peak installed capacity with 8MW gridbox behind the meter allocation in 2025 and optimal bidding behavior

Economic Impact of 8 MW Data Center
Jan-Sept 2025, in EURm

resembles optimal DC behavior Jan 01st to Aug 30th, 2025

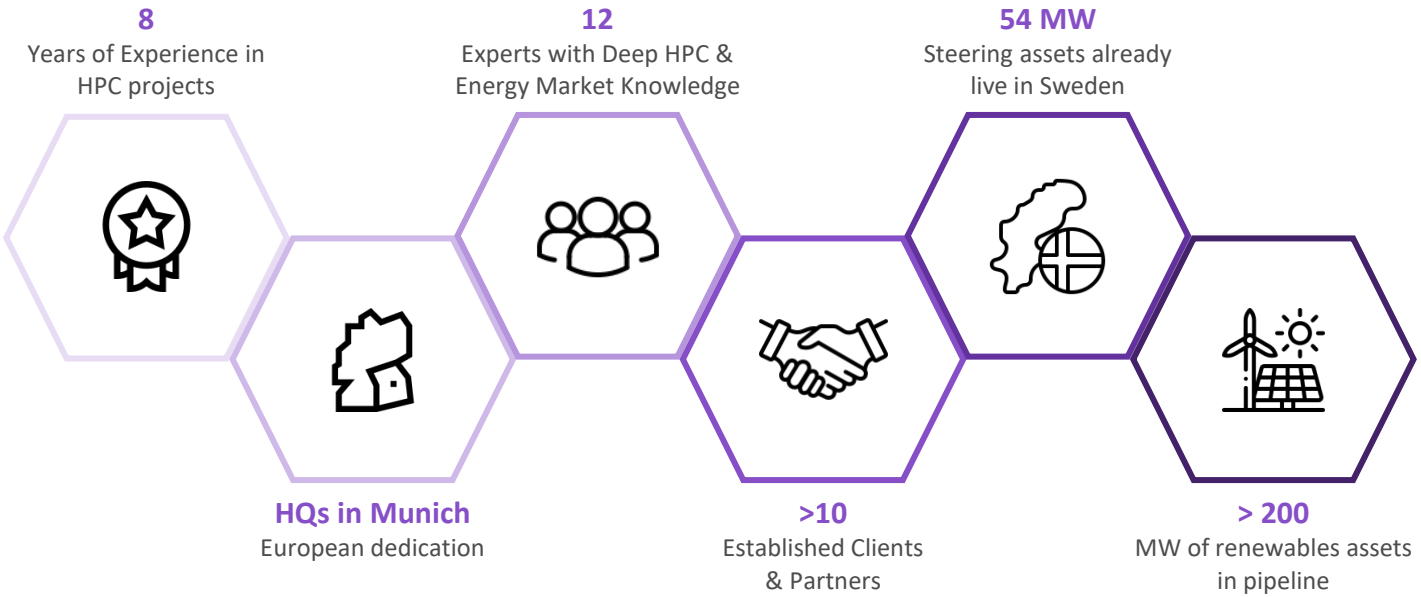


Value Drivers

- **Compute income:** Data center sets floor income of €32/MWh[1] that serves as an *optional hedge*. DC can be utilized for €32/MWh, but without obligation
- **Imbalance cost reduction:** at the recommended DC size of 8MW, ~€0.3m of occurring imbalance costs can be eliminated
- **Imbalance up income:** Beyond imbalance cost avoidance, while utilizing the datacenter, the windfarm can also profit by helping the grid. The “up”-direction means that the datacenter was scheduled to run, and is activated to shut down
- **Imbalance down income:** The “down” direction means that the datacenter was scheduled to be off, and is activated to ramp up

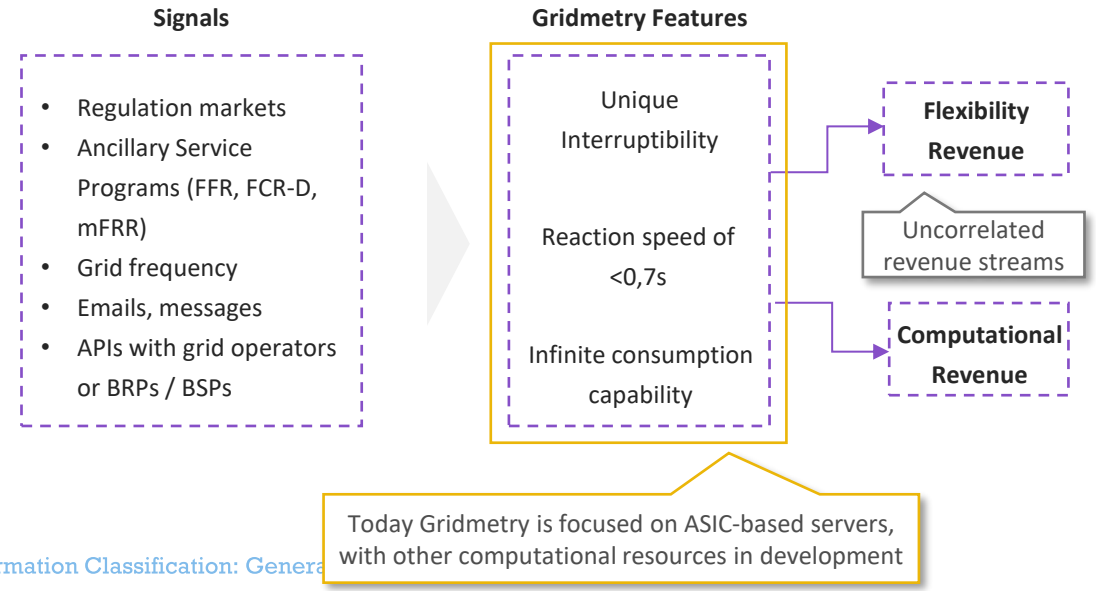
Source: Gridmetry internal research; 1) Fluctuates based on daily profitability - €32/MWh is past 12month avg.

Flexionic’s partrner Gridmetry is driving the energy transition by operating 54 MW of flexible data centers in Sweden with a dedicated team of experts



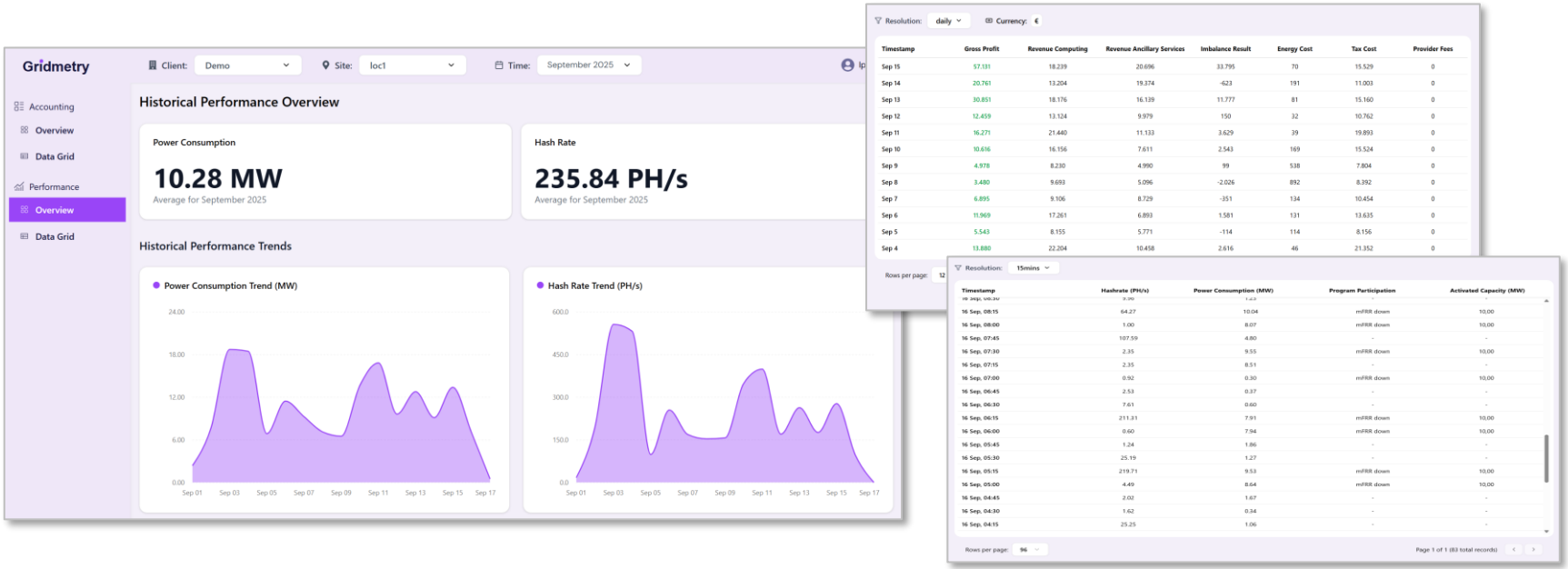
Gridmetry has turned computational capacity into a flexible demand resource – allowing thousands of servers to react on diverse signals with <1 second response time

Computation to Flexibility Overview
Schematic



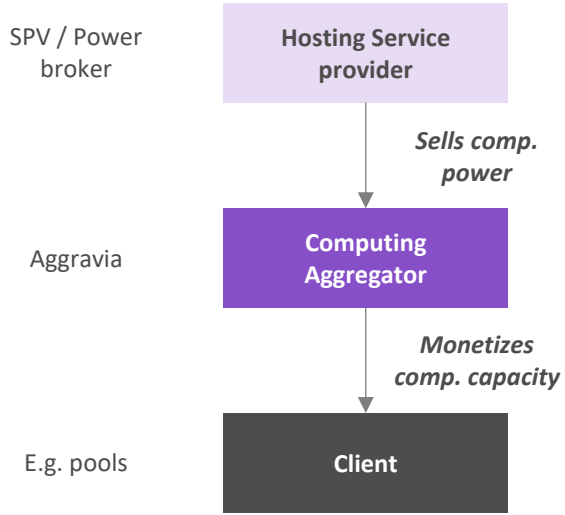
- Gridboxes can be **grid connected or co-located** depending on the economics and grid readiness
- ASIC based computation can be paused **instantly, indefinitely, and repeatedly** without penalty
- Proprietary controls deliver sub-second, unlimited-duration flexibility — **surpassing BESS** while never injecting power or draining grid reserves during scarcity
- Gridmetry is the first solution worldwide qualified for **FCR-D, mFRR, and FFR** programs.

Gridmetry tracks operations and performance in real time via an automized dashboard to provide full transparency and control



The project can realize the computational revenues independently of the end-use of the servers

Depiction of computational revenue realization
Schematic



Hosting Service Provider
- Operates the physical servers
- Sells computational power to the **Computing Aggregator**

Computing Aggregator (e.g., Aggravia)
- Acts as an intermediary between server operators and end-clients
- Purchases computational power from hosting providers
- Monetizes computational capacity by delivering it to clients

Clients (e.g., mining pools, data users)
- Consume the computational capacity
- Generate revenues based on the use of this capacity

→ monetization guaranteed whether the computation goes to mining pools, enterprise workloads, or other applications

Source: MEAG site information, Ghidmetry internal research

FLEXIONICS

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