ZIV TwinGrid

a real-time automation platform

Explore how ZIV is helping network operators improve resilience, reduce restoration time, and move toward semi-automated recovery with confidence

ZIV TWINGRID INTRO

DISCOVER ITS FULL POTENTIAL: KEY QUESTIONS

How do you re-energize a grid from the bottom up when traditional black start strategies fail?

ZIV TwinGrid uses transient analysis and DER coordination to restore power flexibly and safely — even in islanded networks.

.

Can your microgrid absorb large block loads without risking a collapse?

Let's talk about dynamic sequencing, block load risk factors, and how our real-time controller ensures grid-forming DERs remain stable throughout the energisation process.

How can DSOs leverage smart meter data to regulate voltage across complex LV networks?

ZIV TwinGrid enables active voltage regulation and real-time optimization across LV feeders — improving visibility, performance, and reliability where it matters most.

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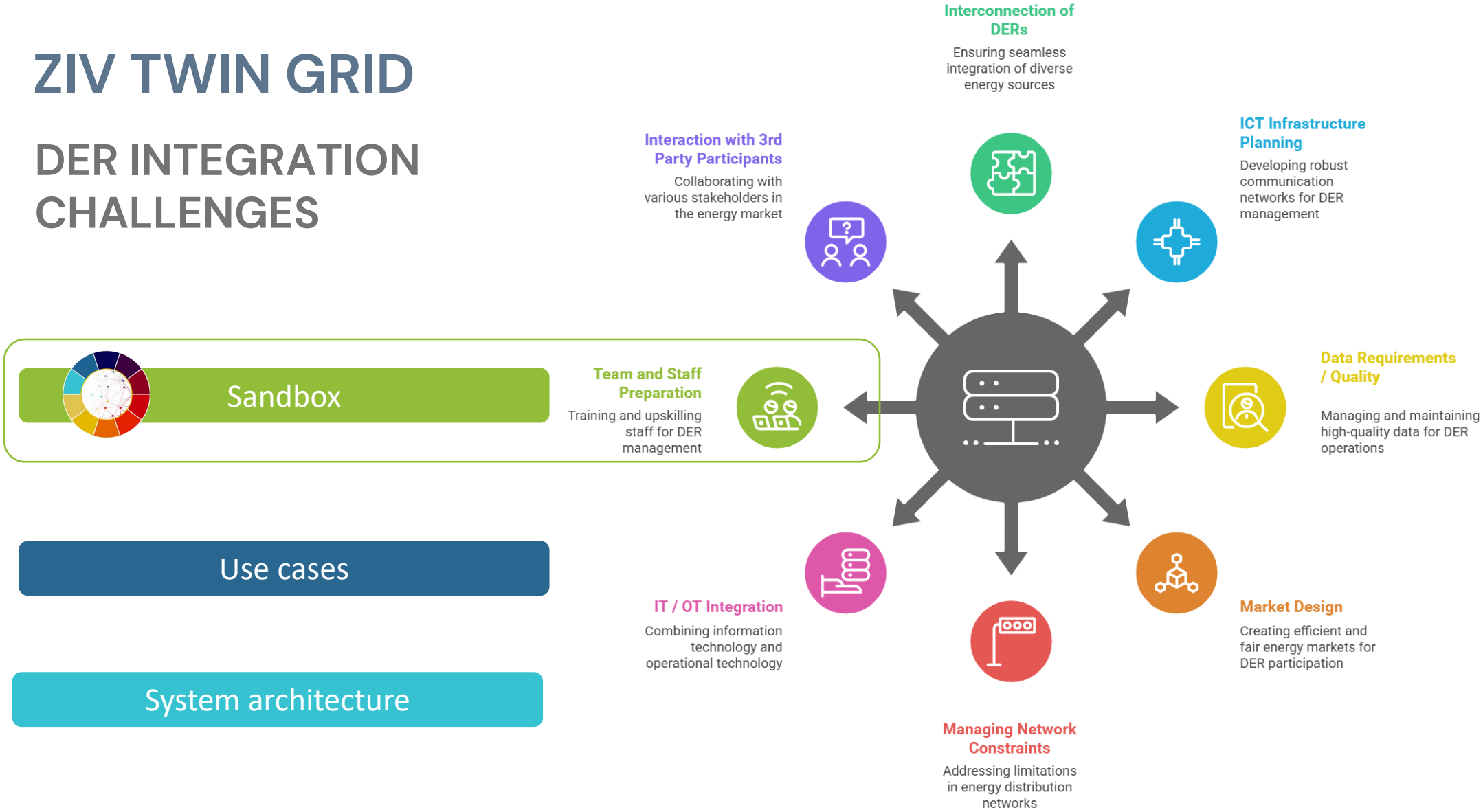
ZIV TWIN GRID

DER INTEGRATION CHALLENGES

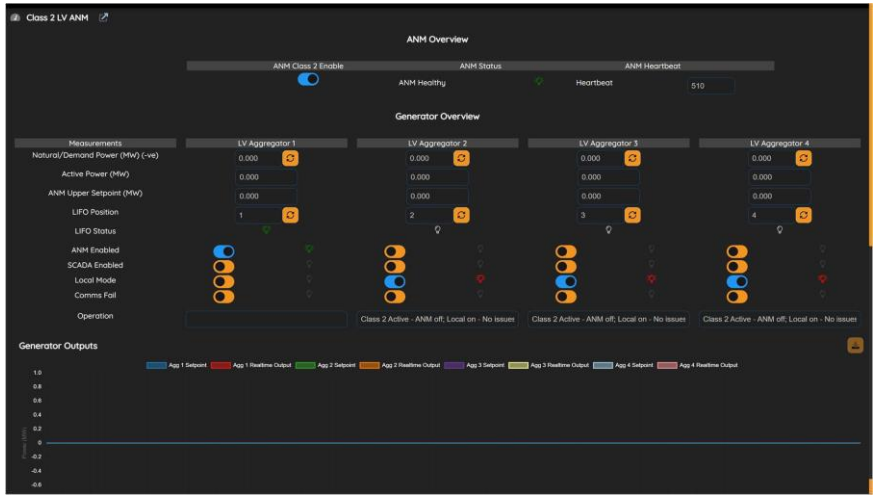


ZIV TWIN GRID

MULTIPLE APPLICATIONS

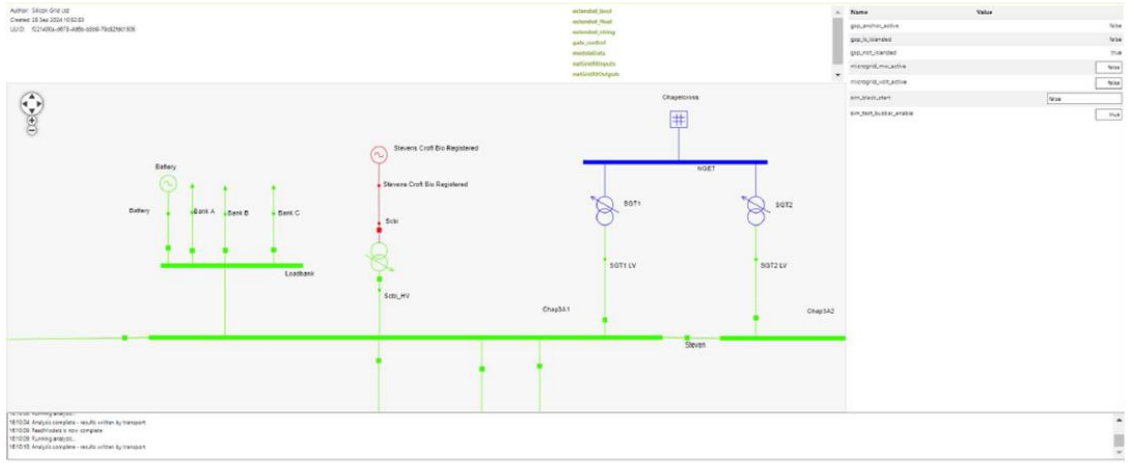
Use cases

- **Optimize the operation of HV/MV & LV networks**
  ensuring improved efficiency and reliability.
- **Automate the management of Distributed Energy Resources (DERs),**
  such as generation and demand, for seamless control. Protect networks with advanced constraint management to maintain stability under fluctuating conditions.
- **Provide forecasting and prediction services**,
  enabling better decision-making and proactive grid management.
- **Enable micro-grid and islanding automation**,
  ensuring continuity in energy supply during disruptions.
- **Integrate energy markets**,
  facilitating smoother transactions and participation in the energy ecosystem.
- **Aggregate services**,
  combining resources to create more efficient, scalable solutions.
- **Implement LV automation**
  to address the growing demands from electric vehicles (EVs), heat pumps, and other new technologies

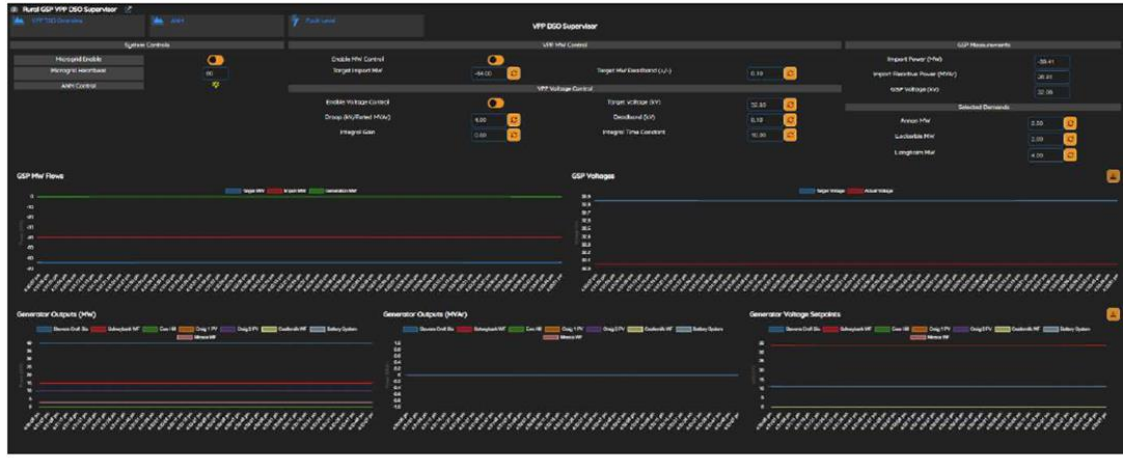


E.g. LV Network ANM Overview Dashboard

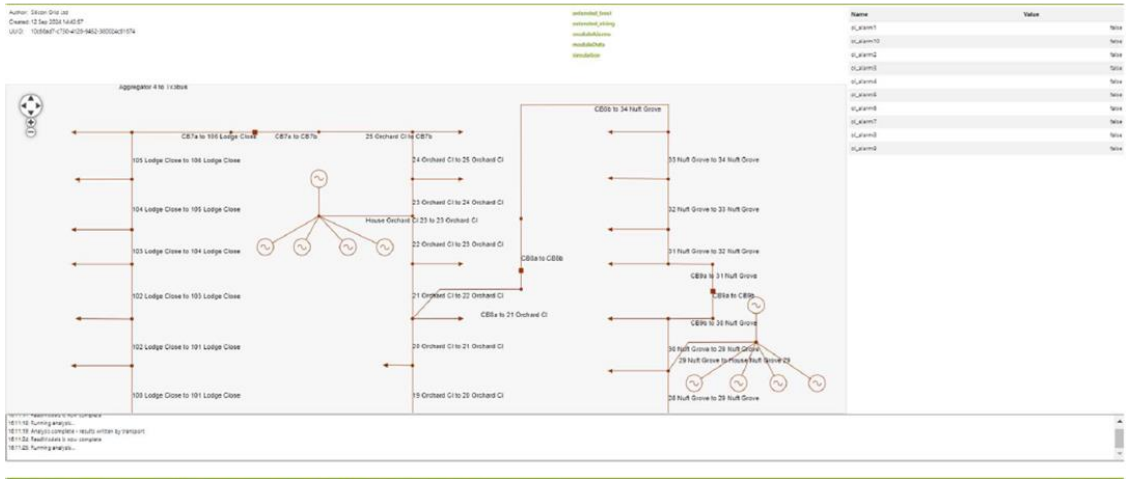
HV Network Simulation



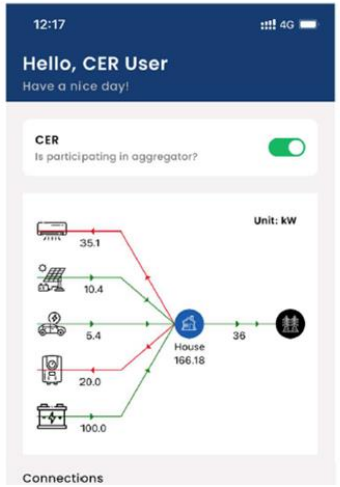
DSO Control Dashboard

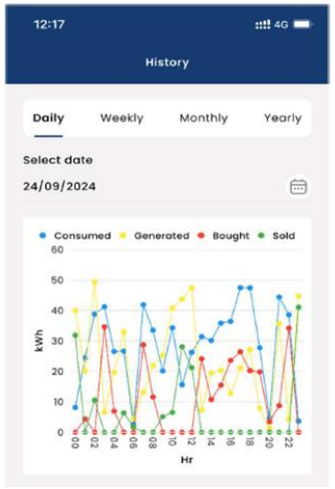


LV Network Simulation



Mobile App





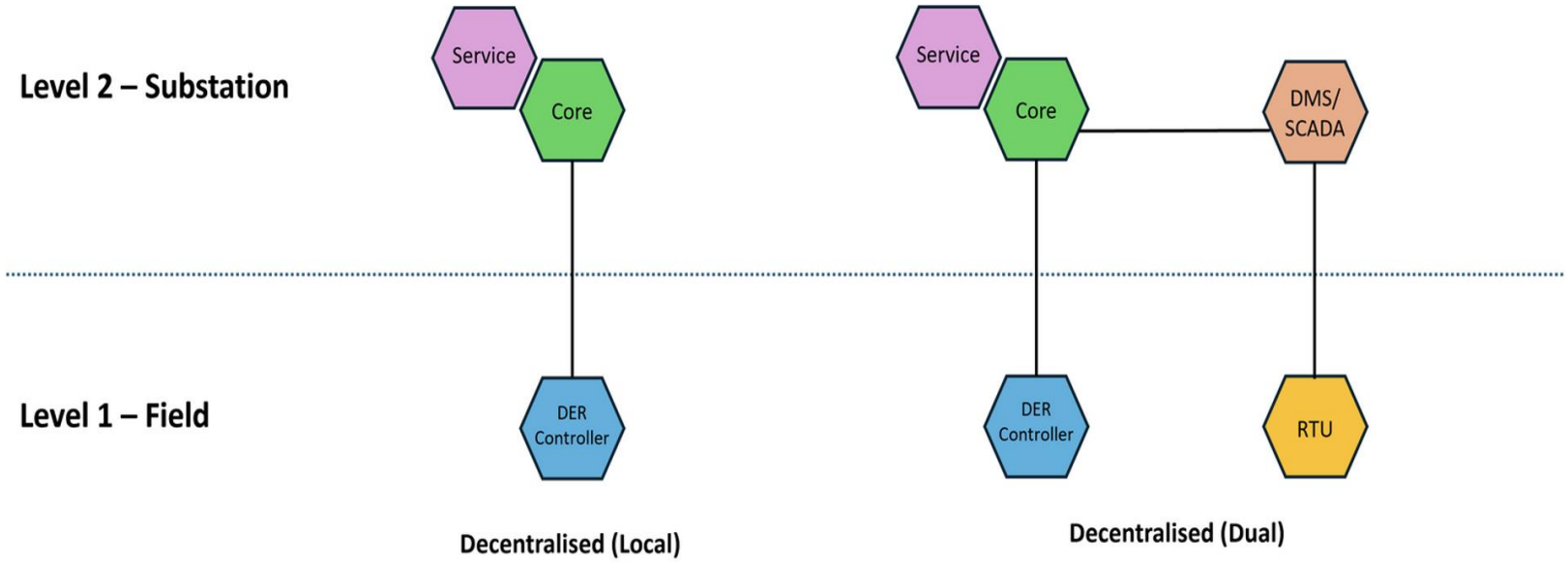
ZIV TWINGRID

Full solution HW + SW

It is a full solution platform offering robust field hardware, substation and enterprise level software and complete design and integration services that covers Level 1,2,3 & 4

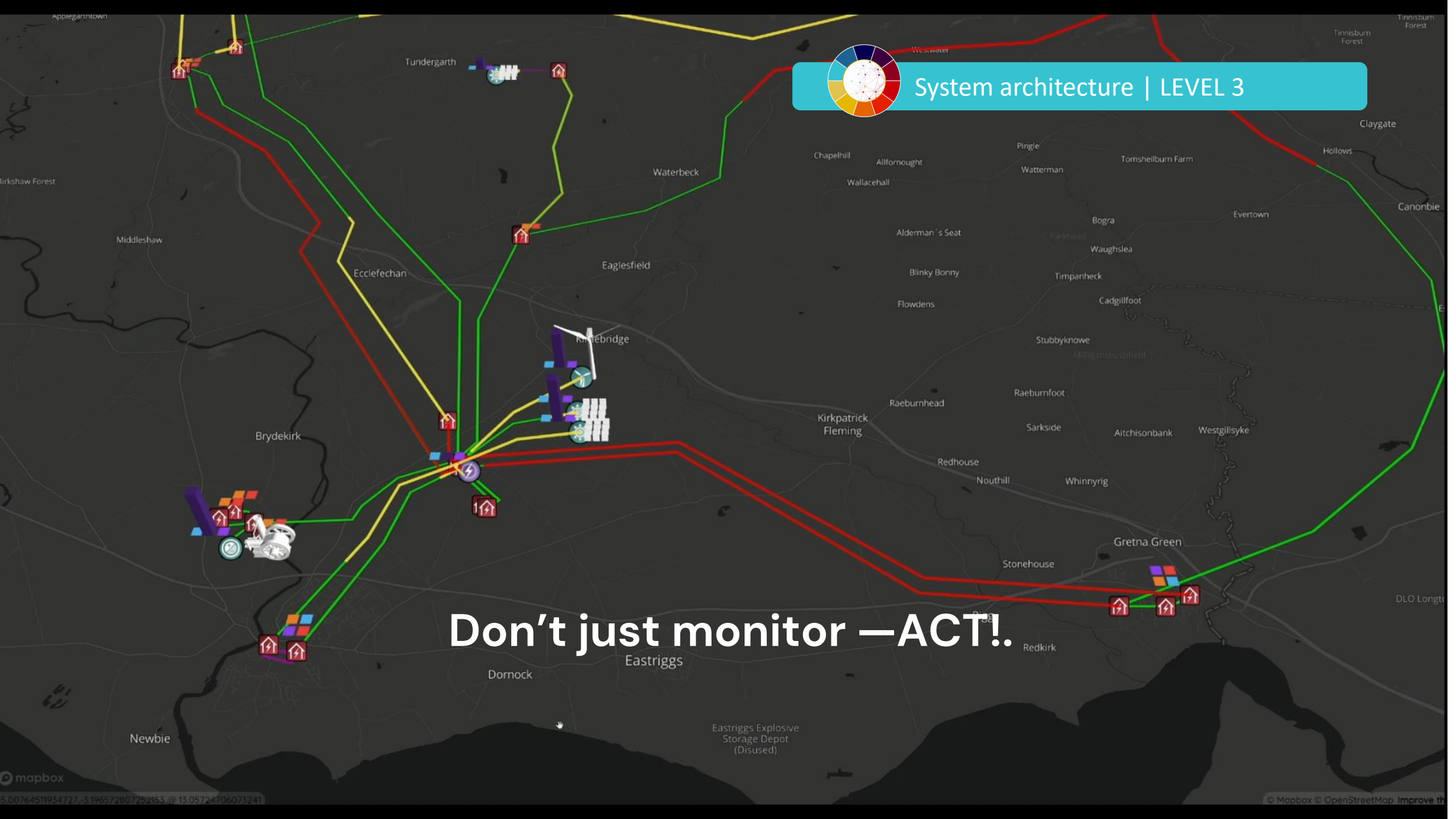
ZIV TWINGRID

Centralised / Decentralised / Hybrid



A **DECENTRALISED** architecture is useful for **small projects** where the automation platform is deployed at the level 2 substation controller.

A **CENTRALISED** architecture can handle **large quantities of data and multiple complex applications.** It is deployed centrally at the level 3 data centre in server-based hardware, and optionally at level 2.


System architecture | LEVEL 3
Tundergarth
Waterbeck
Ecclefechan
Eaglesfield
Middleshaw
Brydekirk
Kirkpatrick Fleming
Raeburnhead
Raeburnfoot
Sarkside
Aitchisonbank
Westgillsyke
Redhouse
Nouthill
Whinnyrig
Stonehouse
Gretna Green
Redkirk
Eastriggs
Dornock
Newbie
Eastriggs Explosive Storage Depot (Disused)
Chapelhill
Allfornought
Wallacehall
Pingle
Watterman
Tomsheilburn Farm
Claygate
Hollows
Canonbie
Evertown
Bogra
Alderman`s Seat
Waughslea
Blinky Bonny
Timpanheck
Flowdens
Cadgillfoot
Stubbyknowe
Birkshaw Forest
Tinnisburn Forest
Don’t just monitor —ACT!.

ZIV TWINGRID

System architecture

FAQS

FAQS | ZIV TwinGrid · A Real-Time Automation Platform

#1 What is the difference between ZIV TwinGrid and SCADA?
#2 What are the different levels – L1, L2, L3 and L4?
#3 What are the main differences between decentralised and centralised systems? What advantages do each one of them have?
#4 What is a microservice?
#5 What impact do heat pumps and LV loads have on LV ANM?
#6 What are aggregate services?
#7 Where is the network model obtained from? How do we ensure that the data is mapped correctly?
#8 What is a Sandbox 1 for?
#9 What is a Sandbox 2 for?

The

Sandbox | program

ZIV TwinGrid

1

TRAINING & FAMILIARISATION

Building confidence and skills for the future energy system

2

DIGITAL TWIN / SIMULATOR

Exploring the network of tomorrow through realistic simulation

3

FORECASTING & PREDICTION

Anticipating tomorrow's network challenges today

4

MARKET TRADING & OPTIMISATION

Turning forecasts into market actions and network value

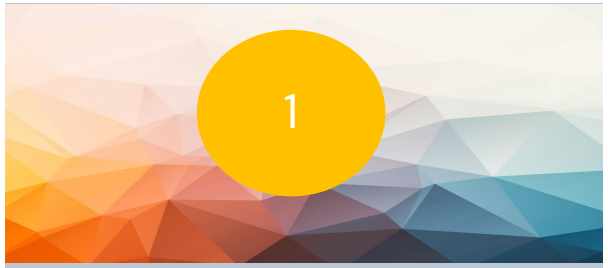
5

PROOF OF CONCEPT / DEPLOYMENT

From simulation to reality — secure pilots in a live-like environment

SANDBOX 1 – TRAINING & FAMILIARISATION

Building confidence and skills for the future energy system



The first step in the Sandbox Program, Sandbox 1 **provides a safe, virtual environment** where staff can learn, explore, and practice the fundamentals of Distributed Energy Resource (DER) management. It is designed to close skill gaps and build confidence across operations, planning, IT/OT, and market teams — without the risks of live system training

Purpose & Objectives

- Upskill staff on DER, ANM, and DSO concepts.
- Provide hands-on practice in a risk-free environment.
- Familiarise operators with new dashboards, workflows, and decision-making processes.
- Lay the foundation for advanced sandboxes (digital twin, forecasting, markets, pilots).

Core Features

- Virtual training environment isolated from live systems.
- Simulated DER assets for learning dispatch and control.
- Predefined exercises and scenarios tailored to different user classes.
- Dashboards, alerts, and workflows that mirror real DERMS/ANM systems.
- User progression tracking and reporting

Who is it for?

- Control room operators and dispatchers.
- Network planners and engineers.
- Market and commercial teams.
- IT/OT staff and cybersecurity specialists.
- Training managers and HR teams.

SANDBOX 1

Building confidence and skills for the future energy system

Key Functions

Interactive Training Modules

Simulations and exercises across DER dispatch, constraint management, and market readiness

Scenario Replay

Learn from historical or synthetic network events in a safe environment..

Progressive Learning Path

From basic familiarity to advanced operation, preparing users for Sandbox 2 and beyond

Multi-User Access

Supports group exercises, team training, and collaborative learning

Step 1 of 5 TRAINING & FAMILIARISATION

Example of Use Cases

Train operators to respond to DER congestion events.

Familiarise planners with forecasting and hosting capacity concepts.

Teach market teams how flexibility bidding and dispatch might look in practice.

Provide IT/OT staff with exposure to secure data flows and DERMS integrations.

Run cross-departmental workshops to align skills and roles.

Integration & Next Step

*Sandbox 1 lays the hu**man and organisational foundation** for the program. By ensuring staff are trained and confident, it prepares the organisation to move forward into Sandbox 2 – Digital Twin/Simulator, where planning and operational modelling become the focus.*

Benefits

Technology	People	Processes	Markets	Security
Builds user familiarity with DERMS/ANM tools	Closes skill gaps and increases staff confidence	Trains teams on new workflows and decision chains.	Introduces staff to flexibility and optimisation concepts.	Ensures awareness of data and access control basics.

SANDBOX 2 – DIGITAL TWIN / SIMULATOR

Exploring the network of tomorrow through realistic simulation

2

Sandbox 2 introduces **a high-fidelity digital twin** of the distribution network. It allows engineers, planners, and operators to safely model real MV/LV networks, test scenarios, and understand how Distributed Energy Resources (DERs) will impact system stability and capacity.

By replicating the electrical, topological, and operational behaviour of the grid, the simulator provides a **safe testbed** for planning, forecasting, and operational analysis — without risking live system performance.

Purpose & Objectives

- Provide realistic simulations of current and future network states.
- Enable planners to test “what-if” scenarios, such as new DER connections or load growth.
- Support operators with replay of past events and predictive system behaviour.
- Build the foundation for advanced forecasting and market testing (Sandbox 3 & 4).

Core Features

- Full network topology models with MV/LV detail.
- Asset representation including transformers, lines, cables, and protection schemes.
- Realistic DER models (solar, storage, EVs, demand response).
- Scenario engine for “what-if” simulations and stress testing.
- Integration with SCADA/DMS data feeds for replay or live-like scenarios.

Who is it for?

- Network planners & engineers.
- Control room operators.
- Data science & forecasting teams.
- IT/OT and integration specialists.

SANDBOX 2

Exploring the network of tomorrow through realistic simulation

Key Functions

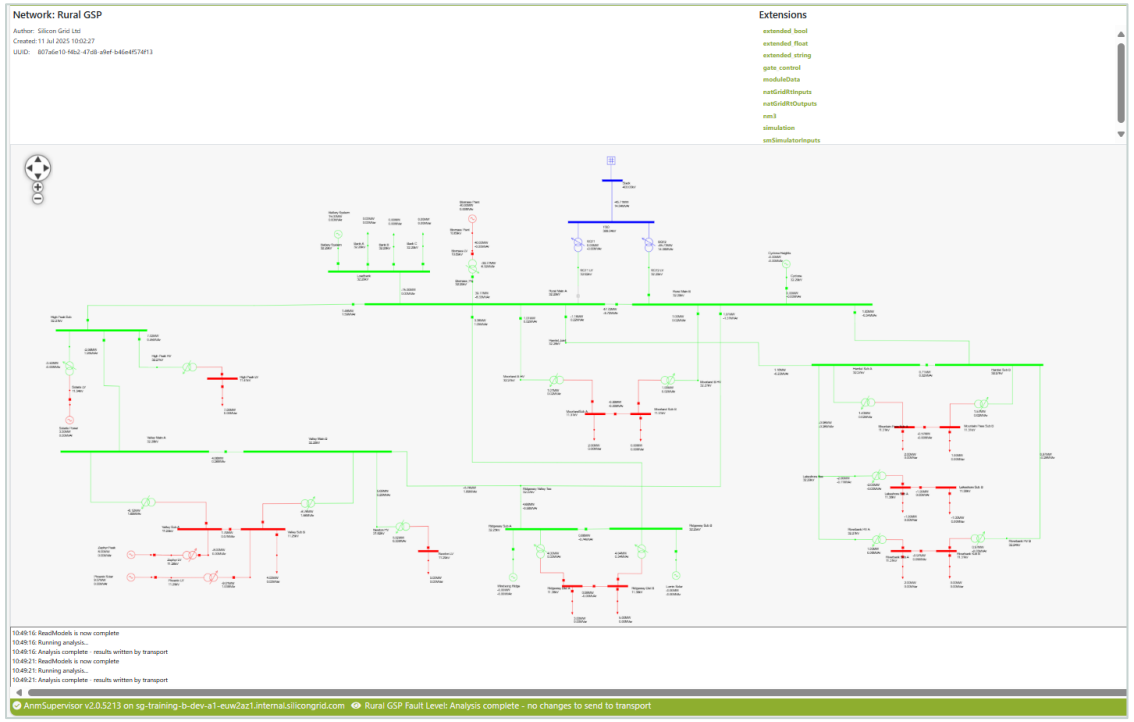
Load Flow Analysis
Run steady-state and contingency studies.

Event Replay
Analyse past network disturbances in a controlled environment.

Scenario Simulation
Test the impact of DER growth, new connections, or outages.

Stress Testing
Model extreme conditions (peak demand, high DERoutput, faults).

Integration Layer
Link to external forecasting and marketmodules for end-to-end studies.



Step 2 of 5 DIGITAL TWIN / SIMULATOR

Example of Use Cases

Assess hosting capacity for new solar or EV charging projects.

Validate ANM/DERMS algorithms before deployment.

Train operators on managing contingency events.

Support regulators with evidence of network resilience.

Provide inputs for investment planning and reinforcement strategies

Integration & Next Step

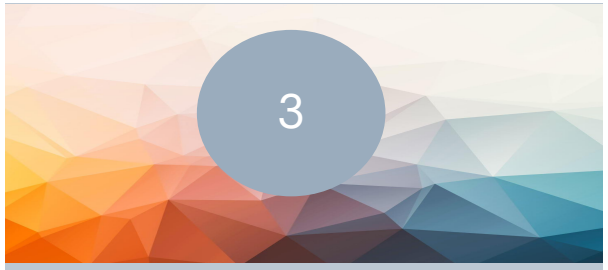
*Sandbox 2 builds directly on the skills developed in Sandbox 1. It introduces real-world complexity and prepares teams for **Sandbox 3 – Forecasting & Prediction**, where future demand, generation, and congestion patterns are modelled.*

Benefits

Technology	People	Processes	Markets	Security
Realistic simulation of networks and DER behaviour.	Gives staff practical experience with predictive tools.	Improves planning workflows and operational preparedness.	Provides the base model for flexibility trials in Sandbox 4.	Enables stress-testing and resilience planning without risk.

SANDBOX 3 – FORECASTING & PREDICTION

Anticipating tomorrow's network challenges today



Sandbox 3 introduces **advanced forecasting and predictive analytics** tools to anticipate demand, generation, and congestion across MV and LV networks. By combining historical data, real-time feeds, and machine learning, it enables planners and operators to make proactive decisions rather than reactive responses.

This sandbox is a key step in the transition from simulation (Sandbox 2) to optimisation and market trials (Sandbox 4). It ensures that utilities can predict where, when, and how constraints will arise — and prepare interventions before they occur.

Purpose & Objectives

- Develop accurate demand and renewable generation forecasts.
- Anticipate congestion and constraint conditions.
- Test forecasting models in a safe environment using real network data.
- Provide predictive insights to feed operational control and market platforms.

Core Features

- Demand and load forecasting at feeder, zone, and regional levels.
- Renewable energy forecasting for solar PV, wind, and storage behaviour.
- Congestion and hosting capacity prediction.
- Model training and retraining using historical and synthetic data.
- Integration with the digital twin (Sandbox 2) for validation

Who is it for?

- Forecasting & data science teams.
- Network planners & engineers.
- Control room operators.
- Market & commercial teams (to align bids with network conditions).

SANDBOX 3

Anticipating tomorrow's network challenges today

Key Functions

Demand Forecasting
Short, medium, and long-term predictions

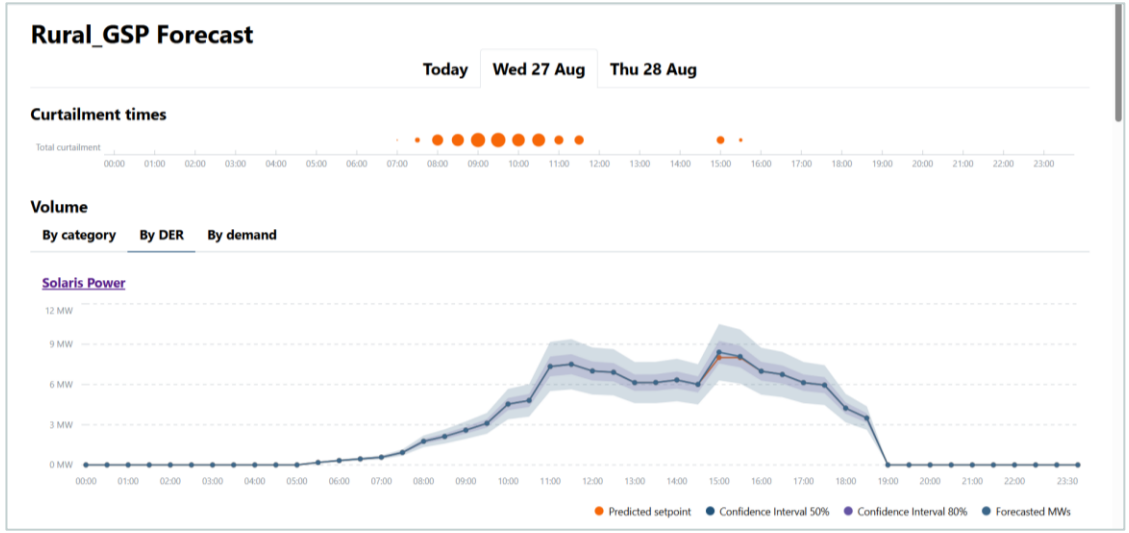
Generation Forecasting
Renewable output forecasting (PV, wind, hybrid DER)..

Congestion Prediction
Identifying times and locations of likely network overload

Model Testing & Retraining
Benchmarking forecast models against real or simulated data.

Decision Support
Providing inputs to ANM/DERMS systems for proactive dispatch

Benefits



Step 3 of 5 FORECASTING & PREDICTION

Example of Use Cases

Forecast EV charging impact on urban LV networks.

Anticipate solar PV generation ramps on feeders with high penetration.

Simulate demand-side flexibility availability during peak conditions.

Run probabilistic congestion studies to inform reinforcement planning.

Support market design by predicting flexibility demand

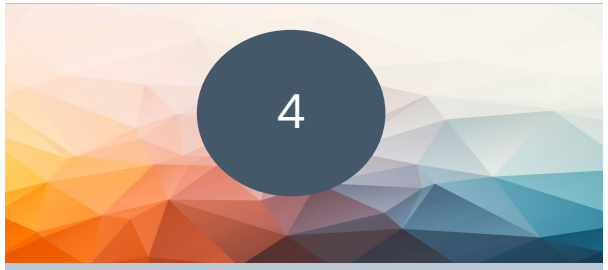
Integration & Next Step

*Sandbox 3 provides the predictive intelligence that powers decision-making in the next stage: **Sandbox 4 – Market Trading & Optimisation**, where forecasts are used to trigger flexibility procurement and dispatch.*

Technology	People	Processes	Markets	Security
Brings predictive capability into network operations	Builds confidence in interpreting and using forecasts	Enables proactive planning and constraint management	Creates visibility of flexibility needs for procurement	Enhances resilience by identifying risks before they occur

SANDBOX 4 – MARKET TRADING & OPTIMISATION

Turning forecasts into market actions and network value



Sandbox 4 provides a controlled environment for **flexibility market trials, trading simulations, and optimisation workflows**. It allows DNOs/DSOs to test how flexibility services can be procured, dispatched, and settled in practice — aligned to regulatory and commercial requirements.

By combining forecasting (Sandbox 3) with real-time control (Sandbox 5), this sandbox bridges the gap between technical readiness and market functionality. It enables operators, market teams, and regulators to understand how flexibility can support both grid stability and economic efficiency

Purpose & Objectives

- Trial different market designs (local, zonal, feeder-level).
- Test flexibility bidding, dispatch, and settlement processes.
- Evaluate optimisation strategies balancing cost, CO_2, and reliability.
- Provide regulators with visibility of transparency, fairness, and security in market operations

Core Features

- Virtual flexibility marketplace (bids, offers, dispatch).
- Optimisation engine configurable for cost, emissions, or reliability.
- Integration with forecasting models and network constraints.
- Automated settlement and performance validation.
- Audit and reporting tools for regulator review.

Who is it for?

- Market design & commercial teams.
- Control room operators (for flexibility dispatch).
- Planners (to link forecasts with procurement).
- Regulators and policy stakeholders

SANDBOX 4

Turning forecasts into market actions and network value

Key Functions

Flexibility Procurement Simulation
Manage bids/offers from virtual DERs

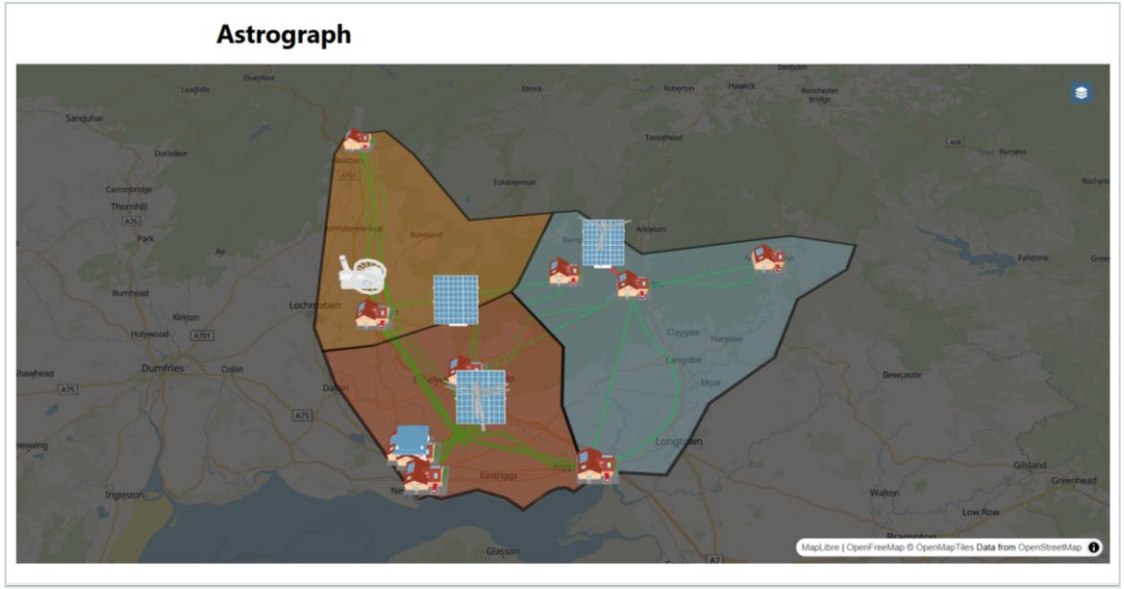
Market Clearing & Dispatch
Optimise resources against network constraints

Settlement & Verification
Track performance and cost outcomes

Optimisation Strategies
Configure objectives (lowest cost, lowest emissions, reliability priority).

Regulatory Audit
Provide transparency for oversight and compliance

Benefits



Step 4 of 5 MARKET TRADING & OPTIMISATION

Technology	People	Processes	Markets	Security
Demonstrates end-to-end integration of forecasts, optimisation, and dispatch.	Trains market and operations staff on flexibility workflows	Tests regulatory compliance and market transparency	Establishes readiness for large-scale flexibility procurement	Ensures financial and data flows can be safely managed

Example of Use Cases

Trial local flexibility markets for LV congestion management.

Compare cost vs CO_2-optimised dispatch outcomes.

Validate settlement workflows for participating DERs.

Simulate how DER flexibility can defer network reinforcement.

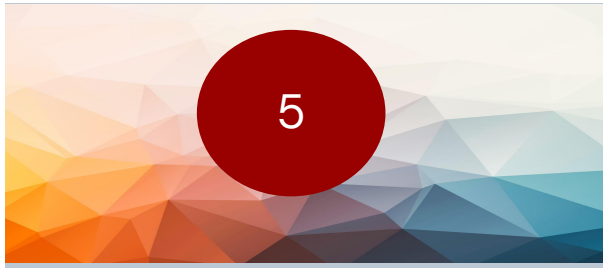
Provide regulators with a testbed for future market design.

Integration & Next Step

*Sandbox 4 validates market functionality in a safe space. The next step, **Sandbox 5 – Proof of Concept / Deployment**, moves from simulations to real-world pilots, integrating with live SCADA/DERs in a secure, production-like environment.*

SANDBOX 5 – PROOF OF CONCEPT / DEPLOYMENT

From simulation to reality — secure pilots in a live-like environment



Sandbox 5 provides the final step before full-scale rollout: a **secure, production-grade environment** connected to live OT/SCADA systems and real DERs. It enables utilities to validate DERMS/ANM integration, test control workflows, and run limited-scope pilots under real-world conditions — without exposing the core operational network to risk.

This sandbox ensures that all technology, processes, and people are **deployment-ready,** giving confidence that the transition from DNO to DSO can be achieved smoothly

Purpose & Objectives

- Validate real-time integration with OT, SCADA/DMS, and DER devices.
- Pilot market and optimisation workflows under real network conditions.
- Test cybersecurity, resilience, and failover procedures.
- Provide final proof of performance before scaling to business-as-usual.

Core Features

- Secure, cloud-hosted environment with VPN/OT connectivity.
- Generator interface panels and DNP3/IEC 61850 protocol support.
- Real-time visibility of network power flows.
- Monitoring and control of DER units in pilot zones.
- Built-in safeguards to prevent operational impact

Who is it for?

- Control room operators (pilot operations).
- IT/OT and cybersecurity specialists.
- Market and commercial teams (live trial participation).
- Regulators and external observers (compliance oversight).

SANDBOX 5

From simulation to reality — secure pilots in a live-like environment

Key Functions

Real-Time Data Exchange
Direct connection to SCADA/DMS and DER units.

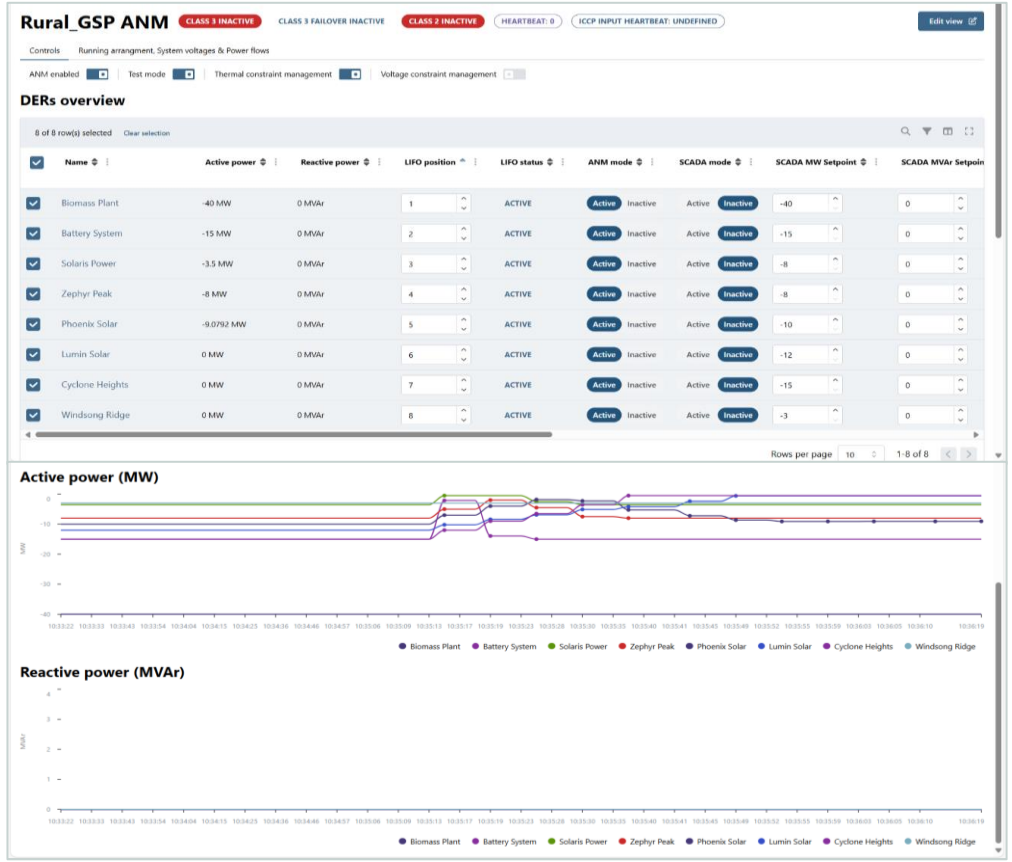
Pilot Dispatch
Execute optimisation strategies on live DERs

Cyber Resilience Testing
Run intrusion, outage, and failover scenarios

Integration Validation
Ensure interoperability across vendors and protocols

End-to-End Workflow
Trial forecasting → market → dispatch → settlement

Benefits



Step 5 of 5 PROOF OF CONCEPT / DEPLOYMENT

Technology	People	Processes	Markets	Security
Validates end-to-end DERMS/ANM integration under real conditions..	Prepares operators and IT/OT staff for production deployment	Proves workflows work in practice, not just simulation.	Confirms flexibility can be procured and dispatched securely.	Ensures resilience is built in before live rollout.

Example of Use Cases

Pilot DER control in a single HV/LV zone before wider rollout.

Demonstrate congestion management using real DER flexibility.

Validate communications with mixed-vendor DER devices.

Stress-test cybersecurity and failover systems.

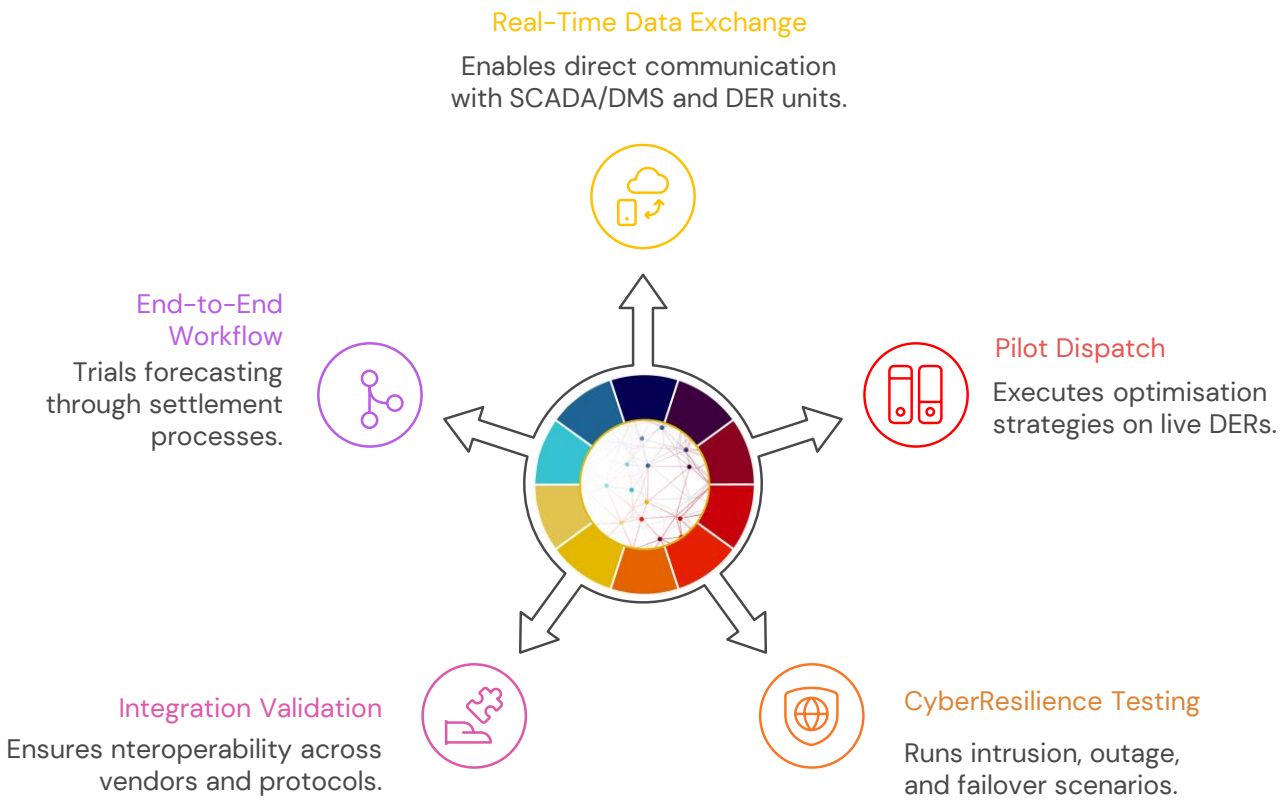
Provide regulator-certified evidence of DSO readiness.

Integration & Next Step

*Sandbox 5 completes the pathway from training to deployment. By proving the full system in a **controlled but real environment**, it provides the evidence needed to move into **business-as-usual operation** at scale.*

SANDBOX 5 – PROOF OF CONCEPT / DEPLOYMENT

The final step before full-scale rollout



Sandbox

program step by step

ZIV TwinGrid

Thank you!

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