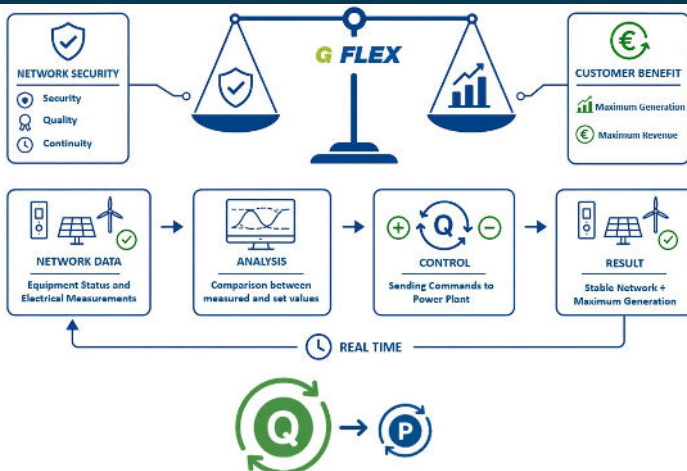


SUCCESS CASE 9.2026

G FLEX

AUTOMATED DISTRIBUTED GENERATION CONTROL



THE CHALLENGE

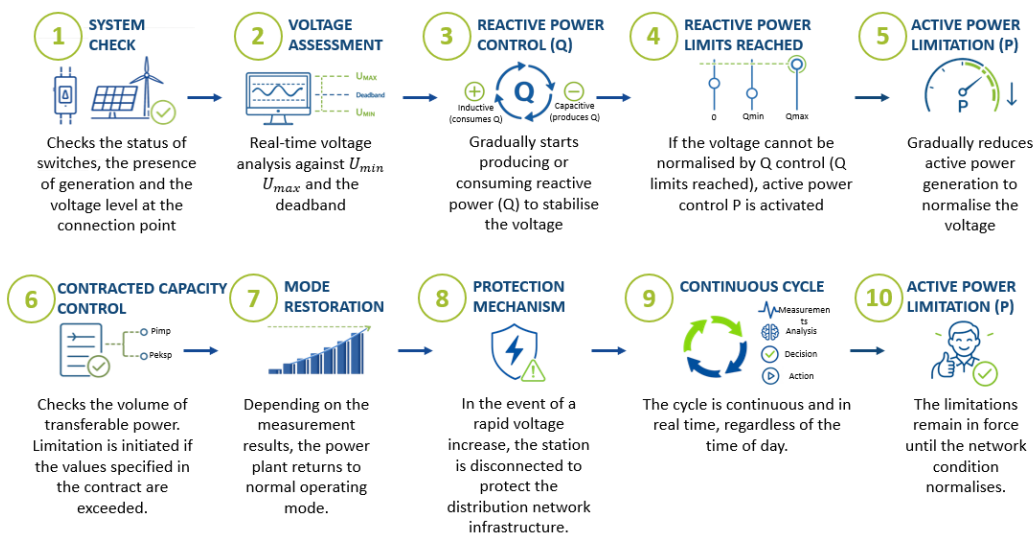
Typically, Volt/VAR Q(U) and Volt/Watt P(U) settings determine the operation of inverter based resources (solar, wind, and hybrid power plants). The field experience by DSO «Sadales tikls» shows that such voltage control framework can lead to inaccurate control actions with respect to the measurements at the grid connection point. This is because the power plant SCADA can be installed far from the grid connection point in the customer network (behind the meter).

THE SOLUTION: AUTOMATED DISTRIBUTED GENERATION CONTROL

G FLEX is an in-house built control algorithm by DSO «Sadales tikls» for all generators with SCADA integration (typically > 0.5MW) connected to distribution network. The algorithm continuously analyses real-time voltage and power measurements at the grid connection point and compares them with network operational limits.

G FLEX defines voltage thresholds, reactive and active power steps, command delays and ramp-rate coordination. The algorithm also includes logic for import/export limits and critical voltage trip/restart, prioritizing reactive power use whenever feasible.

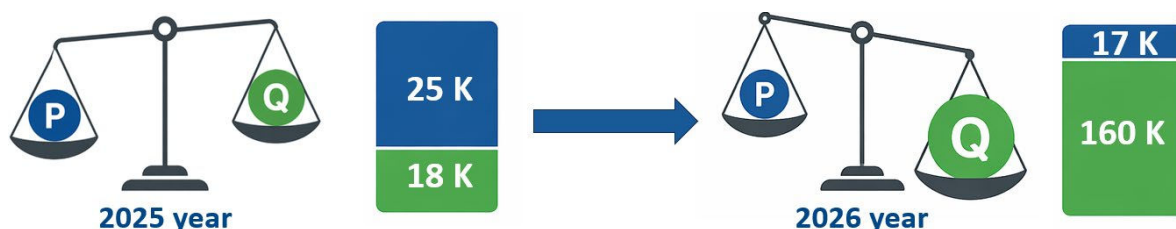
Only if reactive power regulation is not sufficient, the algorithm gradually limits active export power. In case of undervoltage, the algorithm applies capacitive reactive power support from inverters. If the voltage remains outside the defined range, the algorithm can also reduce BESS charging power.



MAIN ACHIEVEMENTS

- ✓ Improved voltage control (U) during abnormal MV network configurations, switching conditions, and N-1 regime.
- ✓ Reduced active power (P) curtailment by prioritising reactive power (Q) regulation before active power limitation.
- ✓ Reduced risk of oscillations and unnecessary trips through stepwise commands, configurable time delays and ramp-rate coordination.
- ✓ Higher operational transparency and safety at the dispatch centre, because the control decisions
 - ✓ are centralized, not autonomous
 - ✓ use grid measurements as a reference, instead of power plant SCADA
- ✓ G FLEX can be applied to all inverter-based and hybrid power plants (solar, wind, BESS).

Comparing with local inverter control using Q(U) and P(U) settings, **G FLEX** gives the DSO a coordinated system-level mechanism that can be adapted to the actual network state. A combination of centralized P,Q control reduced curtailment by up to 60%.



KEY SUCCESS FACTORS

- Reliable real-time measurements at the DER/BESS grid connection point, especially U,P,Q readings.
- SCADA communication for all power plants above 0.5 MW, enabling the DSO to send active and reactive power commands.
- Clear definition of operational thresholds, including voltage limits, critical voltage levels and recovery logic.
- Configurable control parameters, such as Q/P step size, command delay and ramp-rate alignment with plant capabilities.
- Coordination between DSO requirements and plant technical capabilities, including knowledge of available reactive power range and import/export limitations.
- Validation in real network conditions, especially during abnormal configurations where the voltage control challenge is most visible.

WAY FORWARD

- Wider integration with
 - ✓ ADMS functions,
 - ✓ automated network topology awareness,
 - ✓ dynamic prioritisation between multiple plants, and
 - ✓ coordination with flexibility markets or TSO-DSO operational requirements.
- Upgrade G FLEX as part of wider DSO flexibility and active network management framework, where G FLEX serves as a balancing mechanism of generation and demand in the distribution network.