Energia Europa

PQ·GUARD

Technology to eliminate voltage dips, short-duration interruptions and transient overvoltages (surges)

Energia Europa S.p.A.: About Us

Energia Europa S.p.A. is a research and development company based in Zanè (Vicenza), which designs, manufactures and distributes energy efficiency technologies and power quality systems in Italy and many international markets, enabling companies to achieve energy efficiency.

SMARTENERGYLAB

Laboratorio Congiunto per la Power Quality nei Sistemi Elettrici

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A bit of theory: poor power supply from the grid

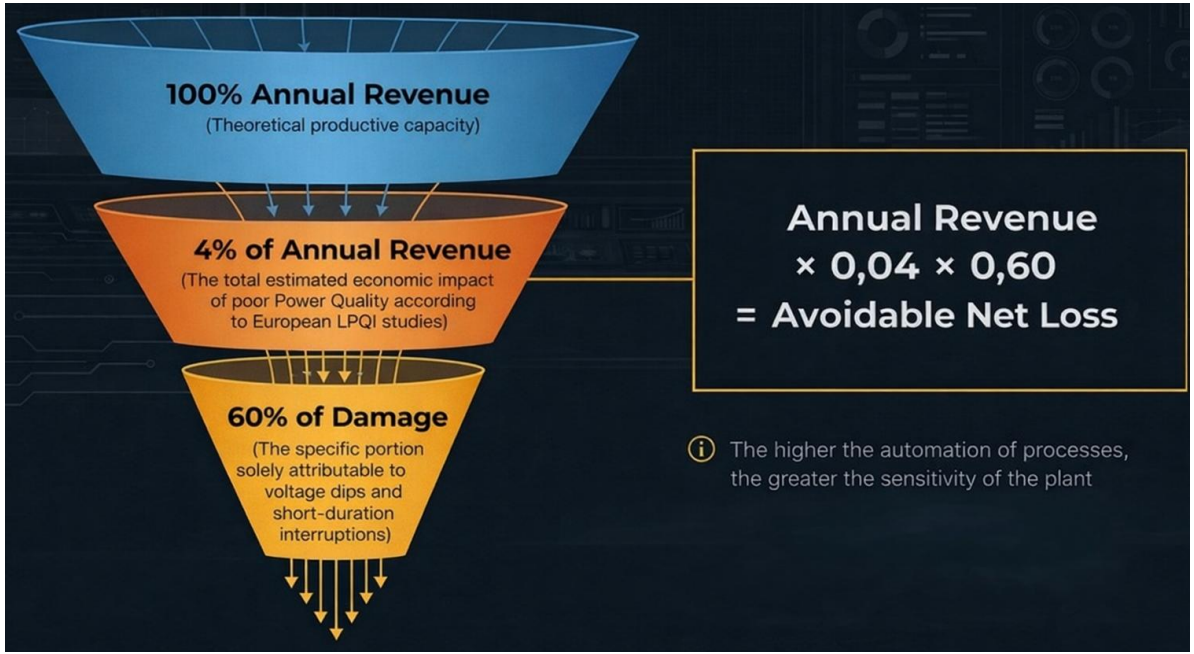
Phenomenon	Technical Description	Operational Impact
Short Interruption	Voltage below 10% of the rated voltage	Process interruption, data loss, extended restart time
Voltage Dip/Sag	Voltage between 10% and 90% of the rated voltage	Inverter lock-up, unstable sensors, production rejects
Voltage Swell	Voltage > 110% of the rated voltage	Failure of electronic boards, wear and tear on motors

Sudden malfunctions, burnt-out circuit boards and unexplained machine downtime are often attributed to wear and tear. In reality, they are caused by poor power quality, 92% of which is due to **voltage dips and short-duration interruptions** (*EPRI Data*).

< 10 ms	10 - 200 ms	200 - 500 ms	500 ms - 1 s	1 - 5 s
Typically absorbed by equipment interfaces.	Process disturbance, PLC reset, sensor malfunction.	Drives trip, contactors drop out, UPS switching.	Machine stop, CNC lock, manual restart required	Full process shutdown, production loss, system reboot required.

Calculating the risk: the maths behind plant downtime

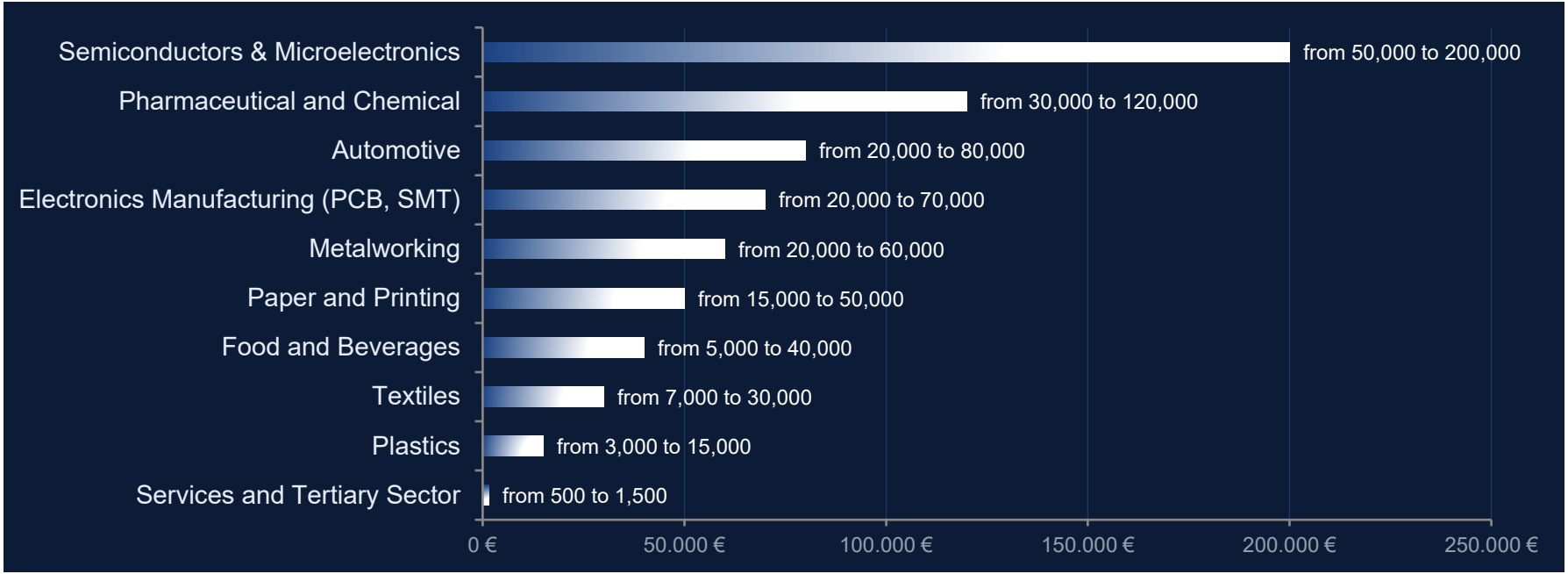
Short-duration interruptions and voltage dips are not just a technical issue, they are a direct financial risk.



Data: CEER, LPQI, Leonardo Energy, IEEE, EPRI.

Estimated cost of a single voltage disturbance event

Costs include direct damage (production scrap, equipment damage) and indirect losses (idle labour, extended downtime, penalties).



Data: CEER, LPQI, Leonardo Energy, IEEE, EPRI.

PQ-GUARD: The ultimate solution for business continuity

This **Active Voltage Conditioner (AVC)** with supercapacitor technology is designed to mitigate voltage dips, short-duration interruptions and transient overvoltages (surges). It ensures power continuity for interruptions up to 1 second at full power, and for longer durations at reduced load.

Ultra-fast response

Ultra-fast response in ~2ms.
Production is unaffected by voltage issues.

Latest-generation supercapacitors

Supercapacitors EDLC (Electric Double-Layer Capacitor) replace vulnerable traditional batteries. 1 million life cycles. Zero maintenance.

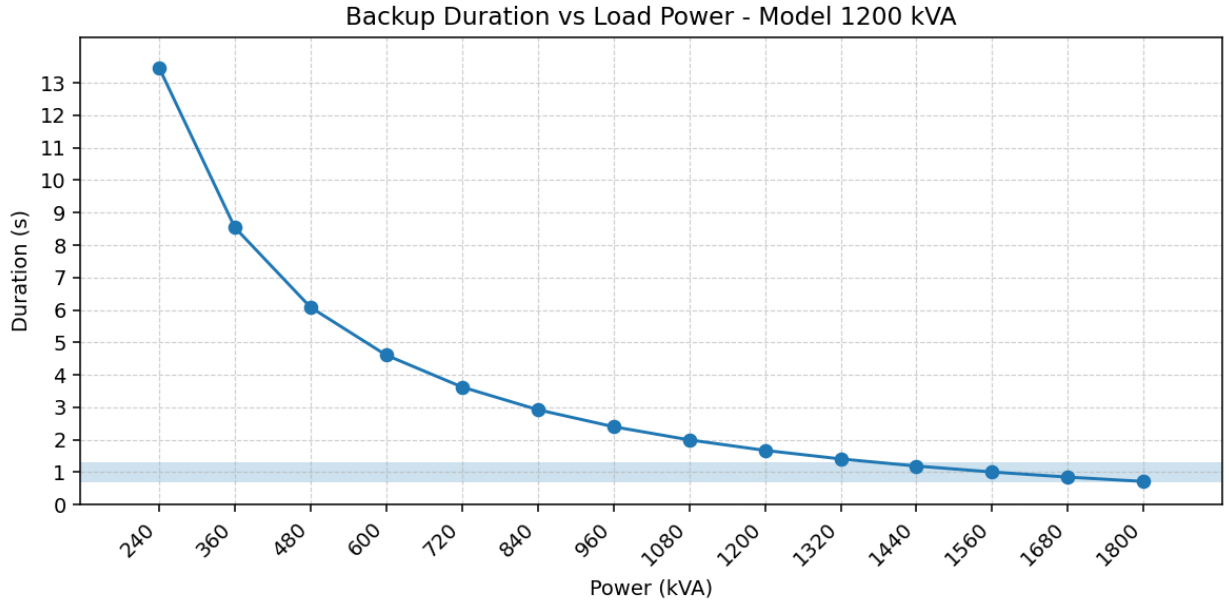
Efficiency and Longevity

Virtually zero maintenance costs, extremely high energy efficiency (ECO Mode) and extended service life.
Includes surge arresters.

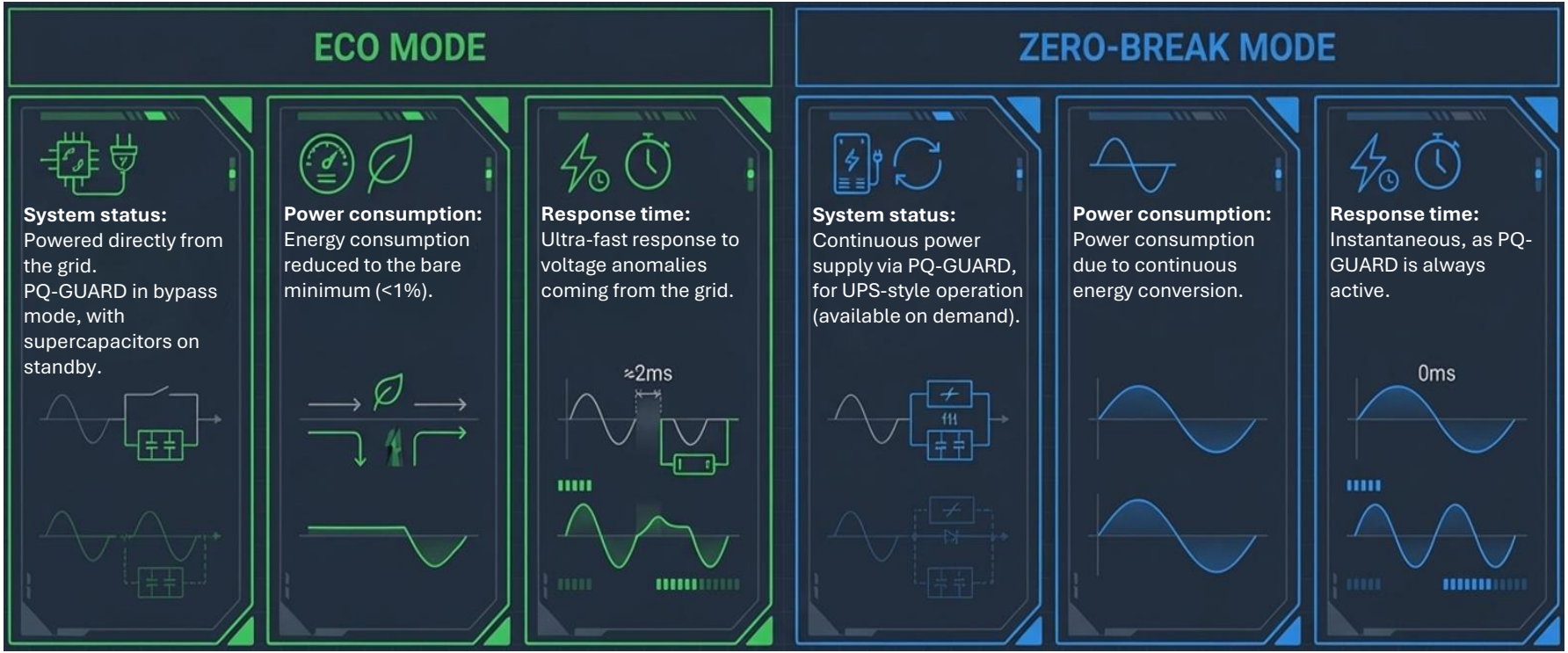


Backup Duration vs. Power Consumption

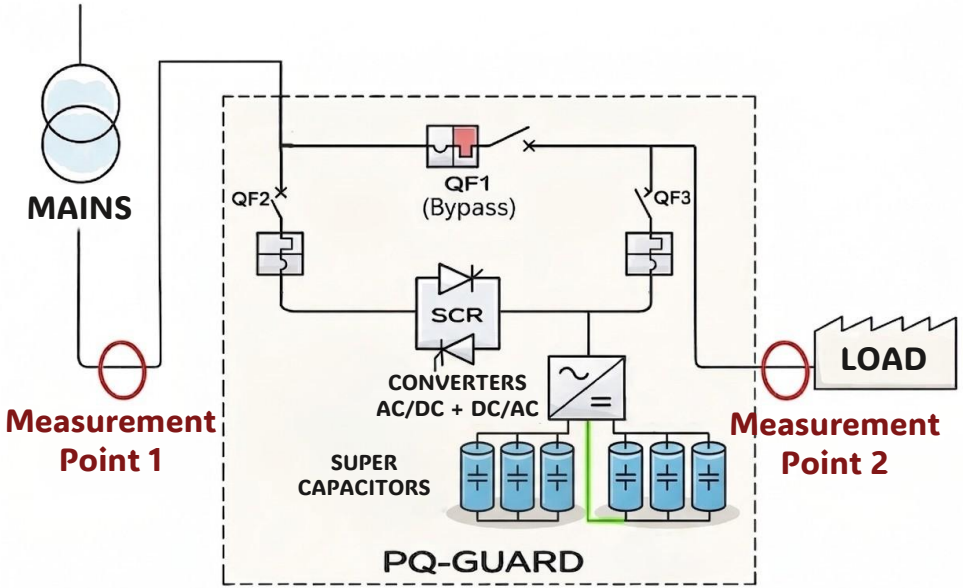
The runtime of the PQ-GUARD system is directly dependent on the power absorbed by the load during voltage disturbances (dips, interruptions or transient events). The graph below illustrates the discharge characteristic curve, highlighting the non-linear relationship between percentage load and available backup time.



Total operational flexibility: ECO Mode vs Zero-Break



The irrefutable proof: dual measurement



Measurement Point 1
(Mains supply side)
Independent instrumentation (e.g. EMA-D6 / DMG9000). Detects and records voltage anomalies coming from the electricity grid.

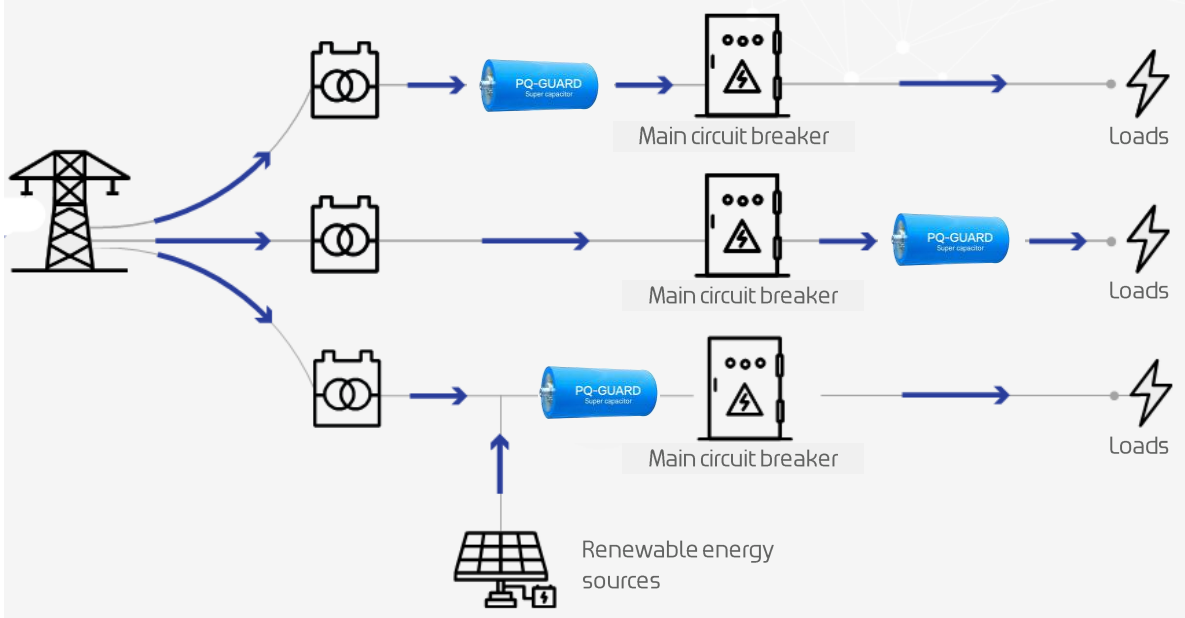
PQ-GUARD
Mitigation intervention.

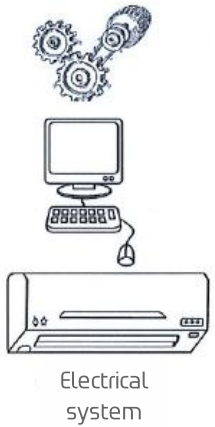
Measurement Point 2
(Electrical system side)
Standalone instrumentation (e.g. EMA-D6 / DMG9000). Records the perfectly stabilised power supply delivered to the load.

Objective measurement allows detection of disturbances on the grid side and verification of the stabilised supply delivered to the load by PQ-GUARD.

Where is it installed

PQ-GUARD is installed in series with the system and can be positioned between the medium-voltage transformers and the main circuit breakers, or downstream of the latter, depending on the plant electrical architecture.
Important: additional energy sources (CHP or photovoltaic) must always be upstream of the PQ-GUARD system.





The next generation: AVC vs traditional UPS

Feature	Traditional UPS (Lithium/Lead-acid batteries)	PQ-GUARD (AVC Supercapacitors)
How to use	Online/continuously energised (continuous consumption)	Always on standby (ECO Mode) (response time of 2 milliseconds)
Self-consumption in normal operating mode	High: 3% - 8% of rated power	Minimum: < 1%
Energy charge lifespan	500 - 3,000 cycles (a few years) Chemical degradation of batteries	Up to 1 million cycles (centuries)
Storage technologies	Chemical reaction	No chemical reaction
Temperature sensitivity	High: limited temperature range (fire risk)	Low: wide temperature range
Maintenance	Costly: battery and BMS replacement	Almost none: routine electrical inspection



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