Customer: **Aruba S.p.A**

RIELLO UPS AND ARUBA: **SECURITY AND CONTINUITY IN DATA CENTERS**

Founded in 1994, Aruba S.p.A. is an Italian company that has been providing web services and IT solutions since 1996. Today, it is one of Italy's leading companies in the cloud, Data Center and digital services sector (hosting, email, domain registration and CEM), serving 16 million users.

With **7 data centers in Italy** and a strategic presence across Europe, Aruba guarantees secure, high-performance and highly available infrastructure.

With over **2.7 million managed domains and 10 million active CEM accounts**, Aruba stands out not only for the scale of its operations but also for its certified excellence: it is the first Italian company to obtain **ISO 22237** certification for data center infrastructure (security and energy efficiency), as well as **ISO 9001** for quality and **ISO 50001** for energy efficiency.
The company combines energy efficiency with technology, utilising photovoltaic systems, hydroelectric power stations and 'free cooling' systems. Over more than 30 years, Aruba has gained extensive experience in the design and management of high-tech data centers, both owned and co-located across Italy, with infrastructure and facilities compliant with the industry's highest security standards (ANSI/TIA-942 Tier 4), ISO 22237 certified and designed according to the 'green-by-design' principle.

The group's infrastructure network also extends across Europe, with an owned data center in the Czech Republic and partner facilities located in France, Germany, Poland and the UK. Notable examples of proprietary infrastructure include:

- **Global Cloud Data Center (IT3)** in Ponte San Pietro (BG), opened in 2017, with a total capacity of **60 MW**;
- **Hyper Cloud Data Center (IT4)** in Rome, opened in 2024, with a total capacity of 30 MW IT.

Both campuses meet and exceed ANSI/TIA-942 Tier 4, the highest international standard for data center design and management, thanks to 2N+1 redundancy and advanced backup technologies. This ensures cloud, colocation and hosting services of the highest security, as well as resilience and availability even under critical conditions.
Thanks to carrier-neutral architectures and Tier 1 Points of Presence (PoPs), Aruba offers direct, fast and global connectivity, with low latency and high bandwidth, without relying on third-party transit.

Aruba S.p.A. today represents a benchmark of Italian digital excellence, capable of combining technology, security, and sustainability, with an international outlook. Ensuring that its facilities operate without interruption, 24 hours a day, 7 days a week, is an absolute priority.

CONTINUITY WITHOUT COMPROMISE

Building a modern data center involves complex challenges.
On the one hand, it is essential to ensure that all IT workloads — from servers to network systems — remain operational even in the event of electrical grid disturbances or critical external events and factors that could compromise the normal functionality of the facilities.
On the other hand, high energy loads must be managed efficiently, reducing environmental impact and ensuring maximum system resilience.

At the Aruba IT3 and IT4 campuses, each building is designed to house **high-density IT infrastructure, with power per rack of up to 40 kW**. Redundant generator sets ensure up to 48 hours of autonomy at full load, an essential requirement for meeting **Service Level Agreements (SLAs)** even during prolonged power cuts.

Security is guaranteed by 24/7 surveillance and multi-level physical and logical access systems, integrated with DCIM (Data Center Infrastructure Management) solutions for real-time energy and environmental monitoring.

For the DC-B and DC-C data centers in Ponte San Pietro and the DC-A in Rome, it was crucial to identify a partner capable of providing integrated solutions and services for the installation, maintenance and monitoring of the systems. The partner also had to stand out for its technological innovation, guaranteeing high standards of reliability and intelligent energy management, in line with the operational continuity requirements of next-generation data centers.

THE RIELLO UPS SOLUTION: PROTECTION, EFFICIENCY AND SCALABILITY

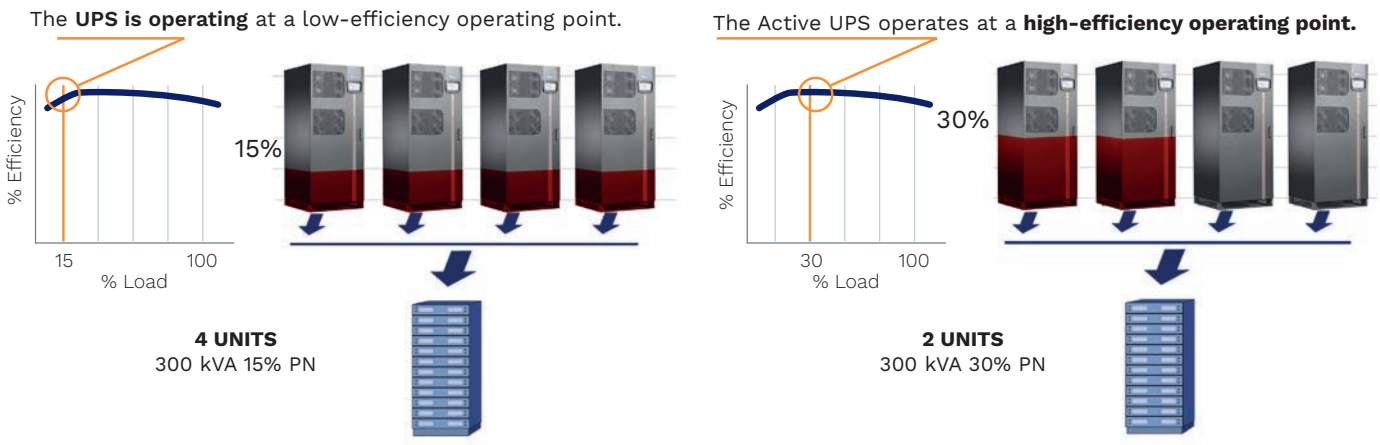
Riello UPS supplied an optimal power protection system based on the **NextEnergy (NXE)** UPS, a transformer-free online double-conversion (VFI) series, with unity power factor (kVA = kW), a three-level IGBT stage, and an ultra-compact design with very high efficiency.
The UPS units incorporate **Smart Battery Management (SBM)**, which constantly monitors battery cells and adapts the charging modes to specific requirements in order to increase reliability and extend service life.
The systems have been installed in **2N+1 parallel configurations**, with 500 kVA UPS units dedicated to IT loads, whilst solutions based on 160 kVA UPS systems power the mechanical loads. NextEnergy's **Efficiency Control Mode (ECM)** allows the UPS units installed in parallel to dynamically adjust the number of units in operation according to the actual load.
Under conditions of reduced load, some of the UPS units automatically switch to idle mode, whilst maintaining the required redundancy and optimising the the overall efficiency of the active units *(see figure below)*. Thanks to this intelligent management, the Power Continuity system helps to significantly improve the PUE (Power Usage Effectiveness), a key parameter for assessing the energy sustainability and overall performance of the data center.

NextEnergy can operate in various modes to ensure the highest level of protection and efficiency depending on grid quality and load type:

- **ONLINE: efficiency up to 97%**
- **ECO MODE: efficiency >99%**
- **ACTIVE ECO: efficiency up to 98.5%**

In **ACTIVE ECO mode**, the NXE functions as an active filter: the bypass line is the main source and supplies active power, whilst the inverter supplies only the reactive portion of the load. This ensures that the power factor at the UPS input remains close to unity, regardless of the load's power factor. Furthermore, the inverter's operation significantly reduces the total harmonic distortion (THDi) fed back into the mains supply. In the event of a mains failure, the switchover time to the inverter is virtually zero (classified as VFD SS 111).
Power factor correction plays an active role in reducinginstallation operating costs: this results in a reduction in Joule losses and voltage drops, allowing for the optimal sizing of electrical equipment such as power transformers, cables, busbars, switches and protective devices. The electrical distribution is more efficient and stable.
ACTIVE ECO mode ensures a high level of availability whilst significantly reducing CAPEX and OPEX. Efficiency exceeds 98.5%

EFFICIENCY CONTROL MODE (ECM)



Designed to integrate with existing power infrastructure, NextEnergy guarantees stability, efficiency and operational continuity, minimising the impact on the overall electrical system. Thanks to its **low harmonic content** and **high power factor**, the system allows for precise system sizing, avoiding oversizing and optimising installation and energy management costs. Under limited power supply conditions, the UPS automatically adjusts power consumption, using the batteries only when necessary, with the option of local or remote management.

Zero Impact Source technology enables NextEnergy not only to prevent grid disturbances, but also to deliver a clean power supply by eliminating harmonics generated by non-linear loads. The input AC/DC converter is based on an IGBT rectifier design using the latest three-level technology.
Key features:

- input current distortion <3%;
- input power factor 0.99;
- power walk-in for a progressive start-up of the rectifier;
- start-up delay function, to restart the rectifiers upon grid restoration.

The **Power Walk-In and Start Delay functions** ensure a gradual and coordinated restart of the UPS input stages, reducing stress on the upstream generators.

The battery system is the energy reserve available in every UPS installation and therefore represents a fundamental resource in any continuity plan to ensure correct operation in the event of a mains failure. NextEnergy, thanks to its **Smart Battery Management (SBM)**, manages this resource with great care, offering all the most advanced features designed to extend battery life and maintain efficient operation, whilst also alerting the user in the event of potential problems.

The NXE model enables the creation of scalable systems, with centralised or redundant configurations in parallel with up to eight UPS units. This architecture reduces initial CAPEX and simplifies power expansion in line with the growing needs of the data center or IT infrastructure.
Integration with centralised management systems **(BMS and DCIM)** enables continuous monitoring and prompt intervention when necessary, improving control and the overall availability of the system.

Thanks to these features, **Riello UPS solutions ensure operational continuity even under the most critical conditions**, protecting customers' investments and data, and contributing to efficient, sustainable and resilient energy management.

PRACTICAL IMPLEMENTATION

The implementation follows a **scalable architecture with 2N+1 configurations**, eliminating single points of failure and enabling maintenance without downtime. The **Master Switches (Static Transfer Switches)** ensure immediate switching between alternative power sources (Red and Green line), whilst **autonomy** is extended up to **48 hours**, thanks to the integration of generator sets, ensuring continuity even in extreme emergency scenarios. The installation followed a modular and bespoke approach, designed to grow alongside the customer's needs.

For the project, Riello UPS supplied:

- **Ponte San Pietro DC-B (IT3): 50 NXE 500kVA UPS units, 16 NXE 160 kVA units**, 2 Master Switch(MTS) 800 A, 1 MTS 600 A. Full-load runtime ofup to 26 hours in emergency conditions.
- **Ponte San Pietro DC-C (IT3): 38 NXE 500kVA UPS units, 12 NXE 160 kVA units**, 2 Master Switch(MTS) 800 A, 1 MTS 600 A.
- **Rome DC-A (IT4): 20 NXE 500 kVA, 4 NXE250 kVA and 6 NXE 160 kVA UPS units**, 2 Master Switch (MTS) 800 A, 1 MTS 600 A.
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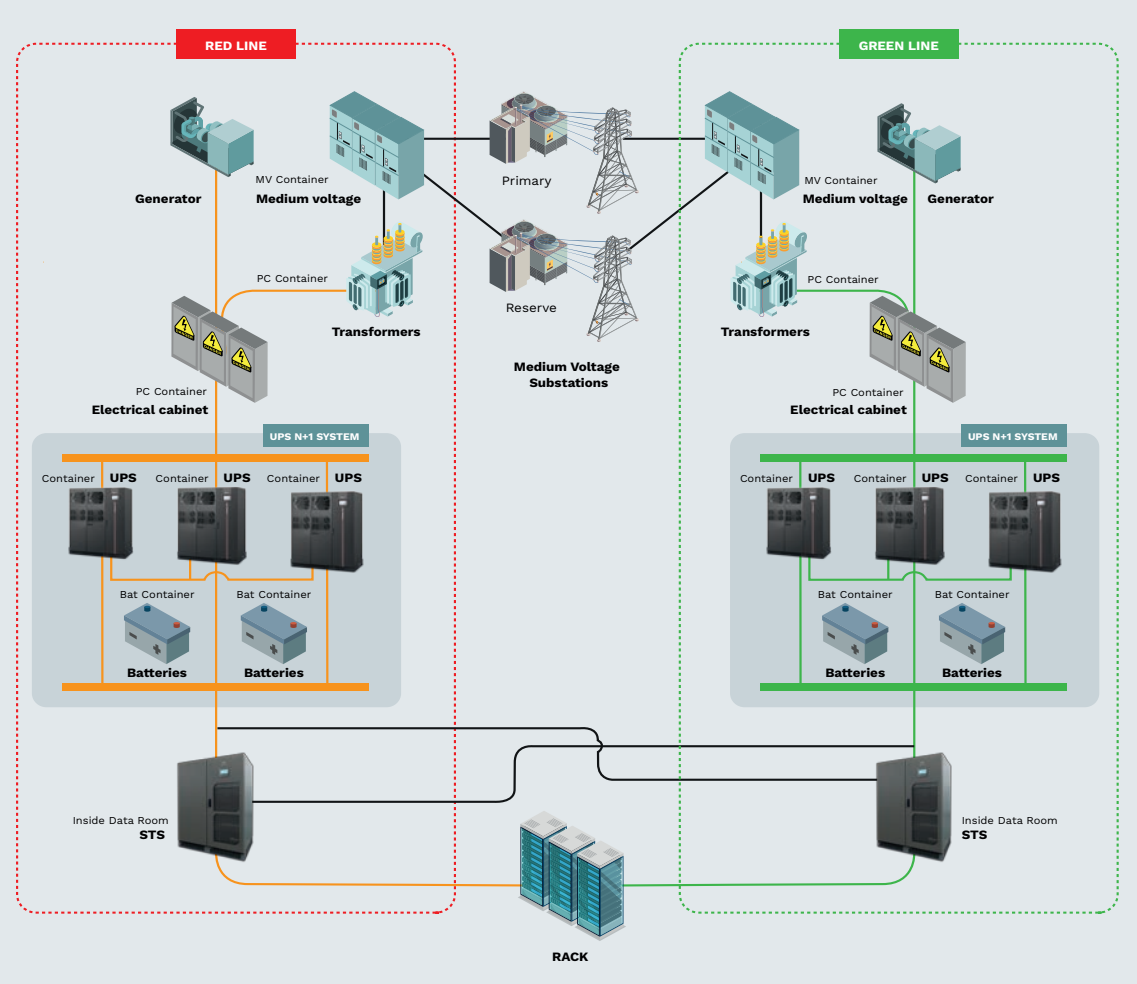
Overall, the sites in Ponte San Pietro and Rome currently reach an **installed active power of approximately 60.4 MW**, thanks to the UPS units supplied to date.



Typical redundant power supply diagram for a data center.

The project is still expanding, whilst ensuring continuity, redundancy and scalability of the infrastructure.

COOLING MANAGEMENT

Each data center is connected to a dual, multimodular Power Centre, supported by redundant cooling systems, which ensure operational continuity even under critical conditions and highly reliable energy management.
At the Ponte San Pietro (IT3) and Rome (IT4) campuses, the **cooling system** is designed to maximise energy efficiency and maintain optimal conditions for the servers. At the Ponte San Pietro campus, cold air is channelled directly to the front of the racks, kept separate from the outgoing hot air, optimizing heat exchange and reducing waste.
In Rome, the infrastructure adopts advanced cooling solutions, utilising free-cooling systems and architectures designed to maintain optimal temperature and humidity levels, ensuring stable operation and a favourable PUE.

THE RESULTS: ENERGY PERFORMANCE AND RELIABILITY

Thanks to Riello UPS solutions, Aruba has achieved significant results:

- **Optimised energy efficiency**, with reduced operating costs thanks to intelligent load management and minimal UPS impact on the grid **(Power Walk-In and Start Delay)**;
- **Intelligent battery management** to preserve efficiency and longevity;
- **Absolute operational continuity**, guaranteed by full redundancy even in the event of multiple component failures, and by SLAs (Service Level Agreements) at the highest levels in the market;
- **Scalability and flexibility**, allowing the installed power to be expanded without interrupting or compromising the services provided;
- **Centralised monitoring and control**, thanks to integration with DCIM (Data Center Infrastructure Management) and BMS (Building Management Systems), which ensure continuous supervision and prompt intervention when necessary.

In summary, Aruba Data Centers now represent an industry benchmark: **Tier 4-certified infrastuctures, with power supply protected by Riello UPS's NextEnergy (NXE) UPS systems and advanced monitoring via DCIM and BMS.** This approach combines resilience, energy efficiency and sustainability, offering customers service continuity to the highest standards in the market.

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