

Nominee: Riello UPS with The Rosebery Group

Nomination title: Cutting Costs & Carbon Emissions With Modular UPS

What was the driving force behind the project?

Riello UPS is one of the world's leading manufacturers of uninterruptible power supply (UPS) products, the crucial first line of defence providing power protection to data centres across the country. The Rosebery Group is an independent electrical engineering contractor that specialises in the design, installation, and maintenance of data centres.

The companies teamed up to upgrade the critical power protection systems at two major data centres integral to the day-to-day operations of one of the world's largest and most recognisable consumer goods suppliers. The client is home to several incredibly popular household brands, and as such, the demands on its two data centres are huge.

Its existing UPS system had been installed in 2007, so was desperately in need of upgrading as technology has developed significantly since then.

At the time of original installation, the client adhered to the then industry best practice of using large static UPS', such as the Riello UPS Master Plus range, configured to N+1 redundancy to provide backup in case of any component failure. However, the subsequent development of more advanced modular UPS units means data centre power protection can now be delivered far more effectively in terms of enhanced performance, improved energy efficiency, and better use of space.

These were the three key requirements the client was seeking, while it was also mindful of its obligation to cut CO2 emissions and comply with mandatory carbon reporting legislation introduced by the government in 2013.

How did the solution address the challenges?



Since the first installation of a Riello UPS unit in 2007 technology has developed considerably, meaning the existing set-up had one principal problem – it was incredibly inefficient. Across several rooms in both data centres, many of the original 800kVA units were operating on consistently low loads – 25%, 19% even as low as 12%, loads which waste incredible amounts of energy. Unsurprisingly UPS efficiency averaged only 92-93% (just 89% in the main switchroom), well below the optimum performance levels the latest UPS units are capable of.

The sizeable static UPS' also generated significant amounts of heat, requiring continuous cooling to ensure both the unit and batteries operate safely – air conditioning output across both sites totalled 414 kW a year, an eye-watering annual bill of £315,517.

While upgrading the old static units to Riello UPS' energy efficient Master Plus HE model was considered, a more radical solution was agreed – one that would provide substantially better performance and greater energy efficiency. All the existing units were replaced with Riello UPS' Multi Power – a modular transformerless UPS which offers the highest levels of efficiency, scalability, and performance.

Rooms which had previously housed three or four of the huge, inefficient 800kVA units were upgraded with multiple modular UPS chassis housing as many as 22 smaller 42kW Multi Power modules. This enabled the system to be configured in a way more closely matched to the data centre's actual power requirements, ensuring there was less wasted capacity without compromising on the crucial need for redundancy to protect against possible component failure.

So the days of the two data centres running sizeable static units on low, inefficient loads are now firmly a thing of the past, with a modern modular UPS carrying the (appropriate) load instead. Multi Power units are far smaller and lighter than the original Master Power. They also produce far less heat so require significantly less cooling and air conditioning, another of the critical obstacles that needed to be overcome.

What tangible benefits has the organisation seen as a result of the project?

The results in terms of both environmental and financial benefits have been astonishing. Annual CO2 emissions directly caused from the UPS systems at the two sites have been cut by a staggering 71.89% from 2,147kg to just 603.5kg a year thanks to significant improvements in performance efficiency and a huge reduction in the need for cooling. In fact, air conditioning has been cut by almost 72%, from 414 kW to just 116.7 kW a year, leading to annual savings of £226,578.



With the new UPS improving efficiency levels across all locations to an average of 96%, compared with previous performance of 92-93%, or in some cases just 89%, the total energy the client needs to run its critical power protection system has been reduced by 1,246,729 kWh a year, cutting its annual electricity bill by £108,465.

The improved operational performance and reduced reliance on cooling has produced total annual energy savings of £335,043, an amazing 11% overall reduction.

This enhanced performance has been delivered in significantly less floor space too. The typical static UPS used in the original system had a footprint of 4.4m². In the new set-up, a sizeable static UPS was replaced with the equivalent of three Riello UPS Multi Power cabinets with a footprint of just 1.8m², a decrease of 59% per m², without compromising on capacity.

The new system provides greater power protection far more efficiently and in less than half the space that the previous one used.

What major challenges were faced during the project and how were they overcome?

The most complex challenge was the requirement for absolutely no downtime during the installation phase of the overhaul. Due to the size and nature of the client, the two data centres needed to be operational at all times – shutting down and replacing the system over a weekend, for example, simply wasn't an option. This meant the existing static UPS' were gradually upgraded to the newer, more efficient modular versions without the overall power ever being switched off, a painstaking but necessary process that required the significant expertise of both Riello UPS and The Rosebery Group.

Moving forwards, modular UPS configuration gives the additional benefit of being "hot swappable" – modules can be replaced/repared without the overall system needing to be shut down – as well as offering the client the flexibility to easily scale up with additional modules as and when the demand occurs, or the choice to use the saved space for other functions.

Why nominee should win

1) 71.89% reduction in annual CO₂ emissions from 2,147kg to 603.5kg

2) Annual saving of roughly 1.25 million kWh energy, enough to power 316 typical UK houses for a year



3) Total running costs for the data centre's UPS system and air conditioning slashed by more than £335,000 a year, savings of nearly 11%

4) Air conditioning requirements cut by 71.81%, saving more than £226,000 and 297.3 kW energy per year

5) 59% per m2 footprint reduction – more power and greater efficiency in significantly less space

Cutting Costs & Carbon Emissions With Modular UPS – ‘Before & After’

‘Before’ – The Existing Master Plus UPS Setup

<i>Locations</i>	<i>Equipment</i>	<i>Load %</i>	<i>Efficiency %</i>	<i>kW Hour Usage Per Year</i>
Switchroom A1, A2, B1 & B2 UPS Room	4 x MP 800- 2.4MVA N+1	25	89.00	6,407,595
UPS Room – 1.1, 1.2, 1.3, 1.4 and 1.5	5 x MP 400 - 1.6MVA N+1	46	93.90	7,836,421
Switchroom UPS 2.12.1 & 2.12.2	2 x MP 250 - 250kVA N+1	19	92.00	714,130
Switchroom 3 UPS 3.2, 3.3 & 3.4	3 x MP 800 - 1.6MVA N+1	45	92.80	8,269,137
Switchroom 4 UPS A, B, C & D	4 x MP 800 - 2.4MVA N+1	41	92.80	7,663,818
Mechanical Plant UPS Room 4.13 & 4.14	2 x MHT 400 - 400kVA N+1	12	92.00	866,478

- **Total kW Hour Usage Per Year = 31,757,579**
- **Overall Energy Cost Per Year (based on £0.087 per kWhr) = £2,762,909.37**
- **Additional Total Heat Output from air conditioning = 414 kW**
- **Additional Total Heat Costs from air conditioning = £315,517.68**
- **Total CO₂ Emissions Per Year = 2,147kg**

Cutting Costs & Carbon Emissions With Modular UPS – ‘Before & After’ (cont...)

‘After’ – The New Multi Power UPS Setup

<i>Locations</i>	<i>Equipment</i>	<i>Efficiency %</i>	<i>kW Hour Usage Per Year</i>
Switchroom A1, A2, B1 & B2 UPS Room	16 x 42kW/kVA Modules - 672kVA N+3	96.00	5,940,375
UPS Room – 1.1, 1.2, 1.3, 1.4 and 1.5	20 x 42kW/kVA Modules - 840kVA N+3	96.00	7,665,000
Switchroom UPS 2.12.1 & 2.12.2	2 x 42kW/kVA Modules - 84kVA N+1	96.20	682,952
Switchroom 3 UPS 3.2, 3.3 & 3.4	22 x 42kW/kVA Modules - 924kVA N+4	96.00	7,993,500
Switchroom 4 UPS A, B, C & D	21 x 42kW/kVA Modules - 840kVA N+3	96.00	7,400,375
Mechanical Plant UPS Room 4.13 & 4.14	3 x 42kW/kVA Modules - 126kVA N+1	96.20	828,648

- **Total kW Hour Usage Per Year = 30,510,850 (a saving of 1,246,729 kW Hours per year)**
- **Overall Energy Cost Per Year (based on £0.087 per kWhr) = £2,654,443.95 (a saving of £108,465.42 per year)**
- **Additional Total Heat Output from air conditioning = 116.7 kW (a 71.81% reduction)**
- **Additional Total Heat Costs from air conditioning = £88,939.40 (a saving of £226,578.28 per year)**
- **Total CO₂ Emissions Per Year = 603.5kg (a 71.89% reduction)**

Total energy and air conditioning savings per year = £335,043.70

Cutting Costs & Carbon Emissions With Modular UPS

The Project Partner's Perspective:

“Advances in UPS technology over the last few years, particularly the development of highly-efficient modular solutions, have completely changed the way we view critical power infrastructure.

“Our client’s current and future successes are inextricably linked to having robust and reliable IT capabilities, and with ever-increasing demands on the UK power network likely to result in additional pressures and disruptions in the years to come, it was essential to devise a solution that provides them with all the benefits of greater efficiency without compromising on resilience.

“Upgrading the existing installation to the Riello UPS Multi Power range equips the client with a far more modern, efficient, and resilient power protection system.

“When this additional reassurance was combined with the significant projected financial savings, CO₂ reductions, footprint savings, and increased maintenance opportunities also offered by working in partnership with Riello UPS, it was an easy decision for our client to make.

“And we’ve no doubt it’s a decision that will help them best achieve optimum business performance in the coming years.”

Andrew Starkey, The Rosebery Group

