MASTER+

Reduce Costs, Increase Reliability

RWE

Riello UPS is partnering with leading energy trading company RWE to offer data centre operators increased reliability and security of supply with the added benefit of significantly reduced costs.

The innovative solution is based on a modified version of the best-selling Master Plus HE three-phase online uninterruptible power supply.

It harnesses the energy storage power of premium lead acid or lithium-ion batteries to transform a UPS system from a vital but often underutilised asset into a smart grid-ready 'virtual power plant', feeding surplus electricity back into the grid.

An Evolving Energy Mix

The way society produces power is changing. In the UK, renewables such as wind and solar now contribute a third of all electricity, with traditional sources like coal, nuclear, and thermal all slowly being phased out.

This growing reliance on more unpredictable low-carbon sources makes maintaining the balance of supply and demand a complicated challenge.

To ensure a stable, consistent frequency, the National Grid is placing increasing faith in battery storage and smart grids that bring together a diverse range of interconnected power generators to balance the network in real-time.

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So far though, mission-critical sites such as data centres have been reluctant to join this energy revolution, even though its potential is unquestionable. According to the National Grid, if just 5% of peak-demand power is met by demand side response (DSR) and energy storage, it'd be the equivalent electricity to that produced by any new nuclear plant.

Uptime is an operator's overriding priority. That's unlikely to change in a society increasingly reliant on data processing and storage power to handle the explosion of 'Internet of Things'-connected devices and gadgets. And conventional wisdom suggests using a UPS's battery power for anything other than emergency backup could compromise reliability.

Essential But Underutilised

For many years, uninterruptible power supplies have been an integral part of minimising data centre downtime, acting as the ultimate insurance in the event of any disruption to the power supply or the worst-case scenario of a complete mains failure.

In reality though, such power outages or network crashes don't happen very often, meaning that a UPS's batteries are rarely called upon.

The inevitable conclusion to this is that even though a UPS is an essential part of any data centre's infrastructure, there's the danger it becomes a somewhat underutilised and expensive asset.

In addition, if the batteries aren't being regularly used, can IT managers be 100% sure they'll actually work if and when they really need them to?

Rethinking The Role Of A UPS

The key objective for any data centre operator is to deliver cost-optimisation without reducing the reliability of their facility.

Riello UPS, the award-winning manufacturer of uninterruptible power supplies, has teamed up with RWE to provide a solution that reduces capital and running costs, while potentially opening up additional revenue streams, all while increasing system resilience and security of supply.

RWE is a major utilities company based in Essen and is the second-largest electricity producer in Germany. It also operates in the Netherlands and the UK, employing nearly 60,000 staff across the group. Through its RWE Supply & Trading division, it is one of Europe's leading energy trading companies.

What Is The Riello UPS-RWE Master+ Model?

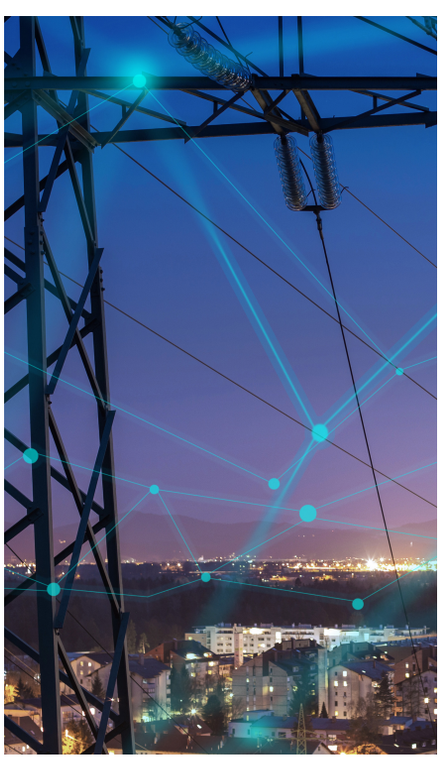
A bespoke solution based on a modified version of the Riello UPS Master Plus HE series. The three-phase online UPS is adapted with a special rectifier that enables the bi-directional flow of electricity to and from the grid.

The UPS is combined with either premium lead acid or high power density lithium-ion batteries and utilises RWE's sophisticated monitoring software and communications technologies to continuously interact with the grid. RWE subsidises* the cost of the more expensive premium batteries and also takes on the risk of dealing with trading on the energy market.

The data centre itself doesn't participate in the market, but it benefits from reduced upfront costs compared to installing a conventional UPS system and reduced operational costs.

Depending on where it is connected, operators can also avoid standard grid operating costs and tap into financial incentives on offer to help balance the electricity network.

* Subsidies and cost structure are project dependant.



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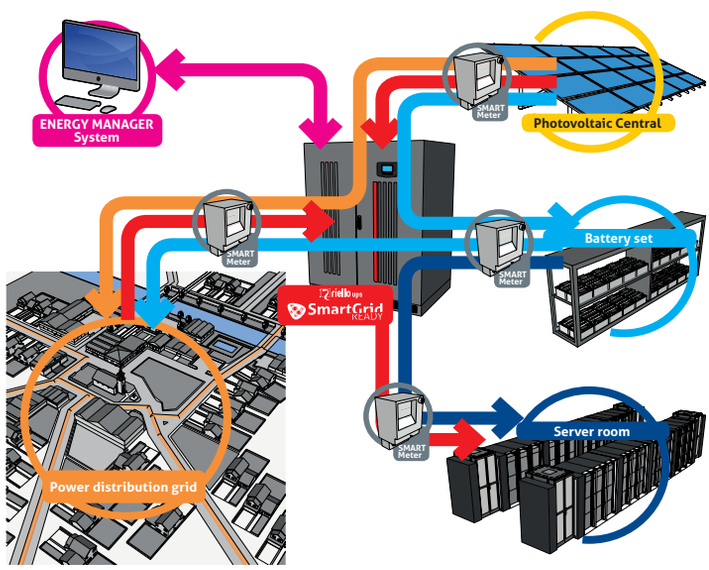
Exploring The Possibilities

The National Grid offers a range of DSR mechanisms and payments to encourage businesses to participate. One such incentive is Firm Frequency Response (FFR), which quickly reduces demand or increases power generation to ensure a consistent grid frequency within one hertz of 50Hz. There are three response speeds for FFR.

- **Primary response**
  Response provided within 10 seconds of an event, which can be sustained for a further 20 seconds
- **Secondary response**
  Response provided within 30 seconds of an event, which can be sustained for a further 30 minutes
- **High frequency response**
  Response provided within 10 seconds of an event, which can be sustained indefinitely.

With the network needing an average 800 MW of FFR capacity, there's a sizeable and consistent demand that data centres can help fill – and reap the rewards.



The Business Case For Data Centres

These figures* are based on projections for a data centre with a typical 1 MW load, with batteries installed to provide 10 minutes runtime and 1 MWh of Frequency Response.

Capital Cost	**Conventional UPS**	**Riello-RWE Master+**
UPS (inc. Comms Card)	£190,000	£190,000
Batteries (inc. Cabinets)	£160,000	£80,000
Installation	£22,000	£22,000
Commissioning	£3,500	£3,500
Total	**£375,000**	**£295,000**

Total CAPEX Saving = 21% (equivalent of £79,500)

Operating Cost	**Conventional UPS**	**Riello-RWE Master+**
UPS Maintenance	£4,500	£2,200
Remote Monitoring	£1,500	£800
Total	**£6,000**	**£3,000**
10 Year Operating Cost	**£60,000**	**£30,000**

Total OPEX Saving = 50% (equivalent of £3,000 per year)

In addition, data centres could save up to £6,000 per MW per year in reduced grid tariffs.

* For illustration purposes only. Actual costs are project dependant.

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The Benefits Of The Riello UPS-RWE Master+ Model

Embracing smart grid-ready UPS turns a data centre's ultimate insurance policy into something that generates additional value.

The premium battery system incorporates mandatory battery monitoring which enables 24/7 remote monitoring and encourages preventive maintenance, enhancing performance and extending lifespan.

The premium battery is divided into two sections – the first's only function is to provide backup power in the event of an emergency. In contrast, the other segment stores energy used for FFR. But if a power failure occurs, any remaining energy stored in this commercial part can be added to the main backup, significantly increasing the operator's overall runtime.

Advantages*

- High efficiency UPS
- Longer battery life
- Improved system reliability
- Subsidised battery costs
- Lower initial capital costs (CAPEX)
- Lower ongoing maintenance costs (OPEX)
- Longer battery backup times (up to 30 minutes depending on design)
- Reduce or avoid grid network charges

* Specific savings and benefits are project dependant.

Disadvantages

- Does require slightly more space to accommodate the additional batteries

Putting Theory Into Practice

Riello UPS and RWE have been successfully piloting the solution since September 2018 at RWE's headquarters in Essen, Germany.

The pilot plant carries a secured load of 100 kW. It consists of two 200 kW Master+ UPS and two 192 kWh nominal capacity high-performance battery cabinets.

A second pilot plant in the UK is currently under construction and due to go online in Q3 of 2019.

For More Information:

RWE Supply & Trading GmbH
Windmill Hill Business Park,
Whitehill Way
Swindon, SN5 6PB

FlexServices@rwe.com
www.master-plus.eu

Riello UPS Ltd
U50 Clywedog Road North
Wrexham Industrial Estate
Wrexham, LL13 9XN

sales@riello-ups.co.uk