

7th and 8th July 2022 in Milan, Italy

Towards more secure, smart & sustainable Datacenters – # UPSs into the DTC Ecosystem – A. Coccia / RPS S.p.A.

CEMEP sustainable products, systems & services



CECHAP European Committee of Manufacturers of Electrical Machines and Power Electronics

Leisure





Social media





Connectivity



The continuous Digitization Process.....24/7







The Key Question is: How is the Next Generation Critical Power Equipment going to be ?







RPS S.p.A. – Our Global Footprint Subsidiaries Distributors **Priello** ups Riello UPS companies PRODUCT RESELLER Rep. Officies 85x Countries 16x Own 3x Mfg Plants 300+ 600 000 UPS's covered Subsidiaries (2xIT, 1x IN) Distribution shipped in 2021 Channels





Single Phase UPS Three Phase UPS Modular UPS CPSS STS **Energy Storage** Connectivity 1ph:1ph 1ph:1ph 1ph:1ph Digital Cards 3ph:3ph From 16A to 800A VRLA 3ph:1ph 3ph:1ph Stand Alone UPSs 3ph:1ph Protocol Converters NiCd 3ph:3ph Off Line From 10 kW to 3ph:3ph Li-lon SW solutions for Asset 6400 kW Management From 10 kW to Line Interactive Erom 3 kVA to Supercapacitors 1176 kW Transformer-free 600 kVA Double Conversion **7 riello** ups IT & Data Center Transformer-based From 400 VA to Industrial Solutions 10 kVA





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A complex Ecosystem, however common requirements across the different types of DTCs can be found





1. Accountability

investments will increasingly be constrained and shaped by the need for more transparency, oversight and accountability

2. Smarter

To Enable Autonomous Operations and Advanced Asset Management Functions, Remote Monitoring and Easily Upgradable

3. Edge

Pushing for a **Myriad of** smaller Size DTC's all immediately available to the point of Data Usage and synergically interconnected and

4. Sustainability

For a **Greener World** and more focused on the **ethical usage of Material** resources

5. Surge of Innovation

C-EMEP

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Machines and Power Electronics

New technologies and New Concepts are continuously looked at to improve performances, PUEs, footprints, utilization factors, etc...









All of these trends are applicable to UPS industry

The main Datacenter Industry Trends







New usly
otprints,





S3P approach: CEMEP companies mission



CEMEP Strategy fully aligned with DTC industry requirements









Simplified Data Center Electrical Power Distribution Scheme







Data Center and key UPS requirements







Design of UPS has to guarantee highest standard of reliability and security of operation PROTECTIO Design for scalability to enable DTC sustainable growth over time, with no need to over design infrastructure and pay as SCALABILITY business grows

Design to Energy efficiency is the answer to the DTC business challenges: 1) PUE reduction, 2) TCO minimization, 3) CO2 footprint reduction

EFFICENCY Data Center and key UPS requirements









Communication to enable IoT. And IoT guarantees Asset Management optimization, Real time diagnosis and Prognosis of the Critical Power Supply

Downtime is not an option in DTC space. The UPS systems and products have to be designed as such to remove all Single Points of failure and increase availability & Uptime

User-Friendly to enable in daily Operations removal of Human errors mistakes, leading to unfortunate Downtime situation, and to enable real time operations-optimization through the entire lifecycle



Data Center and key UPS requirements



Easy to say, but indeed a complex optimization & Multidimensional Analysis



EFFICENC



Total Operational Cost Breakdown into DTC Segment

Incremento Decremento Totale



- Running Energy Costs represents the 60% of the total DTC Operational costs
- Under this consideration, the energy efficiency of Power Protection Equipment becomes essential for the reduction of the annual energy bill and pivotal to the reduction of the CO2 emissions, linked to the energy supply in a DTC space
- Simple calculations show that an increase of energy efficiency of 0,5% may help reducing the running energy cost of a 15% factor





Energy Bill Savings thanks to an increase of 1% efficiency (from 96% to 97%), and calculated at 0,1Eur/kWh, for a 1MW system

Potenza in uscita [kW]	Potenza in ingresso [kW] (Rendimento 1)	Potenza in ingresso [kW] (Rendimento 2)	ΔP [kW]	∆Costo Energia/or a [€]	∆Costo Energia/gi orno [€]	∆energia/ anno [kWh]	ΔCosto Energia/ anno [€]	CO2/anno [kg]
1000	1041,67	1030,93	10,74	1,074	25,8	94137	9414	33173,7



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1000	1041,67	1020,41	21,26	2,126	51,0	186352	18635	65670,5







Graph: UPS Efficiency CELEN 62040-3:2015-02 Efficiency Vs Power UPS NXE 300 97 96 95 95 93 93 93 92 10 20 50 60 70 80 100 0 30 40 90 Power [%]

Thanks to 3L Topologies and control methods, it is possible to improve Energy efficiency and keep it constant over a wide range of loading conditions



Design optimization through:

- Semiconductors Choice
- Converter optimal Topology
- Chokes Design
- Cooling Technologies
- Auxiliary Optimizations
- Advanced Modulation Algorithms









Starting off with a simple 2xUPS Parallel Modules installation

Redundant parallel CAN-Bus over cable RJ 45







SCALABILITY





Redundant parallel CAN-Bus over cable RJ 45







... up to a full system deployment as the DTC space has reached Nominal Design configuration



Easy System Level Scalability through advanced Hot System Level Expansion designs and controls







And when System Level Uptime becomes an extremely critical factor...

2. It is fundamental to design products which have a fully modular approach, with completely redundant power and communication architecture at the same time

Enabling, through N+1 Modular type architectures, a 99.9999% system level availability

And at the same time matching operational constraints optimizing MTTR – reduced to only 10 min necessary for the hot swappable exchange of a power module in case of a failure.

Hot Swappable Power Modules







Towards an Autonomous DTC Operation

- Communication enables a new concept of monitoring / diagnosis service, based on IoT
- Predictive analytics can generate future insights with a significant degree of precision based on historical data and technical assessments such as statistical modelling and machine learning
- □ UPSs HW is then designed in such a way to guarantee full redundancy on the sensing chain (temperatures, currents, voltages, air flows) and with FW control routines, ensuring continuity of operation



Prielloubs



56 COMMS









Thanks for the attention!

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