Dynamic Power's Role In Improving Data Center Sustainability

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Societal Impact of Sustainability

Our industry sits at the center of two major forces:

- Ever growing demand for data
- Very real effects of climate change

As data and digital infrastructure scales, it must do so responsibly for the planet and its people.

Vertiv's Commitment to Sustainability, Safety, & D&I

Vertiv's Sustainability Strategy

Vertiv is committed to working with our customers in solving the complex problems related to critical digital infrastructure. We recognize that the sustainable design, development, use, and disposal of our products is critical to the longevity of our industry and to the greater world. We adhere to all locally applicable laws and are in the early stages of a long multi-year journey to establish and execute an ESG strategy.

You can learn more about our current views here:

- **Sustainability:** https://www.vertiv.com/en-us/about/sustainability/
- **Ethics & Compliance:** https://www.vertiv.com/en-us/about/ethics--compliance/

Sustainable Solutions

Design	Process	Solution
Build upon principles of Sustainable design	Align to design and manufacturing processes	Sustainable solutions from design to use

Sustainable Operations

Measure	Aim	Achieve
Collect scope 1 & 2 emissions, water, and waste data	Align actionable goals that permeate the organization	Deliver impactful environmental improvements

Protecting Vertiv's employees from environmental, health, and safety risks so they can be prosperous and achieve their goals.

We believe that innovation is rooted in uniqueness and diversity of our people, perspectives and approaches. Together, Vertiv excels.

Reduced environmental impact with a safe and inclusive work environment

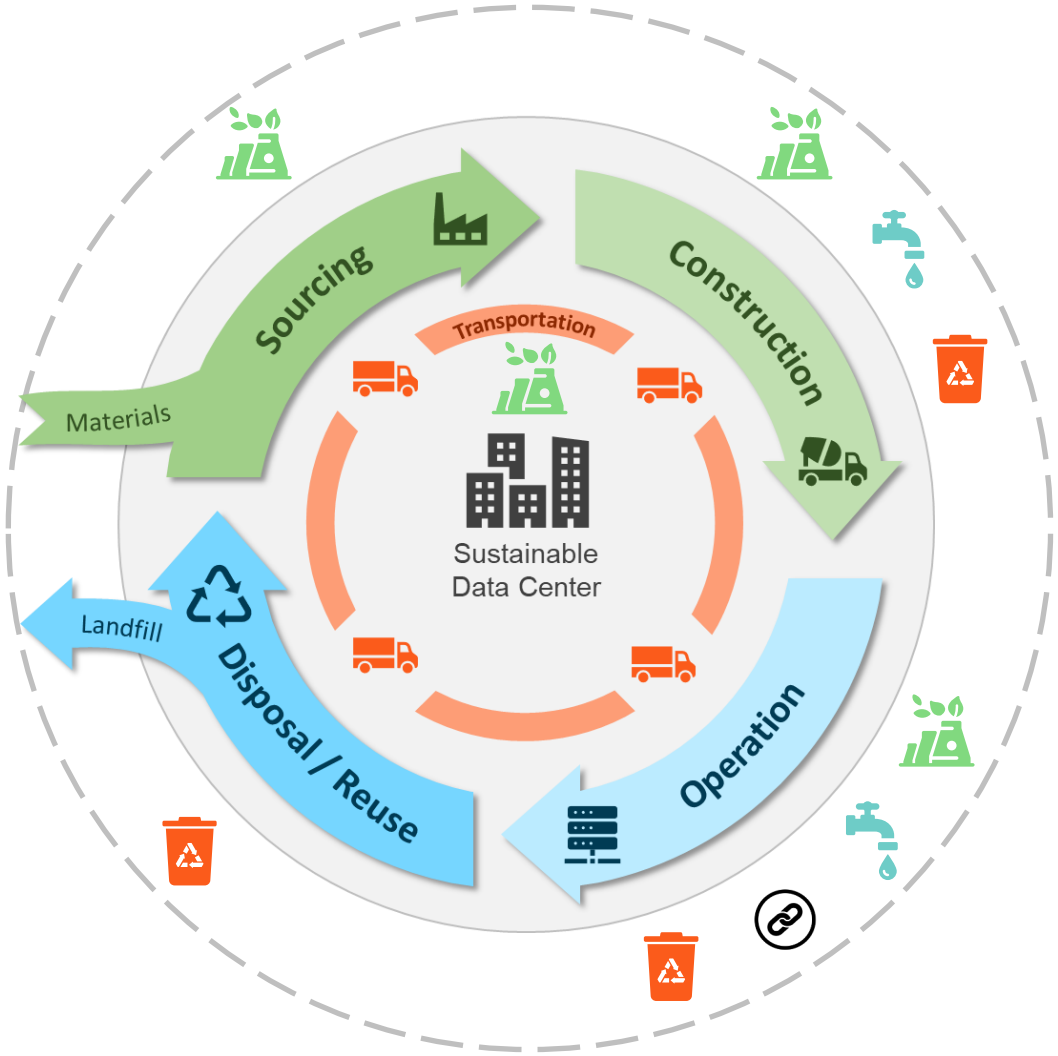
Moving Towards Zero Impact

Zero losses - we are driving to reduce the losses (increase efficiency) in both power and thermal

Zero carbon - we are developing power systems that will enable a move to a hydrogen powered eco-system

Zero water - we are driving thermal configurations that are not dependent on water usage

Zero waste - we are driving to increase utilization rates which will contribute to efficiency improvements



Sustainable Solutions At the Core of Vertiv

New

UPS GRID SUPPORT ENABLING MORE RENEWABLES

Vertiv Liebert EXL S1
Dynamic Grid Support

- Integrated solution including Grid Interactive UPS with external controller and battery storage that is optimal for energy intensive applications
- Provides grid balancing services through fast frequency response and demand management to fully utilize back-up power assets
- Intelligent demand management can enable new revenue streams and cost saving opportunities

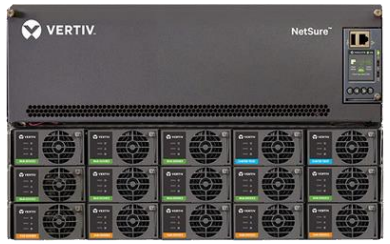
New Asia

HIGHLY EFFICIENT LIQUID COOLING

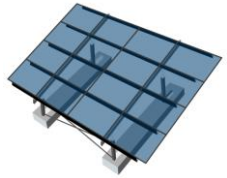
Vertiv Liebert VIC

- High-Density immersion cooling for high performance computing applications
- Cooling up to 200kW per rack, up to 95% more energy efficient than traditional methods
- Operates using clean, odorless ElectroSafe® Dielectric Coolant
- Low cost of operating with mechanical PUE as low as 1.03

HYBRID SYSTEMS INTEGRATING RENEWABLES

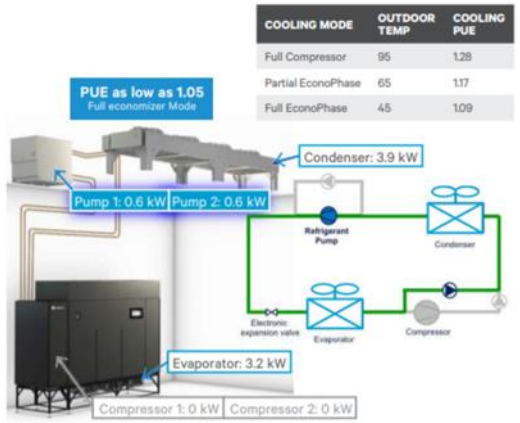


Vertiv NetSure



- Vertiv Solar Arrays purpose built for the unique installation present at telecom sites
- Vertiv NetSure™ fully-integrated DC power system with rectifier, solar and controller to provide maximum efficiency for mobile communication
- Vertiv NetSure™ Control Unit (NCU) allows for advanced energy controls for a wide range of DC power applications

WATER EFFICIENT FREE COOLING SOLUTIONS



Vertiv Liebert DSE Free Cooling

- World's most widely deployed pumped refrigerant economization system for data centers
- Each one saving approximately 6.75 million gallons of water per year
- Our water-free cooling systems have saved billions of gallons of water worldwide since introduced in 2013

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Sustainability Initiatives

We see data center operators adopting a 2 tiered energy sustainability strategy:

First – match energy use with 100 percent renewable energy

Second – operate on 24/7 carbon-free energy generated locally at the data center

sus·tain·a·bil·i·ty

noun

- the ability to be maintained at a certain rate or level.
- avoidance of the depletion of natural resources in order to maintain an ecological balance.

DIGITAL REALTY	• Committed to reducing Scope 1 and 2 emissions (direct and indirect company emissions) by 68% and Scope 3 emissions (indirect emissions in their value chain) by 24% by 2030
Google	• Already carbon-neutral and 100% renewable powered • 24/7 carbon-free operations by 2030
Microsoft	• 100% renewables by 2025 • Carbon-negative by 2030 • Remove all historic emissions by 2050
AT&T	• Carbon-neutral by 2035 • One of the world's largest purchaser of renewable energy
Tencent 腾讯	• 100% renewable by 2030 • Supporting China's aggressive goal of carbon neutrality by 2060
EUROPEAN DATA CENTRE ASSOCIATION	• European data centers carbon neutral by 2030 • 35 large data centers forging path ahead

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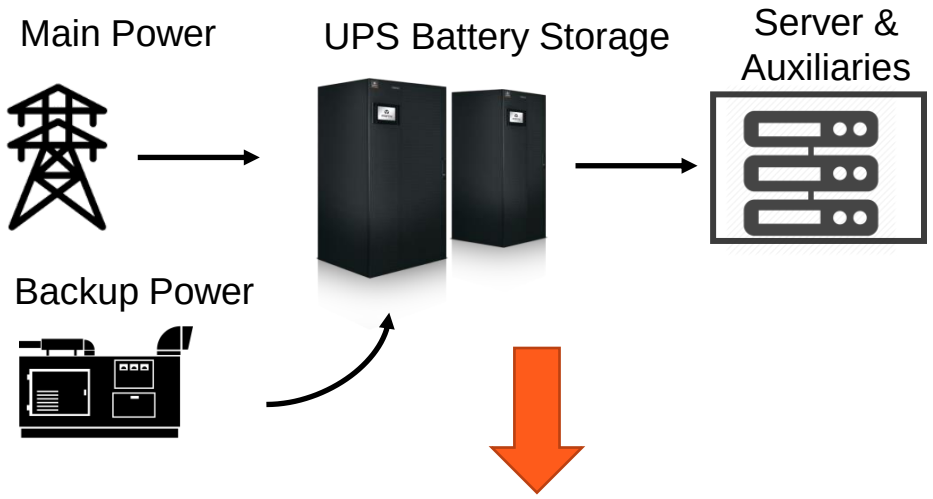
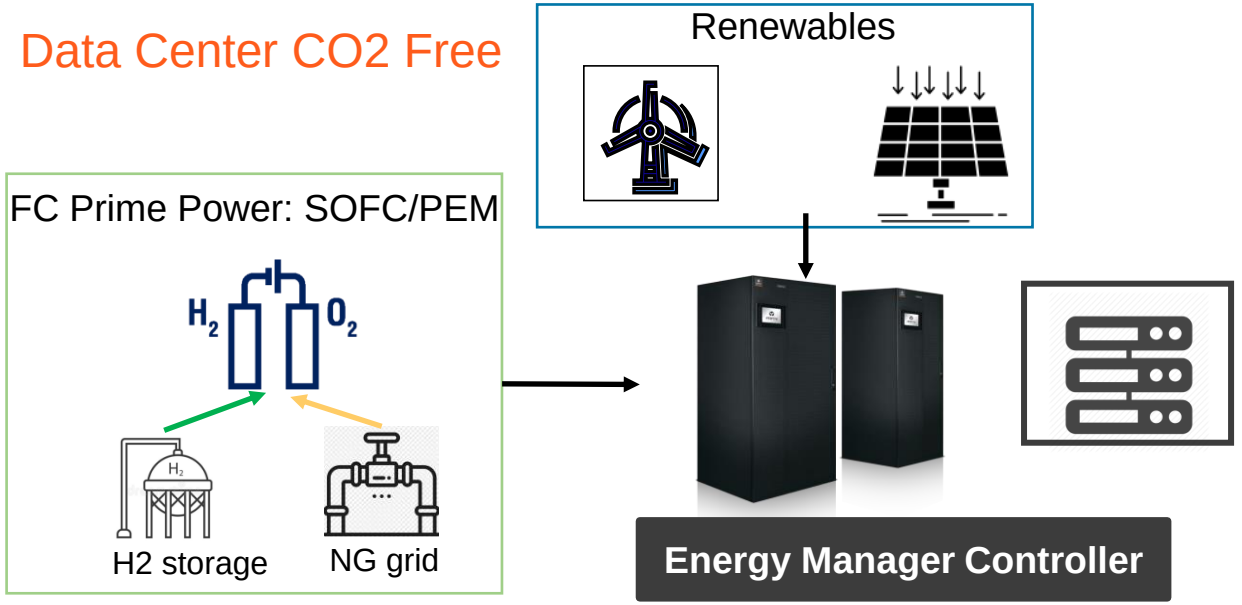
The Path to CO_2 Free Operation: Fuel Cell Integration for Backup and Prime Power

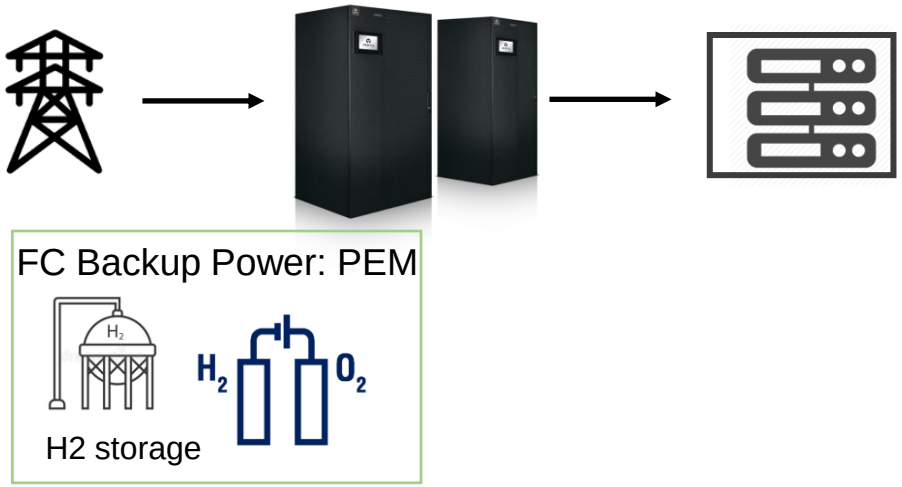
Data Center Today



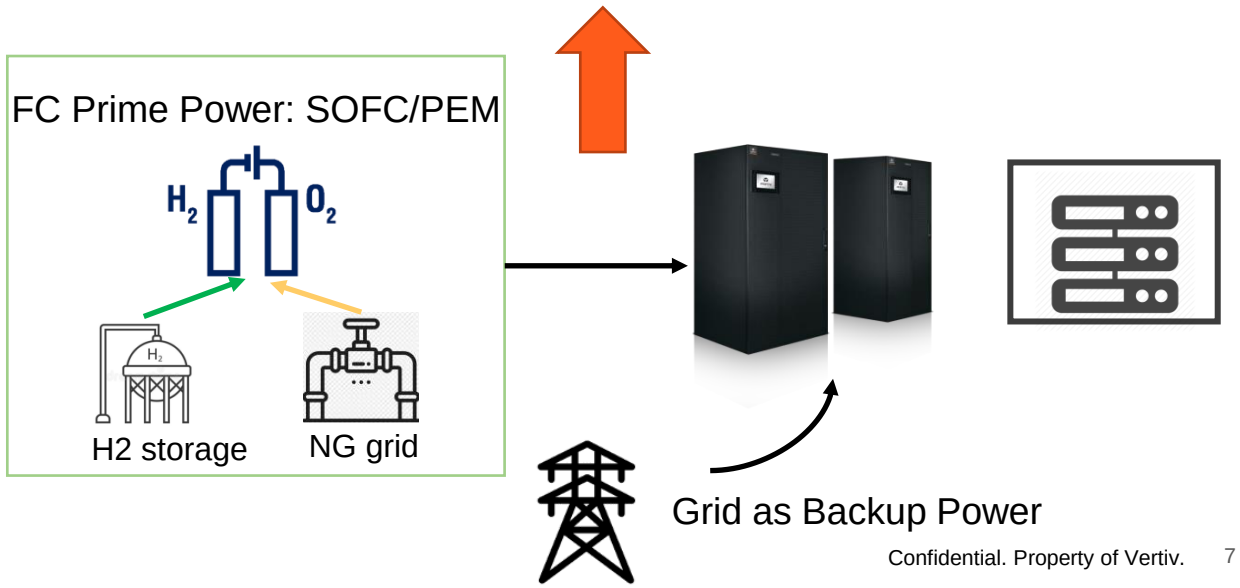
Data Center CO2 Free



Data Center with FC CO2 Free Backup Power



Data Center with FC Prime Power and Low CO2



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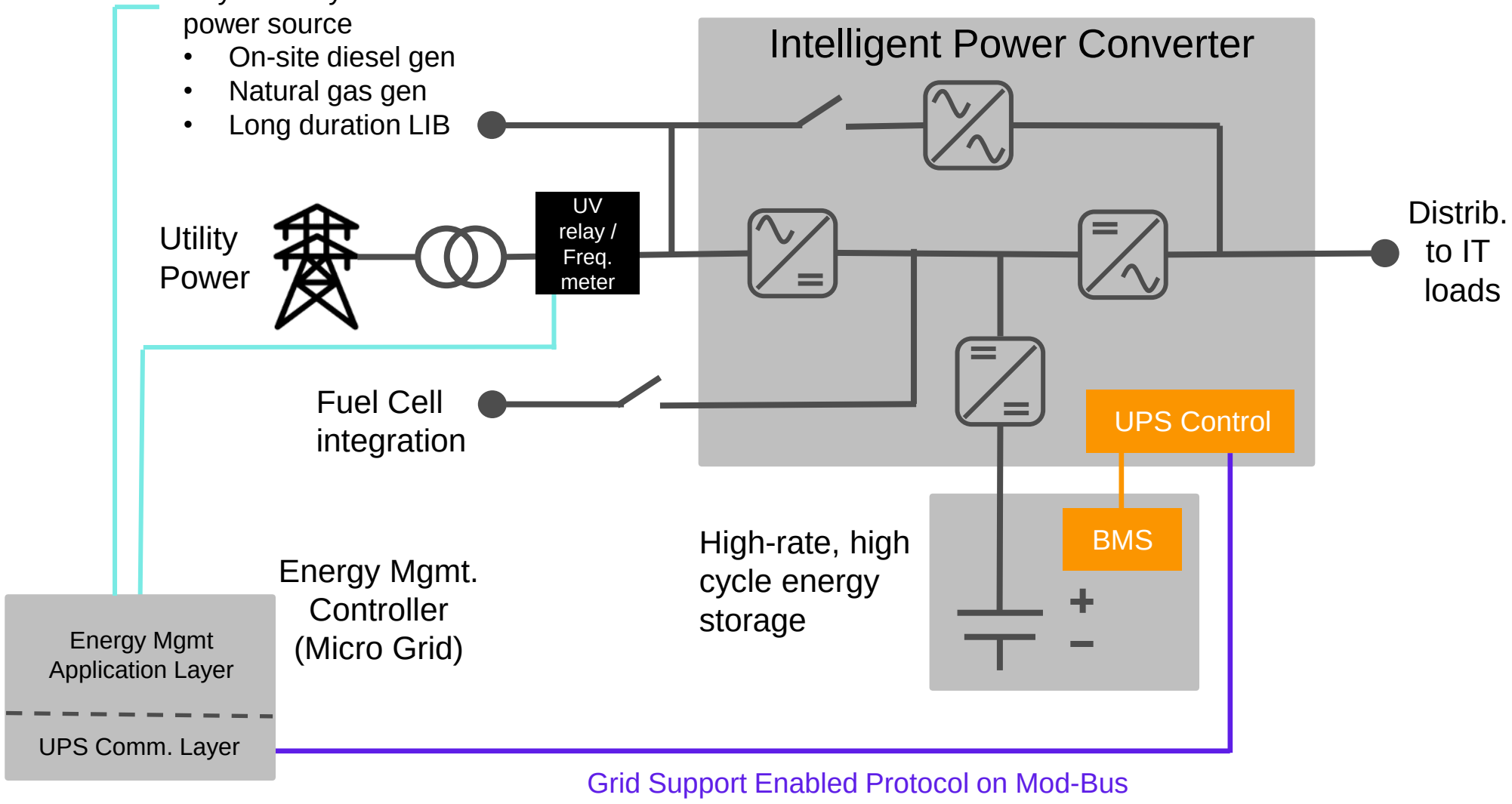
Energy Management Solution Architecture

Any power source can be used as an input to the UPS.

The control logic needs to decide which source is best (in terms of cost or other factors) and manage transitions between sources.

We should no longer assume that utility power is always primary.

Ideally, the energy management application would contain a library of functions for managing each source that might be present on any given site.

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