800 VDC Power and Cooling Solutions for Data Centers



Mike Tu

NVIDIA

Principal Electrical Engineer



Ralf Pieper

Delta

Research and Design

Senior Director

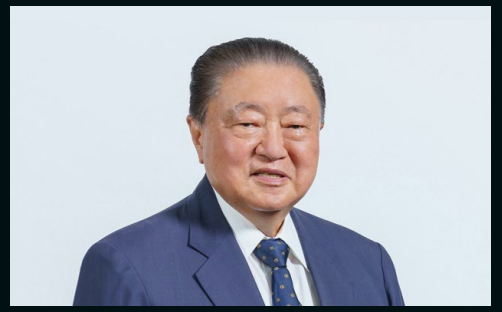
OCP GLOBAL SUMMIT | 2026

Scaling Innovation for the AI Era.

Delta at a Glance

To provide innovative, clean, and energy-efficient solutions for a better tomorrow.

Delta, founded in 1971, is a global provider of power and thermal management solutions. For over 50 years, we have offered the most energy-efficient power and thermal management products for Power Electronics, Mobility, Automation, Infrastructure, and other business categories.



Bruce Cheng

Founder and Honorary Chairman



Ping Cheng

Chairman and CEO

No. 1
Merchant Power Supply Manufacturer

$ 17.88 B
Revenue in 2025

> 8%
of revenue devoted to R&D each year

31.3 M Tons
of carbon emissions reduction from 2010-2025

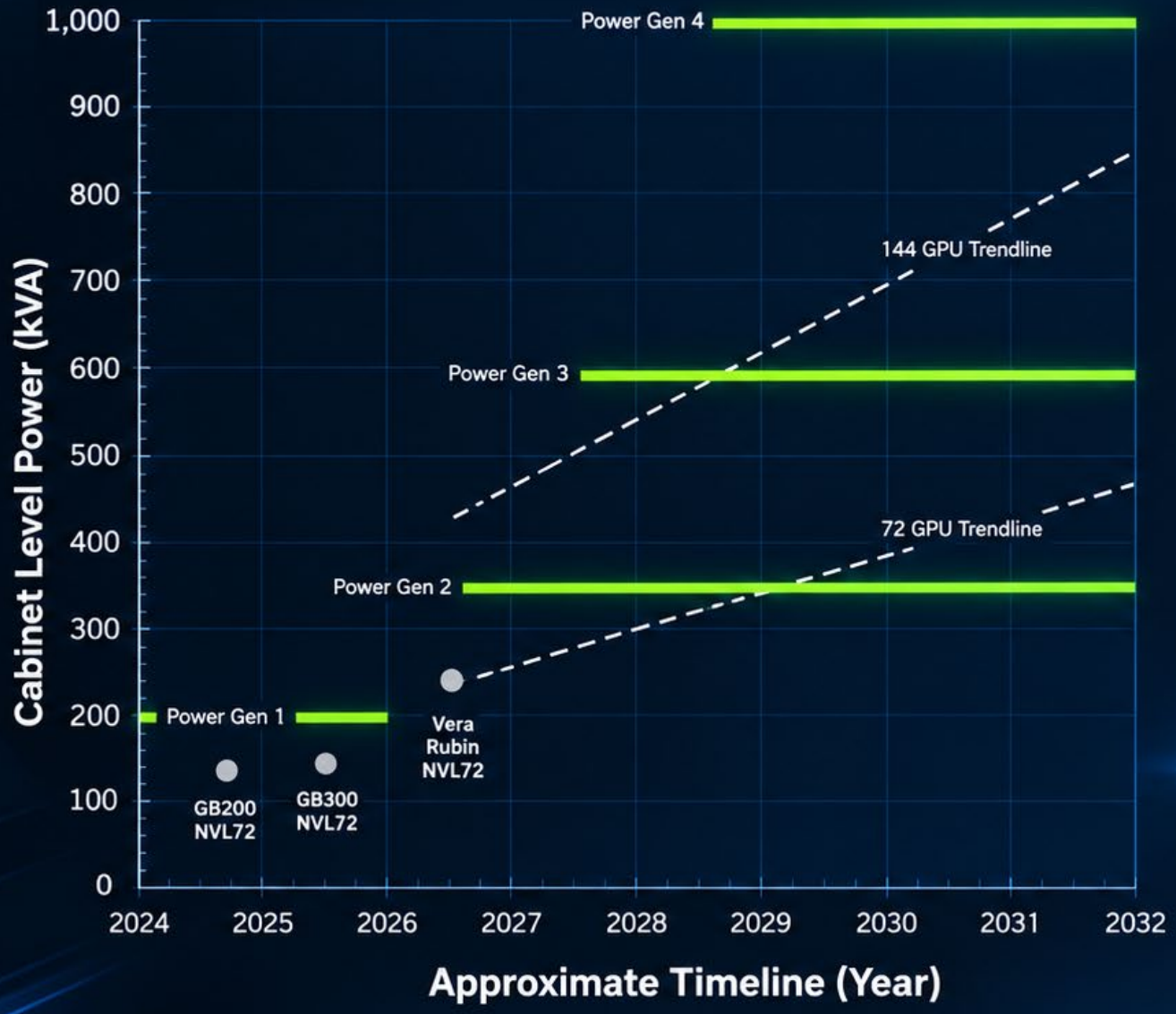
Why 800 VDC?

Two outcomes that define the next generation of AI infrastructure



More compute from every watt. **Faster capacity** from every build.

800 VDC Imperative





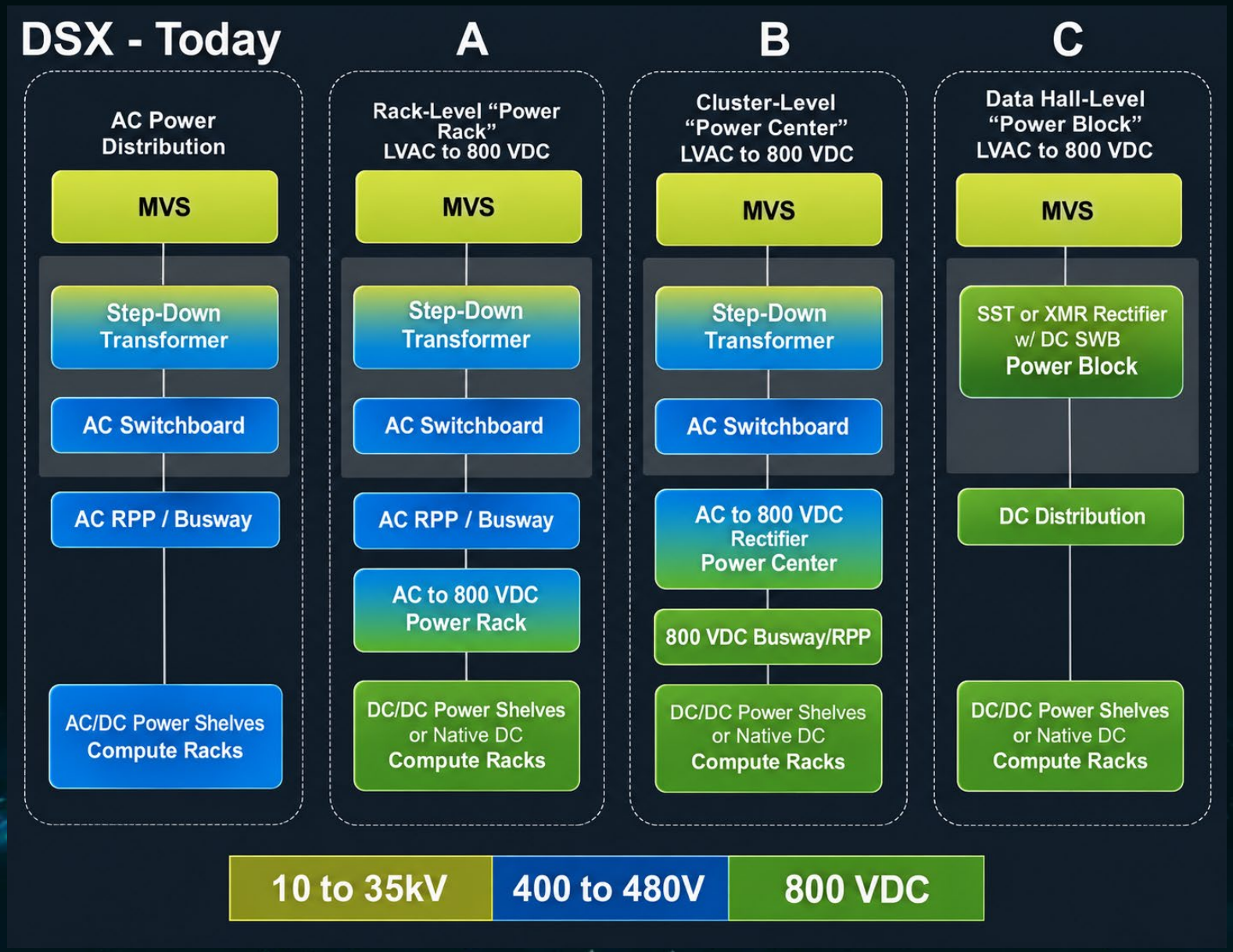
Gen 1
GB200/GB300
54 VDC
145 kW

Gen 2
Vera Rubin NVL72
54 VDC
330 kW

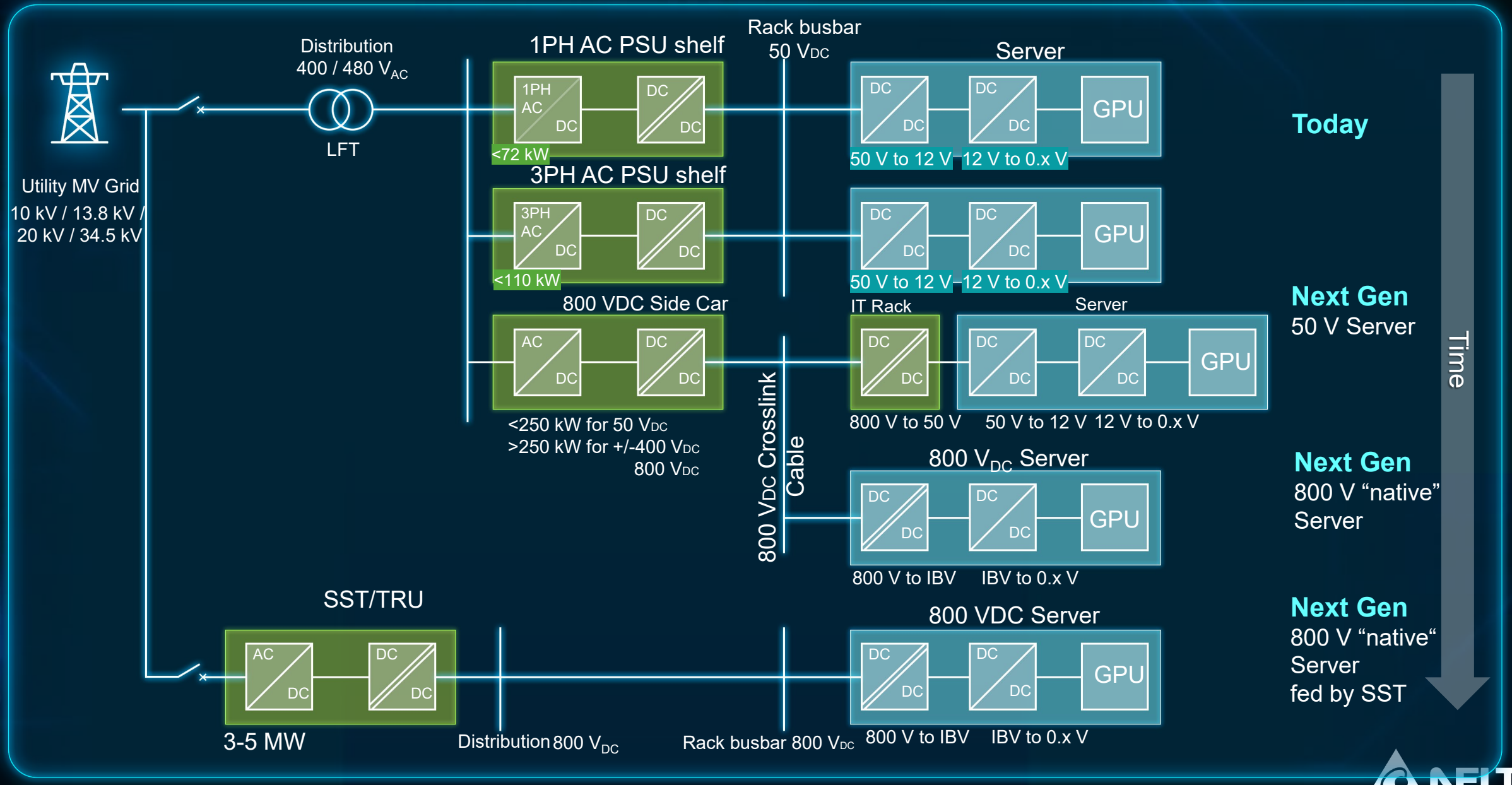
Gen 3
54 VDC
570 kW
800 VDC into the PSUs
100% liquid cooled

Gen 4

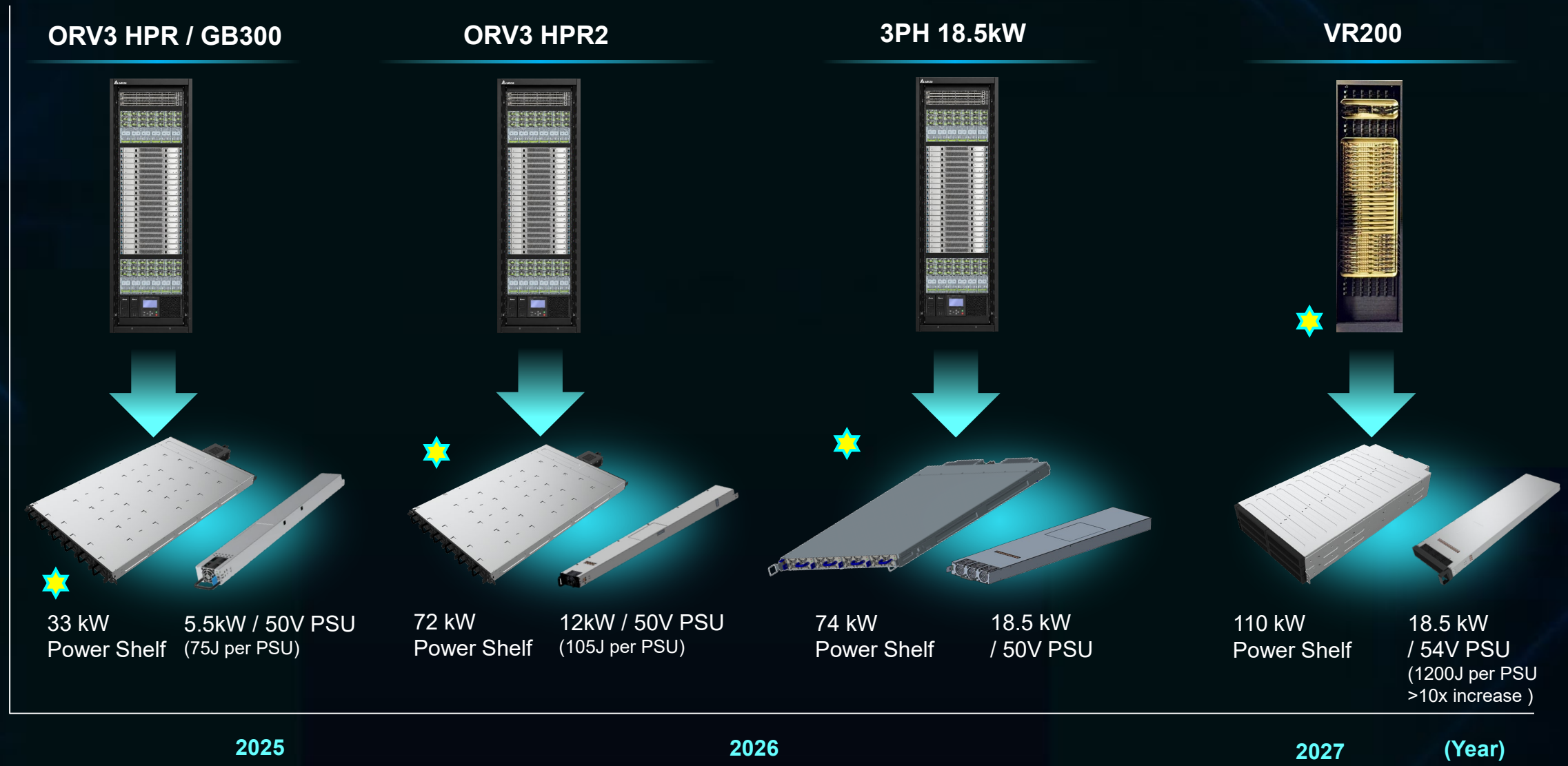
800 VDC Distribution in DSX



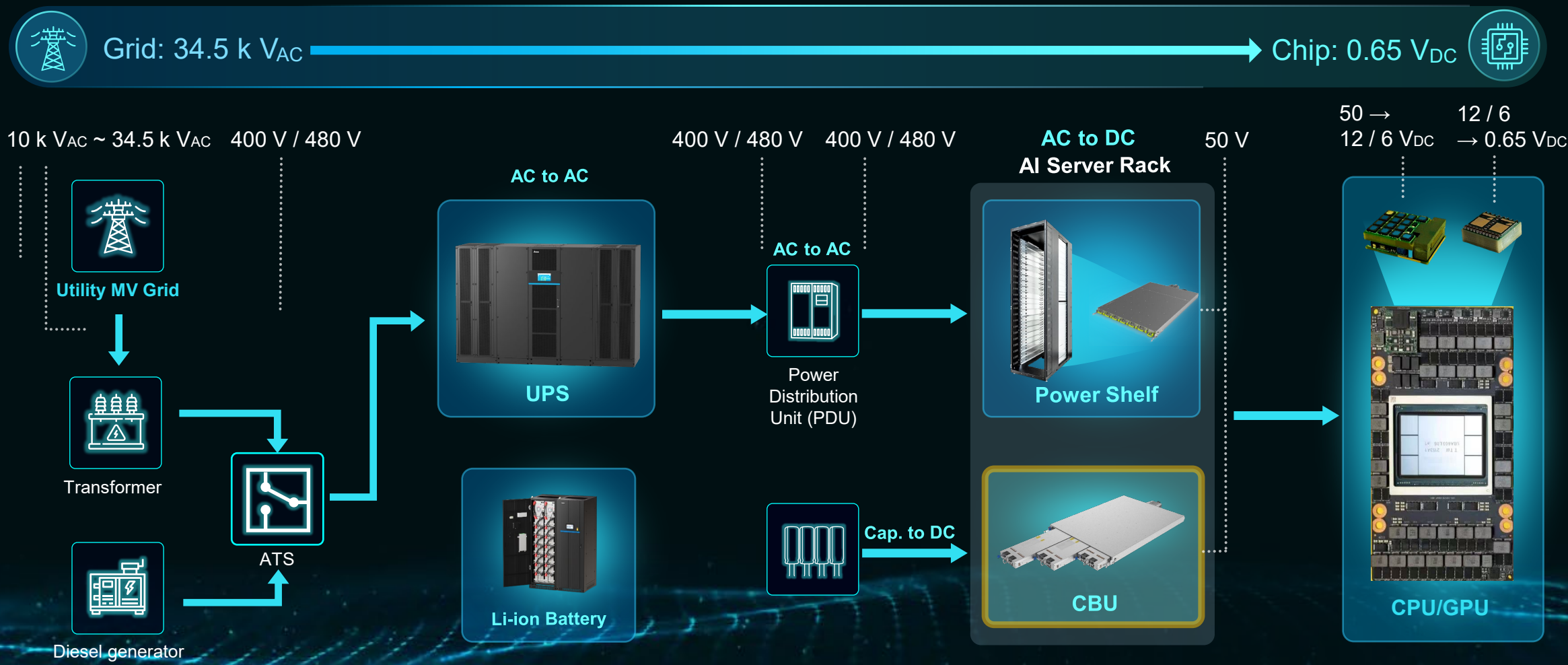
800 VDC Transition Plan



50 VDC Product Overview



Grid-to-Chip Power Solution for Data Centers



Conventional AC Distributed Data Center Infrastructure with CBU

Trending: High-Energy and High-Power PSUs

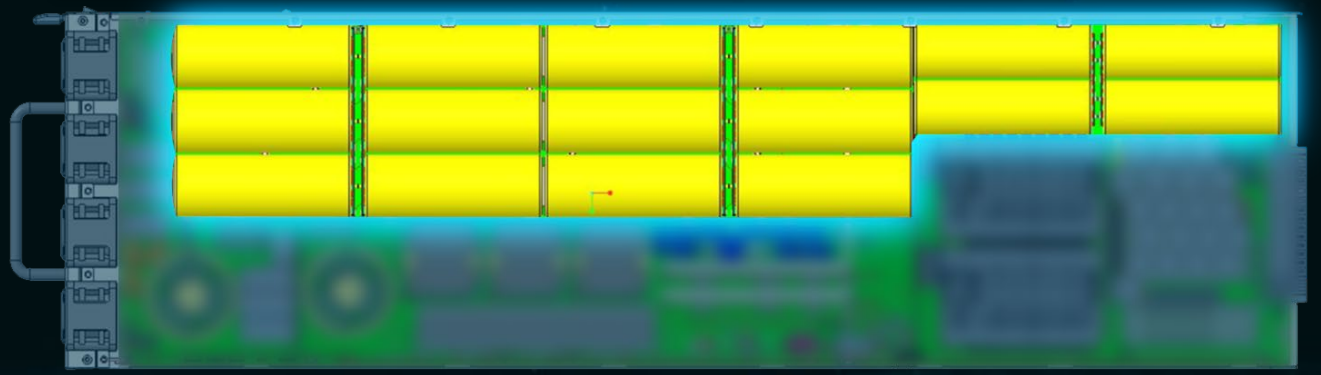
Energy Storage Introduced to flatten the GPU work load patten for
High frequency distortion to the grid and good power factor :

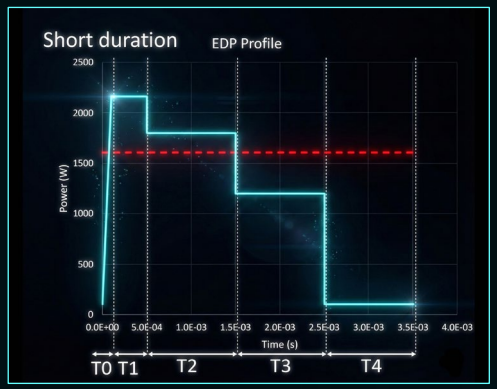


1PH PSU for NVIDIA GB300 NVL72



3PH PSU for NVIDIA Vera Rubin NVL72



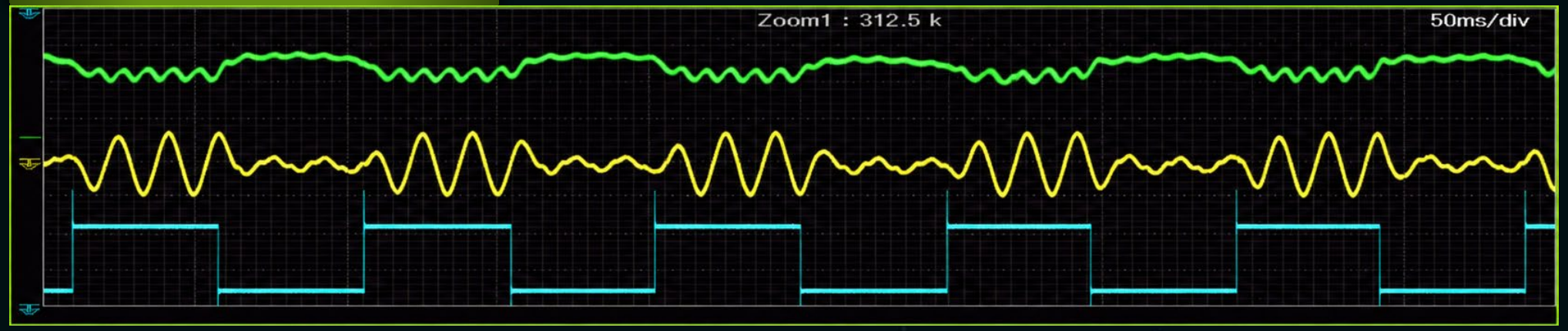


- **Energy Storage Aluminum capacitor embedded in PSU for high frequency dynamic load**

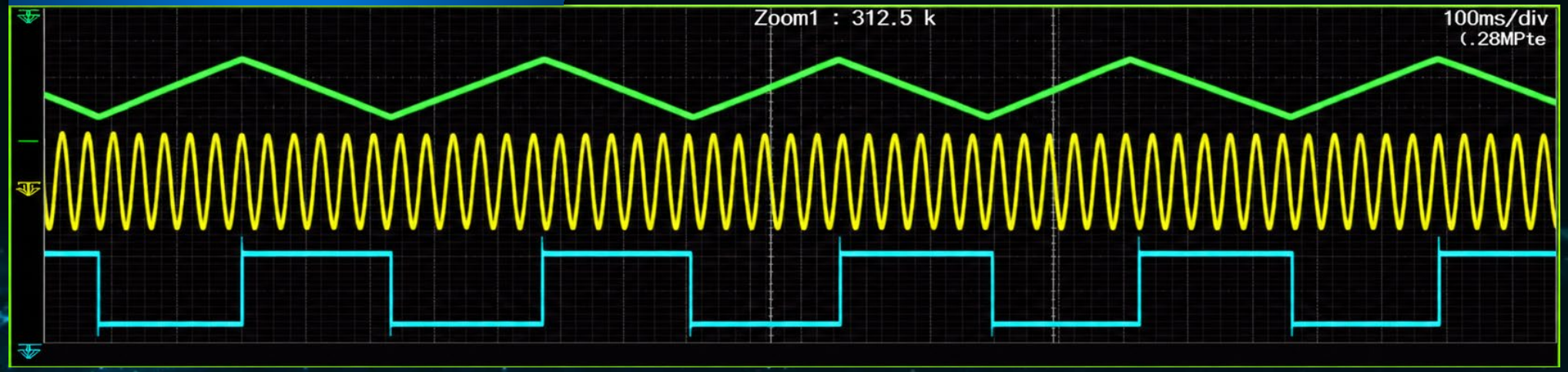
AC Smooth Control with High Energy PSU

1PH NVIDIA GB200 NVL72

— Input current — Output load — Bulk Voltage



3PH NVIDIA Vera Rubin NVL72



Empowering the Future
Gigawatt AI Factory
by 800 VDC

Option A: Edge Inference Upgrade

L11: 1 - 800 VDC Power Rack + 2 – VR NVL72 Compute Rack

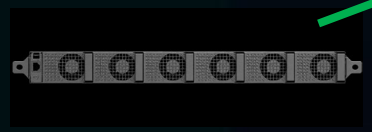
Power Rack:

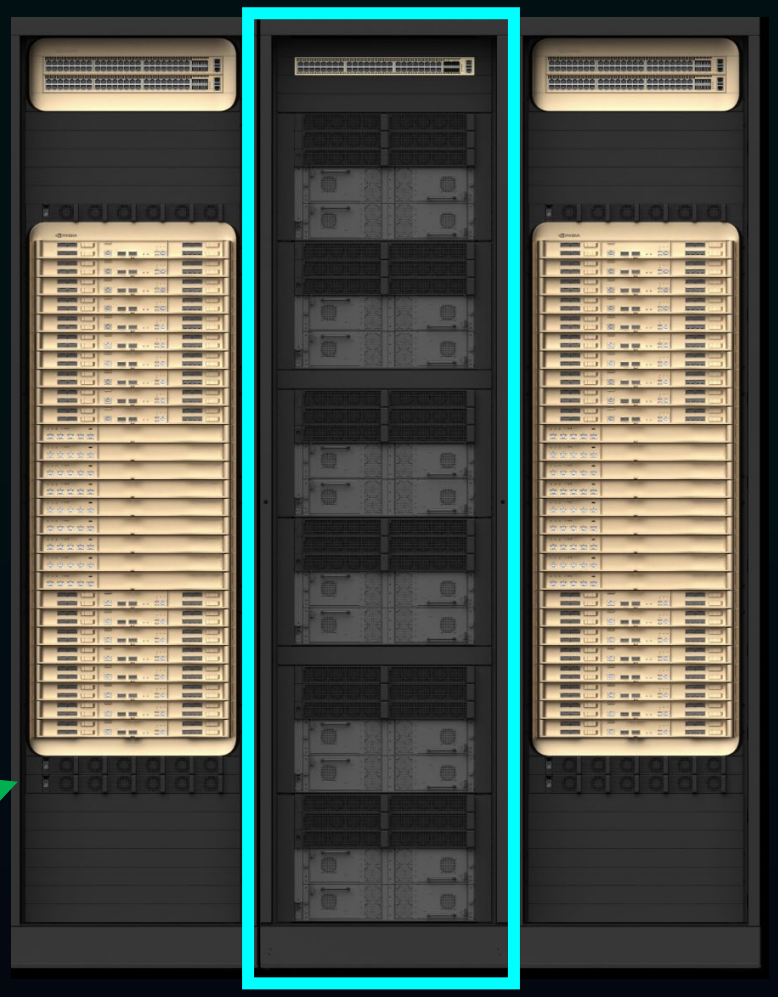
Key Features:

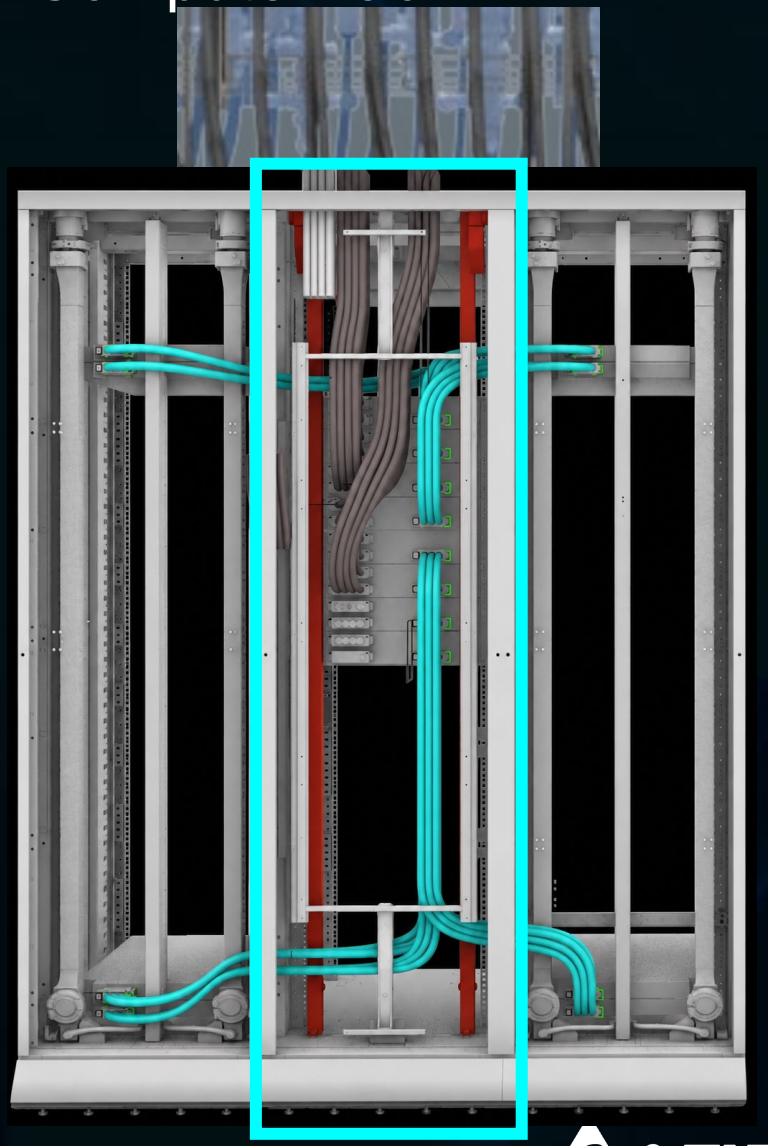
- 660kW Rating – supporting
- 415 – 480 VAC Input w/ 12 – 100A AC Whips
- 800 VDC Output w/ 8 -125A DC Cables
- Allow N+N Redundancy to Compute Rack
- Accommodate Battery Backup Units

Installation Requirement:

- Compute Rack adopts 1RU DC/DC Powershelves @ 90kW each
- Additional In-Row and Data Hall Space
- Sufficient AC Input Power Capacity





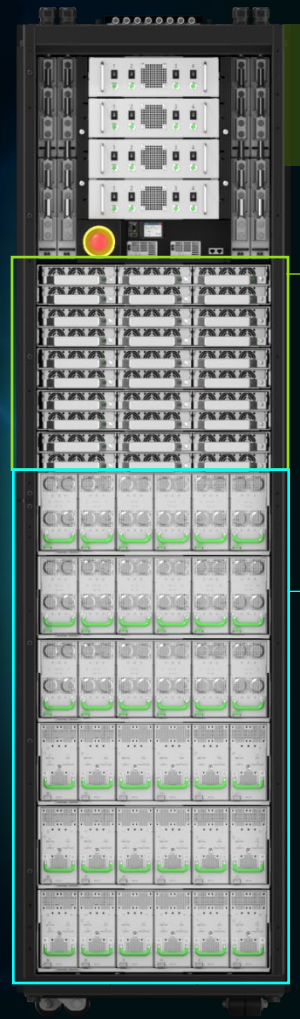


Case 1 – Edge Data Center w/ Option A



ORV3 / 800 VDC In-Row Power Rack

ORV3 HPRv4



900 kW In-Row Power Rack
with BBUs / CBUs



• **6** sets for

BBU 25 kW



or

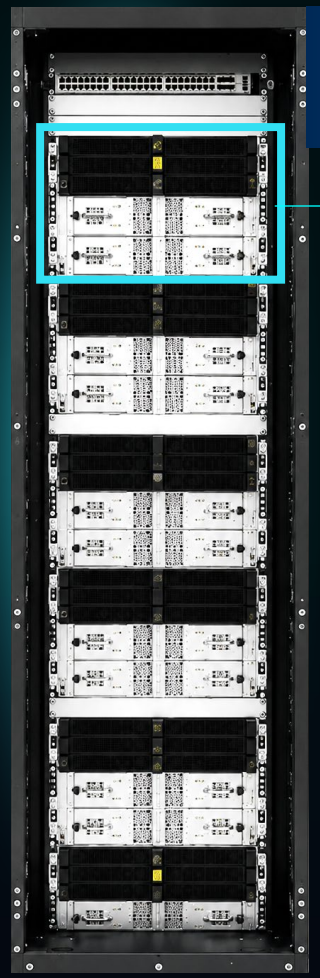
CBU 16 kW



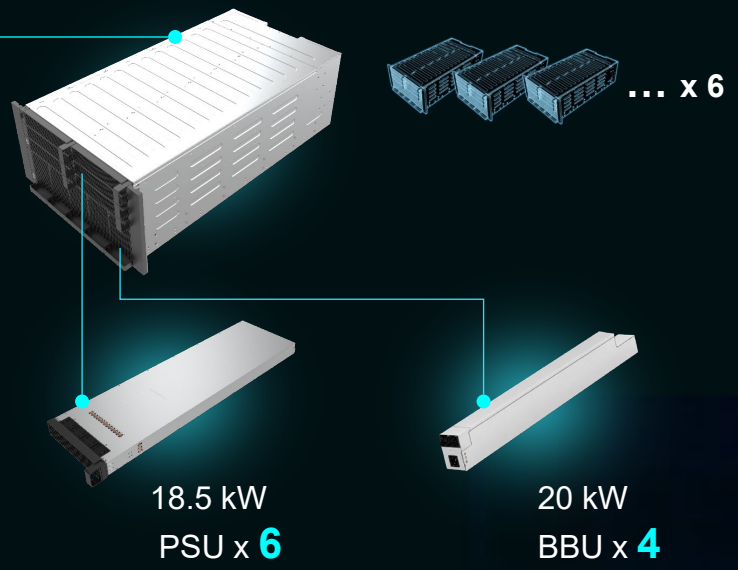
* CBU: Capacitor Bank Unit

- **N+2** redundancy
- **5** sets of **180kW power shelf**
- **2** pcs for redundancy & battery charging

800 VDC



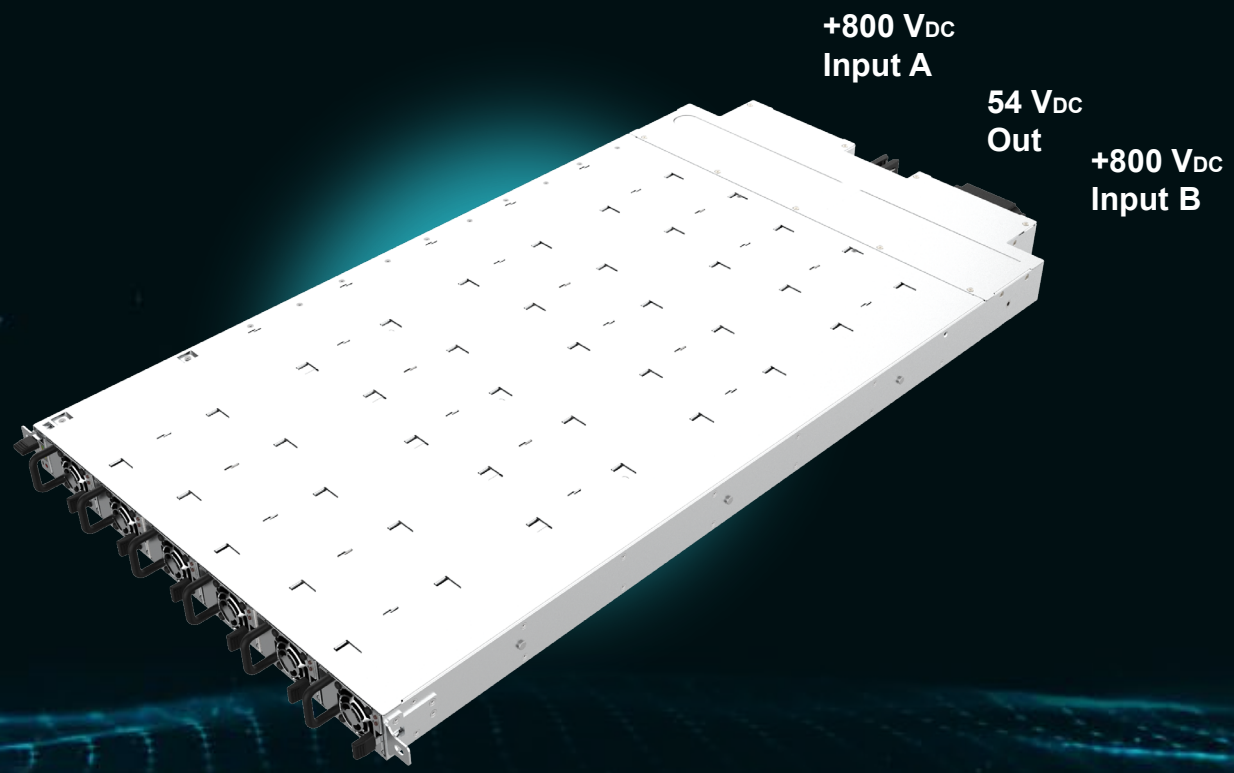
660 kW In-Row Power Rack
with BBUs



Up to **98%** efficiency with integrated **480 kW** BBU backup power.

In-Rack **800 VDC to 50 VDC**
DC-DC Power Shelf

- 1 RU / 1 OU concept based on 19” / 21”
  90 kW shelf and 108 kW shelf
- Peak Efficiency 98,5%
- 6 x Rails with 15 kW / 18kW
- 800 V → 54 V isolated converter
- Output: Busbar Barklip connection
- Shelf Controller with Ethernet / Redfish API



Transition from **Air** to **Liquid** Cooling

- Even 97% efficiency for the PSU leads to 30kW losses @ 1MW pay load
- Fan power for 30kW unit reaches 200W, which leads to 0.7% efficiency loss
- Fans with 38krpm create unbearable acoustic noise

Solution:

“Pizza Box PSU”

One cooling loop, same like a Server, PSU is like a Shelf

- 55 kW in 1U / 19“ or 21“
- 3600J Bulk energy for grid smoothing



95 kW DC/DC

110 kW AC/DC

110 kW AC/DC With BBU

Option B: Compute Cluster Upgrade (RPP)

L12/13: 4- 800 VDC Power Centers + 14 – VR NVL72 Compute Racks

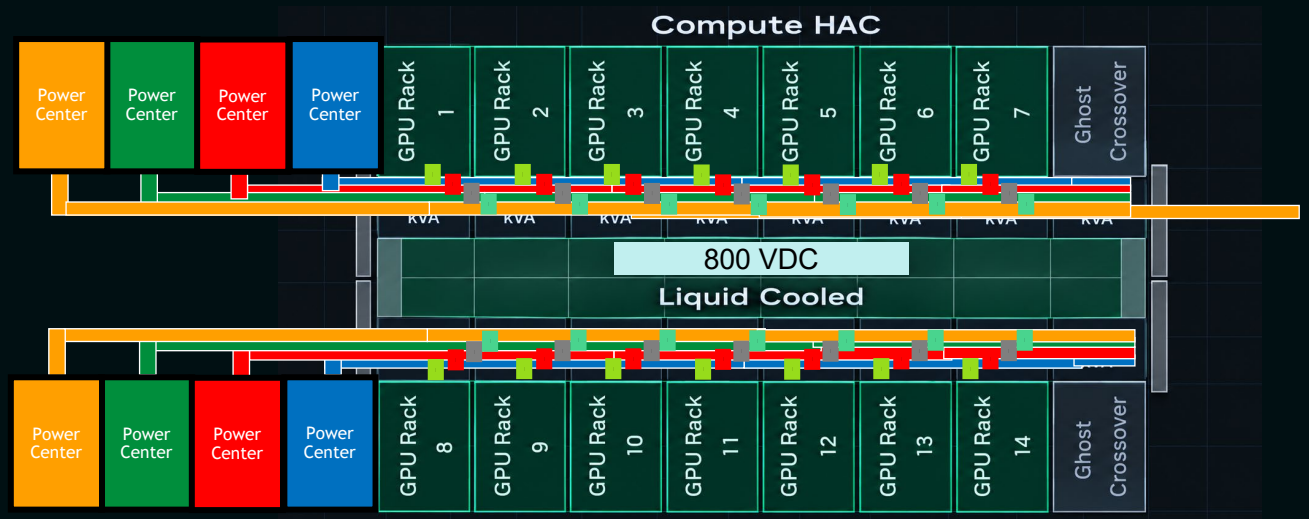
Power Center Compute POD:

Key Features:

- Adopt 4 – 800 to 1000 kW Power Centers for each IT Row
- Compute POD Capacity up to 6MW
- Configurable Redundancy (4 to make 3 or N+N) to Compute Rack
- Require 4 – 125A Whips per VR NVL72
- Power Center can convert to DC UPS with Battery Backup Units (BBUs)
- Reduce Data Hall space requirement

Installation Requirement:

- Sufficient Gray Space AC Power Capacity
- Install DC Power Cables and Connectors



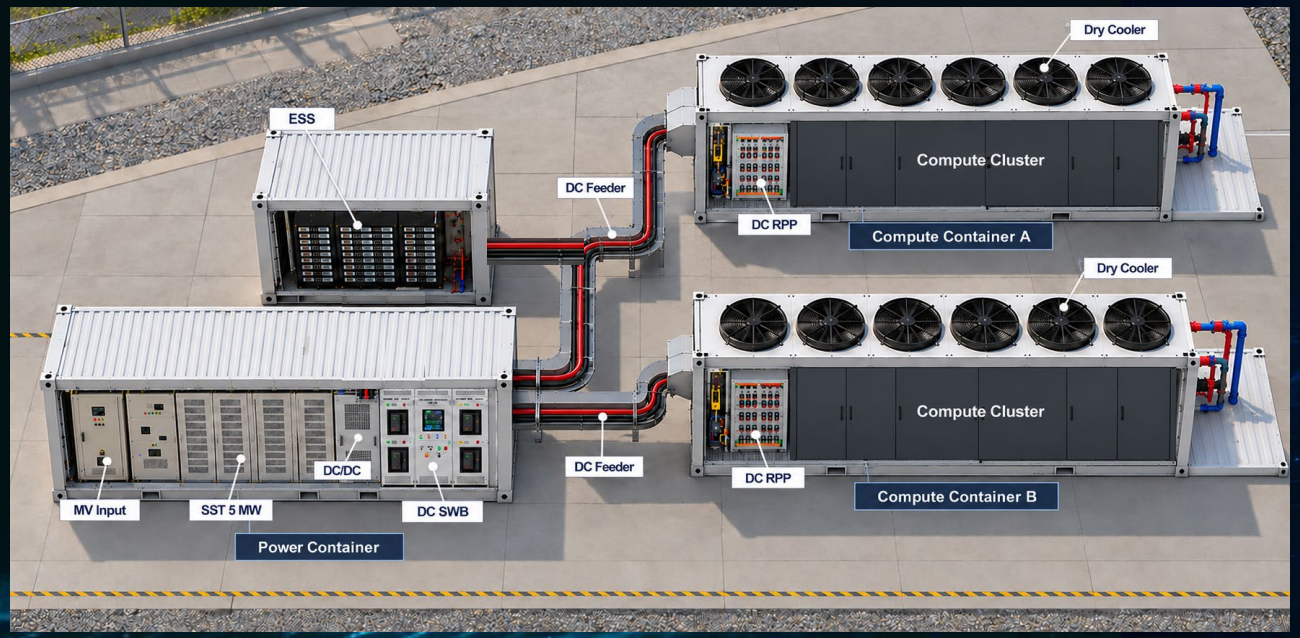


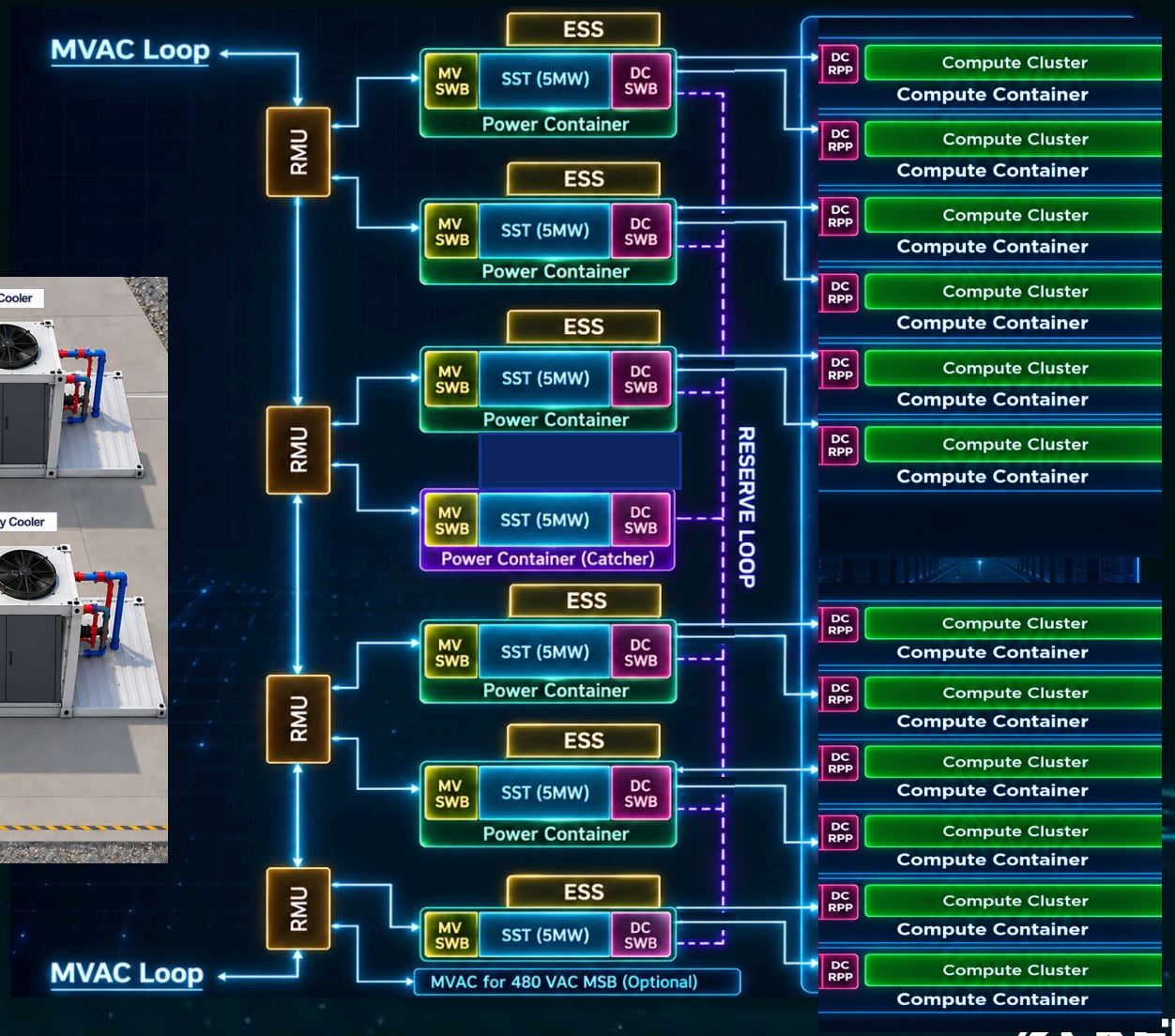
Case 2B – Hyperscale In-flight Pivot w/ Option B



Option C: Green Field Data Hall

L14: MV to 7 - 800 VDC Power Block + 6 - Compute Clusters





800 VDC simplifies the Power Path

Rethink the architecture for the next generation of AI factories

CONVENTIONAL POWER PATH



1. MVAC GRID
2. STEP-DOWN TRANSFORMER
3. LV SWITCHGEAR
4. UPS
5. PDU / RPP
6. RACK PSU
7. COMPUTE

800 VDC POWER PATH



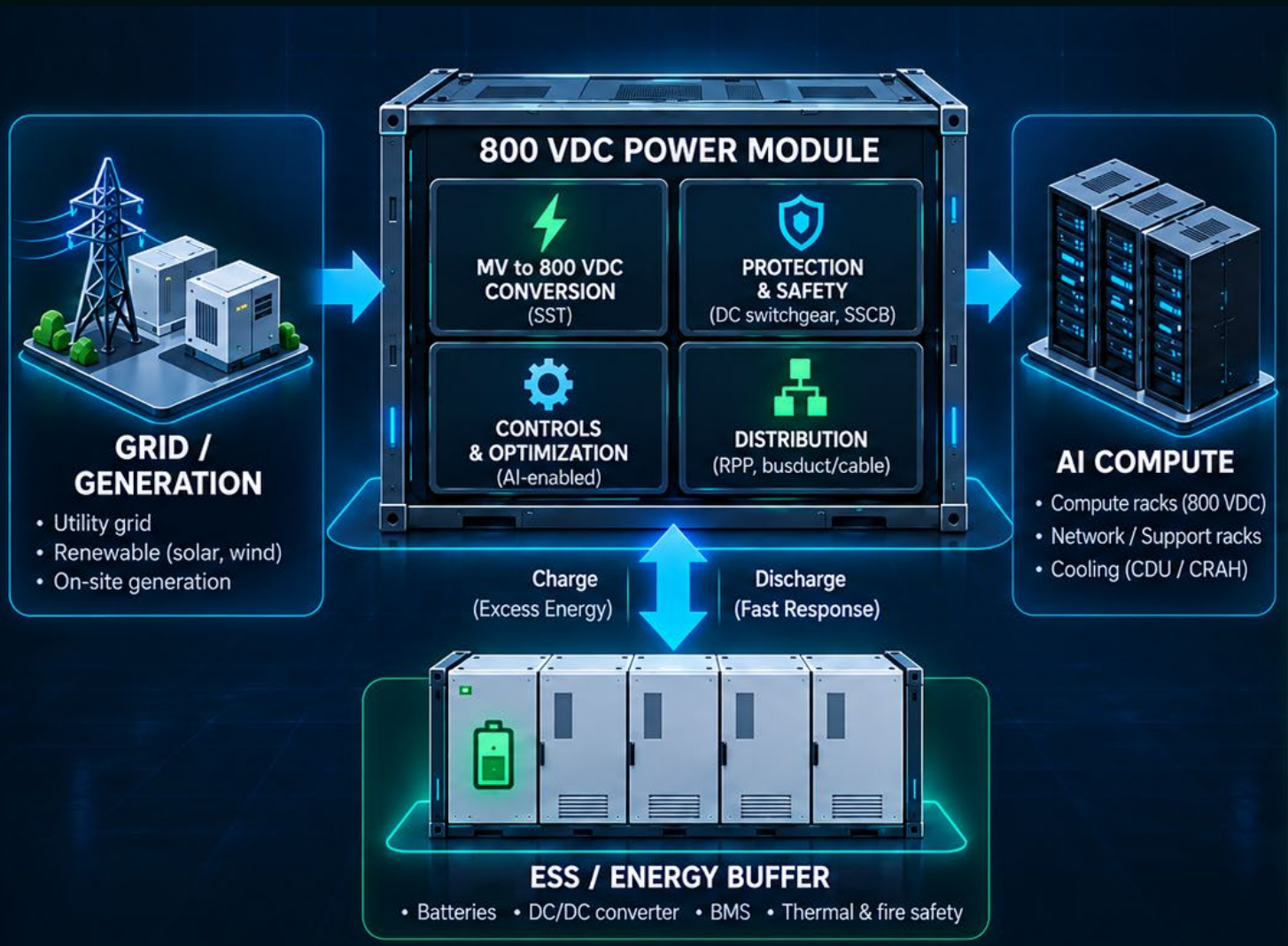
1. MVAC GRID
2. SST / MV RECTIFIER
3. 800 VDC DISTRIBUTION
4. NATIVE 800 VDC COMPUTE

Not just a voltage change — an opportunity to redesign the system.

- **Simplified Power Architecture**
- **Less Power Conversion Stages**
- **Smaller Infrastructure Footprint**

DELTA

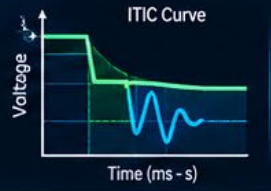
Integrated ESS: Reliability and Power Optimization



WHAT STORAGE ENABLES

FAULT RIDE-THROUGH

Maintain 800 VDC power quality during grid disturbances (ITIC curve compliance)



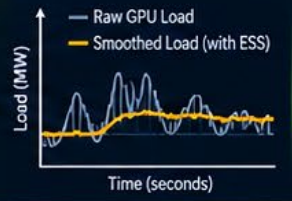
BACKUP POWER (AUTO TRANSFER ENABLER)

Support compute service uptime during source/SST outage or maintenance.



POWER SMOOTHING

Buffer fast load changes, reduce ramp rates and cycling to improve grid compatibility and equipment integrity.

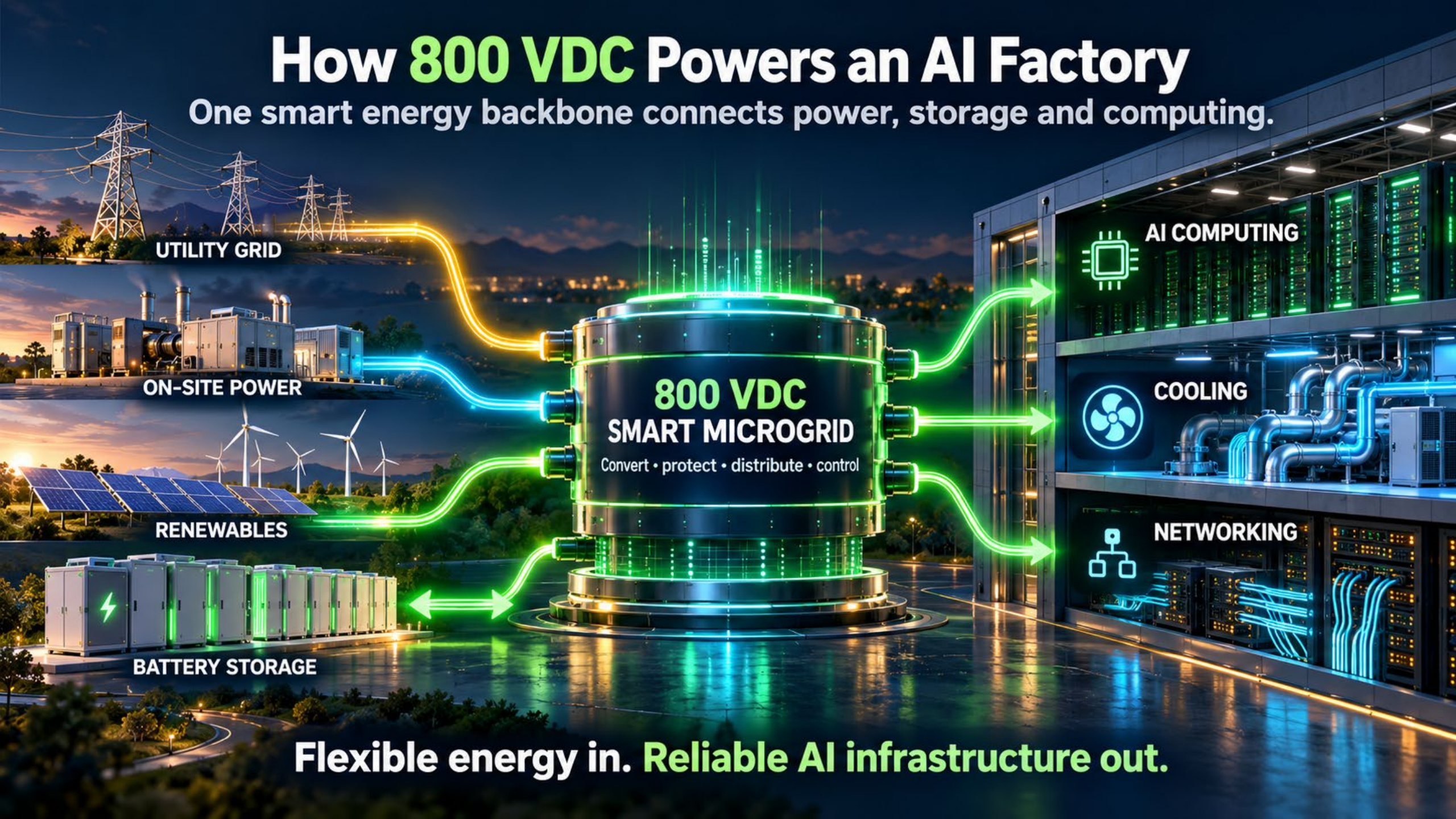


LOAD AVERAGING

Flatten and optimize total load across SSTs to achieve higher sustained utilization (MaxLPS) and enable more GPUs.



STABLE POWER. HIGHER UTILIZATION. MORE COMPUTE.


How 800 VDC Powers an AI Factory
One smart energy backbone connects power, storage and computing.
UTILITY GRID
ON-SITE POWER
RENEWABLES
BATTERY STORAGE
800 VDC
SMART MICROGRID
Convert • protect • distribute • control
AI COMPUTING
COOLING
NETWORKING
Flexible energy in. Reliable AI infrastructure out.

800 VDC Equipment Readiness

A phased path from rack-level power to facility-scale power blocks



Cooling Solutions for Giga-Watt AI Factories

Delta Liquid Cooling Solution Portfolio









Data Center Construction

01 Board Level



- DC pumps integration for **Closed Loop Solutions**
- QD & Hosing integration for **Open Loop Solutions**

02 Rack Level



- Delta DC Pump
- Integrating of Delta Fan and Pump
- Redundant Pump Design

03 System Level



- One Stop Liquid Cooling Integration

800 VDC In-Row CDU

2.5 MW Cooling Capacity in a Compact Footprint

High Cooling Capacity

- Cooling capacity: 2.5 MW @Tapp 4°C
- Flow rate: 3,850 LPM @60Psi



Easy Maintenance & Redundant design

- LED Visual Confirmation for CDU Status
- LED Visual Confirmation for Pump Tray Status
- Pump Redundant design (2+1)
- Hot swappable sensor (Temp/ Pressure sensor)
- 6” Filter easily replaceable design.
- 4” Filter redundant (2+1) and easily replaceable designs

