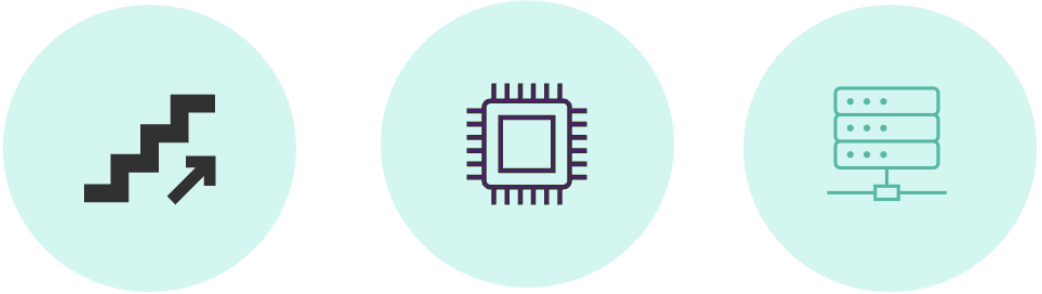
Scaling AI Factories:
800 VDC Architecture, Development, and Deployment

Mike Tu, P.E. *Principal Electrical Engineer, NVIDIA*

Jared Huntington *Power Architect, NVIDIA*

800 VDC: Powering the Next Generation of AI Factories

Power Optimization for "Token Production"



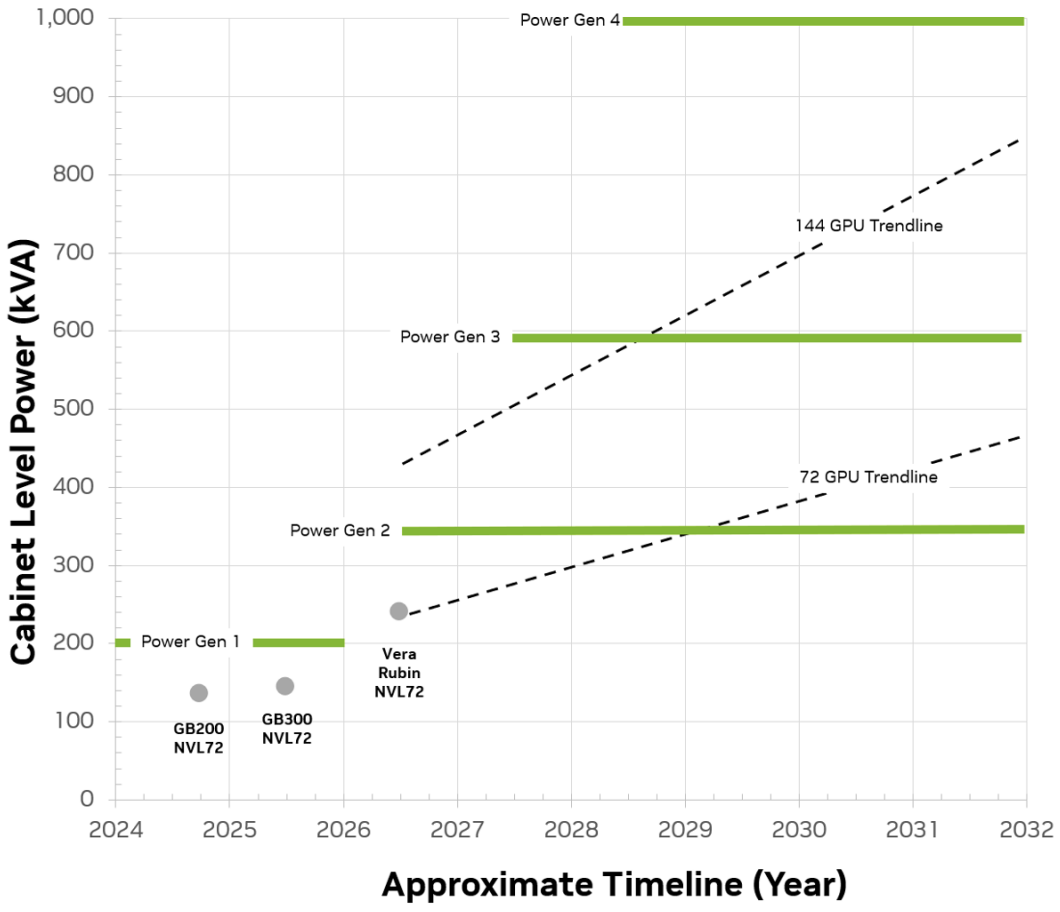
- Simplified & Efficient Power Architecture
- AI Compute Density Enablement
- Improve Power Utilization & Resilience

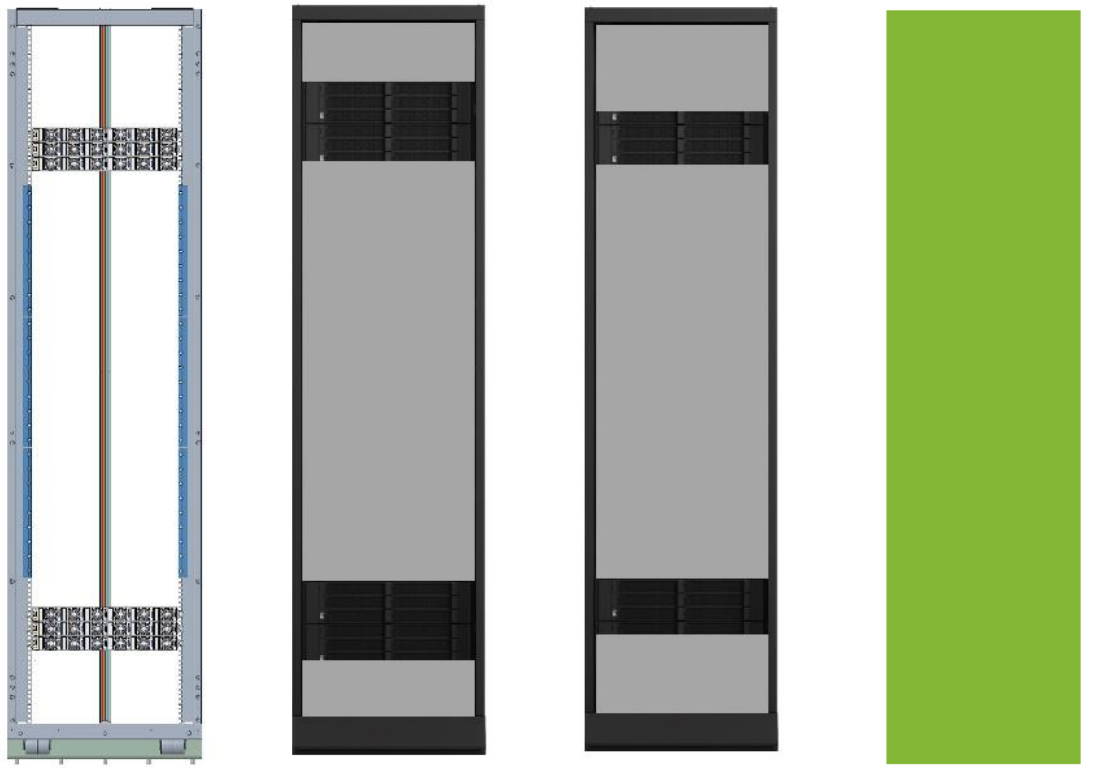
Fast Deployment of "AI Factories"



- Enable Flexible Power Options
- Reduced Power Footprint
- Accelerate AI Factory Construction

800 VDC Imperative





Gen 1
GB200/GB300
54 VDC
145 kW

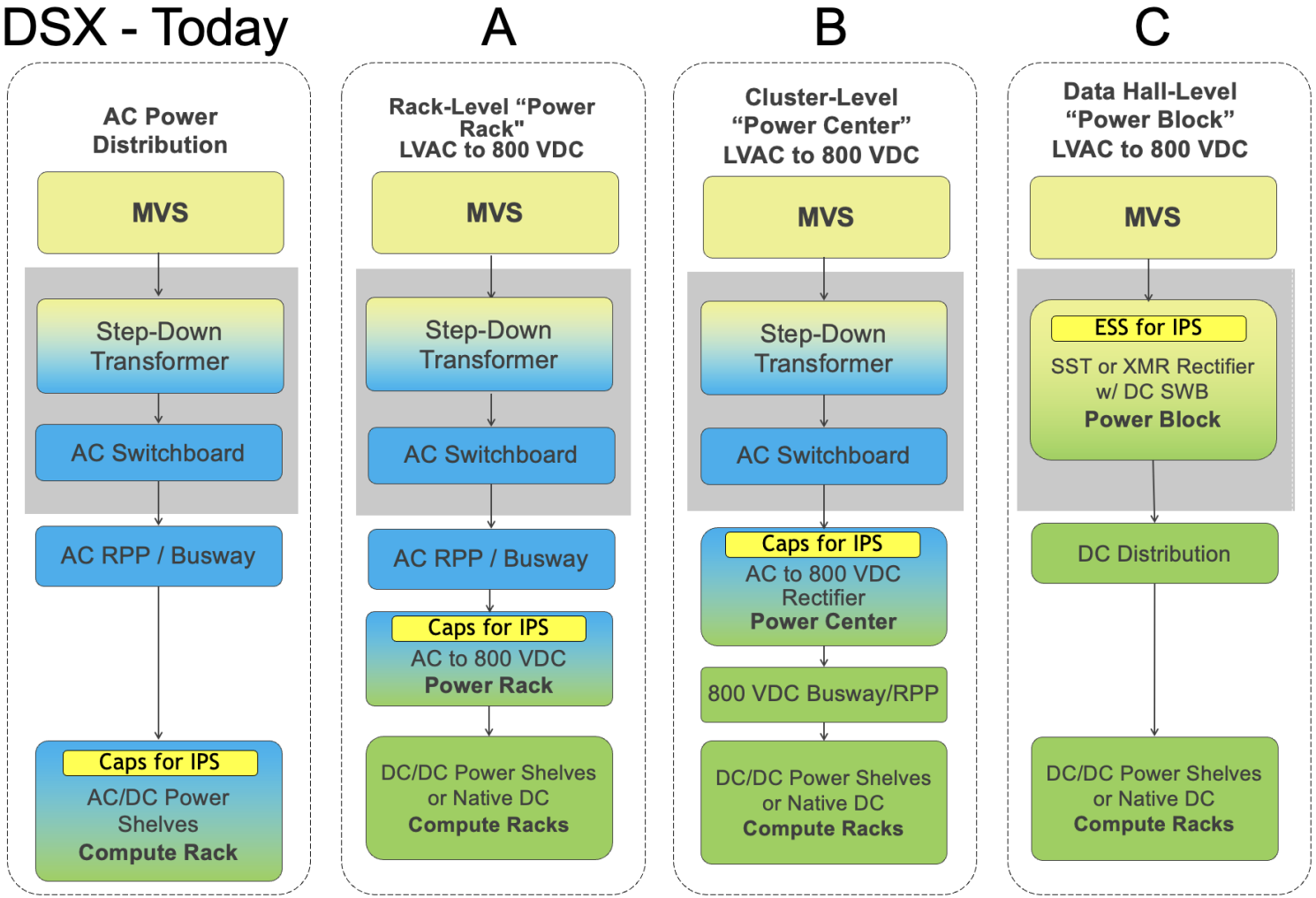
Gen 2
Vera Rubin NVL72
54 VDC
330 kW

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

Gen 4
800 VDC Native

800 VDC Deployment Options

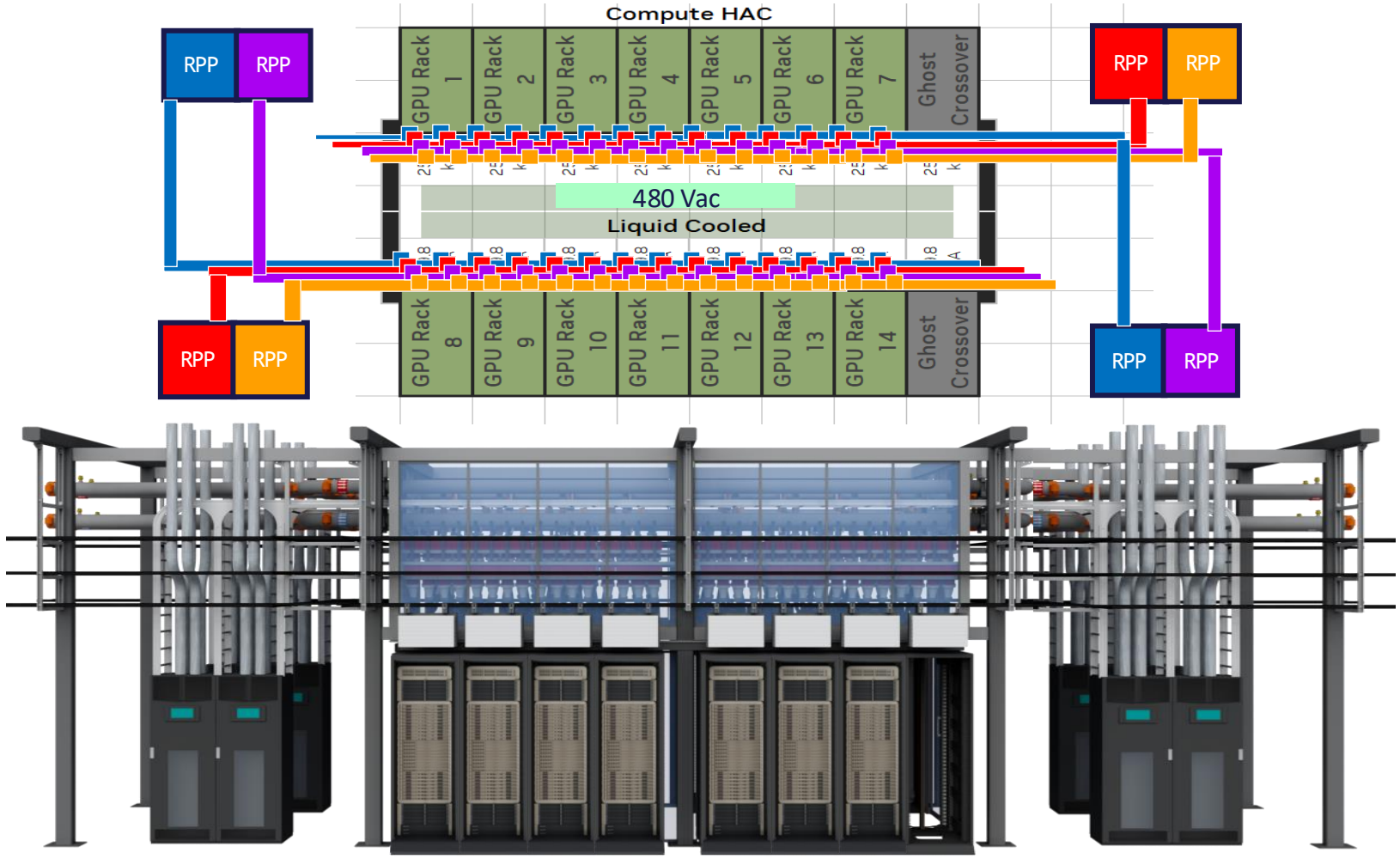
10 to 35kV | 400 to 480V | 800 VDC



DSX Today – AC Solutions

Key Features:

- Nearly all data centers built to date utilize AC distribution
- 8 x 100A whips per VR NVL72
- Need sufficient overhead space to accommodate the congestion from:
  - AC Power Distribution
  - Cooling Pipes
  - Network Connectivity



Option A – DC Power Rack

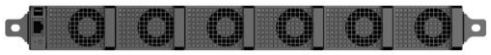
Power Rack:

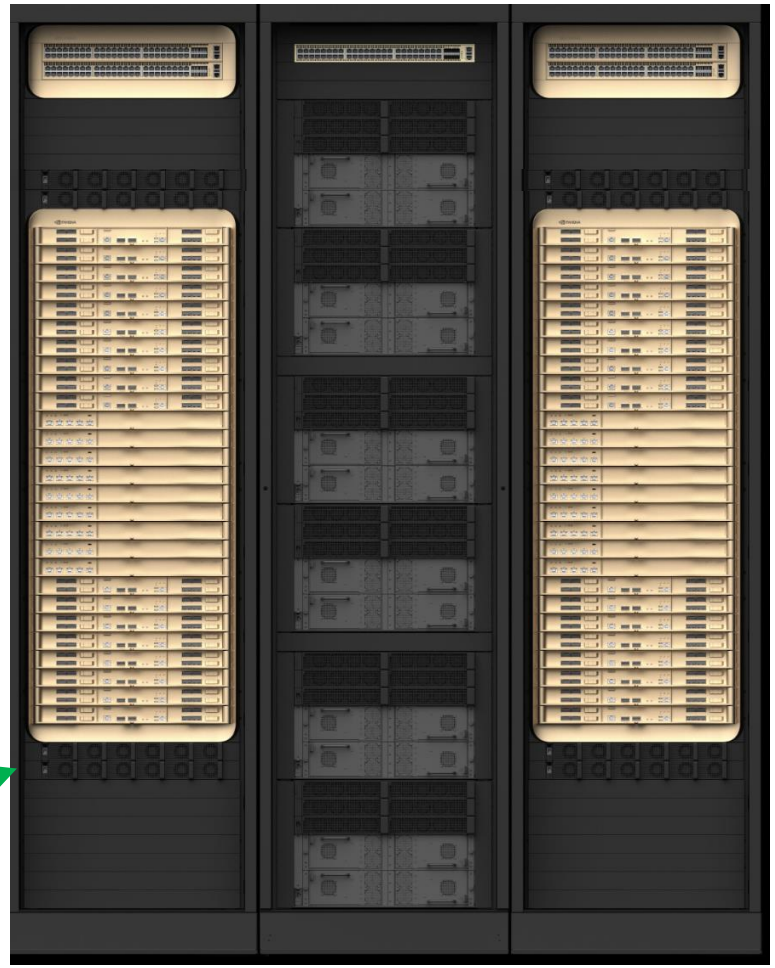
Key Features:

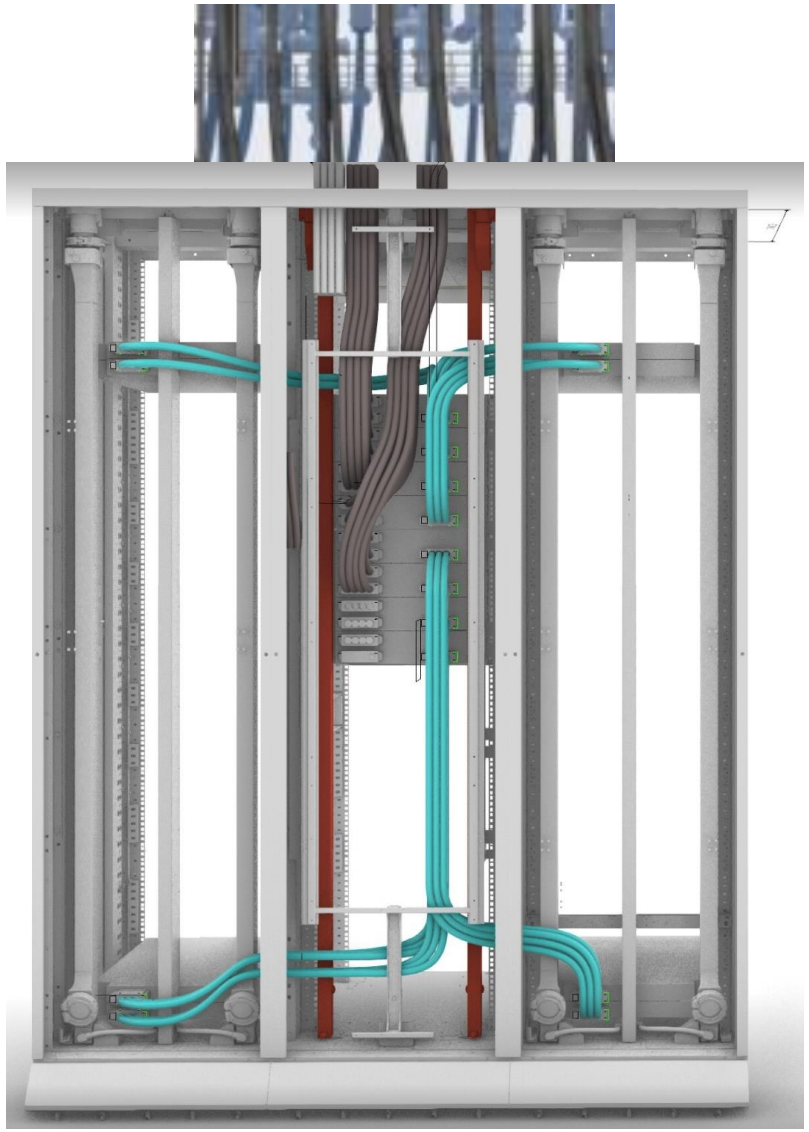
- 660kW Rating – supporting
- 415 – 480 VAC Input w/ 12 – 100A AC Whips
- 800 VDC Output w/ 8 -125A DC Cables
- Allow N+N Redundancy to Compute Rack
- Accommodate Battery Backup Units

Installation Requirement:

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







Option A – DC Power Rack

Key Features:

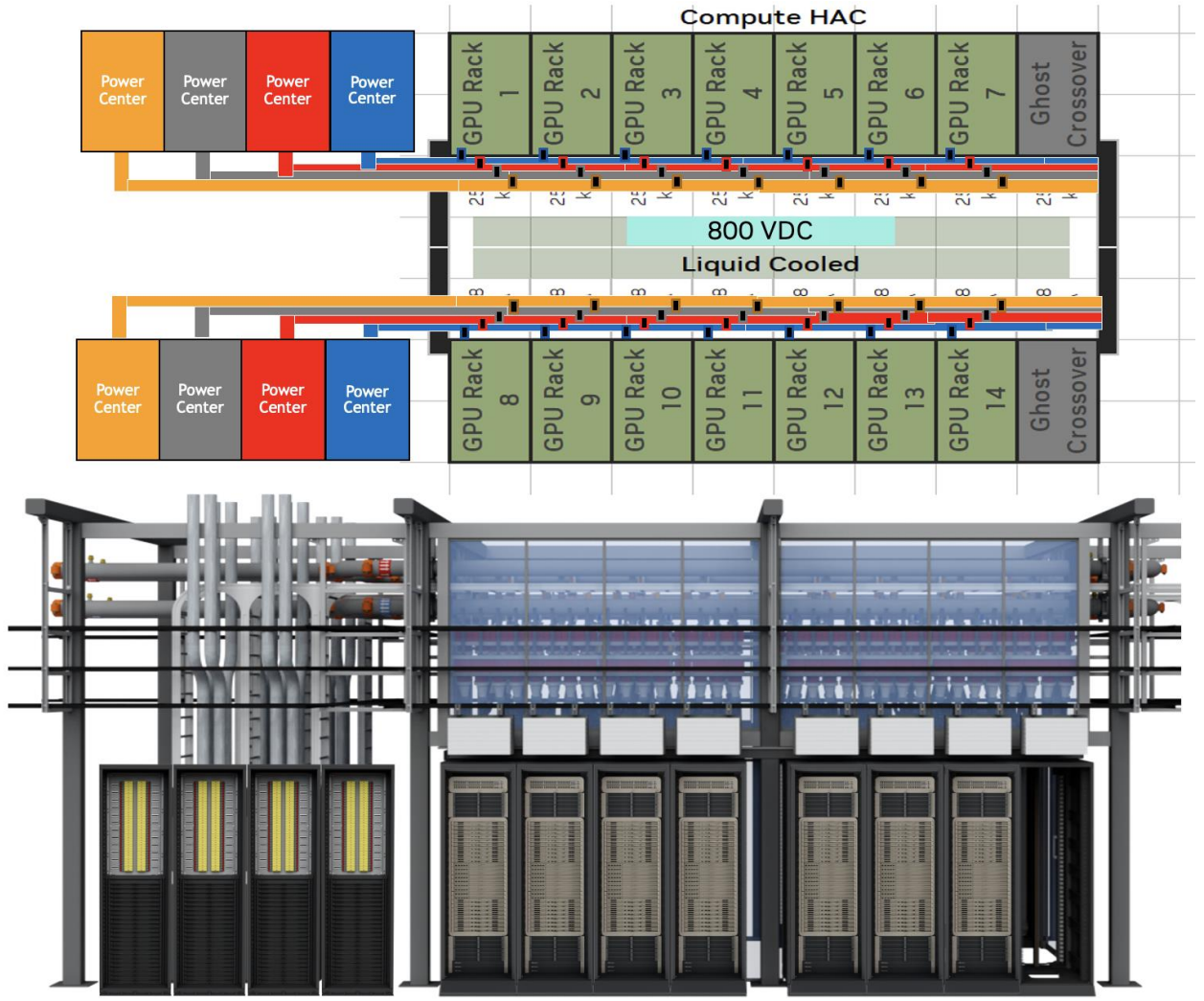
- Utilize existing Facility AC distribution with retrofit in IT Cluster only
- Configurable Redundancy (4 to make 3 or N+N) to Compute Rack
- Accommodate Battery Backup Units
- Pre-requisite:
  - Sufficient IT space for row growth
  - Sufficient AC distribution capacity to support



Option B – DC Power Center

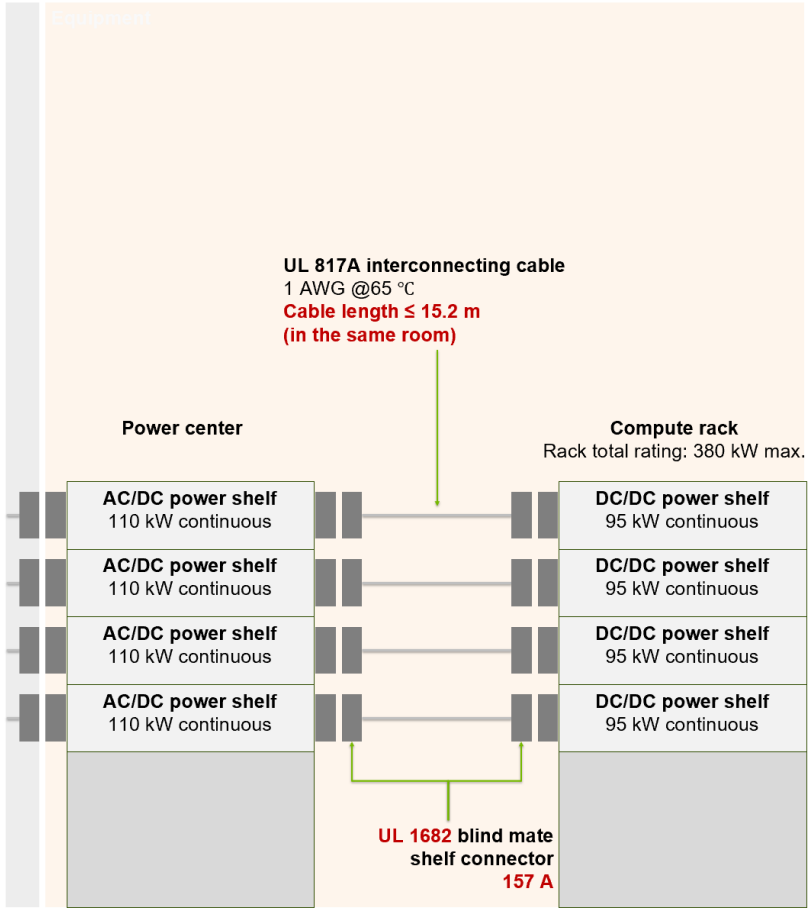
Key Features:

- Utilize existing Facility (Gray Space) AC distribution with retrofit only in white space
- Maintain Data Hall cluster layout
- Configurable Redundancy (4 to make 3 or N+N) to Compute Rack

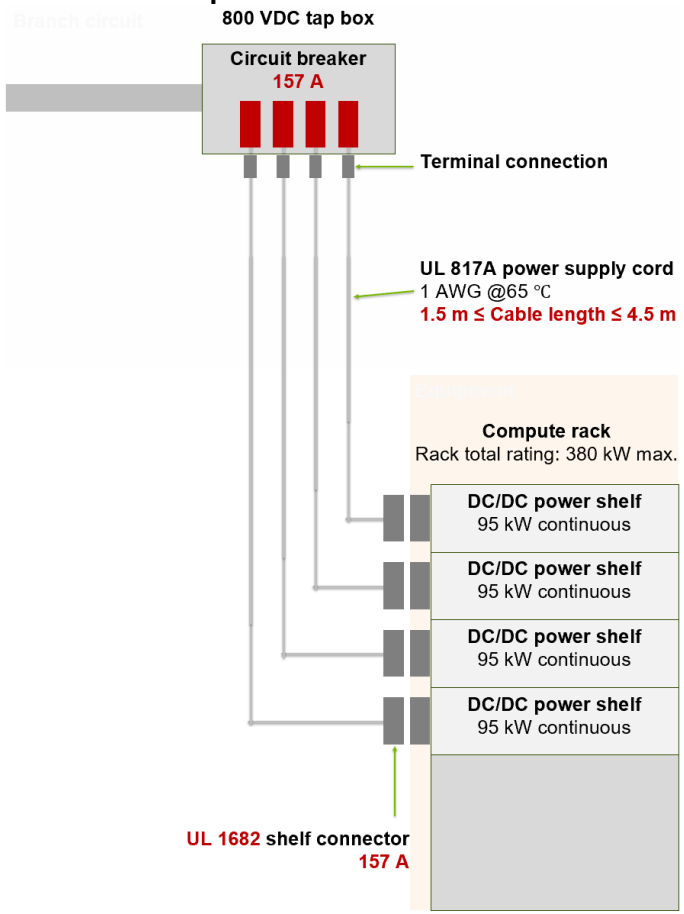


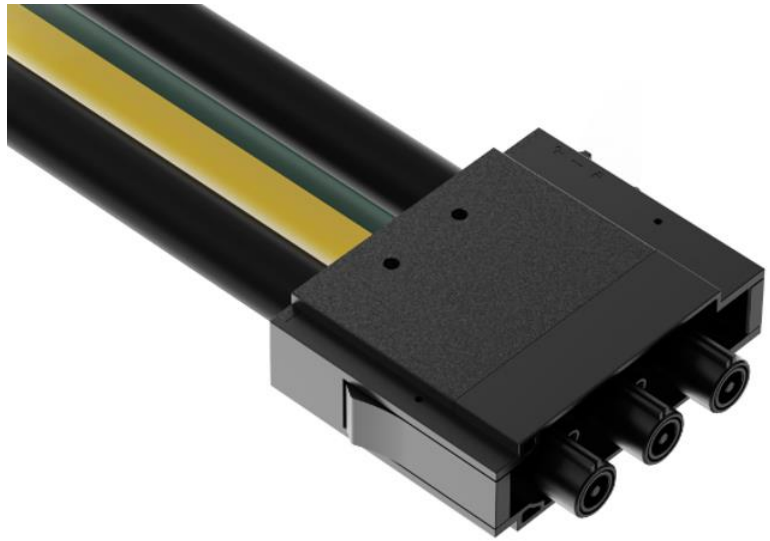
800 VDC 157/125A Connector

Power center to compute rack

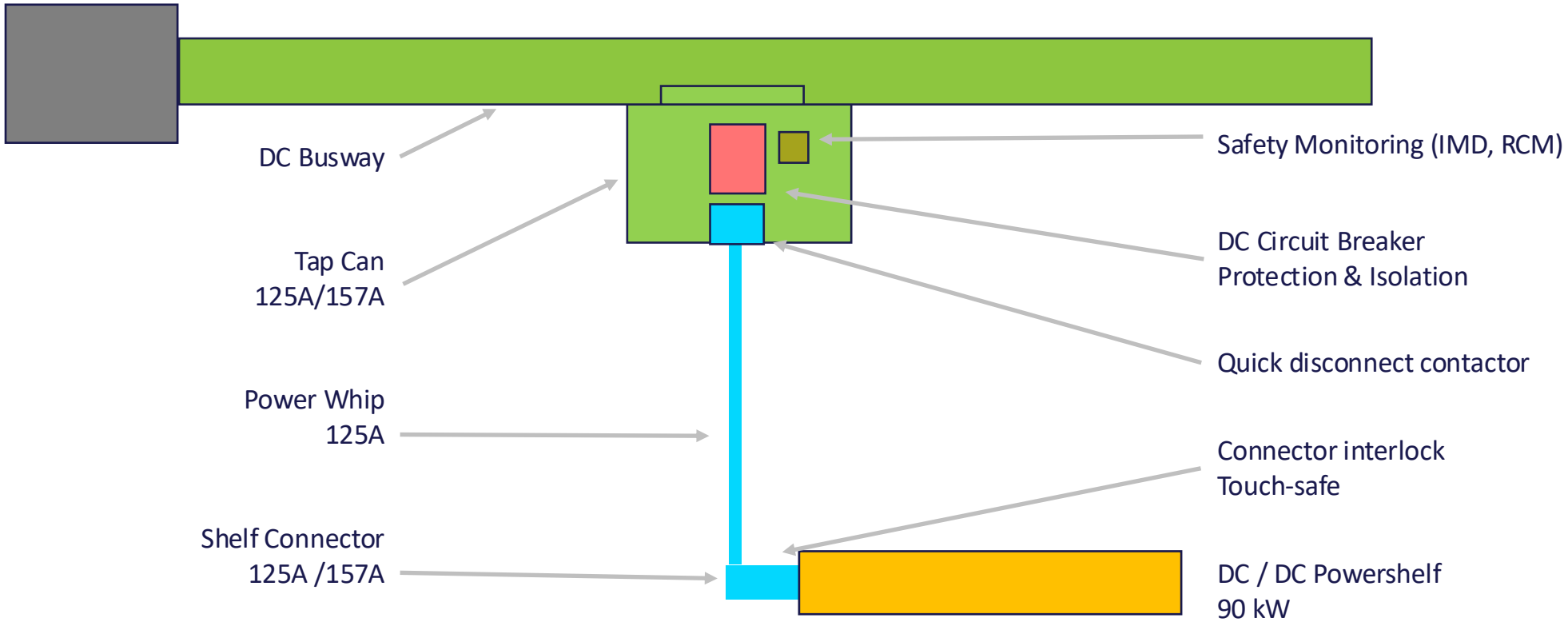


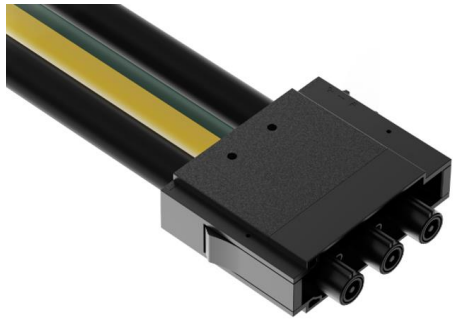
Tap box to compute rack
Hardwired drop cord





DC Busway & Rack Power Interface

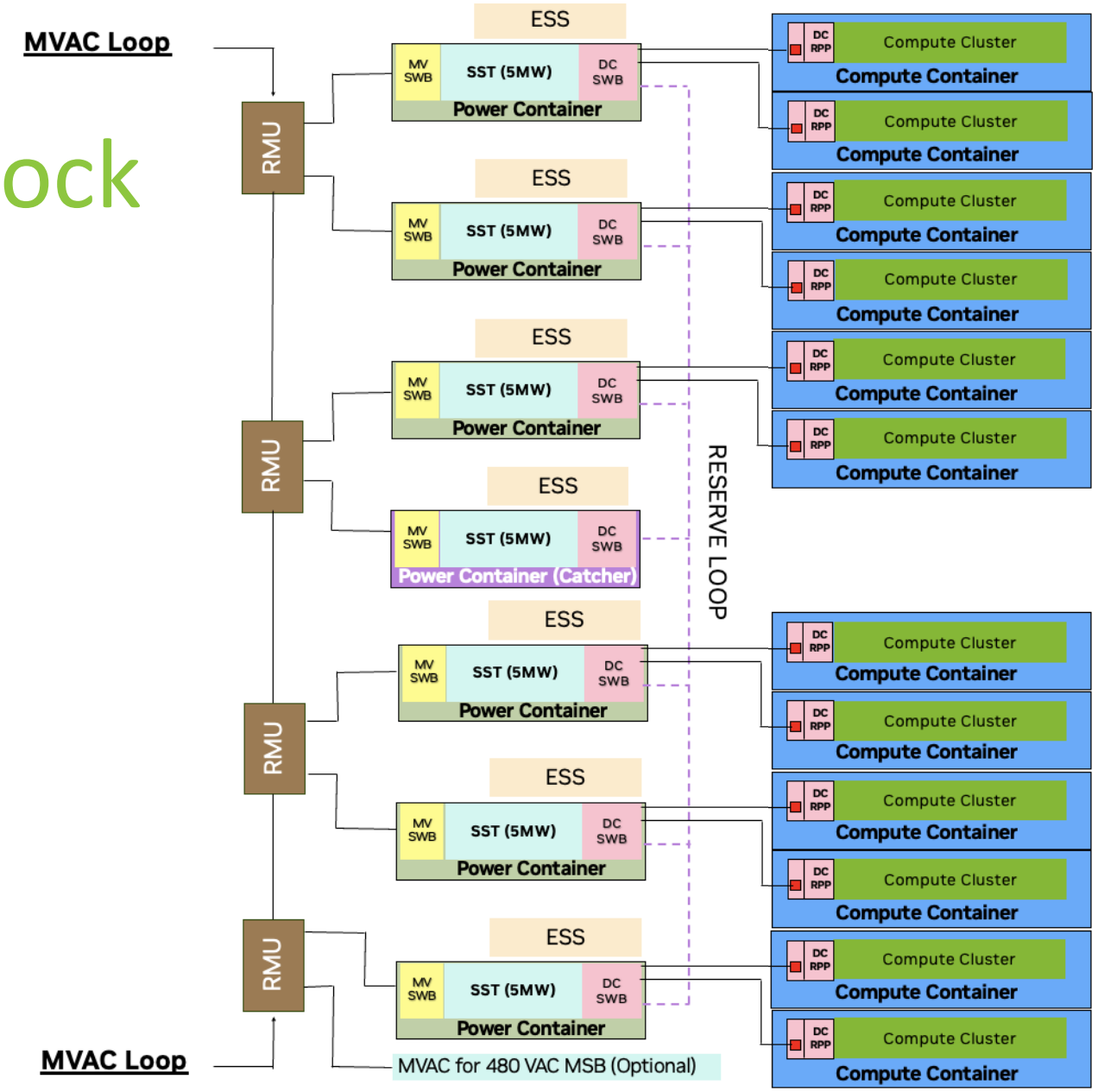




Option C – DC Power Block

Key Features:

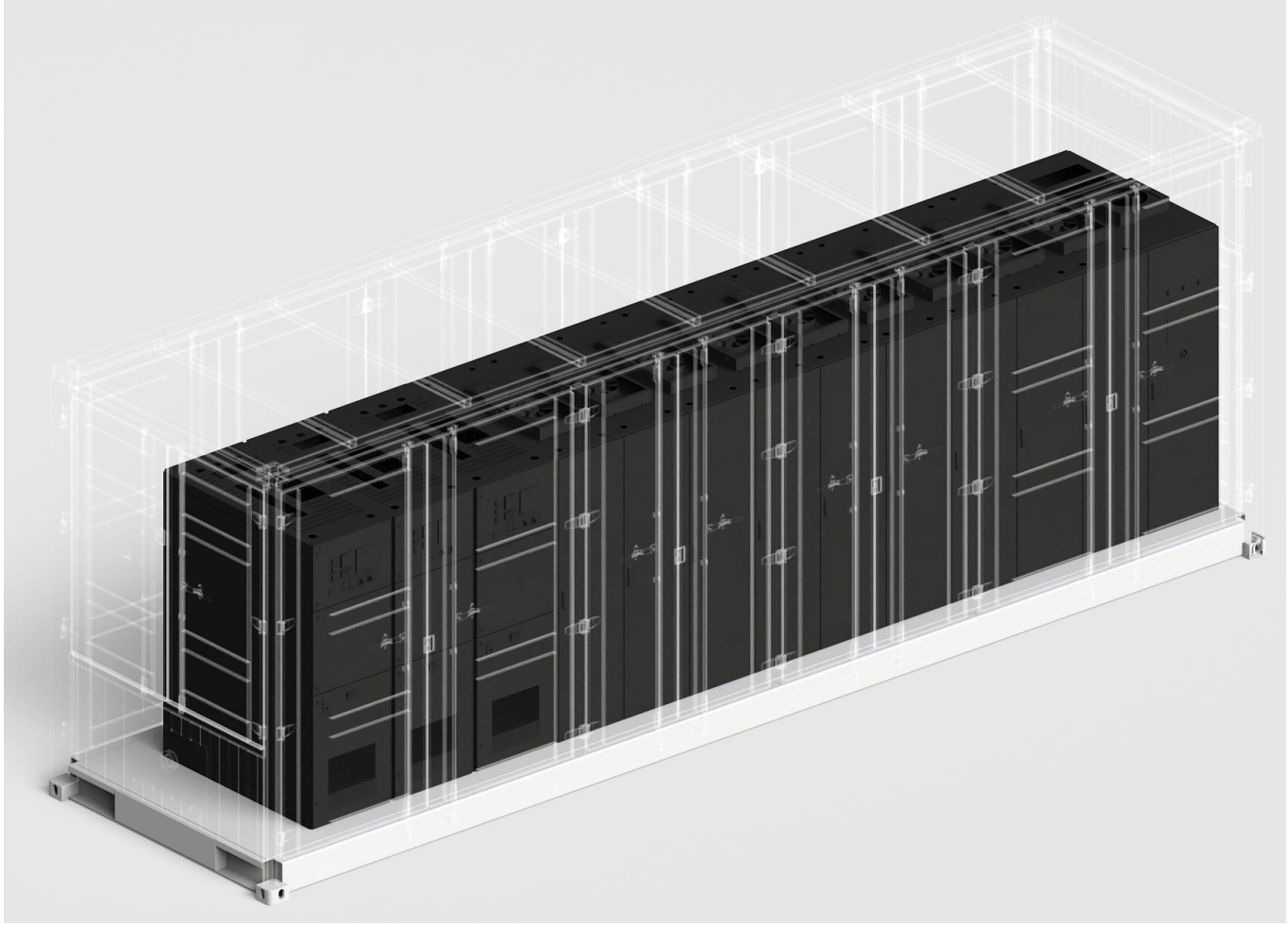
- Adopt 7 – DC Power Blocks
- Redundancy with 6+1
- Power Block can convert to DC UPS
- Reduce Data Hall and Building Space
- Minimal land space requirement
- Green field project focused



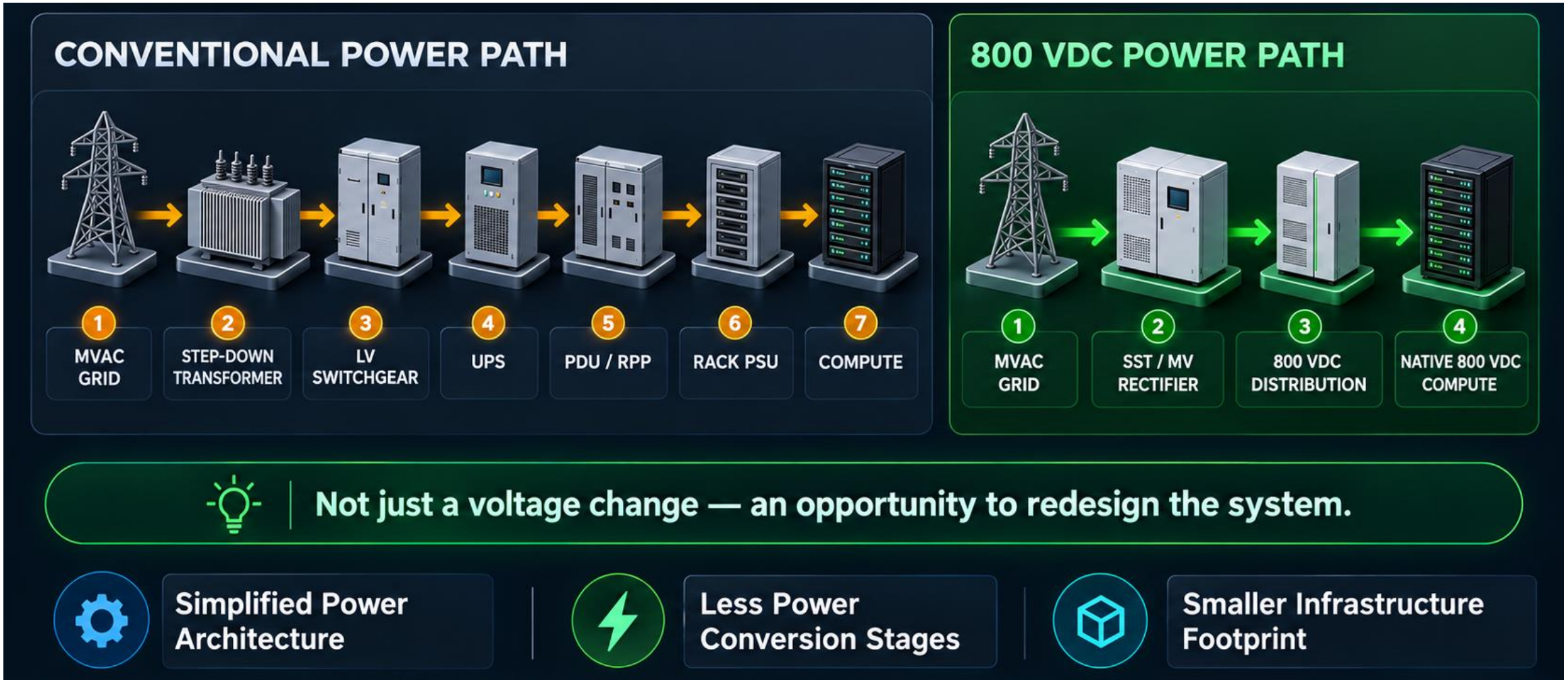
Option C – SST

Key Features:

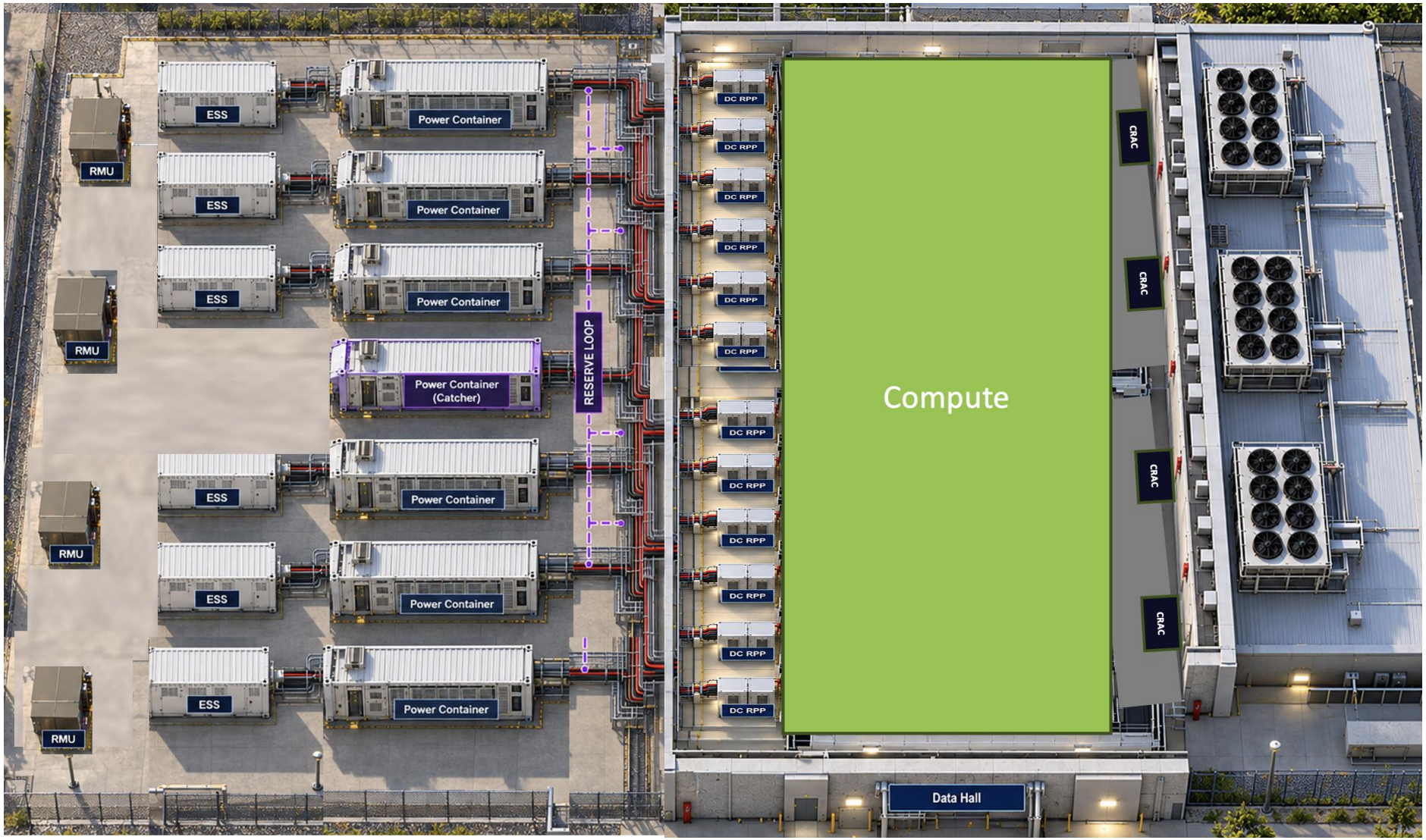
- Outdoor Rated
- 5 MVA input
- ESS DC/DC tie in
- Optional Cather



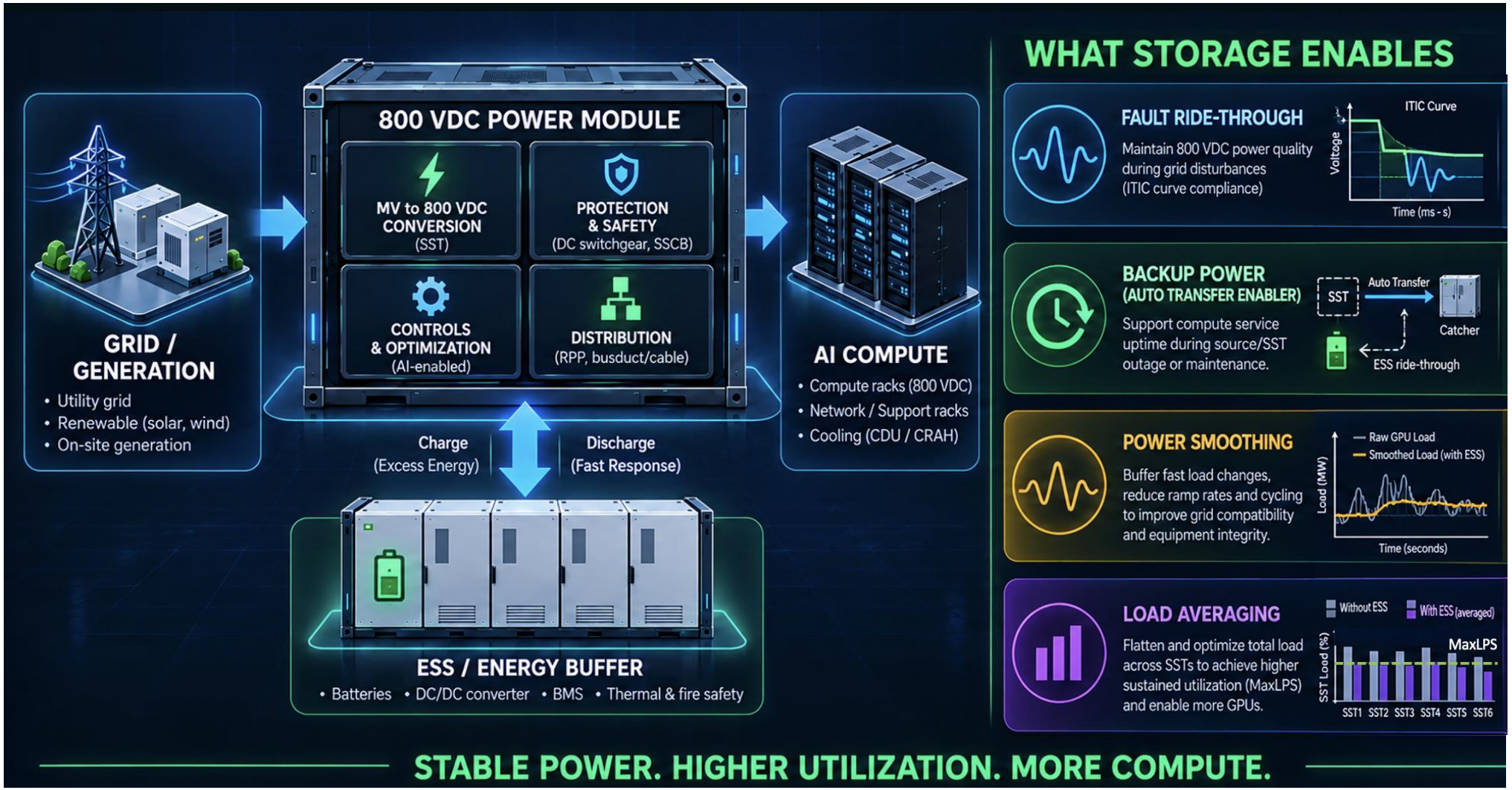
Option C: Accelerate Deployment w/ 800 VDC Architecture

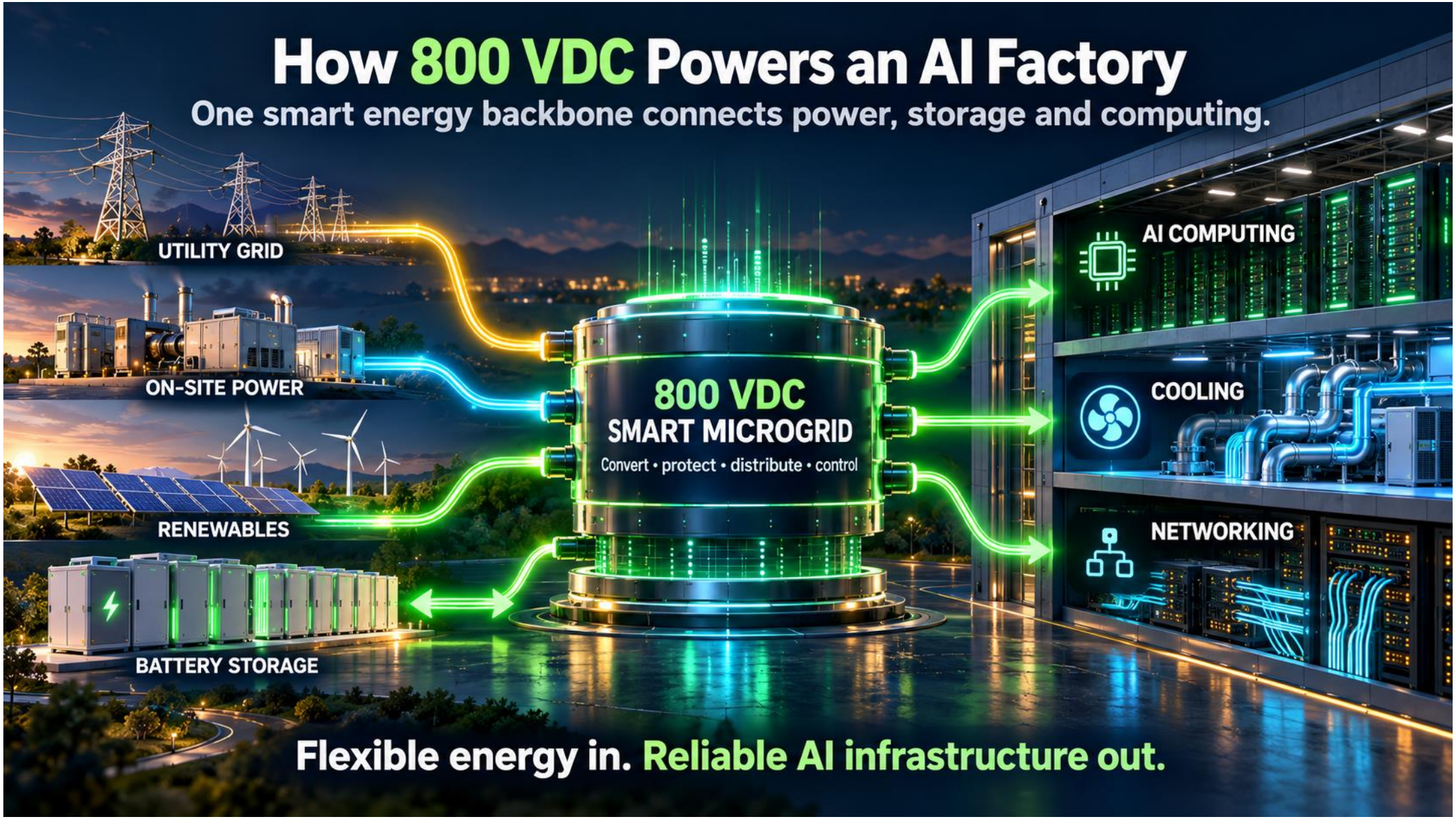


Accelerating Deployment with Option C



Integrated ESS: Reliability and Power Optimization




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



800 VDC — From Development to Deployment

Five coordinated milestones to deliver qualified, production-ready 800 VDC power systems

1

Engineering & Simulation

- Freeze architecture, interfaces & protection
- Validate system stability, impedance & DC voltage envelope

2

Prototype & System Validation

- Validate SST and DC/DC components
- Demonstrate integrated SST + ESS + load performance

3

Certification & Compliance

- Complete safety testing & equipment certification
- Align UL, standards & AHJ requirements

4

Production Readiness

- Finalize production design & qualify suppliers
- Secure components, factory capacity & FAT plans

5

Manufacturing & Deployment

- Ramp production & deliver qualified systems
- Support commissioning & scalable deployment

Thank You!

