

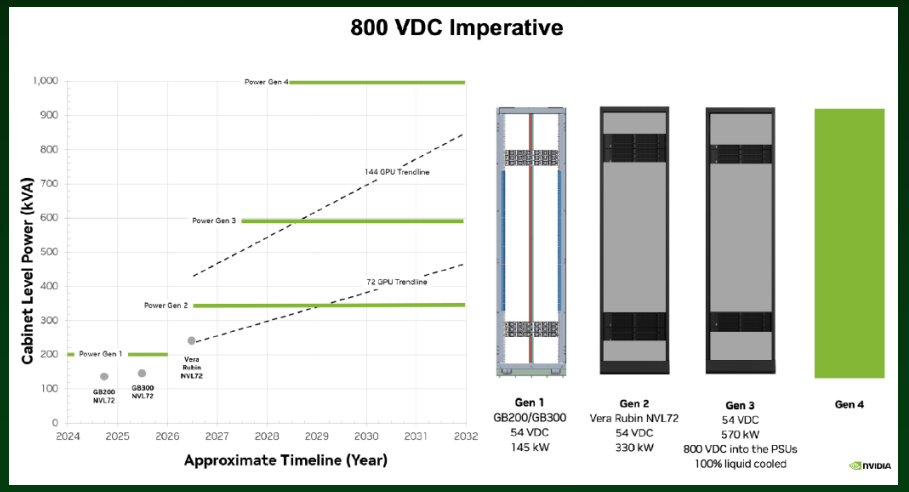
Powering the AI Rack of the Future: A Scalable 800 V DC Sidecar Architecture

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The 800VDC Industry Dilemma



Source: NVIDIA "800 VDC Architecture: Industry Alignment & Execution"

- Race in Token/$/W in AI factories
- Exponential growth in IT rack power
- 480VAC reached its limit around 300kW
- 800VDC deployment as a must to continue this race

800VDC Deployment

2026/27:
660kW-800kW Power Side Car

~2028:
1.5MW-2MW Power Center

~2029:
4MW-5MW Power Block

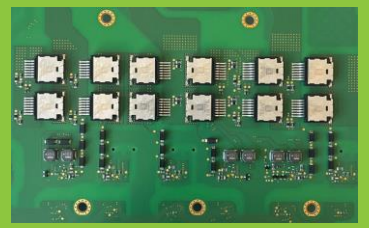
2030++:
MV Direct Conversion

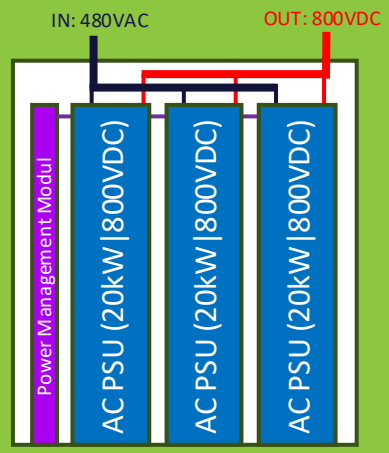
Technology set ready for this deployment roadmap? Do we have right standards in place?

What is the right Technology for 800kW Power?

Printed Circuit Board (PCB)







60kW Power shelf
(60kw/1U)

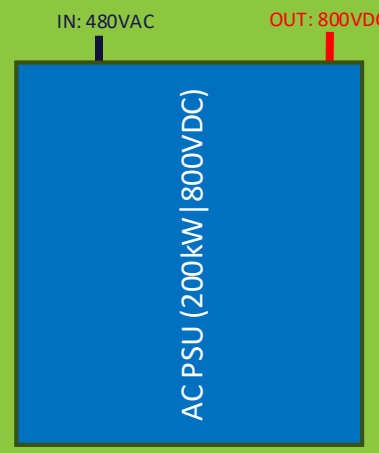
PCB technology is flexible and state of art, but:

- Output limited to ~20kW @480VAC/800VDC per PSU module
- 40 PSU modules @800kW | 100 PSU modules @2MW
- High complexity in mechanical integration and wiring
- Power density limit around 60kW per 1 OU
- Limits in scalability to power class >1MW

Power Module on Cooler (PMoC)







200kW Power shelf
(100kw/1U)

Power Module on Cooler technology brings you:

- Output power >200kW @480VAC/800VDC per PSU
- Factor 10 less modules: 4 for 800kW | 10 for 2MW
- Much less complexity in mechanical integration and wiring
- Min 2/3 higher power density (100kW per 1 OU)
- Full scalable to e.g. 2MW rectifier performance in 20 OU

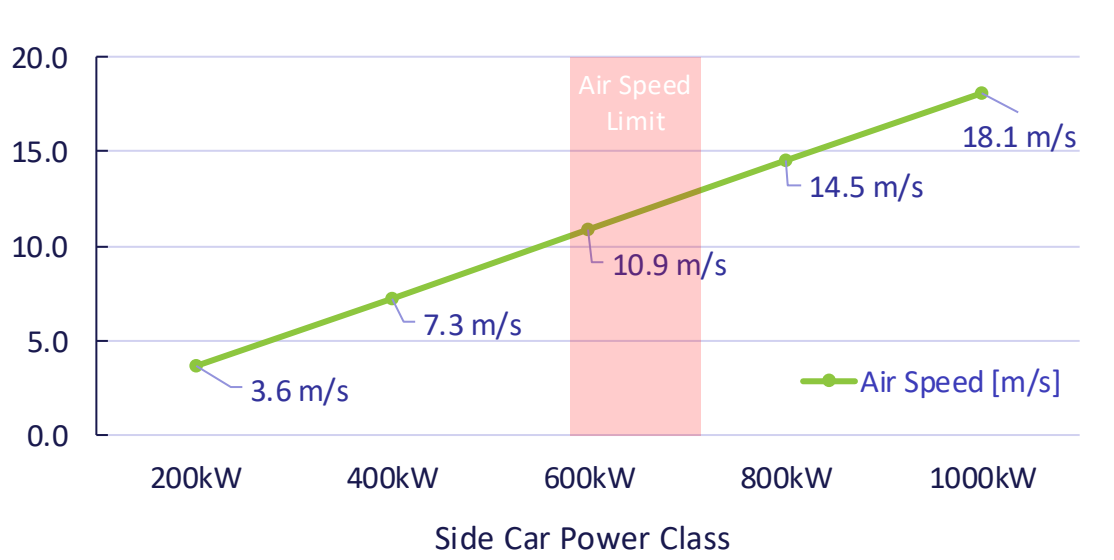
Remark: all power classes including 150%/50ms, 175%/2ms and 180%/0,5ms peak loads

Where is the power density limit for air cooling?

Air Cooling

Example for air cooled power side car (ORV3 Rack)

- 97% power rack efficiency @full load
- ΔT air: 20K (inlet: 20°C, outlet: 40°C)
- 5% of power rack space for air flow only



Limit of air cooled power racks around 600-700kW

Liquid Cooling

Example for liquid cooled power side car (ORV3 Rack)

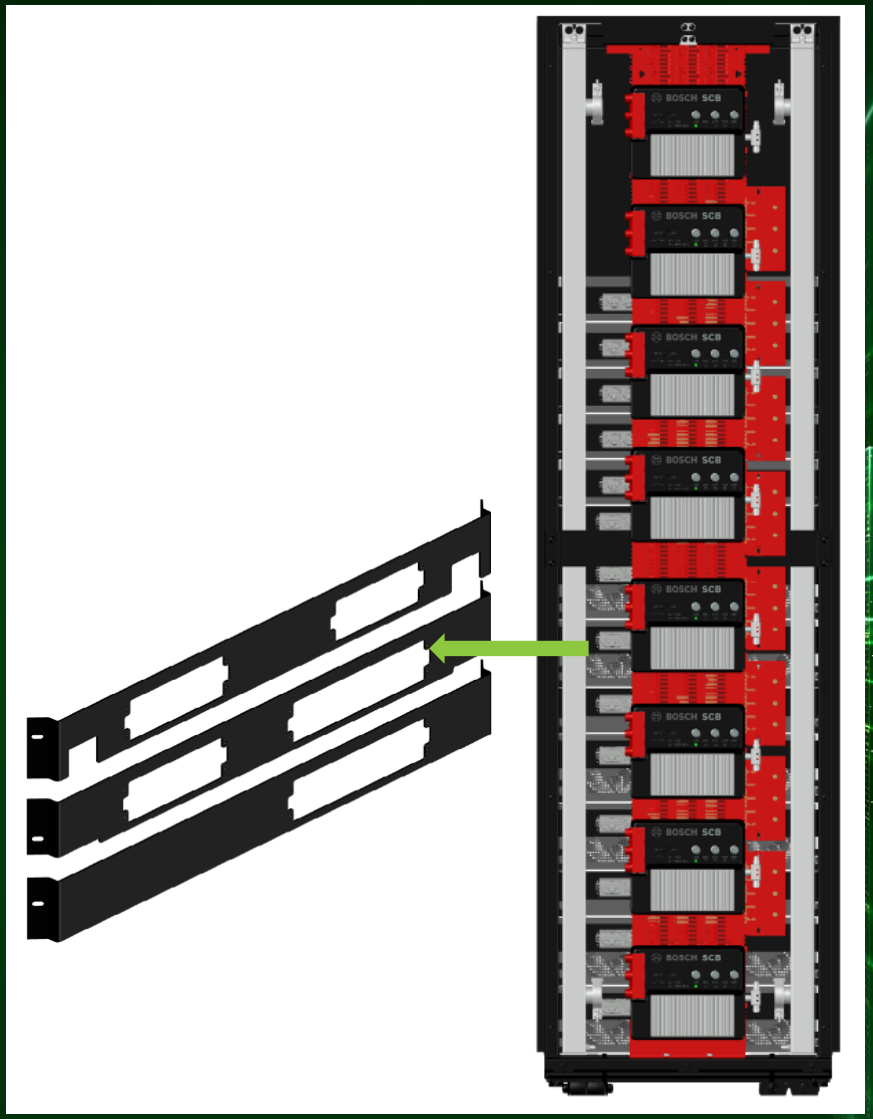
- 97% power rack efficiency @full load
- ΔT coolant: 10K (inlet: 30°C, outlet: 40°C)
- Usage of in row CDU already installed for IT Rack



No relevant power limit with liquid cooling

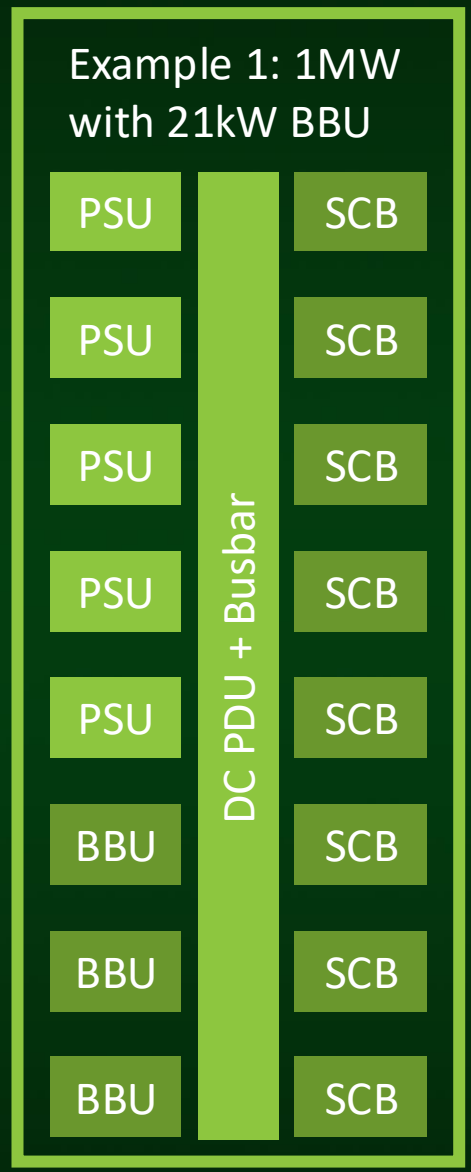
DC PDU + Connections

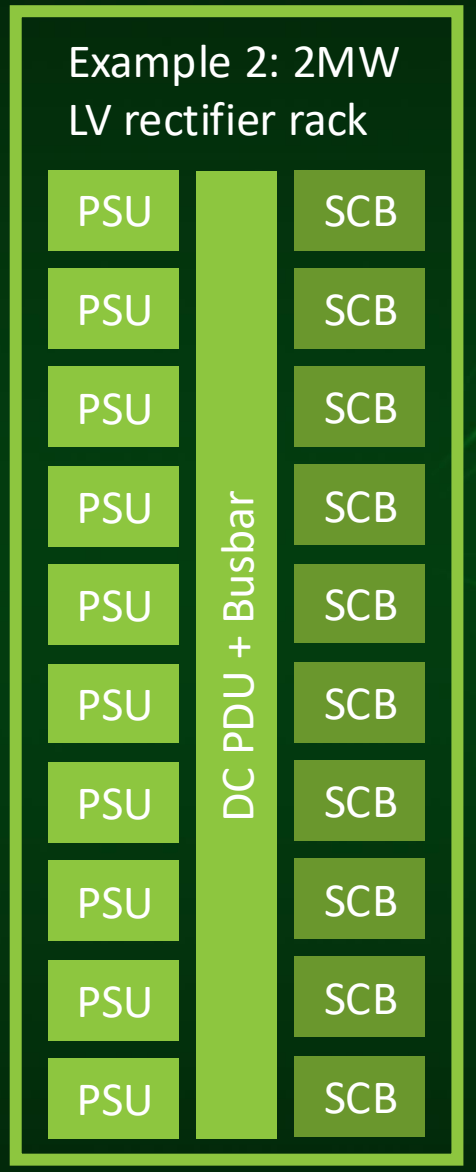
- IP2X rated busbar and PDU combined in one
- Standardized 60mm flat copper busbars for high availability
- SSCB outputs can be freely positioned along the vertical length
- Input on backside, leads to blind mate connectors to modules
- Connectors to modules with at least ±1mm of floating space
- Cascading control strategy, inner loop within module, outer loop with PLC



Open Architecture

- Enable a baseline for power racks of the future
- Enable various system builds within the architecture
- Open interface design to encourage contributions
- Engineered for next gen power centers





Serviceability as the foundation

- Blind mated PSU and BBU with hardware interlock
- Hot swapping of PSU, BBU and SCB
- Only front access is needed to maintain or exchange PSU and BBU
- Back access only needed to exchange whips towards load
- Modular DC PDU outputs, allow for custom 100kw+ layouts
- HMI at front to give direct monitoring with front facing ports for advanced diagnostics



Power Rack ready for Now and NextGen

800VDC 800kW/21kwh Power Side Car



Fixed installation (10 OU)
- Central Power Management Unit (ctrlX)
- LV power supply
- AC Grid filter & protection devices

1MW AC PSU Cluster (10 OU)
- 5x 200kW AC-PSU module
- Optional as 4 out of 5 redundant

825kW / 21kWh BBU(24 OU)
- 3x 225kW DC/DC converter module
- 6x 3,5kWh batterie pack

800VDC 2MW LV Rectifier Rack



Fixed installation (10 OU)
- Central Power Management Unit (ctrlX)
- LV power supply
- AC Grid filter & protection devices

1MW AC PSU Cluster (10 OU)
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Call to Action: let's prepare for what comes next