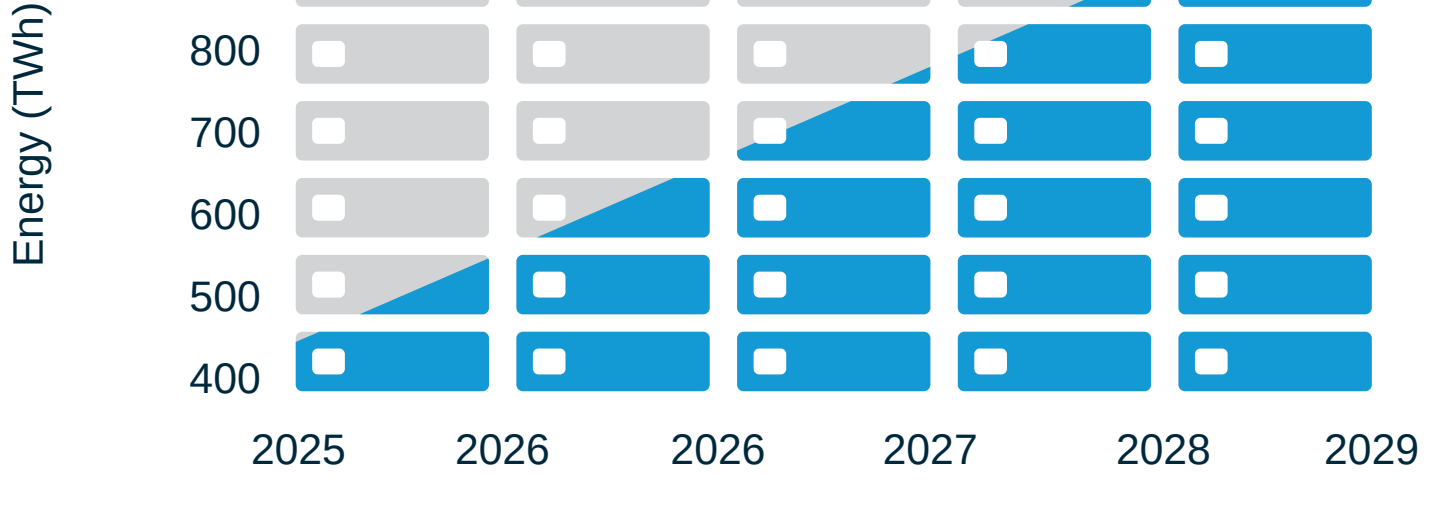


Efficient Modular Supplies Support AI Data Centers' Growing Power Requirements

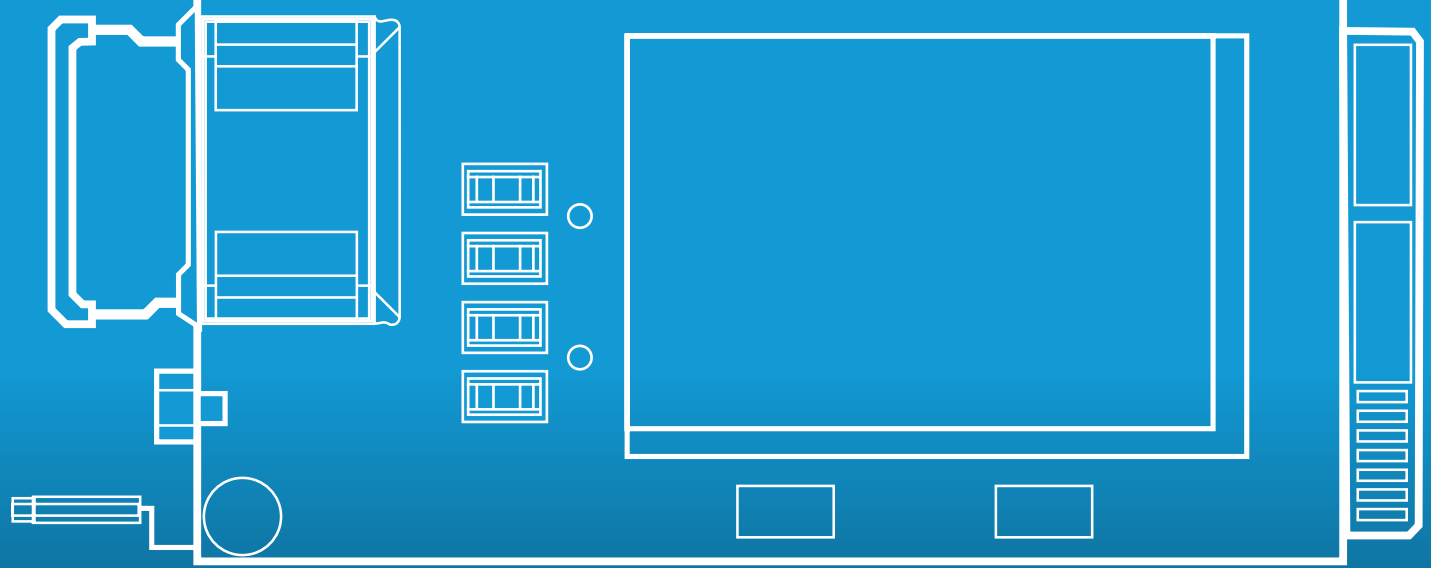
Data center energy demand is increasing rapidly, with consumption expected to rise from 448 TWh in 2025 to 980 TWh in 2030¹. This 119% increase is driven primarily by AI workloads, with each GPU-based AI rack in a data center requiring up to six times the power of a conventional rack. Consequently, AI racks present significant thermal-management and power-supply unit (PSU) efficiency challenges.

Data-Center Energy Demand Forecast (linear approximation)



The Common Redundant Power Supply (CRPS) footprint

To help meet these challenges, the Open Compute Project (OCP) defines the Common Redundant Power Supply (CRPS) form factor for hot-swappable N+1 redundant server PSUs. The 185 × 73.5-mm footprint and 2×25 card-edge connector enable interoperability across platforms and vendors.



To support data center operators managing thousands of nodes, the OCP's Modular-CRPS (M-CRPS) implementation extends CRPS with the addition of PMBus/ SMBus management, firmware attestation via the Secure Protocol Data Model (SPDM), device authentication, remote monitoring, and secure firmware updates.

Pursuing the Highest Efficiency

Regardless of form factor, you'll need to choose a PSU with high efficiency. Power efficiency is simply the output power divided by the input power times 100.

$$\text{Efficiency (\%)} = \frac{\text{Output power (W)}}{\text{Input power (W)}} \times 100$$

To maximize efficiency, power supply designers minimize switching and conduction losses in active components and resistive losses in wires, windings, and PCB traces. They also maximize the power factor to limit resistive losses caused by reactive currents.

To help you choose the optimal PSU for your application, the 80 PLUS certification program helps identify PSUs that meet certain criteria. For data-center internal-redundant applications, **Platinum and Titanium levels indicate the third and second most efficient 80 PLUS ratings**, while the new Ruby level indicates the highest efficiency. For example:

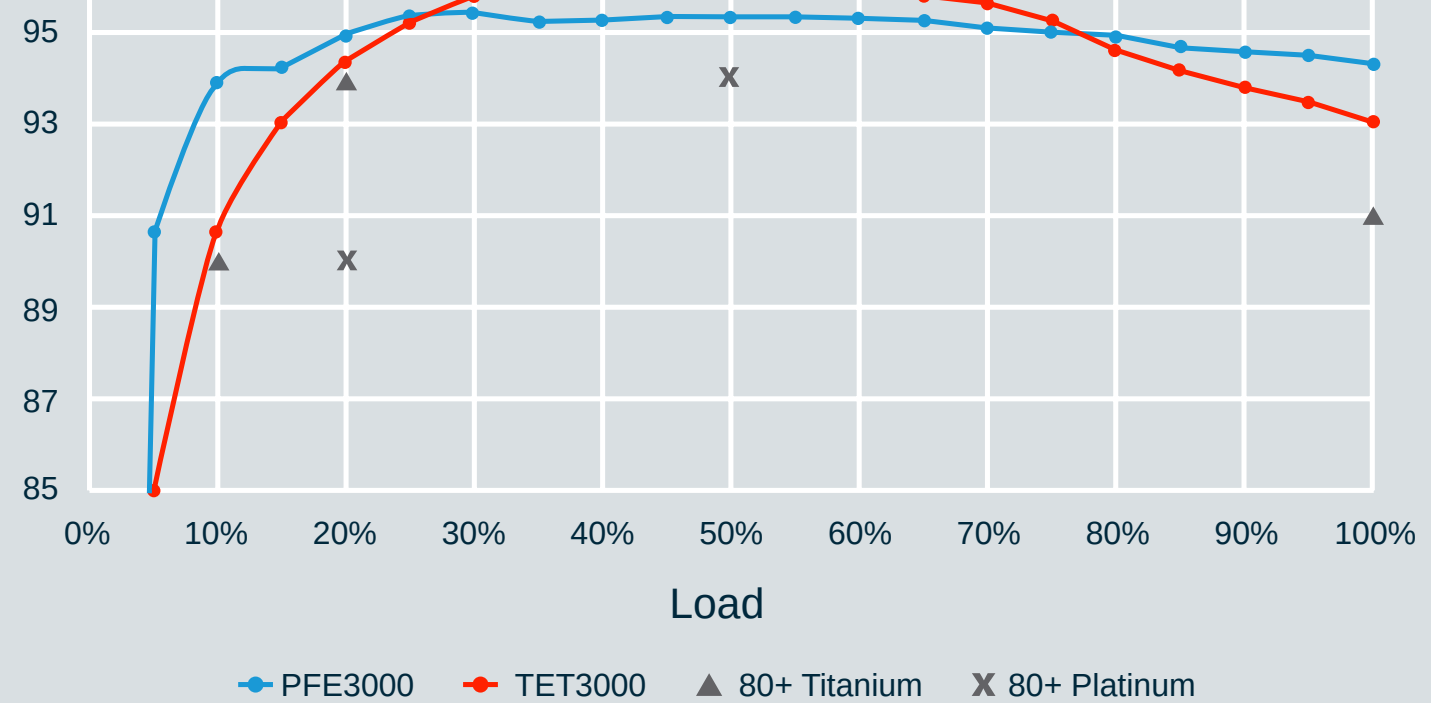
For 230-VAC and 277-VAC supplies
Ruby raises Titanium's 91% efficiency 100% rated load to 92%.



Ruby also specifies a 90% efficiency at 5% load, and it sets a minimum power factor from 0.90 at 5% and 10% rated load to 0.96 at 20% rated load and higher.

The nearby figure shows the efficiency curve for a **Bel Platinum supply (blue)** and a **Bel Titanium supply (red)**. Note that the Titanium supply provides improved efficiency over much of the useful operating range—from about 25% to 75% of rated load—but the Platinum supply may be a better choice if your application frequently operates at very low or very high loads.

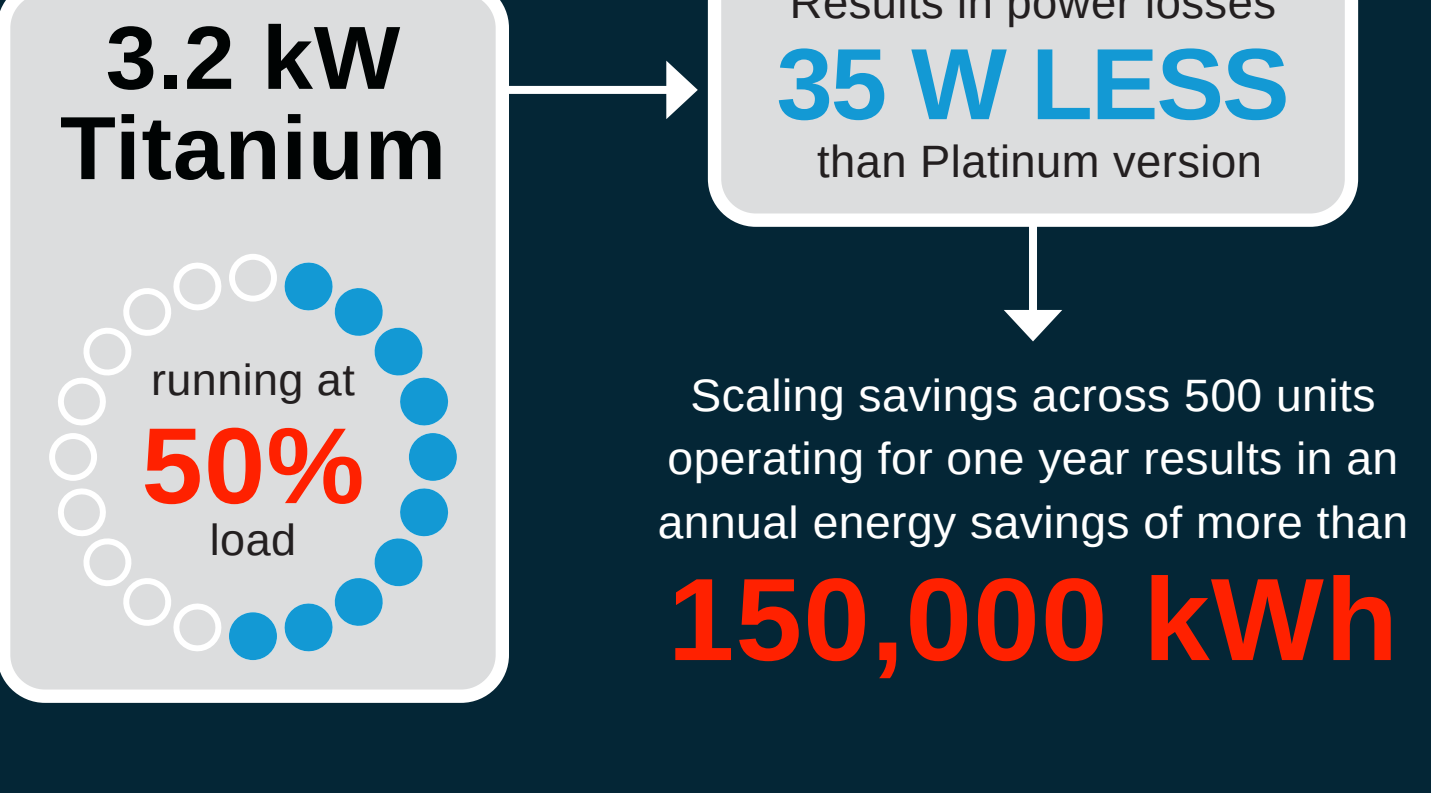
Efficiency [%] Comparison



Always evaluate the efficiency curves of supplies you are considering based on the specifics of your application.

Not Just for Hyperscalers

A myth has arisen that a Titanium- or Ruby-rated CRPS is cost-effective only for hyperscalers deploying tens or hundreds of thousands of servers in each data center. In fact, the power-loss reductions of the more efficient systems compound dramatically when scaled across a few hundred PSUs. Consider, for example, a 3.2 kW Titanium unit running at 50% load. The power losses are 35 W less than the losses for a Platinum version, but scaling that power savings across 500 units operating for one year results in an annual energy savings of more than 150,000 kWh.



To help you take advantage of such savings, Bel provides Titanium-certified CRPSs at standard lead times and with low minimum order quantities (MOQs).

The CRPS Portfolio



Bel's front-end CRPS line spans the full power range engineers need—from 550 W up to 5,200 W—with both Platinum and Titanium options, normal and reverse airflow, high-voltage DC input compatibility, and a built-in black box recorder for remote diagnostics. The power supplies comply with open standards, enabling you to right-size your power infrastructure without proprietary constraints.

¹ Gartner, June 2026. www.gartner.com/en/newsroom/press-releases/2026-06-10-gartner-says-data-center-electricity-demand-to-grow-26-percent-in-2026

Learn More at DigiKey.