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Compute Project



INTRODUCING POWER COMPUTE EFFECTIVENESS (PCE), A PROVISIONED CAPACITY ALLOCATION METRIC FOR THE NEW DATA CENTER ERA

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Executive Summary

As AI workloads drive unprecedented power density, the data center industry faces a growing challenge: how to maximize usable compute capacity within fixed power constraints. Power Compute Effectiveness (PCE) addresses this need by measuring how much provisioned facility power is structurally available for IT compute after quantifying how provisioned facility power is allocated between compute and supporting infrastructure. By focusing on infrastructure design rather than operational conditions, PCE enables operators to quantify and unlock stranded capacity within existing facilities. Aligned with the mission of the Open Compute Project (OCP), PCE provides a critical framework for guiding retrofit strategies, capacity planning, and next-generation AI deployments.

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11. About Open Compute Foundation

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1. Introduction

This whitepaper introduces Power Compute Effectiveness (PCE), a framework for evaluating how provisioned electrical capacity is allocated to IT compute within a data center. It defines the methodology, required variables, and boundary conditions needed to consistently measure PCE, while addressing key considerations such as cooling infrastructure, electrical losses, and auxiliary loads. Upon review of this document, data center operators and designers will be able to quantify structurally available compute capacity, identify stranded power, and apply PCE to guide infrastructure planning, retrofit strategies, and AI-scale deployments.

As rack power densities increase and AI workloads require significant electrical demand, data center operators are increasingly constrained not by physical space, but by how provisioned electrical capacity is distributed within existing infrastructure. In many facilities, a significant portion of contracted and installed power is allocated to cooling systems, electrical losses, and auxiliary loads before reaching IT equipment. Existing industry metrics primarily evaluate operational efficiency and do not provide a framework for assessing these structural constraints at the design or planning stage. PCE addresses this gap by enabling a consistent, design-level evaluation of how provisioned electrical capacity is made available to compute.

2. Compliance with Open Compute Project Tenets

2.1. Openness

This specification defines Power Compute Effectiveness (PCE) as an open, methodology-driven metric based on transparent, verifiable inputs derived from standard data center design and commissioning documentation. All variables—including provisioned facility power, cooling

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power, electrical losses, and auxiliary loads—are grounded in commonly available industry data sources such as utility agreements, equipment nameplates, and single-line diagrams. PCE is designed to be vendor-neutral and extensible, enabling third parties to adopt, validate, and enhance the framework across diverse architectures and deployment models. The methodology encourages collaboration across the Open Compute Project (OCP) community and adjacent industry groups, allowing for refinement, standardization, and integration with complementary metrics and reporting frameworks.

2.2. Efficiency

PCE introduces a new dimension focused on capacity allocation, making visible how much of a data center's provisioned electrical capacity is structurally available for IT compute versus supporting infrastructure. Unlike traditional efficiency metrics, PCE does not evaluate how power is consumed or lost within the system. Instead, it evaluates how the provisioned power envelope is structurally distributed at the design and planning level, enabling operators to identify how infrastructure architecture, including cooling approach, redundancy strategy, and electrical design, impacts the proportion of capacity available for compute. This provides a clear framework for evaluating design decisions based on their direct effect on compute capacity within a fixed power envelope, supporting more effective capital deployment by prioritizing infrastructure changes that increase the portion of provisioned power allocated to compute and improving return on invested power without redefining or replacing existing efficiency metrics.

2.3. Impact

PCE has the potential to redefine how data center capacity is evaluated in the era of AI and high-density compute. By shifting focus from operational performance to provisioned power allocation, PCE introduces a standardized way to make visible how electrical capacity is distributed between compute and supporting infrastructure within a facility. This creates meaningful industry impact by enabling operators to evaluate how infrastructure design choices

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affect the portion of provisioned capacity allocated to compute, particularly in environments where new power infrastructure is increasingly constrained. As an open framework, PCE can be broadly adopted across hyperscalers, colocation providers, and enterprises, driving consistent evaluation methodologies and influencing future data center design standards.

2.4. Scale

The PCE framework is inherently scalable, as it relies on standardized, provisioned capacity inputs that are applicable across facilities of all sizes, from edge deployments to hyperscale campuses. The methodology can be implemented incrementally, allowing operators to evaluate individual facilities, portfolios, or entire regions using the same consistent approach. Because PCE is based on documented design and provisioning data rather than real-time instrumentation, it can be deployed with minimal operational disruption. Supporting documentation including variable definitions, data source requirements, and boundary conditions ensures consistent implementation and repeatability across diverse environments.

2.5. Sustainability

PCE supports sustainability by enabling more efficient utilization of existing electrical infrastructure, reducing the need for new power generation, grid expansion, and associated environmental impact. By quantifying and unlocking stranded capacity, PCE helps maximize the output of already provisioned resources, aligning with principles of resource efficiency and infrastructure optimization. Additionally, PCE provides transparency into how power is allocated within a facility, enabling operators to make more informed decisions about cooling technologies, system design, and energy usage. This contributes to continuous improvement in environmental performance while supporting the responsible scaling of AI and digital infrastructure.

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3. PCE Framework and Methodology

3.1 Metric Definition

Power Compute Effectiveness (PCE) is the ratio of provisioned IT compute electrical capacity structurally available within a declared facility boundary to the total provisioned facility electrical capacity under the declared redundancy basis. PCE is expressed as a dimensionless value between 0 and 1.

$$PCE = \frac{P_{ITcompute_{prov}}}{P_{facility_{prov}}}$$

$P_{ITcompute_{prov}}$ is a derived quantity, not directly measured. It is calculated as:

$$P_{ITCompute_{prov}} = P_{Facility_{prov}} - (P_{CoolReject_{prov}} + P_{ElecLoss_{prov}} + P_{Aux_{prov}})$$

Substituting, the full PCE expression is:

$$PCE = \frac{P_{Facility_{prov}} - (P_{CoolReject_{prov}} + P_{ElecLoss_{prov}} + P_{Aux_{prov}})}{P_{Facility_{prov}}}$$

PCE makes stranded electrical capacity visible by quantifying how provisioned power is allocated between compute and supporting infrastructure. As shown, the stranded electrical capacity is calculated as the power that is provisioned at the facility level but allocated to cooling systems electrical distribution losses, and auxiliary loads before it reaches IT compute. This

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structural view allows data center operators and capacity planners to assess infrastructure capacity allocation at the design level, independent of workload type or operational utilization.

3.2 Required Declarations

Before PCE can be calculated, two declarations shall be made and disclosed.

- **Facility boundary:** The electrical boundary of the facility shall be explicitly defined. This boundary determines which loads and energy sources are included in the PCE calculation. All variables shall be measured and reported consistently within the declared boundary.
- **Redundancy basis:** The redundancy configuration (e.g., N, N+1, 2N) shall be declared. Provisioned capacity values for all variables shall be calculated at the declared redundancy basis to ensure consistency across the calculation.

3.3 Variable Definitions

PCE is calculated using five provisioned power variables. Four are independently documented from facility records; the fifth $P_{ITcompute_{prov}}$ is derived from the others.

Table 1. PCE Variable Definitions

Variable	Definition
$P_{facility_{prov}}$ Provisioned Facility Electrical Capacity (kW or MW)	The maximum continuous electrical capacity the facility is contractually permitted and electrically designed to receive and distribute within the declared boundary. Represents total provisioned power available to the site before any cooling, electrical losses, or auxiliary loads are subtracted.
$P_{CoolReject_{prov}}$	The total provisioned electrical input power required for all installed systems responsible for removing and rejecting heat from IT load at the declared design

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Variable	Definition
Provisioned Cooling and Heat Rejection Electrical Power (kW or MW)	condition. Includes all mechanical and fluid systems required to transport, transfer, and reject heat.
$P_{ElecLoss_{prov}}$ Provisioned Electrical Conversion and Distribution Losses (kW or MW)	The electrical power lost in conversion and distribution between the facility service entrance and the IT distribution boundary. Includes losses in UPS systems, medium-voltage to low-voltage transformers, PDU/RPP distribution equipment, busway systems, and static transfer switches where applicable.
$P_{Aux_{prov}}$ Provisioned Auxiliary Facility Loads (kW or MW)	All non-IT, non-cooling electrical loads required to operate the facility within the declared boundary. Only documented installed loads may be included.
$P_{ITCompute_{prov}}$ Provisioned Compute Power Allocation (kW or MW)	The portion of provisioned facility capacity structurally available for IT compute load after subtracting cooling, electrical losses, and auxiliary loads. This is a derived quantity and is not independently measured.

3.3.1 Provisioned Facility Electrical Capacity ($P_{facility_{prov}}$)

- **Included systems:** $P_{Facility,prov}$ shall account for all provisioned energy sources feeding the facility main distribution bus under the declared redundancy basis. Included sources are:
 - utility grid supply; on-site generation (diesel, gas, or other)
 - on-site renewable generation (where connected to the main distribution bus)
 - on-site energy storage systems feeding the distribution bus.
- **Required Disclosures:** The following supporting documentation shall be provided
 - electrical single-line diagram (SLD) showing the facility power path

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- commissioning report confirming installed capacity ratings
- equipment nameplate documentation for all primary distribution equipment.
- **Data Source:** One of the following shall be selected and disclosed as the basis for $P_{Facility,prov}$
 - utility interconnection agreement or service contract (contracted MW capacity)
 - utility transformer rating documentation
 - main service switchgear nameplate rating (kVA converted to kW using declared power factor)
 - aggregate UPS output rating (kW) from manufacturer submittals at the declared redundancy basis.

3.3.2 Provisioned Cooling and Heat Rejection Electrical Power ($P_{CoolReject_{prov}}$)

- **Included systems:** All of the following shall be counted where applicable: chillers or compressor-based refrigeration units; cooling towers, dry coolers, and fluid coolers (fan motors); primary and secondary chilled water pumps; condenser water pumps; facility-level CDUs including pump motors; CRAH/CRAC units and fan walls; in-row or in-rack cooling systems that are part of facility heat rejection; glycol or heat exchanger pumps; and heat rejection control panels.
- **Required disclosures:** The declared planning condition — including IT load percentage, ambient temperature, and supply/return temperatures — shall be disclosed. Motor horsepower shall be converted to kW ($HP \times 0.746$). No modeled values are permitted without OEM documentation.
- **Data source:** Data shall be taken from mechanical equipment schedules from issued-for-construction drawings, OEM equipment submittals listing rated electrical input power, electrical panel schedules feeding cooling equipment, and commissioning documentation confirming installed ratings.

3.3.3 Provisioned Electrical Conversion and Distribution Losses ($P_{ElecLoss_{prov}}$)

- **Included systems:** $P_{ElecLoss,prov}$ shall include losses in all conversion and distribution equipment between the facility service entrance and the IT distribution boundary, including: UPS systems;

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medium-voltage to low-voltage transformers; PDU/RPP distribution equipment; busway systems; and static transfer switches where applicable. Internal server PSU losses are excluded unless explicitly declared in the boundary definition.

- **Required disclosures:** The declared loading conditions used to calculate losses shall be disclosed and shall be consistent with the provisioning assumptions applied to all other PCE variables.
- **Data source:** Data shall be obtained from manufacturer efficiency curves for UPS systems, transformers, and PDUs; certified equipment submittals; commissioning efficiency test results; and the electrical single-line diagram defining the power path.

3.3.4 Provisioned Auxiliary Facility Loads ($P_{Aux_{prov}}$)

- **Included systems:** $P_{Aux,prov}$ may include: interior and exterior lighting; fire detection and suppression systems; security and access control systems; building management systems (BMS); monitoring and control panels; office or support space loads within the declared boundary; non-IT ventilation systems; and maintenance receptacles and service loads. Only documented installed loads may be included.
- **Required disclosures:** Any loads that fall within the declared facility boundary but are not counted in $P_{CoolReject,prov}$ or $P_{ElecLoss,prov}$ shall be accounted for in $P_{Aux,prov}$. Omissions shall be justified and documented.
- **Data source:** Data shall be taken from electrical panel schedules, building load summary sheets, as-built electrical load calculations, and commissioning documentation.

3.3.5 Provisioned Compute Power Allocation ($P_{ITCompute_{prov}}$)

- **Included systems:** $P_{ITCompute,prov}$ is a derived quantity and does not have independently counted systems. It represents the residual provisioned electrical capacity available to IT compute after all infrastructure loads are subtracted.

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- **Required disclosures:** The derivation shall be shown explicitly:

$$P_{ITCompute_{prov}} = P_{Facility_{prov}} - (P_{CoolReject_{prov}} + P_{ElecLoss_{prov}} + P_{Aux_{prov}})$$

- All four input variables shall be calculated and disclosed in accordance with the requirements in sections 3.3.1 through 3.3.4.
- **Data source:** Derived from the four variables above. No independent data source is required.

3.4 Variable Definitions

To claim PCE compliance, a facility shall satisfy the following six requirements:

1. Declare facility boundary. The physical and contractual scope of the PCE calculation must be explicitly documented and supported by an electrical single-line diagram.
2. Declare redundancy basis. The N-configuration (N, N+1, 2N, etc.) under which all provisioned capacities are evaluated must be stated.
3. Provide documented data sources. Each variable must reference the specific documentation from which it was derived, in accordance with the data source requirements defined in Section 3.3.
4. Use provisioned capacity values. PCE must be calculated from provisioned capacity data. Metered operational data may be used for validation but shall not serve as the primary input.
5. Disclose planning conditions. The design conditions under which cooling and electrical capacity are provisioned — including IT load percentage, ambient temperature, and supply/return temperatures — must be disclosed alongside the reported PCE value.
6. Avoid modeled or speculative inputs. All inputs must be derived from utility agreements, equipment nameplate ratings, issued-for-construction documentation, commissioning reports, or OEM-certified submittals.

4. Relationship to Existing Metrics

PCE evaluates how provisioned electrical capacity is allocated to IT compute after accounting for cooling, electrical distribution losses, and auxiliary facility loads independent of workload

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type or operational utilization. The metrics below each address a distinct dimension of data center performance. PCE is intended to complement these metrics, not replace them.

4.1 Power Usage Effectiveness (PUE)

PUE measures operational energy efficiency by comparing total facility energy consumption to IT equipment energy consumption under operating conditions. PUE evaluates energy performance during facility operation, while PCE evaluates structural electrical capacity allocation based on provisioned infrastructure design.

4.2 Data Center Infrastructure Efficiency (DCiE)

DCiE represents the inverse expression of PUE and indicates the proportion of facility power delivered to IT equipment during operation. DCiE evaluates operational efficiency using measured energy consumption, whereas PCE evaluates provisioned electrical capacity allocation within a declared facility boundary.

4.3 Infrastructure Use Effectiveness (IUE)

IUE evaluates the utilization of five infrastructure resource elements — power delivery, power distribution, cooling generation, cooling flow, and rack space — relative to IT load, identifying which resource constrains IT load expansion under operating conditions. PCE differs from IUE in that PCE evaluates the allocation of provisioned electrical capacity at the design level, independent of operational resource consumption or utilization measurements.

4.4 Total-Power Usage Effectiveness (TUE)

TUE combines PUE with IT-power Usage Effectiveness (ITUE) to measure total facility energy consumption relative to the energy delivered to compute components within IT equipment, extending the operational energy-efficiency ratio from utility supply down to compute silicon and

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closing a PUE blind spot that arises when cooling or power-conversion losses shift across the IT boundary. TUE evaluates annual operational energy performance across the full energy chain, whereas PCE evaluates structural electrical capacity allocation at the design level, independent of operational energy flow or IT-component efficiency.

4.5 Carbon Usage Effectiveness (CUE)

CUE measures greenhouse gas emissions associated with data center energy consumption by relating facility energy use to resulting carbon impact. CUE evaluates environmental performance, whereas PCE evaluates structural electrical capacity allocation independent of emissions or energy source.

4.6 Water Usage Effectiveness (WUE)

WUE evaluates water consumption associated with data center operation, including cooling system water usage. PCE evaluates capacity allocation across cooling technologies, but does not directly measure water use while WUE measures resource utilization associated with facility operation.

Table 2. PCE Relationship to Existing Data Center Metrics

Metric	What It Measures	How It Differs from PCE
PUE	Operational energy efficiency during facility operation	Uses measured energy consumption during operation; PCE uses provisioned capacity values from infrastructure design documentation
DCiE	Proportion of facility power delivered to IT equipment during operation	Inverse expression of PUE; shares the same operational, measured basis and does not evaluate provisioned capacity allocation

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Metric	What It Measures	How It Differs from PCE
IUE	Utilization of five infrastructure resource elements (power, cooling, rack space) relative to IT load	Evaluates operational resource utilization under IT load; PCE evaluates provisioned capacity allocation at the design level, independent of operational utilization
TUE	Total facility energy consumption relative to compute component energy; combines PUE with ITUE to extend the energy view inside IT equipment (fans, power supplies, voltage regulators)	Evaluates operational energy flow from utility supply to compute silicon; PCE evaluates provisioned electrical capacity allocation at the design level, independent of operational energy or IT-component efficiency
CUE	Greenhouse gas emissions associated with data center energy consumption	Evaluates environmental performance relative to energy use; PCE evaluates structural electrical capacity allocation independent of emissions or energy source
WUE	Water consumption associated with data center operation, including cooling system usage	Evaluates cooling resource utilization during operation; PCE evaluates electrical capacity allocation independent of cooling technology or water consumption

5. Applied Scenarios

The two scenarios below demonstrate how PCE is calculated across different facility types and scales. Both are representative composites based on published industry equipment

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specifications and design standards. They are intended to illustrate the PCE calculation methodology, not to prescribe infrastructure design choices or establish target values. PCE will differ across facilities based on their provisioned infrastructure design, redundancy configuration, and declared boundary.

5.1 Enterprise Colocation: 20 MW Tier III Facility (N+1 Redundancy)

This scenario represents a mid-size enterprise colocation facility operating under N+1 redundancy. The declared facility boundary encompasses all mechanical and electrical systems from the utility service entrance to the IT distribution boards. Variable values are sourced from the utility interconnection agreement, mechanical equipment schedules, OEM submittals, and electrical panel schedules in accordance with the data source requirements defined in Section 3.3.

Table 3. PCE calculation on 20MW Enterprise Colocation Campus

Variable	Value	Basis
$P_{facility_{prov}}$ Provisioned Facility Electrical Capacity	20.0 MW	- Utility interconnection agreement: 20 MW contracted service capacity - Main service switchgear nameplate - Commissioning report
$P_{CoolReject_{prov}}$ Provisioned Cooling and Heat Rejection	4.8 MW	- (5) 750-ton centrifugal chillers at 0.58 kW/ton (OEM submittal) = 2,175 kW - Cooling tower fan motors, 5 cells (OEM submittal) = 500 kW - Primary CHW pumps, 4 x 75 kW (panel schedule) = 300 kW - Secondary CHW pumps, 6 x 90 kW (panel schedule) = 540 kW - Condenser water pumps, 5 x 90 kW (panel schedule) = 450 kW - CRAH units, 40 x 18 kW (equipment schedule) = 720 kW

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Variable	Value	Basis
		- VFD and control panels (IFC drawings) = 115 kW
$P_{ElecLoss_{prov}}$ Provisioned Electrical Conversion and Distribution Losses	0.7 MW	- (6) 500 kVA UPS modules at 95% efficiency (manufacturer curves) = 150 kW - Step-down transformers, 8 x 300 kVA at 98% (nameplate) = 48 kW - PDU distribution losses (certified submittals) = 200 kW - Busway losses (commissioning report) = 302 kW
$P_{Aux_{prov}}$ Provisioned Auxiliary Facility Loads	0.4 MW	- Lighting circuits = 80 kW - Fire detection and suppression = 40 kW - BMS/SCADA panels = 60 kW - Security and access control = 30 kW - Non-IT ventilation = 80 kW - Maintenance receptacles = 50 kW - Office and support-space loads = 60kW - Source: electrical panel schedules; building load summary sheet
$P_{ITCompute_{prov}}$ Provisioned Compute Power Allocation	14.1 MW	$P_{Facility,prov} - (P_{CoolReject,prov} + P_{ElecLoss,prov} + P_{Aux,prov})$ $= 20.0 - (4.8 + 0.7 + 0.4) = 20.0 - 5.9 = 14.1 \text{ MW}$
PCE	0.705	$PCE = P_{ITCompute,prov} / P_{Facility,prov}$ $PCE = 14.1 / 20.0 = 0.705$

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Of the 20.0 MW of provisioned facility electrical capacity, 5.9 MW is allocated to cooling systems and heat rejection, electrical distribution losses, and auxiliary loads. The remaining 14.1 MW is structurally available for IT compute, yielding a PCE of 0.705.

5.2 Hyperscale Campus: 100 MW Facility (N+1 at Generator Level)

This scenario represents a large-scale hyperscale campus operating under N+1 redundancy at the generator level. The declared facility boundary encompasses all mechanical and electrical systems from the transmission substation to the IT distribution infrastructure. Variable values are sourced from the utility interconnection agreement, mechanical equipment schedules, OEM submittals, and electrical panel schedules in accordance with Section 3.3.

Table 4. PCE calculation on 100MW Hyperscale Campus

Variable	Value	Basis
$P_{facility_{prov}}$ Provisioned Facility Electrical Capacity	100.0 MW	- Utility interconnection agreement: 100 MW contracted transmission capacity - Transmission substation nameplate rating - Commissioning report
$P_{CoolReject_{prov}}$ Provisioned Cooling and Heat Rejection	16.0 MW	- (6) 2,500-ton centrifugal chillers at 0.55 kW/ton (OEM submittal) = 8,250 kW - Cooling tower fan motors, 6 cells at 250 kW each (OEM submittal) = 1,500 kW - Primary/secondary CHW pumps, 16 x 150 kW (panel schedule) = 2,400 kW - Condenser water pumps, 6 x 175 kW (panel schedule) = 1,050 kW - CRAH/fan walls (IFC mechanical schedule) = 2,800 kW

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Variable	Value	Basis
$P_{ElecLoss_{prov}}$ Provisioned Electrical Conversion and Distribution Losses	3.5 MW	- Central UPS losses at declared loading (manufacturer efficiency curves) = 2,400 kW - MV/LV transformer nameplate losses (commissioning report) = 600 kW - PDU/busway distribution losses (certified submittals) = 500 kW
$P_{Aux_{prov}}$ Provisioned Auxiliary Facility Loads	1.5 MW	- Interior/exterior lighting = 400 kW - Fire systems = 150 kW - BMS/SCADA = 250 kW - Security and access control = 200 kW - Non-IT ventilation = 300 kW - Maintenance loads = 200 kW - Source: electrical panel schedules; building load summary sheets
$P_{ITCompute_{prov}}$ Provisioned Compute Power Allocation	79.0 MW	$P_{Facility,prov} - (P_{CoolReject,prov} + P_{ElecLoss,prov} + P_{Aux,prov})$ $= 100.0 - (16.0 + 3.5 + 1.5) = 100.0 - 21.0 = 79.0 \text{ MW}$
PCE	0.790	$PCE = P_{ITCompute,prov} / P_{Facility,prov}$ $PCE = 79.0 / 100.0 = 0.790$

Of the 100.0 MW of provisioned facility electrical capacity, 21.0 MW is allocated to cooling systems, electrical distribution losses, and auxiliary loads. The remaining 79.0 MW is structurally available for IT compute, yielding a PCE of 0.790.

5.3 Observations

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These scenarios illustrate two points central to PCE as a metric. First, PCE is scale-independent. The calculation methodology and data source requirements are identical whether the facility is 20 MW or 100 MW. Second, PCE surfaces the absolute magnitude of provisioned power allocated to infrastructure overhead: 5.9 MW in the colo scenario and 21.0 MW at hyperscale. This is the stranded capacity that PCE is designed to make visible — power that is provisioned and paid for but unavailable to IT compute under the declared infrastructure design. Existing operational metrics do not capture this structural allocation, as they evaluate energy consumption during operation rather than how provisioned capacity is distributed at the design level.

5.4 Adoption

PCE is designed for straightforward industry adoption using information that already exists within standard facility engineering and construction documentation. Provisioned facility electrical capacity, cooling rejection capacity, electrical distribution losses, auxiliary load capacity, and provisioned IT compute capacity are derivable from commonly available sources including utility service agreements, equipment nameplate ratings, panel schedules, issued-for-construction drawings, and commissioning reports. No new metering infrastructure, telemetry platforms, or operational data collection processes are required. Because PCE is based on provisioned design capacity rather than live operational performance, it can be calculated during the design phase prior to facility commissioning. PCE is intended to complement, not replace, existing operational metrics such as PUE. The primary requirement for consistent adoption is disciplined application of the variable definitions, system boundaries, and data-source conventions established in Section 3.

6. Operational Applications of PCE

PCE provides a consistent framework for evaluating how provisioned electrical capacity is allocated at the design level. Key applications include:

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- **Retrofit Prioritization:** Identify facilities where infrastructure overhead consumes a significant portion of provisioned capacity, enabling targeted upgrades to recover stranded power.
- **Cooling Architecture Comparison:** Evaluate the impact of different cooling strategies on electrical allocation, supporting more informed design decisions.
- **Capacity Planning:** Quantify how much additional IT load can be supported within existing provisioned power constraints.
- **Portfolio-Level Analysis:** Compare PCE across multiple facilities to prioritize capital investment and infrastructure improvements.

These applications enable operators to use PCE as a decision-making tool rather than solely a reporting metric.

7. Conclusion

Power Compute Effectiveness introduces a provisioned-capacity perspective that existing operational metrics do not provide. By quantifying the proportion of provisioned facility electrical capacity structurally allocated to IT compute, PCE makes stranded capacity visible, comparable, and reportable across facilities of any type or scale. PCE does not prescribe infrastructure choices or favor any technology; it is an open, vendor-neutral framework that complements other established metrics with a structural view of how provisioned power is allocated, consistent with the OCP tenets of openness, efficiency, and sustainability. As compute density increases and utility interconnection constraints tighten across the industry, the Open Compute Project community is positioned to drive adoption of PCE as a standard reporting metric enabling operators, owners, and planners to evaluate infrastructure capacity allocation at the design level and make more informed decisions about how provisioned electrical capacity is put to work.

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8. Glossary

PCE (Power Compute Effectiveness): The ratio of provisioned IT compute electrical capacity structurally available within a declared facility boundary to the total provisioned facility electrical capacity under the declared redundancy basis; expressed as a dimensionless value between 0 and 1.

Provisioned Capacity: The maximum electrical capacity for which a facility is designed and documented, derived from utility agreements, equipment nameplate ratings, issued-for-construction documentation, or commissioning reports; distinct from metered or operational values.

Stranded Capacity: Provisioned electrical capacity that is unavailable to IT compute because it is allocated to cooling systems, electrical distribution losses, or auxiliary facility loads within the declared facility boundary.

9. References

- 9.1. Quigley, P., Chen, Y., & Roberts, J. (2026). *Power Compute Effectiveness (PCE): Definition and Framework for Data Center Electrical Capacity Allocation*. Zenodo. <https://doi.org/10.5281/zenodo.18986582>

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11. About Open Compute Foundation

The Open Compute Project (OCP) brings at-scale innovations and hyperscaler best practices to all, spanning technology domains from the data center to the edge, and the technology stack from silicon, to systems, to site facilities and services. The international OCP Community is made up of organizations and people from hyperscale and tier-2 cloud data center operators, communications providers, colocation providers, diverse enterprises, and technology vendors. The OCP Foundation fosters collaboration within the Community to tackle market challenges in an array of OCP Projects that create open contributions such as specifications, designs, and more. The OCP Solution Provider Program then recognizes the application of those contributions in compliant products, solutions, and data center facilities and services with designations like OCP Inspired, OCP Accepted and OCP Ready. With the tenets of openness, impact, efficiency, scale and sustainability, the OCP engages and educates thousands of

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engineers every year through many events and webinars. Across many initiatives the OCP Foundation and Community are meeting the market today and shaping the future.

Learn more at: www.opencompute.org.

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