

Power Guide for Data Centers

An at-a-glance guide to on-site and grid-connected power strategies.

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This guide outlines the power options data center developers are actively evaluating. The goal is to clarify what's practical, what's conditional, and what requires long-range planning. Developers already know:

Power is the gating issue.

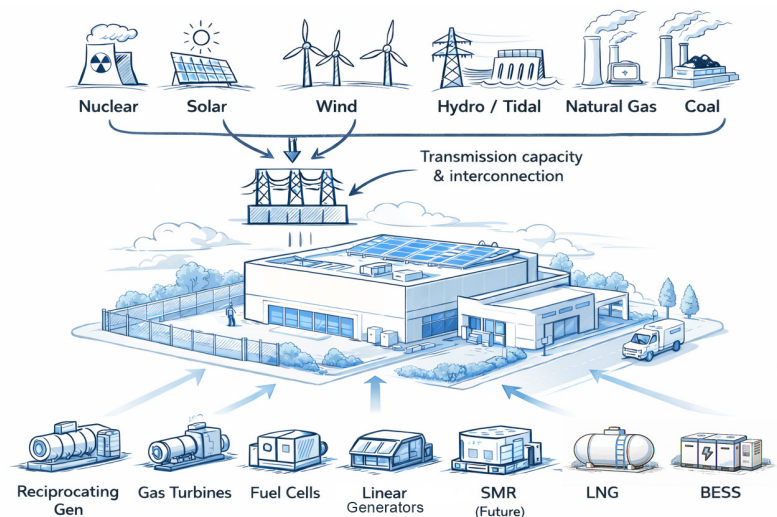
The question is how projects move forward inside those constraints. Strategies fall into two broad categories: 1) generation that can be colocated with the data center; and 2) power delivered through the grid.

Selection of on-site power generation sources or grid connectivity bring different implications for schedule, capital planning, operational control, emissions, and long-term flexibility.

Some options are available now while others are emerging and being deployed based on geography, utility posture, and regulatory context.














Power strategy shapes not only schedule, but the life of the facility.

Colocated and grid-delivered power solutions



Power decisions are system decisions.

There is no single right answer for data center power; this comparison explores the practical advantages and constraints of each option to support layered and evolving approaches.

SOURCE	TYPICAL ROLE	RELIABILITY	CARBON PROFILE	KEY ADVANTAGES	KEY CONSTRAINTS
 NATURAL GAS combined cycle/steam turbines	Regional or on-site primary power	Highly reliable	↑	High efficiency & proven technology	Fuel price volatility, permitting, water usage, & emissions
 NATURAL GAS simple cycle combustion turbines	Peaking or fast-response support	Highly dispatchable	↑	Fast start & grid support	Lower efficiency, limited asset availability, & emissions
 NATURAL GAS reciprocating generators	On-site resilience and supplemental power	Highly reliable when paired with stabilizing assets	↑	Rapid response & scalable	Emissions, fuel dependency, & maintenance cycle
 FUEL CELLS natural gas	On-site primary or supplemental power	Highly reliable when paired with stabilizing assets	Reduced	Scalable, quiet, high efficiency operation	Fuel supply dependency & carbon-emitting
 FUEL CELLS hydrogen	On-site low-carbon where fuel is available	Highly reliable when paired with stabilizing assets	↓	Zero-emission at point of use	Limited hydrogen & infrastructure constraints
 NUCLEAR traditional	Primary on-site or regional baseload	Highly reliable, continuous	↓	Long-term reliability & high output	Long permit timelines, waste handling, & labor requirements
 NUCLEAR SMR	Future on-site baseload option	Designed for continuous operation	↓	Scalable with strong reliability potential	Not commercially available & supply chain maturity
 GEOTHERMAL POWER	Niche primary or supplemental power	Continuous where viable	↓	Stable output & low operating emissions	Limited geographic & capital feasibility
 SOLAR	Supplemental on-site or off-site power	Intermittent	↓	Clean energy & scalable	Intermittency & land requirements
 WIND	Supplemental off-site power	Intermittent	↓	Clean energy & mature technology	Intermittency & siting constraints
 TIDAL POWER	Experimental supplemental power	Predictable but limited	↓	Predictable cycles	Early-stage, limited deployment, & corrosive environment
 HYDROELECTRIC	Off-site legacy baseload	Highly reliable	↓	Proven baseload generation	New permitting unlikely & limited expansion
 LINEAR GENERATORS multi-fuel	Flexible on-site generation	Highly reliable when paired with stabilizing assets	Fuel dependent	Fuel flexibility & favorable emissions	New technology, fuel sourcing, & maintenance cycle



How hyperscalers evaluate power strategy early

At hyperscale, power decisions shape portfolio velocity and capital deployment. The question is which tradeoffs remain acceptable when repeated across dozens of sites.

WHAT DRIVES THE DECISION

Time to capacity dominates. The ability to deliver large, predictable load blocks on schedule outweighs most other variables, especially when paired with solutions that can be replicated across regions without introducing operational variance.

WHERE PROGRAMS BREAK DOWN

Risk concentrates when portfolios depend on future transmission upgrades, overestimate the scalability of emerging technologies, or defer power decisions too late in site sequencing. Each of these introduces friction that compounds across markets rather than remaining isolated to a single project.

WHAT WORKS AT SCALE

Successful programs screen sites by viable power pathways, plan for phased power models that preserve long-term optionality, and manage risk at the portfolio level to avoid shared dependencies that can stall multiple sites at once.

How Salas O'Brien can help

We can help enterprise clients, developers, and hyperscalers find the right mix of power strategies for their context and make a plan for speed to market or transitions over time.

For more information, reach out:

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