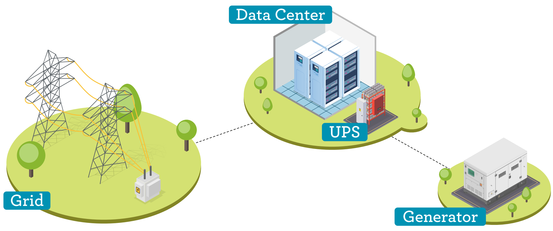
The Electricity Needs of DATA CENTERS

A Tier-by-Tier Breakdown

Data centers consume a significant amount of electricity to power servers, computing equipment, cooling systems and other ancillary devices. The source of this power depends on required reliability and uptime (i.e., operational time). Data centers fall into a four-tiered classification system, with Tier I being the least reliable and Tier IV being the most reliable. Power can be supplied from several sources: electricity from a local power grid, a power plant dedicated to the data center (serving as either a backup or primary power source) or a combination of both. This ensures continuous operation.

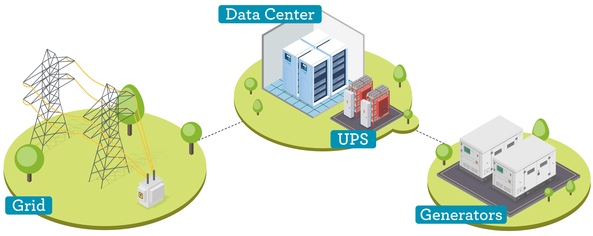
Tier I

Tier I data centers are the most basic with the **lowest reliability requirement**. They are suitable for **small businesses** with minimal IT needs. Power is typically delivered through a **single utility feed** from the local power grid, an uninterruptible power supply (UPS) (i.e., battery) and a backup generator.



Tier II

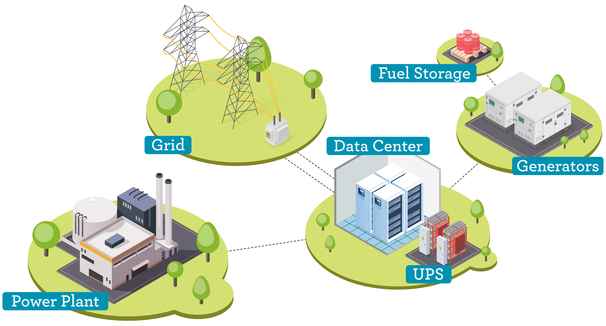
Tier II data centers provide **better reliability** than Tier I and are commonly used by **medium-sized businesses**. While they typically have a single utility feed from the local power grid, they also include a **redundant UPS and backup generator** to enhance reliability.



Tier III

Tier III data centers offer significant redundancy and maintenance can be performed without downtime. They are widely used by **large enterprises** and critical applications, such as **hospitals and government agencies**. Tier III data centers add a second connection to the local power grid and a **dedicated power plant** to further enhance reliability.

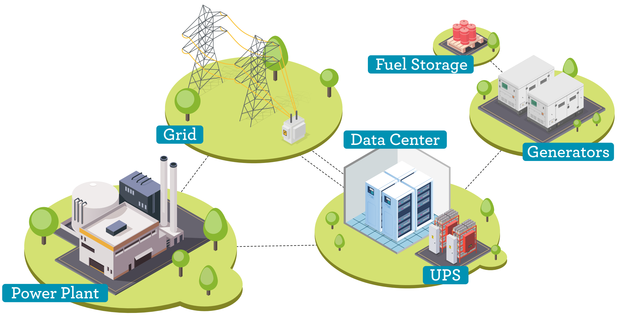
Additionally, they can **interchangeably draw from grid power or power generated on-site**. Standby generators with extra fuel are available in the event of an extended power outage, with enough capacity to operate for up to 72 hours.



Tier IV

Tier IV data centers represent the **highest level of reliability and redundancy**. They are used by organizations that require maximum uptime, such as **financial institutions and large cloud providers**. Tier IV data centers use the same utility feed and power plant arrangement as Tier III data centers but add an **independent power path from the power plant to the grid** and standby generators with refuel supplies that can run indefinitely.

In some cases, the power plant is connected to both the data center and the utility to **sell power to the grid** when data center demand is less than the potential supply of the power plant.



The Uptime Institute's tier classification system is a globally-recognized standard for evaluating data center performance and reliability. These tiers help organizations choose data centers based on their needs for uptime, redundancy and cost. Higher tiers offer more reliability but are also more expensive to build and maintain.

	Uptime *(per year)*	Downtime *(per year)*	Cost *(per kW)*	Operating Staff
Tier I	99.67%	28.8 hrs	$11,500	None
Tier II	99.74%	22.7 hrs	$12,500	1 Shift
Tier III	99.98%	1.6 hrs	$23,000	1+ Shifts
Tier IV	99.99%	27 mins	$25,000	24/7

LET'S TALK DATA CENTERS

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For more information about this topic, check out Kendalle's article Data Centers and Environmental Sustainability: Navigating the Future.

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