

A wide-angle photograph of a modern data center. The room is filled with rows of black server racks, each containing numerous server units with glowing blue and green lights. The floor is made of light-colored square tiles with dark rectangular ventilation grates. The perspective leads the eye down a central aisle between the racks. The ceiling is high with visible structural beams and some lighting fixtures.

DATA CENTERS

Scott Sandal

- 30-year IT career > 20-year data center infrastructure mgmt. software focus
- VP Client Services @ Sunbird Software
- Built a team of over 50+ DC experts in SD
- Lennox SD Board of Education 9-years
- Dakota State Univ. Alumni, Madison SD
- West River SD ranch raised, and K-8 2-room Country School educated
- Father of 4, Grandfather of 2

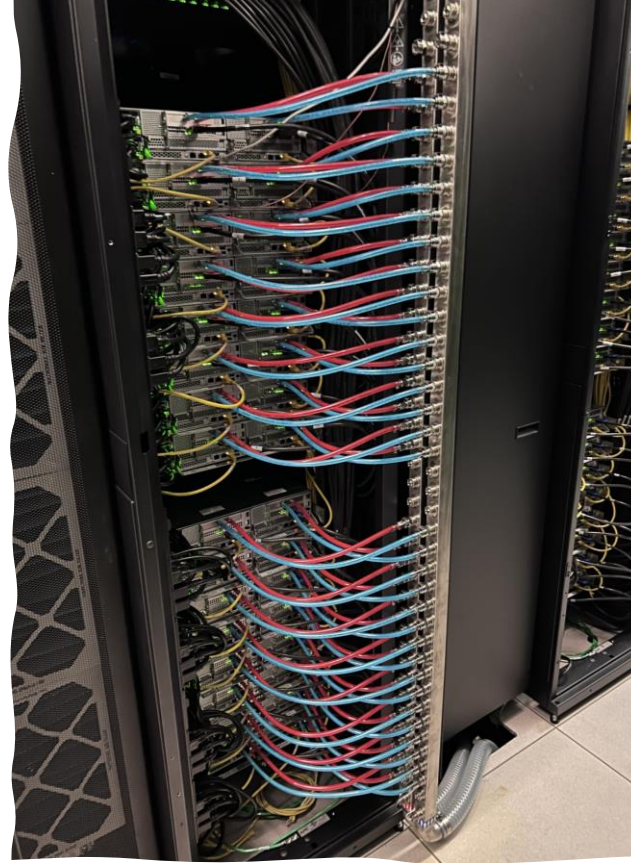
Here to share knowledge and experiences
from 50 states and 110 countries!





Personal Computer Evolution into a Digital Age

PC “Server” in Cabinet/Rack

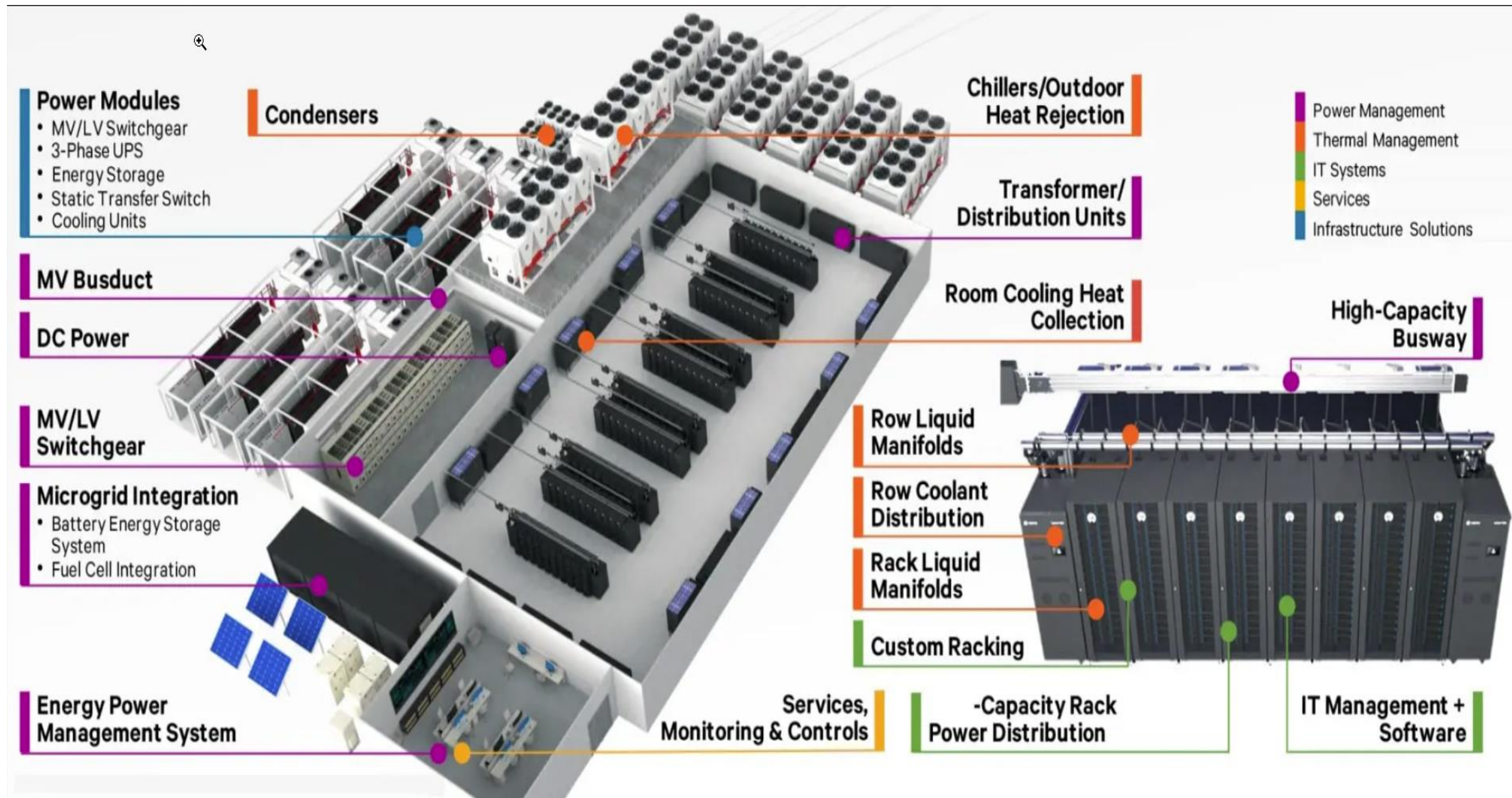






Data Centers Building or Campus

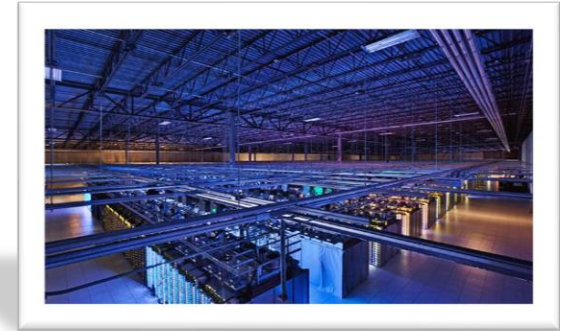


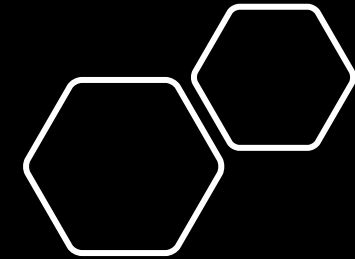


Data Center Infrastructure - Source: Vertiv

What is the job of a data center?

- Be a secure, centralized physical facility that houses, powers, and manages an organization's critical IT infrastructure, servers, storage, and networking to store, process, and distribute vast amounts of digital data and run essential applications, powering everything from cloud services and e-commerce to AI and streaming.
- Provide the backbone for the digital world by ensuring data is accessible, reliable, and protected, with redundant systems for power and cooling.



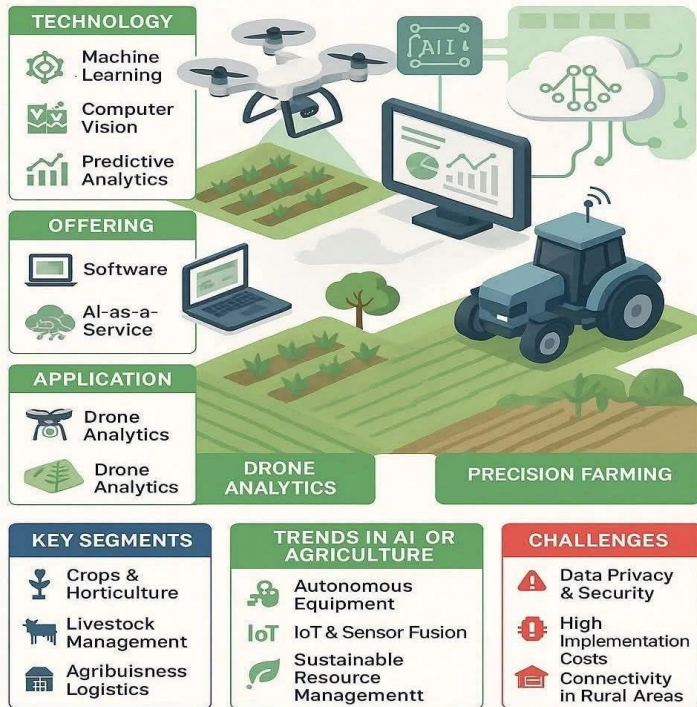


Prompt: create a graphic of who uses data centers and why they exist for high school students to understand.

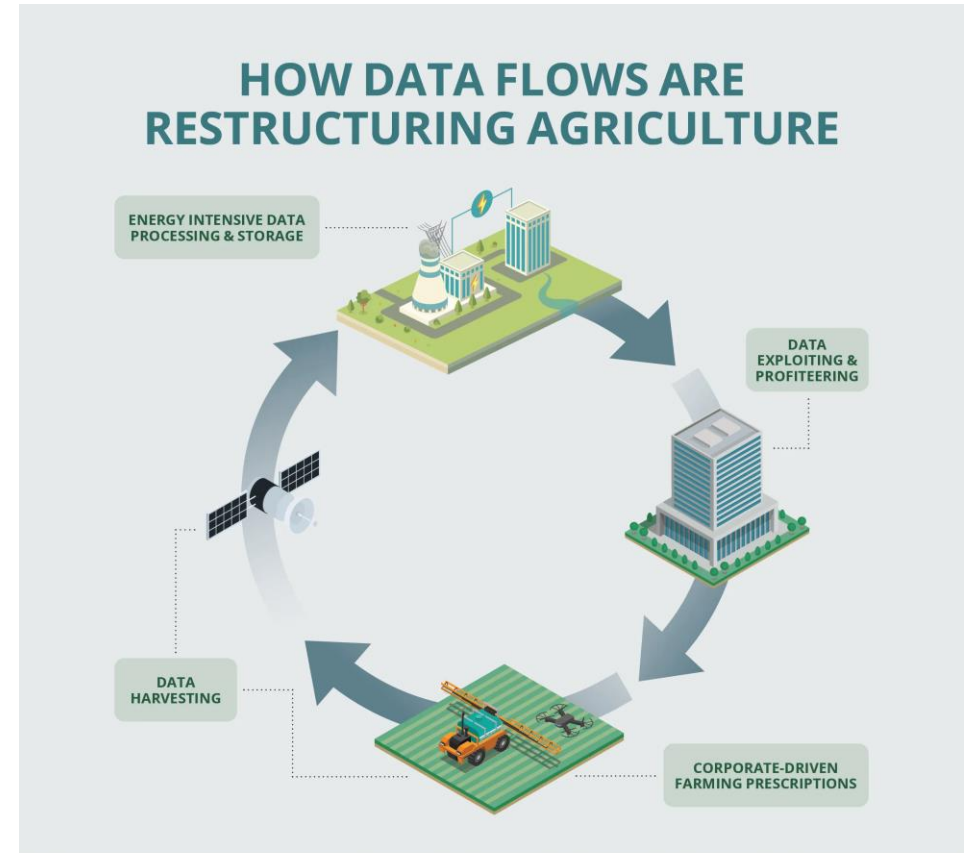
Data Centers in Agriculture

ARTIFICIAL INTELLIGENCE IN AGRICULTURE

Technologies Driving Efficiency, Sustainability, and Precision in Farming



HOW DATA FLOWS ARE RESTRUCTURING AGRICULTURE



Data Center Types

- **AI Hyperscale**
 - 100MW+ campus / 75kW+ per cabinet
- **Bitcoin Mining / Crypto Currency**
- **Traditional Data Center**
 - kW to MW in size / 5-50kW per cabinet
 - Enterprise
 - Healthcare \ Medical
 - University \ Research
 - Colocation \ D.R.
 - Cloud Compute \ Storage
 - IDF/MDF/Data Room



The Health Risks of Data Centers

Air Pollution



Data centers that run on fossil fuels, including diesel backup generators, emit toxic pollution that may contribute to approximately 1,300 premature deaths per year.

Noise Pollution



Constant, low-frequency noise can lead to annoyance, sleep disturbances, higher blood pressure, mental fatigue, tinnitus, and cardiovascular disorders.

Light Pollution



Many data centers use 24/7 exterior lighting, which can disrupt sleep cycles, increasing risk of mood and anxiety disorders, obesity, cardiovascular diseases, and cancers.

Increased Costs



Large electricity users strain the grid and can drive up prices for other rate payers. Without strong regulations, some residential rates may increase by up to 25%.

Wasted Water



Data centers consume massive amounts of water, elevating the risk of drought stress, waterborne disease, and poor maternal and infant health outcomes.

Climate Change



Gas-powered data centers raise temperatures and increase greenhouse gas emissions, leading to more extreme weather, power outages, and health consequences.



Carrying Capacity

Understanding what the land and resources can support.



Relating to Ranching

- Meade County SD
 - 20-30 acres / pair (animal units)
 - Water source – 2500 ft wells
 - 16-19 inches annual rainfall
- Yankton County SD
 - 3-5 acres / pair summer grazing
 - Water source - 200 ft wells
 - 25-29 inches annual rainfall



3 - 5 kW

10 - 20 kW

50 - 80 kW

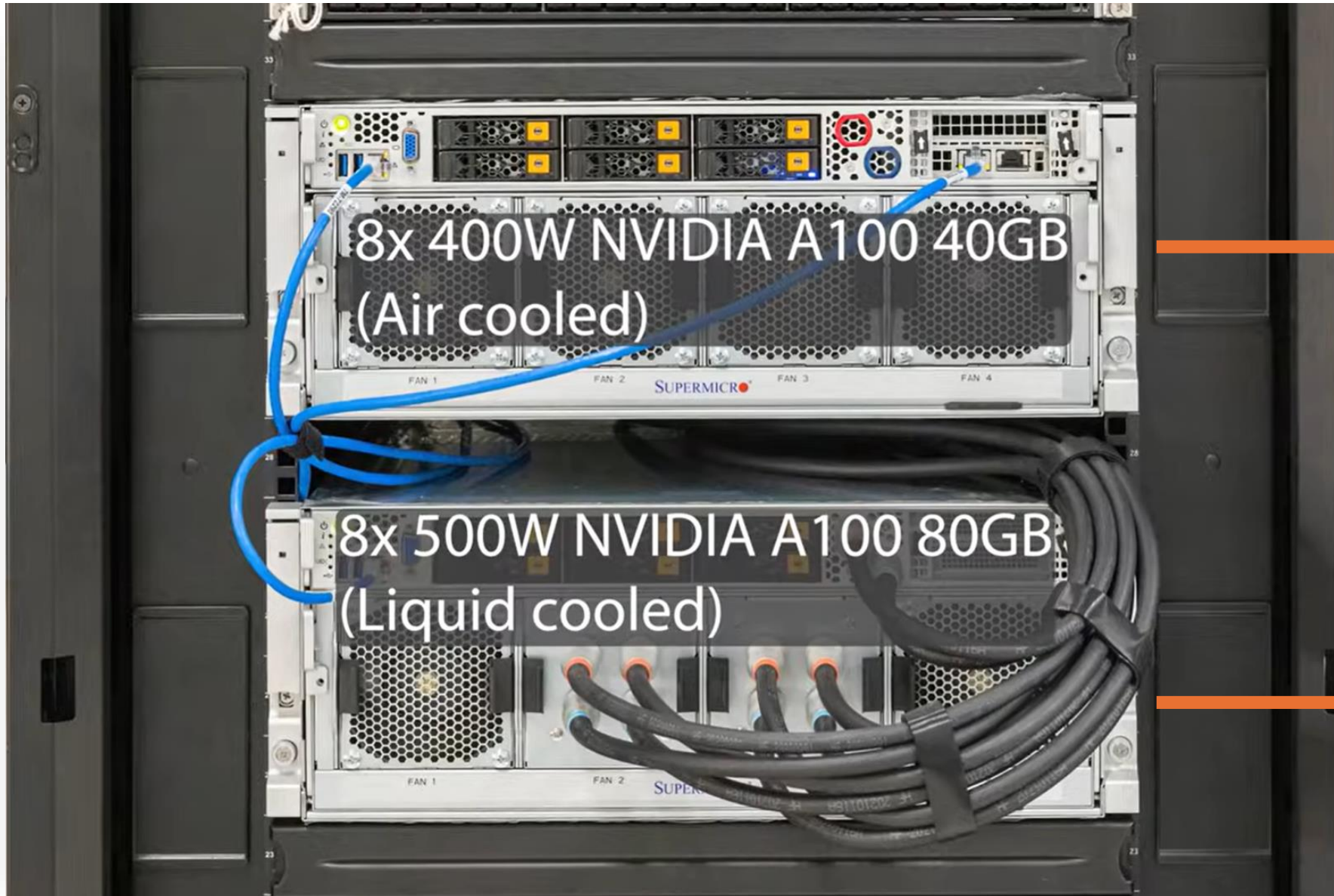
80 - 100 kW

1 MW?

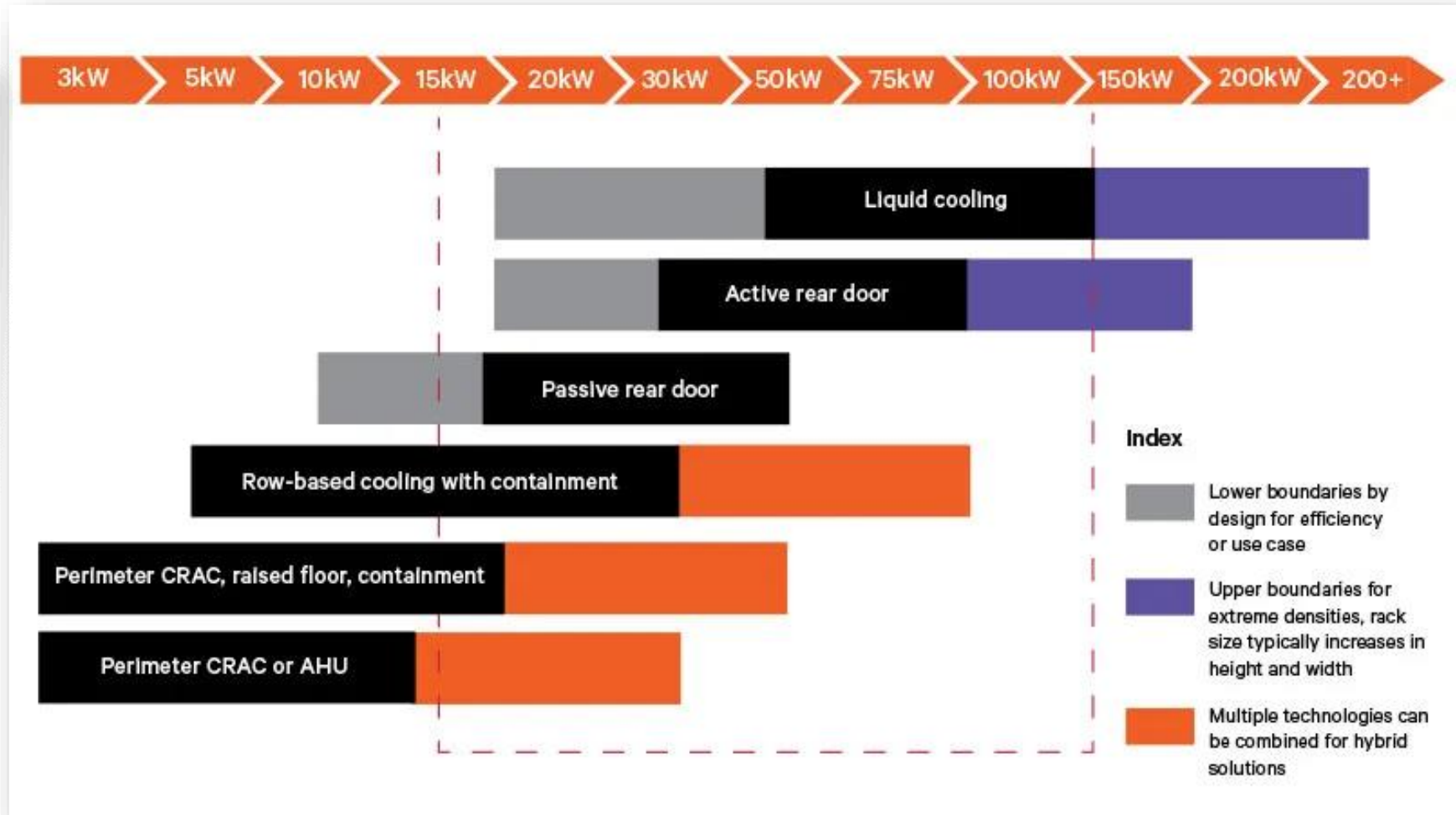
1 Megawatt?



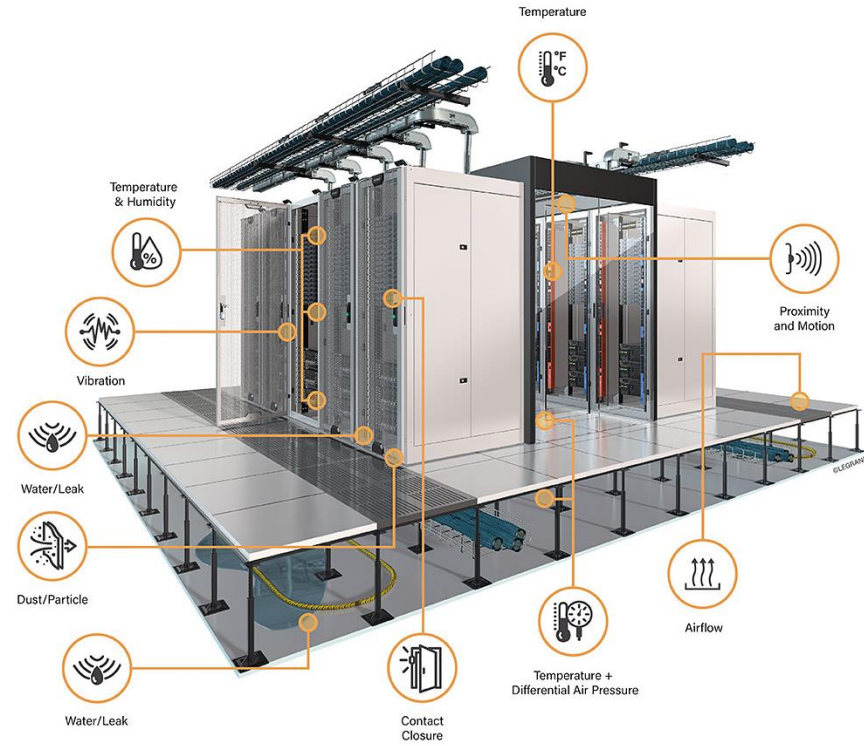
Server Cooling Technology



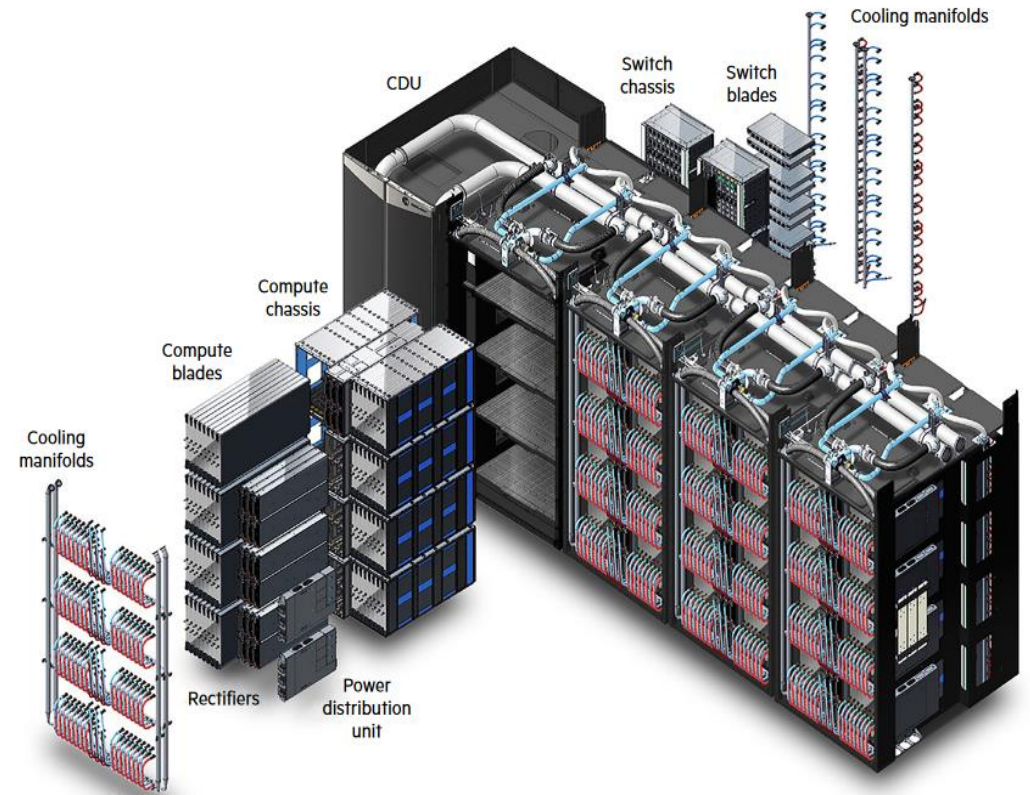
Cabinet Power Density and Cooling Technologies



Environment Monitoring and Modern Cooling

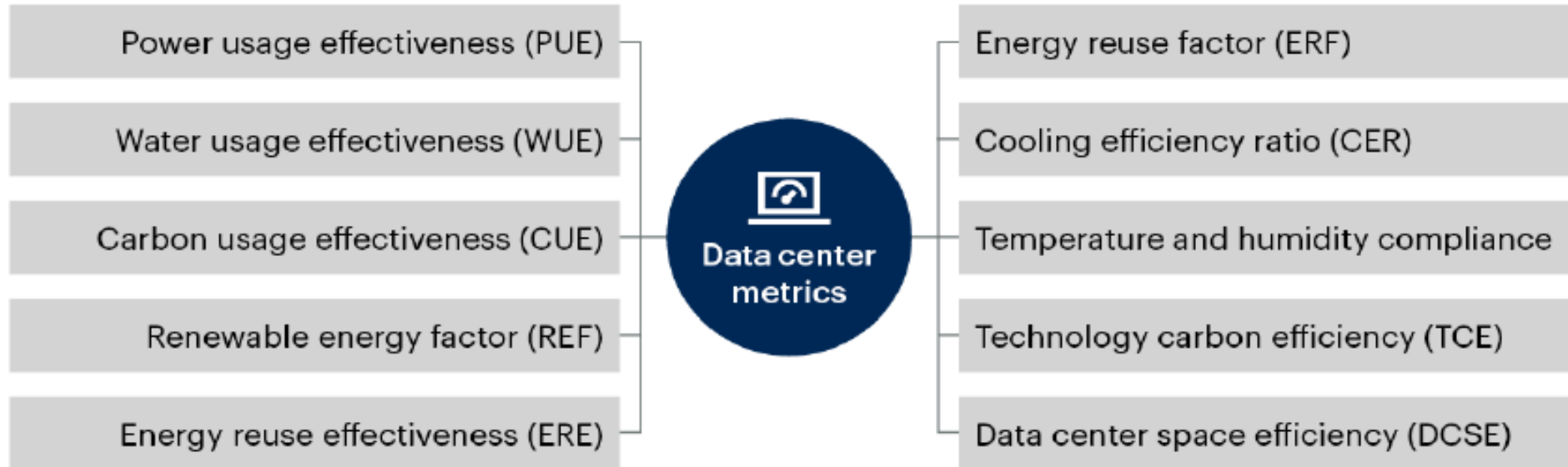


**This is for illustration only and is not an actual deployment recommendation.*



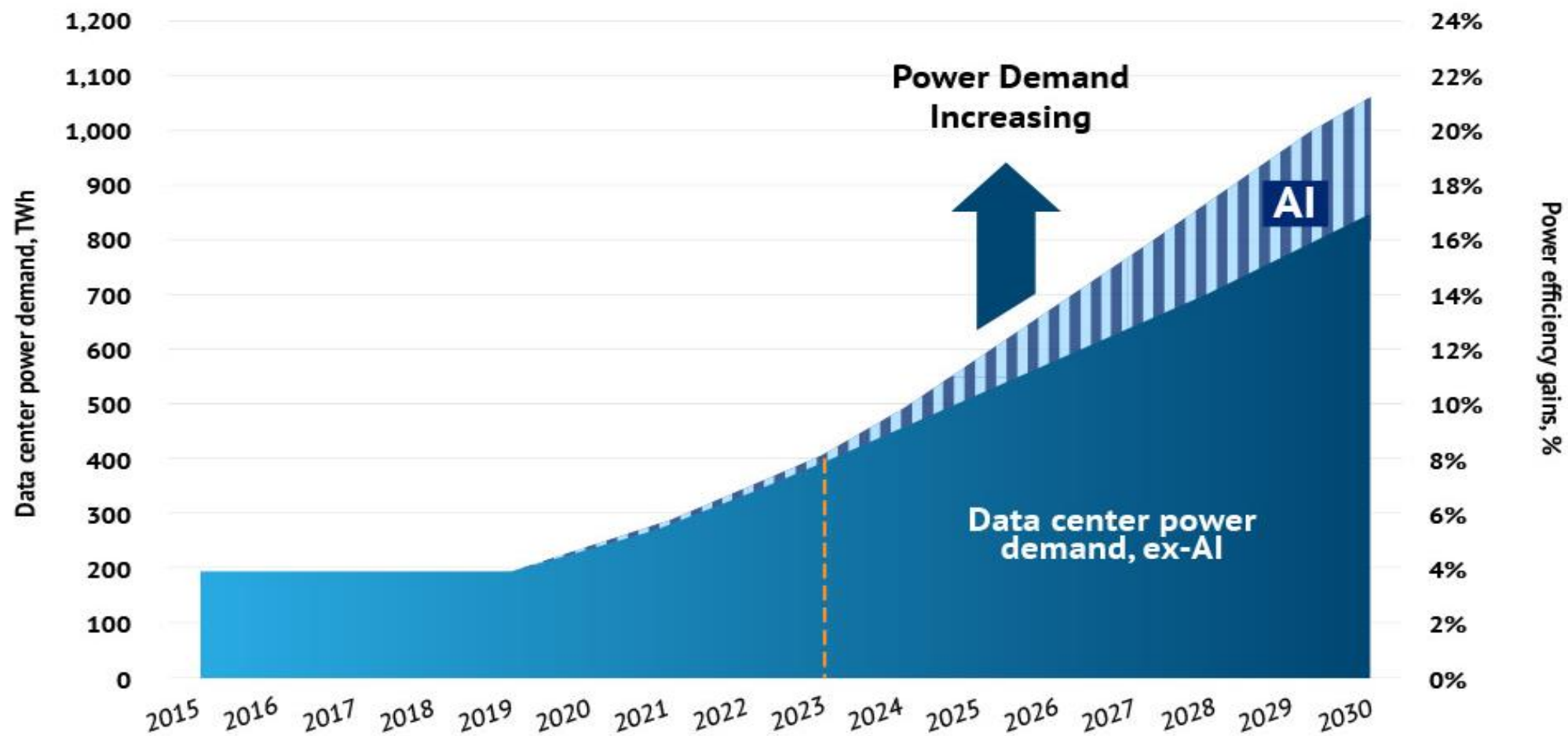
Foundation to Transparency

Data Center Sustainability Metrics



Source: Gartner
805621_C

Data Center Demand AI and Non-AI





THANK YOU