ENVIRONMENTAL SUPERCONFERENCE
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Data Centers 101

Why digital infrastructure is now environmental infrastructure

A.W. Armstrong
Principal & Texas Market Director

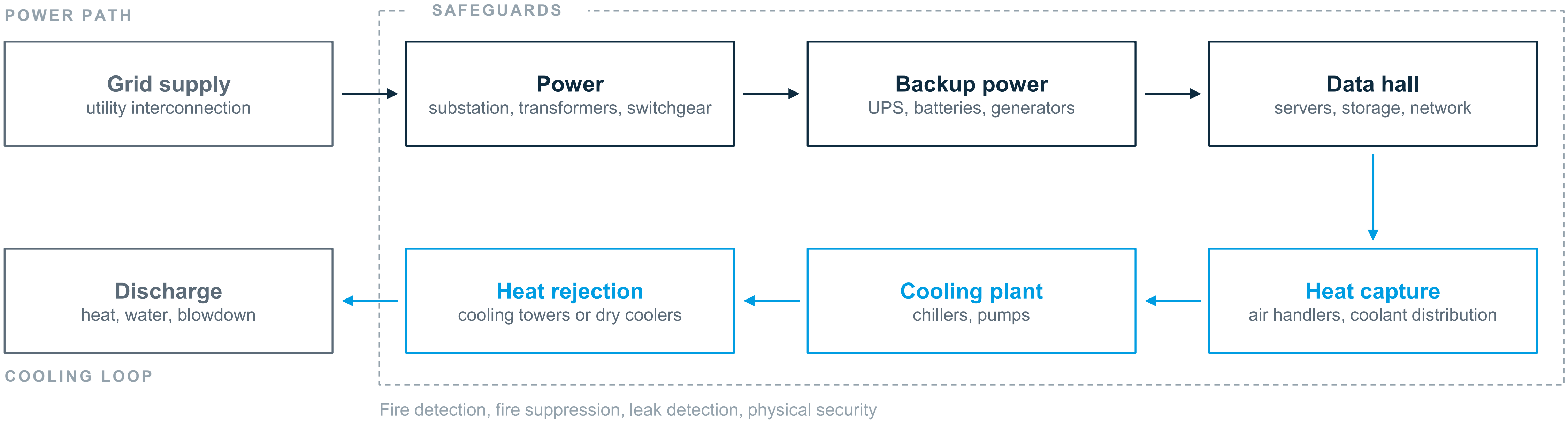
RAMBOLL

Bright ideas.
Sustainable change.

ANATOMY

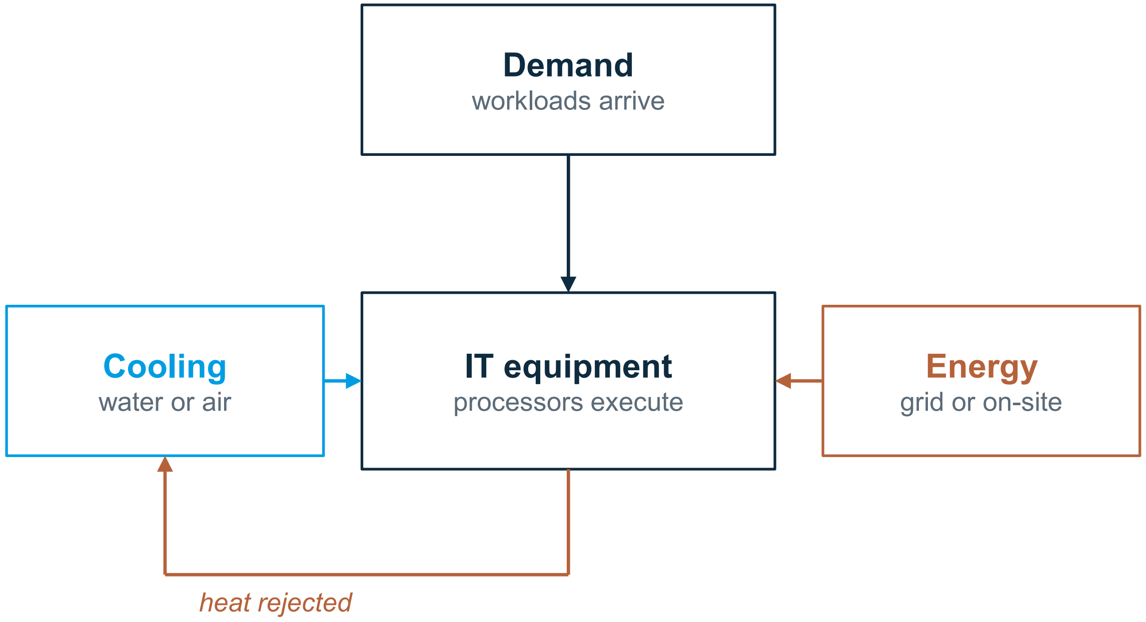
A data center is four coupled systems, not a building

Every element is engineered around a single requirement: the IT load stays available 24 hours a day. Power flows in, work is done, and heat leaves through the cooling loop.



Reliability, not floor area, sets the environmental footprint.

Energy in, heat out: the cycle that creates every environmental issue



Compute demand activates servers. Servers draw power. Almost all of that power leaves the building as heat. The heat has to go somewhere, and the method chosen determines whether the facility consumes water, more electricity, or more land.

This is a closed loop, not a sequence. Adding compute adds power draw, which adds heat, which adds cooling capacity, which adds either water consumption or further power draw.

Nearly all electrical energy delivered to the IT load leaves the building as heat.

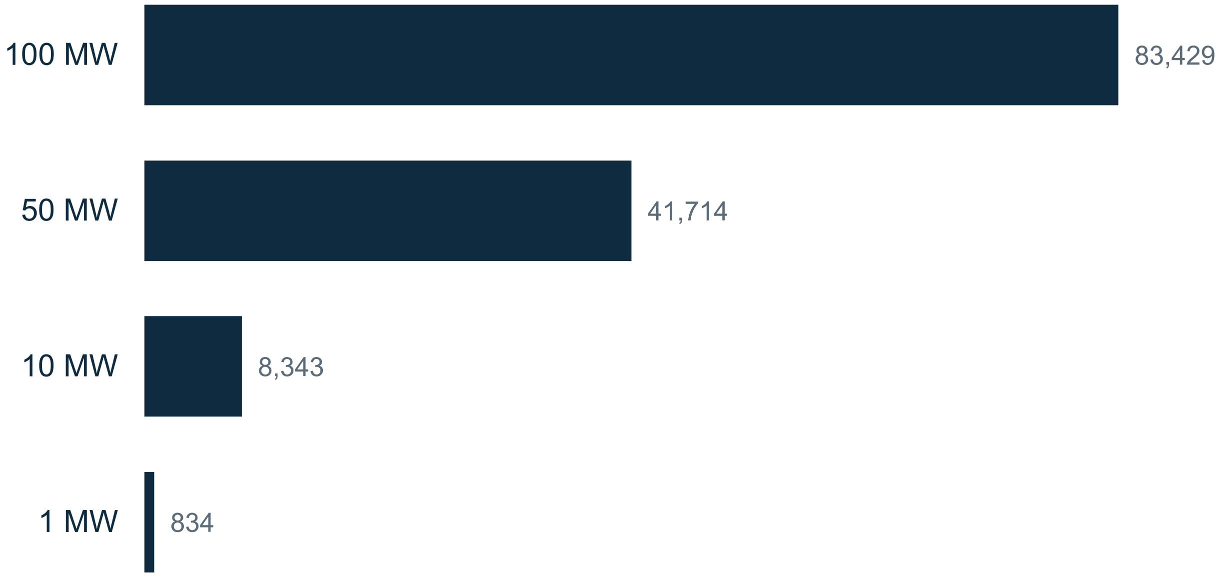
More compute is never just more servers. It is more power, more heat rejection, more backup generation, and usually more water.

The facility model determines who carries the risk

Hyperscale	100+ MW campuses under a single operator-owner. Grid interconnection and generation capacity are the gating issues. Permits, water contracts, and transmission commitments sit with one party, which makes accountability clear and negotiation slow.
Build-to-suit	A developer builds, a single tenant occupies under a long-term lease. Compliance duties are allocated by contract, so obligations frequently land on the party least equipped to perform them.
Colocation	Shared power and cooling across many tenants. Responsibility for emissions inventories, outage consequences, and reporting is diffuse and often unassigned until something goes wrong.
Crypto and mining	Power-hungry, often containerized, sited opportunistically near cheap or stranded power. Reliability expectations are lower, and facilities can arrive or leave inside a single permit cycle.

Ask who holds the interconnection agreement, the water contract, and the air permit. That answer tells you where liability lands, not the building type.

One 100 MW facility draws as much electricity as 83,000 homes



Constant 24/7 load, expressed as average U.S. households.

83,000

average U.S. households

A 100 MW load running continuously consumes roughly 876 GWh per year. EIA puts average U.S. household use near 10,500 kWh per year.

The comparison understates the problem in one important way. Households peak and trough. A data center does not. It asks for the same load at 3 a.m. in February as at 5 p.m. in August, which is a materially different request to make of a grid.

Campuses now proposed at 300 to 500 MW represent load comparable to a mid-sized Texas city, delivered to a single meter.

Power availability sets the project schedule. Everything else follows it.

Sources: EIA, Electricity Use in Homes (~10,500 kWh per household-year); calculation assumes constant 24/7 load. LBNL 2024 U.S. Data Center Energy Usage Report.

Cooling is a choice between spending water and spending power

Evaporative

Cuts electrical load and consumes water, then discharges it with concentrated dissolved solids.

Dry and air-cooled

Cuts water consumption to near zero and raises electrical demand, capital cost, and land area.

Closed-loop and direct-to-chip

Moving into high-density AI halls and shifts the balance again, toward power and away from consumptive water use.

PUE total facility energy divided by IT energy

WUE liters of water per kilowatt-hour of IT load

Operators optimize one at the expense of the other.

The siting question worth asking early: which resource is actually constrained here? Power, water, air quality headroom, land, or all four.

There is no low-impact cooling option. There is only a decision about which resource to spend.

Commitments made in year one govern for the next twenty

01

Site selection

power, fiber, water, land

02

Permitting

zoning, air, water, NEPA where federal nexus exists

03

Design and build

cooling method, generator fleet, stormwater

04

Commissioning

testing, energization, permit conditions

05

Operations

compliance, reporting, expansion

Two to five years from concept to energized load, and the hardest constraints are set in stages one and two.

The Texas overlay: SB 6 moved the gating decisions to the front of the project

Money and site control move up front. Security proposed at $50,000 per MW, study fees of $100,000 to $300,000, and five-year site control.

Disclosure now reaches the permitting file. Air permits for backup generators, plus any parallel interconnection requests elsewhere in Texas.

Queue position is collective, not individual. The PUCT approved ERCOT's Batch Zero process on June 18, 2026, studying large loads in groups, not one at a time.

Diligence starts at siting and compounds through operations. Early utility, water, and permit commitments control risk for decades.

TAKEAWAYS

What to take from this

01

Treat them as industrial infrastructure

A data center is a coupled system of IT load, power, cooling, safeguards, and reliability obligations. Reviewing one as commercial development misses everything that matters.

02

Plan energy and water as one decision

Grid capacity, generation mix, cooling method, and water source are a single linked choice, not four separate issues.

03

Match diligence to model and stage

The facility type and the project's phase determine which permits, contracts, liabilities, community exposures, and expansion rights are actually in play.

A.W. Armstrong
Principal & Texas Market Director, Ramboll
aarmstrong@ramboll.com | (512) 921-8438