Data Center Water Use & Sustainability

Oregon Governor's Task Force on Data Centers
March 27th, 2026

BRIGHTWORKS SUSTAINABILITY

Brightworks Sustainability

JOSH HATCH
Partner
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25+ Years
We can take on a big or small role Sustainability Consulting

2,000+
Sustainability Projects

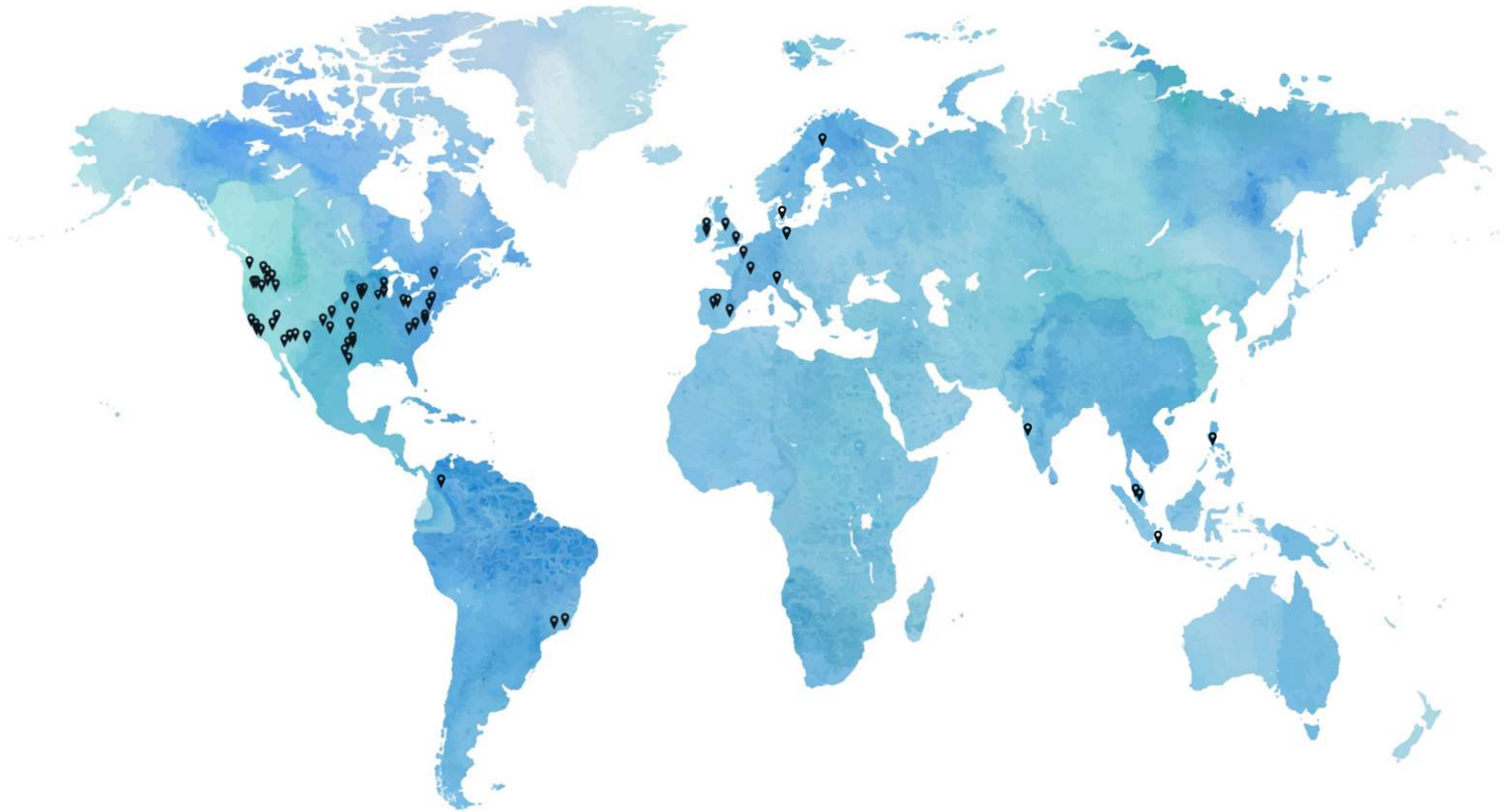
35+
Industries

7
Practice Areas

What We Do

ESG & CORPORATE SUSTAINABILITY	ESG & Sustainability Strategy | ESG & Sustainability Program Implementation | Decarbonization & Emissions Reduction | Sustainability Reporting & ESG Disclosure
GOVERNMENT & PUBLIC SECTOR	Climate Action Planning & Implementation | Public Agency Sustainability Programs | Net Zero, Decarbonization & Renewable Energy | High Performance Public Buildings
BUILT ENVIRONMENTS	Green & Sustainable Buildings | Green Building Certifications | Energy Analysis & Modeling | Commissioning | Zero Carbon Buildings | Sustainable Building Materials WELL Building Standard | Fitwel Building Standard | Healthy Building Materials
CARBON	Decarbonization & Emissions Reduction | Net Zero Energy | Electrification | Embodied Carbon & Life Cycle Analysis
ENERGY	Auditing | Energy Mangement | Analysis & Modeling | Commissioning
MATERIALS	Embodied Carbon & Life Cycle Analysis | Corporate Materials Programs | Support for Architects & Designers | Manufacturer Services

Brightworks Data Center Project Experience



Denotes an approximate location where one or more of Brightworks' data center projects are located.

180+
Data Center Projects

50+
Data Centers outside the U.S.

30+
Data Centers in EMEA

Brightworks Data Center Industry Leadership

INFRASTRUCTURE MASONS

Sustainability Committee Member, Joshua Hatch

BRIGHTWORKS IS AN "INFRASTRUCTURE VISIONARY"

Contracted to manage Governing Body & Working Groups

Ran stakeholder input for Climate Accord Maturity Model

GRESB

Data Center Working Group Member, Joshua Hatch

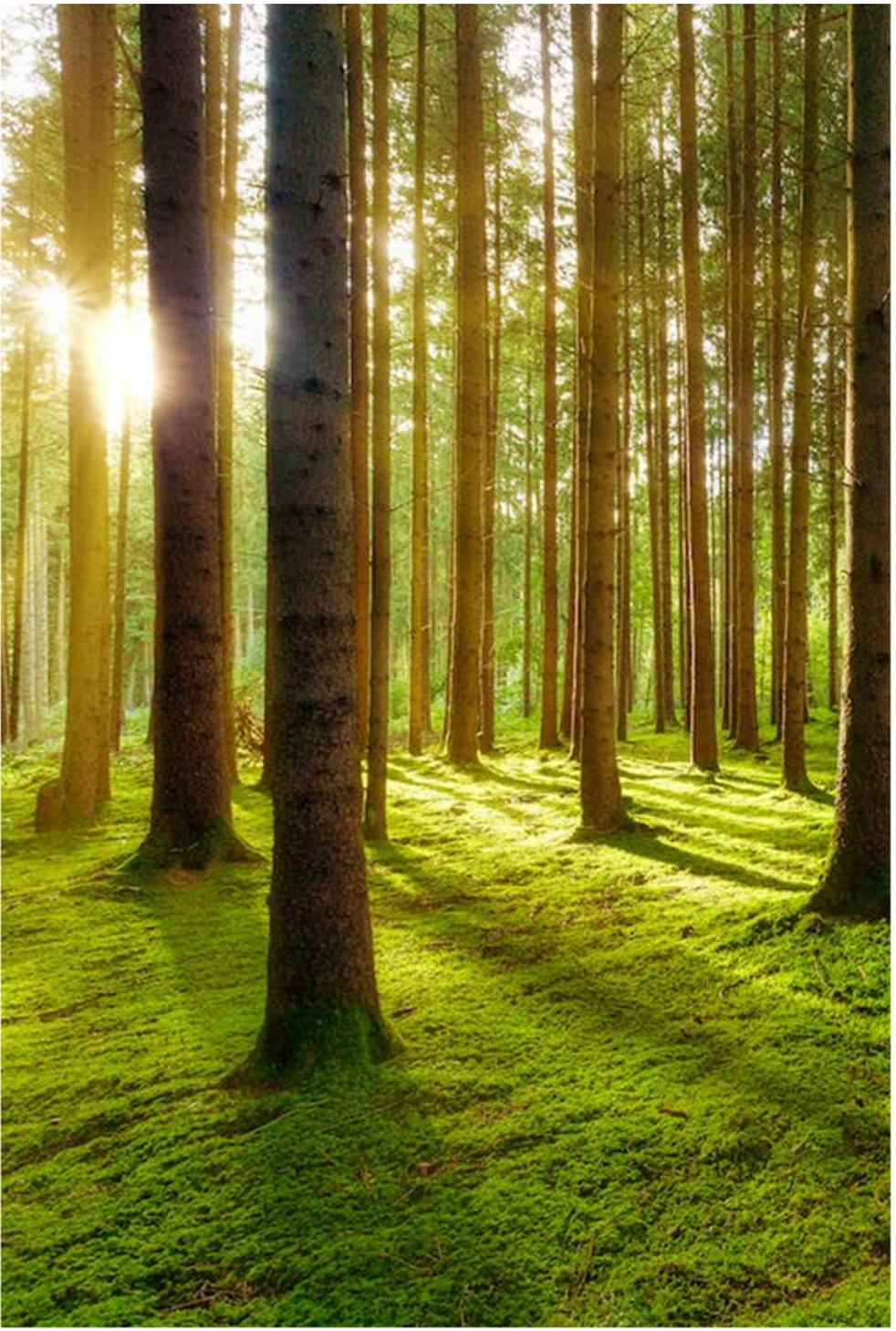
USGBC

Technical contributor to LEED for Data Centers

Created numerous Alternative Compliance Paths (ACPs) for Data Centers

Serve on 4 Technical Committees, significant contributions to LEEDv4.1 and LEEDv5

OTHER PARTNERS



AGENDA

1. Data Center Water Use
2. Cooling Water Use
3. Energy / Water Nexus
4. Water Scarcity & Risk
5. Water Metrics & Performance
6. Data Center Sustainability Frameworks

Data Center Water Use

Cooling Systems

- Data centers' water use is driven primarily by cooling systems; intensity varies widely by cooling technology, server type, and climate.
- A data center can use ~2 billion gallons per year, as much as a small town with 50,000 people
- Evaporative cooling can make data centers 5–50× more water-intensive per area than typical offices; air-cooled/closed-loop designs use far less.
- Mitigation: design choices (air/closed-loop), water reuse (condensate/graywater), and operational practices reduce water use, but depend on climate, server type, cost, and business model.

Steam rises above the cooling towers in The Dalles data center in Oregon. These plumes of water vapor create a mist at dusk. Google photo

Other Water Uses (not significant)

- Flush/flow fixtures, irrigation, process equipment, maintenance

Data Center Cooling

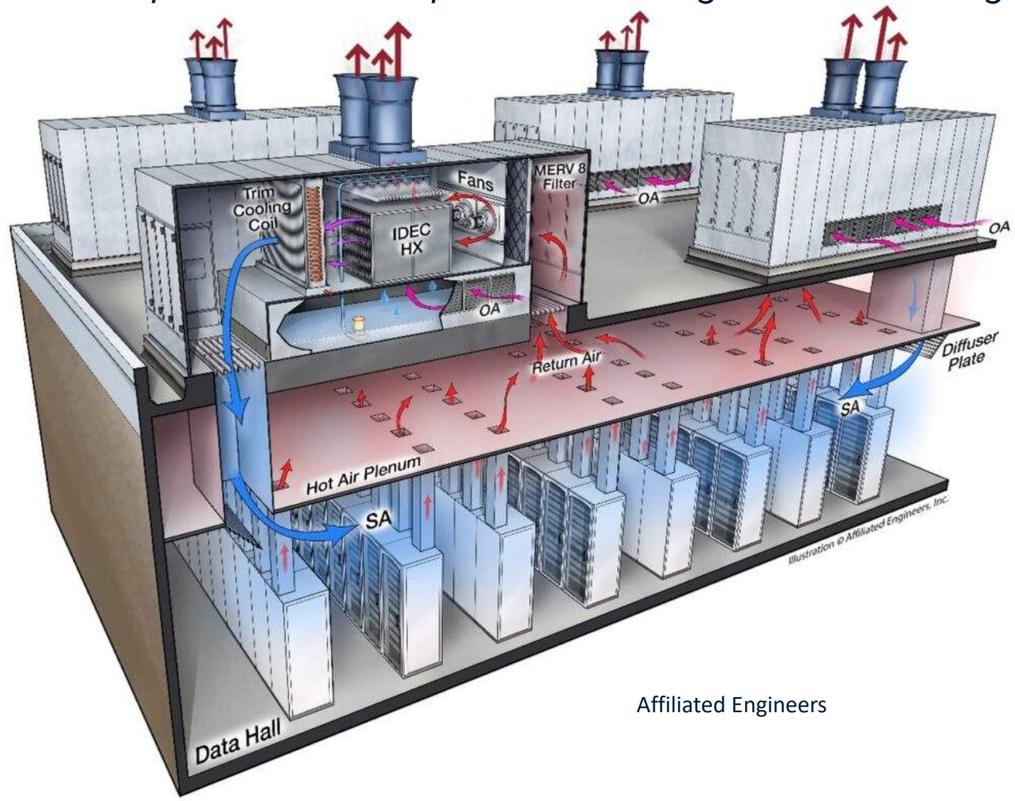
Server Heat Collection

- **Air Cooling** – Airflow over servers removes heat from IT equipment
- **Liquid Cooling** – Liquid removes heat (Direct-to-Chip, Rack-level, or Immersion)

Data Center Heat Rejection

- **Air-cooled chiller** – Condenser fans move air over refrigerant coils to remove heat
- **Water-cooled chiller** – Water is evaporated over refrigerant coils to remove heat
- **Evaporative Cooling** – Water is evaporated directly into the air to provide cooling; or water is indirectly evaporated on a heat exchanger to pull heat out of a fluid
- **Hybrid** – Combination of above, used together or separate depending on conditions

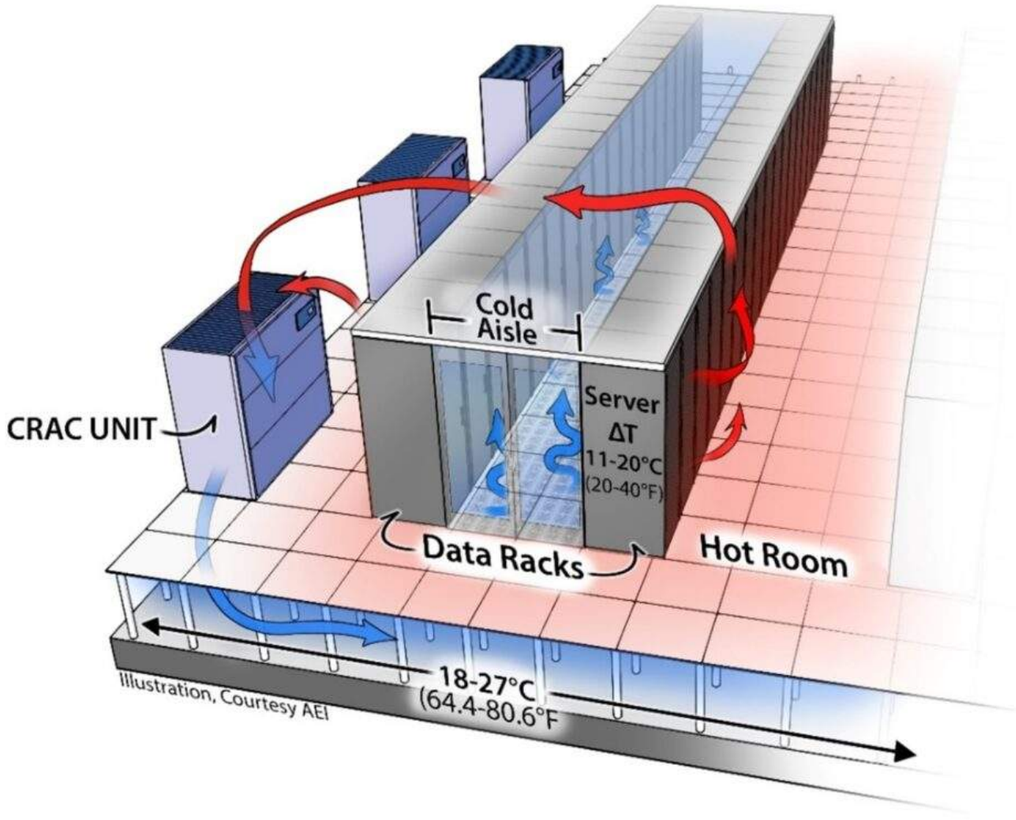
Example: Indirect Evaporative Cooling with air cooling



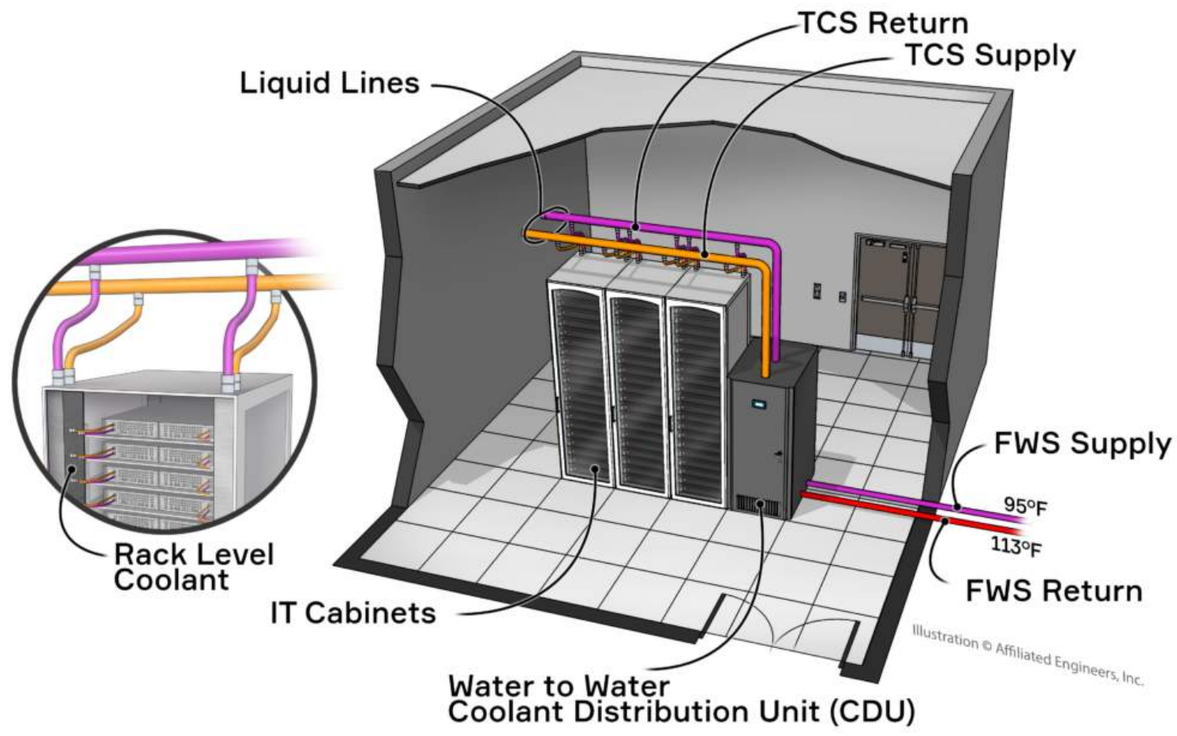
Affiliated Engineers

Server Heat Collection (Cooling)

Air Cooling



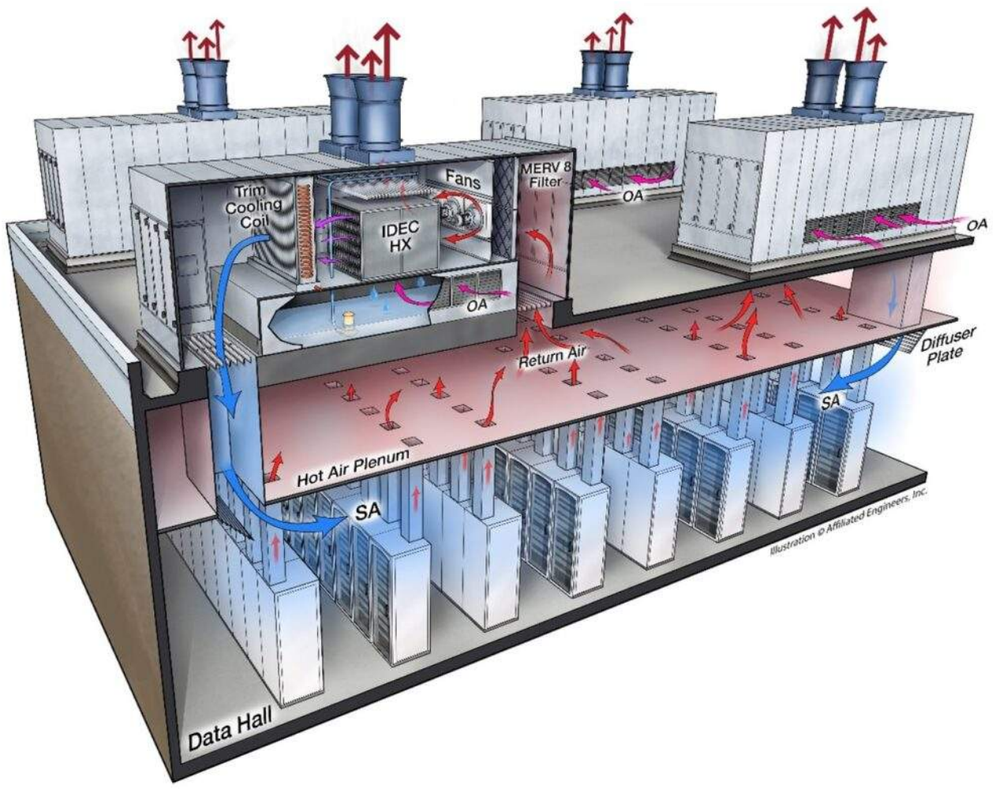
Liquid Cooling



Affiliated Engineers

Data Center Heat Rejection (Cooling)

Evaporative Cooling



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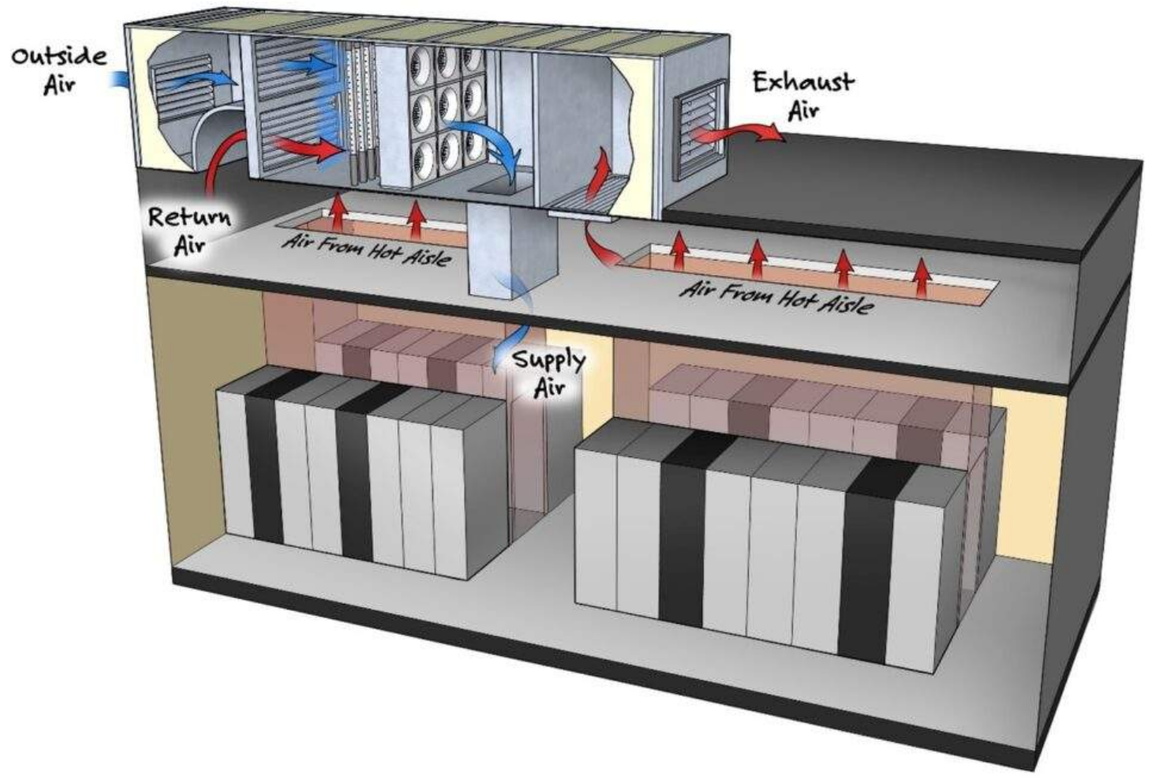
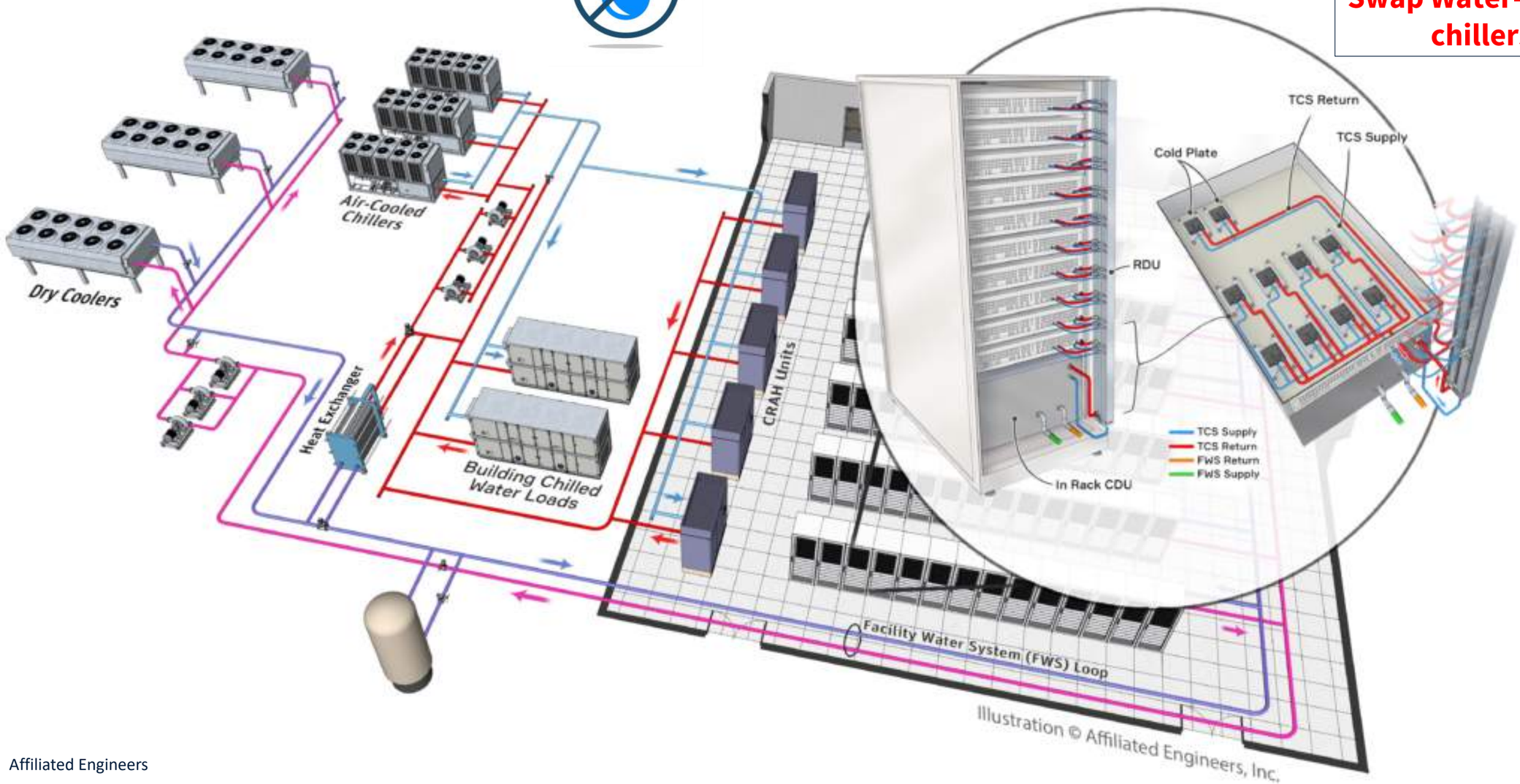
Air Cooling



Affiliated Engineers

Data Center Heat Rejection (Cooling)

Liquid Cooling with air-cooled chillers



COULD ALSO BE

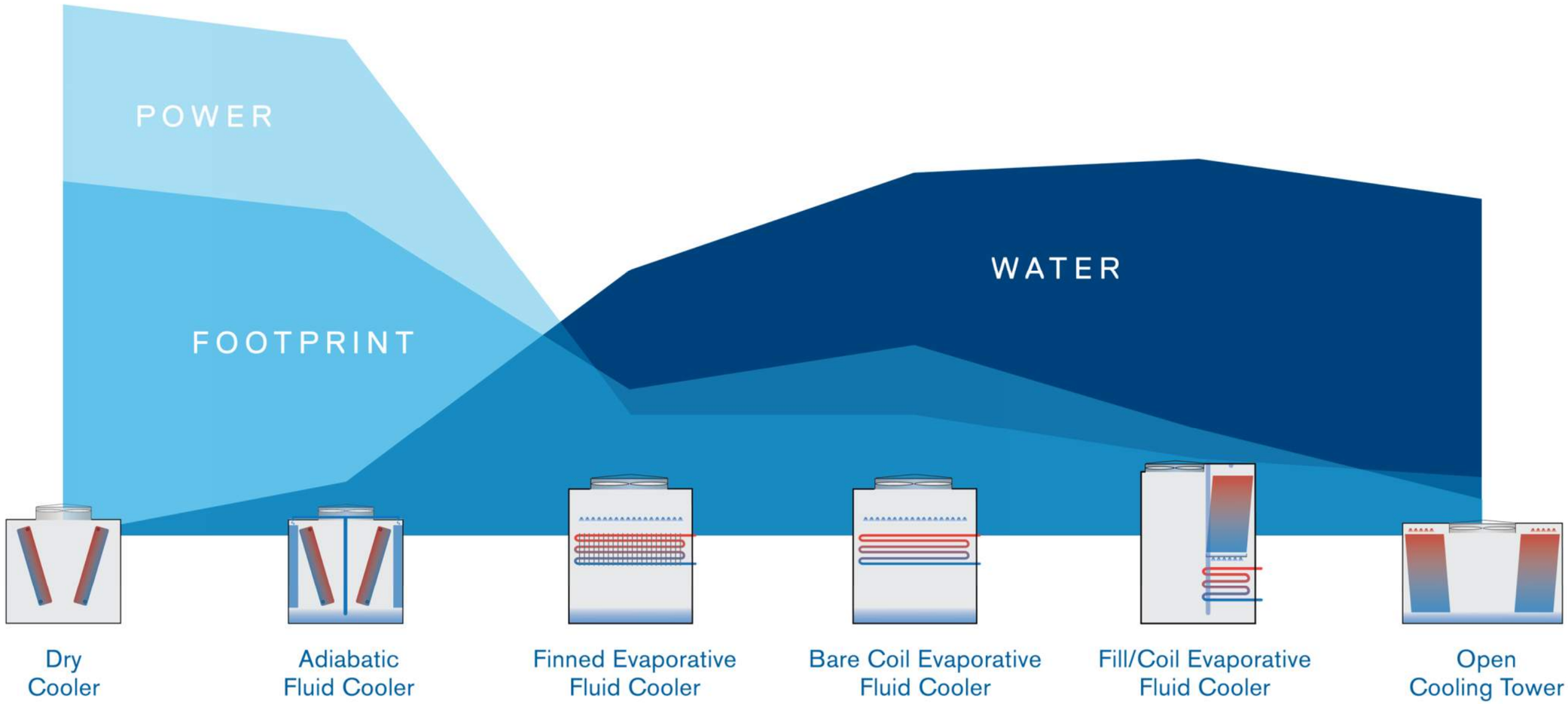
Evaporative Cooling

Swap Water-cooled chillers

BRIGHTWORKS SUSTAINABILITY

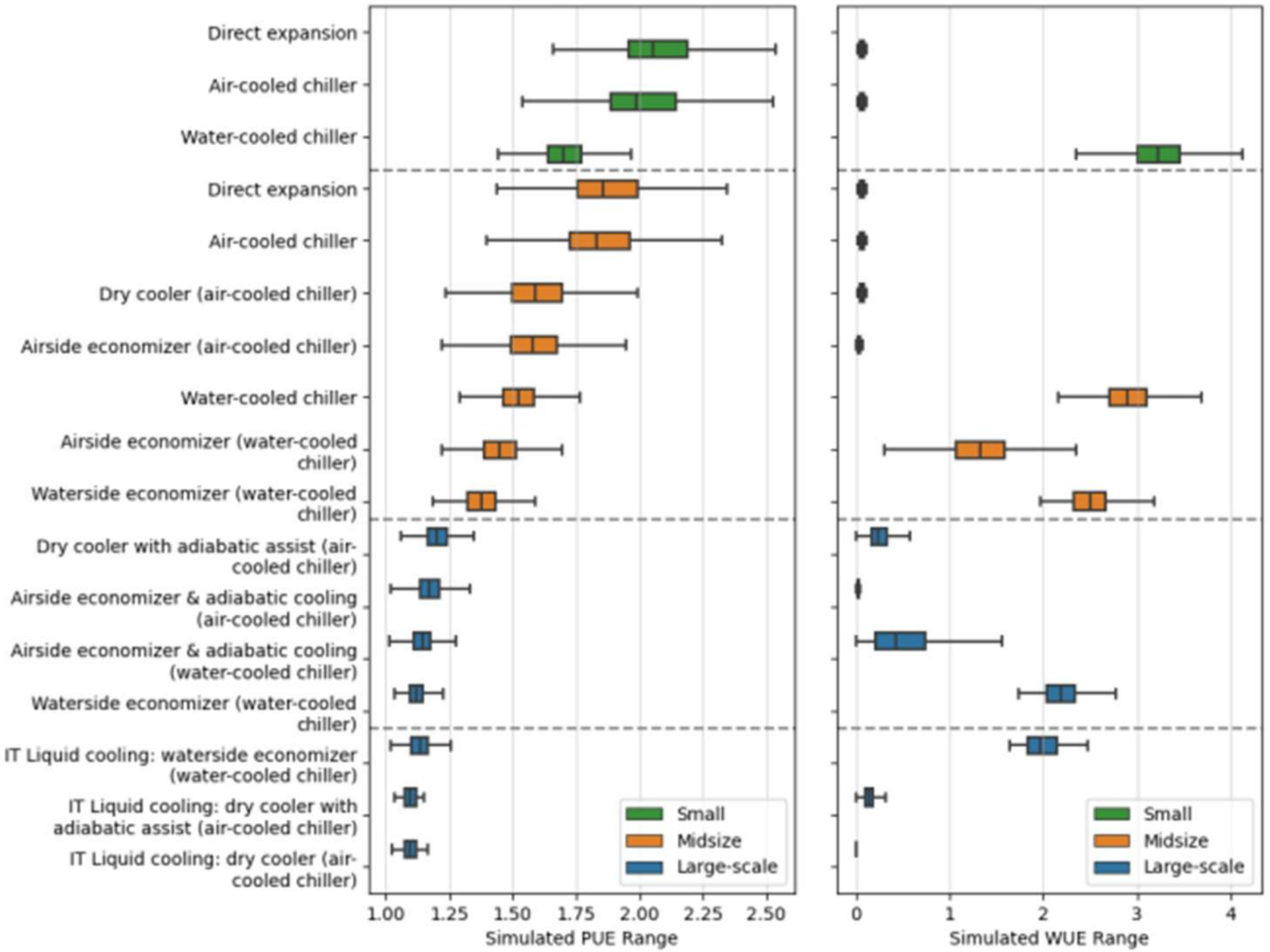
Energy-Water Nexus

POWER · FOOTPRINT · WATER



Marley – SPX Technologies

Energy-Water Nexus



CHP Alliance, US DOE, Jim Freihaut, - https://chpalliance.org/wp-content/uploads/2019/08/CHP-Data-Centers-Webinar_Jim-Freihaut.pdf

Steam rises above the cooling towers in The Dalles data center in Oregon. These plumes of water vapor create a mist at dusk. Google

Energy-Water Nexus

On-site – Energy and Water tradeoffs

- Evaporative cooling reduces overall energy use, but increases water use
- Study of two Phoenix data centers, the water-cooled chiller/evaporative cooling data center showed a PUE 13% higher and WUE 66% lower than the air-cooled chiller data center

Water-energy tradeoffs in data centers: A case study in hot-arid climates, Resource, Conservation & Recycling, June 2022

Off-site (Source) Energy and Water tradeoffs

- Embedded water of energy production
- Water treatment and conveyance uses energy

Recommendation

- Develop 100% new Renewable Energy for data centers
- Consider water efficiency in context of regional water supply & risk

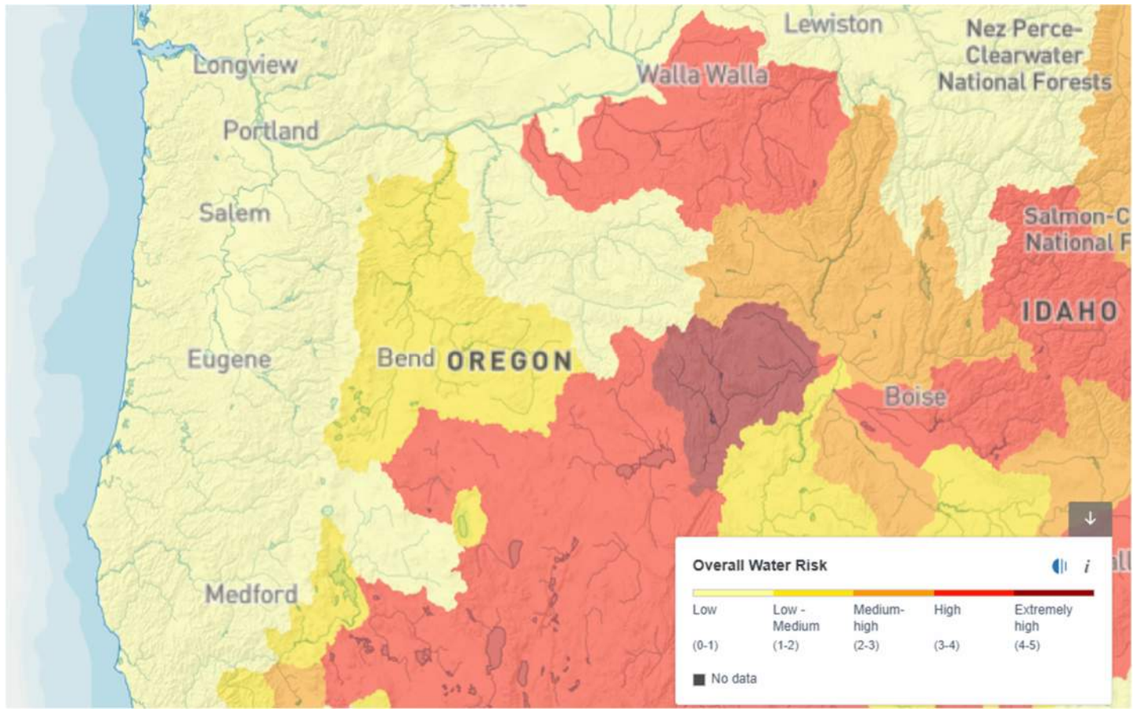
Steam rises above the cooling towers in The Dalles data center in Oregon. These plumes of water vapor create a mist at dusk. Google

Steam rises above the cooling towers for a power plant. Google

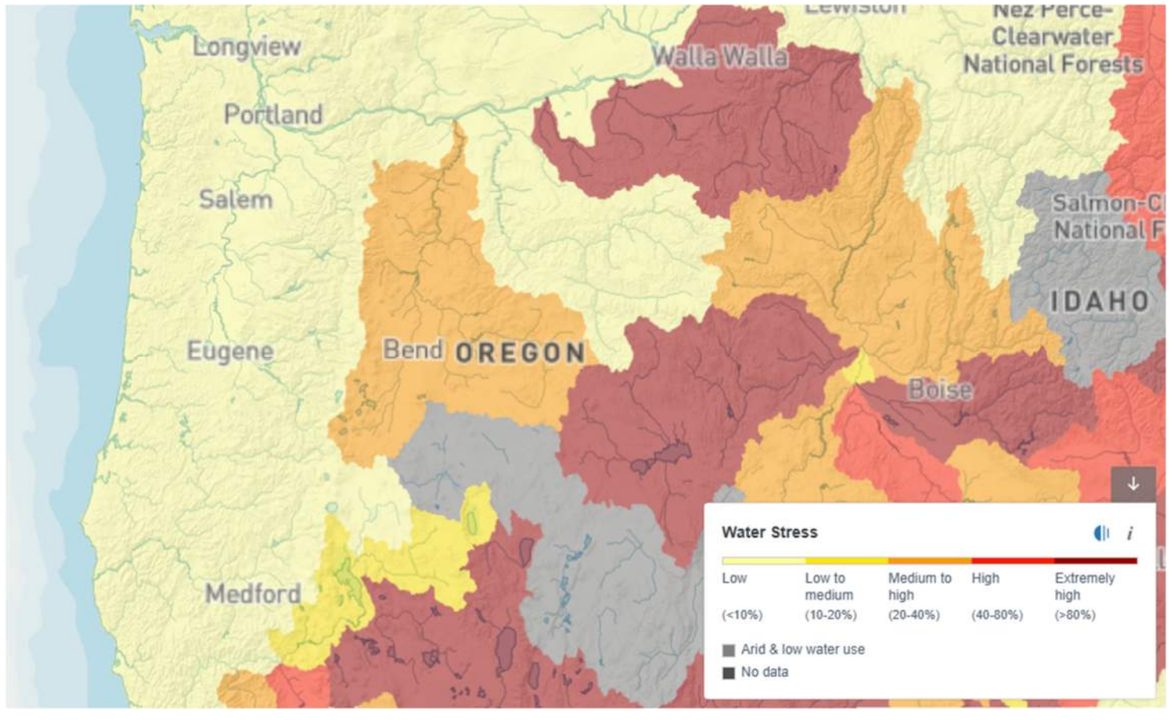
Water Scarcity & Risk

AQUEDUCT WATER RISK ATLAS

BASELINE



FUTURE



Water Performance Metrics for Data Centers

WUE

- Water Usage Effectiveness: Water (liters) / IT Load (MWh)
- Ignores: Embodied Water (power generation), Water Scarcity, & Water Re-use

$$WUE = \frac{On\text{–}Site\ Water}{IT\ Energy}$$

WUE+

- New metric presented at Open Compute Project by Oracle & SPX Cooling Technologies
- WUE+ includes Embodied Water (power generation) and considerations for water scarcity and re-use

$$WUE^{+} = \frac{On\text{–}Site\ Water + Embodied\ Water}{IT\ Energy} \times Regional\ Adjustment \times Reuse\ Efficiency$$

Presented to Open Compute October 2025, developed by Rishab Vardhan Hariskrishnan (Oracle), Michael Anderson (SPX Cooling Technologies)

Green Building Certification for Data Centers

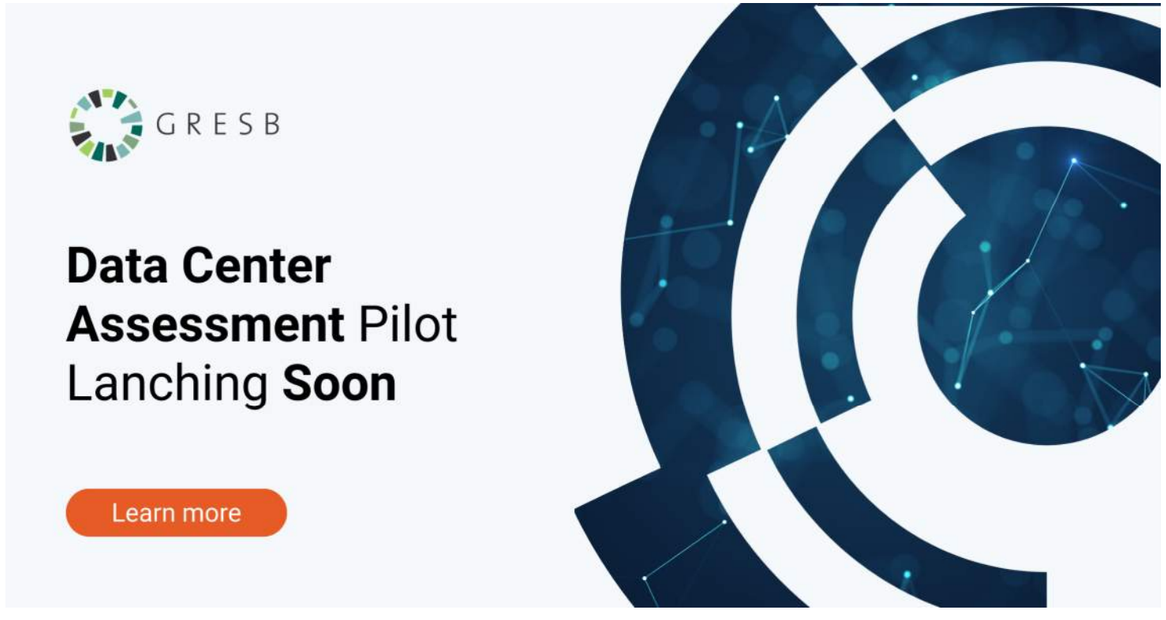
DESIGN + CONSTRUCTION PHASE

- Require data centers to complete green building certification (e.g. LEED) to a high-level (Gold or Platinum)
- Require data centers to co-develop new renewable energy sources for 100% of their annual load
- Require data centers to participate in grid resiliency (demand response, battery back-up, etc.)
- Require data centers to study and reduce embodied carbon at least 20% below benchmark

Sustainability Frameworks for Data Centers

OPERATIONAL REPORTING: Third party disclosure

- GRESB: Require companies to disclose every year through GRESB Data Center Assessment
- Climate Accord Maturity Model: Require companies to disclose using Climate Accord Maturity Model



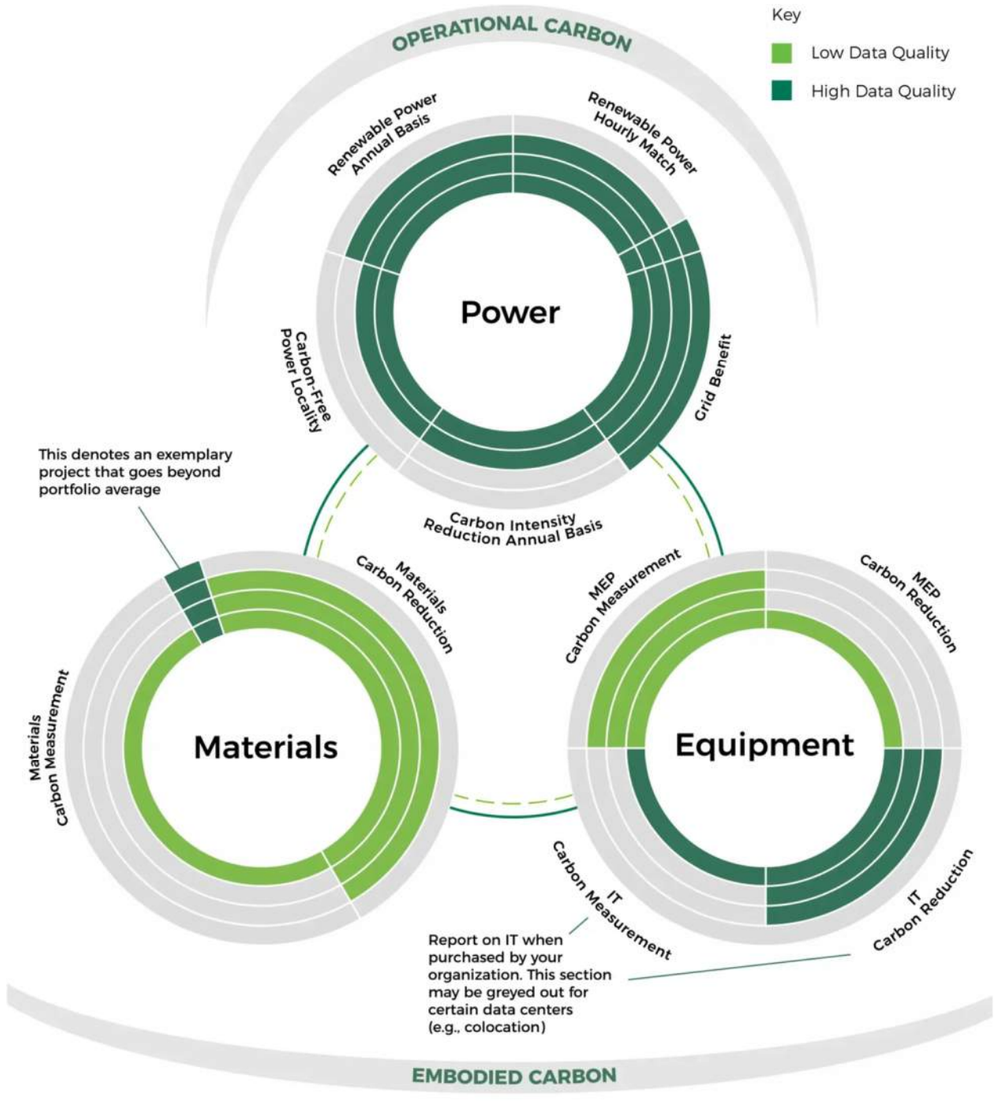


Figure 1 – Power, Equipment & Materials Maturity Model (Example Company)

Sustainability Performance Disclosure for Data Centers

PERFORMANCE DATA DISCLOSURE

- Require annual disclosure of PUE, WUE, WUE+
- Require annual disclosure of renewable energy (annual and hourly-match renewable percentage)

EU Already Requires Disclosure (Oregon can too!) – Energy Efficiency Directive (EED), Data Centers

- **General Information:** Operator name, address, operational dates
- **Technical Data:** Data center floor area, install IT power (kW) and amount of data stored/processes
- **PUE:** Power Usage Effectiveness, Total Energy divided by IT energy.
- **Total Energy Consumption:** Total energy consumed.
- **Renewable Energy Usage:** Total share of renewable energy.
- **Water Usage:** Water footprint.
- **Waste Heat Utilization:** Amount of waste heat reused.
- **Temperature Set Points:** Data center operating temperatures

Recommendations

A vision for more sustainable data center development in Oregon

- Data centers should be located where wind and solar energy has greatest potential
- Data centers should be required to be co-developed with wind, solar, and battery back-up
- Data centers should be required to improve grid resilience and energy affordability
- In water-stressed locations, data centers should be low or no water use
- Communities should plan for secondary economic use of waste heat
- Data centers should invest in community infrastructure – energy, water, and social – to strengthen and increase resilience

BRIGHTWORKS
SUSTAINABILITY

https://brightworks.net/