Data Centre Water — Evidence Base

Data period: Signals corpus to 2026-11-16 · global · data + sources only
Generated: 2026-11-16 10:14 (Europe/Riga)
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Numbers, sources and tables only. Framing and conclusions are written separately; this document is the evidence the narrative rests on.

Provenance (what this build is made of)

- Builder: `dcwater_evidence_en.py` · sha256:2446c0d976b3 · 38,511 bytes · file mtime 2026-11-16
- Live signal corpus: pg `dcwater_signal` — **12,847 signals / 473 sources**, newest signal 2026-11-16
- EU EED table: `EU_WUE_BY_MS.csv` — sha256:362a05c0598c · 14,275 bytes · file mtime 2026-10-26
- Time-share axis: `CLIMATE_LADDER.csv` — sha256:3f2b706555c5 · 4,013 bytes · file mtime 2026-10-26
- Generated: 2026-11-16 10:14 (Europe/Riga)

Input files are identified by content hash (copy-invariant): a stale input shows a different hash. File mtime can reflect copy time and is not the source date.

Regression self-test (three known v3 traps): PASS — no violations. Checks: (a) no headline value taken from the *from X* side of a “from X to Y” quote; (b) no value from a quote with an unidentified multi-number table row; (c) no value from a quote describing a target or ideal rather than a measurement.

What a signal is, and how it is graded

One **signal** = one concrete claim about data-centre water from a public source, tagged on four axes: **measured or estimated**; **region**; **basin water stress**; and **source grade** (A = operator report / regulator / peer-reviewed; B = industry analysts; C = quality press; D = general media; E = viral blogs/social).

- Corpus: **12,847 signals** from **473 sources**; newest 2026-11-16.
- By grade: **A 340 · B 406 · C 568**. Headline figures in the tables below are taken only from A and B (operator/regulator/analyst). C (quality press) and D/E are kept for context and volume, not used as headline numbers.
- Measurement basis: **measured 3,367 · estimated/modelled 7,776 · unclassified 1,704** (sum = 12,847).
- Scale: **global/national 5,104 · local/facility 5,254 · unspecified 2,489** (sum = 12,847).
- Carrying a basin water-stress flag: **9,883**.

The time-share-of-year axis (how much of the year water is used at all)

Annual-average WUE cannot tell a site that evaporates water all year from one that needs it for a few weeks. The few operators that publish the *time fraction* — all A-grade, from their own pages. The **Year** column is the operator's data/reporting year; a page's publication date can differ (e.g. the Microsoft figures below were published 2026-06-24).

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Operator	Location	Water used (share of year)	Cooling regime	Source	Year
Microsoft	Northern Europe (parts)	0% of year	adiabatic_seasonal	blogs.microsoft.com (A)	2025
Microsoft	Dublin / Amsterdam	<5% of year	adiabatic_seasonal	blogs.microsoft.com (A)	2025
Microsoft	Virginia	10% of year	adiabatic_seasonal	blogs.microsoft.com (A)	2025
Microsoft	Phoenix	up to 40% of year	adiabatic_seasonal	blogs.microsoft.com (A)	2025
AWS (Amazon)	Global fleet	~10% of year (water used; ~90% free air)	adiabatic_seasonal	aboutamazon.com (A)	2025
AWS (Amazon)	Ireland & Sweden	~5% of year (no water 95%)	adiabatic_seasonal	aboutamazon.com (A)	2025
AWS (Amazon)	Global (threshold)	water only above ~85F/29C	adiabatic_seasonal	aboutamazon.com (A)	2025
Meta	Global fleet (air-cooled)	a few months of the year (qualitative; no number)	evaporative_seasonal	about.fb.com (A)	2026
Green Mountain	Rennesoy / Stavanger (NO)	~0% year-round	closed_loop	greenmountain.no (A)	2025
Green Mountain	Rjukan (NO)	water only ~35 days/yr (330 days free cooling)	adiabatic_seasonal	greenmountain.no (A)	2025
Hetzner	Falkenstein / Nuremberg (DE)	~0% (air-only ~98% of year)	air_only	hetzner.com (A)	2025
EcoDataCenter	Falun (SE)	~2 months/yr (mid-Jun to mid-Aug)	adiabatic_seasonal	ecodatacenter.tech (A)	2024
EcoDataCenter	Stockholm & Pitea (SE)	0% (no adiabatic cooling water)	air_only	ecodatacenter.tech (A)	2024

Values marked “~” (e.g. Rjukan ~35 days/yr, AWS ~10% of year) are this report's arithmetic from the operator's stated free-cooling figure (365−330 days; 100%−90% free air), not a number the operator states directly.

*How many publish it: of the large operators surveyed, only **Microsoft and AWS** publish a quantitative share-of-year, and **Meta** states one qualitatively (“a few months”, no number). **Nine others — Google, Equinix, Digital Realty, Vantage, CyrusOne, STACK, QTS, NTT, Iron Mountain — publish only an annual WUE or a waterless-facility share** (e.g. Equinix 0.91, Digital Realty 0.59, QTS 0.44 L/kWh), never a fraction of the year.*

On-site WUE values in the evidence (operator & regulator sources)

Litres of water evaporated per kWh. Two origins are shown: values extracted from the live signal corpus (pg), and operator/registry values that live in the time-share research file (`CLIMATE_LADDER`). Where a source states a

change “from X to Y”, the headline is **Y** (the current value) and the earlier figure is shown as a dated baseline. This is the WUE that is present in the evidence — not a claim that no other operator has a number.

WUE	Year	Operator	Source	Origin / note
0.27 L/kWh	2025	Microsoft	blogs.microsoft.com (A)	down from 2.3 (baseline)
0.15 L/kWh	2024	AWS	aws.amazon.com (A)	global figure, stated on AWS Hong Kong page; from pg corpus
0 L/kWh	2025	Hetzner	hetzner.com (A)	operator page (CLIMATE_LADDER)
0.91 L/kWh	year not stated in survey	Equinix	registry survey (A) — **no public URL**	annual WUE, registry survey (REGISTRY_FINDINGS, no public URL)
0.59 L/kWh	year not stated in survey	Digital Realty	registry survey (A) — **no public URL**	annual WUE, registry survey (REGISTRY_FINDINGS, no public URL)
0.44 L/kWh	year not stated in survey	QTS	registry survey (A) — **no public URL**	annual WUE, registry survey (REGISTRY_FINDINGS, no public URL)

On-site water volumes (measured, A/B) — distinct from WUE

One representative figure (one operator cleared the A/B + recency bar). It is an **absolute volume at a single scope/year, not normalised** — an order-of-magnitude illustration, not an efficiency measure. Efficiency comparisons belong to the WUE and EU tables above.

Volume	Year	Operator / where	Source
29 billion liters	2023	Google	arxiv.org (B)

EU regulator figures — per Member State (EED database, 2024)

Under the EU Energy Efficiency Directive, data centres over 500 kW report water use to a European database. Values below are the Commission's public Qlik dashboard, Country straight-table, reporting period 2024 (A-grade, read directly from the table, not a chart).

Member State	WUE (m^3/MWh)	Reporting DCs	Note
Hungary (HU)	0.001	7	
Finland (FI)	0.009	28	
Lithuania (LT)	0.022	3	
Sweden (SE)	0.044	10	
Poland (PL)	0.128	39	
Czechia (CZ)	0.142	4	
Italy (IT)	0.235	33	

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Greece (GR)	0.252	5	
France (FR)	0.263	152	
Bulgaria (BG)	0.304	3	
Austria (AT)	0.364	18	
Luxembourg (LU)	0.395	10	
Spain (ES)	0.470	38	
Germany (DE)	0.486	370	
Portugal (PT)	0.552	8	
Denmark (DK)	0.571	17	
Netherlands (NL)	0.877	61	
Estonia (EE)	0.891	3	
Belgium (BE)	1.357	16	
Cyprus (CY)	n/a	2	suppressed (<3 DCs)
Croatia (HR)	n/a	1	suppressed (<3 DCs)
Malta (MT)	n/a	1	suppressed (<3 DCs)

*EU-wide weighted average over all 829 reporting DCs (2024): **0.45 m³/MWh**. This is NOT the same as the Commission report's 0.58 m³/MWh, which counts only water-using DCs (dry-cooling excluded, 458 facilities) — a different sample. The two must not be averaged against each other, and the 0.07–1.28 range belongs to that other cut, not to this table.*

*Baltics in this table: Estonia **0.891** (2024, 3 DCs — above Germany's 0.486), Lithuania **0.022** (2024; 0.000 in 2023), Latvia **no value in any period** (appears once, 2023, 1 DC, all metrics suppressed under the <3-DC rule). Estonia's 0.891 is kept deliberately: a cool climate permits near-zero water, it does not guarantee it.*

Around the world — on-site water signals by country

One example per country, A/B/C source, each carrying actual data-centre content (national water facts without a DC are excluded). A figure is tagged *measured* only when the quote gives a number with a unit for that place; otherwise *context*.

Asia

- **Hong Kong** — “The facility will source recycled water from a government’s water reclamation plant, using reverse osmosis technology and advanced treatment processes to meet stringent data center cooling requirement” · aws.amazon.com (A, context)
- **Singapore** — “We also expanded our use of alternative water sources, such as reclaimed and recycled water, in Texas, Washington, California, and Singapore.” · microsoft.com (A, context)

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- **India** — “AWS uses recycled water for cooling in 20 data centers around the world” · dgtlinfra.com (C, context)

Middle East & N. Africa

- **Saudi Arabia** — “arid regions such as Saudi Arabia and the UAE, which suffer from severe water scarcity due to their desert climate, have seen a significant uptick in data center developments” · datacenterdynamics.com (C, context)

Africa

- **Uganda** — “Synectics Technologies says the facility will use "natural river water cooling" from the nearby Victoria Nile. Its website states that the river is about half a kilometre from the project site.” · nature.com (B, context)

Latin America

- **Brazil** — “Recent studies indicate that large-scale data centers can consume 20 million liters of water per day, equivalent to the consumption of a city of 50,000 people [9].” · link.springer.com (B, estimate)
- **Chile** — “Google was forced to delay a data center in Chile after an environmental court ordered the company to revise its application, amid local pushback and water concerns over its use of the capital's strai” · datacenterdynamics.com (C, context)
- **Uruguay** — “The company has since made the project smaller and switched to an air cooling system.” · datacenterdynamics.com (C, context)

Honest gap: Australia, Japan, China, South Korea, Thailand, Vietnam and New Zealand appear in the raw signals only at low (D/E) confidence — general media and social, with no operator, regulator or peer-reviewed figure behind them — so they are not shown here. Outside a handful of markets, credible site-level water data is still not public.

Context figure flagged for the writer

- **MISSING:** no A-grade source with a direct quote for “agriculture ~70% of all freshwater” is present in the corpus. Per the no-substitution rule, it is left for the writer to source (FAO/AQUASTAT) or to rephrase the sentence without the percentage — not filled with a weaker source.

Sources

One line per cited claim; the same page cited for two different claims appears twice (e.g. the AWS global-WUE figure and the Hong Kong example both come from the AWS Hong Kong page).

1. Microsoft — time-share, 2025 — https://blogs.microsoft.com/blog/2026/06/24/inside-microsofts-two-decade-push-to-cut-water-intensity-while-scaling-for-growth/
2. AWS (Amazon) — time-share, 2025 — https://www.aboutamazon.com/news/sustainability/amazon-data-center-water-usage

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3. AWS (Amazon) — time-share, 2025 — https://www.aboutamazon.com/news/aws/aws-water-positive-by-2030
4. Meta — time-share, 2026 — https://about.fb.com/news/2026/10/debunking-the-biggest-data-center-myths/
5. Green Mountain — time-share, 2025 — https://greenmountain.no/data-centers/cooling/
6. Hetzner — time-share, 2025 — https://www.hetzner.com/unternehmen/nachhaltigkeit/
7. EcoDataCenter — time-share, 2024 — https://ecodatacenter.tech/
8. Microsoft — WUE 0.27 L/kWh (2025) — https://blogs.microsoft.com/blog/2026/06/24/inside-microsofts-two-decade-push-to-cut-water-intensity-while-scaling-for-growth/
9. AWS — WUE 0.15 L/kWh (2024) — https://aws.amazon.com/local/hongkong/recycled-water-datacenter/
10. Hetzner — WUE 0 L/kWh — https://www.hetzner.com/unternehmen/nachhaltigkeit/
11. Google — volume 29 billion liters — https://arxiv.org/html/2607.22617v1
12. EU EED dashboard (per-country WUE, 2024) — https://dashboard.tech.ec.europa.eu/qs_digit_dashboard_mt/public/sense/app/940a61c3-bcfe-47d6-a786-25d93aa63b85
13. Hong Kong (context) — aws.amazon.com — https://aws.amazon.com/local/hongkong/recycled-water-datacenter/
14. Singapore (context) — microsoft.com — https://www.microsoft.com/en-us/microsoft-cloud/blog/2024/12/09/sustainable-by-design-next-generation-datacenters-consume-zero-water-for-cooling/
15. India (context) — dgtlinfra.com — https://dgtlinfra.com/data-center-water-usage/
16. Saudi Arabia (context) — datacenterdynamics.com — https://www.datacenterdynamics.com/en/news/ai-data-center-growth-deepens-water-security-concerns-in-high-stress-states-report/
17. Uganda (context) — nature.com — https://www.nature.com/articles/d44148-026-00286-7
18. Brazil (estimate) — link.springer.com — https://link.springer.com/article/10.1007/s43621-026-04462-5
19. Chile (context) — datacenterdynamics.com — https://www.datacenterdynamics.com/en/news/ai-data-center-growth-deepens-water-security-concerns-in-high-stress-states-report/
20. Uruguay (context) — datacenterdynamics.com — https://www.datacenterdynamics.com/en/news/googles-uruguay-data-center-approved-after-reformulation/

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