Thirsty work

AI is powered by physical hardware in giant data centres — and those data centres need water

BY **ABI HAYWARD**
WITH ILLUSTRATION BY **MARTIN KRZYWINSKI**

Your query has a cost. Aside from the myriad ethical and social dilemmas that have sprung up since generative artificial intelligence hit the mainstream almost three years ago, there's a hidden cost to asking ChatGPT to write you an email: the water we drink. It's no small amount either; the average 100-megawatt data centre, where AI workloads happen, slurps up about two million litres of water each day.
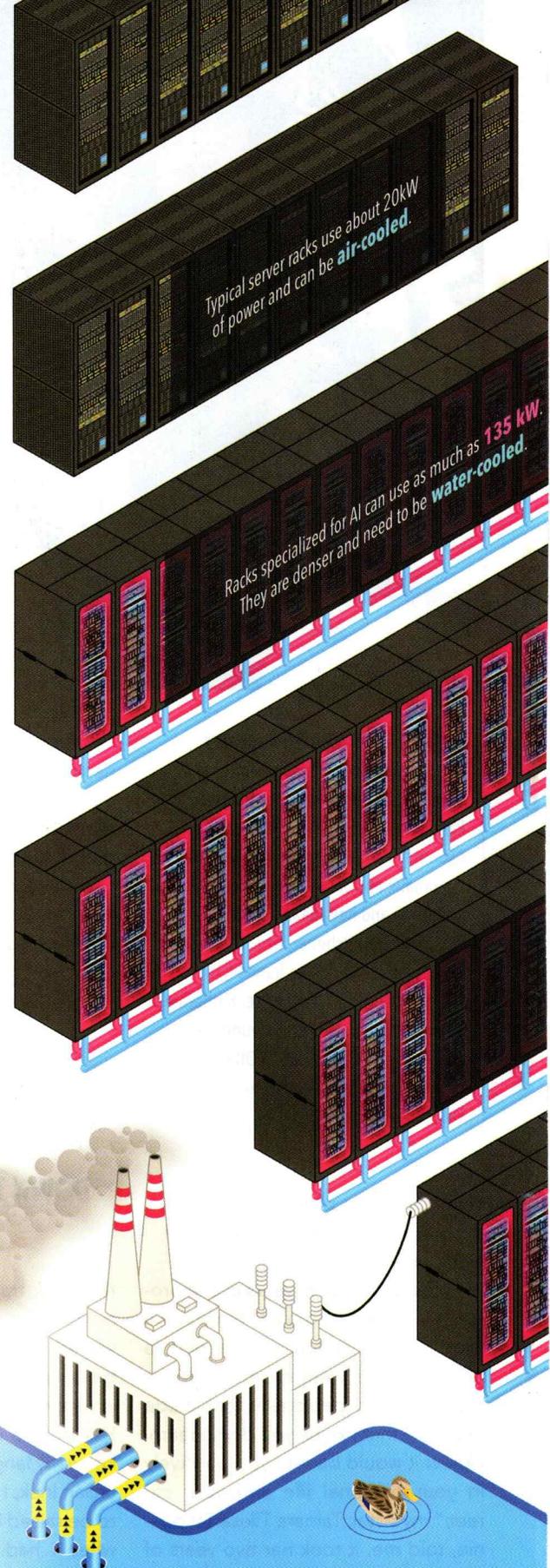
"When we run AI servers, they burn a lot of energy, and this energy turns into heat. So, to get rid of the heat, we have to use a massive cooling system," says Shaolei Ren, an associate professor at the University of California, Riverside, who researches AI. The heat needs to be moved from the servers to the building and then outside. "Many data centres are using open-loop cooling towers that are just evaporating water 24/7," says Ren. Water is also used indirectly through electricity generation to power the servers.

Ren and his team calculated that for 10 to 50 medium-length responses, GPT-3 needs to "drink" 500 millilitres of water. This depends on the data centre — there's a trade-off between water and electricity efficiency. Geography also matters. Hotter climates require more direct water consumption, making Canada an attractive place to put data centres. Electricity is also cheap here and often renewable, especially in British Columbia and Quebec.

Canada now has 239 data centres — a number set to grow, largely because of AI. Bell plans to build six AI data centres in British Columbia, Alberta is jostling to be "North America's destination of choice for AI-enabled data centre investment," and the federal government is investing $2 billion in computing infrastructure over the next five years.

And yet, a *Bloomberg* investigation in May 2025 found most data centres are in areas that are already water stressed. Between 80 and 90 per cent of water consumed by data centres is potable. "They don't *have* to use drinking water, but usually most of the cooling systems require clean water," says Ren.

With climate change already altering the global water cycle, Ren is hoping for more transparency and accountability from the AI industry on its environmental toll. "But at the same time, it's not something we should panic about," he says. "We should evaluate the benefit versus the cost. And environmental cost is just part of the cost." ✸

Typical server racks use about 20kW of power and can be **air-cooled**.

Racks specialized for AI can use as much as **135 kW**. They are denser and need to be **water-cooled**.

Water is also used in the production of power. In the U.S., on average **43.8 litres per kilowatt hour** are withdrawn and **3.1 litres per kW-h** are consumed. The power needed for an average 100-MW data centre can consume as much as **7.5 million litres** per day.

A data centre cooling tower evaporates **70 to 80 per cent** of the water it withdraws from the water supply. This water has been **"consumed"** – it doesn't flow back to be treated and reused.
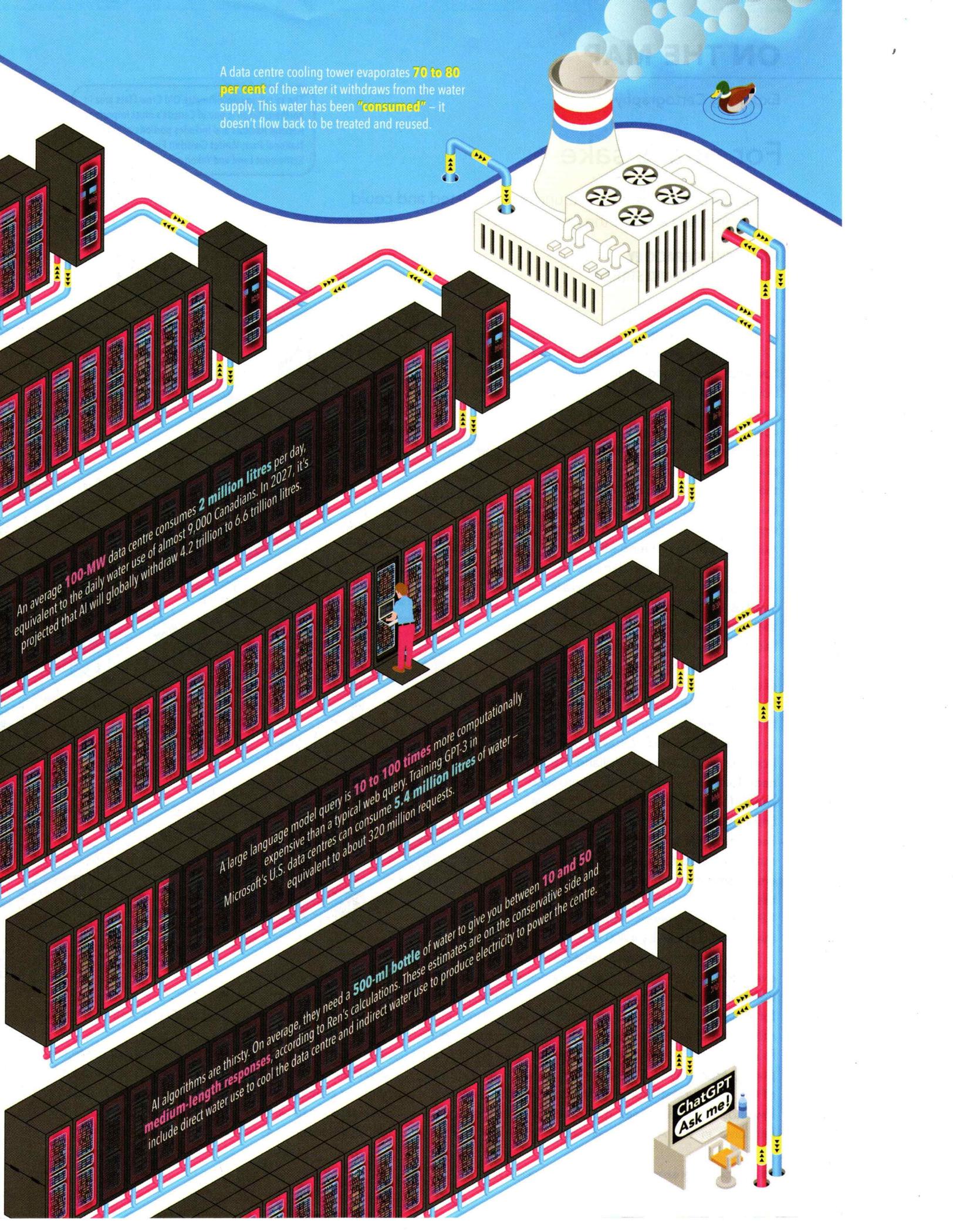
An average **100-MW** data centre consumes **2 million litres** per day, equivalent to the daily water use of almost 9,000 Canadians. In 2027, it's projected that AI will globally withdraw 4.2 trillion to 6.6 trillion litres.

A large language model query is **10 to 100 times** more computationally expensive than a typical web query. Training GPT-3 in Microsoft's U.S. data centres can consume **5.4 million litres** of water – equivalent to about 320 million requests.

AI algorithms are thirsty. On average, they need a **500-ml bottle** of water to give you between **10 and 50 medium-length responses**, according to Ren's calculations. These estimates are on the conservative side and include direct water use to cool the data centre and indirect water use to produce electricity to power the centre.

ChatGPT Ask me!