CASE STUDY

Enhancing Water Efficiency Through Advanced Cooling Technology

At Facebook, we aim to minimize our energy, emissions and water impact, while embracing the responsibility and opportunity to impact the world beyond our operations.

The opportunity

The challenges of the growing global water crisis are well documented as demand for this finite resource continues to rise due to population and economic growth. External factors such as climate change are also profoundly impacting the availability, distribution and quality of water. So much so that McKinsey & Company estimated a 40% gap between global water supply and demand by 2030 [McKinsey, 2009].

We believe that a key way to address and mitigate the risk of this water supply and demand gap is for every sector and company to do its part in using water more efficiently.

The solution

We value water as a vital resource that has no substitute – whether for people to drink, for industries to prosper, for farmers to grow food or for communities to thrive. As a result, we work hard to ensure that all of our data centers – since our very first center in Prineville, Oregon – are as water efficient as possible by using the latest technologies.

Direct evaporative cooling technology is one of the ways we have been able to use less water to cool data centers by relying on outside air. Traditional cooling technologies – such as chilled water plants and cooling towers – typically require more water to reject heat. This process is similar to that of using a window-mounted air conditioner to cool a room instead of putting a fan in a window when the outside temperature is cooler than the temperature in the room. For more details and specifications for this system, see here.

For locations that face specific environmental challenges – such as high levels of dust, extreme humidity or elevated salinity – using direct cooling could severely impact IT equipment. In these cases, we use indirect cooling systems

In 2017 alone, we avoided

1.5 billion

gallons of water use – the equivalent of filling 18.5 million bathtubs

“Our data centers are over **80%** more water efficient than the average data center.”

to minimize the risk to our buildings and the servers housed within. Recently, we have taken this indirect cooling technology a step further with new StatePoint Liquid Cooling (SPLC) system, an advanced evaporative cooling technology we developed in partnership with Nortek Air Solutions. The first of its kind to be deployed to data centers, SPLC produces cold water instead of cold air, thus requiring less water use than a typical indirect cooling system because it uses air to cool water instead of using water to cool air.

As part of our broader efforts to drive operational excellence, we install water-saving fixtures and appliances to conserve water, and all of our bathroom and kitchen fixtures meet Energy Star® standards. We use minimal water for irrigation by planting native or adaptive plant species. We also reuse our water as much as we can before discharging to local wastewater treatment plants.

The impact

As a result of our innovative design choices and water reuse, our data centers are over 80% more water efficient than the average data center [Shehabi et al., 2016]. **In 2017 alone, we avoided 1.5 billion gallons of water use** – the equivalent of filling 18.5 million bathtubs.

Through our Clean and Renewable Energy program, we support all new data centers with 100% renewable energy sources, such as wind and solar power. As we work toward powering our global operations with 100% clean and renewable energy by 2020, we are also reducing our water footprint since producing wind and solar energy takes less water than producing energy from fossil fuels. Between 2014 and 2017, we estimate that our solar and wind energy procurement efforts saved hundreds of millions of gallons of water in the United States [Macknick et al., 2011].

Additionally, we have disclosed our Water Usage Effectiveness (WUE) data – a water efficiency metric that measures the amount of water used by data centers to cool their IT equipment – since 2013. We are the first and, as far as we know, only company to report WUE numbers publicly. In 2017, our centers were nearly eight times more efficient than the industry – with our average WUE at 0.24 L/kWh compared to the industry average of 1.8 L/kWH [Shehabi et al., 2016].

As we continue to prioritize efficient water use within our operations, we see a greater opportunity for the private sector to collaborate to have a greater impact. We hope that more companies will join us in measuring and reporting their water withdrawals and WUE, so we can set better benchmarks and continue to work together to find new ways to improve the sustainable use of this important resource.

“Between 2014 and 2017, we estimate that our solar and wind energy procurement efforts saved **hundreds of millions** of gallons of water in the United States.”

More information
For more information visit our Sustainability site at sustainability.fb.com

References

Macknick, J., Newmark, R., Heath, G., Hallett, K.C. 2011. A Review of Operational Water Consumption and Withdrawal Factors for Electricity Generating Technologies. National Renewable Energy Laboratory, Golden, Colorado. NREL/TP-6A20-50900. Accessed December 18, 2018. https://www.nrel.gov/docs/fy11osti/50900.pdf

McKinsey, 2009. Charting Our Water Future Economic frameworks to inform decision-making. Accessed October 29, 2018 https://www.mckinsey.com/~/media/mckinsey/dotcom/client_service/sustainability/pdfs/charting%20our%20water%20future/charting_our_water_future_full_report_.ashx

Shehabi, A., Smith, S.J., Horner, N., Azevedo, I., Brown, R., Koomey, J., Masanet, E., Sartor, D., Herrlin, M., Lintner, W. 2016. United States Data Center Energy Usage Report. Lawrence Berkeley National Laboratory, Berkeley, California. LBNL-1005775. “Accessed December 18, 2018 https://eta.lbl.gov/sites/all/files/publications/lbnl-1005775_v2.pdf