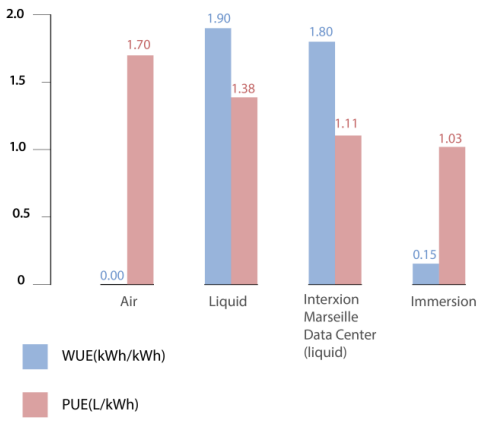
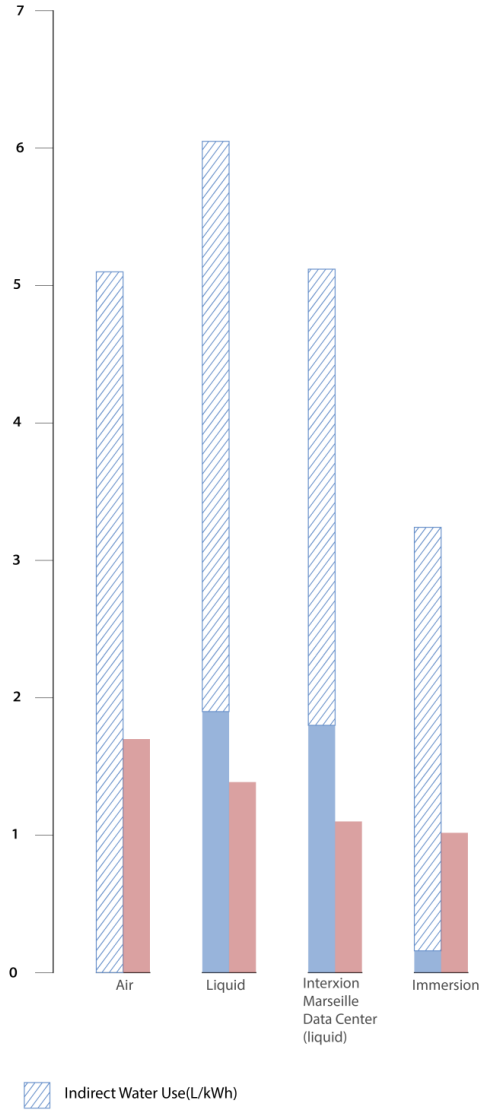
Comparing Impacts by Cooling Type



Energy and Water Efficiency of Different Data Center Cooling Methods



Energy and Water Efficiency of Different Data Center Cooling Methods, Accounting for Indirect Water Use

Power Usage Effectiveness (PUE) = Facility power (kWh)/IT equipment power (kWh)

Water Usage Effectiveness (WUE) = Water usage (L)/IT equipment power (kWh)

Power Usage Effectiveness (PUE) and Water Usage Effectiveness (WUE) are ratios used to describe how efficiently data centers use energy and water. PUE is calculated by dividing a data center's total facility power by its required IT equipment power, which means that a PUE of 1.0 represents

maximum efficiency, with 100% of the power used by the data center used for IT equipment and 0% for cooling and support systems. A higher PUE represents a higher proportion of the data center's total energy consumption used for cooling and support systems.

WUE is calculated by dividing a data center's total water consumption by its required IT equipment power. A PUE of 1.0 represents a data center that uses one liter of water for every kWh of power its IT equipment uses, so a higher PUE signifies higher water consumption relative to computational power.

However, WUE does not account for water consumed throughout the process of producing the energy supplied to the data center. Fossil fuel energy production uses about 3 liters of water for each kWh of electricity produced, so by multiplying total facility power by 3, we can visualize the indirect water use relative to computational power for each data center cooling type.

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