Delaware River Basin Commission
DELAWARE • NEW JERSEY
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UNITED STATES OF AMERICA

Cumulative Thermoelectric Withdrawals and Consumptive Use

Excerpt from DRBC Water Resources Program 2019-2021

Water withdrawals for thermoelectric power generation are primarily used for cooling purposes. The cooling process is typically achieved by either highly evaporative cooling towers or a once-through cooling process that uses a condenser to absorb heat. The two types of cooling use water in different ways. Evaporative cooling towers require a smaller volume of withdrawal but consume most of the water (typically >90% consumptive use). Once-through cooling requires much greater volumes of water at the intake, but the rate of loss to evaporation is very small (typically <1%). In terms of total consumptive use per energy unit (gallons per MWh), cooling towers have higher consumptive use factors. On average, cooling towers use 453 gal/MWh, while once-through systems use 307 gal/MWh. A decline in withdrawals for thermoelectric power generation over the past several years is evident in the figure and is a result of plant closings, or decreased production, at facilities with once-through cooling systems.

However, the need for energy production in the basin continues to increase and other (smaller) facilities have come online to meet demand. The new facilities use evaporative cooling, which withdraws a lesser volume but evaporates a greater percentage of the withdrawal. The figure shows the resulting increasing trend in consumptive water use, despite a decrease in overall water withdrawn for the thermoelectric power generating sector.

Trend in Consumptive Use for Thermoelectric Power Generation in 1994-2016. Trendline is calculated as a 12-month moving average.