

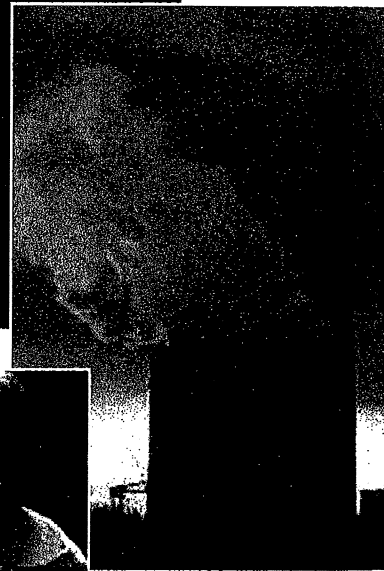
*Spring White
Cham ASSA*

The Last Straw

Water Use by Power Plants in the Arid West



Hewlett Foundation
Energy Series



Clean Air Task Force
The Land and Water
Fund of the Rockies

The Energy Foundation
The Hewlett Foundation

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**Figure 9 –
Cooling water withdrawal and consumption in gal/kWh**

Plant & Cooling System	Withdrawal (cooling & process)	Consumption (cooling)
FOSSIL ^{85,86,87}		
Steam		
Once-through	20 - 50	~.3
Re-circulating	.3 - .8	.24 - .64
Dry cooling	~.04	0
Combined Cycle		
Natural gas, once-through	7.5 - 20	~.1
Natural gas, re-circulating	~.23	~.18
Natural gas, dry cooling	~.04	0
Coal, re-circulating	~.38*	~.2
RENEWABLES		
Wind ⁸⁸		
	~.001	0
Solar – photovoltaic ⁸⁹		
	~.004	0
Solar – parabolic trough ⁹⁰		
	~.83	~.76
Geothermal ^{91,92}		
	**	0 - 1.0
Biomass ^{93,94}		
Steam, once-through	23 - 55	~.35
Steam, re-circulating	.35 - .9	.35 - .9
Steam, dry cooling	~.05	0

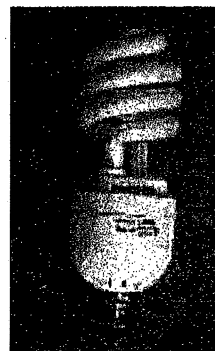
* Includes gasification process water

** If plants require cooling water, it is typically obtained from geothermal heating fluid.

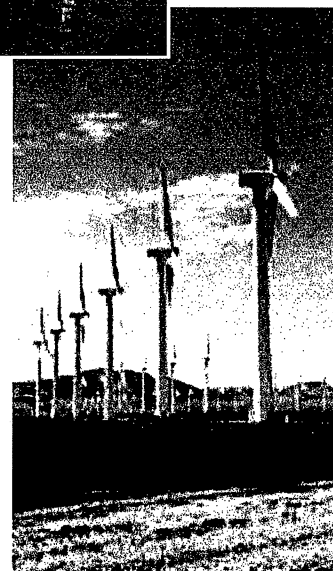
helps minimize the need for incremental power production, and thus avoids environmental impacts and water allocation issues. Improved efficiency and more "no water use" renewable power also helps reduce potential drought-driven power system reliability problems.

Figure 9 compares water withdrawal and consumption across both renewable and conventional fossil power technologies, clearly revealing the water use and consumption benefits of wind and solar photovoltaic power. If the next likely increment of new power generation – 16,800 MW or 112,590,000 MWh – taps wind and photovoltaics, there could be significant water savings. Developing only a small portion of these resources could fully cover the next expected increment in power needs and save upwards of 116 million gallons of water per day.⁹⁵ Renewable development is already on the increase in several states through the introduction of renewable portfolio standards.

The potential for water savings from energy efficiency is also very high. Accelerated adoption of cost-effective energy efficiency measures in Arizona, Colorado, Nevada, New Mexico, Utah and Wyoming could save the region 25 billion gallons a year – 10 percent of current consumption – by 2010.^{96,97}



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