

# THE EFFECTS OF POWER PLANT COOLING ON AMERICA'S WATERWAYS

Power plants boil water to produce steam, which is used to spin turbines, generating electricity. Oftentimes, staggering volumes of water are withdrawn from nearby lakes, rivers, and oceans to cool the steam back into water so that it can be used to produce more electricity. The three basic types of cooling systems - once-through, closed-cycle, and dry cooling - differ drastically in its water usage,

with once-through cooling being the most water-intensive and environmentally harmful method. A clear, consistent national policy is needed to ensure that the U.S. electricity sector is moving toward a cleaner and more water-smart future by replacing outdated and environmentally-destructive once-through cooling systems with modern, less water-intensive technologies.

## Power Plant Share of Total Water Use in the U.S.



In 2005, water withdrawals by steam electric power plants accounted for approximately 49 percent of total water use (fresh and saline) in the United States. That is an estimated 201 billion gallons of water per day – nearly three times the daily volume that roars over Niagra Falls!



LARGEST WATER USERS IN THE COUNTRY

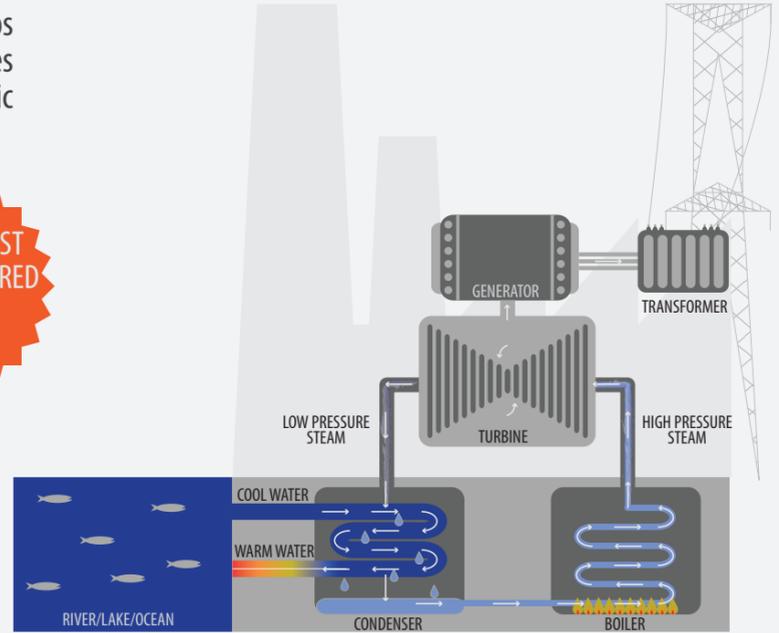
MOST OF THAT WATER IS USED FOR COOLING PURPOSES

## Once-Through Cooling is the Most Harmful Cooling Method

Water is withdrawn from nearby bodies of water, diverted through a condenser where it absorbs heat from the steam, and then discharged back to its original source at higher temperatures causing **severe environmental impacts**, including killing billions of fish, upsetting aquatic ecosystems, and heating up rivers, lakes and ocean waters.

WATER WITHDRAWN*	20,000-50,000 gal/MWh	
FISH KILLED**	100	

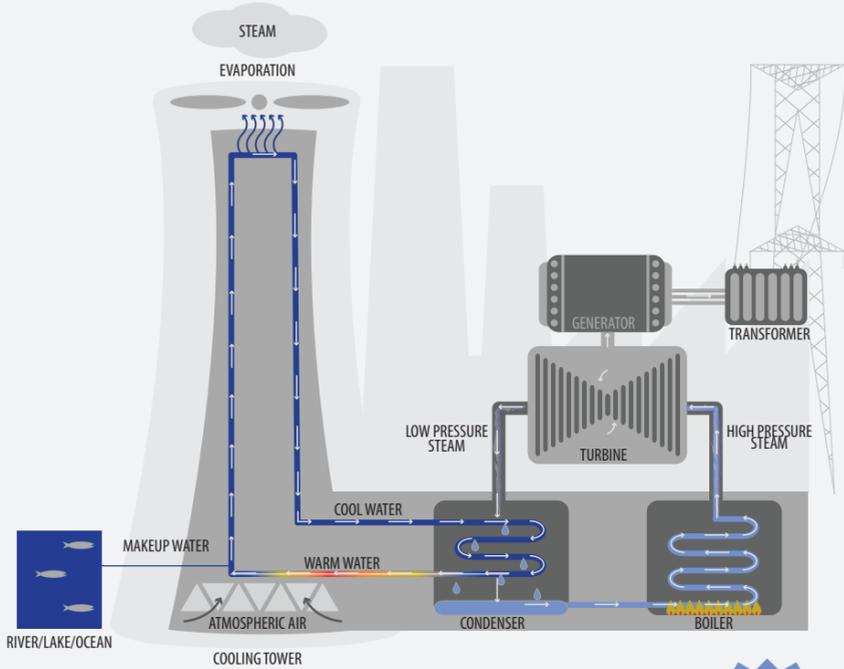
USES THE MOST WATER COMPARED TO OTHER SYSTEMS



## HOW CAN POWER PLANTS BE WATER-SMART?

### Replace Once-Through with Closed-Cycle Cooling

Closed-cycle cooling systems recirculate the cooling water through the condensers instead of having the water discharged back to its original water source.

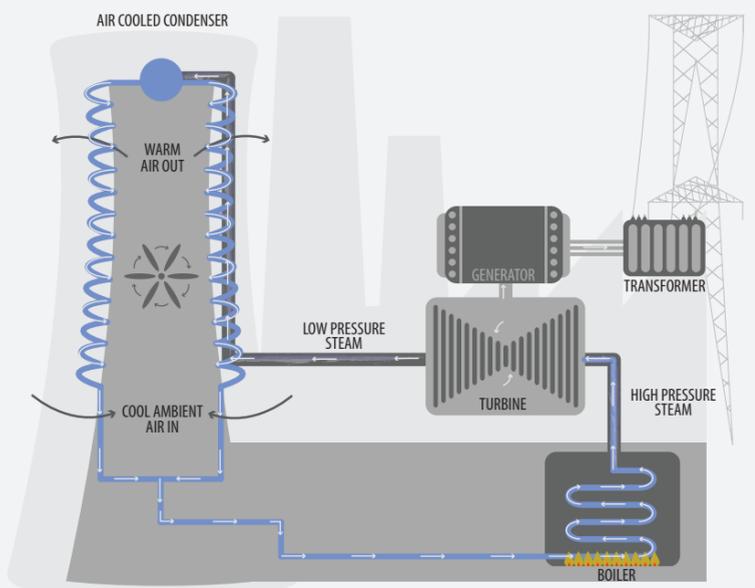


WATER WITHDRAWN*	500-1,200 gal/MWh	
FISH KILLED**	5	

REDUCES WATER USE AND FISH KILLS BY 95%

### Replace Once-Through with Dry Cooling

Dry cooling systems use air from the atmosphere, instead of water, to cool the boiler steam.



WATER WITHDRAWN*	0 gal/MWh	
FISH KILLED**	0	

USES ALMOST NO WATER; ELIMINATES FISH KILLS

### Use Reclaimed Water for Cooling

Instead of freshwater withdrawals, power plants can use treated municipal wastewater, or reclaimed water, for cooling. Nearly 50% of existing coal-fired power plants have sufficient reclaimed water available within a 10-mile radius,

and 75% have sufficient reclaimed water available within a 25-mile radius. The Palo Verde nuclear plant in Arizona uses reclaimed water for its closed-cycle cooling, and as a result avoids using 55 million gallons of freshwater per day.



\* Gallons of water required per megawatt-hour of electricity produced  
\*\* Relative amounts