

Glen Canyon Dam: High Flow Experiments' Effects on Emissions

This tool can be used to see how bypassing water during a High Flow Experiment (HFE) can affect air emissions. Because bypassed water does not go through turbines, it does not produce electricity. That electricity has to be produced by thermal plants that emit CO₂, NO_x, and SO_x.*

The most recent HFE bypassed 143,000 Acre Feet of water.

Acre Feet Bypassed: change number below to see different effects.

Number of Acre Feet Bypassed: AF

Emissions if utilities use gas plants to make up for lost energy from Glen Canyon Dam:

CO ₂ Emissions	219,111,750 lbs
SO _x Emissions	19,305 lbs
NO _x Emissions	328,185 lbs

Emissions if utilities use coal plants to make up for lost energy from Glen Canyon Dam:

CO ₂ Emissions	434,169,450 lbs
SO _x Emissions	2,509,650 lbs
NO _x Emissions	1,158,300 lbs

- Conservative energy per water ratio (400 kwh per AF)
- Historical observed energy per water ratio since ROD (450 kwh per AF)

What Do These Numbers Mean?

CO₂ output equals the annual air emissions from this many cars:

Gas plant emissions equal:	19,360 cars driven for a year
Coal plants emissions equal	38,361 cars driven for a year

How Does the HFE Compare to My Car's CO₂ Emissions?

My car's miles per gallon: MPG

How many miles I drive per day: miles per day

Equivalent to me driving my car daily for: if a gas plant is used	19,859 years
Equivalent to me driving my car daily for: if a coal plant is used	39,351 years

*In most cases, utilities use 100% of generation from renewables like wind & solar, and generate the difference between renewable generation and customer electric needs with thermal generation.

Sources:

<http://www.epa.gov/cleanenergy/energy-and-you/affect/air-emissions.html>

<http://www.epa.gov/cleanenergy/energy-resources/refs.html>

energy per water ratio from Historical output from GCD Post-ROD, or average efficiency of hydro turbines from WAPA numbers

http://www.epa.gov/climatechange/ghgemissions/ind-calculator.html#c=transportation&p=reduceOnTheRoad&m=calc_currentEmissions

AF	429000	
MWh per 1 AF	0.45	
kWh per 1 AF	450	
MWh per calculated AF	193050	
lbs of CO2 Emissions per MWh, average gas plant	1135	From http://www.epa.gov/cleanenergy/energy-and-you/affect/air-emissions.html
lbs of CO2 Emissions per MWh, average coal plant	2249	From http://www.epa.gov/cleanenergy/energy-and-you/affect/air-emissions.html
lbs of SOX per MWh, average gas plant	0.1	From http://www.epa.gov/cleanenergy/energy-and-you/affect/air-emissions.html
lbs of SOX per MWh, average coal plant	13	From http://www.epa.gov/cleanenergy/energy-and-you/affect/air-emissions.html
lbs of NOX per MWh, average gas plant	1.7	From http://www.epa.gov/cleanenergy/energy-and-you/affect/air-emissions.html
lbs of NOX per MWh, average coal plant	6	From http://www.epa.gov/cleanenergy/energy-and-you/affect/air-emissions.html
average car's CO2 emissions per year	11318	From http://www.epa.gov/cleanenergy/energy-resources/refs.html
metric tons CO2/gallon gasoline	0.00889	From http://www.epa.gov/cleanenergy/energy-and-you/affect/air-emissions.html
Miles Traveled	32	
Miles per gallon	0.047619048	From http://www.epa.gov/cleanenergy/energy-and-you/affect/air-emissions.html
.988 CO2 ratio	0.988	From http://www.epa.gov/cleanenergy/energy-and-you/affect/air-emissions.html
total metric tons CO2	0.013711201	Formula from http://www.epa.gov/cleanenergy/energy-and-you/affect/air-emissions.html
metric tons to lbs	30.22804873	

	hours	cfs	max through turbines	bypassed cfs	bypassed c	bypassed cf	AF bypassed	
2008	60	41500	32000	9500	3420000	205200000	4710.744	
2012	24	42300	27300	15000	5400000	129600000	2975.207	
2012	48	36650	27300	9350	3366000	161568000	3709.091	6684.297