

#11 Pine Lake Corn Processors Ethanol Plant Energy and Water Usage vs. Cities within a 10 mile radius

Ethanol Plant without CO ₂ Capture						
No.	Ethanol Plant/ Town	Population	**Water Permit Value MGY	**2023 Water Usage MGY		Comments
Ethanol Plant - Near Steamboat Rock, Iowa						
	Pine Lake Corn Processors - Steamboat Rock Plant		320.0	271.4		Without CO ₂ capture water requirement
	Combined Towns All Water Usage		266.6	266.6		City residential use assumes 70 gal./person/day
1	Owasa	34	0.9	0.9		Water usage too small to require a permit
2	Austinville	50	1.3	1.3		Water usage too small to require a permit
3	Wellsburg	720	18.4	18.4		Water usage too small to require a permit
4	Steamboat Rock	264	6.7	6.7		
5	Ackley	1,599	40.9	40.9		
6	Eldora	2,663	68.0	68.0		
7	Iowa Falls	5,106	130.5	130.5		
	Percentage of ethanol plant usage of total water usage	10,436	54.5%	50.4%		
Conclusion: Without CO₂ Capture						
This ethanol plant consumes 50% of the water used by the cities and plant within the surrounding 10 mile radius (314 square miles).						

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Ethanol Plant with CO ₂ Capture						
No.	Ethanol Plant/ Town	Population	**Water Permit Value MGY	**2023 Water Usage MGY	2023 Water Usage % of Total	Comments
Ethanol Plant - Near Steamboat Rock, Iowa		-	-	-	-	City residential use assumes 70 gal./person/day
1	Owasa	34	0.9	0.9		Water usage too small to require a permit
2	Austinville	50	1.3	1.3		Water usage too small to require a permit
3	Wellsburg	720	18.4	18.4		Water usage too small to require a permit
	No Permit	804	20.5	20.5	3.3%	
4	Steamboat Rock	264	6.7	6.7	1.1%	
5	Ackley	1599	40.9	40.9	6.6%	
6	Eldora	2663	68.0	68.0	10.9%	
7	Iowa Falls	5106	130.5	130.5	21.0%	
8	Ethanol plant water for Ethanol Production		320.0	271.4	43.6%	Without CO ₂ Capture water requirement
9	Ethanol Plant water for CO ₂ Capture		84.0	84.0	13.5%	Additional CO ₂ Capture water requirement
	Total Plant and Towns	10,436	670.6	622.1	100.0%	
	Percentage of ethanol plant usage of total water usage		60.2%	57.1%		
Conclusion: With CO₂ Capture						
This ethanol plant consumes 57% of the water used by the cities and plant within the surrounding 10 mile radius (314 square miles)						
*Ethanol Production Capacity of Plant - MGY		80				
Factor: Water required to cool and compress the CO₂ for capture - MGY Water/ MGY Ethanol		1.05				
Calculate additional water required for CO₂ Capture - MGY		84				
Calculate ratio of gallons of water/ gallons of Ethanol		3.4				
Total water requirement of towns and Ethanol plant - MGY		642.6				
Total water requirement of towns - MGY		287.2				
Total water requirement for ethanol plant - MGY		355.4				
Ratio of ethanol plant water use vs. surrounding area		1.24				
Percentage of ethanol plant usage of total water usage		55.3%				
Total Population within the 10 mile radius		10,436				

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Water Use					
Typical water use per person per day - Gallons/ person/ day	70				
Equivalent # of people ethanol plant water use w/o CO2 capture	10,623				
Equivalent # of people ethanol plant water use w/ CO2 capture	13,911				
Electricity Use					
Electricity to produce Ethanol - kWh/ gallon EtOH for production	0.6				
Total Electricity used to produce ethanol - kWh	48,000,000				
Electrical use to capture CO2 - kWh/ gallon EtOH	0.377				
Total Electricity used to capture CO2 - kWh	30,160,000				
Total electricity to produce ethanol and capture CO2 - kWh	7.816E+07				
Typical electrical use/ residence - kWh/year	10,476.0				
Equivalent number of residences	7,460.9				
Number of people / residence	2.4				
Equivalent number of people	17,906				
Natural Gas Use					
Natural gas use per gallon of ethanol for production - BTU's/ gal.	26,000				
Natural gas use for ethanol plant - BTU's	2.080E+12				
Natural gas use per gal. of ethanol for CO2 capture - BTU's/ gal.	0				
Typical Natural Gas use/ residence - BTU's/ year	96,000,000				
Equivalent number of residences	21,667				
Number of people / residence	2.4				
Equivalent number of people	52,000				
* Ethanol Capacity per Iowa Renewable Fuels Association		** Water usage per the greater of DNR WACOP Permit or 3 times ethanol capacity.			

#11 Pine Lake Corn Processors Ethanol Plant (80 MGY) near Steamboat Rock

Ethanol plant 2023 water usage vs. surrounding Residential water usage of towns within a ten mile radius MGY (Millions of Gallons per Year).

