

### #16 POET Biorefining - Ashton Ethanol Plant Energy and Water Usage vs. Cities within a 10 mile radius

Ethanol Plant without CO <sub>2</sub> Capture						
No.	Ethanol Plant/ Town	Population	**Water Permit Value MGY	**2023 Water Usage MGY		Comments
Ethanol Plant - Near Ashton, Iowa						
	POET Biorefining - Ashton Plant		250	204		Without CO <sub>2</sub> capture water requirement
	Combined Towns All Water Usage		290.0	290.0		City residential use assumes 70 gal./person/day
1	Matlock	74	1.9	1.9		Water usage too small to require a permit
2	Ashton	436	11.1	11.1		Water usage too small to require a permit
3	George	1,077	27.5	27.5		
4	Sanborn	1,392	35.6	35.6		
5	Sibley	2,860	73.1	73.1		
6	Sheldon	5,512	140.8	140.8		
	Percentage of ethanol plant usage of total water usage	11,351	46.3%	41.3%		
<b>Conclusion: Without CO2 Capture</b>						
This ethanol plant consumes 41% of the water used by the cities and plant within the surrounding 10 mile radius (314 square miles).						

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No.	Ethanol Plant/ Town	Population	**Water Permit Value MGY	**2023 Water Usage MGY	2023 Water Usage % of Total	Comments
Ethanol Plant - Near Ashton, Iowa		-	-	-	-	City residential use assumes 70 gal./person/day
1	Matlock	74	1.9	1.9	0.3%	Water usage too small to require a permit
2	Ashton	436	11.1	11.1	2.0%	Water usage too small to require a permit
3	George	1077	27.5	27.5	4.9%	
4	Sanborn	1392	35.6	35.6	6.3%	
5	Sibley	2860	73.1	73.1	12.9%	
6	Sheldon	5512	140.8	140.8	24.9%	
7	Ethanol plant water for Ethanol Production		250	204	36.1%	Without CO <sub>2</sub> Capture water requirement
8	Ethanol Plant water for CO <sub>2</sub> Capture		71.4	71.4	12.6%	Additional CO <sub>2</sub> Capture water requirement
Total Plant and Towns		11,351	611.4	565.4	100.0%	
Percentage of ethanol plant usage of total water usage			52.6%	48.7%		
<b>Conclusion: With CO<sub>2</sub> Capture</b>						
This ethanol plant consumes 49% of the water used by the cities and plant within the surrounding 10 mile radius (314 square miles)						
<b>*Ethanol Production Capacity of Plant - MGY</b>						
		68				
<b>Factor: Water required to cool and compress the CO<sub>2</sub> for capture - MGY Water/ MGY Ethanol</b>						
		1.05				
<b>Calculate additional water required for CO<sub>2</sub> Capture - MGY</b>						
		71.4				
<b>Calculate ratio of gallons of water/ gallons of Ethanol</b>						
		3.0				
<b>Total water requirement of towns and Ethanol plant - MGY</b>						
		565.4				
<b>Total water requirement of towns - MGY</b>						
		290.0				
<b>Total water requirement for ethanol plant - MGY</b>						
		275.4				
<b>Ratio of ethanol plant water use vs. surrounding area</b>						
		0.95				
<b>Percentage of ethanol plant usage of total water usage</b>						
		48.7%				
<b>Total Population within the 10 mile radius</b>						
		11,351				

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<b>Water Use</b>					
Typical water use per person per day - Gallons/ person/ day	70				
Equivalent # of people ethanol plant water use w/o CO2 capture	7,984				
Equivalent # of people ethanol plant water use w/ CO2 capture	10,779				
<b>Electricity Use</b>					
Electricity to produce Ethanol - kWh/ gallon EtOH for production	0.6				
Total Electricity used to produce ethanol - kWh	40,800,000				
Electrical use to capture CO2 - kWh/ gallon EtOH	0.377				
Total Electricity used to capture CO2 - kWh	25,636,000				
Total electricity to produce ethanol and capture CO2 - kWh	6.644E+07				
Typical electrical use/ residence - kWh/year	10,476.0				
Equivalent number of residences	6,341.7				
Number of people / residence	2.4				
Equivalent number of people	15,220				
<b>Natural Gas Use</b>					
Natural gas use per gallon of ethanol for production - BTU's/ gal.	26,000				
Natural gas use for ethanol plant - BTU's	1.768E+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	18,417				
Number of people / residence	2.4				
Equivalent number of people	44,200				
* Ethanol Capacity per Iowa Renewable Fuels Association		** Water usage per the greater of DNR WACOP Permit or 3 times ethanol capacity.			

# #16 POET Biorefining Ethanol Plant (68 MGY) near Ashton

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

