

#18 POET Biorefining - Coon Rapids 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 Coon Rapids, Iowa						
	Poet Biorefining - Coon Rapids Plant		237.4	195.0		Without CO ₂ capture water requirement
	Combined Towns All Water Usage		55.2	55.2		City residential use assumes 70 gal./person/day
1	Dedham	224	5.7	5.7		Water usage too small to require a permit
2	Bagley	233	6.0	6.0		Water usage too small to require a permit
3	Bayard	405	10.3	10.3		
4	Coon Rapids	1,300	33.2	33.2		
	Percentage of ethanol plant usage of total water usage	2,162	81.1%	77.9%		
Conclusion: Without CO₂ Capture						
	This ethanol plant consumes 78% 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 Coon Rapids, Iowa		-	-	-	-	City residential use assumes 70 gal./person/day
1	Dedham	224	5.7	5.7	1.8%	Water usage too small to require a permit
2	Bagley	233	6.0	6.0	1.9%	Water usage too small to require a permit
3	Bayard	405	10.3	10.3	3.2%	
4	Coon Rapids	1300	33.2	33.2	10.4%	
5	Ethanol plant water for Ethanol Production		237.4	195	61.2%	Without CO ₂ Capture water requirement
6	Ethanol Plant water for CO ₂ Capture		68.3	68.3	21.4%	Additional CO ₂ Capture water requirement
Total Plant and Towns		2,162	360.9	318.5	100.0%	
Percentage of ethanol plant usage of total water usage			84.7%	82.7%		
Conclusion: With CO₂ Capture						
This ethanol plant consumes 83% of the water used by the cities and plant within the surrounding 10 mile radius (314 square miles)						
*Ethanol Production Capacity of Plant - MGY						
		65				
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						
		68.25				
Calculate ratio of gallons of water/ gallons of Ethanol						
		3.0				
Total water requirement of towns and Ethanol plant - MGY						
		318.5				
Total water requirement of towns - MGY						
		55.2				
Total water requirement for ethanol plant - MGY						
		263.3				
Ratio of ethanol plant water use vs. surrounding area						
		4.77				
Percentage of ethanol plant usage of total water usage						
		82.7%				
Total Population within the 10 mile radius						
		2,162				

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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	7,632				
Equivalent # of people ethanol plant water use w/ CO2 capture	10,303				
Electricity Use					
Electricity to produce Ethanol - kWh/ gallon EtOH for production	0.6				
Total Electricity used to produce ethanol - kWh	39,000,000				
Electrical use to capture CO2 - kWh/ gallon EtOH	0.377				
Total Electricity used to capture CO2 - kWh	24,505,000				
Total electricity to produce ethanol and capture CO2 - kWh	6.351E+07				
Typical electrical use/ residence - kWh/year	10,476.0				
Equivalent number of residences	6,062.0				
Number of people / residence	2.4				
Equivalent number of people	14,549				
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	1.690E+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	17,604				
Number of people / residence	2.4				
Equivalent number of people	42,250				
* Ethanol Capacity per Iowa Renewable Fuels Association		** Water usage per the greater of DNR WACOP Permit or 3 times ethanol capacity.			

#18 POET Biorefining Ethanol Plant (65 MGY) near Coon Rapids

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

