

#24 POET Biorefining - Hanlontown 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 Hanlontown, Iowa						
	POET Biorefining - Hanlontown Plant		245.0	240		Without CO ₂ capture water requirement
	Combined Towns All Water Usage		308.2	308.2		City residential use assumes 70 gal./person/day
1	Hanlontown	206	5.3	5.3		
2	Joice	208	5.3	5.3		
3	Kensett	257	6.6	6.6		
4	Fertile	305	7.8	7.8		
5	Manly	1,256	32.1	32.1		
6	Lake Mills	2,143	54.8	54.8		
7	Clear lake	7,687	196.4	196.4		
	Percentage of ethanol plant usage of total water usage	12062	44.3%	43.8%		
Conclusion: Without CO₂ Capture						
This ethanol plant consumes 44% of the water used by the cities and plant within the surrounding 10 mile radius (314 square miles).						

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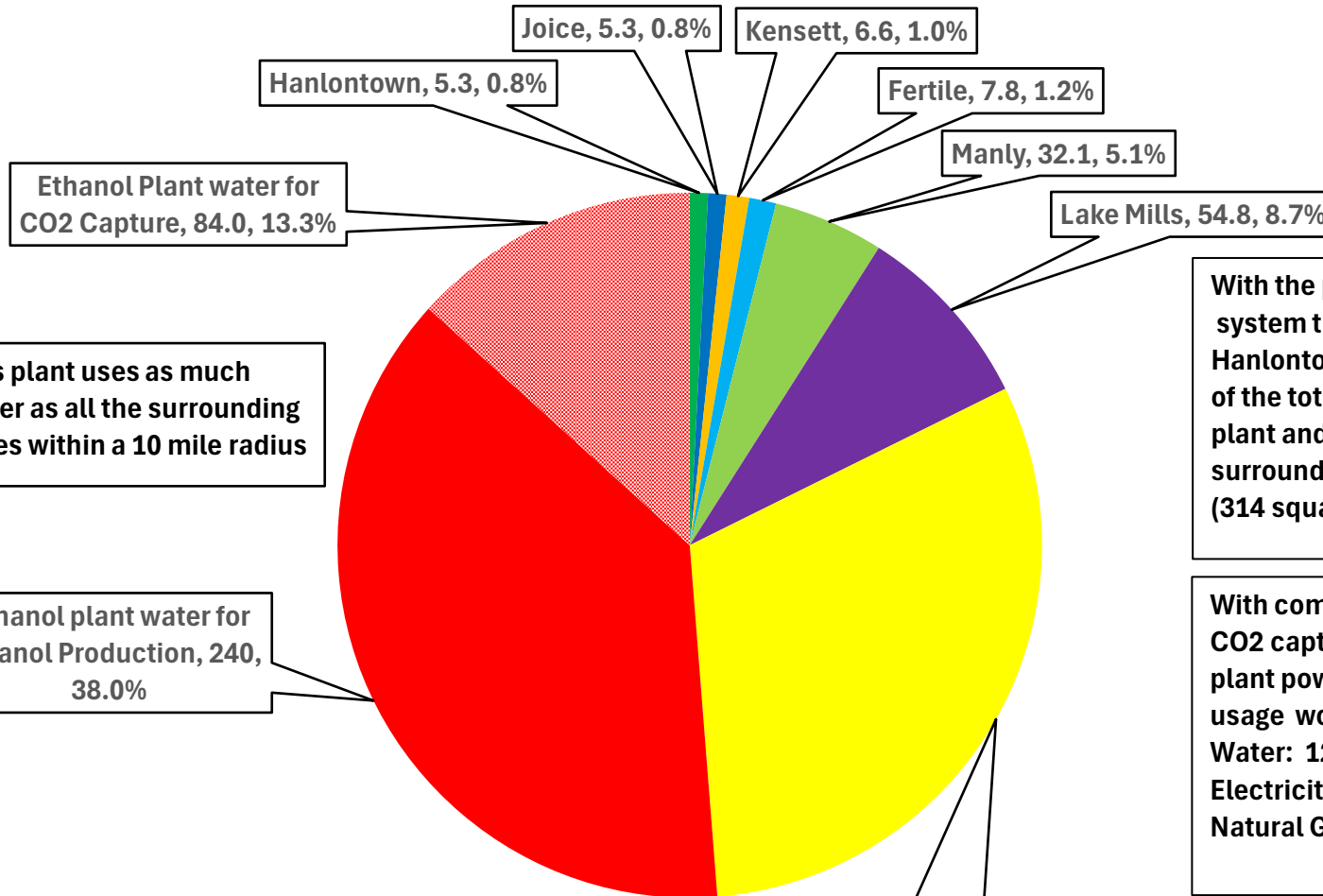
Ethanol Plant with CO ₂ Capture						
No.	Ethanol Plant/ Town	Population	**Water Permit Value MGY	**2023 Water Usage MGY	2023 Water Usage % of Total	Comments
Ethanol Plant - Near Hanlontown, Iowa		-	-	-	-	City residential use assumes 70 gal./person/day
1	Hanlontown	206	5.3	5.3	0.8%	
2	Joice	208	5.3	5.3	0.8%	
3	Kensett	257	6.6	6.6	1.0%	
4	Fertile	305	7.8	7.8	1.2%	
5	Manly	1256	32.1	32.1	5.1%	
6	Lake Mills	2143	54.8	54.8	8.7%	
7	Clear lake	7687	196.4	196.4	31.1%	
8	Ethanol plant water for Ethanol Production		245	240	38.0%	Without CO ₂ Capture water requirement
9	Ethanol Plant water for CO ₂ Capture		84.0	84.0	13.3%	Additional CO ₂ Capture water requirement
Total Plant and Towns		12,062	637.2	632.2	100.0%	
Percentage of ethanol plant usage of total water usage			51.6%	51.3%		
Conclusion: With CO₂ Capture						
This ethanol plant consumes 51% 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		3.0				
Total water requirement of towns and Ethanol plant - MGY		632.2				
Total water requirement of towns - MGY		308.2				
Total water requirement for ethanol plant - MGY		324.0				
Ratio of ethanol plant water use vs. surrounding area		1.05				
Percentage of ethanol plant usage of total water usage		51.3%				
Total Population within the 10 mile radius		12,062				

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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	9,393				
Equivalent # of people ethanol plant water use w/ CO2 capture	12,681				
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.			

#24 POET Biorefining Ethanol Plant (80 MGY) near Hanlontown

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



With the proposed CO₂ capture system the POET Biorefining Hanlontown Plant will use 51% of the total water used by the plant and cities within the surrounding 10 mile radius. (314 square miles)

With combined production and CO₂ capture the ethanol plant power and 2023 water usage would be equivalent to:
 Water: 12,700 people.
 Electricity: 17,900 People.
 Natural Gas: 52,000 People

The total population of the cities within the 10 mile radius is 12,062.

This plant uses as much water as all the surrounding cities within a 10 mile radius

Ethanol plant water for Ethanol Production, 240, 38.0%

3.0 gallons of water per gallon of ethanol used for production. An additional 1.05 gallons is required for CO₂ capture.

The plant draws it's water from the Devonian aquifer. This water level in this area are down as much as 30 feet since 2015

Clear lake, 196.4, 31.1%