

#9 Absolute Energy LLC 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 St. Ansgar Iowa						
	Absolute Energy LLC Plant		842.7	390.0		Without CO ₂ capture water requirement
	Combined Towns All Water Usage		140.8	140.8		City residential use assumes 70 gal./person/day
1	Toeterville	50	1.3	1.3		Water usage too small to require a permit
2	Otranto	50	1.3	1.3		Water usage too small to require a permit
3	Mona	50	1.3	1.3		Water usage too small to require a permit
4	Carpenter	87	2.2	2.2		Water usage too small to require a permit
5	Rose Creek Mn.	397	10.1	10.1		Minnesota Usage
6	Lyle Mn.	521	13.3	13.3		Minnesota Usage
7	London Mn.	1,310	33.5	33.5		Minnesota Usage
8	Johnsburg Mn.	1,428	36.5	36.5		Minnesota Usage
9	Stacyville	458	11.7	11.7		
10	St. Ansgar	1,160	29.6	29.6		
	Percentage of ethanol plant usage of total water usage	5,511	85.7%	73.5%		
Conclusion: Without CO2 Capture						
This ethanol plant consumes 74% of the water used by the cities and plant within the surrounding 10 mile radius (314 square miles).						

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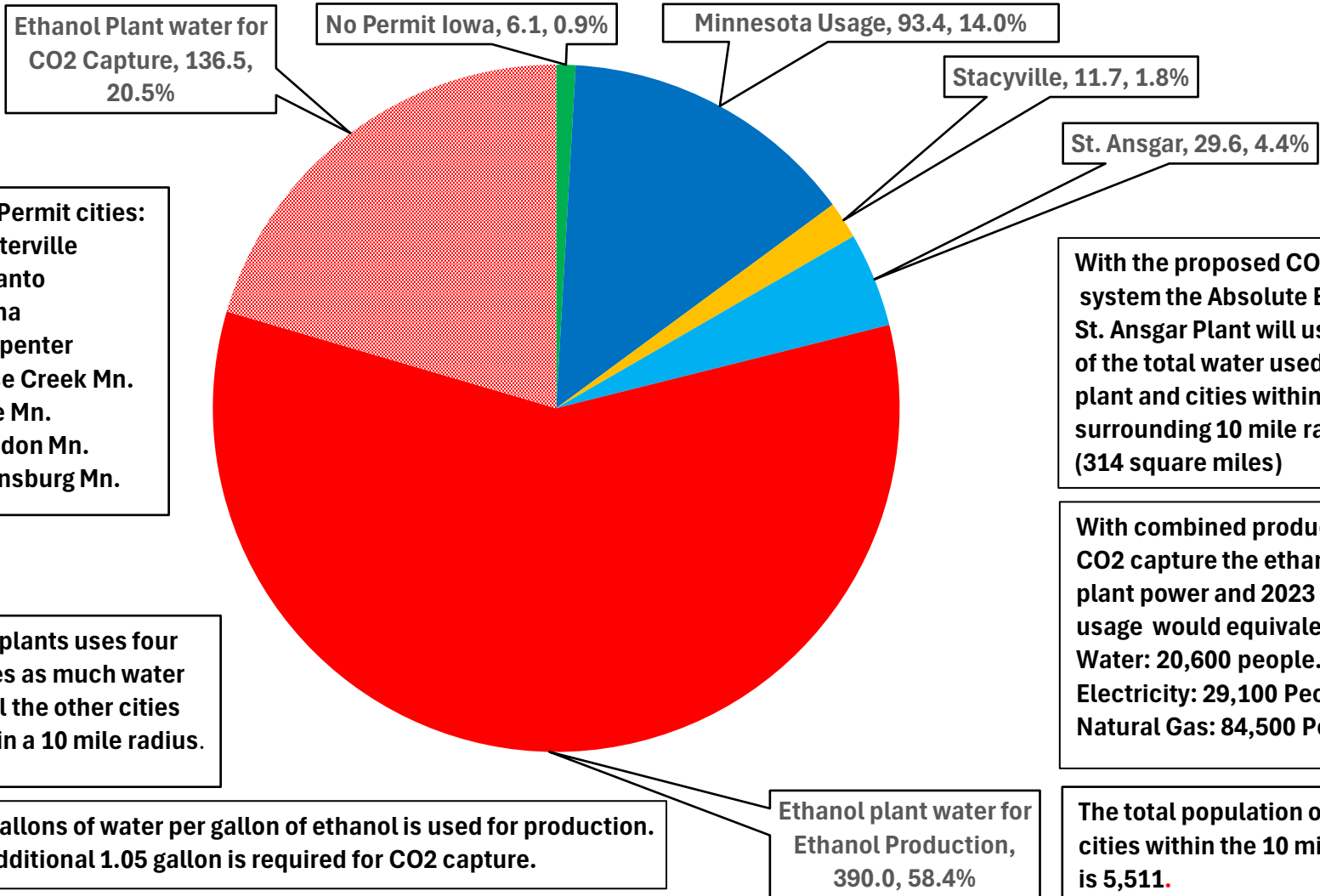
Ethanol Plant with CO ₂ Capture						
No.	Ethanol Plant/ Town	Population	**Water Permit Value MGY	**2023 Water Usage MGY	2023 Water Usage % of Total	Comments
Ethanol Plant - Near St. Ansgar Iowa		-	-	-	-	City residential use assumes 70 gal./person/day
1	Toeterville	50	1.3	1.3		Water usage too small to require a permit
2	Otranto	50	1.3	1.3		Water usage too small to require a permit
3	Mona	50	1.3	1.3		Water usage too small to require a permit
4	Carpenter	87	2.2	2.2		Water usage too small to require a permit
5	Rose Creek Mn.	397	10.1	10.1		Minnesota Usage
6	Lyle Mn.	521	13.3	13.3		Minnesota Usage
7	London Mn.	1310	33.5	33.5		Minnesota Usage
8	Johnsburg Mn.	1428	36.5	36.5		Minnesota Usage
	No Permit Iowa	237	6.1	6.1	0.9%	
	Minnesota Usage	3656	93.4	93.4	14.0%	
9	Stacyville	458	11.7	11.7	1.8%	
10	St. Ansgar	1160	29.6	29.6	4.4%	
11	Ethanol plant water for Ethanol Production		842.7	390.0	58.4%	Without CO ₂ Capture water requirement
12	Ethanol Plant water for CO ₂ Capture		136.5	136.5	20.5%	Additional CO ₂ Capture water requirement
	Total Plant and Towns	5511	1219.5	667.3	100.0%	
	Percentage of ethanol plant usage of total water usage		80.3%	78.9%		
Conclusion: With CO₂ Capture						
This ethanol plant consumes 79% of the water used by the cities and plant within the surrounding 10 mile radius (314 square miles)						
*Ethanol Production Capacity of Plant - MGY		130				
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		136.5				
Calculate ratio of gallons of water/ gallons of Ethanol		3.0				
Total water requirement of towns and Ethanol plant - MGY		766.8				
Total water requirement of towns - MGY		240.3				
Total water requirement for ethanol plant - MGY		526.5				
Ratio of ethanol plant water use vs. surrounding area		2.19				
Percentage of ethanol plant usage of total water usage		68.7%				
Total Population within the 10 mile radius		5,511				

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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	15,264				
Equivalent number of people Ethanol plant w/ CO2 capture	20,607				
Electricity Use					
Electricity to produce Ethanol - kWh/ gallon EtOH for production	0.6				
Total Electricity used to produce ethanol - kWh	78,000,000				
Electrical use to capture CO2 - kWh/ gallon EtOH	0.377				
Total Electricity used to capture CO2 - kWh	49,010,000				
Total electricity to produce ethanol and capture CO2 - kWh	127,010,000				
Typical electrical use/ residence - kWh/year	10,476.0				
Equivalent number of residences	12,123.9				
Number of people / residence	2.4				
Equivalent number of people	29,097				
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	3,380,000,000,000				
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	35,208				
Number of people / residences	2.4				
Equivalent number of people	84,500				
* Ethanol Capacity per Iowa Renewable Fuels Association		** Water usage per the greater of DNR WACOP Permit or 3 times ethanol capacity.			

#9 Absolute Energy LLC Ethanol Plant (130 MGY) near St. Ansgar

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



No Permit cities:
 Toeterville
 Otranto
 Mona
 Carpenter
 Rose Creek Mn.
 Lyle Mn.
 London Mn.
 Johnsburg Mn.

With the proposed CO₂ capture system the Absolute Energy St. Ansgar Plant will use 79% 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 equivalent to:
 Water: 20,600 people.
 Electricity: 29,100 People.
 Natural Gas: 84,500 People

This plants uses four times as much water as all the other cities within a 10 mile radius.

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

The plant draws it's water from the Devonian aquifer
 This water level is down as much as 30 feet since 2015

The total population of the cities within the 10 mile radius is 5,511.