

#7 Corn LP - Goldfield 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 - Goldfield, Iowa			-	-		
	Corn LP Goldfield Plant		262	240		Without CO ₂ capture water requirement
	Combined Towns All Water Usage		193.3	193.3		City residential use assumes 70 gal./person/day
1	Holmes	50	1.3	1.3		Water usage too small to require a permit
2	Hardy	57	1.5	1.5		Water usage too small to require a permit
3	Thor	181	4.6	4.6		
4	Renwick	234	6.0	6.0		
5	Goldfield	634	16.2	16.2		
6	Clarion	2,810	71.8	71.8		
7	Eagle Grove	3,601	92.0	92.0		
	Percentage of ethanol plant usage of total water usage	7,567	57.5%	55.4%		
Conclusion: Without CO₂ Capture						
This ethanol plant consumes 55% of the water used by the cities and plant within the surrounding 10 mile radius (314 square miles).						

#7 Corn LP - Goldfield Ethanol Plant Energy and Water Usage vs. Cities within a 10 mile radius

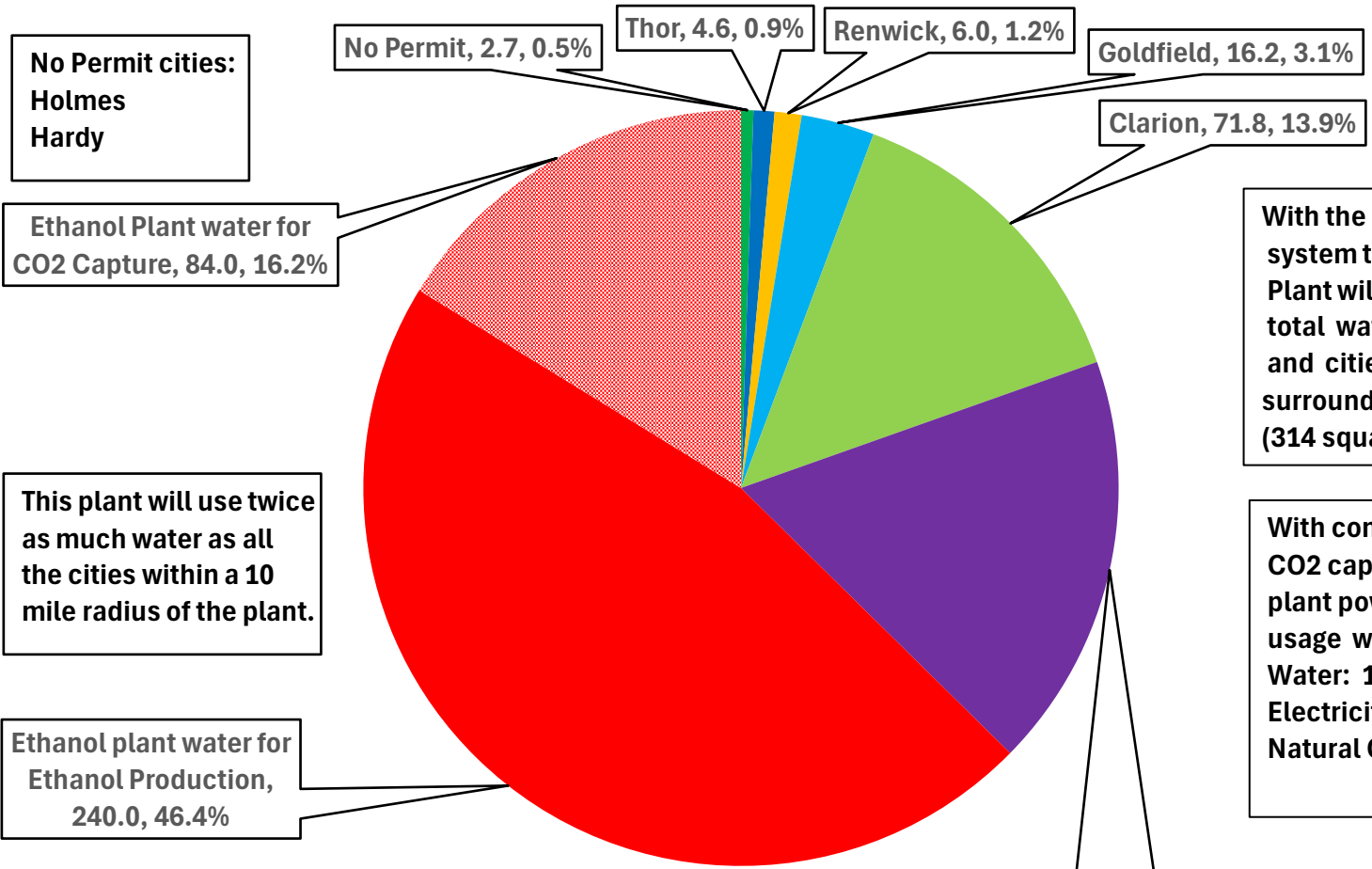
Ethanol Plant with CO ₂ Capture						
No.	Ethanol Plant/ Town	Population	**Water Permit Value MGY	**2023 Water Usage MGY	2023 Water Usage % of Total	Comments
Ethanol Plant - Goldfield, Iowa		-	-	-	-	City residential use assumes 70 gal./person/day
1	Holmes	50	1.3	1.3		Water usage too small to require a permit
2	Hardy	57	1.5	1.5		Water usage too small to require a permit
	No Permit	107	2.7	2.7	0.5%	
3	Thor	181	4.6	4.6	0.9%	
4	Renwick	234	6.0	6.0	1.2%	
5	Goldfield	634	16.2	16.2	3.1%	
6	Clarion	2810	71.8	71.8	13.9%	
7	Eagle Grove	3601	92.0	92.0	17.8%	
8	Ethanol plant water for Ethanol Production		262.0	240.0	46.4%	Without CO ₂ Capture water requirement
9	Ethanol Plant water for CO ₂ Capture		84.0	84.0	16.2%	Additional CO ₂ Capture water requirement
Total Plant and Towns		7,567	539.3	517.3	100.0%	
Percentage of ethanol plant usage of total water usage			64.2%	62.63%		
Conclusion: With CO₂ Capture						
This ethanol plant consumes 63% 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		520.1				
Total water requirement of towns - MGY		196.1				
Total water requirement for ethanol plant - MGY		324.0				
Ratio of ethanol plant water use vs. surrounding area		1.65				
Percentage of ethanol plant usage of total water usage		62.3%				
Total Population within the 10 mile radius		7,567				

#7 Corn LP - Goldfield Ethanol Plant Energy and Water Usage vs. Cities within a 10 mile radius

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.			

#7 Corn LP Ethanol Plant (80 MGY) near Goldfield

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:
Holmes
Hardy

Ethanol Plant water for CO2 Capture, 84.0, 16.2%

This plant will use twice as much water as all the cities within a 10 mile radius of the plant.

Ethanol plant water for Ethanol Production, 240.0, 46.4%

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 Mississippian aquifer. Water levels in this area are down as much as 30 feet since 2015

With the proposed CO₂ capture system the Corn LP Goldfield Plant will use 63% 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

Eagle Grove, 92.0, 17.8%

The total population of the cities within the 10 mile radius is 7,567.