#19 POET Biorefining - Corning 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 Corning, Iowa			-	-		
	POET Biorefining - Corning Plant		270	270		Without CO_2 capture water requirement
	Combined Towns All Water Usage		50.2	50.2		City residential use assumes 70 gal./person/day
1	Carbon	36	0.9	0.9		Water usage too small to require a permit
2	Mount Etna	50	1.3	1.3		Water usage too small to require a permit
3	Brooks	50	1.3	1.3		Water usage too small to require a permit
4	Nodaway	74	1.9	1.9		Water usage too small to require a permit
5	Prescott	191	4.9	4.9		Water usage too small to require a permit
6	Corning	1,564	40.0	40.0		
	Percentage of ethanol plant usage of total water usage	1,965	84.3%	84.3%		
Conclusion: Without CO2 Capture						
	This ethanol plant consumes 84% 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 Corning, Iowa		-	-	-	-	City residential use assumes 70 gal./person/day
1	Carbon	36	0.9	0.9	0.2%	Water usage too small to require a permit
2	Mount Etna	50	1.3	1.3	0.3%	Water usage too small to require a permit
3	Brooks	50	1.3	1.3	0.3%	Water usage too small to require a permit
4	Nodaway	74	1.9	1.9	0.5%	Water usage too small to require a permit
5	Prescott	191	4.9	4.9	1.2%	Water usage too small to require a permit
6	Corning	1564	40.0	40.0	9.6%	
7	Ethanol plant water for Ethanol Production		270	270	65.1%	Without CO2 Capture water requirement
8	Ethanol Plant water for CO_2 Capture		94.5	94.5	22.8%	Additional CO_2 Capture water requirement
	Total Plant and Towns	1,965	414.7	414.7	100.0%	
	Percentage of ethanol plant usage of total water usage		87.9%	87.9%		

Conclusion: With CO2 Capture

This ethanol plant consumes 88% of the water used by the cities and plant within the surrounding 10 mile radius (314 square miles)

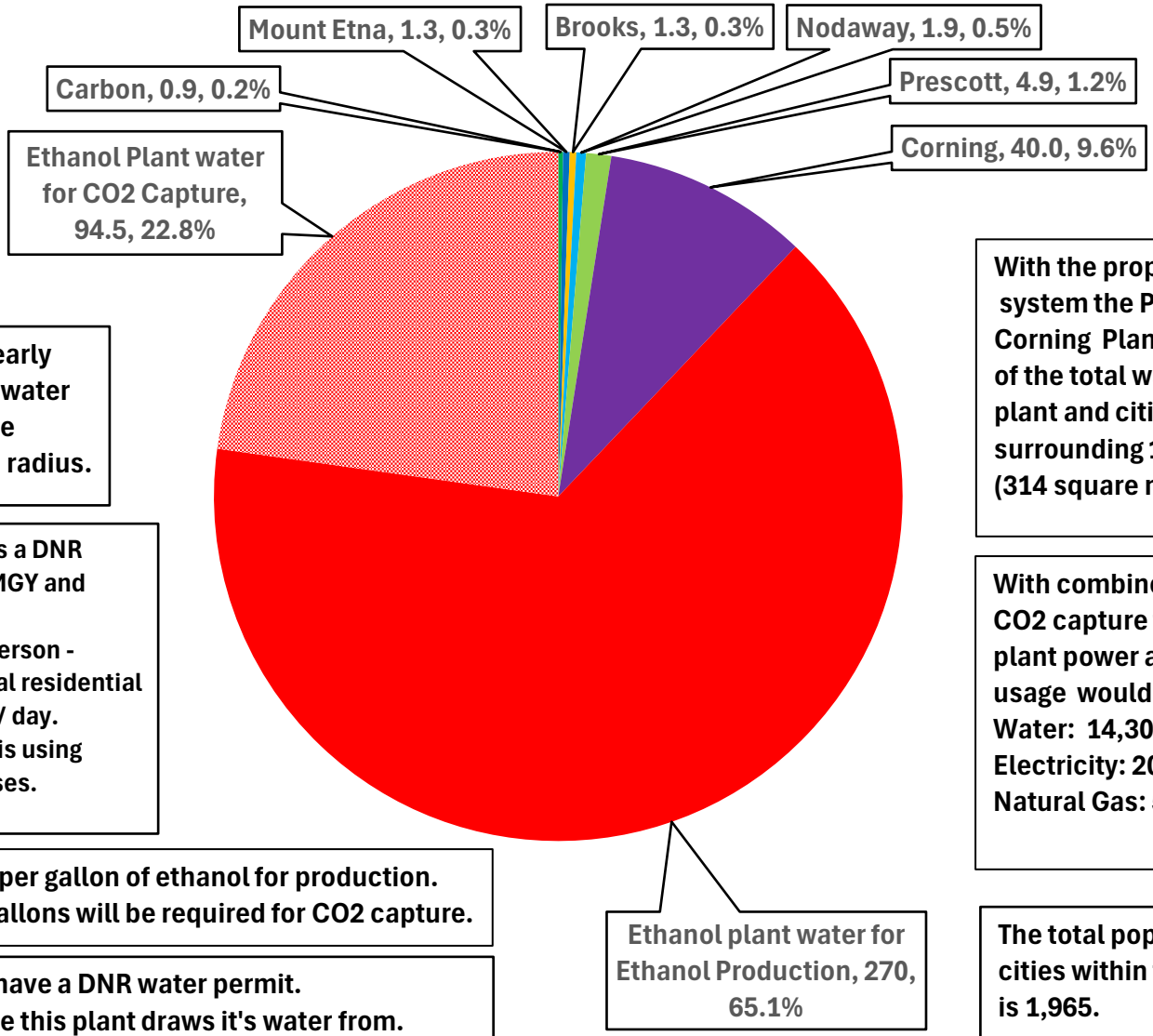
***Ethanol Production Capacity of Plant - MGY**	**90**
Factor: Water required to cool and compress the CO_2 for capture - MGY Water/ MGY Ethanol	1.05
Calculate additional water required for CO_2 Capture - MGY	94.5
Calculate ratio of gallons of water/ gallons of Ethanol	3.0
Total water requirement of towns and Ethanol plant - MGY	414.7
Total water requirement of towns - MGY	10.2
Total water requirement for ethanol plant - MGY	364.5
Ratio of ethanol plant water use vs. surrounding area	35.58
Percentage of ethanol plant usage of total water usage	87.9%
Total Population within the 10 mile radius	1,965

#19 POET Biorefining - Corning 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	10,568
Equivalent # of people ethanol plant water use w/ CO2 capture	**14,266**
Electricity Use	
Electricity to produce Ethanol - kWh/ gallon EtOH for production	0.6
Total Electricity used to produce ethanol - kWh	54,000,000
Electrical use to capture CO2 - kWh/ gallon EtOH	0.377
Total Electricity used to capture CO2 - kWh	33,930,000
Total electricity to produce ethanol and capture CO2 - kWh	8.793E+07
Typical electrical use/ residence - kWh/year	10,476.0
Equivalent number of residences	8,393.5
Number of people / residence	2.4
Equivalent number of people	**20,144**
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	2.340E+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	24,375
Number of people / residence	2.4
Equivalent number of people	**58,500**
* Ethanol Capacity per Iowa Renewable Fuels Association	** Water usage per the greater of DNR WACOP Permit or 3 times ethanol capacity.

#19 POET Biorefining Ethanol Plant (90 MGY) near Corning

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:
Carbon
Mount Etna
Brooks
Nodaway
Prescott

The plant will use nearly nine times as much water as all the cities in the surrounding 10 mile radius.

The city of Corning has a DNR water permit for 500 MGY and a population of 1,564.
This is 652 gal./day/ person - over 9 times the typical residential water usage of 70 gal./ day.
It is assumed the city is using water for other purposes.

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

This plant does not have a DNR water permit.
It is not known where this plant draws it's water from.
This water level in this area has been stable since 2015

With the proposed CO_2 capture system the POET Biorefining Corning Plant will use 88% 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: 14,300 people.
Electricity: 20,100 People.
Natural Gas: 58,500 People

The total population of the cities within the 10 mile radius is 1,965.