#27 POET Biorefining Iowa Falls 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 Iowa Falls, Iowa			-	-		
	POET Biorefining Iowa Falls Plant		525.0	347.8		Without CO_2 capture water requirement
	Combined Towns All Water Usage		154.1	154.1		City residential use assumes 70 gal./person/day
1	Owasa	34	0.9	0.9		Water usage too small to require a permit
2	Bradford	50	1.3	1.3		Water usage too small to require a permit
3	Popejoy	77	2.0	2.0		Water usage too small to require a permit
4	Alden	763	19.5	19.5		
5	Iowa Falls	5,106	130.5	130.5		
	Percentage of ethanol plant usage of total water usage	6030	77.3%	69.3%		
Conclusion: Without CO2 Capture						
	This ethanol plant consumes 69% 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 Iowa Falls, Iowa		-	-	-	-	City residential use assumes 70 gal./person/day
1	Owasa	34	0.9	0.9	0.1%	Water usage too small to require a permit
2	Bradford	50	1.3	1.3	0.2%	Water usage too small to require a permit
3	Popejoy	77	2.0	2.0	0.3%	Water usage too small to require a permit
4	Alden	763	19.5	19.5	3.1%	
5	Iowa Falls	5106	130.5	130.5	21.1%	
6	Ethanol plant water for Ethanol Production		525	347.8	56.1%	Without CO2 Capture water requirement
7	Ethanol Plant water for CO_2 Capture		117.6	117.6	19.0%	Additional CO_2 Capture water requirement
	Total Plant and Towns	6,030	796.7	619.4	100.0%	
	Percentage of ethanol plant usage of total water usage		80.7%	75.1%		

Conclusion: With CO2 Capture

This ethanol plant consumes 75% of the water used by the cities and plant within the surrounding 10 mile radius (314 square miles)

***Ethanol Production Capacity of Plant - MGY**	**112**
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	117.6
Calculate ratio of gallons of water/ gallons of Ethanol	3.1
Total water requirement of towns and Ethanol plant - MGY	619.4
Total water requirement of towns - MGY	154.1
Total water requirement for ethanol plant - MGY	465.4
Ratio of ethanol plant water use vs. surrounding area	3.02
Percentage of ethanol plant usage of total water usage	75.1%
Total Population within the 10 mile radius	6,030

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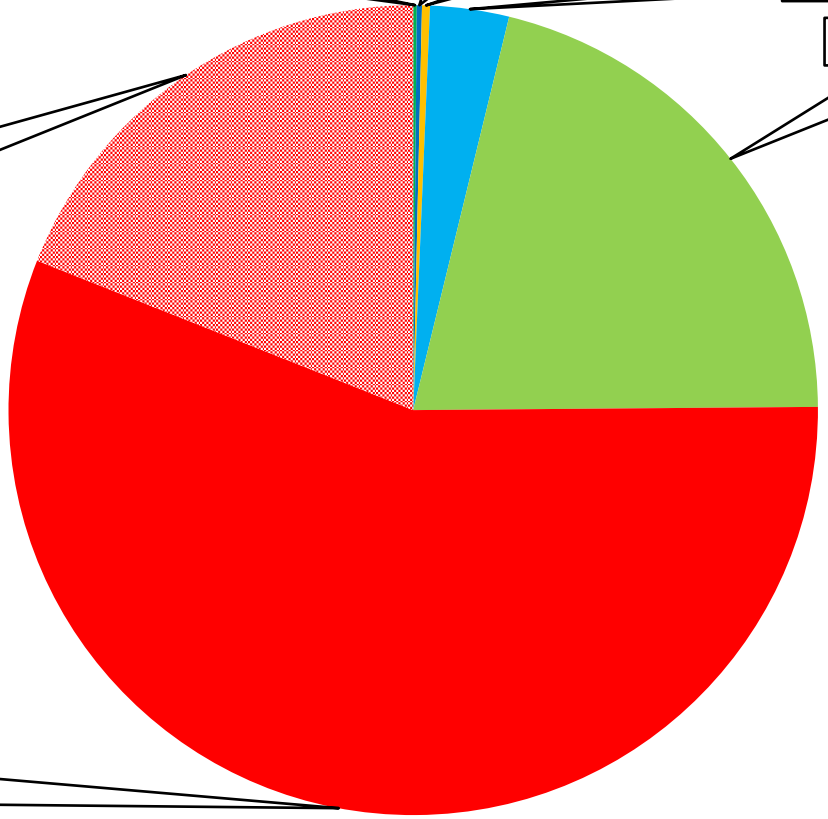
Water Use	
Typical water use per person per day - Gallons/ person/ day	70
Equivalent # of people ethanol plant water use w/o CO2 capture	13,611
Equivalent # of people ethanol plant water use w/ CO2 capture	**18,213**
Electricity Use	
Electricity to produce Ethanol - kWh/ gallon EtOH for production	0.6
Total Electricity used to produce ethanol - kWh	67,200,000
Electrical use to capture CO2 - kWh/ gallon EtOH	0.377
Total Electricity used to capture CO2 - kWh	42,224,000
Total electricity to produce ethanol and capture CO2 - kWh	1.094E+08
Typical electrical use/ residence - kWh/year	10,476.0
Equivalent number of residences	10,445.2
Number of people / residence	2.4
Equivalent number of people	**25,068**
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	2.912E+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	30,333
Number of people / residence	2.4
Equivalent number of people	**72,800**
* Ethanol Capacity per Iowa Renewable Fuels Association	** Water usage per the greater of DNR WACOP Permit or 3 times ethanol capacity.

#27 POET Biorefining Ethanol Plant (112 MGY) near Iowa Falls

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:
Owasa
Bradford
Popejoy

With the proposed CO_2 capture system the POET Biorefining Iowa Falls Plant will use 75% of the total water used by the plant and cities within the surrounding 10 mile radius. (314 square miles)

Iowa Falls reported 2023 water usage of 332 MGY and a population of 5,106. This is 178 gal./day/ person - about 2.5 times the typical residential water usage of 70 gal./ day.

With combined production and CO2 capture the ethanol plant power and 2023 water usage would be equivalent to:
Water: 18,200 people.
Electricity: 25,100 People.
Natural Gas: 72,800 People

3.1 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 Jordan aquifer. This water level in this area is down as much as 30 feet since 2015

This plant uses 3 times as much water as all the surrounding cities within a 10 mile radius.

The total population of the cities within the 10 mile radius is 6,030.