

#10 Homeland Energy Solution - Ethanol Plant Energy and Water Usage vs. Cities with in a 10 mi. radius

Ethanol Plant without CO ₂ Capture						
No.	Ethanol Plant/ Town	Population	**Water Permit Value MGY	**2023 Water Usage MGY		Comments
Ethanol Plant - Near New Hampton/ Lawler Iowa						
	Homeland Energy Solution - New Hampton plant		681.2	585.0		Without CO ₂ capture water requirement
	Combined Towns All Water Usage		136.0	136.0		City residential use assumes 70 gal./person/day
1	Jackson Jct.	37	0.9	0.9		Water usage too small to require a permit
2	Alpha	50	1.3	1.3		Water usage too small to require a permit
3	Jerico	50	1.3	1.3		Water usage too small to require a permit
4	Waucoma	299	7.6	7.6		
5	Lawler	406	10.4	10.4		
6	Fredericksburg	987	25.2	25.2		
7	New Hampton	3,494	89.3	89.3		
	Percentage of ethanol plant usage of total water usage	5,323	83.4%	81.1%		
Conclusion: Without CO₂ Capture						
This ethanol plant consumes 81% of the water used by the cities and plant within the surrounding 10 mile radius (314 square miles).						

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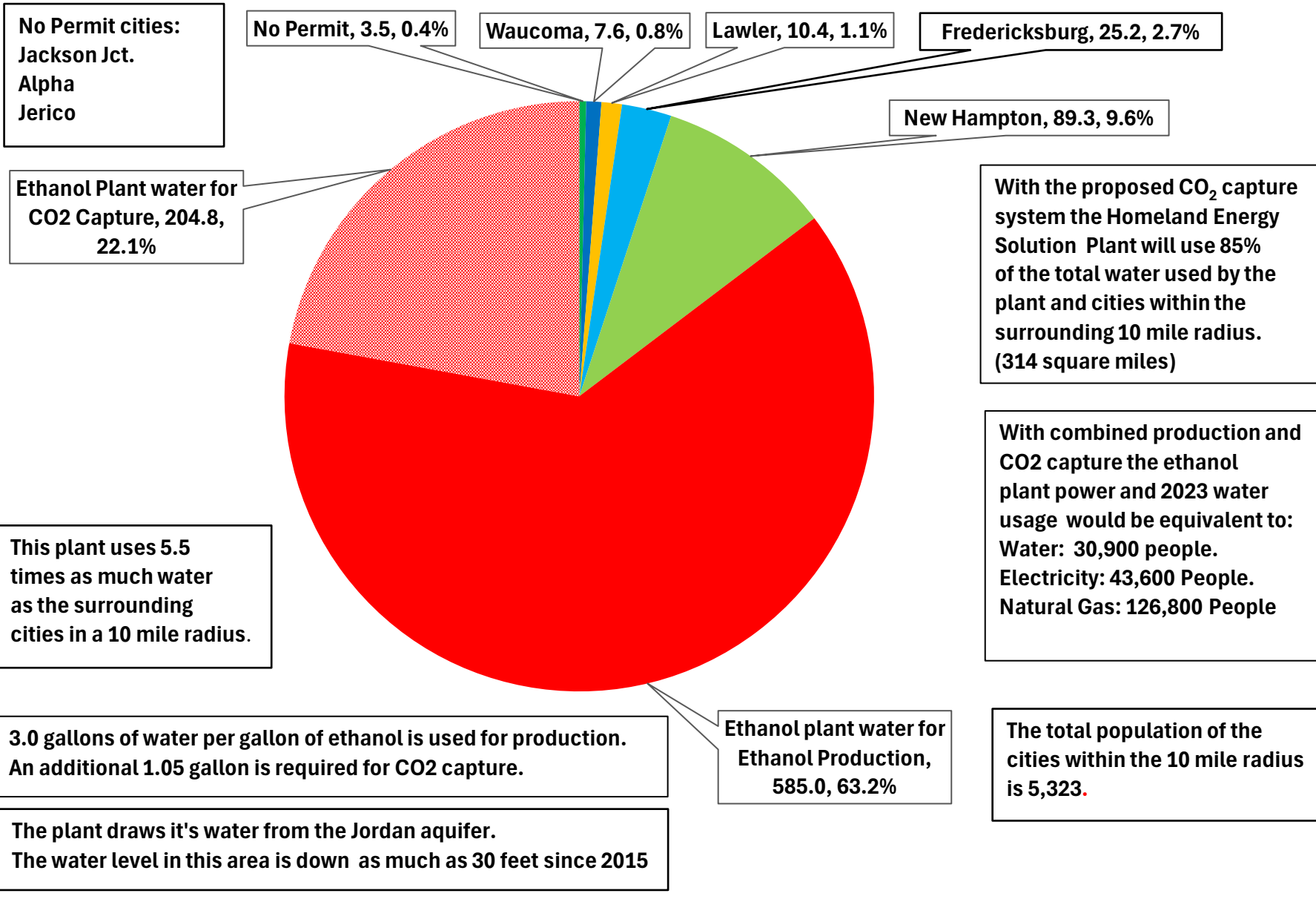
Ethanol Plant with CO ₂ Capture						
No.	Ethanol Plant/ Town	Population	**Water Permit Value MGY	**2023 Water Usage MGY	2023 Water Usage % of Total	Comments
Ethanol Plant - Near New Hampton/ Lawler Iowa		-	-	-	-	City residential use assumes 70 gal./person/day
1	Jackson Jct.	37	0.9	0.9		Water usage too small to require a permit
2	Alpha	50	1.3	1.3		Water usage too small to require a permit
3	Jerico	50	1.3	1.3		Water usage too small to require a permit
	No Permit	137	3.5	3.5	0.4%	
4	Waucoma	299	7.6	7.6	0.8%	
5	Lawler	406	10.4	10.4	1.1%	
6	Fredericksburg	987	25.2	25.2	2.7%	
7	New Hampton	3494	89.3	89.3	9.6%	
8	Ethanol plant water for Ethanol Production		681.2	585.0	63.2%	Without CO ₂ Capture water requirement
9	Ethanol Plant water for CO ₂ Capture		204.8	204.8	22.1%	Additional CO ₂ Capture water requirement
	Total Plant and Towns	5,323	1,022.0	925.8	100.0%	
	Percentage of ethanol plant usage of total water usage		86.7%	85.3%		
Conclusion: With CO₂ Capture						
This ethanol plant consumes 85% of the water used by the cities and plant within the surrounding 10 mile radius (314 square miles)						
*Ethanol Production Capacity of Plant - MGY		195				
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		204.75				
Calculate ratio of gallons of water/ gallons of Ethanol		3.0				
Total water requirement of towns and Ethanol plant - MGY		929.3				
Total water requirement of towns - MGY		139.5				
Total water requirement for ethanol plant - MGY		789.8				
Ratio of ethanol plant water use vs. surrounding area		5.66				
Percentage of ethanol plant usage of total water usage		85.0%				
Total Population within the 10 mile radius		5,323				

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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	22,896				
Equivalent # of people ethanol plant water use w/ CO2 capture	30,910				
Electricity Use					
Electricity to produce Ethanol - kWh/ gallon EtOH for production	0.6				
Total Electricity used to produce ethanol - kWh	117,000,000				
Electrical use to capture CO2 - kWh/ gallon EtOH	0.377				
Total Electricity used to capture CO2 - kWh	73,515,000				
Total electricity to produce ethanol and capture CO2 - kWh	1.905E+08				
Typical electrical use/ residence - kWh/year	10,476.0				
Equivalent number of residences	18,185.9				
Number of people / residence	2.4				
Equivalent number of people	43,646				
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	5.070E+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	52,813				
Number of people / residence	2.4				
Equivalent number of people	126,750				
* Ethanol Capacity per Iowa Renewable Fuels Association		** Water usage per the greater of DNR WACOP Permit or 3 times ethanol capacity.			

#10 Homeland Energy Solutions Ethanol Plant (195 MGY) near New Hampton/ Lawler

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:
Jackson Jct.
Alpha
Jerico

Ethanol Plant water for CO2 Capture, 204.8, 22.1%

This plant uses 5.5 times as much water as the surrounding cities in 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 Jordan aquifer. The water level in this area is down as much as 30 feet since 2015

Ethanol plant water for Ethanol Production, 585.0, 63.2%

With the proposed CO₂ capture system the Homeland Energy Solution Plant will use 85% 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: 30,900 people.
Electricity: 43,600 People.
Natural Gas: 126,800 People**

The total population of the cities within the 10 mile radius is 5,323.