

#13 Lincolnway Energy LLC. - Nevada 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 Nevada, Iowa						
	Lincolnway Energy LLC. Nevada Plant		270	270		Without CO ₂ capture water requirement
	Combined Towns All Water Usage		2079.8	2079.8		City residential use assumes 70 gal./person/day
1	Fernald	50	1.3	1.3		Water usage too small to require a permit
2	Iowa Center	50	1.3	1.3		Water usage too small to require a permit
3	Kelley	304	7.8	7.8		Water usage too small to require a permit
4	Cambridge	827	21.1	21.1		
5	Gilbert	1,211	30.9	30.9		
6	Roland	1,362	34.8	34.8		
7	Huxley	4,244	108.4	108.4		
8	Nevada	6,925	176.9	176.9		
9	Ames	66,427	1697.2	1697.2		
	Percentage of ethanol plant usage of total water usage	81,400	11.5%	11.5%		
Conclusion: Without CO₂ Capture						
This ethanol plant consumes 11% of the water used by the cities and plant within the surrounding 10 mile radius (314 square miles).						

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No.	Ethanol Plant/ Town	Population	**Water Permit Value MGY	**2023 Water Usage MGY	2023 Water Usage % of Total	Comments
Ethanol Plant - Near Nevada, Iowa		-	-	-	-	City residential use assumes 70 gal./person/day
1	Fernald	50	1.3	1.3		Water usage too small to require a permit
2	Iowa Center	50	1.3	1.3		Water usage too small to require a permit
3	Kelley	304	7.8	7.8		Water usage too small to require a permit
	No Permit	404	10.3	10.3	0.4%	
4	Cambridge	827	21.1	21.1	0.9%	
5	Gilbert	1211	30.9	30.9	1.3%	
6	Roland	1362	34.8	34.8	1.4%	
7	Huxley	4244	108.4	108.4	4.4%	
8	Nevada	6925	176.9	176.9	7.2%	
9	Ames	66427	1697.2	1697.2	69.4%	
10	Ethanol plant water for Ethanol Production		270	270	11.0%	Without CO ₂ Capture water requirement
11	Ethanol Plant water for CO ₂ Capture		94.5	94.5	3.9%	Additional CO ₂ Capture water requirement
	Total Plant and Towns	81,400	2444.3	2444.3	100.0%	
	Percentage of ethanol plant usage of total water usage		14.9%	14.9%		
Conclusion: With CO₂ Capture						
This ethanol plant consumes 15% 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 CO₂ for capture - MGY Water/ MGY Ethanol		1.05				
Calculate additional water required for CO₂ Capture - MGY		94.5				
Calculate ratio of gallons of water/ gallons of Ethanol		3.0				
Total water requirement of towns and Ethanol plant - MGY		2454.6				
Total water requirement of towns - MGY		2090.1				
Total water requirement for ethanol plant - MGY		364.5				
Ratio of ethanol plant water use vs. surrounding area		0.17				
Percentage of ethanol plant usage of total water usage		14.8%				
Total Population within the 10 mile radius		81,400				

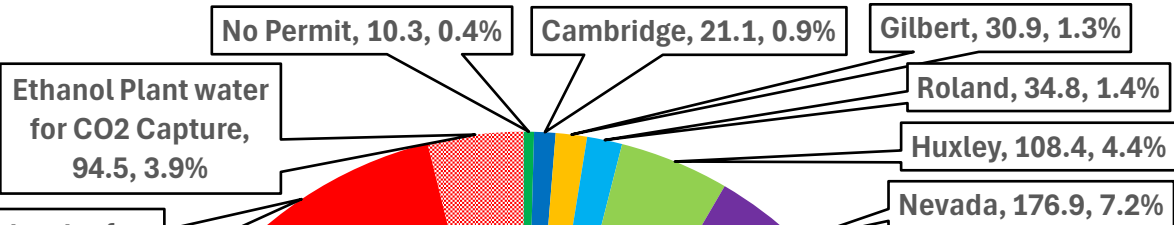
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Water Use					
Typical water use per person per day - Gallons/ person/ day	70				
Equivalent # of people ethanol plant water use w/o CO2 capture	10,568				
Equivalent # of people ethanol plant water use w/ CO2 capture	14,266				
Electricity Use					
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.			

#13 Lincolnway Energy LLC. Ethanol Plant (90 MGY) near Nevada

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:
Fernald
Iowa Center
Kelly



Ethanol plant water for Ethanol Production, 270, 11.0%

With the proposed CO₂ capture system the Lincolnway Energy Plant will use 15% 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 81,400.

The city of Nevada reported 2023 water usage of 643 MGY and a population of 6,925. This is 254 gal. per person/ day - about 4 times typical residential water

Ames has a water permit of 3.8 billion gallons/ year. And used 2.5 billion. This large water usage overshadows any other usage.

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

The plant draws it's water from an alluvial water source.