Summit ethanol plant water usage

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Source of values used for analysis

1 Affected area

This analysis will use a circle with a radius of 10 miles around each ethanol plant as the area affected by ethanol plant water withdrawal.

2 City populations within the affected area

This analysis will use the Iowa DOT 2023-2024 road map for the population of Iowa cities and towns.

If the town is too small to show a population on the Iowa map the analysis will assume a population of 50.

The analysis will use google search to obtain the population of cities in Minnesota and South Dakota.

3 Ethanol plant ethanol production

This analysis will use the Iowa Renewable fuels Association (IRFA) reported plant capacity as shown in their website as of March 2024.

Source of values used for analysis

4 Water use for cities within a 10-mile radius of an ethanol plant

Several cities in Iowa show very high DNR reported 2023 usage values, up to nine times normal personal water use values and are providing water for other uses.

It is known that some cities are providing water to ethanol plants which would avoid the DNR oversight for an ethanol plant to get a water permit.

This analysis will not use the DNR WACOP 2023 reported values for water usage for cities but will use a value of 70 gallons per person per day to calculate equivalent personal water use.

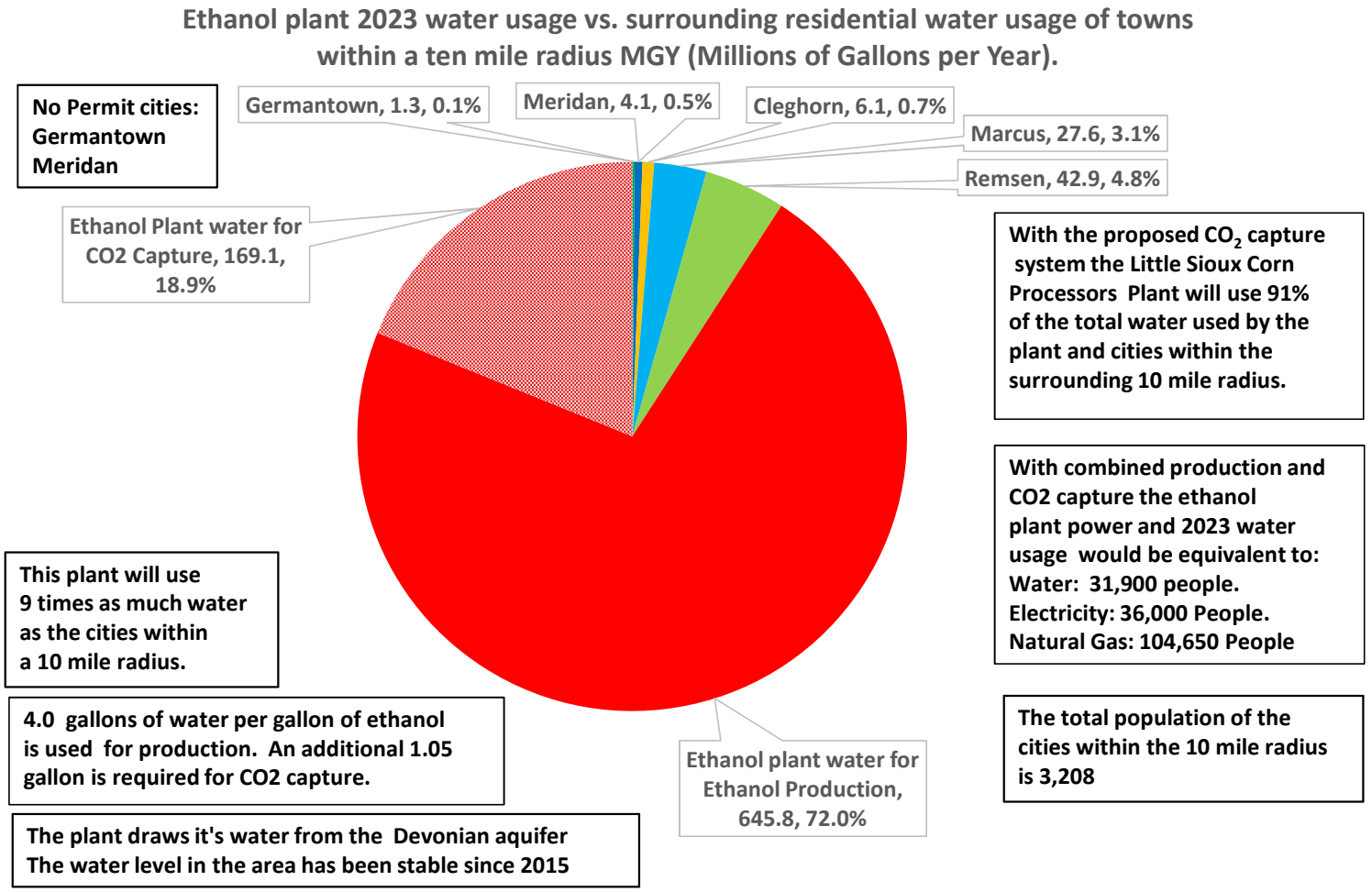
5 Water use for ethanol production

This analysis will use the greater of the DNR WACOP 2023 water use or 3 times the IRFA reported ethanol capacity of the plant.

6 Water use for CO_2 capture

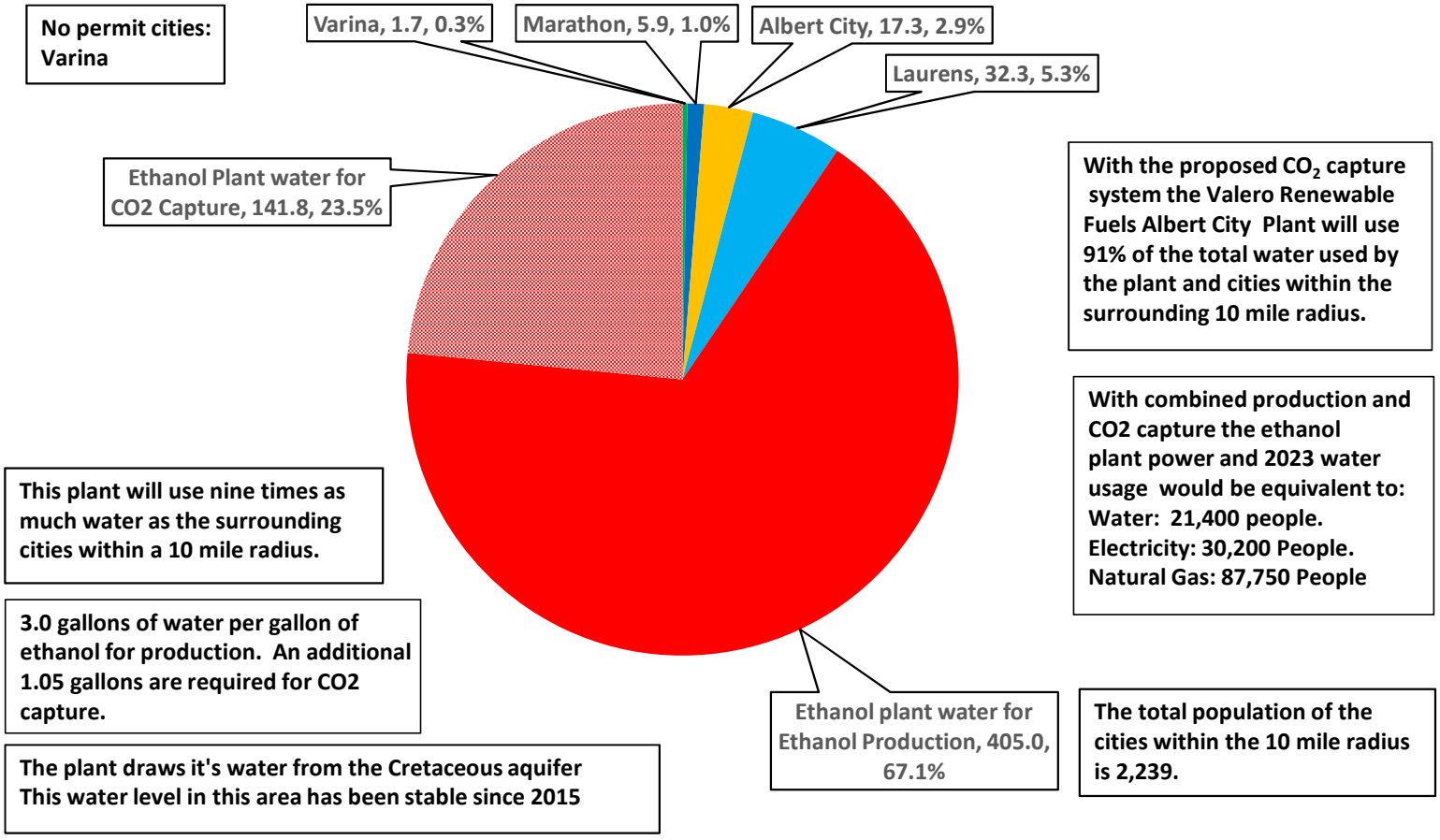
This analysis will use a ratio of 1.05 gallon of water per gallon of ethanol as determined from the Illinois ISGS Circular 595 published in 2018.

#4 Little Sioux Corn Processors Ethanol Plant (161 MGY) near Marcus



#14 Valero Renewable Fuels Ethanol Plant (135 MGY) near Albert City

Ethanol plant 2023 water usage vs. surrounding residential water usage of towns within a ten mile radius MGY (Millions of Gallons per Year).



With the proposed CO_2 capture system the Valero Renewable Fuels Albert City Plant will use 91% of the total water used by the plant and cities within the surrounding 10 mile radius.

With combined production and CO2 capture the ethanol plant power and 2023 water usage would be equivalent to:
Water: 21,400 people.
Electricity: 30,200 People.
Natural Gas: 87,750 People

This plant will use nine times as much water as the surrounding cities within a 10 mile radius.

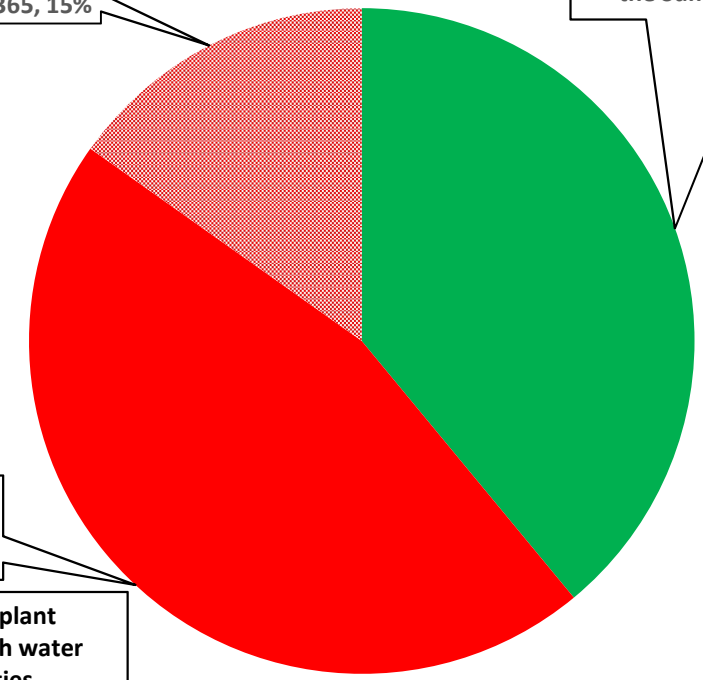
3.0 gallons of water per gallon of ethanol for production. An additional 1.05 gallons are required for CO2 capture.

The plant draws it's water from the Cretaceous aquifer
This water level in this area has been stable since 2015

The total population of the cities within the 10 mile radius is 2,239.

2023 Water and Energy usage of the 31 Summit ethanol plants

Summit Ethanol plants 2023 water usage vs. surrounding usage of towns within a ten mile radius MGY (Millions of Gallons per Year).



Ethanol plant water for CO2 capture, 3,365, 15%

Total water used by the 190 cities on the Summit pipeline, 8,643, 39%

Ethanol plant water for ethanol production, 10,151, 46%

Total ethanol plant water usage with CO2 capture is over 13.5 billion gallons.

With the proposed CO_2 capture system the 31 Summit ethanol plants will use 61% of the total water used by the plants and cities within the surrounding 31 10 mile radius areas. a total of 9734 square miles.

With combined production and CO_2 capture the ethanol plant power and 2023 water usage would be equivalent to:
Water: 529,000 people.
Electricity: 717,000 people.
Natural Gas: 2,083,000 people
The population of the state of Iowa is 3,200,000 people.

On average each Summit plant will use 1.5 times as much water as all the surrounding cities.

The total population of the 190 cities within the 10 mile radius is 338,286.

3.2 Gallons of water per gallon of ethanol for production.
1.05 gallon of water/ gallon ethanol for CO2 capture.

Sampling for alluvial vs. aquifer water source

					Alluvial Samples		Aquifer Samples		Total	Sampling	% by Usage		Assumed % for analysis	
Iowa DNR WACOP Category	2022 DNR Reported usage MGY	2022 DNR usage corrected for city water usage MGY	Total Number of WACOP Permits	Number sampled	Number of samples	2022 Usage MGY	Number of samples	2022 Usage MGY	Alluvial & Aquifer MGY	% of total sampled by water usage	Alluvial	Aquifer	Alluvial	Aquifer
Ethanol Production	7,653	13,500	33	32	5	701	27	6,952	7,653	100.0%	9.2%	90.8%	10%	90%
Heating/ Cooling	7,669	7,669	111	20	6	1,010	14	2,085	3,095	40.4%	32.6%	67.4%	30%	70%
Animal Feeding Operation	4,410	4,410	150	20	5	938	15	388	1,326	30.1%	70.7%	29.3%	60%	40%
Industrial/ Commercial	95,686	95,686	131	25	9	14,689	16	10,274	24,963	26.1%	58.8%	41.2%	60%	40%
Public Water System	157,251	151,404	657	35	16	85,467	19	40,476	125,942	80.1%	67.9%	32.1%	65%	35%
Other[1]	511	511	25	12	4	2,819	8	833	3,652	714.7%	77.2%	22.8%	75%	25%
Irrigation - All[2]	37,571	37,571	1554	20	15	1,053	5	257	1,310	3.5%	80.4%	19.6%	80%	20%
Recreational	11,994	11,994	116	12	9	3,861	3	43	3,904	32.5%	98.9%	1.1%	95%	5%
Power Generation[3]	491,720	491,720	20	20		487,076		4,644	491,720	100.0%	99.1%	0.9%	99%	1%
Quarry	29,376	29,376	325	30	29	15,918	1	14	15,933	54.2%	99.9%	0.1%	99%	1%

1. The DNR report showed a value of 511 MGY total, the sum of the 12 samples was 3,652 MGY.
2. Alluvial aquifers were considered as alluvial
3. Some power plants had both alluvial and aquifer sources
4. The DNR 2022 water report did not include 218 water permits for Golf Course/ Country Club water usage.

Note: The Cargill Inc. plant at Eddyville produces 1,4-butanediol (BDO), not ethanol.

2022 Iowa percent alluvial and bedrock aquifer water source by categories