APPENDIX

ATTACHMENT A: DNR initial decision summary for Lawler Carbon Capture

IOWA DEPARTMENT OF NATURAL RESOURCES
WATER USE PERMIT SUMMARY REPORT

Applicant: Lawler Scs Capture LLC

Application Log No.: 32,563

The applicant, Lawler Scs Capture, LLC, Iowa DNR Log No. 32,563, requests a permit authorizing withdrawal of water from one new Devonian Limestone well, about 380 feet deep, located on land generally described as the NW ¼ of the SE ¼ of Section 01, T95N, R12W, Chickasaw County, Iowa, in the maximum quantity of 55.9 million gallons per year at a maximum rate of 100 gallons per minute throughout each year for carbon capture-related purposes on said land.

The well is in proximity to the Homeland Energy ethanol production plant.

1. The proposed source of water is located in the Devonian Limestone, geographically about 6 miles generally east of the City of New Hampton. The Devonian aquifer is sometimes used in this locality for public and private water supply, and is quite productive with substantial local variations.

2. The proposed source of water is in the vicinity of the village of Lawler, and 2000 feet west of the Simpson Creek drainage, which flows in a southerly to easterly direction east of the applicant's land. The drainage area of the Simpson Creek catchment just downstream of the land in question is about 14.6 square miles. Simpson Creek hence (eventually) drains into the Turkey River. The water in question is to be used for issues related to carbon capture, ancillary related to ethanol production uses. IDNR anticipates no substantial impacts on water availability in the aquifer as a result of the Applicant's proposed withdrawal.

3. Based upon the previous pump test there appears to be sufficient water for the Homeland Energy usage and also for the existing City of New Hampton municipal use.

4. The nearest private well, as discussed above, is located approximately 5100 feet east-northeast of the site. Withdrawals made at this distance and at the magnitude and rate requested by the Applicant are likely to result in some minor degree of interference (at the most) with this private well. It is further likely that any other private water wells

associated with these dwellings identified with this application will not be adversely affected by the proposed withdrawals, to a certain degree (see analysis above). Such drawdown effects as have been discussed do not preclude a recommendation to grant this permit. In any event, the interests of individuals using water for domestic purposes, as well as those persons benefiting from the permits mentioned above, are amply protected, in the event of substantial injury, pursuant to Section 455B.271, Code of Iowa.

5. According to Departmental records, the nearest neighboring water user requiring the diversion of water in sufficiently large proportions to require a water use permit and utilizing a Cambrian Jordan sandstone water source (#1471) is more than 6 miles south and westward of the Applicant's withdrawal site. In this circumstance, substantial interference with this neighboring water user is highly unlikely. Other neighboring water uses requiring the diversion of water in sufficiently large proportions to require water use permits are located in excess of 7 miles from Applicant's well, and are withdrawing water for municipal use, and for material production. The City of Lawler is located only two miles eastward of this withdrawal site, this City utilizes a Devonian Cedar Valley Limestone aquifer source for their municipal wells. Based on the hydrology of the drainage basin system, and the relative elevations and distances between the withdrawal sites, and the lack of any reported or documented usage conflicts from this operation or any other operation in this area, the Department anticipates no adverse impacts resulting from the Applicant's proposed use of water.

6. Any permit issued pursuant to this application should not be construed as an authorization to discharge water into the Simpson Creek drainage, or ultimately to the Turkey River itself, or to any other waters or lands. An NPDES Permit authorizing such discharges must first be obtained from the Department.

7. The ability and intent of the applicant to devote a reasonable amount of water to a beneficial use seem evident. There is no evidence that the use of water pursuant to a permit granted in accordance with the conclusions contained herein will constitute a waste of the water resources of the State, will be incompatible with the state comprehensive plan for water resources, will impair the effect of pollution control laws of this State or the navigability of and navigable watercourse, or will be detrimental to the public interest or to the interests of property owners with prior or superior rights who might be affected.

THEREFORE:

The requested use of water conforms to the relevant criteria in Division III, Part 4, Chapter 455B, Code of Iowa and Chapter 52 of Part 567, Iowa Administrative Code. No adverse effect upon other water users is foreseen at this time. Following publication of notice and subject to revisions in response to comments that may be submitted, the attached draft permit should be issued for a period of ten years.

April 25, 2023

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Water Supply Engineering Section

ATTACHMENT B: DNR initial decision summary for Goldfield Carbon Capture

IOWA DEPARTMENT OF NATURAL RESOURCES
WATER USE PERMIT SUMMARY REPORT

Applicant: Goldfield Scs Capture LLC

Application Log No.: 32,814

The applicant, Goldfield Scs Capture, LLC, Iowa DNR Log No. 32,814, requests a permit authorizing withdrawal of water from one new Mississippian Limestone well, about 4080 feet deep, located on land generally described as the SE ¼ of the SE ¼ of Section 34, T92N, R26W, Wright County, Iowa, in the maximum quantity of 27.6 million gallons per year at a maximum rate of 55 gallons per minute throughout each year for carbon capture-related purposes on said land.

The well is in proximity to the Corn LP ethanol production plant.

1. The proposed source of water is located in the Mississippian Limestone, geographically about 1/2 miles generally east of the City of Goldfield. The Mississippian aquifer is sometimes used in this locality for public and private water supply, and is quite productive with substantial local variations.

2. The facility, located near the intersection of State Highway 3 and County Road R26, near the east municipal limits of the City of Goldfield, in west-central Wright County, Iowa, about 4 miles north of the City of Eagle Grove, Iowa, and about 8 miles west of the City of Clarion, Iowa. The site is in an area surrounded by farm land to the east and municipal and industrial sites to the west.

3. The usage will withdraw water from the Merameciam Series in what is known as the subcrop area of the Mississippian aquifer, a 100 foot to a maximum of about 600 foot thick formation of limestone and sandstone defined by overlying and underlying confining bed strata that extends under most of central and southern Iowa. The subcrop area of the Mississippian aquifer usually a "tight" formation with generally low porosity is predominantly in an artesian condition, with primary recharge water obtained from water moving in a south and southwesterly direction from the outcrop area in west central and north central Iowa and in local areas from downward seepage through fractures and joints and along bedding planes in overlying strata.

4. For the Corn LP permit, their five production wells are located on a line along the north boundary of the plant site and are separated by a distance of about 500 to 750 feet. According to the Well Drawdown Test Reports, test pumping the production wells at or near rated capacity until the drawdown stabilized produced no detectable change in the static water level in adjacent wells. If water levels in the production wells remain at or near the levels obtained during the pumping tests, the aquifer should not be subject to significant depletion or experience an extended cone of depression, and withdrawals at the quantity and rate proposed by the Applicant should pose no material adverse effects on the nearby wells or on the environment in the area.

5. The nearest neighboring water user requiring the diversion of water in quantities greater than 25,000 gallons per day, thus requiring a water use permit, is the city of Goldfield, with two municipal wells finished in the Mississippian aquifer. These wells are located about 1/3 mile west of the Applicant's west production well site. Based on the pumping tests and that the Department has no record of well interference between local area Mississippian wells with similar and closer separation distances, it is not anticipated that this neighboring permitted water user will experience any detectable impacts to properly constructed wells resulting from this proposed use of water.

6. The next nearest neighboring water user requiring the diversion of water in sufficiently large proportions to require a water use permit is a recreational user located about 3/4 mile to the northwest of the Applicant's west production well. This well is reported to be in the shallow alluvial aquifer and would not be impacted by the Applicant's proposed use of water.

7. Nearby private wells are located from about 1/4 mile to about 1/2 mile to the west, north, and south of the Applicant's production wells. These wells are thought to be finished in the Mississippian aquifer. It is unlikely that the Applicant's withdrawals will have any significant impact on properly constructed neighboring wells located at this distance from the withdrawal sites. It is also unlikely that other persons living in the vicinity of the proposed withdrawal site and having wells in the same or deeper aquifer will experience any significant impacts from the withdrawals by the Applicant. In any event, the interests of individuals using water for domestic purposes, as well as those persons benefiting from the permits mentioned above, are amply protected, in the event of substantial injury, pursuant to Section 455B.271, Code of Iowa.

8. Any permit issued pursuant to this application should not be construed as an authorization to discharge water into the Boone River, or to any other waters or lands. An NPDES Permit authorizing such discharges must first be obtained from the Department.

9. The ability and intent of the applicant to devote a reasonable amount of water to a beneficial use seem evident. There is no evidence that the use of water pursuant to a permit granted in accordance with the conclusions contained herein will constitute a waste of the water resources of the State, will be incompatible with the state comprehensive plan for water resources, will impair the effect of pollution control laws of this State or the navigability of and navigable watercourse, or will be detrimental to the public interest or to the interests of property owners with prior or superior rights who might be affected.

THEREFORE:

The requested use of water conforms to the relevant criteria in Division III, Part 4, Chapter 455B, Code of Iowa and Chapter 52 of Part 567, Iowa Administrative Code. No adverse effect upon other water users is foreseen at this time. Following publication of notice and subject to revisions in response to comments that may be submitted, the attached draft permit should be issued for a period of ten years.

Sept. 06, 2023

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Water Supply Engineering Section

ATTACHMENT C: Summit Ethanol Plant 2023 Water Usage Spreadsheet

Summit Ethanol Plant 2023 Water, Electrical and Natural Gas Usage.

Summit No.	Plant Name	Nearest City	Ethanol Production Capacity* MGY	CO2 Production ***** millions of metric tonnes per year	Reported DNR Water Permit** MGY	Reported 2023 Water Usage ** MGY	Ratio Reported 2023 gal. water per gal. Ethanol	Estimated Required DNR Water Permit MGY	Estimated 2023 Water Usage MGY	Ratio Estimated 2023 gal. water per gal. Ethanol	Estimated Water Usage for CO2 capture *** 0.4 ratio MGY	Estimated Water Usage for CO2 capture **** 1.05 ratio MGY	Total 2023 Ethanol Plant and CO2 capture water usage 1.05 ratio MGY	Total Max DNR water permit and CO2 capture water usage MGY	Ratio 2023 permit gal. water/ gal. ethanol	Percent plant vs. city water usage %	Water Equivalent number of people equal to ethanol plant 2023 water usage with CO2 capture	Electrical Equivalent number of people equal to ethanol plant electrical usage with CO2 capture	Natural Gas Equivalent number of people equal to ethanol plant natural gas usage with CO2 capture	Population all cities within a 10 mile radius of the ethanol plant. Without duplicate cities in overlapping areas
1	Lakeview Plymouth Energy LLC.	Merrill	65	0.16	284.0	299.48	4.61	284.0	299.48	4.61	26.0	68.3	367.7	352.3	4.37	54%	14,400	14,500	42,300	12,402
2	Green Plains Inc. - Shenandoah	Shenandoah	80	0.20	92.0	32.67	0.41	240.0	240.00	3.00	32.0	84.0	324.0	324.0	3.00	66%	12,700	17,900	52,000	6,421
3	Quad County Corn Processors	Galva	34	0.09	315.0	209.16	6.15	315.0	209.16	6.15	13.6	35.7	244.9	350.7	9.26	67%	9,600	7,600	22,100	4,766
4	Little Sioux Corn Processors	Marcus	161	0.40	1036.1	645.77	4.01	1036.1	645.77	4.01	64.4	169.1	814.8	1205.2	6.44	91%	31,900	36,000	104,700	3,208
5	Green Plains Inc. - Superior	Superior	60	0.15	422.0	291.16	4.85	422.0	291.16	4.85	24.0	63.0	354.2	485.0	7.03	50%	13,900	13,400	39,000	13,874
6	Louis Dreyfus - Grand Junction	Grand Junction	125	0.31	630.7	354.57	2.84	630.7	375.00	3.00	50.0	131.3	506.3	762.0	5.05	78%	19,800	28,000	81,300	5,505
7	Corn LP	Goldfield	80	0.20	262.0	172.11	2.15	262.0	240.00	3.00	32.0	84.0	324.0	346.0	3.28	63%	12,700	17,900	52,000	7,567
8	Golden Grain Energy LLC.	Mason City	135	0.34	683.0	359.86	2.67	683.0	405.00	3.00	54.0	141.8	546.8	824.8	5.06	41%	21,400	30,200	87,800	30,398
9	Absolute Energy LLC.	St. Ansgar	130	0.33	842.7	341.04	2.62	842.7	390.00	3.00	52.0	136.5	526.5	979.2	6.48	79%	20,600	29,100	84,500	5,511
10	Homeland Energy Solution	New Hampton	195	0.49	681.2	424.50	2.18	681.2	585.00	3.00	78.0	204.8	789.8	886.0	3.49	85%	30,900	43,600	126,800	5,323
11	Pine Lake Corn Processors LLC.	Steamboat Rock	80	0.20	320.0	271.42	3.39	320.0	271.42	3.39	32.0	84.0	355.4	404.0	4.00	57%	13,900	17,900	52,000	10,436
12	Siouxland Energy Cooperatives	Sioux Center	65	0.16	425.0	0.00	0.00	425.0	195.00	3.00	26.0	68.3	263.3	493.3	6.54	37%	10,300	14,500	42,300	17,295
13	Lincolnway Energy LLC.	Nevada	90	0.23	27.0	0.00	0.00	270.0	270.00	3.00	36.0	94.5	364.5	364.5	3.00	15%	14,300	20,100	58,500	81,400
14	Valero Renewable Fuels - Albert City	Albert City	135	0.34	610.0	324.62	2.40	610.0	405.00	3.00	54.0	141.8	546.8	751.8	4.52	91%	21,400	30,200	87,800	2,239
15	POET Biorefining - Arthur	Arthur	132	0.33	761.0	375.59	2.85	761.0	396.00	3.00	52.8	138.6	534.6	899.6	5.77	63%	20,900	29,500	85,800	12,484
16	POET Biorefining - Ashton	Ashton	68	0.17	250.0	171.46	2.52	250.0	204.00	3.00	27.2	71.4	275.4	321.4	3.68	49%	10,800	15,200	44,200	11,351
17	Valero Renewable Fuels - Charles City	Charles City	140	0.35	No Permit	0.00	0.00	420.0	420.00	3.00	56.0	147.0	567.0	567.0	3.00	71%	22,200	31,300	91,000	8,998
18	POET Biorefining - Coon Rapids	Coon Rapids	65	0.16	237.4	149.37	2.30	237.4	195.00	3.00	26.0	68.3	263.3	305.7	3.65	83%	10,300	14,500	42,300	2,162
19	POET Biorefining - Corning	Corning	90	0.23	No Permit	0.00	0.00	270.0	270.00	3.00	36.0	94.5	364.5	364.5	3.00	88%	14,300	20,100	58,500	1,965
20	POET Biorefining - Emmetsburg	Emmetsburg	68	0.17	350.0	211.07	3.10	350.0	211.07	3.10	27.2	71.4	282.5	421.4	5.15	70%	11,100	15,200	44,200	4,826
21	POET Biorefining Fairbank	Fairbank	132	0.33	578.0	368.43	2.79	578.0	396.00	3.00	52.8	138.6	534.6	716.6	4.38	63%	20,900	29,500	85,800	12,039
22	Valero Renewable Fuels - Ft. Dodge	Fort Dodge	110	0.28	No Permit	0.00	0.00	330.0	330.00	3.00	44.0	115.5	445.5	445.5	3.00	40%	17,400	24,600	71,500	26,300
23	POET Biorefining - Gowrie	Gowrie	90	0.23	No Permit	0.00	0.00	270.0	270.00	3.00	36.0	94.5	364.5	364.5	3.00	83%	14,300	20,100	58,500	2,830
24	POET Biorefining - Hanlontown	Hanlontown	80	0.20	245.0	166.36	2.08	245.0	240.00	3.00	32.0	84.0	324.0	329.0	3.06	51%	12,700	17,900	52,000	12,062
25	Valero Renewable Fuels - Hartley	Hartley	140	0.35	570.0	389.23	2.78	570.0	420.00	3.00	56.0	147.0	567.0	717.0	4.07	82%	22,200	31,300	91,000	4,767
26	Poet Biorefining - Hudson S.D.	Hudson	80	0.20	No Permit	0.00	0.00	240.0	240.00	3.00	32.0	84.0	324.0	324.0	3.00	61%	12,700	17,900	52,000	7,940
27	POET Biorefining Iowa Falls	Iowa Falls	112	0.28	525.0	347.75	3.10	525.0	347.75	3.10	44.8	117.6	465.4	642.6	4.69	75%	18,200	25,100	72,800	6,030
28	POET Biorefining - Jewel	Jewel	90	0.23	No Permit	0.00	0.00	270.0	270.00	3.00	36.0	94.5	364.5	364.5	3.00	69%	14,300	20,100	58,500	6,533
29	Valero Renewable Fuels - Lakota	Lakota	110	0.28	0.0	239.58	2.18	330.0	330.00	3.00	44.0	115.5	445.5	445.5	3.00	88%	17,400	24,600	71,500	2,369
30	POET Biorefining - Menlo	Menlo	132	0.33	No Permit	0.00	0.00	396.0	396.00	3.00	52.8	138.6	534.6	534.6	3.00	82%	20,900	29,500	85,800	4,747
31	POET Biorefining Shell Rock	Shell Rock	131	0.33	578.0	368.43	2.81	578.0	393.00	3.00	52.4	137.6	530.6	715.6	4.41	57%	20,800	29,300	85,200	15,369
		Totals	3205	8.06	10,725	6,514		13,642	10,151		1,282	3,365	13,516	17,007		61%	**529,004**	**717,362**	**2,083,250**	**338,286**

* Per Iowa Renewable Fuels Association or company web page

** per DNR WACOP Permit Search

*** Ratio calculated from Trimeric Red Trail Energy Report 29 Nov 2019 — 0.4

**** Ratio calculated from the Illinois ISGS CO2 capture report. — 1.05

*****Ratio for tonnes CO2 produced per MG Ethanol — 2514

Weighted average 2023 gal. water/ gal. ethanol w/o CO2 capture					3.17
Assumed minimum ratio gal. water/ gal. ethanol					3.0
Assumed daily city water use/ person/ day - gallons					70
Minimum	33	3.00	237	195	3.00
Maximum	646	6.15	1036	646	6.15

w/ CO2 capture	4.22	Permit water/ gal. 5.31
	Average percent plant vs. city water usage	%/ total 66%
		2022 population of Iowa 3,201,000
36	245	
205	815	Equivalent people/ million gallon ethanol
Average	436	

Water******	Electrical	Natural Gas
158.5	223.8	650.0

******At 3 gallon water/ gal. ethanol

Original Route on Docket HLP-2021-0001

Added to Route on Docket HLP-2023-0004 on 19 June 2023

Added to IUB Docket HLP-2024-0001 - 0014 on 4 March 2024

Ethanol plants without a DNR water permit or no reported 2023 water usage

Ethanol plants operating at less than capacity or less than minimum water/ ethanol ratio

Entered Values

Don Johannsen
May 2024

Print Date: 6/3/2024

ATTACHMENT D: Application form for water withdrawal

Water Use Permit Application

www.iowadnr.gov/wateruse
https://programs.iowadnr.gov/wacop/

CASHIER'S USE ONLY
0975-542-WATR-PA-0570
NAME

This water use permit application form and associated attachment(s) are required to be filled and submitted to the Department to apply for a **new** water use permit, or **modify** an existing water use permit.

A water use permit is required for any entity that withdraws over 25,000 gallons in a 24-hour period during a calendar year. A $350 non-refundable fee is required for all new applications. A $350 fee also applies to existing permits wishing to modify their permit by adding a new source/well/intake, or increasing the limits placed on their withdrawal rates. For temporary, non-recurring uses of a one year period or less, apply for a water use registration in lieu of a permit.

Select one option below to indicate the type of water use application. Please contact the program with questions.

☐ $350.00 I wish to apply for a **new** water use permit. Fee is non-refundable.

****OR****

☐ $350.00 I wish to **modify** an existing water use permit by increasing current permitted area, annual allocation, withdrawal points, water sources, or rates.

My permit number is _____

- to add a new water source to your permit, go to Sections 3-5.
- to add a new withdrawal intake or well, go to Sections 3-5.
- to increase the total annual amount/rate of water withdrawn, go to Sections 3-5.
- to expand your water use and/or withdrawal area(s), go to Section 5.

****OR****

☐ No fee I wish to **modify** an existing water use permit by reducing the permitted area, annual allocation, withdrawal points, water sources, or rates.

My permit number is _____

- to remove sources, wells, and intakes from the permit go to Section 3
- to decrease your annual amount or rate of water withdrawn, go to Section 3 and 4.
- to decrease your water use and/or withdrawal area(s), go to Section 4

APPLY & PAY ONLINE	PAY BY CHECK or MONEY ORDER	PAY BY CREDIT CARD Over the phone
DNR accepts: • Visa, MasterCard, Discover, AmEx • ACH (Electronic Check) https://programs.iowadnr.gov/wacop/ Apply for a new or modified permit online and pay the fee at the end of the application process.	• Make check payable to Iowa Department of Natural Resources • Attach this application to your payment and • Mail application and fee to: **IOWA DNR** **WATER SUPPLY ENGINEERING** **502 E 9TH ST** **DES MOINES IA 50319-0034** • Check #: _____	**Email:** a copy of the application to Webmaster@dnr.iowa.gov with the subject line: Credit Card Payment for (Company Name) **OR** **Fax:** to 515-725-8201 Wait 20 minutes after sending then call **515-725-8200** to make the payment. Email completed application to wateruse@dnr.iowa.gov

DO NOT complete the entire form.

Complete only those sections needed for your use category and withdrawal source(s). After you have completed the appropriate sections, and attachments, sign the Certification at the end of the application.

1. Contact Information

This section includes contact information regarding the property owner and permit holder for this facility. The listed **permit holder** will receive all communications from the program, including annual fees, unless otherwise noted. Specifying which contact(s) receive the annual fee invoice and complete the annual water use report is required.

1a. Permit Holder

Receives annual fee invoice? ☐ Yes ☐ No Completes annual water use report? ☐ Yes ☐ No

Business Name _____

First Name _____ Last Name _____

Address 1 _____ Address 2 _____

City _____ State _____ Zip _____

E-mail _____ Primary Phone _____

Secondary Phone _____ Fax _____

1b. Property Owner (complete *only if* different than 1a. Permit Holder)

Receives annual fee invoice? ☐ Yes ☐ No Completes annual water use report? ☐ Yes ☐ No

Business Name _____

First Name _____ Last Name _____

Address 1 _____ Address 2 _____

City _____ State _____ Zip _____

E-mail _____ Primary Phone _____

Secondary Phone _____ Fax _____

1c. Authorized Representative (complete *only if* this entity is under contractual obligation to report/pay fee)

Receives annual fee invoice? ☐ Yes ☐ No Completes annual water use report? ☐ Yes ☐ No

Business Name _____

First Name _____ Last Name _____

Address 1 _____ Address 2 _____

City _____ State _____ Zip _____

E-mail _____ Primary Phone _____

Secondary Phone _____ Fax _____

2. Water Use Category

This section includes information on how this facility will use the water after being withdrawn. Select at least one of the options below that best indicates the major water use category requested for this facility. Fill in all relevant additional details regarding this specific type of facility. Where appropriate, include the identification number from other state and federal programs that apply to this facility.

☐ **Animal Feeding or Dairy Operation** AFO ID# _____ PWS ID# _____

Water used primarily for animal/livestock drinking water, facility and animal washing, or other use related to animals.

Type of facility: ☐ Poultry ☐ Swine ☐ Dairy ☐ Beef ☐ Other _____

☐ **Ethanol Production** PWS ID# _____

Water used primarily for the processing and production of ethanol fuel.

Type of facility: ☐ Dry mill ☐ Wet mill ☐ Other _____

☐ **Heating/Cooling**

Water used primarily for the heating and cooling of building(s), also called geothermal energy.

Type of facility: ☐ Pump and Reinjection ☐ Pump and Surface Discharge ☐ Other _____

☐ **Industrial/Commercial** PWS ID# _____

Water used primarily in the production of industrial and commercial goods, including agriculture and manufacturing materials.

Type of facility: ☐ Agricultural Industrial ☐ Manufacturing ☐ Other _____

☐ **Crop Irrigation** PWS ID# _____

Water used primarily for the irrigation of crops. Irrigation is allowed from April 1st through September 30th for corn and soybeans, and from April 1st through October 31st for all other specialty crops.
Irrigation on slopes over six percent requires a soil conservation plan attached with this application.

Type of crops: ☐ Corn and/or Soybeans ☐ Specialty Crops (type) _____

Total irrigated acres (mark area on attached map): _____

☐ **Golf Course/Country Club** PWS ID# _____

Water used primarily for the irrigation of turfgrass, water supply, and/or filling of pools, ponds, and reservoirs for a golf course or county club.

Irrigation of turfgrass = _____ % of total annual water use.

Are wells used for both public water and water use? ☐ Yes ☐ No

If yes, well name(s): _____

☐ **Power Generation** PWS ID# _____

Water used primarily in the generation of electricity.

Type of facility: ☐ Hydroelectric Dam ☐ Water to Steam ☐ Other _____

☐ **Public Water Supply** PWS ID# _____

Water used for a municipal water supply, a subdivision water supply, or any other system classified as a public water supply and used primarily for drinking water.

Type of facility: ☐ Municipal ☐ Rural Water System ☐ Subdivision ☐ Non-Community

☐ **Quarry Operation** PWS ID# _____

Water used primarily for water level management, washing, and other operation of a quarry or sand and gravel pit.

Type of facility: ☐ Limestone/Dolomite ☐ Sand and Gravel ☐ Sandstone ☐ Other _____

Water is used for: ☐ Water Level Management ☐ Washing Materials ☐ Other _____

Permit lifespan acres of quarry (mark area on attached map) _____ Dewatering to Elevation (ft) _____

Lowest geologic formation(s) mined/quarried from this operation _____

☐ **Recreational Water** PWS ID# _____

Water used primarily for recreation, including swimming pools, recreational lakes, ponds, wetlands, and water parks.

Type of facility: ☐ Wetland (Hunting) ☐ Lake/Pond/Stream (Hunting) ☐ Water Park ☐ Swimming Pool
☐ Casino Lake ☐ Lake/Pond/Stream (Non-Hunting) ☐ Other _____

3d. TOTAL ALLOCATION REQUEST FOR ALL SOURCES (Sum of all sources)

Total pumping rate, ALL SOURCES (gpm): _____

Annual water allocation requested, ALL SOURCES: _____ ☐ Million Gallons Per Year (mgy) *or*

☐ Acre-Feet Per Year (AFY)

4. Water Return/Discharge

This section applies to those facilities that return water at a specific location after use. Only complete if you discharge water back into a specific location.

Is a portion of this water returned to a specific location after use? ☐ Yes ☐ No

If "Yes", where is the water returned or discharged?

☐ Lake/Pond/Stream (identify on attached map)

☐ Wastewater System (Name)

NPDES ID# _____

☐ Injection Well (Well Name)

☐ Other (Specify) _____

5. Water Withdrawal and Use Site Locations

There are required attachments for all new applications, as well as all new sources/infrastructure that is added to an existing permit. Attach an aerial, topographic, or street map (site plan) that clearly displays the following information:

1. this facility's water use location boundaries
2. labeled point locations of all withdrawal sites (wells and intakes) for this facility
3. mark all known well locations within ¼-mile (1,320 ft.) of the facility's water use location boundaries
4. labeled point locations of discharge/return points, if needed, for this facility

Certification and Signature

I certify the above information is true and correct to the best of my knowledge and that I will provide any additional information to the department as requested. The Iowa Administrative Code states that water use permit applications must be approved or denied within 90 days. By signing this document, the applicant authorizes an extension in the event this application is incomplete or needs further analysis.

Signature: _____ Date: _____

Print Name: _____

☐ If this box is checked, the applicant declines an extension and understands that this application may be dropped and any applicable existing permit may be terminated.

☐ **Other** PWS ID# _____

Water use does not fit into any listed categories. Use is: _____

Additional details/description about your water use: _____

3. Water Sources

This section includes information regarding the type of sources of water withdrawn for this facility. Identify all unique sources of water to be used (if applying for a new permit), or added/removed (if modifying an existing permit) for this facility. Unique water sources can be isolated ponds, pits, reservoirs, aquifers, or streams. If there are multiple sources, start with the source with the greatest annual withdrawal as primary, then descending use as secondary and tertiary.

- Attach driller's logs, intake designs for all existing infrastructure (wells and intakes).
- For all planned wells and intakes, mark the anticipated construction date and depth.
- For all plugged wells, attach plugging well record for listed source.
- Attached driller's log well names and intake names should match the table below and attached map.
- Attach additional copies of this page if using more than three unique sources or four intakes/wells.

***3a.* Primary Water Source** ☐ Aquifer ☐ Lake/Pond/Res. ☐ Stream/River ☐ Quarry/Pit

Primary Source Name _____ Number of wells/intakes using this source _____

Well/Intake Name _____ Rate (gpm) _____ Const. Date _____ Depth (ft) _____

Well/Intake Name _____ Rate (gpm) _____ Const. Date _____ Depth (ft) _____

Well/Intake Name _____ Rate (gpm) _____ Const. Date _____ Depth (ft) _____

Well/Intake Name _____ Rate (gpm) _____ Const. Date _____ Depth (ft) _____

Total pumping rate from primary source (gpm) _____

Total annual amount requested from primary source _____ ☐ Million Gallons Per Year (mgy) *or* ☐ Acre-Feet Per Year (AFY)

***3b.* Secondary Water Source (*if needed*)** ☐ Aquifer ☐ Lake/Pond/Res. ☐ Stream/River ☐ Quarry/Pit

Secondary Source Name _____ Number of wells/intakes using this source _____

Well/Intake Name _____ Rate (gpm) _____ Const. Date _____ Depth (ft) _____

Well/Intake Name _____ Rate (gpm) _____ Const. Date _____ Depth (ft) _____

Well/Intake Name _____ Rate (gpm) _____ Const. Date _____ Depth (ft) _____

Total pumping rate from secondary source (gpm) _____

Total annual amount requested from secondary source _____ ☐ Million Gallons Per Year (mgy) *or* ☐ Acre-Feet Per Year (AFY)

***3c.* Tertiary Water Source (*if needed*)** ☐ Aquifer ☐ Lake/Pond/Res. ☐ Stream/River ☐ Quarry/Pit

Tertiary Source Name _____ Number of wells/intakes using this source _____

Well/Intake Name _____ Rate (gpm) _____ Const. Date _____ Depth (ft) _____

Well/Intake Name _____ Rate (gpm) _____ Const. Date _____ Depth (ft) _____

Well/Intake Name _____ Rate (gpm) _____ Const. Date _____ Depth (ft) _____

Well/Intake Name _____ Rate (gpm) _____ Const. Date _____ Depth (ft) _____

Total pumping rate from tertiary source (gpm) _____

Total annual amount requested from tertiary source _____ ☐ Million Gallons Per Year (mgy) *or* ☐ Acre-Feet Per Year (AFY)

ATTACHMENT E: Water usage charts for Lakeview Plymouth Energy, Merill

#1 Lakeview Plymouth Energy LLC. Merrill 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 Merrill Iowa			-	-		
	Lakeview Plymouth Energy LLC.		284.0	299.5		Without CO_2 capture water requirement
	Combined Towns All Water Usage		316.9	316.9		City residential use assumes 70 gal./person/day
1	Seney	50	1.3	1.3		Water usage too small to require a permit
2	Brunsville	129	3.3	3.3		Water usage too small to require a permit
3	Merrill	717	18.3	18.3		
4	Hinton	935	23.9	23.9		
5	Le Mars	10,571	270.1	270.1		
	Percentage of ethanol plant usage of total water usage	12,402	47.3%	48.6%		
Conclusion: Without CO2 Capture						
	This ethanol plant consumes 49% of the water used by the cities and plant within the surrounding 10 mile radius (314 square miles).					

#1 Lakeview Plymouth Energy LLC. Merrill Ethanol Plant Energy and Water Usage vs. Cities within a 10 mile radius

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 Merrill Iowa		-	-	-	-	
1	Seney	50	1.3	1.3		Water usage too small to require a permit
2	Brunsville	129	3.3	3.3		Water usage too small to require a permit
	No Permits	179	4.6	4.6	0.7%	
3	Merrill	717	18.3	18.3	2.7%	
4	Hinton	935	23.9	23.9	3.5%	
5	Le Mars	10571	270.1	270.1	39.5%	
9	Ethanol plant water for Ethanol Production		284	299.5	43.7%	Without CO2 Capture water requirement
10	Ethanol Plant water for CO_2 Capture		68.3	68.3	10.0%	Additional CO_2 Capture water requirement
	Total Plant and Towns	12,402	669.1	684.6	100.0%	
	Percentage of ethanol plant usage of total water usage		52.6%	53.7%		

Conclusion: With CO2 Capture

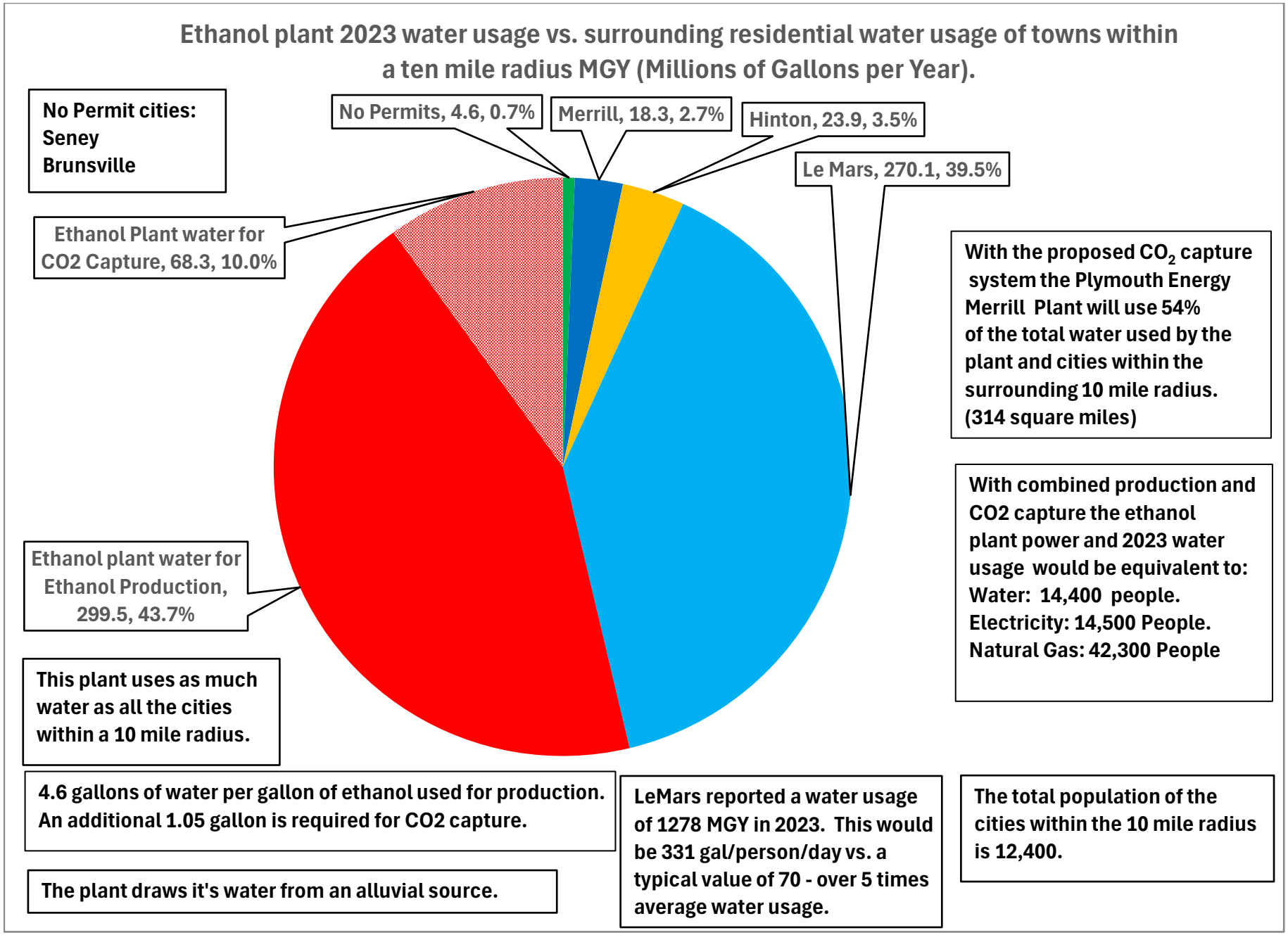
This ethanol plant consumes 54% of the water used by the cities and plant within the surrounding 10 mile radius (314 square miles)

***Ethanol Production Capacity of Plant - MGY**	**65**
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	68.25
Calculate ratio of gallons of water/ gallons of Ethanol	4.6
Total water requirement of towns and Ethanol plant - MGY	689.2
Total water requirement of towns - MGY	321.4
Total water requirement for ethanol plant - MGY	367.7
Ratio of ethanol plant water use vs. surrounding area	1.14
Percentage of ethanol plant usage of total water usage	53.4%
Total Population within the 10 mile radius	12,402

#1 Lakeview Plymouth Energy LLC. Merrill 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	11,721
Equivalent # of people ethanol plant water use w/ CO2 capture	**14,393**
Electricity Use	
Electricity to produce Ethanol - kWh/ gallon EtOH for production	0.6
Total Electricity used to produce ethanol - kWh	39,000,000
Electrical use to capture CO2 - kWh/ gallon EtOH	0.377
Total Electricity used to capture CO2 - kWh	24,505,000
Total electricity to produce ethanol and capture CO2 - kWh	63,505,000
Typical electrical use/ residence - kWh/year	10,476.0
Equivalent number of residences	6,062.0
Number of people / residence	2.4
Equivalent number of people	**14,549**
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	1.690E+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	17,604
Number of people / residence	2.4
Equivalent number of people	**42,250**
* Ethanol Capacity per Iowa Renewable Fuels Association	** Ethanol Plant Water usage per the greater of DNR WACOP Permit or 3 times ethanol capacity.

No. 1 Lakeview Plymouth Energy Ethanol Plant (65 MGY) near Merrill



Don Johannsen
May 2024

Print Date:5/20/2024

ATTACHMENT F: Water usage charts for Green Plains, Shenandoah

#2 Green Plains Inc. Shenandoah 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 Shenandoah Iowa			-	-		
	Green Plains Inc. Shenandoah Plant		240.0	240.0		Without CO_2 capture water requirement
	Combined Towns All Water Usage		164.1	164.1		City residential use assumes 70 gal./person/day
1	Imogene	39	1.0	1.0		Water usage too small to require a permit
2	Riverton	245	6.3	6.3		
3	Farragut	490	12.5	12.5		
4	Essex	722	18.4	18.4		
5	Shenandoah	4,925	125.8	125.8		
	Percentage of ethanol plant usage of total water usage	6,421	59.4%	59.4%		
Conclusion: Without CO2 Capture						
	This ethanol plant consumes 59% of the water used by the cities and plant within the surrounding 10 mile radius (314 square miles).					

#2 Green Plains Inc. Shenandoah Ethanol Plant Energy and Water Usage vs. Cities within a 10 mile radius

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 Shenandoah Iowa		-	-	-	-	City residential use assumes 70 gal./person/day
1	Imogene	39	1.0	1.0	0.2%	Water usage too small to require a permit
2	Riverton	245	6.3	6.3	1.3%	
3	Farragut	490	12.5	12.5	2.6%	
4	Essex	722	18.4	18.4	3.8%	
5	Shenandoah	4925	125.8	125.8	25.8%	
6	Ethanol plant water for Ethanol Production		240	240	49.2%	Without CO2 Capture water requirement
7	Ethanol Plant water for CO_2 Capture		84.0	84.0	17.2%	Additional CO_2 Capture water requirement
	Total Plant and Towns	6,421	488.1	488.1	100.0%	
	Percentage of ethanol plant usage of total water usage		66.4%	66.4%		

Conclusion: With CO2 Capture

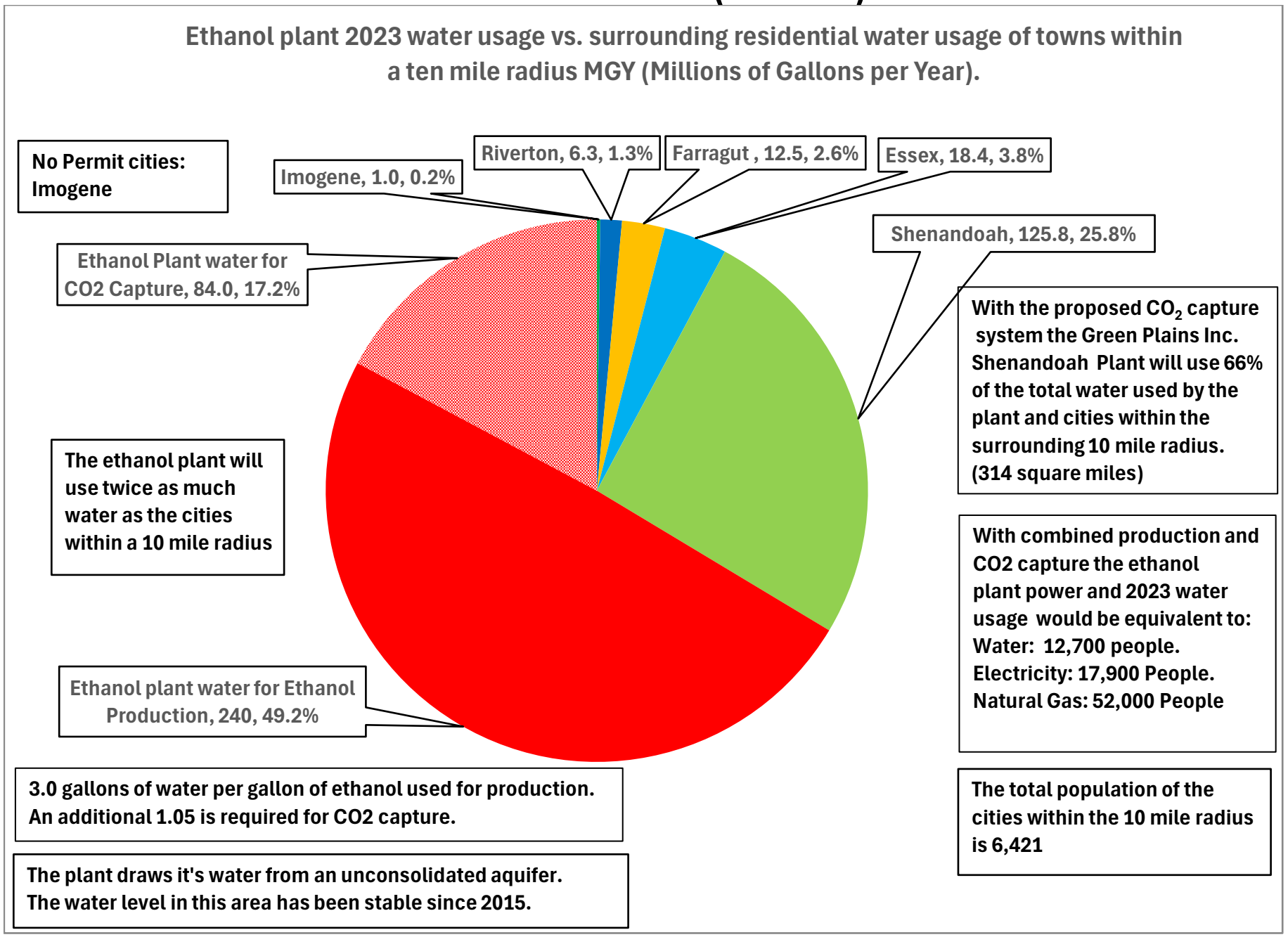
This ethanol plant consumes 66% of the water used by the cities and plant within the surrounding 10 mile radius (314 square miles)

***Ethanol Production Capacity of Plant - MGY**	**80**
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	84
Calculate ratio of gallons of water/ gallons of Ethanol	3.0
Total water requirement of towns and Ethanol plant - MGY	488.1
Total water requirement of towns - MGY	164.1
Total water requirement for ethanol plant - MGY	324.0
Ratio of ethanol plant water use vs. surrounding area	1.97
Percentage of ethanol plant usage of total water usage	66.4%
Total Population within the 10 mile radius	6,421

#2 Green Plains Inc. Shenandoah 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	9,393
Equivalent # of people ethanol plant water use w/ CO2 capture	**12,681**
Electricity Use	
Electricity to produce Ethanol - kWh/ gallon EtOH for production	0.6
Total Electricity used to produce ethanol - kWh	48,000,000
Electrical use to capture CO2 - kWh/ gallon EtOH	0.377
Total Electricity used to capture CO2 - kWh	30,160,000
Total electricity to produce ethanol and capture CO2 - kWh	78,160,000
Typical electrical use/ residence - kWh/year	10,476.0
Equivalent number of residences	7,460.9
Number of people / residence	2.4
Equivalent number of people	**17,906**
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	2.080E+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	21,667
Number of people / residence	2.4
Equivalent number of people	**52,000**
* Ethanol Capacity per Iowa Renewable Fuels Association	** Water usage per the greater of DNR WACOP Permit or 3 times ethanol capacity.

#2 Green Plains Inc. Ethanol Plant (80 MGY) near Shenandoah



ATTACHMENT G: Water usage charts for Quad County Corn Processors, Galva

#3 Quad County Corn Processors - Galva 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 Galva Iowa			-	-		
	Quad County Corn Processors Galva Plant		315	209.2		Without CO_2 capture water requirement
	Combined Towns All Water Usage		121.8	121.8		City residential use assumes 70 gal./person/day
1	Hanover	50	1.3	1.3		Water usage too small to require a permit
2	Galva	435	11.1	11.1		
3	Schaller	729	18.6	18.6		
4	Holstein	1,501	38.4	38.4		
5	Ida Grove	2,051	52.4	52.4		
	Percentage of ethanol plant usage of total water usage	4,766	72.1%	63.2%		
Conclusion: Without CO2 Capture						
	This ethanol plant consumes 63% of the water used by the cities and plant within the surrounding 10 mile radius (314 square miles).					

#3 Quad County Corn Processors - Galva Ethanol Plant Energy and Water Usage vs. Cities within a 10 mile radius

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 Galva Iowa		-	-	-	-	City residential use assumes 70 gal./person/day
1	Hanover	50	1.3	1.3	0.3%	Water usage too small to require a permit
2	Galva	435	11.1	11.1	3.0%	
3	Schaller	729	18.6	18.6	5.1%	
4	Holstein	1501	38.4	38.4	10.5%	
5	Ida Grove	2051	52.4	52.4	14.3%	
6	Ethanol plant water for Ethanol Production		315.0	209.2	57.0%	Without CO2 Capture water requirement
7	Ethanol Plant water for CO_2 Capture		35.7	35.7	9.7%	Additional CO_2 Capture water requirement
	Total Plant and Towns	4,766	472.5	366.6	100.0%	
	Percentage of ethanol plant usage of total water usage		74.2%	66.8%		

Conclusion: With CO2 Capture

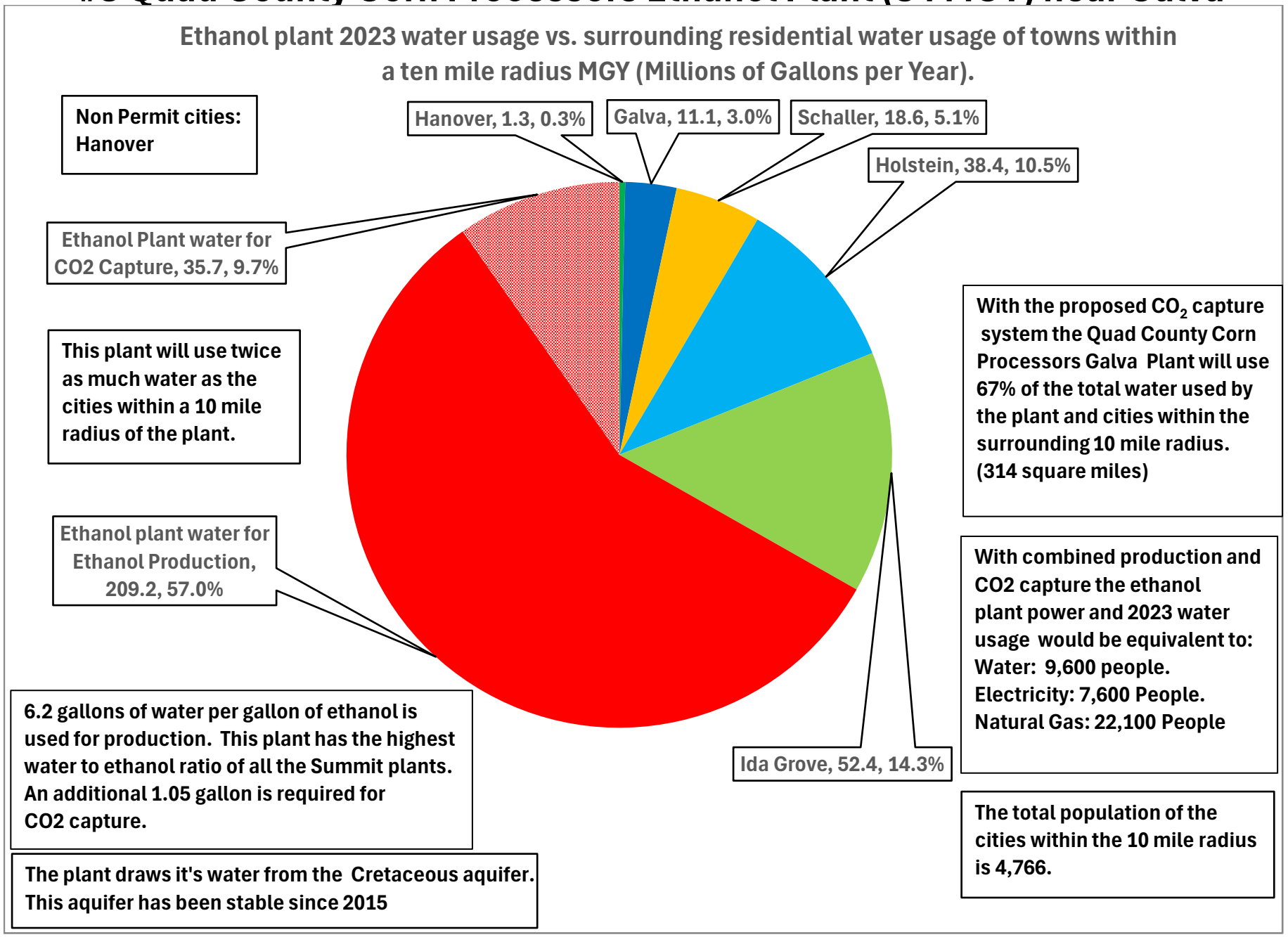
This ethanol plant consumes 67% of the water used by the cities and plant within the surrounding 10 mile radius (314 square miles)

***Ethanol Production Capacity of Plant - MGY**	**34**
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	35.7
Calculate ratio of gallons of water/ gallons of Ethanol	6.2
Total water requirement of towns and Ethanol plant - MGY	366.6
Total water requirement of towns - MGY	121.8
Total water requirement for ethanol plant - MGY	244.9
Ratio of ethanol plant water use vs. surrounding area	2.01
Percentage of ethanol plant usage of total water usage	66.8%
Total Population within the 10 mile radius	4,766

#3 Quad County Corn Processors - Galva 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	8,186
Equivalent # of people ethanol plant water use w/ CO2 capture	**9,584**
Electricity Use	
Electricity to produce Ethanol - kWh/ gallon EtOH for production	0.6
Total Electricity used to produce ethanol - kWh	20,400,000
Electrical use to capture CO2 - kWh/ gallon EtOH	0.377
Total Electricity used to capture CO2 - kWh	12,818,000
Total electricity to produce ethanol and capture CO2 - kWh	33,218,000
Typical electrical use/ residence - kWh/year	10,476.0
Equivalent number of residences	3,170.9
Number of people / residence	2.4
Equivalent number of people	**7,610**
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	884,000,000,000
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	9,208
Number of people / residence	2.4
Equivalent number of people	**22,100**
* Ethanol Capacity per Iowa Renewable Fuels Association	** Water usage per the greater of DNR WACOP Permit or 3 times ethanol capacity.

#3 Quad County Corn Processors Ethanol Plant (34 MGY) near Galva



ATTACHMENT H: Water usage charts for Little Sioux Corn Processors, Marcus

#4 Little Sioux Corn Processors 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 Marcus Iowa			-	-		
	Little Sioux Corn Processors Marcus Plant		1036.1	645.8		Without CO_2 capture water requirement
	Combined Towns All Water Usage		82.0	82.0		City residential use assumes 70 gal./person/day
1	Germantown	50	1.3	1.3		Water usage too small to require a permit
2	Meridan	161	4.1	4.1		Water usage too small to require a permit
3	Cleghorn	240	6.1	6.1		
4	Marcus	1,079	27.6	27.6		
5	Remsen	1,678	42.9	42.9		
	Percentage of ethanol plant usage of total water usage	3,208	92.7%	88.7%		
Conclusion: Without CO2 Capture						
	This ethanol plant consumes 89% of the water used by the cities and plant within the surrounding 10 mile radius (314 square miles).					

#4 Little Sioux Corn Processors Ethanol Plant Energy and Water Usage vs. Cities within a 10 mile radius

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 Marcus Iowa		-	-	-	-	City residential use assumes 70 gal./person/day
1	Germantown	50	1.3	1.3	0.1%	Water usage too small to require a permit
2	Meridan	161	4.1	4.1	0.5%	Water usage too small to require a permit
3	Cleghorn	240	6.1	6.1	0.7%	
4	Marcus	1079	27.6	27.6	3.1%	
5	Remsen	1678	42.9	42.9	4.8%	
6	Ethanol plant water for Ethanol Production		1036.1	645.8	72.0%	Without CO2 Capture water requirement
7	Ethanol Plant water for CO_2 Capture		169.1	169.1	18.9%	Additional CO_2 Capture water requirement
	Total Plant and Towns	3,208	1287.1	896.8	100.0%	
	Percentage of ethanol plant usage of total water usage		93.6%	90.9%		

Conclusion: With CO2 Capture

This ethanol plant consumes 91% of the water used by the cities and plant within the surrounding 10 mile radius (314 square miles)

***Ethanol Production Capacity of Plant - MGY**	**161**
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	169.05
Calculate ratio of gallons of water/ gallons of Ethanol	4.0
Total water requirement of towns and Ethanol plant - MGY	896.8
Total water requirement of towns - MGY	82.0
Total water requirement for ethanol plant - MGY	814.8
Ratio of ethanol plant water use vs. surrounding area	9.94
Percentage of ethanol plant usage of total water usage	90.9%
Total Population within the 10 mile radius	3,208

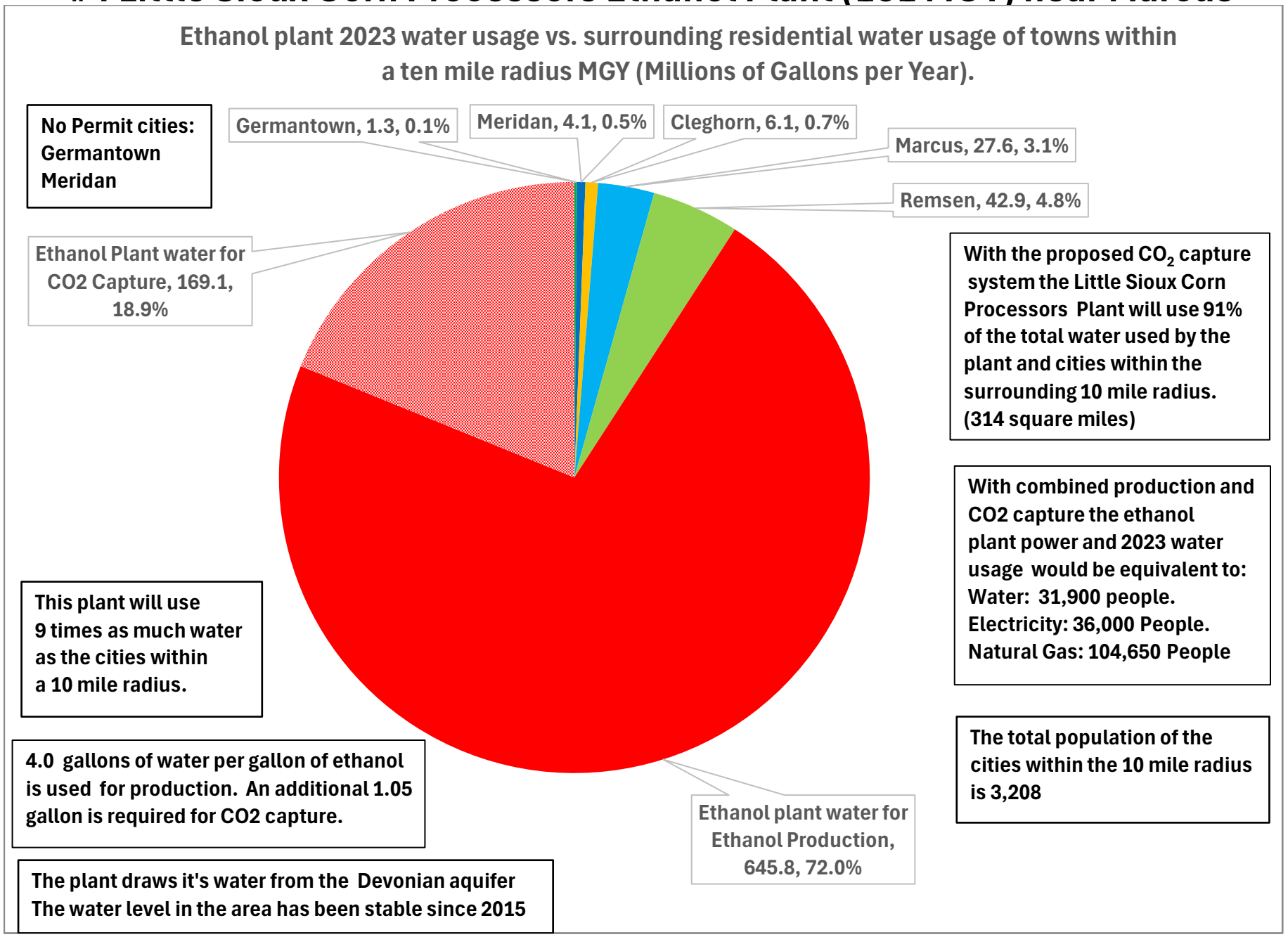
#4 Little Sioux Corn Processors Ethanol Plant Energy and Water Usage vs. Cities within a 10 mile radius

Water Use	
Typical water use per person per day - Gallons/ person/ day	70
Equivalent # of people ethanol plant water use w/o CO2 capture	25,275
Equivalent # of people ethanol plant water use w/ CO2 capture	**31,891**
Electricity Use	
Electricity to produce Ethanol - kWh/ gallon EtOH for production	0.6
Total Electricity used to produce ethanol - kWh	96,600,000
Electrical use to capture CO2 - kWh/ gallon EtOH	0.377
Total Electricity used to capture CO2 - kWh	60,697,000
Total electricity to produce ethanol and capture CO2 - kWh	1.573E+08
Typical electrical use/ residence - kWh/year	10,476.0
Equivalent number of residences	15,015.0
Number of people / residence	2.4
Equivalent number of people	**36,036**
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	4.186E+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	43,604
Number of people / residence	2.4
Equivalent number of people	**104,650**

* Ethanol Capacity per Iowa Renewable Fuels Association

** Water usage per the greater of DNR WACOP Permit or 3 times ethanol capacity.

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



ATTACHMENT I: Water usage charts for Green Plains, Superior

#5 Green Plains - Superior 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 Superior Iowa			-	-		
	Green Plains Inc. - Superior Plant		422.0	291.2		Without CO_2 capture water requirement
	Combined Towns All Water Usage		354.5	354.5		City residential use assumes 70 gal./person/day
1	Superior	132	3.4	3.4		Water usage too small to require a permit
2	Orleans	521	13.3	13.3		Water usage too small to require a permit
3	Arnolds Park/ Okoboji	1,878	48.0	48.0		
4	Spirt Lake	5,439	139.0	139.0		
5	Estherville	5,904	150.8	150.8		
	Percentage of ethanol plant usage of total water usage	13,874	54.35%	45.10%		
Conclusion: Without CO2 Capture						
	This ethanol plant consumes 45% of the water used by the cities and plant within the surrounding 10 mile radius (314 square miles).					

#5 Green Plains - Superior Ethanol Plant Energy and Water Usage vs. Cities within a 10 mile radius

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 Superior Iowa		-	-	-	-	City residential use assumes 70 gal./person/day
1	Superior	132	3.4	3.4	0.5%	Water usage too small to require a permit
2	Orleans	521	13.3	13.3	1.9%	Water usage too small to require a permit
3	Arnolds Park/ Okoboji	1878	48.0	48.0	6.8%	
4	Spirt Lake	5439	139.0	139.0	19.6%	
5	Estherville	5904	150.8	150.8	21.3%	
6	Ethanol plant water for Ethanol Production		422.0	291.2	41.1%	Without CO2 Capture water requirement
7	Ethanol Plant water for CO_2 Capture		63.0	63.0	8.9%	Additional CO_2 Capture water requirement
	Total Plant and Towns	13,874	839.5	708.6	100.0%	
	Percentage of ethanol plant usage of total water usage		57.8%	50.0%		

Conclusion: With CO2 Capture

This ethanol plant consumes 50% of the water used by the cities and plant within the surrounding 10 mile radius (314 square miles)

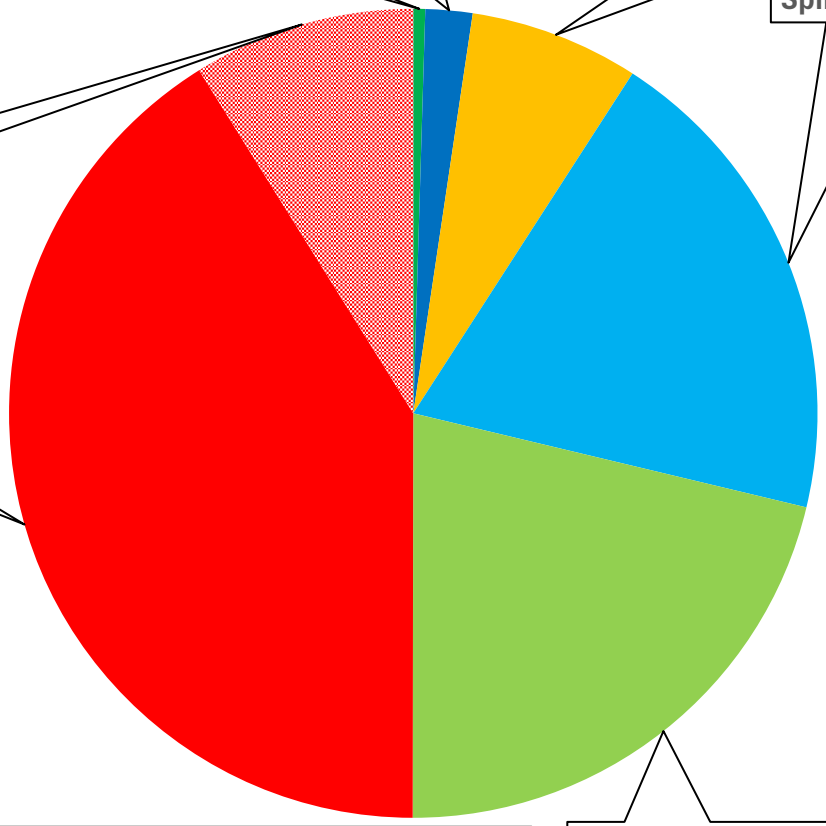
***Ethanol Production Capacity of Plant - MGY**	**60**
Factor: Water required to cool and compress the CO_2 for capture - MGY Water/ MGY Ethanol	1.05
Calculate additional water required for CO_2 Capture - MGY	63
Calculate ratio of gallons of water/ gallons of Ethanol	4.9
Total water requirement of towns and Ethanol plant - MGY	708.6
Total water requirement of towns - MGY	354.5
Total water requirement for ethanol plant - MGY	354.2
Ratio of ethanol plant water use vs. surrounding area	1.00
Percentage of ethanol plant usage of total water usage	50.0%
Total Population within the 10 mile radius	13,874

#5 Green Plains - Superior 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	11,396
Equivalent # of people ethanol plant water use w/ CO2 capture	**13,861**
Electricity Use	
Electricity to produce Ethanol - kWh/ gallon EtOH for production	0.6
Total Electricity used to produce ethanol - kWh	36,000,000
Electrical use to capture CO2 - kWh/ gallon EtOH	0.377
Total Electricity used to capture CO2 - kWh	22,620,000
Total electricity to produce ethanol and capture CO2 - kWh	5.862E+07
Typical electrical use/ residence - kWh/year	10,476.0
Equivalent number of residences	5,595.6
Number of people / residence	2.4
Equivalent number of people	**13,430**
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	1.560E+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	16,250
Number of people / residence	2.4
Equivalent number of people	**39,000**
* Ethanol Capacity per Iowa Renewable Fuels Association	** Water usage per the greater of DNR WACOP Permit or 3 times ethanol capacity.

#5 Green Plains Inc. Ethanol Plant (60 MGY) near Superior

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:
Superior
Orleans

With the proposed CO_2 capture system the Green Plains Inc. Superior Plant will use 50% 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: 13,900 people.
Electricity: 13,400 People.
Natural Gas: 39,000 People

Estherville reported 2023 water usage of 396 MGY and a population of 5,904. This is 184 gal. per person/day - about 2.5 times the typical residential water usage of 70 gal./ day.

The total population of the cities within the 10 mile radius is 13,874.

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

The plant draws it's water from the Cretaceous Aquifer
Water levels in this area are down as much as 30 feet since 2015

This plant will use as much water as all the cities within a 10 mile radius of the plant.

ATTACHMENT J: Water usage charts for Louis Dreyfus, Grand Junction

#6 Louis Dreyfuss - Grand Junction 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 Grand Junction, Iowa			-	-		
	Louis Dreyfuss - Grand Junction Plant		630.7	375.0		Without CO_2 capture water requirement
	Combined Towns All Water Usage		140.7	140.7		City residential use assumes 70 gal./person/day
1	Berkley	23	0.6	0.6		Water usage too small to require a permit
2	Dana	38	1.0	1.0		Water usage too small to require a permit
3	Beaver	46	1.2	1.2		Water usage too small to require a permit
4	Cooper	50	1.3	1.3		Water usage too small to require a permit
5	Rippey	220	5.6	5.6		Water usage too small to require a permit
6	Paton	221	5.6	5.6		
7	Grand Junction	725	18.5	18.5		
8	Jefferson	4,182	106.9	106.9		
	Percentage of ethanol plant usage of total water usage	5,505	81.8%	72.7%		
Conclusion: Without CO2 Capture						
	This ethanol plant consumes 73% of the water used by the cities and plant within the surrounding 10 mile radius (314 square miles).					

#6 Louis Dreyfuss - Grand Junction Ethanol Plant Energy and Water Usage vs. Cities within a 10 mile radius

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 Grand Junction, Iowa		-	-	-	-	City residential use assumes 70 gal./person/day
1	Berkley	23	0.6	0.6		Water usage too small to require a permit
2	Dana	38	1.0	1.0		Water usage too small to require a permit
3	Beaver	46	1.2	1.2		Water usage too small to require a permit
4	Cooper	50	1.3	1.3		Water usage too small to require a permit
5	Rippey	220	5.6	5.6		Water usage too small to require a permit
	No Permit	377	9.6	9.6	1.5%	
6	Paton	221	5.6	5.6	0.9%	
7	Grand Junction	725	18.5	18.5	2.9%	
8	Jefferson	4182	106.9	106.9	16.5%	
9	Ethanol plant water for Ethanol Production		630.7	375	58.0%	Without CO2 Capture water requirement
10	Ethanol Plant water for CO_2 Capture		131.3	131.3	20.3%	Additional CO_2 Capture water requirement
	Total Plant and Towns	5,505	902.6	646.9	100.0%	
	Percentage of ethanol plant usage of total water usage		84.4%	78.3%		

Conclusion: With CO2 Capture

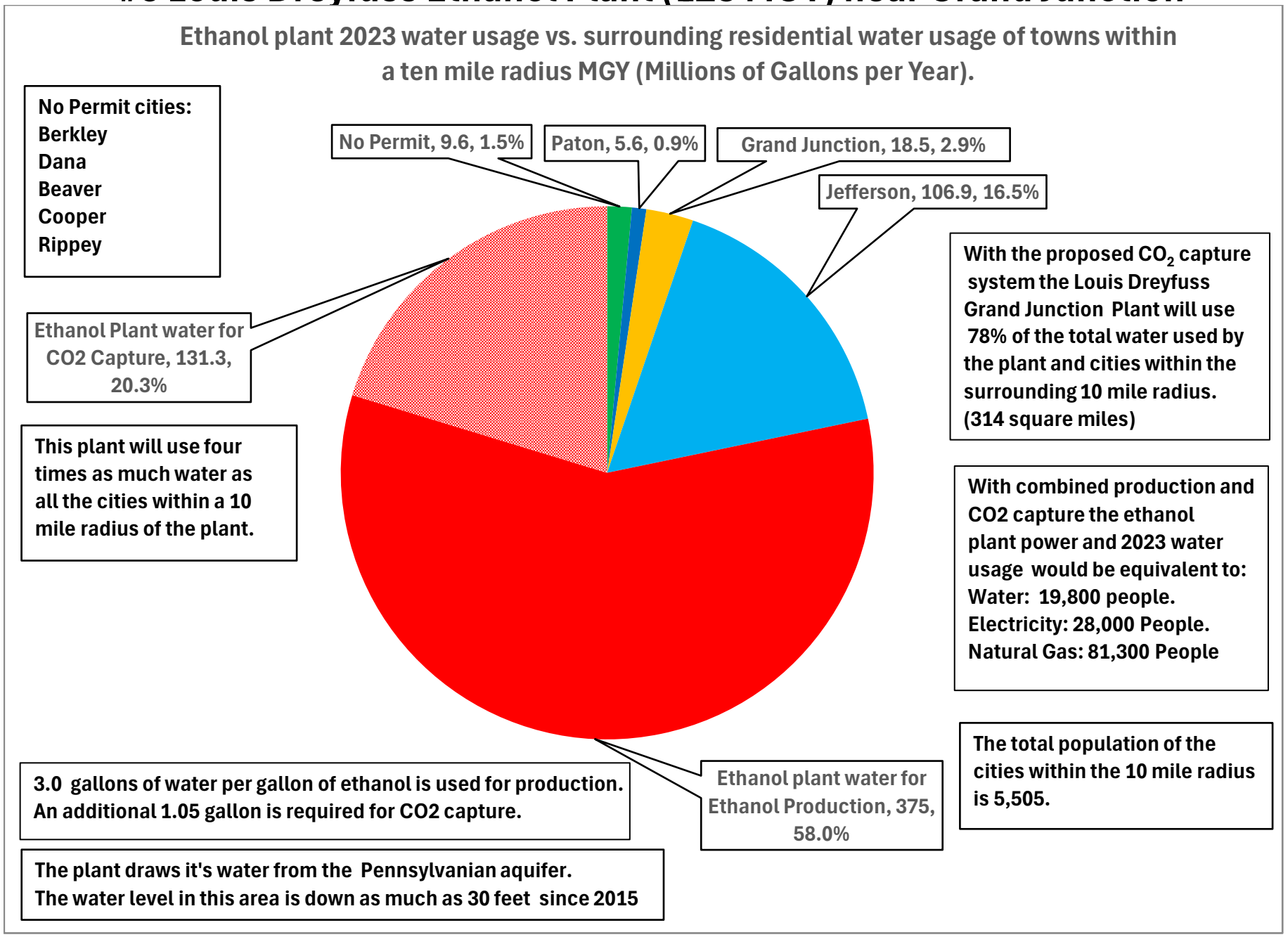
This ethanol plant consumes 78% of the water used by the cities and plant within the surrounding 10 mile radius (314 square miles)

***Ethanol Production Capacity of Plant - MGY**	**125**
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	131.25
Calculate ratio of gallons of water/ gallons of Ethanol	3.0
Total water requirement of towns and Ethanol plant - MGY	656.5
Total water requirement of towns - MGY	150.3
Total water requirement for ethanol plant - MGY	506.3
Ratio of ethanol plant water use vs. surrounding area	3.37
Percentage of ethanol plant usage of total water usage	77.1%
Total Population within the 10 mile radius	5,505

#6 Louis Dreyfuss - Grand Junction 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	14,677
Equivalent # of people ethanol plant water use w/ CO2 capture	**19,814**
Electricity Use	
Electricity to produce Ethanol - kWh/ gallon EtOH for production	0.6
Total Electricity used to produce ethanol - kWh	75,000,000
Electrical use to capture CO2 - kWh/ gallon EtOH	0.377
Total Electricity used to capture CO2 - kWh	47,125,000
Total electricity to produce ethanol and capture CO2 - kWh	1.221E+08
Typical electrical use/ residence - kWh/year	10,476.0
Equivalent number of residences	11,657.6
Number of people / residence	2.4
Equivalent number of people	**27,978**
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	3.250E+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	33,854
Number of people / residence	2.4
Equivalent number of people	**81,250**
* Ethanol Capacity per Iowa Renewable Fuels Association	** Water usage per the greater of DNR WACOP Permit or 3 times ethanol capacity.

#6 Louis Dreyfuss Ethanol Plant (125 MGY) near Grand Junction



ATTACHMENT K: Water usage charts for Corn LP, Goldfield

#7 Corn LP - Goldfield 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 - Goldfield, Iowa			-	-		
	Corn LP Goldfield Plant		262	240		Without CO_2 capture water requirement
	Combined Towns All Water Usage		193.3	193.3		City residential use assumes 70 gal./person/day
1	Holmes	50	1.3	1.3		Water usage too small to require a permit
2	Hardy	57	1.5	1.5		Water usage too small to require a permit
3	Thor	181	4.6	4.6		
4	Renwick	234	6.0	6.0		
5	Goldfield	634	16.2	16.2		
6	Clarion	2,810	71.8	71.8		
7	Eagle Grove	3,601	92.0	92.0		
	Percentage of ethanol plant usage of total water usage	7,567	57.5%	55.4%		
Conclusion: Without CO2 Capture						
	This ethanol plant consumes 55% of the water used by the cities and plant within the surrounding 10 mile radius (314 square miles).					

#7 Corn LP - Goldfield Ethanol Plant Energy and Water Usage vs. Cities within a 10 mile radius

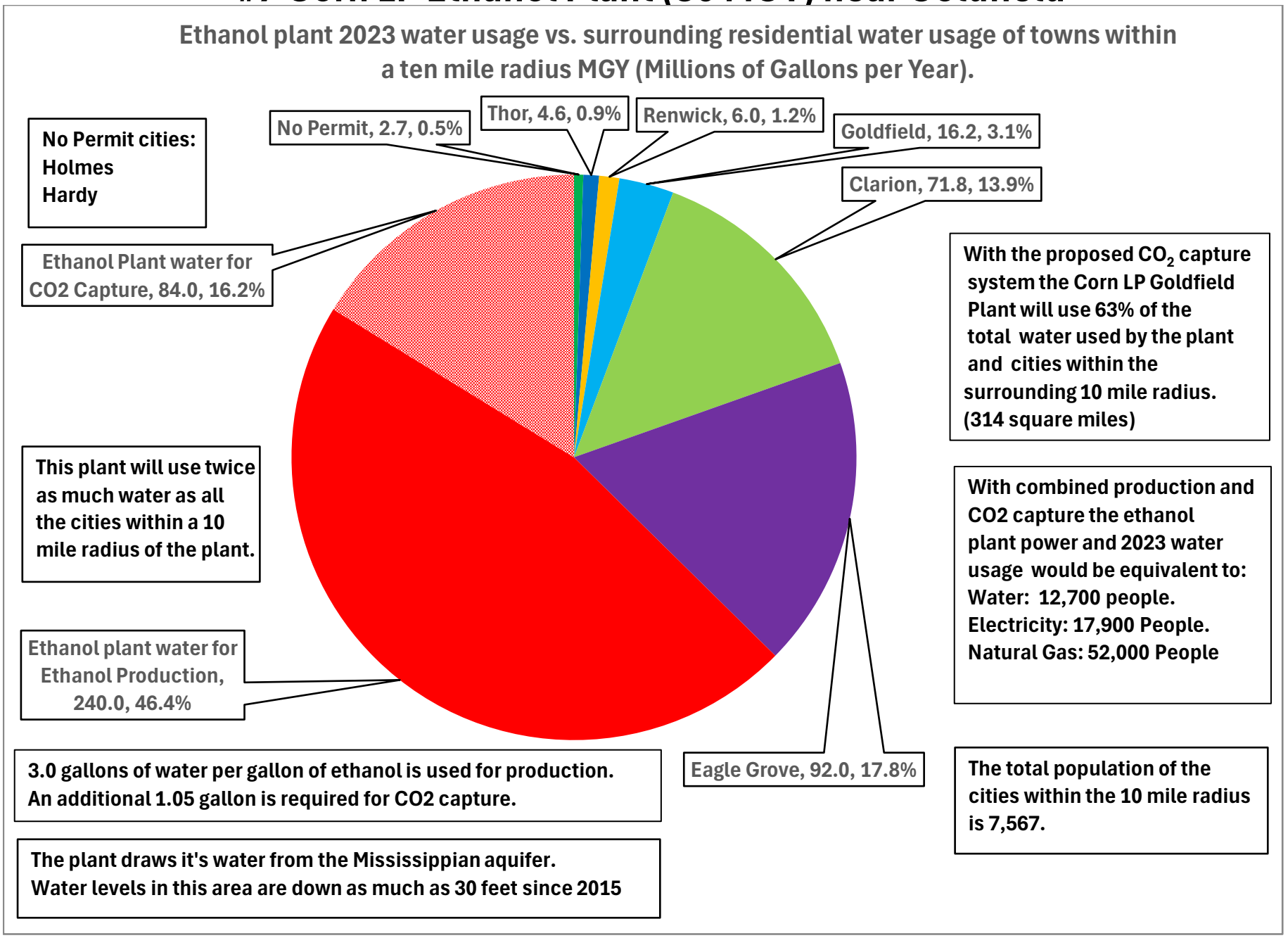
Ethanol Plant with CO_2 Capture						
No.	**Ethanol Plant/ Town**	**Population**	****Water Permit Value MGY**	****2023 Water Usage MGY**	**2023 Water Usage % of Total**	**Comments**
Ethanol Plant - Goldfield, Iowa		-	-	-	-	City residential use assumes 70 gal./person/day
1	Holmes	50	1.3	1.3		Water usage too small to require a permit
2	Hardy	57	1.5	1.5		Water usage too small to require a permit
	No Permit	107	2.7	2.7	0.5%	
3	Thor	181	4.6	4.6	0.9%	
4	Renwick	234	6.0	6.0	1.2%	
5	Goldfield	634	16.2	16.2	3.1%	
6	Clarion	2810	71.8	71.8	13.9%	
7	Eagle Grove	3601	92.0	92.0	17.8%	
8	Ethanol plant water for Ethanol Production		262.0	240.0	46.4%	Without CO2 Capture water requirement
9	Ethanol Plant water for CO_2 Capture		84.0	84.0	16.2%	Additional CO_2 Capture water requirement
	Total Plant and Towns	7,567	539.3	517.3	100.0%	
	Percentage of ethanol plant usage of total water usage		64.2%	62.63%		
Conclusion: With CO2 Capture						
	This ethanol plant consumes 63% of the water used by the cities and plant within the surrounding 10 mile radius (314 square miles)					

***Ethanol Production Capacity of Plant - MGY**	**80**
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	84
Calculate ratio of gallons of water/ gallons of Ethanol	3.0
Total water requirement of towns and Ethanol plant - MGY	520.1
Total water requirement of towns - MGY	196.1
Total water requirement for ethanol plant - MGY	324.0
Ratio of ethanol plant water use vs. surrounding area	1.65
Percentage of ethanol plant usage of total water usage	62.3%
Total Population within the 10 mile radius	7,567

#7 Corn LP - Goldfield 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	9,393
Equivalent # of people ethanol plant water use w/ CO2 capture	**12,681**
Electricity Use	
Electricity to produce Ethanol - kWh/ gallon EtOH for production	0.6
Total Electricity used to produce ethanol - kWh	48,000,000
Electrical use to capture CO2 - kWh/ gallon EtOH	0.377
Total Electricity used to capture CO2 - kWh	30,160,000
Total electricity to produce ethanol and capture CO2 - kWh	7.816E+07
Typical electrical use/ residence - kWh/year	10,476.0
Equivalent number of residences	7,460.9
Number of people / residence	2.4
Equivalent number of people	**17,906**
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	2.080E+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	21,667
Number of people / residence	2.4
Equivalent number of people	**52,000**
* Ethanol Capacity per Iowa Renewable Fuels Association	** Water usage per the greater of DNR WACOP Permit or 3 times ethanol capacity.

#7 Corn LP Ethanol Plant (80 MGY) near Goldfield



ATTACHMENT L: Water usage charts for Golden Grain Energy, Mason City

#8 Golden Grain Energy - Mason City 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 Mason City, Iowa			-	-		
	Golden Grain Energy - Mason City Plant		683.0	405.0		Without CO_2 capture water requirement
	Combined Towns All Water Usage		776.7	776.7		City residential use assumes 70 gal./person/day
1	Portland	50	1.28	1.28		Water usage too small to require a permit
2	Rock Falls	150	3.83	3.83		Water usage too small to require a permit
3	Rudd	358	9.15	9.15		
4	Plymouth	375	9.58	9.58		
5	Rockford	758	19.37	19.37		
6	Nora Springs	1,369	34.98	34.98		
7	Mason City	27,338	698.49	698.49		
	Percentage of ethanol plant usage of total water usage	30,398	46.8%	34.3%		
Conclusion: Without CO2 Capture						
	This ethanol plant consumes 34% of the water used by the cities and plant within the surrounding 10 mile radius (314 square miles).					

#8 Golden Grain Energy - Mason City Ethanol Plant Energy and Water Usage vs. Cities within a 10 mile radius

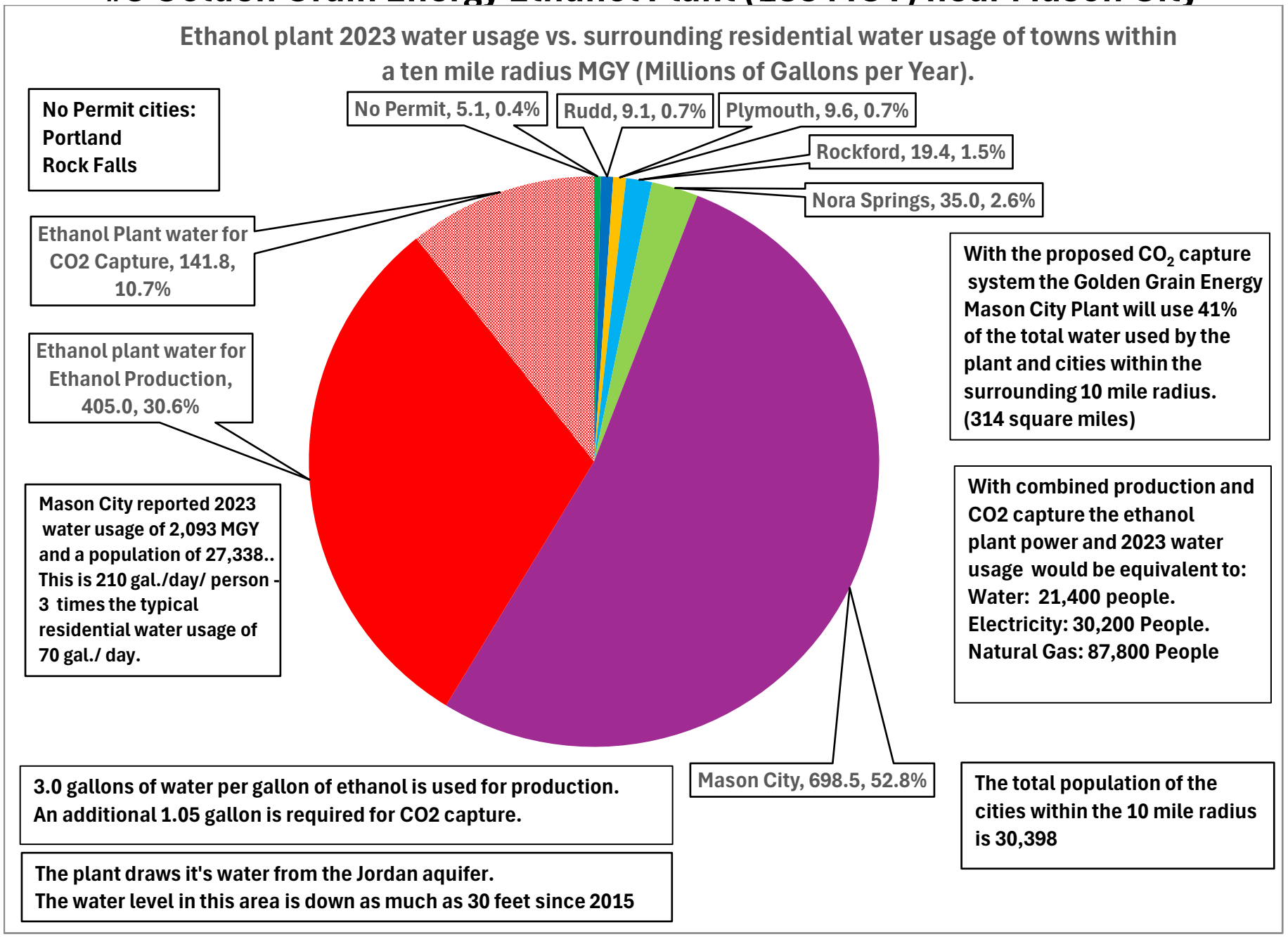
Ethanol Plant with CO_2 Capture						
No.	**Ethanol Plant/ Town**	**Population**	****Water Permit Value MGY**	****2023 Water Usage MGY**	**2023 Water Usage % of Total**	**Comments**
Ethanol Plant - Near Mason City, Iowa		-	-	-	-	City residential use assumes 70 gal./person/day
1	Portland	50	1.3	1.3	0.10%	Water usage too small to require a permit
2	Rock Falls	150	3.8	3.8	0.29%	Water usage too small to require a permit
	No Permit	200	5.1	5.1	0.4%	
3	Rudd	358	9.1	9.1	0.7%	
4	Plymouth	375	9.6	9.6	0.7%	
5	Rockford	758	19.4	19.4	1.5%	
6	Nora Springs	1369	35.0	35.0	2.6%	
7	Mason City	27338	698.5	698.5	52.8%	
8	Ethanol plant water for Ethanol Production		683.0	405.0	30.6%	Without CO2 Capture water requirement
9	Ethanol Plant water for CO_2 Capture		141.8	141.8	10.7%	Additional CO_2 Capture water requirement
	Total Plant and Towns	30,398	1601.4	1323.4	100.0%	
	Percentage of ethanol plant usage of total water usage		51.5%	41.3%		
Conclusion: With CO2 Capture						
	This ethanol plant consumes 41% of the water used by the cities and plant within the surrounding 10 mile radius (314 square miles)					

***Ethanol Production Capacity of Plant - MGY**	**135**
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	141.75
Calculate ratio of gallons of water/ gallons of Ethanol	3.0
Total water requirement of towns and Ethanol plant - MGY	1328.5
Total water requirement of towns - MGY	781.8
Total water requirement for ethanol plant - MGY	546.8
Ratio of ethanol plant water use vs. surrounding area	0.70
Percentage of ethanol plant usage of total water usage	41.2%
Total Population within the 10 mile radius	30,398

#8 Golden Grain Energy - Mason City 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	15,851
Equivalent # of people ethanol plant water use w/ CO2 capture	**21,399**
Electricity Use	
Electricity to produce Ethanol - kWh/ gallon EtOH for production	0.6
Total Electricity used to produce ethanol - kWh	81,000,000
Electrical use to capture CO2 - kWh/ gallon EtOH	0.377
Total Electricity used to capture CO2 - kWh	50,895,000
Total electricity to produce ethanol and capture CO2 - kWh	1.319E+08
Typical electrical use/ residence - kWh/year	10,476.0
Equivalent number of residences	12,590.2
Number of people / residence	2.4
Equivalent number of people	**30,216**
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	3.510E+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	36,563
Number of people / residence	2.4
Equivalent number of people	**87,750**
* Ethanol Capacity per Iowa Renewable Fuels Association	** Water usage per the greater of DNR WACOP Permit or 3 times ethanol capacity.

#8 Golden Grain Energy Ethanol Plant (135 MGY) near Mason City



ATTACHMENT M: Water usage charts for Absolute Energy, St Ansgar

#9 Absolute Energy LLC 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 St. Ansgar Iowa			-	-		
	Absolute Energy LLC Plant		842.7	390.0		Without CO_2 capture water requirement
	Combined Towns All Water Usage		140.8	140.8		City residential use assumes 70 gal./person/day
1	Toeterville	50	1.3	1.3		Water usage too small to require a permit
2	Otranto	50	1.3	1.3		Water usage too small to require a permit
3	Mona	50	1.3	1.3		Water usage too small to require a permit
4	Carpenter	87	2.2	2.2		Water usage too small to require a permit
5	Rose Creek Mn.	397	10.1	10.1		Minnesota Usage
6	Lyle Mn.	521	13.3	13.3		Minnesota Usage
7	London Mn.	1,310	33.5	33.5		Minnesota Usage
8	Johnsburg Mn.	1,428	36.5	36.5		Minnesota Usage
9	Stacyville	458	11.7	11.7		
10	St. Ansgar	1,160	29.6	29.6		
	Percentage of ethanol plant usage of total water usage	5,511	85.7%	73.5%		
Conclusion: Without CO2 Capture						
	This ethanol plant consumes 74% of the water used by the cities and plant within the surrounding 10 mile radius (314 square miles).					

#9 Absolute Energy LLC Ethanol Plant Energy and Water Usage vs. Cities within a 10 mile radius

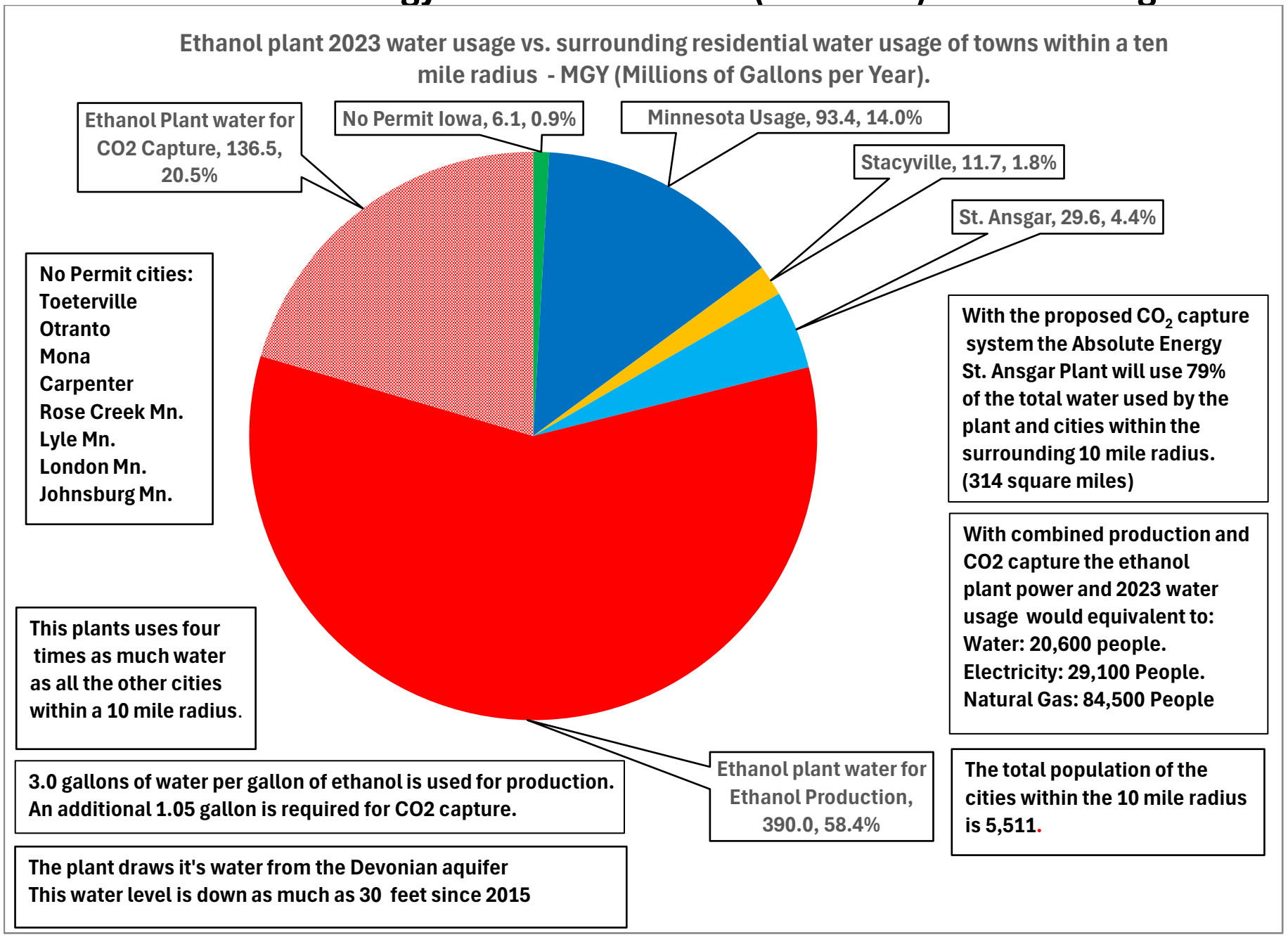
Ethanol Plant with CO_2 Capture						
No.	**Ethanol Plant/ Town**	**Population**	****Water Permit Value MGY**	****2023 Water Usage MGY**	**2023 Water Usage % of Total**	**Comments**
Ethanol Plant - Near St. Ansgar Iowa		-	-	-	-	City residential use assumes 70 gal./person/day
1	Toeterville	50	1.3	1.3		Water usage too small to require a permit
2	Otranto	50	1.3	1.3		Water usage too small to require a permit
3	Mona	50	1.3	1.3		Water usage too small to require a permit
4	Carpenter	87	2.2	2.2		Water usage too small to require a permit
5	Rose Creek Mn.	397	10.1	10.1		Minnesota Usage
6	Lyle Mn.	521	13.3	13.3		Minnesota Usage
7	London Mn.	1310	33.5	33.5		Minnesota Usage
8	Johnsburg Mn.	1428	36.5	36.5		Minnesota Usage
	No Permit Iowa	237	6.1	6.1	0.9%	
	Minnesota Usage	3656	93.4	93.4	14.0%	
9	Stacyville	458	11.7	11.7	1.8%	
10	St. Ansgar	1160	29.6	29.6	4.4%	
11	Ethanol plant water for Ethanol Production		842.7	390.0	58.4%	Without CO2 Capture water requirement
12	Ethanol Plant water for CO_2 Capture		136.5	136.5	20.5%	Additional CO_2 Capture water requirement
	Total Plant and Towns	5511	1219.5	667.3	100.0%	
	Percentage of ethanol plant usage of total water usage		80.3%	78.9%		
Conclusion: With CO2 Capture						
	This ethanol plant consumes 79% of the water used by the cities and plant within the surrounding 10 mile radius (314 square miles)					

***Ethanol Production Capacity of Plant - MGY**	**130**
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	136.5
Calculate ratio of gallons of water/ gallons of Ethanol	3.0
Total water requirement of towns and Ethanol plant - MGY	766.8
Total water requirement of towns - MGY	240.3
Total water requirement for ethanol plant - MGY	526.5
Ratio of ethanol plant water use vs. surrounding area	2.19
Percentage of ethanol plant usage of total water usage	68.7%
Total Population within the 10 mile radius	5,511

#9 Absolute Energy LLC 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	15,264
Equivalent number of people Ethanol plant w/ CO2 capture	**20,607**
Electricity Use	
Electricity to produce Ethanol - kWh/ gallon EtOH for production	0.6
Total Electricity used to produce ethanol - kWh	78,000,000
Electrical use to capture CO2 - kWh/ gallon EtOH	0.377
Total Electricity used to capture CO2 - kWh	49,010,000
Total electricity to produce ethanol and capture CO2 - kWh	127,010,000
Typical electrical use/ residence - kWh/year	10,476.0
Equivalent number of residences	12,123.9
Number of people / residence	2.4
Equivalent number of people	**29,097**
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	3,380,000,000,000
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	35,208
Number of people / residences	2.4
Equivalent number of people	**84,500**
* Ethanol Capacity per Iowa Renewable Fuels Association	** Water usage per the greater of DNR WACOP Permit or 3 times ethanol capacity.

#9 Absolute Energy LLC Ethanol Plant (130 MGY) near St. Ansgar



ATTACHMENT N: Water usage charts for Homeland Energy, New Hampton

#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).					

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

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 CO2 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

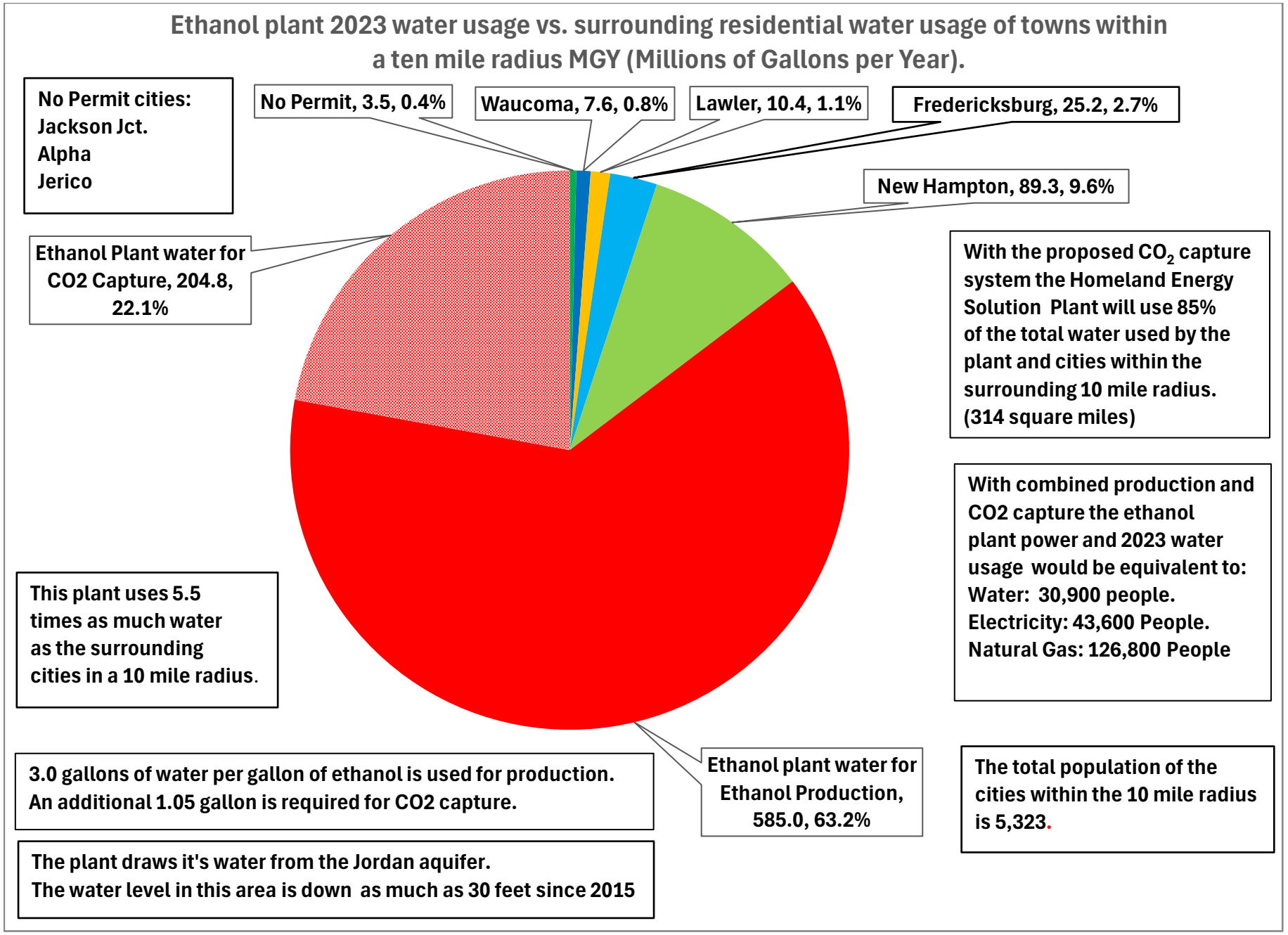
This ethanol plant consumes 85% of the water used by the cities and plant within the surrounding 10 mile radius (314 square miles)

***Ethanol Production Capacity of Plant - MGY**	**195**
Factor: Water required to cool and compress the CO_2 for capture - MGY Water/ MGY Ethanol	1.05
Calculate additional water required for CO_2 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

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



ATTACHMENT O: Water usage charts for Pine Lake Corn Processors, Steamboat Rock

#11 Pine Lake Corn Processors 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 Steamboat Rock, Iowa			-	-		
	Pine Lake Corn Processors - Steamboat Rock Plant		320.0	271.4		Without CO_2 capture water requirement
	Combined Towns All Water Usage		266.6	266.6		City residential use assumes 70 gal./person/day
1	Owasa	34	0.9	0.9		Water usage too small to require a permit
2	Austinville	50	1.3	1.3		Water usage too small to require a permit
3	Wellsburg	720	18.4	18.4		Water usage too small to require a permit
4	Steamboat Rock	264	6.7	6.7		
5	Ackley	1,599	40.9	40.9		
6	Eldora	2,663	68.0	68.0		
7	Iowa Falls	5,106	130.5	130.5		
	Percentage of ethanol plant usage of total water usage	10,436	54.5%	50.4%		
Conclusion: Without CO2 Capture						
	This ethanol plant consumes 50% of the water used by the cities and plant within the surrounding 10 mile radius (314 square miles).					

#11 Pine Lake Corn Processors Ethanol Plant Energy and Water Usage vs. Cities within a 10 mile radius

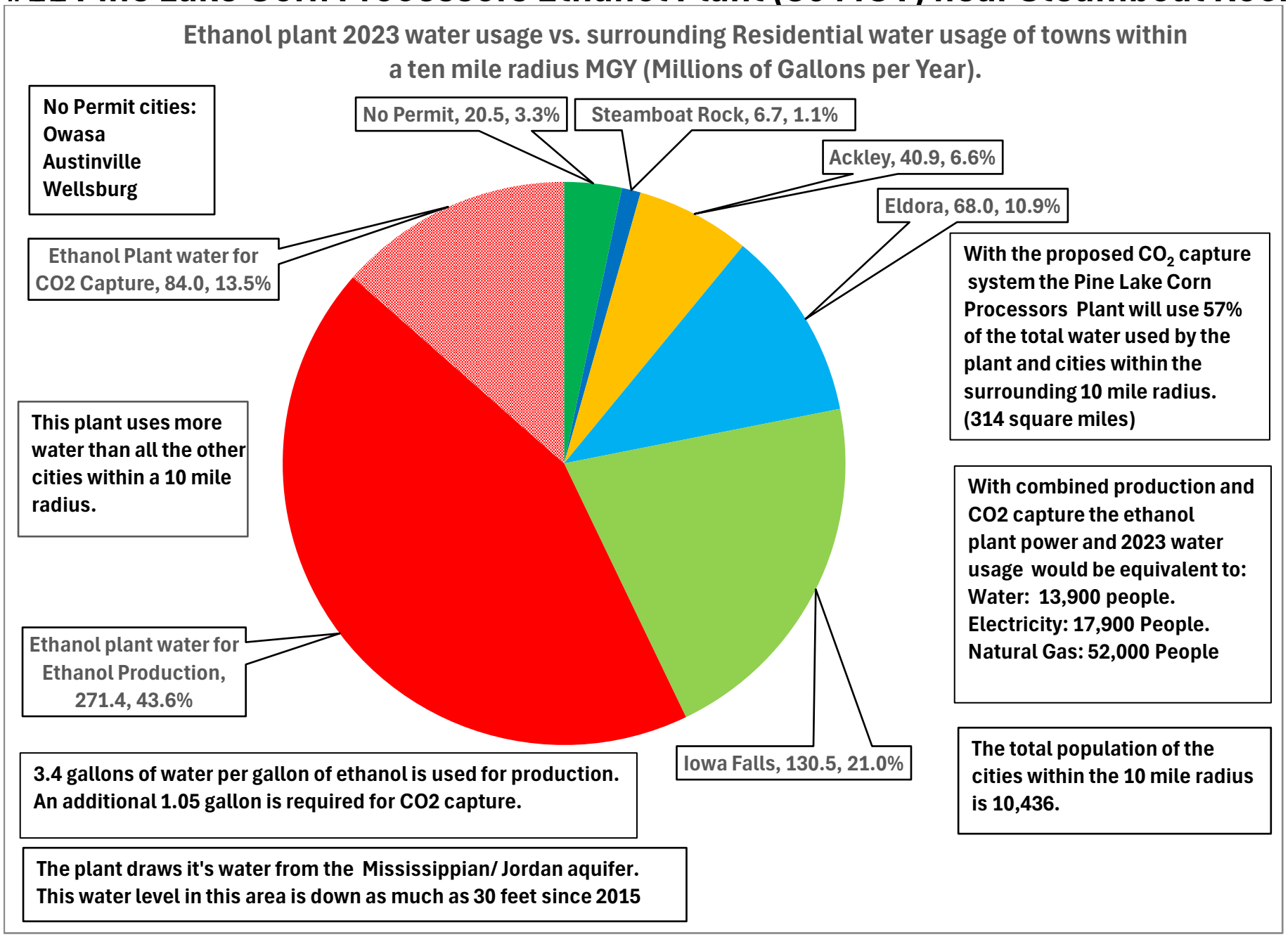
Ethanol Plant with CO_2 Capture						
No.	**Ethanol Plant/ Town**	**Population**	****Water Permit Value MGY**	****2023 Water Usage MGY**	**2023 Water Usage % of Total**	**Comments**
Ethanol Plant - Near Steamboat Rock, Iowa		-	-	-	-	City residential use assumes 70 gal./person/day
1	Owasa	34	0.9	0.9		Water usage too small to require a permit
2	Austinville	50	1.3	1.3		Water usage too small to require a permit
3	Wellsburg	720	18.4	18.4		Water usage too small to require a permit
	No Permit	804	20.5	20.5	3.3%	
4	Steamboat Rock	264	6.7	6.7	1.1%	
5	Ackley	1599	40.9	40.9	6.6%	
6	Eldora	2663	68.0	68.0	10.9%	
7	Iowa Falls	5106	130.5	130.5	21.0%	
8	Ethanol plant water for Ethanol Production		320.0	271.4	43.6%	Without CO2 Capture water requirement
9	Ethanol Plant water for CO_2 Capture		84.0	84.0	13.5%	Additional CO_2 Capture water requirement
	Total Plant and Towns	10,436	670.6	622.1	100.0%	
	Percentage of ethanol plant usage of total water usage		60.2%	57.1%		
Conclusion: With CO2 Capture						
	This ethanol plant consumes 57% of the water used by the cities and plant within the surrounding 10 mile radius (314 square miles)					

***Ethanol Production Capacity of Plant - MGY**	**80**
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	84
Calculate ratio of gallons of water/ gallons of Ethanol	3.4
Total water requirement of towns and Ethanol plant - MGY	642.6
Total water requirement of towns - MGY	287.2
Total water requirement for ethanol plant - MGY	355.4
Ratio of ethanol plant water use vs. surrounding area	1.24
Percentage of ethanol plant usage of total water usage	55.3%
Total Population within the 10 mile radius	10,436

#11 Pine Lake Corn Processors 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	10,623
Equivalent # of people ethanol plant water use w/ CO2 capture	**13,911**
Electricity Use	
Electricity to produce Ethanol - kWh/ gallon EtOH for production	0.6
Total Electricity used to produce ethanol - kWh	48,000,000
Electrical use to capture CO2 - kWh/ gallon EtOH	0.377
Total Electricity used to capture CO2 - kWh	30,160,000
Total electricity to produce ethanol and capture CO2 - kWh	7.816E+07
Typical electrical use/ residence - kWh/year	10,476.0
Equivalent number of residences	7,460.9
Number of people / residence	2.4
Equivalent number of people	**17,906**
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	2.080E+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	21,667
Number of people / residence	2.4
Equivalent number of people	**52,000**
* Ethanol Capacity per Iowa Renewable Fuels Association	** Water usage per the greater of DNR WACOP Permit or 3 times ethanol capacity.

#11 Pine Lake Corn Processors Ethanol Plant (80 MGY) near Steamboat Rock



ATTACHMENT P: Water usage charts for Siouxland Energy, Sioux Center

#12 Siouxland Energy Cooperatives 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 Sioux Center, Iowa			-	-		
	Siouxland Energy Cooperatives - Sioux Center Plant		425.0	195.0		Without CO_2 capture water requirement
	Combined Towns All Water Usage		441.9	441.9		City residential use assumes 70 gal./person/day
1	Perkins	50	1.3	1.3		Water usage too small to require a permit
2	Carmel	50	1.3	1.3		Water usage too small to require a permit
3	Newkirk	50	1.3	1.3		Water usage too small to require a permit
4	Maurice	265	6.8	6.8		Water usage too small to require a permit
5	Hull	2,384	60.9	60.9		Water usage too small to require a permit
6	Orange City	6,267	160.1	160.1		
7	Sioux Center	8,229	210.3	210.3		
	Percentage of ethanol plant usage of total water usage	17,295	49.0%	30.6%		
Conclusion: Without CO2 Capture						
	This ethanol plant consumes 31% of the water used by the cities and plant within the surrounding 10 mile radius (314 square miles).					

#12 Siouxland Energy Cooperatives Ethanol Plant Energy and Water Usage vs. Cities within a 10 mile radius

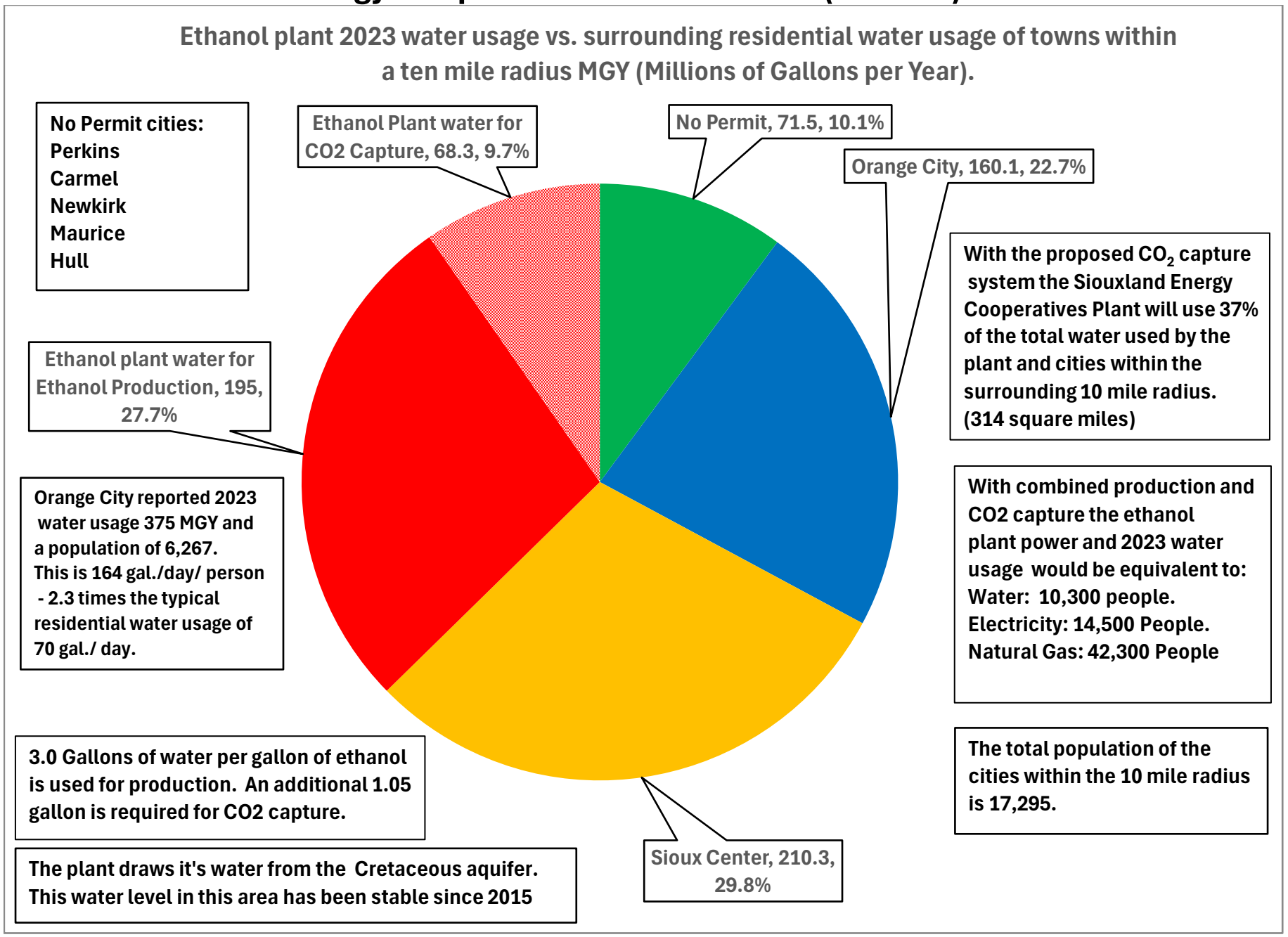
Ethanol Plant with CO_2 Capture						
No.	**Ethanol Plant/ Town**	**Population**	****Water Permit Value MGY**	****2023 Water Usage MGY**	**2023 Water Usage % of Total**	**Comments**
Ethanol Plant - Near Sioux Center, Iowa		-	-	-	-	City residential use assumes 70 gal./person/day
1	Perkins	50	1.3	1.3		Water usage too small to require a permit
2	Carmel	50	1.3	1.3		Water usage too small to require a permit
3	Newkirk	50	1.3	1.3		Water usage too small to require a permit
4	Maurice	265	6.8	6.8		Water usage too small to require a permit
5	Hull	2384	60.9	60.9		Water usage too small to require a permit
	No Permit	2799	71.5	71.5	10.1%	
6	Orange City	6267	160.1	160.1	22.7%	
7	Sioux Center	8229	210.3	210.3	29.8%	
8	Ethanol plant water for Ethanol Production		425	195	27.7%	Without CO2 Capture water requirement
9	Ethanol Plant water for CO_2 Capture		68.3	68.3	9.7%	Additional CO_2 Capture water requirement
	Total Plant and Towns	17,295	935.1	705.1	100.0%	
	Percentage of ethanol plant usage of total water usage		52.7%	37.3%		
Conclusion: With CO2 Capture						
	This ethanol plant consumes 37% of the water used by the cities and plant within the surrounding 10 mile radius (314 square miles)					

***Ethanol Production Capacity of Plant - MGY**	**65**
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	68.25
Calculate ratio of gallons of water/ gallons of Ethanol	3.0
Total water requirement of towns and Ethanol plant - MGY	776.7
Total water requirement of towns - MGY	513.4
Total water requirement for ethanol plant - MGY	263.3
Ratio of ethanol plant water use vs. surrounding area	0.51
Percentage of ethanol plant usage of total water usage	33.9%
Total Population within the 10 mile radius	17,295

#12 Siouxland Energy Cooperatives 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	7,632				
Equivalent # of people ethanol plant water use w/ CO2 capture	**10,303**				
Electricity Use					
Electricity to produce Ethanol - kWh/ gallon EtOH for production	0.6				
Total Electricity used to produce ethanol - kWh	39,000,000				
Electrical use to capture CO2 - kWh/ gallon EtOH	0.377				
Total Electricity used to capture CO2 - kWh	24,505,000				
Total electricity to produce ethanol and capture CO2 - kWh	6.351E+07				
Typical electrical use/ residence - kWh/year	10,476.0				
Equivalent number of residences	6,062.0				
Number of people / residence	2.4				
Equivalent number of people	**14,549**				
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	1.690E+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	17,604				
Number of people / residence	2.4				
Equivalent number of people	**42,250**				
* Ethanol Capacity per Iowa Renewable Fuels Association	** Water usage per the greater of DNR WACOP Permit or 3 times ethanol capacity.				

#12 Siouxland Energy Cooperatives Ethanol Plant (65 MGY) near Sioux Center



ATTACHMENT Q: Water usage charts for Lincolnway Energy, Nevada

#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).					

#13 Lincolnway Energy LLC. - Nevada Ethanol Plant Energy and Water Usage vs. Cities within a 10 mile radius

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 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 CO2 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

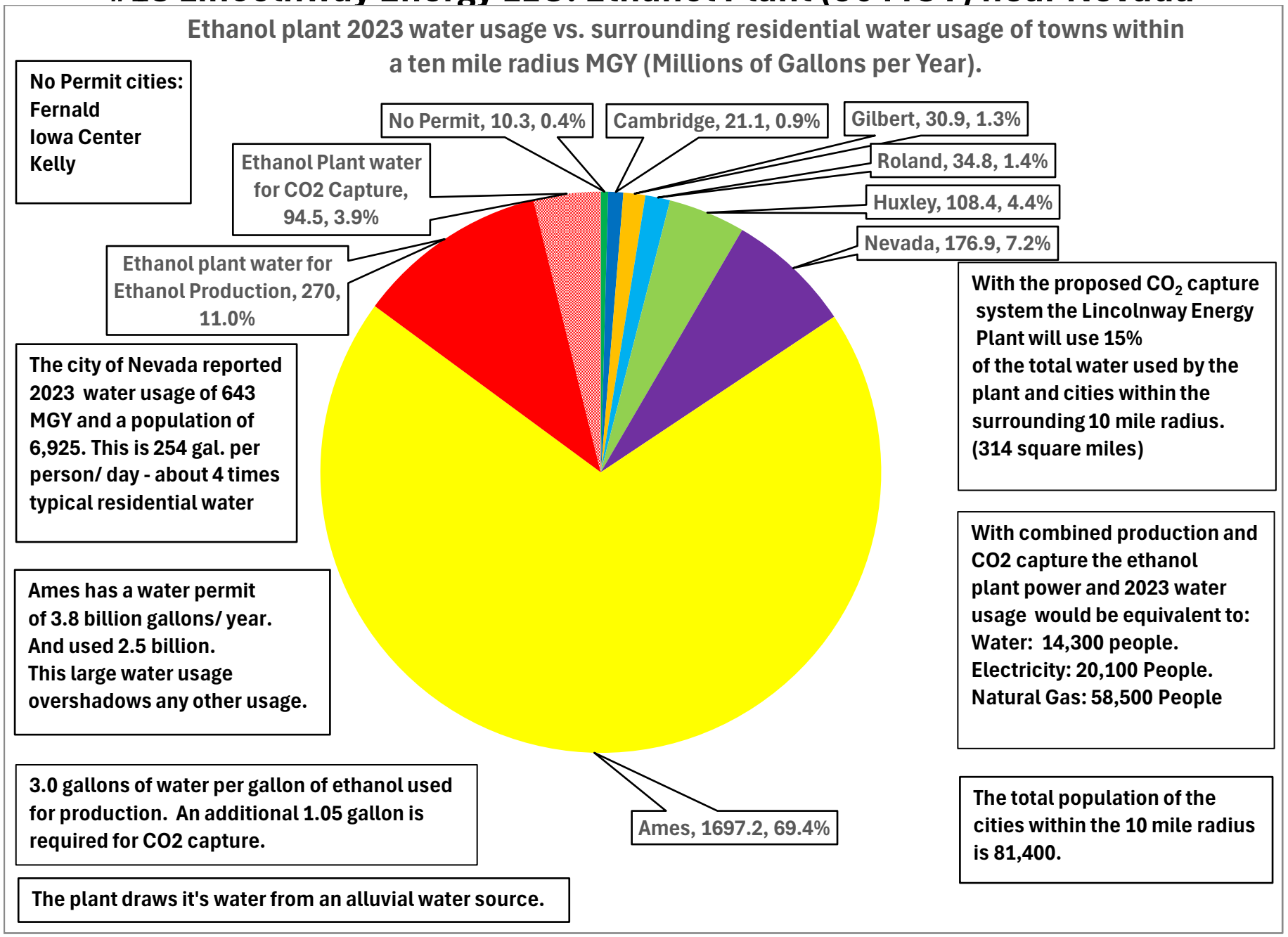
This ethanol plant consumes 15% of the water used by the cities and plant within the surrounding 10 mile radius (314 square miles)

***Ethanol Production Capacity of Plant - MGY**	**90**
Factor: Water required to cool and compress the 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	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

#13 Lincolnway Energy LLC. - Nevada 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.

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



ATTACHMENT R: Water usage charts for Valero, Albert City

#14 Valero Renewable Fuels - Albert City 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 Albert City, Iowa			-	-		
	Valero Renewable Fuels - Albert City Plant		610	405		Without CO_2 capture water requirement
	Combined Towns All Water Usage		57.2	57.2		City residential use assumes 70 gal./person/day
1	Varina	68	1.7	1.7		Water usage too small to require a permit
2	Marathon	230	5.9	5.9		
3	Albert City	677	17.3	17.3		
4	Laurens	1,264	32.3	32.3		
	Percentage of ethanol plant usage of total water usage	2,239	91.4%	87.6%		
Conclusion: Without 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).					

#14 Valero Renewable Fuels - Albert City Ethanol Plant Energy and Water Usage vs. Cities within a 10 mile radius

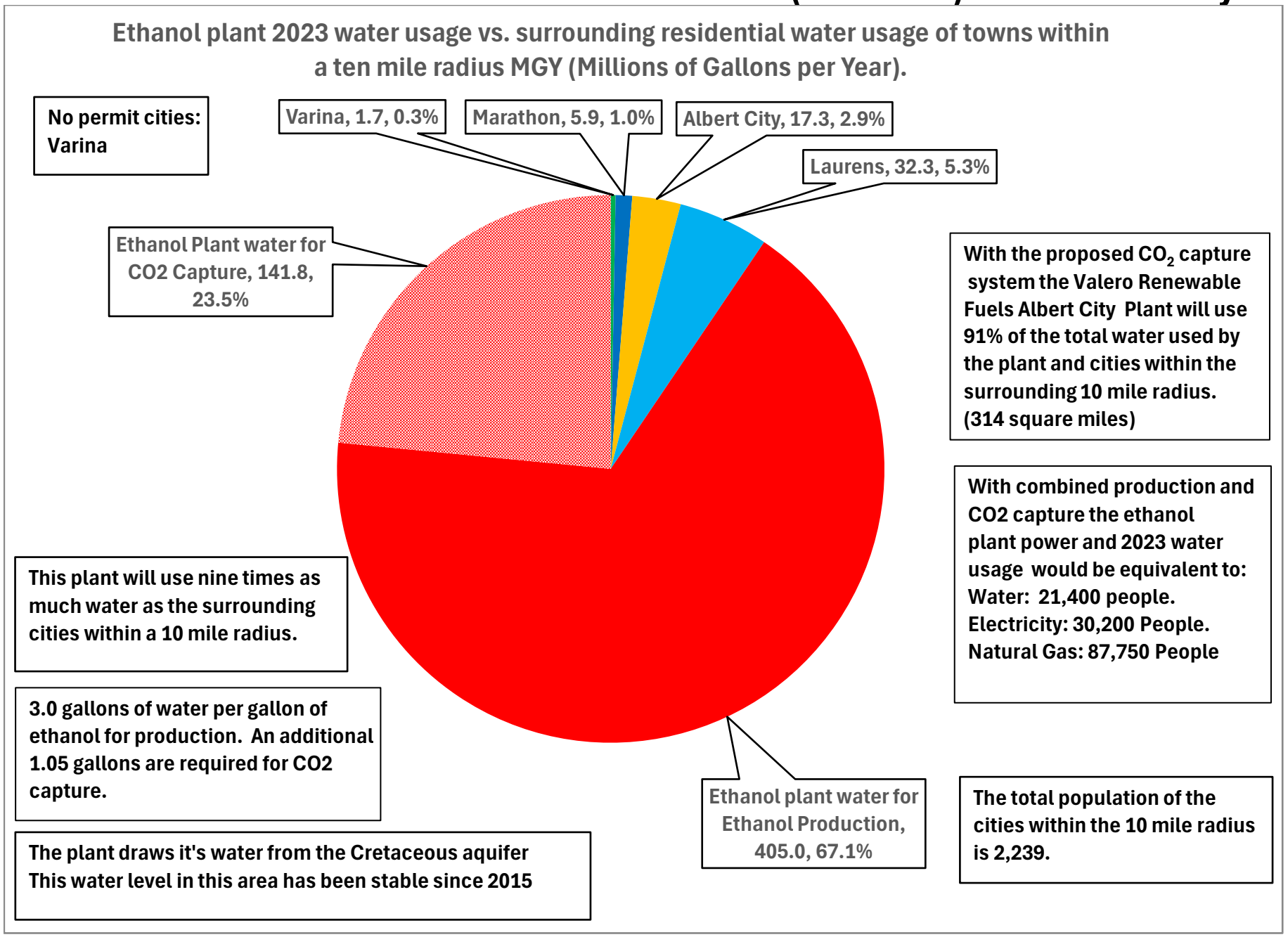
Ethanol Plant with CO_2 Capture						
No.	**Ethanol Plant/ Town**	**Population**	****Water Permit Value MGY**	****2023 Water Usage MGY**	**2023 Water Usage % of Total**	**Comments**
Ethanol Plant - Near Albert City, Iowa		-	-	-	-	City residential use assumes 70 gal./person/day
1	Varina	68	1.7	1.7	0.3%	Water usage too small to require a permit
2	Marathon	230	5.9	5.9	1.0%	
3	Albert City	677	17.3	17.3	2.9%	
4	Laurens	1264	32.3	32.3	5.3%	
5	Ethanol plant water for Ethanol Production		610.0	405.0	67.1%	Without CO2 Capture water requirement
6	Ethanol Plant water for CO_2 Capture		141.8	141.8	23.5%	Additional CO_2 Capture water requirement
	Total Plant and Towns	2,239	809.0	604.0	100.0%	
	Percentage of ethanol plant usage of total water usage		92.9%	90.53%		
Conclusion: With CO2 Capture						
	This ethanol plant consumes 91% of the water used by the cities and plant within the surrounding 10 mile radius (314 square miles)					

***Ethanol Production Capacity of Plant - MGY**	**135**
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	141.75
Calculate ratio of gallons of water/ gallons of Ethanol	3.0
Total water requirement of towns and Ethanol plant - MGY	604.0
Total water requirement of towns - MGY	57.2
Total water requirement for ethanol plant - MGY	546.8
Ratio of ethanol plant water use vs. surrounding area	9.56
Percentage of ethanol plant usage of total water usage	90.5%
Total Population within the 10 mile radius	2,239

#14 Valero Renewable Fuels - Albert City 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	15,851
Equivalent # of people ethanol plant water use w/ CO2 capture	**21,399**
Electricity Use	
Electricity to produce Ethanol - kWh/ gallon EtOH for production	0.6
Total Electricity used to produce ethanol - kWh	81,000,000
Electrical use to capture CO2 - kWh/ gallon EtOH	0.377
Total Electricity used to capture CO2 - kWh	50,895,000
Total electricity to produce ethanol and capture CO2 - kWh	1.319E+08
Typical electrical use/ residence - kWh/year	10,476.0
Equivalent number of residences	12,590.2
Number of people / residence	2.4
Equivalent number of people	**30,216**
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	3.510E+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	36,563
Number of people / residence	2.4
Equivalent number of people	**87,750**
* Ethanol Capacity per Iowa Renewable Fuels Association	** Water usage per the greater of DNR WACOP Permit or 3 times ethanol capacity.

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



ATTACHMENT S: Water usage charts for POET, Arthur

#15 POET Biorefining - Arthur 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 Arthur, Iowa			-	-		
	POET Biorefining - Arthur Plant		761	396		Without CO_2 capture water requirement
	Combined Towns All Water Usage		318.966	318.97		City residential use assumes 70 gal./person/day
1	Arthur	222	5.7	5.7		Water usage too small to require a permit
2	Kiron	267	6.8	6.8		Water usage too small to require a permit
3	Ida Grove	2,051	52.4	52.4		
4	Odebolt	9,944	254.1	254.1		
	Percentage of ethanol plant usage of total water usage	12,484	70.5%	55.4%		
Conclusion: Without CO2 Capture						
	This ethanol plant consumes 55% of the water used by the cities and plant within the surrounding 10 mile radius (314 square miles).					

#15 POET Biorefining - Arthur Ethanol Plant Energy and Water Usage vs. Cities within a 10 mile radius

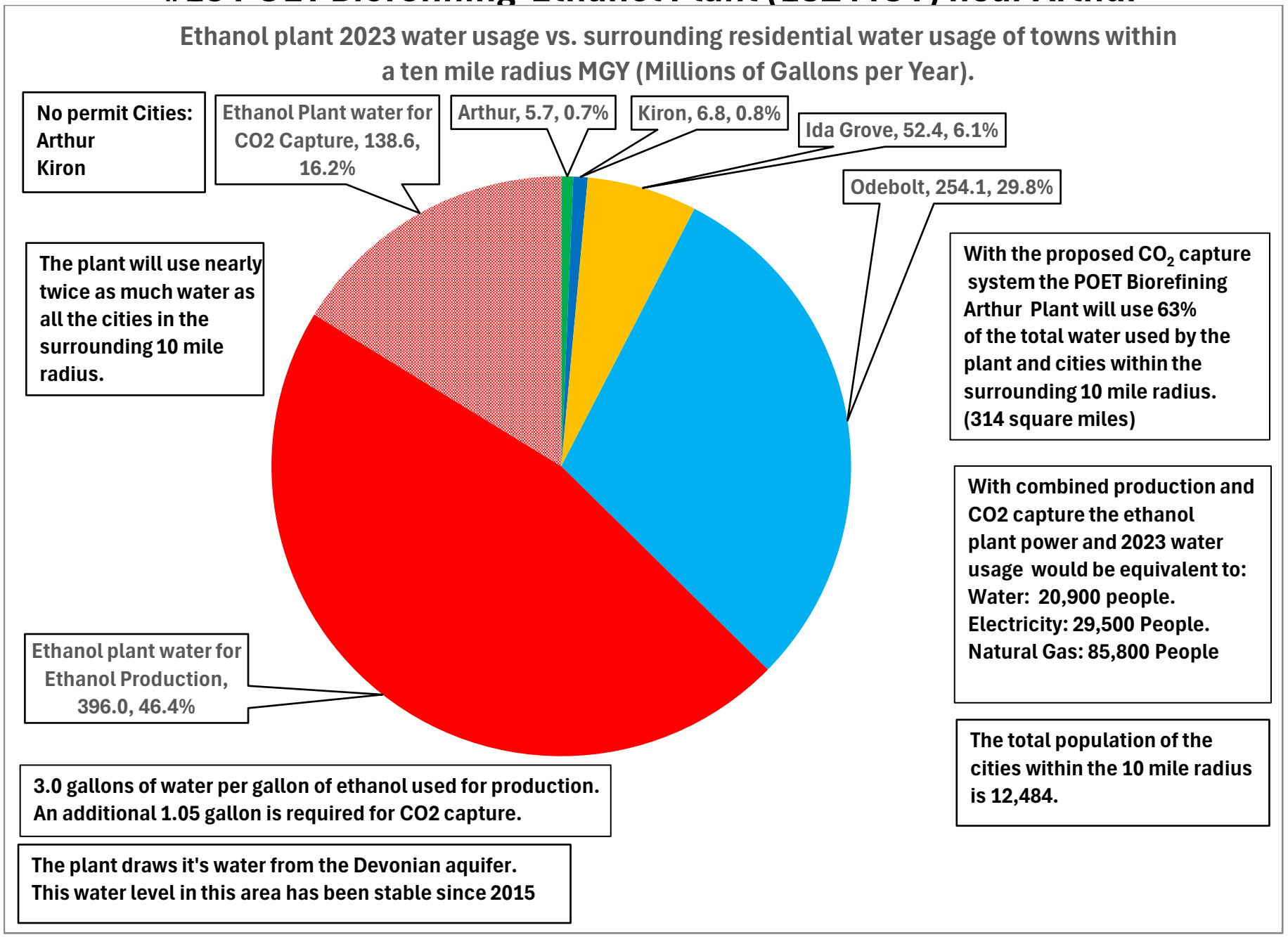
Ethanol Plant with CO_2 Capture						
No.	**Ethanol Plant/ Town**	**Population**	****Water Permit Value MGY**	****2023 Water Usage MGY**	**2023 Water Usage % of Total**	**Comments**
Ethanol Plant - Near Arthur, Iowa		-	-	-	-	City residential use assumes 70 gal./person/day
1	Arthur	222	5.7	5.7	0.7%	Water usage too small to require a permit
2	Kiron	267	6.8	6.8	0.8%	Water usage too small to require a permit
3	Ida Grove	2051	52.4	52.4	6.1%	
4	Odebolt	9944	254.1	254.1	29.8%	
5	Ethanol plant water for Ethanol Production		761.0	396.0	46.4%	Without CO2 Capture water requirement
6	Ethanol Plant water for CO_2 Capture		138.6	138.6	16.2%	Additional CO_2 Capture water requirement
	Total Plant and Towns	12,484	1218.6	853.6	100.0%	
	Percentage of ethanol plant usage of total water usage		73.8%	62.63%		
Conclusion: With CO2 Capture						
	This ethanol plant consumes 63% of the water used by the cities and plant within the surrounding 10 mile radius (314 square miles)					

***Ethanol Production Capacity of Plant - MGY**	**132**
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	138.6
Calculate ratio of gallons of water/ gallons of Ethanol	3.0
Total water requirement of towns and Ethanol plant - MGY	853.6
Total water requirement of towns - MGY	319.0
Total water requirement for ethanol plant - MGY	534.6
Ratio of ethanol plant water use vs. surrounding area	1.68
Percentage of ethanol plant usage of total water usage	62.6%
Total Population within the 10 mile radius	12,484

#15 POET Biorefining - Arthur 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	15,499
Equivalent # of people ethanol plant water use w/ CO2 capture	**20,924**
Electricity Use	
Electricity to produce Ethanol - kWh/ gallon EtOH for production	0.6
Total Electricity used to produce ethanol - kWh	79,200,000
Electrical use to capture CO2 - kWh/ gallon EtOH	0.377
Total Electricity used to capture CO2 - kWh	49,764,000
Total electricity to produce ethanol and capture CO2 - kWh	1.290E+08
Typical electrical use/ residence - kWh/year	10,476.0
Equivalent number of residences	12,310.4
Number of people / residence	2.4
Equivalent number of people	**29,545**
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	3.432E+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	35,750
Number of people / residence	2.4
Equivalent number of people	**85,800**
* Ethanol Capacity per Iowa Renewable Fuels Association	** Water usage per the greater of DNR WACOP Permit or 3 times ethanol capacity.

#15 POET Biorefining Ethanol Plant (132 MGY) near Arthur



ATTACHMENT T: Water usage charts for POET, Ashton

#16 POET Biorefining - Ashton 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 Ashton, Iowa			-	-		
	POET Biorefining - Ashton Plant		250	204		Without CO_2 capture water requirement
	Combined Towns All Water Usage		290.0	290.0		City residential use assumes 70 gal./person/day
1	Matlock	74	1.9	1.9		Water usage too small to require a permit
2	Ashton	436	11.1	11.1		Water usage too small to require a permit
3	George	1,077	27.5	27.5		
4	Sanborn	1,392	35.6	35.6		
5	Sibley	2,860	73.1	73.1		
6	Sheldon	5,512	140.8	140.8		
	Percentage of ethanol plant usage of total water usage	11,351	46.3%	41.3%		
Conclusion: Without CO2 Capture						
	This ethanol plant consumes 41% of the water used by the cities and plant within the surrounding 10 mile radius (314 square miles).					

#16 POET Biorefining - Ashton Ethanol Plant Energy and Water Usage vs. Cities within a 10 mile radius

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 Ashton, Iowa		-	-	-	-	City residential use assumes 70 gal./person/day
1	Matlock	74	1.9	1.9	0.3%	Water usage too small to require a permit
2	Ashton	436	11.1	11.1	2.0%	Water usage too small to require a permit
3	George	1077	27.5	27.5	4.9%	
4	Sanborn	1392	35.6	35.6	6.3%	
5	Sibley	2860	73.1	73.1	12.9%	
6	Sheldon	5512	140.8	140.8	24.9%	
7	Ethanol plant water for Ethanol Production		250	204	36.1%	Without CO2 Capture water requirement
8	Ethanol Plant water for CO_2 Capture		71.4	71.4	12.6%	Additional CO_2 Capture water requirement
	Total Plant and Towns	11,351	611.4	565.4	100.0%	
	Percentage of ethanol plant usage of total water usage		52.6%	48.7%		

Conclusion: With CO2 Capture

This ethanol plant consumes 49% of the water used by the cities and plant within the surrounding 10 mile radius (314 square miles)

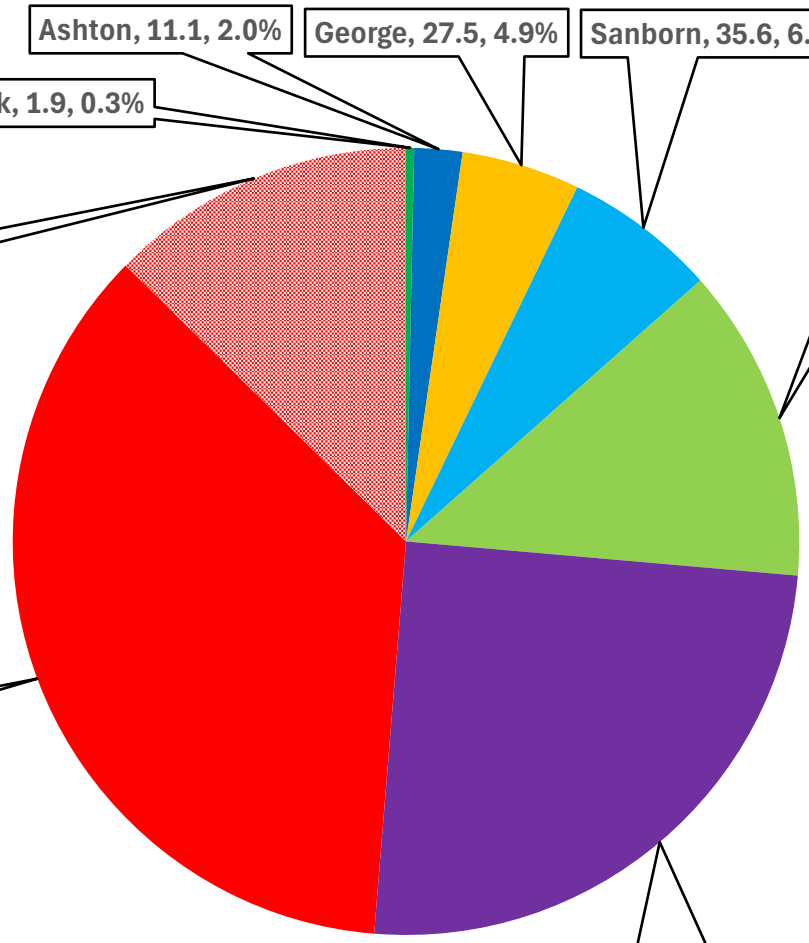
***Ethanol Production Capacity of Plant - MGY**	**68**
Factor: Water required to cool and compress the CO_2 for capture - MGY Water/ MGY Ethanol	1.05
Calculate additional water required for CO_2 Capture - MGY	71.4
Calculate ratio of gallons of water/ gallons of Ethanol	3.0
Total water requirement of towns and Ethanol plant - MGY	565.4
Total water requirement of towns - MGY	290.0
Total water requirement for ethanol plant - MGY	275.4
Ratio of ethanol plant water use vs. surrounding area	0.95
Percentage of ethanol plant usage of total water usage	48.7%
Total Population within the 10 mile radius	11,351

#16 POET Biorefining - Ashton 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	7,984				
Equivalent # of people ethanol plant water use w/ CO2 capture	**10,779**				
Electricity Use					
Electricity to produce Ethanol - kWh/ gallon EtOH for production	0.6				
Total Electricity used to produce ethanol - kWh	40,800,000				
Electrical use to capture CO2 - kWh/ gallon EtOH	0.377				
Total Electricity used to capture CO2 - kWh	25,636,000				
Total electricity to produce ethanol and capture CO2 - kWh	6.644E+07				
Typical electrical use/ residence - kWh/year	10,476.0				
Equivalent number of residences	6,341.7				
Number of people / residence	2.4				
Equivalent number of people	**15,220**				
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	1.768E+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	18,417				
Number of people / residence	2.4				
Equivalent number of people	**44,200**				
* Ethanol Capacity per Iowa Renewable Fuels Association	** Water usage per the greater of DNR WACOP Permit or 3 times ethanol capacity.				

#16 POET Biorefining Ethanol Plant (68 MGY) near Ashton

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:
Matlock
Ashton

The plant uses as much water as all the surrounding cities within a 10 mile radius.

With the proposed CO_2 capture system the POET Biorefining Ashton Plant will use 49% 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: 10,800 people.
Electricity: 15,200 People.
Natural Gas: 44,200 People

The total population of the cities within the 10 mile radius is 11,351.

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 an unconsolidated aquifer. This water level in this area has been stable since 2015.

ATTACHMENT U: Water usage charts for Valero, Charles City

#17 Valero Renewable Fuels - Charles City 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 Charles City, Iowa			-	-		
	Valero Renewable Fuels - Charles City		420	420		Without CO_2 capture water requirement
	Combined Towns All Water Usage		229.9	229.9		City residential use assumes 70 gal./person/day
1	Roseville	50	1.3	1.3		Water usage too small to require a permit
2	Orchard	68	1.7	1.7		Water usage too small to require a permit
3	Colwell	55	1.4	1.4		
4	Floyd	313	8.0	8.0		
5	Rudd	358	9.1	9.1		
6	Rockford	758	19.4	19.4		
7	Charles City	7,396	189.0	189.0		
	Percentage of ethanol plant usage of total water usage	8,998	64.6%	64.6%		
Conclusion: Without CO2 Capture						
	This ethanol plant consumes 65% of the water used by the cities and plant within the surrounding 10 mile radius (314 square miles).					

#17 Valero Renewable Fuels - Charles City Ethanol Plant Energy and Water Usage vs. Cities within a 10 mile radius

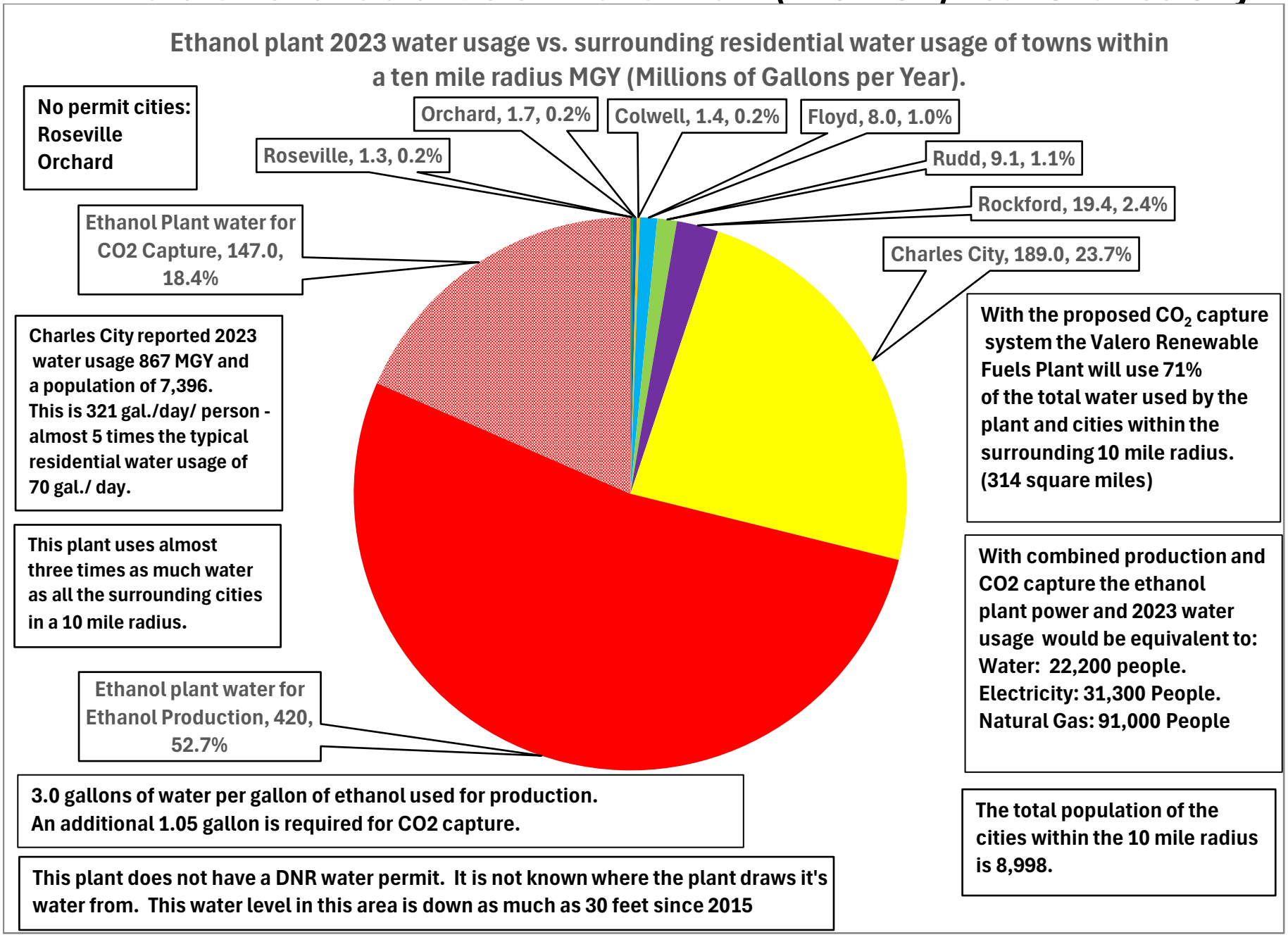
Ethanol Plant with CO_2 Capture						
No.	**Ethanol Plant/ Town**	**Population**	****Water Permit Value MGY**	****2023 Water Usage MGY**	**2023 Water Usage % of Total**	**Comments**
Ethanol Plant - Near Charles City, Iowa		-	-	-	-	City residential use assumes 70 gal./person/day
1	Roseville	50	1.3	1.3	0.2%	Water usage too small to require a permit
2	Orchard	68	1.7	1.7	0.2%	Water usage too small to require a permit
3	Colwell	55	1.4	1.4	0.2%	
4	Floyd	313	8.0	8.0	1.0%	
5	Rudd	358	9.1	9.1	1.1%	
6	Rockford	758	19.4	19.4	2.4%	
7	Charles City	7396	189.0	189.0	23.7%	
8	Ethanol plant water for Ethanol Production		420	420	52.7%	Without CO2 Capture water requirement
9	Ethanol Plant water for CO_2 Capture		147.0	147.0	18.4%	Additional CO_2 Capture water requirement
	Total Plant and Towns	8,998	796.9	796.9	100.0%	
	Percentage of ethanol plant usage of total water usage		71.2%	71.2%		
Conclusion: With CO2 Capture						
	This ethanol plant consumes 71% of the water used by the cities and plant within the surrounding 10 mile radius (314 square miles)					

***Ethanol Production Capacity of Plant - MGY**	**140**
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	147
Calculate ratio of gallons of water/ gallons of Ethanol	3.0
Total water requirement of towns and Ethanol plant - MGY	796.9
Total water requirement of towns - MGY	229.9
Total water requirement for ethanol plant - MGY	567.0
Ratio of ethanol plant water use vs. surrounding area	2.47
Percentage of ethanol plant usage of total water usage	71.2%
Total Population within the 10 mile radius	8,998

#17 Valero Renewable Fuels - Charles City 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	16,438
Equivalent # of people ethanol plant water use w/ CO2 capture	**22,192**
Electricity Use	
Electricity to produce Ethanol - kWh/ gallon EtOH for production	0.6
Total Electricity used to produce ethanol - kWh	84,000,000
Electrical use to capture CO2 - kWh/ gallon EtOH	0.377
Total Electricity used to capture CO2 - kWh	52,780,000
Total electricity to produce ethanol and capture CO2 - kWh	1.368E+08
Typical electrical use/ residence - kWh/year	10,476.0
Equivalent number of residences	13,056.5
Number of people / residence	2.4
Equivalent number of people	**31,336**
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	3.640E+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	37,917
Number of people / residence	2.4
Equivalent number of people	**91,000**
* Ethanol Capacity per Iowa Renewable Fuels Association	** Water usage per the greater of DNR WACOP Permit or 3 times ethanol capacity.

#17 Valero Renewable Fuels Ethanol Plant (140 MGY) near Charles City



ATTACHMENT V: Water usage charts for POET, Coon Rapids

#18 POET Biorefining - Coon Rapids 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 Coon Rapids, Iowa			-	-		
	Poet Biorefining - Coon Rapids Plant		237.4	195.0		Without CO_2 capture water requirement
	Combined Towns All Water Usage		55.2	55.2		City residential use assumes 70 gal./person/day
1	Dedham	224	5.7	5.7		Water usage too small to require a permit
2	Bagley	233	6.0	6.0		Water usage too small to require a permit
3	Bayard	405	10.3	10.3		
4	Coon Rapids	1,300	33.2	33.2		
	Percentage of ethanol plant usage of total water usage	2,162	81.1%	77.9%		
Conclusion: Without CO2 Capture						
	This ethanol plant consumes 78% of the water used by the cities and plant within the surrounding 10 mile radius (314 square miles).					

#18 POET Biorefining - Coon Rapids Ethanol Plant Energy and Water Usage vs. Cities within a 10 mile radius

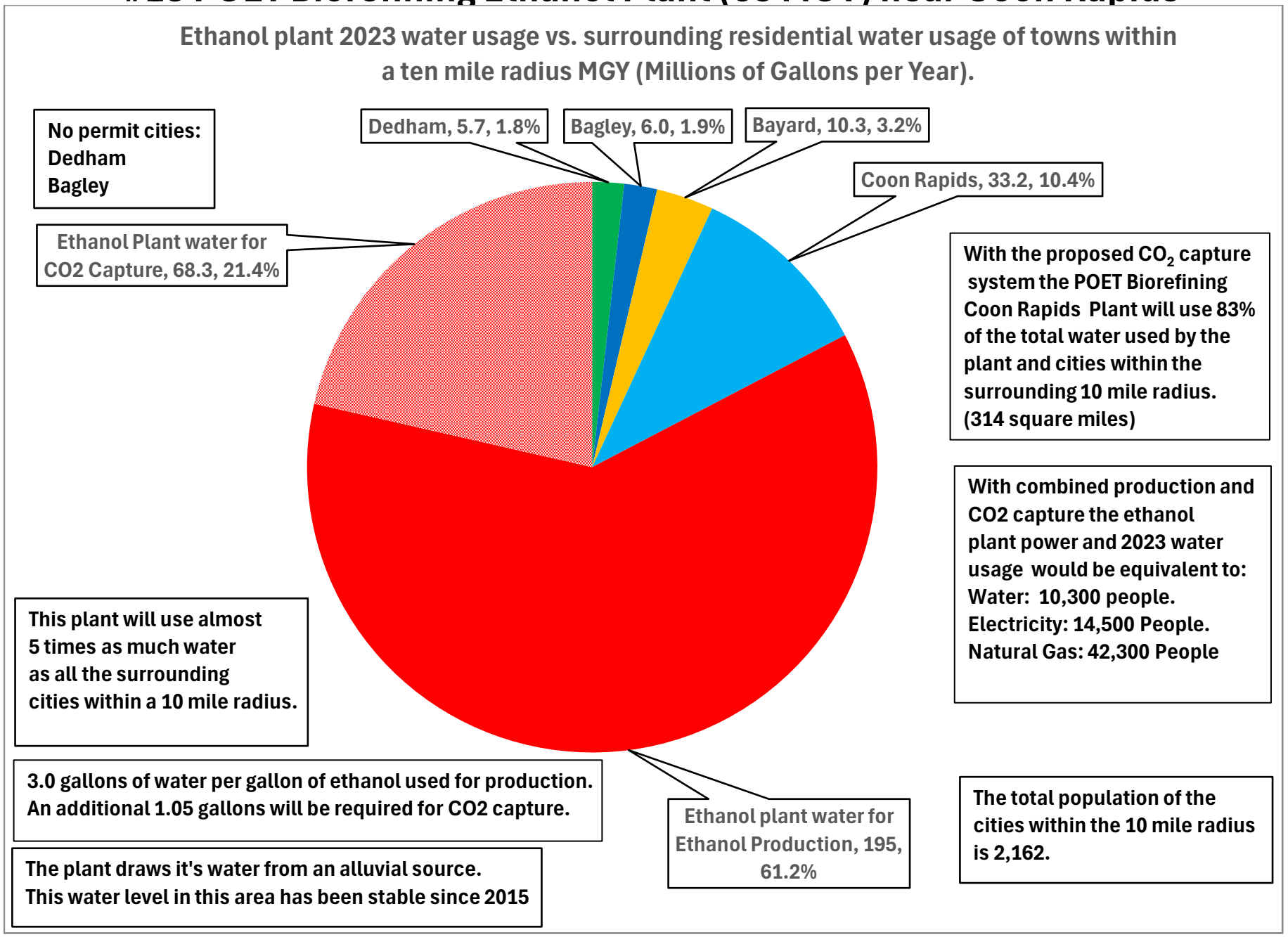
Ethanol Plant with CO_2 Capture						
No.	**Ethanol Plant/ Town**	**Population**	****Water Permit Value MGY**	****2023 Water Usage MGY**	**2023 Water Usage % of Total**	**Comments**
Ethanol Plant - Near Coon Rapids, Iowa		-	-	-	-	City residential use assumes 70 gal./person/day
1	Dedham	224	5.7	5.7	1.8%	Water usage too small to require a permit
2	Bagley	233	6.0	6.0	1.9%	Water usage too small to require a permit
3	Bayard	405	10.3	10.3	3.2%	
4	Coon Rapids	1300	33.2	33.2	10.4%	
5	Ethanol plant water for Ethanol Production		237.4	195	61.2%	Without CO2 Capture water requirement
6	Ethanol Plant water for CO_2 Capture		68.3	68.3	21.4%	Additional CO_2 Capture water requirement
	Total Plant and Towns	2,162	360.9	318.5	100.0%	
	Percentage of ethanol plant usage of total water usage		84.7%	82.7%		
Conclusion: With CO2 Capture						
	This ethanol plant consumes 83% of the water used by the cities and plant within the surrounding 10 mile radius (314 square miles)					

***Ethanol Production Capacity of Plant - MGY**	**65**
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	68.25
Calculate ratio of gallons of water/ gallons of Ethanol	3.0
Total water requirement of towns and Ethanol plant - MGY	318.5
Total water requirement of towns - MGY	55.2
Total water requirement for ethanol plant - MGY	263.3
Ratio of ethanol plant water use vs. surrounding area	4.77
Percentage of ethanol plant usage of total water usage	82.7%
Total Population within the 10 mile radius	2,162

#18 POET Biorefining - Coon Rapids 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	7,632
Equivalent # of people ethanol plant water use w/ CO2 capture	**10,303**
Electricity Use	
Electricity to produce Ethanol - kWh/ gallon EtOH for production	0.6
Total Electricity used to produce ethanol - kWh	39,000,000
Electrical use to capture CO2 - kWh/ gallon EtOH	0.377
Total Electricity used to capture CO2 - kWh	24,505,000
Total electricity to produce ethanol and capture CO2 - kWh	6.351E+07
Typical electrical use/ residence - kWh/year	10,476.0
Equivalent number of residences	6,062.0
Number of people / residence	2.4
Equivalent number of people	**14,549**
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	1.690E+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	17,604
Number of people / residence	2.4
Equivalent number of people	**42,250**
* Ethanol Capacity per Iowa Renewable Fuels Association	** Water usage per the greater of DNR WACOP Permit or 3 times ethanol capacity.

#18 POET Biorefining Ethanol Plant (65 MGY) near Coon Rapids



ATTACHMENT W: Water usage charts for POET, Corning

#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).					

#19 POET Biorefining - Corning Ethanol Plant Energy and Water Usage vs. Cities within a 10 mile radius

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)

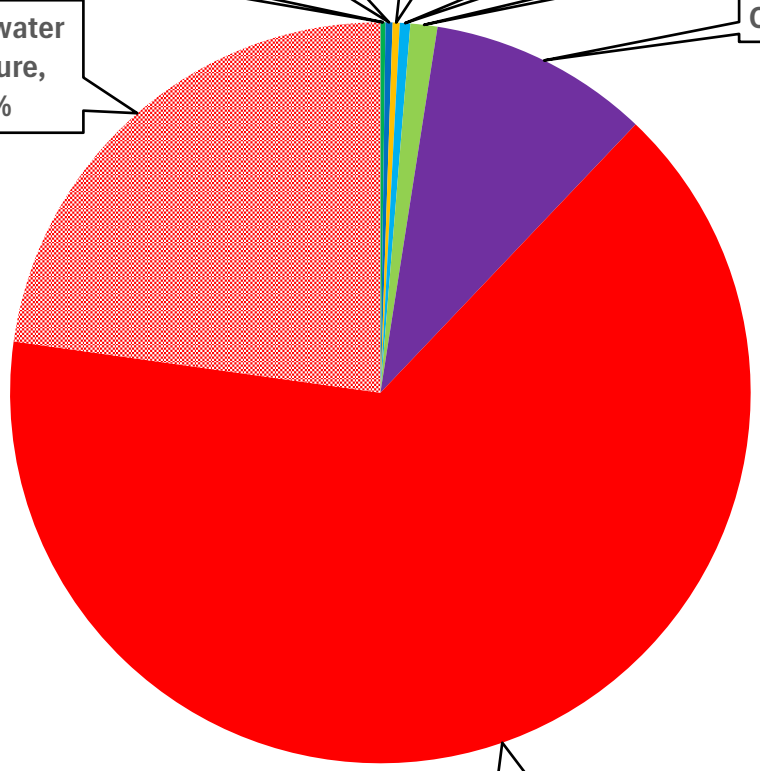
***Ethanol Production Capacity of Plant - MGY**	**90**
Factor: Water required to cool and compress the CO_2 for capture - MGY Water/ MGY Ethanol	1.05
Calculate additional water required for CO_2 Capture - MGY	94.5
Calculate ratio of gallons of water/ gallons of Ethanol	3.0
Total water requirement of 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.

ATTACHMENT X: Water usage charts for POET, Emmetsburg

#20 POET Biorefining - Emmetsburg 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 Emmetsburg, Iowa			-	-		
	POET Biorefining - Emmetsburg Plant		350	211.1		Without CO_2 capture water requirement
	Combined Towns All Water Usage		123.3	123.3		City residential use assumes 70 gal./person/day
1	Rodman	31	0.8	0.8		Water usage too small to require a permit
2	Curlew	37	0.9	0.9		Water usage too small to require a permit
3	Cylinder	87	2.2	2.2		Water usage too small to require a permit
4	Ayrshire	133	3.4	3.4		Water usage too small to require a permit
5	Graettinger	832	21.3	21.3		
6	Emmetsburg	3,706	94.7	94.7		
	Percentage of ethanol plant usage of total water usage	4,826	73.9%	63.1%		
Conclusion: Without CO2 Capture						
	This ethanol plant consumes 63% of the water used by the cities and plant within the surrounding 10 mile radius (314 square miles).					

#20 POET Biorefining - Emmetsburg Ethanol Plant Energy and Water Usage vs. Cities within a 10 mile radius

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 Emmetsburg, Iowa		-	-	-	-	City residential use assumes 70 gal./person/day
1	Rodman	31	0.8	0.8		Water usage too small to require a permit
2	Curlew	37	0.9	0.9		Water usage too small to require a permit
3	Cylinder	87	2.2	2.2		Water usage too small to require a permit
4	Ayrshire	133	3.4	3.4		Water usage too small to require a permit
	No Permit	288	7.3584	7.3584	1.8%	
5	Graettinger	832	21.3	21.3	5.2%	
6	Emmetsburg	3706	94.7	94.7	23.3%	
7	Ethanol plant water for Ethanol Production		350	211.1	52.0%	Without CO2 Capture water requirement
8	Ethanol Plant water for CO_2 Capture		71.4	71.4	17.6%	Additional CO_2 Capture water requirement
	Total Plant and Towns	4,826	544.7	405.8	100.0%	
	Percentage of ethanol plant usage of total water usage		77.4%	69.6%		

Conclusion: With CO2 Capture

This ethanol plant consumes 70% of the water used by the cities and plant within the surrounding 10 mile radius (314 square miles)

***Ethanol Production Capacity of Plant - MGY**	**68**
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	71.4
Calculate ratio of gallons of water/ gallons of Ethanol	3.1
Total water requirement of towns and Ethanol plant - MGY	413.1
Total water requirement of towns - MGY	130.7
Total water requirement for ethanol plant - MGY	282.5
Ratio of ethanol plant water use vs. surrounding area	2.16
Percentage of ethanol plant usage of total water usage	68.4%
Total Population within the 10 mile radius	4,826

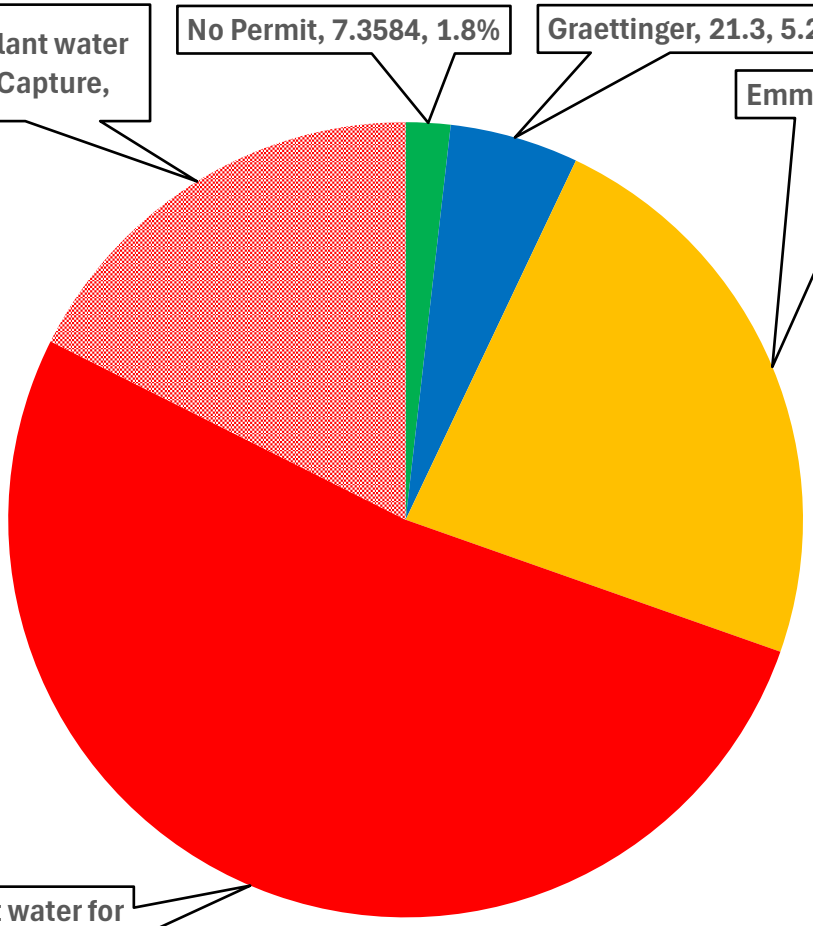
#20 POET Biorefining - Emmetsburg Ethanol Plant Energy and Water Usage vs. Cities within a 10 mile radius

Water Use	
Typical water use per person per day - Gallons/ person/ day	70
Equivalent # of people ethanol plant water use w/o CO2 capture	8,261
Equivalent # of people ethanol plant water use w/ CO2 capture	**11,056**
Electricity Use	
Electricity to produce Ethanol - kWh/ gallon EtOH for production	0.6
Total Electricity used to produce ethanol - kWh	40,800,000
Electrical use to capture CO2 - kWh/ gallon EtOH	0.377
Total Electricity used to capture CO2 - kWh	25,636,000
Total electricity to produce ethanol and capture CO2 - kWh	6.644E+07
Typical electrical use/ residence - kWh/year	10,476.0
Equivalent number of residences	6,341.7
Number of people / residence	2.4
Equivalent number of people	**15,220**
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	1.768E+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	18,417
Number of people / residence	2.4
Equivalent number of people	**44,200**
* Ethanol Capacity per Iowa Renewable Fuels Association	** Water usage per the greater of DNR WACOP Permit or 3 times ethanol capacity.

#20 POET Biorefining Ethanol Plant (68 MGY) near Emmetsburg

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:
Rodman
Curlew
Cylinder
Ayrshire



This plant will use over twice the water used by all the cities in the surrounding 10 mile radius.

Emmetsburg reported 2023 water usage of 214 MGY and a population of 3,706. This is 158 gal./person/ day - 2.3 times the typical residential water usage of 70 gal./ day.

With the proposed CO_2 capture system the POET Biorefining Emmetsburg Plant will use 70% 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: 11,100 people. Electricity: 15,200 People. Natural Gas: 44,200 People

The total population of the cities within the 10 mile radius is 4.826.

3.1 gallons of water per gallon of ethanol used for production. An additional 1.05 gallons will be 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

ATTACHMENT Y: Water usage charts for POET, Fairbank

#21 POET Biorefining - Fairbank 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 Fairbank, Iowa			-	-		
	POET Biorefining - Fairbank Plant		578	396		Without CO_2 capture water requirement
	Combined Towns All Water Usage		307.6	307.6		City residential use assumes 70 gal./person/day
1	Littleton	50	1.3	1.3		Water usage too small to require a permit
2	Oran	50	1.3	1.3		Water usage too small to require a permit
3	Hazelton	713	18.2	18.2		Water usage too small to require a permit
4	Dunkerton	842	21.5	21.5		
5	Readlyn	845	21.6	21.6		
6	Fairbank	1,111	28.4	28.4		No DNR Water Permit
7	Jesup	2,508	64.1	64.1		
8	Oelwein	5,920	151.3	151.3		
	Percentage of ethanol plant usage of total water usage	12039	65.3%	56.3%		
Conclusion: Without CO2 Capture						
	This ethanol plant consumes 56% of the water used by the cities and plant within the surrounding 10 mile radius (314 square miles).					

#21 POET Biorefining - Fairbank Ethanol Plant Energy and Water Usage vs. Cities within a 10 mile radius

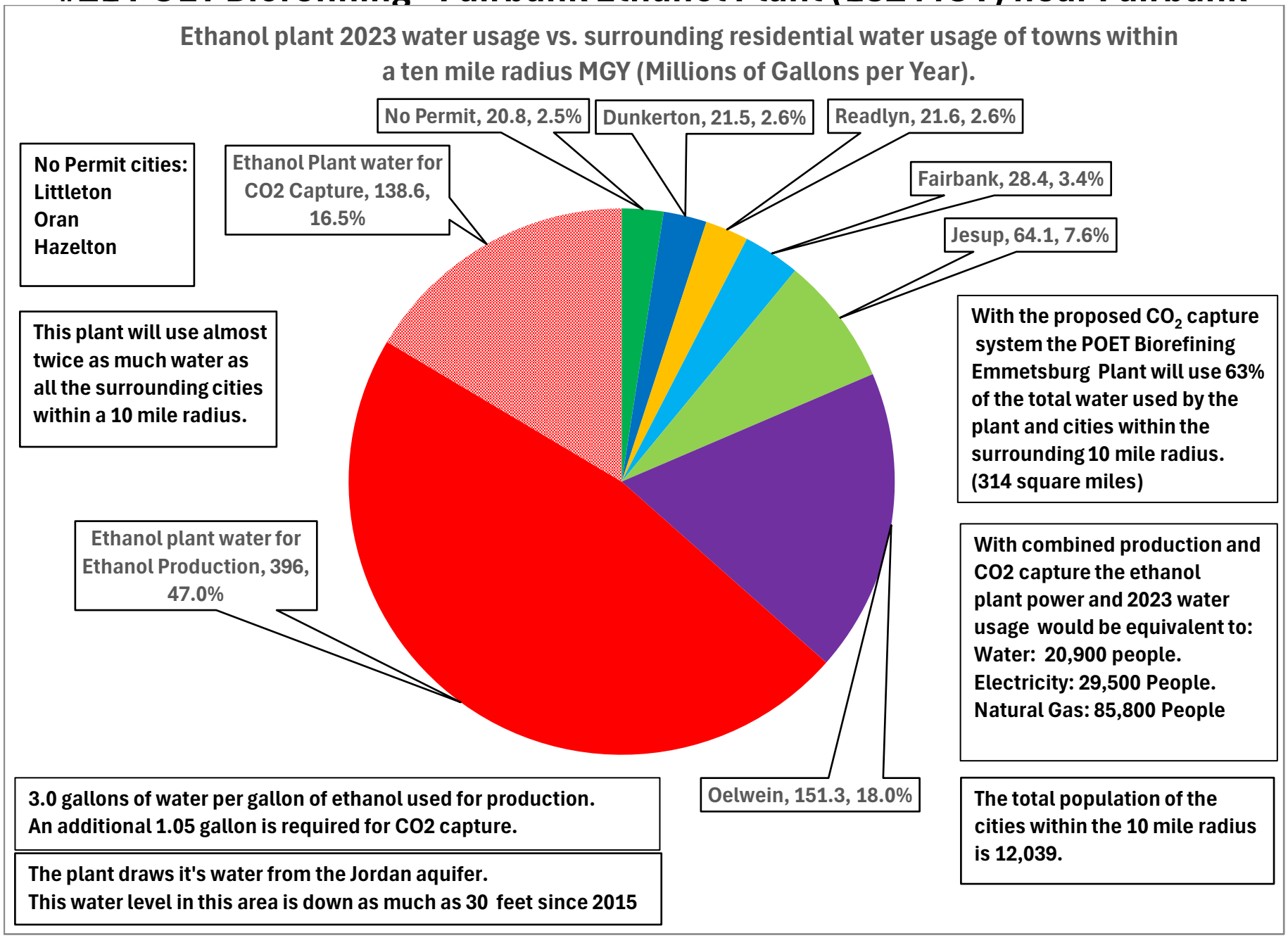
Ethanol Plant with CO_2 Capture						
No.	**Ethanol Plant/ Town**	**Population**	****Water Permit Value MGY**	****2023 Water Usage MGY**	**2023 Water Usage % of Total**	**Comments**
Ethanol Plant - Near Fairbank, Iowa		-	-	-	-	City residential use assumes 70 gal./person/day
1	Littleton	50	1.3	1.3		Water usage too small to require a permit
2	Oran	50	1.3	1.3		Water usage too small to require a permit
3	Hazelton	713	18.2	18.2		Water usage too small to require a permit
	No Permit	813	20.8	20.8	2.5%	
4	Dunkerton	842	21.5	21.5	2.6%	
5	Readlyn	845	21.6	21.6	2.6%	
6	Fairbank	1111	28.4	28.4	3.4%	No DNR Water Permit
7	Jesup	2508	64.1	64.1	7.6%	
8	Oelwein	5920	151.3	151.3	18.0%	
9	Ethanol plant water for Ethanol Production		578	396	47.0%	Without CO2 Capture water requirement
10	Ethanol Plant water for CO_2 Capture		138.6	138.6	16.5%	Additional CO_2 Capture water requirement
	Total Plant and Towns	12,039	1024.2	842.2	100.0%	
	Percentage of ethanol plant usage of total water usage		70.0%	63.48%		
Conclusion: With CO2 Capture						
	This ethanol plant consumes 63% of the water used by the cities and plant within the surrounding 10 mile radius (314 square miles)					

***Ethanol Production Capacity of Plant - MGY**	**132**
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	138.6
Calculate ratio of gallons of water/ gallons of Ethanol	3.0
Total water requirement of towns and Ethanol plant - MGY	863.0
Total water requirement of towns - MGY	328.4
Total water requirement for ethanol plant - MGY	534.6
Ratio of ethanol plant water use vs. surrounding area	1.63
Percentage of ethanol plant usage of total water usage	61.9%
Total Population within the 10 mile radius	12,039

#21 POET Biorefining - Fairbank 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	15,499
Equivalent # of people ethanol plant water use w/ CO2 capture	**20,924**
Electricity Use	
Electricity to produce Ethanol - kWh/ gallon EtOH for production	0.6
Total Electricity used to produce ethanol - kWh	79,200,000
Electrical use to capture CO2 - kWh/ gallon EtOH	0.377
Total Electricity used to capture CO2 - kWh	49,764,000
Total electricity to produce ethanol and capture CO2 - kWh	1.290E+08
Typical electrical use/ residence - kWh/year	10,476.0
Equivalent number of residences	12,310.4
Number of people / residence	2.4
Equivalent number of people	**29,545**
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	3.432E+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	35,750
Number of people / residence	2.4
Equivalent number of people	**85,800**
* Ethanol Capacity per Iowa Renewable Fuels Association	** Water usage per the greater of DNR WACOP Permit or 3 times ethanol capacity.

#21 POET Biorefining - Fairbank Ethanol Plant (132 MGY) near Fairbank



ATTACHMENT Z: Water usage charts for Valero, Fort Dodge

#22 Valero Renewable Fuels Ethanol Fort Dodge Plant Energy and Water Usage

Ethanol Plant without CO_2 Capture						
No.	**Ethanol Plant/ Town**	**Population**	****Water Permit Value MGY**	****2023 Water Usage MGY**		**Comments**
Ethanol Plant - Near Fort Dodge Iowa			-	-		
	Valero Renewable Fuels Fort Dodge		330	330		Without CO_2 capture water requirement
	Combined Towns All Water Usage		672.0	672.0		City residential use assumes 70 gal./person/day
1	Coalville	50	1.3	1.3		Water usage too small to require a permit
2	Kalo	50	1.3	1.3		Water usage too small to require a permit
3	Knierim	53	1.4	1.4		
4	Clare	136	3.5	3.5		
5	Moorland	168	4.3	4.3		
6	Barnum	175	4.5	4.5		
7	Callender	368	9.4	9.4		
8	Otho	429	11.0	11.0		
9	Fort Dodge	24,871	635.5	635.5		
	Percentage of ethanol plant usage of total water usage	26,300	32.9%	32.9%		
Conclusion: Without CO2 Capture						
	This ethanol plant consumes 33% of the water used by the cities and plant within the surrounding 10 mile radius (314 square miles).					

#22 Valero Renewable Fuels Ethanol Fort Dodge Plant Energy and Water Usage

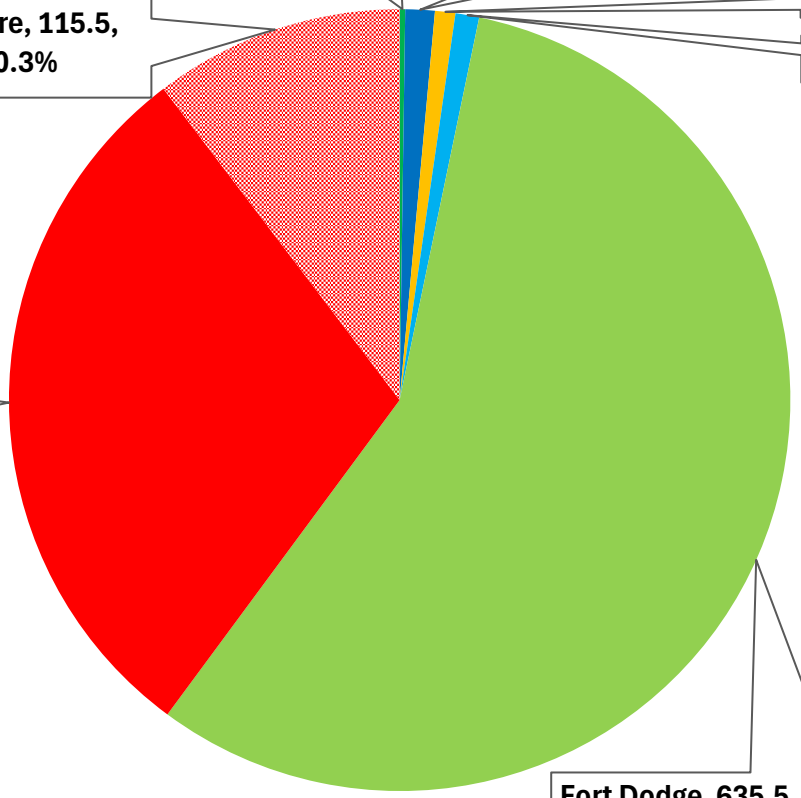
Ethanol Plant with CO_2 Capture						
No.	**Ethanol Plant/ Town**	**Population**	****Water Permit Value MGY**	****2023 Water Usage MGY**	**2023 Water Usage % of Total**	**Comments**
Ethanol Plant - Near Fort Dodge Iowa		-	-	-	-	City residential use assumes 70 gal./person/day
1	Coalville	50	1.3	1.3		Water usage too small to require a permit
2	Kalo	50	1.3	1.3		Water usage too small to require a permit
3	Knierim	53	1.4	1.4		Permit less than 5
4	Clare	136	3.5	3.5		Permit less than 5
5	Moorland	168	4.3	4.3		Permit less than 5
6	Barnum	175	4.5	4.5		Permit less than 5
	No Permit	100	2.6	2.6	0%	
	Permits less than 5 MGY	532	13.6	13.6	1%	
7	Callender	368	9.4	9.4	1%	
8	Otho	429	11.0	11.0	1%	
9	Fort Dodge	24871	635.5	635.5	57%	
10	Ethanol plant water for Ethanol Production		330	330	30%	Without CO2 Capture water requirement
11	Ethanol Plant water for CO_2 Capture		115.5	115.5	10%	Additional CO_2 Capture water requirement
	Total Plant and Towns	26300	1117.5	1117.5	100.00%	
	Percentage of ethanol plant usage of total water usage		39.9%	39.9%		
Conclusion: With CO2 Capture						
	This ethanol plant consumes 40% of the water used by the cities and plant within the surrounding 10 mile radius (314 square miles)					
***Ethanol Production Capacity of Plant - MGY**		**110**				
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		115.5				
Calculate ratio of gallons of water/ gallons of Ethanol		3.0				
Total water requirement of towns and Ethanol plant - MGY		1133.6				
Total water requirement of towns - MGY		688.1				
Total water requirement for ethanol plant - MGY		445.5				
Ratio of ethanol plant water use vs. surrounding area		0.65				
Percentage of ethanol plant usage of total water usage		39.3%				
Total population within the 10 mile radius		**26,300**				

#22 Valero Renewable Fuels Ethanol Fort Dodge Plant Energy and Water Usage

Water Use	
Typical water use per person per day - Gallons/ person/ day	70
Equivalent # of people ethanol plant water use w/o CO2 capture	12,916
Equivalent # of people ethanol plant water use w/ CO2 capture	**17,436**
Electricity Use	
Electricity to produce Ethanol - kWh/ gallon EtOH for production	0.6
Total Electricity used to produce ethanol - kWh	66,000,000
Electrical use to capture CO2 - kWh/ gallon EtOH	0.377
Total Electricity used to capture CO2 - kWh	41,470,000
Total electricity to produce ethanol and capture CO2 - kWh	107,470,000
Typical electrical use/ residence - kWh/year	10,476.0
Equivalent number of residences	10,258.7
Number of people / residence	2.4
Equivalent number of people	**24,621**
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	2.860E+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	29,792
Number of people / residence	2.4
Equivalent number of people	**71,500**
* Ethanol Capacity per Iowa Renewable Fuels Association	** Water usage per the greater of DNR WACOP Permit or 3 times ethanol capacity.

#22 Valero Renewable Fuels Ethanol Plant (110 MGY) near Fort Dodge

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:
Coalville
Kalo
Less than 5 MGY
Knerium
Clare
Moorland

Ethanol Plant water for CO2 Capture, 115.5, 10.3%

No Permit, 2.6, 0.2%

Permits less than 5 MGY, 13.6, 1.2%

Callender, 9.4, 0.8%

Otho, 11.0, 1.0%

With the proposed CO_2 capture system the Valero Renewable Fuels Fort Dodge Plant will use 40% of the total water used by the plant and cities within the surrounding 10 mile radius. (314 square miles)

Ethanol plant water for Ethanol Production, 330, 29.5%

With combined production and CO2 capture the ethanol plant power and 2023 water usage would be equivalent to:
Water: 17,400 people.
Electricity: 24,600 People.
Natural Gas: 71,500 People

The large use of water by Fort Dodge overshadows any other use of water in the area.

Fort Dodge, 635.5, 56.9%

The total population of the cities within the 10 mile radius is 26,300

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

The plant draws it's water from the Fort Dodge city water system.
Fort Dodge gets it's water from the Mississippian Aquifer.
Water level in this area is down more than 50 feet since 2015

Fort Dodge has a water permit value of 4,000 MGY and used 4,119 MGY in 2023. It uses 454 gal/person/day vs. typical 70. It appears the city provides water to other industries.

ATTACHMENT AA: Water usage charts for POET, Gowrie

#23 POET Biorefining - Gowrie 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 Gowrie, Iowa			-	-		
	POET Biorefining - Gowrie Plant		270	270		Without CO_2 capture water requirement
	Combined Towns All Water Usage		72.3	72.3		City residential use assumes 70 gal./person/day
1	Rinard	38	1.0	1.0		Water usage too small to require a permit
2	Burnside	50	1.3	1.3		Water usage too small to require a permit
3	Lanyon	50	1.3	1.3		Water usage too small to require a permit
4	Somers	128	3.3	3.3		Water usage too small to require a permit
5	Moorland	168	4.3	4.3		
6	Harcourt	264	6.7	6.7		
7	Callender	368	9.4	9.4		
8	Farnhamville	383	9.8	9.8		
9	Otho	429	11.0	11.0		
10	Gowrie	952	24.3	24.3		
	Percentage of ethanol plant usage of total water usage	2830	78.9%	78.9%		
Conclusion: Without CO2 Capture						
	This ethanol plant consumes 79% of the water used by the cities and plant within the surrounding 10 mile radius (314 square miles).					

#23 POET Biorefining - Gowrie Ethanol Plant Energy and Water Usage vs. Cities within a 10 mile radius

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 Gowrie, Iowa		-	-	-	-	City residential use assumes 70 gal./person/day
1	Rinard	38	1.0	1.0		Water usage too small to require a permit
2	Burnside	50	1.3	1.3		Water usage too small to require a permit
3	Lanyon	50	1.3	1.3		Water usage too small to require a permit
4	Somers	128	3.3	3.3		Water usage too small to require a permit
	No Permit	266	6.8	6.8	1.6%	
5	Moorland	168	4.3	4.3	1.0%	
6	Harcourt	264	6.7	6.7	1.5%	
7	Callender	368	9.4	9.4	2.2%	
8	Farnhamville	383	9.8	9.8	2.2%	
9	Otho	429	11.0	11.0	2.5%	
10	Gowrie	952	24.3	24.3	5.6%	
11	Ethanol plant water for Ethanol Production		270	270	61.8%	Without CO2 Capture water requirement
12	Ethanol Plant water for CO_2 Capture		94.5	94.5	21.6%	Additional CO_2 Capture water requirement
	Total Plant and Towns	2,830	436.8	436.8	100.0%	
	Percentage of ethanol plant usage of total water usage		83.4%	83.4%		

Conclusion: With CO2 Capture

This ethanol plant consumes 83% of the water used by the cities and plant within the surrounding 10 mile radius (314 square miles)

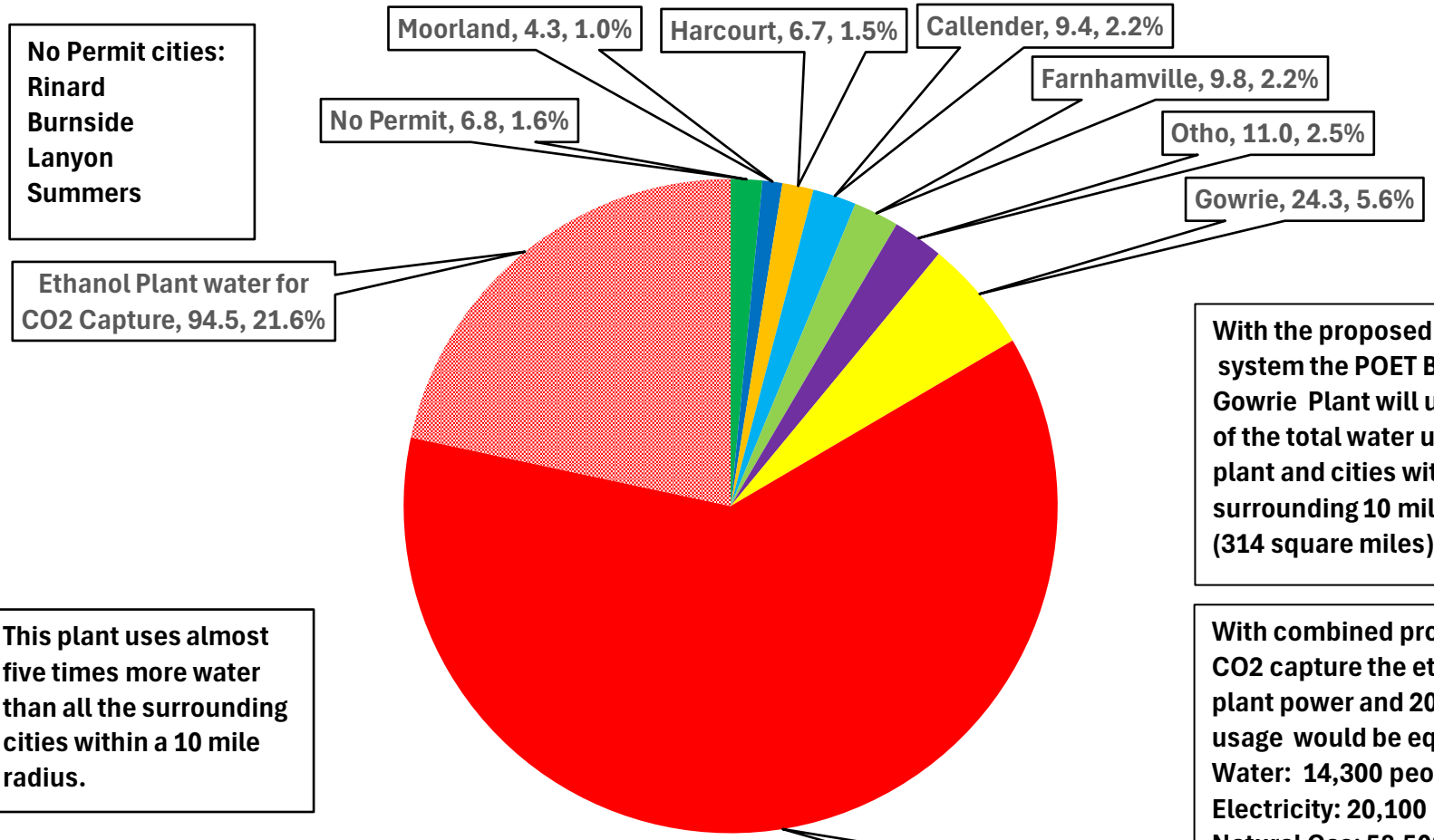
***Ethanol Production Capacity of Plant - MGY**	**90**
Factor: Water required to cool and compress the CO_2 for capture - MGY Water/ MGY Ethanol	1.05
Calculate additional water required for CO_2 Capture - MGY	94.5
Calculate ratio of gallons of water/ gallons of Ethanol	3.0
Total water requirement of towns and Ethanol plant - MGY	443.6
Total water requirement of towns - MGY	79.1
Total water requirement for ethanol plant - MGY	364.5
Ratio of ethanol plant water use vs. surrounding area	4.61
Percentage of ethanol plant usage of total water usage	82.2%
Total Population within the 10 mile radius	2,830

#23 POET Biorefining - Gowrie 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.

#23 POET Biorefining - Gowrie Ethanol Plant (90 MGY) near Gowrie

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:
Rinard
Burnside
Lanyon
Summers

With the proposed CO_2 capture system the POET Biorefining Gowrie Plant will use 83% of the total water used by the plant and cities within the surrounding 10 mile radius. (314 square miles)

This plant uses almost five times more water than all the surrounding cities within a 10 mile radius.

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

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

The plant does not have a DNR water permit.
It is not known where the plant draws it's water from.
This water level in this area is down as much as 30 feet since 2015

The total population of the cities within the 10 mile radius is 2,830.

ATTACHMENT BB: Water usage charts for POET, Hanlontown

#24 POET Biorefining - Hanlontown 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 Hanlontown, Iowa			-	-		
	POET Biorefining - Hanlontown Plant		245.0	240		Without CO_2 capture water requirement
	Combined Towns All Water Usage		308.2	308.2		City residential use assumes 70 gal./person/day
1	Hanlontown	206	5.3	5.3		
2	Joice	208	5.3	5.3		
3	Kensett	257	6.6	6.6		
4	Fertile	305	7.8	7.8		
5	Manly	1,256	32.1	32.1		
6	Lake Mills	2,143	54.8	54.8		
7	Clear lake	7,687	196.4	196.4		
	Percentage of ethanol plant usage of total water usage	12062	44.3%	43.8%		
Conclusion: Without CO2 Capture						
	This ethanol plant consumes 44% of the water used by the cities and plant within the surrounding 10 mile radius (314 square miles).					

#24 POET Biorefining - Hanlontown Ethanol Plant Energy and Water Usage vs. Cities within a 10 mile radius

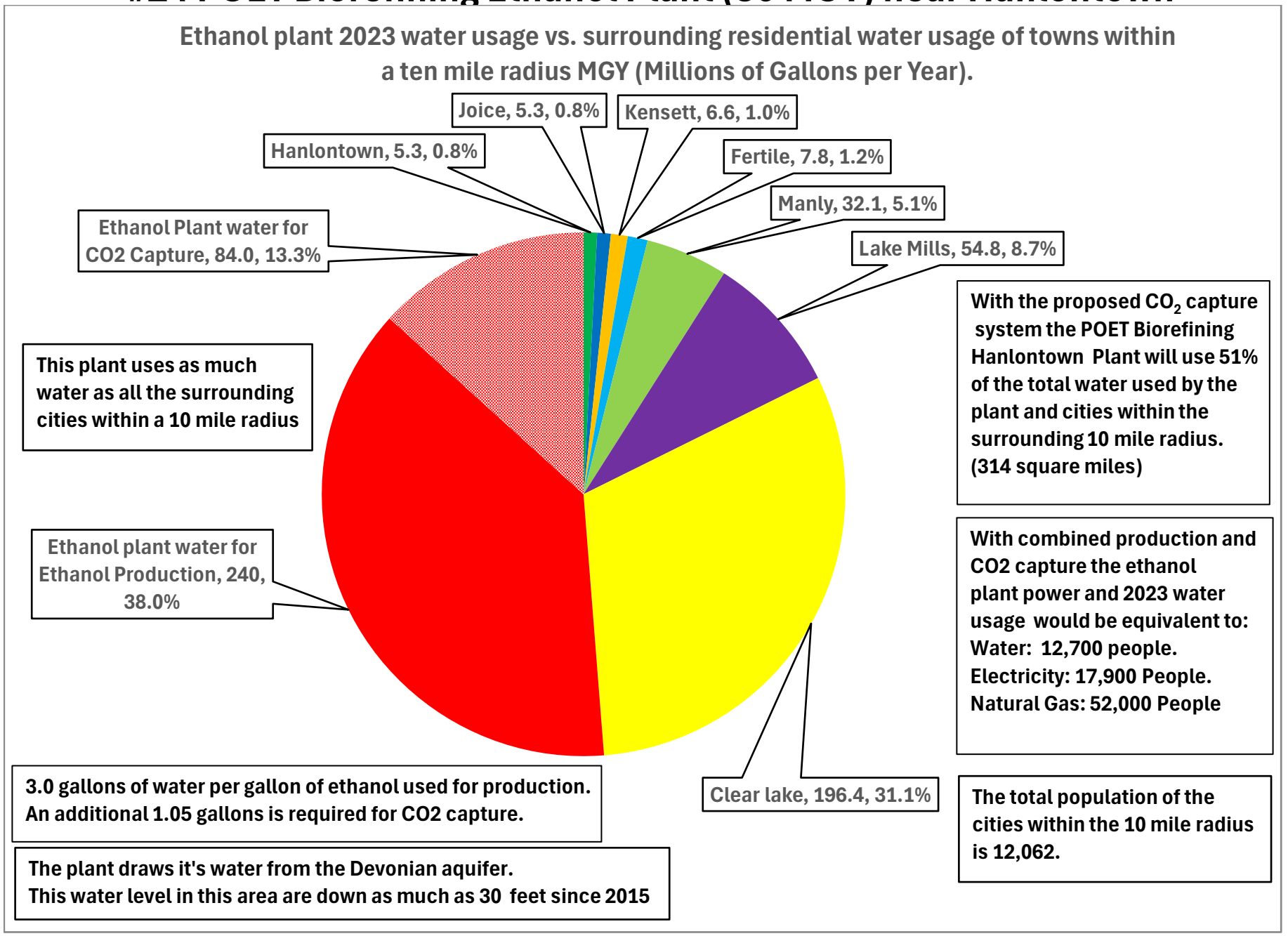
Ethanol Plant with CO_2 Capture						
No.	**Ethanol Plant/ Town**	**Population**	****Water Permit Value MGY**	****2023 Water Usage MGY**	**2023 Water Usage % of Total**	**Comments**
Ethanol Plant - Near Hanlontown, Iowa		-	-	-	-	City residential use assumes 70 gal./person/day
1	Hanlontown	206	5.3	5.3	0.8%	
2	Joice	208	5.3	5.3	0.8%	
3	Kensett	257	6.6	6.6	1.0%	
4	Fertile	305	7.8	7.8	1.2%	
5	Manly	1256	32.1	32.1	5.1%	
6	Lake Mills	2143	54.8	54.8	8.7%	
7	Clear lake	7687	196.4	196.4	31.1%	
8	Ethanol plant water for Ethanol Production		245	240	38.0%	Without CO2 Capture water requirement
9	Ethanol Plant water for CO_2 Capture		84.0	84.0	13.3%	Additional CO_2 Capture water requirement
	Total Plant and Towns	12,062	637.2	632.2	100.0%	
	Percentage of ethanol plant usage of total water usage		51.6%	51.3%		
Conclusion: With CO2 Capture						
	This ethanol plant consumes 51% of the water used by the cities and plant within the surrounding 10 mile radius (314 square miles)					

***Ethanol Production Capacity of Plant - MGY**	**80**
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	84
Calculate ratio of gallons of water/ gallons of Ethanol	3.0
Total water requirement of towns and Ethanol plant - MGY	632.2
Total water requirement of towns - MGY	308.2
Total water requirement for ethanol plant - MGY	324.0
Ratio of ethanol plant water use vs. surrounding area	1.05
Percentage of ethanol plant usage of total water usage	51.3%
Total Population within the 10 mile radius	12,062

#24 POET Biorefining - Hanlontown 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	9,393
Equivalent # of people ethanol plant water use w/ CO2 capture	**12,681**
Electricity Use	
Electricity to produce Ethanol - kWh/ gallon EtOH for production	0.6
Total Electricity used to produce ethanol - kWh	48,000,000
Electrical use to capture CO2 - kWh/ gallon EtOH	0.377
Total Electricity used to capture CO2 - kWh	30,160,000
Total electricity to produce ethanol and capture CO2 - kWh	7.816E+07
Typical electrical use/ residence - kWh/year	10,476.0
Equivalent number of residences	7,460.9
Number of people / residence	2.4
Equivalent number of people	**17,906**
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	2.080E+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	21,667
Number of people / residence	2.4
Equivalent number of people	**52,000**
* Ethanol Capacity per Iowa Renewable Fuels Association	** Water usage per the greater of DNR WACOP Permit or 3 times ethanol capacity.

#24 POET Biorefining Ethanol Plant (80 MGY) near Hanlontown



ATTACHMENT CC: Water usage charts for Valero, Hartley

#25 Valero Renewable Fuels - Hartley 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 Hartley, Iowa			-	-		
	Valero Renewable Fuels - Hartley Plant		570	420		Without CO_2 capture water requirement
	Combined Towns All Water Usage		121.8	121.8		City residential use assumes 70 gal./person/day
1	May City	50	1.28	1.28		Water usage too small to require a permit
2	Moneta	50	1.28	1.28		Water usage too small to require a permit
3	Melvin	199	5.08	5.08		Water usage too small to require a permit
4	Everly	575	14.69	14.69		
5	Primghar	896	22.89	22.89		
6	Sanborn	1,392	35.57	35.57		
7	Hartley	1,605	41.01	41.01		
	Percentage of ethanol plant usage of total water usage	4767	82.4%	77.5%		
Conclusion: Without CO2 Capture						
	This ethanol plant consumes 78% of the water used by the cities and plant within the surrounding 10 mile radius (314 square miles).					

#25 Valero Renewable Fuels - Hartley Ethanol Plant Energy and Water Usage vs. Cities within a 10 mile radius

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 Hartley, Iowa		-	-	-	-	City residential use assumes 70 gal./person/day
1	May City	50	1.3	1.3		Water usage too small to require a permit
2	Moneta	50	1.3	1.3		Water usage too small to require a permit
3	Melvin	199	5.1	5.1		Water usage too small to require a permit
	No Permit	299	7.6	7.6	1.1%	
4	Everly	575	14.7	14.7	2.1%	
5	Primghar	896	22.9	22.9	3.3%	
6	Sanborn	1392	35.6	35.6	5.2%	
7	Hartley	1605	41.0	41.0	6.0%	
8	Ethanol plant water for Ethanol Production		570	420	61.0%	Without CO2 Capture water requirement
9	Ethanol Plant water for CO_2 Capture		147.0	147.0	21.3%	Additional CO_2 Capture water requirement
	Total Plant and Towns	4,767	838.8	688.8	100.00%	
	Percentage of ethanol plant usage of total water usage		85.5%	82.3%		

Conclusion: With CO2 Capture

This ethanol plant consumes 82% of the water used by the cities and plant within the surrounding 10 mile radius (314 square miles)

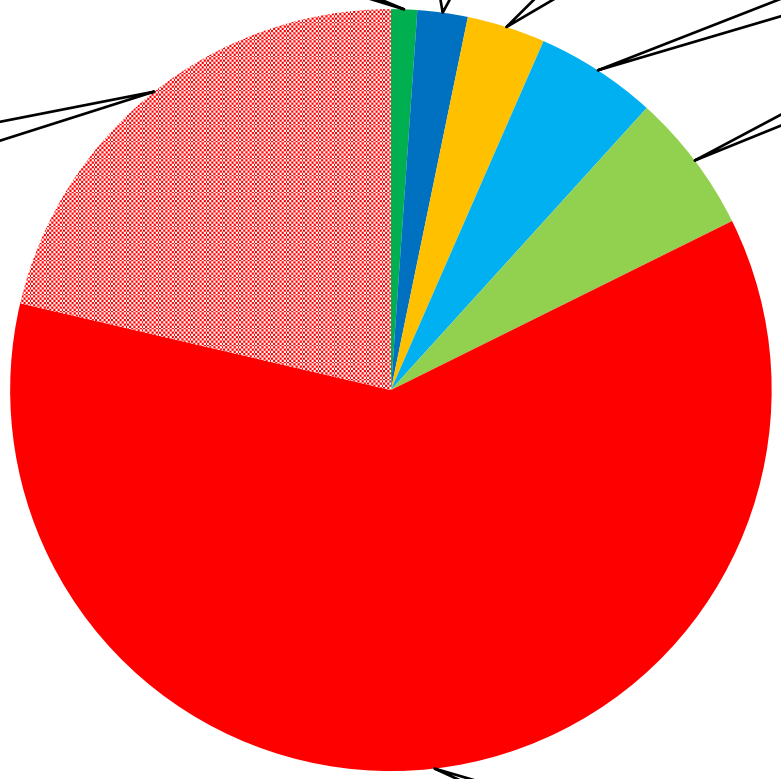
***Ethanol Production Capacity of Plant - MGY**	**140**
Factor: Water required to cool and compress the CO_2 for capture - MGY Water/ MGY Ethanol	1.05
Calculate additional water required for CO_2 Capture - MGY	147
Calculate ratio of gallons of water/ gallons of Ethanol	3.0
Total water requirement of towns and Ethanol plant - MGY	696.4
Total water requirement of towns - MGY	129.4
Total water requirement for ethanol plant - MGY	567.0
Ratio of ethanol plant water use vs. surrounding area	4.38
Percentage of ethanol plant usage of total water usage	81.4%
Total Population within the 10 mile radius	4,767

#25 Valero Renewable Fuels - Hartley 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	16,438
Equivalent # of people ethanol plant water use w/ CO2 capture	**22,192**
Electricity Use	
Electricity to produce Ethanol - kWh/ gallon EtOH for production	0.6
Total Electricity used to produce ethanol - kWh	84,000,000
Electrical use to capture CO2 - kWh/ gallon EtOH	0.377
Total Electricity used to capture CO2 - kWh	52,780,000
Total electricity to produce ethanol and capture CO2 - kWh	1.368E+08
Typical electrical use/ residence - kWh/year	10,476.0
Equivalent number of residences	13,056.5
Number of people / residence	2.4
Equivalent number of people	**31,336**
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	3.640E+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	37,917
Number of people / residence	2.4
Equivalent number of people	**91,000**
* Ethanol Capacity per Iowa Renewable Fuels Association	** Water usage per the greater of DNR WACOP Permit or 3 times ethanol capacity.

#25 Valero Renewable Fuels Ethanol Plant (140 MGY) near Hartley

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:
May City
Moneta
Melvin

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

With the proposed CO_2 capture system the Valero Renewable Fuels Hartley Plant will use 82% 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: 22,200 people.
Electricity: 31,300 People.
Natural Gas: 91,000 People

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 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 4,767.

ATTACHMENT DD: Water usage charts for POET, Hudson

#26 POET Biorefining - Hudson S.D. 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 Hudson, South Dakota			-	-		
	POET Biorefining, Hudson S.D. Plant		240	240		Without CO_2 capture water requirement
	Combined Towns All Water Usage		202.9	202.9		City residential use assumes 70 gal./person/day
1	Fairview SD	65	1.7	1.7		South Dakota
2	Hudson SD	329	8.4	8.4		South Dakota
3	Alcester SD	787	20.1	20.1		South Dakota
4	Hawarden	2,700	69.0	69.0		
5	Rock Valley	4,059	103.7	103.7		
	Percentage of ethanol plant usage of total water usage	7940	54.2%	54.2%		
Conclusion: Without CO2 Capture						
	This ethanol plant consumes 54% of the water used by the cities and plant within the surrounding 10 mile radius (314 square miles).					

#26 POET Biorefining - Hudson S.D. Ethanol Plant Energy and Water Usage vs. Cities within a 10 mile radius

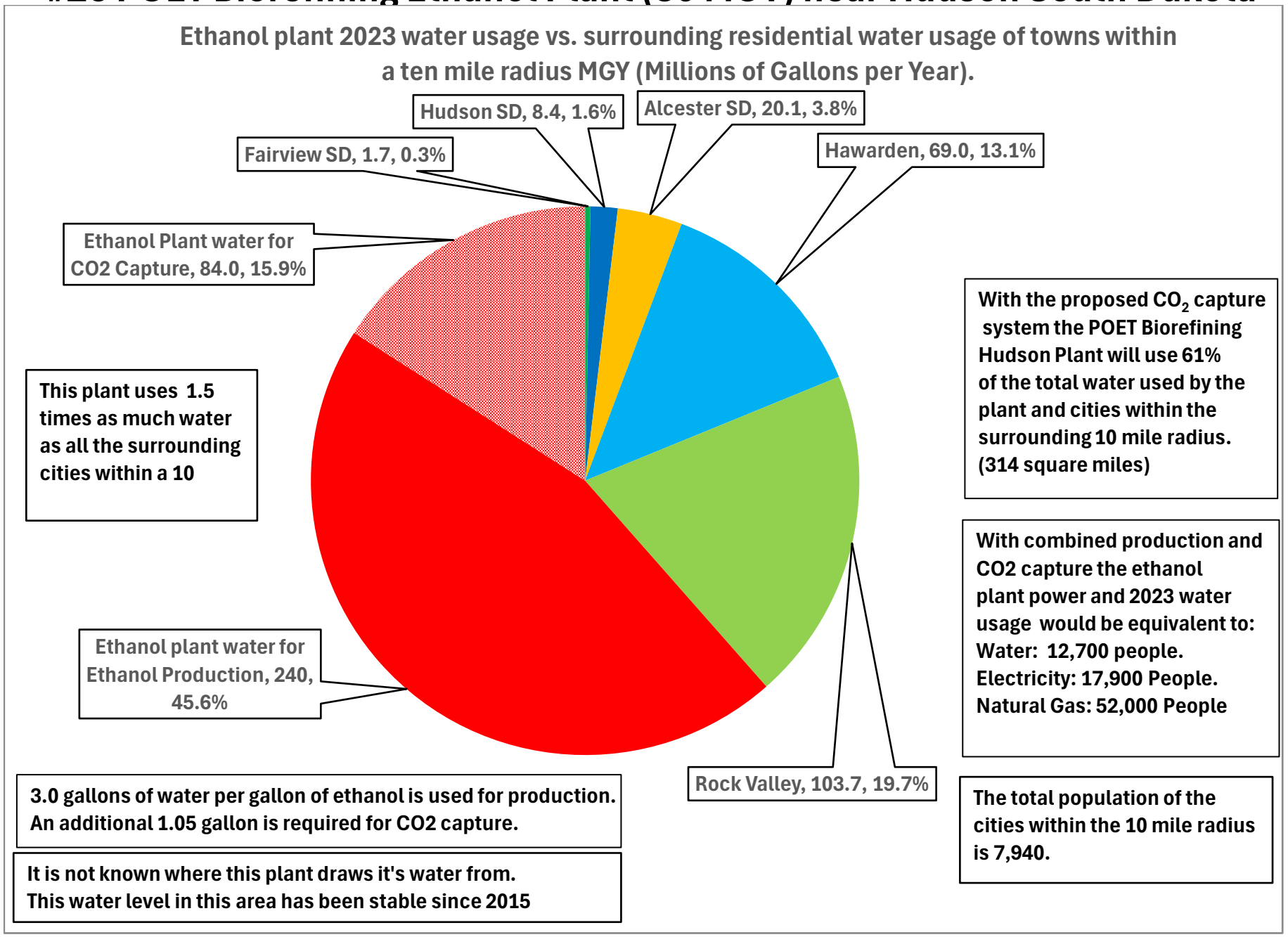
Ethanol Plant with CO_2 Capture						
No.	**Ethanol Plant/ Town**	**Population**	****Water Permit Value MGY**	****2023 Water Usage MGY**	**2023 Water Usage % of Total**	**Comments**
Ethanol Plant - Near Hudson, South Dakota		-	-	-	-	City residential use assumes 70 gal./person/day
1	Fairview SD	65	1.7	1.7	0.3%	South Dakota
2	Hudson SD	329	8.4	8.4	1.6%	South Dakota
3	Alcester SD	787	20.1	20.1	3.8%	South Dakota
4	Hawarden	2700	69.0	69.0	13.1%	
5	Rock Valley	4059	103.7	103.7	19.7%	
6	Ethanol plant water for Ethanol Production		240	240	45.6%	Without CO2 Capture water requirement
7	Ethanol Plant water for CO_2 Capture		84.0	84.0	15.9%	Additional CO_2 Capture water requirement
	Total Plant and Towns	7,940	526.9	526.9	100.0%	
	Percentage of ethanol plant usage of total water usage		61.50%	61.5%		
Conclusion: With CO2 Capture						
	This ethanol plant consumes 61% of the water used by the cities and plant within the surrounding 10 mile radius (314 square miles)					

***Ethanol Production Capacity of Plant - MGY**	**80**
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	84
Calculate ratio of gallons of water/ gallons of Ethanol	3.0
Total water requirement of towns and Ethanol plant - MGY	526.9
Total water requirement of towns - MGY	202.9
Total water requirement for ethanol plant - MGY	324.0
Ratio of ethanol plant water use vs. surrounding area	1.60
Percentage of ethanol plant usage of total water usage	61.5%
Total Population within the 10 mile radius	7,940

#26 POET Biorefining - Hudson S.D. 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	9,393
Equivalent # of people ethanol plant water use w/ CO2 capture	**12,681**
Electricity Use	
Electricity to produce Ethanol - kWh/ gallon EtOH for production	0.6
Total Electricity used to produce ethanol - kWh	48,000,000
Electrical use to capture CO2 - kWh/ gallon EtOH	0.377
Total Electricity used to capture CO2 - kWh	30,160,000
Total electricity to produce ethanol and capture CO2 - kWh	7.816E+07
Typical electrical use/ residence - kWh/year	10,476.0
Equivalent number of residences	7,460.9
Number of people / residence	2.4
Equivalent number of people	**17,906**
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	2.080E+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	21,667
Number of people / residence	2.4
Equivalent number of people	**52,000**
* Ethanol Capacity per Iowa Renewable Fuels Association	** Water usage per the greater of DNR WACOP Permit or 3 times ethanol capacity.

#26 POET Biorefining Ethanol Plant (80 MGY) near Hudson South Dakota



ATTACHMENT EE: Water usage charts for POET, Iowa Falls

#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).					

#27 POET Biorefining Iowa Falls Ethanol Plant Energy and Water Usage vs. Cities within a 10 mile radius

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)

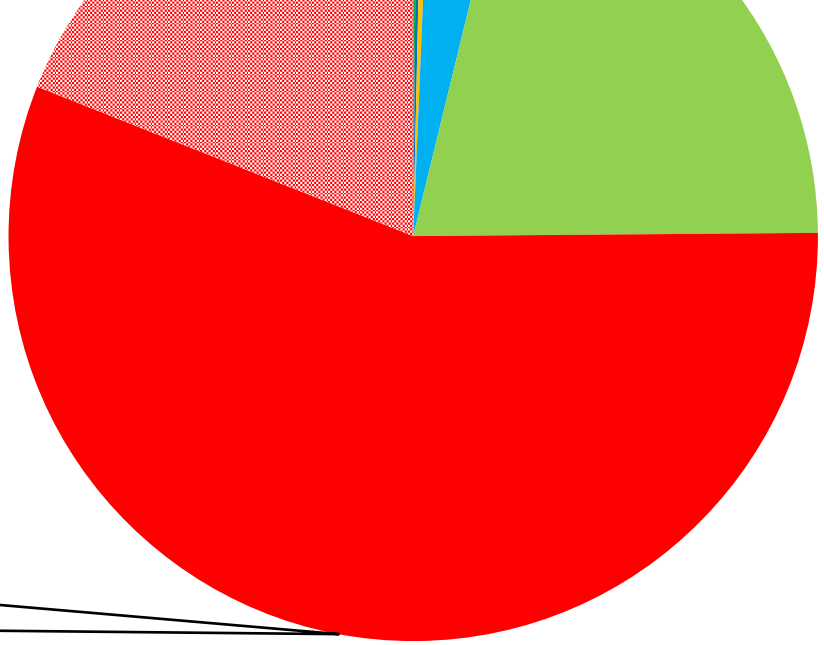
***Ethanol Production Capacity of Plant - MGY**	**112**
Factor: Water required to cool and compress the CO_2 for capture - MGY Water/ MGY Ethanol	1.05
Calculate additional water required for CO_2 Capture - MGY	117.6
Calculate ratio of gallons of water/ gallons of Ethanol	3.1
Total water requirement of 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

#27 POET Biorefining Iowa Falls 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	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.

ATTACHMENT FF: Water usage charts for POET, Jewell

#28 POET Biorefining - Jewel 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 Jewel. Iowa			-	-		
	POET Biorefining - Jewel Plant		270	270		Without CO_2 capture water requirement
	Combined Towns All Water Usage		166.9	166.9		City residential use assumes 70 gal./person/day
1	Randall	154	3.9	3.9		
2	Kamrar	179	4.6	4.6		Water usage too small to require a permit
3	Stanhope	364	9.3	9.3		
4	Radcliffe	555	14.2	14.2		
5	Blairsburg	713	18.2	18.2		
6	Jewell	1,216	31.1	31.1		
7	Story City	3,352	85.6	85.6		
	Percentage of ethanol plant usage of total water usage	6533	61.8%	61.8%		
Conclusion: Without CO2 Capture						
	This ethanol plant consumes 62% of the water used by the cities and plant within the surrounding 10 mile radius (314 square miles).					

#28 POET Biorefining - Jewel Ethanol Plant Energy and Water Usage vs. Cities within a 10 mile radius

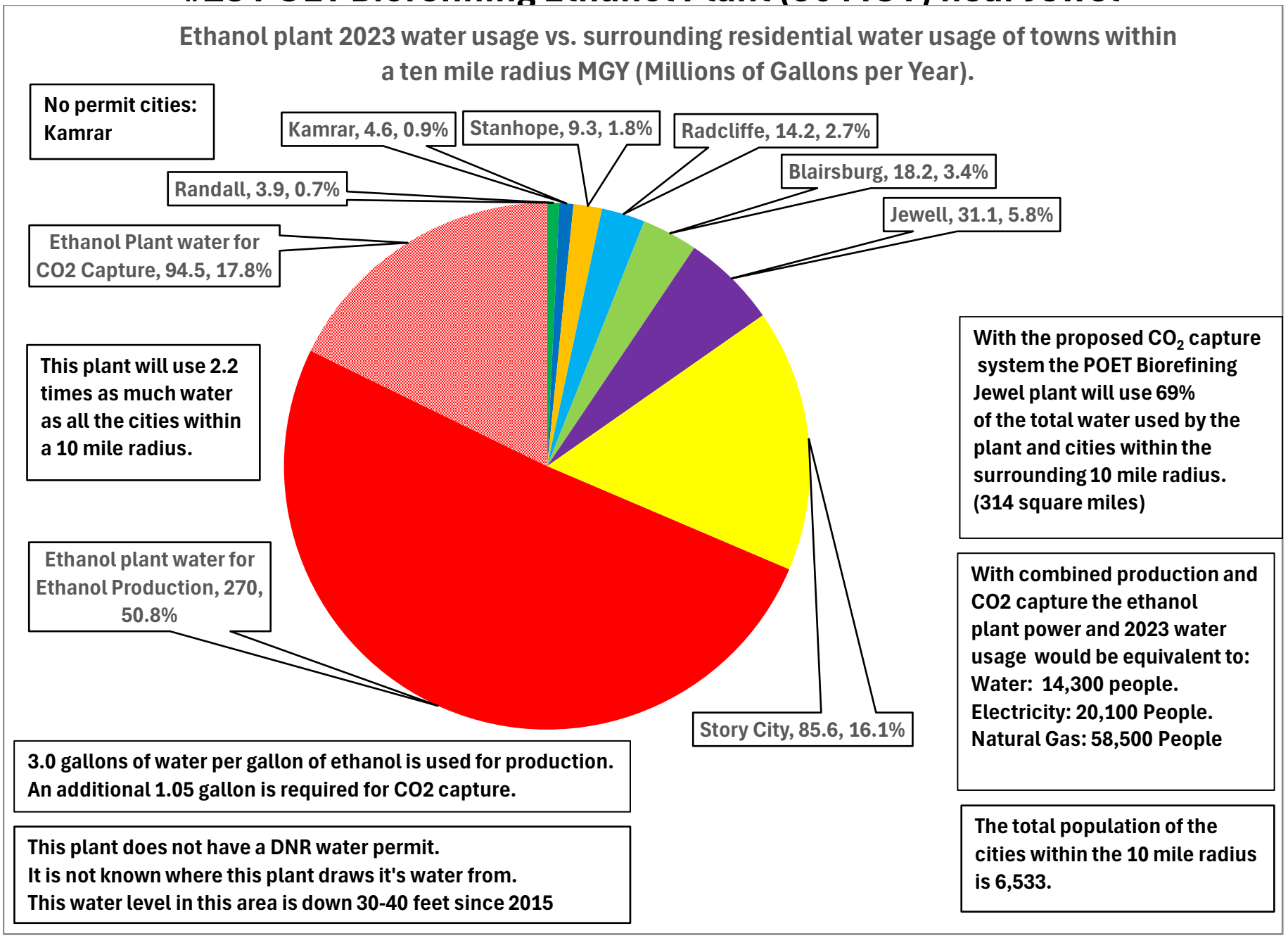
Ethanol Plant with CO_2 Capture						
No.	**Ethanol Plant/ Town**	**Population**	****Water Permit Value MGY**	****2023 Water Usage MGY**	**2023 Water Usage % of Total**	**Comments**
Ethanol Plant - Near Jewel. Iowa		-	-	-	-	City residential use assumes 70 gal./person/day
1	Randall	154	3.9	3.9	0.7%	
2	Kamrar	179	4.6	4.6	0.9%	Water usage too small to require a permit
3	Stanhope	364	9.3	9.3	1.8%	
4	Radcliffe	555	14.2	14.2	2.7%	
5	Blairsburg	713	18.2	18.2	3.4%	
6	Jewell	1216	31.1	31.1	5.8%	
7	Story City	3352	85.6	85.6	16.1%	
8	Ethanol plant water for Ethanol Production		270	270	50.8%	Without CO2 Capture water requirement
9	Ethanol Plant water for CO_2 Capture		94.5	94.5	17.8%	Additional CO_2 Capture water requirement
	Total Plant and Towns	6,533	531.4	531.4	100.0%	
	Percentage of ethanol plant usage of total water usage		68.6%	68.6%		
Conclusion: With 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)					

***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	531.4
Total water requirement of towns - MGY	166.9
Total water requirement for ethanol plant - MGY	364.5
Ratio of ethanol plant water use vs. surrounding area	2.18
Percentage of ethanol plant usage of total water usage	68.6%
Total Population within the 10 mile radius	6,533

#28 POET Biorefining - Jewel 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.

#28 POET Biorefining Ethanol Plant (90 MGY) near Jewel



ATTACHMENT GG: Water usage charts for Valero, Lakota

#29 Valero Renewable Fuels - Lakota 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 Lakota, Iowa			-	-		
	Valero Renewable Fuels Lakota Plant		330	330		Without CO_2 capture water requirement
	Combined Towns All Water Usage		60.5	60.5		City residential use assumes 70 gal./person/day
1	Pilot Grove Mn.	167	4.3	4.3		Minnesota Town
2	Elmore Mn.	549	14.0	14.0		Minnesota Town
3	Ledyard	121	3.1	3.1		
4	Lakota	267	6.8	6.8		
5	Swea City	566	14.5	14.5		
6	Bancroft	699	17.9	17.9		
	Percentage of ethanol plant usage of total water usage	2369	84.5%	84.5%		
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).					

#29 Valero Renewable Fuels - Lakota Ethanol Plant Energy and Water Usage vs. Cities within a 10 mile radius

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 Lakota, Iowa		-	-	-	-	City residential use assumes 70 gal./person/day
1	Pilot Grove Mn.	167	4.3	4.3	0.8%	Minnesota Town
2	Elmore Mn.	549	14.0	14.0	2.8%	Minnesota Town
3	Ledyard	121	3.1	3.1	0.6%	
4	Lakota	267	6.8	6.8	1.3%	
5	Swea City	566	14.5	14.5	2.9%	
6	Bancroft	699	17.9	17.9	3.5%	
7	Ethanol plant water for Ethanol Production		330	330	65.2%	Without CO2 Capture water requirement
8	Ethanol Plant water for CO_2 Capture		115.5	115.5	22.8%	Additional CO_2 Capture water requirement
	Total Plant and Towns	2,369	506.0	506.0	100.0%	
	Percentage of ethanol plant usage of total water usage		88.0%	88.0%		

Conclusion: With CO2 Capture

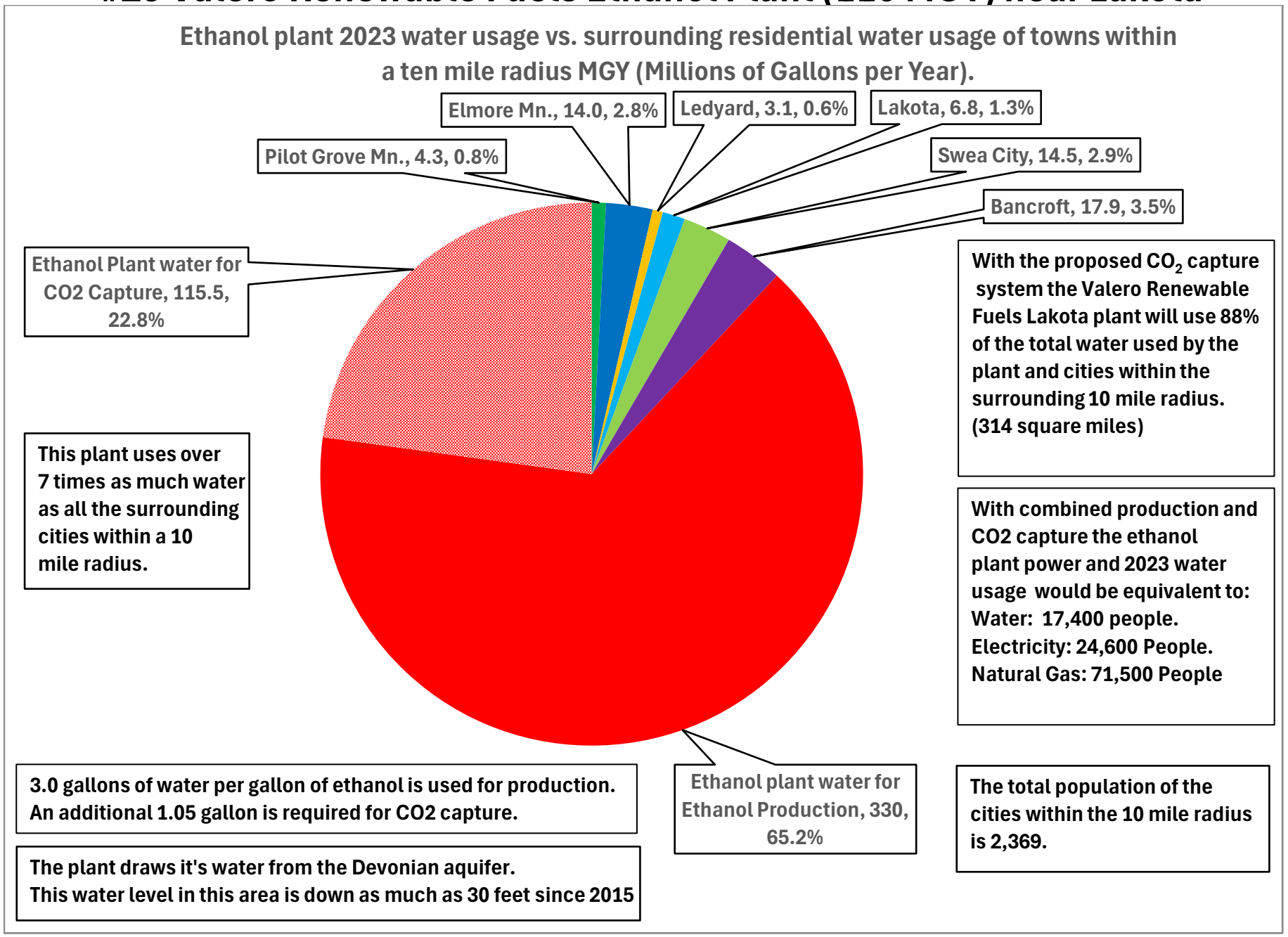
This ethanol plant consumes 88% of the water used by the cities and plant within the surrounding 10 mile radius (314 square miles)

***Ethanol Production Capacity of Plant - MGY**	**110**
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	115.5
Calculate ratio of gallons of water/ gallons of Ethanol	3.0
Total water requirement of towns and Ethanol plant - MGY	506.0
Total water requirement of towns - MGY	60.5
Total water requirement for ethanol plant - MGY	445.5
Ratio of ethanol plant water use vs. surrounding area	7.36
Percentage of ethanol plant usage of total water usage	88.0%
Total Population within the 10 mile radius	2,369

#29 Valero Renewable Fuels - Lakota 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	12,916
Equivalent # of people ethanol plant water use w/ CO2 capture	**17,436**
Electricity Use	
Electricity to produce Ethanol - kWh/ gallon EtOH for production	0.6
Total Electricity used to produce ethanol - kWh	66,000,000
Electrical use to capture CO2 - kWh/ gallon EtOH	0.377
Total Electricity used to capture CO2 - kWh	41,470,000
Total electricity to produce ethanol and capture CO2 - kWh	1.075E+08
Typical electrical use/ residence - kWh/year	10,476.0
Equivalent number of residences	10,258.7
Number of people / residence	2.4
Equivalent number of people	**24,621**
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	2.860E+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	29,792
Number of people / residence	2.4
Equivalent number of people	**71,500**
* Ethanol Capacity per Iowa Renewable Fuels Association	** Water usage per the greater of DNR WACOP Permit or 3 times ethanol capacity.

#29 Valero Renewable Fuels Ethanol Plant (110 MGY) near Lakota



ATTACHMENT HH: Water usage charts for POET, Menlo

#30 POET Biorefining - Menlo 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 Menlo, Iowa			-	-		
	POET Biorefining Menlo Plant		396.0	396.0		Without CO_2 capture water requirement
	Combined Towns All Water Usage		121.3	121.3		City residential use assumes 70 gal./person/day
1	Menlo	345	8.8	8.8		Water usage too small to require a permit
2	Casey	387	9.9	9.9		
3	Dexter	640	16.4	16.4		
4	Guthrie Center	1,593	40.7	40.7		
5	Stuart	1,782	45.5	45.5		
	Percentage of ethanol plant usage of total water usage	4747	76.6%	76.6%		
Conclusion: Without CO2 Capture						
	This ethanol plant consumes 77% of the water used by the cities and plant within the surrounding 10 mile radius (314 square miles).					

#30 POET Biorefining - Menlo Ethanol Plant Energy and Water Usage vs. Cities within a 10 mile radius

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 Menlo, Iowa		-	-	-	-	City residential use assumes 70 gal./person/day
1	Menlo	345	8.8	8.8	1.3%	Water usage too small to require a permit
2	Casey	387	9.9	9.9	1.5%	
3	Dexter	640	16.4	16.4	2.5%	
4	Guthrie Center	1593	40.7	40.7	6.2%	
5	Stuart	1782	45.5	45.5	6.9%	
6	Ethanol plant water for Ethanol Production		396	396	60.4%	Without CO2 Capture water requirement
7	Ethanol Plant water for CO_2 Capture		138.6	138.6	21.1%	Additional CO_2 Capture water requirement
	Total Plant and Towns	4,747	655.9	655.9	100.0%	
	Percentage of ethanol plant usage of total water usage		81.5%	81.51%		
Conclusion: With CO2 Capture						
	This ethanol plant consumes 82% of the water used by the cities and plant within the surrounding 10 mile radius (314 square miles)					

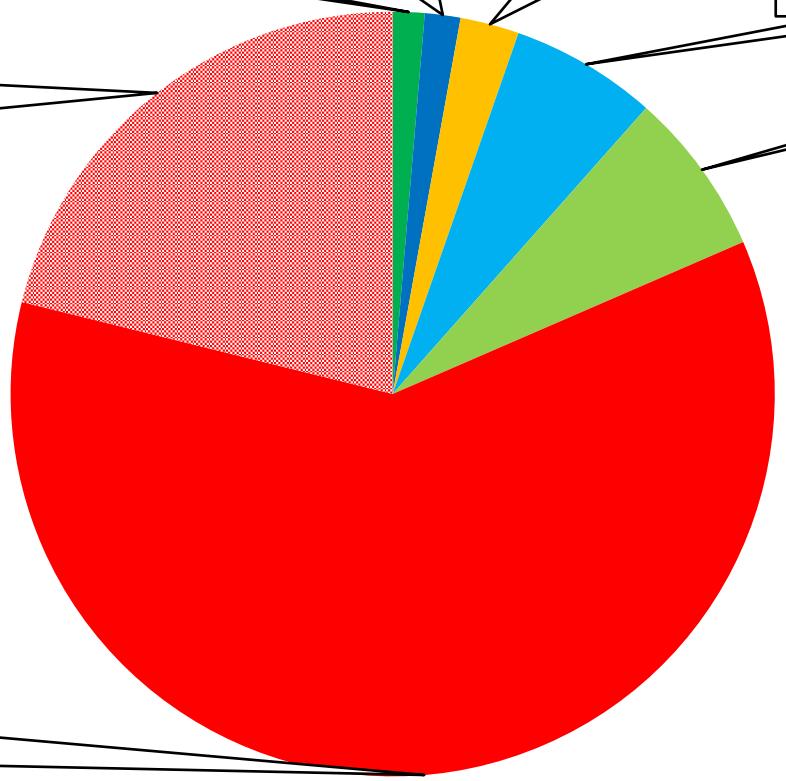
***Ethanol Production Capacity of Plant - MGY**	**132**
Factor: Water required to cool and compress the CO_2 for capture - MGY Water/ MGY Ethanol	1.05
Calculate additional water required for CO_2 Capture - MGY	138.6
Calculate ratio of gallons of water/ gallons of Ethanol	3.0
Total water requirement of towns and Ethanol plant - MGY	655.9
Total water requirement of towns - MGY	121.3
Total water requirement for ethanol plant - MGY	534.6
Ratio of ethanol plant water use vs. surrounding area	4.41
Percentage of ethanol plant usage of total water usage	81.5%
Total Population within the 10 mile radius	4,747

#30 POET Biorefining - Menlo 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	15,499
Equivalent # of people ethanol plant water use w/ CO2 capture	**20,924**
Electricity Use	
Electricity to produce Ethanol - kWh/ gallon EtOH for production	0.6
Total Electricity used to produce ethanol - kWh	79,200,000
Electrical use to capture CO2 - kWh/ gallon EtOH	0.377
Total Electricity used to capture CO2 - kWh	49,764,000
Total electricity to produce ethanol and capture CO2 - kWh	1.290E+08
Typical electrical use/ residence - kWh/year	10,476.0
Equivalent number of residences	12,310.4
Number of people / residence	2.4
Equivalent number of people	**29,545**
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	3.432E+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	35,750
Number of people / residence	2.4
Equivalent number of people	**85,800**
* Ethanol Capacity per Iowa Renewable Fuels Association	** Water usage per the greater of DNR WACOP Permit or 3 times ethanol capacity.

#30 POET Biorefining Ethanol Plant (132 MGY) near Menlo

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: Menlo

This plant uses 4.5 times as much water as all the surrounding cities within as 10 mile radius.

With the proposed CO_2 capture system the POET Biorefining Menlo plant will use 82% 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: 20,900 people.
Electricity: 29,500 People.
Natural Gas: 85,800 People

The total population of the cities within the 10 mile radius is 4,747.

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

This plant does not have a DNR water Permit. It is not know where this plant draws it's water from. This water level in this area is down as much as 30 feet since 2015

ATTACHMENT II: Water usage charts for POET, Shell Rock

#31 POET Biorefining - Shell Rock 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 Shell Rock, Iowa			-	-		
	POET Biorefining - Shell Rock Plant		578	393		Without CO_2 capture water requirement
	Combined Towns All Water Usage		392.7	392.7		City residential use assumes 70 gal./person/day
1	Finchford	50	1.3	1.3		Water usage too small to require a permit
2	Plainsfield	393	10.0	10.0		Water usage too small to require a permit
3	Allison	966	24.7	24.7		
4	Janesville	1,034	26.4	26.4		
5	Clarksville	1,264	32.3	32.3		
6	Shell Rock	1,268	32.4	32.4		
7	Waverly	10,394	265.6	265.6		
	Percentage of ethanol plant usage of total water usage	15,369	59.5%	50.0%		
Conclusion: Without CO2 Capture						
	This ethanol plant consumes 50% of the water used by the cities and plant within the surrounding 10 mile radius (314 square miles).					

#31 POET Biorefining - Shell Rock Ethanol Plant Energy and Water Usage vs. Cities within a 10 mile radius

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 Shell Rock, Iowa		-	-	-	-	City residential use assumes 70 gal./person/day
1	Finchford	50	1.3	1.3		Water usage too small to require a permit
2	Plainsfield	393	10.0	10.0		Water usage too small to require a permit
	No Permit	443	11.3	11.3	1.2%	
3	Allison	966	24.7	24.7	2.7%	
4	Janesville	1034	26.4	26.4	2.9%	
5	Clarksville	1264	32.3	32.3	3.5%	
6	Shell Rock	1268	32.4	32.4	3.5%	
7	Waverly	10394	265.6	265.6	28.8%	
8	Ethanol plant water for Ethanol Production		578.0	393.0	42.6%	Without CO2 Capture water requirement
9	Ethanol Plant water for CO_2 Capture		137.6	137.6	14.9%	Additional CO_2 Capture water requirement
	Total Plant and Towns	15,369	1108.2	923.2	100.0%	
	Percentage of ethanol plant usage of total water usage		64.6%	57.47%		

Conclusion: With CO2 Capture

This ethanol plant consumes 57% of the water used by the cities and plant within the surrounding 10 mile radius (314 square miles)

***Ethanol Production Capacity of Plant - MGY**	**131**
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	137.55
Calculate ratio of gallons of water/ gallons of Ethanol	3.0
Total water requirement of towns and Ethanol plant - MGY	934.5
Total water requirement of towns - MGY	404.0
Total water requirement for ethanol plant - MGY	530.6
Ratio of ethanol plant water use vs. surrounding area	1.31
Percentage of ethanol plant usage of total water usage	56.8%
Total Population within the 10 mile radius	15,369

#31 POET Biorefining - Shell Rock 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	15,382
Equivalent # of people ethanol plant water use w/ CO2 capture	**20,765**
Electricity Use	
Electricity to produce Ethanol - kWh/ gallon EtOH for production	0.6
Total Electricity used to produce ethanol - kWh	78,600,000
Electrical use to capture CO2 - kWh/ gallon EtOH	0.377
Total Electricity used to capture CO2 - kWh	49,387,000
Total electricity to produce ethanol and capture CO2 - kWh	1.280E+08
Typical electrical use/ residence - kWh/year	10,476.0
Equivalent number of residences	12,217.2
Number of people / residence	2.4
Equivalent number of people	**29,321**
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	3.406E+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	35,479
Number of people / residence	2.4
Equivalent number of people	**85,150**
* Ethanol Capacity per Iowa Renewable Fuels Association	** Water usage per the greater of DNR WACOP Permit or 3 times ethanol capacity.

#31 POET Biorefining Ethanol Plant (131 MGY) near Shell Rock