# #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