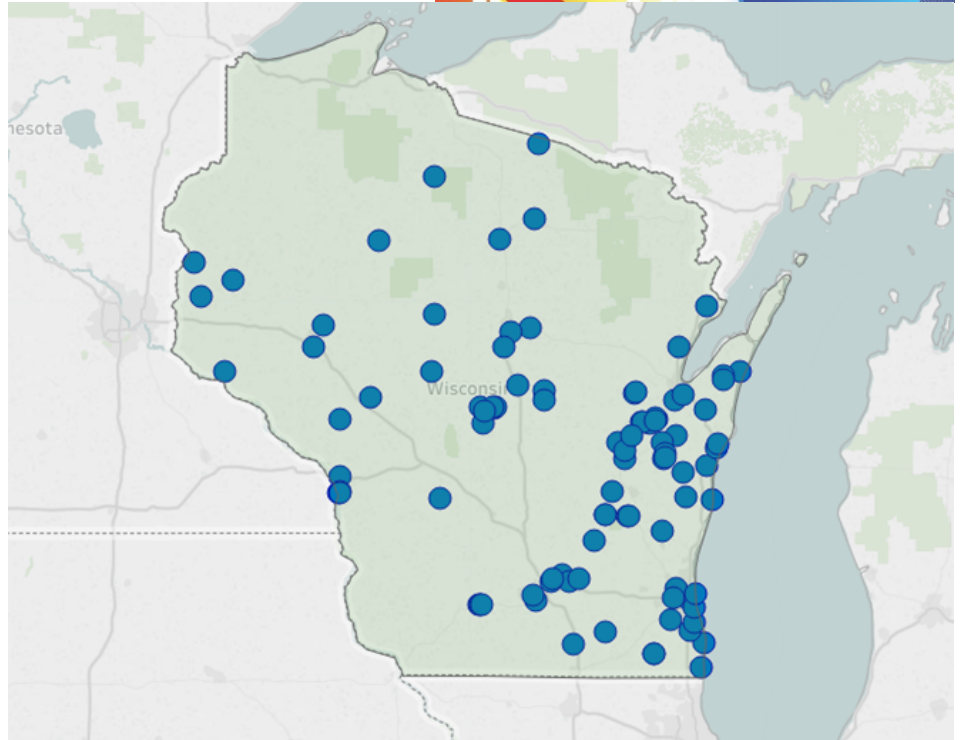


## The State of CHP: Wisconsin



Combined heat and power (CHP) – also referred to as cogeneration – is an efficient and clean approach to generating on-site electric power and useful thermal energy from a single fuel source. The information in this document provides a general overview of the state of CHP in Wisconsin, with data on current installations, technical potential, and economics for CHP.



Map of current CHP installations in Wisconsin. Illustration from ICF.

### Wisconsin: Installed CHP

#### U.S. DOE Combined Heat and Power Installation Database

The DOE CHP Installation Database is a data collection effort sponsored by the U.S. Department of Energy. The database contains a comprehensive listing of combined heat and power installations throughout the country, including those in Wisconsin, and can be accessed by visiting <https://doe.icfwebservices.com/chp>.

#### CHP Project Profiles

The Midwest CHP TAP has compiled information on certain illustrative CHP projects in Wisconsin. You can access these by visiting the Department of Energy’s CHP Project Profiles Database at <https://betterbuildingsolutioncenter.energy.gov/chp/chp-project-profiles-database>.

#### Midwest CHP Technical Assistance Partnership

For assistance with questions about specific CHP opportunities in Wisconsin, please consult with the Midwest CHP TAP by visiting [mwchptap.org](http://mwchptap.org) or contacting the CHP TAP director.

#### Wisconsin Existing CHP

| Sector                   | Sites     | Capacity (MW) |
|--------------------------|-----------|---------------|
| Industrial               | 22        | 709           |
| Commercial/Institutional | 39        | 853           |
| Other                    | 35        | 29            |
| <b>Total</b>             | <b>96</b> | <b>1,590</b>  |

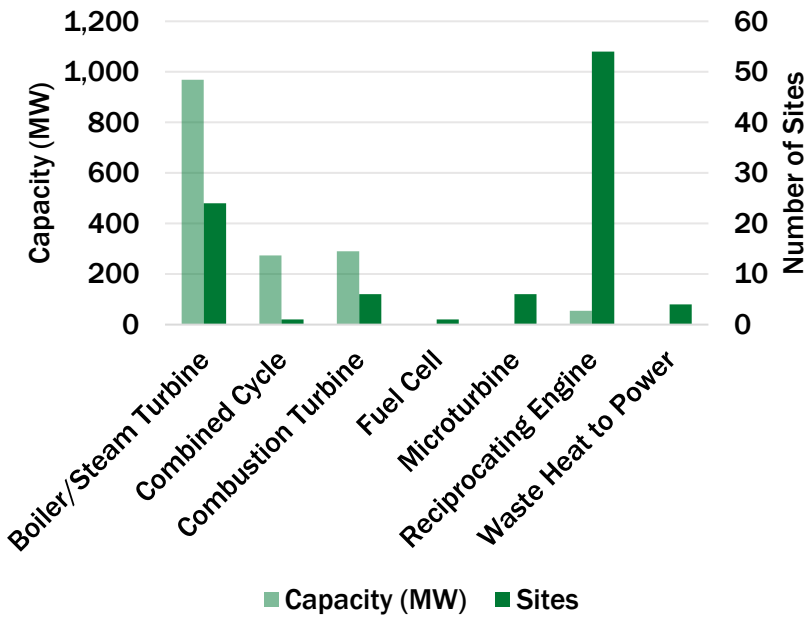
#### Midwest CHP TAP Director

**Cliff Haefke**

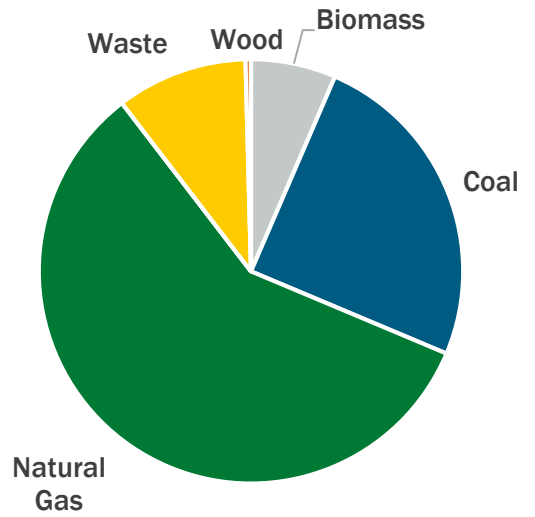
- University of Illinois at Chicago
- [chaefk1@uic.edu](mailto:chaefk1@uic.edu)
- 312-355-3476



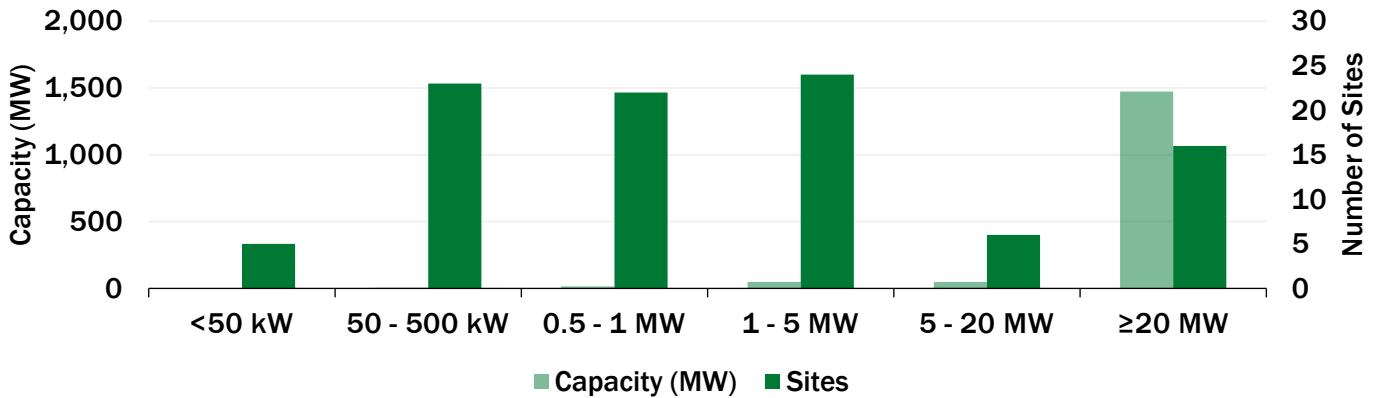
Wisconsin CHP by Technology



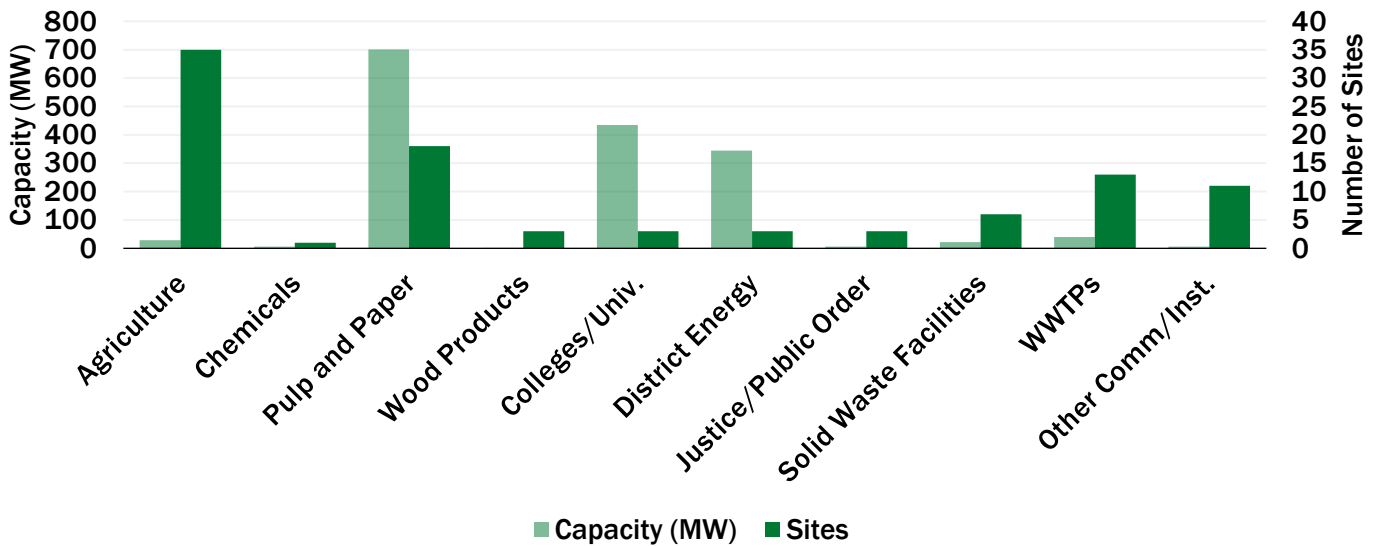
Wisconsin CHP Capacity (MW) by Fuel



Wisconsin CHP by Size Range



Wisconsin CHP by Application



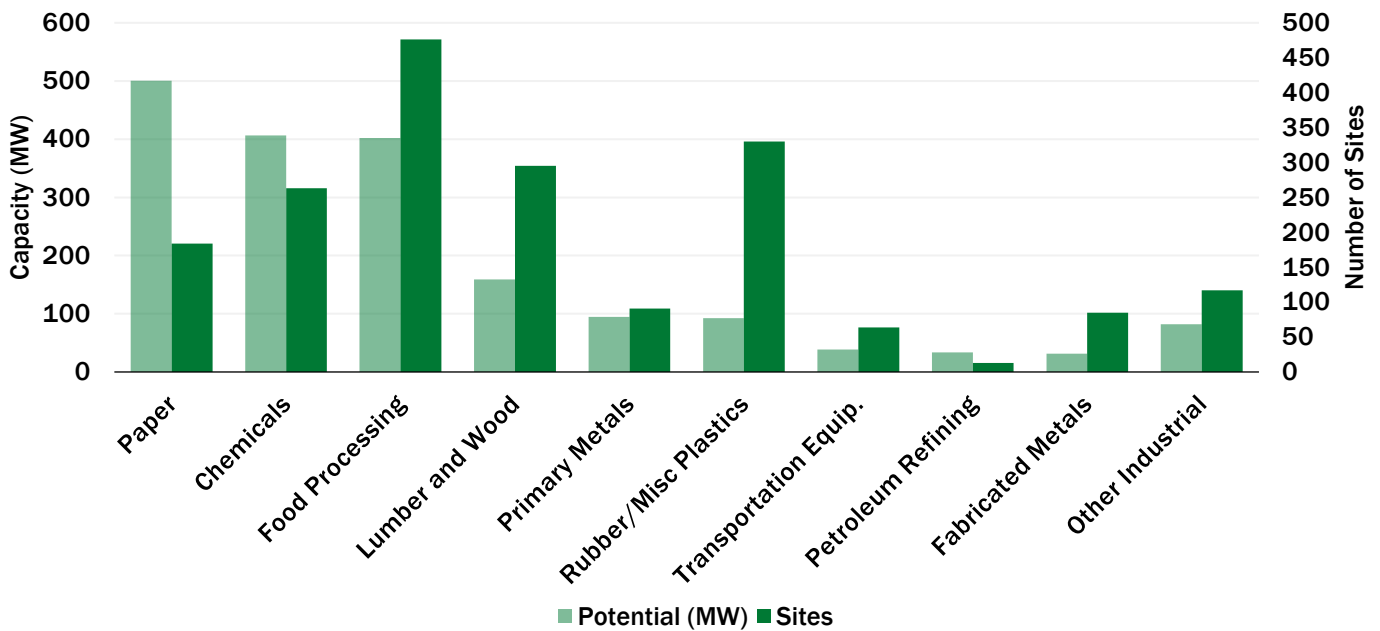
## Wisconsin: Technical Potential for New CHP Installations

The “Combined Heat and Power (CHP) Technical Potential in the United States” market analysis report provides data on the technical potential in industrial facilities and commercial buildings for “topping cycle” CHP, waste heat to power (WHP) CHP, and district energy CHP in the U.S. Read the report [here](#).

## Wisconsin CHP Technical Potential

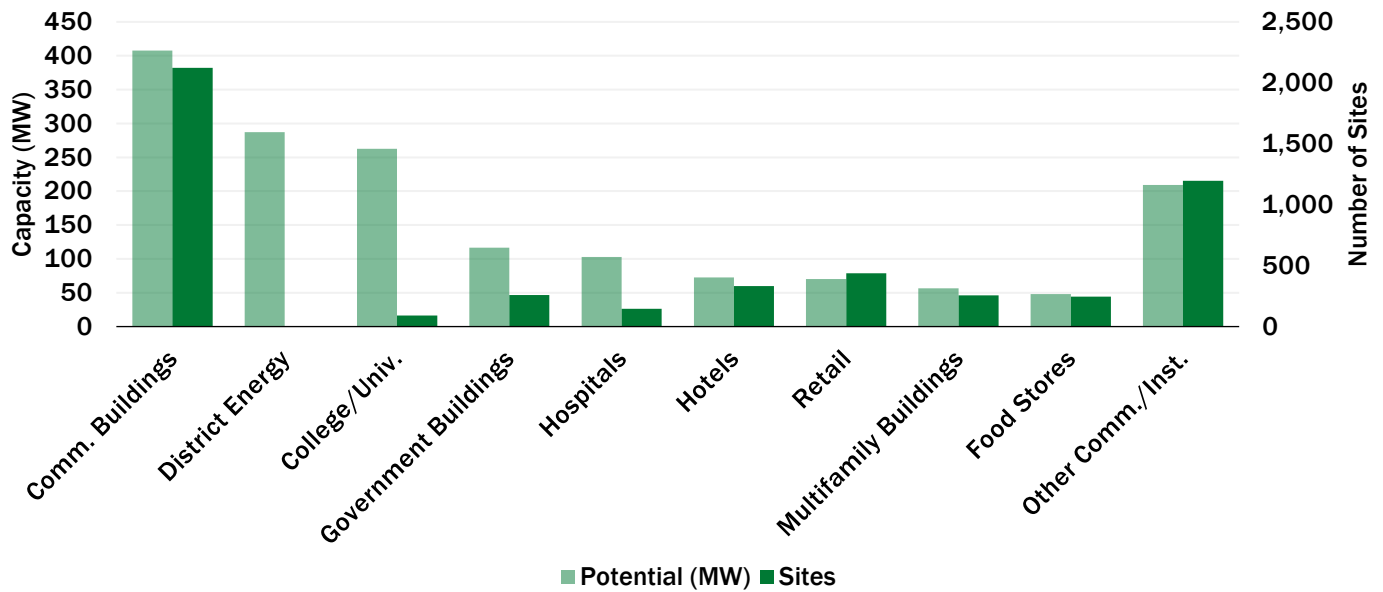
| Sector                   | Potential Sites | Potential MW |
|--------------------------|-----------------|--------------|
| Industrial               | 1,918           | 1,840        |
| Commercial/Institutional | 5,090           | 1,633        |
| <b>Total</b>             | <b>7,008</b>    | <b>3,474</b> |

Wisconsin Technical Potential (MW) for Industrial CHP Applications



| Application      | 50-500 kW    |            | 0.5 - 1 MW |            | 1 - 5 MW   |            | 5 - 20 MW |            | >20 MW   |            | Total        |              |
|------------------|--------------|------------|------------|------------|------------|------------|-----------|------------|----------|------------|--------------|--------------|
|                  | Sites        | MW         | Sites      | MW         | Sites      | MW         | Sites     | MW         | Sites    | MW         | Total Sites  | Total MW     |
| Paper            | 89           | 23         | 26         | 19         | 44         | 110        | 21        | 218        | 4        | 131        | 184          | 501          |
| Chemicals        | 142          | 27         | 42         | 29         | 55         | 120        | 22        | 173        | 2        | 58         | 263          | 407          |
| Food Processing  | 322          | 68         | 75         | 58         | 66         | 131        | 11        | 93         | 2        | 51         | 476          | 402          |
| Lumber and Wood  | 229          | 43         | 34         | 23         | 29         | 55         | 2         | 15         | 1        | 22         | 295          | 159          |
| Primary Metals   | 58           | 13         | 16         | 12         | 13         | 30         | 4         | 40         | 0        | 0          | 91           | 95           |
| Other Industrial | 490          | 80         | 56         | 40         | 57         | 110        | 6         | 48         | 0        | 0          | 609          | 278          |
| <b>Total</b>     | <b>1,330</b> | <b>255</b> | <b>249</b> | <b>181</b> | <b>264</b> | <b>556</b> | <b>66</b> | <b>586</b> | <b>9</b> | <b>262</b> | <b>1,918</b> | <b>1,840</b> |

## Wisconsin Technical Potential (MW) for Commercial/Institutional CHP Applications



| Application          | 50-500 kW    |            | 0.5 - 1 MW |            | 1 - 5 MW   |            | 5 - 20 MW |            | >20 MW   |            | Total        |              |
|----------------------|--------------|------------|------------|------------|------------|------------|-----------|------------|----------|------------|--------------|--------------|
|                      | Sites        | MW         | Sites      | MW         | Sites      | MW         | Sites     | MW         | Sites    | MW         | Total Sites  | Total MW     |
| Commercial Buildings | 1,358        | 68         | 594        | 238        | 170        | 102        | 0         | 0          | 0        | 0          | 2,122        | 408          |
| College/Univ.        | 46           | 9          | 7          | 5          | 21         | 61         | 16        | 152        | 1        | 37         | 91           | 263          |
| Government Buildings | 207          | 31         | 25         | 17         | 23         | 34         | 5         | 34         | 0        | 0          | 260          | 117          |
| Hospitals            | 85           | 20         | 21         | 13         | 39         | 65         | 1         | 5          | 0        | 0          | 146          | 103          |
| Hotels               | 301          | 33         | 16         | 10         | 14         | 24         | 1         | 5          | 0        | 0          | 332          | 73           |
| Other Comm./Inst.    | 1,982        | 240        | 113        | 63         | 39         | 54         | 3         | 27         | 2        | 287        | 2,139        | 671          |
| <b>Total</b>         | <b>3,979</b> | <b>401</b> | <b>776</b> | <b>345</b> | <b>306</b> | <b>340</b> | <b>26</b> | <b>223</b> | <b>3</b> | <b>324</b> | <b>5,090</b> | <b>1,633</b> |

### Department of Energy CHP Accelerators

#### Packaged CHP Accelerator

Standardized packaged CHP systems can reduce risk for both CHP users and suppliers by reducing design errors, limiting uncertainty about performance, shortening project development time, and reducing overall costs. Accelerator partners will validate the installation, performance, and economic and resiliency benefits of packaged CHP systems, evaluate the integration of new technologies and packaged CHP, and identify R&D challenges. For more information, visit <https://betterbuildingssolutioncenter.energy.gov/accelerators/packaged-chp>

#### CHP for Resiliency Accelerator

The U.S. DOE collaborated with cities, states, utilities, and other stakeholders who are actively pursuing CHP as a consideration in resiliency planning for critical infrastructure in their jurisdictions. This included defining resiliency, identifying critical infrastructure, and assessing CHP opportunities. This process was documented in the DG for Resilience Planning Guide and the CHP for Resilience Screening Tool. For more information, visit <https://betterbuildingssolutioncenter.energy.gov/accelerators/combined-heat-and-power-resiliency>

## Wisconsin: CHP Economics

The most important indicators for CHP economics are electricity and gas prices. For most potential CHP installations, natural gas and electricity rates for host facilities will fall within the range of average commercial and industrial prices. Lower energy prices may be possible for large CHP applications.

### Wisconsin Natural Gas Prices

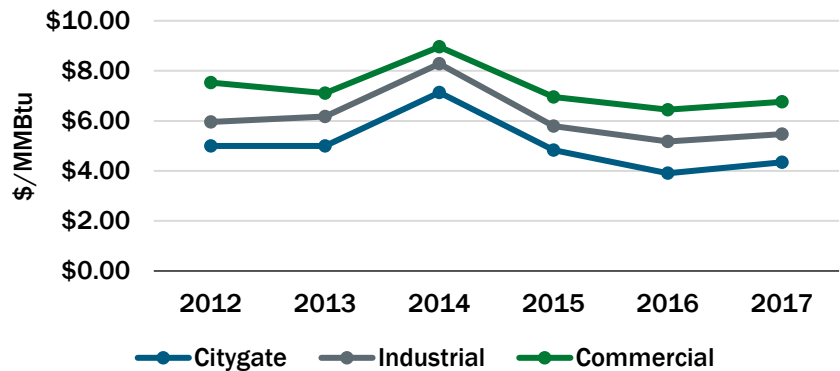
The EIA industrial natural gas price is a full tariff rate, and most large consumers are purchasing gas commodities from marketers at a lower rate.

#### Wisconsin Average Gas Prices (\$/MMBtu) - 2017

| Sector     | WI Price | U.S. Price |
|------------|----------|------------|
| Citygate*  | 4.35     | 4.26       |
| Industrial | 5.47     | 4.20       |
| Commercial | 6.77     | 8.08       |

\*Citygate is a point or measuring station at which a distributing gas utility receives gas from a NG pipeline company or transmission system.

#### Wisconsin Average Natural Gas Prices



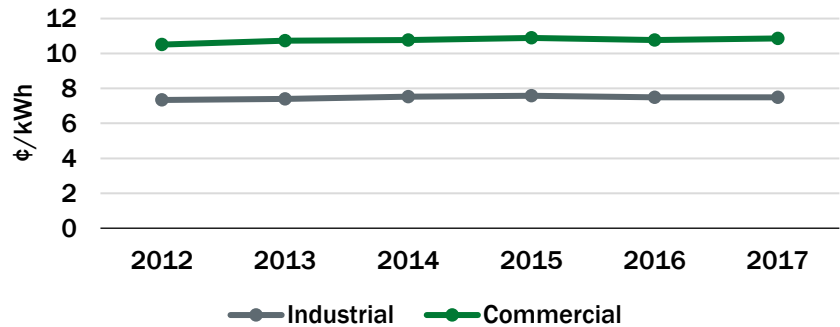
### Wisconsin Electricity Prices

Electricity rates can vary greatly by utility and facility size range. The rates below from EIA represent general averages; individual facility rates may vary.

#### Wisconsin Average Electricity Prices (¢/kWh) - 2017

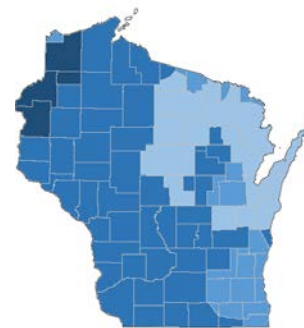
| Sector     | WI Price | U.S. Price |
|------------|----------|------------|
| Industrial | 7.49     | 6.88       |
| Commercial | 10.87    | 10.66      |

#### Wisconsin Average Electricity Prices



#### Wisconsin Average Delivered Electricity Prices by Utility

| Utility                       | Industrial Price (¢/kWh) | Commercial Price (¢/kWh) | Average Price (¢/kWh) |
|-------------------------------|--------------------------|--------------------------|-----------------------|
| Northwestern WI Electric      | 9.36                     | 14.05                    | 11.71                 |
| Dahlberg Light & Power        | 9.89                     | 12.79                    | 11.34                 |
| Madison Gas & Electric        | 8.23                     | 11.33                    | 9.78                  |
| Xcel Energy                   | 7.40                     | 11.67                    | 9.53                  |
| Alliant Energy                | 7.81                     | 11.22                    | 9.51                  |
| We Energies                   | 5.81                     | 11.64                    | 8.73                  |
| Superior Water, Power & Light | 7.06                     | 9.43                     | 8.24                  |
| Wisconsin Public Service      | 5.98                     | 9.38                     | 7.68                  |



- Wisconsin Public Service
- Superior WLP / We Energies
- Alliant Energy / MGE / Xcel Energy
- Dahlberg Light & Power / NW WI Elec