

# COVID-19

## ENERGY IMPACTS TO WISCONSIN SCHOOLS

WHITE PAPER | 2021

On March 11, 2020, the World Health Organization officially declared the coronavirus disease (COVID-19) a pandemic. Shortly after, Wisconsin's Department of Health Services (DHS) issued a Safer at Home order requiring public and private K-12 schools to close for the 2019-20 school year.

Many schools implemented operational changes based on input from various health department and [guidance from the Center for Disease Control and Prevention \(CDC\)](#) to allow in-person instruction to resume for the 2020-21 school year.



Guidance from the CDC included:

- Opening outside air dampers beyond minimum settings to reduce or eliminate HVAC air recirculation
- Increasing the introduction of outdoor air by opening windows and doors when weather conditions allow
- Using fans to increase the effectiveness of open windows
- Ensuring ventilation systems are operating properly
- Rebalancing HVAC systems to increase total airflow
- Turning off demand-controlled ventilation to reduce air supply based on occupancy or temperature during occupied hours
- Running HVAC systems at maximum outside airflow for two hours before and after occupied times

While these strategies may be effective at mitigating the spread of COVID-19 and maintaining a comfortable learning environment, these changes have unintended impacts on the building's energy usage.

# LEARNING ENVIRONMENT

The psychrometric chart from the American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. (Figure 1) describes the relationship between air temperature and humidity. HVAC experts have determined building occupants are most comfortable when the temperature is between 68°F and 80°F (see the shaded zones in Figure 1). In Wisconsin, these conditions are met less than 10% of the year. The rest of the time, the air needs to be conditioned.

Because these ideal conditions are rarely present during the year, supplemental heating and cooling is needed to keep a safe and effective learning environment. Traditionally, conditioned air is recirculated which requires less heating or cooling to meet the desired space temperature. The latest CDC guidance advises buildings to reduce or eliminate air recirculation and bring in more outside air. Because the space temperature and outside air often have a greater temperature differential, using more outside air requires additional heating and cooling to satisfy the space temperature needs.

Wisconsin is in this zone less than

**10%** of the year.

Figure 1: The psychrometric chart

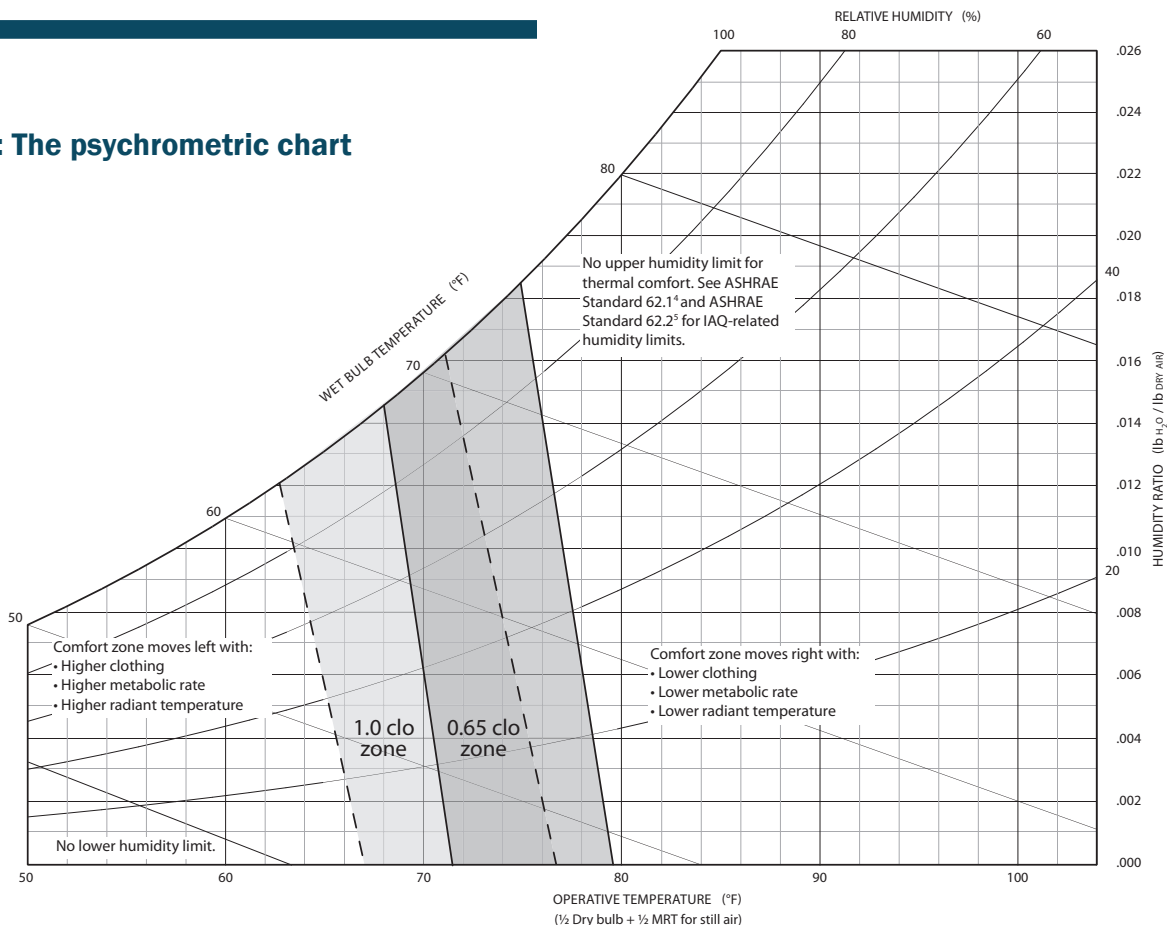


Illustration: ANSI/ASHRAE Standard 55-2020

# IMPACT ON ENERGY USE

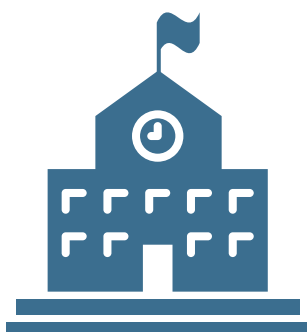
FOCUS ON ENERGY® evaluated an average-sized Wisconsin middle school building (200,000 ft<sup>2</sup>) designed to current state code (IECC 2015). In the baseline scenario, the building operated with a ventilation rate of 7.5 cubic feet per minute (CFM) of outside air per occupant (code minimum). The same building was modeled using a proposed ventilation rate of 15 CFM per occupant, which is consistent with the CDC's recommended ventilation practices. In comparing these scenarios, results showed the COVID-19 operating method increasing heating fuel usage (Therms) by 10% and electric fuel usage (kWh) by 0.4%. This scenario assumed no other changes occurred at the facility, such as the installation of UV systems, use of portable HEPA filters, or additional filter installation, which could further impact electric usage.

Using Focus on Energy's statewide benchmarking data, these operational changes equate to an additional \$5.62 million in estimated utility costs for Wisconsin schools.<sup>1</sup>

The safety of students and staff are a school's top priority and these operational changes are necessary to keep a safe learning environment. Next we'll look at how schools can be better prepared for potential increases in energy usage and costs.

## These mitigation strategies scientifically prove to lessen the spread of COVID-19

and are recommended by the CDC, American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) and DHS.<sup>2</sup>



Wisconsin's schools will spend over

**\$5.62  
MILLION**

more on utility bills using COVID-19 operating strategies.

<sup>1</sup> Wisconsin's schools have about 178 billion gross square footage. Data showed buildings use an average of 5.69 kWh/ft<sup>2</sup> and 0.42 Therms/ft<sup>2</sup>.

<sup>2</sup>Van Beusekom, M. (2020, May 28). Indoor spread of COVID-19 can be lessened, experts say. Center for Infectious Disease Research and Policy. <https://www.cidrap.umn.edu/news-perspective/2020/05/indoor-spread-covid-19-can-be-lessened-experts-say>.

# ENERGY SAVING STRATEGIES

Avoid being surprised by rising monthly energy bills by taking the steps below.

- **Take steps now to quantify the budget impacts.** Review energy bills from a “normal” year (2018-19 school year or later) to determine the building’s baseline energy use (kWh and therms) and energy costs. Increase the annual therm usage by 10% and kWh usage by 0.4% and then multiply the usage by the current energy rates to estimate the energy costs due to COVID-related operational changes.
- **Record changes to building control settings.** Consider taking screenshots of the control system settings pre- and post-COVID. Maintain the current settings on a fixed schedule if possible.
- **Evaluate other systems impacted by setting changes.** If you are bringing in more outside air during colder temperatures, will your coils freeze? If you install a new higher density filter, is the system able to overcome the increased pressure difference? Get ahead of potential problems by reviewing interrelated systems and settings.
- **Perform a building tune-up.** Retrocommissioning and preventative maintenance can identify no and low cost opportunities to extend equipment life and ensure the building is operating at peak efficiency.
- **Choose high efficiency equipment.** Request Trade Allies provide multiple efficiency options when providing proposals for upgrading or replacing fans, motors, or heating and cooling equipment. Choosing the most efficient option provides long-term energy savings and may qualify for financial incentives.

*How to calculate your monthly budget increase:*

$$\text{3 Year Avg. of Therm Usage} \times 10\% \times \text{Recent Therm Rate from Utility Bill} = \text{Estimated Increase in Heating Cost}$$

$$\text{3 Year Avg. of kWh Usage} \times 0.4\% \times \text{Recent kWh Rate from Utility Bill} = \text{Estimated Increase in Electric Cost}$$



# HERE TO HELP



Energy efficiency projects can lower a school district's energy bills creating an opportunity to put those budgeted dollars towards:

- Hiring more teachers
- Purchasing more computers and tablets
- Investing in future energy efficiency projects

**Learn more about how Focus on Energy can help Wisconsin schools get in on energy efficiency by contacting an Energy Advisor or calling 888.623.2146.**

## REDUCING ENERGY WASTE ACROSS WISCONSIN

Focus on Energy, Wisconsin utilities' statewide program for energy efficiency and renewable energy, helps eligible residents and businesses save energy and money while protecting the environment. Focus on Energy information, resources and financial incentives help to implement energy efficiency and renewable energy projects that otherwise would not be completed.

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