

# Reducing Greenhouse Gas Emissions in Schools

*School business officials can play an important role in reducing greenhouse gas emissions in school operations.*

By Richard Weeks, RSBA

In 2021, almost 200 countries came together at the United Nations Climate Change Conference and agreed to the Glasgow Climate Pact, an update to the landmark 2015 Paris Agreement. This action affirmed the United Nations' recognition that limiting global warming requires "rapid, deep and sustained" reductions in global greenhouse gas (GHG) emissions. It includes reducing global carbon dioxide (CO<sub>2</sub>) emissions by 45% by 2030 relative to the 2010 level and to net zero around mid-century.

As a result, most U.S. states have enacted climate mitigation statutes, and communities established GHG emission benchmarks.

Federal and state agencies are providing the financing, primarily through incentives, tax credits, and tax cuts; however, the actual work of reducing GHG emissions is overseen at the state and local levels. Figure 1 is a composite of several communities' climate action plans with the goal of reducing metric tons of CO<sub>2</sub> or the equivalent (in thousands) to net zero by 2050.

"Net zero" refers to the balance between the amount of GHGs (carbon dioxide, methane, and sulfur dioxide) that is removed from the atmosphere and the amount emitted by human activity.

In Figure 1, "Mobility" refers to the phaseout of vehicles with internal combustion engines and replacing them with electric cars and school buses. In relation to school districts, school business officials (SBOs) may anticipate updates on grant applications to the Environmental Protection Agency (EPA) Clean School Bus program.

"Buildings" and "Energy" refer to high-impact energy efficiency and health improvements to local

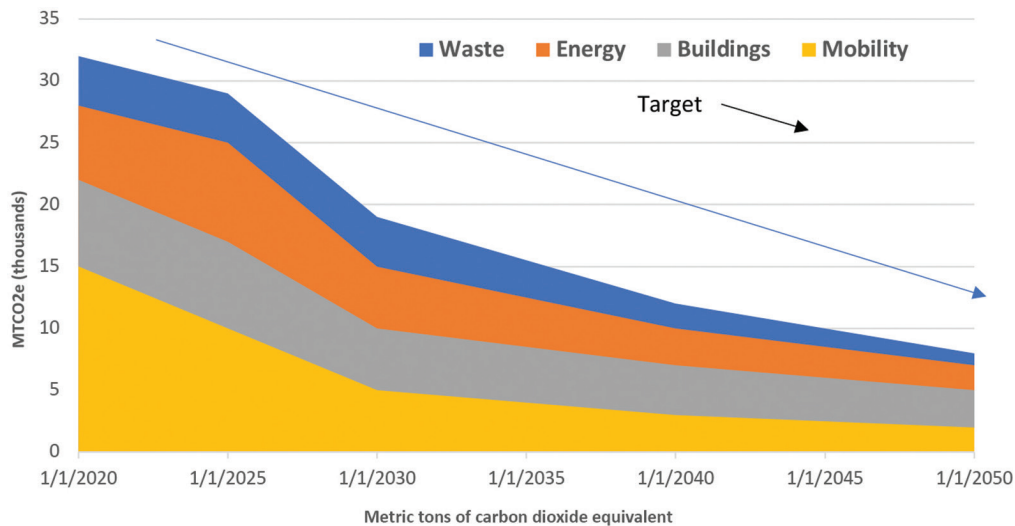


infrastructure, including schools. Competitive grants focused on these areas were established as part of Congress's Bipartisan Infrastructure Law of 2021. Community sustainability committees may recruit district leaders to apply for grants that prioritize schools with a high percentage of students who are eligible for a free or reduced-price lunch.

## Carbon Dioxide and Methane Gas Emissions

The EPA identifies CO<sub>2</sub> and methane as the most prevalent greenhouse gases (see Figure 2). Carbon is an essential element of all life forms on Earth. Whether these life forms take in carbon to help manufacture food or release carbon as part of respiration, the intake and output of carbon are components of all plants and animal life.

In school classrooms, inadequate ventilation can create an unhealthy environment in the form of high CO<sub>2</sub> concentrations. ASHRAE (the American Society of Heating,



**Figure 1.** A community’s action plan: reducing greenhouse gas emissions to net zero.

Refrigerating and Air-Conditioning Engineers) recommends that indoor CO<sub>2</sub> concentrations be maintained at or below 1,000 parts per million in classrooms. Studies have demonstrated that higher levels of CO<sub>2</sub> decrease cognitive functioning in students. Perhaps unused Elementary and Secondary School Emergency Relief (ESSER) funds could be used to repair heating, ventilation, and air-conditioning HVAC units in older buildings.

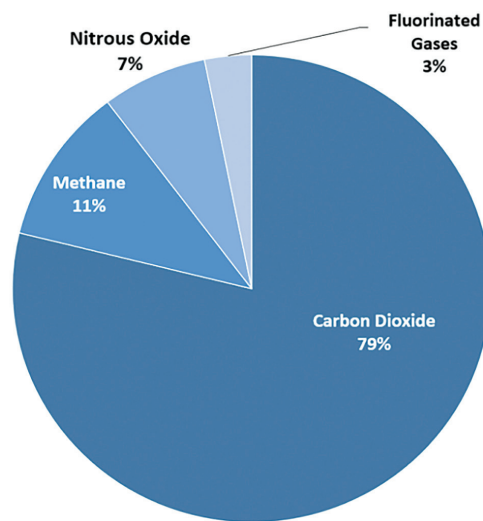
In addition, SBOs may work with architects to design new or renovate school district facilities that use low-embodied-carbon materials for structure and finishes to improve building performance. “Embodied carbon” is the CO<sub>2</sub> emissions associated with building construction, including manufacturing, transporting, and installing building materials.

Architects may present power system options, such as “tri-generation” units that combine heating, cooling, and generation of electricity from the same plant. Geothermal and solar technology systems may also be considered to reduce many tons of carbon emissions per year and to achieve the goal of net-zero efficiency.

## Looking toward Electric

Various fuels produce different amounts of CO<sub>2</sub> to produce thermal energy, resulting in global warming. The EPA publishes emission coefficients for CO<sub>2</sub> by type of fuel per unit of volume or mass and per million Btus ([www.eia.gov/tools/faqs/faq.php?id=73&t=11](http://www.eia.gov/tools/faqs/faq.php?id=73&t=11)).

Districts will likely procure new school buses within the next several years. Although they may want to purchase electric buses, they may need to wait because of vehicle cost, limited competitive grant opportunities, nascent battery technology, and infrastructure requirements. Under the pressure to reduce CO<sub>2</sub> emissions of buses and maintenance vehicles by 2030, districts will need to consider operating them with a fuel alternative to diesel, such as propane.



**Figure 2.** Overview of U.S. greenhouse gas emissions in 2020.

“Methane” accounts for about 11% of all GHG emissions, primarily from the agricultural sector in the production of fertilizer and from livestock. Methane is the largest compound of “natural gas,” the fossil fuel used in most schools.

Because natural gas is colorless and odorless, gas companies add the compound mercaptan to give it a rotten egg or sulfur smell to ensure that leaks can be detected by school personnel. Gas leaks have become a major concern because of the aging infrastructure in the delivery of gas from refineries and holding tanks to our homes and schools. The EPA now requires gas companies to aggressively detect and repair underground leaks that allow methane to escape.

Gas appliances in our schools, such as stoves and hot-water heaters, have come under scrutiny. When ovens or stove tops burn natural gas, CO<sub>2</sub> is released. In older units, there is a brief lag between the time the gas is

turned on and when the pilot light ignites. That lag time allows considerable methane to leak into the atmosphere without being burned. Gas stoves can also expose people to chemicals such as benzene, which are linked to cancer.

Districts might consider finding a reputable vendor who can tune-up appliances to mitigate possible methane problems. In time, electric appliances will replace most gas appliances. The EPA's Energy Star program may assist districts with procurement rebates ([www.energystar.gov/rebate-finder](http://www.energystar.gov/rebate-finder)).

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## Initiatives for SBOs

SBOs have an opportunity to reduce dependency on fossil fuels and the resulting GHG emissions.

**Energy conservation.** A good time to conserve energy is during school breaks and vacations. Brian Holloway, director of maintenance and operations at Lodi Unified School District in California, prepared a comprehensive checklist for his principals and custodians (Table 1). Many schools now have “building resource monitoring systems,” which allow energy managers to print energy use data reports generated in real time to alert personnel to current energy consumption.

**School board policies.** School board members may welcome the SBO's help in crafting new policies on environmental matters. Does your district have a policy to use renewable energy? In your budgeting process, is there a procurement plan to support the purchase of renewable energy from utilities whose sources include solar, water, and wind?

Districts have adopted policies commonly referred to as “approved appliance programs.” The policies restrict the use of convenience appliances, such as coffeemakers, microwaves, refrigerators, plug-in air fresheners, space heaters, and fans. School principals manage the policies by issuing approved appliance stickers that are attached to the appliances that fulfill a valid need.

**Green revolving funds (GRFs).** Consider asking your school board and municipality to establish GRFs dedicated to sustainability projects. Green revolving accounts work as follows: A capital project is identified that would improve the health, safety, and efficiency of operations to the occupants of the school or district. Funds available in the established revolving account are used to pay for the proposed project. Energy savings resulting from the project are reinvested in the green revolving account for future projects.

Projects of any size can be funded with GRFs. Some districts use these funds to improve water and waste

**Table 1. School Break Custodial Energy Shutdown Checklist (abridged)**

### General

- Close doors and windows. Building must be pressurized to distribute air.
- Close blinds to reduce heat gain during the day.
- Unplug all appliances not required for critical health and safety concerns, including vending machines. Clean out and defrost refrigerators.
- Notify the Technology Help Desk for any computer-related concerns.

### HVAC

- In rooms with programmable thermostats, check for appropriate settings.
- Make sure that no furniture, posters, or bulletin boards are covering HVAC vents.
- If your building has unit ventilators, keep items off the top and sides.
- If you observe any HVAC system running during nonoccupied times, report this to Maintenance and Operations.

### Lighting

- Make sure all classroom lighting is turned off.
- Report any outside lighting that is on during the day to Maintenance and Operations.
- Leave on approved security lighting. Reset time clock schedules, if necessary.
- Ensure that all light switches are off, thus disabling any unintentional use of lighting sensors.

**Source:** Lodi Unified School District, Lodi, California, and the USGBC, Center for Green Schools, 2021.

management systems and to upgrade their fleet maintenance vehicles.

## In Conclusion

Do not forget about student outreach and engagement. Be supportive of and encourage student organizations involved in GHG mitigation efforts. Student council advisers might encourage students to approach the school board with a policy proposal that governs student-owned vehicles. Restricting the use of private vehicles can reduce CO<sub>2</sub> emissions and help alleviate gridlock and congestion around schools. Such a suggestion is better coming from students than “from on high” by the school board.

The first emission benchmarks in 2030 are fast approaching. Do your part to make a mark.

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