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Federal Investments in K-12 Infrastructure Would Benefit Students Across the Country

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Introduction and summary

School buildings across America are crumbling. According to a 2020 report by the U.S. Government Accountability Office (GAO), 54 percent of U.S. school districts need to update or completely replace multiple building systems in their schools.¹ This crisis has only deepened during the COVID-19 pandemic, as well as in the face of record-breaking extreme weather events exacerbated by climate change.

Historically, public schools have been excluded from federal infrastructure legislation,² despite representing the nation's second-largest infrastructure sector.³ In one recent example—although funds from the Infrastructure Investment and Jobs Act (IIJA) may be used to upgrade school facilities—the president's requested \$100 billion specifically designated for this purpose did not make it into the final version of the IIJA.⁴ So, while funds from the IIJA and the American Rescue Plan (ARP) are being used in part to improve school facilities—particularly for efforts related to school air quality, school buses, and energy efficiency—it is noticeably less than the outstanding needs.

As a result of decades of underfunding school infrastructure, national spending for K-12 school buildings falls short by an estimated \$85 billion annually, as reported by a 2021 analysis from the 21st Century School Fund. Over the next decade, it would cost an estimated \$1.1 trillion to modernize and replace obsolete school buildings and systems.⁵

Public schools receive most of their funding from local and state government sources. Yet since public schools in communities with fewer resources generate less funding from local property taxes—the primary source of local education funding—they must rely on state and limited local funding to cover operational and capital infrastructure expenditures to upgrade school facilities. For this reason, low-income and historically underresourced communities, which often

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primarily serve students of color, are left with inadequate resources to repair and modernize school buildings, while wealthier districts are able to use their ample tax bases to generate the revenue necessary to outfit schools with state-of-the-art technology, classrooms, and science labs.

The need to initiate long-term federal school infrastructure funding is therefore not only about upgrading school buildings but also addressing the long-standing, ongoing need for racial justice, environmental justice, and educational equity. Low-income and underresourced school districts should not have to rely on inadequate funding to cover infrastructure upgrades and day-to-day operations such as teacher salaries, student services, and classroom materials.

Fortunately, the federal government is critically aware of America’s school infrastructure crisis and has begun responding to meet the needs of the country’s public schools. In April, the Biden administration released the Biden-Harris Action Plan for Building Better School Infrastructure,⁶ which directs the entire federal government to leverage investments from the IIJA and the ARP to upgrade public schools with modern, clean, energy-efficient facilities and transportation. This signals a renewal of the administration’s commitment to providing all students with safe, healthy, and modernized learning environments that will foster their growth and set them up for long-term success. For example, the U.S Department of Energy is launching a \$500 million grant program through the ARP to make public schools more energy efficient.⁷ In addition, districts across the country have already allocated about \$15 billion from their ARP Elementary and Secondary School Emergency Relief funds to improve school facilities, prioritizing heating, ventilation, and air conditioning (HVAC) upgrades.⁸ Furthermore, FutureEd estimates that infrastructure investments could make up about one-quarter of all K-12 emergency relief spending by school districts—totaling nearly \$26 billion.⁹

The need to invest in K-12 infrastructure: By the numbers

54%

Percentage of U.S. school districts that need to update or completely replace multiple building systems in their schools

36K

Number of U.S. school buildings that need to update or replace their HVAC systems – one-third of school buildings

\$85B

The amount by which national spending for K-12 school buildings falls short each year

\$1.1T

Estimated cost of modernizing and replacing obsolete school buildings and systems over the next decade

These investments are a great start, but equitable, dedicated long-term funding for school infrastructure is needed to ensure that all school buildings are safe and conducive to student learning. Namely, the administration’s plan for improving America’s schools, coupled with its executive order on advancing racial equity and support for underserved communities at the federal level, is critical.¹⁰ Our students deserve the whole-of-government equity agenda set forth by the Biden administration, which prioritizes modernizing school infrastructure and improving schools in communities that have been historically underserved, among other equity initiatives.

This report will explore how new and expanded federal funding for school infrastructure would meaningfully benefit both students’ physical health and academic success.

Benefits to student health

Poor school infrastructure often exposes students and teachers to harmful, toxic substances such as lead paint, debris, mold spores, and other indoor toxins, which can negatively affect their health. These contaminants, coupled with the coronavirus, which spreads more rapidly in poorly ventilated areas, heighten concerns about indoor air quality in classrooms.¹¹ However, federal investments in school infrastructure would reduce the concentration of airborne toxins, pollutants, allergens, chemicals, and other contaminants by remediating the sources of toxins, replacing building systems, and constructing new facilities. Taken together, these investments would improve student and teacher health, helping to improve overall student learning.

Improving air quality in school buildings

There is substantial need to replace aging building systems in districts across the nation. In fact, a recent report by the GAO found that one-third of schools—up to 36,000 school buildings—need to update or replace their HVAC systems.¹² When HVAC systems break down, they no longer properly filter, circulate, temperature control, or dehumidify air,¹³ leading to leaks that result in water damage and mold, as well as poor air quality in classrooms that can cause and worsen respiratory conditions among children.¹⁴ Improving indoor air quality can remove toxins from the air, help address student respiratory issues, and better prepare schools for future unknown pathogens.

Electrifying school bus fleets

Diesel school buses are another source of harmful pollutants. They often leak dangerous fumes into the cabin, exposing children to carbon monoxide, hydrocarbons, nitrogen oxide, and other particulate matter.¹⁵ In 2001, a Natural Resource Defense Council study found that children riding inside diesel school

Learn more about how improving school air quality plays a vital part of a multi-layered strategy to improve and protect health, education, equity, and the environment:

[School Air Filtration and Ventilation Strategies To Improve Health, Education, Equity, and Environmental Outcomes](#)

buses were exposed to as much as four times more diesel exhaust as those riding in a car or standing alongside the bus.¹⁶ Similar to poor classroom ventilation, fine particulate, toxic matter from nonelectric school buses exacerbates and increases children’s susceptibility to asthma and other respiratory diseases.¹⁷ Moreover, diesel exhaust has been recognized as a carcinogen by many health agencies, including the U.S. Environmental Protection Agency.¹⁸

It is essential for schools to replace diesel buses with battery electric models to protect students’ health. The IIJA, which Congress passed in November 2021, provides \$5 billion in new federal funding over five years for nondiesel school buses.¹⁹ While this funding is greatly needed, the money is split evenly between zero-emission or electric school buses and “alternative fuel buses,” which run on compressed natural gas, propane, and biofuels that still produce harmful pollutants.²⁰ With additional federal investments specifically intended for zero-emission or electric buses, schools can replace their existing bus fleets and move toward dramatically reducing the localized air pollution produced by diesel and alternative fuel buses.

According to the U.S. Centers for Disease Control and Prevention (CDC), asthma and other respiratory illnesses are the leading cause of school absenteeism.²¹ In 2013, the CDC found that children with asthma missed almost 14 million school days,²² while another study found that teachers have higher asthma rates than those in related occupations.²³ While asthma is a complex condition that may be exacerbated by many factors, improving school facilities—including indoor air quality and school buses—would help reduce the number of instructional days that students miss each year. In particular, investing in HVAC systems that improve classroom air quality would help improve attendance for both students and teachers, thereby reducing disruptions to student learning. Upgrading HVAC systems and school buses are two of the best-documented ways schools can promote student health, but they can cost schools millions of dollars, and many schools will need additional financial resources to afford them.²⁴

COVID-19 demonstrated the importance of holistically thinking about school safety and being prepared for the future.²⁵ Now, the federal government must make investments to ensure that students today and for generations to come have access to safe, healthy school environments.

Benefits to student learning

High-quality, well-designed, and modernized school facilities can also improve student academic outcomes. Both in the classroom and on the school bus, healthier air quality has been linked to increased concentration, improved test scores, and improved academic performance.²⁶ Furthermore, schools with abundant natural light, thermal comfort, and low sound levels better facilitate student learning, as physical learning environments contribute significantly to students' ability to engage and comprehend academic material. In short, upgrading and modernizing schools is not simply a matter of aesthetics but an essential element of learning.

Modernizing schools

Modernizing schools must involve completely renovating systems, redesigning school interiors, improving schoolyards, and updating technology.²⁷ In particular, equitable access to laptops, virtual reality, and other 21st century technologies can help eliminate the digital divide and expand the learning opportunities available to all students.²⁸ Examples of school modernization include ensuring that furniture and school spaces facilitate teaching and learning, providing all schools with broadband and functioning computers for every classroom, and ensuring safe transportation pathways to and from school.²⁹ A recent study found that students in modernized schools were happier, healthier, and more ready to engage in their education. Modernizing schools can provide students and teachers with an improved quality of life and educational experience.³⁰

Maximizing natural light

Natural light plays a crucial role in the body's daily biological processes. In fact, a Center for Green Schools research compendium detailed several studies that found that inadequate daylight can impair students' alertness.³¹ Furthermore,

natural light has been linked to improved social behavior and cognitive skills in students.³² Ultimately, improving the amount of natural light available in students' learning environments can lead to improved academic performance and physical well-being.³³

Ensuring thermal comfort

Most people would not perform their best in an environment that is too cold or too hot, yet students are often expected to perform well in uncomfortably cold or warm classrooms. Unsurprisingly, a study of 75,000 test scores from students in New York City showed a correlation between classroom temperature and test scores,³⁴ finding that the likelihood of a student failing an exam on a 90-degree day is 12.3 percent higher than on a 75-degree day. Therefore, it is vital that students are provided with comfortable temperatures in their learning environments in order to improve their productivity and help them stay alert.

Improving classroom acoustics

Working or learning in loud environments can cause distractions that impede students' ability to listen and engage in the classroom. Indeed, research shows that attention, memory, and other cognitive processes develop slowly and are sensitive to noise exposure.³⁵ Likewise, observational and experimental studies have found a negative relationship between exposure to noise and children's cognitive performance and learning outcomes.³⁶ For students to retain new material, they must be in learning environments with low background noise and limited auditory disruptions.³⁷

Creating new learning and career opportunities

In addition to optimizing the learning environment, making energy-efficient upgrades and installing clean energy technologies such as solar panels, battery storage, and microgrids can provide students with hands-on educational and professional training opportunities. When schools become living labs for clean energy deployment, climate action, and resilience, students gain a firsthand understanding of how they and the institutions around them can address the climate crisis – an innovative and important step toward developing the next generation of climate leaders.

Schools across the country have adopted sustainability curriculums and career technical education programs in tandem with their energy efficiency upgrades and clean energy installations.³⁸ The School District of Philadelphia, for example, partnered with

the Philadelphia Energy Authority in 2019 to launch the Bright Solar Futures training program, which provides high school students with technical training to enter the solar industry.³⁹ Meanwhile, in New York City, the state Department of Education works with the nonprofit Solar One to offer more than 19,000 students experiential learning and professional development opportunities related to clean energy, green engineering, and other STEM careers.⁴⁰

The federal government should prioritize investing more funding into programs such as the Climate Change Education Act to ensure that green career education continues to play an influential role in transitioning students to the clean energy workforce, one of the fastest-growing employment sectors.⁴¹

Conclusion

The Biden-Harris Action Plan for Building Better School Infrastructure helps districts and schools identify much-needed funding opportunities for infrastructure upgrades. Yet on its own, it is an inadequate solution to America's crumbling schools.⁴² The proposed funding mechanisms, including ARP Elementary and Secondary School Emergency Relief funds, fall short of the \$85 billion annual K-12 infrastructure spending gap, the \$100 billion that President Joe Biden called for in his American Jobs Plan, and the estimated \$1.1 trillion needed to upgrade and replace school buildings and systems in need over the next decade.⁴³ Moreover, if the country does not act now to upgrade and replace school buildings in disrepair, the impacts of climate change stand to widen this already astronomical funding gap. The administration's efforts to support schools and the Department of Education's newly proposed Office of Infrastructure and Sustainability are a good starting point, much more is needed to ensure that all students can attend schools that provide safe, healthy, and modernized learning environments that will foster their growth and set them up for long-term success.⁴⁴

The Center for American Progress calls on the federal government to prioritize long-term investments dedicated to school infrastructure that will advance climate resilience, energy efficiency, and healthy, productive learning environments. For example, the Reopen and Rebuild America's Schools Act of 2021 would provide \$100 billion in grants and \$30 billion in bond authority targeted at improving high-poverty school facilities.⁴⁵ Without dedicated long-term federal investments in K-12 infrastructure, schools will continue to fall into disrepair, and students will continue to suffer the consequences. This is especially true for students of color and students in districts with fewer resources that are once again being asked to choose between using funds to operate schools or repair them.

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Dedicated long-term federal K-12 infrastructure investments would provide essential, compound benefits to students while also addressing systemic racial injustices. Such investments must begin with equitably and justly repairing the institutions most important to the foundation and future of the United States. Providing schools with the modern infrastructure and clean energy technology they need will help keep students safe and healthy today and prepare them for the careers of tomorrow.

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