TRANSFORMING PUBLIC EDUCATION:

A GREEN NEW DEAL FOR K–12 PUBLIC SCHOOLS

July 15, 2021, Philadelphia

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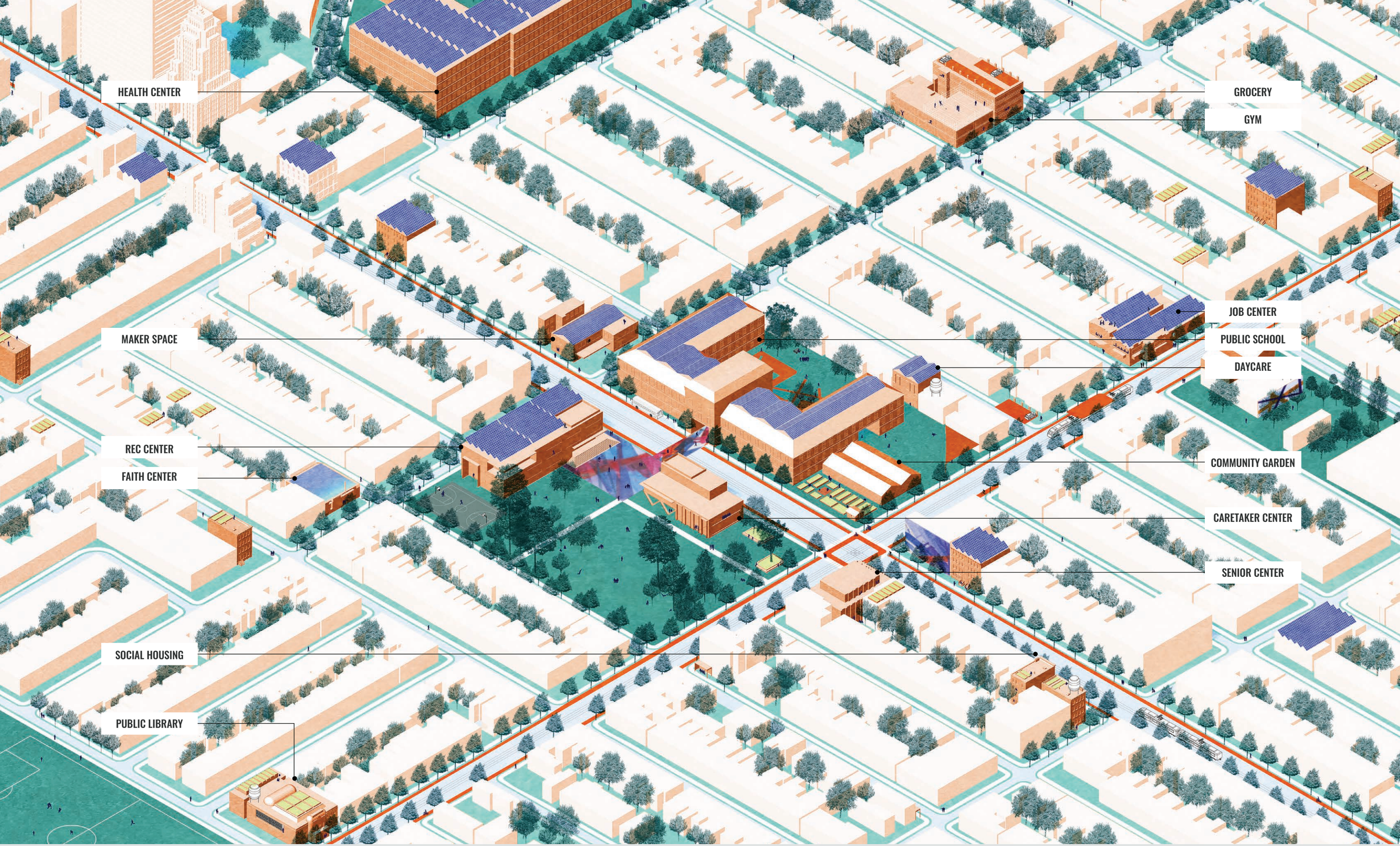
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A GREEN NEW DEAL FOR K-12 PUBLIC SCHOOLS

July 15, 2021 Philadelphia

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The **climate + community project (ccp)** is a network of social scientists, lawyers, and policy experts conducting cutting-edge qualitative and quantitative research who are committed to supporting a justice-based Green New Deal. @cpluscp climateandcommunity.org

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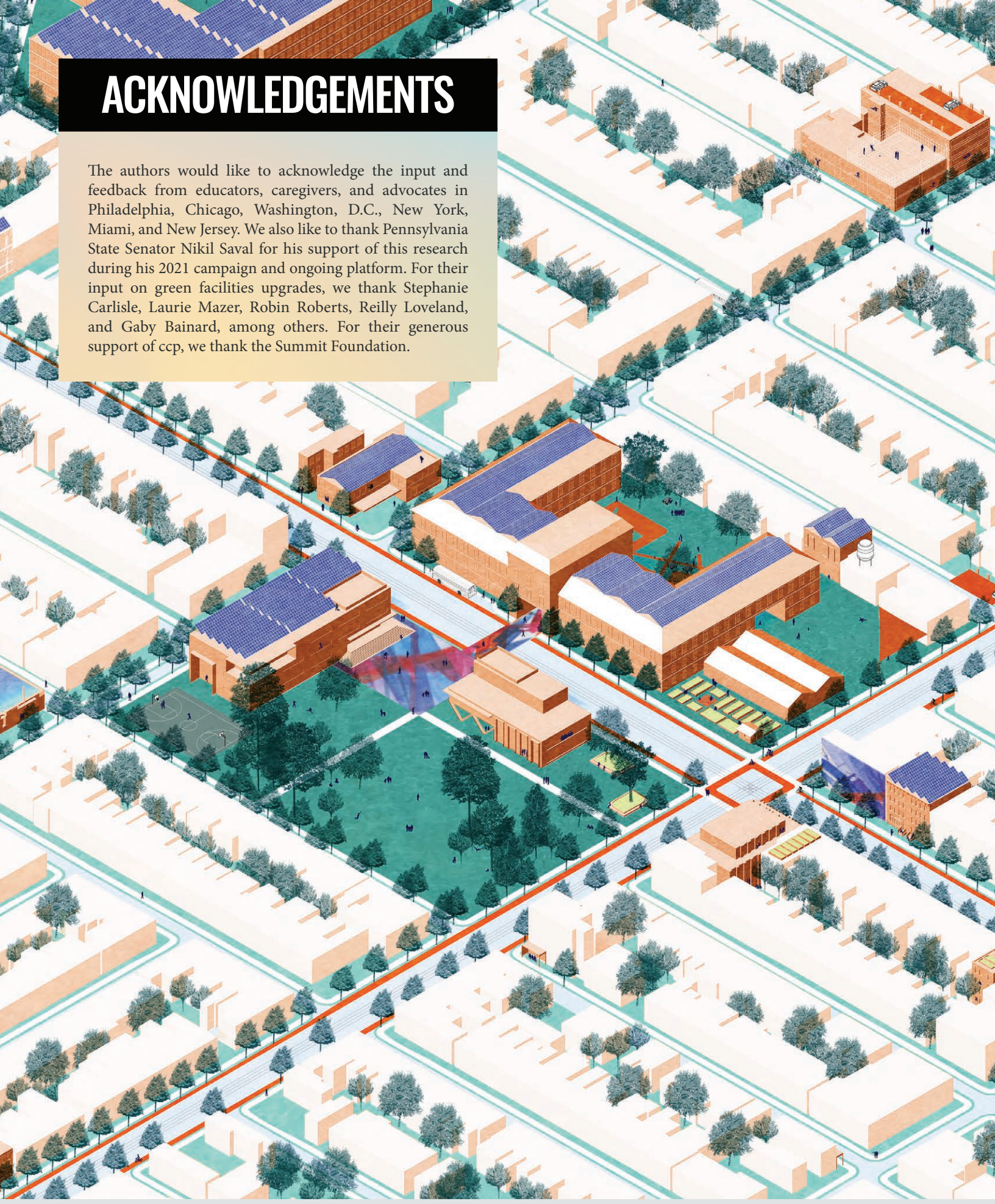


EXECUTIVE SUMMARY

> “It is clear that our public education system is in need of transformation and modernization to meet the needs of an increasingly diversifying nation. There is a clear need for American schools to offer a broader portfolio of educational opportunities to students, to equip them for a full range of possible futures.”

Public education in the United States has reached a critical point. Over the last 20 years, polling has shown that Americans are divided when it comes to their satisfaction with the K–12 public school system.[1] There is a clear need for American schools to offer a broader portfolio of educational opportunities to students, to equip them for a full range of possible futures. Beyond questions of curricula, recent polling also shows that **nearly two thirds of Americans are in favor of federal investment in public school buildings.**[2] **And schools need the investment. The American Society of Civil Engineers has estimated that the country’s public schools require $380 billion just to meet standards of good repair—never mind climate resiliency and decarbonization.**[3] **In June 2020, the Government Accountability Office (GAO) estimated that about 54 percent of all public school districts in the US need at least two major systems updated or replaced in most of their school facilities, and about 26 percent of all districts need at least six systems updated or replaced** (see Figure 1).[4] The report called out the severe health and safety risks to students, educators, and community members from the “hazardous conditions” of public school facilities, noting the number of schools that had to close even prior to the COVID-19 pandemic. A June 2021 NBC news story detailed the scope and scale of these problems, particularly in low-income school districts.[5]

In addition to these calls for transforming the mission, priorities, and funding streams of public education, public school buildings and districts have long been a battleground in state and local politics. They are often where the long legacy of segregation, racist housing policies, and growth machine politics manifest themselves in nearly every community in this country. Whether through the decades-long campaigns to privatize school districts, the creation of inequitable funding formulas that saddle low-wealth communities with high operating and capital costs for their schools, or the long legacy of segregation, disinvestment in public education—perhaps more than any other sector—has contributed greatly to disparate education outcomes across race, class, and ability lines. Over time, these issues compound—with low-wealth schools struggling to maintain their buildings,[6] to recruit and retain quality teachers, and to give students the resources and opportunities they need to succeed.[7] These inequities occur both between and within school districts across the US.

A Green New Deal for K–12 Public Schools addresses these **long-term issues of health and environmental inequity, educational inequity, economic inequity, and structural racism by offering equitable**

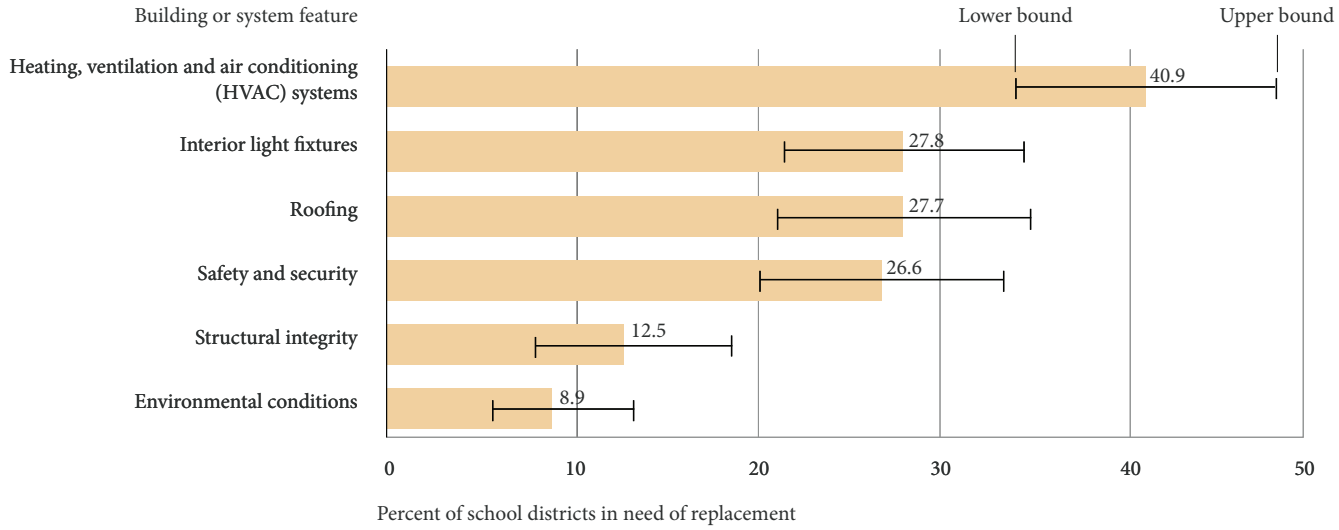


FIGURE 1. Estimated Percentage of Public School Districts in Which at Least Half the Schools Need Updates or Replacements of Selected School Building Systems and Features. Source: Government Accountability Office, "K–12 Education: School Districts Frequently Identified Multiple Building Systems Needing Updates or Replacement," GAO-20-4024, June 2020, https://www.gao.gov/assets/gao-20-494.pdf.

goals, priorities, and $1.4 trillion in funding for our K–12 schools through federal Climate Capital Facilities Grants, Resource Block Grants, and expansion in Title I funding over the next decade. Without it, we risk deepening these existing inequities between facilities conditions, per pupil spending, and teacher retention rates, that contribute to poor health, educational, and economic outcomes for majority BIPOC school districts and communities.

A Green New Deal for K–12 Public Schools aligns with the Biden administration's goals of rescuing schools from the devastation of the COVID-19 pandemic while creating jobs, addressing decades of disinvestment in the physical capital and educational resources of school facilities, delivering racial equity, improving health outcomes, slashing carbon emissions, and improving school resilience to extreme weather, all at the same time. It would also help the Biden administration achieve its Justice40 Initiative goal of ensuring that 40 percent of the benefits of its climate funding flows to disadvantaged communities.[8] The massive public investments called for here would yield economic, educational, and climate benefits for decades to come.

To achieve a Green New Deal for K–12 Public Schools, we propose $1.4 trillion in new funding over 10 years that would direct:

- **$446 billion over 10 years for Climate Capital Facilities Grants** to fund healthy, green, climate-friendly retrofits for every public school in the country. These grants would be paired with **an additional $223 billion in low-interest loans to deliver healthy, green retrofits to all K–12 public schools.** Grant funding would be targeted to school districts in the lowest-income areas, which will be prioritized for first access to funds in the program's first three years. These retrofits will also include short-term measures to help schools reopen safely as we exit the pandemic. An additional **$40 billion will be made available, over 10 years, for school resiliency measures,** to fund additional green upgrades to schools to keep them safe in extreme weather and contribute to community resiliency. Today, over 50 million students attend public K-12 public schools—a number that will only grow. This bill would help them all.

- **$250 billion over 10 years for Resource Block Grants** to fund expanded staff, social services, training, and professional development in public schools with the greatest need; this would include **$100 million in Educational Equity Planning Grants** to pilot a process of eliminating intra-region education inequities in school funding.

- **$69.5 billion annually in expanded Title I and IDEA Annual Funding** to sustain operational support for the Resource Block Grants.

The Green New Deal for K–12 Public Schools is also a jobs program. Investments in healthy green retrofits will generate 935,000 jobs per year (of which 272,000 are construction and on-site maintenance jobs); and the resource block grants support 339,000 educator resource jobs each year. **Overall, this bill will fund 1.3 million jobs annually.**

The country's 105,000 K–12 schools currently emit 78 million metric tons of CO2 each year;[9] they use 8 percent of all the energy used by US buildings.[10]

State	Construction and On-Site Maintenance Jobs Over Ten Years
California	38,960
Texas	37,220
Florida	15,360
New York	13,000
Arizona	9,260
Illinois	9,260
North Carolina	9,240
Michigan	8,380
Georgia	7,840
Ohio	7,140

TABLE 1. States with Highest Number of Construction and On-Site Maintenance Jobs from Retrofitting K–12 Schools over Ten Years (see Table 2 for estimates for all states, Washington DC, and Puerto Rico)

Decarbonizing the country's K–12 schools would entirely eliminate that carbon pollution, the equivalent of taking 17 million cars off the road. School energy use can be fully decarbonized by performing deep-energy retrofits for school buildings, adding solar panels to school facilities, and switching to zero-carbon energy sources for any remaining electricity needs. And electrification will have local health benefits, by eliminating toxic fumes from in-building combustion of gas, oil, and/or propane. To date, schools have been constrained in making truly healthy, deep-energy retrofits because of high upfront costs. We propose using federal investment to cover schools' full retrofit cost. For schools in the lowest income third of census tracts, we propose full grant funding for retrofits. Better-funded schools would receive a mix of federal grants and federal loans. **Overall, this massive federal investment in schools will drive down the cost of deep energy retrofits for the entire building sector, by creating and growing businesses, building workers' capabilities, and lowering costs for technologies and materials. This would help advance racial justice while healing the planet—and schools' balance sheets.**[11]

We estimate that retrofitting all the country's K–12 public schools would cost $669 billion. This would also cover community green infrastructure improvements like school-site solar and battery, as well as community involvement throughout the retrofit process. **We recommend that the federal government cover two thirds of this upfront cost—$446 billion—through Climate Capital Facilities Grants, with the final third coming from low- and no-interest loans from the Department of Energy or Department of Education, as these retrofits should cut most annual utility bills by over 50 percent. Schools in the most vulnerable third of census tracts should have their retrofits entirely funded by grants, and would be prioritized for funding in the program's first three years.** Overall, to comply with President Biden's executive orders on environmental justice,[12] we recommend that retrofits for schools in the most vulnerable third of census tracts be entirely grant-funded, that schools in the middle third have two thirds of retrofit costs covered by grants, and that schools in the richest third of census tracts have one third of their retrofit cost covered by grants.We use the CDC's Social Vulnerability index to measure vulnerability.

Healthy, green retrofits to all the country's K–12 public schools would create 935,000 jobs per year across the economy. Of those, we estimate that 272,000 jobs would be on-site construction and maintenance jobs compensated at union rates. Our estimate of projected place-based spending, based on our proposal's equity criteria, finds that on-site jobs would be evenly distributed between red states and blue states (based on 2020 electoral college vote), with 137,000 going to blue states and 132,000 to red states, plus 3,000 to Puerto Rico.

These retrofits will turn schools into neighborhood resiliency hubs, making them a key node of overall green community infrastructure. With these retrofits complete, schools that can generate and store their own energy, and that contain large meeting spaces from auditoriums to gyms, could better serve as key disaster relief centers during extreme weather events. Retrofits would benefit from technical support from the Department of Energy and its national

labs, like the National Renewable Energy Laboratory.

Moreover, the retrofits will create ideal learning laboratories to promote deep engagement with STEAM learning and skills. Using the school as a learning laboratory, children and educators will be able to leverage the new facilities to develop project-based learning activities and programs that are rooted in land-based scientific discovery and engagement.[13] Through providing early and repetitive exposure to real-world scientific and engineering learning, these schools will generate a pipeline of students who have the skills and knowledge to pursue STEAM careers and will contribute to a labor force that better reflects our nation's diversity.[14]

The Resource Block Grants will establish well-resourced classrooms and school facilities across the country while creating 339,000 new, good-paying jobs in schools. In schools with the greatest needs and that serve low-wealth students, these block grants can be used to support hiring more educators, lowering teacher-student ratios to 1:12 for K–8 schools and 1:15 for grade 9–12 schools. We will reach these ratios by hiring additional classroom teachers (a head and associate teacher for all K–grade 3 classrooms) as well as learning specialists, including math and reading specialists and afterschool staff, for all K–grade 12 classrooms. Research suggests that higher salaries *and* greater resources in classrooms and schools are vital to teacher retention and improving student educational outcomes.[15] These grants can also be used to build up and diversify the pipeline of educators and paraprofessionals trained in trauma-informed teaching and learning practices. The expansion of the educator pipeline, along with resourcing development and operations to retain and attract existing educators to our nation's most under-resourced schools, will address the forecasted educator shortages of the next decade.[16] States and local districts may also use these funds to retain and promote these federally funded and professionally trained educators to address the expected rise in educator retirements in the coming years.

Although funding and administration of public schools are highly localized, governance and local control are not entirely democratic, representative, or transparent. Nearly 95 percent of school boards have elected members, but a growing number of these local elections receive donations from national coalitions of educational reformers that can disenfranchise less monied local interests.[17] Moreover, many urban school districts lost their democratically elected school board when their state governments took over the fiscal management of these districts and dissolved their locally elected boards.[18]

Educational Equity Planning Grants will help to address one of the most critical issues of educational sustainability: inequities in school funding formulas that limit district budgets to the values of the property taxes in their jurisdictions. The Green New Deal for K–12 Public Schools builds on the work of fair housing and educational equity advocates with the introduction of Educational Equity Planning Grants to encourage the formation of regional school planning and funding mechanisms to minimize intra- and inter district disparities. **These grants build on the FY 2021–22 appropriation proposal from the Biden administration and the Department of Education for Title I Equity Grants, which seek to address funding inequities in Title I allocations, by addressing inequities found in state and local allocations to school districts and individual schools.**[19] The problems facing schools are not simply a lack of resources, but the inability to develop sustainable infrastructure, including staffing facilities, administration, and funding of public schools. As part of this initiative, we are proposing a series of transformative pilots, such as the educational equity planning grants, by **establishing regional councils of school districts composed of educational stakeholders like local and state officials, state and local educational departments, students, staff, educators, administrators, school planners, and financial officers.**[20]

Research demonstrates that barriers to improving school facilities in particular are the result of both lack of funding and lack of expertise.[21] Eligible districts will be offered planning grants to allow them to:

1) Document past educational inequities in the region,

2) Identify or create funding sources for a regional pool to finance school districts, and

3) Create a multi-year plan that lays out district and regional-specific benchmarks to achieve greater equity between school budgets in the region.

Expanded Elementary and Secondary School Act (ESEA Title I) and Individuals with Disabilities Education Act (IDEA) funding addresses years of little to no relative growth in these spending categories. Both Title I and IDEA funding are intended to funnel resources directly to the students and schools who need them most. However, in reality, most schools and administrators must apply these funds in ways that are meant to replace funding decreases from federal, state, and local budgets.[22] So, rather than increasing resources for high-need students and schools, these funds have become stopgaps in cities and states where austerity-minded officials attempt to defund public education. Title I and IDEA funding increases are often impactful in their first year, and then slowly lose efficacy over time as other funding sources are decreased in proportion to the new increases.[23]

In Philadelphia's highest-need schools, for example, this means that principals are forced to use Title I funds to staff positions that are not centrally allocated as a result of unreliable local, state, and federal funding streams. When needed infusions of federal funds from the 2008 foreclosure crisis (where state and local revenues decreased from falling property values) ended, high-need schools lost their reading specialists, assistant teachers, and other vital staff positions. Local principals must use these discretionary funds to address multiple needs—far more than existing funds can adequately address. **By increasing these discretionary funds and providing new sources of federal funding to address systemic disinvestment, a Green New Deal for K–12 Public Schools will remove these tradeoffs for under-resourced administrators. It will also invest a portion of these funds to hire more staff in state-level education departments and local educational agencies, increasing state and local capacity to better direct resources to schools that need it for increased equity.**

In sum, the Green New Deal for K–12 Public Schools addresses key resource gaps so that our most disinvested public schools can act as engines for health, environmental, educational, and economic equity. Instead of federal policies that encourage schools to Race to the Top after decades of deferred maintenance, high debt service payments, targeted disinvestment, and decreasing staff-to-student ratios, let's invest in the public schools that need it the most by affirming their local rights and control: to create green and healthy buildings in neighborhoods, using labor from the community, to improve educational outcomes and make school facilities safe and resilient spaces for all. A Green New Deal for K–12 Schools invests in building up the pipeline of green workers, innovative educators, engaged youth, and community-centered school facilities.

INTRODUCTION

An Overview of the Problem: Why Do We Need a Green New Deal for K–12 Public Schools?

In the mid-19th century, Horace Mann proclaimed that "education...is a great equalizer of the conditions of men—the balance wheel of the social machinery." Unfortunately, this radical idea never came to fruition. Instead of being a great equalizer, public education, in its earliest days, was reserved primarily for affluent, white Americans.[24] In fact, the first tax-supported high schools, in Massachusetts, exclusively served middle-class white children whose families worried that the economic changes presented unprecedented challenges for their families and their children's future.[25] In 1880, 3 percent of America's 17-year-old girls and boys graduated from high school. By 1900, nearly 8 percent of America's 17-year-old girls and only 5 percent of boys earned their high school diploma.[26] The vast majority of these graduates were white, middle-class children. Class and racial inequality were built into the foundation of America's public schools.[27]

As public education developed across the country, it had to contend with the underlying racial disparities and spatial segregation that shaped American communities—and in most cases, became a reflection of the larger inequities at the core of American life.[28] As early as 1910, cities in the United States implemented racial zoning laws that prohibited the sale of homes from members of one racial category to members of a different racial category. At the individual home level, restrictive deed covenants prohibited similar interracial sales of homes, creating a country that was built on racial and class segregation of neighborhoods, and therefore of schools. Further, as nonwhite migrants from rural communities settled into urban areas, suburban areas of exclusive homes and community amenities—including public schools—flourished with support from government-backed mortgages issued by the Federal Housing Administration and transformative investments in commuter railways and freeways by the Department of Transportation. Urban and depopulated rural areas served as the sites of industry and properties with declining values, and jobs and property tax revenues in these areas decreased during the mid-20th century.[29]

Throughout the 20th century, the federal government has not played a major role in educational policy or practice; state and local governments maintained power over school governance, educational policy, and resource allocations.[30] As a result, public education became yet another institution for reproducing the inequities based on class, race, and space across the US. Majority-white, middle-class schools received more support (from school districts and philanthropy) and had better facilities than schools with poor students of color. School districts became critical sites of contestation as civil rights activists fought gerrymandered school boundaries, race-based attendance policies, and race-segregated hiring practices for much of the mid-20th century.[31]

Public school facilities, students, staff, and educators, particularly those in urban and rural communities, have been negatively impacted by housing, urban development, environmental, and education reform policies during the latter half of the 20th century. In 1954, the Supreme Court handed down its ruling for the *Brown v. Board of Education of Topeka* case, which affirmed that school districts could no longer offer separate and unequal public school facilities. This ruling created a precedent, at least in theory, that school district officials must provide for the equitable provision of K–12 education for all residents regardless of race.[32]

In response, a phenomenon sometimes referred to as "white flight" emerged—one in which upwardly mobile white families moved to all-white suburbs or opened private, all-white segregation academies in exurban communities, taking their tax dollars and children with them. At the same time, urban renewal and redevelopment policies cleared land and subsidized the construction of inner-city, suburban, and rural school facilities, but declining property tax revenues in nonwhite, nonaffluent areas robbed these investments of needed maintenance and operation funds. Because of the historical effects of redlining, private investment for middle-class housing and jobs were directed to new suburban communities that were created with some of the last legal restrictive covenants, and with zoning rules that discouraged affordable housing. Many white residents subsequently left the public school system and enrolled their children in parochial and private schools. Eventually, these communities advocated for school choice, in the form of boutique charter schools and increased school vouchers, to avoid integration, often with public subsidies that might have once gone to public school districts.[33] As a result, public schools in America are actually more segregated today than they were in 1954.[34]

School districts fund their budgets through a combination of state, local, and federal monies (financing aspects of their budgets through bond issuance); but the uniformity stops there. Depending on geography, the mix

of school district funding sources will differ. Since school funding largely comes from property taxes,[35] higher overall property values lead to more local school funding. Poorer districts (predominantly urban and rural) rely more heavily on state and federal grants deriving from other taxes, but still face shortfalls. **Inequity in private property is therefore school funding inequity,[36] and the inequity is intense.** Many courts have found state school funding formulas unconstitutional, but little changes: schools serving poor and working-class (and more racially diverse) areas continue to face more challenges, have fewer resources per pupil, and find no opportunities for relief from government or the courts.[37] Without new private investment, school districts in legacy areas had difficulty remaining solvent, and budgets for new construction and staff and curriculum development were reduced. As unemployment and poverty rates increased in these areas, school districts took on additional roles as social service providers—and surveillers.

Presently, school districts and facilities in these legacy areas are often forced to contend with the following challenges: greater student population needs, fewer resources, aging infrastructure composed of toxic materials, and inefficient heating and cooling systems that make buildings uninhabitable at times and major sources of carbon emissions. In the schools themselves, these failing systems cause immediate health problems, from gas fumes in school cafeterias, to incomplete or broken HVAC systems that fail to ensure safe, comfortable temperatures 365 days a year. In Philadelphia, school officials made a decision to begin schools before Labor Day in 2018 to counter the loss of days from closures due to June temperatures. By Labor Day of that year, students were released early three times in the first week because of the unbearable conditions from the school buildings' inadequate mechanical systems.[38] Today, the poor air quality and ventilation in underfunded schools (and even well-funded ones)[39] exacerbates the risk of COVID-19 transmission, deepening an already desperate public health crisis.

The most recent data suggests that **school districts in the US spend approximately $8 billion in energy costs per year, their second highest expenditure after salaries.**[40] Decades of deferred maintenance have increased these operating costs for aging facilities, making it difficult for overburdened school districts to attract favorable bond terms for capital investment into these facilities.

The 2020 GAO report found that school districts most commonly used local funding to address school facility needs, but nearly three quarters of all states provided some level of capital funding to school districts for new build or renovations. Fewer states (17) reported providing districts with funding for maintenance and operation. Without strong state and/or federal support of grants or low-cost loans, the report noted, low-resource schools with small cash reserves of debt capacity often spend money on temporary fixes that only forestall the cost of replacing outdated or hazardous systems (such as spending $20,000 to repair a leaky roof that needs a $3 million replacement).[41] The report supports the recommendation to make energy-saving investments (such as LED lighting systems) to maximize the benefit and opportunity of low-cost facility investment funding mechanisms.[42]

In order to address these obstacles to equity, the Green New Deal for K–12 Public Schools proposes investing $1.4 trillion over 10 years, directing $446 billion of grant funds into the green retrofitting of aging school facilities, and new construction as needed, at the Net Zero Energy standard,[43] using Climate Capital Facilities Block Grants (plus $223 billion in loans to middle- and upper-income schools), along with $40 billion for additional resiliency measures; $250 billion into human resources and capacity building using Resource Block Grants; $100 million in Educational Equity Awards, and quadrupling the annual appropriations for Title I and IDEA funding ($695.1 billion over ten years).

The aggregate effects of racially segregated schools and communities governed by economic, educational, and environmental policies that allocated resources to whiter, more affluent places, what some call "eco-apartheid,"[44] mean that a **Green New Deal for K–12 Public Schools must prioritize areas that are most vulnerable to historic economic marginalization, environmental injustice, and educational inequity. This includes schools in high-need, socially vulnerable areas, schools sited on unremediated land and surrounded by poor air quality, districts in states that have historical and ongoing funding inequities, facilities that care for juveniles who are incarcerated and wards of the state, and our Tribal schools. The Green New Deal for K–12 Public Schools will address the contemporary needs of historically disinvested communities to create sustainable and just futures by directly investing in green retrofits for schools in high-need districts and communities.**

To address long-standing racial and spatial inequities that are exacerbated by historical struggles over governance and funding, we need a Green New Deal for K–12 Public Schools that is supported by federal grant programs. The grant proposals should be grounded in three principles that community stakeholders should affirm and articulate at the start of the inclusive and engaged planning process:

1) Health and Environmental Equity

Environmental equity is grounded in principles of environmental justice. Dr. Robert Bullard's definition of environmental justice affirms the economic, racial, health, and environmental rights of those who are impacted most by environmental policymaking.[45] This includes such complex decisions as the location of waste facilities and sanitation infrastructure and the toxicity of school construction materials. To affirm environmental equity in the Green New Deal for K–12 Public Schools means to allocate funding to communities that have historically been marginalized in investment opportunities, program design, and decision-making around school facilities. These are the communities that are more likely to absorb the burdens of negative environmental externalities. In particular, lower-income schools are more likely to have undermaintained, older facilities constructed with less sustainable or outright toxic materials.[46] **Grants will prioritize projects that retrofit energy-inefficient schools in the most impoverished districts (as determined by local per-pupil contribution) into zero net carbon buildings, and build ZeroEnergy facilities. Grant proposals that include living labs for community and student learning, and community gardens and kitchens, and proposals that demonstrate reductions in community energy expenditures, are also prioritized in this initial award cycle.**

Environmental equity, like other forms of equity, prioritizes those historically marginalized in environmental policymaking processes and outcomes. The Green New Deal for K–12 Public Schools not only uses increased environmental equity as a benchmark for vulnerable districts, but also uses equity to structure the planning, implementation, and administration processes of these block grants. **Prioritizing community control of the building retrofit process not only ensures that those who are most in need of green jobs and training receive them,** but also that school design and site location are complementary to the needs of the community, and articulated in a mandatory community values statement.

2) Educational Equity

Ann Ishimaru defines educational justice as "community-determined educational aims and democratic schooling processes that ensure those mostly affected by inequities are key decision makers in shaping education,"[47] and this definition guides our educational equity principle. Schools and districts must engage educators, caregivers, and community residents, and the federal government must provide technical and financial support to facilitate this engagement. Educational equity means turning away from traditional educational policies and pedagogies and transforming the way we conceive of public education and public school facilities.[48]

Grant proposals that receive priority in the first award cycle include those that: **fund community school models (including funding to increase paraprofessional retention and hiring in local communities to address the expected shortage in the teacher pipeline and particularly for BIPOC educators), facilitate the creation and implementation of trauma-informed learning models, increase funding for parent and student engagement, and/or increase funding for translation, childcare, and other social services to make K–12 facilities more accessible to all.** These funding increases will be used to hire staff, but also to create seed pilot funding for locally generated and sustained programming, curriculums, apprenticeships, and other resources to sustain the community-based school model.

3) Economic Equity

The Green New Deal for K–12 Public Schools also addresses issues of economic equity. Economically equitable policies not only prioritize the needs of the most economically vulnerable in policymaking, but also include a diversity of economic models in their planning and implementation. Economically equitable policies create sustainable jobs with living wages that employ people living in the school district and diversify local industries. The Green New Deal for K–12 Public Schools prioritizes public sector job creation and sustainability. By targeting economically vulnerable communities in socially vulnerable school districts, the Green New Deal for K–12 Public Schools can infuse needed federal resources into communities for the purposes of stimulating economic growth and stabilizing economies through federal job protections.

To affirm economic equity, **grant proposals that mandate at least 30 percent of all jobs to local residents (from construction, retrofitting, and educating), training opportunities within school buildings, and apprenticeship programs for green unionized jobs will be prioritized in the first award cycle. Grant proposals that partner with local businesses/nonprofits/cooperatives owned and employing a majority of BIPOC workers will also receive priority in this first cycle.**

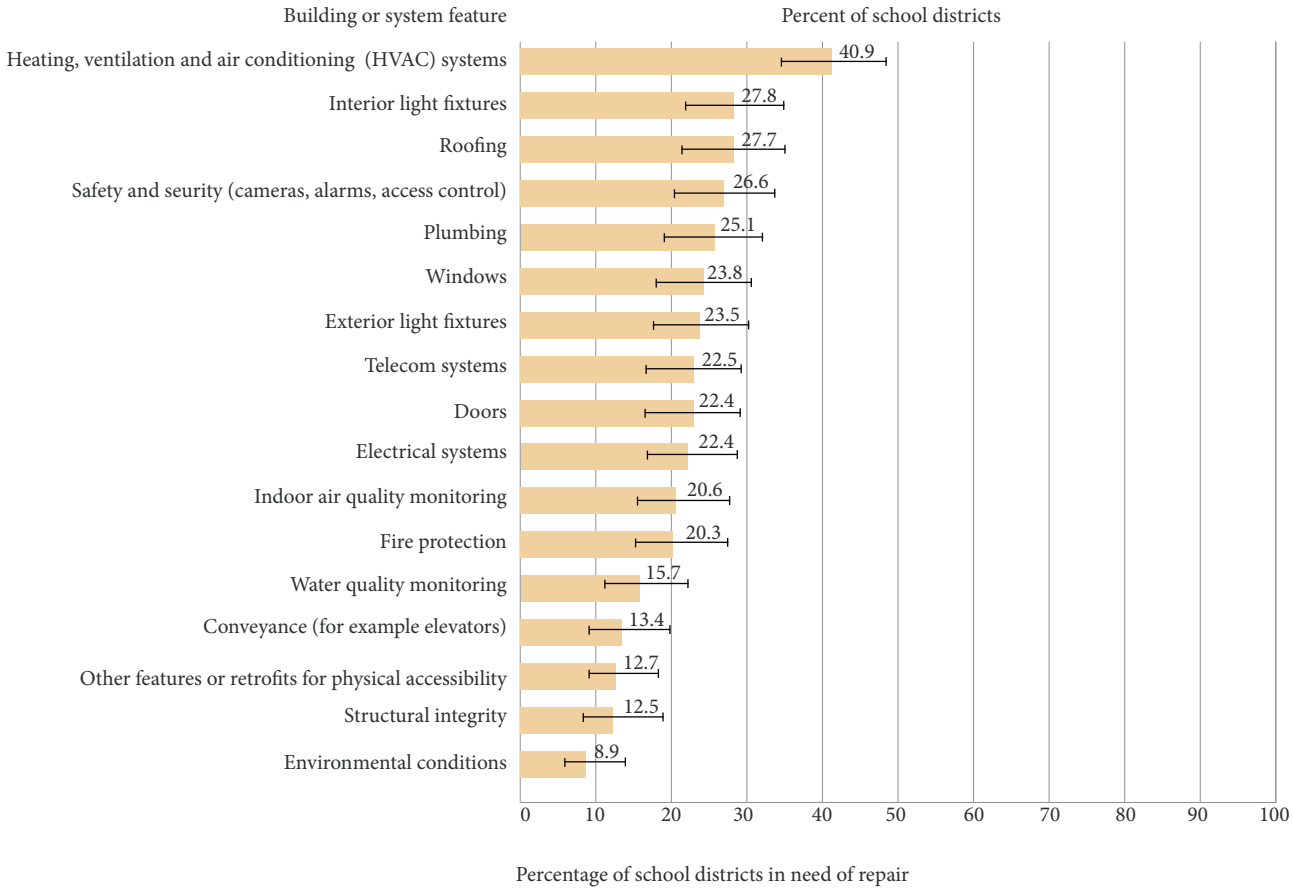


FIGURE 2. Estimated Percentage of Public School DIstricts in Which at Least Half the Schools Need Updates or Replacements of Selected School Building Systems and Features. Source: Government Accountability Office, "K–12 Education: School Districts Frequently Identified Multiple Building Systems Needing Updates or Replacement," GAO-20-4024, June 2020, https://www.gao.gov/assets/gao-20-494.pdf.

School Facilities

Presently, the US does not have a comprehensive census of the conditions of all of its public school facilities. The most recent review of school facilities was a June 2020 report of a representative sample of schools across the country, in an attempt to understand the scope of problems that limit the capacity of school facilities. It found that over half of all school districts need to update at least two major systems in **at least half of their schools, and over a quarter (26 percent) of districts need to update or replace at least six major systems** in at least half of their schools (see Figures 1 and 2). A 1995 GAO report sought to quantify the cost of these underinvested school facilities. That report found that $121 billion was needed to address the physical conditions of public school facilities, with at least $3 billion needed by 1998 to bring violating schools up to federal standards regarding both accessibility and exposure to toxic materials (asbestos, lead in water pipes and paint, materials in underground storage tanks, and radon). Of the schools surveyed, **over half reported issues with indoor air quality.**

The $121 billion recommended 25 years ago was only enough to bring these school facilities into "good" "overall" condition—meaning that a school would require light maintenance to adequately serve its function as a space of instruction.[49] These costs did not aspire to include green building retrofits to improve health and learning outcomes, nor were they grounded in community-led design that would expand the purpose and use of a public school facility into a space that served a broader segment of the community.

Things have not changed over the last two decades; if anything, they've become worse. A 2016 report and survey from the Center for Green Schools, the 21st Century School Fund, and the National Council on School Facilities noted that 24 percent of school facilities are in fair or poor condition, in spite of the $2 trillion invested in school facilities since the 1995 report. This $2 trillion investment accounts for both maintenance and operations of existing schools as well as construction of new schools (averaging about $950 billion for each over 20 years). These investments were critical to modernizing school facilities: with accessibility features for students, new technology infrastructure, and an increasing amount of maintenance

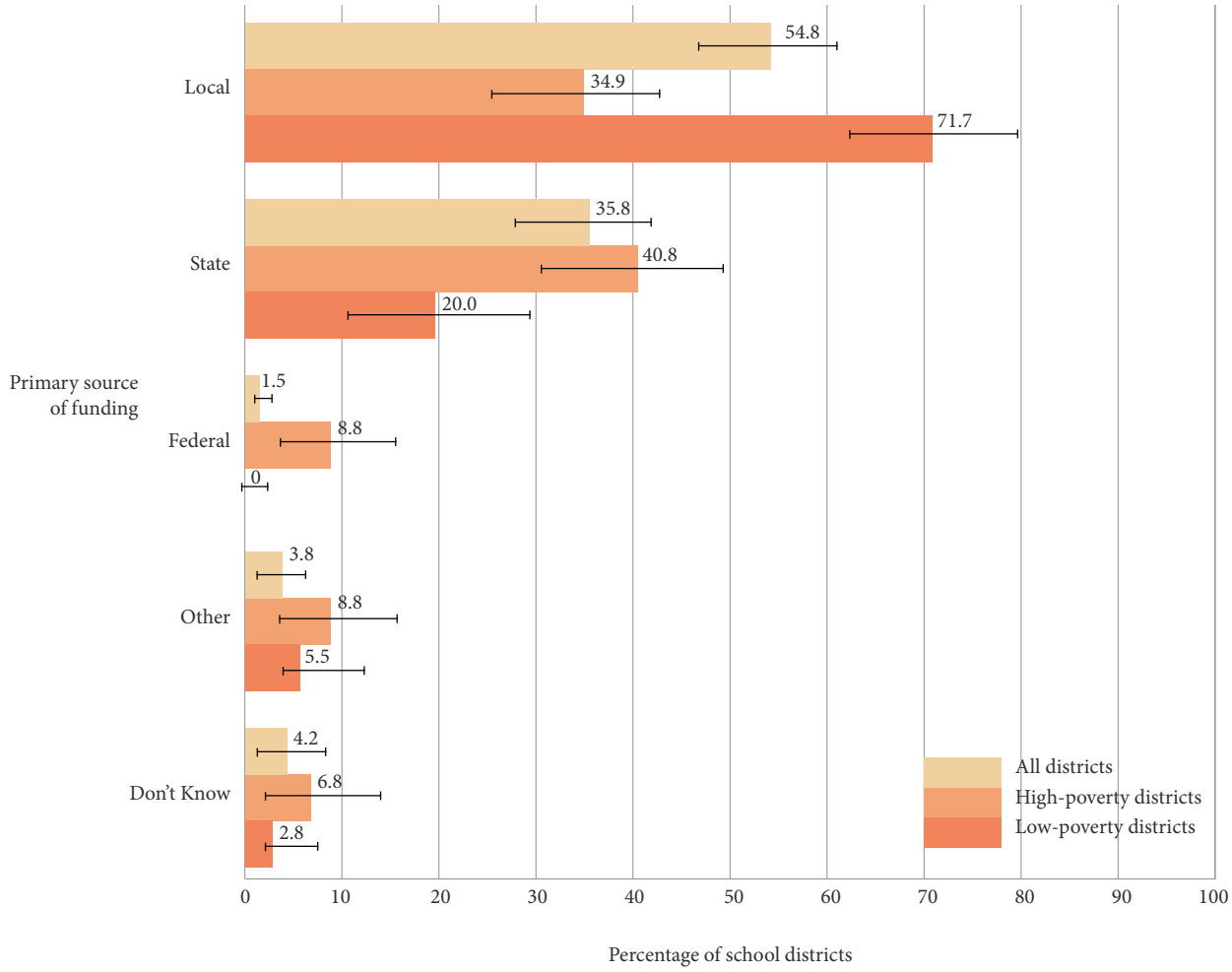


FIGURE 3. Estimated Percentage of Public School Districts By Primary Source of Funding for Public School Facilities. Source: Government Accountability Office. Source: Source: Government Accountability Office, "K–12 Education: School Districts Frequently Identified Multiple Building Systems Needing Updates or Replacement," GAO-20-4024, June 2020, https://www.gao.gov/assets/gao-20-494.pdf.

over aging and deteriorating school facilities. New capital investment for school districts was almost exclusively funded by local governments, furthering the already vast inequities of facility conditions between well-resourced and under-resourced communities (see Figure 3).[50]

From 2015 to 2016, the GAO analyzed capital expenditure costs for school facilities and found striking inequities across school district poverty lines. Construction expenditures, on average, were about $300 less per student in high-poverty districts ($719 per student) compared to low-poverty districts ($1,016), and low-poverty districts spent about $1 billion more on capital construction than high-poverty districts that year. Capital construction expenditures per student were similar, on average, for urban ($838 per student) and rural districts ($834). Green retrofit capital planning and construction standards for school facilities could help reduce a number of capital and operational costs in the long term. The cases below illustrate the scale and scope of these high facilities costs across different contexts in the United States.

New York City: On September 8, 2020, the Chancellor of New York City's Department of Education released a comprehensive survey of the ventilation quality of all of the city's public school facility spaces. The results were shocking. Of the 115,392 spaces surveyed, 81 percent were found to have good ventilation. **Less than half (43 percent)** of the city's 23,353 school bathrooms had good ventilation, and **one fifth (20 percent)** of all 28,029 office spaces had bad ventilation.[51] A letter in response from Brooklyn educators at PS139 alleged the building vents were **"filthy, damaged, and ineffective."**[52]

Philadelphia: In 2019, the *Philadelphia Inquirer* received a Pulitzer Prize for its exposé series titled "Toxic Schools." The series estimated the amount of asbestos, lead, vermin, and mold inside the school district's facilities, and directly tied these conditions to health outcomes for students and educators. Philadelphia

is the largest, poorest city in the nation, and as a result all students qualify for free and reduced lunch. Pennsylvania also has some of the most inequitable school spending on a per-pupil basis, whereby neighboring Philadelphia and Lower Merion School districts have a spending disparity of 2:1.[53] According to Philly Healthy Schools Initiative, a local policy and advocacy group, **"nearly 100% of the paint in school buildings constructed prior to 1978 remain lead-based paints,** and lead levels in Philadelphia's children is double the national average; **15% of recent water samples taken from Philly public schools had lead levels higher than the federal standards for home tap water, and asbestos. . . is pervasive in schools'** pipe and heating insulation, floor and ceiling tiles, and other products commonly found in our schools."[54]

Arizona: In 2017, nearly three decades after being sued for inequitably funding school facilities, the State of Arizona and the School Facilities Board were sued after cutting $2 billion from the facility capital budget. Glendale School District, one of the four plaintiffs, noted that **since 2009 the district had lost $29 billion in capital funding from state cuts**, creating years of deferred maintenance. When retrofitting (weatherizing) two schools, contractors found structural damage that closed facilities for two months, disrupting the school year. In 2020, Arizona faced unprecedented temperatures,[55] and its school facilities have ripped roofs, overworked and aging air conditioning systems, and sinking floors.[56]

Mississippi: In 2017, the State of Mississippi was sued by the Southern Poverty Law Center on behalf of four plaintiffs for failing to provide an equal education for white and Black students. School facilities for majority-Black student populations were in worst condition: crumbling and peeling paint, leaky ceilings, and poor lighting. The legacy of racialized school disinvestment was infamous in the state: a 2019 report found that between 1890 and 1960 (nine years before schools were forcibly desegregated), white schools received $25 billion more than Black schools.[57] The state has underfunded schools by $2.3 billion since 2008.[58] Mississippi was forecasted to experience above average hurricanes in 2020,[59] and should replicate its successful 2012 $8.7 million construction of St. Martin School,[60] which was intentionally designed to serve as an emergency shelter for staff, educators, and community members.

Healthy school facilities translate into healthy communities. Schools with environmentally sustainable, community-led design frameworks and non-toxic materials will improve learning outcomes, community engagement, teacher turnover, and school climate.[61] In addition to the direct and indirect economic impacts of new school construction and retrofits, investment in public school education and infrastructure will dramatically redefine the purpose and use of school facilities in communities, as well as serve as a base for greening other spaces and community infrastructure.[62]

Funding

The loss of income and property tax revenue creates a dangerous ripple effect that is *multiplied* by marginalization and inequity. Hammond writes that **"the wealthiest 10% of school districts in the United States spend nearly 10 times more than the poorest 10%, and spending ratios of 3 to 1 are common within state,"** and goes on to say that **"funding systems allocate fewer resources to poor urban districts than to their suburban neighbors, but studies consistently show that, within these districts, schools with high concentrations of low-income and 'minority' students receive fewer instructional resources than others in the same district."**[63] The lowest-resourced students receive the least amount of funding and are often segregated (and thus attract greater need) into the lowest-resourced schools. These schools, of course, are more likely to produce students with lower standardized test scores, grades, and graduation rates, deepening educational inequity.

Funding disparities transcend traditional binaries such as Black and white, urban and suburban. Rural schools, Tribal schools, and schools in the nation's growing ethnoburbs face similar funding constraints and, with the ongoing pandemic, are unlikely to see any economic growth in the near future. The Green New Deal for K–12 Public Schools will prioritize grant applications from districts in these under-resourced communities, providing them with the technical assistance, training, and data to construct healthy educational facilities and retain greater resources.

The Green New Deal for K–12 Public Schools is intended to invest both in school facilities and internal school resources. The resource grants and equity grants are intended to address the limitations low-resource districts have to invest in, or even preserve, school and community resources. In the years of education privatization and austerity, school districts are more reliant than ever on property tax and other local revenues. Low-resource communities have low-resource schools with high-need students and caregivers that are getting educated and perhaps other vital social services in declining, unsafe, and unhealthy facilities. They have a harder time attracting and retaining talented educators. They are more likely to have unsafe school climates. The lack of funding propagates deferred maintenance, exacerbating risks for environmental

GOVERNANCE

The American public is overwhelmingly in favor of improving school facility conditions. The existing structures of school governance and funding are both a key limitation and an opportunity in implementing a Green New Deal for K–12 Public Schools. The GND for K-12 Public Schools provides more robust mechanisms for local control that advances the policy's goals around health, environmental, educational, and economic equity.

The federalist dynamics of public education have taken shape through a winding process of state-building and political struggle since the origins of tax-supported public schools in the 19th century until the expansive efforts of the federal government to shape, without overtaking, the local provision of public schooling in the second half of the 20th century. The continued salience of localism and "local control" both have hindered progressive reform efforts and helped incubate important movements for democratic power and anti-austerity resistance. A brief history of these tensions is described below:

1930s–1950s: The New Deal, the Cold War, and the Federal Government's Expanding Role in Public Education

The New Deal created the first modern role for the federal government in public schools with the introduction of public school construction under its work programs. But it was not until the 1950s that the federal state made more concerted efforts to shape public schooling according to federal priorities. Two distinct streams of federal intervention developed in those years:

- Enforcing desegregation and promoting equalization (after *Brown*);
- Combining federal policy priorities with administrative decentralization (*National Defense Education Act* as key starting point).

1960s–1970s: The Great Society and the Contradictions of Local Control

Great Society education politics were marked by three developments exemplifying the tensions of federal intervention into local governance. First, the landmark Elementary and Secondary Schools Act of 1965 (ESEA) and the introduction of its anti-poverty Title I programs to fund schools for the country's poorest students used the federal state to erode locally based inequalities in school funding and quality. Second, a wide range of middle-class and reactionary political formations, clamoring for "local control," ended a brief period of experimentation in racial equalization via desegregation. Third, in response to the anti-segregation movement, Black and Latinx political communities in much of the US made their own turn towards "local control" as a means of securing basic political power in the education system and shielding themselves from the right-turn of the middle-class anti-equalizers. Reactionary forces blunted the federal move to equalize and desegregate public schooling, forcing the political system to reorient along the axis of "local control" without consideration of broader inequalities.

1980s–2010s: Education Reform and the New Localism of Anti-Austerity Resistance

Federal education reforms since the collapse of desegregation and decreasing federal contributions to local budgets have emphasized a range of policy programs that privatize many aspects of schooling and casualize many parts of the public sector workforce. In response to several decades of austerity and federally encouraged but state- and locally enacted school privatization efforts, numerous anti-austerity movements composed of teachers, parents, students, and community groups have come together, creating new centers of gravity. In cities like Philadelphia, such moves have leaned heavily on the language and politics of public local control—not as a concession to private firms, but as an expression of democratic priorities. The fight for local control and against contemporary education reform has been a key mover, providing new points of focus for progressive politics in cities and communities across the country. Unfortunately, this comes at a time when these areas have fewer resources than ever.

Looking Forward

The tensions between locally controlled school districts, state-level school system mandates, and federal attempts to intervene in schools to advance federal policy priorities, from New Deal era building projects to Cold War defense spending to Great Society antipoverty initiatives and recent privatization efforts, have all operated with a tenuous balance. Structurally, the federal effort has almost always involved the routing of federal dollars through state and local governments (including school districts).

hazards[64] and excessive energy use in school buildings.[65]

Chicago: In 2013, the Chicago School District proposed closing 50 schools in response to problems of teacher retention, urban depopulation, and increasing maintenance and capital needs for aging facilities. This common disruption in urban school districts was intended as a cost-saving measure, but schools that received displaced students were more likely to have fewer resources (librarians, teachers) than all schools in Chicago.[66]

Kansas: Over half of all public schools in Kansas are in rural areas, and one in four students attends a rural school. Students in rural schools are more likely to have social vulnerabilities: disabilities, poverty, and housing instability.[67] Rural school districts, like older urban ones, also face budget problems, issues with teacher retention, and depopulation. Kansas schools continue to face uphill battles after a contentious Supreme Court case mandated a new school funding formula that was both equitable and adequate to address 21st-century funding needs in property-tax-poor districts.[68]

California: Following the Great Recession of 2009, thousands of US educators lost their jobs, many never to recover the tenure, wages, and stability from before. This group was hard hit at the same time by the foreclosure crisis, multiplying the scale and scope of the recession on public schools. In California, because of budget cuts and a limiting property tax law, 40,000 educators were laid off in 2009.[69] The districts in the state, particularly those serving high proportions of socially vulnerable students, were never able to recover the double loss of educators and funding from the recession. In the wake of COVID-19, where states are experiencing similar budget crises, these states will need more fiscal support than ever to maintain adequate and equitable schools.[70]

Tribal Schools: In Arizona, the Havasupai people have sued the Bureau of Indian Education for repeatedly failing to provide an adequate education for students at the Havasupai Elementary School. According to the lawsuit, the federal government did not include culturally competent or relevant curriculum, did not offer reading and math consistently, and offered no extracurricular activities, or any educational, physical, or social services for students with disabilities, in spite of 70 percent of the student body qualifying for these services. The school is so understaffed it occasionally shuts down.[71] The pandemic will only exacerbate these problems.[72]

The Green New Deal for K–12 Public Schools will use the following new and existing funding mechanisms:

Climate Capital Facilities Grants: The federal government will offer states and school districts climate capital facilities grants, technical assistance, and other resources to accommodate the green retrofit of public school facilities. Block grant awardees must submit a retrofit or construction plan, including a values statement from the community that outlines a set of priorities to address environmental, economic, and educational equity in the building retrofit planning, construction, and operations. Statements should include a commitment to local hiring from BIPOC-owned and majority-employed businesses, nonprofits, and cooperatives, with annual benchmarks documenting this progress in a public dashboard. These facilities grants can also be used to acquire and lease land; for, attorney, architecture, and design fees; and to construct zero carbon new builds. Green stormwater infrastructure, community gardens, wireless infrastructure, solar installations, and electrification of fleets are also covered in these grants. These grants can also go toward green jobs training for local residents, who should be prioritized in hiring. States and school districts will *not* be required to match funds.

Resource Block Grants: The federal government will offer school districts resource block grants, technical assistance, and other resources to accommodate the expansion of staff and social service programming at public schools. Block grant awardees must submit a values statement from the community that outlines a set of priorities to address environmental, economic, and educational equity in the administration of the resource block grant. Block grants can address issues of school climate, mental and physical health, and staff and educator turnover and retention, as well as the development and replication of community-driven curriculums. Statements should include a commitment to local hiring from BIPOC-owned and majority-employed businesses, nonprofits, and cooperatives, with annual benchmarks. States and school districts will not be required to match funds.

Expanded Title I and IDEA Funding: In addition to Resource Block Grants, we suggest **quadrupling annual Title I funding,** from $16.5 billion to $69.5 billion, for schools and districts with students living in poverty and increasing funding for IDEA (Individuals with Disabilities Education Act) for students with disabilities from $13 billion to $33 billion; that's a net increase of 69.5 billion per year. **These increased appropriations will help to reach a goal of $5000 APPE for all Title I students in an attempt to address the inequity of**

funding sources across the country. This will help sustain the investments from the Resource Block Grants.

Educational Equity Planning Grants: We propose a new form of funding directly tied to regional educational equity. Education Equity Grants seek to eliminate intraregion education inequities by facilitating an inclusive, regional equity planning process and providing federal funds to the schools doing the most to advance equity within their regions. The program will be modeled after HUD's Sustainable Communities Regional Planning Grants program, and build on the Biden Administration's Title I Equity Grants.[73]

Low-Cost Loans: To expand the benefits of this program to cover 100 percent of all K–12 public school facilities, the program will guarantee low-interest loans to the middle two thirds and top one third of all schools based on their social vulnerability indices.[74]

The GND for K-12 Schools will Prioritize High-Need Schools in the Initial Grant Cycle

All LEAs will be eligible to apply for facility and resource block grants. Regional districts that create regional equity plans are eligible for annual equity awards. However, the Green New Deal for K–12 Public Schools will prioritize the following schools in the first round of awards:

- Schools located in census tracts with social vulnerability indices in the bottom third of the nation (ie, the most vulnerable third)
- Schools in the bottom third of student to staff ratios

Overview of the Report

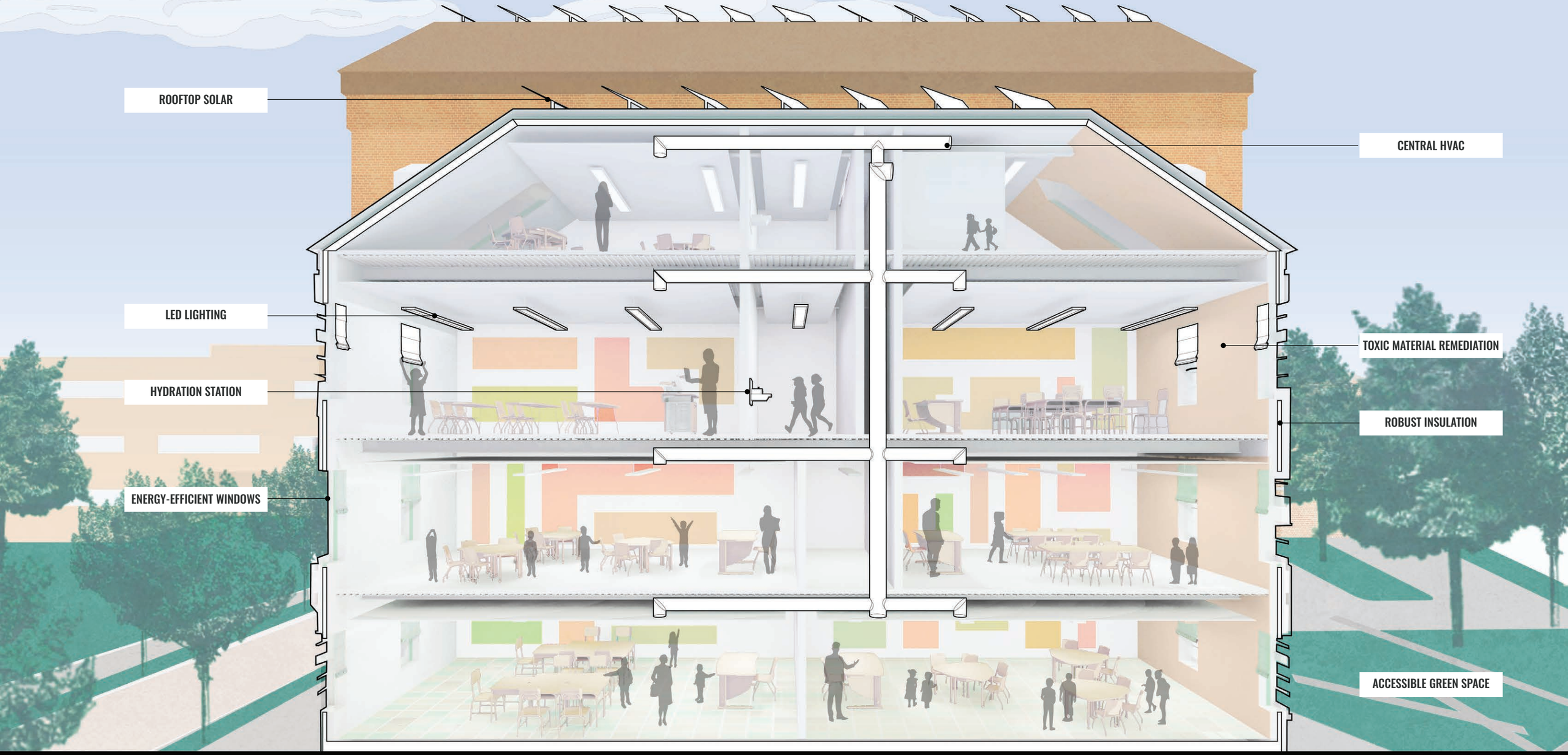
This report is organized by the three principles that guide it. **Part I focuses on achieving health and environmental equity,** tracing out the building retrofit process in a series of maps and examples about where this policy could invest facility and resource grants, and how those investments would generate increased environmental equity—from both the facility and the programming of the public schools.

Part II focuses on educational equity, where we will illustrate how investments in green retrofits and school staff and programming will advance equitable education. Retrofits and improved school facilities can improve educational outcomes, but also facilities and resource grants will alleviate school district budget burdens, and allow for more flexible spending for community-centered curricula.

Finally, **Part III focuses on economic equity,** where we demonstrate spatially and by sector the amount of economic equity that could be achieved through the direct investment of resources into economically and socially vulnerable communities. We identify the economic impact of each retrofit, and create targets for possible job creation for the resource block grants.

Throughout, we've included helpful case studies and deep dives into some of the more complex components of the policy. We hope these case studies are illustrative of the possibilities of this policy, yet also serve as practical blueprints for schools and districts that are ready to begin investing in a Green New Deal for K–12 Public Schools.

PART I: ENVIRONMENTAL EQUITY



HEALTH AND ENVIRONMENTAL EQUITY

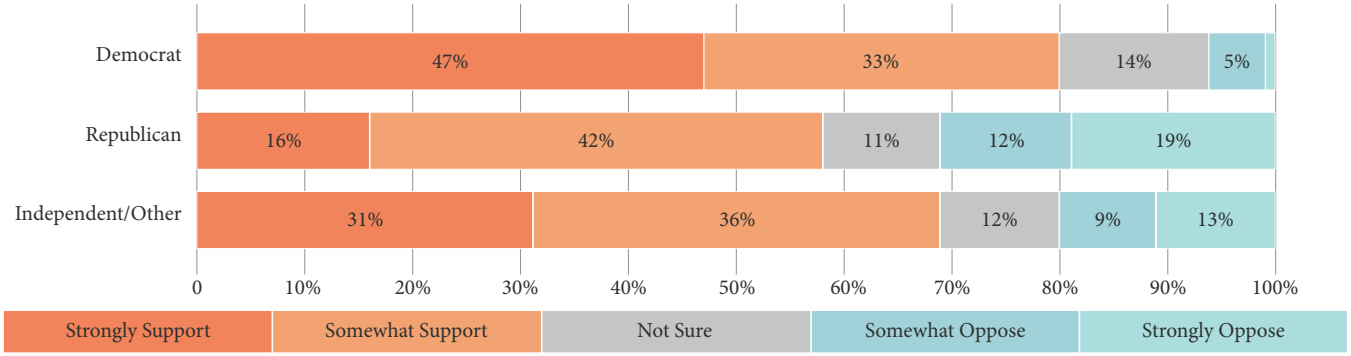


FIGURE 4. Support Level for a Fund to Create Disaster Saftey Centers. Data for Progress.

The Green New Deal for K–12 Public Schools will secure health and comfort in K–12 schools with zero-carbon, deep-energy retrofits. These retrofits would fully electrify school buildings' heating, cooling, air conditioning, lighting, and food service facilities (e.g., cafeterias) with the most efficient, comfortable, resilient building systems on the market. Wherever feasible, they will add solar panels and batteries to facilities, allowing schools to operate basic functions even during power outages.[75] Retrofits would make schools into sustainable living and learning laboratories, and some of the most climate-resilient infrastructure in communities. These funds could also be used to build zero-carbon permanent classroom structures to retrofit or replace portable classrooms with inadequate ventilation and unhealthy materials; there are currently over 300,000 portables classrooms in use,[76] and many are in poor condition.[77] Retrofits would benefit from technical support from the Department of Energy and its national labs, like the National Renewable Energy Laboratory. These agencies are already doing research and pilot programs on whole-building energy retrofits, and advancing the technological frontier with an eye to major cost reductions and improved retrofit construction processes. With regard to retrofitting or replacing portable classrooms in particular, modular prefabrication approaches have the potential to dramatically lower costs while improving building quality.

These retrofits will also turn schools into green infrastructure and resiliency hubs, cementing their status as anchor institutions in neighborhoods across the nation. With these retrofits complete, schools that can generate and store their own energy, and that contain large meeting spaces from auditoriums to gyms, will serve as key disaster relief hubs during floods, extreme storms, heat waves, and other extreme weather events. A recent survey found that majorities of Republicans (58 percent), Democrats (80 percent), and Independents/Others (67 percent) supported investments to turn public schools into neighborhood resiliency centers.[78] The survey asked: "Would you (support or oppose) the creation of a $10 billion fund to turn all public schools, libraries, and community centers into disaster safety centers to support their communities, by providing cooling during heat waves, shelters during storms, electricity during power outages, and hubs for disaster relief?"

Buildings that Teach

The Green New Deal for K–12 Public Schools' retrofit program will transform school buildings into living laboratories for environmental education. Picture students learning the concepts of wastewater systems engineering during the planning, execution, and subsequent study of schools' upgraded water filtration system. This will bring urgency and relevance to educational content. Students will likewise use their own buildings to learn about thermal solar water heating technologies, kinetic-electrical energy conversion and generation, native agricultural landscapes and habitats, and more. At every opportunity, school redesign will incorporate experiential learning that supports STEAM education.

For school buildings to succeed in becoming tangible parts of students' education, they will have to incorporate feedback to building occupants about their performance. Building monitoring and sensor systems are not only cost-effective strategies to improve realized building performance, but also serve as an ongoing

opportunity for education and engagement. For example, students at Discovery Elementary School in Arlington, Virginia, a zero-energy school, spend the year engaged with a curriculum that explores the building's zero-energy features, such as a bioretention system and a renewable energy lab.[79] As students engage in public-speaking coursework, they're assigned to include their school's building technology as content in their writing. They then act as docents for the school's many visitors.[80]

Another example of the integrated building-as-learning-lab model is through the installation of green roofs using Green Roof Professionals (GRP)[81] and the Living Architecture Performance Tool (LAPT).[82] The LAPT is a holistic approach to designing, installing, and maintaining green roofs and other green stormwater infrastructure to address issues around inclusion in design, construction, and maintenance using sustainable materials, maintenance, and operations. In New York City, P.S. 41's green roof provides "provides ancillary outdoor classroom space that does not conflict with the playground area schedules and is utilized in various school subjects and activities: literacy, math, science, STEM, art, movement, and even counseling."[83] Further, "[d]ata from the 2019 Environmental Protection Agency's Energy Star's Portfolio Manager, an online building energy monitoring tool, details a 32.70% decrease in total greenhouse gas (GHG) emissions and a 27.8% reduction in Source Energy Usage (EUI) that P.S. 41 consumes on-site from the school's 2008 energy baseline."[84] The GRP and LAPT are supported in H.R. 1863, introduced in 2020 by Representative Nydia Velazquez.[85]

In all schools, students will be able to observe record heat waves, changes in water supply, and energy-efficient behavioral changes in their building's own facilities data. Being able to observe how changes in the environment intersect with changes in a building system's capacity and operations will be a rich part of students' and teachers' learning relationships.

Additional benefits

Green building market development

Today, low-carbon building materials and all-electric equipment are forced to compete with artificially low-cost fossil fuels and carbon-intensive manufacturing processes, which receive implicit and explicit subsidies, and exacerbate the climate emergency. Because gas appliances are almost always cheaper than their electric counterparts, the industry favors use of appliances that generate carbon emissions. The massive public procurements involved in the Green New Deal for Schools plan—including Buy America provisions—will help catalyze the domestic manufacture of electric appliances, energy-efficient building components like double- and triple-glazed windows, sustainable materials like nontoxic insulation, and countless other products essential to the overall green building economy, one of the most important areas for economic and scientific innovation in the next two decades.

Upgrading cafeterias to save energy and improve worker health

At present, school cafeterias largely run on fossil fuels. These turn cafeteria kitchens into extremely uncomfortable, unhealthy environments, as a result of both high heat from gas flames and the toxic fumes resulting from combustion, paired with sub-standard ventilation systems. Food service is often a major contributor to schools' utility costs. Fully electric kitchens, using contemporary induction burners and convection stoves, are not only less costly to install and maintain, but also dramatically reduce indoor air pollution and improve working conditions. They will require less ventilation to achieve far higher standards of comfort, health, and safety.

RETROFITTING FOR HEALTH IN THE WAKE OF COVID-19

The COVID-19 pandemic exacerbates the existing health risks in schools. Respiratory irritants are already present in schools, and students already have asthma attacks while attending. Short-term, high-priority retrofit actions to protect student health and safety in the age of COVID-19 include identification and removal of existing asbestos, lead, and mold; cleaning and removing insulation and walls with contamination; and installing HEPA air filters and increasing air filtration to sustain healthier indoor air quality. Then retrofits should repair all leaks in plumbing fixtures and upgrade them with touchless, low-flow fixtures to reduce wastewater and limit cross-contamination in spreading the virus.

The building retrofit process

Retrofits for K–12 schools will address eight goals:

1. Optimal Air Quality
2. Detoxification of Air and Materials
3. Enhanced Light Quality
4. Improved Energy Efficiency
5. Improved Water Efficiency
6. Decarbonization
7. Optimized Energy Management
8. Renewable Energy

A national program of school retrofits must use best practices to minimize disruption, and maximize student, teacher, parent, and community input to a sophisticated, effective process. Here we outline some generic key steps in the process, in which representatives of parent and teacher groups should be present at every step; Steps 4, 5, and 6 should involve the largest numbers of stakeholders at public meetings.[86]

1. Perform benchmarking and portfolio review. Use available, standardized tools to collect energy use information over time, and compare energy performance of one school in a district to another of similar size or enrollment. Documentation of energy use should account for all energy sources purchased or generated on-site. EPA Portfolio Manager is a popular energy tool that would be helpful. The process of benchmarking involves comparing energy use between schools of a similar size, operating hours, and climate. This process will reveal buildings which are most and least energy-efficient.

2. Develop school-level energy performance goals. Energy performance goals rely on results from districtwide benchmarking. These energy performance goals should be presented as performance-based targets, such as achieving 30 percent energy use reductions from 2020 energy use levels by 2030.

3. Select property. Start by selecting schools with the greatest potential for improvements. Deep energy retrofits to buildings can produce energy and cost savings of 50 percent or more. Several characteristics would make a school building a great candidate for a retrofit: a building more than 10 years old, high energy intensity (BTUs/sq.ft.), Carbon-intensive life cycle assessment.

4. Conduct technical assessments and audits. Once a property is selected, a more thorough assessment for a school's systems and equipment should be evaluated with respect to environmental health and energy performance. Auditors should have experience using energy modeling software, conducting diagnostic testing, and detecting environmental health hazards, and have the ability to perform post-retrofit inspections. They will review 12–24 months of historical utility data and may conduct interviews. Results from audits will be made publicly available to promote trust and transparency throughout the process. Auditors should work directly with students, parents, teachers, staff, and other community members to identify their needs and any existing complaints about building operations and conditions.

5. **Determine scope of work and release requests for proposals.** To determine the scope of work, a school facilities team should meet with the auditor and evaluate any recommended measures. This team should also present options to community members who will help choose priorities for the school retrofit process and outcomes, and assist in design decisions ranging from aesthetics to transformation of building systems.

6. Design strategy: Select material and equipment. The design and implementation phase of the retrofit process should consider a holistic, systems approach to building performance and comfort. A holistic approach to the building retrofit process, rather than one that only considers building components in isolation, has potential to create widely distributed benefits from single expenditures. The implementation phase of the retrofit process will vary between schools, but will generally include the following measures:[87]

1. OPTIMAL AIR QUALITY

Indoor air quality will be improved by installing or upgrading a school's heating, ventilation, and air conditioning systems (HVAC) and replacing natural gas uses with all-electric equipment. Many schools rely upon fans, window-unit air conditioners, or opening windows for modifications in air quality. New, all-electric HVAC systems with high-efficiency particulate air (HEPA) filters will provide the highest-quality experiences for students and teachers. Additionally, the use of natural gas in school kitchens decreases air quality. Replacing kitchen appliances with modern, electric alternatives will save energy and improve air quality.

2. DETOXIFICATION OF AIR AND MATERIALS

All toxic materials in schools will be removed from school buildings, and replaced with zero-carbon materials. In order to remove allergens, dust mites, and other airborne respiratory irritants, new HEPA filters and HVAC systems will be deployed to all schools. HEPA filters will remove 99.9 percent of dust, pollen, mold, bacteria, and many airborne particles.

Problems of mold and fungi, associated leaky plumbing systems, intense storms, or poor moisture control will be solved with newer construction and plumbing systems that are airtight, watertight, and maintenance-friendly. Touchless fixtures and technology will aid in limiting the spread of viruses and bacteria. With the introduction of a cleaner

building material palette, retrofits will remove other toxins such as asbestos found in insulation, lead from plumbing systems, and polychlorinated biphenyls (PCBs) found in caulk, paint, ceiling tiles, floors,and other building surfaces.

3. ENHANCED LIGHT QUALITY

Lighting improvements in school buildings will enhance daylighting, provide low-grade ambient lighting for visual comfort, and improve strategies for task-lighting and targeting visual interest. These objectives will be accomplished in ways that allow for flexibility and control for students and teachers, standardization of lamp types for ease of maintenance, and energy efficiency in lighting technology.

4. IMPROVED ENERGY EFFICIENCY

Improving energy efficiency in school buildings will involve use of passive design strategies, the most energy-efficient building equipment, and automated energy management systems to modulate use on an as-needed basis.

Buildings will use strategies to maximize natural ventilation and daylighting, we can reduce demand for energy use in major mechanical systems. To enhance efficiency when lighting or HVAC is needed, we will upgrade buildings with new heating, ventilation, and air conditioning systems and ensure that buildings don't lose their controlled climates from poor insulation or other air leaks and thermal bridges. LED lighting will use 75 percent less energy and last up to five times longer than conventional lighting.[88]

5. IMPROVED WATER EFFICIENCY

The largest uses of water in schools comes from restrooms, landscaping, heating, cooling, and school kitchens. Reductions in water waste can be accomplished with active leak detection, immediate repair and increasing the water efficiency in all fixtures, sinks, toilets, building chillers and boilers, and use of greywater and water retention systems.

6. ELECTRIFICATION AND DECARBONIZATION

By retrofitting buildings instead of constructing new schools, we can save an immense amount of carbon emissions. We will electrify all energy uses in the building, allowing their energy sources to transit to 100 percent carbon-free energy sources. Buildings will receive electric heat pumps for HVAC systems, induction-heating for all-electric kitchens, and electric water heaters for all end uses. Technological advancement has allowed for building equipment to become smaller and more efficient. These smaller systems, with less steel and smaller components, are less carbon-intensive in their manufacturing and supply chains.

Carbon emissions from the building industry consist of embodied carbon (associated with material and component supply chain and manufacturing), as well as operational carbon (from energy use over time). Addressing carbon intensity via materials selection is just as important as energy efficiency.

7. OPTIMIZING ENERGY MANAGEMENT

Automated building energy systems will optimize buildings' energy use, and coordinate automatically with the electric grid. Buildings will make best use of local energy sources (like rooftop solar), draw on the electric grid as needed, and supply the grid with energy when possible (eg, during sunny hours and/or contributing energy stored onsite when needed by the grid). Schools will thus help stabilize local energy grids.

8. RENEWABLE ENERGY

Instead of relying solely on electricity and natural gas from the grid, schools will generate renewable energy on-site using solar and wind energy. Where physical conditions permit and it is cost-effective, wells will be dug for geothermal heat pumps for more efficient heating and cooling. Wherever it is legal, schools will also purchase their electricity from 100 percent clean energy sources. We estimate that by 2030, the US power sector will be closer to carbon neutrality, based on the Biden administration's 2035 zero-carbon electricity target. Between energy retrofits slashing energy use by up to 80 percent, on-site solar generation in most schools, and the increasingly decarbonized grid, we expect the country's K–12 schools to be zero-carbon overall by 2030.

7. Conduct phasing and construction: In the school retrofit process, a phased construction approach should take place, based on extensive consultations with community members, including all frequent school users. Normally, this process would start with the items that yield the greatest short-term benefits. These include actions that mitigate the greatest health

risks, yield the most energy savings, and produce the most drastic improvements to indoor environmental quality. Sometimes, one building component may yield benefits in all three of these categories.

For example, in the case of the Philadelphia public schools asbestos crisis, harmful levels of asbestos, a chemical commonly found in building insulations, were discovered at seven different schools, forcing them to temporarily close. We need to remove the asbestos in the walls, which is then an opportunity to rebuild walls with the most advanced, nontoxic insulation materials. Phasing building envelope repair before mechanical system repair, in this case, would not only mitigate health risk, but also enhance energy savings due to the use of newer, high-performance building insulation.

8. Conduct post-occupancy evaluation: Post-occupancy evaluations (POEs) occur six months to a year after building improvements have been made in order to assess building performance and comfort. While not as meticulous as technical audits, POEs still provide valuable information about the success of building repairs and mechanical replacements. They review energy use over time and perform qualitative interviews about the experiences of students, teachers, staff, parents, and other community members.

9. Ensure effective operations and maintenance: Effective operations and maintenance will ensure long-term reliability, energy efficiency, and safety of all school retrofits. Massive reductions to schools' utility bills must be channeled in part into fully funded operations and maintenance. Operations and maintenance can be understood as two inclusive protocols:[89]

a. Actions focused on scheduling and work/systems optimization, and

b. Routine, predictive, scheduled and unscheduled actions aimed at preventing equipment and material failure or declines in efficiency.

Maintenance and Care

Beyond conducting deep-energy retrofits for schools most in need, the Green New Deal for K–12 Public schools is about taking responsibility for ensuring schools are always the greatest learning environments possible. Improvements to quality of air, light, and materials will be a *continuous* operation, resisting decreases in school quality from normal wear-and-tear and sustaining resilience to increasing numbers of harsh weather events.

As we maintain and care for school buildings, we also maintain the socio-economic infrastructures that sustain care. This includes the engineers, sanitation workers, plumbers, and craftspersons that work hard to create atmospheres of comfort. Maintenance and care gets people reinvested in place. Such alterations affect the students, teachers, and members of the surrounding community.

What does a building retrofit cost?

The cost to retrofit a school building will vary depending on the scope of work necessary.[90] Each school has unique needs based on its building history, its state of repair, and its local climate. While recently built, well-maintained schools may only need upgrades to some mechanical systems, other schools may additionally require major construction replacement of wall systems and structural alterations.

Healthy, green, carbon-neutral retrofits will likely incur a gross capital cost of between $15/sq.ft. and $600/sq.ft., including conventional capital repairs and greening, depending on the needs of a particular school. Our facilities grants should also cover the costs of solar and battery installation. We have estimated a median cost of $85/sq.ft., inclusive of all these measures. In our discussions with officials currently engaged in deep green retrofit processes in California, we have examined data, not yet public, with whole building retrofits costing substantially less and substantially more than our projected median cost. We also recognize that some schools will require 5–10 times the median amount, based on local conditions like building age and historic levels of (under-)investment.

In Philadelphia, for instance, one of the country's most neglected school districts, a recent study estimated that the district's schools needed renovations with an upfront cost of nearly $5 billion, averaging over $500/sq.ft.[91] That report focused on health needs; but the vast majority of projected repair costs concerned windows and HVAC—precisely the systems that a deep energy retrofit would replace. For crumbling schools with broken energy systems, a healthy, green, deep energy retrofit would only cost marginally more than a conventional retrofit, as building system replacement and repair is already needed. But in the process, a healthy, green, deep energy retrofit would be using the most modern, advanced building systems, instead of saddling schools with high-energy, near-obsolete alternatives. With the federal government covering the entire upfront cost for low-income schools, the savings from dramatically lower utility bills, coupled with earnings from on-site solar wherever feasible, will provide massive financial benefits for school districts.

To estimate the costs for this program, we looked at data on existing schools, case studies of school retrofits, and research on deep energy retrofits of commercial buildings. We currently lack detailed estimates of the cost of a deep energy, whole building retrofit for a wide variety of US schools. Most case studies of school retrofits involve minor or moderate energy efficiency programs, with ambition capped at reducing energy use by up to one third.[92] As described above, studies of commercial buildings' experiences with such retrofits find enormous variation in costs, from $5/sq.ft. to over $200 in rare cases.[93] The most expensive case study we found for a deep energy retrofit to a K–12 school was a project to renovate over 100 schools in Orange County Unified School District, at a cost of $22.7 million, or $22/sq.ft. The project yielded annual energy savings of over $680,000 per year.[94] These retrofits included comprehensive HVAC upgrades, albeit not wholesale building transformations of the kind proposed here. Nor did that school district address the kind of toxin abatement needs present in Philadelphia. Research finds that higher upfront investments in deep energy retrofits are needed to deliver improved, longer-lasting results in slashing energy use.[95]

We need the global justice imperative of deeper energy retrofits. Each solar panel and each wind turbine that the United States does not need to deploy to power its buildings frees up those resources for use in the Global South. As our schools become more energy-efficient, they will require less (renewable) energy to power them. High upfront costs in improving buildings' envelopes, such as improved insulation and more efficient windows, will simply yield a more cost-effective, and more resource-efficient, energy system in schools. Spreading these practices across the US buildings sector will be essential to curbing American energy—and electricity—demand, which is necessary to facilitate equitable decarbonization around the world.

In American schools, healthy, green, deep energy retrofits must simultaneously tackle expensive repair needs like lead and asbestos abatement. Asbestos is a horrific health risk, expensive to remove,[96] and widespread in schools—with nearly half the country's schools built between 1950 and 1969, at a time when it was a common building material.[97] We also note that workers in the asbestos sector are often paid little, suffer health impacts, and are often undocumented workers with few legal rights.[98] Any and all work toward a Green New Deal for K-12 Public Schools should be done at the highest levels of safety, with full training, and with a path to citizenship as needed.

Finally, we expect funding for healthy, green, deep energy retrofits to cover some or all of the upfront costs of installing solar energy arrays. Revenue from solar energy can pay back the cost of purchasing and installing panels; federal grant funding can ensure the best possible terms for schools, allowing them to buy panels instead of leasing them and to maximize installed capacity.[99] From Arkansas's Batesville School District to Portland, Maine, to Tacoma, Washington, installed or planned solar panels will provide low-cost, clean energy to schools.[100] In Puerto Rico, solar microgrids will save schools energy costs, while affording them guaranteed energy—thus maintaining food safety—even when the regional power grid suffers outages.[101] And the potential for solar panels to provide clean energy and generate revenue for Tribal schools is massive.[102] In Chicago, public high school teachers have created Career and Technical Education (CTE) course curricula (as part of the CPS High School Solar Initiative) that train high school seniors to install solar panels in their neighborhoods.[103] In addition to the energy and economic benefits of these installations, teachers are hoping to create a pipeline of future high school teachers that can provide those technical skills and educational credits to others.

On one hand, we expect costs for green retrofits and solar installations to come down dramatically over the course of the decade. On the other hand, our higher estimate ensures that no low-income school will be unable to benefit fully from this program. Any funds that may no longer be needed as the cost of retrofits and solar deployment decline will be able to contribute to additional programming and wrap-around services in school facilities. Indeed, we expect grants would also help cover (but are not limited to) the following:

- The costs of engaging students, teachers, staff, parents, and community in the design process (including curriculum redesign)
- The logistical costs of relocating students as needed during retrofits
- The higher upfront costs of green retrofits
- Installing solar panels and batteries, and connecting to CTE curricula
- The replacement of unhealthy portable classrooms
- Accelerating electric school bus deployment
- Improving walkability of the school area
- Installing green roofs using Green Roof Professionals and that meet the requirements of the Living Architecture Performance Tool
- Developing disaster response training and acquiring relevant equipment

- Establishing gardens for students to learn food cultivation
- Developing sustainability education curricula for community members

With an average school having 75,000 square feet,[104] and roughly 105,000 schools covered by this bill, and an average retrofit cost of $85/square foot, we have estimated a total cost of $669 billion, of which we recommend two thirds—$446 billion—should be covered by direct grants, and the rest—$223 billion—by no- and low-cost loans from the federal government. We urge that grants cover the entire cost for the most vulnerable third of schools, two thirds of costs for the middle third of schools, and one third of costs for the least vulnerable third of schools. To ensure that the most vulnerable schools get help right away, the most vulnerable third of schools should be the only ones eligible for grant funding during the first four years of the program. Grant allocation to states, territories, and tribes should be based in part on local climate, a major determinant of building energy needs—and thus retrofit cost. Using this total cost as an input, Table 2 provides a state-by-state breakdown of the nearly 272,000 new construction and on-site maintenance jobs generated by this capital investment over the next decade.

TABLE 2

ON-SITE CONSTRUCTION AND MAINTENANCE JOBS FROM $669 BILLION INVESTED INTO PUBLIC SCHOOL GREEN RETROFITS OVER TEN YEARS

STATE + TERRITORY	JOBS	STATE + TERRITORY	JOBS
Alabama	4,820	Montana	1,000
Alaska	2,070	Nebraska	1,260
Arizona	9,260	Nevada	2,580
Arkansas	3,750	New Hampshire	190
California	38,960	New Jersey	4,840
Colorado	3,290	New Mexico	4,460
Connecticut	1,750	New York	13,000
Delaware	570	North Carolina	9,240
District of Columbia	960	North Dakota	420
Florida	15,360	Ohio	7,140
Georgia	7,840	Oklahoma	6,240
Hawaii	690	Oregon	3,690
Idaho	1,540	Pennsylvania	4,220
Illinois	9,260	Rhode Island	750
Indiana	3,550	South Carolina	4,610
Iowa	1,130	South Dakota	1,000
Kansas	1,870	Tennessee	5,440
Kentucky	4,940	Texas	37,220
Louisiana	5,570	Utah	1,330
Maine	710	Vermont	200
Maryland	2,200	Virginia	3,420
Massachusetts	2,770	Washington	5,900
Michigan	8,380	West Virginia	1,510
Minnesota	4,090	Wisconsin	2,770
Mississippi	5,180	Wyoming	310
Missouri	5,630	Puerto Rico	2,960
		Total	**272,000**

PART II: EDUCATIONAL EQUITY

EDUCATIONAL EQUITY

The Green New Deal for K–12 Public Schools prioritizes educational equity through the investment in green retrofits and new builds, with a particular focus on supporting school districts that have been defunded through state and local budget cuts over the last half century. The inequities within our existing educational system do not stop with deferred maintenance, disinvestment, and rising operational costs that lower the quality of the school facilities. They extend beyond the building envelopes and into the resources and programming available to our students and teachers—the arts, music, recreation, guidance counselors, nurses, assistant teachers, librarians, and extracurricular activities that help bring these community hubs to life.

When the United States expanded educational opportunities in the first half of the century, the country experienced some of its greatest economic growth.[105] However, that growth was not distributed evenly. Currently, the United States has one of the highest opportunity or resource gaps in the world. This gap fractures individuals along racial and geographic lines. Education attainment among white youth far outpaces that of poor, BIPOC youth who do not have access to well-resourced, safe public schools that white youth often attend.[106] We can and must do better.

Schools in urban and rural districts face overcrowded classrooms, while having to adhere to academic performance standards set at the state and federal level. As poverty increases in older suburbs, their school districts will also face these problems. These standardized academic performances assume that funding, resources, and communities are equitable, but years of study indicate that they are not.[107] Thus, rewarding districts and schools for outperforming relative to their peers merely deepens existing inequities, instead of addressing them. The funding inequities have had dire consequences for poor, BIPOC, special education, and English Language Learners in our nation's public schools, resulting in an opportunity or resource gap between the most advantaged and disadvantaged youth.[108]

The Green New Deal for K–12 Public Schools will provide resource block grants, low-interest loans, and technical support for school districts that submit **resource allocation plans and community value statements** adhering to the following educational equity priorities: community engaged planning processes with representation from educators, principals, administrators, students, school boards, caregivers, and community organizations that have documented experience as local providers and partners. Prior to receiving the block grant, we recommend that applicants submit community value statements with plans to address community concerns around local resource needs—particularly with information and plans to address local employment needs, gaps in the curriculum, and opportunities to increase community control and input during the grant's implementation.

In his April 2021 address to the nation, President Biden provided an overview of his American Families Plan and reminded listeners that a young child with access to high-quality early childhood programs is far more likely to graduate from high school and continue their education beyond K–12 institutions. Adolescents who have access to affordable community college opportunities are more likely to earn a four-year college degree, which in turn increases wages for themselves and their families.[109]

In addition to building on President Biden's American Families Plan, we hope to increase the funding streams into high-need districts and schools to support more local pipeline building efforts. This includes retention efforts such as the provision and funding of lesson planning periods, training for culturally competent curriculum development, and seed funding for community-based/led curricula and extracurricular activities.[110]

The **resource block grants** are intended to direct federal resources to schools in high-poverty areas to lower teacher-student ratios to, on average, 1:15 for grades 9–12 and 1:12 for grades K–8. The Green New Deal for K–12 Public Schools values school autonomy and local control, and encourages the use of these funds for the following activities:

- The hiring of additional assistant educators to address issues in the K–12 teacher pipeline
- The strengthening of community partnerships and stronger student, caregiver, community, and educator engagement, participation, and inclusion in school policy, curricula, and management decisions
- The support of locally designed and rooted curricula, through seed funding for curriculum development available to students, educators, and community members, with local and state administrative support to integrate these local curricula into state testing standards
- The professionalization of paraprofessionals, with a preference toward those hired from the local community, into established educational career pathways to address teacher pipeline issues, particularly

for BIPOC teachers, counselors, and administrators

- The resourcing of extracurricular and community-based activities such as arts, recreation, organized sports, honor societies, 4H clubs, foreign language, college access centers, early childcare centers, after-school, and summer education programming

- Resources to hire and implement curriculum and programming rooted in trauma-informed practices and pedagogies

- Mandating that 5 percent of all grants be allocated to the state and local educational agencies to build out capacity for state and local governments to take over these functions for oversight and data management for future grant cycles.

Additional assistant educators, particularly in K–8 classrooms, are needed to lower teacher-student ratios, and strengthen pipelines in classrooms to address the recent year of disruption. This includes professional development, tuition reimbursement, and the development of pipeline programs for educators in under-represented groups, which may include a definition of under-representation rooted in census data and historical hiring and promotion data from the district or rooted in groups that are not traditionally represented in national and state-level teacher demographics.[111]

Building Stronger Community Partnerships for Greater Resilience

This includes affirming and formalizing informal partnerships between principals and community organizations, parents, and other groups that have long supported, but not been fully supported by, school districts and local governments. Using federal resources to affirm stronger connections between local knowledge and in-school curriculum will translate into improved educational outcomes and stronger teacher and staff retention. These policy recommendations take into consideration the fact that high-need schools and districts have little capacity to make and sustain these local connections and partnerships that are critical to student and staff success.[112] The Green New Deal for K–12 Public Schools provides funding for technical assistance (including contract templates, local data clearinghouses for best practices, and temporary staff to support finding and building initial partnerships) to build the capacity to develop and sustain local partnerships with other knowledge centers in the community.

Curricula that help to address historical gaps in representation and knowledge such as the curricula developed by Indigenous people and Tribal groups, and/or the Black Lives Matter at School curriculum[113] will also receive priority and support for high-need communities. Research has demonstrated that curricula rooted in connections to place and community can foster greater student interest and outcomes, particularly when there is a focus on environmental learning and stewardship.[114] The actual planning and community meetings where local and community curricula are established are also spaces where the community can identify and establish values they would like to see integrated into the K–12 curriculum.[115] The Green New Deal for K–12 Public Schools invests in community-based, culturally relevant and responsive curricula that can have a multitude of impacts, from teachers and staff retention, to greater parental involvement, to improved student outcomes and broader student civic engagement and environmental stewardship.[116] We also affirm the inclusion of these local curricula into academic performance measures and standards tied to state funding.

Training and professional development funds are required to create sufficiently resourced libraries, health offices, mental health and wellness centers, college access centers, gymnasiums, studios and art spaces to support educational programming open to K–12 students and the broader community. In the spirit of educational and community equity, the Green New Deal for K–12 Public Schools transforms education by redefining what counts as a school facility, and who the users of that school facility are. We value and prioritize expansive notions of school facilities, and encourage public use of school facilities for community needs, such as childcare, libraries, job resource centers, and mental and physical health centers. We support the use of resource block grants and low-interest loans to formalize facility and resource partnerships with local community groups to both make other spaces "schools" and to bring the public into school spaces, making the school a true social center for the entire community.[117] This includes the support of programming in libraries, recreational and athletic facilities, studios, and wellness centers to host programs for K–12 students and members of the community. We thus provide funding for technical assistance (including contract templates, local data clearinghouses for best practices, and temporary staff to support finding and building initial partnerships) to build the capacity to develop and sustain local partnerships with other knowledge centers in the community.

Curricula, programs, and policies must be designed to acknowledge and support trauma-informed learning models that prioritize mental health and wellness and incorporate these priorities holistically into public schools. Youth of color, low-income youth, and youth in the carceral system or foster care are at greater risk than their peers.[118] Building a stronger, more equitable education

system requires the rethinking of current curricula, administration, and school communities to support students' needs in the face of trauma. **A Green New Deal for K–12 Public Schools calls for the trauma-informed transformation of schools, funded and supported as part of the Green New Deal, recognizing that social, emotional, and intellectual well-being of youth is part of building a just and equitable green future.** A Green New Deal for K–12 Public Schools puts forth three types of recommendations for transforming education to face trauma:

1. **Build local and regional networks**
2. **Embed trauma-informed practices in the curriculum**
3. **End the school-to-prison pipeline**

Decades of inequitable funding disparities across race, class, and ability must be addressed. The Green New Deal for K–12 Public Schools will also expand the Elementary and Secondary School Act (Title I) and Individuals with Disabilities Education Act funding, with the ultimate goal of providing up to $5,000 in average per-pupil expenditure (APPE) of Title I federal funding, eliminating intradistrict funding disparities, and incentivizing states to eliminate interdistrict funding disparities. By quadrupling the annual appropriations for ESEA over the decade, we encourage a federal mandate to incentivize states and learning education agencies to reach an APPE of $5,000 of funding for each Title I student. For context, the United States spends about $15,908 per pupil across local, state, and federal funding sources.[119] The current Title I APPE is $1,227.[120]

In addition to using resource block grants to support these educational equity outcomes, the Green New Deal for K–12 Public Schools will require that grantees allocate 5 percent of all grants to support the training of state employees to take over these awards and oversight in years 5–10 of the program. We support the current Rebuild American Schools Act imperative that states and local authorities should have control over these functions once federal funding has addressed the decades of inequity from its previous policies.

TABLE 3

NEW EDUCATOR RESOURCE JOBS BY STATE AND TERRITORY

STATE + TERRITORY	JOBS	STATE + TERRITORY	JOBS
Alabama	5,300	Montana	190
Alaska	710	Nebraska	640
Arizona	10,530	Nevada	5,890
Arkansas	2,920	New Hampshire	30
California	107,860	New Jersey	2,670
Colorado	3,510	New Mexico	3,290
Connecticut	1,270	New York	8,480
Delaware	560	North Carolina	8,190
District of Columbia	280	North Dakota	40
Florida	25,390	Ohio	8,170
Georgia	9,710	Oklahoma	5,390
Hawaii	740	Oregon	6,580
Idaho	1,810	Pennsylvania	6,040
Illinois	8,460	Rhode Island	520
Indiana	4,930	South Carolina	4,000
Iowa	680	South Dakota	320
Kansas	1,030	Tennessee	5,520
Kentucky	4,520	Texas	36,880
Louisiana	7,860	Utah	3,190
Maine	70	Vermont	20
Maryland	2,010	Virginia	2,590
Massachusetts	1,750	Washington	7,370
Michigan	9,260	West Virginia	780
Minnesota	2,140	Wisconsin	2,010
Mississippi	3,780	Wyoming	60
Missouri	2,350	Puerto Rico	350
		Total	**339,000**

BUREAU OF INDIAN EDUCATION SCHOOLS

While 92 percent of Native students attend state-run public schools, the remaining 8 percent—about 46,000 Native students—attend schools funded by the federal government's Bureau of Indian Education (BIE).[121] These BIE schools are the remnants of the federal government's ethnocidal effort to assimilate Native children into whiteness by forcefully removing them from their families and placing them into government-run boarding schools. If the Green New Deal for K–12 Public Schools is going to close the nation's education equity gaps, it must address the needs of students and educators in BIE schools.

The BIE funds a total of 183 elementary and secondary schools dispersed across 23 states. The BIE operates 57 of these schools directly, and the remaining 126 are operated by tribes.[122] These schools are typically located on reservations and in rural areas in which they are the only school available.

MEETING THE NEEDS OF NATIVE STUDENTS, EDUCATORS, AND COMMUNITIES

In 2011, 78 BIE schools were in such poor condition that their educators were conducting more than 75 percent of their instruction in portable units.[123] At that time, the Department of the Interior estimated that it would cost $1.3 billion to bring all of the BIE's schools up to fair or good condition.[124] Stories of rat-infested facilities with caving roofs and without internet or even reliable electricity abound.[125] Without a doubt, BIE schools need a large transfusion of federal funds.

But Native communities also need absolute control over those funds. Education sovereignty has long been a central demand of Native advocacy groups. The National Indian Education Association lists educational sovereignty as one of its core tenets,[126] and the Red Nation[127] and NDN Collective[128] echo similar sentiments in their organizing principles. When the Department of Education and Department of the Interior surveyed Native leaders and communities about their experiences with BIE schools, almost all demanded greater local control and autonomy.[129] The Green New Deal for K–12 Public Schools aligns itself with these demands.

Currently, Native tribes can take administrative control of the BIE schools within their communities, but their discretion is severely limited.[130] Tribally controlled BIE schools obtain their funding through BIE contracts, but these contracts often come with significant strings attached. For example, these strings prevent Tribal administrators from reallocating funding between line items on their budgets or from hiring personnel who have state accreditation but do not meet the BIE's accreditation requirements. And, because all federal funding passes through the BIE, it often gets held up and sometimes never reaches the schools.[131]

Education sovereignty will look different in each setting, as each Native tribe or community will have a different desire and capacity to administer projects at the scale imagined by the Green New Deal for K–12 Public Schools. What is critical, however, is that Native tribes and communities get to determine the level of their autonomy.

Indeed, history shows that some of the most innovative advancements in public education have resulted from Native-led education programs. When the Navajo established the Rough Rock Community School in 1966, for example, they redefined the possibilities of community-directed and culturally determined education. The school developed nonhierarchical classrooms that eschewed Western concepts of classroom order and, instead, privileged Navajo traditions of learning through observation and self-direction. Over just a few decades, thousands of educators visited the school to study its techniques.[132]

The federal government has failed to fulfil its duties to Native students for centuries. The Green New Deal for K–12 Public Schools cannot possibly absolve the federal government of its centuries of failure, but it can take a first step in that direction.

TOWARD TRAUMA-INFORMED TRANSFORMATION

Trauma—poverty, racism, food insecurity, homelessness, parental incarceration, and other adverse childhood experiences (ACEs)—impacts the lives and learning of students. Studies estimate that between 45 percent and 66 percent of all children have experienced at least one ACE.[133] Youth of color, low-income youth, and youth in the carceral system or foster care are at greater risk than their peers.[134] Building a stronger, more equitable education system requires the rethinking of current curricula, administration, and school communities to support students' needs in the face of trauma. **A Green New Deal for K–12 Public Schools calls for the trauma-informed transformation of schools, funded and supported as part of the Green New Deal, recognizing that social, emotional, and intellectual well-being of youth is part of building a just and equitable, green future.** A Green New Deal for K–12 Public Schools puts forth three types of recommendations for transforming education to face trauma:

1. Build local and regional networks

2. Embed trauma-informed practices in the curriculum

3. End the school-to-prison pipeline

Build local and regional networks: To uplift the trauma-informed transformation, schools must build local and regional networks of care, leveraging regional planning efforts to set appropriate policies and goals for school districts—and then fund them. I**t is recommended these regional planning efforts work in concert with the educational equity planning grants to also seek and sustain regional funding sources to eliminate intrastate funding inequities.** Care multiplies, spreading through communities at every scale, lifting up individuals, lifting up people together. Building networks between schools, between community institutions, and between students, staff, administrators, and caregivers is integral to supporting each other toward and through transformation. First, schools must network with other schools and educators further along in the transformation, encouraging peer learning and mutual support.[135] Schools must also network with the district to ensure continuity to students' care needs as they move through their educational experience. Then, schools must reach into their local communities to develop partnerships with businesses, nonprofits, libraries, mental health agencies, public health officials, and more to provide integrated services for schools.[136] Reaching in to community can also include opening trauma-informed trainings hosted by schools to the local and regional network community.[137]

Finally, networks of care also must address working conditions. The trauma-informed transformation includes caring for educators and all staff persons at a school who have experienced secondary trauma as well as students. Schools must build supportive working conditions by investing in preparation, mentoring, and trauma-informed training as well as wellness, stress management, and mindfulness training.[138]

Embed trauma-informed practices in the curriculum: A trauma-informed transformation looks like educating the whole youth: student's cognitive, emotional, and social selves. Students must be instructed in social and emotional learning, not just cognitive, while standards in each regional care network must be adopted collaboratively for social and emotional learning.[139] In general, trauma-informed practices look like cultivating positive relationships through safety; increasing trustworthiness and transparency; encouraging peer support, collaboration, and mutuality; empowerment, voice, and choice; and respect for cultural, racial, and gender background.[140]

End the school-to-prison pipeline: DecarceratePA refers to the school-to-prison pipeline as "the national trend of criminalizing, rather than educating, our nation's children," and the circumstance where "public institutions increasingly devote huge chunks of their already tight budgets to law enforcement personnel and security infrastructure, while simultaneously directing ever-dwindling sums to the arts, music, languages, recreation, and afterschool programming."[141] As of 2019, 14 million students were in a school with police, but no counselor, nurse, psychologist, or social worker.[142] Public schools must reshape discipline to halt destructive practices that funnel youth into the carceral system instead of addressing their social, emotional, and cognitive needs.

The Green New Deal for K–12 Public Schools calls for an end to zero-tolerance discipline, including suspensions, expulsions, disciplinary transfers, and referrals to law enforcement.[143] These practices have been shown to disproportionately impact students of color, students with disabilities, and LGBQ youth.[144] Resources spent on punishment should be reallocated to institute restorative justice practices, including

peer mediation, restorative conferences, counseling, and peace circles for students as well as anti-bullying initiatives.[145] A Green New Deal for K–12 Public Schools recommends investments in mental health staffing to support trauma-informed and restorative practices, including hiring one school psychologist for every 500 students, hiring one guidance counselor for every 250 students, and—as the President's Budget for 2022 states—providing at least $1 billion for hiring these nurses, counselors, and mental health professionals.[146] Schools that have implemented restorative measures have been shown to have reductions in violence, improved school climate, and improvement in attendance and achievement as well as reductions in racial and economic disparities in suspensions.[147]

Schools must be sites of mutual care and restoration, not incarceration; therefore none of the funding mechanisms proposed by the Green New Deal for K–12 Public Schools may be used to increase or sustain carceral infrastructure in schools, including metal detectors, surveillance infrastructure such as cameras, school resources officers, or any collaborations with police.

COMMUNITY DESIGN OF SCHOOLS

In order for public schools to achieve the aims of educational equity that we have proposed, school districts will need to invest themselves in community-driven planning and design processes involving educators, students, and community members toward the development of culturally relevant topics and curriculum. Most curricula in the US center the dominant culture in content and standards, using white supremacist cultural norms as the basis for standardized testing. A community-informed curriculum would center learning and not test prep, be responsive to the needs of the students and community, and reflect the diversity of the lived experiences of students without essentializing any culture(s) through trivialization or translation.[148] This will demand a shift away from standardization and toward an approach to teaching and content development that adapts to changing student populations. Not only will this improve students' education, it will also support the community and increase trust through both representation and retention. Beyond the curriculum, a key component of this work is investment in educators' own ongoing professional development with community in culturally relevant topics.[149]

Examples of this practice can be seen in Black Lives Matter at School, which began in Seattle as a day, spread to Philadelphia for a week, and is now a nationwide movement organizing with communities for racial justice in education.[150] The four demands of the movement (end zero-tolerance; mandate Black history and ethnic studies; hire and retain more black teachers; fund counselors, not cops) were identified by students of color and their communities as priorities (critically, through racial justice, these demands link education to policing, housing, wages, and health care) and continue to be supported by those students and communities.[151] Black Lives Matter at School has developed a variety of classroom resources to support curriculum development and hosted conversations to increase community and educator participation.[152]

The Chicago Teachers Union (CTU) and Portland's Educating for Climate Justice have both developed units on environmental/climate justice to support their students (who are already organizing around the issue), recognizing the importance of educating about not only the climate crisis but also what students can do as individuals and in community to effect change.[153] CTU has resolved to increase advocacy and effective curricula on climate justice in partnership with the trade unions and climate justice organizations in Chicago.[154] In Portland, Educating for Climate Justice involved educators and noneducators (first education, environmental, social justice, labor, student, and religious groups and then the local school board) in the slow process of developing curricula that advocate for climate justice and work with students to both teach climate science and develop the tools and understandings on how to effect change in the world.[155] In all three cases, the curricula were developed in conversation with students and stakeholders around topics of importance for the communities.

Beyond these curricular interventions, the process of designing or retrofitting school buildings themselves often fails to engage community members and other stakeholders in deep or meaningful ways (e.g., presenting "options" for a conceptual plan at the end of a design process). This is not community engagement—it is community exploitation. True community engagement begins early and requires significant time to do well. It requires structuring a process that allows for shared values to be established, community visions to be seen and heard, and the eventual design options to be co-produced at each step along the way. In the following two examples, the firm Civic Projects acknowledges that there is no predetermined design. Rather, the design process is an explorative journey toward a solution that empowers everyone involved.

When developing the design for an interior renovation of the Global Citizens Experience Lab School (GCE) in Chicago, the design team began with a series of "listening sessions." These sessions served as an opportunity for designers to learn about how students perceive their learning environment. In the sessions, students explicitly revealed their personal relationship to their educational experiences and environment. "How do I take what I learn here and bring it back to where I'm from?" one student asked, referencing not only her strong value for project-based learning experiences but the connection between designs, schools, and communities.

Students emphasized priorities in "paying it forward," flexibility in learning, and determining how they would use their knowledge for good. The three-firm design team, consisting of Civic Projects, Landon Bone Baker Architects, and ArchitectureIsFun, used these values as guiding principles in further engagement, design specifications, and design feedback. Their design included public-facing, collaborative maker-studios and student discussion spaces as key "hearts" of the design proposal. This would not have been the case if students weren't at the forefront of the project's conception or periodical design reviews, emphasizing their values for collaboration and learning environments that aren't detached from the real world.

COMMUNITY DESIGN OF SCHOOLS

When designing the Englewood Accelerator in Englewood, Chicago, Civic Projects launched a participatory design process that centered the interests of the community early on in the project phase. Even when introducing business and technology writer Ian Linton's definition of business incubators as sites for support for startups,[156] the project team and clients were able to evolve this definition into something that was more tailored to the desires of the community. They found that there were generally four user types: promotion seekers, office seekers, education seekers, and connection seekers. The diverse team, consisting of Civic Projects' architects, the local Community Development Commission, design students from Illinois Institute of Technology, and other stakeholders, used these "types" to design the space. These projects show how community engagement and transparent communication are critical to the process of designing spaces that are appropriate and responsive to the needs of a community.

In order to ensure that investments in school facilities reflect the dreams and values of the communities they help anchor, a Green New Deal for K–12 Schools recommends funding and supporting the kinds of deep engagement and self-determination these projects exemplify.

PART III: ECONOMIC EQUITY

ECONOMIC EQUITY

The final value of the Green New Deal for K–12 Public Schools is economic equity. In addition to the environmental and educational disparities our current education system has produced and reinforced, the failure to address structural issues in school funding, spending, and decision-making has created massive economic inequities. The Green New Deal for K–12 Public Schools is also a jobs program. Investments in healthy green retrofits will generate in addition to **the annual 935,000 jobs per year (of which 272,000 are construction and on-site maintenance jobs); and the resource block grants support generated by the $669 billion in green retrofits (of which $446 billion are in the form of direct grants), new builds, and infrastructure, the bill is also creating and supporting 339,000 educator resource jobs each year. generated by the $250 billion in resource block grants. Overall, this bill will fund 1.3 million jobs annually.** At the state level, the 5 percent allocation to increase state capacity should also induce hiring and economic impact through building out state governments to support these grants and low-interest awards and monitoring in years 5–10.

We define **economic equity** a s a value for the Green New Deal for K–12 Public Schools by using an award formula that targets communities most harmed by the years of disinvestment from the cycle that puts downward pressure on school quality, resources, home values, and economic opportunity as a result of our nation's housing and educational policies. We plan to directly address leaky pipelines that lead to brain drain in communities by creating unionized, living-wage construction jobs and on-site maintenance jobs, developing and funding teaching assistant and paraprofessional careers, and better incorporating returning citizens into local and sustainable green economies.

Local Jobs at Living Wages with Collective Bargaining Rights [157]

By instituting a strong union and local hiring preference and requiring prevailing wage (per the Davis-Bacon Act) on all retrofit work, the Green New Deal for K–12 Public Schools can ensure that workers at the heart of the Green New Deal are paid well and fairly.[158] The Davis-Bacon Act for public school investments requires paying locally prevailing wages, as determined by the Department of Labor, for all construction, alteration, or repair work. It also mandates that workers are paid time-and-a-half for any time in excess of 40 hours/week.[159]

The Green New Deal for K–12 Public Schools would further prioritize union workers by supporting project labor agreements, which establish the terms and conditions of employment on a construction project and protect collective bargaining rights. Similar to Maryland's Workplace Fraud Act, construction and landscaping workers with companies contracted to work on public projects are considered employees—not contractors—unless proven otherwise. This will expand union benefits and fair wages to more workers.[160] We prioritize the hiring of local workers, caregivers, and recent graduates of high schools that are awarded these grants in low-resource communities that have been historically marginalized to support the economic equity value of the Green New Deal for K–12 Public Schools.

Building a K–20 Pipeline with Local Trades in Construction and Education

With over 100,000 school facilities to retrofit and build, a Green New Deal for K–12 Schools represents a major investment in the building trades and broader labor movement. With this investment in educational facilities, there is also an opportunity to build connections between K–12 curricula, local and diverse economies, and formalized apprenticeship programs and career pathways. Provisions in the Green New Deal for K–12 Public Schools specify a priority for grants that commit to hiring workers from low- to moderate-income areas and those returning from incarceration. In addition to targeting specific workers, green retrofits open up space for extensive pre-apprenticeship and apprenticeship programs. Through local curriculum design committees established under the Educational Equity section of this report, pre-apprenticeship programs can be readily adapted to meet changing market demand and prepare workers for entry into registered apprenticeship programs in the construction trades and other industries.

The Green New Deal for K–12 Public Schools calls for no less than 20 percent of individuals employed on a project to be part of a registered apprenticeship program, and should give priority to those programs run through unions. The structure to connect workers to union apprenticeships already exists through the Department of Labor's Apprenticeship.gov site, which helps manage registered programs that already employ over 500,000 apprentices across the country.[161] This provides a direct vehicle for the training and hiring of public housing residents alongside other workers.
As proposed in S.1769, the Offshore Wind Jobs and

Opportunity Act, the Green New Deal for K–12 Public Schools prioritizes resource block grants for partnerships between unions and educational institutions like community colleges that allow workers to attain a recognized postsecondary credential. This will take advantage of pre-existing programs while strengthening local institutions. In an effort to address educational equity values around reducing privatization and strengthening public capacity, the Green New Deal for K–12 Public Schools supports funding for raising staffing levels within state departments of education and local educational agencies in perpetuity, to eliminate the need for contracting out to private firms. This is in line with several proposals for a federal jobs guarantee.[162]

Involving Caregivers and Community Members in High-Need Sites

The construction and maintenance phases of deep green retrofits will require jobs—both on-site and off—that last during the 10 years of intensive Green New Deal investment and beyond. To maximize demand generated through procurement, the Buy American Act should be applied, so that manufacturing jobs that help produce essential materials and technologies are secure in the long term. As the name implies, Buy American requires domestic procurement so long as the materials are reasonably available commercially. Where possible, grant programs should further incentivize local sourcing, as required by the Regional Materials LEED credit.[163] This minimizes energy use from transportation. A separate small business program nested within a Green New Deal for K–12 Public Schools could provide technical assistance and priority procurement opportunities for local caregivers and community-owned small businesses.

Strengthening Local Economies by Building Safe, Healthy Schools with Resources

In addition to the jobs and economic benefits of this plan, the Green New Deal for K–12 Public Schools will rethink funding disparities between and within school districts. Through the $100 million dedicated in Educational Equity Planning Grants, the Green New Deal for K–12 Public Schools will support the formation of regional school districts that document funding and resource disparities, create plans with community value statements to address these funding and resource inequities, and will receive "equity awards" once they reach these benchmarks. Initially, high-need schools that have been historically under-resourced relative to their regional peers will receive these equity awards, but over time, we hope to see more members of the regional districts (including over-resourced high-wealth suburban schools or special admit urban schools) receive these equity awards.

SCHOOL FUNDING EQUITY

Educational Equity Grants seek to eliminate intraregion education inequities by facilitating an inclusive, regional equity planning process and providing federal funds to the schools doing the most to advance equity within their regions. The program will be modeled after HUD's Sustainable Communities Regional Planning Grants program, and expands on President Biden's proposal for Title I Equity Grants in the FY 2022 proposed budget.[164] The Educational Equity Grants program will have five components.

1. The program will require each local education agency (LEA) interested in receiving funding to join the other LEAs within its metropolitan or micropolitan statistical area to form a regional consortium.

2. The program will require federal agencies including HUD, DoEd, EPA and DOT to provide these consortia with data that reflect demographic trends and the spatial distribution of poverty, environmental hazards and access to education, transportation, and economic opportunities across the consortium's region.

3. The program will require consortia to engage in extensive community outreach to solicit comments from diverse stakeholders on issues related to education equity. The more a consortium solicits, receives, considers and addresses community input, the higher its priority for Education Equity funding will be. Consortia will also get increased priority as they increase the diversity of the individuals and organizations from whom they solicit input.

4. The program will require the consortia to utilize the federal data along with the local data and commentary input it received through the outreach process to develop a regional education equity plan. This plan must identify current racial, class, gender, and disability-related inequities in education access within the region; identify the historic causes of those inequities; and make a plan for redressing those inequities. The DoEd will also provide these consortia with an equity assessment tool—basically a structured list of questions—that will guide the consortia through their equity planning.

5. Finally, the consortia will submit their education equity plans to the DoEd for review. The DoEd will have authority to reject any plan that does not adequately comport with the Green New Deal for K–12 Public Schools' equity mandate or otherwise violates applicable federal law. Once the DoEd accepts a plan, however, it will then distribute funding to schools within the consortium in accordance with the priorities established in the consortium's plan.

Critically, consortia will receive federal funding for every aspect of the community outreach and planning process. The lack of funding for outreach and planning was one of the key features that prevented smaller and more rural regions from fully availing themselves of the Sustainable Communities Initiative.[165]

By attaching funding to a regional planning process, the Educational Equity Grants program promotes education equity in two ways. The funding, of course, helps to bring schools that serve the largest proportions of poor and minority students to a resource level equal to that of schools in high-property value districts. But the regional planning process itself also facilitates regional equity by building intraregional relationships and mutual understanding through the process of planning.[166] Further, awarding funding in accordance with regional plans places local communities with the best understanding of local needs in the driver seat. The Educational Equity Grants program is essential to the Green New Deal for K–12 Public Schools because eliminating education inequity requires a *regional* approach.

The relationship among housing discrimination, local property taxes, and public school budgets limits the long-term impact of localized investments. Local school districts sit in regional economies. When a school district improves, the wealthier families in the regional economy will move to that school district, thereby driving up property values. Meanwhile, rising property values combine with housing, transportation, and economic discrimination to ensure that poor and minority students get pushed out of the improving school district and shuffled into the region's lower-resource schools. The localized investment in a particular school may have temporarily increased education equity for that school's poor and minority students, but, in the long term, the investment does little more than redistribute the geography of education inequity.[167]

The Green New Deal for K–12 Public Schools can only break this cycle and prevent the perpetual displacement of poor and minority families if it equalizes education resources within regional economies. The Climate Capital Facilities and Resource Block Grants ameliorate inequities that exist today. The Educational Equity Grants program prevents those inequities from reemerging tomorrow.

CONCLUSION

The Green New Deal for K–12 Public Schools is the first step of many to address over a century of inequitable health, environmental, educational, and economic injustices produced by our public school facilities and policies. Through a robust and comprehensive examination of historical inequities, a strong federal infusion of funding into programming and policies that address these historical inequities, and the affirmation and support of effective local school districts, educators, administrators, students, and community members, the Green New Deal for K–12 Public Schools can make school facilities into the local resilient infrastructure our communities need. The Green New Deal for K–12 Public Schools will transform public school teaching and learning into a collaborative, cooperative process rooted in community partnerships and knowledge with sustainable federal funding. It will do this by investing in green retrofits; supporting K–12 curricula and training programs that will transform the public school facility into a living lab; employing local residents with living-wage, unionized construction, maintenance, and education jobs; developing pipelines to support local educators and local curricula; and by dismantling the growing privatization of professional development, school administration, and operation. Thanks to substantial federal funding, these policies would uplift public school teaching and learning into a collaborative, cooperative process rooted in community partnerships and knowledge, while tackling root causes of the climate emergency. A Green New Deal for K–12 Public Schools would be an unprecedented—and essential—investment in our children's and communities' future.

APPENDIX 1

METHODOLOGICAL NOTES ON STUDENT-EDUCATOR RATIOS

Educator staffing needs were estimated from National Center for Education Studies data. (This is how we estimated the need for an additional 339,000 educator resource staff positions). The School-level Membership and Staff tables for 2018–2019 were joined to get student counts from the Membership table and teacher counts from the Staff table. Schools were removed from the table if they were missing values for number of students or teachers or showed only one or fewer students or teachers at the school. Upper outliers, which showed student-teacher ratios above 100, were also trimmed. Many of these upper outliers were schools and learning programs that offered education other than full-time, in-person education for K–12 students. Trimming these outliers brought down the number of schools in our "target universe" from 33,488 to 30,660 schools.

Target student-educator ratios were 12:1 for grades K–8 and 15:1 for grades 9–12. Target ratios for each school were calculated as the weighted average of these ratios, where weights were the number of students in each grade range at each school. Students in unmarked or unspecified grade levels were included and given a 15:1 target ratio. These target ratios were derived to proxy best-case staffing ratios, and meant to take into account the differentiated needs of educators across students, needs, and curricula. We estimate these staffing ratios will be reached by adding assistants to the classroom in addition to providing relief for more prep periods for existing educators.

Additional teachers for each school were calculated based on the difference between the existing and the target student-educator ratio. National staffing needs were the total across all schools, after an inflation ratio was applied to account for schools for which data was missing. New staffing needs in these missing rows was assumed to be the average of those at schools with better data when calculating national averages.

APPENDIX 2

METHODOLOGICAL NOTES ON JOB CREATION AND EMISSIONS REDUCTIONS

Overall estimates for job creation reflect total expected jobs, based on $250 billion in grants for green retrofits. This includes jobs directly created by the spending, indirect jobs in industries supplying intermediate goods such as building materials, and induced jobs from these newly hired workers spending money into the economy.

Jobs estimates were generated from an Input-Output model with multipliers derived by the Employment Policy Institute from Bureau of Labor Statistics data. The Bill-of-Goods method was used to generate jobs, which is the preferred method for using input-output modeling to estimate the impact of construction spending.

On-site construction jobs were generated from the estimated proportion of the $250 billion going directly to the sector from the school retrofit grants. The breakdowns of these jobs by state, congressional district, and city are based on the locations of the roughly 35,000 schools targeted for these grants.

The Bill-of-Goods method for Input-Output modeling requires a breakdown of spending across sectors of the economy, so that appropriate multipliers can be applied to each segment of the spending. The allocation used here was created from engineering reports and studies of green retrofits for schools and other large buildings, and we checked against other work on using Input-Output models to estimate the impacts of green retrofits.

Teacher staffing needs were estimated from National Center for Education Statistics data. The School-level Membership and Staff tables for 2018–2019 were joined to get student counts from the Membership table and teacher counts from the Staff table. Schools were removed from the table if they were missing values for number of students or teachers or showed only one or fewer students or teachers at the school. Upper outliers, which showed student-to-teacher ratios above 100, were also trimmed. Many of these upper outliers were schools and learning programs that offered education other than full-time, in-person education for K–12 students. Trimming these outliers brought down the number of schools in our "target universe" from 33,488 to 30,660 schools.

Target student-to-teacher ratios were 12:1 for grades K–8 and 15:1 for grades 9–12. Target ratios for each school were calculated as the weighted average of these ratios, where weights were the number of students in each grade range at the each school. Students in unmarked or unspecified grade levels were included and given a 15:1 target ratio.

Additional teachers for each school were calculated based on the difference between the existing and the target student-to-teacher ratio. National staffing needs were the total across all schools, after an inflation ratio was applied to account for schools for which data was missing. New staffing needs in these missing rows was assumed to be the average of those at schools with better data when calculating national averages.

EMISSIONS REDUCTIONS

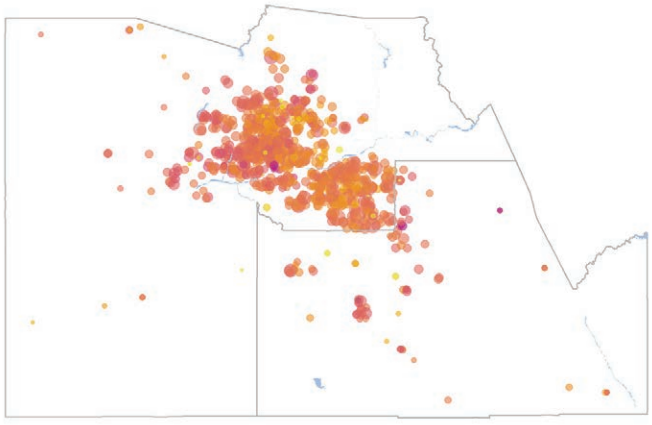
Estimates for CO2e emission reductions are based on analysis of the 2012 Commercial Buildings Energy Consumption Survey, from the US Energy Information Administration. This survey provided an estimate for total energy consumption by source for all education buildings (Table C1). Energy usage estimates were then scaled to the one-third of schools targeted for grants in our proposal. This provided energy consumption estimates by energy type (natural gas, oil, electricity, etc.). This method does not account for methane leakages in gas infrastructure, as the EPA does not yet provide standardized estimates. But it is virtually certain that full electrification represents significant savings on this front as well. Carbon conversion factors were then applied to energy consumption by fuel type to yield the estimate for carbon savings.

APPENDIX 3: MAPS

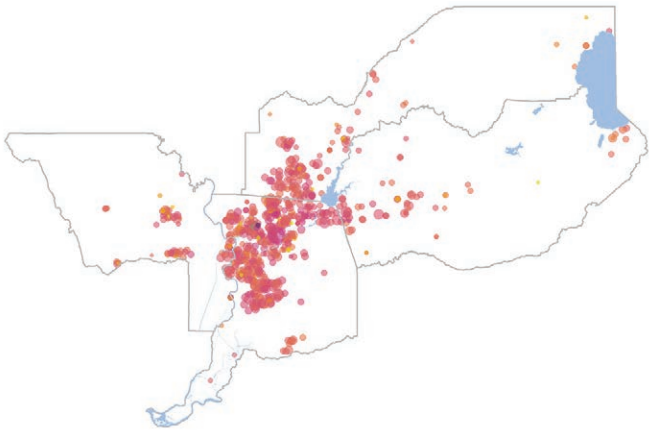
CURRENT STUDENT:TEACHER RATIOS

Student teacher ratios throughout metro areas, dots sized by student population at each school

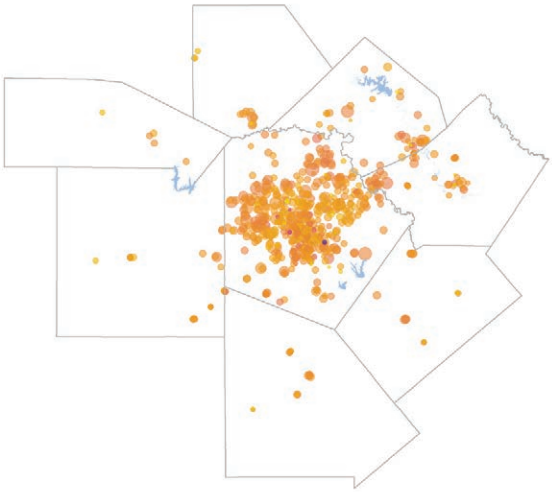
PHOENIX-MESA-CHANDLER, ARIZONA



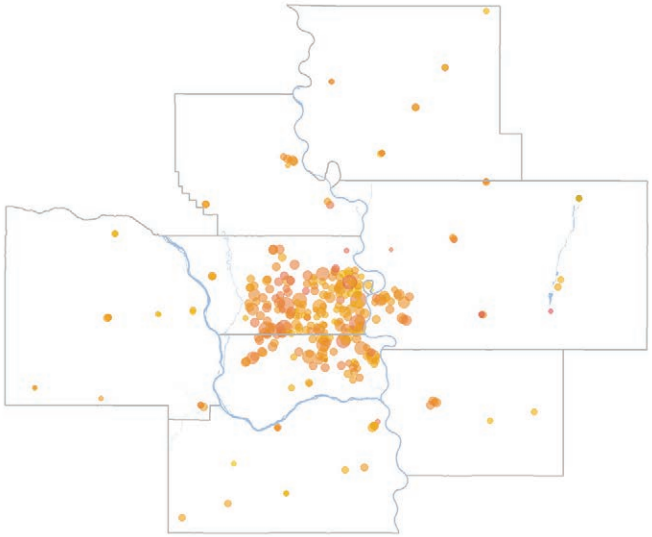
SACRAMENTO-ROSEVILLE-FOLSOM, CALIFORNIA

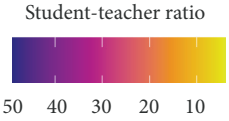


SAN ANTONIO-NEW BRAUNFELS, TEXAS



OMAHA-COUNCIL BLUFFS, NEBRASKA AND IOWA





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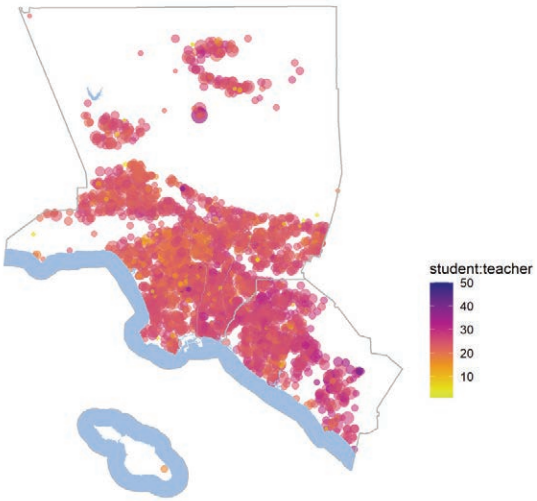
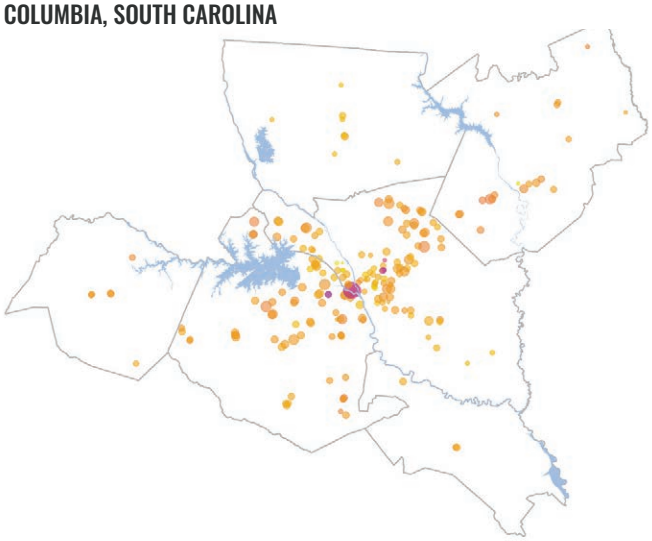
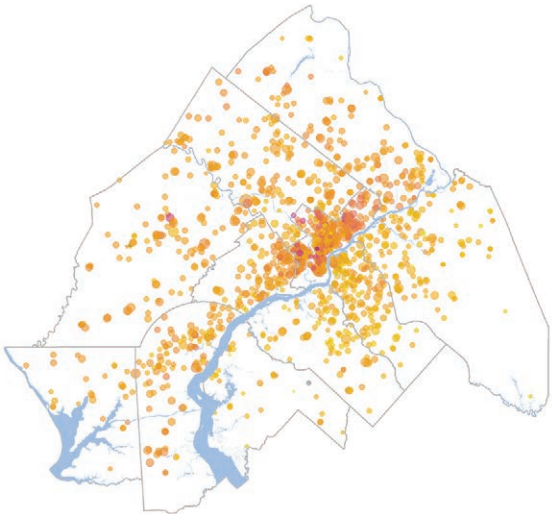


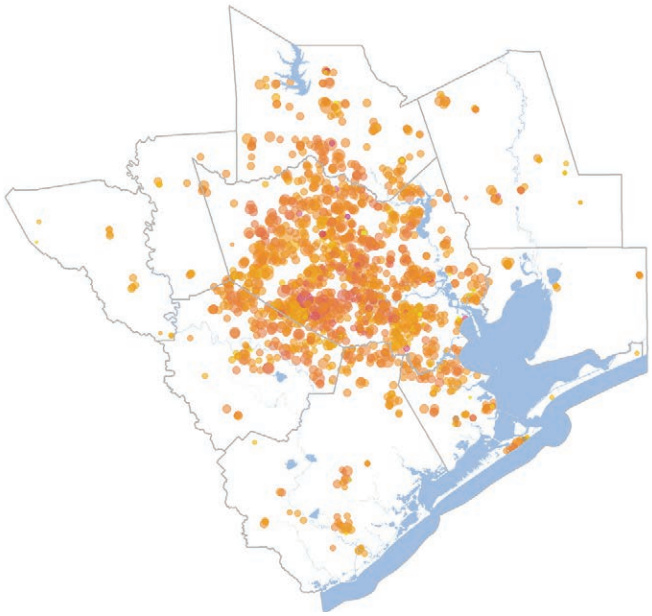
COLUMBIA, SOUTH CAROLINA



PHILADELPHIA-CAMDEN-WILMINGTON



HOUSTON-WOODLANDS-SUGARLANDS, TEXAS



Student-teacher ratio

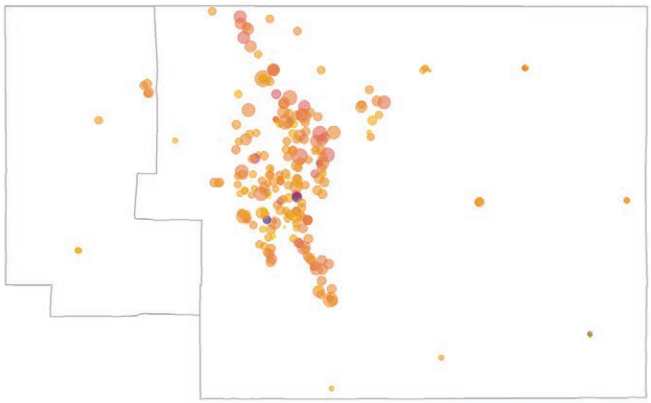
50 40 30 20 10

APPENDIX 3: MAPS

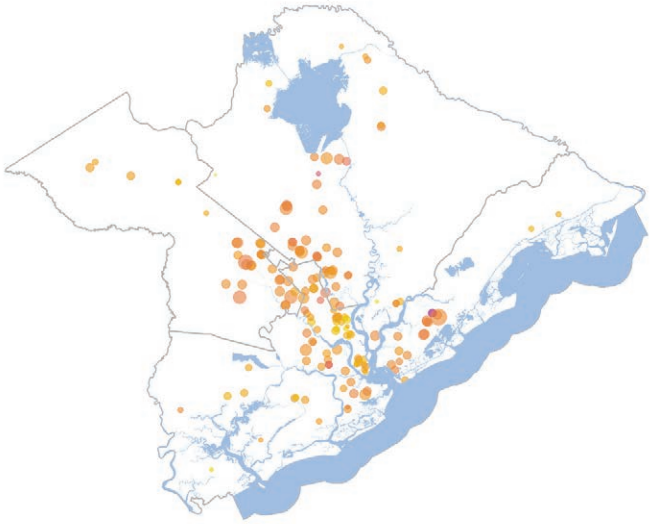
CURRENT STUDENT:TEACHER RATIOS

Student teacher ratios throughout metro areas, dots sized by student population at each school

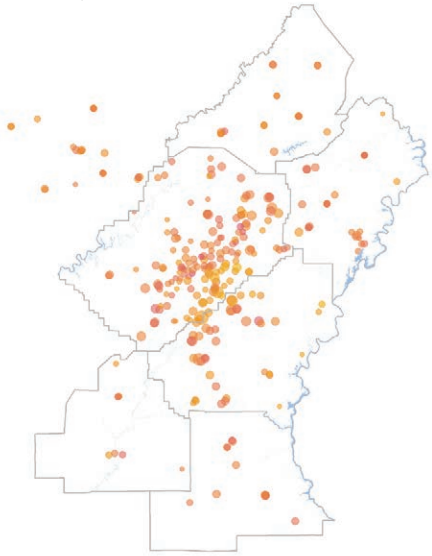
COLORADO SPRINGS, COLORADO



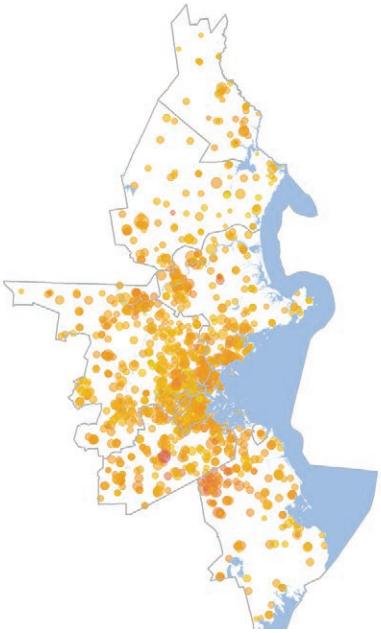
CHARLESTON-NORTH CHARLESTON, SOUTH CAROLINA



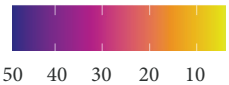
BIRMINGHAM-HOOVER, ALABAMA



BOSTON-CAMBRDGE-NEWTON



Student-teacher ratio



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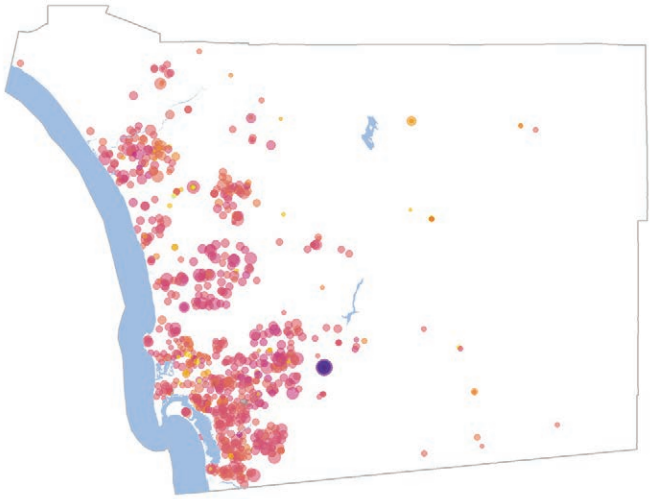
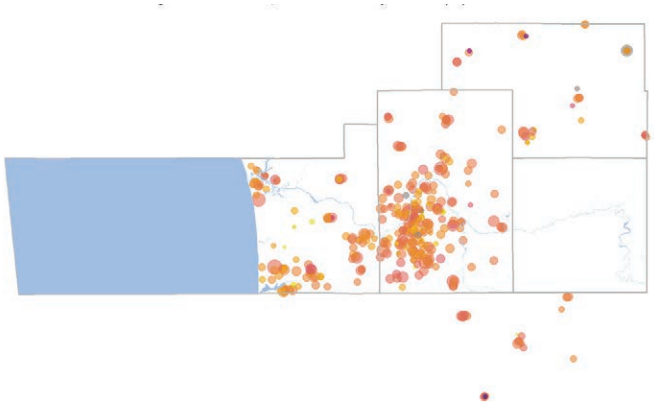
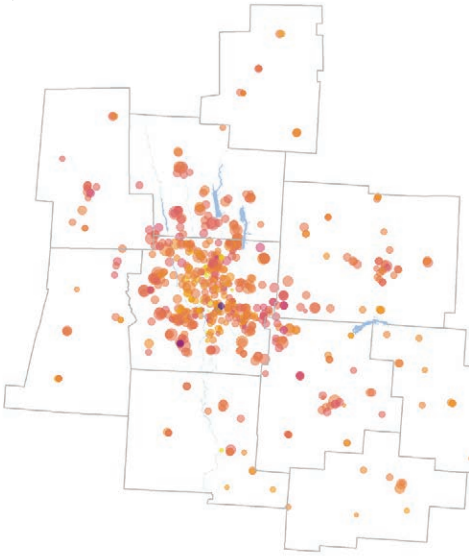
SAN DIEGO-CHULA VISTA-CARLSBAD, CALIFORNIA



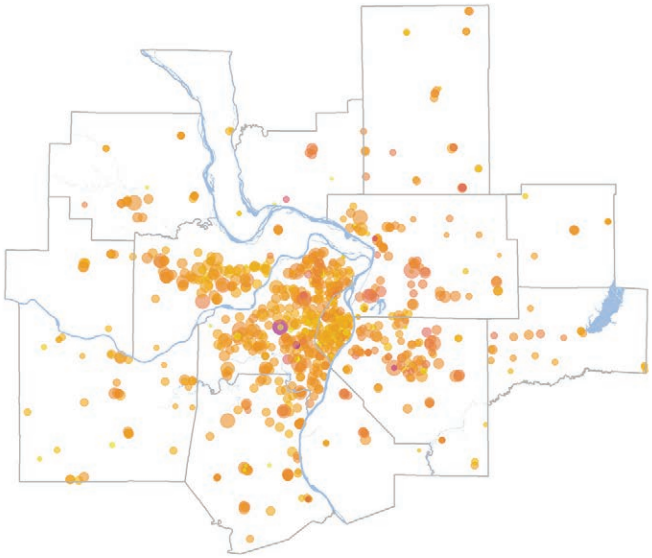
GRAND RAPIDS, KENTWOOD, MISSOURI



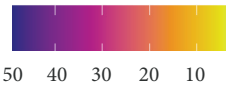
COLUMBUS, OHIO



ST. LOUIS, MISSOURI AND ILLINOIS



Student-teacher ratio

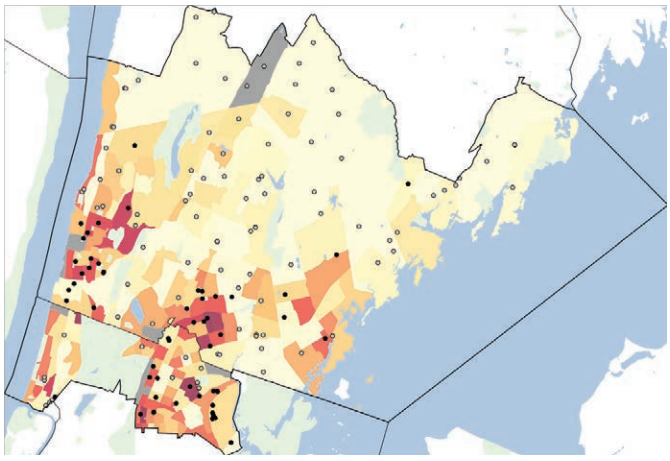


APPENDIX 3: MAPS

Social and environmental vulnerabilities of school communities in select districts

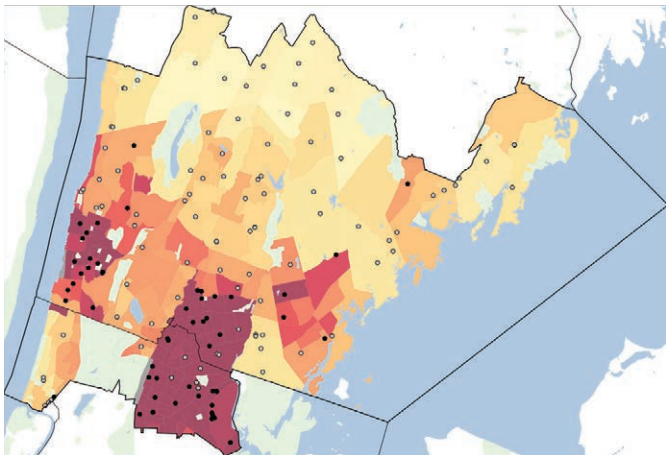
New York District 16

LIFE EXPECTNACY



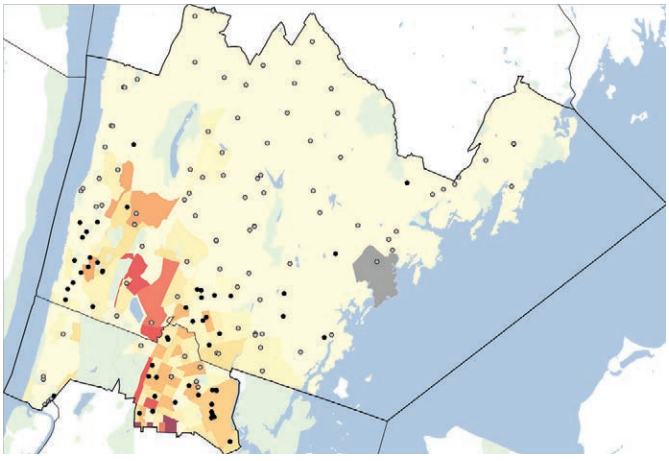
74 Years of life 84

ASTHMA PREVALENCE



8 Percent of adults over 18 12

HEAT VULNERABILITY



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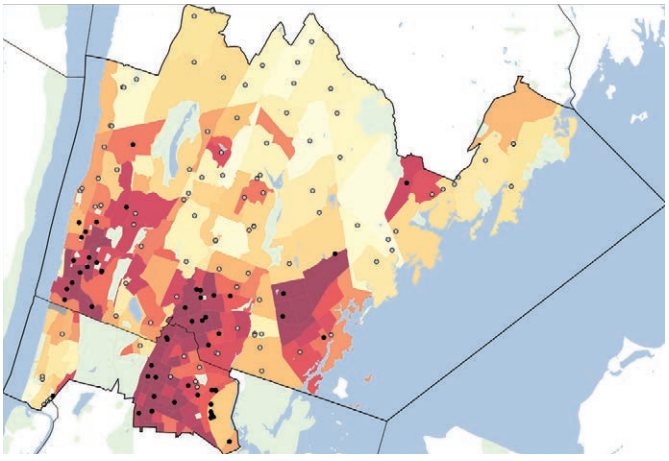
HOUSING COST



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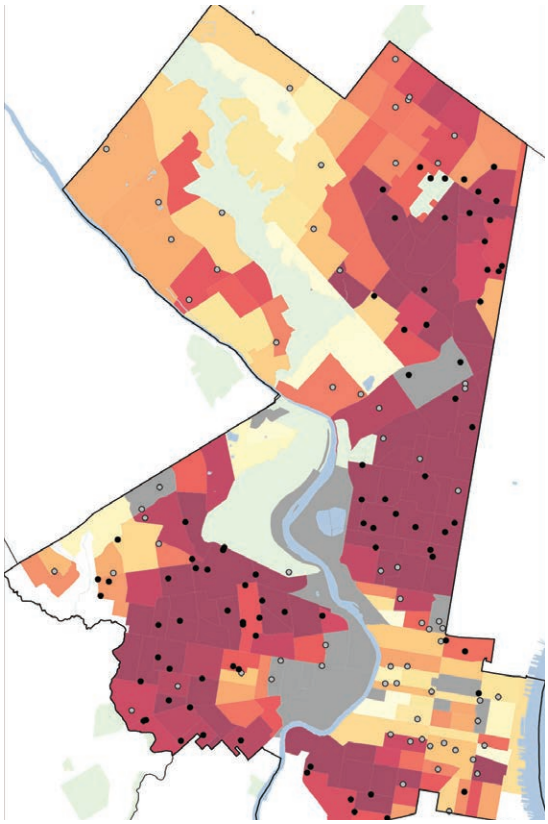
- K-12 Public Schools in most vulnerable census tracts
- K-12 Public Schools

APPENDIX 3: MAPS

Social and environmental vulnerabilities of school communities in select districts

Pennsylvania District 3

LIFE EXPECTNACY



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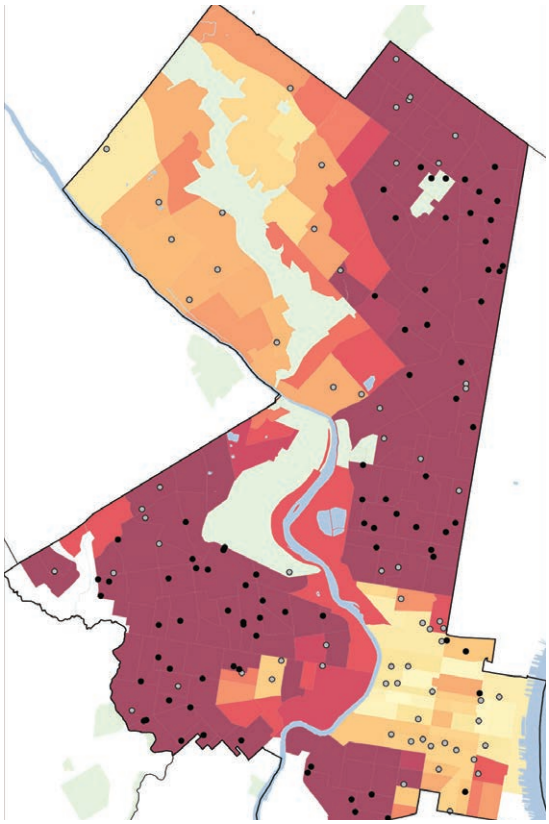

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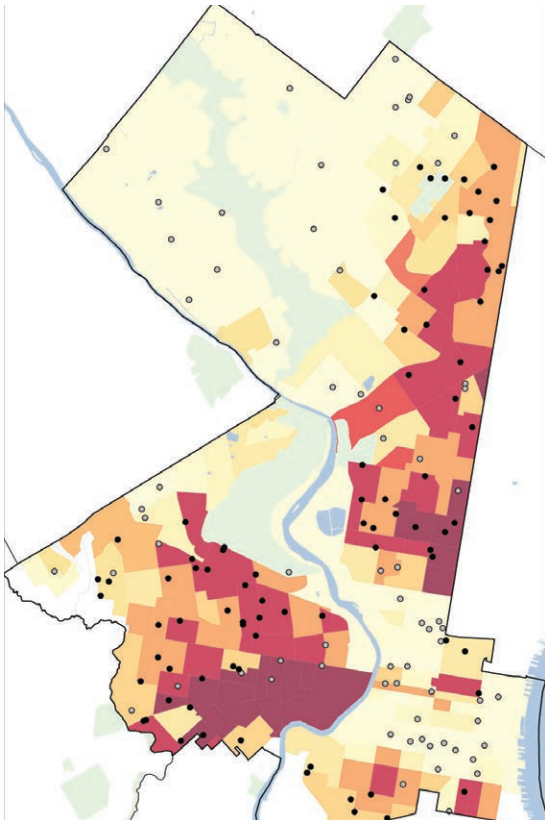

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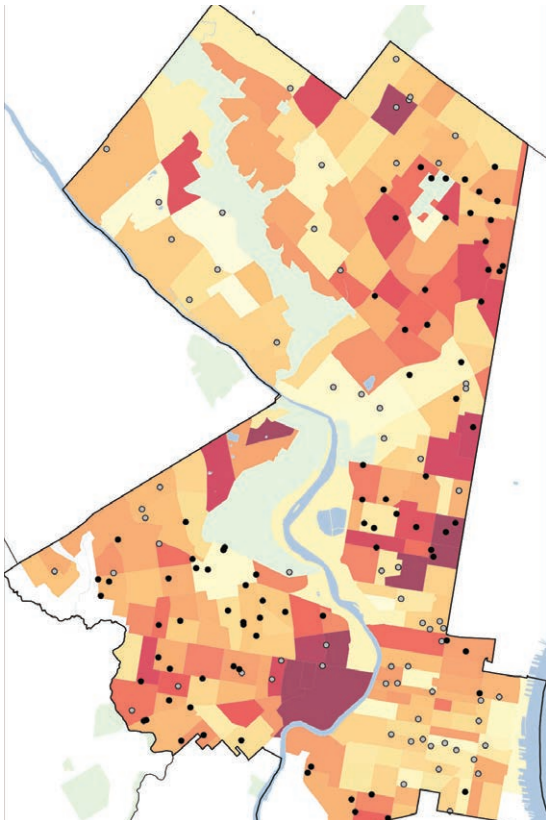

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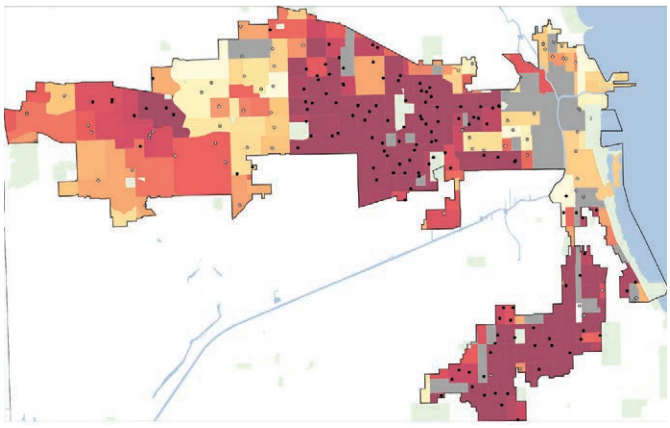
Social and environmental vulnerabilities of school communities in select districts

Illinois 7

LIFE EXPECTNACY



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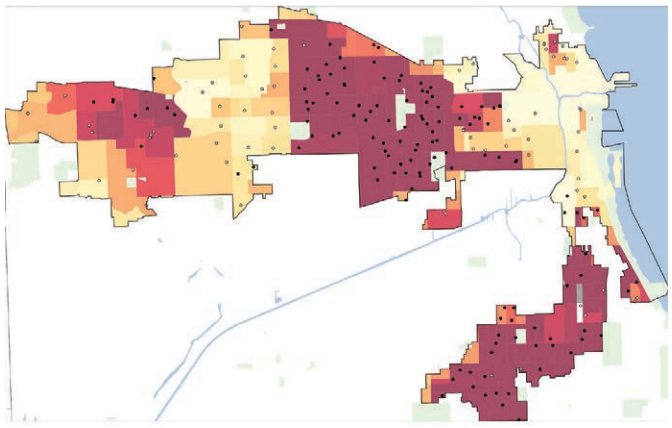

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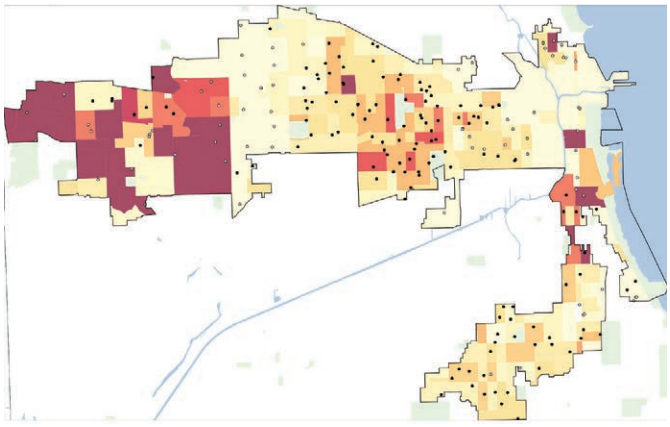

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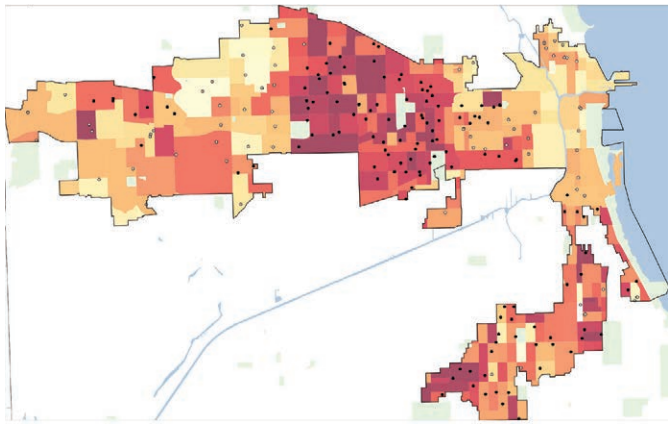

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Texas 18

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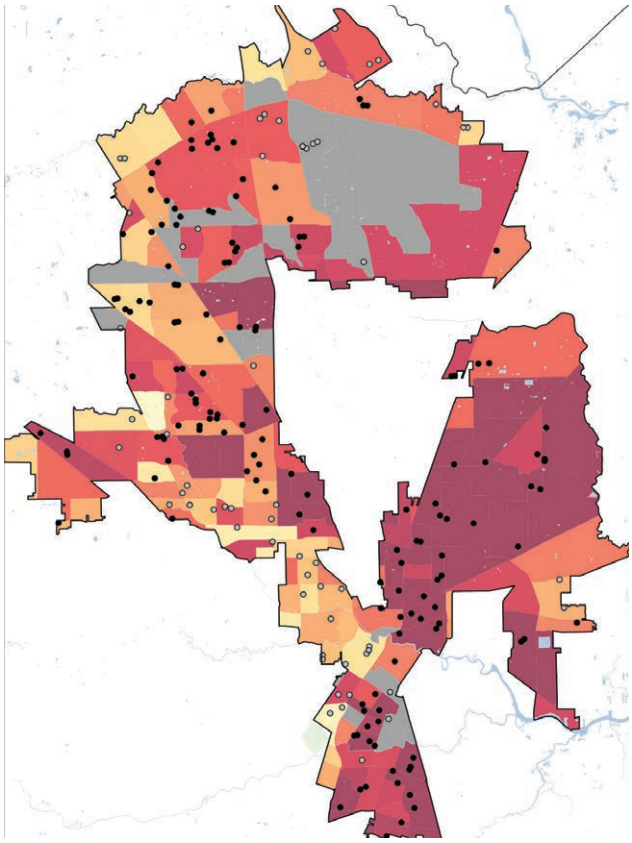

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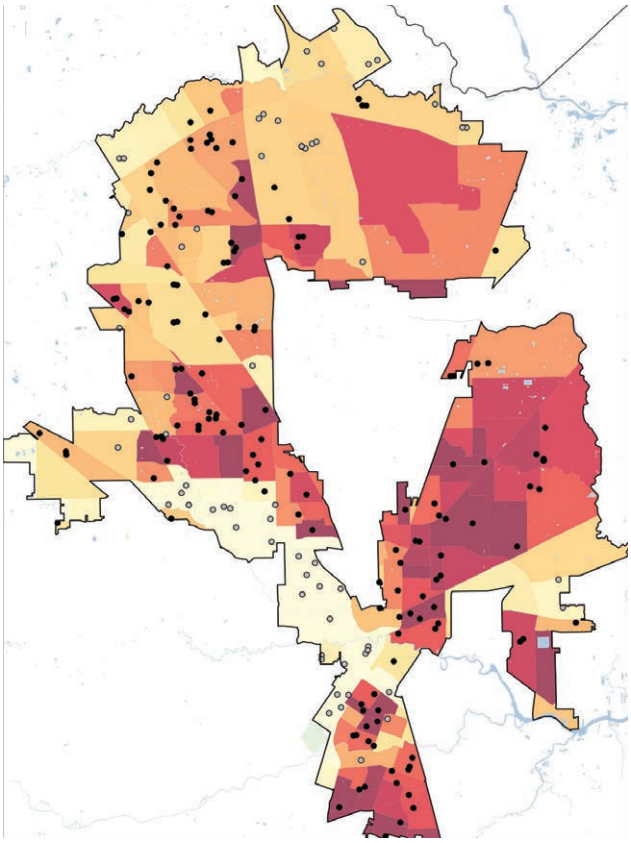

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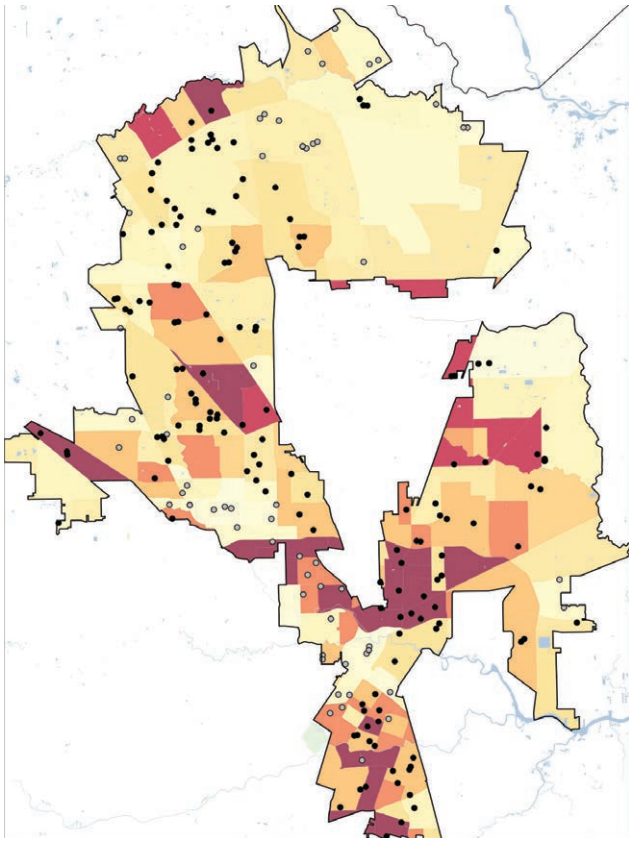

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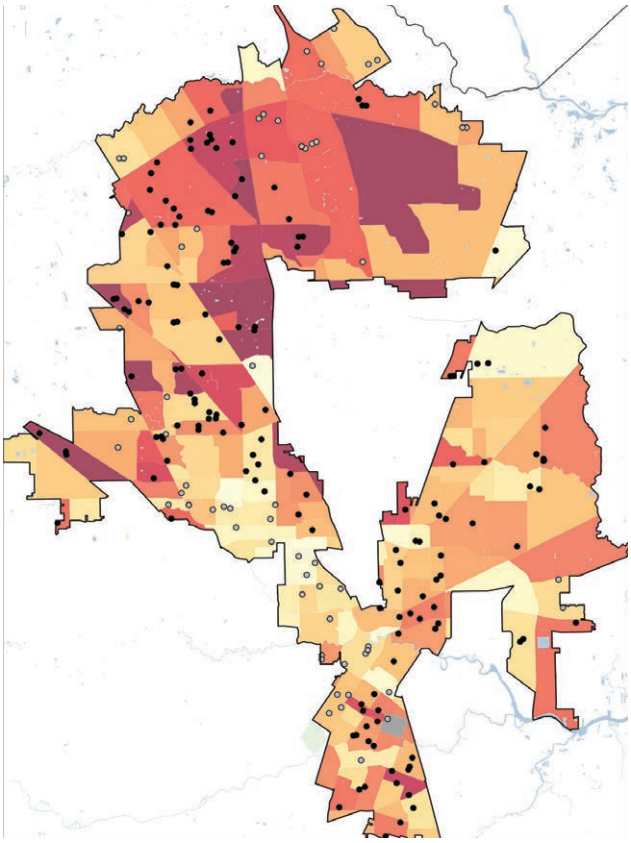

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Tennesse 5

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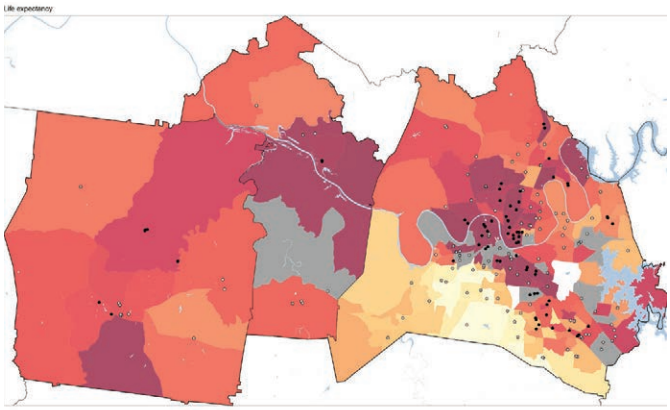

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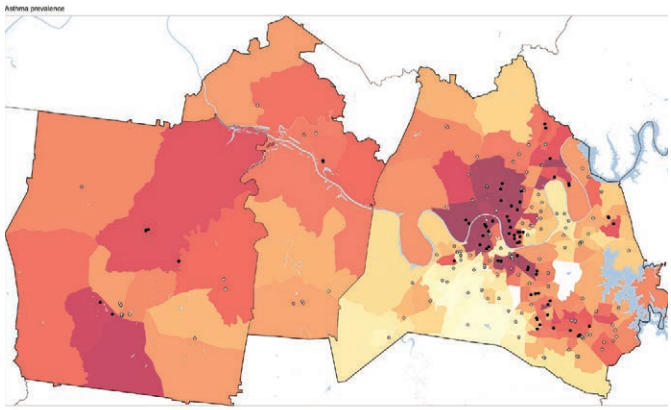

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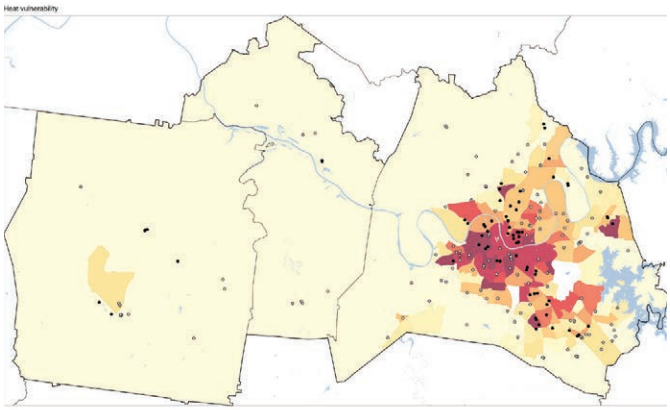

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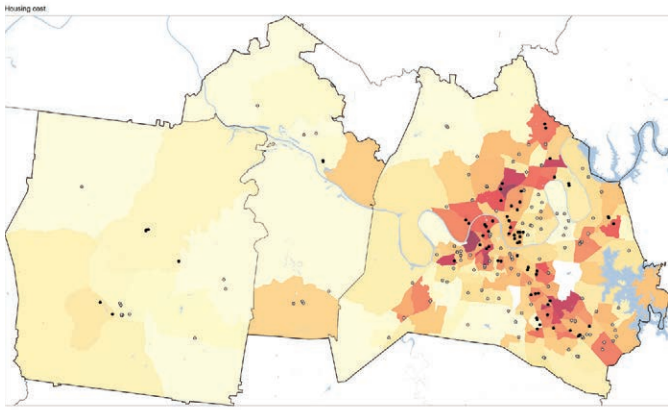

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