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## Environmental Sustainability
## December Update

### Ann Arbor Sustainability Commission – December 9, 2025

**Jason Bing**, Director
*Capital Programs*

**Moe Nagpal**, Construction Projects Manager
*Capital Programs*

# Agenda – Environmental Sustainability

- Overview – Why does AAPS invest in Environmental Sustainability?
- What are AAPS goals for Sustainability?
- What does Implementation look like?
  - What is AAPS integrating into our New and Major Projects?
- Where can one find this information?
- What else is coming – on the horizon?
- Summary

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# Why does AAPS invest in Environmental Sustainability?

# Why Environmental Sustainability?

- Investing in our Students and Staff **Now**

  Supporting Health and Wellness through healthy, high performance school buildings

- Investing in our Students' **Future**

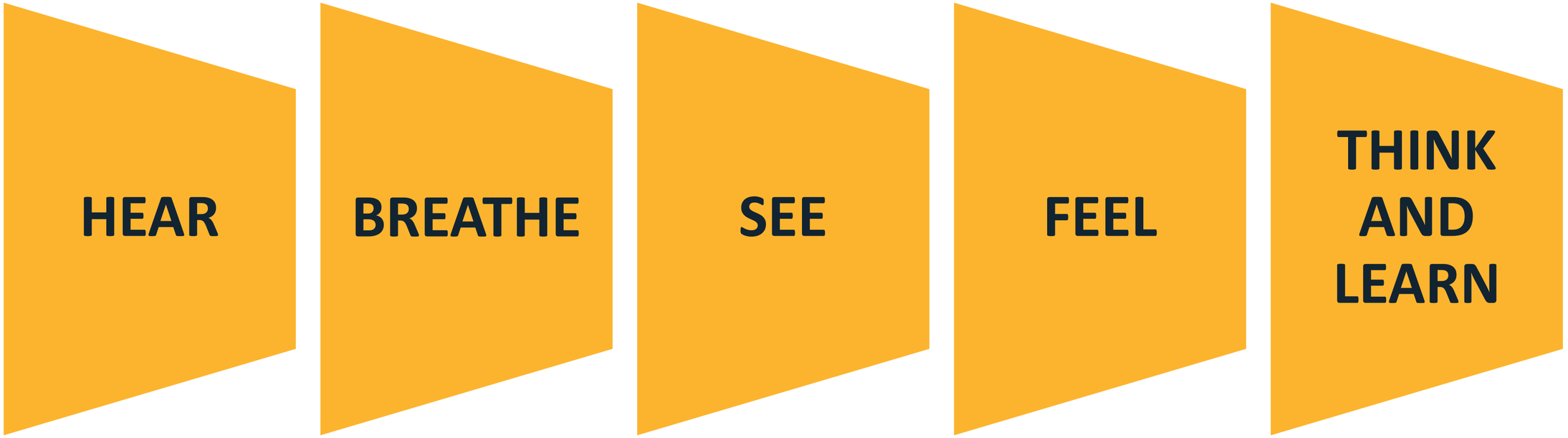
  Decarbonizing the AAPS to support reduced carbon, reduced operating costs, and Climate Action

# “Schools for Health: Foundations for Success”


*www.forhealth.org*

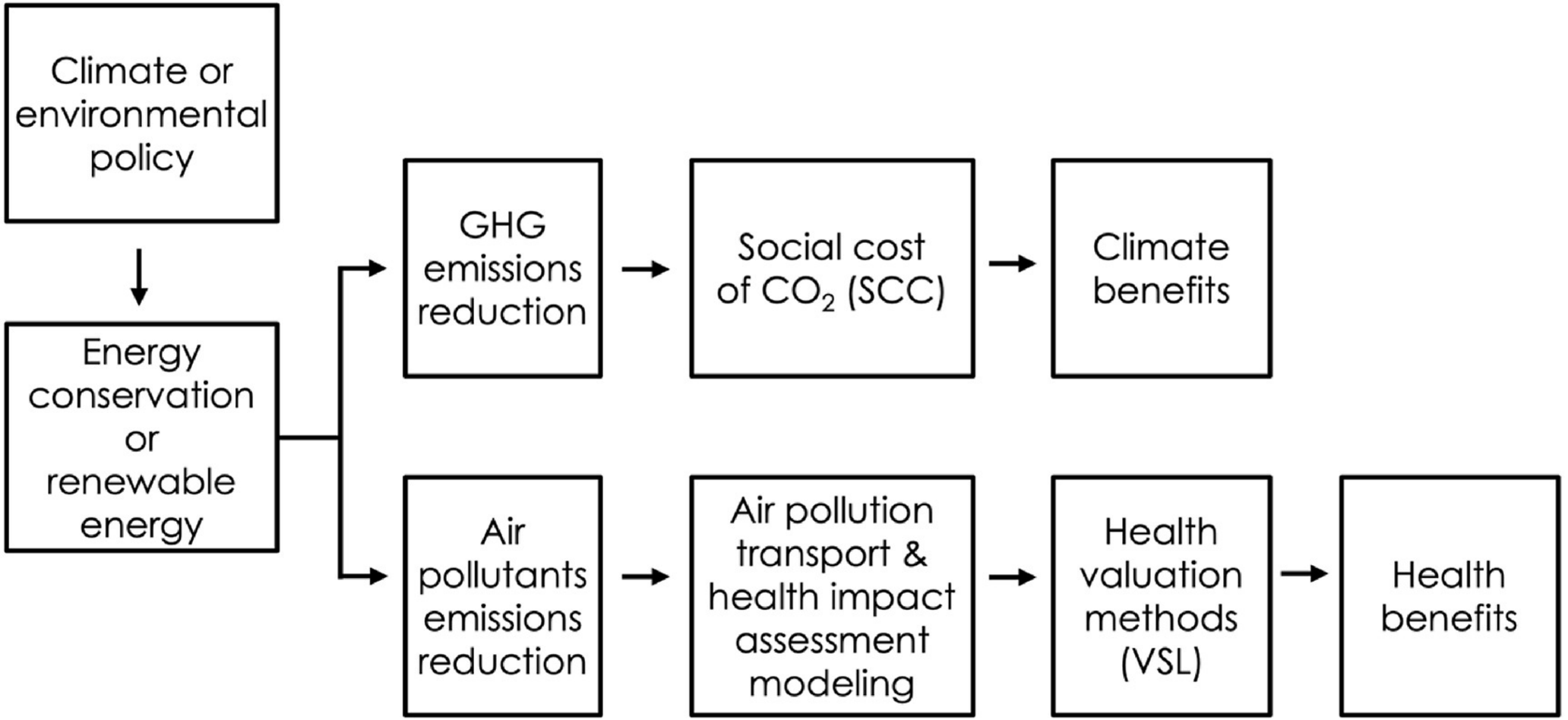
‘How School Buildings Influence Student Health, Thinking, and Performance’
Harvard T.H. Chan School of Public Health

# Research Overview – How Students:




Source: “The Impact of School Buildings on Student Health and Performance: A Call for Research”
http://www.usgbc.org/Docs/Archive/General/Docs18534.pdf

# Why Environmental Sustainability?




https://www.sciencedirect.com/science/article/pii/S0360132323006455?via%3Dihub

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# What are AAPS Goals for Sustainability?

# 2019 Bond and AAPS Capital Program Vision

Our Kids
Our Schools
Our Future
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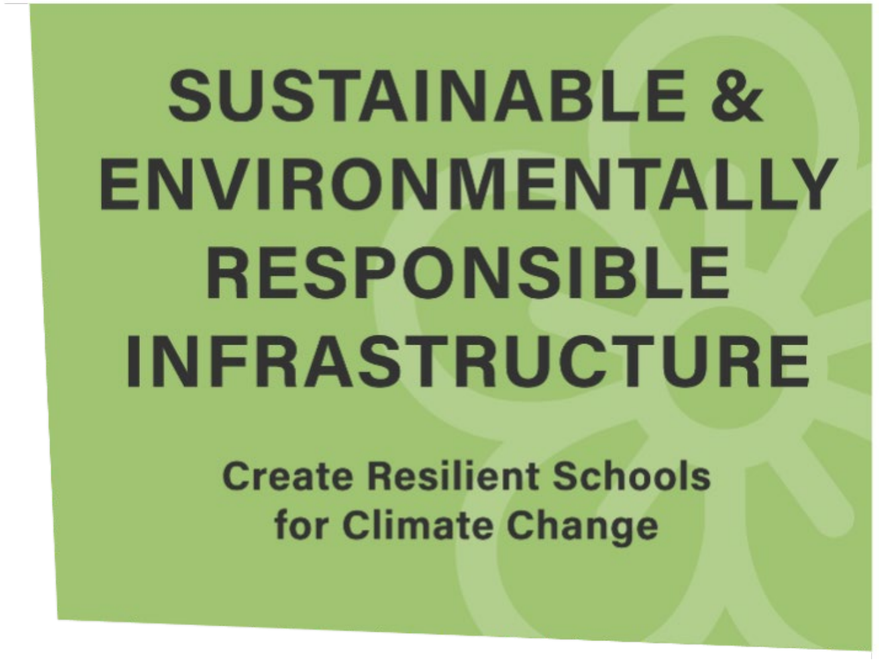
**To transform the student learning experience** with the goal of providing for the health, safety, and well-being **of all students** in high-quality, equitable, and environmentally sustainable schools

# 2019 BOND: Renewal & Re-envision




- Prepare schools to adapt to climate change
- Chart a course for carbon neutrality
- Utilize interior and exterior finishes that are long-lasting and require minimal maintenance and replacement
- Install dimmable LED lighting
- Install renewable solar & geothermal energy sources
- Increase recycling and composting

# Board Policy 8000: Environmental Sustainability

*Approved by the Board on December 12, 2018*

The Ann Arbor Public Schools recognizes that:

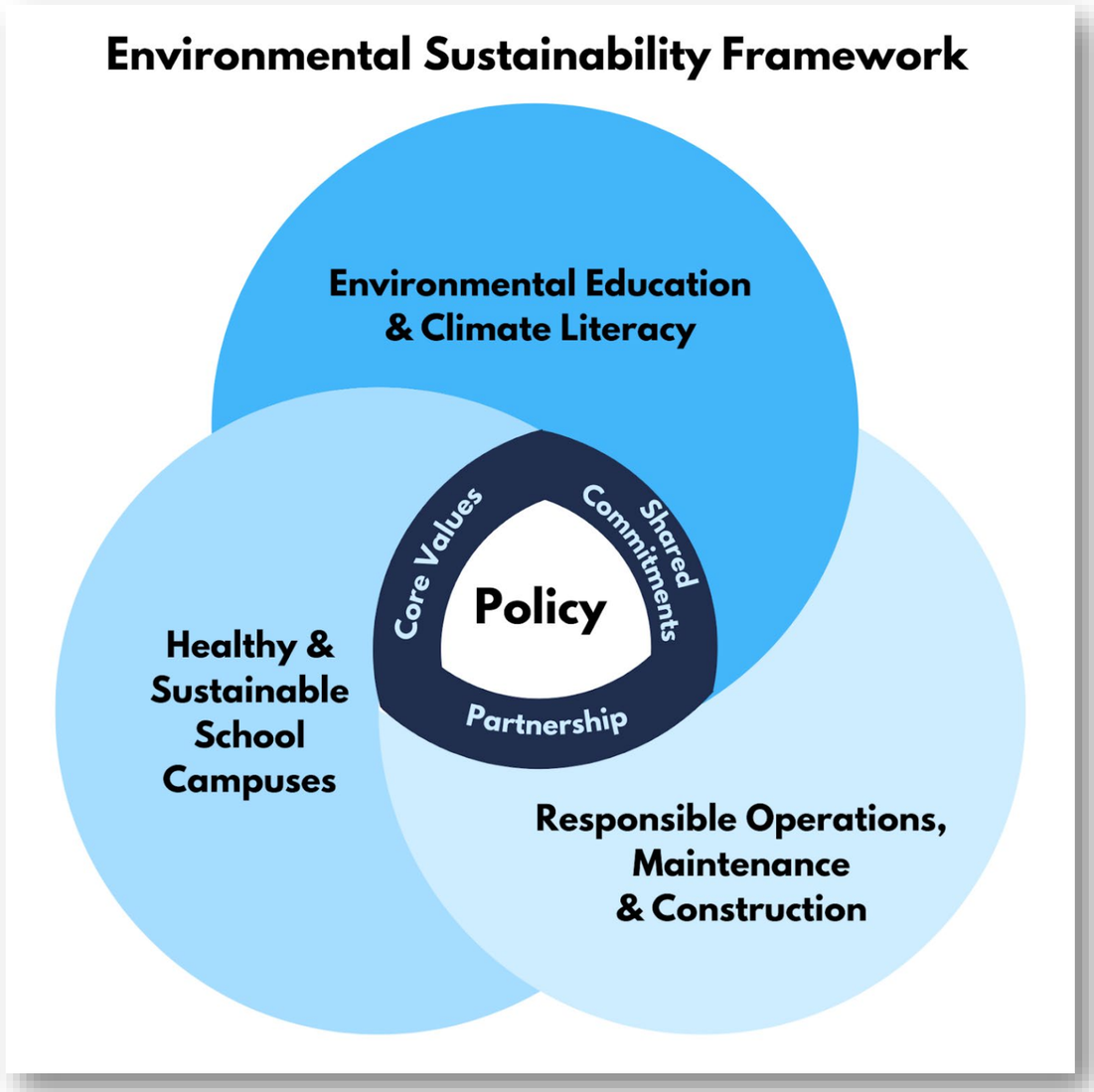
- **Climate change is real, increasing, and caused by human activity**; and
- the Ann Arbor community is committed to practices that support a healthy environment for present and future generations; and
- the District has a responsibility to help prepare current and future generations to respond to climate change through the reduction of harmful human activities, the promotion of human activities that restore the environment, and the development of strategies to adapt to climate change.

The District will support the prioritization of:

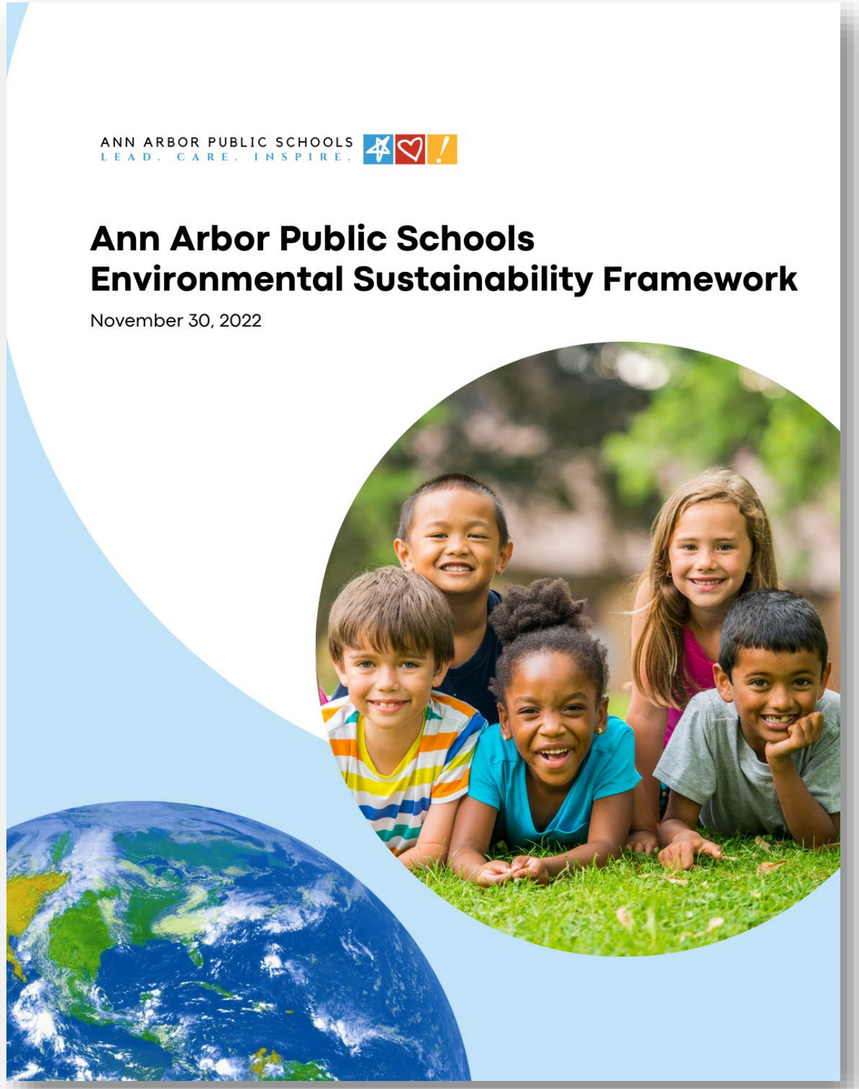
- **Environmental sustainability education** that prepares present and future generations to become thoughtful stewards of the environment; and
- developing **student leaders** prepared to succeed in an uncertain climate change future; and
- maintaining and operating **district buildings and grounds** that reduce the environmental impact of human activities, promote the restoration of the environment, and adapt to climate change; and
- building and enhancing **partnerships** that support the Ann Arbor community's environmental principles.

The Superintendent and/or designee(s) will report annually to the Board of Education on activities related to this policy.

# AAPS Environmental Sustainability Framework




**Approved by the Board in November 2022**



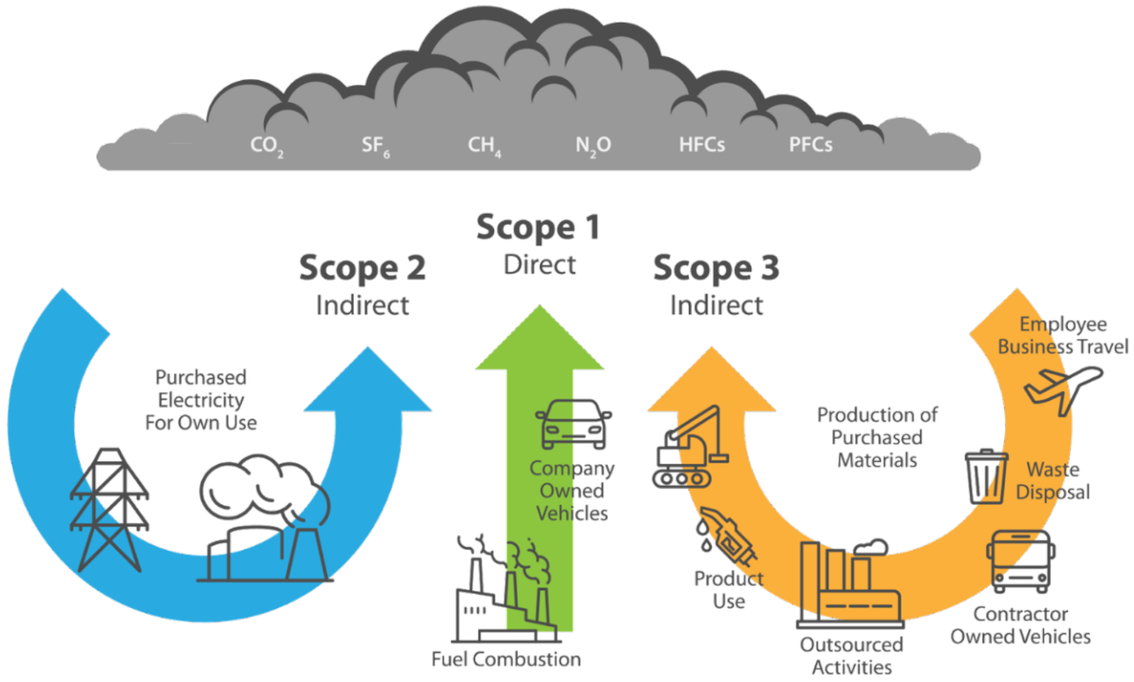
# AAPS Environmental Sustainability Framework

## *Greenhouse Gas Emissions (GHG) - Overview*

AAPS accounts for less than 1% of our community's greenhouse gas (GHG) emissions.  Though this is a small amount of the total emissions in Washtenaw County, the district is committed to doing what it can to be part of a carbon-neutral future.

AAPS Environmental Sustainability Framework includes important steps to reduce the district's GHG footprint.  These actions are organized based on the three scopes of emissions utilized by the Intergovernmental Panel on Climate Change (IPCC) of the United Nations, major corporations, countries, and municipalities worldwide, including in the United States.

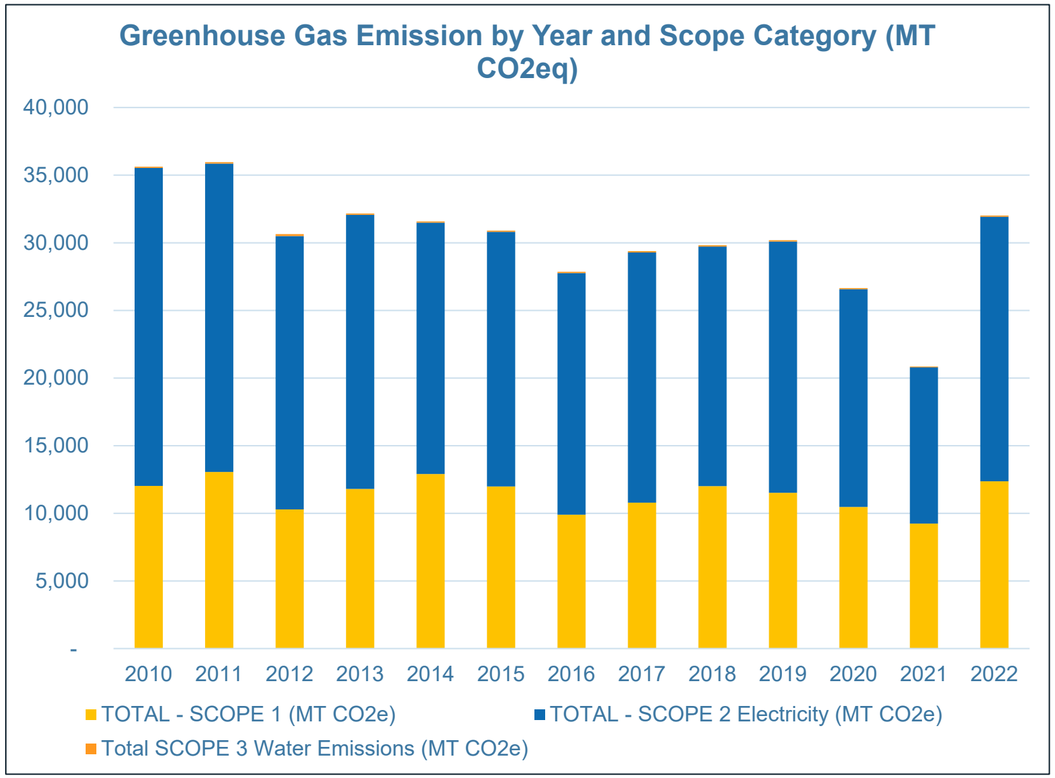
The IPCC defines Scope 1, 2 and 3 emissions as:
*'Scope 1' indicates direct greenhouse gas (GHG) emissions that are from sources owned or controlled by the reporting entity. 'Scope 2' indicates indirect GHG emissions associated with the production of electricity, heat, or steam purchased by the reporting entity. 'Scope 3' indicates all other indirect emissions, i.e., emissions associated with the extraction and production of purchased materials, fuels, and services, including transport in vehicles not owned or controlled by the reporting entity, outsourced activities, waste disposal, etc. (WBCSD and WRI, 2004).*

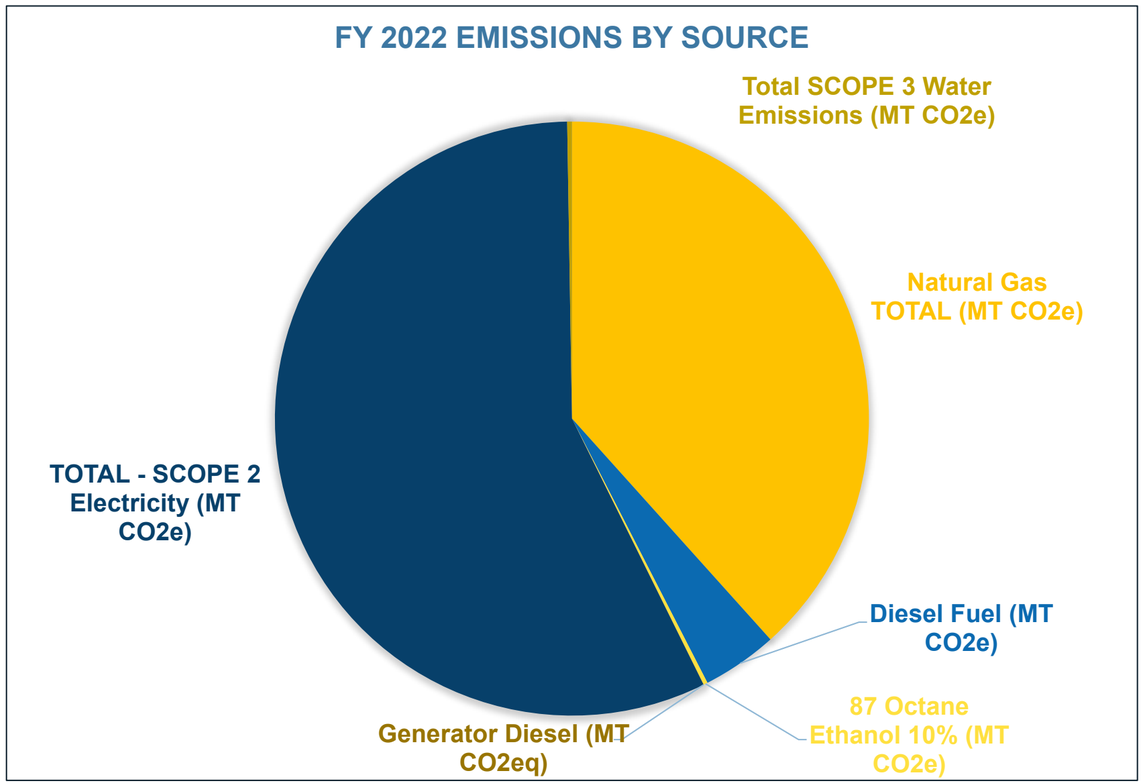


# AAPS Environmental Sustainability Framework

## *Greenhouse Gas Emissions (GHG) - Overview*

| SCOPE 1+2+3 | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Fiscal Year | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2022 vs. 2010 |
| | *Baseline* | | | | | | | | | | | | | |
| TOTAL - SCOPE 1+2+3 (MT CO2e) | 35,630 | 35,961 | 30,646 | 32,167 | 31,579 | 30,893 | 27,855 | 29,378 | 29,819 | 30,194 | 26,650 | 20,848 | 32,018 | 89.86% |
| Per Student (MT CO2e/student) | 2.17 | 2.17 | 1.84 | 1.93 | 1.92 | 1.84 | 1.63 | 1.68 | 1.69 | 1.70 | 1.50 | 1.20 | 1.88 | 86.53% |
| Per 1000 SF (MT CO2e/1000 SF) | 10.15 | 10.25 | 8.73 | 9.17 | 8.96 | 8.77 | 7.90 | 8.34 | 8.42 | 8.46 | 7.47 | 5.84 | 8.97 | 88.36% |



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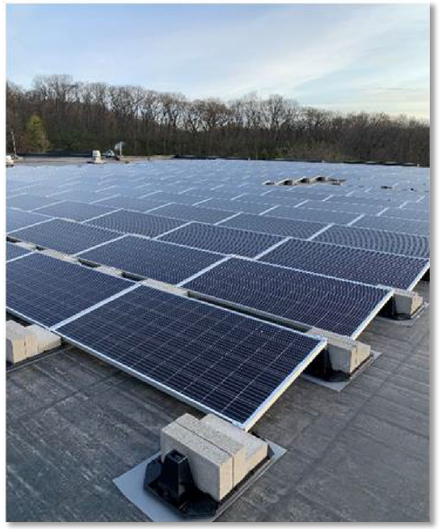
# How is AAPS integrating Environmental Sustainability – Now and in the Future?

# AAPS - Implementing Sustainable Practices

## Focus on Energy + Decarbonization

- **Solar**
  AAPS continues to be the largest K-12 public school district owner/operator of solar in the State of Michigan
- **Geothermal/GeoExchange + Energy Efficiency**
  AAPS operates one of the largest portfolios of geothermal operations in Washtenaw County
- **Transportation**
  AAPS continues to transition its fleet from diesel powered buses to EV Buses

Pattengill



Huron

Haisley

A2 STEAM

# AAPS - Solar + Clean Energy Investments

**Completed :**

- Pattengill Elementary (118 kW DC) - 2020
- Haisley Elementary (149 kW DC) - 2021
- A2 STEAM @ Northside (165 kW DC) - 2021
- Forsythe Middle School (194 kW DC) - 2021
- Huron High School (167 kW DC) - 2021
- Bryant Elementary (194 kW DC) - 2022
- Pioneer HS (183 kW) - 2022
- Westerman Preschool (194 kW) – 2022
- Tappan Middle School (199 kW) - 2023
- Scarlett Middle School (199 kW) – 2023
- Skyline High School (191 kW) - 2024
- Earhart Administration (135 kW) - 2024

**2025/26 Construction:**

- Transportation (164 kW DC) - 2025
- Freeman Environmental Education Center (105 kW DC) – 2025/26
- **Forsythe MS Expansion (491 kW DC) – 2025/26**
- **Scarlett MS Expansion (491 kW DC) – 2025/26**
- **Huron HS Expansion (500 kW DC) – 2025/26**
- **Pioneer HS Expansion (456 kW DC) – 2025/26**
- **Skyline HS Expansion (517 kW DC) – 2025/26**

***Pending BOE review/approval***

***5.8 MW DC rated rooftop solar***

***In 2026 will be equivalent to offsetting carbon of:***

- *10,350,000 miles driven by cars; or*
- *4,500,000 pounds of coal burned; or*
- *570 homes annual electricity usage*

**Equal to >20% of AAPS's annual electrical consumption***

**estimate based on FY 23 data*

***Annual General Fund Savings:***

***>$750,000/year***

# AAPS - Solar

## *Solar In Photos*

*Huron HS*

*Scarlett MS Rooftop Solar Array*

*Tappan MS Rooftop Solar Array*

*Pattengill ES*

*Huron HS*

*Haisley ES*

*Ann Arbor STEAM*

# AAPS - Geothermal

## *Geothermal In Photos*

*Clague Middle School*

*Forsythe Middle School*

# AAPS – Transition to EV

## EV Bus In Photos

*AAPS Transportation – South Lot*

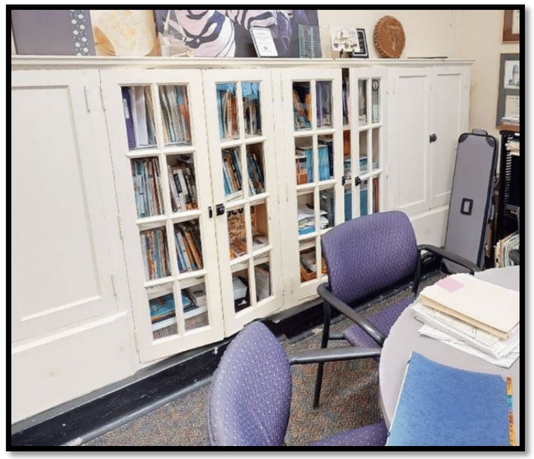

*AAPS Transportation - Main*

# AAPS – Integration of Healthier Materials

## *2025 Projects*

*Scarlett MS – Natural/Non Toxic Flooring*

*Huron HS – Organic Infill Athletic Fields*



*Community HS – Material Restoration (Before and After)*

# AAPS Sustainability Targets + Metrics Tracking

***New and Major Projects***

## US – CHPS Certification

- Meet Collaborative for High Performance Schools - Verified Leader certification

## EUI of 25 or lower

- NBI Decarbonization Roadmap and ZeroTool

## 10% or better embodied carbon reduction

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# Tracking Progress through the Collaborative for High Performance Schools (US-CHPS)

# Sustainability Rating Systems

## *Overview - Collaborative for High Performance Schools (CHPS)*

CHPS is a leading national green building verification system to improve student performance and the entire educational experience by building the best possible learning environments. To achieve this goal, CHPS maintains the nation's most authoritative criteria for healthy, environmentally sustainable, cost-effective school buildings.

The CHPS Criteria for New Projects is designed to help school districts in every community across the country to:

- **reduce operating costs;**
- **achieve higher student performance;**
- **increase daily attendance;**
- **retain quality teachers and staff;**
- **be energy, water and resource efficient;**
- **and minimize environmental impact.**

# Sustainability Rating Systems – Major Projects

## *Categories - Collaborative for High Performance Schools (CHPS)*

*Strong focus on student and staff health and wellbeing and energy efficiency and conservation*

**Point Assignments in the Core Criteria**

| Category | % (Points) |
|---|---|
| Integration (II) | 11% (22) |
| Indoor Environmental Quality (EQ) | 33% (66) |
| Energy (EE) | 24.5% (49) |
| Water (WE) | 9% (18) |
| Site (SS) | 8.5% (17) |
| Materials & Waste (MW) | 6.5% (13) |
| Operations (OM) | 7.5% (15) |
| TOTALS | 100% (200) |

**CHPS provides many benefits for AAPS, including:**

- *Third Party verification of environmental performance*
- *Creates systems of accountability for design and construction teams*
- *Transparent methods to track and report environmental sustainability performance*

# Typical Major Project Protocols

**For each of the AAPS' major projects, the following tasks are completed in the early planning phases:**

- Environmental Site Assessment Reports
- Threatened and Endangered Species Reviews
- Background Noise Studies
- Traffic Studies
- Topographical Surveys with associated Title Work and, where appropriate, Wetland Delineations
- Thermal Conductivity Testing
- Soil Bearing and Infiltration Testing
- Sustainability Reports/Reviews
  - ➢ Climate Vulnerability Assessment
  - ➢ Energy Modeling
  - ➢ Whole Building Life Cycle Assessment
    - ❖ Environmental Product Declarations (EPD)

# US-CHPS – Verified Leader Tracking

## Estimated Tracking/Metrics

| | Mitchell Elementary | Dicken Elementary | Logan Elementary | Thurston Elementary |
|---|---|---|---|---|
| **250 Total Pts - 64% needed (160)** | 66-68% total pts | >64% total pts | 66-70% total pts | 66-70% total pts |
| **Indoor Env Quality Pts** | 74-84% IEQ pts | >68% IEQ pts | 68-78% IEQ pts | 68-77% IEQ pts |

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# Tracking Progress on Decarbonization Targets

# Net Zero Energy (NZE) and Zero Energy Ready (ZER)

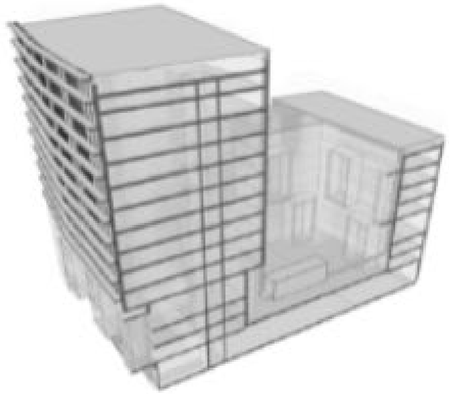
**1 Design an energy efficient building**

Efficiency Standard: ASHRAE 90.1-2016 minimum; ASHRAE 189.1-2017; others

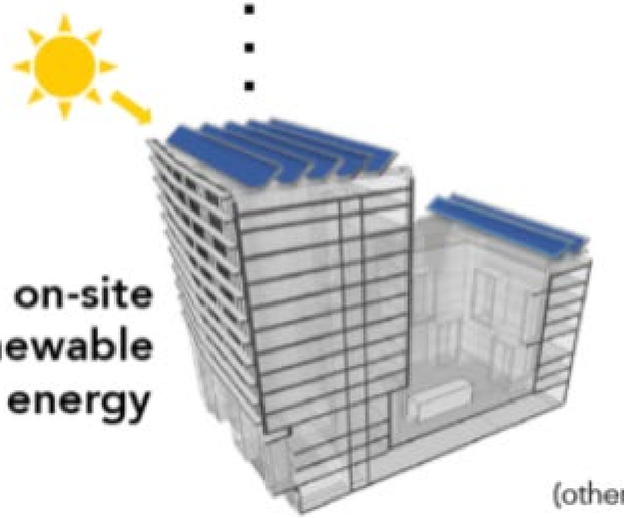
Efficient building envelope / daylighting

Passive heating / cooling / ventilation

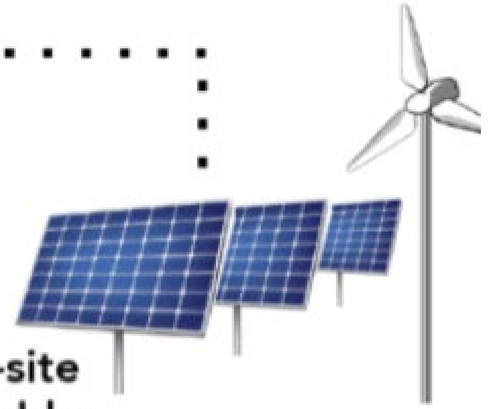
Efficient systems / equipment / controls



**2 Address the remaining building's energy needs with:**



**on-site renewable energy**



**and/or off-site renewable energy**

wind • solar • hydro
(other non-$CO_2$ emitting sources)

Source: Architecture 2030
Graphic adaptations: Sefaira; DOE

# Energy Modeling

## Energy Efficiency and Emissions

Path to Zero Carbon

**Passive design:** access to daylight, calibrated external shading system, natural ventilation, high performance envelope.

**Active design:** efficient air distribution system, displacement ventilation, decouple heating/cooling from ventilation; active controls to shut down during unoccupied periods; all electric heating and cooling with energy recovery.

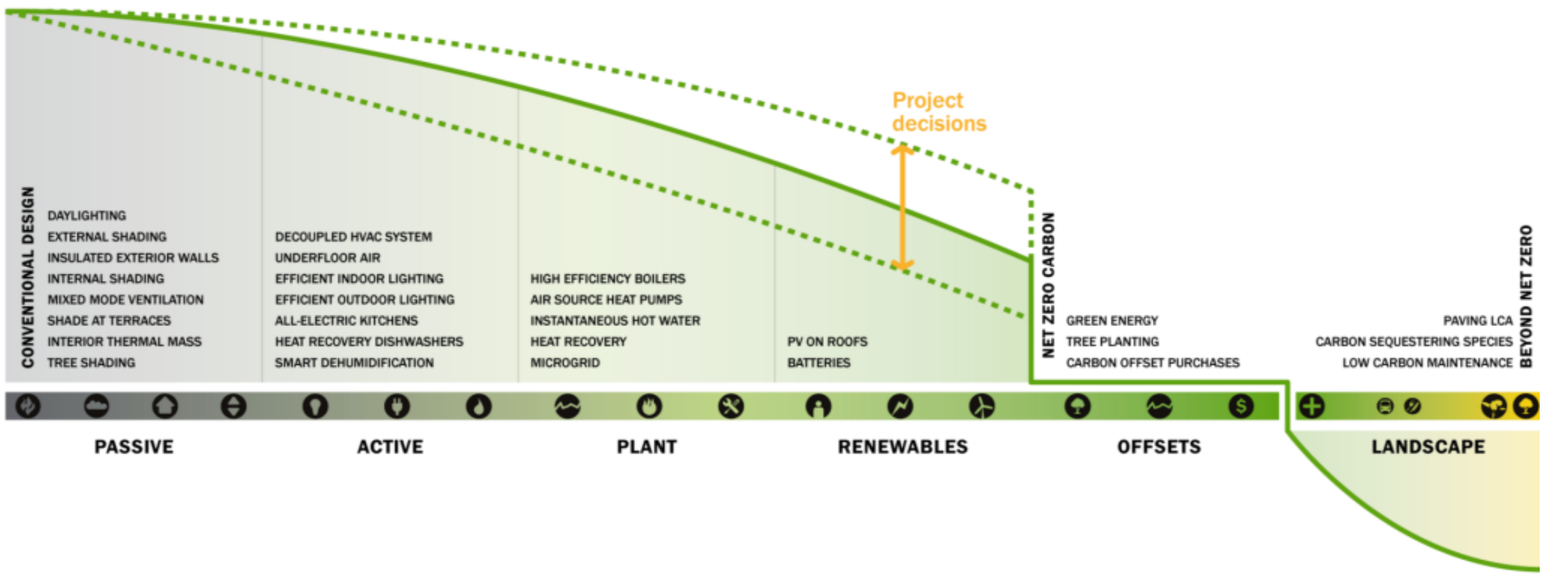
**All-electric development:** electrification of heating, domestic hot water, and any natural gas use in kitchens.

**On-site and off-site renewables**

**Advanced microgrid controls:** tied to on-site photovoltaic array and battery storage to maximize GHG reduction from renewable sources

**Building Quality Assurance**

atelier ten




***What major, early design decisions, will impact the projects' abilities to reduce their holistic carbon footprint and contribute to an all-electric future?***

# Net Zero Ready in Planning/Practice

## Estimated Modeling

| | Mitchell Elementary | Dicken Elementary | Logan Elementary | Thurston Elementary |
|---|---|---|---|---|
| **Total Square Feet (SF)** | 24% larger | 32% larger | 36% larger | 32% larger |
| **Total Energy Use (kBtu/sf/yr)** | 35% less energy | 42% less energy | 29% less energy | 24% less energy |

# Whole Building Life Cycle Assessment (WBLCA)

## Embodied Carbon

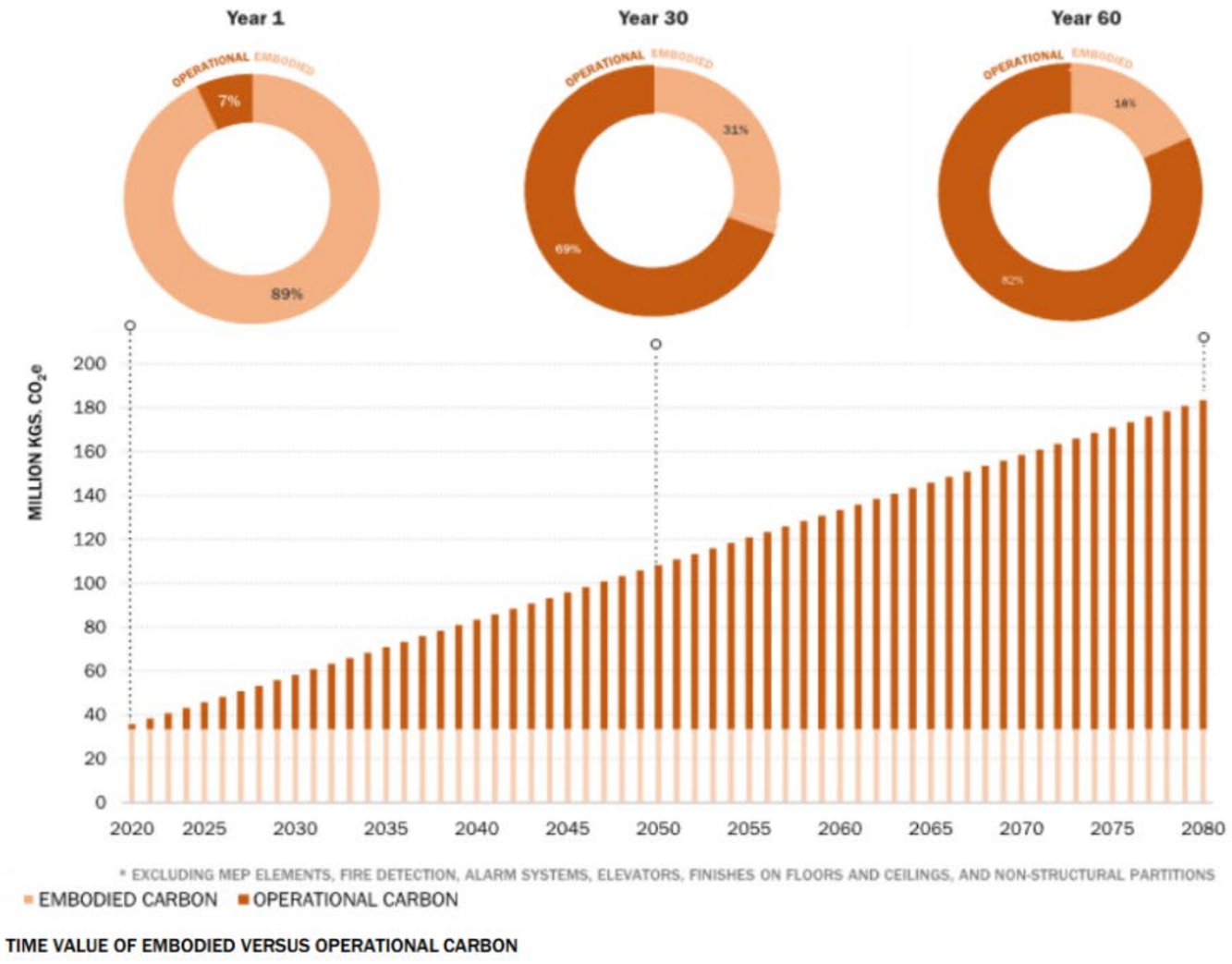
Materials Matter - Time Value of Carbon

Embodied carbon should be a part of the conversation around defining climate positive design

Carbon reductions now have more value than carbon reductions in the future as we strive to stay under 1.5 °C

By the year 2050, embodied carbon emissions and operational emissions will be roughly equivalent (steel construction scenario).

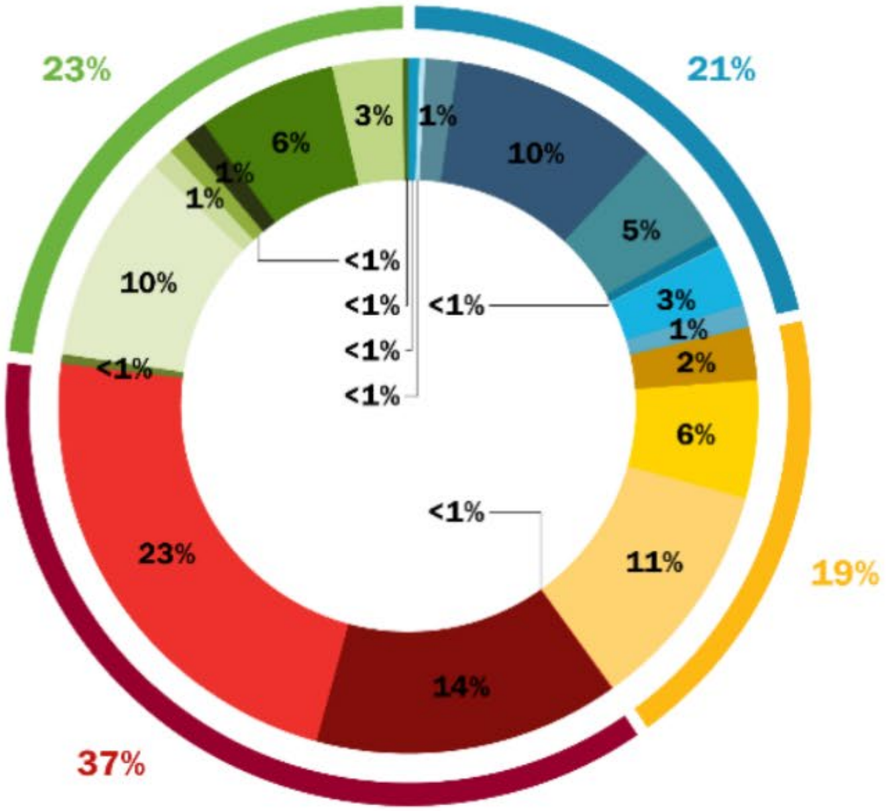
LEED version 4 has a Materials & Resources credit that gives credit for quantifying and reducing embodied carbon.




TIME VALUE OF EMBODIED VERSUS OPERATIONAL CARBON

# Embodied Carbon

## Embodied Carbon Drivers




**ENCLOSURE**
- Glass
- Gypsum, Plaster, and Cement
- Insulation
- Steel and Metals
- Insulated Metal Panel
- Doors, Windows, and Parts
- Wood
- Plastics, Membranes, and Roofing
- Concrete

**SUBSTRUCTURE**
- Concrete Rebar
- Geotechnical Pile Concrete
- Concrete

**SUPERSTRUCTURE**
- Insulation
- Structural Steel
- Concrete

**INTERIOR**
- Flooring and Wall Base
- Carpet Tile
- Glass
- Gypsum
- Insulation and Acoustic Finishes
- Paints and Coatings
- Steel and Metals
- Doors, Windows, and Paneling

**20-30%** Enclosure

**45-60%** Structure

**20-30%** Interiors

***Structural materials drive the majority of a building's embodied carbon footprint. Early design decisions to significantly reduce associated emissions make a large impact.***

***Enclosure material selection should be closely reviewed alongside building energy use impacts.***

***Select interior finishes can have high embodied carbon emissions.***

# Embodied Carbon Reductions

## Estimated (Whole Building Life Cycle Analysis)

| | Mitchell Elementary | Dicken Elementary | Logan Elementary | Thurston Elementary |
|---|---|---|---|---|
| **Embodied Carbon Total** | >10% over baseline | >10% over baseline | 13.1% over baseline | 14.2% over baseline |
| **Embodied Carbon includes sequestration Total** | 33% over base with biogenic carbon | >20% over base with biogenic carbon | 29% over base with biogenic carbon | 27% over base with biogenic carbon |

# New Mitchell – Main Entry View

# New Dicken Elementary School

Architect: DLR Group + Wightman

Construction Manager: Brix Co

Manufacturer (Mass Timber): Element 5



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# New Thurston Elementary School

Architect: Stantec + Fielding International

Construction Manager: Christman Co

Manufacturer (Mass Timber): Nordic Structures



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# New Mitchell – Learning Commons View

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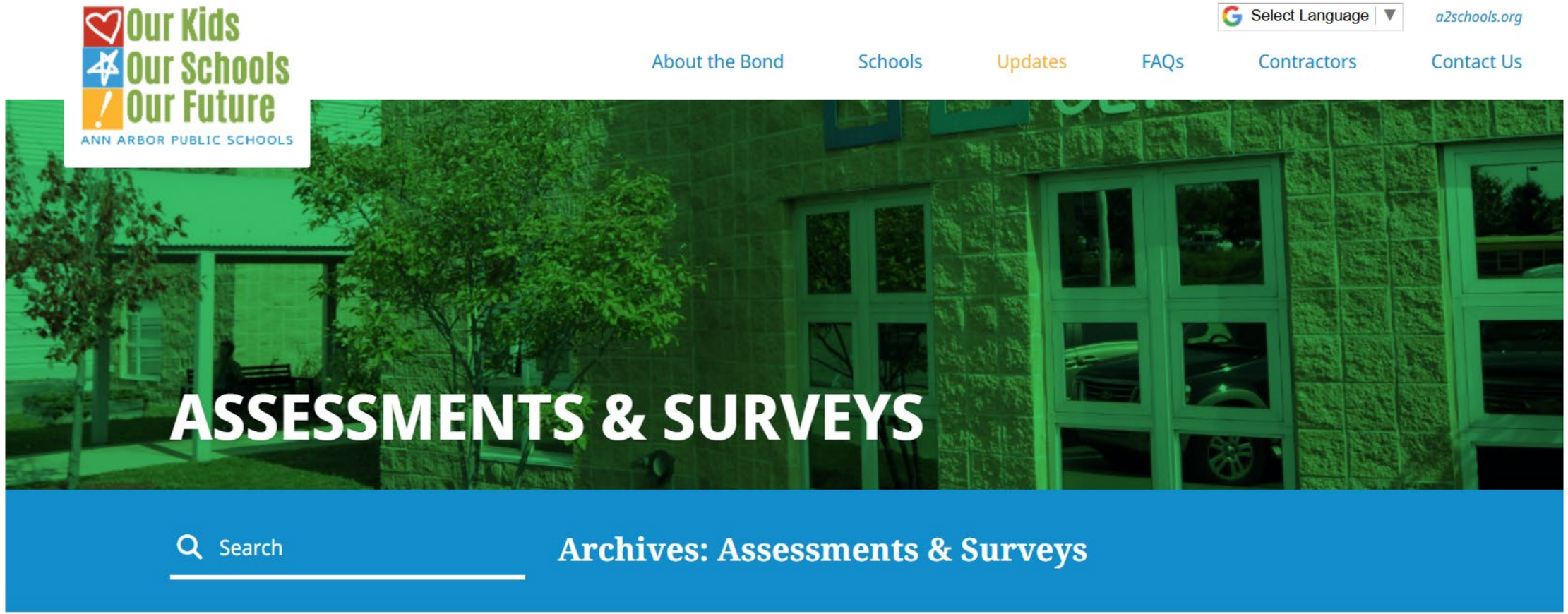
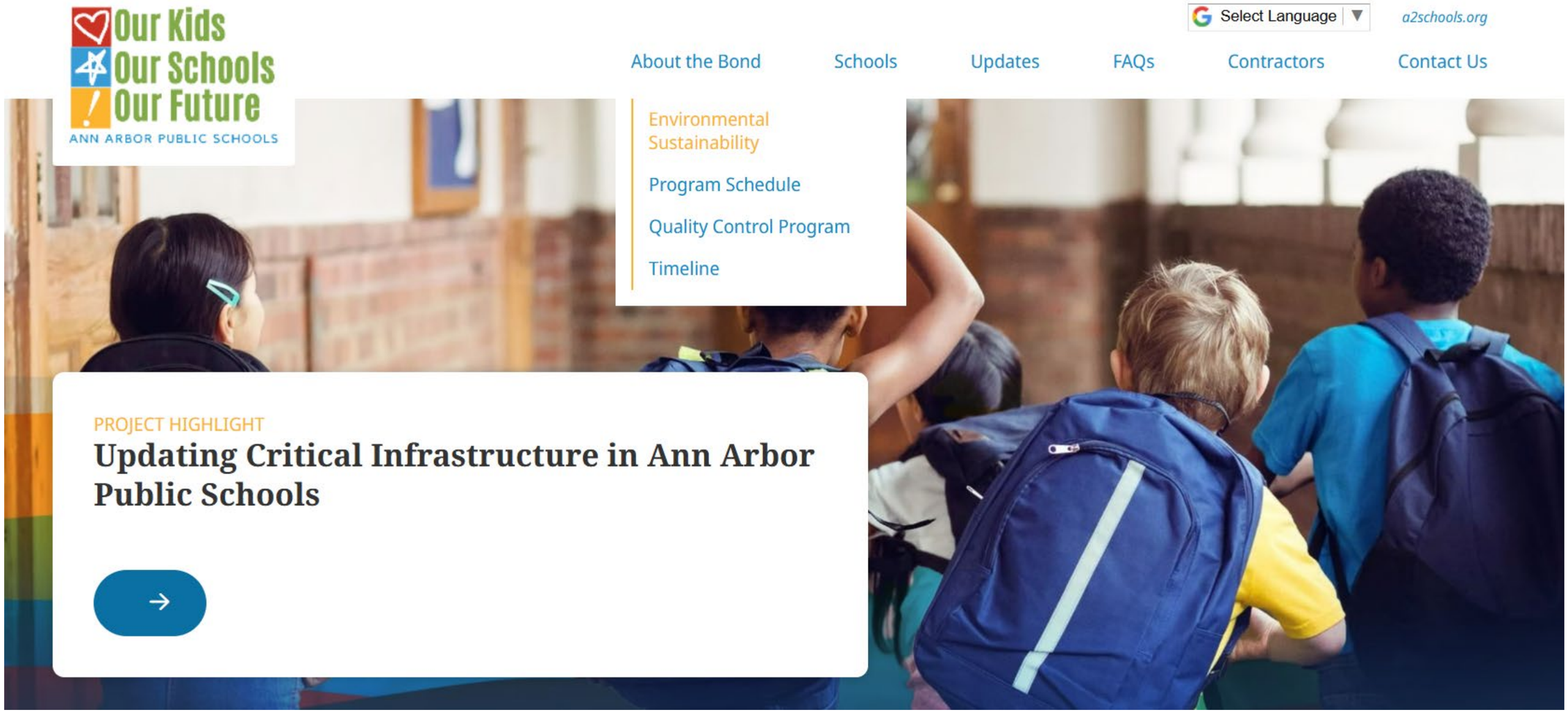
# Where can we find more info and resources?

# Assessments and FAQ – www.a2schoolsbond.org



# Environmental Sustainability – www.a2schoolsbond.org



# Environmental Sustainability – www.a2schoolsbond.org

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Select Language | a2schools.org

About the Bond | Schools | Updates | FAQs | Contractors | Contact Us

## SUSTAINABILITY & ENVIRONMENTAL CONSERVATION

Through the Capital Bonds program, Ann Arbor Public Schools is leading innovative projects that support the district's sustainability goals while promoting environmental awareness among students.

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NEWS & PRESS


### Journey Toward Sustainability: AAPS' Electric School Bus Initiative

*May 13th, 2025* | *Posted in:* *Environment & Sustainability* *Success Stories* *Transportation*

**AAPS was one of the first school districts in Michigan to use electric school buses. After a slow but successful pilot program, the district targets using 100% electric school buses by 2035*.**

Related news
*May 13th, 2025*
Journey Toward Sustainability: AAPS' Electric School Bus Initiative

NEWS & PRESS

### Transforming Lost Trees: AAPS' Urban Wood Recovery Initiative

*March 7th, 2025* | *Posted in:* *Environment & Sustainability*

**AAPS is recovering wood from trees that have to be removed for construction of new schools and transforming it into part of the new buildings.**

Related news
*May 13th, 2025*
Journey Toward Sustainability: AAPS' Electric School Bus Initiative

# Resources

- **AAPS Environmental Sustainability**
  - https://www.a2schools.org/departments/environmental-sustainability
  - https://www.urbanashes.com
- **AAPS Capital Program**
  - www.a2schoolsbond.org
- **AAPS Environmental Education**
  - https://sites.google.com/a/aaps.k12.mi.us/enved/freeman-environmental-center
- **Healthy Schools**
  - https://healthybuildings.hsph.harvard.edu/research/schools/
  - Indoor Air Quality (IAQ) Tools for Schools https://www.epa.gov/iaq-schools/iaq-tools-schools-resources
- **Whole Building Lifecycle Assessment (WBLCA)**
  - Carbon Leadership Forum: https://carbonleadershipforum.org/
- **Product Guidance**
  - Collaborative for High Performance Schools (CHPS) resources: https://chps.net/products

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# On the Horizon?

# Innovation – *Pushing the Envelope*


QUINN EVANS

NEWS

## Lawton Elementary School Design Wins Mass Timber Competition

*By Kristina von Tish, CPSM, LEED Green Associate*

NOVEMBER 4, 2025

The new Lawton Elementary School in Ann Arbor, Michigan, is among four projects selected as winners in the Softwood Lumber Board and USDA Forest Service's 2025 Mass Timber Competition: Building Sustainable Schools. Quinn Evans is the architect for the project, which is still in design.


**PROJECT SCOPE**

- Design and construction of a **new healthy, net zero energy** neighborhood elementary school to replace a 62 year old facility;
- Significant improvements to **indoor air quality, student/occupant comfort, safety and security, student transportation, technology and systems, and green infrastructure** measures;
- Increased **square footage and programmatic amenities** to provide for high quality, 21st-century flexible learning environments for students and teachers, including new outdoor classrooms;
- Utilization and **integration of Mass Timber** structural systems;
- Project planned to achieve Verified Leader **green building certification** through the US Collaborative for High Performance Schools (US-CHPS) rating system;
- Proposed improvements to support **shared community benefits** along the boundary with Lawton Park; and
- Proposed project **allows the existing school to operate on site** as a new school is constructed, keeping the school community together and eliminating the need to relocate students elsewhere.

**PROJECT BENEFITS**

- Designed to **support the health and wellness of students, staff** and visitors
- **Reduced energy use, operating costs, and carbon** impacts
- **Safer and more secure school building for students, staff** and school community
- Proposed project **supports commitments through the 2019 Bond and Environmental Sustainability Framework** carbon neutrality goals, and the building as a teaching tool;
- Green infrastructure supports stormwater conditions onsite and development of habitats;
- Supports long-term enhancements of Lawton Park and **collaboration with the city for mutual benefits**, such as pathways, play areas, and climate resiliency efforts; and
- As proposed the New Lawton Elementary school is anticipated to be **one of the most environmentally sustainable K-12 school buildings in Michigan** and an exemplar for this climate region.

**PROPOSED SCHEDULE:**
**Spring 2026** - *Break Ground*
**Fall 2028** - *New School Opens*
**Spring 2029** - *Park and Campus Restoration Complete*

**FOR MORE INFORMATION:**
www.a2schoolsbond.org

**DID YOU KNOW?**
-Students spend 80-90% of their typical school day indoors;
-Other than the home, a student will spend more time inside a school building than any other location up until they graduate;
-Research indicates that **healthy buildings can promote student health**; and
-Research indicates healthier students lead to better cognitive function and opportunities in the classroom

**FOR MORE INFORMATION:**
https://healthybuildings.hsph.harvard.edu/research/schools/


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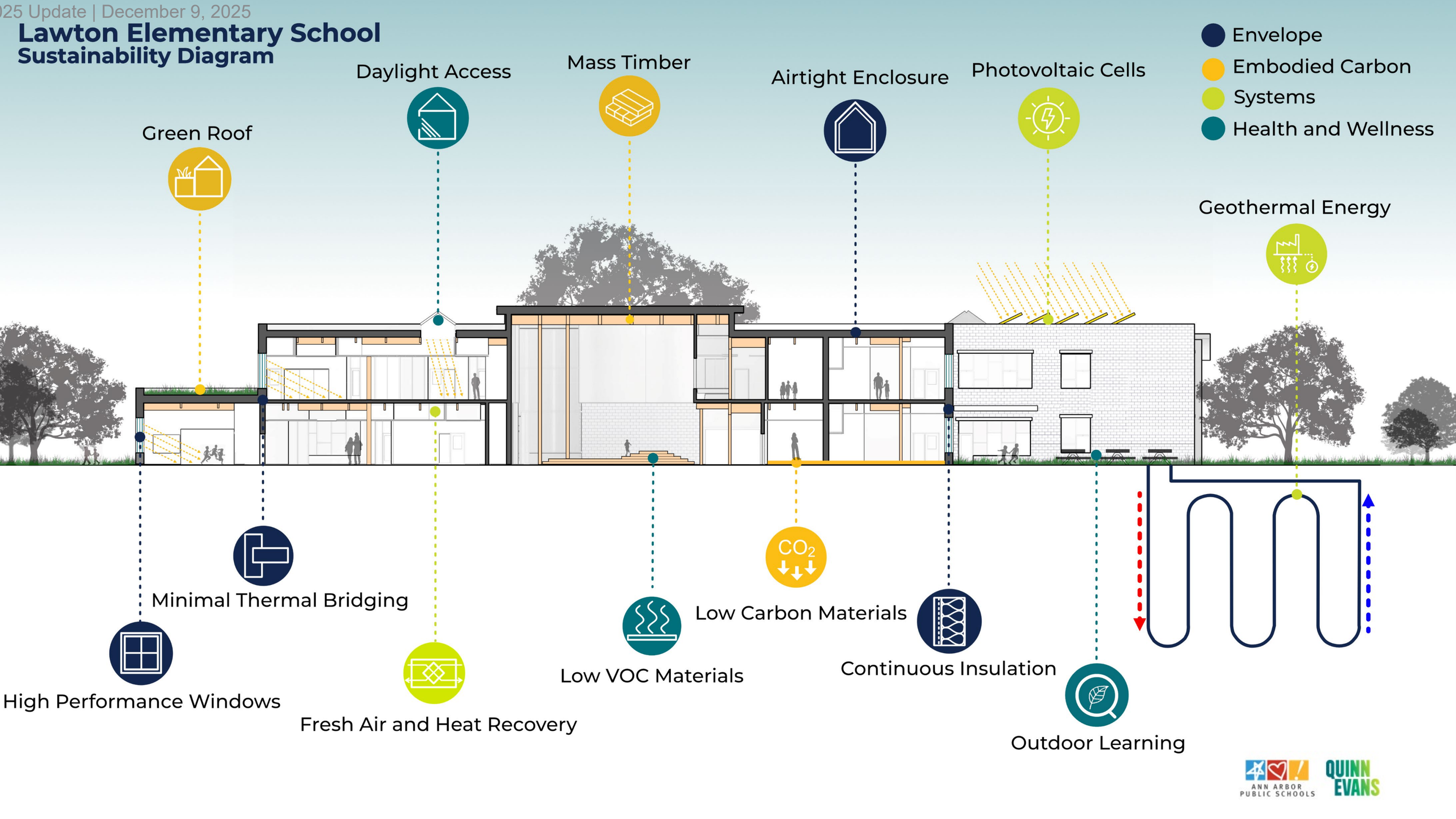
025 Update | December 9, 2025

# Lawton Elementary School
## Sustainability Diagram

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QUINN EVANS

# AAPS Capital Program – New Lawton ES

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**Find the informational video here: https://www.youtube.com/watch?v=amaYJuJsAW0**

# Innovation – Urban Forestry

THE CUT MODEL


URBAN WOOD
& CARBON

URBAN ASHES®

URBAN WOOD RECYCLING SYSTEMS & MARKET DEVELOPMENT

*Creating Social Equity, Economic Diversity and Environmental Sustainability*

## ~12.7 MILLION

Metric Tonnes of Dried Urban Lumber is Available to be Produced Every Year in America.*

Instead, the vast majority of our fallen urban trees are chipped, burned or landfilled.

** Urban Forestry & Urban Greening 46 (2019), Annual biomass loss and potential value of urban tree waste in the United States, David J. Nowak, Eric J. Greenfield, Ryan M. Ash*

## ~6.35 MILLION

Metric Tonnes of Carbon is Available to Continue to be Sequestered within Durable Urban Wood Products, Every Year in America.*

Instead, the vast majority of our fallen urban trees are chipped, burned or landfilled.

** Based upon an average 3.5lbs per dried board foot*
** Dried wood on average is 50% Carbon by weight*

# Innovation – Environmental Education

2024

## Business Plan:

## Freeman Environmental Education Center Educational Plant Nursery

## Conclusion

The business model aims to create a sustainable and impactful native plant nursery that empowers students, supports environmental education, and enriches the local ecosystem. By fostering hands-on learning and community engagement, the model positions the nursery as a valuable resource for ecological restoration and climate resilience within Ann Arbor Public Schools and the broader community. This initiative will not only strengthen environmental stewardship among students but also establish the Freeman Environmental Education Center as a leader in sustainable education and community-driven conservation. This model is designed to ensure the nursery's long-term financial stability and environmental sustainability, enabling it to achieve the desired impact. As a living document, it will evolve as the nursery grows, adapting to new opportunities and the changing needs of the community.

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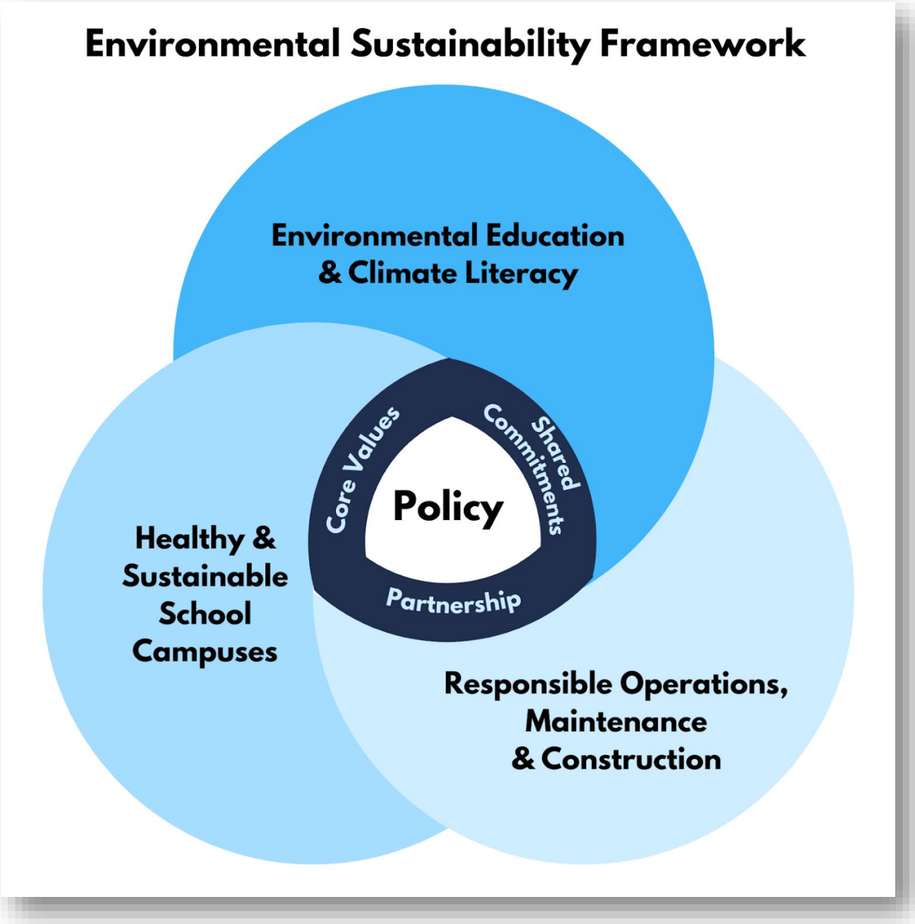
# Summary

# Decarbonizing AAPS School Buildings

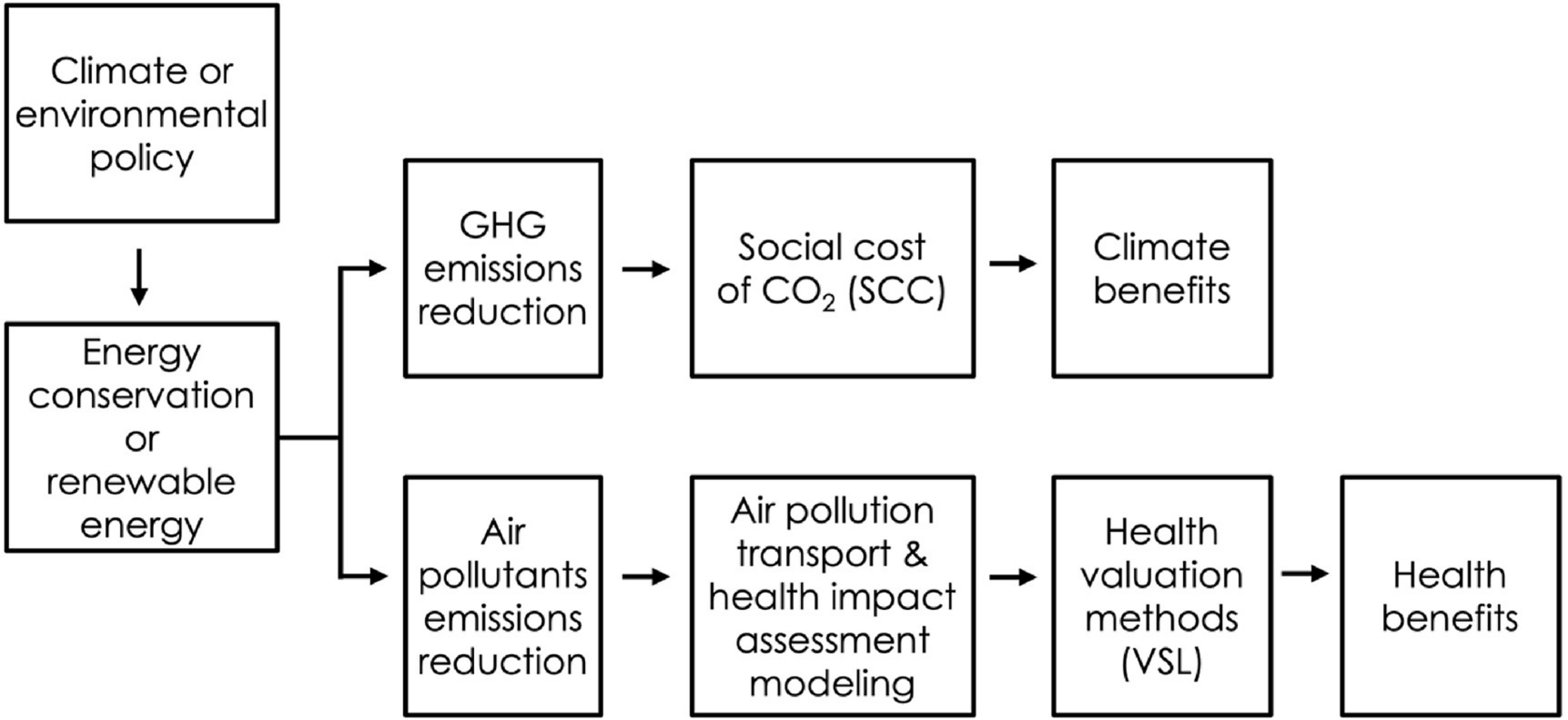
The District's **commitment to carbon neutrality** – specifically the target to offset or eliminate Scope 1 and 2 emissions by 2035 – is a response to the urgent need for greenhouse gas emission reductions and is intended to directly impact the health and well-being of not only students, staff, and school community, but all living things, and the natural systems that will shape a hopeful future for our students.

Carbon neutral schools are healthy, energy efficient buildings with primary all-electric heating and cooling systems that:

- **Provide healthy, comfortable, and productive learning environments for all students**
- **Redirect money from utility bills to the classroom**
- Provide tangible learning opportunities for future focused skills
- And can encourage students to take a more active role in environmental sustainability and their own learning needs



# Why Environmental Sustainability?




https://www.sciencedirect.com/science/article/pii/S0360132323006455?via%3Dihub

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# Thank You!

Questions: Jason Bing – bingj@aaps.k12.mi.us

For more information, please visit:

A2schoolsbond.org