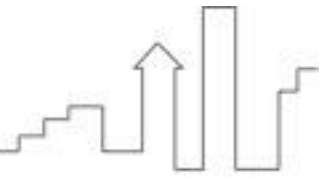


Using a Decarbonized High School to Teach Future Citizens



The Environmental Charter School Puts Its Mission into Practice

Environmental Charter High School (ECHS), Pittsburgh, PA

ECHS is transforming the notion of a traditional high school to support the development of the whole person and instill the ability to “systems think” to successfully navigate relationships, careers, and personal journeys in the 21st century. ECHS will utilize use their smart, high performing building to demonstrate the impact of ecological thinking on the environment and human health.



Credit: Avon Design Group

Owner’s Project Goals

ECS set very high building performance expectations using contemporary building science and data science tools. The goals, embedded in the Owner’s Project Requirements include environmental stewardship, occupant wellness and transparent/secure access to performance data.

Operating Carbon

- Site EUI of 14kBtu/SF/year representing the most cost-effective path to zero energy.
- Passive House (PHI & PHIUS) certified.

Occupant Health

- 30% more outdoor air than required by code.
- RESET Air certified.

Photovoltaic Arrays

- Secures the path to zero operating carbon.

Smart Building Infrastructure

- Open, integrated control systems utilizing an independent data layer (IDL).
- Single pane of glass for all operational technologies.

Project Highlights

This aspirational project is likely to become one of the most celebrated high schools in the country. The Environmental Charter High School is Passive House certified (PHI& PHIUS), RESET Air certified with WELL Building Performance Rating underway. The school is employing the smartest intelligent building capabilities for the purpose of enabling easy control and access to the building’s performance data.

The school’s focused pursuit of performance-based certifications demonstrates ECS’s commitment to the environment and occupant health & well-being. By certifying Passive House and RESET Air, ECS proves, by their actions, that we are not required to trade-off environmental health with human health.

In addition, ECS intends to share its building performance data not only for use in their schools but for academic use with partnering universities. This single act will accelerate the pace of learning about decarbonization in the built environment for practitioners in the fields of architecture, engineering, construction, and data science.

New Construction High School

51,000 SF

Project Team

AUROS Group
Avon Design Group
Heapy
Newcomb & Boyd
CMAD

Project Reference

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Credit: Avon Design Group

Owner’s Project Goals

- 1. Site Energy Use Intensity: 14 kBtu/sf/year**
 - An efficiency-first strategy is the only way to ensure the highest performing building at the lowest cost
 - Passive House (PHI and PHIUS) pre-certifications
- 2. Renewables energy**
 - Right-sized photovoltaic arrays secure the path to zero energy
- 3. Minimized embodied carbon**
- 4. Building Performance & Occupant Health & Well-being**
 - High performance building envelope
 - RESET Air certification
 - 0.35 air changes per hour, but not less than 15 cfm/person
- 5. Smart Building Infrastructure**
 - Democratized data for use in establishing environmentally focused, data-driven curricula across grades and subjects
 - Access to building performance data ensures buildings are resilient and maintain performance over time

Supporting Documentation

1. Lowest energy consumption level achievable using building science with the following benefits:
 - o Lowest cost approach to zero energy.
 - o Slashes the cost of energy for the life of the building.

Source: <https://www.weforum.org/agenda/2021/01/passive-housing-sustainable-emissions-reduction/>

2. Efficiency: The First Renewable Energy
<https://www.treehugger.com/efficiency-the-first-renewable-energy-5184220>
3. Embodied Carbon – designing with wood over steel reduces embodied carbon by up to 75%.
<https://passivehouseaccelerator.com/articles/addressing-embodied-energy-with-mass-timber>
4. Supporting research: Buildings demonstrating significantly improved CO2, VOCs and ventilation rate demonstrated over 2x higher cognitive scores than conventional buildings.
<https://green.harvard.edu/tools-resources/research-highlight/impact-green-buildings-cognitive-function>
5. Use of empirical data in teaching sustainability and environmentalism:
<https://cft.vanderbilt.edu/guides-sub-pages/teaching-sustainability/>

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