Defining Standards for High Performance Building

The Pittsburgh 2030 District drives market transformation by uniting 164 leading organizations, creating unprecedented collaboration between sectors such as healthcare, hospitality, higher education, and technology. Defined by Pittsburgh’s economic centers, the District boundary includes Downtown, Oakland, the Northside, and Uptown, with an expansion into the Strip District in 2019. Increasing GBA’s influence in Western Pennsylvania, the District Affiliate program adds another 212 properties (representing over 9.4 million square feet) from across the region, building a broad coalition for change. GBA formalized Erie as an Established 2030 District in 2019. Erie now joins Pittsburgh and 21 other Established Districts around the world with 61 committed buildings, representing over 4.1 million square feet.

The Road to 2030

As a founding member of the 2030 Districts Network and the largest District to date, Pittsburgh is setting international standards for best practices in sustainable building. Founded in 2012, Pittsburgh represents 17.3% of all committed square feet in North America, including Philadelphia, Seattle, and Toronto. The District’s robust network of 556 properties (representing more than 86.3 million square feet) has saved $154 million and avoided over 1.5 million metric tons of CO2e to date.

As we enter the final ten years on the road to 2030, we are reminded of the importance of building the Pittsburgh 2030 District to meet the ever-changing needs of the future. This could not be done without the dedication and collaboration of our Property Partners and District Affiliates. Solving today’s problems with tomorrow’s solutions is the goal of every one of our partners and has been the reason why the Pittsburgh 2030 District is successful.
What are the 2030 Challenge Goals?
The Pittsburgh 2030 District follows the 2030 Challenge for Planning, a framework created by Architecture 2030 to drastically improve buildings’ environmental impact by 2030. Through separate goals for new construction and existing buildings, the 2030 Challenge sets rigorous but achievable reduction targets in five-year increments. New construction and major renovation projects commit to carbon neutrality by 2030, while existing buildings pursue 50% reductions in energy use below national baselines. Both new and existing buildings commit to 50% reductions in water use and transportation emissions below regional baselines.

A Performance-Based Model
According to the United Nations, the urban built environment is responsible for 75% of annual global greenhouse gas emissions, with buildings alone accounting for 39%. In response, GBA adopted the 2030 District Challenge model, which sets specific targets for buildings’ use reduction. The 2030 Challenge aligns with the timeline created by the United Nations 2030 Agenda for Sustainable Development, providing a roadmap for partners to meet the 50% reduction goals. Property Partners and District Affiliates join community organizations, utilities, designers, technology firms, and government officials to find solutions to current obstacles and create tangible improvements throughout the region.

Erica Taylor
Building Innovation Analyst
The PNC Financial Services Group

We’ve learned that 50% reduction goals are not only very important, but they will take the cooperation of everyone to achieve. No two buildings are the same, and continuous collaboration and innovation is paramount for everyone to achieve greater efficiency and sustainability.
To measure progress toward 2030 Challenge goals, the Pittsburgh 2030 District relies on comprehensive data collection and analysis. Individual property’s performance metrics are aggregated to find District reductions in energy, water, and transportation emissions, in addition to improvements in indoor air quality.

Each building’s performance is determined by pairing contextual factors with metric-specific data, as reflected in Table 1. While property-level performance is held in confidence, the aggregate data set critically informs policy and planning across Western Pennsylvania.

Baseline & Performance Metrics

Determining a building’s resource reduction requires an initial point of comparison, known as the building’s baseline. Using the best available data, each building is assigned an initial baseline value, which takes into account various features depending on the metric. In cases with specific use types, such as public event facilities, custom baselines are developed referencing document past use.

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ENERGY

A Cycle of Energy Reinvestment

In 2019, properties reduced total District energy to 23.1% below baseline, surpassing the 2020 interim goal of the 2030 Challenge. The District avoided over 194,000 metric tons of CO2e, the equivalent electricity use of more than 17,700 homes. Property Partners saved $34 million in energy costs this year. These savings continue to be reinvested in energy efficiency projects including lighting retrofits, envelope commissioning, and installation of building automation systems.

Renewable Energy
at the District Scale

In 2018, the Pittsburgh 2030 District became the first in the world to capture district-wide renewable energy into performance calculations. In 2019, Property Partners purchased 792 million kBtus of off-site renewable energy, representing 7.7% of all energy used. Falling renewable energy prices and growing commitments to corporate social responsibility have led an increasing number of Property Partners to purchase 100% of their electricity from clean sources.

A New Metric

In addition to water rate increases, a stormwater fee will be coming into effect in 2021 or 2022. Large volumes of stormwater continue to be an issue for Pittsburgh, with reports of flooding basements and water backing up in buildings. Additional rainfall across the region combined with an abundance of new development makes the system increasingly prone to overflow.

The fee will be based on a property’s total impervious surface – roofs, concrete, parking lots – which causes runoff that contributes to stormwater. As a result, Property Partners have been investigating ways to increase their permeable area where water can soak into the ground. The Pittsburgh 2030 District will be creating a fifth metric by which to track Property Partners’ stormwater reductions.

WATER

Rising Water Rates Drive High Performance

In 2019, Property Partners reduced total water use to 19.8% below baseline, avoiding 274 million gallons of water or almost 16 million showers. Significant increases in local water and sewage rates are compelling building owners to shift their focus towards water conservation. Over the past year, Partners have completed numerous projects including fixture replacements, installing aerators, and moving towards low-flow toilets. These actions helped Partners save $9 million in water costs in 2019. As local water and sewer rates continue to climb, Partners will find even better returns on their water reduction investments.

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“A The Pittsburgh 2030 District is one of many Pittsburgh efforts that show we are stronger together, sharing all the motivation, knowledge, and connections we need to attack the challenges of our time, including climate change.”

Aurora Sharrard
Director of Sustainability
University of Pittsburgh
TRANSPORTATION

The Region’s First Comprehensive Commuter Survey

In 2018, the Pittsburgh 2030 District relaunched Make My Trip Count (MMTC), the region’s first comprehensive commuter survey. The survey recorded over 20,000 responses, measuring modes of transportation including personal vehicles, electric vehicles, light rail, buses, and ridesharing like Uber and Lyft. MMTC also recorded carbon neutral forms of transportation such as walking, biking, and telecommuting. Developed in collaboration with EMC Research and 19 transportation partners, MMTC captured commuter choices at the census block level, providing regional transportation agencies with more granular data by which to support transportation decisions. The survey will be administered every three years.

The Importance of Measuring Transportation

The 2030 Challenge calculates transportation performance by measuring a reduction in CO₂ emissions from a regional baseline. In Pittsburgh, commuting accounts for approximately 835,000 tons of CO₂ emitted into the atmosphere each year. Transportation has an significant impact on air quality, for which Pittsburgh has consistently ranked among the worst in the country. Through the release of chemicals like sulfur oxides, nitrogen oxides, and particulate matter, transportation is responsible for 18% of overall greenhouse gas emissions and 22% of the region’s air pollution. Roughly half of transportation emissions come from single passenger vehicles.

Creating Commuter Baselines

In partnership with Southwestern Pennsylvania Commission (SPC), the Pittsburgh 2030 District created two CO₂ emissions baselines for people commuting to Downtown and Oakland. The District measures the number of individual trips taken, the distance of travel, and the transit mode(s) used against SPC’s modeled baselines. Each person trip is multiplied by emissions factors from the Environmental Protection Agency, which specifies the amount of CO₂ released based on vehicle type.

The Social Cost of Carbon

Carbon emissions include various air pollutants that cause increased rates of asthma, respiratory illnesses, and heart disease. These toxins have direct costs for families, businesses, and governments. The ‘social cost of carbon’ (SCC) is a measurement that accounts for these economic impacts by assigning a dollar value to each ton of carbon emitted.

Deeper Analysis

Commuter choices avoided approximately 77,265 tons of CO₂ in 2018. This equates to about $3.86 million in social cost savings, using the Environmental Defense Fund’s SCC estimate of $50 per ton of carbon. For those commuting to Downtown or Oakland by driving alone, each driver’s emissions amounted to about $114 in social cost annually. In comparison, a bus rider’s emissions cost about $42 each year. If 5,000 drivers were to switch to the bus, this would result in a social cost reduction of $360,000.

Public transit is used more where there are fewer private lots/employee garages, higher parking costs, and a stronger transit infrastructure. The greatest desire for increased transit frequency was East of Pittsburgh. To increase access in this area, Port Authority of Allegheny County is creating the Bus Rapid Transit (BRT) project. It will have a core route that runs through the east into Oakland and Downtown.

Future Considerations

At the time of this writing, the world is undergoing an unprecedented pandemic. The threat of COVID-19 has forced employers from around the world to continue business operations remotely, leading to the single biggest investment in work from home technology to date. According to a study by MIT, 34% of Americans who traditionally commuted to an office worked from home during the first week of April 2020. This is the same percentage of people whose jobs provide them the ability to work remotely. A national quarantine combined with a substantial increase in working from home has caused public transit ridership to plummet.

WHAT DOES THIS MEAN FOR THE FUTURE OF TRANSPORTATION?

In the next iteration of the Make My Trip Count survey, expect to see increased rates of telecommuting leading to a decrease in the average number of physical commuting trips.
Measuring Pittsburgh’s Indoor Air Quality

While average levels of air pollution in Pittsburgh have decreased since 2000, the region still ranks 7th in the nation for consistently high levels of annual particle pollution. Outdoor air quality directly affects indoor air quality (IAQ), and combined with the fact that Americans on average spend 90% of their time indoors, IAQ was chosen as the Pittsburgh 2030 District’s fourth performance metric. In a complete redesign of 2017’s IAQ survey, the 2019 version focused on individual building’s results. Over 120 buildings’ unique practices were captured. The survey measured building operations, maintenance strategies, and purchasing policies which impacted IAQ. This dataset provides an inside look at what practices Pittsburgh building owners and managers have taken to improve indoor air quality.

Where’s the Baseline?

Indoor air quality doesn’t have a baseline. There is a lack of hard data on levels of indoor pollutants because so few buildings in the District have IAQ monitors. To collect information from more buildings and increase access to this metric, the Pittsburgh 2030 District created a survey based on research of best practices in multiple building rating systems and a pilot study conducted with the University of Pittsburgh.

86% of buildings in the survey had a green cleaning program.

77% of buildings purchased low or no VOC products

The Importance of Good IAQ

Employees are the largest operational cost of any organization. As poor indoor air quality has a direct effect on occupant health and productivity, working to improve IAQ is essential. Buildings with poor indoor air quality can cause occupants to experience headaches, decreased productivity, and increases absenteeism – consequences known as Sick Building Syndrome. Indoor air quality regards concentrations of pollutants in a space at a given time. Pollutants come from a variety of sources: building characteristics, materials, occupant behavior, outdoor sources, and operations and maintenance practices. Broadly, good indoor air quality revolves around reducing pollutant levels by limiting outdoor pollutant infiltration and high pollutant materials, in combination with properly ventilating spaces and maintaining ventilation systems.

Looking Towards the Future

As we move toward 2030, Pittsburgh property owners can improve their indoor air quality through these key areas: envelope commissioning, IAQ monitoring, and materials purchasing. Commissioning a building’s envelope has many benefits. It increases occupant comfort and energy efficiency, reduces ambient noise, and improves indoor air quality. A tight envelope with proper ventilation prevents outdoor particles from entering the building without being properly filtered.

Monitoring IAQ datapoints can help determine if there is adequate ventilation. CO₂ concentrations is a common datapoint to track and directly affects occupants. CO₂ levels greater than 1000 parts per million can result in headaches, fatigue, and trouble concentrating. This figure is especially important for schools, as classrooms routinely mark over this threshold. Combining IAQ monitoring with demand-controlled ventilation is a best practice that helps ensure good indoor air quality for occupants. Product choices can reduce the amount of pollutants in a building. Choosing certified green cleaning products, purchasing materials which have low to no VOCs, and asking for product disclosures of Red List chemicals are three strategies to help reduce harmful particles from indoor materials. International Living Future Institute’s Red List highlights common materials found in the building industry which either pollute the environment, the food chain, or negatively affect human health. Eliminating the use of products with these chemicals will improve human and environmental health while pushing manufacturers to use less harmful alternatives.
TEN YEARS TO 2030

Like the numbers hidden in the background of this report, the sustainable solutions these final 10 years demand may not be obvious to us now, but through innovation and collaboration we can confront the changing needs of the future together.

The 2030 Challenge goals focus on 50% reductions in energy use, water use, and transportation emissions by 2030 and carbon neutrality for new construction and major renovations. These goals are benchmarks on the path to a more sustainable future and are widely recognized as one of the best roadmaps to get us there. The next ten years are crucial in this effort. As the primary ‘low-hanging fruit’ has been picked, deeper retrofits, better data tracking, innovative financing strategies, and more creative designs are needed in order to push the region past our 2030 targets.

The Pittsburgh 2030 District is shaping the region’s evolution into a healthier city for all with its Partners. Through monthly Partner meetings, quarterly Bridge to 2030 education series, one on one reports, and technical assistance, GBA provides expertise on how the region can meet these crucial benchmarks – but we can’t do it alone. Collective effort from Partners in all sectors is integral to the success of the District.

Increasing Regional Influence

In 2017, Green Building Alliance began working with the City of Erie, Erie County, and a group of regional building owners to develop the Erie Emerging 2030 District. By the Fall of 2019, the District acquired enough Property Partners to officially become the 22nd Established 2030 District in the world. Currently, Erie has 16 Property Partners spanning public and private organizations that make up 61 buildings and 4.1 million square feet.

The Erie 2030 District offers free education opportunities through its bimonthly Partner Meetings. The District has partnered with local universities like Mercyhurst, Gannon, and Penn State Behrend to work with students and conduct vital data collection to help create energy and water baselines for the city. The Erie 2030 District will continue to create essential economic opportunities in the region and plans to release 2019 progress towards its energy reduction goals later in 2020. Erie’s commitment to the 2030 Challenge Goals positions the region for economic growth, facilitating new investment now and in the future.

“The Pittsburgh 2030 District has helped City government leverage the power of energy benchmarking, catalyzing the creation of the Pittsburgh Energy Benchmarking and Disclosure Ordinance and framing the development of the city’s Climate Action Plan 3.0.”

Grant Ervin
Chief Resilience Officer
City of Pittsburgh
A Network of Influence

The Pittsburgh 2030 District’s success stems from its extensive network of partners and sponsors. This collaborative spans the depth and breadth of economic sectors in the city, translating sustainability goals through all facets of the region’s economy. Partners are invited to monthly closed-door meetings that feature presentations from technical experts, service providers, and building owners which showcase successful projects. These sessions are framed through a regional lens in which Partners share best practices and challenges with a diverse group of public and private organizations. In more than 10 meetings throughout the year, partners gain direct access to policymakers, regional thought leaders, university researchers, and financial organizations.

Individual Technical Evaluations

GBA consults with Property Partners and District Affiliates on a one-on-one basis to identify critical investments toward achieving their individual reduction targets. Partners receive a confidential annual performance report that analyzes their progress toward the 2030 Challenge goals. These reports highlight Partners’ current and former performance while GBA staff provide context and ideas for specific building upgrades. Where possible, reports also compare a building’s performance to similar, anonymized local buildings.

The 2030 District’s greatest impact on Pittsburgh has been bringing together many individual organizations to work collectively on organizational and regional progress around short-term and long-term goals involving energy, water, transportation and indoor air quality.

Phyllis Barber
Sustainability Manager
Highmark Health

In 2019, the Pittsburgh 2030 District set an international precedent by welcoming the Pittsburgh International Airport to the District Affiliate program. It is now the first airport in the world to commit its buildings to the 2030 Challenge goals.
Green Building Alliance (GBA) advances innovation in the built environment by empowering people to create environmentally, economically, and socially vibrant places. As Greater Pittsburgh’s authority on sustainable design, GBA works with cities to close the building performance gap; cities to create denser, more walkable neighborhoods; and cities to develop more sustainable communities.

Green Building Alliance

Building Challenge 4.0; BREEAM 2016; RESET Air Standard v2.0; Fitwel v2.1

References:


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