At the 26th Intergovernmental Panel on Climate Change in Glasgow (COP26), Architecture 2030 warned “If the world is to meet the 1.5°C carbon budget set in the 2015 Paris Agreement, we must provide the necessary leadership to reduce CO2 emissions in the entire built environment to zero.”

This warning moves the conversation from focusing on energy reduction to carbon reduction goals. To meet this urgent challenge, the Pittsburgh 2030 District is re-aligning its goals to match current climate science and is adapting its tools to help partners meet the change. Annual performance reports to 2030 District partners will feature assessments of their building’s carbon emissions intensity and progress as well as energy-use and water-use intensity. Future Pittsburgh 2030 District partner meetings will include educational sessions on topics related to carbon emissions and the built environment. These will include guidance to reduce carbon emissions such as deep carbon retrofits, beneficial building electrification, thermal energy storage, demand response and grid optimization, grid-interactive efficiency, on-site renewable energy, and grid decarbonization. They will also introduce the concept of embodied carbon and whole-building life-cycle assessments, which account for the emissions generated during the construction or renovation of a building.

This report marks ten years since the launch of the Pittsburgh 2030 District. In 2012, Pittsburgh joined Cleveland and Seattle in forming communities of high-performing buildings to catalyze transformation in the built environment and the role it plays in mitigating climate change. Since then, this network has grown to include 2030 Districts in over 20 cities across North America, driving down energy use, water use, transportation emissions, and the carbon they produce. Pittsburgh is the largest 2030 District in North America and has made a tremendous impact throughout western Pennsylvania. Our timeline of progress is on pages 5-6, and we continue to grow.

The District acknowledges that climate change is a common concern of humankind, and we have the power to change its trajectory. Aligning with international leaders in Glasgow, the District will “respect, promote and consider its obligations on human rights, the right to health, the rights of Indigenous peoples, local communities, migrants, children, persons with disabilities and people in vulnerable situations and the right to development, as well as gender equality, empowerment of women and intergenerational equity.”

To that end, the Pittsburgh 2030 District invites everyone to identify leaders to commit community anchors, such as schools, housing, and worship facilities within their neighborhoods. There is an immense opportunity for District partners to promote the value of occupant health and well-being and to empower citizens to claim that value for themselves. Committing community anchors to the Pittsburgh 2030 District promotes economic growth and is an investment in the health and vibrancy of our region.

Chris Cieslak, PE, LEED AP, GPRO
Vice President, Program Strategy & Impact
2030 District Senior Director

Statement of land acknowledgement

We recognize that the City of Pittsburgh and many of the 2030 District properties occupy the historic land of the Osage and Shawnee peoples. While we cannot change the past, we can move forward with purpose, and work toward a vision that respects all people and provides places where all can thrive.
560 BUILDINGS COMMITTED

86.6M SQUARE FEET COMMITTED

38.3% CARBON REDUCTION (INCLUDING REC\s)

34.9% ENERGY REDUCTION (INCLUDING REC\s)

30M SQUARE FEET EVALUATED FOR IAQ

37.1% WATER REDUCTION

382,000 METRIC TONS OF CO₂e EMISSIONS AVOIDED
Defining Standards for High-Performance Building

For the past ten years, the Pittsburgh 2030 District has set the standard for high-performance building. The District is a community of more than 130 organizations across a variety of sectors, including business, technology, government, healthcare, hospitality, and education. Expanding GBA’s influence throughout Western Pennsylvania, the Erie 2030 District adds another 17 organizations, building a broad coalition for change. Pittsburgh and Erie belong to a network of more than 20 Established Districts around the world with more than 520 million square feet and 1,200 member organizations committed to the 2030 Challenge. Over the past ten years, the commitment of our Property Partners to the goals and to one another has been an integral part of the Pittsburgh 2030 District’s progress.

2030 Districts: A Performance-Based Model

According to the United Nations, building construction and operations accounted for 38% of energy-related carbon emissions. The 2030 District Challenge sets specific targets for buildings’ carbon emissions, energy use, and water use reduction that aligns with the timeline created by the United Nations 2030 Agenda for Sustainable Development. Property Partners join community organizations, utilities, designers, technology firms, and government officials to explore, test, and share a wide variety of approaches to reducing energy-related carbon emissions throughout the region.

Inspiring Leadership

As a founding member of the 2030 Districts Network and the largest District to date, Pittsburgh demonstrates leadership and inspiration in sustainable building. The Pittsburgh 2030 District was the first district to incorporate indoor air quality as a performance metric. This led to the Cincinnati 2030 District creating the first metric on overall occupant health.

Baseline & Performance Metrics

Determining a building’s reduction in energy and water use requires an initial point of comparison, known as a baseline. Using the best available data, each building is assigned an initial baseline value, which considers various features depending on the metric. Unique use types, such as public event facilities, have custom baselines referencing their historic performance.

<table>
<thead>
<tr>
<th>CARBON EMISSIONS</th>
<th>ENERGY</th>
<th>WATER</th>
<th>INDOOR AIR QUALITY</th>
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<tr>
<td>BASELINE TYPE</td>
<td>National Baseline</td>
<td>National Baseline</td>
<td>Local Baseline</td>
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<td>BASELINE SOURCE</td>
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<td>2003 Commercial Building Energy Consumption Survey (CBECS)</td>
<td>2009-2012 Pittsburgh Water &amp; Sewer Authority water usage</td>
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<td>• Building use type(s)</td>
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<td>• Occupancy</td>
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<td>• Weather</td>
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<td>Emissions Intensity (EI)</td>
<td>Annual Energy Use Intensity (EUI)</td>
<td>Annual Water Use Intensity (WUI)</td>
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<td>MEASUREMENT UNITS</td>
<td>kg CO₂e/square foot/year</td>
<td>kBtu/square foot/year</td>
<td>Gallons/square foot/year</td>
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<td>ENERGY STAR Portfolio Manager</td>
<td>ENERGY STAR Portfolio Manager</td>
<td>ENERGY STAR Portfolio Manager</td>
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<tr>
<td>REPORTING 2021 PERFORMANCE</td>
<td>346 buildings, 55.9 million square feet, 66% of total committed square feet</td>
<td>403 buildings, 70.5 million square feet, 81% of total committed square feet</td>
<td>299 Buildings, 54.2 million square feet, 65% of total committed square feet</td>
</tr>
</tbody>
</table>

The Pittsburgh 2030 District was the first district to incorporate indoor air quality as a performance metric.
10 YEARS OF IMPACT

Eliminating Barriers, Increasing Access

Founded in 1993, Green Building Alliance has had a long history of inspiring a movement towards the creation of healthy, high-performing buildings. Originally, this was done by promoting green building certifications, but by 2012, GBA recognized that the complexity of certification programs could inhibit an honest assessment of existing building performance. GBA launched the Pittsburgh 2030 District initiative to provide a simple, free, and effective program for building owners to assess and measurably improve their buildings. In the first year, GBA enlisted the leadership of almost 40 organizations representing over 100 landmark properties to implement performance improvements, emissions-reduction strategies, evaluate progress, and share results. Momentum for the District accelerated upon the publication of the inaugural progress report in 2013, prompting the first boundary expansion to encompass universities and hospitals in the Bluff and Oakland.

Measuring Results, Demonstrating Impact

The 2030 District program succeeds, in part, because it uses data to demonstrate impact. Property Partners provide data to set performance targets and report annual energy and water use to assess progress. Pittsburgh 2030 District staff prepare individual and district-wide progress reports to show measurable outcomes. The annual reports illustrate the collective impact of participants’ efforts, setting the stage for renewed enthusiasm for and investment in the creation of healthy, high-performing buildings. From the start of the District in 2012, Property Partners have collectively invested at least $2.3B in building renovations and new construction.

Reduced District energy use by 20%
Indoor air quality performance metric added

2012 $30M
District founded in Downtown

2013 $80M
First progress report published

2014 $280M
Expanded to Oakland

2015 $500M
Reduced District energy use by 10%

2016 $1B
Expanded to the Northside

2017 $1.4B

2018 $1.9B

2019 $2.1B

2020 $2.2B

2021 $2.3B

COP26 Glasgow Climate Conference Carbon performance metric added

2017

Igniting a Movement

The 2030 District encourages participants to envision the impact of collective action. Its network of Property Partners cultivates collaboration across numerous sectors, including community organizations, utilities, designers, technology providers, and government officials. Because of the program’s demonstrated success, the Pittsburgh 2030 District has expanded to include influential community anchors such as school districts, developers, and landlords of multi-family buildings to further inspire a movement towards healthy, high-performing communities.
Beyond 2030: Accelerating to Zero

The 2030 Challenge originally set incremental reduction targets for both new and existing buildings. District Partners have historically committed to 50% reductions in energy, water, and transportation related emissions for existing buildings, while new construction and major renovation projects committed to carbon neutrality by 2030, but the conversation has shifted.

At the 26th Intergovernmental Panel on Climate Change in Glasgow (COP26), Architecture 2030 warned "If the world is to meet the 1.5°C carbon budget set in the 2015 Paris Agreement [figure 2], we must reduce CO₂ emissions in the entire [existing] built environment by 50–65% by 2030 and reach zero carbon by 2040." New buildings and major renovations must be designed for zero carbon immediately.

Accelerating to zero carbon calls for building electrification, increasing renewable energy, reducing embodied carbon, and advocating for more stringent building codes and energy related policy and incentives.

To meet the 1.5°C carbon budget set in the 2015 Paris Agreement, we must reduce CO₂ emissions in the entire [existing] built environment by 50–65% by 2030 and reach zero carbon by 2040.

**2030 Challenge Goals**

**Existing Buildings**

**New Construction/Major Renovations**

![Graph showing the reduction of carbon emissions from building energy use.](image)

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**The Global Carbon Budget**

*REACHING ZERO EMISSIONS BY 2040 INCREASES PROBABILITY OF STAYING AT OR BELOW 1.5°C GLOBAL TEMPERATURE RISE*
Partnership and coalition building are key to creating a clean energy future for all, and the 2030 District has been instrumental in advancing that effort. Celebrating the tenth anniversary of the district allows us to reflect on the deep and impressive progress the partners have accomplished, and further position our region for decarbonization, increased facility performance, and improved public health.

Kevin Walker
President and CEO
Duquesne Light Company
CARBON EMISSIONS

From Energy to Carbon: Tracking Progress

Except for renewable energy, producing and using energy creates carbon emissions, and different types of energy have different emissions factors. Depending on the amount of each fuel a building uses, the amount of emissions produced will differ. ENERGY STAR Portfolio Manager tracks emissions by determining the amount of each fuel type used and multiplying the amount of fuel used by an emissions factor.6

Transitioning to a Cleaner Grid

While carbon emissions from fossil fuels are constant, emissions from electricity generation vary by geographic region and time of day. The EPA’s Emissions & Generation Resource Integrated Database (eGRID) assesses the sources of electric power systems in specific geographic regions and tracks changes to those sources over time. The emissions factors for southwestern Pennsylvania’s specific EDA eGRID subregion, RFCW, are shown in figure 5. The graph shows that emissions factors have decreased over time as more carbon-free electricity is produced.

Renewable Energy in the District

Partners continue to increase amount invested in renewable energy. The University of Pittsburgh completed its carbon action plan in 2022, highlighting a planned 20 MW solar power facility and an 8.4 MW hydropower facility.7 Carnegie Mellon University purchased over 125 million kWh of renewable energy in 2021, enough to cover over 110% of their annual electricity usage. In 2022, the Community College of Allegheny County (CCAC) officially transitioned to solar power, installing a new 543 kW solar array which will produce enough electricity to power 30–40% of CCAC North Campus’s electricity needs.9

The Social Cost of Carbon Emissions

Carbon emissions include 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’ is a measurement that accounts for these economic impacts by assigning a dollar value to each ton of carbon emitted.10

2021 SOCIAL COST OF CARBON SAVED: $19.5M

2021 SOCIAL COST OF CARBON SAVED: $102.7M

District Performance

It is imperative to reduce carbon emissions by 50-65% for existing buildings by 2030. 2021 marks the first year in which the Pittsburgh 2030 District has evaluated carbon emissions reductions against a baseline, achieving an impressive 58.3% reduction. As renewable energy commitments, energy efficiency, and the amount of renewable energy feeding the grid increase, we expect progress to continue in the coming years.

2021 CARBON PERFORMANCE

YEARLY CARBON EMISSIONS AVOIDED VS ELECTRICITY CARBON EMISSIONS FACTORS

2021 SOCIAL COST OF CARBON SAVED: $19.5M

CUMULATIVE SOCIAL COSTS OF CARBON SAVED: $102.7M

2020 GOAL 50–65% REDUCTION

2040 GOAL ZERO CARBON

Figure 6
Throughout 2021, many buildings had not yet returned to full capacity since the original pandemic shutdown in March 2020. For the 2020 data year, there were almost three months of full occupancy energy use reflected, whereas 2021 experienced twelve months of limited occupancy. This greatly impacted overall energy use. Offices, for example, performed at 37.3% below the baseline in 2020 and 44% below the baseline in 2021 likely due to this factor.

In addition, many Partners’ energy conservation projects came to fruition in 2021. Partners replaced chillers and cooling towers with more efficient equipment. They added variable frequency drives to adjust motor speed of fans and introduced variable air volume systems to optimize the amount and temperature of distributed air. Several Partners added or upgraded building automation systems to better control the operation of the mechanical and lighting systems. These measures all positively impacted energy performance.

Throughout 2021, the Pittsburgh 2030 District reduced energy use to 34.9% below the baseline, compared to 28.9% in 2020. Without renewable energy credits (RECs) factored in, the District's performance improved 5% from 2020 to 2021, highlighting energy performance improvements across the District. 2021’s energy savings equate to the annual energy use of over 30,000 households.

Before analyzing the data, GBA expected 2021 energy use to increase between 2019 and 2020 levels as lockdowns from the pandemic eased. The additional 5% decrease in energy use from 2020’s performance came as a surprise, though it is explained by two key factors: low occupancy rates which continued through 2021, and substantial building performance improvement projects that were completed in 2020 and 2021.

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### Measuring Indoor Air Quality

While average levels of air pollution in Pittsburgh have decreased since 2000, the region still ranks 9th in the nation for high levels of annual particle pollution. Because 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 2019, the Pittsburgh 2030 District created a survey to capture partners’ actions that affect IAQ. Questions were based on best practices from multiple building rating systems as well as a pilot study done with the University of Pittsburgh. Over 120 buildings’ unique practices were captured. With the second iteration of the survey capturing 2021 data, this dataset highlights how IAQ practices have been affected by COVID-19.

#### Baselines and Scorecards

The Pittsburgh 2030 District created “scorecards” or baselines for individual buildings as well as for use types in order to measure their performance. Questions were divided into five categories: testing + monitoring, building policy + occupant behavior, building characteristics + ventilation systems, operations + maintenance, and materials policy. Respondents earned points for each question based on their answer. Points earned for individual questions were totaled by category to provide partners with a diagnostic to highlight areas in which they are performing well and those that have room for improvement.

#### IAQ Changes: A Response to COVID-19

The pandemic prompted a recognition of the importance of air filtration, ventilation, and cleaning protocols. 2030 District Partners implemented numerous measures to protect occupant health, including increasing ventilation rates, improving filtration, and sanitizing indoor air.

Comparing 2019 and 2021 IAQ datasets, the most dramatic change related to the ASHRAE compliance standards which govern ventilation system design and acceptable indoor air quality. In 2019, 61% of respondents did not know if their buildings complied with ASHRAE 62.1-2010 or a more current version of the standard. This uncertainty dropped dramatically in 2021, with 66% now responding that they met or exceeded the 2010 standard. It is highly likely that COVID was the prompting factor for Partners to assess filtration in their buildings.

Answers regarding cleaning improved dramatically. 84% of Partners reported that they were in compliance with major green cleaning standards in comparison with 62% in the 2019 dataset, and 80% stated they deeply clean their carpets at least one time per year, a 31% increase from 2019.

#### Areas for Improvement

Similarly to 2019, the 2021 dataset highlighted that envelope commissioning and monitoring indoor air quality continue to be areas for improvement, with fewer than 20% of respondents confirming their building envelope had been commissioned or resealed. Commissioning and tightening the building envelope has several benefits: it increases occupant comfort and energy efficiency, reduces ambient noise, and improves indoor air quality.

A tight envelope with proper ventilation and filtration prevents outdoor particles from entering the building. Regarding IAQ monitoring, fewer than 16% of respondents noted they have functional CO2 monitors in high occupancy areas. Monitoring IAQ data can help determine if a space is adequately ventilated. A common datapoint to track is the concentration of CO2 in a space, which directly affects occupant health. CO2 levels greater than 1000 parts per million can result in headaches, fatigue, and trouble concentrating. Combining IAQ monitoring with demand-controlled ventilation helps ensure better indoor air quality for occupants.
Two PPG Place: All-Electric and All-In for Sustainability

Two PPG Place, Highwoods Properties
Year Built: 1984
Gross Floor Area: 179,000 ft²

Two PPG Place, one of Highwoods Properties’ most energy efficient buildings, has earned ENERGY STAR certification every year since its acquisition in 2011 and is LEED Silver certified. As part of the Pittsburgh 2030 District, this all-electric building has reduced its energy usage from 7% below baseline in 2012 to 48% in 2021. The success of Two PPG Place is due to the following characteristics: a dedicated sustainability team and asset management department and meticulous energy saving plans that were developed when the building was first purchased.

Terry Kennedy, Senior Director of Asset Management, and his team identified key retrofits based on cost savings and projected life span of mechanical equipment. Major building projects included a roof replacement, rolling upgrades to LED lighting and controls, elevator modernization, new chillers, a heat recovery wheel, and upgrades to direct digital controls (DDC).

A key factor in Highwoods Properties’ success is its financial structure as a REIT, a real estate investment trust. REITs specifically buy and develop properties as part of an investment portfolio, increasing the focus on and capital for improvements.

“The individual building performance reports we get from the 2030 District have been a great benefit to us. They clearly show the progress we’ve made towards energy and carbon reduction goals.”

Terry Kennedy, Senior Director of Asset Management, Highwoods Properties

Water

Occupancy Drives Water Use
In 2021, the Pittsburgh 2030 District reduced water consumption by 37.1%, a slight decrease from the 2020 reduction of 42.1%, but still far greater than the 2019 reduction of 19.8%. Partners saved 4.79 million gallons of water in 2021, the equivalent annual water use of over 3,700 single family homes.

As COVID restrictions eased, buildings and businesses reopened, leading to a natural increase in water usage compared to pandemic shutdown levels in 2020. With the future of work trending towards a hybrid model,16 many office buildings will likely not return to full capacity. As such, water use is not expected to return to pre-pandemic levels.

2021 WATER COST SAVINGS: $22.9M

Cumulative Water Savings: $77.2M

District Water Performance Against Baseline Over Time

Figure 12

Figure 13

Figure 11
The Pittsburgh 2030 District’s success stems from its extensive community of partners and sponsors. Our network of Property Partners spans multiple sectors of Pittsburgh, welcoming all to explore facets of building efficiency and possibilities for future progress in their buildings. Partners are invited to monthly meetings that feature presentations from technical experts, service providers, and building owners that 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 over ten meetings throughout the year, partners gain direct access to policymakers, regional thought leaders, university researchers, and financial organizations. Pittsburgh 2030 District Partners form a community of educated, purposeful leaders that have the knowledge to positively impact building development and operations throughout the region.

Become a Property Partner

Distinguish your organization or school district by joining western Pennsylvania’s most influential network of building owners and developers. Upon commitment to the 2030 Challenge goals, Property Partners gain access to a community of technical experts, service providers, and fellow building management professionals as well as individualized property benchmarking and evaluation. Any new or existing developments in western Pennsylvania are welcome to join.

Individual Building Performance Evaluations

GBA consults with Property Partners one-on-one to identify critical investments toward achieving 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, anonymous local buildings.

Property Partners:

- A.W. Beattie Career Center
- ALCO Parking
- Allegheny Center Alliance Church
- Allegheny County Airport Authority
- Allegheny County
- Allegheny Health Network
- ASCEND Pittsburgh
- Avenu/Innovate POH
- Bellesfield Presbyterian Church
- Benedum Trees
- Blind & Vision Rehabilitation Services
- BNT Mellon
- BPQ 360
- Brookside America
- Bridgeway Capital
- Burns Scalzo Real Estate
- Butler Area School District
- Carlow University
- Carnegie Library of Pittsburgh
- Carnegie Mellon University
- Carnegie Museums
- CBSE
- Central Catholic High School
- Chatham University
- Children’s Museum
- City of Pittsburgh
- Collaborative Real Estate
- Community College of Allegheny County (CCAC)
- DMI Companies
- Dollar Bank
- Duquesne University
- Elmhurst Group
- Environmental Charter School
- Fair Park Properties
- First Presbyterian Church
- Forest Hills Borough
- Gateway Towers Condominium
- General Nutrition Centers
- General Services Administration
- Giant Eagle
- Hazelwood Green
- Heinz History Center
- Hertz Investment Group
- Highmark
- Highwoods Properties
- Housing Authority of Pittsburgh
- Hooverspace JLL
- Kossman Development
- MLJ Willow
- McAllister Equities
- McKnight Property Management
- Milcraft
- Murind Associates
- National Aviary
- NDC Asset Management
- Neighborhood Legal Services
- Newport Grubb Knight Frank
- Oakland Planning and Development Corporation
- Oxford Development
- Pennsylvania Department of Conservation and Natural Resources (DCNR)
- Phipps Conservatory and Botanical Gardens
- Pittsburgh Cultural Trust
- Pittsburgh Gateway
- Pittsburgh Parking Authority
- Pittsburgh Parks Conservancy
- Pittsburgh Penguins
- Pittsburgh Pirates
- Pittsburgh Pirates
- Pittsburgh Steelers
- Planning Parenthood of Western PA
- PNC Financial Services Group
- Point Park University
- Protohaven
- Residences at Wood Street
- REDC/MII 19
- Root Cause
- Rudolf Shalom Congregation
- Rugby Realty/Dinonhill Management
- Shadyside Academy
- Shadyside
- Soldiers & Sailors Memorial Hall & Museum Trust
- Spectrum Charter School
- Sports & Exhibition Authority of Pittsburgh and Allegheny County
- St. Paul’s Catholic Church
- The Davis Companies
- The Fenchel Group
- Tree Pittsburgh
- Trex Development Group
- University of Pittsburgh
- USPMC
- Urban Redevelopment Authority
- Waldorf
- Walnut Capital
- Western Pennsylvania School for Blind Children
- Western Hotel
- Wexford Scitech
- Wexford Management
- Woodland Hills School District
- WIGED Multimedia
- YWCA Greater Pittsburgh

Green Building Alliance (GBA) positively transforms the world through the built environment for a sustainable, healthy, and just future for everyone. As Greater Pittsburgh’s authority on sustainable design, GBA drives the market for healthy communities while equipping designers, manufacturers, developers, and policymakers to catalyze systemic change. GBA manages the largest 2030 District in North America, and in 2019, established Pittsburgh as the 2nd International Center of Excellence on High Performance Building in the world. GBA partners across Western Pennsylvania, with strategic alliances including the 2030 District Network, Architecture 2030, the United Nations, and International Living Future Institute.