

*An Energy Efficiency Renovation Model
for Rural Downtown Buildings*

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Introduction

“These partnerships, and this project, truly embody our mission of integrating conservation and economic development in a way that strengthens our rural communities. When I think of all of the things that are going to be created here by us and the hundreds of small businesses in our network, the growth that’s going to happen here, the creativity that will happen in this space – and then also about the smaller environmental footprint that we’re leaving because we did these energy efficiency upgrades - that’s an incredible thing, especially when you consider it in terms of the next generation, who will be continuing this work long beyond any of us.”



-Ta Enos, PA Wilds Center for Entrepreneurship Founder & CEO

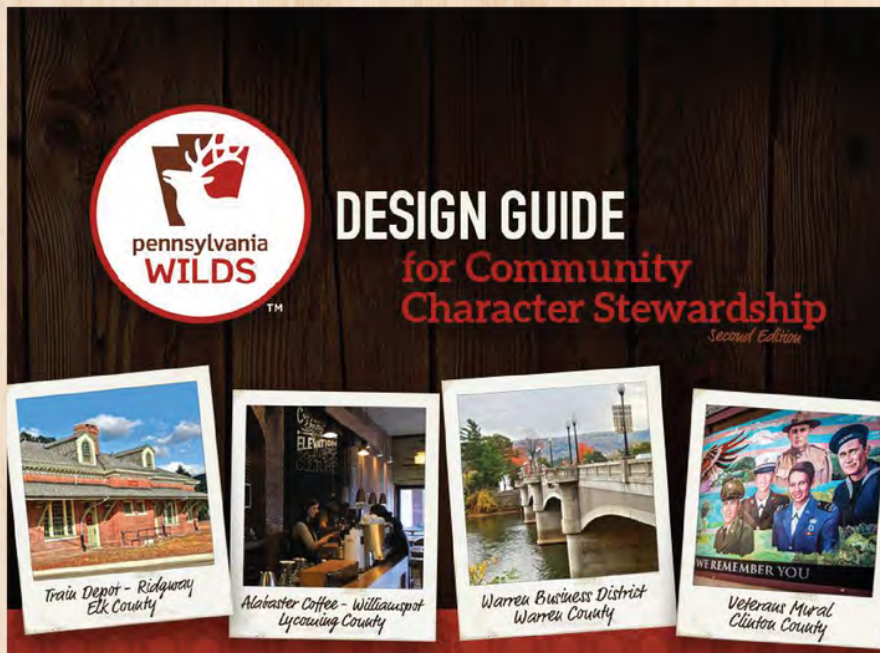


Establishing the PA Wilds Media Lab

Tackling energy efficiency and accessibility challenges in second-floor Main Street

In 2018, the nonprofit PA Wilds Center for Entrepreneurship embarked on establishing its first physical program space, the PA Wilds Media Lab, in Kane. The space would have tools and technologies to support the Center's growing entrepreneurial ecosystem.

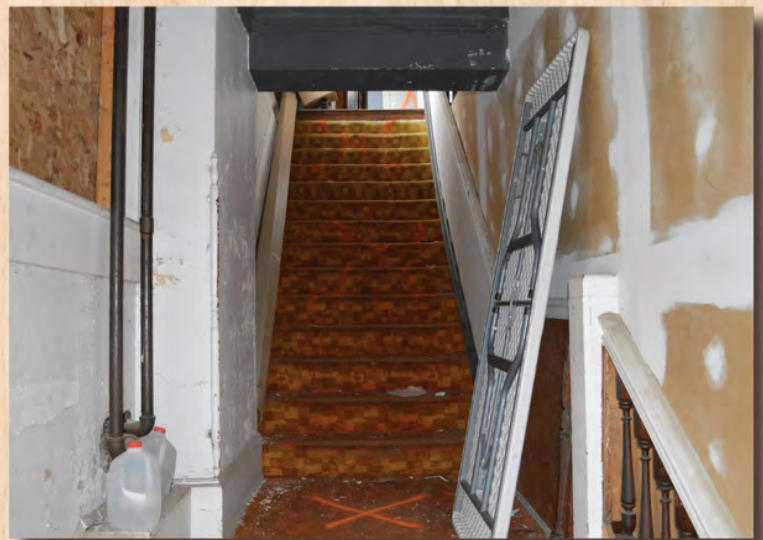
The Center felt strongly it should establish the Media Lab on the empty second floor of an older Main Street-type building. The PA Wilds Design Guide for Community Character Stewardship highlights how important Main Streets are to the economic and cultural well-being of our rural communities. It also highlights the importance of energy-efficient building models. Across the Pennsylvania Wilds region, Main Streets are making a comeback, thanks to innovative entrepreneurs, increasing visitation and robust local and regional revitalization efforts. But second floors are particularly thorny to redevelop. We wanted to interpret and share how we went about our renovation to help demystify the process.



Broadbent-Stiteler Building

PA Wilds Center entered into a lease agreement with the Laughing Owl Press Company, a longtime collaborator in our ecosystem, to put the Media Lab on the second floor of the Broadbent-Stiteler building at 59 N. Fraley Street. The company owners, Joe and Andrea Lanich, had recently bought the historic building and rehabbed the first floor for their craft business. But they weren't sure how they were going to afford renovations to the second or third floors.

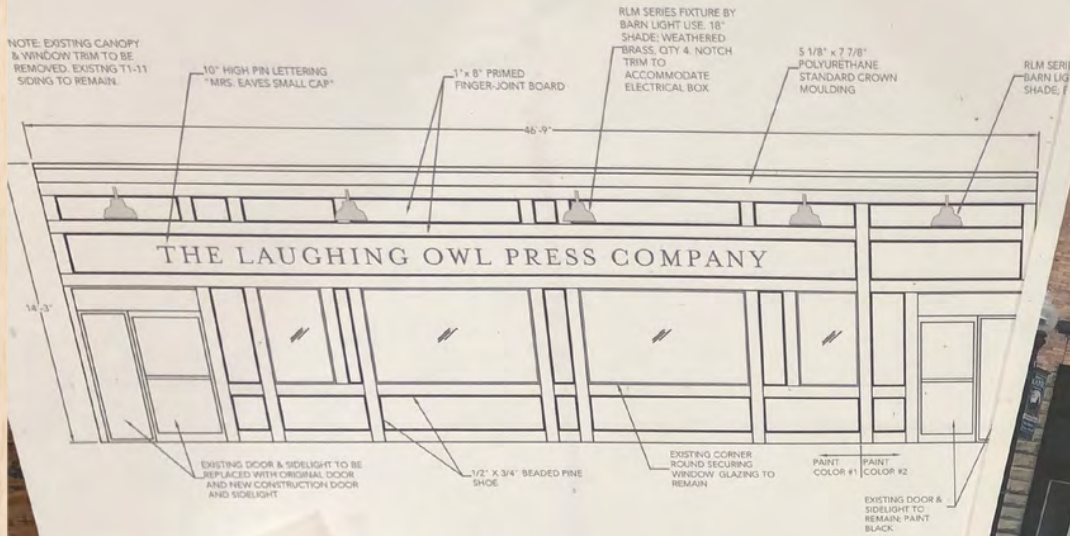
Built in 1906, older buildings like this one are part of the fabric of rural communities, but until restored, they make for lousy collateral with banks. We struck a deal -- a 20-year lease, the first 10 years of it rent-free -- and in exchange, the PA Wilds Center would do its own leasehold improvements. We had our work cut out for us!



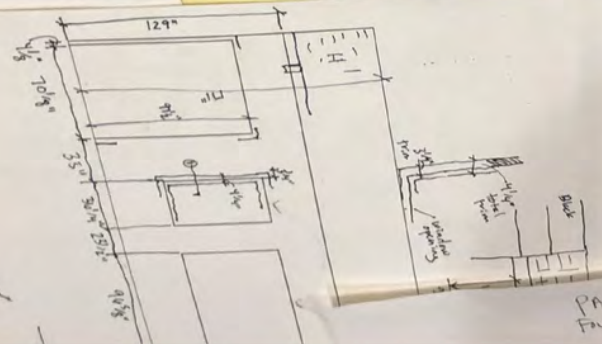
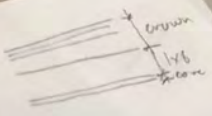
*Project photos for this exhibit by:
Tracy Smith, Sixty Foot Films*

Dec. 1

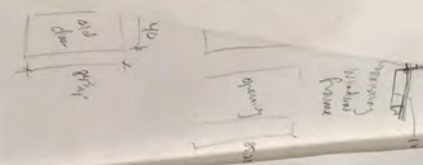
Apex



PROPOSED FACADE ELEVATION



Old door
83x41.5
Old door
87 3/4 x 40



PA Wilds
Founders Club
- w/ center log





How do you make an older Main Street building that hasn't seen any love in a long time energy efficient? We turned to the nonprofit West Penn Power Sustainable Energy Fund (WPPSEF) for guidance. With their support, we brought in Envinity, an energy-focused design and build firm based in State College, to do an energy audit of the building.

Through this process, they examined the building's thermal envelope, mechanical systems and utility bills to establish how the building was using energy and how this could be improved. Among other things, the audit showed that the roof was leaking, the attic had no insulation, and the walls were under-insulated.

With financial support from WPPSEF, and additional investment by the Laughing Owl Press Co., we began to make the Broadbent-Stiteler building more energy efficient. First up was repairing the roof and upgrading the building's thermal envelope. Our general contractor, Luciano & Sons Builders, installed 24 new Energy STAR windows on the second and third floors, and insulated the attic and exterior walls. Insulation is measured using 'R-value' -- the ability of the material to resist heat flow. As the R-value increases, heat loss is reduced. The Broadbent-Stiteler building went from a zero R value in the attic to R-64. The exterior walls in the Media Lab went from 0 to R22. With the thermal envelope complete, we applied and received an "ACT 129 rebate" for the improvements. (See more on these rebates in the display).







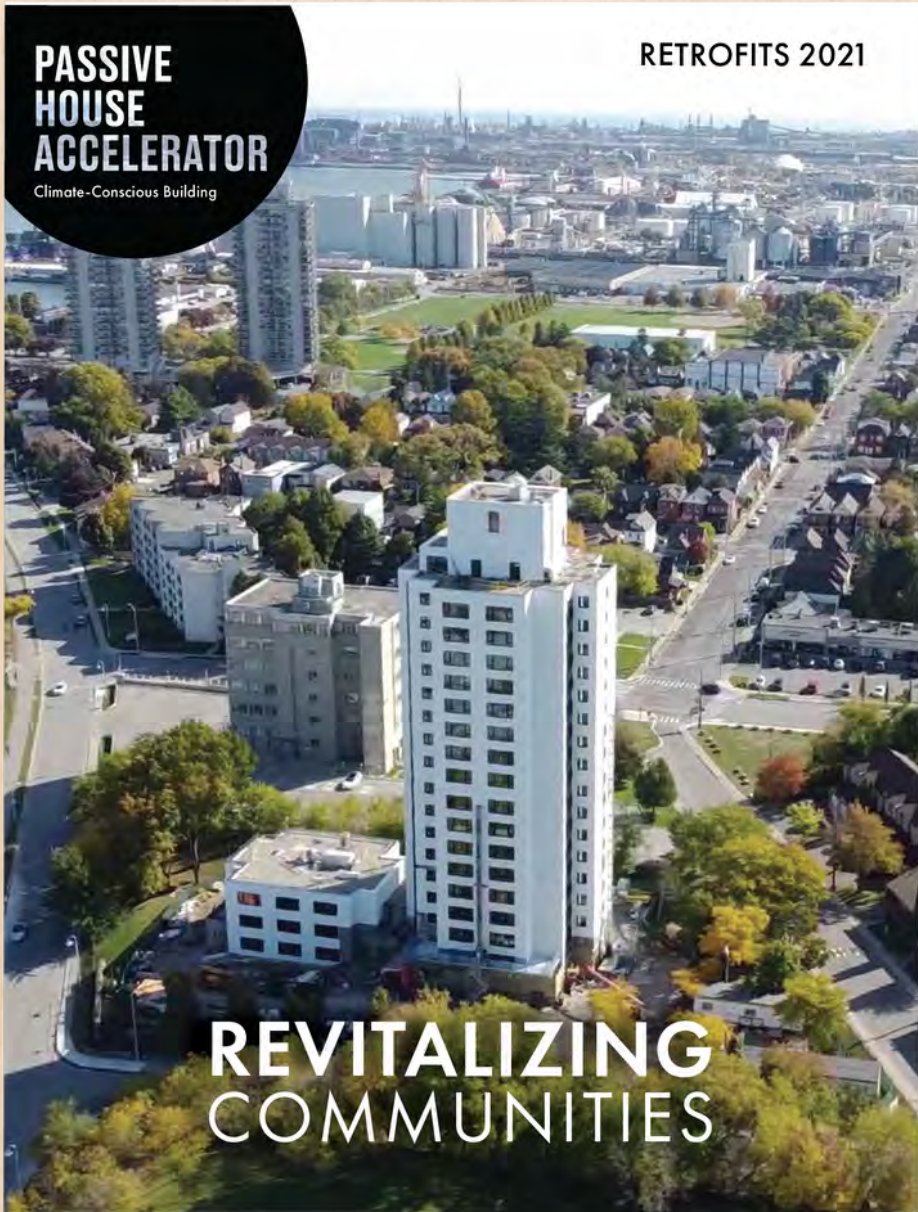


Next up: our heating and cooling system! Our energy audit recommended a ductless mini split system that could provide heating and cooling and a heat recovery ventilator (HRV) to help ventilate the space. While more expensive up front, this more eco-friendly system would result in lower monthly energy bills and fresher air. Our new ductless system would also be flexible, allowing us to set specific temperature controls for each room in the 5000-square foot Media Lab. Today, visitors to the Media Lab often remark that they feel like they are breathing fresh outside air. That's because we are! HRV systems work by removing stale air from inside and replacing it with fresh air from outside. When heated stale air is pulled from the space, it's used to heat or cool incoming fresh air, without cross-contamination.

PASSIVE HOUSE ACCELERATOR

Climate-Conscious Building

RETROFITS 2021



REVITALIZING COMMUNITIES

PASSIVE HOUSE ACCELERATOR // Retrofit 2021 // CASE STUDIES

PA WILDS RETROFIT NEARS the FINISH LINE

PA Wilds



Rending (above) courtesy of Moshier Studio. Photos by Adam Horn



In November 2021 a small commercial Passive House building, dubbed The Wilds, will be completed in the northern Pennsylvania town of Kane. Retrofitted from the shell of an 1897 structure, the revamped energy-efficient building will be used by organizations that support rural economic development while promoting sustainable energy practices throughout the Pennsylvania Wilds. PA Wilds, as it is colloquially known, encompasses over 2 million acres of public land—more than Yellowstone National Park.

At Wilds, we started with the original architect and helped with the analysis of the existing structure. Adam Horn of Emvivi, a design build firm, has taken on the role of project manager. The retrofit is envisioned as a learning opportunity for the local workforce and a chance to feature local and low-embodied-energy materials whenever possible.

From the front, the building will look thoroughly updated, with an entirely new locally-sourced sandstone facade featuring extensive glazing set to be installed next summer 2022. A Passive House-quality curtain wall will extend from the daylight entrance way to the roof. Behind that facade, in addition to promoting low-embodied-energy materials, a good portion of the building is being raised, including the foundation, the party walls, and the three-story brick wall on the back.

The exterior was gutted except for the floor structures. Working around cross-country COVID-19 lockdowns that impeded supplies and the ability to work on-site at times, the team was still able to maintain their vital schedule. Structural concrete has been poured and the exterior brick repair, air sealing and painting was finished by March of this year. The

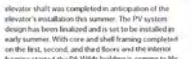
interior shell was completed in anticipation of the elevator's installation this summer. The PV system design has been finalized and is set to be installed in early summer. With core and shell framing complete on the first, second, and third floors and the interior framing started, the PA Wilds building is coming to life once again. On the exterior, the front end and facade design have been finalized and the new sandstone facade has been ordered and is in production.

Since Passive House Buildings magazine first reported on the project in Fall 2020 there have been a few changes to the phased-retrofit plan. The building will no longer have three separate ERVs on each floor but rather one single 3,000 CFM ERV on the roof that serves the entire building. Moshier noted the most difficult part of the retrofit thus far has been the boundary conditions of the structure, particularly at the party walls. He said the trickiest part was the rear end of the wall where it connects with the neighboring building. Another challenge has been mastering the complexity of PHPP for commercial buildings, with planning for rain gain proving especially difficult.

The Wilds is Moshier's first Passive House retrofit, though his previous retrofit projects have attained either top-end code performance certifications. With The Wilds nearing completion, Moshier and Horn are setting their sights on other upcoming Passive House retrofit projects. Her next high-speed residential apartment building is State College, Pennsylvania. Learn more about the Pennsylvania Wilds project in our Fall 2020 story "Pennsylvania Wilds Going for Passive House."

—Sydney Gladis is a freelance writer based in Seattle, Washington

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had been completed by the Wilds Point. The energy-efficient building is set to be completed in early 2022. The construction team set to be completed by the end of the year. The building is set to be completed by the end of the year. The building is set to be completed by the end of the year.

PASSIVE HOUSE METRICS	
Energy use	10.1 kWh/m²/yr
CO ₂ eq. emissions	0.5 t/m²/yr
CO ₂ eq. emissions	0.5 t/m²/yr
CO ₂ eq. emissions	0.5 t/m²/yr
CO ₂ eq. emissions	0.5 t/m²/yr
CO ₂ eq. emissions	0.5 t/m²/yr



SCAN ME



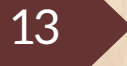
passive
house
buildings

CLIMATE-CONSCIOUS Building

CLT Panels
Wood-Fiber Insulation
Industrialized Retrofits

LOW CARBON CONSTRUCTION

Fall/Winter 2020



Pennsylvania WILDS Goes Passive



Rendering Courtesy of Mobler Studio; photos on opposite page courtesy of WPPSEF



The existing building, pictured in the middle, had been vacant since 2015.

In northern Pennsylvania, in the midst of the Allegheny National Forest, sits the small town of Kane—"A Star in the Forest" made the town famous. That star has now dimmed, and now one more is being added: a gem of a small commercial Passive House building. Renowned from the shell of an 1887 structure, the existing building will be used to support organizations such as the PA Wilds Center for Entrepreneurship, whose mission is to integrate conservation and economic development in a way that strengthens and supports communities across the 125 counties in the Pennsylvania Wilds. PA Wilds is a nationally known conservation and 2 million acres of public land—more than Yellowstone National Park.

The existing three-story masonry building had been vacant since 2015. It was purchased in 2019 by Bradley Lovett, LLC, in collaboration with the Wild From Forest Sustainable Energy Fund (WPPSEF), a nonprofit founded to promote clean power and sustainable energy technologies. Passive House was chosen as the performance goal early on in the process, and the conversion brought in Gary Medsker of Pittsburgh-based Mobler Studio to steer that effort. A local firm, Incaur Architects, has helped with matters of the existing structure. The result is envisioned as an inspiring opportunity for the local workforce and a chance to feature local and low-carboned energy materials, wherever possible.

Julia Morrison, director of the WPPSEF, says that the Passive House project is a centerpiece of the organization's mission, which centers leveraging sustainability for the revitalization and enrichment of communities. "WPPSEF believes it is time to change the conversation about sustainability and sustainable energy to a more robust discussion centered in a progressive way of thinking," he says. WPPSEF is managing the deconstruction of the building's layers, its revitalization, and its operation.

The project is proceeding in two phases. The first phase is the renovation of the core and shell. The second is the finishing of the interior core-progressive systems have been identified. Anticipated uses are retail for the ground floor, offices on the second, and educational servers on the third. Key considerations in tenant selection will be engagement with sustainable practices, according to Barbara Bekke, who manages marketing and communications for the WPPSEF. "The team and PA Wilds again are excited about the project as it would be a huge challenge," she says. The building team can't wait to start, affording maximum visibility for the mission, although Kane is a small town, interest in the region's recreational opportunities has been growing, and a major new railroad is opening there soon.

From the inside, the building will look thoroughly updated, with an entirely new facade featuring extensive glazing and a Passive House quality curtain wall that extends from the deck cantilevering to the roof. Behind that facade, a solid wall is providing the embodied energy materials, a good portion of the building is being erected, including the foundation, the party walls, and the three-story brick wall at the back. The interior was gutted except for the floor structure.

The new front wall, which faces east, will feature a brick brick some chinking. "We're excited that we were able to source a locally quarried stone for the stone," says Bekke. The hand-laid wall runs north of the

main stairway will also showcase local products—multiple and showcased in this case—as will the hand-laid ceiling above the stairway. Mobler is hoping to use reclaimed wood joints from the building for the new entry canopy.

The front facade's large windows will be surrounded by coverings, providing the only shading needed in this relatively cold climate. A thermally broken dip system will be used to attach the cladding to the structural sheathing. The primary air barrier will be on the inside of the sheathing with a water-resistive barrier on its exterior surface overlaid with 8 inches of mineral wool.

Below the front facade, the existing foundation consists of rough-hewn stone resting on bedrock, while the rest has a newly poured slab. New foundation piers were used to increase the floor height. The basement, which will house the utility entrances and possibly basements in the future, is outside of the Passive House envelope. The elevator pit that penetrates into the basement will be thoroughly air sealed and wrapped in mineral wool.

To thermally isolate the basement from the rest of the building, mineral wool will be inserted between the ground floor joists with a continuous layer of rigid insulation below that. A self-adhered membrane on top of the subfloor will be the air barrier.

The brick party walls have been repaired and are being coated on the interior in a water-based acrylic air barrier, allowing for an exposed, painted brick aesthetic on the interior. The party walls will only need insulating in a few places to eliminate potential thermal bridging issues. An air barrier membrane will function as the transition from the walls to the taped sheathing layer in the roof assembly. The rear masonry wall will be insulated from the exterior, most likely with an exterior insulation and finish system.

Three ERVs will be used to separately ventilate each floor of this all-electric building. Although one centralized ERV might have been sufficient, the flows are anticipated to be taxed by three different tenants and put in different zones, and separating the ventilation systems diminishes the possibility of cross-contamination—a particularly important benefit in the time of Covid.

Supplemental heating and cooling will be provided by a variable refrigerant flow system. As the demand for hot water will be relatively small, an electric-resistance water heater can meet the requirements without pushing the total energy demand beyond Passive House limits. The group is excited to field a demonstration of how energy efficiency in design can smooth the transition to all-electric buildings. "In some cases, we are saving money," Medsker points out. "Because we would have had to re-establish a gas line to the building."

In keeping with WPPSEF's mission, there will be a 15-kW PV array on the rooftop, which should produce enough renewable energy to power the building's load on an annual basis. This big contribution from the PV system is allowing the project to get certified using the Primary Energy Renewable criteria.



Historic photo of the existing building, circa 1930-1940.

The building renovation has been proceeding in phases, interrupted at times by pandemic-related shutdowns. From so, the building shell retrofit work is expected to be completed by late fall. Occupancy should begin by next fall, hopefully in time for an anticipated influx of visitors to Pennsylvania's winter region.

—Mary James

To stay updated on the progress of this retrofit in the PA Wilds region, visit www.facebook.com/kanepassivehouse/.

Passive House METRICS

	Heating energy	Cooling energy	Total space energy	Air leakage
WPPSEF '19	5.84	2.07	68.2	10 ACH ₅₀
WPPSEF '20	1.02	0.02	15.9	0.6 ACH ₅₀
WPPSEF '21	12.25	11.06	142.8	



Shortly after investing in the Media Lab, WPPSEF purchased the building next door (which was vacant and had pigeons living in it) and its Board of Directors voted to renovate it to “Passive House” standards. Passive House is an approach that focuses heavily on a building’s thermal envelope and results in ultra-low energy buildings that require little energy for space heating or cooling. WPPSEF’s inspiring project, named “Six & Kane,” has garnered national and international attention for being one of the first Main Street commercial retrofits in America done to Passive House standards. The project has also led to innovative workforce development locally (hear more about that story in the display video, “The Wilds Are Working: New Energy Ideas Helping to Revitalize Rural Communities”). WPPSEF’s Six & Kane investment also helped us solve one of our biggest challenges at the Media Lab -- how to make the second-floor more accessible. WPPSEF installed a new shared elevator. Learn more about our shared elevator model in the display.







Partnerships were key to establishing the Media Lab. Funders who helped us with renovations included WPPSEF, United States Department of Agriculture, The Richard King Mellon Foundation, The Collins Companies Foundation, The Conservation Fund, and Northwest Bank. The U.S. Economic Development Administration and North Central Regional Planning and Development Commission assisted us with outfitting the space with technology. The PA Department of Conservation and Natural Resources, a core partner in the regional effort to establish the PA Wilds as a premier outdoor recreation destination, helped us cover Center staff time to manage the project. Many additional in-kind donations were made by Laughing Owl Press Co., Envinity, Allegheny Hardwoods Utilization Group, Joe's Props Shop, Sixty Foot Films and many volunteers!





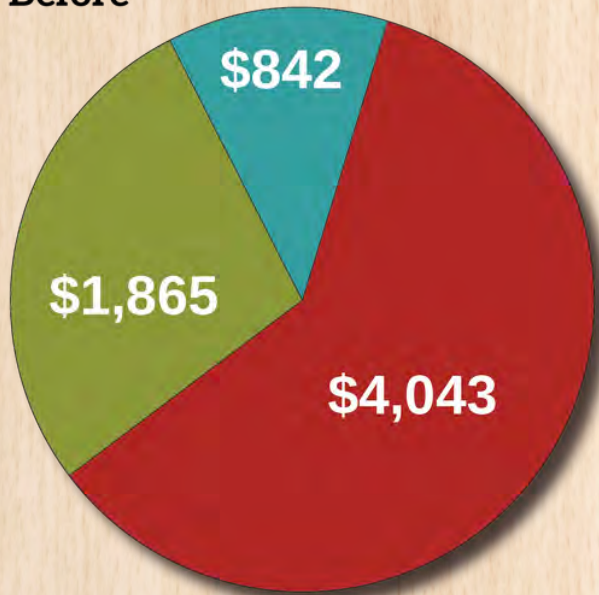




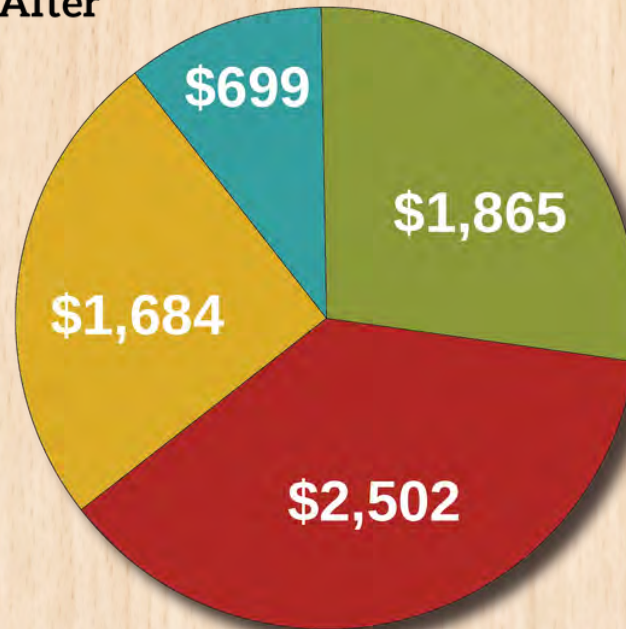
Before + After Energy Consumption

The energy improvements made at the Media Lab will significantly reduce our energy consumption - helping the environment and our bottom line while also improving the comfort of those using the space.

Before



After



- Cooling
- Heating
- Appl/Itg
- Savings



Learn more about the PA Wilds Media Lab by visiting WildsCoPA.org/media-lab/

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