GREAT LAKES BUILDING INNOVATIONS LLC.

SOLAR • AEROBARRIER • RADIANT HEAT PANELS

GREEN BUILDER

AEROBARRIER®

Air Sealing Technology from Aeroseal

(248) 793-5356 • WWW.ECOTEKSUPPLY.COM

Meet Any ENERGY STAR®, LEED, Passive House or Net Zero Requirement Consistently

SINGLE FAMILY BUILDINGS

MULTI-FAMILY BUILDINGS

COMMERCIAL & MUNICIPAL BUILDINGS

ZERO ENERGY READY HOME U.S. DEPARTMENT OF ENERGY PARTNER

UL GREENGUARD GOLD

PH

AEROBARRIER®
Air Sealing Technology from Aeroseal

EXPERIENCE THE Benefits of AeroBarrier

Measurable Results

As AeroBarrier is applied, the results are displayed in real time. By incorporating a blower door, the AeroBarrier system is able to dial in your desired leakage. It's that easy and verified upon completion.

Fast & Easy to Apply

From start to finish, the sealing process takes 60-90 minutes. In new construction applications, prep and clean up time is minimal – typically taking less than an hour. Once set up, the AeroBarrier machine takes over and manages the sealing process through completion.

Cost-Effective

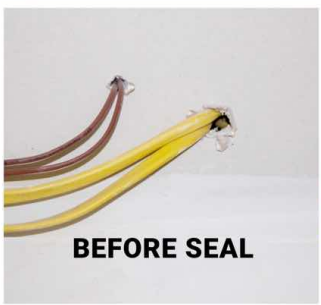
No more caulking needed to weatherize a space pre-drywall. Meet and verify air tightness requirements in real time, avoid sealing guesswork, and save on time, material and labor.

Durable

Sealant achieves durability performance in 3 key areas: flexing, aging and compatibility in tests simulating 50 years of service.

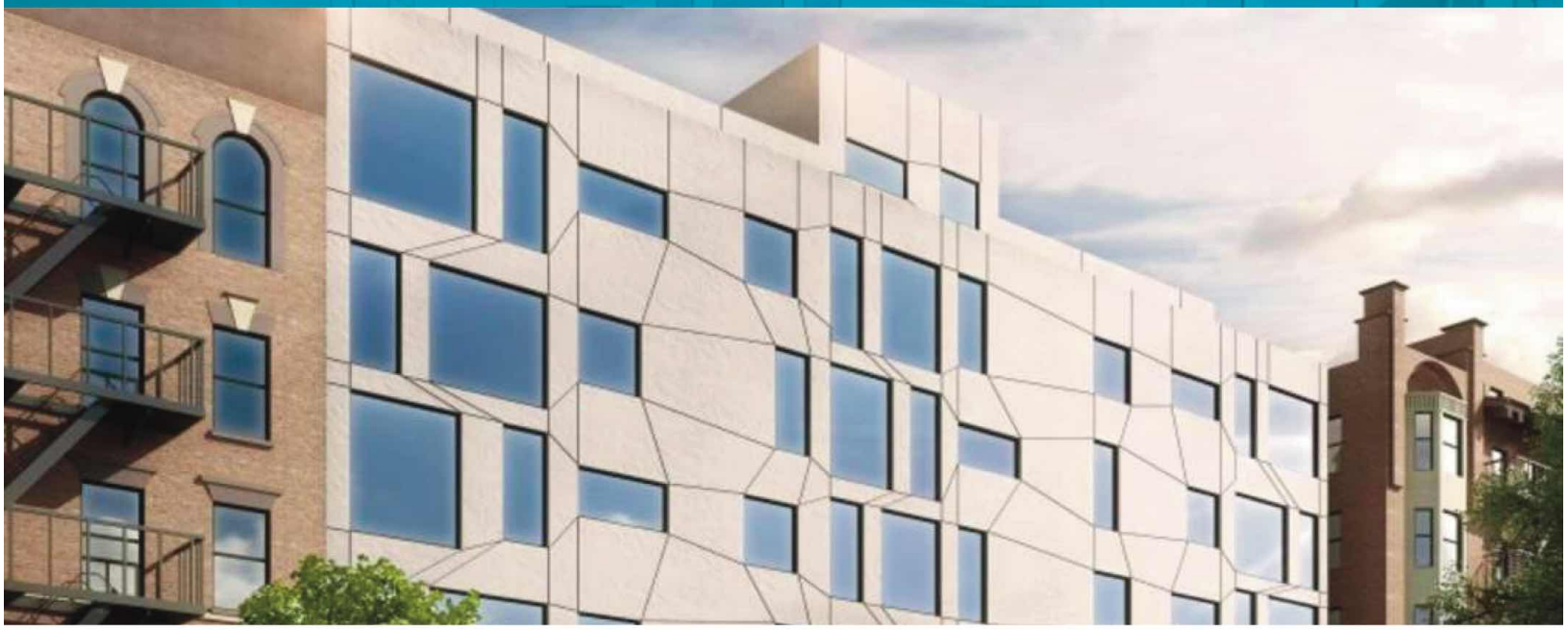
Safe

GreenGuard Gold certified with Ultra-low VOC content and no off-gassing. Work can resume in the home within 30 minutes.



CASE STUDY

Multi-Family Passive House



PROJECT OVERVIEW

PROJECT
153rd St Apartments

BUILDER
Synapse Development Group

ARCHITECT
Chris Benedict, R.A.

LOCATION
Upper West Side, Manhattan

RESULTS
Using AeroBarrier, 34 units were sealed to passive house levels of 0.6ACH50 in just 8 days.

AeroBarrier Allows Engineers to Easily Attain Desired Tightness for Energy Efficiency, Comfort, and Livability

Air Sealing Technology Makes Effective Compartmentalization Simple for New York Apartment Building Project

For New York-based architect Chris Benedict, compartmentalization is the holy grail of apartment building design. As a recognized pioneer in energy efficient building, she understands that effectively sealing the envelope that exists between apartments is not only critical for maximum energy efficiency, but it's also key to ensuring indoor air quality and limiting the migration of bugs, smoke, noise, and other common tenant discomforts that can travel from one unit to another.

That's why Benedict was unhappy to learn her latest project, a newly constructed six-story apartment building on Manhattan's upper west side, did not meet the passive house-levels of tightness targeted by her design.

> It was blowing people's minds – mostly because monitoring compartmentalization in a multi-family building under construction is typically a very difficult, time consuming task. The level of coordination and commitment you need to get from all contractors on the job is as critical as it is nearly impossible to achieve. With AeroBarrier, it's simply not a problem.
>
> **Chris Benedict** – *Architect*
> *CBRA*

AEROBARRIER®
Air Sealing Technology from Aeroseal

225 Byers Road, Suite 1
Miamisburg, OH 45342
877-959-8421
info@aerobarrier.net

AEROSEAL.COM/AEROBARRIER

While the manual caulking implemented by contractors got them close, it did not meet the industry's highest standard. Now with plumbing, electrical and sheet rock installation finished, the building was almost finished and further manual sealing was impractical and would delay project completion.

Fortunately, Benedict had heard about the AeroBarrier process. The AeroBarrier system allowed precise levels of tightness to be dialed in. After AeroBarrier proved successful at sealing a test unit, contractors sealed the remaining apartments within the building.

The ability to monitor compartmentalization in a multi-family building under construction is typically a very difficult, time-consuming task. The level of coordination and consistency you need to get from all of the contractors on the job is critical yet hard to achieve. With Aerobarrier, that is simply not a problem.

It took the AeroBarrier team just 8 days to seal all 34 units to passive house levels of 0.6 air changes per hour at 50 Pascals pressure (ACH50). Blower door tests conducted after the application of the AeroBarrier technology confirmed the results – AeroBarrier was a project-saving success.

CASE STUDY

Multi-Family Development Goes Solar

PROJECT OVERVIEW

PROJECT
Soleil Lofts, a 600-Unit Multi-Family Building

BUILDER
The Wasatch Group

CONTRACTOR
AeroBarrier West

LOCATION
Herriman, UT

RESULTS
Pre-Leakage: 10 ACH_{50} average per unit

Post-Leakage: < 1 ACH_{50} per unit

Rebates added up to more than the cost of AeroBarrier – a 150% return on investment

600-Unit Multi-Family Development Goes Solar Using AeroBarrier

The Wasatch Group knew Soleil Lofts was an ambitious project during the design phase. A first of its kind development, featuring 600 solar powered, all-electric apartment units certainly sounds ambitious. But a unique issue was driving the Salt Lake City real estate developer.

Winter Air Quality Issues Drive Net Zero Design

The picturesque mountain ranges surrounding the Salt Lake area create a valley and, during the winter months, inversions. Inversions are when warmer air above the valley traps cooler air near the ground. Fine particulate emissions are trapped in the cooler air, creating a smoggy haze, and decreasing air quality. Soleil Lofts had to be a net zero development – addressing this issue without contributing to it.

"We knew we had to reduce energy consumption by 50 percent to support solar," said Josh Roy, Wasatch Group's Vice President of Sustainability. "The AeroBarrier technology consistently gave us the results we needed. By making air sealing a dependable process, we were able to make changes in the design phase that were critical to this project's success."

> The AeroBarrier technology consistently gave us the results we needed. By making air sealing a dependable process, we were able to make changes in the design phase that were critical to this project's success.

Josh Roy
The Wasatch Group

AEROBARRIER®
Air Sealing Technology from Aeroseal

225 Byers Road, Suite 1
Miamisburg, OH 45342
877-959-8421
info@aerobarrier.net

AEROSEAL.COM/AEROBARRIER

AeroBarrier Makes Short Work of Party Walls

Shared walls between multifamily homes are an issue for builders and homeowners alike. They are more difficult to air seal effectively, leading to issues when trying to meet code. And research from the University of Toronto shows up to 20 percent of a neighbors' air can transfer into a home through a shared wall. That's why sounds and smells seem to infiltrate multifamily homes so easily.

The issue has been accepted as unavoidable, with no reliable solution, until AeroBarrier. By sealing the various gaps in shared walls, odors from air infiltration are stopped and sounds are also mitigated. These issues aren't always high on the builders or homeowners list of concerns – if at all. But Josh Roy, Wasatch Group's Vice President of Sustainability, has seen AeroBarrier's sound mitigation improve the home-buying experience.

"Going into a fully-furnished unit with AeroBarrier, you notice the difference," said Roy. "It signals you're in a well-built, quality home."

For solar to work, energy storage was also paramount. Wasatch addressed this by creating a "virtual power plant" – a network of battery storage systems managed by the local utility. When it came to energy reduction, Wasatch explored multiple options.

Air Sealing Unlocks Savings During Design Stage

"We looked at other energy efficiency measures, including lighting and appliances, but energy modeling showed us they aren't as cost-effective as air sealing," said Roy.

AeroBarrier was chosen because the project needed a level of consistency and precision not seen in manual air sealing. Wasatch was relying on the air sealing process for more than simply meeting code.

"During the design phase, we realized if air sealing could bring all 600 units could down to a 1 ACH_{50} we could reach our performance goals with HVAC systems half the size we originally planned," said Roy.

The AeroBarrier technology emits precise levels of safe, non-toxic sealant mist into the pressurized space, automatically drawing the sealant to leaks around windows, drywall, electrical outlets, recessed lighting, and other areas.

"AeroBarrier gave us the confidence to not overcompensate with an oversized HVAC system to hit our performance goals. This cut our HVAC costs in half and reduced the amount of capital invested in mechanicals."

Utility Rebates Deliver a 150% ROI

AeroBarrier air sealing helped Soleil Lofts qualify for several different utility rebates. In fact, the rebates added up to more than the cost of AeroBarrier – a 150% return on investment.

The rebates are just part of the impact air sealing has had on this project. There have been no homeowner issues or callbacks due to comfort. Since they're able to stay comfortable year-round without pushing their mechanicals to the limit, homeowners are seeing utility savings and getting longer life from their HVAC systems. And during the winter months, no pollution is infiltrating their home, while ERVs ensure they have clean and healthy indoor air.

"AeroBarrier makes it possible to cost-effectively create a high-performance home using standard quality materials," said Roy. "It's exceeded our expectations and our architects have added it as a specification for future projects."

And if there were any doubt The Wasatch Group more than achieved the ambitious goals set for this project, the all-electric, solar-powered multifamily community is also one of Utah's largest net zero projects.

> AeroBarrier gave us the confidence to not overcompensate with an oversized HVAC system to hit our performance goals. This cut our HVAC costs in half and reduced the amount of capital invested in mechanicals. AeroBarrier makes it possible to cost-effectively create a high-performance home using standard quality materials. It's exceeded our expectations and our architects have added it as a specification for future projects.

Josh Roy
The Wasatch Group

AEROBARRIER®
Air Sealing Technology from Aeroseal

225 Byers Road, Suite 1
Miamisburg, OH 45342
877-959-8421
info@aerobarrier.net

AEROSEAL.COM/AEROBARRIER

CASE STUDY

"Sunset at Sarsons" Residential Home

PROJECT OVERVIEW

PROJECT
Residential Home

BUILDER
Edward West Luxury Homes

CONTRACTOR
Okanagan AeroBarrier

LOCATION
Kelowna, British Columbia

RESULTS
Pre-leakage: 2.2 ACH50

Post-Leakage: 0.58 ACH50

Reduction: 75%

BC Home Builder Shrinks Mechanical Costs 20% with AeroBarrier Air Sealing

Like most cities in North America, COVID-19 has brought uncertainty to British Columbia's housing market. Smart builders are using this disruption to their advantage, finding new ways to differentiate their homes by finding the ideal mix of value, quality, and comfort.

Edward West Luxury Homes is a perfect example of this trend. This family-owned, custom home builder is based in Kelowna, BC. Just 90 miles from the United States border, the city sits on Okanagan Lake and offers homeowners world-class vineyards, great weather, beaches and even ski hills.

Making Air Sealing a Non-Issue

"In addition to offering comfort and beauty, our homes are sustainable and efficient," said Edward West's Sebastian Motora. "We knew air sealing was critical to achieving this goal. But we had to make sure our approach would be efficient, affordable, and effective."

> The consistency and precision of AeroBarrier air sealing eliminates many unknowns from the home building process. We use it to air seal every home we build. Air sealing ensures a home exceeds code requirements and reaches efficiency goals using a smaller HVAC system. This reduced our mechanicals cost by 20 percent, saving us $10,000.

Sebastian Motora
Edward West Luxury Homes

AEROBARRIER®
Air Sealing Technology from Aeroseal

225 Byers Road, Suite 1
Miamisburg, OH 45342
877-959-8421
info@aerobarrier.net

AEROSEAL.COM/AEROBARRIER

> Thanks to AeroBarrier, offering a high-performance home is no longer a trade-off requiring you to sacrifice a homeowner amenity to cover the cost. In fact, by not having to upgrade the HVAC system and other benefits, air sealing is now a competitive advantage.

Sebastian Motora
Edward West Luxury Homes

As a result, Motora experimented with several varieties of air sealing before settling on AeroBarrier.

"We spent thousands of dollars and hundreds of labor hours on expensive tapes and mechanically fastened air barriers," said Motora. "But the results were inconsistent and, often, ineffective."

The AeroBarrier system can dial in and measures building envelope performance. Once the building envelope has been pressurized, AeroBarrier atomizes precise levels of non-toxic sealant mist that is automatically drawn to any leaks. The process is proven safe, using a water-based sealant that has no off-gassing.

Once desired tightness has been achieved, the system's software prints out a certificate to verify results and shows before and after ACH levels. It is faster, simpler and more effective than the imprecise and inconsistent nature of manual envelope sealing and provides guaranteed results.

"The consistency and precision of AeroBarrier air sealing eliminates many unknowns from the home building process. Knowing this technology will deliver allows us to plan around air sealing. AeroBarrier has given us a new level of flexibility and cost savings; we use it to air seal every home we build."

Air Sealing Impacts HVAC Design

A recent Edward West project showed the impact of AeroBarrier air sealing on HVAC system design. Two spec homes were being built next to each other, one with a more modern design and the other a more traditional aesthetic. The HVAC contractor would not initially right size the HVAC system based on the lower ACH from a tighter building envelope.

"The traditional home's HVAC system was sized based on an ACH greater than five," says Motora. "It was a larger system, designed to compensate for envelope leakage. The modern home's HVAC system was right sized based on an ACH of 0.59. Air sealing ensures the home exceeds code requirements and reaches efficiency goals using a smaller HVAC system. This reduced our mechanicals cost by 20 percent, for a savings of $10,000."

In addition to cost-savings, a smaller HVAC system fits better in the floor joists, eliminating the need for space wasting bulkheads.

Air Sealing: A Builder's Competitive Advantage

In addition to cost savings, air sealing has brought Edward West several other benefits.

Increased:

- Comfort
- Open Space in the Home
- Indoor Air Quality
- Energy Rebates

Decreased:

- Noise and Odors
- Space Wasting Bulkheads
- Dust and Pollutants
- Utility Costs

The housing market will always fluctuate. And codes will continue to change, increasing the builder's requirements. But Edward West Luxury Homes is ready.

CASE STUDY

Exceeding Code Requirements

PROJECT OVERVIEW

PROJECT
The Baymont Townhome Community

BUILDER
Isola Homes

CONTRACTOR
Ekovate

LOCATION
Seattle, WA

RESULTS
Pre-leakage:
9.28 ACH_{50} avg. per unit

Post-Leakage:
1.49 ACH_{50} avg. per unit

Isola Homes Exceeds Code Requirements Using AeroBarrier

Isola Homes has built a successful business by making every one of its homes and townhomes environmentally friendly. The Seattle-area housing market has always been dense with homes and competitors marketing their own green housing. And compared to other markets nationwide, Seattle's homeowners are highly aware of green homebuilding, moving sustainability to their must-have lists.

These factors are what drive Matt Deveny, Isola Home's Vice President of Construction. Deveny is part of Isola Homes' constant, exacting focus on improving their homes in ways that exceed customer and code requirements to set the builder apart.

Contractors are Key in Reaching Green Goals

"Our homes must improve energy use by 20 percent over codes," said Deveny. "So Isola Homes works closely with contractors to find smarter ways to achieve project goals."

The 20 percent goal is part of the Built Green program. It certifies homes that exceed Washington's state and county building codes using a rating system. Isola Homes projects are designed to earn a four-star Built Green rating.

> The ability to dial in tightness and knowing you'll pass the blower door test every time is why Isola Homes uses AeroBarrier.

Matt Deveny – *Vice President of Construction*
Isola Homes

AEROBARRIER®
Air Sealing Technology from Aeroseal

225 Byers Road, Suite 1
Miamisburg, OH 45342
877-959-8421
info@aerobarrier.net

AEROSEAL.COM/AEROBARRIER

> Making air sealing a consistently effective process made the blower door test a non-issue.

Matt Deveny
Isola Homes

The steps the builder was taking to achieve this rating included having contractors seal the drywall using caulk. This added step was proving problematic.

"The drywall contractors would sometimes forget the extra step," said Deveny "We wound up assigning someone on our crew to police the work to make sure it got done and sometimes we even had to caulk around outlets and penetrations if we did not pass the blower door test."

Making Air Sealing a Consistent, Reliable Process

Deveny turned to Tadashi Shiga for help finding a different solution. Shiga is owner of the energy rating and contractor firm Ekovate. They introduced AeroBarrier air sealing technology to Isola Homes as a way to eliminate this issue.

"We had to see it for ourselves to believe AeroBarrier was a viable option," said Deveny. "Ekovate showed us the air sealing process at one of their projects. The ability to dial in tightness and to know you'll pass the blower door test every time is why Isola Homes uses AeroBarrier."

After Isola Homes began using AeroBarrier, the builder eliminated manual drywall sealing and also saw benefit in being able to schedule around air sealing – a now consistent process;

"Not passing the blower door test was more than an inconvenience," said Deveny. "It slowed down the handoff to the homeowner. Making air sealing a consistently effective process made the blower door test a non-issue."

Helping Homeowners See Benefit of Air Sealing

Isola Homes now uses AeroBarrier on 100 percent of its homes and markets this fact to potential homeowners. Its marketing team uses social media and simple, in-home signage to alert potential homebuyers it's been air sealed.

In addition to signaling the extra steps Isola Homes takes to save energy, this also details the impact it has on the home's comfort. In such a dense housing market, many of the builder's townhomes are near street traffic. AeroBarrier's ability to dampen sound makes for a quieter home. And without air from outdoors or the neighbors infiltrating the home, the home's indoor air is also cleaner and healthier.

With its four-star Green Built homes making homeowners happy, Isola Homes is standing out from other builders. But like any successful business, their focus on regular process improvements will continue.

CASE STUDY

Energy Efficient, Healthy Homes

PROJECT OVERVIEW

PROJECT
3-Story Rowhomes

BUILDER
Thrive Home Builders

CONTRACTOR
Rocky Mountain AeroBarrier

LOCATION
Wheat Ridge, CO

RESULTS
Pre-leakage: 5 ACH50

Post-Leakage: 1.6 ACH50

Reduction: 70%

Thrive Home Builders Eliminates Stress of Meeting Code with AeroBarrier

Home builders in the greater Denver area deal with exacting air tightness levels. While some builders might avoid cities with strict enforcement of low air tightness levels, Thrive Home Builders has turned this challenge into an opportunity. In fact, continuous innovation has differentiated Thrive locally and established it as a nationally recognized pioneer.

"We felt it was important to build a brand around energy-efficient homes," said Bill Rectanus, Thrive's Vice President of Home Building Operations. "Making it an option for homeowners doesn't work. But they will pay for a better home. We made energy efficiency a brand standard, regardless of price point."

As a result, every new Thrive home is designed to meet the highest standards, including LEED®, EPA Indoor airPLUS, Zero Energy Ready Homes, and Energy Star®. This has fueled innovation at Thrive – innovation focused on better ways to create healthy, energy-efficient homes within these standards.

> In addition to sound and odor mitigation, AeroBarrier ensures air from each garage doesn't infiltrate any of the homes.

Bill Rectanus – *Vice President of Home Building Operations*
Thrive Home Builders

AEROBARRIER®
Air Sealing Technology from Aeroseal

225 Byers Road, Suite 1
Miamisburg, OH 45342
877-959-8421
info@aerobarrier.net

AEROSEAL.COM/AEROBARRIER

> AeroBarrier's made our Construction Superintendents' lives less stressful. Eliminating worry about certification is a major benefit.
>
> **Bill Rectanus**
> *Thrive Home Builders*

Air Sealing Solves Multiple Issues

Thrive's innovation extends to air sealing, using AeroBarrier to reach 3 ACH50 airtightness with the rowhomes at its West Ridge community in Wheat Ridge, Colorado. These three-story, solar-powered homes come with attached garages.

Prior to AeroBarrier, Thrive was having issues with the garage separation walls. They were failing inspection and requiring the installation of fans to pass reinspection – an expensive, unsustainable solution.

"Our townhomes are grouped together in four, five and six units" said Rectanus. "This makes for a lot of shared walls. In addition to sound and odor mitigation, AeroBarrier ensures air from each garage doesn't infiltrate any of the homes."

AeroBarrier emits precise levels of safe, non-toxic sealant mist into the pressurized space, automatically drawing the sealant to leaks around windows, drywall, electrical outlets, recessed lighting, and other areas. The computer-guided process allows tightness to be dialed in and is faster, simpler and more effective than the imprecise and inconsistent manual envelope sealing.

AeroBarrier Passing Tests, Reducing Stress

After Rocky Mountain AeroBarrier applies AeroBarrier for Thrive, finishes are applied before the home's final certification test. An independent energy rater must certify the home's air tightness before it can be handed off to its owner.

"Certification is the final hurdle for our projects," said Rectanus. "AeroBarrier consistently passes the blower door test. It's made our Construction Superintendents' lives less stressful. They know they're going to pass and won't have to scramble to fix any unforeseen issues. Eliminating this issue is a major benefit."

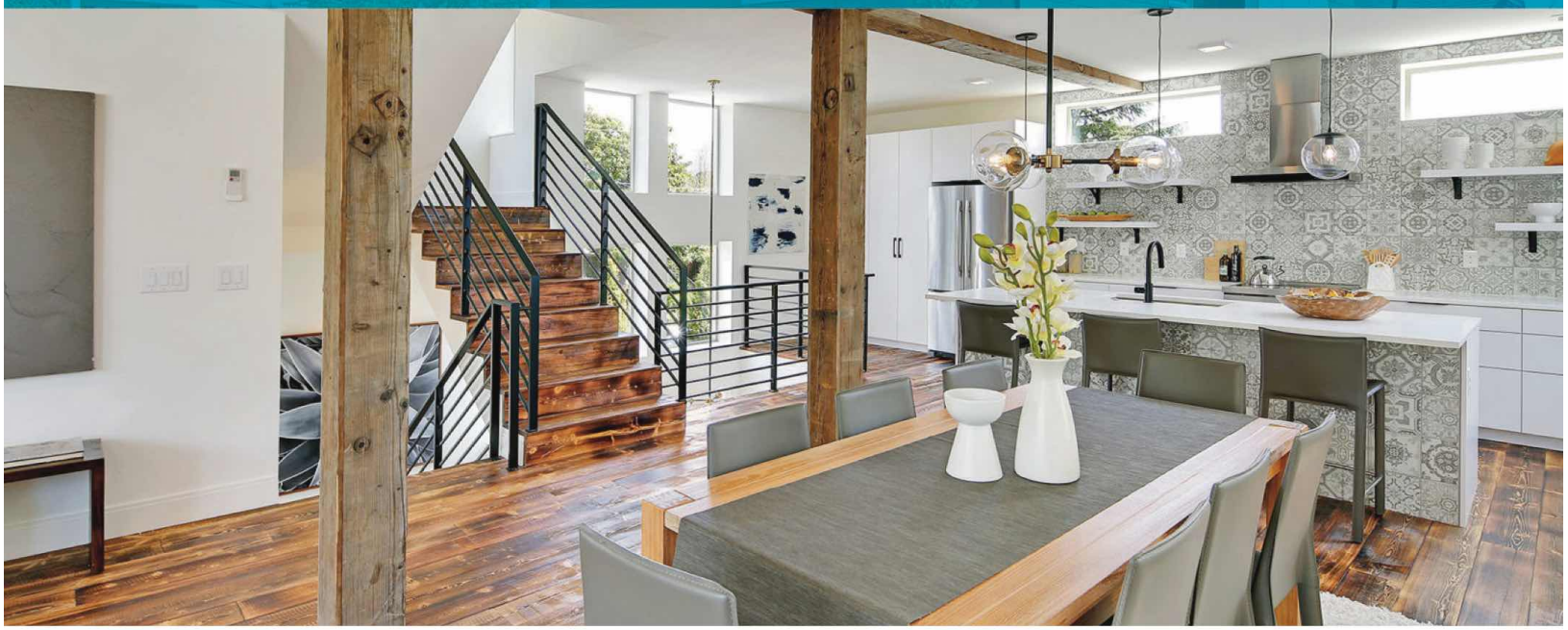
Thrive Focused on Continuous Improvement

Thrive has evolved to make energy-efficiency a competitive point of difference. But the home builder understands this evolution must continue. As a result, Thrive will not rest in its search for ways to improve its homes.

This restlessness and focus on innovation are clearly paying off for Thrive. In addition to being singled out for multiple industry awards, its application of air sealing with garage separation walls is being studied by the Department of Energy.

CASE STUDY

High Performance Homes



PROJECT OVERVIEW

PROJECT
Residential Home in Seattle's Jackson Place Neighborhood

BUILDER
Dwell Development

LOCATION
Seattle, WA

RESULTS
Post-Leakage: 0.22 ACH50

Achieved a 45 HERS index pre-solar (30% better than code). Reaching .22 ACH is now easy and affordable.

Dwell Development is Reinventing Housing, & Using AeroBarrier to Achieve 0.22 ACH50

Seattle is famous for homegrown companies that reinvent and disrupt industries, such as Starbucks and Amazon. Now, Dwell Development is reinventing housing and using AeroBarrier in the process.

Seattle's Jackson Place is the location of a single-family sustainable new build, by Dwell Development, called King Street. The lot is the site of a home built in 1929, and the location is within walking distance of downtown, the Seattle streetcar, Beacon Hill, and Amazon headquarters.

A trend for the neighborhood, developers generally scrape a lot and build five or six townhomes. Anthony Maschmedt, Principal of Dwell Development says, "Rather than be like everyone else and scrape the entire lot, we chose to preserve the existing home and build a single-family home where the garage was located." Scraping the entire lot and building multiple units may lead to greater profits, says Maschmedt, "from an economic standpoint other builders are going to say we are leaving money on the table, and we

> AeroBarrier is the top project that I've seen in the past ten years for making these homes healthy and more energy efficient. It means faster projects. It means saving money. But also it means better homes. It will literally change the marketplace.

Tadashi Shiga – *Owner*
Evergreen Certified

AEROBARRIER®
Air Sealing Technology from Aeroseal

225 Byers Road, Suite 1
Miamisburg, OH 45342
877-959-8421
info@aerobarrier.net

AEROSEAL.COM/AEROBARRIER

> AeroBarrier is the most important product that a [builder] trying to meet passive house standards could use. It eliminates all of the guesswork.
>
> **Anthony Maschmedt** – *Principal Dwell Development*

probably are. But we look at the big picture. We look at the neighborhood and its people. We are looking at it from a community standpoint and the right thing to do."

While other builders in Jackson Place tear down existing homes and replace them with multiple units, Maschmedt is doing the opposite. This sort of contrarianism is a common theme for Dwell. The Dwell motto is, 'always lead, always challenge, always stride to do more.' For the past ten years, this is exactly what Maschmedt and his team have done.

The Decade of Dwell Development

Since 2008, Dwell has built over 200 homes. Since the beginning, Maschmedt's business model could be labeled that of a contrarian; "If everyone is selling vanilla ice cream, we are going to sell chocolate, we will stay true to our motto and differentiate," says Maschmedt.

In 2008, and determined to build the most high-performance home, Maschmedt contacted Tadashi Shiga from Evergreen Certified. During the real estate crisis of 2008, Shiga left his brokerage to launch a leading home performance firm in the Northwest, providing services that include energy rating, third-party verification, and energy modeling. Shiga and Maschmedt shared a passion for sustainable development, both choosing the niche at a time when it was not popular.

During this early period, Maschmedt challenged Shiga to research innovative technologies and energy efficient design strategies, helping to create what we today know as Dwell Development – homes that are reclaimed modern and emphasize innovation and thoughtful design. That's when Maschmedt and Shiga discovered AeroBarrier.

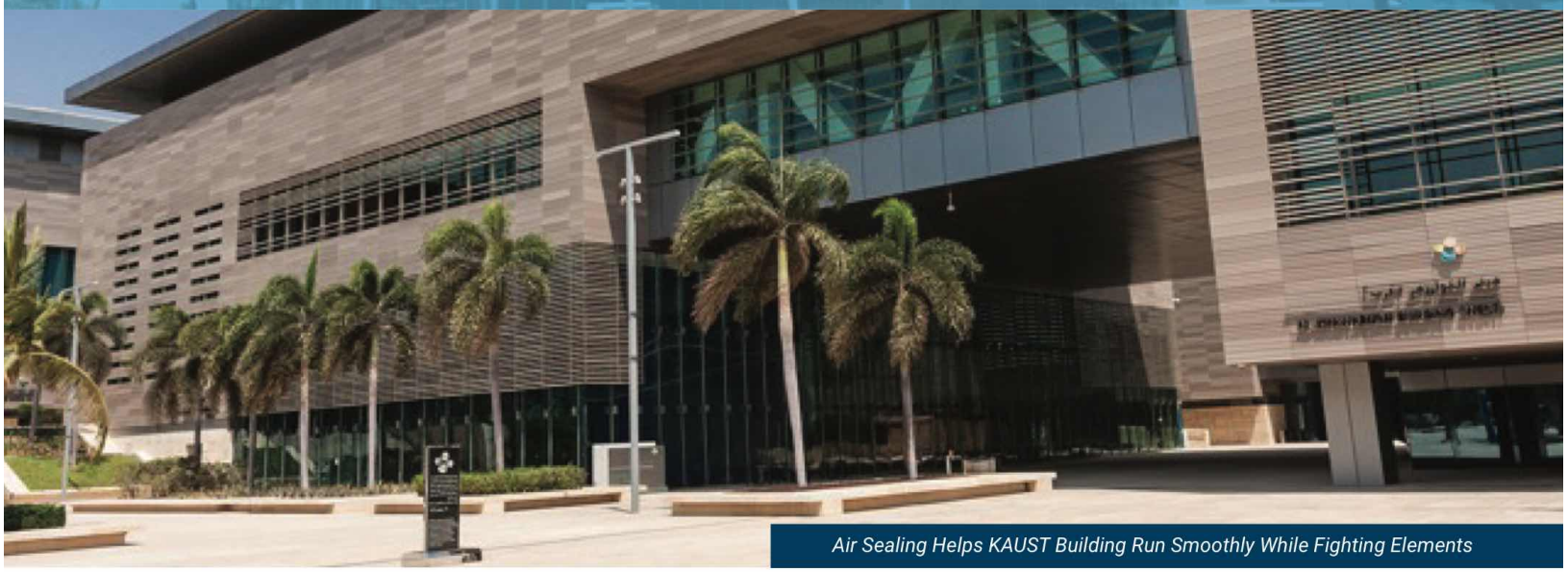
Certifications, Ratings, and Performance

King Street achieved a 45 HERS Index pre-solar (30% better than code). Shiga says the superior energy efficiency is accomplished with innovative wall systems, thermal barrier strategies, hybrid water heating, .28 U-value windows, and advanced envelope sealing technology.

The advanced sealing technology is accomplished by using AeroBarrier, making a 0.22 ACH50 easy and affordable, with no disruption to the construction schedule. With the addition of a 7kWh solar array, King Street achieved zero energy. After the initial success of AeroBarrier on the King Street project, Dwell has used the sealing technology on all of its houses.

CASE STUDY

Al Khawarizmi Building
King Abdullah University of Science and Technology, Saudi Arabia



Air Sealing Helps KAUST Building Run Smoothly While Fighting Elements

PROJECT OVERVIEW

BUILDING:
King Abdullah University of Science and Technology (KAUST), Al Khawarizmi building

GOAL:
Solve facility's alarms and mechanical shut down problems caused by condensation from humidity and moisture infiltration issues

AMOUNT OF EXTERIOR WALL SEALED:
32,904 SF of Wall Surface Area, 757 lineal feet of exterior wall

BEFORE AEROBARRIER:
41.28 ACH50,
61,571 CFM Leakage

AFTER AEROBARRIER:
2.2 ACH50, 3,732 CFM

RESULTS:
Achieved airtightness level of 2.2 ACH50 and a reduction in air leakage of 57,839 CFM (about a 94% reduction) and approximately $126,800 in estimated annual operational savings.

Leading Research University in Saudi Arabia Protects Scientific Computing Center with AeroBarrier

King Abdullah University of Science and Technology
جامعة الملك عبدالله للعلوم والتقنية

The King Abdullah University of Science and Technology (KAUST) in Thuwal, Saudi Arabia offers state-of-the-art facilities, expert academic staff, and a world-class curriculum. These are among the reasons why KAUST is one of the fastest growing research universities in the world with a high-quality research output ranked globally among its peers.

Located on the Red Sea, facilities across its core campus have always been challenged with extreme weather conditions since opening in September 2009. KAUST has tried multiple options to eliminate these issues.

"Our weather puts our facilities in a constant challenge with condensation and moisture infiltration caused by wind driven high humidity, especially due to proximity to the sea.

Biju Reghuvaran
KAUST's Civil and Maintenance Contract Compliance Lead

AEROBARRIER
Air Sealing Technology from Aeroseal

225 Byers Road
Miamisburg, OH 45342
937-428-9300
info@aerobarrier.net

AEROBARRIER.NET

PROJECT OVERVIEW CONT'D.

LOCATION:
Thuwal, Saudi Arabia

KAUST ENGINEER:
Biju Reghuvaran

AEROBARRIER INSTALLERS:
Advanced World Trading - AWT

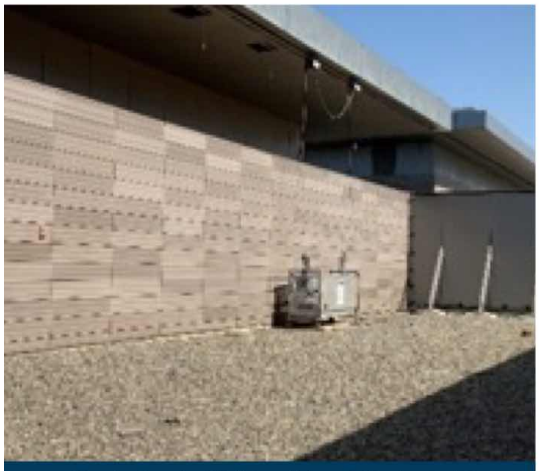


***Fig. 1** - Exterior Wall Condition of Mechanical Room*

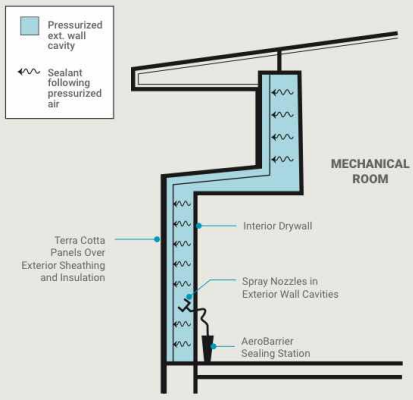


***Fig. 2** - Air Sealing from Inside the Exterior Wall Cavity*

Keeping the Supercomputing Center Up & Running

The Al Khawarizmi building on the KAUST campus includes the university's Supercomputing Laboratory, home to the region's top performing supercomputer. Ranked as one of the world's fastest, KAUST's Shaheen II Cray XC40 supercomputer houses computing clusters for scientific and engineering research. Shaheen also services industrial, governmental, and other educational institutions both within the Kingdom and internationally.

Since the building opened, infiltration of humidity through the building envelope of its penthouse mechanical room was causing significant problems. Remedies carried out earlier had sealed visible openings in the envelope, but there were several gaps that were either not visible or inaccessible to repair. Sensors and alarms were set off during the high humidity months, shutting down the mechanical equipment and triggering evacuations for the building's occupants.

The Facility Management team at KAUST had spent significant time attempting to manually seal the mechanical room's envelope, as well as analyzing air sealing methods that ultimately would interfere too much with the building's operation, take too long, and cost too much.

Eventually, they turned to AeroBarrier's envelope air sealing solution to address the problem, along with Advanced World Trading (AWT) to implement the solution. AWT is an installer of AeroBarrier in Saudi Arabia and specializes in indoor air quality (IAQ) management and infection prevention.

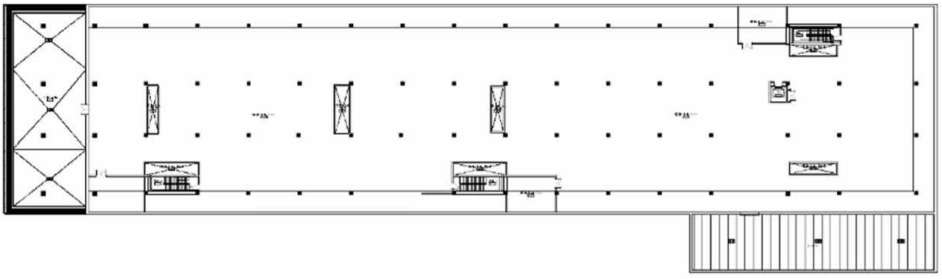


***Fig. 3** - Mechanical Room Floor Plan*

Thorough Planning to Ensure Success

A team from KAUST, AWT Services, and AeroBarrier conducted careful planning prior to the start of air sealing to ensure the project's success. The large area of building envelope surrounding the 457' x 150' mechanical room (Fig. 3) needed to be sealed.

Considering unique exterior wall construction and campus site constraints, a detailed air sealing plan needed to be developed in advance of being on site to do the actual air sealing work. The team planned to air seal the mechanical room's exterior walls in segments, with the north, south, and east walls each subdivided differently based on their construction. The west wall is constructed of solid block and didn't need to be sealed.

Third party exterior thermal imaging assessment and visual inspections showed previous, manual seals of leaks and pipe penetrations were shearing. And a few gaps

> We knew AeroBarrier's proven technology could help KAUST solve the air infiltration problems in the Al Khawarizmi building as well as in other buildings on the KAUST campus. Through discussions with the maintenance team at KAUST, we proposed using AeroBarrier to first seal the mechanical room envelope at the Al Khawarizmi building to solve the issues that were disrupting the building's operations.
>
> **Fadi Shoura**
> *AWT's Executive Director*

***Fig. 4** - Pressurizing the Exterior Wall Cavity*

***Fig. 5** - Sealing Station Spray Nozzles in Exterior Wall Cavity*

in the exterior wall less than 1.2cm (0.47") in size were also found. As a result, the initial blower door tests showed leakage as high as 60 ACH50 in some segments of the building envelope.

Flexible Technology and Team Navigate Unique Building and Site Challenges

The building envelope construction of the building's mechanical room, as well as the building's location on the KAUST campus presented some challenges that were successfully resolved through key advantages provided by AeroBarrier's air sealing system.

- Air sealing without the need to remove the terra cotta panels used as the mechanical room's exterior finish (Fig. 1).
- Placing AeroBarrier's sealing stations so that their atomized sealant spray did not get into the mechanical room's interior, air handling units, and ductwork.
- Air sealing around several HVAC motor control center (MCC) panels. These clusters of electrical and control pipes required special attention and preparation as part of the air sealing process.
- Conducting the air sealing while ensuring that sealant and debris didn't fall onto a major pedestrian circulation spine underneath and near the building.
- Working around the university's high traffic periods and not creating any disruption to the building's occupants' work schedules.
- Shorter duration of the rectification works compared to the traditional methods of sealing the envelope.

Applying AeroBarrier Sealant Within the Exterior Wall Cavity

AeroBarrier's air sealing system pressurizes a space using a blower door and fan, then sprays an atomized sealant mist into that space, causing the sealant to follow the pressurized air escaping through leaks in the building envelope and sealing those leaks. Since avoiding contact between the atomized sealant and the mechanical room equipment was critical, the cavity inside the exterior wall was pressurized and sealant was sprayed directly into the wall cavity to accomplish the air tightness goal for the mechanical room building envelope (Fig. 2).

Due to its size, the exterior envelope was sealed in smaller segments. Two different types of sealing station placements were used to seal from the inside of the exterior wall cavity, leveraging the team's creativity and technical expertise.

Temporary access panels were cut through the interior finish drywall to provide access into the confined space of the wall cavity for further inspection, setup, and preparation work to be carried out, and ultimately to provide access points for the blower door and sealing stations.

For each segment of the envelope, the blower door was then placed into a temporary access panel to pressurize the wall cavity (Fig. 4). Most segments of the envelope were

***Fig. 6**-Sealing Station Inside Ext. Wall Cavity*

***Fig. 7**-Sealing Behind Conduits While Protecting Control Panels*

sealed by then deploying sealing stations against the interior face of the exterior wall at these access panels while inserting the spray nozzles inside the cavity and then spraying the sealant mist directly inside (Fig. 5).

In a small number of envelope segments, the wall cavity was deep enough to place the entire sealing station inside the wall so that sealant could then be sprayed into the pressurized cavity (Fig. 6). AeroBarrier's unique technology and capabilities enabled this customized envelope air sealing approach.

An additional area included a series of control panels that controlled the mechanical equipment, and many conduits that were not possible to get in between and behind to seal the exterior wall. The team successfully sealed this area by constructing temporary walls of framing and plastic film to both pressurize this space and protect the control panels during the sealing process (Fig. 7).

The AeroBarrier system's Main Control Unit, laptop and software managed the entire process, recording air tightness and leakage reduction in real time.

Verified Air Sealing Results Lead to Operational Savings, Broader Application

Working together, the team achieved airtightness levels below 3 ACH50, a 94% reduction in the mechanical room building envelope air leakage. An estimated $126.8K in annual operational savings are being realized through reductions in both university staff's time responding to sensor alarms and sealing envelope air leaks, as well as the elimination of the building evacuations that had caused reductions in productivity for staff working in the building.

These results were achieved with no damage to the HVAC equipment and minimal disruption to building occupants, operations, and the surrounding campus. AeroBarrier successfully sealed the envelope in less than 2 months, a dramatically shorter project than the 10-12 months that would have been needed with other air sealing methods.

Based on this first AeroBarrier air sealing project for the Al Khawarizmi building, KAUST is planning to roll out the use of AeroBarrier on other facilities. In addition to the successful air sealing results, the non-invasive nature of AeroBarrier's process and support from AWT were a big plus.

To learn more about making building envelope air sealing a more effective and easier process with guaranteed results, CALL: 937-428-9300 or EMAIL: info@aerobarrier.net.

> The AeroBarrier technology is mind-blowing," Reghuvaran said. "And this project is a remarkable achievement for us. It's one of the most satisfying projects I've worked on in my entire career as an engineer.

Biju Reghuvaran
KAUST's Civil and Maintenance Contract Compliance Lead

AEROBARRIER
Air Sealing Technology from Aeroseal

225 Byers Road
Miamisburg, OH 45342
937-428-9300
info@aerobarrier.net

AEROBARRIER.NET

CASE STUDY

Near Net Zero

PROJECT OVERVIEW

PROJECT
Residential Home

BUILDER
Mandalay Homes

LOCATION
Prescott, Arizona

RESULTS
Pre-leakage: >1.4

Post-Leakage: 0.6

Can now achieve net zero with only 8 solar panels on a typical 2,000 sq ft home compared to 60 solar panels. Savings of $50k.

Constructing 3,500 Carbon-Neutral Homes in Arizona

Mandalay's Founder, Dave Everson, is on a mission to scale carbon-neutral (or zero-energy) homes, and offer them as a standard feature on every home they sell. The challenge is making such homes economically feasible and scalable.

The zero-energy formula typically involves loading a rooftop full of solar panels – for a typical code-built, 2000 square foot home, approximately 60 solar panels are needed to achieve net-zero, at a cost of $60,000

Everson was able to perfect the building envelope with advanced framing and insulation techniques. In 2012, a typical Mandalay home tested at a 74 HERS Index. By 2016, Everson had pushed the performance of a typical home to a 50 HERS Index. But, no matter how disciplined Mandalay was on insulation and envelope sealing strategies, they could not attain better than a 1.4 ACH.

Although this number is significantly better than code, it would still mean 30 solar panels would be required to attain net-zero. At a cost of almost $30,000, the price tag would not allow Everson to offer a net-zero home as a standard feature.

Advanced Sealing Technology – a Lower ACH

When Everson learned about AeroBarrier, he was intrigued. The process seemed perfect for his needs –quick to apply, easily scheduled, economically feasible, and produced consistent results.

The AeroBarrier system reduced the typical Mandalay home from an ACH of 1.4 to .6. With this, Everson had cracked the energy plus homebuilding conundrum, coming one step closer to offering net-zero homes as a standard feature.

The Birth of a Carbon Neutral Community

After five years of Everson's determination, and with the help of technology advancements and market competitiveness, Mandalay has broken ground on 3,500 carbon-neutral homes in the master-planned community of Jasper. Everson states, "At Mandalay, we believe the catalyst to the carbon-neutral community is AeroBarrier and it will be used on every home we build."

Battery Storage

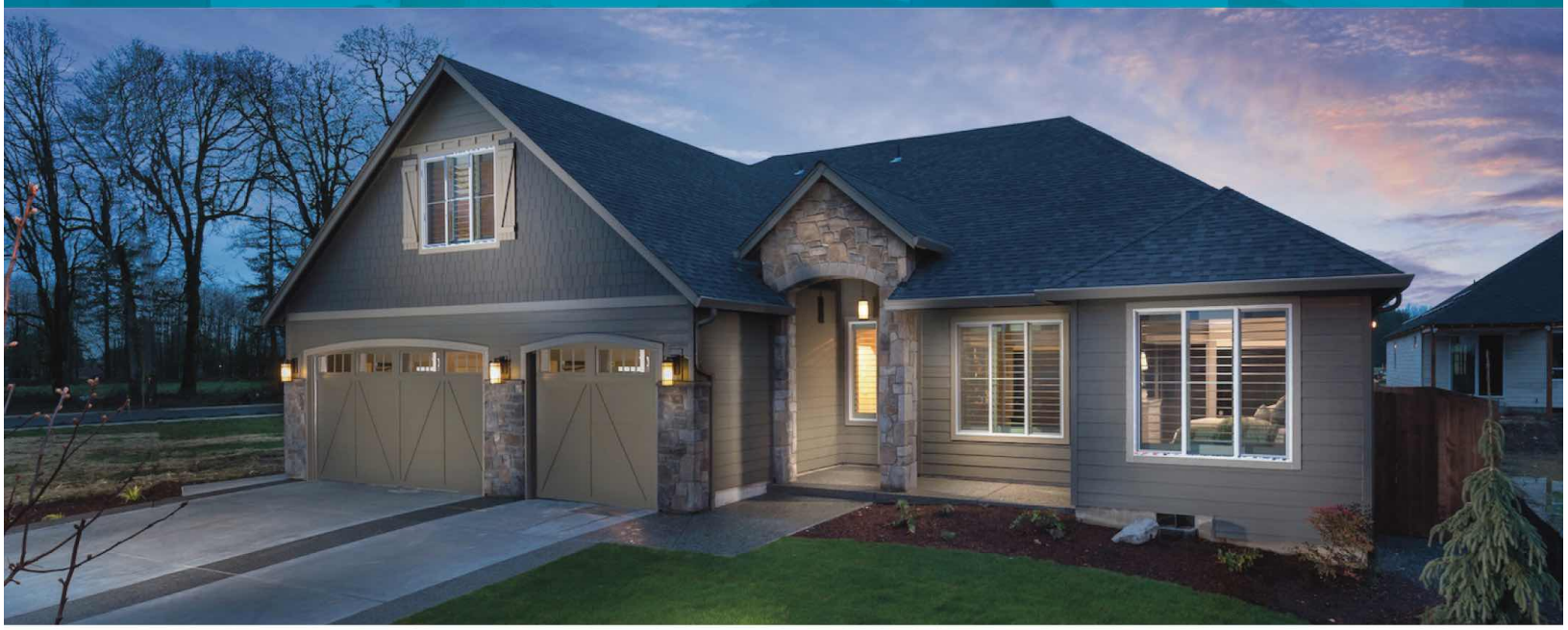
Around the time of applying AeroBarrier to the first Mandalay home, Everson was experimenting with battery storage. Impressed by their market presence in Germany, high storage capacity, and 28-year battery life, Everson selected sonnenBatterie for his energy storage partner. The result of marrying AeroBarrier technology sonnenBatterie's solution reduced the number of solar panels necessary to achieve net-zero to only eight, at a cost savings of $50,000.

> AeroBarrier may be the most important innovation to hit the building community in years. We were seeking a tighter building envelope and AeroBarrier answered the call. The technology is easily deploy-able in the field, delivers results immediately which is invaluable, and works well in a fast paced production environment.
>
> You may be able to overcome the inefficiencies of manual sealing by repeating the process over and over, but it would require more expensive labor hours and still no guarantee. AeroBarrier is fast and you know the results before you are even finished.

Geoff Ferrell – *Chief Technology Officer*
Mandalay Homes

CASE STUDY

Path To Net Zero



PROJECT OVERVIEW

PROJECT
Residential Homes

BUILDER
New Tradition Homes

LOCATION
Washington

RESULTS
Decreased ACH from 2.6 to 0.6 within 90 minutes. This reduction in energy demand means very little solar is required to reach zero energy.

In A Move to Zero Energy, New Tradition Homes is Testing Product Innovation

For 30 years, New Tradition Homes has led the Washington home building market, constructing over 5000 single-family homes. They are recognized as a top builder in the state based on volume, and are known nationally as a leader in building energy efficient homes.

Some builders claim to build energy efficient homes, but very few build to the level of New Tradition. All New Tradition homes are certified ENERGY STAR and Built Green Washington 3-star –the only high-volume builder in the state to do so. This commitment to excellence is reflected in company values, which emphasize quality, durability, health, and innovation.

An Industry Leader

In 2005, New Tradition made a commitment to meet or exceed the most stringent standards for energy efficiency. At that time, the builder also committed to focus on

> Average, or code minimum, is not an option for us. We are constantly striving for improvement which includes a lower HERS Index. If budget was not an issue, there are a lot of options. But, when considering a new product or new construction strategy, we are challenged with making it standard on every home while remaining market competitive.

Kelly Helms – *Chief Executive Officer*
New Tradition Homes

AEROBARRIER®
Air Sealing Technology from Aeroseal

225 Byers Road, Suite 1
Miamisburg, OH 45342
877-959-8421
info@aerobarrier.net

AEROSEAL.COM/AEROBARRIER

indoor air quality, innovation, and continued improvement. Building to high standards is reflected in the company slogan, 'We Build Homes for Life!'.

Steve Tapio, Building Science Team Leader, has worked for New Tradition since 2003. Tapio says, "We are proud of our awards, but the most important driver for our company is our home buyer – we deliver a home that we would proudly build for our mom. Every home we build must pass the 'mom test'."

The 'mom test' translates into a home that is high quality and durable, costs less to live in, is comfortable, and has healthy indoor air quality. These attributes are directly attributed to building strategies that improve energy efficiency, including mechanical design, duct tightness, and particulate control.

Advanced Envelope Sealing

On a mission to build the best home, Tapio and Helms continuously research new building products and construction strategies, and discovered AeroBarrier. New Tradition wanted to put AeroBarrier to the test – and the timing was perfect. New Tradition was in the process of building a home for Ron Nardozza. Nardozza is New Tradition's third-party energy rater and verifier and the founder and President of Four Walls.

Excited to make his personal home as energy efficient as possible, Nardozza saw AeroBarrier as key to reducing envelope leakage and energy demand. Nardozza said, "Within 90 minutes, the ACH went from 2.6 to .6. It was quite remarkable. The application was easy to setup, and the results were immediate. With a .6 ACH, heating and cooling my home just got easier – and cheaper." Nardozza says the reduced energy demand will mean the 3600 square foot home will require very little solar to achieve zero energy. With the success of Nardozza's home, New Tradition began using AeroBarrier across multiple projects.

> Within 90 minutes, the ACH went from 2.6 to .6. It was quite remarkable. The application was easy to setup, and the results were immediate. With a .6 ACH, heating and cooling my home just got easier – and cheaper.
>
> **Ron Nardozza** – *Founder & President*
> *Four Walls Energy Experts*

The Energy Efficiency Scorecard

The typical New Tradition home scores a 54 HERS Index. (ENERGY STAR requires a HERS Index of 65). Meanwhile, the average, code-built home in Washington state scores a 72 HERS Index. The energy requirement for Built Green Washington requires 10% better than code.

Kelly Helms, New Tradition's CEO, says, "Average, or code minimum, is not an option for us. We are constantly striving for improvement which includes a lower HERS Index. If budget was not an issue, there are a lot of options. But, when considering a new product or new construction strategy, we are challenged with making it standard on every home while remaining market competitive."