

Low-E Storm Window Market Expansion Pilot

FINAL REPORT

FOCUS ON ENERGY

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I. Executive Summary

Low emissivity (low-E) storm windows look like a promising cost-effective energy efficiency measure, but are they a viable new measure and program opportunity that Focus on Energy should pursue? In 2017, Focus on Energy funded the Low-E Storm Window Market Expansion Pilot (Low-E Pilot) to explore this question.

Low-E storm windows are a new kind of storm window with a technologically advanced coating and an airtight design that can deliver a performance approaching or in some cases surpassing that of an ENERGY STAR® certified replacement window at a fraction of the cost. Unlike replacement windows, low-E storm windows are easy to self-install, which most purchasers do. This product category represents the first cost-effective solution for reducing the disproportionate heat loss and gain experienced by single- and double-pane clear glass windows.

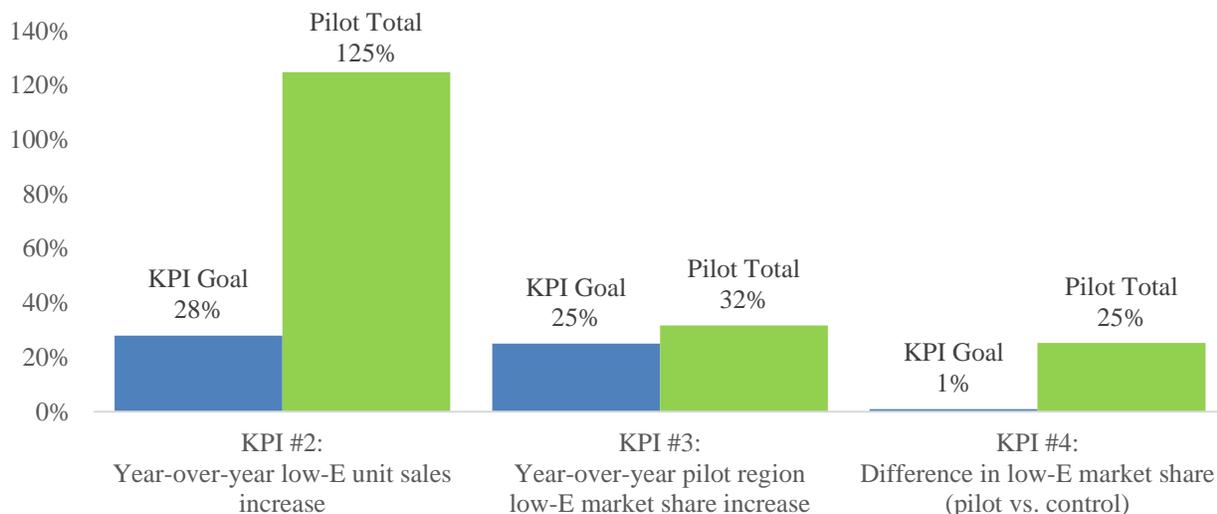
To see whether low-E storm windows can deliver on this promise and to prepare for such a possibility, the Low-E Pilot aimed to develop Wisconsin-specific deemed savings, incremental cost, and to see how much an incentive program could lift low-E storm window sales and market share. Impact was evaluated using both pre-post (year-on-year) and treatment-control methodologies.

The Program Implementer (D+R International), its Manufacturer Partners (Larson Manufacturing Company and Quanta Technologies, Inc), and its Retail Partners (Menards and The Home Depot) primarily focused on retail sales, but also on building a multifamily market. The retail portion of the pilot employed three primary tactics to drive higher sales: a 25% markdown, in store marketing materials, and digital media promotion. The multifamily portion leveraged digital media in addition to email communication through the Focus on Energy's Multifamily Energy Savings Program.

The results demonstrate that low-E storm windows are viable and valuable new measure for Focus on Energy. The pilot delivered more than the energy and demand savings goals, and as illustrated in Figure 1, exceeded all other key performance indicators. Year-over-year low-E sales exceeded the goal by more than 300 percent, increasing to 125% of 2016 sales; and low-E market share, year-over-year, in the pilot region (Milwaukee) jumped from 30% to 62%, a 32 percentage point increase. Most importantly, these changes can be attributed almost exclusively to the pilot program because the jump in low-E market share was only 7 percentage points in the control region (Madison).

Based on these results, Focus on Energy is seriously considering launching a full-scale program in 2018.

Figure 1. Results of KPIs 2-4



II. Background

Storm windows are secondary glazings installed over an existing window assembly to protect and insulate against inclement weather, particularly during the winter. Modern storm windows bear little resemblance to traditional storm window products, many of which have to be put up and taken down every winter. Modern products have attractive durable powder coat finishes and are permanently mounted and operable to allow for ventilation. They come in exterior and interior varieties to allow purchasers to refresh or retain their exterior look, and are offered in low-emissivity (low-E) or standard clear glass. The majority of sales (70%) in Wisconsin are custom products built to match the dimensions of the window openings. Many stores also offer stock products in standard sizes. Although primarily a single-family residential product, modern storm windows are available to retrofit multifamily and commercial buildings as well.

Modern storm windows of both glass types will improve the performance of existing windows due to two technological innovations:

- **Tighter seal.** Durable high-quality polymers designed for marine environments tightly seal the glass to the frame to prevent air leakage around the joints so that the unit as a whole is airtight.
- **Dead air space and reduced air leakage.** When properly installed and sealed, the low-E storm window and prime window together create an insulating dead air space and reduce air infiltration and leakage previously allowed by the base window.

The low-E glass, for which low-E storm windows are named, works with the other two innovations to dramatically improve the thermal performance relative to both traditional and clear glass storm windows.

- **Low-E glass.** Low-E glass is coated with covalently bonded metal oxides transparent to visible light, but which reflect infrared radiation, thereby creating a one-way heat-mirror that allows visible light and heat to pass through, but minimizes heat loss.

When installed over a base window, whether single- or double-pane, a low-E storm window will improve the performance of the entire window system by cutting heating energy load and consumption in winter and electric cooling load and consumption in the summer.

In multiple field tests funded by the U.S. Department of Energy, low-E storm windows delivered significant energy savings in climates as diverse as Atlanta, Chicago, and Philadelphia. Lab home testing by Pacific Northwest National Laboratory has shown that the combination of a low-E storm window and a clear glass single or double pane window delivers a performance approaching or in some cases surpassing an ENERGY STAR® certified replacement window.¹

In addition to their energy savings value, low-E storm windows offer cost savings at the register and upon installation. Stock low-E storm window products cost less than \$100 per window, half to one-quarter of the cost of an energy efficient replacement window.² Whereas replacement windows typically require professional installation, low-E storm windows are easy to install, with 80% being installed by the homeowner or property owner.³ All told, using low-E storm windows, homeowners can obtain similar performance as full window replacement for a third to a fifth of the cost of the product plus installation.⁴ In heating-dominated climates

¹ Thermal and Optical Properties of Low-E Storm Windows and Panels (Culp, TD. 2015. PNNL-24444. Pacific Northwest National Laboratory, Richland, Washington. https://www.pnnl.gov/main/publications/external/technical_reports/PNNL-24444.pdf)

² Low-E Storm Windows: Market Assessment and Pathways to Market Transformation (Cort, KA. 2013. PNNL-22565. Pacific Northwest National Laboratory, Richland, Washington. http://www.pnnl.gov/main/publications/external/technical_reports/PNNL-22565.pdf)

³ Cort, KA. 2013

⁴ Cort, KA. 2013.

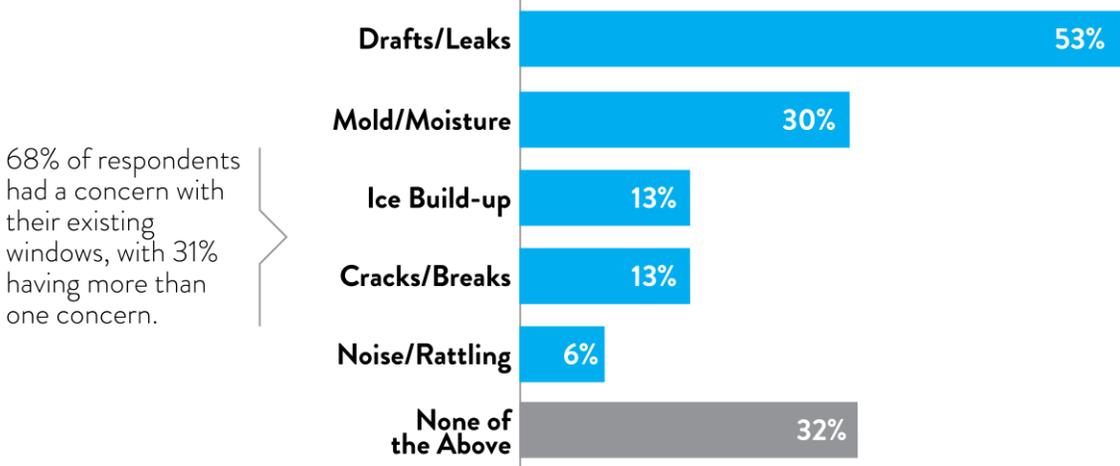
such as Wisconsin’s, the sizeable energy savings quickly pay back the initial cost, and then continue to generate additional savings over the 15-year lifetime of the measure.⁵

The winning combination of high performance and low cost has caught the attention of leading energy efficiency program sponsors. For example, in the last few years:

- The Northwest Power and Planning Council’s Regional Technical Forum deemed low-E storm windows as a proven measure;
- The Bonneville Power Administration added low-E storm windows to its measure manual and offers a \$2 per square foot incentive for market rate programs and a \$10 per square foot incentive for Weatherization Assistance Programs; and
- Efficiency Vermont has tested retail low-E mark-downs, conducted a deep-dive consumer survey to quantify market potential in 2016, and is in the process of developing Technical Resource Manual characteristics for the product category.⁶

Currently the U.S. storm window market is less than one-third the size of the window replacement market, with low-E storm windows taking up a small portion of those sales.⁷⁸ However, research suggests that the potential market for low-E storm windows is enormous, equal or perhaps greater than that of replacement windows. For example, an in-depth survey of Vermont residents found that 68% of respondents had concerns with their existing windows and 31% had more than one concern that could be remedied by low-E storm windows.⁹

Figure 2. Vermont Residents' Window Concerns¹⁰



Like Vermont, the Midwest has older housing stock and severe winter weather. Today, 42% of all storm window sales are made in the Midwest, making it ripe for market expansion.¹¹ The primary barrier holding back sales may be consumer awareness. Just 16% of Vermonters were familiar with Low-E storm windows, but when as shown promotional copy for low-E storm windows 28% percent of respondents said they would be likely to purchase them within the next 60 days.¹²

⁵ Energetics. Evaluation of Low-E Storm and R-5 Windows for inclusion in Pennsylvania’s Weatherization Priority List. May 11, 2010. https://www.quantapanel.com/wp-content/uploads/2016/08/09_PA-Window-Evaluation-11May10-Final.pdf
⁶ Pugliese, Jenna. A Look Into Low-E Storm Windows as a Potential EE Opportunity. 2017 ACEEE Market Transformation Symposium. April 4, 2017. http://aceee.org/sites/default/files/pdf/conferences/mt/2017/Pugliese_SessionC4_MT17_4.4.17.pdf
⁷ Cort, KA. 2013.
⁸ Culp, TD. 2015.
⁹ Efficiency Vermont. Low-E Storm Windows & Awareness Research. Efficiency Vermont. December 2016.
¹⁰ Efficiency Vermont. 2016.
¹¹ Cort, KA. 2013.
¹² Efficiency Vermont. 2016.

In short, low-E storm windows are a proven, visible, inexpensive, and cost-effective heating, cooling, and peak load energy savings measure applicable to the great majority of Wisconsin households, multifamily and commercial buildings for which there is likely substantial latent demand in Wisconsin.

III. Introduction

Focus on Energy, in collaboration with Larson Manufacturing Company (Larson), Quanta Technologies, Inc. (Quanta), Menards, The Home Depot, and D+R International, developed and conducted the Low-E Storm Window Market Expansion Pilot in Wisconsin in the fall of 2017. The pilot's goal was to enable Focus on Energy and its partners to assess the viability of a long-term collaboration on a full-scale low-E storm window retail program. More specifically, the pilot aimed to:

- Establish deemed savings for low-E storm windows as a new measure in Wisconsin
- Educate consumers about the energy savings benefits of storm windows
- Increase the overall sales of low-E storm windows and the share of low-E versus clear glass products in the storm window market

The Low-E pilot ran from September 2017 to November 2017 – the main storm window sales season – when customers are looking to improve the efficiency and comfort of homes prior to the winter heating season. Both single-family and multifamily homeowners in the Milwaukee area had access to pilot incentives through marked down prices of low-E storm windows at retail stores and direct-from-manufacturer online sales.

The pilot used a treatment-control methodology to evaluate program impact. Discounted prices were offered in the Milwaukee area only and sales were compared to those in Madison. Baseline market share for low-E storm windows in the proposed treatment and control regions for the period of performance to be evaluated in 2017 (retail weeks 38-46) were nearly identical in 2016, indicating they were appropriately comparable. In 2016, Milwaukee stores had 626 low-E storm window sales, comprising a 30% share of the overall storm window market in that region, compared to Madison, which had 343 low-E sales and a 29% market share.

IV. Program Design and Delivery

A. Roles and Responsibilities

The Low-E Pilot was funded by Focus on Energy, administered by APTIM, and implemented by D+R International. The Program Administrator and Program Implementer worked with Manufacturer Partners to develop marketing materials and campaigns, coordinate with Retailer Partners, and ultimately offer incentives on low-E storm windows to Milwaukee-area customers. Table 1 describes the roles and responsibilities for the participants involved in the pilot.

Table 1. Low-E Pilot Roles and Responsibilities

Role	Company Name	Responsibilities
Program Administrator	APTIM	Develop and administer the pilot
Program Implementer	D+R International	Propose concept, recruit partners, and design and implement the pilot as a subcontractor to the Program Administrator
Manufacturer Partner	Larson	Assist in development of the pilot and marketing materials, work with potential retailer partners, train retail sales associates, and mark down price of low-E products according to pilot incentives
Manufacturer Partner	Quanta	Assist in development of the pilot and marketing materials, and mark down price of low-E products according to pilot incentives
Retailer Partner	The Home Depot	Work with manufacturer partners to establish terms of participation in pilot and pass through manufacturer mark down to customers
Retailer Partner	Menards	Work with manufacturer partners to establish terms of participation in pilot and pass through manufacturer mark down to customers
Digital Marketing Partner	Excelerate Digital Marketing Agency	Assist in development of digital marketing campaign, target potential storm window consumers in the Milwaukee area, and report results to Program Implementer

The Manufacturer Partners involved in the pilot were Larson and Quanta. Larson already had a presence in the Wisconsin storm window market, with products sold through Menards, The Home Depot, and Lowe's, in addition to a number of independent dealers. Quanta is a smaller manufacturer that solely produces custom low-E storm windows and has had traction in the multifamily and historical retrofit markets along the East Coast, but no presence in Wisconsin prior to the pilot.

B. Program Description

The Low-E Pilot had an incentive budget of \$55,000 and targeted two customer groups – single-family homeowners and multifamily building owners. Focus on Energy developed tailored incentive structure approaches for each group (see Table 2 below).

Table 2. Low-E Pilot Incentives

Description	Incentive Amount	Incentive Pool	Limitations
Single-family	25% per window	\$50,000	15 window maximum; contractors must pass on incentives to customer
Multifamily	\$3 per square foot	\$5,000	\$1,000 per project

Single-family

Milwaukee-area single-family homeowners could purchase low-E storm windows at a discounted price during the pilot period either by purchasing Larson products at participating The Home Depot and Menards stores or by purchasing products directly through Quanta. Program partners originally planned the single-family launch on September 1, 2017, but technical and logistical issues delayed the start to September 19 for The Home Depot and September 21 for Menards. The Quanta single-family discount launched on September 15.

Multifamily

Focus on Energy deemed owners of multifamily residential dwellings with four or more units, such as apartment buildings or condominiums, eligible for incentives by purchasing low-E storm windows directly through Quanta from September 1, 2017 to November 15, 2017. Eligible building owners had to be a customer of a participating Focus on Energy utility (We Energies, Oconomowoc Municipal, or Cedarburg Municipal), and the building had to be in an eligible Milwaukee ZIP code (see Table 10. Eligible Milwaukee Area ZIP Codes). Due to limited multifamily lead generation in the target region, the Program Administrator approved an expansion of the eligible territory from Milwaukee to all of Wisconsin on October 5, 2017.

C. Key Performance Indicators (KPIs)

Focus on Energy and its partners established the KPIs listed in Table 3 to evaluate the Low-E Pilot based on energy savings, sales volumes, and market share growth.

Table 3. KPIs

Goal	KPI	Measurement
Increase total energy and demand savings from retailers participating in the pilot: ¹³ <ul style="list-style-type: none"> • 1,356 Demand kW • 11,711,496 kWh • 22,990,499 Therms • 2,339,009 Total MMBTU 	Energy savings	Gross kWh, kW, and therms (MMBtu) savings
28% increase in total unit sales in the pilot area by manufacturers	Low-E storm window sales	Year-over-year low-E storm window unit sales in pilot region by manufacturer
Increase in market share of low-E storm windows in pilot area by 25 percentage points	General product category market growth	Year-over-year increase in low-E storm window market share unit sales in pilot stores
Accelerate market transformation in pilot area	Low-E storm window market share	Overall percent increase in low-E storm window market share in pilot stores vs. control stores

D. Measures

The Low-E Pilot’s measures included stock and custom low-E storm windows manufactured by Larson and Quanta. During the planning stage of the pilot, the Program Implementer developed a workpaper to establish low-E storm window as a measure in Wisconsin. The workpaper included calculations of deemed savings and incremental cost of low-E storm windows in single-family and multifamily residences.

Table 4 identifies the calculated deemed savings per square foot of low-E storm window for single-family and multifamily applications, installed over single-pane and double-pane windows. The single-family savings are based on installation in a home where the window area is assumed to be 15% of the floor area. The calculations are based on a weighted average of one-story (1,700 sq. ft.) and two-story (2,800 sq. ft.) homes in Minneapolis and Duluth, Minn.¹⁴ The HVAC system used is assumed to be a gas furnace and an electric air conditioner.

Multifamily savings are based on installation in a typical residential multifamily building in Chicago, which has a similar climate to Wisconsin. The assumed building characteristics are¹⁵:

- Five-story apartment building, default construction (e.g. R13 walls, R19 roof)
- 40,000 sq. ft. building area with a 1.17 aspect ratio (96.6 ft. x 82.8 ft.)
- 25% window-to-wall ratio, with 4,359 sq. ft. of glazing area

¹³ Demand savings set prior to the pilot based on estimated sales in Milwaukee for a full year. Upon further review, Program Administrator and Program Implementer revised the goals to:

- 6.9 Demand kW
- 4,273 kWh
- 7,799 Therms
- 795 Total MMBTU

¹⁴ Cort, KA. 2013.

¹⁵ Culp, TD. 2012. Birch Point Consulting, LLC for Quanta Technologies Inc. Personal communication.

Table 4. Proposed Deemed Savings (per square foot of low-E storm window)

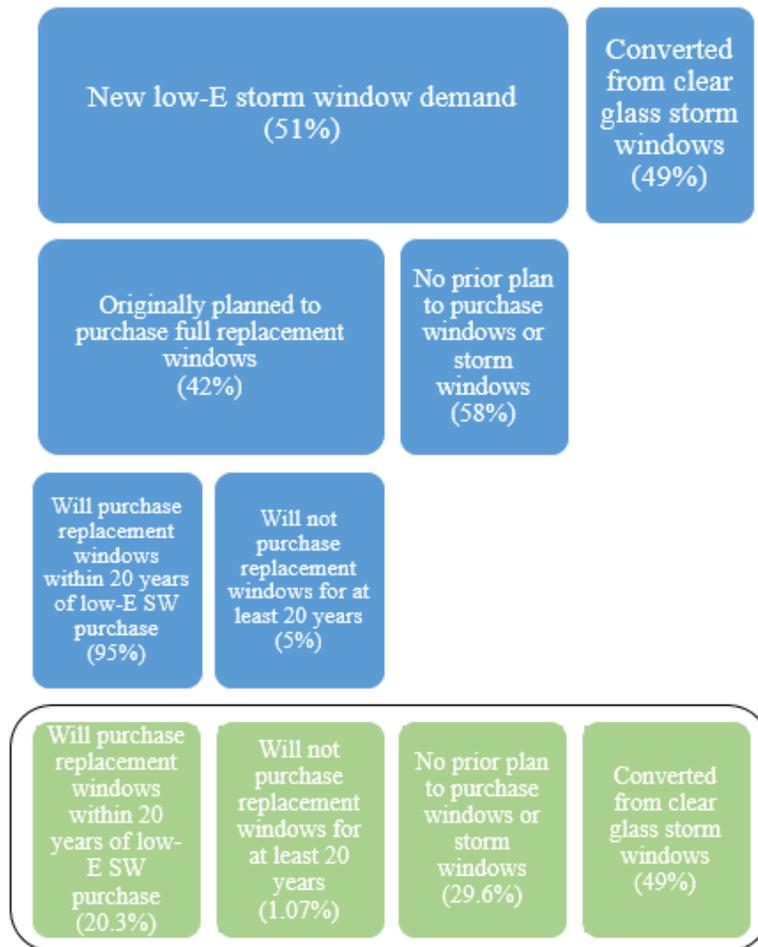
Residence Type	Baseline Window (Clear Glass)	Annual kWh	Annual Therms	Peak Coincident kW	Lifecycle kWh	Lifecycle Therms
Single-family	Single Pane	0.54	1.6	0.00087	8.14	24.02
	Double Pane	0.48	0.6	0.00077	7.14	8.64
Multifamily	Single Pane	2.23	0.62996	0.00482	33.43	9.45
	Double Pane	1.37	0.43198	0.00298	20.52	6.48

The calculated incremental cost per square foot of a single-family, low-E storm window is a weighted average based on three classes of customers. Each class has a different incremental cost of installed product based on their replacement scenario.

- **Upsold clear glass storm window purchaser.** The first customer class includes those who planned to purchase a clear glass storm window, but instead purchased a low-E storm window.
- **Previously planned to purchase replacement windows.** Within this second customer class, there are those who do not install replacement windows within 20 years of the low-E storm window purchase, and those who delay installation of replacement windows for an average of 10 years due to the low-E storm window purchase. The customer class also includes those who originally planned to replace their windows, but instead chose to purchase low-E storm windows as a substitute for window replacement.
- **No prior plan to purchase replacement or storm windows.** The third customer class includes those who had concerns about the performance of their current windows, but were not planning to install replacement windows or any type of storm window.

The overall incremental cost is a weighted average of the three customer classes' estimated share of low-E storm window sales based on total installation cost. Figure 3 shows a breakdown of these three customer types and the weightings applied to each.

Figure 3. Share of New Low-E Storm Window Sales by Customer Class



The cost of installation per single-family, low-E storm window represents the weighted average of a do-it-yourself (DIY) install (\$2) and a contractor installation (\$30). Approximately 80% of storm windows are DIY installations, with the remaining 20% installed by a contractor.¹⁶ The overall incremental costs for each residence type are listed in Table 5 below and full calculations are included in Appendix D – Incremental Cost Calculations.

Table 5. Incremental cost

Residence Type	Incremental Cost (per square foot)
Single-family	\$1.73
Multifamily	\$14.00

E. Implementation Timeline

The planning, execution, and analysis of the Low-E Pilot ran from April 2017 to December 2017. Table 6 shows a summary of major tasks for the pilot, and Appendix B – Detailed Implementation Timeline contains more information about task completion dates.

¹⁶ Cort, KA. 2013.

Table 6. Tasks Timeline Summary

Task	Timeframe									
	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	
Task 1: Planning										
Task 2: Program Development										
Task 3: Pilot Run										
Task 4: Pilot Completion										

F. Partner and Trade Ally Engagement

The Low-E Pilot leveraged the existing Focus on Energy Trade Ally Network to generate interest in low-E storm windows and associated discounts. A representative from Focus on Energy’s Trade Ally Network distributed the single-family flyers (see Figure 20) to home performance contractors during field visits and trainings to raise awareness of the promotion.

In addition, Focus on Energy’s Multifamily Energy Savings Program Implementer promoted the pilot to multifamily building owners and managers. The pilot Program Implementer provided an email template and a multifamily flyer (see Figure 21) for direct email outreach completed by September 6 to the program’s existing multifamily contacts within the designated Milwaukee area. After the Program Administrator approved the full state expansion, the Multifamily Energy Savings Program Implementer sent out additional outreach emails to its full list of 185 multifamily buildings on October 12, along with a follow-up email on November 6.

G. Customer Marketing, Outreach and Education

The marketing and communications objectives for this pilot were to:

- Educate the target market about low-E storm windows and their benefits
- Provide information about incentives
- Drive customers to purchase low-E storm windows during the pilot incentive period

The partners’ approach was to reach potential customers through a combination of in-store materials and external marketing, including the Focus on Energy website and targeted digital ads. The pilot marketing campaign targeted single-family and multifamily customers in the Milwaukee area looking to purchase storm windows or replacement windows. Messaging touched on themes of improving the efficiency, comfort, or appearance of their home or multifamily building.

The Program Implementer worked with Larson and the marketing partners to develop and install in-store materials that would bring attention to the 25% discount. These materials included:

- Cut sheets promoting energy efficient low-E storm windows with measurement and ordering information (previously created by Larson)
- Pocket cards for employees in participating retail stores (Figure 17)
- Sticker clings for storm window displays (Figure 18)
- Stack outs that would serve as standalone containers for stocked low-E storm windows (Figure 19)
- Sell sheets describing low-E storm windows and their benefits (Figure 20 and Figure 21)

Due to internal policies and time restrictions, the retailers were not able to include stack outs in the store during the pilot, but were able to install the other marketing materials. Larson sales representatives delivered the materials to the participating stores prior to the launch dates and trained retail sales associates on proper display and use of the promotional materials.

In addition to in-store materials, the Program Implementer coordinated with the Program Administrator and Manufacturer Partners to develop and deploy a landing page on the Focus on Energy website with relevant information for potential customers, including a store locator map (Figure 16). All external marketing directed potential customers to this page to access more detailed eligibility and educational information.

The pilot team also coordinated to develop a marketing campaign to promote the pilot to homeowners through multiple digital platforms. The campaign took a three-pronged approach by serving pay-per-click (PPC), display and Facebook ads to potential customers in the Milwaukee area. Google Adwords served ads to people who searched on a set of relevant keywords in the PPC branch of the digital marketing campaign. People within the Milwaukee ZIP codes identified in Appendix A – Pilot Incentive Eligibility saw the pilot ad if they were within a short distance of the participating retail stores as part of the display campaign. Finally, Facebook directed ads to users ages 25-65+ in the Milwaukee area who were homeowners interested in energy efficiency.

V. Results

A. Sales and KPI Results

Based on the Key Performance Indicators (KPIs) the pilot was an unmitigated success. The Low-E Pilot produced significant increases in low-E storm window sales and the share of low-E versus clear glass storm window units, exceeding nearly all of its KPIs, based on the methodologies in the submitted workpaper. The Low-E Pilot achieved more than the energy and demand savings in KPI 1 as shown in Figure 4.

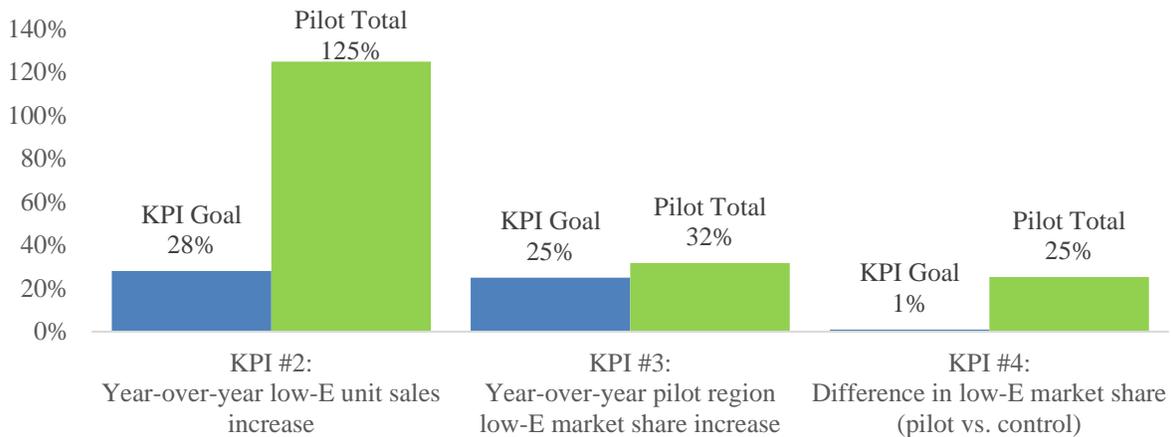
Figure 4. KPI 1: Total Energy and Demand Savings¹⁷



The source of these savings and most dramatic results are revealed in the pilot performance on KPIs 2, 3, and 4, shown in Figure 5.¹⁸

¹⁷ Calculated based on proposed energy savings calculation methodology in submitted workpaper.
¹⁸ To enable the most accurate year-over-year comparisons and account for weekend sales properly, KPI calculations included storm window sales for the full sales weeks 38-46 even though incentives were offered in only portions of Week 38 and Week 46. The additional days counted in the KPI calculations represent a small number of storm window sales (total incentivized low-E unit sales were 1,391; but the total sales in the full sales weeks used for KPI calculations was 1,407).

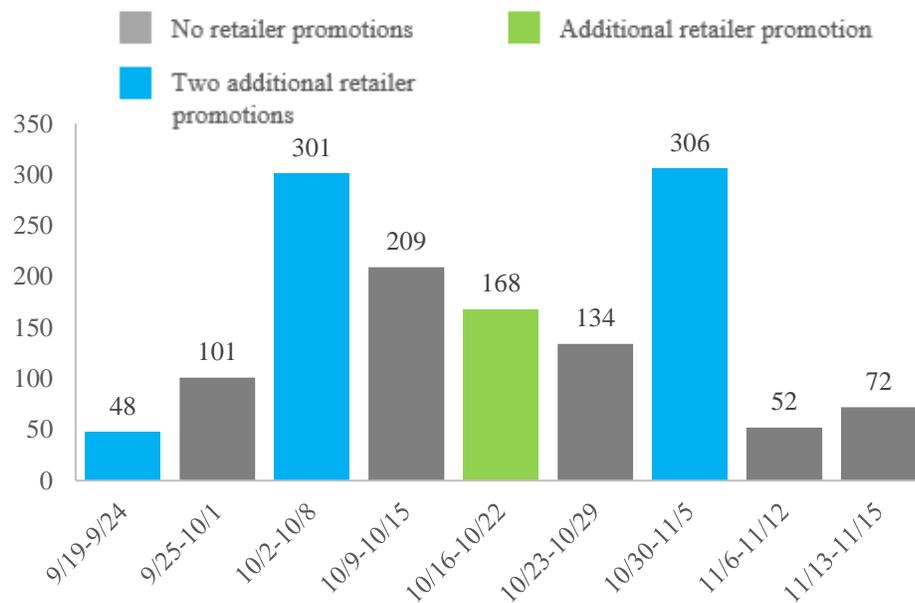
Figure 5. KPI 2-4 Results



Low-E storm windows showed a 125% sales increase, a 32 percentage point year-over-year increased market share (from 30% to 62%), and a 25 percentage point higher market share versus clear glass in the pilot region (62%) compared to the control region (37%), confirming that the Low-E Pilot stimulated storm window sales, particularly low-E products. These significant results validated the 25% incentive chosen and prove that discounts available through big box retailers drive customers to purchase low-E storm windows.

One factor worth noting is that the retailers routinely run multiple low-E storm window promotions in the fall and did so statewide in 2016 and 2017. Promotions included rebates and sales on all storm windows and, in some cases, only stock low-E storm windows. To visualize the impact of these promotions on the Low-E Pilot, Figure 6 shows weekly sales of low-E storm windows with color coding based on concurrent retailer promotions.

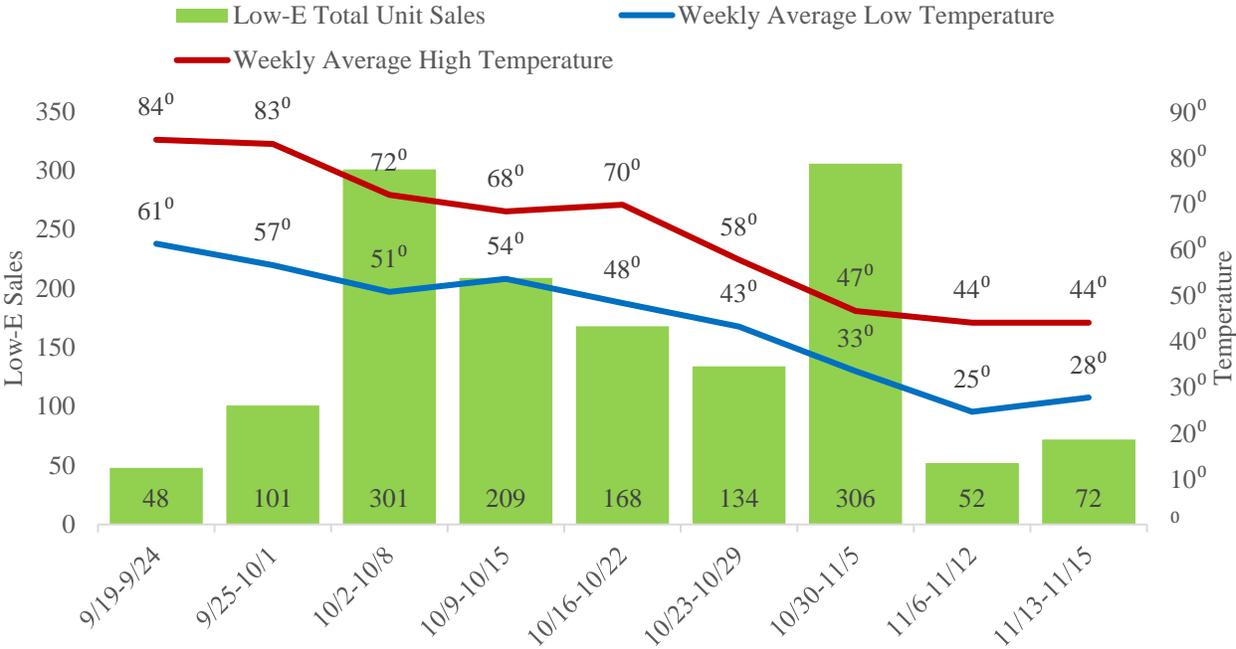
Figure 6. Weekly Low-E Storm Window Sales



Overall, sales of low-E storm windows in the participating retail stores slowly increased in the beginning of the pilot and decreased toward the end, punctuated by strong sales in the week of October 1-7 and October 29- November 4. Interestingly, there is no observable link between additional promotions and high weekly

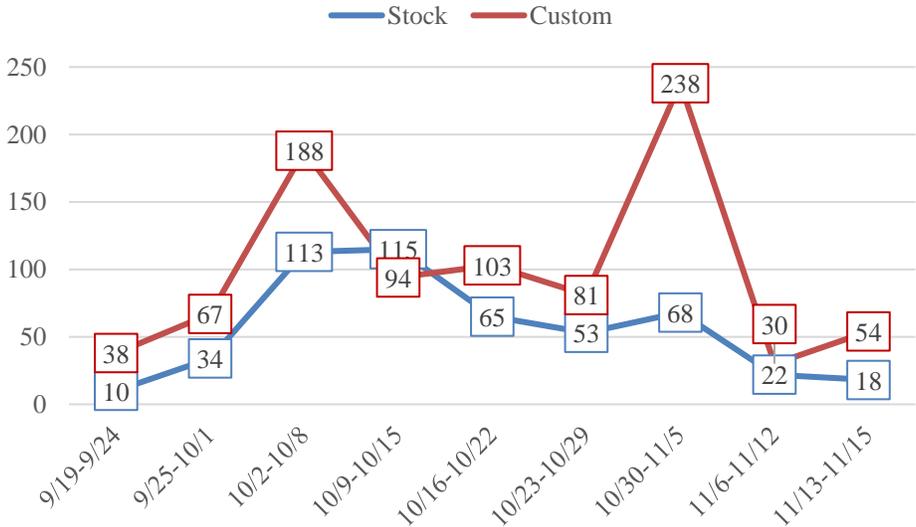
sales during the pilot, with the possible exception of Promotion B. That promotion, from October 1-7, targeted low-E storm windows specifically, so the 25% discount from the pilot and the additional mail-in rebate from the retailer may have driven customers to purchase low-E storm windows during that period of time.

Figure 7. Weekly Low-E Storm Window Sales vs. Average High and Low Temperature



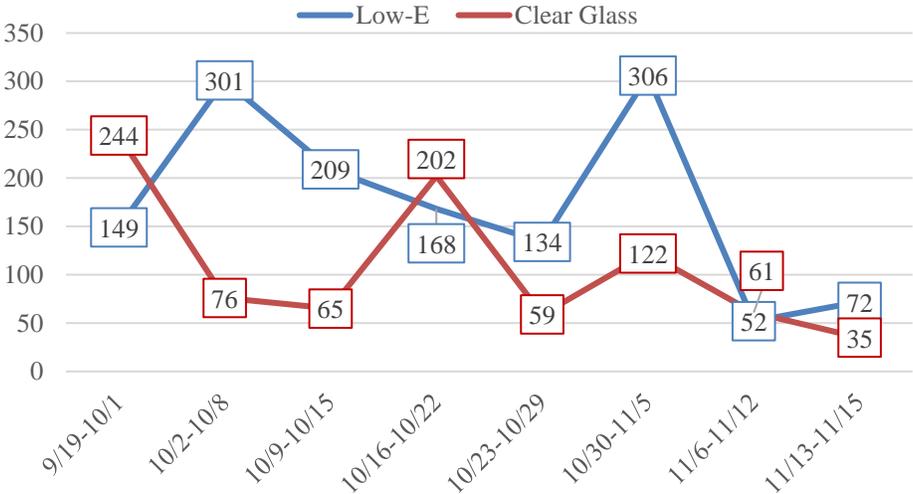
In Figure 7, the temperature dip matches up with the sales increase from October 29- November 4, indicating that the arrival of colder weather could have had a stronger effect on sales of low-E storm windows than the retailer rebate, which was also offered from September 15-23 but with little effect on sales. Another interesting trend to note is that the two highest sales weeks corresponded with the highest jumps in custom low-E storm window sales, as seen in Figure 8.

Figure 8. Stock and Custom Low-E Storm Window Sales



Perhaps unsurprisingly, sales of low-E storm windows and clear glass storm windows had an inverse relationship: when low-E sales increase, clear glass sales decreased, and vice versa. Figure 9 shows the interplay of low-E versus clear glass sales over the pilot period.

Figure 9. Low-E and Clear Glass Storm Window Sales

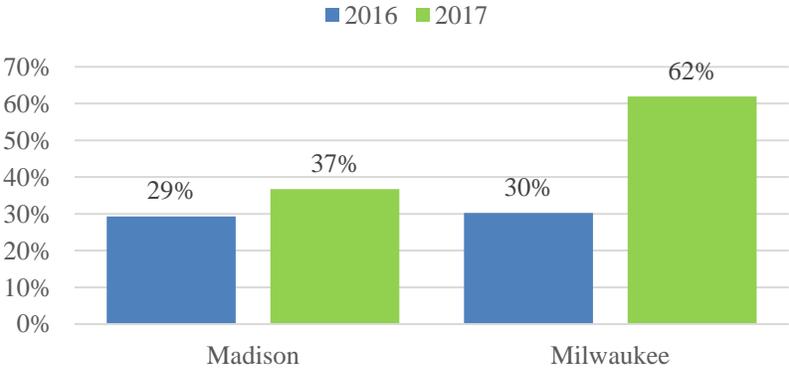


Overall the pattern of sales spikes suggests that low-E sales volumes and relative market share during these periods is the result of four simultaneous elements:

1. The onset of fall calendar months (namely, October and November)
2. Declining average daytime or night-time temperatures of 10 degrees or more
3. Retailer promotional activities in- and ex-store
4. Focus on Energy mark-downs and promotions

Although additional retailer promotions that occurred during the pilot program almost certainly increased overall storm window sales, comparative analysis of the pilot region (Milwaukee) against the control region (Madison) shows that the Low-E Pilot incentives produced an increase in sales and market share of low-E storm windows independent of the additional retailer promotions. While the Milwaukee stores saw a 125% low-E sales increase, the low-E sales in the Madison region increased by only 16%, despite the same retailer promotions and similar weather. Additionally, although the Madison low-E market share increased by 8% from 2016 to 2017, the Milwaukee region increased by 32% (see Figure 10 for 2016 and 2017 market share percentages). These results clearly illustrate the Low-E Pilot’s role in the increased low-E sales and market share in Milwaukee beyond the effects of the retailer promotions.

Figure 10. Low-E Market Share by Region (2016 and 2017)



B. Incentive Budget

The pilot sales exhausted a majority (63%) of the incentive budget by the end of the period. Single-family retail customers comprised all of the pilot’s low-E sales and therefore incentive usage. Figure 11 and Figure 12 show the total incentives paid out during the pilot period.

Figure 11. Budget Expenditure

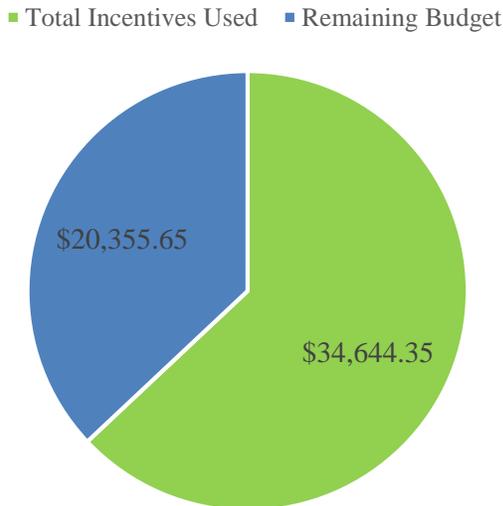
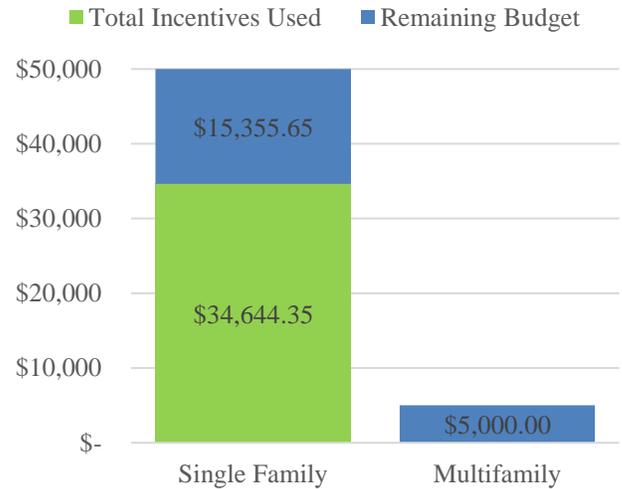


Figure 12. Budget Expenditure by Customer Type



The amount of incentives used closely matched the incentive usage estimated in pre-pilot planning based on historical sales and estimated sales growth as a result of the incentive. The 25% discount moved the market as anticipated.

C. Success Stories

Given the stellar results it is perhaps not surprising that the Manufacturer and Retailer Partners support expansion to a full-scale program. Throughout the development and execution of the pilot, the Manufacturer Partners and Retailer Partners were enthusiastic about the incentives and educational opportunities funded through Focus on Energy and passed on to their customers.

The Manufacturer Partners worked most closely with the Program Administrator and Program Implementer to coordinate the details of the Low-E Pilot. Larson – the Manufacturer Partner with a significant presence in the storm window market in Wisconsin – was pleased with the results of the pilot, both in terms of marketing materials and sales. Although Quanta did not have any sales stem from this pilot, the company did receive sales leads from Wisconsin customers – a region where they had no previous sales. Based on their experience with the Low-E Pilot, both Manufacturer Partners expressed interest in future opportunities to work with Focus on Energy.

Similarly, the 25% discount available through Focus on Energy for this pilot was large enough to motivate the Retailer Partners to participate. The two participating Retailer Partners were happy to accommodate the logistics of the Low-E Pilot, even in the midst of implementing their own promotions. The retailer that was not able to participate due to logistical reasons was attracted by the pilot and expressed interest in future opportunities around low-E storm window programs.

D. Marketing and Outreach

The customer outreach and marketing campaign met its goals of increasing customer awareness of low-E storm windows and incentive availability, and likely led to additional sales of low-E storm windows in the pilot region. Programmatic display (including geofencing), Google Adwords (pay per click), and Facebook display advertising tactics were deployed from September 29 to November 15. By using these digital marketing strategies, ads with pilot messaging reached the relevant audience during the incentive period. The Focus on Energy site landing page saw 1,833 unique page views, which was achieved based on all of the outreach strategies.

Display Campaign

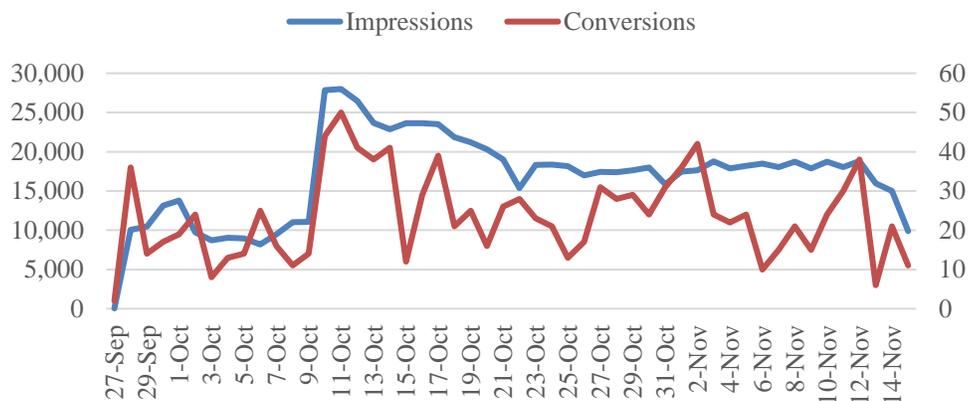
The display campaign resulted in 838,572 impressions, 885 clicks, and 1,179 conversions, as broken out in Table 7 below. A conversion occurs when someone who was served the ad ends up viewing the landing page – either from clicking on the ad or from navigating to the page at a later time. 1,338 customers tracked through geofencing subsequently entered a participating store.

Table 7. Display Campaign Results by Type

Type	Impressions	Clicks	Click-through Rate	Total Conversions
Geofencing	368,298	642	0.17%	717
Programmatic Display	470,274	243	0.05%	462
Total	838,572	885	0.11%	1179

Early on in the Low-E Pilot, the display campaign experienced fewer impressions; however in the second week of October, impressions and conversions spiked due to technical optimization of the campaign, and then slowly decreased and evened out through the remainder of the incentive period, as shown in Figure 13.

Figure 13. Display Campaign Impressions and Conversions



PPC Campaign

The PPC campaign saw 2,768 impressions and 151 clicks. The total click through rate was 5.46%, over two times the national average. The terms “storm windows,” “energy efficient windows,” and “insulated windows” were the top performing keywords in the campaign due to their high volume of searches compared to the other terms identified in Table 11. PPC Keywords.

Table 8. Keyword Results

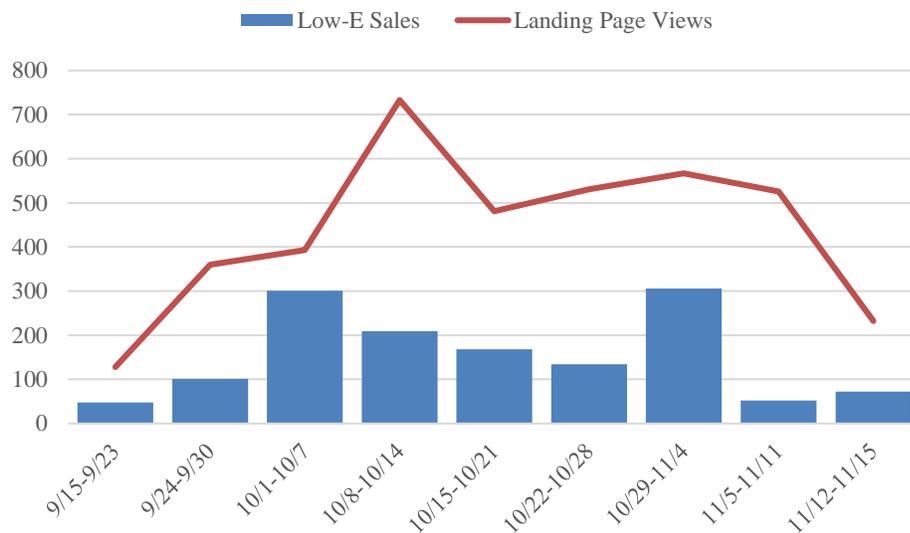
Keyword	Impressions	Clicks	Click-through Rate
Storm windows	2,329	130	5.58%
Insulated windows	271	9	3.32%
Energy efficient windows	167	12	7.19%
Grand Total	2,768	151	5.46%

Facebook Campaign

The ad campaign run through Focus on Energy’s Facebook page both engaged and expanded the page’s audience. The Facebook ads resulted in 49,888 impressions and 581 clicks, and also led to five additional page likes.

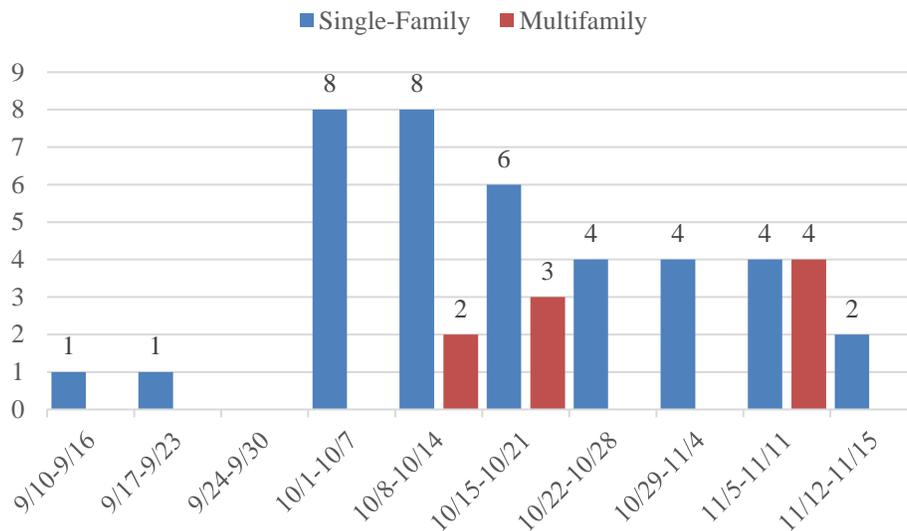
The digital marketing campaign as a whole, across all tactics, resulted in 3,191 conversions. Since there was no way to directly track marketing activity to sales (i.e. customers could not purchase discounted low-E storm windows online after seeing an ad), the exact extent of the marketing campaign’s impact on sales is unclear.

Figure 14. Landing Page Visits vs. Low-E Sales by Pilot Week



The Focus on Energy Multifamily Energy Savings Program email outreach resulted in nine eligibility form submissions. Figure 15 shows the number of form submissions received during the pilot period, totaling 38 single-family leads and nine multifamily leads. This email outreach (sent on October 12) may also be responsible for the spike in page views on the Focus on Energy Landing Page, as seen in Figure 14.

Figure 15. Quanta Eligibility Form Submissions



VI. Challenges, Lessons Learned, and Future Considerations

A. Challenges

This pilot faced a number of challenges and obstacles during its development and implementation. Due to the number of pilot stakeholders, the feedback cycles for tasks, such as the workpaper and marketing pieces, were longer and more numerous than originally planned. The delay in finalizing these items pushed back the deadlines for other tasks and, in some cases, led to duplicated work, as it was necessary to update previously completed work based on outdated information.

Additionally, necessary confidentiality precautions between the two manufacturers prevented the full team from coordinating openly in key areas, such as establishing the incentive levels and recruiting retailer partners. Multiple meetings with separate attendees were required to share information and discuss aspects of the pilot, which prolonged the pilot development process.

The most unexpected issues in the Low-E Pilot were encountered during development and distribution of the marketing materials and digital advertising strategy. The development of the in-store marketing materials from scratch experienced delays due to complications of an eventual break with the original Marketing Partner and the need for multiple rounds of edits. Once the project partners finalized and shared draft in-store materials with the retailers, the team learned that the retailers would not utilize the stack out or the pocket cards. The team also delayed the pilot launch and implementation of the digital marketing campaign as a result of technical and logistical issues. The team brought on a new Marketing Partner to develop the digital marketing campaign right as the pilot launched. The Marketing Partner had issues gaining access to Focus on Energy’s Facebook page and the team decided to wait until all of the elements of the digital marketing campaign were ready before launching. In the future, these issues could be avoided by having marketing templates to work with initially and starting development work further in advance of the pilot launch.

The multifamily portion of the Low-E pilot also dealt with some setbacks. While the digital marketing and multifamily email campaigns generated an increase in leads in Wisconsin, those leads did not convert to sales despite the incentives offered. The delays in launching the marketing campaigns may have disadvantaged the multifamily side more than single-family, since building owners and managers typically require more time to make purchasing decisions. The pilot could have run for a longer period of time or started marketing and outreach prior to the pilot so those customers had enough time for their acquisition processes. Sales calls also

indicated that that the incentive pool did not meet the expectations of multifamily building owners. Some leads expressed to Quanta that they had participated in other programs (namely lighting) through which they received substantial discounts, whereas they found low-E storm windows, even with the incentive, too expensive due to installation costs due to typical use of contractors on top of the product prices. Options for resolving this concern could have been a higher discount, an incentive on installation, and/or working with Focus on Energy Trade Allies more closely to arrange a lower installation cost.

B. Lessons Learned

The challenges that the pilot partners experienced offered lessons for future pilot and program development efforts:

- Pilot design and development, including retailer engagement, must begin as early as possible to accommodate potential delays
- All stakeholders should work to finalize the workpaper and deemed savings at the outset, prior to making program design decisions such as incentive amounts
- Multifamily incentives and/or outreach must be launched earlier to facilitate the longer decision timeframes
- All project partners should be included in as many meetings together as possible to improve efficiency, while recognizing the need for independent discussion with manufacturers
- Coordinate with other Focus on Energy incentives and retailer promotions currently in place to further broaden the exposure and take advantage of creative already developed

Despite the challenges associated with developing and implementing the marketing campaign related to timeline delays, the marketing efforts could have been improved to maximize efficacy. The main takeaway would be to prepare further in advance for the digital marketing campaign and to plan out how to track the effectiveness of the ads in relation to the KPIs and pilot goals. Additionally, the incentive budget should include a larger pool for multifamily projects in order to amplify interest and make the discount worthwhile for multifamily building owners.

VII. Conclusions

A. Steps to a Full-scale Program

When transitioning the Milwaukee-based pilot into a statewide Wisconsin low-E storm window program, there are a number of elements of the program design and marketing strategy to consider, for both single-family and multifamily customers.

Single-Family

The pilot included two manufacturers – Larson and Quanta – for single-family products. Larson storm windows (both low-E and clear glass) were already sold in the Wisconsin market in retail stores and through independent dealers. Quanta is a smaller company that is new to the Wisconsin market and manages sales directly via phone and web inquiries; no retailer or dealers carry their product. With a statewide program, other low-E storm window manufacturers could participate, as well. A key element of a successful statewide program will be maintaining the existing pilot Program Implementer who has deep knowledge of the relevant players and the technology. The pilot Program Implementer will be able to help coordinate all parties, including the current Focus on Energy retail Program Implementer, and enable the group to leverage the combined expertise and relationships with Retailer Partners of the retail Program Implementer and Larson. A statewide low-E storm window program can build upon the pilot’s momentum, but also can grow by absorbing into and becoming bolstered by the existing Focus on Energy retail program.

While any low-E storm window offered by the participating manufacturers was incentivized during the pilot, a full-scale program could consider Attachments Energy Rating Council (AERC) rated and ENERGY STAR® certified low-E storm windows as the measure receiving the incentive. AERC developed a new rating system for

window attachments, launching in the first quarter of 2018, which is also when the ENERGY STAR® Storm Windows specification is scheduled for release. More than 80% of consumers recognize the ENERGY STAR® brand, which could improve the perceived energy efficiency benefits of low-E storm windows and enable stronger differentiation from customers' conceptions of traditional storm windows.

In this pilot, the incentive was available to consumers as a percentage discount (25% of regular cost) via a markdown from the retailers and manufacturers. A statewide program could keep the percentage discount or offer a per-square foot discount (e.g. \$3/sq. ft.). A flat discount per unit (e.g. \$25 off each window) is not recommended due to a wide range of size variations, and because 70% of storm window sales in Wisconsin are custom products. Although the upstream markdown could be used in a statewide program, the Program Implementer recommends using a near-instant rebate process integrated with the retailer point-of-sale systems. This approach would enable immediate savings for the customer and maintain top-line sales for the retailers, which could influence retailer participation in the program. The pilot offered single-family discounts only at big box stores, but a full-scale program could additionally include independent dealers. Adding independent dealers is recommended since they represent approximately 30% of sales in Wisconsin. One retailer also expressed interest in the pilot but the timeframe did not work, so beginning conversations with all potential retail and dealers earlier could ensure their participation. In addition to the incentive to consumers, Focus on Energy could also consider offering a stocking bonus to retailers to convert to selling only low-E products or to carry stock low-E storm windows in store since not all retailer stores currently carry stock products. This would help make the product a more visible presence in stores.

Depending on which retailers and dealers participate in the program, an incentive pool of at least \$200,000 is recommended for a full-year program, compared to the \$50,000 incentive budget for the two-month Milwaukee-based pilot. Final budgetary decisions should involve analysis of participating manufacturers' historical sales at participating retailers and/or dealers, and should take into account expected sales increases.

Multifamily

The multifamily portion of the pilot involved only Quanta products and offered \$3 per square foot discounts for a maximum of \$1,000 per customer (with a \$5,000 total incentive pool). The Focus on Energy Multifamily Energy Savings Program assisted with outreach to participating multifamily building owners and managers. Further outreach through the Multifamily Energy Savings Program over a longer period of time is recommended, as purchasing decisions in this sector typically require multiple approvals, and therefore a longer timeframe. Additional considerations include involving multifamily contractors, expanding the pool of incentives, per square foot incentive, and per-customer maximum (since large multifamily buildings may have hundreds of windows), including installation incentives as part of the program design, and closer coordination with the existing Multifamily Energy Savings Program Implementer.

Marketing and Outreach

Retailer merchandising and marketing was fairly limited in the pilot program, mainly because of the short timeframe, the small pilot area, and the fact that, in Wisconsin, low-E storm windows are only currently stocked in Menards stores. The Program Implementer recommends working with Larson to encourage the installation of stack-out displays in as many stores as possible for the statewide program to increase low-E sales. The stack-out display designed in the early stages of the project for Focus on Energy could easily be adapted for a statewide program. It would also be helpful to advertise the incentive directly through the retailers (e.g. weekly circulars or commercials), other relevant groups such as historical societies and weatherization programs, as well as through Focus on Energy's existing marketing campaign(s). Part of the challenge of the pilot was that it was limited to Milwaukee, so Focus on Energy could not broadcast incentive availability to all customers and risk confusion or disappointment if people wanted to participate but were not in the Milwaukee area. Focus on Energy should leverage its name and channels of influence to promote a statewide program.

Digital marketing was useful in the pilot program, but would require additional work, such as a customer survey included in stock product packaging, to link ad impressions and clicks to sales if employed in a statewide program. The pilot's digital marketing campaign generated significant online engagement, but it was unclear how many

sales could be attributed to the digital ads. The landing page on Focus on Energy's website could be updated with the relevant program information and linked from other Focus on Energy pages so that it is easier for consumers to find. Additionally, Focus on Energy could develop social media posts advertising the program and including information about the incentive in the email newsletter, and seek out earned media to increase low-E storm window sales. Additional tracking mechanisms, such as unique phone numbers or landing pages could be put into place to determine digital ad effectiveness.

Other Considerations

While the pilot focused solely on residential applications of low-E storm windows, Focus on Energy may want to evaluate opportunities and potential energy savings for commercial installations of low-E storm windows. The timing of the statewide program is important to consider as well; storm window sales are typically highest around the transition into and out of the heating season, so initiating conversations with program stakeholders as early as possible is recommended. In addition, Focus on Energy should provide all of its utility partners with more information and opportunities to coordinate with a statewide program. Utility involvement could increase potential customer reach and also provide utilities with an opportunity to demonstrate their commitment to their customers through the discount offer. Finally, Focus on Energy may want to evaluate other energy efficient window attachment product categories beyond low-E storm windows, such as cellular shades, for additional incentive programs. Inclusion of cellular shades in a window attachment incentive program will be possible in 2018 when products with the AERC rating and label will be available.

Summary of Recommendations

Below is a summary of recommendations for the transition to a statewide program, based on the lessons learned and results from the Low-E Pilot:

- Expand participation to other low-E storm window manufacturers
- Maintain the existing pilot Program Implementer to help coordinate all parties
- Consider AERC rated and ENERGY STAR® certified low-E storm windows as the eligible measure
- Keep the percentage discount or offer a per-square foot discount
- Use a near-instant rebate process integrated with the retailer point-of-sale systems
- Include independent dealers in the full-scale program
- Offer a stocking bonus to retailers to carry stock low-E storm windows, potentially exclusively
- Provide an incentive pool of at least \$200,000 (depending on the number of retail and dealer partners)
- Additional Multifamily recommendations include:
 - Conduct outreach through the Multifamily Energy Savings Program over a longer period of time
 - Include multifamily contractors in the program
 - Expand the pool of incentives and/or allow for installation incentives
 - Increase the per-square foot incentive and/or raise the per-customer maximum
 - Coordinate more closely with the existing Multifamily Energy Savings Program Implementer
- Encourage the installation of stack-out displays in as many stores as possible
- Advertise the incentive directly through the retailers, other relevant groups, and through Focus on Energy's existing marketing campaign(s)
- Include a customer survey in stock product packaging
- Update the landing page on Focus on Energy's website with the relevant program information and link to it from other Focus on Energy pages
- Develop social media posts advertising the program, include information about the incentive in the email newsletter, and seek out earned media
- Evaluate opportunities and potential energy savings for commercial installations of low-E storm windows
- Initiate conversations with program stakeholders as early as possible, since storm window sales are typically highest around the transition into and out of the heating season
- Increase utility involvement and coordination
- Evaluate other energy efficient window attachment product categories (such as cellular shades) for additional incentive programs

VIII. Appendix A – Pilot Incentive Eligibility

Table 9. Participating Retail Stores

Retailer	Store Number	Store Name	Street	City	State	ZIP
Menards	3190	Baraboo	1040 US Highway 12	Baraboo	WI	53913
Menards	3224	Beaver Dam	121 Frances Lane	Beaver Dam	WI	53916
Menards	3217	Beloit	2851 Milwaukee Road	Beloit	WI	53511
Menards	3212	Burlington	2100 Milwaukee Avenue	Burlington	WI	53105
Menards	3195	Franklin	10925 West Speedway Drive	Franklin	WI	53132
Menards	3173	Germantown	W186N9754 Appleton Avenue	Germantown	WI	53022
Menards	3252	Janesville	2001 Morse Street	Janesville	WI	53545
Menards	3159	Johnson Creek	440 Wright Road	Johnson Creek	WI	53038
Menards	3127	Kenosha	7330 74 th Place	Kenosha	WI	53142
Menards	3126	Madison East	2102 East Springs Drive	Madison	WI	53704
Menards	3058	Madison West	430 Commerce Drive	Madison	WI	53719
Menards	3029	Milwaukee	8110 West Brown Deer Road	Milwaukee	WI	53223
Menards	3034	Monona	6401 Copps Avenue	Monona	WI	53716
Menards	3032	Oak Creek	6800 S 27 th Street	Oak Creek	WI	53154
Menards	3143	Pewaukee	1357 Capitol Drive	Pewaukee	WI	53072
Menards	3247	Sheboygan	4825 Vanguard Drive	Sheboygan	WI	53083
Menards	3043	Racine	3101 South Oakes Road	Sturtevant	WI	53177
Menards	3261	Waukesha	2315 Bluemound Road	Waukesha	WI	53186
Menards	3052	West Allis	2535 South 108 th Street	West Allis	WI	53227
Menards	3149	West Bend	575 West Paradise Drive	West Bend	WI	53095
Menards	3226	West Milwaukee	2101 Miller Park Way	West Milwaukee	WI	53219
Home Depot	4910	Delafield	3400 Hillside Drive	Delafield	WI	53018
Home Depot	4907	Franklin	6489 S 27th Street	Franklin	WI	53132
Home Depot	4919	Grafton	1350 Port Washington Road	Grafton	WI	53024
Home Depot	4924	Janesville	3200 Deerfield Drive	Janesville	WI	53546
Home Depot	4916	Kohler	4025 Highway 28	Kohler	WI	53044
Home Depot	4940	Wisconsin Dell	136 Commerce Street	Lake Delton	WI	53940
Home Depot	4912	Lake Geneva	550 North Edwards Blvd	Lake Geneva	WI	53147
Home Depot	4921	Delafield	3400 Hillside Drive	Delafield	WI	53018
Home Depot	4926	Franklin	6489 S 27th Street	Franklin	WI	53132
Home Depot	4941	Grafton	1350 Port Washington Rd	Grafton	WI	53024
Home Depot	4918	Kohler	4025 Highway 28	Kohler	WI	53044
Home Depot	4923	Lake Geneva	550 N Edwards Blvd	Lake Geneva	WI	53147

Home Depot	4902	Menomonee Falls	N94 W 18375 Thunder Ridge	Menomonee Falls	WI	53051
Home Depot	4925	North Shore	4155 N Port Washington	Milwaukee	WI	53212
Home Depot	4909	Mukwonago	232 E Wolf Run	Mukwonago	WI	53149
Home Depot	4906	Racine	2429 S Green Bay Road	Racine	WI	53406
Home Depot	4911	SE Milwaukee	150 West Holt Avenue	Milwaukee	WI	53207
Home Depot	4929	Waukesha	2320 W Bluemound Road	Waukesha	WI	53186

Figure 16. Map of Participating Retail Stores

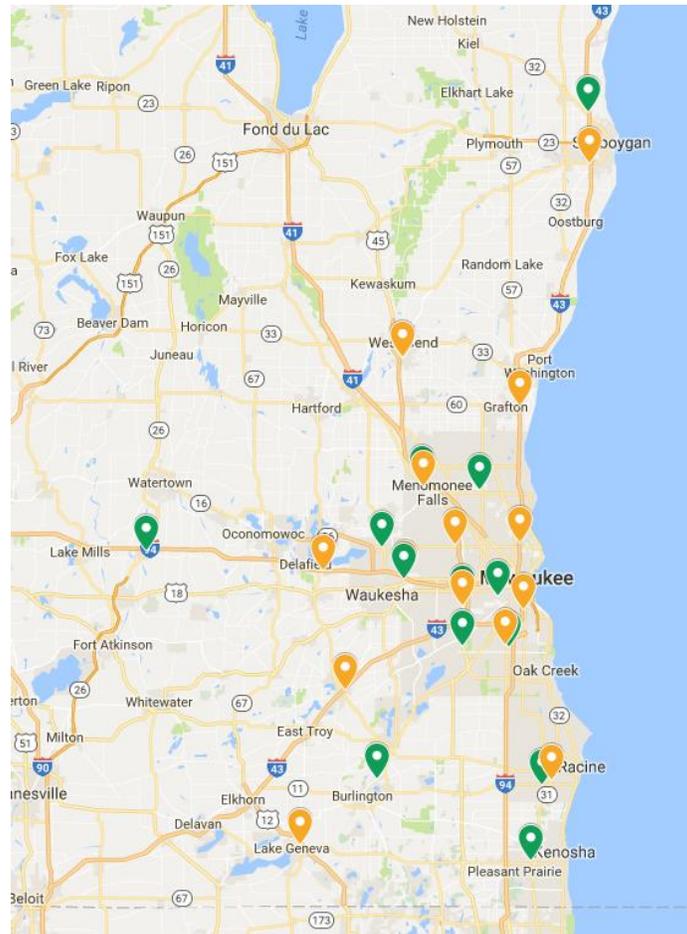


Table 10. Eligible Milwaukee Area ZIP Codes

ZIP Code				
53002	53046	53110	53188	53216
53004	53051	53118	53189	53217
53005	53058	53119	53202	53218
53007	53066	53122	53203	53219
53012	53069	53129	53204	53220
53017	53072	53130	53205	53221
53018	53074	53132	53206	53222
53021	53076	53146	53207	53223
53022	53080	53149	53208	53224
53024	53086	53150	53209	53225
53027	53089	53151	53210	53226
53029	53090	53153	53211	53227
53033	53092	53154	53212	53228
53037	53095	53172	53213	53233
53040	53097	53183	53214	53235
53045	53103	53186	53215	53295

IX. Appendix B – Detailed Implementation Timeline

Task	Deliverable	Submission date
Task 1: Planning	Low-E storm windows measure workpaper and cost-effectiveness calculator (CEC)	May 4
	Monthly report	Monthly (April-December)
	Identify rebate options	April 28
	Set final performance baselines and program performance targets	May 3
	Create mock-ups of retail marketing materials	May-June
	Prepare materials to present to retailers	July-August
	Engage retailers and manufacturers in discussion of program features and terms	July-August
	Retailer agreement to participate	July-August
	Finalize rebate application and fulfillment mechanisms	June 16
	Complete pilot operating plan	June 20
	Prepare program summary	June 20
Task 2: Program Development	Pilot integration with SPECTRUM	June-August
	Retail marketing and merchandizing materials	July-August
	Create mock-ups of multifamily marketing materials	June-August
	Multifamily marketing materials	July-August
	Store-level commitments to sales trainings	August
	Conduct in-store sales trainings and store preparation	September 15-21
	Final launch plan	July 21
Task 3: Pilot Run	Coordination and presentation of pilot to existing Focus on Energy programs	July-August
	Pilot data analysis and reporting	September 1 – November 27
	Marketing coordination	September 1 – November 15
Task 4: Pilot Completion	Meetings and reporting	September 1 – November 15
	Report final sales and incentive figures	November 27
	Final Report	December 1

Figure 18. Window Sticker



Figure 19. Stack-out



Figure 20. Single-family Flyer



EVERY WINDOW NEEDS ANOTHER LAYER

Save money and energy while reducing drafts in your home by installing low-E (low emissivity) storm windows on the interior or exterior of your existing windows. Low-E storm windows make your home more comfortable and can offer similar energy-saving performance to ENERGY STAR® certified replacement windows for as low as 25% of the cost – **starting under \$100 each.**

To get started, visit focusonenergy.com/low-estorms

**NOW
25%
OFF**
FROM 9/15/17 - 11/15/17
OR WHILE FUNDS LAST

BENEFITS OF LOW-E STORM WINDOWS



MODERN DESIGN

A visually appealing addition to your home with an easy, ready to use design.



NO BRAINER ECONOMICS

The elimination of wasted energy pays for itself many times over.



SUPERIOR COMFORT

Regain comfort everywhere in your home, all year long.

Upgrade Today:
focusonenergy.com/low-estorms

WHAT IS LOW-E?

Low-E stands for low emissivity. It is an extremely durable coating on glass that minimizes the amount of infrared energy that can pass through, without compromising the amount of visible light that shines in. The coating itself is 1/100th the thickness of a human hair, but it has a huge impact on keeping your home comfortable!

HOW DO LOW-E STORM WINDOWS WORK?

Low-E storm windows use high-performance weather stripping to create a tight seal and a layer of insulating airspace on your existing windows, making you home quieter and more comfortable. They come with a transparent low-emissivity coating that acts as a heat mirror, which keeps the heat outside in the summer and inside in the winter.

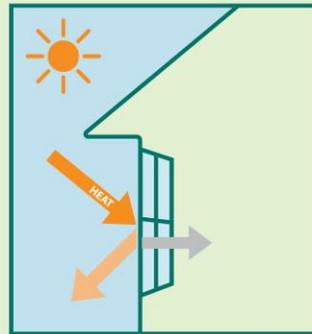


WARMER IN WINTER

- Improves window performance by reflecting heat back into home and reducing energy transfer through the window opening
- Reduces heating energy costs

COOLER IN SUMMER

- Less sun-generated heat enters your home
- Helps keep interiors cooler
- Reduces cooling energy costs



ACT NOW TO GET A 25% DISCOUNT

Homeowners in the Milwaukee area are eligible for a 25% discount off purchases of 15 or fewer eligible low-E storm windows.

Visit focusonenergy.com/low-estorms to find your nearest participating retailer or get a quote today.

Discounts provided by Focus on Energy are available from September 15 to November 15, 2017, or while funds last.



Figure 21. Multifamily Flyer



EVERY WINDOW NEEDS ANOTHER LAYER

Low-E Storm Windows for your Multifamily Building

If your building has beautiful windows and views, but your tenants experience problems associated with older windows, consider an upgrade that works with your existing windows.

You can still own a historic property and retain its original windows and offer your tenants improved energy, comfort and noise reduction.

Learn more at: focusonenergy.com/low-estorms

**LIMITED
TIME
DISCOUNT**

FROM 9/1/17 - 11/15/17
OR WHILE FUNDS LAST

LOW-E STORM WINDOWS ARE IDEAL FOR:



GARDEN APARTMENTS

Exterior low-E storm windows are ideal for garden apartments and multifamily adaptive reuse properties.



RESIDENTIAL MULTIFAMILY

Exterior or interior solutions work for residential multifamily buildings.



HIGH RISE APARTMENTS

Interior products are ideal for multifamily high rise apartment buildings.

upgrade your building performance with
LOW-E STORM WINDOWS

WHAT IS LOW-E?

Low-E stands for low emissivity. It is an extremely durable coating on glass that minimizes the amount of infrared energy that can pass through, without compromising the amount of visible light that shines in. The coating itself is 1/100th the thickness of a human hair, but it has a huge impact on building performance.

HOW CAN LOW-E STORM WINDOWS IMPROVE BUILDING PERFORMANCE?

Thermal and energy performance. The transparent low-emissivity coating that acts as a heat mirror, which keeps the heat outside in the summertime and inside in the wintertime.

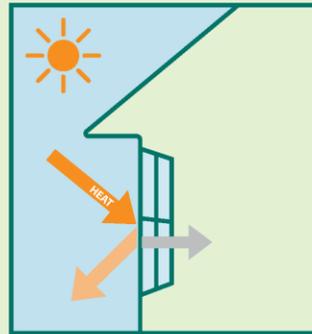


WARMER IN WINTER

- Improves window performance by reflecting heat back into home and reducing energy transfer through the window opening
- Reduces heating energy costs

COOLER IN SUMMER

- Less sun-generated heat enters your home
- Helps keep interiors cooler
- Reduces cooling energy costs



Comfort and livability performance

A low-E storm window provides a tight seal between itself and your existing window by using high-performance weather stripping. This tight seal helps to:

- Reduce exterior noise
- Reduce drafts
- Create more uniform room temperature
- Reduce temperature differences between rooms

ACT NOW TO GET A DISCOUNT

1. Eligible customers should own or manage a multifamily building that:

- Has 4+ residential units
- Is located in Wisconsin
- Is a customer of a Focus on Energy participating utility

2. Fill out the [eligibility form](#) and receive a price quote from QUANTAPANEL

3. Purchase low-E storm windows from QUANTAPANEL between September 1 and November 15, 2017 and receive an instant discount of \$3 per square foot of low-E storm window (limit \$1,000 per project).



Figure 22. Landing Page (www.focusonenergy.com/low-estorms)

gy.com/residential/low-estorms?utm_source=vanity-url&utm_medium=vanity&utm_campaign=low-estorms



FOR YOUR HOME FOR YOUR BUSINESS FOR TRADE ALLY CONTRACTORS ABOUT US

Low-E Storm Windows

Every window needs another layer. Layer it on for energy savings and comfort.

A modern low-E storm window uses high performance weather stripping to create a tight seal and a layer of insulating airspace between itself and your existing window. It also comes with a transparent low-emissivity (low-E) coating that acts as a heat mirror, which keeps the heat outside in the summertime and inside in the wintertime.

No brainer economics

Studies have shown that with low-E storm windows, you can achieve similar energy-saving performance to ENERGY STAR® certified replacement windows for as low as 25% of the cost. Low-E storm windows start under \$100 each, and many people install them without help from contractors. Limited-time discounts provided by Focus on Energy reduce the price of low-E storm windows even further.

Superior comfort

Did you know that air leakage accounts for 25-40% of the energy used for home heating and cooling? Low-E storm windows not only reduce drafts to make your home more comfortable, but they can also cut heating and cooling costs by 20% or more. In addition, low-E storm windows improve interior comfort by reducing exterior noise, so you can enjoy your quiet home.

Modern design

Low-E storm windows are a smart investment. The durable, high-quality finish and low profile design gives them virtually the same visual appearance as new replacement windows.

HOW CAN I GET DISCOUNTED LOW-E STORM WINDOWS?

- 1 Homeowners** in the Milwaukee area can purchase a maximum of 15 low-E storm windows at a 25% discount at participating Menards and Home Depot locations from September 15 through November 15, 2017, or [get a quote online today](#).
- 2 Multifamily Property Owners** or managers can [request an estimate](#) and [determine their eligibility](#) or contacting the Focus on Energy Multifamily Energy Savings Program tyounger@franklinenergy.com for more information.



Interested in purchasing low-E storm windows at a limited-time discount from Focus on Energy? Check the eligibility details for home owners and multifamily property owners, frequently asked questions, and qualifying low-E storm window products below!

Contact Us

Do you have questions about Focus on Energy and its programs or your eligibility? We're happy to help. [Get in touch with us](#)

What's New? Residential Programs

[Review all the latest Residential Program Updates.](#)

Figure 23. Facebook Ad #1

 **Focus on Energy**
Sponsored · 

[Like Page](#)

For high performance weather stripping that keeps a tight seal and keeps your home warm in the winter, Focus On Energy has a great deal for you!



Every Window Needs Another Layer!

Millwaukee Residents!
NOW 25% OFF
LOW-E Storm Windows

Get 25% Off Now On Low-E Storm Windows!
Click to learn more.

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Figure 24. Facebook Ad #2 (updated without text)

 **Focus on Energy**
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For high performance weather stripping that keeps a tight seal and keeps your home warm in the winter, Focus On Energy has a great deal for you!



Get 25% Off Now On Low-E Storm Windows!

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Table 11. PPC Keywords

Energy efficient windows
Insulated windows
Storm windows
Low-E storm windows
Discount storm windows
Storm window rebates
Windows that lower energy bill
Windows that qualify for energy rebates
Windows that qualify for energy bill rebates
Focus on energy window rebates
Replace leaky windows
Discount low-E storm windows

XI. Appendix D – Incremental Cost Calculations

INPUT	VALUE	EXPLANATION/SOURCE
Average Window Size (sq. ft.)	10.7	Historical storm window manufacturer sales data
Cost of Low-E Storm Window	\$ 74.01	Historical storm window manufacturer sales data, normalized for 10.7 sq ft window
Cost of Clear Glass Storm Window	\$ 53.64	Historical storm window manufacturer sales data, normalized for 10.7 sq ft window
Cost of DIY Storm Window Installation	\$ 2.00	Low-E Storm Windows: Market Assessment and Pathways to Market Transformation (Cort, KA: 2013. PNNL-22565. Pacific Northwest National Laboratory, Richland, Washington. http://www.pnnl.gov/main/publications/external/technical_reports/PNNL-22565.pdf)
Cost of Contractor Installation	\$ 30.00	See PNNL paper above
Cost of Replacement Window, Installed	\$ 403.77	D+R International (unpublished) Calculated from national average installed replacement window cost based on mystery shopping quotes from window installation contractors in seven metro areas collected by Consumers Checkbook, normalized to a 10.7 sq. ft. window.
Percent of DIY Storm Window Installation	80%	See PNNL paper above
Percent of Contractor Installation	20%	See PNNL paper above
Upgrade from Clear Glass Storm Windows (Share of Net New Low-E Sales)	49%	Calculated from Efficiency Vermont pilot results in Bonn, et al. 2015 LO(W-E) AND BEHOLD: Low-E Storm Windows Provide a New Way to Solve the Window Conundrum. Efficiency Vermont. (https://www.efficiencyvermont.com/Media/Default/docs/white-papers/efficiency-vermont-low-e-and-behold-white-paper.pdf)
New Demand (Share of Net New Low-E Sales)	51%	Calculated as 100% minus Upgrades from Clear Glass
Share of New Demand that wanted to purchase full replacement windows	42%	Efficiency Vermont Survey
Share of low-E purchasers who do not install replacement windows within 20 years of low-E purchase	5%	Assumed. In future = 1 - share that will replace within 20 years
Share of low-E purchasers who still install replacement windows within 20 years of low-E storm window purchase	95%	Assumed. In future years = forecast based on Low-E SW purchasers who have replaced original windows with new full replacement windows
Average length of delay in full replacement (years)	7	Assumed. In future will be based on surveys of Low-E purchasers
Average lifetime of replacement windows (years)	20	ENERGY STAR

 = Controlling inputs for tables below
 = Cell in tables accepting controlling value

FINAL INCREMENTAL COST (SEE STEPS BELOW)	
Average Incremental Cost per unit	\$ 18.52
Average Incremental Cost per square foot	\$ 1.73
Average Incremental Cost as Percent of Total Installed Product	23%

INSTALLED COST OF STORM WINDOWS AND REPLACEMENT WINDOWS, WEIGHTED BY DIY/CONTRACTOR INSTALLATION SPLIT							
		Unit Cost	Installation cost	Total installed cost	Installations split	Weighted share of cost	Weighted installed cost
Low-E Storm Window	DIY	\$ 74.01	\$ 2.00	\$ 76.01	80%	\$ 60.81	\$ 81.61
	Contractor	\$ 74.01	\$ 30.00	\$ 104.01	20%	\$ 20.80	
Clear Glass Storm Window	DIY	\$ 53.64	\$ 2.00	\$ 55.64	80%	\$ 44.51	\$ 61.24
	Contractor	\$ 53.64	\$ 30.00	\$ 83.64	20%	\$ 16.73	
Full Replacement Window		\$ 403.77				\$ 403.77	

INCREMENTAL COST OF INSTALLED LOW-E STORM WINDOW BY CUSTOMER CLASS									
Customer Class	Customer Subclass	Weighted Cost of Low-E Storm Window	Weighted Cost of Clear Glass Storm Window	Cost of Replacement Window	Lifetime of replacement window	Value of deferring replacement window installation for 1 year	Average length of deferral	Value of average deferral	Incremental Cost Per Low-E Storm Window
Converted From Clear Glass Storm Windows		\$ 81.61	\$ 61.24						\$ 20.37
New Low-E Storm Window Demand	No prior plan to purchase window or storm window	\$ 81.61							\$ 81.61
	Originally planned full window replacement Do not install replacement windows within 20 years of low-E storm window purchase			\$ 403.77	20				\$ (322.16)
	Install replacement windows within 20 years of low-E storm window purchase	\$ 81.61				\$ 20.19	7	\$ 141.32	\$ (59.71)

ABSOLUTE SHARE OF LOW-E WINDOW STORM WINDOW SALES BY CUSTOMER CLASS						
Customer Class	Customer Subclass	Conversions vs. New Demand	New Demand Split	Originally planned full window replacement, absolute share	Install window replacements after purchasing low-E storm window, share	Absolute Share of Low-E Sales
Converted From Clear Glass Storm Windows		49%				49%
New Low-E Storm Window Demand	No prior plan to purchase window or storm window	51%	58%			29.6%
	Originally planned full window replacement Do not install replacement windows within 20 years of low-E storm window purchase	51%	42%	21.4%		1.071%
	Install replacement windows within 20 years of low-E storm window purchase			21.4%	5%	20.349%

FINAL INCREMENTAL COST CALCULATIONS	
Incremental Cost Per Low-E Storm Window	\$ 20.37
Weighted Incremental Cost/(Value)	\$ 9.98
	\$ 81.61
	\$ 24.14
	\$ (322.16)
	\$ (3.45)
	\$ (59.71)
	\$ (12.15)
Average Incremental Cost	\$ 18.52
Average Incremental Cost as Percent of Total Installed Product Cost	23%