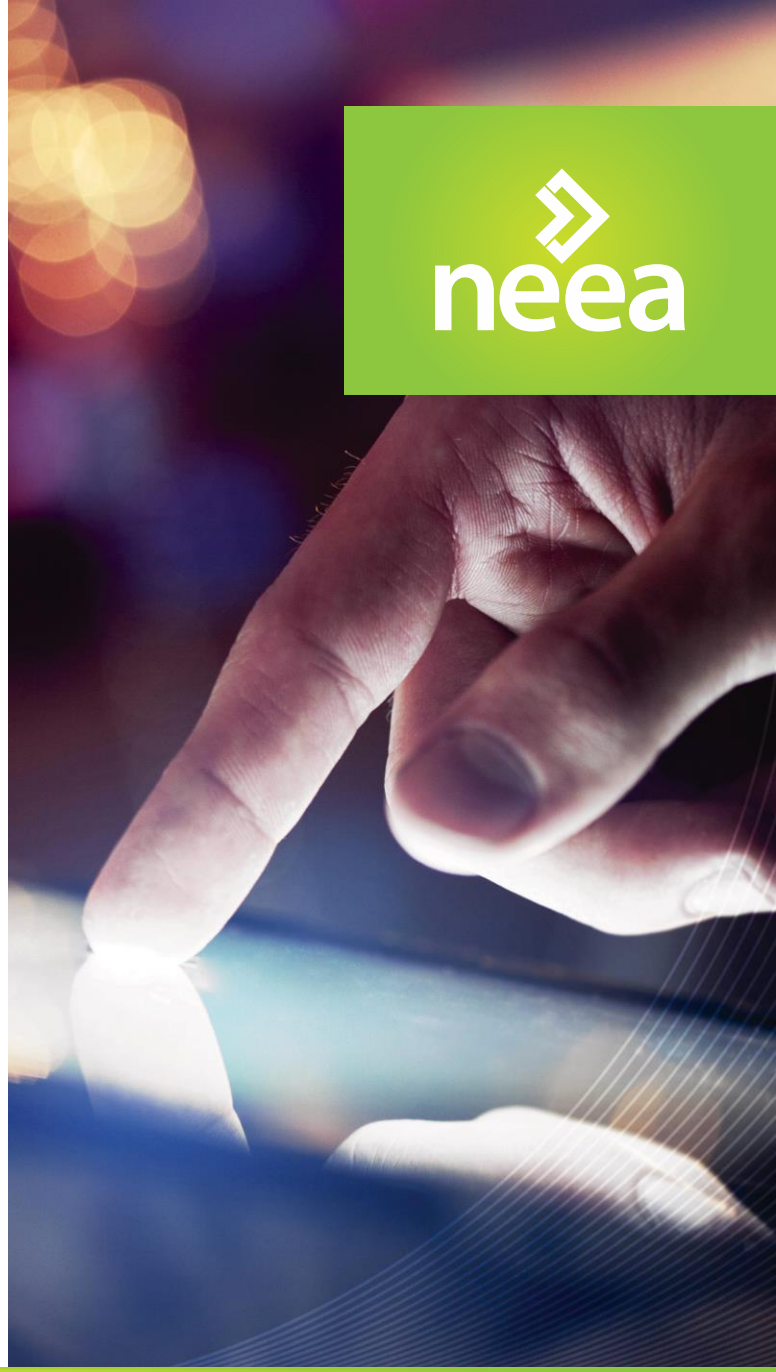
03/16/2018

Secondary Glazing Systems (SGS)

APEM
March 16, 2018
Christian Miner, NEEA





Today's Objectives

- Understanding of NEEA
- Understanding of NEEA's commercial programs
- Familiarity of product, product cost and savings potential
- Understanding of NEEA's regional efforts for SGS

Northwest Energy Efficiency Alliance

NEEA identifies barriers and opportunities to increase and ***accelerate the market adoption of energy efficient products in the Northwest***

We work in four sectors:


Commercial


Residential


Industrial


Codes & Standards

NEEA

Established - 1996

Non-profit

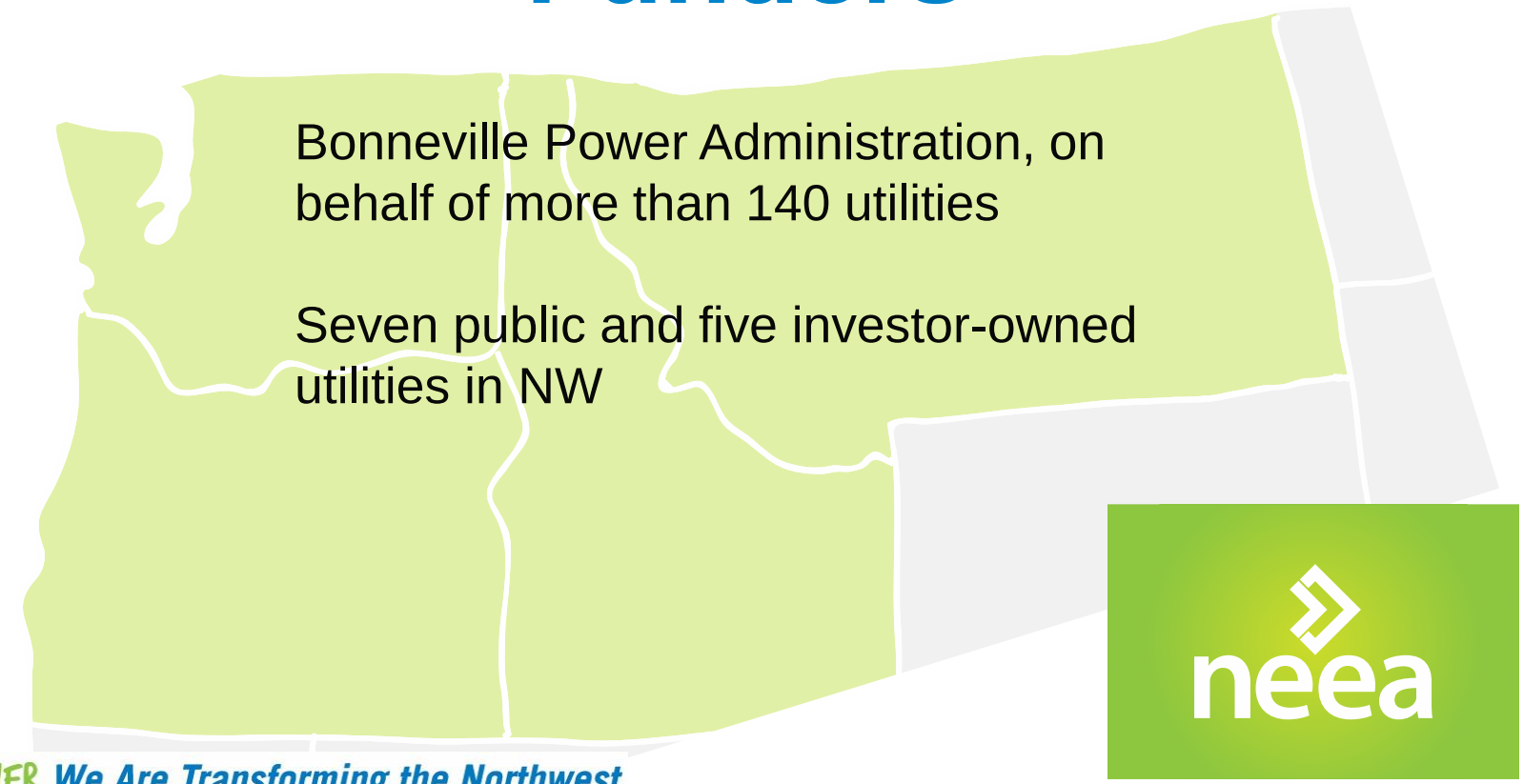
Team Breadth

- 87staff with deep market transformation expertise

Follow us on –

“Conduit”
BetterBricks
CRE Hub
SEM Hub
Spark!

Funders



Bonneville Power Administration, on behalf of more than 140 utilities

Seven public and five investor-owned utilities in NW

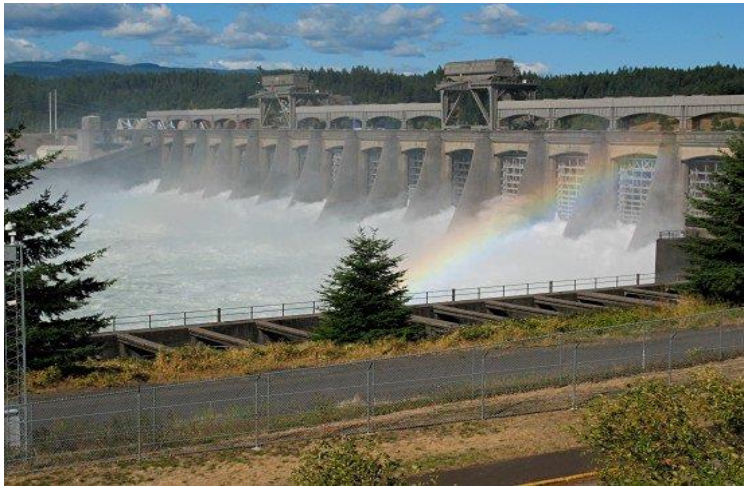
neea

TOGETHER We Are Transforming the Northwest

Avista · Bonneville Power Administration · Cascade Natural Gas Corporation · P.U.D. Chelan County · Clark Public Utilities · Cowlitz PUD · Energy Trust of Oregon · Grant PUD · Idaho Power An IDACORP Company · NorthWestern Energy · NW Natural · Pacific Power · PGE · Puget Sound Energy · Seattle City Light · Snohomish County PUD Public Utility District No. 1 · Tacoma Power Tacoma Public Utilities

Northwest Perspective

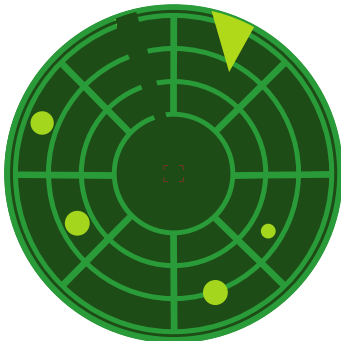
- Since 1996, the region has cost-effectively delivered over ***1,000 aMW*** of energy efficiency through market transformation



- Equal annual capacity of Bonneville dam

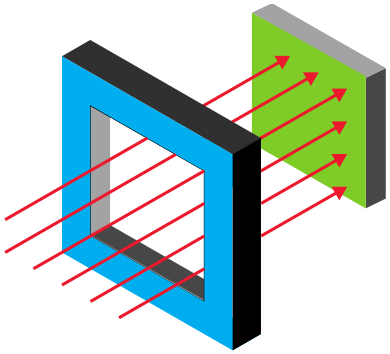
How We Work

IDENTIFY BARRIER



Identify barriers that impede market adoption of energy-efficient products, services and practices.

MARKET INTERVENTION



Strategically intervenes to remove market barriers in collaboration with funders.

MARKET TRANSFORMED

The market is transformed and continues to accelerate ***without further intervention***.

Commercial Programs

Commercial Real Estate

- Building network with a “hard to reach market”
- Seattle Tune-up Accelerator (TUA)
- Seattle 2030 District
- Benchmarking
- BOMA & Emerging Technologies
- CRE Hub & Spark!

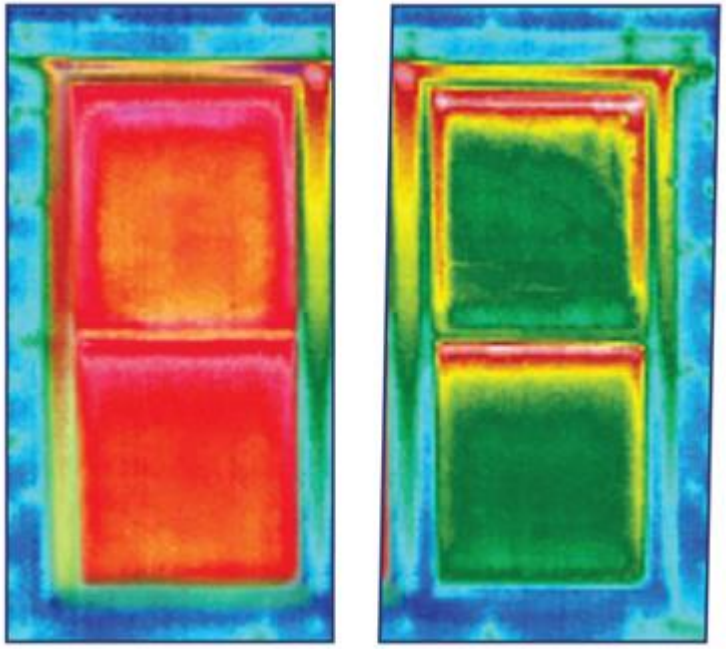
Strategic Energy Management

- Energy Smart Bellevue
- Community SEM
- Idaho Schools initiative
- CRE Hub

Window Attachments

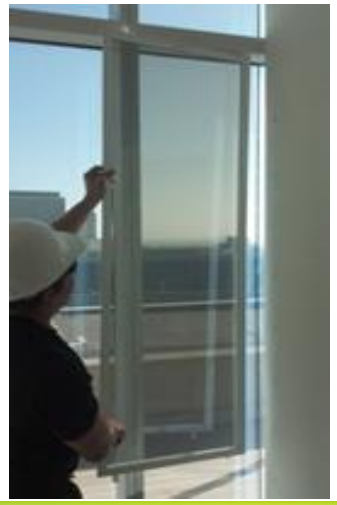
- Low-e Storm Windows (LES)
- Secondary Glazing Systems (SGS)
- Films
- Cellular Shades

Cellular Shades

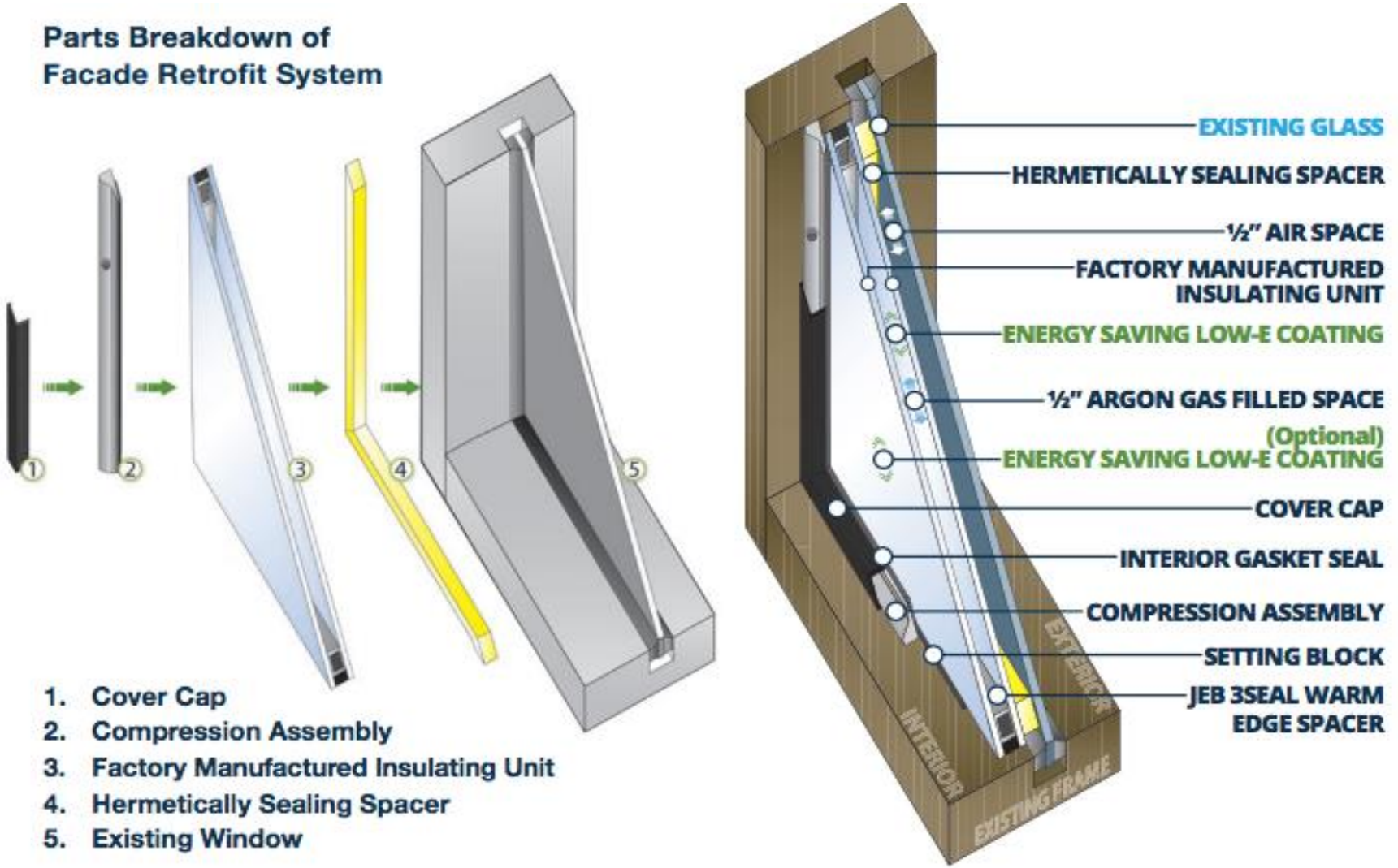


Commercial Programs

CRE



SGS - Product


Parts Breakdown of
Facade Retrofit System
1
2
3
4
5
1. Cover Cap
2. Compression Assembly
3. Factory Manufactured Insulating Unit
4. Hermetically Sealing Spacer
5. Existing Window
EXISTING GLASS
HERMETICALLY SEALING SPACER
½" AIR SPACE
FACTORY MANUFACTURED
INSULATING UNIT
ENERGY SAVING LOW-E COATING
½" ARGON GAS FILLED SPACE
(Optional)
ENERGY SAVING LOW-E COATING
COVER CAP
INTERIOR GASKET SEAL
COMPRESSION ASSEMBLY
SETTING BLOCK
JEB 3SEAL WARM
EDGE SPACER
INTERIOR
EXTERIOR
EXISTING FRAME

Product Benefits

"Inefficient windows account for as much as 25 percent of a typical building's heating load in cold climates and 50 percent of the cooling load in warm climates."

- Environmental Protection Agency (EPA)

Value Proposition:

Building Repositioning

- Reduce electric use 5-29%
- Non-Energy Benefits (NEB)
  - Thermal comfort
  - Increased occupant productivity
  - Health & wellness
  - Reduce exterior street noise
- Increase rents and occupancy rate
  - $/sqft
  - Rentable space
- Ease of installation
- Low Risk
- Equipment Downsize (replacement)

Regional Savings Potential

(20 years)

20-40 aMW electric, additional gas potential

Barriers to Adoption

- High first cost and “do nothing” scenario
- No credible standards for product energy performance
- Manufacturers claims untested
  - Rainier tower, Seattle
  - New Haven, CT
  - Buffalo, NY
  - Pennsauken, NJ
  - Philadelphia, PA
  - LUB, Seattle (Electro-chromatic - View Dynamics)
- Measurement and value of non-energy benefits
- Inadequate knowledge of business case by target market
- Perceived condensation risk
  - Navigant Market Research (2017) – “no substantial evidence of concerns about product performance”
- Failing Seals
  - SGS manufacturers have required comprehensive re-sealing of all single pane glazing prior to installation of any SGS units.

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SGS - Manufacturers

JE Berkowitz (RnB) – Salem County, NJ

Allied Window - Cincinnati, OH

Thermolite – South Bend, IN

Wausau – Wausau, WI

Cost & Savings

- **Standard Rip-out & Replacement - $100/sqft of Glass**
- **SGS - $50/sqft of Glass**
- **eQuest run #1 by RnB**
    - Total Square Feet of Glass: **187,733**
    - Est. Annual Savings: **$1,081,359**
    - Est. upgrade cost: **$9,850,000**
    - Cost: **$52/sf**
    - Est. Payback in Years: **9.11**
- **eQuest run #2 by RnB**
    - Total Square Feet of Glass: **65,648**
    - Est. Annual Savings: **$849,520**
    - Est. upgrade cost: **$3,450,000**
    - Cost: **$52/sf**
    - Est. Payback in Years: **4.06**

Cost & Savings

- **NEEA and SOLARC Engineering conducted preliminary SGS analysis in 2016**
- **Cost and Savings was modeling using eQuest/DOE2.2 software**
- **Six building types were modeled:**
  - High and Mid-rise office
    - » Gas-fired hot water boiler serving built-up VAV system with hydronic reheat
    - » Electric resistance hot water boiler serving built-up VAV system with hydronic reheat
  - Small office
    - » Single zone rooftop units with gas furnaces
    - » Single zone rooftop units with air-source heat pumps
- **Climate regions were represented by the following weather data:**
  - Portland, Oregon
  - Spokane, Washington
  - Missoula, Montana
  - Oakland, California

Cost & Savings

		Limited Operation		Extended Operation		Continuous Operation	
Typology	Alternative	Minimum Payback Period, Yrs	Maximum Payback Period, Yrs	Minimum Payback Period, Yrs	Maximum Payback Period, Yrs	Minimum Payback Period, Yrs	Maximum Payback Period, Yrs
High Rise Office Gas Heat	Single Pane SGS	46	77	25	45	22	36
	Double Pane SGS	37	48	20	25	15	22
High Rise Office Electric Heat	Single Pane SGS	18	40	10	23	9	19
	Double Pane SGS	16	27	8	14	6	10
Mid-rise Office Gas Heat	Single Pane SGS	41	56	21	30	20	25
	Double Pane SGS	37	51	19	25	17	21
Mid-rise Office Electric Heat	Single Pane SGS	17	31	10	18	7	14
	Double Pane SGS	16	27	9	14	6	10
Small Office Gas Heat	Single Pane SGS	70	107	43	62	42	59
	Double Pane SGS	53	73	31	43	28	36
Small Office Electric Heat Pump	Single Pane SGS	51	101	32	57	29	46
	Double Pane SGS	45	70	27	40	23	32

[1] Payback periods less than 20 years are highlighted.

Case Study

- 195 Church St., New Haven CT
- 260k sf office building
- $500k rebate from local utility brought payback from 15 to 6 year payback
- Existing ¼” single pane glass
- Electric base-board heating
- 42,066 sf of glass covered with Wausau interior “seal – window”
- Apogee was installer

Case Study

PROJECT RESULTS:

$203K

annual savings

29% ↓

decrease in building annual electricity consumption

New National Standards

Attachments Energy Rating Council **(AERC) certification and rating label** for low-e storm windows scheduled for Q1 2017.

AERC is a non-profit organization created to develop a comprehensive **energy certification and rating program** for products installed internally or externally

EnergyStar label scheduled to immediately follow

NEEA's SGS Regional Efforts

- AERC – Certification
- Regional Technical Forum (RTF)
- Utility Outreach
- Verify Cost and Savings
  - 10 Lafayette Square, Buffalo, NY
  - 400 Market St., Philadelphia, PA
  - Kevon Office Center, Pennsauken, NJ
  - New Haven, CT

SGS Calculator

- Calculator built using Energy Plus whole building simulations and two prototype office building models.
  - High-Rise Office Model is a 500k SF twelve story building
  - Midrise office building is based on a 53k SF three story office building
- Model limitations
  - Size
  - Location
  - HVAC system

Spark! Tool
BetterBricks

Discussion

- Your questions
- How does the initiative complement or conflict with your programs?
- Other comments on SGS?

Thank You!

Christian Miner

Sr. Program Manager

cminer@neea.org 503-688-5498