

**Meeting Notes**  
**Q3 2022 Integrated Systems Coordinating Committee (ISCC)**  
**Thursday, August 11, 2022**  
**Webinar Only 9-12:30p Pacific Time**



**Attendees:**

|  |  |
|--|--|
| Matt Babbitts – Clark Public Utilities         | Jake Wise – Portland General Electric                                  |
| Eric Mullendore – Bonneville Power Admin (BPA) | John Petosa – Snohomish County PUD                                     |
| Emma Johnson – Seattle City Light (SCL)        | Tucker Kramer – Northwestern Energy (NWE)                              |
| Lorri Kirstein – Avista                        | Jocelyne Moore – Cascade Natural Gas                                   |
| Sinh Tran – Snohomish County PUD               | Megan Brooks Lacy – Puget Sound Energy (PSE)                           |
| Natasha Houldson – Tacoma Power                | Amy Burke – Bonneville Power Administration (BPA)                      |
| Michael Lane – Puget Sound Energy (PSE)        | Grace Diller – Minnesota Center for<br>Energy and Environment (MN CEE) |
| Haley Burk – Inland Power and Light            | Andrew Shepard – Energy Trust of Oregon (ETO)                          |
| Oliver Kesting – Energy Trust of Oregon (ETO)  | Bill Hibbs – Clark Public Utilities                                    |
| Mark Aalfs – Tacoma Power                      | Peter Goldberg - ConEdison   |
| Nancy Goddard – Pacific Power                  |  |

**NEEA Staff:** Maria Alexandra Ramirez, Brandon Lindquist, Rick Dunn, Rachel Zakrasek, Kathryn Bae, Jesse Largent, Britt Cutsforth Dawkins

**Resources**

- **Agenda packet on NEEA.org:** [Northwest Energy Efficiency Alliance \(NEEA\) | Q3 2022 ISCC Packet](#)
- **Master slide deck on NEEA.org:** [Northwest Energy Efficiency Alliance \(NEEA\) | Q3 2022 ISCC Slide Deck](#)
- **Meeting Recordings:** **Part 1:** <https://attendee.gotowebinar.com/recording/2207396461928743682>  
**Part 2:** <https://attendee.gotowebinar.com/recording/943527637009787650>

**Welcome, Introductions, and Housekeeping(packet p. 1-3, 10| slides 1-11)**

*If you have questions regarding general content in this meeting please contact Maria Alexandra Ramirez. ([maramirez@neea.org](mailto:maramirez@neea.org)).*

**A. Agenda Review & Introductions**

**B. Housekeeping**

- 1) Nominations are open for 2022 Leadership in Energy Efficiency Awards. There is a new Rising Star category.
  - a. You can nominate here: [Northwest Energy Efficiency Alliance \(NEEA\) | Leadership in Energy...](#)
- 2) Efficiency Exchange 2023 idea submissions are open from September 15 through October 28. Efficiency Exchange website is here: [Northwest Energy Efficiency Alliance \(NEEA\) | Efficiency Exchange...](#)
- 3) Emily Moore has been promoted to Director and oversees the entire electric portfolio, including all the programs under Products and Integrated Systems.
- 4) Stephanie Quinn has moved from Market Transformation Manager to Manager of Program Management. She may be involved with this committee in the future.
- 5) Charter reminder



- a.
- 6) ISCC Annual Workplan can be found here: [Northwest Energy Efficiency Alliance \(NEEA\) | ISCC 2022 Annual...](#)

## Cross-Sharing: High-Performance Windows ([packet p. 4-7](#) | [slides 12-25](#))

*Rachel Zakrasek ([rzakrasek@neea.org](mailto:rzakrasek@neea.org)) and Rick Dunn ([rdunn@neea.org](mailto:rdunn@neea.org)) shared NEEA's current activity on the High-Performance Windows program. Matt Babbitts (PUD), Jocelyne Moore (Cascade), and Andrew Shepard (ETO) held a panel on their respective utilities windows programs. Grace Diller walked through PAWS work and Minnesota CEE's involvement.*

### Presentation Highlights

- 1) The long-term goal of the High Performance Windows program is to increase the share of sales of windows with a 0.22 U value to 50%. Current market share is between two and four percent.
  - a. Typically the windows that fit the above definition are triple pane windows, but there are double pane windows that do.
- 2) Key activities and learnings
  - a. A market characterization study will be released this quarter. This is foundational to understand the residential windows market.
  - b. Incremental cost study will be released this quarter.
  - c. A builder pilot is ongoing and will most likely be published in early 2023.
  - d. ENERGY STAR spec update is pending
  - e. The program has established relationships with multiple manufacturers.
  - f. The Partnership for Advanced Windows Solutions work is ongoing.
- 3) Program staff have heard from manufacturers that producing high performance windows and supplying the Northwest is not a barrier. What is a barrier is having enough demand to make the business case to produce a lot of these windows. Chicken and egg, but NEEA sees the problem being creating demand. Concentrating on new construction market to drive up that demand.
- 4) High Performance Windows Builder Pilot
  - a. Four builders have tested use of high performance windows in new homes
  - b. One national production builder enrolled
  - c. Two builders pending enrollment, including one national production builder
  - d. Overlap with Energy Code support in Oregon and Washington

## Incremental Manufacturing Cost

- 0.22 vs 0.27 IGU:  
~\$2.00 / sq ft

## Incremental Price to the Consumer

- 0.22 vs 0.27 window:  
~\$15 - \$20 / sq ft

5)

6) ENERGY STAR v7 for Residential Windows, Doors & Skylights

- NEEA submitted comments in support of v7, as well as through the Partnership for Advanced Window Solutions and on behalf of all stakeholders.
- Expecting EPA will take about a month to look at comments
- V7 would go into effect around September 2023

| Version 6     |             |             |                               | Version 7 Final |             |             |                               |
|---------------|-------------|-------------|-------------------------------|-----------------|-------------|-------------|-------------------------------|
| Climate Zone  | U-Factor    | SHGC        |                               | Climate Zone    | U-Factor    | SHGC        |                               |
| Northern      | $\leq 0.27$ | Any         | Prescriptive                  | Northern*       | $\leq 0.22$ | $\geq 0.17$ | Prescriptive                  |
|               | $= 0.28$    | $\geq 0.32$ | Equivalent Energy Performance |                 | $= 0.23$    | $\geq 0.35$ | Equivalent Energy Performance |
|               | $= 0.29$    | $\geq 0.37$ |                               |                 | $= 0.24$    | $\geq 0.35$ |                               |
|               | $= 0.30$    | $\geq 0.42$ |                               |                 | $= 0.25$    | $\geq 0.40$ |                               |
|               | $= 0.30$    | $\geq 0.42$ |                               |                 | $= 0.26$    | $\geq 0.40$ |                               |
| North-Central | $\leq 0.30$ | $\leq 0.40$ |                               | North-Central   | $\leq 0.24$ | $\leq 0.40$ |                               |
| South-Central | $\leq 0.30$ | $\leq 0.25$ |                               | South-Central   | $\leq 0.28$ | $\leq 0.23$ |                               |
| Southern      | $\leq 0.40$ | $\leq 0.25$ |                               | Southern        | $\leq 0.32$ | $\leq 0.23$ |                               |

d.

- Solar heat gain coefficient refers to the aspect of the window that allows it to provide passive heat into the home
- There are product available that currently meet the v7 requirements

7) Utility Panel Residential Windows Cross-Sharing

- Clark Windows Program
  - Designed with BPA implementation manual in mind
  - Two windows incentive programs. The first one is for new windows that have a u-factor of .3 or less; the incentive is \$6 per square foot. The second program is a high performance window incentive for new windows that have a u-factor of .22 or below; the incentive is \$8 a square foot.
  - Customers who are doing a retrofit can receive financing from Clark at 4.99% interest up to \$15,000.
  - Incentives have pre and post-condition requirements. Existing double-pane metal windows qualify, double-pane vinyl does not. Post-condition must also be vinyl double or triple-pane.
  - Have had good activity in program over the last couple of years. In 2021, Clark provided more than \$100,000 in incentives. Clark is at \$70,000 so far through 2022. One of the drivers is an increased rebate. In the future, savings will lessen as less homes need a window retrofit.
  - Seeing some supply chain issues for window program.
  - Customers have the ability to sign over the rebate to the contractor. This happens around a third of the time.
  - As people have spent more time at home throughout the pandemic, they have invested more into their home.
  - Up front cost is the primary barrier for Clark

- x. Advertise non-energy benefits to customers such as reduced noise and aesthetics.
  - b. Cascade Natural Gas Windows Program
    - i. Cascade only has a retrofit program for rebates, no new window program.
    - ii. The pre-condition requirement is to go from single-pane to a double or triple-pane window with a qualifying u-factor. A u-factor of .22 or less is \$9 a square foot. .23-.3 has a \$5 a square foot incentive.
    - iii. Expecting a slowdown as the number of qualifying homes begin to replace windows and the population of single-pane windows dwindles.
    - iv. Experiencing supply chain issues.
    - v. Have a robust low-income weatherization program but it does not include windows.
    - vi. Working on making outreach more electronic.
    - vii. Lack of financing option is a barrier with the upfront cost. Missing a lot of information from projects.
    - viii. Allow for licensed contractors to submit for incentives.
    - ix. Relationship between customer and installer drives a lot of rebates.
  - c. Energy Trust of Oregon Windows Program
    - i. Must replace existing window, glass door, or skylight.
    - ii. Incentives are \$6 a square foot for a u-factor of .24 or less, \$4 a square foot for a u-factor between .25-.27, \$1.75 a square foot for a u-factor of .28 and .3.
    - iii. Can be installed by any licensed contractor.
    - iv. Savings Within Reach program can be used for income-qualified households.
    - v. The past couple of years have been more or less record years in terms of participation with ETO's weatherization, and specifically Windows, offerings. In 2021, ETO realized 5,438 window projects in Oregon, 279 homes in Washington, for savings of 949,288 kilowatt hours saved, and 135,354 therms saved. It has been a very big measure for ETO over the past couple of years.
    - vi. Most customers receive incentive through window installer via instant incentive offer.
    - vii. Having supply chain issues.
    - viii. Offering likely to change in 2023 as costs go up.
    - ix. Up front cost is the primary barrier for ETO. Windows projects are complicated.
    - x. Contractors need to be done through trade ally contractors and signed up with the ETO incentive platform.
- 8) PAWS Utility Working Group
  - a. Low-e storm window pilot in Minneapolis, Minnesota
    - i. Will replace existing old storm windows
    - ii. Three case studies of specific sites targeting three to ten single-family homes. Also interested in manufactured and multifamily.
    - iii. Report summarizing air leaking, energy savings, and customer experience
      - 1. Not very many single-pane windows in such a cold climate
    - iv. Developing support materials for utilities that are engaged. Have also created a savings calculator to help utilities decide on incentive amounts.

### **Cross-Sharing: Commercial Secondary Windows ([packet p. 8-9](#) | [slides 41-73](#))**

*Rachel Zakrasek ([rzakrasek@neea.org](mailto:rzakrasek@neea.org)) presented on NEEA's Commercial Secondary Windows Program, Bill Hibbs of Clark Public Utilities presented on the 915 Broadway Building Project, Sinh Tran provided information on a Snohomish PUD commercial secondary windows project for Crane Aerospace &*

Electronics, Peter Goldberg of Con Edison discussed commercial secondary windows projects and activities in their New York City territory.

### Presentation Highlights

- 1) A secondary window is one that attaches to the interior or exterior of an existing window, creates an insulating air pocket between new and existing panes, and can address the inefficiency of the original glazing as well as the frame.
- 2) NEEA's program is currently in program development. This is the learning and development phase.

#### a. Northwest Field Test, 2020-2022

##### i. Goals

1. Validate energy savings assumptions
2. Learn about materials and installation costs
3. Learn about customer decision-making
4. Gather additional performance data

##### ii. Six different project sites were selected, able to do full metering in four of them

|                                       | Site A  | Site B      | Site C      | Site D      | Site E      | Site F      |
|---------------------------------------|---|-------------|-------------|-------------|-------------|-------------|
| <b>Existing</b>                       |   |             |             |             |             |             |
| Window Type                           | Floor 1: Double-pane<br>Floors 2-4: Single-pane | Single-pane | Double-pane | Single-pane | Single-pane | Single-pane |
| Window Frame                          | Aluminum  | Aluminum    | Aluminum    | Wood        | Wood        | Aluminum    |
| Estimated U-Value                     | 1.054   | 1.12        | 0.54        | 0.87        | 1.03        | 1.07        |
| Estimated SHGC                        | 0.744   | 0.72        | 0.56        | 0.642       | 0.7         | 0.66        |
| <b>Commercial Secondary Windows</b>   |   |             |             |             |             |             |
| # of CSWs Installed                   | 250   | 330         | 105         | 90          | 42          | 56          |
| CSW Installed Area (ft <sup>2</sup> ) | 6,091   | 2,355       | 3,150       | 1,168       | 1,444       | 1,726       |
| Selected CSW Type                     | Double-pane                                     | Single-pane | Single-pane | Single-pane | Single-pane | Double-pane |
| U-Value                               | 0.241   | 0.47        | 0.33        | 0.44        | 0.501       | 0.19        |
| Solar Heat Gain Coefficient           | 0.371   | 0.41        | 0.42        | 0.571       | 0.702       | 0.28        |
| <b>Difference</b>                     |   |             |             |             |             |             |
| U-Value Difference                    | 0.813   | 0.65        | 0.21        | 0.43        | 0.53        | 0.88        |
| Solar Heat Gain Coefficient Di        | 0.373   | 0.31        | 0.14        | 0.07        | 0.00        | 0.38        |

##### iii.

|  | Site A     | Site B    | Site C     | Site D    | Site E    | Site F    | Average    |
|--|------------|-----------|------------|-----------|-----------|-----------|------------|
| # of CSWs Installed                                    | 250        | 330       | 105        | 90        | 42        | 56        | 146        |
| CSW Installed Area (ft <sup>2</sup> )                  | 6,091      | 2,355     | 3,150      | 1,168     | 1,444     | 1,726     | 2,656      |
| <b>Base Price</b>                                      |            |           |            |           |           |           |            |
| Material Cost (\$)                                     | \$ 214,188 | \$ 86,368 | \$ 99,981  | \$ 53,278 | \$ 34,429 | \$ 57,292 | \$ 90,923  |
| Installation (\$)                                      | Incl.      | Incl.     | \$ 36,244  | \$ 5,100  | \$ 14,440 | \$ 4,565  | \$ 15,087  |
| Shipping and Handling (\$)                             | Incl.      | Incl.     | \$ 8,660   | Incl.     | Incl.     | Incl.     | \$ 8,660   |
| Sales Tax (\$)   | \$ 15,345  | \$ 6,193  | \$ -       | \$ -      | \$ -      | \$ -      | \$ 10,769  |
| Total Base Price (\$)                                  | \$ 229,533 | \$ 92,561 | \$ 144,885 | \$ 58,378 | \$ 48,869 | \$ 61,857 | \$ 106,014 |
| Base Price Less Tax (\$)                               | \$ 214,188 | \$ 86,368 | \$ 144,885 | \$ 58,378 | \$ 48,869 | \$ 61,857 | \$ 102,424 |
| Unit Price - Base Price Less Tax (\$/ft <sup>2</sup> ) | \$ 35.16   | \$ 36.67  | \$ 46.00   | \$ 49.98  | \$ 33.84  | \$ 35.84  | \$ 38.57   |

##### iv.

##### v. Commercial Secondary Window Performance

1. Energy savings of 8% on average
  - a. From 1% to 14% range
2. Noise reduction of 5-6 dB on average, significant for the human ear.
3. Improved thermal comfort
4. Air leakage reduction of 7% on average
- b. Marketing resources can be found on BetterBricks
- c. To be released are four more PDF case studies, two more video case studies, and a commercial secondary windows FAQ.
- d. Have not experienced any issues with condensation so far.
- 3) Clark Public Utilities Secondary Commercial Windows Program at the 915 Broadway Building
  - a. 915 Broadway building received commercial secondary windows through Clark, in partnership with NEEA and BPA.
  - b. Clark was able to pay \$.40 kWh through custom program due to project having a 30-year measure life.

- c. Comfort was a top priority
  - d. Full window replacements can interrupt normal everyday operations, making commercial secondary windows an attractive option
  - e. Customer portion ended up being about 20% off full cost
  - f. Final savings of 132,852 kWh and \$53,140.81 of incentives.
- 4) Snohomish PUD Program Crane Aerospace and Electronics Manufacturing Facility
- a. Have a custom incentive program, anything that doesn't go under rebates. Can be flexible on incentive rate.
  - b. Incentives help but need more to overcome barriers
  - c. Easier to market the program with case studies
  - d. 32,000 square foot office building
  - e. All electric
  - f. 331 single pane, inoperable aluminum frame windows
  - g. Installed single-pane inserts with an installation time of three weeks
  - h. Seamlessly blended new windows with existing aesthetics
  - i. Had a 12 percent reduction in annual energy use
  - j. \$3,100 in annual energy cost savings
  - k. Interior temperature within 2.9 degrees Fahrenheit of setpoint
  - l. Employee feedback was that there are significant improvements in thermal comfort and noise levels, as well as a more attractive appearance
  - m. Results ended up being \$.53 per kWh a year of energy savings and \$24,651.56 in total incentives.
  - n. Barriers for the Snohomish PUD program are economics, need for an all-electric building, and there not being enough data via case studies.
- 5) Con Edison Commercial Windows Projects
- a. Service territory is New York City and Westchester County
  - b. There is a difference between deep savings like envelope or replacing major appliances, and non-deep savings like lighting and behavior. Con Edison is incentivized to go after the deep savings.
  - c. Incentivized to focus on lifetime of the measures
  - d. Regulators are attempting to get Con Edison on electrification and things that enable electrification
  - e. A local New York City law, Local Law 97, establishes a certain amount of pounds of CO2 emissions per square foot. New York City skyscrapers have extra windows and may not be much more than single-pane windows and they are poor for soundproofing. This creates a large opportunity for secondary commercial windows.
  - f. Heating is commonly from district steam and fuel oil
  - g. Not a large barrier to entry for window insert and there is a lot of competition
  - h. Used custom pathways within core programs, didn't need a separate pilot or separate program. This custom pathway requires an energy model for building envelope and M and V for a new technology.



## 8 Vetted Calibrated Energy Models

|    | Status      | Project Cost | Electric (Mwh) | Gas (Therms) | Steam (MMBtu) | Total (MMBtu) |
|----|-------------|--------------|----------------|--------------|---------------|---------------|
| 1  | Installed   | \$320k       | 4              | N/A          | 800           | 814           |
| 2  | In progress | \$1.3M       | 233            | N/A          | 2,740         | 3,535         |
| 3  | In progress | \$930k       | 172            | N/A          | N/A           | 588           |
| 2a | Inactive    | \$6.9M       | 1,500          | N/A          | 18,160        | 23,278        |
| 4  | Inactive    | \$210k       | 3              | N/A          | 74            | 83            |
| 5  | Inactive    | \$5.8M       | 62             | 11,450       | 10,612        | 11,968        |
| 6  | Inactive    | \$2.0M       | 888            | 31,770       | N/A           | 6,206         |
| 7  | Inactive    | \$1.8M       | 51             | N/A          | 3,974         | 4,150         |

Significant market interest, including from major players, but hard to complete the sale

- i.
- j. Lessons Learned
  - i. Non-energy benefits are key motivators, noise and comfort in particular
  - ii. Energy models are a barrier to participation
    - 1. They require big upfront investments
  - iii. Smaller projects are more likely to be installed as large projects require capital funding
- k. Important that you can do window inserts at any time as you don't need to wait for a replacement life-cycle

## **Feedback, Wrap-Up, & Adjourn**

- A. Next meeting: ISCC Q4 11/7 and 11/8
- B. Public Comments: None
- C. Meeting adjourned at 12:30pm