WonderWindow ave Year After Year

WonderWindow Value Proposition + Return-on-Investment

Report for Burlington, Vermont

Contact us at mark@wonderwindow.com and we will be happy to run a similar cost comparison for your climate location with the energy costs and equipment efficiencies you provide.

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Easy to Order, Easy to Install!

Three typical applications with budget pricing for materials

Insulate existing windows with single glazing layer **$5/sf**

Add glazing layer plus Spacer Stix **$8/sf**

Double glazing layer plus Spacer Stix + turn buttons **$12/sf**

The following report relies on these assumptions and core definitions

Total Degree Days *for buildings that both heat & cool*: 7933
Heating Degree Days: 6858
Cooling Degree Days: 1075

Equipment: Furnace or boiler running at 75% AFUE efficiency + SEER 11 room air-conditioner(s)

Cost of fuels in Burlington, Vermont as of February 2019:
- Electricity = $15.8 cents/kwh
- Propane = $2.69/gallon
- Natural Gas = $1.085/CCF
- Kerosene = $3.27/gallon
- No. 2 Fuel Oil = $2.80/gallon

Annual Return-on-Investment (ROI):
The annual rate of return is calculated by taking the amount of money saved in a year divided by the initial investment. In the examples shown, the initial investment is for materials only, assuming Do-It-Yourself (DIY) or volunteer installation, or installation by salaried staff that do not job cost their time.

Savings-to-Investment Ratio (SIR):
Used by Weatherization Assistance Programs to determine what energy conservation measures are worth undertaking, based on 10 years of projected energy savings, requiring an SIR of 1, with an SIR of 4 being likely to be implemented.

Propane Gas

Retrofit on single pane R1 windows

Save $4.70/sf/year or $85 per year for a 3’x6’ window

Single layer glazing + tape at $5/sf

- ROI: 94% (1 year payback)
- SIR: 9.4

Single layer glazing + tape + Spacer Stix at $8/sf

- ROI: 59% (1.8 year payback)
- SIR: 5.9

Save $8.60/sf/year or $155 per year for a 3’x6’ window

Double layer glazing + tape + Spacer Stix at $12/sf

- ROI: 72% (1.4 year payback)
- SIR: 7.2

Retrofit on double pane R2 windows

Save $1.55/sf/year or $28 per year for a 3’x6’ window

Single layer glazing + tape at $5/sf

- ROI: 31% (3.2 year payback)
- SIR: 3.1

Single layer glazing + tape + Spacer Stix at $8/sf

- ROI: 19% (5.2 year payback)
- SIR: 5.9

Save $4.98/sf/year or $90 per year for a 3’x6’ window

Double layer glazing + tape + Spacer Stix at $12/sf

- ROI: 42% (2.4 year payback)
- SIR: 4.2

Kerosene

Retrofit on single pane R1 windows

Save $3.90/sf/year or $70 per year for a 3’x6’ window

Single layer glazing + tape at $5/sf

- ROI: 78% (1.3 year payback)
- SIR: 7.8

Single layer glazing + tape + Spacer Stix at $8/sf

- ROI: 49% (2 year payback)
- SIR: 4.9

Save $7.15/sf/year or $129 per year for a 3’x6’ window

Double layer glazing + tape + Spacer Stix at $12/sf

- ROI: 60% (1.7 year payback)
- SIR: 6.0

Retrofit on double pane R2 windows

Save $1.29/sf/year or $23 per year for a 3’x6’ window

Single layer glazing + tape at $5/sf

- ROI: 26% (3.9 year payback)
- SIR: 2.6

Single layer glazing + tape + Spacer Stix at $8/sf

- ROI: 16% (6.2 year payback)
- SIR: 1.6

Save $4.13/sf/year or $74 per year for a 3’x6’ window

Double layer glazing + tape + Spacer Stix at $12/sf

- ROI: 34% (2.9 year payback)
- SIR: 3.4

No. 2 Fuel Oil

Retrofit on single pane R1 windows

Save $3.20/sf/year or $58 per year for a 3’x6’ window

Single layer glazing + tape at $5/sf

- ROI: 64% (1.6 year payback)
- SIR: 6.4

Single layer glazing + tape + Spacer Stix at $8/sf

- ROI: 40% (2.5 year payback)
- SIR: 4.0

Save $5.97/sf/year or $107 per year for a 3’x6’ window

Double layer glazing + tape + Spacer Stix at $12/sf

- ROI: 49% (2 year payback)
- SIR: 4.9

Retrofit on double pane R2 windows

Save $1.06/sf/year or $19 per year for a 3’x6’ window

Single layer glazing + tape at $5/sf

- ROI: 21% (4.8 year payback)
- SIR: 2.1

Single layer glazing + tape + Spacer Stix at $8/sf

- ROI: 13% (7.7 year payback)
- SIR: 1.3

Save $3.39/sf/year or $61 per year for a 3’x6’ window

Double layer glazing + tape + Spacer Stix at $12/sf

- ROI: 28% (3.6 year payback)
- SIR: 2.8

Natural Gas

Retrofit on single pane R1 windows

Save $1.68/sf/year or $30 per year for a 3’x6’ window

Single layer glazing + tape at $5/sf

- ROI: 34% (3 year payback)
- SIR: 3.4

Single layer glazing + tape + Spacer Stix at $8/sf

- ROI: 21% (4.8 year payback)
- SIR: 2.1

Save $3.07/sf/year or $55 per year for a 3’x6’ window

Double layer glazing + tape + Spacer Stix at $12/sf

- ROI: 26% (3.8 year payback)
- SIR: 2.6

Retrofit on double pane R2 windows

Save $0.55/sf/year or $10 per year for a 3’x6’ window

Single layer glazing + tape at $5/sf

- ROI: 11% (9.1 year payback)
- SIR: 1.1

Single layer glazing + tape + Spacer Stix at $8/sf

- ROI: 7% (14.3 year payback)
- SIR: 5.9

Save $1.77/sf/year or $32 per year for a 3’x6’ window

Double layer glazing + tape + Spacer Stix at $12/sf

- ROI: 15% (6.7 year payback)
- SIR: 1.5

Detailed Calculations for the Burlington, Vermont metro area

The flow of heat through a roof, wall, or window is described as Heat Flow, Q, being equal to Area divided by Thermal Resistance, R, times Delta T, the difference in temperature between inside and out, which gives the result in Btu/sf/degree F/hour: Q= A/R x Delta T, so for a single square foot of single pane glass:

Heating Season: A=1/R=1 x 6858 Heating Degree Days/year x 24 hours/day = **164,592 Btu/year/sf of R1 single pane glass**

Cooling Season: A=1/R=1 x 1075 Cooling Degree Days/year x 24 hours/day = **25,800 Btu/year/sf of R1 single pane glass**

Example: 75% AFUE kerosene furnace with SEER 11 room air conditioner

KEROSENE

Kerosene in Vermont costs $3.27/gallon (as of February 2019) with each gallon containing 134,000 Btu, or $2.44/100,000 Btu. [Source: https://publicservice.vermont.gov/content/retail-prices-heating-fuels]

Heating Season:

The typical kerosene fueled furnace is likely to be an older 80-82% AFUE model, which typically delivers 75% actual AFUE efficiency.

To deliver **164,592 Btu/year/sf** of heat, a **75% AFUE** furnace needs to burn **219,456 Btu of kerosene for each square foot of window** (164,592 divided by 75%).

219,456 Btu of kerosene divided by **134,000 Btu per gallon** times **$3.27/gallon = $5.36/sf of fuel expense for an existing single pane window each & every year.**

The **Wonder**Window retrofit creates a ¾" airspace which yields an **R2.4** (per the ASHRAE Handbook of Fundamentals):

1 sf/R 2.4 x 6858 HDD x 24 hours/day = **68,580 Btu/sf/year** post-installation, for a savings of 219,456 – 68,580 = **150,876 Btu/sf/year savings**

150,876 Btu/sf/year savings x $3.27/134,000 Btu= **$3.68/sf heating cost saved per year,** or **$66 per year** for a 3' x 6' window

Cooling Season:

A=1/R=1 x 1075 Cooling Degree Days/year x 24 hours/day = **25,800 Btu/year/sf of R1 single pane glass**

Electricity cost for Burlington Residential Service is $15.8 cents/ kwh, inclusive of all fees. [Source: https://www.burlingtonelectric.com/rates-fees]

A SEER 11 room air-conditioner produces 11 Btu of cooling per watt-hour of electricity consumed: 25,800 Btu/year/sf divided by 11 Btu of cooling per watt-hour at 15.8 cents/kwh = 37 cents cooling cost per sf of R1 single pane per year

The **Wonder**Window retrofit creates a ¾" airspace which yields an **R2.4** (per the ASHRAE Handbook of Fundamentals):

1 sf/R 2.4 x 1075 CDD x 24 hours/day = 10,750 Btu/sf/year post-installation, for a savings of 25,800 – 10,750 = **15,050 Btu/sf/year savings**

15,050 Btu/sf saved per year divided by 11 Btu/hour per watt-hour at 15.8 cents/kwh = **22 cents cooling cost /sf saved per year. When added to the $3.68/sf heating cost saved per year,** the **Wonder**Window retrofit can save **$3.90/sf of window per year** or **$70 per year** for a 3' x 6' window.

Existing single pane glass has an annual energy cost of $5.73/sf of window ($5.36/sf heating + .37/sf cooling, as shown above).

Existing R-2 double pane glass has half the annual energy cost of $5.73/sf, or **$2.36/sf of window,** so adding a **Wonder**Window retrofit with its **R2.4** airspace yields a total **R4.4**. This yields an estimated savings of $2.36/sf x R2.4/R4.4, or **$1.29 saved per sf of window when applied over existing R2 double pane.**

Adding a ¾" **Wonder**Window R2.4 insulating airspace in a double glazed 'sandwich', ¾-4" to the inside of a **single pane window** can provide a total R4.4 in combined insulating airspaces, saving R4.4/R2.4 x $3.90, or **saving $7.15/sf per year,** in a kerosene fueled home.

Adding a ¾" **Wonder**Window R2.4 insulating airspace in a double glazed 'sandwich', ¾-4" to the inside of an **R2 double pane window** can add a total R4.4 in combined insulating airspaces to the existing R2, saving R6.4/R2 x $1.29, or **saving $4.13/sf per year,** in a kerosene fueled home.

PROPANE GAS

Propane gas in Vermont costs $2.69/ gallon (as of February 2019) with each gallon containing 91,600 Btu, or $2.94/ 100,000 Btus. [Source: https://publicservice.vermont.gov/content/retail-prices-heating-fuels]. Compared to $2.44/ 100,000 Btu kerosene, a propane fueled home with similar equipment net efficiencies can expect a **Wonder**Window retrofit over single pane glass to **save $4.70/sf of window per year** (or 2.94/2.44 x $3.90/sf saved for kerosene), or **$85 per year** for a 3' x 6' window.

Adding a **Wonder**Window double glazed 'sandwich', ¾-4" to the inside of a single pane window saves R4.4/R2.4 x $4.70, or **save $8.60/sf per year,** in a home burning propane gas. Adding a double glazed 'sandwich' to the inside of a double pane window saves (2.94/2.44 x $4.13 saved for kerosene, or) **$4.98/ sf per year.**

Adding a **Wonder**Window retrofit with its **R2.4** airspace over existing R-2 double pane glass yields a total **R4.4**. Compared to kerosene's savings of $1.29 per sf of window, propane will deliver (2.94/2.44 x $1.29, or) **$1.55 saved per sf of window when applied over existing R2 double pane.**

NATURAL GAS

Natural gas in the Burlington area costs $1.085/CCF (or 100 cubic feet, as of February 2019) with each CCF containing 103,700 Btu, or $1.05/ 100,000 Btu. Compared to $2.44/ 100,000 Btu kerosene, a natural gas fueled home with similar equipment efficiencies can expect a **Wonder**Window retrofit over single pane glass to save **$1.68/sf of window per year** (or 1.05/2.44 x $3.90/sf saved for kerosene), or **$30 per year** for a 3' x 6' window.
[Source: https://www.vermontgas.com/account/rates/ & eia.gov]

Adding a **Wonder**Window double glazed 'sandwich', ¾-4" to the inside of a single pane window saves R4.4/R2.4 x $1.68, or **save $3.07/sf per year,** in a home burning natural gas. Adding a double glazed 'sandwich' to the inside of a double pane window saves (1.05/2.44 x $4.13 saved for kerosene, or) **$1.77/ sf per year.**

Adding a **Wonder**Window retrofit with its **R2.4** airspace over existing R2 double pane glass yields a total **R4.4**. Compared to kerosene's savings of $1.29 per sf of window, natural gas will deliver (1.05/2.44 x $1.29, or) **$0.56 saved per sf of window when applied over existing R2 double pane.**

NO. 2 FUEL OIL

No. 2 fuel oil in the Burlington area costs $2.80/gal (as of February 2019) with each gallon containing about 140,000 Btu, or $2.00/ 100,000 Btu. Compared to $2.44/ 100,000 Btu kerosene, a home that burns fuel oil, with similar equipment efficiencies, can expect a **Wonder**Window retrofit over single pane glass to save **$3.20/sf of window per year** (or 2.00/2.44 x $3.90/sf saved for kerosene), or **$58 per year** for a 3' x 6' window.
[Source: https://www.eia.gov/dnav/pet/hist/LeafHandler.ashx?n=PET&s=W_EPD2F_PRS_SVT_DPG&f=W]

Adding a **Wonder**Window double glazed 'sandwich', ¾-4" to the inside of a single pane window saves R4.4/R2.4 x $3.20, or **save $5.87/sf per year,** in a home burning fuel oil. Adding a double glazed 'sandwich' to the inside of a double pane window saves (2.00/2.44 x $4.13 saved for kerosene, or) **$3.39/ sf per year.**

Adding a **Wonder**Window retrofit with its **R2.4** airspace over existing R2 double pane glass yields a total **R4.4**. Compared to kerosene's savings of $1.29 per sf of window, No. 2 fuel oil will deliver (2.00/2.44 x $1.29, or) **$1.06 saved per sf of window when applied over existing R2 double pane.**

These calculations assume the above energy costs and equipment efficiencies. Your actual experience may be different, and no guarantee of actual cost savings is made or implied.