

An Innovative Approach to Retrofitting an Historic Home

Better Buildings by Design
February 5, 1014



Alex Wilson
Founder, BuildingGreen, Inc.
President, Resilient Design Institute

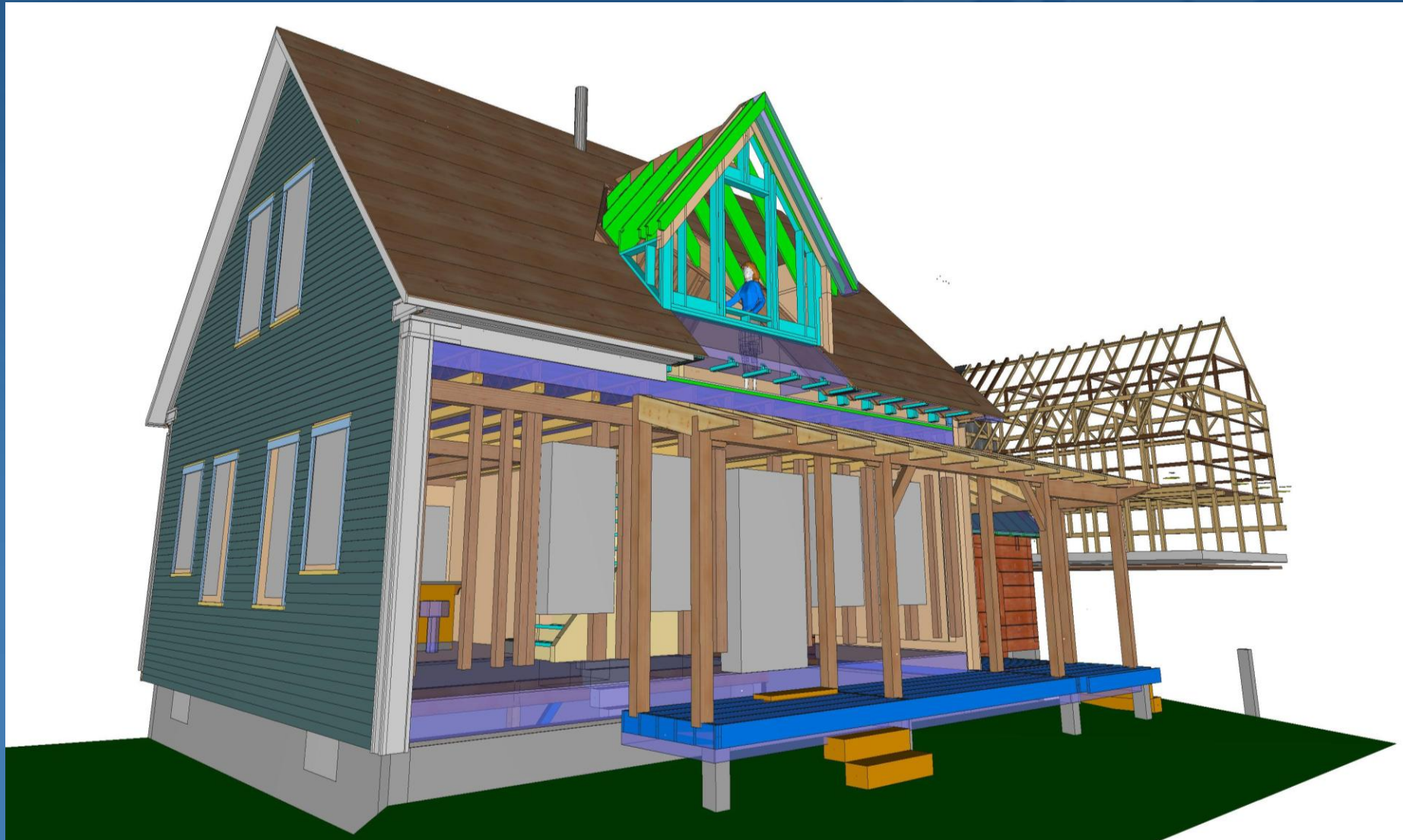


Eli Gould,
Founder, Ironwood Brand
Founder, PreCraft, Inc.





3D Modeling



House footprint

- Footprint reduced
- Shed additions removed; replaced by garage
- Garage entry shifted to gable end
- House repositioned 25 feet to the north
- Orientation modified slightly to align with barn



Making an Old Farmhouse New



Leonard Farm, Dummerston, Vermont – photo: Alex Wilson





GOOD
RUBBISH
802-2

Making an Old Farmhouse New



Leonard Farm, Dummerston, Vermont – photo: Alex Wilson

You're going to do what?



Making an Old Farmhouse New



Leonard Farm, Dummerston, Vermont – photo: Alex Wilson

Making an Old Farmhouse New



Leonard Farm, Dummerston, Vermont – photo: Alex Wilson

Making an Old Farmhouse New



Leonard Farm, Dummerston, Vermont – photo: Alex Wilson







Foamglas cellular glass



*4" installed for sub-slab insulation (R-12)
Photos: Alex Wilson*

Foamglas cellular glass



*6" layer adhered onto foundation walls (R-21) with an Ardex X-5 polymer cement
Photos: Alex Wilson*

Foamglas cellular glass with Ardicote



Ardicote polymer cement waterproofing layer applied to Foamglas. Photos: Alex Wilson

Putting the House Back



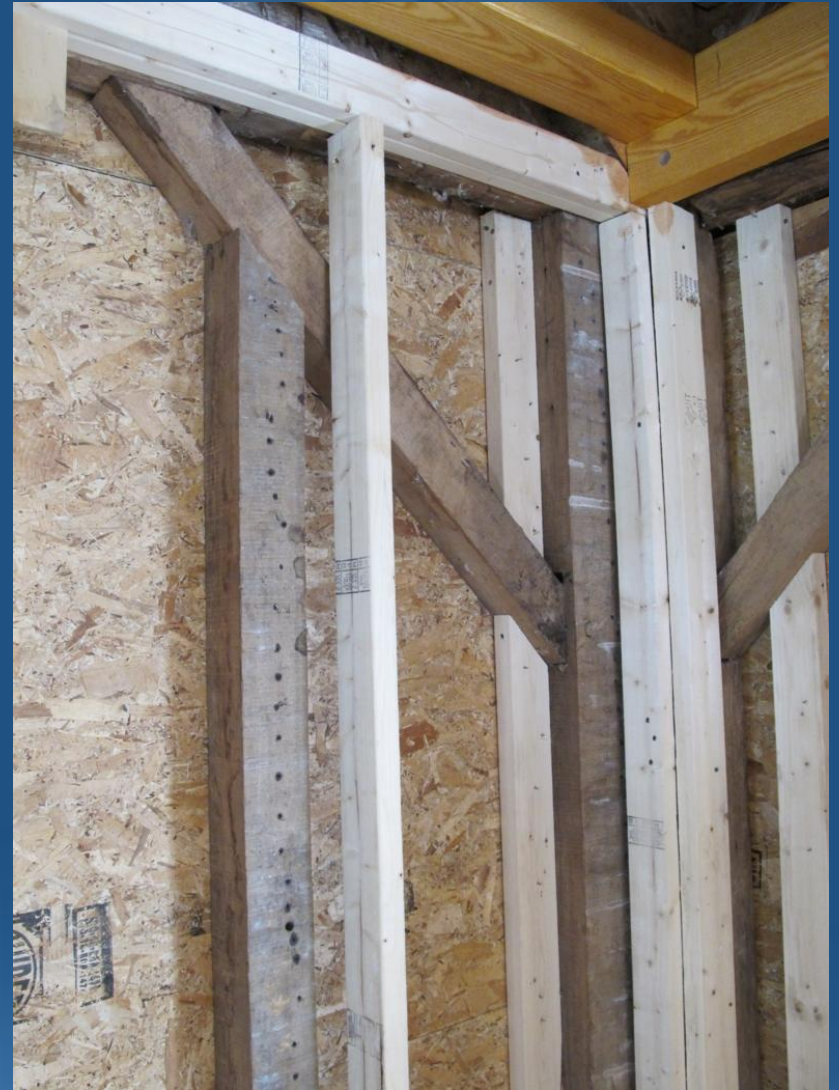
Putting the house back. Photo: Alex Wilson

Putting the House Back



Putting the house back. Photo: Alex Wilson

Staggered studs on walls





Hybrid structural system



Triform joists being used as rafters. Photo: Alex Wilson

Engineered lumber that should last



*Triforce joists do not use metal truss plates, which may fail.
Photo: Alex Wilson*

16" truss joists used as rafters



*Triforce joists being used as rafters.
Photo: Alex Wilson*



Truss rafters



Triforme joists being used as rafters. Photo: Alex Wilson

Achieving air space for roof ventilation



Exterior Window Surrounds



*Prefabricating
exterior window
surrounds.
Photo: Alex
Wilson*

Window configuration

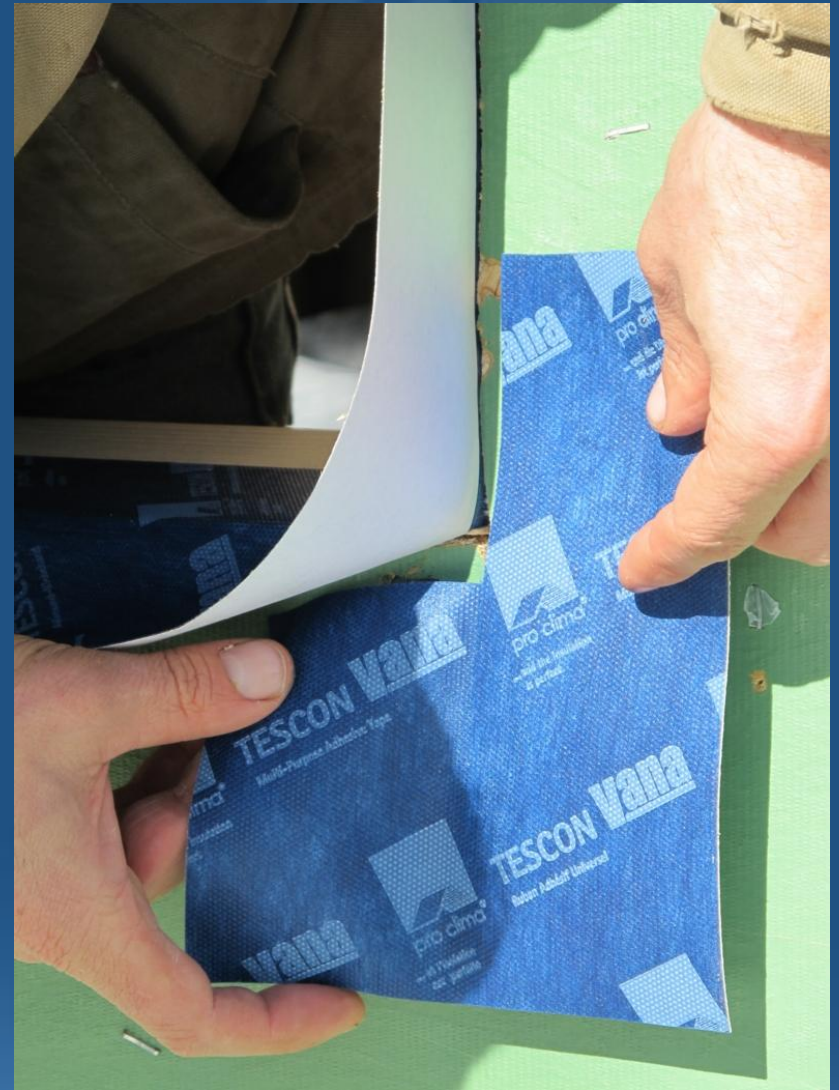


*Triple-glazed
performance
using standard
low-e argon
prime window
with low-e
storm*

Exterior Window Surrounds



High-performance assembly



Air barrier at sheathing – insulation on the interior and exterior



Expanded cork insulation

- Invented in the U.S. in the late 1800s
- Widely sold here in the 1920s and 30s (Armstrong Industries)
- Being reintroduced here
- Only ingredient is natural cork
- No flame retardants, blowing agents, adhesives, VOCs
- R-3.6 per inch



*Photo:
Alex Wilson.*

Expanded cork insulation



- Cork is the outer bark of cork oak (*Quercus suber*) - native to the Western Mediterranean
- Harvested as it was 2,000 years ago
- Amorim a Portuguese company
- Many of it's cork forests FSC-certified, as are many factories
- As synthetic wine stoppers replace natural cork, forests being razed and biodiversity being lost

Photos: Amorim Isolamentos, S.A.

Expanded cork insulation



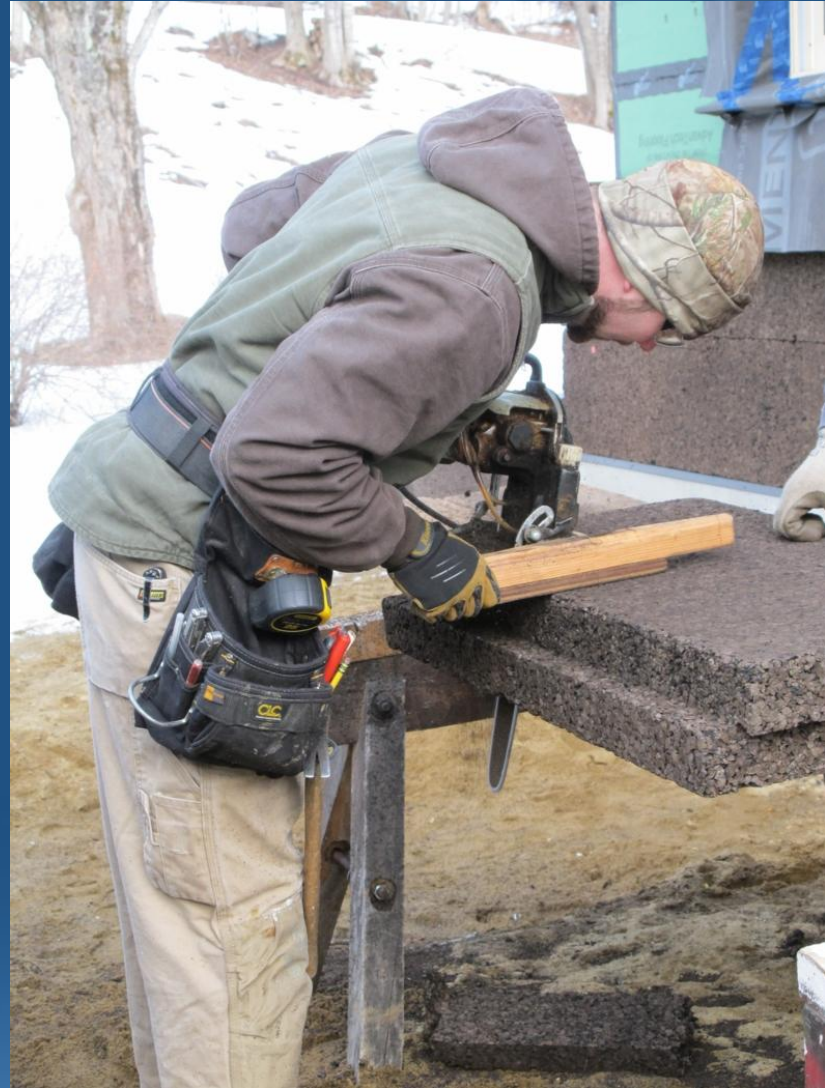
*Photos: Amorim
Isolamentos, S.A.*

Expanded cork insulation



*Photo:
Alex
Wilson*

Cutting cork insulation – using SIP tools



*Photos:
Alex
Wilson*

Installing cork insulation



Photos: Alex Wilson



Pro Clima Solitex Mento 1000 Weather-Resistive Barrier (Housewrap)





Air Sealing from the Interior – Knauf EcoSeal



Air Sealing from the Interior



*Knauf EcoSeal
Photo: Alex Wilson*

Air Sealing from the Interior



Testing air
tightness Photo:
Alex Wilson

Spray-fiberglass insulation



JM Spider insulation - Photo: Alex Wilson

Spray-fiberglass insulation



Spray-fiberglass insulation





Spider & variable-permeability membrane





pro clima DB+

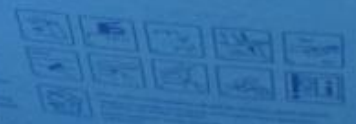
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10571

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Heat-recovery ventilator & ducting







Heat-recovery ventilator & ducting



Detail of heating system



*Mitsubishi 18,000 Btu/hour heat pump
Photo: Alex Wilson*

1812 Barn - Before





New Barn Piers and Posts



New Barn Roof













Finished interior



Finished interior



Finished interior



*Haiku fan from Big Ass Fans
Photo: Alex Wilson*





For more information

Energy Solutions Blog:
www.greenbuildingadvisor.com

BuildingGreen
122 Birge Street, #30
Brattleboro, VT 05301
802-257-7300
www.buildinggreen.com

Resilient Design Institute
802-579-4858 (Alex's cell)
alex@resilientdesign.org
www.resilientdesign.org

PreCraft Inc.
802-258-0800 (Eli's cell)
ironwoodbrand@gmail.com
www.precraft.com



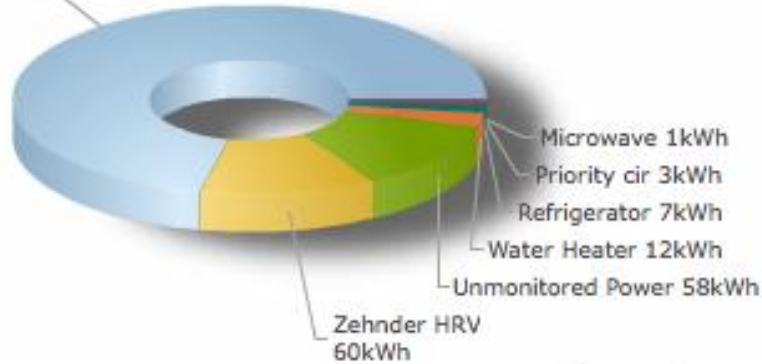
Energy data



Where I've used electricity in the past 8 days: Top 12 Circuits

Click a slice or label for detail / [View All Circuits](#)

Mitsubishi Mini-split
354kWh



kWh Cost

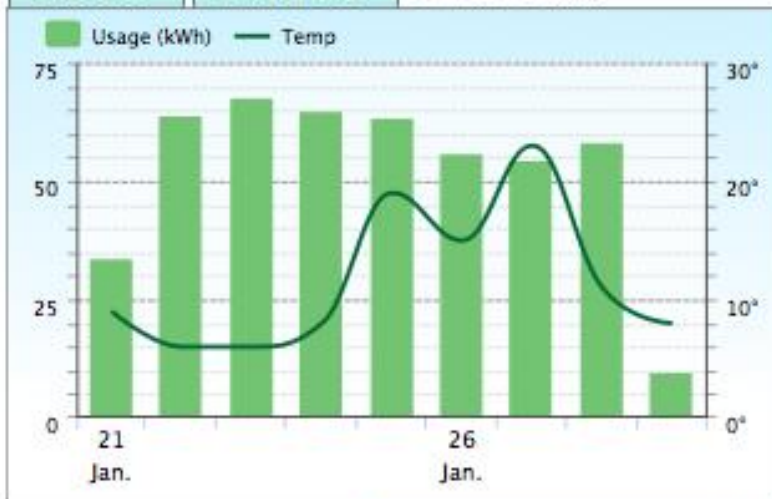
Electricity Usage in kWh by Month i

This Month	To date: 471 kWh	471 kWh
Last Month		N/A

Top 4 Users by kWh - Last 8 days

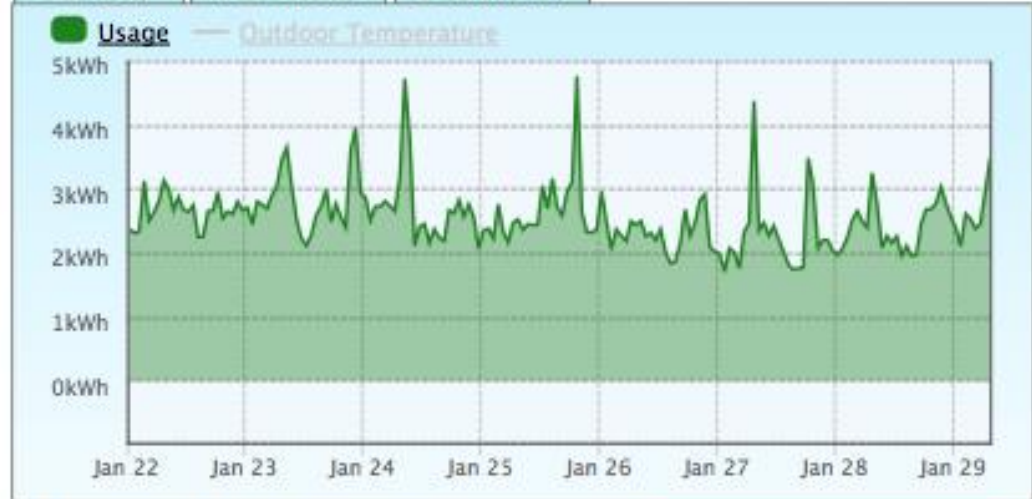


Past Year **Past Month** kWh Cost



[View History Details](#)

Past Day **Past Week** **Past Month**



Click and drag in the plot area to zoom in.

[View Circuit Details](#)

This Month
Last Month



55 kWh
433 kWh

Mitsubishi Mini-split, Hourly View for the Past Week

Day Week Month

[View History Details](#)

Usage Outdoor Temperature



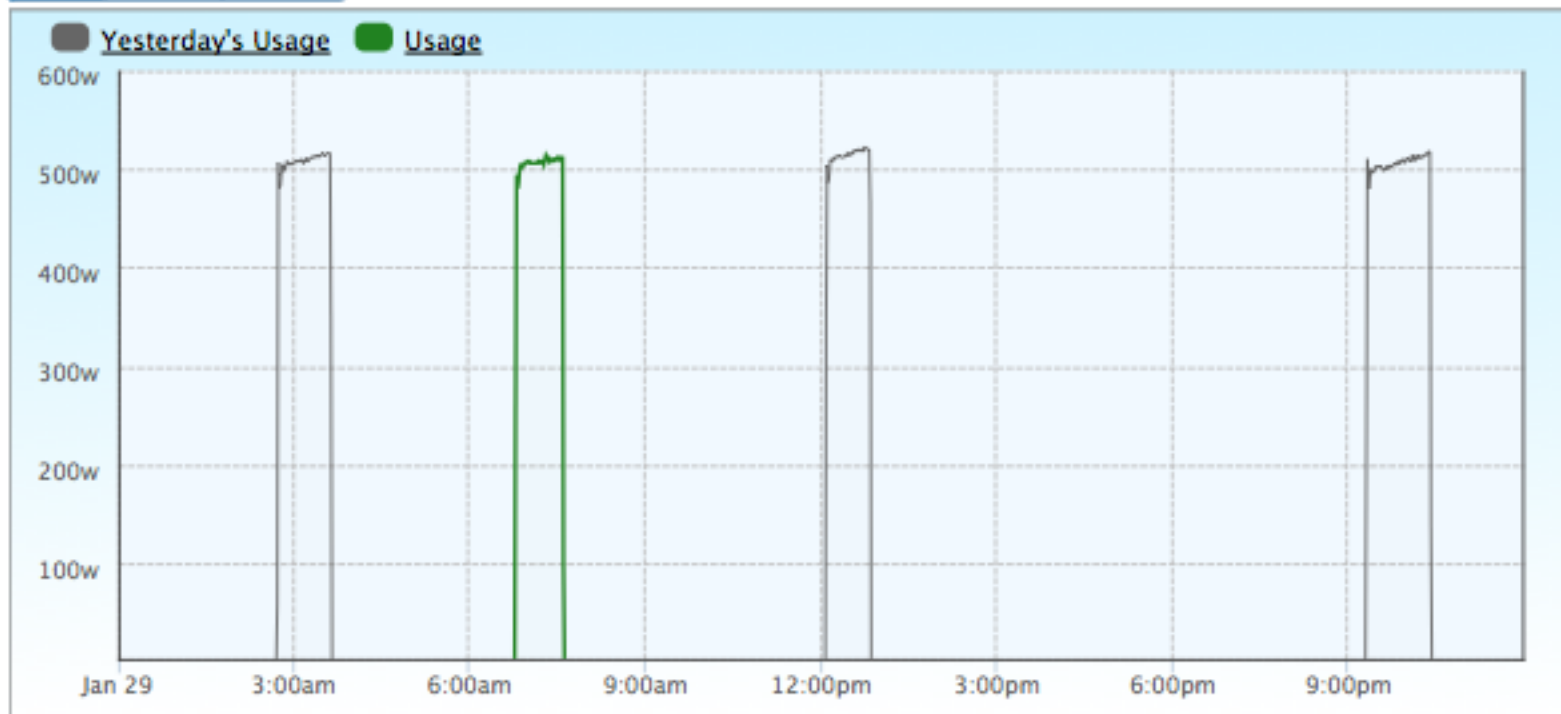
Projected Usage in kWh vs Previous Period kWh Cost



Water Heater, Minute by Minute View for Today

Day Week Month

[View History Details](#)



Click and drag in the plot area to zoom in.

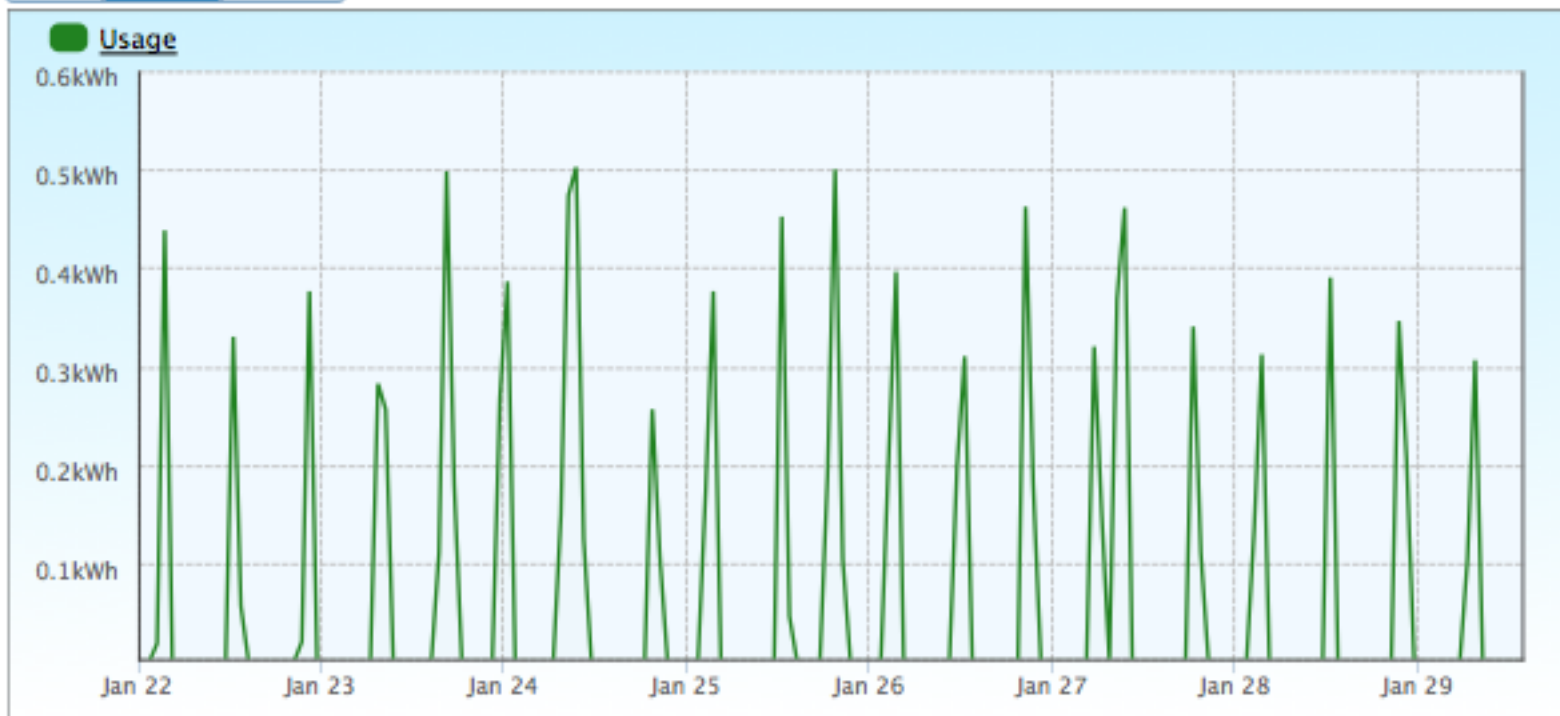
Projected Usage in kWh vs Previous Period kWh Cost



Water Heater, Hourly View for the Past Week

Day **Week** Month

[View History Details](#)



Click and drag in the plot area to zoom in.

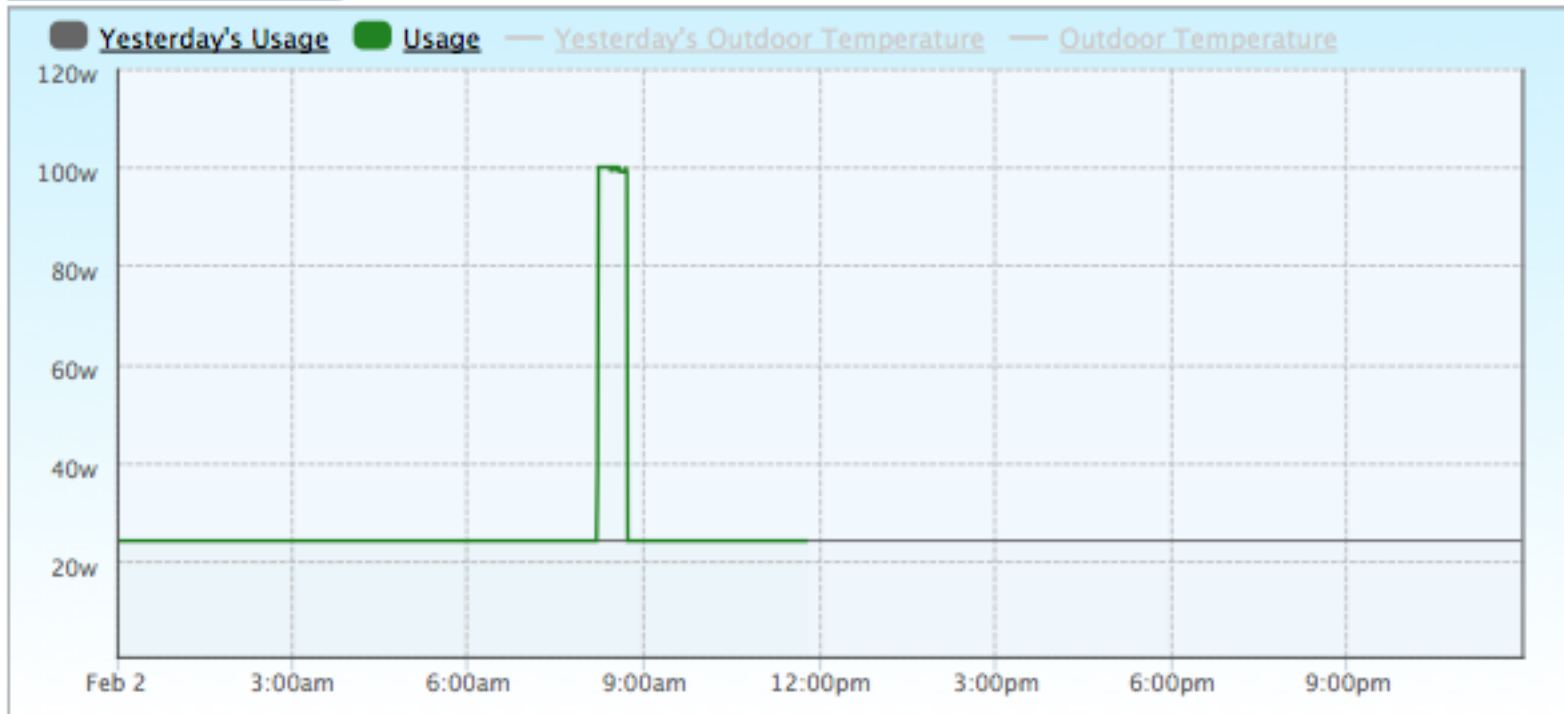
Projected Usage in kWh vs Previous Period kWh Cost



Zehnder HRV, Minute by Minute View for Today

Day Week Month

[View History Details](#)



Click and drag in the plot area to zoom in.

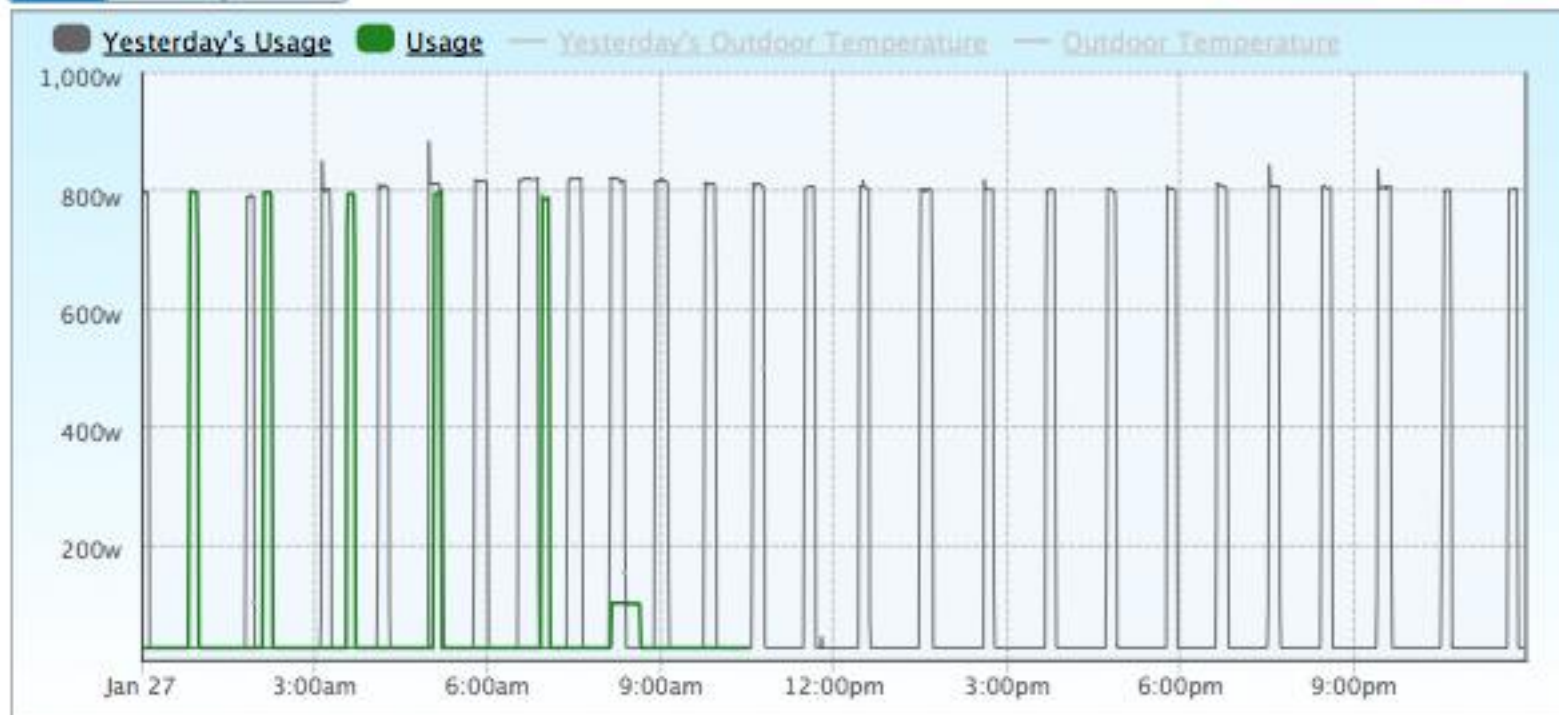
Projected Usage in kWh vs Previous Period kWh Cost



Zehnder HRV, Minute by Minute View for Today

Day Week Month

[View History Details](#)



Click and drag in the plot area to zoom in.

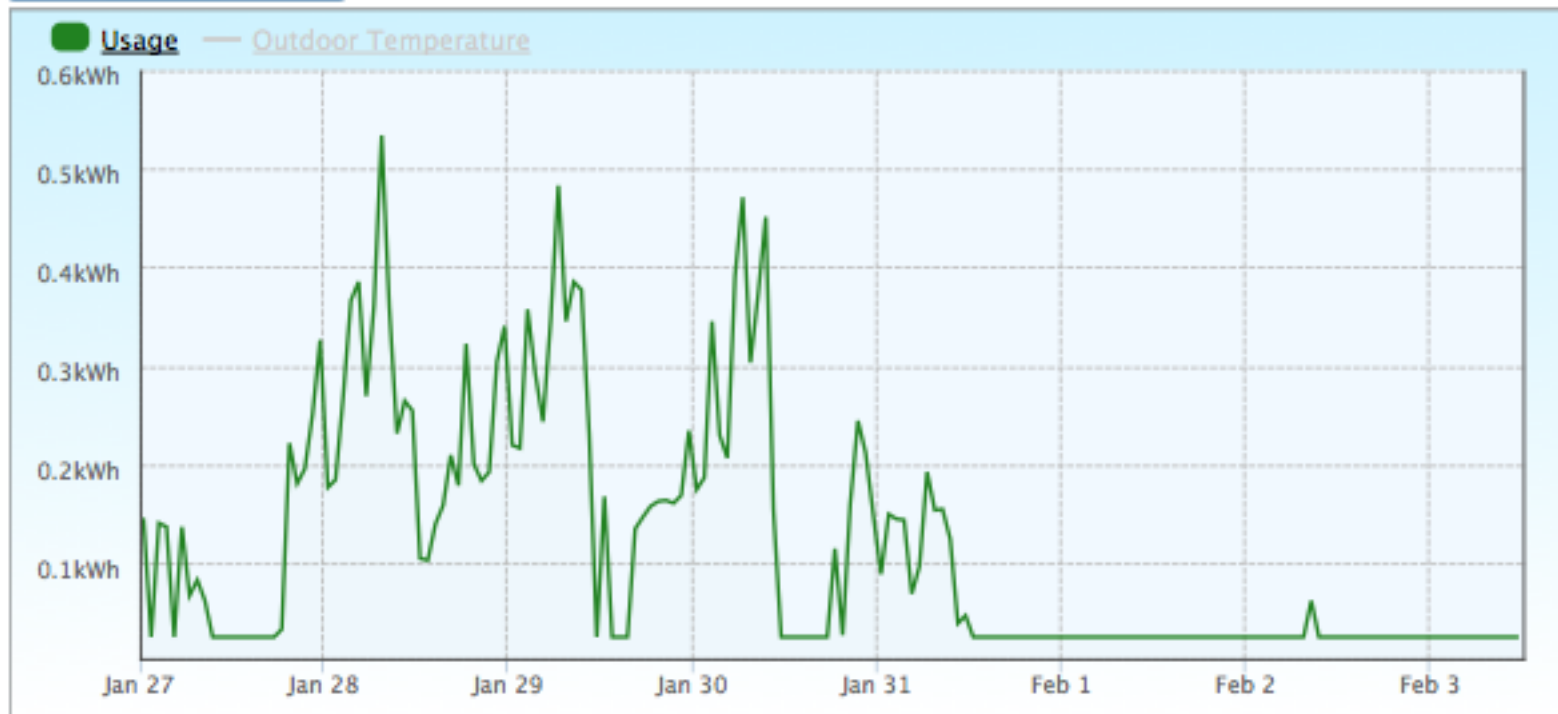
Projected Usage in kWh vs Previous Period kWh Cost



Zehnder HRV, Hourly View for the Past Week

Day **Week** Month

[View History Details](#)



Click and drag in the plot area to zoom in.