


OCTOBER 13, 2016

Efficiency Vermont's Commercial Net Zero Energy Program

Nick Thiltgen, PE, LEED AP
Energy Consultant



Introduction

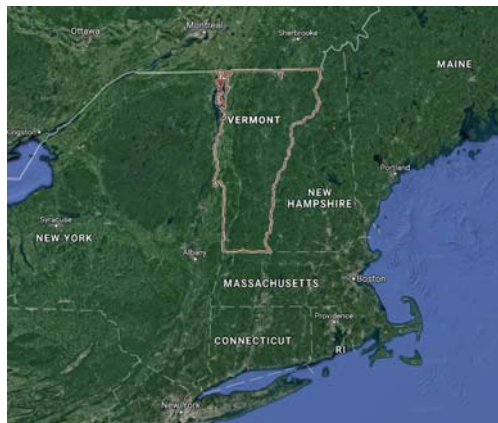
Efficiency Vermont



Efficiency Vermont

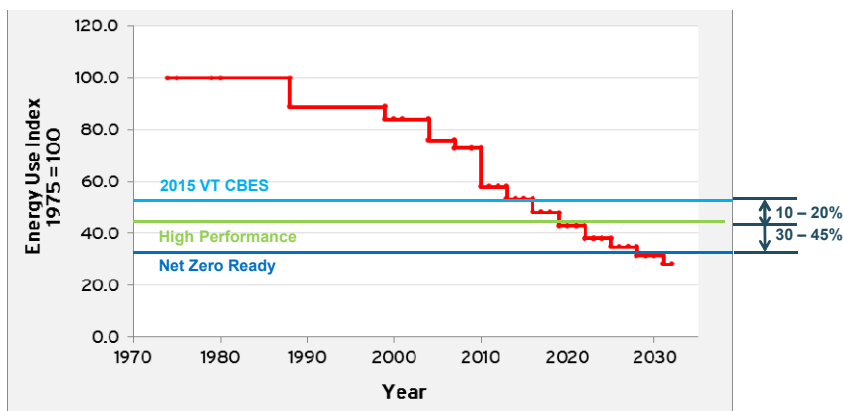
Vermont

- Population: 625,000
- Burlington
- Vermont Gas
- Green Mountain Power
- Biomass
- Comprehensive Energy Plan
- Efficiency VT



Efficiency Vermont

Energy Efficiency Index Over Time



Efficiency Vermont

Net Zero Energy Building Program

- Energy Efficiency
- Renewable Energy
- Energy Charrette
- Energy Modeling
- Commissioning
- Energy Metering



Efficiency Vermont

Net Zero Energy Building Program

- 5 completed projects
- 6 on-track projects
- 12 not-completed/participated projects



Photo: Gary Hall Photography



Lessons Learned

Efficiency Vermont



Efficiency Vermont

General

- Definition, Structure
- Design Incentives
- Owner Priorities
- EVT Support



Graphic: Breadleaf Corporation



Efficiency Vermont

Energy Charrette

- Participants
- Preparation
- Goal Setting, Communication
- Owner's Project Requirements



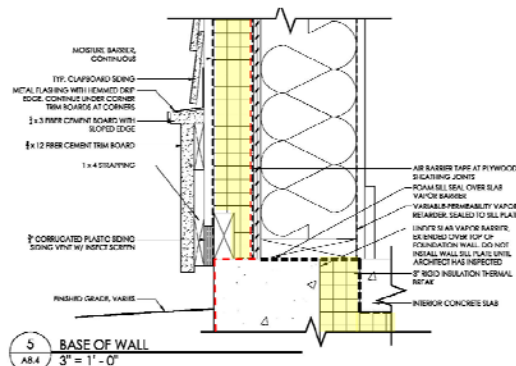
Photo: Breadloaf Corporation



Efficiency Vermont

Energy Efficiency

- Envelope
- Lighting



Graphic: Macley Architects



Efficiency Vermont

Energy Efficiency - Mechanical

- Ventilation
- Heat Pumps – Sizing, Heat Back-Up
- Hot Water



Photo: Weimann Lamphere Architects



Efficiency Vermont

Renewable Energy

- Necessary PV Area
- (Virtual) Net Metering
- Solar Adder
- RECs



Graphic: Gossens Bachman Architects



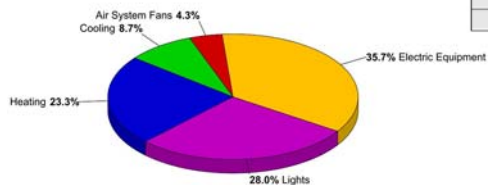
Efficiency Vermont

Energy Modeling

- Purpose
- Cost
- Modelers

2. Energy Consumption by System Component

Component	Site Energy (kBTU)	Site Energy (kBTU/ft ²)
Air System Fans	13,160	0.857
Cooling	27,607	1.797
Heating	68,747	4.476
Pumps	0	0.000
Heat Rejection Fans	0	0.000
HVAC Sub-Total	109,514	7.129
Lights	86,485	5.630
Electric Equipment	110,087	7.167
Misc. Electric	0	0.000
Misc. Fuel Use	0	0.000
Non-HVAC Sub-Total	196,572	12.797
Grand Total	306,085	19.926



Graphic: GWR Engineering



Efficiency Vermont

Energy Metering

- Integration
- Fossil Fuel
- Investigation
- Monitoring



Graphic: eGauge Systems



Efficiency Vermont

Commissioning

- Providers
- Costs
- Qualifications



Air leaks where the caulk seal did not get tooled well around the shims/clips and where there are voids or bubbles in the caulk joint itself.



Photos: Zero by Degrees

Efficiency
Vermont

Efficiency Vermont

Other

- “Green” Materials
- Transportation
- Plug Loads
- Zero Energy Design vs. Use
- Additional Cost vs. Benefits



Efficiency
Vermont



OCTOBER 13, 2016

Efficiency Vermont's Commercial Net Zero Energy Program

Nick Thiltgen, PE, LEED AP
Energy Consultant

