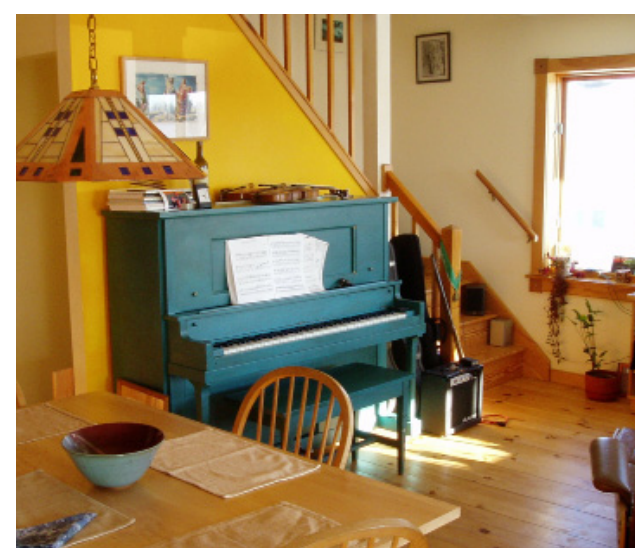
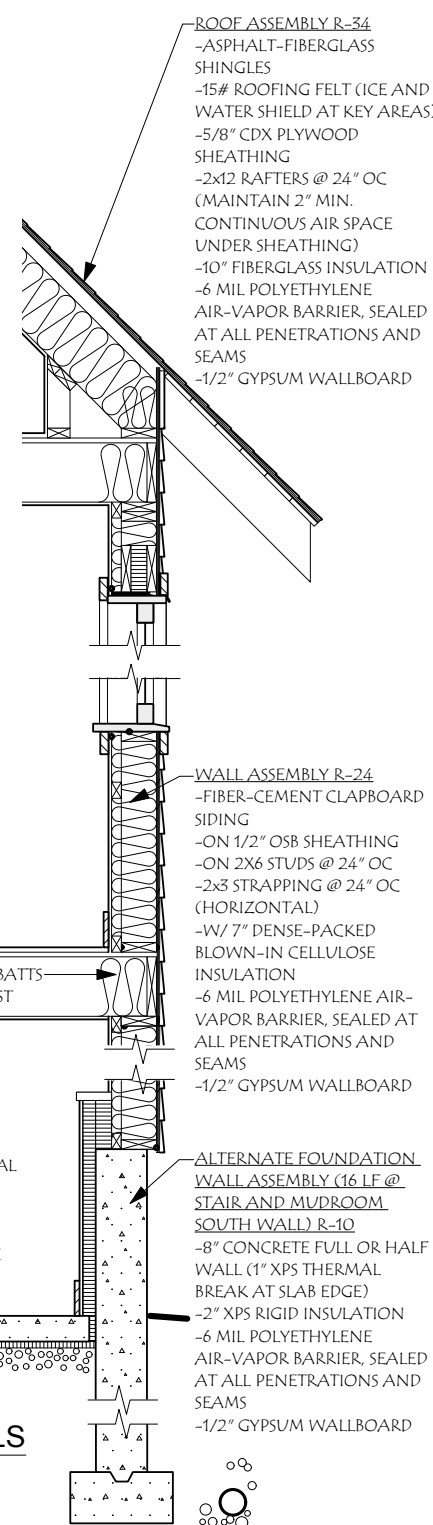


# What Does It Take ... ...to bring a well-built home to zero net energy? *Not much!*

## Starting point:

1

- small, energy-efficient duplex home
- built in 1994 for approximately \$56/SF
- compact fluorescent lighting
- exhaust-only ventilation
- spacious feeling in a compact floor plan
- solar hot water already installed



## Better than zero net:

2

### strategies:

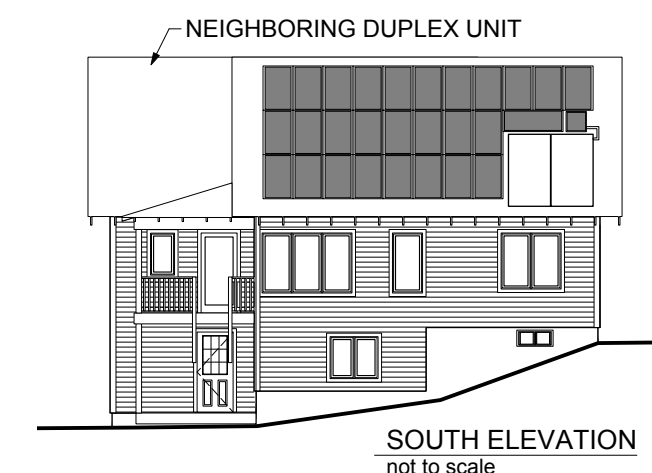
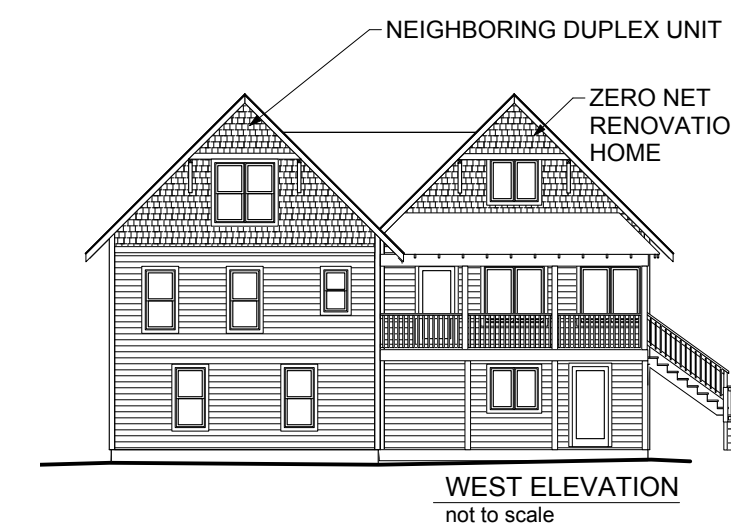
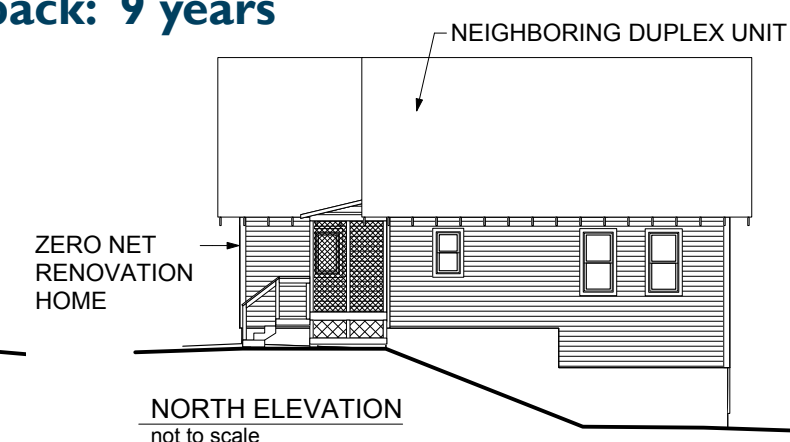
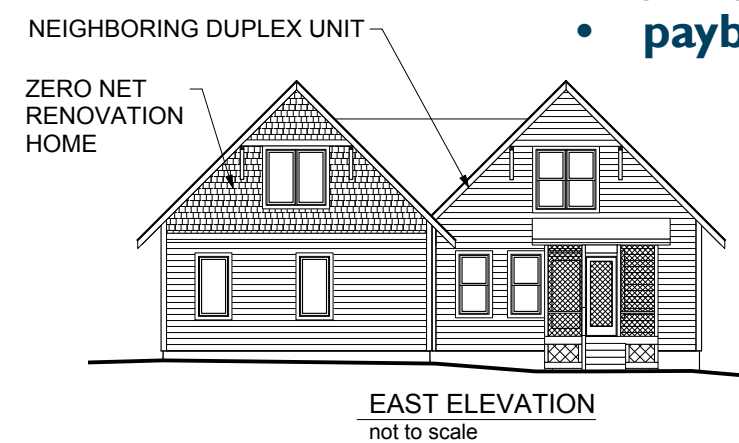
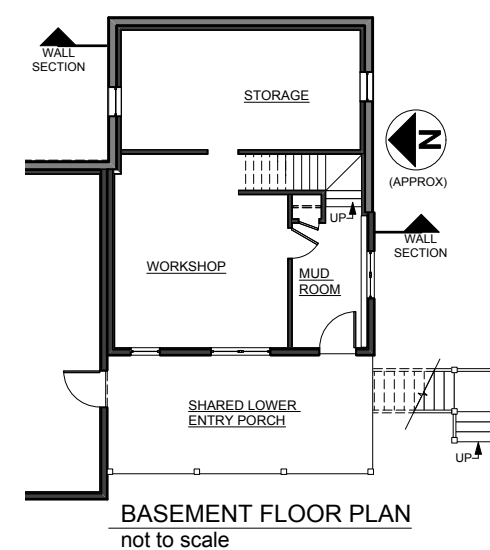
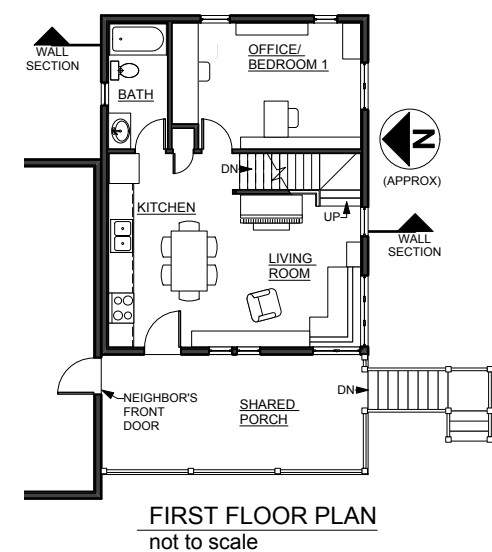
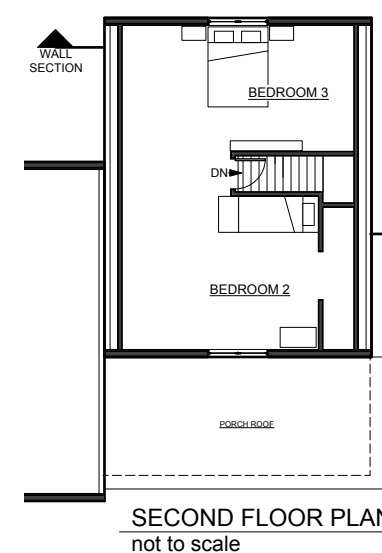
- careful modeling to determine strategies
- targeted air sealing
- reducing plug loads (old refrigerator and dehumidifier were energy hogs)
- new air-source heat pumps to replace propane boiler
- new HRV to replace exhaust-only ventilation
- super-insulated electric water tank as new backup for solar hot water
- 5.9 kw PV array to cover all energy uses

### results:

- **exceeded zero net: net energy producing by 430 kwh/year**
- total energy use reduced by 23%
- new refrigerator alone saved ~40 kwh/month
- air leakage reduced by 110 CFM 50 (15% estimated improvement)
- basement dehumidification using heat pump is more efficient & effective
- comfort improved (pleasant heating system)

### costs:

- total cost before rebates: \$62,100
- cost after rebates & tax credits: \$35,000
- yearly revenue from SRECs: \$2,400
- yearly cost savings on utilities: \$1,500
- **payback: 9 years**



## Next steps...

3

- interior storm windows
- more air sealing
- LED lighting
- magnetic induction range
- further reduction in plug loads
- improved monitoring



## Kraus-Fabel Renovation, Amherst, Massachusetts

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