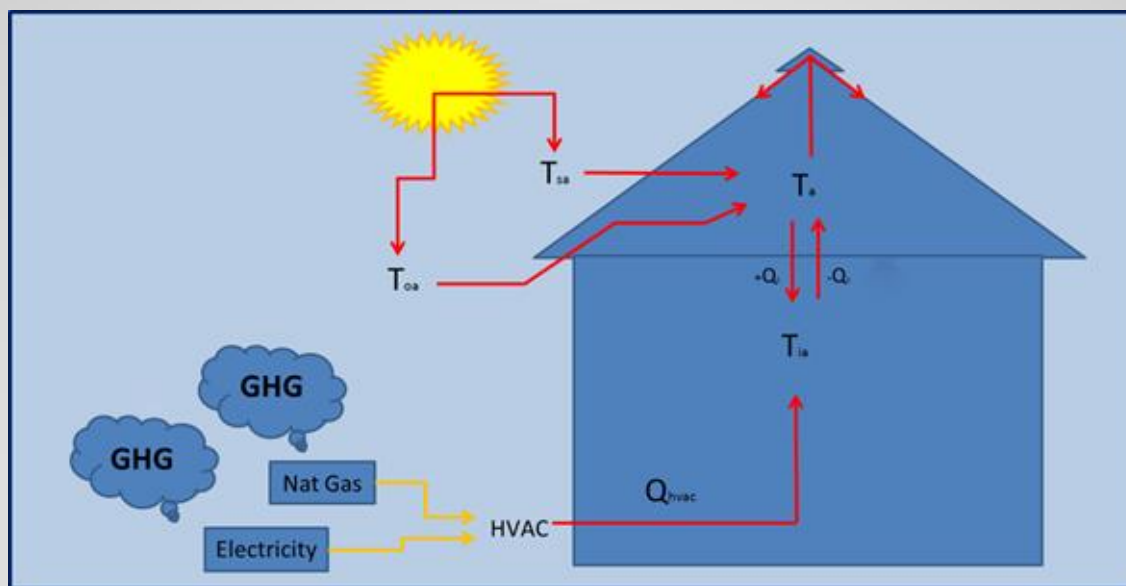


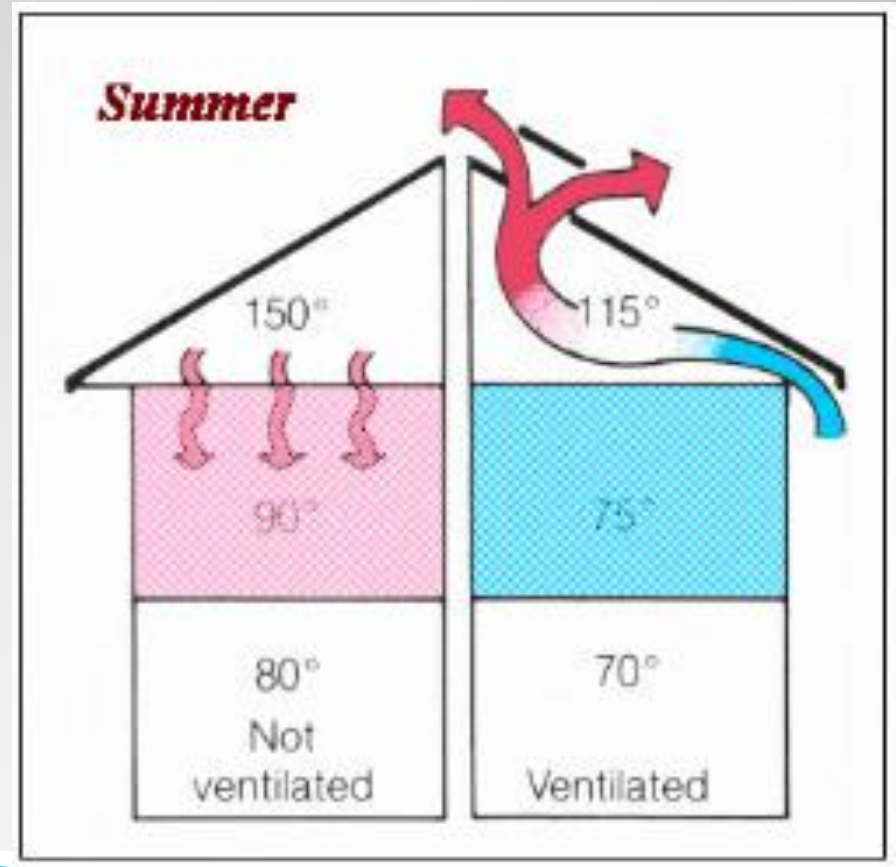
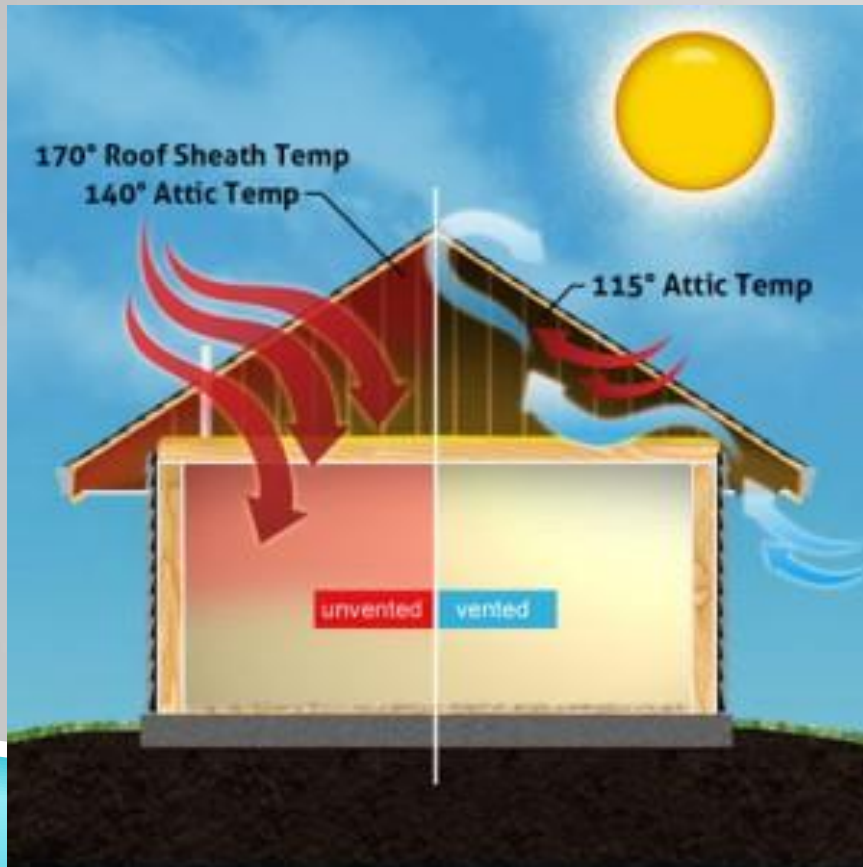
# CASE STUDY

Improving the comfort of your home  
& saving money with passive attic ventilation  
and additional attic insulation



## **SUMMER PROBLEM:** Marginally vented & insulated attics

Hot blanket of trapped attic air permeates through insulation and ceiling creating a **hot** climate in the home and increased air conditioner use & electric bills



**WINTER PROBLEM:** Marginally insulated attics

Heat loss from home's living space into minimally insulated attics creates a **cold** climate in the home and increased heater use & gas bills

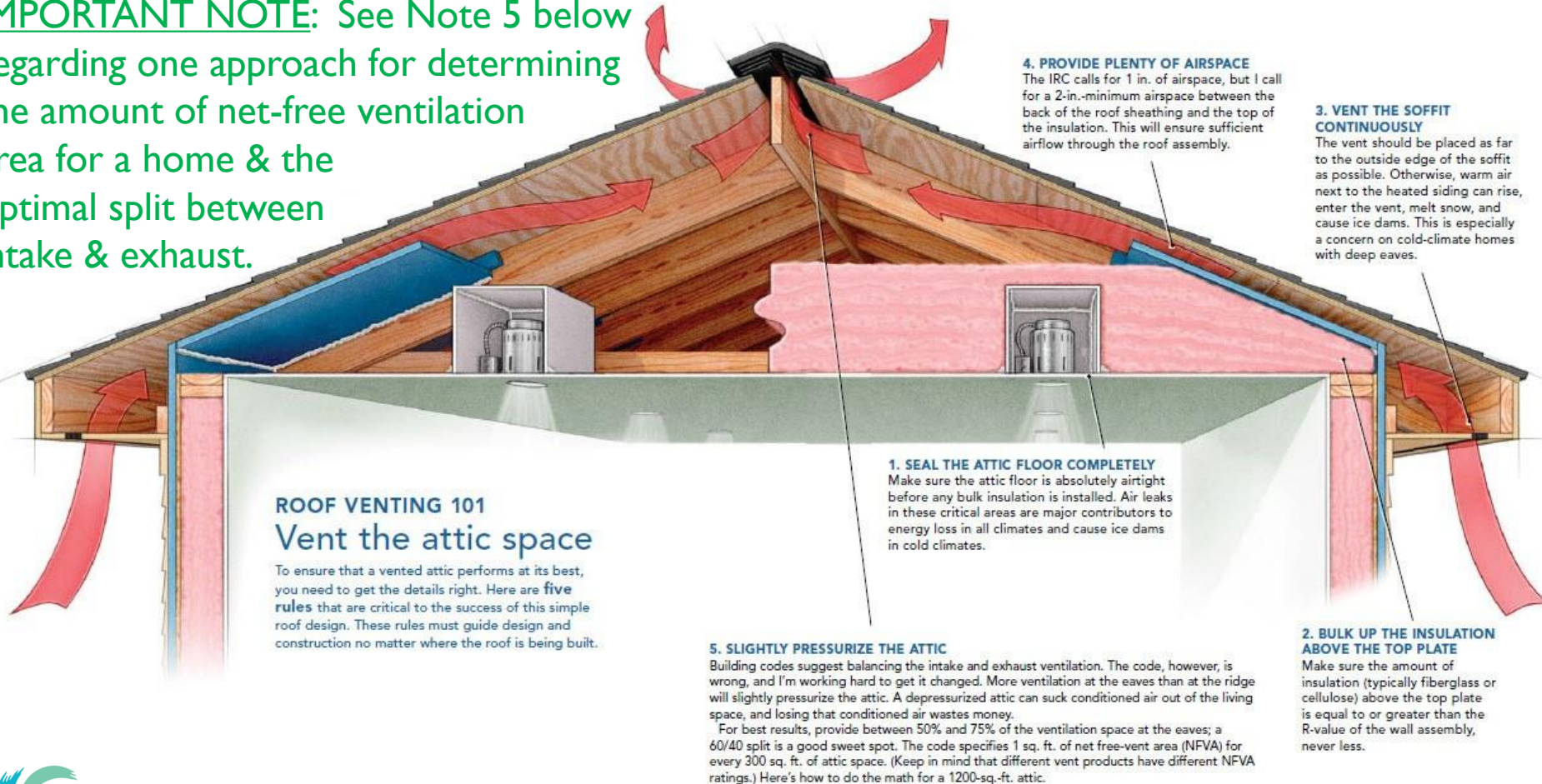




# **SOLUTION:** Five Step Attic Retrofit

1. Sealing Ceiling Penetrations
2. More & Well Laid Insulation
3. Soffit Vents
4. Rafter Vent/Baffle
5. Baffled Ridge Vent

**IMPORTANT NOTE:** See Note 5 below regarding one approach for determining the amount of net-free ventilation area for a home & the optimal split between intake & exhaust.



# CASE STUDY: Project in Santa Margarita, CA

## STEP 0a. Complete theoretical vent calculations

Before you start your project, it is best to estimate how you will secure the exhaust and inlet net-free areas you seek as discussed in the previous slide. This will help you determine the size of the soffit holes to cut. For this project, between the soffit holes cut and the number of soffit and rafter vents installed, the rafter vents which were flush mounted to the roof sheeting proved to be the constraining factor for inlet air flow.

The screenshot displays the Microsoft Excel interface with the file 'VentRidgeCalcs.xlsx' open. The ribbon includes File, Home, Insert, Page Layout, Formulas, Data, Review, View, and Acrobat. The 'Home' ribbon is active, showing options for Font, Paragraph, Styles, and Cells. The spreadsheet contains the following data:

**House Area**

The attic portion for the house has venting throughout the back of the house, but the front only has 9 truss spaces for soffit holes.

**Exhaust:** 65' peak at 18 sq in/linear foot for vent ridge = 1170 sq in = 8.125 sf **Total House Exhaust**

**Current front inlet w/o Rafter Vents:**

	Sq in	Sf
Soffit Vents:	448	3.111
Soffit Holes:	274.5	1.906
Soffit Circles REMOVE		
Porch Mesh	173	1.201
<b>Total Front Inlet w/o Rafter Vents</b>	<b>6.219</b>	<b>sf</b>

**Current rear inlet w/o Rafter Vents:**

	Sq in	Sf
Soffit Vents:	1008	7.000
Soffit Holes:	7.187	sf

**Current rear inlet w/o Rafter Vents:**

	Sq in	Sf
1	20.75	0.504
2	22.5	0.547
3	14.25	0.000
4	31	0.000
5	22.5	0.087
6	22.5	0.125
7	22.5	0.250
8	22.5	0.222
9	22.5	0.065
10	22.5	0.254
11	22.5	0.244
12	22.5	0.219
13	22.5	0.087
14	22.5	0.215
15	22.5	0.215
16	22.5	0.087
17	22.5	0.000
18	22.5	0.087

**Rafter Vent Net**

	Free Area	Minimum NFA	Minimum NFA
26	234	1.625	sf
26	sq in	0.000	sf
173	sq in	1.201	sf
<b>Total Front Inlet with Rafter Vent Restrictions</b>	<b>2.826</b>	<b>sf</b>	
<b>Total House Inlet with Rafter Vent Restrictions</b>	<b>8.063</b>	<b>sf</b>	
<b>Total Rear Inlet with Rafter Vent Restriction</b>	<b>5.236</b>	<b>sf</b>	

**Notes:**

- Problem: The front house attic above the garage does not have inlet air.
- Question: Should I cut openings between the garage and house to get that stagnant air to flow?
- Don't use this because the Soffit Holes are the bottleneck.
- 2x laying flat somewhat blocking
- Bisected truss - Closed

# CASE STUDY: Project in Santa Margarita, CA

## STEP 0b. Meet with an emPower Central Coast Energy Coach

Meet with an Energy Coach to help consider other energy saving home projects, learn about contractor help, and incentive opportunities:  
[www.empowersbc.org](http://www.empowersbc.org); 805-781-5625



The screenshot shows the emPower Central Coast website. The header includes the emPower Central Coast logo, the text "COUNTIES OF SANTA BARBARA, VENTURA AND SAN LUIS OBISPO", and a "Select Language" dropdown. The navigation menu has links for Home, About the Program, For Homeowners, For Contractors, News & Events, and Contact Us, along with an "eNewsletter Signup" button. The main content area features a large banner with a photo of two men, Paul and Jason, and the text "emPower ENERGY COACHES". To the right of the banner, it says "Need help getting started with home energy upgrades? Talk to an Energy Coach (it's free!)" and includes a "GET MORE INFO" button. Below the banner, there is a section titled "Upgrade today with the emPower program:" with a list of benefits: "Utility incentives up to \$6,500", "FREE home energy site visit", "Low-interest, unsecured loans", and "Qualified contractors". At the bottom left, there is a section titled "Not sure where to start? Here's Alelia's story:" with a paragraph about a free site visit and a video link. The video link is titled "Home Energy Visit: Alelia's Story" and features the emPower Central Coast logo.

File Edit View History Bookmarks Tools Help

Home | empowerSBC

www.empowersbc.org

WINAMP

Select Language

emPower Central Coast

COUNTIES OF SANTA BARBARA, VENTURA AND SAN LUIS OBISPO

Home About the Program For Homeowners For Contractors News & Events Contact Us eNewsletter Signup

Need help getting started with home energy upgrades?

Talk to an Energy Coach (it's free!)

GET MORE INFO

Upgrade today with the emPower program:

- Utility incentives up to \$6,500
- FREE home energy site visit
- Low-interest, unsecured loans
- Qualified contractors

Not sure where to start? Here's Alelia's story:

An emPower Energy Coach conducted a free site visit at Alelia's home, and now she knows what upgrades will make her home more comfortable and save energy – watch the video to find out what she learned.

emPower Central Coast

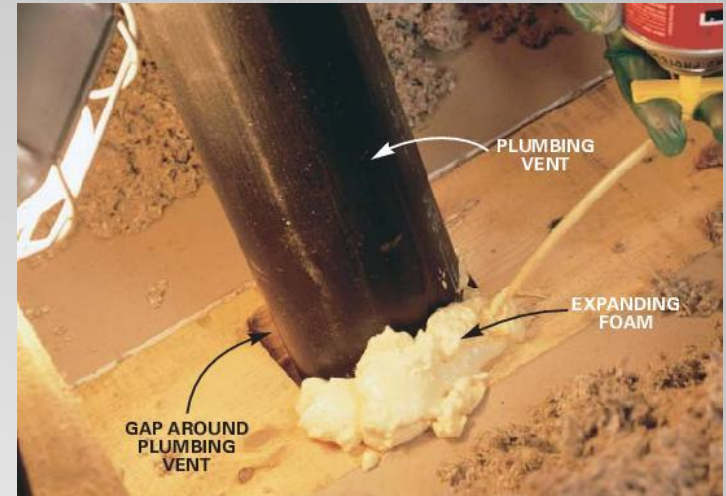
Home Energy Visit: Alelia's Story



## CASE STUDY: Project in Santa Margarita, CA

### STEP 1. Sealing Ceiling Penetrations

Unaware of this step at project start, this was a missed opportunity to reduce heating & cooling inefficiencies.



Proper sealing examples.



## CASE STUDY: Project in Santa Margarita, CA

**STEP 2. More & well laid insulation:** Removed existing R-30 fiberglass insulation that was too wide for the truss spacing (24"). Removed moisture barrier from the fiberglass insulation and laid it on the attic floor between the trusses. On top of the moisture barrier, installed properly sized (23" wide by 3.5" tall) denim insulation between trusses. Where possible, re-laid fiberglass insulation perpendicular to trusses. Secured 2014 tax credit. Result = R43. An insulation knife and sharpener is quite handy to have.





## **CASE STUDY: Project in Santa Margarita, CA**

**STEP 3. Soffit Inlet Vents:** LOTS of difficult sawzall work. Created openings between almost every truss along front and back of the home and added openings in the front facing garage. Enclosed eaves with screened vents that connect the soffit holes to the outside air. Identify location of electrical, water, etc. lines inside the attic near the eaves before cutting into soffit.



## CASE STUDY: Project in Santa Margarita, CA

### Step 4. Rafter Inlet Vent/Baffle:

Install rafter vents to create connective air flow from the soffit holes into the attic. Angle cut end of insulation so that it fits flush against rafter vent taking care not to collapse rafter vent.





## CASE STUDY: Project in Santa Margarita, CA

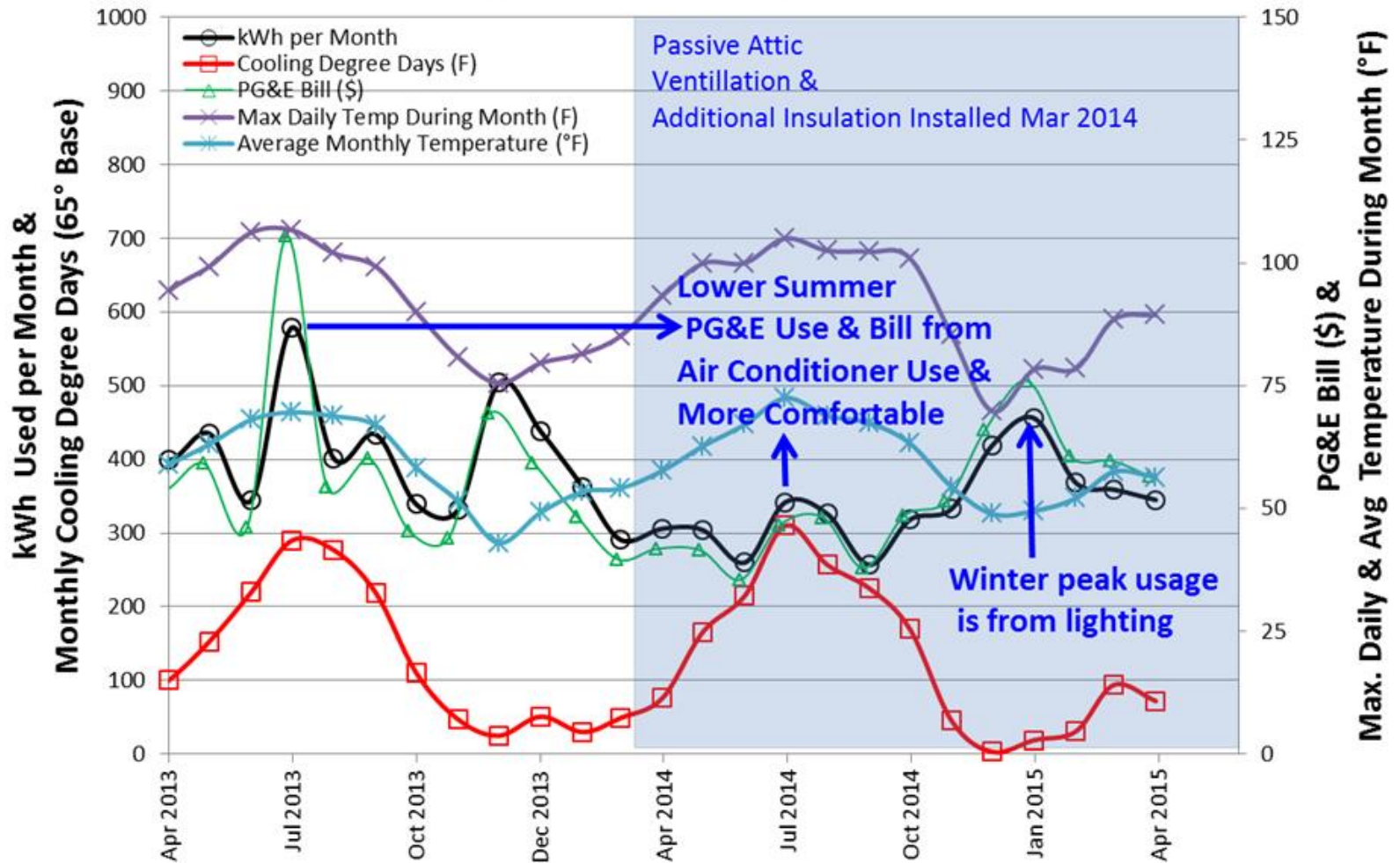
### Step 5. Baffled Exhaust Ridge Vent:

Installed a baffled ridge vent to enable convective heat loss from the attic. The ridge vent's baffling create a venturi effect that draws air out of the attic when wind blows over the ridge vent, thus augmenting the convective heat losses.

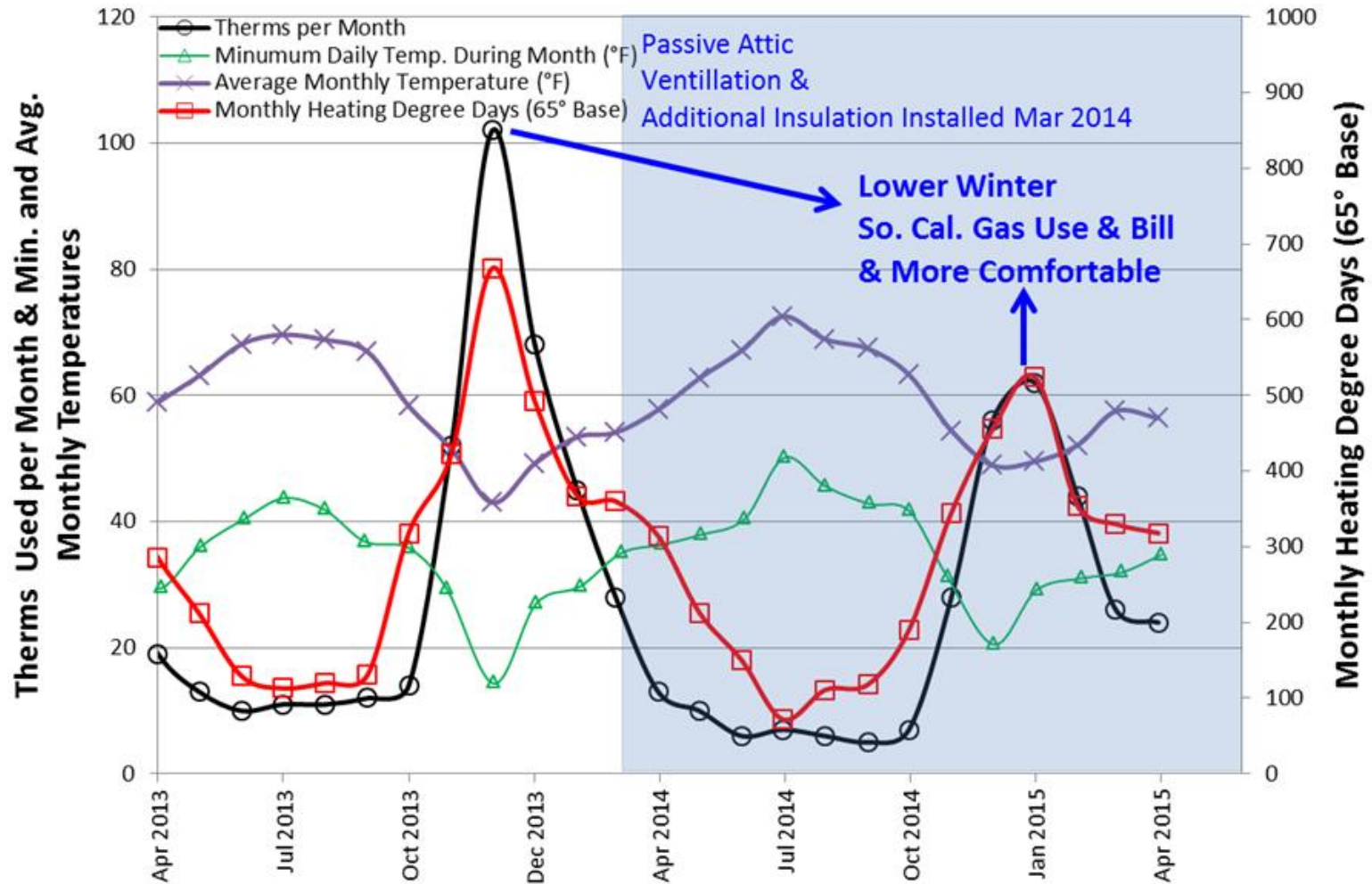




# Summer Benefits from Passive Attic Ventillation & Added Insulation



# Winter Benefits from Passive Attic Ventillation & Added Insulation



# Take Home Messages: Home Retrofit

## Passive Attic Venting **Retrofitting** = SERIOUS sweat equity

- Materials *(Add Total Material Costs and Home & Garage Area Square footages)*
  - Venting materials are quite affordable
  - Biggest material cost was R13 denim insulation
  - Not terribly more than fiberglass (\$0.75/sf vs. \$0.606/sf – 2015 Home Depot pricing)
    - Denim: From 100% recycled material, non-hazardous & non-itchy, easy to work with, better sound insulator, LEED eligible, Class-A fire rated
- Labor
  - The work is time, labor intensive, hot, and often in cramped quarters
  - If hired out, labor costs could exceed material costs
  - Tyvek suits, latex/non-latex gloves, goggles, and respirators were necessary
  - Work is best done in cooler fall/winter months
- Benefits:
  - A solid “green home” feature can help future sales
  - The home is more comfortable year round
  - Lower/more even temps in attic means longer life for shingles & things in attic
  - Lower summer electricity use & bills – less need for air conditioning
  - Lower winter natural gas use & bills – less need to run the heater
  - Results would likely have improved had Step 1 (sealing) been part of project
  - Best results would be expected in areas with big seasonal temperature extremes and or with big diurnal temperature variations



# Take Home Messages: New Construction

## Passive Attic Venting in NEW Construction = SERIOUS no brainer

### Immediate benefits for designing passive attic venting into a project

- Additional labor & material would result in minimal increases
- Steps 0 to 5 would be vastly easier during new construction
- Title 24 already requires substantial attic insulation, so it's already a project cost
- This solid "green home/commercial structure" feature can help sales
  - Owners/users will enjoy more comfortable inside environment with significantly less energy use and longer life for shingles & things in attic

### Ancillary benefits for designing passive attic venting into a project

- The resulting greenhouse gas (GHG) reductions from a new development that includes passive attic ventilation into the design can:
  - Generate credits by the developer for other projects that need CEQA based GHG reductions. In the future, these GHG credits could be sold statewide on the CAPCOA GHG Registry Exchange; or
  - Be used by the developer to offset impacts from their future large projects that will exceed the SLO County GHG significance threshold of 1,150 metric tons per year (2012 CEQA Air Quality Handbook)