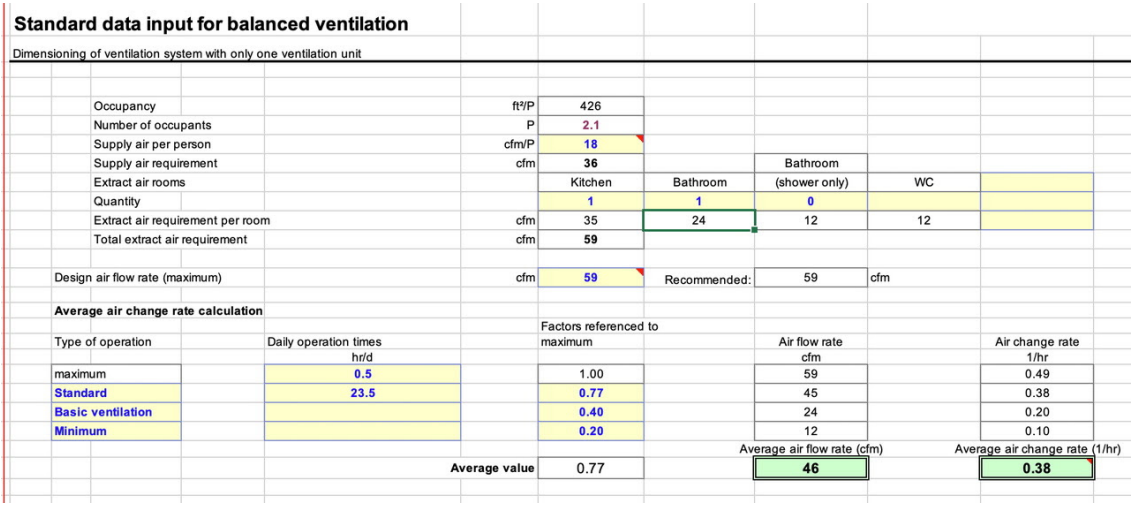
PASSIVE HOUSE CALIFORNIA

APRIL 2021 NEWSLETTER

·PASSIVE HOUSE RESIDENTIAL VENTILATION IN CA·



Standard data input for balanced ventilation

Dimensioning of ventilation system with only one ventilation unit

Occupancy	ft²/P	426				
Number of occupants	P	2.1				
Supply air per person	cfm/P	18				
Supply air requirement	cfm	36		Bathroom		
Extract air rooms		Kitchen	Bathroom	(shower only)	WC	
Quantity		1	1	0		
Extract air requirement per room	cfm	35	24	12	12	
Total extract air requirement	cfm	59				
Design air flow rate (maximum)	cfm	59	Recommended:	59	cfm	

Average air change rate calculation

Type of operation	Daily operation times hr/d	Factors referenced to maximum	Air flow rate cfm	Air change rate 1/hr
maximum	0.5	1.00	59	0.49
Standard	23.5	0.77	45	0.38
Basic ventilation		0.40	24	0.20
Minimum		0.20	12	0.10
			Average air flow rate (cfm)	Average air change rate (1/hr)
	Average value	0.77	46	0.38

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RESIDENTIAL VENTILATION IN CALIFORNIA By Steve Mann

Passive House residential ventilation seems like a fairly straightforward topic on the surface. You install a whole-house heat-recovery ventilator (**HRV**) or energy-recovery ventilator (**ERV**), exhausting stale air from the wet areas of the house and supplying fresh air to the primary living and sleeping areas. (I'll use the term HRV to represent both types

of equipment throughout the remainder of this article). Unfortunately, the Passive House design guidelines don't always align with California's ventilation requirements.

The Passive House Institute (PHI) calculates the **Design Air Flow Rate** as the largest of three separate calculations (see Figure 1):

- 30% of the total **Ventilation Volume**, which is calculated as the treated floor area (a quantity similar to conditioned floor area) times an average room height of 8.2 feet;
- The number of occupants times 18 cubic feet per minute (CFM); or
- The whole building exhaust air requirement, where specific exhaust rates are assigned to kitchens (35 CFM), full bathrooms (24 CFM), shower-only bathrooms (12 CFM), and water closets (12 CFM). Laundry rooms may optionally be assigned 12 CFM as well.

Typically, the **Standard Ventilation Rate** for both supply and exhaust, assuming a balanced ventilation system, is then calculated at 77% of the Design Air Flow Rate. You can break up each 24-hour day into up to four separate flow rates, but this is typically not done in residential projects. A common scenario is to assign one hour or less to high-humidity events like baths, showers, and cooking, where the flow rate is boosted above 77%, with the remaining hours staying at the Standard Ventilation Rate.

The whole-building **Air Changes per Hour** (ACH) is then calculated as the average of the flow rates for each of the four parts of the day. The minimum ACH must be at last 0.3, considered the minimum rate for hygienic purposes. Rates higher than 0.4 might be flagged as potentially resulting in lower-then-desired indoor humidity during the winter.

Once a Standard Ventilation Rate is selected, airflows are allocated to the individual rooms in the house. How much air gets allocated to each room depends on which of the three ventilation calculations determined the Design Air Flow. For small houses, especially with multiple bathrooms, the winner may be the room-by-room exhaust rates. For larger houses, the Ventilation Volume or the number of occupants may be the determining factor. Each situation is unique.

California has its own separate residential ventilation requirements. There are two: whole-house ventilation, and local bath and kitchen exhaust, all drawn from the ASHRAE 62.2 standard. The whole house rate is based on the conditioned floor area and the number of bedrooms. The local bath exhaust rate is 50 CFM, switched, or 20 CFM continuous. The local kitchen exhaust rate is 100 CFM, switched, or 5 ACH based on the kitchen volume.

In a California Passive House, a HRV is normally used to satisfy the Energy Code's bathroom exhaust minimum of 20 CFM. (It would be silly to install a separate bath fan to satisfy that requirement if you have a HRV.) The allocation of the Standard Ventilation Rate to each bathroom needs to meet this requirement. A HRV is not typically used to satisfy the Energy Code's local kitchen exhaust requirement. It's advisable to keep the

HRV kitchen exhaust inlet away from cooking locations so as not to get fouled with cooking grease, and use a separate range hood.

When designing a residential Passive House, you need to make sure that the two ventilation standards are reconciled prior to locking in a house's mechanical design. It could spare you some headaches.

·SHOW US YOUR CA PASSIVE HOUSE BUILDING!·

WE WANT TO SEE YOUR PASSIVE HOUSE PROJECTS IN CALIFORNIA!

We want to know about your Passive House (PHI) building or project located here in California — in planning, under construction or recently completed. Passive House California (PHCA) wants to spread the good news about the Momentum we are seeing on the West Coast in recent months. Here is how you can contribute and be part of the movement.

- Provide us with a virtual video tour of your completed Passive House building.
- Provide us with a virtual tour of your Passive House building currently under construction - we love to see how it is coming together.

- Send us renderings, photographs, and/or information about your Passive House building — in any stage of the process (design, engineering, permitting, or Passive House certification).
- If your Passive House building includes Prefab components or modules, send send us video, photographs, and information about the project and the process

We would like to include and possibly showcase your project on the new Passive House California (PHCA) website, incorporate it into events around the International Passive House Open days in June 2021, and post your work on our PHCA social media platforms. If you or anyone involved in your Passive House project is a member of PHCA, please consider submitting the project for inclusion in the Project Database on the PHCA website (LINK).

(Note: All projects shall be in compliance with Passive House Institute (PHI) requirements and have a verified Passive House Planning Package (PHPP)).

Stay tuned for more information about the International Passive House Open Days taking place on June 25-27, 2021.

(Image: Carmel by the Sea Passive House, Rick Pharoah)

Click Here to Learn More

·EFFICIENCY FIRST REGIONAL VIDEO·

#EfficiencyFirst #Earthday2021 #Restoreourearth

·UPCOMING EVENTS FROM OUTSIDE PHCA·

PASSIVE HOUSE AWARD 2021 by PHI
Deadline to submit projects: June 1, 2021

The Passive House Institute has announced the Passive House Award 2021 which highlights pioneering projects of energy efficient construction. Special consideration will be given to the renewable energy supply of the buildings by an international panel of judges. Quality assurance of the building through certification is a prerequisite for participation in the Passive House Award 2021. The award will be presented during the 25th International Passive House Conference in September which will be held in Wuppertal and online.

Click Here to Learn More

REDUCE YOUR CARBON FOOTPRINT: THE ALL ELECTRIC HOME
CEC'S 2021 VIRTUAL SANTA BARBARA EARTH DAY FESTIVAL & 3CREN
April 23rd 1:30PM-2:30PM

Join 3C-REN and the CEC for the CEC's 2021 Virtual Santa Barbara Earth Day Festival from April 22-April 24. Over the three days, CEC will also outline and dive deeper into ambitious plans for how our community can meet the urgency of the climate crisis and go all in together on halting the impacts of climate change – rapidly and equitably – through three major efforts:

- Reverse: Push for ambitious, equitable zero emissions and zero waste goals for the energy, transportation, food, and agriculture sectors
- Repair: Tap into the power of nature to draw down excess carbon from the atmosphere and repair the disrupted carbon cycle
- Protect: Safeguard the health of our general public and vulnerable populations from the impacts of climate change already underway

Please join 3C-REN in partnership with In Balance Green Consulting for our live event "Reduce Your Carbon Footprint: The All-Electric Home". You can join this interactive

segment on April 23rd from 1:30 PM – 2:30 PM. This earlier live session will allow attendees who would like to engage and ask questions to our instructors to participate more actively in the session.

CLICK HERE TO REGISTER

·NAPHN ON DEMAND TRADESPERSON TRAINING·

ON DEMAND TRAINING

MAY 20,27& JUNE 3,10,17,24 & JULY 1: Thursdays, 2-3 PM PDT Each Day

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NAPHN is offering On-Demand Tradesperson Training in May and June.

This course is for all building professionals: tradespeople, site supervisors, general contractors builders, and construction managers, who will be involved in the construction of Passive House building. This course can also be appropriate for architects, MEP and structural engineers, developers, and owners' representatives. NAPHN currently offers the CPHT training online, in collaboration with our partner, Emu Systems.

This course has 10 units and is structured as an online on-demand training. The dates below correspond to the live online webinar unit reviews with our expert trainers. The

March course is over a 7 week period and the September course is a shorter schedule over a 4 week period.

CLICK HERE TO REGISTER

PHCA Monthly epiPHany

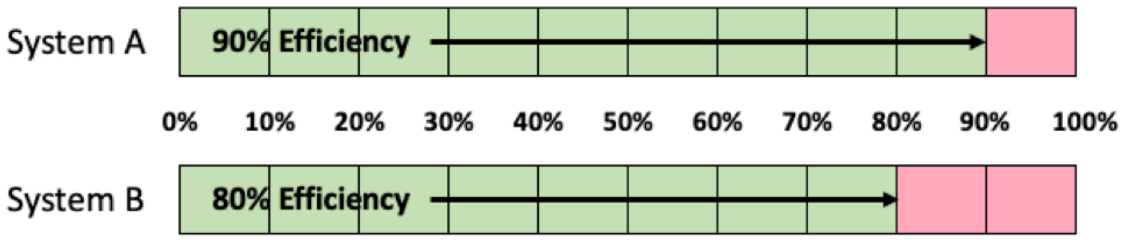
How does a 10% change in efficiency have a 100% impact?

"Value engineering" is a term that is familiar to those involved in the design and construction of buildings and generally involves the substitution of a specified component or system with an alternative solution that is similar, but less expensive. Consider the following:

A building is designed to include a heat recovery ventilation system (HRV) in order to provide a balanced exchange of continuous fresh air to the occupants and, at the same time, transfer heat from the stream of warm air being exhausted to the cold stream of air coming inside. The design team chooses and specifies an HRV system that is rated at 90% efficiency at transferring the warmth from the outgoing stale air to the incoming fresh and filtered air. Let's call this 90% efficient HRV, "System A".

Before construction begins, the builder does some research and discovers that there is an alternative, HRV "System B", that is available at a significantly lower price and is rated at 80% efficiency. The difference between 80% and 90% is only 10%, so it seems like a smart choice to give up a little in performance in order to take advantage of the savings opportunity.

The 10% drop in efficiency between System A and System B, as you can see in the green segment of the bars below, is a relatively small difference. To provide a specific example: Assume that the inside air temperature is 70 degrees and the outside temperature is 30 degrees, a difference of 40 degrees. System A would deliver incoming air that has been warmed 90%, to 66 degrees (36 degrees of the 40-degree difference), while the incoming air from System B would be 62% (32 degrees of the 40-degree difference). Again, the 4-degree difference between 66 and 62 degrees is relatively small.



However, when you look at the same comparison from the perspective of “inefficiency” (the pink segment of the two bars) you can see that HRV system A is 10% inefficient, while HRV system B is 20% inefficient. The heating load to make up a continuous 8 degrees of difference is double that required to make up the 4 degrees. HRV system B may save you money on the original purchase price but the additional 10% change in efficiency doubles the cost of heating, a 100% impact — year after year, for the life of the HRV system.

Do the math and make informed decisions about value engineering.

By Jay Gentry

PASSIVE HOUSE CALIFORNIA

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Passive House California is a member of the International Passive House Association **and proud to cooperate and collaborate with the global Passive House community including** Passive House Institute **and** North American Passive House Network.