weatherization nyswda directors association

Education. Advocacy. Innovation.

ASHRAE 62.2-2013

For Existing Buildings

ASHRAE 62.2-2013

- This is a ventilation standard
- Tighten the house as much as is practical, then add mechanical ventilation
  a. Local ventilation
  b. Whole house ventilation

ASHRAE 62.2 History

- 62.2 - 2003
  - First standard specifically for residential buildings
- 62.2 - 2010
  - First adopted by DOE
  - $0.01A_{floor} + 7.5$ (bedroom + 1)
- 62.2 - 2013
  - BPI and DOE adopted in 2014
  - $0.03A_{floor} + 7.5$ (bedroom + 1)

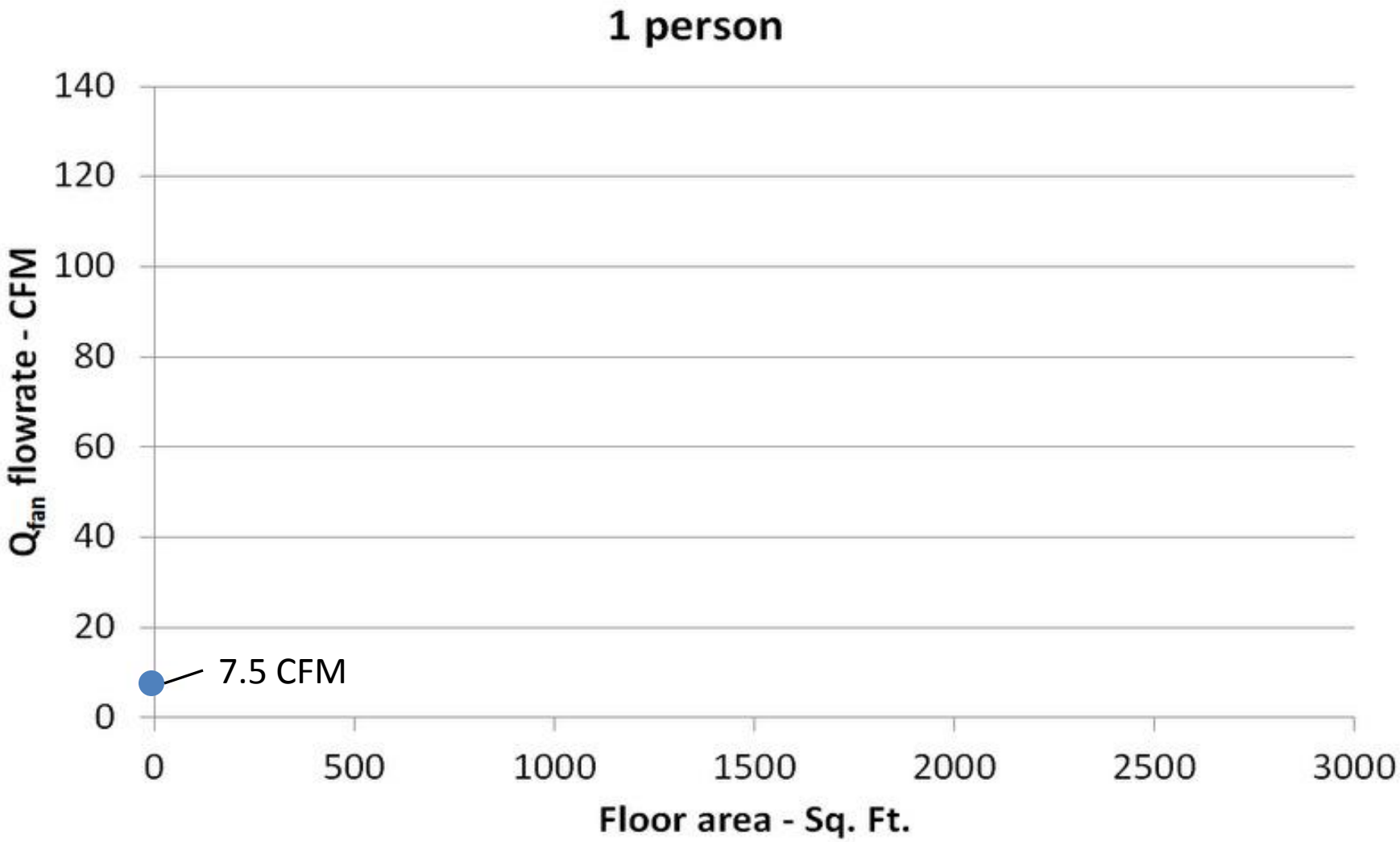
How much air does a person need?

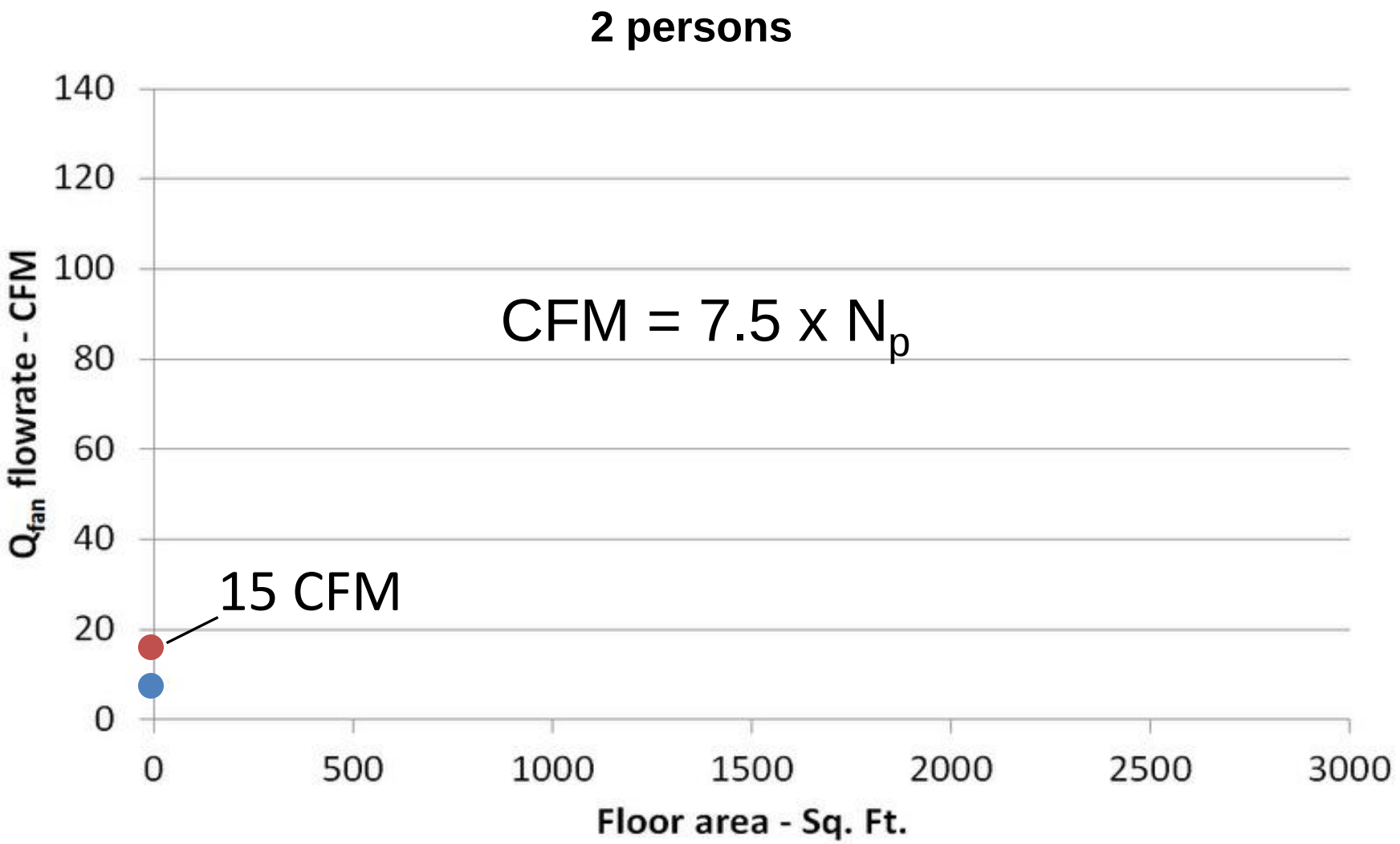
A person needs 7.5 cubic feet per minute (CFM) for breathing.

$CFM = 7.5 \times N_p$

Air for people

- Add up the number of Occupants.
- Add up the number of bedrooms, then add 1.
- Whichever is greater is the number to use.
- Multiply that number times 7.5 CFM.


1 person
140
120
100
80
60
40
20
0
Q_{fan} flowrate - CFM
7.5 CFM
0
500
1000
1500
2000
2500
3000
Floor area - Sq. Ft.

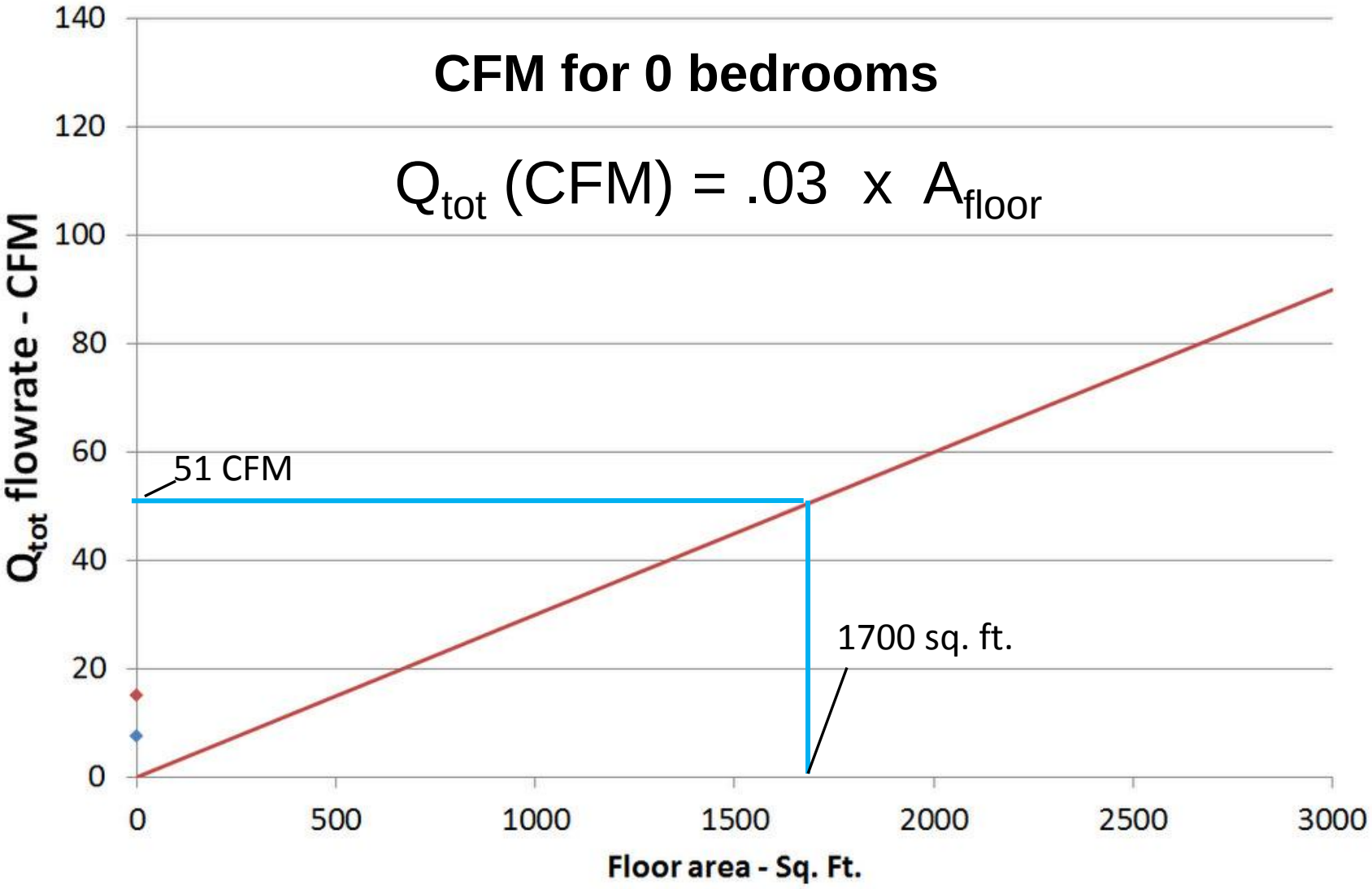

2 persons
140
120
100
80
60
40
20
0
Q_{fan} flowrate - CFM
CFM = 7.5 x N_p
15 CFM
0
500
1000
1500
2000
2500
3000
Floor area - Sq. Ft.

How much air does a house need?

A house needs 3 CFM of fresh air per 100 square feet of living space.

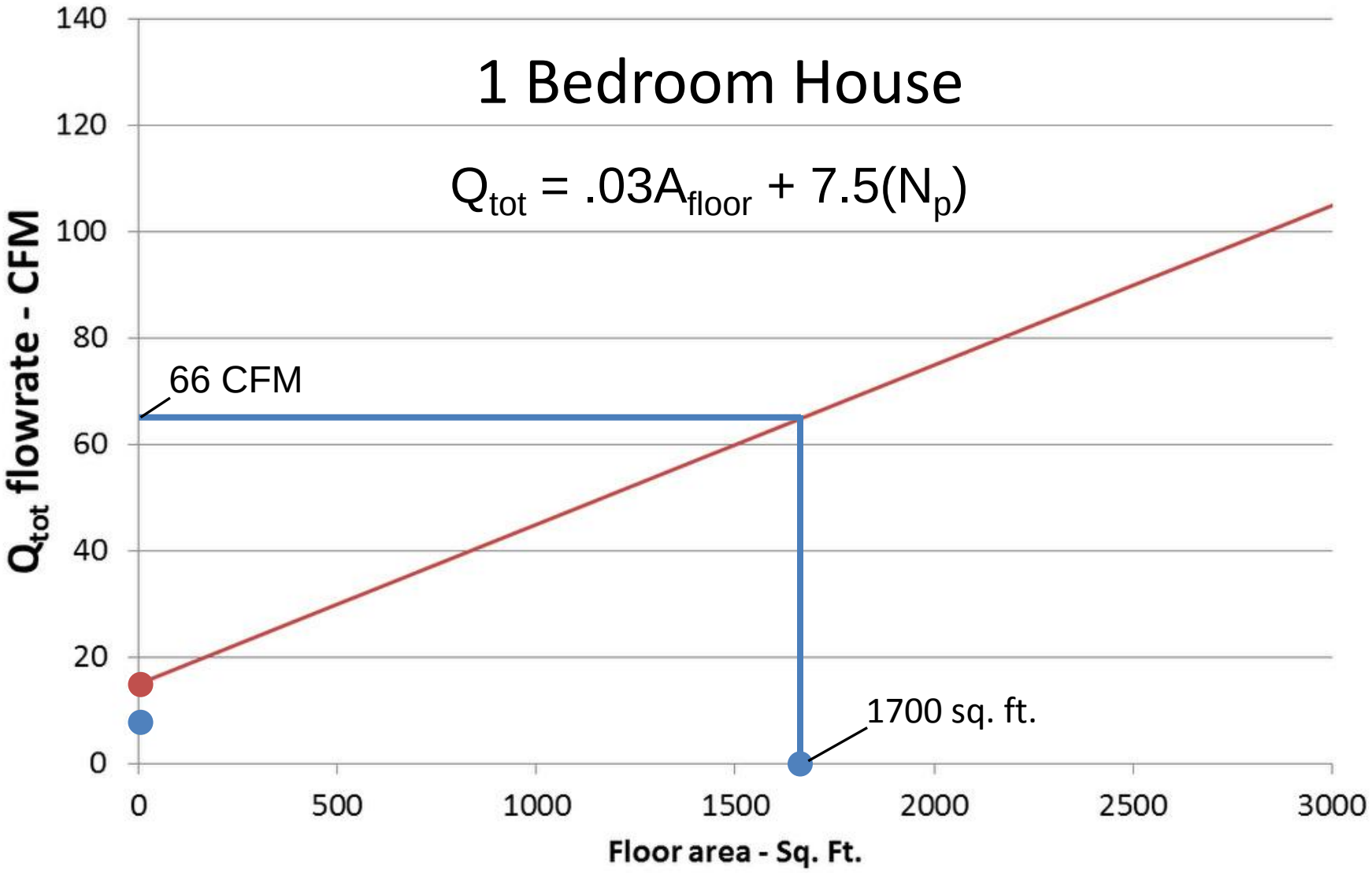
$$CFM = 3 \times \frac{\text{floor area}}{100} \qquad 3 \times \frac{1700 \text{ sq. ft.}}{100} = 51 \text{ CFM}$$

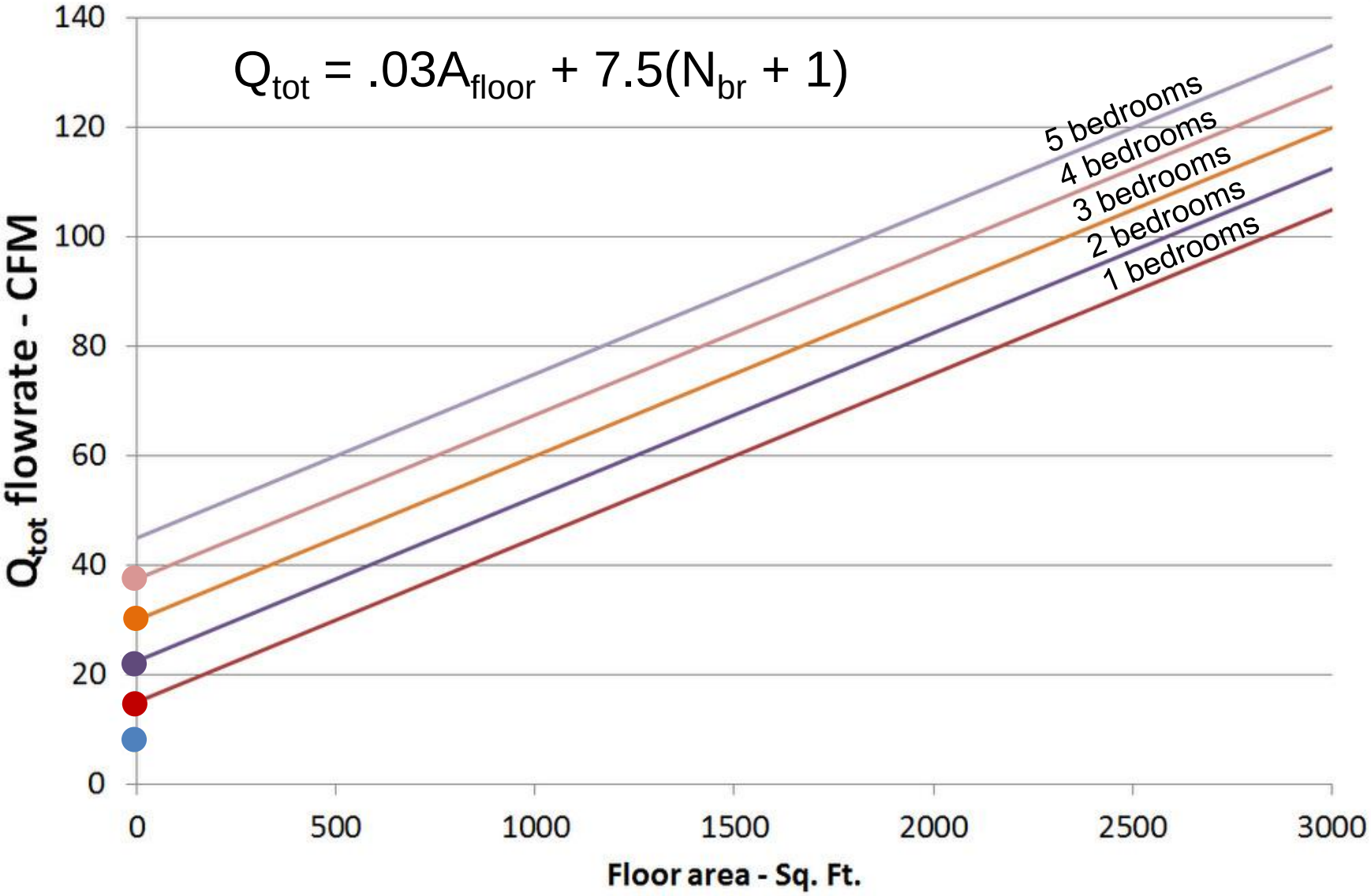
$$CFM = .03 \times A_{floor} \qquad .03 \times 1700 \text{ sq. ft.} = 51 \text{ CFM}$$

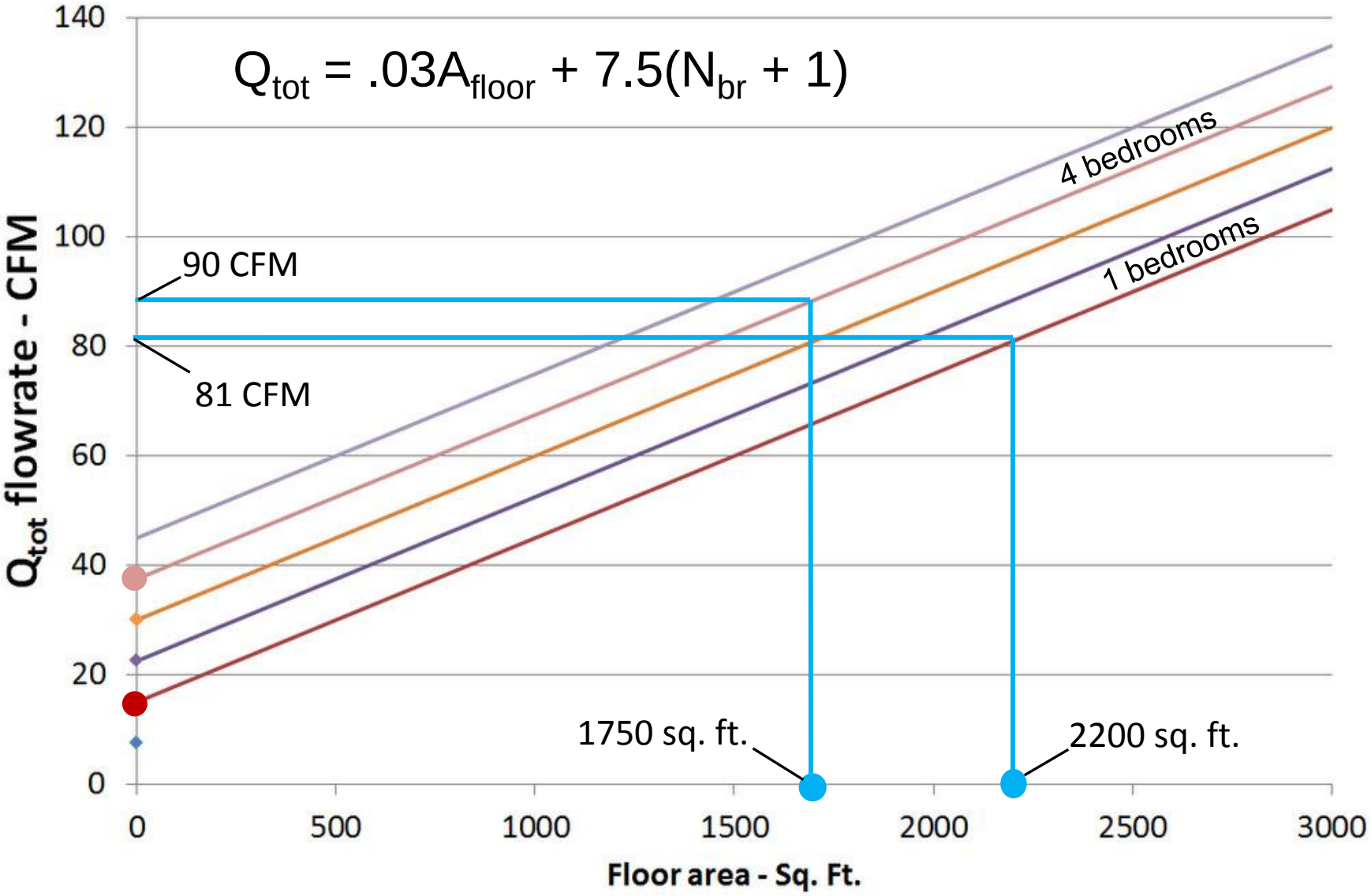

CFM for 0 bedrooms
Q_{tot} (CFM) = .03 x A_{floor}
Q_{tot} flowrate - CFM
140
120
100
80
60
40
20
0
51 CFM
1700 sq. ft.
0
500
1000
1500
2000
2500
3000
Floor area - Sq. Ft.

People air needs
+ House air needs
= total ventilation requirement

$$Q_{tot} = .03A_{floor} + 7.5(N_p)$$


1 Bedroom House
$Q_{tot} = .03A_{floor} + 7.5(N_p)$
66 CFM
1700 sq. ft.
Q_{tot} flowrate - CFM
Floor area - Sq. Ft.
0
20
40
60
80
100
120
140
0
500
1000
1500
2000
2500
3000


$Q_{tot} = .03A_{floor} + 7.5(N_{br} + 1)$
5 bedrooms
4 bedrooms
3 bedrooms
2 bedrooms
1 bedrooms
Q_{tot} flowrate - CFM
140
120
100
80
60
40
20
0
0
500
1000
1500
2000
2500
3000
Floor area - Sq. Ft.


$Q_{tot} = .03A_{floor} + 7.5(N_{br} + 1)$
140
120
100
80
60
40
20
0
Q_{tot} flowrate - CFM
0
500
1000
1500
2000
2500
3000
Floor area - Sq. Ft.
4 bedrooms
1 bedrooms
90 CFM
81 CFM
1750 sq. ft.
2200 sq. ft.

Standard Sizing Table

TABLE 4.1a (I-P) Ventilation Air Requirements, cfm					
Floor Area (ft^2)	Bedrooms				
	1	**2**	**3**	**4**	**5**
<500	30	38	45	53	60
501-1000	45	53	60	68	75
1001-1500	60	68	75	83	90
1501-2000	75	83	90	98	105
2001-2500	90	98	105	113	120
2501-3000	105	113	120	128	135
3001-3500	120	128	135	143	150
3501-4000	135	143	150	158	165
4001-4500	150	158	165	173	180
4501-5000	165	173	180	188	195

VENTILATION CALCULATION

How much air does a kitchen need?

100 CFM

Kitchen existing exhaust ventilation

- Does the kitchen have an exhaust fan?
  - –No, evaluate what it will take to install one.
  - –Yes, measure the airflow.
  - –Does it move 100 CFM or more?
    - Yes, the kitchen is in compliance with 62.2.
    - No, can it be cleaned, repaired or replaced?

- Does the kitchen have an operable window?
  - –Yes, then the kitchen fan only needs to move 80 CFM.
  - –No, then the kitchen exhaust must be 100 CFM minimum.

How much air does a bathroom need?

50 CFM

A full bathroom with a shower or tub needs 50 CFM of ventilation.

A simple half-bath does not need a fan according to ASHRAE 62.2.

Bathroom existing exhaust ventilation

- Does the bathroom have an exhaust fan?
  - –No, evaluate what it will take to install one.
  - –Yes, measure the airflow.
  - –Does it move 50 CFM or more?
    - Yes, the bathroom is in compliance with 62.2.
    - No, can it be cleaned, repaired or replaced?

- Does the bathroom have an operable window?
  - –Yes, then the bath fan only needs to move 30 CFM.
  - –No, then the bathroom exhaust fan must move 50 CFM minimum.

INFILTRATION CALCULATION

"Infiltration" is uncontrolled ventilation.

Fans provide controlled ventilation.

Total ventilation is a combination of infiltration and fan ventilation.

$$Q_{tot} = Q_{inf} + Q_{fan}$$

Total ventilation is a combination of infiltration and mechanical fan ventilation.

$$Q_{tot} = Q_{inf} + Q_{fan}$$

To determine the minimum CFM the fan needs to provide, subtract infiltration from the total ventilation.

$$Q_{fan} = Q_{tot} - Q_{inf}$$

To calculate

Effective Annual Average Infiltration Rate (Q_{inf}),

Three variables must be determined.

wsf	weather and shielding factor
s	number of stories factor
CFM_{50}	air leakage of the house

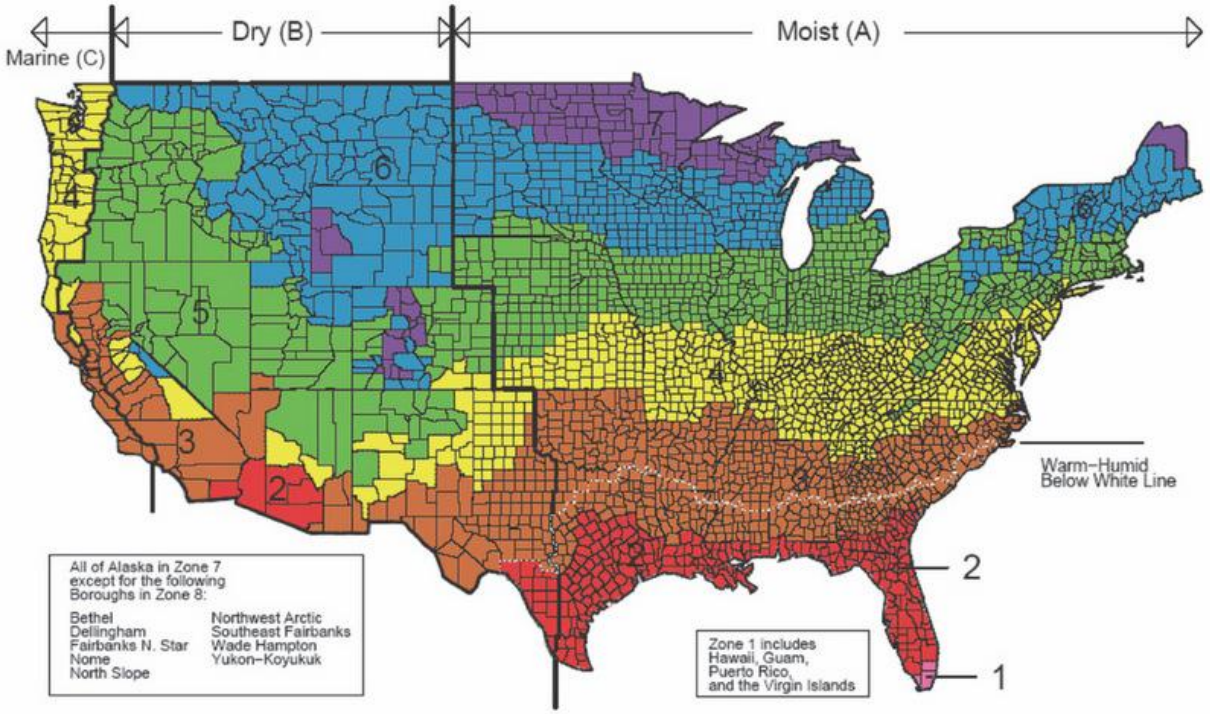
$$Q_{inf} = .052 \times CFM_{50} \times s \times wsf$$

Weather and Shielding Factor (wsf)

wsf is calculated from HDD/CDD, wind, and shielding.

The **wsf** for your nearest weather station is found in Appendix B of the ASHRAE standard.

U.S. Climate Zones



Source: ASHRAE Transactions ©2003 ASHRAE

Number of Stories

- How many stories above ground is the house?

s Factor	
Number of Stories	Story Factor (s)
1	1
2	1.13
3	1.23
4	1.39

Post Air Sealing Blower Door

Expected Final CFM_{50} at test-out.

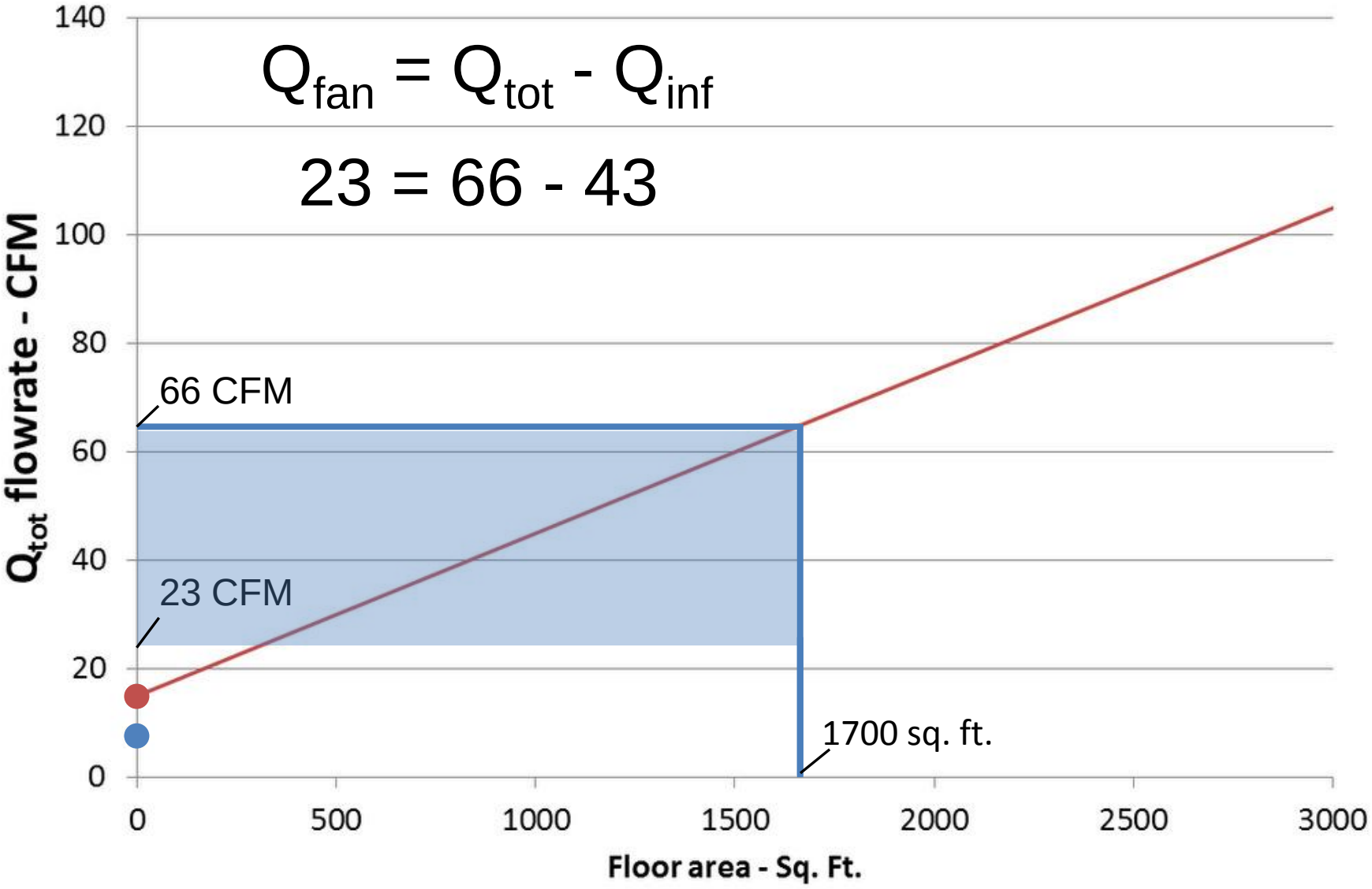
Effective Annual Average Infiltration Rate (Q_{inf})

$$Q_{inf} = .052 \times CFM_{50} \times s \times wsf$$

$$43 \text{ CFM} = .052 \times 1500 \times 1 \times .55$$

$$Q_{fan} = Q_{tot} - Q_{inf}$$

$$23 = 66 - 43$$



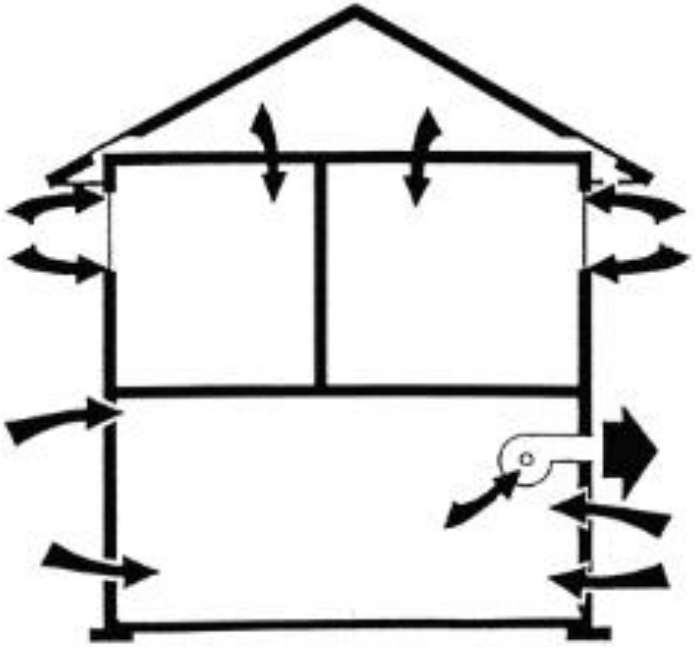
Alternative Compliance Path

- Method of meeting local exhaust requirements in kitchens and bathrooms that do not have existing local ventilation.

- Local ventilation deficits will be added together, and rolled into whole house ventilation requirements.

Continuous exhaust fan run time.

If you must have an intermittent fan, then the fan output increases to make up for the short run time.



EQUIPMENT REQUIREMENTS

Ventilation Equipment Requirements

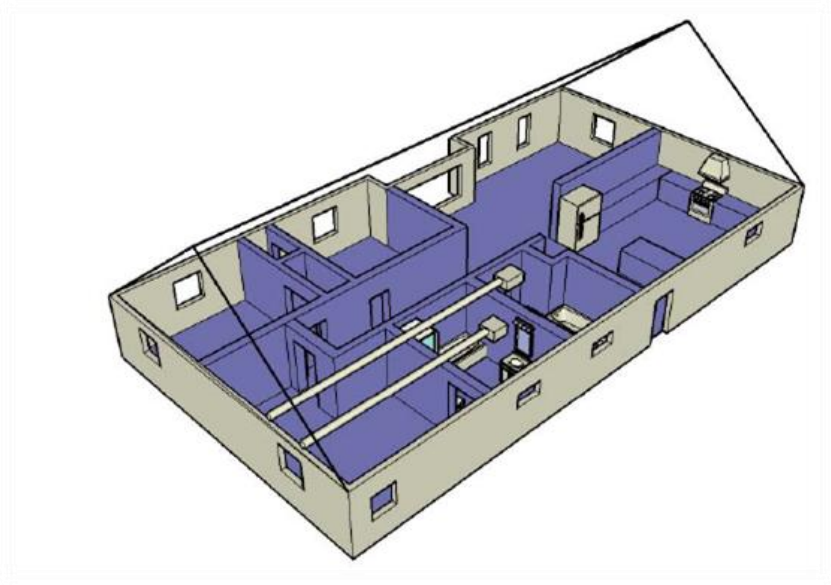
- Whole house ventilation fan should be rated at 1.0 sone or less.
- Intermittent local exhaust fans should be 3.0 sone or less unless they are greater than 400 cfm.
  - Exceptions: HVAC and remote-mounted fans do not need to meet the sound requirements as long as they are outside the habitable space and a minimum of 4 feet of duct from the fan and intake grille.

ASHRAE Standard 62.2-2010 7.1 – 7.2.2

IMPLEMENTATION

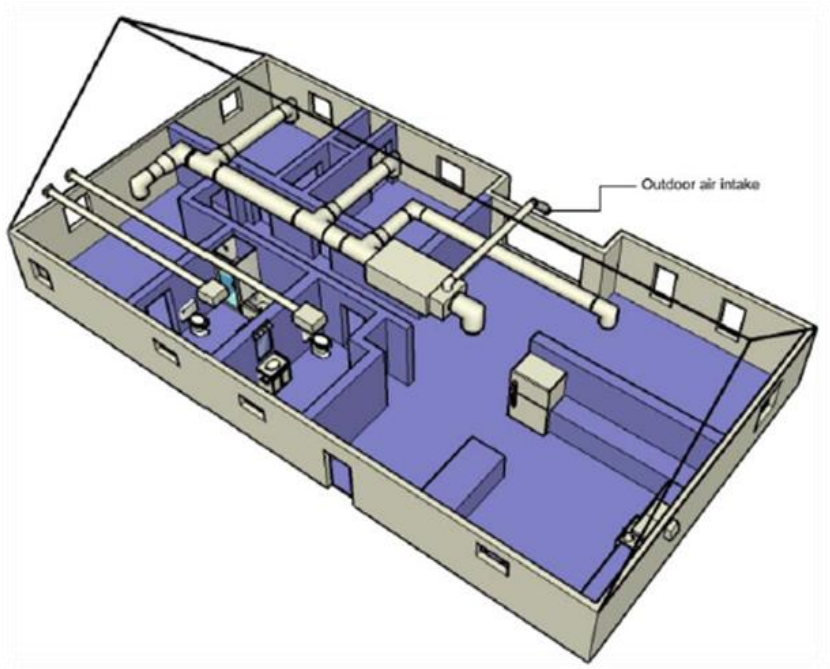
Exhaust Only Ventilation

This will further exacerbate the negative pressure in the house. Best suited for a house where there are no Natural Draft Appliances.



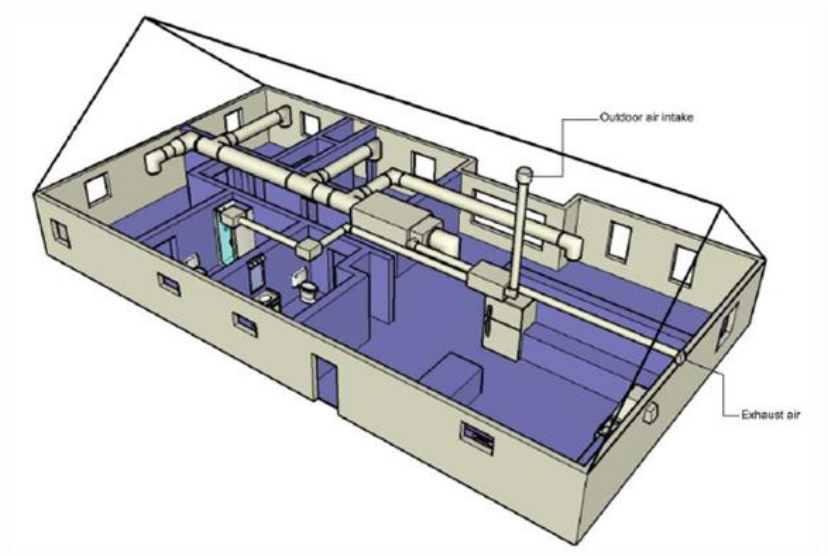
Supply Only Ventilation

This may be a good option for a negative house. It controls where the air is coming from and where it is distributed to.



Exhaust & Supply Ventilation

A balanced system will give the best results for distributed fresh air through the building.



SPREADSHEET CALCULATIONS

EXAMPLE 1

Homes & Community Renewal
Partnering to Improve and Preserve Our Homes and Communities
Andrew M. Cuomo, Governor

ASHRAE 62.2-2013 Ventilation Calculation

Instructions: Enter building data into the green cells below. The yellow cells are calculation results.

WAP Agency					
Auditor					
Date		Bldg#		Job#	
Client Name					
Building Address					
City		,	ZIP		
House type					

BUILDING DESCRIPTION

Nearest weather station	Syracuse Hancock Int'l Airport	
Number of units	1	
Square feet of occupied area (total building)	1850	sq. ft.
Ceiling height (ft)	8	ft.
Number of stories	1	
Number of bedrooms (total building)	3	
Number of occupants (total building)	3	

LOCAL VENTILATION CALCULATION

						Deficit
Kitchen Fan exists?	Y	40	CFM	Operable window?	N	-60 CFM
Bath #1 Fan exists?	Y	45	CFM	Operable window?	N	-5 CFM
Bath #2 exists?	N					
Clothes dryer exhaust		0	CFM	Local Ventilation Deficit:		-65 CFM
Other exhaust sources		0	CFM			

LOCAL VENTILATION CALCULATION

					Deficit
Kitchen Fan exists?	Y	40	CFM	Operable window? N	-60 CFM
Bath #1 Fan exists?	Y	45	CFM	Operable window? N	-5 CFM
Bath #2 exists?	N				
Clothes dryer exhaust		0	CFM	Local Ventilation Deficit:	-65 CFM
Other exhaust sources		0	CFM		

WHOLE HOUSE VENTILATION CALCULATION

Blower Door Final Testout CFM50:		2000 CFM50
1/4 of Local Ventilation Deficit:		-16 CFM
Q_{TOT} Whole House Ventilation:		102 CFM
Apply infiltration credit?	No	0 CFM
Whole House Ventilation needed per 62.2-2013:		102 CFM

Predicted House Depressurization

-0.4 Pa.

Exhaust fan timer an option

BPI CAZ limit	
○	-2 Pa.
◉	-3 Pa.
○	-5 Pa.
○	-15 Pa.
○	-50 Pa.