

DECRYPTING THE DATA

HONING YOUR SNIFF TEST

Today's Task



- Take a look at some data and get a better idea of what entry makes sense and what doesn't on a Step Code form.

How did we get this Data?

- A tool built for Energy Advisors by Energy Advisors
 - Gives more complete faster results
 - Checks errors
 - Automates repetitive task
- HEET now contains 7000+ real world homes that can be data mined
 - Most came from CHBA BC's database
 - The rest from EA's working around the province or city projects

HEET.ca

Home Energy Exploration Tool

Increasing capacity and efficiency for EAs while reducing errors and admin work.

Get started →

Learn more 



HEET is available for use by all Energy Advisors

Date Range Of Homes

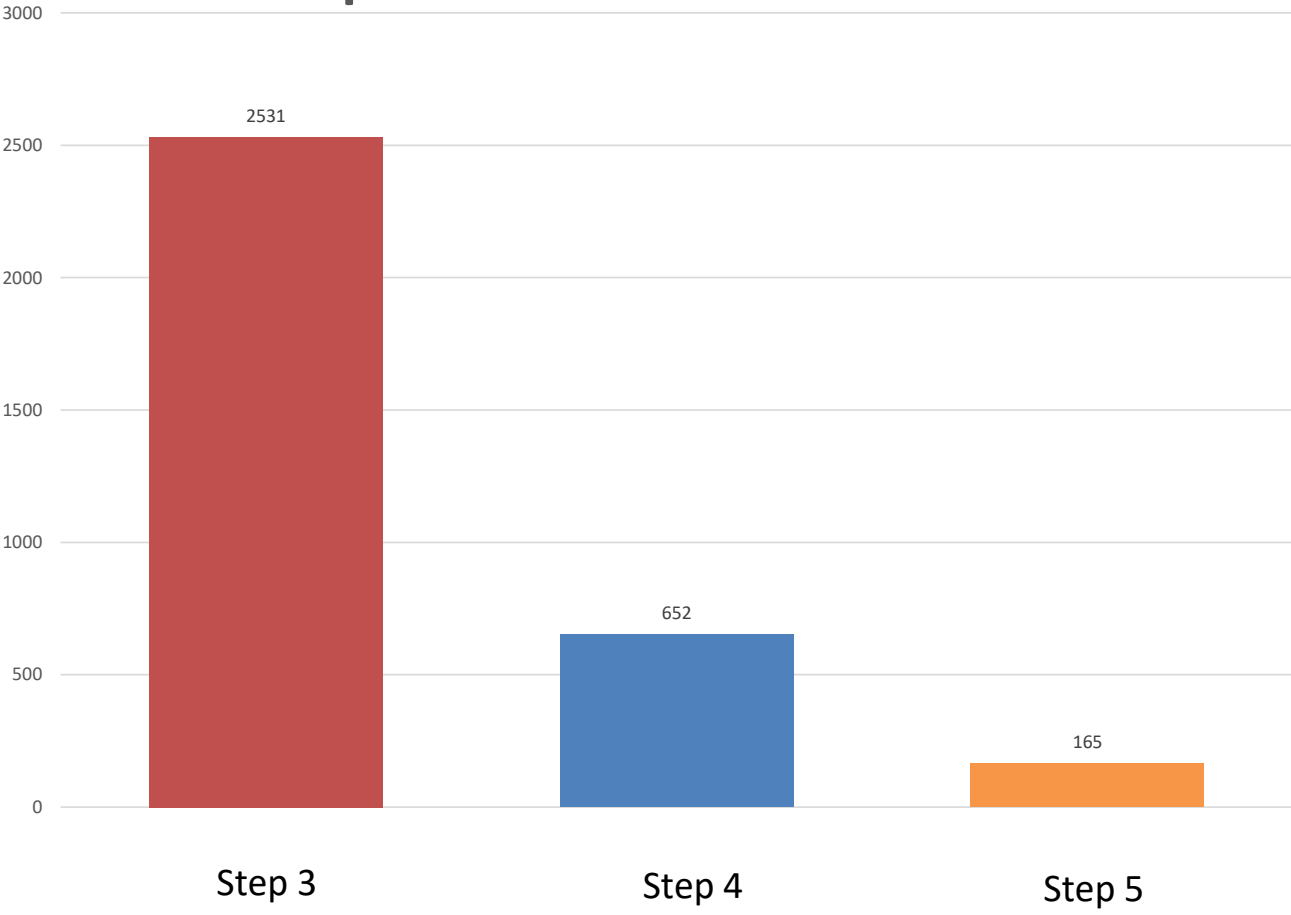
From Jan 2021 to Fall 2023



Energy Step Code and Envelope



Steps Reached



Unless otherwise noted
Step 1 and 2 have been
filtered out.

They are no longer an
option

Approx. 2930 Homes

Many of these homes
would have been built
before the Step 3
requirement

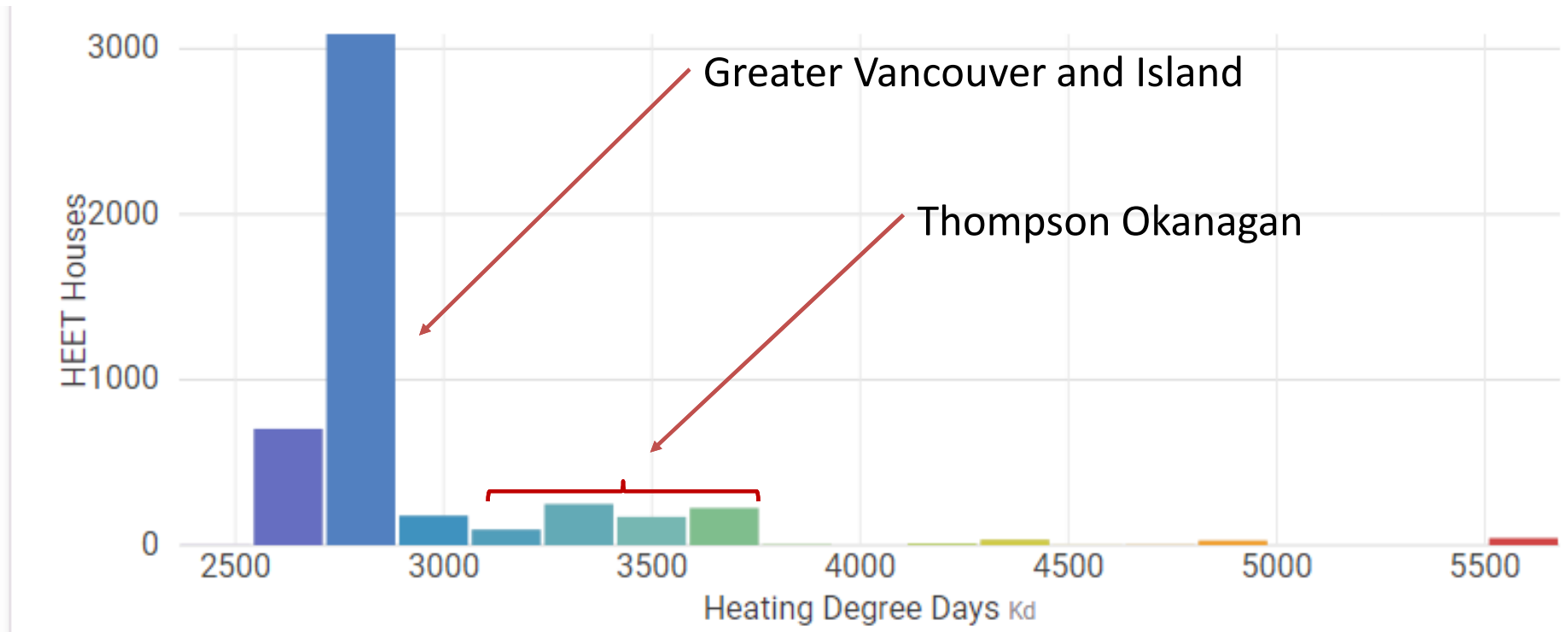
Step 1 and 2



Slide 6

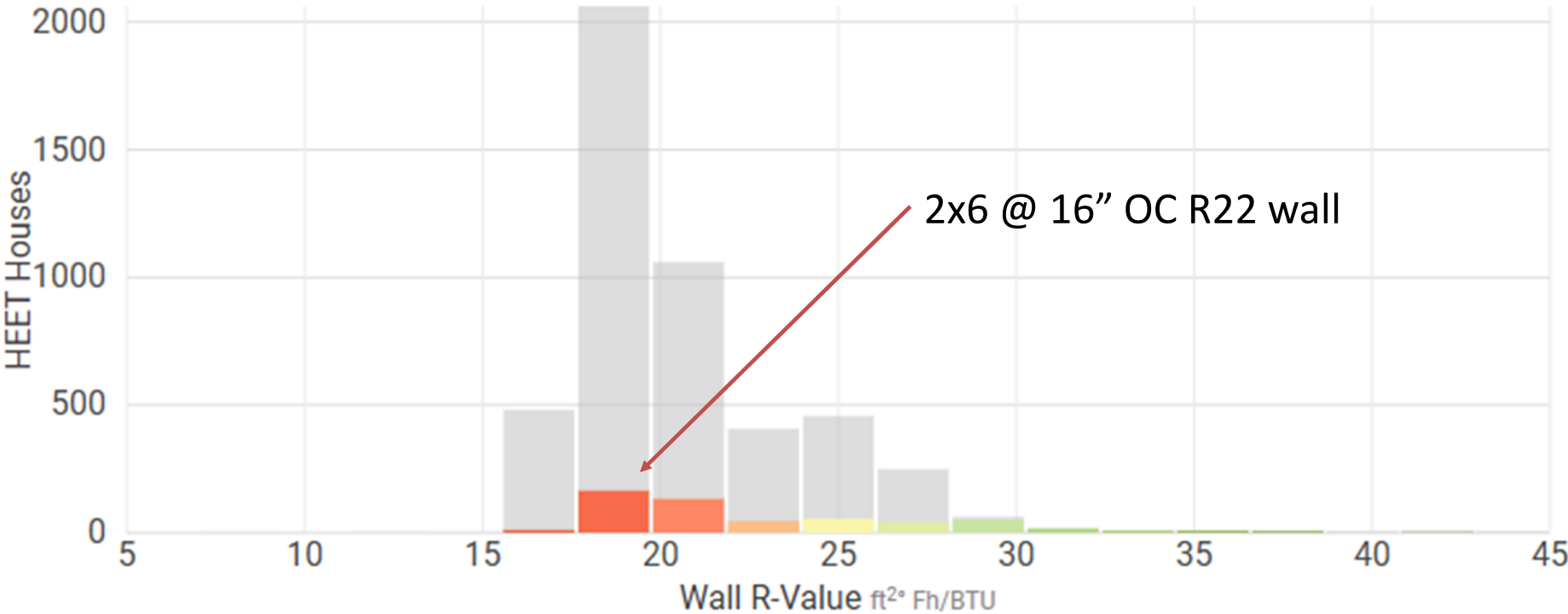
GUO Total number does not add to 448 (total from last slide)
Guest User, 2024-04-17T20:24:46.971

Locations Reached



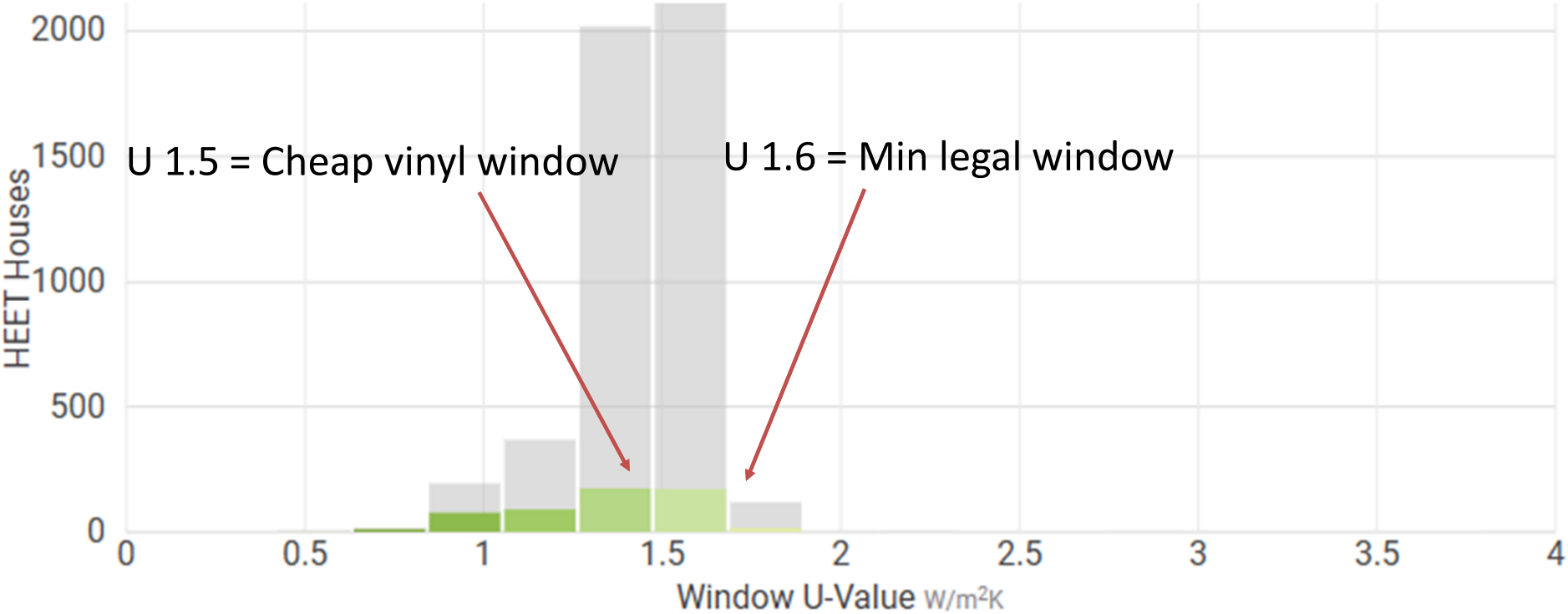
Wall R Values

Provincial Data set filtered for Step 4 and 5



Window U Value

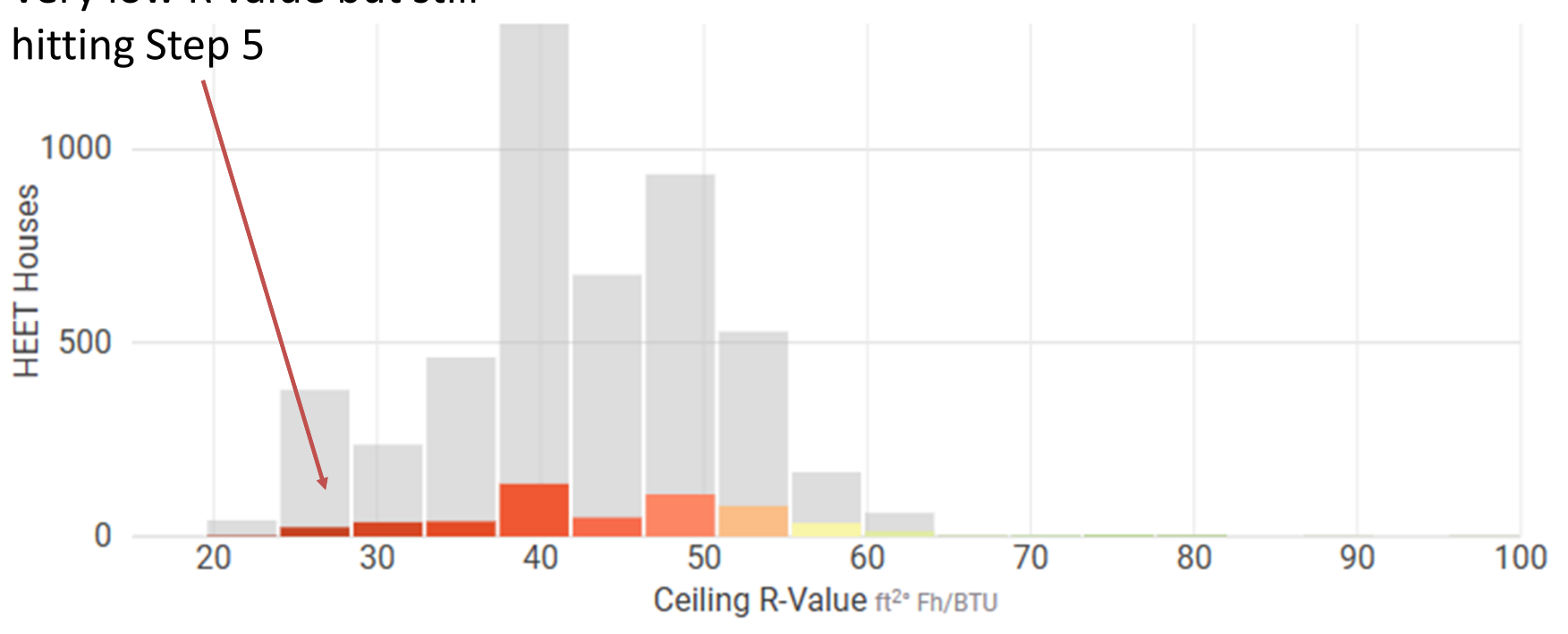
Provincial Data set filtered for Step 4 and 5



Ceiling R Value

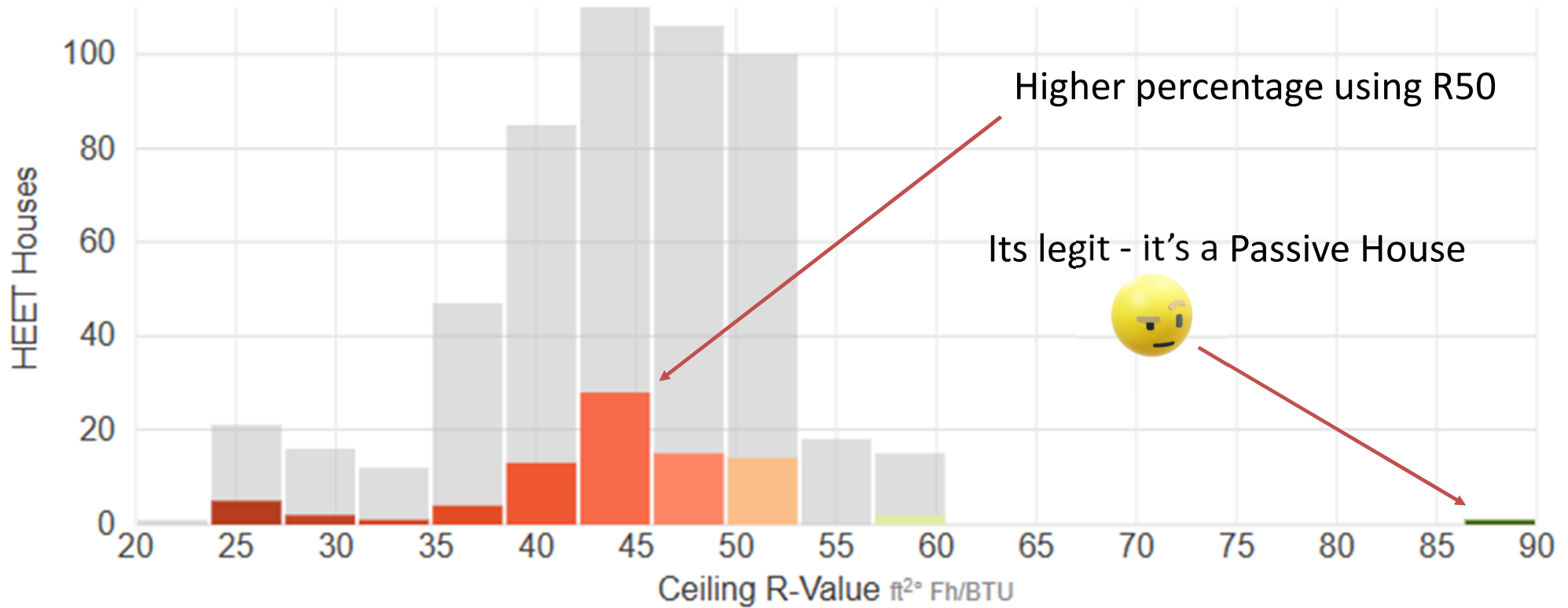
Provincial Data set filtered for Step 4 and 5

Likely vaulted ceilings
Very low R value but still
hitting Step 5



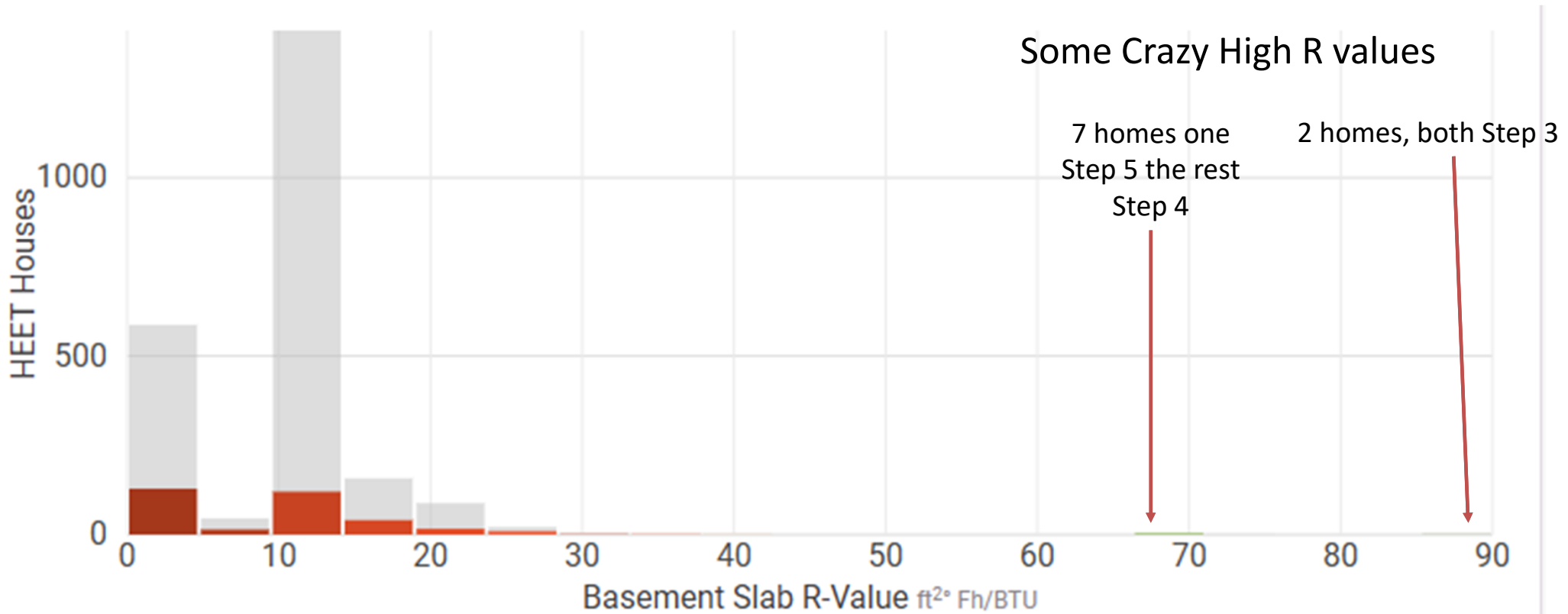
Kelowna Only Ceiling R Value

Filtered for Step 4 and 5



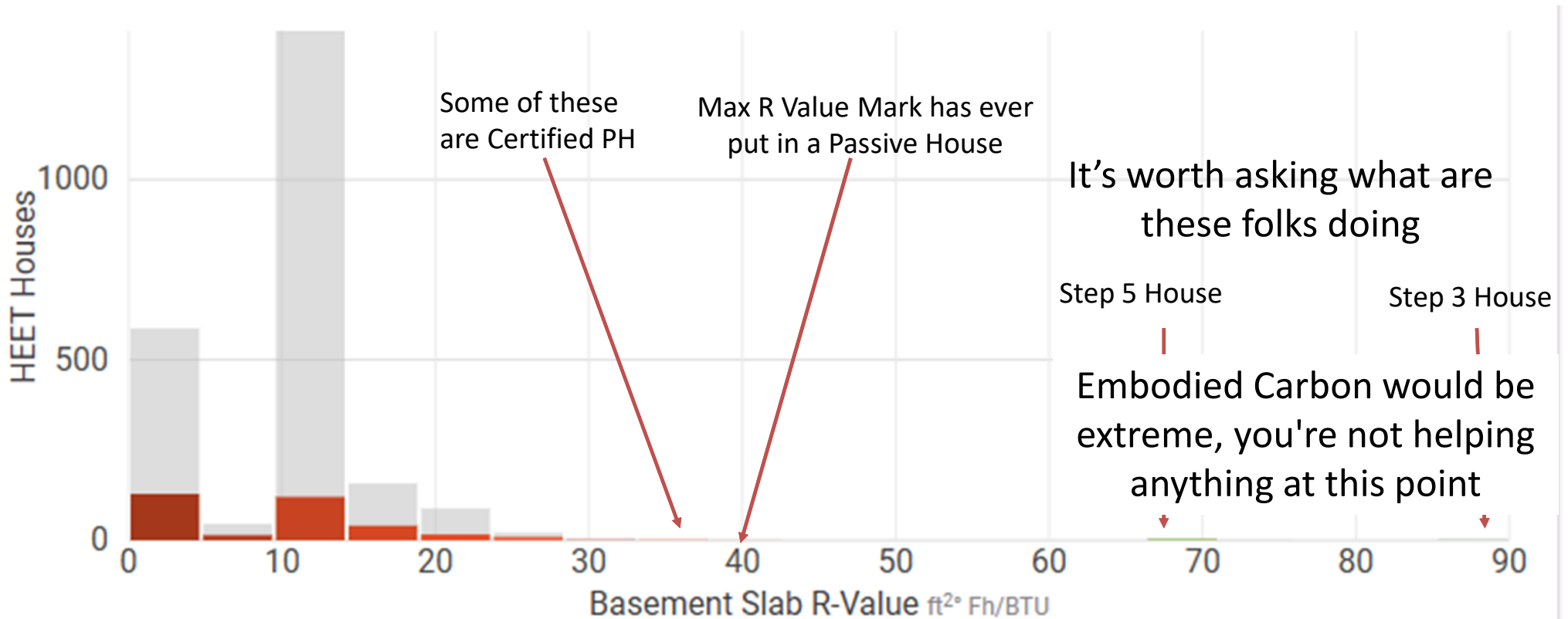
Slab R Value

Provincial Data set filtered for Step 4 and 5



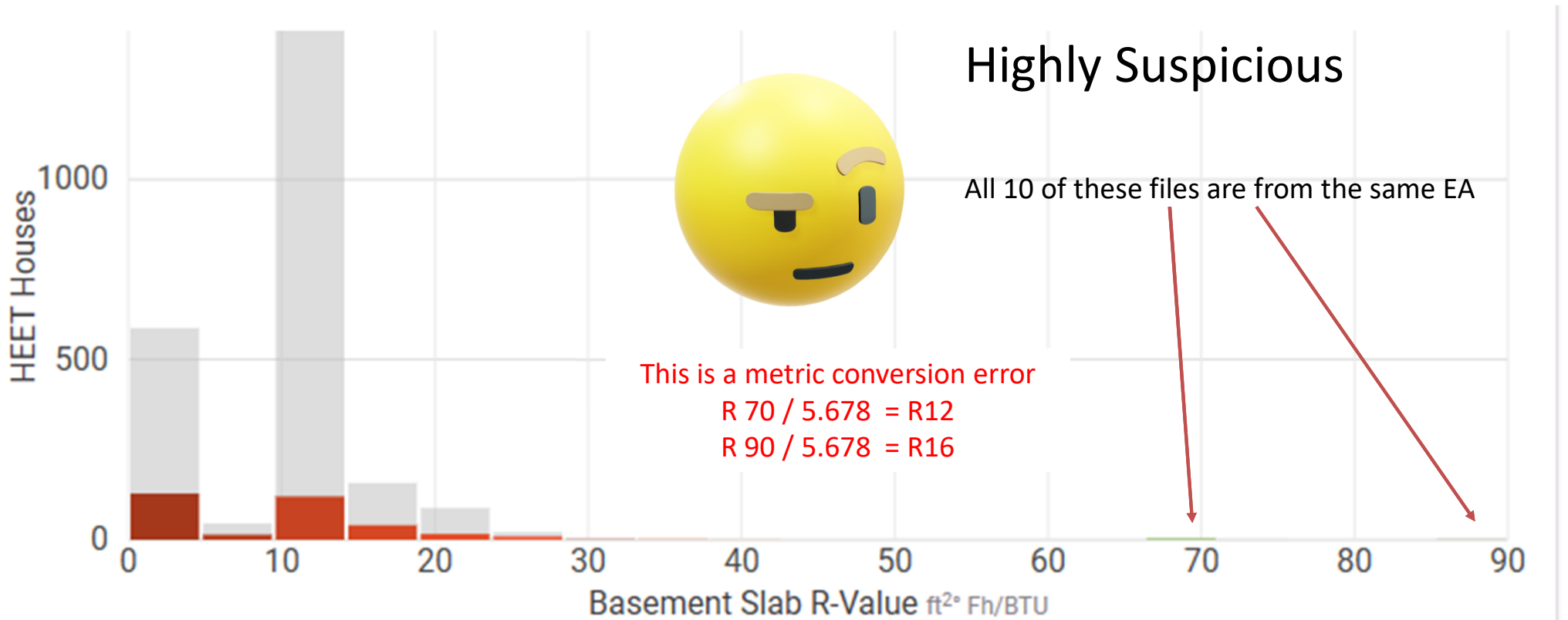
Slab R Value

Provincial Data set filtered for Step 4 and 5



Slab R Value

Provincial Data set filtered for Step 4 and 5



Passing the sniff test

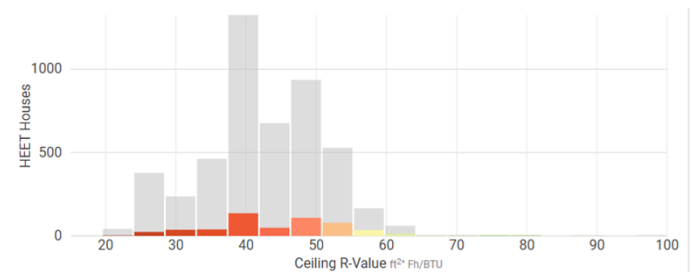
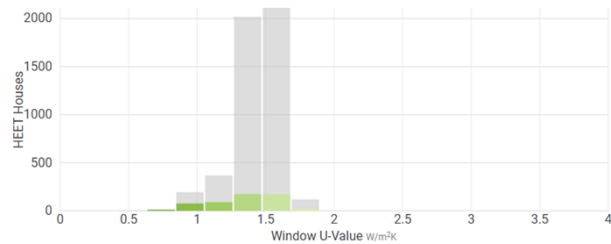
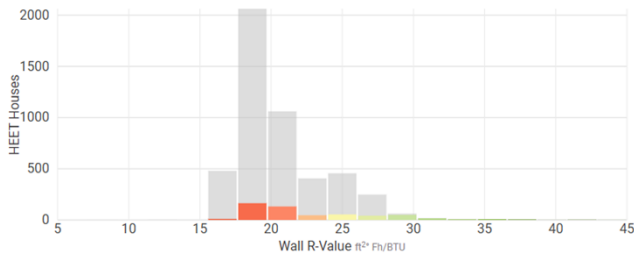
Does this application make sense?

Can a home pass Step 4 or 5 with standard practice R values?

- Yes

Questions should be asked if R values are much higher or lower than normal

- Higher R values may not be wrong, they might just be part of some other goal (e.g. Passive House)
- Low R Values may also be correct but worth a double check



Checking the form

Model Detail Report

Pre Construction Hot2000 Model Details

Address: 12289 244 Road

Total Project Fuel Use (GJ)	
Electricity	61.22
Gas	109.3
Propane	0
Disrict Energy	0
Other	0

Notes:

Model 1

Building Envelope			
Above Ground Opaque Assemblies			
Assembly	Description	Effective RSI (m2*K)/W	Area (m2)
Overall Walls	-	3.50	224.22
Garage	2x6 @ 16 o.c. R24 Garage	3.41	26.99
Main	2x6 @ 16"o.c. R24 Siding	3.52	97.23
SOG (Pony Wall)			
Overall Headers	-	4.05	30.37
Main Floor	R24 Spray Foam	4.05	30.37
Overall Floors	-	0.00	0.00
Overall Ceilings		10.56	210.54
Flat		10.53	132.73
Vault		10.61	77.81

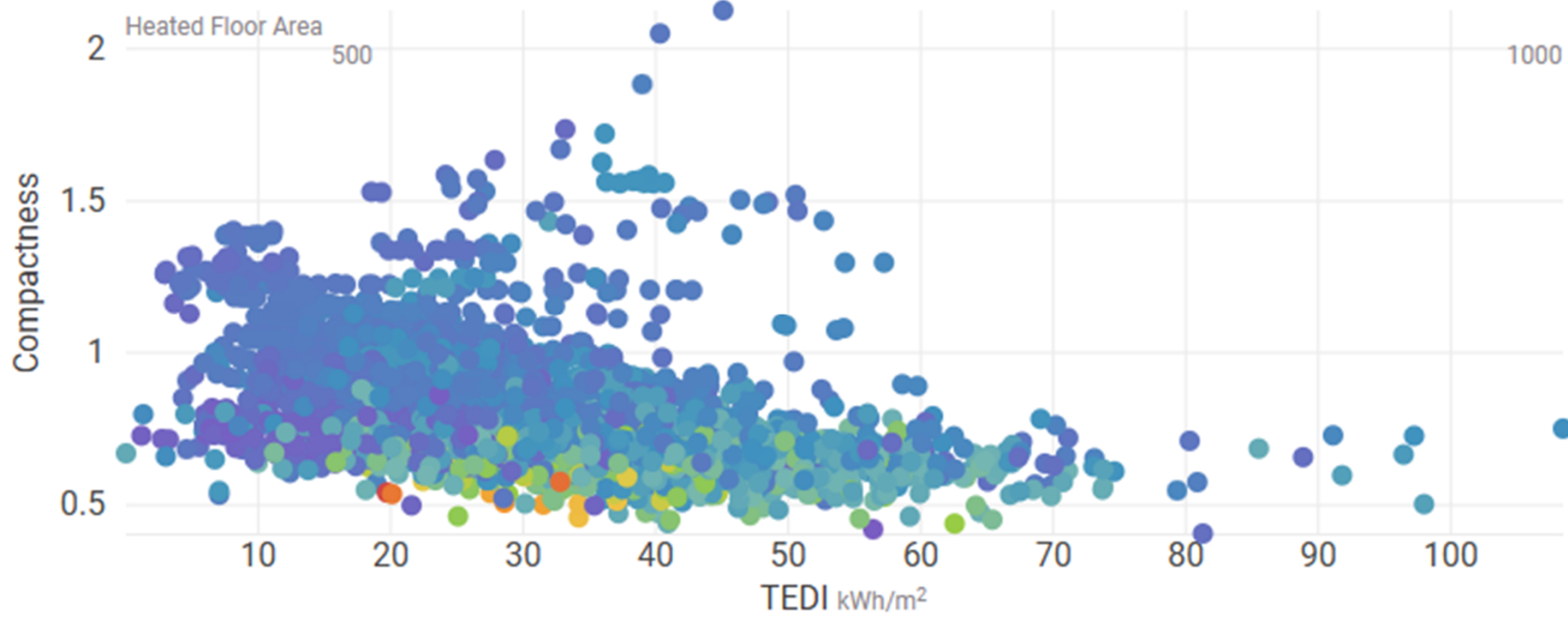
Below Grade Opaque Assemblies

Best place to check this:
Model Detail report

Section D has it, but is
data entry by EA so room
for typo

Compactness

Red = Large Home
Blue = Small Home



What is Compactness?

$$\text{compactness} = \pi^{1/3} * (6 * \text{volume})^{2/3} / \text{surface area}$$



=



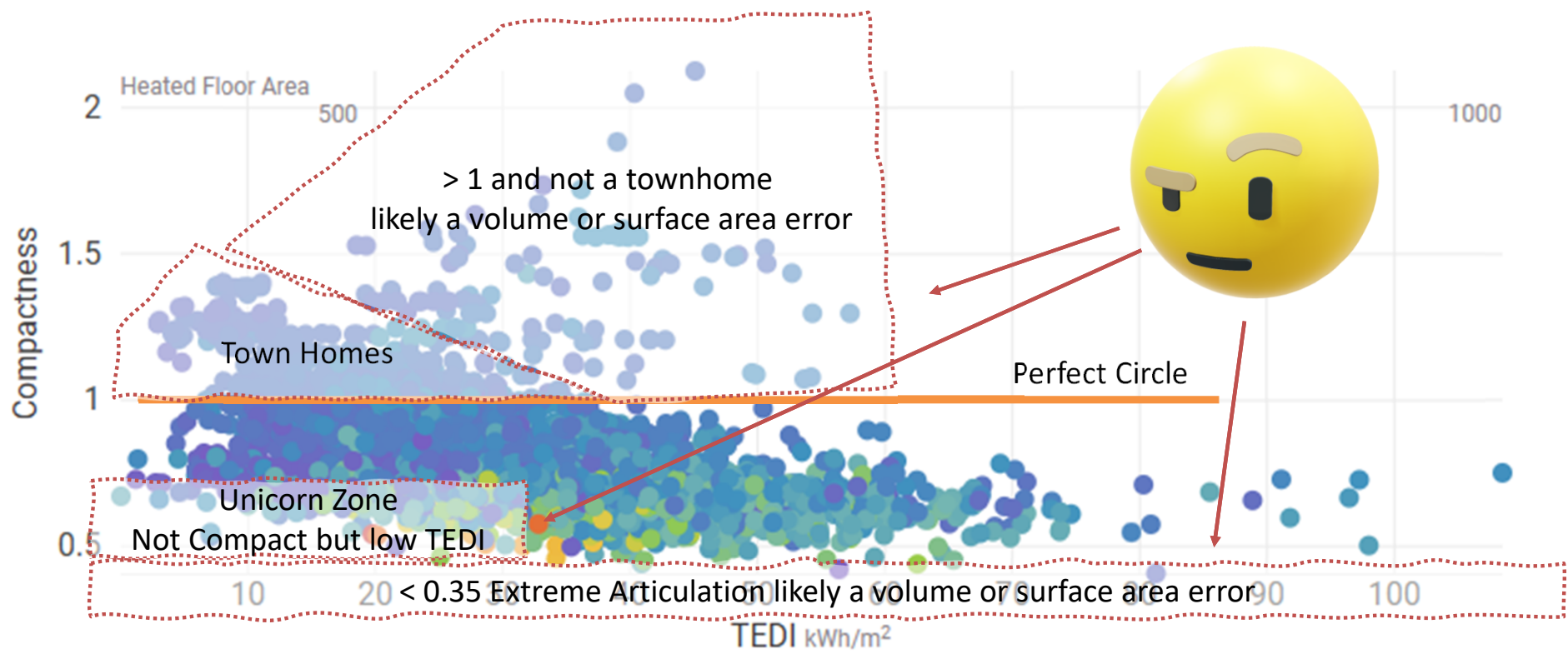
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More Surface Area = More heat can leak out = Less efficient home

Compactness

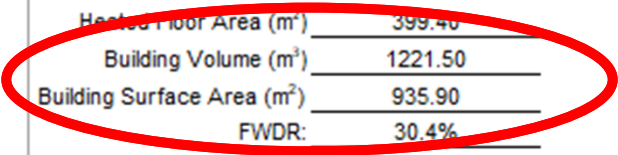
Red = Large Home
Blue = Small Home



Compactness

The data you need to check this is on the form

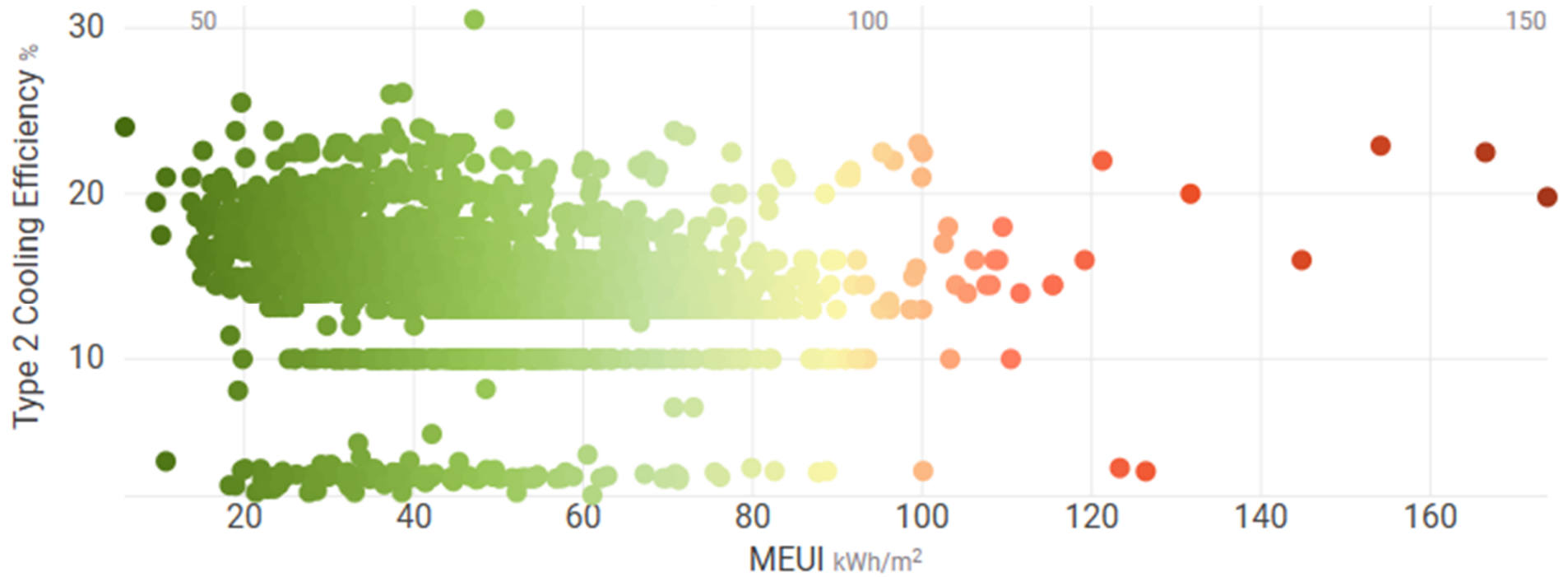
F: 9.36.6. ENERGY STEP CODE COMPLIANCE				
Proposed House Rated Energy Consumption (GJ/year): <u>145</u>		Reference House Rated Energy Target (GJ/year): <u>184</u>		
				Proposed Calculations
Proposed House Metrics	Unit	Proposed Step Requirement	Proposed House Result	Proposed House Pass or Fail
Step Code Level	Step 3, 4 or 5	3		Fail
Mechanical Energy Use Intensity (MEUI)	kWh/(m ² ·year)	100 (max)	101	Pass
% Improvement	%	20 (min)	21	
Thermal Energy Demand (TEDI)	kWh/(m ² ·year)	84 (max)	105	Fail
% Heat Loss Reduction	%	10 (min)	3	
Airtightness in Air Changes per Hour at 50 Pa differential	ACH @ 50 Pa	2.5 (max)	2.50	Pass
Normalized Leakage Area (NLA ₁₀)	10 Pa (cm ² /m ²)	1.2 (max)	1.22	
Normalized Leakage Rate (NLR ₅₀)	L/s/m ²	0.89 (max)	0.91	
Step Code Requirements Met:				No
Software Used: <u>Hot 2000</u>		Version: <u>11.12</u>		
Heated Floor Area (m ²) <u>399.40</u>		Climate Data (Location): <u>FORT ST JOHN</u>		
Building Volume (m ³) <u>1221.50</u>		Degree Days Below 18°C (HDD): <u>5680</u>		
Building Surface Area (m ²) <u>935.90</u>		% Of Space Cooled <u>More than 50%</u>		
FWDR: <u>30.4%</u>				



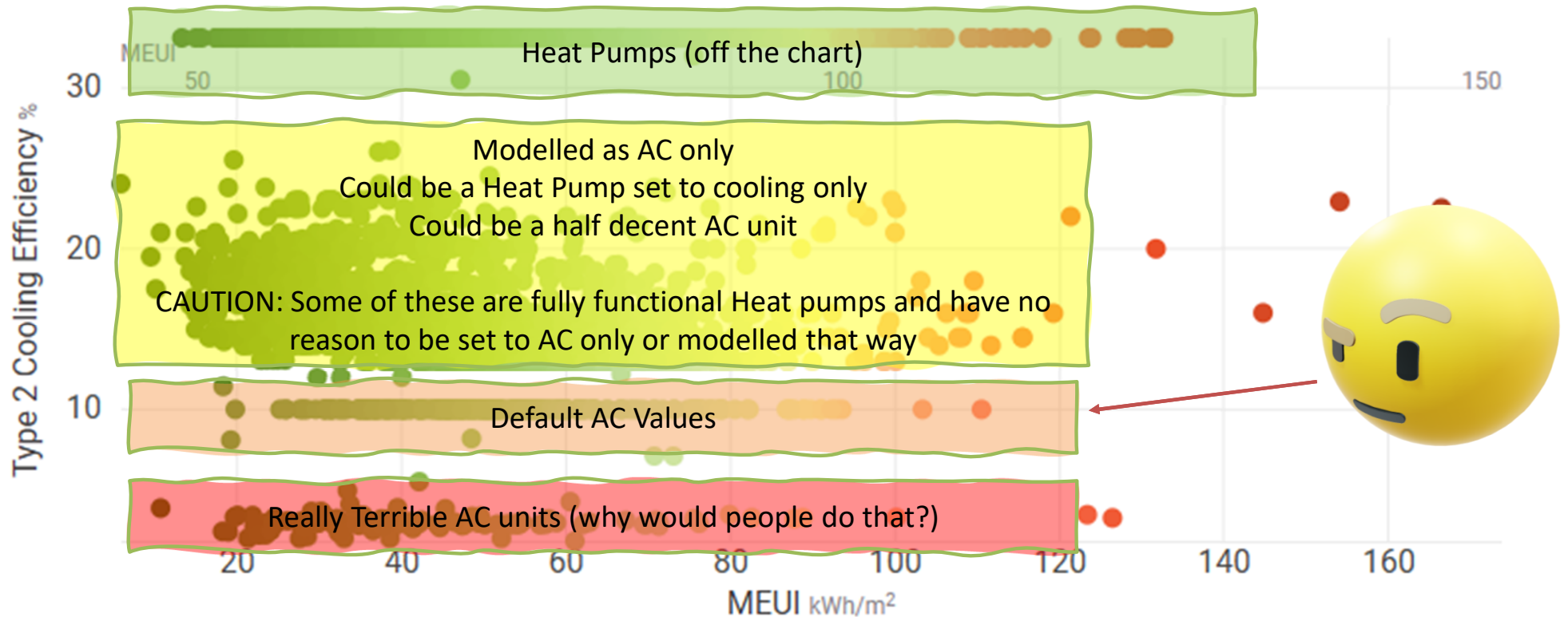
Energy Step Code and Mechanical



Cooling Systems



Cooling Systems



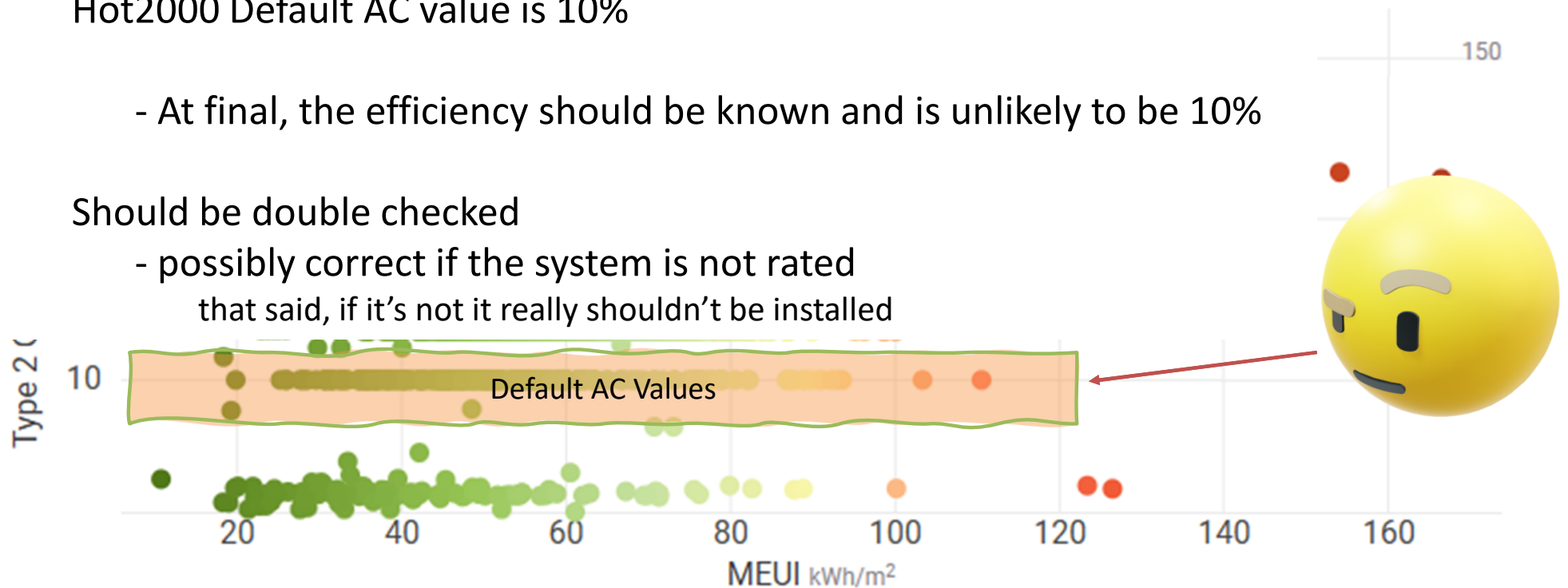
Cooling Systems

Hot2000 Default AC value is 10%

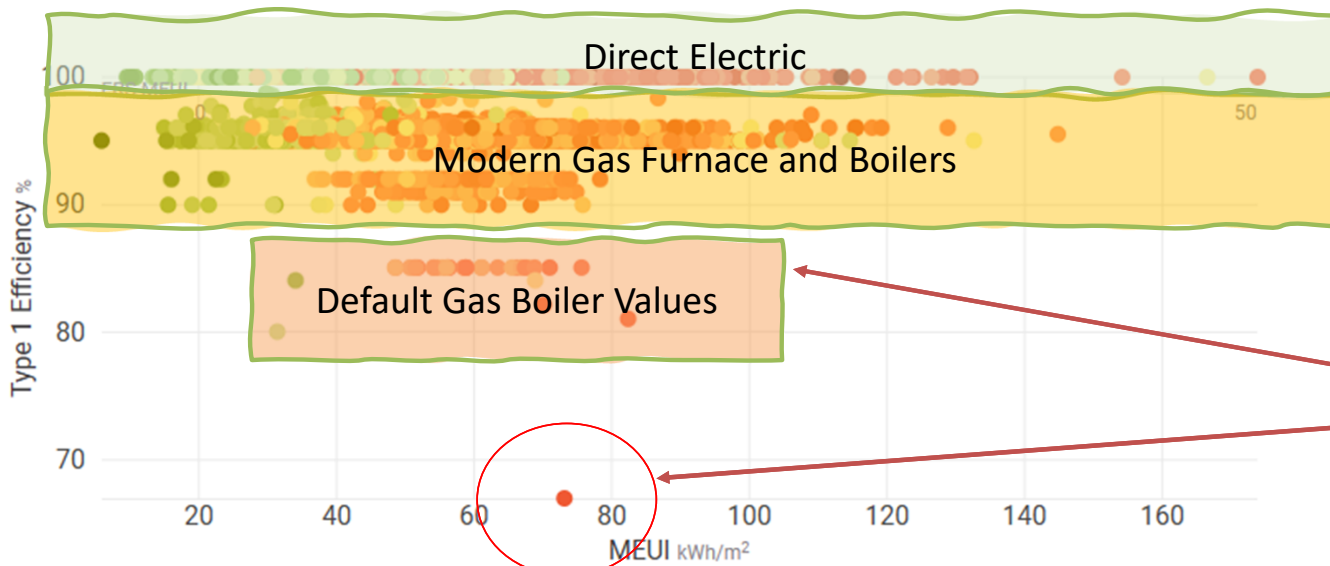
- At final, the efficiency should be known and is unlikely to be 10%

Should be double checked

- possibly correct if the system is not rated
that said, if it's not it really shouldn't be installed

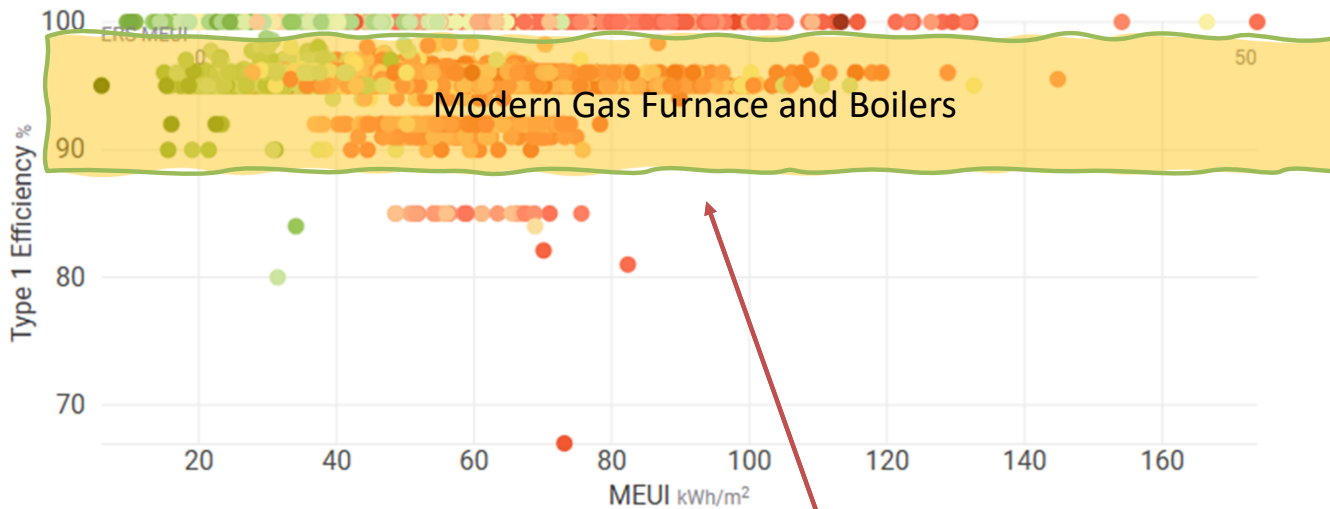


Heating Systems Excluding Heat Pump



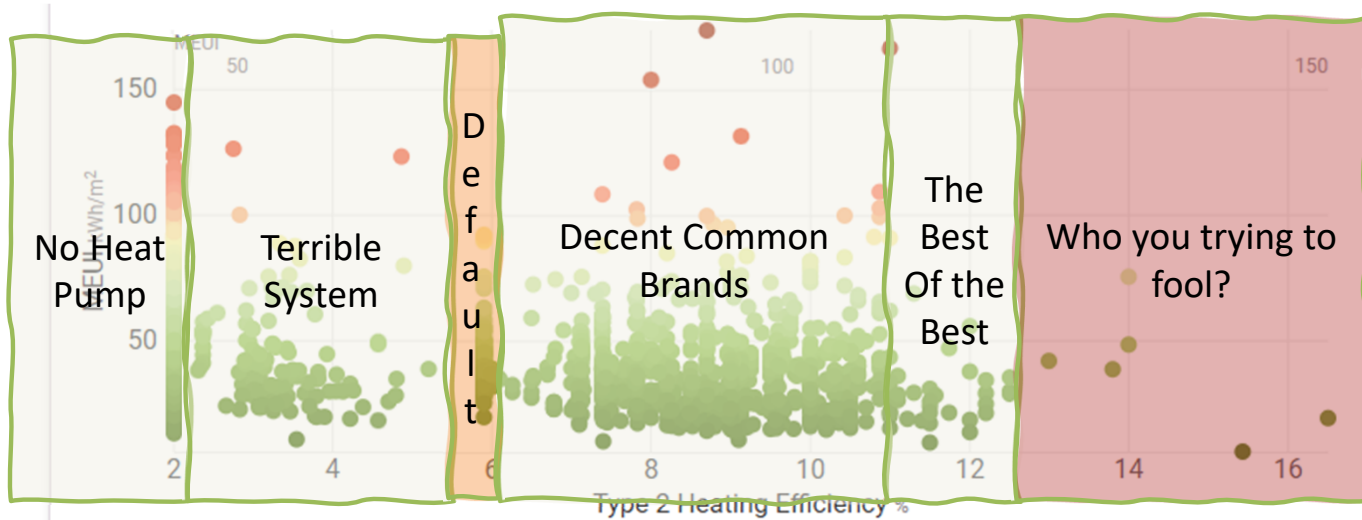
Something is wrong here

Heating Systems Excluding Heat Pump



Likely Some default values here, but good news is it won't make a big difference on the Step reached

Heating Systems Heat Pump



Default = HSPF 5.9 SEER 10 (very low by modern standards)

ERROR: Most Likely EA meant to select HSPF and SEER but selected COP:

A COP of 5.9 for heating and 10 for cooling is extremely high



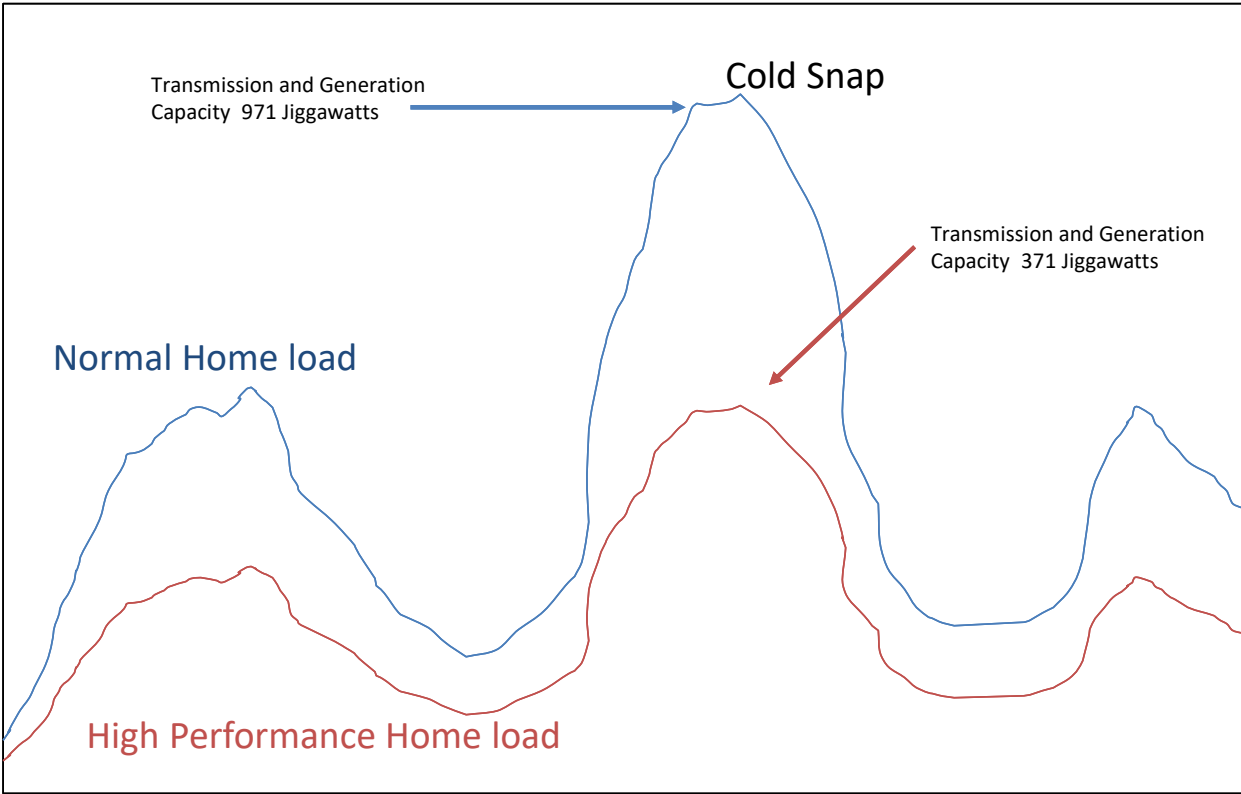


Energy Step Code deals with energy loads
but not emissions



We also need
Greenhouse Gas Limits

Lower peak loads means cost reduction for the grid



Some New Terms



“EL-4 ready”

- Totally unofficial made-up term
- Used to describe a single component of a home
 - EG: Gas furnace is not EL-4 Ready, Heat pump is
 - Doesn't mean the home is EL-4 with just this component

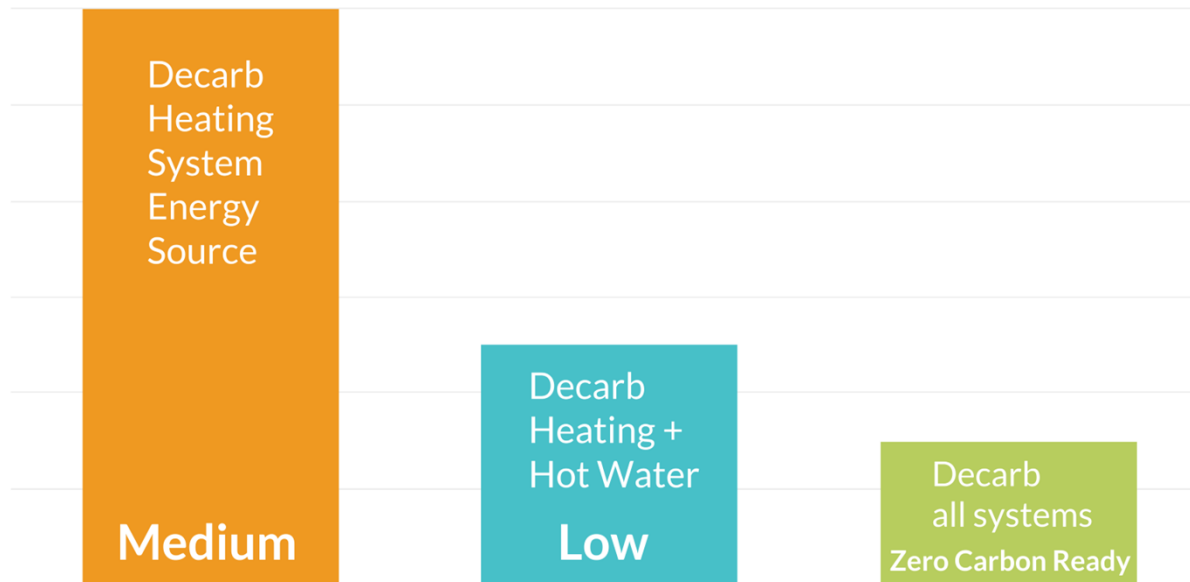
“Zero” Carbon Step Code

- Three categories to choose from
 - Total GHG per year
 - GHG per m² with max cap
 - Prescriptive



Several Different Metrics

All have about the same trend



What is Counted and What is Not

- **Principal Heating System**

- Heat Pump
- Gas Furnace
- Combo system



- **Supplementary Heating Equipment**

- The Gas side of the Hybrid
- Electric Supplement in Heat Pump



Sort Of

- **Hot Water**

- Tank
- Boiler



- **Redundant and Backup Systems**

- Generator
- Gas fireplace
- Wood Fireplace



- **Equipment and Appliances:**

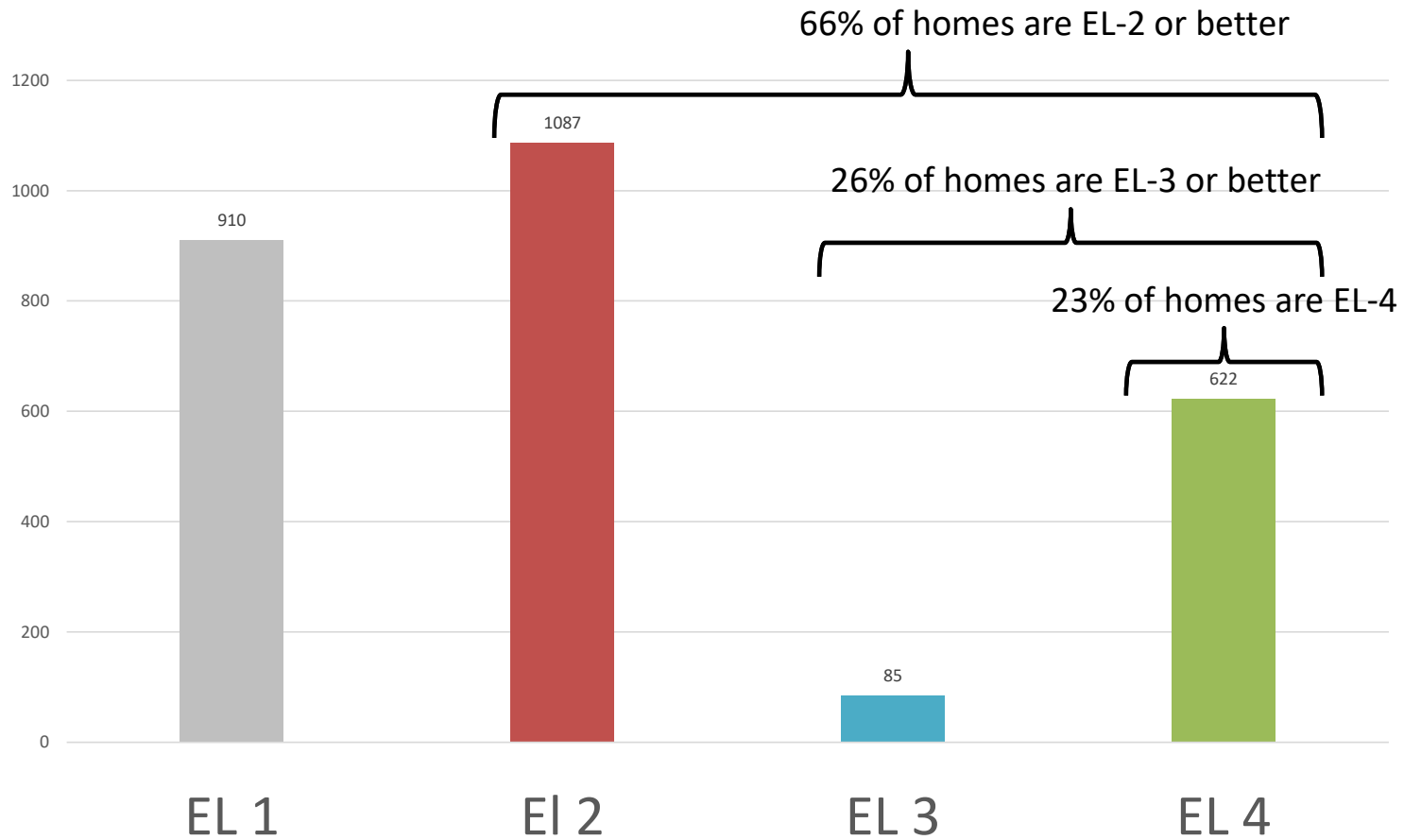
- Cooking
- Laundry



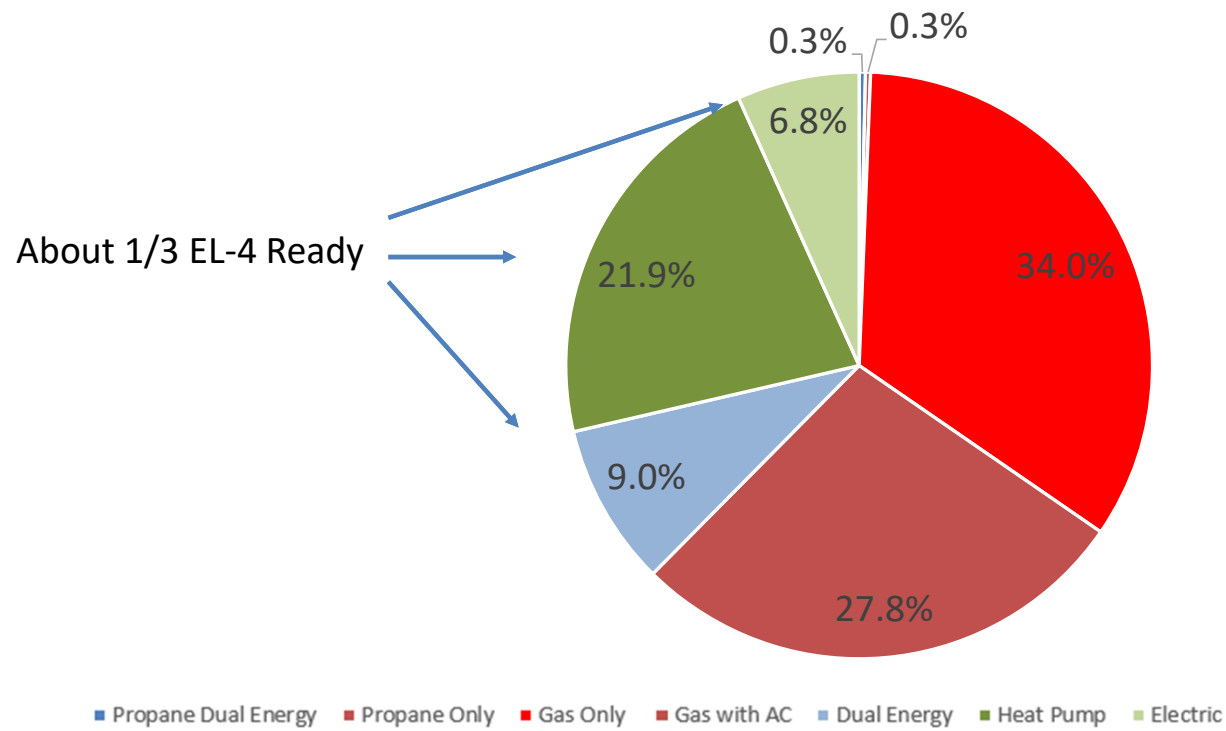
Only Prescriptive



BC EL Levels

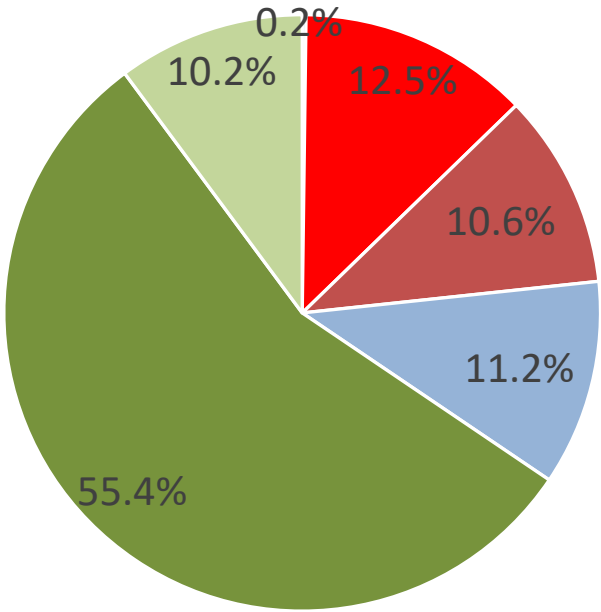


BC Heating Systems / Fuel Types

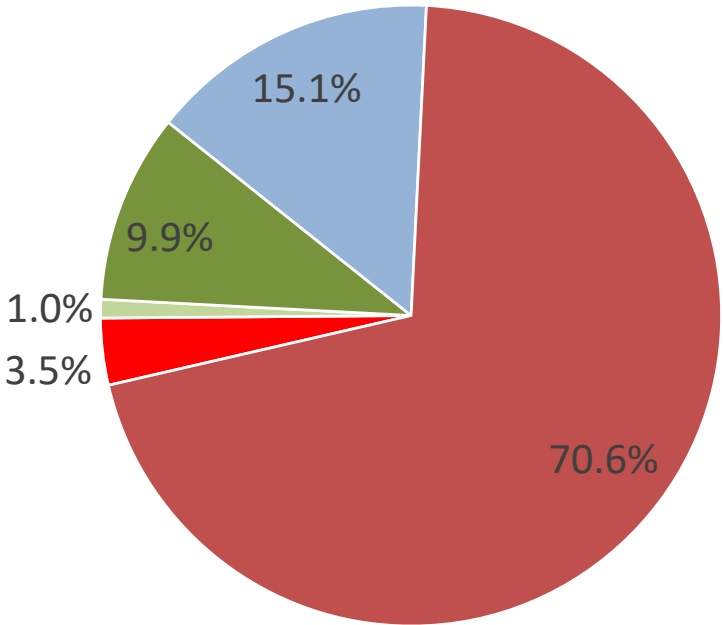


Local Data

Vancouver Island is 3/4 EL-4 Ready



Thompson Okanagan Region is about 1/4 EL-4 ready



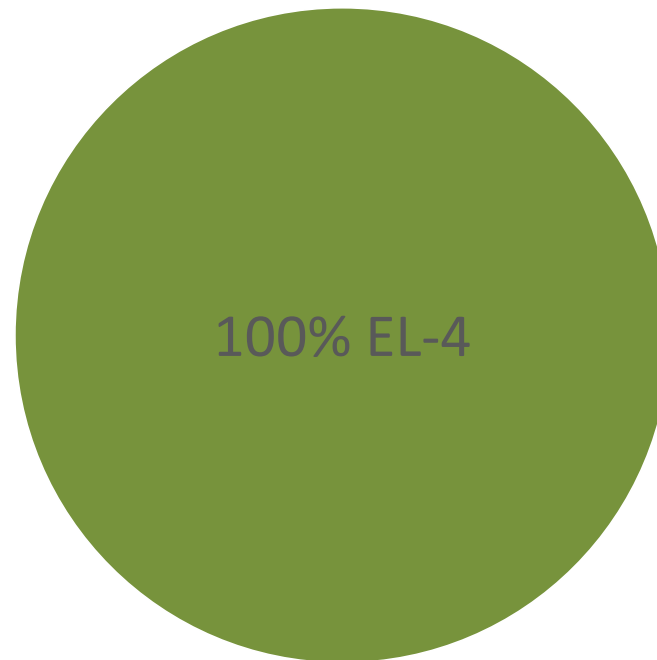
■ Propane Dual Energy ■ Propane Only ■ Gas Only ■ Gas with AC ■ Dual Energy ■ Heat Pump ■ Electric



Local Data

Less about temperature and more about access

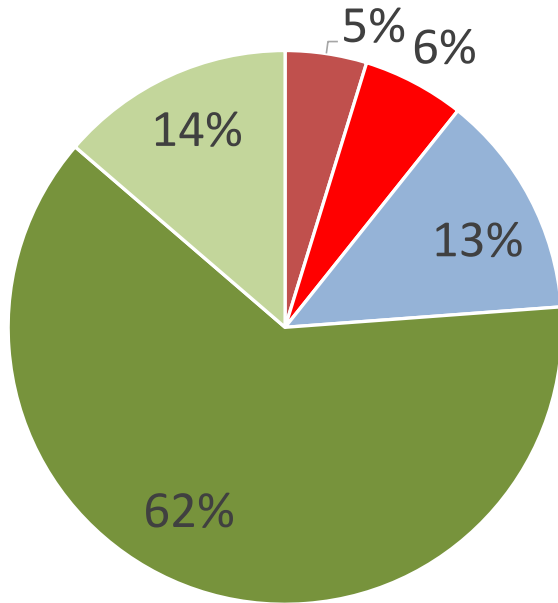
Dees Lake, Invermere, Golden, Port Hardy, Tofino



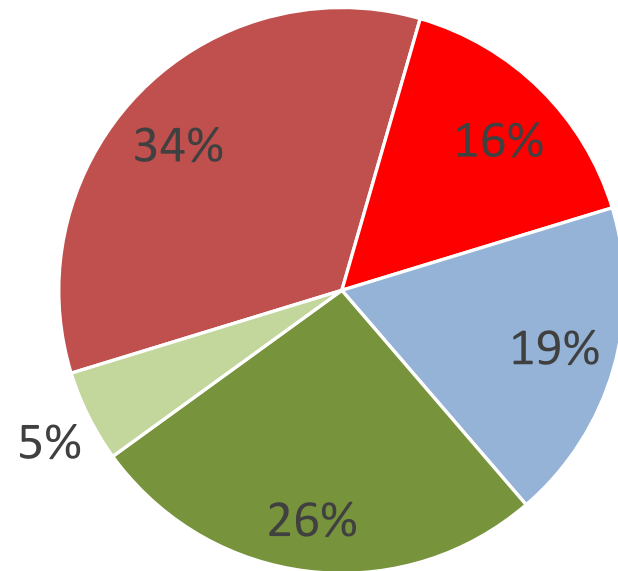
■ Propane Dual Energy ■ Propane Only ■ Gas Only ■ Gas with AC ■ Dual Energy ■ Heat Pump ■ Electric

Local Data From Step 4 and 5

Vancouver Island is 90% EL-4 Ready

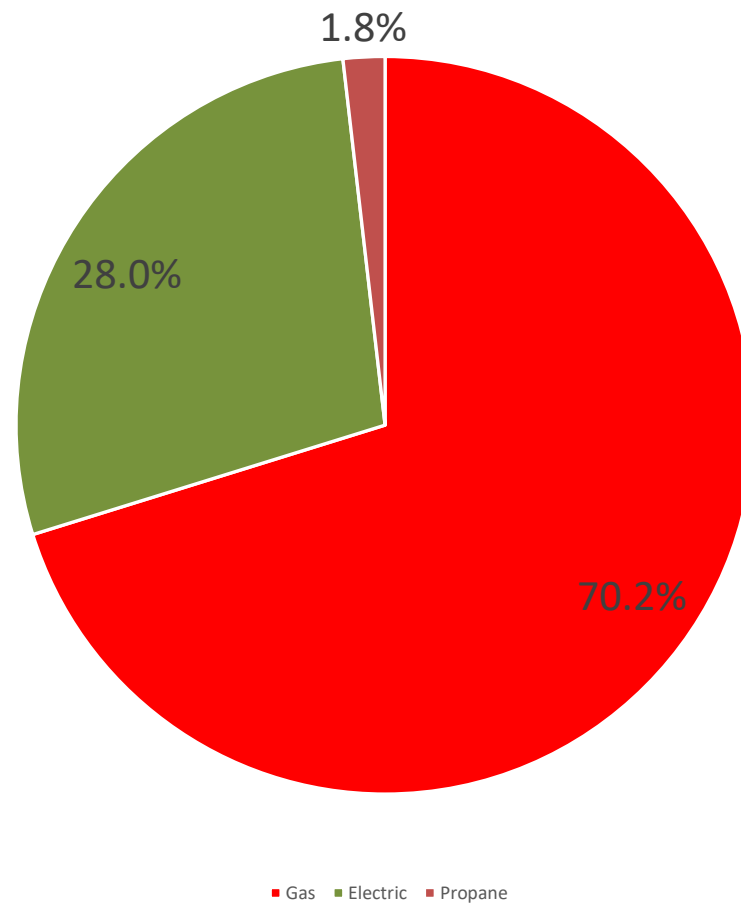


Thompson Okanagan Region is about 1/2 EL-4 ready

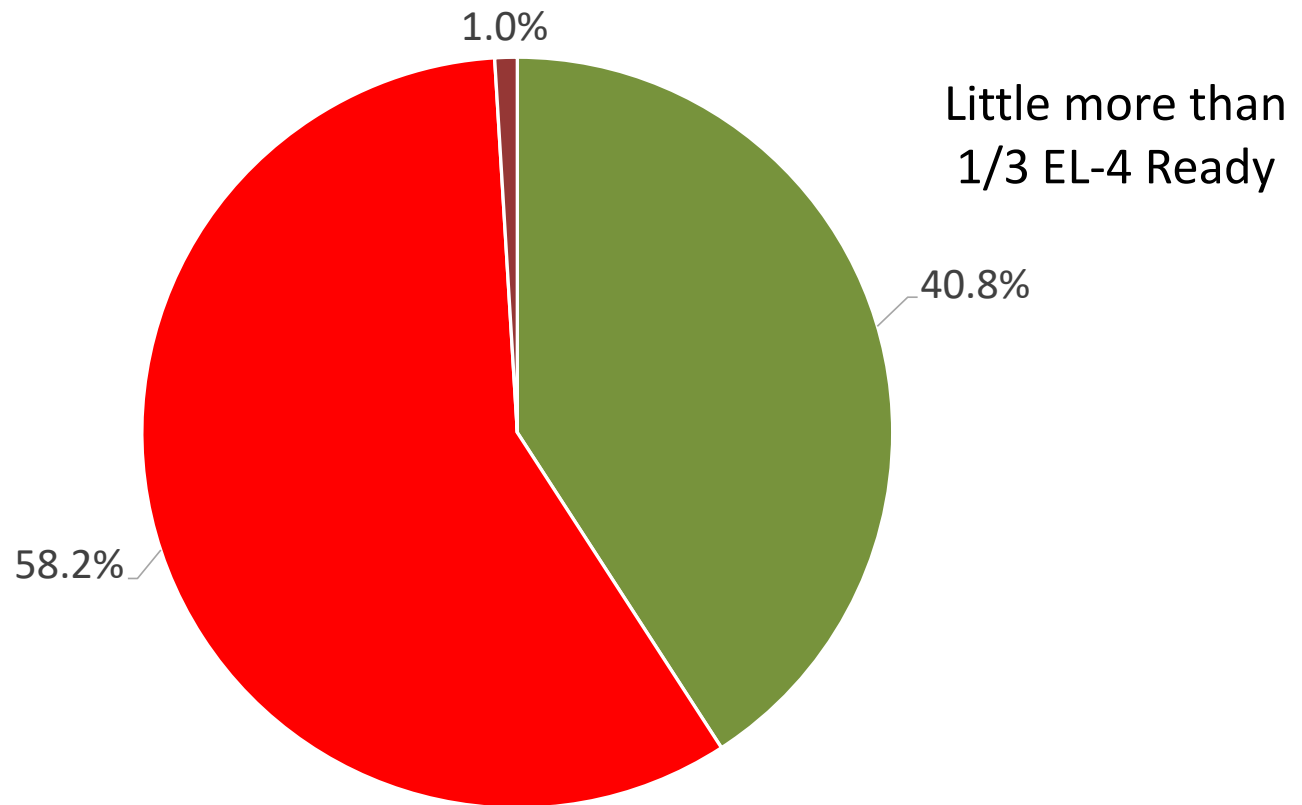


■ Propane Dual Energy ■ Propane Only ■ Gas Only ■ Gas with AC ■ Dual Energy ■ Heat Pump ■ Electric

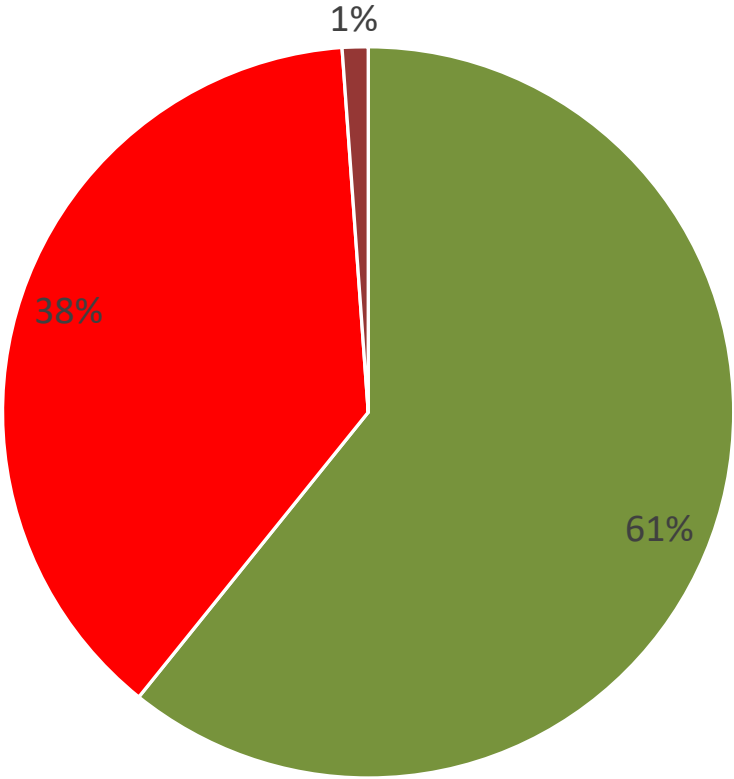
BC Hot Water By Fuel Type



BC Hot Water By Fuel Type Step 4 and 5



Hot Water Fuel Type Step 4 and 5 Vancouver Island



Little less than
2/3 EL-4 Ready



■ Electric ■ Gas ■ Propane

Verification Of ZCSC

Biggest EA mistakes

- Didn't update systems for As Built
- Incorrect system identified

Biggest Plan Checker / Inspector Mistakes

- Didn't verify that the systems installed matched report
- Assuming all systems must match prescriptive requirements

Section D

Space Heating/ Cooling	Principal	-	
	Supplementary	-	
Domestic Hot Water		EF	

Should be a close Match

Model Detail Report

Mechanical Systems				
Component	Type	Energy Source	Performance Rating	Type of Rating
Space Heating System 1	Furnace - Condensing	Natural gas	96.00	Efficiency
Space Heating System 2	Air Source Heat Pump - Central split	Electric	10.00	HSPF
Air Conditioning	Air Source Heat Pump - Central split	Electric	17.00	SEER
Domestic Hot Water	Conventional tank	Electricity	0.82	Heat Loss
DWHR	-	-	-	-
Ventilation	HRV	Electric	42 L/s	Exhaust Flow Rate
HRV / ERV	HRV	Electric	@ 0°: 68%, @ -25°: 70%	SRE
Cooking	-	Electric	-	-
Laundry	-	Electric	-	-
Supplementary Heating 1	Advanced airtight wood stove	Mixed Wood	30 L/s	Efficiency

Finishing thoughts

Everyone is Responsible for Quality Control

- EA's
 - Should have in-house quality checking
- Service Organizations
 - Required to have QAS process
 - Required to provide training
 - Good Service Organizations will have in-depth QAS process
 - EG: CHBA BC will recommend or if needed force training on EAs that do not meet standards. If things are really bad, delicensing is an option
- AHJ's
 - Should be checking reports and have inspections that verify the items shown
 - EA's are not inspectors



“Do or do not. There is no Try”
- Yoda

