Hybrid Heating Systems & the iFLOW Smart Switching Controller

NEEA Product Council Introduction

April 30th, 2024

iFLOW Hybrid Heating Systems: Easy HVAC Upgrades for Every Family

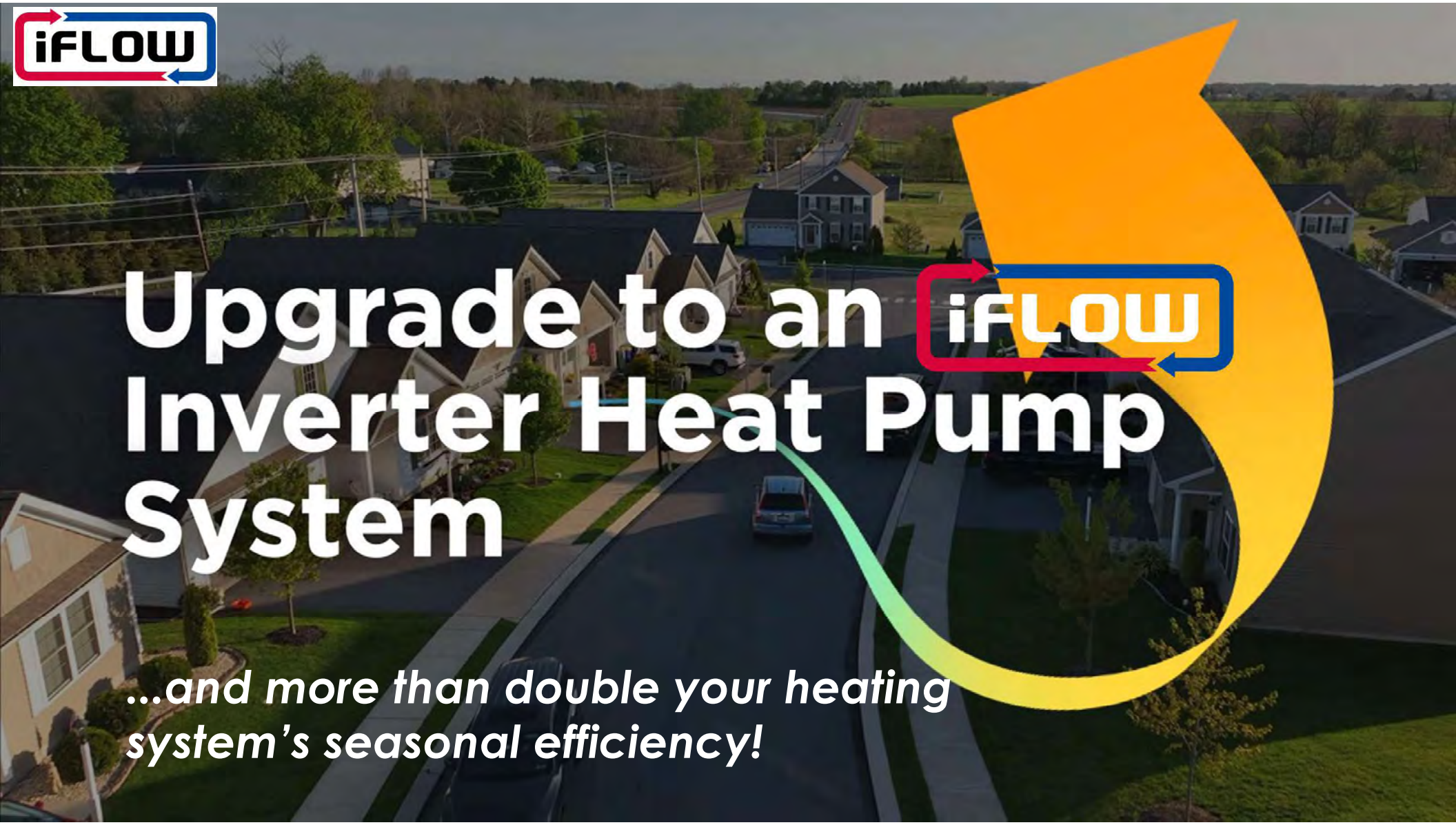
iFLOW's Hydronic Furnace & Inverter Heat Pump Products

Electrification: Problem for Utilities?

- Rapid move to heat pumps for space heating and DHW;
- Rebate incentives changing demand curve;
- Gas is being blocked in some locations for new RNC developments (for example: no gas in RNC in Vancouver B.C. & surrounding areas, no gas water heating in RNC in WA state);
- Supply capacity problem for electric utilities? Do we have sufficient electricity infrastructure?
- What is the source? Clean or dirty? (hydro, wind, solar, natural gas, coal, nuclear, etc.)?;
- Should we keep gas in residential buildings for heating?

Hybrid Heating System Creation:

- iFLOW has an option for you:
  - It's going to be difficult to remove existing infrastructure, so let's make it better.
  - Let's double, triple, or quadruple even, the efficiency of all present gas based heating systems, thereby reducing each home's carbon footprint by ½, ⅔, to ¾;
  - If we reduce residential GHG emissions from space heating by ½ or more, that could reduce total annual GHG emissions in the USA by approximately 200 million metric tons, or approximately 7% of total GHGs;
  - From a utility perspective, let's maintain master control over Heat Pump-to-backup switchover points for better DSM incentive program goal achievement, but with local override if/when needed so as to not compromise the homeowners' ability to heat their home, especially during unusually cold winter periods, by ensuring redundancy;
  - Let's look at the numbers...


iFLOW
Upgrade to an iFLOW Inverter Heat Pump System
...and more than double your heating system's seasonal efficiency!

Huge Opportunity for Heating Innovation Upgrades:

Space Upgrade Opportunities

Propane 5% Oil 4% Wood 2% Other 2%

47% Natural Gas

of homes in U.S. are still heated with traditional natural gas.

Nearly **40%** of U.S. residential AC systems are...

Nearly **50%** of U.S. multi-family AC systems are...

10

years old+

US EIA RECS Table HC7.1 Air conditioning in U.S. homes, by housing unit type, 2020

40% Electricity

are using "expensive" electric resistance heaters or first-generation heat pumps, which underperform when temperatures dipped below freezing."

Source: The Washington Post

Space for Old Heating Equipment Upgrades:

Main air-conditioning equipment age	Total U.S. 108.9M
Less than 2 years old	14.3%
2 to 4 years old	20.0%
5 to 9 years old	27.1%
10 to 14 years old	18.8%
15 to 19 years old	10.1%
20 or more years old	9.7%

Air conditioning in U.S. homes, by housing unit type

Rapid Growth of Ducted Inverter Products

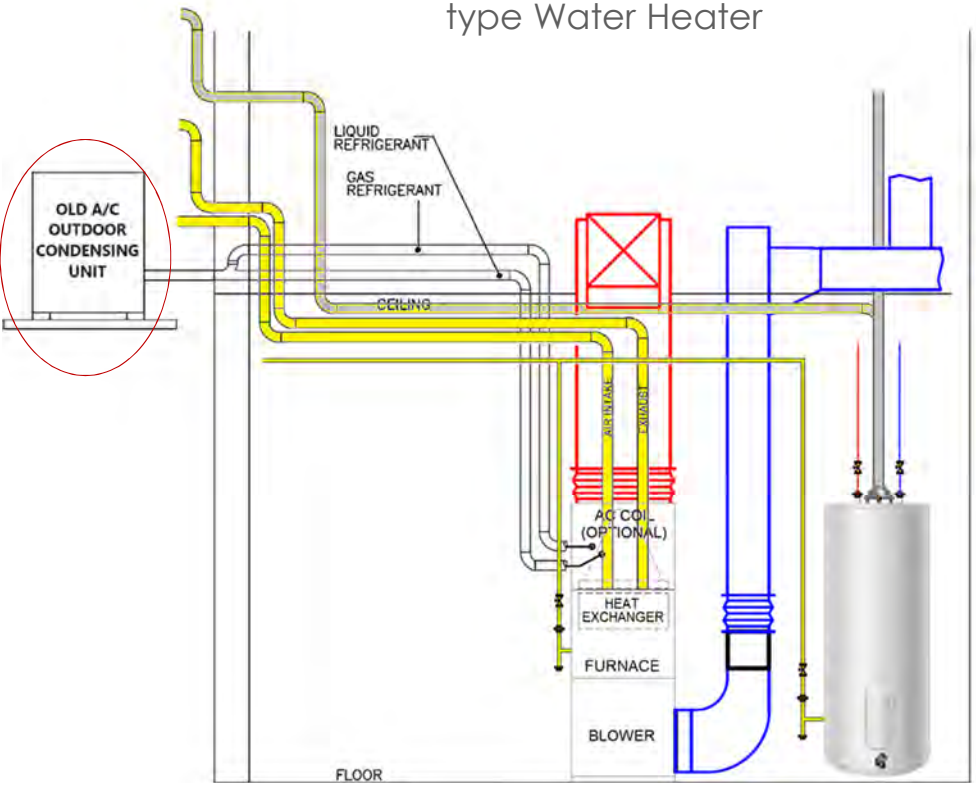
19.97%

compound annual growth rate 2016-2021

AHRI Report 2022
BSRIA Report 101437/1B USA Splits and VRF air conditioning

Conceptual Existing Installation with A/C, Furnace and Tank Type water heater:

Old Air Conditioner & Furnace with Tank-type Water Heater



Hybrid Heating System Creation:

- Here is the plan...
  - Replace old air conditioner with a new inverter driven, variable speed, cold climate heat pump to create a smart hybrid heating system (electric HP & gas furnace);
  - Properly size the heat pump to cover the entire heating load or the entire cooling load, ***whichever is larger***. This is not happening. If unsure, then best guess estimate:

Estimated Decade Home was Built:	Estimated Heat Loss (BTUH) Per Square Foot:	Estimated Square Footage of Heated Area:	Estimated Heat Loss of Home:
1920s-1930s	50	2,000 sq. ft.	100,000
1930s-1940s	46		92,600
1940s-1950s	43		85,200
1950s-1960s	39		77,800
1960s-1970s	35		70,400
1970s-1980s	32		63,000
1980s-1990s	28		55,600
1990s-2000s	24		65,070
2000s-2010s	20		40,800
2010s-2020s	17		33,400
2020s-2030s	13		26,000

Actual Seattle Winter Heating Season

Example Load: 30 MBH

0 btu/h (No Heating Required: 70°F/21°C)

1,000 btu/h

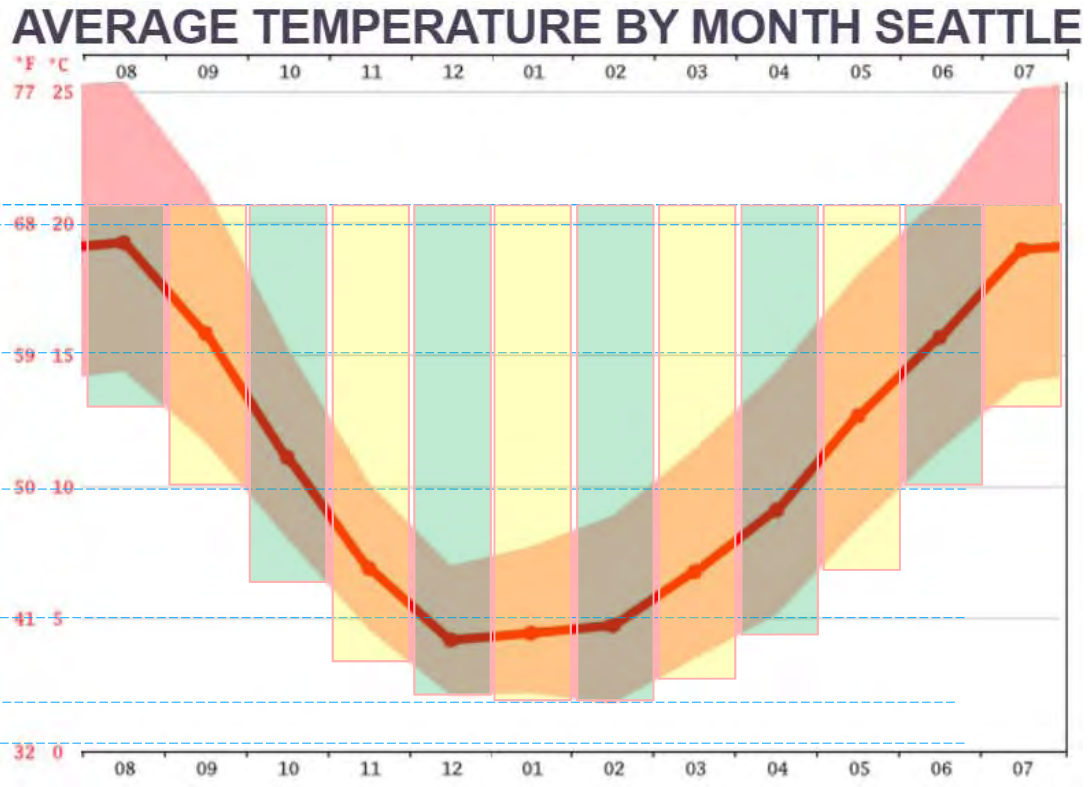
9,500 btu/h

18,000 btu/h

26,500 btu/h

30,000 btu/h (Maximum Heating Required)

35,000 btu/h



Actual Portland Winter Heating Season

Example Load: 30 MBH

0 btu/h (No Heating Required: 70°F/21°C)

1,000 btu/h

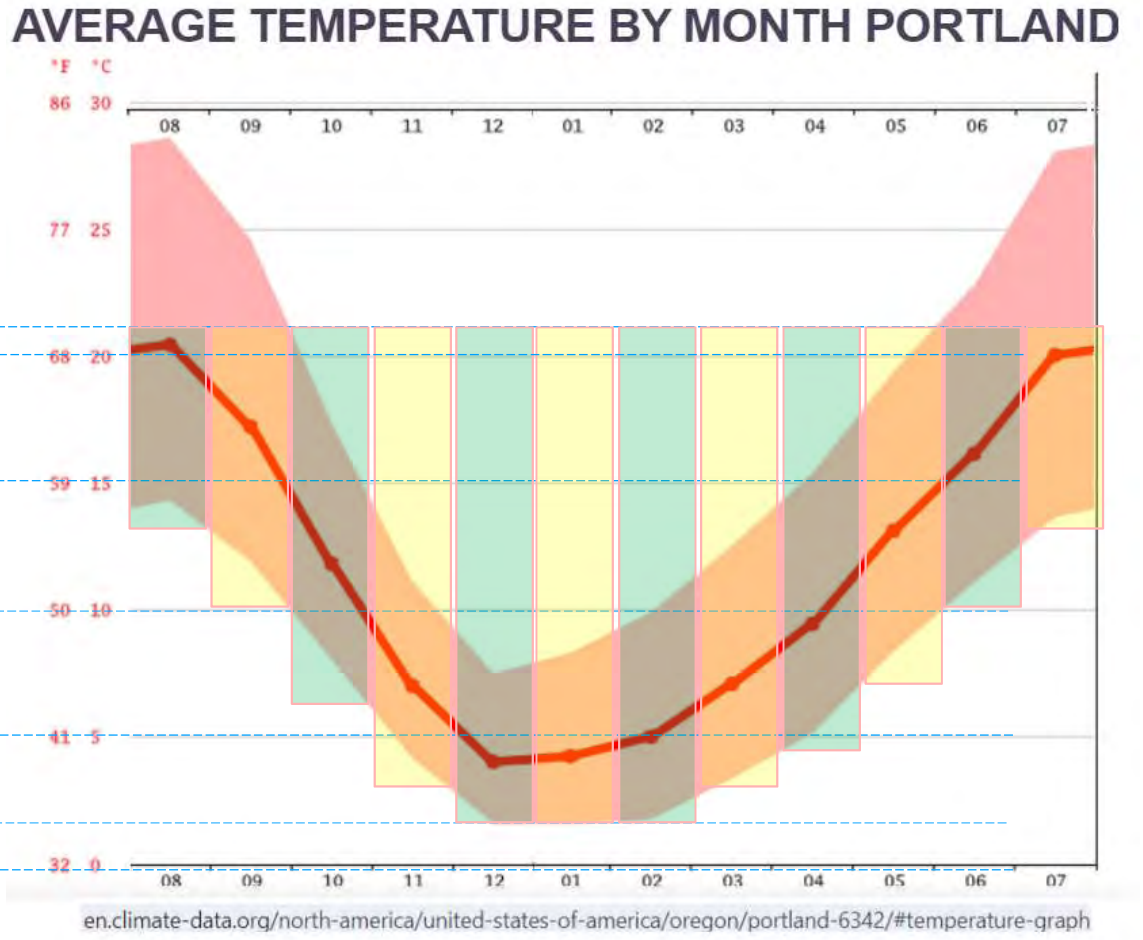
9,500 btu/h

18,000 btu/h

26,500 btu/h

30,000 btu/h (Maximum Heating Required)

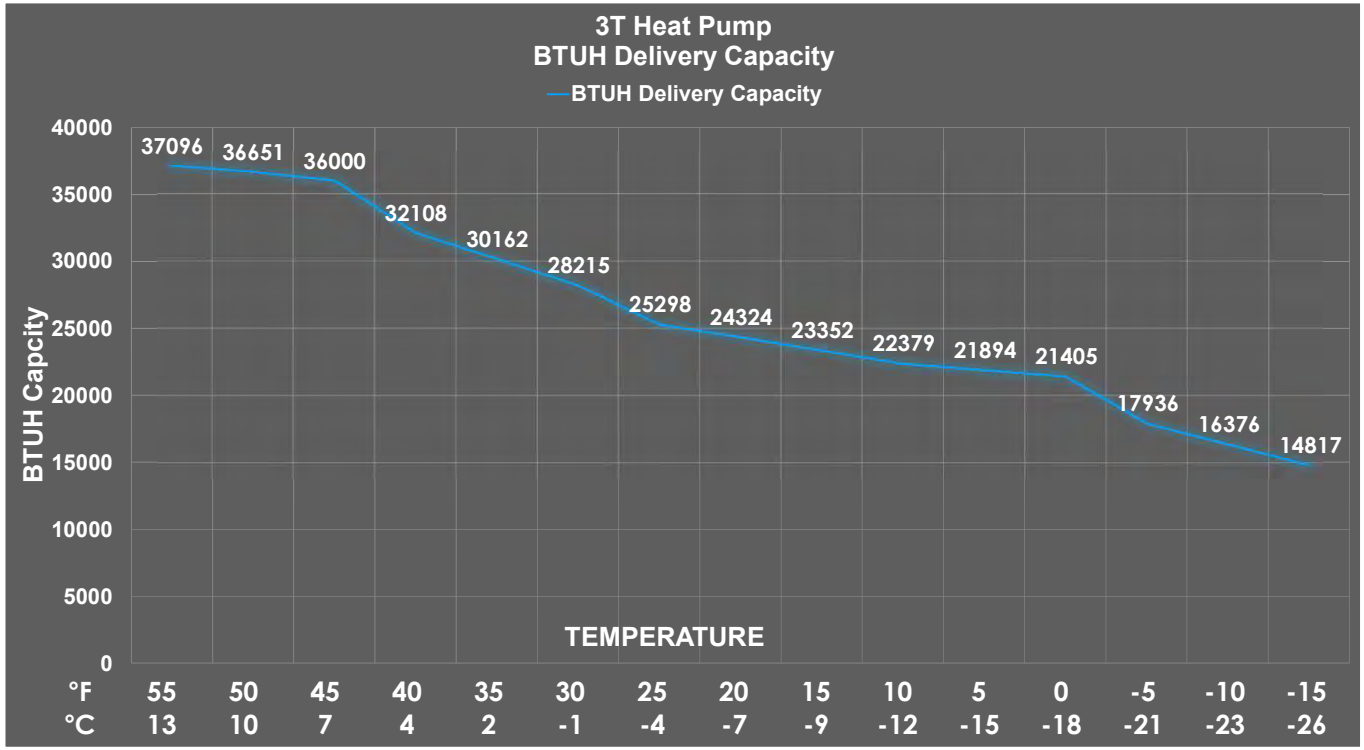
35,000 btu/h



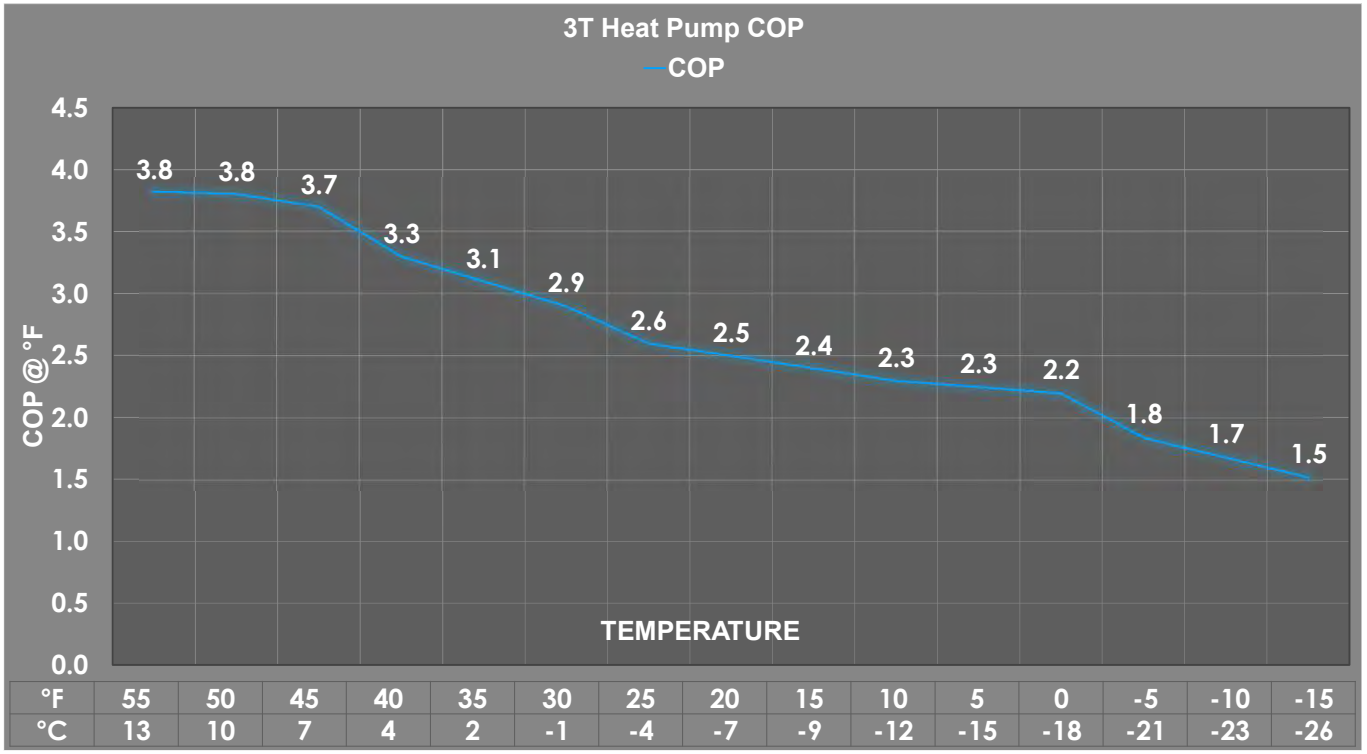
Sizing the Heat Pump

Let's look at an example!

Generic Regular Heat Pump
BTUH Capacity vs. Temperature:



Generic Regular Heat Pump COP vs. Temperature:



Will this Heat Pump Cover the Entire Heating Load in Seattle or Portland?

Let's look

at an example!

Actual Seattle Winter Heating Season

Example Load: 30 MBH

0 btu/h (No Heating Required: 70°F/21°C)

1,000 btu/h

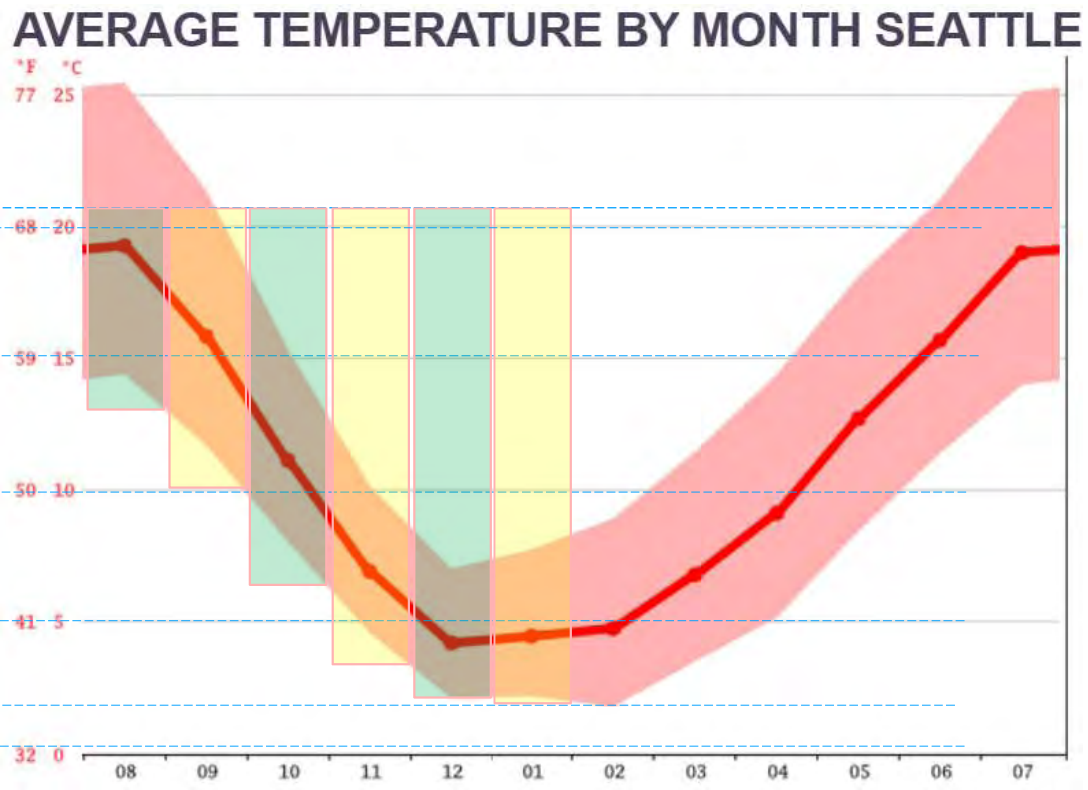
9,500 btu/h

18,000 btu/h

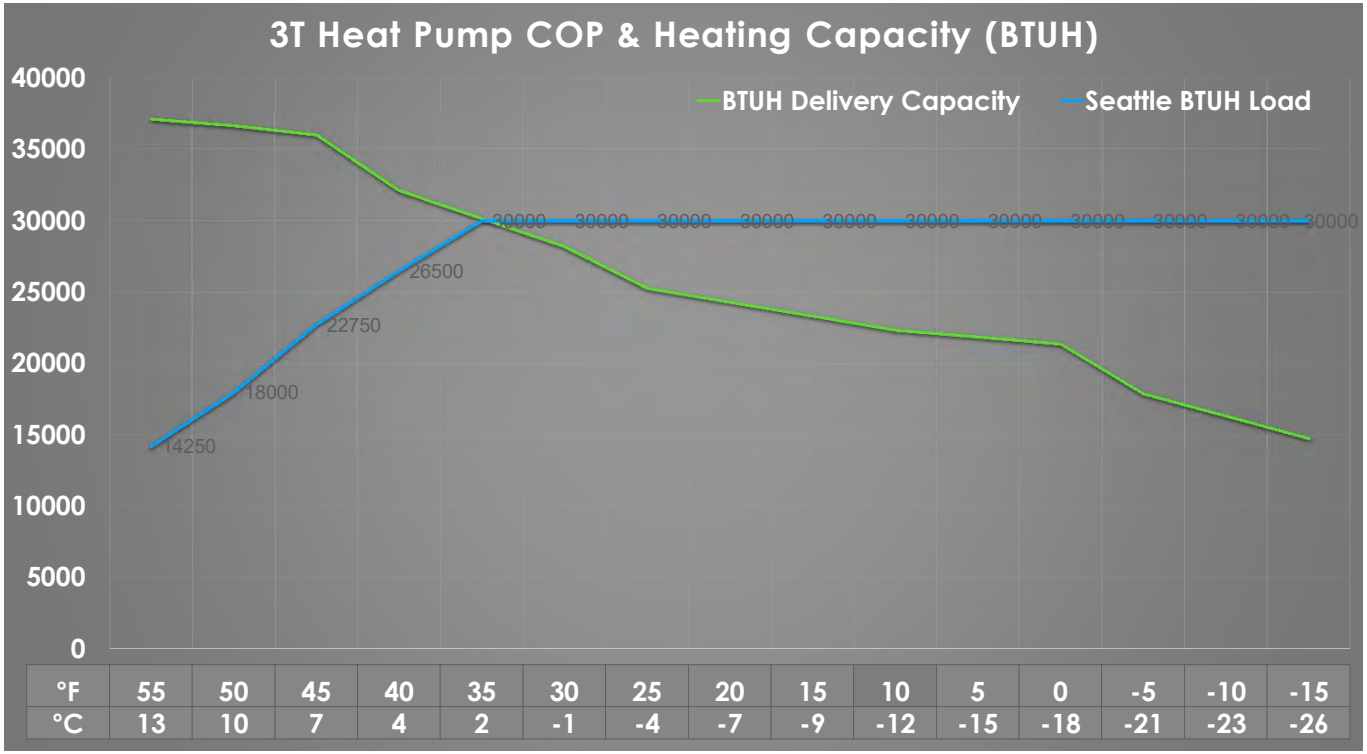
26,500 btu/h

30,000 btu/h (Maximum Heating Required)

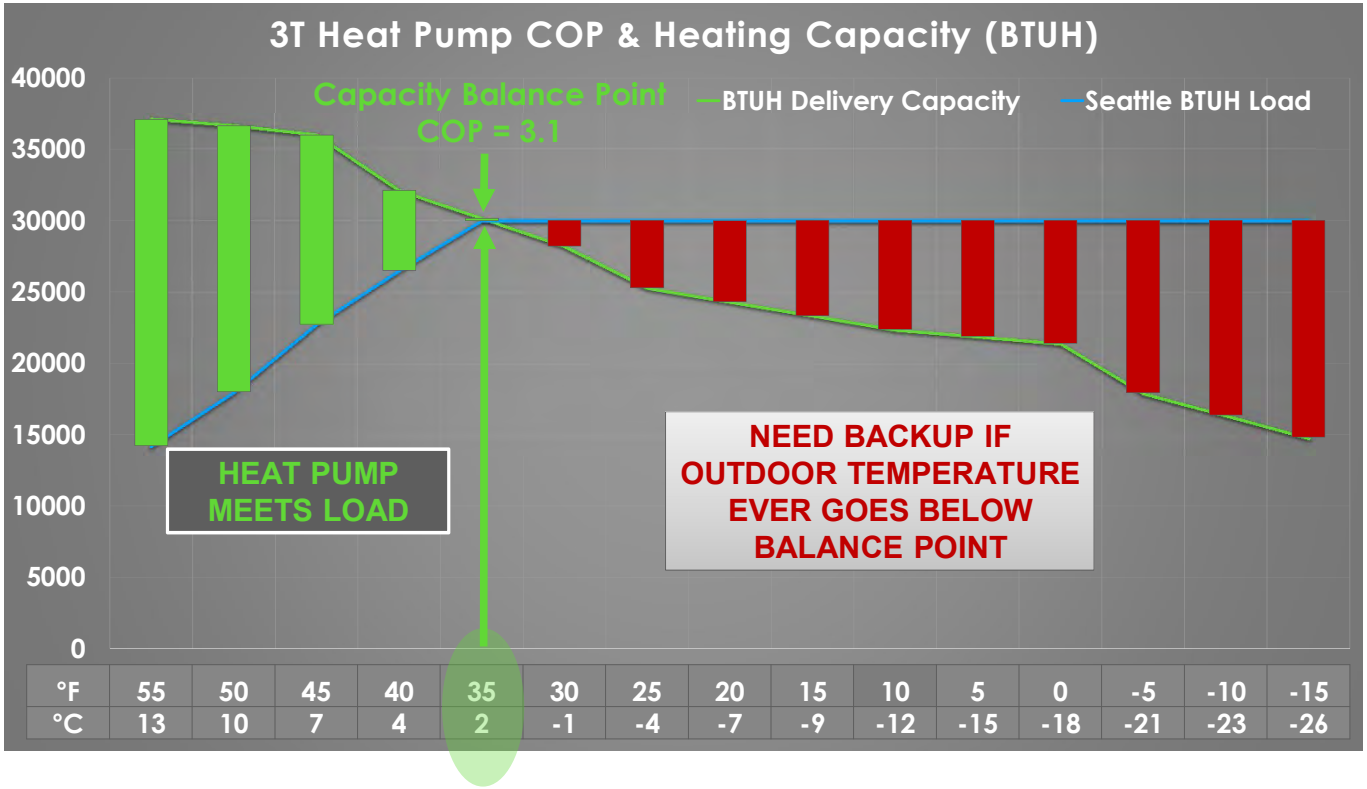
35,000 btu/h



Generic Regular Heat Pump COP & BTUH Capacity vs. Temperature:



Generic Regular Heat Pump COP & BTUH Capacity vs. Temperature:



Actual Seattle Winter Heating Season

Example Load: 30 MBH

0 btu/h (No Heating Required: 70°F/21°C)

1,000 btu/h

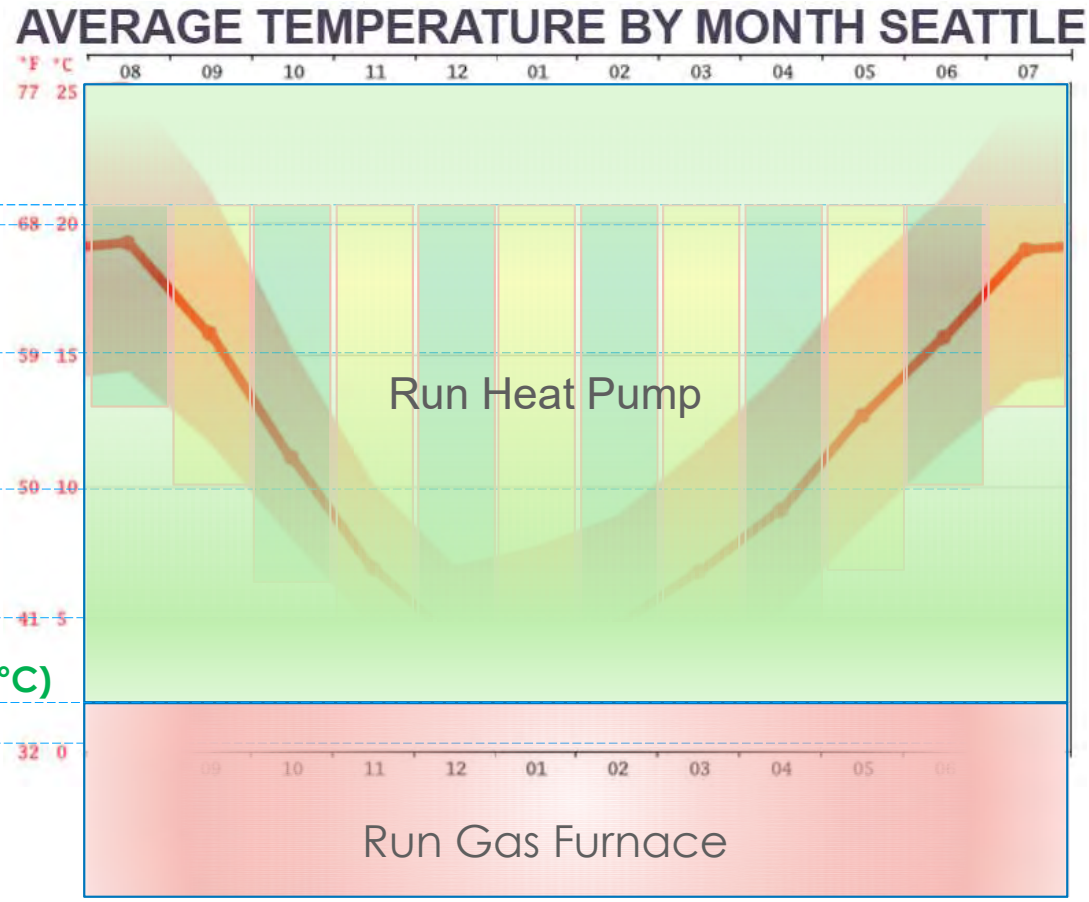
9,500 btu/h

18,000 btu/h

26,500 btu/h

Balance Point Switchover (35°F/2°C)

35,000 btu/h



Hybrid System Results: Generic Regular Heat Pump with High Efficiency Furnace (95%):

- Effective Estimated Hybrid Heating System COP: 3.57
- 0.95 to 3.57 = **3.76X** improvement in system efficiency
- No risk of heating capacity shortage

AIR SOURCE HEAT PUMP & HIGH EFFICIENCY FURNACE (95%) BACKUP											
Month of Year (Heating Season):	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	**Total Effective Hybrid COP:**
Estimated Average Outdoor Temperature Per Month:	61	51	45	39	40	41	45	48	55	61	
COP @ Above Average Temperature:	3.8	3.8	3.7	3.3	3.3	3.3	3.7	3.8	3.8	3.8	
Estimated BTUH Load (Seattle) @ Above Average Temperature:	9,000	16,000	23,000	28,000	27,500	27,000	25,000	20,000	13,500	9,000	
Estimated BTUH Load per Month as % of Total Heat Load (Seattle):	4.5%	8.1%	11.6%	14.1%	13.9%	13.6%	12.6%	10.1%	6.8%	4.5%	
Effective Contribution to total COP:	0.17	0.31	0.43	0.47	0.46	0.45	0.47	0.38	0.26	0.17	**3.57**

What About in Montana or Idaho?

Let's look

at an example!

Actual Toronto Winter Heating Season

Example Load: 40 MBH

0 btu/h (No Heating Required: 70°F/21°C)

7,000 btu/h

14,000 btu/h

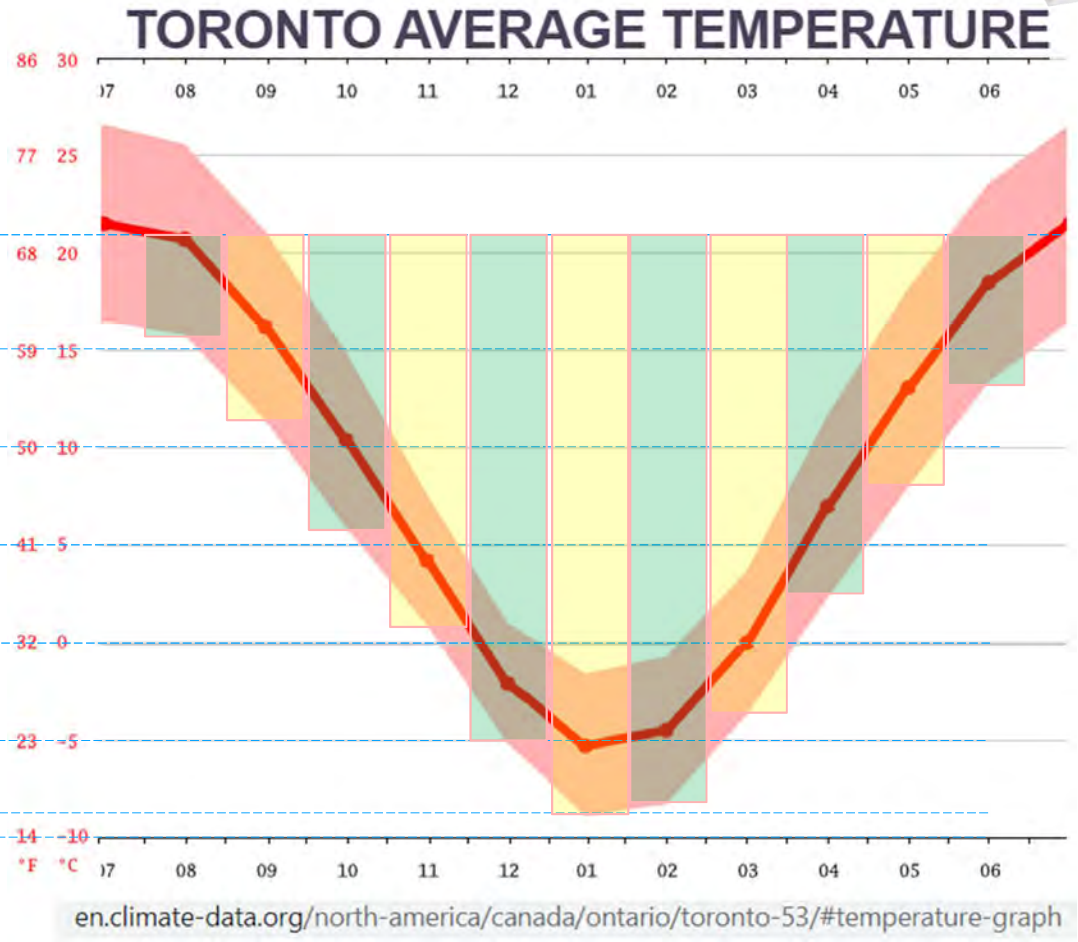
21,000 btu/h

28,000 btu/h

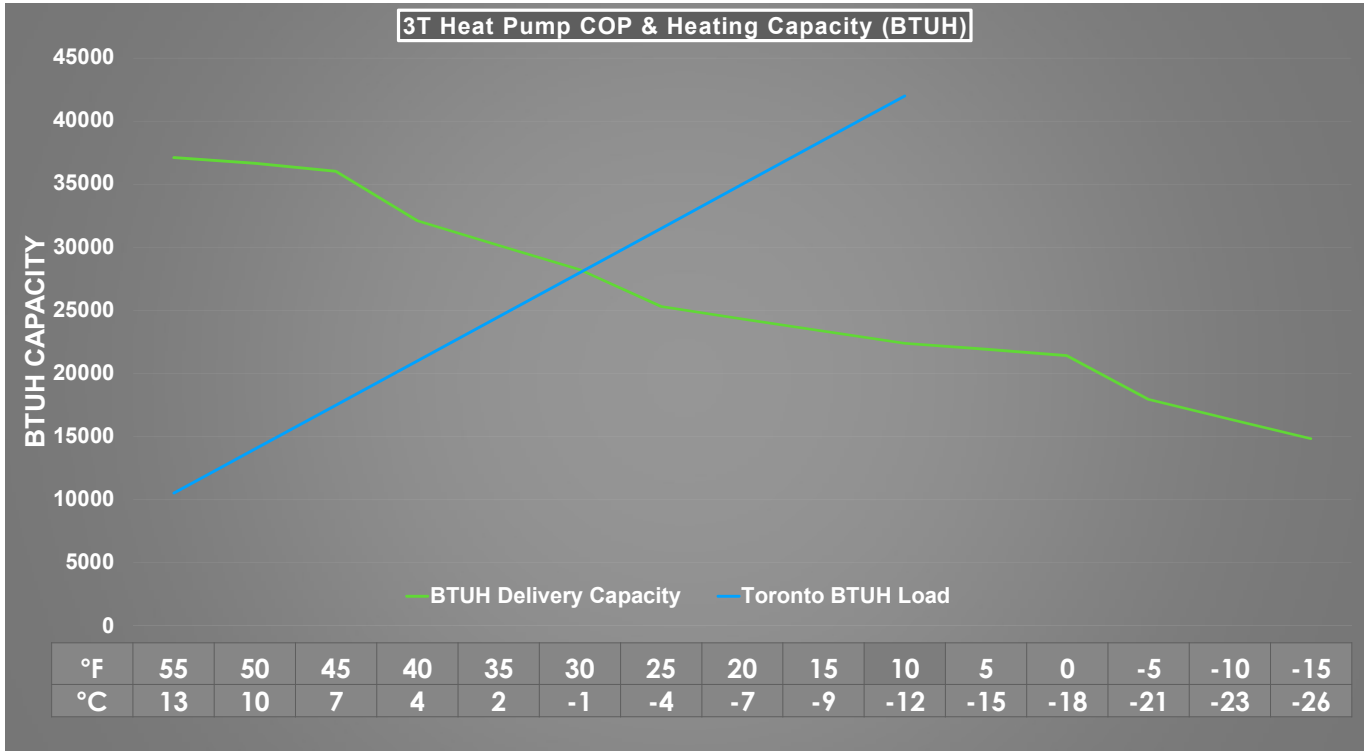
35,000 btu/h

40,000 btu/h (Maximum Heating Required)

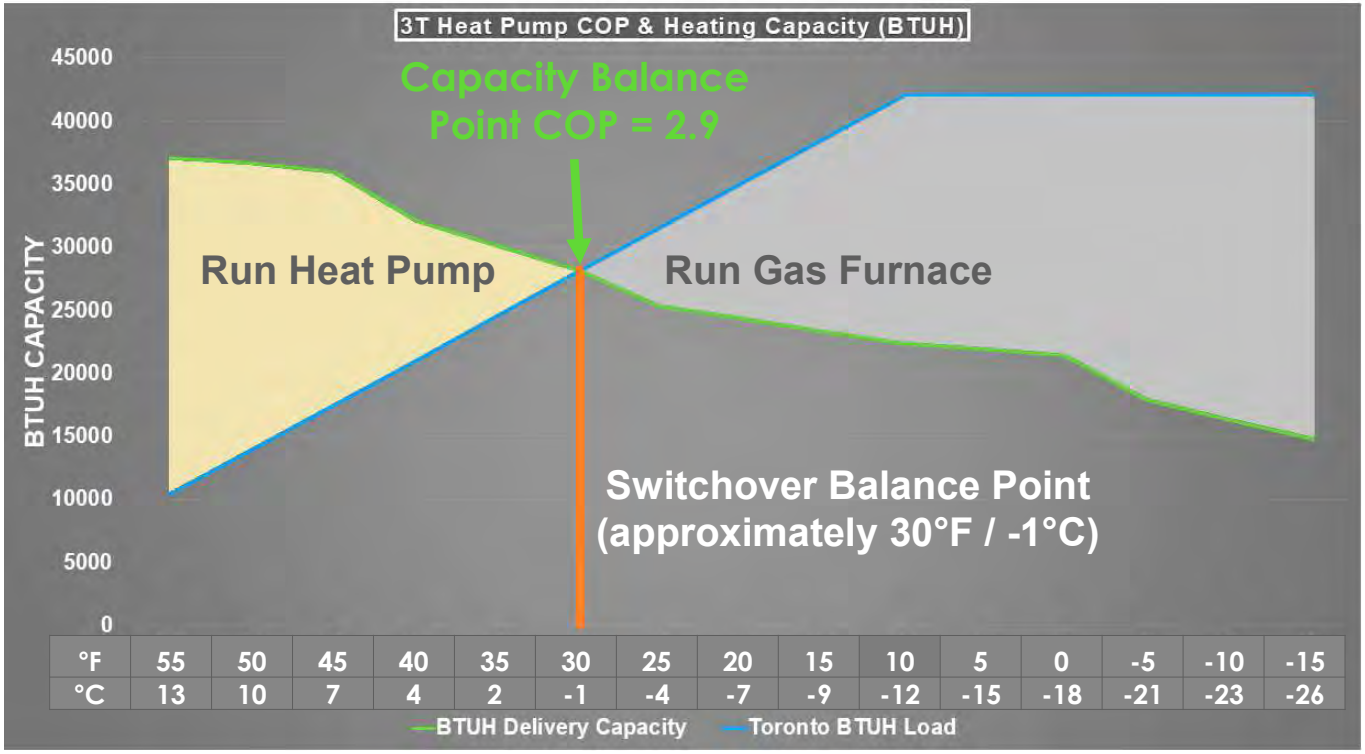
42,000 btu/h



Generic Regular Heat Pump COP & BTUH Capacity vs. Temperature:



Generic Regular Heat Pump COP & BTUH Capacity vs. Temperature:



Actual Toronto Winter Heating Season

Example Load: 40 MBH

0 btu/h (No Heating Required: 70°F/21°C)

7,000 btu/h

14,000 btu/h

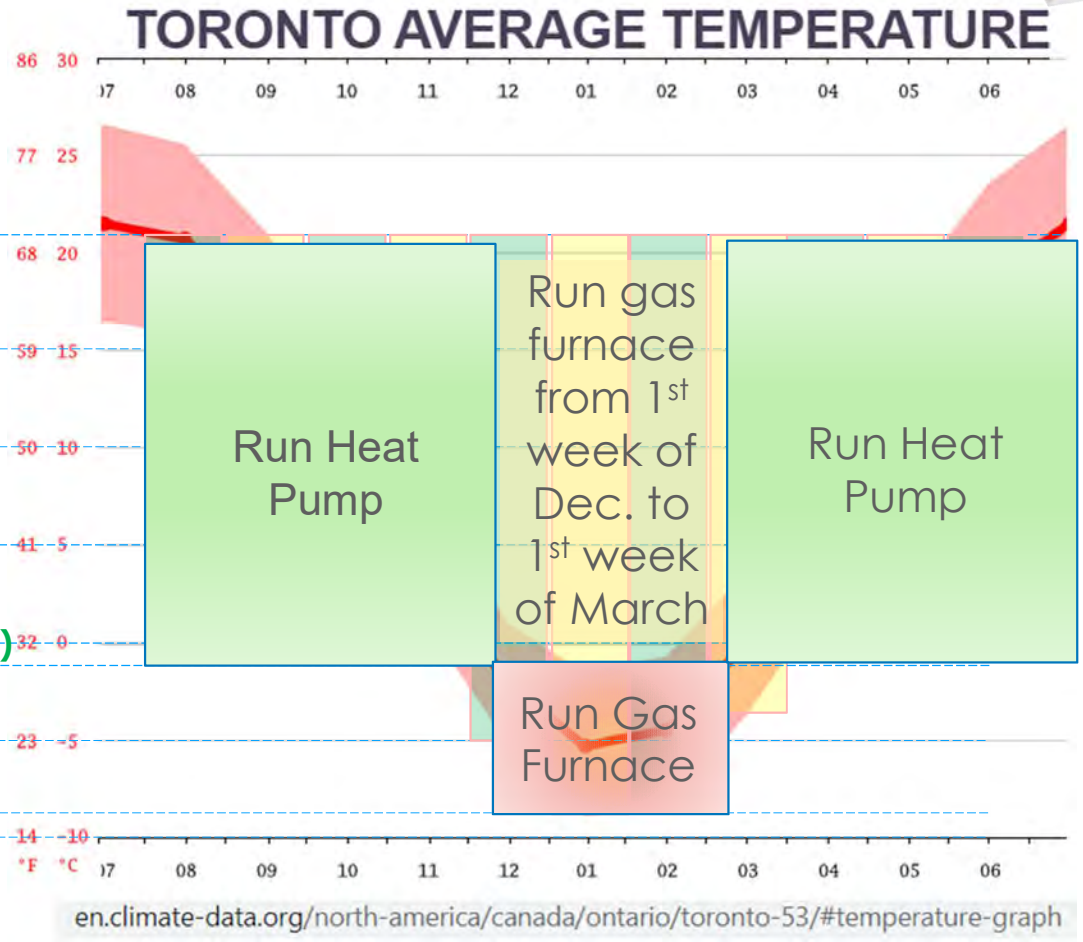
21,000 btu/h

28,000 btu/h **Balance Point Switchover (30°F/-1°C)**

35,000 btu/h

40,000 btu/h (Maximum Heating Required)

42,000 btu/h



Can Installing an iFLOW Heat Pump Really Double a Heating System's Efficiency ?

Yes, Let's look at an example!

Hybrid System Results: High Efficiency Furnace (95%) & Generic Regular Heat Pump:

- Effective Estimated Hybrid Heating System COP: 1.94
- 0.95 to 1.94 = **2.04X** improvement in system efficiency
- No risk of heating capacity shortage

HIGH EFFICIENCY FURNACE (95%)										
Month of Year (Heating Season):	Sept.	October	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	**Total Effective Hybrid COP:**
Estimated Average Outdoor Temperature Per Month:	63	51	39	26	22	23	32	44	56	
COP @ Above Average Temperature:	**3.8**	**3.8**	**2.3**	**0.95**	**0.95**	**0.95**	**2.2**	**3.6**	**3.8**	
Estimated BTUH Load (Toronto) @ Above Average Temperature:	6000	13500	22500	32000	36000	34000	28000	18500	10000	
Estimated BTUH Load per Month as % of Total Heat Load (Toronto):	3.0%	6.7%	11.2%	16.0%	18.0%	17.0%	14.0%	9.2%	5.0%	
Effective Contribution to total COP:	0.11	0.26	0.26	0.15	0.17	0.16	0.31	0.33	0.19	**1.94**
Operational % of Heating Season (Toronto)	20.9%			50.9%			28.2%			
% Contribution to Hybrid Heating System Effective Estimtated COP:	32.4%			24.9%			42.7%			

Hybrid System Results: Mid-Efficiency Furnace (80%) & Generic Regular Heat Pump:

- Effective Estimated Hybrid Heating System COP: 1.86
- 0.8 to 1.86 = **2.35X** improvement in system efficiency
- No risk of heating capacity shortage

MID-EFFICIENCY FURNACE (80%)										
Month of Year (Heating Season):	Sept.	October	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	**Total Effective Hybrid COP:**
Estimated Average Outdoor Temperature Per Month:	63	51	39	26	22	23	32	44	56	
COP @ Above Average Temperature:	**3.8**	**3.8**	**2.3**	**0.8**	**0.8**	**0.8**	**2.2**	**3.6**	**3.8**	
Estimated BTUH Load (Toronto) @ Above Average Temperature:	6000	13500	22500	32000	36000	34000	28000	18500	10000	
Estimated BTUH Load per Month as % of Total Heat Load (Toronto):	3.0%	6.7%	11.2%	16.0%	18.0%	17.0%	14.0%	9.2%	5.0%	
Effective Contribution to total COP:	0.11	0.26	0.26	0.13	0.14	0.14	0.31	0.33	0.19	**1.86**
Operational % of Heating Season (Toronto)	20.9%			50.9%			28.2%			
% Contribution to Hybrid Heating System Effective Estimtated COP:	32.4%			21.0%			42.7%			

Hybrid Heating System Creation:

- Find a controller that can:
  - Use the heat pump during the shoulder seasons when the COPs are highest (Sept., Oct., Nov.; Mar., Apr., May), and when gas equipment would typically be cycling, resulting in reduced gas furnace efficiency;
  - Switch to the gas furnace for the coldest months (Dec., Jan., Feb.) when COPs drop, and when furnace would have longer running times, offering better efficiency; and when heat pump would not typically have BTUH capacity;
  - Ensure home heating capacity is not at all compromised.
  - Reduce GHG emissions by 50% or more

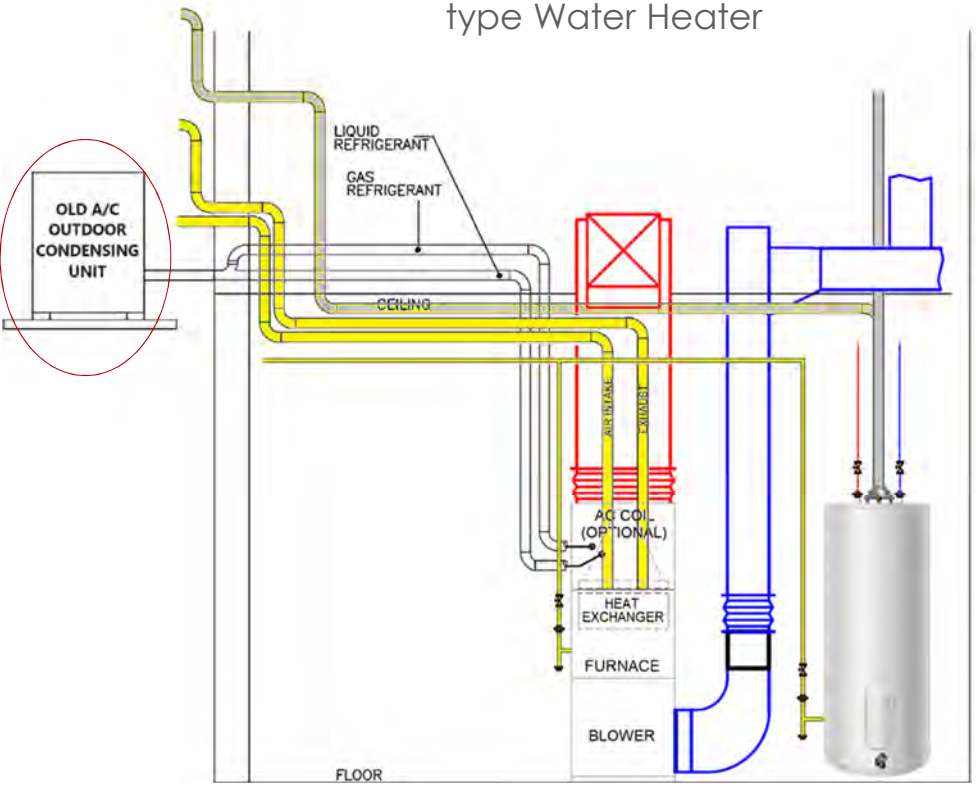
- Introducing the iFLOW Smart Hybrid Controller...

How Can I Control a Hybrid System (Heat Pump & Furnace)?

Let's Take a Look!

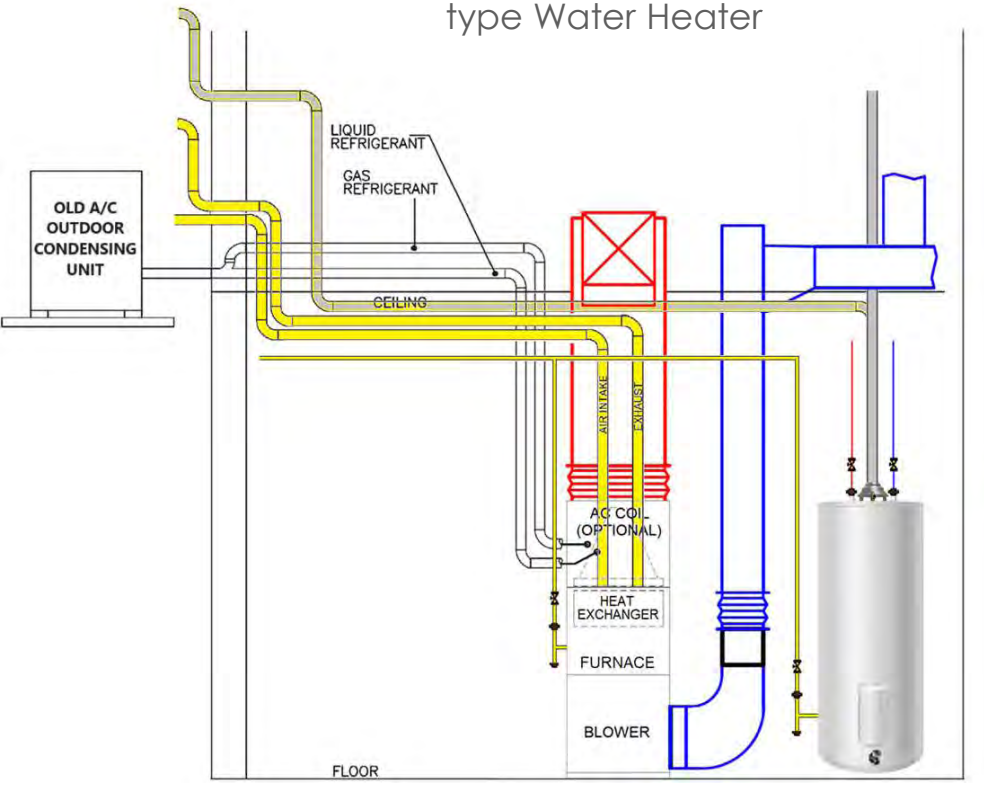
Conceptual Installation of a new iFLOW Heat Pump & Existing Furnace:

Old Air Conditioner & Furnace with Tank-type Water Heater



Conceptual Installation of a new iFLOW Heat Pump with the iFLOW Smart Hybrid Heating Controller & Existing Furnace:

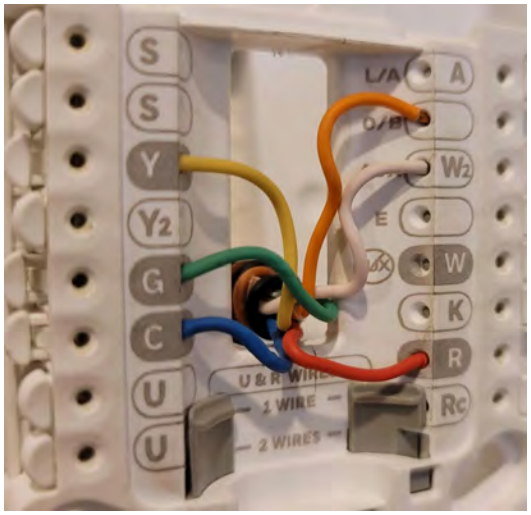
Old Air Conditioner & Furnace with Tank-type Water Heater



Using a Heat Pump Thermostat:

- When creating a hybrid system, a method to switch between heat pump and furnace/hydronics will be needed.
- A thermostat with a heat pump option and settings, like any of these thermostats below, has typically been used:

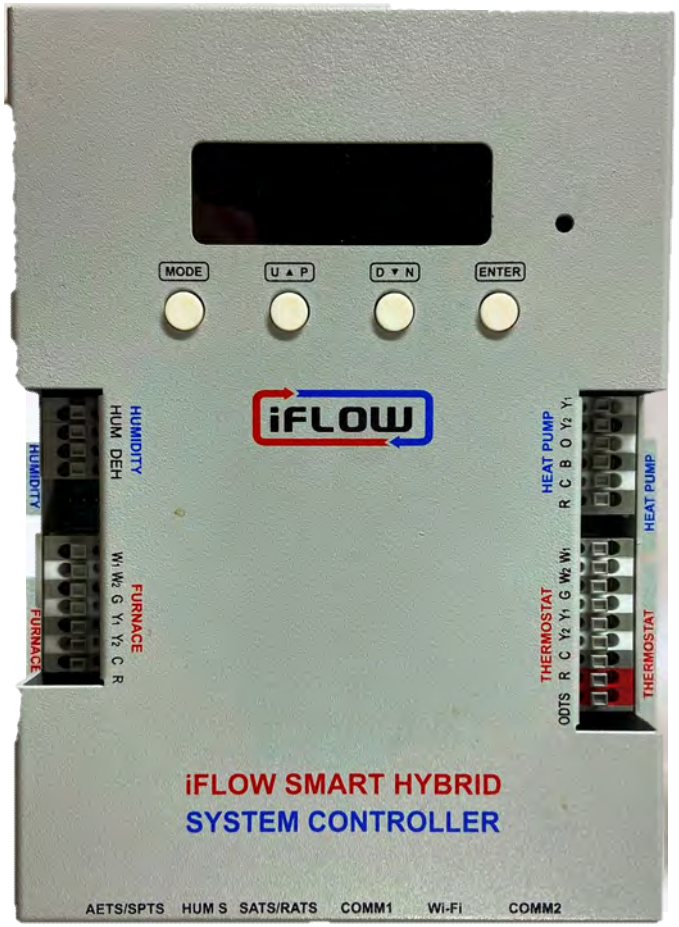
- To install these thermostats however, typically a minimum of 6 wires is needed (R, W, G, Y, C, O/B).
- In new construction, this may not be a problem....



Using a Heat Pump Thermostat:

- But for the renovation market, many homes only have 4 wires (R, W, G, Y) (see image).
- Contractor would need to fish new wires through the home (hours in labour, especially if finished basements), possible holes in drywall, painting, etc.
- Worry not however...
- ***iFLOW has a solution...***

Introducing the iFLOW Smart Hybrid Heating Controller Kit Solution...



Outdoor Temperature Sensor

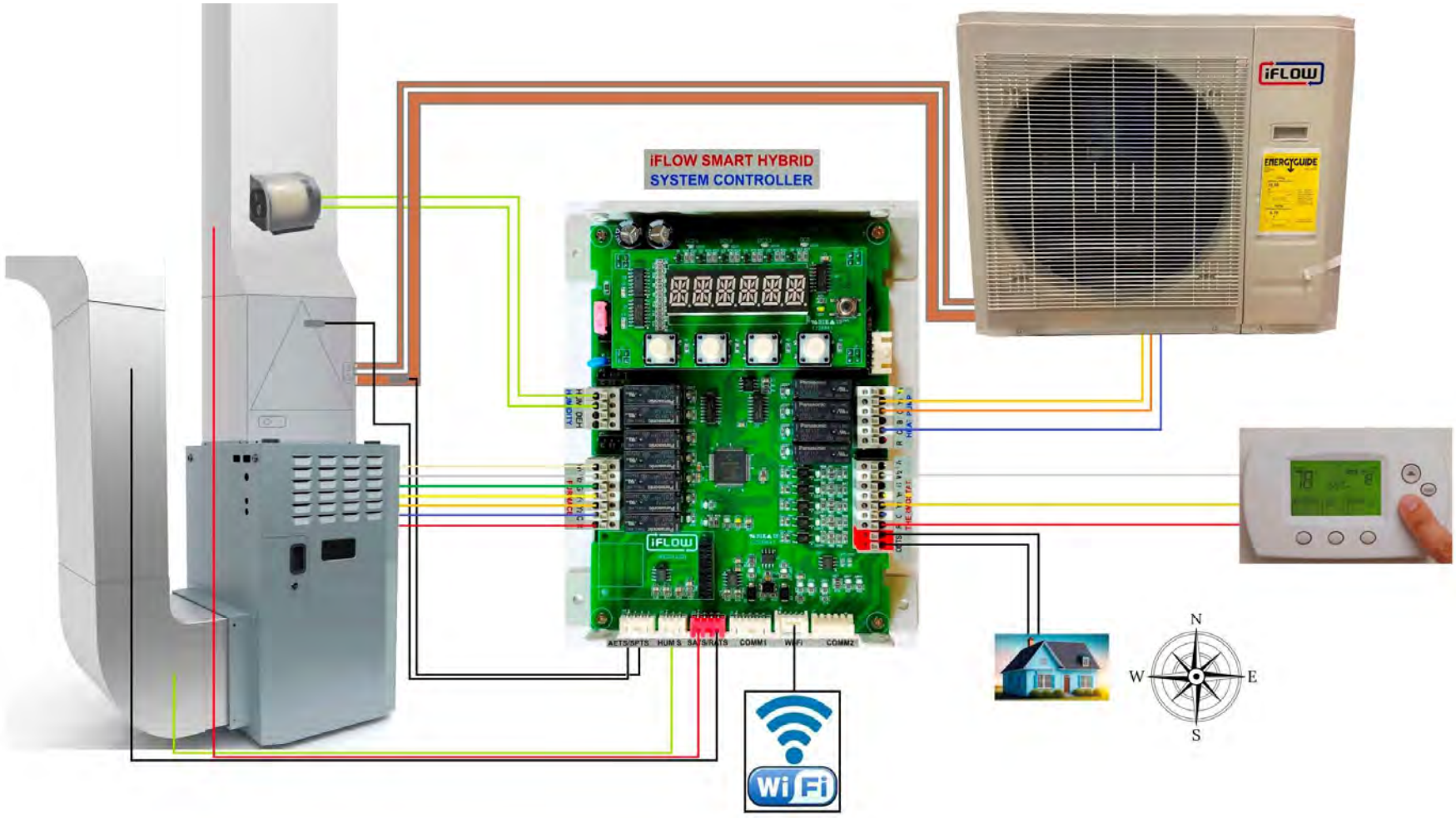
Supply & Return Air Temperature Sensors

Evaporator (Freeze Protection) & Suction Line Temperature Sensors

Optional Wi-Fi Module

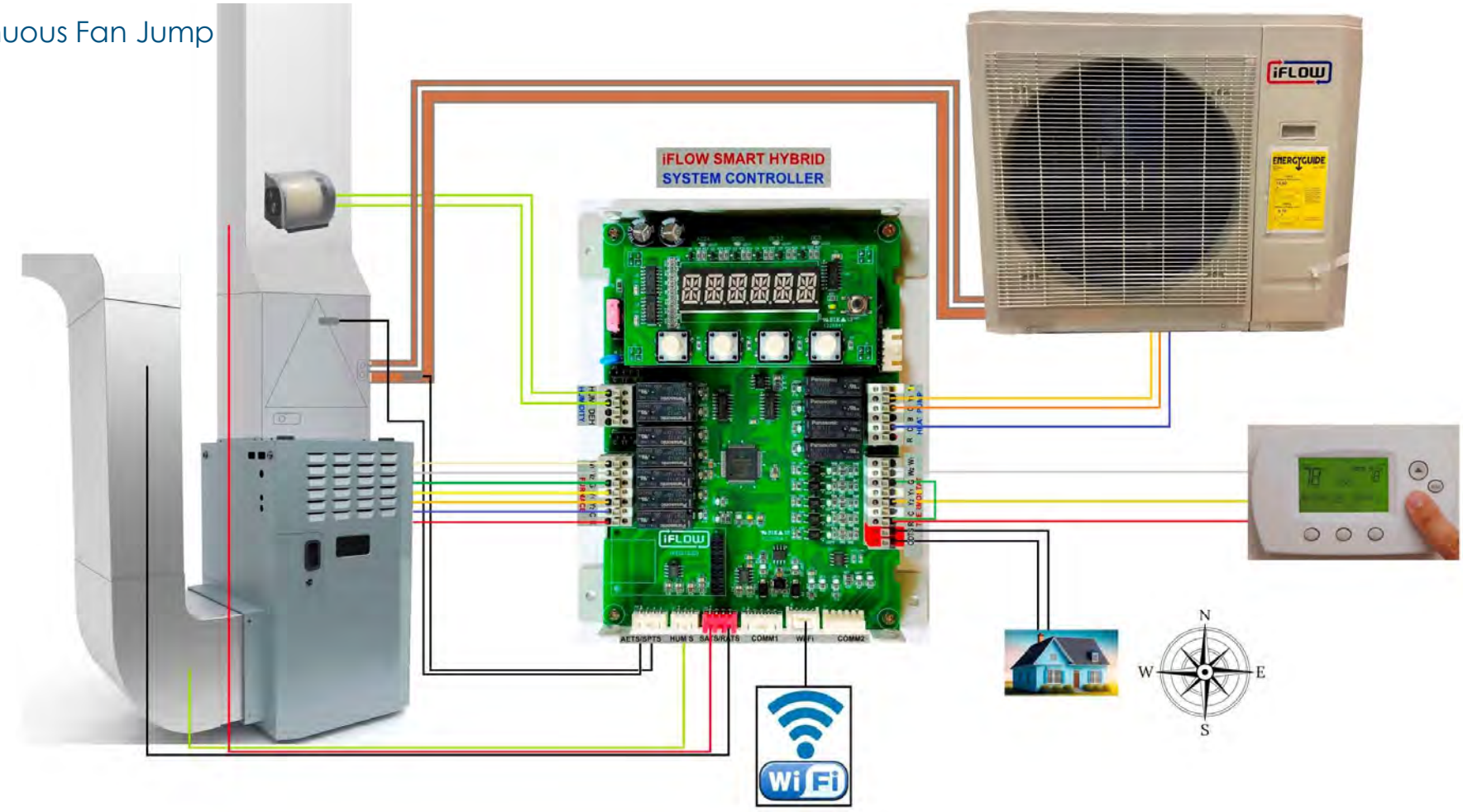
iFLOW Wiring (Easy!)

Wiring of the iFLOW Smart Hybrid Heating Controller :



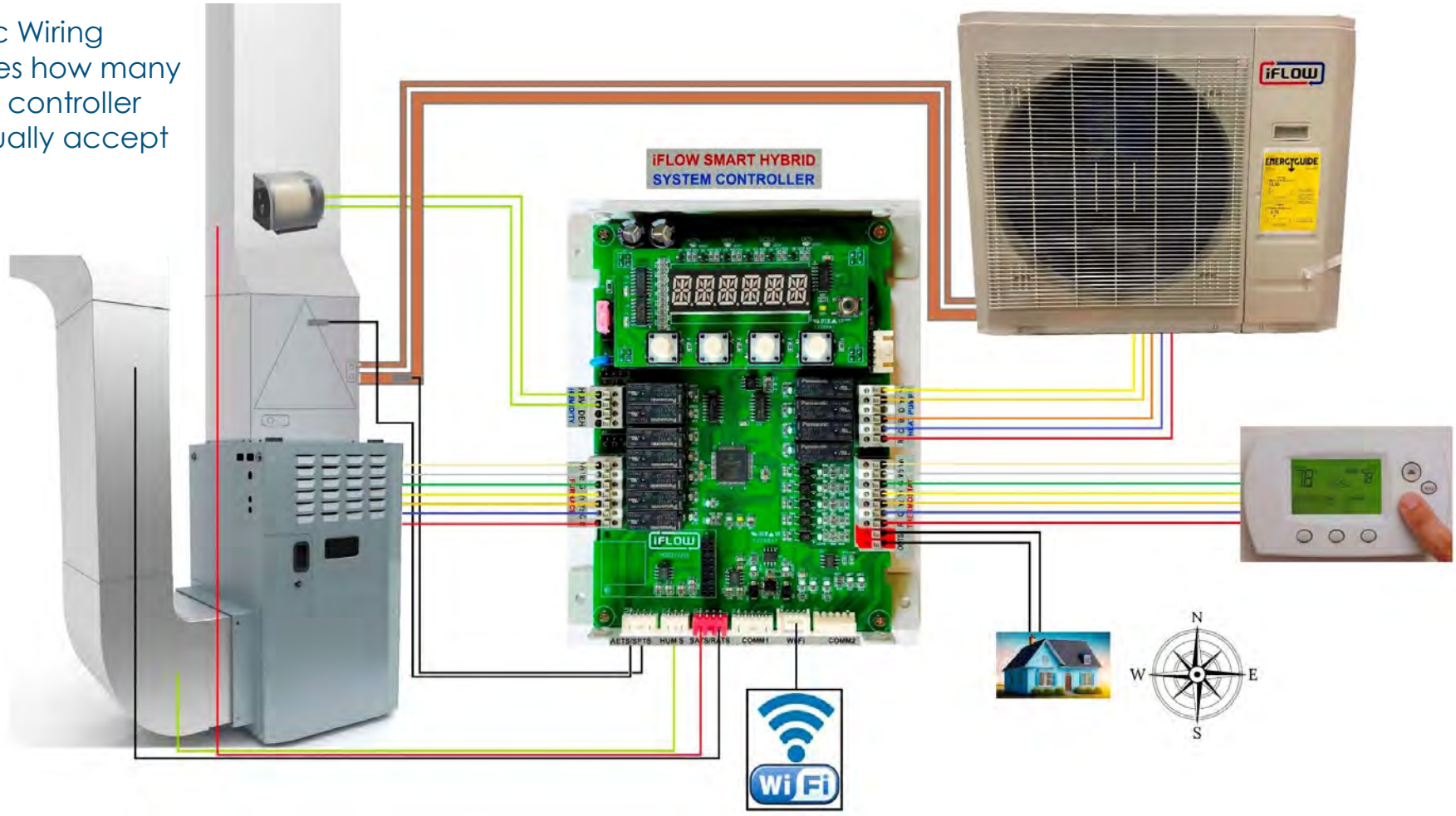
Wiring of the iFLOW Smart Hybrid Heating Controller :

- Continuous Fan Jump



Wiring of the iFLOW Smart Hybrid Heating Controller :

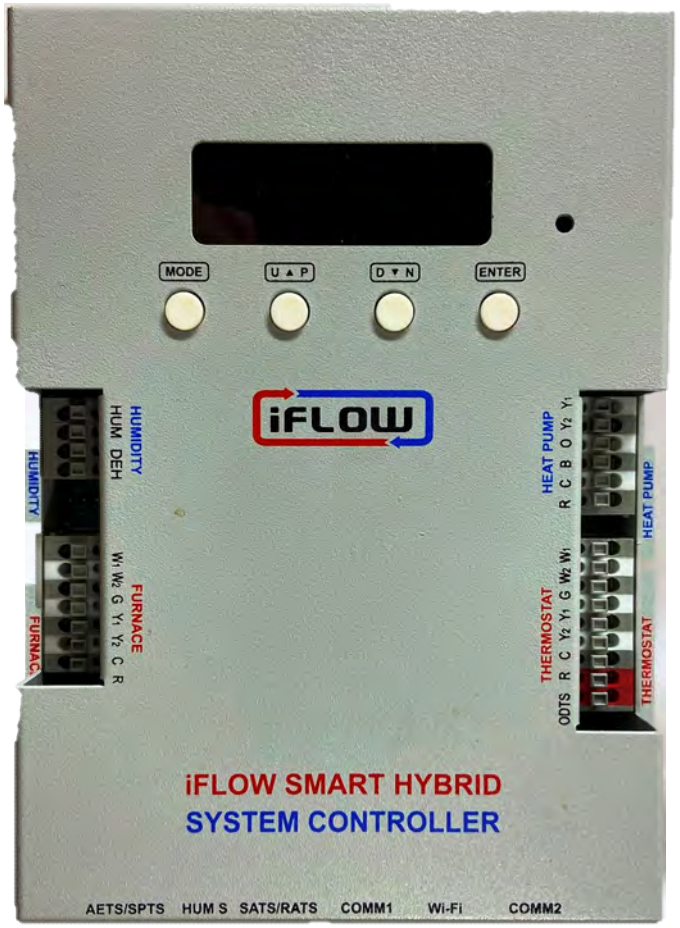
- Generic Wiring
- indicates how many wires the controller can actually accept



Introducing the iFLOW Smart Hybrid Heating Controller Solution...

Installation Advantages: Ideal for Renovations!

- Use ***existing thermostat*** (expensive Heat Pump thermostats not required - save hundreds in cost);
- Use ***existing thermostat wiring***; no need to fish/pull any new wires through the home (save hours in labour); no holes in drywall and no painting;
- Controller installs in the mechanical room where is existing wiring already is;
- Works with any 3rd party furnace and/or any heat pump (as long as that equipment can accept a generic 24V input; not proprietary);



Advantages of the iFLOW Smart Hybrid Heating Controller:

Other Advantages:

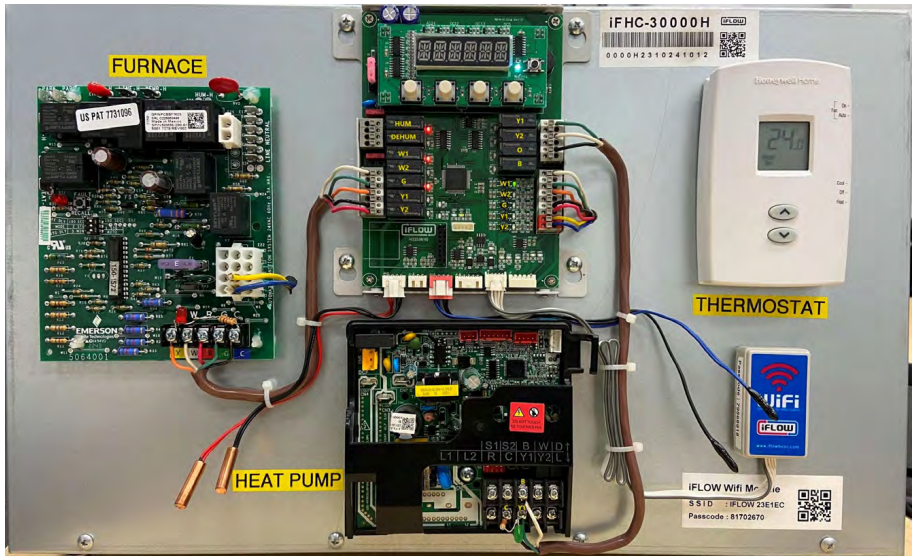
- Simple and easy wiring; extra sensors for better heating system control
- Better system operation, recognition & feedback control with Supply & Return Air sensors, evaporator & suction line temperature sensors; the iFLOW knows what is going on in the mechanical room compared with heat pump thermostats
- Freeze protection (using evaporator air temperature sensor; if evaporator is freezing up, will stop compressor while continuing to run the furnace blower);
- Compressor Temperature Delivery Detection using its suction line temperature sensor (waits for a suction line temperature of 90°F before starting furnace blower thus never delivers cold air during start up);
- Defrost Mode detection (using suction line temperature sensor);
- Automatic switching to furnace if heat pump cannot deliver (if outdoor unit does not deliver 90°F within 20 minutes after start-up or after defrost cycle starts, iFLOW will default to furnace until t-stat call is finished; no manual thermostat intervention required);
- Wi-Fi capable (for use with free iFLOW Smartphone APP, auto updates, remote monitoring, demand response advantage, etc.)

iFLOW Diagnostics (Also Easy!)

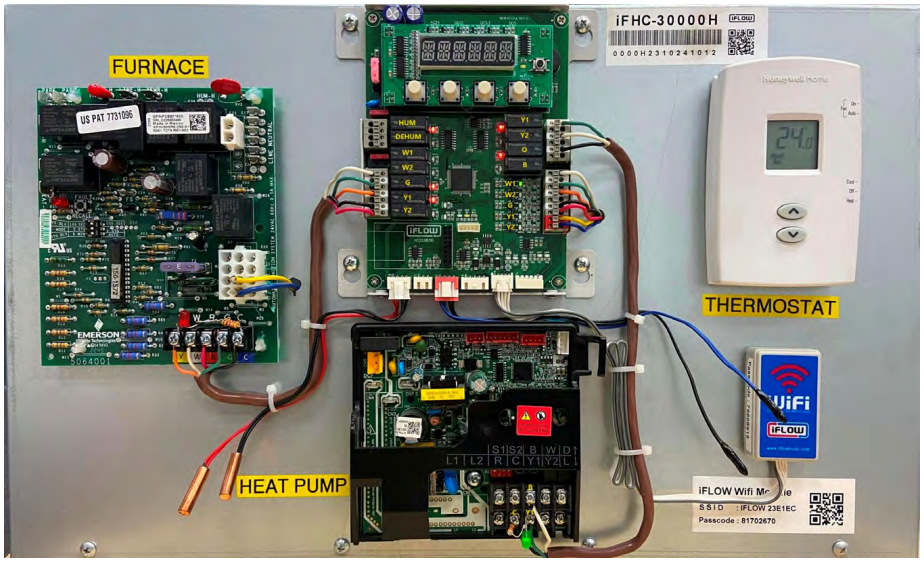
Smart Controller's Easy Diagnostics:

- Another advantage of the iFLOW Smart Controller is the ease of diagnosing any problems with the system;
- Each contact on the iFLOW Smart Hybrid Controller has a corresponding LED light that will illuminate when energized allowing a contractor to quickly and easily see the inputs and outputs that are being called on with the system; no need for a multi-meter is most cases;
- In test mode, a contractor can energize any of the relays to test operation, even remotely!

Call for heat at the thermostat W wire is indicated by the green LED. Furnace W1 and G (and Humidifier HUM) contacts are energized as indicated by red LEDs

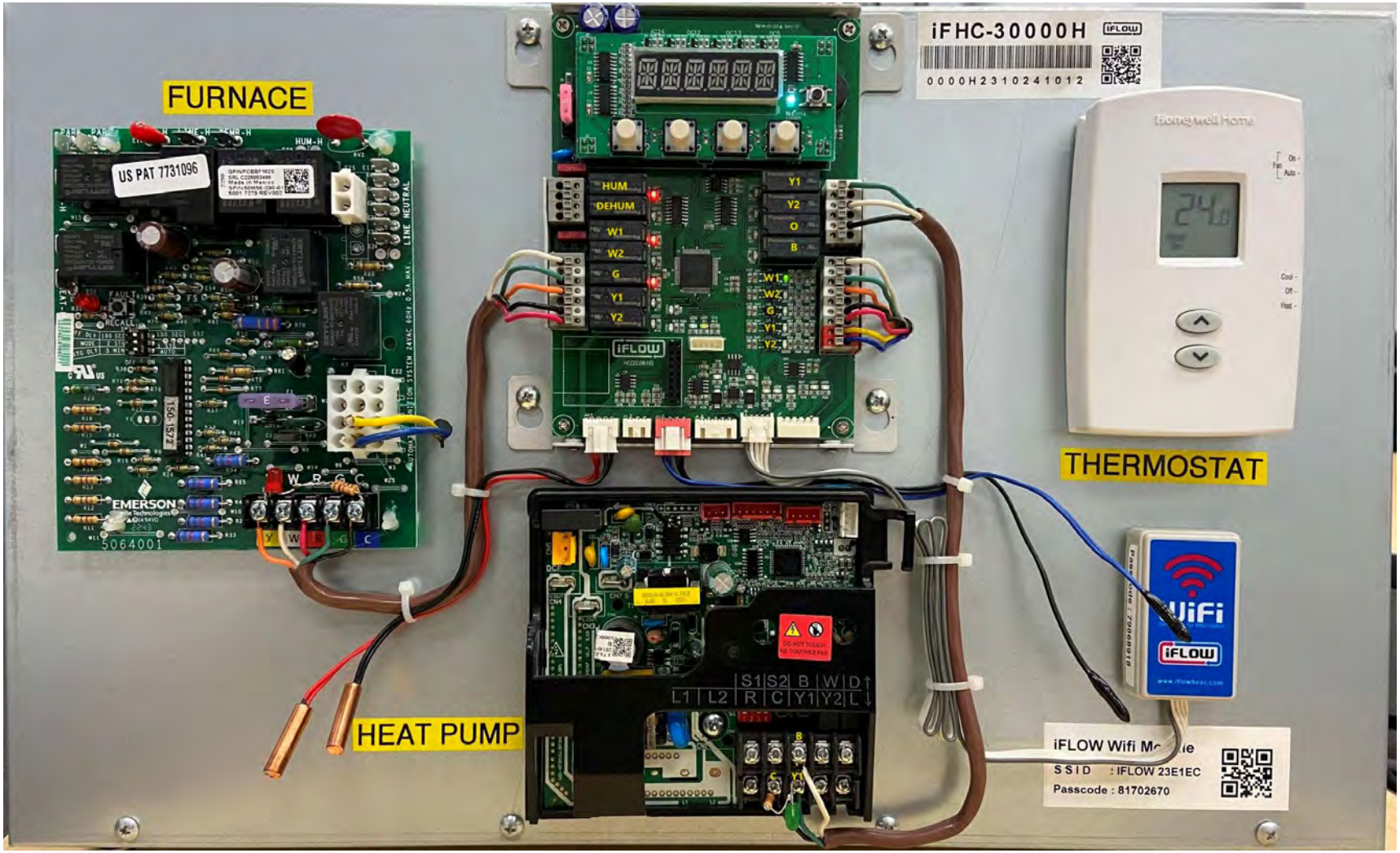


Call for heat at the thermostat W wire is indicated by the green LED. Heat Pump Y1 and Reversing Valve O, as well as the Y1 and G (and Humidifier HUM) contacts are energized as indicated by red LEDs



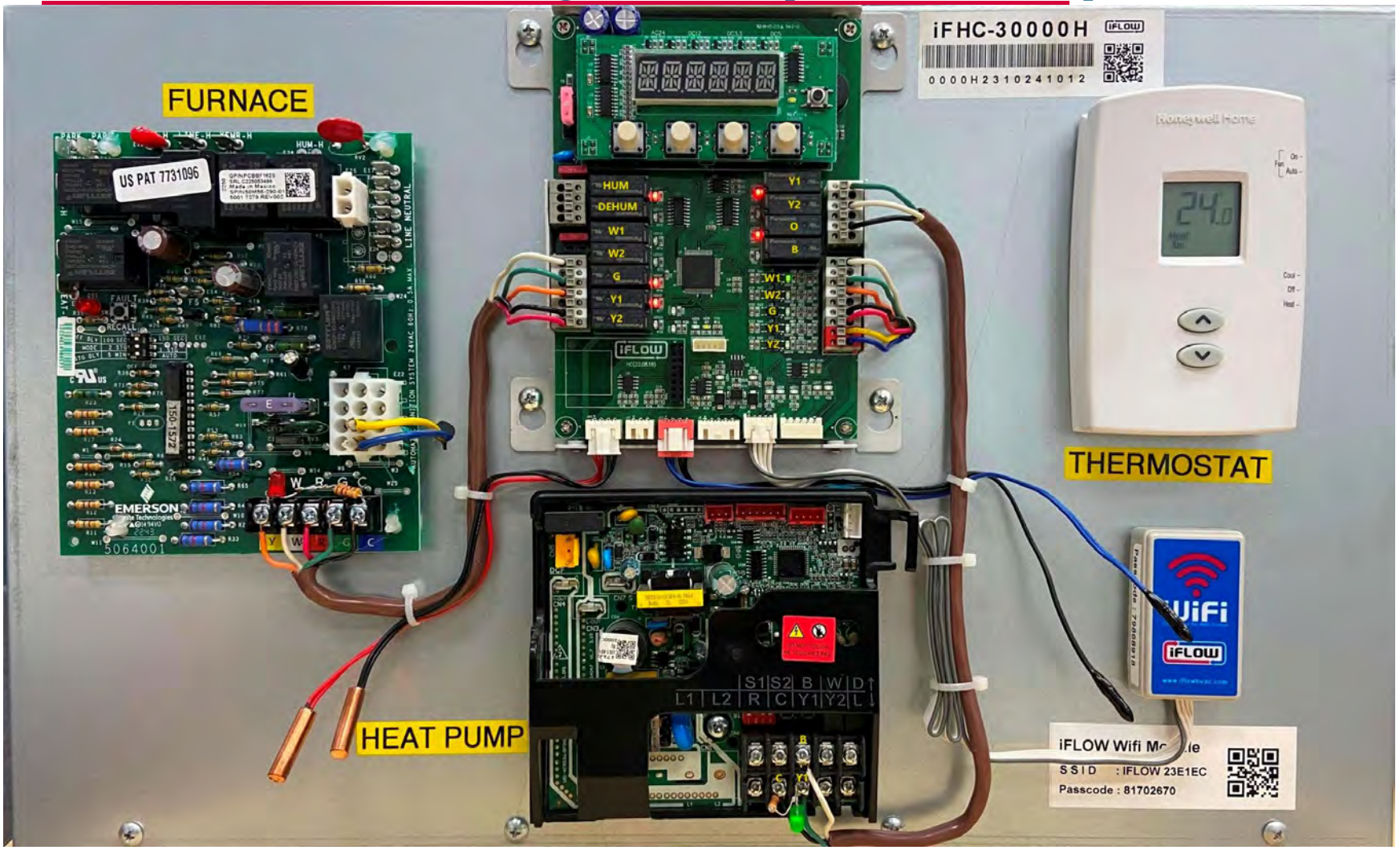
Smart Controller's Diagnostics (Furnace):

Call for heat at the thermostat W wire is indicated by the green LED. Furnace W1 and G (and Humidifier HUM) contacts are energized as indicated by red LEDs



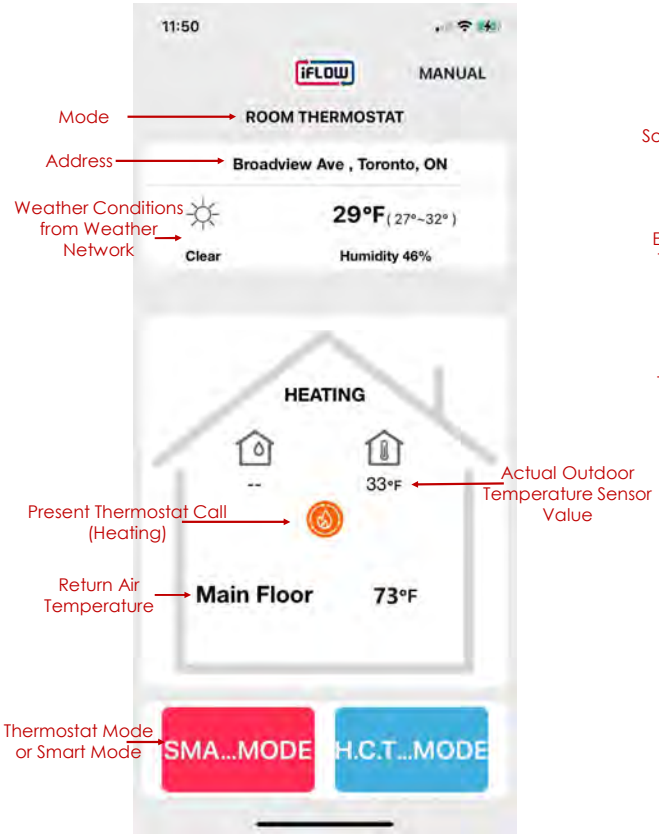
Smart Controller's Diagnostics (Heat Pump):

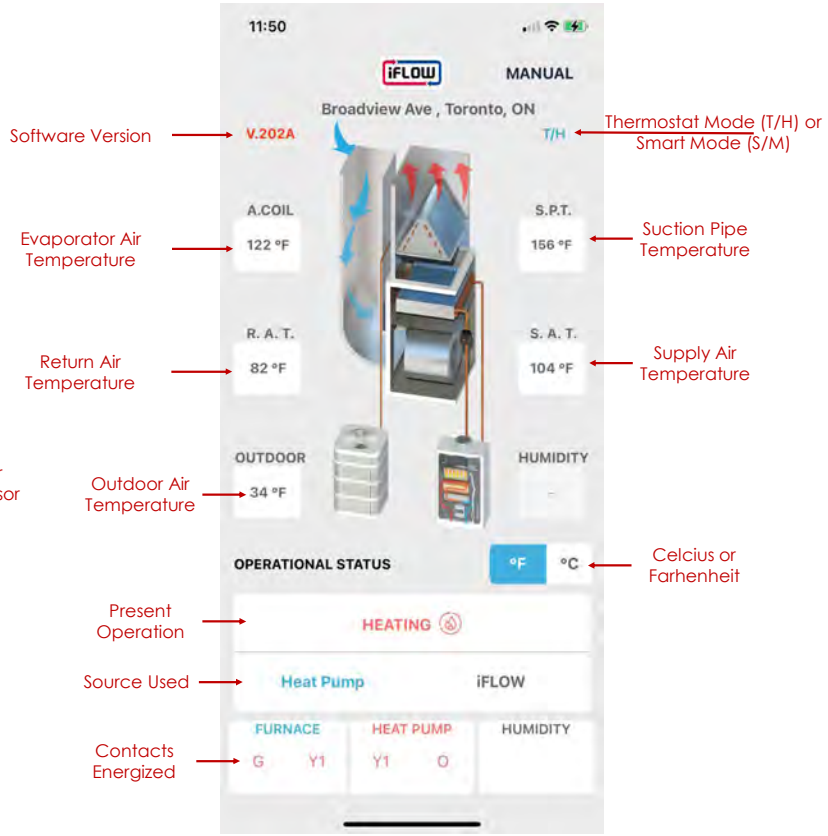
Call for heat at the thermostat W wire is indicated by the green LED. Heat Pump Y1 and Reversing Valve O, as well as the Y1 and G (and Humidifier HUM) contacts are energized as indicated by red LEDs

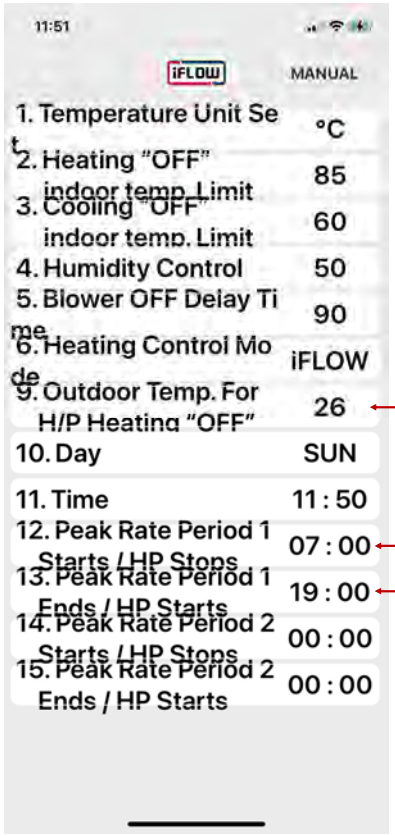


Smart Controller's Mobile Phone App:

- Another advantage of the iFLOW Smart Controller is the free smartphone APP; adjust and monitor remotely
- Available for iPhone or Android platforms;



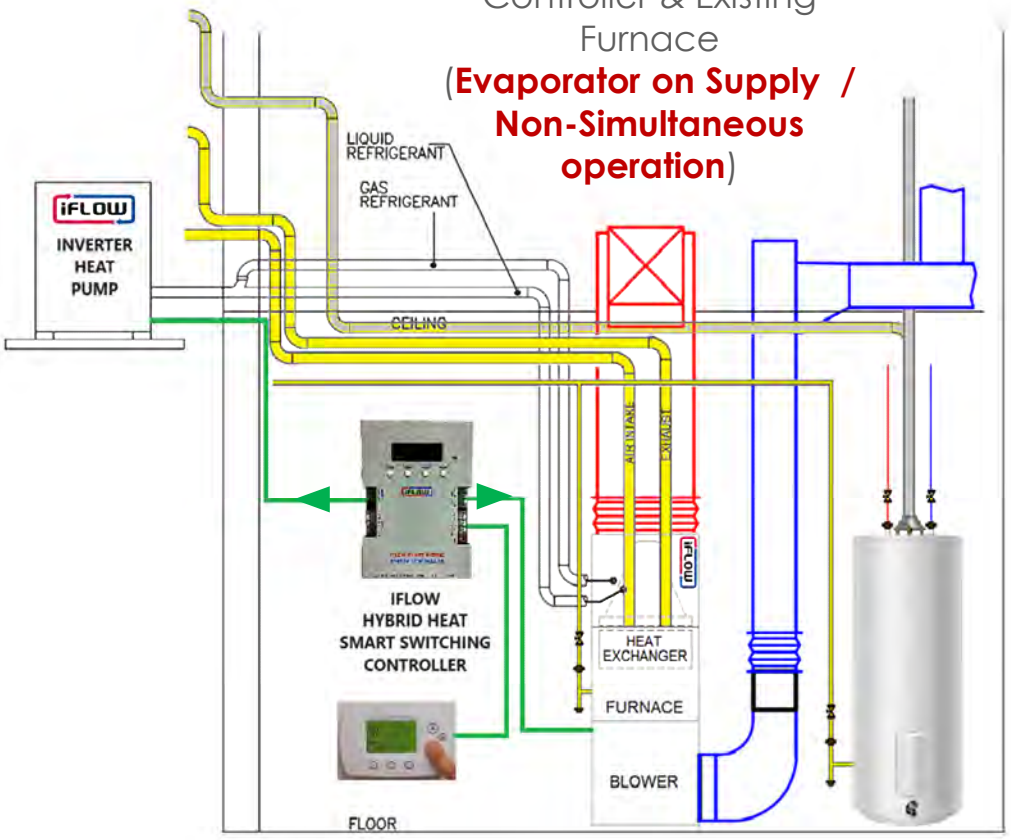




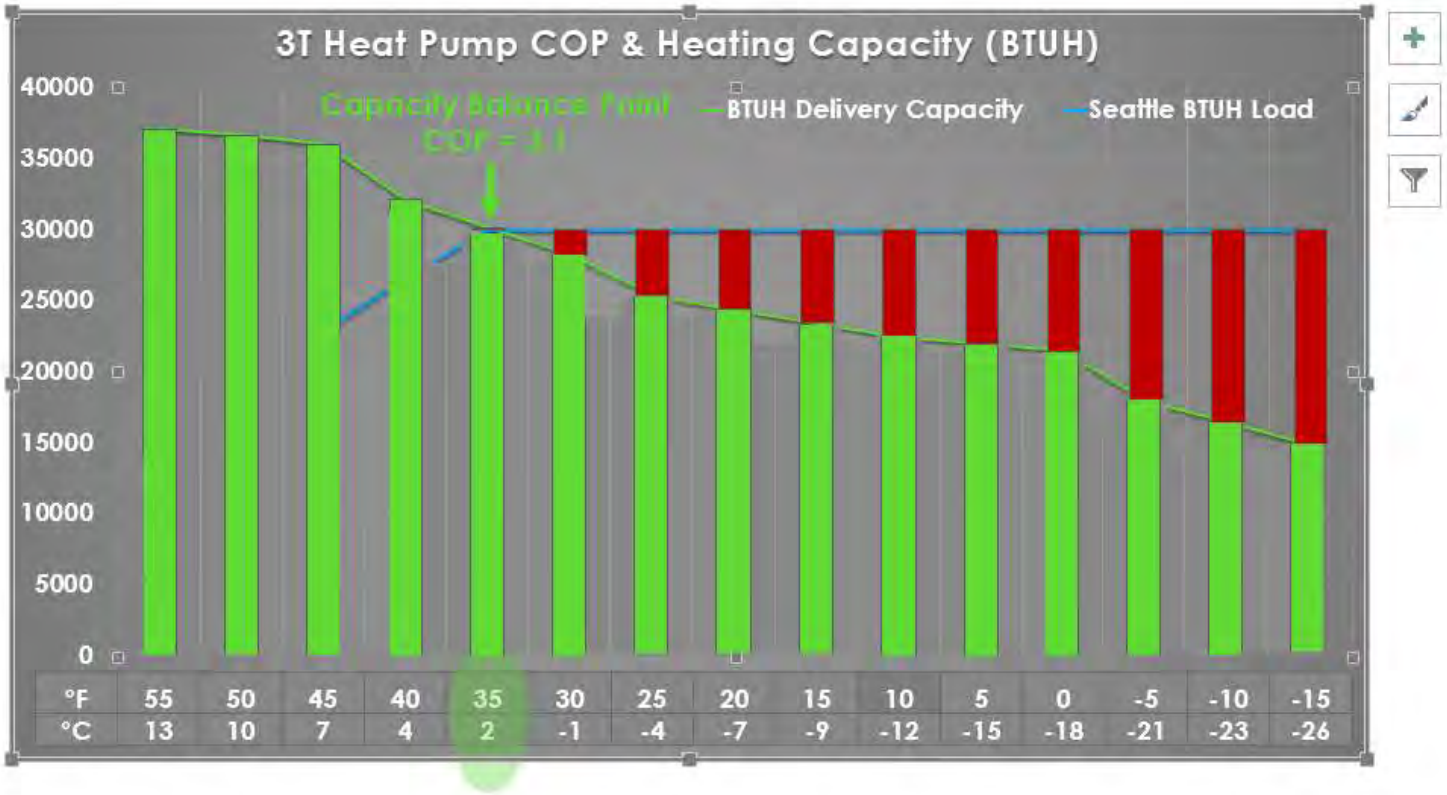
Unique Conceptual Installation of Simultaneous Heat Pump & Furnace Operation :

Operational Advantage:

New iFLOW Inverter Heat Pump with iFLOW Smart Controller & Existing Furnace (**Evaporator on Supply / Non-Simultaneous operation**)



Generic Regular Heat Pump COP & BTUH Capacity vs. Temperature:

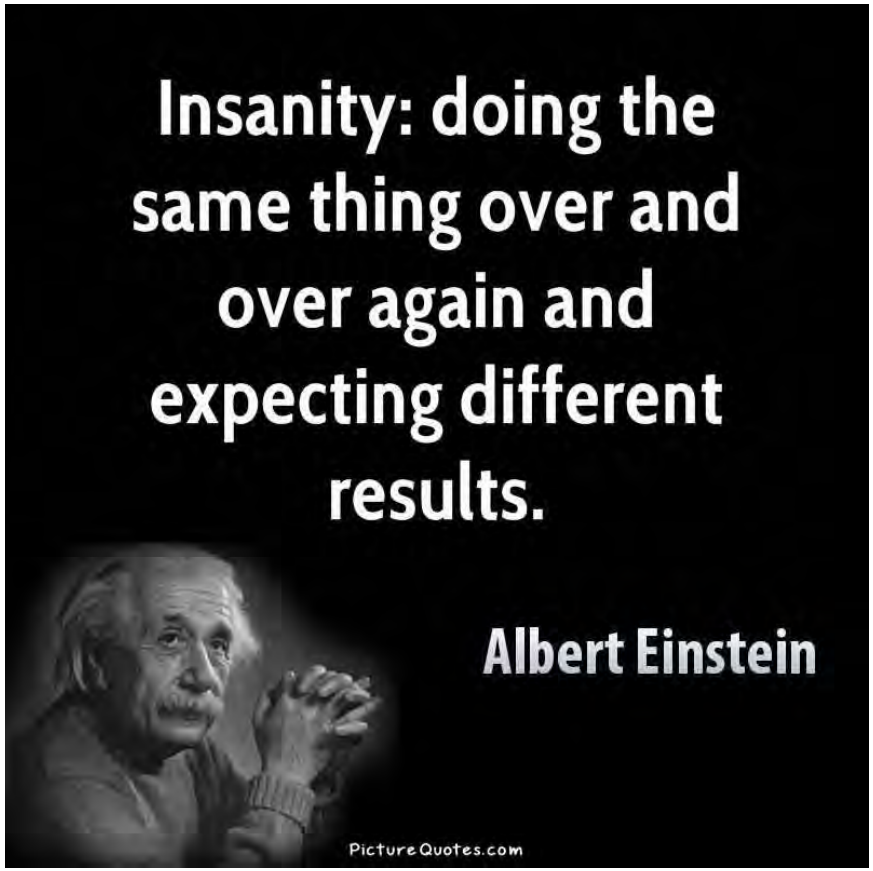


Why Consider a Combi-System?:

- It's about better HVAC Solutions: ***Better Comfort*** and ***Better Savings***...
- As we all know first hand, technology is changing rapidly and it is now an integral part of our lives...from smartphones, to cars that drive themselves, to rockets taking passengers into space, etc. etc...all things 20 years ago were just a dream...

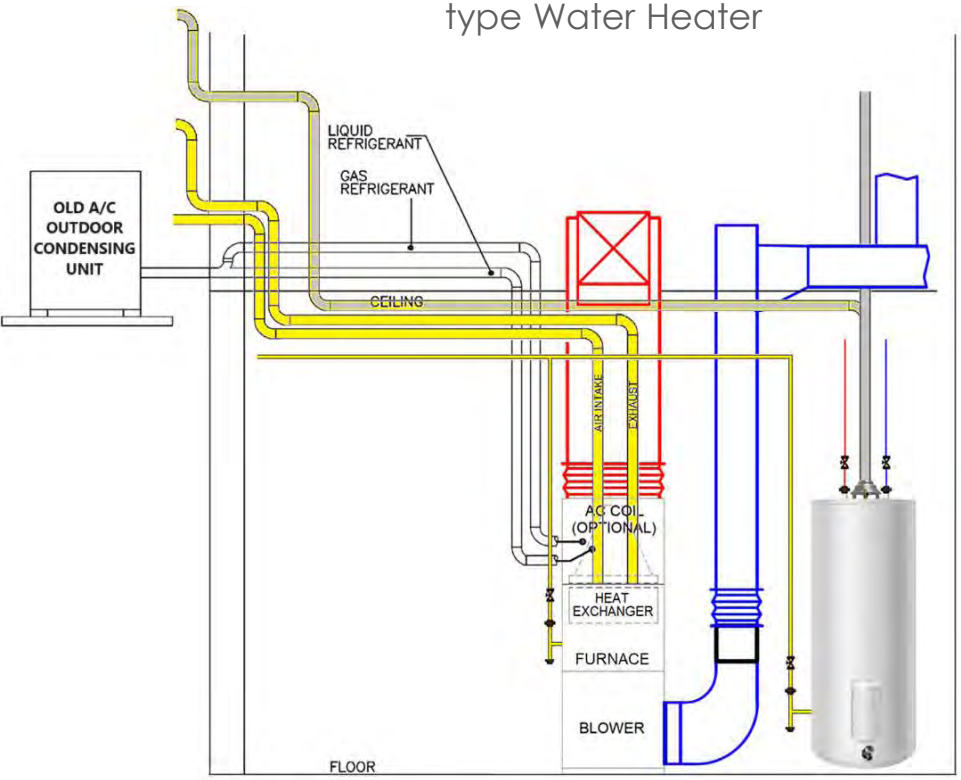
Houston…we have a problem:

This is 2023, there is new technology, there are better solutions…

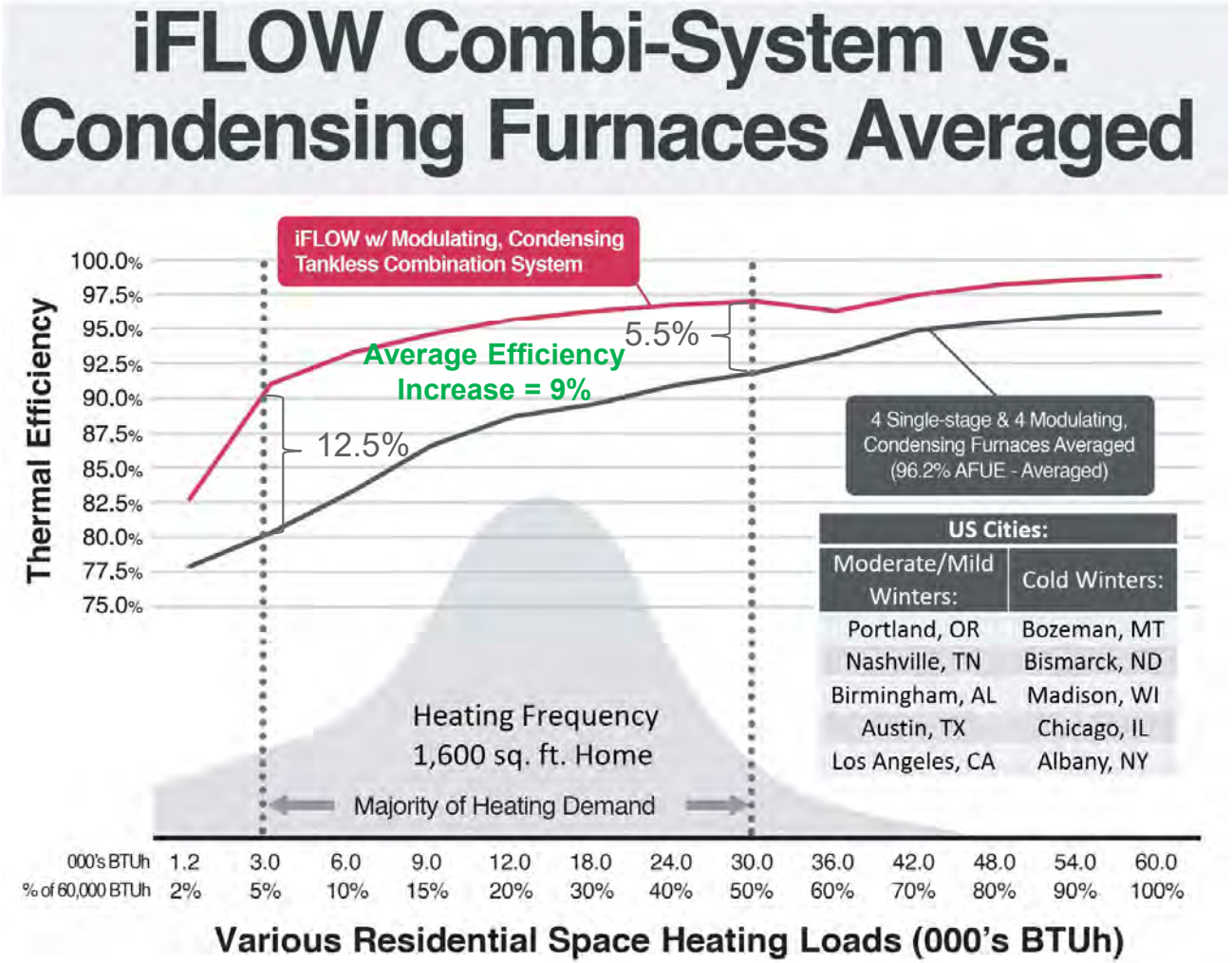


Conceptual Installation of a new iFLOW Heat Pump and iFLOW Hydronic Furnace with a new Condensing Tankless Water Heater:

Old Air Conditioner & Furnace with Tank-type Water Heater



Efficiency Performance Comparison:



https://conduitnw.org/Upload/RETACProducts/b1e526fa-3c49-4ced-a7d0-7e2ca9c4512aiFlowNavien%20Combi%20GTI%20Final%20Report%202019.08.05.pdf

The iFLOW Hybrid System:

Condensing Tankless Water Heater

iFLOW EZEE Plumbing Kit for Connecting the iFLOW Hydronic Furnace with any Condensing Tankless Water Heater

iFLOW Cased Evaporator Coils (must be matched for NRCAN rebate)

iFLOW Cold Climate Air Source Heat Pumps (ccASHP)

iFLOW Hydronic Furnace

All iFLOW Heat Pumps

Are designed for **Cold Climates** with the capability to provide whole home heating throughout the winter.

100%

heating output down to -4°F (-20°C) with COP up to 2.0

-22°F (-30°C)

Continuous operation down to as low as -22°F (-30°C)

Note: most regular air source heat pumps are able to deliver heat but only down to 5°F (-15°C), and even then, the actual BTUH delivery capacity and COPs are much less than its rated capacity.

Let's Apply Real Life: Single Stage Furnace

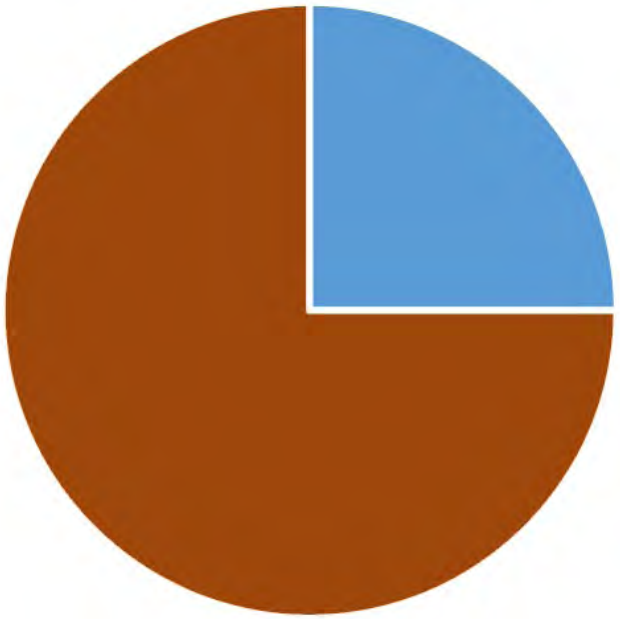
- Let's look at a home example with a total heating design load of 40,000 BTU/H (worst day of winter)
- A contactor installs a 95% AFUE, 60,000 BTU/H, single stage furnace (#1 selling furnace SKU in North America because it was a great price!...and that's what the wholesaler had in stock...)
- On a late October night, you may only need 15,000 BTU/H of heating...
- How is this furnace going to perform?
- Single stage means it comes on at 60,000 BTU/H; but you only need 15,000 BTU/H...that's 4x the heating needed...as such, it can only run for 25% of the time (60MBH/15MBH) or it will overheat the space...

Let's Apply Real Life: Single Stage Furnace

- If a 60,000 BTU/H, single stage furnace is installed, it operates at 1 output level, that's at 100% or 60,000 btu/h
- If 60,000 btu/h ÷ 60 min/hr = 1,000 btu/min...
- 60,000 = 1,000 btu/min...
- 60
- If the home only needs 15,000 btu/h, for how many minutes per hour can it run?
- 15,000 btuh ÷ 1,000 btu/min = 15 minutes per hour...
- If it runs longer, it will deliver too many btu/h and the room will be warmer; if runs less than 15 minutes, it won't provide enough heat...

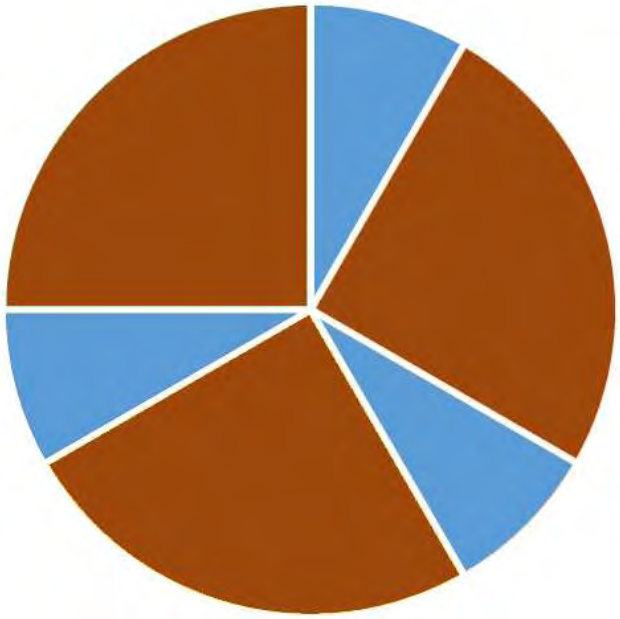
Let's Apply Real Life: Single Stage Furnace

- Scenario 1:



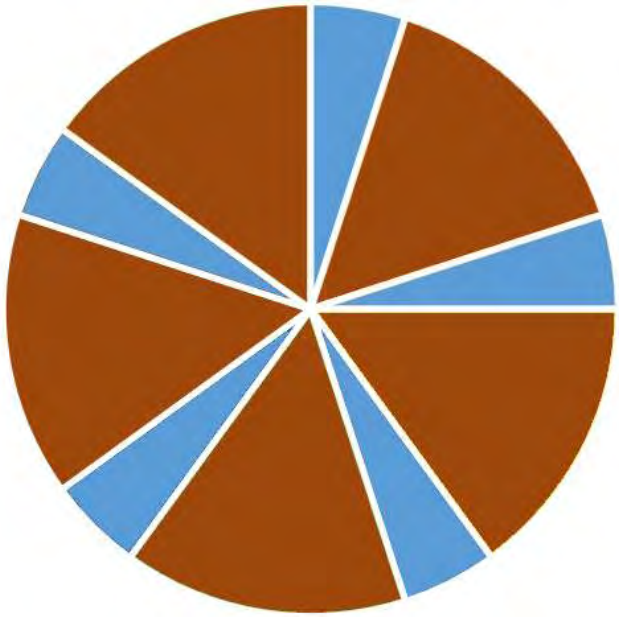
- 1 Cycle per hour
- On for 15 minutes
- Off for 45 minutes

- Scenario 2:



- 3 Cycles per hour
- On for 5 minutes
- Off for 15 minutes

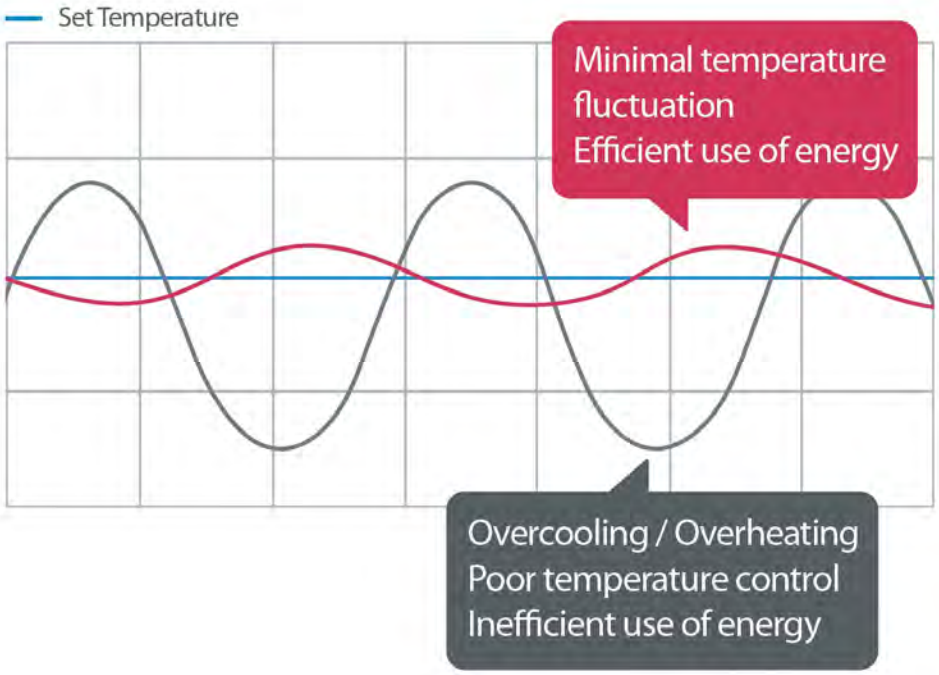
- Scenario 3:



- 5 Cycles per hour
- On for 3 minutes
- Off for 9 minutes

So What Does All of this Mean?:

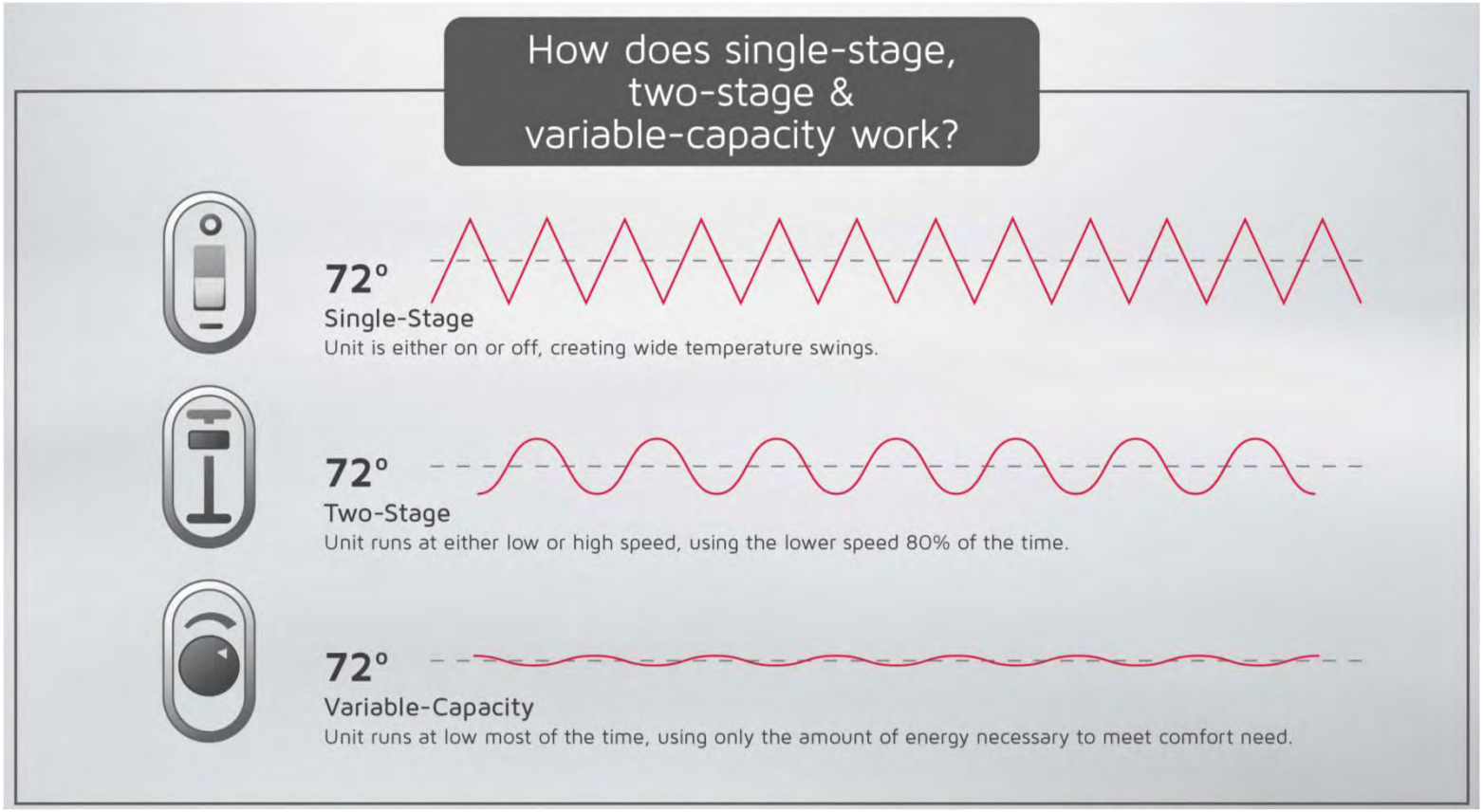
- Relating this to thermal comfort inside the home, it equates to 3 minutes of overheating, followed by 9 minutes of no heating, repeated 5 times each hour (wide temperature swings).



IT'S ALL ABOUT BETTER EFFICIENCY & BETTER COMFORT

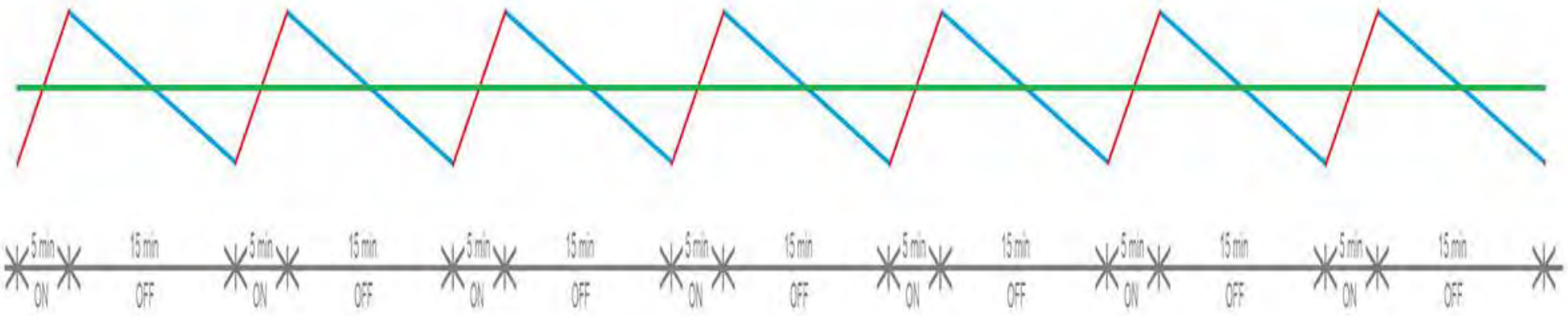
1-Stage, 2-Stage & Variable Capacity Furnaces

- From our friend's at Lennox's SLP99V brochure from 10/2021...



So What Does All of this Mean?:

- Relating this to thermal comfort inside the home, because of the modulation capability of the iFLOW-Navien combi-system, it equates to 60 minutes of steady comfortable heating, running at just the BTU/H needed for the entire hour with no temperature swing.
- iFLOW-Navien 15MBH temperature delivery performance is in **GREEN**



IT'S ALL ABOUT BETTER EFFICIENCY & BETTER COMFORT!

WE CAN DO BETTER!!:

iFLOW has your solutions…

Questions?

iFLOW Sales Contact:

iFLOW

iFLOW HVAC INC.

Steve Bagshaw

Mobile 949-419-4154
Toll Free 800-985-9227 Ext:102
e-mail steve.bagshaw@iflowhvac.com
29 Howden Road, Toronto, ON, M1R 3C7
www.iflowhvac.com

iFLOW Smart Hybrid Controller Warranty:

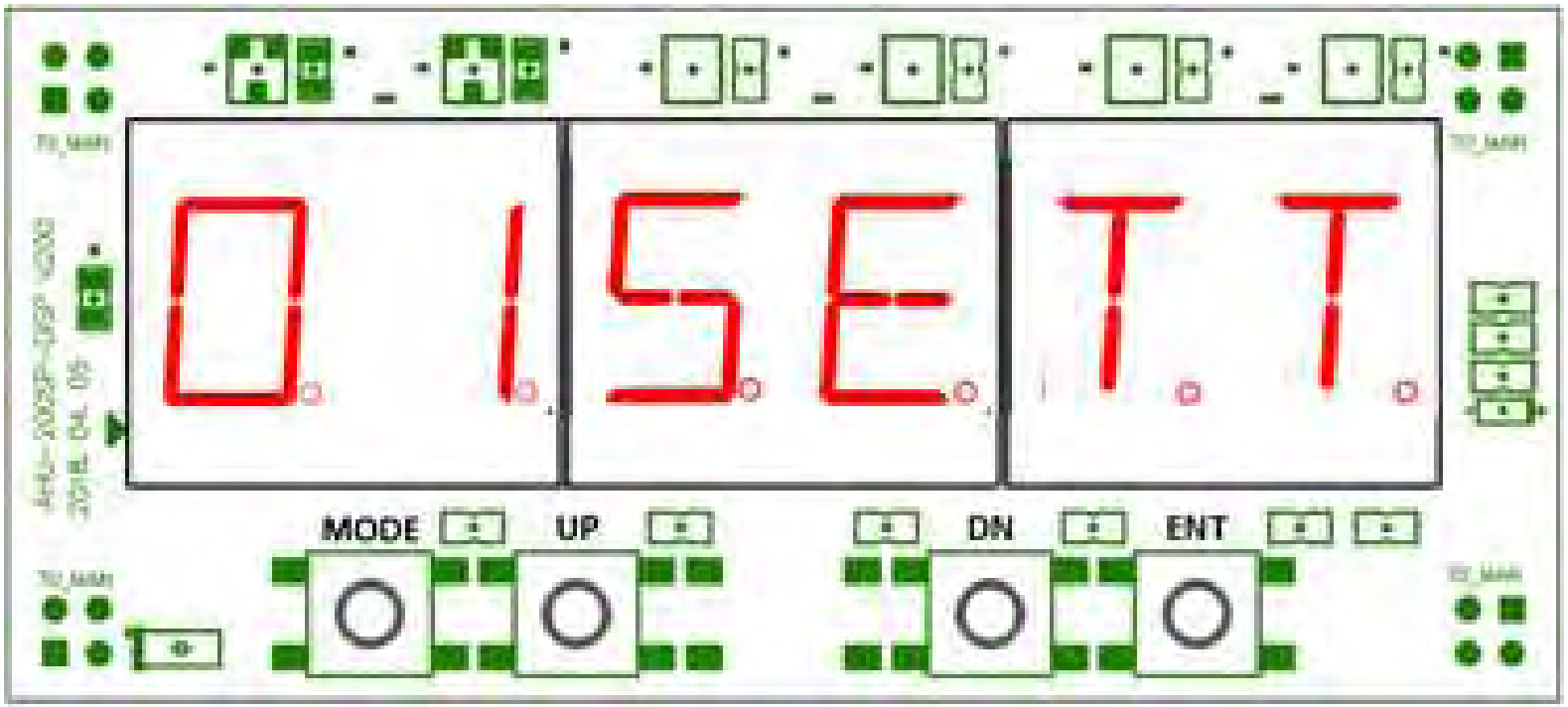
Warranty Recitals:

This warranty is to the original purchasing owner and subsequent owners only to the extent and as stated in the Warranty Conditions and below. The limited warranty period in years, depending on the part and the claimant, is as shown in the table below. iFLOW HVAC Inc. warrants this product against failure due to defect in materials or workmanship under normal use and maintenance as follows:

Warranty Registration	If Not Registered		If Registered*	
Components Covered	Original Owner	Subsequent Owners	Original Owner	Subsequent Owners
Smart Hybrid Heating Controller	1 year		2 years	

How to Access and Configure the iFLOW Smart Controller:

• The iFLOW Smart Controller has 4 buttons (MODE, UP, DOWN, ENTER) below the LED display used to navigate through the controller.



How to Access and Configure the iFLOW Smart Controller:

- Pressing the MODE button repeatedly will scroll through the MODE list.

1. Setting (SETT)	3. Error Codes (ERR)
2. Information (INFO)	4. Test Mode (TEST)

1. **SETT**ings mode offers settable parameters you can use to customize each and every installation.

2. **INFO**rmation mode gives the present operational state of the iFLOW; it shows all of the sensor valves.

3. **ERR**or code mode displays the present error.

4. **TEST** mode enables field testing without affecting any set parameters and is used for commissioning and troubleshooting. Nothing done is TEST mode is saved or stored.

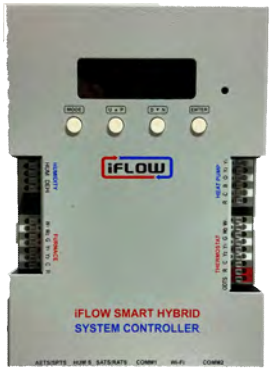
- When you arrive at a mode you would like to enter, press the '**ENTER**' button to confirm.

How to Access and Configure the iFLOW Smart Controller:

- Once you enter a mode, there will be 2 values displayed: the parameter number will be on the left side of the display and the parameter value will be on the right. Once you are in a 'mode', press the '**UP**' and '**DN**' (down) buttons to scroll all menu lists. Only the number that is flashing will respond to the '**UP**' and '**DN**' (down) buttons.

- When you wish to change a parameter value, press the '**ENTER**' button. This will switch the flashing between the parameter number (on left) and parameter value (on right).

- Then use the '**UP**' and '**DN**' (down) buttons to adjust the value. Press '**ENTER**' button to confirm any changes.



How to Access and Configure the iFLOW Smart Controller:

Item	Display	Value Range	Default
Temperature Unit of Measure Set	**01.UNIT**	0=°C, 1=°F	1
Select the temperature scale you wish to display: Celsius or Fahrenheit			

How to Access and Configure the iFLOW Smart Controller:

Item	Display	Value Range	Default
Heating Control Method Selection	**06.HTCM**	COP / By-Pass = BP / iFLOW = IFLW	COP
Select the method of heating control: there are 3 modes. 1) COP Mode: controller will operate the electric HP until the lower COP limit selected in parameter 8 below is reached. 2) Thermostat Bypass-to-Furnace Mode: this mode will bypass the iFLOW Smart Controller and will operate the furnace as if thermostat was directly connected. 3) iFLOW Mode: iFLOW will select heating method (gas furnace or electric heat pump) based on the outdoor temperature and 'peak electricity rate' avoidance. iFLOW will not run the heat pump if the outdoor temperature is below the temperature selected in parameter 9, nor if the call for heat occurs during a 'peak electricity rate' period.			

How to Access and Configure the iFLOW Smart Controller:

Item	Display	Value Range	Default
Heat Pump Manufacturer and Model Selection	**07.HPMS**	Example: CP36	DEF (default = average COP curve)
Select Heat Pump Manufacturer and model from the list. Select the 4 digit code (first 2 digits for manufacturer and last 2 digits for Heat Pump BTU (ex. CP18 = ComfortStar 18,000 BTUH (1.5Ton) model): COMFORTSTAR: CP18 (CPR1.5Ton), CP24(CPR2Ton), CP30(CPR2.5Ton), CP36(CPR3Ton), CP48(CPR4Ton), CP60(CPR5Ton) GOODMAN: GZ18(GSZ16018B), GZ24(GSZ160241B), GZ30(GSZ160301B), GZ36(GSZ160361B), GZ42(GSZ16421B), GZ48(GSZ160481B), GZ60(GSZ160601B),GS24(GSZC180241), GS36(GSZC180361), GS60(GSZC180601), GV24(GVZC200241A), GV36(GVZC200361A), GV48(GVZC200481A), GV60(GVZC200601A)			

How to Access and Configure the iFLOW Smart Controller:

Item	Display	Value Range	Default
Enter Minimum COP Value for Switchover to Furnace	**08.COPS**	1.1~6.0 COP	2.5
Based on the performance capacity and economic balance points of your Heat Pump, set the lowest COP value at which you wish the heat pump to operate. When the iFLOW receives a call for heating, it will first check the set COP value; if the actual COP value is at or above this set COP value, iFLOW will call on the Heat Pump for heating. If the actual COP value is below this set temperature, iFLOW will call on the furnace.			

How to Access and Configure the iFLOW Smart Controller:

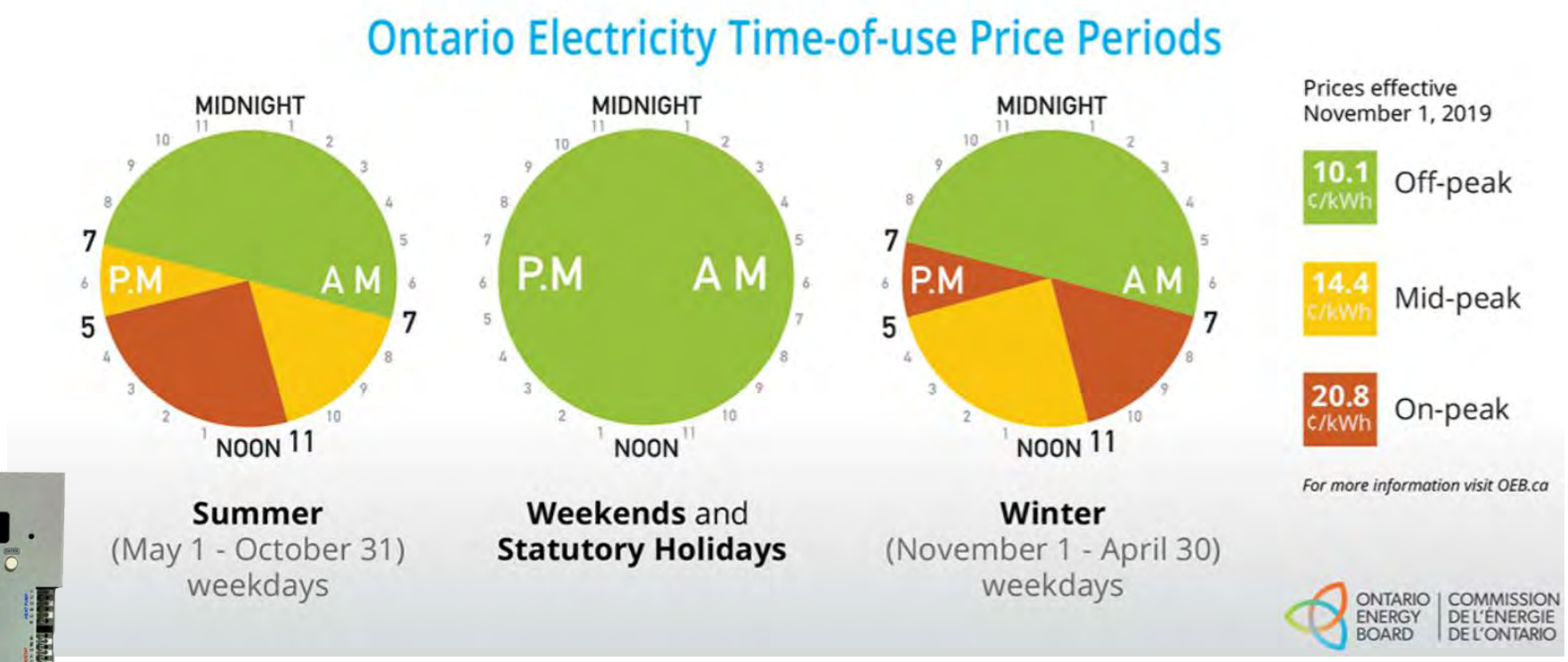
Item	Display	Value Range	Default
Outdoor Temperature for 'H/P Heating OFF'	**09.OTHO**	0 – 41°F (-18°C to 5°C)	32°F (0°C)
Set the lowest outdoor temperature at which you wish the heat pump to operate. If in iFLOW mode (parameter 7), when the iFLOW receives a call for heating, it will first check the outdoor temperature: if the outdoor temperature is at or above this set temperature, iFLOW will call on the Heat Pump for electric heating. If below, iFLOW will call on the furnace for gas heating.			

How to Access and Configure the iFLOW Smart Controller:

Item	Display	Value Range	Default
Day	**10.DAY**	SUN, MON, TUE, WED, THU, FRI, SAT	SUN
Set current day of the week			
Time	**11.TIME**	HH:0~24, MM:0~59	0:00
Set current time (24 hour clock)			

How to Access and Configure the iFLOW Smart Controller:

Electricity time-of-use price periods in Ontario



How to Access and Configure the iFLOW Smart Controller:

Electricity Rates:

- Ultra Low
- Mid-peak
- On-peak
- Mid-peak
- Off-Peak
- Ultra Low

Time Period:			Day of the Week (Winter Season (Nov. 1-April 30):						
From:	Until:	Hour #:	Sunday (Su)	Monday (M)	Tuesday (Tu)	Wednesday (W)	Thursday (Th)	Friday (F)	Saturday (Sa)
12:00:00 AM	1:00:00 AM	1	HP	HP	HP	HP	HP	HP	HP
1:00:00 AM	2:00:00 AM	2	HP	HP	HP	HP	HP	HP	HP
2:00:00 AM	3:00:00 AM	3	HP	HP	HP	HP	HP	HP	HP
3:00:00 AM	4:00:00 AM	4	HP	HP	HP	HP	HP	HP	HP
4:00:00 AM	5:00:00 AM	5	HP	HP	HP	HP	HP	HP	HP
5:00:00 AM	6:00:00 AM	6	HP	HP	HP	HP	HP	HP	HP
6:00:00 AM	7:00:00 AM	7	HP	HP	HP	HP	HP	HP	HP
7:00:00 AM	8:00:00 AM	8	HP	GAS	GAS	GAS	GAS	GAS	HP
8:00:00 AM	9:00:00 AM	9	HP	GAS	GAS	GAS	GAS	GAS	HP
9:00:00 AM	10:00:00 AM	10	HP	GAS	GAS	GAS	GAS	GAS	HP
10:00:00 AM	11:00:00 AM	11	HP	GAS	GAS	GAS	GAS	GAS	HP
11:00:00 AM	12:00:00 PM	12	HP	GAS	GAS	GAS	GAS	GAS	HP
12:00:00 PM	1:00:00 PM	13	HP	GAS	GAS	GAS	GAS	GAS	HP
1:00:00 PM	2:00:00 PM	14	HP	GAS	GAS	GAS	GAS	GAS	HP
2:00:00 PM	3:00:00 PM	15	HP	GAS	GAS	GAS	GAS	GAS	HP
3:00:00 PM	4:00:00 PM	16	HP	GAS	GAS	GAS	GAS	GAS	HP
4:00:00 PM	5:00:00 PM	17	HP	GAS	GAS	GAS	GAS	GAS	HP
5:00:00 PM	6:00:00 PM	18	HP	GAS	GAS	GAS	GAS	GAS	HP
6:00:00 PM	7:00:00 PM	19	HP	GAS	GAS	GAS	GAS	GAS	HP
7:00:00 PM	8:00:00 PM	20	HP	HP	HP	HP	HP	HP	HP
8:00:00 PM	9:00:00 PM	21	HP	HP	HP	HP	HP	HP	HP
9:00:00 PM	10:00:00 PM	22	HP	HP	HP	HP	HP	HP	HP
10:00:00 PM	11:00:00 PM	23	HP	HP	HP	HP	HP	HP	HP
11:00:00 PM	12:00:00 AM	24	HP	HP	HP	HP	HP	HP	HP

How to Access and Configure the iFLOW Smart Controller:

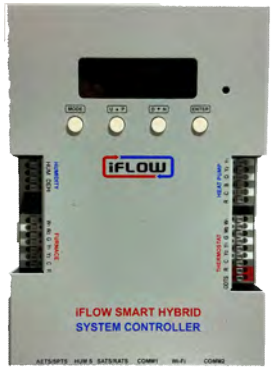
Item	Display	Value Range	Default
To Turn H/P OFF at Start of Electricity 'Peak Rate' Period 1	**12.PR1S**	00:00~24:00	00:00
If the electric utility has peak rates and you do not want to run your electric heat pump during that time, use this function to stop operating the heat pump at the beginning of the 'peak' rate period 1. (Refer to your electric utility's Time-of-Use Pricing and Schedule). Select the start time of the 'peak rate' Period 1.			
To Turn H/P ON at End of Electricity 'Peak Rate' Period 1	**13.PR1E**	00:00~24:00	00:00
Use this function to start operating the heat pump again at end of the 'peak' rate period 1. Select the end time of the 'peak rate' Period 1.			

How to Access and Configure the iFLOW Smart Controller:

Item	Display	Value Range	Default
To Turn H/P OFF at Start of Electricity 'Peak Rate' Period 2	**14.PR2S**	00:00~24:00	00:00
If the electric utility has a second peak rate period and you do not want to run your electric heat pump during that time, use this function to stop operating the heat pump at the beginning of the 'peak' rate period 2. (Refer to your electric utility's Time-of-Use Pricing and Schedule). Select the start time of the 'peak rate' Period 2.			
To Turn H/P ON at End of Electricity 'Peak Rate' Period 2	**15.PR2E**	00:00~24:00	00:00
Use this function to start operating the heat pump again at end of the 'peak' rate period 2 (started above). Select the end time of the 'peak rate' Period 1.			

How to Access and Configure the iFLOW Smart Controller:

Item	Display	Value Range	Default
Method of Internet / Network Connection	**16.NETW**	OFF= Pairing Mode ON=WIRELESS (Wi-Fi)	OFF= Pairing Mode
Use this function to select a wired or wireless connection to the internet. NOTE: the iFLOW Smart Controller operates only on a 2.4GHz band.			



How to Access and Configure the iFLOW Smart Controller:

Item	Display	Value Range	Default
Smart Mode Using iFLOW App	**17.SMRT**	ON, OFF	OFF
Smart Mode circulates air continuously through the home and relies on the return air temperature sensor to indicate if more or less heating/cooling is required. Set desired temperature and set back on the iFLOW App.			

How to Access and Configure the iFLOW Smart Controller:

Item	Display	Value Range	Default
Home Comfort Mode Using RATS	18.HCTC	OFF/HEATING/COOLING	OFF
In iFLOW Home Comfort Mode, select Heating, Cooling or OFF as you would on a regular thermostat. When heating or cooling is selected, iFLOW then circulates air continuously through the home and relies on the return air temperature sensor to dictate if more or less heating/cooling is required. This is a much more accurate reading of the home's entire temperature than just a room thermostat that relies only on that room's temperature. Set desired temperature on the iFLOW Smart Controller.			

The Times They Are A-Changin'

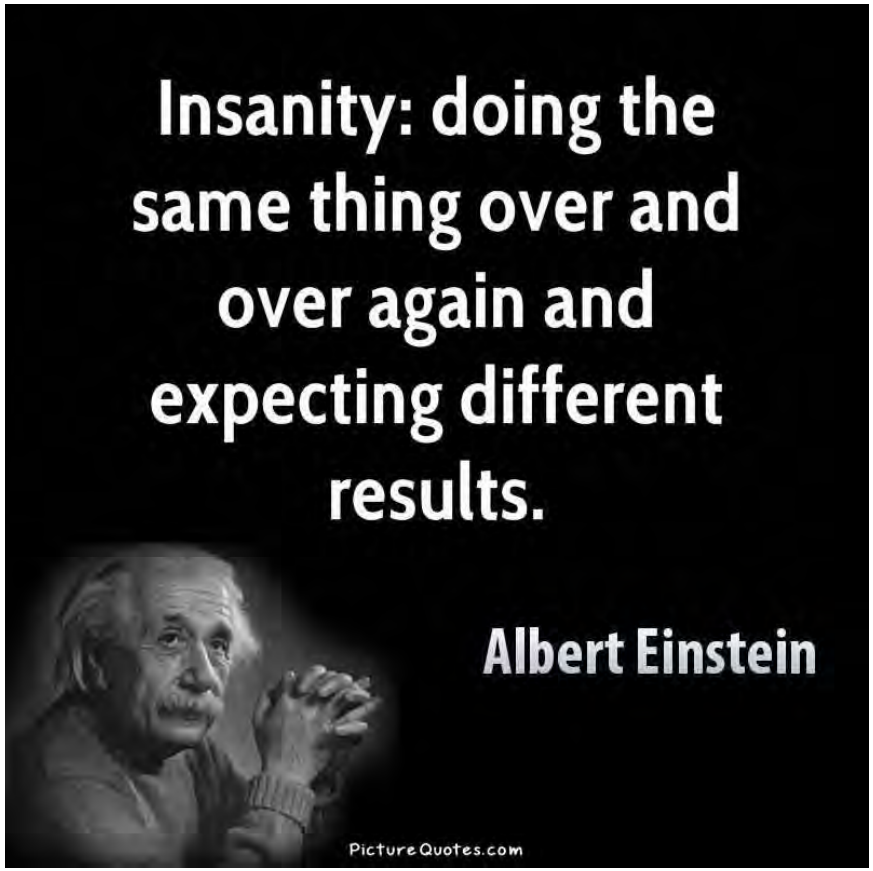
(Song Title By Bob Dylan)

Why Consider a Combi-System?:

- It's about better HVAC Solutions: ***Better Comfort*** and ***Better Savings***...
- As we all know first hand, technology is changing rapidly and it is now an integral part of our lives...from smartphones, to cars that drive themselves, to rockets taking passengers into space, etc. etc...all things 20 years ago were just a dream...

Houston…we have a problem:

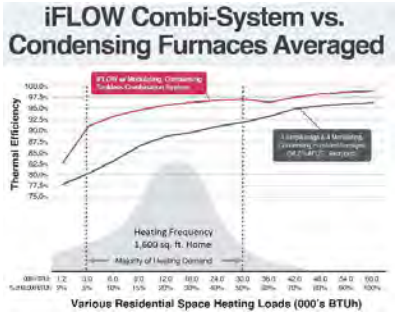
This is 2023, there is new technology, there are better solutions…



WE CAN DO BETTER!!:

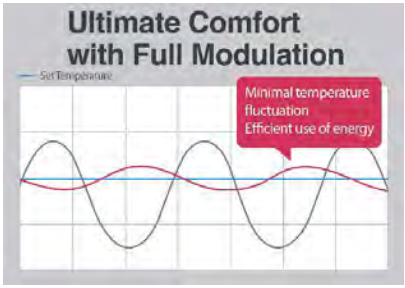
iFLOW has your solutions…

HVAC *EVOLUTION*?



HVAC *REVOLUTION*?

EITHER WAY, JUST *BETTER HVAC SOLUTIONS*...



Questions?

iFLOW Sales Contact:

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e-mail steve.bagshaw@iflowhvac.com
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