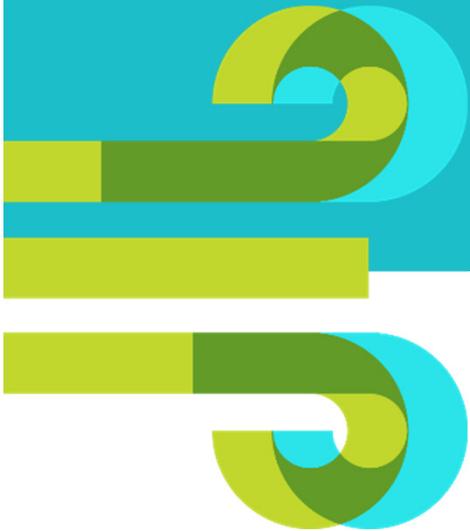


# T028 AHR Expo Findings

MARCH 18, 2020



Bonneville  
POWER ADMINISTRATION



# AGENDA

1. Goals and Methodology
2. Review Key Findings

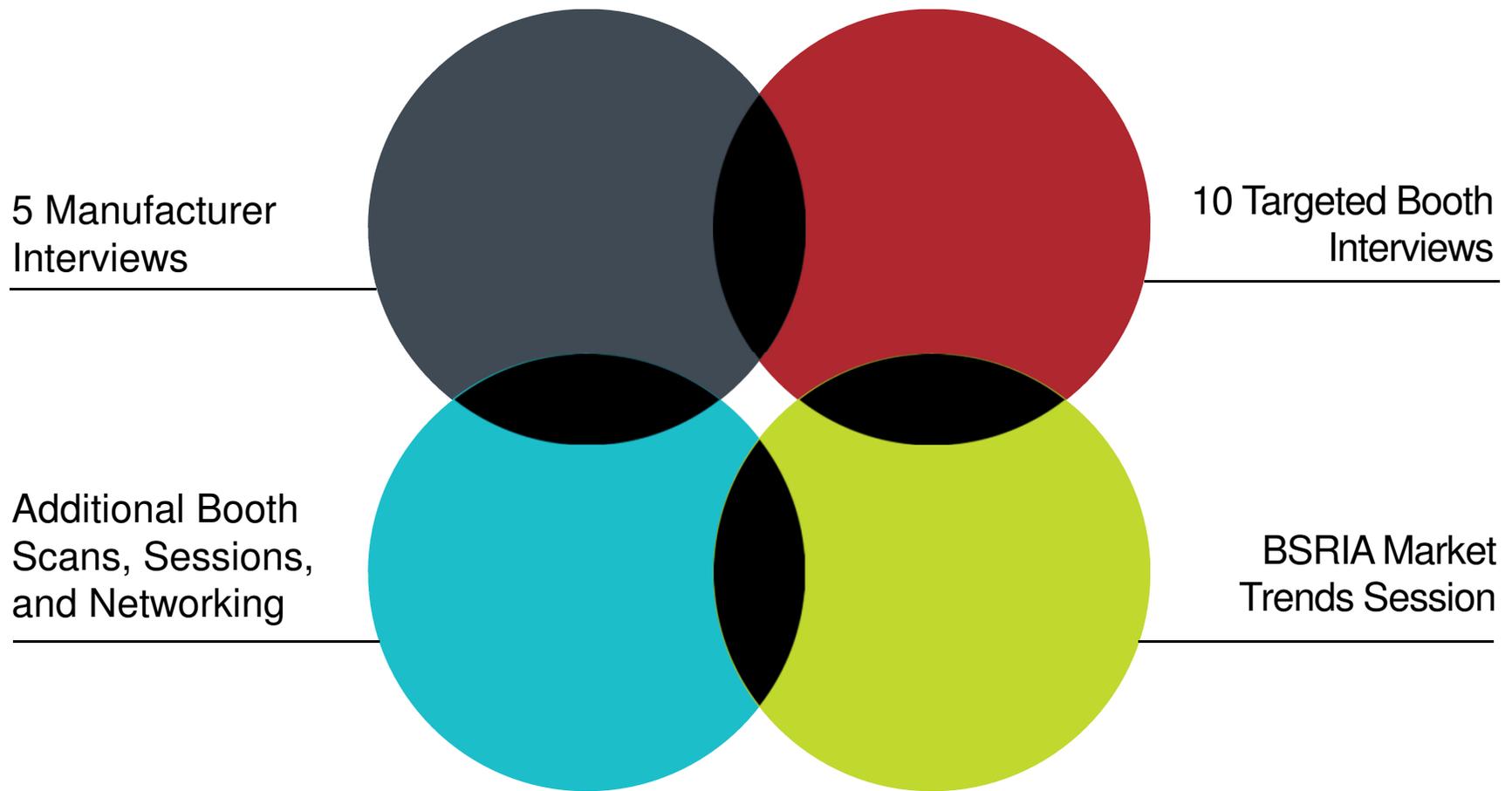
# GOALS FOR ATTENDING AHR

Identify key trends in HVAC from the manufacturer perspective

- › Where is the market changing?
- › What is driving market change?
- › Where are the future opportunities?

Confirm and verify existing market model estimates and assumptions

# METHODOLOGY



# IMPORTANT REMINDERS



Findings are based on statements from manufacturers interviewed at the AHR Expo



Any numbers and percentages presented are anecdotal, unless otherwise cited.

# Key Findings

The HVAC market is changing, but not quickly

Several factors impact current market changes

Upcoming changes could shape the future HVAC market

Distribution channels consistent with current assumptions

# KEY FINDINGS



# CURRENT MARKET CONDITIONS

**The HVAC market is changing, but not quickly**

Several factors impact current market changes

Upcoming changes could shape the future HVAC market

Distribution channels consistent with current assumptions



# RESIDENTIAL SPLIT SYSTEMS ARE GROWING



# TRENDS IN PORTABLE AC



Increase in portable cooling in previously non-cooling focused markets (BSRIA)



Manufacturers reported a trend away from portable cooling and toward ASHP and DHPs

# VRF continues to grow in commercial market

VRF showed largest growth of any technology in 2019

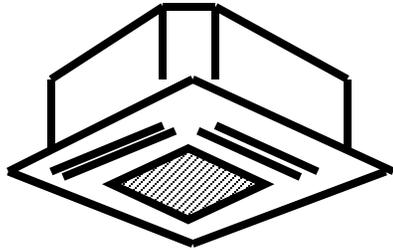
Changes in refrigerant requirements could introduce uncertainty



**Consistent with 2018 and 2019 findings**

# VRF VS. DHP IN COMMERCIAL APPLICATIONS

## VRF



- › Simultaneous heating and cooling
- › Low incremental cost vs. multi-zone DHP

## DHP



- › Single zone areas without ducting

# WATER-SOURCE HEAT PUMPS VS VRF



WSHP are a small percent of sales and relatively flat

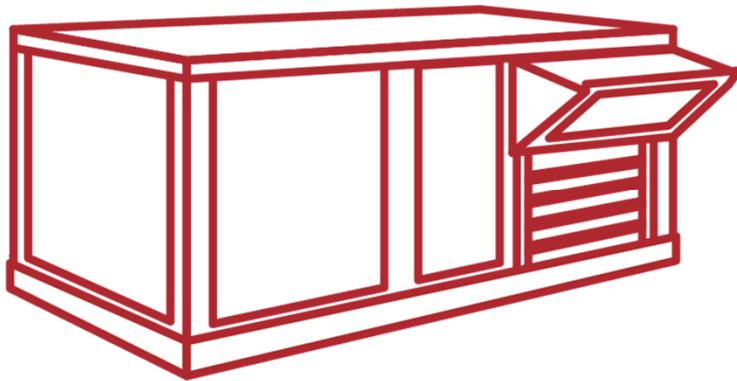


More traction in high-rise and multifamily buildings

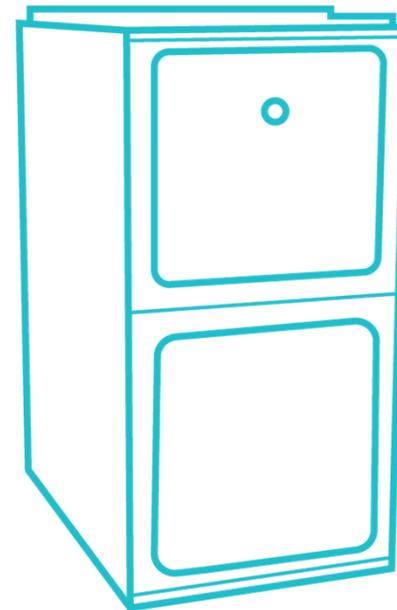


WSHP manufacturers focus on future electrification trends and the need for non-refrigerant solutions

# Standard efficiency isn't going away anytime soon



**Commercial**



**Residential**



Consistent with 2018 and 2019 findings



# FORCES OF MARKET CHANGE

The HVAC market is changing, but not quickly

**Several factors impact current market changes**

Upcoming changes could shape the future HVAC market

Distribution channels consistent with current assumptions

# What's preventing market change?

Manufacturers offer energy efficient products, but there is a gap in installation/specifying



- › Lack of installer knowledge,
- › Architects/engineers not specifying EE equipment
- › **So, what moves the market forward?**

AHRI Standard 340/360

2015 Standard for Performance Rating of Commercial and Industrial Unitary Air-conditioning and Heat Pump Equipment

AHRI CERTIFIED®  
www.ahridirectory.org

Variable Refrigerant Flow (VRF) Multi-Split AC and HP  
AHRI Standard 1230

[6450-01-P]

DEPARTMENT OF ENERGY

10 CFR Part 431

[Docket Numbers EERE-2013-BT-STD-0007 and EERE-2013-BT-STD-0021]

RIN: 1904-AC95 and 1904-AD11

Energy Conservation Program for Certain Industrial Equipment: Energy Conservation Standards for Small, Large, and Very Large Air-Cooled Commercial Package Air Conditioning and Heating Equipment and Commercial Warm Air Furnaces

AGENCY: Office of Energy Efficiency and Renewable Energy, Department of Energy.

AHRI HOPE Act final rule.

# CODES, STANDARDS, AND REGULATIONS SHIFT THE MARKET FROM THE BOTTOM UP.

## Energy Code

### 2015 Washington State Energy Code

WAC 51-11C (Commercial)

WAC 51-11R (Residential)

### Appendix Chapters

Based on the 2015 ICC, "Residential" includes One- and Two-family dwellings, Townhouses and Group R-2 and R-3 buildings three stories or less "Commercial" includes all buildings not covered under "Residential"  
(Effective July 1, 2015)

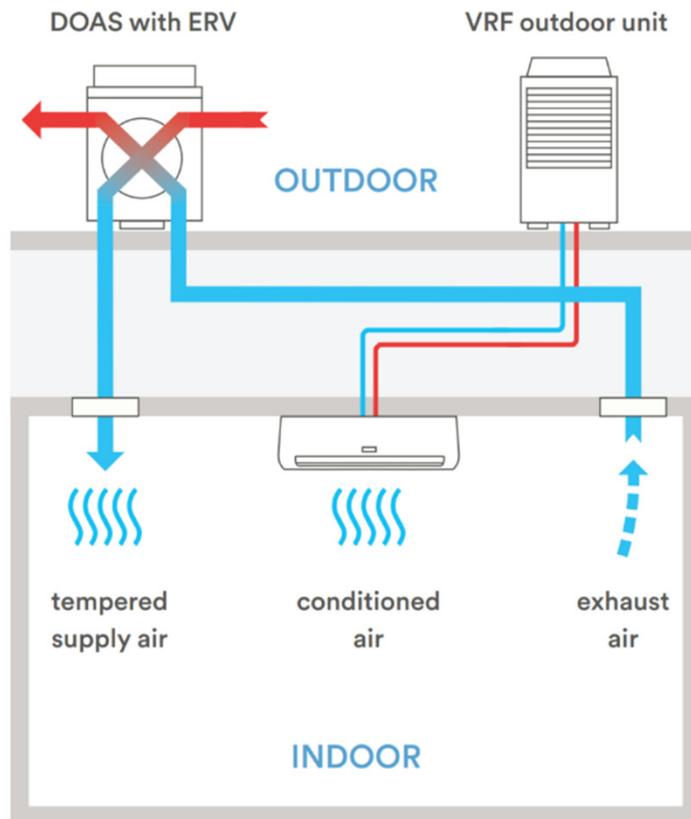
California begins planning for transition away from natural gas

Hallory Murch | Jan 22, 2020 | Updated Jan 22, 2020 6:38 p.m.



~ Consistent with 2018 and 2019 findings

# Codes causing rise in DOAS



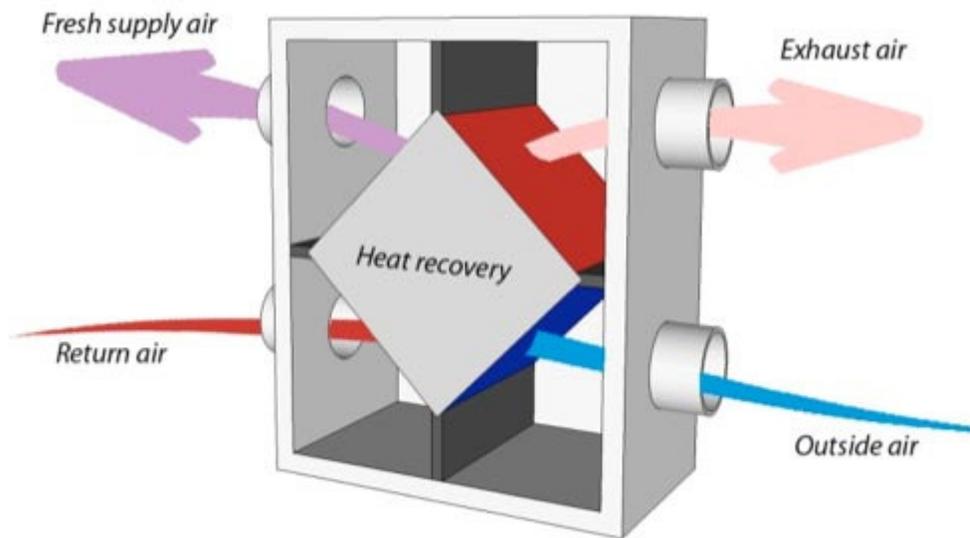
VRF/DOAS  
manufacturer  
distribution  
partnerships are  
emerging

- › Mitsubishi & Trane
- › Fujitsu & Rheem
- › Midea & Carrier

# Codes causing rise in heat recovery

## HRV/ERV Efficiency Ranges:

- › Low efficiency: 40-50%
- › Average efficiency: 50-70%
- › High efficiency: 70-80+%



## › Wheels

- › Make up most of the market (80% estimated)
- › Easier to clean and maintain and achieve higher efficiencies

## › Plate HEX

- › Crossflow HEX make up the majority of plate HEX
- › Few counterflow plate HEX featured
- › Manage odor control and cross-contaminants better

# MISCONCEPTIONS ABOUT CODES, STANDARDS, AND REGULATIONS

## Refrigerants

Fears about refrigeration requirements  
changing/upcoming bans

## RTUs

2023 Commercial Unitary System Standard Update

## VRF

Changes to VRF test procedure

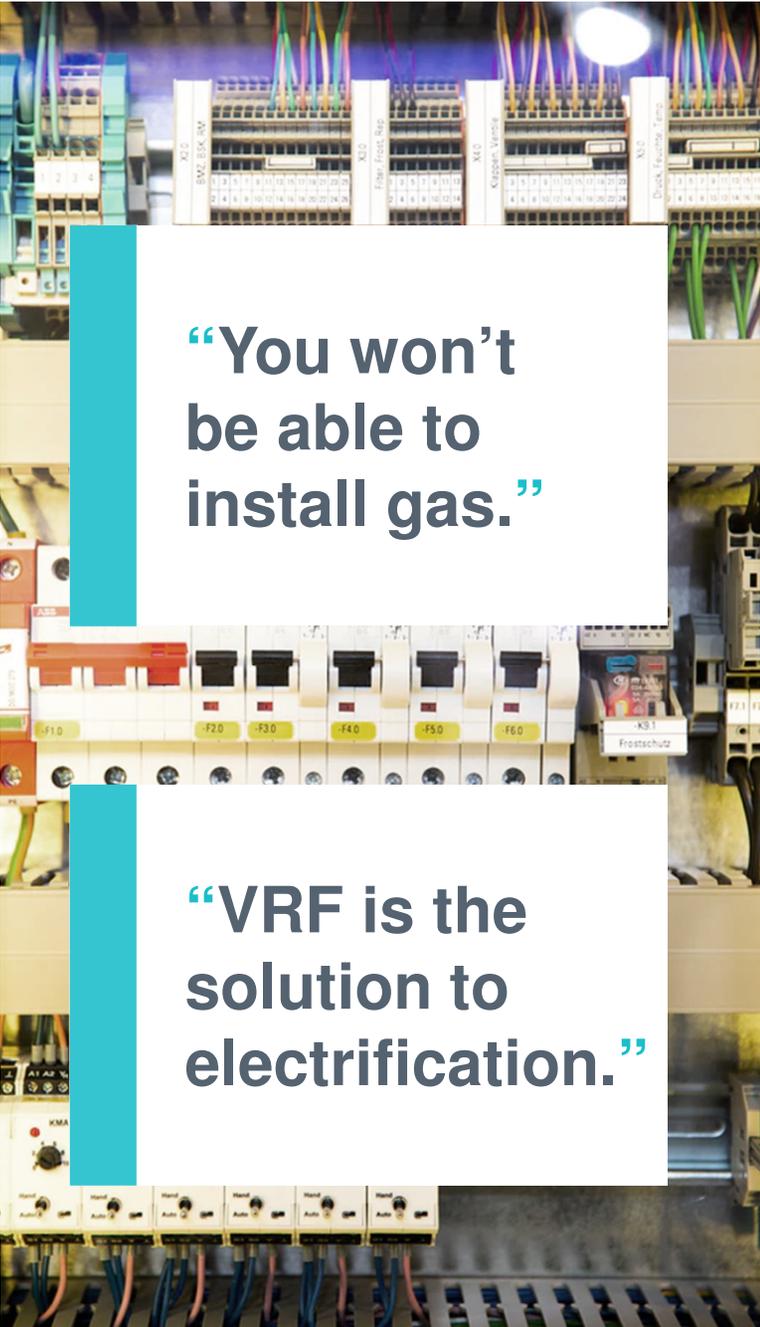
# WHAT'S NEXT?

The HVAC market is changing, but not quickly

Several factors impact current market changes

**Upcoming changes could shape the future HVAC market**

Distribution channels consistent with current assumptions



# Electrification is a hot topic...

“You won’t be able to install gas.”

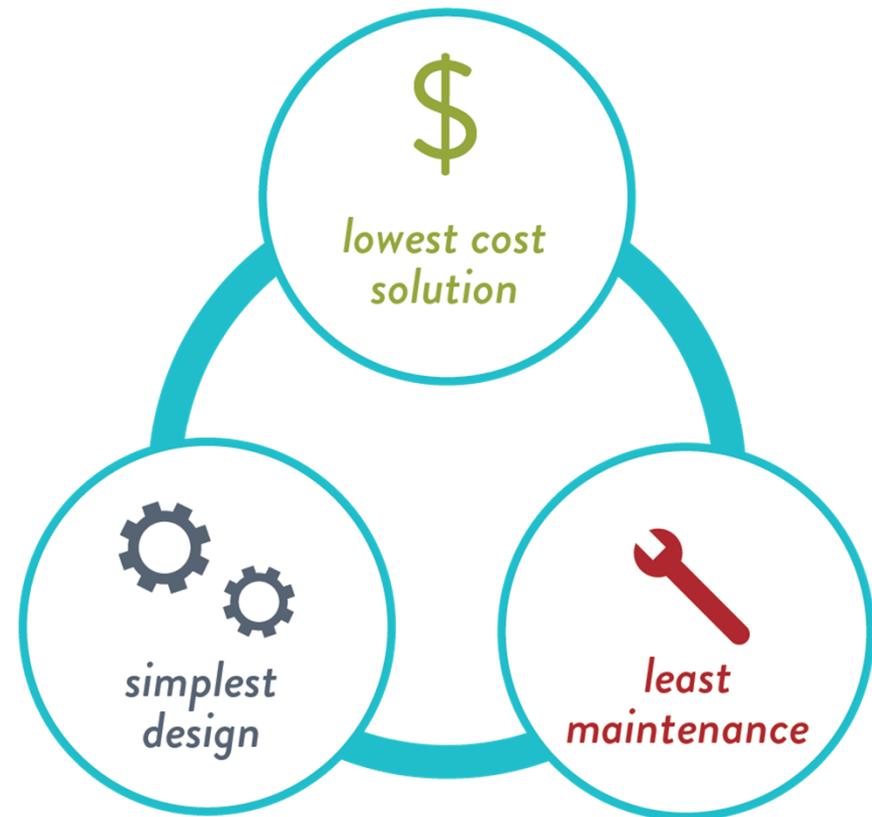
“VRF is the solution to electrification.”

High efficiency electric manufacturers using it as a selling point, **especially VRF manufacturers.**

Is electrification of heating driving trends towards ASHP, DHP, VRF?

# ...But gas manufacturers aren't worried

- › Gas RTUs, furnaces, and boilers, are still a huge market and not going away *quickly*.
- › Low gas prices continue to drive gas equipment sales.



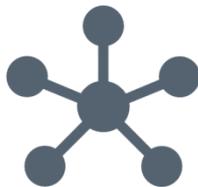
# Emerging technologies aren't necessarily technologies

Very little buzz about “emerging technologies” that are actual technologies

Emerging opportunities are:



Operation



Design and  
Integration  
Improvements



Controls



Components



Consistent with 2018 and 2019 findings

# Residential controls are all about **comfort** and **connectivity**

## What's hot:

- › Phone-controlled “Smart homes” driven by comfort, security, and entertainment
- › Alexa-integrated systems that control lighting, temperature, appliances, and other home features

Energy efficiency is a benefit and feature, but not the primary driver



**What does that mean for smart thermostat energy savings?**

# Residential demand response is emerging but not mainstream



Two manufacturers (JCI and Mitsubishi) make demand-response-ready thermostats



Vast majority of manufacturers did not showcase demand-response-ready thermostats and said “they were working on it”



Residential water heaters had more products compliant with CTA-2045

# Commercial controls are *also* all about **comfort** and **connectivity**

Advanced sensors integrate occupancy-based controls with HVAC and other systems with a focus on remote control and diagnostics

- › Focus on remote control and diagnostics
- › Wired solutions remain more common than wireless
- › Demand response not a commercial topic or area of focus



# SHIPMENTS AND DISTRIBUTION CHANNELS

The HVAC market is changing, but not quickly

Several factors impact current market changes

Upcoming changes could shape the future HVAC market

**Distribution channels consistent with current assumptions**

# Most residential product sales go through distributors

## Residential product sales



Major manufacturers go through distributors



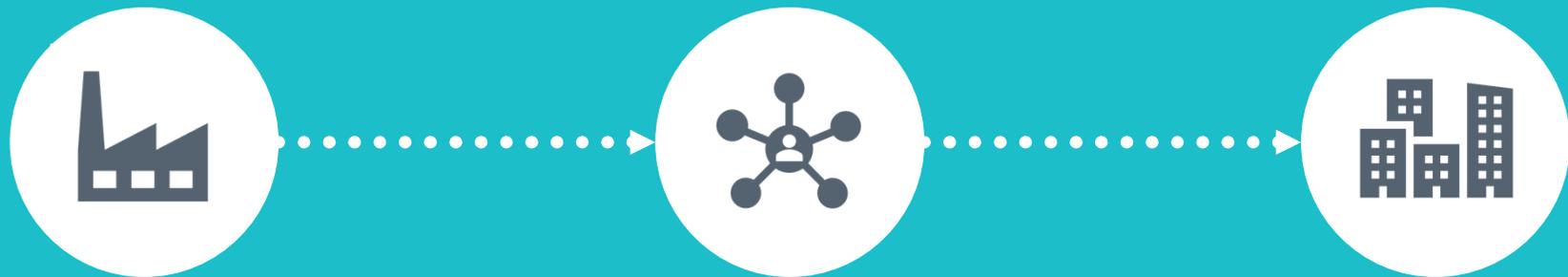
A small but possibly growing percent of sales go through retail or online as DIY

› Smaller brands and a very small percent of total sales

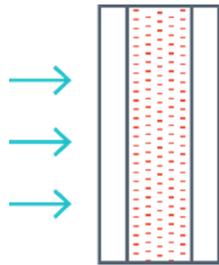
Consistent with our past understanding of the market

# Most commercial sales go through manufacturer reps

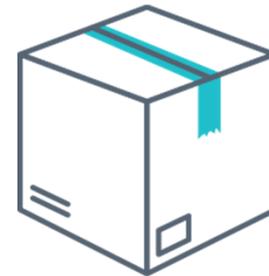
- › Majority does not go through distribution
- › AHRI collects commercial sales data from manufacturers
- › Other third-party companies do sales data collection/reporting, but usually based on qualitative information, not actual sales data collection (like BSRIA)



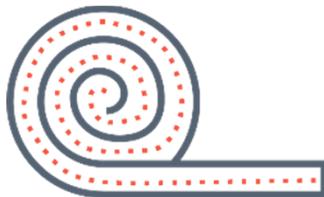
# RESIDENTIAL INSULATION MARKET CHANNELS



A large (undefined) percentage of the residential insulation market (batt, blown-in, board) goes towards the replacement market



Bigger contractors buy directly from the manufacturer, not through distributors



Don't discount the retail market for insulation



Programs are a big driver, but insulation has a good payback even without programs

**QUESTIONS?**

# CONTACT

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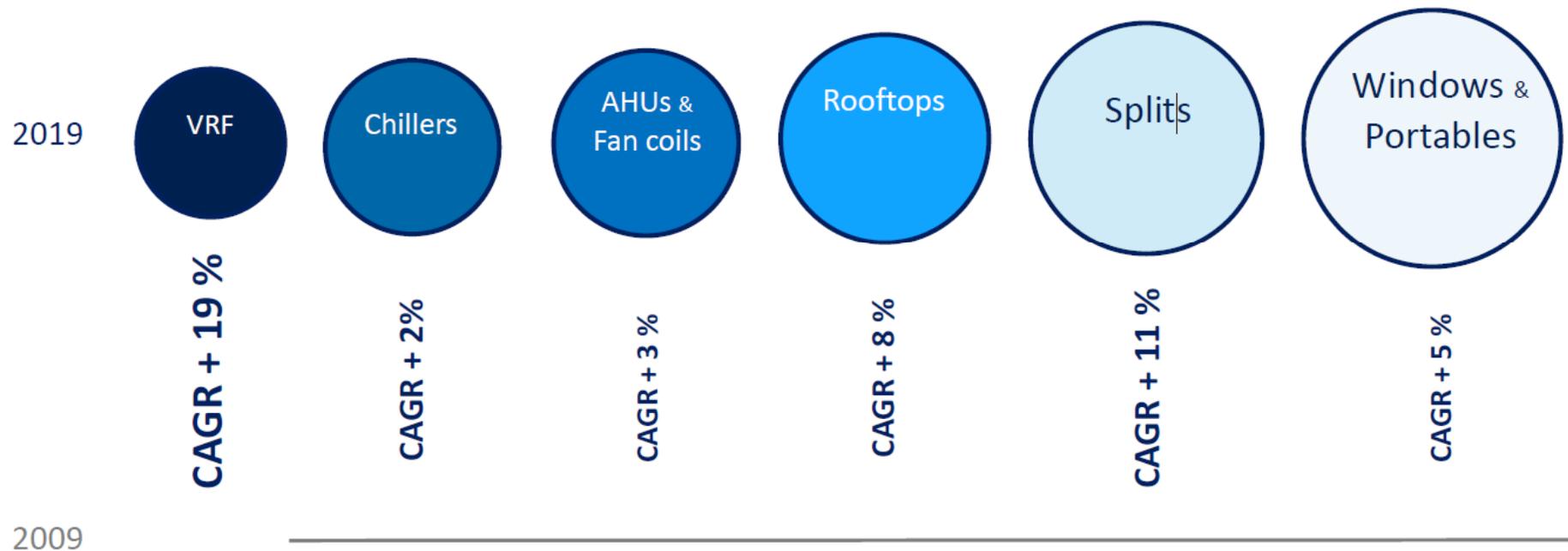


# APPENDIX



# 2020 BSRIA Presentation Highlights

## Decade of growth in US



Improving the built environment



Delivering knowledge



Measuring compliance and performance



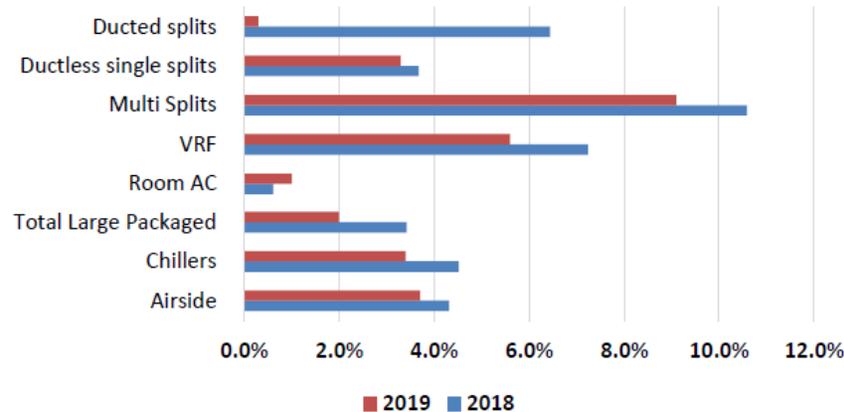
International

[www.bsria.com/us](http://www.bsria.com/us)

## Globally, how did the products perform in 2019?



### Growth by product, by volume



Source: BSRIA

- Growth is continued albeit smaller than 2018
- Residential and light commercial favouring multi splits and VRF
- The world's biggest ducted splits –US slowed down
- Double digit growth forecasted in ductless splits in US – market gradually shifting away from ducted and Room AC
- Healthy growth in chillers across the globe with newer lower GWP refrigerants
- Growth in modular/Oil Free Centrifugal Chillers



Improving the built environment



Delivering knowledge



Measuring compliance and performance



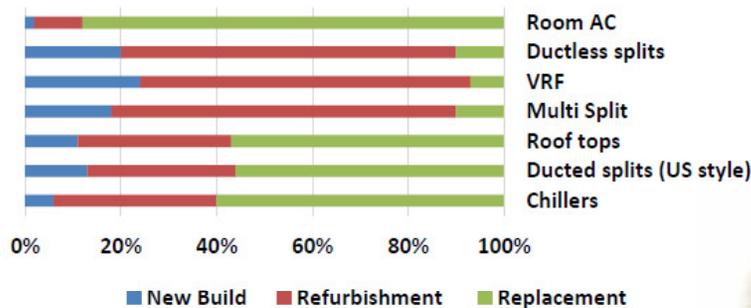
International

[www.bsria.com/us](http://www.bsria.com/us)

## Where is the sales coming from?



Application in 2018, by volume



Shift from traditional systems to more energy efficient options

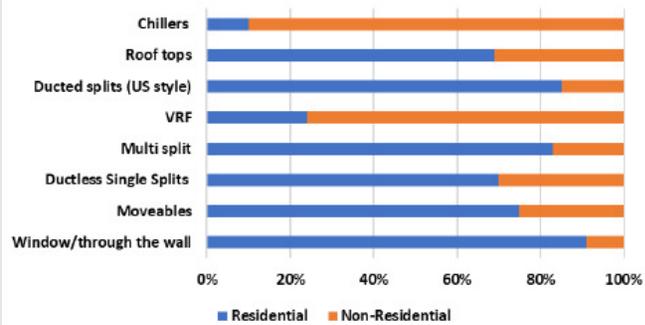


Penetration of AC in residential



Penetration of AC Commercial Buildings

Residential vs Non-Residential in 2018, by volume



Improving the built environment



Delivering knowledge



Measuring compliance and performance



International

[www.bsria.com/us](http://www.bsria.com/us)

# Market Leaders Then and Now in US



Top 5 players in 2009, by volume



Top 5 players in 2009, by value



Top 5 players in 2018, by volume



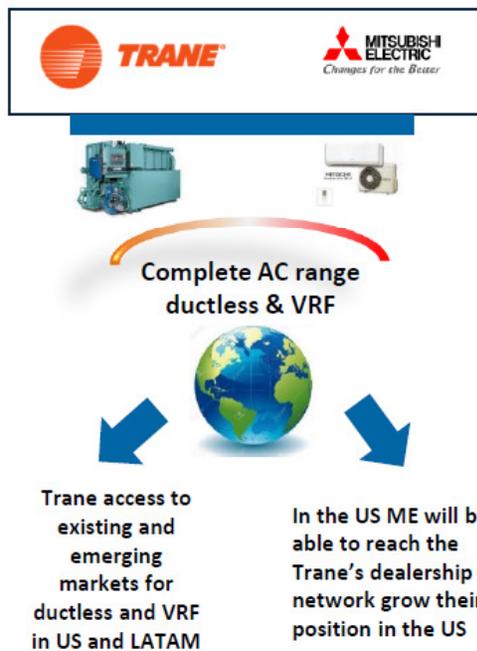
Top 5 players in 2018, by value



[www.bsria.com/us](http://www.bsria.com/us)

## Recent JVs

January 2018: Trane & Mitsubishi Electric  
Ductless and VRF in US and selected LATAM countries



September 2017: Carrier & Midea  
Residential Ductless HVAC Joint Venture in NA



Carrier to become a strong player in the growing ductless market and Midea to have access to huge potential market



[www.bsria.com/us](http://www.bsria.com/us)



Improving the built environment



Delivering knowledge



Measuring compliance and performance



International

