Market Research & Momentum Savings Team

Quarterly Call | August 5, 2020

Bonneville
POWER ADMINISTRATION


hello
MY NAME IS

Agenda

- Team staffing update **(5 min)**
- Updates on HVAC research **(5 min)**
- Learnings from 2020 AHR Expo **(30 min)**
- Updated meeting information **(5 min)**

Team Staffing Updates

BONNIE

WATSON

Team Lead

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JOAN

WANG

Project Lead

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Coming soon

NEW

STAFF

Project Lead

Updates on HVAC

- Commercial HVAC
  - Feasibility assessment completed in early **2020**
  - Working on finalizing methods now
  - **2016-2021** permit data collection starting soon
  - Permit database available summer **2021**
  - Model development in **2021**
- Residential HVAC
  - **2016-2018** sales data and AHR Expo
  - **2019** sales data and market intelligence
  - Insulation market study
  - Model update in **2021**

2020 AHR Expo Findings

Research performed by Cadeo

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

5 Manufacturer Interviews

10 Targeted Booth Interviews

Additional Booth Scans, Sessions, and Networking

BSRIA Market Trends Session

IMPORTANT REMINDERS

- Findings are based on statements from manufacturers interviewed at the AHR Expo held in early February 2020 (pre-COVID).

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

KEY FINDINGS

The HVAC market is getting more efficient, but not quickly

Codes and standards have had bigger market impacts than emerging technologies

Trends on the horizon include electrification, better integrated systems, and increased connectivity

CURRENT MARKET CONDITIONS

The HVAC market is getting more efficient, but not quickly

Codes and standards have had bigger market impacts than emerging technologies

Trends on the horizon include electrification, better integrated systems, and increased connectivity

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 ASHPs and DHPs

VRF continues to grow in commercial market

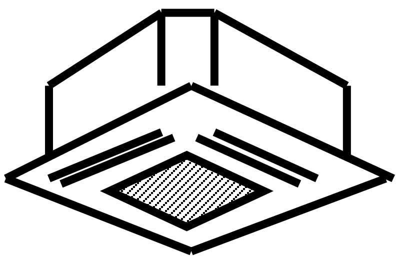
VRF showed largest growth of any technology in 2019

Changes in refrigerant requirements could introduce uncertainty

~ **Consistent with 2018 and 2019 findings**

VRF VS. DHP IN COMMERCIAL APPLICATIONS

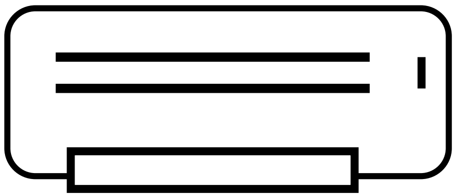
VRF



› Simultaneous heating and cooling

› Low incremental cost vs. multi-zone DHP

DHP

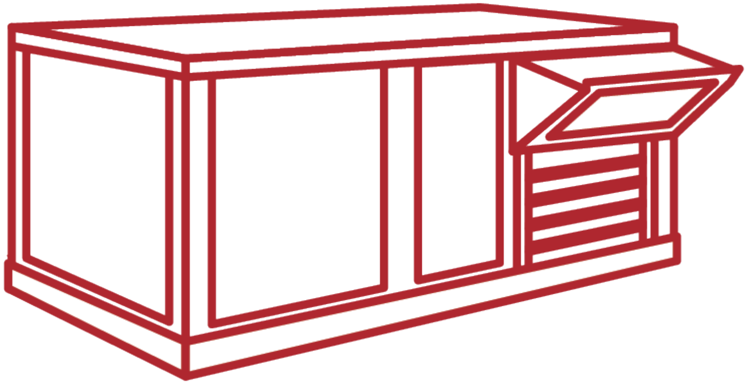


› Single zone areas without ducting

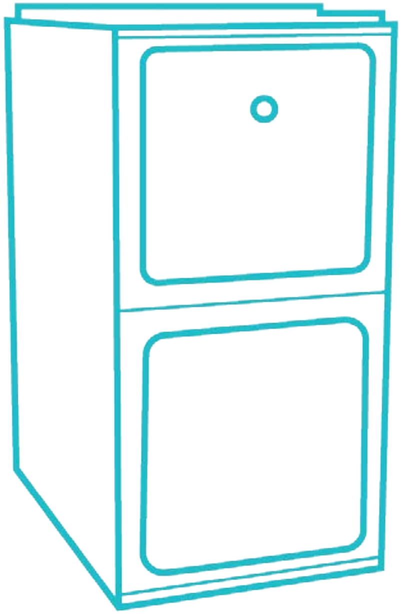
WATER-SOURCE HEAT PUMPS VS. VRF

- 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 getting more efficient, but not quickly

Codes and standards have had bigger market impacts than emerging technologies

Trends on the horizon include electrification, better integrated systems, and increased connectivity

What’s preventing market change?

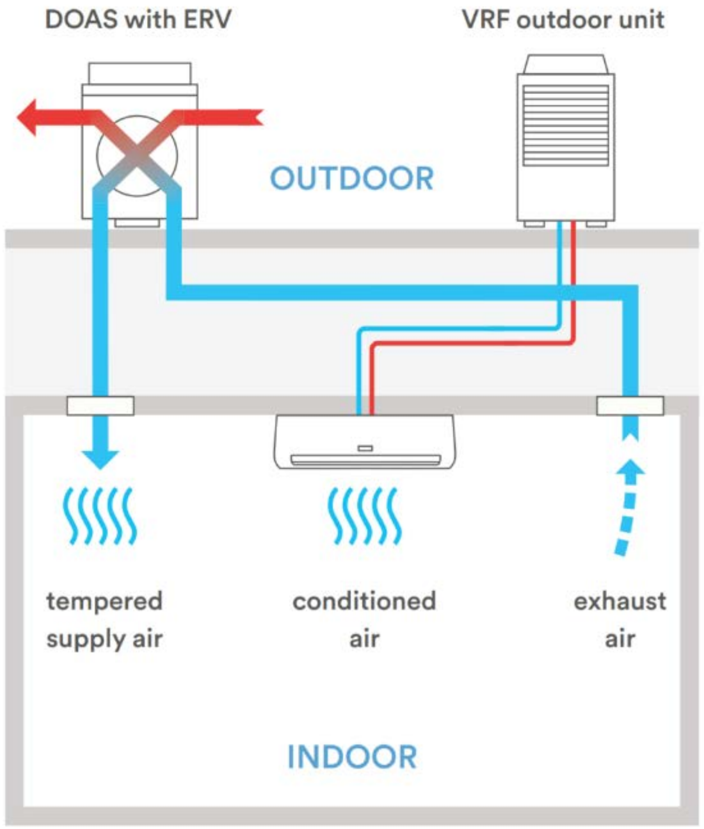
Manufacturers offer energy efficient products, but there is a gap in installation/specifying

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

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

~ Consistent with 2018 and 2019 findings

Codes causing rise in DOAS



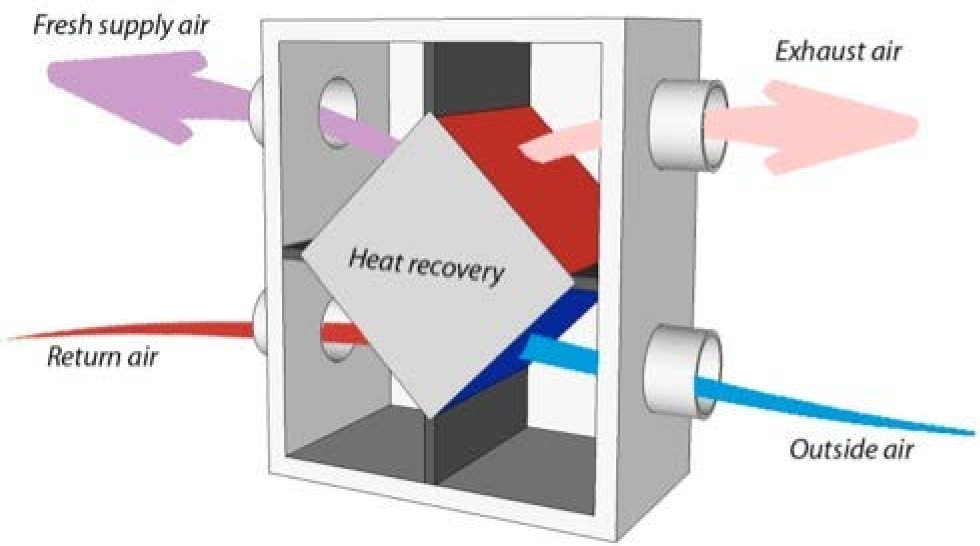
VRF/DOAS manufacturer distribution partnerships are emerging

- 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/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 getting more efficient, but not quickly

Codes and standards have had bigger market impacts than emerging technologies

Trends on the horizon include electrification, better integrated systems, and increased connectivity

"You won't be able to install gas."

"VRF is the solution to electrification."

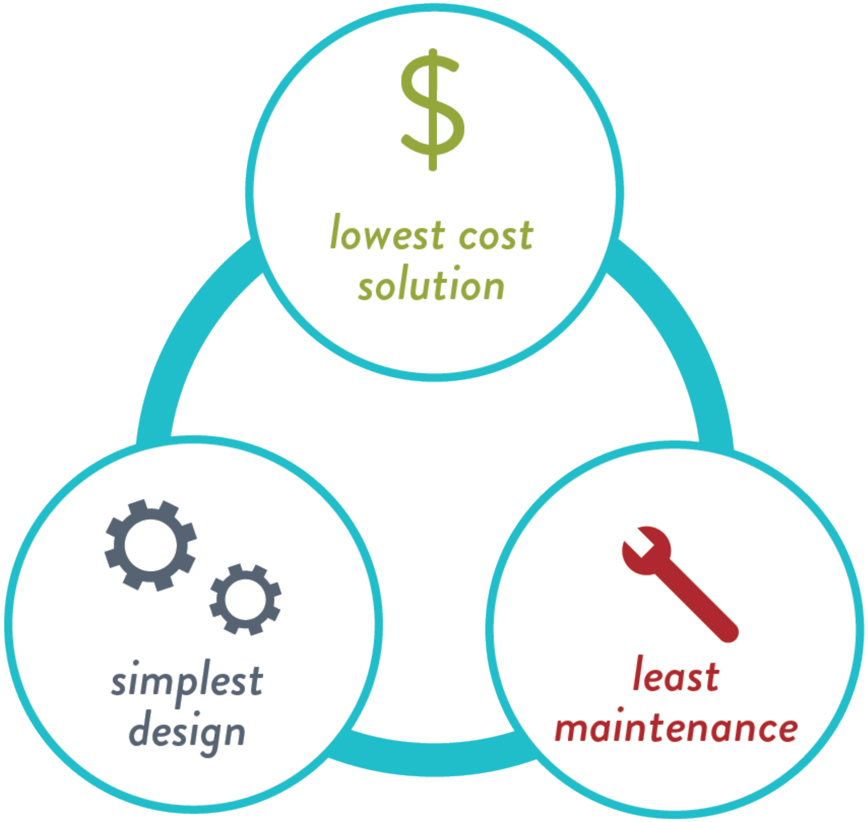
Electrification is a hot topic…

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

Is electrification of heating driving sales 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 center around integration, operations, and controls

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
- Voice-integrated systems that control lighting, temperature, appliances, and other home features

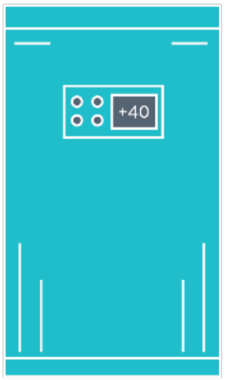
Energy efficiency is a benefit and feature, but not the primary driver

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

QUESTIONS?

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Updated WebEx for future quarterly calls!

Link to meeting information:
https://www.bpa.gov/EE/Utility/Momentum-Savings/Pages/Calls.aspx

See you on November 4th!

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APPENDIX

SHIPMENTS AND DISTRIBUTION CHANNELS

Distribution channels consistent with current assumptions

Most residential product sales go through distributors

Residential product sales

Major manufacturers go through distributors

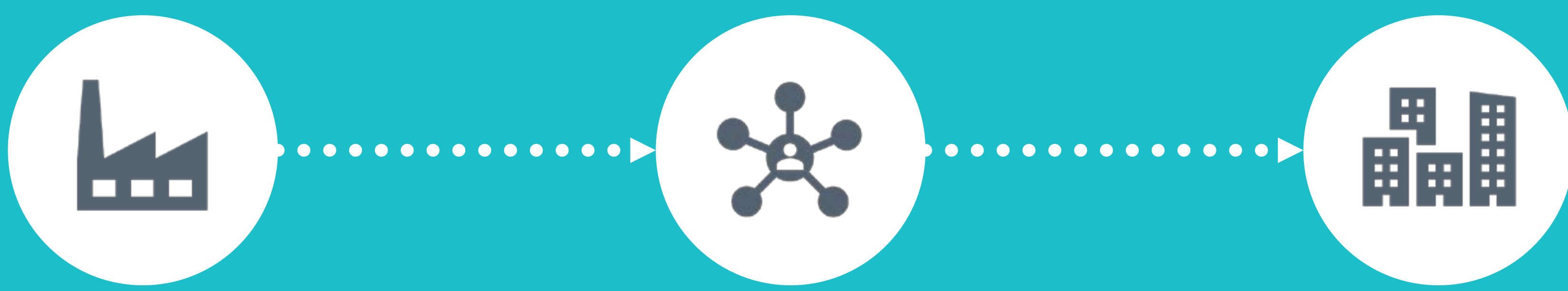
A small but possibly growing percent of sales go through retail or online as DIY

› Smaller brands and a very small percent of total sales

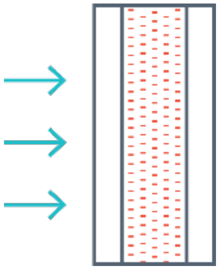
Consistent with our past understanding of the market

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)

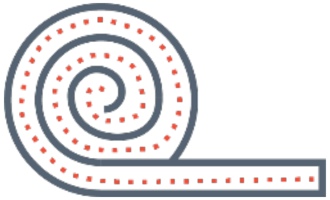


RESIDENTIAL INSULATION MARKET CHANNELS



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

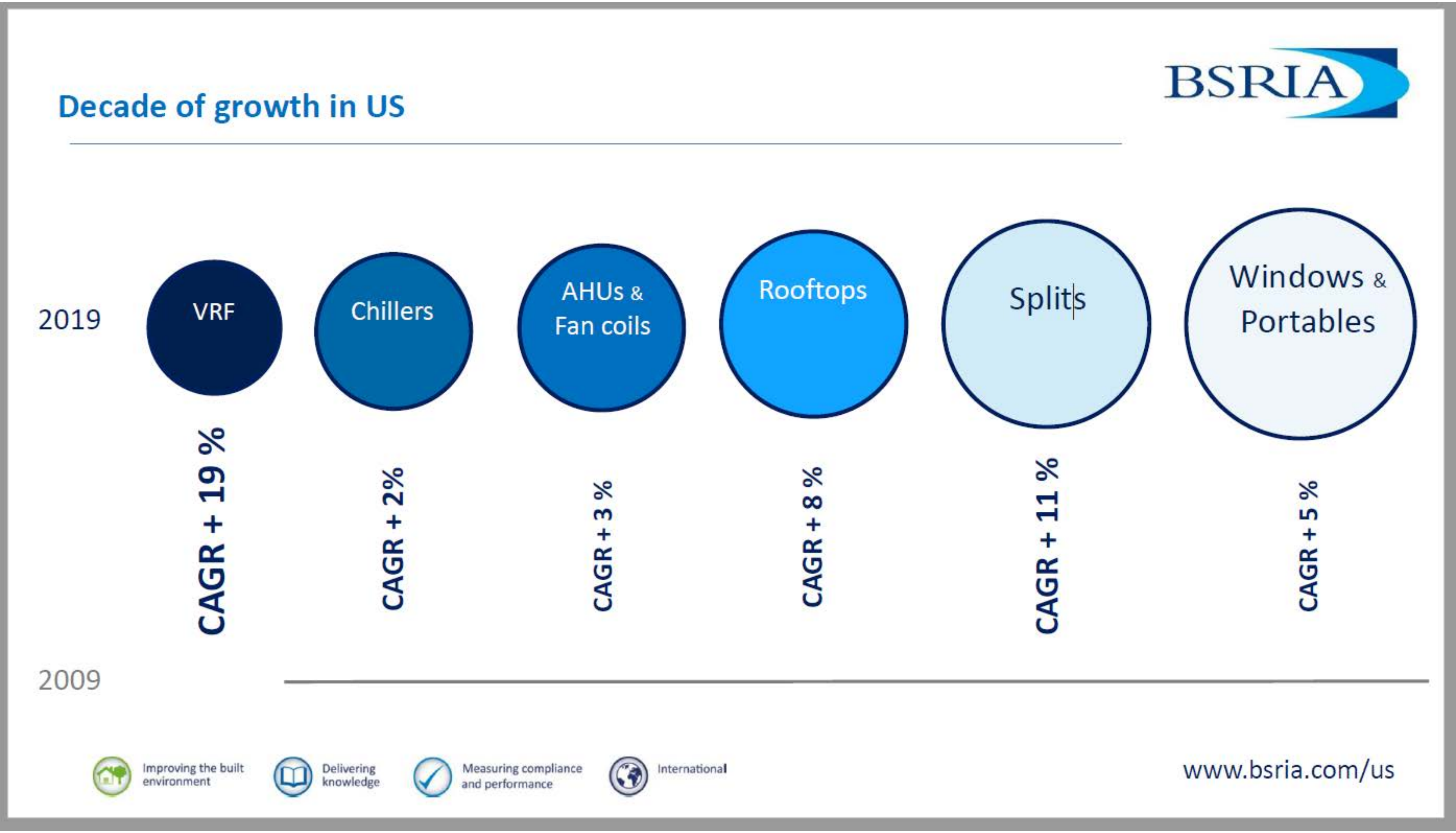
Bigger contractors buy directly from the manufacturer, not through distributors



Don't discount the retail market for insulation

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

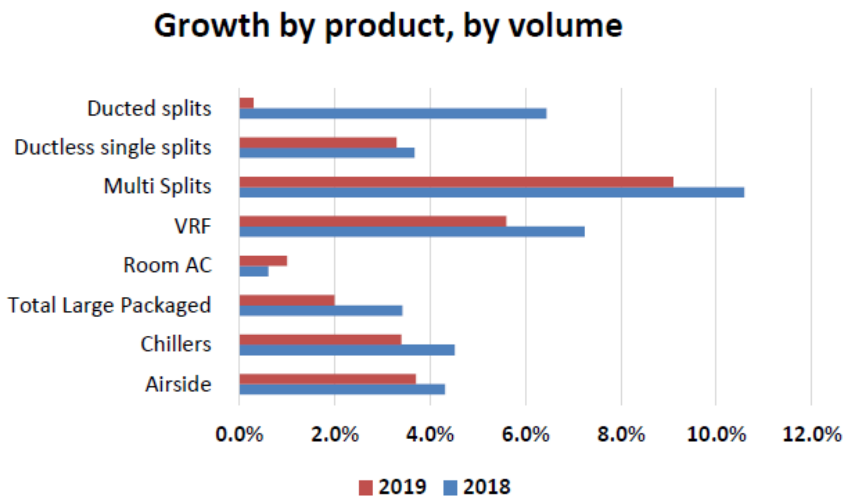
2020 BSRIA Presentation Highlights



2020 BSRIA Presentation

Globally, how did the products perform in 2019?

BSRIA



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

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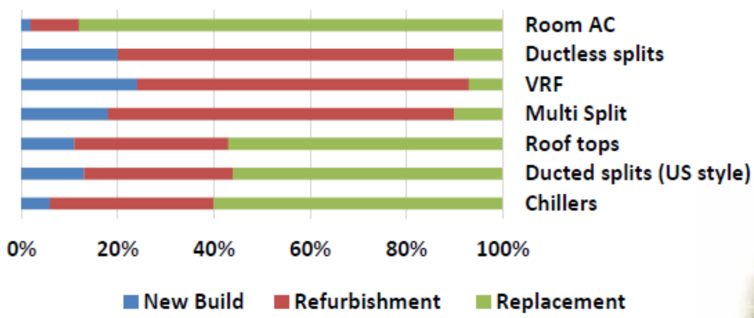
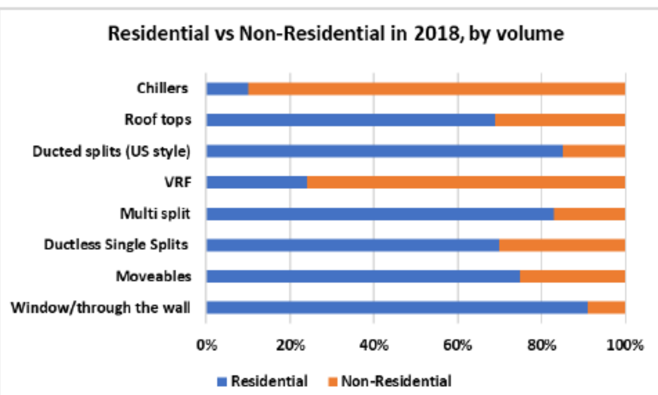
Where is the sales coming from?

BSRIA

Application in 2018, by volume





Shift from traditional systems to more energy efficient options

Penetration of AC in residential

Penetration of AC Commercial Buildings

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Market Leaders Then and Now in US

BSRIA

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
LG	TRANE	DAIKIN	Carrier United Technologies
GE	Carrier United Technologies	Carrier United Technologies	DAIKIN
FRIGIDAIRE	Johnson Controls	GE	TRANE
Haier	Goodman Air Conditioning & Heating	LG	Johnson Controls
Carrier United Technologies	DAIKIN	FRIGIDAIRE	LENNOX

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Recent JVs

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

Complete AC range
ductless & VRF

Trane access to existing and emerging markets for ductless and VRF in US and LATAM

In the US ME will be able to reach the Trane's dealership network grow their position in the US

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

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