

# COMMERCIAL HVAC MARKET CHARACTERIZATION

2015 FINDINGS



BONNEVILLE  
POWER ADMINISTRATION



## **CONTRIBUTORS »**

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Developed for the Bonneville Power Administration.

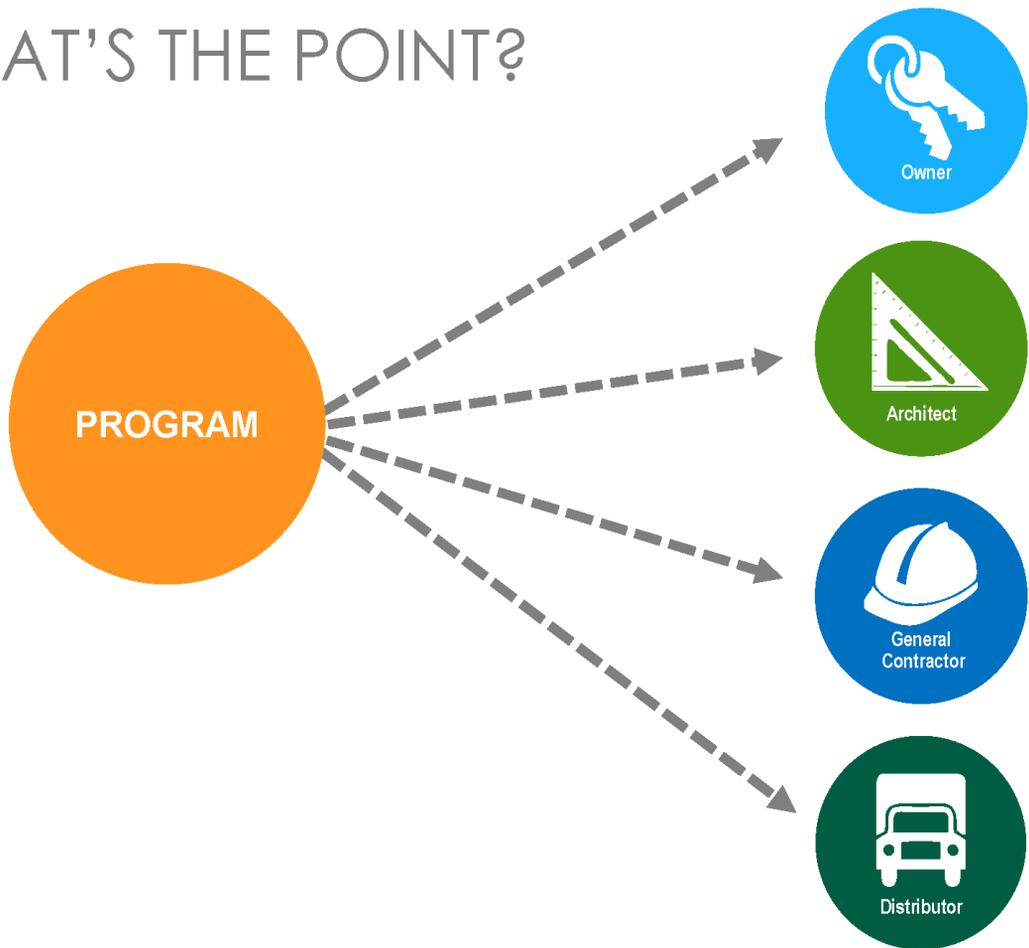
This analysis is based on interviews conducted to support the 2015 BPA HVAC Market Characterization.

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# WHAT'S THE POINT?

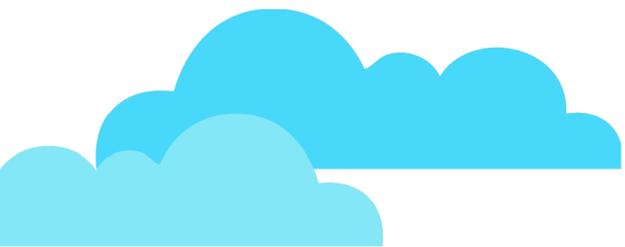


## MARKET CHARACTERIZATION MATTERS »

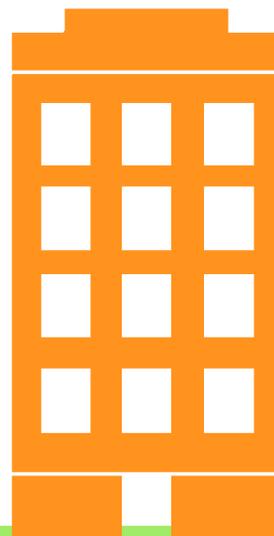
Market characterization matters because it informs program intervention and strategy.

The commercial HVAC market has a few key segments, characterized by different market actors, behaviors, and incentives. Understanding these nuances is the key to delivering effective programs.

These findings are informed by 26 interviews the research team conducted with HVAC distributors, facility solution firms, engineering firms, utility and regional program staff.



**Residential**



**Commercial**

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## **SECTOR DIFFERENCES »**

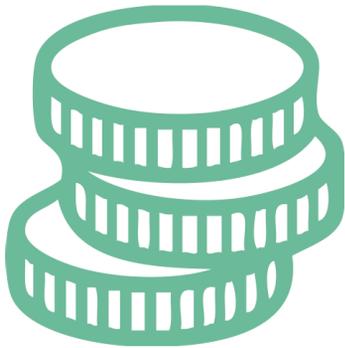
The commercial HVAC market is very different than the residential market in terms of budgets, technology options, technology complexity, decision influencers, and sales cycles. These differences have important programmatic implications.

Note that distributors define residential not by the end-use or building type, but by the product line. While they recognize some residential products are used in commercial applications (and to a lesser extent, vice versa), they usually do not know where the products they sell are eventually installed.

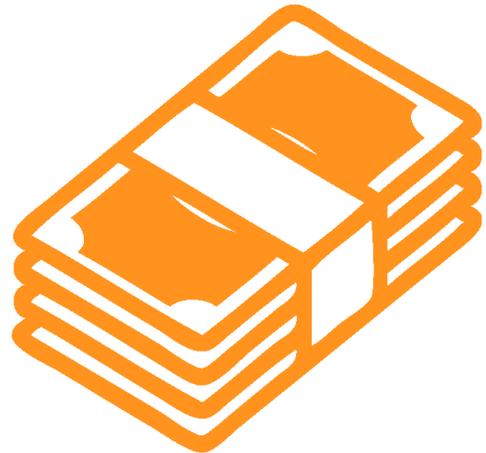


# BUDGET

## Residential



## Commercial



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### BUDGET DIFFERENCES »

The budget for residential and commercial HVAC installations is also different.

The residential market is generally associated with smaller and less complex orders, which means they require a smaller budget than larger, more complex commercial orders.

For the commercial market, this means money comes out of capital budgets rather than maintenance budgets, which requires more planning and the involvement of multiple decision makers.



# TECHNOLOGY OPTIONS

## Residential



## Commercial



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## TECHNOLOGY OPTION DIFFERENCES »

The commercial HVAC market has far more technology options available than the residential market. This is part of the reason there are more influencers—experts are needed to evaluate the many options available.

Owners need trusted sources of information about the myriad of options, which include not just equipment but increasing controls solutions.



# TECHNOLOGY COMPLEXITY

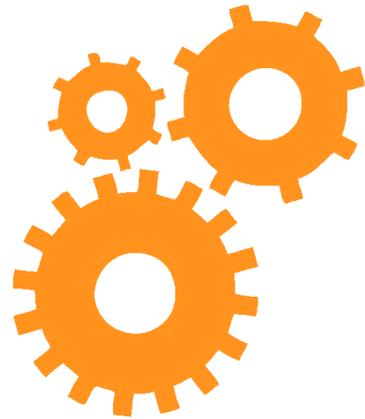
## Residential

Set and Forget



## Commercial

Sophisticated Operation



## TECHNOLOGY COMPLEXITY DIFFERENCES »

The technologies available to and used by commercial installations are generally more sophisticated than residential. The vast majority of technology used for residential installation is ‘set and forget.’

New technologies require some level of comfort among maintenance staff, building operations personnel, and even architect and mechanical engineers, before they will consider recommending the solutions to building owners.

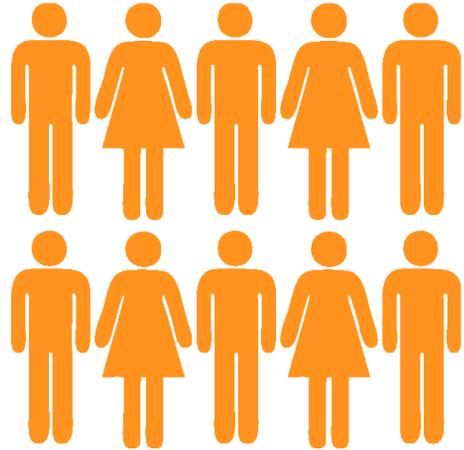


# DECISION INFLUENCERS

## Residential



## Commercial



## DECISION INFLUENCER DIFFERENCES »

Generally, the only decision maker in the residential replacement market is the homeowner, who selects among the options the contractor provides (rarely more than one option). In new construction, the builder typically selects the least expensive option.

The commercial market decision chain is varied and multi-faceted. Multiple entities—contractors, distributors, manufacturer representatives, architects, and mechanical engineers—all have a hand in influencing the owner's decision.

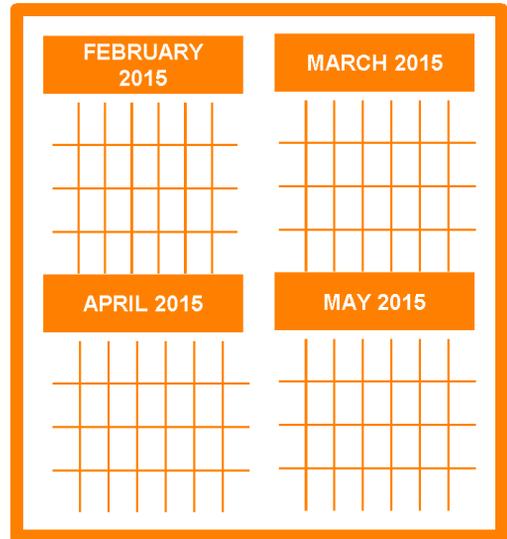


# SALES CYCLE

## Residential



## Commercial

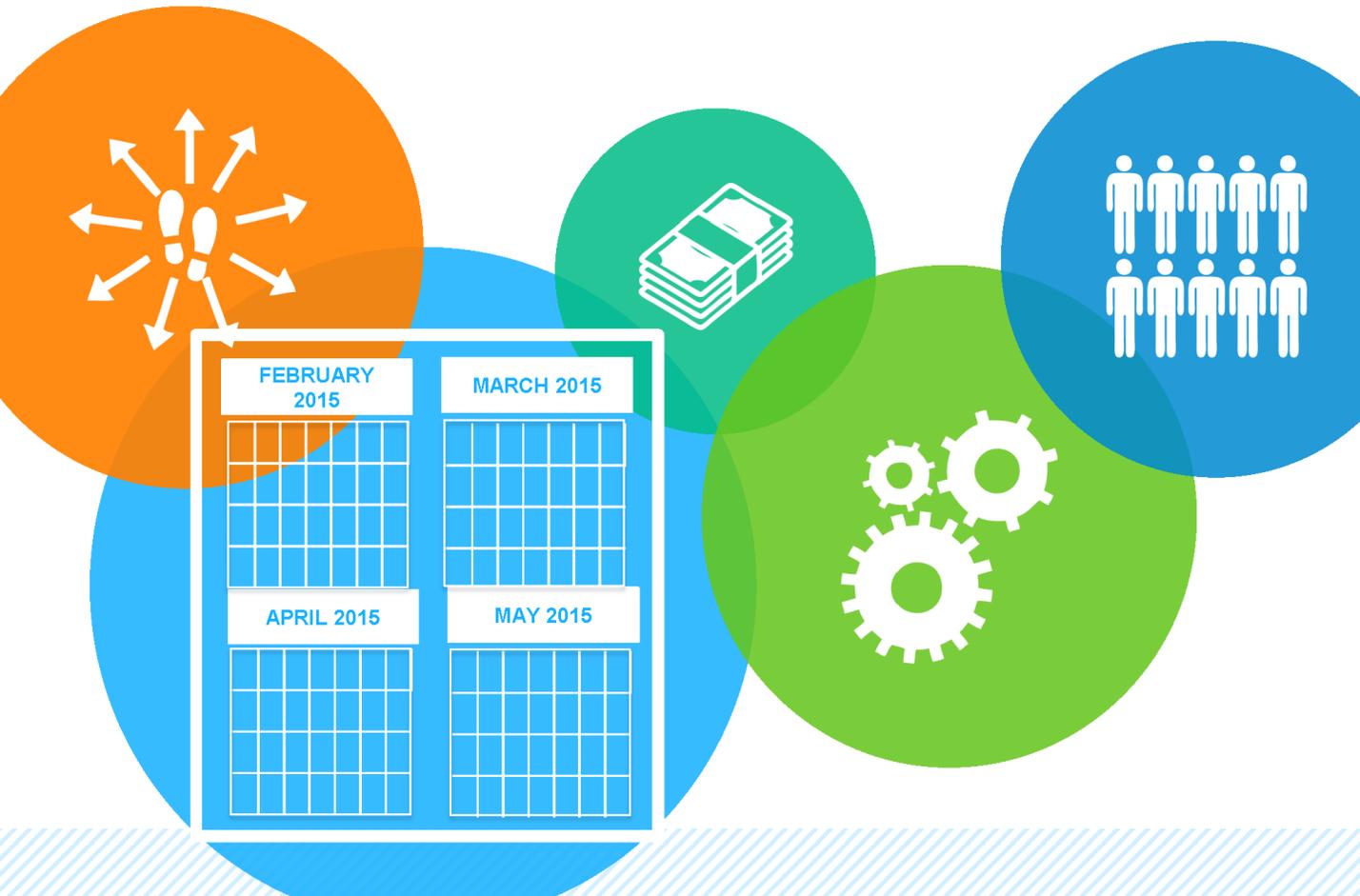


## SALES CYCLE DIFFERENCES »

The majority of residential sales are replaced on failure—typically emergency replacements that happen quickly.

The commercial sector is much different. While there are certainly emergency replacements in the commercial sector, the sales cycle is often much longer and more complex. Even in the case of emergency replacements, temporary heating/cooling solutions businesses exist to provide time for buyers to evaluate their technology options.

# COMMERCIAL HVAC



## SUMMARY »

In summary, there is a lot more variation in commercial than in residential. For that reason, we lean on market segmentation as an analysis tool to gain clarity on how we can influence efficient choices in commercial HVAC choices.



# PERSPECTIVES

We segmented the market based on three perspectives:

## **MARKET ACTORS »**

Organizations that are involved in how a given piece of HVAC technology gets into the market.

## **PROJECT TYPE »**

Refers to the structure by which equipment is sourced, bought and sold.

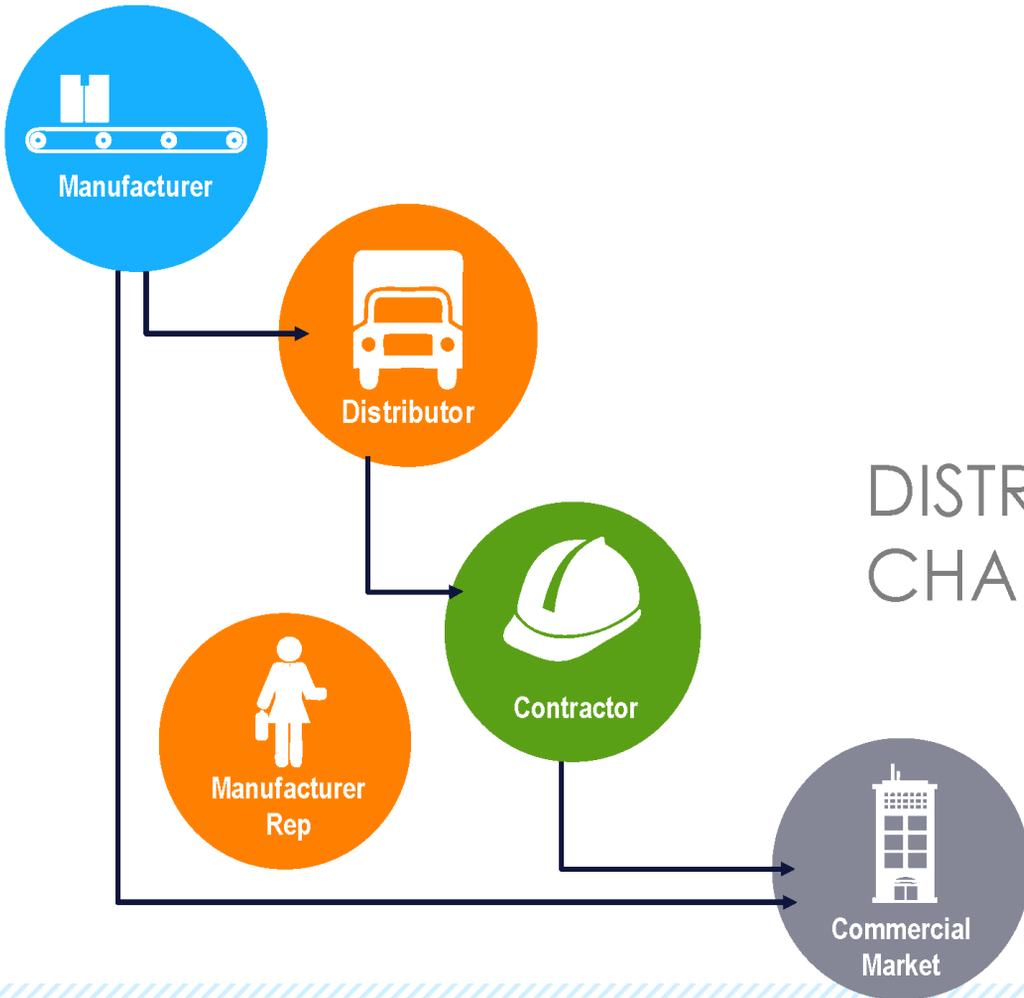
## **TECHNOLOGY MIX »**

The common technology types currently available in the market.



# MARKET ACTORS





# DISTRIBUTION CHAIN

## HVAC EQUIPMENT DISTRIBUTION CHAIN »

The physical flow of HVAC products begins at the manufacturer and then goes through one of two primary paths:

Using one path, the product is shipped to a distributor's warehouse (typically a regional distribution center) then to the distributor's branch. An HVAC contractor then picks it up on an "as needed" basis. This is typical for unitary equipment (typical split and package systems) under 25 tons and capacity equipment that does not need be customized. This process is similar to residential product flow.

The second path moves product from the manufacturer directly to the builder site. The equipment is typically large, customized, and complex. Additionally, equipment that follows this path is sold through manufacturer reps or commercial sales organizations rather than wholesale distributors. This distinction between wholesale distributors and manufacturer reps highlights the key market segments among market actors in the commercial HVAC market.

Note that this is not the decision chain, which is described later, and involves other parties.



## WHOLESALE DISTRIBUTORS



## MANUFACTURER REPS



### **MARKET ACTOR DISTINCTION »**

The key distinction among commercial HVAC market actors is between the manufacturer reps and wholesale distributors.

# WHOLESALE DISTRIBUTORS



Hub and spoke distribution model

Stock product for fast delivery

Focus on light commercial (<25 ton) equipment; churn and earn

Target customer: Contractor



## FUNCTIONAL ROLE »

The wholesale distributor's functional role in the market is balancing short term supply and demand fluctuations and getting product where it is needed. Wholesale distributors are in the business of logistics.



# WHOLESALE DISTRIBUTORS

## HOW IT WORKS »

The commercial wholesale distribution market looks much like the residential market. The manufacturer ships the product to the wholesale distribution center. Product is then distributed to various branches (typically daily replenishment of stock at the branches). Contractors then pick up the product on an as needed basis.



## FUNCTIONAL ROLE »

The commercial market according to manufacturer representatives is a little different. In this case, the manufacturer representative liaises with the contractor and the end user to make a sale. The manufacturer then ships the product directly to the end user, where it is installed by the contractor.

Manufacturer reps may or may not be manufacturer owned, but their job is the same—to sell.

# MANUFACTURER REP FIRMS



Focus on sales and engineering design support

Do not stock product

Focus on large (>25 ton) equipment and “applied equipment”

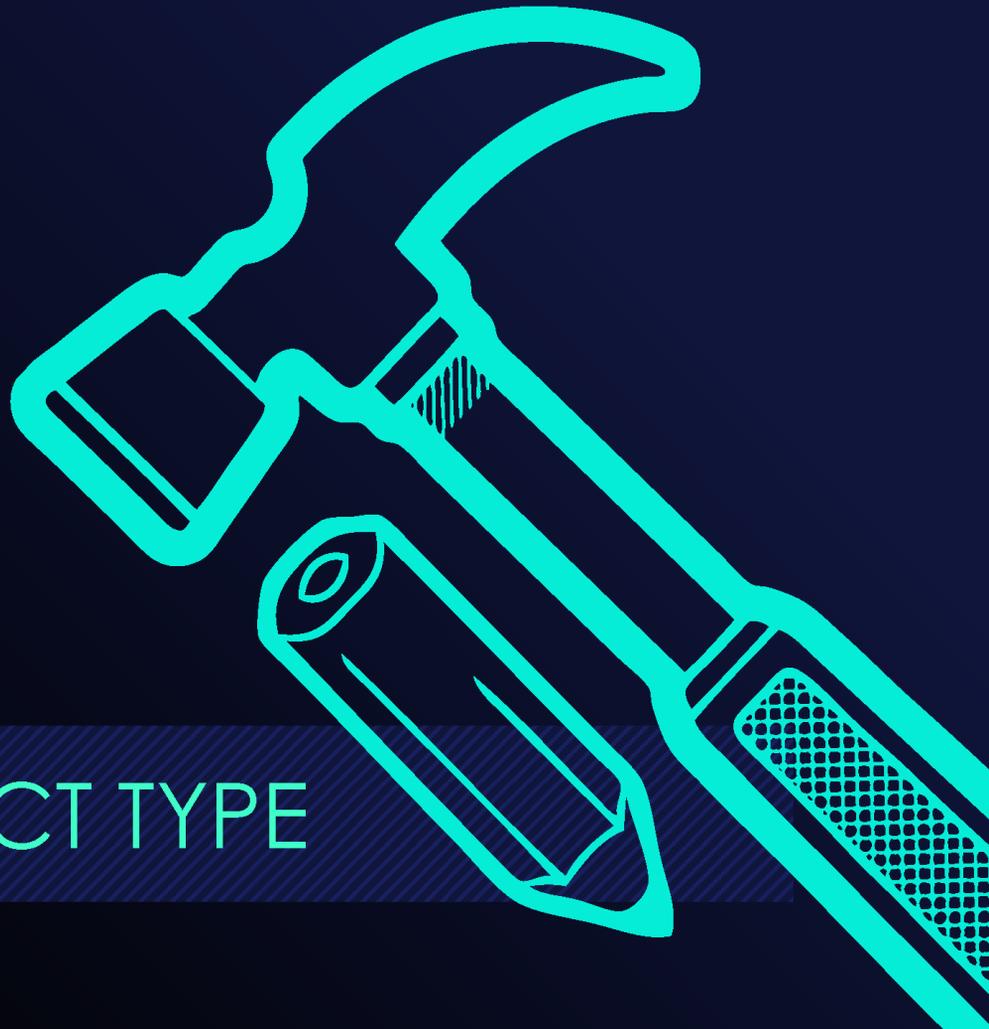
May or may not be manufacturer-owned



## HOW IT WORKS »

Manufacturer rep firms operate alongside wholesale distributors in the commercial HVAC market, helping to connect end-users with solutions for their HVAC needs. Rep firms may or may not be independently owned and typically have responsibility for sales of one manufacturer's product line in a given geographic territory.

Rep firms are focused on customer education and sales, increasing brand awareness among other market actors such as architects, engineers, and contractors.

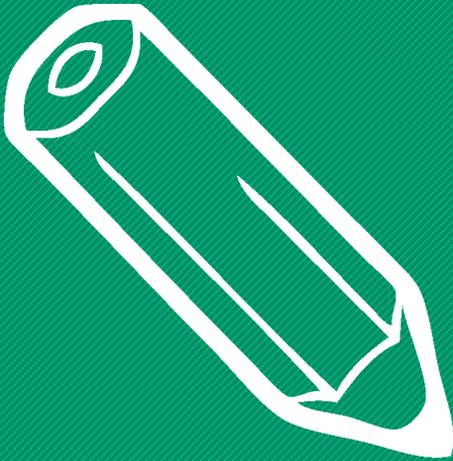


## PROJECT TYPE



# INDUSTRY MARKET SEGMENTS

## PLAN + SPEC



## DESIGN/BUILD



### **TWO TYPES OF MARKETS »**

Every distributor we spoke with used these terms to discuss the market; this is how the industry thinks, though not typically how the energy efficiency community thinks. The two types of projects are very different.

The mix of design + build and plan + spec is totally market driven and hyper local.

# PLAN + SPEC



Competitive bidding

More management layers

Complex decision chain

Large and complex jobs

New construction; major renovation

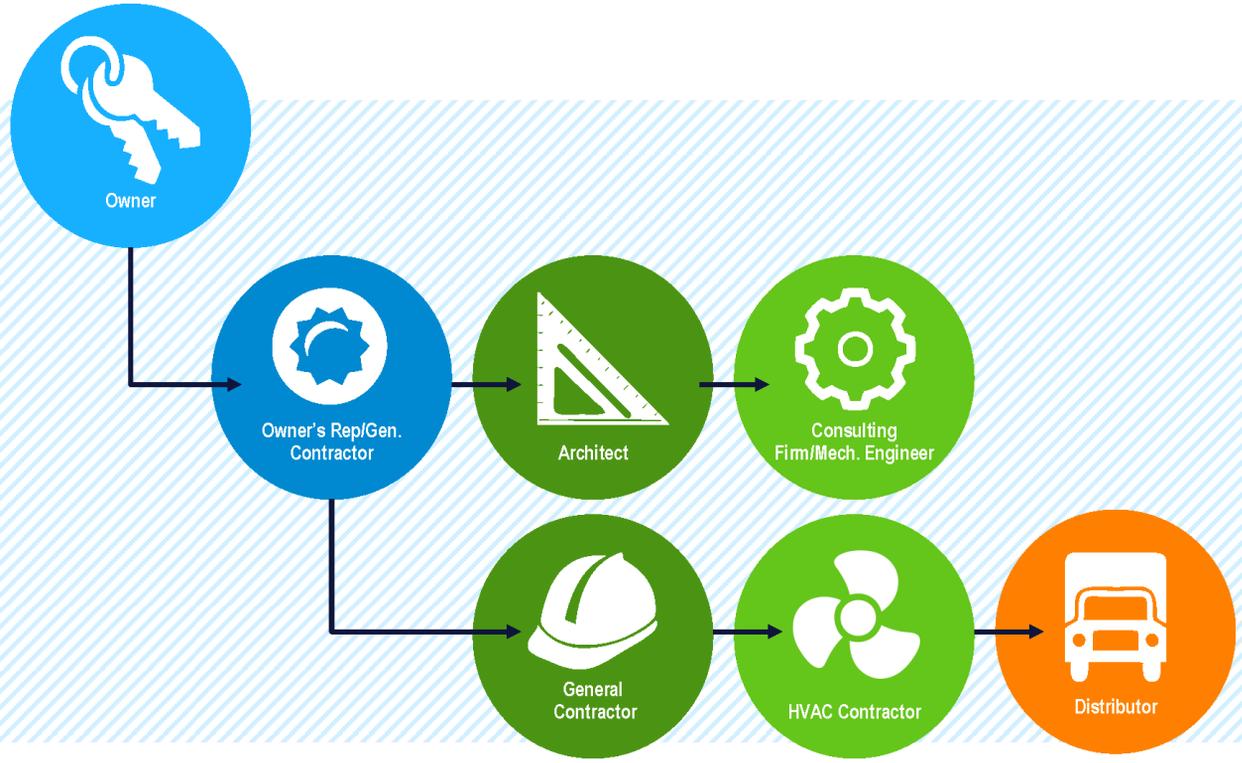
## HOW IT WORKS »

In the plan + spec market, the owner (or owner's rep) hires an architect or engineering firm to design the job's HVAC specifications, which include equipment types and minimum performance requirements. That 'spec' is then put out to competitive bid, whereupon mechanical contractors provide quotes for equipment and installation.

Typically, plan + spec jobs are large enough to assume the overhead costs associated with the RFP process and additional layers of project management.

# PLAN+ SPEC

## Decision Chain



## SNAPSHOT OF DECISION PROCESS »

The commercial HVAC decision chain—not the distribution chain—is the most important factor for energy efficiency program intervention. Specifically, the decision chain on the buy-side of the equation.

The key feature in the plan + spec market is that the project goes out to bid. The owner/owner's rep will hire an architect for the project, who will in turn hire a mechanical engineer to develop the system specifications—a very detailed description of exactly what the owner wants. This is then put out to bid.

Contractors and distributors monitor the 'street' for such RFPs, then work with distributors to put together an equipment price, add their own labor estimates and submit their proposal to, typically, the general contractor who has been hired to execute the project.

In the plan + spec market, the engineer/architect acts as a “chief of staff” of sorts to the owner or ultimate decision maker. The E/A frames the decision and provides the choices. The E/A will often tell the contractor to arrange a good, better, and best menu for the owner.

# PLAN + SPEC

## Program Opportunities



Targeted marketing to specifiers on program benefits.

Educate specifiers on advanced technologies. Reduce the perceived risk.

Track market progress through RFPs. Assign account rep to large jobs.

### PROGRAM OPPORTUNITIES »

There is very little chance that contractors or distributors will be recommending or altering the project specs in any way. Therefore, to influence the technologies/designs in the plan + spec market, programs must reach the correct influencers, not contractors and distributors, but mechanical engineering firms, architects and, potentially, the owners themselves.

In the plan + spec market, the best point for programs to influence decision makers is an even split between architects and mechanical engineers.

# DESIGN + BUILD



Sole sourced

Fewer decision makers

Less complex and smaller jobs

Relationship/referral based

## HOW IT WORKS »

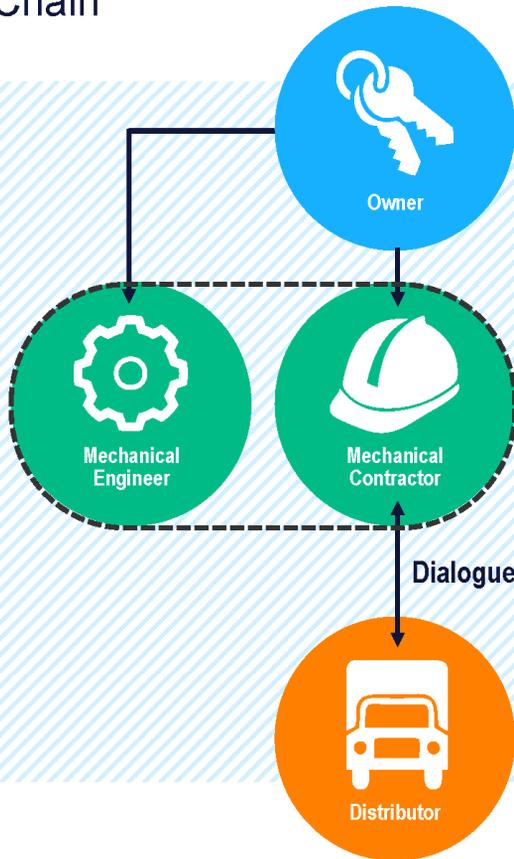
Design + build projects are much more streamlined with shorter sales cycles, no bidding process, and fewer headaches than are associated with various parties involved in the decision making. Design + build projects are typically more relationship-based, and less formal.

While equipment prices are less competitive because they are sole-sourced, the overall price may be better because exorbitantly priced change orders can be avoided.

Interestingly, 70% of <10 ton units are replacement/retrofit. Market actors called these “change outs”.

# DESIGN + BUILD

## Decision Chain



 Often in-house

## SNAPSHOT OF DECISION MAKING PROCESS »

As shown here, the decision chain for design + build project types is much more straightforward than the plan + spec market.

Typically, the owner hires a design + build firm directly with both a mechanical engineer and mechanical contractor in-house, streamlining project management. This approach is often relationship-based, allowing for more opportunity for the contractor and distributor to influence the decision because they are closer to the owner and because they are not constrained by a detailed specification based on an RFP.



# DESIGN + BUILD

## Program Opportunities

Educate contractors on advanced technologies.

Contractor sales training for upsells—5 year payback test.

Provide contractor engineering support on advanced technologies.

### PROGRAM OPPORTUNITIES »

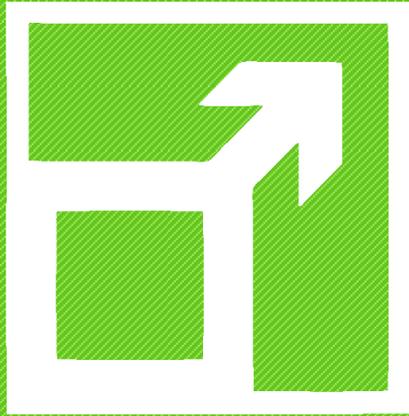
For programs, the key influence point with design + build projects is likely with contractors. Contractors are much more likely to influence the decision and make recommendations to building owners with these types of projects.

# TECHNOLOGY





## BY SIZE



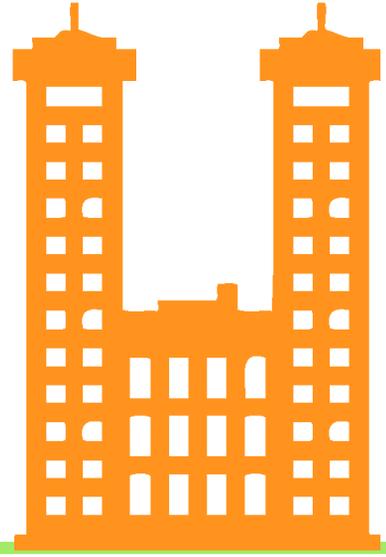
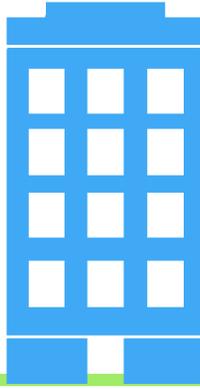
## BY CATEGORY



### **TYPES OF TECHNOLOGIES »**

There are two ways to think about segmenting technologies in the commercial market: size and category.

# BY SIZE



## **Residential**

<5 ton

(always stocked)

## **Lite Commercial**

<25 ton

(usually stocked)

## **Large Commercial**

>25 ton

(never stocked)

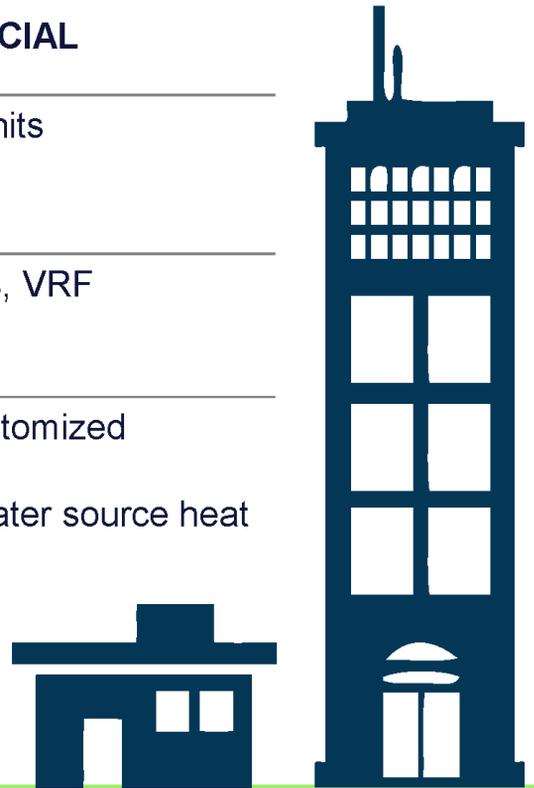
## **TECHNOLOGY SIZE »**

The industry uses the three sizes here to discuss HVAC equipment. Equipment size often dictates whether the product is stocked or not.

# BY CATEGORY



	RESIDENTIAL	COMMERCIAL
Ducted (Unitary)	Packaged and split systems	Rooftop units
Ductless	Mini-splits	Multi-splits, VRF
Applied	—	Large, customized systems: chillers, water source heat pump



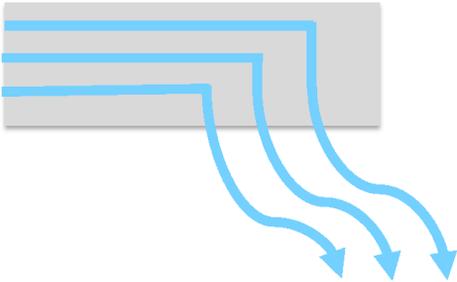
## TECHNOLOGY CATEGORY »

The market has three main technology categories:

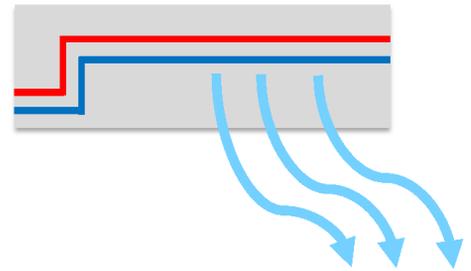
1. Ducted, which is the most familiar and traditional.
2. Ductless, the relative “new kid on the block.”
3. Applied, which is a catch-all term for the complex, customized equipment. Applied technologies are almost always sold by manufacturer reps, who can provide the necessary engineering support required in making the sale.



## DUCTED



## DUCTLESS (VRF)



### TECHNOLOGY CATEGORY »

In terms of technology category, the clear and growing distinction in the market is ducted versus ductless. Extremely common in the rest of the world, particularly Asia, ductless solutions move refrigerant rather than air to cool and heat.

On the residential side, the ductless mini split heat pump is the big player in the Northwest. On the commercial side, the growing product is VRF—variable refrigerant flow.

# ABOUT VRF

Massive growth potential

\$1 billion national sales by 2017

Minimal disruption in retrofit applications

Superior comfort

Significant cost premium

Lack of in-field performance data

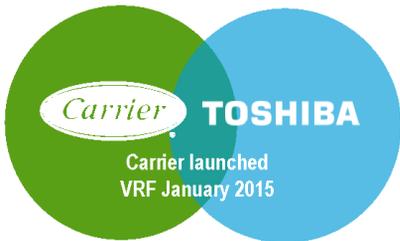
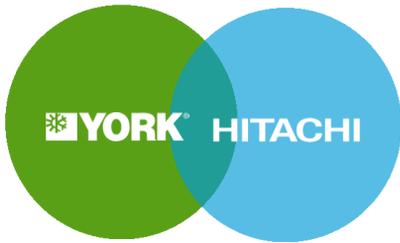
Maintenance requires a different skill set

## VARIABLE REFRIGERANT FLOW (VRF) »

The technology value proposition is two-fold: energy savings in both heating and cooling; and comfort improvement. Also, building owners can retrofit floor by floor to avoid business disruption.

Although taking off in the U.S., this is not an emerging technology. VRF has 90% of the market share in Japan and other parts of the world.

# MANUFACTURER MARRIAGES



**Ducted**      **Ductless**  
**Partner**      **Partner**

## VARIABLE REFRIGERANT FLOW (VRF) »

One clear sign of market movement is the way traditional (U.S.-based) HVAC manufacturers have been positioning themselves to take advantage of what they expect to be explosive growth in the ductless VRF market.

U.S. manufacturers lacking ductless technology expertise have partnered with Asian manufacturers, who have the technology, but not the distribution.

# PROGRAM OPPORTUNITIES IN TECHNOLOGY

VRF performance testing—huge need to corroborate ratings

Tighter program and emerging technology integration

Retrofit: VFDs below 8.5 tons, heat recovery ventilators, economizers

## PROGRAM OPPORTUNITIES »

VRF technology has its promise—and its evangelists. While it is seeing rapid growth, there is little in the way of hard data to corroborate its efficiency ratings. Integrating program needs with BPA's emerging technology group more tightly can help anticipate these barriers in the future.

For new units and for any packaged units, code now requires that 8.5 ton or larger units have a 2-speed (or variable speed) motor on an evaporator fan motor. That means an opportunity is missed in the <8.5 ton range. Not to mention most of the installed stock could be equipped with smaller 'add-on' measures like VFDs.

# SALES TRENDS – RESIDENTIAL CAC AND HEAT PUMPS

	2010	2014
13 SEER	56%	58%
14-16 SEER	36%	18%
17+ SEER	8%	24%

## SALES TRENDS »

The region-wide efficiency mix for 2010 and 2014 is shown above for residential CAC and heat pumps.

While the super-high efficiency category has tripled, perhaps due to the region's success in promoting ductless heat pumps, the most notable observation may be the stability of the baseline efficiency share—essentially unchanged.

# SALES TRENDS – RESIDENTIAL GAS FURNACES

	2010	2014
80% AFUE	30%	32%
90% AFUE	21%	8%
95% AFUE	49%	60%

## SALES TRENDS »

The region-wide efficiency mix for 2010 and 2014 is shown above for residential furnaces.

The market has clearly moved to embrace condensing technology, with nearly two-thirds choosing 90%+ AFUE.





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