



## VRV Vertical Market Focus – Hotel Applications



# VRV In Hotel Applications

*“We have found a system (Daikin VRV) that is price competitive with PTAC’s that gives us better attributes than a 4 pipe system.”*

– Drury Hotels

Value Drivers

Guest Comfort  
and Loyalty

Efficiency

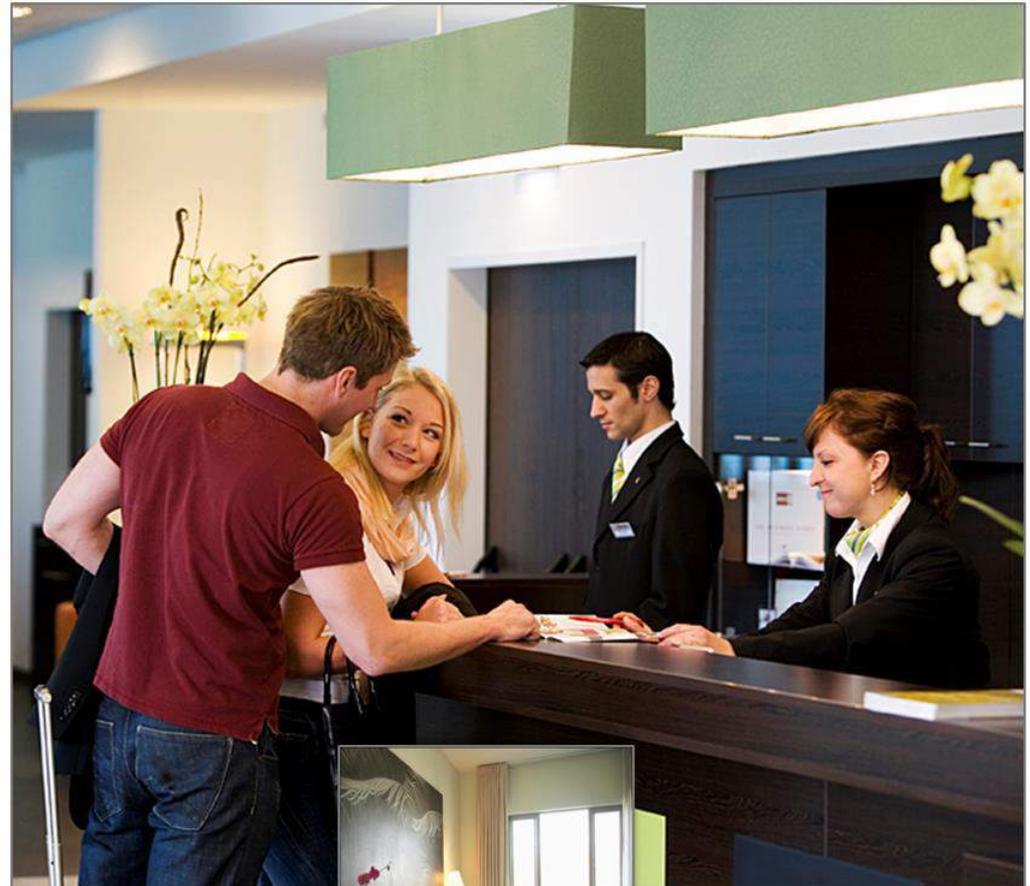
Control



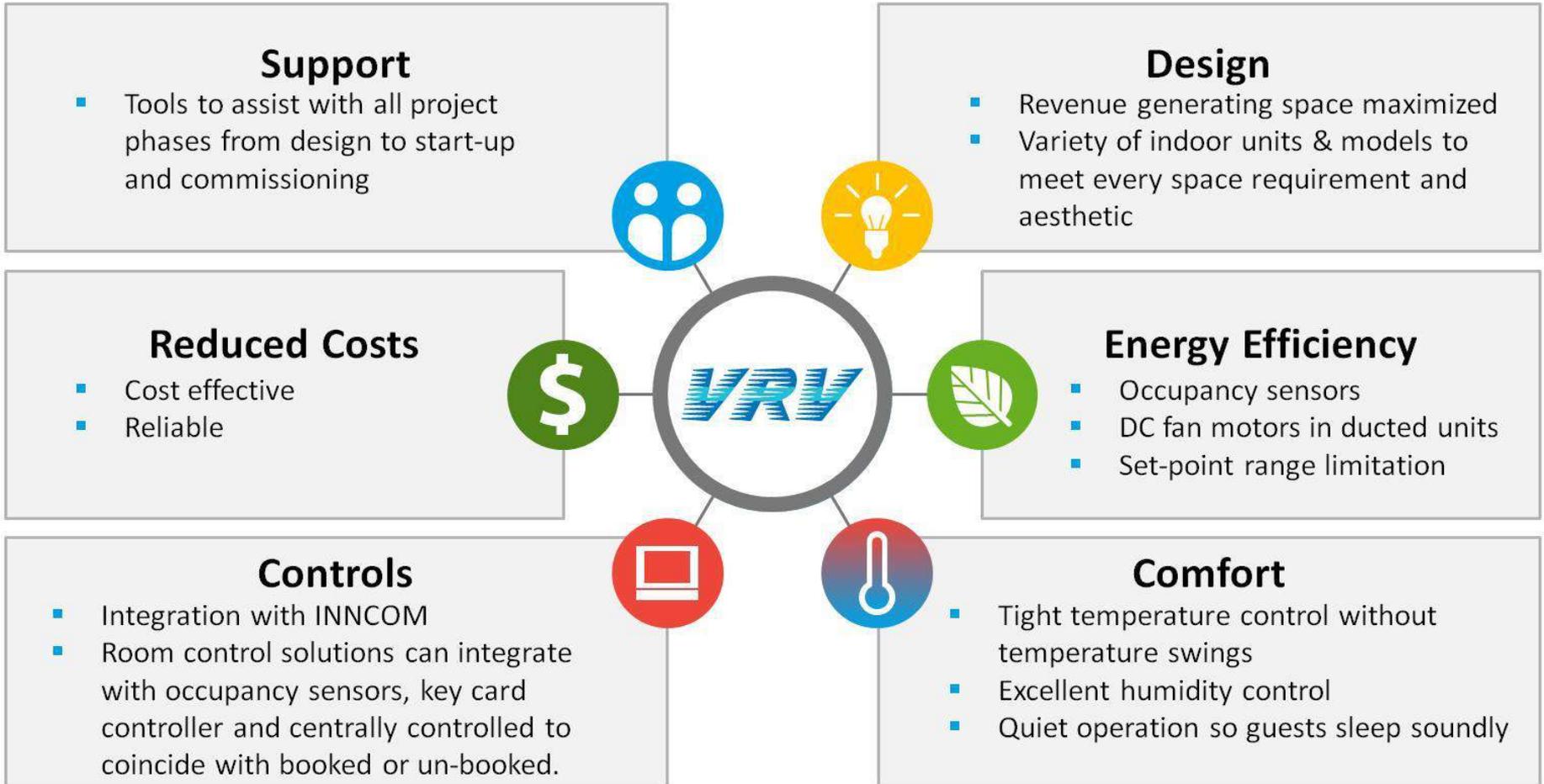
# Hotel Application Requirements

100's of New users every day!

- Simple Occupant Control
- Efficient and Reliable Operation
- Comfortable Environment (Sound & Temperature Swings)
- Simple and Quick Maintenance
- Discrete System
- Happy Customers (No Complaints, Repeat Business)

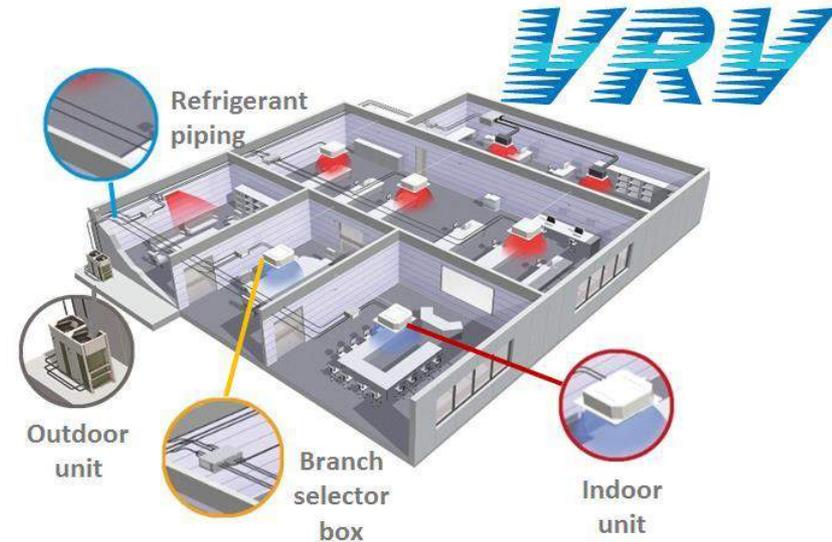
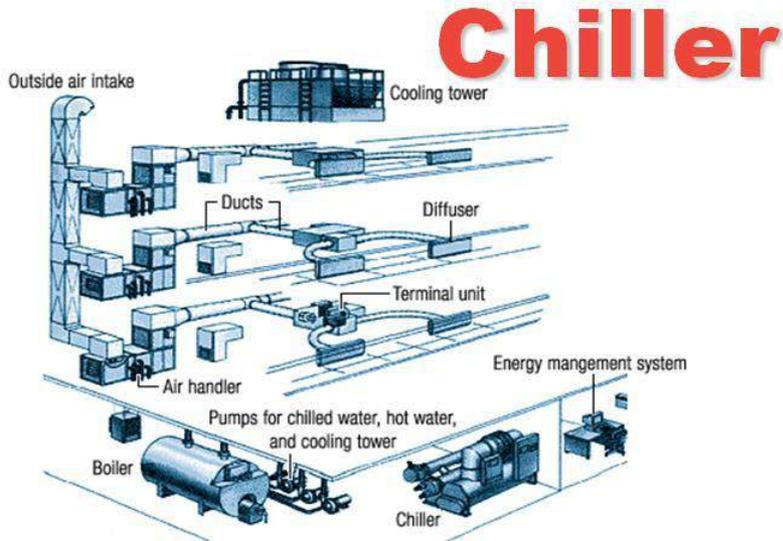


# Attributes Behind VRV Success In Hotels



At Daikin we're proud of our commitment to providing the best in guest comfort

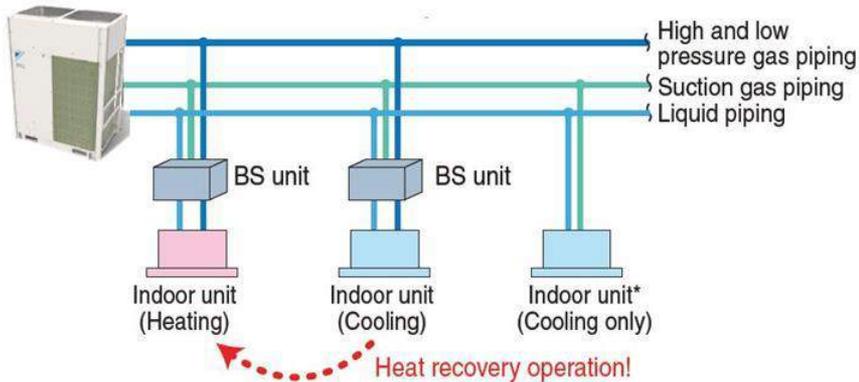
# Variable Refrigerant Volume Vs. Chiller Overview



- Compressor + pump + cooling tower + boiler + controls/AHU + ducts or FCUs + water pipe
- Uses water as heat transfer medium
- 2 pipe chiller & 4 pipe system for simultaneous heating and cooling
- Complicated operation requires management

- Outdoor unit + piping + branch selector box (for Heat Recovery only) + indoor unit + controls
- Uses refrigerant as heat transfer medium
- 2 pipe chiller = Heat pump.
- 4 pipe system = 3 pipe Heat recovery (simultaneous heat/cool)
- Up to 64 indoor units to one outdoor unit
- Simple energy efficient operation

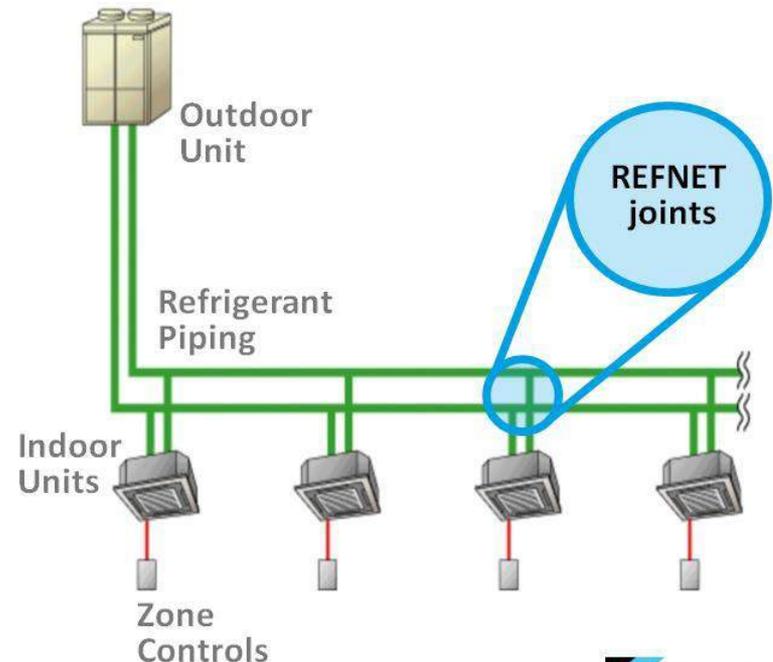
# A Closer Look At VRV Systems In Offices...



- Simultaneous Heat/Cool ability with 3 Refrigerant pipes
- Has both Cooling source and Heating Source built into Condenser
- Only outdoor space required for Condenser in most cases
- Refrigerant as the Heat-Transfer Medium.

## Simple building blocks:

- Less components
- More leasable square feet or save on construction
- Less maintenance and repairs to disrupt productivity



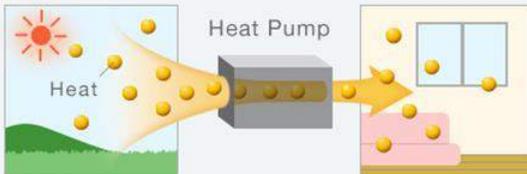
# Design: Technology & Innovation



## Daikin focuses on 3 cutting edge technologies

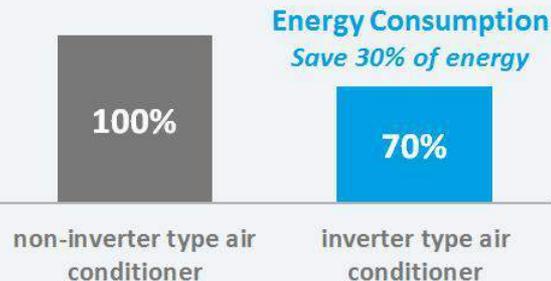
### Heat Pump

*Energy saving technology transferring available ambient heat yielding energy savings.*



### Inverter

*Contributes to greater energy efficiency and comfort by eliminating unnecessary operation.*



### Refrigerant Control

*Enhanced energy savings and comfort delivered through Daikin's Variable Refrigerant Temperature (VRT) technology.*



**As an innovative leader Daikin paves the way for next generation technologies, uniquely integrated to provide optimal energy efficiency for you and comfort for your guests.**

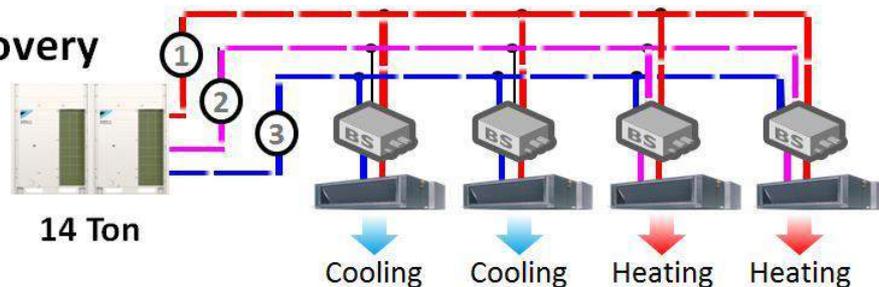
# Design: Product & System Flexibility



## Design benefits to hotel owners

- Central controls allow groups of indoor units on certain floors or wings to be turned off during times of low occupancy
- Units are controlled in each individual zone; local malfunctions do not cause system shut down
- Multiple types of indoor units and sizes provides design flexibility for each space
- Operates over a broad temperature range
- Meet the comfort demands of each guest room using simultaneous heating and cooling with Daikin VRV Heat Recovery

### Heat recovery



# Design: Small Guest Room Solutions



## Slim Duct Built-In Concealed Ceiling Unit



- Experience a restful nights sleep with sound levels as low as 29dB(A).
- Can be installed into limited ceiling void, bulkhead, or soffit space.
- Reduced maintenance costs with washable filter included.

## 1-Way Cassette



- Alternative to Slim Ducted unit
- Limited install space required
- Easy maintenance

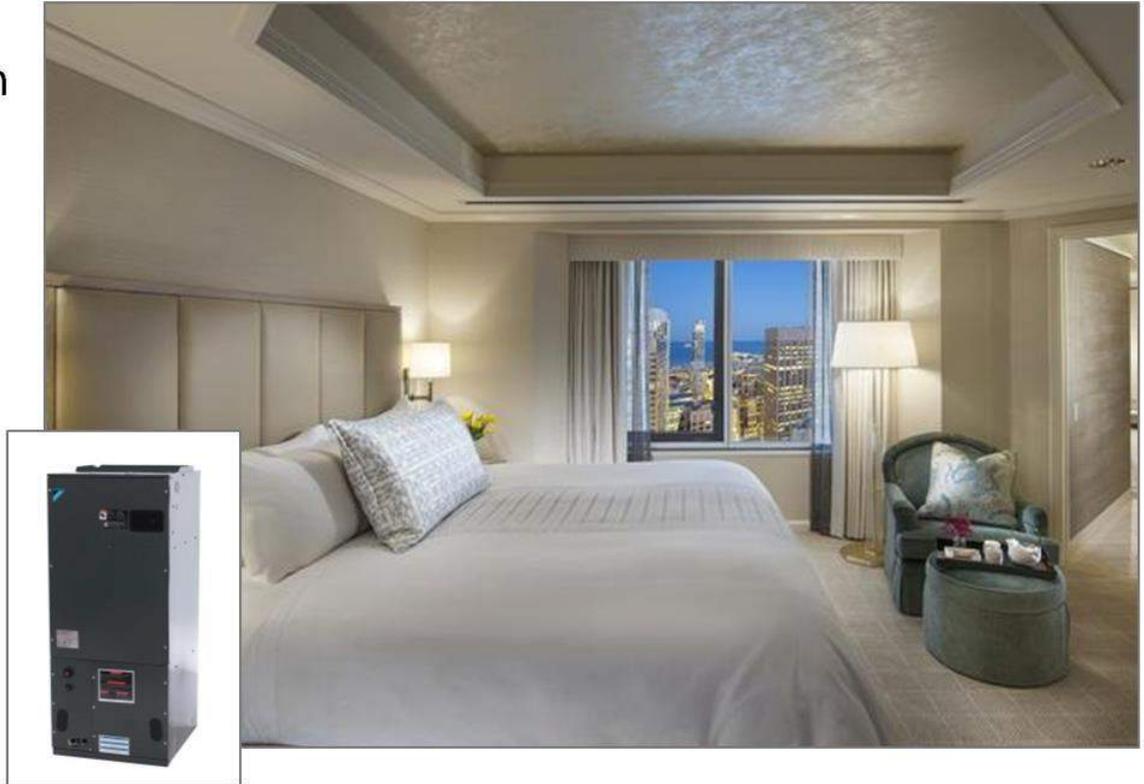
**These solutions are ideal for guest rooms up to 400ft<sup>2</sup> in need of a low profile unit with low sound levels.**

# Design: Large Guest Room Solutions



## Vertical Air Handling Unit

- Minimized equipment and installation cost with plug-in electric heat control.
- Energy efficiency with ECM (Electronically Commutated Motor) fan motor.
- Reduced piping cost with smaller piping diameters.
- Can be used in new construction and replacement projects.
- Ability to mix and match with other Daikin VRV indoor units on the same system as room sizes may vary.



# Design: Ducted Indoor Unit Types



Type	Model	Capacity Sizes	Description
	<b>Slim Duct built-in concealed low static</b>	<b>7.5 MBH to 24 MBH</b>	<ul style="list-style-type: none"><li>▪ Low profile and low sound levels</li><li>▪ Ductless soffit or adapt to minimal ductwork</li><li>▪ Installation for supply and return</li><li>▪ Condensate lift pump</li><li>▪ Rear or bottom return</li></ul>
	<b>Medium static ducted unit</b>	<b>72 MBH &amp; 96 MBH</b>	<ul style="list-style-type: none"><li>▪ 6 and 8 ton capacity models</li><li>▪ Standard blower motors</li><li>▪ Gravity condensate drain</li><li>▪ Front discharge – rear return</li></ul>
	<b>Floor standing unit (concealed)</b>	<b>7.5 MBH to 24 MBH</b>	<ul style="list-style-type: none"><li>▪ Top discharge/bottom return</li><li>▪ Space saving free-standing or wall mounted</li><li>▪ Optional condensate pump</li><li>▪ Factory long-life filter</li></ul>

**Designed for absolute comfort and versatility with zoning flexibility and control for every room and space.**

# Design: Common Area Solutions



## Round Flow Sensing Cassette



- 360° Airflow and occupancy sensors enable optimized comfort and efficiency
- Optional self-cleaning filter panel to further increase efficiency and reduce maintenance time and costs
- LEED ready - MERV 13 filter options



**Ideal for common areas, meeting rooms, cafes and restaurants within the hotel.**

# Other Ductless Indoor Unit Types



Type	Model	Capacity Sizes	Description
	<b>2' x 2' 4-way ceiling cassette</b>	<b>7.5 MBH to 18 MBH</b>	<ul style="list-style-type: none"><li>▪ 2,3 or 4 way configured air flow</li><li>▪ Condensate lift pump</li><li>▪ Outside air integration possible</li><li>▪ Factory long life filter</li></ul>
	<b>Under ceiling 4-way cassette</b>	<b>18 MBH to 36 MBH</b>	<ul style="list-style-type: none"><li>▪ Innovative under ceiling 4-way cassette</li><li>▪ 2,3 or 4 way configured air flow</li><li>▪ Optional floor and presence sensor kit</li></ul>
	<b>Wall-mounted unit</b>	<b>7.5 MBH to 24 MBH</b>	<ul style="list-style-type: none"><li>▪ Quiet operation</li><li>▪ Powered louvers – programmable</li><li>▪ Optional condensate pump kit</li><li>▪ Factory long-life filters</li></ul>
	<b>Ceiling suspended unit</b>	<b>12 MBH to 36 MBH</b>	<ul style="list-style-type: none"><li>▪ Wide air discharge with long throw</li><li>▪ Powered louver – programmable</li><li>▪ Less than 8" high</li><li>▪ Factory long-life filters</li></ul>
	<b>Floor standing unit (exposed)</b>	<b>7.5 MBH to 24 MBH</b>	<ul style="list-style-type: none"><li>▪ Top discharge/bottom return</li><li>▪ Space saving free-standing or wall mounted</li><li>▪ Optional condensate pump</li><li>▪ Factory long-life filter</li></ul>

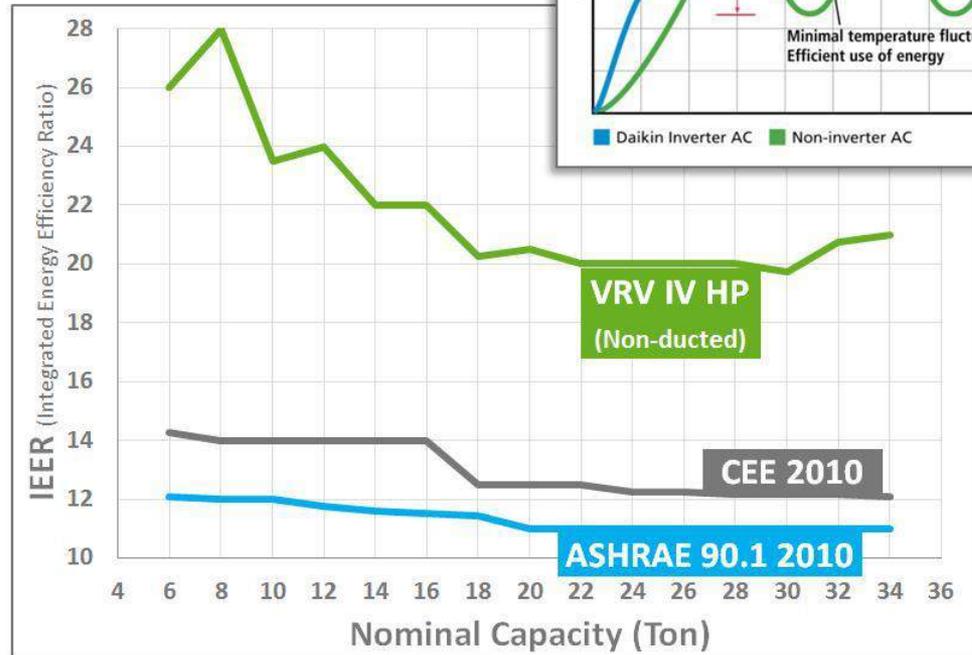
# Energy efficiency



## Energy efficiency by design: attributes and features

- Variable-speed inverter compressor eliminates unnecessary operation
- Sophisticated zone controls
- Indoor unit features such as occupancy sensors
- VRT (Variable Refrigerant Temperature) climate tuning capability
- Easy to model using energy simulation tools
- Systems are AHRI certified

### IEER Ratings



**Daikin VRV far exceeds minimum efficiency requirements**

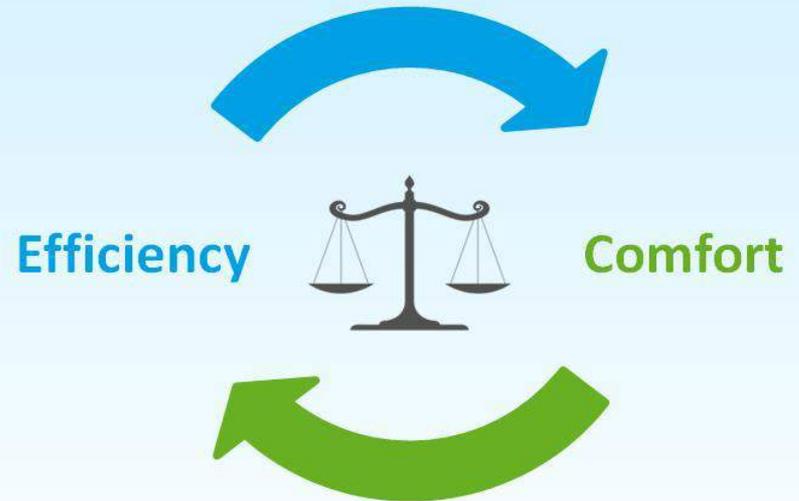
# VRT: Where Comfort And Efficiency Intersect



The system adjusts intelligently to weather variations and real life situations.



Evaporating and condensing temperatures can be tailored precisely to achieve the optimum balance.



**VRT delivers a perfectly controlled interior climate with maximum energy savings.**

# Comfort: Optimal Room Temperature



Always the right temperature with VRT technology

- Improved temperature control
- Reduced temperature swings
- Improved humidity control in every season



Building  
Load

Winter



Spring



Summer



Fall



A commitment to providing a comfortable stay for every guest

# Comfort: Low Sound Emissions

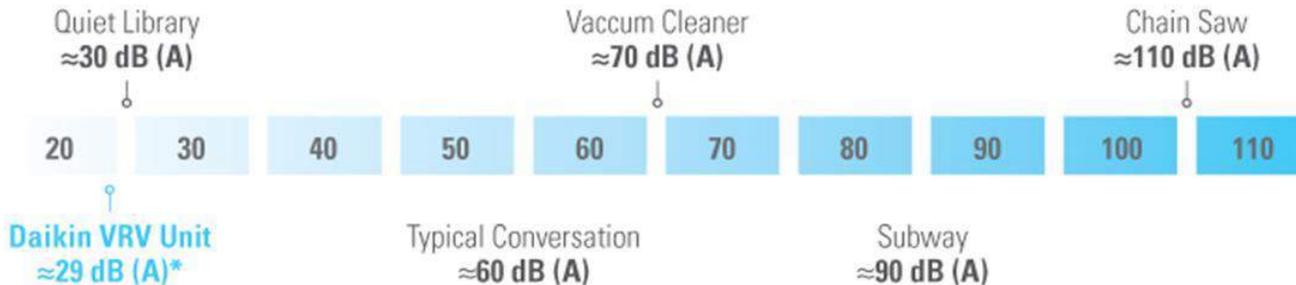


Low sound emissions from both indoor and outdoor units

## Requirements for hotel noise criterion (NC)

Individual rooms 25-35 NC → 35-45 dB(A)

Halls, corridors & lobby: 35-40 NC → 50-55 dB(A)



\* Based on the 0.6 - 1 ton Slim-Duct, Built-In Concealed Ceiling unit (FXDQ-MVJU) on low fan speed

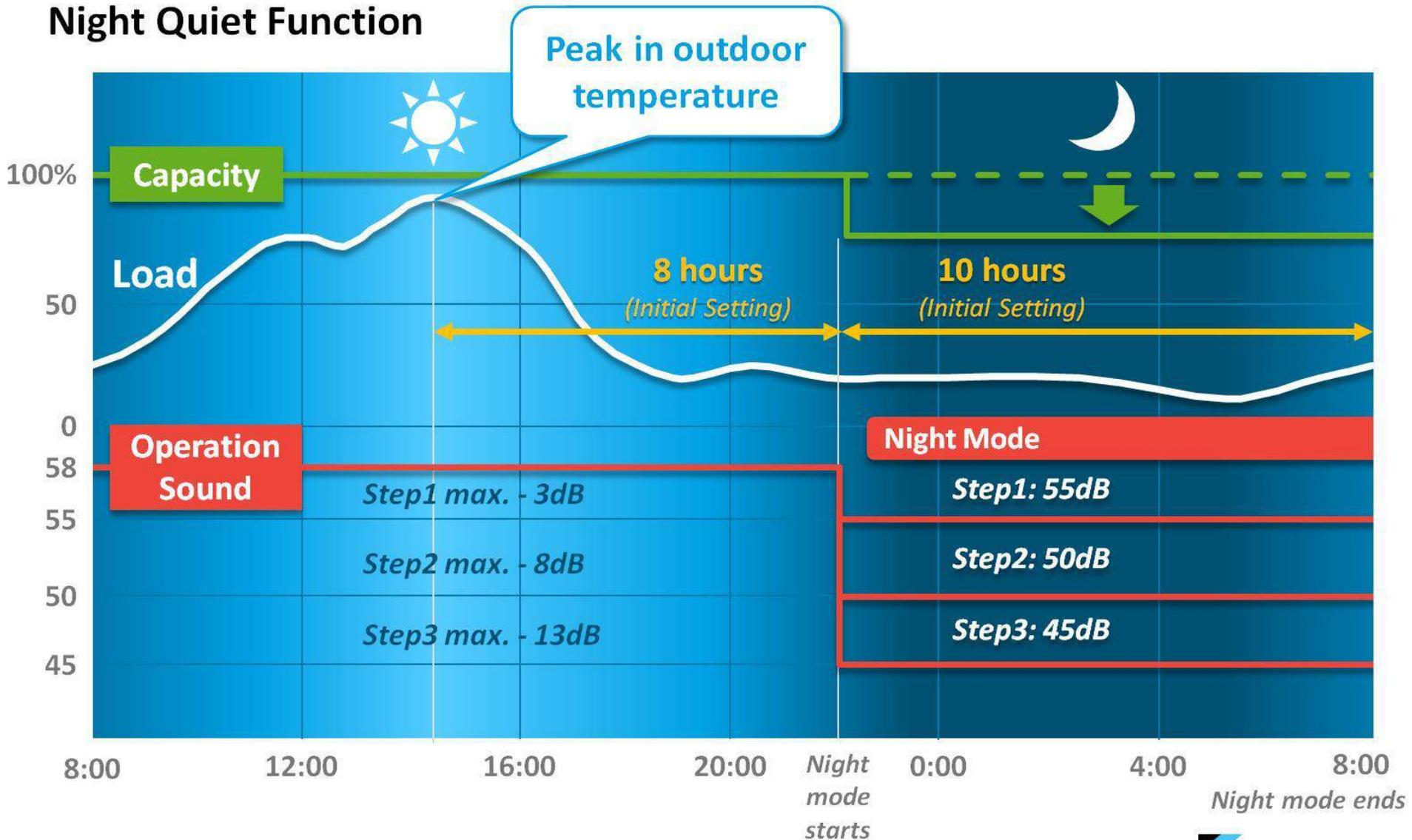
➔ Average PTAC runs at ~53 dB(A) with compressor running at High Cool

Quiet operation so your guests sleep undisturbed.

# Comfort: Night Time Operation



## Night Quiet Function



# Controls: Simple And Intuitive Room Options

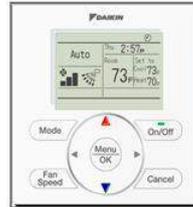


## Simple to use intuitive control for guest rooms and common areas

- Interchangeable face plates allow for only the necessary and required level of guest control
- Programmable max/min and setback points maximize guest comfort and system efficiency



*Simplified controls for guests*

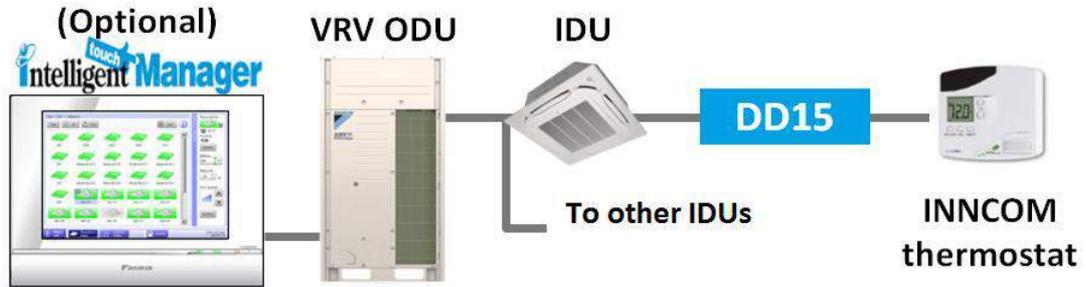


*Detailed menu options for staff to control zones and floors*

- Complete compatibility with INNCOMM; provides the guest with familiar and easy to use controls

*plug and play integration with*

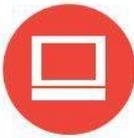
**INNCOMM**



*An INNCOMM and DAIKIN joint development*

**Flexible, guest friendly and highly customizable controls.**

# Controls: Hotel Building Management

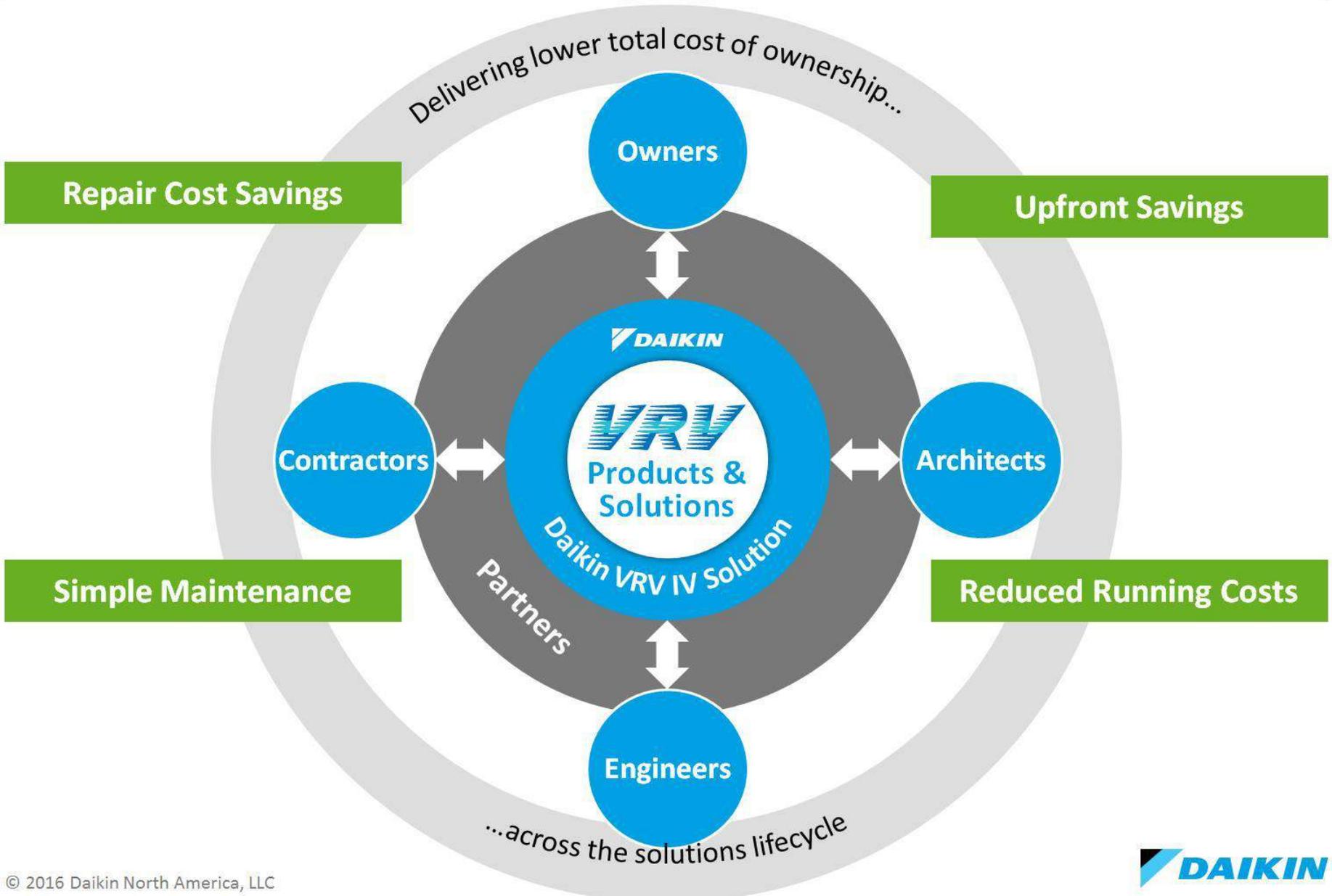


## Comprehensive control for hotel management with iTouch Manager



- Advanced Multi-zone controller with the ability to control up to 1024 indoor units
- Zone-based scheduling, ex: 5+1+1 'field set'
- Web monitoring via Internet & Intranet & email alerts for potential system errors
- Auxiliary control of other equipment such as DOAS, lighting, fire alarms and pumps capability
- Seamless integration with other building controls via LonWorks, BACnet® and Modbus

# Daikin VRV IV Optimized Life Cycle Costs



# Upfront Savings: Installation Phase



## Upfront cost-reduction potential



Reduced overall power supply



Reduced back-up generator capacity – generator surge loads are greatly reduced or eliminated



Additional auxiliary equipment may not be needed for install



Minimal landscaping around compact outdoor unit by strategically placing out of sight



Sophisticated controls are part of the VRV package, no separate purchase

**With Daikin VRV there are many cost reduction opportunities to realize to lower first costs during the installation phase.**

# Reduced Energy Usage & Costs: Operational



Based on 60,00 ft<sup>2</sup> hotel, 4 floors,  
12,000ft<sup>2</sup> common area

Average cost Savings with VRV-IV

Chiller + AHU	69%
DX + PTAC	63%
DX + PTHP	73%
PTAC	72%
WSHP	59%
VRV WIII84	34%

Average cost Savings with VRV-IV

Chiller + AHU	48%
DX + PTAC	40%
DX + PTHP	51%
PTAC	56%
WSHP	35%
VRV WIII84	5%

Average cost Savings with VRV-IV

Chiller + AHU	41%
DX + PTAC	36%
DX + PTHP	52%
PTAC	56%
WSHP	40%
VRV WIII84	5%

Average cost Savings with VRV-IV

Chiller + AHU	66%
DX + PTAC	71%
DX + PTHP	78%
PTAC	73%
WSHP	70%
VRV WIII84	51%

Average cost Savings with VRV-IV

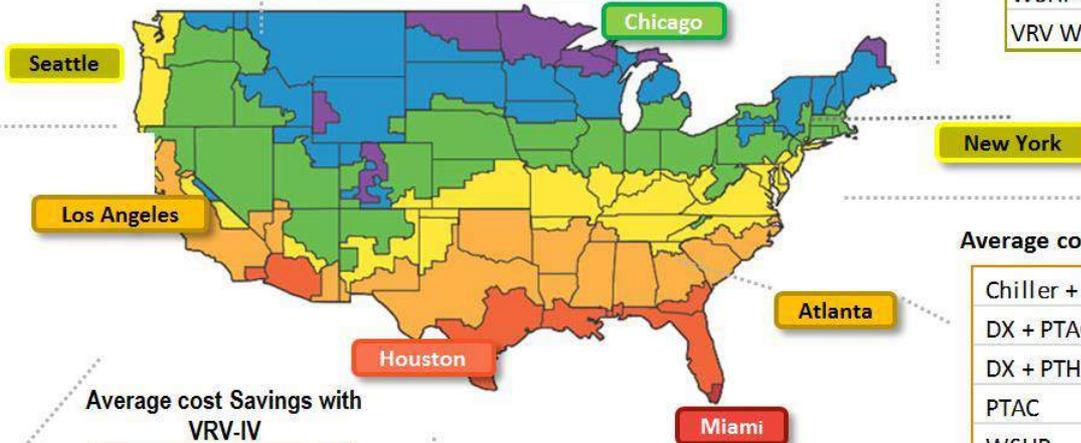
Chiller + AHU	40%
DX + PTAC	34%
DX + PTHP	46%
PTAC	31%
WSHP	26%
VRV WIII84	-15%

Average cost Savings with VRV-IV

Chiller + AHU	48%
DX + PTAC	42%
DX + PTHP	52%
PTAC	36%
WSHP	37%
VRV WIII84	0%

Average cost Savings with VRV-IV

Chiller + AHU	52%
DX + PTAC	45%
DX + PTHP	56%
PTAC	51%
WSHP	39%
VRV WIII84	3%



IES-VE modeling software

Usage modeled by PhD  
in-house Energy Engineer

Using 2014 state  
commercial energy  
prices

# Reduced Costs: Simple Maintenance



## Round Flow Sensing Cassette



**Indoor units that include life long washable filters**

- Slim-Duct, Built-in Concealed Ceiling Unit
- Concealed Floor-standing unit
- 2' x 2' 4-Way Ceiling Mounted Cassette
- Ceiling-Suspended Unit
- Floor-standing unit

**Maintenance costs reduced both for guest rooms and open areas.**

# Reduced Costs: Repair Expenses



## Best in-class 10 year warranty reduces repair costs

- Industry leading warranty and experience provides long term reliability & peace of mind
- 10yr Parts and Compressor Warranty for all VRV products
- Indoor fan coil features such as long life filters reduce replacement costs
- PTAC units need to be replaced every 7-10 years whereas Daikin VRV's lifespan is 15-20 years



*Complete warranty details available from your local dealer or at [www.daikincomfort.com](http://www.daikincomfort.com).*

**A commitment to serve and lower costs for the lifetime of your system.**

# Leading Investment, Tools And Support



## Local Development and Manufacturing



**Extensive local inventory and short lead times**

**98% of replacement parts shipped in 48hrs**

### Electronic Tools to assist with:

- Design (CAD & REVIT)
- Equipment selection
- Energy Screening
- Submittal
- Start Up and Commissioning





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