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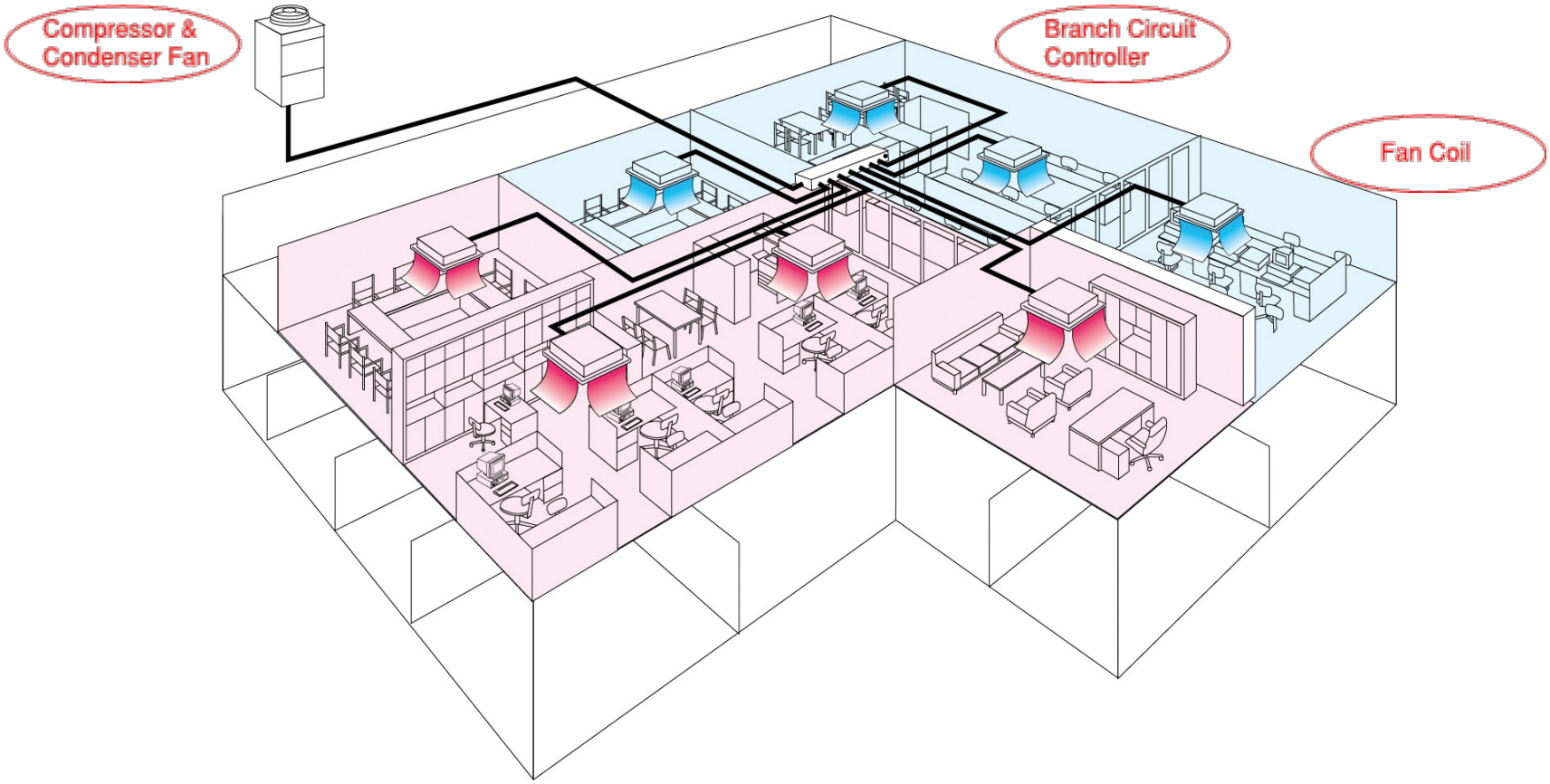
MITSUBISHI ELECTRIC
COOLING & HEATING
Live Better

VRF Complete Building Solution

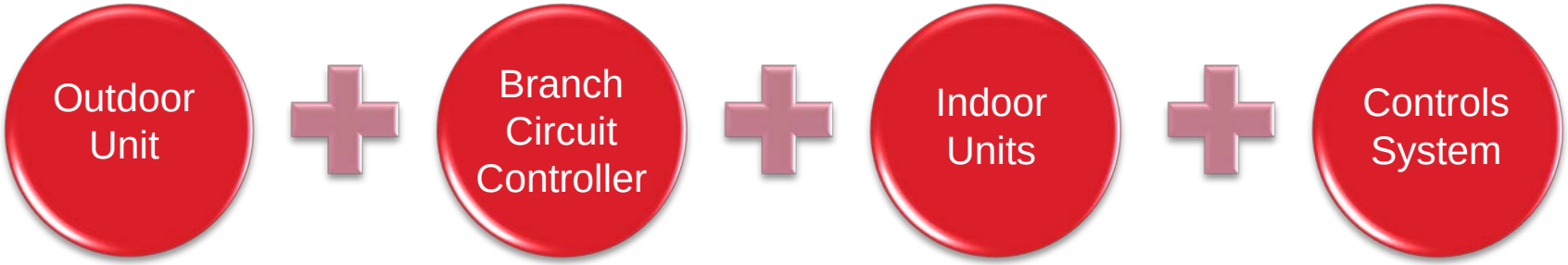
AGENDA

1. *VRF Technology Overview*
2. *“The Building”*
3. *Heating and Cooling with VRF*
4. *VRF For Ventilation*
5. *Built in Energy Savings*
6. *Manufacturer Support*

VRF Heat Recovery System Layout



VRF Heat Recovery System Components



VRF Heat Recovery System Components

Outdoor Unit

+

Branch Circuit Controller

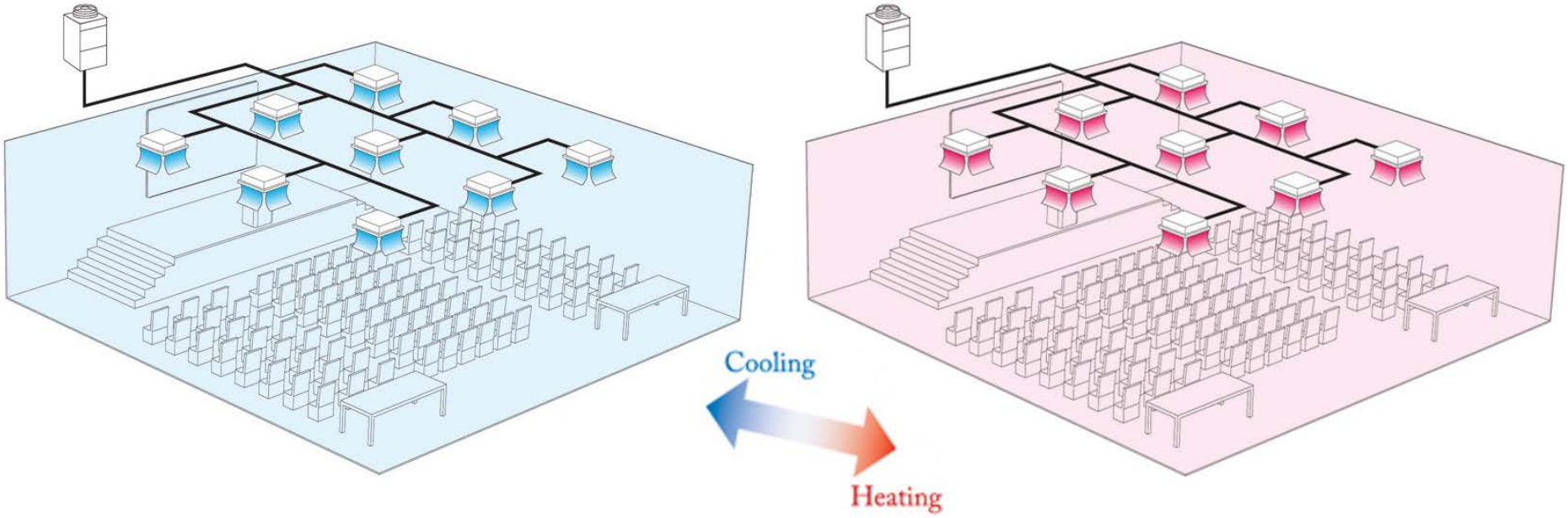
+

Indoor Units

+

Controls System

VRF Heat Pump System Layout



VRF Heat Pump System Components

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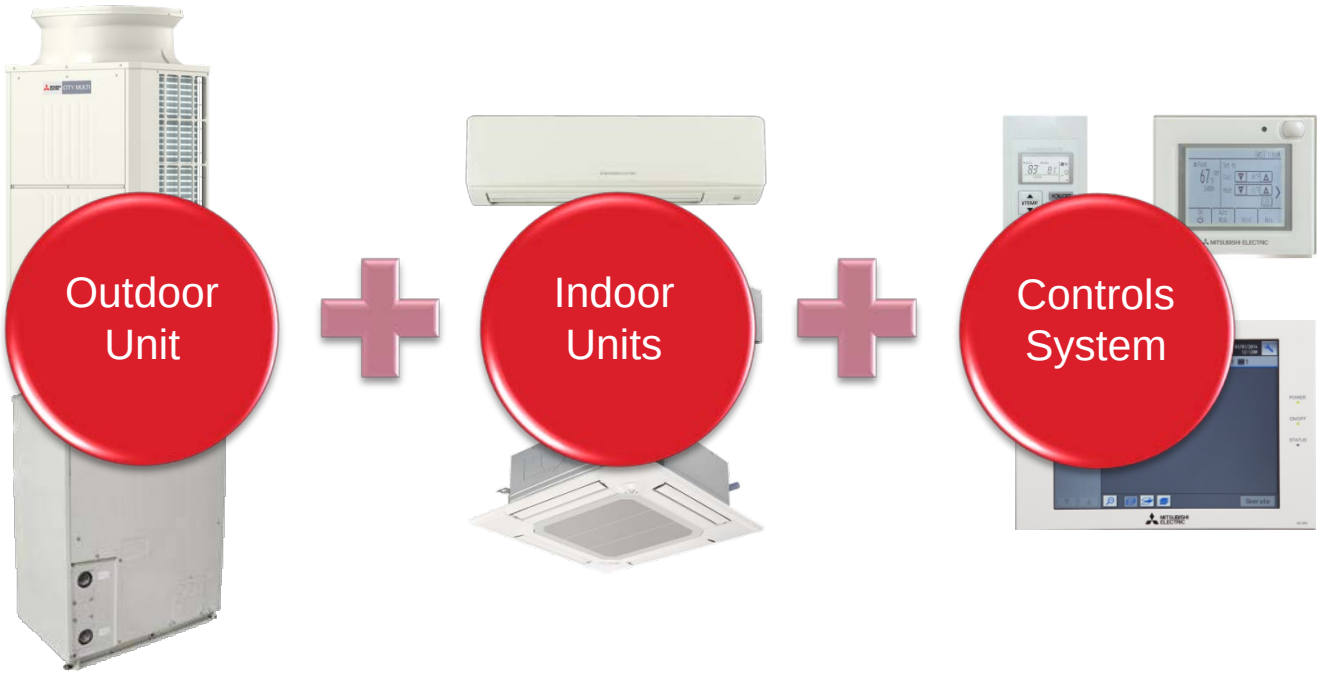
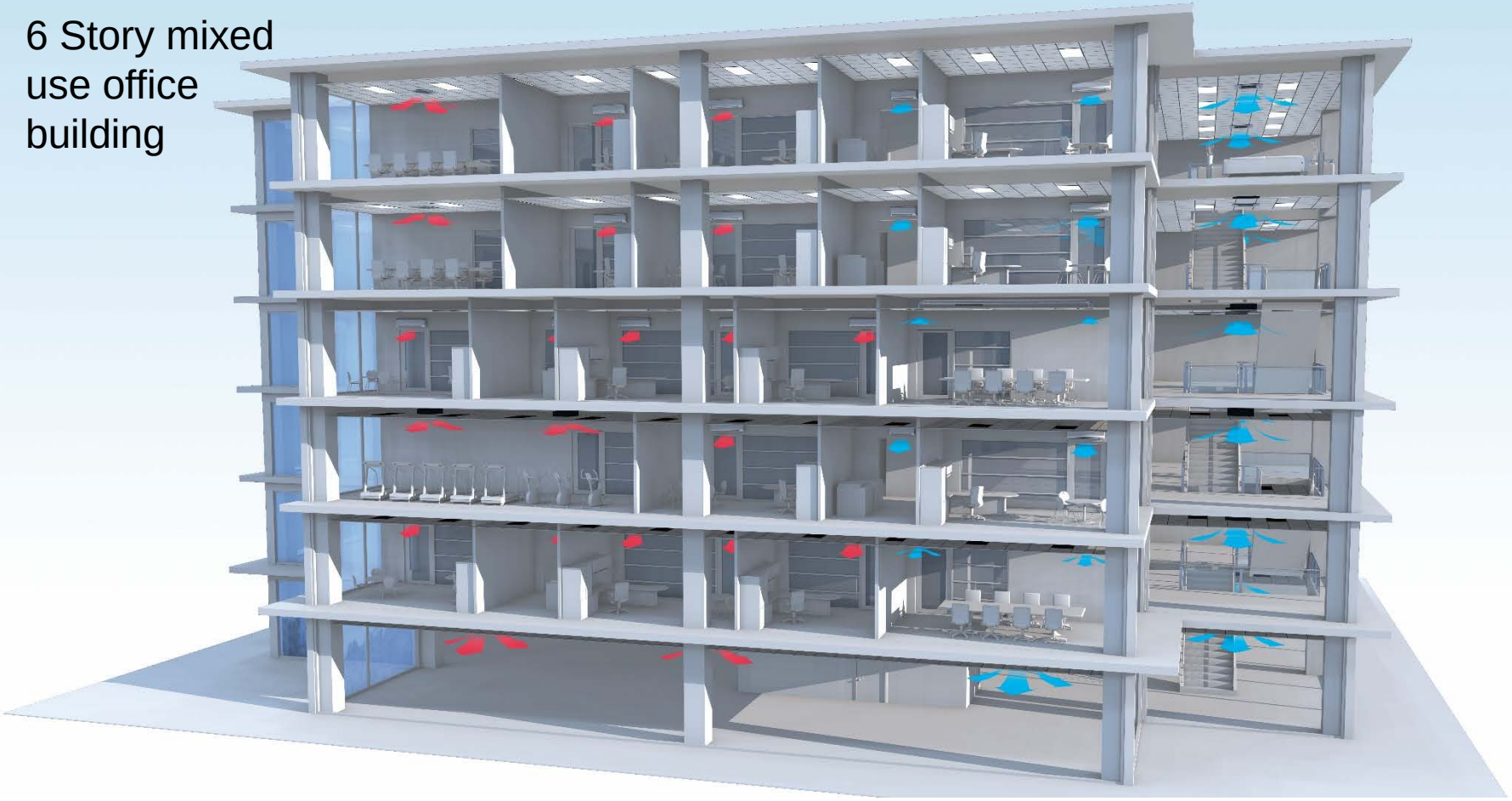


The Building

6 Story mixed use office building

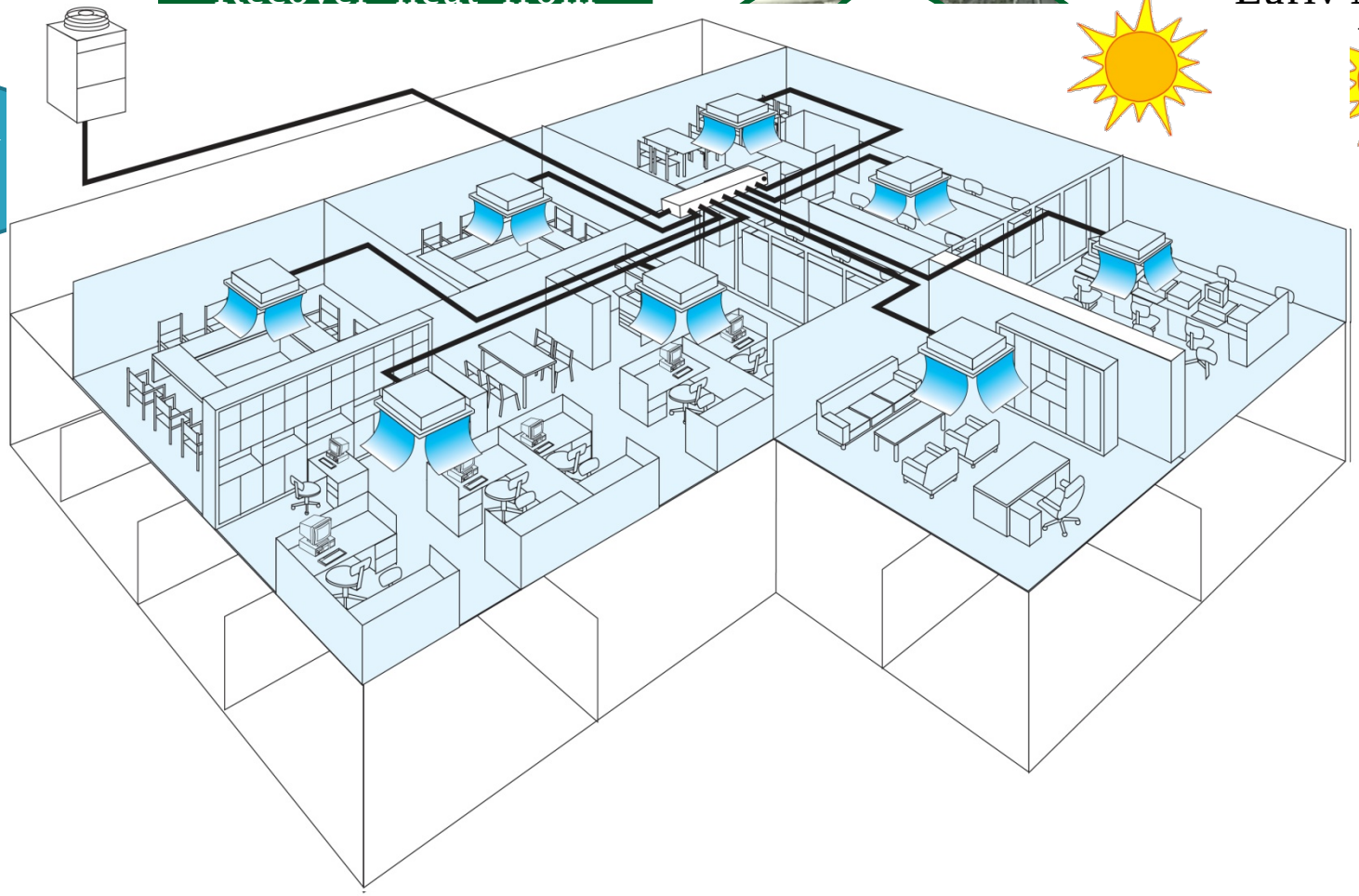


Recover heat from

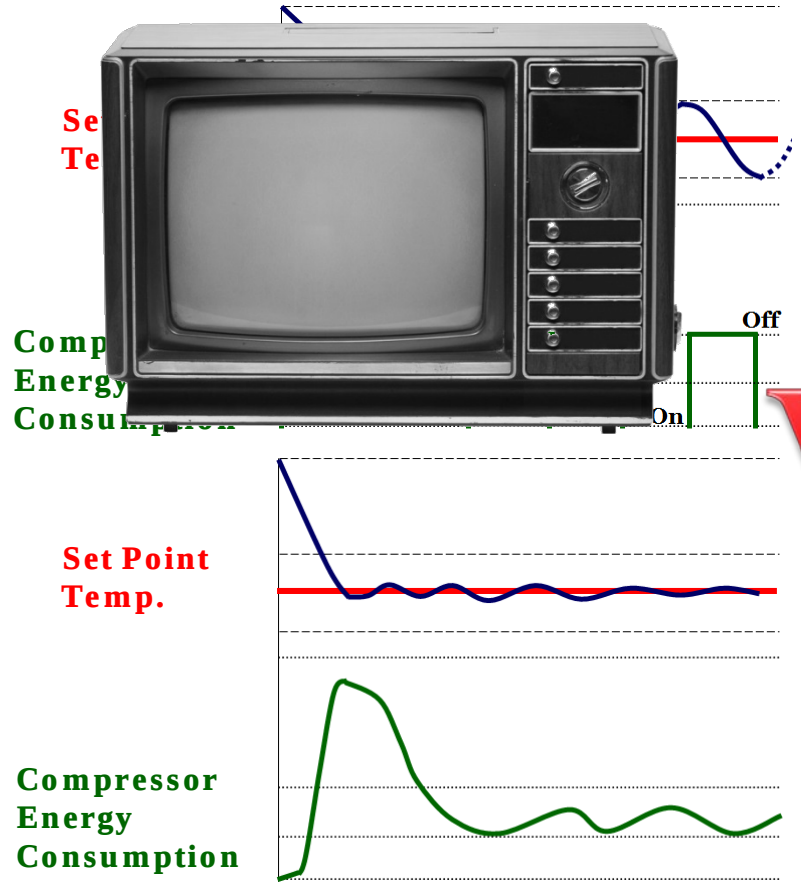
Afternoon

9:00 AM
Early Morning
Heating

12 Person Staff Meeting!!



VRF for Outside Air

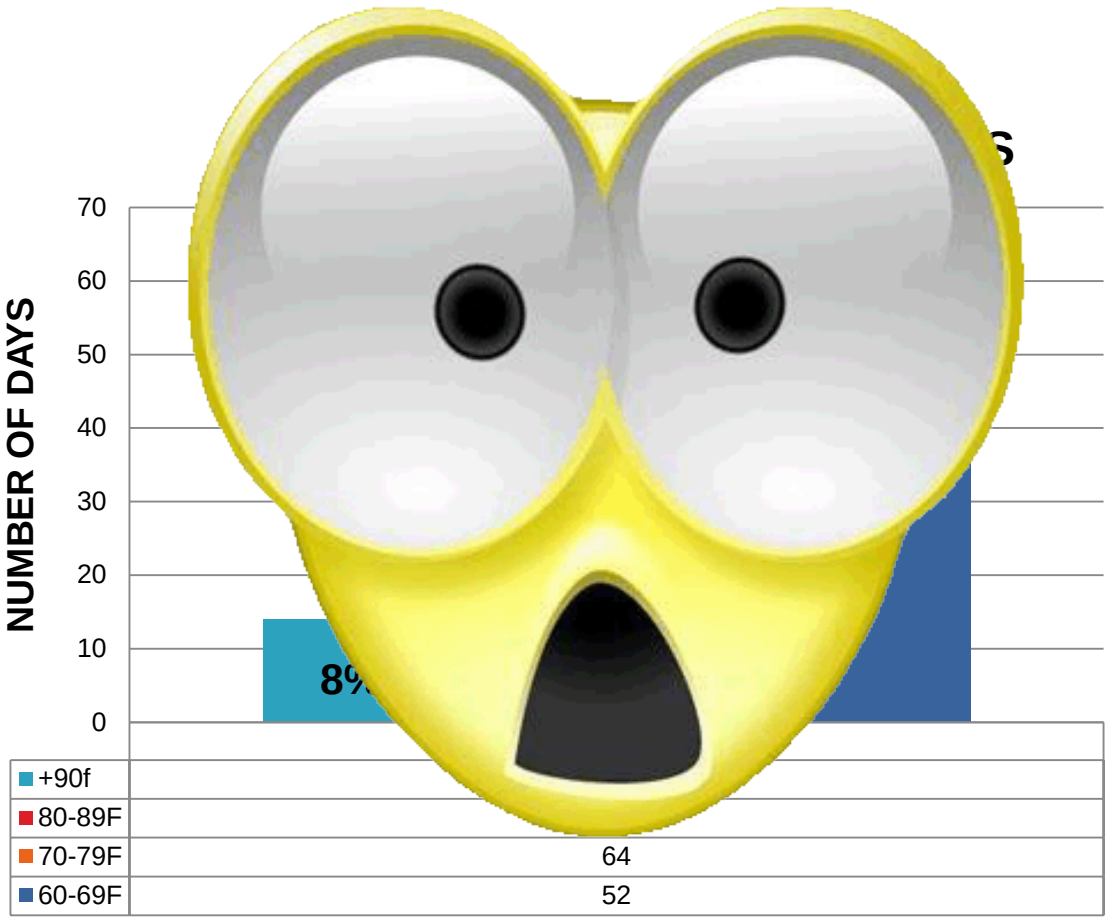


VS.

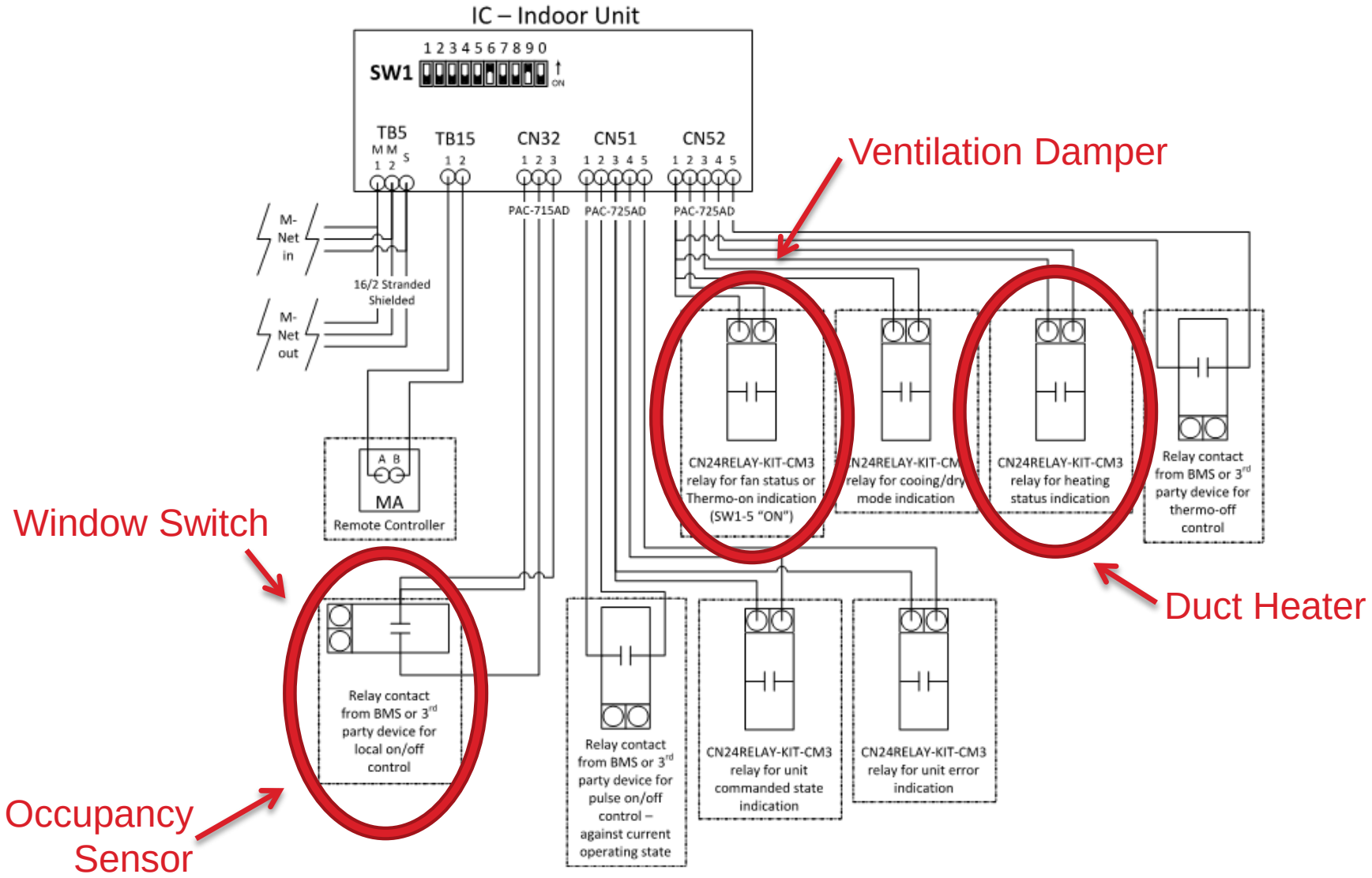
VRF for Outside Air Energy Savings

- In the past year Boston has seen design day temperatures less than 8% of the cooling season!

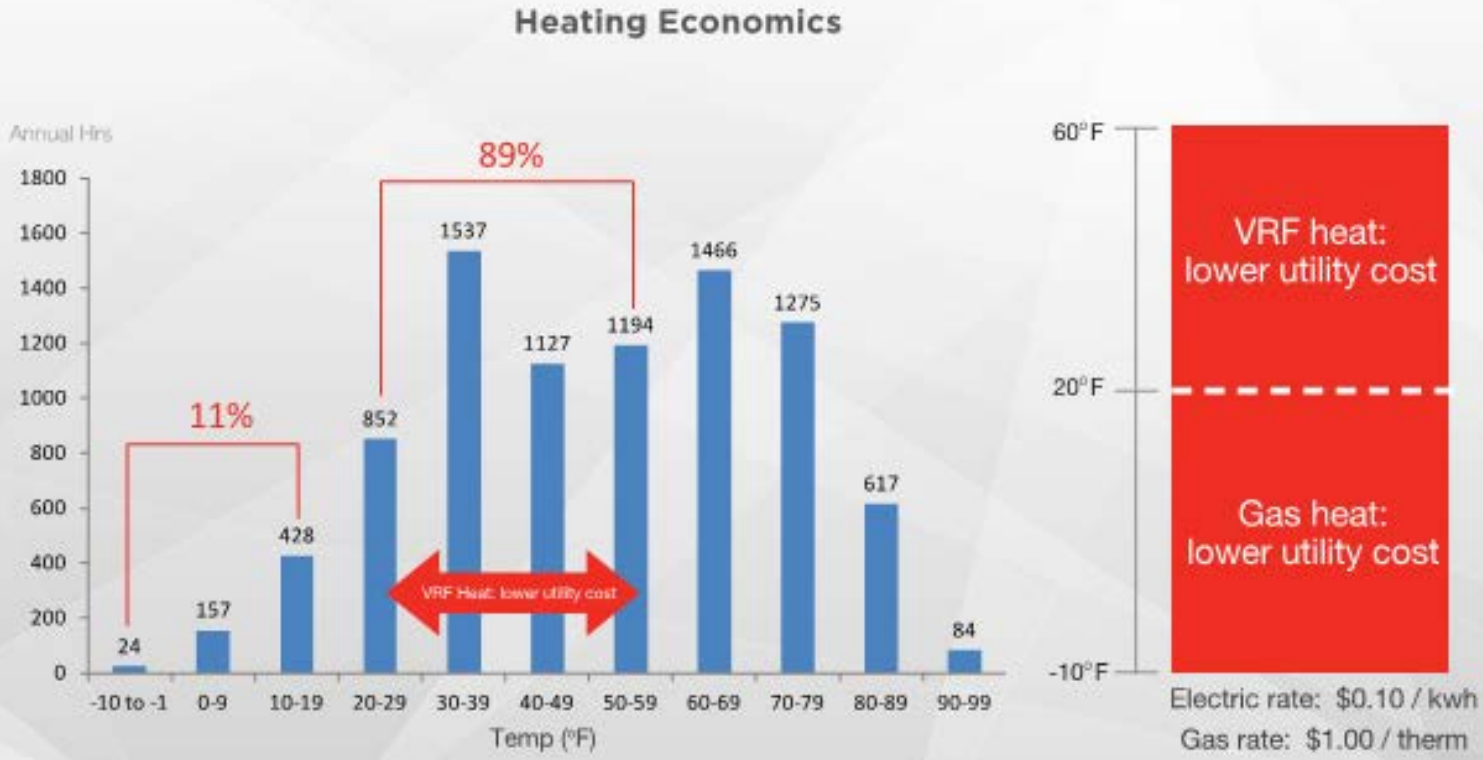
- Based upon 4,000 CFM and an 11 EER baseline. The Boston area should expect a **35% ENGERGY SAVINGS** as compared to it's conventional counter-part.



Built in Energy Savings



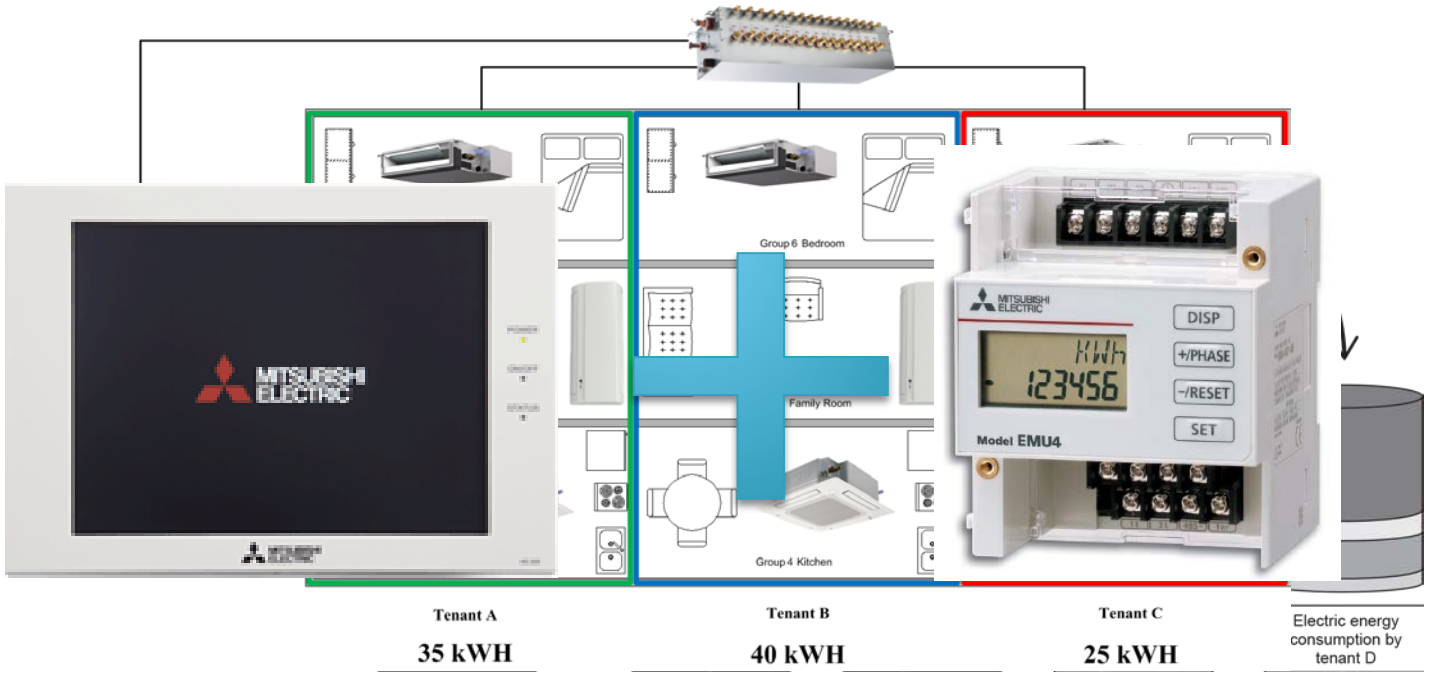
Built in Energy Savings



These charts provide an example, demonstrating Chicago's heating economics. For 89 percent of Chicago's heating season, it is cheaper to heat with VRF than any other kind of HVAC system.

Energy Allocation

- Indoor units' individual electrical consumption is metered separately on the tenant's electrical meter. That captures the energy consumed by running the indoor unit fan.
- The outdoor unit system, which consumes energy in order to spin the compressor and direct the needed refrigerant to the LEV and coil of each indoor unit must be accurately allocated to each tenant space based on what the units in that space are calling for.
- So there must be something that tracks what the indoor units are calling for and something that meters the outdoor unit electrical consumption in order to make energy allocation possible.



Energy Allocation System Architecture

LAN

Pulse Output

Dedicated electrical service for one or multiple ODUs

WHM

PI Controller (up to 4 pulse inputs)

Max. 50 tenant units

Common/Retail space, no billing

Max. 50 tenant units

More tenant systems

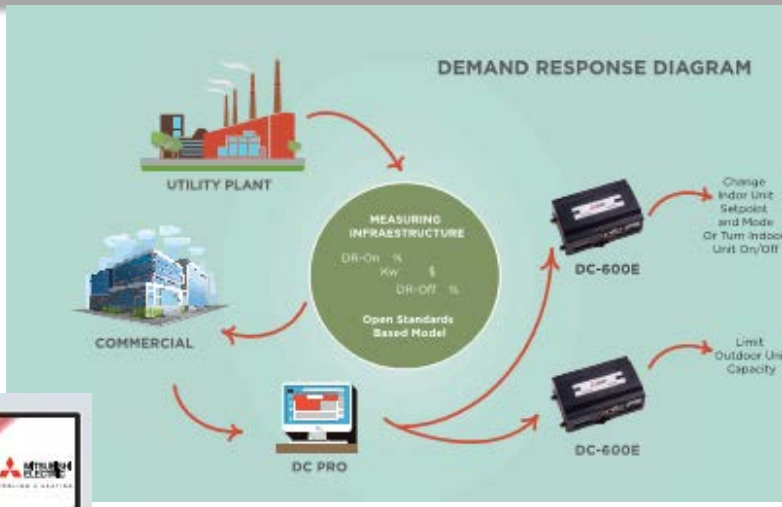
- •LAN connection facilitates import of apportionment data
- •Calculation Tool used to export charge data to billing entity.
- •Web browser can monitor/control up to 2000 indoor units.

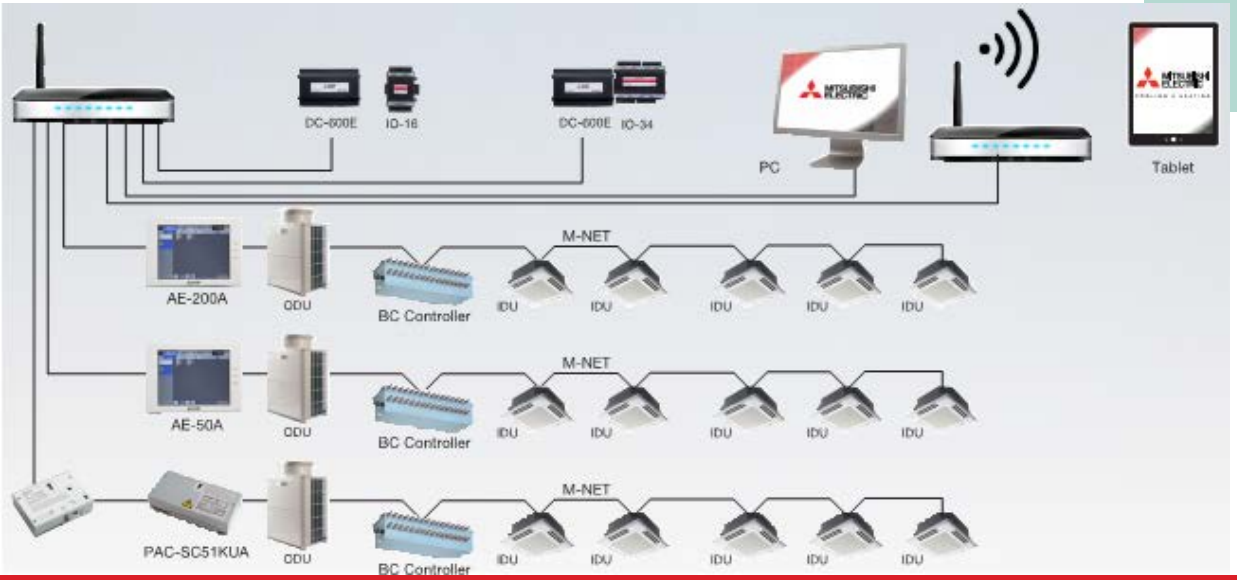
- •“Apportionment” serves as a data processing unit for billing data.
- •Can control/monitor up to 200 indoor units via four expansion controllers via LAN.

Energy Management Function

Advanced Controls + Demand Response

When the Demand Response signal is received from the utility company, Diamond Controls can adjust Mitsubishi Electric outdoor units, indoor units and third party equipment. Diamond Controls will change the set points, mode, and turn off some or all Mitsubishi Electric Cooling & Heating Variable Refrigerant Flow (VRF) indoor units to satisfy the signal. Diamond Controls can also limit the capacity of the Mitsubishi Electric VRF outdoor units. Not only can Diamond Controls perform this advanced logic on our own VRF units, but can adjust third party equipment controlled by the Diamond Controller.





Value Added Manufacturer Support

- Equipment Commissioning
- Project Supervision
- Equipment Startup
- Extended Warranty Support
- Owner Training
- System Evaluation

QUESTIONS?

SOURCES:

- Weather bin data provided by:
  - Degreedays.net