

# MassCEC VRF Program: Lessons Learned from 2 Years in the Field

NEEP 2019 ASHP Market Transformation Workshop

June 19, 2019

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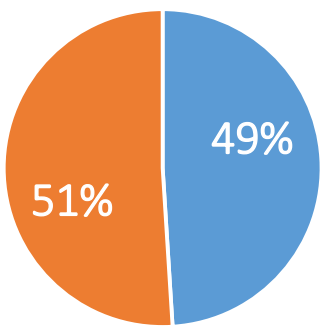
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# MassCEC VRF Program Snapshot

- Program Goal: Develop VRF industry and market to decarbonize heating in commercial buildings
- Launched May 2017
- Program ending imminently due to funding limitations
- Looking to share lessons learned and best practices with utilities, other states

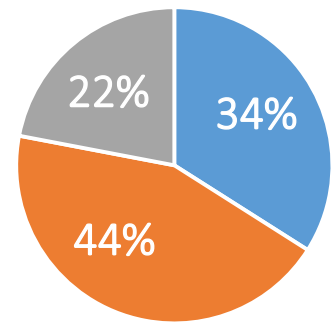
MassCEC VRF Program Stats	
Number of Projects	107
Total Awards	\$5,995,000
Average Capacity	585 MBH
Cost (50 <sup>th</sup> Percentile)	\$695/MBH (heating)
Cost (25 <sup>th</sup> Percentile)	\$589/MBH (heating)
Rebate as % of Costs	15-20%

Project Type



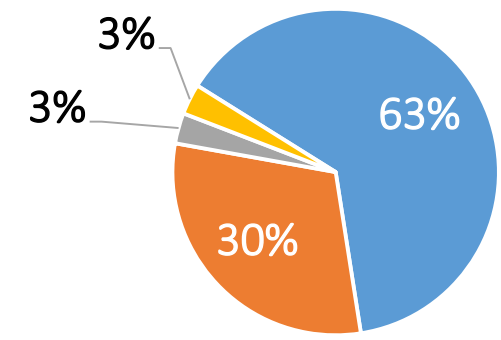
■ NC/Renovation ■ Retrofit

Building Sector



■ Comm ■ Public/NP ■ Aff Housing

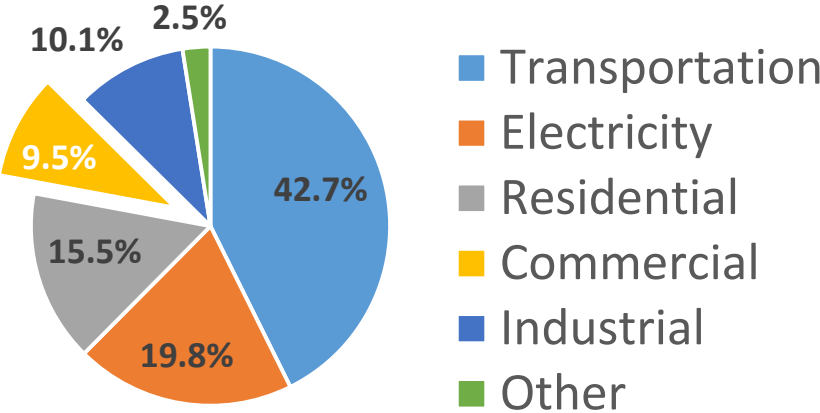
Offset Fuel



■ Natural Gas ■ Oil ■ Electric ■ Propane/Other

# Takeaway 1: VRF is a viable, broadly applicable low-carbon heating solution for commercial buildings

## MA GHG Emissions



### Market Advantages

- Market demand exists today
- Industry supply chain is robust
- Technology is advanced

### Market Challenges

- Public, building industry awareness is low
- Contractor experience is low

### Market Development Progress

- Rate of deployment insufficient to meet state GHG goals
- Need VRF to be an option now for all building remodels/NC going forward
- Technology, performance, and awareness will only improve

Factors for technology success	VRF Status
Consumer and Industry Awareness	Low/Moderate
Cost-Effective vs. Alternatives	Varies
Reputation for Efficiency, Reliability	Moderate/ Need More data
Attractive Business Opportunity	Yes
Limited Implementation Hurdles	Yes

# Takeaway 2: VRF is new and complex

## **VRF requires different project design thinking**

- Similar challenges as residential ASHPs, including performance dependent on precise indoor/outdoor sizing, proper installation.

## **Different consumer motivations for VRF**

- Operational cost savings, upfront cost savings, A/C, increased comfort, space savings, outdoor aesthetics, air quality, carbon.

## **Cost savings depend on application**

- Operational cost savings for cooling and when offsetting higher-cost heating fuels. Upfront cost savings possible.

## **Engaging in project development cycle is complicated**

- Typically fuel switching
- Primarily stand-alone heating system and not FF displacement
- Most installs occur during building remodels or new construction
- Many companies involved, with different interests and influence



# Takeaway 3: Incentivizing VRF is complicated, but worth it!

## **Incentives help establish industry best practices**

- Require standards of quality be implemented (e.g. appropriate refrigerant charging, sizing relative to loads)
- Promote bundling of weatherization and on-site renewables

## **Incentivizing VRF is fundamentally different from other EE**

- Most EE technologies offer operational savings at increased upfront cost
- When replacing natural gas in New England, VRF delivers energy and GHG savings with increased operational costs and sometimes marginal/lower upfront installation costs
- Because of exceptional GHG/energy benefits, VRF required an adjustment to our thinking on incentive design

## **At beginning of long path of heating electrification/decarbonization**

- MA Comprehensive Energy Plan calls for 100,000s heat pumps by 2030
- Regional collaboration will help ensure we're doing this right

