CalMTA

20 August 2025

Market Transformation Advisory Board (MTAB) Meeting

CalMTA is a program of the California Public Utilities Commission and is administered by Resource Innovations.

Agenda

Time	Agenda item	Presenter
9:00 a.m.	**1. Welcome, Introductions & Agenda**	Stacey Hobart
9:10 a.m.	**2. COI Declarations & Review Draft MTAB Meeting Notes 6/27/25**	Stacey Hobart
9:15 a.m.	**3. Commercial Rooftop Units: Market Characterization**	Cynthia Kan
9:45 a.m.	**4. Commercial Rooftop Units: Logic Model and Market Transformation Theory**	Rick Olson-Huddle
10:15 a.m.	**5. Public Comment**	
10:20 a.m.	*Break (10 min)*	
10:30 a.m.	**6. Commercial Rooftop Units: Logic Model & Market Transformation Theory – *continued***	Rick Olson-Huddle
11:30 a.m.	**7. Review Commercial Building Efficiency Accelerator (CBEA) Advancement Plan Comment/Response Summary**	Rick Olson-Huddle
11:50 a.m.	**8. Public Comment**	
11:55 a.m.	**9. Next Meeting & Next Steps**	Stacey Hobart
Noon	*Adjourn*	

Phone participants will be muted throughout the meeting and can raise their hand during the public comment period to be unmuted.

MTAB meeting notes

Draft MTAB meeting notes

June 27, 2025

COI Declarations

MTAB declaration of COI

MTAB eligibility

- Can't receive funding from CalMTA or be in pursuit of funding

Recusal requirements

- Can't bid on RFP/RFQ if giving input after Phase I
  - All ideas under development are now in Phase II except CBEA
- Those with competitive interest can recuse from discussion, but must leave MTAB if responding to RFP
- Agree not to influence remaining MTAB members
- Interpretation, if needed, done by CPUC staff

MTAB Charter with Conflict of Interest

Transparency

- Public meetings and process where COI concerns can be raised by the public

CalMTA COI policies

- The CalMTA program has robust COI policies to ensure decision-making is transparent, impartial, and unbiased.
- The Resource Innovations team that administers CalMTA has deep experience implementing market transformation and other energy efficiency programs in California and throughout North America.
- Resource Innovations employees and subcontractors who function in decision-making roles for CalMTA are firewalled from any ongoing work with California utilities or other covered entities and sign COI certifications.
- CalMTA seeks CPUC approval when there is a need to draw on specialized expertise from subject matter experts who also support work with covered entities.

CRTUs *Idea to Initiative* topics

		MTAB meeting
Part 1	• Market Characterization • Logic Model • Market Transformation Theory	**August 20**
Part 2	• Market Progress Indicators & Milestones • Product Assessment • Total System Benefit & Cost Effectiveness	**September 29**
Part 3	• Evaluation Plan • Draft Market Transformation Initiative Plan & Appendices	**November 12**

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3. Idea to Initiative: Commercial Rooftop Units (CRTUs)

Cynthia Kan | Contractor, Cadmus Group

Rick Olson-Huddle | Strategy Manager

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August 20, 2025

What is an RTU?

Rooftop Units (RTUs) package a variety of components into a single unit to serve a building's **heating**, **cooling**, and **ventilation** needs.

Traditionally sit on the roof of **small- to medium-sized** non-residential buildings

Can provide heating via **gas-powered furnace, electric resistance, or heat pump**.

What is a CRTU?

Single-zone **heat pump** RTU with 3-20 tons of cooling

Connected Controls and Commissioning (CCC)

- Application-based startup and commissioning
- Automated fault detection and diagnostics (beyond Title 24)
- Remote connection
- Demand response

Variable-speed heat pump

Exceed federal minimum cooling efficiency by at least 20%

Commercial Rooftop Units Market Characterization

Key Findings and Conclusions

Cynthia Kan, Cadmus Group

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Market characterization goals

- Characterize recent RTU sales in California
- Identify relevant voluntary and required regulations impacting RTUs
- Understand the supply-side dynamics of the RTU market
- Understand the demand-side dynamics of the RTU market
- Assess the light commercial HVAC workforce
- Estimate Incremental Price

Methodology

Secondary research	Interviews	Surveys	Price research
(Literature review, permit applications, programs and policies, etc)	(Stakeholders, workforce, contractors, distributors, manufacturers)	(RTU decision makers)	CRTU features
• 40+ data sources • Purchased and publicly available	• 50+ interviews • Within CA and nationally	• 70 facility managers • 68 building owners	• Request bids • Secondary research

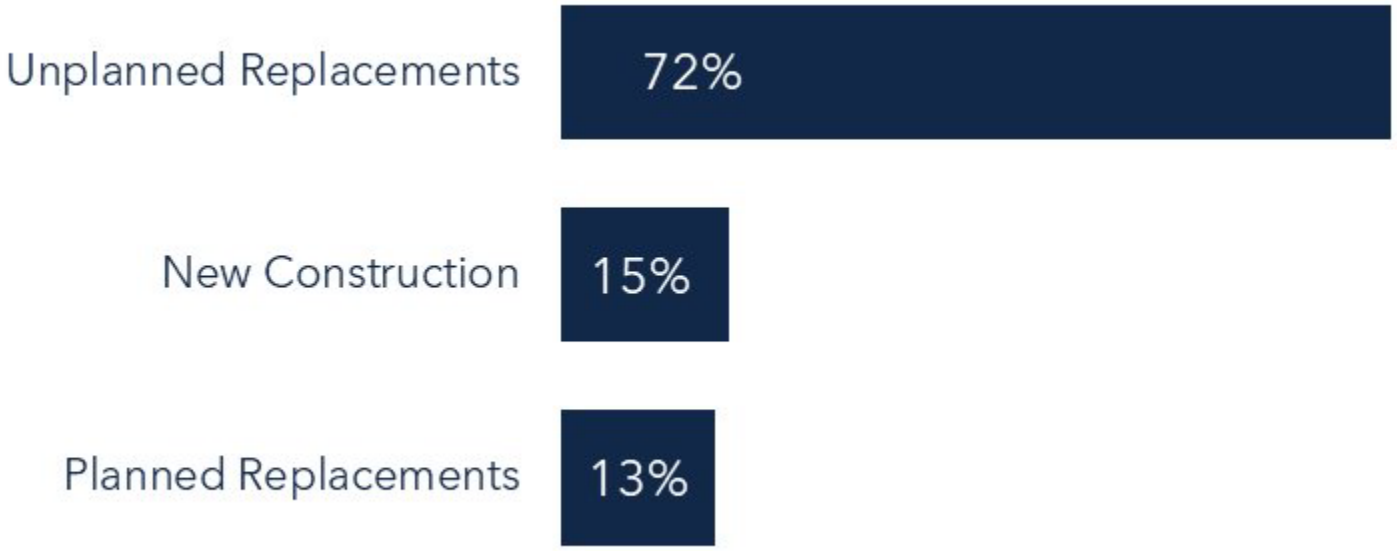
Key finding #1

The RTU market can be subdivided into two markets: custom design/build and "two-minute" purchases

Manufacturers estimated 80% of the market are "two-minute" replacements

Contractors said 72% of sales were unplanned replacements, in line with the literature

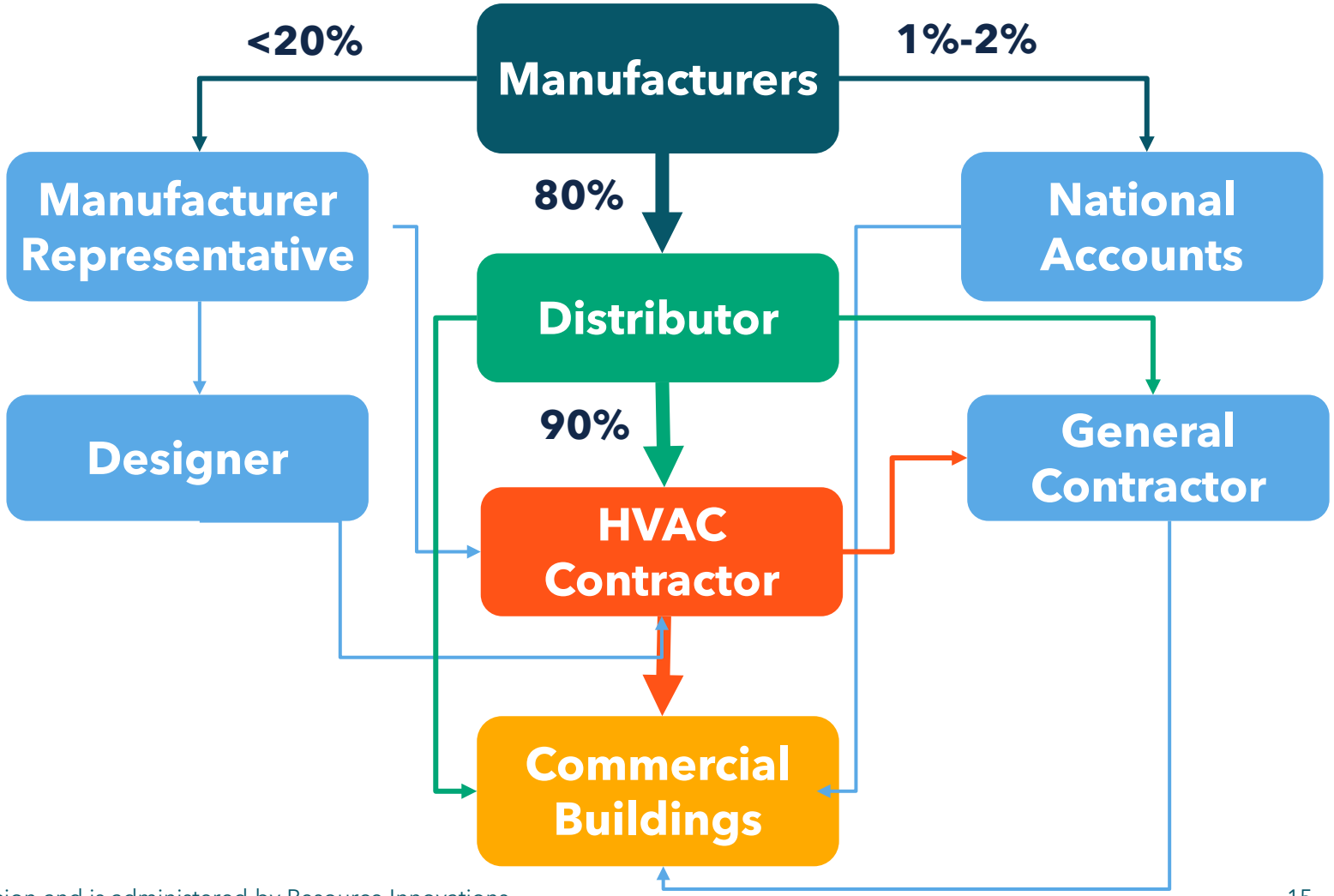
Contractor RTU sales by scenario (n=18)



Source: CalMTA HVAC interviews

Supply chain map

- Multiple pathways from manufacturer to end user
- Most installations involve HVAC contractor unless on-site HVAC personnel are present (e.g. university)



Key finding #2

Many regulations and industry standards (required and voluntary) apply to RTUs

Federal standards vary by equipment type and capacity. Units <5.4 tons use SEER2 while those 5.4+ tons use IEER for cooling efficiency. 2029 update.

Title 24 regulates aspects of RTUs not covered under federal efficiency standards, such as economizer fault detection and diagnostics (AFDD), and automated demand response.

U.S. Environmental Protection Agency (EPA) Refrigerant Mandates starting January 1, 2025, R-410A no longer allowed, now must use A2L refrigerants. A2L systems have a leak detection system due to increased flammability.

Potential regulations impacting RTUs

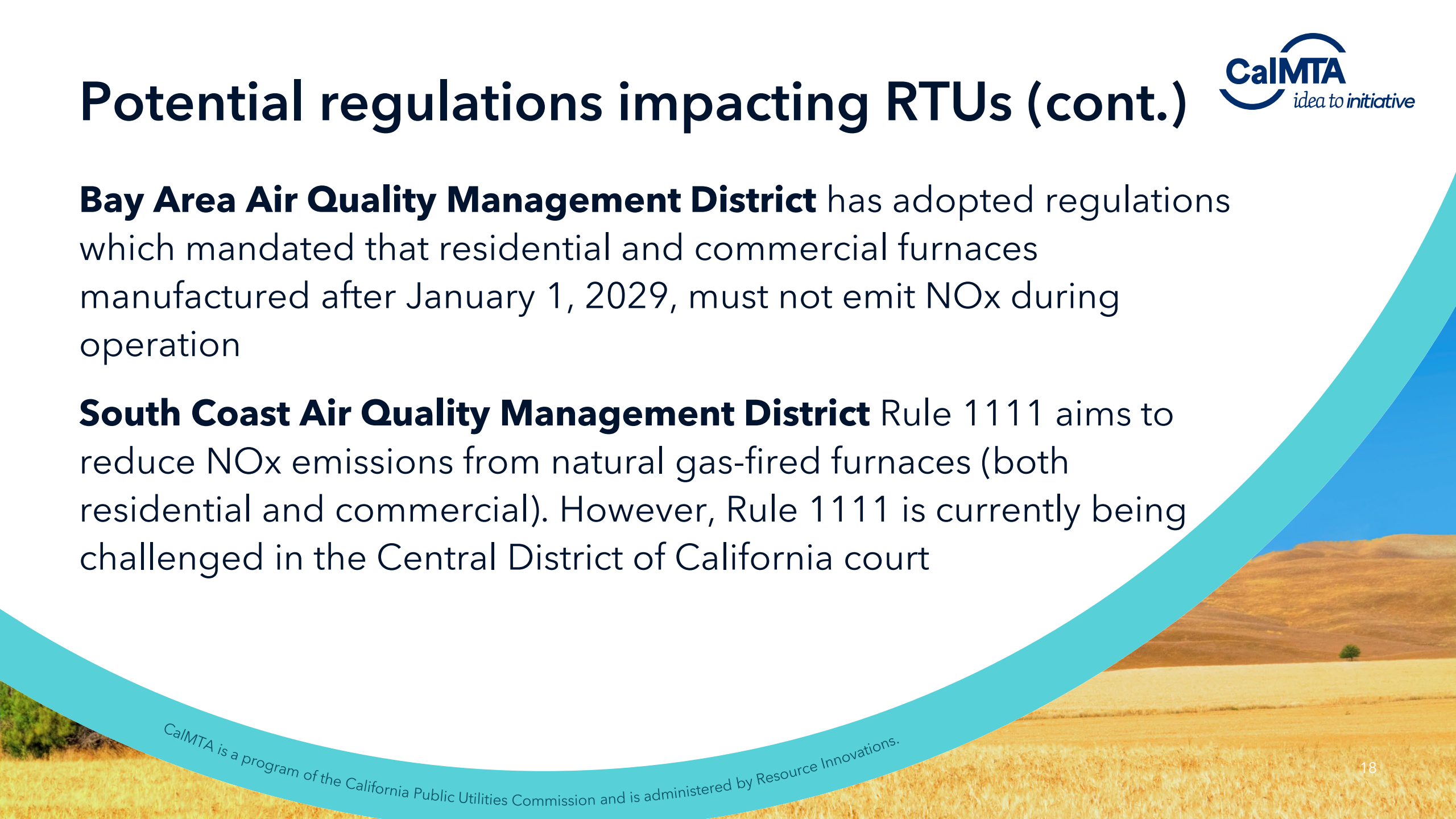
Building Standard Performance (BPS) requires existing nonresidential buildings over a certain size to improve energy efficiency

California Air Resources Board (CARB) is seeking to establish space and water heater standards that would impose bans on the sale of new mixed-fuel and dual-fuel RTUs as soon as 2029

Potential regulations impacting RTUs (cont.)

Bay Area Air Quality Management District has adopted regulations which mandated that residential and commercial furnaces manufactured after January 1, 2029, must not emit NOx during operation

South Coast Air Quality Management District Rule 1111 aims to reduce NOx emissions from natural gas-fired furnaces (both residential and commercial). However, Rule 1111 is currently being challenged in the Central District of California court



Voluntary Programs

Market transformation/ development organizations

- Northwest Energy Efficiency Alliance
- Minnesota Center for Energy and Environment
- US DOE Commercial Building Heat Pump Accelerator
- California Heat Pump Partnership
- Consortium for Energy Efficiency

CPUC oversight programs

- GoGreen Financing
- Comfortably CA
- Codes & Standards
- CalNEXT
- On-Bill Financing

Municipal programs

- L.A. Department of Water and Power
- Silicon Valley Power
- City of Anaheim
- Commercial Property Assessed Clean Energy

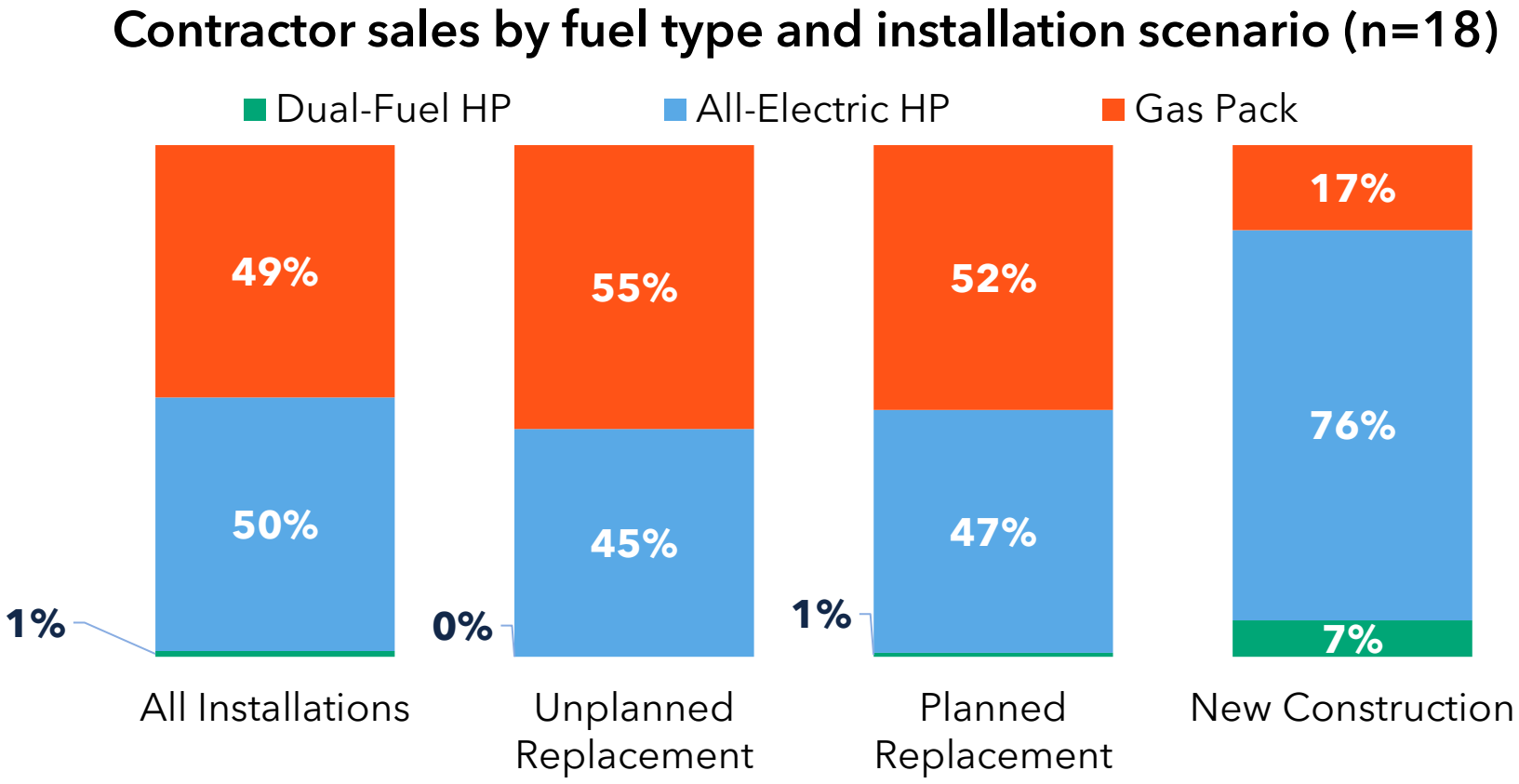
Industry organizations

Industry Organizations developing industry standards, performance certification, and trainings

- Air Conditioning, Heating, and Refrigeration Institute (manufacturers)
- Heating Air-conditioning Refrigeration Distributors International (wholesale distributors)
- American Society of Heating, Refrigerating and Air Conditioning Engineers (members have 12+ years of industry experience)
- Air Conditioning Contractors of America (contractors)
- Sheet Metal and Air Conditioning Contractors' National Association (contractors that have a signed collective bargaining agreement)
- Refrigeration Service Engineers Society (technicians and contractors)

Key finding #3

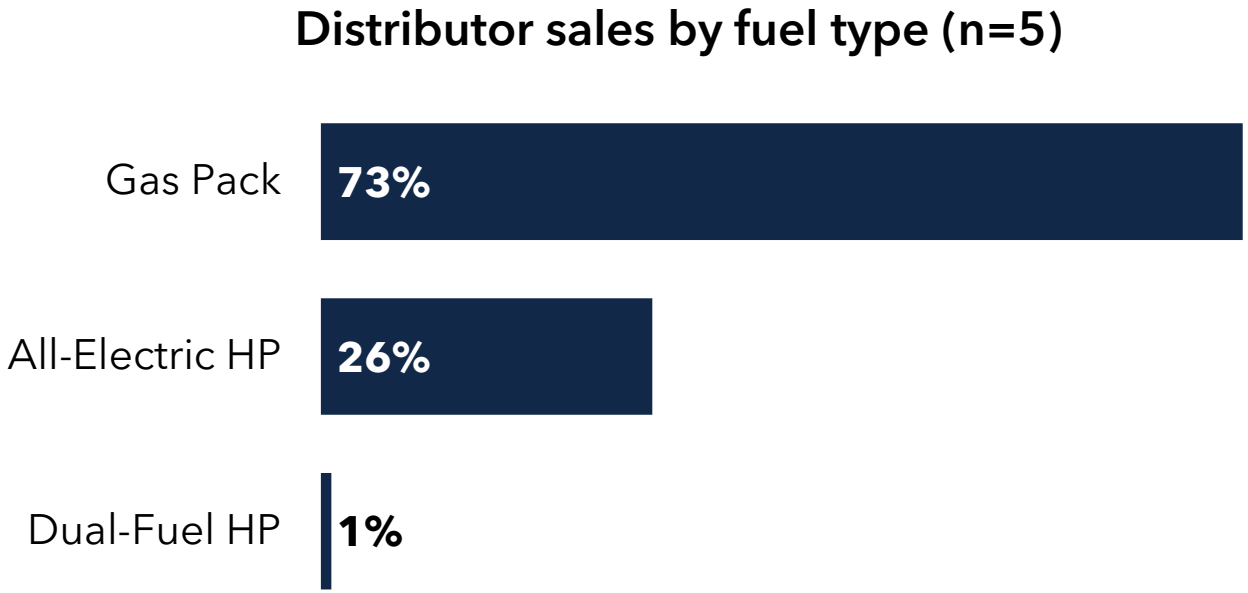
Heat pumps are a significant share of the California RTU market



Source: CalMTA HVAC interviews, results weighted by sales

Key finding #3 (cont.)

Heat pumps are a significant share of the California RTU market



Source: CalMTA HVAC interviews

Key finding #4

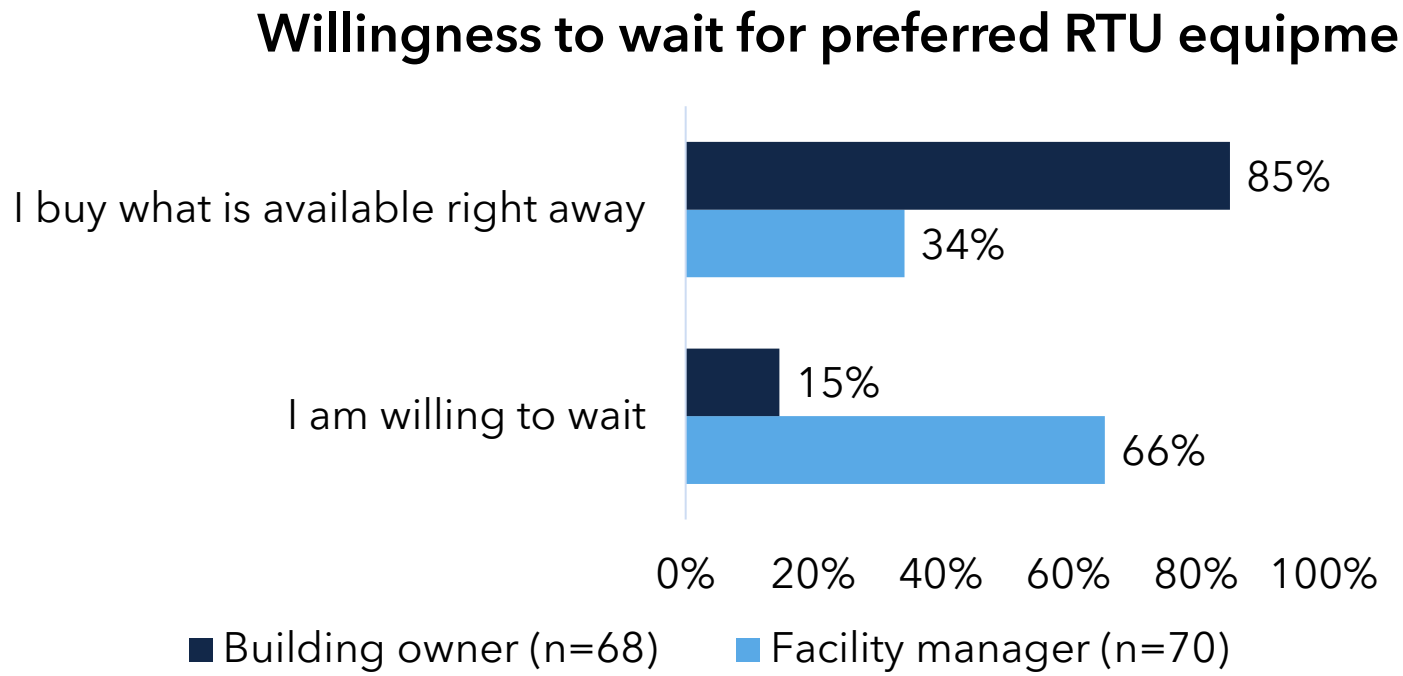
Decision-making in commercial buildings is complex and varies based on the type of decision-maker

Types of RTU buyers reported by contractors (n=18)

Source: CalMTA HVAC interviews

Key finding #4 (cont.)

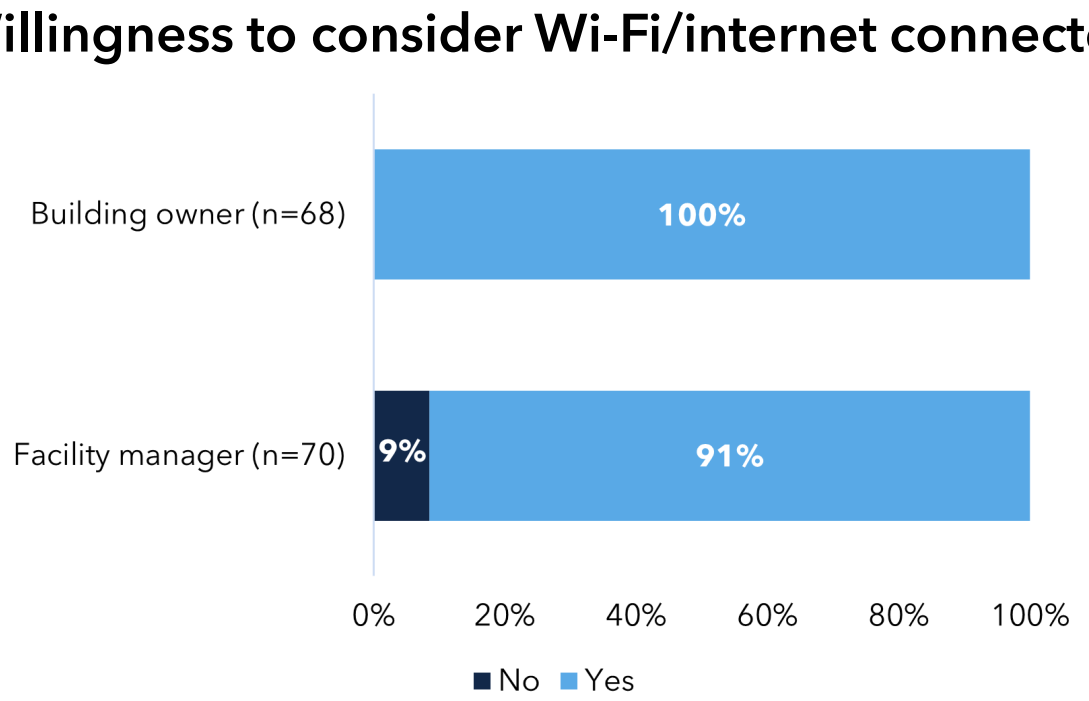
Building owners are less likely to wait for preferred RTU equipment than facility managers



Source: CalMTA HVAC Decision Maker Survey

Key finding #4 (cont.)

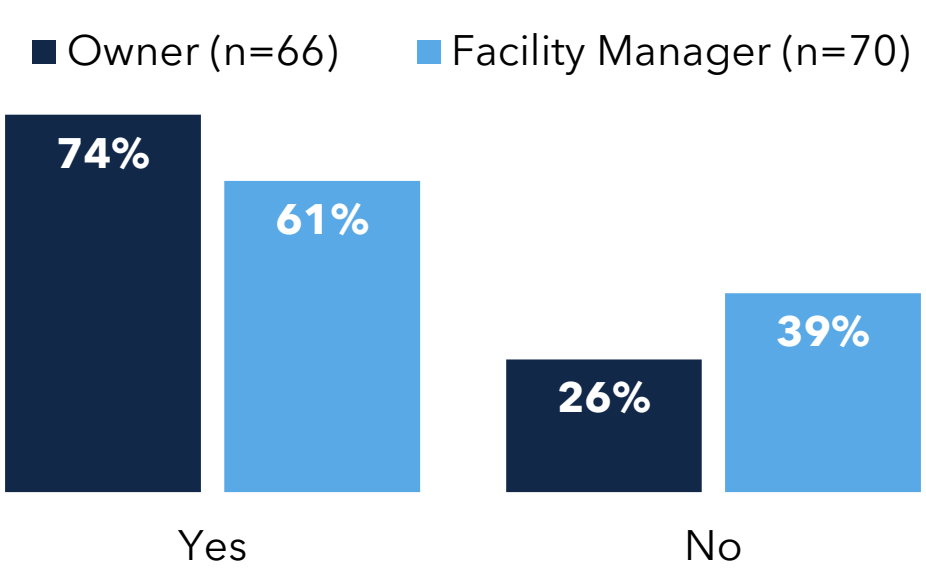
Most decision makers were interested in a connected RTU



Source: CalMTA HVAC Decision Maker Survey

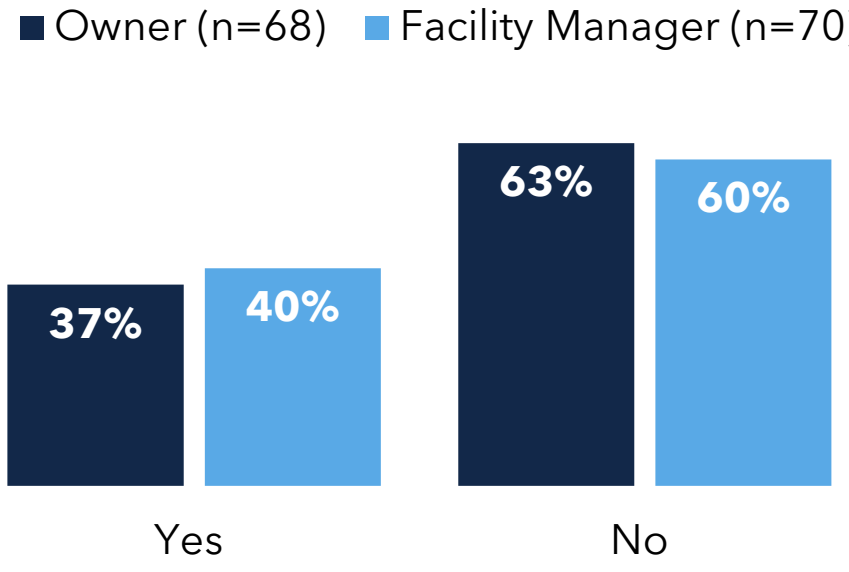
Willingness to adopt heat pump

Most decision makers were willing to consider replacing a furnace with HP



Source: RTU Decision-Maker Survey - "Would you consider replacing the furnace system with a heat pump system?"

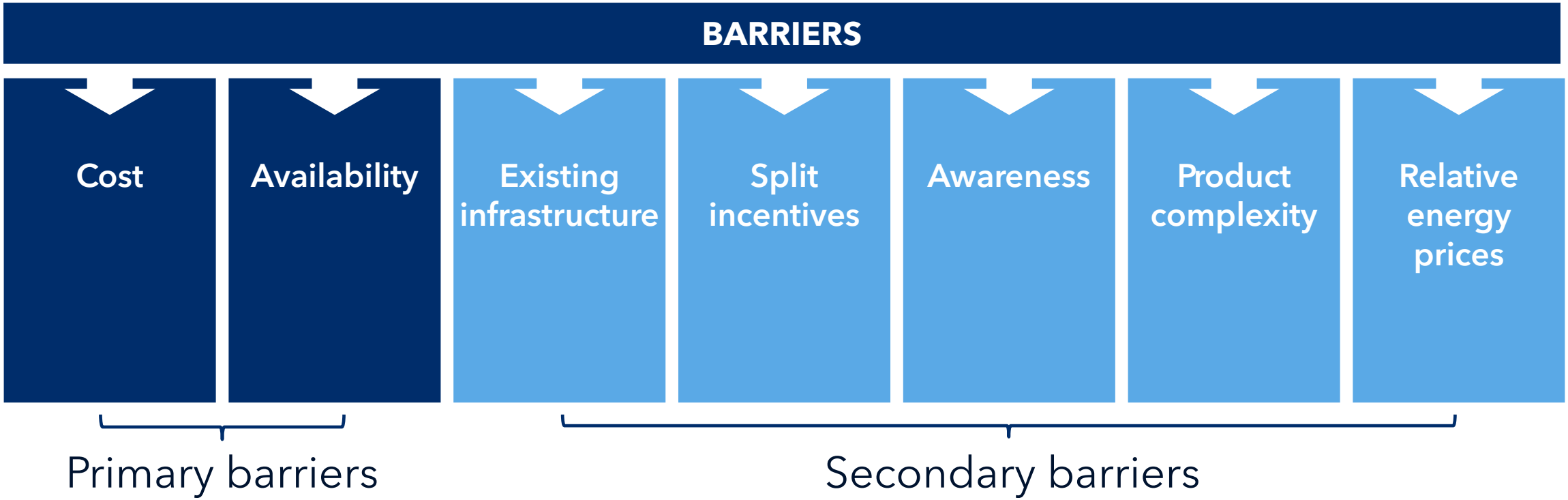
However, they were less inclined to consider a HP if it meant an increase in energy costs



Source: RTU Decision-Maker Survey - "Are you willing to switch to a heat-pump RTU if it means energy costs may increase?"

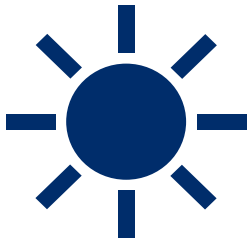
Key finding #5

There are several barriers impeding the broad adoption of efficient RTUs. Availability and cost are the main barriers in the two-minute market



Key finding #6

There is a shortage of experienced HVAC workers, especially during the busy summer months



HVAC demand is seasonal

Strong competition for workers

Desired characteristics and certifications

Employer challenges

CRTU pricing & challenges

Many factors impact installed costs:

- Location
- Quantity
- Efficiency
- Crane/transportation
- Tonnage
- Curb adapter
- Building modifications
- Installation difficulty

- RTU pricing is generally not publicly available
- Contractors or their suppliers reluctant to provide information

CRTU pricing & challenges cont.

- **CCC** may be standard on some product lines but not available or optional on others, manufacturer says incremental cost not zero but relatively small
- **High efficiency cooling** meeting 20% better than code criteria not available in all tonnages for most mass-market brands
- **Inverter compressors** are usually a custom feature, not common in the mass-market brands
- **RTU with all proposed features $3,800/ton more than code min RTU** however this quote includes features that go beyond program requirements

Questions?

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4. CRTU Logic Model & Market Transformation Theory

Rick Olson-Huddle | Strategy Manager

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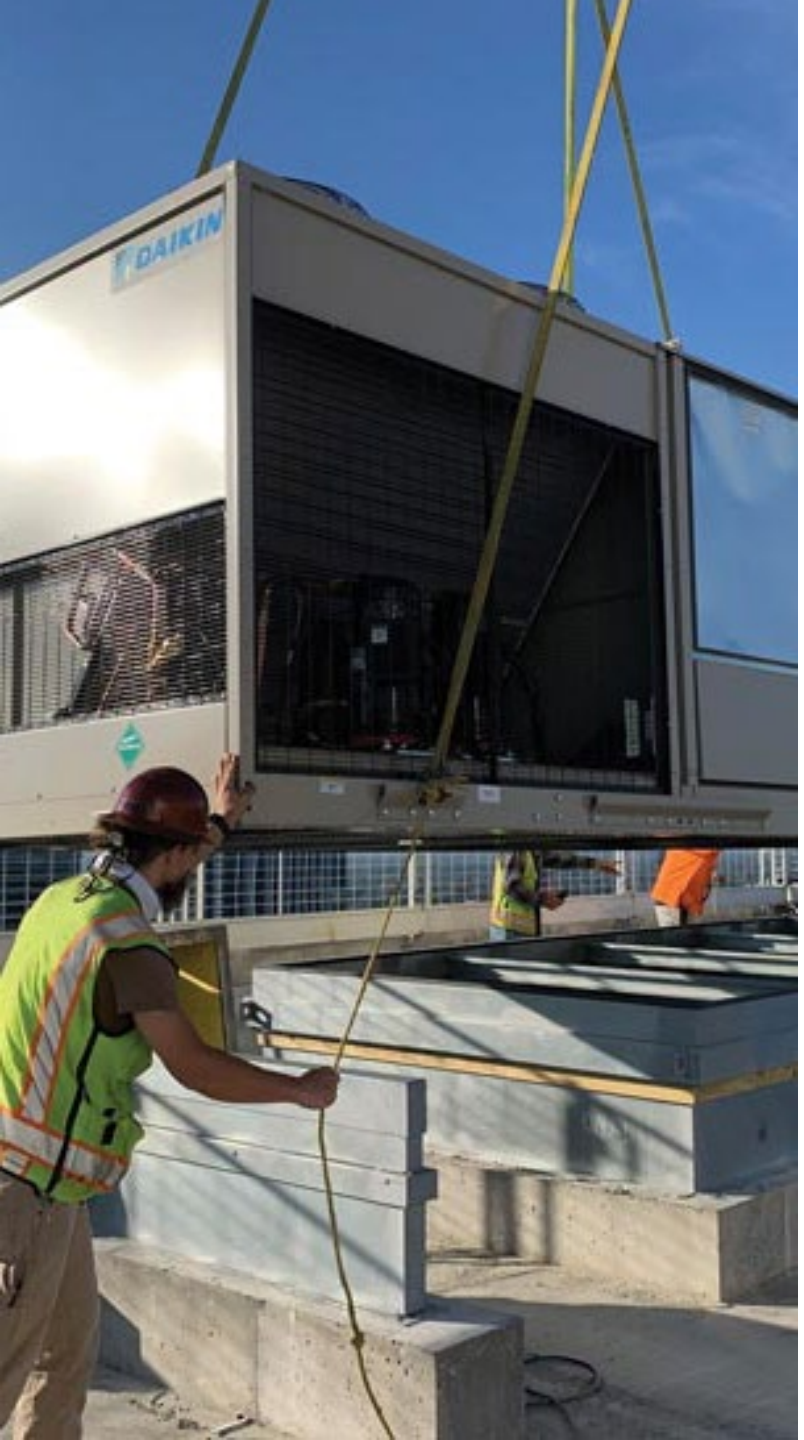
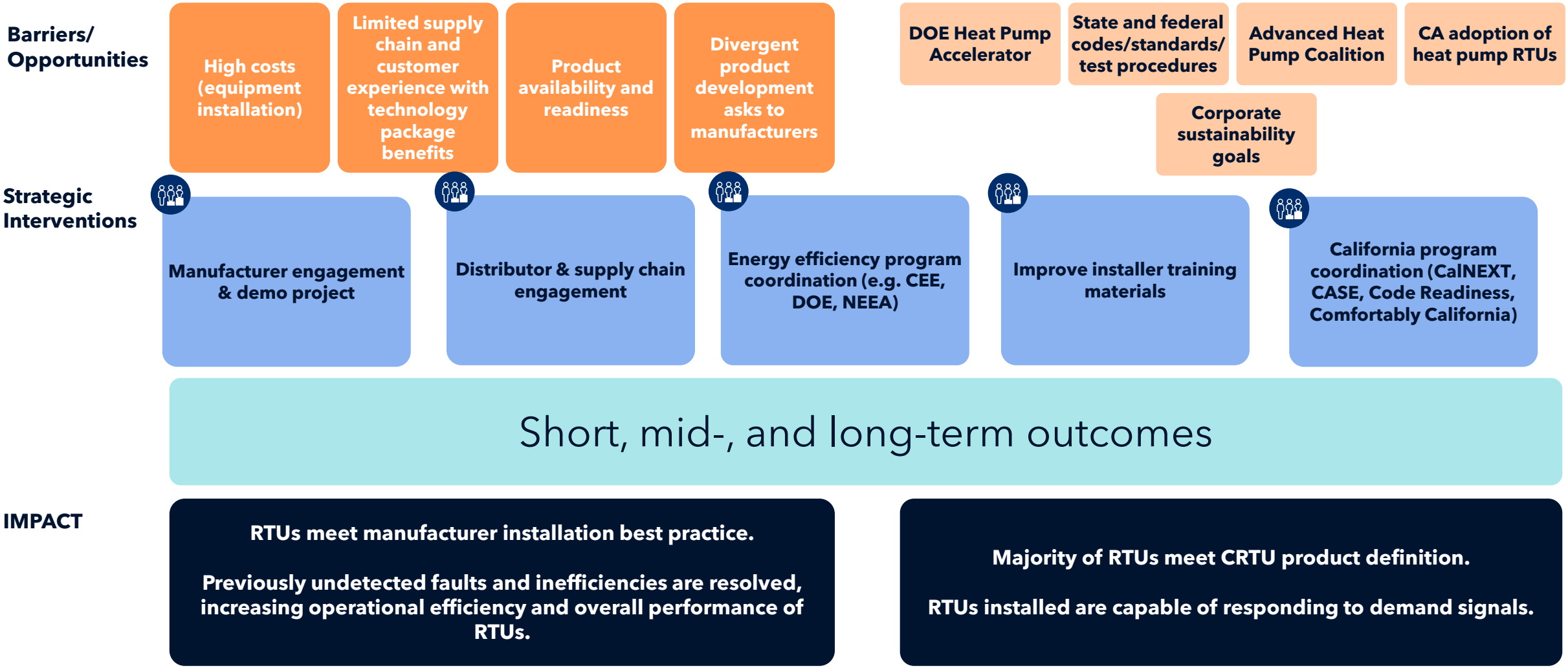


Vision for the future

- Majority of RTUs sold in CA align with our product definition
  - Focus on replacements, esp. the 2-minute market
- Connected Controls & Commissioning (CCC) will **reduce installation errors** and **optimize performance** over lifetime
  - HVAC contractors recognize the value of CCC
- RTUs are capable of responding to demand calls

CCC gets adopted first, then variable speed & high-efficiency cooling RTUs will follow

Snapshot of Logic Model



Logic Model – barriers

High cost

Product availability & readiness

Limited supply chain and customer experience with CRTUs

Divergent product development asks to manufacturers

Key

- Market
- Financial
- Technology

Logic Model – opportunities

U.S. Department of Energy (DOE) Commercial Building Heat Pump Accelerator

2029 New Federal Test Procedure

California's adoption of heat pump RTUs

Corporate sustainability goals

Advanced Heat Pump Coalition

Key

- Market
- Financial
- Technology

Logic Model – interventions

Manufacturer engagement & demo project

Distributor and contractor engagement

Energy efficiency program coordination

Upgrading installer training materials

California program coordination

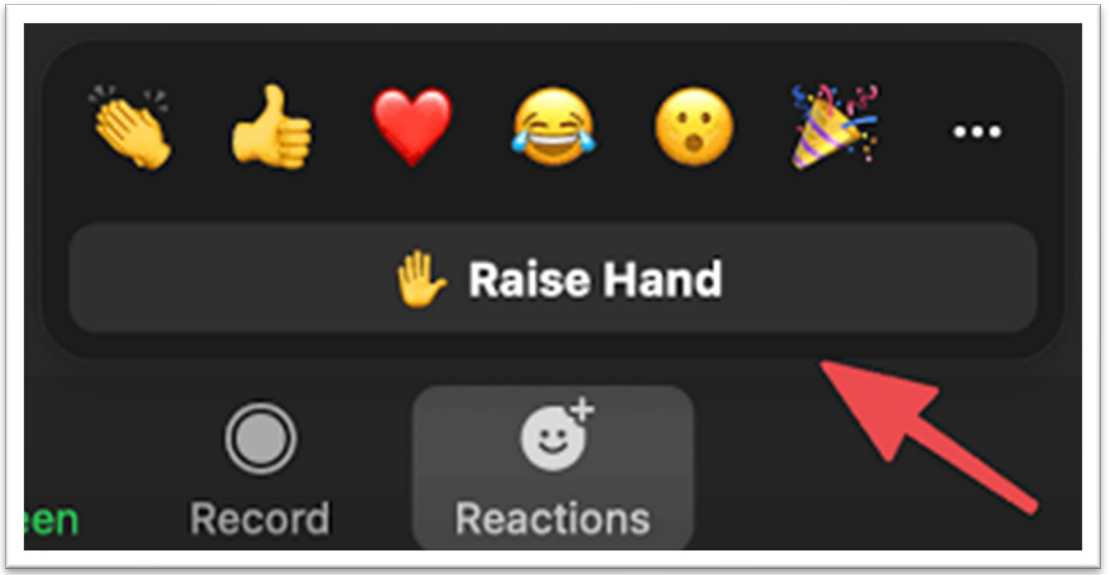
Key

- Market
- Financial
- Technology

Questions?

5. Public Comment

Raise your hand using the “Reactions” feature and we will allow you to unmute yourself.



Break (10 min)
We will be back soon.

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6. CRTU Logic Model & Market Transformation Theory – continued

Rick Olson-Huddle | Strategy Manager

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Manufacturer engagement

1. CalMTA will collaborate on the development of a **demonstration project**
2. CalMTA will provide **upstream incentives targeted at manufacturers**
3. CalMTA will work to establish **long-term partnerships with manufacturers**

Timeline	Outcomes
1-3 years	Demonstration project & manufacturers refine products
4-8 years	Multiple manufacturers incorporate sensors and CCC as standard practice
10+ years	Market share of products incorporating CCC, variable speed, and IVEC+20% grows.

Distributor & contractor engagement

1. Build distributor and contractor familiarity and awareness through the **initial demonstration project**
2. Long-term: **support and monitor stocking practices** for CRTU products
   - Leverage distributor relationships with HVAC contractors

Timeline	Outcomes
1-3 years	Demonstration project & distributor awareness
4-8 years	Distribution and standard supply chain channels stock, sell, and promote CRTU product
8-10+ years	RTUs are installed according to manufacturer's best practice, faults are detected, and ongoing performance is optimized.

Energy efficiency program coordination (e.g., CEE, MN CEE, NEEA, DOE)

1. Actively work to influence organizations to **incorporate sensors and CCC**
2. Coordinate with U.S. Department of Energy's (DOE) Heat Pump Accelerator program
   - **Increased performance** aligns well with variable speed specs
   - Phase II also calls for advanced **controls and functionality**

Timeline	Outcomes
1-3 years	Shared industry tiers/specifications incorporate California needs.
4-8 years	Multiple manufacturers incorporate controls into a broader suite of heat pump product.

Upgrading installer training materials

1. Develop key messages and education strategies through **manufacturers, supply chain partners, and state programs**

2. Work with market actors to offer materials in multiple languages, accommodating various learning styles, and delivering content through **established workforce education and training** market actors

Timeline	Outcomes
1-3 years	N/A
4-8 years	HVAC installers and workforce are trained- including ESJ communities.
10+ years	RTUs are installed according to manufacturer's best practice, faults are detected, and ongoing performance is optimized.

California program coordination

1. Coordinate across CalNEXT, Codes & Standards Enhancement, Code Readiness, Comfortably CA **to create consistent program offerings**
2. Build on the foundation of the Heat Pump RTU Working Group to create a **shared technology roadmap.**

Timeline	Outcomes
1-3 years	Manufacturers see aligned CA market
4-8 years	Incentives for RTUs are consistent Installers have confidence in promoting
10+ years	California energy efficiency infrastructure leverages data from CRTU to inform programs

Theory of market change

IF	THEN
If manufacturers are incentivized and gain market share for developing products that incorporate CCC…	**then** stocking practices across the distribution network will shift, leading to increased market adoption of CCC
If manufacturers integrate CCC into RTU products intended for the emergency replacement market…	**then** customers will begin to view these features as standard practice, leading to broader acceptance

Theory of market change cont.

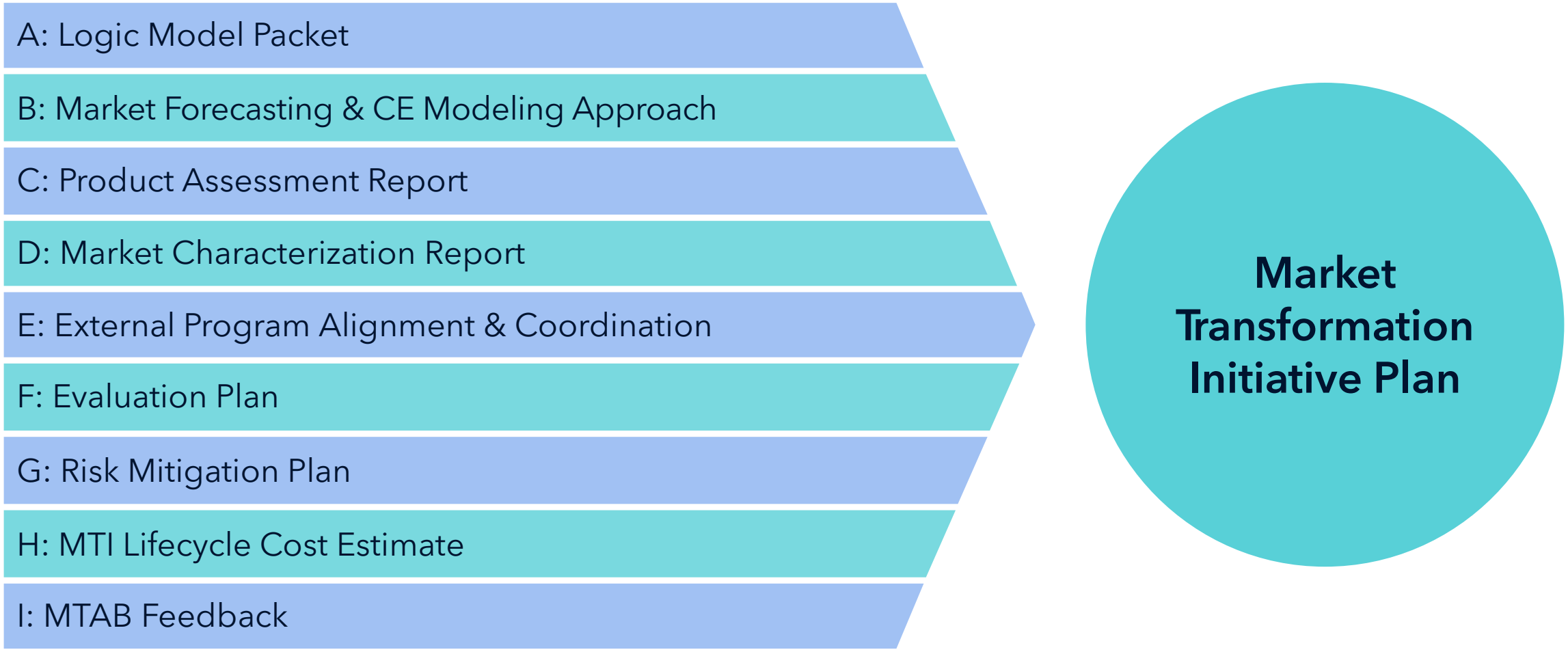
IF	THEN
If California programs can align around a common RTU product roadmap…	**this will** reduce market confusion and accelerate the adoption of advanced RTU heat pump technology
If major manufacturers receive consistent market signals and coordinated requests from California and national partners…	**then** they will more quickly develop CRTU products
If major manufacturers see consistent product tiers from California and national partners…	**then** manufacturers will see value at producing these at scale and that will chip away at first-cost barriers for variable speed heat pump technology and IVEC +20%

Theory of market change cont.

IF	THEN
If contractors recognize the value of equipment with CCC and adapt their business models to take advantage of them, particularly when available at comparable cost…	**then** contractors will help promote CCC
If RTU products incorporate integrated sensors and CCC…	**then** a greater percentage of installations will be completed correctly, and system performance will be optimized – ultimately **resulting in increased energy savings**

Questions?

MTI Plan Appendices - All



MTI Plan appendices – shared 8/20

A: Logic Model Packet

B: Market Forecasting & CE Modeling Approach

C: Product Assessment Report

D: Market Characterization Report

E: External Program Alignment & Coordination

F: Evaluation Plan

G: Risk Mitigation Plan

H: MTI Lifecycle Cost Estimate

I: MTAB Feedback

Market Transformation Initiative Plan

MTI Plan appendices – shared 9/29

A: Logic Model Packet

B: Market Forecasting & CE Modeling Approach

C: Product Assessment Report

D: Market Characterization Report

E: External Program Alignment & Coordination

F: Evaluation Plan

G: Risk Mitigation Plan

H: MTI Lifecycle Cost Estimate

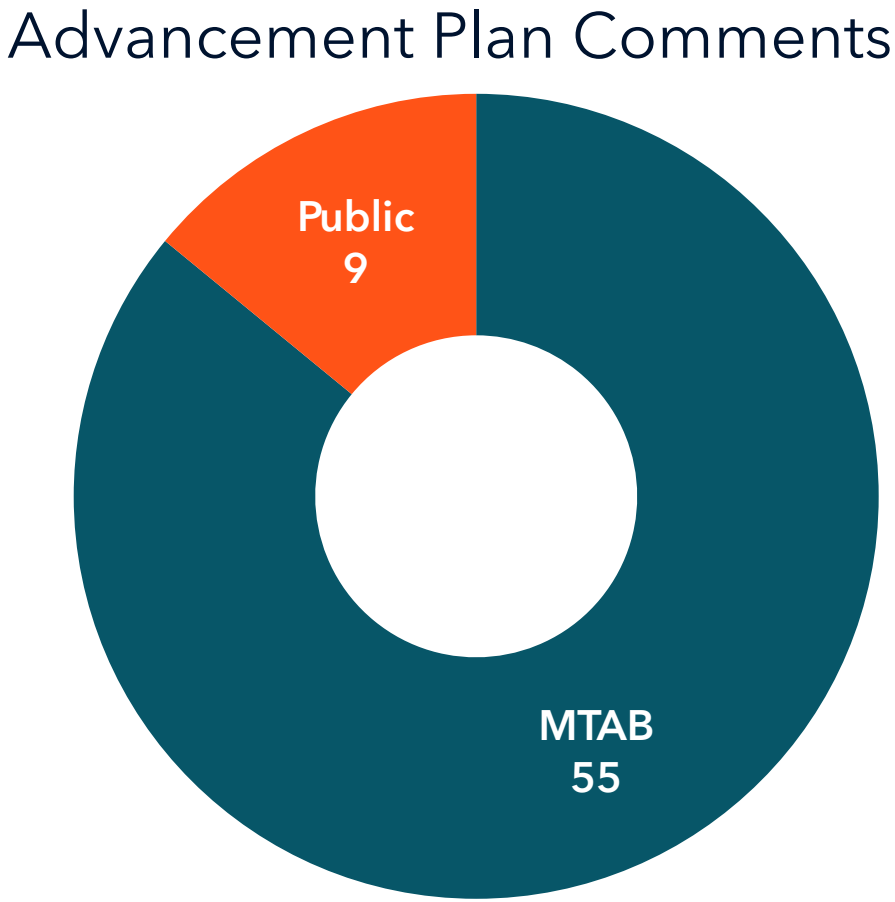
I: MTAB Feedback

Market Transformation Initiative Plan

7. Commercial Building Efficiency Accelerator (CBEA) Advancement Plan Comment/Response summary

Rick Olson-Huddle | Strategy Manager

Feedback received



Comments and responses: Target market

Consider further refining and focusing the target market.

Response:

Refined the segmentation strategy in the Advancement Plan to prioritize factors such as portfolio scale, ownership tenure, and organizational structure.

Comments and responses: Strategic intervention

Focus on designing tools that are simple, actionable, and adaptable.

Response:

Updated Section 8 to include **additional research and questions that assess existing tools**, evaluate usability, and inform development of a flexible ownership planning playbook that supports a broad range of decision-making styles and investment strategies

Comments and responses: Policy and program landscape

Consider strategies that will be resilient across policy scenarios and for tools to help building owners navigate California's complex program landscape.

Response:

Updated section 8: Market research and technology assessment activities to include **additional research on the implications of federal policy changes and funding availability.**

Comments and responses: Workforce training and implementation

Consider developing training programs for energy professionals that are curated and accessible to a wide variety of specific market actors.

Response:

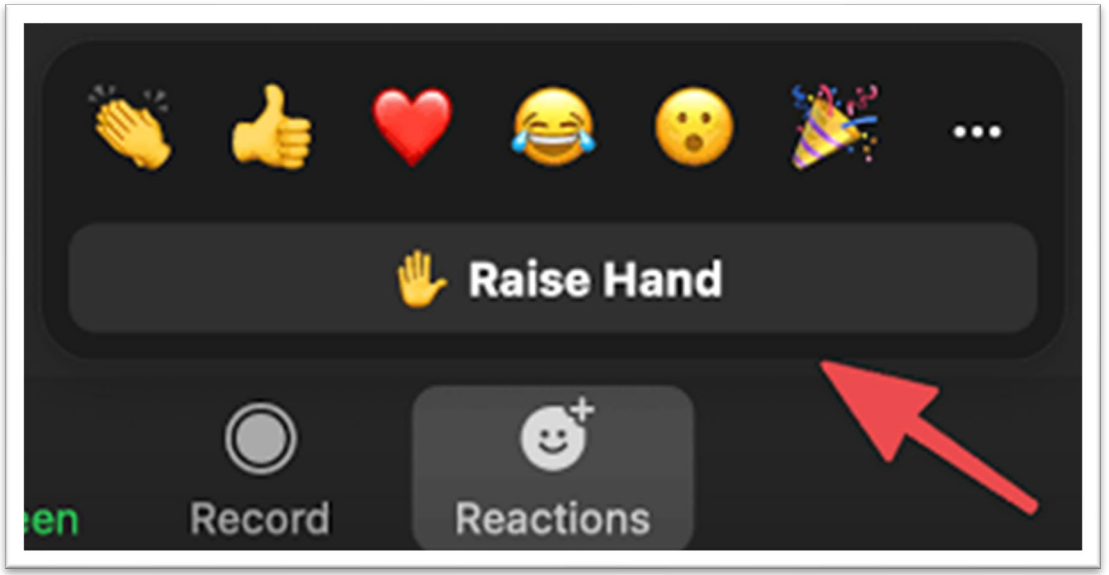
Activities being carried out during phase II of our **research plan will help inform WE&T priorities** and **align them with market demand**.

Next Steps

- Final Advancement Plan approved by CPUC
- Post final Advancement Plan on CalMTA.org and the PDA site
- Launch Phase II activities (targeting early September)

8. Public Comment

Raise your hand using the “Reactions” feature and we will allow you to unmute yourself.



9. Next Meeting & Next Steps

Stacey Hobart | Principal of Engagement & Communications

Upcoming MTAB meetings

	Mon, Sept. 29, 2025	Wed, Nov. 12 & Thurs, Nov. 13, 2025
Time	1 – 5 p.m.	Between 9 a.m. – 5 p.m.
Location	Virtual – Zoom	In-person SF/Bay Area, location TBD

	Thurs, Jan. 29, 2026	Thurs, Mar. 5, 2026	Wed, Mar. 25, 2026
Time	Between 9 a.m. – 5 p.m.	Between 9 a.m. – 5 p.m.	9 a.m. – 1 p.m.
Location	In-person SF/Bay Area, location TBD	In-person SF/Bay Area, location TBD	Virtual – Zoom

Transformative Energy Solutions

for the public good

Market transformation is a proven approach that works to remove market barriers so that energy efficient, equitable, and climate-friendly approaches become the new standard practice for all Californians.

Sign up for updates at: **calmta.org/subscribe/**

Questions? Email **info@calmta.org**

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