

Market Barriers to Adoption of Efficient HVAC Retrofit Technologies

Sarah Outcault (presenter), Jennifer Kutzleb,
Jonathan Wooley, and Kristin Heinemeier

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Study overview

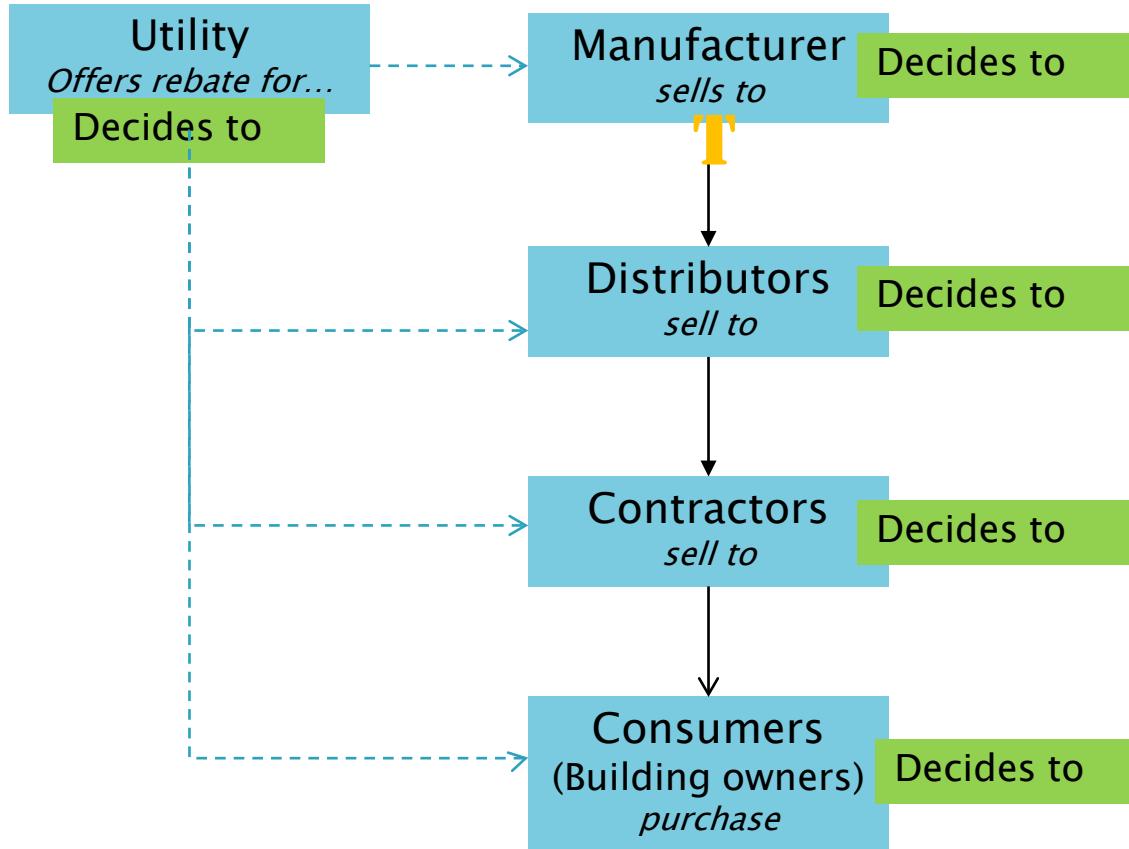
- **Problem:** slow adoption of climate-appropriate HVAC technologies
- **Objectives:** To identify:
 1. Market barriers to adoption
 2. Opportunities to increase adoption
- **Technologies:** retrofits (2) for commercial HVAC units
 - evaporative pre-cooling condenser air retrofit unit; and
 - retrofit supply fan speed control
- **Geographic scope:** SMEs in SCE territory
- **Timeline:** November 2013 – February 2015
- **Sponsor:** Southern California Edison

Research approach

- Exploratory research:
 - Who? What? Where? When? Why? How?
- Mixed methods for collecting data
 - Semi-structured interviews
 - Group discussions
 - Online surveys
- 76+ respondents representing key stakeholder groups:

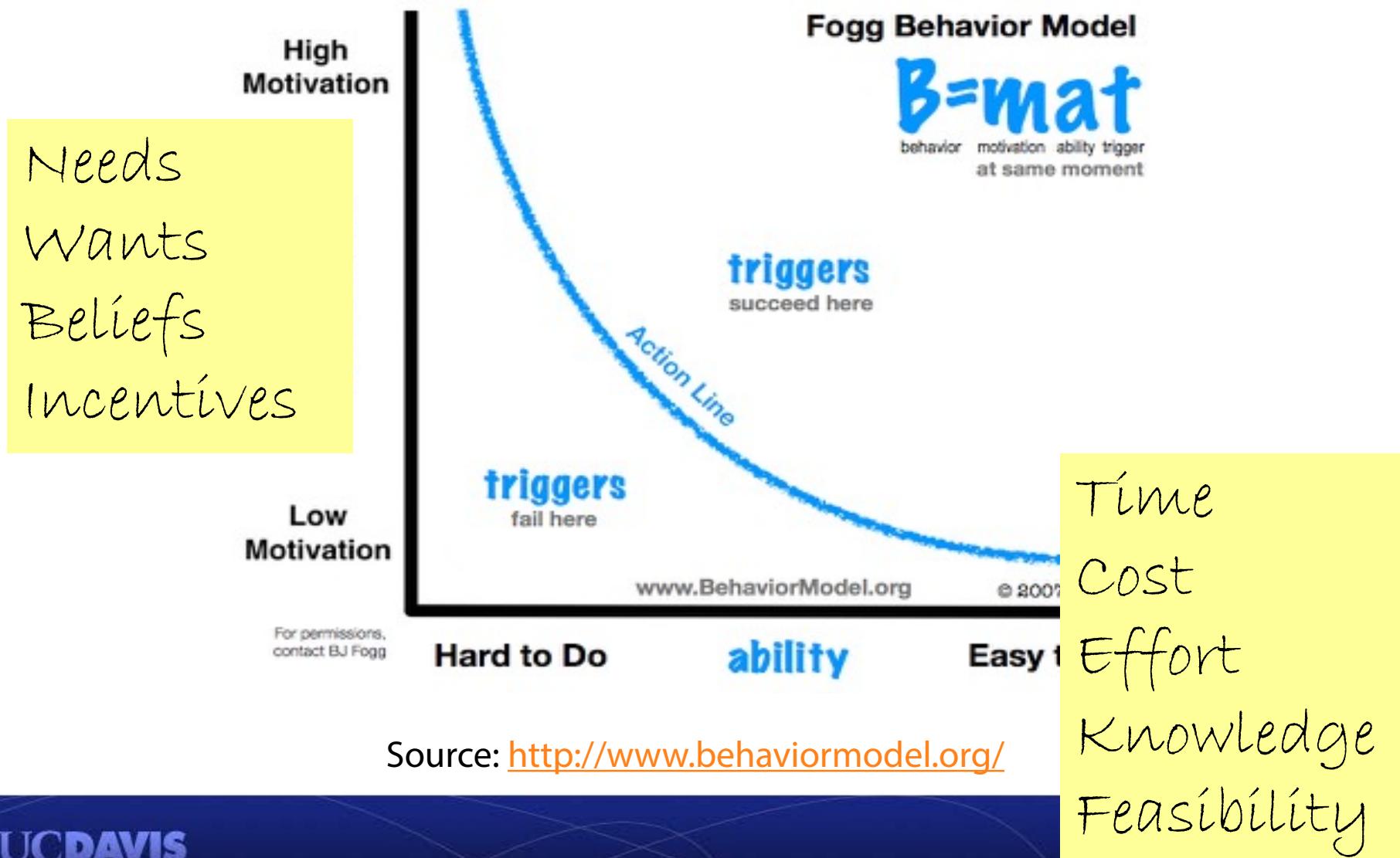
Utilities	Design engineers
Manufacturers	Contractors
Distributors	Customers
- Analyzed content using grounded theory approach to identify emergent themes

Who does what...



*Each action is preceded by the **decision** to take such action*

Why do stakeholders decide to buy/sell/adopt/promote?



8 key factors affecting motivation to adopt/promote ET

1. **Technical requirements and performance**, including the human, material, and logistical resources
2. **Technology costs**, initial and ongoing uncertainty and diffused responsibility
3. **Additional benefits** beyond energy savings
4. **Access to information**
5. **Endorsements**: stakeholder recommendations and social norms
6. **Status quo bias**
7. **Stakeholder coordination**
8. **Accountability and support**, especially if problems arise

Capital invest vs. operating

- Transparency
- Reliability
- Air quality
- Status

- Who recommends it?
- How much do I trust them?

6 key factors affecting ability to adopt/promote ET

1. **Technical feasibility**, given the climate, human resources required, building and HVAC characteristics
2. **Cost** (and uncertainty) of retrofits and utility incentives
3. **Effort**: selling, installing and maintaining, obtaining rebates
4. **Awareness, knowledge and communication**
5. **Access**: logistics of supply chain acquisition
6. **Empowerment**: can stakeholders adopt and/or promote retrofits

- Are you pitching to the guy that can buy it?
- Will he be the one that sells it?

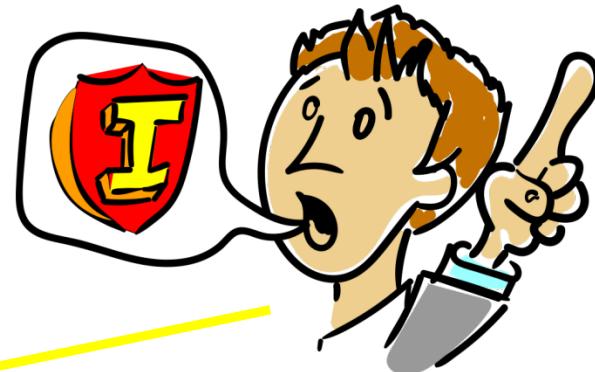
5 cross-cutting themes

Motivation						Ability			
Technical requirements & performance	Technology costs	Additional benefits	Access to information	Endorsements	Status quo bias	Stakeholder coordination	Accountability & support	Technical feasibility	Cost
									Effort
									Awareness, knowledge, communication
									Access
									Empowerment
Dependency									
Risk									
Opaqueness									
Accountability									
Trust									

Three Conclusions - #1

1. Information is vital in ET adoption and promotion.

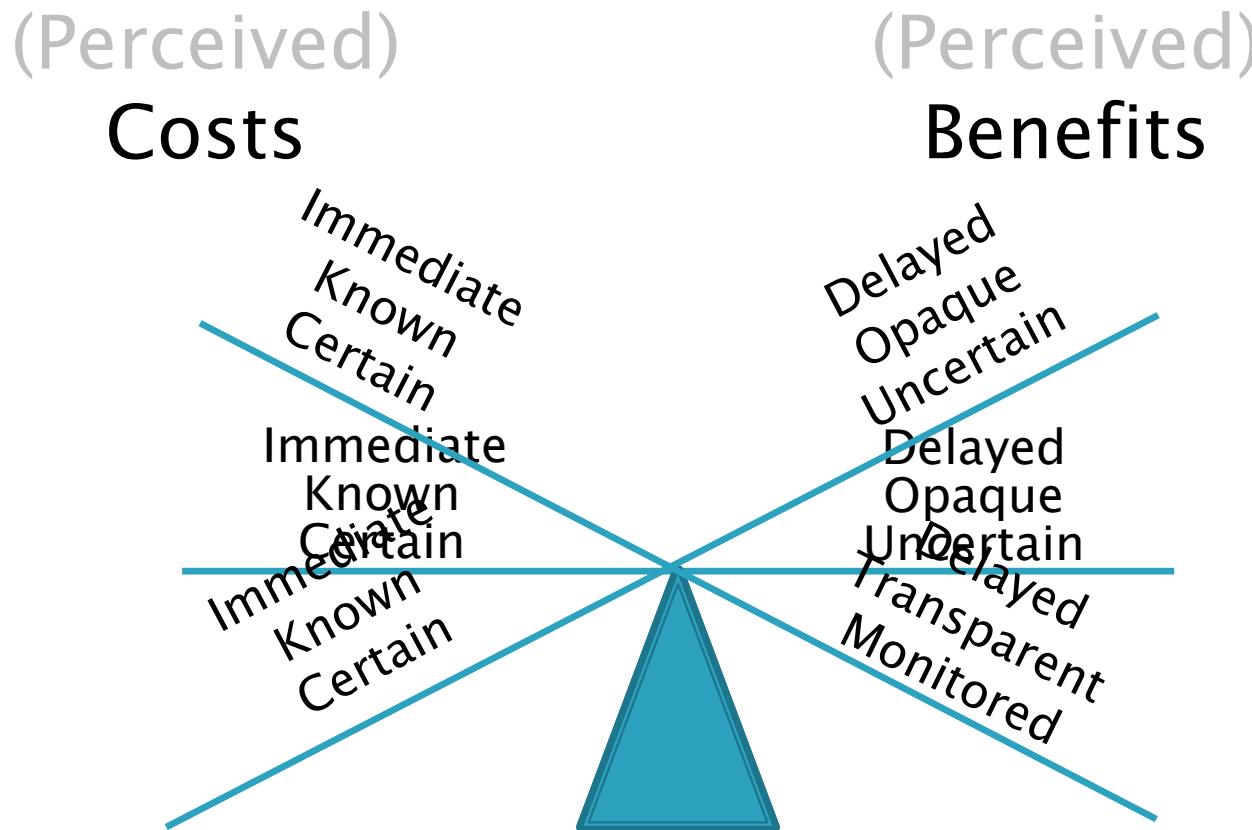
Trusted source?



Correct target?

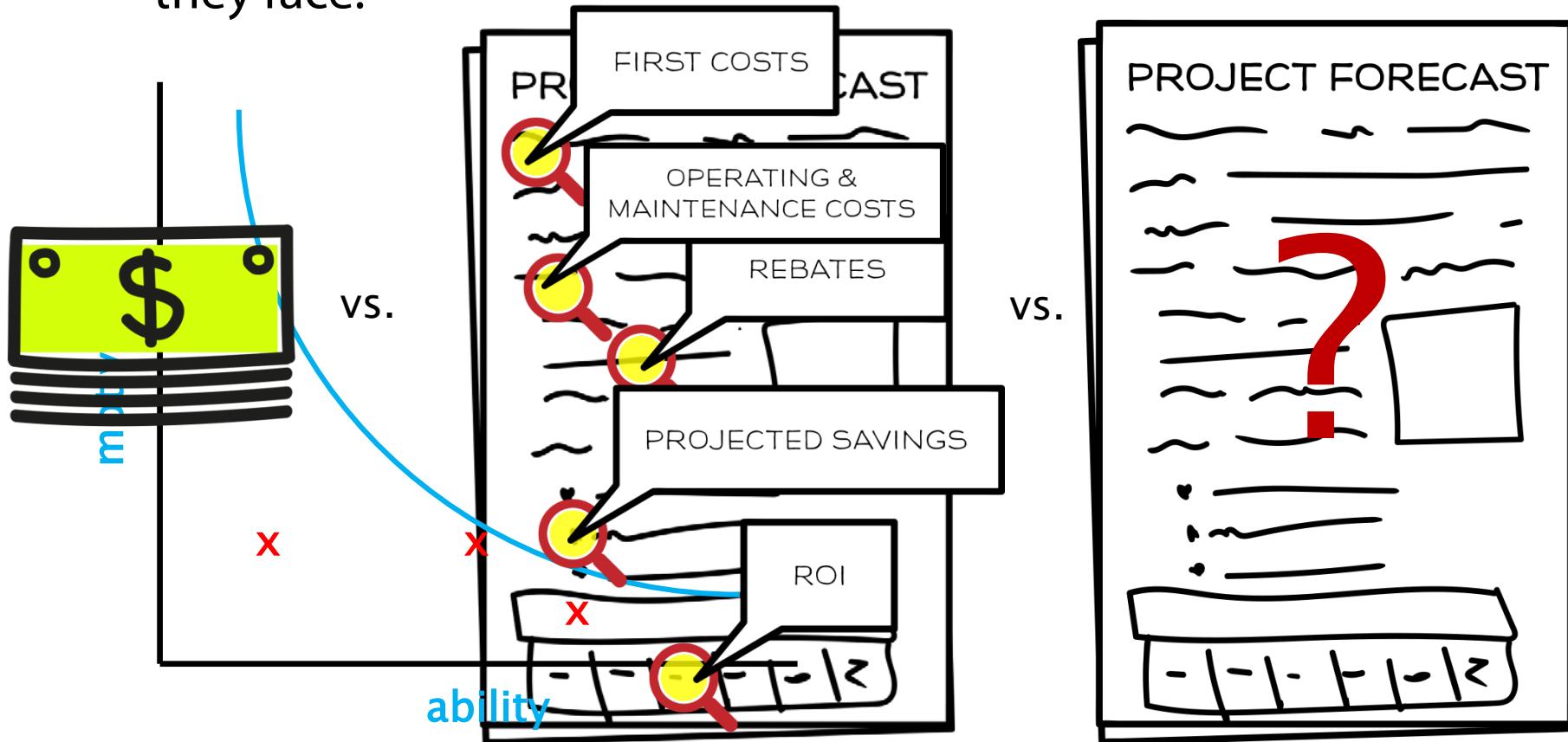
Three Conclusions - #2

2. A behavioral analysis of the costs and benefits reveals an imbalance.



Three Conclusions - #3

3. Stakeholders differ in the specific impediments to adoption they face.



Thank you.

Emerging Technologies

MARKET BARRIERS TO WIDESPREAD DIFFUSION OF CLIMATE-APPROPRIATE HVAC RETROFIT TECHNOLOGIES

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Prepared by:

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Customer Service
Southern California Edison*

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Find the paper:

- WCEC website, Publications tab
- ETCC website, search project reports for “market barriers”

Contact me:
Sarah Outcault, Ph.D.
smoutcault@ucdavis.edu
wcec.ucdavis.edu

Triggers to adopt/promote ET

- ET doesn't have the benefit of existing equipment failure as a trigger for *replacement*, but...you can leverage
 - HVAC failure or degradation
 - Adoption by another stakeholder group
 - Awareness, training, outreach
 - Rising energy prices, low interest rates
 - Changes in customer needs with occupant turnover