

Market Barriers to Adoption of Efficient HVAC Retrofit Technologies

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WCEC Affiliates Forum - 5/18/16

Study overview

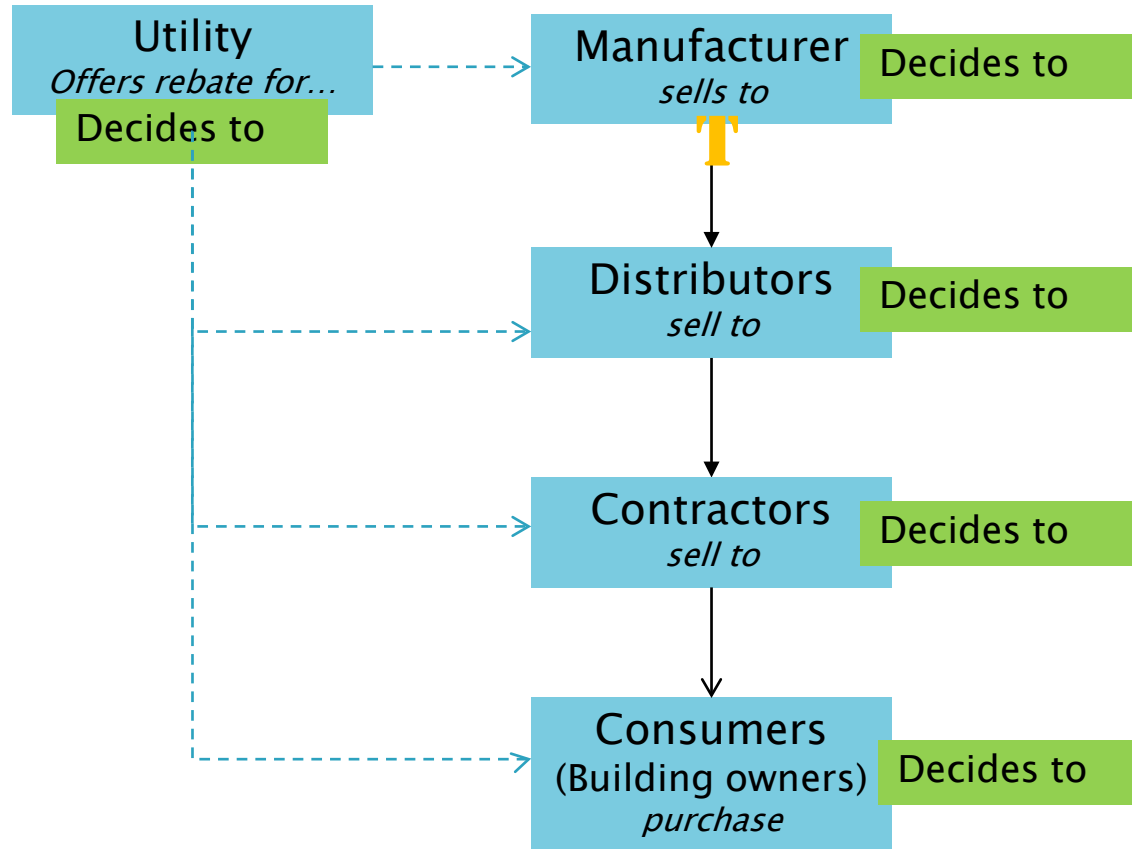
- **Problem:** slow adoption of climate-appropriate HVAC technologies
- **Objectives:** To identify:
 1. Market barriers to adoption
 2. Opportunities to increase adoption
- **Technologies:** retrofits (2) for commercial HVAC units
 - evaporative pre-cooling condenser air retrofit unit; and
 - retrofit 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

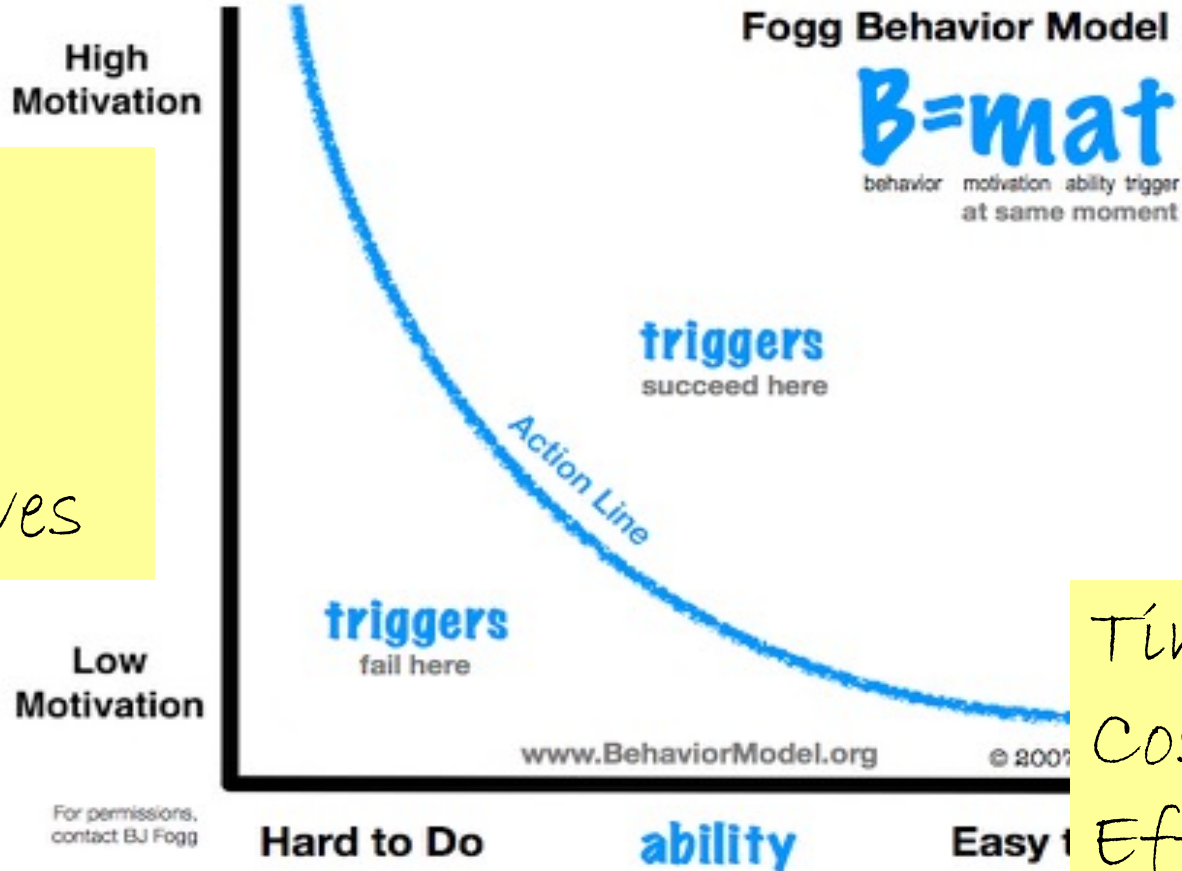
Who does what...



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

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

Needs
Wants
Beliefs
Incentives



Time
Cost
Effort
Knowledge
Feasibility

Source: <http://www.behaviormodel.org/>

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 investment vs. operating costs

- 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?

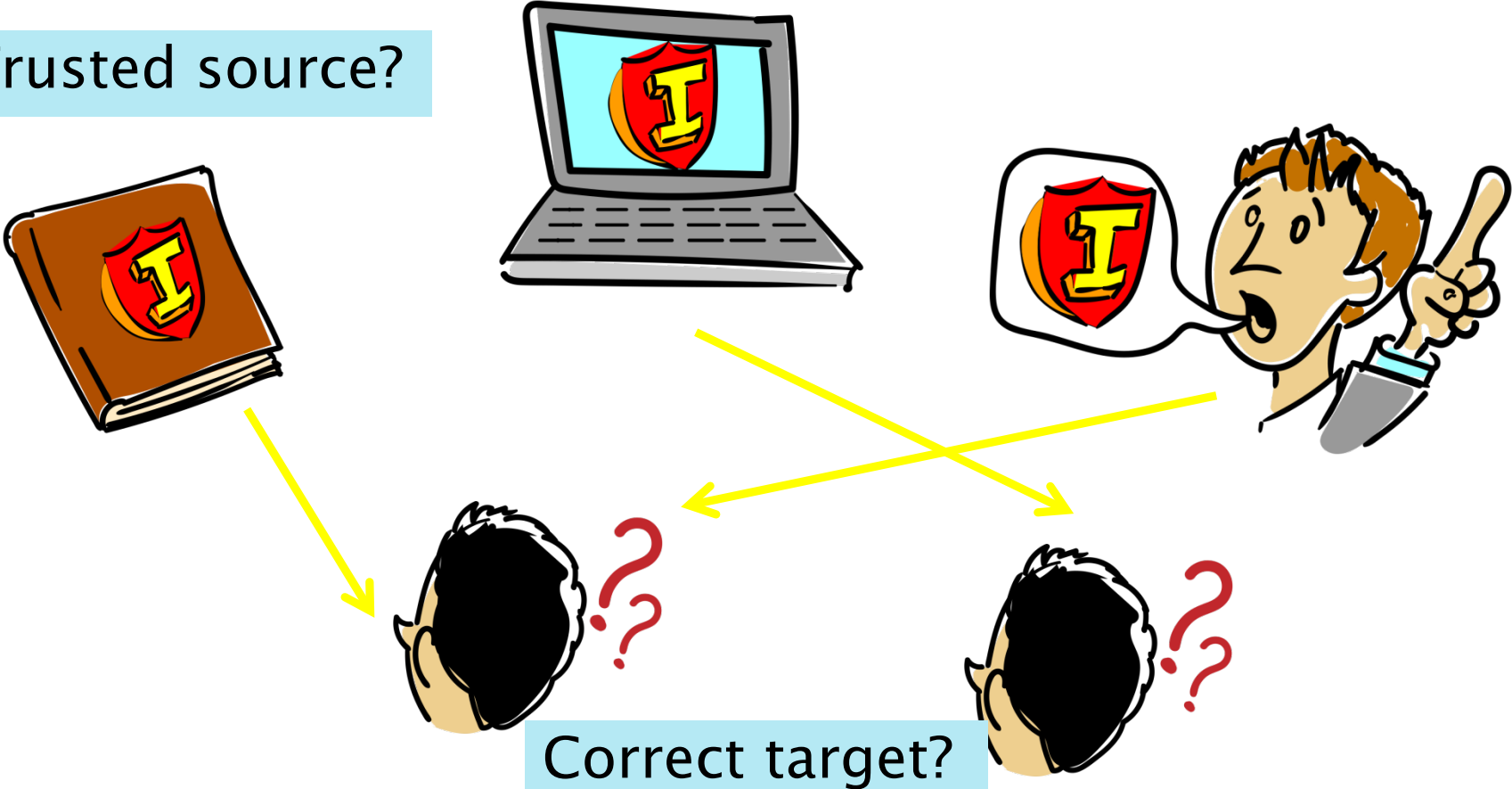
5 cross-cutting themes

| 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 | | | | | | | | | | | | | |
| Opacity | | | | | | | | | | | | | |
| Accountability | | | | | | | | | | | | | |
| Trust | | | | | | | | | | | | | |

Three Conclusions - #1

1. Information is vital in ET adoption and promotion.

Trusted source?

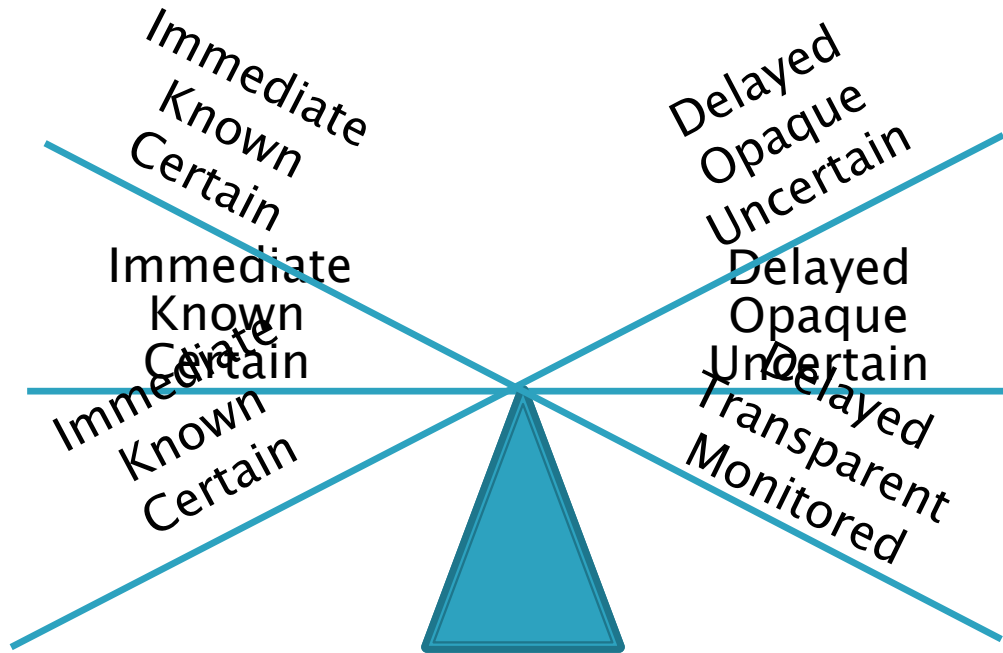


Three Conclusions - #2

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

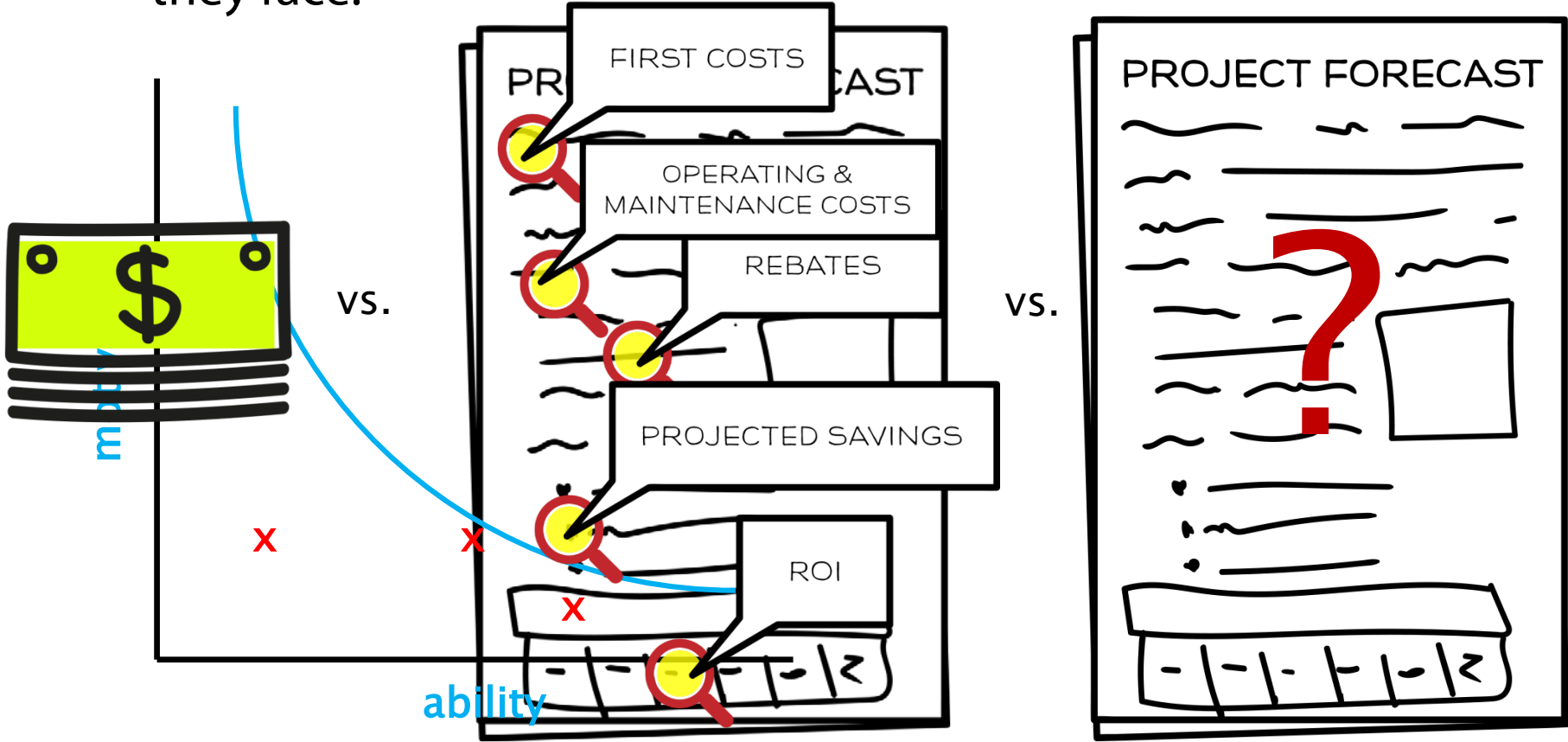
(Perceived)
Costs

(Perceived)
Benefits



Three Conclusions - #3

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



Thank you.

Find the paper:

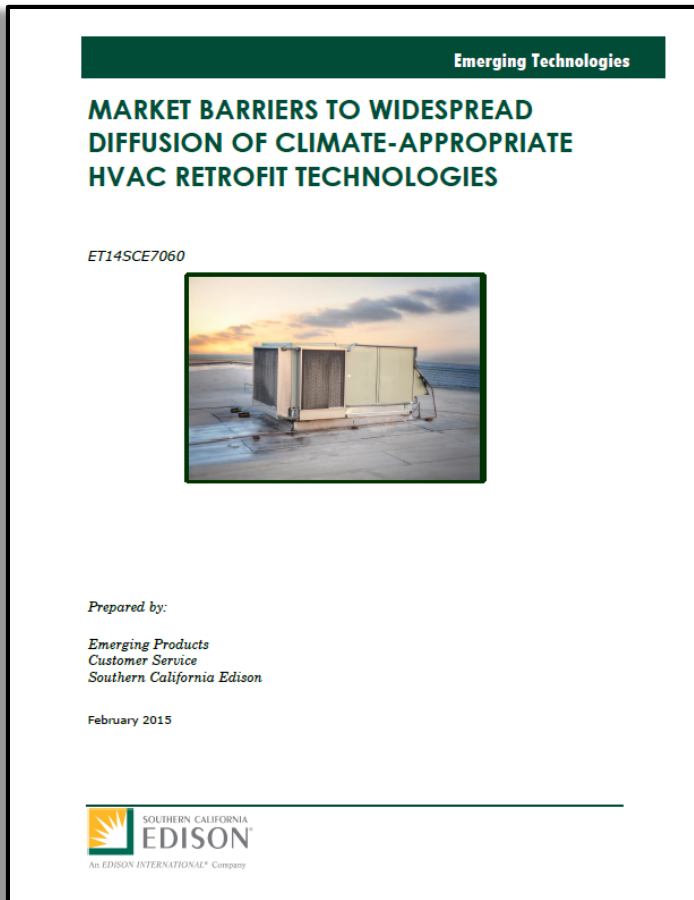
- WCEC website, Publications tab
- ETCC website, search project reports for “market barriers”

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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