Market Barriers to Adoption of Efficient HVAC Retrofit Technologies

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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:
• 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...

Utility
Offers rebate for...
Decides to

Manufacturer
sells to
Decides to

Distributors
sell to
Decides to

Contractors
sell to
Decides to

Consumers
(Building owners)
purchase
Decides to

Each action is preceded by the decision to take such action
Why do stakeholders decide to buy/sell/adopt/promote?

Source: [http://www.behaviormodel.org/](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 investments 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

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<th>Motivation</th>
<th>Ability</th>
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<td>Technical requirements &amp;</td>
<td>Technical feasibility</td>
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<td>performance</td>
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1. Information is vital in ET adoption and promotion.
2. A behavioral analysis of the costs and benefits reveals an imbalance.

(Perceived) Costs

(Perceived) Benefits

Immediate
Known
Certain

Delayed
Opaque
Uncertain

Immediate
Known
Certain

Delayed
Opaque
Uncertain

Immediate
Known
Certain

Delayed
Transparent
Monitored

Known
Uncertain

Opaque
Transparent
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