What Drives Interest in Rooftop Solar? Insights from the Field and Theory

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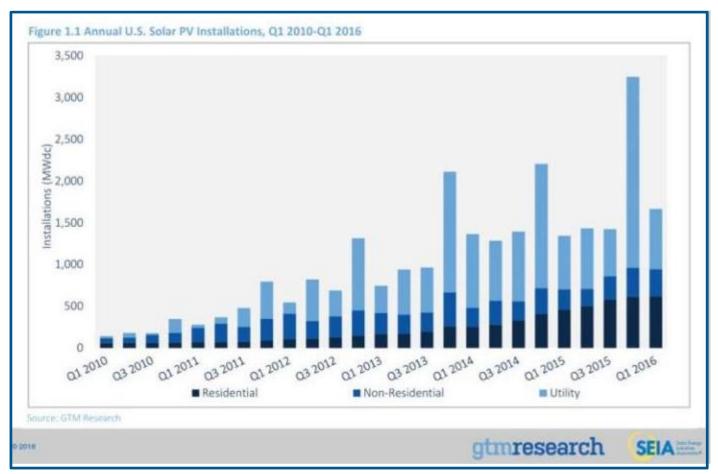
Collaborators:

Paul Stern, National Academies of Sciences Tom Dietz, Michigan State University





Residential Solar Photovoltaics (PV) are becoming more popular



Source: GTM Research, U.S. Solar Market Insight Report 2016 Q2

BUT Customer acquisition costs remain high:

\$3,000 to acquire one new customer!

Online Survey of Consumer Perceptions

Sample

- Non-adopting homeowners in AZ, CA, NJ & NY
- Quotas used to match sample to Census
- 1,156 respondents with complete data

Objectives:

- Identify factors that influence interest in PV
- Develop a framework to examine their relative importance

Examined two types of Interest in PV:

Social Curiosity



"If my neighbor [or friend] installed solar, I would be interested in learning about the costs and savings"

Interest in Talking to Installer



Intention to contact installer in next 6 months

"If I could get a no-cost assessment of what solar panels could do for my home, I would"

"If a company that sells solar... were in my neighborhood, I would be interested in talking with a representative."

Why have people gone solar?

For the Planet.

To Save Money.

Because it's Cool.







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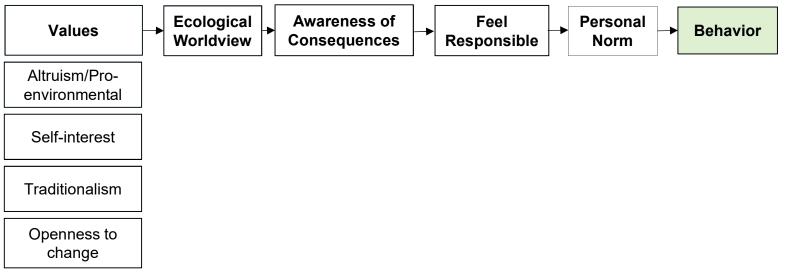




Value-Belief-Norm theory (Stern *et al*, 1999) Theory of Planned Behavior (Ajzen, 1991) Diffusion of Innovations (Rogers 2003)

1) Solar as an eco-friendly behavior?

Value-Belief-Norm Model (Stern et al., 1999)

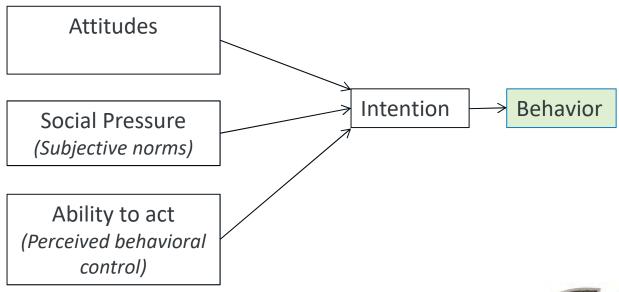


VBN: People who have strong altruistic and environmental values, believe the environment is threatened, and that they can do something to help, will feel a moral obligation to take action, and are more likely to pursue PV.



2) Solar as a consumer good?

Theory of Planned Behavior (Ajzen, 1991)

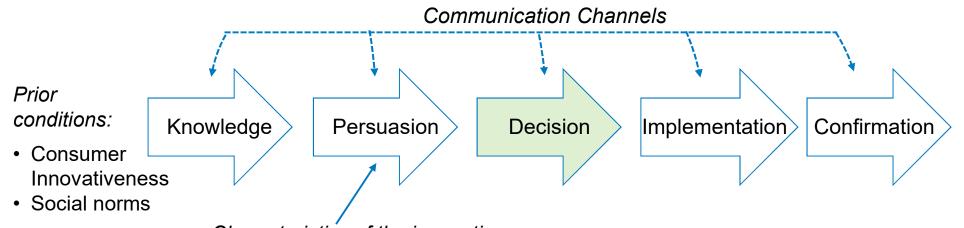


TPB: People decide whether to engage in a behavior after rationally weighing the pros and cons, taking into account their beliefs and attitudes about solar, social expectations and whether they think they're capable of getting PV.



3) Solar as an innovative technology?

Diffusion of Innovations (Rogers, 2003)



- Characteristics of the innovation:
- Relative advantage
- Compatibility
- Complexity
- Trialability
- Observability

DOI describes the process by which new innovations are adopted. Innovative, novelty-seeking consumers are likely to adopt first. Adoption and diffusion occur more quickly when people hold favorable impressions of the innovation.



Proposed Integrated framework

FACTORS SHAPING BELIEFS ABOUT PV

PERSONAL DISPOSITIONS

Pro-environmental Norm (VBN)

Consumer Innovativeness (DOI)

EXTERNAL INFLUENCES

(DOI)

- Exposure to marketing

BELIEFS & ATTITUDES

Beliefs about advantages & disadvantages

PV-SPECIFIC

(TPB/DOI)

Subjective Norms (TPB)

Perceived Behavioral Control (TPB)





- Observability
- Trusted information sources

Controlling for:

VALUES

(VBN)

Household **Constraints**



Predictors of Social Curiosity

FACTORS SHAPING BELIEFS ABOUT PV

PERSONAL DISPOSITIONS

Pro-environmental Norm

- Awareness of consequences
- Personal norm (.14)

Consumer Innovativeness

- CNS
- CIJM

EXTERNAL INFLUENCES

- Observability
- PV marketing
- Trust in PV industry (.07)
- Trust social network (.11)

Beliefs about advantages & disadvantages

PV-SPECIFIC

BELIEFS & ATTITUDES

- Personal benefits/ Relative advantage (.16)
- Environ, benefits
- Riskiness
- Cost concerns
- PV may improve
- Trialability (.37)

Subjective Norms

Social Support (.23)

Perceived Behavioral Control

- Unsuitable home
- Might move

Standardized betas, p < .001

SC

$$R^2_{Adj} = .42$$

Controlling for:

VALUES

• *Altruism* (.20)

Traditionalism

Self-interest

Openness to

Change

Household **Constraints**

Orange italics = significant total effect

Predictors of Intent to Talk to Solar Installer

FACTORS SHAPING BELIEFS ABOUT PV

PERSONAL DISPOSITIONS

Altruism (.17) Self-interest

VALUES

- Traditionalism
- Openness to Change

Pro-environmental Norm

- Awareness of consequences
- Personal norm (.21)

Consumer Innovativeness

- CNS (.17)
- CIJM

EXTERNAL INFLUENCES

- Observability
- PV marketing
- Trust in PV industry (.15)
- Trust social network

Beliefs about advantages & disadvantages

PV-SPECIFIC

BELIEFS & ATTITUDES

- Personal benefits/ Relative advantage (.25)
- Environ, benefits
- Riskiness
- Cost concerns (.09)
- PV may improve
- Trialability (.10)

Subjective Norms

Social Support (.10)

Perceived Behavioral Control

- Unsuitable home (.12)
- Might move

Standardized betas, p < .001

(.26)

$$R^2_{Adj} = .48$$

Controlling for:

Household Constraints

Orange italics = significant total effect

What this means for generating leads

WHO to target?

- Innovative consumers/early adopters of technology
- Environmentally conscious*
 *Show how PV aligns with values but also demonstrate personal benefits

WHAT messaging?

 Make the financial and personal benefits clear. Show how PV meets needs and addresses concerns.

HOW?

- Tap trusted social networks and information sources
- Carefully structure incentive programs/policies

Proposed Integrated framework

FACTORS SHAPING BELIEFS ABOUT PV

PERSONAL DISPOSITIONS

Pro-environmental Norm (VBN)

Consumer Innovativeness (DOI)

EXTERNAL INFLUENCES

(DOI)

- Observability
- Exposure to marketing
- Trusted information sources

Controlling for:

VALUES

(VBN)

Household Constraints

PV-SPECIFIC BELIEFS & ATTITUDES

Beliefs about advantages & disadvantages (TPB/DOI)

Subjective Norms (TPB)

Perceived Behavioral Control (TPB)

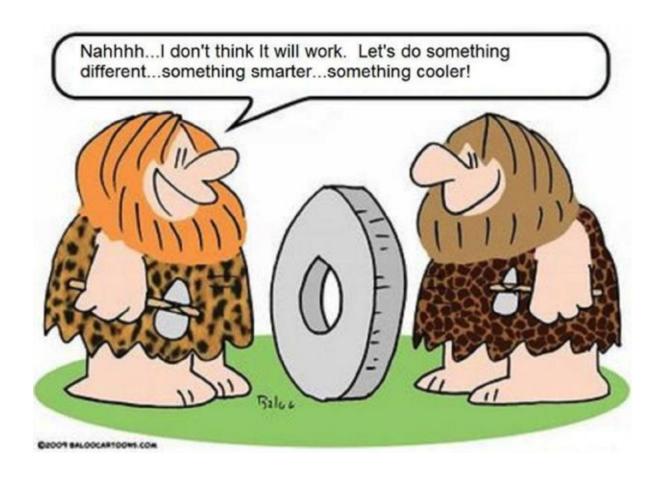






BECC is 10 years old

Let's remember to build off of what we've learned and not...





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Research Partners

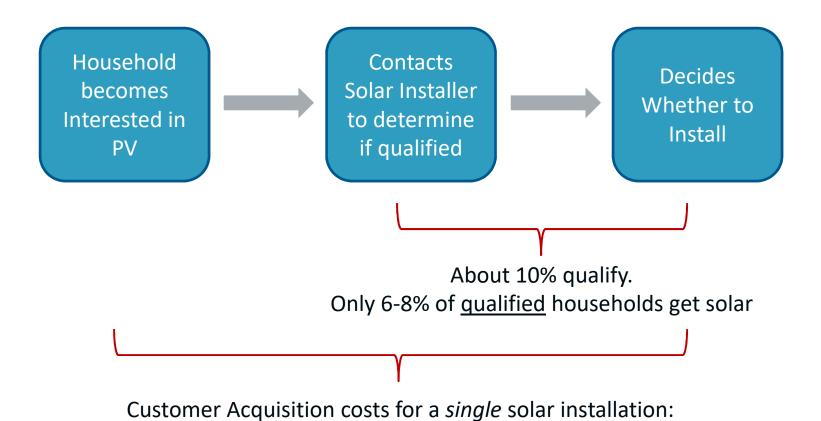
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Extra Slides

But there is room to improve customer acquisition



~ \$3,000 (10% of total costs)

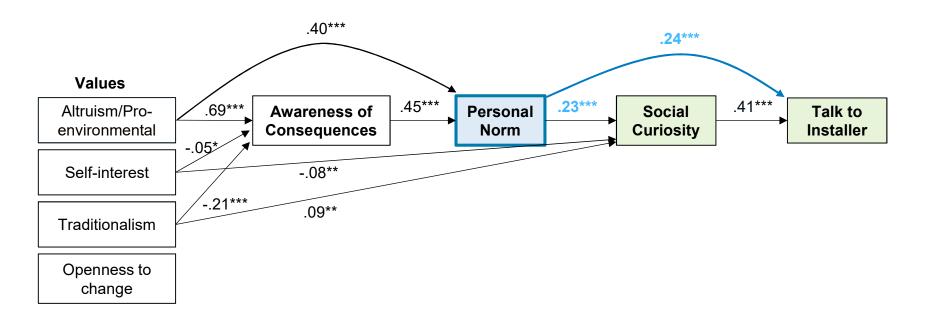
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How much do socio-demographics explain?

- Explain 11% of variance in Interest. Significant predictors:
 - Age: Younger individuals more interested
 - Gender: Males more interested
 - High summer bills
 - Lower household incomes
 - Have experienced more power outages
- Once we control for psychological variables, only age and gender remain significant

1) Solar as an eco-friendly behavior?

Value-Belief-Norm Model (Stern et al., 1999)



Household Constraints

(Significant paths not shown)

$$R^2 = .36$$

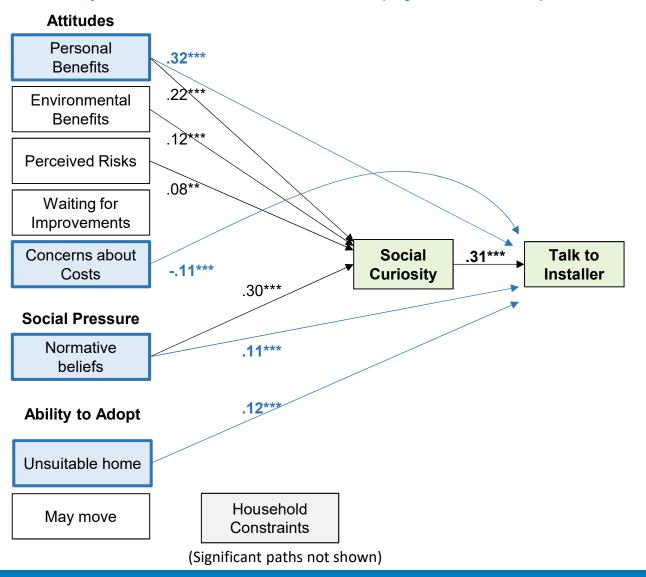
 $R^2_{Adj} = .35$

VBN explains 11% of variance after controlling for household constraints (excluding SC)



2) Solar as a consumer good?

Theory of Planned Behavior (Ajzen, 1991)



 $R^2 = .45$ $R^2_{Adj} = .44$

TPB explains 27% of variance after controlling for household constraints (excluding SC)



3) Solar as an innovative technology?

Diffusion of Innovations (Rogers, 2003)

