Welcome

Conservation Applied Research & Development (CARD) Webinar

December 12, 2018

Examining the Potential for Prepay as an Energy Efficiency Program in Minnesota
Examining the Potential for Prepay as an Energy Efficiency Program in Minnesota

Mary Sue Lobenstein
R&D Program Administrator
marysue.Lobenstein@state.mn.us

Laura Silver
Senior Program Administrator
Laura.Silver@state.mn.us

Reuven Sussman
Senior Research Manager
rsussman@aceee.org

Ariel Drehobl
Senior Analyst
adrehobl@aceee.org

ACEEE
American Council for an Energy-Efficient Economy
Webinar Basics

• Attendees in listen-only mode
• Type your questions into Q&A box
• Questions addressed at end
• Webinar recorded & archived
• Handouts
• Established in Next Generation Energy Act of 2007

• Help Minnesota utilities achieve 1.5% energy savings goal by:
  • Identifying new technologies or strategies to maximize energy savings;
  • Improving effectiveness of energy conservation programs;
  • Documenting CO$_2$ reductions from energy conservation programs.

Minnesota Statutes §216B.241, Subd. 1e

• Utility may reach its energy savings goal
  • Directly through its Conservation Improvement Program (CIP)
  • Indirectly through energy codes, appliance standards, behavior, and other market transformation programs
CARD RFP Spending by Sector thru June 2018 (FY2018)

- 9 Funding Cycles
- Over 420 proposals
- 107 projects funded
- Almost $24.5 million in research
Exploring Potential for Prepay as an Energy Efficiency Program in Minnesota

Reuven Sussman, Jeannette LeZaks, Ariel Drehobl, Martin Kushler, and Annie Gilleo

R. Sussman, Sr. Manager, Behavior and Human Dimensions Program
American Council for an Energy-Efficient Economy
rsussman@aceee.org – 202-507-4746
Co-Chair of Behavior, Energy and Climate Change conference (BECC)
Prepaid Electricity?

- Paying in advance
- Popular in other countries
- Mostly low-income
- Controversial
Method

• Literature review
• Analysis of program evaluations
• Interviews with key stakeholders
• Model potential prepay scenarios in MN
History and Prevalence of Prepay

- Popular in other countries since 1980s, mostly not AMI-based
- United States: At least 17 “Pilot” or “Full-Scale” programs (DEFG, 2018)
  - AMI-based, most launched after 2009
- Minnesota: One co-op has a “PayGo” option
  - 400 of 40,000 customers
Prepay Program Evaluations
Program Evaluations

• 10 reports with 16 evaluations
  • 8 of 16 had limited information available in report
Summary of Program Evaluations: Sample size and design

- Sample size, duration: Okay, but sometimes small or short
  - Half of all programs had < 202 participants
  - Four of 16 had > 1,000 participants
  - Most observed for 1 year of prepay (4 longer, 1 shorter)

- Design: Difficult to rule out self-selection bias
  - Most used matched control group, 4 used only pre-post evaluation, one used instrumental variable control
  - One creative study used 27 groups pre-post, non-voluntary switch. Good self-selection control (South Africa)
Summary of Program Evaluations: Disconnection and behavior change

• Disconnection: Savings due to disconnection usually not excluded
  • Five of 16 evaluations excluded disconnection savings
  • But the procedure could be debated for three of those
  • Self-disconnection to save electricity?

• Behaviors: Learning and rationing
  • Only one evaluation measured self-reported behavior
    • Purchasing thermostat or allowing disconnection = ↓ usage
  • O’Sullivan et al (2014): customers learn about energy use and ration it
    • Severe hardship customers at risk for “extreme rationing”
Energy Reductions? Yes

- Savings
  - Average = ~9%
  - 7 evaluations < 7%
  - 5 evaluations > 10%

- Possible issues
  - Selection bias
  - Savings from disconnections
  - Missing information
  - Generalizability
  - Deprivation?
Behavior Change
What causes behavior change?

• Identifying key elements matters
• Potentially important drivers of change
  • Feedback
  • Fast shutoff
  • Costs to customers
  • Usually more frequent payments
  • Active payment
  • Paying in advance
• Maybe it’s the combination of elements
Feedback

• Effective feedback is a key element of prepay
• Some aspects can be exported to postpay
  • Facilitates learning
  • Uses understandable metrics (e.g., dollars not kWh)
  • Empowering and motivating messages (e.g., gamify)
• But some aspects are possibly more powerful with prepay
  • Counting down rather than up: loss aversion
  • Motivation to pay attention is higher (e.g., to avoid shutoff)
Implementing prepay
Why implement prepay?

• The top three reasons that American utilities give for implementing prepay are:*  
  1. Providing customers an additional payment option (18 programs)
  2. Reducing customer debt, offering debt recovery options, and reducing write-offs (8 programs)
  3. Providing energy efficiency, demand-side management, or conservation programs (8 programs)

• Most proposals to regulators do not cite energy savings as primary reason for implementation

* DEFG database of 40 American current, planning or former prepay programs, 2018
Five advocate and opponent concerns: Research and Customers

1. Research: More research is needed

2. Customers: Customers are satisfied, and they appreciate the control they feel, but the program must remain voluntary
Five advocate and opponent concerns: Utility

3. **Utility**: Utilities face lost revenue from usage reductions, but they can also increase profits through reduced arrearages

- Some advocates argue that utility efficiency spending should be used on “traditional” energy efficiency measures
Five advocate and opponent concerns: Consumer Protections

4. Consumer protections:
Consumer advocates are concerned that disconnection is the main motivator for behavior change and that deprivation may occur.

- Some also argue that quality of life could improve in some ways (e.g., flexibility and control).
- If programs serve primarily low-income customers, their protection and equitable treatment is paramount.
Five advocate and opponent concerns: Regulation

5. Regulation: Some regulators have rejected proposals for prepay programs for various reasons
   - Insufficient customer benefit (or possible deprivation)
   - Cost-effectiveness

• Possible Minnesota concerns:
  - Would a prepay program qualify as “energy efficiency?”
  - Providing service to prepay customers during shut-off moratoriums (e.g., extreme cold days). Can arrears be accumulated?
Deprivation?
Deprivation?

• Deprivation ≠ Energy Efficiency
  • In Minnesota energy efficiency is a reduction of energy use “without a reduction in the quality or level of service provided to the energy consumer”*

*Minnesota Statues, section 216B.241
Does prepay increase quality of life?

• High self-reported satisfaction
  • Utility surveys and unbiased university researchers

• People want the program
  • Facilitates budgeting, control, empowerment, small frequent payments, flexibility, reactivation of services without deposit

• Note: Possible selection bias and halo effect
Does prepay reduce quality of life?

• More disconnections may be harmful
  • But possibly shorter duration and easier to reconnect

• Evaluated programs usually slightly more expensive than postpay
  • Vendor fees, access charges, etc.

• Other considerations
  • We need more objective health measures of customers on prepay and postpay
  • Current postpay system also sometimes fails to protect low-income customers
Estimating Usage Reductions in MN
Assumptions

• Advanced metering infrastructure is in place
• Real-time information can be provided to the customer through several modes of communication (i.e., text, web, and phone)
• The program is voluntary or opt-in
• The savings rate does not include savings from disconnection.
• Adoption rate is 1%*

* Based on current PayGo adoption in one Minnesota co-op
Two scenarios: Disconnection

• Removing threat of disconnection may improve consumer protection but reduce savings

• Scenario 1 (with disconnection):
  • $0 balance = Disconnection occurs at the next legally permissible time
  • Usage reductions based on current prepay program evaluations

• Scenario 2 (no disconnection):
  • $0 balance = After short grace period, customer is transferred to a postpay plan
  • Usage reductions based on evaluations of phone app-based programs

• Both scenarios must be validated with more research
# Potential Electricity Reductions

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Baseline residential energy consumption (GWh)</th>
<th>Annual usage reduction</th>
<th>Total potential statewide annual savings (GWh)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scenario One: With disconnection</td>
<td>10,627</td>
<td>8.5%</td>
<td>9 GWh</td>
</tr>
<tr>
<td>Scenario Two: Without disconnection</td>
<td>10,627</td>
<td>2%</td>
<td>2.1 GWh</td>
</tr>
</tbody>
</table>

*Note: Estimates preliminary. They are based on current evaluations which may not generalize perfectly to the greater Minnesota population (e.g., there may be a self-selection bias and programs often include specialized customer segments)*
Big Picture Questions and Future Research
Big Picture Questions

• How much of the observed usage reduction is due to
  • Energy efficiency improvements (e.g., switching to LEDs)
  • Behavioral energy waste reduction (e.g., turning off unused lights)
  • Reduced use of normal amenities (e.g., discomfort or sacrifice)
  • Deprivation (e.g., shut-offs or drastic curtailment)

• Is there a better way to provide energy efficiency?

• Debt vs shut-off

• Paying in advance: A new-old way of doing things
More Research is Needed

- Control for selection bias
  - Quasi-experimental methods
- Larger sample size for longer period
- Alternative treatment groups
  - Postpay with feedback
  - Prepay without active payment
- Evaluation of possible deprivation
  - Surveys and objective health outcomes
  - Data on what actions within a household account for any observed usage reduction. Which behaviors are changed?
Considering a pilot? Implementation issues

- Convene a stakeholder advisory group
- Consider consumer protection issues, particularly for extremely budget-constrained customers
- Thoroughly assess cost-effectiveness
- Allow time and resources for educating customers and customer service representatives on entirely new system
Research design

- Sample size considerations
- Adequate control groups
  - Allow testing of different elements of prepay
- Use a quasi-random design
- Use a variety of outcome measures
  - Objective health outcomes
  - Electricity use
  - Surveys
Conclusion
Should prepay be considered an energy efficiency measure in Minnesota?

- Considering prepay as an energy efficiency measure in MN rests on three interacting elements:
  1. The program’s ability to cost-effectively reduce electricity consumption
  2. Program elements that cause electricity reduction
  3. The nature of the customer actions that result in the usage reduction

- More research and discussion is needed on this topic
Questions?

Examining the Potential for Prepay as an Energy Efficiency Program in Minnesota

Reuven Sussman
Senior Research Manager
rsussman@aceee.org

Ariel Drehobl
Senior Analyst
adrehobl@aceee.org

Send us your questions using WebEx Q&A box
CARD Project Resources

For Reports use CARD Search Quick Link

For Webinars use CARD Webinars & Videos Quick Link

For Other research documents use CARD Fact Sheets, Guidelines & Tools Quick Link

Final Report available now

R&D Web Page (https://mn.gov/commerce/industries/energy/utilities/cip/applied-research-development/)
Thanks for Participating!

Upcoming CARD Webinars:

• **Dec 17**: Minnesota Energy Efficiency Potential Study
• **Feb 7**: Field Study of Tier 2 Advanced Power Strips

Commerce Division of Energy Resources e-mail list sign-up

If you have questions or feedback on the CARD program contact:

Mary Sue Lobenstein

marysue.Lobenstein@state.mn.us

651-539-1872