HOME ENERGY REPORTS – WHO IS DRIVING THE SAVINGS?

Using Multi-Level Models To Identify High, Medium and Negative Savers

Olivia Patterson

Research Objective

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Overview of Home Energy Reports (HER) and Energy Efficiency

- Customers receive reports with:
  - Historical usage
  - Social norming (i.e. comparisons to neighbors)
  - Savings recommendations
- Most evaluations show small but consistent household-level savings
- Typically very large programs, up to hundreds of thousands of participants

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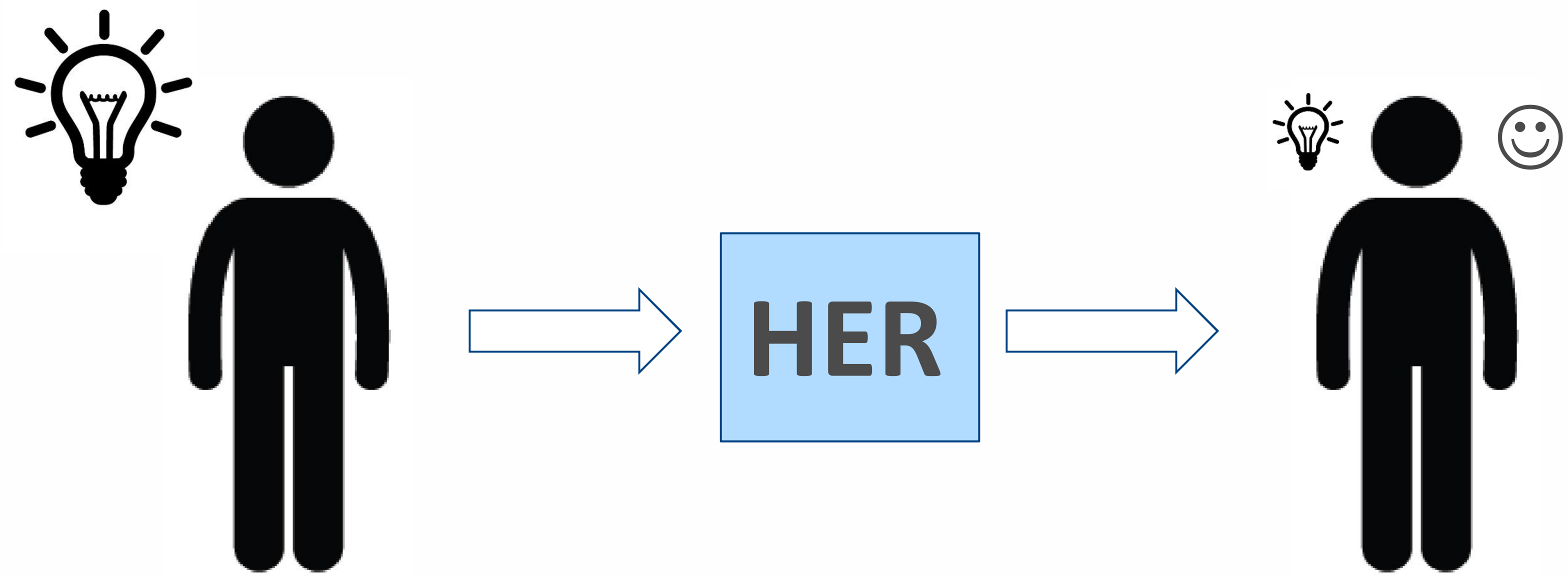
HER reports in theory

- Reduce energy consumption by changing customer behaviors and choices…



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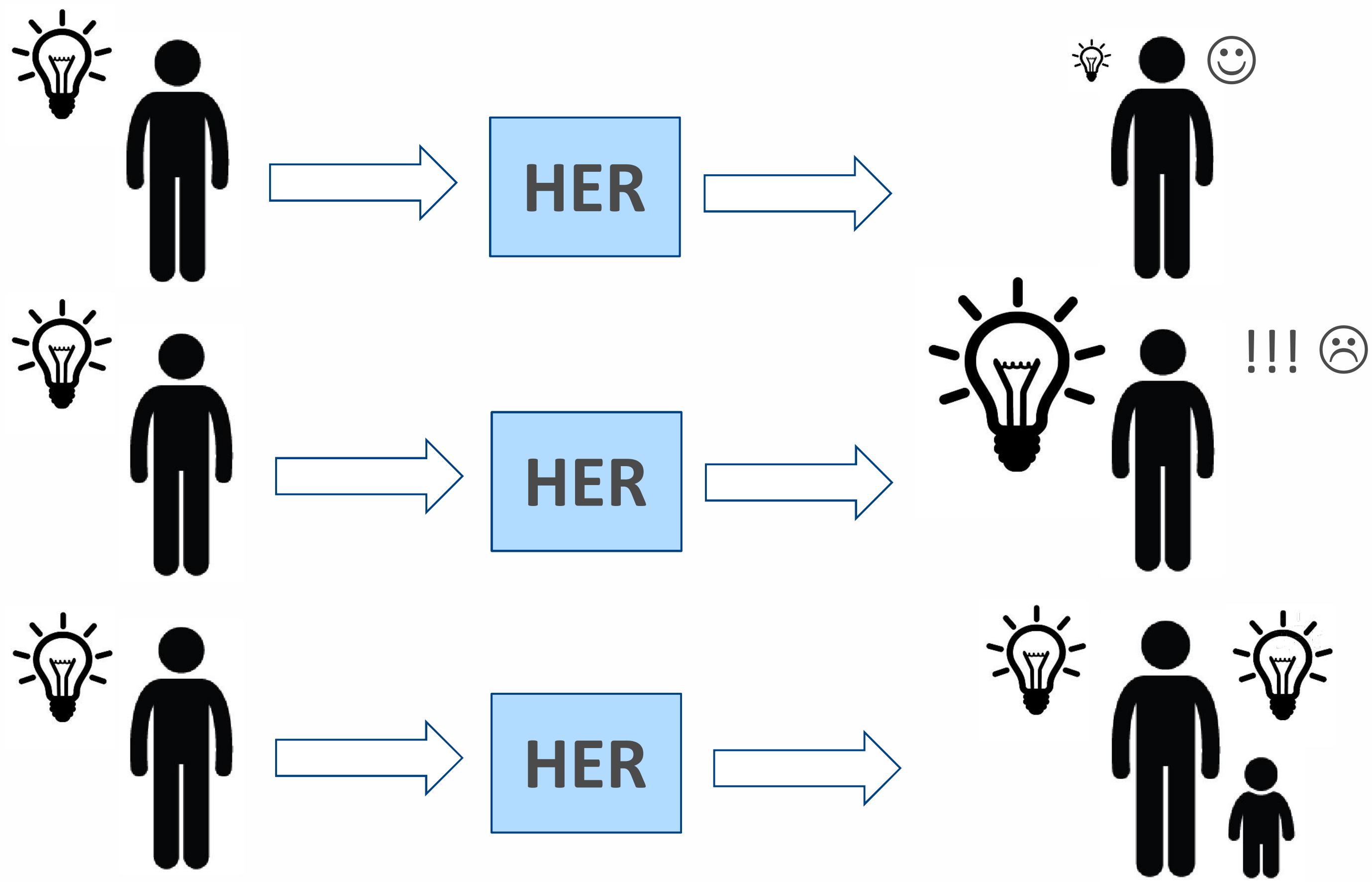
HER reports in practice...

- ...but customers may not respond the same way



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If each individual responds differently, should we be asking different questions?

- Who were the high savers, low savers, and negative savers?
- Can we isolate top-tier savers and lower-tier savers, to better understand who is driving savings, and potentially, through leveraging secondary data, what their characteristics are?

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What will these questions answer?

- Understanding household-level differences in response could:
  - Improve program targeting
  - Increase savings for some customers
  - Inform program reach and goals
- For this to happen, we must be able to:
  - Identify subgroups of customers with different savings
  - Understand *why* these customers behave differently

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Approach & Results

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Conduct multilevel modeling to garner customer insights

- Evaluated long-running HER program with ~250k customers
- Developed model to understand the responses of different types of customers to the HERs in addition to calculating total savings attributable to the program

Multi-Level Billing Analysis

- Estimated individual savings for each participant

Group Customers into Savings Categories

- High Savers
- Medium
- Neutral
- Negative
- Very Negative

Analyzed Data

- Correlation to demographics and HH characteristics
- Examined group mobility to identify how savings change year to year

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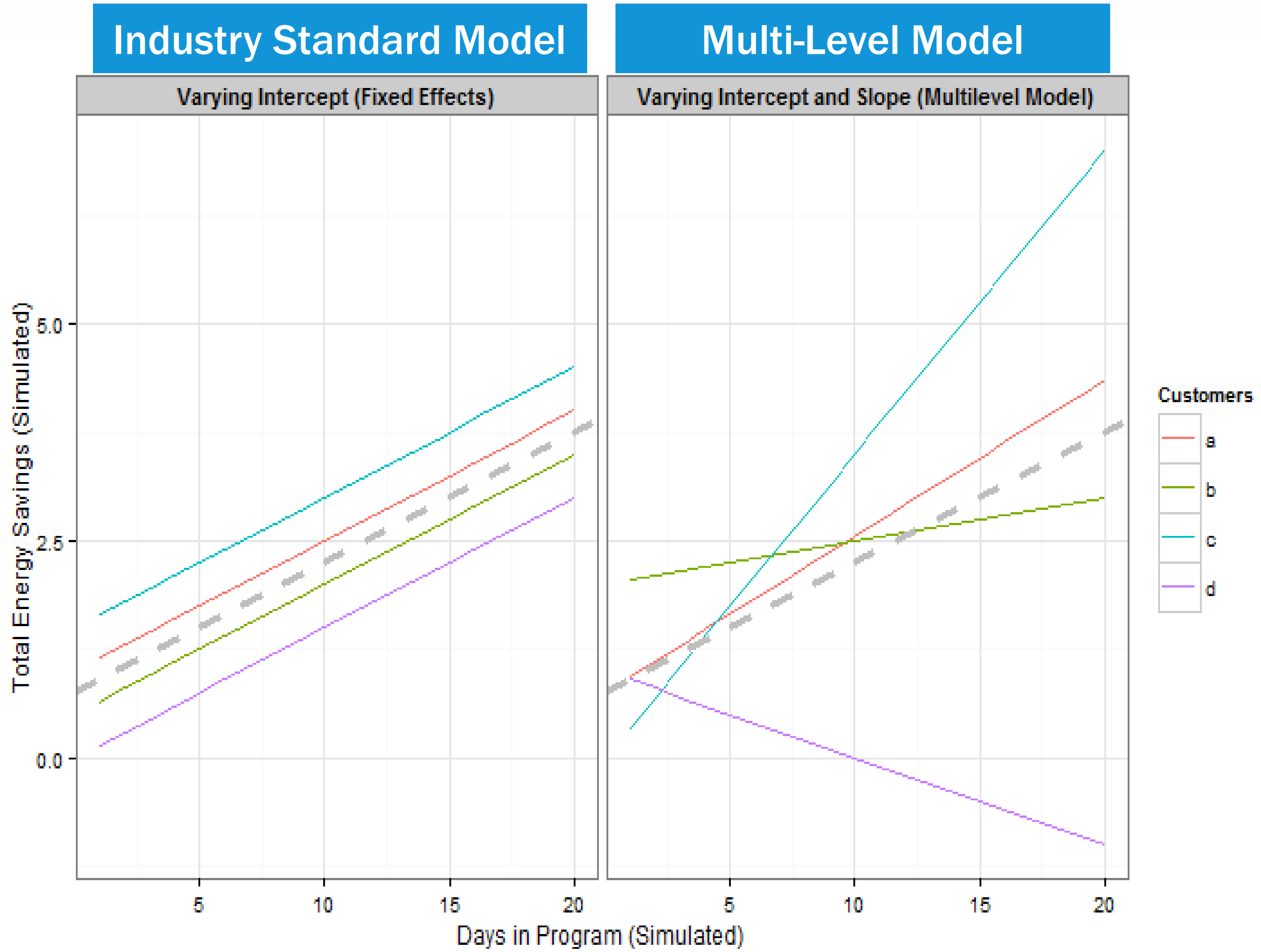
Multilevel modeling estimates individual customer savings



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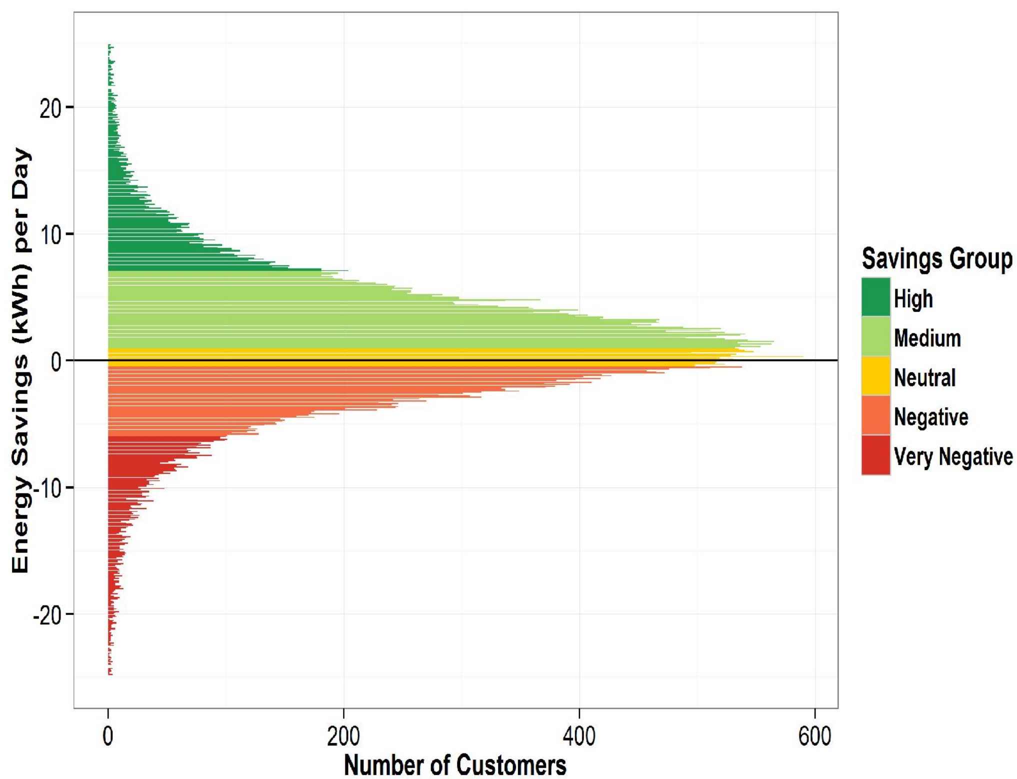
On average, customers have positive energy impacts, but 40% of customers are increasing their energy usage



Group	Percent of Population	kWh Savings / Day
High	Top 10%	> 7 kWh
Medium	Next 30%	> 1 & ≤ 7 kWh
Neutral	Middle 20%	> - 0.5 & ≤ 1 kWh
Negative	Next 30%	> -6 & ≤ -0.5 kWh
Very Negative	Bottom 10%	≤ -6 kWh

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Relationship to housing characteristics and demographics

- The most predictive characteristics after pre-treatment usage were:
  - *All fuel types*: age of the house, the customer's age, educational level, occupation, and number of people living at the residence
  - *Electric cohorts*: older participants, and those with fewer people living at the residence
  - *Gas cohorts*: participants with older houses, shorter time in home
- The size of the relationship between housing characteristics and savings varies by pre-treatment usage and interactions with other characteristics

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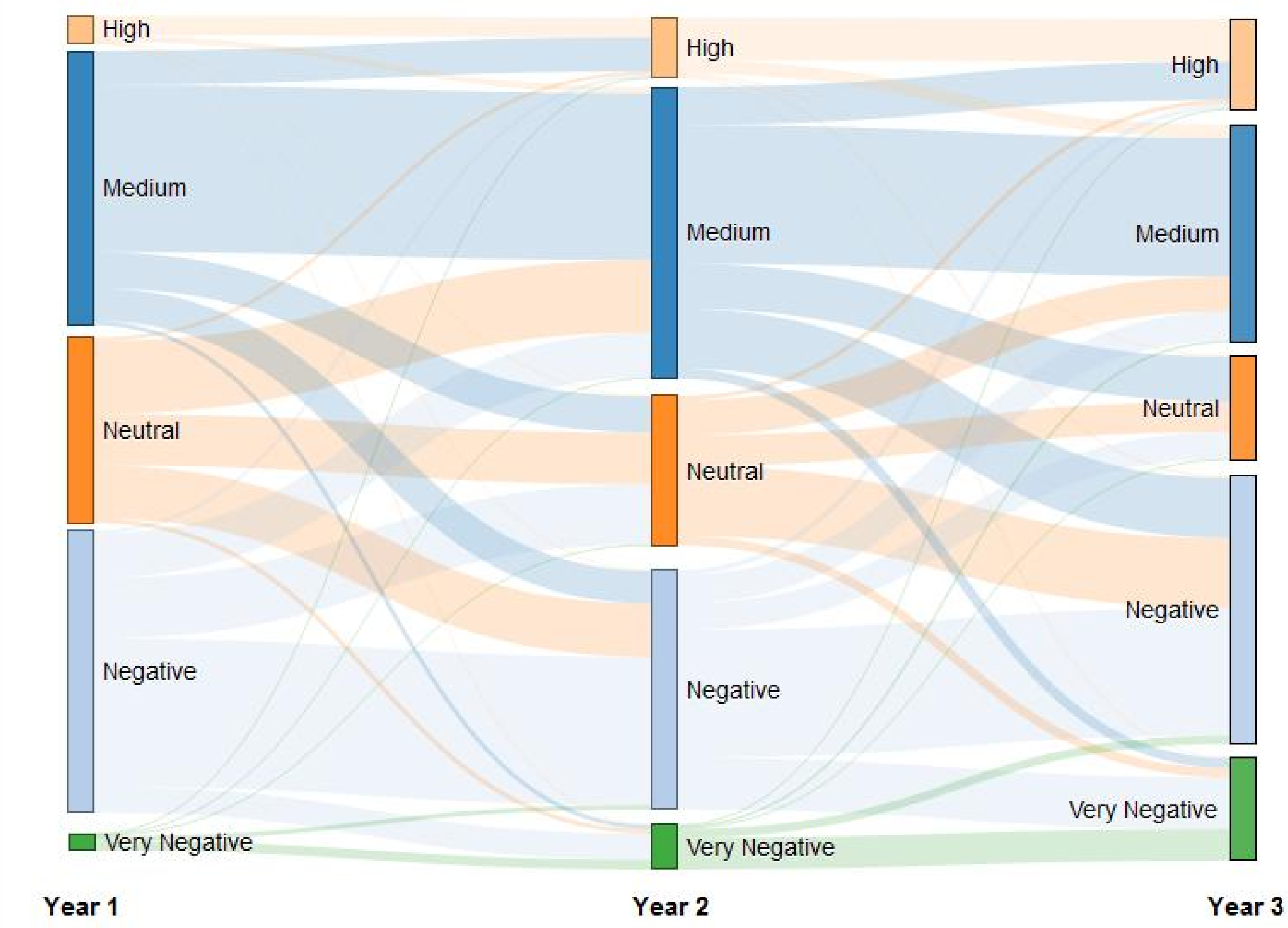
Surprising results from mobility in savings groups



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Conclusions

- On average, HER program produces positive savings
  - However, a little under half of participants are negative savers (e.g., increase energy consumption)
- Specific characteristics are associated with energy savings
  - These may not be generalizable to other populations
- Customers do not tend to change groups over time
  - Negative savers rarely become positive savers

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Considerations Moving Forward

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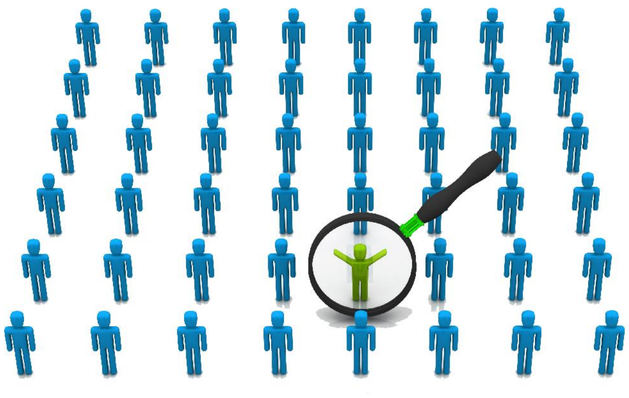
Predictive modeling can support program implementation changes

- Identify participants that would benefit from alternative intervention strategies:
  - *Very Negative Savers*: Stop or modify reports for participants in the very negative savings group could increase program impact (either frequency or messaging)
  - *Very High Savers*: Push them further into additional programs, heavily promote utility sponsored programs
  - *Middle of the Pack*: Use the report as an engagement tool (or for other online platforms)
- Remove customers predicted to be negative savers from future cohorts



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Outstanding Questions & Next Steps

Why do participants save more or less? → Detailed survey to understand attitudes, behaviors, life changes

Can we predict the likely savings of new participants? → Models to predict participant savings

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Thanks for listening!

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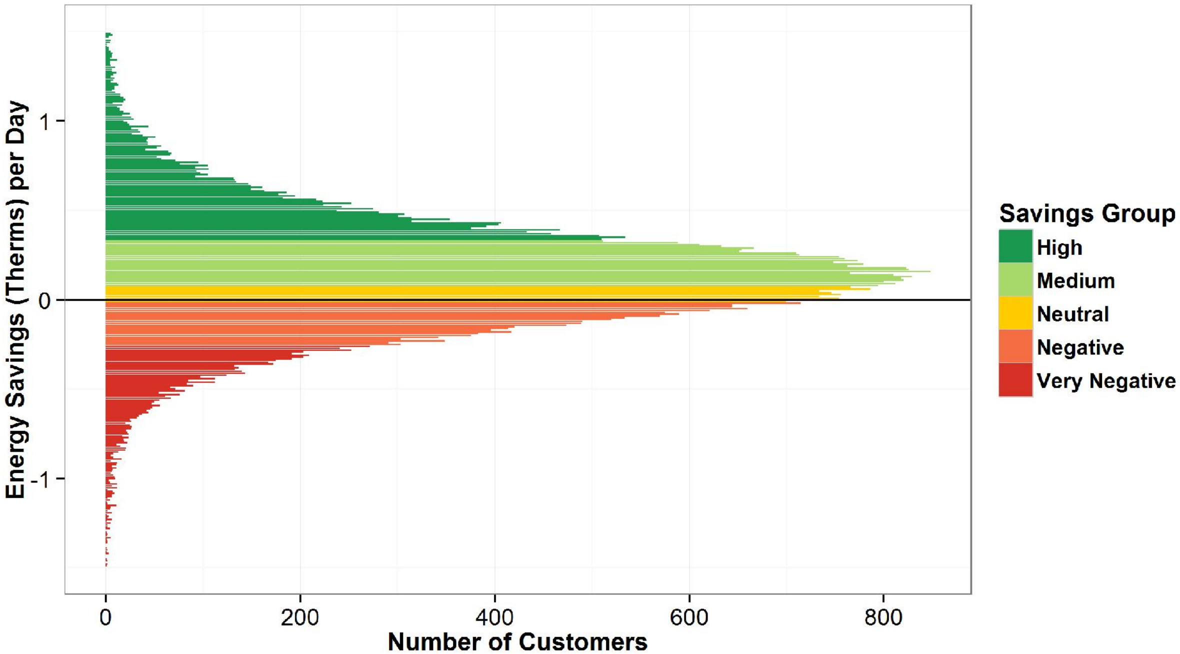
MLM Example: Daily Household-Level Gas Savings



High: > 0.33 thm

Medium: > 0.08 & < 0.33 thm

Neutral: > - 0.02 & ≤ 0.08 thm

Negative: > - 0.25 & < -0.02 thm

Very Negative: ≤ - 0.25 thm

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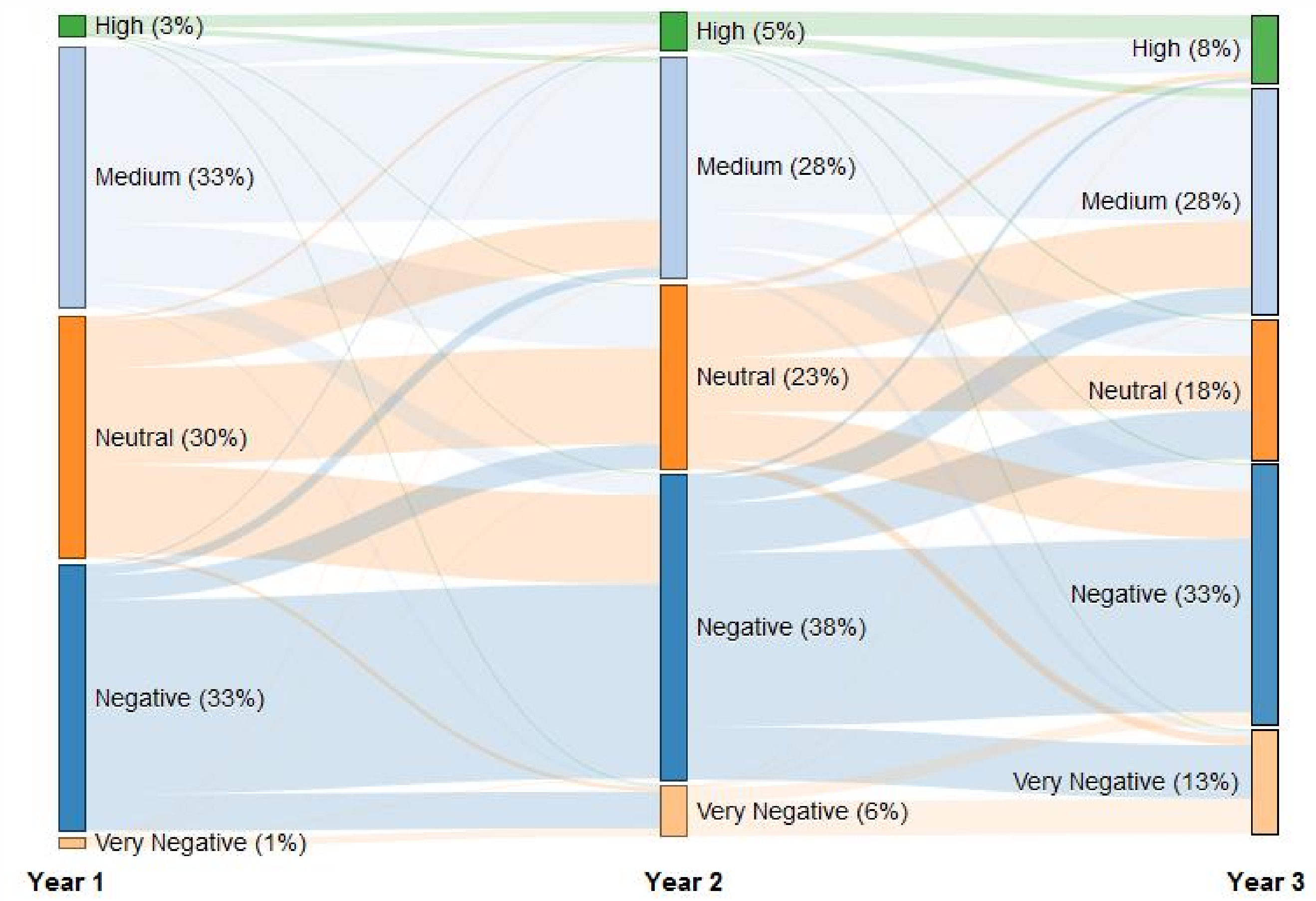
MLM Example: Gas Savings Group Evolution



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