



# SMART GRID INVESTMENT GRANT

CONSUMER BEHAVIOR STUDY ANALYSIS

## **Time-of-Use as a Default Rate for Residential Customers: Issues and Insights**

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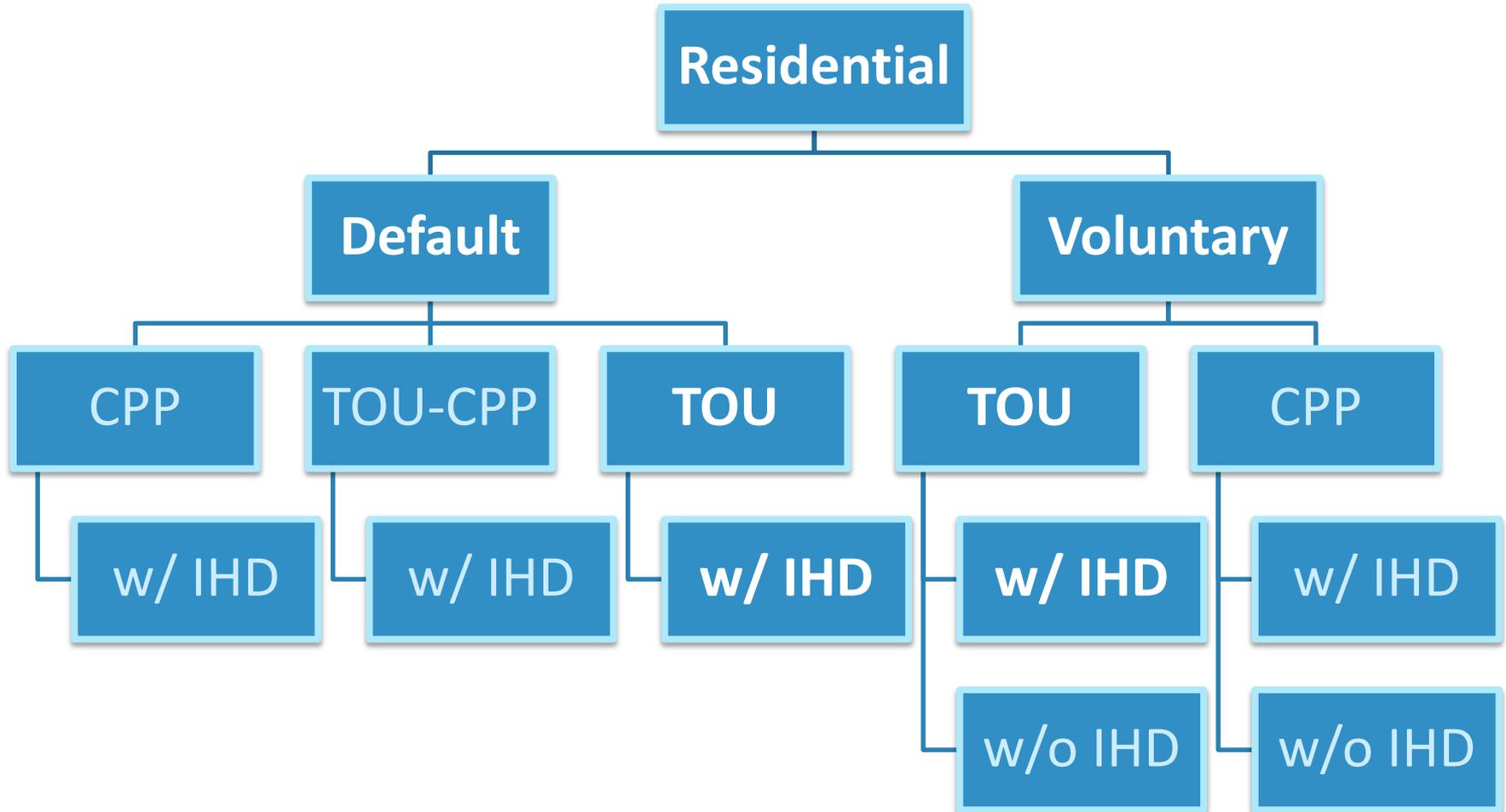
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# Overview of SGIG Consumer Behavior Studies

- **DOE Smart Grid Investment Grant (SGIG) Funding Opportunity Announcement (FOA) was released in June 2009**
  - Goal: Provide more definitive answers to policymakers responsible for modernizing the country's electricity infrastructure, in part by funding studies/pilots
- **FOA stated ideal approach for conducting funded consumer behavior studies:**
  - Focus on highly dynamic pricing tariffs (i.e., RTP, CPP)
  - Random assignment of start date for customers to be exposed mandatorily to dynamic pricing as default rate design
  - Customers remain on such rates for at least two (2) years
  - Requirement to deliver highly granular customer-level data for subsequent DOE cross-project analysis



# SMUD Experimental Design: TOU w/IHD Offer



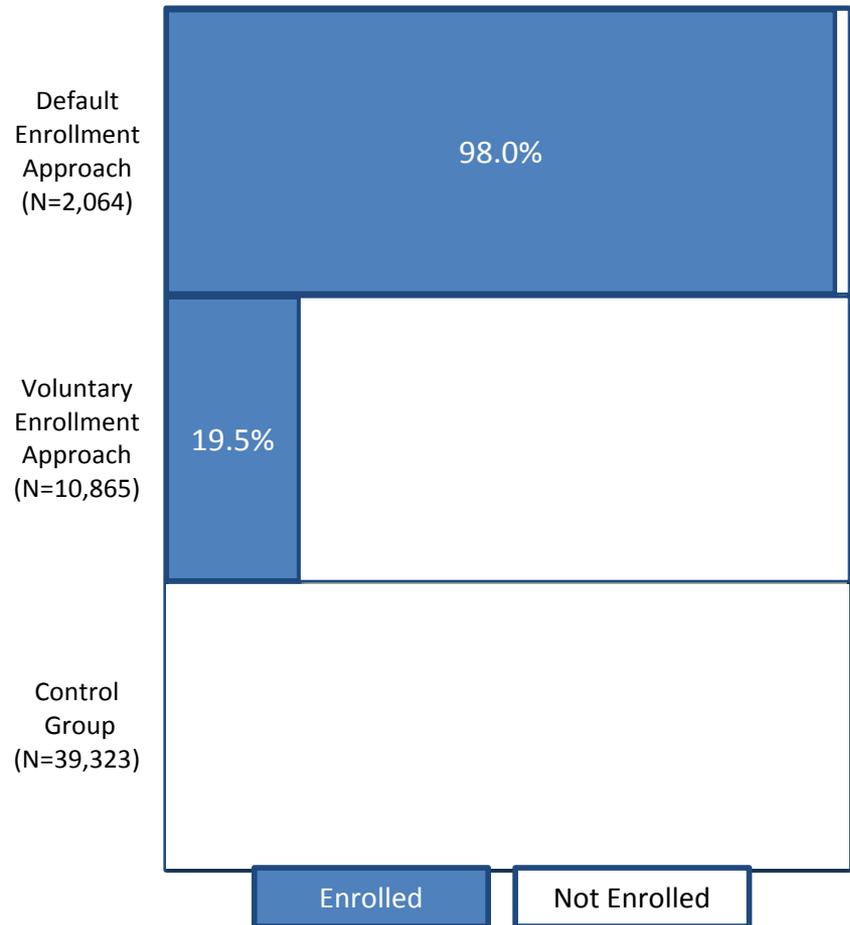
# Default vs. Voluntary Residential TOU

- **Many of the previously stated concerns about a transition to default TOU for residential customers didn't materialize**
  - Customers don't want it
    - 98% of customers defaulted onto TOU didn't opt-out, while less than 20% volunteered for the rate
  - Customers will leave it
    - 3.9% of defaulted customers dropped out during the study vs. 4.4% of those who volunteered
  - Customers won't respond to it
    - Default customers did exhibit smaller load response than volunteers but it could be precisely and credibly measured (statistically significant estimates)
- **In aggregate, if SMUD offered TOU to entire class of residential customers, default enrollment would produce considerably larger load impacts at lower costs → higher cost effectiveness**



# Recruitment Experience

- Enrollment in default TOU was five times larger than with voluntary enrollment approach



# SMUD Recruitment Costs

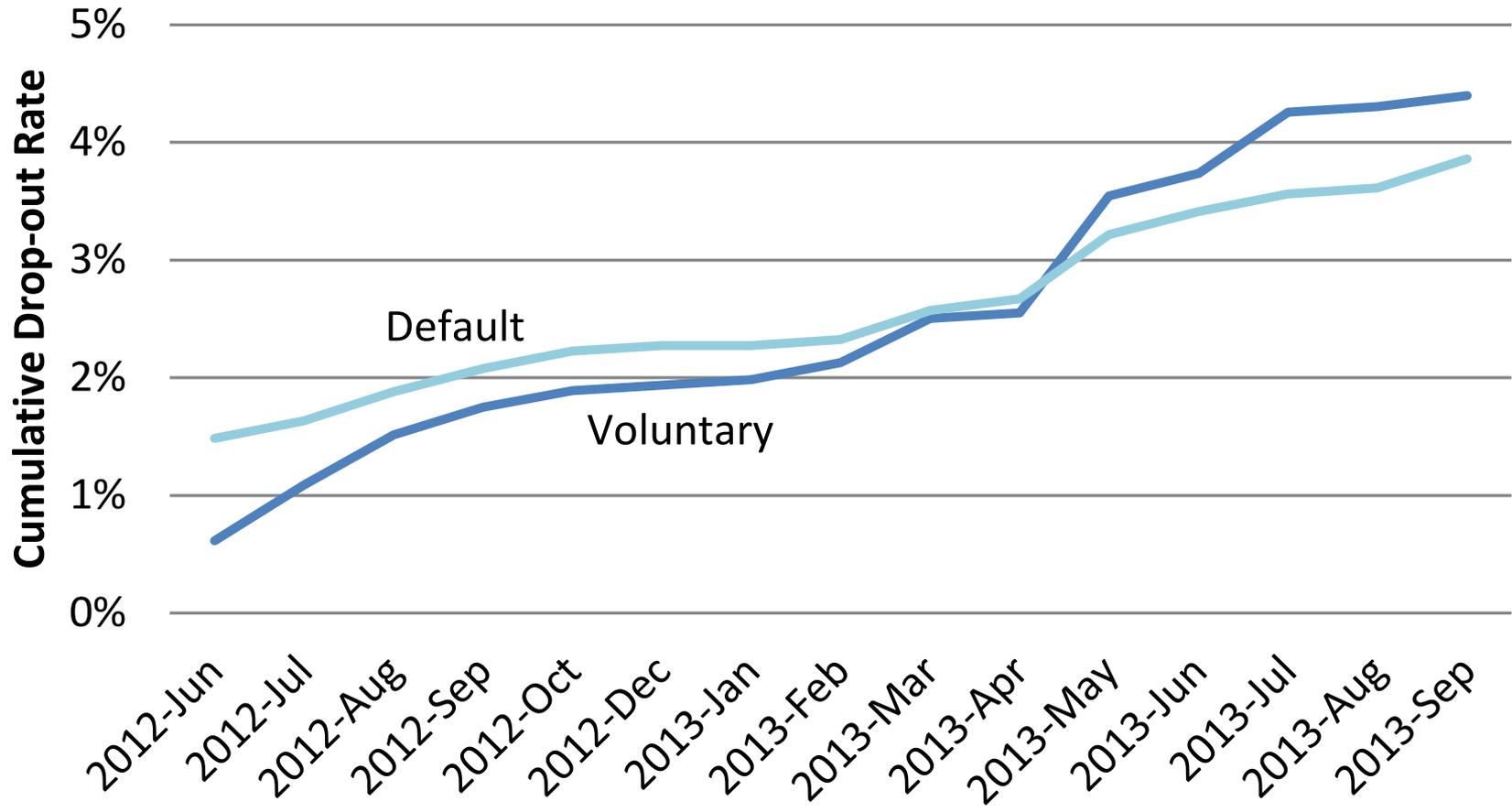
- Identical rate design employed for default and voluntary TOU rate offering
- Identical marketing collateral for default and voluntary TOU rate offering

Default Enrollment Approach	Voluntary Enrollment Approach
\$3.99/enrollee (w/o IHD cost)	\$60.77/enrollee (w/o IHD cost)

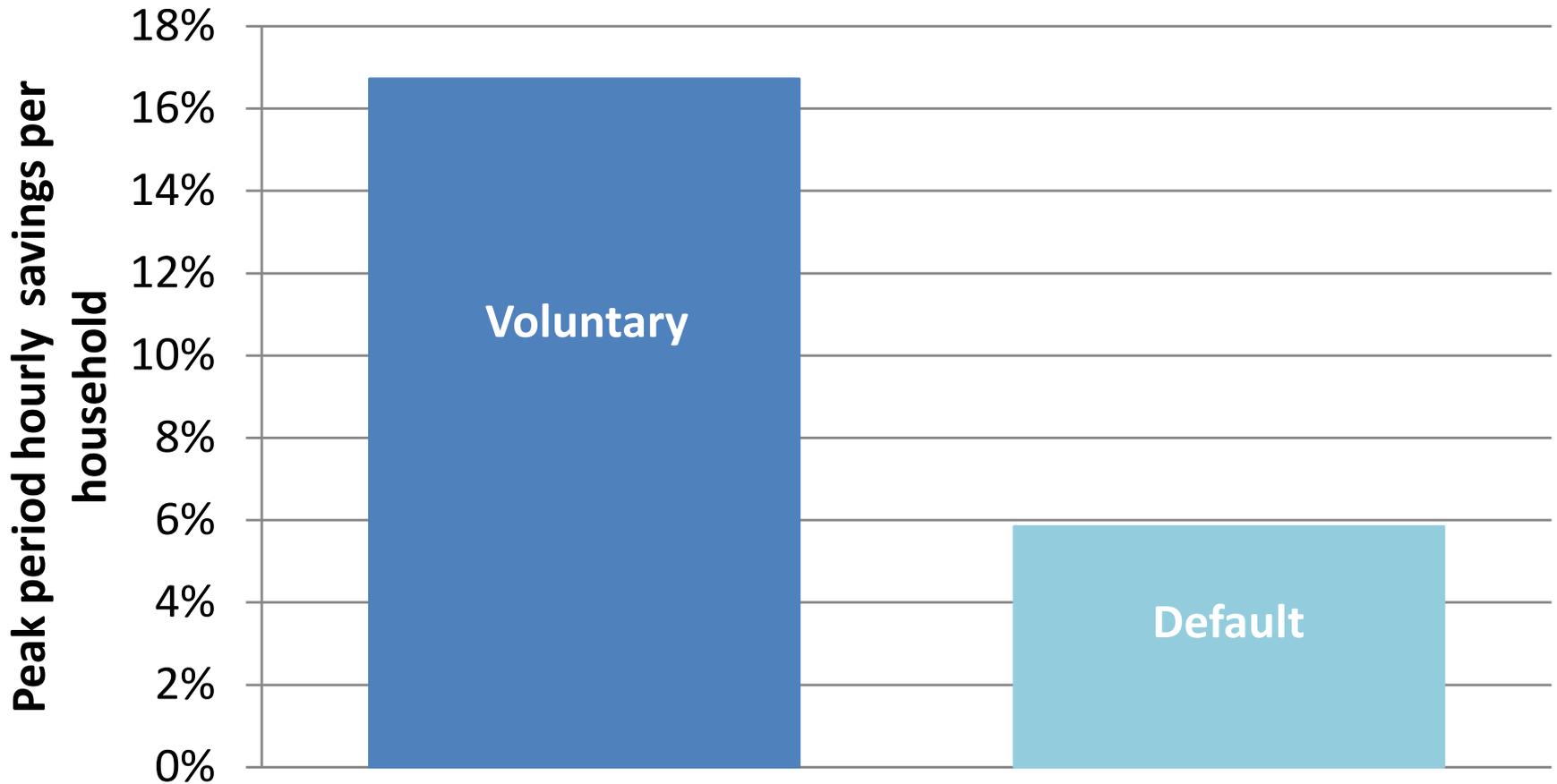
Source: Potter et al. (2014). SmartPricing Options Final Evaluation. Sacramento Municipal Utility District. Prepared for U.S. Department of Energy. September, 2014.



# Attrition Experience

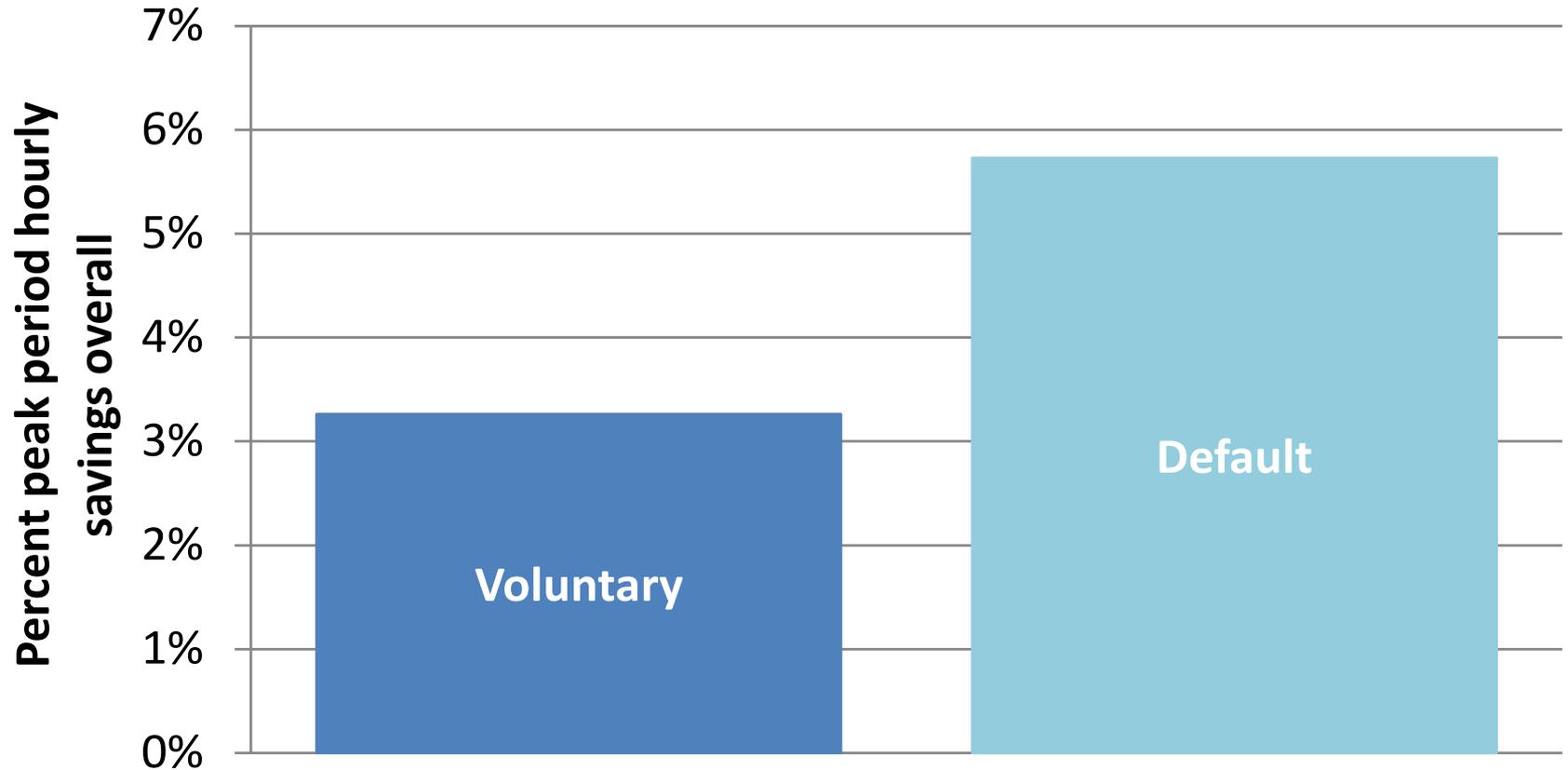


# Load Response Experience Per Enrollee



# Load Response Experience

## 545,000 Residential Customer Population



# Participating Customer Bill Savings

	Predicted % Savings (using pre-treatment energy usage)	Actual % Savings (using post-treatment bills)
Default Rate	-1.9%	1.8%*
Voluntary Rate	-1.8%	2.6%

\*  $p < 0.05$



# Cost Effectiveness Results

Enrollment Approach	Benefit-Cost Ratios	10-year Net Present Values (\$M)
Voluntary	0.74	- \$5.50
Default	2.04	+ \$34.10

Source: Potter et al. (2014). SmartPricing Options Final Evaluation. Sacramento Municipal Utility District. Prepared for U.S. Department of Energy. September, 2014.



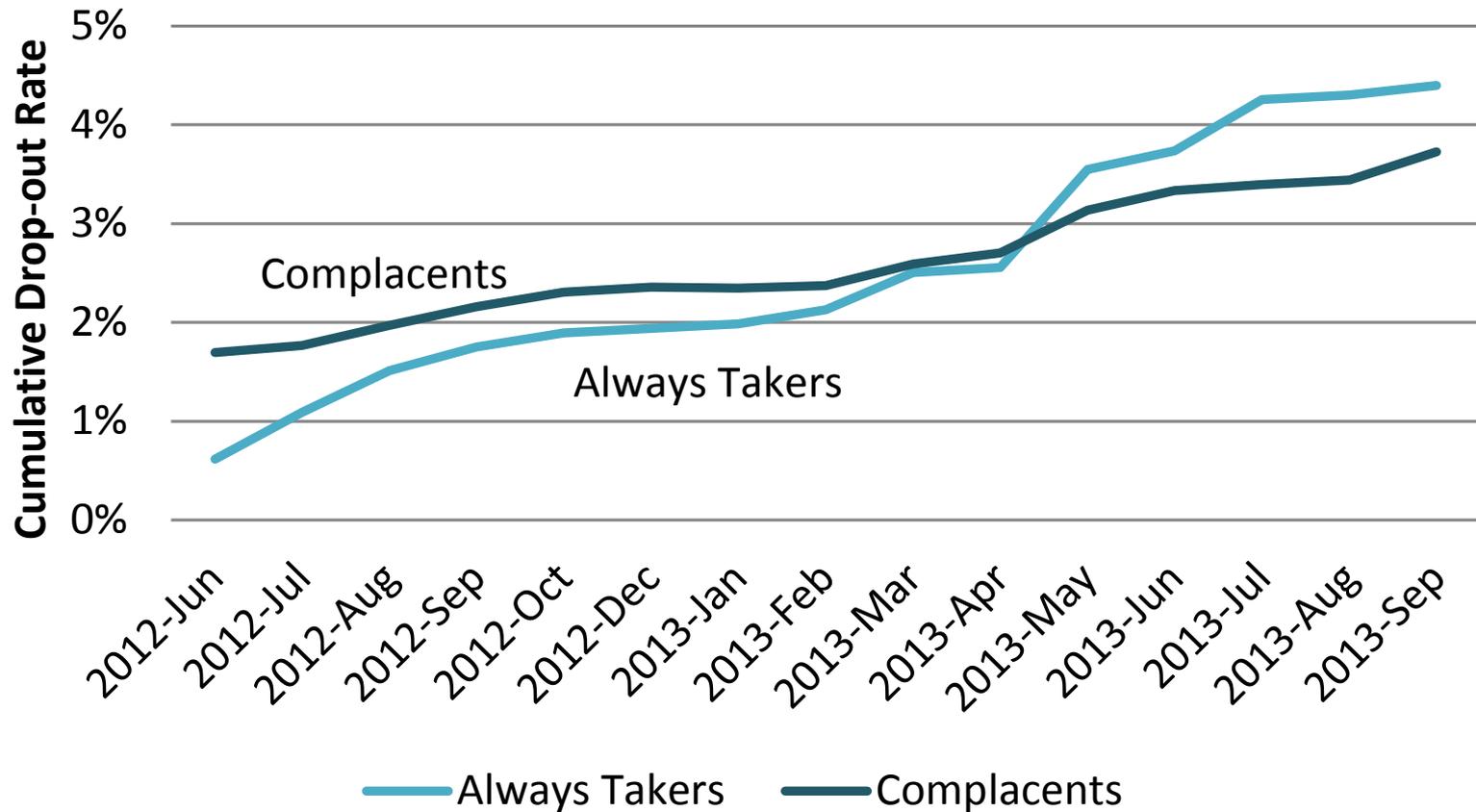
# Subpopulations of Customers

- **Always Takers**: The set of customers that would **actively opt in** to a voluntary TOU offer and would **not actively opt out** when TOU is the default
- **Complacents**: The set of customers who would **not actively opt in** to a voluntary TOU offer, but **would not actively opt out** when TOU is the default.
- **Never Takers**: The set of customers that would **not actively opt in** to a voluntary TOU offer, and would **actively opt out** when TOU is the default

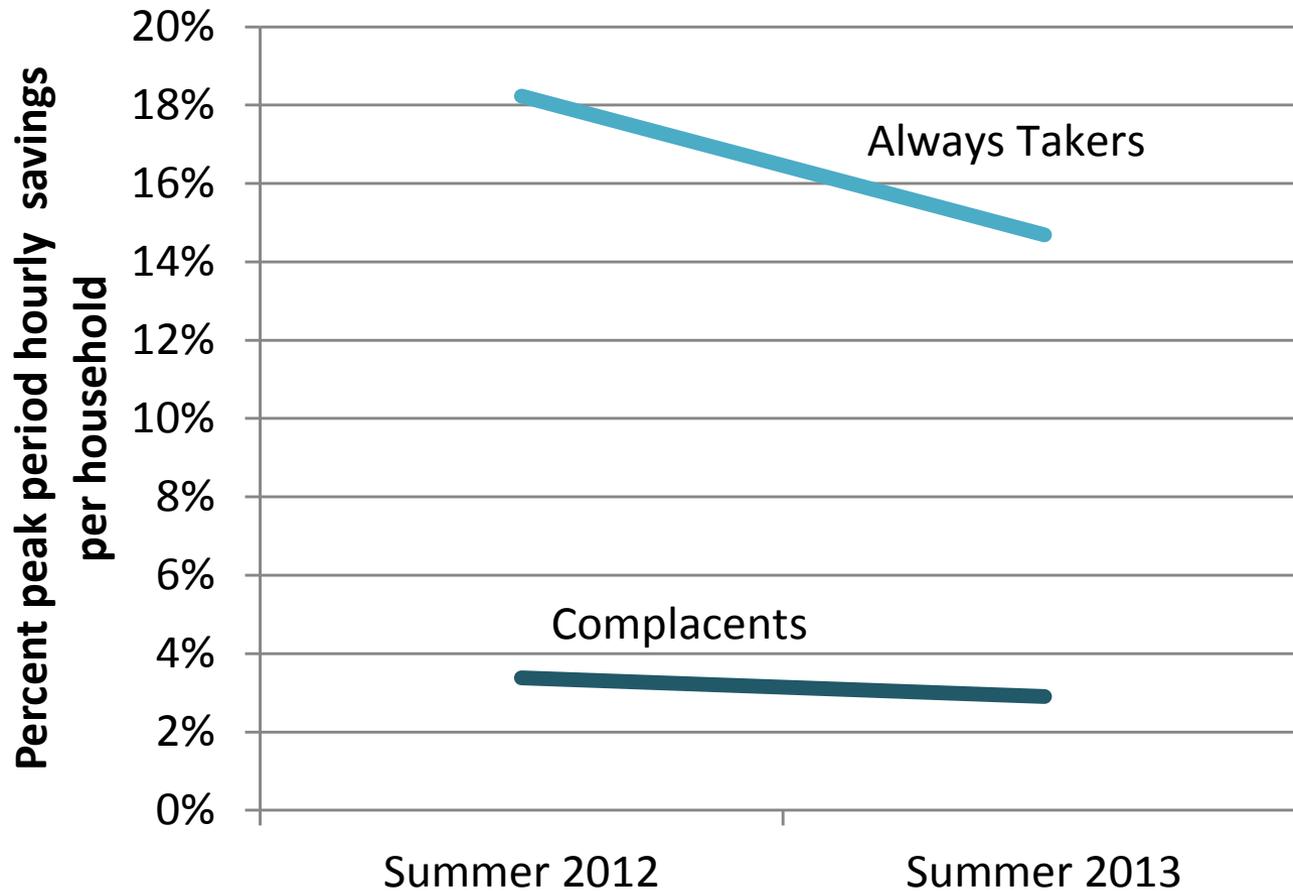
	Always Takers 19.5%	Complacents 78.5%	Never Takers 2.0%
Default Enrollment Approach (N=2,064)			
Voluntary Enrollment Approach (N=10,865)			
Control Group (N=39,323)			
	Enrolled		Not Enrolled



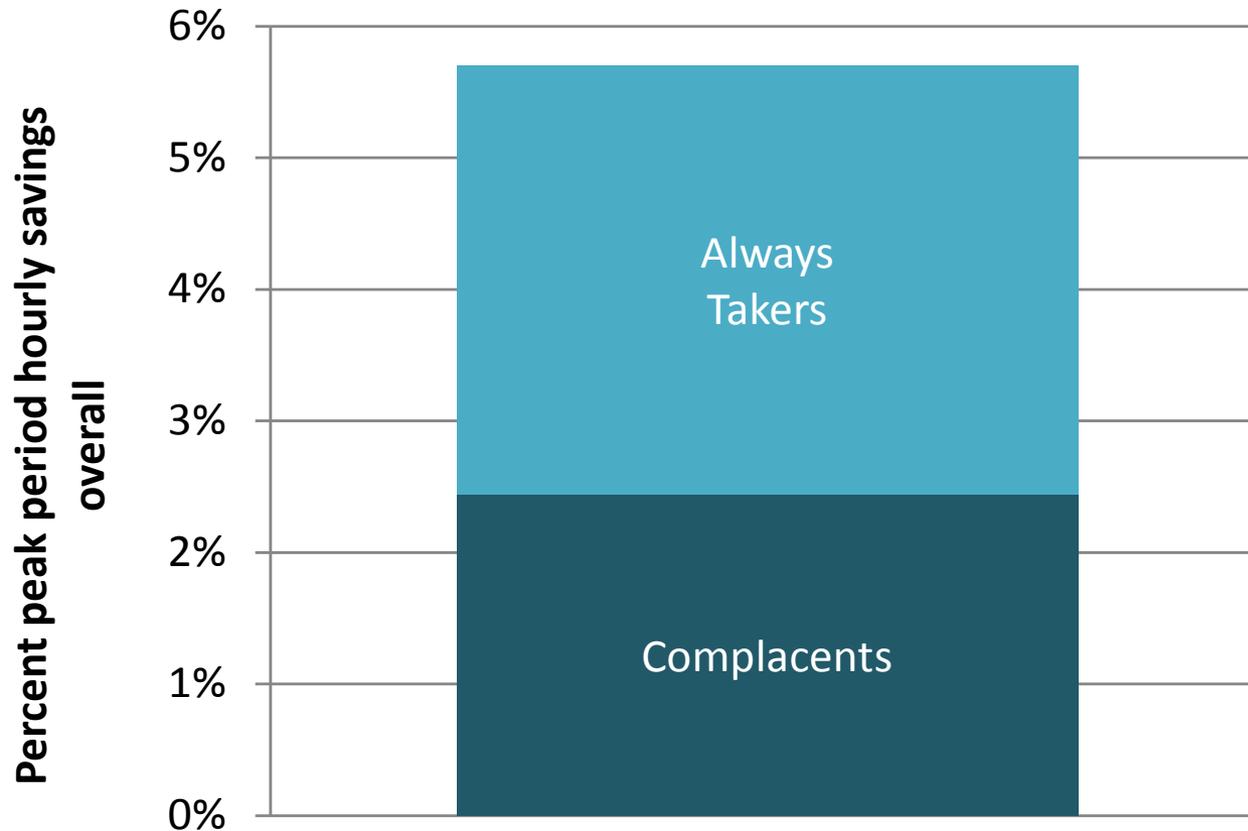
# Complacents Dropped Out at Slightly Higher Rates Initially, but This Trend Reversed By Year 2



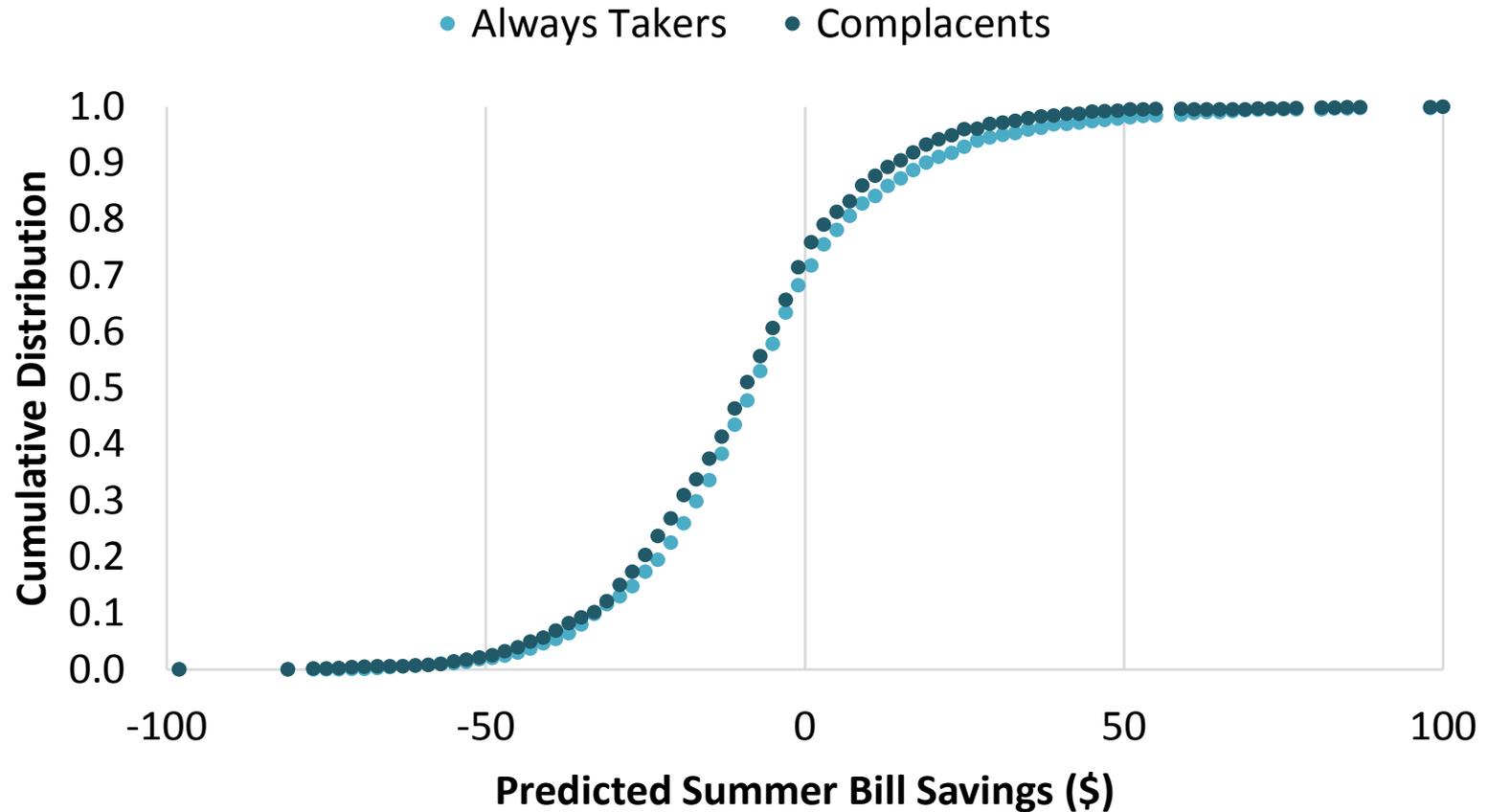
# Complacents Provided More Consistent Load Response Over Time than Always Takers



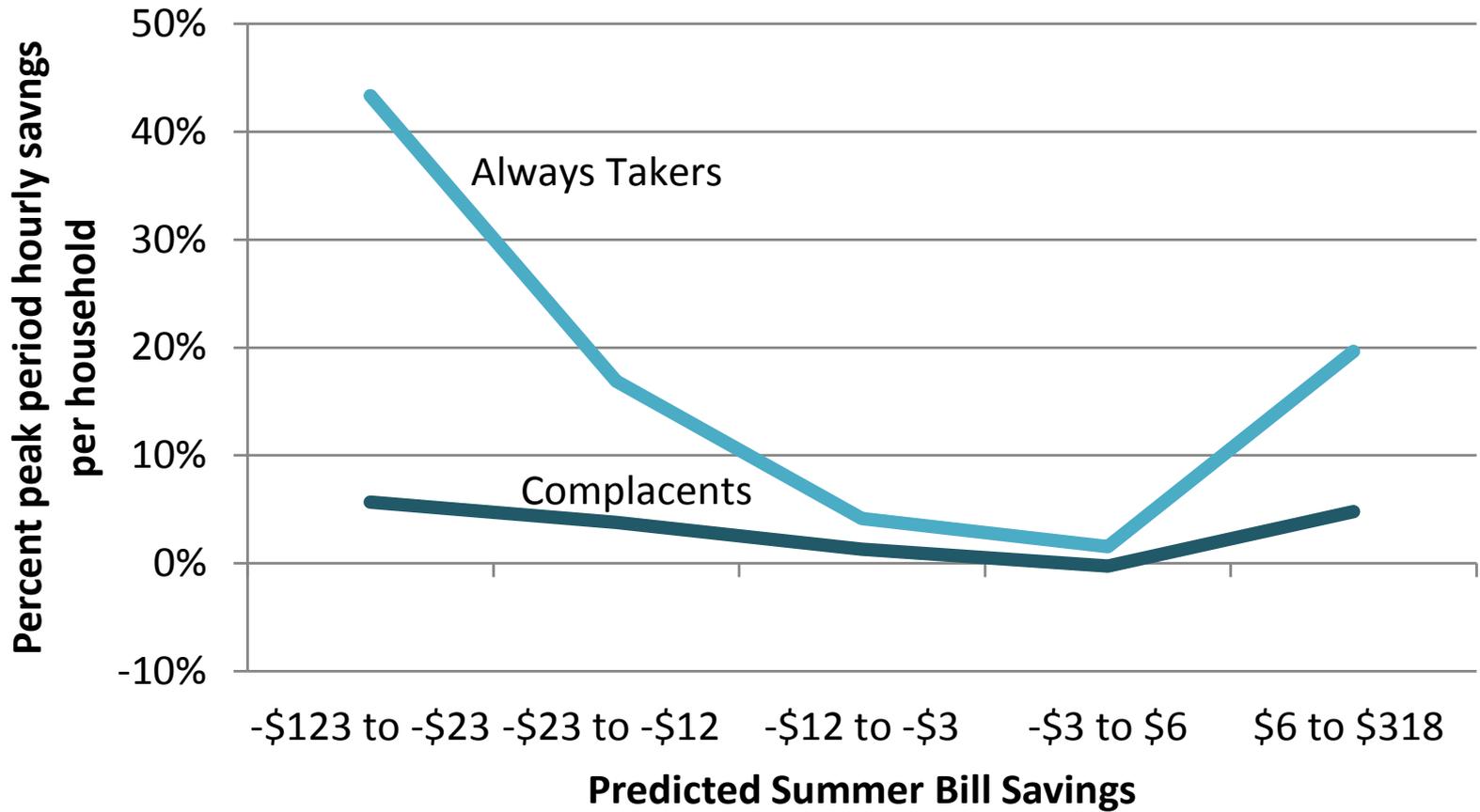
# Aggregate Demand Reductions for all of SMUD's Residential Class of 5.7%



# Nearly Identical Distribution of Predicted Bill Savings by Customer Subpopulation



# Large Predicted Bill Savings/Loss May Increase Desire & Willingness to Manage Electricity Usage More



# Predicted Bill Savings Not a Major Factor in Customer Satisfaction with the Rate

Predicted Summer Bill Savings (\$)	Average Share of Survey Respondents Satisfied with the Existing Rate	
	Always Takers	Complacents
Less than - \$20	94%	73%
-\$20 to -\$10	87%	92%
-\$10 to -\$5	89%	67%
-\$5 to \$5	82%	73%
\$5 to \$10	85%	100%
\$10 to \$20	72%	88%
Greater than \$20	82%	53%



# Conclusions & Take-Aways

- **Always Takers and Never Takers should not be of particular concern to regulators and policymakers as they are able to express and act on their preferences**
- **Complacents are the primary subpopulation of concern**
  - There was a share who were fully aware of the rate, engaged enough to undertake substantial changes to their behavior in order to achieve bill savings, and were generally satisfied with the rate
  - Another subset may have been largely indifferent, not particularly concerned about being defaulted onto TOU, expended a modest level of effort to respond to the rate and were satisfied enough to keep taking service, provided they didn't see large bill increases
  - The remaining group was largely inattentive and unengaged. We estimate this group to be 25% of the Complacents and 20% of the entire residential population



# Conclusions & Take-Aways (2)

- **Under SMUD's transition to TOU, our research suggests it is NOT the entirety of SMUD's residential population that is at risk of being worse off but a relatively small subset (20%)**
  - Focus utility efforts on identifying these customers prior to the transition
  - Target these customers for more direct and non-traditional communication strategies
  - Use market research to identify optimal ways to make these customers aware of transition so they can make more informed choices
  - Simplify the opt-out process so customers can easily navigate it should they want to not take service under default TOU



# Conclusions & Take-Aways (3)

- **Under SMUD's transition to TOU, our research suggests a majority of SMUD's residential population (80%) could be better off under transition to default TOU over voluntary TOU**
  - That's not to say they all see lower bills
  - But instead they seem reasonably satisfied with the new rate and willing to continue taking service under it, even if they saw higher bills
  - Best voluntary TOU rates experience 50% enrollment (APS), but the vast majority see less than 2%
- **If regulators and policymakers seek to actively mitigate risks of inattentive Complacents, transition to default TOU dramatically increases the size of the customer population who are seemingly better off and the size of utility cost reductions that inure to everyone**

