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A Tale of Two Frameworks – Advancing Flexible Load Program Engagement by Redefining Engagement Frameworks and Pathways for Success

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Study Motivation

Demand response programs have focused on operational capabilities and much less on how to effectively engage customers so they choose to enroll and continue to participate.

Utilities need widespread, sustained engagement across residential and commercial customers to meet load flexibility targets.

A distinct customer-centric engagement framework is needed for both residential and commercial customers.



Xcel Energy's DR Program Goals



- Xcel Energy offers a range of residential and commercial DR programs
- They seek to maximize participation in current offerings and identify opportunities to engage new customers.
- Need to understand what motivates or deters customer participation so it can maximize its programs' impact cost-effectively, without compromising safety or reliability.

Residential DR Customer Engagement Framework

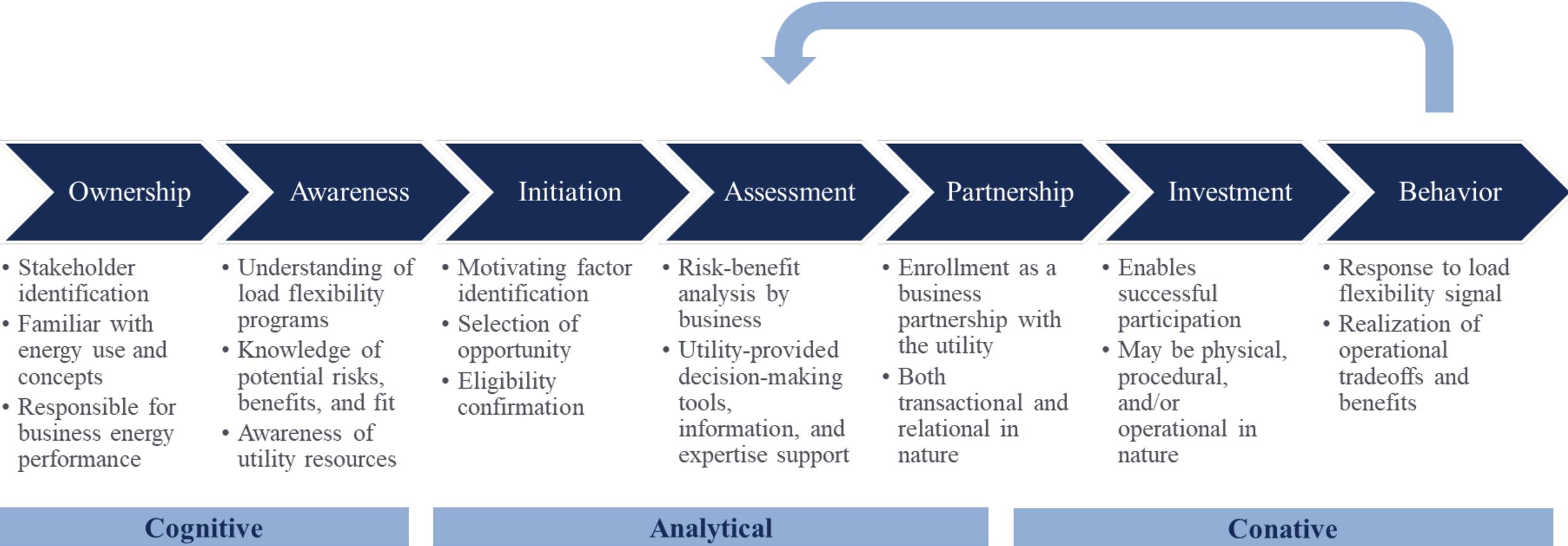
- DR participation is a two-step decision-making process
 1. Customer opts into program
 2. Customer responds and engages, continuously and predictably.
- Each stage offers a potential leverage point but can also present a potential barrier.
- This framework sets the stage and makes it easier to understand those leverage points, supporting smarter segmentation, messaging, program design, and implementation.

Residential DR Customer Engagement Framework

	Determinants	Hypotheses		Determinants	Hypotheses
Cognitive	Attention	Individuals who do not pay much attention to paying utility bills, personal energy usage, interacting with their utility, and reading about energy issues are less likely to be good candidates for demand response participation.	Conative	Investment	Non-participants without required technologies are not likely to participate in demand response programs that require those technologies.
	Energy Literacy	Customers who understand basic energy concepts are more likely to be good candidates for demand response participation.		Energy Literacy	Customers with specific attitudes and values (e.g., environmental attitudes, locus of control, trust in utility) are more likely to participate in demand response programs.
Affective	Awareness	Customers who are unaware of demand response offerings are unable to participate in these offerings until they become aware.		Behavior	Customers with attention, high energy literacy, awareness, and relevant attitudes are more likely to enroll in demand response programs and participate if they intend to take action and change behavior.
	Attitudes	<ul style="list-style-type: none"> Customers who value the environment are more likely to participate in demand response offerings. Nonparticipants who have specific concerns with program details are unlikely to participate unless they are supported to change those attitudes through outreach and education. 			

Incorporated from Karlin et al., 2015, Ehrhardt-Martinez et al., 2010, and Wood & Newborough, 2003

Commercial DR Customer Engagement Framework



Methods: Four Studies with Xcel Customers

Residential Survey

Two waves (both in 2024):

EV owners + solar customers

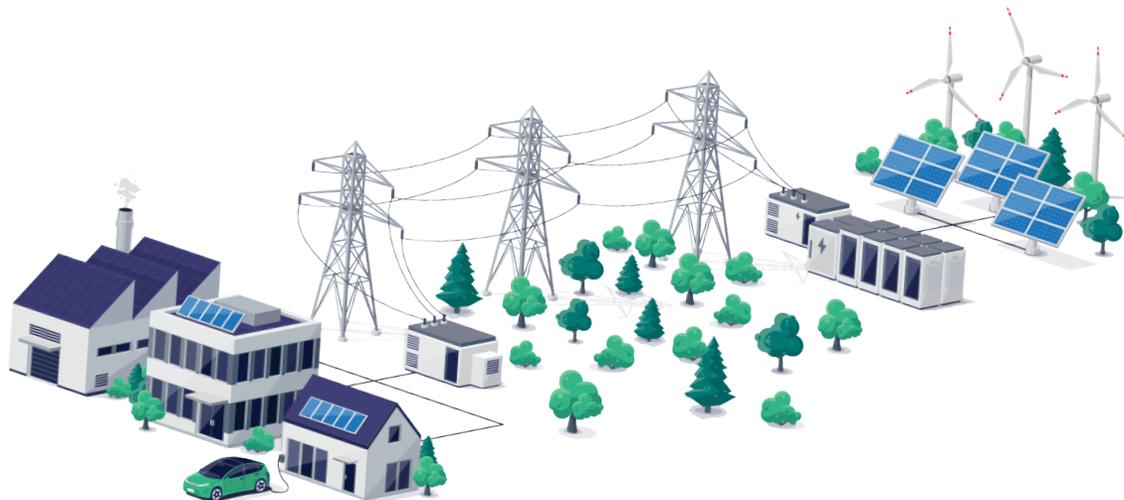
Sample sizes:

Wave 1 : 487 eligible NPs

Wave 2: 402 NPs & 85 participants

Commercial Interviews

1. With 8 account managers (2023)
2. With 10 near-participant business customers (2024-2025)
3. With 4 businesses signed up but were not taking action during events (2025)





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FINDINGS

Residential Findings – Testing Framework

- **Attention:** weak predictor of DR program engagement.
- **Energy Literacy:** positively correlated with favorable attitudes toward, and interest in, DR.
- **Attitudes:** Trust emerged as a powerful determinant.
 - NPs showed high levels of energy and community mindfulness, as well as conservation consciousness
- **Awareness:** shallow awareness may hinder engagement more than lack of knowledge.
 - Messaging must help customers meaningfully interpret what DR is and how it aligns with their values and behaviors.
- **Investment:** early adopters good for technology-based DR, less so for behavioral
- **Enrollment:** (on next slide)



Residential Enrollment Barriers & Implications

Barrier	Implication
Low attention to energy use and bills	Reduce complexity and promote low-effort, automatic participation pathways
Shallow awareness or misunderstanding of DR	Go beyond raising awareness to ensure comprehension of what DR is, how it works, and customer benefits
Concerns about loss of control (e.g., thermostat, EV charging)	Highlight customer choice, flexibility, and override options in program design and communication
Insufficient or unclear incentives	Emphasize the total value proposition, combining financial, environmental, and community benefits
Low perceived relevance (e.g., renters, multifamily, no central cooling)	Develop alternative offerings and clear eligibility pathways for underserved segments
Discomfort with third-party access or enabling technologies	Provide clear assurances, data privacy protections, and transparent operational safeguards

Commercial Customer Findings and Framework Development

- Two main motivators:



Financial benefits: Saving money is the primary motivation, becoming particularly salient when commercial customers are trying to reduce operational costs



Reputational and social corporate responsibility benefits: For customers with public environmental goals, especially these types of benefits are a secondary motivator

Commercial Enrollment Barriers & Implications

Barrier	Implication
Lack of awareness and knowledge	Provide education and information about financial and environmental benefits
Dispersed and complex decision-making processes	Identify appropriate stakeholder(s) to engage; Provide decision-making tools, information, and expertise
Operational priority or inflexibility	Offer a variety of load flexibility opportunities; Engage best-fit customers for each program
Uncertain risks vs. benefits	Provide decision-making tools, information, and expertise; Engage best-fit customers for each program
Landlord/tenant dilemma	Offer a variety of load flexibility opportunities, including those beneficial to customers that lease their facilities
Lack of trust in utility	Provide education and build relationships



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RECOMMENDATIONS FOR RESIDENTIAL AND CUSTOMER PROGRAM DESIGN AND EVALUATION

Recommendations

Refine Customer Segmentation Strategies. Incorporate behavioral and psychographic dimensions to align messaging, marketing channels, and program design with where customers are in their engagement journey.

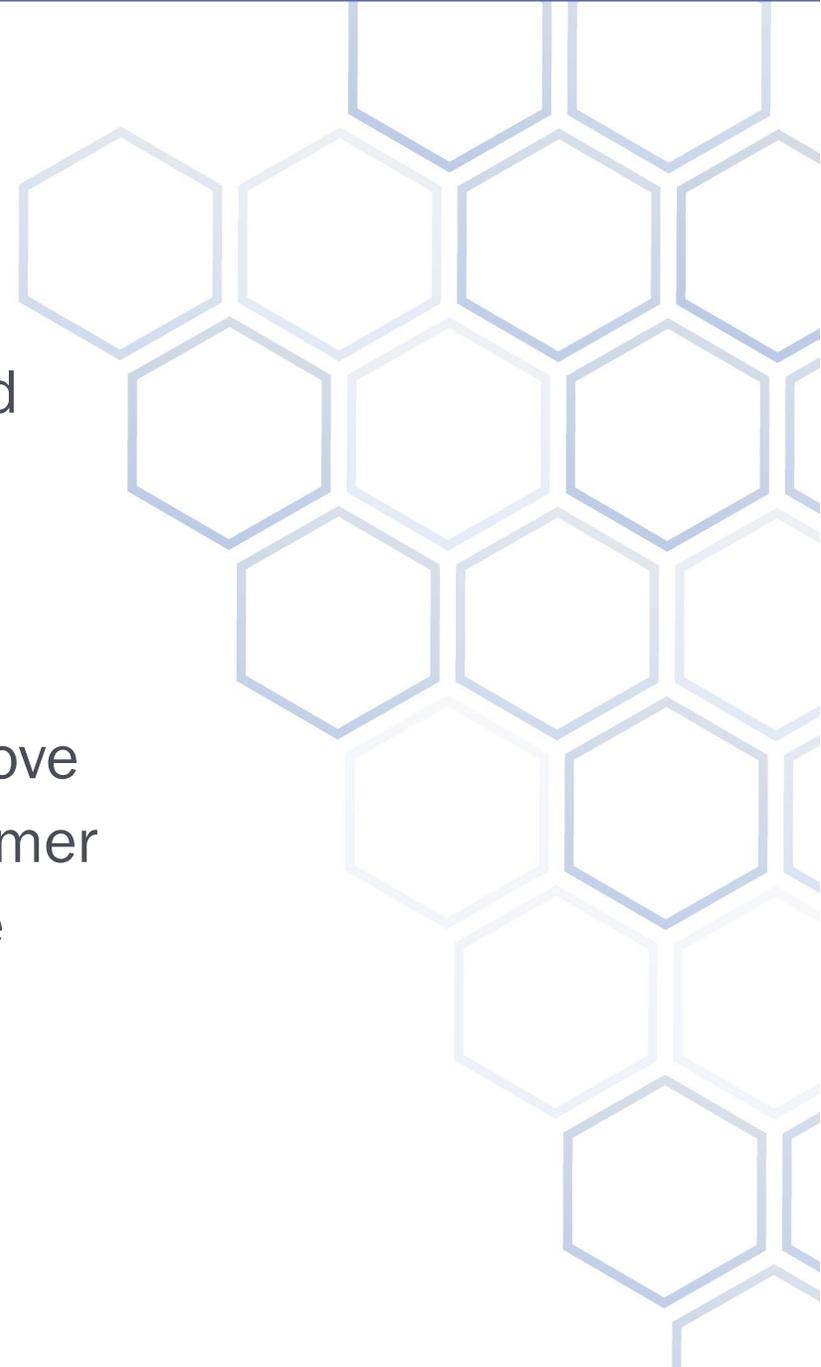
Provide Clear Decision Support Tools. Create simple, user-friendly tools to help customers—particularly small- and medium-sized businesses—understand their usage patterns, evaluate program options, and estimate potential benefits.



Recommendations

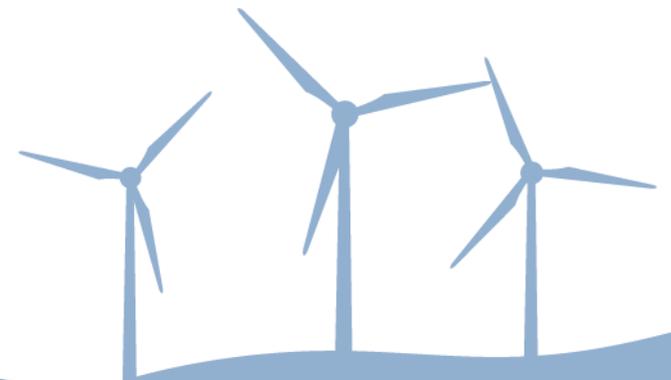
Integrate Behavioral Science into Design and Messaging. Use behavioral levers such as social norms, peer comparisons, and community framing to support enrollment and continued engagement.

Shift Evaluation Practices Toward Multi-Stage Engagement. Move away from binary participation metrics and instead map customer behavior across the engagement framework, identifying where drop-off occurs and which supports are most effective. Use results to target interventions more precisely.



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