Empowering Choice: Designing a Self-Directed Path for Commercial and Multifamily New Construction Energy Efficiency

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ABSTRACT

A major southeastern utility's full-service new construction offering provides energy modeling, dedicated consultants, and structured engagements through multiple touchpoints. Due to successful implementation, the utility wanted to explore deeper market reach. Analysis determined that some retail, warehouse, multifamily, and smaller projects were not participating due to factors such as shorter timelines and minimal design fees. Thus, a self-directed online tool was introduced, enabling customers to independently navigate energy efficiency requirements and incentives without full consulting support. This presentation explores the development and implementation of the self-directed new construction offering, examining initial challenges and solutions related to customer adoption, program integrity, and energy savings. We describe how customers migrated to this new model, program design features that supported their journey, and early results. Results show offering a choice in participation models broadens program reach and enhances customer satisfaction while maintaining energy savings outcomes.

- Initial year: reached 30 new project participants (+30% over prior seven years); while smaller projects, similar savings were achieved on a per SF basis.
- Year two and beyond: ~35% of all projects (new and returning participants) utilize the self-directed path; continued similar per SF savings.
- 86% of participants spend 20 minutes or less with the software tool to receive a pre-approved, whole-building incentive offer.
- ~50% of participants explore multiple iterations with the tool for "what-if" scenarios to maximize savings and/or incentives

Introduction

Since 2016, Duke Energy has offered a full-service new construction pathway under its Smart $aver© Custom energy efficiency program, providing project teams with whole building consulting through energy modeling and structured engagement across multiple design touchpoints. Over nearly a decade of implementation, the offering successfully guided over 1,500 large and medium commercial customers. However, as participation patterns peaked, the utility sought to understand how it could expand the offering's reach to a broader set of

customers and project types while maintaining the energy savings outcomes achieved through the full-service approach. The utility engaged its program implementer, Willdan (hereafter referred to as “the program implementer”), to investigate these gaps and develop solutions to increase market penetration.

Program participation analysis conducted in 2022 revealed that market segments—including retail, warehouse, restaurants, fast food, senior living, and some fast-track multifamily—were underrepresented in the full-service pathway. Many of these projects operate under compressed design timelines, with minimal design fees and limited bandwidth for iterative energy modeling engagements. Stakeholder interviews with architects, engineers, and owners further confirmed that the high-touch, consultant-supported approach is great for larger projects, those with significant savings goals, or longer design timelines, but sometimes too cumbersome for smaller projects to realistically undertake. As a result, many customers in this segment could not fully benefit from the new construction offering despite clear opportunities for meaningful energy savings. At the same time, serving these customers with only prescriptive rebates increases the paperwork burden for the customer , while also leaving savings on the table. These challenges reflect a nationwide challenge in delivering equitable, scalable, and cost-effective new construction energy efficiency programs.

Motivated by a desire to serve all customers equally, the utility tasked the program implementer with identifying new strategies to reduce participation barriers while preserving program integrity, maximizing available savings, and maintaining whole-building modeling rigor. The effort culminated in the introduction of a self-directed new construction pathway launched in June 2023. The self-directed pathway allows customers to independently navigate energy efficiency requirements and incentive structures through online Customer experience (CX), without the need for traditional full-service consulting support. The program theory underlying this new pathway centers on reducing friction for fast-timeline projects, offering alternative participation models that align with varying design processes, and expanding engagement into previously underrepresented commercial segments. This approach follows those from other industries offering both a do it yourself approach and a full-service approach to align with customers’ varied needs and capacities. The redesigned structure intentionally targets project types that historically faced the greatest barriers to participation.

The addition of the self-directed pathway aims to:

- Expand program reach into smaller projects and hard-to-reach commercial segments.
- Support customers with limited design budgets or minimal access to energy modeling resources.
- Reduce participation burden by providing a streamlined, low-touch alternative to the full-service offering.
- Maintain energy savings consistency by embedding whole-building requirements within a self-guided platform.

- Provide flexible participation models that meet customers at various stages in the design process.

Programmatic support for both the full-service and self-directed pathways is designed to influence decision-making across the commercial new construction process. The program enhancements are intended to ensure access to energy efficiency programs, serve a more diverse portfolio of commercial construction projects, and improve customer satisfaction. The work addresses the broader problem of misalignment between program design and real-world construction practices.

Background and Evaluation of Current New Construction Programs in the U.S

New construction (NC) programs across the United States have evolved in response to tightening energy codes and shifting market needs. Recently DOE determined that Standard 90.1-2022 improves energy efficiency in commercial buildings, with buildings meeting 90.1-2022 achieving 9.8% site energy savings compared to the 2019 edition. This signals continued upward pressure on baseline performance and reinforcing the need for utility programs to operate clearly "above code." DOE's Building Energy Codes Program (DOE BECP, 2024) notes that IECC and ASHRAE 90.1 remain the predominant compliance frameworks, with adoption varying widely across states and regions. These dynamics shape how NC programs set baselines, claim savings, and design their participation pathways (Federal Register 2024).

Across the country, custom whole-building programs remain the deepest savings channel, leveraging full energy modeling, early-phase design guidance, and integrated system analysis. Programs such as NYSERDA's Commercial New Construction (NYSERDA n.d.) and Energy Trust of Oregon's (Energy Trust of Oregon n.d.) pathways exemplify this model. While effective, these offerings carry participation burdens—modeling fees, iterative reviews, and schedule demands—often limiting uptake among all commercial projects, especially fast-timeline sectors such as retail and food service, a trend repeatedly documented in ACEEE Summer Study proceedings.

To reach broader markets, many utilities operate prescriptive NC programs that offer streamlined measure-based incentives. These have historically reduced participation friction but now face diminishing incremental savings as advanced code editions (including 2024 IECC and forthcoming ASHRAE 90.1-2025) strengthen requirements for controls, metering, and lighting power. In states with aggressive policy environments, stretch or above-code programs supplement utility offerings.

Program models emphasizing design-assistance (e.g., Energy Design Assistance (Xcel Energy n.d.) continue to support integrated design in larger projects by underwriting modeling and charrettes. These programs successfully influence decisions but still present barriers to smaller firms with constrained design budgets and schedules. Such participation challenges echo broader industry concerns about rising code complexity and the uneven pace of adoption across regions.

Meanwhile, modeling-based incentive programs remain central to commercial NC because they naturally align with performance-path compliance, allowing trade-offs relative to a code baseline. The continued interplay between IECC and ASHRAE Standard 90.1—especially the option to use either pathway in many jurisdictions—creates both flexibility and confusion, underscoring the need for simplified modeling frameworks and clearer guidance for smaller market actors. Recent HUD (HUD 2024) and USDA adoption of 2021 IECC and ASHRAE Standard 90.1-2019 for financed housing, including acceptance of later editions as alternative compliance paths, show how federal policy is pushing markets toward higher performance while preserving flexibility.

Across all program types, three evaluation themes consistently emerge. First, customer burden: participation requirements (modeling, documentation, multi-step review) can deter smaller projects or firms with limited technical capacity. Second, hard-to-reach segments: retail, quick-serve, multifamily developers, and prototype-driven national accounts—struggle to engage in traditional high-touch pathways. Third, equity considerations: increasingly central, especially as federal and state policy frameworks emphasize disadvantaged communities and affordability. Nationally, participation among disadvantaged or hard-to-reach segments remains low; in one recent utility sample of 180 NC enrollments, fewer than 5% were in disadvantaged communities, mirroring findings from ACEEE's program design and equity panels.

Looking ahead, U.S. NC programs are trending toward tiered portfolio designs that pair deep-savings custom modeling with simpler prescriptive or self-directed pathways. This structure supports participation across a wider range of project types, aligns incentives with evolving code baselines and performance metrics, and reduces friction for small and underserved customer segments—all while maintaining verifiable savings in an era of rapidly tightening energy codes.

Across the industry, several limitations in existing new construction program models constrain both participation and achievable savings (Deloitte Insights 2023). Prescriptive programs, while simple to administer, frequently leave savings on the table because they rely on a narrow set of eligible measures rather than reflecting the full range of efficiency strategies typically identified through whole-building analysis. At the same time, traditional custom programs—despite their depth—can be overly review-intensive, often requiring multiple layers of technical review on the utility side, which slows processing and adds administrative cost. Prescriptive offerings also tend to require detailed invoices for each installed product, a requirement that is often impractical for new construction projects where procurement occurs through bundled contracts and fast-moving schedules. The prescriptive offering lacks the influence piece that the other new construction offerings provide. These combined limitations—not enough depth in prescriptive tracks, too much burden in custom tracks, and procedural friction in both—have historically restricted program reach.

Experience Design

Rationale and objectives. The experience design was focused around removing the barriers in new construction programs discussed in the previous section. Compared with the existing pathways, the approach fills a clear gap: traditional custom projects were too review-intensive and dependent on pre-approvals, creating long cycle times; prescriptive paths covered only a narrow subset of strategies, routinely leaving savings on the table. The end users of the self-service approach include architects, design engineers, developers, property owners, program implementers and utilities. The three key design criteria were –

1. Deliver a guided, intuitive experience that any project team can navigate quickly.
2. Strike a careful balance in data requests—enough information to ensure credible results without overwhelming users.
3. Keep influence and accuracy high through modeling and program guardrails.

Modeling foundation and guardrails. The experience uses software that employs robust, automated, whole-building energy models using a Simplified Performance Rating Method (SPRM) style methodology (DOE 2022) anchored to the utility's baseline protocol (ASHRAE 90.1 Appendix G–aligned). From the market segments identified, the implementer recommended six building types for inclusion in a self-directed customer experience. For program integrity, the utility's engineers reviewed the six supported building types, vetted underlying assumptions, and pre-approved a results range—eliminating the need for case-by-case pre-approvals while ensuring consistency. To preserve accuracy and equitable processing, only six building types are supported initially:

a) Those that were historically under-represented in the program.
b) Those that exhibit lower variability, so assumptions remain credible.

A size-range guardrail routes projects beyond a high/low threshold to the full-service path, ensuring larger, higher-incentive projects still receive comprehensive review and improving portfolio forecasting with defensible savings.

Workflow design rationale - The workflow was intentionally structured to minimize cognitive load and shorten decision cycles—directly addressing the long review timelines and overly technical data requests that have historically constrained new construction participation. The design team prioritized a minimal input set that would still sustain credible modeling outputs. Factors such as location, building type, size, and system classification were selected because they consistently drive the largest variations in modeled savings while avoiding the need for early-stage design documents and aligning with inputs commonly used for TRM based calculations.

The first design decision was to determine where in the customers' journey this new experience would take place. The program implementer decided to integrate the self-directed approach directly into existing program enrollment intake form which can determine a project's fit and eligibility for the self-directed path. This takes into consideration characteristics such as the project's location, building usage type, design and construction schedule before introducing the customer to their building energy savings opportunities. It also introduces these opportunities to the user at their first engagement with the program, which keeps the process low-touch and efficient for the customer.

Once a customer is identified as a good fit for the self-directed track, they are presented with a project-specific energy efficiency analysis. During early prototyping, the team evaluated measure-by-measure selection but rejected it due to its complexity and the risk of overwhelming the customer and reinforcing prescriptive thinking. Conversely, grouping measure packages together into building wide packages such as those defined in ASHRAE's Advanced Energy Design Guides can prove to be too rigid for building designers. As a result, energy-efficiency strategies were organized into bundled "good/better/best" packages across multiple building energy systems to reduce decision fatigue and encourage holistic system improvements. This allows customers the flexibility to invest in the highest impact and most cost-effective areas of their project.

Bundled strategies ensure that interactive effects are appropriately captured and that users can rapidly explore performance tiers without navigating a long list of energy conservation measures (ECMs). This allows users to evaluate "what-if" scenarios and visualize how different design decisions impact the energy savings and program incentives.

Stakeholder influence and launch. Stakeholder engagement was woven directly into the design phase rather than treated as an end-stage review. The program implementer utilized rapid prototyping software to enable real-time design sessions, quickly incorporating feedback from UX designers, subject matter experts, and stakeholders.

Utility engineers were involved early to vet key model assumptions, identify risk points, and define acceptable result ranges. Their input directly shaped the number of supported building types, size thresholds for routing to the full-service pathway, and safeguards intended to ensure equitable and consistent processing. This collaborative vetting process is what enabled removal of case-by-case pre-approvals—one of the primary program reforms tied to the release of the new customer experience.

The implementer's program staff contributed insights based on common customer pain points, which informed interface flow and bundle definitions. Beta testing allowed several early adopters to run real projects through the tool, leading to refinements in system categorizations, clarification of prompts, and streamlining of the navigation sequence.

The full launch in June 2023 included deliberate support structures—guided walk-throughs, and rapid feedback loops—to reinforce user confidence during the transition away from traditional submittal paths. The combination of vetted modeling, defined guardrails, and strong onboarding allowed the program to issue offer letters within days instead of weeks, demonstrating how design decisions translated into measurable administrative improvements.

Results

User interaction and speed. The self-service experience is achieving the intended friction reduction. 86% of participants finish in ≤20 minutes; median completion is 15 minutes. At the low end (≈3 minutes), customers who are not a good fit are identified early, contact information is captured and they are redirected, avoiding dead-end effort. At the high end (≈45 minutes), extended sessions typically reflect users pausing to confirm details with their engineer/architect or referencing drawings—still within a single sitting and well below custom-path time investments.

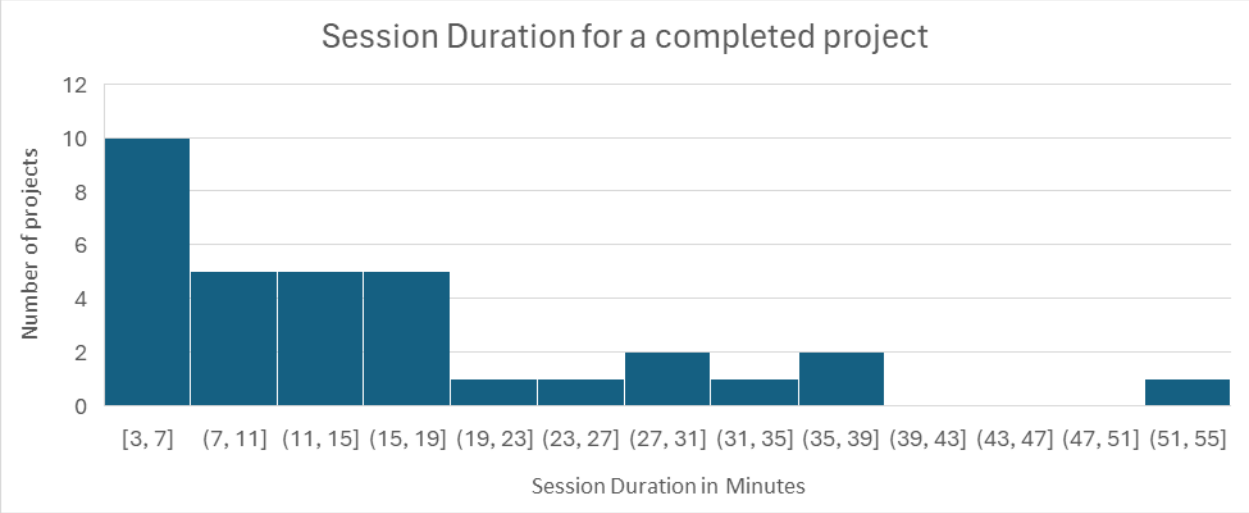

Figure 1– Duration of user sessions from start to finish for a completed project. Source: Internal data

Scenario iteration and decision quality. Roughly 50% of users run multiple "what-if" iterations before finalizing. The most common comparisons include HVAC efficiency tiers, lighting and water-heating options, and envelope packages; users iterate to find the bundle combination that maximizes both savings and incentives.

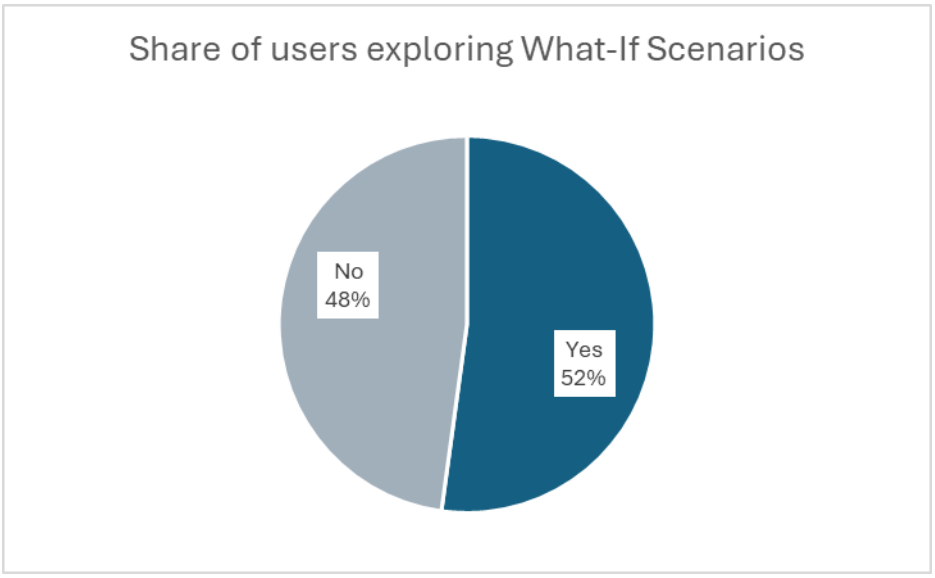

Figure 2– Over half the users explore multiple what-if scenarios. Source: Internal data

Savings outcomes. Average savings of 2.92 kWh per sq.ft, with an average 20% better-than-code performance. Savings vary by building type, HVAC selection, and bundle mix, as expected in whole-building analysis. Net Energy Optimizer (NEO) is an online, cloud-based energy modeling platform based on DOE 2 simulation engine. It provides accurate, easy to use whole building performance analysis for commercial buildings, enabling users to evaluate HVAC systems, compare energy conservation measures, and support workflows ranging from existing building audits to early stage and new construction design. Average savings per project is 90,000 kWh.

The validated NEO modeling engine on the backend provides consistency comparable to mature custom programs while the simplified frontend accelerates throughput

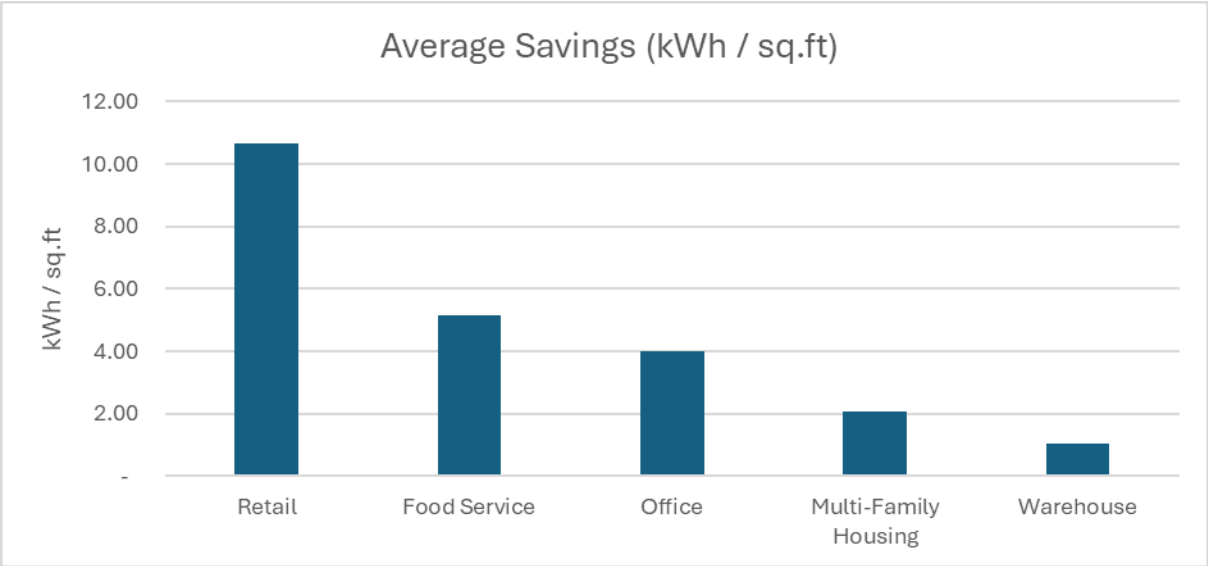

Figure 3 – Average kWh savings by building type. Source: Internal data

Participation and market reach. In Year 1, the self-directed path added 30 new project participants that had not previously participated. By Year 2, ≈35% of all NC projects chose the self-directed route. Uptake has been strongest among small retail, design-build teams, developers with tight timelines, and national retail/convenience accounts—segments that previously struggled with the time and documentation burdens of custom or the measure gaps of prescriptive.

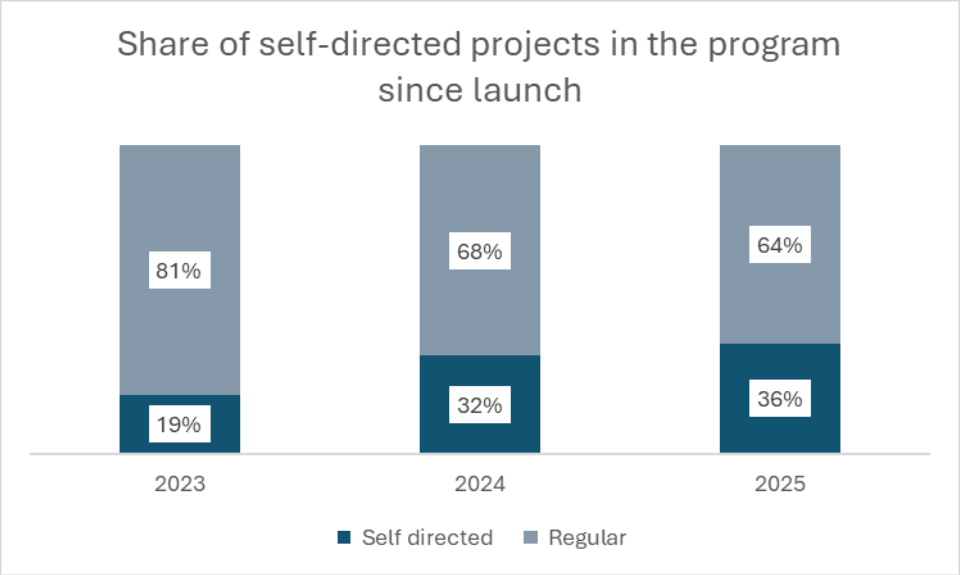

Figure 4– Increase in self-directed participants in the program. Source: Internal data

Program administration and processing. Eliminating pre-approvals removed a major bottleneck: the utility now conducts one review post-construction, focused on validation and model updates from submittals. With fewer back-and-forth cycles (customers primarily sign an application and offer letter), processing is faster and staff workload lower. Incentive payments also move faster, as these projects typically fall below the threshold that would trigger deeper post-project EM&V.

Early challenges and continuous improvement. During the first months, the team reviewed user sessions to identify points of confusion or delay. Most of the issues were addressed by making targeted UI refinements. Minimal input misinterpretation occurred due to embedded model logic and validation. To support adoption, the team delivered training for business energy advisors and trade-ally reps and provided guided walk-throughs for initial customers—building confidence and accelerating market acceptance.

Future Work

Looking ahead, there are multiple opportunities to expand the capabilities of the self-directed approach and integrate it more deeply into the utility's broader new construction and renovation ecosystem.

- Use the tool's large database of energy models to give customers estimated incentive and savings ranges, even when a project cannot fully proceed through the full workflow.
- Expand capabilities to let customers compare multiple HVAC systems for electrification and decarbonization pathways instead of choosing a single system upfront.
- Adapt the interface for existing buildings and renovation projects to enable broader participation.
- Create automated connections to the TRM or prescriptive portals so customers can access prescriptive savings through the same guided interface.
- Continue to add more supported building types, with at least three additional types planned for inclusion.

Programmatically, a logical next step is to introduce the tool earlier in the design process, particularly during schematic design, where architects and design firms can conduct quick massing studies and strategy comparisons before committing to detailed engineering work. Market expansion remains a priority as well, especially among national accounts, where significant opportunity remains despite strong early adoption. Customer-facing enhancements are also on the roadmap, including fully automated application and offer-letter generation, along with the ability for users to upload construction drawings directly through a secure link within the tool.

A few constraints will shape the pace of these enhancements, including staff bandwidth and the need to increase market awareness of the tool's capabilities. The strategic vision is to evolve the platform into a holistic, automated, customer-directed design ecosystem: one that streamlines participation and ultimately brings more customers into the energy-efficient new construction pipeline.

Conclusion

The introduction of the self-directed new construction tool marks a significant evolution in the utility's approach to engaging commercial customers in whole-building energy efficiency. By addressing long-standing gaps in traditional prescriptive and custom pathways—namely limited measure coverage, high review burden, and slow feedback cycles—the tool offers a streamlined, credible, and customer-centered alternative. Its design combines a guided, intuitive user experience with the rigor of whole-building modeling, leveraging pre-approved assumptions and established SPRM-aligned methodologies to ensure both accessibility and accuracy. The result is a hybrid participation model that preserves the integrity of savings estimates while dramatically reducing friction for smaller, fast-moving, or previously hard-to-reach market segments.

Early results demonstrate the value of this approach. Customers complete the tool quickly, iterate freely through multiple design scenarios, and receive offer letters in days rather than weeks. Average savings remain strong - 20% above code and roughly 90,000 kWh per project while participation has expanded meaningfully into small retail, design-build projects, and national

account segments that had historically struggled to engage. Administrative efficiencies have multiplied as well, with reduced back-and-forth communications, streamlined reviews, and faster incentive processing. These outcomes reflect a tool that not only modernizes program delivery but also extends the reach of whole-building strategies to customers who previously faced barriers in participation.

The success of the self-directed experience also lays a robust foundation for future growth. Opportunities exist to incorporate additional building types, integrate prescriptive and TRM pathways into the guided interface.

In sum, the self-directed new construction tool demonstrates how thoughtful program innovation—grounded in rigorous analysis, streamlined user experience, and strategic alignment with utility objectives—can expand participation, preserve savings quality, and modernize delivery. Its growing adoption highlights not only the demand for flexible, low-touch engagement models but also the potential for such tools to shape the next generation of utility energy efficiency programs.

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