NAVIGANT

Evaluation, Measurement and Verification Plan

2019-2021 Program Cycle

Prepared for:

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TABLE OF CONTENTS

Confidential and Proprietary   Page i
Proposed Scope of Work for Evaluation Services
March 20, 2018

1. INTRODUCTION AND OVERVIEW

Navigant is pleased to offer this proposal to the Delmarva Power & Light Company (Delmarva Power) to evaluate Delmarva Power's proposed portfolio of Delaware Energy Efficiency Programs for the 2019-2021 period. Delmarva Power's final Portfolio Plan, submitted for consideration by the Energy Efficiency Advisory Council (EEAC), includes a Residential Consumer Products Program and a Residential Behavior Based Program.[1]

Navigant has successfully evaluated similar programs for numerous utilities including Delmarva Power's programs operating in Maryland. Navigant will leverage its existing knowledge base and resources to deliver high-quality evaluation results to Delmarva Power. Navigant will ensure that the results meet the Evaluation, Measurement, & Verification (EM&V) requirements that exist in Delaware as specified in the *EM&V Committee Guidance Document* (*EM&V Guidance*) and the *Regulations Governing Evaluation, Measurement, and Verification Procedures and Standards* (*EM&V Regulations*).

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[1] *Delaware Three-Year Program Plan 2017-2019, Energy Efficiency and Conservation Portfolio*, February 15, 2017.

2. OVERVIEW OF EVALUATION APPROACH BY PROGRAM

This section describes, at a high level, the evaluation approaches Navigant will use in the 2019-2021 evaluation cycle. Navigant will develop samples that estimate energy and demand savings at 90% confidence that the estimated savings are not less than 10% below the estimated value at the portfolio level (i.e., a 90/10 confidence and precision using a one-tailed test). Navigant will target a 90/20 (one-tailed) confidence and precision at the program level. Navigant believes that this level of effort will support sound decision-making regarding ongoing investment in the Delmarva Power energy efficiency programs; however, Navigant will adjust confidence and precision levels as needed to satisfy EEAC reporting requirements.

2.1 Consumer Products Program

The Consumer Products program consists of in-store discounts for residential lighting measures, and rebates for appliances and appliance recycling. The residential lighting offering will contribute a large portion of Delmarva Power's reported energy savings and Navigant will focus evaluation activities on that offering. The residential lighting market is evolving rapidly as implementation of the Energy Independence and Security Act of 2007 (EISA) changes the distribution of lamps available to customers and LEDs gain market share as their technology improves and their purchase prices continue to decline.[2] The appliance rebate and appliance recycling offerings use well-established program delivery models and past evaluations of these offerings in Maryland confirmed energy use assumptions and baselines that will be leveraged for this evaluation.

The following list presents examples of the evaluation activities that Navigant may conduct for the Consumer Products Program:

- **Engineering Review of Program Tracking Data.** Review program tracking data and *ex-ante* energy savings calculations to ensure that the calculations are using the correct TRM inputs and are being appropriately applied to program data. Navigant assumes that the program tracking data will include all program-incentivized sales, which is true for Delmarva Power Maryland, and therefore no additional sales data collection will be necessary.

- **Program Manager and Program Implementer Interviews.** Interview program and implementer staff to understand response to current program measures and measures of interest for the future. The interviews will help identify market-specific interests or issues to explore in targeted process evaluations (e.g., investigate shifts in customer attitudes and knowledge about energy-efficient equipment choices, explore customer perceptions of different equipment types, how customers assess price vs. lifetime trade-offs, and barriers to deeper penetration of efficient equipment in the home).

- **Customer Surveys.** Verify program participation and installation of rebated measures, assess awareness of other Delmarva Power programs, and determine net-to-gross (NTG) ratios.

- **Trade Ally Interviews.** Interview participating trade allies to identify market perceptions of program measures and barriers to adoption, effectiveness of program training and outreach, and determine net-to-gross (NTG) ratios.

- **In-Home Audits.** Analyze in-service rates and efficient bulb and fixture saturation levels for lighting technologies promoted by the program.

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[2] Uncertainty regarding the EISA 2020 backstop legislation remains a large unknown for the Residential Lighting Program.

- **Commercial Application Survey.** Identify commercial-use bulbs that were purchased at retail locations.

- **Net-to-Gross (NTG) Analysis**. Conduct multi-state modeling activities to identify the program's impact on product availability and pricing, and ultimately on customers' purchasing behavior.

- **Regression Modeling.** Estimate energy savings for the cohort of equipment recycled during this evaluation cycle by fitting characteristics to a regression model that estimates consumption for key equipment attributes.

- **Geo-mapping.** Model leakage scores based on the geographic proximity of participating retailers to Delmarva Power customers relative to other utility (i.e., non-Delmarva Power) customers. This is one of the recommended approaches to determining leakage from the Residential Lighting Evaluation Uniform Methods Project protocol.[3]

2.2 Residential Behavior Based Program

The Home Energy Reports (HERs) delivered through Delmarva Power's Behavior Based program will provide customers with various types of information, including: a) how their recent energy use compares to their energy use in the past; b) tips on how to reduce energy consumption, some of which are tailored to the customer's circumstances; and c) information on how their energy use compares to that of "neighbors" (i.e., customers with comparable homes or energy usage patterns) with similar homes. An important feature of the Behavior Based program is that it is founded on randomized controlled trial (RCT) principles where the customers are randomly chosen by the program implementer to enroll in the program, but have the option of opting out of the program at any time. Navigant has evaluated behavior programs for numerous clients, including Delmarva Power Maryland, and will use the following methods to validate reported energy savings as well as provide information regarding opportunities to optimize program performance:

- **Comprehensive RCT Impact Evaluation.** Navigant will employ an analysis framework that is consistent with the methodology described in the SEE ACTION report[4] and the Uniform Methods Project (UMP)[5], relying on statistical analysis appropriate for RCTs. This evaluation has three primary components:

  o **Validating the allocation of customers to the treatment and control groups.** The UMP recommends that a third-party evaluator certify that assignment of customers to treatment and control groups by the program implementer was truly random. To perform the validation, Navigant will compare the mean, median, and multiple percentiles of energy usage of the treatment and control groups during at least a 12-month period prior to the start of the program. If the allocation of the households across the treatment and control groups is truly random, the two groups will have a very similar distribution of energy usage for each of the 12 months before the start of the program.

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[3] Dimetrosky, S.; Parkinson, K.; Lieb, N. (2017). Chapter 6: Residential Lighting Evaluation Protocol, The Uniform Methods Project: Methods for Determining Energy-Efficiency Savings for Specific Measures. Golden, CO; National Renewable Energy Laboratory. NREL/ SR-7A40-68562. http://www.nrel.gov/docs/fy17osti/68562.pdf

[4] Todd, A., E. Stuart, S. Schiller, and C. Goldman. *Evaluation, Measurement, and Verification (EM&V) of Residential Behavior-Based Energy Efficiency Programs: Issues and Recommendations.* Lawrence Berkeley National Laboratory. May 2012. Available at: http://behavioranalytics.lbl.gov/

[5] Stewart, J.; Todd, A. (2017). Chapter 17: Residential Behavior Protocol, The Uniform Methods Project: Methods for Determining Energy-Efficiency Savings for Specific Measures. Golden, CO; National Renewable Energy Laboratory. NREL/SR-7A40-68573. http://www.nrel.gov/docs/fy17osti/68573.pdf

- o **Conducting regression analysis to quantify program savings**. Navigant will estimate program impacts using two approaches: linear fixed effects regression (LFER) analysis applied to monthly billing data, and a simple lag dependent variable regression (LDV) analysis with lagged controls. Navigant uses this same approach to evaluate Delmarva Power's Behavior Based program in Maryland and will run both models as a robustness check. Navigant prefers to report out the LDV model given that, as an empirical matter—based on Navigant's past analyses and those presented in the academic literature—estimated savings from the LDV model tend to have lower standard errors than those from the LFER model, though the differences are usually very small.

  - o **Quantifying participation uplift in other energy efficiency programs**. If the Behavior Based program increases participation in other energy efficiency (EE) programs, the increase in energy savings may be allocated to either the Behavior Based program or the other EE programs, but cannot be allocated to both. Navigant will use a difference-in-difference (DID) statistic to estimate uplift in other energy efficiency programs and quantify the associated energy savings. The DID statistic measures the change in participation rate in other EE programs between the year of the Behavior Based program evaluation and the pre-program year for the control group; this value is then subtracted from the same change for the treatment group.

- • **Program Optimization Research.** Commissioners and program stakeholders in several states have taken increased interest in behavior programs given the relatively large energy savings generated by the programs as well as questions regarding the persistence of program savings. Navigant will work with Delmarva Power to design and conduct targeted research efforts as needed to ensure that program performance is optimized in terms of program implementation, cost-effectiveness, and ongoing customer satisfaction.

2.3 Supplemental Research to Support Program Savings Analysis and Cost-Effectiveness

Navigant will work with Delmarva Power and other stakeholders to identify potential information gaps and specific research or analysis activities that may be needed to support improved decision-making regarding program activities and investment decisions during the 2019-2021 evaluation cycle. Navigant will conduct any activities recommended through this collaborative process only after receiving a formal notice(s) to proceed from Delmarva Power. Navigant anticipates that these one-off studies will be conducted on a separate, parallel path to the ongoing evaluation activities discussed previously. As such, the team will prepare separate evaluation plans and results deliverables for the studies and will coordinate with interested stakeholders to ensure study results are completed in a timely manner.

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3. SCHEDULE

The EM&V budget will be 5% of total approved spend as filed in Delmarva Power's Energy Efficiency program cycle plan. Navigant will work with Delmarva Power to develop an evaluation schedule that adheres to the EEAC's reporting requirements as presented in the *EM&V Guidance* and *EM&V Regulations* including providing support for the annual reconciliation report. A key goal of the evaluation will be to provide Delmarva Power with actionable and timely feedback for smooth ramp-up and steady-state operation of the programs.

The evaluation schedule is highly dependent upon 1) the dates in which the Consumer Products program and Residential Behavior Based program are introduced to eligible Delmarva Power customers and 2) the subsequent market response to the programs (i.e., program participation rates). Navigant will work closely with Delmarva Power to understand these key program implementation metrics and track changes in program participation rates over time. Navigant will provide to Delmarva Power the data and information necessary to complete the annual reconciliation reports due on April 1 of each year. The content of the first reconciliation report (i.e., the report due April 1, 2019) and the evaluation activities Navigant will complete to support that report will be determined once Navigant has a better sense of the program launch dates and associated market response.