



MEMORANDUM

To: Massachusetts Program Administrators (PAs) and Energy Efficiency Advisory Council Consultants (EEAC)

From: NMR Group, Inc.

Date: April 12, 2018

Re: Reported Leave-Behind APS Net of Free-ridership and In-Service Rates

This memorandum stems from a joint study for general products (RLPNC 17-5 General Products Net-to-Gross) and advanced power strips (APS) (RLPNC 17-4 Smart Power Strip Literature Review and Consumer Survey).¹ Specifically, this memo provides net of free-ridership (FR), in-service rate (ISR), and short-term retention for Tier 1 APS left behind during in-home assessments as part of the Home Energy Services (HES) Initiative, referred to as the *direct install (DI) program* in this memo. We also briefly address customer experiences with the APS.

To note, HES energy specialists were instructed to leave Tier 1 APS behind without installing them, despite being a component of a DI program. NMR estimated these factors based on a surveyed sample of 250 DI program participants, fielded in January 2018. The participation period spanned from January through November 2017 with 54,213 household participants receiving 76,665 leave-behind APS. The survey resulted in a 25% response rate² and 7% sampling error.

The team recommends the PAs use the combined ISR/short-term retention rate (76%) and net-of-FR rate in [Table 1](#) for estimating energy and demand savings for 2017 and 2018 and for 2019 to 2021 program planning. We further recommend use of the net-of-FR rate for the full 2019 to 2021 program cycle. The team does not believe the FR rate will change substantially over the next few years, assuming Tier 1 APS remain a leave behind measure. However, the PAs and

¹ The full study can be found here:

http://ma-eeac.org/wordpress/wp-content/uploads/RLPNC_1745_APSPRODUCTSURVEYS_27MAR2018_-final.pdf

² Response rate = Sample/(Number of Mailers – Number of Returned Mailers)

EEAC consultants should consider applying HES program influence and spillover to produce a full net-to-gross ratio for APS.

Table 1: Leave-behind Tier 1 APS Evaluated Impact Factors

| Sample size | Gross Impacts | | | Net Impacts | | |
|-------------|-------------------|----------------------|-------------------|-------------|---------------------|-------------------|
| | ISR (CI) | Short-term Retention | Combined | Sample size | Free-ridership (CI) | Net of FR (CI) |
| 250 | 81% (77%, 85%) | 94% (93%, 95%) | 76% (74%, 78%) | 222 | 5% (3%, 7%) | 95% (94%, 97%) |

Section 1 Analysis Methods

NMR calculated the net-of-FR value derived from the survey using the following equation:

$$Net\ of\ FR = 1 - FR.$$

NMR based FR on prior APS awareness and likely actions in the absence of the program. The decision to omit a program influence score and participant spillover reflects the fact that participants received APS as a leave-behind measure within the broader HES program.³ The HES program likely drives program influence and participant spillover.

NMR calculated the ISR using the following equation:

$$ISR = \frac{Total\ ever\ installed}{Total\ purchased}$$

Where *total ever installed* includes all leave-behind APS that were ever installed, regardless of whether they still were in place at the time of survey, and *total purchased* is the sum of APS left at survey respondents' homes through the DI program.

The team also calculated short-term retention using the following equation:

$$Retention = \frac{Still\ installed}{Total\ ever\ installed}$$

Where *still installed* includes all leave-behind APS installed at the time of the survey. The study bases retention on all survey respondents' answers regardless of how long they had their measures. All DI respondents received their devices within a year of the survey.

³ The broader study addressed program influence and participant spillover for Tier 1 and Tier 2 APS purchased online (as well as other products obtained online or using mail-in rebates).

Section 2 Key Findings

2.1 SELECTED GROSS IMPACT FACTORS

This section reports evaluated net of FR, evaluated ISR, and short-term product retention for the DI program.

For the leave-behind Tier 1 APS, **net of FR** is based on prior APS awareness and likely actions in the absence of the program was 95% (90% confidence interval of 93% to 97%) from 222 participants. Because this rate lacks program influence and participant spillover, the full NTGRs for the leave-behind APS should also consider the program influence free-ridership score and spillover of the HES program.

The primary researched found an 81% **ISR** (90% confidence interval of 77% to 85%) for leave-behind Tier 1 APS from 250 participants. However, as the customer experience section below explains, respondents are not necessarily using their APS optimally. On average, 2.5 devices are plugged into the three outlets (*always on* and *control*) that do not yield any energy savings. Only an average of 1.6 devices are plugged into the four switched outlets that yield energy savings.

For the purposes of this study, we define **short-term retention** as the proportion of products ever installed that remained installed at the time of the survey. Respondents had the leave-behind APS less than 12 months when surveyed. The surveys found a high short-term retention for leave-behind APS Tier 1 of 94% (90% confidence interval of 93% to 95%).

The combined ISR/short-term retention rate is 76% (confidence interval 74% to 78%).

2.2 CUSTOMER EXPERIENCES⁴

The DI survey asked respondents to report how they were using the different Tier 1 APS plug outlets to manage their devices. The findings suggest that many households are not using the Tier 1 APS optimally possibly due to the lack of understanding the different functions of the three types of outlets.⁵ We find the always on outlet is used at a higher rate than the control or switched outlets, suggesting a suboptimal management of plug load.

At the time of the survey, about 70% of households still had their APS installed but 20% had installed and removed their APS and the remaining 10% never installed then.⁶ Most of the households that removed and do not intend to reinstall their APS felt that it did not work for their needs, was not what they were expecting, or did not find that the APS functioned properly. These reasons suggest that households found the APS difficult to install or installed them incorrectly.

⁴ The full report describes the customer experience and APS setup in more detail.

⁵ The units left behind by the program primarily comprised of seven outlet models with one *control* outlet, two *always on* outlets, and four *switched* outlets. The *control* outlet controls the power to the *switched* outlets. The *always on* outlets draw power independent of the state of the *control* outlet.

⁶ Note that this rate differs from the 76% ISR/retention rate in Table 1 (76%). NMR based the rates in Table 1 on APS units. In contrast, the customer experience results reflect the number of respondents. Some respondents received more than one APS, and installed one but not the other, hence the disconnect between the two values.

Figure 1 shows the six most common devices that were plugged into the three types of APS outlets. The devices most frequently connected to the outlets that are *always on* were televisions, set top boxes, computers, and routers. For optimal use, set-top boxes and routers should be plugged into the *always on* outlets whereas televisions and computers are best installed in the *control* outlet. Televisions and computers were the devices most often plugged into the *control* outlet, which is an optimal set-up. The three most common devices plugged into the *switched* outlets include DVD or Blu-ray players, surround sound systems, and gaming systems, all of which are considered optimal devices for this type of outlet. Overall, it appears that DI respondents are over-using the *always on* outlets which leads to under use of the *control* outlet – and suboptimal management of plug load.

Figure 1: Uses for Direct Install Tier 1 APS by outlet type

