### Tier 2 Advanced Power Strips (APS) – Residential Audio Visual

###### Description

This measure relates to the installation of Tier 2 Advanced Power Strips for household audio visual environments (Tier 2 AV APS). Tier 2 AV APS are multi-plug power strips that remove power from audio visual equipment through intelligent control and monitoring strategies without the need for a master device (like a TV) as required in Tier 1 AV APS products.

By utilizing advanced control strategies such as true RMS power sensing and/or motion sensing[[1]](#footnote-1); both active power loads and standby power loads of controlled devices are managed by Tier 2 AV APS devices. Monitoring and controlling both active and standby power loads of controlled devices will reduce the overall load of a centralized group of electrical equipment (i.e. the home entertainment center). This more intelligent sensing and control process has been demonstrated to deliver increased energy savings, demand reduction and higher user acceptance compared with the older ‘Tier 1 Advanced Power Strips’.

The Tier 2 APS market is a relatively new and developing one. There are currently no certifying bodies or standardized testing protocols and with new products coming to market it is important that energy savings are clearly demonstrated through independent field trials. The IL Technical Advisory Committee have developed a protocol whereby product manufacturers must submit evidence of the energy savings of their particular product either to the TRM Administrator for consideration during the TRM update process (August – December), or engage with a Program Administrator’s independent evaluation team to review at other times. The product will be assigned a Product Class (A-H) corresponding to the proven savings and all products in a class will claim consistent savings. The IL TRM Administrator will maintain a list of eligible product and class on the IL TRM Sharepoint site. If a mid-year review has taken place, supporting information should be posted on the Sharepoint site such that other program administrators can review.

Due to the inherent variance day to day and week to week for hours of use of AV systems, it is critical that field trial studies effectively address the variability in usage patterns.  There is significant discussion in the EM&V and academic domain on the optimal methodology for controlling for these factors and in submitting evidence of energy savings, it is critical that it is demonstrated that these issues are adequately addressed.

This measure was developed to be applicable to the following program types: DI.

Current evaluation is limited to Direct Install applications. Through a Direct Install program it can be assured that the APS is appropriately set up and the customer is knowledgeable about its function and benefit. If additional evaluation provides assumptions for alternative implementation strategies in the future, these will be considered at that time.

###### Definition of Efficient Equipment

The efficient case is the use of a Tier 2 AV APS in a residential AV (home entertainment) environment that includes control of at least 2 AV devices with one being the television[[2]](#footnote-2).

Only Tier 2 AV APS products that have independent demonstrated energy savings via field trials are eligible.

The minimum product specifications for Tier 2 AV APS are:

**Safety & longevity**

* + Product and installation instructions shall comply with 2012 International Fire Code and 2000 NFPA 101 Life Safety Code (IL Fire Code).
  + Third party tested and certified to UL1363 Fourth Edition and UL1449 Third Edition.
  + 10-year product warranty or replacement guarantee
  + $10,000 connected device warranty
  + Product liability insurance of $5 million per claim or in aggregate maintained by manufacturer
  + Contains a resettable circuit breaker
  + Incorporates power switching electromechanical relays rated for 100,000 switching cycles at full 15 amp load (equivalent to more than 10 years of use).

**Energy efficiency functionality**

* + At least 2 always on sockets and either (a) at least 5 masterless controlled sockets or (b) 1 master and at least 4 controlled sockets
  + Consumes less than 3 Watts when sending, receiving, or processing wireless communication signals; consumes less than 1 Watt at all other times.
  + Calculates real power as the time average of the instantaneous power, where instantaneous power is the product of instantaneous voltage and current.
  + Factory default countdown to auto-power down of controlled devices set at 60-75 minutes, but user-adjustable to at least one longer duration of at least 120 minutes.
  + Delivers at least a visual warning when the countdown timer begins before an active power down event and maintains the visual component of the warning until countdown is concluded or reset by use of the remote or other specified signal.
  + Uses an automatically adjustable power switching threshold.
  + Uses an infrared remote signal filtering mechanism which discriminates these signals from other natural and man-made signals on the corresponding wavelengths.

###### Definition of Baseline Equipment

The assumed baseline equipment is a standard power strip or wall socket that does not control loads of connected AV equipment.

###### Deemed Lifetime of Efficient Equipment

The default deemed lifetime value for Tier 2 AV APS is assumed to be 7 years[[3]](#footnote-3).

###### Deemed Measure Cost

Direct Installation: The actual installed cost (including labor) of the new Tier 2 AV APS equipment should be used.

###### Loadshape

Loadshape R13 - Residential Standby Losses – Entertainment

###### Coincidence Factor

The summer peak coincidence factor for this measure is assumed to be 80%[[4]](#footnote-4)

Algorithm

###### Calculation of Energy Savings

###### Electric Energy Savings

ΔkWh= ERP\* BaselineEnergyAV \* ISR

Where:

ERP = Energy Reduction Percentage of qualifying Tier2 AV APS product range as provided below

BaselineEnergyAV = 600 kWh[[5]](#footnote-5)

| **Product Class** | **Field trial ERP range** | **ERP used** | **ΔkWh** |
| --- | --- | --- | --- |
| A | 55 – 60% | 55% | 330 |
| B | 50 – 54% | 50% | 300 |
| C | 45 – 49% | 45% | 270 |
| D | 40 – 44% | 40% | 240 |
| E | 35 – 39% | 35% | 210 |
| F | 30 – 34% | 30% | 180 |
| G | 25 – 29% | 25% | 150 |
| H | 20 – 24% | 20% | 120 |

ISR = In Service Rate

= 0.70[[6]](#footnote-6)

###### Summer Coincident Peak Demand Savings

∆kW**=** ∆kWh/ Hours \* CF

Where:

∆kWh = Energy savings as calculated above

Hours = Annual number of hours during which the APS provides savings.

= 4,380 [[7]](#footnote-7)

CF = Summer Peak Coincidence Factor for measure

= 0.8 [[8]](#footnote-8)

|  |  |
| --- | --- |
| **Product Class Range** | **ΔkW** |
| A | 0.060 |
| B | 0.055 |
| C | 0.049 |
| D | 0.044 |
| E | 0.038 |
| F | 0.033 |
| G | 0.027 |
| H | 0.022 |

###### Natural Gas Savings

N/A[[9]](#footnote-9)

###### Water and Other Non-Energy Impact Descriptions and Calculation

N/A

###### Deemed O&M Cost Adjustment Calculation

N/A

###### Measure Code: RS-CEL-APS2-V01-160601

1. Tier 2 AV APS identify when people are not engaged with their AV equipment and then remove power, for example a TV and its peripheral devices that are unintentionally left on when a person leaves the house or for instance where someone falls asleep while watching television. [↑](#footnote-ref-1)
2. Given this requirement, an AV environment consisting of a television and DVD player or a TV and home theater would be eligible for a Tier 2 AV APS installation. [↑](#footnote-ref-2)
3. There is little evaluation to base a lifetime estimate upon. Based on review of assumptions from other jurisdictions and the relative treatment of In Service Rates and persistence, an estimate of 7 years was agreed by the Technical Advisory Committee, but further evaluation is recommended. [↑](#footnote-ref-3)
4. In the absence of empirical evaluation data, this was based on assumptions of the typical run pattern for televisions and computers in homes. [↑](#footnote-ref-4)
5. Figure is rounded down from 603kWh and assumes average annualized energy consumption reported by NYSERDA (NYSERDA 2011. “*Advanced Power Strip Research Report*”, Table 3.2 p. 30) is applicable to households in Illinois. [↑](#footnote-ref-5)
6. Based on two Australian study results (one showing 28% and the other 33%). This factor would benefit from more localized EM&V. [↑](#footnote-ref-6)
7. This is estimate based on assumption that approximately half of savings are during active hours (assumed to be 5.3 hrs/day, 1936 per year (NYSERDA 2011. “*Advanced Power Strip Research Report*”)) and half during standby hours (8760-1936 = 6824 hours). The weighted average is 4380. [↑](#footnote-ref-7)
8. In the absence of empirical evaluation data, this was based on assumptions of the typical run pattern for televisions and computers in homes. [↑](#footnote-ref-8)
9. Interactive effects of Tier 2 APS on space conditioning loads has not yet been adequately studied. [↑](#footnote-ref-9)