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CalPlug Comment to CEC Re LPM

Additional submitted attachment is included below.

CALIFORNIA PLUG LOAD RESEARCH CENTER
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October 7, 2021

Chair David Hochschild
California Energy Commission
1516 Ninth Street
Sacramento CA 95814

Subject: Comment on the CASE Team Low Power Mode Data Collection Procedure (LPM DCP)

Dear Chair Hochschild,

Improving low power mode states and power management settings for plug load devices is an important strategy for increasing energy efficiency and savings potential, particularly in products that are traditionally difficult to manage and control. The California Plug Load Research Center (CalPlug) at UC Irvine fully supports the Low Power Mode Data Collection Procedure initiative (LPM DCP), as prepared by the Statewide Codes and Standards Enhancement (CASE) Team. We endorse the utility of taking a user-centric, horizontal approach to assessing this class of products for increased energy savings in low power and sleep modes.

Plug loads and miscellaneous electric loads (MELs) make up an increasing percentage of total building energy use, both in the residential and commercial sectors. The Department of Energy estimates that 47% of commercial building energy consumption is due to plug and process loads. This trend is partly the result of increased efficiency in other large end uses, such as HVAC systems and lighting, which are easier to schedule and control. However, stated local, state, and federal goals towards building electrification and trends in digitization also result in building owners and tenants installing more plug load devices, such as kitchen appliances, entertainment devices, and exercise equipment. Furthermore, as buildings continue to become “smart,” plug load products increasingly include internet connectivity capabilities and machine-learning features.

There are several challenges for increasing energy efficiency in plug loads. Unlike large HVAC building loads, most plug loads (e.g., countertop appliances, printers, audio devices, etc.) use relatively low energy at the device level. Yet in aggregate, they can accumulate a large amount of energy use and waste. Moreover, plug load usage patterns are largely determined by user behavioral preferences and workflow needs and are therefore highly heterogeneous. Many plug load devices also waste energy if they don’t transition to low-power modes when idle, or if low-power modes don’t save much energy. This is particularly relevant to devices that include internet connectivity and digital interfaces as secondary features. Because plug loads are inextricably linked to human behavior, control strategies must be compatible with providing high quality user experience and require sophisticated methods of encouraging energy efficiency without interrupting daily activities.

Given the limited methods of addressing plug load energy waste, optimizing low power modes is a practical way of promoting energy efficiency capabilities for appliances, electronics, and other MELs. CalPlug's research suggests that the LPM DCP strategy of measuring the natural device inactive state (e.g., how the device behaves when left alone) is potentially a very valuable way to assess how well the stated device low power modes are functioning and may give insight into ways to improve these power management features. For example, CalPlug's Power Management User Interface field test (funded by the Energy Commission) found that sleep settings were disabled for the majority of office desktop computers, and even when enabled, did not always function as stated.

CalPlug supports the LPM DCP's goal of implementing a horizontal approach to create a standardized method of testing inactive state energy draw across device types. This strategy wisely does not seek to compare devices' primary functionality, but focuses on secondary functions that continue to provide service during periods of inactivity, including network connectivity, sensors, and digital interfaces. These ancillary features are common across device categories and have similar behavioral characteristics, from small kitchen appliances to imaging devices. For example, a commonly observed problem for LPM across device types occurs when fluctuations in a local wireless connection inadvertently "wakes up" a product from inactive mode. The test method proposed by the LPM DCP, drawing from the ENERGY STAR and CTA-2049A methods of measuring Wi-Fi connectivity in internet-enabled devices, provides an important roadmap. It gives researchers the tools to measure the interactions between connectivity and primary device functionality in a consistent, repeatable fashion across device types. This assessment in turn can provide valuable insight into common malfunctions that impede the ability of devices to enter and remain in LPM while not in use, and provide guidance to researchers and regulators for improving codes and standards for plug loads and MELs.

CalPlug thanks the Energy Commission for the opportunity to comment on this issue. As our team continues to work on the Plug Load Energy Testing for Improving Codes and Standards (PLETICS) project for the Energy Commission, we look forward to collaborating with the CASE team to further develop LPM test metrics.

Sincerely,

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