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NEMA Comments to CEC RFI Low Power Mode

On behalf of Philip Squair, Vice President of Government Relations, National Electrical Manufacturers Association, the following comments are submitted.

Additional submitted attachment is included below.

National Electrical Manufacturers Association

PHILIP A. SQUAIR
Vice President, Government Relations

April 2, 2019

Via web: http://www.energy.ca.gov/appliances/2017-AAER-06-13/17-AAER-12.html

Ms. Soheila Pasha
California Energy Commission
1516 Ninth Street
Sacramento, CA 95814-5512

NEMA Comments on Request for Additional Public Comments on Low Power Mode Data Collection Procedure

Docket No. 17-AAER-12

Dear Ms. Pasha,

As the leading trade association representing the manufacturers of electrical and medical imaging equipment, the National Electrical Manufacturers Association (NEMA) provides the attached comments to your Request for Additional Public Comments on Low Power Mode Data Collection Procedure. These comments are submitted on behalf of NEMA Member companies.

NEMA continues to urge caution in proceeding too quickly into regulation of this emerging area or in over-generalizing about product performance traits when product designs are rapidly evolving.

The National Electrical Manufacturers Association (NEMA) represents nearly 350 electrical equipment and medical imaging manufacturers that make safe, reliable, and efficient products and systems. Our combined industries account for 360,000 American jobs in more than 7,000 facilities covering every state. Our industry produces $106 billion shipments of electrical equipment and medical imaging technologies per year with $36 billion exports.

If you have any questions on these comments, please contact Alex Boesenberg of NEMA at 703-841-3268 or alex.boesenberg@nema.org.

Sincerely,

Philip Squair
Vice President, Government Relations
National Electrical Manufacturers Association

COMMENTS OF THE NATIONAL ELECTRICAL MANUFACTURING ASSOCIATION (NEMA)

Request for Additional Public Comments on Low Power Mode Data Collection Procedure

1. Commission staff requests feedback on specific product types that require more than 24 hours for system provisioning and specific product types that require less than 24 hours for system provisioning.

   NEMA Comment:

   a) In our experience, on initial commissioning some devices with rechargeable batteries may need up to 24 hours for full charge and normal operation. However, we note that the Commission previously has stated that battery charging systems, as with other devices already covered by CEC Title 20 or covered by Federal regulations, will not be in scope of this Roadmapping. In that case, they are not of concern, and we request the CEC confirm this in writing.

   b) Devices that require a thermal stabilization process will likely need >24 hours for ramp to temperature and minimal temperature stability variation for system normalization.

   c) Devices that require future stabilization prior to measurement may require more than 24 hours, specifically those that require high accuracy or high precision. Industrial Internet of Things Devices that require software configuration, and installation prior to service commissioning, for example edge devices, and potentially IOT gateways, may require greater than 24 hours.

2. Commission staff requests feedback on the definition of the[se] terms.
   a. “Disconnecting primary function” should be clarified.
   b. Rename LPM to be more reflective of its state and be inclusive of products without LPM. Examples: Standby, Long-inactive, Long-no input.
   c. Define Small Network Equipment (SNE), Edge Devices, Standby, Nonactive, No-load, Off-mode, Off-State.

   NEMA Comment: These are largely modes and terms that were developed for IT equipment and it is not clear yet in the emerging IoT market/landscape whether these terms will carry over or be replaced with new terms. It is NEMA opinion that it is not appropriate at this time in the evolution of IoT systems and products to standardize on these terms.

   Some definitions for the items in c. above can be found in ENERGY STAR program documentation for IT devices. For sake of consistency, the CEC could use these definitions, but as noted above they may continue to evolve.

   The marketplace for Edge devices and the scope of the term “Edge” are still developing. The Commission should proceed cautiously in this space and avoid standardizing on perceptions based on how this market is structured at this early stage.

   With respect to connected devices, Commission staff have already published regulatory efforts on IT equipment; the vast majority of the definitions provided above are IT related. It appears the commission staff is assuming that IOT, IIOT, edge devices, and

IOT gateways will operate as IT devices do. We are concerned that some of the devices potentially in scope of this roadmap and follow-on regulations are being considered as some form of IT equipment, because they are "connected". This is an erroneous assumption. Legacy IT equipment was built with low power / sleep mode functionality, but the connected environment is moving towards all-time connectivity as mesh networks and sensor networks become commonplace for the purpose of sharing data and resilience of communication. As such, traditional low power mode operation as described for IT equipment may not exist.

3. Commission staff seeks data on time to enter LPM state by product type.

   NEMA Comment: As noted in our reply to item 1, battery charging and thermal stabilization may demand longer provisioning times.

   Because the marketplace is still evolving and forming, diversity of architectures exists, and device architectures are similarly varied and not related to previous well-established IT landscapes. While commission staff might be able to acquire four or five devices with the terms "IOT", "edge devices", or "IOT gateway" in their descriptions, without scope or definitions identified that does not mean they truly ARE those types, just that these terms are being used or marketed for lack of better terms to describe them to consumers.

   Measurements made against a small sampling of potentially non-related devices with respect to operating modes and power consumption can and should not be applied across an entire scope of products. This does not mean that Industry does not support the Commission's roadmap approach, or that it is not valuable, but the market is not yet developed to the point that substantial information is available, or enough to be practical to develop clear guidance and regulations or test procedures.

   We again urge caution and hesitation against gathering and publishing "representative" data, from which regulations might be proposed, because it is not yet possible due to market and design instabilities.

4. Commission staff seeks information on how halting the primary function in different ways can impact LPM power. (For example manually entering sleep vs. allowing the product to auto power down.)

   NEMA Comment: Most existing information on this subject is relative to the IT device category, as we note in our response to item 3. It is unclear if these states/behaviors are similar for other devices. Some network equipment halts connectivity when it enters an idle state, thus interrupting the network and rendering the system impaired.

   Commission staff needs to understand and accept that in some cases halting the primary function of the device may prevent the device from working during critical operating needs.

   Because of this, we propose that certain medical, security, and surveillance devices be excluded from consideration in this Roadmapping because suspending their primary functions may mean the devices fail to operate as intended. Likewise, there are other devices (i.e. small or large network devices) that security, surveillance, and medical devices depend on to operate in network mode. In the case of IT equipment there are features and functions such as wake on LAN that depend on the network to initiate that

feature. The need for continuous network communication for many types of devices clearly evidences that certain classes of devices should never be forced, or programmed to enter sleep mode or to be automatically powered down.

5. Commission staff seeks data on the amount of inbound and outbound traffic needed to resume the primary function for different product types and communication technologies.

   NEMA Comment: After review of commonly used protocols across industries, we have reached the conclusion that the answer to this question differs greatly by protocol and is not currently able to be standardized. Further evolution of the connected device market and landscape may see contraction of protocol usage, such that standardization is more feasible, but at this time it is too widely varied to declare some maximum power consumption allowance without cutting off entire protocols from participation. Each protocol is designed to serve the needs of the devices and systems it joins, not serve to minimize connected power. Perhaps some future protocol, designed with low connected power consumption, will emerge, but this is not assured and may not even be possible given system needs.

   We reiterate our previous positions that systems architecture enables better, more efficient energy practices, and as such systems should not be prejudiced against in regulations because of their communications protocol.

6. Commission staff seeks data on the impact of security conditions on power consumption, such as password protection on a local area network (LAN).

   NEMA Comment: Security and life safety equipment should be exempted from these requirements, at least in the first iteration, because these systems are “always on” to keep cameras and sensors/detectors powered on and performing their primary functions.

   We note that for some products, some functions, such as “Wake on LAN” that can trigger devices to come back from sleep mode or idle mode, do not work when the network is lost/idled. So these “saving” features are therefore lost.
   Mesh networks are becoming more common, either for convenience or cost savings (i.e. no dedicated communications-only equipment without other functions) and a mesh is not possible if devices are “asleep”. Mesh networks are both low cost, (lower power transmitters shorter range), and resilient (multiple transmitters and receivers for data). This makes them resistant to be shut down, unless the network is turned off. Turnoff may (almost certainly, will) require restoring Mesh components and cycling power to reinitialize the network.

   Furthermore, for some devices a heartbeat, keep alive, or otherwise constantly transmitted data authentication packet is used to let the receiver know the communications path is alive and has not been compromised. This poses two concerns with respect to the subject of these comments; 1) one cannot switch off the communications path without impacting performance or the service level agreement for the device (notable concerns for industrial or commercial equipment), and 2) these devices may have a lower power mode, but it will be different from IT equipment because some circuitry will be required to continuously operate. These concerns lead to our request to segregate commercial and industrial equipment from residential and consumer IoT devices. As the discussion progresses from the Internet of Things to the

Industrial Internet of Things (IoT to IIoT), the need for different treatment becomes more important, due to the environment and especially those devices which are part of critical infrastructure. It is incorrect to assume all devices industrial, commercial, residential or consumer can be (accurately) placed into a single category for horizontal rulemaking purposes. Additionally, these devices often include features that employ some form of encryption based algorithms for authentication, privacy and data protection, as identified under the California connected devices law. This feature may likely spread into some sensors used for building management systems and other control equipment, as well as into IIoT for critical infrastructure (electric grid, refineries and chemical plants, and pipelines).

7. Commission staff seeks data on the LPM power sensitivity to cable lengths of 10 m, 2 m, and <2m.

   NEMA Comment: We can state with confidence that the sensitivity of low power levels, such as the "low power mode" being explored by this Roadmapping, is definitely impacted by I^2R losses related to the length of the cable that the minimal power is transmitted through, and per the laws of physics, the longer the cable the greater the loss.

8. Commission staff seeks data demonstrating the power consumption of devices with wireless versus wired network connections.

   NEMA Comment: The CEC proceeding for Battery Charging Systems received some of this data during that rulemaking, which we restate below.

   In a review of available materials online, NEMA notes this comment[1] to the DOE made by NEMA Member Schneider Electric. This table may serve as a useful starting point for discussions, though we note that these values may be too product-specific and should be more widely tested and considered for a wider scope of products.

Feature	**Allowance** (Watts AC)	**Quantity**	**Justification**
10/100 Ethernet	1.6	Per Port	Requires a 10/100 MAC and PHY and may require a coprocessor all of which raise the tare power of the UPS
10/100/1000 Ethernet	2.0	Per Port	Requires a 10/100/1000 MAC and PHY and may require a coprocessor all of which raise the tare power of the UPS
Low Power Wireless (e.g. ZigBee, Bluetooth, etc.)	1.0	Per Instance	Requires a Wi-Fi radio and may require a coprocessor all of which raise the tare power of the UPS

[1] https://www.regulations.gov/document?D=EERE-2016-BT-STD-0022-0017

Wireless LAN (e.g. Wi-Fi)	3.0	Per Instance	Requires a Wi-Fi radio and may require a coprocessor all of which raise the tare power of the UPS
Cellular Modem	4.0	Per Instance	Requires a cellular radio and may require a coprocessor all of which raise the tare power of the UPS
External Wired Sensor Connection	0.5	Per Instance	Requires larger logic power supply and additional interface circuits which raises the tare loss of the PSU.

Table 1

9. Commission staff seeks feedback to determine whether edge devices can use the same setup instructions as network equipment.

   NEMA Comment: We do not believe so, no. Many edge devices require encryption synchronization at the time of installation. For example, these devices also require unique logins and passwords, in compliance with the California connected devices law.

10. Commission staff seeks data on showing the impact of shield enclosures on power draw and examples of test procedures that have this requirement.

    NEMA Comment: We have no information available to share at this time.

11. Commission staff seeks data on the impact of the distance between product and wireless router on LPM power.

    NEMA Comment: We are aware of a technology called Energy Efficient Ethernet, EEE. This technology is related to IEEE Standard802.3az. This standard allows for physical layer transmitters to consume less power during periods of low data activity by using a "Low Power Idle" (LPI). It should be noted that devices that take advantage of this standard today are IT devices. As we note in our response to items 2 and 3, there is no guarantee that this IT standard may be applied to IOT or non-IT connected devices.

12. Commission staff seeks information on what provisions are needed for products with functionality similar to SNE that are not SNE.

    NEMA has no comment on this item.

13. Commission staff seeks information on new sensor technologies and data on the impact of available sensor technologies on LPM power.

    NEMA Comment: Sensors generally are never "off", otherwise they are no longer sensing and providing useful data. As such, several types of sensors should be excluded from all attempts to force low-power modes onto their device architecture, as unintended consequences may result. Sensors used in medical devices, security systems, video or audio surveillance, and even simple occupancy sensors, to name a few, should be excluded. For example, occupancy sensors are used in buildings during the day to determine presence for lighting and air conditioning, but turning them "off" at night

prevents their use for security or other purposes that the Building Management System uses occupancy for. By turning these sensors off, they are excluded from use by the technology they are designed to support. Security, video and audio surveillance, and medical devices are not designed to achieve a low-power mode, and some are specifically intended for most relevant use/benefit during low to no occupancy times. Similarly video and audio surveillance also depend on network availability, and would not allow for low-power mode of the network device without loss of primary functions/services.

14. Commission staff also seeks information on the impact of different ambient sound conditions on LPM power.

    NEMA has no comment on this item.

15. Commission staff seeks information on the impact of attaching a fully charged product on the power draw.

    NEMA Comment: Insufficient information is available from the question to determine a likely outcome.

16. Commission staff seeks input for a measurement method for hardwired products where load and controls or other associated loads are on the same circuit.

    NEMA has no comment on this item.

17. Commission staff also seeks LPM data on PoE and other DC powered products (including data on power draw and market share).

    NEMA Comment: Power over Ethernet (PoE) technology describes a system to pass electrical power, along with data on ethernet data cables. The IEEE standard for PoE requires category 5 cable or higher for high power levels, and may be operated with category 3 for low-power modes, or short distance loads. In the event the voltage reaching the load is insufficient a device such as or mid span power supply maybe inject voltage adequate to support the load.

    We note that the U.S. Department of Energy in their narrative for Test Procedures for External Power Supplies[2] clearly note that PoE is considered an external power supply in some cases[3], and as such PoE is Federally-regulated and the CEC is preempted from regulation in this area.

18. Commission staff seeks data on whether powering a product through its different USB-PD-Type C ports will impact its power draw.

    NEMA has no comment on this item.

[2] https://www.regulations.gov/document?D=EERE-2014-BT-TP-0043-0001

[3] From Section III I.3 "An EPS may be considered a Class A EPS if it connects to the end-use application using any type of electrical connection, cable, cord, or other wiring, including both removable and hard-wired connections. An Ethernet cable would meet these criteria, so an EPS that connects to the end-use product via an Ethernet cable would still be considered a Class A EPS and would be subject to the applicable energy conservation standards if it meets the other five criteria of a Class A EPS."

19. Commission staff seeks data on systems tested using a variety of methods.

    NEMA has no comment on this item.

20. Commission staff seeks data on the impact of the length of time for off mode power measurement.

    NEMA has no comment on this item.

Other comments

1. We recommend that the Commission, once it begins testing of “representative” products, focus on products which are identified by their manufacturers as *having* standby/low power mode functions, since as we note above, some products do *not* have these functions for specific reasons, such as safety and security.