National Electrical Manufacturers Association

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

Ms. Soheila Pasha
California Energy Commission
Docket Unit, MS-4
Re: Docket No. 17-AAER-12
1516 Ninth Street
Sacramento, CA 95814-5512

NEMA Comments on CEC Title 20 Phase 2 Pre-Rulemaking Low Power Mode & Power Factor 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 in response to CEC Title 20 Pre-Rulemaking Documents for Low Power Mode and Power Factor. These comments are submitted on behalf of NEMA Member companies.

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. Please find our detailed comments attached.

We welcome your careful consideration of this information and we look forward to the Commission regularly seeking constructive interaction with industry. 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

NEMA Comments on CEC Title 20 Phase 2 Pre-Rulemaking
Low Power Mode & Power Factor

General Comments:

1. We refer the CEC to, and support, the Joint Trade Association comments submitted simultaneously with individual Association comments to this proceeding.

2. Liability: Will the CEC indemnify industry from claims of harm due to reduced functionality resulting from conformance to Title 20 standards? The issue of liability and safety must be addressed before mandatory requirements are levied on industry and forced on consumers. Delays on startup when coming from a reduced power mode are not uncommon in connected/connectable devices. Many devices potentially in the scope of this proposed rulemaking could provide or participate in functions relating to safety and security sensing. Devices such as, but not limited to: smoke and fire detection, carbon monoxide detection, video surveillance systems, safety and emergency egress lighting, alarm systems, temperature control, infant monitoring and alarm systems. All of these are examples of real time, continuously functioning devices whose intended use does not allow for cessation of network communications, or entering low power mode with limited functionality. The CEC's emerging, but poorly defined, potential scope of covered products for this rulemaking does not exclude these devices. Placing these devices into limited power modes or limited operating modes may not allow the devices to deliver the intended functionality to the consumer in a timely manner, or at all. Requiring specific low power mode functionality may cause unintended consequences through inaction of the device or its network. Discussions of potential consumer hazards relating to "Connected Devices" or "Internet of Things" (IoT) have only just begun at the U.S. Consumer Product Safety Commission (CPSC)[1]. While the discussion in CPSC is currently focused on active mode operation injuries, future considerations will include IoT taking too long to recover from a sleep or low power mode, or other failures as a result of taking too long to recover from the modes proposed in this proposed CEC rulemaking. Because network functionality is of a customized and variable content depending on on-the-spot application, a device that is part of a network but restricted in its timely function due to CEC requirements could pose a risk to consumer safety.

3. Definitions: The CEC must clearly define both scope and the types of product it intends to examine and eventually regulate. There are several international versions of definitions for the products and power states discussed in the pre-rulemaking solicitation. If the CEC pursues Small Network Equipment (SNE) and edge devices, then these products need to be clearly defined. The CEC's proposal references the IEA 4E Standby Annex paper, which describes these products, but never defines them. We suggest the following definitions, adapted from said paper:

   NEMA considers SNE to mean household devices that have as their primary function the provision of the network itself. Common examples of SNEs include network routers, switches, modems, network access points, and IoT hubs/gateways.

[1] https://www.federalregister.gov/documents/2018/03/27/2018-06067/the-internet-of-things-and-consumer-product-hazards

NEMA considers Edge Devices to mean household devices that utilize two-way communication with SNE to perform its functions, but that do not provision the network itself. Battery-powered devices are NOT Edge Devices.

We are aware of definitions intended to be submitted by the IT and Consumer Technology sector as well and support consideration of those.

In addition to Edge Devices and SNE, the CEC should define the following overarching terms as they apply to the aforementioned scope of products: Standby, Non-Active, No-Load, Off-Mode and Off-State. Devices which rely on sensors of some kind can never be truly off, and neither can their sensors.

4. Products that do not have a low power mode due to the need to provide continuous communication for the purpose of well-being, safety and security should be exempt from this test procedure and future roadmap.

   Exceptions: the following systems listed in item 1 should be exempted from conformance to this emerging regulation (not all-inclusive): smoke and fire detection, carbon monoxide detection, video surveillance systems, safety and emergency egress lighting, alarm systems, temperature control, infant monitoring and alarm systems.

Comments to the Draft Test Procedure in Order of its Contents

1. Provisioning the Product
   NEMA has no comment at this time.

2. Testing State
   We note that the IEC is working on a testing protocol specifically for lighting products. This standard, IEC 63103, is not final and is still within the committee that drafted it. NEMA members participating in the effort expect it to be available more widely before the end of 2018. While IEC 62301 is referenced in Title 20 for LED Lamps today, this is because it was the only standard available at the time. New standards are being developed and the CEC should consider referencing them as they become available. For example, the CEC should leverage IEC 63103 for lighting products when it becomes available.

3. Network Connections
   Many devices participate with and support a network using the “mesh” approach, in which one lost node is made up for by others which work together to get information shared through the network to other devices, including decision-making devices. This communication is constant, and cannot be interrupted for lack of vital information to share, or the mesh is lost. Communications protocols involved include ZigBee, Z-Wave, and other alternative technologies. Devices which use these protocols to communicate in mesh networks should not be included in scope of these requirements or mesh network communications could become invalid options for network solutions.

4. Sensors
   Where international or regional standards exist for the test parameters sought by this regulatory discussion, it is tempting to copy test conditions and requirements into Title

20. However, to do so will tilt the impact of the regulation negatively against products which already have more detailed efficiency test processes, while allowing less-regulated products more free reign. This would disadvantage established products and could reduce their ability to participate in the greater connected environment. The roadmap should not specify California-specific product test conditions. Rather, the roadmap should reference international standards for those product classes *where they exist* and manufacturer specified test conditions where they do not. This will ensure fair competition between products which are capable of delivering the same service but which have differing energy efficiency regulations.

For example: the proposed ambient light requirement of 300-400lux for sensor-related test conditions and detection pattern discussion in a horizontal test method of section 4 of the draft are best left out. These conditions are not readily understood by non-lighting professionals and if misapplied would unfairly disadvantage lighting products from fuller participation in the connected environment.

5. Charging, Wired
   It is not clear how this is different from the test procedure for battery charging systems, which is already preempted by federal regulations.

6. Charging, Wireless
   NEMA has no comment at this time.

7. DC Powering
   - The test and safety requirements between Low-Voltage DC (PoE, etc.) and High-Voltage DC are very different in terms of the potential risks and benefits and should be separated for clarity.
   - Some equipment or systems within the scope provided are not shipped with cable; reference examples are surveillance equipment, and video surveillance equipment. These systems are not intended to be installed by consumers. The challenge with some of these systems is that the load may be a substantial distance from the section controlling the load as is the case with surveillance systems installed in buildings, or on properties. In these cases, manufacturers utilize several methodologies to ensure that the load is adequately powered to deliver the intended use over an extended operating environment, distance to sensor and other factors of the equipment. Installation may be performed in both AC and DC power. Installers are trained to understand the I^2R losses, voltage drop, and choose conductors and conductor sizes accordingly. In addition, many systems have the ability to step up voltage to assure the load at the end of the conductor receives adequate voltage and power to perform the intended use. The variables in this installation are broad, distance to load, wire size, power supply size, to name a few. However, given the set of variables and complexity of these installations, industry would recommend eliminating the wire as a source of error for any market surveillance activity performed to validate equipment. These variables are significant enough that we are concerned a less-experienced third party laboratory may encounter false failures during enforcement testing, which would result in excessive costs investigating equipment that is in compliance.
   - In this case; NEMA believes the principal concern to be surveillance systems, and the associated sensors and video systems supporting the surveillance systems. In the case of video surveillance systems the cable serves two purposes, power to the load, and sensor or video communications to the main

surveillance systems nexus. The distance the power is driven is determined by usable voltage at the load, and an optimal amount of amperage. However, regardless of power delivered to the load, a minimum voltage is required at the load to operate. Variability is almost always wire size, and voltage out of the power supply. Units using AC power to the load are generally run from a transformer or multitap transformer to deliver adequate voltage, current, and power to the load to assure operation of the intended use. Wire is not shipped for these installations due to several factors: 1) professional installation is required, 2) wire size may be incremented to assure lower voltage drop, and I2R losses at the load (distance). Due to these factors it is NEMA's position that surveillance systems of all kinds should be excluded from this rulemaking.

- Industry is interested in understanding if the CEC intends to regulate Power over Ethernet (PoE) systems such as those that power remote handsets, and other sensors such as video surveillance and emergency services. We note that surveillance systems typically operate 24/7 without standby or low power modes.

8. Systems
    - We have concerns about the component-build-up approach that the proposal seems to encourage, evidenced by "System" being a subset. This topic, IoT product power consumption, is a System concern. The additional power needed by these products is directly related to their participation in the system. The CEC should approach this entire topic from a system perspective, not a component level breakdown or buildup.
    - The challenge with this topic is that once connected, SNE and Edge Devices will fall into the "system" category once the power source is included – but the context of the system can range drastically from a DALI bus supply, to a PoE switch, to a driver with auxiliary/bus power, to a standalone power supply (which can be discretely and individually shipped and installed).
    - Systems can be designed 1-to-1, 1-to-many, or many-to-1, and we recommend SNE/Edge Devices be tested using a 1-to-1 evaluation.
    - 8.1 Option 1 appears to be more reliably set up from a measurement standpoint (analogous to the concept of weight change for a container). However it should be constrained to:
        - A 1-to-1 evaluation, allowing for an understanding solely of the change in power of the device
        - The hub/power source must be kept in some sort of identical load in the connected and disconnected state
        - The hub/power source selection must not be part of the qualification/results, but should be reported in the test report only
    - The cable losses should be excluded so a short cable should be specified.

9. Off Mode
    - Definitional clarification needed – the requirement explanation is unclear – is this the same as No-Load?
    - For devices that operate 24/7 there is no off mode, though an on – off switch or button may be present to reset the device. Many devices have no off mode, and require disconnection from the mains, and/or its DC source to be turned off.
    - We are concerned that there is a misunderstanding in this road mapping, with this short-sighted focus on "off mode" as an example. Off mode is an atypical condition for network/connected products.

NEMA Comments on List of Questions for the Low Power Mode Test Procedure Problem Statement & Information Request (CEC Attachment B):

1. Provisioning the Product
1.1. Should the product be allowed to run for a specific amount of time, for example 24 hours, to allow the product to update and provision software before taking the LPM measurements? If so, what is the appropriate amount of time?
NEMA Comment: The minimum cycle time for an update will be different from manufacturer to manufacturer. It may also be dependent on registration, authentication and initialization of the product. The normal cycle requires the customer to initialize and register, authenticate, establish preferences, set up the features and functionality of the device; and then update firmware, and/or software. Some manufacturers update firmware software immediately upon connection to the Internet. The defining reason for these differences is, generally speaking, the utility and functionality of the device, interconnectivity with other devices, and the business process and operating requirements of the industry selling into the marketplace. Generally speaking the answer for this question is different by manufacturer. However, whomever performs the market surveillance test will need to ensure that all of the procedures have been followed and the system has been updated to the latest released firmware. The complexity of this task is underestimated by the CEC. When looking across the industries that fall within the scope and definitions as provided by CEC to this point, the market surveillance task will not be easy or simple to implement. The architecture and implementations of Edge Devices which fall within the scope and definition as provided by CEC are as broad as the industry.

Those performing testing should solicit input from manufacturers or manufacturer specifications. For the sake of setting a time, we suggest 24 hours or longer if specified by the manufacturer.

2. Testing State
2.1. Is the approach outlined in section 2 of the test procedure an effective way to define the testing state for a broad range of products? If not, explain why.
NEMA Comment: The approach could work, but we are concerned that there remains a need to find a way to exempt products which don't have a LPM, due to constant connectivity, communication or sensing requirements.

The CEC proposes as the definition for a testing state "To make this test procedure broadly applicable to define a wide range of product types, the Commission is considering an approach where LPM is not defined as a specific mode, but rather a particular state that is reached when the user has not interacted with the product for a defined amount of time." It is important to clarify low power mode in this case. In some cases Edge Devices could operate for weeks or months with little to no user interface to make sure this state is stable. Also user interface access can be through a variety of means, such as a digital device, or direct interface (physical touch). In many cases for edge devices the user will interface with the device frequently after installation, and become progressively less, and less over time, possibly leading to no touch at all. However, the device is still expected to function, provided its intended use with or without customer interface. It is questionable that over the life of the product that this definition of LPM would be adequate. Industry notes that this is similar, but not identical to the ENERGY STAR imaging test method. Depending upon the industry and the device, varying times may be required from the point of last user interface, to entry into LPM. As the scope and definition of the CEC proposed rulemaking is horizontal and broad CEC will be hard-pressed to create a

unified or singular time for which all devices, across all industries and across all purposes are to enter LPM.

2.2. Explain other approaches that would be preferable/superior to the approach described in section 2 for testing state that is applicable to a broad range of products.
NEMA Comment: NEMA believes it is not possible to find a common method that works across a variety of products. From the lighting perspective, the preferred approach would be to the follow the method in IEC 63103 which is currently under development. IEC 62301 is currently applicable only to EPS, or those compute devices complying with the low power mode or standby power.

2.3. How long should X (the time between discontinuation of user interaction and the beginning of the measurement) be?
NEMA Comment: The "time between" should be at least 30 minutes. However, referencing our comment in section 2.1, we believe that this time interval will be a variable by industry, and not an absolute across all industries. Nor do we believe that it can be specified by rulemaking, or required by law without impact to the usability, and functionality specifically of the intended use of the device in a residence, or industry. To attempt to define these requirements may limit the usability and functionality of the intended use of the device.

3. Network Connections
A. Traffic content and levels:
3.1. To what extent do network and device data communication traffic need to be prescribed?
NEMA Comment: Network traffic should be limited to only what is needed to resume the primary function from its non-active mode.

3.2. Is the Energy Commission's proposed approach in section 3A of the test procedure appropriate? What is an appropriate limit on the inbound traffic?
Explain what modifications or additions need to be made.
NEMA Comment: The challenge with this parameter is that inbound traffic may be firmware updates, software updates, variable changes, optimization updates for the specific application. In programming the timing for these updates, we would program around peak data inbound and outbound traffic, which almost always occurs in the middle of the night. While programming for avoiding peak data utilization implementations, this almost always places firmware updates, and software updates in the path of regulatory limits.

3.3. Alternatively, is it better to prescribe specific network conditions, such as which network services are present, similar to the ENERGY STAR's approach? If so, what modifications, if any, need to be made to the ENERGY STAR's network conditions?
NEMA Comment: For lighting products we refer the CEC to the initial guidance in the aforementioned IEC 63103 (under development).

Unlike CEC the ENERGY STAR program is not a minimum efficiency standard arena. While we support the reuse of definitions and standards as provided by ENERGY STAR program we note that often ENERGY STAR definitions are not utilized by federal and state level entities developing minimum efficiency performance standards. The ENERGY STAR program is extensively targeted at the top 25% of the marketplace, while minimum efficiency performance standards are targeted at raising the bar from the lowest performers.

B. Configuration requirements
i. Wired Connections

3.4. Are the instructions described in section 3.B.i of the test procedure complete and appropriate? What other configurations or conditions need to be specified?
NEMA Comment: We have no comment on this item at this time

3.5. Does Ethernet cable's length significantly impact power draw in LPM, and should it be specified for the testing? If so, what is an appropriate length for the Ethernet cable used for the testing?
NEMA Comment: We disagree with the CEC's recommendation of a 2'-6' cable when no specifics are provided with a specific piece of equipment. A better approach would be to favor the use of as short a cable as possible. This would allow for lower I^2R losses in the cable, which otherwise unfairly detract from the device's test results.
Proposal: Change wording to "If no cable is shipped with the product, the shortest cable available should be used in its place."

ii. Wireless Connections
3.6. Do edge devices require different instructions from network devices? If so, specify which parts of the instructions should be different and how they should be.
NEMA Comment: The distinction is not that simple. For example, multi-function lighting equipment can be regarded as Edge devices with network device functionality.

3.7. What other test conditions besides those described in section 3.B.ii will impact LPM power draw? What additional test instructions are necessary to account for these impacts?
NEMA Comment: Low power mode (LPM) is a feature of compute devices. Compute devices may be placed into the low power mode during times of low utilization, or a preprogrammed time that could be anticipated by the manufacturer. Low power mode is dependent on several items one of which is that the user is not accessing the machine at that time. With respect to SNE/ED this assumption is false. SNE/ED equipment is not user-based or dependent upon an operator. SNE/ED products are anticipated to operate 24/7 without active interference from an operator. This relates back to the fallacy of the argument that a low power mode is beneficial, because the operator will no longer be operating the equipment.

The challenge with this approach is that the variability of entering low power mode as preprogrammed by the manufacturer may not allow the test procedure to adequately address measurement of low power mode due to the spectrum of equipment available, and the variability of when this equipment will enter low power mode depended upon the operating parameters of the systems employed.

3.8. How far should the device under test be from the network router?
NEMA Comment: The distance depends on the router technology and architecture.

iii. SNE-Specific Instructions
3.9. Are these setup instructions adequate to ensure reproducible results for testing SNE?
NEMA Comment: We have no comment on this item at this time

3.10. If not, what instructions should be added or modified?
NEMA Comment: We have no comment on this item at this time

3.11. Should 3-phase input power requirements be added to the setup instructions?
NEMA Comment: This is not applicable for lighting equipment or low voltage controls, but may be for other types.

NOTE: Questions 4 through 9 apply to edge devices only. The test procedure will require setup instructions for some secondary functions, in addition to network functionality, that are present in the product under test, particularly those that significantly impact power draw.
NEMA Comment: We have no comment on this item at this time

4. Sensors
4.1. Which sensors besides those listed in section 4 of the test procedure (occupancy/motion, gesture, sound, voice recognition, ambient light, temperature, humidity, touch) need to be addressed in the test procedure?
NEMA Comment: The variety of sensors that could be used in the future is unknown. This procedure has to be able to scale. We note the following potential additions: fluid level, rotational velocity, air velocity, aggregated or instantaneous power levels (KWH, volts, and amperes), air density, static air pressure, dynamic air pressure, contaminants, smoke, carbon monoxide, vibration, and door or lid open/close detection.

4.2. Which sensors (for example, gesture recognition) must process environmental conditions to identify particular patterns (for example, a wave gesture)? How sensitive is power draw to ambient inputs (such as, sound for a voice recognition sensor or movement for a gesture sensor)?
NEMA Comment: We have no comment on this item at this time

4.3. What is the appropriate instruction to ensure that sensors do not cause the product to exit LPM during the test and also represent real life situations? No environmental input or no specific trigger?
NEMA Comment: In our experience, it is not feasible to specify a single trigger or cause for a device to exit low power mode. While most compute products rely on a consumer to trigger them to power on, non-compute devices should not or cannot assume a manual trigger event.

4.4. What other ambient environmental inputs should be specified? For example, what type and level of background ambient noise should be used?
NEMA Comment: We have no comment on this item at this time

5. Charging, wired
5.1. Is the methodology described in section 5 of the test procedure a reasonable approach to evaluate the wired charging function to minimize its power impact when it is not being used?
NEMA Comment: The proposed approach could work for some devices, but for lighting products NEMA recommends CEC follow IEC 63103 (under development).

Another concern NEMA has is that this section appears to duplicate existing requirements for battery charging systems. One must focus on the potential differences between SNE/ED devices utilizing wired charging versus existing battery charging system requirements for the purposes of this regulation.

6. Charging, wireless
6.1. Is the methodology described in section 6 of the test procedure a reasonable approach to evaluate wireless charging function to minimize its power impact when it is not being used?
NEMA Comment: We have no comment on this item at this time.

7. DC Powering
7.1. What is the appropriate input voltage to supply during testing, particularly for products that specify a range of acceptable DC input voltages?

NEMA Comment: While some DC power voltages, such as USB, are described in industry standards, others may vary by manufacturer. NEMA proposes the CEC set this condition to "as specified by the manufacturer" or some similar approach.

7.2. How should the measurement be made? Are the instructions in the ENERGY STAR display test procedure appropriate? Explain how the procedure should be modified, if the ENERGY STAR instructions are not adequate.
NEMA Comment: We are not aware of many SNE/ED devices that utilize displays. While the broad scope and definitions for this topic might allow for some display to be included, the challenge would be to separate the display energy measurements from the rest of the device without disassembling the device and attaching test instrumentation. With this in mind we do not believe that the ENERGY STAR for Displays test procedure would be appropriate.

8. Systems
8.1. Would the approach described in section 8 of the test procedure for systems that are powered separately from their system hub adequately represent system's power draw? If not, explain how to capture the actual power of products that need to connect to other products, wired or wirelessly, in order to transfer data.
NEMA Comment: We have no comment on this item at this time.

8.2. Does the test procedure described in section 8 for systems that are powered from their system hub apply to all products? Explain if and how this approach should be modified to be applicable for new technologies.
NEMA Comment: We have no comment on this item at this time.

8.3. Are the test procedures described in section 8 reasonable approaches?
Provide reasons and explain what needs to change.
NEMA Comment: We have no comment on this item at this time.

9. Off Mode
9.1. Is the definition in section 9 an appropriate definition for the off mode? If not, what is an appropriate definition?
NEMA Comment: As written, no. A switch could be used to change the state of the device from ON to OFF and that would meet the definition. It might be better to describe off mode as a state where everything is off.

In certain devices, off mode may only be accomplished by disconnecting from mains power.

9.2. Are any other instructions beside those in section 9 needed to collect the off mode power measurement?
NEMA Comment: Many devices are not connected to a hub as described in this document. They are standalone and are wirelessly connected to the hub. Usually these devices, the hub and the remote device contain or utilize an EPS (external power supply). It is not clear if the commission is proposing a different test procedure for EPS due to the SNE/ED designation that might contradict or be preempted by existing Federal EPS regulations and Test procedures.

9.3. How might products that do not have hard or soft switches be turned off?
NEMA Comment: One method might be to disconnect, or remove main power, and in the event that it has battery backup remove the main battery. Then unplug the device.

9.4. What proportion of products do not have an off mode?

NEMA Comment: It is difficult to say. Battery backup exists in some systems and products to prevent off mode, and in some cases regulators and consumers require limited continued service despite power outages. For instance, the FCC in notice 15-98A1 mandated no less than 24 hours battery backup for voice over IP communications for 911 purposes[2]. While the continuity of telephone communications might seem an obvious exception from standby and off mode power consumption requirements, the topic of security raises further concerns over the CEC's efforts here. If system function is degraded by energy efficiency demands, will the CEC accept liability or waive manufacturers from liability from consumer issues or injuries that result from lack of timely connectivity? Examples of this concern are; 1) detection of fire, smoke, Carbon Monoxide, 2) intrusion detection systems, video surveillance systems and the associated power systems which could be EPS or Power over Ethernet. The Consumer Product Safety Commission is examining the issue of IoT related hazards to consumers as well.

10. General
10.1. Provide inputs on other gaps or issues not identified in the proposed test procedure.
NEMA Comment: We have no comment on this item at this time

[2] "we require these providers to offer, within three years of the effective date of the eight hour obligation, at least one option that provides a minimum of 24 hours of 911 service"
https://www.fcc.gov/ecfs/search/filings?bureaus_description=Public%20Safety%20and%20Homeland%20Security&express_comment=0&filers_name=Verizon&limit=100&proceedings_name=14-174&sort=date_disseminated,ASC&submissiontype_description=NOTICE%20OF%20EXPARTE