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Australian Energy Market Commission

RE: Submission to the AEMC Review of the Regulatory Framework for Metering Services – Ref: EMO0040

This submission is made on behalf of Schreder Australia Pty Ltd. Schreder is one of the largest outdoor lighting companies worldwide headquartered in Brussels, Belgium. Our company has existed for 112 years and is proudly family-owned in the 4th generation. With 2,600 employees and offices in 70 countries, including 7 R&D centres in strategic global locations, Schreder has been leading in its industry with innovative outdoor lighting solutions for many decades.

Schreder's local subsidiary Schreder Australia Pty Ltd is the largest street lighting solutions provider in Australia with a majority market share. We count most Australian DNSPs and Main Road Authorities as our customers, as well as many local councils and other government agencies. Products and solutions are developed, assembled, delivered and supported locally with a team of over 100 experts. Schreder Australia's headquarter is in Sydney with local offices and representatives in all major cities around the country.

Street lighting is an important road safety measure. As with many industries, the street lighting industry is undergoing a significant transformation with the emergence of new technologies. Firstly, new LED technology in luminaires enables significant energy savings in comparison to conventional technologies. Secondly, smart street lighting controls systems enable remote asset monitoring (including revenue-grade energy metering) and controls of luminaires.

The street lighting industry has come a long way standardizing the controller interface on luminaires for smart lighting systems with a so called 7-PIN NEMA receptacle, which is based on the global standard ANSI C136.10. As such, the 7-PIN NEMA receptacle has become an integral part of international and Australian street lighting standards and is included in the luminaire specifications of all Australian DNSPs and Main Road Authorities. This means that almost every new streetlight that is installed in Australia is smart-enabled and has the capability to have a controller attached to connect it to a smart lighting system, which, amongst a range of other things, can meter and report on a luminaire's energy consumption.

Currently, energy consumption for most streetlights is billed as deemed loads under the NEM's type 7 metering approach for unmetered loads. While this approach may have been appropriate in the past for older technology, it does not suit the current technical capabilities of luminaires and smart lighting systems, which include dimming and switching operations that can generate significant energy savings. Adding to this, luminaires and light poles are increasingly locations of interest to deploy smart city sensors, which in turn can be monitored and the energy consumption can be accounted for by smart lighting systems.

Considering all of this, many of our customers and system end users, which are primarily Main Road Authorities and Councils that are provided a smart lighting solution by their DNSP (the party owning and maintaining the luminaire assets), have requested that the energy metering capability of our smart lighting systems are recognised to take

advantage of the energy savings the systems can generate. It is in this context and based on these requests that we strongly welcome the AEMC's recognition in table 2.1 of the Directions Paper that the energy metering capabilities of smart street lighting systems offer benefits to Councils and Main Road Authorities.

Besides asset monitoring and controls, it is worth noting here that the controller devices of our smart lighting systems generate a significant amount of power quality data, which can be useful for DNSPs to manage their networks, e.g. voltage, current and power factor data. Polling intervals are 60min typically for asset monitoring use cases but can be configured to shorter intervals, e.g. 5min. The devices can further generate useful warnings, such as real time power outage alerts, over/under voltage events, and more.

With approximately 2.2 million streetlights in Australia, which are mostly owned and maintained by DNSPs, the data obtained from smart street lighting systems could assist DNSPs with managing their networks more dynamically.

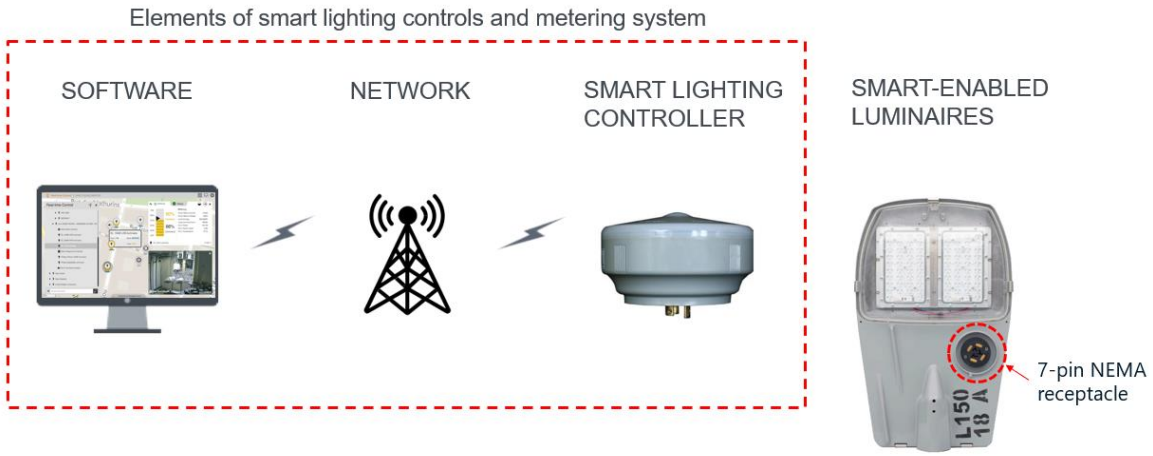
In summary, Schreder would welcome reforms that better facilitate the adoption of smart street lighting systems and enable customers and system end users to take full advantage of its benefits. We seek reform that recognises the metering capability embedded in these systems because the energy savings a smart lighting system can generate is a key ingredient in business cases to make investments into this type of technology viable for customers.

Smart lighting system architecture

System architectures differ between different solutions. At Schreder, we only work with world leading OEMs to design systems that meet local requirements, from system security, data hosting and network coverage to specific attributes on controller hardware to comply with Australian standards and withstand Australian environmental conditions.

Smart lighting systems comprise of several elements:

1. Controller devices, which attach to the luminaires' 7-PIN NEMA receptacles, and which have embedded metering capabilities for power parameters (energy, wattage, current, power factor, etc.). The device can also generate alerts and warnings and send dimming and switching signals to the luminaire drivers. The controllers have an integrated wireless communication module to communicate with a central management system.
2. Communication network, which the controllers use to send and receive data. The communication network can be comprised of a field device network with access points that have cellular backhaul capability, or the controllers can have an integrated cellular module to communicate directly in a carrier network.
3. Central management software, which is often cloud-hosted, and which provides the user interface to send commands, visualise and export data and to run reports and analytics for asset monitoring activities.



Schreder responses to Directions Paper Consultation Questions

The AEMC's direction paper raises several questions throughout the document to obtain feedback from market participants. Our responses to these questions can be found below. Please note that the responses are provided in the specific context of smart street lighting controls systems.

QUESTION 1: BENEFITS WHICH CAN BE ENABLED BY SMART METERS	*(a) Are there other benefits which can be enabled by smart meters that are important to include in developing policy under the Review?* Smart street lighting controls have a range of benefits that flow through to different parties and stakeholders. As such, business cases can be complex but overall, the outcomes are strongly net positive, making investments into the technology viable. This is demonstrated by the more than 20 million smart lighting controllers that are estimated to be deployed and connected worldwide as of 2021, with a compound annual growth rate of 24.8% (The Global Smart Street Lighting Market - Research and Markets). In Australia, DNSPs own the majority of street lights, and they would mainly benefit from maintenance management use cases and power quality data generated by the system. Councils are the DNSPs' customers for street lighting services and they pay for the energy usage of the luminaires. They would mainly benefit from energy savings the systems can generate. As a result, Councils are the party who invests into new LED luminaires, even though they are DNSP-owned assets, because they can recoup the investment through saved energy. Evidence from international smart lighting deployments and several local projects where smart lighting systems are deployed on luminaires which are powered on metered circuits suggests, that the same would hold true for smart street lighting systems if the embedded metering capabilities were recognised. Main Road Authorities own a large portion of their luminaire assets and maintain them, and they are also liable to pay for the energy consumed by these assets. Therefore, they can realise the benefits of both, asset management and energy savings use cases, while power quality data would still benefit the DNSP. In summary, it is vital that customers and system end users can realise the energy savings benefits through the embedded metering capabilities of smart lighting systems. Energy savings are a key consideration in business cases that make investments into the technology viable, especially for Councils that upgrade their DNSP-owned lighting assets. Overall, the additional energy saved from controls can be up to 30%, with 15-20% being mostly cited in international deployments (IPWEA Street Lighting & Smart Controls Roadmap). We acknowledge that the Type 7 deemed approach could work with a fixed dimming regime, where dimming levels are pre-configured and don't change over time. However, extensive testing is required for each dimming regime and with each luminaire model it will be applied to, making it an expensive process and the implementation is difficult to manage for customers, suppliers, AEMO, and other stakeholders. The approach is also prone to error, e.g. when dimming regimes are unintentionally removed from controller devices by system users, changed, or if controllers are replaced and dimming regimes are not reconfigured appropriately. This would all need to be managed in a feedback loop with the DNSPs and retailers, who rely on accurate information about the applied dimming regimes at the individual luminaire level to calculate energy consumption and charges.

Table 1: Benefits summary of smart street lighting system for different stakeholders

Benefit	Councils	DNSPs	Main Road Authorities
Automated fault and outage reporting, including the resulting road safety benefits.	X	X	X
Streamlined maintenance management activities, e.g. by reducing truck rolls, accurate fault information and diagnostic data before site visits, reducing faults through predictive maintenance strategies, etc.		X	X
Eliminating the need for visual inspections to confirm if lights are working.		X	X
Improved accuracy of asset inventory information.	X	X	X
Accurate location information of assets from GPS chips in controllers.		X	X
Ability to address complaints remotely, e.g. light spill onto residential properties, by dimming lights or adjust switch ON/OFF times.	X	X	X
Increased luminaire asset lifetime when dimming regimes are applied.		X	X
Proactively manage asset replacement cycles through reported burning hours and diagnostic asset data.		X	X
Smart city devices and sensor support. If devices are powered from the luminaire, the assets can be monitored and energy consumption can be measured and accounted for.	X	X	X
Power quality data – voltage, current, power factor with configurable polling intervals.		X	
Energy savings: - Dimming lights during off peak times, as road lighting is designed to be appropriate for the maximum traffic volumes on a road, which may only occur for a few hours each night during rush hour times. - Optimizing ON/OFF switch times and reducing excess lighting due to static luminaire wattages - Constant Light Output keeps the light output the same by increasing power input over a luminaire's lifetime as opposed to over lighting the roads, which is implemented in lighting	X		X

	designs to allow for lumen depreciation of the LEDs. - Billing accuracy improvement compared to the current deemed approach (if metering capabilities are recognised). - Greenhouse Gas emissions reductions in line with energy savings.			

(b) What are stakeholders' views on alternative devices enabling benefits? What are the pros and cons of these alternative devices?

We do not see any feasible alternatives to derive the same benefits as smart street lighting systems. Conventional photocells simply switch the lights ON/OFF based on ambient lighting and do not generate any of the benefits identified above. To implement metering capability, the deployment of traditional metering solutions would be prohibitively expensive for streetlights, and the many other benefits smart street lighting systems generate would not eventuate.

QUESTION 2: PENETRATION OF SMART METERS REQUIRED TO REALISE BENEFITS

(a) Do stakeholders agree that a higher penetration of smart meters is likely required to more fully realize the benefits of smart meters? If so, why? If no, why not (b) Do stakeholders have any feedback on the level of smart meter penetration required for specific benefits? Or to optimize all benefits?

Our experience with smart lighting system deployments has shown us that the technology only generates sufficient benefits when deployed at scale. For example:

- Dimming individual lights in a section creates uniformity issues and becomes a road hazard. It will also not be standards compliant. Dimming regimes should only be applied to whole sections of lights to uniformly reduce light output.
- Maintenance benefits cannot be realised if only some lights have fault reporting capabilities. E.g. visual inspections are still required, and fault reports cannot be bulked together for any higher level asset analysis to derive insights for predictive maintenance and to streamline maintenance activities in the field.
- Power quality data for DNSPs will be more useful and valuable if it is obtained from as many metering points as possible in the network.

We request the AEMC to consider reforms to recognise the embedded metering capability of smart street lighting systems and thereby facilitate widespread adoption and deployment of the technology, generating the greatest number of benefits to all parties, including non-energy related benefits, and thereby creating a positive feedback loop between the different stakeholder groups.

QUESTION 3: TO REACH A CRITICAL MASS IN A TIMELY MANNER, OPTIONS TO ACCELERATE THE ROLL OUT SHOULD BE CONSIDERED	*(a) Do you consider that the roll out of smart meters should be accelerated? Please provide details of why or why not* *(b) What are the merits, costs and benefits of each option? Is there a particular option which would be most appropriate in providing a timely, cost effective, safe, and equitable roll out of smart meters?* *(c) How would each of these options for rolling out smart meters impact the cost profiles of smart meters?* *(d) Are there other options that you consider would better provide a timely, cost effective, safe and equitable roll out of smart meters?* The AEMC's discussion paper points to a minimum penetration target of 50% for smart meters for many of their benefits related to network monitoring to be realised. We propose that the widespread adoption of street lighting systems and the associated power quality data they will be able to provide is useful to bridge the gap to some extent, by providing reliable data generation capability across large network areas as a by-product to asset monitoring and controls. Deployments of smart street lighting controllers are often happening in bulk as part of a luminaire replacement project, where the luminaires of at least one, sometimes several, Councils are replaced and upgraded in one go. This means thousands of additional metering points can be available to a DNSP within a short amount of time, often just a few weeks or months depending on the size of the project. The same holds true for Main Roads Authorities, which could instal tens of thousands of lights with controllers on its roads and across a DNSP network within several months. In summary, we encourage the AEMC to consider reforms that would recognise the metering capability of smart lighting systems to facilitate widespread adoption of the technology in the market. If this happens, a secondary, indirect benefit could be to create a new and significant source of power quality data for DNSP that could, to some extent at least, compensate for the somewhat slow uptake of smart meters and assist with managing networks more dynamically in the future.
QUESTION 4: OPTIONS TO ASSIST IN ALIGNING INCENTIVES	*(a) What are the costs and benefits of each option? Is there a particular option which would best align incentives for stakeholders?* *(b) Are there other options that you consider would better align incentives?* We agree that the incentives for deploying smart street lighting systems are split across different stakeholders. For DNSP-owned assets specifically, the maintenance management benefits, and power quality data benefits are captured by the DNSP, but on its own these benefits are often not sufficient to make an investment in the technology viable. Councils are the end users and liable to pay for the energy that streetlights consume, and energy savings are a significant part of the overall business case that make investments viable. Hence, without end users like Councils being able to capture the energy savings on their electricity bills, they are unlikely to contribute to the investment in a smart lighting system. For Main Roads Authorities the scenario is different because they can capture the asset monitoring and maintenance management benefits directly. Nevertheless, the business cases will often not be viable without being able to capture energy savings, as is the case with Councils and DNSPs. Considering all of this, if the energy-related benefits of smart street lighting systems were facilitated for customers by metering reforms adopted in the NEM, the overwhelming

	evidence internationally (and from customer-owned lighting systems in Australia) is that such systems will be widely deployed at scale. We strongly agree that information should be shared as openly as possible between all parties to maximise the overall benefits. For example, AEMC's discussion paper raises the possibility of a data platform to provide power quality data to DNSPs from smart meter deployments by retailers. Smart street lighting systems could feed power quality data into the same platform to be fetched and utilised by the DNSPs alongside smart meter data. Alternatively, since energy consumption data from the smart street lighting system would need to be shared with DNSPs and retailers in any case (if the metering capability was recognised), the same processes and mechanisms can be used to share the power quality data from the system with DNSPs. Under any such arrangements, street lighting end users and customers like Councils and Main Road Authorities, who bear the bulk of the costs of the deployment, should be appropriately compensated. This is especially the case if system configurations are implemented based on DNSP requirements, for example shorter polling intervals (15min/5min/etc) for power quality data, with associated impacts on functionality and/or costs, e.g. increased data volume to be transmitted in wireless networks. Some compensation will provide a modest additional incentive for end users and customers to invest into smart street lighting systems, while also providing a valuable and cost-effective power quality data source to DNSPs. There are other more advanced use case scenarios, which could provide incentives for DNSPs. For example, streetlights could be dimmed at night or in certain areas switched off entirely to make load capacity available in the network for other use cases, such as electric vehicle charging, which will mainly occur at night-time and during off-peak hours.
QUESTION 5: THE CURRENT MINIMUM SERVICE SPECIFICATIONS ENABLE THE REQUIRED SERVICES TO BE PROVIDED	*(a) Do you agree with the Commission's preliminary position that the minimum service specification and physical requirements of the meter are sufficient? If not, what are the specific changes required?* *(b) Are there changes to the minimum service specifications, or elsewhere in Chapter 7 of the NER, required to enable new services and innovation?* *(c) What is the most cost-effective way to support electrical safety outcomes, like neutral integrity? Would enabling data access for DNSPs or requiring smart meters to physically provide the service, such as via an alarm within the meter, achieve this?* *(d) Do you agree smart meters provide the most efficient means for DNSPs to improve the visibility of their low voltage networks? Why, or why not? What would alternatives for network monitoring be, and would any of these alternatives be more efficient?* *(e) Can smart meters be used to provide an effective solution to emerging system issues?* We are not in a position to comment on the detailed metering specifications from the NEM but we can comment that smart street lighting systems do not fit the "typical" definition of a metering device. Rather, they would need to be considered separately as a non-traditional metering system and the associated controllers as devices with different characteristics and a different set of attributes. This includes the devices themselves but also related processes, for example with regards to the installation and commissioning of devices and smart lighting systems. In light of the many benefits of smart street lighting systems, we request AEMC to re-consider some of the definitions and requirements in their specifications that do not fit a smart street lighting system and the associated controller devices, and to assess if amendments could be developed and implemented to accommodate this new type of metering system.

	We note that the AEMC and NEM would not stand alone with amending specifications to recognise the metering capability of smart street lighting systems. For example, precedents have been set in the US, where the system of one of our partner vendors has been recognised by a Californian DNSP and the Public Utility Commission for metering applications. In the UK, Elexon BSCP520 also effectively recognizes outputs from smart lighting systems for metering and billing purposes. In our region, the New Zealand Electricity Authority is currently proposing a mechanism for metering from smart street lighting systems, which we understand is about to be trialed in a live deployment. We encourage the AEMC to consider these precedents when assessing our responses and when developing an approach for smart lighting metering recognition.
QUESTION 6: ENABLING APPROPRIATE ACCESS TO DATA FROM METERS IS KEY TO UNLOCKING BENEFITS FOR CONSUMERS AND END USERS	*(a) Do you agree there is a need to develop a framework for power quality data access and exchange? Why or why not?* *(b) Besides DNSPs, which other market participants or third parties may reasonably require access to power quality data under an exchange framework? What are the use cases and benefits that access to this data can offer?* *(c) Do you have any views on whether the provision of power quality data should be standardized? If so, what should the Commission take into consideration?* *(d)Do you consider the current framework is meeting consumers' demand for energy data (billing and non-billing data), and if not, what changes would be required? Is there data that consumers would benefit from accessing that CDR will not enable?* As mentioned previously, we support the concept of data sharing to maximise benefits for all stakeholders in a smart street lighting deployment. The definition of processes and system interfaces to enable this data sharing is a key requirement to drive this outcome. At a minimum, mechanisms for sharing energy consumption data with DNSPs and retailers need to be defined and implemented (provided the embedded metering capabilities of smart lighting systems are recognised). The same or similar processes and mechanisms could then be used to share other types of data, e.g. power quality data, with the DNSPs. The smart lighting systems Schreder deploys provide API interfaces and system integrations are already part of many smart lighting deployments, for example to integrate with a customer's asset management data base. The same API interfaces can share energy consumption and power quality data, so it is an inbuild capability of the systems, ready to be utilised for metering use cases with DNSPs and retailers. We recommend that any process and mechanism should be standardised as much as possible so it can be replicated in other projects and with other customers to provide certainty to stakeholders.
QUESTION 7: FEEDBACK ON THE INITIAL OPTIONS FOR DATA ACCESS THAT THE COMMISSION HAS PRESENTED	*(a) What are the costs and benefits of a centralised organisation providing all metering data? Is there value in exploring this option further? (e.g. high prescription of data management).* *(b) What are the costs and benefits of minimum content requirements for contracts and agreements for data access to provide standardisation? Would such an approach address issues of negotiation, consistency, and price of data?* *(c) What are the costs and benefits of developing an exchange architecture to minimise one-to-many interfaces and negotiations? Could B2B be utilised to serve this function? Is there value in exploring a new architecture such as an API-based hub and spoke model?* *(d) What are the costs and benefits of a negotiate-arbitrate structure to enable data access for metering? Is there value in exploring this option further? (e.g. coverage tests or non-prescriptive pricing principles).*

	(e) Are there any other specific options or components the Commission should consider? We are not in a position to comment on the mechanisms, processes and systems best suited for the NEM to manage metering data. But as mentioned previously, the amount of power quality data generated by a smart street lighting system can be significant and should be considered in any NEM data exchange platform. In terms of integration capability, open API interfaces are part of most smart lighting systems these days and they can be used to exchange data. It would seem the most logical and cost-effective way to develop a standardised approach for smart lighting systems to provide energy consumption and power quality data automatically to a DNSP and retailer, either directly, or via an intermediary, like a data exchange platform. A central platform could help with standardising processes and mechanisms. But we also note that a direct integration with DNSP and retailer systems is likely to be quicker and less expensive to implement and could the first phase to achieve the desired outcome for the end users and customers. At the same time, direct integrations can provide a testing ground for DNSPs and retailers to explore how to manage smart lighting data in their systems, and to develop suitable processes and mechanisms to be deployed in a centralised data exchange platform at a later time. It is important to note too that any costs associated with the implementation of data sharing processes and mechanisms should not outweigh the benefits.
QUESTION 8: A HIGHER PENETRATION OF SMART METERS WILL ENABLE MORE SERVICES TO BE PROVIDED MORE EFFICIENTLY	*(a) Are there other potential use cases that third parties can offer at different penetrations of smart meters? What else is required to enable these use cases?* *(b) Noting recommendations in incentives and the roll out, are there other considerations for economies of scale in current and emerging service models* Smart lighting systems offer a range of benefits to end users and customers beyond energy savings, some of them are detailed in Question 1, Table 1. It is however important to note that the energy savings are a key element in a business case for the investment into a smart lighting system to become viable. As mentioned previously, power quality data from smart lighting systems could be useful to DNSPs to manage their networks. With this in mind, the larger the deployment of a smart lighting system the better to maximise the volume and value of the power quality information for network monitoring use cases. A smart lighting system can assist with monitoring smart city devices on pole infrastructure. For this use case, a larger deployment of controllers will create a network canopy, which sensors and other devices can be connected into to leverage data transmission and monitoring capabilities of the smart lighting system. The larger the network canopy the more useful it will become for this type of use cases.
QUESTION 9: IMPROVING CUSTOMERS' EXPERIENCE	*(a) Do you have any feedback on the proposal to require retailers to provide information to their customers when a smart meter is being installed? Is the proposed information adequate, or should any changes be made?* *(b) Should an independent party provide information on smart meters for customers? If so, how should this be implemented?* *(c) Should retailers be required to install a smart meter when requested by a customer, for any reason? Are there any unintended consequences which may arise from such an approach?*

	These questions do not apply in the context of a smart lighting system deployment. When such systems are deployed, the deployment is usually initiated and managed by the end users and customers, such as Councils, DNSPs, and Main Road Authorities. As a result, there is no need to notify customers. Instead, the need is to notify retailers of a planned smart lighting deployment (if metering capabilities were recognized). This is necessary so plans can made for the smart lighting system to provide metering data to the retailer, e.g. by defining the timeline for the deployment and commissioning of the system, including the point in time when the "data exchange" with the retailer's systems will go live to provide energy consumption data.
QUESTION 10: REDUCING DELAYS IN METER REPLACEMENT	*(a) Do you have any feedback on the proposed changes to the meter malfunction process?* *(b) Are there any practicable mechanisms to address remediation issues that can prevent a smart meter from being installed?* Because most streetlights are currently unmetered and managed as deemed loads (Type 7 unmetered loads), no metering replacements are necessary. When smart lighting systems are installed, the deployment, maintenance and support activities for the system are the responsibility of the asset owners, which in most cases are either the DNSPs or Main Road Authorities. When a smart lighting controller device is malfunctioning and energy consumption data is not available for a luminaire for a certain time period, experience in deployments overseas has shown that the most practical and reasonable solution is to default to the maximum connected load value of the luminaire for that time period.
QUESTION 11: MEASURES THAT COULD SUPPORT MORE EFFICIENT DEPLOYMENT OF SMART METERS	*(a) Do you have any feedback on the proposal to reduce the number of notices for retailer-led roll outs to one?* *(b) What are your views on the opt-out provision for retailer-led roll outs? Should the opt-out provision be removed or retained, and why?* *(c) Are there solutions which you consider will help to simplify and improve meter replacement in multi-occupancy premises? Should a one-in-all-in approach be considered further?* These questions do not apply to the context of a smart lighting system deployment. When such systems are deployed, the deployment is initiated and managed by the end users and customers, such as Councils, DNSPs, and Main Road Authorities.
QUESTION 12: FEEDBACK ON OTHER INSTALLATION ISSUES	*(a) Do you have feedback on any of the other installation issues raised by stakeholders? Are there any other installation issues the Commission should also consider?* In the case of smart lighting systems, the installation of controllers in the field is usually managed by the asset owners, DNSPs or Main Road Authorities, and is implemented as part of luminaire upgrades to absorb the installation costs into the asset replacement activity. As a result, the installation issues identified with typical smart meters do not apply for smart lighting systems.

QUESTION 13: IMPROVEMENTS TO ROLES AND RESPONSIBILITIES	*(a) Are there any changes to roles and responsibilities that the Commission should consider under this review? If so, what are those changes, and what would be the benefit of those changes?* As mentioned previously, the deployment of smart lighting systems is initiated and managed by the end users and customers, such as Councils, DNSPs, and Main Road Authorities. The luminaire asset owners, i.e. DNSPs and Main Road Authorities, usually own the smart street lighting systems. Hence, with regards to the embedded metering capability of a smart lighting system, the roles and responsibilities of who owns and administers the metering data and shares the data with other parties in the NEM may need to be redefined.

We would welcome the opportunity to discuss our responses in more detail with the AEMC and other relevant parties and to clarify any questions that may arise. In the first instance please contact:

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