



IPWEA

INSTITUTE OF PUBLIC WORKS
ENGINEERING AUSTRALASIA

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Cities Division
Department of the Prime Minister and Cabinet
1 National Circuit, Barton ACT 2600
Sent by email to cities@pmc.gov.au

RE: IPWEA Submission on Smart Cities Plan

The Institute of Public Works Engineering Australasia (IPWEA) welcomes the opportunity to make a submission in relation to the Commonwealth Government's Smart Cities Plan. This submission provides some information on IPWEA's Street Lighting & Smart Controls Programme, highlights street lighting's pivotal role in the smart city, some barriers to adoption and briefly suggests some areas where enhancements to the Smart Cities Plan may be beneficial.

Overview

IPWEA strongly supports the intent of the Smart Cities Plan. IPWEA recognises that there is enormous potential to use technology to help make our cities smarter and in doing so, improve people's lives, cut costs and optimise resource use.

At the core of a smart, adaptive and more efficient city are a range of connected devices in the public domain. And, connected street lighting is increasingly recognised as the likely enabling platform for much of the emerging smart city infrastructure.

Due to its ubiquitous nature up in the air at regular intervals above virtually every urbanised street, street lighting is ideally situated for a range of smart city communication devices, sensors, cameras and other infrastructure that will be required to enable the future smart city.

IPWEA encourages the Cities Division to give further to consideration of the pivotal role that smart street lighting is likely to play in the future smart city as well as some of the barriers to its adoption touched on in this submission.

IPWEA and the key participants in its Street Lighting and Smart Controls (SLSC) Programme would be pleased to engage in further discussions with the Department at any point.

About IPWEA

The Institute of Public Works Engineering Australasia (IPWEA) is the professional organisation for those involved in and delivering public works and engineering services to the community in both Australia and New Zealand. IPWEA provides services to its members as well as advocacy on their behalf. IPWEA's 4000 members come from all tiers of government and from the private sector. The organisation is best recognised for its widely adopted asset management programmes.

About the IPWEA Street Lighting & Smart Controls Programme

Recognising the fundamental digital transformation now underway in street lighting and other outdoor infrastructure, IPWEA initiated a collaborative a two-year Street Lighting & Smart Controls (SLSC) Programme in 2016. The SLSC Programme brings together a range of government and private sector stakeholders with the key objectives of:

- Informing and educating public works professionals, utility providers and private sector partners on the application and benefits of Street Lighting and Smart Controls technology;
- Providing tools to assist all stakeholders with the transition to more efficient and smarter street lighting such as model street lighting strategies, model specifications and model investment-grade business plans; and
- Informing government at all levels about the application and benefits of Street Lighting and Smart Controls technology and, about where reform is needed to reflect Government policies to improve the livability of our cities and to improve productivity through innovation.

IPWEA initiated the SLSC Programme after concluding that there is now an overwhelming commercial, safety and environmental case for the wholesale renewal of street lighting infrastructure in Australia and New Zealand. In financial terms, the total cost of ownership of modern LED street lighting and smart controls is now at least 25% lower than legacy street lighting types¹.

While there is a growing push in both Australia and New Zealand to see widespread replacement of older public lighting, there are a range of significant knowledge gaps, misaligned interests and out-of-date guidance both for policy makers who would seek to foster and proponents who want advance such deployments.

IPWEA is managing the SLSC Programme but the programme's success will be built on the collaboration of the diverse stakeholders with an interest in street lighting, smart controls and the broader smart cities agenda. The key stakeholders and initial participants in the SLSC Programme are:

- The Commonwealth Department of Industry, Innovation & Science
- Lighting Council Australia (LCA)
- Energy Networks Association (ENA)
- Australian Local Government Association (ALGA)
- The Illuminating Engineering Society of Australia & New Zealand (IESANZ)
- Major commercial funding partners: GE, Philips, Gerard Lighting, Cisco and Silver Spring Networks
- Technical Advisory Group (TAG) members: Eaton Lighting, Toshiba, Pecan/LED Roadway Lighting, Aldridge Traffic Technologies/Telensa, Eye Lighting, Oak Electronics/Harvard Engineering, OrangeTek, Electrix/Citeos and Citelum

Street Lighting's Pivotal Role in the Smart City

As LED street lighting and control systems have matured, so too have a range of other digital outdoor infrastructure falling broadly under the umbrella of the smart city. Globally, a city's street lighting

¹ IPWEA Practice Note 11: Towards More Sustainable Street Lighting
<http://www.ipwea.org/Go.aspx?MicrositeGroupTypeRouteDesignKey=c650931e-6904-464d-80cc-2c48df735859&NavigationKey=cfd76bec-79e0-4707-a31c-d936c1704e09>

infrastructure is being increasingly recognised as the likely enabling platform for much of this smart city infrastructure².

Three basic characteristics make street lighting particularly important to the future smart city:

1. Street lighting is ubiquitous in nature, located every 30-80m along almost every urbanised street in Australia;
2. Being up in the air, away from buildings and above the road surface makes street lighting ideally situated for a range of smart city communication devices, sensors, cameras and other infrastructure that will be required to enable the future smart city; and
3. By definition, street lights already have a support structure and a supply of electrical power.

Adding intelligence and communications capabilities to street lights will give councils and road authorities the ability to monitor and dynamically control the lighting to improve urban lighting services delivered, reduce operating costs and achieve energy savings.

In addition, thanks to their ubiquitous nature, connected street lights can act as an Internet of Things (IoT) platform for sensors and critical infrastructure. This will enable councils and other public agencies to rapidly deploy many types of smart city infrastructure in a cost-effective manner including:

- **Traffic controllers and transportation** sensors essential for monitoring and implementing active traffic management strategies
- **Parking vacancy sensors** to support smarter parking and payment systems
- **Environmental sensors** to detect and respond to motion, noise, temperature, rain, flood, humidity, air quality, gas leakages, vibration etc.
- **Utility metering and leakage sensors** – Electricity, Water & Gas
- **Speakers and messaging billboards** - Music and/or emergency broadcast speakers
- **Electric vehicle charging stations**
- **Public safety, security and intelligence**

These smart city technologies will not only dramatically improve the information available to councils and other public agencies, but some of the new services they will enable for the community could also provide new sources of revenue. The recent emergence of Li-Fi that uses visible-light communication may reinforce the pivotal role of each smart street light as a local connectivity hub for other smart cities technologies.

Cities such as Copenhagen³, Barcelona⁴, Glasgow⁵, San Diego⁶ and Los Angeles⁷ and others are all implementing smart, connected street lighting projects that support other smart city functionality.

Slow Adoption of Smart Street Lighting in Australia to Date

As discussed above, smart street lighting networks are likely to be a key enabling platform for the future smart city. Unfortunately, within Australia, there has been a particularly small and slow uptake of smart street lighting controls to date.

² <https://eu-smartcities.eu/content/eip-scc-working-smarten-humble-lamppost-across-europe>

³ <http://www.silverspringnet.com/customer/copenhagen/>

⁴ <https://www.youtube.com/watch?v=k1yJ1x4XsRA>

⁵ <http://futurecity.glasgow.gov.uk/intelligent-street-lighting/>

⁶ <https://www.youtube.com/watch?v=sMhLLkj7os4&feature=youtu.be>

⁷ <http://www.ledsmagazine.com/articles/2015/04/philips-lighting-will-supply-network-technology-for-los-angeles-led-street-lights.html>

While there are some notable small early deployments in locations such as Ryde, Canberra and Adelaide⁸, based on research that IPWEA is currently undertaking for the SLSC Programme, it appears that less than 2000 of Australia's 2.4 million street lights are equipped with smart controls. This compares poorly with other jurisdictions such as the United Kingdom where over 1.5 million street lights with smart controls are already connected.

Barriers to New Street Lighting & Smart Controls Uptake

Why has the adoption of smart street lighting in Australia been so slow to date? As part of its work on the Street Lighting and Smart Controls Programme, IPWEA is currently investigating barriers to the adoption of smart street lighting. These include a range of regulatory, commercial, Standards, knowledge, education and financial barriers.

Without pre-empting this work, IPWEA notes that foremost amongst these is the lack of good alignment between the ownership of the street lights and responsibility for provision of the service. At present, electricity distribution utilities own the great majority of Australian street lights while local governments and main road authorities have legal responsibility for the provision of street lighting for the community. The current situation is particularly challenging for local governments, main road authorities, utilities and pricing regulators because, in most jurisdictions in Australia, minimum street lighting service levels and the relationship between the parties is not robustly defined in either regulation or contracts.

In the context of smart cities, there is an apparent lack of incentive under the National Electricity Law, the National Electricity Regulations and State regulatory requirements for electricity distributors to consider new street lighting and controls technology, little clarity about how new lighting and controls technology choice is to be made in conjunction with those responsible for provision of street lighting and no drivers on the utilities to consider a range of issues of high importance to local authorities such as:

- Minimising the total cost of lighting and smart controls for the community;
- Identifying opportunities to reduce energy consumption and greenhouse gas emissions;
- Considering the quality of lighting and lighting outcomes including all aspects of standards compliance, public safety, public security, public amenity, colour, colour rendering and light pollution in all its forms; and
- Facilitating the integration of street lighting and smart controls with other smart city infrastructure.

In years past, when street lighting technology was relatively stable, the lack of clarity in the relationship between utilities and local governments was not particularly problematic. However, with rapid technological change, the absence of a robust governance framework for street lighting is creating significant challenges for all parties and consequent costs to the community. This includes delays in the adoption of vital smart city infrastructure as evidenced by the slow uptake of smart controls to date in Australia outlined in the previous section.

In considering how to facilitate the future smart city in Australia, the Commonwealth Government, in conjunction with the States and Territories, will need to reconsider the approach taken to street lighting under the National Electricity Law, National Electricity Regulations and State and Territory regulation. IPWEA will be pleased to share its findings with all relevant agencies.

⁸ <http://investadelaide.com.au/why-adelaide/adelaide-smart-city/smart-lighting-trial-project>

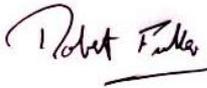
Street Lighting & the Emissions Reduction Fund

The Smart Cities Plan notes, on page 27, the incentive offered by the Emissions Reduction Fund (ERF) for Australian local governments to upgrade old public lighting to more energy efficient alternatives. Estimates from IPWEA advisors are that the incentive offered by the ERF for public lighting projects, based on the first two ERF auctions, is as small as 5% of the capital and installation costs of new public lighting on residential roads (which make up about 70% of all public lighting). Compounding the financial challenge in some jurisdictions, are significant residual asset values that the utilities would seek to claim from local governments for the old lighting before lighting upgrades are made.

In this context, IPWEA believes that it is unlikely that a financial incentive of around 5% of the capital cost of lighting upgrades (or less where residual values are higher) will spur significant additional investment in smarter and more energy efficient public lighting. Enhancements to the Emissions Reduction Fund or other complementary incentives will need to be considered to deliver accelerated deployments of LED street lighting and smart controls systems.

IPWEA would be pleased to engage in further discussions with the Department on the above matters at any point.

Yours Sincerely,



Robert Fuller
Chief Executive Officer
IPWEA Australasia