

Smart Lighting Feasibility Study

■ Public Lighting Group

Webinar

22 NOVEMBER 2017

ARUP

PLG

Agenda

Background

What is Smart Lighting?

What is this study about?

Feasibility Study Outcomes

Costs

Benefits

Considerations

Risks

Recommendations

Questions (15 mins)

As messages

Background

The background image is a dark, low-contrast photograph of a meeting. Several people are seated around a table, their faces partially visible in the dim light. The overall tone is professional and serious. The word 'Background' is prominently displayed in the upper left corner in a clean, white, sans-serif font. A solid yellow horizontal line is positioned directly beneath the text, extending across the width of the word.

What is Smart Lighting?

- 'Smart Lighting' describes LED lighting which has the ability to be controlled by a Central Management System (CMS).
- These systems provide operators with intelligent and flexible lighting control, individual control to street lights, dimming, and asset management.
- Many smart lighting products have inbuilt connectivity that can help connect other Smart City uses and products to the Internet.
- For example, a smart parking system can connect to the Internet via a smart lighting system to send data back to council officers or to car park users.

Stages of Smart Lighting



Level 1

Traditional Lighting

Generally, traditional sodium lighting, mercury vapour or fluorescent.



Level 2

LED

Replacement of LED's creates notable energy savings, changes in lighting profile, compared to sodium lighting.

These efficiencies and advantages are well understood, and are not the focus of this study.



Level 3

Smart Lighting

Connecting lighting (generally LED lights) to each other and to the Internet to enable operational efficiencies for lighting owners. Incorporates a lighting Control Management System (CMS).



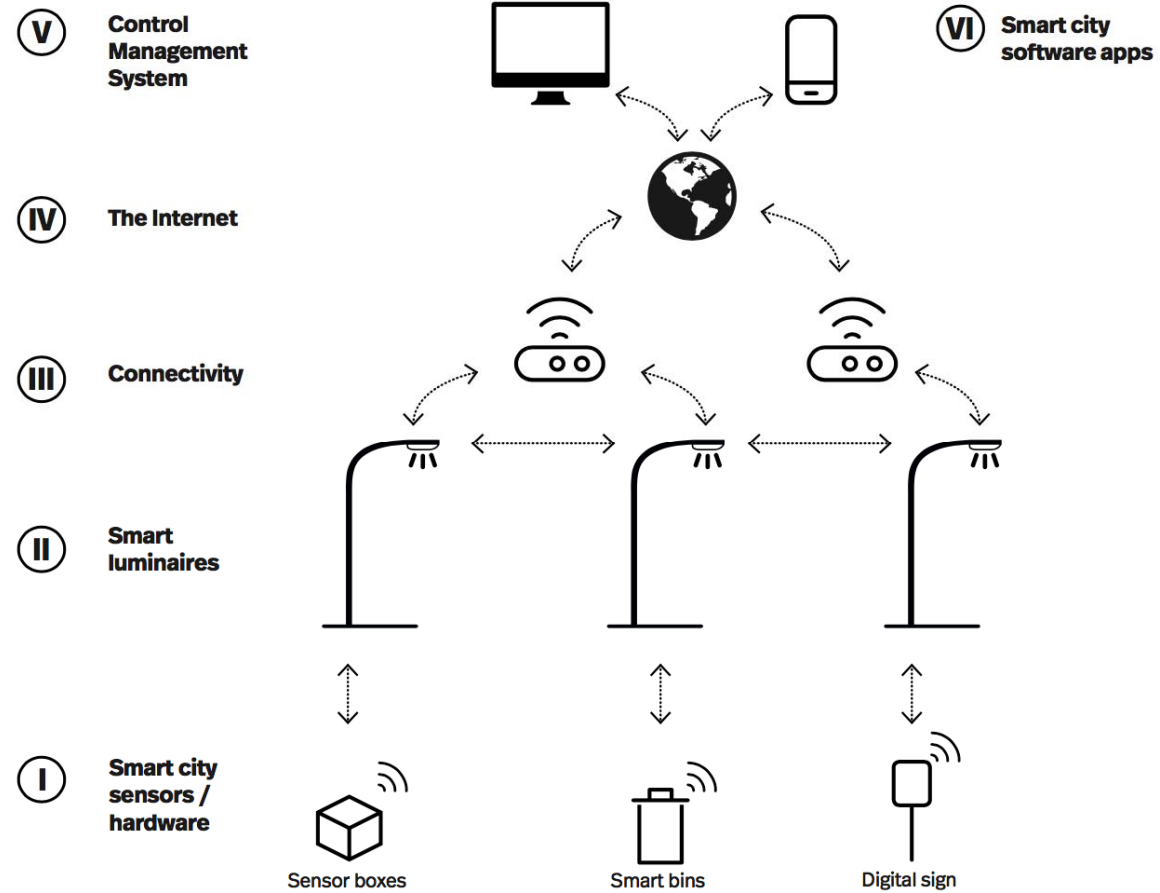
Level 4

Smart Lighting with Smart City Connectivity

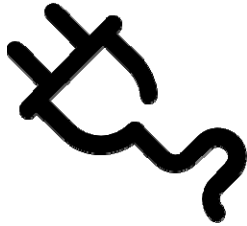
Connectivity can also be used to provide network connection for other smart city uses and products (e.g. smart parking).

Street lighting can be an enabler of these sensors/hardware, due to cities being conveniently scattered with light poles, attachment locations and a reliable power supply.

What is Smart Lighting?



The Role of Smart Lighting



Power

+



Connectivity



Chicago Array of Things

Libelium
Smart Parking





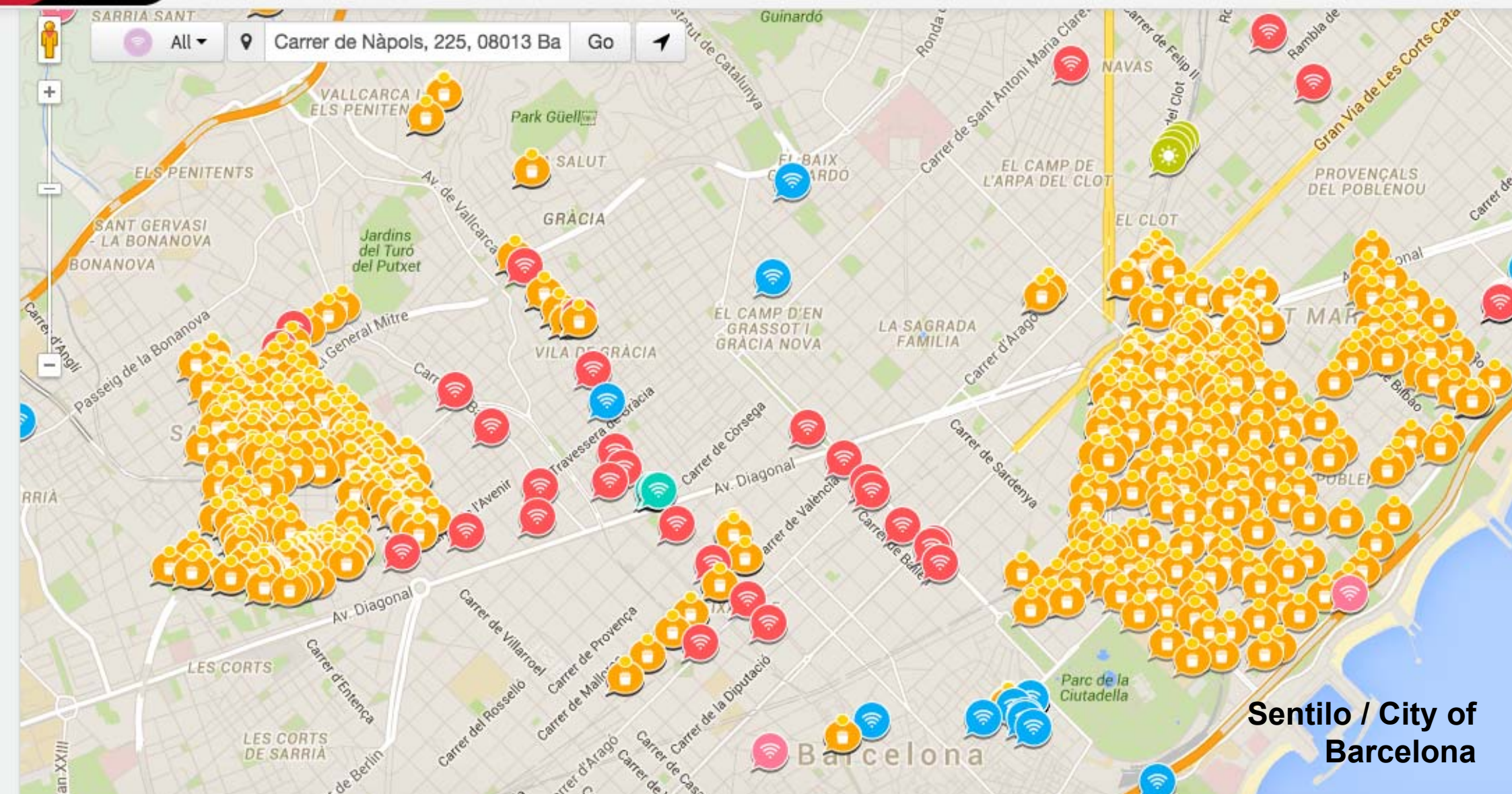
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Study Deliverables

Public Lighting Group.
Smart Lighting Feasibility Study.

Draft
8th August 2017

Arup
Rebecca Chau, Matthew Dunn,
Tim Hunt, Matt Low

ARUP

Draft

Public Lighting Group.
On-Street Community Participation.

Mini Business Case

Draft
7th August 2017

Arup
Rebecca Chau, Matthew Dunn,
Tim Hunt, Matt Low

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Public Lighting Group.
Smart Parking Spaces.

Mini Business Case

Draft
August 2017

Arup
Rebecca Chau, Matthew Dunn,
Tim Hunt, Matt Low

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Public Lighting Group.
Smart City Concept Deck.

31st October 2017

Arup
Rebecca Chau, Matthew Dunn,
Tim Hunt, Matt Low

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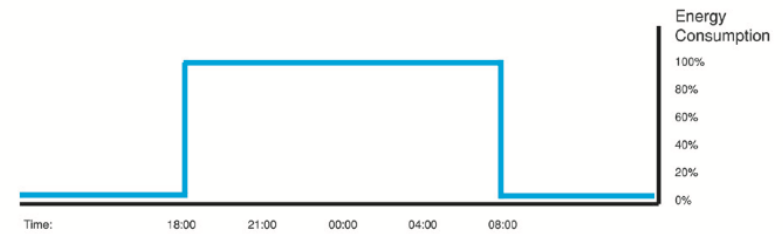
Key Findings



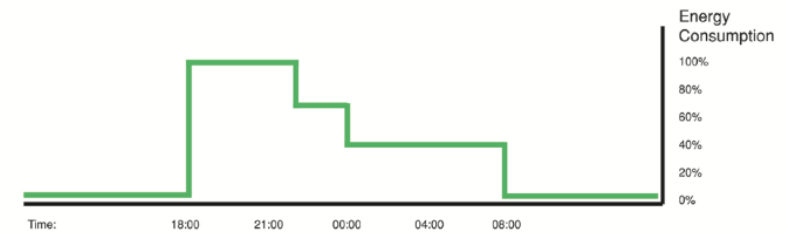
Smart Lighting Benefits

Energy efficiencies
associated with smart
lighting controls

LED lighting (without smart controls) energy consumption profile



LED lighting (with smart controls) energy consumption profile



Smart Lighting Benefits

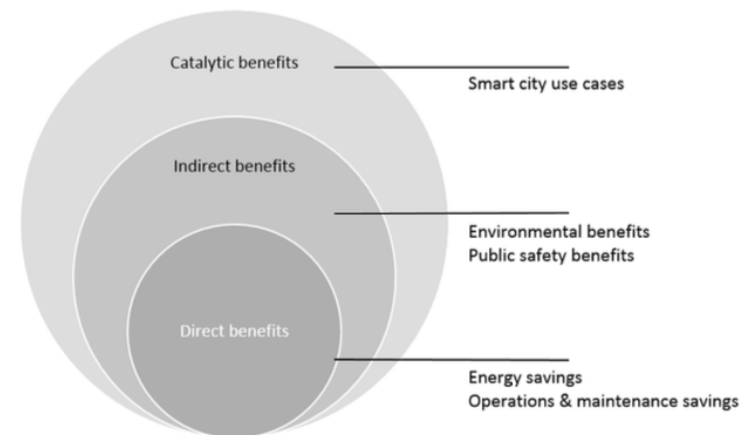
Energy efficiencies
associated with smart
lighting controls

Operational efficiencies
associated with smart
lighting controls

Environmental benefits
as a result of lower
greenhouse gas
emissions

Public safety benefits
associated with more
responsive lighting levels

Enabling Smart City use
cases and products



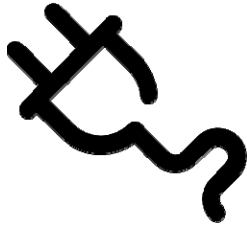
Smart Case Studies

Title/Source	Change	Description	Financial Costs	Financial Payback Period	Other Benefits
Aurich	Level 1 to 3	Installation of CityTouch CMS	Unknown	Unknown	0.14 tonnes of CO2 saved per light annually
Silver Spring Report (supplier commissioned)	Level 1 to 2	LED replacement only	Unknown	8 years	Unknown
Silver Spring Report (supplier commissioned)	Level 1 to 4	LED replacement with connected lighting	20% more expensive compared to normal LED replacement over lifetime (but higher benefits as well)	6 years	Additional financial savings driven by operational savings as well as increased energy savings from dimming and reduced nightly burn time enabled by the network.
Greater Geelong City Council	Level 1 to 4	Rollout of smart lighting in Ocean Grove shopping area	Unknown	Unknown	Public Wifi, public USB charging points - helping to activate Ocean Grove shopping area
San Diego	Level 1 to 4	Installation of LED luminaries, with connectivity and lighting control system (using GE LightGrid), associated smart city applications	Unknown	13 years	Dimming schedules to reduce light use
Dublin City Council	Level 1 to 3	Installation of LEDs with connected lighting	Unknown	8.6 years	7% energy saving compared to normal LED installation
Dublin City Council	Level 1 to 4	Installation of LEDs with connected lighting and connectivity for smart city uses	Unknown	9.1 years	7% energy saving compared to normal LED installation
Adelaide (Pirie St)	Level 1 to 3	Installation of LED luminaries in pedestrian area with dimming feature, pedestrian sensors	Unknown	Unknown	15% energy savings reported

Smart Lighting Considerations

- Ownership
- Lighting Standards
- Regulatory Context
- Alternative Options

The Role of Smart Lighting



Power

+



Connectivity

**Alternate Connectivity
Directional Wifi**



**Alternate Connectivity
LoRaWAN / Things Network**



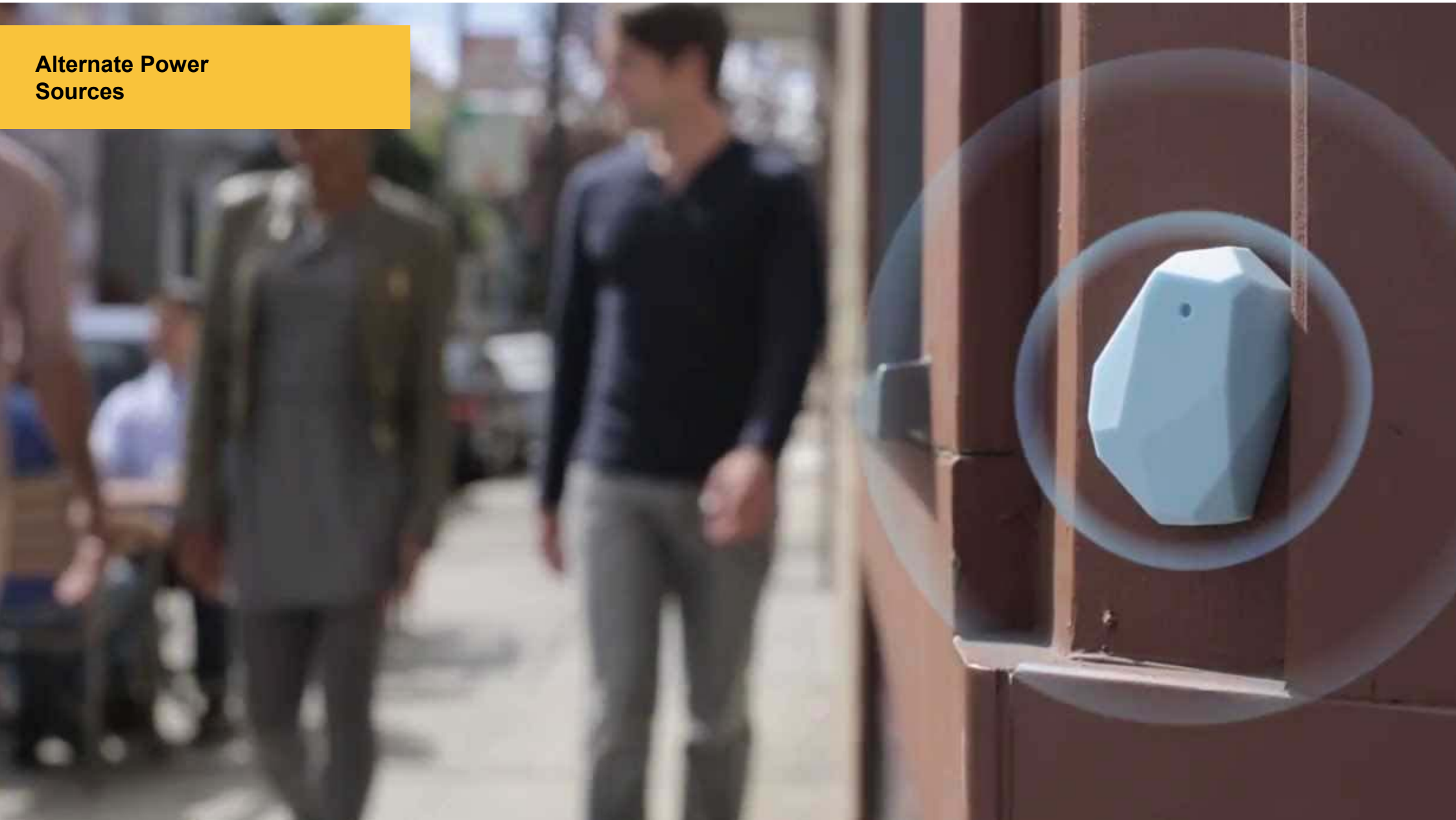
**Alternate Connectivity
Narrowband / Optus x SE Water**



Alternate Power Sources



Alternate Power Sources



Smart Lighting Risks

- DNSPs- Benefit Capture
- Vendor Lock-In
- Data Management
- Funding
- Resourcing
- Benefits Realisation
- Technical Specifications for Smart City Uses
- Alternate Networks

Conclusions



Key Conclusions

- DNSP Challenges
- Limited Smart City Use Cases
- Pilots – Activity Centres
- Wider Rollouts

Recommendation - Pilot

