ACT Smart Lighting

SUSTAINABLE TERRITORIES

SUSTAINABLE CITIES AND STREETLIGHTS - PAST, PRESENT AND FUTURE FOR CANBERRA

Danny Bettay – Smart Streetlighting Electrical Engineer (OMEXOM)
| PhD Candidate (Australian National University)

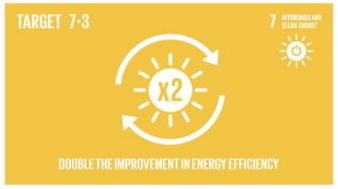
SUSTAINABILITY

MORE THAN SMART, SUSTAINABLE CITIES ARE OUR FOCUS

Sustainable Cities are Smart Cities

Cities that are resilient and sustainable in their actions and culture, and by doing so continue to balance the needs and requirements of current and future generations of humans, more-than-humans and the planet without negatively impacting the ecosystems that provide them.

Sustainable Energy Solutions

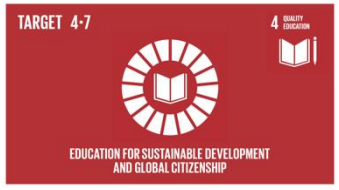


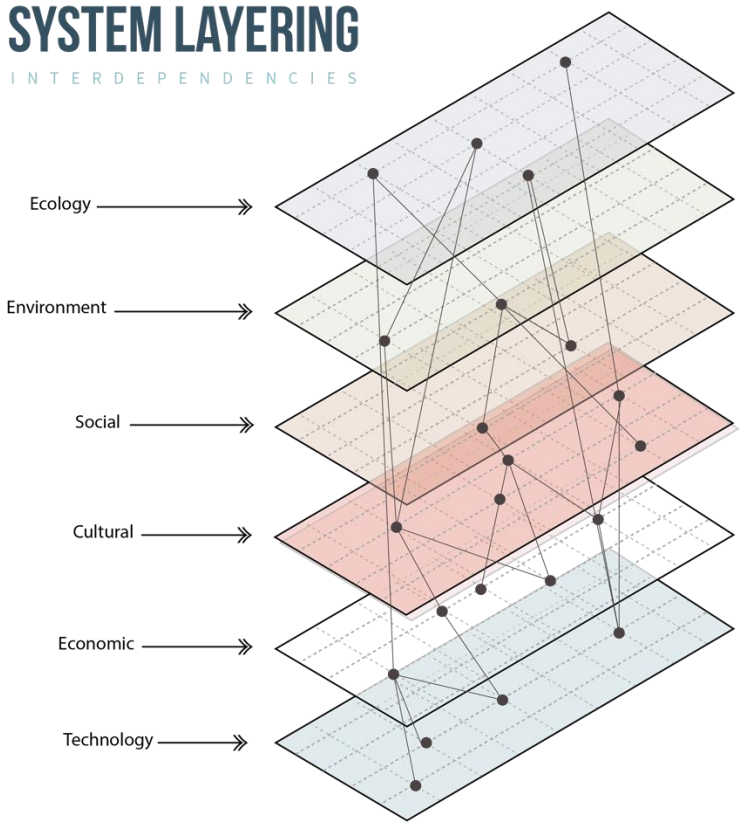
Environmental Transition

Resilient Infrastructure

Multilevel-Community Engagement and Collaboration

Education





SMART/SUSTAINABLE CITY FRAMEWORK

Territorial Governance

Asset and Maintenance Management Data Management

Risk Prevention

Boost Public Safety

Environmental Transition

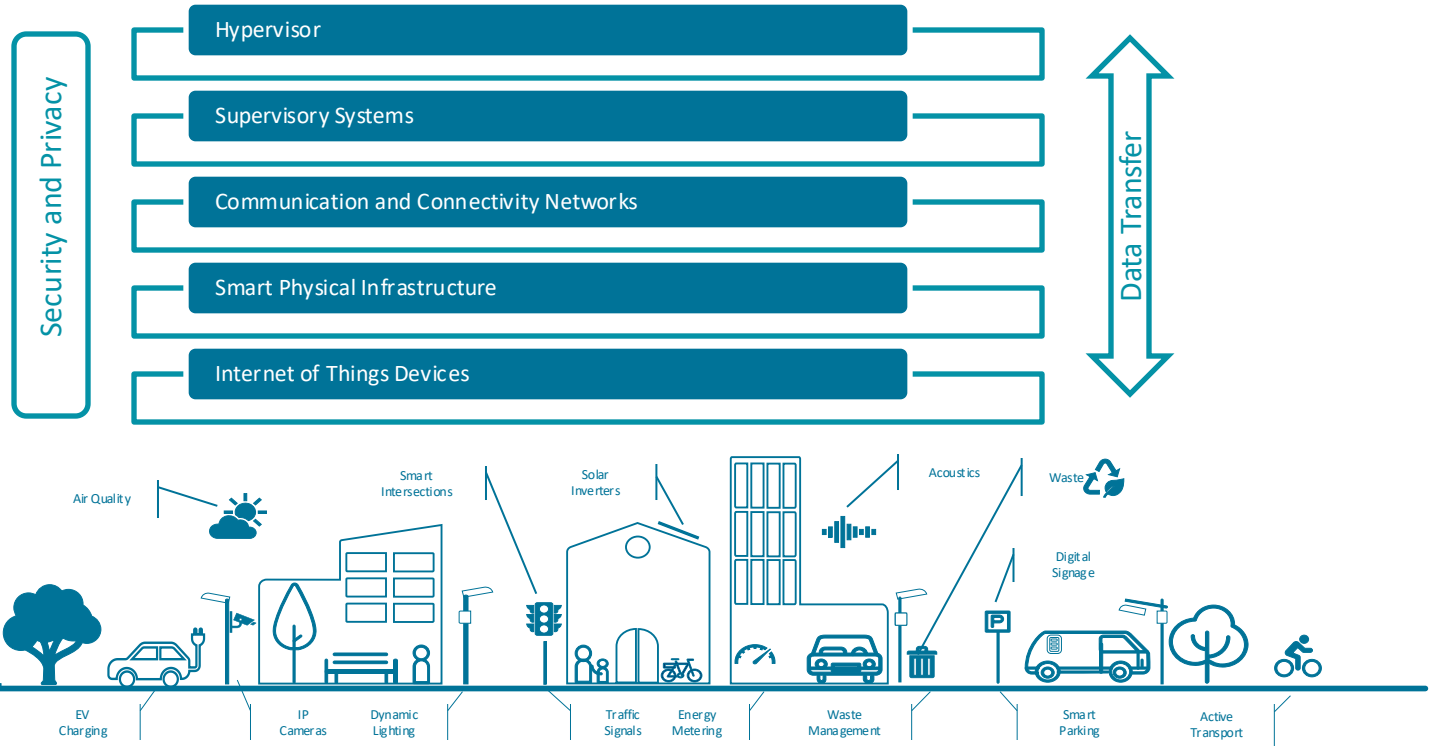
Environmental Sustainability

Energy Transition

Energy Efficiency & Demand Management

Sustainable Mobility

Ease congestion & enhance road safety



SMART/SUSTAINABLE CITY FRAMEWORK

ACT ENVIRONMENT

Data Ingestion and Orchestration:
Hypervisor

BIMCity
CITY HYPERVISION

Applications, Analytics and Interfaces:
Supervisory Systems

CityApp
CMMS solutions

Power BI

Itron

ACT Government
Transport Canberra and City Services

Access Canberra.
FIX MY STREET

BEFORE YOU DIG
www.byda.com.au

ParKam
find.navigate.park

SYLVANIA Schréder
Experts in lightability™
THUNDERGRID

PiP

Intelematics

Communications and Connectivity Networks

Wi Fi

4G
Lte 5G

Itron

NB-IoT

sigfox

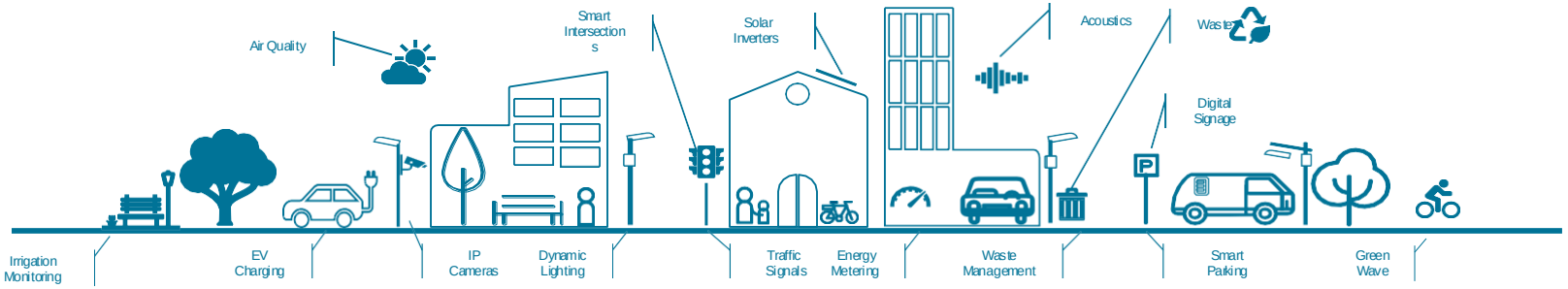
Bluetooth

zigbee

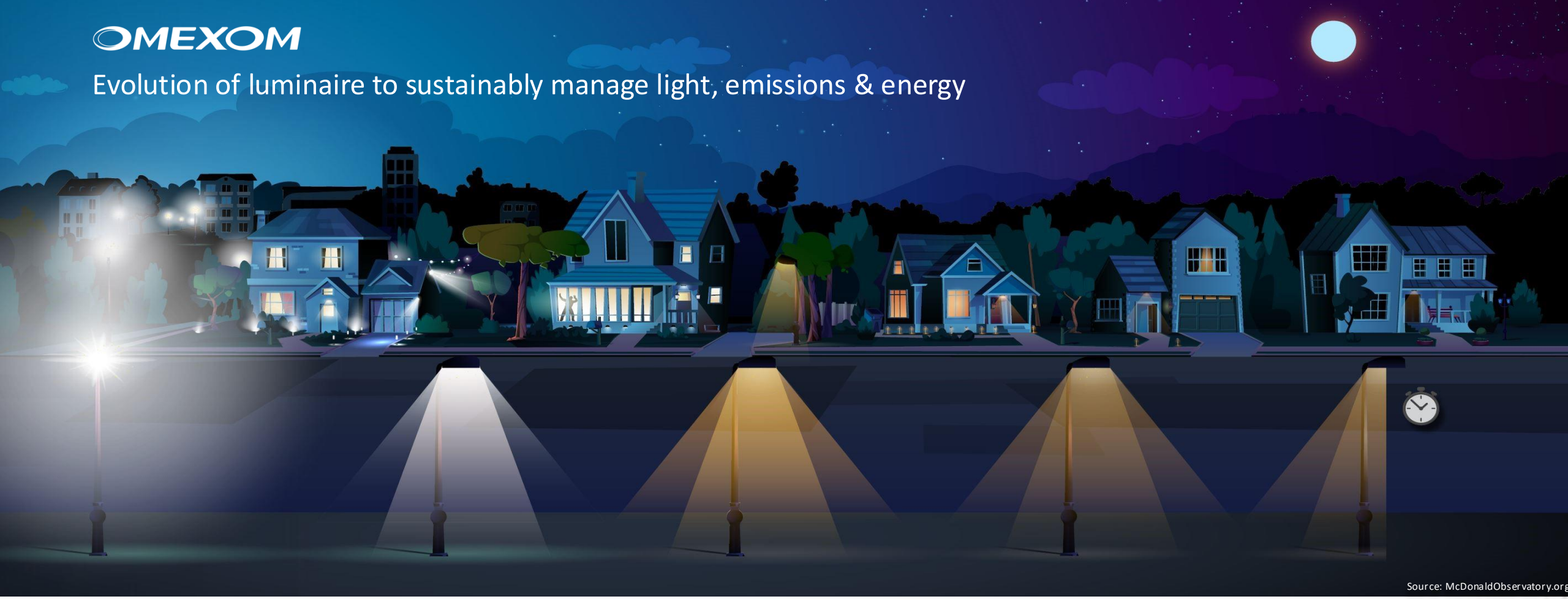
LoRa

Smart Physical Infrastructure

Sensor and Devices:
Internet of Things (IoT)



Evolution of luminaire to sustainably manage light, emissions & energy



Source: McDonaldObservatory.org

HID		LED		SMART CONTROL	
UNCONTROLLED	SHIELDING	LED UPGRADE	COLOUR TEMPERATURE (CCT)	INTENSITY	ADAPTIVE
BASIC	EMERGING	EVOLVING		DYNAMIC	MASTERING
	Light Pollution Reduction No Energy or CO_2 Reduction,	≥ 50% Energy, CO_2 & Light Pollution Reduction	Additional Light (Blue) Reduction – No Energy or CO_2 Reduction	**Trimming** - 5% Energy & CO_2 Reduction. 2.5% Light Pollution Reduction **Constant Light Output** – 10% Energy & CO_2 Reduction. 5% Light Pollution Reduction	**Time Based** – 15% Energy & CO_2 Reduction. 7.5% Light Pollution. **Dynamic** - ≥ 15% Energy & CO_2 Reduction. 7.5% Light Pollution **Tuneable CCT –** Reduce Light Pollution

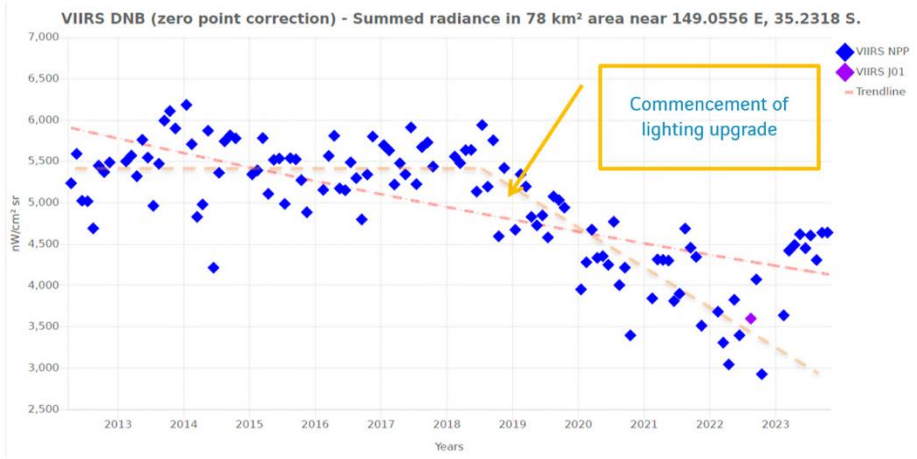
SUSTAINABILITY

LIGHT POLLUTION STUDY

- Collaboration with Australian National University – Mt Stromlo Research Observatory
  - Dr Brad Tucker - Astrophysicist and Cosmologist, Research School of Astronomy & Astrophysics

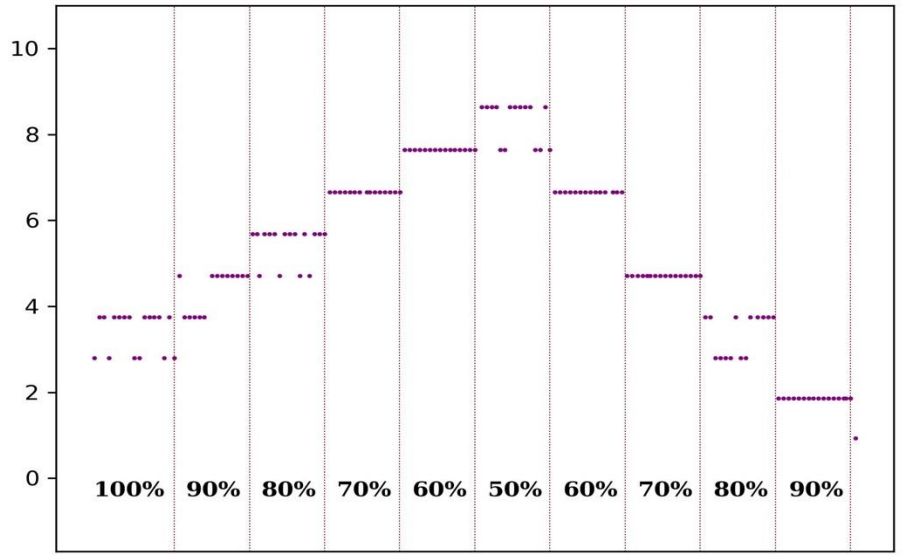
Australian National University

Upgrade to LED reduced sky glow (light pollution) by up to 50%



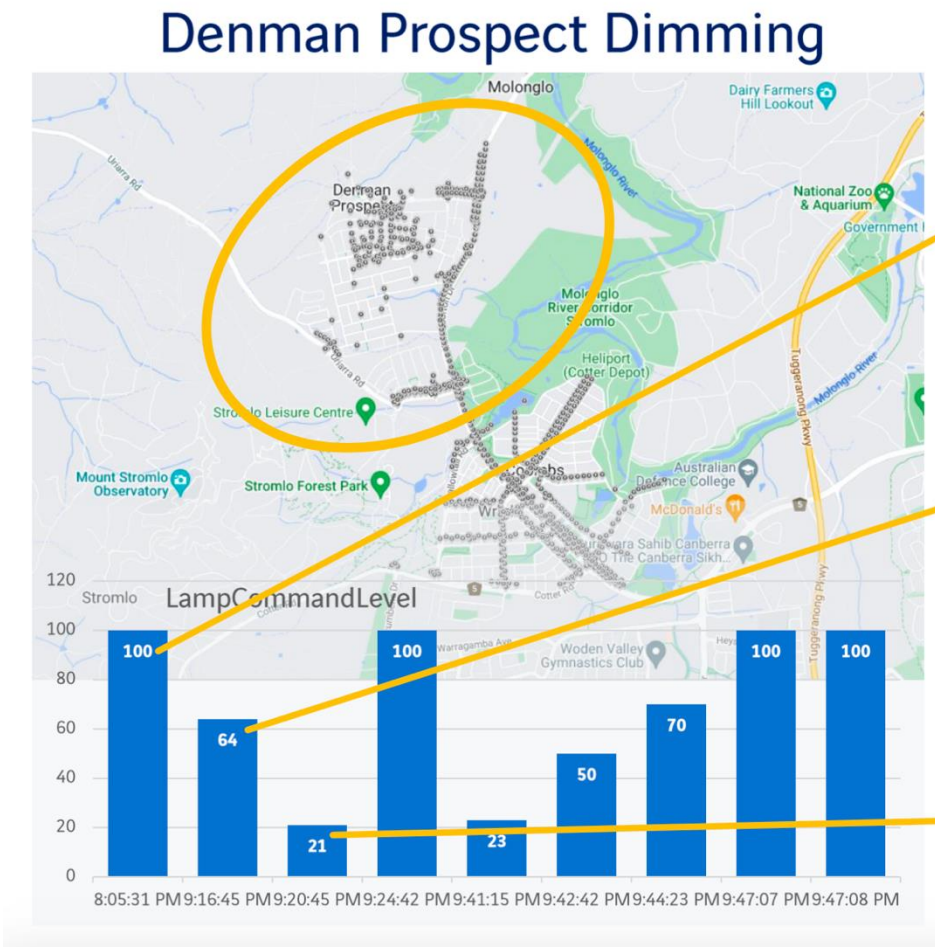
Study of adaptive lighting on sky glow (light pollution)

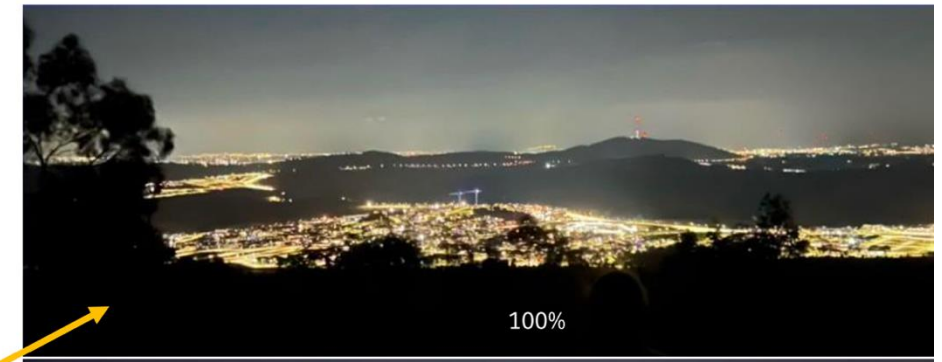
- 6 Month Duration
- Dimming in 10% increments – 100% to 50% to 100%
- Measurement of Visual, Blue, Red & Clear
- Results – Every 10% dimming reduced sky glow by 5%



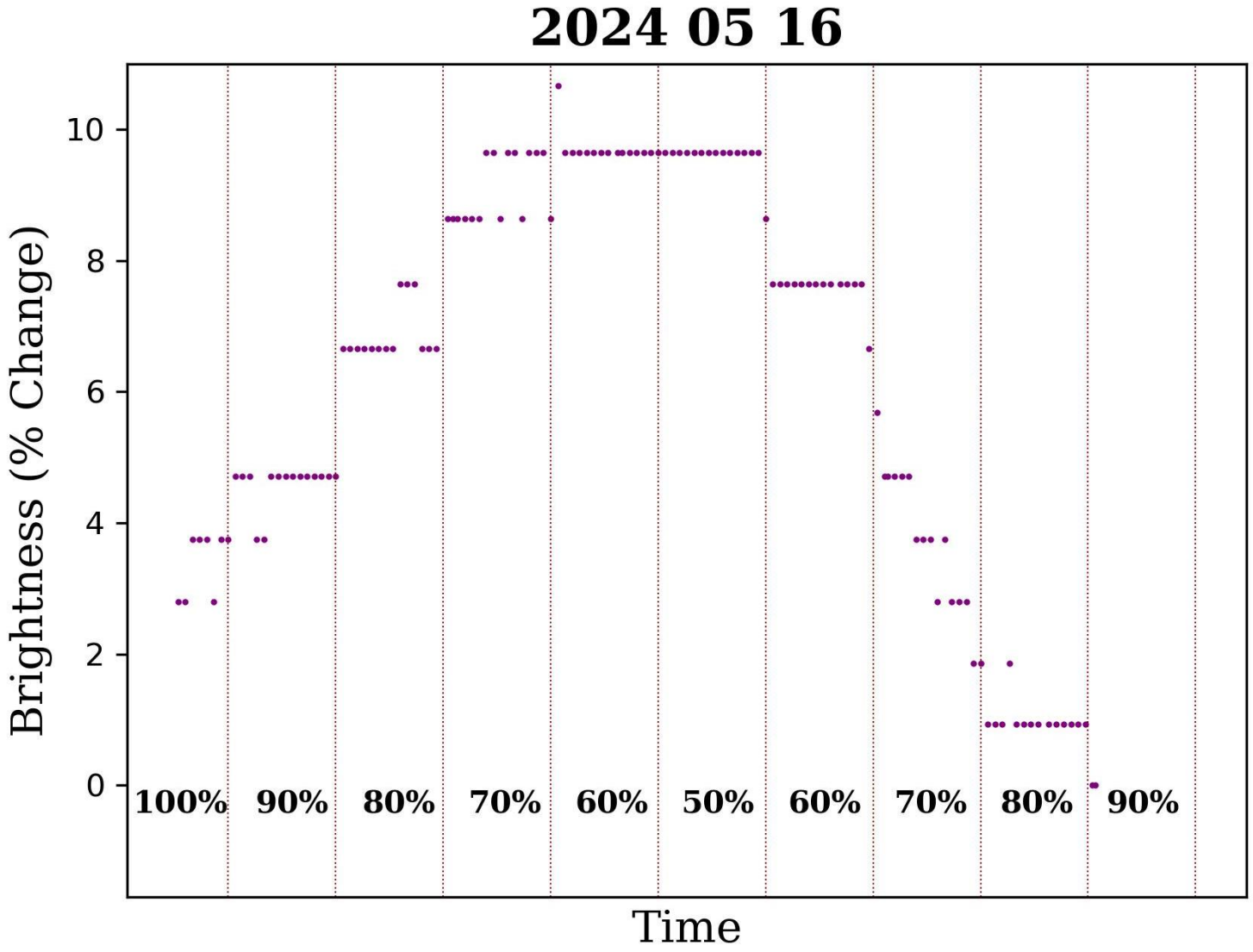
SUSTAINABILITY

LIGHT POLLUTION STUDY

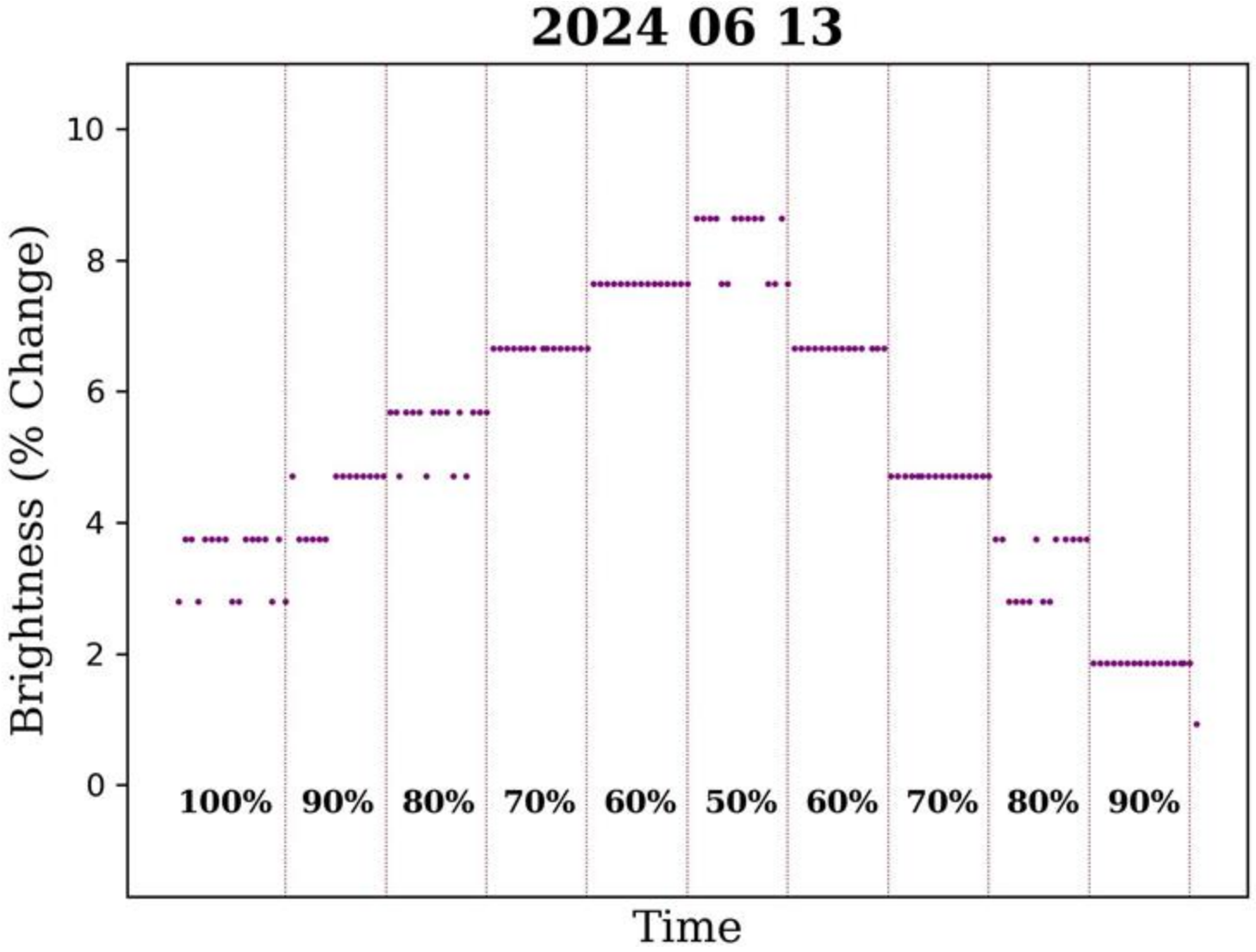




ADAPTIVE LIGHTING



ADAPTIVE LIGHTING



ADAPTIVE LIGHTING PROJECT

CANBERRA'S SUSTAINABLE STREETLIGHTS

A project collaboration between OMEXOM, the Australian National University's School of Cybernetics and Research School of Astronomy and Astrophysics, and the ACT Government

01 STREETLIGHT TECHNOLOGY
EXAMINING DYNAMIC AND ADAPTIVE STREETLIGHTING CAPABILITIES; AND OTHER CPS.

02 ECOLOGY
TESTING SYSTEMS, FRAMWORKS, AND MODELS TO ASCERTAIN DATA ON ECOLOGICAL IMPACTS FROM SSTREETLIGHTS AND OTHER URBAN TECHNOLOGIES

03 SOCIAL
TESTING SYSTEMS, FRAMWORKS, AND MODELS TO ASCERTAIN DATA ON SOCIAL IMPACTS FROM SSTREETLIGHTS AND OTHER URBAN TECHNOLOGIES

04 RESOURCE/ ENVIRONMENTAL
TESTING SYSTEMS, FRAMWORKS, AND MODELS TO ASCERTAIN DATA ON RESOURCE AND ENVIRONMENTAL IMPACTS FROM SSTREETLIGHTS AND OTHER URBAN TECHNOLOGIES

05 TECH
SCALING TECHNOLOGICAL SYSTEMS ACROSS STREETLIGHTING INFRASTRUCUTRE TO UNDERSTAND AND IDENTIFY FUTURE POTENTIAL S

START

PHASE 00
TESTING

PHASE 01
PHASE 01
TESTING - SCALING

PHASE 02
PHASE 02
TESTING - ECOLOGICAL

PHASE 03
PHASE 03
TESTING - SOCIAL

PHASE 04
PHASE 04
TESTING - RESOURCE / ENVIRONMENTAL

PHASE 05
PHASE 05
TESTING TECH

PHASE 06
PHASE 06
TESTING - COMBINED

FINAL PHASE
FINAL PHASE
COMBINED COMMISSIONING

FINISH

01 DETAILS

TESTING
TESTING TECH CAPABILITIES AND SCALABILITY

REPORTS & FRAMEWORKS
TECH-CONTEXT TRIAL OUTCOMES.

TECH-CONTEXT TRIAL OUTCOMES AND ADJUSTMENTS

PUBLIC ENGAGEMENT
PUBLIC CONSULTATION AND FEEDBACK

02 DETAILS

TESTING
TESTING TECH CAPABILITIES AND SCALABILITY

REPORTS & FRAMEWORKS
TECH-CONTEXT TRIAL OUTCOMES.

TECH-CONTEXT TRIAL OUTCOMES AND ADJUSTMENTS

PUBLIC ENGAGEMENT
PUBLIC CONSULTATION AND FEEDBACK

03 DETAILS

TESTING
TESTING TECH CAPABILITIES IN THE CONTEXT OF ECOLOGY-CENTERED DESIGN

REPORTS & FRAMEWORKS
TECH-CONTEXT TRIAL OUTCOMES.

TECH-CONTEXT TRIAL OUTCOMES AND ADJUSTMENTS

PUBLIC ENGAGEMENT
PUBLIC CONSULTATION AND FEEDBACK

03 DETAILS

TESTING
TESTING TECH CAPABILITIES IN THE CONTEXT OF SOCIAL/HUMAN-CENTERED DESIGN

REPORTS & FRAMEWORKS
TECH-CONTEXT TRIAL OUTCOMES.

TECH-CONTEXT TRIAL OUTCOMES AND ADJUSTMENTS

PUBLIC ENGAGEMENT
PUBLIC CONSULTATION AND FEEDBACK

04 DETAILS

TESTING
TESTING TECH CAPABILITIES IN THE CONTEXT OF RESOURCES AND BROADER ENVIRONMENTAL IMPACTS

REPORTS & FRAMEWORKS
TECH-CONTEXT TRIAL OUTCOMES.

TECH-CONTEXT TRIAL OUTCOMES AND ADJUSTMENTS

PUBLIC ENGAGEMENT
PUBLIC CONSULTATION AND FEEDBACK

05 DETAILS

TESTING
IDENTIFYING AND TESTING FUTURE TECH CAPABILITIES ACROSS THE VARIOUS DOMAINS AND OBJECTIVES

REPORTS & FRAMEWORKS
TECH-CONTEXT TRIAL OUTCOMES.

TECH-CONTEXT TRIAL OUTCOMES AND ADJUSTMENTS

PUBLIC ENGAGEMENT
PUBLIC CONSULTATION AND FEEDBACK

06 DETAILS

TESTING
FINAL TESTING AND AFDJUSTMENTS OF REQUIREMENTS ACROSS THE VARIOUS DOMAINS AND OBJECTIVES

REPORTS & FRAMEWORKS
TECH-CONTEXT TRIAL OUTCOMES.

TECH-CONTEXT TRIAL OUTCOMES AND ADJUSTMENTS

PUBLIC ENGAGEMENT
PUBLIC CONSULTATION AND FEEDBACK

FINAL DETAILS

TESTING
FINAL COMMISSIONING OF SYSTEMS AND AGREEMENT ACROSS THE VARIOUS DOMAINS AND OBJECTIVES

REPORTS & FRAMEWORKS
TECH-CONTEXT TRIAL OUTCOMES.

TECH-CONTEXT TRIAL OUTCOMES AND ADJUSTMENTS

PUBLIC ENGAGEMENT
PUBLIC CONSULTATION AND FEEDBACK

SUSTAINABILITY

CURRENT STUDY – MULLIGANS FLAT LIGHT STUDY

- Lighting Study adjacent to Mulligans Flat Nature Reserve

- Two Types of Luminaire:
  - CCT Adjustable Luminaire – 4000k to 2200k
    - Vary light intensity throughout the night
  - Dual Socket Luminaire – Movement Sensor
    - Adjacent lighting controlled via movement sensors

  - ANU Mt Stromlo Research Observatory – Measure effect of:
    - Upward Spill Light – Light Pollution
    - Blue, Red, Green & Clear Light Measurements
    - Nocturnal Animal Study


THANK YOU
& QUESTIONS