



Commercial Lighting for the NSW Energy Efficiency Target

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Objective

- Develop a methodology for calculating energy savings from commercial lighting efficiency projects



Principles

- Maximise eligible lighting measures
- Minimise transaction costs
- Robust, credible & accurate
- Allow for emerging technologies
- Reasonable additionality
- Ex-ante
- Lighting quality



Scope

- Commercial lighting:
 - Lighting for general purpose illumination in the non-residential sector
 - Including common areas of apartment buildings



DAF vs Formulae

- DAFs create de-facto “endorsement” for products
- Commercial lighting products are application specific
- Too many DAFs needed



Formulae

1. Energy saving =
baseline energy consumption
- upgrade energy consumption



Formulae (2)

2. Baseline and upgrade energy consumption:

$$\sum_{\text{lamps}} (\text{LCP} \times \text{Asset Lifetime} \\ \times \text{Annual Operating Hours} \\ \times \text{CM} \times \text{AM})$$



Database

Project Details (multiple nested records per registration batch)

Project Name:	<input type="text" value="25 Pitt Street"/>	Lighting Type	<input checked="" type="radio"/> Road <input type="radio"/> Other
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Space Details (multiple nested records per project)

Space Name:	<input type="text" value="Level 5 office"/>	Space Type:	<input type="text" value="Utility, toilet"/> Circulation, storage, kitchen, boardroom, carpark Office, auditorium, education, wholesale, ward Lobby, laboratory, industrial Examination, hospitality, carpark entry, retail
Subject to Building Code?	<input type="radio"/> Yes <input checked="" type="radio"/> No		
Building Code IPD (W/m ²):	<input type="text" value="N/A"/>		
Area (m ²):	<input type="text" value="350"/>		

Baseline Technology (multiple nested records per space)

Lamp Type:	<input type="text" value="Linear fluorescent"/> Linear fluorescent Circular fluorescent CFLn Incandescent - mains voltage Incandescent - ELV Metal halide Mercury vapour High pressure sodium (HPS)	Ballast Type:	<input type="text" value="A1"/> A1 A2 A3 B1 B2 C D
Number of lamps:	<input type="text" value="75"/>		
Control System 1:	<input type="text" value="Occupancy sensor"/> Occupancy sensor Daylight-linked control Programmable dimming Manual dimming	Control System 2:	<input type="text" value="Occupancy sensor"/> Occupancy sensor Daylight-linked control Programmable dimming Manual dimming
Air Conditioned?	<input checked="" type="radio"/> Yes <input type="radio"/> No		



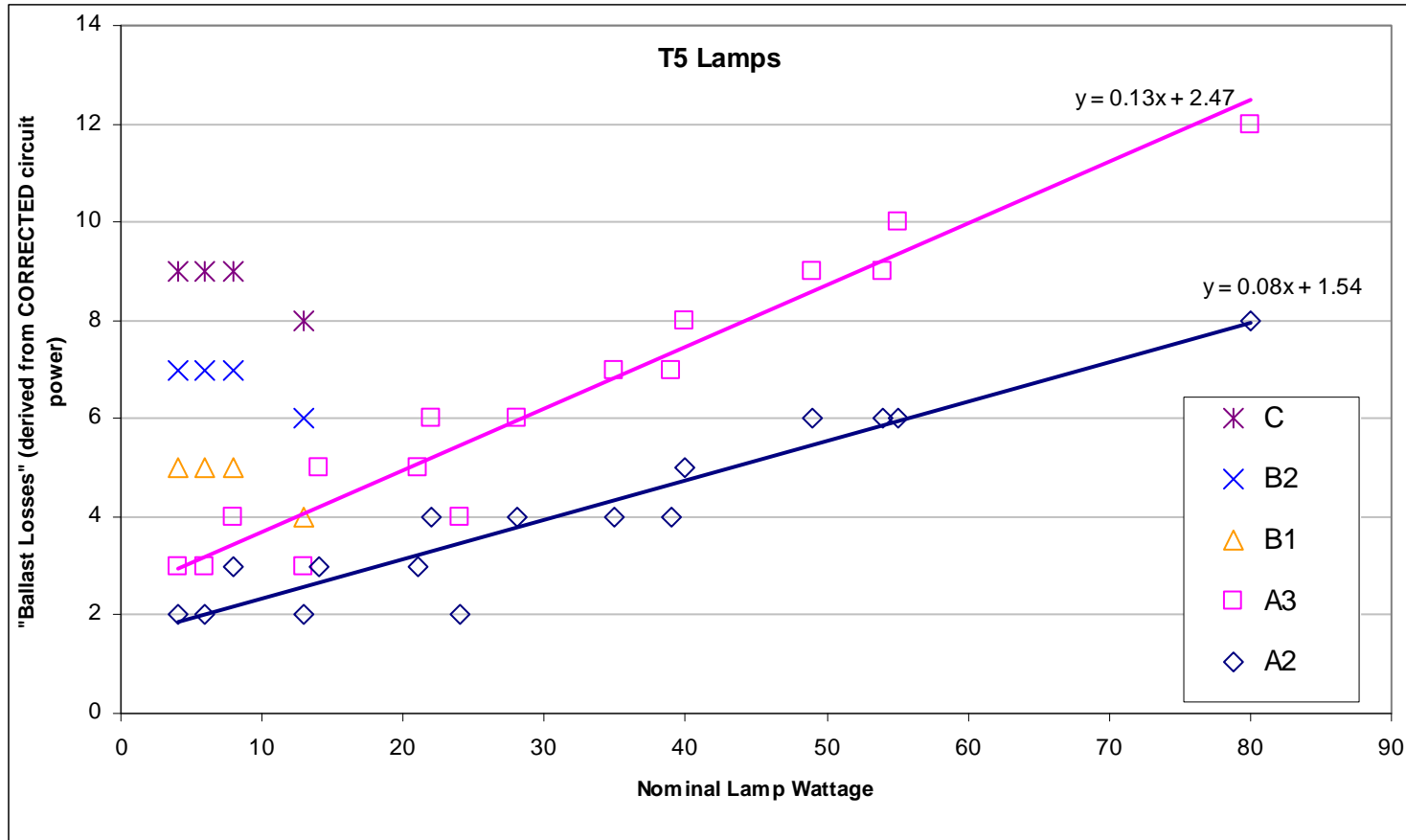
Database (2)

- Database looks up values for LCP, AM, CM, etc.

Ballast EEl:	A1	A2	A3	B1	B2	C	D
T8 and T12 Lamps	NLP + 2	NLP	NLP + 2	NLP + 6	NLP + 8	NLP + 10	NLP + 12
T5 Lamps	1.13 x NLP + 2.5	1.08 x NLP + 1.5	1.13 x NLP + 2.5	N/A	N/A	N/A	N/A
CFLn Lamps	NLP + 3	NLP + 1	NLP + 3	NLP + 5	NLP + 7	NLP + 9	NLP + 11

NLP = nominal lamp power

Database (3)





Database (4)

- CM:

Occupancy Sensor	Daylight-Linked Control	Programmable Dimming	Manual Dimming	Maximum Allowable Total
0.7	0.7	0.85	0.9	0.6

- AM: 1.0 or 1.3



Other Relevant Info

- Asset lifetime \approx 10 years (or nominal lamp life)
- Default annual operating hours:
 - Road: 4,500 hours p.a.
 - Other: 3,000 hours p.a.
- Can apply (in advance) for non-default values



Other Relevant Info (2)

- If subject to Building Code, Baseline consumption based on IPD required
- Pre-approval required for LED, induction lighting, T5 Adaptors, voltage reduction, technology not in DB
- Administrator can require independent verification of performance claims



Evidence

- Range of evidence categories
- Proponent / occupant declarations
- Database upload capability?

- Photograph
- Installation record
- Purchase order
- Invoice
- Delivery docket
- Disposal record
- Independent witness
- Manufacturer specification sheet

Project Guidelines (Summary)

- High power factor equipment
- No change in use
- De-lamping permanent
- Light levels measured / modelled before and after installation
- AS/NZS 1680 for maintained illuminance, uniformity, colour temperature, colour rendering, glare
- Road Lighting: comply AS/NZS 1158



Simple Case Study

- Per 100m² office space:
 - B2 triphosphor for HP A2 triphosphor luminaires
 - IPD from 10.5 to 5.5 W/m²
 - 24 lamps to 15
 - + occupancy & daylight control
 - Reduce cost from \$3000 to \$2300 (~25%)



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