Lighting Control Technologies
for Energy Saving

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• Current Control Technologies
  – Daylight Harvesting
  – Occupancy Sensing
  – Dimming
    » DSI, DALI, DMX
  – Timed (TPCU), Manual (PCU) & Logic (PLC/PIC)
  – Combined Technologies & Advanced Control

• Future Control Technologies
Daylight Harvesting
Daylight Harvesting

- What is Daylight Harvesting?
- How does it work?
- Does it work?
What is Daylight Harvesting?

- On/Off based upon ambient light
  - (Photocell)

- Dimming based upon ambient light
  - (Daylight Sensor)
Daylight Harvesting

• How does it work?
  – Photocell

  Photocell detects \rightarrow Relay switches

  – Daylight Sensor

  Daylight Sensor detects \rightarrow Control signal issued \rightarrow Luminaire responds

• Does it work?
Daylight Harvesting

Daylight Sensor for CFL & Fluorescent

• Day

• Dusk to Dawn
Daylight Harvesting

![Graph showing electrical power over the day with 'Available Daylight' marked.]
Daylight Harvesting
Daylight Harvesting

Daylight Sensor

Heat
Glass Front / Windows
Skylights
Insulation
Fluorescent
Occupancy Sensing
PIR (Passive Infrared)

- Corridors
- Open Areas
- Simple
- Heat Detection
- Heat
- Jump & Wave
- Small Office
Occupancy Sensing

- PIR & Microphonics
  - Cubicle / Partitioned Areas
  - Back-Facing
  - Heat & Sound Detection
  - Noisy Equipment
  - Complex
  - Open Areas
Occupancy Sensing

- Solid Walled Areas
- Heat & Movement Detection
- Any Movement
- Moving Equipment
- Complex
- Open Areas
Dimming

• Automatic
  – Daylight Harvesting
  – Occupancy Sensing

• Manual
  – Telemanagement
  – PCU

• Timed
  – PLC
  – TPCU
Dimming Protocols

- DSI (Digital Serial Interface)
  - Two-Core Low Voltage
- DALI (Digital Addressable Lighting Interface)
  - Two-Core Low Voltage
- DMX (DMX512 DeMultiplexer)
  - Five-Core Low Voltage
- Daylight Harvesting & Occupancy Sensing
• Corridor Function
Advanced Control
• Traditionally Indoor / Office

• Can Street Lighting be Dimmed?
Surely I can switch off every alternate luminaire?

- 50 percent saving in energy
- Danger to Road Safety from uneven illumination

- NOT RECOMMENDED
Dimming of HID Lamps - HPS

- Power Switch (PCU)
- Timed Power Switch (TPCU)
  - Differences
  - Applications
    - 250W, 400W & 600W HPS
• Externally Switched
• Standard Applications
  – Highways & High Usage Roads
  – High Contrast - Peak & Low Traffic
  – 250W, 400W & 600W HPS
    • 250W – 150W
    • 400W – 250W
    • 600W – 400W
  – Required
    • Igniter, Special Ballast & Power Switch
    • Additional Cable/Core
    • PLC, Manual or Logic Control
Power Switches - Reduce Luminous Flux

• Approx. 50% energy saving
• Road safety still guaranteed
  – uniform lighting maintained
• Higher once-off initial costs
• Short pay-back periods
• New Installations
  – Loop controlled switching
  – Double Reflector
  – Double Luminaire
  – PLC (Programmable Logic Controller)
  – Telemanagement
Power Switch (PCU)

- New Installations
  - Loop controlled switching
Power Switch (PCU)

- New Installations
  - Loop controlled switching
• Internally Switched
Combined Technologies

• Retrofitting for Energy Reduction
  – Timed Power Switch & Double Luminaire
Timed Power Switch

- Standard Wiring

- Alternate Wiring
Timed Power Switch

$P_L$

100%

red.

$t$

5 h

11 h
Timed Power Switch

- Double Reflector Luminaire
  - 2* 150W MH-T
  - TPCU
Timed Power Switch

- Switch On
- After 5 hours
- After 11 hours
- Daybreak
Combined Technologies

Dual Reflector Technology & TPCU

• Low traffic conditions
  – 50% light output reduction

• Approx. 50% energy saving

• Road safety still guaranteed
  – uniform lighting maintained

• Higher once-off initial costs

• Short pay-back periods
Combined Technologies

- DLS
- PIR
- PCU
Combined Technologies

- Industrial Applications
  - Mines
  - Plants
  - Machine Floors

150W, 250W & 400W HPS-T
(eg. BEKABAY)
PCU
Occupancy Sensors
Maintenance Override
Combined Technologies

• Industrial Applications
  – Mines
  – Plants
  – Machine Floors

  150W, 250W & 400W HPS-T
  (eg. BEKANOVA/BEKASTRADA)
  PCU
  IR Beams
  Maintenance Override
What does the future hold?

A look into the looking glass…
Energy Saving or Power Generation

What is the world up to?
A computer launched kite saving approx $1500 per day or 20% in fuel consumption.
Thank you

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