# *Intelligent Zone Lighting*

## *智能區域照明*

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- Lighting in HK consumes 13% of total electricity in 2013 (HKSAR EMSD)

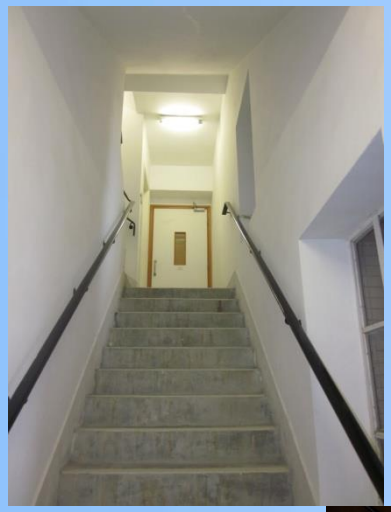
Picture source : https://www.blendspace.com

- Power plant Greenhouse gas emission was 68.2% of total emission in 2012 (HKSAR Environmental Protection Dept)

Picture source : http://ohiocitizen.org/

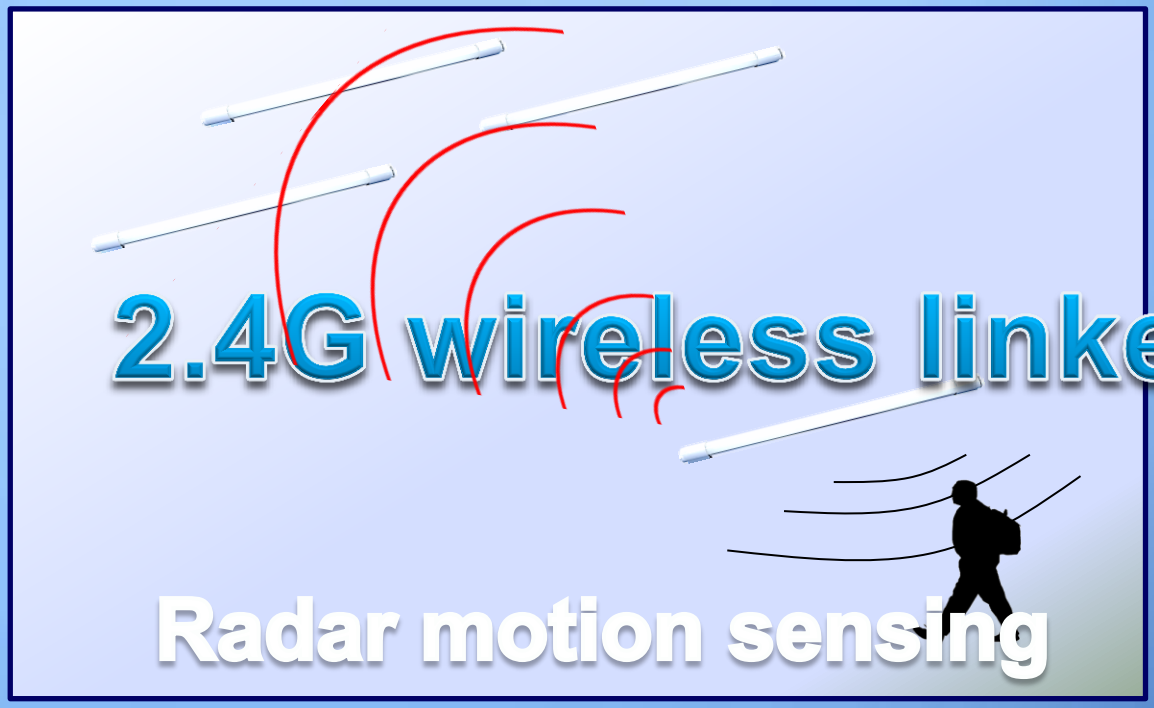
# Public area lighting is wasting energy

- Public area lighting in buildings need 24 hr lighting
- Access is infrequent



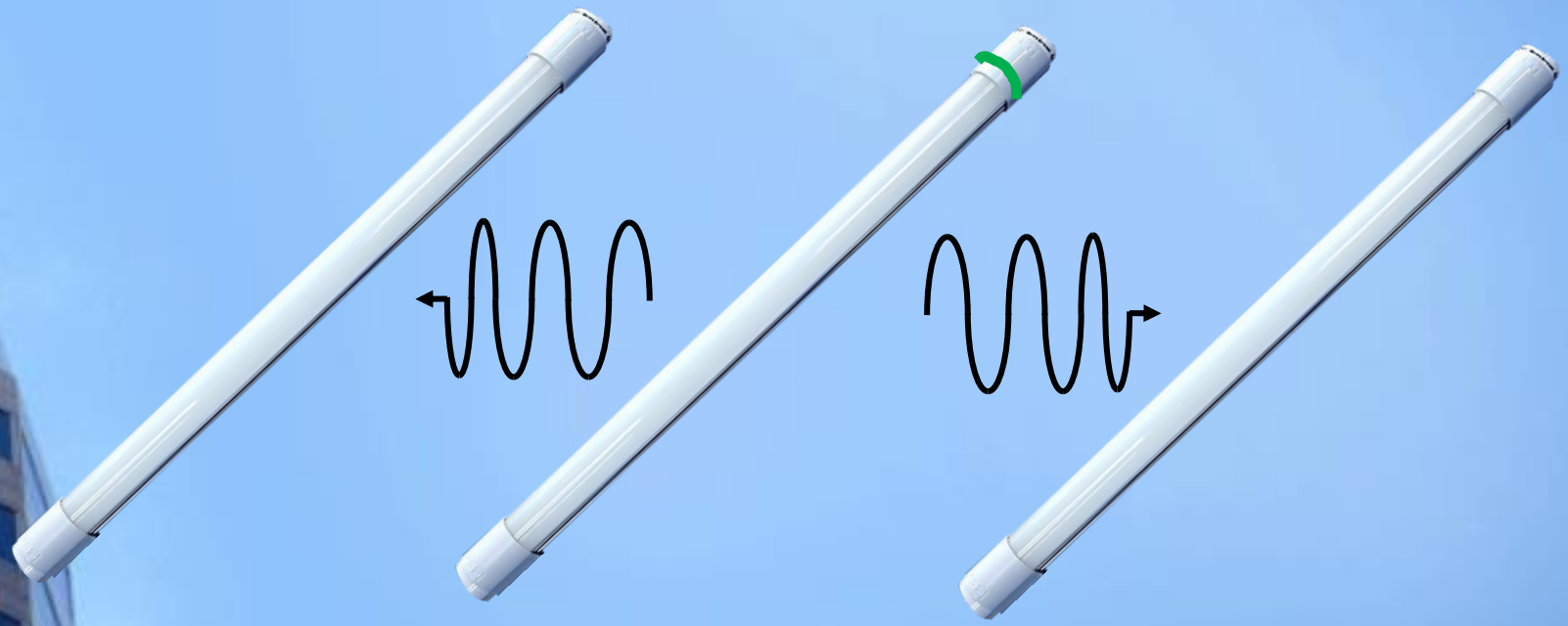
# Solution for you

- Automatic zone lighting with dimming control



# Master and Slave lamps with Wireless Communication

- Master lamp controls **unlimited** number of slave lamps within range (~30m)



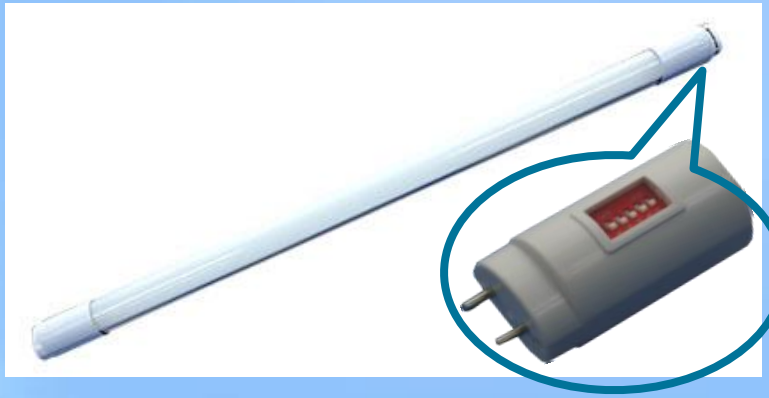
Slave

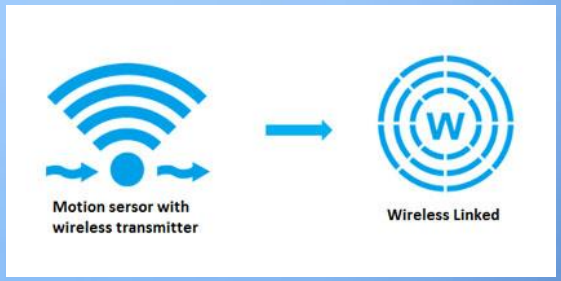
Master with Motion sensor

Slave

# CET SmartDIM III
# Multiple Intelligent lamp system

- Integrated radar motion sensor and wireless transmitter or receiver
- Master and slave lamps
- Addressable for zone setting
- Sensitivity adjustment
- Dim brightness adjustment
- Dim delay adjustment





# Proprietary wireless protocol

- Why don’t we use Zigbee ?
  - For low cost
  - For simplicity, we have no main programmable controller
  - For security, we can’t be hacked
  - For avoidance of revision maintenance costs

# Proprietary wireless protocol

- Why don't we use wired or semi-wired system such as DALI ?
  - Wiring is expensive – material and manpower
  - Central programming is expensive
  - Limited number of addressable lamps, we use wireless broadcast technique with no limit on the number of slaves

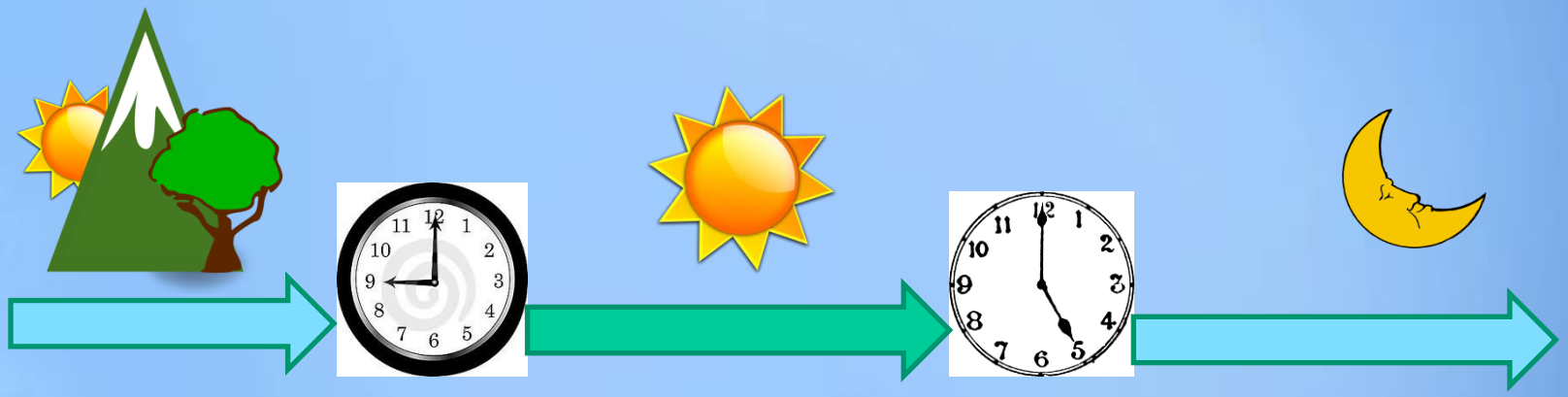
# Different types of sensor control

- Integrated sensor in lamp
- Detached motion sensor

- Detached Daylight sensor

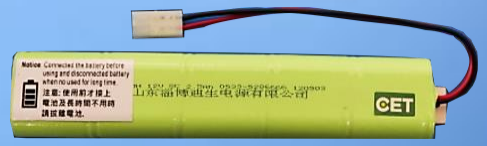
# Timer control

- External sensors with timer can define sensor active period



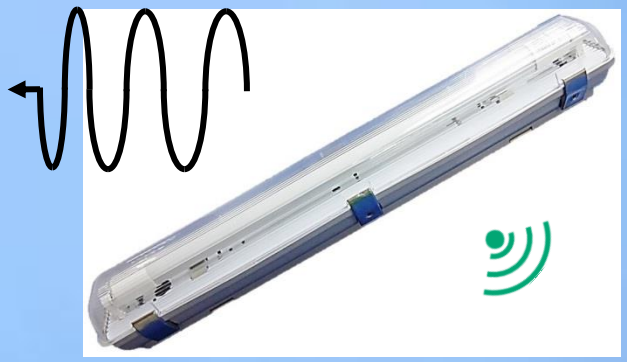
# Battery back up fixtures for the SmartDIM III Lamp tubes

- Dedicated fixtures with fire safety approval (HKFSD)



# Outdoor applications

- Motion sensing and wireless communication in CET lamps can penetrate through non-metallic enclosures.
- Parks, playgrounds, gardens, swimming pools, campsites, walkways, bus terminals, parking lots, farms, construction sites, tunnels, stadiums, ferry piers, ….



# Energy Consumption comparisons

| lamp | Power (W) | Annual consumption (kWh)* | Electricity bill by HKE rate ** (HKD) |
|---|---|---|---|
| T8 36W lamp with magnetic ballast | 48 | 421 | $709 |
| T8 36W lamp with electronic ballast | 34 | 298 | $480 |
| T5 28W lamp with electronic ballast | 30 | 263 | $415 |
| 20W LED lamp | 20 | 175 | $252 |
| CET SmartDim III | 8.65 | 76 | $88 |

* CET SmartDIM III calculation based on 3 hour full brightness and 21 hour dimmed in a day
** Based on100 tubes consumption and average per tube

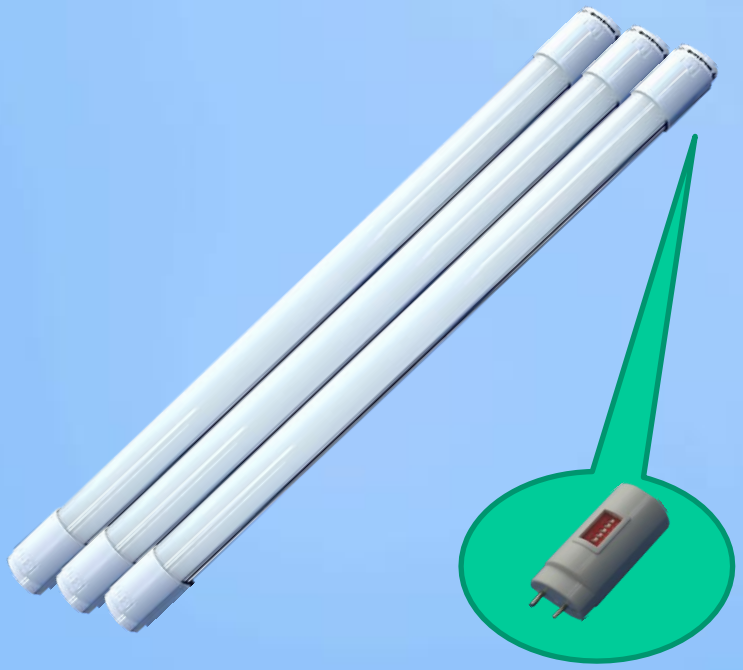
# Extra Benefits

- Extended LED life – Dimming allows LEDs to work at lower temperature

- Green Building – credits from LEED & BEAM

# Applications of 2.4G CL Series LED Lamp Unit with Wireless Communication

- Much more than just an LED lamp…

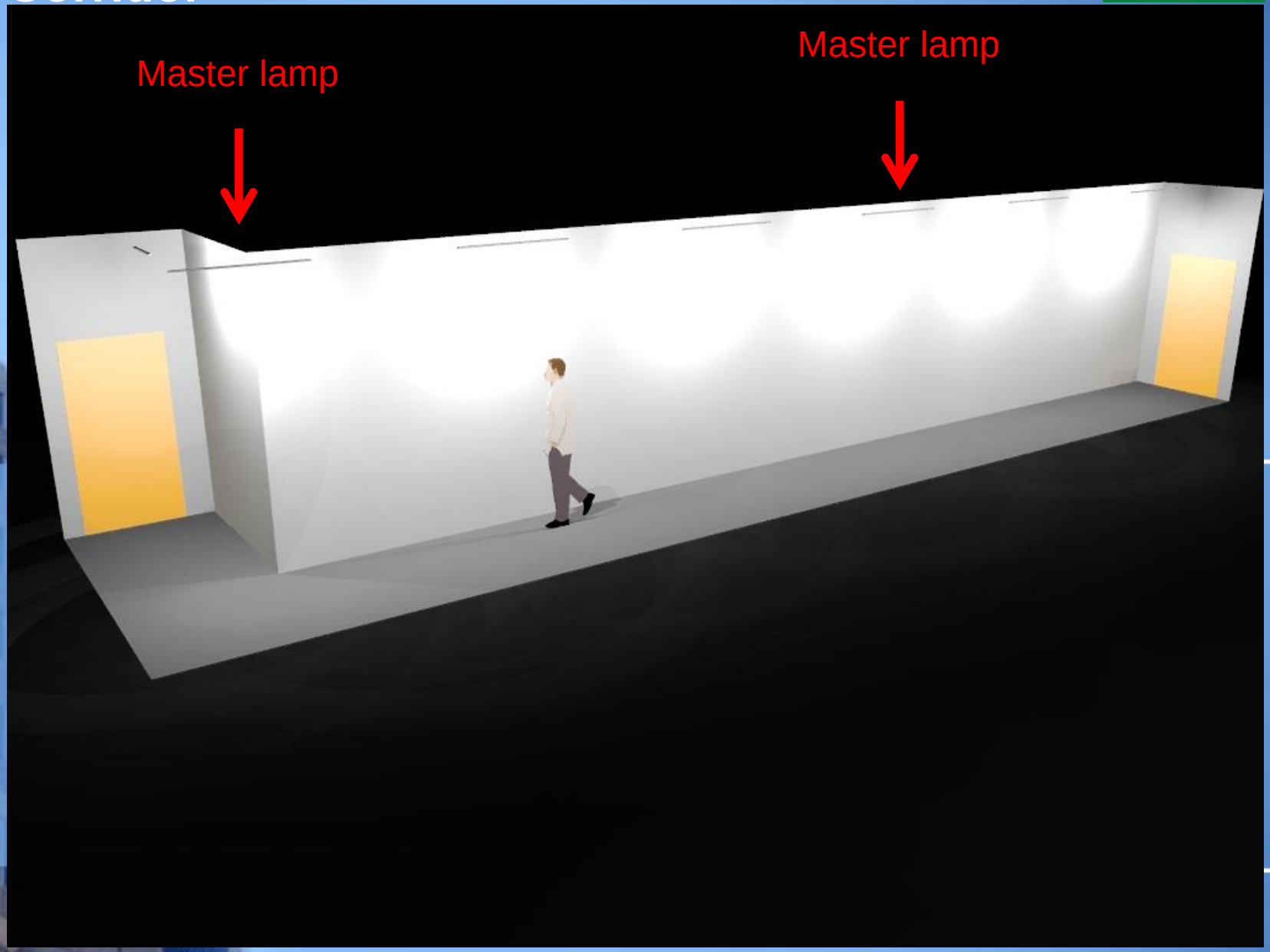


Motion sensor

+

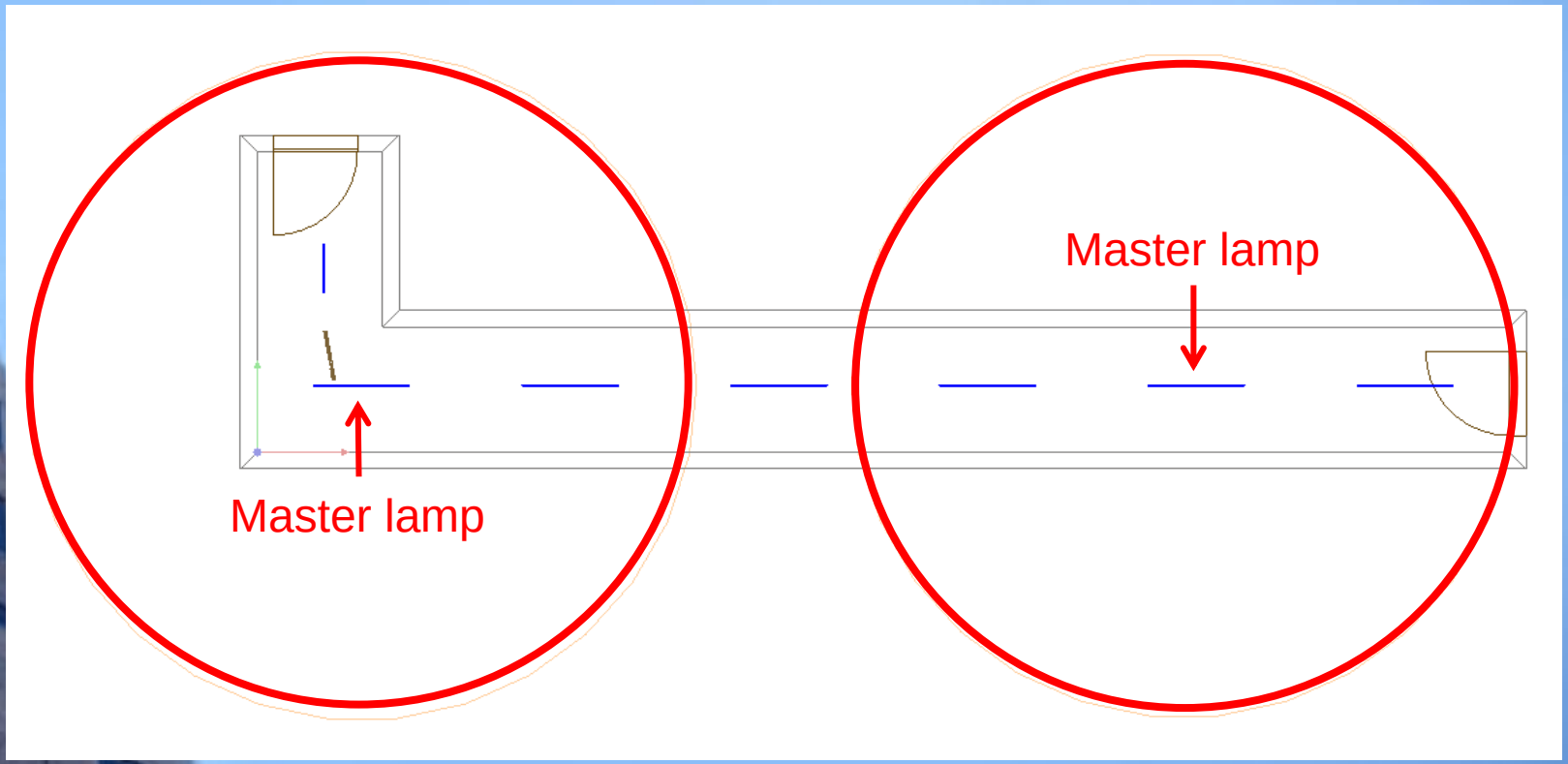
Wireless link

# Corridor



## Lamp placement

- Motion sensing radius is 4m (height < 4m)
- RF transmission radius is 20m, straight line distance
- In this corridor, 2 masters and 5 slaves



# Energy saving in corridor

- Savings 82% to 85%
- 365 operating days in a year
- 24 operating hours a day
- 3 hours bright

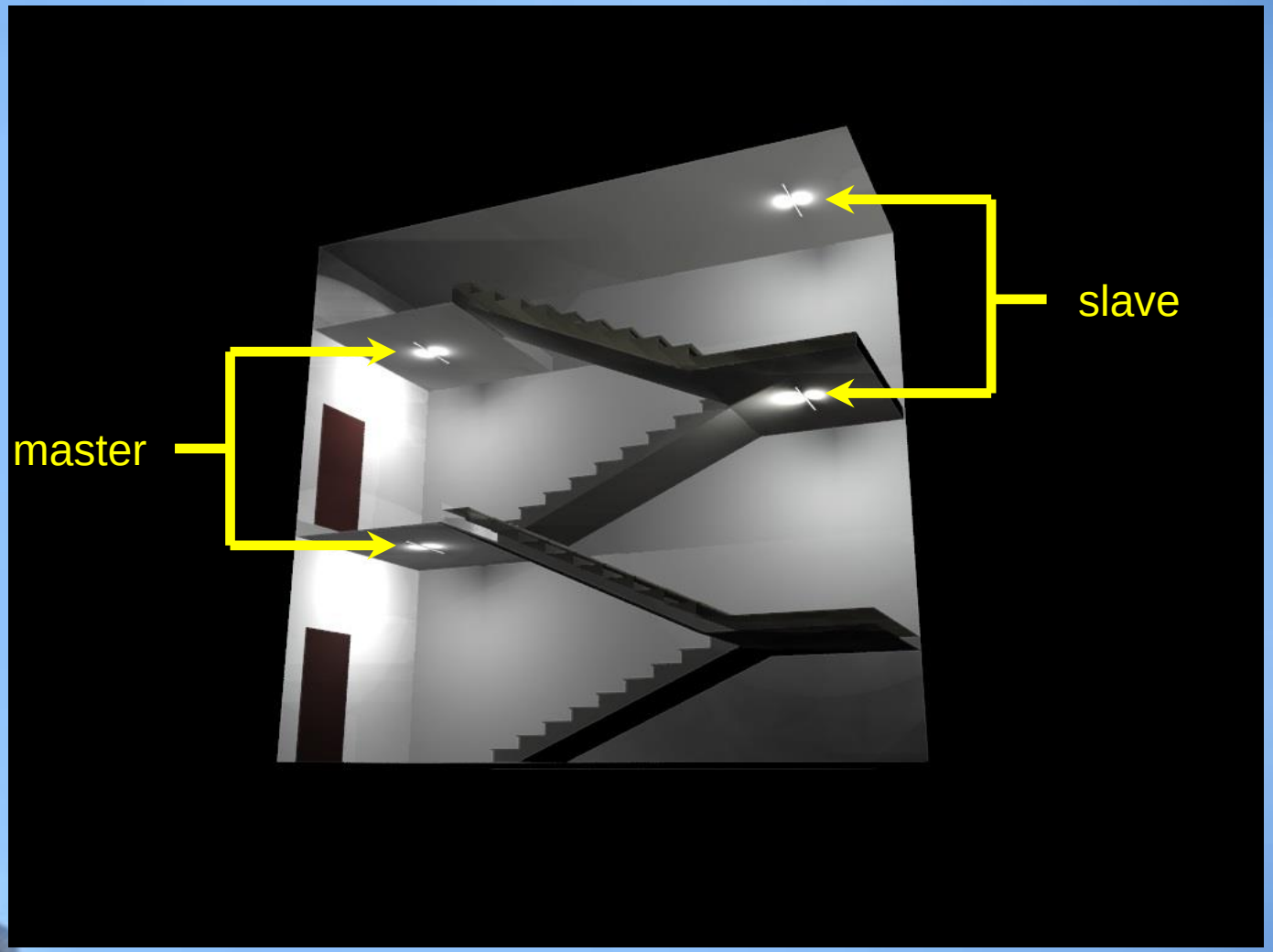
CET Energy Saving Lamps Compared with T8 Fluorescent Lamp

| Product : CL Series Intelligent LED Tube |  |
|---|---|
| Features | |
| ➢ External or Integrated motion sensor. | |
| ➢ Automatic dimming for energy saving. | |
| ➢ Fit into generic fluorescent battens. | |
| ➢ Wireless link between sensor & lamps. | |

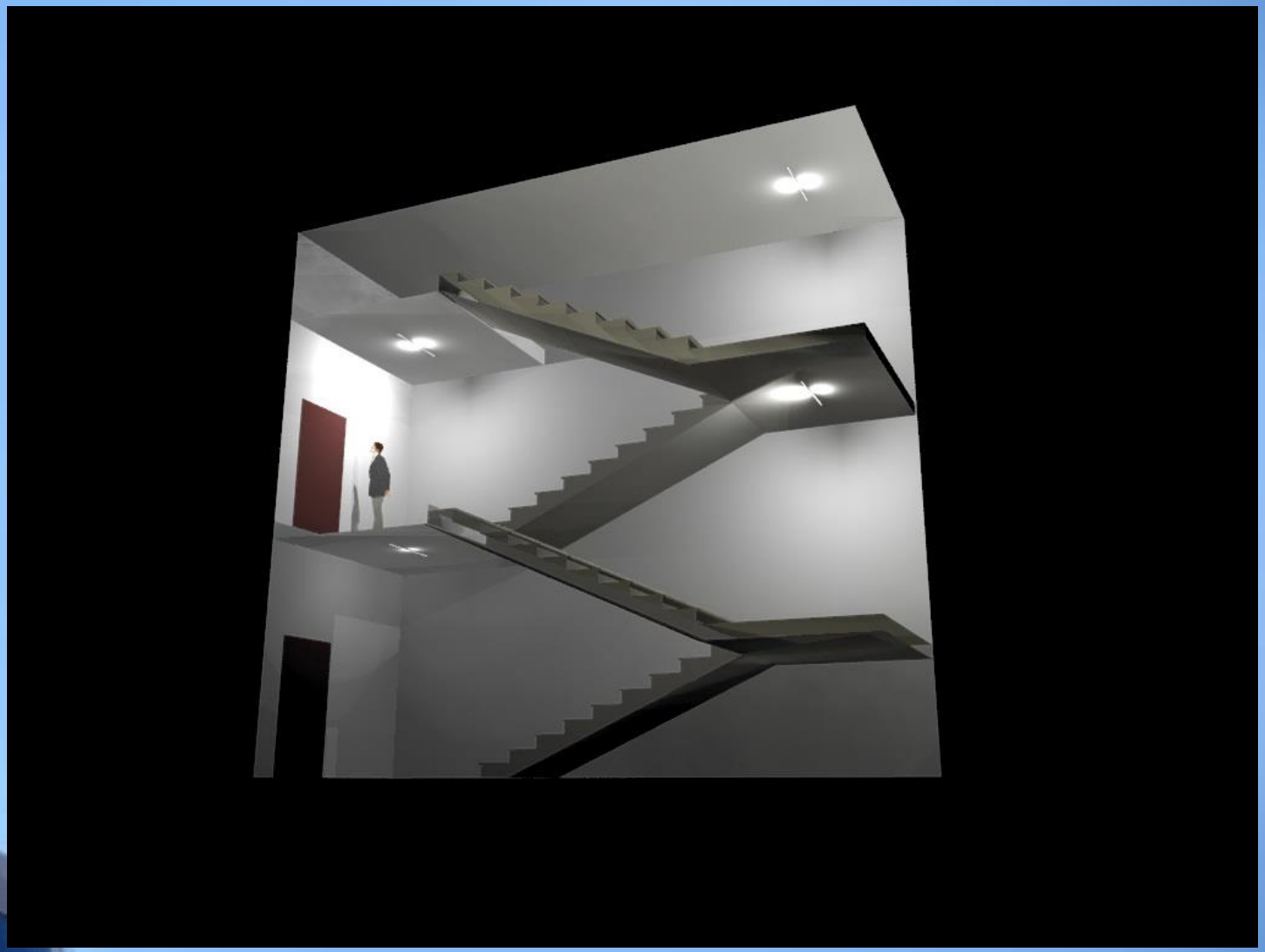
| Lamp / Parameters | T8 fluorescent lamp with magnetic ballast (4 ft) | CET CL4820 Intelligent LED Tube |
|---|---|---|
| Input Full Power | 36+12 W | 20 W |
| Dimmed Power | NA | 7 W |
| Daily Full Power Duration | 24 hrs | 3 hrs |
| Daily Dimmed Power Duration | - | 21 hrs |
| Average Input Power | 48 W | 8.65 W |
| Annual Electricity Consumption | 420 kWh | 76 kWh |
| Annual Saving | - | 344 kWh (82%) |

| Lamp / Parameters | T8 fluorescent lamp with magnetic ballast (3 ft) | CET CL3815 Intelligent LED Tube |
|---|---|---|
| Input Full Power | 30+12 W | 15 W |
| Dimmed Power | NA | 5 W |
| Daily Full Power Duration | 24 hrs | 3 hrs |
| Daily Dimmed Power Duration | - | 21 hrs |
| Average Input Power | 42 W | 6.25 W |
| Annual Electricity Consumption | 368 kWh | 55 kWh |
| Annual Saving | - | 313 kWh (85%) |

# Staircase



# Staircase



# Energy saving in stairs

- Savings 84% to 87%
- 365 operating days in a year
- 24 operating hours a day
- 1 hour bright

CET Energy Saving Lamps Compared with T8 Fluorescent Lamp

| Product : CL Series Intelligent LED Tube | |
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| Features |  |
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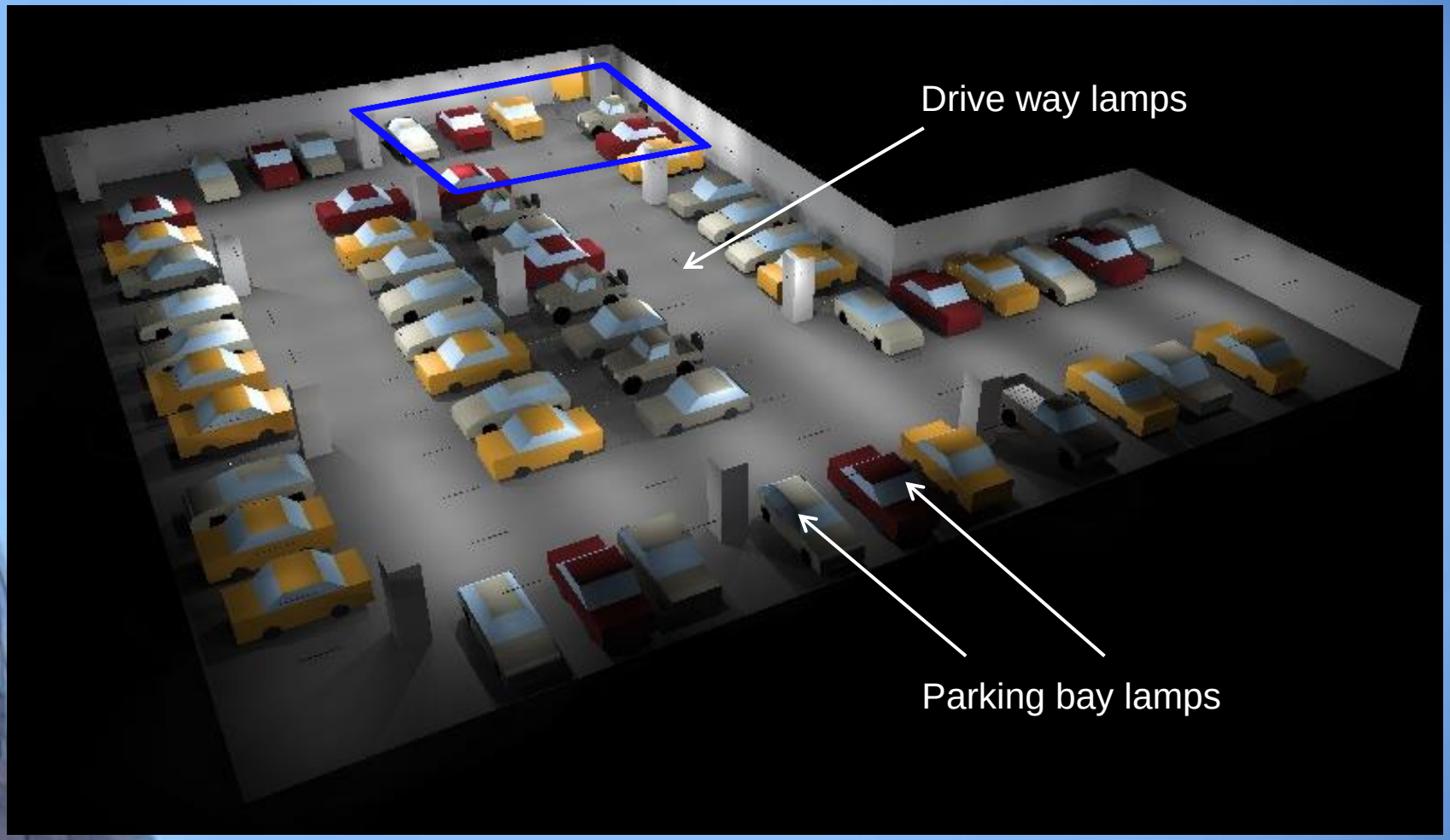
| ➢ Automatic dimming for energy saving. | |
| ➢ Fit into generic fluorescent battens. | |
| ➢ Wireless link between sensor & lamps. | |

| Lamp Parameters | T8 fluorescent lamp with magnetic ballast (4 ft) | CET CL4820 Intelligent LED Tube |
|---|---|---|
| Input Full Power | 36+12 W | 20 W |
| Dimmed Power | NA | 7 W |
| Daily Full Power Duration | 24 hrs | 1 hr |
| Daily Dimmed Power Duration | - | 23 hrs |
| Average Input Power | 48 W | 7.54 W |
| Annual Electricity Consumption | 420 kWh | 66 kWh |
| Annual Saving | - | 354 kWh (84%) |

| Lamp Parameters | T8 fluorescent lamp with magnetic ballast (3 ft) | CET CL3815 Intelligent LED Tube |
|---|---|---|
| Input Full Power | 30+12 W | 15 W |
| Dimmed Power | NA | 5 W |
| Daily Full Power Duration | 24 hrs | 1 hr |
| Daily Dimmed Power Duration | - | 23 hrs |
| Average Input Power | 42 W | 5.42 W |
| Annual Electricity Consumption | 368 kWh | 48 kWh |
| Annual Saving | - | 320 kWh (87%) |

| Lamp Parameters | T8 fluorescent lamp with magnetic ballast (2 ft) | CET CL2811 Intelligent LED Tube |
|---|---|---|
| Input Full Power | 18+12 W | 10 W |
| Dimmed Power | NA | 4 W |
| Daily Full Power Duration | 24 hrs | 1 hr |
| Daily Dimmed Power Duration | - | 23 hrs |
| Average Input Power | 30 W | 4.25W |
| Annual Electricity Consumption | 263 kWh | 37 kWh |
| Annual Saving | - | 226 kWh (84%) |

# Car Park



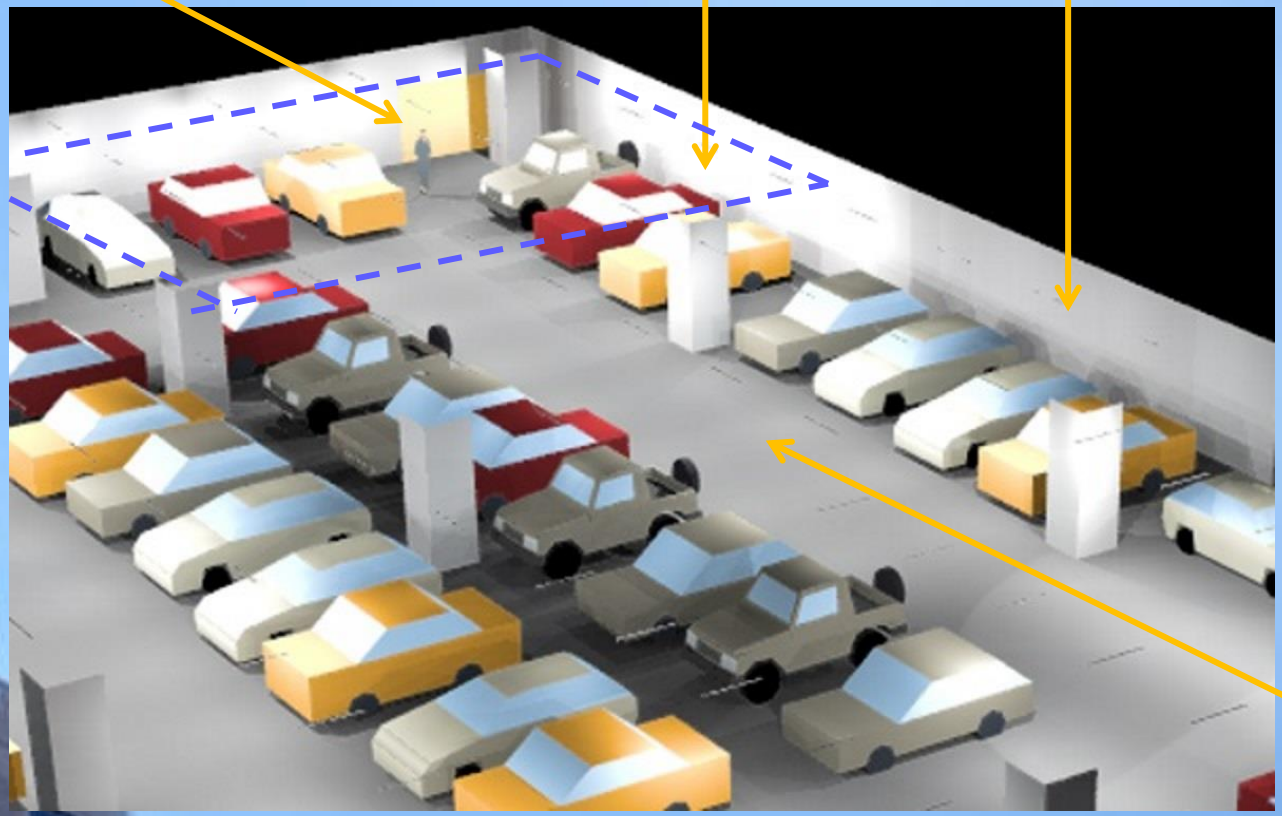

- A typical car park equipped with SmartDim lamp tubes
- Driveway lamps are always on and parking bay lamps are auto-dimmed

# Car Park

Someone enters
the car park

Zone activated
Bay lamps ON

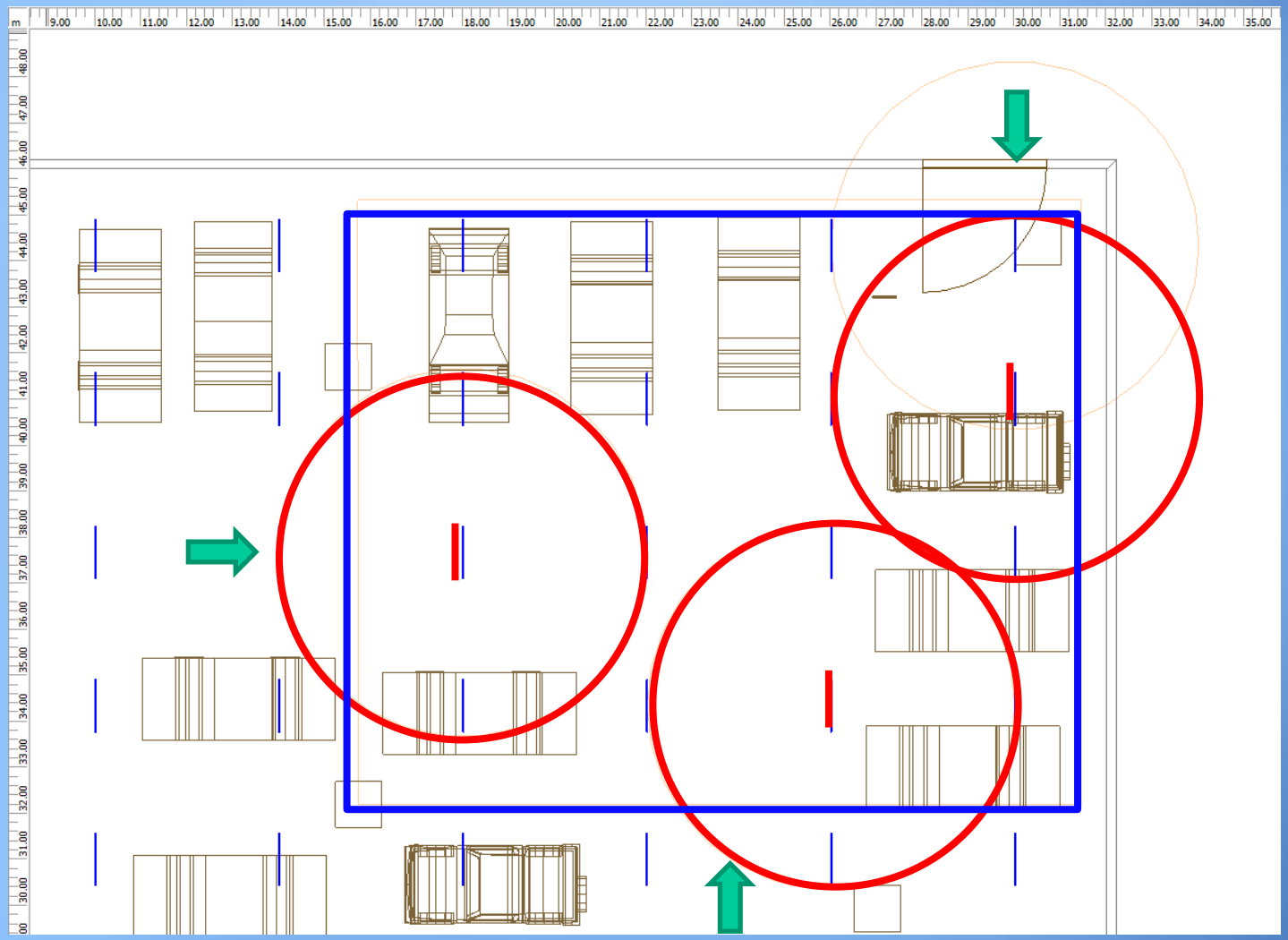
Non activated zone
Bay lamps remains OFF



Driveway lamps
always ON

# Master Lamp placement in a typical car park zone

- Motion sensing radius is 4m (height < 4m)
- 3 master lamps, 13 slave lamps covers entry triggering in the zone from three directions



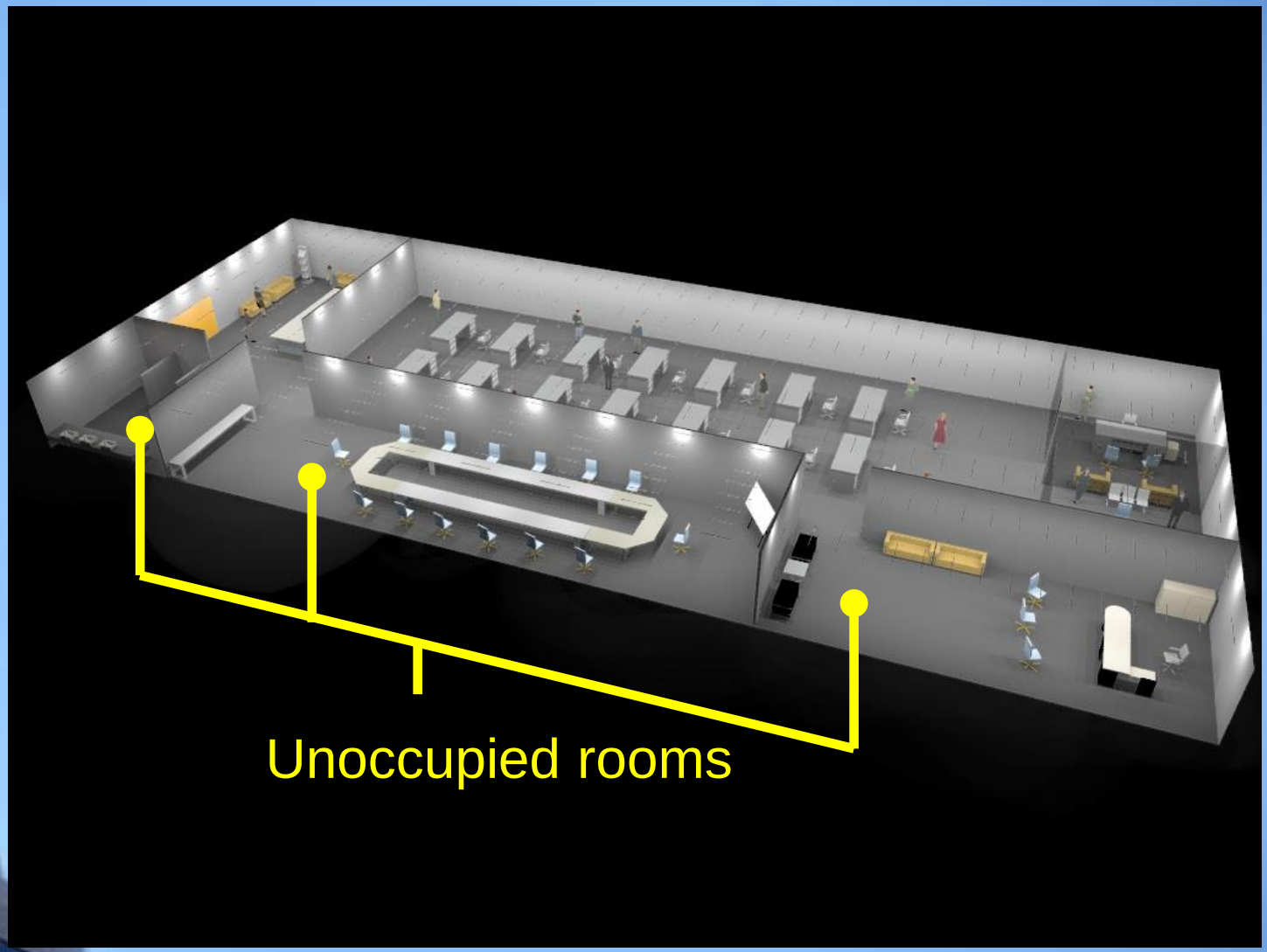
# Energy saving in car park

- Savings 82% to 85%
- 365 operating days in a year
- 24 operating hours a day
- 3 hours bright

CET Energy Saving Lamps Compared with T8 Fluorescent Lamp

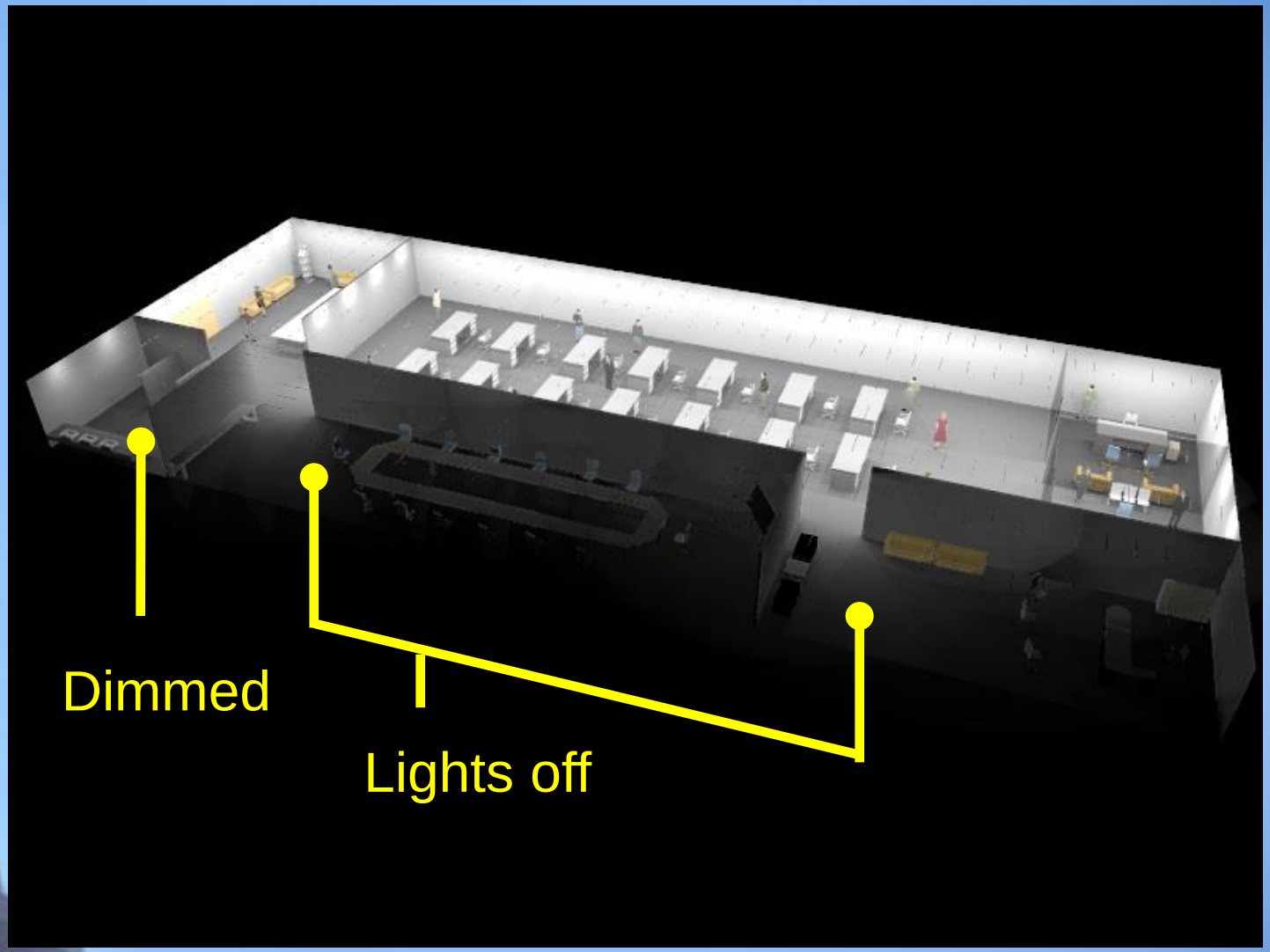
| Product : CL Series Intelligent LED Tube |  | |
|---|---|---|
| Features | | |
| ➢ External or Integrated motion sensor. | | |
| ➢ Automatic dimming for energy saving. | | |
| ➢ Fit into generic fluorescent battens. | | |
| ➢ Wireless link between sensor & lamps. | | |
| Lamp / Parameters | T8 fluorescent lamp with magnetic ballast (4 ft) | CET CL4820 Intelligent LED Tube |
| Input Full Power | 36+12 W | 20 W |
| Dimmed Power | NA | 7 W |
| Daily Full Power Duration | 24 hrs | 3 hrs |
| Daily Dimmed Power Duration | - | 21 hrs |
| Average Input Power | 48 W | 8.65 W |
| Annual Electricity Consumption | 420 kWh | 76 kWh |
| Annual Saving | - | 344 kWh (82%) |
| Lamp / Parameters | T8 fluorescent lamp with magnetic ballast (3 ft) | CET CL3815 Intelligent LED Tube |
| Input Full Power | 30+12 W | 15 W |
| Dimmed Power | NA | 5 W |
| Daily Full Power Duration | 24 hrs | 3 hrs |
| Daily Dimmed Power Duration | - | 21 hrs |
| Average Input Power | 42 W | 6.25 W |
| Annual Electricity Consumption | 368 kWh | 55 kWh |
| Annual Saving | - | 313 kWh (85%) |

# Office



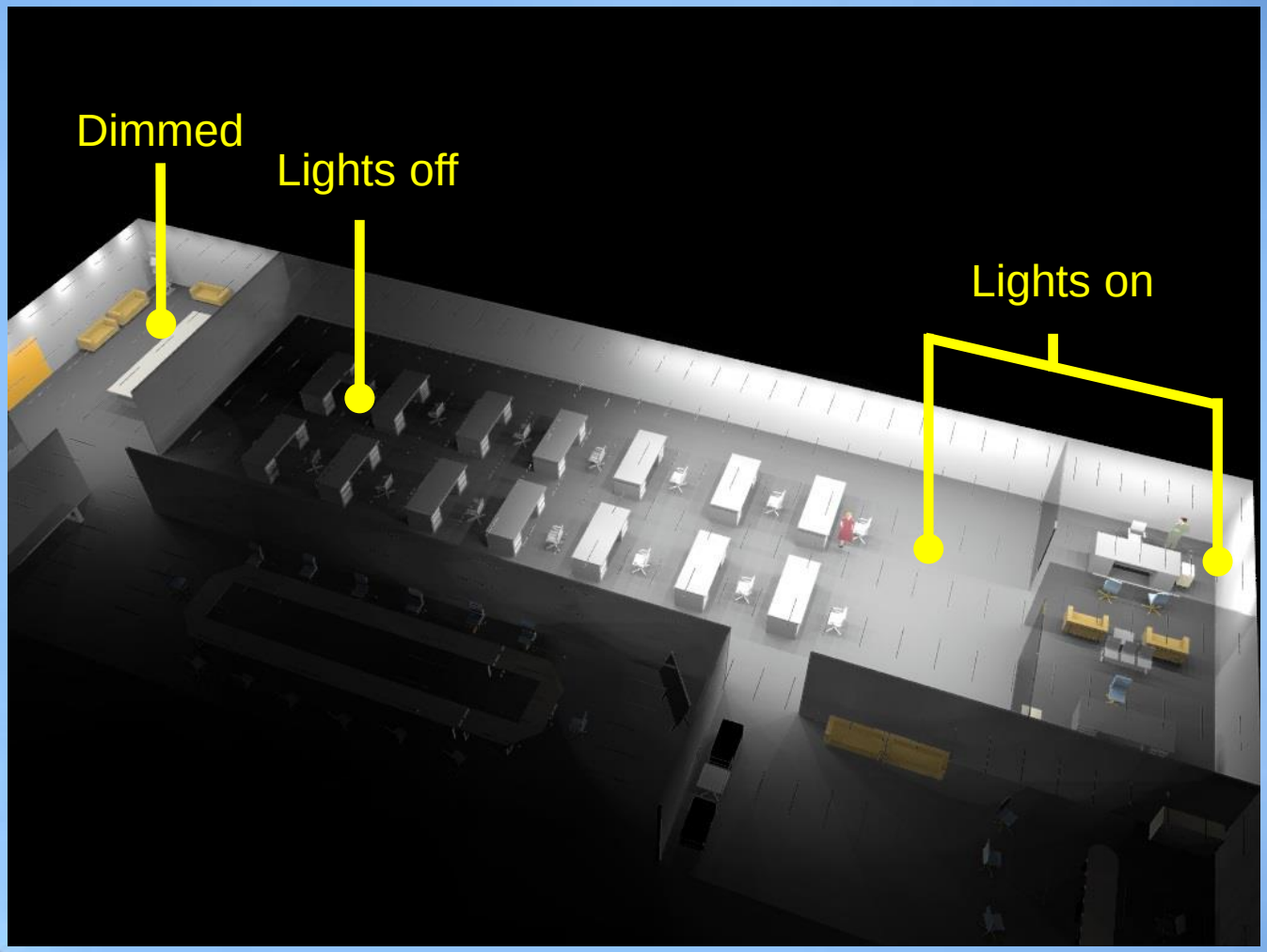

- Full brightness

# Office




- Lamps off and dimmed to save energy

# Office




- After office hour – *external* sensor activated

# Energy saving in offices

- Savings 72% to 77%
- 312 operating days in a year
- 12 operating hours a day
- 6 hours bright

CET Energy Saving Lamps Compared with T8 Fluorescent Lamp

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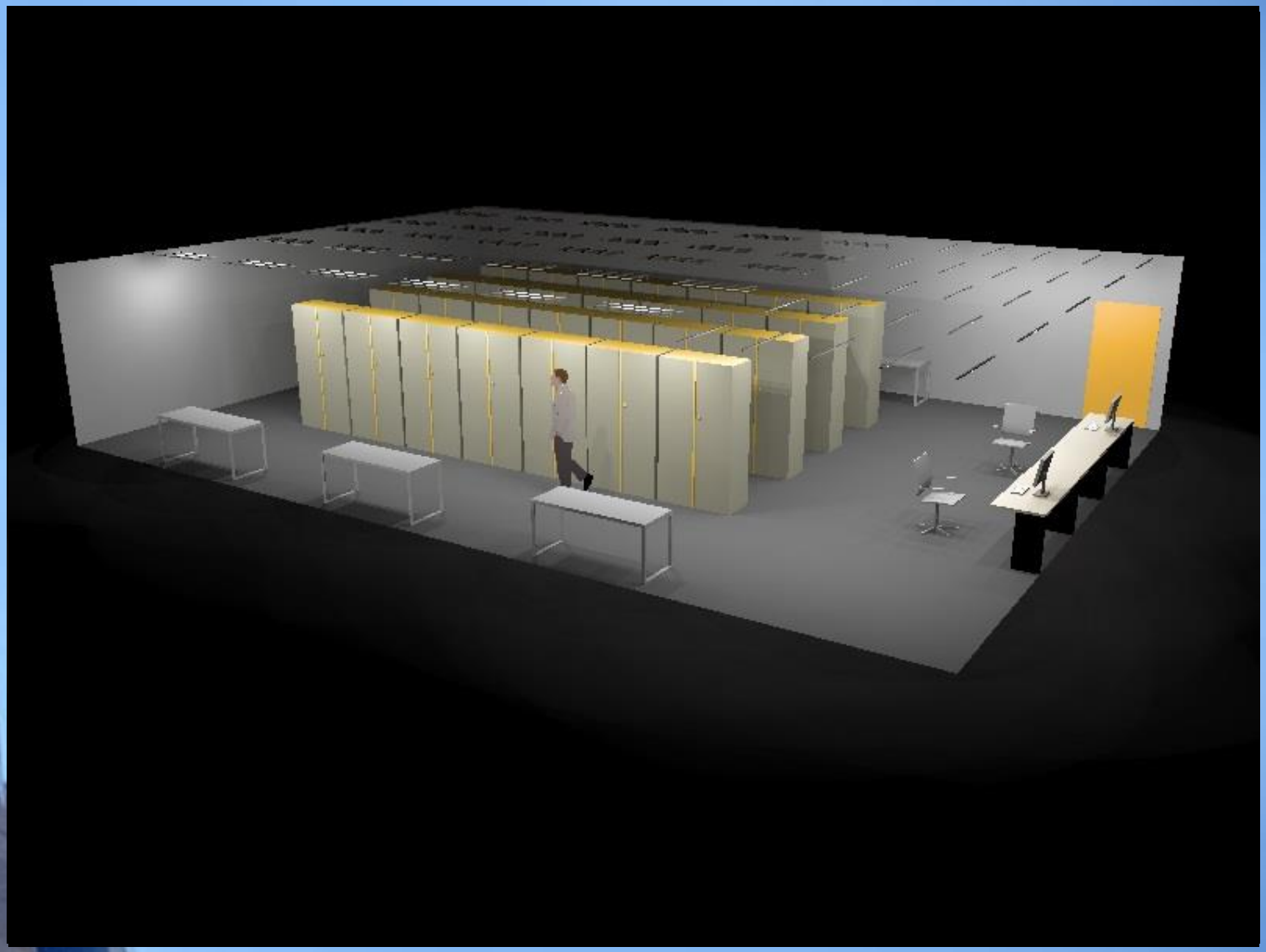
|---|---|---|
| Features | |  |
| ➢ External or Integrated motion sensor. | | |
| ➢ Automatic dimming for energy saving. | | |
| ➢ Fit into generic fluorescent battens. | | |
| ➢ Wireless link between sensor & lamps. | | |
| Lamp Parameters | T8 fluorescent lamp with magnetic ballast (4 ft) | CET CL4820 Intelligent LED Tube |
| Input Full Power | 36+12 W | 20 W |
| Dimmed Power | NA | 7 W |
| Daily Full Power Duration | 12 hrs | 6 hrs |
| Daily Dimmed Power Duration | - | 6 hrs |
| Average Input Power | 48 W | 13.5 W |
| Annual Electricity Consumption | 180 kWh | 50.5 kWh |
| Annual Saving | - | 129.5 kWh (72%) |
| Lamp Parameters | T8 fluorescent lamp with magnetic ballast (3 ft) | CET CL3815 Intelligent LED Tube |
| Input Full Power | 30+12 W | 15 W |
| Dimmed Power | NA | 5 W |
| Daily Full Power Duration | 12 hrs | 6 hrs |
| Daily Dimmed Power Duration | - | 6 hrs |
| Average Input Power | 42 W | 10 W |
| Annual Electricity Consumption | 157 kWh | 37 kWh |
| Annual Saving | - | 120 kWh (76%) |
| Lamp Parameters | T8 fluorescent lamp with magnetic ballast (2 ft) | CET CL2811 Intelligent LED Tube |
| Input Full Power | 18+12 W | 10 W |
| Dimmed Power | NA | 4 W |
| Daily Full Power Duration | 12 hrs | 6 hrs |
| Daily Dimmed Power Duration | - | 6 hrs |
| Average Input Power | 30 W | 7 W |
| Annual Electricity Consumption | 112 kWh | 26 kWh |
| Annual Saving | - | 86 kWh (77%) |

# DATA CENTER

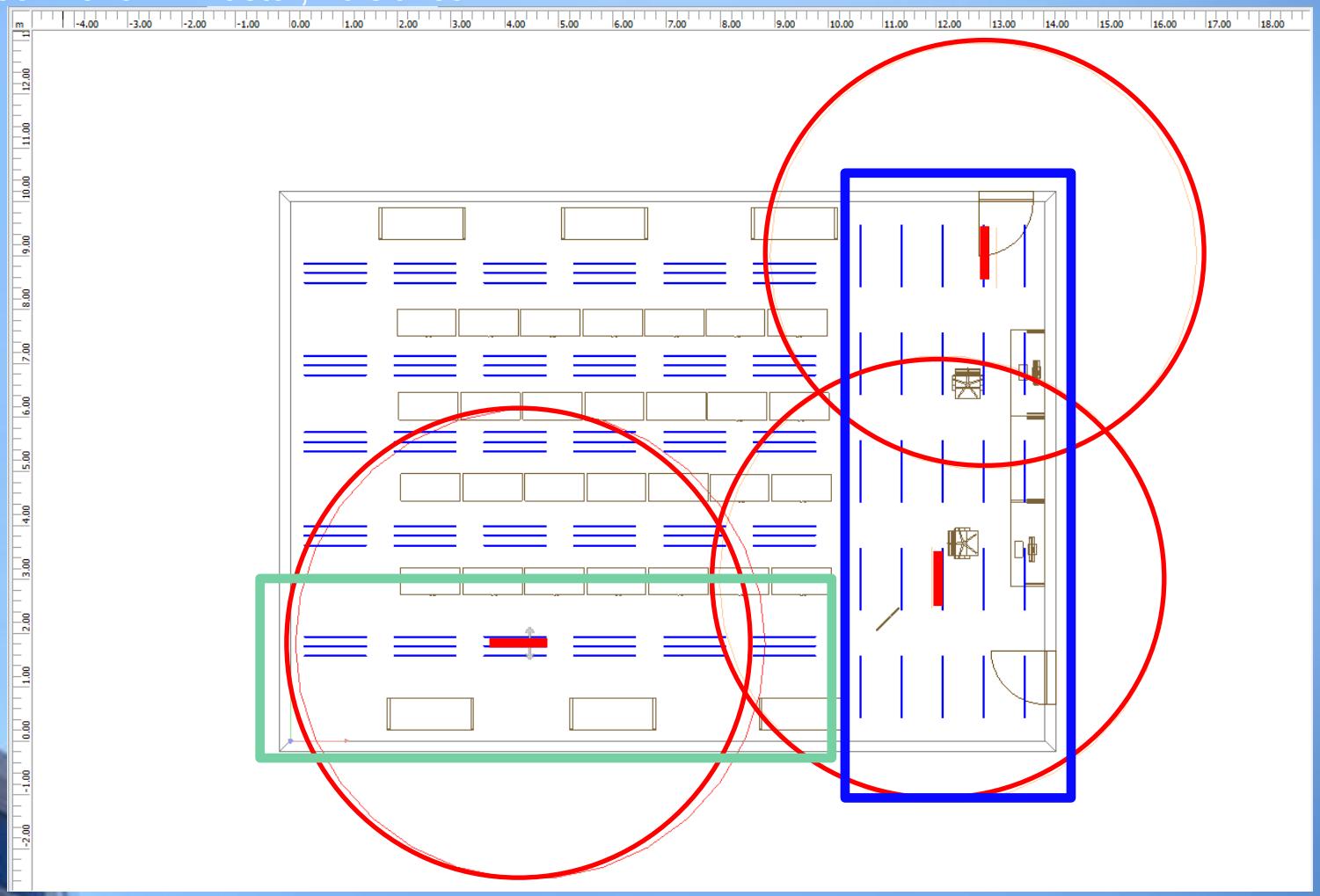




- Multiple zones in a data center

# Master Lamp placement in a data center

- Motion sensing radius is 4m (height < 4m)
- Blue zone : 2 masters, 23 slaves
- Green zone : 1 master, 18 slaves



# Energy saving in data center

- Savings 84% to 86%
- 365 operating days in a year
- 24 operating hours a day
- 1 hour bright

| CET Energy Saving Lamps Compared with T8 Fluorescent Lamp | | |
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| Features | | |
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| Parameters / Lamp | T8 fluorescent lamp with magnetic ballast (4 ft) | CET CL4820 Intelligent LED Tube |
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| Dimmed Power | NA | 7 W |
| Daily Full Power Duration | 24 hrs | 1 hr |
| Daily Dimmed Power Duration | - | 23 hrs |
| Average Input Power | 48 W | 7.54 W |
| Annual Electricity Consumption | 420 kWh | 66 kWh |
| Annual Saving | - | **354 kWh (84%)** |
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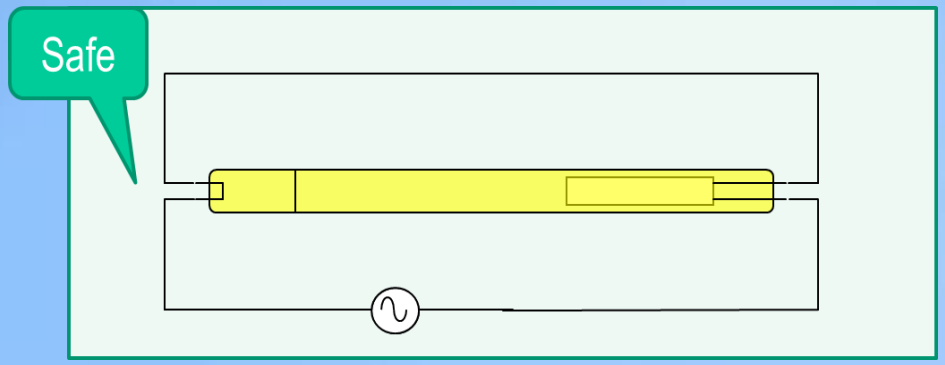
| Average Input Power | 30 W | 4.25W |
| Annual Electricity Consumption | 263 kWh | 37 kWh |
| Annual Saving | - | **226 kWh (84%)** |

# Example Installations

## Yoho3, Yuen Long, N.T.

# Fixture Installation



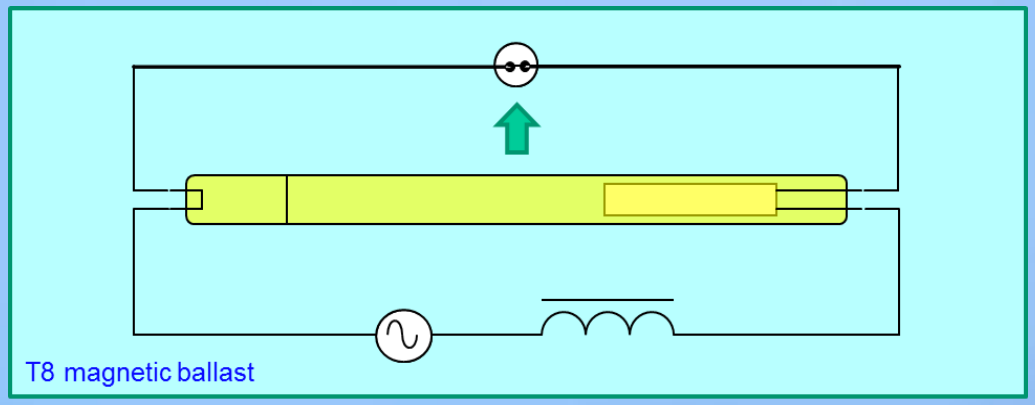

- No ballast in the standard fixture
- Safe to touch

# Fire Escape floor,  1063 King's Road


- Zone activated by a master lamp

# Use original T8 Fixture

- Simply replace the fluorescent lamp starter by a Short circuit starter provided by CET



# Corridor,  Science Park, Hong Kong


# King's Park- Homantin

- Lift lobby & stairs

# CET products are fully certified

- Regulatory compliance with CE European standards

| | |
|---|---|
| EN60598-1 | EN62031 |
| EN60598-2-1 | EN55015 |
| EN60598-2-22 | EN61000-3-2 |
| EN61347-1 | EN61000-3-3 |
| EN61347-2-13 | EN61547 |
| EN62471 | HK FSD approval |

# Award Winning Product


- SmartDIM III Wireless Intelligent lamps
- Example projects are introduced

**Exhibition**
**Build4Asia**
**Booth # 1C-528**


Q & A