



BURWOOD HIGHWAY,
BURWOOD,
VICTORIA

ROADWAY - TECHNOLOGY



Environ System
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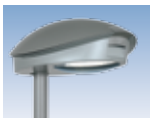


Environmental
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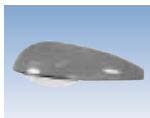
ROADWAY - LED



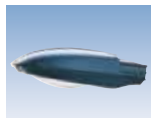
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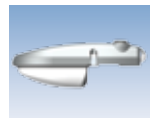
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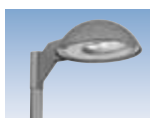
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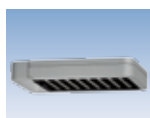
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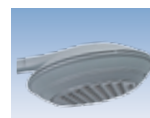
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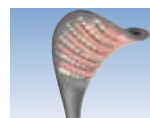
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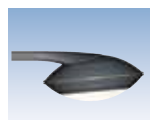
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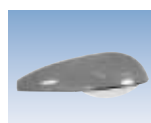
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ENVIRONMENTAL LIGHTING - THE ROAD AHEAD

Climate change / global warming is the world's biggest environmental issue and with the imminent introduction of an emissions trading scheme by the Australian government, the focus on energy efficiency will continue to intensify. Apart from the environmental implications there will be financial penalties with the inevitable increase in electricity costs due to carbon taxes.

Whilst we all search for solutions and unsubstantiated claims are made, like most issues there is no "silver bullet". In fact an environmentally friendly lighting scheme will only be achieved when all of the basic lighting design factors are considered and appropriately weighted for each installation.

The challenge is to provide an environmentally friendly lighting scheme that is fit for purpose will continue into the future.

This process isn't new, it's what all competent lighting engineers' have done in consultation with their clients' for many years. Sure, new developments come along such as high power LED's, however, their real benefits can only be determined when accessed in terms of a lighting scheme and not in isolation.

As Australia's market leader in roadway and public area lighting, SYLVANIA Lighting is in a unique position as we have been developing luminaires specifically for the roadway market for many years. This has been possible due to the millions of dollars invested in our local research and development facility, including a NATA registered lighting laboratory.

During the development process, the luminaires are modelled on computer aided design programmes for mechanical and optical performance prior to prototyping and then rigorously tested for mechanical performance. During this process the luminaire's performance is heavily scrutinised by the Design and Applications engineers.

An environmentally friendly lighting scheme will only be achieved when all of the basic lighting design factors are considered and appropriately weighted for each installation.

The six basic lighting design factors are:

- 1) **Determination of light technical parameters - select a category**
 - a) How much light - Lighting level Luminance / Illuminance (Average / Maximum / Minimum)
 - b) Quality - Uniformity / Glare / Spill Light
 - c) Upward light control (Airports, Observatories)
- 2) **Luminaire locations - pole height**
 - a) Position
 - b) Mounting height
 - c) Forbidden zones
- 3) **Light source - correct lamp**
 - a) Lumen package
 - b) Colour (Colour rendering / Colour Temperature)
 - c) Lumen maintenance
 - d) Lamp mortality
 - e) Control gear
- 4) **Luminaire - good distribution**
 - a) Performance - Light distribution compatible with the LTP's and luminaire locations
 - b) Reliability / Maintenance
 - c) Functionality and Aesthetics
- 5) **Lighting design - get a lighting designer**
 - a) Selection luminaire and lamp
 - b) Determination of maintenance factor in conjunction with client
 - c) Lighting calculations
 - d) Compliance / Achievement of Light technical parameters
- 6) **Operation - correct switching**
 - a) Photoelectric switches
 - b) Stepped dimming - Note: Reducing light levels during no peak periods (Car Parks)

Inappropriate use of any of these basic factors will affect the environmental impact of any lighting scheme.

Ultimately, the success of the installation will be determined by how well the designer / client responds to these challenges. It can sometimes be the subtle refinements which differentiate between a good and poor installation.

SYLVANIA'S LONG-TERM ENVIRONMENTAL CONSCIENCE



Sylvania Lighting has been involved in environmental lighting for many years with the following projects:

Environmental Lighting Project

In 2002, Sylvania Lighting teamed with Coffs Harbour Council and Country Energy in New South Wales in a project to implement energy efficient lighting. The trial was so successful that it won the 2002 Local Government Excellence in the Environment Award for Energy Efficient Greenhouse Projects and led to a roll-out of the new energy efficient lights throughout the entire area in 2004.

"The savings are significant both financially and for the environment. The council should save at least 15% on annual street lighting costs. But even more impressive are the environmental benefits. Our forecasts show that we will reduce greenhouse gas emission by 35% which equates to 650 tonnes eCO₂ per annum.

Energy Efficient Luminaire Developments

Suburban Eco Luminaire Series

Building upon the success of the Suburban Eco Series sees the further refinement of the optical system in line with recent changes to Australian Standard AS1158.3.1. The new high efficiency optical system in combination with the 32W compact fluorescent lamp will now be the optimum luminaire/lamp configuration for most applications, providing a 62% energy savings in comparison to an 80W mercury vapour luminaire.

Bourke Hill Eco Series

To provide an energy efficient decorative luminaire the Suburban Eco optical system and control gear cassette have been incorporated into the Bourke Hill – S Series, providing the following benefits:

- a) Energy efficient decorative luminaire with identical performance to the Suburban Eco.
- b) Lighting design (luminaire arrangement) is common to both luminaire types.
- c) IP65 optical system reduces allows for a reduced maintenance factor or longer cleaning intervals.

Future Developments

As part of our ongoing development strategy we not only continue with the incremental development of existing luminaires and light sources but also continue to evaluate new technologies, materials and design methods.

Sylvania Lighting regularly conducts environmental lighting forums, around Australia and New Zealand. Contact your local SLA office for further information.

The Sylvania Environ System

An **Energy Saving** system for Metal Halide and High Pressure Sodium luminaires

- Saves Energy (20% typically)
- Costs savings (payback)
- Extends Lamp Life (greater than 50%)
- Reduces Maintenance (longer lamp replacement intervals)
- Constant Uniformity (luminaire flux)
- Reduction In Greenhouse Gases

Energy and Cost Efficient lighting for High Intensity Discharge lamps

The Environ system is *Intelligent Control Gear* for High Performance Sylvania luminaires, it combines the benefits of electronic lamp control with the reliability of conventional electro-magnetic control gear. Compatible with High Pressure Sodium and Metal Halide lamps from 150W to 2,000 Watt.

Incorporating the Active Reactor controller, lamps will operate at least 50% longer while consuming substantially less energy whilst providing the user a reliable lighting system.

To find out more about what Sylvania Lighting is doing to rescue the planet please call 1300 728 988 or visit our website at www.sla.net.au

- Available from 150W to 2000W HID lamps
- Adaptable Roadway and Public Lighting
- Australian designed and manufactured



THE SYLVANIA ENVIRON SYSTEM

Is an *Energy Saving* system for Metal Halide and High Pressure Sodium Luminaires

The Environ System is **Intelligent Control Gear** for Metal Halide and High Pressure Sodium luminaires to enable the luminaire to provide constant light output. As it automatically adjusts the lamp's power to compensate for the luminaire's light loss factors, lamp lumen depreciation as well as dirt accumulation on the luminaire's optical surfaces so that the luminaire's light output is constant. As opposed to conventional control gear which provides constant power to the lamp, therefore the luminaire's light output continually diminishes during operation due to these light loss factors.

Conventional

Concept: Constant Power = Variable Light

Environ System

Variable Power = Constant Light

With constant light output the lighting installation is then designed to provide the required maintenance illumination level 100% of the time, instead of the conventional system which must be over illuminated to compensate for these light loss factors during operation. In fact the conventional system will only provide the required maintenance illumination 1% of the time, which is at the end of the maintenance cycle, prior to lamp replacement and luminaire cleaning. Therefore 99% of the time the installation must be over illuminated which is wasted energy.

Conventional

Concept: Variable Light = Over illumination (Wasted Energy)

Environ System

Constant Light = Maintained Illumination

The **Environ System** works in harmony with Lighting Design Principles and Standards, as a "Maintenance Factor" is incorporate in all lighting application designs to allow for the luminaire's light loss during operation. The difference is that the Environ System provides the ideal constant lighting level all the time, whereas the conventional system's lighting level is continually diminishing over the maintenance cycle.

Concept: Similar to a car's gearbox which enables constant speed to be maintained up a hill.

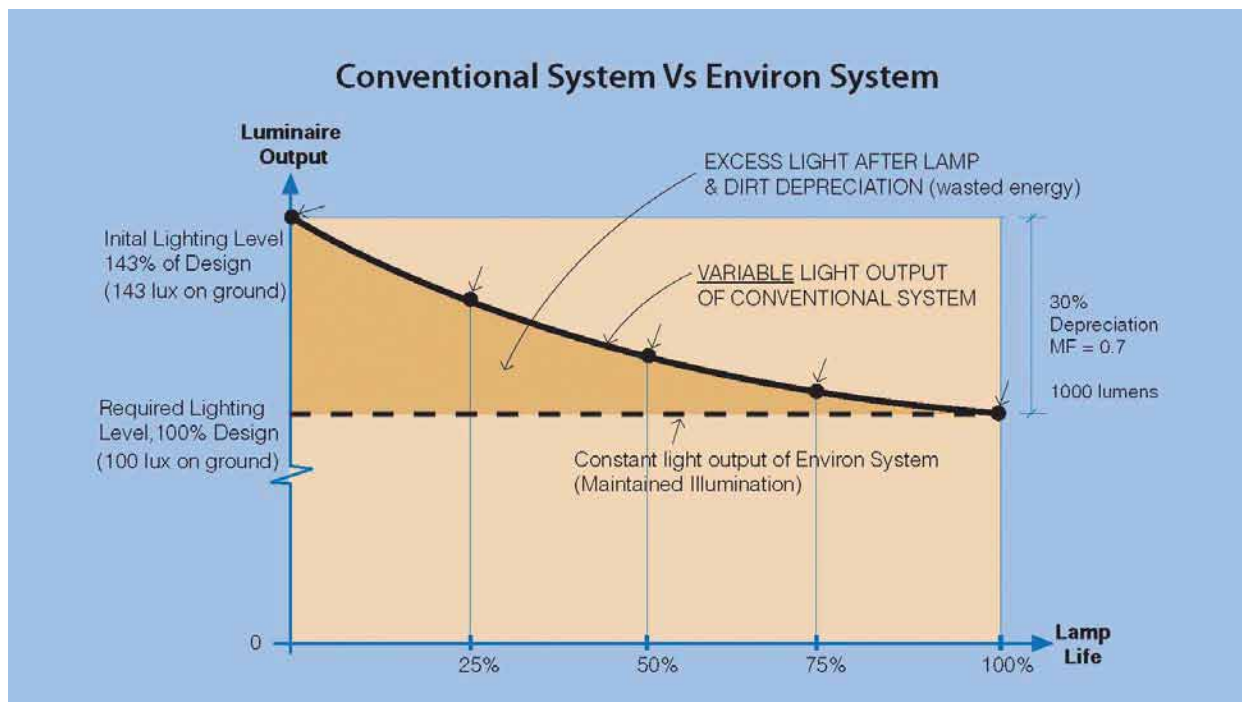


Figure 1.

Figure 1. Illustrates the over lighting (Wasted Energy) of a conventional installation to allow for the depreciation of the luminaire's light output, with a typical Maintenance Factor (MF) of 0.7. This shows that initially the installation is over lighting by $1/0.7=1.43$ times as required to produce at the end of life maintained illuminance.

Obviously the luminaires initially also consume 1.43 times as much power.

In addition to providing constant light output other benefits of the Environ system is that it extends lamp life, is immune to supply voltage variation and provides constant uniformity.

The Environ System

The Sylvania Environ System consists of an Active Reactor Controller combined with conventional ballasts, Ignitors and capacitors incorporated into SLA luminaires. It can be fitted integrally in the case of the Roadster 150W & 250W versions or supplied as a remote gear tray for other luminaires.

The Active Reactor Controller is an electronic device used for the control of HID luminaires. The device uses electronics and built in intelligence to start and run HID lamps in a predefined manner. It is applicable for the control of all higher wattage metal halide and high pressure sodium in the power range 150W-2000W.

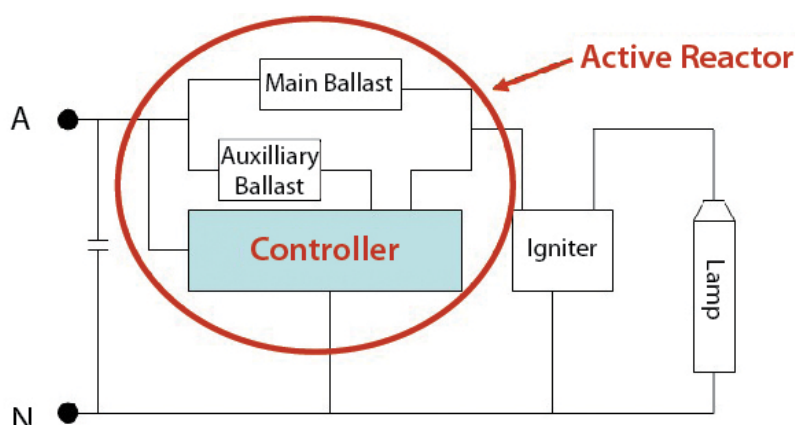
Using the device in HID lighting applications results in significant energy savings (and reduction in greenhouse gas emissions), lamp life extension and improved lumen maintenance.

Operation

The Active Reactor components are:

1. The Active Reactor Controller which contains the electronics to control the lamp power and lamp starting.
2. A main ballast which supplies the base load (typically 70%) of the lamp power.
3. A control ballast (current injector) which supplies the boost (typically 0-30%) of the lamp power.

Figure 2.



The Active Reactor utilises the main ballast as the primary source of power for the lamp and injects additional current (and power) into the circuit via the control ballast to achieve the required lamp operating conditions.

THE SYLVANIA ENVIRON SYSTEM

As the lamp flux is not directly proportional to power when dimmed, for a MF=0.7 the lamp power starts at 75% HPS (78% MH) rated power and increases in time until it reaches 100% rated lamp power at the end of lamp life.

The minimum power the lamp can run at is typically 70% rated power when the control ballast is turned off completely. The maximum power the lamp can run at is typically 100% rated power when the control ballast is turned on fully. Hence the lamp can run at any instant, at any point in its life, between 75% and 100%

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The minimum power the lamp can run at is typically 75% HPS (78% MH) rated power when the control ballast is turned off completely. The maximum power the lamp can run at is typically 100% rated power when the control ballast is turned on fully. Hence the lamp can run at any instant, at any point in its life, between 75% and 100% power by appropriate current injection into the lamp, that is, by appropriate switching of the control ballast into the circuit.

This operation is summarised below for a typical HPS lamp @ 0.7 maintenance factor

Main ballast		Control ballast		Lamp Power	Lamp Flux
ON	70%	Min	5%	75%	70%
ON	70%	Max	25%	100%	100%
ON	70%	partially ON/OFF		75-100%	70 -100%

Note: In the event of failure the Main ballast will supply 70% lamp power

Substantial Power & Energy Savings - Constant Light Output Operation

One of the most desirable modes of any luminaire operation is constant light output. However, as the lamp's output depreciates over time as well as light loss due to dirt accumulation on the luminaire's optical system this is not possible with conventional control gear. The Active Reactor varies the power to the lamp, starting with a low power for a new lamp/clean luminaire and gradually increasing the power during operation to full power for an old lamp/dirty luminaire resulting in constant lamp flux throughout the life of the lamp.

The Active Reactor Controllers are programmed in accordance with the maintenance factor utilised in the lighting design to allow for the lamps lumen depreciation as well as dirt accumulation over the luminaire's optical surfaces.

This mode of operation results in significant energy savings during the life of a lamp as well as significant lamp life extension and lumen maintenance. The energy savings for a nominal 0.7 maintenance factor are typically 15-20% for MH and 20-25% for HPS while the lamp life increase is typically >50%.



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