

# LIGHT WARRIOR

**LIGHT WARRIOR** energy saving system, is a micro-processor controlled unit that manages and reduces fluorescent , HID / high ,sodium ,compact fluorescents,resistive lighting power, and improves lighting and energy efficiency. It has the unique capability to offer significant cost savings in the operation of fluorescent lighting power (up to 30%), whilst achieving a major reduction in greenhouse gas emissions and pollution of the environment.

**LIGHT WARRIOR** will enable existing buildings and tenancies become more energy efficient without the need for expensive and potentially non cost effective lighting upgrades. **LIGHT WARRIOR** installed in T8/T12 fluorescent lighting circuits, with very reliable [high performance magnetic ballasts](#) (including older discontinued EEI C/D Class models), will:

- save far more energy than comparable T8 fluorescent lighting circuits fitted with electronic ballasts
- save as much, if not more, energy as T5 fluorescent fittings at a much lower installed and whole-of-life cost
- allow complementary energy saving and lighting efficiency measures to be implemented

In each case **LIGHT WARRIOR** units are integrated directly into existing lighting power circuits, at or near the switchboard. A significant and unique feature of **LIGHT WARRIOR** is its ability to manage multiple lighting circuits unlike other products that only operate on a single lighting circuit. Importantly, **LIGHT WARRIOR** is not a lighting dimming device.

The unit is considered an 'appliance' and does not normally require any special approval prior to installation.

## *The Smart Solution*

### **What Does LIGHT WARRIOR Power Saver Do?**

- **Energy Saving** by effectively managing and reducing lighting power
- **Saves Money** by reducing operating costs
- **Reduces Greenhouse Gas** Emissions through a reduction in energy consumption (lighting power) and demand
- **Reduces Peak Power** Demand
- **Complements** existing Building Management Efficiency procedures

### **Where is LIGHT WARRIOR Power Saver Used?**

**LIGHT WARRIOR Power Saver** is used in fluorescent , HID / high ,sodium, resistive lamps lighting installations fitted with magnetic ballasts to:

- Reduce lighting power consumption by up to 30% typically

- Reduce lighting Power Density (watts/m<sup>2</sup>)
- Increase lighting efficiency by >20%
- Reduce energy loss across magnetic ballasts by >60%
- Modify voltage, current and power factor while preserving conditions for reliable operation and starting of fluorescent tubes
- Provide significant greenhouse gas savings (in excess of 4 tonnes per unit per annum); whilst
- Causing no perceptible effect on fluorescent light levels

## How does LIGHT WARRIOR Power Saver Work?

- Advanced IGBT technology is utilised to achieve a voltage reduction across the lighting power circuit
- On start-up of lights full mains voltage is applied to the lighting load
- When lighting load start is complete and a stable operating load is achieved, load voltage is automatically reduced by a fixed amount
- If mains voltage falls enough to compromise proper operation or starting in save mode, full mains voltage is restored
- When load lighting power is increased by switching on additional lighting, full mains voltage is restored, and start-up of new lamps is commenced in accordance with manufacturer's specifications preserving lamp life (see [current sensing](#) and [down-line switching](#))

## FAQ :

Q. How many tubes will a single LIGHT WARRIOR handle?

A. The 2 standard Power Saver models are capable of handling 2kVA = 50 x 36W tubes (of any sort) and 3kVA - around 75 x 36W tubes (of any sort), respectively.

Q. LIGHT WARRIOR work with all fluorescent tubes?

A. Power Saver will work with all fluorescent tubes with T12 or T8 lamps with non-electronic ballasts. When used with electronic ballasts or T5 lamps there is no reduction in consumed energy.

Q. What is the pay-back time for the initial outlay?

A. Normally less than 2 years (typically 8-15 months depending on the installation).

Q. Will LIGHT WARRIOR work with the new-type low-loss and super low-loss magnetic ballasts?

A. Yes. A very effective combination to achieve maximum energy saving of lighting power.

Q. Can other energy saving measures be used with LIGHT WARRIOR ?

A. Yes. Installation of LIGHT WARRIOR is complementary to and can be used in conjunction with other lighting controls such as timers, occupancy sensors etc. Additionally, the use of inexpensive [electronic starters](#) will further improve the lighting efficiency, provide quick start-up of lamps as well as stopping any flickering of lamps, and significantly lengthen tube life.

Q. How much saving of Greenhouse Gas Emissions can LIGHT WARRIOR achieve?

A. The 2kVA version of Power Saver (50 x 36W tubes) saves around 4 tonnes of Greenhouse Gas emissions per unit per annum (based on Queensland coal power generation). This will vary slightly between power generating plants across U.S.A.

Q. Is there any discernable loss of light quality?

A. No discernable loss of lighting quality with fluorescent lights. (Maximum %8-%10 lumen loss.)

Q. When switching from BYPASS to SAVE mode and back, is there any flickering?

A. NO. This is a unique capability to LIGHT WARRIOR and was part of a patent application for this product.

Q. Can I read the current savings being achieved on LIGHT WARRIOR ?

A. Power Saver is designed to be able to interface with a data logger that can record and display the savings, normally in kWh. Data loggers are not normally provided but can be sourced as an optional feature of an installation, such as in large commercial buildings where the capture of ongoing detailed energy savings in lighting is required for audit purposes.

Q. What happens when some of the managed lights are switched ON or OFF?

A. **Current sensing** and **down-line switching** are inherent features of LIGHT WARRIOR . The unit senses a change in current and reverts to full load (BYPASS Mode). When the load stabilises, it switches to SAVE Mode. This capability is present for all models of LIGHT WARRIOR . It makes the Power Saver highly suited to an office environment where room lights are turned on and off many times. This automated feature ensures that all lamps are started at full voltage, enabling correct warm-up of the tube cathode before the ballast ignites/starts the tube. It ensures that the life of the tube is maintained in accordance with the manufacturer's specifications and prevents annoying flickering of the tubes. Not all competitors are able to achieve this capability, particularly for larger lighting loads. It is a potential problem for basic voltage reduction units sold by some competitors and are reliant upon a Building

Management System to control the activation of lights, normally only permitted once a day.

Q. Is LIGHT WARRIOR able to sense very small changes in the lighting load (current), such as small offices with only a few lights?

A. The **current sensing** feature of LIGHT WARRIOR is able to sense quite small changes in the lighting load. The microprocessor detects changes as a percentage of the actual load, not a fixed number of amps. The standard factory setting is around 10%, but is variable to suit a particular installation. In rare situations where a separately switched room has only a couple of tubes, we would recommend and supply electronic starters for those fittings ensuring that the tube life is not affected by starting attempts at reduced voltage.

Q. Is the operation of LIGHT WARRIOR affected by lighting contractor maintenance and replacement of faulty tubes and/or starters?

A. **No**, LIGHT WARRIOR operation is not affected. Where [electronic starters](#) are installed, ideal conditions for lamp re-starting is present at all times, even for single tube changes. Where glow starters/flicker starters are installed, LIGHT WARRIOR is fitted with a manual 'by-pass' switch that can be activated when lighting contractors are doing routine maintenance, especially on single lamp fittings such as tube and/or glow starter replacement (electronic starters should never need replacing). The replacement of single tubes without switching the individual lights off, may in some cases result in the current sensing feature of LIGHT WARRIOR being below the load threshold and a tube may not re-start efficiently with common glow starters. Wherever common glow starters are installed, activating the LIGHT WARRIOR 'by-pass' switch as part of your standard maintenance procedures will ensure that all lighting tube replacements and light maintenance results in efficient operation of all lighting.

Q. Can LIGHT WARRIOR control more than a single light circuit?

A. **Current sensing** and **down-line switching** features of LIGHT WARRIOR are effective across multiple lighting circuits. This is a unique feature of LIGHT WARRIOR and is not present in most other known products. Other competitor products are normally installed on the basis of one unit per lighting circuit, and are only effective for small lighting loads.

Q. Is the LIGHT WARRIOR unit safe?

A. LIGHT WARRIOR is inherently safe, automatically adjusting it's operation with the operating environment (no chance of combustion or dramatic system failure).

Q. Will LIGHT WARRIOR affect my lighting should there be a disruption to mains power supply or a system fault?

A. No. LIGHT WARRIOR has a number of in-built features that ensure the LIGHT WARRIOR unit will not prevent your lights from operating.

- The Operation and Installation Manual provides full details of the operation of the units, troubleshooting and fault finding procedures.
- A micro-computer is incorporated which monitors and controls all functions of the operation. The microcomputer monitors load conditions and provides proper operating and starting conditions for the lighting load, as well as providing protection against brownout. In the event of the load voltage falling to an unacceptable level, such as mains brownout, the unit will automatically go into "by-pass" mode until normal supply is re-gained. The lighting circuits will continue to operate as if the unit was not installed.
- LIGHT WARRIOR does not use 'phase switching' as part of voltage reduction and the autotransformer is not in-circuit when full power is applied to the lighting load.
- All individual lighting circuits are protected by circuit-breakers, either at the switchboard or inside the LIGHT WARRIOR unit depending on the installation method chosen.
- LIGHT WARRIOR has internal circuit breaker protection for the control electronics, the active load and the neutral line. These circuit breakers are designed to protect the unit and the lighting circuits being managed. In the event they are tripped, the unit is automatically "by-passed" restoring full load to the lighting circuits, with normal protection to these circuits being provided by their individual active load circuit breakers. In addition, the unit is protected through a mains circuit breaker (normally 20amps).

Q. Why does LIGHT WARRIOR not use 'phase switching' to apply a voltage reduction to the lighting load?

A. Other known devices that reduce voltage mostly incorporate 'phase switching' and the switching must occur at the 'zero cross-over' point of the AC cycle. This process is subject to the introduction of light flicker, electrical noise, is sensitive to switching timings, has reliability issues, and inconvenient failure modes.

Q. What is the Customer Confidence Guarantee?

A. The guarantee is to provide a replacement unit over a 2 year period if it does not perform as specified.

Q. What is the warranty period?

A. The warranty period is five (2) years (return to factory) or for the full period of any rental and/or service agreement.

Q. Who installs the product?

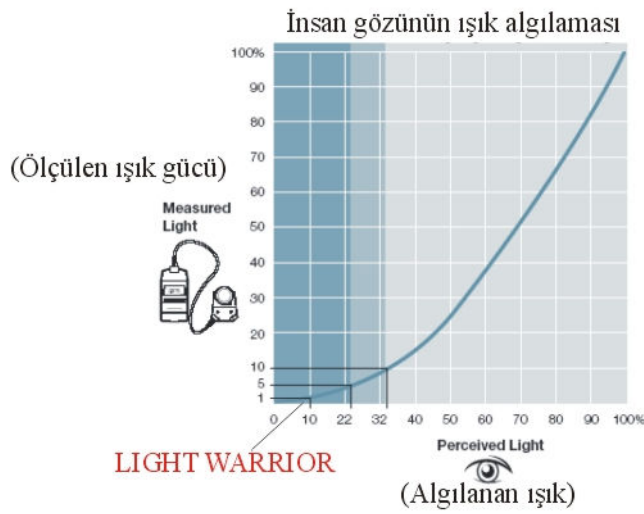
A. We encourage installation by your normal electricians who are familiar with your electrical installation.

Q. When does LIGHT WARRIOR require service and maintenance?

A. The units do not normally require servicing. They are a true set and forget product. However, the installation should be checked at least annually for ingress of such items as insects and moisture.

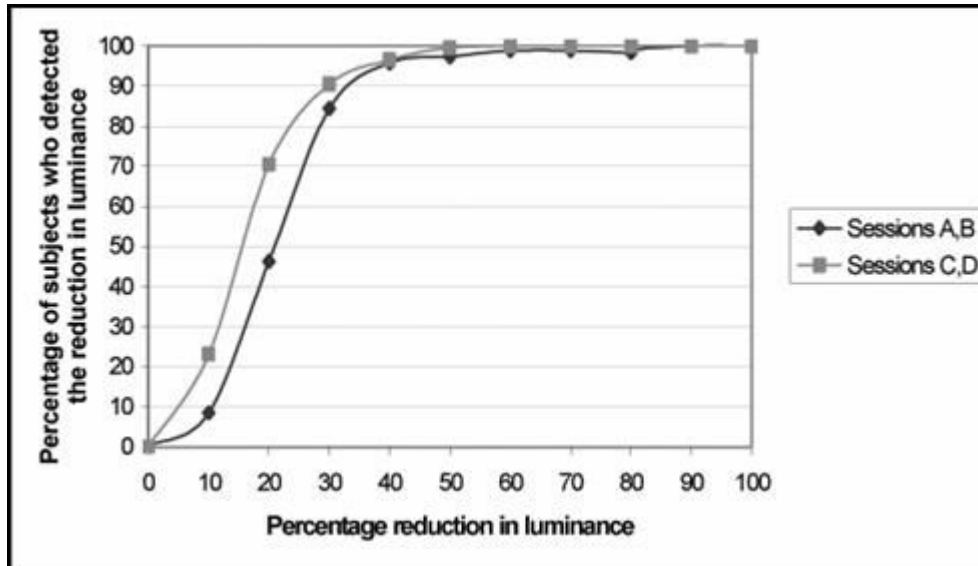
Q. What is the expected life of LIGHT WARRIOR ?

A. LIGHT WARRIOR has an expected Mean Time between Failure in excess of 26 years(for 12 hours/day usage)

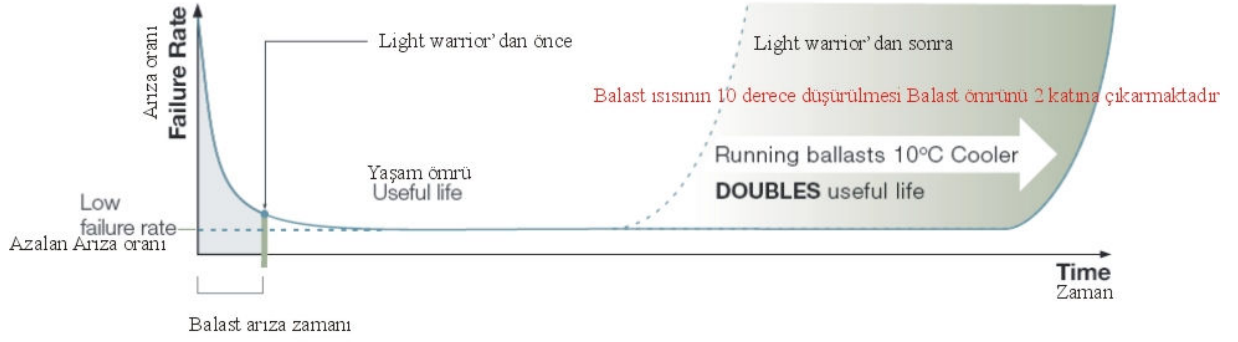


$$\text{Formula: Perceived Light (\%)} = 100 \times \sqrt{\frac{\text{Measured Light (\%)}}{100}}$$

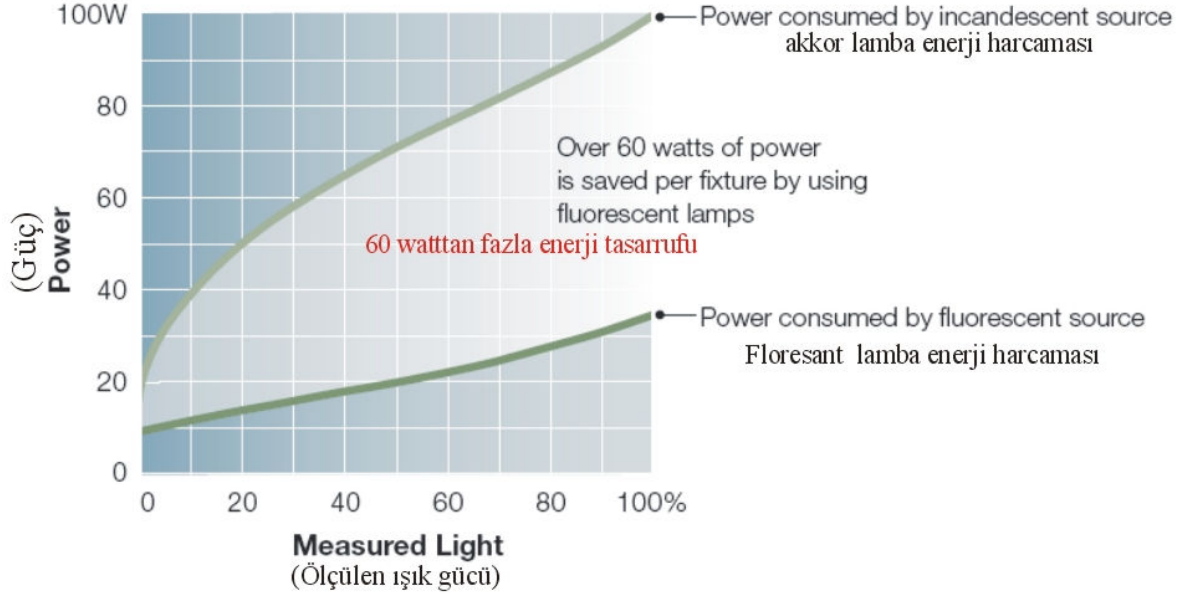
Source: IESNA Lighting Handbook, 9th Edition, (New York: IESNA, 2000), 27-4.

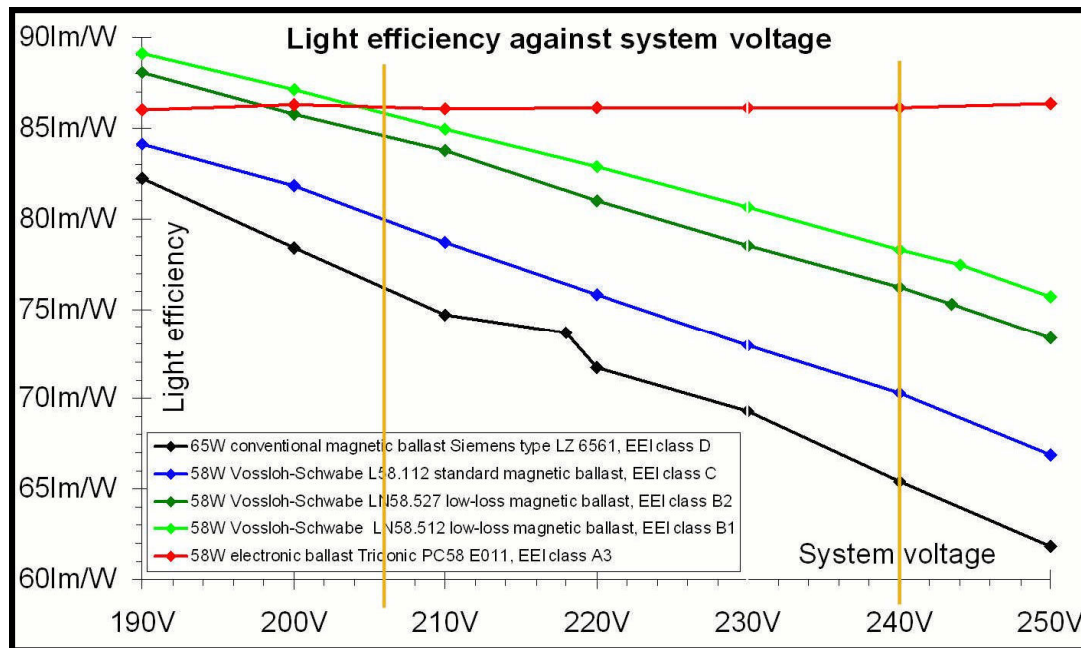


### Gazlı armatürlerde ısının balasta etkisi - yaşam süresi



### Floresant lamba ve akkor lamba ışık karşılaştırması





## LIGHTING AND HEALTH RESEARCHES IN THE WORLD

### Impact of Artificial Light on Health

There is so much discussion and research in this decade about artificial light and light pollution and how it impacts human health. It is suggested that a number of illnesses such as cancer, arthritis, diabetes, cardio vascular disorders, sleep disorders, irritability and so much more is affected by the amount of natural light and darkness we are exposed to in a 24 hour cycle. The natural circadian rhythm of the body requires a period of light and a period of natural darkness to work optimally. Ongoing research indicates there may be serious impacts on human health from artificial light at night.

The research of Dr. Steven Lockley an Associate Neuroscientist at Brigham and Women's Hospital, Boston, and an Instructor in Medicine at Harvard Medical School, has primarily focused on the characterization of circadian rhythm disorders in relation to light loss and the visual impairment in the blind. More recently he has conducted some of the first studies examining the spectral sensitivity of the circadian system or how different wavelengths of light affect the internal 24-hour body clock.

### Understanding and Control of the Circadian Rhythm is a very Powerful Tool in Modifying Human Health

Dr. Joan Roberts, Ph.D. is a tenured professor of Chemistry at Fordham University. She received her Ph.D. in Organic Chemistry from St. John's University and her undergraduate degree in chemistry with a minor in mathematics from Marymount Manhattan College. Dr. Roberts has been featured on ABC World News Tonight with Per Jennings for her research on melatonin/circadian immune responses. In addition to over 60 publications in peer reviewed scientific journals, her work has been published in several prominent "lay journals" including New Scientists, Eye World, Men's Health and on several medical websites, such as ABC New.com, Reuters and BBC News.com. She has been a guest speaker at numerous national and international conferences.

“Circadian Rhythm is a term used to define the chemical and biological oscillations that occur daily in most species including human. These circadian responses are primarily triggered by visible light impinging on the retina, which is then directed to the suprachiasmatic nucleus (SCN) in the hypothalamus. This leads to a cascade of hormonal changes in the pituitary, pineal, adrenal and thyroid glands. The lack of light, total darkness, blocks some of these hormonal events while enhancing its own cascade of neuroendocrine changes. This daily oscillation of darkness and light has a profound effect on most physiological functions in the body. When the circadian hormone response is disrupted through environmental light changes, particularly light in the evening, severe damaging emotional and physical effects associated with seasonal depression (SAD), jet lag, and shift work occur. External control of the dark/light cycle and /or the administration of melatonin have led to effective treatments of these disorders. The immune response also fluctuates in a rhythmic pattern during the day and evening. B (antibody producing) cells are most active in the morning so that hay fever or asthmas may be more severe on awakening. On the other hand T cells and NK (natural killer) cells that attack tumors are more active in the evening. Lissoni and Maestroni have found that cancer treatments that consider this immune-circadian rhythm are much more effective than when randomly administered. Chronotherapy is being considered as an adjunct to treatment of other disorders. It has become evident that all living things need a certain period of darkness and then quality daylight in order to function properly. Understanding and control of circadian rhythm is a very powerful tool in modifying human health.”

Reference: Ecology of The Night: An International Symposium: Darkness as a Biological Imperative

### **Why the Incidence of Cancer is Increasing: The Role of “Light Pollution”**

N.A. Kerenjy, E. Pandula and G. Geuer

Department of Pathology, University of Toronto, Sunnybrook Medical Centre and  
Departments of Clinical Biochemistry and Pharmacology, University of Toronto, Toronto  
Canada

“At present, cancer is responsible for almost half of all deaths among women 45-64 years of age, and about 30% of all deaths among men in the same age group (1). This high rate represents a marked increase from the end of the last century, and it probably has a multifactorial etiology. Air pollution, smoking, diet, alcohol, occupational exposures, and stress are all considered as possible etiologic and risk factors. We put forward a hypothesis that one of the most important etiologic factors in the rapid growth rate of cancer is the change of light exposure that took place in the last 100 years, especially in the developed countries. Increased light exposure acting through the pineal gland reduces melatonin production, thereby diminishing the non-specific oncostatic effects of the pineal gland.”

“It is suggested that light has a major role in tumorigenesis through its effect in regulating melatonin production by the pineal gland. It is further proposed that the major increase in light exposure of the human population may be one of the most important factors that is responsible for the increased incidence of tumors. We propose that studies of environmental components, particularly of the major role of light pollution, may lead to a better understanding of the development of some cancers, their geographic distribution, and their increasing incidence in younger age groups. It is also proposed that appropriate preventive

measures by limiting or neutralizing the increased exposure to light may advance cancer prevention or may even lead to possible better routes in therapy.”

### **NIGHT LIGHTS and your IMMUNE SYSTEM: An ENVIRONMENTAL MESS**

The following is the text of an item which was broadcast on CTV Newsnet on Wednesday May 16, 2001:

Darkness can have a spooky, negative connotation: dark impulses, a dark street, the dark side of one's character. However, science is discovering that shedding light on things isn't always the best. In fact, darkness is essential for good health. Bill Blakemore has more on the benefits of turning off the lights.

“Look at North America from a satellite at night, and it glows. With billions of wasted energy dollars. Nobody meant this to happen. And it's having a devastating effect on our health. It turns out we need darkness to make our immune systems work. Scientists have now discovered that only when it's really dark can your body produce the hormone called melatonin. Melatonin fights diseases, including breast and prostate cancer. Joan Roberts, Photobiologist: It turns off the cancer cell from growing.” But if there's even a little light around your bed at night, your melatonin production switches off. Joan Roberts, again: “ so there may be this natural way, that mother nature has give us, that is , dark night, to keep certain cancers under control.” Light at night, even watching TV turns on other immune-system hormones that should be active only in daytime. They get depleted and you're more likely to get a cold. Nature needs darkness too. The immune systems of animals grow weak if there's artificial light at night.

It turns out this is one pollution that's easy to fix. Lights that spill so much glare into the sky they even wipe out the stars, can be fitted with reflectors to focus the light, which in turn means they require less energy, or you can simply switch off the lights.

Bill Blakemore, AMC News, New York

### **Spirituality**

For thousands of years man has looked up in to the heavens and with outstretched arms or heads bent in prayer asked for guidance, help, healing, hope, and forgiveness. Man has fallen on his knees and asked God in heaven to hear his intimate plea.

Man has asked for rain in times of drought, prayed for healing, understanding, patience, love, and for guidance. Eyes and hearts raise their souls to God, Allah, The All Mighty, the Great Spirit, to our Father, to Saints and loved ones who have gone before us. With outstretched arms reaching for the sky, man sings, and prays and chants with the hope of a better tomorrow for their families, for their nation, for the world.

Ask a child “Where is Heaven?” And most of them will point to the sky. For children living in urban centres, the heavens are lost to night glare and night pollution. We are becoming more and more disconnected with the beauty, and the spiritual nature of the night sky. Days like Queen Victoria's Birthday are national holidays. Wouldn't it be a wonderful celebration to have a Heavens and Shimmering Stars Night once a year?

Sunlight and dark nights have been with us since the beginning of life on this planet. As we've visually disconnected from shimmering star-studded dark skies, we have forgotten the

beauty, the ancient spiritual properties and now we are just beginning to understand its powerful effect on human health.

For more information and questions :

+ 90 232 489 34 65

Mr.Savas SENER / manager

[www.senertek.com](http://www.senertek.com)

[www.senerlabs.com](http://www.senerlabs.com)