

Carmanah Technologies Inc.

Efficient Application of Alternative Energy

Carmanah Technologies designs and manufactures solar-powered LED (light-emitting diode) marine navigation lighting. By designing products that are durable while efficiently using solar energy, Carmanah has helped improve marine safety while reducing the use of standard energy and the impact of pollution on the marine environment. Products are engineered to be environmentally supportive and economically practical for maximum utility and mainstream appeal.

Dr. David Green was looking for a way to run his sailboat's anchor lights at sea without draining the battery when he developed the first prototype for Carmanah lights. Using applied research and an intimate understanding of the marine environment, Dr. Green developed a light that charges nearly anywhere in the world while withstanding harsh and variable marine weather conditions. Locations include the Panama Canal, the Suez Canal, along inland waterways in Vietnam (replacing kerosene lanterns) and recently in Iraq marking waterways for humanitarian efforts.

These compact and efficient lights are gradually replacing the standard bulky solar arrays and banks of car batteries currently used to power marine navigation lights. Costs for maintaining each navigation marker have fallen from as high as \$50,000US to zero. The Canadian and United States Coast Guards as well as coast guards around the world have approved and are utilizing this new technology.

Because Carmanah lights are smaller and lighter than current navigation technology, large boats are no longer required for installation. This, combined with up to five years of maintenance-free operation, has dramatically reduced the environmental impact of the aids to navigation system. Of equal significance, the rechargeable battery is built into the light, eliminating the possibility of spent car batteries in the ocean.

Carmanah is the first to integrate LEDs with solar charging and battery power storage for durable, efficient lighting products that meet real and specific needs. To trap sunlight from any

direction, solar panels are built into each side of the light or placed on top of the light inside a shock-resistant dome. This patented design maximizes durability and solar panel efficiency for full charging even on overcast days. Fully sealed, Carmanah lights withstand salt water submersion, temperature swings from -40 to +80°, heavy shocks and UV exposure.



An LED is a semiconductor chip the size of a grain of sand encapsulated in an epoxy resin. Light is emitted when electricity passes through and colour is determined by the crystal composition of the chip. With no filament or loose parts they are naturally shock and vibration resistant. The lifespan of an LED is approximately 100,000 hours, or 27 years when used for 10 hours per day — 20 times longer than the best incandescent bulbs.

Eighty-five per cent of the electricity passing through the filament of an incandescent bulb is wasted as heat. Of the 15 per cent that becomes white light, more is lost if a colour filter is used. LEDs, which give off very little heat and don't use filters, are about 100 times more efficient, using 90 per cent less electricity than equally bright incandescent bulbs, making them the best choice for sustainability. There are now over 70,000 Carmanah lights installed in 110 countries. Please see www.carmanah.com for more information.

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