# EVOLUTION OF THE MODERN LIGHTHOUSE


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# Since people first started to go to sea, aids to navigation have been used.

**Most historians believe that the earliest aids to navigation were fires left burning on the beach by native fishermen.**

*As time went by, and sailors ventured farther offshore, the height of the fires raised higher and higher to allow the fire to be seen at a greater distance.*

***A lighthouse is a tower building, or other type of structure designed to emit light, and to serve as a navigational aid for maritime pilots at sea or on inland waterways.***

*Pharos Lighthouse in Alexandria, Egypt was reportedly 500 feet tall and could be seen even from 40 miles at sea.*

## Of course, a structure of that magnitude was not appropriate for any locations.

- **In addition, rain and foul weather soon proved to dampen both sailor's mood and fires.**

# By over time, timber fires gave way to towers,working with candles and oil.

Although the  tower was a shelter,  wind and water could hide the light source.

Large and inefficient consumption of fuel, and the constant need to clean  glass and lenses, limited the effectiveness of these systems.

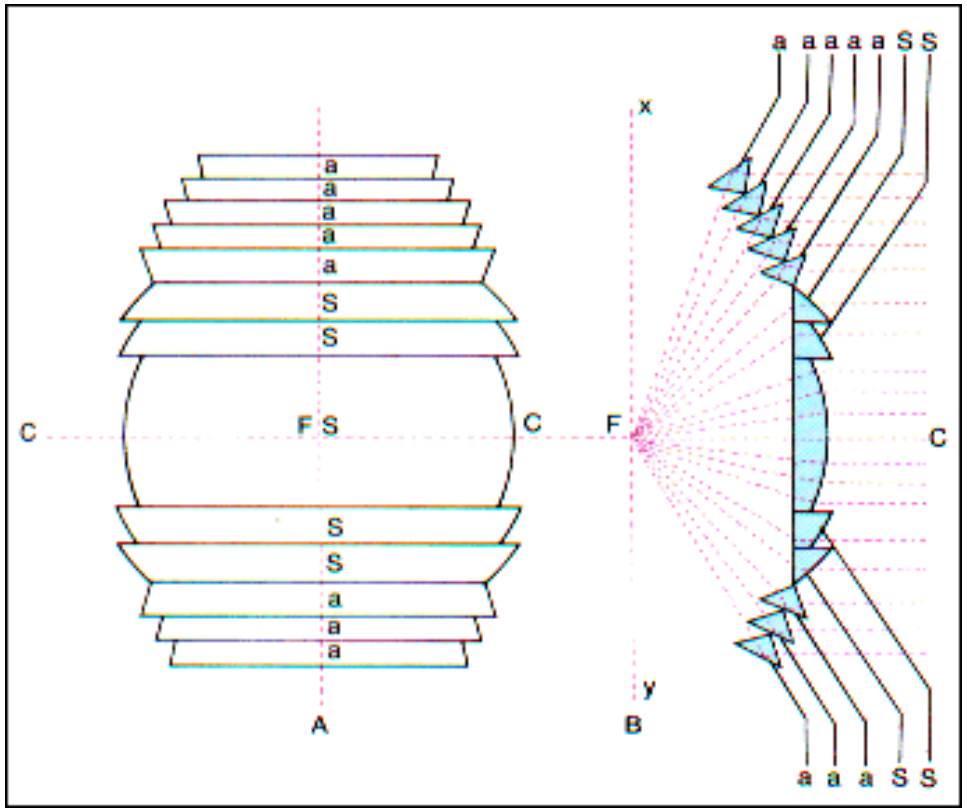
## One of the most important innovation for navigation and lighthouse technology was the introduction of the Fresnel lens, in the middle  of18th Century.

**These smaller, lightweight lenses demonstrated extraordinary improvement of efficiency and intensity . They permitted the use of greatly reduced quantity of fuel, smaller towers and support structures.**

In the latest 100 years, acetylene replaced oil,  until it was replaced by electricity. Small aluminum and acrylic lenses are replacing large glass lenses.

**Technological improvements have been  more reliable, efficient and effective than the former systems, but cheaper.**

# CONCAVE LENS ARE THINNER IN THE MIDDLE AND THUS DIVERGE LIGHT RAYS




Fresnel lens

Lighthouses mark dangerous coastlines, hazardous shoals, reefs, and safe entries to harbors, and can support aerial navigation. Once widely used, the number of operational lighthouses has declined,  due to the expense of maintenance and use of electronic navigational systems.

- **Nowadays, even though GPS and modern technologies have replaced lighthouses, sometimes they can crash.**

That is why having a lighthouse it is important.

# In some lighthouses, solar panels and LED lights are used

**Photovoltaic systems, or PV for short, are probably the fastest word wide energy provider, which relies on an almost infinitely available source of renewable energy – light from the sun.**

Outdoor LED headlights are used because **they allow energy saving of at least 70%**

The photovoltaic system is the set of mechanical, electrical and electronic components that capture solar energy, transform it into electrical energy, to make it available.

The word “photovoltaic” combines the Greek root word for a packet of light energy (photon) with the Latin for electricity ( Alessandro Volta).

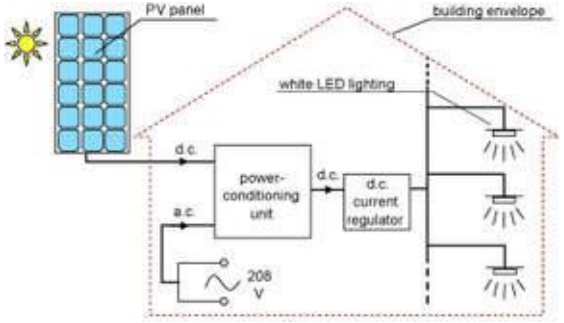
This makes any system of converting sunlight into electricity both eco- friendly and cost-effective.

PV systems use a variety of light sensitive materials to convert light energy into usable electrical energy.

PV solar cells and panels were first developed in remote places where electricity was required, such as spacecraft and lighthouses or beacons at sea.

The majority of PV systems use a very pure form of silicon as light sensitive material space craft

# There are several reasons why solar energy has become so popular and it is likely to keep growing over the next two decades

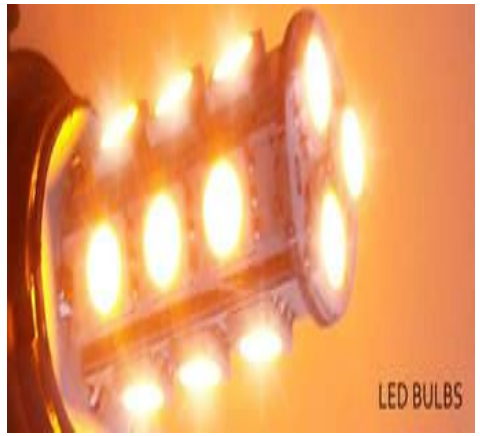



**First of all** because fossil fuels will certainly be not so available in the future, which will raise cost per unit of electricity provided, more than in any time in the past.

The unit cost of electricity generated by solar panels has dropped by at least 50% over the last decade.

A second reason is the attention given to the effects of fossil fuel combustion on the Earth's atmosphere and a global awareness of the potential effects of rapidly increasing climate change.

# LED lights




LED light are LONG LIFE

LED light are  Ecologically Friendly

LED lights are free of toxic chemicals.

LED light are DURABLE QUALITY

LED light use Low-Voltage Power Supply

**They have LONG LIFE**

**If you leave the LED fixture on for 8h per day it would take around 20 years before you have to replace the LED bulb.**

**Because of the long life span of LED lights, also the maintenance work is reduced.**

**They do not really burn out and stop working like a standard light.**

**They are Ecologically Friendly**

**LED lights are free of toxic chemicals.**

**Most conventional fluorescent lighting bulbs contain a multitude of materials like mercury that are dangerous for the environment.**

**They are 100% recycable, and will help you to reduce your carbon footprint by up to a third.**

**They are Durable Quality**

**LED are ideal for operation under cold and low outdoor temperature settings.**

**LEDs are extremely durable and built with sturdy components that are highly rugged and they can withstand even the roughest conditions.**

**LED lights are resistant to shock, vibrations and external impacts, they make great outdoor lighting systems for rough conditions and exposure to weather, wind, rain.**

**A low-voltage power supply is sufficient for LED illumination. This makes it easy to use LED lighting also in outdoor settings, by** connecting an external solar-energy source and using **LED technology is a great advantage.**

# Thank you for your kind attention


Progetto a cura delle professoresse
Cervo Matilde ed De Vico Eva.