

# Lighting and Development



- 1.6 billion people (about 30% of the global population) are without access to electricity.
- For poor families lighting is often the most expensive item among their energy uses, typically accounting for 10-15% of total household income.
- New advancements in lighting technology, such as compact fluorescent light bulbs (CFLs) and light emitting diodes (LEDs), promise clean, portable, durable, lower cost, and higher quality lighting.

### **Social/Economic Benefits:**

- Increase the quality of life
- Extend the working day
- Extend productive time in the home
- Provide savings—although fuel is cheaper upfront, it is much more expensive in the long-run on a strictly financial basis
- Increase educational opportunities in school and in the home for children and provide opportunities for adult literacy and higher education programs
- Increase gender equality for women

### **Health Benefits**

- Reduce harm to eyes from working over poor-quality light
- Reduce burn potential
- Enhance safety and security through outdoor lighting
- Improve indoor air quality by reduction of harmful smoke and other emissions from burning fuel

### **Environmental Benefits:**

- Less Greenhouse Gas Emissions
- Initiate the transition towards a more sustainable energy economy

# Technologies for off-grid Lighting

- Solar Lanterns: charge themselves (solar panel integrated into the design)
- Battery powered lanterns: charged by external power source
- Wind up lighting
- Lights connected to an external power source
- Mainly use CFL bulbs or LED bulbs.



**Other Products from Vaishno Pro-gen**



**Solar fan with LED**



**LED House Lighting System**



**SPECIFICATIONS**

**Lantern**

Power consumption 3 watts. LED life is typically 100,000 hours. One charge (6 hours on mains) or 8-10 hours on solar gives 8 hours of continuous light. Battery 6volts, 4.5 AH Lead acid type

**Mains Charger**

Input:-85 Volts to 300 volts. Output- 7.2 volts

**Solar Panel**

6 Volts, 3 Watts or 5 Watts



**LED Garden Lamp**

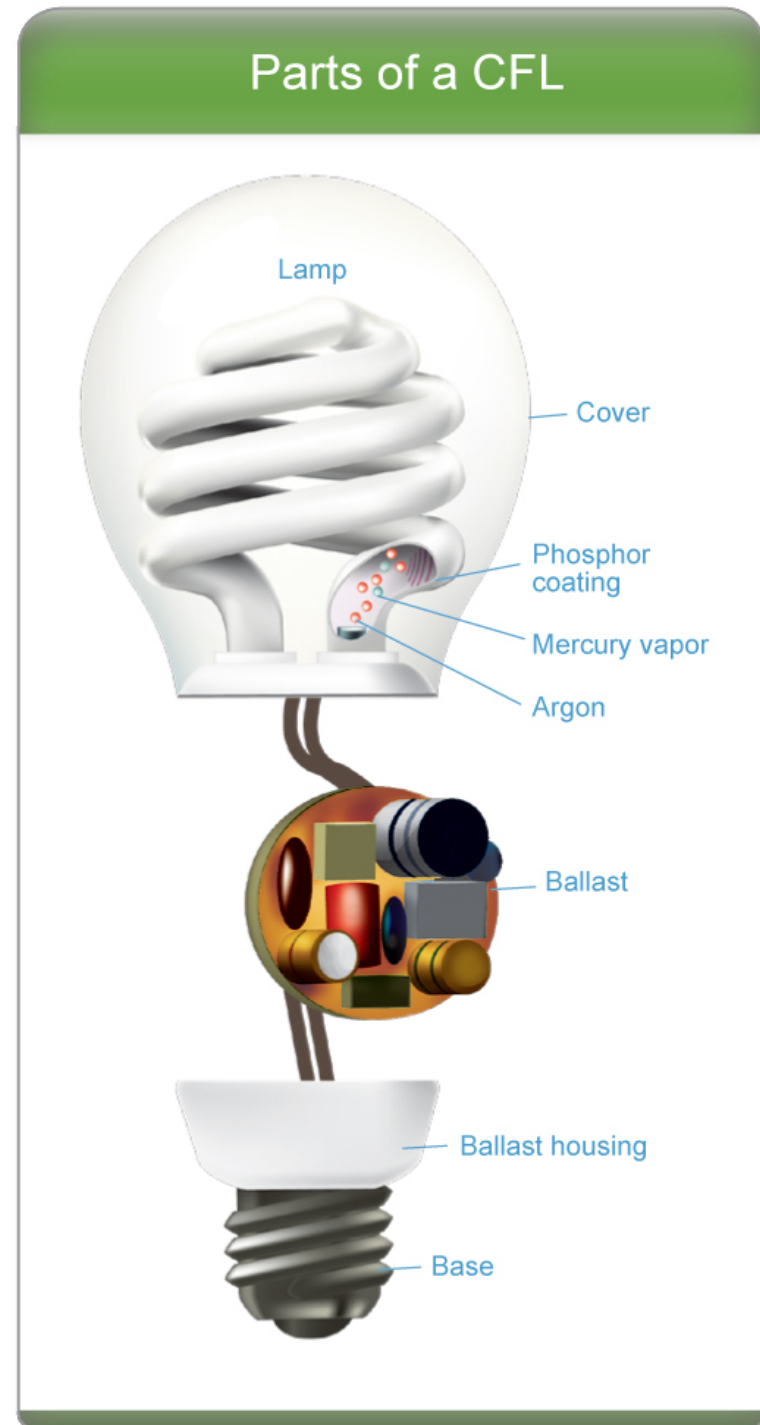


**LED Solar Street Lamp**



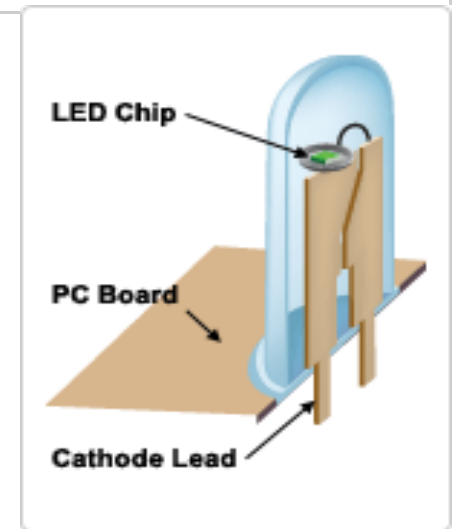
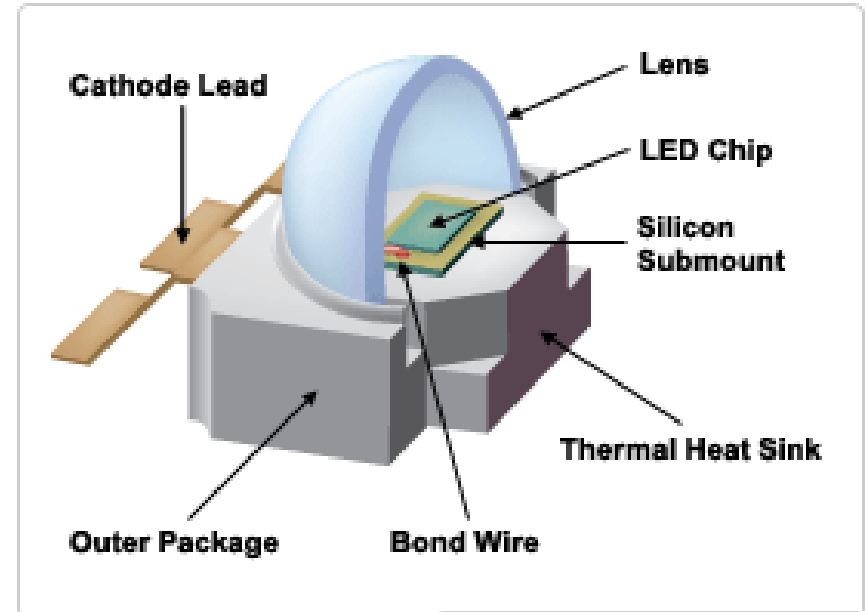
# Compact Florescent Lights (CFLs)

- Cheaper alternative to LEDs with good quality light, but more expensive than incandescent
- Use more energy than LEDs, but use 75% less energy than incandescent lights
- Do contain mercury and potentially present disposal issues
- Can work with most existing light sockets
- Lifetime is approx. 9 years



# Light Emitting Diodes (LEDs)

- Highly efficient
- Better for task lighting applications but new innovations have “all around” light options
- More expensive than CFL bulbs
- Very long life, approx 22 years
- Bulb and fixture are one in the same so cannot be used with existing fixtures



# Lighting Programs Around the World

- Lighting Africa—World Bank/IFC program
- BoGo—working around the world
- Cosmos Innovations—based in India and working in India
- Light up the World Foundation—working in many countries based in Canada
- Barefoot Power—working in Papua New Guinea based in Australia
- Innovative Lighting in Liberia—working mainly in Liberia but technology throughout other countries in Africa

# World Bank/IFC Lighting Africa Program

- Seeks to support the global lighting industry in developing affordable, clean, and efficient modern lighting and energy solutions for millions of Sub-Saharan Africans who currently live without access to the electricity grid.
- Every year, African households and small businesses spend upwards of **\$17 billion** on lighting, dominated by fuel-based sources such as kerosene, a costly and inefficient alternative.
- However, despite these huge expenditures – many households spend as much as **30% of their disposable income** on fuel-based lighting – consumers receive little value in return.
- Supports innovation, cooperation, and commercialization in lighting sector by hosting Development Marketplace competition; hosting discussions online; holding technology demonstrations and meetings throughout Africa
- [http://www.youtube.com/watch?v=2nASqdJw3rg&feature=player\\_embedded#](http://www.youtube.com/watch?v=2nASqdJw3rg&feature=player_embedded#)

# BoGo Solar Lights

- Works around the world. Highlighted projects include:
  - BoGo solar LED flashlight in Madagascar. A full charge allows a light to shine 4 to 22 hours depending on the setting. The shape of the Super BoGo model mimics that of a shampoo bottle. It can illuminate a room or be carried on the go.
  - Use in refugee camps so women armed with flashlights have some protection from potential attackers.
  - Working on developing solar-powered devices that kill or sterilize malaria-infected mosquitoes, as well as water treatment technology and a solar radio.
- "We have discovered in male-dominated societies, the men were stealing the lights from the women," Joan Dodd, chief operating officer, "We made the lights pink--no man wants to carry an item widely seen in their community as a 'woman's product' so the women no longer have their lights stolen from them."



# Cosmos Ignite—India

- Cosmos Ignite Innovations was founded in 2004
- The New Delhi company's signature product is the LED MightyLight, which also charges mobile phones.
- Costs US \$45 and is water- and shock-resistant; it can be hung from a hook as a light fixture or carried by a handle.
- Rated not to fuse for 100,000 hours (up to 30 years on usage of 8 hrs daily).



# Light up the World Foundation (LUTW)

- Working to increase lighting opportunities around the world—now in Costa Rica, Nepal, Papua New Guinea
- LUTW provides technology and sets up projects, then volunteers raise money to come and install (the raised money pays for the project set up, the volunteer pays their own travel). Most volunteers are from US or Canada.
- Administered through Tides Foundation



# Barefoot Power

- Barefoot Power (based in Australia) provides solar-charged lighting for Papua New Guinea.
- Barefoot sells lighting kits of 10 watts to 20 watts each that include CFLs. Co-founder Stewart Crane believes that in PNG, CFLs provide more light for the money spent than LEDs. Other companies choose LEDs over CFLs because CFLs contain mercury and don't last as long as LEDs.



Firefly lamp next to a kerosene-fueled flame.

# Innovative LED Lighting in Liberia

- An LED flashlight, torchlight or ceiling light is made from a plastic water bottle and other local materials.
- The original developer, Green Energies, trains local entrepreneurs to build the lights in country.
- In 2008, Green Energies, under a contract with USAID, set up five micro-factories in Monrovia and several nearby villages, including one run exclusively by women.
- The project has attracted the attention of Liberian President Ellen Johnson-Sirleaf.
- With additional money from Daphne Foundation, the project is starting a pilot solar light project in three school classrooms.



- The technology—called Taa Bora (Swahili for “better light”)—is set up so that most of the materials used to make the lights can be obtained locally, reducing the dependence on shipping from outside the country.
- The technology uses recycled plastic bottles, LED bulbs, and simple wiring to create dual purpose lights. The rechargeable batteries, which last approximately three years before replacements are needed, are charged with miniature solar panels.
- Participants are provided a 3 day training session learning to build and repair the products and then ongoing business support and quality checks.



# Liberia Lighting Applications

