

## SWITCH TO CFL

STEP	DESCRIPTION
1	The inefficient 60 Watt incandescent lamp is thrown after replacing it with efficient 15 Watt CFL.
2	The bulb misbalances the fulcrum lever and raises the opposite end.
3	The rope tied to the fulcrum pulls the latch holding the ball and releases it.
4	The ball strikes the arm lever and moves the rope on the pulley arrangement tied top the opposite end.
5	Due to movement of the rope the plunger compresses the liquid in the container.
6	The pressurized liquid is ejected from the nozzle and hits the bucket and moves the cross lever arms.
7	The hand moves up and the finger of the hand releases the lock of the compressed spring and moves a lever
8	Due to movement of the lever, the rope tied to it opens the spring loaded jaw of the pliers and releases the ball.
9	The ball strikes the see-saw arrangement and moves the other end holding the ball up.
10	The ball bounces on another lever and strikes it.
11	Due to striking of ball the other end of the lever goes up to operate the scissors
12	The scissors cut the string balancing a weight and a balloon.
13	Due to cutting of string the balloon rises up and strikes the lever. The weight falls down.
14	The other end of lever goes down and the ball is dropped.
15	The ball slides down the guide ramp and moves the slide tooth rack and gear pinion assembly.
16	The sliding tooth rack moves the linkages and tilts the wine filled jug.
17	The wine from the jug fills the wine glass held by the hand. Due to filling of wine in the glass, the weight of the glass increases and moves the hand holding it down.
18	The hand moves the sliding tooth rack upwards, which rotates the gear pinion assembly. It further moves the other sliding tooth rack downwards and the attached hand presses the lever down and opens the jaw of the pliers holding the spring loaded rope end.
19	The rope moves through a train of pulleys arrangement and further moves the iron ball down and presses the lever. The mouse sitting under the lever also gets hurt.
20	The lever further moves up another lever through a linkage. A flag attached to this linkage displays "TURN OFF LIGHTS NOT IN USE". The lever further tilts the slide holding a ball. The ball slides and falls in a funnel of a spiral tube.
21	The ball comes out of the tube at a great velocity and strikes the lid of the pet box. The rabbit sitting inside the box jumps out and moves the conveyer on


	the pair of rollers, which further lifts up the lid of another box.
22	The spring loaded forward moving hand moves out of the box and activates hammer
23	The hammer strikes the incandescent lamp and breaks it and releases the end tied to the cap of the bulb.
24	The iron ball moves the belt and rotates the gear arrangement. It further moves the sliding tooth rack forward.
25	The latch is released and the arm moves upwards due to compression of spring.
26	The hand moves upwards and tilts the half pipe holding the ball and the ball rolls down.
27	The ball pushes the lever down and operates the linkages and another lever.
28	The match stick fixed at the end of the lever rubs on the rough surface moves down and lit the candles. It also pushes the spring loaded rod.
29	The moving rod pushes the ball kept on the stand. The ball falls on the ramp and moves down.
30	The ball falls in the cup fitted on one end of the lever and pushes it down. The other end moves up and operates the crank rod arrangement which moves the pinion gear train arrangement.
31	The gear arrangement moves the sliding tooth arrangement which further moves the lever arrangement at 30, backwards. Due to backward movement of the pulley connected to the lever stand, the string connected to the pulley arrangement moves the champagne bottle down and it gets open. Due to the weight of the bottle, the string is pulled and which in turn open ups through a set of pulleys, the BEE Poster showing the various stages in the improvement in lighting efficiency.

### THUS THE REPLACEMENT OF 60 WATT INCANDESCENT LAMP WITH 15W CFL IS CELEBRATED.

#### Answers to questions

1. Estimate how large is “?” in percent.  
“?” is 1.3%.  
An incandescent light “bulb” converts only 1.3% of the energy in coal provided to a power plant to generate a useful energy output.
2. What is the “useful energy output” of a CFL.  
The useful energy output of CFL is 5%.  
CFL converts 5 % of the energy in coal provided to a power plant to generate a useful energy output.  
The CFL are about four times efficient than an incandescent lamp.
3. Where is the energy lost on its way from coal to electricity consumed by the CFL.  
The energy is lost in following ways:
  - 1) Loss in coal mining, crushing and transportation
  - 2) Loss in burning of coal as fuel in the boilers
  - 3) Loss of heat due to dry flue gas
  - 4) Loss of heat due to moisture in fuel and combustion air
  - 5) Loss of heat due to combustion of hydrogen

- 6) Loss of heat due to radiation
- 7) Loss of heat due to un-burnt fuel
- 8) Loss in production of steam in boilers
- 9) Steam network losses
- 10) Steam turbine losses
- 11) Generator losses – Load and No load losses
- 12) Generator transformer losses - Load and No load losses
- 13) Transmission losses
- 14) Distribution losses
- 15) Switchboard and Distribution losses
- 16) Lighting circuit losses, including losses in fuses and switches
- 17) Ballast losses
- 18) Lamp losses

A.	Photograph	
B.	Personal Details:  <ol style="list-style-type: none"> <li>1. Name :</li> <li>2. Company name:</li> <li>3. Designation:</li> <li>4. Qualifications:</li> <li>5. Email Address:</li> <li>6. Complete postal address</li>   <li>7. Fax No:</li> <li>8. Phone No:</li> <li>9. <i>BEE exam registration number - EA</i></li> </ol>	ANEESH KUMAR SHANDILYA BHARAT OMAN REFINERIES LTD. VICE PRESIDENT (ELECTRICAL) B.Tech (Electrical), MBA, Energy Auditor <a href="mailto:akshandilya@borl.in">akshandilya@borl.in</a> / <a href="mailto:akshandilya@rediffmail.com">akshandilya@rediffmail.com</a> C/o Mr Rakesh Singhai, Singhai Rajkumar Memorial Hospital, Khimlasa Road, BINA Distt Sagar (M.P.)  Not available 09977403311 (Mob) Certified Energy Auditor EA0399 -Year 2004
C.	Experience details related with Energy Management	<ol style="list-style-type: none"> <li>a) Implementation of Load Management System</li> <li>b) Energy Monitoring of the Complex</li> <li>c) Have handled the Billing of State Electricity Board</li> <li>d) Implementation of Energy Conservation Projects</li> </ol>
D.	Area of Specialization	<ol style="list-style-type: none"> <li>a) Installation of Electrical equipments in Refinery</li> <li>b) Electrical Maintenance in Petro-chemical Process Industries</li> <li>c) Load Management System</li> <li>d) Cathodic Protection System</li> </ol>

E.	Major Achievements	<ul style="list-style-type: none"> <li>a) Erection and commissioning of Gas based 1500 MTPD Ammonia Plants of Vijaipur Project in 1986-87 and in 1995-97</li> <li>b) Installation of PLC based SCADA System (LOAD MANAGEMENT SYSTEM) for Control, Supervision &amp; Monitoring of Electrical System, from Central Control room covering Captive Power Plant (3 x 16 MW Gas Turbine Generators), DG Sets, ten Substations in the old plant and the Expansion plant.</li> <li>c) Installation of the CATHODIC PROTECTION SYSTEM for mitigation of corrosion in underground pipelines in Vijaipur Line-I and Line-II</li> </ul>
F.	Details of Energy Management Projects undertaken, if any	<ul style="list-style-type: none"> <li>a) Replacement of Steam Turbine with 1300KW motor with 11KV soft Starter for energy conservation in Ammonia Cooling tower</li> <li>b) Replacement of Steam Turbine with 1450KW motor for energy conservation in Ammonia Cooling tower</li> <li>c) Implementation of Load Management System</li> <li>d) Implementation of Energy saving schemes in Lighting System in the Complex</li> <li>e) Changeover of Delta Connected motors to star connection</li> </ul>