

Intervening Technique	Optimise the Plant Lighting Load in Tempered Glass Industry
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Before CP	Plant is operating 15 nos. High Pressure Mercury Vapour Lamp (HPMV) of 250 watt each, for 8 hrs. Per day. Also, approximately 20 nos. CFL of 32 watt in admin department as well which also operated almost 8 hrs. Per day.
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After CP	The comparison between different light types is shown in following table:
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Table: Comparison of Lights (LED/Fluorescent/Incandescent)

Energy Efficiency	Incandescent Light Bulbs	Fluorescent (CFL)	LED
Life Span (average)	1,200 hours	8,000 hours	50,000 hours
Watts of Electricity Used (equivalent to 60 watt bulb).LEDs use less power (watts) per unit of light generated (lumens). LEDs	60 watts	13-15 watt	6 - 8 watts

	<p>help reduce greenhouse gas emissions from power plants and lower electric bills</p>			
	<p>Environmental</p>	<p>Incandescent Light Bulbs</p>	<p>Fluorescent (CFL)</p>	<p>LED</p>
	<p>Contains the TOXIC Mercury. A silvery-colored poisonous elemental metal that is liquid at room temperature.</p>	<p>No</p>	<p>Yes - Toxic for your health and the environment.</p>	<p>No</p>
	<p>RoHS Compliant (Reduction Of Hazardous Substances). The maximum concentration limits on</p>	<p>Yes</p>	<p>No - contains 1mg-5mg of Mercury and is a major risk to the environment</p>	<p>Yes</p>

	<p>hazardous materials used in electrical and electronic equipment. Enforced by the European Union.</p>			
	<p>Important Facts</p>	<p>Incandescent Light Bulbs</p>	<p>Fluorescent (CFL)</p>	<p>LED</p>
	<p>Sensitivity to low temperatures</p>	<p>Some</p>	<p>Yes - may not work under negative 10 degrees Fahrenheit or over 120 degrees Fahrenheit</p>	<p>None</p>
	<p>Sensitive to humidity</p>	<p>Some</p>	<p>Yes - can have a higher failure rate in more humid climates/weather.</p>	<p>No</p>
	<p>On/off Cycling. Switching a CFL on/off</p>	<p>Some</p>	<p>Yes - can reduce lifespan drastically</p>	<p>No Effect</p>

	quickly, in a closet for instance, may decrease the lifespan of the bulb.			
	Turns on instantly	Yes	No - takes time to warm up the Mercury to achieve maximum light output.	Yes
	Durability	Not Very Durable - glass or filament can break easily	Not Very Durable - glass can break easily	Very Durable - LEDs can handle jarring and bumping
	Heat Emitted. Incandescent bulbs emit large amounts of heat which can increase air conditioning	85 btu's/hour	30 btu's/hour	3.4 btu's/hour

	costs and energy consumption while using air conditioning.			
	Possibility of Mechanical Failure	Some	Yes - may catch on fire, smoke, or emit an odor	Not typical
	Minimum Light Output	Incandescent Light Bulbs	Fluorescent (CFL)	LED
	Lumens Measures luminous flux or total packets of light produced by a light source	<p>Watts</p> <p>The unit of power. The amount of energy transferred in one second</p>		
	250	25	4-9	3
	450	40	9-13	4-5
	800	60	13-15	6-8
	1,100	75	18-25	9-13
	1,600	100	23-30	16-20
	2,000	125	28-40	20-25
2,600	150	30-55	25-28	

Streetlight	90 LED	250W Mercury-vapour	
Light source	1W LED (90pcs)	(OSRAM)HQL 250W	
Central luminance	15-16Lux at 7m	15-16Lux at 7m	
Beam angle	120°	150°	
Life Span	100,000 hours	15,000 hours	
Energy consumption per year	442kWh /year	1068kWh /year	
Ultraviolet hazards	No ultraviolet emission	Emits ultraviolet	
LED Streetlight		Mercury-vapour Streetlight	
	Lumen	OSRAM HQL	Lumen
28 LEDs - 28W	2300	50W~80W	1800~3800
56 LEDs - 56W	5000	80W~125W	3800~6300
112 LEDs-112W	10000	125W~250W	6300~13000
168 LEDs-168W	14000	250W~400W	13000~22000

Thus, by replacing the conventional light with LEDs (250 watt HPMV with 90 watt LED and 32 watt CFL with 18 watt LED) plant can save approximately 7504 kWh per annum.

Benefits	
Environmental	<ul style="list-style-type: none"> • Per Day reduction in the Natural Gas consumption: 20.84 KWh • Per Year reduction in the Natural Gas consumption: 7504KWh • Per Day reduction in Greenhouse Gas (CO₂) emission: 0.02 MT of CO₂ • Per Year Reduction in Greenhouse Gas (CO₂) emission: 6.45 MT of CO₂
Economical	<p>Investment: Rs. 1,15,000/- for LED</p> <p>Annual Savings: Rs. 56,200 /- per Annum</p> <p>Payback Period: 25 months</p>