

Lighting Efficiency

New Developments & Maintenance

- New designs = better efficiency
- The best modern systems are 29% more efficient than 10 year old systems

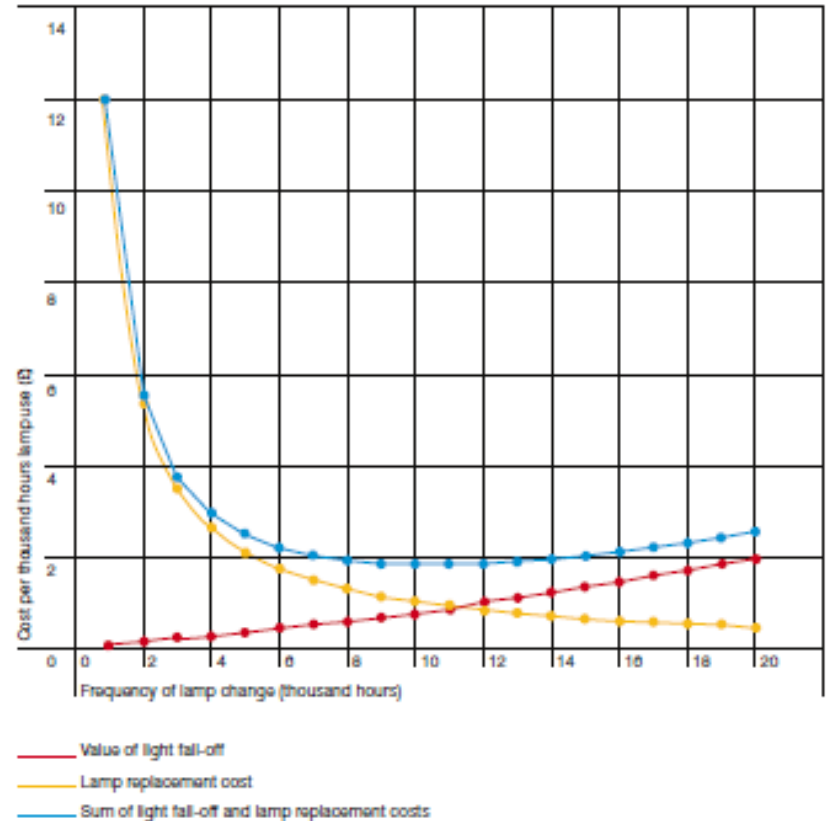
Lamp	Voltage (V)	Ballast type	Actual power (W)	Lamp output ($\mu\text{mol/s}$)	Lamp efficiency ($\mu\text{mol/s}/\text{input W}$)	Comparative efficiency (%)
Standard HPS 400 W	230	Electro-magnetic	450	630	1.40	-
Horticultural HPS 400 W	230	Electro-magnetic	450	725	1.61	+15
Horticultural HPS 600 W	230	Electro-magnetic	670	1,100	1.64	+17
Horticultural HPS 600 W	400	Electro-magnetic	670	1,150	1.72	+23
Horticultural HPS 600 W	400	Electronic	635	1,150	1.81	+29
MH 400 W	230	Electro-magnetic	450	540	1.20	-14

- High reflectivity materials
 - Maximise the light directed to the plant
- Specialist coatings
 - Maximise energy in the PAR range



- Light output reduces with operating time
 - 6 to 10% @ 10,000hrs
 - 20% @ 20,000hrs
- Replace lamps at the economically optimum time
 - Typically 12,000hrs

Graph 3 The effect of frequency of lamp change on the sum of light energy fall-off and lamp replacement cost for a 400 W HPS lamp (using data from PC 176)



Don't forget maintenance

- Lamp & reflector cleaning
 - Approx 2.5% light reduction per year
- Reflector re-anodising
- Electricity supply voltage
 - 1% voltage = 3% light