

Bright Ideas about Lighting – The Myths and Facts about CFLs

Presented at
Spotlight on Energy Efficiencies
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Why Change the Lamps?

- To reduce energy consumption and save money
- To improve lighting quality





The Basics of Electrical Energy Efficiency

- Power = **How Fast** we use electricity
 - Measured in watts (W)
- Energy = **How Much** electricity we use
 - Measured in kilowatt-hours (kWh)

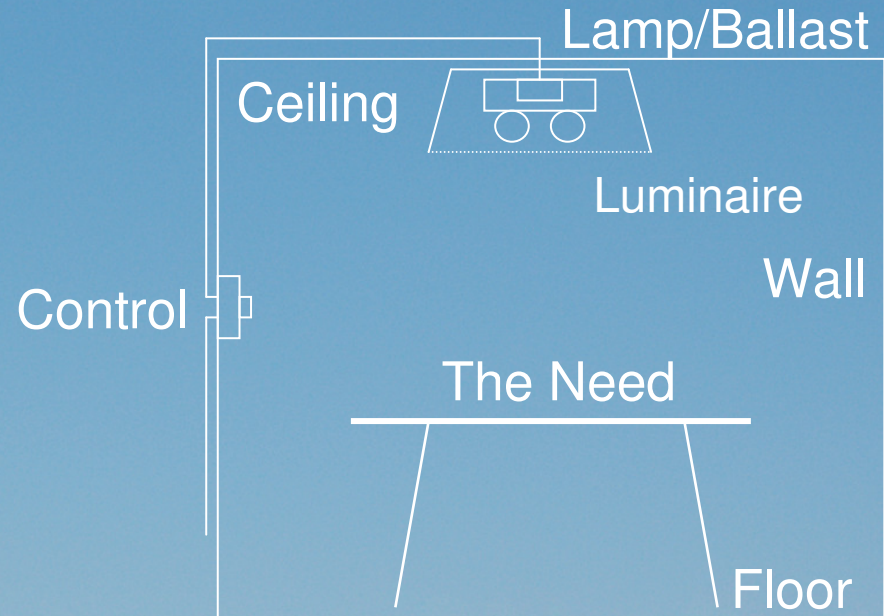
How Much = How Fast x How Long



The “Golden Rule” of Energy Efficiency

*Reduce the “how much”
By reducing the “how fast”
Or by reducing the “how long”
Or both*

What is a Lighting System?



How to Maximize your Savings

- Minimize operating time (“how long”)
- Ensure appropriate levels and quality (“how much”)
- Maximize efficiency of delivery (“how much”)
- Maximize the source efficacy (“how much”)
 - Lamp efficiency = efficacy

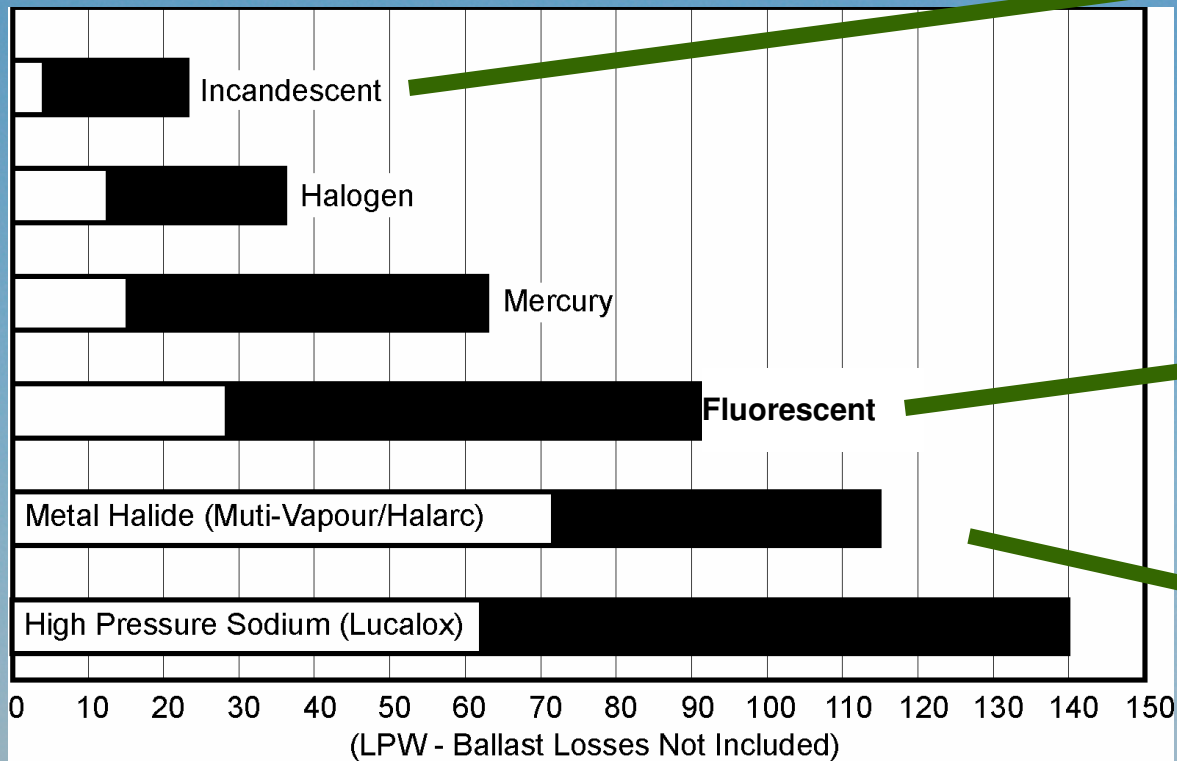


Considerations in Choosing Lights

- Efficacy
- Illumination level required
- Uniformity
- Absence of glare
- Colour temperature
 - Low temp = warm light
 - High temp = cool light
- Colour rendering index (CRI)
- Maintenance and disposal



Light Source Efficacy – lumens/watt



Energy Efficient Lighting

60 W incandescent



=

13 W compact
fluorescent



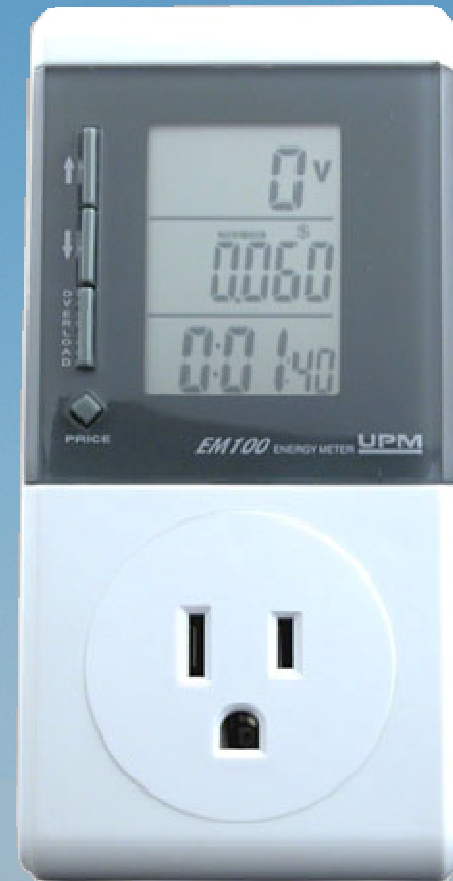
Same light for less than
25% of the power

CFLs with electronic ballast		Incandescent	
Watts	Lumens	Watts	Lumens
15	900	25	220
18	1100	40	495
20	1200	60	855
25	1750	75	1170
		100	1680

A Simple Power Meter

Plug it in and read

- Volts
- Watts
- kWh
- Dollars of electricity consumed



Light Level Measurement

Type of Visual Task	Lighting Level		Comments
	fc	lux	
Tasks occasionally performed	3	30	Orientation & Simple Visual Tasks
Simple orientation/short visits	5	50	Orientation & Simple Visual Tasks
Working spaces/simple tasks	10	100	Orientation & Simple Visual Tasks
High contrast/large size	30	300	Common Visual Tasks
High contrast/small size or inverse	50	500	Common Visual Tasks
Low contrast/small size	100	1,000	Common Visual Tasks
Tasks near threshold	300-1,000	3,000-10,000	Special Visual Tasks





Desired Lighting Levels by Building Area

Building Area and Task	fc	lux	Comments
Bathrooms	30	300	
Building Entrances (Active)	5	50	
Kitchen	50	500	
Laundry	30	300	
Lobbies	10	100	
Office - General	30	300	
Parking Areas - Covered	2	20	Lower at night
Parking Areas - Open	.2	2	Higher for enhanced security
Reading/Writing	50	500	Varies with task difficulty
Restaurant - Dining	10	100	
Stairways	5	50	
Stores - Sales Area	30	300	
Streetlighting - Highways	0.9	9	Varies with traffic density
Streetlighting - Roadways	0.7	7	Varies with traffic and pedestrian density

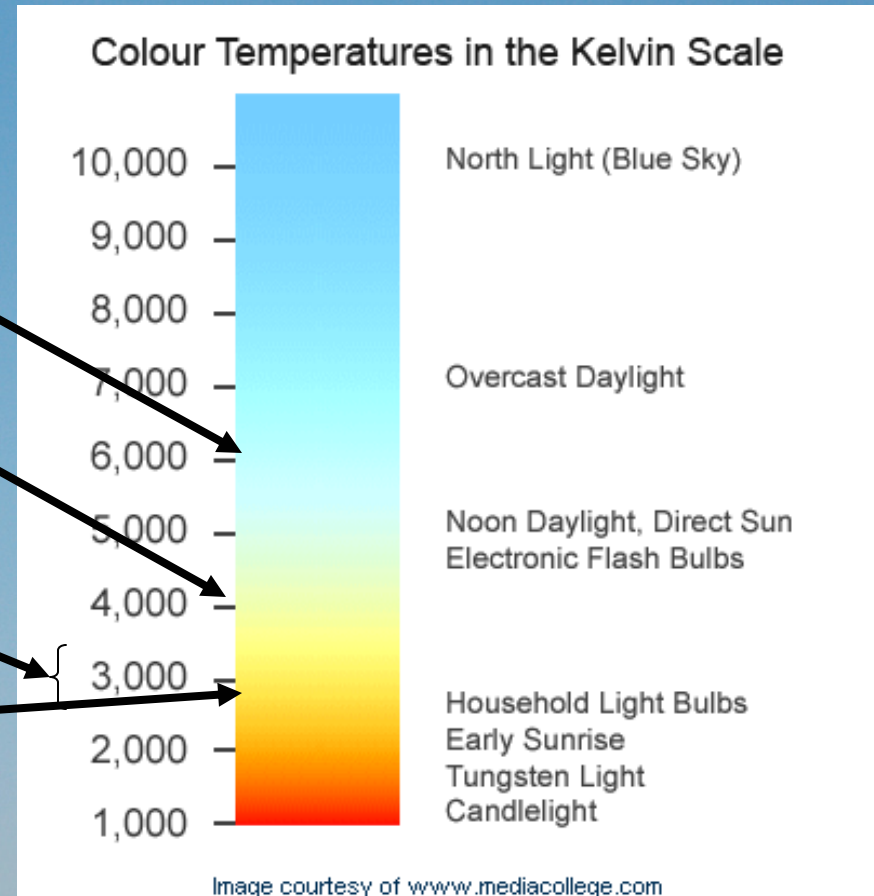
Myth No. 1: CFLs have a harsh, cold light quality

Daylight

Cool white
fluorescent

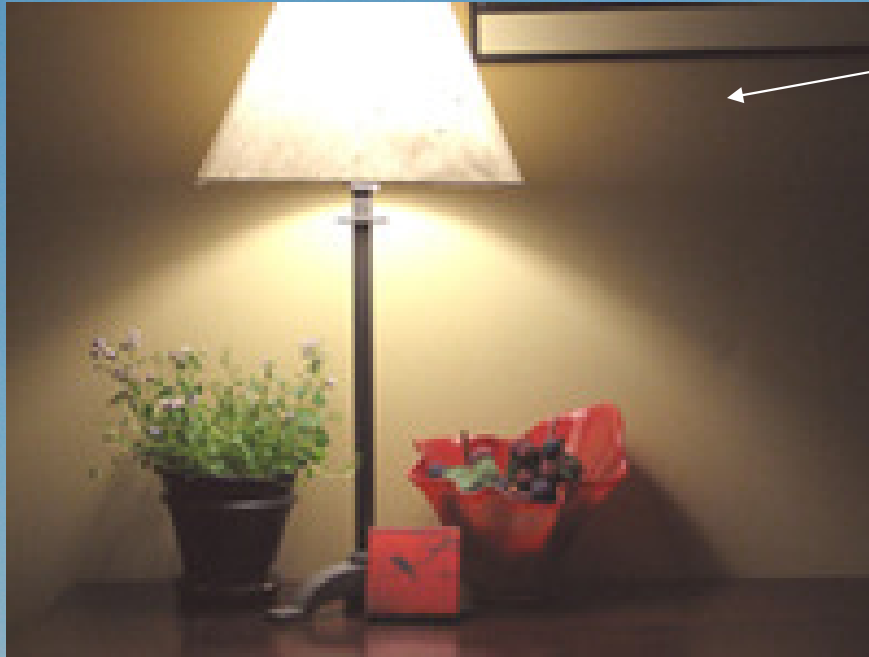
Modern CFLs

Incandescent lights



Colour Temperature

2700K CFL



3500K CFL



Myth No. 2: Colours don't look natural under fluorescent light.

Colour Rendering Index (CRI)

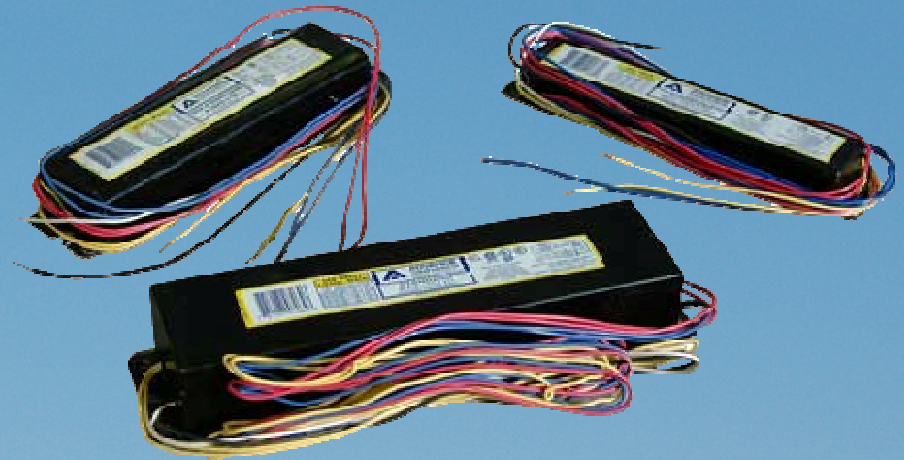
- Incandescent 97 Excellent
- CFLs 80+ Excellent
- T12 Cool white 62 Good
- Mercury vapour 45 Poor

Color Rendering Table

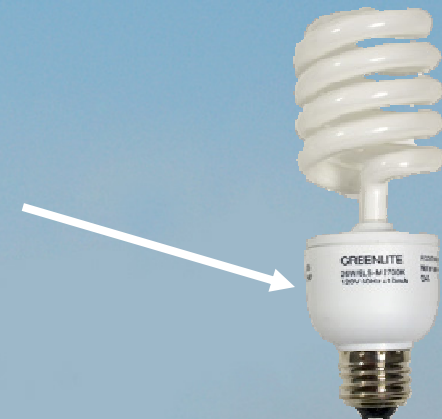
CRI Range	Rating	Typical Applications
80+	Excellent	Homes, retail, restaurants, lobbies
60-80	Good	Offices, classrooms, supermarkets
Less than 60	Poor	Street lighting, warehouses

Myth No. 3: Fluorescent Lights Flicker















- **Magnetic ballasts**
 - Consume about 9 W
 - Cannot be dimmed
- **Electronic ballasts**
 - Consume about 4 W
 - Better performance – **eliminate flickering**
 - Can be dimmed



Integrated
electronic
ballast



Myth 4: Fluorescent lights won't fit in my fixtures

Current Fixture/Bulb Type		Locations	CFL Suggestions		Savings per bulb per year
Outdoor Type A 40-60 W		Porch Garage	9-15 W CFL		Up to \$22
Table and Floor Lamps Type A 40-100 W		Living room Family room Bedroom	9-26 W CFL		Up to \$33
Pendants over tables, Type A 60-100 W		Kitchen Dining room Hallway	15-26 W CFL		Up to \$22
Potlights with PAR bulbs		Kitchen Livingroom	23W PAR shaped CFL		Up to \$20
Globe fixtures over bathroom mirrors and on ceilings		Bathroom	8-15 W Globe shaped CFL		Up to \$7
Chandelier bulbs		Dining room	4-9 W chandelier type CFL		Up to \$ 4
Ceiling Fan		Kitchen Dining Room Bedroom	9-26W CFL		Up to \$33

Other New Lighting Technologies - LEDs

- Produce light by the action of electricity passing through a chemical compound that is excited and as a result, generates light
- No filament to heat
- Good choice for EXIT signs and low-light applications like Christmas decorations



Mercury Content

I have read that CFLs contain mercury. Is that correct?

- Yes, typically about 5 mg.
- Typical mercury-based fever thermometers contain 0.5 to 3 grams of mercury or 100 to 600 times as much





Mercury Content

Does that mean I need to be concerned about breakage and disposal?

- **Burnt out CFLs and fluorescent tubes should be treated as household hazardous waste.**
- **Cleaning up broken CFLs:**
 - **Air out the room for 15 minutes.**
 - **Scoop up the fragments and powder with stiff paper or cardboard and place them in a sealed plastic bag.**
 - **Using disposable rubber gloves (do not use bare hands), wipe the area clean with damp paper towels and place them in the plastic bag.**
 - **Place the first bag in a second sealed plastic bag and put it in the outdoor trash container.**
 - **Wash your hands after disposing of the bag.**
 - **on a rug or carpet, use sticky tape to pick up fragments and powder**
 - **Vacuum if needed and dispose of vacuum bag in sealed plastic bag.**

Maintenance Advantages

- Lamp replacement depends on lamp life

	Lamp wattage	Lamp life
GLS	15 - 150 W	1,000 h
High efficiency incandescent lamp	20-50 W?	2,000 h ?
Low voltage halogen lamp	25 - 500 W	2,000 h
Halogen lamp	25 - 500 W	2 - 3,000 h
Halogen infrared (HIR) lamps	20 W	4,000 h
Linear fluorescent (halophosphate)	15 - 100 W	10,000+ h
Linear fluorescent (tri-phosphor)	4 - 70 W	10,000+ h
CFL	5 - 23 W	5 - 10,000 h
Self-ballasted induction lamp	23 - 55 W	10 - 60,000 h
Cold cathode CFL	5- 23W?	25,000 h
Ceramic metal halide	20 - 70 W	7,500-10,000 h
Sulphur plasma	1000W	10,000-60,000 h
LED	?	100,000 h
OLED	?	100,000 h

Incandescent

CFL

LED



Efficiency opportunities for lighting

- Switch off unnecessary lights
- Remove redundant fixtures
- Delamping in overlit areas
- Relamping with higher efficiency sources
- Modifications or replacement
 - Remove or replace fixture lenses
 - Retrofit the existing lighting system with a more efficient system
 - Replace inefficient ballasts
- Clean light fixtures, lamp reflectors and room surfaces



Toronto Hydro Program

- **In-suite CFL Replacement Program**
 - Sign up at the GLOBE booth
- **GLOBE training opportunities:**
 - For housing providers – Conservation Training
 - For residents – Community Champion Program

Training

- One-day workshop for housing providers
 - A context for energy efficiency
 - The basics of energy management in multi-residential facilities
 - Managing energy by changing technology, operations & maintenance, resident behaviour
 - Focus on lighting systems
 - Resident engagement strategies
- Training for “Community Champions”
 - To enable the community champion to engage other residents