



Getting the Green Light: Reduce Energy, Maximize Efficiency

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Measuring “Green” Lighting

For a single family, detached home with hardwired lighting, 2,000 sf interior space, three bedrooms, garage and 5,000 sf site at 10¢/kWh

Average American Home

- 5,000 watts of interior lighting
- 1,000 watts of exterior lighting
- 750 hours of average operation

Green American Home

- 1500 watts of interior lighting
- 250 watts of exterior lighting
- 600 hours of average operation



Savings from “Green” Lighting

For a single family, detached home with hardwired lighting, 2,000 sf interior space, three bedrooms, garage and 5,000 sf site at 10¢/kWh


Average American Home

- 4500 kWh per year
- Plus up to 1500 kWh in cooling load
- Cost: \$600/year

Green American Home

- 1050 kWh per year
- Plus up to 350 kWh in cooling load
- Cost: \$140 /year

Baseline "Average"



24 Downlights	2400 w
3 Bath Bars	720 w
4 Ceiling Lights	720 w
Chandelier	240 w
Kitchen Pendant	150 w
Foyer Light	150 w
Garage Keyless	400 w
Closets and Misc.	180 w
Exterior lanterns	400 w
Exterior Security Lights	600 w

Steps to Green Lighting

- Efficient light sources
- Effective controls
- Layered design practices
- Eliminate unnecessary or wasteful lighting



Efficient Sources

- Full size fluorescent lamps
- Compact fluorescent lamps
- LED lighting
- Low wattage halogen



Full Size Fluorescent Lamps

- Highest lumens per watt you can get (80-100)
- Dimmable
- Best applications: kitchens, bathrooms, garages, utility
- Drawbacks
 - Long lamps need long fixtures
 - Too much light for some spaces



“Real” Compact Fluorescent Lamps

- High lumens per watt (40-70)
- Some are dimmable
- Best applications: bathrooms, exteriors, ceiling fixtures, lanterns
- Drawbacks
 - Dedicated CFL fixtures hard to find
 - Slight color shift



"Screw-in" Compact Fluorescent Lamps

- High lumens per watt (40-60)
- Some are dimmable
- Best applications:, bathrooms, exteriors, ceiling fixtures, lanterns
- Drawbacks
 - What can screw in can screw out
 - Warm up time
 - Color ranges from good to horrid

Mini-Spiral or Twist	Tube or Universal	Incandescent/ A-line	Globe G25, G30, G40	Candelabra, Post or Bullet Shape	Indoor and Outdoor R20, R30, R40, PAR38
					

LED Lighting

- Promising future
- Current products 30-50 lumens per watt
- Significant underperformance concerns with many current products
- Dimmable



Some of the first LED downlight products that actually perform as advertised (we think)

LED Accents

- Products now becoming available
- Good products are costly, cheap products have issues



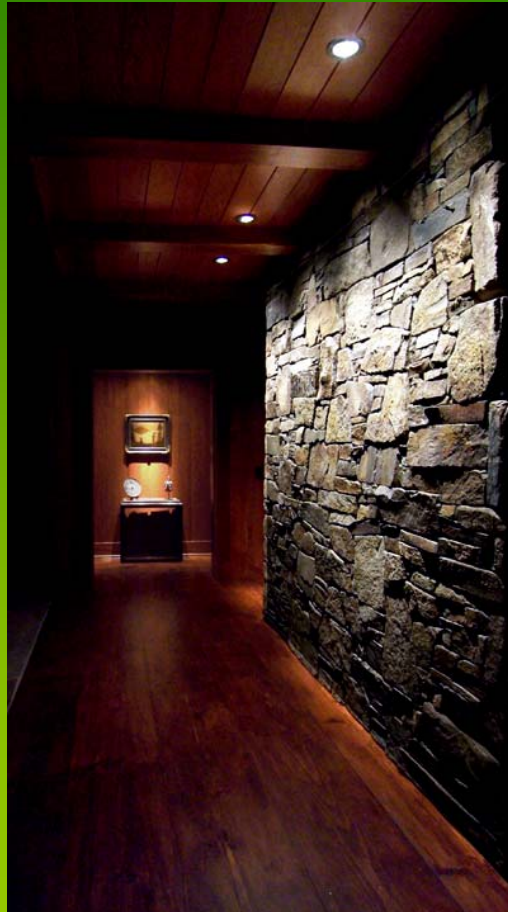
Halogen

- A relatively inefficient source
- But the quality is superior for certain applications
- Keep the watts low and it's still viable
- Uses
 - Accent lighting in living spaces, especially art
 - Downlighting in hallways
 - Reading lights in bedrooms
 - Spot lighting tables and displays



Use 20 watt IR lamps for general lighting and 37 watt IR lamps for art accents and table lighting

Halogen



Fluorescent can't do this. LED can't do this (yet).

Effective Controls

- Motion sensors
 - Bathrooms, closets, garages, utility rooms
- Dimmers
 - Kitchens, dining rooms, bedrooms, hallways, foyers
- Daylight sensors
 - Outdoor lanterns
- Daylight/motion sensors
 - Outdoor security lighting

Layered Design Principles

- Ambient Lighting
- Task Lighting
- Accent Lighting
- Decorative Lighting



Layered Design Principles



Everyday Ways to Conserve

Energy Star Traditional Lighting
Typical savings: 50 watts per lamp



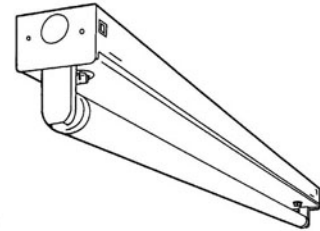
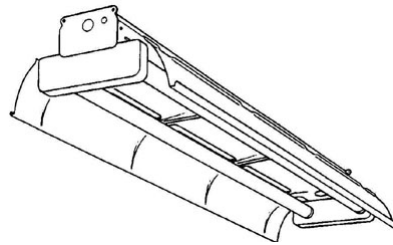
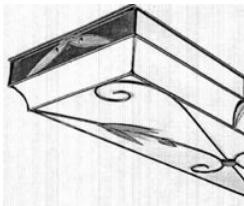
Everyday Ways to Conserve

Energy Star Modern Lighting
Typical savings: 50 watts per lamp



Everyday Ways to Conserve

Efficient Standard Lighting



Downlighting: the most significant opportunity

The Standard of the Industry

- 6" ICAT can
- Baffle trim

Average Home: 24 cans



Downlighting options

Incandescent 65R30 (725 lumens)

Halogen 45PAR/IR/FL40 (800 lumens)

True CF 13 watt good downlight (16 watts, 900 lumens)

Screw in CF 15 watt R40 (725 lumens)

12 watt LED 6" downlight (600 lumens)



The \$Green\$ in Green

Cost of Materials for can, trim and lamp (including ballast)

1. Incandescent \$20
2. Halogen \$25
3. Dimmable Screw in CF \$35
4. Dimmable LED \$75-100?
5. Dimmable True CF \$100

Summary

- A home can be designed to use about $\frac{1}{4}$ of the lighting energy of a standard home
- The annual savings will be about \$450, national average. In LA or New York this could easily be \$1000 or more.
- With screw-in technology, there are risks but the increased cost will be negligible. Risks include short lamp life, long warm up, mediocre color and possible short lamp life.
- The up-front investment for good technology will be at least \$2000 for a 2000 sf home.

Long Term Sustainability

The only things really wrong and not sustainable about high technology lighting are

1. Mercury in CFL lamps is a neurotoxin and must be controlled.
2. Electronics in ballasts contain mercury, lead and other toxins and must also be controlled
3. Control means recycling at approved centers. Don't throw these lamps away!



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For a copy of this program
go to
www.benyalighting.com