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Lighting Options for Your Home

Innovation is driving lighting technologies toward greater energy efficiency. As the market transitions, here are options to consider as you look to increase energy savings…

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February 2012

Lighting Options for Your Home

Out with the Old, In with the New

New standards set the stage for a transition to energy efficiency

HERE'S WHAT YOU NEED TO KNOW...

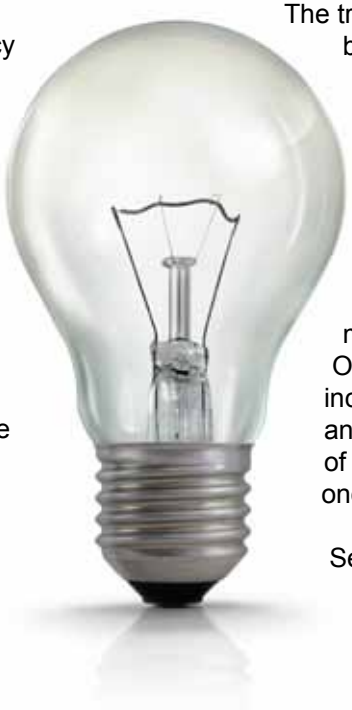
By the Lamp Section of the National Electrical Manufacturers Association (NEMA)

Some of you may have heard or read about the transition to more energy efficient light bulbs.

In 2007, the Energy Independence and Security Act (EISA) was signed into law. The provisions in this law are intended to reduce energy usage and greenhouse gas emissions and enable the U.S. to be less dependent on foreign sources of energy.

One of the provisions establishes efficiency standards for several types of light bulbs. Today's 40W, 60W, 75W, and 100W general service incandescent light bulbs do not meet these new efficiency standards. This is important to you, the consumer, because lighting accounts for about 12% of the energy use in homes.

General service incandescent light bulbs are basic light bulbs with medium screw bases and finishes including clear, inside frosted, and soft white. They provide one level of light and operate at 120-130 Volts. You use them in a variety of fixtures in and around your home, such as overhead light fixtures, wall sconces, table and floor lamps, fan light kits, outdoor entrance fixtures, and post top decorative lanterns. General service incandescent light bulbs do not include specialty, décor, 3-way, or chandelier light bulbs.



The transition to more energy efficient light bulbs will occur over the course of three years as minimum standards for increased efficiency are phased-in. More efficient light bulbs will include halogen, compact fluorescent, and solid state (LED) technologies.

As of January 1, 2012, the 100W incandescent light bulb was no longer manufactured for use in the United States. On January 1, 2013, the production of 75W incandescents will cease; and in 2014, 60W and 40W bulbs will follow suit. In the State of California, these effective dates will occur one year earlier.

See the table below for details.

Current Wattage	Effective Dates for Efficiency Standards* (Manufactured on or after)
100W	January 1, 2012
75W	January 1, 2013
60W	January 1, 2014
40W	January 1, 2014
*For California, efficiency standards take effect one year earlier.	

The ***rated life*** is the number of operating hours when half of the bulbs in a group have failed and half are still operating with all bulbs operated as designed.

The lower wattage limits set by the new standards will use about 30% less energy than the old incandescent wattages they are replacing. That will mean lower energy costs to operate the new bulbs and fewer greenhouse gas emissions. For the first time, federal law sets a minimum rated life of 1,000 hours for general service light bulbs.

You have several technology options for increasing your energy savings.

HALOGEN

Halogen is really a more energy efficient form of incandescent, so these bulbs can be used in any application where you have been using incandescent bulbs. Halogen bulbs have wattages similar to the new maximum rated wattages as set by the EISA efficiency standards (see table on p. 6) and they look like the incandescent bulbs you are used to buying. They use about 30% less energy, deliver a pleasing incandescent light and are dimmable, mercury-free, and available today.

COMPACT FLUORESCENT LAMP (CFL)

Compact fluorescent (CFL) bulbs are another option. CFL bulbs are made to produce different variations of white light. They are rated in terms of the color appearance of the light they emit. These values (2700K, 3000K, 3500K, 4100K, etc.) are numerical indicators of the appearance of the light emitted by the bulbs. If you want a warm, incandescent-like light, choose a lamp designated 2700-3000K; if you want a cooler color of light that is more like the traditional crisp, white light of fluorescent lamps, choose one designated 4100K; if you prefer a more neutral color of light that is neither warm nor cool, choose one designated 3500K.

To select the appropriate wattage CFL bulb, choose one that is about one-quarter (1/4) the wattage of the incandescent lamp you want to replace (see table on p. 6). The advantages of CFL bulbs are that they use about 75% less energy and last from 6 to 16 times longer than general service incandescents.

Because CFLs use fluorescent technology, they contain a very small amount of mercury to ensure proper operation; however, as it relates to the environment as a whole, the mercury content in CFLs is more than offset by reduced mercury emissions from utilities that would otherwise be powering less efficient incandescent bulbs. They must be safely and appropriately disposed of in accordance with state and/or municipal hazardous waste ordinances.

Not all compact fluorescent bulbs can be used in all incandescent applications. Be sure to check the packaging to see if the CFL bulb is suitable for use in your application, including operation on incandescent dimmers, in enclosed fixtures, or in outdoor applications. If the CFL bulb will be turned on and off frequently, its life will be reduced, but you will still realize the energy savings. When selecting a CFL bulb, look for the ENERGY STAR® logo on the packaging. As with appliances, the EPA sets standards for some lighting products to assure users of the quality of the energy saving products they are purchasing.

SOLID STATE (LED or Light Emitting Diode)

Solid state (LED) bulbs are also an option. Retailers are starting to carry this newest family of bulbs, which use LED technology. Several companies make replacements for today's 25W, 40W, and 60W incandescent bulbs. Higher wattage replacements are in development. These bulbs will deliver about 80 percent energy savings and are mercury-free. They have extremely long life—from 25,000 to 50,000 hours—compared to the incandescent bulbs they replace. While the energy savings is similar to CFL, bulb life is much longer. Watch for the ENERGY STAR® logo on the packaging for these bulbs.

Technology Options

Foyer Chandelier - Decorative
Solid State LED lamps with dimmer controllability

Overhead Light Fixture
Compact Fluorescent, Halogen or Solid State LED

Incandescent
– unfinished attic, garage, basement areas with pull string
Compact Fluorescent

Ceiling Fan
Compact Fluorescent or Solid State LED

Eat In Kitchen above table lighting
Halogen or Solid State LED with dimmer controllability

Garage lighting
Compact Fluorescent, Halogen or Solid State LED

Undercabinet lighting
Compact Fluorescent, Halogen or Solid State LED

Pendant lighting
Compact Fluorescent, Halogen or Solid State LED with dimmer controllability

Recessed lighting
Compact Fluorescent, Halogen or Solid State LED with dimmer controllability

Table lamp lighting
Compact Fluorescent, Halogen or Solid State LED

Torchiere lamp lighting
Compact Fluorescent, Solid State LED or 3-Way Incandescent

Task lamp lighting
Compact Fluorescent, Halogen or Solid State LED

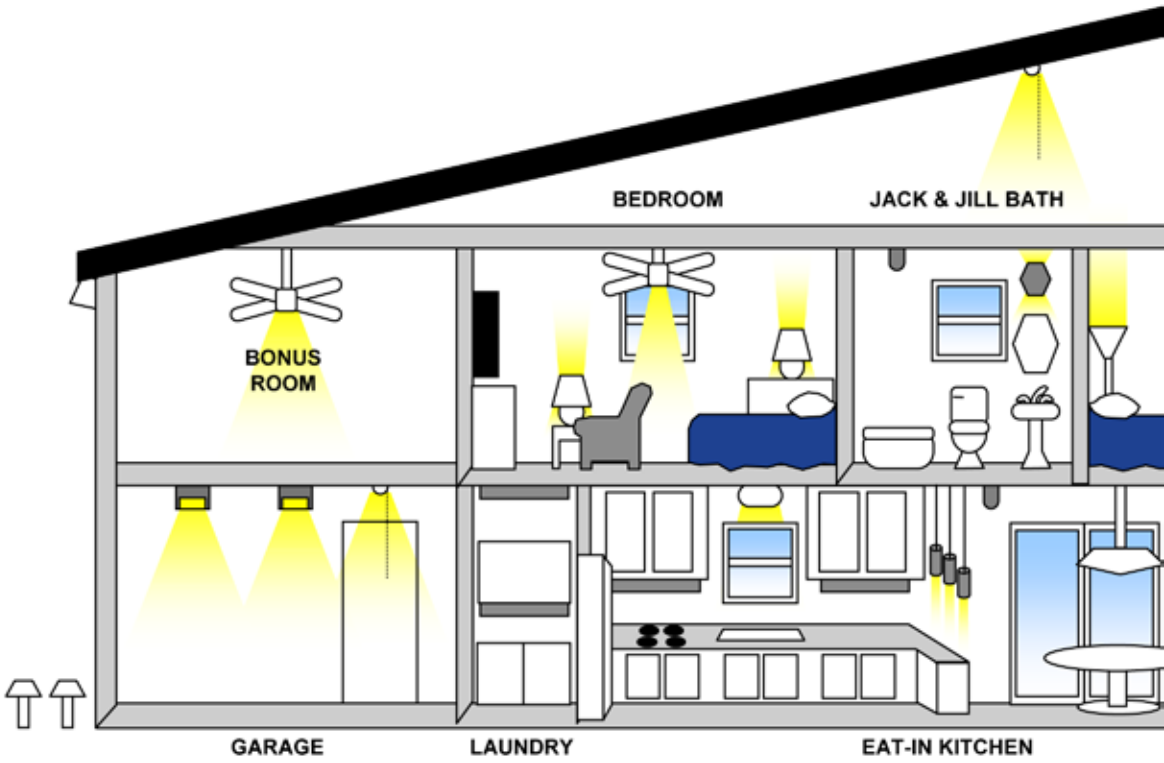
Indoor wall sconce lighting
Compact Fluorescent, Halogen or Solid State LED with dimmer controllability

Outdoor wall sconce lighting
Outdoor rated Compact Fluorescent, Halogen or Solid State LED

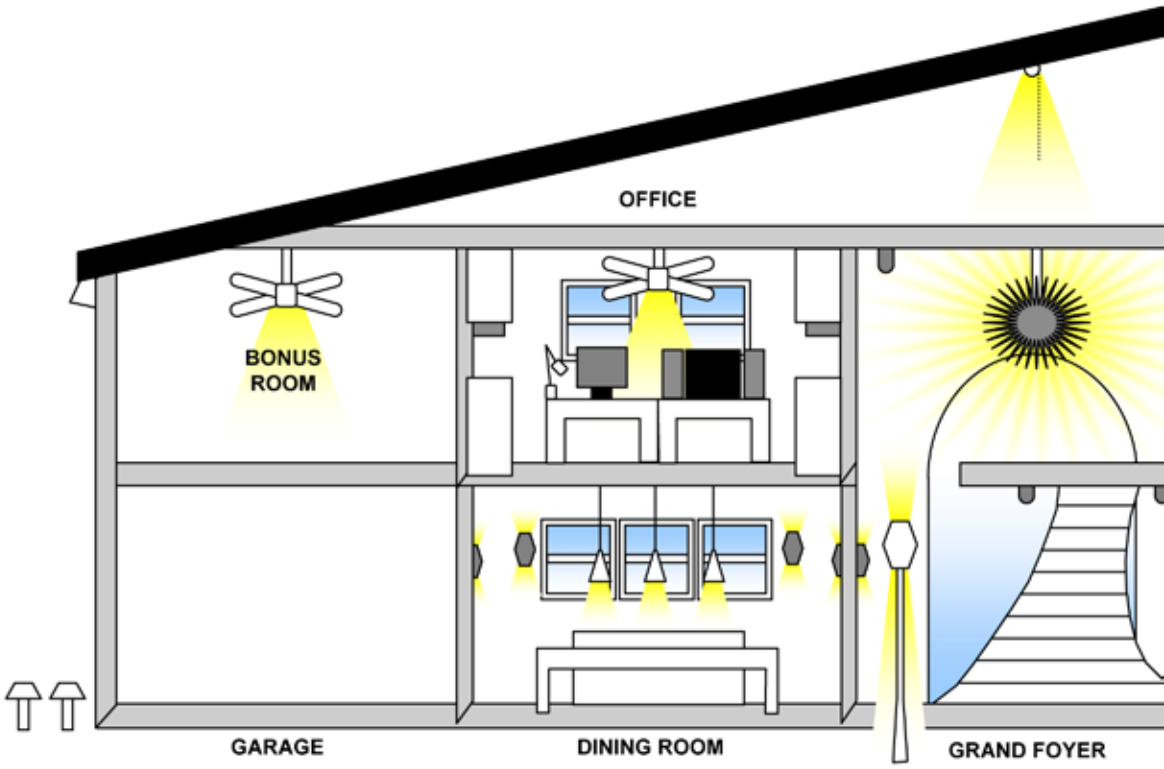
Outdoor lighting attached to home
Outdoor rated Compact Fluorescent, Halogen or Solid State LED

Landscaping lighting
Outdoor rated Halogen or Solid State LED

Outdoor post lighting
Outdoor rated Compact Fluorescent, Halogen, or Solid State LED

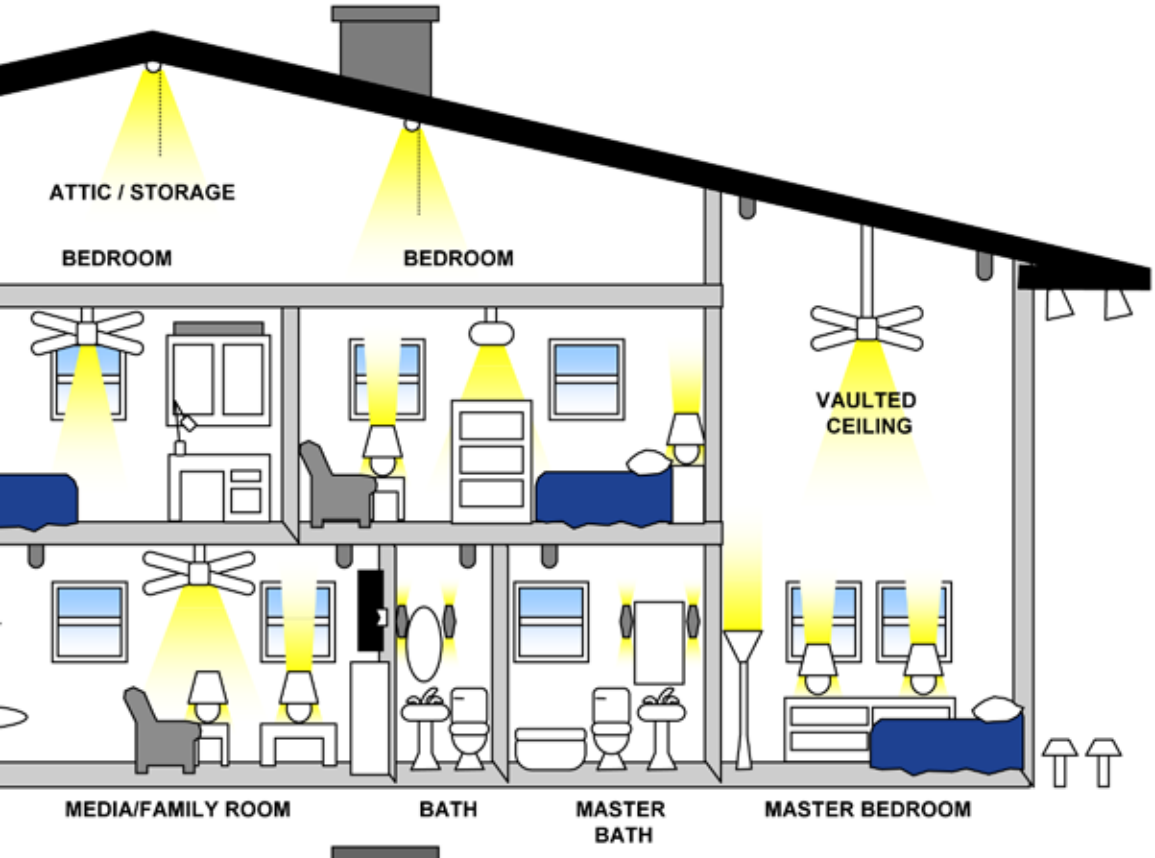


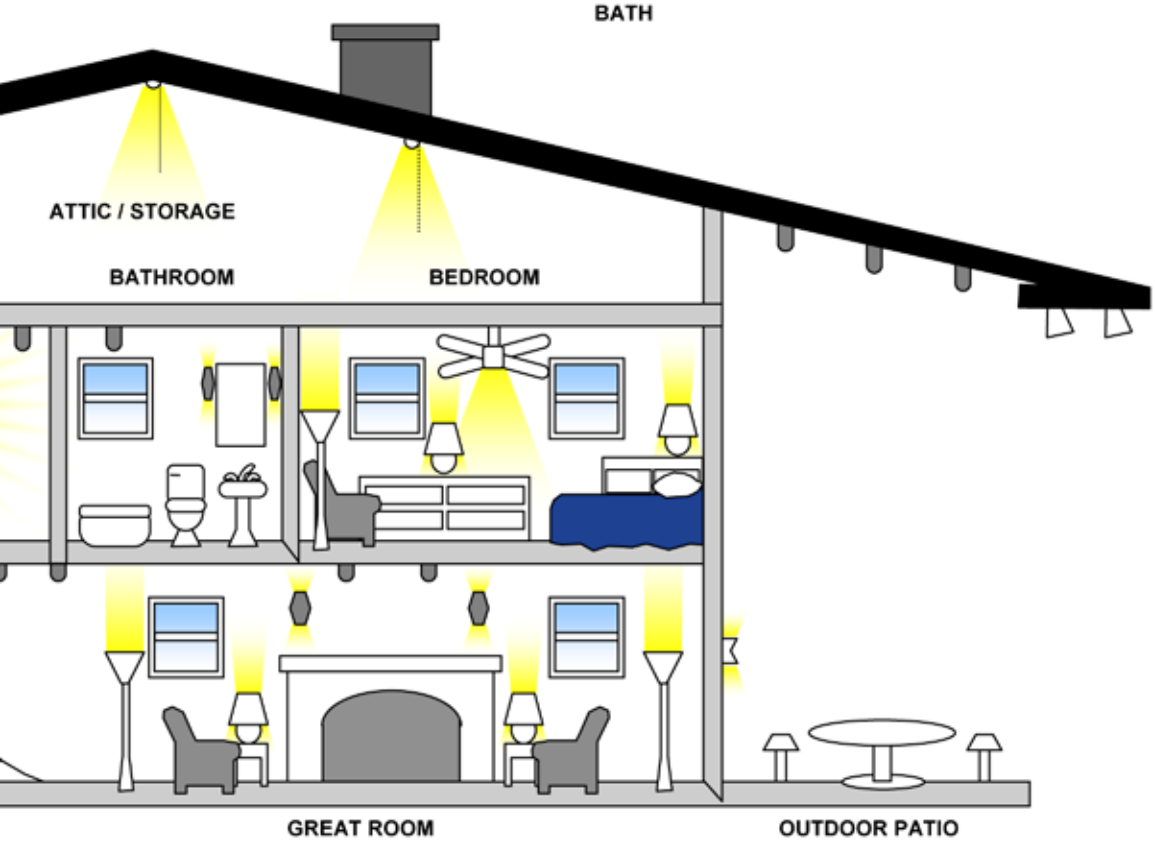
BACK OF HOUSE



FRONT OF HOUSE

The household pictured above is not the typical U.S. household, lighting used in American homes. The applications where general se





Technology Selected

Foyer Chandelier - Decorative
3 Solid State LED

Overhead Light Fixture
Kitchen: 2 Halogen
Bedroom: 2 CFL

Incandescent
Compact Fluorescent

Ceiling Fan
3 Solid State LED

Eat In Kitchen above table lighting
No changes made

Garage lighting
1Solid State LED per Garage Door Opener

Undercabinet lighting
No changes made

Pendant lighting
3 Halogen – 1 per Fixture

Recessed lighting
No changes made

Table lamp lighting
1 Compact Fluorescent

Torchiere lamp lighting
1 Compact Fluorescent

Task lamp lighting
No changes made

Indoor wall sconce lighting
1 Halogen
2 Halogen – Jack and Jill Bath

Outdoor wall sconce lighting
1Solid State LED

Outdoor lighting attached to home
No changes made

Landscaping lighting
No changes made

Outdoor post lighting
1 Solid State LED

but is one designed to give you an idea of all the applications for ervice incandescent bulbs would be used are highlighted with yellow.

turers Association, Enlighten America

SAME LIGHT, FULLER WALLET, BETTER ENVIRONMENT...

The preceding household diagram is designed to show the many ways general service bulbs are used in homes. Based on converting from 60 Watt incandescent bulbs to a combination of 43 Watt Halogen, 13 Watt Compact Fluorescent, and 12 Watt Solid State (LED) bulbs that deliver similar light output (brightness) to the incandescent bulbs, the annual benefit for the household in the diagram would be a savings of **3,118.56 kWh** and **$343.04** on electric bills.

In addition, **4,182 fewer pounds of CO_2** (carbon dioxide) would be emitted by the power plant supplying the household in the diagram. These numbers are based on using each bulb 3 hours per day, 365 days per year and an electrical utility rate of $0.11 per kWh.

WATTAGE/LUMEN EQUIVALENCY

Increasingly, more energy efficient bulbs operate at lower wattages for similar light output. The wattages for equivalent light outputs are different depending on the technology of the bulbs. This means you will now need to select a light bulb based on the light output (brightness) of the bulb. The light output of a light bulb is measured in lumens.

Today's 60W incandescent bulb delivers about 850 lumens; if that is the right amount of light you need, you will want to choose a replacement bulb that delivers a similar amount of light.

Light Bulb Comparison: Same Amount of Light

Light Output (in Lumens*)	Today's Incandescent Wattage	Maximum Wattage Allowed (Per EISA)	Halogen Wattage	CFL Wattage	Solid State (LED) Wattage
1690	100	72	70 – 72	23 – 26	n/a
1170	75	53	53	18 – 20	n/a
850	60	43	43	13 – 15	12
475	40	29	28 – 29	10 – 11	8 – 9
*A lumen is a unit of measurement of light output, or "brightness."					

For more information on energy efficient lighting for your home, we suggest you visit the Department of Energy (DOE) webpage at:

www.energysavers.gov/your_home/lighting_daylighting/index.cfm/mytopic=11980

You don't have to wait to transition to the more energy efficient bulbs. Start thinking about where you use the incandescent general service bulbs in and around your home and consider replacing them with one or more of the replacement options. Go "green" and start reaping the benefits of reduced energy usage, reduced greenhouse gas emissions, and longer bulb life today while saving money on your electric bills. Just think of the difference we will make when all of us are using these more energy efficient bulbs!

Appendix

Not all U.S. households use as many general service incandescent bulbs as depicted in the diagram on pages 4 and 5. If we look at a typical U.S. household as defined in a 2002 study, these would be the benefits.

Benefits for a typical U.S. household:

60W Incandescent to Mix of New Options	
Energy Saved/Year	1,295.385 kWh
Energy $ Saved/Year	$142.49
Pounds of CO_2 Eliminated/Year	1,737.1

Mix of new options: five 12W LED, fourteen 43W halogen, and fifteen 13W CFL bulbs, all used 3 hours per day, 365 days per year at an electrical rate of $0.11/kWh.

Total benefits for all U.S. households (111 million):

60W Incandescent to Mix of New Options	
Energy Saved/Year	143,917,273,500 kWh
Energy $ Saved/Year	$15.8 Billion
Metric Tons of CO_2 Eliminated/Year	87.5 Million
Equivalent to Removing This Many Cars and Light Trucks from the Road	16.5 Million

References

- DOE webpage
  http://www.energysavers.gov/your_home/lighting_daylighting/index.cfm/mytopic=11980
- U.S. Lighting Market Characterization 2002 Volume 1; Tables 5-2, 5-5 and 5-6
- EIA 2005 Residential Energy use Consumption Survey
  http://www.eia.doe.gov/emeu/recs/recs2005/hc2005_tables/hc13lightingindicators/pdf/alltables.pdf
- DOE Carbon Dioxide Emissions from the Generation of Electric Power in the United States, July 2000
  http://www.eia.doe.gov/cneaf/electricity/page/co2_report/co2emiss.pdf
- Pounds of CO_2 per passenger vehicle from EPA
  http://www.epa.gov/oms/climate/420f05004.htm
- Percentage of energy use for lighting in homes
  http://apps1.eere.energy.gov/buildings/publications/pdfs/corporate/building_trends_2010.pdf

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February 2012

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