SNI Energy Forum: Energy Savings in Illumination Systems
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Spotlight on Energy Efficient Lighting for Buildings and General Illumination

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Outline

- Background
- Country Lighting Assessment
- US DOE Solid State Lighting (SSL) Program
- City of Los Angeles Case Study
- IEA's Recommendations

Background: IEA 2006 Analysis

- Globally lighting used 17.5% of total global electricity (over 2200 TWh/year)
  - Largest share in commercial and public buildings
- Global lighting electricity demand:
  - Incandescent lamps: 31%
  - Fluorescent lamps: 44%
  - High Intensity Discharge (HID) lamps: 25%
- Main strategies to reduce lighting energy demand by 40%
  - Use CFLs
  - Deploy high efficiency ballasts
  - Phase out mercury vapor lamps

http://www.iea.org/papers/2008/cd_energy_efficiency_policy/4-Lighting/4-light2006.pdf

OECD Primary Findings

- Wide variation in nationally recommended lighting levels for identical spaces
- Installed illumination levels exceed recommended values
- Fixtures in which the lamps are housed absorb between 10% to over 50% of the light emitted by the light-source
- The use of automatic controls typically saves between 20 to 40% of total lighting energy use

en.lighten Initiative

- A UNEP initiative supported by the GEF Earth Fund, OSRAM GmbH, Phillips Lighting, and the French Environment Energy Management Efficiency Agency (ADEME), in collaboration with the World Bank
- Targeted Outcome
  1. A roadmap for global lighting market transformation with a global pathway to phase out obsolete technologies and introduction of new energy efficient ones,
  2. A set of guidelines for global quality, performance-based standards and certification procedures for energy-efficient lighting products,
  3. A toolkit based on examples of national best practice and experience,
  4. Guidance and materials on lighting related topics (standards development, certification, communication, consumer and environment protection, recycling, etc.)
  5. Country lighting assessments

http://www.enlighten-initiative.org/AboutUs/TheenlightenPartnership/tabid/4944/Default.aspx

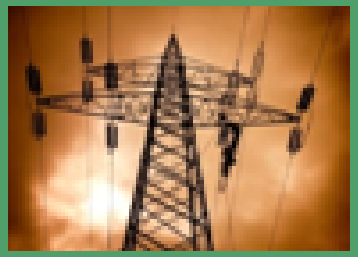
Country Lighting Assessment

- New analysis released on December 1st at COP-16 in Cancun, Mexico
- 1st Generation Country Lighting Assessments (CLAs) provide estimates for 100 countries
- Analyses include:
  - Potential energy savings,
  - CO2 reductions, and
  - Financial gains by shifting from incandescent lights to efficient compact fluorescent lamps (CFLs).

http://www.enlighten-initiative.org/CountryLightingAssessments/tabid/29601/Default.aspx

Initial High Level Global Data

Electricity savings



- 409 TWh
- 2% of global electricity consumption
- equivalent to 35.1 million Toe

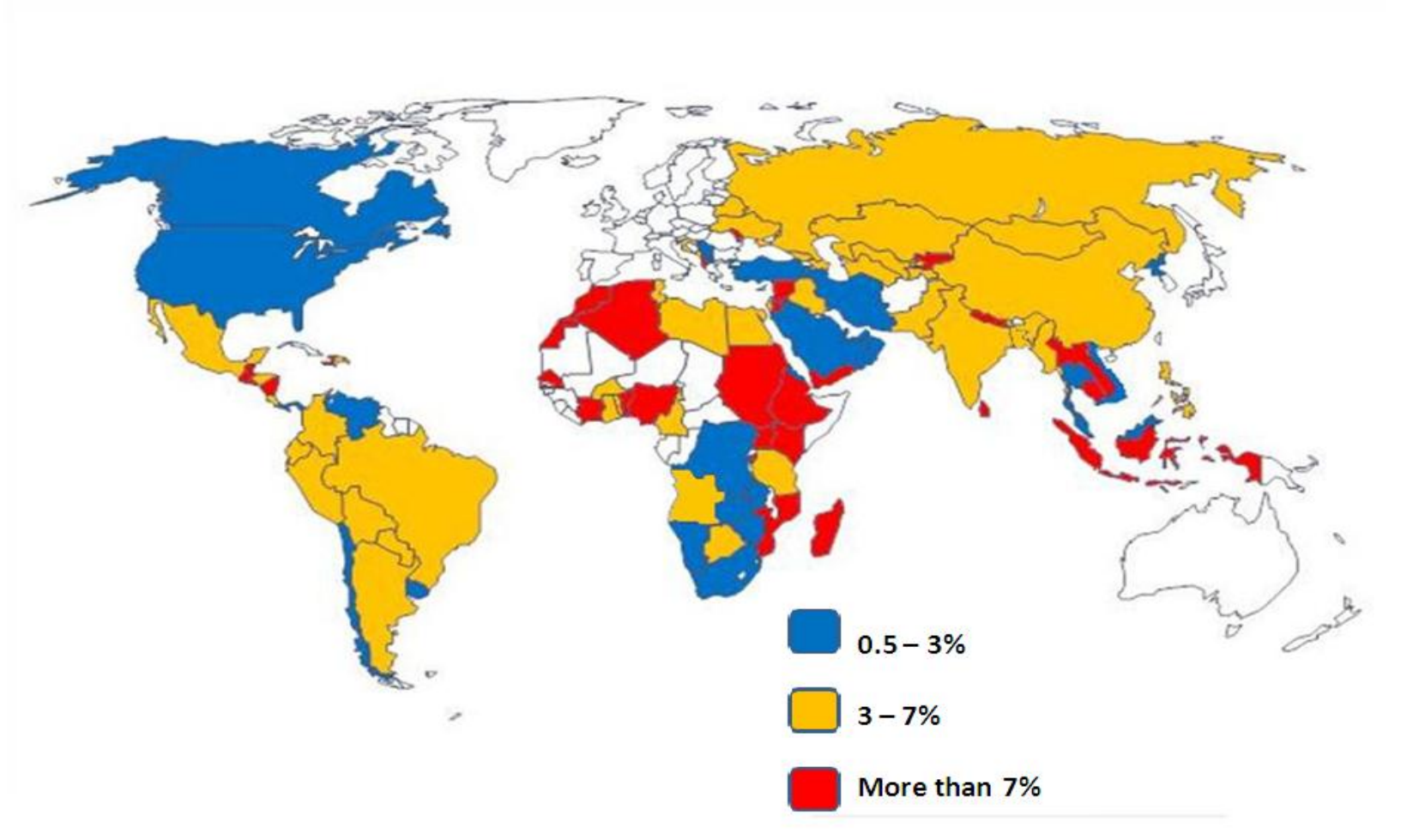
CO_2 reductions

- 246 Mt
- 1% of global CO_2 emissions
- equivalent to 61 million cars

Assumption:

- Replacing all ILs with energy efficient CFL globally,
- Annual Energy Savings
  - ✓Annex I countries: 54% of global savings
  - ✓Non-Annex I countries: about 46% of global savings

Percentage of Projected National Savings in Electricity Consumption



Lighting Assessment in the Americas

(Annual)	USA	Canada	Mexico	Brazil
Energy saving	80 TWh	5.3 TWh	9 Twh	12.4
MT CO_2 reduced	45	1	5	4
USD$ saved	9 Billion	530 million	900 million	2 Billion
gCO2/kWh	554	197	556	320

Lighting Assessment outside the Americas

(Annual)	Philippines	South Africa	Ukraine
Energy saving	1.7 TWh	2.4 TWh	5.7 TWh
MT CO_2 reduced	0.8	2.5	2
USD$ saved	180 million	280 million	210 million
gCO2/kWh	501	1,048	354

US DOE Solid State Lighting (SSL) Program

"No other lighting technology offers the DOE so much potential to save energy and enhance the quality of our built environment" (from DOE Multi Year Program Plan – March 2010)

- Working to accelerate advances in emerging solid-state lighting technologies
  - Large potential to save energy,
  - Enhance the quality of building environments, and
  - Contribute to climate change solutions
- Three concurrent, interactive pathways
  - *Core technology research* - conducted primarily by academia and national laboratories
  - *Product development* - conducted primarily by industry to improve commercially viable materials, devices, or systems
  - *Manufacturing initiative* - accelerate manufacturing improvements that reduce costs and enhance quality.

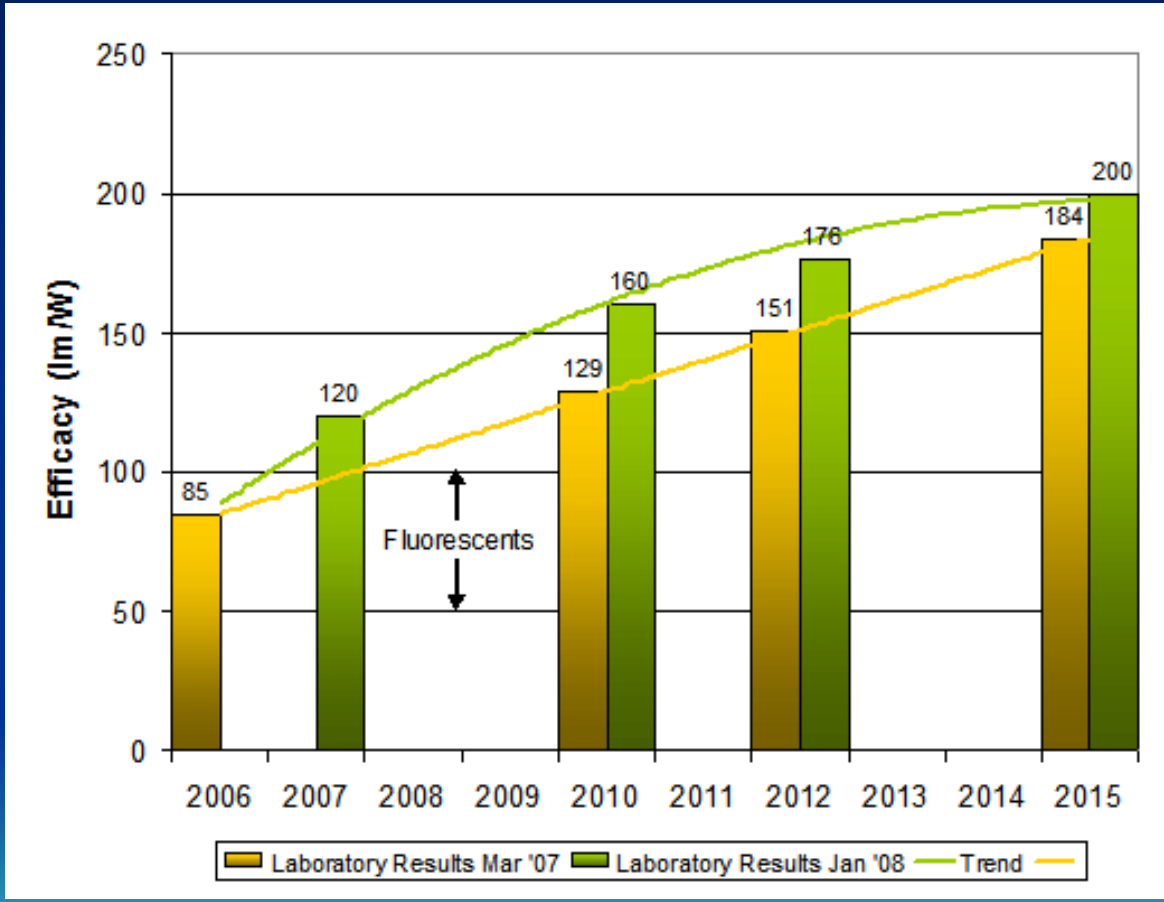
Energy Savings Potential of Solid-State Lighting

US DOE report www.ssl.energy.gov/tech_reports.html

"Energy Savings Potential of Solid-State Lighting in General Illumination Applications" (February 2010)

- *Annual energy savings in 2030:* about 190 Twh (equivalent to annual electrical output of about 24 *1,000 MW* electric power plants).
- *GHG emission reduction:* 31.4 million metric tons of carbon (for the same mix of power generation).
- *Total electricity consumption for lighting*: decrease by 25% relative to a scenario with no solid-state lighting.
- *Over the period 2010–2030*: cumulative energy savings estimated to total close to 1,500 terawatt-hours,

Projected Trends of SSL Efficacy



City of Los Angeles – Case Study

- 2nd largest City in the USA
- 4 Million Residents
- 6500 Miles of streets
- 210,000 streetlights with over 400 different styles
- 4500 miles of streets are illuminated
- Energy Usage -190 million KWH/year
- Energy Cost - $17 million/year

City of Los Angeles – LED Program

- Convert 140,000 streetlights to LED
- Install Remote Monitoring System
- Total Cost -$57 million
- Program payback –7 years
- Launched –February 2009
- Specifications:
  - Warranty 6 years
  - Minimum of 40% energy savings

City of Los Angeles - Progress

- 20,072 fixtures installed up to date
- 1,842 KW TOTAL Energy savings
- $690,000 Annual Energy Savings
- Lessons Learned
  - “ENERGY SAVINGS ARE REAL”– with new LED technology, the energy savings are being realized and continue to increase.
  - “IMPROVED VISIBILITY”–The change from HPS to white light have improved visibility as noticed by residents and encouraged by the Police Department

6th Street Bridge in Los Angeles, California

Before (HPS)

LED Light

After (LED)

IEA Recommendations for Governments Policies and Programs

- Minimum energy performance standards
- Energy labels, ratings and certification schemes
- Building codes
- Building energy performance certification
- Financial and fiscal incentives
- Procurement programs and competitions
- Information, awareness raising and capacity building
- Market-transformation programs
- Voluntary and long-term agreements and auditing
- Utility obligation schemes
- ESCOs and third-party finance

It is in our hands to keep the world healthy and green for us and for future generations!

Thank you for your attention