Need for Energy-Efficient Lighting Programs

Lighting contributes significantly to energy as well as peak demand and is, therefore a good target for demand-side energy efficiency initiatives because of the prevalent use of inefficient lighting technologies especially in the residential sector. Energy efficiency initiatives targeting large-scale implementation of efficient lighting technologies can offer win-win solutions. From a national perspective, these programs enhance energy security by freeing up extra generation capacity and reducing the need for fuels, which itself is vulnerable to price variations and availability constraints. At the same time, they help offset the impact of higher tariffs. There are substantial benefits to consumers, utilities, and governments while the impact of energy consumption on the local and the global environment is reduced (see Table 1).

Table 1 - Benefits of Energy-Efficient Lighting

Benefits of Energy Efficient Lighting	
Customer	Energy savings, reduced bills, mitigation of impacts of higher tariffs
Utility	Peak load reduction, reduced capital needs, reduced cost of supplying electricity
Government	Reduced fiscal deficits, reduced public expenditures, improved energy security
Environment	Reduction in local pollution and in Greenhouse Gas (GHG) emissions

The benefits to residential customers include energy savings, reduced electricity bills, and mitigation of the impacts of higher electricity tariffs. Utilities benefit from energy-efficient lighting through peak load reduction, reduced capital needs for future generation expansion, reduced cost of supplying electricity, and reduced utility losses in supplying electricity to low-tariff or low-collection customers[i]. Benefits to governments include reduced fiscal deficits, reduced public expenditures, reduced energy price volatility, and improved energy security. In terms of the benefits to the local environment, energy-efficient lighting initiatives can help to reduce both local environmental pollution and global GHG emissions.

Despite these benefits, the implementation of energy-efficient lighting in developing countries has been very slow. While some residential consumers in most developing countries have switched from ILs to FTLs, most FTLs (more than 75 percent) use energy-intensive magnetic ballasts,[ii] and the resulting energy savings are not as high as those achievable with CFLs. The penetration of more efficient CFLs (which can offer savings of 75-80 percent compared to ILs) is generally small -- no more than 10-15 percent in most developing countries Some of the reasons for the low penetration of CFLs are the poor quality (for example lower life, lower power factor or lower lumens per watt) of some of the CFLs on the market, and the relatively higher market price of the good-quality CFLs. Furthermore, in most developing countries, CFL prices are inflated by VAT and customs duties, since local manufacturing is not available and these products are almost always imported. Even though using CFLs leads to reduced electricity bills and improved reliability, perceptions of poor quality and high prices especially in the 1980s and early 1990s, have made CFLs unattractive to many consumers, particularly amongst the low- and middle-income consumers. Furthermore, inferior-quality CFLs are eventually ineffective in helping the electric utility, since estimated potential savings in energy and peak load reduction are never actually achieved. There is therefore a need for energy-efficient lighting programs that assure high quality CFLs at a reasonable and affordable price to achieve large-scale implementation of this efficient lighting technology.

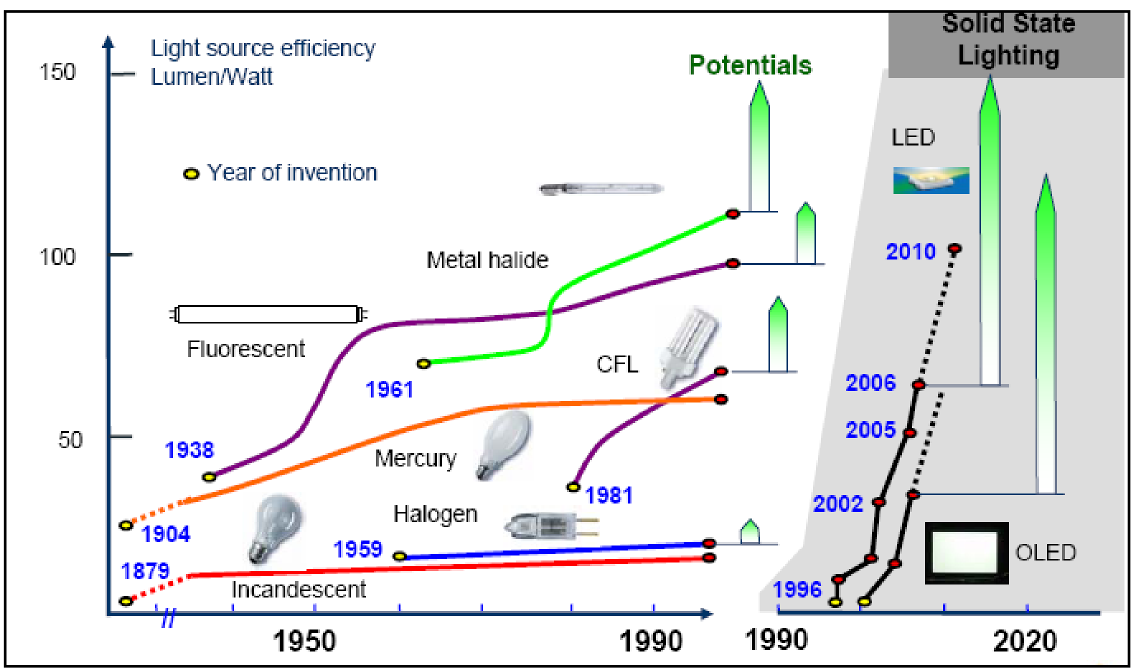
Efficient Lighting Technologies

Much of the developing world still uses the IL, which is a 100-year-old technology. However, there have been major innovations and improvements in lighting technologies over the last several decades (see Figure 1). As Figure 1 shows, the efficiency (efficacy in lumens per watt) of CFLs has also been increasing gradually, since these lamps became commercially available around the early 1980s.

Many of these technologies offer the potential for energy savings in various different lighting applications, such as street lighting, office and industry lighting, hospitality and retail spotlights, and household lighting (see Figure 2).

Of these, the technology option that is the most attractive to developing countries to make short-term substantial reductions in peak loads and derive other benefits to consumers, utilities, governments, and the environment is the replacement of ILs with high-quality CFLs. Box 1 provides a brief history of the CFL.

Figure 1 - Improvements in Lighting Technologies



Source: Wolfgang Gregor, "Towards a New Culture of Lighting", Presentation to the World Bank Energy Efficiency Thematic Group: Washington DC, January 2009.

Figure 2 - Energy Savings Potential in Lighting Applications

Application in general lighting	Energy saving through innovative lamp technologies			~savings / lamp / year*
Street lighting	Mercury vapor	~40%	High-pressure sodium lamp	220 kWh / 110 kg CO_2
Office & Industry Lighting	Fluorescent lp. w. halophosphate phosphor	~65%	New T5 fluorescent w/ electronic control & light management	180 kWh / 90 kg CO_2
Shop lighting	3 Standard Halogen lamps	~80%	New Ceramic metal halide lamps	500 kWh / 250 kg CO_2
Hospitality Spotlighting	Low voltage halogen reflector	~30%	Dichroic Halogen lamp with infrared coat technology	60 kWh / 30 kg CO_2
Household lighting (private)	Standard Incandescent	~80%	Compact fluorescent	50 kWh / 25 kg CO_2
		~30%	Halogen Energy-Saver	18 kWh / 9 kg CO_2
Lighting design	Low voltage halogen reflector	~50%	White LED Module COINlight OSTAR	45 kWh / 22 kg CO_2

* For typical usage / Energy-Mix 0,5 kg CO2/kWh

Source: Wolfgang Gregor, "Towards a New Culture of Lighting", Presentation to the World Bank Energy Efficiency Thematic Group: Washington DC, January 2009.

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[i] For instance, life-line consumers whose bills are highly subsidized

[ii] Magnetic ballasts themselves consume about an extra 15-16 W per lamp, thus offsetting the efficiency gains of FTLs (38 W) over incandescent lamps (60 W). A switch over to electronic ballasts helps achieve increased savings.