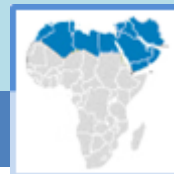




MNA Knowledge and Learning ...Fast Brief



Reimbursable Advisory Services: Bahrain's Energy Efficient Lighting Initiative

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Picture by: Steven Beletich

Introduction: The power sector in the Kingdom of Bahrain is growing rapidly with demand increasing at an annual rate of over 10%. While adding new power generation capacity costs both time and money, the fossil-fuel dominated power sector contributes to both global and local emissions. It is estimated by Bahrain's Electricity and Water Authority (EWA) that generation capacity is around 3,167 MW, against a peak demand of over 2,700 MW. The peak load continues to grow, and the power system's reserve margin is small. Out of the total consumption of about 12,000 GWh per year on the EWA grid, nearly 50% of consumption is in the residential sector, followed by the commercial sector (~38%). As observed in other warmer parts of the

world, air-conditioning and lighting contributes the most to peak loads in Bahrain.

Energy Efficient Lighting and Bahrain: Although energy efficient lamps such as compact fluorescent lamps (CFLs) and light-emitting diode (LED)-based lamps are emerging in the Bahraini market, it is estimated that over 2 million incandescent lamps (ILs) are sold annually.² The energy consumption of these ILs is 5 to 8 times higher compared to CFLs, and their lifespan is about 6 times less than CFLs. Assuming a peak coincidence factor for lighting of around 70% and a lifespan of about 1200 hours, it is estimated that incandescent lighting could contribute approximately 100 MW to peak load.

Although high quality imported CFLs are available in the local market, many other brands are also being sold that are not of high quality and do not follow international technical specifications. The poor quality of the sub-standard CFL means lower life-times, low lumens per watt, high lumens depreciation, and higher energy consumption. The relatively high cost of CFLs (compared to ILs) and the poor performance of the low quality CFLs result in low consumer confidence. Furthermore, the problems associated with Bahrain's energy inefficient lighting stock in the residential sector is exacerbated by low consumer electricity tariffs given high rates of subsidization. The emerging generation of LED-based household lighting solutions are even more energy efficient, last longer, and avoid environmental hazards such as the mercury associated with current CFLs.³ Both from an energy security standpoint as well as in terms of climate change mitigation, a full market transformation

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² Personal communication with Philips Lighting in Bahrain, February 2013.

³ CFLs typically contain 5 milligrams (mg) of mercury, although new CFLs with as low as 1 mg of mercury is less hazardous amalgam form are becoming available.

from ILs to CFLs and subsequently LEDs is considered desirable.

Bank Support to the Bahrain Lighting Initiative: Under a Reimbursable Advisory Services (RAS) program, the Bank is providing technical assistance to the Kingdom of Bahrain to support the design and implementation of a large scale efficient lighting program for the residential sector. The project “The Bahrain Lighting Initiative” supports replacing energy inefficient ILs with efficient CFLs in the short term and with more efficient technologies such as LED based lamps in the medium term.

The project follows a two-track approach, the first focusing on the actual deployment of the new light bulbs while track two focuses on the policy and regulatory issues around the introduction of the CFLs and LEDs.

Track 1: Deployment of CFLs and LEDs: A selected number (~10) of high quality CFLs per household (electricity consumer) will be provided free of charge to all residential consumers in Bahrain, in exchange for the return of the same number of ILs currently being used in these households. A similar approach will be followed for a limited number of consumers of LED lamps.

Track 2: Regulatory Policy-Based Phase out of ILs: A national policy is being formulated to phase out (ban) the manufacture, assembly and import of ILs by the end of 2013⁴, and institutionalize the high quality standards for CFLs and LEDs which would apply to the Bahraini market (for manufacture, assembly and import).

Project Components: The project entails the following 5 specific building blocks:

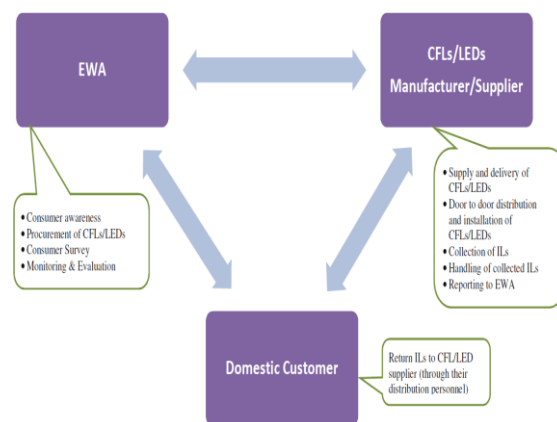
Activity 1- Consumer Lighting End Use Survey: As a part of Track 1, a residential consumer lighting usage survey has been undertaken. This was used to determine the usage parameters of the number of lamps, types of lamps, sizes of lamps, light color preference, etc. This information was used in developing the approach and detailed design of the programmatic deployment of CFLs across all households in Bahrain.

⁴ There is however currently no local manufacture of ILs in Bahrain. All lamps are imported.

Activity 2 - Deployment Program Design: The program’s design and the approach taken for distribution draws upon international best practices and technical specifications as laid out in the World Bank’s “CFL Toolkit” (<http://www.esmap.org/esmap/cfltoolkit>).

In-depth stakeholder consultations also helped in refining the approach and developing the detailed design of the staged deployment across all households in Bahrain (Graph 1). EWA, in cooperation with the Ministry of Finance will conduct bulk procurement of high quality CFLs and LEDs and together with the CFL/LED supplier, it will undertake a door-to-door distribution and installation in exchange for ILs. The distribution, to be spread out over several months, will make use of the well-established EWA meter reader service routes, which utilize well defined geographical areas and blocks covering the Kingdom.

Graph 1: Door to door distribution and installation



This activity will include peak load and energy savings analyses, carbon emission reduction analysis and a financial/economic analysis from both the utility and consumer perspective, which will be monitored and verified (see Activity 5 below).

Activity 3 - Designing a Consumer Awareness Plan: A comprehensive consumer awareness plan is being developed and is targeted to different categories of consumers to channel the most effective and appropriate information about the benefits of using CFLs and LEDs. The use of different media such as

billboards, posters, newspapers, electricity bills, television (TV), text messages, etc. will be recommended to increase consumer awareness amongst consumers and what they should look for in high quality CFLs.

Activity 4 - Assistance in Formulating the Policy for Phasing out ILs: Drawing upon the experience of several countries that have successfully launched IL bans and others that are in the process of developing such programs, a national level IL Phase Out policy is being drafted for Bahrain. Alongside this activity, minimum energy performance and technical specifications for both CFLs and LEDs will be developed to ensure that only high quality CFLs and LEDs are allowed to enter and be sold in the market. These minimum energy performance standards will be a part of the IL Phase Out policy. The compliance infrastructure, institutions, and systems required to enforce the phase out policy will be identified, such as establishing CFL and LED testing laboratories and testing procedures, etc.

Activity 5 - Monitoring and Verification: A systematic monitoring and verification of savings process will be put in place at both the utility (EWA) and consumer end to measure the impact of CFL deployment in Track 1 and also in Track 2 after the IL Phase Out policy is implemented. This would lead to a report that would estimate the impacts in terms of MW, MWh and carbon emissions reduction.

Key Issues and Initial Conclusions: The proposed two track approach is comprehensive and flexible, and has several advantages:

- First, it allows the CFLs to be targeted to the residential sector initially (ILs to be replaced in each households) to replace the ILs with the highest number of hours of usage, thereby resulting in high impact in terms of both MW and MWh savings.
- Second, this approach does not let the consumer to get locked into CFL technology as, in the long run, the consumer would be able to make its own decision to replace ILs with either CFLs or LEDs as markets change in terms of prices and technologies. The price of household LED based lamps which are relatively higher than the CFLs

are expected to reduce quickly over the next few years.

- Third, by banning ILs from the market, non-residential commercial and public buildings (who are not targeted for free CFLs under Track #1), will also participate in the initiative as they will not be able to find the ILs local markets when they want to replace their existing ILs.
- Fourth, Track #1 would let consumers become more familiar with the technology and benefits of CFLs, before they start paying for the high quality CFLs whose market prices are more expensive than ILs.
- Fifth, this two-track approach will help to smooth the transition and signal to private sector lighting suppliers to help prepare for the “phase out IL” regime. Expanded market will also lead to faster decline in CFL and LED prices.

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