

Energy Efficiency Potentials in the Power Sector of Bangladesh

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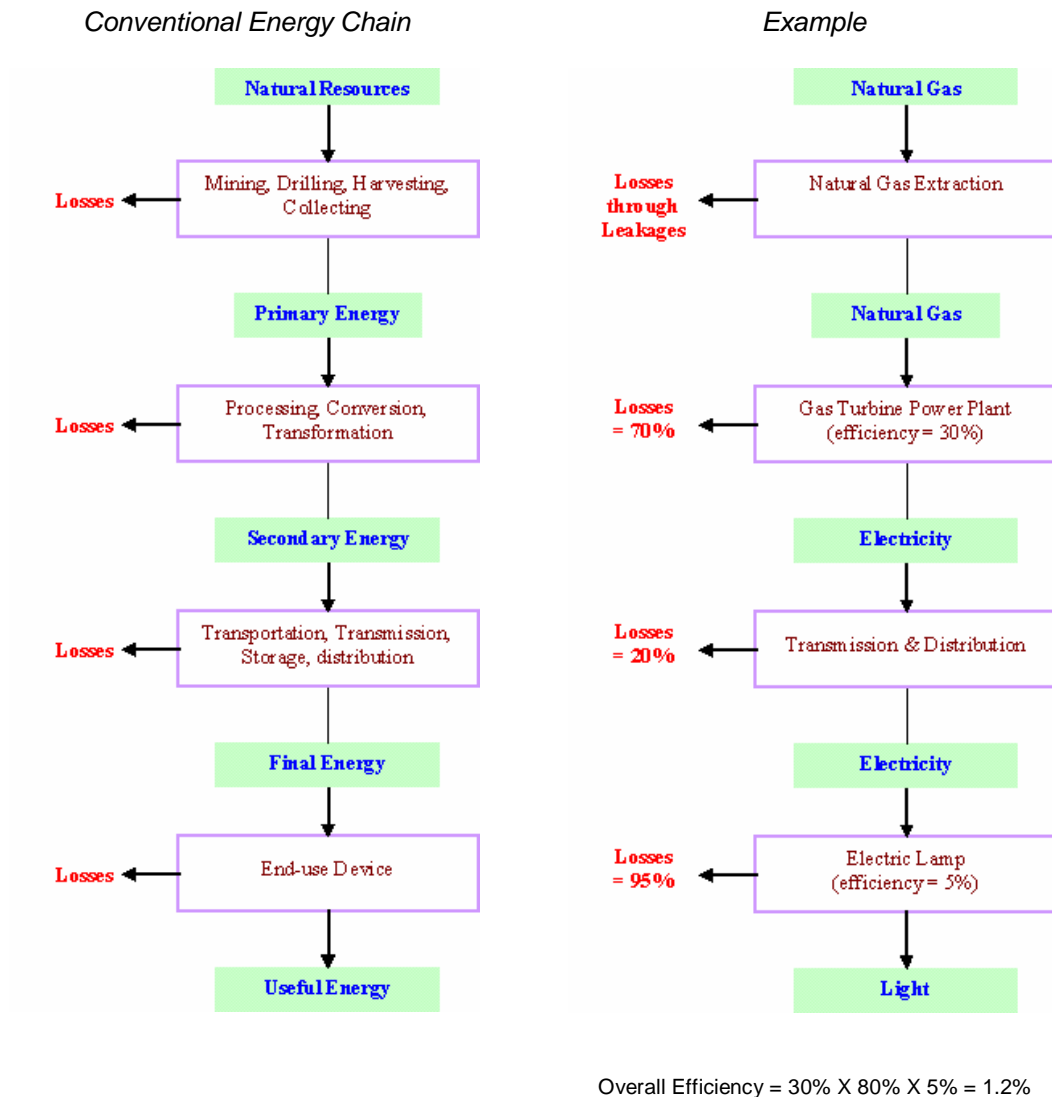
1. Introduction:

The best route to sustainable development of the energy system is a “low energy path”, which means that nations should take the opportunities “to produce the same levels of energy services with as little as half the primary energy currently consumed” [World Commission on Environment and Development, 1987]. The improvement of energy efficiency is now generally viewed as the most important option to reduce the negative impacts of the use of energy and/or fossil fuels in the near term. Energy efficiency is defined as decreasing the use of energy per energy service without substantially affecting the level of these services [UNISE, 2000].

Losses are accrued in all the steps of energy conversion steps in the traditional energy chain (Figure 1). Numerous and varied economic opportunities exist for energy efficiency improvements, particularly in this final conversion step from useful energy to energy services. It would mean less costly energy services and lower energy-related pollution and emissions. The next few decades will likely see new processes, motor systems, materials, vehicles, and buildings designed to reduce useful energy demand.

There are significant potentials to save energy in all the energy consuming sectors (e.g. domestic, commercial, industrial, transport, agricultural and non-energy use) of the country. But, this paper will highlight only the potential of energy efficiency improvement measures in the power sector through efficient devices.

Figure 1



2. Electrical Energy Consumption Patterns in Bangladesh:

From the daily load curve shown in Figure 2, we can see that in the evening time the demand for electricity is maximum. The main reason for this sharp increase is - millions of electric lights are switched on by all types of consumers during that period. According to a preliminary study - the light load contributes about 80% of the peak demand. At present, the maximum peak demand served by BDPB is 3084 MW. This composition of electrical demand by different sectors is shown in Table 1.

Figure 2: Daily Energy Curve on 14/01/2002

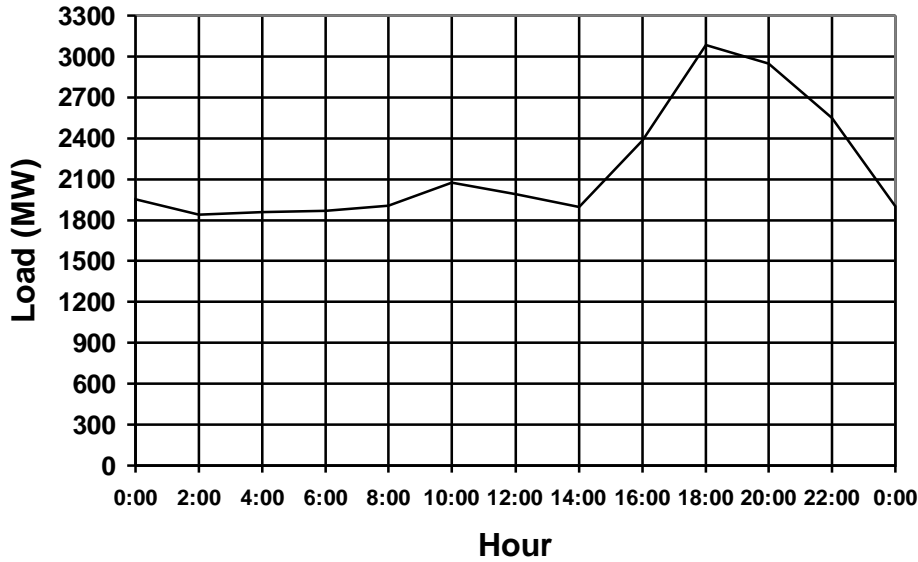


Table 1: Composition of Electrical Demand by Different Sectors

Consumer Category	Consumption	Consumption Pattern
i) Households	38.76 % (853 MW)	Lighting = 341 MW (40%) Fans & A/Cs =230 MW (27%) Refrigeration =188 MW (22%) Others = 94 (11%)
ii) Agriculture	7.55 % (166 MW)	Pumps =66 MW (40%) Rice Husking = 83 MW (50%) Lighting = 17 MW (10%)
iii) Industry	41.23 % (907 MW)	Motors =635 MW (70%) Lighting =73 MW (8%) Others =200 MW (22%)
iv) CELL	9.44% (208 MW)	Lighting =135 MW (65%) Others = 73 MW (35%)
vi) Public and others	3.02% (66 MW)	Lighting = 26 MW (40%) Water Pump =20 MW (30%) Others =20 MW (30%)

3. Scopes of Energy Savings with the Motors:

We can see from the Table 1 that the motors are the principal consumer of electricity during peak and off-peak hours. According to the preliminary studies, approximately 60% of our country's daily electric power consumption is used to run electric motors and up to 40% of the powers consumed by these motors produce no 'useful' output.

The digital Intelligent Motor Controllers (IMC) when installed with an induction motor provides optimal power management and results in energy savings up to 40%. The IMCs also increase appliance motor's life by decreasing the motor's operating temperature. It is estimated by the authors that with the application of the IMCs, we can save up to 720 MW electricity.

4. Scopes of Energy Savings with the Energy Efficient Lamps:

At present, there are more than 5 million consumers of electricity in the country. Assuming only 2 Incandescent Bulbs (IB) per consumer, there are 10 million IBs in the country. The Compact Fluorescent Lamps (CFL) can give the same illumination as that of an IB with 80% less energy. The IBs generate 85% heat and 15% light on the other hand the CFLs generate 85% light and 15% heat. Moreover, the life span of CFLs are 10 times higher than IBs. So, energy efficient CFLs can be used to reduce the peak load demand of the country.

5. Scopes of Energy Savings with the Electronic Ballasts:

With the conventional Fluorescent Lamps, magnetic ballasts are used which consume about 25 Watt. The digital Electronic Ballasts (EBT) when installed with the Fluorescent Lamps, provides optimal power management and results in energy savings up to 40%.

6. Scopes of Energy Saving in the Power Plants:

In Bangladesh, auxiliary consumption of the power plants is about 6 to 7% of total generation. By proper energy auditing, energy management and installation of the latest energy efficient devices, auxiliary power consumption in the power plants can be reduced significantly.

7. Initiatives from BPDB

Bangladesh Power Development Board (BPDB), established in 1972, is responsible for planning, construction and operation of power generation and transmission facilities throughout Bangladesh and for distribution in the urban areas except Dhaka and its adjoining areas. BPDB generates electricity from

both the renewable (hydro) and non-renewable sources (natural gas, furnace oil, diesel etc.). Different energy efficiency related activities of BPDB are show below.

7.1 Feasibility Study for Energy Conservation by CFL

CFL use is new in Bangladesh and till now it hasn't got confidence by consumers due to several factors like - unawareness and high upfront cost. Recently BPDB has taken decision about conducting a 4-month long Feasibility Study on Promotion of CFLs in different areas of the country and to identify it's local market. It is desired that after completion of the Study, BPDB will be able to understand this new technology better and enabling projects on CFL can be launched.

7.2 Energy Conservation Pilot Project By Intelligent Motor Controller

The objective of the project is to popularize energy conservation measure using Intelligent Motor Controllers (IMC) in different parts of the country. IMC is the culmination of over ten years research and development in the field of electrical motor efficiency which has been successfully applied in the commercial and industrial sectors for decades in the other parts of the world. It is expected that by introducing IMC in the commercial and industrial sectors of the country, 30 to 40% energy saving will be achieved. The project will generate a revolving fund which will be used for replicating the pilot project to the other areas of the country. A project concept paper (PCP) on Pilot Project by IMC has already been submitted for approval in the Planning Commission.

7.3 Energy Conservation Pilot Project by Compact Fluorescent Lamps

The objective of the project is to popularize energy conservation measure using Compact Fluorescent Lamps (CFL). There are 25-27 millions of electric lamps in the country. In the evening, all the lights are switched on throughout the country. Due to the simultaneous load of all these electric lights, the demand for electricity increases drastically, By utilizing energy efficient CFL, upto 80% of the electricity consumed by the lighting loads can be saved. The project will also generate a revolving fund which will be used for replicating the pilot project to the other areas of the country. A project concept paper

(PCP) on Pilot Project by CFL has already been submitted for approval in the Planning Commission.

8. Conclusion:

Energy efficiency is one of the key element for sustainable energy development. Energy conservation measures are technically feasible, financially viable and economically profitable. Institutional capabilities of Energy Audit Cell (EAC) should be activated and strengthened to enhance energy conservation activities.

Utilities like BPDB is facing enormous challenge to meet up the demand of the peak hours. Mass introduction of energy efficient devices will decrease this burden to a great extent.