

Energy Efficient City: Bangladesh Perspective

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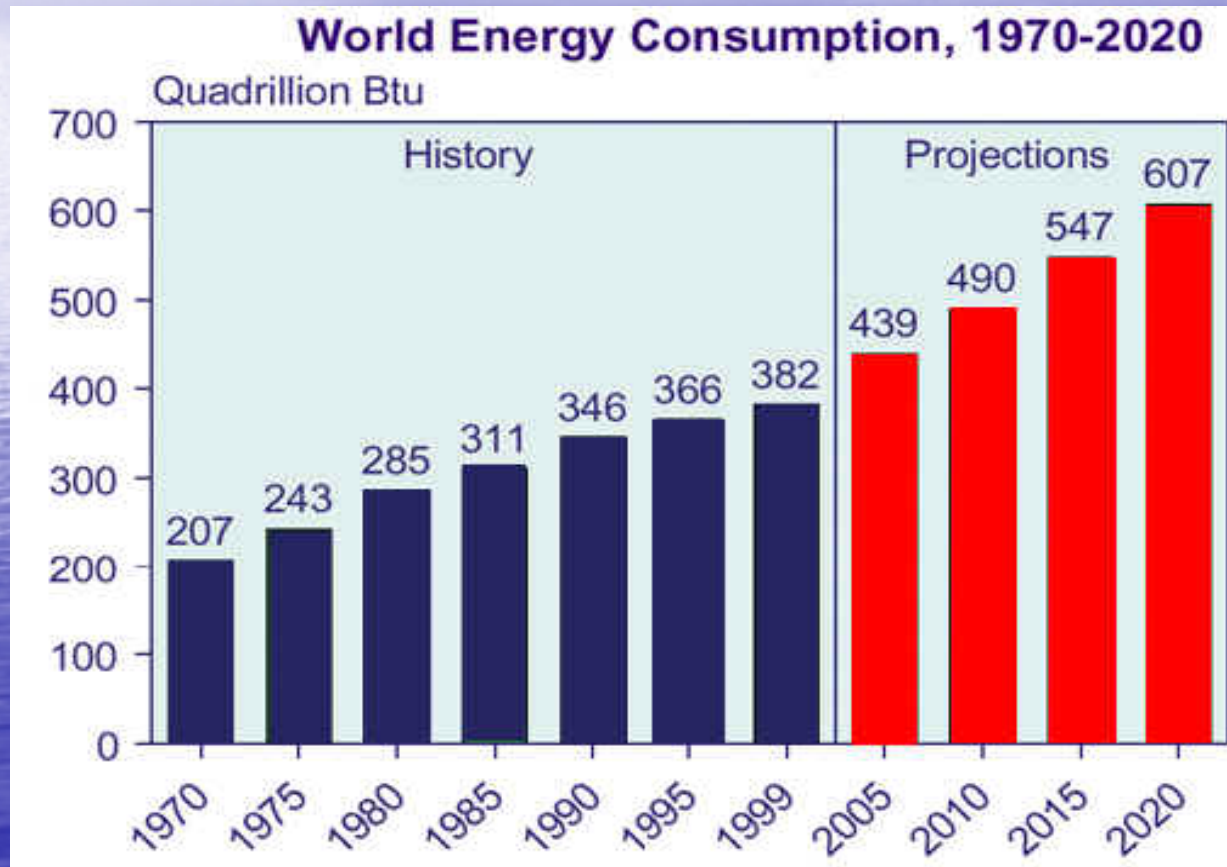
Importance of Energy Efficiency

- What is energy efficiency?
 - Reduce energy wastage
 - Use less energy for the same task by using better and more efficient gadgets
 - Use unavoidable energy wastes for other useful purposes

Why Energy Efficiency?

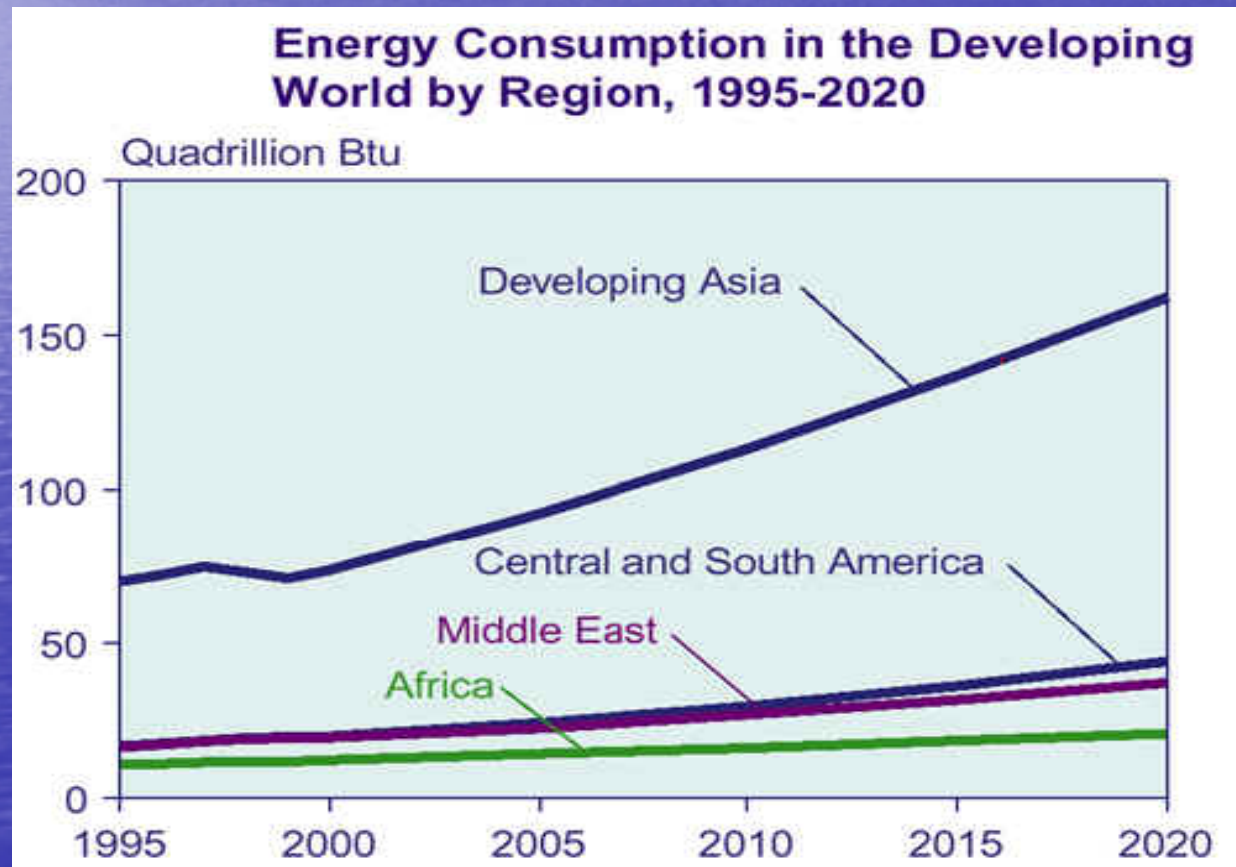
- Conventional energy sources are not environment friendly
 - Fossil fuels generate carbon dioxide
 - Nuclear waste dumping is a major problem
- Renewable energy sources are still expensive

World Energy Consumption Scenario



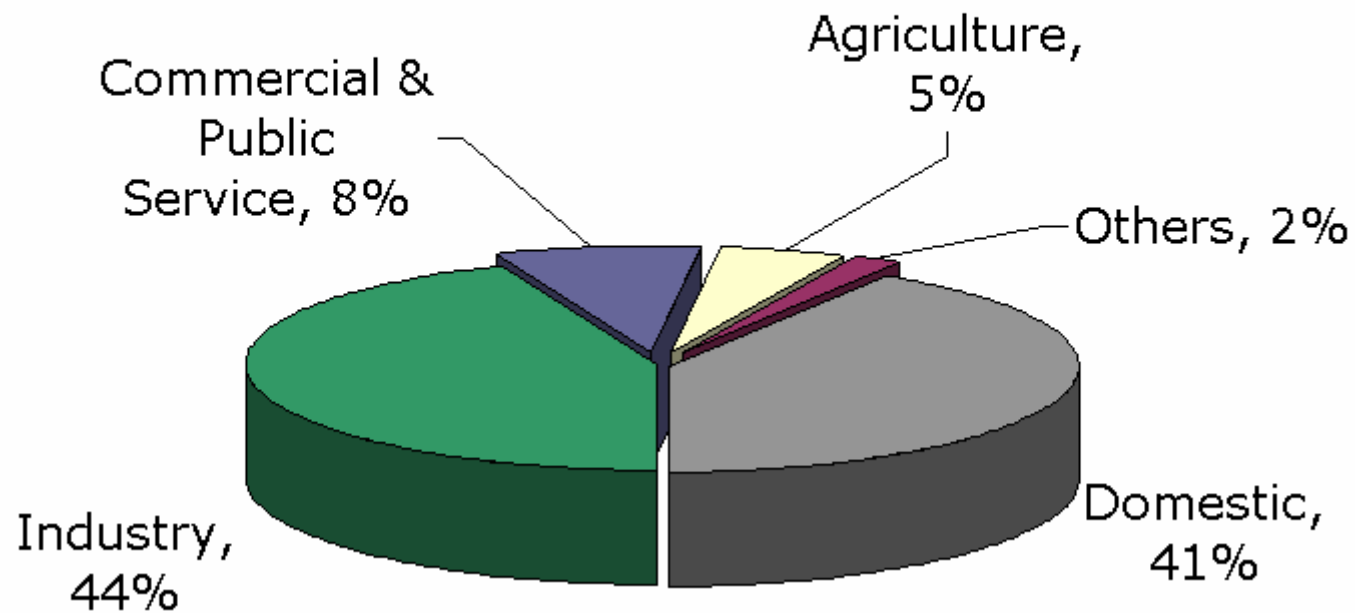
Energy consumption is set to increase quite fast in the next decade. This is due to the fact that developing world like Asia is coming up

Energy consumption in the developing world



Energy consumption: Bangladesh perspective

Energy Consumption by Sector, Bangladesh, 2003



Energy consumption in the cities

- Natural gas
 - House hold cooking and heating
 - Industrial heating
 - Electricity generation
- Electricity
 - Industrial drives
 - Lights, fans, electronic gadgets and air conditioners in domestic, commercial and industrial installations
 - pumps
- Petroleum products

Energy Efficiency enhancement in the cities

- Identification of wastages/inefficiencies
- Remedial measures against wastages
- New steps to enhance efficiency

Identification of inefficiencies and remedial measures

- Generation side
 - Proper maintenance
 - Replacement of old machines
 - Introduction of combined cycle
- Transmission side
 - Higher transmission voltages
 - Setting up of new transmission lines

Identification of inefficiencies and remedial measurescont.

- Distribution side
 - Proper maintenance
 - Tight control on non-technical losses
 - Replacement of old transformers
 - Avoid overloading of the lines
 - Maintenance of proper line voltages

New steps to enhance efficiency

- Consumer side management
- Introduction of appropriate tariff policy
- Taxation policy to reduce cost of energy efficient gadgets
- Penalty for inefficiency
- Promote awareness amongst the consumers

Consumer side management

- Replacement of incandescent lamps by
 - Fluorescent lamps with low loss ballasts
 - Light Emitting Diodes (LEDs)
- Initial cost and low voltage problem are discouraging factors
- Energy efficient lamps are not very soothing for human eyes



Caution!!

Most of the electronic ballasts or controllers for LEDs generate significant high frequency harmonics!!!

Power electronic drives and motor controllers

- Power electronic drives can reduce current inrush during motor starting
- Variable frequency motor controllers provide high torque at lower speeds improving power factor
- Innovations in motor manufacturing to suppress harmonic losses

Caution!! Harmonic generation by power electronic controllers are high

Power factor improvement

- Installation of PFI plants should be strictly monitored
- Researches needed to innovate more capacitive loads like capacitive ballast of a fluorescent light

Installation of smart systems

- Smart systems to control the consumer load according to the needs like
 - Switching off the air conditioner or light when nobody is in the room
 - Switching off the corridor lights in a building when not in use
 - Reducing street lights after mid night

Reduction of harmonic generation

- Almost all the electronic gadgets like computers, televisions etc. generate higher harmonics
- Excessive generation of higher harmonics distorts sinusoidal voltage wave shape
- Causes malfunction of the protective systems
- Causes excessive heating in the transformer cores
- Increases copper loss due to skin effect

Caution!! Proper steps should be taken immediately to reduce harmonic generation before it goes out of control

Proper building design

- Proper insulation of the building
- Proper design of doors and windows

Supply of hot water

- Hot water can be generated as a by product
 - Using hot air from household cookers/ovens
 - Hotels/restaurants can use air cooler heat exchanger
- Solar energy can be a potential source of hot water

Other important aspects

- Fuel wastage can be reduced by imposing effective traffic law
- Strict and corruption free fitness certification for vehicles
- Metering of all types of energy users including natural gas
- Proper setting of office hours for daylight saving
- Proper tariff and taxation policy
- Consumer awareness

The image features a blue gradient background. The top portion is a lighter, hazy blue with wispy white clouds, suggesting a sky. A horizontal line separates this from the bottom portion, which is a deeper, more uniform blue with a subtle, rippling texture, suggesting water. The text "Thank you" is centered in the middle of the image.

Thank you