Promoting National and Regional Renewable Energy Technology Innovation Systems:

Prospects & Challenges For Regional Cooperation

Presentation of Bangladesh

Md. Nazrul Islam, Joint Chief, Power Division,

Ministry of Power, Energy & Mineral Resources

- Introduction
- Energy Scenario
- Policies & Strategies
- Programs
- Achievement
- Recommendations

Introduction

- In the context of **International Year of Sustainable Energy for All (SE4ALL)** and the outcome of the **Rio+20 Conference**, this **Regional Consultation Meeting** has special significance.
- Achieving three broad goals, set by **SE4ALL**, of ensuring universal **access** to modern energy services, doubling the rate of improvement in energy **efficiency** and doubling the share of **renewables** in the global energy mix by 2030, deserve coordinated efforts at Regional level.

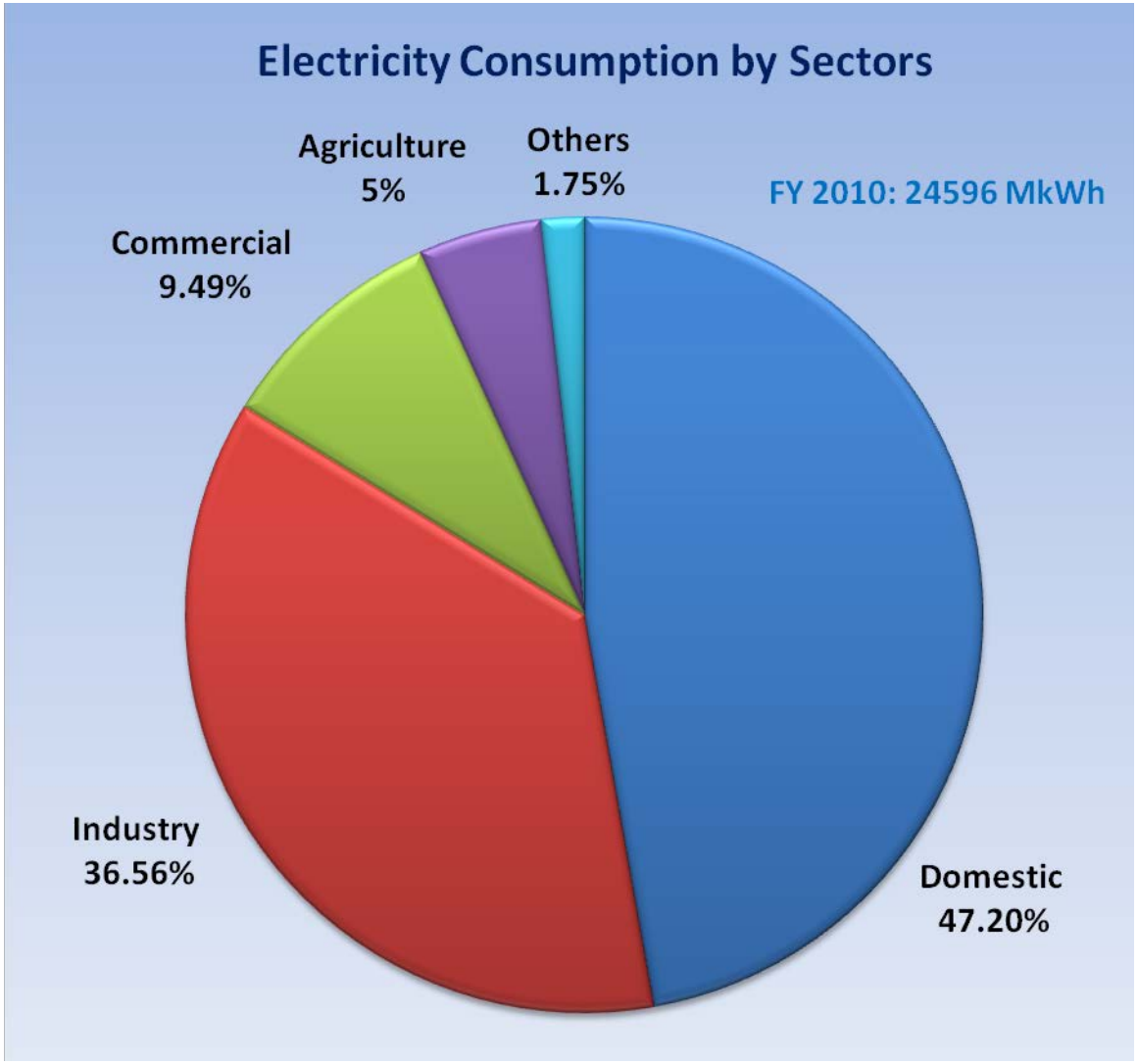
Energy Scenario

- Bangladesh with about 160 million people in a land mass of 147,570km^2 is one of the most densely populated countries in the world and is a low energy consuming country.
- Per capita electricity consumption is about **265 kWh**.
- Since 2007 energy demand has outstripped supply
- GDP growth of 6% to 7% per year would have been higher if more electricity and gas could be supplied.

Energy Scenario

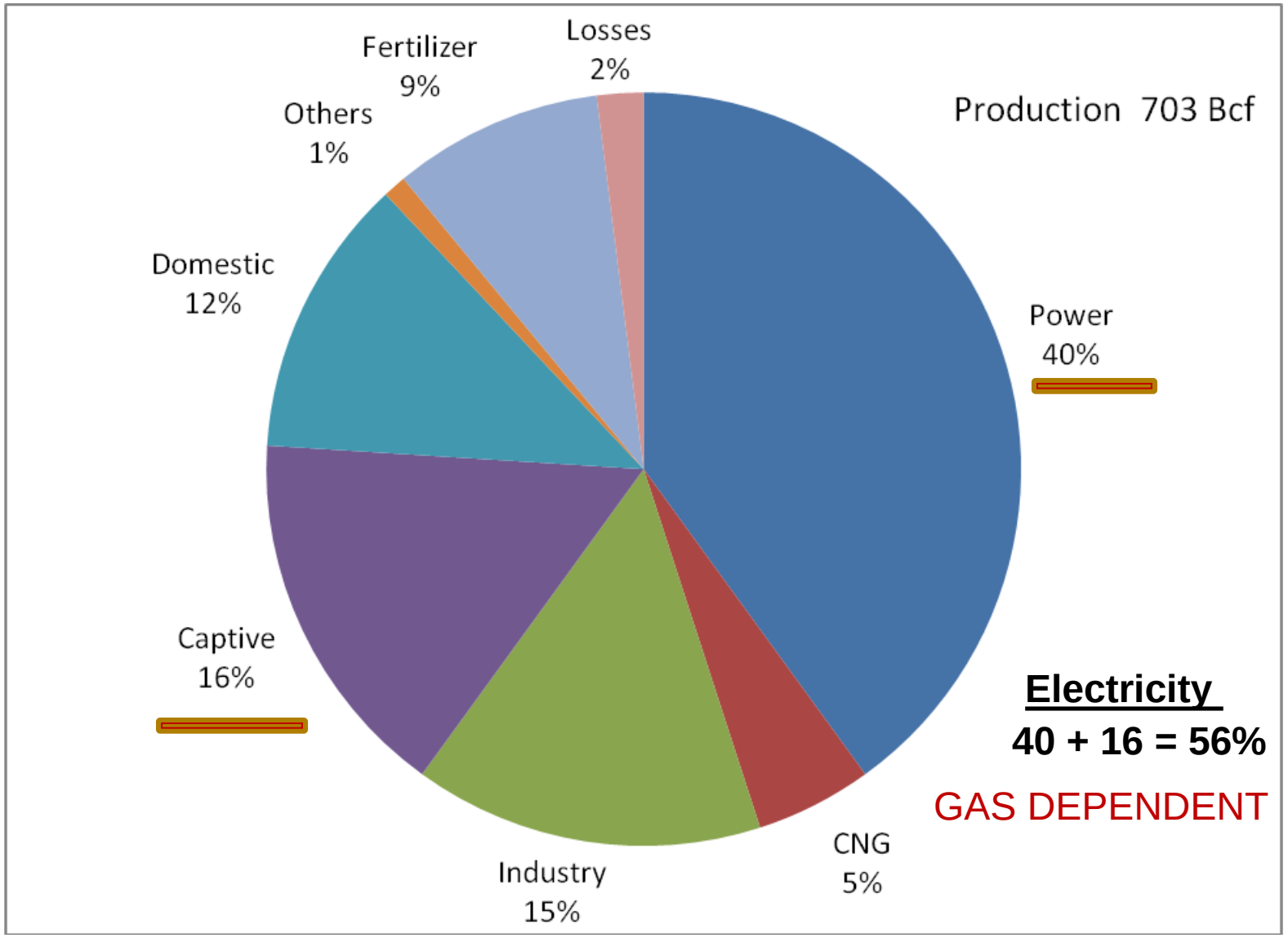
Summary of Primary Energy Supply in Bangladesh in 2012-13

Fuel Type	Original Unit	(TJ)	(%) of Total	(%) Without Biomass
Natural Gas	800 BCF	733600	42.04	67.62
Oil	5.8 million Tons	258100	14.79	23.79
Coal (estimate)	3.5 million Tons	89250	5.11	8.23
Hydro	1000 GWh	3600	0.21	0.33
Solar PV (estimate)	75 MW-p (equivalent)	400	0.02	0.04
Biomass (estimate)	55 million Tons	660000	37.82	
	TOTAL →	1,744,950	100.00	100.00



47% of grid electricity consumed by **DOMESTIC** sector indicating low level of industrialization

Gas Consumption by different sectors at present



Electricity Generation

Dependable power capacity **(2012)** stands at **7500 MW**

Gas: 4000 MW **Oil/Gas: 3000 MW**

Coal: 250 MW **Hydro: 250 MW**

Electricity generation has been ***dependent on gas***

To overcome short term gas crisis, ***oil fired power plants*** have been built in recent years

To diversify fuel mix, both ***mining and importing coal*** are being considered, plus ***1000 MW of nuclear power***

Plan for **5000 MW** of coal power plants by **2015**; by **2030** approximately **50%** of generation capacity would be coal

Policies & Strategies

- **Power System Master Plan (**PSMP) has been revised in 2010 to improve and expand electricity supply to match GDP growth in the 7 to 8 per cent range.
- As per **PSMP-2010,** 13,300 MW power needs to be generated by 2015, 22,500 MW by 2020 and 39,000 MW by 2030.
- The **SFYP**(FY 2011-FY-2015) lays down energy development plan & specific **strategies** to support higher growth & sets target to increase energy efficiency by 10%.

Policies & Strategies

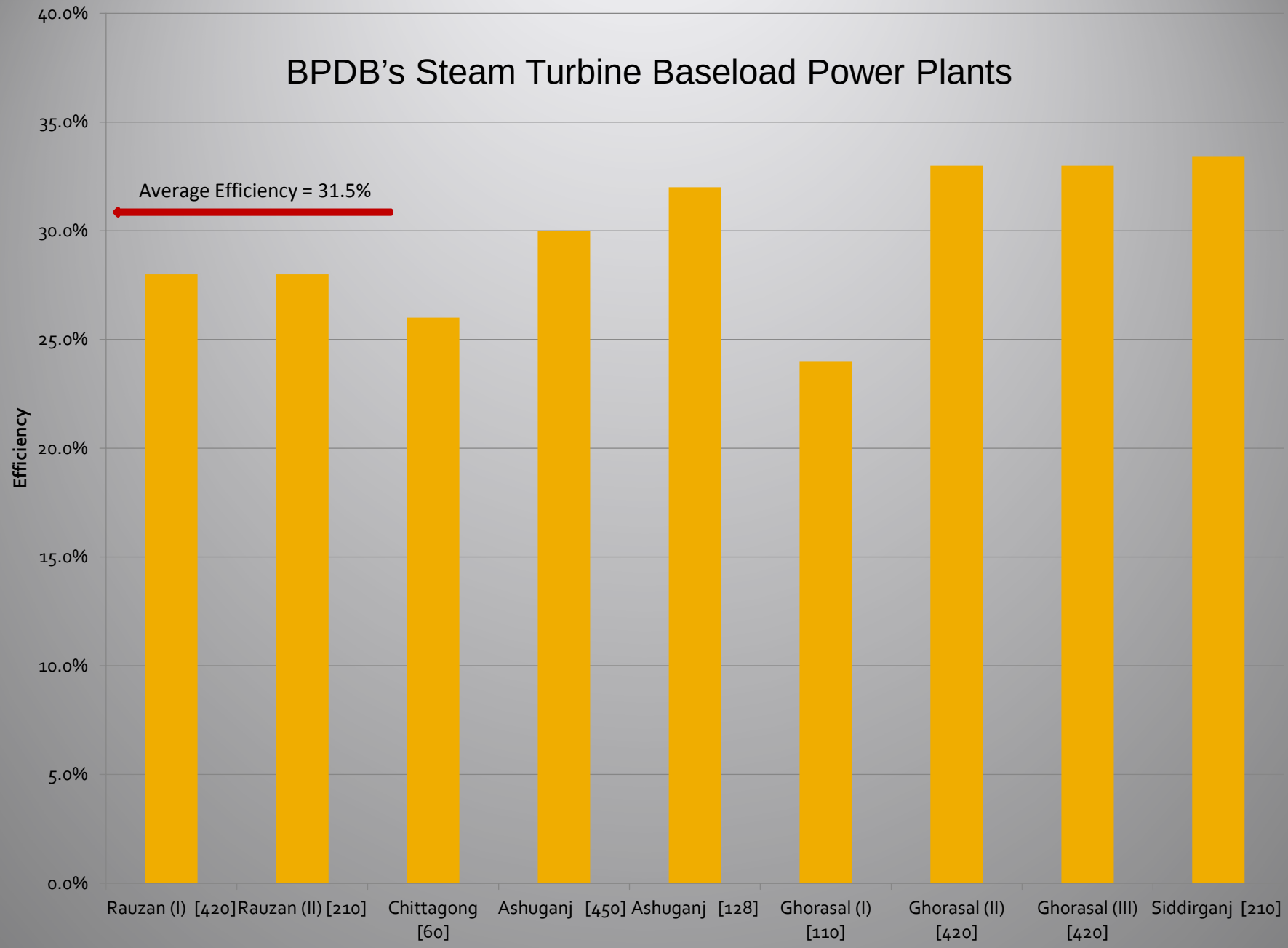
- **Renewable Energy Policy of Bangladesh** was adopted in 2008
- The Policy envisions **5%** of total power generation from renewables by 2015 & **10%** of the same by 2020.
- GoB is committed to facilitate both public and private sector investment in renewable energy projects to scale up contributions of existing renewable energy based electricity productions.

Renewable Energy Policy

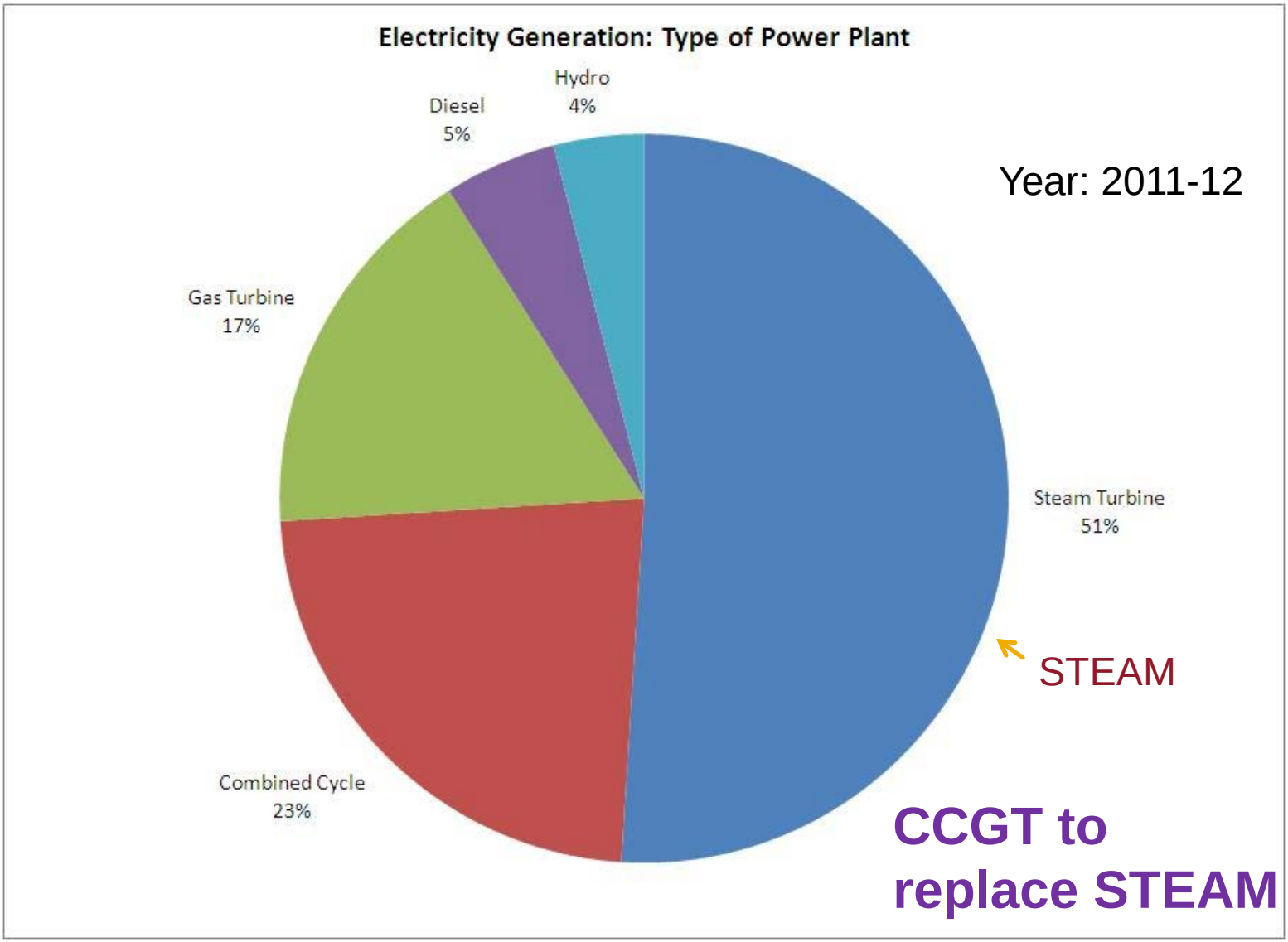
- **Renewable Energy Policy of Bangladesh** was adopted in 2008
- To achieve the objective government has set targets for developing renewable energy resources to
- **5% of total power demand by 2015**
- **and 10% by 2020**
- The government has identified renewable energy, especially solar photovoltaic as one of the thrust areas for energy security and GHG mitigation

Policies & Strategies

- "Mitigation and Low Carbon Development" is one of the thematic areas of "**Bangladesh Climate Change Strategy and Action Plan-2009.** Renewable energy development is one of the important programs under this thematic area.**"**
- A dedicated central agency, the **Sustainable and Renewable Energy Authority** (SREDA), is approved by the Government of Bangladesh.


BPDB's Steam Turbine Baseload Power Plants
Efficiency
40.0%
35.0%
30.0%
25.0%
20.0%
15.0%
10.0%
5.0%
0.0%
Average Efficiency = 31.5%
Rauzan (I) [420]
Rauzan (II) [210]
Chittagong [60]
Ashuganj [450]
Ashuganj [128]
Ghorasal (I) [110]
Ghorasal (II) [420]
Ghorasal (III) [420]
Siddirganj [210]

Electricity Generation



MoPEMR's energy efficiency and renewable energy programs (supply and demand side)

Supply side

- Gas-fired power plants owned by BPDB are very old and are operating at extremely low efficiencies (> 2000 MW)
- T&D infrastructure is also old and losses are high

The following efficiency improvement measures being pursued:

- Combined Cycle Gas Turbine (CCGT) to replace Steam Turbine
- Rehabilitation of old gas turbine power plants
- T&D upgrading and rehabilitation

MoPEMR programs on energy efficiency and solar energy

Demand Side

- Revision of the Building Code by inserting Energy Efficiency and Solar Energy issues
- Installation of Solar Panels in government organizations
- Dissemination of CFL bulbs in the residential sector
- Street lights to be replaced first by LED lights and later by solar PV powered lights

MoPEMR programs on energy efficiency and solar energy Demand Side

- Discontinuation in phases of incandescent bulbs and heaters
- Encouraging the business community to use solar energy
- Steps taken to introduce prepaid metering system all over the country to reduce system loss and lower use of electricity
- Cogeneration in industries having Captive Generation
- Steel re-rolling and Boiler efficiency improvement through energy audit and enforcing minimum efficiency standard

Bangladesh Standards and Testing

BSTI has been working on **Energy Standards and Labeling (ESL)** and are in a position to provide **Star Labeling** of some devices

BRESL project funded by UNDP-GEF is providing support

BSTI has completed work on 6 consumer products

Fans **refrigerators** **air conditioners**

Motors **CFLs** **Ballasts**

Companies are being encouraged to apply for grading and certification of their products

Renewables: Present Achievements

Bangladesh has become a real success story and has achieved worldwide acclaim by installing nearly **1.5 million units (75 MW) of SHSs in rural areas**

Target to install **4 million SHSs by 2015** through funding support from Infrastructure Development Company Ltd. (IDCOL)

IDCOL is also implementing the National Domestic Biogas and Manure Program. Under the project a total of **150,000** domestic sized biogas plants will be **financed up to 2016**

Up to **June 2012, over 23,000 biogas plants** have been constructed

Ongoing efforts on renewable energy

- The rapidly expanding and very successful **Solar Home Systems (SHS)** program under IDCOL is being provided with **additional funding**
- **Mini-grid** based on solar-biomass-wind hybrid for markets and commercial centers
- **Solar irrigation** (more than 0.2 million diesel/electric pumps can be displaced)
- Bids have been invited to set up **wind turbines** in different locations
- **Biomass options** (cookstoves, **rice parboilers**, biogas for cooking and electricity)

Bangladesh's Response to Climate Change: GHG Mitigation and CDM

The Ministry of Environment and Forest (MoEF) is promoting Sustainable Energy through its activities related to GHG mitigation and Clean Development Mechanism (CDM)

The most recent study on GHG mitigation is the *Second National Communication (SNC)* to satisfy Bangladesh's obligations under the UNFCCC

The SNC estimated the reduction potential from 21 identified options. It was found that the difference between the baseline scenario and the energy efficiency or mitigation scenario, in the year 2030 was as high as 25%

Bangladesh's Response to Climate Change: GHG Mitigation and CDM

The MoEF has approved **8** CDM projects

5 have been registered by the CDM Executive Board

The CDM projects that enhance environmental conservation are the following:

- Solar home systems (SHS)
- Improved kiln efficiency in brick manufacturing
- Improved cook stoves
- Efficient Lighting Initiatives of Bangladesh (ELIB)

Efficient Lighting Initiatives in Bangladesh (ELIB)

ELIB, a project supported by the World Bank has achieved a great success in promoting energy efficient lighting

In phase-I, **10.5 million CFLs** were distributed free of cost

5.5 million were distributed to 1.5 million households through 5 utilities in one day

The project covered **27 districts through 1400 distribution** centres and reduced the power demand by **260-270 MW**

In phase-II, **17.5 million CFLs** are expected to be deployed

Cookstoves (old and new type)

Solar Reflective Glass could have been used

Solar Irrigation

To give environmental conservation an emphasis, Bangladesh has approved an apex body called **Sustainable and Renewable Energy Development Authority (SREDA)** to promote renewables and energy efficiency.

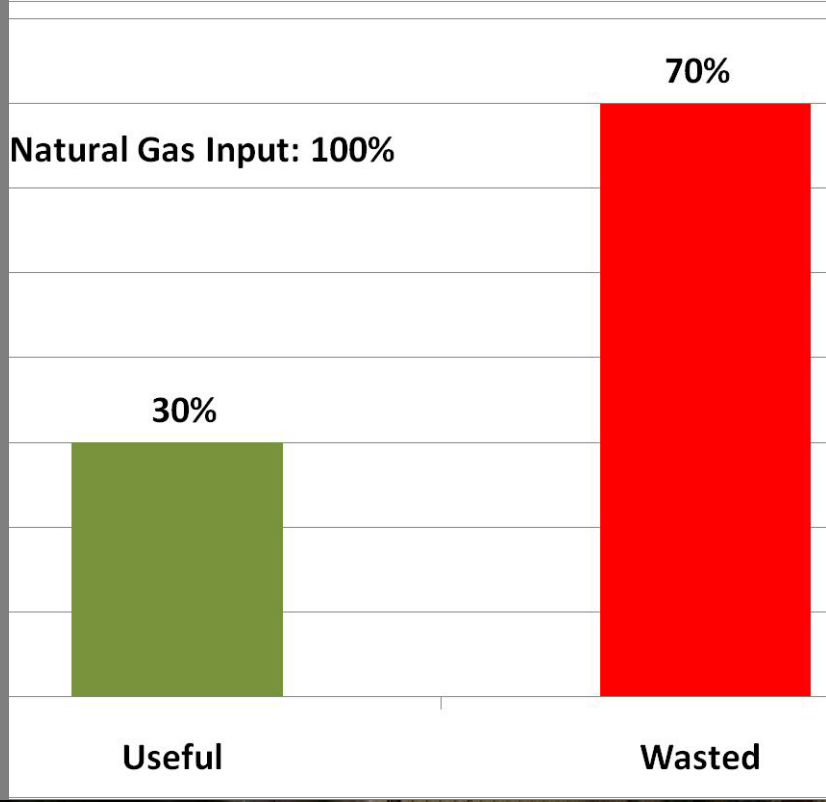
COGENERATION

A waste-heat boiler can recover a good portion of the wasted heat to produce steam

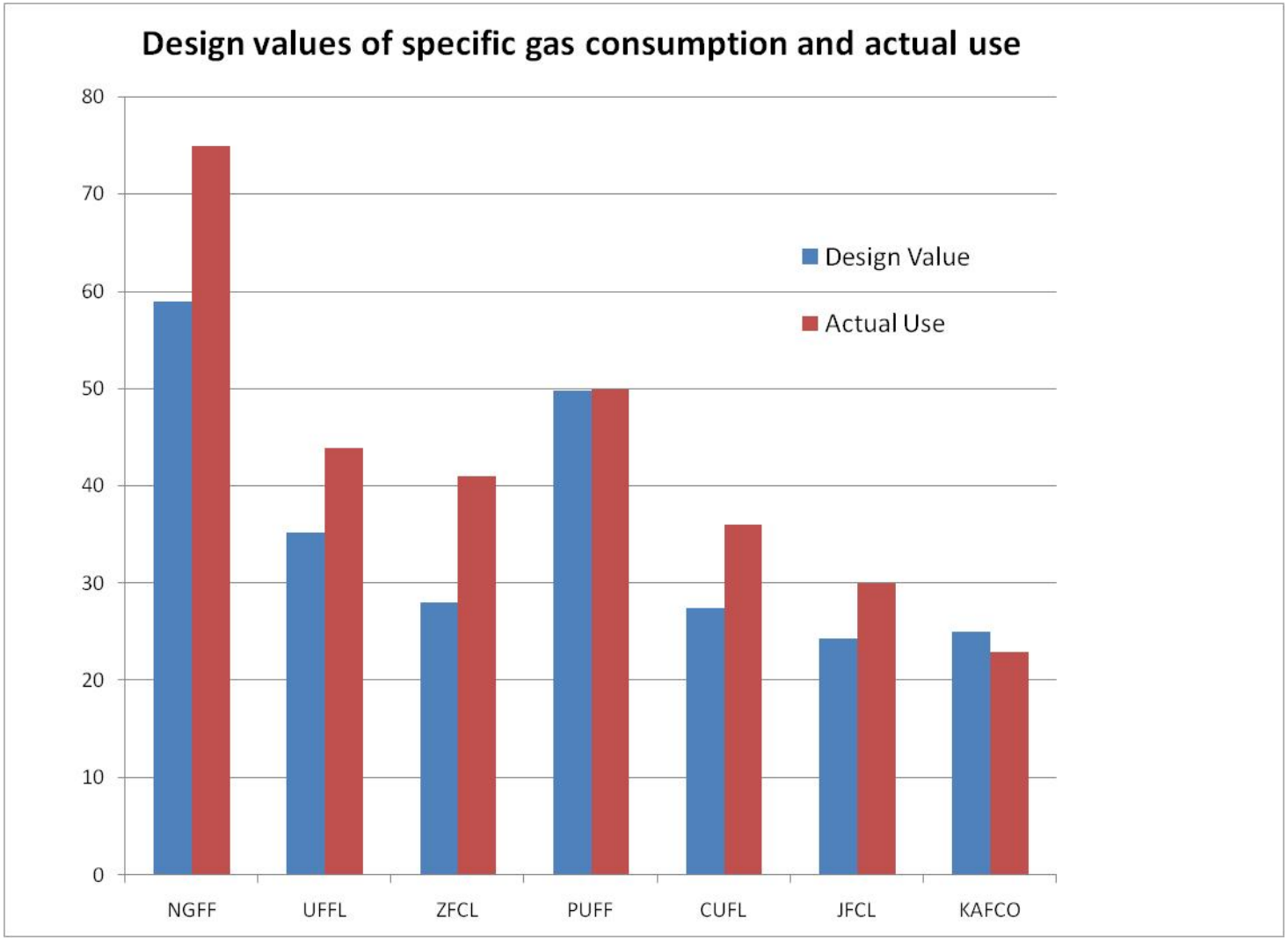
This will replace the existing boiler thus saving the natural gas used to make steam

If the industry does not require steam, then absorption refrigeration can be used for air-conditioning or making ice

Otherwise, the steam can be sold to neighboring industries



Urea Fertilizer: Four plants (NGFF, PUFF, UFFL, ZFCL) consume for 1 ton of urea more than 40 Mcf of natural gas, compared to 23 Mcf and 30 Mcf by KAFCO and JFCL respectively



Private Industries: Brick Kilns

- 5000+ Fixed Chimney Kilns (FCK) consume 2-3 million Tons of coal - Highly polluting and energy inefficient
- FCK – Very crude furnace; dugout area in open field
- Smalltime entrepreneurs run the industry

- **Government has taken many measures to improve the present situation both in terms of energy consumption and environmental pollution**
- **GEF project in 2005-2008; UNDP, WB and GTZ have facilitated**
- **World Bank pilot project for improvement of FCK**
- **CDM project using Hybrid Hoffman Kiln have been registered**
- **World Bank CASE project is ongoing to improve situation**

Private Industries: Brick Kilns

- Government has taken many measures to improve the present situation both in terms of energy consumption and environmental pollution
- GEF project in 2005-2008; UNDP, WB and GTZ have facilitated
- World Bank pilot project for improvement of FCK
- CDM project using Hybrid Hoffman Kiln have been registered
- World Bank CASE project is ongoing to improve situation

Fixed Chimney Kiln (FCK)

VSBK: 40-50% more efficient than FCK

HOFFMAN KILN – Coal Fired: 25-35% more efficient than FCK

Re-rolling Mills Reheating Furnace

- Energy component more than 25% of product cost
- Crude Operation and Inefficient Induction Furnaces
- Re-rolling Mill: Bad insulation; no heat recovery and inefficient burners

25 to 75 m^3/ton for modern to traditional re-rolling mills

Solar Home System in Rural Areas

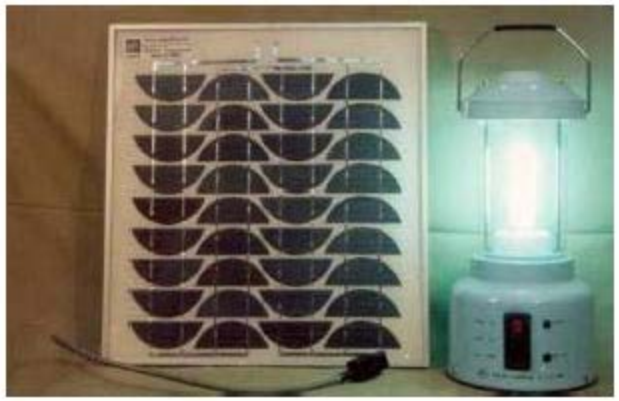
Grameen Shakti is the leading NGO selling SHSs supported by IDCOL

Solar Lanterns

- More than 300,000 tons of kerosene used annually for lighting purpose
- Solar PV lanterns are high quality replacement for kerosene lamps (KUPI)

RE Practices in Bangladesh - Solar PV Technologies

Solar Lantern Programme for Rural Poor Households in Bangladesh (UNDP supported)



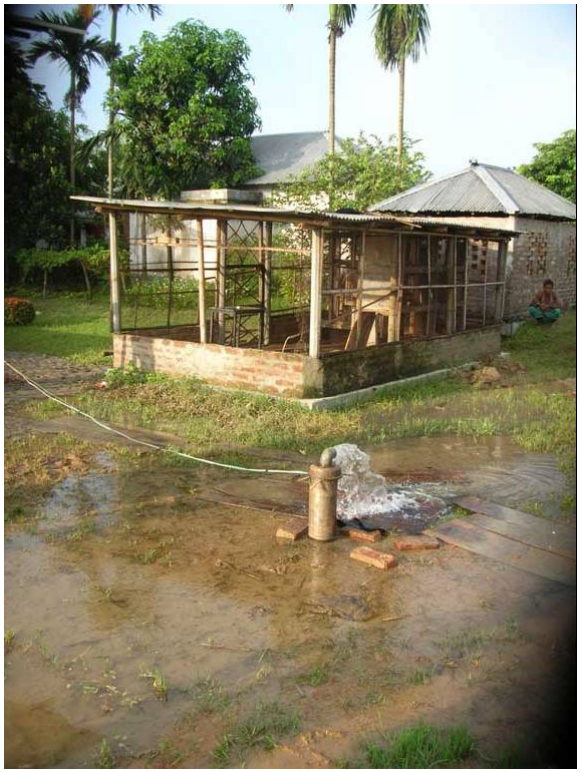
DNA has given approval for a PIN for a Solar PV Lantern CDM project

Biogas Digester

Biogas can Replace LPG

Solar Irrigation

	Diesel-Pump	Solar-Pump
Price:	Tk 70,000	Tk 6 lac
Diesel:	Tk 80000/yr	Tk 8000/yr
Life:	10 years	20 years



Improved Biomass Cookstove

Traditional Stove = 8% efficiency

Improved Cook Stoves (ICS) can easily achieve a thermal efficiency of 20%

Saved biomass is **Non Renewable Biomass**; CDM project registered

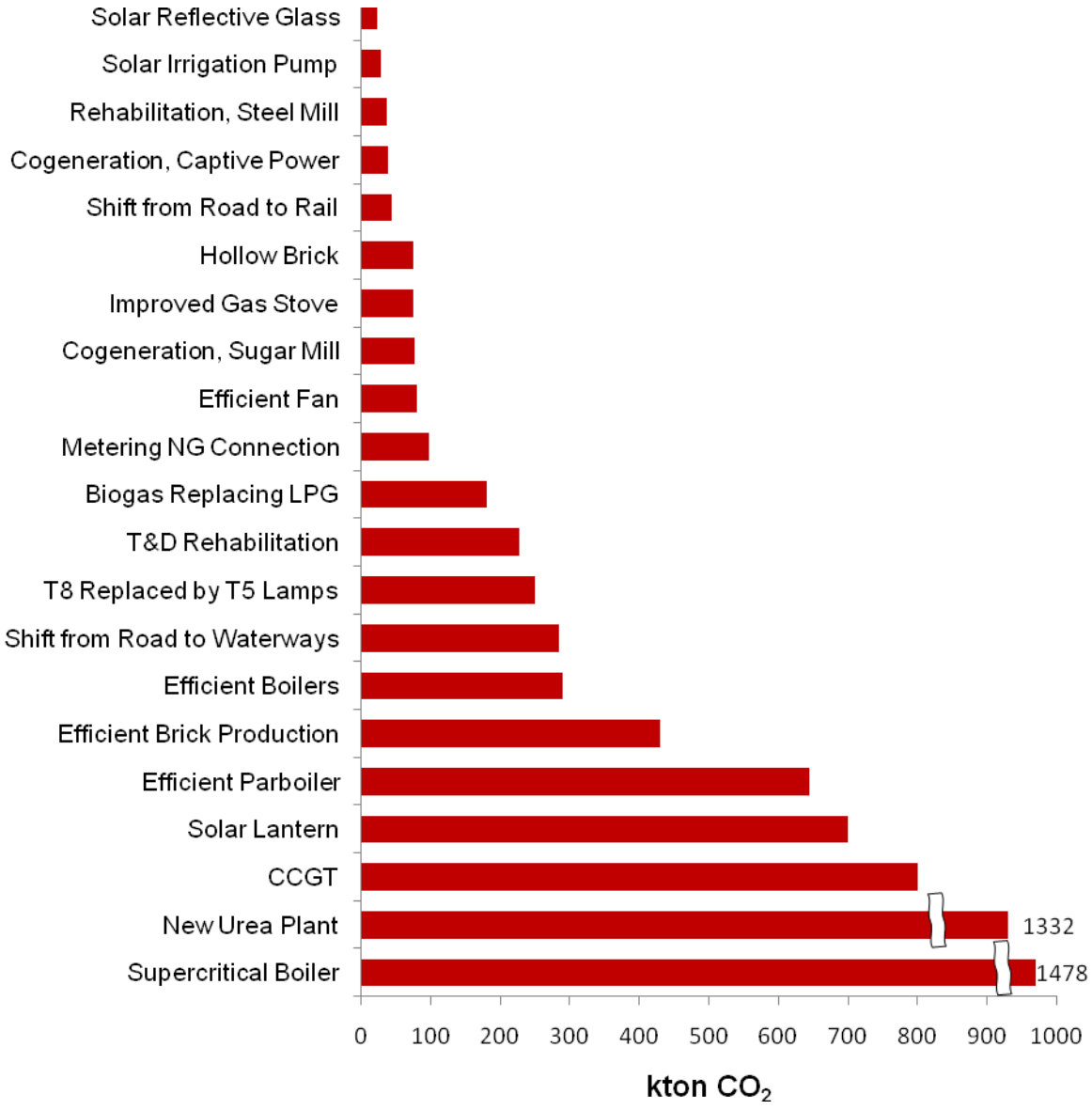
← ICS →

Village Restaurant

Efficient use of Biomass

Efficiency improvement of paddy PARBOILERS

GIZ Project



GHG Reduction Potential of Mitigation Options

Cooperation amongst Member Countries

Bangladesh

- Has shown tremendous progress in Solar-PV Home Systems applications in rural areas
- Biogas technology especially for small scale power generation is gaining popularity

Pakistan, Egypt and Nigeria can greatly benefit

Iran and Nigeria

- Have long experience in management of oil/gas resources –

Indonesia and Malaysia also have vast experience –

Bangladesh and Pakistan can greatly benefit

Cooperation amongst Member Countries

Research and development in energy and environmental conservation

Turkey and Egypt can give leadership being close to Europe as well as having good research institutions of their own.

Malaysia in Asia can also provide leadership in this area.

Energy efficiency measures have seen significant adoption in Malaysia, which can be disseminated.

Recommendations

- Member countries should ideally make a dedicated forum desk under its umbrella to expedite solid work in the field of renewable energy.
- Feasibility need to be studied.

Thank You