

Needs, Targets and Opportunities for Green Technology in Bangladesh

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Needs, Targets and Opportunities for Green
Technology in Bangladesh

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Professor , Department of Civil Engineering-BUET

PROGRESS OF THE NETWORKING ACTIVITIES

Meetings within Bangladesh & Japan

- **1st December** Skype Meeting
- **15th January** Skype Meetings—Cancelled due to unavoidable circumstances
- **16th February**
- **18-20th February**—Within Bangladeshi Counterparts

Study Workshop Proceedings

Virtual Skype Conference with Dhaka, Bangladesh



Study Workshop Proceedings

December 1st, 2014

Virtual Skype Conference with Dhaka, Bangladesh

- Ways to involve Academic Community and Researchers
- Brief Discussion on what kind of Projects JCM Supports
- Potential and challenges for JCM projects in the country and how the domestic network can contribute

Study Workshop Proceedings

January 15th, 2015

Virtual Skype Conference with Dhaka, Bangladesh

- **Could not be held due to unavoidable circumstances in Bangladesh.**

Study Workshop Proceedings

February 16th, 2015 4:00-5:30 PM

Virtual Skype Conference with Dhaka, Bangladesh

Presentation One:

Joint Crediting Mechanism (JCM) projects for Sustainable Low Carbon Development in Asia- Pacific Region-- 3E Nexus Secretariat, Integrated Research System for Sustainability Science (IR3S), The University of Tokyo, Japan

Presentation Two:

Energy, Environment and Ecosystems (3E) Nexus Initiative; Kensuke Fukushi, Ph.D., Professor, Integrated Research System for Sustainability Science (IR3S), The University of Tokyo, Japan

Study Workshop Proceedings

February 16th, 2015 4:00-5:30 PM

Virtual Skype Conference with Dhaka, Bangladesh

Sl No	Name	Designation	Organization
1	Dr. Md. Mafizur Rahman	Professor, Department of Civil Engineering	Bangladesh University of Engineering & Technology (BUET)
2	Engr. Md. Shahariar Kamal	Manager-Credit Risk Management	IDLC Finance Limited
3	Engr. Md. Kamruzzaman	Senior Energy Sector Specialist	USAID-CCEB Program
4	Engr. Md. Mehbuboor Rahman	Assistant Manager- Green Finance	IDLC Finance Limited
5	Engr. Md. Ibrahim Hossain	Proprietor/CEO;	CENTRE FOR ENGINEERING & TECHNICAL ASSISTANCE (CETA);Bangladesh
6	Sanoar Hossain	Professional	Leather Technology

Study Workshop Proceedings

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Participants From Japan:

- Kensuke Fukushi, Ph.D., Professor, Integrated Research System for Sustainability Science (IR3S) ; The University of Tokyo, Japan
- Yuki Hashimoto, IDEA Consultants, Inc.
Researcher, Overseas Projects Department
2-2-2 Hayabuchi, Tsuzuki-ku, Yokohama, JAPAN 224-0025

Study Workshop Proceedings

February 16th, 2015 4:00-5:30 PM

Virtual Skype Conference with Dhaka, Bangladesh

Summary of the presentation One

- ✓ **Introduction of participants**
- ✓ **Explanation of aim of this project** – focused on creation of an academic network
- ✓ **Background/beginning of the project**– carbon tax on electricity bill used as funding for MOEJ and METI
- ✓ Host country and Japan can discuss and decide how to issue MRV, how to make credits. Carbon credits will be shared between the 2 countries, ratio TBD.
- ✓ **Explanation of JCM Framework, Joint Committee**
- ✓ **Platforms to Support Leapfrog** – Local governments of Japan wants to share their experiences/technologies, this project is part of the research platform
- ✓ **Comparison of JCM with the CDM** – JCM is more flexible than the CDM, process is quite similar
- ✓ **Criteria of JCM Methodology** –carbon reduced should be derived from energy, i.e. converting methane to CO₂ is not included
- ✓ For financing, planning to be about 300 million USD per year
- ✓ Investing in long-term large-scale carbon reductions is also important is where we can play a role (i.e. traffic monitoring and data collection in Bangkok)

Study Workshop Proceedings

February 16th, 2015 4:00-5:30 PM

Virtual Skype Conference with Dhaka, Bangladesh

Summary of the presentation Two: 3E Nexus

- ✓ **Importance of co-benefits** (i.e. high efficiency power plant also releases low amount of pollutants such as sulfur oxide, etc.). Need to develop cash value of natural environment, reduction of pollution, etc.
 - ✓ **Explanation of steering committee, first kickoff meeting, current network map, etc.**
 - ✓ **Low carbon in relation to ecosystem** is difficult but must be included in the future (i.e. high efficiency coal power-plant reduces acid rain and effect on forest)
 - ✓ Hope to **make more concrete projects** from next year and strengthen the network more to connect industries and academicians, government, etc.
- Hope that the Bangladesh academicians can be the consultants for the projects.

Study Workshop Proceedings

February 16th, 2015 4:00-5:30 PM

Virtual Skype Conference with Dhaka, Bangladesh

Questions Asked from Different Bangladeshi Participants

- When doing the FS, people need to go through the One-Stop Service?
- JCM is approved only when Japanese company is approved, when Bangladesh company has an idea, how can they develop and participate in the JCM projects?
- Who bears the cost when doing a project for example in industry?
- For the investment, is it a grant or a loan?
- Are there guidelines on what kind of technologies that you have to purchase/invest in?
- Can the industry directly contact the JCM committee?
- How long does it take to approve a project?
- Can you please clarify on the Japanese involvement (i.e. manufacturing company), are there certain conditions to make the projects with Japanese companies?

Study Workshop Proceedings

February 20th, 2015

Conference with Dhaka, Bangladesh

- Possible way Forwards
- Involvements and contribution from each Participants
- Preparation for the upcoming Presentation
- Academic community/researchers involvement in creating future JCM projects
- Ideas on how to create an effective network for 3E Nexus/JCM projects within the country
- Measurement, Reporting, Verification (MRV) methods related to JCM projects, how the domestic network can contribute to MRV

Outcomes of Group Meeting 1

Prospects and Constraints of JCM in BD

Bangladesh at a glance



Bangladesh at a glance

Location

- Northeastern part of South east Asia
- Surrounded by India, Myanmar & Bay of Bengal

Area & Terrain

- Area: 147,570 square km
- Low flat land consisting of alluvial soil

Climatic Condition

- Hot summer with high humidity (March-June)
- Monsoon (July-October)
- Dry winter (November-February)

Bangladesh: Demographic Info


Total Population: 166.3 Million

**0-14
years
34.3%**

**15-64
years
61.1%**

**65 years
and
over
4.6%**

Economy of Bangladesh

- 
- The country is classified as next eleven emerging market

- Potential member of frontier five

- Entering into golden era as more than 60% of population is in workable condition (age 15-65)

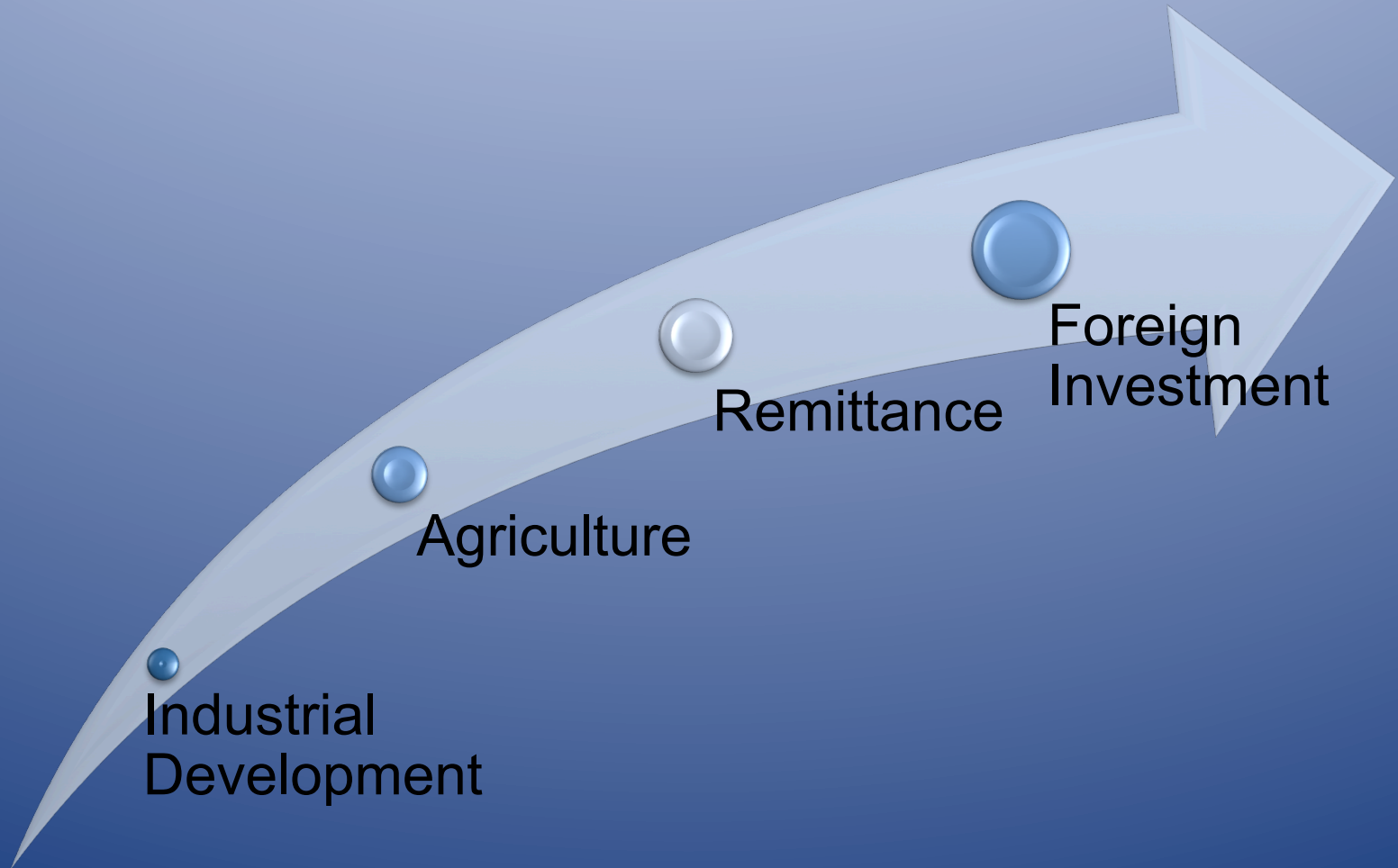
- Constant GDP growth of more than 6% has been observed throughout last 10 years

Economy: Parameters in a nutshell

Indicators	FY11		FY12		FY13		FY14		FY15
	Plan	Actual	Plan	Actual	Plan	Actual	Plan	Actual	Plan
Real GDP Growth (%)	6.7	6.7	7.0	6.2	7.2	6.0	7.6	6.5	8.0
							7.2*	(6.1)	7.3*
Gross Domestic Investment (% of GDP)	24.7	25.2	26.8	26.5	29.6	26.8	31.0	26.5	32.5
								(28.7)	
Private Investment (% of GDP)	19.5	19.5	22.2	20.0	22.7	19.0	23.8	18.9	25.0
								(21.4)	
Public Investment (% of GDP)	5.3	5.6	6.6	6.5	6.9	7.9	7.2	7.6	7.5
								(7.3)	
National Savings (% of GDP)	28.4	28.8	26.7	29.2	29.4	29.5	30.7	27.8	32.1
								(30.5)	

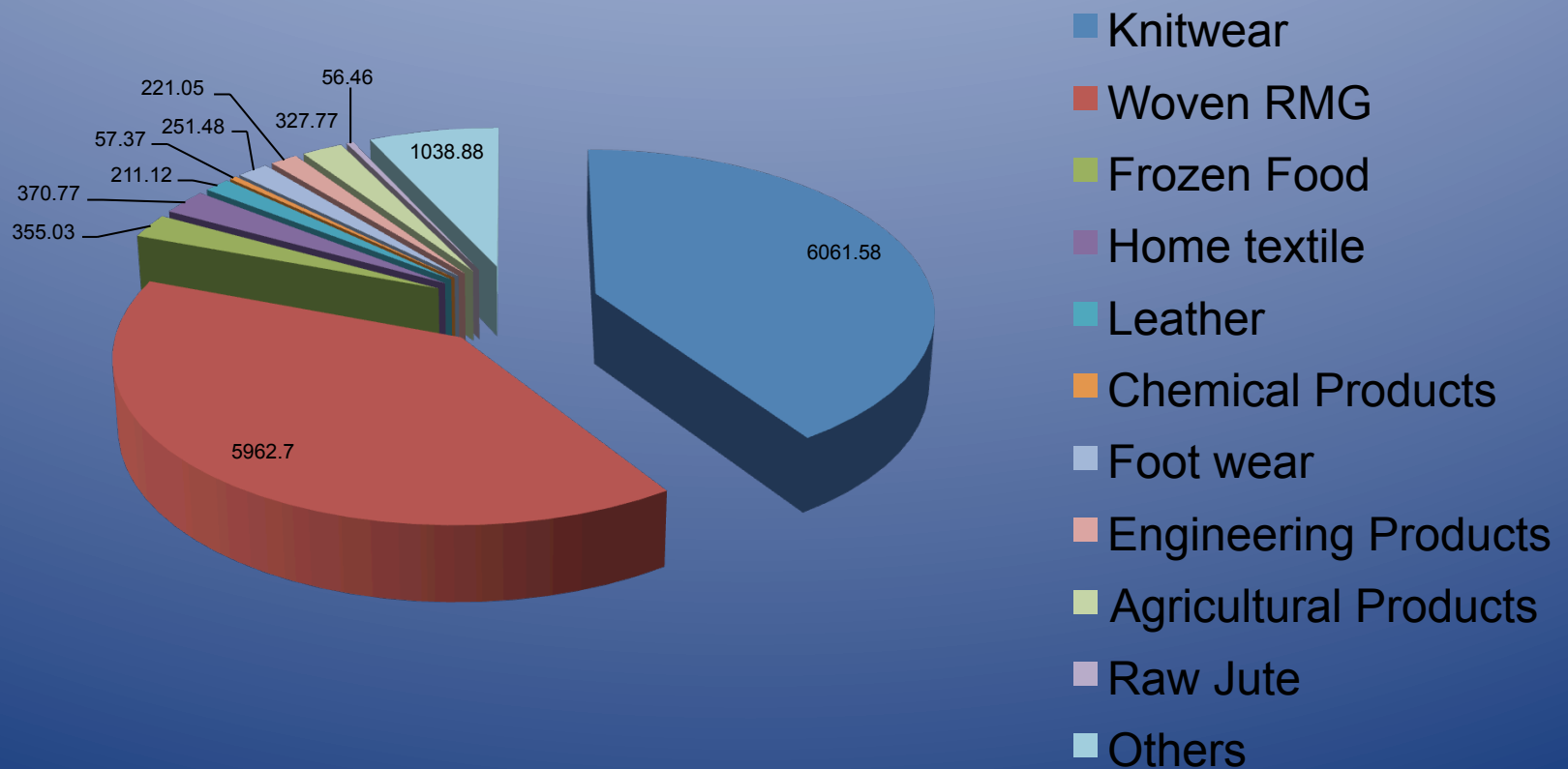
Constant GDP Growth 6%

Driving Force of Economy



Contribution to Export Earning

Export Volume (July-December 2014)



Opportunity for Investment



- Government policy encourages foreign investors



- Infrastructural development is ongoing to create more scope

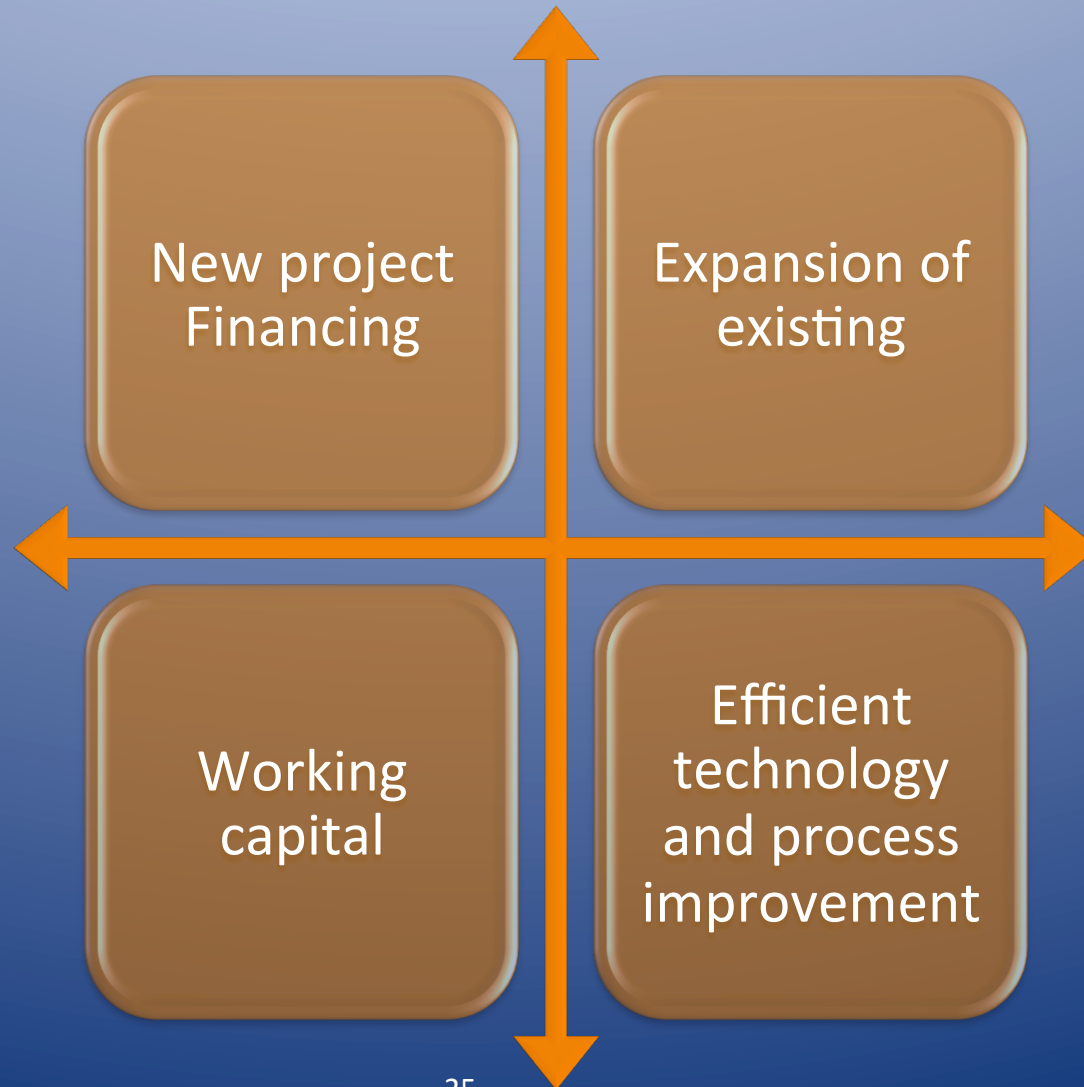


- Less ForEx risk acts as a driving factor for foreign currency financing

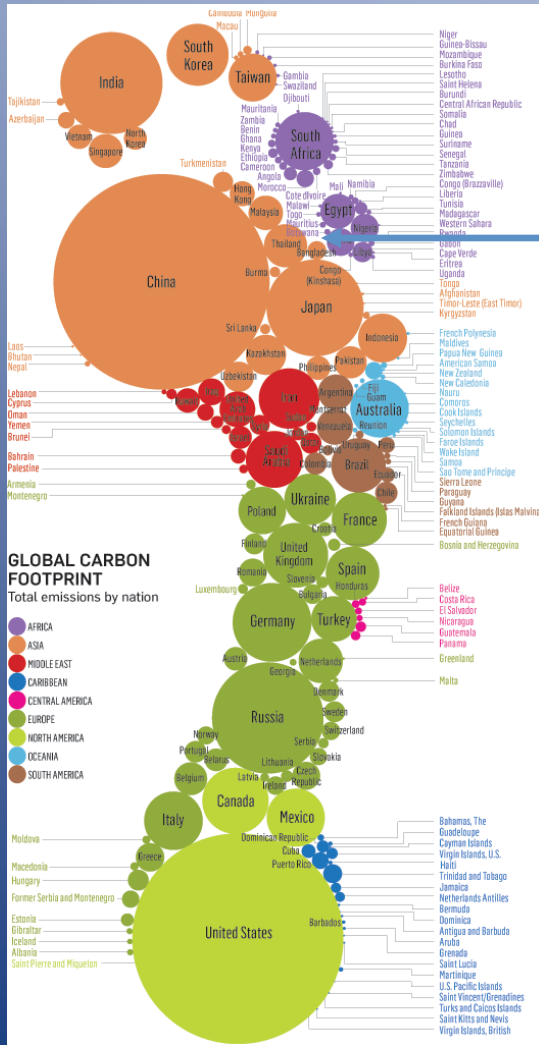


- Higher rate of interest from local Banks discourages sponsors

Scope of Investment



Carbon Footprint



Contribution of Bangladesh
0.14%



A large swathe of the Buriganga river, the lifeline of the capital, has turned pitch-black with toxic waste flowing into it from industrial units.

Government Initiative towards CDM Projects

- 
- Policy on RE and EE is already in place

- Targeted contribution of RE is 5% of total power generation by 2015

- By 2020, Government is planning to enhance it to 10%

- 6th Five year plan creates opportunity to save 10% of energy through EE

But Bottlenecks are still dominating

Investment Challenges & Mitigation

Low profitability

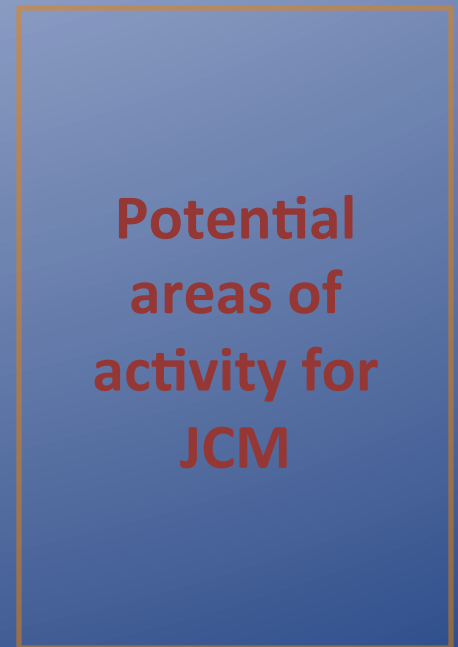
- Aid/Grant
- Subsidized Loans
- Flexible structure and longer tenor
- Credit guarantee

Low Market demand

- Capacity building of all relevant stakeholders
- Research and Development

Limited knowledge

- Mass Awareness
- Promotional Campaign
- Policy and framework



JCM-BD Counterpart Meeting

- ❖ A meeting was conducted to sort out possible opportunities and scope of JCM in Bangladesh.
- ❖ JCM-Bangladesh Focal Person Dr. Md. Mafizur Rahman presided over the meeting.
- ❖ Participants tried to sort out scopes and opportunities under JCM umbrella.
- ❖ Different sectors were identified based on their potential, contribution to national economy and environment, possible outcome etc.

Sorting out Opportunities

Energy Efficiency in Textile,
Power, Steel etc sector

Renewable Energy

Waste to
Energy

Brick Kiln

Green
Building

Policy and
Awareness
campaign

Scope 1: Energy Efficiency

- ❑ Interventions based on energy audit to reduce energy consumption

- ❑ Potential Sectors:
 - ❑ Textile and Ready Made Garments
 - ❑ Steel and Rerolling
 - ❑ Cement
 - ❑ Pharmaceuticals
 - ❑ Power Generation

- ❑ Government's goal to reduce energy consumption, additional charge for power, potential savings opportunity are driving factor

S1: EE- Improvement Options

Replacement of old boiler with thermo-oil or similar type

Replacement with efficient LED lighting system

Improvement in HVAC system

Use of variable Frequency Drive (VFD) in motor

Process improvement and automation

Improvement of Chiller, Compressor and other appliances

Scope 2: Renewable Energy

- ❑ Bangladesh share on RE is growing due to power scarcity and price hike

- ❑ Types of RE:
 - ❑ Solar Energy
 - ❑ Biogas
 - ❑ Wind Energy
 - ❑ Hydroelectricity

- ❑ RE has strengthen its foot step in both on grid and off-grid area of rural Bangladesh

S2: RE- Applicability

SI No	Type	Area	Industry
1	Solar Energy	All over Bangladesh specially off-grid areas	Household level, Clean Energy Generation, Grid connected network
2	Biogas	All over Bangladesh	Household level, Poultry and dairy, Agricultural waste
3	Hydroelectricity	Hilly Region of Chittagong and Sylhet	Grid connected network
4	Wind Energy	Coastal Belt	Grid connected network

S2: RE- Few Examples

- ❑ IDCOL has installed more than 3 Million Solar Home System all over the country
- ❑ Two 30 MW capacity Wind Energy is going to be installed in coastal areas of Cox's Bazar
- ❑ Kaptai dam established in 1960s still has got the potential of generating more than 230 MW of hydroelectricity
- ❑ It is expected that large size clean energy projects will share its contribution in national grid

Scope 3: Waste to Energy

- ❑ The concept of Waste to Energy is to generate electricity or to produce fertilizer from different sorts of waste
- ❑ Conversion of waste to energy preserves environment and emerged as good business opportunity
- ❑ Proposed Waste to Energy project at sanitary landfill near Dhaka, Composting facility from municipal waste is drawing investor's attention.

S3: Waste to Energy- Few Options

ETP and reduction of Liquor ration in fabric dyeing

Composting and preparation of fertilizer from municipal waste

Electricity generation from sanitary landfill

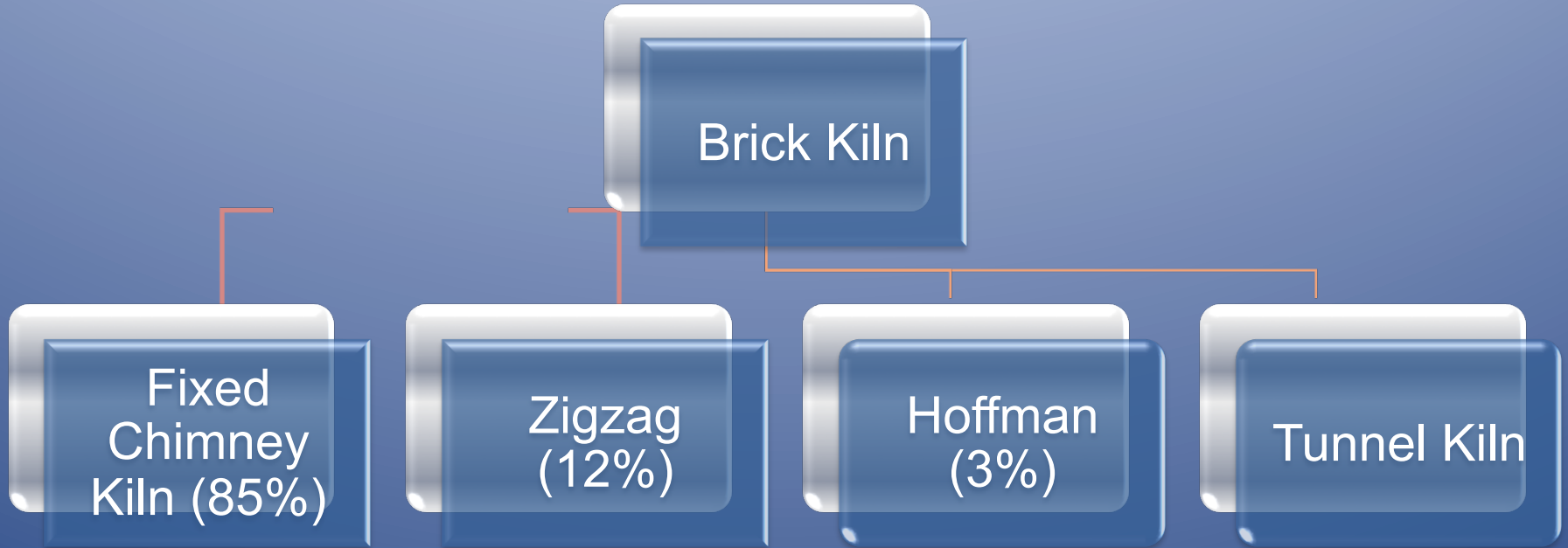
Waste Water Treatment/ Sewage Treatment Plant

Methane Recovery

Scope 4: Brick Kiln

- ❑ Brick is one of the basic construction material and used all over.
- ❑ Contribution of Brick industry is 1% to national GDP
- ❑ Still we are practicing traditional Fixed Chimney Kiln(FCK) Technology which has severe impacts. Around 85% of produced bricks comes from FCK
- ❑ Government as well as ADB,WB are encouraging establishment of new technology to conserve environment.

Scope 4: Brick Kiln-Classification



Scope 4: Brick Kiln-FCK

- ❑ Fixed Chimney Kiln has got certain disadvantages:
 - ❑ Produces more smoke and emission
 - ❑ SO_x and NO_x emission is pretty high
 - ❑ Portion of first class brick is below 60%
 - ❑ Cost of production is high
 - ❑ Labor intensive technology
 - ❑ Involves occupational health and safety hazards

Scope 4: Brick Kiln-Opportunity

- ❑ Due to government restriction all FCK needs to be converted into Zigzag/Hoffman/Tunnel Kiln technology
- ❑ License issued for FCK will not be renewed from next year
- ❑ New technology requires more investment with flexible terms
- ❑ JCM can scope opportunities from here
- ❑ Tunnel Kiln technology is a suitable CP project

Scope 5: Green Building

- ❑ In order to meet compliance issue, enhance brand value and to secure additional premium in pricing sponsors of Textile and RMG sectors are constructing green buildings
- ❑ United State Green Building Council (USGBC) certified LEED Green Buildings are raising their head in the country
- ❑ Due to high initial investment, sponsors are facing bottlenecks
- ❑ Presently 64 numbers of buildings have been registered as Green with USGBC

Scope 5: Green Building

- ❑ Key Issues of Green Building:
 - ❑ Sustainable site
 - ❑ Air efficiency and circulation'
 - ❑ Water efficiency
 - ❑ Energy efficiency
- ❑ Significant amount of carbon credit generated from these projects are rather unutilized or not yet discovered.

Scope 6: Policy and Campaign

- ❑ JCM may also scope opportunities in:
 - ❑ Training and awareness program
 - ❑ Capacity building of local stakeholders
 - ❑ Policy, advocacy knowledge sharing
 - ❑ Sharing of best practice all around globe
 - ❑ Research and development for scoping further
 - ❑ Ensuring the appropriate technologies at an affordable cost

Recommendations from BD

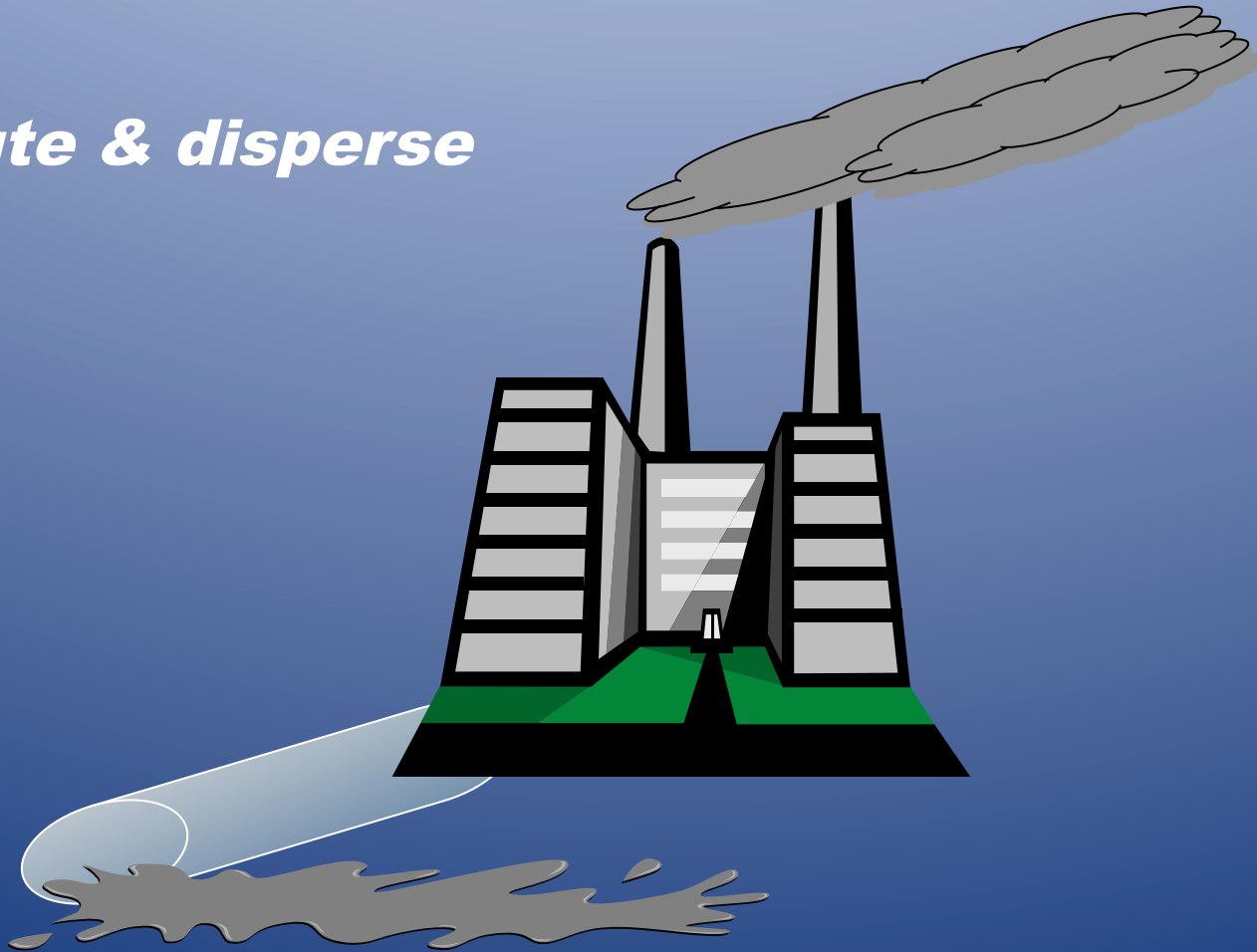
- ❑ Following recommendations may be considered for efficient utilization of resources of JCM:
 - ❑ Apart from investing only in transportation sector, JCM may work out other potential sectors
 - ❑ Investment can be made open for all industry capable of generating carbon credit
 - ❑ Industry belong to local sponsors need to be considered for developing in a wide spread manner
 - ❑ Guideline on JCM investment in BD need to be formulated before starting.



Outcomes of Group Meeting 2
CLEANER PRODUCTION (CP)
CONCEPTS AND PRACTICE
A TESTED WAY TO REDUCE
CO2 EMISSION

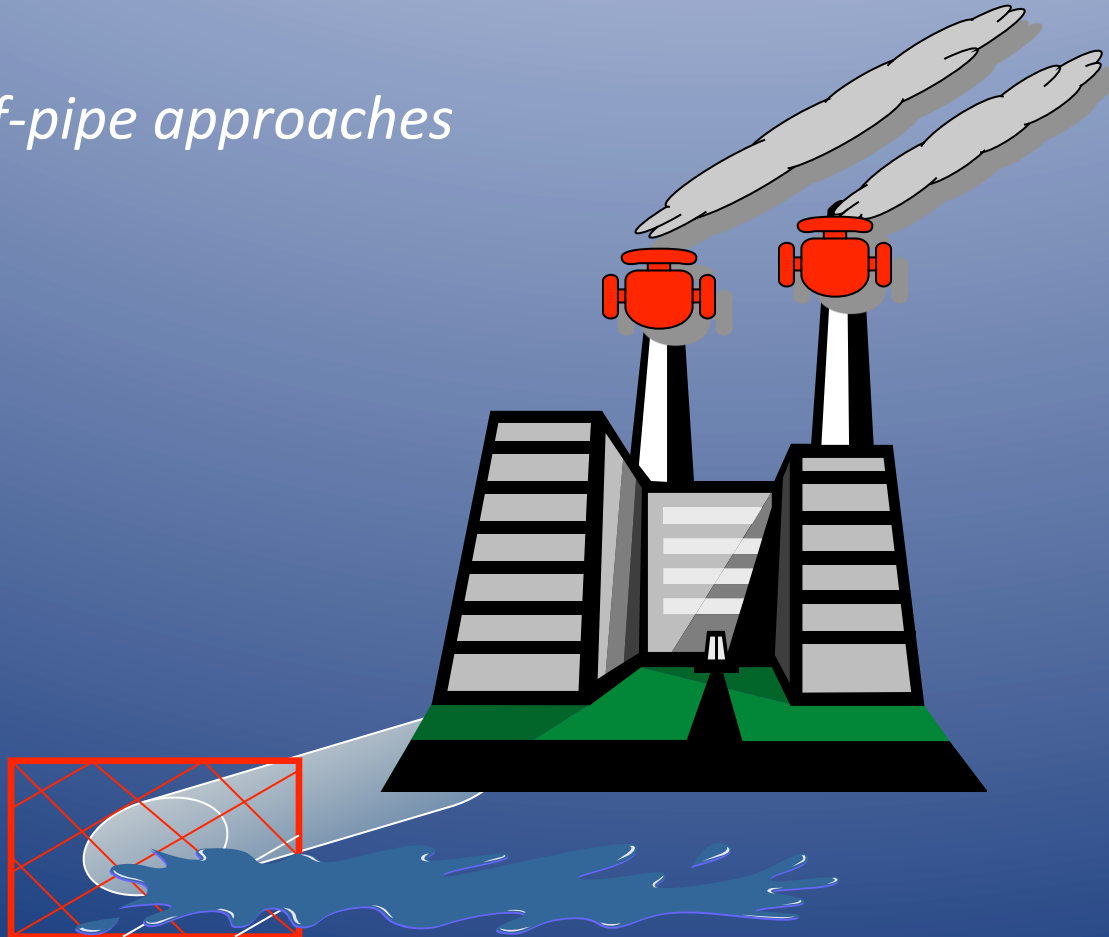
Passive environmental strategies

Dilute & disperse



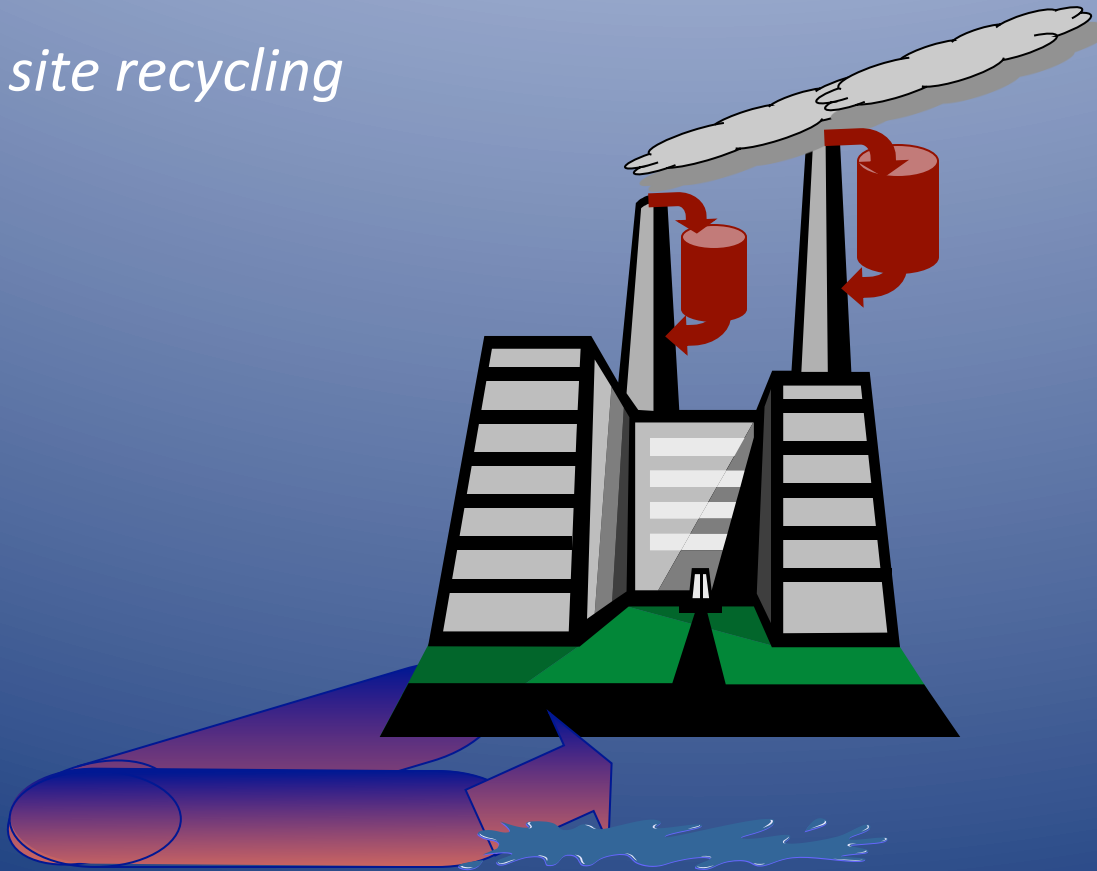
Reactive environmental strategies

End-of-pipe approaches



Reactive environmental strategies

On - site recycling



Proactive environmental strategies: Cleaner Production



Prevention of Waste generation:

- Good housekeeping
- Input substitution
- Better process control
- Equipment modification
- Technology change
- On-site recovery/reuse
- Production of a useful by-product
- Product modification

Cleaner Production Financing

The “Cost of Waste” Iceberg



Cleaner Production Definition

“The **continuous** application of an **integrated preventive environmental strategy** applied to **processes, products, and services** to increase overall efficiency and **reduce risks to humans and the environment.**”

(United Nations Environment Programme)

SCP in relation to

- (S) CP = Eco-efficiency
- Energy efficiency is integral part of SCP, thereby also addressing climate change
- SCP contribute considerable to the implementation of Multilateral Environmental Agreements



CP versus End-of-Pipe approach

Cleaner Production

Continuous improvement

Progress towards use of closed loop or continuous cycle processes

Everyone in the community has a role to play; partnerships are essential

Active anticipation and avoidance of pollution and waste

Elimination of environmental problems at their source

Involves new practices, attitudes and management techniques and stimulates technical advances

Pollution Control and Waste Management

One-off solutions to individual problems

Processes result in waste materials for disposal a pipeline with resources in and wastes out

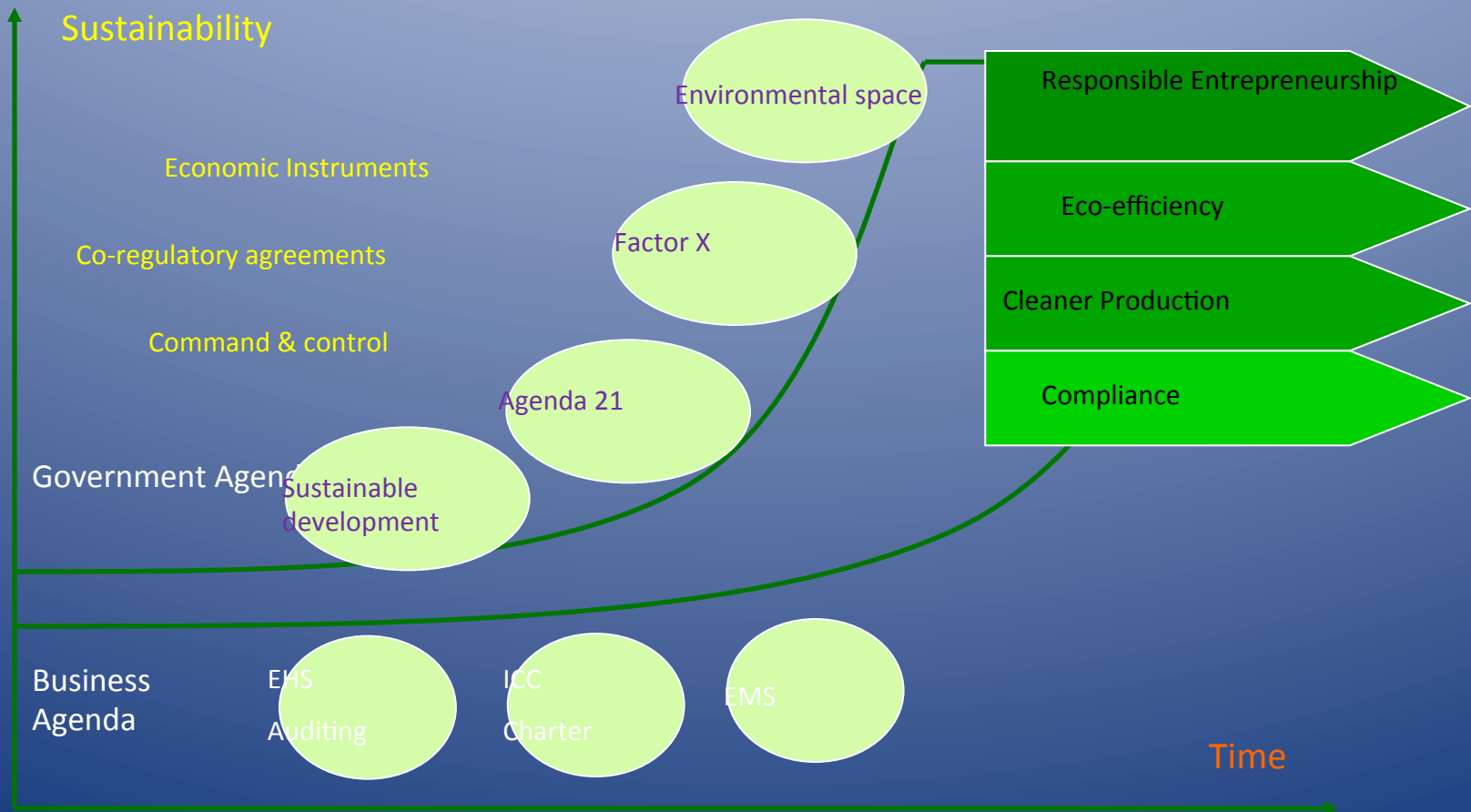
Solutions are developed by experts often in isolation

Reactive responses to pollution and waste after they are created

Pollutants are controlled by waste treatment equipment and methods

Relies mainly on technical improvements to existing technologies

Cleaner Production and Sustainable Development



!!!

CP is
a journey
not a
destination

**Few feasible CP options
to **REDUCE** energy
consumption leading to
less CO2 emission**

Option: Exemplary

Utilization of generator exhaust heat running waste heat recovery boiler or absorption chiller

Facts:

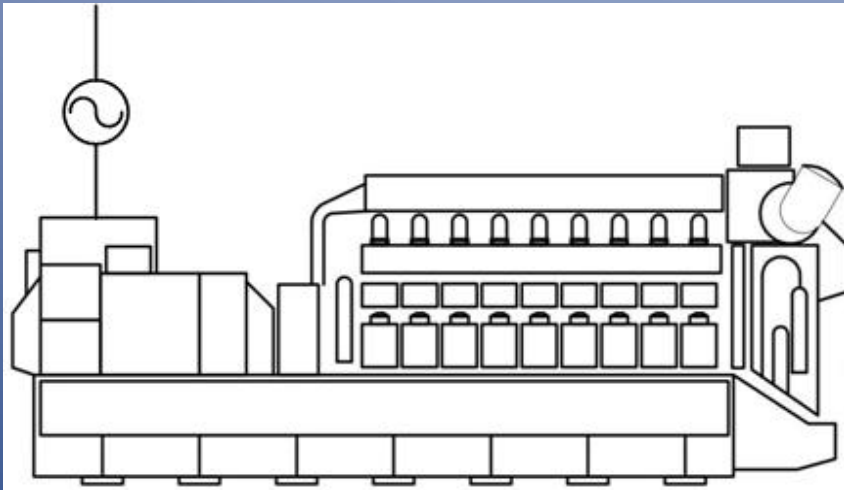
Successfully implemented in many industries and improved efficiency

Environmental impact:

Efficient usage of fuel confirming less CO2 emission

TRADITIONAL ELECTRIC POWER GENERATION

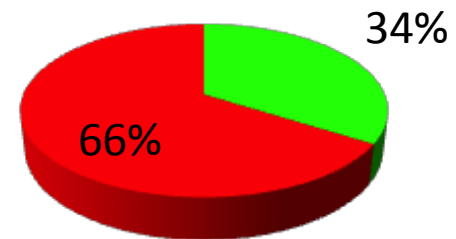
34% Electricity Output



1 MW GAS GENERATOR

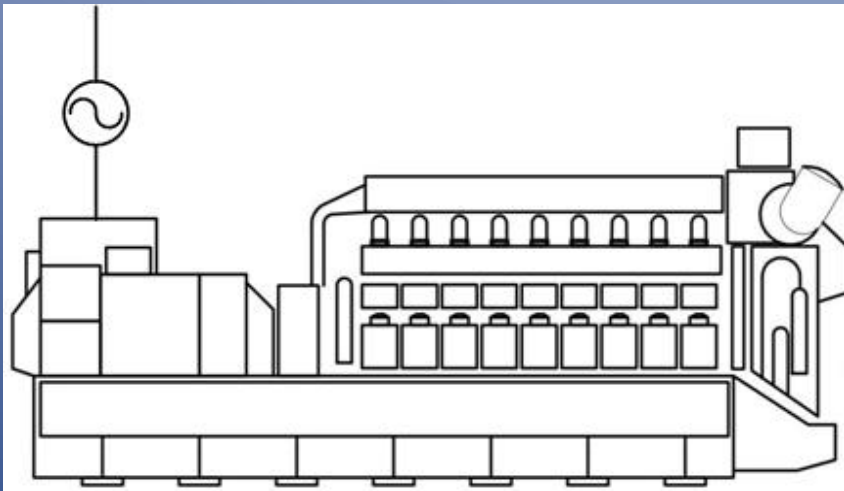
Energy BALANCE

- Output Electric Energy
- Energy Wastage

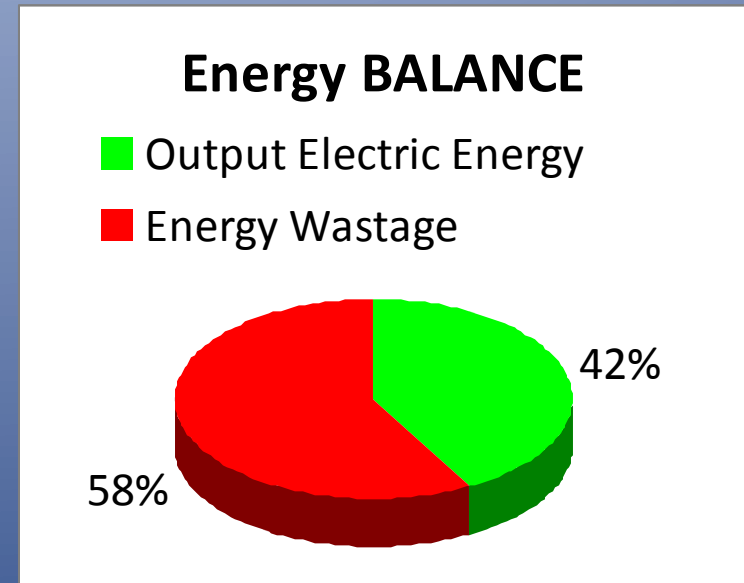


TRADITIONAL ELECTRIC POWER GENERATION WITH BIG PLANT EFFICIENCY GO UP

42% Electricity Output

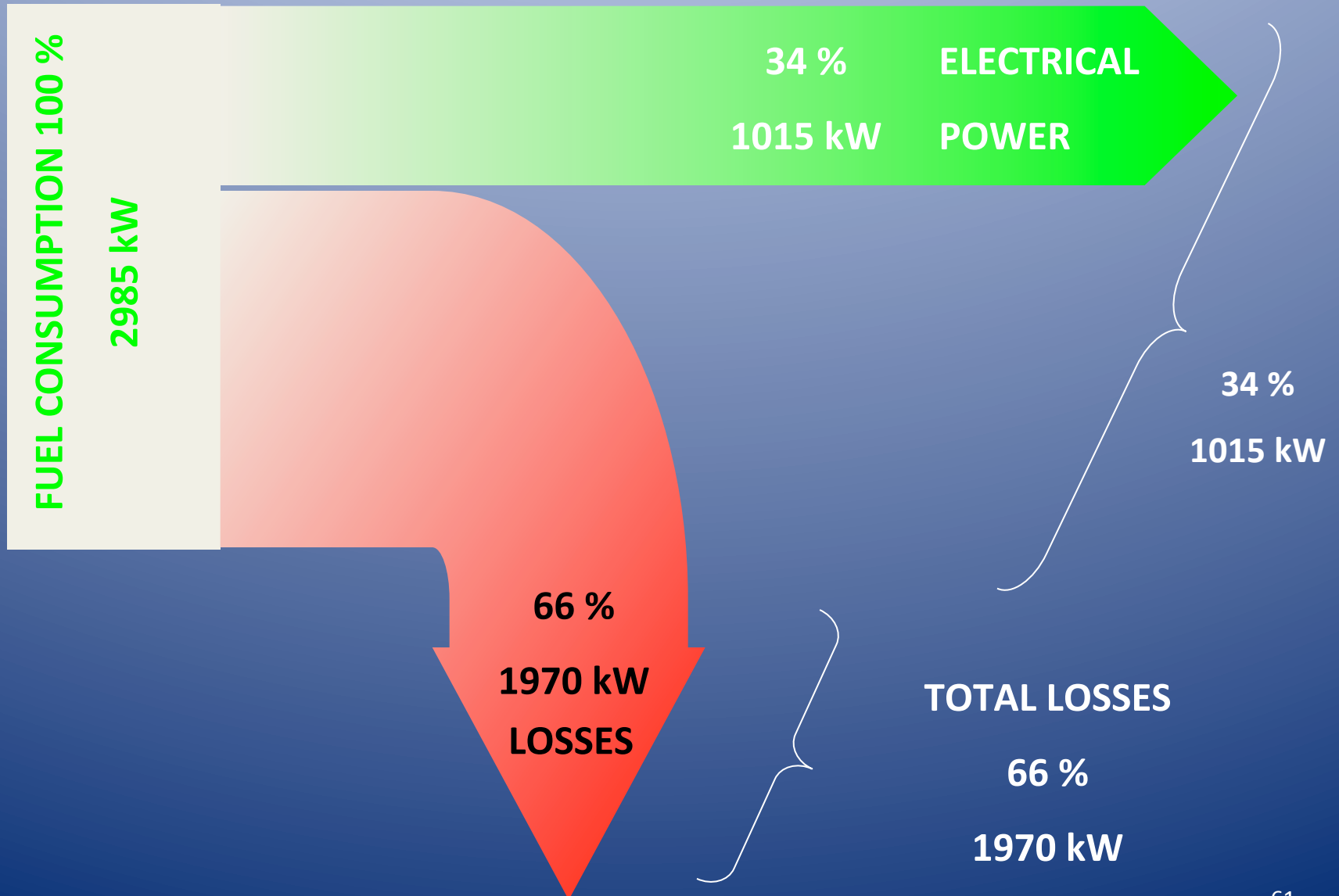


8.7 MW GAS GENERATOR



BUT 58% OF ENERGY IS PUT ON ATMOSPHERE

TRADITIONAL ELECTRIC POWER GENERATION



Summary of other Options

Option	General Fact	Potential Environmental Impact
Heat and water recovery from steam condensate	These options have been implemented, tested in many industries in Bangladesh including textiles, RMG etc.	In all these options energy/resource (gas, diesel, water etc) consumption will be reduced that will eventually lead to reduced CO2 emission to the nature
Recovery of heat from generator hot jacket water		
Heat recovery from hot water in water cooled air compressors		
Reduction of energy consumption using inverter control module		

Summary of other Options

Option	General Fact	Potential Environmental Impact
Optimization of Natural gas consumption efficiency through burner tuning for boilers	These options have been implemented, tested in many industries in Bangladesh including textiles, RMG etc.	In all these options energy/resource (gas, diesel, water etc) consumption will be reduced that leads to reduced CO2 emission to the nature
Reduction of power consumption in compressed air system through process optimization		
Optimization of Generator efficiency by analyzing load profiles and performance		

For CORRECT Application of ENERGY RECOVERY SYSTEMS AND CHP Need to KNOW

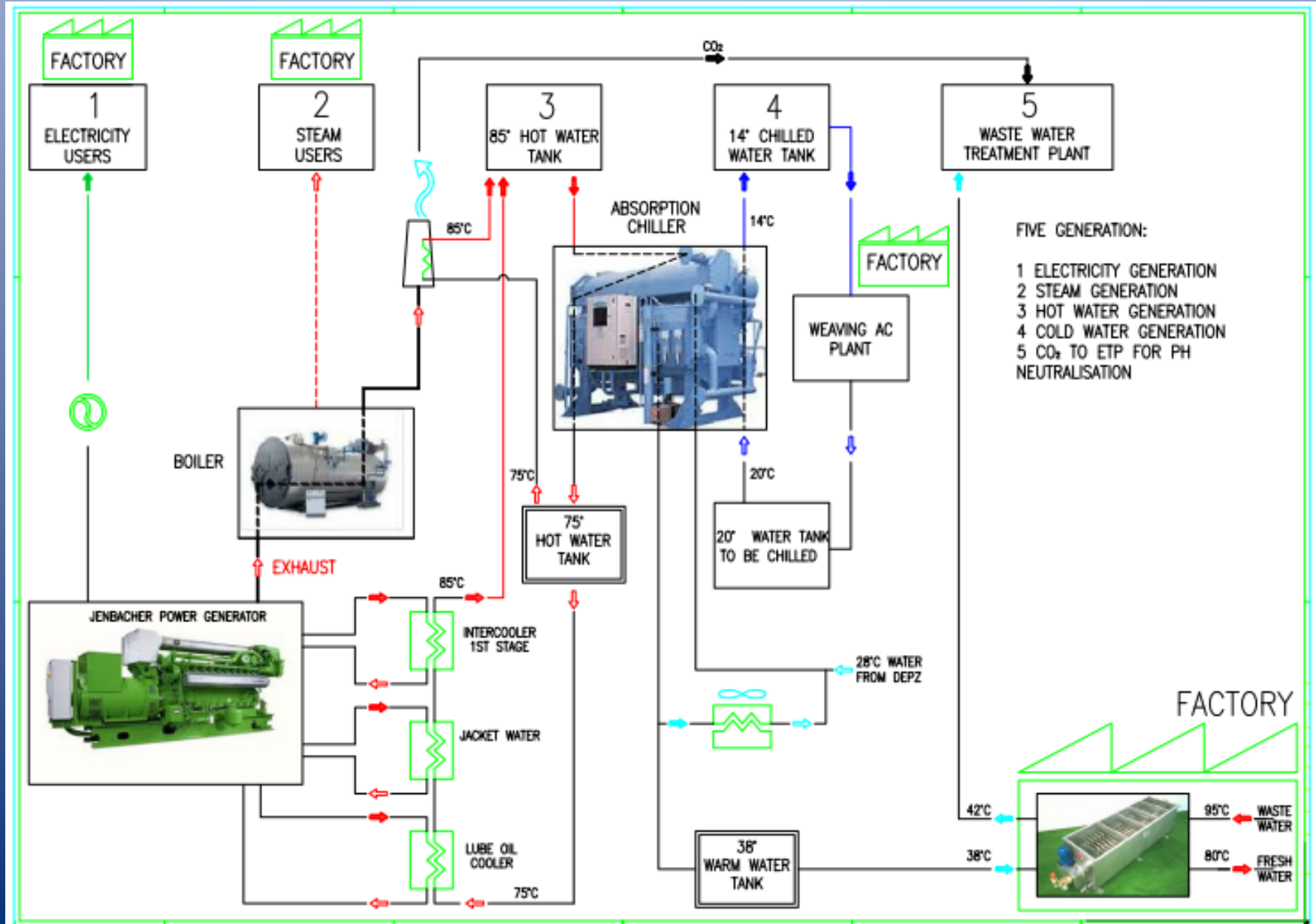
ENERGY CONSUMPTION

- » STEAM**
- » HOT WATER**
- » COLD WATER**
- » ELECTRIC ENERGY**

ENERGY TIME DISTRIBUTION

**An EXAMPLE OF
ENERGY RECOVERY SYSTEM
(CHP + Energy Recovery
System + CO₂ Usage)**

SCHEMATICS OF COMBINED ENERGY CONSERVATION



STATISTICAL TABLE ON CP BENEFITS FOR TEXTILE SECTOR in Bangladesh

RESOURCE	% OF REDUCTION	COMMENTS
Ground water	5-35	
Natural gas (NG)	5-20	
Steam	5-10	Relate to NG
Electricity	3-10	Relate to NG
CO2e emission	5-20	Across NG usage

Outcomes of Group Meeting 3

**Collaborative Pathways to Sustainable Resource
Management in Urban Bangladesh**

Green/Clean Technology to Limit Environmental Degradation

Cities: Growing economy – Spreading pollution



At the price of environment, the cities are expanding.

Urban Growth and Pollution:

- Major urban areas in Bangladesh are the seats of the forces of civilization.
- Developmental trends in the cities, especially large cities like Dhaka, emphasizing environmental modifications are rather non-ecological.
- Man-environment interface in Dhaka in the wake of misdirected urban development that seriously impairs ecology has become a matter of concern for the environmentalists, engineers, and urban planners.
- The rapidly growing urban population in Dhaka and its outskirts is causing 'gradual degradation of life-support systems including air, water and land'. Hence, enhancing environmental pollution posing 'problems to human health and threatening the general quality of life'
- It is unlikely that already built industries would be shifted to other areas, in a country like Bangladesh where its economy is largely dependent on many of these industries.
- So far we have failed in taking preventive measures. Now, should we fail, too, to take any curative measures?

Urban Growth and Pollution:

- Industries are the backbone of the economy in Bangladesh, and located in cities.
- But environmental pollution has surpassed the limit a long ago, for which industries are the major contributor.
- The regulatory bodies are trying to prevent pollution, by enforcing laws against industrial pollution.
- But stopping these industries from operation would hamper the livelihoods of millions of people.
- At the same time, huge population of cities making it more difficult for city authorities to limit the pollution level.

How the dilemma can be solved:

Regulatory bodies i.e. Department of Environment, Ministries etc should enforce the laws to stop further environmental pollution.

Industries and commercial institutions, who are major contributors to environmental pollution, should adopt technologies that are environment friendly:

- Low carbon emission
- Low water footprint
- Use of Renewable energy
- Recycle and reuse

But challenging parts are:

- Efficiency of technologies used
- Economic viability

What roles can experts play:

It needs a collaboration among all the parties (regulatory bodies – industries – academics – activists):

- Academics should work with industries to find the solution, technology-wise
- Carry out researches to develop an economic model for the technologies that interest both industries and the environment
- Awareness campaigning to raise voice against environmental pollution by regulatory bodies and environmentalists

A platform should be developed that would play the bridging role among all the parties, and can anchor the initiative towards its goals.

