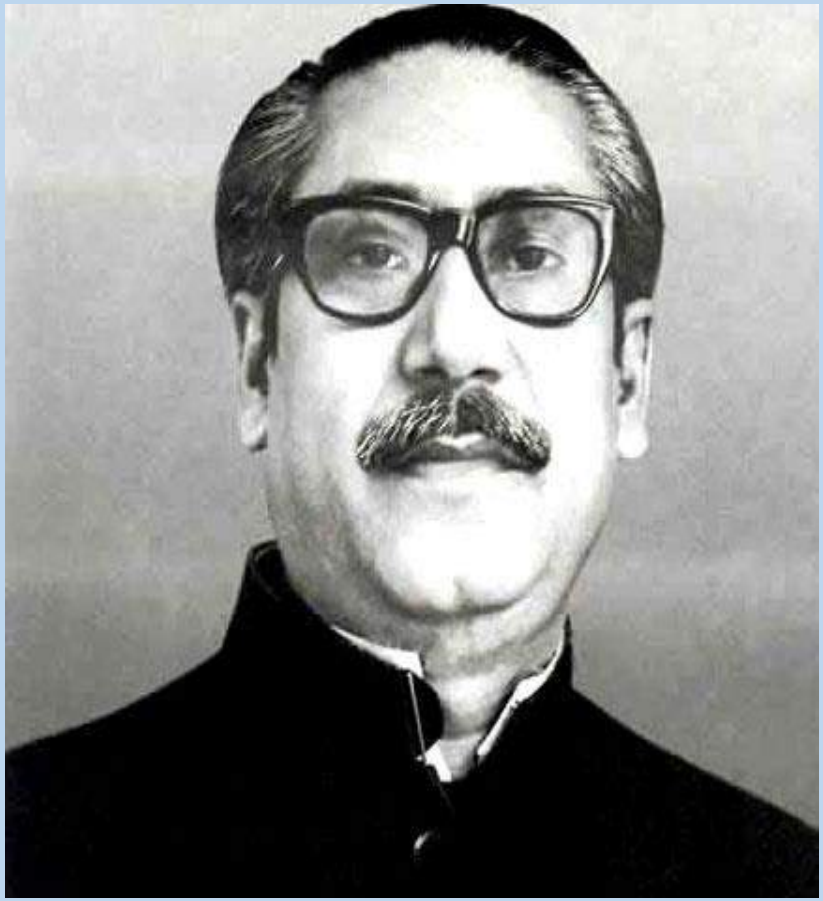
মুজিববর্ষ উপলক্ষ্যে প্রকাশিত

Seminar Compilation FY 2020-21

(HCU, October 2021)

HYDROCARBON UNIT
Energy and Mineral Resources Division



The Father of the Nation Bangabandhu Sheikh Mujibur Rahman
The Architect and Dreamer of our National Energy Security

HYDROCARBON UNIT
Energy and Mineral Resources Division

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Users are invited to suggest additions or improvements which would enhance the value of the Seminar Compilation FY 2020-21.

Preface

Seminar Compilation FY 2020-21 is being prepared and published by Hydrocarbon Unit (HCU) in November 2021. This compilation comprises of the 10 (Ten) vibrant Seminar on Hydrogen Fuel, Biofuel, SCADA, Fourth Industrial Revolution, Gas Leakage Detection & Digital Mapping, Digital Transformation Strategy, Energy Efficiency and Conservation, SDG 7, Human resources development in Energy and Power Sector those were arranged by HCU in the period of July 2020 to June 2021. These seminar topics were very concurrent and relevant. However, the knowledge sharing sessions, thoughts & idea, academic discussions, technical & non-technical consultations and recommendations from the participants should not be considered as the Government position though all of these are enclosed in this compilation. These findings can be examined to make viable for the policymaker.

It is also expected that this compilation will be an element of interest for the concerned technical and non-technical personnel for developing their expertise in their respective fields.

The report will also be available at HCU's website: www.hcu.org.bd.

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Acknowledgement

We are privileged to express our token of gratitude to several persons who helped directly or indirectly to accomplish this meticulous Seminar Compilation (FY 2020-21) of Hydrocarbon Unit comprises of the 10 (Ten) vibrant Seminar whose were very concurrent and respective stakeholder's participation was satisfactory.

We deliver our heart-full indebtness and owe a deep sense of thankfulness to the Hon'ble State Minister of MoPEMR and the Secretary of EMRD for managing time to have a glance and guide us to make it an effective publication for the professionals related to this industry. Sincere guidance and appreciation from Petrobangla and its companies, BPC and its companies, BPI, GSB, BMD, DoE have made this endeavor to reach at this stage. We cannot thank enough with this little gratitude note to all those people who time to time had substantial intervention for making this compilation a significant one. Please accept our apology in this regard.

We also thank Hydrocarbon Unit office staffs for their numerous contribution to the preparation of this meticulous task, especially, Mr. Md. Nazmul Haque, Assistant Director (Planning) and Mr. Debbrath Das, Assistant Director (Administration and Accounts).

We look forward to having the opportunity to enrich this compilation with all of your valuable comments and feedback over this edition.

Nasrul Hamid MP
Honorable State Minister
Ministry of Power, Energy and Mineral Resource
Government of the People's Republic of Bangladesh

Message from Honorable State Minister

I congratulate the initiative of publishing **"Seminar Compilation FY 2020-21"** by Hydrocarbon Unit.

Role of energy sector in socio-economic development, industrialization and poverty alleviation of a country is undoubtedly a substantial factor, which needs to be addressed with immense care. The present government of Bangladesh has been conducting energy security and diversification of energy sources with top most priority since taking power. In this context, Hydrocarbon Unit being the think tank of EMRD successfully arranged 10 (Ten) vibrant seminars whose were very concurrent and respective stakeholders' active participation were highly appreciable. I hope these vibrant seminars will incite the respective manpower which will lead to skilled manpower as well as technology transfer in future.

I wish every success of these initiatives.

Joy Bangla, Joy Bangabandhu.
Long live Bangladesh.

(Nasrul Hamid MP)

Md. Anisur Rahman
Senior Secretary
Energy & Mineral Resources Division
Government of the People's Republic of Bangladesh

A Welcome Message from the Senior Secretary

I take the opportunity in appreciating Hydrocarbon Unit for the publication of "**Seminar Compilation FY 2020-21**". Hydrocarbon Unit (HCU) being the technical arm as well as the think tank of Energy and Mineral Resources Division (EMRD) tends to assist it in achieving energy security by providing updated data and analysis of primary and alternative energy and mineral resources. In this context, HCU arranged 10 (Ten) energetic seminars in FY 2020-21 on concurrent topic addressing challenges and way forward in energy sector.

I appreciate Hydrocarbon Unit for this type publication and also looking forward to conduct more workshop/seminar in the context of energy security and technology transfer to adapt 4th IR and to achieve SDG.

(Md. Anisur Rahman)

Dr. Md. Rafiqul Islam
Director General (Additional Charge)
Hydrocarbon Unit
Energy & Mineral Resources Division
Government of the People's Republic of Bangladesh

Message from the Director General

It is an honor to announce that Hydrocarbon Unit (The Think Tank of EMRD) has published "**Seminar Compilation FY 2020-21**" aimed at ongoing knowledge construction and sharing current technical ideas and views with the respective stakeholders .

We have strived to make this Compilation a high-quality publication. We have tried to make our all seminars vibrant, relevant, addressing concurrent issues, thought provoking and inclusive of a diverse range of voices and perspectives from respective all stakeholders. I hope all the participants specially respective stakeholders of Energy and Power sector in these seminars will thrive with a new inspiration to deliver a better service at their own for the betterment of our nation.

Contributions from any corner and critical commentaries has been duly noted and incorporated for the betterment of this publication. Hydrocarbon Unit will look forward to continuing and updating this Compilation on an annual basis.

(Dr. Md. Rafiqul Islam)

Executive Summary

Primery Energy in Banlgdesh is aproaching towards import dependance day by day. But to ensure energy security and inclusive development we have to adopt right decision on fuel mix. Being technical arm of Energy and Mineral Resources Division, Hydrocarbon Unit (HCU) is concerned about future energy security, primary energy trends, energy mix and sustainable development in the energy & power sector. In our country, entire total gas transmission and distribution pipeline, metering stations should be under proper online monitoring system (e.g. SCADA) for developing transparency, reducing corruption and efficient operation. Development of LNG grid pipeline for receiving full capacity from FSRU is becoming an important issue. Investment of private entities (local) in national grid pipeline may be considered with the corresponding stakeholders. Incentives for voluntary Energy Efficiency & Conservation action plan for industries [e.g., tax incentives and low interest loans for industrial energy efficiency measures] should be considered. Promoting combined heat and power (CHP, also known as cogeneration) through tax. Energy efficiency standards and labelling for passenger vehicles [through tax incentives and low interest loans for EV etc.] On the contrary, according to Paris Agreement, rising of World's temperature should not exceed 2 degree within the following century. To reduce carbon emission, clean & modern energy should play an important role for healthy environment but it needs to be affordable at price. Hydrogen fuel is an alternate and sustainable options addressing renewable energy to reduce carbon emission & Green House Gas (GHG). Harvesting microalgae from our ample marine sector (Sea, River and Canal) is a new prospect for Bangladesh ensuring blue economy. Research work on renewable energy should be industrialized (tagged with Govt. or private entities) for a sustainable energy solution. Identifying cyber risks and vulnerabilities need to be addressed properly in energy and power sector. Continuous assessment and development on the existing networking system is required to ensure effective and efficient operation in the energy and power industry. To ensure technology transfer every stakeholders should work together with proper coordination. Policy maker, Industry and academia should be cooperated and collaborated to develop a sustainable Energy Pricing and subsidies for the nation's inclusive development.

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Dated: 29.09.2020

Seminar 1: Hydrogen the Future Fuel

Seminar Key Personnel at a Glance

Chief Guest	**Mr. Md Anisur Rahman** Senior Secretary Energy and Mineral Resources Division (EMRD)
Host	**A S M Manzurul Quader** Director General (Joint Secretary) Hydrocarbon Unit
key-Note Speaker	**Dr. Md Aman Uddin** Assistant Professor Dept. of Mechanical Engineering, BUET
Panel Discussant	**Dr. Kazi Bayzid Kabir** Associate Professor Dept. of Chemical Engineering, BUET
	Dr. Mohammed Mahbubur Rahman Associate Professor and Head Dept. of PMRE, BUET
	Mr. Mollah Amzad Hossain Editor Energy & Power

Abstract of the Seminar

What is Hydrogen?

Hydrogen is the simplest and most abundant element on earth—it consists of only one proton and one electron. Hydrogen can store and deliver usable energy, but it does not typically exist by itself in nature and must be produced from compounds that contain it.

Application of Hydrogen as a Fuel:

Hydrogen is a clean fuel that, when consumed in a fuel cell, produces only water, electricity, and heat. Hydrogen and fuel cells can play an important role in our national energy strategy, with the potential for use in a broad range of applications, across virtually all sectors—transportation, commercial, industrial, residential, and portable.

Hydrogen and fuel cells can provide energy for use in diverse applications, including distributed or combined-heat-and-power; backup power; systems for storing and enabling renewable energy; portable power; auxiliary power for trucks, aircraft, rail, and ships; specialty vehicles such as forklifts; and passenger and freight vehicles including cars, trucks, and buses.

List of Advantages of Hydrogen Fuel Cells:

- ✓ It is readily available
- ✓ It does not produce harmful emissions
- ✓ It is environmentally friendly
- ✓ It can be used as fuel in rockets
- ✓ It is fuel-efficient
- ✓ It is renewable

List of Disadvantages of Hydrogen Fuel Cells:

- ✓ It is expensive
- ✓ It is difficult to store
- ✓ It is not easy to replace existing infrastructure
- ✓ It is highly flammable
- ✓ It is dependent on fossil fuels

PowerPoint Presentation from the Key Note Speaker

Hydrogen: The Future Fuel

Md Aman Uddin, PhD

Assistant Professor
Department of Mechanical Engineering
Bangladesh University of Engineering and Technology (BUET)

Outline

- Background
- Global Perspective
- Bangladesh Perspective
- Conclusion

Global Initiative

Hydrogen Council

A global CEO-led initiative of 92 companies to develop the hydrogen economy

European Clean Hydrogen Alliance

- **Established**: March 2020
- **Participants**: industry, national and local public authorities, civil society and other stakeholders.
- **Functions**:
  - ✓ Help to build up a robust pipeline of investments
  - ✓ Establish an investment agenda and support the scaling up of the hydrogen value chain across Europe.
  - ✓ An industry blueprint estimates investments of €430 billion until 2030.

European Investment

- A hydrogen strategy for a climate-neutral Europe
- Cumulative investments in renewable hydrogen in Europe could be up to EUR 180-470 billion by 2050, and in the range of €3-18 billion for low-carbon fossil-based hydrogen.

European Commission - Press release

European Green Deal Call: €1 billion investment to boost the green and digital transition

Brussels, 17 September 2020

US Investment

Office of
ENERGY EFFICIENCY & RENEWABLE ENERGY

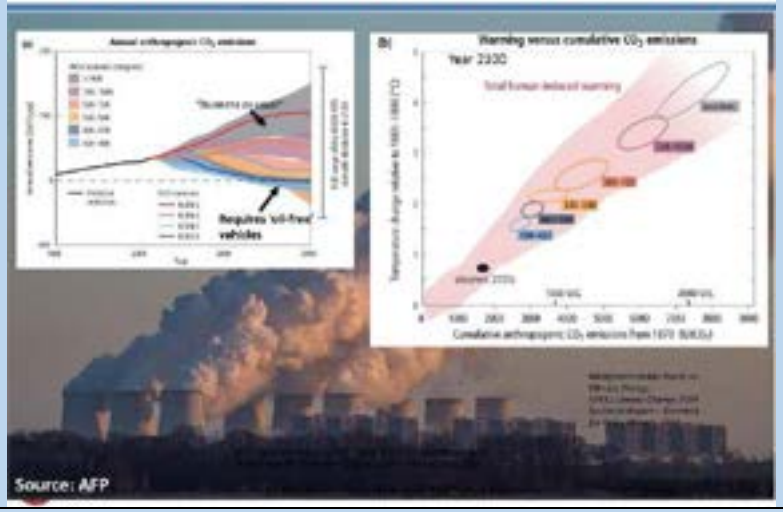
Office of Energy Efficiency & Renewable Energy

Energy Department Announces Up to $64M to Advance H2@Scale in New Markets

JANUARY 23, 2020

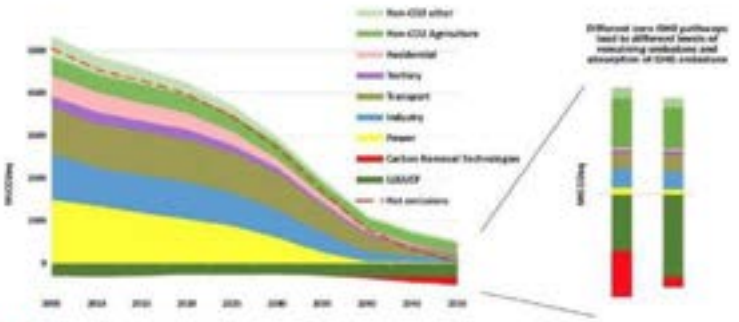
500 crore Taka this year

Carbon Emissions and Climate Change



A Climate-neutral Europe

- EU GHG emission towards an 80% domestic reduction (100% = 1990) in line with Paris Agreement 1.5°C ambition.
- Possible policy push to speed-up decarbonization of the power sector.



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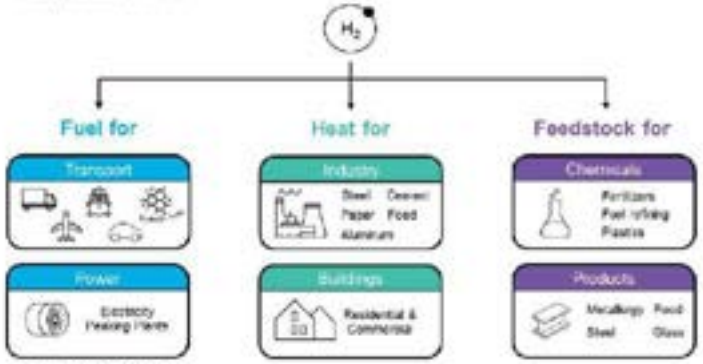
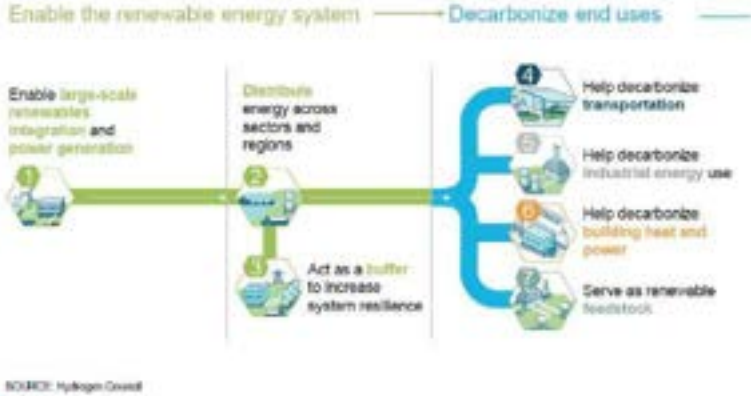
Uses of Hydrogen

- Hydrogen production: natural gas, coal, water, electricity, and high-temperature heat.



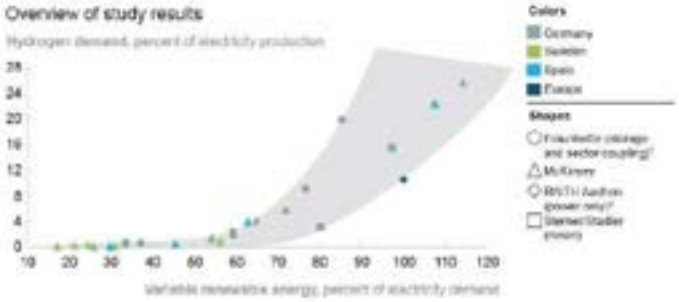
Source: BloombergNEF

Hydrogen's Roles in the Energy Transition

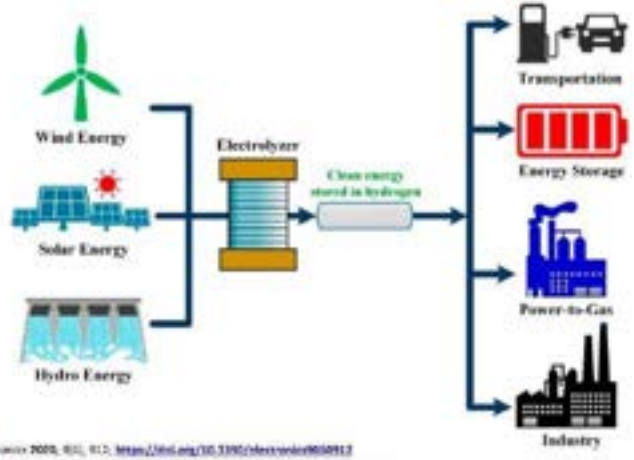


Need for Energy Storage

- Some 20% of variable electricity has to be converted to hydrogen to guarantee a secure energy supply every time of the day and year.



H2 in Renewable Energy Integration



Transportation Sector

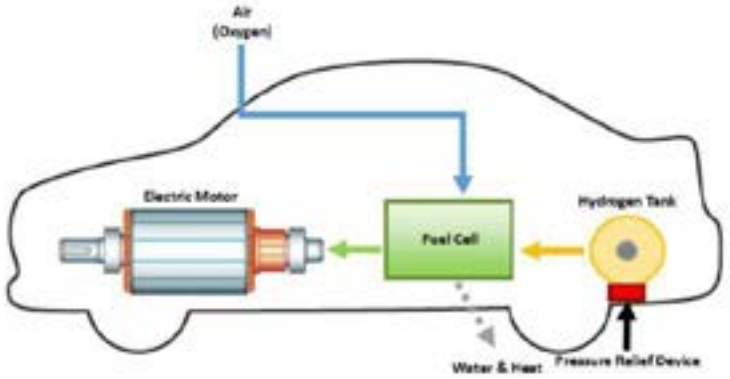
- The two-degree scenario requires reducing emissions by 40% until 2050
- Hydrogen is a key technology in a decarbonized transport system

Share of U.S. GHG Emissions by End-Use Sector

More than 80 million zero-emission vehicles will need to be on the roads by 2030 – just 12 years from today

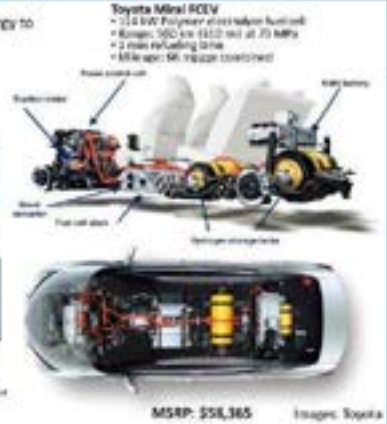
- Transportation contributes to a third of US greenhouse gas emissions

H_2 Fuel Cell Vehicles



H_2 Fuel Cell EVs (FCEVs)

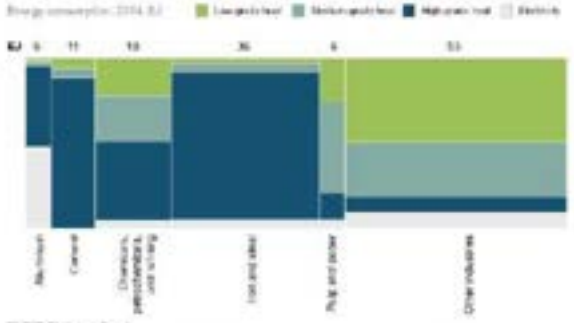
- Efficient (60-70%) direct conversion of chemical energy to electricity (**no Carnot limit**)
- Energy storage (**range**) decoupled from power (**acceleration**)
- Long range and larger vehicles
- Rapid refueling (~5 min)



Industry Energy

- A third of final energy consumption and a quarter of CO2 emissions.
- The two-degree scenario calls for CO2 emission reductions of 30% in this sector: 2.5 Gt less compared to today's levels

Hydrogen is the main option for decarbonization of industrial processes requiring high heat and/or combustion



Building Heat and Power

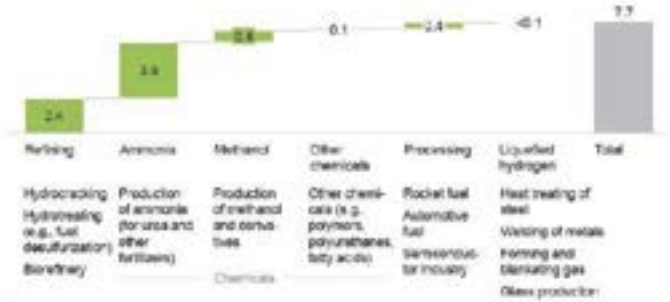
- Hydrogen can be used to decarbonize the natural gas grid in three ways: it can be blended with natural gas, methanized, or used in its pure form.

The "H21 Leeds City Gate" project in the UK is planning to progressively convert all households to 100% hydrogen before 2030

Source: Hydrogen scaling up, Hydrogen Council, 2017

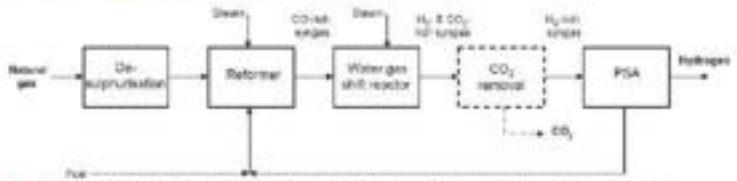
Industry Feedstock

- This year, industry will use about 55 million tons of hydrogen as feedstock – enough to power more than 100 million FCEVs
- Creates some 350 to 400 Mt of CO2 per year



Hydrogen Production

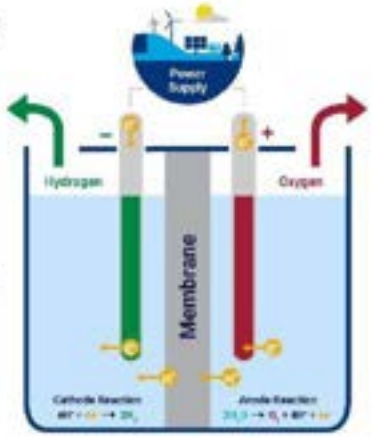
- Almost all of the current hydrogen is produced from hydrocarbons such as natural gas and coal.
- Responsible for the emission of around 830 Mt of CO_2 per year, equivalent to the combined CO_2 emissions of the United Kingdom and France.
- **Coal Gasification**
- **Reforming of Natural Gas**



Michael Sulzl, Martin Wietschel, The Hydrogen Economy: Opportunities and Challenges, Cambridge University Press, 2009

Green Hydrogen by Water Electrolysis

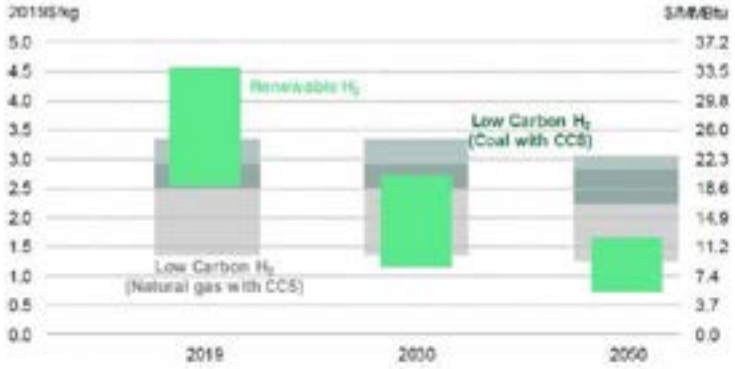
- Renewable energy sources: solar **photovoltaic** and **wind** energy
- Migrating all current hydrogen production would represent an **electricity demand** of 3600 TWh, more than the annual electricity generation of the entire European Union.



https://alcasoft.com/green-hydrog

Green Hydrogen Production Cost

- Forecast global range of levelized cost of hydrogen production from large projects



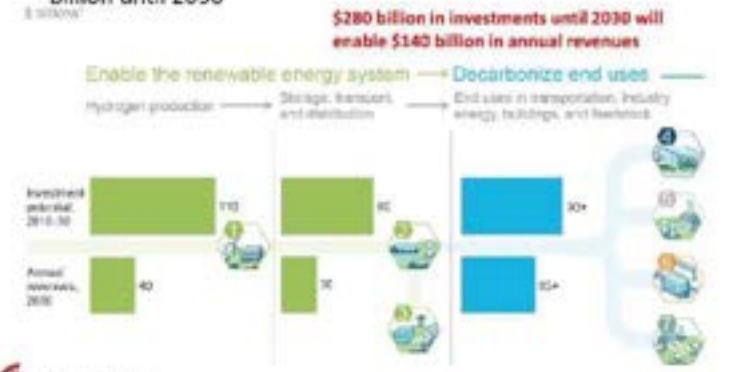
Source: BloombergNEF. Note renewable hydrogen costs based on large projects with optimistic projections for capex. Natural gas prices range from $1.1-10.3/MMBtu, coal from $30-116/t.

Hydrogen Ecosystem in Europe: A Roadmap to 2050

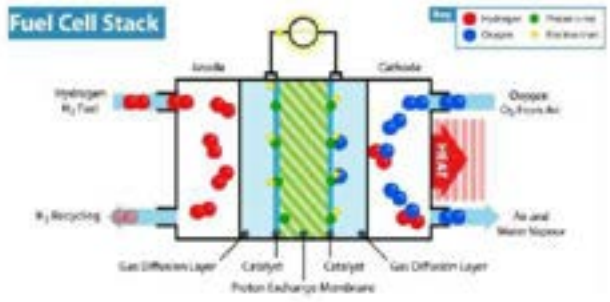
- **Short term**: from 2020 up to 2024
  - ✓ to decarbonize existing hydrogen production
  - ✓ Install at least 6 GW of renewable hydrogen electrolyzers in the EU
  - ✓ production of up to **1 million tonnes of renewable hydrogen**
- **Medium term**: from 2025 to 2030
  - ✓ hydrogen needs to become an intrinsic part of an integrated energy system
  - ✓ Install at least 40 GW of renewable hydrogen electrolyzers by 2030
  - ✓ production of up to **10 million tonnes of renewable hydrogen** in the EU.
- **Long term**: from 2030 onwards and towards 2050
  - ✓ renewable hydrogen technologies should **reach maturity** and be deployed at a large scale to reach all hard-to-decarbonize sectors where other alternatives might not be feasible or have higher costs.

What needs to be done

- Building the hydrogen economy would require annual investments of about $20 to 25 billion for a total of about $280 billion until 2030



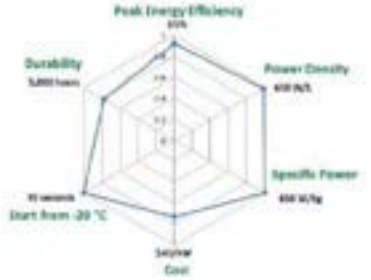
Electricity Production by Hydrogen

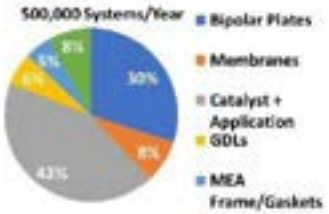


https://aleasoft.com/green-hydrogen-fuel-future/

Fuel Cell Commercialization Targets

- Cost Target
  - $40/kW system
  - $14/kW$_{net}$MEA
  - 43% of cost due to PGM catalyst





The Hydrogen in the Transport Sector

- The hydrogen fuel cell electric cars (FCEV) would reduce local air pollution because, like battery electric cars (BEV), they have zero emissions of polluting gases.

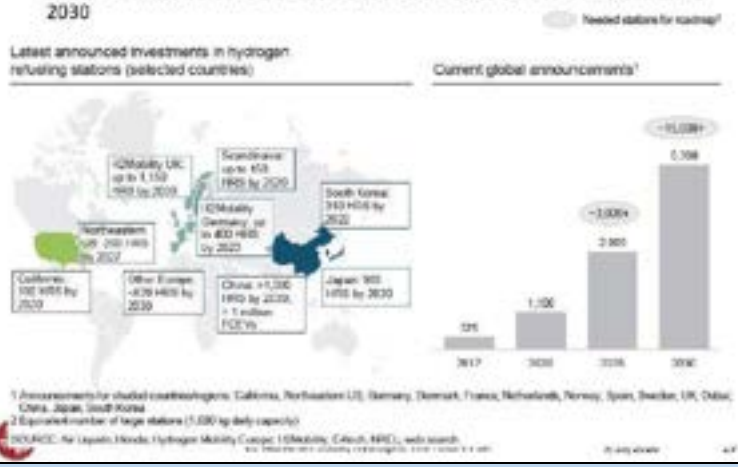
First hydrogen stack vehicle registered in Spain. Hyundai Nexo.

The Hydrogen in the Transport Sector

Hydrogen fuel cell bus in London.

Hydrogen Refueling Station

- Major countries plan to build more than 5,000 hydrogen refueling station by 2030



Bangladesh Perspectives

- **Climate Impact**: Bangladesh is extremely vulnerable to the impacts of climate change
- **Renewable Energy Policy of Bangladesh**:
  - ✓ GoB has a plan to install a total capacity of 3,864 MW of renewable energy power generation by 2041
- **Research**: Hydrogen Energy Laboratory by BCSIR

Conclusion

The green hydrogen is the fuel of the

Hydrogen Vision for 2050

> *Potential Impacts from Hydrogen Council Roadmap Study, By 2050:*
> - *$2.3 trillion in global revenues*
> - *30 million jobs*
> - *400 million cars, 15-20 million trucks*
> - *18% of total global energy demand*

SOURCE: Hydrogen Council; IEA ETP Hydrogen and Fuel Cells; IEO; National Energy Outlook 2019;

Recommendations of the participants at the seminar "Hydrogen the Future Fuel":

- ✓ Industrialization & modernization in the last few decades encountering incremental carbon emission by burning fossil fuel resulting temperature rise of our environment. According to Paris Agreement, World's temperature rise should not exceed 2 degrees within the following century. To reduce carbon emission, clean & modern energy should play an important role for healthy environment but it needs to be affordable at price.

- ✓ Hydrogen fuel is an alternate and sustainable options addressing renewable energy to reduce carbon emission & Green House Gas (GHG).

- ✓ FCEV's (Fuel Cell Electric Vehicles) is applicable for heavy-duty vehicle with longer mileage & transportation. Battery Electric vehicle is the efficient shorter distance transportation system. So both are not competitive for each other's.

- ✓ Fertilizer industry & textile industry currently uses SMR (Steam Methane Reforming) technology for generating hydrogen but creates CO_2 which is not clean for the environment. Therefore, Hydrogen fuel technology is an important prospect in the following days.

- ✓ Currently $3.5-5.00/GGE (gasoline gallon equivalent) is the costing of hydrogen production where $2.27 for natural gas.

- ✓ More research should be run on this Hydrogen technology collaborating with BCSIR, BEPRC, public & private universities and researchers.

Some Notable Moments of the Virtual Seminar

Dated: 20.10.2020

Seminar 2: SCADA System in Gas Sector

Seminar Key Personnel at a Glance

Chief Guest	**Mr. Md Anisur Rahman** Senior Secretary Energy and Mineral Resources Division (EMRD)
Host	**A S M Manzurul Quader** Director General (Joint Secretary) Hydrocarbon Unit
key-Note Speaker	**Engr. Md. Atiquzzaman** Managing Director GTCL
Panel Discussant	**Mr. Arun Karmaker** President Energy Reporter's forum Bangladesh.
	Engr. Md. Kamruzzaman Director (Operation & Mines) Petrobangla

Abstract of the Seminar

What is SCADA?

SCADA is an acronym of **Supervisory Control and Data Acquisition**, a computer system for gathering and analyzing real time data. SCADA systems are used to monitor and control a plant or equipment in industries such as telecommunications, water, power grid, oil and gas transmission pipelines.

Use of SCADA system in different sectors in Bangladesh. Chevron Bangladesh is monitoring Bibiyana, Jalalabad and Maulavibazar gas fields by SCADA. WASA uses SCADA system for monitoring its water distribution network. PGCB uses SCADA in its National Load dispatch Centre and GTCL uses SCADA to monitor gas transmission networks.

Basics of SCADA System

SCADA system consists of following main components:

- Sensors
- Remote Terminal Unit(RTU)
- Telecommunication network
- SCADA Software

Benefit of SCADA

- SCADA system enable us to monitor and control the operation in real time. In gas transmission networks total supply of gas fields to the gas grid and total delivery of gas to the end user can be monitored in real time.
- Gas Flow, delivery Pressure and Temperature parameter of gas of a particular field or metering station can be viewed online.
- Remote control of flow control valve, emergency shutdown of a valve or a particular network can be performed by SCADA system.
- Automatic Generation of hourly and daily production and consumption report of a gas network.
- SCADA system eliminates the need for site visits by the personnel for data collection and inspection.
- SCADA system helps gas network load balancing.
- Real time information provides operational flexibility that can be used to meet market demands thus increasing income of a company.

PowerPoint Presentation from the Key Note Speaker

SCADA SYSTEM IN GAS SECTOR

Md. Atiquzzaman
MD, GTCL

October 20, 2020

MISSION & VISION

Vision

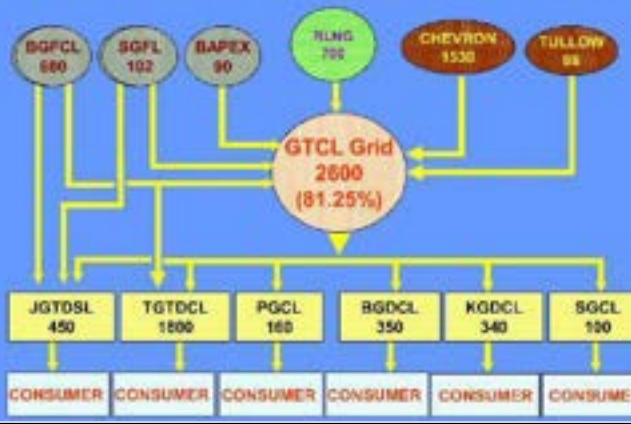
To gradually create the national gas grid for the uninterrupted transportation of natural gas in a safe, reliable and economical way to the demand centres for ultimate distribution of the same by the marketing companies.

VISION = SOME DAY

GTCL Highlights

- GTCL is the only National Transmission Company of Bangladesh established in 1994 as a company of Petrobangla and fully owned by GoB.
- Total production of gas is about 3200 mmscfd out of which 2600 mmscfd is produced from Local gas fields and 600 mmscfd is imported LNG. Out of which 2650 mmscfd gas on an average is transported through GTCL Pipeline Systems to all the Six Gas Marketing Companies (JGTDSL, TGDTDCL, BGDCL, KGDCL, PGCL, SGCL) under Petrobangla.
- GTCL is presently operating about 1950 km high pressure gas transmission pipeline.
- Contribution to National Exchequer (2019-2020):
- Net Profit Before Tax (2019-2020):
- Net Profit After Tax (2019-2020):

GAS FLOW CHAIN (Schematic, Volumes in MMSCFD)



What is SCADA?

➢ SCADA is an acronym of Supervisory Control and Data Acquisition, a computer system for gathering and analyzing real time data. **SCADA** systems are used to monitor and control a plant or equipment in industries such as telecommunications, water, power grid, oil and gas transmission pipelines.

➢Use of SCADA system in different sectors in Bangladesh. Cheveron Bangladesh is monitoring Bibiyana, Jalalabad and Moulovibazar gas fields by SCADA. WASA uses SCADA system for monitoring its water distribution network. PGCB uses SCADA in its National Load dispatch Centre and GTCL uses SCADA to monitor gas transmission networks.

Objective of GTCL SCADA System

The main objective of SCADA system is to optimize & Monitor gas production and supply of gas to the distribution companies and to reduce the problem of regional load imbalance to ensure efficient and effective gas distribution to the whole country.

Basics of SCADA System

SCADA system consists of following main components:

- Sensors
- Remote Terminal Unit(RTU)
- Telecommunication network
- SCADA Software

➢ Sensors: In gas infrastructure sensors means Pressure transmitter, Differential Pressure transmitter and Temperature transmitters. Numbers of transmitters are determined by the number of streams(RUN) the station possesses. Transmitter produces 4-20 ma signal to the RTU. Transmitters of ABB and Yokogawa are used in GTCL SCADA.

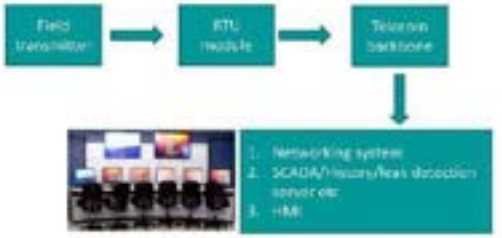
Remote Terminal Units (RTU)

➢ Remote terminal units (RTUs): These are small computerized units deployed in the field at specific sites and locations. RTUs serve as local collection points for gathering process data from sensors and deliver commands to control relays. RTUs used in GTCL SCADA are SCADApack of Schneider and STARDOM of Yokogawa.

Telecommunication

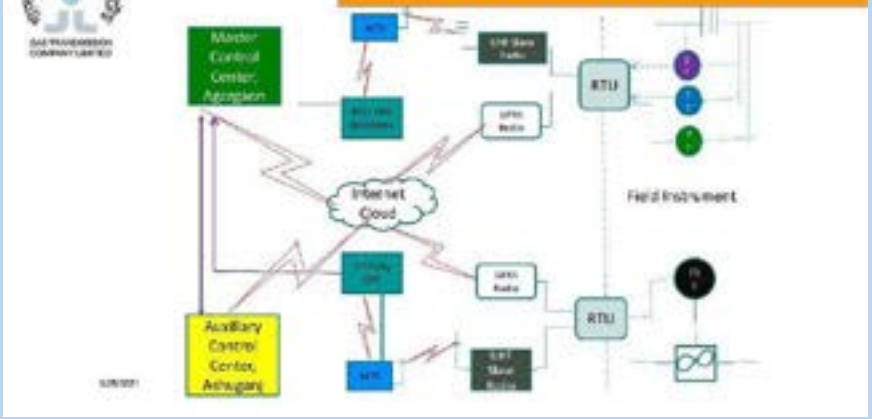
- Communication networks: The communication networks connect the SCADA master unit to the RTUs in the field for collecting real time data.
- Telecommunication is vital for SCADA system. A Communication network can be established along the gas transmission pipelines by installing microwave towers and necessary radio equipment for data communication.
- As 3G mobile network becomes available GPRS(General Package for Radio Service) modem is used in SCADA system. SCADA software collects process data from RTU with help of GPRS modem. GTCL SCADA Rehabilitation project uses GPRS and third party optical fibre network as backup channels.
- SCADA software is a computer program like WinCC OA for Siemens, Fast/Tools for Yokogawa.

Main Component Segment of GTCL SCADA System



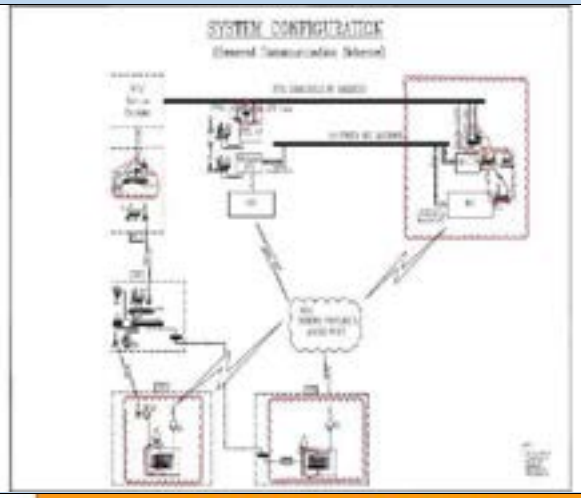
CONTROL CENTER, DHAKA

SCADA Architecture

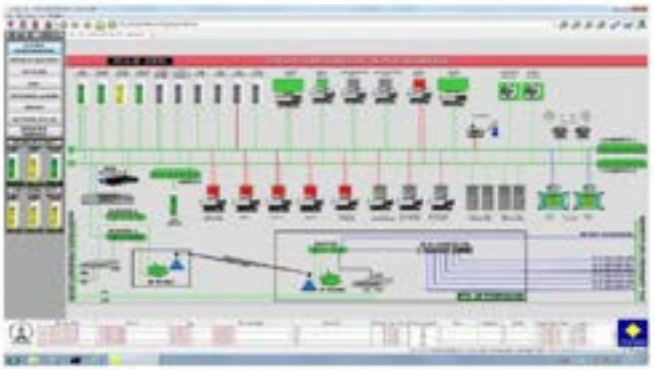


Connectivity Scheme for GTCL

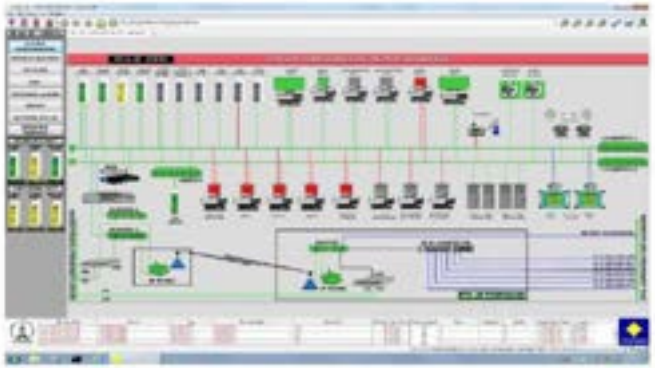
FINAL CONNECTIVITY SCHEME (BACKBONE) FOR GTCL PROJECT:



SCADA Architecture



SCADA Architecture



Equipment of GTCL SCADA System

- 02 (two) SCADA Servers, History Server, 04 (four) HMI Work station, 02 No Large Screen Monitor, SCADA Software, Communication Equipment at MCC & ACC for displaying Gas Pipeline Parameter like Flow, Pressure, Temperature, Valve Open /Close Status, electrical Parameter etc.
- Router, Switch, IP Radio & establish communication link from MTS to MCC & ACC.
- Field Instrument such as Pressure Transmitter, Differential Pressure Transmitter, Temperature Transmitter, Flow computer at RTU sites for collecting gas parameters from the field.
- UHF Radio & GPRS Modem at RTU to establish communication link from RTU to MCC & ACC.
- Video Conferencing System.

Project Cost

Project Cost as per RDPP :
Total : 17698.51 Lakh Taka
PA : 12642.74 Lakh Taka
GOB : 5055.77 Lakh Taka
Actual cost:
Total : 14567.78 Lakh Taka
PA : 11054.25 Lakh Taka
GOB : 3519.19 Lakh Taka

Funding Agency : JICA
Loan No : BD- P71
Implementation Period : January 2013 to Dec 2018

Pipelines under Eastern Zone SCADA System

1. N-S Pipeline (175Km)
2. Ashuganj-Bakhrabad (58Km)
3. Bakhrabad-Demra (69Km)
4. Bakhrabad-Chittagong (175Km)
5. Ashuganj-Monohordi-Dhanua
6. B-B Line (124 Km)
7. R- A Pipe Line (82 Km)
8. Elenga-Tarakandi Pipeline (40 Km)
9. Bibiyana – Dhanua Line (136 Km)
10. Moheshkhali-Anowara pipeline(90Km)

Pipelines under Western Zone SCADA System

- Western Zone SCADA system was commissioned on 15 December 2015.
- Western Zone SCADA covers following gas pipelines and metering stations:

(i)Elenga manifold station to Nalka
(ii) Nalka to Bhaghabari
(iii) Nalka to Hatikumrul
(iv) Hatikumrul to Banpara
(v) Hatikumrul to Bogra
(vi) Banpara to Rajshahi
(vii) Banpara to Khulna

Gas Sites under GTCL SCADA System

- Gas Field locations =25 Nos
- CGS=07 Nos
- Manifold=05 Nos
- Valve station=22 Nos
- Metering station/TBS/DRS=11 Nos
- Power=11 Nos
- Fertilizer=06 Nos
- Compressor=3

Present Status of GTCL SCADA System

- SCADA Server, HMI, Work station, Firewall, History server, web servers are installed in MCC & ACC.
- Router, switch, Master UHF Radio, GPRS Modem and other equipment are installed in the 11 MTS.
- Communication links from MTS to Control Centres are established trough BTCL Network & BD Com OFC Network.
- Transmitters, Flow Computers, Stardom PLC , GPRS Modem,UHF Slave Radio are installed in RTU Sites .
- RTUs are also connected to Control Centres through Grameen Phone & Banglalink Network.
- RTU are online and live data is available in Agargaon Master Control Centre & Ashuganj Auxiliary Control Centre.
- 2 years O&M started from November 2018.

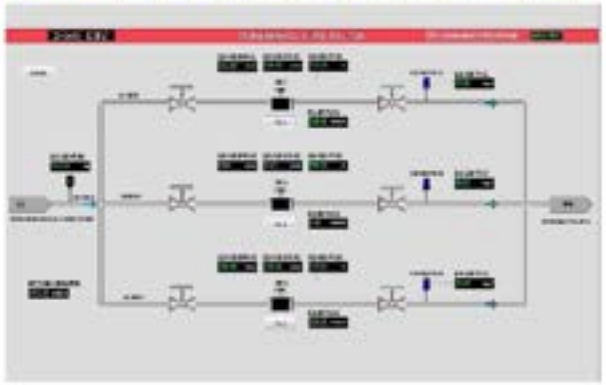
Output of GTCL SCADA System

- SCADA system enable us to monitor and control the operation in real time. In gas transmission networks total supply of gas fields to the gas grid and total delivery of gas to the end uses are monitored in real time.
- Gas Flow, delivery Pressure and Temperature parameter of gas of a particular field or metering station are viewed online.
- Automatic Generation of hourly and daily production and consumption report of a gas network.
- SCADA system eliminates the need for site visits by the personnel for data collection and inspection.
- SCADA system helps gas network load balancing.
- Real time information provide operational flexibility that can be used to meet market demands thus increasing income of a company.

SCADA Control Centre, Agargaon

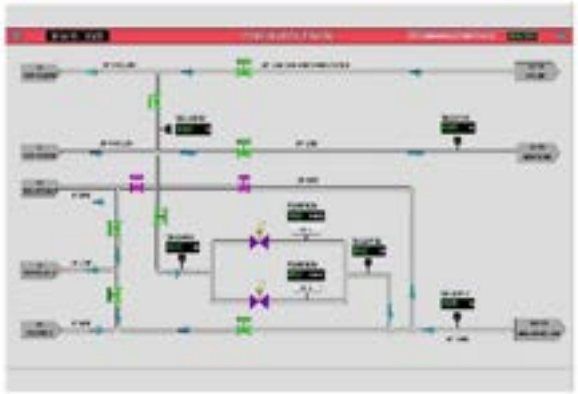
Real Data (KTL)

SCADA real data of sites (Moheshkhali CTMS)

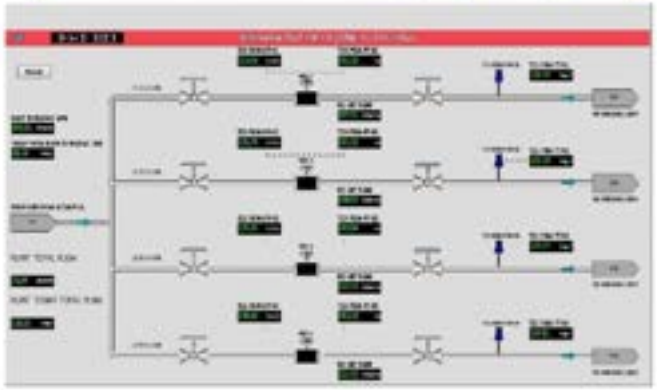


SCADA real data of sites (Ashuganj)

SCADA real data of sites (Bakhrabad)



SCADA real data of sites (Bibiyana GF)



SCADA real data of sites (Bibiyana GF)

Gas Production Data

Remote Terminal Units (RTU)

Transmitter with Stands

Typical Tower & Antenna Mast

SCADA Control Buildings at Ashuganj and Elenga

Orifice Meter

RTU & MTS Panel Outside View

Recommendations of the participants at the seminar "SCADA System in Gas Sector"

- ✓ Entire total gas transmission and distribution pipeline, metering stations should be under proper online monitoring system (e.g. SCADA) for developing transparency, reducing corruption and efficient operation
- ✓ Regular maintenance and calibration should be performed to acquire authentic real-time data from the transmission and distribution pipeline which will rectify the revenues from the sales of our gas
- ✓ SCADA system in Bangladesh is only operational in the context of supervisory control but unmanned operational activity from the remote distance should be integrated with the current facilities to strengthen real-time data acquisition capacity
- ✓ In the context of gas measurement, SCADA has a limitation to custodial transfer of sender and receiver end of natural gas
- ✓ Skilled manpower should be developed under the guidance of the subcontractor of GTCL who executed the entire SCADA system
- ✓ A project has been taken to mitigate the pipeline leakage & system loss by TGTDCL in the Dhaka city
- ✓ Public awareness & perception should be clarified and any update from the news agency of energy sector should be concerned from the right department to circulate authentic news

Some Notable Moments of the Virtual Seminar

HYDROCARBON UNIT
Energy and Mineral Resources Division

Dated: 17.11.2020

Seminar 3: Fourth Industrial Revolution

Seminar Key Personnel at a Glance

Chief Guest	**Mr. Md Anisur Rahman** Senior Secretary Energy and Mineral Resources Division (EMRD)
Host	**A S M Manzurul Quader** Director General (Joint Secretary) Hydrocarbon Unit
key-Note Speaker	**Dr. A.B.M. Alim Al Islam** Professor, Dept. of CSE BUET
Panel Discussant	**Dr. Mohammed Mahbubur Rahman** Associate Professor and Head Dept. of PMRE, BUET
	Mollah Amzad Hossain Editor Energy & Power

Abstract of the Seminar

The Fourth Industrial Revolution (or Industry 4.0) is the ongoing automation of traditional manufacturing and industrial practices, using modern smart technology. Large-scale machine-to-machine communication (M2M) and the internet of things (IoT) are integrated for increased automation, improved communication and self-monitoring, and production of smart machines that can analyze and diagnose issues without the need for human intervention.

The speed, breadth and depth of this revolution is forcing us to rethink how countries develop, how organizations create value and even what it means to be human. The Fourth Industrial Revolution is about more than just technology-driven change; it is an opportunity to help everyone, including leaders, policy-makers and people from all income groups and nations, to harness converging technologies in order to create an inclusive, human-centered future.

Background:

- ✓ 1st Industrial Revolution is the Age of Mechanical Production
- ✓ 2nd Industrial Revolution is the Technological Revolution
- ✓ 3rd Industrial Revolution is the Digital Revolution
- ✓ 4th Industrial Revolution is the Cyber Physical Systems

Three main concepts of Industry of 4.0:

- ✓ Extreme connectivity
- ✓ Extreme computing power
- ✓ Extreme automation

Four Design Principles of Industry 4.0:

- ✓ Interconnection
- ✓ Information transparency
- ✓ Technical assistance
- ✓ Decentralized decisions

Nine Pillars of Industry 4.0: ✓ Artificial Intelligent ✓ Big Data Analysis ✓ Autonomous Systems ✓ Internet of things ✓ Cloud Computing ✓ Cyber Security ✓ 3D printing ✓ Simulation ✓ Augmented Reality	**Other Components of Industry 4.0:** ✓ Block chain ✓ Innovative Materials ✓ Quantum Computing ✓ Crypto Currency ✓ Robotics ✓ Biotechnology

PowerPoint Presentation from the Key Note Speaker

Industry 4.0: Possibilities and Potentials in Bangladesh w.r.t. Power, Energy, and Mineral Resources

Outline of the Presentation

- Background on Industry 1.0, 2.0, and 3.0
- Fourth industrial revolution (Industry 4.0)
  - How Is Industry 4.0 affecting business and workforce?
- Applicability of Industry 4.0 over energy resources in Bangladesh
  - Future prospects and possibilities in Bangladesh

Industrial Revolutions (1750-present)

First Industrial Revolution (1750-1870)

- Also known as the **Age of Mechanical Production**

1. Textiles

2. Iron industry

3. Steam power

4. Machine tools

Second Industrial Revolution (1870-1914)

- Also known as **Technological Revolution**

1. Steel production
2. Electrification
3. Telecommunication
4. Petroleum

5. Automobile
6. Maritime technology
7. Agriculture
8. Business management

Third Industrial Revolution (1947-2015)

- Also known as **Digital Revolution**
- Focused on electronic systems, IT systems, and automation
- Processes automation using logic processors and information technology

4

Fourth Industrial Revolution (2016-Present)

- Referred to **Cyber-physical systems**
- Combines physical, digital, and biological worlds
- Three main concepts - Extreme connectivity, Extreme computing power, and Extreme automation
- There are four design principles identified as integral parts to Industry 4.0

1. Interconnection
2. Information transparency
3. Technical assistance
4. Decentralized decisions

Nine Pillars of Industry 4.0

HYDROCARBON UNIT
Energy and Mineral Resources Division

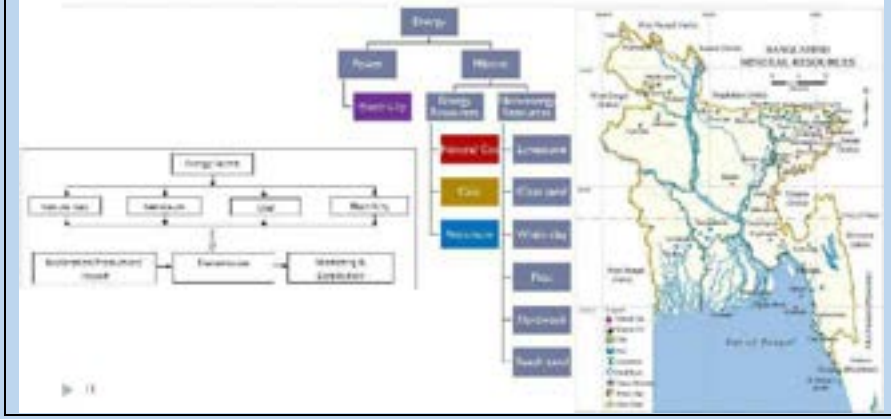
Other Important Components of Industry 4.0

Blockchain | Quantum computing | Crypto currency | Human-machine interface

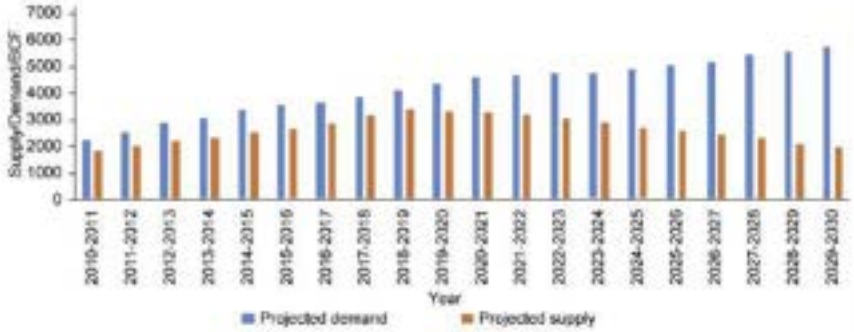
Innovative materials | Robotics | Biotechnology | Location detection technologies

How Is Industry 4.0 Affecting Business and Workforce?

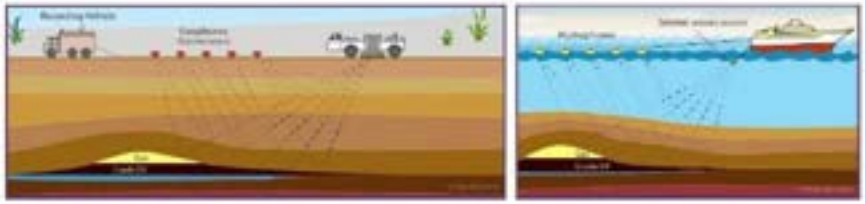
Business Focus of Ministry of Power, Energy and Mineral Resources



Natural Gas Supply and Demand Forecast up to 2030 in BD



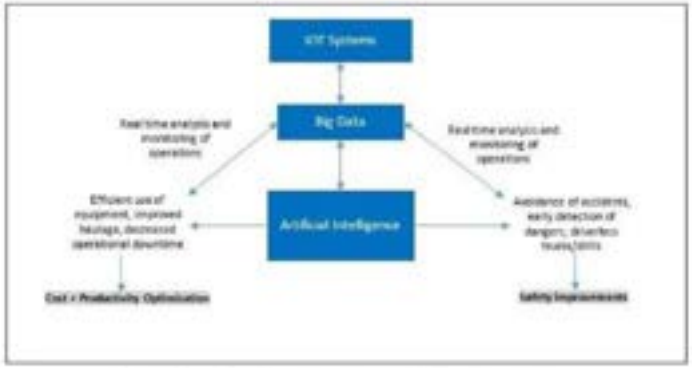
Natural Gas and Oil Reservoir Searching Techniques



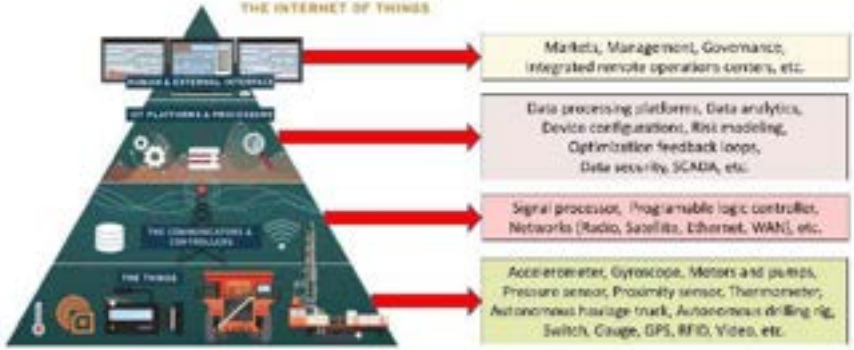
Any new method of searching?

Natural Gas, Oil, and Electricity Production and Distribution

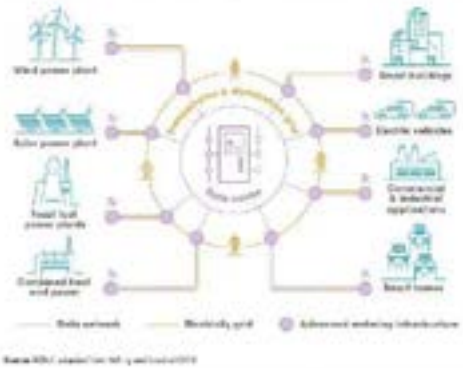
Applications of Industry 4.0 in Energy Industry at Different Levels



IoT in Mining (Oil and Natural Gas) Industry

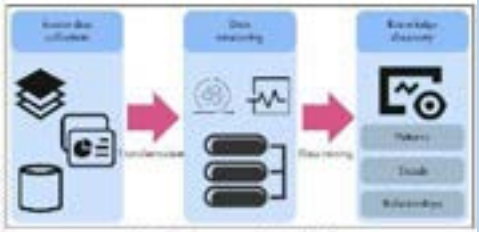


IoT in Power Industry



Big Data in Mining (Oil and Natural Gas) Industry

Major data sources in mining industry



Application procedure of big data

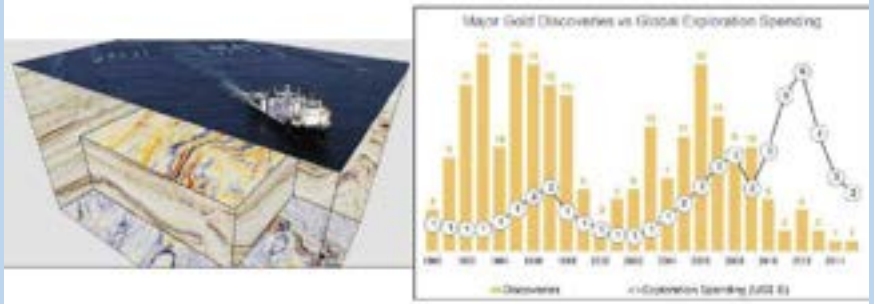
Big Data in Power Industry

There are many ways in which big data is adding a bigger advantage in the energy sector. Here are few;

Characteristics of Big Data in Power Industry

Feature: 4V	Power big data
Volume	TB →PB above
Variety	Structured data, Semi-structured data, Unstructured data
Velocity	Real-time data, online processing
Value	Predict business trend, Promote business growth

Exploration of Mining – Gold as a Case Study



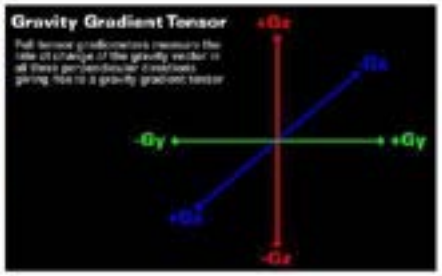
AI in Mining (Oil and Natural Gas) Industry

AI in Power Industry

Cyber Security in Mining (Oil and Natural Gas) Industry

Cyber Security in Power Industry

Analyzing Oil and Gas Fields in Bangladesh



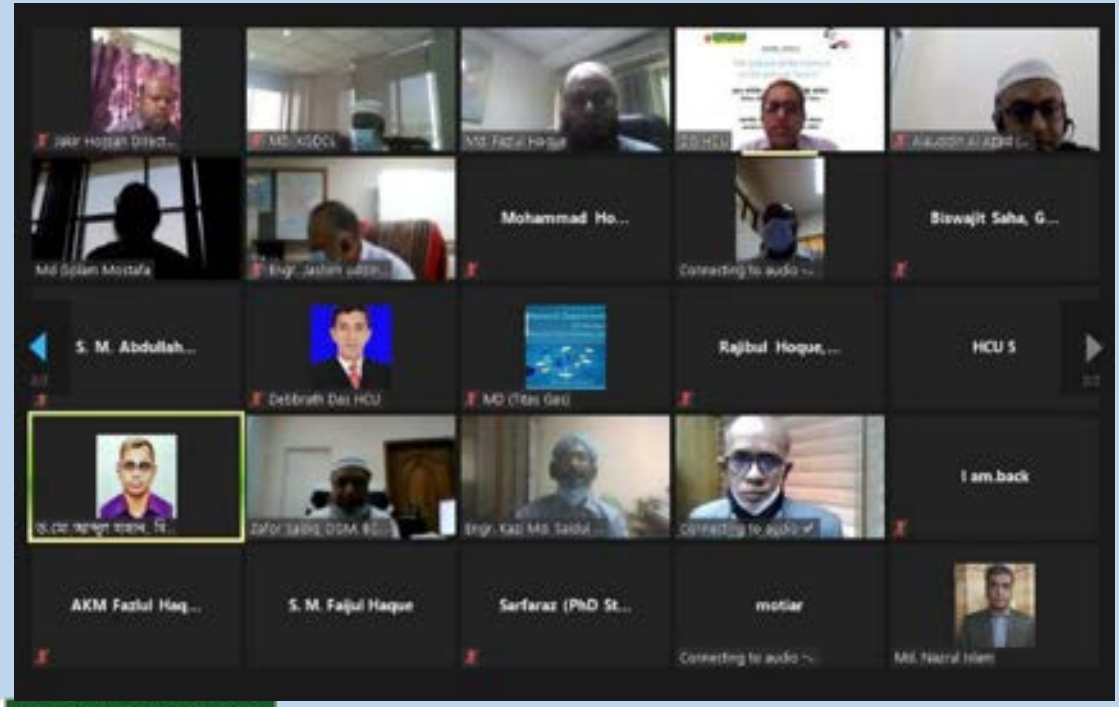
PRIO | Peace Research Institute Oslo

Analyzing Oil and Gas Fields in Bangladesh [contd.]

Recommendations of the participants at the seminar "Fourth Industrial Revolution":

- ✓ Automation of Energy sector (e.g. SCADA) will be more transparent and will help to mitigate any unfair means or corruption in this sector
- ✓ Big data analysis, AI & IoT can help to evaluate historical data, interpret the way forward & can help to take right policy at right time
- ✓ 4th industrial revolution can effectively forecast supply vs. demand (using)in the energy sector & play an important role in the decision making process
- ✓ In the context of improving productivity, cost & productivity optimization in the energy sector Industry 4.0 is a new dimension and carrying a substantial prospect
- ✓ Big data in energy sector is adding a bigger advantage such as data collaboration, energy preservation, analyzing future risks & opportunities, supply chain visibility, improves monitoring as well as efficiency
- ✓ 40% of mining companies will invest in VR (Virtual Reality) & AI during the production phase across the next 3-5 years
- ✓ AI in power industry such as smart grids, coordination of maintenance works, smart home & smart meter is adding a new dimension in the power sector
- ✓ Professional development for skilled manpower to cope up with industry 4.0 is needed to initiate immediately.

Some Notable Moments of the Virtual Seminar



HYDROCARBON UNIT
Energy and Mineral Resources Division

Date: 22 December 2020

Seminar 4: Gas leakage detection & Digital Mapping

Seminar Key Personnel at a Glance

Chief Guest	**Mr. Md Anisur Rahman** Senior Secretary Energy and Mineral Resources Division (EMRD)
Host	**A S M Manzurul Quader** Director General (Joint Secretary) Hydrocarbon Unit
key-Note Speaker	**Engr. Ali Iqbal Md. Nurullah** Managing Director TGTDCL
Panel Discussant	**Mr. Md. Abdul Aziz Khan** Ex-Member, BERC and Ex-MD, TGTDCL
	Mollah Amzad Hossain Editor Energy & Power

Abstract of the Seminar

Gas leakage detection

What is it?

- ✓ Gas leakage detection systems are engineering systems used to detect leak of materials from the pipeline, in order to alert the operator to leak incidents.
- ✓ An essential component of pipeline risk management
- ✓ Allows the operator to respond in time to the leaks to prevent further escalation of incidents.
- ✓ Different technologies are available to detect the leak from pipelines, depending on the nature of the fluid in the pipeline and the leak size.

Importance

- ✓ To monitor aging infrastructure
- ✓ To improve system integrity, due to regulatory guidelines
- ✓ To reduce greenhouse gas emissions
- ✓ To rely on error-prone, time-consuming, paper-based monitoring systems
- ✓ To reduce cost
- ✓ Data transparency requirements

Challenges

- ✓ Conventional processes are unable to meet today's demands for rapid, transparent and accurate data.
- ✓ Although pipeline leak detection systems can be quite sophisticated and take a lot of effort to operate and maintain, they may not always be very effective.
- ✓ Some assessments found that leak detection system effectiveness is less than 20% only
- ✓ However, leak detection systems can still be useful in picking up some leaks and may still be worth implementation from risk management perspective.
- ✓ The higher the risk posed by the pipeline, the more sophisticated and important leak detection systems should be.

Digital Mapping in Gas Network

What is Digital Mapping?

Digital mapping, by definition, is performed through some kind of digital interface, typically a computer system with a graphical user interface (GUI). Whilst GUIs have been available for some considerable time, it is worth stressing that image interpretation requires *graphical* display and the greater the size and number of pertinent displays, the easier interpretation potentially becomes. It is also essential for all work to be performed within a geographical information system (GIS) in order to ensure that input imagery and interpreted data sets maintain the same geographical coordinate system. This allows data export into other geographic products and facilitates accurate map production and quantitative analyses.

Benefits

- ✓ **Data index maps** – Often such maps are delivered using web-based GIS applications that require little or no training to use, and show all data of interest side-by-side in a single interface.
- ✓ **Block ranking** – It provides a unique way of mining large quantities of different types of data in order to help make a decision, and many companies employing digital mapping for this analysis believe that it gives them a competitive edge in license acquisition.
- ✓ **Well planning** – Digital Mapping is being used increasingly for well planning, particularly with the rise of unconventional resources such as shale gas, shale oil and coal bed methane.
- ✓ **Pipeline routing** – Building pipelines to carry petroleum products is capital-intensive, so determining the optimum route is critical. Studies have shown that GIS-based least cost path analysis can produce more environmentally friendly routes, as well as reducing costs by up to 15%.
- ✓ **Pipeline monitoring** –An emerging use of Digital Mapping is in integrating the map with digital video, often acquired using remote vehicles on the seabed, enabling engineers to see sections of pipeline and monitor hazards affecting the installation.

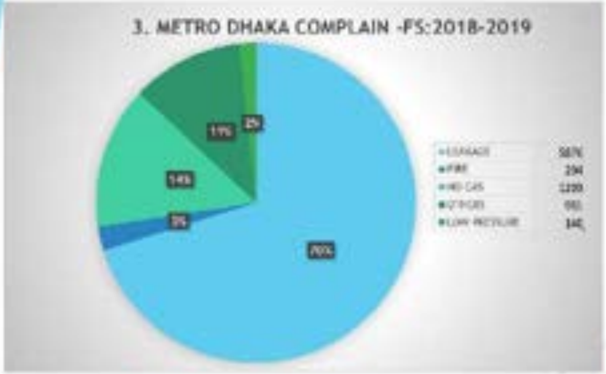
PowerPoint Presentation of the Key Note Speaker

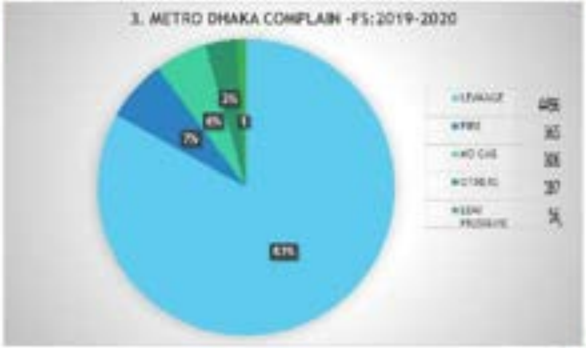
তিতাস গ্যাস নেটওয়ার্কে লিকেজ সনাক্তকরণ
ও
ডিজিটাল ম্যাপিং

তিতাস গ্যাস নেটওয়ার্কে লিকেজ সনাক্তকরণ
ও
ডিজিটাল ম্যাপিং

১. পটভূমি

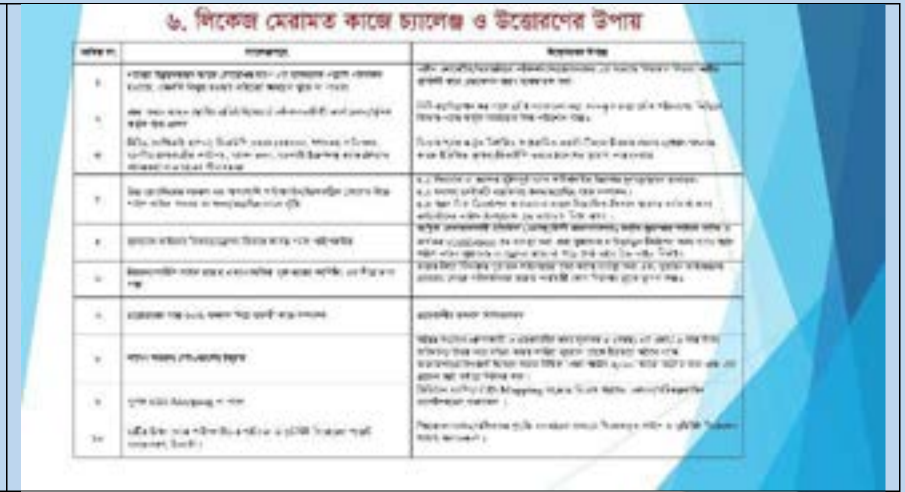
২. গ্যাস লিকেজ ডিটেক্শন ও মেরামত কাজের ফ্লো-চার্ট/ডায়াগ্রাম





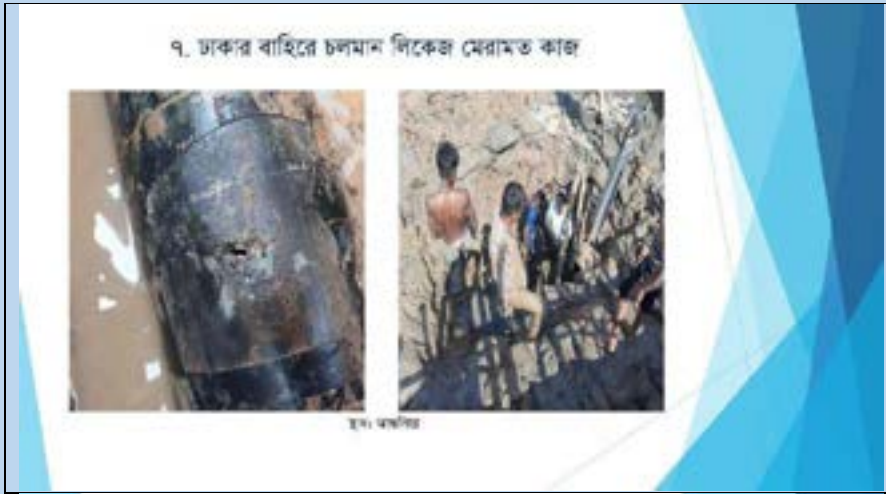
৪. গ্যাস লিকেজ /অগ্নিদূর্ঘটনার কারণ ঃ


৫. গ্যাস লিকেজ সংক্রান্ত দুর্ঘটনার প্রতিকারঃ


৬. লিকেজ মেরামত কাজে চ্যালেঞ্জ ও উত্তোরণের উপায়


৭. জরুরী গ্যাস নিয়ন্ত্রণ বিভাগ কর্তৃক চলমান লিকেজ মেরামত কাজ


৭. জরুরী গ্যাস নিয়ন্ত্রণ বিভাগ কর্তৃক চলমান লিকেজ মেরামত কাজ

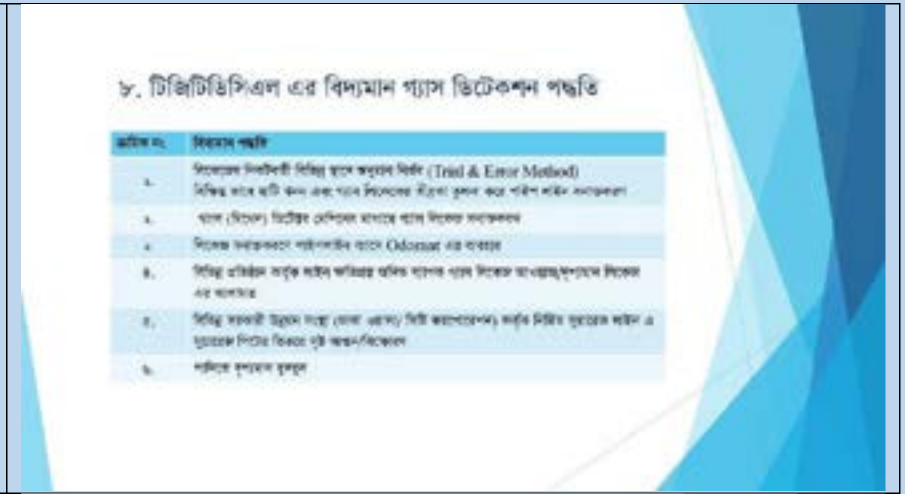

৭. ঢাকার বাহিরে চলমান লিকেজ মেরামত কাজ


৭. ঢাকার বাহিরে চলমান লিকেজ মেরামত কাজ

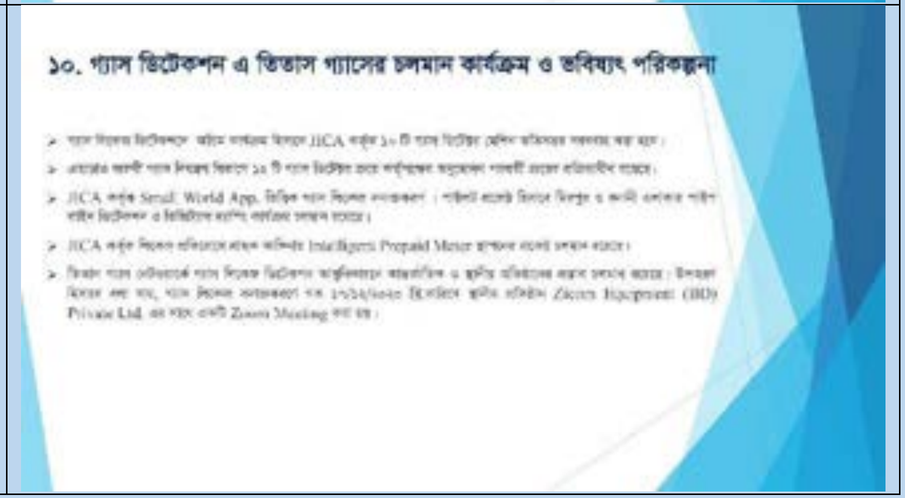

৭. মেরামত কাজ চলাকালীন জরুরী গ্যাস নিয়ন্ত্রণ বিভাগের অগ্নিদগ্ধ কর্মী
সাম্প্রতিক একটি দুর্ঘটনা


৭. ঝুঁকিপূর্ণ পাইপলাইন


৭. বিস্ফোরণ পরবর্তী স্থিরচিত্র


৮. টিজিটিডিপিএল এর বিদ্যমান গ্যাস ডিটেকশন পদ্ধতি
(Trial & Error Method)


৯. তিতাস গ্যাস কোম্পানীতে জরুরী লিকেজ মেরামত কার্যক্রম


১০. গ্যাস ডিটেকশন ও তিতাস গ্যাসের চলমান কার্যক্রম ও ভবিষ্যৎ পরিকল্পনা

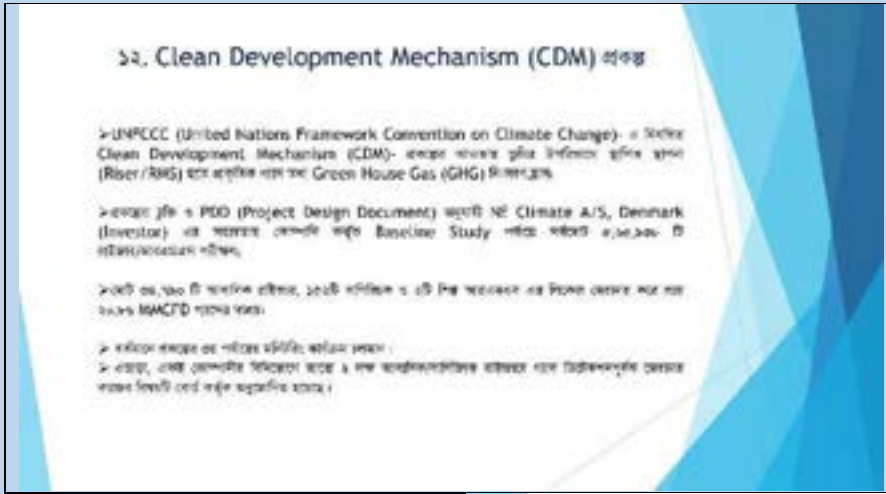
১০. পাইপ লোকেটর

১০. গ্যাস ডিটেক্টর

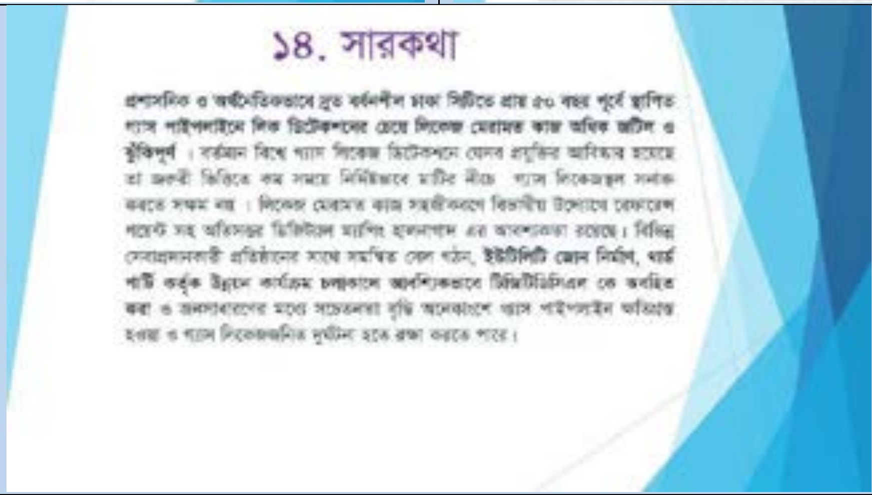
১০. মোবাইল গ্যাস লিক ডিটেকশন সিস্টেম

১১. অর্থনৈতিক অঞ্চলসমূহে গ্যাস সরবরাহ

- ফিরোজ অন্তর্ভুক্ত এলাকায় বন্ধবায়বাধীন/ প্রস্তাবিত ১৮টি অর্থনৈতিক অঞ্চল এ গ্যাস সরবরাহ কার্যক্রম বিভিন্ন পর্যায়ে চলমান রয়েছে।
- ১৮টি অর্থনৈতিক অঞ্চল এ মোট গ্যাস চাহিদা ৬০৬ MMCFD।
- সমস্ত অর্থনৈতিক অঞ্চল এ গ্যাস সরবরাহ শীঘ্র শুরু হবে এবং পরিকল্পনা অনুযায়ী সম্পূর্ণ চাহিদা পর্যায়ক্রমে ২০২৬ সালের মধ্যে প্রয়োজন হবে।


১২. Clean Development Mechanism (CDM) প্রকল্প
UNFCCC (United Nations Framework Convention on Climate Change)
Clean Development Mechanism (CDM)
(Riser/RMS) Green House Gas (GHG)
PDD (Project Design Document) NE Climate A/S, Denmark (Investor) Baseline Study
MMCFD


১৩. টিজিটিডিসিএল গ্যাস বিতরণ নেটওয়ার্ক (ঢাকা মেট্রোপলিটন এরিয়া)


১৪. সারকথা
প্রশাসনিক ও অর্থনৈতিকভাবে দ্রুত বর্ধনশীল ঢাকা সিটিতে প্রায় ৫০ বছর পূর্বে স্থাপিত গ্যাস পাইপলাইনে লিক ডিটেকশনের চেয়ে লিকেজ মেরামত কাজ অধিক জটিল ও ঝুঁকিপূর্ণ।

“Gas leakage detection & Digital Mapping” সেমিনারে উপস্থিত বিশেষজ্ঞদের সুপারিশমালা:

সুপারিশমালাঃ

- ✓ অত্যাধুনিক প্রযুক্তির ব্যবহার নিশ্চিত করতে হবে।
- ✓ জরুরিভিত্তিতে গ্যাস ডিটেকশনের জন্য আধুনিক যন্ত্রপাতি ক্রয় করতে হবে।
- ✓ টেকনিক্যাল টিমের জনবল ও সক্ষমতা বৃদ্ধিপূর্বক আরও কর্মতৎপর হতে হবে।
- ✓ অবৈধ গ্যাস সংযোগ দ্রুত বিচ্ছিন্ন করতে হবে এবং এ কাজে বাধাপ্রাপ্ত হলে উর্ধ্বতন কর্তৃপক্ষের সহযোগিতা নিতে হবে।
- ✓ ডিস্ট্রিবিউশন নেটওয়ার্কের ডিজিটাল ম্যাপিং দ্রুত বাস্তবায়ন করতে হবে।
- ✓ সিটি কর্পোরেশন, রাজউক, ওয়াসা, ডেসকো প্রভৃতি উন্নয়ন কার্যক্রম সম্পাদনকারী সংস্থা সমূহের সাথে সমন্বয় করে কর্মসম্পাদন করতে হবে।
- ✓ সেবা প্রদানের বিষয়ে সেবা প্রদানকারী সংস্থাকে আরও স্বচ্ছতা ও জবাবদিহিতা নিশ্চিত করতে হবে।

Some Notable Moments of the Virtual Seminar

HYDROCARBON UNIT
Energy and Mineral Resources Division

Date: 20 January 2021

Seminar 5: Role of Private Entities in the Energy Sector of Bangladesh

Key Personnel of the Seminar at a Glance

Chief Guest	**Mr. Md Anisur Rahman** Senior Secretary Energy and Mineral Resources Division (EMRD)
Host	**A S M Manzurul Quader** Director General (Joint Secretary) Hydrocarbon Unit
key-Note Speaker	**Mr. Azam J Chowdhury** Chairman East Coast Group
Panel Discussant	**Mr. Faisal Karim Khan** Director Summit Power International
	Mr. Arun Karmaker President Energy Reporter's forum Bangladesh

সেমিনারের সারসংক্ষেপ

বর্তমান সরকার জ্বালানি খাত উন্নয়নের অপরিহার্যতা যথাযথভাবে অনুধাবন করে জ্বালানি খাতকে অগ্রাধিকার খাত হিসেবে চিহ্নিত করেছে। রূপকল্প-২০২১ (মধ্যম আয়ের দেশ), রূপকল্প-২০৪১ (উন্নত দেশের মর্যাদা), জাতিসংঘ ঘোষিত টেকসই উন্নয়ন লক্ষ্যমাত্রা (এসডিজি) ২০৩০ অর্জনের মাধ্যমে জ্বালানি খাতে পূর্ণ নিরাপত্তা অর্জনের লক্ষ্যে জ্বালানি ও খনিজ সম্পদ বিভাগ এবং এর অধীনস্থ প্রতিষ্ঠানসমূহ বিভিন্ন গঠনমূলক ও ফলপ্রসু কর্মকান্ডের মাধ্যমে একনিষ্ঠভাবে কাজ করছে।

জ্বালানি খাত একটি পুঁজি-ঘন খাত। এ খাতের উন্নয়নে প্রচুর বিনিয়োগ প্রয়োজন হয়। পাবলিক সেক্টরে এককভাবে উন্নয়ন সাধন একটি দুরূহ ব্যাপার বিধায় জ্বালানি বিভাগ এ খাতের উন্নয়নে বেসরকারি খাতকে সম্পৃক্ত করার জন্য বিভিন্ন নীতিমালা প্রণয়ন করেছে। এর মধ্যে উল্লেখযোগ্য হচ্ছেঃ

- ✓ এলপিজি বটলিং প্ল্যান্ট স্থাপন নীতিমালা, ২০১৬
- ✓ তরলীকৃত পেট্রেলিয়াম গ্যাস (অটো-গ্যাস) রিফুয়েলিং স্টেশন ও রুপান্তর ওয়ার্কশপ স্থাপন, পরিচালন এবং রক্ষণাবেক্ষণ নীতিমালা, ২০১৬
- ✓ বায়োইথানল প্লান্ট স্থাপন ও পরিচালনা সংক্রান্ত নীতিমালা, ২০১৭
- ✓ লুব ব্লেন্ডিং প্ল্যান্ট স্থাপনের নীতিমালা, ২০১৮
- ✓ বেসরকারি পেট্রোকেমিক্যাল প্ল্যান্ট স্থাপন এবং পরিচালনা নীতিমালা, ২০১৯
- ✓ বেসরকারি খাতে এলএনজি স্থাপনা নির্মাণ, আমদানি ও সরবরাহ নীতিমালা, ২০১৯
- ✓ আবাসিক পর্যায়ে খোলা বাজার হতে প্রি-পেইড/স্মার্ট গ্যাস মিটার ক্রয় ও স্থাপন নীতিমালা, ২০১৯

এতে অনেক বেসরকারি প্রতিষ্ঠান এ খাতে সম্পৃক্ত হয়ে বিগত ১০ বছর যাবত উল্লেখযোগ্য অবদান রাখছে।

বর্তমানে বসুন্ধরা, যমুনা, ওমেরা, টিকে গ্যাস, ওরিয়ন, প্রমিতা, নাভানা, সেনা, বেক্সিমকো, জি গ্যাসসহ ২৫টি কোম্পানি এলপি গ্যাস বাজারজাত করছে।

বাংলাদেশের লুব্রিকেন্টস বাজারের শীর্ষ পাঁচ কোম্পানীর মধ্যে এমজেএলবিডি, বিপি পিএলসি (ক্যাসট্রোল সহ), টোটাল, ক্যালটেক্স এবং রয়েল ডাচ শেল উল্লেখযোগ্য।

এলএনজি আমদানিতে যুক্ত দুটি কোম্পানী সামিট এলএনজি টার্মিনাল কোম্পানী (প্রাঃ) লিমিটেড এবং এক্সিলারেট এনার্জি বাংলাদেশ লিমিটেড।

এদের সম্মিলিত প্রচেষ্টা দেশের জ্বালানি নিরাপত্তা নিশ্চিত করণে গুরুত্বপূর্ণ ভূমিকা পালন করবে।

PowerPoint Presentation of the Key Note Speaker

HYDROCARBON UNIT

ROLE OF PRIVATE ENTITIES IN THE ENERGY SECTOR OF BANGLADESH

KEYNOTE SPEAKERS
MR. AZAM J. CHOWDHURY
MR. TANZEEM CHOWDHURY

20TH JANUARY, 2021

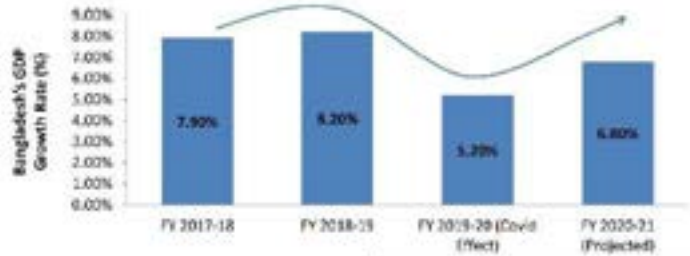
CONTENTS

- COVID-19 SCENARIO IN BANGLADESH
- CONTRIBUTION OF PRIVATE ENTITIES TO THE ENERGY SECTOR OF BANGLADESH
- CHALLENGES FACED BY PRIVATE ENTITIES IN ENERGY SECTOR OF BANGLADESH
- PROSPECTS OF PRIVATE ENTITIES IN ENERGY SECTOR OF BANGLADESH
- RECOMMENDATION FROM PRIVATE ENTITIES TO ENHANCE ENERGY SECURITY
- OVERALL CHALLENGES IN INVESTMENT CLIMATE
- EXPECTATION FROM GOVERNMENT TO OVERCOME THE CHALLENGES
- NOTE OF THANKS

STRONG ECONOMIC GROWTH THROUGH COVID

- As per the Asian Development Bank Report:

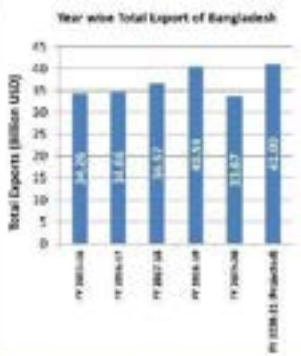
A RESILIENT ECONOMY WITH SHARP RECOVERY



ECONOMIC REBOUND OF BANGLADESH

Due to the effective measures undertaken by the Government of Bangladesh to protect the economy from the fallout of COVID-19, the economy is on track towards making a sharp rebound.

- Bangladesh Bank's foreign currency reserve has crossed $41 billion for the first time
- Export earnings are also on the rise, with Bangladesh currently posting a surplus in its **Balance of Payments**
- the **flow of credit** to the private sector is slow but it is growing consistently
- The **inflow of remittance**, which was expected to drop, is now on an upward trajectory
- After a long time, Bangladesh's **capital market** has also returned to a bullish trend. Aside from the gains in the key index, trading in the country's premier bourse has also seen an upturn, buoyed by renewed optimism among investors



MAJOR HYDROCARBONS USED/PROCESSED IN BANGLADESH

I. NATURAL GAS

II. LIQUEFIED NATURAL GAS (LNG)

III. LIQUEFIED PETROLEUM GAS (LPG)

IV. LUBRICATING OIL

V. FURNACE OIL

VI. CRUDE OIL

KEY DRIVERS BEHIND ENERGY DEMAND

- 100 ECONOMIC ZONES UNDER CONSTRUCTION
- NATIONAL EXPORTS HAVING CONSISTENT GROWTH (YOY)
- BOOST IN HIGH TECH INDUSTRIES
- COMPLETION OF PADMA BRIDGE THAT WILL REVIVE ECONOMY OF SOUTH WEST BANGLADESH
- COMPLETION OF NUCLEAR POWER PLANT (2400 MW)
- INCEPTION OF TRANSIT FACILITIES UNDER BBIN FRAMEWORK
- DEVELOPMENT OF IT PARKS WILL CREATE HIGH – MEDIUM SKILLED WORKFORCE
- DOMESTIC CONSUMPTION LED BY POPULATION GROWTH, INCREASED DISPOSABLE INCOMES AND FOREIGN INVESTMENT
- PUBLIC SECTOR INVESTMENT AND INFRASTRUCTURE UPGRADATION

NATURAL GAS SECTOR: PRODUCTION

Description	Data
Total number of gas fields	26 nos
Number of gas fields in production	19
Number of producing wells	110
Present gas production capacity	2750 mmcfd
Avg. gas production rate	2033 mmcfd
Annual Production by NOC	385.34 Bcf (40%)
Annual Production by IOC	575.43 Bcf (60%)
Present Demand	3650 mmcfd
Present Deficit	1016.75 mmcfd
Number of Customer	41.80 Lakh (approx.)

MAJOR GAS FIELD OPERATED BY PRIVATE COMPANY/ IOC

Private Company / IOC	Gas Field	Nos of Active Well
CHEVRON	Bibiyana	26
CHEVRON	Moulovibazar	05
CHEVRON	Jalalabad	07
KrisEnergy (Tullow)	Feni	-
KrisEnergy (Tullow)	Bangura	05
Santos	Offshore	0

GAS TRANSMISSION

Compressor Station: 03 nos (Muchai, Ashuganj, Elanga)

Private Company / IOC	Transmission Pipeline/ Compressor unit	Capacity
CHEVRON	Muchai (Bahubal)	1100 psi (added 200 psi with existing 900 psi)

Had a great contribution to increase gas transmission to the middle & western part of the Country

PRIVATE/INTERNATIONAL GAS COMPANIES- OFFSHORE ACTIVITIES (INDEPENDENT & JV)

PSC (Product Sharing Contract) signed for 4 block at Bay of Bangla with:

1. Santos
2. KrisEnergy
3. ONGC Videsh limited (OVL)
4. Oil India Limited (OIL)
5. POSCO Daewoo Corporation

Note:

- Santos & KrisEnergy have a JV with BAPEX
- ONGC Videsh limited (OVL) & Oil India Limited (OIL) have a JV with BAPEX

Source: Annual report [illegible]

GAS FIELDS IN PRODUCTION AND SUPPLY SCENARIO

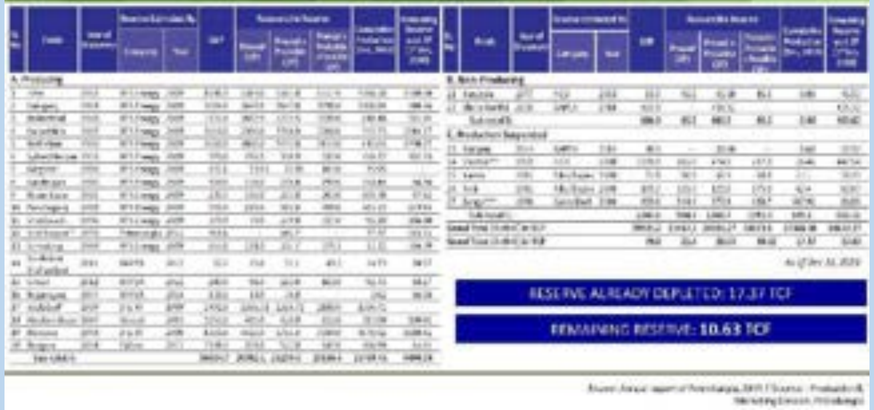
Company	Gas Field	Total Wells (No.)	No of Producing Wells	Production Capacity (MMscfd)	Production	
					Gas	Condensate
1. BGFCL	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	Sub Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2. SGFL	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	Sub Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
3. BAPEX	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	Sub Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	Sub Total (1+2+3)	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4. IOCs						
CHEVRON	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
5. [illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	Sub Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	Grand Total (1+2+3+4+5)	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

[illegible]

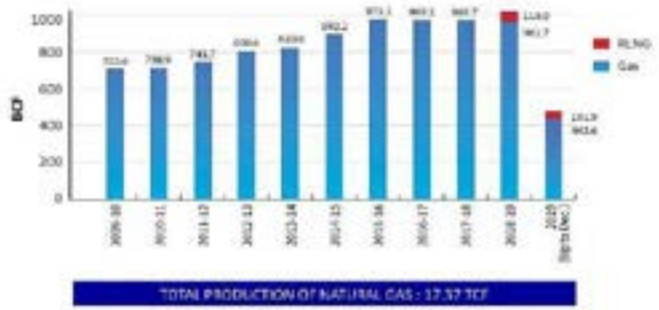
PRESENT PRODUCTION CAPACITY : 2,750 MMSCFD

Source: [illegible]

NATURAL GAS RESERVE OF BANGLADESH



YEAR WISE PRODUCTION OF NATURAL GAS



CHALLENGES IN NATURAL GAS SECTOR

CHALLENGES IN NATURAL GAS SECTOR

- TRANSMISSION & DISTRIBUTION NETWORK OF NATURAL GAS IS YET TO COVER ENTIRE BANGLADESH
- NATURAL GAS NETWORK IS FULLY OWNED AND OPERATED BY GOVERNMENT OF BANGLADESH
- LACK OF INVESTMENT FRIENDLY POLICY FOR PRIVATE ENTITIES TO INVEST IN NATURAL GAS SECTOR
- NO INCENTIVES TO PRIVATE COMPANIES (LOCAL) IN EXPLORATION OF PROBABLE GAS FIELDS
- NO SUFFICIENT EXPLORATION INVENTORY (DRILLING RIGS AND OTHER CHEMICALS) SINCE THEY ARE VERY COSTLY & EXPLORATION WORK IS NOT CONTINUOUS
- LOCAL PRIVATE COMPANIES ARE STILL NOT SELF SUFFICIENT IN TERMS OF TECHNICAL CAPABILITY AND NEED ASSISTANCE FROM FOREIGN COMPANIES

PROSPECTS IN NATURAL GAS SECTOR

PRIVATE GAS PIPELINE NETWORK

- PRIVATE COMPANIES, ON BOOT (BUILD, OWN, OPERATE, TRANSFER) BASIS OR INDEPENDENTLY, CAN BUILD THE INFRASTRUCTURE REQUIRED FOR GAS PIPELINE NETWORK TO SUPPLY NATURAL GAS TO ECONOMIC ZONES
- DEDICATED & SMALL SCALE GAS STORAGE & PIPELINE NETWORK FOR EACH EPZ WILL ENSURE UNINTERRUPTED NATURAL GAS SUPPLY
- PRIVATE COMPANIES CAN ALSO ACTIVELY PARTICIPATE IN NATURAL GAS MARKETING AND DISTRIBUTION
- FOR INSTANCE, CON EDISON (FOUNDED IN 1823 AS THE NEW YORK GAS LIGHT COMPANY), AN US BASED PRIVATE ENERGY COMPANY IS DISTRIBUTING AND MARKETING NATURAL GAS THROUGH NEW YORK CITY

PROSPECT FOR PRIVATE INVESTMENT IN GAS SECTOR

- **EXPLORATION & PRODUCTION OF NATURAL GAS**

PRIVATE ENTITIES OF BANGLADESH

- HAVE ALREADY DEMONSTRATED AND PROVEN THEIR EXPERTISE IN ENERGY/POWER SECTOR (EXAMPLE: POWER PLANTS, LUBRICATING OIL, LPG ETC.)
- CAN ACTIVELY CONTRIBUTE IN NATURAL GAS EXPLORATION & PRODUCTION
- IS CAPABLE OF CAPACITY BUILD-UP FOR EXPLORATION & PRODUCTION OF NATURAL GAS
- CAN LEAD & FORM JOINT VENTURE WITH OIL COMPANIES TO EXPLORE PROBABLE GAS FIELDS AND EVENTUALLY SECURE COUNTRY'S ENERGY SECURITY AND INTEREST
- CAN OWN DRILLING RIGS AND OTHER EQUIPMENTS WHICH WILL EVENTUALLY GIVE A COMPETITIVE ADVANTAGE IN TERMS OF ECONOMY OF SCALE IN OPERATION & INVENTORY MANAGEMENT
- MARGINAL GAS FIELD CAN BE EXPLORED BY LOCAL PRIVATE COMPANIES USING EXISTING INFRASTRUCTURE OF BAPEX

- **TRANSMISSION & DISTRIBUTION OF NATURAL GAS**
  - AT PRESENT, FULLY CONTROLLED BY GOVERNMENT OF BANGLADESH
  - PRIVATE COMPANIES IS CAPABLE OF TAKING OVER TRANSMISSION & DISTRIBUTION OF NATURAL GAS
  - ENTIRE COUNTRY CAN BE DIVIDED INTO SUB DIVISIONS /ZONES TO ENSURE MAXIMUM EFFICIENCY IN GAS TRANSMISSION & DISTRIBUTION
  - ADB INSTANCE, IN CANADA, THE NATURAL GAS TRANSMISSION & DISTRIBUTION LINE IS OWNED AND OPERATED BY PRIVATE COMPANIES

RECOMMENDATION IN NATURAL GAS SECTOR

RECOMMENDATION

- **PRIVATE COMPANIES:**
  - NEED TO FOCUS ON CAPACITY BUILD UP AND COMPETENCY FOR EXPLORATION OF ONSHORE AND OFFSHORE GAS FIELDS
  - SHOULD JOIN HAND WITH BAPEX FOR TECHNOLOGY TRANSFER AND KNOWLEDGE SHARING FOR EXPLORATION AND PRODUCTION OF NATURAL GAS
  - PARTICIPATION OF PRIVATE SECTOR IN PRODUCTION & EXPLORATION OF NATURAL GAS SHOULD BE MADE MANDATORY TO HAVE BETTER PSC TERMS
  - GOVERNMENT SHOULD REFORM POLICIES AND MAKE THE POLICIES INVESTMENT FRIENDLY TO ENCOURAGE PRIVATE ENTITIES TO ACTIVELY PARTICIPATE IN TRANSMISSION AND DISTRIBUTION OF NATURAL GAS
  - USE OF NATURAL GAS AS CNG FOR VEHICLE, DOMESTIC AND COMMERCIAL PURPOSE SHOULD BE DISCONTINUED AND INCREASE USE OF NATURAL GAS TO PRODUCTIVE SECTORS FOR SUSTAINABILITY
  - PRIVATE COMPANIES SHOULD TAKE THE CONTROL OF INVITING INTERNATIONAL COMPANIES TO EXPLORE PROBABLE GAS FIELDS
  - GOVERNMENT SHOULD ENCOURAGE PRIVATE ENTITIES TO EXERCISE THEIR EXPERTISE IN NATURAL GAS SECTOR
  - SHOULD KEEP AN INVENTORY OF DRILLING RIGS AND OTHER CHEMICALS FOR CONTINUOUS EXPLORATION WORK OF GAS FIELD

CONTRIBUTION IN LIQUEFIED NATURAL GAS (LNG) SECTOR

LNG FSRU AT MOHESHKHALI, COXS BAZAR

- TWO (02) LNG FSRUS ARE CURRENTLY OPERATING IN BANGLADESH AT MOHESHKHALI REGION, NAMELY:-
  - MOHESHKHALI FLOATING LNG (MLNG) TERMINAL
  - SUMMIT LNG TERMINAL CO LTD.

- **MLNG BY EXCELERATE ENERGY**
  - BANGLADESH'S FIRST LNG IMPORT TERMINAL
  - WORLD'S FIRST FULLY INTEGRATED TURNKEY FLOATING LNG TERMINAL (UNDER A SINGLE CONTRACT BY A SINGLE PROVIDER) : BY EXCELERATE ENERGY
  - STARTED SUPPLYING RE-GASIFIED LNG COMMERCIALLY : FROM AUGUST 2018
  - COUNTERPARTY: PETROBANGLA
  - BASE LOAD/SEND OUT CAPACITY: 500 MMSCFD

- **SLNG BY SUMMIT**
  - BANGLADESH'S SECOND LNG IMPORT TERMINAL
  - STARTED SUPPLYING RE-GASIFIED LNG COMMERCIALLY : FROM APRIL 2019
  - FSRU PROVIDER & OWNER'S ENGINEER: EXCELERATE ENERGY
  - BASE LOAD/SEND OUT CAPACITY: 500 MMSCFD

EXCELERATE LNG FSRU

SUMMIT LNG FSRU

CHALLENGES OF LNG SECTOR

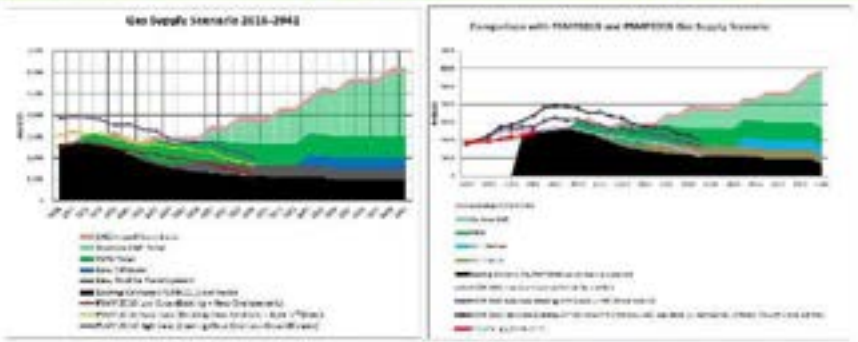
SUMMIT LNG FSRU

CHALLENGES IN LNG

- INTURRUPTION IN SUPPLY SECURITY OF LNG FROM THE PRESENT TWO FSRUS DUE TO EXTREME WEATHER CONDITIONS DURING THE MONSOON PERIOD
- DEEP SEA PORT IS STILL IN PROJECT PHASE, WILL TAKE TIME TO COMPLETE
- LNG IMPORT PRICE IN LAND BASED TERMINAL & FSRUS WILL NOT BE SAME, GOVERNMENT SHOULD ADDRESS THIS ISSUE
- OPEX OF FSRU IS VERY HIGH

PROSPECTS OF LNG SECTOR

GAS SUPPLY SCENARIO & FORECAST FOR 2016-2041 BY JICA



Gas Supply Scenarios 2016 – 2041 by JICA

Gas Supply Forecast for 2016 – 2041 by JICA

MAP OF PROPOSED PROJECTS AT MAHESHKHALI- MATARBARI DEEP SEA PORT

LAND BASED LNG TERMINAL AT MATARBARI

LAND BASED LNG IMPORT TERMINAL AT MATARBARI

A TYPICAL LAND BASED LNG IMPORT TERMINAL

SMALL SCALE LAND BASED LNG STORAGE TERMINAL

A TYPICAL SMALL SCALE LAND BASED LNG STORAGE TERMINAL

LNG IMPORT/DISTRIBUTION BY ISO TANKS

RECOMMENDATION

- DEVELOPMENT OF LAND BASED LNG TERMINAL TO FACILITATE IMPORT OF LNG ON LONG TERM PERSPECTIVE
- PRIVATE COMPANIES CAN FIND OUT SUITABLE LOCATIONS/LANDS (WITH RIVERINE ACCESS) FOR SMALL SCALE LNG TERMINALS
- GOVERNMENT SHOULD CREATE ACCESS TO THOSE LANDS TO PRIVATE COMPANIES
- PRIVATE SECTOR CAN OWN AND OPERATE SLING TERMINALS
- PETROBANGLA CAN BUY THE LNG AND PASS BACK TO PRIVATE COMPANIES FOR RETAILING WHICH IN TURN CREATES REVENUE FOR BANGLADESH GOVERNMENT AS WELL

RECOMMENDATION IN LNG SECTOR

CONTRIBUTION IN LIQUEFIED PETROLEUM GAS (LPG) SECTOR

CURRENT SCENARIO OF BANGLADESH LPG MARKET

LOCAL LPG PRODUCTION:	~ 2%
LOCAL PRODUCERS:	EASTERN REFINERY LIMITED & PFGCL
LPG IMPORT :	~ 98%
IMPORT TERMINALS:	~ 20
DEALERS:	~ 3000
RETAILERS:	~ 30 000
LPG CYLINDERS IN MARKET:	~ 80 000 000

IN 2015 BANGLADESH LPG IMPORT VOLUME	~ 560,000 MT
IN 2020 BANGLADESH LPG IMPORT VOLUME	~ 1,300,000 MT
GROWTH RATE	~ 14.8%

SOURCE: MARKET DATA & Daily Star

ROLE OF LPG OPERATORS DURING COVID

- LIQUEFIED PETROLEUM GAS (LPG) IS A GREEN FUEL THAT IS USED FOR COOKING AND HEATING.
- DURING COVID LOCKDOWN, LPG WAS DECLARED AS AN **'ESSENTIAL PRODUCT'** BY THE GOVERNMENT OF BANGLADESH.
- THIS FACILITATED THE TRANSPORT AND DISTRIBUTION OF LPG ACROSS THE COUNTRY.
- LPG OPERATORS HAVE ROLLED OUT HOME DELIVERY SERVICES OF CLEAN, SANITIZED LPG CYLINDERS.
- IT HAS HELPED MILLIONS OF FAMILIES TO *STAY HOME AND STAY SAFE* WITH ACCESS TO CLEAN COOKING FUELS.

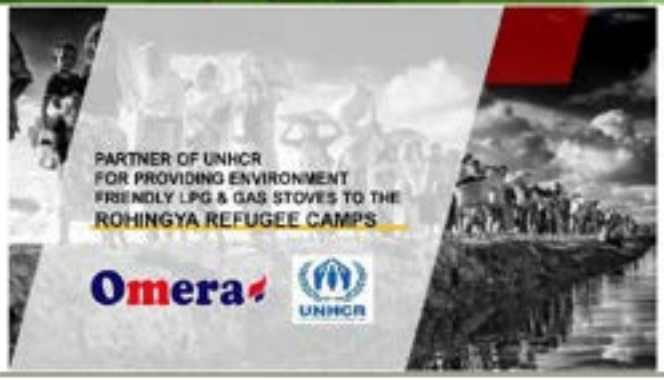
Bashundhara LP GAS Limited | Omera LPG | BEXIMCO LPG

LPG INDUSTRY ACHIEVEMENTS

DEBT FINANCING BY IFC (WORLD BANK)

- OMERA PETROLEUM LIMITED, SECURED DEBT FUNDING OF $40 MILLION FROM IFC, A MEMBER OF THE WORLD BANK GROUP, COMPLYING TO ALL ITS CONDITIONS & ON THE BEST **POSSIBLE TERMS**.
- THIS INVESTMENT IS FINANCING THE EXPANSION PROJECT OF THE COMPANY, FOLLOWING ALL DUE DILIGENCES AND MEETING OF COVENANTS, OPL IS THE FIRST AND ONLY DOWNSTREAM PETROLEUM COMPANY IN BANGLADESH WITH SUPPORT OF IFC.
- AS PER IFC STATEMENT" **OPL'S PROJECTS ARE TRANSFORMATIONAL IN** SUPPORTING TO MORE THAN DOUBLE ITS CAPACITY AND BUILD THE NECESSARY SUPPLY CHAIN AND INFRASTRUCTURE **TO INCREASE THE PENETRATION OF LPG DISTRIBUTION TO NEARLY ALL SUB-DISTRICTS OF BANGLADESH".**
- BY CONSERVATIVE ESTIMATES, IT IS EXPANDING THE ACCESS OF **LPG TO 350,000 ADDITIONAL HOUSEHOLDS** (AND 1/3 PERCENT OF TOTAL MARKET POTENTIAL) OVER THE LIFE OF THE LOAN. THUS, THE PROJECT WILL INCREASE ACCESS TO LPG TO A WIDER POPULATION, REDUCING GHG EMISSIONS BY SUBSTITUTING KEROSENE, WOOD AND OTHER HAZARDOUS COOKING FUELS, AND MOST IMPORTANTLY, ALLOWING LIMITED RESERVES OF NATURAL GAS TO BE DIVERTED TO POWER GENERATION AND INDUSTRIES.

PARTNER OF UNHCR FOR ROHINGYA PROJECT



ROHINGYA CAMP : BEFORE & AFTER ARRIVAL OF LPG FOR COOKING

BULK LPG EXPORT TO INDIA

INAUGURATION OF LPG EXPORT FROM BANGLADESH TO INDIA ON 5TH OCTOBER,2019

BULK LPG EXPORT TO INDIA

CLARIFICATION ON LPG EXPORT

- THE BULK EXPORT OF LPG TO INDIA HAS CREATED SOME CONFUSION DUE TO CIRCULATION OF WRONG INFORMATION
- ONLY LIQUEFIED PETROLEUM GAS (LPG), IMPORTED BY PRIVATE LPG OPERATORS IN BANGLADESH ARE BEING RE-EXPORTED TO INDIA. NO NATURAL GAS NOR LPG DERIVED FROM NATURAL GAS IS BEING EXPORTED TO INDIA
- THE LPG IS RE-EXPORTED AFTER THE PRIVATE COMPANIES HAVE SUCCESSFULLY MET LOCAL DEMAND AND MADE DUE VALUE ADDITION
- THE BUYER OF THE LPG IS STATE-OWNED INDIAN OIL CORPORATION LIMITED (IOCL), WHICH WILL BOTTLE AND SELL THE GAS TO CONSUMERS OF THE LANDLOCKED STATES OF INDIA
- WITH ACCESS TO LPG, PEOPLE OF THE REGION WILL HAVE BENEFIT OF CLEAN COOKING, SAFE HEALTH AND GREEN ENVIRONMENT, ULTIMATELY BOLSTERING ITS ECONOMIC ACTIVITIES, CREATING JOB OPPORTUNITIES AND BUSINESS GROWTH FOR BANGLADESH

LPG CYLINDER EXPORT TO GLOBAL MARKET

CHALLENGES OF LPG SECTOR

CHALLENGES OF LPG SECTOR

- MULTIPLE REGULATORS
- HIGHEST LPG IMPORT PRICES IN THE WORLD
  - CANNOT RECEIVE LARGE LPG VESSELS DUE TO LACK OF PORT INFRASTRUCTURE AND LOW WATER DEPTH
- HIGH IMPORT COST OF RAW MATERIALS FOR LPG CYLINDERS
- UNHEALTHY PRACTICES SUCH AS CROSS FILLING OF LPG CYLINDERS
- SMALL LPG COMPANIES (IN TERMS OF INFRASTRUCTURE & MARKET SHARE) DO NOT MAINTAIN STANDARD INDUSTRY PRACTICES AND SAFETY GUIDELINES

CHALLENGES ARISING OUT OF COMPLEX REGULATORY ENVIRONMENT FOR THE LPG INDUSTRY

REGULATORS CONCERNED WITH LPG OPERATION

Sl. No.	NAME OF REGULATORS
1	Bangladesh Energy Regulatory Commission (BERC)
2	Bangladesh Petroleum Corporation (BPC)
3	Bangladesh Investment Development Authority (BIDA)
4	Department of Environment (DoE)
5	Bangladesh Standards & Testing Institution (BSTI)
6	Department of Explosives (DoE)
7	Bangladesh Fire Service & Civil Defense (BFSCD)
8	Bangladesh Inland Water Transport Authority (BIWTA)
9	City Corporation/Local Government
10	Department of Inspection of Factories & Establishment (DIFE)
11	Office of the Chief Controller of Imports and Exports (CCI&E)
12	Dhaka Chamber of Commerce & Industry (DCCI)
13	Registrar of Joint Stock Companies and Firms (RJSC&F)

LICENSE FEE TO CONCERNED REGULATORS (ONE TIME DURING SET UP)

(Assuming 1 Import Terminal & 3 Satellite plants)

Sl. No.	Name of Regulators	One off Fee (Tk.)
1	Bangladesh Energy Regulatory Commission (BERC)	3,561,600
2	Bangladesh Petroleum Corporation (BPC)-PROPOSED	3,500,000
3	Bangladesh Investment Development Authority (BIDA)	90,000
4	Department of Environment (DoE)	205,800
5	Bangladesh Standards & Testing Institution (BSTI)	1,204,158
6	Department of Explosives (DoE)	111,600
7	Bangladesh Fire Service & Civil Defense (BFSCD)	186,000
8	Bangladesh Inland Water Transport Authority (BIWTA)	12,500,000
9	City Corporation/Local Government	11,700
10	Department of Inspection of Factories & Establishment (DIFE)	129,000
11	Office of the Chief Controller of Imports and Exports (CCI&E)	43,800
12	Dhaka Chamber of Commerce & Industry (DCCI)	18,930
13	Registrar of Joint Stock Companies and Firms (RJSC&F) (Assuming authorized capital Tk 100 crore)	2,700,000
	Grand Total	13,493,298

ANNUAL LICENSE FEE TO CONCERNED REGULATORS

(Assuming 1 Import Terminal & 3 Satellite plants)

Sl. No.	Name of Regulators	Annual Fee (Tk.)
1	Bangladesh Energy Regulatory Commission (BERC)	5,935,000
2	Bangladesh Petroleum Corporation (BPC)-PROPOSED	3,500,000
3	Department of Environment (DoE)	205,000
4	Bangladesh Standards & Testing Institution (BSTI)	1,073,625
5	Department of Explosives (DoE)	116,000
6	Bangladesh Fire Service & Civil Defense (BFSCD)	6,000
7	Bangladesh Inland Water Transport Authority (BIWTA)	12,500,000
8	City Corporation/Local Government	303,750
9	Department of Inspection of Factories & Establishment (DIFE)	6,000
10	Office of the Chief Controller of Imports and Exports (CCI&E)	30,000
11	Dhaka Chamber of Commerce & Industry (DCCI)	13,370
	Grand Total	23,189,895

REGULATORY DUPLICATION

- BERC WAS ESTABLISHED ON MARCH 13, 2003 TO REGULATE ELECTRICITY, GAS & PETROLEUM PRODUCTS INCLUDING LPG IN BANGLADESH AND PROMOTE EQUAL OPPORTUNITIES FOR PUBLIC AND PRIVATE INVESTMENTS AND TO DEVELOP COMPETITIVE MARKET
- AS PER THE BANGLADESH PETROLEUM ACT, 1974 AND SUBSEQUENT REPLACEMENT BY THE BANGLADESH PETROLEUM CORPORATION ACT 2016, BPC IS AUTHORIZED TO CONTROL ALL THE ACTIVITIES RELATING TO IMPORT, STORE, MARKETING, DISTRIBUTION OF LPG PRODUCTS IN BANGLADESH
- BPC OWN AND OPERATE LPG BUSINESS. SO IT IS A CONFLICT OF INTEREST FOR BPC TO PLAY A REGULATORY ROLE IN LPG SECTOR
- BERC IS COMPETENT AUTHORITY TO PAY A REGULATORY ROLE AND CONSIDER PRICE FORMULATION
- BPC IS CHARGING US A MARKETING FEE BY ENTERING INTO AN AGREEMENT WITH OPERATORS SHOWING REFERENCE TO SECTION 11 (M) OF BPC ACT 2016.
- BERC IS ALSO CHARGING VERY HIGH MARKETING FEE. SO WE DON'T UNDERSTAND WHY WE HAVE TO PAY MARKETING FEE TO BPC AND BERC AT THE SAME TIME

REGULATORY DUPLICATION (Cont..)

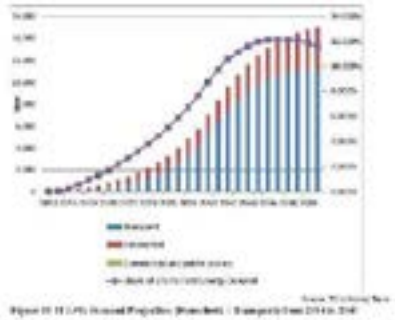
- BPC WAS CHARGING BDT 2 LACS PER ANNUM WHICH BPC PROPOSED TO INCREASE TK. 25 LAC PER ANNUM.
- AS PER BPC LETTER NO. 28.03.0000.038.03.023.20.218 DATED 28 JULY 2020 TO OPERATORS, BPC ALSO PROPOSED TO MAKE PROCEDURES TO ASCERTAIN A RETAIL PRICE FOR LP GAS IN THE COUNTRY. IT IS NOT CLEAR WHO IS GOING TO WORK WITH BNF STAKEHOLDERS TO DETERMINE AN AUTOMATIC PRICE FORMULATION
- BPC often nominate representatives of the oil marketing companies to inspect installations of the operators which is supposed to be done by DOE.
- Final operator endorsement comes through an agreement with BPC, where BPC itself is a LPG operator.
- Once operators get the license from BERC in addition to permission received from the ministry and SOE should suffice.

FALLACY

- IN OIL AND GAS MARKET, SOME PRICE FACTORS ARE VARIABLE IN ACCORDANCE TO THE PRACTICES IN THE INTERNATIONAL MARKET
- PRICE CAN NOT BE FIXED WHEN THERE IS A VARIABLE COST ELEMENTS THAT DETERMINE THE PRICE IN THE INTERNATIONAL MARKET
- THEREFORE, THE FIXED COST AND VARIABLE COST MAKES A PRICE COMPOSITION BASED ON DEMAND AND SUPPLY .THIS IS CALLED AUTOMATIC PRICE FORMULATION
- AN AUTOMATIC PRICING FORMULA MEANS IT AUTOMATICALLY GET ADJUSTED WITH ESCALATION AND DE-ESCALATION OF PRICES IN THE INTERNATIONAL MARKET

PROSPECTS OF LPG SECTOR

LPG INDUSTRY FORECAST BY JICA



LPG DEMAND PROJECTION (HOUSEHOLD+ TRANSPORT FROM 2014 TO 2041)

REFRIGERATED LIQUEFIED PETROLEUM GAS (REF-LPG) IMPORT & STORAGE TERMINAL AT MOHESHKHALI MATARBARI DEEP SEA PORT

- THE MAJORITY OF THE LPG COMPANIES OF BANGLADESH HAVE THEIR IMPORT TERMINALS AT SHALLOW DRAFT LOCATIONS
- AS A MATTER OF FACT, THEY CAN ONLY IMPORT 2,500 – 4,000 MT LPG VESSELS FROM THE ASIA PACIFIC BY PAYING HIGH FREIGHT COSTS/ CARGO PREMIUMS WHICH EVENTUALLY INCREASE THE COST/MT AT CONSUMER LEVEL
- BY SETTING UP A REFRIGERATED LPG IMPORT TERMINAL UNDER **MOHESHKHALI-MATARBARI INTEGRATED INFRASTRUCTURE DEVELOPMENT INITIATIVE (MIDI),** THE FOLLOWING OPERATION CAN BE PERFORMED:
  - IMPORT 44,000 MT VLGCS (VERY LARGE GAS CARRIER) FROM THE U.S.A AND MIDDLE EAST (ARAB GULF) AND PAYING MARGINAL FREIGHT COSTS
  - BUILD A 50,000 MT REFRIGERATED STORAGE FACILITY IN THE PROPOSED LOCATION FOR STORING THE WHOLE CARGO AT A GO
  - MARKET AND SUPPLY THE LPG TO THE LOCAL LPG MARKETING COMPANIES USING SMALL DRAUGHT/ER VESSELS (2,500 – 4,000 MT HYDRAULIC COASTAL LPG BARGES AND ROAD TANKERS)
  - RE-EXPORT MEDIUM SIZED LPG PARCELS OF 10,000 MT TO 15,000 MT TO NEIGHBORING MARKETS SUCH AS BHUTAN, MYANMAR, SRI LANKA, INDIA, MALDIVES AND OTHER ASIA PACIFIC COUNTRIES AFTER MEETING BANGLADESH DEMAND
- THIS IS HOW LPG IMPORT COSTS AND DOMESTIC PRICES WILL BE MORE COMPETITIVE AND USER FRIENDLY

REFRIGERATED LIQUEFIED PETROLEUM GAS (REF-LPG) IMPORT & STORAGE TERMINAL AT MOHESHKHALI MATARBARI DEEP SEA PORT

- THE SHIPPING WILL ALSO TAKE LOWER LEAD TIMES (9 DAYS INSTEAD OF 18 DAYS)
- THIS WILL ALSO ENCOURAGE USE OF ALTERNATIVE FUELS AND ALLOW THE GOVERNMENT OF BANGLADESH TO DIVERT NATURAL GAS TO PRODUCTIVE SECTORS ONLY
- THE TERMINAL'S RE-EXPORT OPERATIONS OF LPG TO FOREIGN MARKETS WILL FETCH MASSIVE SUMS OF FOREIGN CURRENCY FOR THE BANGLADESH ECONOMY, THEREFORE COMPLEMENTING THE BANGLADESH BANK'S ACCUMULATION OF FOREIGN CURRENCY RESERVES
- **PRIVATE COMPANIES CAN SOLELY OR BY FORMING JOINT VENTURE WITH FOREIGN COMPANIES CAN OWN AND OPERATE SUCH LARGE SCALE REF-LPG TERMINALS**

MAP OF MAHESHKHALI- MATARBARI DEEP SEA PORT & PROBABLE LOCATION FOR REF - LPG TERMINAL

CLEAN SOURCE OF POWER GENERATION : LPG FIRED POWER PLANTS

<Clean Source of Power : LPG>
Base load: Geothermal, Hydroelectricity, Nuclear, Coal, **LPG**
Middle : LNG
Peak : Oil, Pumped-storage hydroelectricity

Character of LPG Power Generation

- High flexibility of supply chain
  ⇒Facility optimization leads to lower CAPEX
- More than 120 Units are installed in the world, More than 100 Units of Power scale are less than 100MW

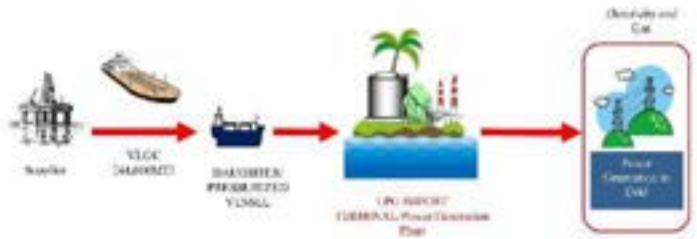
Main target of LPG Power | **Small power plants of 100 MW**

PARTICULARS OF LPG FIRED POWER PLANT

	Items	Merits
1.Comparison with LNG		
①	CAPEX	Cheaper than LNG Facilities
②	Handling	Easy storage and transportation
2.Comparison with Diesel Oil		
①	Fuel Cost	Cheaper than Diesel Oil
②	Performance	Output: Approx. +0.7% Energy efficiency: Approx.+1.3% (Depends on operational conditions)
③	Emission	Emission decrease in large amounts

BUILDING ON-SHORE IMPORTING FACILITIES (LPG IMPORT TERMINAL-ALREADY AVAILABLE)

△ LPG is supplied from VLGC to the power plant via Barge(not Pressurized vessel)
△ This Power generation Plant will also work as LPG import terminal, which results in a combined facility which can distribute both electricity and gas



COMPARISON OF FUEL FOR POWER GENERATION (IN USD)

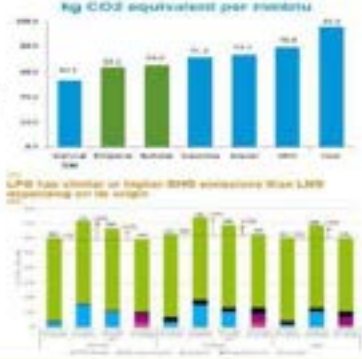
	Oil	LNG	Small-scale LNG (FSRU)	LPG
Generation Capacity	400MW Efficiency 39%	1,400MW Efficiency 52%	800MW Efficiency 52%	100MW Efficiency 51%
CAPEX	1.2 ¢/kWh USD 696 mil	0.7 ¢/kWh USD 1,461 mil	2.4 ¢/kWh USD 347 mil	0.9 ¢/kWh USD 130 mil
Maintenance Cost	0.9 ¢/kWh	0.4 ¢/kWh	1.5 ¢/kWh	0.6 ¢/kWh
Fuel Cost	7.7 ¢/kWh	4.7 ¢/kWh	4.7 ¢/kWh	5.6 ¢/kWh
Generation Cost	9.8 ¢/kWh	5.8 ¢/kWh	8.7 ¢/kWh	7.0 ¢/kWh
Environmental Performance				
Operation Characteristics				

LPG FIRED COMBINED CYCLE

LPG Burning Combined Cycle Output:120MW Efficiency:50.8%

FOCUS ON ENVIRONMENTAL IMPACT

- In the context of power plants, LPG has a strong environmental performance, particularly when compared to oil or coal alternatives
- Greenhouse gas impact is comparable to LNG and exhaust gas treatment is facilitated with LPG compared to LNG, diesel and HFO with very low Sox, Nox and Particles Matters emissions
- LPG fired power plants can contribute to further environmental improvements with the following solutions:
  - Inclusion of heat recovery system / cogeneration
  - Inclusion of on-site renewables solutions (solar panels etc..)
  - Focus on eco friendly shipping for LPG supply



KEY HIGHLIGHTS OF LPG TO POWER SOLUTIONS

Clean:
LPG is a low carbon fuel with significant benefits to contribute to sustainable development goals, and UN support programs

Flexible:
Highly versatile fuel (cooking, monsoon, power), which can be deployed as a permanent solution for IPPs

Fast:
Global availability of the fuel with fully developed logistics chain (sea, rail, road) allowing simple and quick implementation of solutions, including in remote locations

Competitive:
Combination of market over supply, proven technology and low capital investments result in solid price competitiveness, particularly versus diesel

Calorific value:
LNG (49.3 MJ/KG) > HFO (41.8 MJ/KG)

RECOMMENDATION IN LPG SECTOR

RECOMMENDATION

- GOVERNMENT SHOULD PROVIDE FULL POLICY SUPPORT TO LPG INDUSTRY
- ENFORCING SUPERVISORY OF GOVERNMENT ORGANIZATIONS SUCH AS DG NETWORK OF EXPLOSIVES, BMDA ETC. TO CONTROL INDUSTRY MISS PRACTICES/ACTS AND SECURE NATIONAL INTEREST
- FRAMING OF NATIONAL POLICY GUIDELINES FOR REDUCING DEPENDENCY ON USAGES OF NATURAL GAS AND ENCOURAGE USE OF LPG IN DOMESTIC, COMMERCIAL AND INDUSTRIAL SEGMENTS
- NEW POLICY FOR INSTALLATION OF LPG IN LPG FIRED POWER PLANTS
- IMPORT OF LPG CYLINDER MUST NOT TAX TO MAKE THE LPG SECTOR COMPETITIVE
- PRIVATE ENTITIES HAVE PROVEN TRACK RECORD AND ALL EXPERTISE TO OWN AND OPERATE SUCH REFUELING TERMINAL. GOVERNMENT SHOULD CONSIDER MARKETING SUCH PROJECTS TO PRIVATE COMPANIES OF BANGLADESH
- NOT ALL INTERNATIONAL OIL & GAS COMPANIES HAVE SUFFICIENT CREDENTIALS. GOVERNMENT SHOULD CHECK AND PROVIDE PRIVATE COMPANIES


FINANCIAL POST

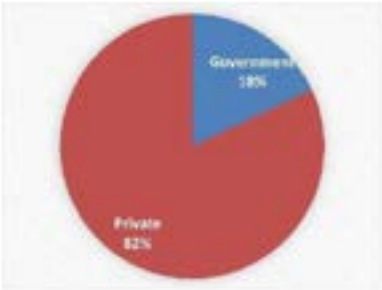
Vitol Pays $160 Million to Settle Bribery, Manipulation Charges

CONTRIBUTION IN LUBRICATING OIL SECTOR

LUBRICATING OIL MARKET SCENARIO IN BANGLADESH

- TOTAL MARKET SIZE : ~ 130 MILLION LITER (2019)
- MARKET MONETARY VALUE AROUND : BDT 3,500 CORE
- MAJOR SECTORS:
  - AUTOMOBILE SECTOR
  - INDUSTRIES SECTOR
  - POWER PLANT SECTOR
  - AGRICULTURE
  - MARINE
- THE BANGLADESH LUBRICANTS MARKET EXPECTED GROWTH IS AROUND 3% PER ANNUM

CONTRIBUTION OF PRIVATE SECTOR



GOVERNMENT:

BANGLADESH PETROLEUM CORPORATION (BPC)

i. MEGHNA PETROLEUM LIMITED.
ii. JAMUNA OIL COMPANY LIMITED.
iii. PADMA OIL COMPANY LIMITED.
iv. STANDARD ASIATIC OIL COMPANY LIMITED.
v. EASTERN LUBRICANTS BLENDERS LIMITED (DEFUNCT ONE)

STATE OWNED COMPANIES ARE MARKETING THE FOLLOWING BRANDS

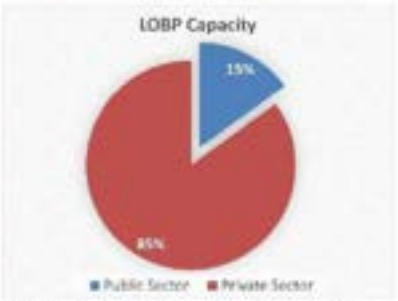
- MOBIL
- BP
- TOTAL
- ORIENTA LUBRICANTS
- CASTROL
- UNOCAL
- MEGHNA
- QR
- JAMUNA ETC.

BRANDED LUBRICANTS

Source: BPC Data

LUBRICATING OIL BLENDERS AND BLENDING CAPACITY

Sn	Name of Lube Blenders	Brand	Capacity MT
1	Standard Asiatic Oil Co Ltd (Public)	/IOCL/MRL/PDCL	50,000
2	Eastern Lubricant Blenders Ltd (Public)	/IOCL/MRL/PDCL	26,000
3	M.I. Bangladesh Limited	Mobil/Omera	50,000
4	Pacific Oil Co. Limited	Sirsi	12,000
5	Lubricant Asia Ltd	Puma	12,000
6	Global Oil Co. Ltd	AP	20,000
7	Sigma oil Industries Ltd	Soil	25,000
8	City Oil Industries Limited	Amrath	20,000
9	Al Haj Abdul Kashim Ltd	IB	30,000
10	Sita Amrobah Oil Agency Ltd	Boss	15,000
11	Mega Lubricants Ltd	Mega/Tiffi	10,000
12	Rc Lubricants Ltd	Kings	12,000
13	Lub-rel Bangladesh Limited	BMD	20,000
14	Mm oil Ltd	Mm	5,000
15	Oriental Oil Co Limited	Orient	30,000
16	Lube House Limited	National	25,000
		Total Capacity	379,000



NOTE: THE TOTAL LOCAL BLENDING CAPACITY IS 2.3 TIMES THAN THE LUBE MARKET DEMAND, THE YEAR 2019

BEST PRACTICES OF LUBRICATING OIL BLENDING PLANT | AUDIT

Exxon Mobil Global Audit Achievement_2020	
3PIMS	3.9 out of 4
QPnG	3.8 out of 4
ISO	ISO 9001:2015

Note:
1. 3PIMS: ExxonMobil Product Integrity Management System
2. QPnG : ExxonMobil Quality Practices & Guidelines

BEST Practices Endorsement By Global Major Player As An Example.

WORLD CLASS BLENDING FACILITY DONE BY PRIVATE COMPANIES

WORLD CLASS BLENDING FACILITY DONE BY PRIVATE COMPANIES

CHALLENGES IN LUBRICATING OIL SECTOR

RECOMMENDATION IN LUBRICATING OIL SECTOR

CHALLENGES AND PROBLEMS FACED BY PRIVATE SECTOR IN BANGLADESH

- **COUNTERFEIT/ADULTERATION** PRODUCTS HAVE BEEN A BIG CONCERN AREA FOR THE LUBRICANTS INDUSTRY
- LACK OF REGULATORY **MONITORING** IN LUBRICATING OIL SECTOR
- **RE-CYCLE OIL**, EXTRACT THROUGH CONVENTIONAL FILTRATION OF USED LUBRICANTS, IS ANOTHER CONCERN
- ANYBODY CAN **ENTER** THE LUBRICANT INDUSTRY OR MARKETING, WHICH HAS RENDERED IT DIFFICULT TO ENSURE QUALITY DUE TO INSUFFICIENT POLICY TO CONTROL
- **TOO MANY PLAYERS,** IN THE MARKET, HAVE BEEN FLOODING INFERIOR QUALITY PRODUCTS WITH MINIMUM ACCOUNTABILITY
- THE GOVERNMENT IS ALLOWING TO PRODUCE/MARKET VERY LOW-QUALITY GRADE WHICH IS GLOBALLY OBSOLETE (I.E., **API SC/CC) IN THE YEAR 1967.**

RECOMMENDATION

- THE MINIMUM STANDARD API GRADE SHOULD BE SET FOR **GASOLINE ENGINE: SG/CD** AND **DIESEL ENGINE: CF/SF** AND GRADUALLY UPGRADE IT TO THE GLOBAL STANDARD
- STRONG LAW ENFORCEMENT TO STOP **COUNTERFEIT/ADULTERATION** THROUGH MOBILE COURT/REGULATORY CONTROL AUTHORITY
- POLICY REFORM OF LUBRICANT MARKET
- REQUIRED POLICY ON PROPER COLLECTION AND DISPOSAL OF **USED LUBRICANTS** TO PROTECT THE ENVIRONMENT & COUNTERFEIT
- **RECYCLE USED** LUBRICANTS MUST BE **BANNED** TO USE AS A LUBRICATING OIL
- STRENGTHENING OF **"MONITORING CELL"** INCLUDING BSTI/BDRC TO MONITOR THE QUALITY OF LUBRICANTS FROM LOCAL LUBE OIL BLENDING PLANTS, IMPORTATION AND MARKETING TO ENSURE THE MINIMUM SET STANDARD
- FULLY PROHIBITED TO BLEND/IMPORT/MARKET LUBRICATING OIL HIGHER THAN SAE 50 VISCOSITY ENGINE OILS
- THE GOVERNMENT ALREADY HAS TAKEN THE FISCAL MEASURE OF SETTING "MINIMUM ASSESSMENT VALUE" OF FINISHED LUBRICANTS TO **USD 2000 PER MT** BUT YET TO SET THE MINIMUM ASSESSMENT VALUE SEPARATELY FOR THE **SYNTHETIC FINISHED LUBRICANTS** (SOURCE PRICE OF SYNTHETIC OILS ALWAYS MORE THAN DOUBLE OF BEST QUALITY MINERAL OIL)
- THOUGH THE BASE OIL MINIMUM ASSESSMENT VALUE IS SET TO **USD 700/MT**, WHICH NEEDS TO BE AMENDED PERIODICALLY (QUARTERLY/YEARLY) FOLLOWING ICIS-LOR INDEX VALUE (AS PER GLOBAL PRICE CHANGE)

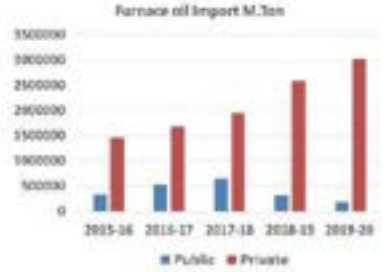
Note: ICIS-LOR: Independent Commodity Information Services London Oil Reports

CONTRIBUTION IN FURNACE OIL SECTOR

FURNACE OIL (HSFO): OVERVIEW

Imported Petroleum Products: Furnace

Financial Year	Furnace Oil (M.T)	
	Public	Private (Approx.)
2015-16	3,35,150	14,64,850
2016-17	5,21,199	16,78,801
2017-18	6,50,540	19,49,460
2018-19	3,18,634	25,81,366
2019-20	1,75,693	30,24,307



NOTE: BPC IMPORT CONTINUOUSLY DROPPED DUE TO ALLOWING PRIVATE POWER PRODUCERS TO IMPORT FURNACE OIL FOR THEIR OWN CONSUMPTION

FURNACE OIL (HFO): OVERVIEW OF IMPORTATION & CONSUMERS

- HIGH SULPHUR FURNACE OIL (HSFO), 180 CST WITH SULPHUR CONTAINS 2.5-3.5%WT.
- MAJOR CONSUMER- AROUND 43% CONSUMED BY HSFO FIRED POWER PLANT (5,724 MW).
- PRIVATE POWER PRODUCERS ARE ALLOWED TO IMPORT FURNACE OIL FOR THEIR OWN POWER PLANT CONSUMPTION SINCE 2011 AND CONSUMPTION INCREASING GRADUALLY AS GOVERNMENT APPROVED POWER PLANTS ARE NEWLY SETTING.
- THE EASTERN REFINERY LIMITED (ERL) UNDER THE STATE-RUN BANGLADESH PETROLEUM CORPORATION (BPC) ALSO PRODUCES FURNACE OIL AS A BY-PRODUCT
- GOVERNMENT OF BANGLADESH ALLOWED PRIVATE COMPANIES TO IMPORT FURNACE OIL (HFO) FOR POWER PLANTS

A TYPICAL FURNACE OIL TERMINAL

A TYPICAL FURNACE OIL TERMINAL

WORLD CLASS FURNACE OIL TANK TERMINAL BY PRIVATE COMPANIES

CHALLENGES IN FURNACE OIL SECTOR

FURNACE OIL (HSFO): CHALLENGES

- BANGLADESH POWER GENERATION CAPACITY IS AROUND 19,991 MW, OUT OF WHICH, FURNACE-OIL-BASED POWER PLANTS 5,724 MW, REQUIRE APPROX. 7.8 MILLION TONS OF HSFO ANNUALLY . (CONSIDERING 55% CAPACITY UTILIZATION).
- HIGHLY FLUCTUATING DEMAND DUE TO SESSIONAL AND PICK-HOUR OPERATIONAL IMPACT OF HSFO POWER PLANTS THAT'S WHY HSFO CONSUMPTION VARIES WIDELY AND DIFFICULT TO MAINTAIN THE SUPPLY CHAIN.
- **NOT ENOUGH STORAGE FACILITY IN PUBLIC SECTOR FOR IMPORTED FURNACE OIL.**

Source: BPDB, 2019

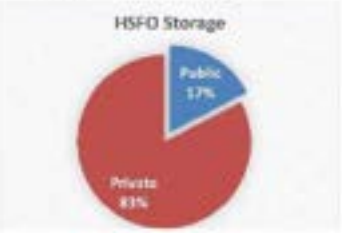
RECOMMENDATION IN FURNACE OIL SECTOR

CONTRIBUTION IN CRUDE OIL SECTOR

Public-Private Development : Furnace Oil (HSFO)

- CURRENTLY, THE BPC HAS A TOTAL STORAGE CAPACITY OF 1.31 MILLION TONS OF LIQUID PETROLEUM PRODUCTS, WHICH INCLUDE DIESEL, FURNACE OIL, PETROL, OCTANE, KEROSENE, BITUMEN, CONDENSATE, CRUDE OIL, ETC.
- EACH POWER PLANT HAS A SUBTAIN HSFO STORAGE TANK OF CAPACITY AROUND 5000-10000 MT.
- **THE PUBLIC PRIVATE PARTNERSHIP STORAGE CAPACITY MAY SOLVE THE DIFFICULTIES OF HSFO STORING CAPACITY AND FASE UP THE OPERATION.**

HSFO Storage Capacity (approx.) MT	
Public	Private
75,000	856,012



KEY HIGHLIGHTS OF CRUDE OIL SECTOR: 2011-2020

IMPORTED QUANTITY OF CRUDE OIL : 2011 - 2020

IMPORT OF REDEFINED PETROLEUM PRODUCTS : 2011 - 2020

IMPORT DEPENDENT CRUDE OIL SECTOR

CRUDE OIL: CHALLENGES

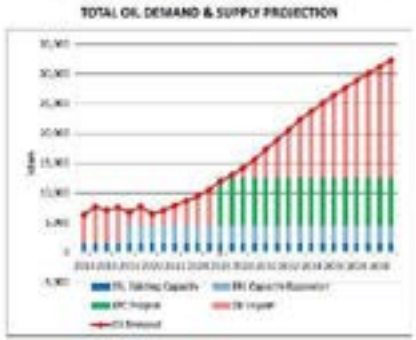
- NO SPM (SINGLE POINT MOORING) FOR RECEIVING OF IMPORTED CRUDE OIL
- LIGHERAGE OF OIL PRODUCT IS DONE THAT CAUSES ADDITIONAL COST
- VERY LIMITED NUMBER OF LARGE SCALE OIL REFINERY IS AVAILABLE IN BANGLADESH

Source: BPDB, 2019

CHALLENGES IN CRUDE OIL SECTOR

PROSPECT OF CRUDE OIL SECTOR

TOTAL OIL DEMAND & SUPPLY PROJECTION BY JICA: 2014-2041



BANGLADESHI AFRAMAX TANKERS USED FOR CRUDE OIL IMPORT : OMERA QUEEN

BANGLADESHI AFRAMAX TANKERS USED FOR CRUDE OIL IMPORT : OMERA LEGACY

RECOMMENDATION IN CRUDE OIL SECTOR

RECOMMENDATION

- INSTALLATION OF SPM (SINGLE POINT MOORING) FOR RECEIVING OF IMPORTED CRUDE OIL WITHOUT LIGHTERAGE
- PRIVATE ENTITIES, EITHER SOLELY OR IN JV WITH INTERNATIONAL COMPANIES, ARE CAPABLE TO INSTALL AND OPERATE SUCH SPM FOR CRUDE OIL IMPORT
- GOVERNMENT OF BANGLADESH CAN BUY CRUDE OIL 50% THROUGH G2G AND 50% THROUGH PRIVATE ENTITIES BY TENDER
- REHABILITATION AND EXPANSION OF OUR REFINERY TO RAISE ITS CAPACITY UP TO 100,000 /BBLS A DAY
- BUILDING OF STORAGE CAPACITY TO INCREASE INVENTORY FROM 180 DAYS TO 90 DAYS
- PRIVATE SECTOR MUST BE ENCOURAGED AND INCENTIVIZED TO INVEST ALONG WITH THE PUBLIC ENTERPRISES TO BUILD CAPACITY
- NEED TO SET UP LARGE SCALE OIL REFINERY UNDER PRIVATE / PRIVATE-PUBLIC OWNERSHIP
- PETROBANGLA CAN BUY THE CRUDE OIL AND PASS BACK TO PRIVATE COMPANIES WHICH IN TURN CREATES REVENUE FOR BANGLADESH GOVERNMENT AS WELL
- PRIVATE COMPANIES CAN ARRANGE ALL THE SUPPLIES AS WELL
- BANGLADESH CAN USE OWN VESSELS TO IMPORT ALL CRUDE OIL PRODUCTS

BITUMIN & OTHER PETROLEUM PRODUCTS

PRIVATE ENTITIES SUCCESS STORY – BITUMIN, TRANSFORMER OIL, ADDITIVES

Annual Demand	500,000 MT	
ERL production	68,877 MT	2018-2019
Spend	Around 1720 crore in 2019	Daily star
Private company production capacity/ arisen	275, 000 MT at present Will be increased upto 500,000 MT	Targeting 3-4 lakh MT to export

Annual Demand	
Supply	
Gap Market	

Supply	
Production by ERL	
Import by Private Entities	
Production by Private Entities	

RECOMMENDATION FROM PRIVATE ENTITIES TO ENHANCE ENERGY SECURITY

GOING FORWARD

BANGLADESH WILL HAVE TO TAKE FOLLOWING STEPS WITH TOP PRIORITY TO MAINTAIN ITS WHEEL OF GROWTH BY CREATING ADEQUATE ENERGY SECURITY:

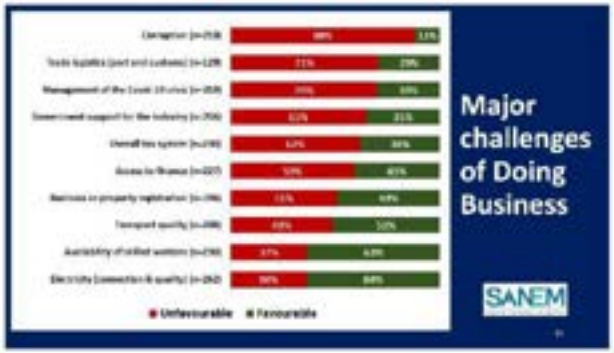
- AMENDMENT OF PETROLEUM ACT 1974 (BPC ORDINANCE)
- INVESTMENT AT HOME AND ABROAD FOR BUILDING RESERVE
- INVESTMENT IN INFRASTRUCTURE LIKE DEVELOPMENT OF DEEP SEA PORTS AT MAHESHKHALI, CHITTAGONG BAY TERMINAL AND PAYRA (PATUAKHALI)
- THIS CAN BE A RULE FOR ALL TYPE OF LIQUID PRODUCT IMPORT WHICH WILL EVENTUALLY MAKE THE PRODUCT COST COMPETITIVE
- WE NEED TO REMAIN COMPETITIVE IN PRODUCTION AND SERVICE SECTOR
- BUILD UP PETROCHEMICAL TERMINAL TO REDUCE THE RAW MATERIAL IMPORT COST OF PLASTIC PRODUCTS
- NEED TO HAVE "ONE STOP SERVICE CENTER"
- SUBSIDY / INCENTIVE IN PRIVATE SECTOR
- HIGH TAX RATES FOR PRIVATE ENTITIES ARE DISCOURAGING PRIVATE COMPANIES TO INVEST MORE IN BANGLADESH ECONOMY FOR ITS SUSTAINABLE DEVELOPMENT IN THE LONG RUN

OVERALL CHALLENGES IN INVESTMENT CLIMATE

CHALLENGES IN INVESTMENT CLIMATE

Investment Constraints	Some Specific Policy Actions and Reforms Options
Access to Finance	Private equity market, strengthening, loan resolution strategy, Diversification of external commercial borrowing, credit information system for MSMEs, bank mergers, bond market development, streamlined approval process for corporate bonds, partial liberalization of foreign exchange control restriction, credit guarantee for SMEs
Customs and Logistics	Fast approval of new projects etc, rationalization of tariffs for high priority export sector, Separate bonded regime for non-RMG sectors, develop logistics warehousing facilities, strengthen port governance, implement customs single window in 20 months
Regulatory reforms	Develop government policy on regulatory governance and stakeholder processes, establish technical oversight body to oversee regulatory reforms, modernize Companies Act, Arbitration Act, Bankruptcy Act, Foreign Exchange Regulation regime etc., faster implementation of Doing Business reform plans, improve policy predictability
Infrastructure	Fast implementation of Bay Terminal and Mongla-Ashuganj ports, completion of at least three PPP special economic zones in 2020, creation of new international airport terminal, corridor and further expansion of telecom coverage, upgradation in line with global trends
Taxes	Increase contribution from direct taxes, move progressive income tax rate, reduction in tax rates , simplify and unify tax regime for private sector , reduce VAT tax burden on SMEs, digitalize tax return filing + processing – automatic application of tax policy and administration, reduce discretionary power of tax officials, make TAI ADR effective
Energy policy	Continuation of current policy and engagements to utilize foreign assistance, private power producers
FDI policy	Modernize FDI-relevant laws, develop FDI Policy , adopt medium term targeted investment promotion strategies, streamlining approval process, completion of effective one-stop shop, better tax sustainment and investment policies
Export diversification	Fast implement external export roadmaps, improve standards capacity, environmental, assist for further market access, develop export market intelligence system, policies and support for export sector and supply chain to have better access to technology
Corporate governance	Encourage more listing and transparency, strengthening contract enforcement through introduction of ADR and strengthening commercial justice system

CHALLENGES IN INVESTMENT CLIMATE



EXPECTATION FROM GOVERNMENT TO OVERCOME THE CHALLENGES

POLICY AND REFORM PRIORITIES

VIBRANT DOING BUSINESS IMPROVEMENT PROGRAM: EXPEDITING DOUBLE-DIGIT VISION

Significant Progress in the Past Years

- Clear, Time-Bound Reform Direction : Comprehensive DB Reform Memorandum and Disaggregated Reform Action Plan
- Strong Political Will
- Powerful Institutional Structure for Monitoring and Coordination : NCMB
- Dedicated Coordination and Secretariat : BIDA
- Encouraging Early Success
- Nine Concrete Reforms Across 7 Indicator Areas in Last 12 Months
- 27 Reforms Earmarked for Implementation in Next 12 Months

Bigger Bang for Buck Possible But Requires

- Implementation Pace: Need for Time-bound Actions
- Broad-based Ownership (Are Line Agencies Equally Motivated ?)
- Opening Entry for Bolder, Higher-order Reforms (e.g. Tax Policy, Tariff Structure, Financial Sector, Standards etc.)
- Engaging Private Sector in the Reform Process
- Feedback Loop

FAST-MOVING SEZ AGENDA NOW THE KEY INDUSTRIAL POLICY TOOL: EXPANDING ISLANDS OF SUCCESS INTO CONTINENTS OF IMPACT

- **Excellent Progress Across The Board**
  - Congenial Legal and Regulatory Framework
  - Strong Institutional Capacity: Pro-active, Focused Planning and Implementation by BEZA
  - Large Land Bank
  - Progressive Infrastructure Development (20 Licensed – 11 Private, and 2 PPP; 8 Operational)
  - Rising Investments ($3.8b)
  - More and Better Jobs (34 Thousands)
  - Innovative G2G Models (Japanese SEZ; Sumitomo-BEZA Partnership Model)
- **Further Attention Required to Address**
  - Sudden Policy Changes (e.g. 15% VAT Imposed on Land Leases)
  - Tax and Incentive Treatment
  - Better Linkage with Domestic Economy
  - Logistics Connectivity
  - Distributional Effect on National Employment

WHY TAX TOPS INVESTORS' CONCERN: RATES AND PREDICTABILITY

FOREIGN EXCHANGE REGULATIONS: GREAT START BUT TIME FOR FULL OVERHAUL

SEVERAL USEFUL CHANGES PUT IN PLACE

- Credit permissible income allowed in foreign currency accounts.
- Dividend payable to foreign shareholders may be credited to their foreign currency accounts maintained in Bangladesh
- Declared dividend may be remitted and used as inward remittances for re-investment
- Allowed foreign investors to remit share sale proceeds to non-listed companies under three cases without the need to take prior approval from the central bank.
- Approval from the BB or valuation from independent agency would be not required to repatriate sales proceeds of shares of up to Tk 1 crore or equivalent foreign currency

BUT MORE CAN BE DONE

- Implementation Gap (Provisions of Law vis-a-vis Practice)
- Ad-Hoc/Discretionary Decisions
- Exit Valuation Methods

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- Exit Valuation Methods

POST COVID REALITY IN BUSINESS

1. ***De-globalization*** –businesses will source from nearer to home, there will be increasing use technology in production and logistics
2. ***Large corporations will optimize their size & further strengthen*** their positions
3. ***Supply-chain protection/strengthening*** will gain importance (focus on diversified investment and payment mechanisms)
4. ***Businesses will be conducted on Digital platforms***
5. ***Governments will become dominant customers*** – next 24 months
6. ***Focus on SMEs to support shorter supply chains*** – renewed importance

Shifting Trends in International Production Systems:

Re-shoring, Diversification, Regionalization, Replication

Source: Policy Exchange of Bangladesh

WHAT'S IN THE SHIFTING TRENDS FOR BANGLADESH?

Challenges	Opportunities
Impact of restructuring of international production configurations: divestment, relocations, investment diversion	Attracting investors that are looking to diversify supply bases and building redundancy and resilience
Shrinking pool of efficiency-seeking investment, tougher competition for FDI	Increasing local and regional market-seeking FDI and distributed manufacturing
Value capture in GVCs and development based on workbook specialization increasingly difficult	Shorter value chains and more investment in final-goods production with broader industrial capability and clustering
Diminishing returns of infrastructure built for a world of GVCs	Digital infrastructure and platforms enabling new applications and services and new S&C entrants

While Global Value Chains are shrinking, domestic demand is expanding

Source : Prime Exchange of Bangladesh

SHIFTING TRENDS IN GLOBAL FDI AND STRATEGIC OPTIONS FOR BANGLADESH

SIX FRONTS TO FACILITATE INVESTMENTS IN UNCERTAIN TIMES

01
02
03
04
05
06

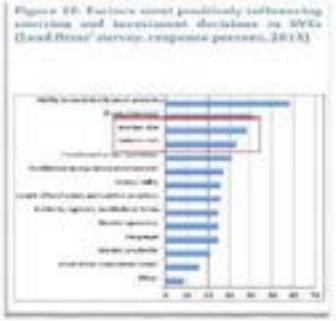
Source : Prime Exchange of Bangladesh

MOVING AWAY FROM LABOR-COST DIFFERENTIAL TO COMPETITIVENESS-BASED VALUE PROPOSITION

Bangladesh has an important **market size & competitive labor cost.**

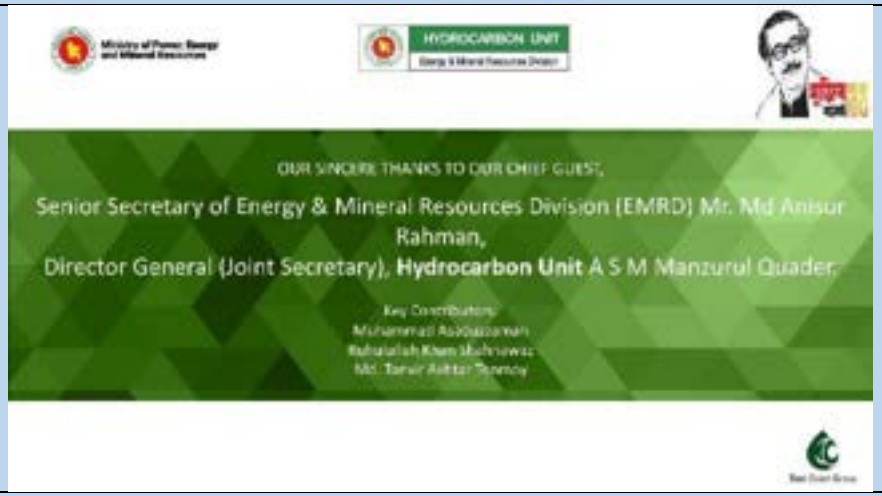
But investors also look for:

- *Compliance with international production standards*
- *Confidence in regulatory enforcement*
- *Skilled labor*
- *Easy cross-border movement of goods, labor, capital and ideas*
- *Easy access to critical inputs: power, transportation and industrial land*
- *Efficient reaction by authorities (institutional capacity)*



Source : Prime Exchange of Bangladesh, World Bank Group

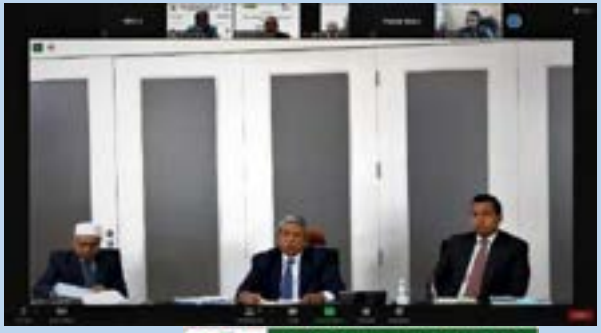

MANY STRENGTHS FOR FOREIGN INVESTORS TO LEVERAGE:
INVESTMENT IN BANGLADESH
High Growth Rate
Sound Macro-economic Management
Demographic Dividend to Last for Another Several Decades
Rising Purchasing Power
Liberal Policies for Private Participation in All but Four Sectors
Strategic Geographic Location
Proven Manufacturing and Export Capacity
Affordable and Flexible Labor Market
Preferential Market Access


HYDROCARBON UNIT
OUR SINCERE THANKS TO OUR CHIEF GUEST,
Senior Secretary of Energy & Mineral Resources Division (EMRD) Mr. Md Anisur Rahman,
Director General (Joint Secretary), Hydrocarbon Unit A S M Manzurul Quader.

Recommendations of the participants at the seminar "Role of Private Entities in the Energy Sector of Bangladesh":

The key topics discussed in the seminar are as follows:	Recommendations:
✓ Covid-19 scenario in Bangladesh ✓ Contribution of private entities to the energy sector of Bangladesh ✓ Challenges faced by private entities in energy sector of Bangladesh ✓ Prospects of private entities in energy sector of Bangladesh ✓ Recommendation from private entities to enhance energy security ✓ Overall challenges in investment climate ✓ Expectation from government to overcome the challenges	✓ Port development targeting effective & efficient functional Import & Export facilities ✓ Ensuring energy security for the manufacturers & reviewing energy prices ✓ High import cost of raw materials for LPG cylinders should be reviewed ✓ Unhealthy practices such as cross filling of LPG cylinders should be regulated ✓ Adulteration of Lube oil segment should be strictly regulated & used oil should be managed properly concerning environmental safety issues. ✓ Abatement of usage of fossil fuel & ensuring the incremental growth of clean & modern energy for all ✓ Development of LNG grid pipeline for receiving full capacity from FSRU ✓ Investment of private entities (local) in national pipeline grid may be considered

Some Notable Moments of the Virtual Seminar



HYDROCARBON UNIT
Energy and Mineral Resources Division

Dated: 22.02.2021

HCU Seminar 6: Prospects of Biofuels in Bangladesh

Seminar Key Personnel at a Glance

Chief Guest	**Mr. Md Anisur Rahman** Senior Secretary Energy and Mineral Resources Division (EMRD)
Host	**A S M Manzurul Quader** Director General (Joint Secretary) Hydrocarbon Unit
key-Note Speaker	**Dr. AKM Mahbub Hasan** Professor, Department of Biochemistry and Molecular Biology University of Dhaka
Panel Discussant	**Mollah Amzad Hossain** Editor Energy & Power
	Dr. Md Tanvir Sowgath Associate Professor, Dept. of Chemical Engineering BUET

Abstract of the Seminar

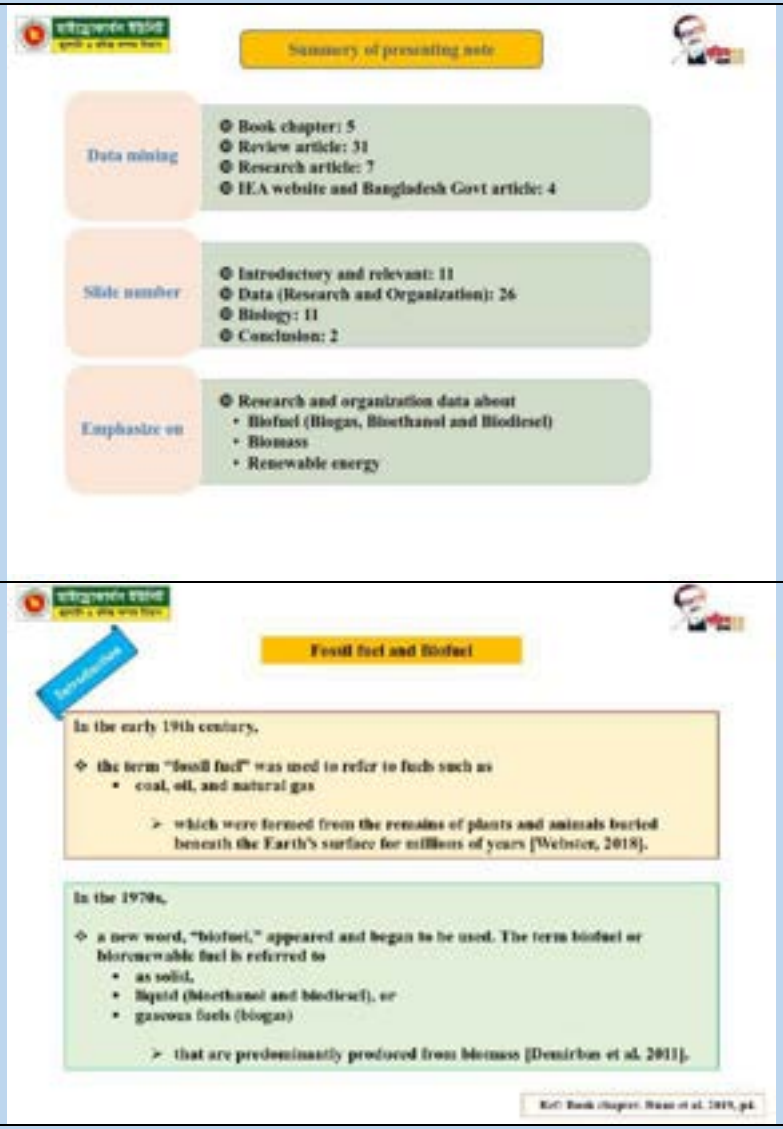
Biofuel is a type of renewable energy source derived from microbial, plant, or animal materials. Examples of biofuels include ethanol (often made from corn in the United States and sugarcane in Brazil), biodiesel (sourced from vegetable oils and liquid animal fats), green diesel (derived from algae and other plant sources), and biogas (methane derived from animal manure and other digested organic material).

Biofuels can be produced from a variety of plants like rapeseed, mustard, corn, sunflower, canola, algae, soybean, pulses, sugarcane, wheat, maize, and palm etc.

In the early 20th century of Bangladesh, bio-fuel was used for lighting lamps or lanterns. In an agriculturally based country like Bangladesh, bio-fuel can be a better alternative because a 30 percent blend of bio-fuel can be used along with our diesel or petrol. This can also be an excellent fuel to kindle lamps in rural Bangladesh.

Advantages of Biofuels	Disadvantages of Biofuels
✓ Efficient Fuel ✓ Durability of Vehicles' Engine ✓ Easy to Source ✓ Renewable ✓ Reduce Greenhouse Gases ✓ Economic Security ✓ Reduce Dependence on Foreign Oil ✓ Lower Levels of Pollution	✓ High Cost of Production ✓ Monoculture ✓ Use of Fertilizers ✓ Water Use ✓ Changes in Land Use ✓ Can only be used diesel powered engine ✓ More likely to attract moisture ✓ Can cause inner fuel tube damage.

PowerPoint Presentation from the Key Note Speaker



Biofuels classified into the widely accepted four groups

Generation	Example
First generation biofuels	Bioalcohols, vegetable oil, biodiesel, biomethanol, biosyngas, biogas
Second generation biofuels	Bioalcohols, biooil, biodiesel, bioDMF, biomethanol, bioFT diesel, biohydrogen
Third generation biofuels	Bioethanol, vegetable oil biodiesel, biomethanol, jet fuels
Fourth generation biofuels	Green biodiesel, biogasoline, green aviation fuels

[FT (Fischer-Tropsch); BtL (biomass to liquid); DMF (dimethylfuran); Biogasoline or biopetrol produced from biomass such as algae: made up of hydrocarbons with 6 to 12 carbon.]

[Syngas (also known as producer gas, product gas, synthetic gas, or synthesis gas) is produced. The syngas is mainly composed of CO, H_2, N_2, CO_2 and some hydrocarbons (CH_4, C_2H_4, C_2H_6 etc.). Very small amounts of H_2S, NH_3 and tars may also be produced] [Zhang et al. 2015]

Ref: Book chapter. Ruan et al. 2019, p9.

Key advantages and disadvantages of the four generation biofuels

[Liew et al. 2014; Tabatabaei et al. 2015; Achinas et al. 2017]

Fuel	Advantages	Disadvantages
First generation	• Biodegradable • Feedstocks available at large quantities • Feedstocks available at large quantities	• Competition of land use • Negative impacts on biodiversity • Higher food prices owing to competition with food
Second generation	• No competition with food • Available feedstocks • Low cost for feedstock	• The use of agriculture and forest residue degrades soil quality • Complex processes are required • Lack of technological and research breakthrough
Third generation	• No land or land competition • High oil yield • Bioengineered algae are renewable	• High processing cost • Lack of technological and research breakthrough • Not yet commercially feasible
Fourth generation	• Carbon-negative rather than simply carbon neutral, as it "locks" away more carbon than it produces • Synthetic raw materials to produce biofuels is a possibility • Energy security	• Lack of study on its practical performance in terms of technical and economic aspects • Still in research and development stage • Requires new technologies

Ref: Book chapter. Ruan et al. 2019, p9, 10.

Key advantages and disadvantages of the four generation biofuels

[Liew et al. 2014; Tabatabaei et al. 2015; Achinas et al. 2017]

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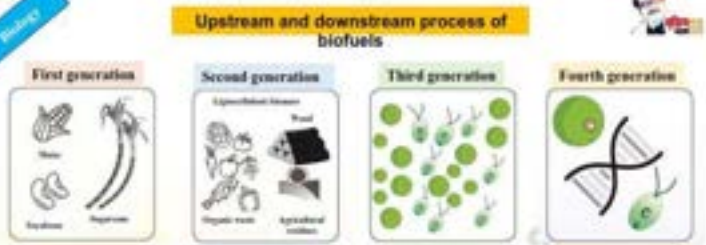
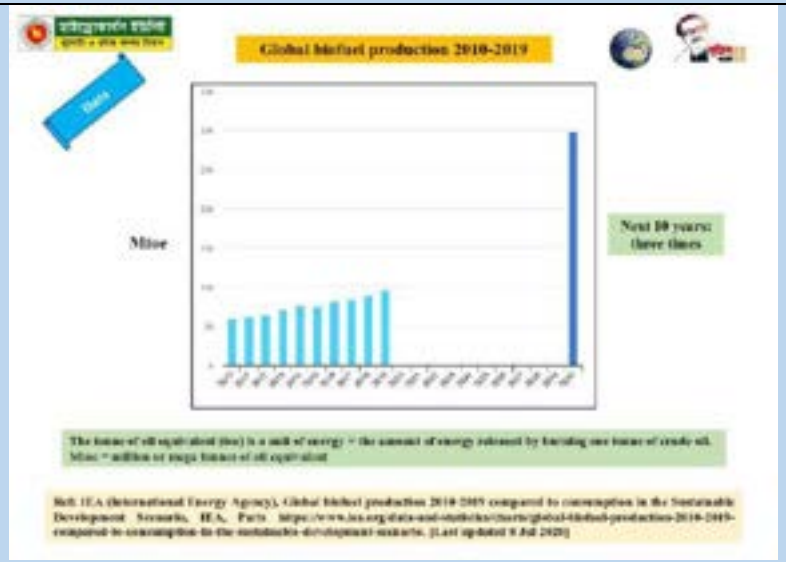
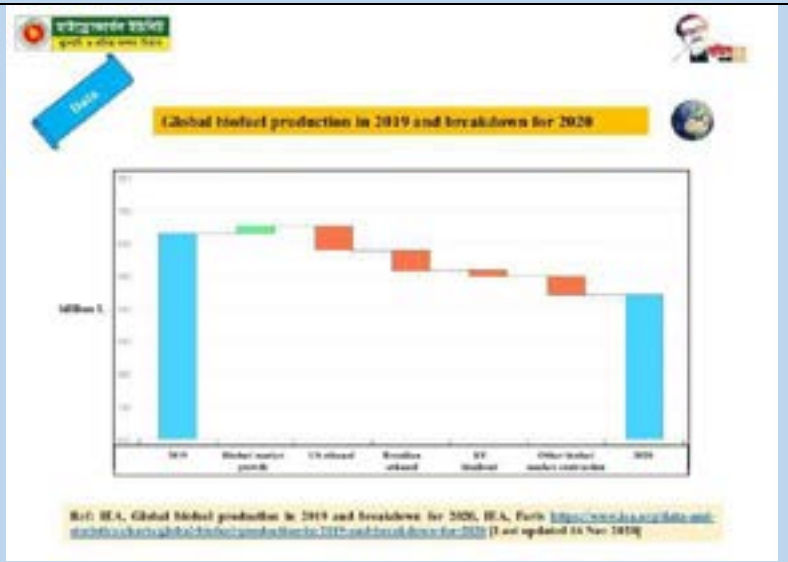
Ref: Book chapter. Ruan et al. 2019, p9, 10.

Upstream and downstream process of biofuels

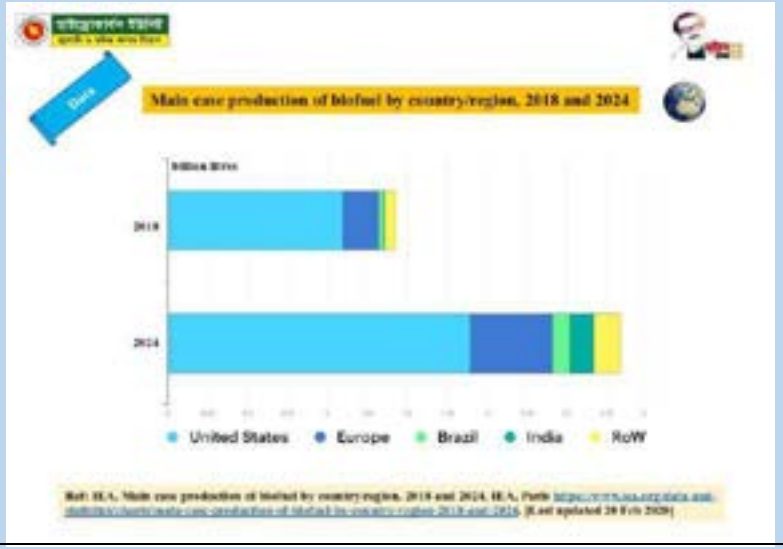


Ref: Review. Aatu et al. 2019, p55.

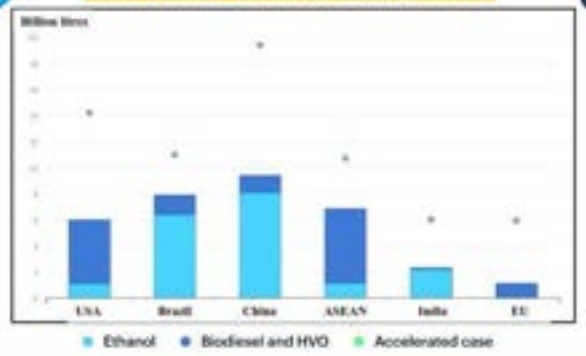

Global biofuel production 2010-2019
Data
Mtoe
Next 10 years: three times


Global biofuel production in 2019 and breakdown for 2020
Data


All biofuels production, world, 1990-2025
Data
Thousand barrels/day
All biofuels: Biodiesel and HVO (Hydrotreated Vegetable Oils), Ethanol


Main case production of biofuel by country/region, 2018 and 2024
Data
2018
2024
United States
Europe
Brazil
India
RoW

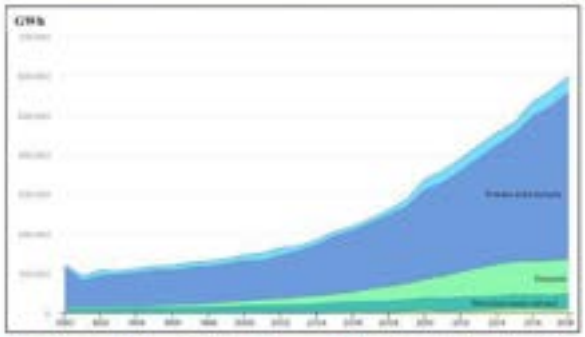
Biofuel production growth in key markets, 2019-2024



High-quality renewable diesel (also known as Hydrotreated Vegetable Oil or HVO) and traditional biodiesel (also known as Fatty Acid Methyl Ester or FAME) are different products.

Ref: IEA, Biofuel production growth in key markets, 2019-2024, IEA, Paris https://www.iea.org/data-and-statistics/charts/biofuel-production-growth-in-key-markets-2019-2024 [Last updated 20 Feb 2020] Notes: ASEAN = Association of Southeast Asian Nations. EU = European Union.

Electricity generation from biofuels and waste by source, world 1990-2018



Ref: Source: IEA Renewables Information 2020 https://www.iea.org/subscribe-to-data-services/renewables-statistics [Last visited 31/01/2021]

Biogas

- Biogas consists of approximately
  - 45%–70% CH_4 and
  - 30%–55% CO_2.
- Biogas contains additional gases
  - In minor amounts (e.g., H_2S, water vapor, etc.).

Compound	Concentration (%)
Methane (CH_4)	45–70
Carbon dioxide (CO_2)	35–55
Hydrogen sulfide (H_2S)	1–2
Hydrogen (H_2)	-
Ammonia (NH_3)	-
Carbon monoxide (CO)	Trace
Oxygen (O_2)	Trace
Water vapor	Trace
Siloxanes	Trace

A siloxane is a functional group in organosilicon chemistry with the Si–O–Si linkage.

Ref: Book chapter. Angelidaki et al. 2019, p818.

Compositions of natural gas and biogas

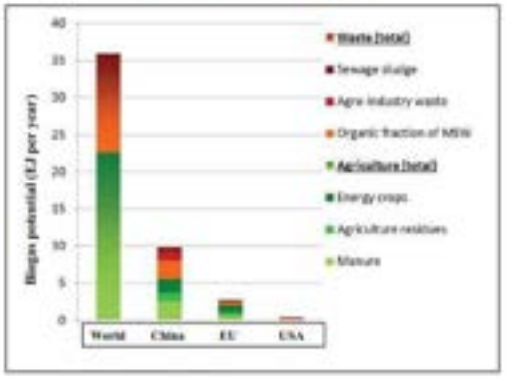
[Guo et al. 2015; Gould, 2015]

Composition	Natural Gas (%)	Biogas (%)
Methane (%)	95	45–65
Ethane (%)	5	–
Propane (%)	+	–
Butane (%)	+	–
Carbon dioxide (%)	+	30–40
Hydrogen sulfide (%)	–	0.3–3
Ammonia (%)	–	0–1
Moisture (%)	–	0–10
Nitrogen (%)	+	0–5
Oxygen (%)	–	0–2
Hydrogen (%)	–	0–1

+, indicate there is some content but not detailed; –, indicates no.

Ref: Book chapter. Ruan et al. 2019, p34.

Energy potential of biogas

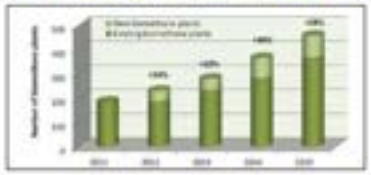


1 Exajoule = 10^{18} joules

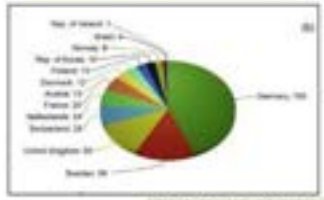
Ref: Review, Paolini et al. 2018, p2.

Biogas plant development and distribution

Number of operating biomethane plants



Location of existing biomethane plants

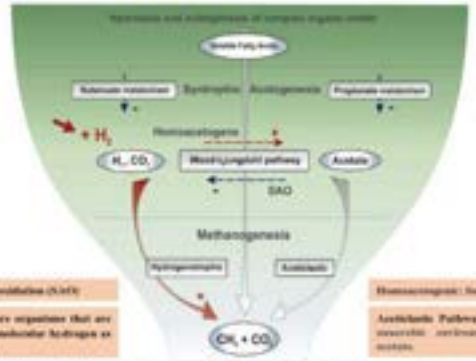


Biogas plant in Bangladesh (21/02/2021)

Agency	Biogas plant number
IDCOL	57,829
GIZ	1,500
BCSIR	24,774
MoDMR	128
Total	83,431

Ref: Review, Angelidaki et al. 2018, p2. http://www.renewableenergy.gov.bd/index.php?id=2&i=6

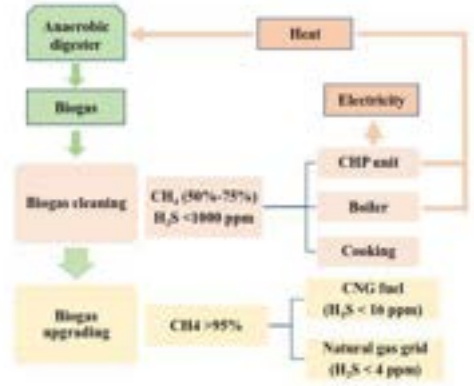
Metabolic pathways for hydrogen assisted methanogenesis



Anaerobic digestion: biological biogas upgrading can be obtained via two different processes. The first one: mediated by hydrogenotrophic methanogenic archaea performing the direct conversion of CO_2 in CH_4 with the use of external H_2 as a source of electrons. The second metabolism responsible for biogas upgrading is indirect. It involves homoacetogenic bacteria and is based on the conversion of CO_2 to acetate via the Wood-Ljungdahl pathway. Archaea constitute a domain of single-celled organisms different from bacteria. *Syntrophy* (syn, together; trophy, feeding): between an archaeal and a bacterial partner.

Ref: Review, Angelidaki et al. 2018, p9.

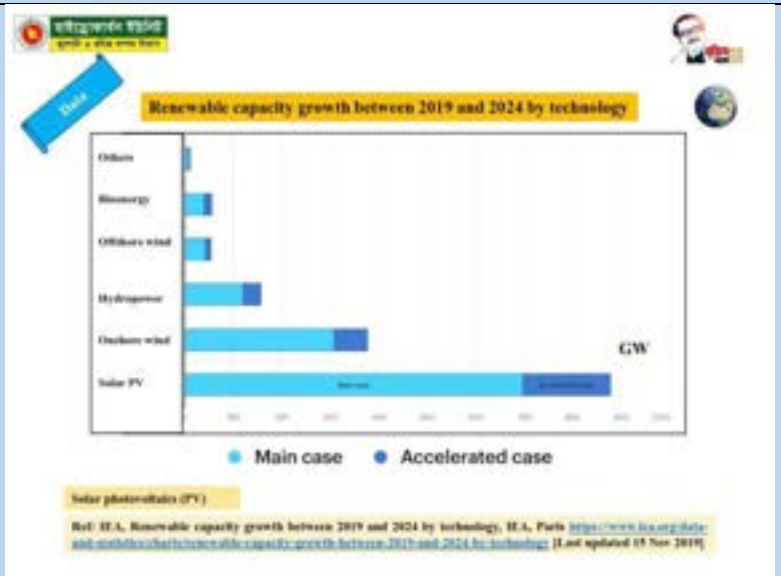
Biogas cleaning, upgrading, and applications

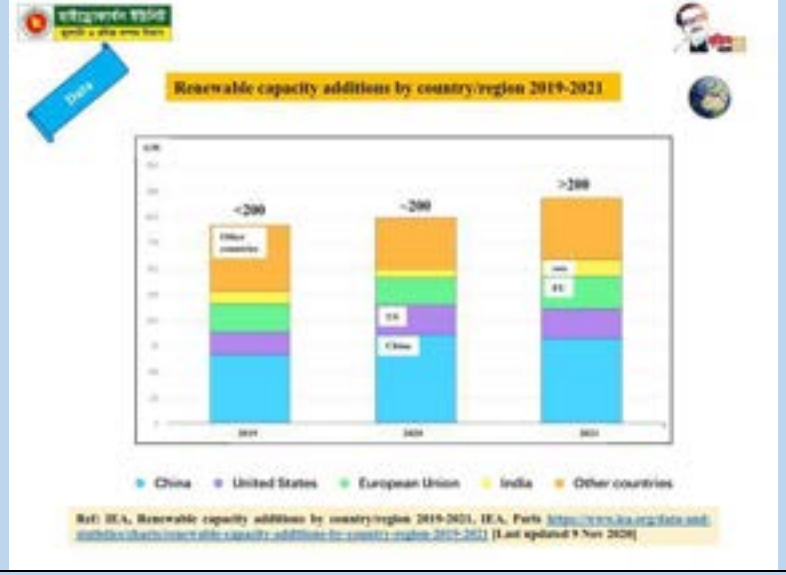


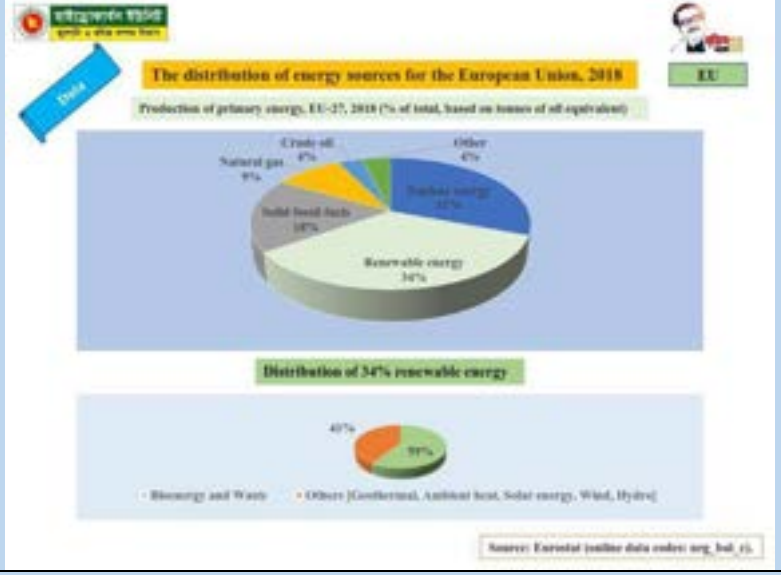
CHP = Combined Heat and Power

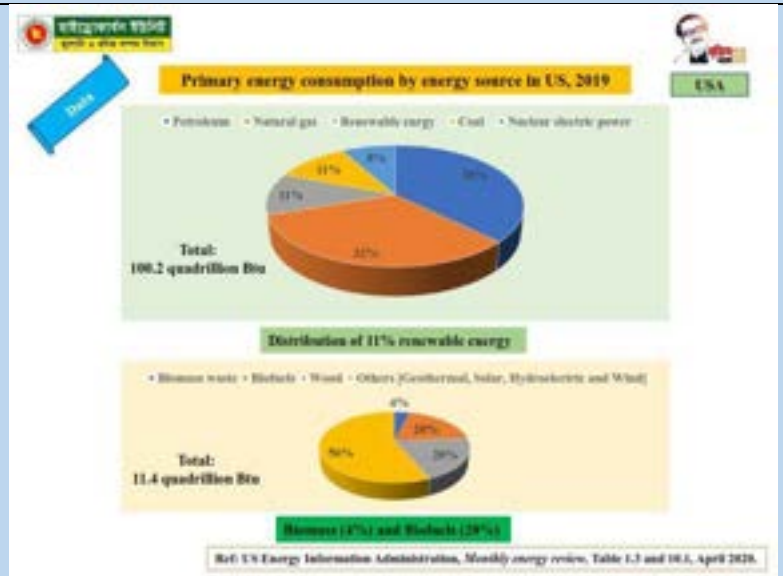
Ref: Modified from Book chapter, Nguyen et al. 2019, p773.

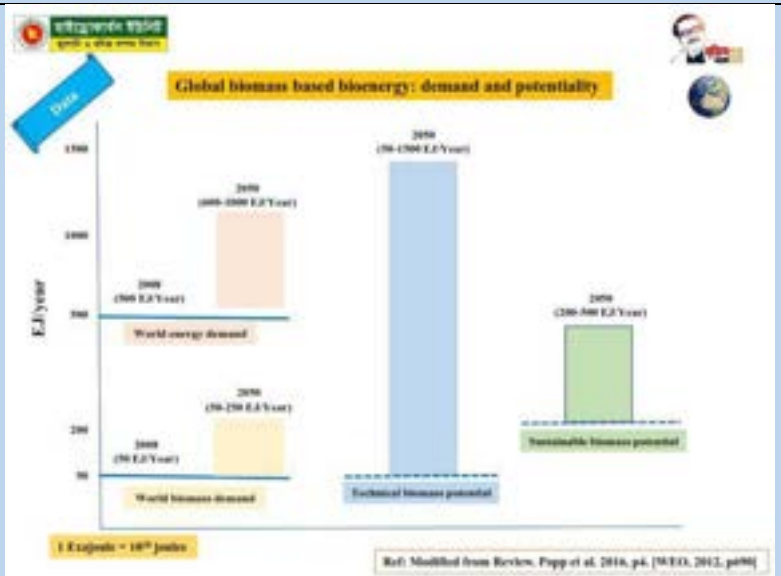

Introduction
Potential renewable energy sources
Potential sources of renewable energy paradigm
Biomass
User
Sun
User
User

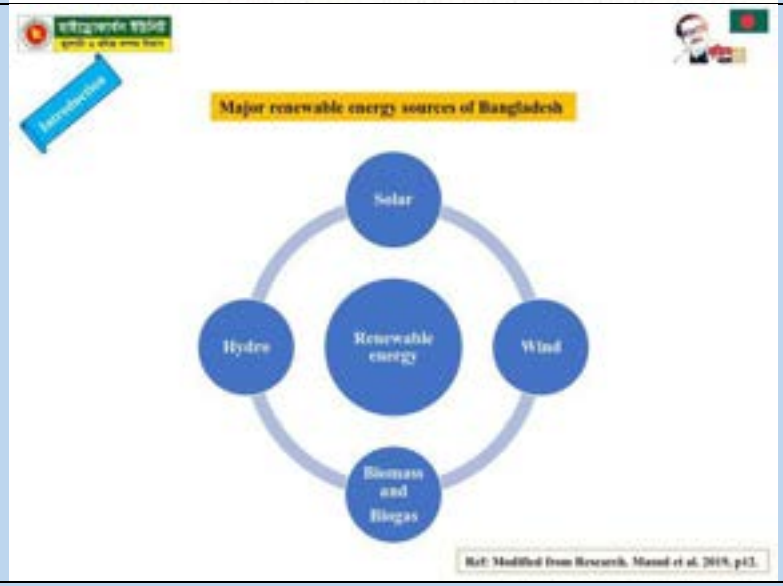

Data
Renewable capacity growth between 2019 and 2024 by technology
Others
Bioenergy
Offshore wind
Hydropower
Onshore wind
Solar PV
GW
Main case
Accelerated case
Solar photovoltaics (PV)

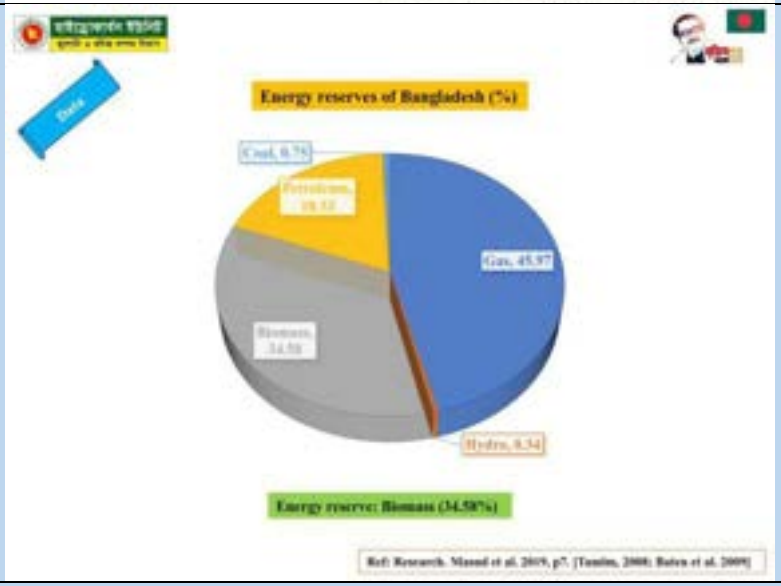

Data
Renewable capacity additions by country/region 2019-2021
<200
~200
>200
China
United States
European Union
India
Other countries

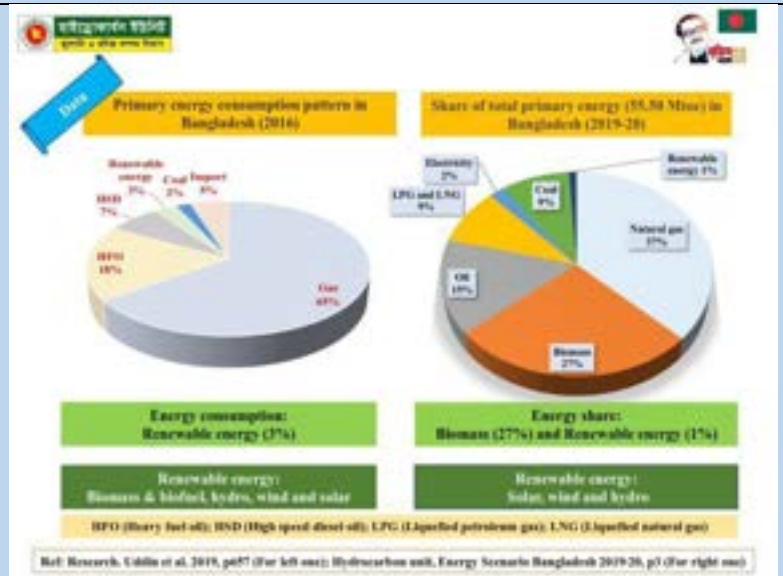

Data
The distribution of energy sources for the European Union, 2018
EU
Production of primary energy, EU-27, 2018 (% of total, based on tonnes of oil equivalent)
Crude oil 4%
Other 4%
Natural gas 9%
Renewable energy 34%
Distribution of 34% renewable energy
40%
59%
Bioenergy and Waste
Others (Geothermal, Ambient heat, Solar energy, Wind, Hydro)

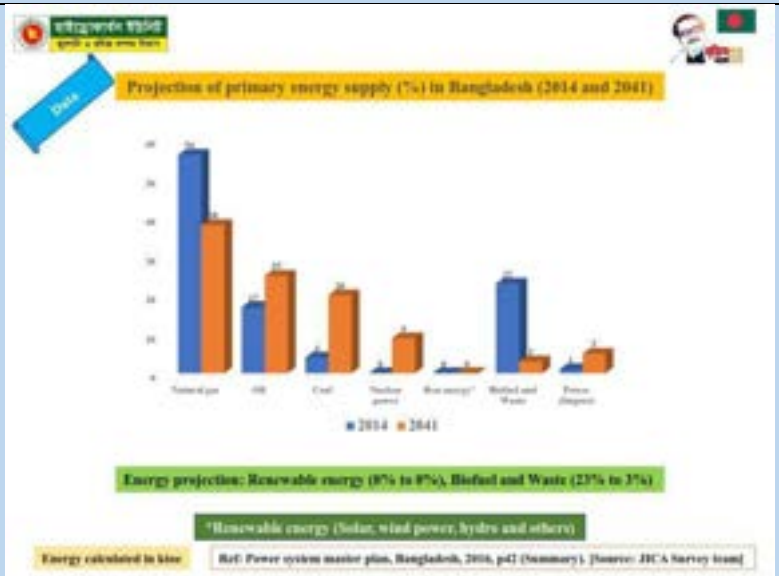

Data
Primary energy consumption by energy source in US, 2019
USA
Total:
100.2 quadrillion Btu
Distribution of 11% renewable energy
Total:
11.4 quadrillion Btu
Biomass (4%) and Biofuels (29%)
Ref: US Energy Information Administration, Monthly energy review, Table 1.3 and 10.1, April 2020.


Data
Global biomass based bioenergy: demand and potentiality
EJ/year
World energy demand
Technical biomass potential
Sustainable biomass potential
World biomass demand
1 Exajoule = 10^18 joules
Ref: Modified from Review, Popp et al. 2016, p4. [WEO, 2012, p690]

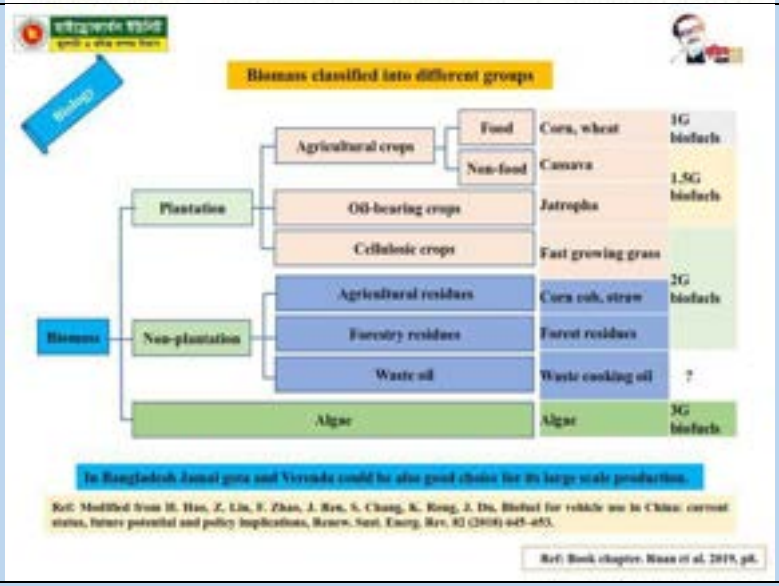

Introduction
Major renewable energy sources of Bangladesh
Solar
Hydro
Renewable energy
Wind
Biomass and Biogas
Ref: Modified from Research, Masud et al. 2019, p12.

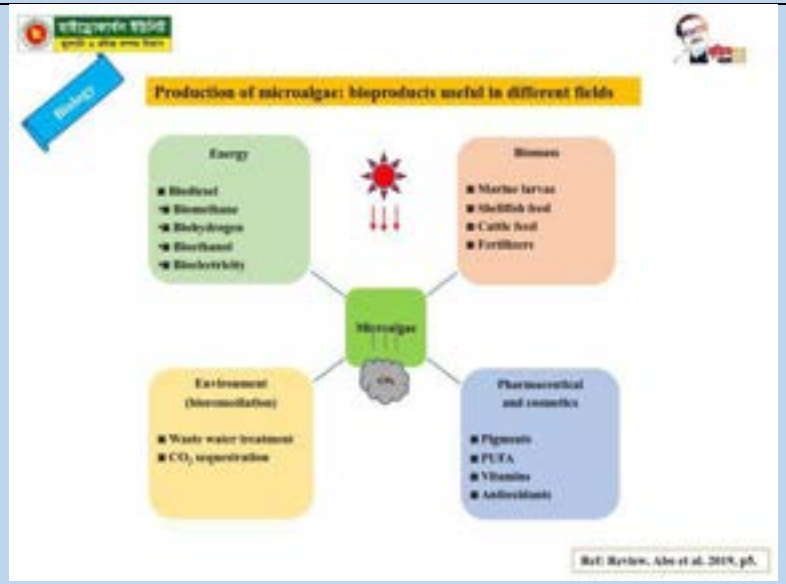

Data
Energy reserves of Bangladesh (%)
Coal, 0.76
Petroleum, 19.52
Gas, 45.97
Biomass, 34.58
Hydro, 8.34
Energy reserve: Biomass (34.58%)
Ref: Research, Masud et al. 2019, p7. [Tamim, 2008; Rahva et al. 2009]

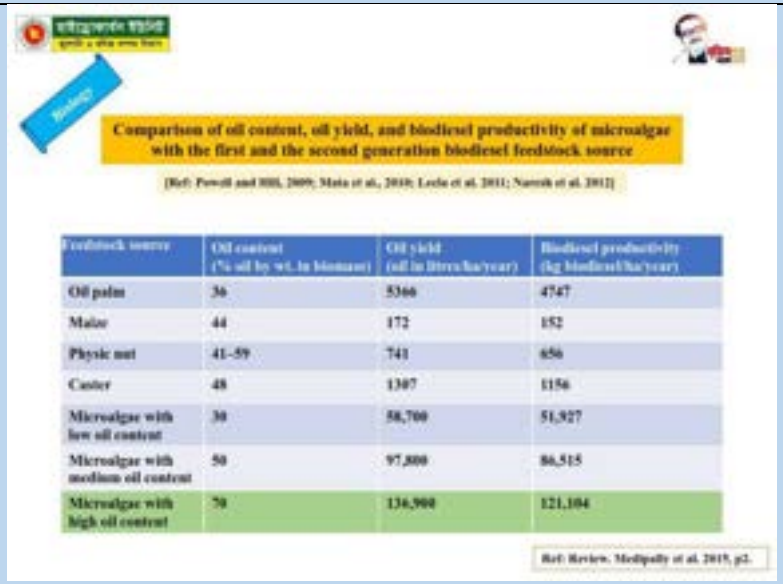

Data
Primary energy consumption pattern in Bangladesh (2016)
Share of total primary energy (35.38 Mtoe) in Bangladesh (2019-20)
Energy consumption: Renewable energy (3%)
Energy share: Biomass (27%) and Renewable energy (1%)
Renewable energy: Biomass & biofuel, hydro, wind and solar
Renewable energy: Solar, wind and hydro
HFO (Heavy fuel oil); HSD (High speed diesel oil); LPG (Liquefied petroleum gas); LNG (Liquefied natural gas)
Ref: Research. Uddin et al. 2019, pp57 (For left one); Hydrocarbon unit, Energy Scenario Bangladesh 2019-20, p3 (For right one)

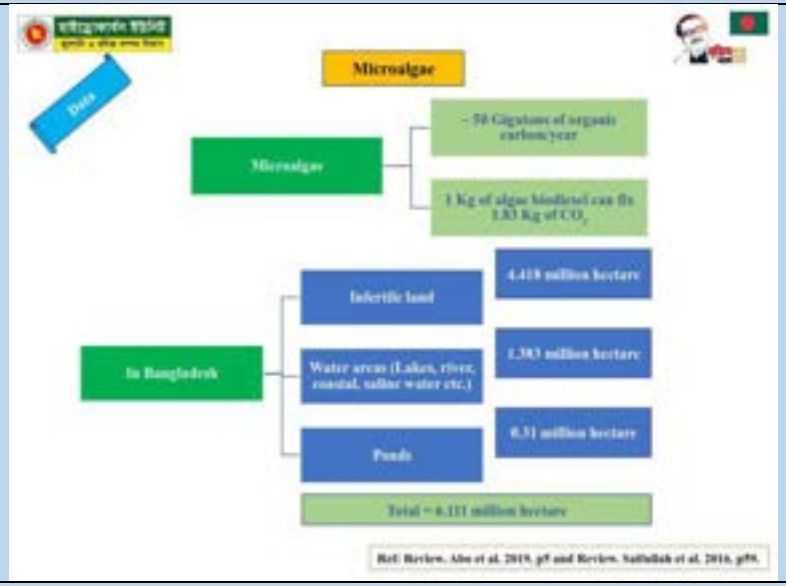

Data
Projection of primary energy supply (%) in Bangladesh (2014 and 2041)
2014
2041
Energy projection: Renewable energy (8% to 8%), Biofuel and Waste (23% to 3%)
*Renewable energy (Solar, wind power, hydro and others)
Energy calculated in ktoe
Ref: Power system master plan, Bangladesh, 2016, p42 (Summary). [Source: JICA Survey team]

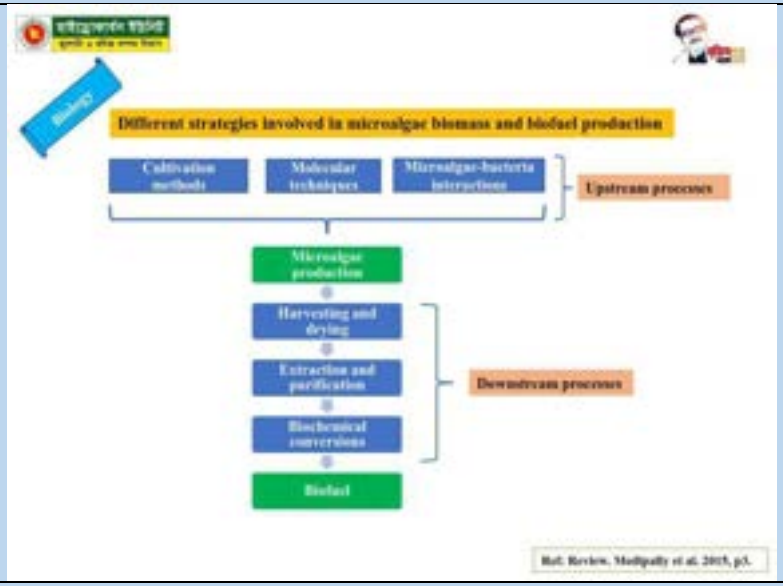

Biodigt
Different possible sources of biomass in Bangladesh
Forest residues
Industrial residues
Sewage
Biomass sources
Municipal solid waste
Agricultural crop residues
Animal manure
Bangladesh: ~1.8% electricity generation is dependent on Biogas and Biomass (Alvia et al. 2015).
Ref: Research. Masud et al. 2019, p26.

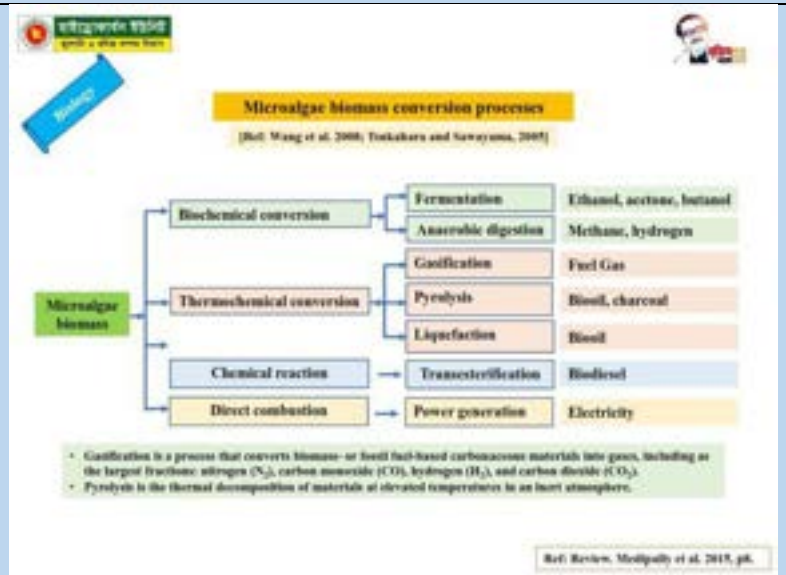

Biodigt
Biomass classified into different groups
Biomass
Plantation
Non-plantation
Agricultural crops
Food
Non-food
Oil-bearing crops
Cellulosic crops
Agricultural residues
Forestry residues
Waste oil
Algae
Corn, wheat
Cassava
Jatropha
Fast growing grass
Corn cob, straw
Forest residues
Waste cooking oil
Algae
1G biofuels
1.5G biofuels
2G biofuels
?
3G biofuels
In Bangladesh Jamai gora and Verenda could be also good choice for its large scale production.
Ref: Modified from H. Hao, Z. Liu, F. Zhao, J. Ren, S. Chang, K. Rong, J. Du, Biofuel for vehicle use in China: current status, future potential and policy implications, Renew. Sust. Energ. Rev. 82 (2018) 645–653.
Ref: Book chapter. Nizam et al. 2019, p8.

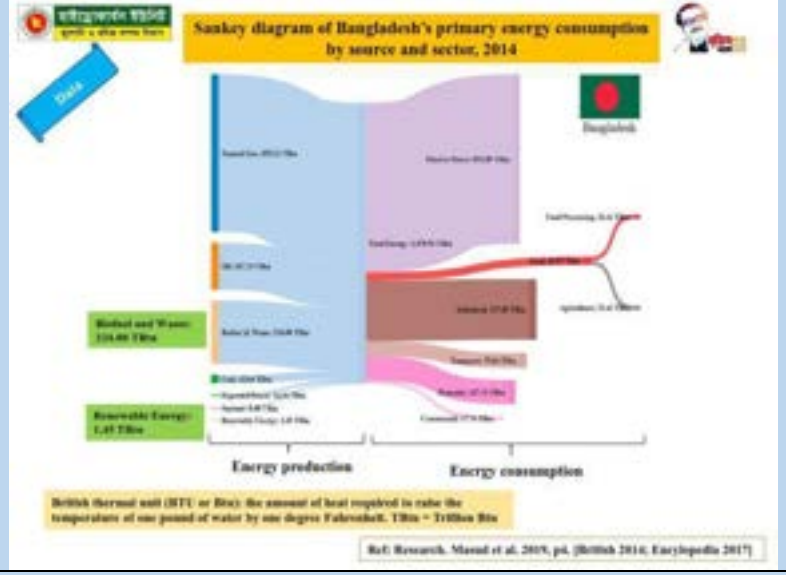

Production of microalgae: bioproducts useful in different fields
Energy
Biodiesel
Biomethane
Biohydrogen
Bioethanol
Biosolvents
Biomass
Marine larvae
Shellfish feed
Cattle feed
Fertilizers
Microalgae
CO2
Environment (bioremediation)
Waste water treatment
CO2 sequestration
Pharmaceutical and cosmetics
Pigments
PUFA
Vitamins
Antioxidants
Ref: Review, Abo et al. 2019, p5.

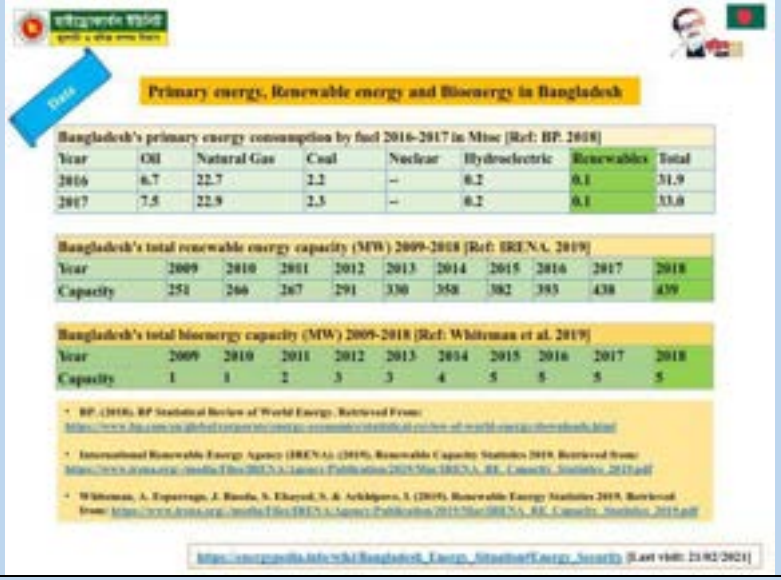

Comparison of oil content, oil yield, and biodiesel productivity of microalgae with the first and the second generation biodiesel feedstock source
[Ref: Powell and Hill, 2009; Mata et al., 2010; Leche et al. 2011; Naresh et al. 2012]
Feedstock source | Oil content (% oil by wt. in biomass) | Oil yield (oil in litres/ha/year) | Biodiesel productivity (kg biodiesel/ha/year)
Oil palm | 36 | 5366 | 4747
Maize | 44 | 172 | 152
Physic nut | 41–59 | 741 | 656
Castor | 48 | 1307 | 1156
Microalgae with low oil content | 30 | 58,700 | 51,927
Microalgae with medium oil content | 50 | 97,800 | 86,515
Microalgae with high oil content | 70 | 136,900 | 121,104
Ref: Review, Mudiyally et al. 2019, p2.


Microalgae
Microalgae
~ 50 Gigatons of organic carbon/year
1 Kg of algae biodiesel can fix 1.83 Kg of CO2
In Bangladesh
Infertile land
4.418 million hectare
Water areas (Lakes, river, coastal, saline water etc.)
1.383 million hectare
Ponds
0.31 million hectare
Total = 6.111 million hectare
Ref: Review, Abo et al. 2019, p5 and Review, Sathbhai et al. 2016, p99.


Different strategies involved in microalgae biomass and biofuel production
Cultivation methods
Molecular techniques
Microalgae-bacteria interactions
Upstream processes
Microalgae production
Harvesting and drying
Extraction and purification
Biochemical conversions
Biofuel
Downstream processes
Ref: Review, Mudiyally et al. 2019, p3.







Bangladesh's primary energy consumption by fuel 2016-2017 in Mtoe [Ref: BP, 2018]

Year	Oil	Natural Gas	Coal	Nuclear	Hydroelectric	Renewables	Total
2016	6.7	22.7	2.2	--	0.2	0.1	31.9
2017	7.5	22.9	2.3	--	0.2	0.1	33.0

Bangladesh's total renewable energy capacity (MW) 2009-2018 [Ref: IRENA, 2019]

Year	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Capacity	251	266	267	291	330	358	382	393	438	439

Bangladesh's total bioenergy capacity (MW) 2009-2018 [Ref: Whiteman et al. 2019]

Year	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Capacity	1	1	2	3	3	4	5	5	5	5

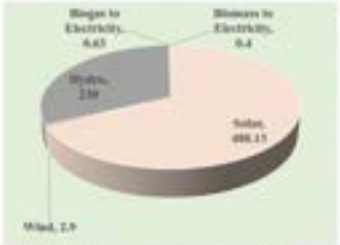
- BP. (2018). BP Statistical Review of World Energy. Retrieved From: https://www.bp.com/en/global/corporate/energy-economics/statistical-review-of-world-energy.html
- International Renewable Energy Agency (IRENA). (2019). Renewable Capacity Statistics 2019. Retrieved from: https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2019/Mar/IRENA_RE_Capacity_Statistics_2019.pdf
- Whiteman, A. Esparrago, J. Rueda, S. Elsayed, S. & Arkhipova, I. (2019). Renewable Energy Statistics 2019. Retrieved from: https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2019/Mar/IRENA_RE_Capacity_Statistics_2019.pdf

https://energypedia.info/wiki/Bangladesh_Energy_Situation#Energy_Security [Last visit: 21/02/2021]

Data

The electricity production capacity from renewable technology in Bangladesh

Last visit: 21/02/2021



Renewable energy installed capacity: 722.06 MW

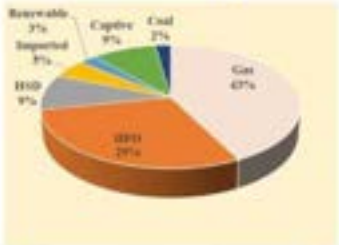
RE Generation Mix | National Database of Renewable Energy (sreda.gov.bd) https://solve.sreda.gov.bd/index.php?id=6

http://sreda.portal.gov.bd/sites/default/files/files/sreda.portal.gov.bd/page/8a0fd43ed_0b7b_4823_a7e7_ba713833f7eb/2020-10-27-13-18-13724ed07f24f5bd111563a0f9ac8fd4.pdf

HFO (Heavy fuel oil); HSD (High speed diesel oil)

The electricity production capacity from renewable fuel in Bangladesh

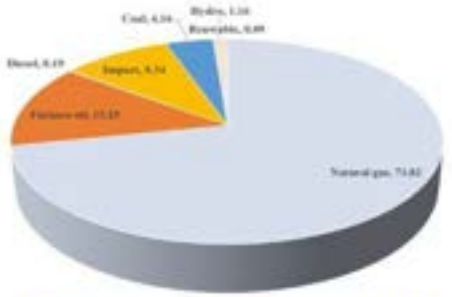
Annual report: 2018-19



Total power generation capacity = 23,394.84 MW

Data

Power generation (%) by fuel type in Bangladesh (2019-20)



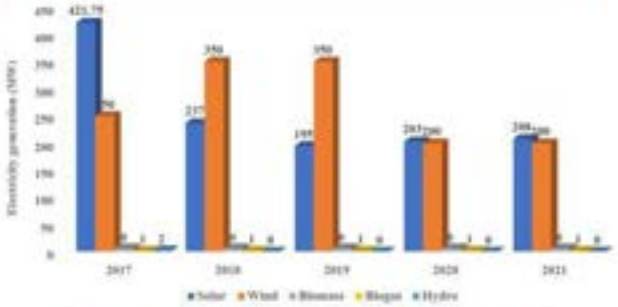
Power generation: Renewable (0.89%) and Hydro (1.16%)

Net electricity generation in Bangladesh (2019-20): 886 GWh

Ref: Hydrocarbon unit, Energy Scenario Bangladesh 2019-20, p25

Data

The electricity production scenario until 2021 from renewable sources



No increase of electricity generation from biomass and biogas (2017-2021)

The government has drawn a master plan to produce 38,700 MW by 2030 (BPDB, 2017). At present, only 3.5% of the total energy demand is from renewable energy sources.

BPDB = Bangladesh Power Development Board

Ref: Modified from Research, Masud et al. 2019, p26.

Data

The electricity production projection from renewable sources in Bangladesh for each year (2021-2030)

Annual report: 2018-19

Technology	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	Total (2021-2030)
Solar	120	150	165	165	165	165	165	165	165	165	1590
Wind	80	120	170	170	170	170	170	170	170	170	1560
Hydro	0	0	0	0	0	0	0	0	0	0	0
Biomass	15	15	15	15	15	15	15	15	15	15	150
Biogas	3	4	4	4	4	4	4	4	5	5	41
Others*	0	0	0	0	2	4	6	8	10	10	40

*Others: Tidal and Wave

http://sreda.portal.gov.bd/sites/default/files/files/sreda.portal.gov.bd/page/8a0fd43ed_0b7b_4823_a7e7_ba713833f7eb/2020-10-27-13-18-13724ed07f24f5bd111563a0f9ac8fd4.pdf

Data

Biomass resources and energy generation in Bangladesh (2012-2013)

Biomass sources	Biomass generation (Million tons)	Energy content (PJ)	Electricity generation (TWh)	Coal equivalent (Million tons)	Gas equivalent (Billion cubic meters)
Agricultural Residues	94.1	582.33	161.8	19.88	14.72
Forest Residues	17.44	210.64	58.53	7.19	5.33
Livestock Residues	88.89	456.41	126.81	15.58	11.54
MSW	13.38	95.61	26.57	3.26	2.42
Total	213.81	1344.99	373.71	45.91	34.01

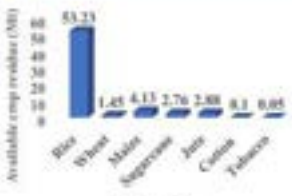
The theoretical assessment of sustainable biomass potential shows that annually biomass could provide over 1000 PJ energy (Huda et al. 2014)

The petajoule (PJ) = one quadrillion (10^{15}) joules.

Ref: Research, Masud et al. 2019, p21.

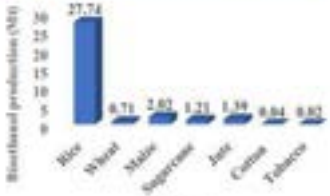
Data

Available agricultural residue for bioethanol production in Bangladesh



~ 65.36 Mt of agricultural residues are available

Bioethanol production capacity of agriculture residue in Bangladesh



~ 32 Mt bioethanol can be generated from 65.36 Mt

Ref: Review, Mikkat et al. 2020, p11, t2.

Data

Research works related to the solutions of the energy crisis of Bangladesh through renewable energy

Author	Year of publication	Title of paper
Masud et al.	2019	Development and performance test of a low-cost hybrid solar air heater
Badrul Imam	2011	Energy crisis and potential in Bangladesh
Ahmed et al.	2014	Exploitation of renewable energy for sustainable development and overcoming power crisis in Bangladesh
Amein and Hussain	2011	Power Crisis & Its Solution through Renewable Energy in Bangladesh
Reza et al.	2012	Present scenario of renewable energy in Bangladesh and a proposed hybrid system to minimize power crisis in remote areas
Ahmed et al.	2013	Alternative energy resources in Bangladesh and future prospect
Masud et al.	2019	Perspective of biomass energy conversion in Bangladesh
Islam et al.	2018	Current energy scenario and future prospect of renewable energy in Bangladesh
Bakhtiar et al.	2019	Energy scarcity and potential of renewable energy in Bangladesh
Islam et al.	2014	Energy security in Bangladesh perspective — An assessment and implication
Islam et al.	2008	Renewable energy resources and technologies practice in Bangladesh
Wadud et al.	2015	Renewable Energy, an Ideal Solution of Energy Crisis and Economical Development in Bangladesh
Haque et al.	2018	Power crisis and solution in Bangladesh
Bahadora et al.	2010	Geothermal Potential in Bangladesh – Results from Investigations of Abandoned Deep Wells
Hasan et al.	2015	Energy demand & prospect of geothermal energy as the solution of energy crisis of Bangladesh – an approach to green energy solution
Masud et al.	2017	Design, construction and performance study of a solar assisted Tri-cycle
Jouvidder et al.	2018	Proposal of a solar storage system for plant-based food materials in Bangladesh
Jouvidder et al.	2017	Solar Pyrolysis: Converting Waste into Asset Using Solar Energy
Uddin et al.	2015	Design, Construction and Performance Test of a Solar Powered Prototype Vehicle

19 articles are listed here

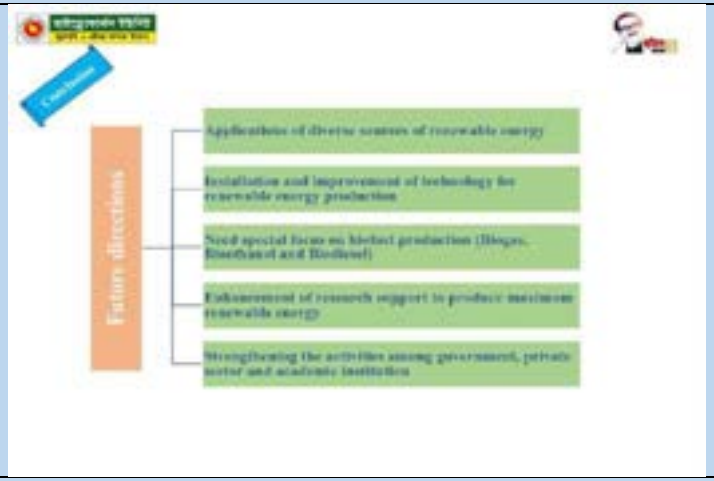
Ref: Modified from Research, Masud et al. 2019, p38.

Conclusion

Prospect of renewable energy in the context of Bangladesh

Energy	Current investment	Future prospect	Barriers
Solar	Government and private	Bright	Low solar radiation in winter and rainy season
Biomass & Biogas	Government and private	Bright	Carbon emission
Wind	Government	Limited to coastal regions	Low wind speed in winter season
Hydropower	Government	Limited to few sites	Environmental concerns
Tidal	None	To be investigated	Expensive
Wave	None	To be investigated	Expensive
Geothermal	None	To be investigated	Expensive

Ref: Modified from Research, Masud et al. 2019, p36.


Future directions
Applications of diverse sources of renewable energy
Installation and improvement of technology for renewable energy production
Need special focus on biofuel production (Biogas, Bioethanol and Biodiesel)
Enhancement of research support to produce maximum renewable energy
Strengthening the activities among government, private sector and academic institution

Recommendations of the participants at the Seminar "Prospects of Biofuels in Bangladesh":

- ✓ A major portion of current primary energy of Bangladesh is gradually depending upon import, diverse sources of renewable energy should be considered immediately to ensure energy security
- ✓ Enhancement of research support thru installation and improvement of latest technology for renewable energy production
- ✓ Need special focus on biofuel production (Biogas, Bioethanol and Biodiesel)
- ✓ Biodiesel is environment friendly and can be a new prospect in the transportation sector of Bangladesh thru proper conversion of the vehicle engine
- ✓ Biogas plant should be scattered & established more in number as Bangladesh is now self-sufficient in livestock & animal husbandry
- ✓ Harvesting microalgae from our ample marine sector (Sea, River, Canal) is a new prospect for Bangladesh ensuring blue economy
- ✓ Usage of efficient energy should be ensured in every spheres of our life to prevent any energy wastage
- ✓ Biofuel is more effective for the less densely populated country. As Bangladesh is highly dense populated country and considering food security, ensuring raw materials of biofuel is a major challenge for Bangladesh
- ✓ Research work on renewable energy should be industrialized (tagged with Govt. or private entities) for a sustainable energy solution
- ✓ A specific technical team/unit under EMRD should monitor and coordinate the entire endeavor in the alternate energy resources of Bangladesh. EMRD should monitor all the feedbacks of that technical team/unit.

Some Notable moments of the Seminar

HYDROCARBON UNIT
Energy and Mineral Resources Division

Dated: March 21, 2021

Seminar 7: Improvement of Energy Efficiency & Conservation in the Energy Sector of Bangladesh

Seminar Key Personnel at a Glance

Chief Guest	**Mr. Md Anisur Rahman** Senior Secretary Energy and Mineral Resources Division (EMRD)
Host	**A S M Manzurul Quader** Director General (Joint Secretary) Hydrocarbon Unit
key-Note Speaker	**Dr. Abdul Hasib Chowdhury** Professor, EEE BUET
Panel Discussant	**Mollah Amzad Hossain** Editor Energy & Power
	Dr. Mohammed Mahbubur Rahman Associate Professor and Head, Dept. of PMRE BUET

Abstract of the Seminar

Energy Efficiency

Energy Efficiency simply means using less energy to perform the same task – that is, eliminating energy waste. Often called the "first fuel" of the global energy system, energy efficiency is one of the most important steps that any government can take to move towards a sustainable energy system. EE means high competitiveness; it means producing more with less energy.

Energy Conservation

Energy Conservation is the effort made to reduce the consumption of energy by using less of an energy service. This can be achieved either by using energy more efficiently (using less energy for a constant service) or by reducing the amount of service used (for example, by driving less). Energy conservation is a part of the concept of Eco-sufficiency. It also lowers energy costs by preventing future resource depletion.

Energy Intensity

Energy intensity is a measure of the energy inefficiency of an economy. It is calculated as units of energy per unit of GDP. High energy intensity means high industrial output as portion of GDP. Countries with low energy intensity signifies labor intensive economy

Energy Conservation vs. Energy Efficiency: What is the difference?

Energy conservation and efficiency may be related, but they have distinct definitions in the energy world. Energy conservation involves using less energy by adjusting behaviors and habits. Examples include driving car fewer miles per week, turning ac up a degree or two in the summer time and unplugging computer or home appliances when they are not in use. Energy efficiency, on the other hand, involves using technology that requires less energy to perform the same function. Energy-saving light bulbs, large household appliances, smart thermostats, and smart home hubs like Constellation Connect are all examples of technology that can be energy efficient.

Importance of EE&C in Bangladesh	Challenges
There is lack of urgency among the public and industries to save energy under the current situation where GOB highly subsidizes energy and power sector to lower the costs of fuel and electricity prices for the household and industries. Nevertheless, people and entrepreneurs are wise enough to know the importance of energy saving once they find out the magnitude of economic benefits they can earn, even under the current low energy prices. It is important for the Government, therefore, to facilitate the installment, execution and proliferation of EE&C Programs as well as to create the momentum to promote energy saving activities among all the public through EE awareness-raising activities.	✓ Mass awareness build up ✓ Financial implication ✓ increasing the magnitude of savings; ✓ diversifying energy resources; ✓ measuring and ensuring the persistence of energy savings; ✓ integrating EE&C savings with a carbon reduction framework; and ✓ Understanding and valuing EE&C as part of an evolving grid.

PowerPoint Presentation from the Key Note Speaker

Improvement of Energy Efficiency & Conservation in the Energy Sector of Bangladesh

A. Hasib Chowdhury, PhD
Professor, Dept. of EEE &
Director, Institute of Nuclear Power Engineering
BUET

Seminar organized by **Hydrocarbon Unit (HCU), Energy and Mineral Resources Division**
Ministry of Power, Energy and Mineral Resources

28 March, 2021

Contents

- Energy efficiency and conservation
- Bangladesh energy scenario
- EE&C – Sectors and Potentials
- Investment in Energy Efficiency
- Economic Impact of EE&C
- Inefficiencies in Energy and Power Systems
- What Needs To Be Done

Energy Efficiency and Energy Conservation

Sustainable Development Goal 7

- SDG 7 sets the target to 'ensure access to affordable, reliable, sustainable and modern energy for all'
- Three targets of SDG 7 to achieve by 2030
  i. ensure universal access to affordable, reliable, sustainable and modern energy services
  ii. increase substantially the share of renewable energy in the global energy mix
  iii. double the rate of improvement in energy efficiency

Energy Efficiency and Energy Conservation

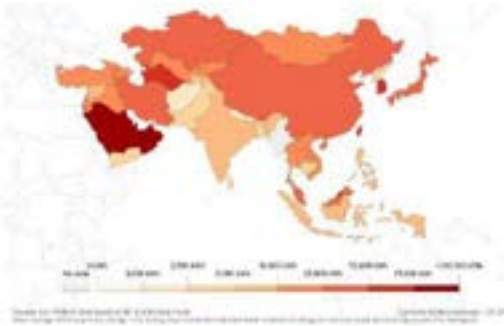
- **Energy efficiency and energy conservation are related but different**
  - Using the stairs instead of an elevator is energy conservation
  - The elevator will operate less often, but it will still use the same amount of electricity when it does operate
  - Two or more people using the elevator at the same time results less energy requirement per person

Bangladesh Energy Scenario

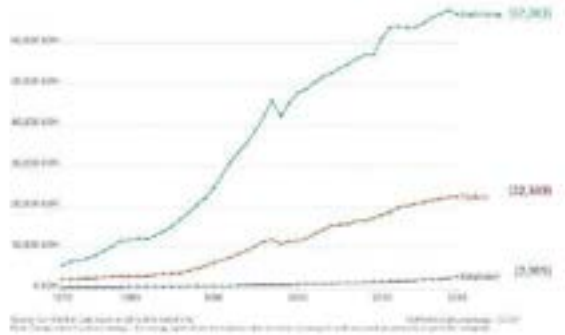
Energy Efficiency and Energy Conservation

- Energy efficiency is using technology that requires less energy to perform the same function
  - Example - using a LED light bulb or a CFL bulb that requires less energy than an incandescent light bulb to produce the same amount of light
  - Wastage of energy occurs whenever there is conversion or transmission of energy
- Energy conservation is any behavior/design that results in the use of less energy
  - Example - turning the lights off when leaving the room and recycling aluminum cans are both ways of conserving energy

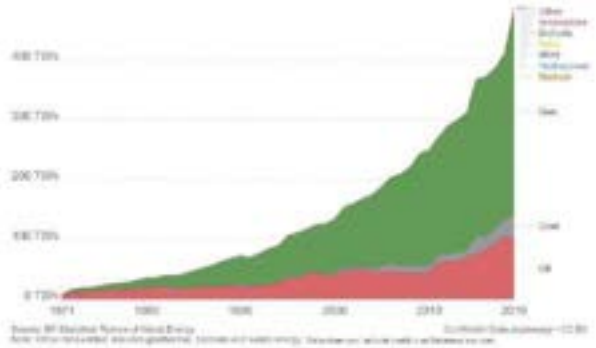
Energy Use Per Person, 2019



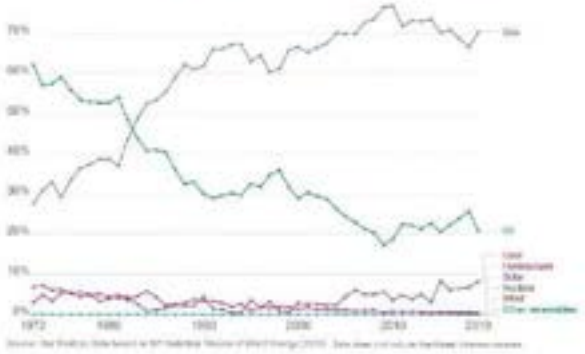
Energy Use Per Person, 2019



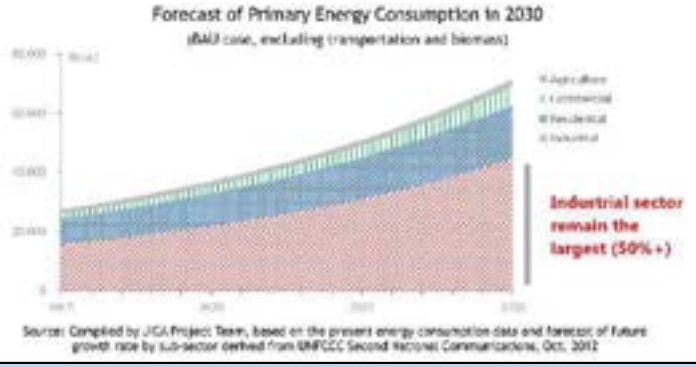
Energy Consumption by Source



Share of Energy Consumption by Source



Primary Energy Consumption

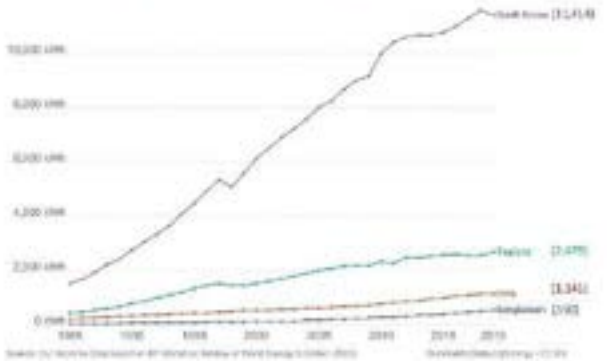


Source: Compiled by JICA Project Team, based on the present energy consumption data and forecast of future growth rate by sub-sector derived from UNFCCC Second National Communications, Oct. 2012

Bangladesh Energy Flow in 2017

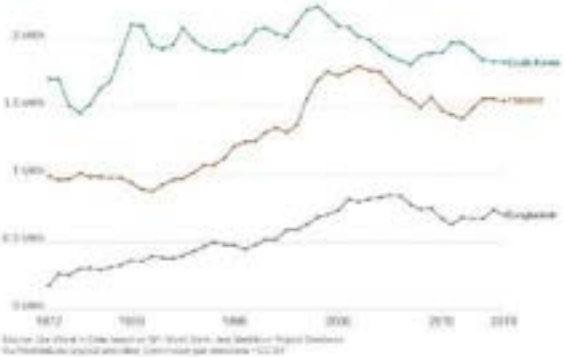
Priority to National Energy Efficiency & Conservation ; Power > Gas > Oil

Per Capita Electricity Consumption



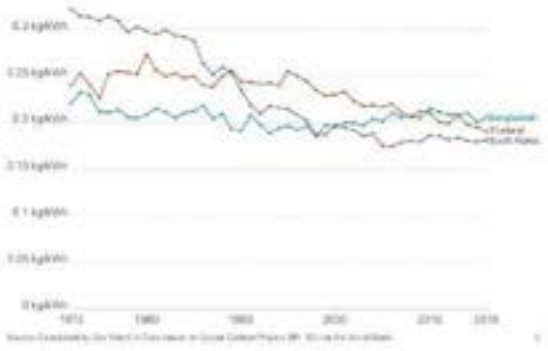
Energy and Carbon Efficiency

- **Energy intensity:** how much energy does Bangladesh use per unit of GDP?



Energy and Carbon Efficiency

- **Carbon intensity:** how much carbon does Bangladesh emit per unit of energy?
- We can reduce emissions by (1) using less energy; (2) using lower-carbon energy



EE&C – Sectors and Potentials

Assessing EE&C Potential

- Comparison between No-EE&C and EE&C Case

Item	No-EE&C	EE&C	Indicator
Production	Inefficient process	Efficient process	Unit energy cost
Lighting	Incandescent lamp	Fluorescent lamp, LED	Lumen/watt
AC	Window type	Split type, inverter type	COP, EER
Thermal power generation	Conventional	Combined cycle, Co generation	Thermal efficiency
Car	Heavy car	Hybrid car	Fuel efficiency
Life style	Sleep with lights on	Sleep with lights off	Household's electricity charge

EE&C Sectoral Potential

Industrial Sector

- Manufacturing industries in Bangladesh are energy inefficient
  - → Usage of old/mal-maintained machines and poor energy management
- Estimated EE&C potential in industrial sub-sectors ~30% of entire sector consumption
- Considering national primary energy consumed in industrial sector ~50%, potential impact of EE&C is almost 15% reduction

EE&C Sectoral Potential

Residential Sector

- Calculated maximum potential is 36% reduction in energy consumption

Commercial Sector (Buildings)

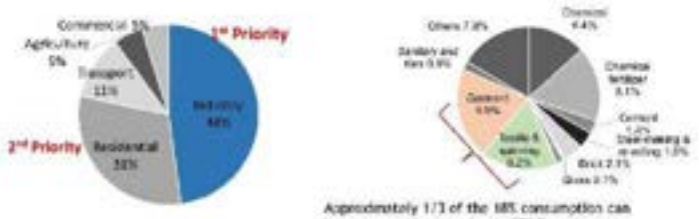
- ~50% of total energy consumed by ACs; 10-30% by lighting systems
- Replacement of ACs and lighting systems with energy efficiency ones can save ~50% of total electricity consumptions in commercial sector

EE&C Potential by Industrial Sub-sector

Sub sector and items	Energy consumption (1000TOE/yr)	EE&C potential (1000TOE/yr)	EE rate
Textile and garment			
■ Adoption/improvement of: spinning machine, air jet loom (Weaving machine), sewing machine, efficient lighting (HF TFL and LED lamp), gas engine waste heat recovery, gas turbine cogeneration, steam boiler waste heat recovery, steam boiler combustion control, once through steam boiler, high efficient canteen, etc.	3,740	1,159	- 31%
Chemical fertilizer			
■ Replacement of the old plants with 3rd generation technology plants	1,646.3	431	- 26%
■ Waste heat recovery technology and refurbishment in 4 plants			
Steel making & re rolling			
■ Retrofitting furnace re-generative burner combustion control unit, waste heat recovery, heat insulation with ceramic fiber	707	156	- 22%

EE&C Potential by Industrial Sub-sector

- 1/2 of total primary energy supply (TPES) is being consumed in industry sector
- Ready-made garments (RMG), textile & spinning sub-sectors, together consume 18% of TPES



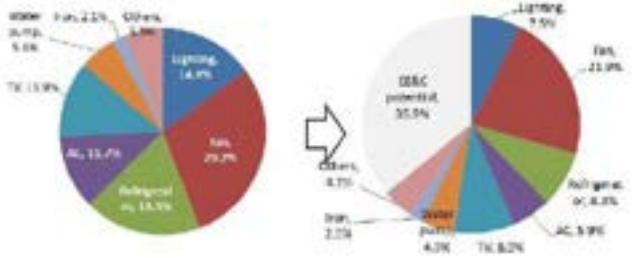
Approximately 1/3 of the ME consumption can be conserved by introducing EE&C equipment

Source: Energy Efficiency & Conservation Master Plan up to 2030

EE&C Potential in Residential Sector

Appliance	EE Technology	Currently Energy Consumption (GWh/year)	EE Rate	Net EE&C Potential (GWh/year)
Lighting	LED high frequency FL	3,724	50%	1,862
Fan	High efficiency motor	6,181	-25%	1,545
Refrigerator /freezer	Variable speed compressor, high performance heat insulation	3,599	-55%	1,264
AC	High COP with large heat exchanging coil and variable speed compressor	2,257	50%	1,129
TV	LCD with LED back light	2,105	-25%	526
Water pump	High efficiency motor	298	15%	45
Iron	Thermostat	181	-5%	9
Other		540	-20%	109
Total		17,570	35.9%	6,479

EE&C Potential in Residential Sector



A: Present electricity consumption B: EE case electricity consumption

Source: Energy Efficiency & Conservation Master Plan up to 2030

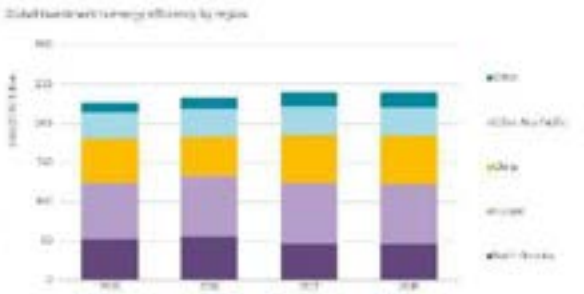
Investment in Energy Efficiency

Global Investment in Energy Efficiency

Source: Energy Conservation 2017, IEA

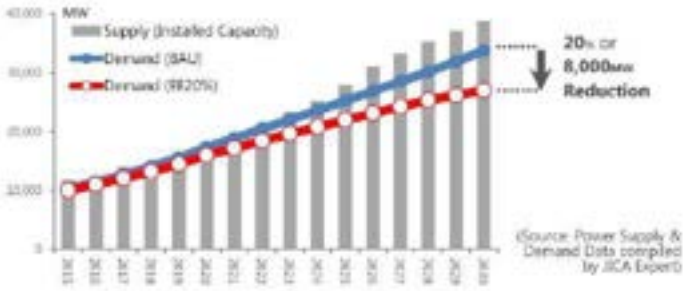
Global Investment in Energy Efficiency

- USD 240 billion invested in energy efficiency across the buildings, transport, and industry sectors (2018)
- Buildings sector is still the largest destination of energy efficiency expenditures

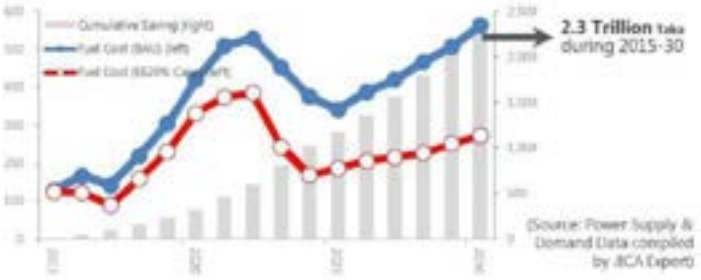


Economic Impact of EE&C

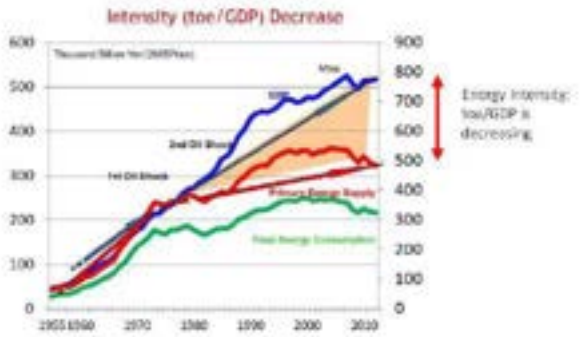
Impact on Power Demand and Supply (MW)



Impact on Fuel Costs (BDT billion)



Example - Energy Efficiency and Conservation in Japan



Source: Derived from "Energy Conservation Experiences and Recent Energy Policies in Japan", Shen Zhonghuan, IEEJ

Inefficiencies in Energy and Power Systems

Efficiency of Gas Utilization in Industries

Petrobangla project: Technical Assessment to Review the Approach for Increasing Efficiency of Gas Utilization in Certain Major Users (2016)

- Boiler Economiser Pilot Program (to fit an economiser to exhaust of boiler to recover waste heat for heating boiler feed water): gas consumption reduced by 4.4%
- Generator Jacket Water Pilot Program (to recover heat from generator jacket water for use as process heat): gas consumption reduced by 14.4%
- Reheating Furnace Recuperator Pilot Program (to install a recuperator to exhaust of furnace to pre-heat combustion air) : gas consumption reduced by 9.10%
- Excess air controll by installing a butterfly damper at chimney; excess air as well as oxygen controlled by dampers as a result furnace losses reduced significantly; gas consumption was reduced by 35%

Source: Petrobangla Annual Report (2016)

Efficiency of Gas Utilization in Industries

Potential Gas Savings and Carbon Emissions Reduction

Energy Management Opportunities	From Audited Industries		Nationwide projection			
	Possible Annual Gas savings (MMSCF)	Savings to Consumption Ratio of Gas	Total Gas consumption (MMSCFD)	Potential Gas savings (MMSCFD)	%	Carbon Emission reduction (Ton/year)
Industrial boilers	664	0.17	3910	98	17	1,172,254
Captive Generator	1054	0.50	444	224	80	4,107,838
Re-heating Furnace	202	0.10	22	4	10	11,172
Total			816	286		5,853,964

Source: Petrobangla Annual Report (2016)

Boiler and Burner Efficiency Improvement

Boiler

- Monitor combustion conditions, adjust quantity of combustion air; keep operating efficiency high [it takes energy to heat excess air not utilized in combustion process, most of this heat is lost up the stack]
- Insulation of boiler and valve
- Monitor water treatment system; check frequently for steam and water leaks
- Use properly sized boiler, ensure high capacity utilization—one boiler operating at high load is much more efficient than two boilers each at low load

Gas burner

- Higher efficiency gas burner; induction cooker [gas burning and heat transfer both are important]

Efficiency of Compressed Air System

- Location of compressor
- Compressor selection
- Regular maintenance [leaks, over-pressure, pressure drop waste energy]
- Clean air filters to eliminate blocking by dust or grease
- Reduce air intake temperature e.g. consider relocating the intake
- Optimize system pressure; install heat recovery systems

Power Plant Efficiency

Sl. No.	Name of power plant	Type of fuel	Installed Capacity (As of June) (MW)	Net Energy Generation (GWh)	Annual Plant factor (%)	Efficiency (%) (Net)
PUBLIC						
DHAKA ZONE						
1	a) Ghorasal TPP Unit 1&2)	Gas	110	313.86	45.71%	25.02%
	b) Ghorasal Repowered CCPP Unit-3	Gas	210	463.93	32.98%	27.97%
	c) Ghorasal Repowered CCPP Unit-4	Gas	210	626.87	42.31%	28.13%
	d) Ghorasal TPP Unit-5	Gas	210	594.59	12.67%	28.90%
	e) Ghorasal TPP Unit-6	Gas	0	-1.23	-	-
2	Ghorasal 365 MW CCPP Unit-7	Gas	365	1789.83	59.03%	47.38%
3	Tongi 50 MW CTPP	Gas	105	-0.79	-	-
4	Haripur GTPP	Gas	32	1.88	1.66%	18.10%
5	210 MW Shiddirganj TPP	Gas	210	-4.69	-	-
6	Siddhirganj 2x120 MW GTPP	Gas	210	318.69	18.13%	24.60%
7	Haripur 412 MW CCPP	Gas	412	2800.29	80.71%	55.15%

Power Plant Efficiency

Sl. No.	Name of power plant	Type of fuel	Installed Capacity (As of June) (MW)	Net Energy Generation (GWh)	Annual Plant factor (%)	Efficiency (%) (Net)
CUMILLA ZONE						
20	a) Ashuganj TPP Unit-3	Gas	150	496.79	40.56%	32.67%
	b) Ashuganj TPP Unit-4	Gas	150	169.28	16.33%	33.24%
	c) Ashuganj TPP Unit-5	Gas	150	214.37	20.33%	34.32%
21	Ashuganj 50 MW PP	Gas	53	244.15	63.61%	38.93%
22	Ashuganj 225 MW CCPP	Gas	221	1480.50	77.83%	47.27%
23	Ashuganj 450 MW CCPP (South)	Gas	360	2350.52	77.52%	55.70%
24	Ashuganj 450 MW CCPP (North)	Gas	360	2458.47	81.34%	56.47%
25	Chandpur 150 MW CCPP	Gas	163	590.80	44.36%	33.64%
RANGPUR ZONE						
50	Barapukuria Coal based S/T (unit 1,2)	COAL	250	887.48	23.80%	23.32%
51	Barapukuria Coal based S/T (unit 3)	COAL	274	1750.57	80.60%	34.28%
52	Saidpur 20 MW GT	HSD	20	9.22	5.20%	21.07%
53	Rangpur 20 MW GT	HSD	20	3.38	1.99%	18.06%

Power Generation

- Retire very old and highly inefficient power plants
- Schedule and planned maintenance of power plants
- Ensure super critical/ultra super critical technology for large coal based power projects

Transmission System

- Modernization of National Load Dispatch Center (NLDC)
- Implementation of unit commitment, optimal power flow (OPF), automatic generation control (AGC)
- 400 kV and 765 kV transmission backbone
- Voltage profile improvement

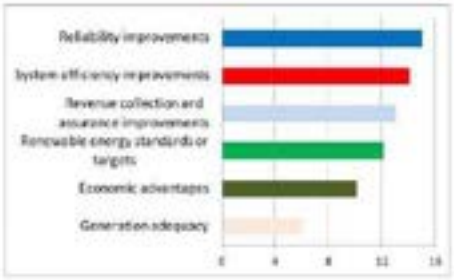
Distribution System

- Higher distribution system voltage
- Adoption of smart grid technologies
- Energy star rated distribution transformer
- Feeder reconfiguration
- Feeder reinforcement
- Construction of new substation
- Reactive-power compensation
- Power quality monitoring

Distribution System

- Introduce smart grid technologies

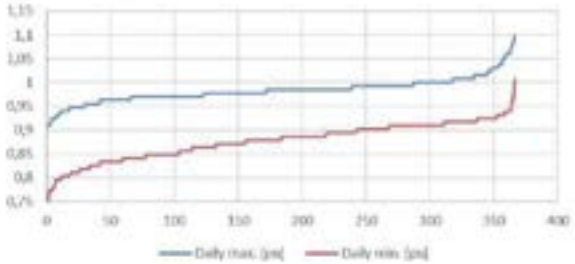
Ranked smart grid technology motivating drivers based on country surveys of developing economies



Source: International Smart Grid Action Network (ISGAN), Smart Grid Drivers and Technologies by Country, Economies, and Continent, 2014

Low Grid Voltages

Jaldhaka 132 kV substation daily maximum and minimum voltage duration curve, June 2019 – May 2020



- No scheduling of reactive power resources
- Generator reactive power reserve not maintained

Transformer Efficiency

- Distribution transformer losses under the star rating program of the Bureau of Energy Efficiency of India

Standard losses in watts up to 11 KV Class (For ratings above 200 kVA)

Rating (kVA)	Per Cent. Impedance	Star 1		Star 2		Star 3		Star 4		Star 5	
		50 Per Cent. Load	100 Per Cent. Load	50 Per Cent. Load	100 Per Cent. Load	50 Per Cent. Load	100 Per Cent. Load	50 Per Cent. Load	100 Per Cent. Load	50 Per Cent. Load	100 Per Cent. Load
250	4.5	980	2930	920	2700	864	2488	811	2293	761	2113
315	4.5	1025	3099	955	2750	890	2480	829	2164	772	1920
400	4.5	1225	3450	1150	3330	1080	3214	1013	3102	951	2994
500	4.5	1510	4300	1430	4100	1354	3909	1282	3727	1215	3554

27.9% reduction of full load loss

Energy Efficient Lighting

- Use natural light where possible, e.g. fit transparent roof panels or skylights
- Paint walls and ceilings white or bright colors to improve light reflection
- Energy efficient fluorescent tubes, CFLs, LED and other low energy efficient light sources
- Electronic ballasts
- Task lighting
- Proper lighting design
- Dimmers, occupancy sensors, time-based control, day-light linked control

Motor Efficiency Improvement

Motors are significant energy consumers

- Use appropriately sized motors and only run when required
- Use high efficiency motors
- Use electronic variable speed controls where motor loads are variable in normal operation
- Install improved bearings and lubricate frequently
- Improve power factor; install capacitor banks close to running equipment

Electric Appliances

- Washing machines, dryers and dish washers – only run with a full load
- Replace old inefficient appliances (washing machines, refrigerators, air-conditioners, water heaters etc.) with efficient ones
- Replace electric water heater by solar water heater

Improving Energy Footprint of Buildings

Example – energy footprint of commercial buildings

Building Name	Floor area (sq. ft.)	Estimated annual energy consumption (kBtu)	Energy footprint (kBtu/sq. ft.)
BRACU building 1	3600	1,255,805	348.80
BRACU building 3	2700	10,0571	37.25
BRACU building 4	3583.13	26,6303	74.03
BRACU building 5	1800	57,178	31.77
Yeasmin Tower	3600	2,399,512	666.53

Energy efficient envelope system

Identification pointers	Possible replacements
Single glazed windows	Energy Star rated windows or double or triple glazed windows
Cracks and gaps in walls	Getting resolved once identified
Doors	Energy star rated swinging doors
Paints	Less reflectance warm colors
Curtains	Energy efficient insulated curtains

Improving Energy Footprint of Buildings

Example - savings from replacement of typical florescent lamps by LED lamps

Type of Light	Efficacy (lumens per watt)	Replacement	Efficacy (lumens per watt)
T-8 (32W)	80.67	LED Tube Light (9W)	99.19
T-12 (50W)	65	LED Tube Light (16W)	100.25
CFL (14W)	60	LED Lamps (9W)	95.25
CFL (23W)	71.74	LED Lamps (14W)	100
CFL (65W)	76.92	LED Lamps (55W)	100

Name of Building	Percentage Savings (%)	
	Lighting	Electrical Equipment
BRAC University Building 5	28.8	8.9
BRAC University Building 3	41.5	12.55

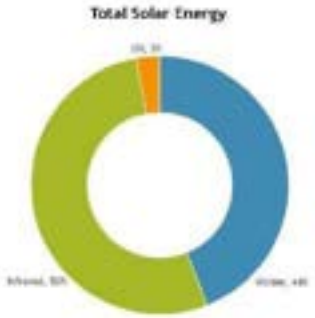
Improving Energy Footprint of Buildings

Example - Building Energy Management System (BEMS)

- Prototype BEMS developed at the EEE Dept., BUET and funded by EPRC
- The system was tested using 3 AC units of different brands and 16 composite units of LED (Light Emitting Diode) tubes already existent in a lab space
- Test showed energy saving from about 11% to 35% for cooling loads and around 35% to 87.5% for lighting loads as the occupancy decreases from high to low level

Improving Energy Footprint of Buildings

- Windows should be effective parts of building climate control and lighting systems
- Quality of a window should be measured by its insulating value, and its transparency to the sun's visible and infrared light
- Use natural ventilation where possible
- Roofing should reflect sunlight instead of absorbing it and be able to efficiently radiate heat from the building



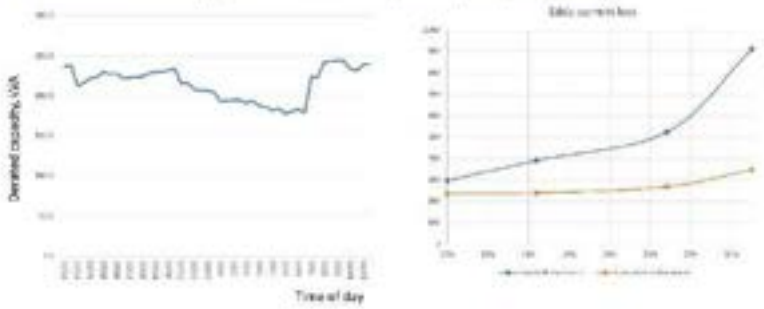
Distribution Transformer Loss Due to Low Quality Battery Chargers

- Battery operated three-wheelers (EVs) are becoming a major part of transport
- e.g. Energy sold to EV charging stations by WZPDCL has more than doubled between 2014-2015 and 2019-2020

2014-2015	2019-2020
19.7 MWh	39.9 MWh

Distribution Transformer Loss Due to Low Quality Battery Chargers

- Transformer derating due to harmonics injected by easy-bike charger



Distribution Transformer Loss Due to Low Quality Battery Chargers

- Transformer eddy current losses due to EV charging loads

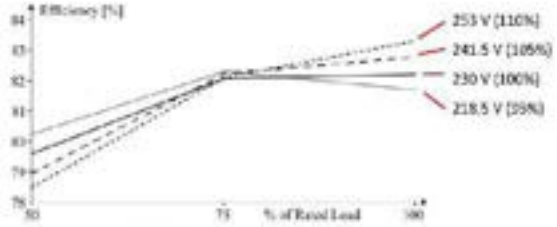
Transformer capacity derating, %	Time of day	Calculated eddy current losses, Watts		Increase in eddy current losses, Watts	Increase in eddy current losses as a percentage of full load losses, %
		Considering actual harmonics	Assuming no harmonics		
1	2	3	4	5	6
10%	15:00	296	236	60	1.8
14.4%	22:00	391	240	151	4.9
20.8%	22:30	523	268	255	8.2
25%	0:30	911	347	564	18.2

Motor Efficiency Standard

- Efficiency of 1.1 kW motors according to IEC 60034-30-1

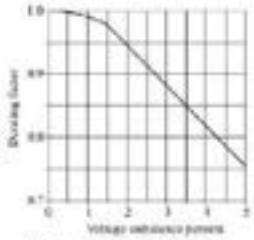
Efficiency Class	Efficiency codes	Comments
New class	IE5 (90%+)	Permanent Magnet motors
Super Premium Efficiency	IE4 (87.2%)	Induction motors with single speed
Premium Efficiency	IE3 (84.1%)	Induction motors with single speed
High Efficiency	IE2 (81.4%)	Induction motors with single speed
Standard Efficiency	IE1 (75%)	Induction Motors with Single speed

Loss of Motor Efficiency Due to Low Voltage



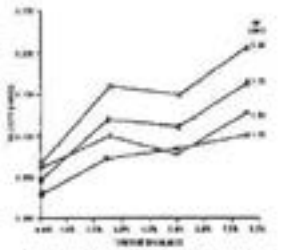
Source: Harner et al. (1997)

Loss of Motor Efficiency Due to Voltage Unbalance



NEMA recommended derating factor for voltage unbalance
(Bonnett, 2000)

NEMA - National Electrical Manufacturers Association of the United States



Increase in motor vibration due to voltage unbalance

Source: The Impact That Voltage Variations Have on AC Induction Motor Performance, Austin H. Bonnett, Rob Reboler, US Electrical Motors, Emerson Motors

Energy Savings Example

- 100-hp motor, fully loaded, operated for 1,500 hrs/yr
- Motor efficiency M_1 = 94.4%, M_2 = 93%
- Annual average energy savings with higher efficiency motor: 1,780 kWh
- Energy price: 10 BDT/kWh
- Annual savings on energy cost: BDT 17,800

Power Distribution System in Building

Safety and efficiency are related issues

- BNBC specifies standard building electrical distribution system
- Connection without lug cause
  - Heating & burning
  - Power loss
  - Voltage drop
  - Voltage unbalance

Power Distribution System in Building

Safety and efficiency are related issues

Burning sign in wooden DB

What Needs To be Done

General Recommendations

- Development of energy efficiency programs
- Strong regulatory regime
  - Energy Conservation Law
  - Energy audit regulations [mandatory and voluntary energy audit; free energy audits for smaller firms]
  - EE&C financing regulations
  - Standard and labelling of appliance regulations
  - Green building rating [for building design and construction]
- Skilled technical manpower
- Awareness program [school program; consumer education and promotion campaigns; identification of non-energy benefits of efficiency etc.]

General Recommendations

- Special program for energy efficient government buildings
- Incentives for voluntary EE&C action plan for industries [e.g., tax incentives and low interest loans for industrial energy efficiency measures]
- Promote combined heat and power (CHP, also known as cogeneration) [e.g., through tax incentives and financial support]
- Energy efficiency standards and labelling for passenger vehicles [tax incentives and low interest loans for EV etc.]
- Subsidy for new technologies
- Banking policy for Green investment

General Recommendations

- Technical assistance to industry
  - Technical assistance to industry for energy efficient plants
  - Technical assistance to industry for energy efficient products
- Development of systematic energy management system [identify the value of cost-effective energy savings that can be achieved by modern energy management systems]
- Development of business model for combined CHP
- Industry-academia collaboration [in-depth studies; training and capacity building]
- Metering and energy data management [allocate energy costs to business units and/or production lines based on submetered energy data]

Examples

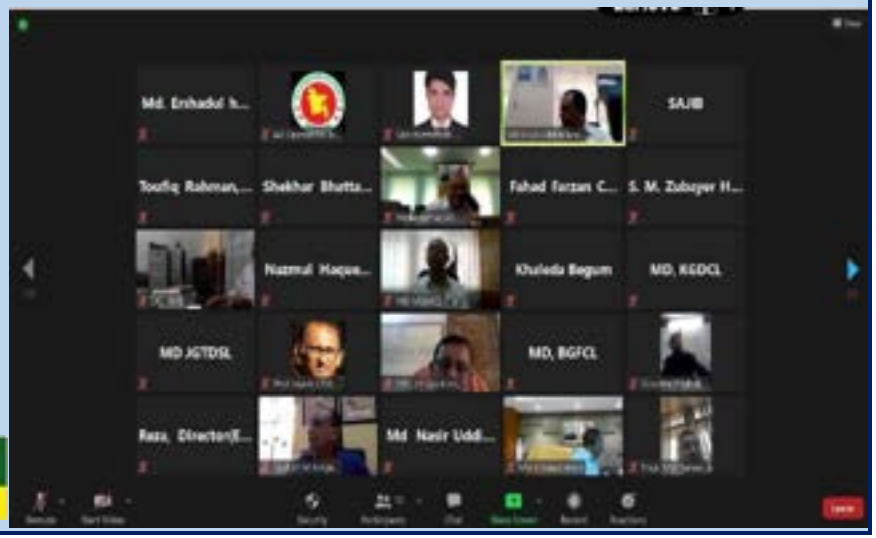
1. Restrict import of **IE1 and IE2 class motors** (and pumps)
2. Heat recovery from industrial utility items (generators, boilers, and compressors)
3. Mandatory data management on energy consumption for each factory
4. Mandatory/voluntary energy audit for industries and commercial buildings
5. Standards for EV charger
6. Mandatory water meter for factories; fines may be considered for disproportionate water use
7. Reduce dust from environment (especially from roads) – this will reduce water usage

Recommendations of the participants at the seminar "Improvement of Energy Efficiency & Conservation in the Energy Sector of Bangladesh":

✓ Development of energy efficiency programs ✓ Strong regulatory regime o Energy Conservation Law o Energy audit regulations mandatory and voluntary energy audit; free energy audits for smaller firms o EE&C financing regulations o Standard and labelling of appliance regulations o Green building rating [for building design and ✓ Skilled technical manpower	✓ Awareness program [school program; consumer education and promotion campaigns; identification of non-energy benefits of efficiency etc.] ✓ Special program for energy efficient government buildings ✓ Incentives for voluntary EE&C action plan for industries [e.g., tax incentives and low interest loans for industrial energy efficiency measures] ✓ Promote combined heat and power (CHP, also known as cogeneration) e.g., through tax ✓ incentives and financial support] ✓ Energy efficiency standards and labelling for passenger vehicles [tax incentives and low interest loans for EV etc.] ✓ Subsidy for new technologies ✓ Banking policy for Green investment

✓ Technical assistance to industry o Technical assistance to industry for energy efficient plants o Technical assistance to industry for energy efficient products ✓ Development of systematic energy management system [identify the value of cost effective energy savings that can be achieved by modern energy management systems]	✓ Development of business model for combined CHP ✓ Industry academia collaboration [in depth studies; training and capacity building ✓ Metering and energy data management [allocate energy costs to business units and/or production lines based on submetered energy data]

Some Notable Moments of the Virtual Seminar



HYDROCARBON UNIT
Energy and Mineral Resources Division

Dated: May 09, 2021

Seminar 8: Digital Transformation Strategy in Energy & Power Sector

Seminar Key Personnel at a Glance

Chief Guest	**Mr. Md Anisur Rahman** Senior Secretary Energy and Mineral Resources Division (EMRD)
Host	**A S M Manzurul Quader** Director General (Joint Secretary) Hydrocarbon Unit
key-Note Speaker	**Dr. A. B. M. Alim Al Islam** Professor, CSE BUET
Panel Discussant	**Mollah Amzad Hossain** Editor Energy & Power
	Mr. Mohammad Hossain Director General Power Cell, Power Division

Abstract of the Seminar

Digital Transformation

Digital Transformation is the adoption of digital technology to transform services or businesses, through replacing non-digital or manual processes with digital processes or replacing older digital technology (electronic tools, systems, devices and resources that generate, store or process data.) with newer digital technology. Digital solutions may enable – in addition to efficiency via automation – new types of innovation and creativity, rather than simply enhancing and supporting traditional methods. One example of digital transformation is the use of cloud computing. This reduces reliance on user-owned hardware and increases reliance on subscription-based cloud services.

Digital Transformation Strategy

Digital transformation requires a digital transformation strategy that, as any strategy, looks at the goals, current situation and how to move forward on a transformational journey in a way that makes sense and connects the dots. A digital transformation strategy starts with answering essential questions such as the what, why, how and who. A digital transformation strategy builds bridges between current state and desired long-term plan.

Benefits

- Enhanced data collection, storage and analysis
- Greater resource management
- An overall better customer experience
- Encourages digital culture (with improved collaboration)
- Increased profits
- Increased agility
- Improved productivity
- Improved monitoring & supervision

In Energy & Power Sector

It is truly important that energy & power companies realize the promise of digital transformation at scale, on both national & global basis. Over the next two to three decades, more than five billion people across the developing world will seek a path out of poverty. Unlocking the magnitude of energy resources required to improve their lives, in a way that does not choke the environment, cannot be done without the power of digital to improve efficiency and manage complexity.

And it matters to energy & power companies because they face unprecedented changes across the system: more competition, more complexity, and less predictability. Profit margins are under pressure, and the margin of error for survival is shrinking.
These changes affect every player:

- ✓ oil and gas operators that face price volatility, potential peak demand, and the dynamism of shale versus OPEC
- ✓ utilities that face distributed generation, more complex grids, and evolving customer expectations
- ✓ refineries that must adapt to global uncertainty over new sources of feedstock and new patterns of demand
- ✓ renewables developers that must survive and grow amid intensifying competition and potential commoditization
- ✓ service companies that must remake their delivery models to meet customers' new expectations about digital efficiencies
- ✓ engineering, procurement, and construction companies that struggle to deliver the types of capital projects that matter for the future

Challenges

- ✓ **Physical orientation**: The energy & power sector is sensitive to the geophysics of an oil and gas reservoir, quantum physics of solar power, fluid dynamics of wind, thermodynamics of fossil power, or electromagnetics of power transmission. Moreover, it is embodied in heavy capital such as power plants, offshore platforms, or LNG terminals or pipelines. This physicality makes energy operations, and profit generation, fundamentally difficult.
- ✓ **Health and safety risk:** Energy industry pays enormous attention to safety, but incidents still occur— energy & power companies are averse to risk and try to control for it through detailed and rigorous processes. This makes them slow to change.
- ✓ **Heavy dependence on third parties:** The work of energy companies depends on an extensive and fragmented supply chain.
- ✓ **Large scale operations**: Energy & power companies go where the resources are. Often, relatively simple things such as internet connectivity cannot be taken for granted in remote region. Labor forces vary in capability, reliability, size, and cost. Supply chains vary in maturity.
- ✓ **Adaptation with rapidly changing technology**
- ✓ **Proper utilization of manpower**
- ✓ **Cyber security**

PowerPoint Presentation from the Key Note Speaker

Digital Transformation Strategy in Energy & Power Sectors

A. B. M. Alim Al Islam

Outline of the Presentation

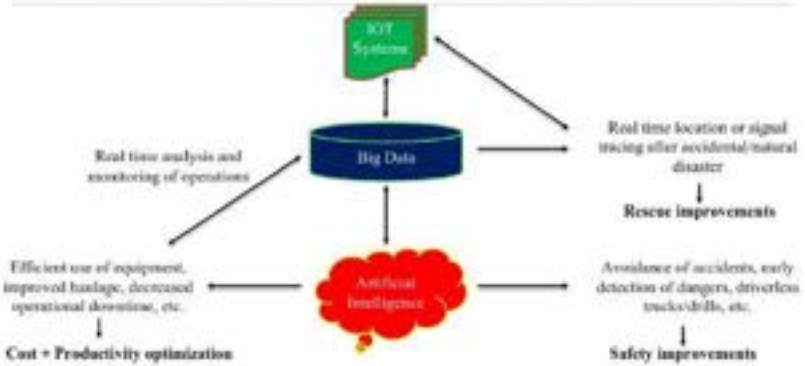
- Defining digital transformation strategy
- Digital transformation strategy in energy and power industry
  - IoT in energy and power industry
  - Big Data in mining and power industry
  - Cyber Security in energy and power industry

Digital Transformation Strategy (DTS)

DTS in Energy & Power Generation and Distribution

Applications of DTS in Energy & Power Industry: User View

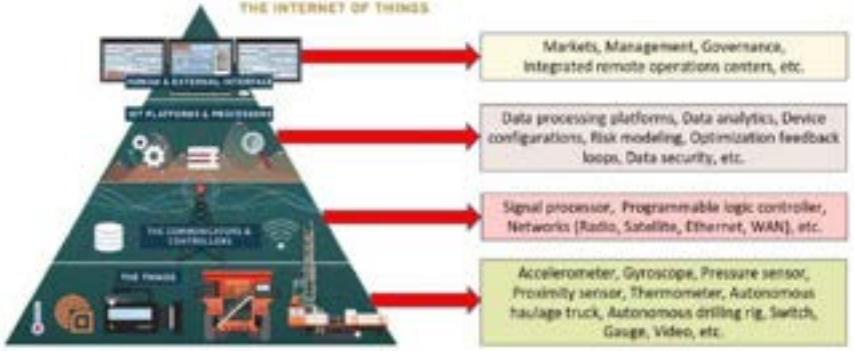
Applications of DTS in Energy & Power Industry: Tech View



IoT in Oil and Natural Gas Industry: User View

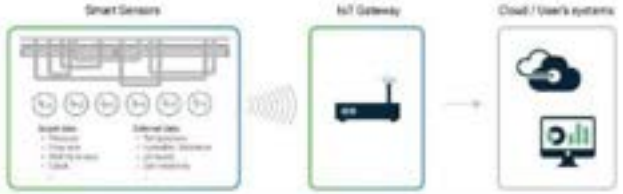
IoT in Mining Oil and Natural Gas Industry: Tech View

IoT in Mining Oil and Natural Gas Industry: Tech View

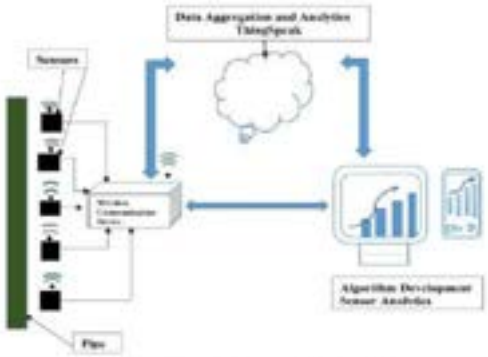


IoT in Oil and Natural Gas Industry: Asset Perspective

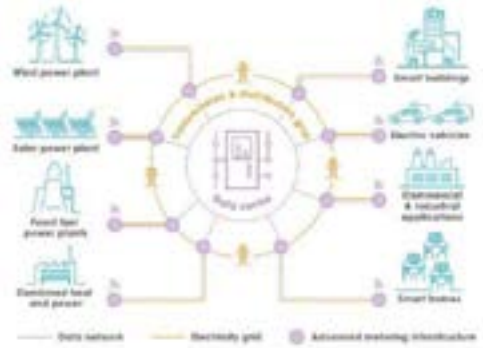
IoT in Oil and Natural Gas Industry: Facility Perspective



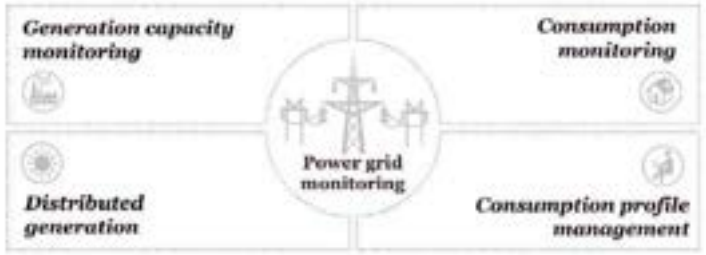
IoT in Oil and Natural Gas Industry: Distribution Perspective



IoT in Power Industry: Data in The Loop



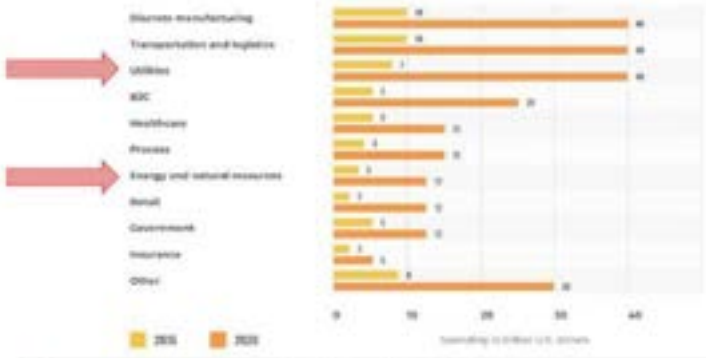
IoT in Power Industry: Generation to Consumption



IoT in Power Industry: The Maintenance Maturity Pyramid

IoT in Smart Metering

Worldwide Spending on IoT: 2015 and 2020

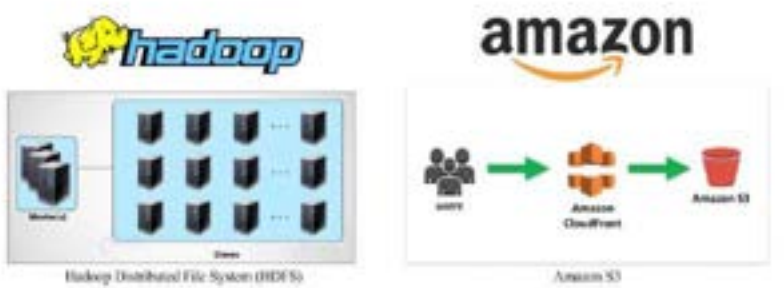


What Comes As A Consequence of Massive IoT Deployment?

Big Data in Oil and Natural Gas Industry: Applications

Big Data in Oil and Natural Gas Industry: Other Data Sources

Big Data in Oil and Natural Gas Industry: Storages



Hadoop Distributed File System (HDFS)

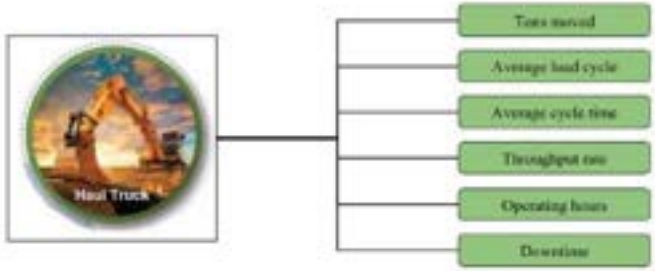
Amazon S3

Big Data in Oil and Natural Gas Industry: Use Cases

Use Case A: Identifying Variables Impacting Productions

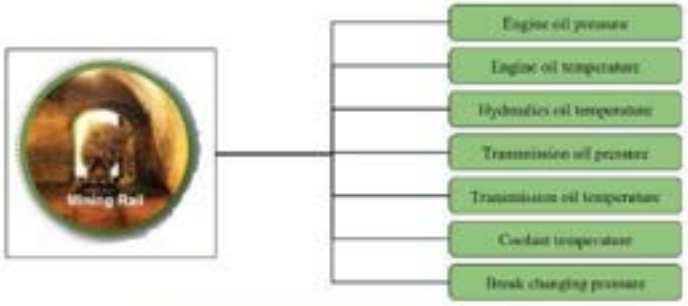
Big Data in Oil and Natural Gas Industry: Use Cases (contd.)

Use Case B: Identifying Haul Truck Performance Variables



Big Data in Oil and Natural Gas Industry: Use Cases (contd.)

Use Case C: Identifying Machine Patterns for Maintenance of Trucks



Applications of Big Data in Power Industry


Power generation


Power transmission


Power distribution


Power demand management

Big Data in Power Industry: Data Sources


Smart meters


Grid assets data


Asset management data

Big Data in Customer Service

Big Data: Data Visualization and Analysis


Data visualization


Statistical analysis


Artificial Intelligence

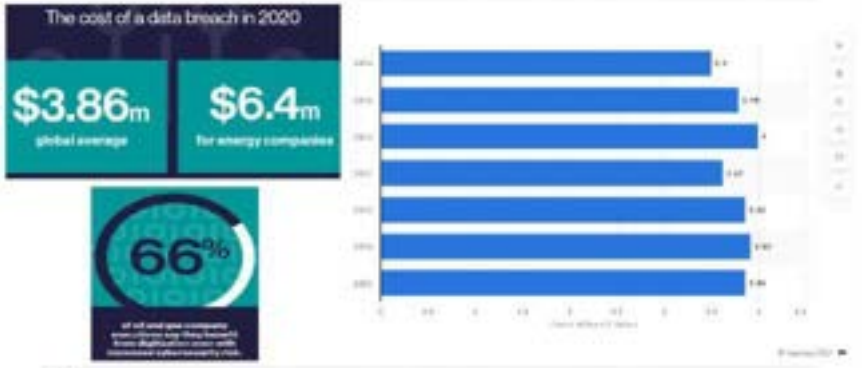

Natural Language Processing

Big Data: Data Security and Ownership

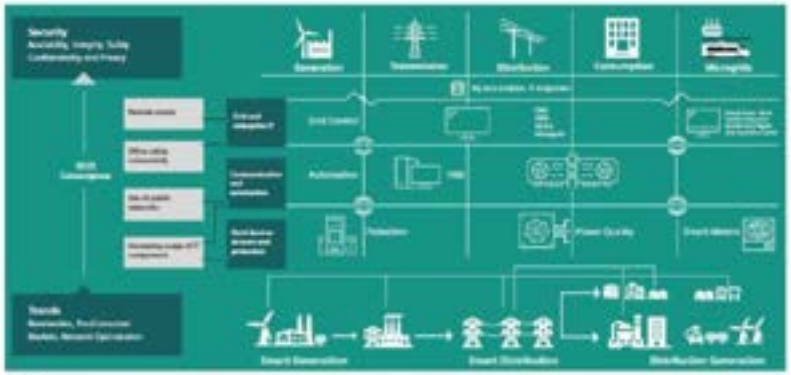
Privacy of consumer data | Legislation surrounding ownership of data | Control over data exchange

Cyber Security in Mining (Oil and Natural Gas) Industry

Cost of Cyber Security Breach: Energy Industry and Overall



Cyber Security in Energy Industry



Cyber Security in Power Industry

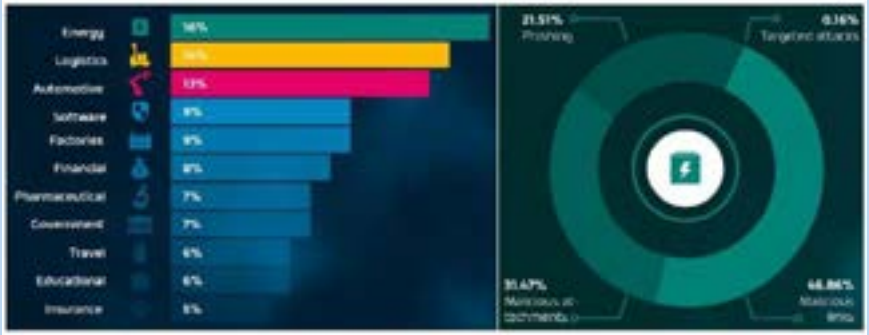


Figure: Top 10 industries targeted by cyber criminals in 2019 *Figure: Types of attacks on the energy sector*

Cyber Security: An Example Overview of Reality

Figure: Malware received between January and September 2020

Cyber Security: An Example Case

Figure: Ransomware hides behind harmful email attachments or download links

Cyber Security in Power Industry: Origins of Threats

Figure: Geographical origin for the distribution of malware

Cyber Security in Power Industry: Matrix over Actors-Impacts

Figure: The cyberthreats profile for the US electric power sector is highest from three key actors

Cyber Security in Power Industry: To Do

Way Ahead ...

- Identification of the important areas to be taken under digital transformation
  - Prioritize the areas
- Formulate plans for the digital transformations
  - Short-term and long-term
- Onboard own people
  - Procurement, testing, maintenance, and training
- Research and Development (R&D) sustaining local needs, customs, and practices

Recommendations of the participants at the seminar "Digital Transformation Strategy in Energy & Power Sector":

✓ Identifying cyber risks and vulnerabilities need to address properly in energy and power sector ✓ Continuous assessment and development on the existing networking system of energy and power industry ✓ Installing security patch management and continuous system upgradation is needed to protect the cyber security ✓ Cyber-crime hotline should be considered for any security breach in energy and power sector ✓ Addressing prioritize area to take under digital transformation is required immediately ✓ Formulation of Short-term and long term plan for the digital transformation ✓ Initiation of Technology transfer is required as early as possible ✓ Training and development of manpower to grow expertise addressing cyber security in energy and power sector ✓ Introducing National data center and to maintain/secure it properly ✓ Capitalizing our own Satellite Bangabandhu-1 for seismic survey	✓ We have to collect our own data by our own rather any engagement of foreign personnel. In this regard we have to train and develop our own manpower ✓ Policy maker, Industry and academia should be cooperated and collaborated to develop a sustainable planning and implementation ✓ Installation of AI in the gas pipeline and networking system for transparency and system efficiency

Some notable moments of the seminar

Date: June 02, 2021

Seminar 9: "SDG-7: Progress so Far"

Seminar Key Personnel at a Glance

Chief Guest	**Mr. Md Anisur Rahman** Senior Secretary Energy and Mineral Resources Division (EMRD)
Host	**A S M Manzurul Quader** Director General (Joint Secretary) Hydrocarbon Unit
key-Note Speaker	**A S M Manzurul Quader** Director General (Joint Secretary) Hydrocarbon Unit
Panel Discussant	**Md Azizul Islam** Additional Secretary (Admin) Energy & Mineral Resources Division
	A K M Fazlul Haque Additional Secretary (Development) Energy and Mineral Resources Division

Abstract of the Seminar

Sustainable Development Goals

The Sustainable Development Goals (SDGs) or Global Goals are a collection of 17 interlinked global goals designed to be a "blueprint to achieve a better and more sustainable future for all". The SDGs were set up in 2015 by the United Nations General Assembly and are intended to be achieved by the year 2030. They are included in a UN Resolution called the 2030 Agenda or what is colloquially known as Agenda 2030. The SDGs were developed in the Post-2015 Development Agenda as the future global development framework to succeed the Millennium Development Goals, which ended in 2015.

The 17 SDGs are: (1) No Poverty, (2) Zero Hunger, (3) Good Health and Well-being, (4) Quality Education, (5) Gender Equality, (6) Clean Water and Sanitation, (7) Affordable and Clean Energy, (8) Decent Work and Economic Growth, (9) Industry, Innovation and Infrastructure, (10) Reducing Inequality, (11) Sustainable Cities and Communities, (12) Responsible Consumption and Production, (13) Climate Action, (14) Life Below Water, (15) Life On Land, (16) Peace, Justice, and Strong Institutions, (17) Partnerships for the Goals.

Targets and indicators

Each goal typically has 8–12 targets, and each target has between 1 and 4 indicators used to measure progress toward reaching the targets. The targets are either "outcome" targets (circumstances to be attained) or "means of implementation" targets. The latter targets were introduced late in the process of negotiating the SDGs to address the concern of some Member States about how the SDGs were to be achieved. Goal 17 is wholly about how the SDGs will be achieved.

SDG:7-Affordable and Clean Energy (Targets, Indicators & Custodian Agencies in Bangladesh)

SDG Targets	Global Indicators for SDG Targets	Lead/ Co-Lead Ministries/ Divisions	Associate Ministries/ Divisions
7.1 By 2030, ensure universal access to affordable, reliable and modern energy services	7.1.1 Proportion of population with access to electricity	Lead: PD	EMRD; MoST; MoFA
	7.1.2 Proportion of population with primary reliance on clean fuels and technology	Lead: EMRD Co-Lead: PD	MoST; MoInf
7.2 By 2030, increase substantially the share of renewable energy in the global energy mix	7.2.1 Renewable energy share in the total final energy consumption	Lead: PD	ERD; MoFA; EMRD
7.3 By 2030, double the global rate of improvement in energy efficiency	7.3.1 Energy intensity measured in terms of primary energy and GDP	Lead: EMRD Co-Lead: PD	ERD; MoFA; BERC
7.a By 2030, enhance international cooperation to facilitate access to clean energy research and technology, including renewable energy, energy efficiency and advanced and cleaner fossil-fuel technology, and promote investment in energy infrastructure and clean energy technology	7.a.1 Mobilized amount of United States dollars per year starting in 2020 accountable towards the $100 billion commitment	Lead: ERD	EMRD; MoEFCC; MoFA; MoST; BB
7.b By 2030, expand infrastructure and upgrade technology for supplying modern and sustainable energy services for all in developing countries, in particular least developed countries, small island developing States and landlocked developing countries, in accordance with their respective programs of support	7.b.1 Investments in energy efficiency as a percentage of GDP and the amount of foreign direct investment in financial transfer for infrastructure and technology to sustainable development services	Lead: PD	ERD; IED; MoFA; PID, MoInd; MoST

SDG7: Progress So Far

Target 7.1: By 2030, ensure universal access to affordable, reliable and modern energy services

Indicator 7.1.1: Proportion of population with access to electricity

2000	2005	2010	2016	2017	2018	2019	2020
31.2	44.23	55.26	75.92	85.3	90	92.23	99

Indicator 7.1.2: Proportion of population with primary reliance on clean fuels and technology

2015	2016	2017	2018	2019	2020
12.08	14.96	18.38	24.40	31.12	36.87

Target 7.2: By 2030, increase substantially the share of renewable energy in the global energy mix

Indicator 7.2.1: Renewable energy share in the total final energy consumption

2015	2016	2017	2018	2019	2020
2.79	2.85	2.87	3.15	3.25	3.49

Target 7.3 By 2030, double the global rate of improvement in energy efficiency

Indicator 7.3.1: Energy intensity measured in terms of primary energy and GDP

2015	2016	2017	2018	2019	2020
2.81	2.67	2.35	2.09	2.15	1.99

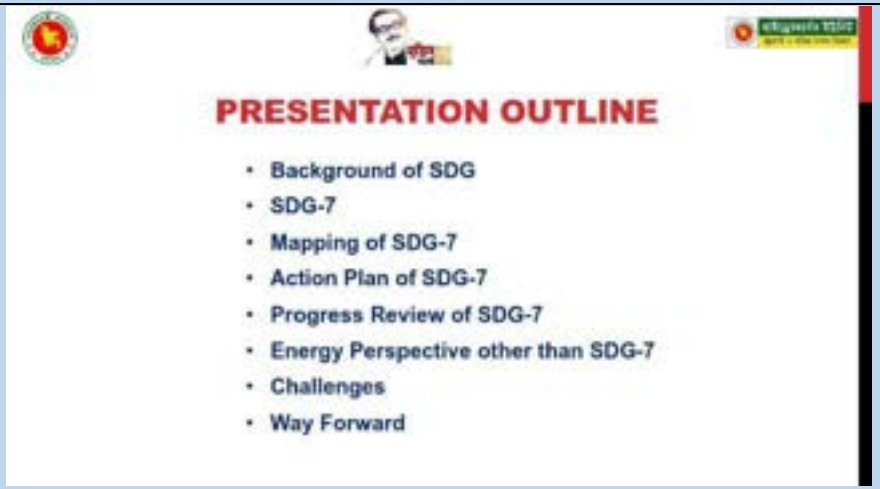
EMRD involvement in other than Goal-7

SDG Targets	Global Indicators for SDG Targets	Lead/ Co-Lead Ministries/ Divisions	Associate Ministries/ Divisions
12.a Support developing countries to strengthen their scientific and technological capacity to move towards more sustainable patterns of consumption and production	12.a.1 Installed renewable energy-generating capacity in developing countries (in watts per capita)	Lead: PD Co-Lead: EMRD	ERD; IED; MoFA; PID, MoInd; MoST
12.c Rationalize inefficient fossil-fuel subsidies that encourage wasteful consumption by removing market distortions, in accordance with national circumstances, including by restructuring taxation and phasing out those harmful subsidies, where they exist, to reflect their environmental impacts, taking fully into account the specific needs and conditions of developing countries and minimizing the possible adverse impacts on their development in a manner that protects the poor and the affected communities	12.c.1 Amount of fossil-fuel subsidies per unit of GDP (production and consumption)	Lead: FD Co-Lead: EMRD	IRD; PD
14.2 By 2020, sustainably manage and protect marine and coastal ecosystems to avoid significant adverse impacts, including by strengthening their resilience, and take action for their restoration in order to achieve healthy and productive oceans	14.2.1 Number of countries using ecosystem-based approaches to managing marine areas	Lead: MoFL Co-Lead: MoS; EMRD; MoEFCC	MoST; MoD; PSD (Coast Guard); MoFA

CHALLENGES

- Affordable and Reliable Modern Energy for all
- Clean Fuel and Technology
- Increase share of Renewable Energy
- On-shore and Off-shore exploration of gas
- Development of domestic Coal field
- Energy Efficiency and conservation issue
- LNG import
- Emphasis on coal fired power project management
- Energy pricing and subsidies
- Suitable Energy mix &
- Huge financing of project related to SDG

PowerPoint Presentation from the Key Note Speaker



MDG At A Glance…

Sustainable Development Goals(SDG)

The SDGs are a collection of 17 global goals designed to be a "blueprint to achieve a better and more sustainable future for all". The SDGs, set in 2015 by the United Nations General Assembly and intended to be achieved by the year 2030, are part of UN Resolution 70/1, the 2030 Agenda.

- No Poverty
- Zero Hunger
- Good Health and Well-being
- Quality Education
- Gender Equality
- Clean Water and Sanitation
- Affordable and Clean Energy
- Decent Work and Economic Growth

Sustainable Development Goals(SDG)

- Industry, Innovation, and Infrastructure
- Reducing Inequality
- Sustainable Cities and Communities
- Responsible Consumption and Production
- Climate Action
- Life Below Water
- Life On Land
- Peace, Justice, and Strong Institutions
- Partnerships for the Goals

SDG Goals At A Glance…


Sustainable Development Goals(SDG)
17 goals
169 targets
232 indicators


SDG Goal 7
HELPING GOVERNMENTS AND STAKEHOLDERS MAKE THE SDGS A REALITY


Targets of Goal 7
7.1 By 2030, ensure universal access to affordable, reliable and modern energy services
7.2 By 2030, increase substantially the share of renewable energy in the global energy mix
7.3 By 2030, double the global rate of improvement in energy efficiency


Targets of Goal 7
7.a By 2030, enhance international cooperation to facilitate access to clean energy research and technology, including renewable energy, energy efficiency and advanced and cleaner fossil-fuel technology, and promote investment in energy infrastructure and clean energy technology
7.b By 2030, expand infrastructure and upgrade technology for supplying modern and sustainable energy services for all in developing countries, in particular least developed countries, small island developing States and landlocked developing countries, in accordance with their respective programs of support

Targets & Indicators of Goal 7

7.1 By 2030, ensure universal access to affordable, reliable and modern energy services

- 7.1.1 Proportion of population with access to electricity
- 7.1.2 Proportion of population with primary reliance on clean fuels and technology

7.2 By 2030, increase substantially the share of renewable energy in the global energy mix

- 7.2.1 Renewable energy share in the total final energy consumption

7.3 By 2030, double the global rate of improvement in energy efficiency

- 7.3.1 Energy intensity measured in terms of primary energy and GDP

Targets & Indicators of Goal 7

7.a By 2030, enhance international cooperation to facilitate access to clean energy research and technology, including renewable energy, energy efficiency and advanced and cleaner fossil-fuel technology, and promote investment in energy infrastructure and clean energy technology

- 7.a.1 Mobilized amount of United States dollars per year starting in 2020 accountable towards the $100 billion commitment

7.b By 2030, expand infrastructure and upgrade technology for supplying modern and sustainable energy services for all in developing countries, in particular least developed countries, small island developing States and landlocked developing countries, in accordance with their respective programs of support

- 7.b.1 Installed renewable energy generating capacity in developing countries (in watts per capita)

Revised Lead/Co-Lead Ministries/Divisions, March 2021

SDG Targets	Global Indicators for SDG Targets	Lead/ Co-Lead Ministries/ Divisions	Associate Ministries/ Divisions
7.1 By 2030, ensure universal access to affordable, reliable and modern energy services	7.1.1 Proportion of population with access to electricity	Lead: PD	EMRD; MoST; MoFA
	7.1.2 Proportion of population with primary reliance on clean fuels and technology	Lead: EMRD Co-Lead: PD	MoST; MoInf
7.2 By 2030, increase substantially the share of renewable energy in the total final energy consumption	7.2.1 Renewable energy share in the total final energy consumption	Lead: PD	ERD; MoFA; EMRD
7.3 By 2030, double the global rate of improvement in energy efficiency	7.3.1 Energy intensity measured in terms of primary energy and GDP	Lead: EMRD Co-Lead: PD	ERD; MoFA; BERC

Revised Lead/Co-Lead Ministries/Divisions, March 2021

SDG Targets	Global Indicators for SDG Targets	Lead/ Co-Lead Ministries/ Divisions	Associate Ministries/ Divisions
7.a By 2030, enhance international cooperation to facilitate access to clean energy research and technology, including renewable energy, energy efficiency and advanced and cleaner fossil-fuel technology, and promote investment in energy infrastructure and clean energy technology	7.a.1 Mobilized amount of United States dollars per year starting in 2020 accountable towards the $100 billion commitment	Lead: ERD	EMRD; MoEFCC; MoFA; MoST; BB
7.b By 2030, expand infrastructure and upgrade technology for supplying modern and sustainable energy services for all in developing countries, in particular least developed countries, small island developing States and landlocked developing countries, in accordance with their respective programs of support	7.b.1 Installed renewable energy generating capacity in developing countries (in watts per capita)	Lead: PD	ERD; IED; MoFA; PID; MoInd; MoST

SDG Action Plan (Up to 2021 and beyond)

Goal 7. Ensure access to affordable, reliable, sustainable and modern energy for all

EMRD projects to achieve the 7FYP and SDG target

Most of the targets of SDG7 are related to Power Division, but to fulfill this target, EMRD is responsible to provide available primary energy. As fuel plays the main role for the electricity generation, EMRD took several projects to attain the set targets of SDG, which are mainly aligned with the proposed **indicator 7.1.1**. Major projects are summarized in the following table-

PROGRESS SO FAR...

TARGET 7.1: BY 2030, ENSURE UNIVERSAL ACCESS TO AFFORDABLE, RELIABLE AND MODERN ENERGY SERVICES

INDICATOR 7.1.1: PROPORTION OF POPULATION WITH ACCESS TO ELECTRICITY

Table: Proportion of population with access to electricity (Percent)

2000	2005	2010	2016	2017	2018	2019	2020
31.2	44.23	55.26	75.92	85.3	90	92.23	99

INDICATOR 7.1.2: PROPORTION OF POPULATION WITH PRIMARY RELIANCE ON CLEAN FUELS AND TECHNOLOGY

Table: Proportion of population with access to clean fuels and technology for cooking (Percent)

2015	2016	2017	2018	2019	2020
12.08	14.96	18.38	24.40	31.12	36.87

PROGRESS SO FAR...

GOAL 7.2: BY 2030, INCREASE SUBSTANTIALLY THE SHARE OF RENEWABLE ENERGY IN THE GLOBAL ENERGY MIX

INDICATOR 7.2.1: RENEWABLE ENERGY SHARE IN THE TOTAL FINAL ENERGY CONSUMPTION

Table: Renewable energy share in the total final energy consumption (Percent)

2015	2016	2017	2018	2019	2020
2.79	2.85	2.87	3.21	3.21	3.49

7.3 By 2030, double the global rate of improvement in energy efficiency

INDICATOR 7.3.1: ENERGY INTENSITY MEASURED IN TERMS OF PRIMARY ENERGY AND GDP

Table: Energy intensity level of primary energy (kiloton of oil equivalent (ktoe) per billion BDT)

2015	2016	2017	2018	2019	2020
2.81	2.67	2.35	2.09	2.15	1.90

INDICATOR 7.1.2: PROPORTION OF POPULATION WITH PRIMARY RELIANCE ON CLEAN FUELS AND TECHNOLOGY

Year	Proportion		
	Clean fuel user (million)	Total population (million)	Proportion (%)
2014-15	19.08	157.90	12.08
2015-16	23.91	159.89	14.96
2016-17	29.73	161.75	18.38
2017-18	39.93	163.65	24.40
2018-19	51.51	165.55	31.12
2019-20	61.78	167.56	36.87

Source: BBS, HCU

INDICATOR 7.3.1: ENERGY INTENSITY MEASURED IN TERMS OF PRIMARY ENERGY AND GDP

Energy Intensity of Bangladesh			
Year	Energy Mix (Primary) MTOE	GDP (Current) (billion Tk)	Intensity (Ktoe/billion BDT)
2014-15	42.53	15158.022	2.81
2015-16	46.10	17328.637	2.66
2016-17	46.43	19758.154	2.35
2017-18	47.01	22504.793	2.09
2018-19	54.60	25424.826	2.15
2019-20	55.50	27963.782	1.99

Source: BBS, HCU

EMRD involvement in other than Goal-7

SDG Targets	Global Indicators for SDG Targets	Lead/ Co-Lead Ministries/ Divisions	Associate Ministries/ Divisions
12.a Support developing countries to strengthen their scientific and technological capacity to move towards more sustainable patterns of consumption and production	12.a.1 Installed renewable energy-generating capacity in developing countries (in watts per capita)	Lead: PD Co-Lead: EMRD	ERD; IED; MoEF, FD; MoInd; MoFT
12.c Rationalize inefficient fossil-fuel subsidies that encourage wasteful consumption by removing market distortions, in accordance with national circumstances, including by restructuring taxation and phasing out those harmful subsidies, where they exist, to reflect their environmental impacts, taking fully into account the specific needs and conditions of developing countries and minimizing the possible adverse impacts on their development in a manner that protects the poor and the affected communities	12.c.1 Amount of fossil-fuel subsidies per unit of GDP (production and consumption)	Lead: FD Co-Lead: EMRD	IED; FD
14.2 By 2020, sustainably manage and protect marine and coastal ecosystems to avoid significant adverse impacts, including by strengthening their resilience, and take action for their restoration in order to achieve healthy and productive oceans	14.2.1 Number of countries using ecosystem-based approaches to managing marine areas	Lead: MoFL Co-Lead: MoS; EMRD; MoEFCC	MoST; MoD; FSD (Coast Guard); MoFA

Indicator 12.c.1: Amount of fossil-fuel subsidies per unit of GDP (production and consumption)

Year	Subsidies (billion Tk)	GDP (current) (billion tk)	Fossil-fuel subsidies (consumption and production) as a proportion of total GDP (%)
2014-15	0	15158.022	-
2015-16	0	17328.637	-
2016-17	0	19758.154	-
2017-18	0	22504.793	-
2018-19	25	25424.826	0.10
2019-20	35	27963.782	0.13

CHALLENGES TO ACHIEVE SDG

- Affordable, Reliable and Modern Energy for all
- Clean Fuel and Technology
- Increase share of Renewable Energy
- On-shore and Off-shore exploration of gas
- Development of domestic Coal field


CHALLENGES TO ACHIEVE SDG
• Energy Efficiency and conservation issue
• LNG & LPG import
• Emphasis on coal fired power project management
• Energy pricing and subsidies
• Suitable Energy mix &
• Huge financing of project related to SDG

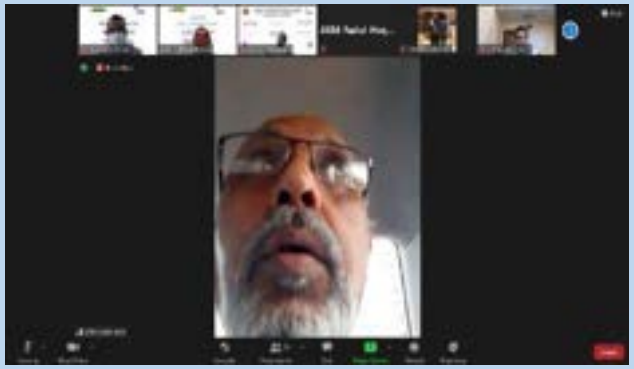

WAY FORWARD...
• Energy Transition (from Fossil-fuel to non Fossil-fuel)
• Modern Energy Management
• Imported Energy (LNG, LPG, Coal, Electricity)
• Cross Border Energy
• Fuel Diversification (LNG,LPG, Coal, Renewable & Nuclear)
• Intensifying Domestic E&P Efforts both in off-shore and on-shore
• Coal Based Power Plants

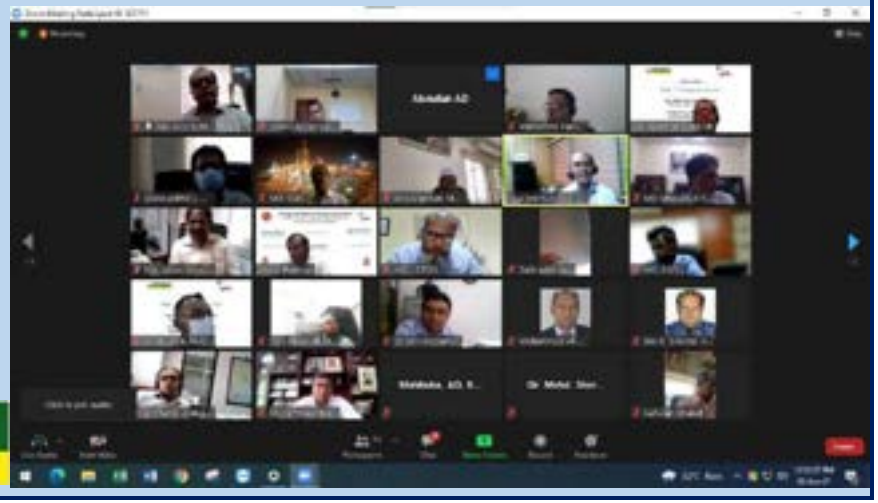

WAY FORWARD...
• Biomass and Biofuel
• Unconventional form of energy (CBM, UCG, Gas Hydrate etc.)
• Energy Efficiency and Conservation
• Policy and institutional interventions
• Immediate adjustment of all energy prices, especially gas

Recommendations of the participants at the seminar “SDG-7: Progress so Far"

- ✓ Effective cooperation and coordination between Power Division and Energy and Mineral Resources Division is very substantial to address SDG mandate
- ✓ Marine resources can be capitalized in the context of modern & clean energy
- ✓ Immediate adjustment of all energy prices, especially gas
- ✓ Energy Efficiency and Conservation
- ✓ Policy and institutional interventions
- ✓ Cross Border Energy
- ✓ Fuel Diversification (LNG, LPG, Coal, Renewable & Nuclear)
- ✓ Intensifying Domestic E&P Efforts both in off-shore and on-shore
- ✓ Imported Energy (LNG, LPG, Coal, Electricity)
- ✓ Coal Based Power Plants
- ✓ Unconventional form of energy (CBM, UCG, Gas Hydrate etc.)

Some notable moments of the seminar





HYDROCARBON UNIT
Energy and Mineral Resources Division

১৩.০৬.২০২১

সেমিনার ১০: জ্বালানিখাতে মানবসম্পদ উন্নয়ন স্ট্র্যাটেজি এবং প্রাসঙ্গিক ভাবনা

Seminar Key Personnel at a Glance

Chief Guest	**Mr. Md Anisur Rahman** Senior Secretary Energy and Mineral Resources Division (EMRD)
Host	**A S M Manzurul Quader** Director General (Joint Secretary) Hydrocarbon Unit
key-Note Speaker	**A S M Manzurul Quader** Director General (Joint Secretary) Hydrocarbon Unit
Panel Discussant	**Md Azizul Islam** Additional Secretary (Admin) Energy & Mineral Resources Division
	A K M Fazlul Haque Additional Secretary (Development) Energy and Mineral Resources Division
	Engr. Anwar Hossain Khan Ex-DG, Hydrocarbon Unit

সেমিনারের সারসংক্ষেপ

মানবসম্পদ

মানবসম্পদ একটি জাতির জন্য আর্শীবাদ স্বরূপ। জনসংখ্যা যতক্ষণ পর্যন্ত মানবসম্পদে পরিণত না হবে, ততক্ষণ তা একটি জাতির জন্য বোঝা স্বরূপ। জাতীয় উন্নয়নের জন্য মানবসম্পদ উন্নয়নের বিকল্প নেই। জনশক্তিকে জন সম্পদে পরিণত করতে হলে মানবসম্পদ উন্নয়নে সচেষ্ট হতে হবে। মানব সম্পদ উন্নয়নে শিক্ষা ও প্রশিক্ষণ অন্যতম ভূমিকা পালন করে।

শিক্ষাও প্রশিক্ষণ ব্যক্তির গুণগত পরিবর্তন সাধন করে তাকে দক্ষ জনশক্তিতে পরিণত করে। মানব সম্পদ উন্নয়ন হলো জনসম্পদের এমন এক গুণগত পরিবর্তন প্রক্রিয়া যার মাধ্যমে একটি জাতি উৎপাদনক্ষম ও দক্ষ জনশক্তি হিসেবে উৎপাদন প্রক্রিয়ায় ক্রমবর্ধমানভাবে বলিষ্ঠ অবদান রাখতে পারে এবং মানবীয় শক্তি ও সামর্থ্যের সর্বোত্তম বিকাশে সক্ষম হয়ে উঠতে পারে।

মানব সম্পদ কি

মানবসম্পদ উন্নয়ন বলতে এমন একটি প্রক্রিয়াকে বুঝায় যার মাধ্যমে কোনো মানুষের জ্ঞান, দক্ষতা ও কর্মক্ষমতা বৃদ্ধি পায়। মানবসম্পদ ব্যবস্থাপনা কৌশল একটি প্রতিষ্ঠানের অভীষ্ঠ লক্ষ্যসমূহ অর্জনের জন্য অভ্যন্তরীণ মানবসম্পদের সুষ্ঠু ব্যবস্থাপনা পদ্ধতির উপর আলোকপাত করে।

দক্ষ মানব সম্পদ কেন প্রয়োজন:

কর্মীদের প্রতিষ্ঠানের প্রতি আকৃষ্ট করা, আগ্রহীদের মধ্য থেকে যোগ্যদের খুঁজে বের করা ও যোগ্য কর্মী নিয়োগ প্রদান,কর্মীদের প্রাতিষ্ঠানিক লক্ষ্য অর্জনে অনুপ্রাণিত করা ও তাদের সাথে প্রতিষ্ঠানের সু-সম্পর্ক বজায় রাখা কর্মজীবনে উত্তরোত্তর উন্নয়নের পথ সৃষ্টি করা এবং প্রয়োজনে অদক্ষ,অযোগ্য কর্মী ছাঁটাই করাসহ প্রতিষ্ঠানের মানবসম্পদ সম্পর্কিত সবধরনের কাজই প্রতিষ্ঠানের মানবসম্পদ ব্যবস্থাপনা বিভাগের কাজ। একটি মেধাবী দক্ষকর্মী বাহিনী কোন প্রতিষ্ঠানের প্রাণশক্তি হিসেবে কাজ করে।

মানব সম্পদের দক্ষতা অর্জনের পথে অন্তরায় সমুহ

১. 'উপযুক্ত স্থানে, উপযুক্ত কর্মকর্তা/কর্মচারী পদায়ন না করা
২.কর্মকর্তা/কর্মচারীর দাপ্তরিক কাজ সম্পাদনে অনীহা
৩.কর্মকর্তা/কর্মচারীদের পারস্পারিক সুসম্পর্কের অভাব
৪.তথ্য প্রযুক্তির জ্ঞানের অভাব।
৫.নতুন নিয়োগ প্রাপ্ত কর্মকর্তা/কর্মচারীগণের প্রতিষ্ঠানের কার্য সম্পর্কে ব্যবহারিক জ্ঞান অর্জনের প্রয়োজনীয় প্রশিক্ষণ গ্রহণের সুযোগ
৬.কর্মকর্তা/কর্মচারীগণের দাপ্তরিক কাজের চাপ (Stress) সামলানোর ঘাটতি
৭.কর্মকর্তা/কর্মচারীগণের প্রশিক্ষণে অমনোযোগীতা ও অনাগ্রহ।
৮.দেশীয় প্রশিক্ষণ ও বৈদশিক প্রশিক্ষণে সুযোগ না পাওয়া
৯. প্রশিক্ষণ ইনস্টিটিউটের স্বল্পতা ও দক্ষতা সম্পন্ন প্রশিক্ষক না পাওয়া
১০. প্রভাবশালী মহলের চাপ
১১.গবেষনা খাতের বরাদ্দ

গৃহীত পদক্ষেপ

১.ইনহাউজ প্রশিক্ষণ

জনবলকে দক্ষ মানব সম্পদে রূপান্তরিত করতে ইনহাউজ প্রশিক্ষণ এর ভূমিকা রয়েছে । কর্মকর্তা ও কর্মচারীদের জন্য ৬০ কর্মঘন্টা প্রশিক্ষনের নির্দেশনার অংশ হিসেবে অধিকাংশ প্রতিষ্ঠানই ইনহাউজ প্রশিক্ষণ এর আয়োজন করে থাকে । তেল, গ্যাস ও খনিজের সাথে সম্পৃক্ত বিভিন্ন বিষয় ছাড়াও চাকরি বিধির বিভিন্ন বিষয় নিয়ে ইনহাউজ প্রশিক্ষণ আয়োজন করা হয়ে থাকে ।

২. প্রশিক্ষণ

কিছু কিছু প্রতিষ্ঠাণে বিশেষজ্ঞ প্রশিক্ষক দ্বারা প্রশিক্ষণ এবং কর্মকর্তা/ কর্মচারীদের প্রশিক্ষণের চাহিদা নিরূপণ হেতু Training Need Assessment প্রশিক্ষণ কার্যক্রম গ্রহন করা হয়। এছাড়াও দেশের অভ্যন্তরে প্রশিক্ষণ প্রদানকারী খ্যাতনামা প্রতিষ্ঠান যেমন বিপিআই, এনএপিডি,বিআইম ইত্যাদি প্রতিষ্ঠানে কর্মকর্তাদের প্রশিক্ষণের ব্যবস্থা করা হয়। বিদেশে উচ্চশিক্ষা অর্জনের লক্ষ্যে সরকারি অনুমোদন গ্রহন সাপেক্ষে প্রয়োজনীয় ব্যবস্থা গ্রহন করা হয়।

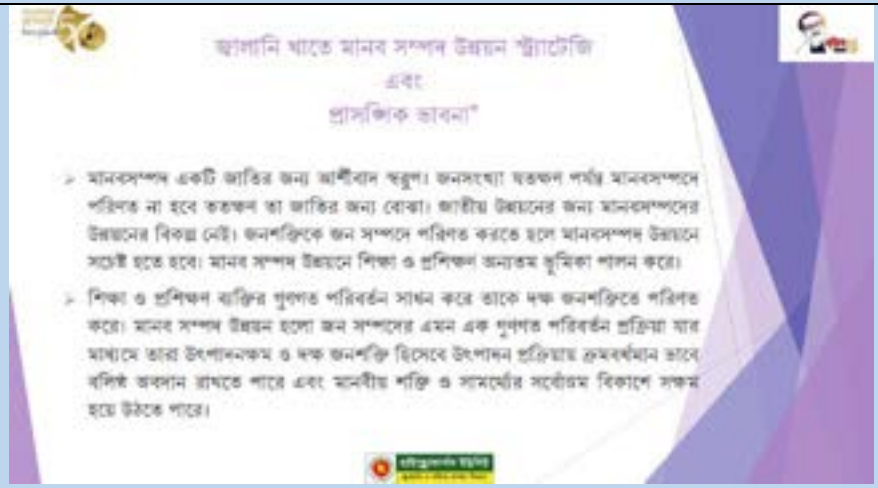
ভবিষ্যৎ উন্নয়ন পরিকল্পনা গ্রহণ:

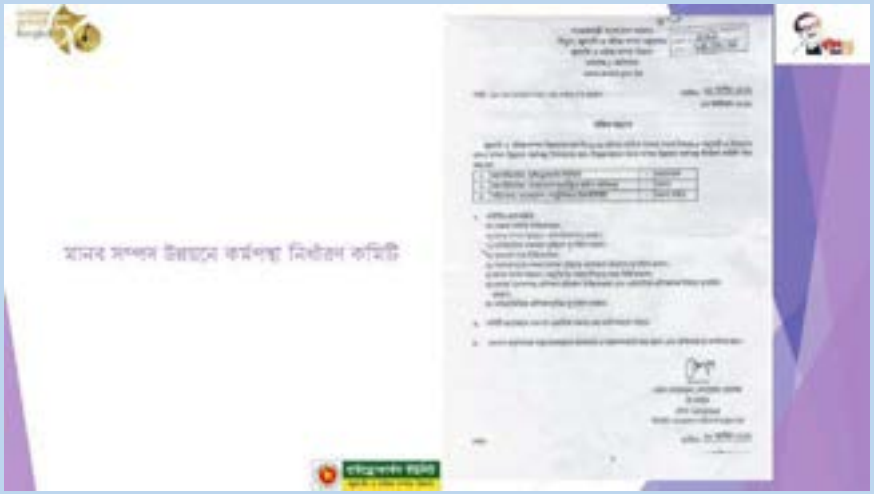
বর্তমান যুগকে যান্ত্রিক যুগ বলা হয়। প্রযুক্তির উন্নয়ন ও বিকাশের ফলে আমাদের চারপাশ দ্রুত পরিবর্তিত হচ্ছে। তাই মানব সম্পদ ব্যবস্থাপনা পরিবর্তীত অবস্থার সাথে তাল মিলিয়ে চলতে প্রতিষ্ঠানের জন্য বিভিন্ন মেয়াদী ভবিষ্যৎ উন্নয়ন ও পরিকল্পনা গ্রহণ করে তা বাস্তবায়নের জন্য পদক্ষেপ গ্রহণ করে থাকে।
কর্মকর্তা/কর্মচারীগণের কর্ম যথাযথভাবে নিরপেক্ষ দৃষ্টিকোণ থেকে মূল্যায়নের পদক্ষেপ গ্রহণ করতে হবে। অভিজ্ঞতাকে বিবেচনায় রেখে মেধাকে পদোন্নতির মানদণ্ড হিসেবে বিবেচনা করা প্রয়োজন। এক্ষেত্রে পদোন্নতির মানদণ্ড এমনভাবে নির্ধারন করা প্রয়োজন যাতে সৎ, শিক্ষিত, মেধাবী, যোগ্য ও দক্ষ কর্মকর্তা/কর্মচারীরা পদোন্নতি পেয়ে সঠিক স্থানে অবস্থান করে প্রতিষ্ঠানের উন্নয়নে ভূমিকা রাখতে পারে।

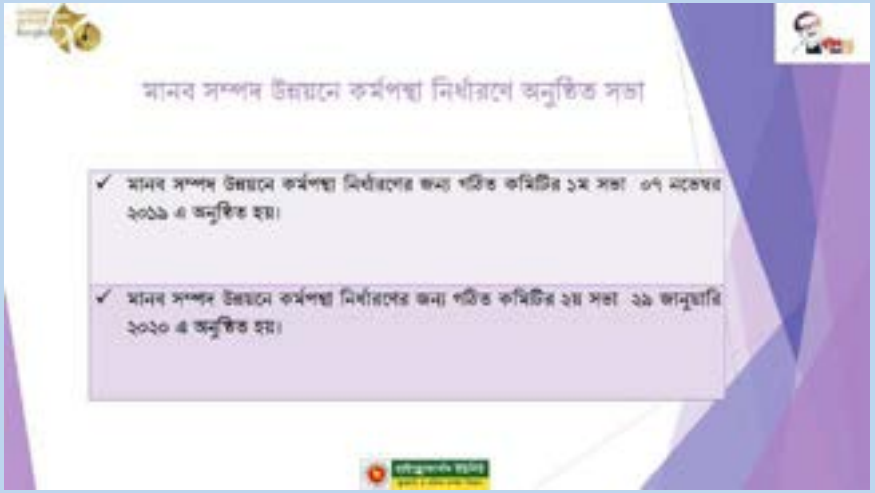
শেষ কথা

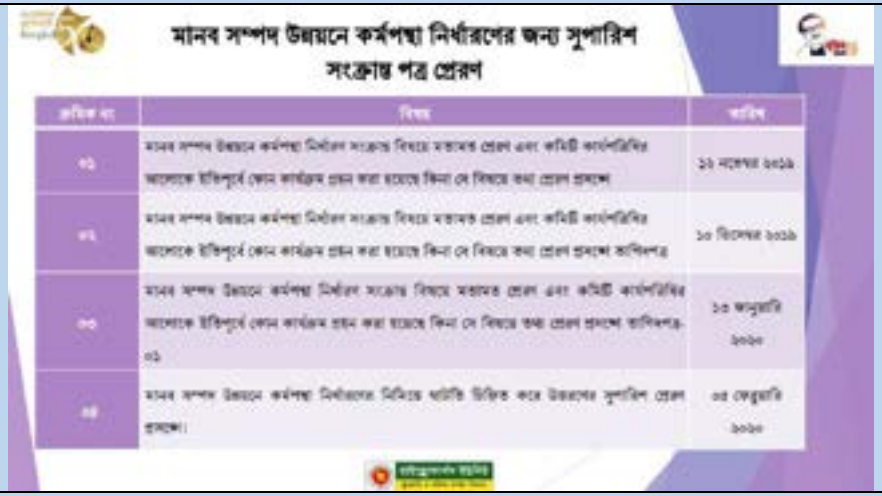
কোনো দেশের অর্থনৈতিক উন্নয়নের জন্য মানবসম্পদ উন্নয়ন অতীব জরুরী। জনবল-কে Human Capital বা মানবসম্পদে পরিণত করতে হবে। মানবসম্পদ উন্নয়নের মাধ্যমে সুদক্ষ জনশক্তি গড়ে তোলার ব্যাপক ও কার্যকর উদ্যোগ গ্রহণ করতে হবে। মানবসম্পদকে দেশে ও বিদেশে কাজে লাগিয়ে দেশের অর্থনীতি শক্ত ভিতের উপর দাঁড় করানো যেতে পারে।

PowerPoint Presentation from the Key Note Speaker





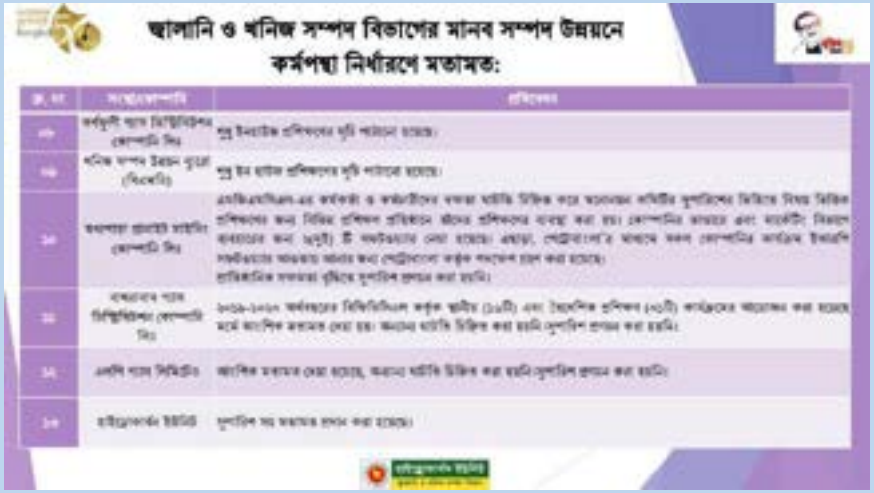


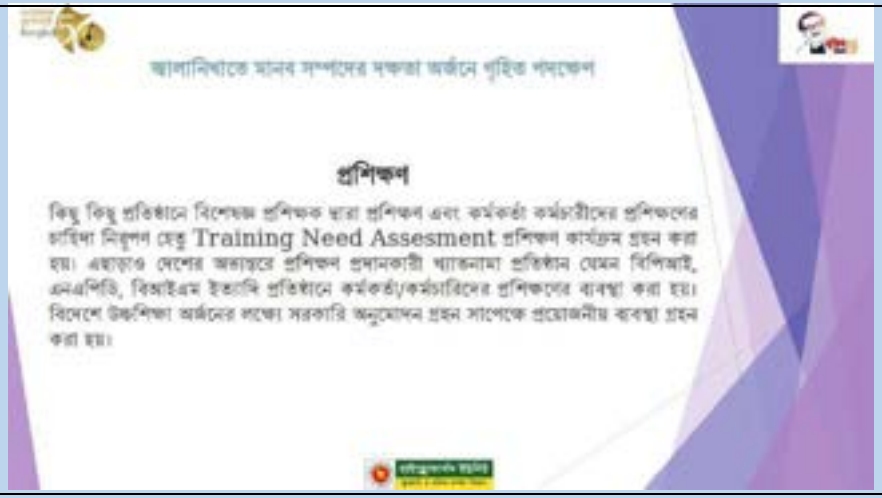


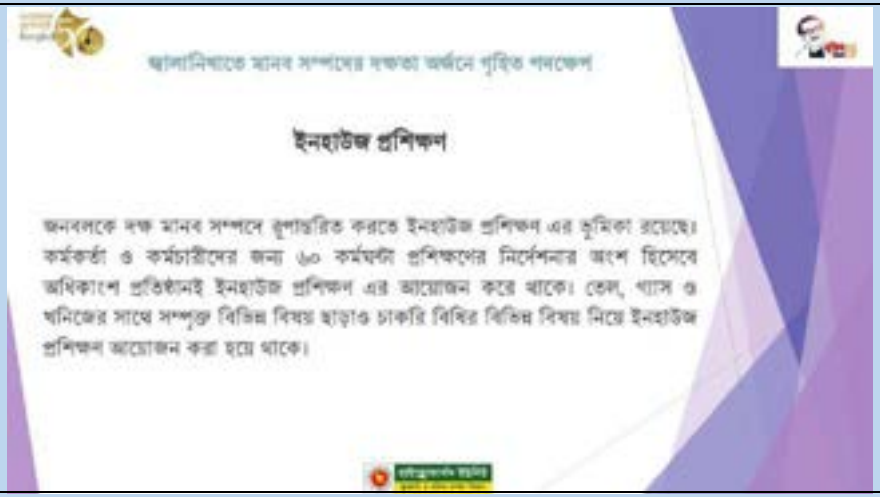
ক্রমিক নং	বিষয়	তারিখ
০১	মানব সম্পদ উন্নয়নে কর্মপন্থা নির্ধারণ সংক্রান্ত বিষয়ে মতামত প্রেরণ এবং কমিটি কার্যপরিধির আলোকে ইতিপূর্বে কোন কার্যক্রম গ্রহণ করা হয়েছে কিনা সে বিষয়ে তথ্য প্রেরণ প্রসঙ্গে	১১ নভেম্বর ২০১৯
০২	মানব সম্পদ উন্নয়নে কর্মপন্থা নির্ধারণ সংক্রান্ত বিষয়ে মতামত প্রেরণ এবং কমিটি কার্যপরিধির আলোকে ইতিপূর্বে কোন কার্যক্রম গ্রহণ করা হয়েছে কিনা সে বিষয়ে তথ্য প্রেরণ প্রসঙ্গে তাগিদপত্র	১০ ডিসেম্বর ২০১৯
০৩	মানব সম্পদ উন্নয়নে কর্মপন্থা নির্ধারণ সংক্রান্ত বিষয়ে মতামত প্রেরণ এবং কমিটি কার্যপরিধির আলোকে ইতিপূর্বে কোন কার্যক্রম গ্রহণ করা হয়েছে কিনা সে বিষয়ে তথ্য প্রেরণ প্রসঙ্গে তাগিদপত্র-০১	১৩ জানুয়ারি ২০২০
০৪	মানব সম্পদ উন্নয়নে কর্মপন্থা নির্ধারণে বিভিন্ন খাতটি চিহ্নিত করে উন্নয়নের সুপারিশ প্রেরণ প্রসঙ্গে।	০৪ ফেব্রুয়ারি ২০২০

ক্রমিক নং	কার্যালয়/কোম্পানি	তারিখ
০১	বিস্ফোরক পরিদপ্তর	১৫/১১/২০১৯
০২	মেসার্স পেট্রোসিরাম লিঃ	০১/১২/২০১৯
০৩	সিলেটপুরুলিয়া কোল মাইনিং কোম্পানী	০৪/১২/২০১৯
০৪	বাংলাদেশ পেট্রোলিয়াম এক্সপ্লোরেশন এন্ড প্রোডাকশন কোম্পানী লিঃ (বাপেক্স)	০২/১২/২০১৯
০৫	পশ্চিমাঞ্চল গ্যাস কোম্পানি লিঃ	১৪/১২/২০১৯
০৬	ভূতাত্ত্বিক জরিপ অধিদপ্তর	১৯/১২/২০১৯
০৭	গ্যাস ট্রান্সমিশন কোম্পানী লিঃ (জিটিসিএল)	১৮/১২/২০১৯
০৮	কর্ণফুলী গ্যাস ডিস্ট্রিবিউশন কোম্পানি লিঃ	১৯/১২/২০১৯
০৯	খনিজ সম্পদ উন্নয়ন ব্যুরো (সিএমডি)	১৯/১২/২০১৯
১০	মহানগর প্রভাতী মাইনিং কোম্পানি লিঃ	৯০/১২/২০১৯
১১	বাখরাবাদ গ্যাস ডিস্ট্রিবিউশন কোম্পানি লিঃ	৯০/১২/২০১৯
১২	তুলাতলি প্রাকৃতিক গ্যাস লিমিটেড	০৭/০১/২০২০
১৩	পদ্মা অয়েল কোম্পানি লিমিটেড	০১/১২/২০১৯


জ্বালানি ও খনিজ সম্পদ বিভাগের মানব সম্পদ উন্নয়নে
কর্মপন্থা নির্ধারণে মতামত


জ্বালানি ও খনিজ সম্পদ বিভাগের মানব সম্পদ উন্নয়নে
কর্মপন্থা নির্ধারণে মতামত:

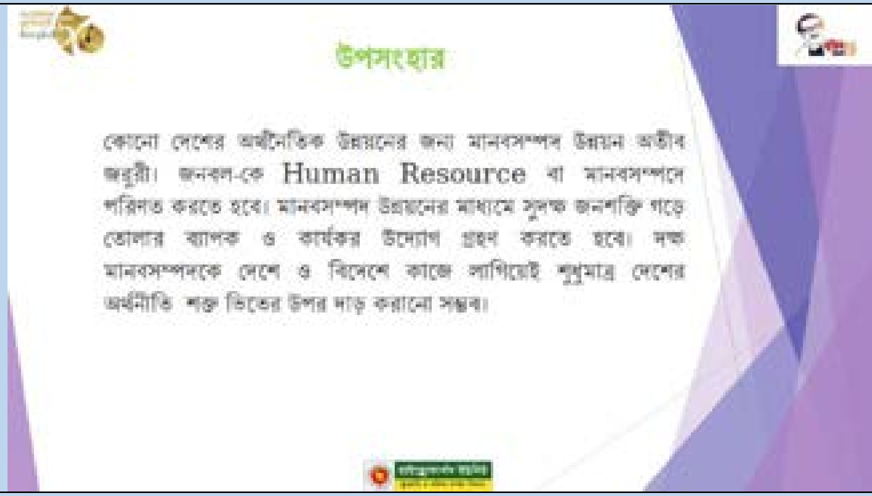

জ্বালানিখাতে মানব সম্পদের দক্ষতা অর্জনে গৃহিত পদক্ষেপ
প্রশিক্ষণ
কিছু কিছু প্রতিষ্ঠানে বিশেষজ্ঞ প্রশিক্ষক দ্বারা প্রশিক্ষণ এবং কর্মকর্তা কর্মচারীদের প্রশিক্ষণের চাহিদা নিরূপণ হেতু Training Need Assesment প্রশিক্ষণ কার্যক্রম গ্রহন করা হয়। এছাড়াও দেশের অভ্যন্তরে প্রশিক্ষণ প্রদানকারী খ্যাতনামা প্রতিষ্ঠান যেমন বিপিআই, এনএপিই, বিআইএম ইত্যাদি প্রতিষ্ঠানে কর্মকর্তা/কর্মচারিদের প্রশিক্ষণের ব্যবস্থা করা হয়। বিদেশে উচ্চশিক্ষা অর্জনের লক্ষ্যে সরকারি অনুমোদন গ্রহন সাপেক্ষে প্রয়োজনীয় ব্যবস্থা গ্রহন করা হয়।


জ্বালানিখাতে মানব সম্পদের দক্ষতা অর্জনে গৃহিত পদক্ষেপ
ইনহাউজ প্রশিক্ষণ
জনবলকে দক্ষ মানব সম্পদে রূপান্তরিত করতে ইনহাউজ প্রশিক্ষণ এর ভূমিকা রয়েছে। কর্মকর্তা ও কর্মচারীদের জন্য ৬০ কর্মঘন্টা প্রশিক্ষণের নির্দেশনার অংশ হিসেবে অধিকাংশ প্রতিষ্ঠানই ইনহাউজ প্রশিক্ষণ এর আয়োজন করে থাকে। তেল, গ্যাস ও খনিজের সাথে সম্পৃক্ত বিভিন্ন বিষয় ছাড়াও চাকরি বিধির বিভিন্ন বিষয় নিয়ে ইনহাউজ প্রশিক্ষণ আয়োজন করা হয়ে থাকে।


ভবিষ্যৎ উন্নয়ন পরিকল্পনা
বর্তমান যুগকে যান্ত্রিক যুগ বলা হয়। প্রযুক্তির উন্নয়ন ও বিকাশের ফলে আমাদের চারপাশ দ্রুত পরিবর্তিত হচ্ছে। তাই মানব সম্পদ ব্যবস্থাপনার পরিবর্তীত অবস্থার সাথে তাল মিলিয়ে চলতে প্রতিষ্ঠানের জন্য বিভিন্ন মেয়াদী ভবিষ্যৎ উন্নয়ন ও পরিকল্পনা গ্রহণ করে তা বাস্তবায়নের জন্য পদক্ষেপ গ্রহণ করা উচিত।
কর্মকর্তা/কর্মচারীগণের কর্ম যথাযথভাবে নিরপেক্ষ দৃষ্টিকোণ থেকে মূল্যায়নের পদক্ষেপ গ্রহণ করতে হবে। অভিজ্ঞতাকে বিবেচনায় রেখে মেধাকে পদোন্নতির মানদণ্ড হিসেবে বিবেচনা করা প্রয়োজন। এক্ষেত্রে পদোন্নতির মানদণ্ড এমনভাবে নির্ধারন করা প্রয়োজন যাতে সৎ, শিক্ষিত, মেধাবী, যোগ্য ও দক্ষ কর্মকর্তা/কর্মচারীরা পদোন্নতি পেয়ে সঠিক স্থানে অবস্থান করে প্রতিষ্ঠানের উন্নয়নে ভূমিকা রাখতে পারে।


জ্বালানি খাতে মানব সম্পদের দক্ষতা অর্জনে চ্যালেঞ্জ সমূহ


জ্বালানি খাতে মানব সম্পদের দক্ষতা অর্জনের পথে ঘাটতি উত্তরণের সুপারিশ

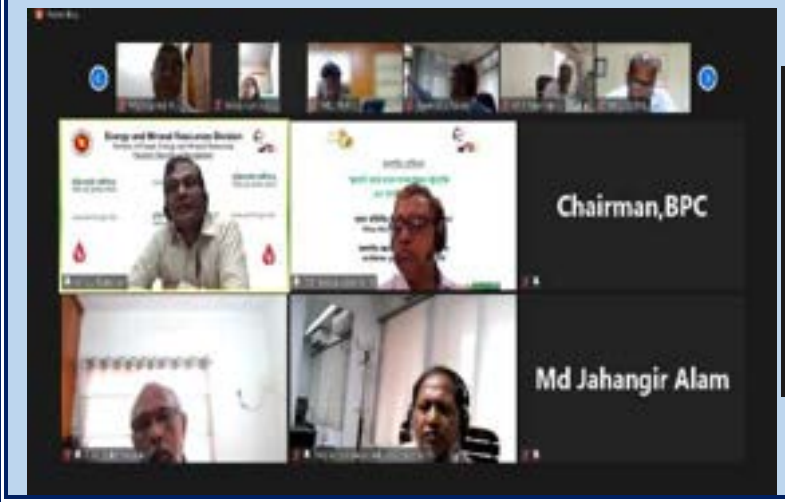

উপসংহার
কোনো দেশের অর্থনৈতিক উন্নয়নের জন্য মানবসম্পদ উন্নয়ন অতীব জরুরী। জনবল-কে Human Resource বা মানবসম্পদে পরিণত করতে হবে। মানবসম্পদ উন্নয়নের মাধ্যমে সুদক্ষ জনশক্তি গড়ে তোলার ব্যাপক ও কার্যকর উদ্যোগ গ্রহণ করতে হবে। দক্ষ মানবসম্পদকে দেশে ও বিদেশে কাজে লাগিয়েই শুধুমাত্র দেশের অর্থনীতি শক্ত ভিতের উপর দাড় করানো সম্ভব।

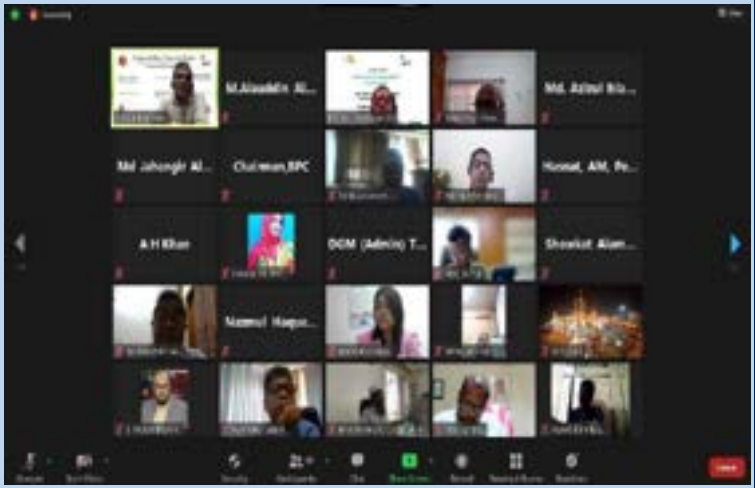
“জ্বালানি খাতে মানব সম্পদ উন্নয়ন স্ট্র্যাটেজি এবং প্রাসঙ্গিক ভাবনা” সেমিনারে উপস্থিত বিশেষজ্ঞদের সুপারিশমালা

সুপারিশমালাঃ

- ✓ কিছু কর্মকর্তা/কর্মচারীর দাপ্তরি কাজে উদাসিনতা থাকে। তারা দাপ্তরিক কাজ সম্পাদন করেন না। এ সকল কর্মকর্তা/কর্মচারীরা দাপ্তরিক কাজে যাতে মনোনিবেশ করেন সেজন্য মোটিভেশনাল ও নৈতিকতা বিষয়ে প্রশিক্ষণের ব্যবস্থা গ্রহণ করা যেতে পারে।
- ✓ কর্মকর্তা/কর্মচারীদের ব্যক্তিগত যোগ্যতার উপর নির্ভর করে সঠিক কাজ পদায়ন করা জরুরী। কাজের ধরণ, প্রকৃতি ও বৈশিষ্ট্য অনুযায়ী কার্য বিভাজন করে কর্মকর্তা/কর্মচারীকে উপযুক্ত কাজে নিয়োগ দান করা হলে কর্মকর্তা/কর্মচারীর দক্ষতার দ্রুত উন্নয়ন ঘটে।
- ✓ কর্মকর্তা/কর্মচারীদের পারস্পারিক সম্পর্ক উন্নত হলে প্রতিষ্ঠানের সেবার মানও উন্নত হয়। পারস্পারিক সম্পর্কের ঘাটতি থাকলে আন্তঃদলীয় সমস্যা সৃষ্টি হয়। তাই পারস্পারিক সুসম্পর্ক বজায় রাখার জন্য অফিস ব্যবস্থাপনায় নানামুখী সামাজিক ও সাংস্কৃতিক অনুষ্ঠানের আয়োজন করা যেতে পারে।
- ✓ কর্মকর্তা/কর্মচারীগণের তথ্য ও যোগাযোগ প্রযুক্তি বিষয়ে পর্যাপ্ত জ্ঞান অর্জনের জন্য প্রয়োজনীয় প্রশিক্ষণের আয়োজন করা যেতে পারে।
- ✓ অনেক ক্ষেত্রে প্রশিক্ষণার্থীগণ প্রশিক্ষণে অমনোযোগী থাকে। একারণে প্রশিক্ষণের মূল্যায়ন পদ্ধতি চালু করা হলে প্রশিক্ষণার্থী প্রশিক্ষণ কর্মসূচিতে কতটুকু সক্রিয় ছিল, আলাপ আলোচনা কতটুকু সক্রিয় ছিল, আলাপ আলোচনায় কতটুকু অংশগ্রহণ করল সে বিষয়ে স্পষ্ট ধারণা পাওয়া যায়; যা মানব সম্পদ উন্নয়নের একটি ভালো পদক্ষেপ হিসেবে বিবেচিত হতে পারে।
- ✓ কর্মকর্তা/কর্মচারীগণের দাপ্তরিক কাজের চাপ সামলিয়ে যথাযথভাবে কাজ করার সামর্থ্য ধরে রাখার জন্য স্ট্রেস হ্যান্ডেলিং এর প্রশিক্ষণ আয়োজন করা প্রয়োজন।
- ✓ জনবল-কে Human Capital বা মানবসম্পদে পরিণত করতে সুদক্ষ জনশক্তি গড়ে তোলার ব্যাপক ও কার্যকর উদ্যোগ গ্রহণ করতে হবে। মানবসম্পদকে দেশে ও বিদেশে কাজে লাগিয়ে দেশের অর্থনীতি শক্ত ভিতের উপর দাঁড় করানো যেতে পারে।

সেমিনারের কিছু উল্লেখযোগ্য মুহূর্ত





Concluding Remarks

As per vision 2041 and SDG, Bangladesh is focusing on energy security as well as developing its human resource to address energy transition and technology transfer. Hydrocarbon Unit (HCU), being a technical arm of Energy and Mineral Resources Division tends to develop its expertise as an organization as well as its stakeholders. To do so, HCU is always concerned about the concurrent global energy trends, topic and issues. It always tends to communicate regularly with its stakeholders thru meetings, seminars and workshop to strengthen the expertize of this sector.

It is a matter of concern that, the Primary Energy of Bangladesh is approaching towards import dependence day by day. In the context of energy security and inclusive development, we have to adopt right decision on fuel mix. Feasibility study by Global Energy Consultant in every single projects of Bangladesh is mandatory considering future viability, impact and outcome of the project. In our country, entire total gas transmission and distribution pipeline, metering stations should be under proper online monitoring system (e.g. SCADA) for developing transparency, reducing corruption and efficient operation. Investment and development of LNG grid pipeline for capitalizing full capacity from FSRU is becoming a substantial issue in the context of Energy security of Bangladesh. Scope of Investment opportunities for private entities (local) in national grid pipeline may be considered with the concern of corresponding stakeholders. On the contrary, according to Paris Agreement, rising of World's temperature should not exceed 2 degrees within the following century. Quickly initiation to design proper roadmap on Alternate Energy/ Future fuel to address energy security, perspective plan, SDG, Vision 2030, Vision 2041, Delta Plan 2100. To reduce carbon emission, clean & modern energy should play an important role for healthy environment but it needs to be affordable at price. More feasibility study, research and development is required immediately on Hydrogen fuel. The economic viability of Hydrogen Fuel to reduce carbon emission & Green House Gas (GHG) should also be evaluated. Harvesting microalgae from our ample marine sector (Sea, River and Canal) is a new prospect for Bangladesh ensuring blue economy. Research work on renewable energy should be industrialized (tagged with Govt. or private entities) for a sustainable energy solution. Identifying cyber risks and vulnerabilities need to be addressed properly in energy

and power sector. Continuous assessment and development on the existing networking system is required to ensure effective and efficient operation in the energy and power industry. To adopt 4th Industrial Revolution (4IR) (with 10 Technologies) proper action plan should be adopted immediately. Skilled manpower should be developed to address 4IR concerning with every corresponding stakeholder. More cooperation and collaboration is needed among NOC, IOC, corresponding stakeholders and academia focusing on Technology Transfer and Energy Transition. More skill should be developed in the context of Procurement. Integrity, transparency and accountability should be ensured in all procurement activities. Timely training and development of related work force from CPTU and corresponding procurement experts should be engaged in mega projects of Bangladesh. Personal Integrity and Institutional Integrity should be monitored on a regular interval in every functional institution of energy and power sector. The service provider of Energy and power sector should monitor feedback from every service recipient on a regular basis. Transparency and accountability of every public servant are mandatory to stop corruption in every energy and power projects as well as in every functional institution.