Annual Report

on

The Joint Crediting Mechanism (JCM)

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Introduction

Sustainable development and preservation of environment are now recognized globally as overriding imperatives to protect our planet from the ravages inflicted on it by mankind. Various global initiatives are underway to counter the ill effects of development that we encounter today such as global warming and climate change.

While the country has been leading the way in climate change adaptation, it is more reluctant to embrace the new paradigm of low carbon resilient development, which seeks to bring limiting or reducing emissions, often referred to as climate mitigation, and climate adaptation together in one agenda. This is because the government and some groups argue that Bangladesh has played only a very small role in contributing to climate change and has very small greenhouse gas (GHG) emissions per person compared to larger developing countries, like India or China, and most western countries. Bangladesh is not highly industrialized or urbanized, and these are two of the main sectors that emit greenhouse gases. As such, they feel it is unfair to expect a developing country like Bangladesh to reduce its greenhouse gas emissions at the same time as adapting to climate change.

Over the last 35 years Bangladesh has invested over $10 billion in addressing the consequences of natural disasters. It's built flood management schemes, coastal defenses, cyclone and flood shelters, raised roads and highways so they are less likely to be washed away, and developed early warning systems to warn people as storms approach to move to safer areas. Cyclone Sidr, which struck in 2007, and Cyclone Mahasen, which hit it again six years later in 2013, both show the devastating consequences of climate change and natural disasters on this low-lying coastal country.

Bangladesh has formulated national plans and strategies to respond to the impacts caused by climate change. Partly in response to Cyclone Sidr, Bangladesh formulated the Bangladesh Climate Change Strategy and Action Plan (BCCSAP) in 2008, which laid out a comprehensive strategy for adapting to the effects of climate change, including the institutional structures needed to manage climate risks and the climate funds they needed to raise to support adaptation across the country. This built on their earlier National Adaptation Program of Action (NAPA).

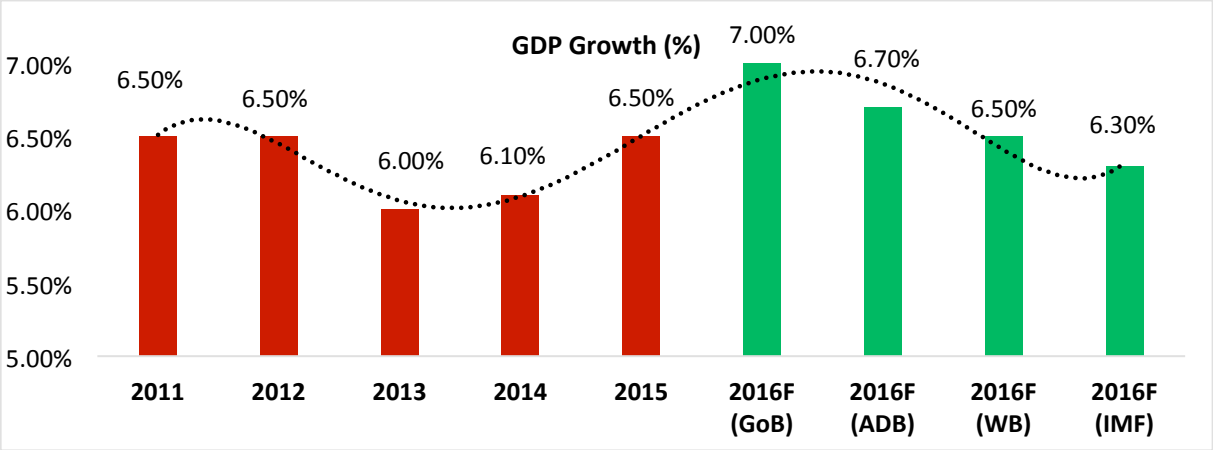
While most of the BCCSAP focuses on adaptation, a small part of it looks at reducing Bangladesh's greenhouse gas emissions and promoting low-carbon development. Bangladesh is slowly emerging on the investment radar as a frontier market. Bangladesh's large youthful population and competitive labor cost structure make it a prime investment destination for businesses with labor-intensive operations, such as agriculture and manufacturing. In December 1997, Bangladesh along with 160 other countries, completed negotiations at the third the Kyoto Protocol. Bangladesh is signatory to the United Nations Framework Convention on Climate Change (UNFCCC) and the Kyoto Protocol. It ratified the UNFCCC in February 1994 and the Kyoto Protocol in October 2001. Hence, government is committed to go for sustainable development and resource efficiency mechanism by implementing low carbon technologies.

Joint Crediting Mechanism (JCM) can play a vital role in introducing low carbon technologies within affordable pricing and solution to the entrepreneurs. The project is targeted to address the issues related to climate change and development of low carbon society. It has been designed for

both developed and developing countries to achieve low-carbon growth all around the world by fully mobilizing technology, markets and finance. For the developing country like Bangladesh, plenty of opportunities are still prevailing like industrial energy efficiency, renewable energy, low carbon transportation system, waste management etc which will ultimately led to reduction of carbon footprint. As Ready Made Garments and Textile contributes to 80% of countries export earning, plenty of opportunities related to low carbon technologies are yet to be fulfilled on that sector. Government policy promotes such technology at this moment and also encouraging factory sponsors to come forward and adopt green technologies. Favorable policy with Bangladesh Government, enhanced awareness level with businessmen and availability and ease accessibility for the same shall undoubtedly assist us to reach cherished goal.

Economy of Bangladesh at a glance

Bangladesh economy is in its growth phase, demonstrating a stable growth of above 6.0% over the last several years. The economic potential of the country didn't go unnoticed as Goldman Sachs identified Bangladesh among the **Next Eleven (N-11)** countries due to its promising outlook for investments and future growth. The criteria that Goldman Sachs used were macroeconomic stability, political maturity, openness of trade and investment policies, and the quality of education. The growing human capital and higher consumer spending put additional support to the growth phase of Bangladesh. Besides, Govt. of Peoples Republic Bangladesh is focusing more on the implementation of infrastructural projects like, Padma Bridge, Metro Rail, Dhaka Expressway, Dhaka-Ashulia Expressway, Deep Sea Port, Ruppur Nuclear Power Plant etc. Accordingly, development activities are expected to pick-up very soon. Additionally, overall decline of global commodity prices could be a boon for Bangladesh. Meanwhile, being a net importer, Bangladesh is already reaping the benefit of global oil price decline. Since the country observed an inflection point to economic pick-up, the facts revealed that growing industrialization, private sector credit growth, increased private and public investments, export recovery, growth supportive fiscal and monetary policy and boost in consumption showcase promising future for Bangladesh. Accordingly, Govt. of Peoples Republic of Bangladesh (GoB), International Monetary Fund (IMF), Asain Development Bank (ADB) and World Bank (WB) forecasted the GDP growth of Bangladesh to be 7.0%, 6.3%, 6.7% and 6.5%, respectively for 2016



Analyzing the key issues on the basis of which global economic organizations forested robust growth for Bangladesh economy are,

GOB

- Higher **consumer spending** due to pay rise and increased remittance
- Higher **ADP** spending
- Redistribution of **savings from oil bills**
- Growth supportive **monetary policy** and **targeted credit** to productive sectors
- **Export** recovery

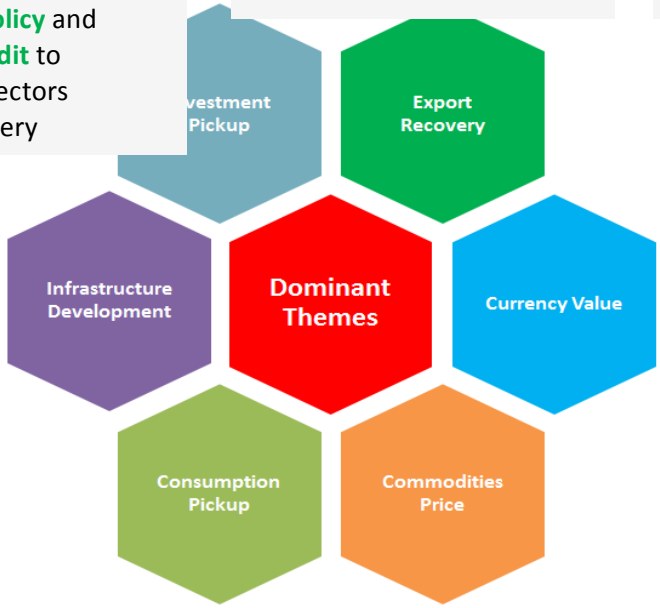
ADB

- **Export** recovery
- Higher **consumption** due to boost in remittance
- Pick up in Public and Private **Investment**
- Increased **ADP** spending

WB

- **Export** recovery
- Boost in **consumption**
- High **government consumption**
- Immune from Chinese turmoil

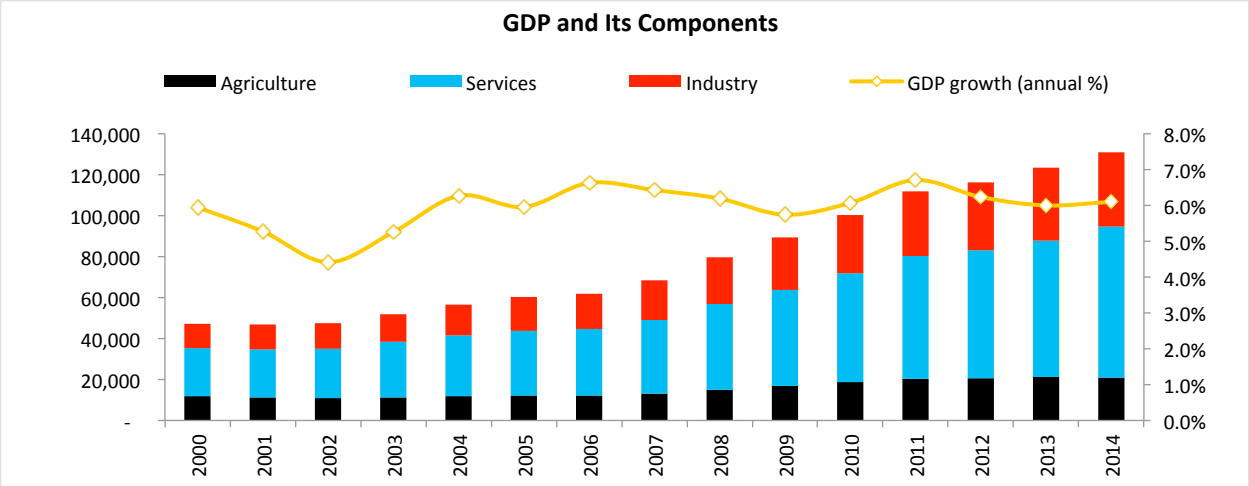
In a nut … fic … d t… econom… diag…



GDP Growth

Particulars (Base: 2005-06)	Unit of Measurement	FY 2010-11	FY 2011-12	FY 2012-13	FY 2013-14	FY 2014-15 (P)*
GDP at Current Market Price	BDT Bn	9,158.3	10,552.0	11,989.2	13,436.7	15,136.0
GDP at Constant Market Price	BDT Bn	6,463.4	6,884.9	7,299.0	7,741.4	8,245.3
GDP Growth Rate at Constant Market Price	%	6.46%	6.52%	6.01%	6.06%	6.51%

Source: Bangladesh Bureau of Statistics and Selected Indicators, Bangladesh Bank
(P) indicates provisional figure while Bangladesh Bureau of Statistics declared **GDP Growth Rate at Constant Market Price to be 6.55% during FY 2014-15 [source: The Financial Express]*



Source: Research, IDLC Investments Ltd.

On current market price basis, provisional GDP size of Bangladesh is BDT 15,136.0 Bn during FY 2014-15 which was BDT 13,436.7 Bn during last fiscal year. Accordingly, nominal GDP growth rate was 12.65% during FY 2014-15. However, in real term provisional GDP size became BDT 8,245.3 Bn and its growth rate was 6.51% in FY 2014-15 which was 6.06% during FY 2013-14.

Accordingly, per capita income amplified to USD 1,316.0 from that of USD 1,190.0, a year ago, assisting an improvement of overall standard of living. Breaking down the GDP component, we find the following issues.

- % GDP growth stayed above 6.0%.
- Agriculture is NOT primary contributor in GDP growth, anymore.
- Industrial stagnation couldn't support GDP spike due to infrastructural bottleneck.
- Service sector is the primary contributor to recent GDP growth which is mostly sensitive to domestic paradigm.
- In case of domestic problems, service sectors may be the most hurt, including financial sector.
- Probable amplification in consumer demand, export recovery, private credit growth supporting productive segment, infrastructural improvement and political stability would support GDP growth in the upcoming days.

Economy Overview for the year 2015

Bangladesh GDP grew 6.55% in the last fiscal 2014-15 in spite of political turmoil in the beginning of 2015. The growth rate is the highest in last eight years. The country achieved lower middle income status in 2015 with per capita income of $1,314. With such a high growth rate, Bangladesh is now the second fastest growing nation in South Asia region only behind India. For many years, the government and the central bank have guided the real and financial sectors into inclusive, environmentally sustainable output activities with macroeconomic stability and growth

in mind. This has helped Bangladesh economy to maintain six plus percent annual average real GDP growth for almost a decade now.

Fiscal policy is affected by revenue collection and budget implementation shortfalls. The budget size in 2015-16 increased by 17.8%. The overall fiscal deficit including foreign grant in FY16 was about 4.7% of GDP. However, there is little improvement in the Annual Development Plan (ADP) implementation. Yet, the size of the ADP in FY16 is envisioned to increase by 27.5% relative to the FY15 ADP.

In December 2015, the private sector credit registered 13.8% compared to the Monetary Policy target of 14.3% for the same period. However, Bangladeshi companies are taking the advantage of low cost foreign financing with depressed global rate. The government investment-promotion agency has allowed private firms to borrow about $8.6 billion from foreign sources at low rate in the last seven years. Bangladesh Bank (BB) has taken expansionary stance in its latest monetary policy statement by targeting higher Broad Money, Domestic Credit, Public Sector Credit and Private Sector Credit in June 2016 compared to the actual growth achieved in Dec 2015. To spur investment further to achieve higher GDP growth rate, BB has cut its policy rate by 50 basis points after keeping the rate steady for three years.

Inflation based on the consumer price index (CPI) maintained a declining trend in 2015. Point to point inflation fell to 6.1% in Dec 2015 which can be attributed to depressed global commodity market. Moreover, the food component occupies about 60% of our consumption basket and the price of food is falling all over the world. However, the nonfood inflation is in an upward trend since Oct 2014. The pay rise in the Government sector is likely to push up prices but expected fuel price adjustment in the country may pull it down again.

Import grew higher than sluggish export in 2014-15; import figure stood at $40.7 billion with 9.4% growth and export increased to $31.2 with a mere 3.4% growth. Political unrest in the local front, compliance issue in RMG sector coupled with slow global economy, low demand in struggling Europe and fall in the currency Euro were main reasons for the dip in our export proceeds. BB expects about 8% growth in both import and export in next fiscal year in the backdrop of record low oil price and depressed global commodity market. Remittance, which is an important part of our growth, grew to $15.3 billion in 2014-15 compared to $14.2 billion of 2013-14. With increasing number of Bangladeshi workers going abroad despite concern regarding possible slowdown of development activities in the Middle East due to loss of revenue of gulf countries for oil price decline, BB estimates about 5% growth of remittance proceeds in 2015-16.

While the trade deficit mitigated in 2014-15, the current account surplus also widened at the end of the fiscal year and stood at about $2.0 billion because of increased remittances. However, the surplus in balance of payment decreased from $5.5 billion in FY14 to $4.4 billion in FY15 mainly resulted from Errors and omissions. Foreign reserve increased to $27.5 billion in December 2015 which is sufficient to meet more than 7 months of import payment.

JCM and its implication in Bangladesh

Increasing scientific evidence reveals that the earth is getting warmer due to various human activities resulting in sea level rise and occurrence of extreme events such as cyclones, floods and droughts. In order to tackle Global Warming, United Nations General Assembly took up this issue of Climate Change and adopted the resolution "Protection of Global Climate for Present and Future Generations of Mankind". A session was held at Kyoto Japan to finalize a protocol subsequently known as United Nations Framework Convention on Climate Change (UNFCCC), adopted in 1992 which came into force in 1994 established an international framework to address global climate change. Parties to the Convention agreed to stabilize greenhouse gas (GHG) concentrations in the earth's atmosphere.

Although around 7500 CDM projects have been registered globally, the penetration level in Bangladesh has been very low with only 8 registered projects. However there is a huge opportunity for the industries in Bangladesh across diverse sectors and projects of various types to qualify as a potential investment target for carbon financing for consideration by companies from developed nations. But due to complex registration process and involvement of expertise which is not yet readily available in Bangladesh, growth of CDM projects were not exponential in spite of great demand and potential.

Hence, arrival of JCM can be considered as an opportunity for local industries to adopt low carbon technologies at an affordable level of investment. Hence, diffusion of leading low carbon technologies, products, systems, services, and infrastructure as well as implementation of mitigation actions through JCM platform is a promising approach towards sustainable development.

Overview of Domestic Network Building Activities

Domestic network building includes scoping out of suitable projects in line with JCM principle and methodology, awareness raising amongst relevant stakeholders, business matchmaking, technical support, capacity development of local personnel etc. JCM Bangladesh counterpart was engaged in similar activities since inception and carrying out to achieve the common goal.

A workshop was organized in AIT, Thailand to scope out the opportunities and to learn from already set examples. JCM has already in touch with several factory owners willing to implement similar technology. It is expected that in 2016, few projects will come forward to seek support from JCM team.

One stop service solution

JCM Bangladesh counterpart is initially formed by following persons representing different sectors of professional.

Sl No	Name	Designation	Expertise
1	Dr. Mafizur Rahman	Professor, Department of Civil Engineering-BUET	Environment, Low carbon technology, GHG emission, CDM project development etc.

Sl No	Name	Designation	Expertise
2	Md Mehbuboor Rahman	Manager-Green Banking, IDLC Finance Limited	Green Finance, Renewable Energy and Energy Efficiency Financing, CDM Projects
3	Tanvir Ahmed Siddiqui	Vice President & Unit Head, Large Infrastructure, IDCOL	Project financing, large infrastructure, power plant, clean production
4	Shaymal Barman	CEO- Grenech Carbon Solutions Limited	CDM projects, Energy efficient brick kiln projects, Climate Change Adaptation, Clean Energy Finance, JCM
5	Riad mahmud	Managing Director, National Polymer	Entrepreneur and owner of green industry (ongoing)
6	Md Shahariar Kamal	Manager, Credit Risk Management, IDLC Finance Limited	Credit Risk Management, Project Appraisal, Financial Modelling
7	Shafiqul Alam	Junior Advisor, GIZ Bangladesh	Energy Efficiency and CDM

It is eminent that following lists contains different level of personnel containing academician, factory owner, energy auditors, CDM specialist, Finance people etc. It is expected that if few more personnel are added such as from government sector such as department of environment, SREDA and others then the local counterpart shall become efficient enough to provide one stop solution starting from scratch. Already, consultation is going on with few government officials depending upon their interest.

Another important issue is business matchmaking by which JCM local part can provide necessary technical guidance related to machineries to the factory owners. Therefore, a business matchmaking session as proposed in the Thailand workshop can be arranged to satisfy local demand.

Local consultants and academicians needs to be well equipped on JCM methodology for which more similar programs are required to take place in 2016 and forward. Factory visit can also be another option by which local consultants and increase their expertise on Japanese machineries and can recommend to the factory owners as per their need.

Study Workshop

In order to establish a low carbon society and develop JCM projects, a team from Bangladesh participated in a workshop at AIT, Thailand on 20th December, 2015. The objective was to introduce participants with objective and methodology of JCM through representatives of AIT, 3E Nexus and Tokyo University.

Opening Remarks: Prof. C. Visvanathan, SERD, AIT delivered opening remarks to the participants. Prof. Visvanathan welcomed guests and mentioned that previously government officials were trained on AIT through different programs. He illustrated the importance and introduced to the methodology of JCM.

3E Nexus: On behalf of 3E Nexus, Dr. Geeta Mohan, Project Assistant Professor, IR3S, Tokyo University delivered his presentation. His introductory presentation regarding 3E Nexus made participants well aware about the deliverables and objective of JCM program.

NIES, Japan: Dr. Junichi Fujino, Senior Researcher, NIES, Japan made a short presentation on JCM and provided with some examples of JCM projects. He also focused on few advices to form JCM crediting proposal. Real life example of JCM projects that has already been implemented encouraged Bangladesh participants to scope out similar opportunities.

Implementation of JCM projects in Bangladesh: Prof. Dr. Md Mafizur Rahman from Department of Civil Engineering of BUET delivered with a presentation on country perspective and illustrated the opportunities and challenges associated with such intervention. His presentation included demographic information of Bangladesh and related it for scoping out opportunities. Dr. Rahman also scoped out few sectors where JCM can focus due to its energy savings and carbon emission reduction potential as well as its impact over economy. Apart from the opportunities, he also focused on possible challenges that could restrain JCM projects.

Opportunities for low carbon technologies in different sectors of Bangladesh: Engr. Md Mehbuboor Rahman, CEA, Manager-Green Banking of IDLC Finance Limited made his presentation on few examples and products by which objective of JCM can be fulfilled. He focused on different initiatives such as Renewable Energy, Industrial Energy Efficiency, Energy Efficient Brick Kiln, Waste Management and Green Industry technologies which are in line with JCM. Mr. Shafiqul Alam from GIZ also made a short presentation on a real life example of a garment manufacturing industry showing its immense potential, low payback and viable business case.

Open Discussion: The program became vibrant when floor became open to all of the participants. Suggestions from different participants are mentioned below:

Tanvir A Siddique: Mr. Tanvir, Vice President of IDCOL illustrated the importance of a business matchmaking session in Dhaka with sponsors of different industry and technology providers from Japan. Thus factory sponsors will be able to pick up the relevant and appropriate technology equipped with low carbon features. Also JCM policy makers can select few suitable sectors of Bangladesh where Bangladesh count part can focus with enhanced attention. A framework can also be formed for availing such grant facility.

Dr. Riad Mahmud: Dr. Mahmud, Managing Director of National Polymer expressed his interest in such program. Being a factory sponsor, he expressed his interest readily to avail similar low carbon technology. But he insisted that in order to make this program more widely applicable, a piloting can be done to set example. Thus during awareness session, speakers can indicate to pilot case which will inert confidence amongst sponsors. For conducting programs at different

levels, such as awareness raising session with factory owners, business matchmaking in Dhaka, he mentioned that Embassy if Japan in Bangladesh must be informed at once. Thus future program will become much easier to implement.

Engr. Shaymal barmon: Mr. Barmon has been working closely with CDM projects for past few years indicated several points from his experience. He insisted to include local stakeholders such as government officials in this program. Private sector sponsors such as Dr. Mahmud needs to be included more and more to widespread this idea. A forum can also be formed for providing technical support and JCM policy makers must sort out the scope and space for local consultants in this program and how they go through self-development as well.

Engr. Md Mebuboor Rahman: Mr. Rahman, being agreed with previous speaker, illustrated that JCM Bangladesh Counterpart can act as a one stop service solution to factory sponsors for all sort of issues. JCM BD part should be able to advice sponsors on all aspects starting from project design, feasibility, technology selection, implementation and commercial operation.

Engr. Mr. Shafiqul Alam: Mr. Alam, being working closely with development agenda on energy efficiency shared his experience with participants. He focused that JCM Bangladesh team needs to go through more capacity development session and this team need to visit technology providers. In order to scope out more opportunity, if JCM Bangladesh team visits technology providers, that will insert more confidence amongst them to roll out the program and can also share technical improvisation with local sponsors.

Engr. Shahariar Kamal: Mr. Kamal addressed that JCM BD team can host several awareness raising session with sponsors to educate them regarding this program. Such event will make them aware as well as they will be more interested to implement low carbon technology.

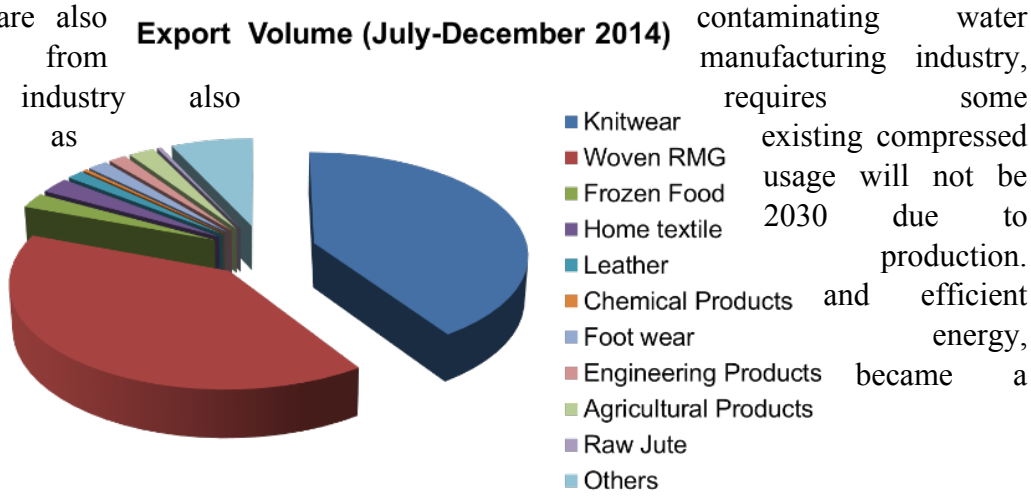
Potential needs for JCM

In order to sort out potential JCM projects, two different approaches were adopted, first is sector wise and the second is product wise. First approach attempted to sort out polluting industries which have more potential to reduce carbon footprint by adopting green technologies. On the contrary, product wise approach included identification of suitable low carbon technologies considering Bangladesh context.

Sector analysis for JCM

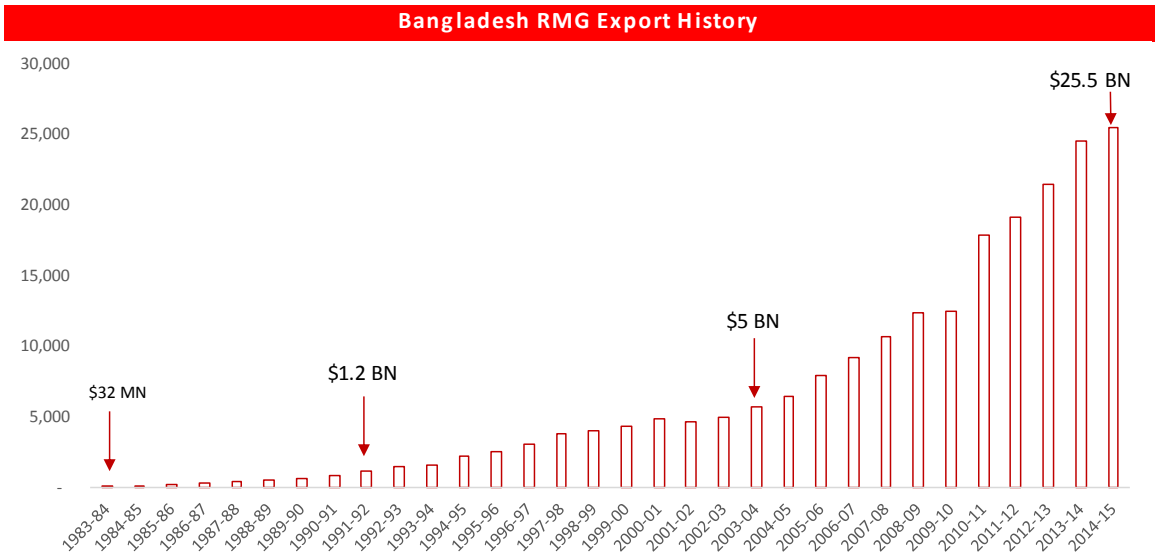
Looking into different sector for analyzing them based on revenue generation, employment generation, potential for contaminating natural resources, proximity to adopt green technology etc. it can be recommended that Ready Made Garments (RMG), Textile, Pharmaceutical, Cement, Steel should be on the focus chart for JCM. A comparative analysis of export earning which can be revealed through pie chart shows that RMG and Textile sector contributes almost 80% of the foreign currency earning. At present, target for export has been set as $ 27 Billion which is expected to reach by $ 50 Billion within next five or more years. So ultimately, RMG and Textile is growing to be the largest energy consuming industry type within next few years. Apart from RMG and Textile, Pharmaceutical, Cement, Brick Kiln, Steel are also few other sectors which are consuming energy at higher level and also contributing to carbon footprint. For

example, emission from cement, steel, brick kiln etc are directly polluting air. Furthermore, industries that use wet processing and chemical such as fabric dyeing and washing, steel, pharmaceutical are also contaminating water body. Apart from manufacturing industry, transportation industry also requires some improvement as existing compressed natural gas usage will not be substantial after 2030 due to lowering of production. Sustainable and efficient source of energy, therefore, became a talk of the topic.

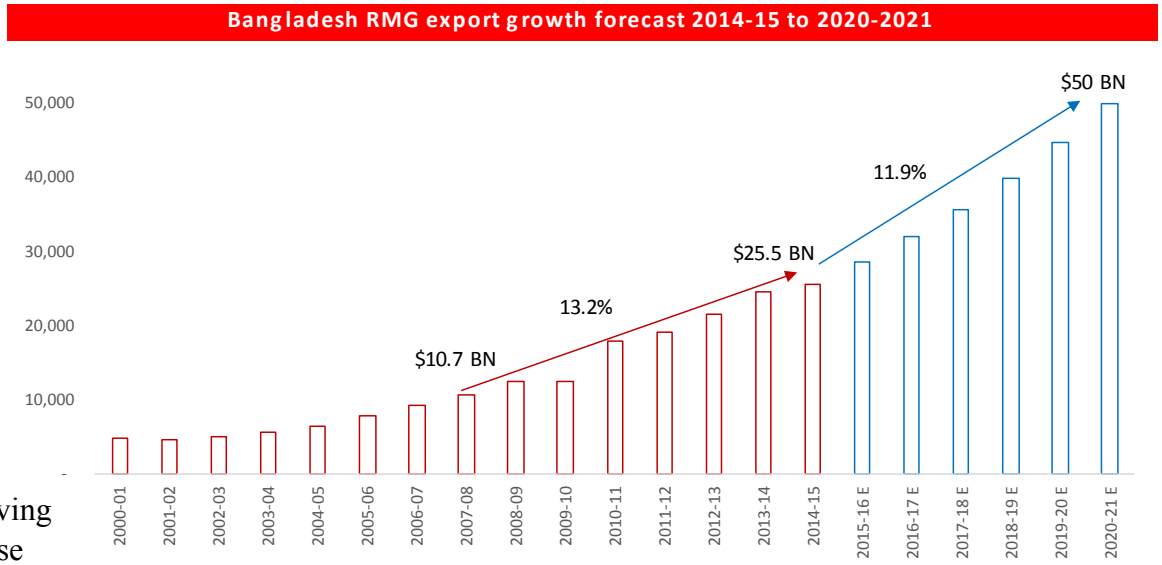


Apparel Industry (Textile and Garments)

World apparel trade almost $450 billion and expected to go up to $650b by 2020. China is still the biggest player while Bangladesh is considered as hot spot with a contribution of around 6% market share. Considering the continuous growth and support, it is expected to reach $ 50 Billion by 2021. Following graphs shows the historical growth and anticipated growth of future through pie chart.



Being the biggest revenue earning and energy consuming industry, implication of low carbon technology is huge for the same. Industrial energy efficiency such as use of variable frequency drive, servo motor, exhaust gas boiler, thermo oil boiler and efficient lighting system can be a viable and feasible option to reduce energy consumption. Moreover, renewable energy such as solar power, waste management and green factory can be other suitable options of low carbon technology.



Having a close look at the top chart, we can see that Bangladesh Apparel industry is targeting to become double by next five years. Hence, energy requirement will also become double which is difficult for country scenario. Therefore, in order to ensure sustainable growth, this sector is in need of JCM attention to set few examples of sustainable and low carbon technology.

Pharmaceutical Industry

A generics-driven growing Bangladeshi pharmaceutical industry characterized by higher-than-average growth and profitability, local player dominance, high industry concentration, virtually

nonexistent backward linkage, is now poised for its next stage of growth. On the demand side, a combined effect of increased life expectancy, shifting disease profile to chronic/non-communicable diseases, and a growing share of aging population coupled with the increasing healthcare expenditure resulting from growing income level are going to work as significant growth drivers. On the supply side, growth in the healthcare services delivery channels and systems, gradual introduction of the biotech industry, penetration of oncology drugs production plants are also setting the industry up for a significant growth regime.

Traditionally dominated by Proton Pump Inhibitor (PPI), Antibiotic, and Anti-pyretic drugs, the pharmaceuticals industry, after a temporary slowdown in 2013, rebounded to the 2012 growth levels in 2014 with a year-on-year (YOY) growth of 11.4%. This transitory setback was attributable to then-prevailing systematic factors like prolonged violence and political instability across the country.

With the Bangladeshi drugs producers attaining global standards and entering all types of global markets from the very stringent to the less regulated markets, this industry is solidifying its presence across the globe — slowly but surely. We expect this industry to grow at modest rates in the coming days with boosts coming from both domestic drug consumption and exports to Bangladesh's LDC counterparts and mildly regulated markets. Amidst such a growth scenario, looming TRIPS enactment remains to be the only concern. However, given the insignificant level of patented drug production in Bangladesh and the overall generics mix in our country, the magnitude of the impact of TRIPS enactment is still unclear.

Considering all above facts and figures, it is eminent that Pharmaceutical industry is also in need of implementing low carbon technologies such as establishment of green factory, effluent treatment plant and waste management options, management of chemical compounds etc. Hence, considering the growth aspect and future potential, JCM can also focus on this sector.

Cement Industry

Bangladesh cement industry is the 40th largest market in the world. Currently capacity of the industry is about 20 Million tones (MT). Top 13 players are alone controlling over 78% of the total industry capacity. However, the balance capacity still remains quite fragmented.

Per capita consumption remains poor when compared with the world average; only 65 kg (FY2009) while our neighboring countries, India and Pakistan, have per capita consumption of 135kg and 130kg respectively. According to the Bangladesh Cement Manufacturer's Association (BCMA), the cement industry is growing at an average rate of 10-12% per annum. In addition, cement is exported to different states of India and export demand has increased gradually over the years. This underlines tremendous scope for growth in the Bangladesh cement industry in the long term.

The primary energy source for cement factories in Bangladesh is electricity, which is required to drive motors in several production processes. This electricity is either drawn from the national grid or generated from on-site, captive power generators using natural gas. Only 20% of the units have their own captive power plant. In terms of specific energy consumption (toe/ton of

production) self-generation has higher specific energy consumption (SEC) than grid electricity, as the typical efficiency of a captive power plant is only 30%.

Significant opportunities for energy conservation exist in the cement sector in terms of the technology, processes and equipment's used in Bangladesh when compared to international standards. Major savings can be achieved through the installation of pre-grinding high press roller mill, the use of vertical roller mills (VRM), efficient motors and drives, maintenance of induced draft (ID) fans, and maintaining mill air flow. JCM can focus on these aspects to reduce carbon generation as well as to lead towards sustainability.

Iron and Steel Industry

The production output of mild steel (MS) structural products in Bangladesh was about 0.29 million tons in FY 2008-09, about 0.17 million tons in FY 2009-10, and about 0.23 million tons in FY 2010-11. The per capita consumption and/or production of steel are often taken as an indicator of the state of development of a nation. The per capita consumption of mild steel in Bangladesh in 2012 was 1.43 kg/person. This is far below the world average steel use per capita of 216.7 kg/person26. Recent estimates show that the demand for steel in Bangladesh is growing at a rate of about 10% annually.

The world-wide steel industry can be divided into two types of producers: those who convert iron ore into steel (known as integrated producers), and mini steel plants, which make steel by melting scrap, sponge iron or a mixture of the two (known as secondary producers). The steel products that are currently manufactured locally in Bangladesh are made by secondary producers.

Electricity, natural gas and HSD are the main sources of energy for the iron and steel industry in Bangladesh. In fact, this sector is the largest private sector consumer of natural gas in Bangladesh. Induction furnaces use electricity from grid as their primary energy source, natural gas use is predominantly in re-rolling mills. Natural gas is provided by the local gas utility Petro Bangla. Some iron and steel manufacturers generate electricity through gas based self-generation and use it for continuous factory production. The captive generation is up to 30% cheaper than the electricity from the grid. HSD is predominantly used for utility purposes and is kept as a source of back up supply to utility services.

When comparing the processes and practices followed in Bangladesh to the international standard, significant opportunities for energy conservation exist in the iron and steel sector. Major savings can come through the installation of top pressure recovery systems, exhaust gas recovery/waste heat utilization, and furnace insulation. Apart from above mentioned issues, JCM can also focus on other aspects such as waste management as steel industries use plenty of fresh water and discharge it into natural water body at relatively higher temperature.

Low carbon technology analysis for JCM

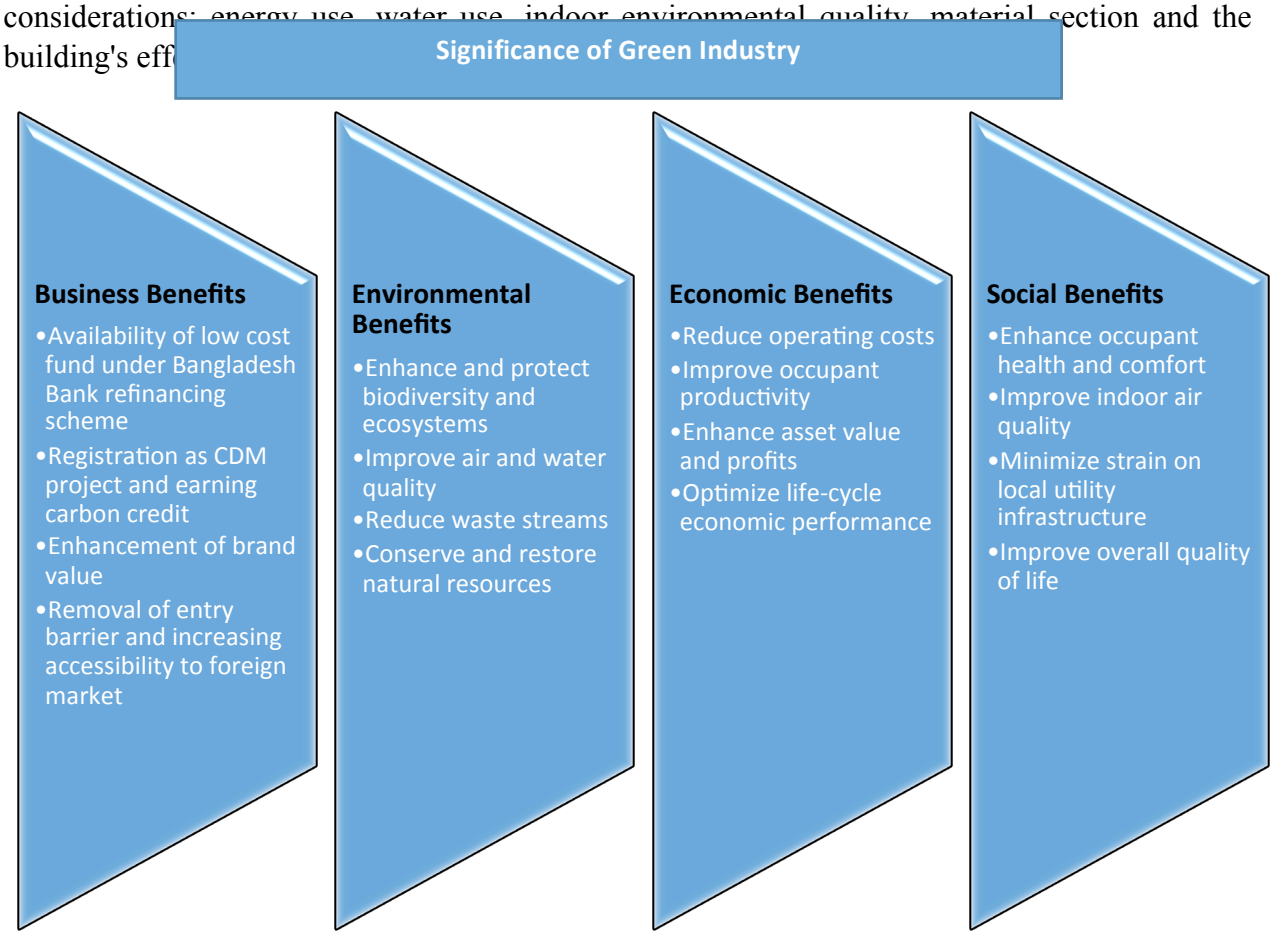
Another approach was to scope out low carbon technologies that are most relevant to Bangladesh Context. Hence, different products or technology or solution were fitted in different industry to maximize the effect of carbon footprint reduction as well as to increase profitability of industry. Details are discussed in below:

Green Industry

Whenever people talks about RMG industry in Bangladesh, fate of Rana Plaza or Tazrin Garments come forward with a devastating show that how deficiency of safety and inefficient energy management can disrupt the business. But now, with few set examples like Plummy Fashion, World's highest rate Knitwear factory having state-of-the art technology and safe work environment, ideology are changing. The factory itself is at least 30% energy efficient than baseline and are also generating electricity through renewable energy sources. This type factory requires several imported items including machinery and construction items which can be brought under JCM umbrella.

Green industry according to United State Green Building Council (USGBC) is a holistic concept that starts with the understanding that the built environment can have profound effects, both positive and negative, on the natural environment, as well as the people who inhabit the structure every day. Green industry is an effort to amplify the positive and mitigate the negative of these effects throughout the entire life cycle of a building.

While there are many different definitions of green building out there, it is generally accepted as the planning, design, construction, and operations of buildings with several central, foremost considerations: energy use, water use, indoor environmental quality, material section and the building's eff



Industrial Energy Efficiency

Energy efficiency has been referred as "hidden fuel" by some experts. However, in case of developing economy like Bangladesh, potentials and impact of energy efficiency is massive. We need to understand that if we are more efficient with the energy we will have less pollution and environmental degradation, less reliance on imported oil, improved power scenario and ultimately cost saving. Existing energy sources as of production of electricity from gas, fossil fuel or coal result in pollution of natural resources. Emissions of carbon dioxide and other greenhouse gases from fossil fuels are contributing to changes in the Earth's climate that are causing widespread harm to lives, communities, infrastructure, institutions and budgets. Sustainable energy plays a vital role in order to solve these issues. Furthermore, efficient utilization of energy in industry reduces cost of goods sold which ultimately yields in higher net profit.

Industrial energy efficient options include but not limited to waste heat recovery system, exhaust gas boiler, thermo oil boiler, servo motor etc. Below chart shows some low carbon technologies for different industries which can be considered under JCM umbrella.

Iron & Steel Sector
Installation of waste heat recovery systems
Replacement of Recuperative Heat Exchanger by Regenerative Heat Exchanger
Pre-heating of combustion air and combustion gases in different Furnaces
Implementation of level 2 and 3 automation in the plant
Flue gas recovery (blast furnace gas/DRI gas/waste heat from furnaces) for energy generation
Chemical/Fertilizer Sector
Retrofitting old ammonia-urea plants to bring those to the level of the state-of-the-art plants
Reducing heat loss into atmosphere along with the flue gases by utilizing it for preheating of combustion air of service boiler
Reduction in steam consumption in Ammonia Plant
Installation of waste heat recovery systems
Textile, RMG and Jute Industry
Waste heat recovery from generators for steam/hot water generation

Fuel switch from fossil fuel to biomass residue for steam and/or power generation
Replacement of fossil fuel in Jute processing by oils of vegetable origin
Use of modern dyes to reduce energy consumption in textile plants
Conversion of sludge to biogas for usage as fuel
Aluminium Industry
Replacement of existing rotary kilns with stationary calciners
Use of variable speed drives for major process pumps and large motors in the plant
Modernization of process control system in plants
Installation of waste heat recovery systems
Cement Industry
Preheating of raw materials fed into the cement kiln
Usage of waste heat for slag drying
Reduction of clinker content for cement manufacturing
Installation of waste heat recovery systems

Waste Management and Waste to Energy

Few projects related to waste management such as effluent treatment plant for treating waste water before discharging into natural stream can be another viable option. Besides, Sewage Treatment Plant (STP), Waste Water Treatment Plant (WWTP) etc are other options. Few projects are focusing on waste to energy such as methane recovery, composting, bio digester etc which can also be brought under JCM umbrella.

Renewable Energy

Renewable energy such as solar power, bio gas, wind turbine and hydroelectricity are few other options which can be implemented to reduce carbon footprint and as a source of clean energy development. The Renewable Energy Policy envisions that 5% of total energy production will have to be achieved by 2015 and 10% by 2020. To achieve this target, GOB is looking for various options preferably Renewable Energy resources. Under the existing generation scenario of Bangladesh, Renewable Energy has a very small share to the total generation. The share of Renewable Energy exceeds more than 1% till now. It is eminent that opportunities are still remaining in different level.

IDCOL has the biggest program related to solar home system and have already installed 6.5 Million systems. But considering 35% of population are still in off-grid areas, plenty of opportunities such as large scale solar PV plant and grid connected systems can be implemented. Furthermore, hilly region has the potential of generating hydro power to limited extent. Moreover, wind power can also be explored in coastal areas.

Future Steps

In order to identify future steps, JCM Bangladesh team assembled in Thailand to discuss few points. Agendas related to future steps can be illustrated by following chart.

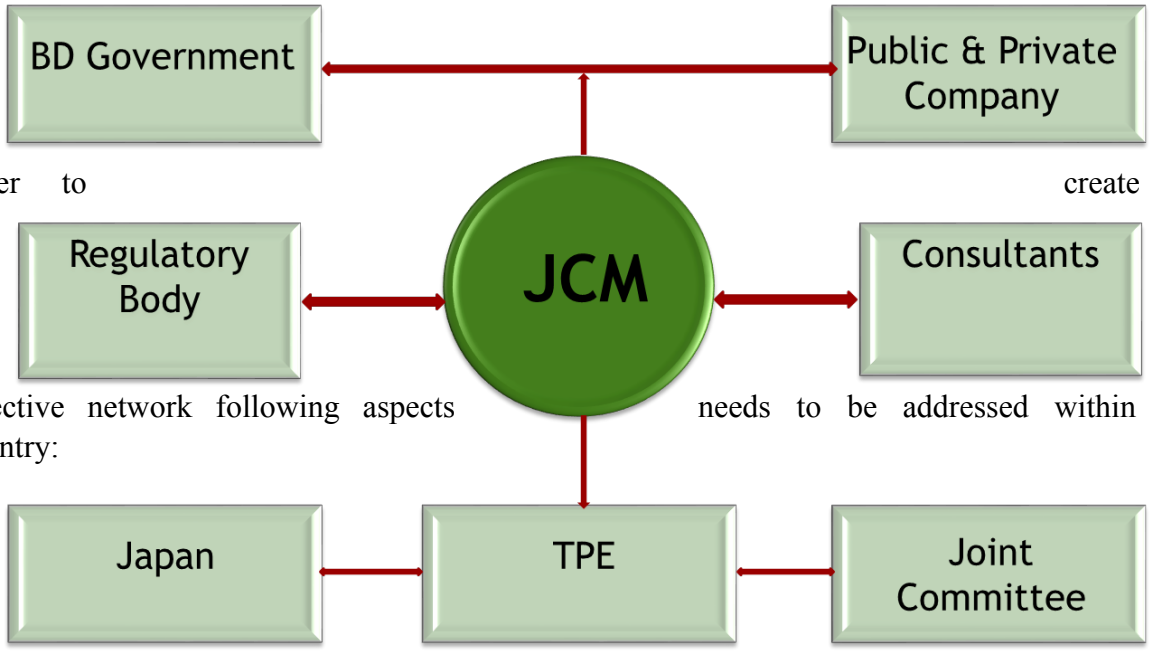
- ❑ Business matchmaking session in Dhaka with sponsors of different industry and technology providers from Japan.
- ❑ Selection of few suitable sectors of Bangladesh where Bangladesh count part can focus with enhanced attention
- ❑ Piloting of one JCM project in Bangladesh to establish an example.
- ❑ Information to Embassy of Japan in Bangladesh to make them aware of such interventions.
- ❑ Inclusion of local government representatives and private sector sponsors in the JCM Bangladesh part.
- ❑ Establishment of a forum in Bangladesh to provide technical support.
- ❑ Scoping out the role and development of local consultants.
- ❑ Equip JCM BD part as one stop solution provider to provide feasibility, technical guidance and implementation guideline.
- ❑ Exposure visit of BD team in Japan or other area to learn set examples and scope out similar opportunity in country.
- ❑ Hosting of awareness event in Bangladesh with sponsors of different industry owners.
- ❑ To formulate a strategy and guideline to implement mentioned tasks within relevant timeframe.

Role of the academic community/researchers in creating future JCM projects

In order to plan future steps, role of academic people needs to be analyzed properly before launching JCM at full scale. For the successful implementation of JCM principles on the proposed projects, academic community/researchers can play a vital role. As this is a new concept for the developing country like ours, knowledge sharing on JCM should be the 1st step towards the long run. And here, the inputs from researchers are significant. Entrepreneurs should be aware of the benefits of JCM implementation in such a way that without major technical knowhow, they could understands the benefits of such projects. Number based knowledge sharing sessions chaired by academic personals from renowned organization can not only encourage the entrepreneur's for the adaptation of recent updated technology but also trigger their drive todays sustainability which may ultimately lead them to JCM projects. For training sessions, capacity development programs, free consultancy service for entrepreneurs, JCM needs the leading academic community/researchers to come forward & work together for sustainability.

Ideas on how to create an effective network for 3E Nexus/JCM projects within the country

JCM Bangladesh part has identified a simple diagram to resemble all relevant stakeholders at aglance which can easiliy be understood from below chart:



In order to create an effective network following aspects needs to be addressed within the country:

- Awareness raising event for sponsors of different industry.
- Capacity development of local consultants and academicians.
- Rigorous consultation workshop both internal within the team, with Japan counterpart and with other stakeholders.
- Business matchmaking with factory owners and technology providers.
- Inclusion of government officials within the team to maximize the impact.

Potential and challenges for JCM projects in the country and how the domestic network can contribute

Potential of JCM projects in different sector through different products have already been analyzed and domestic network can assist through following mechanism:

- To raise awareness amongst factory owners, domestic part can host several events for relevant stakeholders.
- Domestic network can encourage sponsors to go for low carbon technologies and implementation of JCM projects.
- Identification of suitable projects to be entitled under JCM umbrella.
- Technical support for feasibility, implementation and post monitoring

On the contrary, domestic part can also contribute to address the challenges as well by following mechanism:

- To provide one stop solution to the factory owners for design, technology selection and implementation which is more technical in nature and difficult for most of the entrepreneurs.
- Government and other approval for any project in Bangladesh is time consuming and complex which can be eased by domestic network through partnership with government agencies.
- Funding is a major barrier which can be eliminated by utilizing price discounting through JCM fund.
- As the cost of machineries from Japan is higher than that of other country which has low life and durability; JCM fund can boost up the sector.

Conclusion

As the carbon market is expected to see a rise in the near future, the demand of CERs would go up resulting in an increased interest among the companies from developed nations to provide carbon finance to clean projects in the developing countries; JCM can play a vital role. The 3rd Phase (2013 to 2020) of the European Union Emissions Trading System (EU ETS) promotes cleaner projects from the Least Developed Countries (LDCs) like Bangladesh. As per EU Regulations, CERs originating from projects registered with UNFCCC after 1 January 2013 are valid and usable (up to and including the year 2020) only if the projects are taking place in the 'Least Developed Countries' (LDCs). This may be viewed as a great opportunity for the industries in Bangladesh to develop projects which would bring them additional revenue from carbon financing and help improve the financial viability of the projects to a considerable extent. Thus acceleration in development of low carbon technology usage shall definitely have a positive impact over JCM.