

## ECOLOGICAL MARKETING PRACTICES FOR NONRENEWABLE NATURAL RESOURCES: A CASE STUDY ON KGDCL

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### ABSTRACT

*Natural gas already covers most of the global energy demand and one of our most important sources of energy today. The study has emphasized on ecological marketing practices of natural gas. In Bangladesh perspective, there is scarcity in natural gas and its increasing gradually. Karanfully Gas Distribution Limited gives its full and cordial efforts to cover the customer demand of Chittagong City. The study has tried to focus on ecological marketing practices for Nonrenewable Natural Resources. The study has analyzed: the product, price, place, promotion, process, physical evidence, people and planet in natural gas distribution sector. The study has also focused on the analysis of KGDCL's activities through 8ps: Product, price place, promotion, process, physical evidence, people, and planet. By using this 8ps the company is expected to be able to market its product efficiently to customer through its exclusive distribution system. By implementing eight 'P' of ecological marketing, it is possible for Natural Gas Company to develop its proper distribution system. The major nonrenewable resource is natural gas, which the consumer uses daily in huge quantity for household and industrial sector. The unlimited use of natural gas drives us to use ecological marketing concept in natural gas industry for marketing and distribution.*

**Keywords:** Ecological Marketing, Natural Gas and Non Renewable natural resources

### INTRODUCTION

Developed in the 1990s, a marketing approach to highlight products and production methods that improves environmental performance, further ecological causes, or solve environmental problems. Marketing products and services on these effects are growing but not all environmental claims are accurate. Some might be exemplify green-washing. Ecological marketing works well with some groups of users, in particular "True-Blue Greens" or other groups oriented toward

ecological causes. Commonly referred claims include “non-toxic” and “bio-degradable.” However, these claims may turn-off other customers who are Skeptical of environmental claims (Sustainability Dictionary).

The Implementations of ecological marketing concept in natural gas can help to ensure the proper protection of environment and reduce the misuse of natural scarce resources. Natural gas is fully a natural product which is naturally extracted and distributed with less environmental effect. Natural gas is a clean burning fuel; its combustion emits fewer pollutants into the atmosphere than other fossil fuels (Islam, 2007) According to the American Marketing Association green or ecological marketing refers to the “the study of the positive and negative aspects of marketing activities on pollution, energy depletion and non-energy resource depletion” (Henion and Kinnear 1976). According to Herbig et al (1993) green marketing refers “to products and packages that have one or more of the following characteristics; they are less toxic; are more durable; contain reusable materials and/or are made of recyclable materials”. Among the key strategies are; green product strategies, green logistic strategies, green pricing strategies, green promotion strategies, changing consumers from consumption culture to ecologically concerned consumers, adoption of eco-marketing orientation as a business philosophy, Government intervention, lifecycle inventory analysis and teaming up for success (Polonsky et al, 1997; Ottman, 1997; Willum, 1998; Charter et al, 2002).

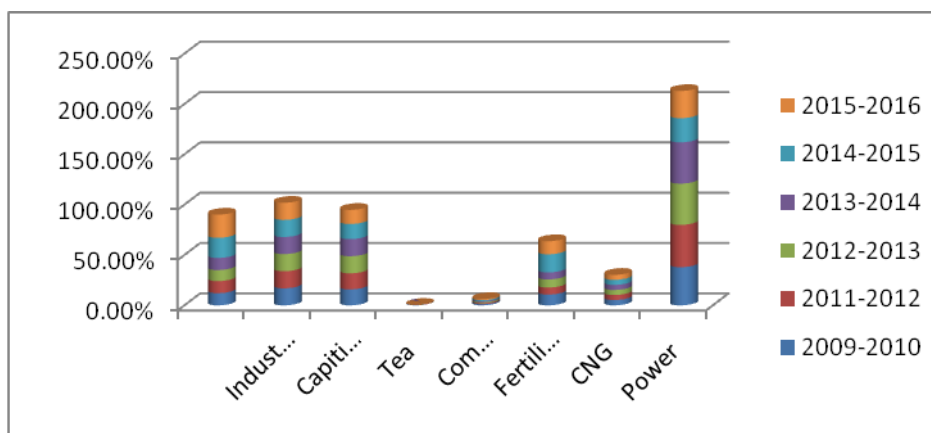
It is a great concern among the concerns to undertake such initiatives that will help to mitigate the destruction of natural gas and environment at the time of production, transportation and distributaries. (Islam, 2007).By incorporating ecological marketing concept in KGDCL domestic natural gas marketing and distribution can reduce environment pollution. Ecological marketing include eight p for performing the marketing practices. These P’s include product, price, place, promotion, process, people, physical evidence and planet (Clark, 2014).

Ecological marketing is the social attempt to sell or market ecologically related product whose positive ecological attributes and content constitute a minor or major appeal for the buyer, influencer, gate keeper, user .The ecologically motivated marketing effort includes product, price, place, promotion, process, people (Apaiwongse).Green marketing mix strategies include developing green-based products, green logistics, green promotion, green pricing and green consumption.

Natural gas is the most important fuel for Bangladesh – both in terms of energy and diversity of use. Bangladesh Oil, Gas and Mineral Resources Corporation

(Petrobangla) is entrusted with the responsibilities of the gas and coal sectors of Bangladesh. Subsidiaries under Petrobangla are responsible for exploration, production, transmission, distribution and marketing of natural gas to the end users.

The port city of Chittagong is the commercial capital city of Bangladesh. Due to expansion of industry and commercial customers and the increasing demand of natural gas, Bangladesh government took the positive initiative to build separate gas Distribution Company for better management and efficient customer service for greater Chittagong region-Karnaphuli Gas Distribution Company Ltd. The consumption figures by the broad sectors are easily available because these are regularly reported in various reports and literature. However, further breakdown of the data are hard to find, and are not reported regularly (Rahman, et al., 2012). Now we give Total national use of natural gas by different sector from year 2009-2010 to year 2015 to 2016.



**Figure- 1: Sector wise gas consumption by Petrobangla**

*Source: Petrobangla Annual report and Appendix 1, Table (1)*

The figure shows that the highest amount of natural gas consumed by power sector and domestic sector consumptions level is same to previous year i.e vary from 11% to 23 %. Natural Gas is a vital component of the world's supply of energy. It is one of the cleanest, safest, misconceptions about natural gas. For instance, the word 'gas' itself has a variety of different uses, and meanings. When we fuel our car, we put 'gas' in it. However, the gasoline that goes into our vehicle, while a fossil fuel itself, is very different from natural gas. The 'gas' in the common barbecue is actually propane, which, while closely associated and commonly found in natural gas, is not really natural gas itself. While commonly grouped in with other fossil fuels and sources of energy, there are many characteristics of natural gas that make it unique (Islam, 2007).

## LITERATURE REVIEW

The Energy Information Administration (EIA) Annual Energy Outlook projects of 1998 stated that natural gas produces fewer amounts of greenhouse and carbon dioxide compared to other energy. The report also mentioned that it is clean burning fuel and it has some impact on environment for leakage during exploration and transmission. Moreover its consumption will increase rather than that of other energy because of its environmental advantages.

Arslan and Gogce (2013) stated green marketing practices have become foundational value adopted by businesses and they compete in environment-friendly manner with consumer and legal responsibilities and protect and contribute to environment. Moreover he found that the increasing importance of the protection of natural environment is the top item on the agenda of the world market and particularly relevant to businesses.

Taiwo (2010) suggested that oil and gas marketing companies have comparative advantages in adopting various marketing strategies using different technologies such as the use of traditional methods of marketing, which is based on “soft” information culled from close contacts by marketing and sales department rather than the use of the specialized strategic marketing methods that are based on “hard” quantitative information.

Grundey (2009) identified that ecological marketing is related to analysis of positive and negative aspect of marketing activities on pollution, energy depletion, and destruction of natural resources. He suggested that ecological marketing can ensure environment ecofriendly business and eco product, farm product, nonrenewable natural resource based product for consumer and created competitive advantage for business.

Vagasi (2004) studied marketing system which is converted into sustainable system creating a way for competitive advantage without compromising ability for future generation. Ecological marketing and sustainable marketing should convert their strategies and offer ecofriendly product for customers wellbeing.

Grants (2007) found that green marketing is a creative opportunity to make different business successful and the environmental market companies have two solutions regarding this : cost saving and market opportunity potentials. By using green marketing the companies can reduce amount of raw materials and energy used in production and reuse.

Suslick and Machado (2009) analyzed that special concerned is required for use,consumption of nonrenewable resources and reserve the scarce resources for future generation through sustainable development and environment legislation.

### **STATEMENT OF THE PROBLEM**

Generally, marketing of product increases waste and hampers our ecological balance. As a result, our environment faces a lot of wastes of production, exploration, distribution and consumption of natural gas daily which causes environmental degradation and creates contradiction in ecological balance. However, regarding to the demand in green products and green services, green marketing remains a key factor in order to gain competitive advantage; “environmental efficiencies are a way to gain cost avoidance and competitive advantage” (Wever, 1996).

Sometimes, lack of optimum utilization of natural gas in our country is damaging ecological environment which creates hindrances for our environment. Over or excess of consumption or misuse and mismanagement of our natural gas industry affects our ecosystem .Moreover the soil of the region has been seriously affected by the explosion. The soil has not only lost its fertility, but also become inappropriate for construction of any heavy structure. The gas fire denuded the surrounding 700-acre reserved forest of Magurchara, rich in flora and fauna. The land will be no good for trees, tea, crops and vegetable for 50 years, according to soil scientists. Environmentalists said that the region would be facing a very serious loss of green cover and extinction of wildlife species (Islam and Raihan, 2007).

Ecological marketing, which is a typical drive for reducing the production and consumption of certain products (for example, toxic pesticides) and/or imposing new eco-products (for example, recycled paper). The concept of eco-performance brings to the forefront the total impact that the entire company has on society and the environment, including all its products and production system. (Katrandjiev). So the research topic is the ecological marketing practices for natural gas from the point of view of marketing influences on the ecological balance on the earth.

### **OBJECTIVE OF THE STUDY**

The main objective of the study is to evaluate ecological marketing practices of non renewable natural resources. The specific objectives are:

- a. To develop a conceptual framework on ecological marketing practices.

- b. To examine the ecological marketing practices on Karnafully Natural Gas Distribution Ltd.
- c. To identify the flaws with ecological marketing practices of natural gas.
- d. To suggest some policy recommendations to improve the ecological marketing practices.

## **RESEARCH DESIGN: METHOD, TECHNIQUES AND METHODOLOGY**

Research is a systematic investigation that is used to find out the answers for questions raised whereas methodology is a system of rules that are explicitly and built upon the research which is based on and against the claims for knowledge usually evaluated (Nachamias et al., 1996). Research is conducted based on theory which is extracted from deep literature study and it helps to interpret and collect data. Theory basically serves as a foundation to conduct the research. Qualitative Approach analyzes, interprets and collects data by studying people's behavior, the way they act and response (Creswell, 1994). To achieve the aim of this study qualitative research method was used.

### **Population and Sample:**

For distribution of natural gas there are six companies in Bangladesh. These companies are Titas Gas, Bakhrabad Gas, Jalalabad Gas, Pachimanchal Gas, Shundarban Gas and Karnafully Gas Distribution Company Limited. The sample of this research is Karnafully Gas Distribution Company Limited. Karnaphuli Gas Distribution Company Limited (KGDCL) has been formed on 8th February, 2010 bifurcating greater Chittagong and Chittagong Hill Tracts area under BGSL franchise pursuant to a government decision in order to rationalize and improve the services of the companies under Petrobangla. The commercial activities of the company have commenced from 1st July, 2010.

### **Data Sources**

The task of data collection begins after a research problem has been defined and a research design plan chalked out. While deciding about the method of data collection to be used for the study, the researchers used secondary data and primary data. The secondary data, on the other hand, are those which have already been collected by someone else and which have already been passed through the statistical process. Sources of secondary data: Company websites and Annual report, Government report. Primary data are collected by unstructured questionnaire from professional people.

## CONCEPTUAL FRAMEWORK

### **Ecological marketing**

Ecological marketing means using natural resources as a raw material of product and this product uses don't create any hindrances to environment and the product waste can be reused for making another product or waste can be recycled properly. For maintaining ecological balance most of the organizations shows the positive reception towards ecological marketing. Within the realm of business, this idea refers to the development that meets the needs of business organizations without compromising the ability of future generations to meet their own needs. Among other socio-economic sciences the Ecological Marketing "needs and wants" (in marketing terminology) to offer its own contribution to the environmental protection. This concept incorporate eco friendly, environmental care in the organizational process without ambition of creating growth but respecting the environment .when more organizations started implementing it, they aimed at gaining competitive advantage from their competitors, claiming that their product and services were less damaging the environment than their competitors product and services.(Peattie,1995)

### ***Product***

Green products are typically durable, non-toxic, made from recycled materials, or minimally packaged (Ottman, 1998). Green based product strategies comprise any or a combination of recycling, reduction of packaging materials, re consumption, dematerializing the products; using sustainable source of raw materials, making more durable products; designing products that are repairable, making products that are safe for disposal, making products and packaging that are compostable, and making products that are safer or more pleasant to use. Characteristics of ecofriendly product: not harmful to human health , desirable in the 'Age of Sustainability 'should be" energy efficient (i.e.reduced CO2 emissions),non-polluting, manufactured from renewable and non-renewable resources, removal of hazardous material (Charter,et al., 2002).

### ***Price***

Many consumers assume that green products are often priced higher than conventional products (Peattie, 1999). While their assumption may be true Peattie (1999) argues that these products are not unusually expensive, but the conventional products are unrealistically cheap because they exclude socio-environmental costs of production, product's use and disposal.

This means that external costs, such as those linked to pollution, are not reflected in the prices of the products that we buy, or the cost accounting of the companies that produce them. This situation is gradually changing. Many of these 'external'

costs are now having a price attached to them by legislation and stakeholders pressure. Legislation is making companies more responsible for emissions and the use of new fiscal measures such as carbon taxes is also increasing the costs for business (Charter, et al., 2002).

### ***Place***

The minimization of energy in transportation of employees and supplies to maintain the building will have a major impact on energy usage, carbon generated and the buildings environmental footprint. Other components of green logistics strategies include reduction of packaging material to directly or indirectly lower distribution costs, use of integrated transportation systems and the Internet. However, more emphasis has been given to reverse channel systems (Willums, 1998; Polonsky, 2001). In green pricing strategies, there are many consumers assume that green products are often priced higher than conventional products (Polonsky, 2001).

### ***Promotion***

Green promotion is an activity of promoting products as having characteristics that do not harm the natural environment (Polonsky et al., 1997). According to Benerjee et al (1995) it should meet one or more of the following criteria: - i) explicitly or implicitly addresses the relation between a product/service and the bio-physical environment. ii) Promotes a green lifestyle with or without highlighting a product/service. iii) Presents a corporate image of environmental responsibility. According to Scholossberg (1993) as quoted by Polonsky (1997), green promotion helps consumers to overcome the “greatest environmental hazard”, that is, the lack of environmental information.

### ***Process***

Processes that we offer within the environment friendly program must reflect our overall commitment to, and understanding of the implementation of green concept throughout the product. This is how smooth customers acquire the services that the organization offers. Customers need to be always happy and satisfied with the system. This can be information for them that how helpful the staff is in acquiring the services. E-commerce has been very helpful in this where customers can purchase items online and await delivery and in case of reading materials, they can download them and reduce wastages (Gitonga, 2014). So, ecological marketing process ensures the optimum utilization and distribution of natural resources.

### ***People***

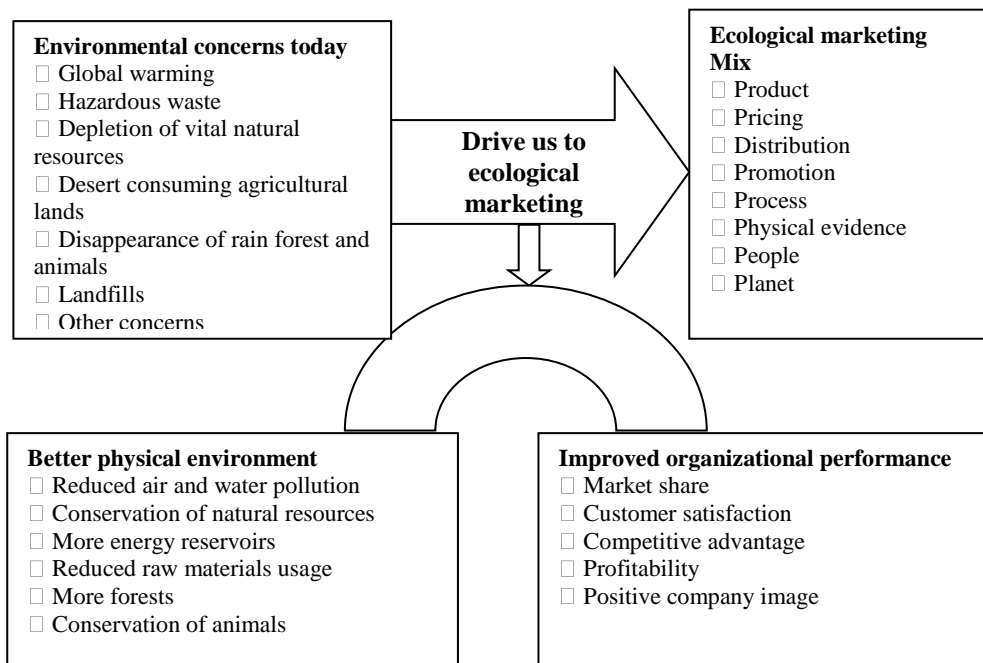
‘P’ for participants is powerful because, for green programs to work, the supplier and their staff are brought into direct contact with customer. People also make the



environmental product available to customer. The participants must be involved through intensive and ongoing training, communication, involvement (team development), and must be knowledgeable about the product. An integral part of business sustainability is to remember that ‘people are the businesses and they have to implement change. Any organization that embarks on the process of making itself more sustainable is likely to face a difficult and turbulent time. It will mean that projects will need to be looked for in different ways, and interdisciplinary skills will also be needed. (Charles.et al., 2002).

**Planet**

When we make a product we must consider the environment because product has some impact on environment. Environment friendly product has less impact on plant (i.e where it is used), (Clark, 2014). Well coordinated use of all green marketing strategies will result in better physical environment in terms of reduced air and water pollution, waste energy depletion, global warming, deforestation, depletion of natural resources, and rate of landfills (Voon & Yazdanifard).



**Figure-1: Framework of Ecological marketing: Concept and Practices**

*Source: Kinoti (2011)*

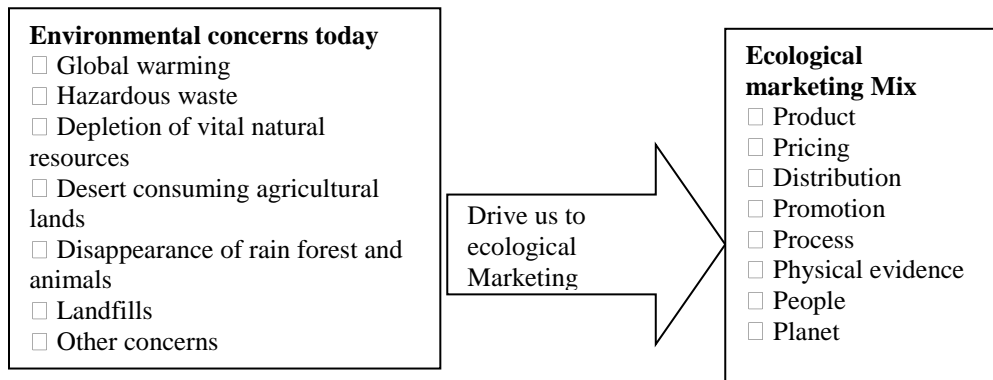
Nowadays, climate change is worsening because manufacturers continually release carbon dramatically that causes greenhouse effect. The firm now realized

the problems and started using degradable packaging, reducing carbon emission and energy consumption (Polonsky & Jay, 1994)

**Physical evidence**

Almost all services include some physical elements even if the bulk of what the consumer is paying for is intangible. The Physical evidence is a holistic validation of the impact of the green strategies and use environment friendly instrument for delivery of eco product. These People one which is driven by, and a drive by environment friendly innovation which is a key point of difference from a competitor. Other components of green logistic strategies include reduction of packaging material to directly or indirectly lower distribution costs, use of integrated transportation systems and the Internet. However, more emphasis has been given to reverse channel systems (Polonsky, 2001).

The model further proposes that marketing through green marketing intervention strategies can respond to the environmental concerned challenges. Other business functional areas can also be intervened through various strategies to provide solutions to the environmental problems. These intervention strategies will result in improved organizational performance and better physical environment, which in turn will result in sustainable development (Kinoti, 2011).



**Figure-2: Driving forces of Ecological Marketing**  
*Source: Compiled by authors*

So the figure 2 shows the driving force of ecological marketing .These driving forces also increase the importance of ecological marketing in present perspective.

## NATURAL GAS IN BANGLADESH

### *ECOLOGICAL MARKETING PRACTICES ON KGDCL*

KGDCL is basically a non renewable natural gas marketing company. For this reason ecological marketing practices can be implemented on KGDCL. Moreover natural gas is environment friendly product.

### **Product of KGDCL**

KGDCL distributes mainly natural gas for different kinds of user like domestic, industry, commercial, power and fertilizer. LNG is now upcoming for supply in Chittagong city. It is fully natural and environment friendly product.

### *Natural Gas*

Natural gas is a fossil fuel formed when layers of decomposing plant and animal matter are exposed to intense heat and pressure over thousands of years. Natural gas is a nonrenewable resource because it cannot be replenished on a human time frame. Natural gas is a hydrocarbon gas mixture consisting primarily of methane, but commonly includes varying amounts of other higher alkenes; it is also the main source of the helium (2-7%) and sometimes a usually lesser percentage of carbon dioxide, nitrogen and hydrogen sulfide.

### *LPG*

Liquefied petroleum gas or liquid petroleum (LPG or LG gas), is also referred to simply propane or butane which are flammable mixtures of hydrocarbon gases used as fuel in heating appliances, cooking equipment, and vehicles. LPG is prepared by refining petroleum or wet natural gas and is almost entirely derived from fossil fuel sources, being manufactured during the refining of petroleum or extracted from petroleum or natural gas streams as they emerge from the ground. LPG is composed primarily of propene and butane while natural gas is composed of the lighter methane and ethane. LPG vaporized and at atmospheric pressure and has a higher calorific value than natural gas which means that LPG cannot simply be substituted for natural gas.

### *CNG*

Compressed natural gas methane is stored at high pressure which can be used in place of gasoline (petrol), diesel fuel and Propene/LNG. CNG combustion produces fewer undesirable gases than the fuels mentioned above. It is safer than other fuels in the event of a spill, because natural gas is lighter than air and disperses quickly when released. CNG may be found above oil deposits, or may be collected from landfills or wastewater treatment plants where it is known as biogas.

## ***LNG***

Liquefied natural gas (LNG) is natural gas (predominantly methane, CH<sub>4</sub>, with some mixture of ethane C<sub>2</sub>H<sub>6</sub>) that has been converted to liquid form for ease and safety of non-pressurized storage or transport. Natural gas is mainly converted in to LNG to achieve the natural gas transport over the seas where laying pipelines is not feasible technically and economically. LNG achieves a higher reduction in volume than compressed natural gas (CNG) so that the (volumetric) energy density of LNG is 2.4 times greater than that of CNG (at 250 bar) or 60 percent that of diesel fuel. This makes LNG cost efficient in marine transport over long distances (en.wikipedia.org). For meeting unlimited demand of gas, the KGDCL now arranges LNG gas from overseas.

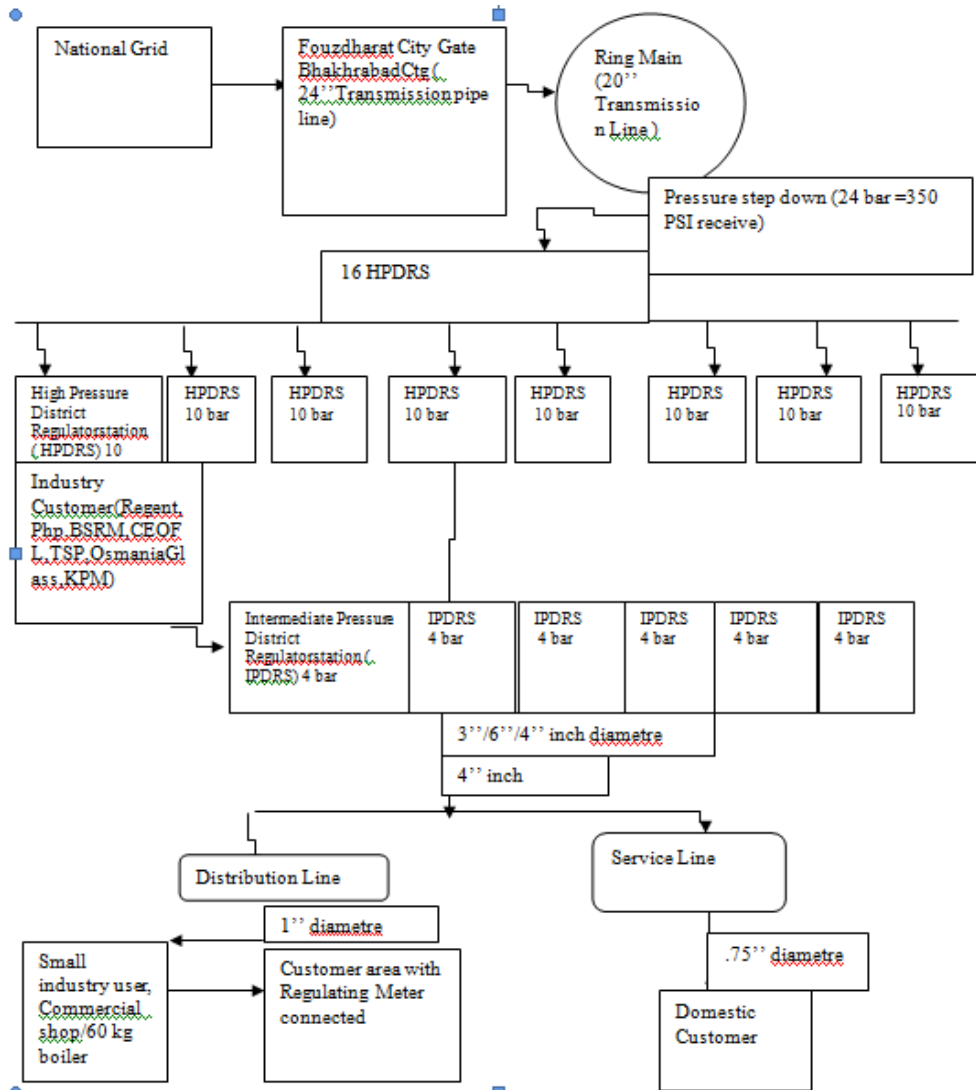
## **Process and Gas Composition**

KGDCL uses a user friendly process for distributing natural gas to different types of customers. KGDCL receives natural gas from national grid and distributes this gas to the Chittagong city. In this figure there is 16 HPDRS transmitted gas to 10 bar HPDRS, then transmitted to 4 bar HPDRS. From IPDRS transmitted to distribution line for industrial customers and service line for domestic customers.

## ***Pipe line construction***

There are 60/150 psig gas distribution pipeline network in the company's franchise area in the greater Chittagong and Chittagong Hill tracts. Besides these lines there are also 350 psig with 20" diameters gas distribution pipeline from Chittagong to 210 MW power plant and 960 psig with 10 " diameter high pressure gas pipeline from Chittagong Ring Main to Semutang gas Field. During FY 2013-14 59.35 Kilometer distribution pipelines with diameters ranging from ¾ " to 8" were constructed against the target of 15 km. it is required to construct more pipeline than target due to providing gas connection to the domestic customers of Chittagong region against the huge demand after the cancelation of government –embargo.

For LNG transmission, the gas pipeline running from Moheshkali to Anowara has already undergone testing; the pipeline has the capacity to transport up to 800,000 mcf per day. Two additional pipeline projects are being developed to deliver the natural gas from Anowara to the rest of the country. The first of the two pipelines, a 30-kilometre section from Anowara to Fouzdarhat is under construction in order to deliver natural gas to users in the city of Chittagong. The remaining 181-kilometre pipeline will be also build to deliver natural gas from Chittagong to the rest of the country (<https://www.lngworldnews.com/tag/bangladesh>).



**Figure 3: Process of Gas Transmission**

Source: Compiled by authors

**Place**

KGDC uses smooth distribution channel for distributing natural gas toward different sector of Chittagong and Hill tracks.

i) Eastern Leg : Fouzderhat – Kalurghat Mainfold station: 24"φ
ii) Kalurghat MS: Shikalbaha power station: 20" φ
iii) Southern Leg: Fouzderhat – Patenga MS: 24"φ
iv) Patenga Ms – Shah Mirpur Ms: 16"φ
v) Shahmirpur- Shikalbaha station 20"φ

KGDCCL distribution system divides the total Chittagong city into eight different zones. In these eight zones, distribution system is performed through north and south sales department. South sales department includes Zone 4, 5, 7 and 8. North sales department zone 1, 2, 3 and 6. For every zone there are manager, assistant manager and engineer etc.

### **North Sales Department**

i) Zone 1 :Nasirabad, Fatikchari and Hattazari

ii) Zone 2: Kalurghat,Rangunia, Raojan, Kaptai, Boailkhali.

ii) Zone 3: Central

iv) Zone 6: Patharghata ,patiya and Anowara

### **South Sales Department**

i) Zone 4 :Pahartali

ii) Zone 5: Agrabad

iii) Zone 7: Haliashahar

iv) Zone 8: Fouzdharat

For ecological marketing practices the company could reduce the number of zone. Because these zones require separate resources and management system for natural gas distribution and supply. Moreover the natural gas is mainly distributed through 24", 20" or 16" dia meter pipeline from ring main line that information demonstrated in the Appendix-1: Distribution Map of Natural Gas for Chittagong city.

### **Physical Evidence**

KGDCCL uses different instruments as a physical evidence for transmitting natural gas to their customers. The company tries to use environment friendly instruments as a physical evidence for distribution. KGDCCL uses repairable, reusable and recyclable instruments. Sometimes KGDCCL maintenance teams conduct repairing activities. They collect the obstacle meters, inspect these to find out the problems and if they think these meters are recoverable then repair it as a environment friendly activities. Now-a-day's KGDCCL uses new technologies and recyclable high quality plastic made pipe. Pipe lines are basically imported from Canada and China.

Gas Meters for reading are also imported from foreign country. All imported instruments are brought through international tender. Gas Transmission Company Limited arranges pipeline for distributing total country natural gas. The main distribution lines i.e transmission lines are setup by GTCL. KGDCCL arranges different pipelines within Chittagong and hill tracts. For proper ecological marketing the company can use different updated instrument and pipeline for supplying natural gas. The leakages of natural gas mainly occur because of

obsolete backdated instruments. So the environment protection or safety depends on using innovative instruments for gas supply.

### ***Modification and Maintenance activities of KGDCL***

Necessary modification and required maintenance work of RMS(s) and different DRS are being done gradually to ensure smooth supply of gas. Steps have been taken to set up a condensate storage tank with flash drum in bulk customer's RMS(s) like KAFCO and CUFL RMS. Steps have been taken to paint different customers RMS. Meter cabinet and Meter protector are being installed to prevent unlawful interference into the RMS by illegal customers. Efficiency of RMS and DRS are monitored regularly. During the financial year such installations were visited several times and 180 Nos. of RMS(s) receiving of filter and regulators were done. Besides, the meters of bulk customers are visited, examined and calibrated to ensure proper functioning of the equipment.

### **Price**

Currently Petrobangla buys gas from the PSC contractors at a price fixed under the 1993 petroleum policy. Petrobangla has the right of first refusal and buys the cost recovery gas and a contractor share of profit gas but does not pay for the government share of profit gas. There is no stamp duty or VAT on the price paid to the producers. Petrobangla is responsible for paying the corporate income tax to the government on behalf of PSC contractors.

Petrobangla then sells the gas to its affiliated gas distribution companies which are the exclusive marketers of gas in their franchise areas to all categories of consumers. The only exception is Santos right to supply gas from Sangu offshore fields directly to end users at market prices following the 2001 amendments to their gas supply and purchase agreement with Petrobangla. In 2012 Bangladesh power development board reportedly started buying gas from Santos to supply gas to a power plant in Chittagong. For gas pricing to the marginal users, the government retains 55% of the gas sales and part of the proceedings goes into a Price Deficit Fund (PDF) to pay the PSC contractors. Petrobangla retains the remaining 45% to pay its costs, including transmission and distribution margins. In 2003 government approved a new gas pricing formula where the government producer's price will also be indexed to HSFO Singapore; with semiannual price adjustment. The average end user price is calculated according to formula:

$$CP = CG + TD + SD + VAT$$

Where, CP=Customer Price

CG=Cost of gas (75-93% HSFO, capped for PSC Production share contractor (PSC) Volumes and 7% HSFO for Petrobangla gas

TD= Transmission and distribution fee=OPEX+ 15% return on net fixed assets  
 SD=Supplementary Duty, Currently a Fixed Charge, VAT= Value added tax =15%

According to the above information, each category of consumer pays a different tariff rate, independently to the volume consumed and distance to the distribution system. Natural gas in Bangladesh remains under priced in relation to the long-run marginal cost. This has led to significant resource transfer by some sectors and consumer groups. The average tariff of all users was 78% of total sales in 1999/2000, implying an average subsidy of 22%. The under pricing of domestic gas use leads to a high opportunity cost in terms of foregone resources that could have been mobilized to support investment within and outside the sector, especially given the country’s massive development financing needs. Performance in the gas sector has also been limited; it is much below the potential because of low gas extraction and limited use by the domestic market. The delayed or inadequate investment in the expansion of the gas production, transmission, and distribution networks and their operation and maintenance are also major concerns in the sector. This has limited the market and constrained Petrobangla’s gas production, causing supply shortages and disrupting fertilizer production and power generation (Islam, 2007).

New price announcement by Bangladesh Energy Regulatory Commission for all gas distributors for different district of Bangladesh. All transmission and distributions company predetermined the price for customers.

**Table: 2.Growth rate of Domestic user’s price rate:**

Domestic users	2003	2009	Growth rate %	2015	Growth rate%	2017 March 01	Growth Rate %	2017 June01	Growth Rate %
One Burner	350	400	14.28%	600	50%	750	25%	900	20%
Two burner	400	450	12.5%	650	44.44%	800	23%	950	18.8%

*Source: (Complied by authors)*

This price rate change has been effected from 01 June 2017 for all domestic user of natural gas. This price change will be effective until the next notice.

**Promotion**

KGDCCL implement different types of promotional tools for environment marketing of natural gas .This tools can be advertising, publicity, public relations and direct marketing.



KGDCCL uses direct marketing by sending online message through online and mobile network. Poster and display of different customer conscious picture for environment friendly initiative. KGDCCL perform different initiatives on different days like Energy day, Environment day; sometimes arrange Publicity for promotion of natural gas. KGDCCL sometimes telecasts radio, newspaper and Television advertising for promoting natural gas in total market. For promoting its products in Chittagong KGDCCL advertises some local newspapers and publishes different news, reports based on petro Bangla and energy department. It also publishes souvenir in different government and non government publication for promoting environmental friendly use of natural gas. Sometimes publishes regular news clip for customer consciousness from KGDCCL. Mostly used instruments of KGDCCL in Chittagong city are its billboard, poster hanging on important places.

### **People**

KGDCCL has sufficient work force including officer and staff for sound distribution of natural gas in Chittagong District. KGDCCL recruits according to its organizational structure. KGDCCL tries to maintain a sufficient manpower in their different department for eco friendly marketing of natural gas. There are three category of employees: General, Technical and Accounts cadres. Moreover there is some casual's staff available in KGDCCL. The total employee of KGDCCL for 2015-2016 is 543.

### ***Different types of training program in different departments***

KGDCCL offers different types of Training program for making efficient working force. KGDCCL sometimes offers national training program and foreign training program. National training programs are held in Chittagong and Dhaka. National training programs are arranged by Petrobangla and Karnafully. Foreign training are also held in Thailand ,Indonesia, Singapore ,England, America ,Netherland ,Spain, China .There are three categories of Training program for improving performance of employee and they can serve the customer. They also become conscious about natural gas misuse and convince the customer to reduce the use of scarce resources.

### **Planet**

In ecological marketing at last what the study finds is Planet. Natural resource marketing depend safety of environment. In this P we try to develop a safety way of marketing. KGDCCL natural gas does not create any environmental hamper and try to reduce wastes of natural gas and maintain optimum level of efficiency. Except the domestic user all types of customers are required to submit clearance certificate from environment Directorate in order to ensure the adverse impact on

the environment. As part of the environment conservation program, saplings of different varieties of trees have been planted in the premises of company installations.

A section named environmental safety has been created in the company to monitor and guard against adverse impacts on environment on account of the company's activities. Environmental safety status of RMS and DRS are being regularly sent to Petrobangla.

#### *Health Safety and Environment Safety*

Due to effective precautionary measures taken for hazards work no one suffered injury during the year. While attending to the hazardous tasks, physician's medical equipment, ambulance: and necessary manpower are kept stand by in the workplace to meet any emergent situation. For environmental safety and protection KGCDL tooks different initiatives for proper and sound gas distributions, riser safety and any kinds of leakage: Established of fire extinguisher, arrange some personal protective equipment (PPE).

#### *Improvement of Cathodic protection system*

Cathodic Protection system is very essential system to protect the underground MS pipelines from corrosion. Due to effect of corrosion a major unexpected accident may happen any time with disruption of gas supply and may require replacement of existing gas pipeline. For effectiveness of the installed cathodic protection system regular maintenance, monitoring and development work were undertaken. A deed has been signed with M/S Total Energy Services Ltd. 333/3 Segunbagi cha for a term of 3 years for operation, proper maintenance and constant monitoring of the cathodic protection system installed at the high pressure and distribution pipe lines under KGDCL.

### **PROBLEMS OF NATURAL GAS MARKETING**

- i.** The first problem is scarcity of natural gas. Now days, the natural gas scarcity in Chittagong city is increasing day by day. KGDCL uses different rationing system for natural gas distribution. Moreover, demand of domestic gas also creates a pressure on natural gas supply.
- ii.** Secondly, the rising tendency of natural gas price always in up. The governments announced their initiative for further rises in natural gas price in 2019. Customer faces financial trouble for this high price charge of natural gas. Titas and Bakhrabad also take initiative to increase their natural gas price 80% and 103 % from previous price.
- iii.** Thirdly, the lack of proper distribution system also creates hindrance on natural gas marketing. The distribution map is not up to date to meet new customer demand in Chittagong city.

- iv. Fourthly, the unavailability of instrument for natural gas supply sometimes obsolete instatements increase the possibility of pipe leakage or any kind of accident.
- v. Fifthly, lack of manpower for maintenance and repair of natural gas distribution system increases the possibility of accident. Sometimes, domestic customer faces difficulty in solving their gas connection complexity because of shortage of employees.
- vi. Sixthly, Moreover, the natural gas delivery process is lengthy and monotonous and gas connection process involves lots of authorization and documentation.
- vii. Finally, sometimes, natural gas exploration and distribution system has impact on environment. But this natural gas has less impact on planet in comparison to other natural resources like oil, coal.

## **FINDINGS, POLICY RECOMMENDATIONS AND CONCLUSION**

### **Findings**

The study identified the transmission system of natural gas system in Chittagong city. The total process of gas transmission from national grid to ring main and then transmitted to distribution line and service line through HPDRS and IPDRS .For transmission from national grid to ring main KGDCL uses 24” diameter pipeline. Then down the pressure and convert to 10 bars and use 16 HPDRS for gas transmission. After that converts it to 4 bar and transmitted through IPDRS. In this way KGDCL transmits natural gas to different types of customers.

The study concluded the distribution system of KGDCL for proper distribution. .In distribution systems there were three stations. From these three stations natural gas were distributed to different zones of Chittagong. KGDCL has mainly divided the total Chittagong franchise areas into 8 zones. These 8 zones are controlled by manager, assistant manager, engineer and others. Zone 3 refers for Central area of Chittagong city. KGDCL faced lack of manpower, instrument and process complexities for serving different zones customers.

The study showed the physical evidence of KGDCL where KGDCL used different instruments and meter for providing gas service to their customers. All instruments are imported from Italy, China, Canada and Japan. For LNG transmission, the gas pipeline running from Moheshkali to Anowara has already undergone testing; the pipeline has the capacity to transport up to 800,000 mcf per day.

Petrobangla increases price for two burner domestic customers to 400 Tk in 2003 and Tk.450 in 2009 the growth rate was 12.5 % in 2015 price was Tk.650 so the growth rate was 44.5%, in 2017 the growth rate was 23 % and 18.8%, price was 950 .

KGDCL promoted natural gas consciousness among their customers mainly through bill board and poster in Chittagong city. There was lack of initiatives for online promotion.

The study identified the unavailability of people for gas distribution. In KGDCL there were different types of manpower available for different type's technical cadres. The total employee for 2015-2016 is 543.

The study showed the KGDCL initiatives for Planet safety or accomplishing ecological marketing. KGDCL maintained some cautious initiatives for environmental and health safety. For environmental safety the company arranges Cathodic protection system for pipeline improvement. KGDCL also uses different color and wall system protection system for environmental safety and annual maintenances. For health safety KGDCL also uses PPE (personal protective equipment) and fire extinguisher for employee protection.

### **Policy Recommendations**

- i.** The KGDCL would have ensured proper supply of natural gas to their customers and also adjusted supply and demand of natural gas that create a new sources to meet unlimited demand of domestic customers.
- ii.** KGDCL would have retained existing price of natural gas and take all initiatives for not to increase the price again .The price rising tendency by government for natural gas creates a dissatisfaction among their consumers.
- iii.** KGDCL would have arranged sufficient number of manpower for proper distribution of natural gas to their customers. Moreover, ecological marketing concept can be implementing by optimum number of manpower for repair and maintenance of natural gas.
- iv.** The KGDCL should have improved their distribution map for smooth distribution system which reduces the misuse of natural gas. The company should have to find the optimum way for transmitting natural gas on different zone of natural gas and ensure proper integration on north and south sales zone.
- v.** The KGDCL should have reduced the natural gas exploration impact and accident which hamper the environment.

- vi. The KGDCL should have arranged sufficient number of instrument for natural gas connection. Moreover, it might take initiatives to reduce the time duration for domestic gas connection. The company should make available different parts of gas connection from foreign countries for proper gas connection.

### Conclusions

This research concludes that ecological marketing is not a new concept but its acceptance increases day by day that creates positive feedback because of today's world now eagerly responding towards environmental consciousness. Natural gas is environment friendly product with less environment effect. So, ecological marketing practices protect the environment and protect scarce non renewable natural gas. KGDCL already installed prepaid meter for reducing misused of natural gas. In these circumstances, for meeting the huge demand of Petrobangla take more initiatives some new sources for natural gas as like; LNG. It has already run by KGDCL which has arranged pipeline for LNG distribution in Chittagong city.

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**Appendix-02****Table 1: Sector wise gas consumption by Petrobangla**

<b>Natural Gas user</b>	<b>2009-2010</b>	<b>2011-2012</b>	<b>2012-2013</b>	<b>2013-2014</b>	<b>2014-2015</b>	<b>2015-2016</b>
Domestic	12.1%	12%	11%	12%	20%	23%
Industry	16.9%	17%	17%	17%	17%	17%
Capitive	15.8%	16%	17%	17%	15%	14%
Tea	0.1%	0.1%	0.1%	0.1%	0%	0%
Commercial	1.2%	1%	1%	1%	1%	1%
Fertilizer	10.7%	7%	8%	7%	18%	13%
CNG	5.3%	5%	5%	5%	5%	5%
Power	37.9%	42%	41%	41%	24%	27%