National Energy Balance 2017-18

(Improvement of Energy Efficiency and Conservation)

Sustainable and Renewable Energy Development Authority
People's Republic of Bangladesh

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Acronyms

AC	Air Conditioner
ADB	Asian Development Bank
BAB	Bangladesh Accreditation Board
BAU	Business as usual
BCMCL	Barapukuria Coal Mining Company Limited
BDT	Bangladesh Taka (currency unit)
BEEER	Building Energy Efficiency and Environment Rating
BEMS	Building Energy Management System
BIFFL	Bangladesh Infrastructure Finance Fund Limited
BPC	Bangladesh Petroleum Corporation
BPDB	Bangladesh Power Development Corporation
BRESL	Barrier Removal and Cost-Effective Efficiency Standards and Labelling
BUET	Bangladesh University of Engineering and Technology
CO2	Carbon dioxide
COP	Conference of the Parties (UNFCCC)
EA	Energy Auditor
EACE	Energy Auditor Certification Examination
EAF	Energy Audit firm
EE&C	Energy Efficiency & Conservation
EECMP	Energy Efficiency Master Plan up to 2030
EECPF	Energy Efficiency & Conservation Promotion Financing
EM	Energy Manager
ESCO	Energy Service Company
FY	Fiscal year
GDP	Gross Domestic Product
GHG	Greenhouse Gas
GW	Gigawatt (power generation capacity unit)
ICS	Improved Cooking Stove
IDCOL	Infrastructure Development Company Limited
IFI	Implementing Financial Institution
IRPS	Improved Rice Parboiling System

JICA	Japan International Cooperation Agency
JPY	Japanese Yen (currency unit)
Ktoe	Kilo ton oil equivalent (calorific unit)
kW	Kilowatt
kWh	Kilowatt hour
L/C	Letter of credit
LED	Light emitting diode
LNG	Liquified natural gas
LPG	Liquified petroleum gas
MIS	Management information system
MP	Master Plan
MPEMR	Ministry of Power, Energy and Mineral Resources
Mtoe	Million ton oil equivalent (calorific unit)
MWh	Megawatt hour (calorific unit)
NOC	No objection certificate
RE	Renewable energy
RMG	Ready-made garment
SDGs	Sustainable Development Goals
SREDA	Sustainable and Renewable Energy Development Authority
T/A	Technical assistance
TFEC	Total final energy consumption
TPES	Total primary energy supply
TV	Television
UNDP	United Nations Development Programme

Part I Energy Supply and Demand Trend

1.1 Introduction

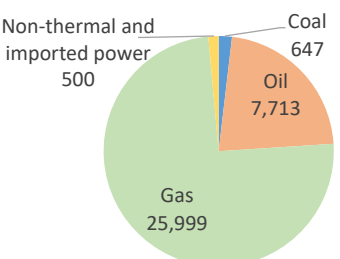
Bangladesh is one of the fastest growing country, aspiring to become a middle-income country by its 50th anniversary. The country, in the course of this remarkable development is also experiencing a gradual depletion of its primary energy resource i.e. natural gas. The time has come to explore and harness the full potential of alternative energy sources to ensure our long-term energy security as well as sustainable economic development. Realizing the importance, Bangladesh Government attaches due importance on renewable energy and energy efficiency issues and as such enacted Sustainable and Renewable Energy Development Authority (SREDA) Act in 2012 to facilitate, regulate and to promote all aspects of energy conservation and development of sustainable renewable energy in the country. SREDA started its official journey from 22nd May 2014. SREDA is working for the acceleration for renewable energy deployment and promotion of energy efficiency & conservation (EE&C).

This booklet on national energy balance data prepared by SREDA, is the second version after its introduction in the previous year (October 2018). It contains the demand-side energy consumption and supply-demand balance analysis, comprised of four parts, which are; (I) Energy Supply and Demand Trend, (II) Energy Balance and Intensity, (III) Energy Efficiency & Conservation, and (IV) Energy Balance Statistics. Energy datasets are the readily-available national data obtained from four governmental organisations, which are; Bangladesh Power Development Board (BPDB), Bangladesh Petroleum Corporation (BPC), (Bangladesh Oil, Gas & Mineral Corporation (Petrobangla) and Barapukuria Coal Mining Company Limited (BCMCL), in coordination with the Hydro Carbon Unit of

the Energy and Mineral Resources Division of MPEMR. It should be noted that although these data may represent the overall trend, they do not encompass the entire energy supply-demand.

1.2 Primary Energy Supply by Fuel Source

Total primary energy supply (TPES) for Bangladesh during FY 2017-18, based on readily-available national data from the four governmental organisations, was 34,858 ktoe, which was 3% increase from that of the previous year. As Bangladesh is significantly dependent on its indigenous natural gas production for its national energy supply, it has a dominant share among the TPES. The latest data for FY 2017-18, compiled from the four major readily-available national datasets, shows that the indigenous natural gas supply of 25,999 ktoe comprises 75% of the country's TPES. The fuel source with the next importance is oil, which supplies 7,713 ktoe, according to BPC national sales data.



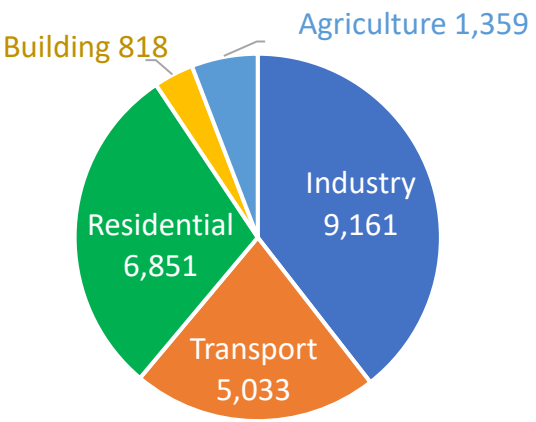
Unit: ktoe

Note:
** Excludes biofuel, imported coal, privately-imported petroleum products and imported LNG.*
** Non-thermal includes hydro, solar power.*
Source: Compiled by SREDA from BPC, Petrobangla, BPDB and BCMCL data

Figure 1 Composition of Primary Energy Supply by Fuel

1.3 Energy Consumption Trend by Sector

Total final energy consumption amounted to 23,222 ktoe in FY 2017-18, according to SREDA compilation from readily-available national data. Industry sector consumed 9,161 ktoe, which comprises 39% of the total final energy consumption, being the top sector in terms of energy usage. Residential sector's consumption was 6,851 ktoe, which comprises 30% of the total final energy consumption, being the second major energy consuming sector. There is a significant increase in building sector consumption, which was 818 ktoe in FY 2017-18 (11% increase from 737 ktoe in the previous fiscal year), which is attributable to urbanization and the rapid growth of service sector within the national economy.



Unit: ktoe

Note:
** Excludes biofuel, imported coal, privately-imported petroleum products and imported LNG.*
** Building sector is the compilation of "commercial" and "others".*
Source: Compiled by SREDA from BPC, Petrobangla, BPDB and BCMCL data

Figure 2 Energy Consumption by Sector

1.4 Energy Consumption on Primary Energy Basis

SREDA, as the authority to promote EE&C, analyses the demand-side energy consumption to identify potential for energy saving, especially focusing on the possibility of saving the use of fossil fuel derived energy. For a comprehensive analysis of energy consumption, it is essential to compare energy consumptions in various sectors fuel sources on an equal basis. Comparison on primary energy basis, which means, referring to the calorific value of the original input to make the energy available, rather than the actually consumed calorific value, is essential.

Total final energy consumption of 23,222 ktoe for FY 2017-18, is converted to primary energy basis to match the total primary energy supply by dividing the electricity consumption by the overall net transformation efficiency of 35% (including thermal power generation, transmission & distribution as well as average captive power efficiency). The data by sector and energy source are as in Table 1 below.

Table 1: Energy Consumption by Sector and Source (Primary Energy Basis)

FY	Industry	Transport	Residential	Building	Agriculture	Total
Gas	5,548	1,223	4,182	216	25	11,194
Oil	375	3,810	174	65	1,211	5,635
Coal	167					167
Electricity	8,799		7,166	1,542	354	17,861
Total	14,889	5,033	11,522	1,824	1,590	34,857

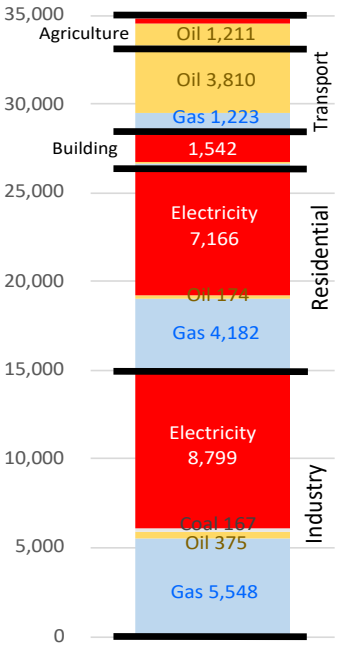
Unit: ktoe

Note:

* Excludes biofuel, imported coal, privately-imported petroleum products and imported LNG.

* Building sector is the compilation of "commercial" and "others".

Source: Calculated by SREDA from BPC, Petrobangla, BPDB and BCMCL data.



Unit: ktoe

Note:

** Excludes biofuel, imported coal, privately-imported petroleum products and imported LNG.*

** Building sector is the compilation of "commercial" and "others".*

Source: Calculated by SREDA from BPC, Petrobangla, BPDB and BCMCL data.

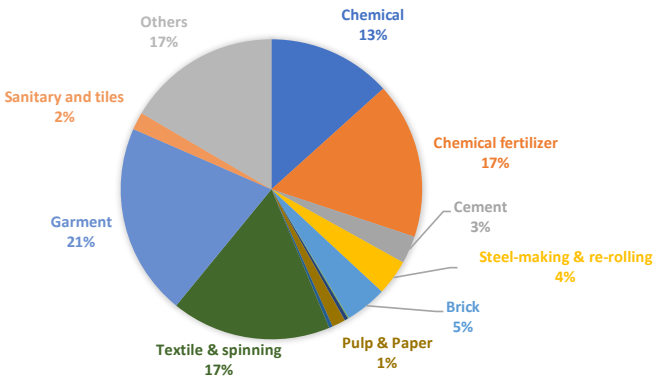
Figure 3 Energy Consumption (Primary Energy Basis) by Sector & Source

The figure on the left shows the breakdown of energy consumption by sector and source. Red segment is electricity consumption, while blue, yellow and grey are segments are gas, oil (petroleum products) and coal, respectively. It becomes apparent that electricity consumption shown in red, especially in industry and residential sectors comprise significant portion of the country's total energy consumption. It also signifies that the largest energy saving potentials exist in these segments.

Based on primary energy-based consumption data analysis, SREDA could identify these first priority areas for promoting demand-side EE&C. The ongoing Energy Efficiency & Conservation Promotion Financing Project, as explained in Part III of this publication, was introduced in response to the findings from primary energy basis consumption analysis.

1.5 Breakdown of Energy Consumption by Industry Sub-sector

As one of the elements for EE&C Master Plan up to 2030, SREDA, in cooperation with different stakeholders, calculated the breakdown of energy consumption among the Industry sector. The calculation is based on sub-sector wise carbon emission data, production data and also with reference to the interview result with the industry owners and academia experts. The result shows that the largest energy consuming sub-sector is the garment sector comprising 21% of the energy usage among the whole industry sector followed by textile & spinning, and chemical sub-sectors, each consuming 17% among the total industry sector energy consumption. It should be noted that the sub-sector breakdown calculation was conducted under restricted data availability and therefore further research and data collection will be required to obtain more accurate and updated data.



Source: Energy Efficiency Master Plan up to 2030

Figure 4 National Energy Consumption by Industry Sub-sector (Primary Energy Basis)

Part II Energy Balance and Intensity

2.1 National Energy Balance

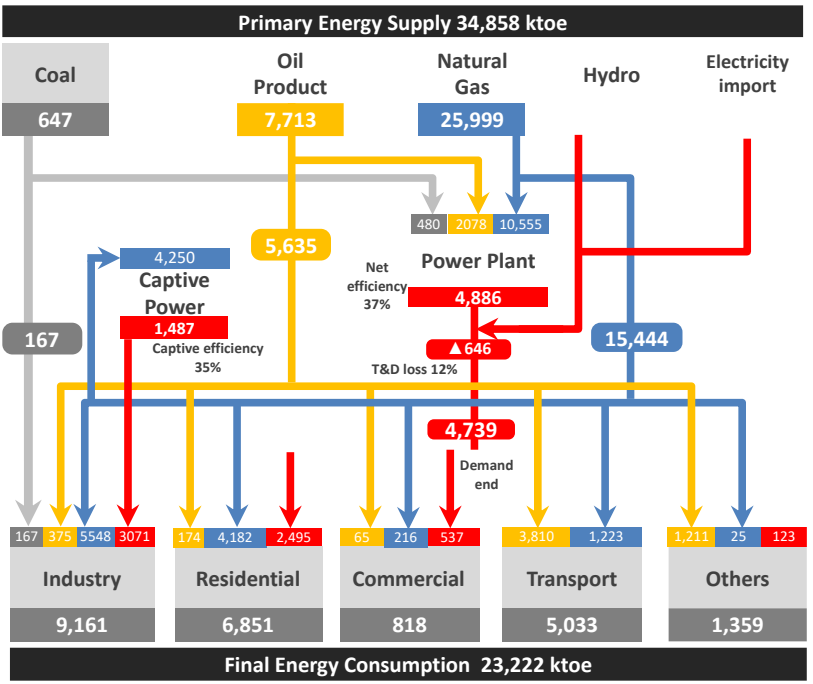
The national energy balance is a presentation of a set of energy data to exhibit the overall pattern of energy supply, conversion and demand trends among the major industry sector and by fuel source. It can also be described as the input-output data table of energy among the sectors by fuel source.

Based on readily-available national energy supply, transformation efficiency and consumption data, an updated energy balance calculation was conducted at SREDA. Figure 5 is the visual presentation of the national energy balance as of FY 2017-18. The energy consumption is shown in actual consumption basis, not in primary energy basis.

The striking characteristics of the national energy balance structure of Bangladesh is that the captive power generation comprises a significant portion of energy transformation. It also shows that approximately a half of the natural gas is being fed into power generation (including captive power generation). Captive power generation is contributing a significant portion of electricity supply to the industry sector (approximately 40%).

Further, looking at fuel source-wise consumption, natural gas is the major source for industry and residential sectors. Electricity is also most consumed in the industry and residential sectors. Transport sector and other sector (includes agriculture) are more dependent on petroleum products. With the agriculture, which is included in the others sector, diesel oil consumption for irrigation pump is thought to comprise a large portion of the energy usage in the sector.

It should be noted that biofuel (mostly firewood used in residential sector for cooking), imported coal, privately-imported LPG and furnace oil (by IPP operators) are not included in this presentation.



Note: Unit = ktoe

Excluding biomass, imported coal and privately-imported petroleum products.

Top five boxes are Primary Energy Supply by fuel source.

Middle two boxes are energy transformation means.

Bottom five boxes are consumption by sector.

Source: SREDA compilation from BPC, BPDB, Petrobangla and BCMCL data

Figure 5 National Energy Balance FY2017-18

2.2 Energy Intensity

[1] Calculation

The indicator employed in measuring the EE&C achievement is the national energy intensity, which is calculated by dividing the primary energy consumption per constant (real) GDP. It is an indicator to measure how much energy is consumed per economic production. Immediate (by FY 2020-21) target set in the EE&C MP is to reduce this national energy intensity by 15% in comparison with what was observed in FY 2013-14 as the base year. The trend of national energy intensity from FY 2013-14 to FY 2017-18, calculated based on readily-available national energy datasets and the economic data from the national accounts is as in the following table and chart.

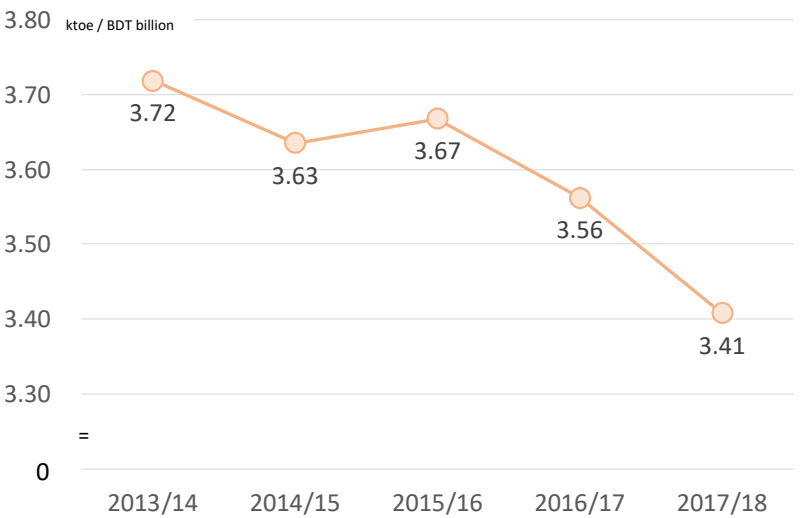
Table 2: National Energy Intensity

Unit: ktoe	2013/14	2014/15	2015/16	2016/17	2017/18
Oil	6,088	5,907	5,834	6,536	7,713
Gas	21,926	23,228	25,601	26,140	25,999
Coal	526	510	559	605	647
Power from Hydro, Import and Solar	245	339	411	485	499
TPES Total Primary Energy Supply	28,786	29,984	32,405	33,766	34,858
Real GDP in BDT billion	7,741	8,249	8,835	9,479	10,224
Energy Intensity (TPES/GDP) ktoe / BDT billion	3.72	3.63	3.67	3.56	3.41
Trend	1.00 (base)	0.98	0.99	0.96	0.92

Source: SREDA compilation based on readily-available national energy data and national accounts

[2] Trend

Figure obtained by dividing total primary energy supply by the real GDP (constant 2010 price) is the energy intensity in the unit of ktoe / BDT billion. The national energy intensity for the FY 2017-18 was 3.41 ktoe / billion BDT, which is 8% less than the baseline year (FY 2013-14). It should be noted here that this 8% reduction also represents the effects of intended and non-intended energy efficiency promotion activities.



Note: National Energy Intensity = TPES / GDP
Note: Biofuel, imported coal, privately-imported petroleum products are excluded.
Source: (1) TPES: compilation from BPC (oil & petroleum), BPDB (non-thermal power), Petrobangla (gas) and BCMCL (domestic coal) data
(2) GDP (constant 2010): Bangladesh Bureau of Statistics

Figure 6 National Energy Intensity Trend

Uninterrupted supply of energy is a major constraint for industrial production in Bangladesh. Saved energy will contribute to further increasing production in the industries. A simple monetary conversion of the energy conservation which contributed to 8% improvement in energy intensity from FY 2013-14 to FY 2017-18 is equivalent to approximately BDT 800 billion of economic production.

There is a declining trend in national energy intensity, which means the country is producing more using the same amount of energy (or, same production is achieved with lesser energy). Background of this declining trend is the change in industrial structure, especially a shift towards service sector where energy consumption per production is lower compared with the industry sector.

[3] Analysis of the National Energy Intensity Trend

Apart from the industrial structure shift, there are obviously intended elements that have contributed to the 4% decline in the national intensity during the recent years. First, upgrading of power generation, transmission and distribution, in the supply side of electricity, have contributed to improving the energy conversion/transmission/ distribution efficiency (c.f. BPDB information source).

SREDA, having the function to promote EE&C on the demand side, has contributed to relieving the national energy intensity, mainly from the following five activities:(1) promotion of industrial energy efficiency through financing, (2) introduction of energy audit programme, (3) preparation for energy labelling programme, (4) Energy Efficiency in Building Program and (5) awareness-raising. These five activities are clearly highlighted on Energy Efficiency and

Conservation Master plan up to 2030 (EECMP). Details of targets and activities of EECMP are mentioned in the following chapters.

Further, another function of SREDA's activities, which is the promotion of renewable energy has a strong relevance to reducing energy intensity. This is especially true when renewable energy is introduced to substitute conventional grid electricity, gas and petroleum products. By promoting the use of renewable energy, the use of conventional energy will decrease for the same production activities. This has contributed to decline in national energy intensity.

Part III Energy Efficiency & Conservation

3.1 Overview

The government has committed to ensuring access to affordable and reliable electricity for all citizens by 2021. To improve energy access situation, the government has adopted a comprehensive energy development strategy to explore supply-side options along with demand management that conserves energy and discourages inefficient use. To attain sustainable GDP growth, it deems necessary to meet the essential energy needs. Demand for power is increasing day by day. Moving towards energy sustainability will require development not only in the way energy is supplied, but also in the way it is used as well. Reducing the amount of energy required to deliver various goods or services is also essential in this regard. Energy efficiency is one of the main pillars for sustainable energy. To identify the core actions to achieve energy efficiency national targets SREDA has prepared the "Energy Efficiency and Conservation Master Plan (EECMP) up to 2030", with support from Japan International Cooperation Agency (JICA).

3.2 Benefit of Promoting Energy Efficiency & Conservation

Energy efficiency and conservation (EE&C) are the techniques of achieving the same result with less energy. Efficient use of energy contributes to sustainable transport, affordable energy, competitiveness, ensure energy security and environmental sustainability. Improving energy efficiency is widely recognised as the easiest and most cost-effective means of reducing carbon emissions. Being more energy efficient offers tremendous financial benefits - industry and society can achieve more with less energy,

public services are delivered at lower cost, and fuel poverty is reduced. Reducing demand also put less pressure on energy supplies. However, this can only be achieved with significant changes to the behaviour of individuals, communities, businesses and the public sector. Energy Balance calculation for energy efficiency and conservation reaffirms the government's commitment on efficient use of energy. The Energy Balance calculation helps to set a framework for energy efficiency and conservation that furthers help the government to combat climate change, tackle economic and social agendas. It sets a target of energy saving and identify some actions to meet the target.

Energy efficiency is the first and foremost a matter of controlling and reducing energy demand, and targeted actions are required for both energy consumption and energy supply. As the energy efficiency and conservation is a cross-cutting issue and different government agencies are involved in its implementation, so the Energy Balance calculation may help to set upcoming plans.

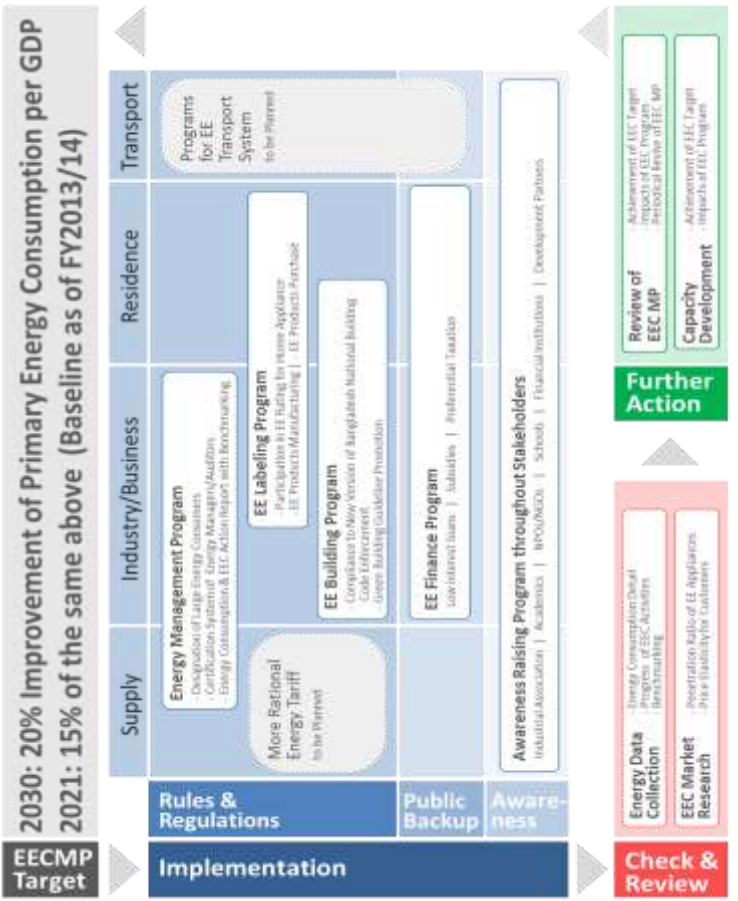
3.3 Master Plan Targets

The Government published the Energy Efficiency & Conservation Promotion Master Plan up to FY 2029/30 (EECMP) in May 2016. The targets set in the EECMP are:

- Target for FY 2020-21 (mid-term): to reduce primary energy per GDP (= national energy intensity) by 15%
- Target for FY 2029-30 (long-term): to reduce primary energy per GDP (= national energy intensity) by 20%

(Note: the targets are set against the actual figure observed in FY 2013/14 as the base year)

The following diagram (Figure 7) represents an overall framework of the EECMP. In the centre of the diagram, there are altogether five core actions which are identified as the means to achieve the MP targets.



Source: Energy Efficiency and Conservation Master Plan (MP) up to 2030

Figure 7 Structure of the Energy Efficiency & Conservation Master Plan up to 2030

SREDA is the responsible authority to conduct these five actions so as to achieve the national targets set forth in the EE&C MP. Among these five actions identified as programs, SREDA is currently implementing the EE&C Promotion Financing (EECPF) Project, with the assistance from JICA, as well as the awareness-raising activities and Energy Audit Programme in industries. Further, SREDA is in the process of developing energy labelling regulation and building rating programmes.

3.4 Necessity of Energy Efficiency & Conservation Promotion

By achieving the target of 20% reduction of primary energy consumption per GDP, a total of approx. 66 million tons of oil or 78 billion m^3 of gas equivalent energy is expected to be saved within the 15 years between 2016 and 2030. The total energy savings in monetary terms will amount to approx. BDT 567 billion in the period or an annual average of BDT 37 billion, at the current weighted average natural gas price. The energy intensity in 2030 will be improved by 20% compared to the 2013 level and the energy consumption in 2030 will be reduced by 17% (or by 12 Mtoe) compared with the BAU (business as usual) case.[1]

Energy-saving activities promoted by SREDA will directly affect power supply through reduced power demand. If the power demand can be gradually reduced in the period between 2015 and 2030 to reach 20% reduction, the peak demand in 2030 will be 33.5 GW. On the other hand, in BAU case where energy saving measures are not implemented, 41.9 GW of power supply capacity will be needed in 2030. It means that 8.4 GW of power supply capacity can be reduced

[1] Energy Efficiency and Conservation Master Plan

due to energy-saving activities[2]. In monetary terms, the amount of imports of expensive fuels for power generation will decrease remarkably: The total energy savings would amount to BDT 2.5 trillion (or an annual average of BDT 144 billion), which is equivalent of 6.47% of national budget and 1.86 % of GDP (FY 2013-14).

3.5 EE&C in National & International Policies

According to Target no 7.1, 7.2 and 7.3 of Sustainable Development Goals (SDGs), by 2030, ensuring universal access to affordable and modern energy services, increasing substantially the share of renewable energy in the global energy mix, doubling the global rate of improvement in energy efficiency is very important. In the 7th Five Year Plan of Bangladesh it is mentioned that, the Government has a target to improve 15% Primary Energy Consumption per GDP by 2021 and 20% by 2030

In December 2015, Paris Agreement has been issued with 196 countries participation at United Nations Climate Change Conference, COP 21 in Paris. Main discussed issue there was international legal frameworks against global warming after 2020. The key authorized points in this agreement are as follows:

a) Global average temperature should be well below 2°C compared to pre-industrial levels
b) Zero net anthropogenic greenhouse gas emissions to be reached during the second half of the 21st century

In accordance with the common understanding for limited fossil energy and the importance of counter measures against global

warming, the importance of EE&C will increase more and more. Under this background, SREDA has pivotal role to promote EE&C and reduce CO_2 emissions.

3.6 Energy Efficiency & Conservation Promotion Financing (EECPF) Project

[1] Background

SREDA, after its establishment in 2014, has been working for the promotion of renewable energy and EE&C in collaboration with the governmental organisations, industries, financial sector and the international development partners. SREDA's Energy Efficiency & Conservation Master Plan up to 2030 sets specific targets to achieve by fiscal year (FY) 2020-21 and by 2029-30. To achieve these targets, the master plan identifies five major interventions which are: (i) e nergy audit, (ii) EE&C building (iii) EE&C labelling (iv) EE&C finance, and (v) awareness raising. SREDA's Energy Efficiency & Conservation Promotion Financing (EECPF) Project comprises the fourth pillar among these necessary interventions. The project is being implemented with the support from Japan International Cooperation Agency (JICA), using their loan fund (project number BD-P90) totalling JPY 12 billion, with 0.01% interest rate, tenure of 40 years among which the first 10 years is the grace period.

[2] Overview of the Project

EECPF Project utilises a two-step loan (or financial intermediate lending) instrument for the purpose of policy financing. SREDA facilitating this low interest loan to industries who intend to use

energy efficient equipment and machineries in their industrial facilities, which are generally slightly expensive than the conventional type equipment. By offering the benefit of lower financial cost, SREDA is encouraging the investors to select energy efficient equipment as compared with conventional equipment.

Once the borrower introduces energy efficient equipment which was acquired utilising this low interest loan, the borrower reports to SREDA energy consumption data through a designated management information system (MIS). SREDA aggregates and analyses the reported data to calculate energy conservation effect through the implementation of EECPF Project. Along with other EE&C promotion activities initiated by SREDA, progress towards achievement of the set goal is being monitored and reported on regular basis.

[3] Project Mechanism

There are three executing agencies who are implementing EECPF Project, which are SREDA, Infrastructure Development Company Limited (IDCOL) and Bangladesh Infrastructure Finance Fund Limited (BIFFL). Among these three executing agencies, SREDA is the administrative authority of the Project who is managing the overall implementation arrangements. SREDA is also a technical node for the Project, being responsible for judging the eligibility of the energy efficient equipment and calculating the energy saving effect from the Project activities. To these ends, SREDA issues the business process manuals for Project implementation and provides the MIS for data collection and calculation. IDCOL and BIFFL are the implementing financial institutions (IFIs) who extend low interest loan in line with the policies and procedures stipulated in SREDA's

business process manuals. This concessional loan channelled to IFIs through the Finance Division of the Government. The basic structure of the EECPF Project illustrated in Figure 8.

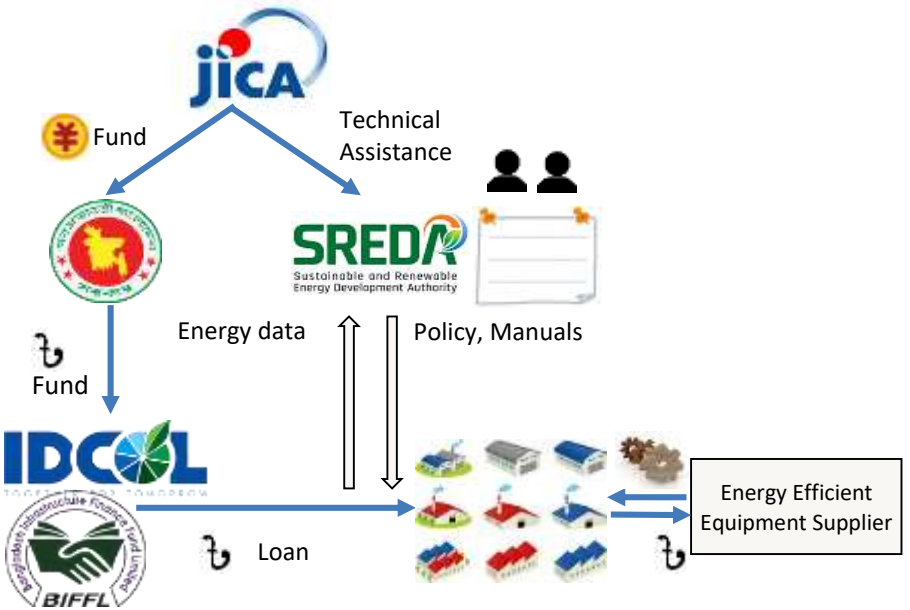


Figure 8 Mechanism of Energy Efficiency and Conservation Promotion Financing Project

The loan utilising factories will share their monthly energy consumption and production quantity data with SREDA through online Project MIS system.

[4] Progress

As of October 2019, there are 18 sub-projects which have received no objection certificates (NOCs) from SREDA to proceed. Among them there are 10 sub-projects which already have their equipment either in operation or being installed. The list of the existing sub-projects with their sectors, equipment purchased with the Project loan, and their current status is as in Table 3.

Table 3 List of Approved Sub-projects under EECPF Project

No.	Loan amount (Million BDT)	Sub-sector	Equipment	Status
1	1,270	Cement	Vertical Roller grinding mill	Installation
2	753	Garment	Sewing Machine, Air compressor, AC, LED lighting	In operation
3	254	Spinning	Roving frame, Automatic winder, Ring spinning frame, Absorption chiller	In operation
4	983	Spinning	Roving frame, Ring spinning frame, Automatic winder	L/C partially opened
5	515	Spinning	Air-jet Spinning, Roving frame, Automatic winder, Absorption chiller	In operation
6	11	Electronics	Air compressor	In operation
7	109	Garment	Sewing machine, Boiler, BEMS	In operation
8	734	Cement	Vertical Roller grinding mill	Installation
9	86	Garment	Gas engine co-generation, LED Light	In operation
10	117	Spinning	Automatic Winder	In operation
11	170	Garment	Sewing Machine	In operation
12	190	Spinning	Automatic winder	L/C opened
13	413	Garment	Sewing machine, Air Compressor, Boiler	NOC issued
14	11	Garment	Sewing machine	NOC issued
15	32	Garment	Sewing machine	NOC issued
16	224	Paper	De-inking plant	NOC issued
17	805	Garment	Sewing machine, Air Compressor, Boiler	NOC issued
18	368	Spinning	Sewing machine	NOC issued
	7,045			

Note: As of October 2019

The sub-project proponents are from various industry segments including ready-made garment (RMG), spinning, cement and home appliances assembly. Eligible equipment applied for includes sewing machine, boiler, vertical roller for cement factory, air conditioner, chiller, spinning machine, air compressor, among others. The number of approved sub-projects is increasing rapidly as the Project is now in full-swing implementation.

Air-jet loom

Air-jet spinning machine

Direct-drive sewing machine

Variable refrigerant flow A/C

Absorption chiller

Heat reflective glass

Super premium efficiency motor

Inverter

Amorphous core transformer

Once-through boiler

Nozzle width adjustable stenter

LED lighting

Figure 9: Examples of Energy Efficient Industry Equipment

[5] Energy Conservation Effect

Under assumption that all of these 18 sub-projects are in full operation, the expected annual energy saving was calculated to be 17,219 toe (ton oil equivalent) or 60,840 MWh. Assuming the unit cost of 1 MWh of electricity is BDT 8,150, the total cost saving from these 18 sub-projects will add up to BDT 500 million per year.

3.7 Energy Audit Programme

From its establishment, SREDA has been working hard to introduce Energy Management program and Energy Audit programme to ensure EE&C, especially in the commercial (building) and industry sectors. As a result, the Energy Audit Regulations 2018 incorporating the introduction of energy managers at industries has been enacted. In accordance with the Regulations, SREDA's Energy Audit Programme is being conducted. Key features of the Programme are energy auditor certification exam, audit in designated consumer, role of energy auditors, and energy managers certification procedure, audit procedure are the key feature of Energy Audit Programme.

3.8 Energy Labelling Activities

The purpose of the EE&C Labelling Program is to promote the sales of energy efficient appliances in the market. The program mainly focuses on home appliances such as air conditioner, refrigerator, TV, light, fan and motor etc. Due to the rapid economic growth, the number of home appliances using by the people, is expanding remarkably and will continue in the coming years. In order to achieve

the EE&C national target by 2030, the average efficiency of each home appliance is expected to increase by 20-30%. EE&C Labelling Program is deemed to be the most effective measure to promote EE&C in the residential sector. Penetration of energy efficient appliances contributes not only to the reduction of energy consumption (kWh), but also to the reduction of electricity demand (i.e., peak load demand in kW) as well as to carbon emissions.

SREDA is currently developing more comprehensive energy efficiency & conservation labelling scheme, to be introduced by the year of 2021.

3.9 Awareness Raising Activities

Government is promoting innovative mechanism to ensure EE&C at industries, residential and service sectors (including commercial buildings). Power Division and SREDA are organizing seminars, workshops, fair, expo, competition etc. on regular basis to raise awareness among relevant stakeholders. The government has taken a number of awareness initiatives for promoting efficient energy use and for reducing the consumption of energy. School Awareness Program, Energy Efficiency and Renewable Energy Related activities inclusion in secondary and higher secondary level curiculums, participating in the National Electricity week, organise seminars, workshop etc. activities are being conducted by SREDA

3.10 Further Activities for Achieving the Targets

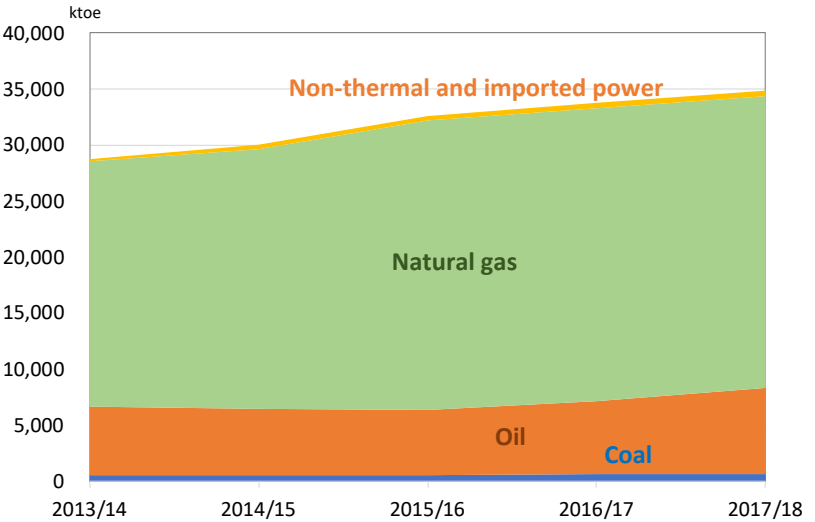
Among the five major activities to be promoted and conducted by SREDA, building rating system is yet to be developed. Draft Building Energy Efficiency and Environment Rating (BEEER) system has been prepared. Now the draft BEEER system is in public consultation stage.

Energy Efficiency and Conservation Promotion Financing (EECPF) Project, which is currently the flagship project under SREDA, has successfully promoted the introduction of various energy efficient industrial equipment. The equipment will conserve energy as they operate. The effect of the Financing Project will therefore be materialised from now on. Further a significant decline in energy intensity is expected as the project implementation matures. The Financing Project will continue until year 2022.

SREDA understands that its activity has its limit in contribution to achieving the national EE&C targets. Along with its own programs and projects, SREDA will involve and collaborate with various entities to promote EE&C, as well as to interact with industries and public in general to raise awareness on the necessity of EE&C. Hence, SREDA will continue to function as a hub for all kinds of EE&C promotion activities in the country.

Part IV Energy Balance Statistics

4.1 Primary Energy Supply by Fuel Source



Unit: ktoe

FY	Coal *1	Oil *2	Gas	Non-thermal *3
2013/14	526	6,088	21,926	245
2014/15	510	5,907	23,228	339
2015/16	559	5,834	25,601	411
2016/17	605	6,536	26,140	485
2017/18	647	7,713	25,999	499

Note

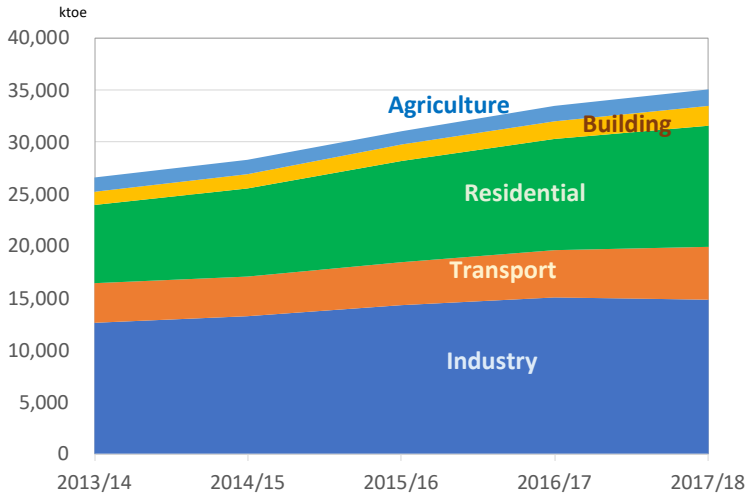
*1 Excludes imported coal

*2 Excludes privately-imported furnace oil and LPG

*3 Includes hydro, solar and imported electricity

Source: Compiled from BCMCL, BPC, Petrobangla and BPDB data

4.2 Final Energy Consumption by Sector (primary energy basis)



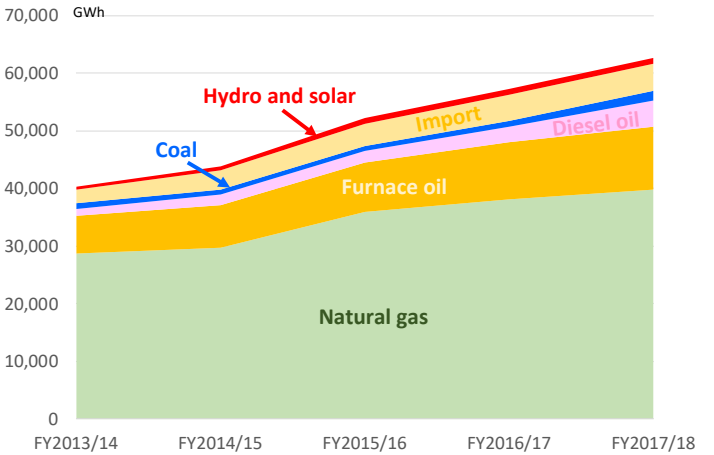
Unit: ktoe (primary energy basis)

FY	Industry sector	Transport sector	Residential Sector	Building sector	Agriculture sector
2013/14	13,412	3,790	8,648	1,436	1,499
2014/15	13,811	3,881	9,373	1,506	1,414
2015/16	14,785	4,134	10,418	1,688	1,382
2016/17	15,172	4,616	10,826	1,718	1,433
2017/18	14,889	5,033	11,522	1,824	1,590

Note

* Excludes biomass, imported coal, privately-imported furnace oil and LPG.
* Building sector is the compilation of "commercial" and "others".
Source: Compiled from BCMCL, BPC, Petrobangla and BPDB data

4.3 Fuel Composition of Power Generation

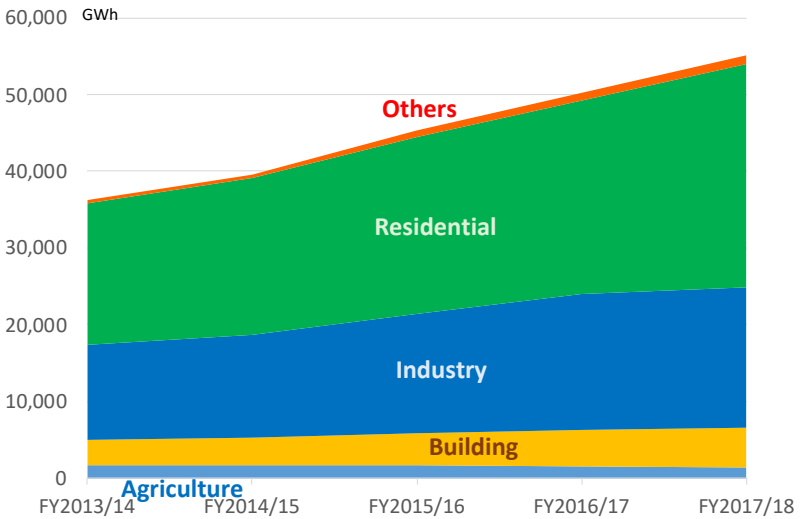


Unit: GWh

FY	Natural gas	Furnace oil	Diesel oil	Coal	Solar	Import	Hydro
2013/14	28,661	6,516	1,228	1,038	0	2,265	588
2014/15	29,731	7,415	1,704	941	0	3,380	566
2015/16	35,822	8,673	2,067	847	0	3,822	962
2016/17	38,052	9,950	2,627	1,009	0	4,656	982
2017/18	39,804	10,850	4,520	1,693	4	4,783	1,024

Note
* Fuel includes imported coal petroleum products and LNG.
Source: Compiled from BPDB Annual Reports data

4.4 Electricity Consumption by Sector



Unit: GWh

FY	Agriculture sector	Building Sector *1	Industry sector	Residential Sector *2	Others
2013/14	1,732	3,312	12,268	18,453	464
2014/15	1,636	3,685	13,306	20,470	523
2015/16	1,635	4,231	15,528	23,053	852
2016/17	1,553	4,660	17,819	25,223	1,005
2017/18	1,433	5,064	18,415	29,012	1,179

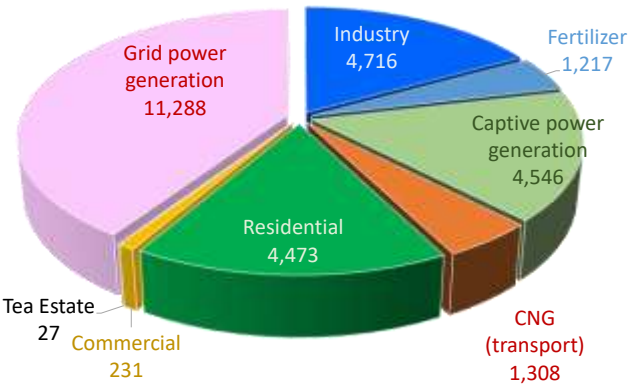
Note

*1 Building sector is referred to as the “Commercial” sector in the original data.

*2 Residential sector is referred to as the “Domestic” sector in the original data.

Source: Compiled from BPDB Annual Reports data

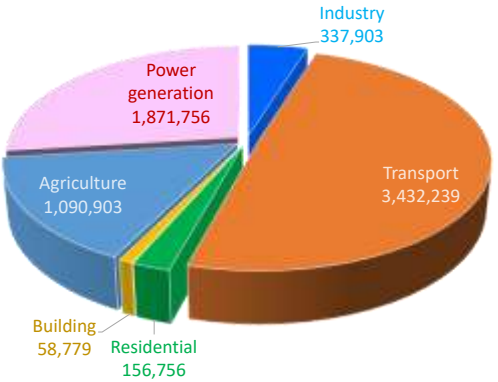
4.5 Gas Consumption by Sector (FY 2017-18)



Unit: MMCM

Source: Chart drawn based on Petrobangla data

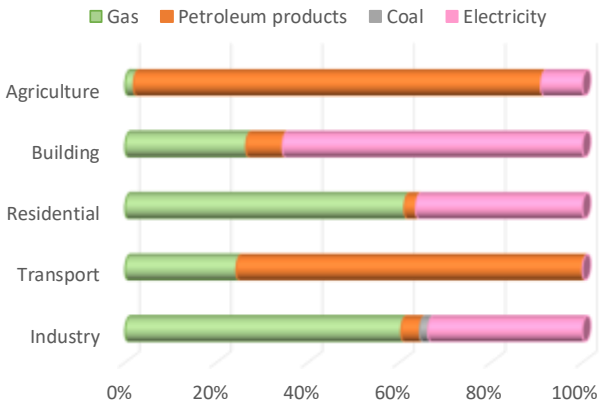
4.6 Petroleum Products Consumption by Sector (FY 2017-18)



Unit: MT

Source: Chart drawn based on BPC data

4.7 Energy Consumption by Sector by Source (FY 2017-18)



Unit: ktoe (consumption basis)

FY	Gas	Petroleum products	Coal	Electricity
Agriculture	25	1,211	0	123
Building	216	65	0	537
Residential	4,182	174	0	2,495
Transport	1,223	3,810	0	0
Industry	5,548	375	167	3,071

Note

* Excludes biomass, imported coal, privately-imported petroleum products.
* Building sector is the compilation of "commercial" and "others".

Source: Compiled from BCMCL, BPC, Petrobangla and BPDB data.

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