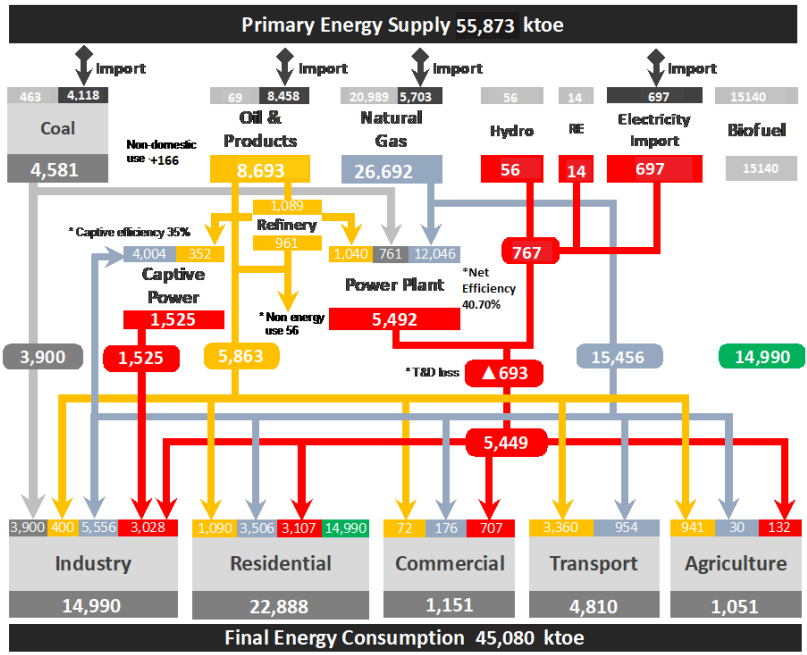
SREDA
Sustainable and Renewable Energy Development Authority

National Energy Balance 2020-21

(Improvement of Energy Efficiency and Conservation)



Oct
2022

Sustainable and Renewable Energy Development Authority

People's Republic of Bangladesh

National Energy Balance 2020-21
(Energy Efficiency Improvement)

Table of Contents

Part I Energy Supply and Demand Trend

Part II Energy Balance and Intensity

Part III Energy Balance Statistics

Part IV National Energy Security and Emission Reduction

Acronyms

AC	Air Conditioner
A/C	Alternate current
ADB	Asian Development Bank
AFD	Agence française de développement
BAB	Bangladesh Accreditation Board
BAU	Business as usual
BBS	Bangladesh Board of Statistics
BCMCL	Barapukuria Coal Mining Company Limited
BDT	Bangladesh Taka (currency unit)
BEEER	Building Energy Efficiency and Environment Rating
BEMS	Building Energy Management System
BERC	Bangladesh Energy Regulatory Commission
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
CHT	Chattogram Hill Tracts
CO_2	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
EECPFP	EE&C Promotion Financing Project
EM	Energy Manager
EMRD	Energy & Mineral Resourced Division
ERL	Eastern Refinery Limited
ESCO	Energy Service Company
FEC	Final energy consumption
FY	Fiscal year
GCF	Green Climate Fund
GDP	Gross Domestic Product
GHG	Greenhouse Gas

GW	Gigawatt (power generation capacity unit)
HCU	Hydrocarbon 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)
KfW	KfW Entwicklungsbank, KfW Group
Ktoe	Kilo ton oil equivalent (calorific unit)
kW	Kilowatt
kWh	Kilowatt hour
L/C	Letter of credit
LDC	Least Developed Country
LED	Light emitting diode
LNG	Liquified natural gas
LPG	Liquified petroleum gas
MCPP	Mujib Climate Prosperity Plan
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)
NDC	Nationally determined contribution
NOC	No objection certificate
PES	Primary energy supply
RE	Renewable energy
RMG	Ready-made garment
RPGCL	Rupantarita Prakritik Gas Company Limited
SDGs	Sustainable Development Goals
SHS	Solar Home System
SREDA	Sustainable and Renewable Energy Development Authority
T/A	Technical assistance
TFEC	Total final energy consumption
toe	Ton oil equivalent
TPES	Total primary energy supply
TV	Television
UNDP	United Nations Development Programme
UNFCCC	United Nations Framework Convention on Climate Change

Part I Energy Supply and Demand Trend

Blank Page

1.1 Introduction

Bangladesh celebrated its 50th anniversary in 2021. The country has been maintaining more than 6% growth for the past 10 years, aspiring to become a middle-income country. In the course of this robustness and of the economy, its energy consumption has also been increasing, while the supply of its indigenous primary energy resource i.e., the natural gas has gradually been decreasing. With the aim to ensure the sustainability of the country's economic activities, the Government of Bangladesh, introduced the Sustainable and Renewable Energy Development Authority (SREDA) Act in 2012, hereby establishing a designated authority responsible for promoting the sustainable supply and use of energy. SREDA commenced its official activities from 22nd May 2014, and has been working for the acceleration for renewable energy (RE) deployment and promotion of Energy Efficiency & Conservation (EE&C).

This booklet on national energy balance data for the fiscal year 2020-21 (from July 2020 to June 2021), prepared and published by SREDA. It contains the demand-side energy consumption and supply-demand balance trends and analysis. It is comprised of four parts, which are; (I) Energy Supply and Demand Trend, (II) Energy Balance and Intensity, (III) Energy Balance Statistics, and (IV) National Energy Security and Emission Reduction. The datasets used for the publication are from the following governmental organisations:

- Bangladesh Bureau of Statistics (BBS)
- Hydro Carbon Unit (HCU) of the Energy and Mineral Resources Division (EMRD)
- Bangladesh Petroleum Corporation (BPC)
- Bangladesh Oil, Gas & Mineral Corporation (Petrobangla)

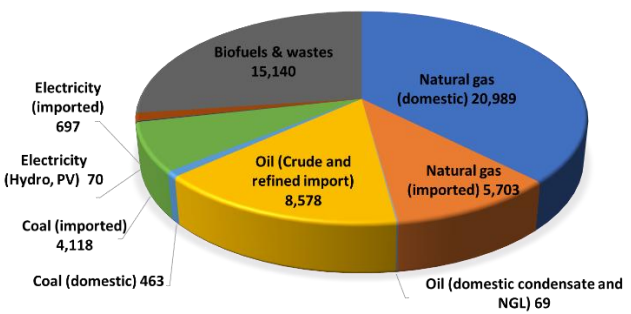
- Eastern Refinery Limited (ERL)
- Barapukuria Coal Mining Company Limited (BCMCL)
- Rupantarita Prakritik Gas Company Limited (RPGCL) and
- Bangladesh Power Development Board (BPDB)

These data may represent the overall trend as they encompass the entire energy supply-demand of the country except aviation bunker and biomass. Later versions of the Energy Balance booklet will incorporate these data when available from reliable sources.
The data used as per fiscal year is given below.

Primary Energy	Year of data
Natural Gas (domestic)	2020-21
Natural Gas (imported)	2020-21
Oil (refined & crude import)	2020-21
Coal (imported)	2020-21
Coal (local)	2020-21
Biofuel & waste	
Electricity (PV& hydro)	2020-21
Electricity (imported)	2020-21
Any other source of energy	
Bunker Fuel export	Not considered

1.2 Primary Energy Supply by Fuel Source

The primary energy supply (PES) for Bangladesh during FY 2020-21 was 55,827 Mtoe. One third of the supply to the country is from its indigenous natural gas. Import of liquefied natural gas (LNG) started from FY2018-19, and is rapidly increasing. The proportion of imported natural gas, in its 3rd fiscal year, has already surpassed 21% of all gas supply. Oil, and oil products also comprise an important portion in the energy supply. For both oil and coal, the proportion of domestically-available supply is limited, with the import comprising a significant portion. Biofuels and wastes, which amount to more than a quarter of the primary energy supply, are mostly firewood for domestic cooking purposes in rural and some urban households.



Unit: ktoe

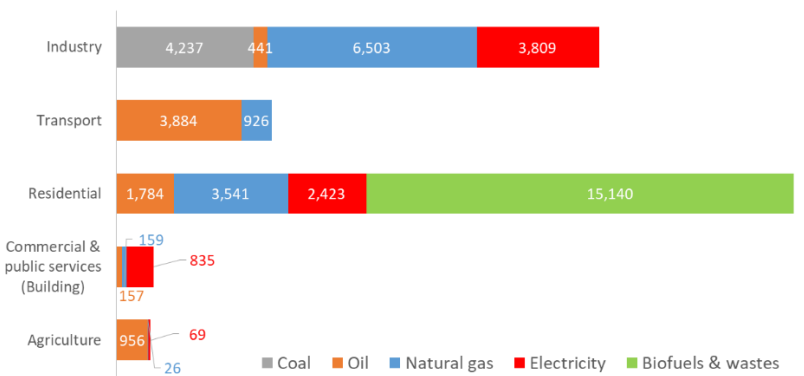
Note: Domestic sales data is used to represent supply, for natural gas and coal, instead of actual domestic production (or import) minus stock change and bunkers due to limited availability of published data.

Source: Compiled by SREDA from HCU, BPC, Petrobangla, ERL, BCMCL, RPGCL and BPDB data

Figure 1 Composition of Primary Energy Supply

1.3 Energy Consumption by Sector and Source

Total final energy consumption amounted to 44.9 Mtoe in FY 2020-21, according to SREDA compilation from readily-available national data. Residential sector consumed 22.8 Mtoe, being the dominant energy consuming sector. More than half of the sector's consumption is the biofuel, in the form of firewood for cooking. It should also be pointed out that the Industrial sector is consuming more electricity than any other sectors. Focusing on fossil fuel-derived energy, and by excluding biofuels and waste, Industry sector becomes the top energy intensive sector by consuming 15 Mtoe, whereby natural gas, coal and electricity are all consumed to a significant portion. Transport sector consumed 4.8 Mtoe, among which 80.7% is the petroleum products, while the remaining is natural gas, in the form of CNG for motor vehicles.



Unit: ktoe

Note: * Commercial and public services (building) sector includes "commercial" and "others".
Source: Compiled by SREDA from HCU, BPC, Petrobangla, ERL, BCMCL, RPGCL and BPDB data

Figure 2 Energy Consumption by Sector and Source

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 the current energy consumption, it is essential to compare consumed energy in various sectors and by fuel sources on an equal basis. Comparison on primary energy basis, by referring to the calorific value of the original input to make the energy available, is the methodology to compare energy consumption on an equal footing, rather than comparing the actually consumed calorific value.

Calorific value of one MWh of electricity is 0.086 toe. However, on primary energy consumption basis for FY 2020-21, the final consumption of one MWh of electricity is calculated as 0.238 toe, which is 2.76 times as much as the calorific value of the final consumption of electricity. This is because the primary energy basis figure for one MWh of electricity is the calorific amount of fuel required to generate this amount of electricity. Considering the net thermal power generation efficiency of 40.70%, and the overall network loss of 11.11% (BPDB annual report 2020-21), it is found that 0.238 toe is required to generate one MWh of electricity on calorific basis. Similarly, the final consumption of one toe of petroleum products is calculated as 1.14 toe at primary side, as the overall efficiency of the oil refinery was 88%, based on data from ERL annual report. Loss and efficiency factors are not considered for natural gas, therefore the primary energy basis figure for natural gas consumption is deemed equal to the final consumption calorific value.

Conversions mentioned in the above explanations are summarised in the table below.

Table 1: Conversion Factors Used for Primary Energy Basis Calculation

Item	Conversion	Remarks
Caloric value of 1 MWh of electricity	0.086 toe	At consumption side
Net Thermal power efficiency	40.07%	Includes power station own use losses.
Caloric value of 1 MWh of electricity (at Consumer/Distribution side)	0.238 toe	At primary fuel side
For electricity generation, 1 toe of equivalent electricity at consumer/distribution side	2.76 toe	At primary fuel side (40.07% efficiency)
1 toe of petroleum product at 88% efficiency as per ERL data	1.14 toe	Simple input – output comparison figure
Natural gas efficiency	100%	Loss related date are not considered

Total final energy consumption of 44.9 Mtoe, after taking out biofuel and waste, calculated on primary energy basis, becomes 43.30 Mtoe. The breakdown by sector shows that industry sector comprises the dominant portion of energy consumption on primary energy basis, while the second dominant sector, the residential sector also takes up a significant portion.

Table 2: Energy Consumption by Sector and Source (Primary Energy Basis)

FY 2020-21	Industry	Transport	Residential	Commercial & public services (building)	Agriculture	Total
Gas	6,503	926	3,541	159	26	11,155
Oil	500	4,404	2,023	178	1,084	8,188
Coal	4,237	0	0	0	0	4,237
Electricity	10,528	0	6,697	2,308	191	19,725
Total	**21,768**	**5,330**	**12,261**	**2,645**	**1,301**	**43,305**

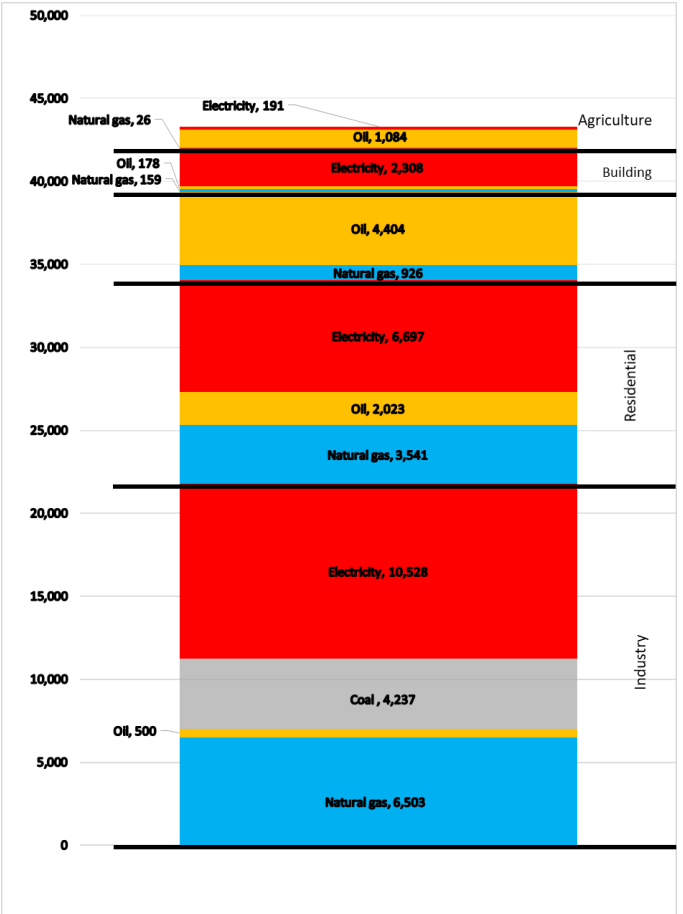
Unit: ktoe

Note:
* Excludes biofuels and wastes.
* Commercial and public services (Building) sector is the compilation of "commercial" and "others".
* Domestic sales data is used to represent supply, for natural gas and coal, instead of actual domestic production (or import) minus stock change and bunkers due to limited availability of published data.

Source: Compiled by SREDA from HCU, BPC, Petrobangla, ERL, BCMCL, RPGCL and BPDB data

The figure 3 on the next page shows the breakdown of energy consumption by sector and source. Electricity consumption which is shown in red, especially in industry and residential sectors, comprise a 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 is capable enough to identify these first priority areas for promoting demand-side EE&C. The ongoing Energy Efficiency & Conservation Promotion Financing Project, (EECPFP) as explained in Part IV of this publication, was introduced in response to the findings from primary energy basis consumption analysis.



Unit: ktoe

Note:

* Excludes biofuels and wastes.
* Building sector is the compilation of “commercial” and “others”.

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

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

Carbon emission reduction is an essential consideration to mitigate climate change. A national energy balance table, with the primary energy-based conversion enables a simple calculation of the country's carbon emission by sector. Here, only the CO2 emission is being shown among various greenhouse gases. Having identified the primary energy basis fuel consumption for each sector, an overall carbon emission of the country by sector can be calculated. CO2 emission factors for natural gas, oil, and coal are taken from the IPCC guidelines for greenhouse gas inventories (for natural gas, oil and coal), while that of grid electricity for Bangladesh is taken from ADB database. As this emission factor for electricity already takes into account the primary consumption factor of electricity, the emission factor of 6.14 t-CO2/toe should be divided by the primary consumption factor of electricity, which is 2.76 to become 2.22 t-CO2/toe. The applied emission factors for each energy source are listed in the following table:

Table 3: CO2 Emission Factors

Energy source	Emission factor	
Natural gas	15.3 t-CO2/TJ	=> 0.64 t-CO2/toe
Oil	20.0 t-CO2/TJ	=> 0.84 t-CO2/toe
Coal	25.8 t-CO2/TJ	=> 1.08 t-CO2/toe
Electricity	0.648 t-CO2/MWh	=> 6.14 t-CO2/toe
	for primary energy basis calculation	=> 2.22 t-CO2/toe

Note: Converted to toe using 1 TJ = 23.88 toe, 1 MWh = 0.086 toe.
Electricity emission factor converted to primary energy basis calculation by dividing by 2.76, which is the primary consumption factor of electricity.
Source: 2006 IPCC Guidelines for National Greenhouse Gas Inventories, IPCC, Volume 2: Energy, Chapter 1: Introduction, Table 1.4 for Natural gas, oil and coal.
ADB database. The IFI Dataset of Harmonized Grid Factors for electricity, 2021.

The total fossil fuel-based CO2 emission during the FY 2020-21 was calculated to be 62382.58 kt-CO2. It can be seen that the contribution of electricity is the highest among all energy sources. The sector-wise composition show that industry sector and

residential sector comprise a significant portion of CO2 emission source. It should be noted that this figure focuses on the fossil fuel-derived CO2 emission, and does not include CO2 emission from biomass consumption.

Table 4: CO2 Emissions by Sector and Energy Source

FY 2020-21	Industry	Transport	Residential	Commercial & public services (building)	Agriculture	Total
Gas	4161.92	592.64	2266.24	101.76	16.64	7139.2
Oil	420	3699.36	1699.32	149.52	910.56	6877.92
Coal	4575.96	0	0	0	0	4575.96
Electricity	23372.16	0	14867.34	5123.76	424.02	43789.5
Total	32530.04	4292	18832.9	5375.04	1351.22	62382.58

Unit: kt-CO2

1.5 Breakdown of Energy Consumption by Industry Sub-sector

As one of the work items for EE&C Master Plan up to 2030 preparation, SREDA, back in FY 2013-14, in cooperation with various stakeholders, conducted a survey and calculated the breakdown of energy consumption among the industry sub-sector. The calculation was conducted using the panel data of large energy consumers, with the cooperation of the utility and energy distribution companies. The result shows that the largest energy consuming sub-sector is the garment sector comprising 15.4% of the energy usage among the whole industry sector followed by textile and chemical sub-sectors, each consuming approximately 12% 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.

Table 5 National Energy Consumption by Industry Sub-sector (Primary Energy Basis)

Sub-Sector	Natural Gas	Electricity	Oil & Coal	Combined	
					Share
Garment	1,844	221	42	2,107	15.4%
Textile	1,586	92	17	1,695	12.4%
Chemical Fertilizer	1,554	94	18	1,666	12.2%
Chemical	282	29	5	316	2.3%
Steel & Re-rolling	276	230	143	649	4.7%
Cement	167	191	36	394	2.9%
Sanitary and Ceramics	152	50	9	211	1.5%
Pulp & Paper	124	22	4	150	1.1%
Glass	8	5	1	13	0.1%
Brick	0	6	1,277	1,284	9.4%
Food& Cold Storage	0	60	11	71	0.5%
Petroleum Refinery	0	1	0	1	0.0%
Sugar	0	1	0	2	0.0%
Jute Mills	0	59	11	71	0.5%
Others	2,134	2,463	465	5,062	37.0%
	8,125	3,524	2,042	13,691	100.0%

Source: SREDA, Energy Efficiency Master Plan up to 2030

Blank Page

Part II National Energy Balance and Intensity

2.1 National Energy Balance Table

The national energy balance is a presentation of a set of energy data to exhibit the overall pattern of energy supply, transformation and consumption pattern among the major sector and by source of energy. It can also be described as the input-output data, or a balance sheet table of energy supply to consumption within the country.

Based on readily-available national energy supply, transformation efficiency and consumption data, an updated energy balance calculation was conducted at SREDA. Table 2 on the next two-pages spread is the country's national energy balance table for FY 2020-21. The visual presentation focusing of the flow of energy by sector and source, based on the table is as shown in Figure 4. It should be noted here that the energy consumption in national energy balance is the final consumption basis, not in primary energy basis. It should also be noted that the national energy balance table and the visual presentation contain ambiguity in that loss, stock change and statistical discrepancies are not clearly segregated between each other, requiring data reconciliation once comprehensive data become available.

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%).

Table 6 National Energy Balance

FY2020-21 (unit: ktoe)	Coal	Oil	Petroleum products	Natural gas
Production	463	69		20,989
Imports	4,118	1,320	7,138	5,703
Exports			0	
Maritime & aviation bunkers				
Stock change		96	120	
Others			-50	
Total energy supply	4,581	1,485	7,208	26,692
Statistical differences		145	-861	
Electric power plants	-344		-1,040	-11,236
Autoproducers (captive)			-356	-4,462
Oil refineries		-1,561	1960	
Condensate & NGL fractionation		-69	202	
Industrial own use			0	
Losses			462	
Total final consumption	4,237		7,575	10,994
Industry	4,237		441	6,503
Iron & steel				
Chemical and petrochemical				*1,706*
Non-ferrous metals				
Non-metallic minerals	*4,237*			
Transport equipment				
Machinery				
Mining & quarrying				
Food and tobacco				
Paper, pulp and print				
Wood and wood products				
Textile and leather				
Construction				
Industries n.e.s.				
Transport			3,884	926
Residential			1,784	3,541
Commercial & public services			157	159
Agriculture, forestry			956	26
Non-energy use			333	
Unit: ktoe			7,222	

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

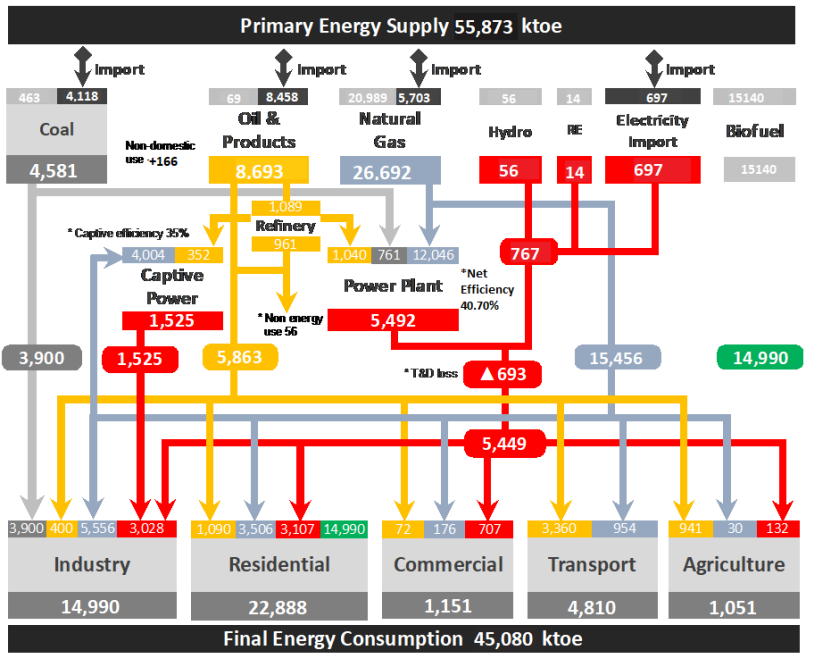
Source: Compiled from HCU, BPC, BCMCL, Petrobangla, ERL and BPDB data

Table (FY 2020-21)

Biofuels and waste	PV and wind power	Hydro power	Imported electricity	Grid power	Total
15,140	14	56			36,731
			697		18,976
					0
					216
					-50
15,140	14	56	697		55,873
					-716
	-14	-56	-697	6,916	-6,471
				1,686	-3,132
					399
					133
					0
				-1,467	-1,005
15,140				7,135	45,080
				3,809	14,990
					1,706
					4,237
					4,810
15,140				2,423	22,888
				835	1,151
				69	1,051
					333

Unit: ktoe

Further, looking at fuel source-wise consumption, natural gas is the major source for industry and residential sectors. It should also be noted that the imported coal, imported petroleum products also comprise an important portion of the primary energy supply. Electricity is the most consumed form of energy in industry, residential and commercial & public service (building) sectors.



Note: Unit = ktoe

Seven boxes on the top (in five colours) are Primary Energy Supply by fuel source.
Middle **three** boxes (power plant, refinery, captive) are energy transformation means.
Bottom five boxes are final consumption by sector.

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

Figure 4 National Energy Balance FY2020-21 (Visualised Flow)

The visualised flow of national energy balance facilitates how the energy is flowing through Bangladesh. The first point to be noted is the significance of natural gas. It becomes clearly visible that natural gas is utilised as it is in industry and residential sector, and that it is also used for power generation, both for grid and captive electricity supply. Captive contributes to more than 20% of the electricity supplied. It also shows the complexity of oil flow, as there are various channels of supply and transformation.

2.2 National Energy Intensity

[1] Calculation

National energy intensity is an internationally-established indicator employed for monitoring the EE&C achievement in a country. It takes into consideration not only the energy supply but also the economic growth. For a fast-growing economy like that of Bangladesh, the national energy intensity is a useful indicator to monitor the degree of EE&C achievement in balance with the economic development. It is an indicator calculated by dividing the primary energy consumption by constant (real) gross domestic production (GDP). It is an indicator to measure how much energy is consumed per economic production, therefore the lower the figure is, the better the performance.

The EE&C promotion targets which are set in the EECMP are in terms of this national energy intensity. The long-term target was set to reduce this national energy intensity by 20% in comparison with what was observed in **FY 2013-14 as the base year**. As an accurate data on the national energy balance was limited at the time of EECMP preparation, the figures were prepared based on the summation of the following four datasets: Domestic coal production, Petroleum products and natural gas sales, and imported electricity. From FY 2018-19 issue onwards, the calculation is being done based

on more comprehensive data including imports of coal and petroleum products. The calorific values of natural gas have also been changed to officially available and updated data wherever possible. As this new method of calculation could be backdated up to FY 2014-15, the **baseline year** in this issue of the national energy intensity is shifted to the first year of calculation which is **FY 2014-15**, then continued up to FY 2020-21. The calculation based on readily-available national energy datasets and the economic data from the national accounts as of FY 2020-21 is as in the following table and chart.

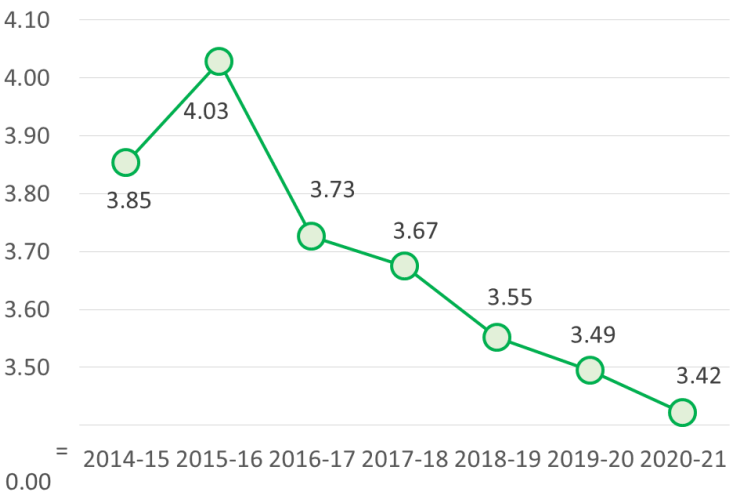
Table 7: National Energy Intensity

Unit: ktoe	2014-15	2015-16	2016-17	2017-18	2018-19	2019-2020	2020-2021
Oil	6,729	6,796	6,486	8,429	7,107	8,413	9723
Gas	23,104	25,491	26,028	25,916	27,494	26,273	26692
Coal	1,617	2,887	2,318	2,722	4,019	4,661	4118
Power from Hydro, Import and Solar	339	411	485	500	649	650	767
Primary Energy Supply	31,789	35,585	35,317	37,567	39,269	39,997	41300
Real GDP in BDT billion	8,249	8,835	9,479	10,224	11,058	11,446	12,072
Energy Intensity (TPES/GDP) ktoe / BDT billion	3.85	4.03	3.73	3.67	3.55	3.49	3.42
Trend	(base)	+4.5%	-3.3%	-4.7%	-7.9%	-9.3%	-11.2%

Note: The following major changes were made from FY 2018-19 issue:
(1) Imported coal and imported petroleum products data have been added.
(2) Production and import data combined are being used for natural gas supply.
Note: Biofuels and waste are excluded from the primary energy supply.
Note: Figures may not add up due to rounding.
Source: SREDA compilation based on readily-available national energy data and national accounts.

[2] Trend

Figure obtained by dividing primary energy supply by the real GDP (constant 2010 price) is the energy intensity in the unit of ktoe / BDT billion. The latest national energy intensity for the FY 2020-21, in based on the new calculation was 3.42 ktoe / billion BDT, which is approximately 11% less than that of the shifted baseline year (FY 2014-15). It should be noted here that this achievement of 11% reduction also represents the effects of both intended and non-intended energy efficiency promotion activities. Industries producing more with the same amount of energy consumption is deemed to be one of the major factors for achieving this EE&C improvement.



Unit: ktoe / BDT billion

Note: National Energy Intensity = PES / GDP
Note: Biofuels and waste are excluded from the primary energy supply.
Source: (1) PES: compilation from HCU (oil & petroleum, various import figures), BPC (oil & petroleum), BPDB (non-thermal power), Petrobangla (gas) and BCMCL (domestic coal) data.
(2) GDP (constant 2010): Bangladesh Bureau of Statistics

Figure 5 National Energy Intensity Trend

Bangladesh energy supply has significantly improved. But there are some interrupted supplies of energy, which may interrupt the industrial production in Bangladesh. Bangladesh has also given priority to energy savings. Saved energy will contribute to minimizing carbon emission (further increasing production in the industries). A simple monetary conversion of the energy conservation which contributed to 11.2% improvement in energy intensity from FY 2014-15 to FY 2020-21 is done as follows: If the energy intensity in FY 2020-21 is assumed to be the same as that of FY 2014-15, the amount of energy required to achieve the actual economic production should have been 5,117 ktoe more. Multiplying this virtually-saved energy with the common household unit cost of electricity (8-9 taka per kWh unit), the cost of saved energy, in conservative terms is calculated as approximately **BDT 505 billion**. Which indicate that more than 100 billion BDT saved by one year.

Table 8: Impact of National Energy Intensity Improvement

	FY 2014-15 GDP = 8,249 billion Taka	FY 2020-21 GDP = 12,072 billion Taka
National energy intensity = 3.85	Actual Energy supply = 31.8 Mtoe	Assumed situation Energy supply should be = 46.477 Mtoe *(5117 ktoe more than actual)*
National energy intensity = 3.42		Actual Energy supply = 41.3 Mtoe

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 **11.2%** improvement 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).

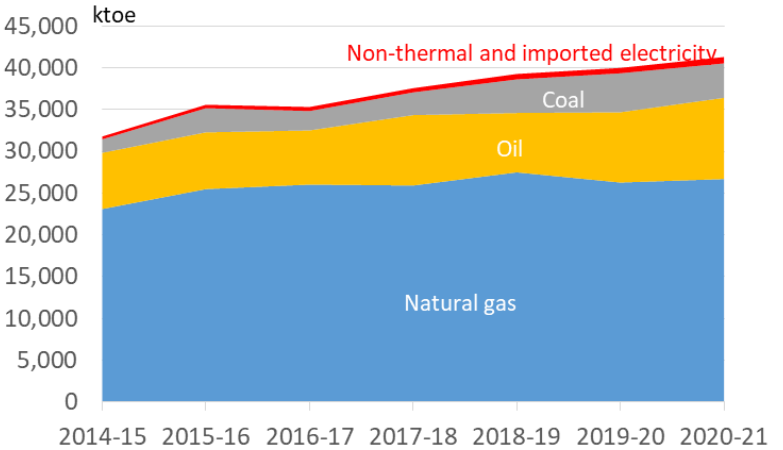
SREDA, having the mission to promote RE and EE&C on the demand side., In EE&C side, has contributed to relieving the national energy intensity, mainly from the following five activities (1) promotion of industrial energy efficiency through financing, (2) introduction of energy audit programme, (3) preparation 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 Part IV of this booklet.

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

Blank Page

Part III Energy Balance Statistics

3.1 Primary Energy Supply by Fuel Source



Unit: ktoe

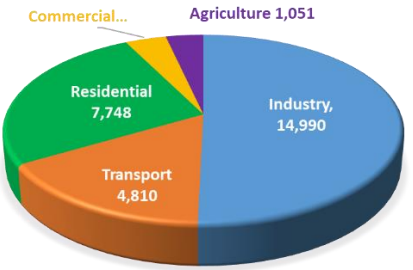
FY	Natural gas	Oil	Coal	Non-thermal*
2014-15	23,104	6,729	1,617	339
2015-16	25,491	6,796	2,887	411
2016-17	26,028	6,486	2,318	485
2017-18	25,916	8,429	2,722	500
2018-19	27,494	7,107	4,019	649
2019-20	26,273	8,413	4,661	650
2020-21	26692	9723	4118	767

*: Non-thermal and imported electricity includes PV, hydro and imported.
Note: The following major changes were made from FY 2018-19 issue:
(1) Imported coal and imported petroleum products data have been added.
(2) Production and import data combined are being used for natural gas supply.
Note: Biofuels and waste are excluded from the primary energy supply.
Note: Figures may not add up due to rounding.

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

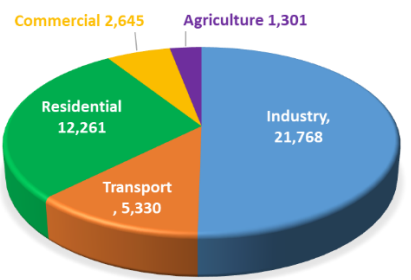
3.2 Final Energy Consumption by Sector

Final energy basis data below show that industry sector consumes half (50%) of the entire energy (excluding biomass). Composition of residential sector is approximately one third, at 26%.



Unit: ktoe

Primary energy basis chart below visualises the fact that the importance of residential sector energy consumption increases when considering the data on primary energy basis.



Note

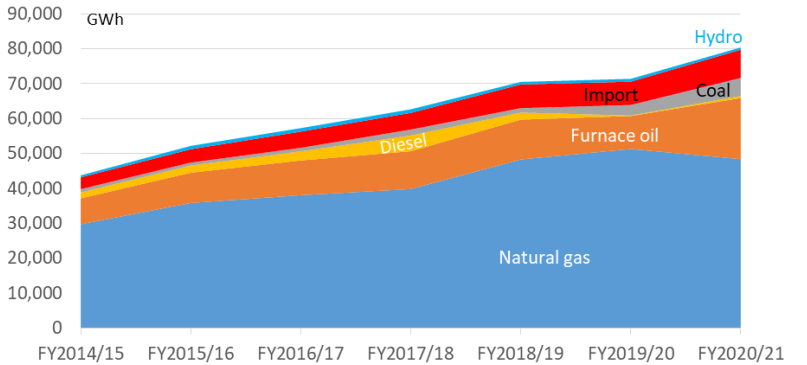
Unit: ktoe

* Excludes biomass.
* Commercial and public services = compilation of commercial, building and others.

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

3.3 Fuel Composition of Power Generation

Natural gas constantly comprises approximately 49% of the entire power generation fuels. The proportion of natural gas is increasing in the recent years in response to the start of LNG import.



Unit: GWh

FY	Natural gas	Furnace oil	Diesel oil	Coal	Solar	Import	Hydro
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
2018-19	48,308	11,426	2,022	1,230	39	6,786	725
2019-20	51,290	9,461	139	2,968	62	6,674	825
2020-21	48,403	17,497	609	4997	158	8103	655

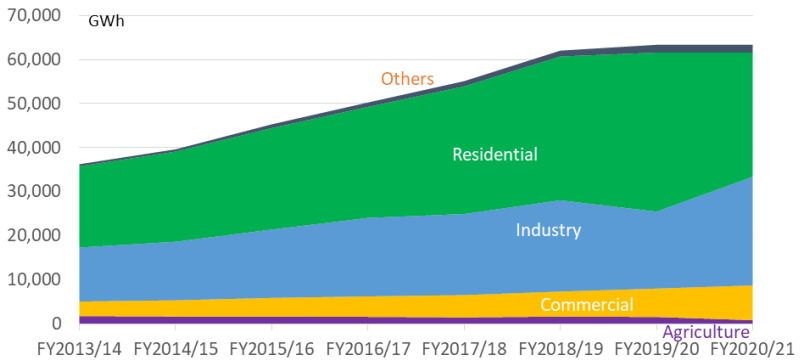
Note

* Solar power generation is not visible on graph due to its small composition.

Source: Compiled from BPDB Annual Reports data

3.4 Electricity Consumption by Sector

Residential sector is the dominant consumer of electricity. Its share rapidly increased due to more people staying home in response to COVID-19 pandemic. Decrease in industry sector electricity consumption can also be explained under the same effect.



Unit: GWh

FY	Agriculture sector	Commercial Sector *1	Industry sector	Residential Sector *2	Others
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
2018-19	1,613	5,701	20,733	32,662	1,328
2019-20	1,533	6,457	17,476	36,130	1,768
2020-21	798	7,908	24,680	28,178	1,800

Note

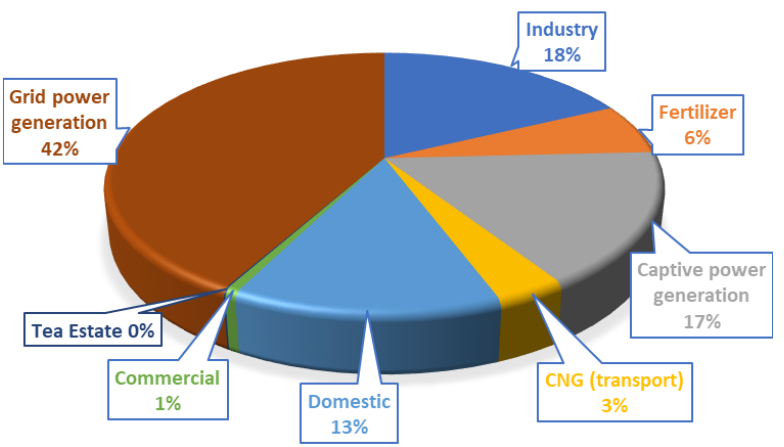
*1 Building sector is referred to as the “Commercial” sector in the original data.

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

Source: Compiled from BPDB Annual Reports data

3.5 Gas Consumption by Sector

Total national consumption of natural gas during the FY 2020-21 was 28,813 MMCM, which was a slight increase from the previous fiscal year. Total natural gas consumption, during the fiscal year, when converted to calorific value, is 26,692 ktoe. Almost a half of the total natural gas consumption, equivalent to 11,236 ktoe, is allocated for grid power generation. Combining with a separately reported 4,462 ktoe for captive power generation at the industries the natural gas used for power generation surpasses 58% of the entire natural gas utilisation. Other two major natural gas consumers are the industry sector other than captive power generation and fertilizer, amounting to 4,797 ktoe, and residential sector at 3,541 ktoe. Although the penetration of CNG fuelled vehicles is high in urban areas, the consumption of natural gas in transport sector is limited at 926 ktoe, has constantly been decreasing for the past three years.

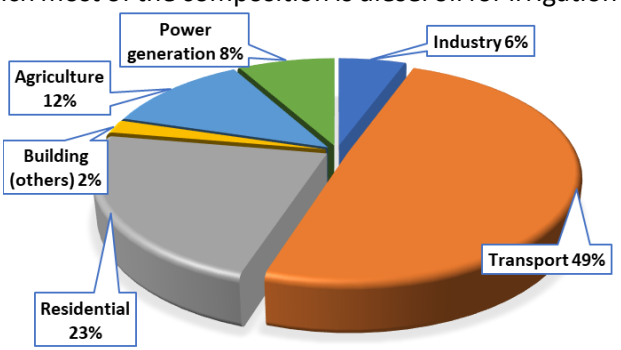


Unit: ktoe

Note: Original data in MMCM, conversion unit employed = **0.933 ktoe/MMCM**.
Source: Chart drawn based on Petrobangla MIS Data.

3.6 Petroleum Products Consumption by Sector

Petroleum products sold and consumed during FY 2020-21 was 7,861 ktoe, which is the summation of sales of 6,174 ktoe of various petroleum products from BPC, and **1,688 ktoe additional sales of LPG by private sector distributors**. More than a half of the entire petroleum product supply, 3,884 ktoe, was for the **largest consuming sector**, the **transport sector**, including road, rail, domestic air and inland waterway transport. Next large petroleum products consuming sector is residential sector consuming 1,784 ktoe, among which LPG comprises more than 94% of the total residential consumption of petroleum products. The consumption of LPG in residential and Transport sector has been growing. Total LPG Consumption has been increased about 69% from previous year . Consumption of kerosene for lighting and cooking purpose is limited compared with that of LPG. Agriculture sector consumed 956 ktoe, of which most of the composition is diesel oil for irrigation purposes.

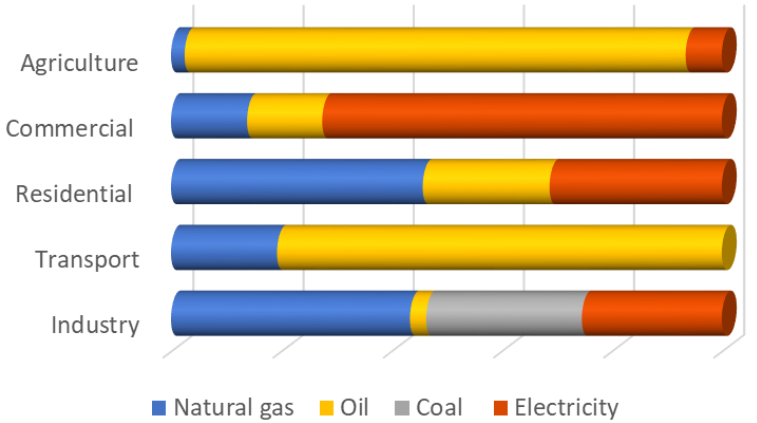


Unit: ktoe

Note: Original data in kg and ton, conversion unit employed = 0.00095 ktoe/ton.
Source: Chart drawn based on BPC annual Report Data and HCL data.

3.7 Energy Consumption by Sector & Source

The horizontal bar chart below is the energy consumption on consumption basis, by sector and source of energy for FY 2020-21. Energy source for agriculture sector and transport is mostly petroleum products, while electricity is the dominant composition for commercial sector. Residential and industry sector have fair mixes of various energy sources.



Unit: ktoe (consumption basis)

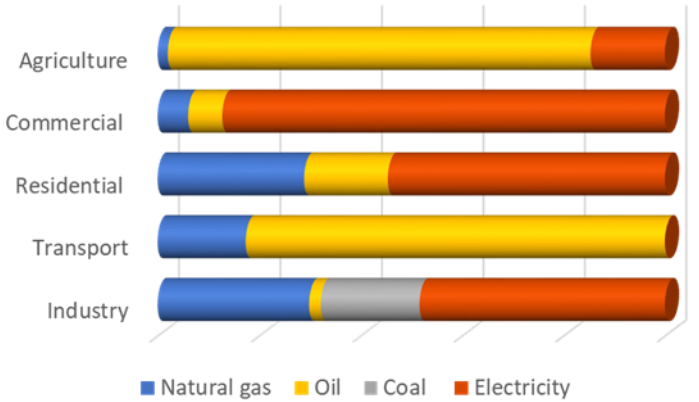
FY	Gas	Petroleum products	Coal	Electricity
Agriculture	26	956		69
Commercial	159	157		835
Residential	3541	1784		2423
Transport	926	3884		
Industry	6503	441	4237	3809

* Excludes biofuels and waste.

* Commercial and public services = compilation of commercial, building and others.

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

With an aim to identify the scope for EE&C on an equal-footing among all energy sources, energy consumption by sector on **primary energy basis** is visualised in the following horizontal bar chart. When compared with the chart on the previous page, it becomes apparent that electricity consumption especially commercial, residential and industry sector, as well as petroleum products consumption in agriculture and transport sectors require further attention as the target for EE&C.



Unit: ktoe (primary energy basis)

FY	Gas	Petroleum products	Coal	Electricity
Agriculture	26	1083	0	190
Commercial	159	178	0	2308
Residential	3541	2022	0	6697
Transport	926	4403	0	0
Industry	6503	500	4237	10528

Note:
* Excludes biofuels and waste.
* Commercial and public services = compilation of commercial, building and others.
Source: SREDA compilation based on readily-available national energy data.

3.8 Calorific Value and Conversion Factor

[1] Calorific Value

Calorific value by product	Reference
Natural gas	
Domestic produced natural gas	
0.926 ktoe/MMCM (FY 2020-21)	Calculated from Petrobangla AR 2019
Re-gasified imported natural gas	
0.932 ktoe/MMCM	UNSD std heat values of gases 39,021 kJ/m3
Oil, petroleum products	
Imported crude oil	
1.01 toe/ton	UNSD 42.3 GJ/ton (net std heat values)
Domestic production condensate	
1.11 toe/ton	**SREDA estimate**
Domestic production Natural Gas Liquid (NGL)	
0.84 toe/KL	**SREDA estimate**
LPG	
1.13 toe/ton	UNSD 47.3 GJ/ton (net std heat values)
Naphtha	
1.06 toe/ton	UNSD 44.5 GJ/ton (net std heat values)
Petrol (motor spirit)	
1.06 toe/ton	UNSD 44.3 GJ/ton (net std heat values)
High octane blending component (HOBC)	
1.26 toe/ton	**SREDA estimate**
Superior kerosene oil (SKO)	
1.05 toe/ton	UNSD 44.1 GJ/ton (net std heat values)
Diesel	
1.03 toe/ton	UNSD 43.0 GJ/ton (net std heat values)
Furnace oil	
0.96 toe/ton	UNSD 40.4 GJ/ton (net std heat values)
Petroleum products (overall)	
0.95 toe/ton	Calculated from UNSD and ERL AR 2019 data
Coal	
Domestic production	
0.614 toe/ton	BCMCL website: 25.68MJ/kg or 6,072kcal/kg
Imported	
0.610 toe/ton	**SREDA estimate**
Electricity	
Consumption basis = 0.086 toe/MWh	
Primary basis = 0.244 toe/MWh	BPDB AR FY2020-21 T&D loss, thermal efficiency

[2] Conversion Factor

1 BTU	= 2.52×10^{-8} toe
1 BTU	= 0.000293071 kWh
1 MJ	= 2.39×10^{-5} toe
1 MJ	= 0.2778 kWh
1 kWh	= 8.60×10^{-5} toe (consumption basis)
1 toe	= 11,630 kWh /11,662.22 kWh at 59ºF
1 cft	= 0.0283168 m^3
1 BBL (US)	= 0.159 m^3
1 BBL (UK)	= 0.163 m
1 ton of Petroleum product	= 0.00095 ktoe

Part IV

National Energy Security and Emission Reduction

Blank Page

4.1 Overview

Bangladesh having an approximate population of 169.11 million (up to January 2021) on 148,460 km² area is one of the densely populated countries of the world. Its main concern was food security which it has achieved to a greater extent. After food security comes Energy security.

Energy security
Bangladesh has achieved 100% electrification. Bangladesh is a flat terrain compact country except for Chattogram Hill Tracts (CHT) area.

Bangladesh economic condition has significantly improved. It is now migrating to Developing countries community from LDC. Its common people economic condition has also improved. This led to growth in energy use of its population. Bangladesh once had over 6 million SHS. But it was found that people are not interested for limited electricity. Same was the fate with Solar mini-grids. Though it provided limited A/C electricity, but due to its limitation of supply, people were looking for Grid connected electricity. At present only 27 mini-grids are directly giving electricity to the consumers. Again, quality of solar products is another challenge. Bangladesh is now almost Grid connected including Sandwip island through submarine cable. Similarly, consumers which were earlier served electricity through mini-grids are now connected with grid-connected electricity through submarine cables. Even Grid substations are established in Khagrachari and Rangamati Districts of CHT.

Shortage of Primary fuel is a problem in Bangladesh. Its natural gas is depleting fast. Unable to extract most of the high-quality coal due

to local problems. Only Hydro project at Kaptai annual average yield is not more than 50 MW OR Day peak is 30 MW and evening peak is 71 MW.

In this situation, it needs an accurate picture of its energy demand and availability. For this a correct Energy balance is a requirement.

Bangladesh main concern is to provide strong grid connectivity and reliable electricity to its consumers. As SHS, Mini-Grids are not the answer. Land constraints makes Utility scale solar power generation a challenge. Solar power generation has many challenges. Next option is exploring alternate sustainable energy sources.

Bangladesh has gone for nuclear energy for electricity generation. Construction is going on at Ruppur, Ishwardi, Pabna for 1200 + 1200 = 2400MW electricity generation plant. Nuclear energy is also clean energy though safety concerns may arise. But Bangladesh has adopted to maximum latest International standard safety measures with this Nuclear Plant.

Bangladesh main source of electricity generation is through Natural gas. Which forms 60.19% of its total generation.

Bangladesh total installed capacity is 22031 MW with Peak generation in 2020-21 was 13792 MW. This was mainly due to the pandemic.

Natural gas which is a major primary fuel depletion has led Bangladesh to go for alternate energy. It is also importing LNG.

For energy security Bangladesh has gone for electricity import. Its average import is 1160 MW. It is also trying for large scale import from Hydro source of Nepal/Bhutan through India.

Due to rapid economic growth and 100% electrification, biomass for domestic use is being gradually replaced by LPG, Induction Stove, Rice Cooker etc. as a result every year there will be a decrease in consumption of biomass etc and an increase in LPG gas, electricity use etc.

Coal is gradually taking a major share due to gradual energization of coal-based Power Plants. Private import coal and its caloric value, emission etc should be publicly released.

Captive power generation is an important component. Its correct data as per fiscal year wise is required for more elaborate Energy balance and its accuracy.

The Industrial use as per Table 2 need to be ascertained. The Table is as per international classification. All Stakeholders may be asked to gradually update it and supply data accordingly.

All concerned Stakeholders should ascertain their data correctly and regularly supply to SREDA within 3 months of the end of fiscal year. Then SREDA can get the National Energy Balance of previous fiscal year by December. Only in that case it will be helpful.

National Energy Balance is required for correct projection of energy demand, analysis of actual energy consumed with Energy Master plan. This will also lead to properly plan energy security. Otherwise

we may have to pay huge amount for generation due to its no use or reverse may also happen.

Bangladesh Government has given maximum priority to minimization of carbon emission and global warming.

As a part of attaining SDG, minimizing emission, SREDA was established in 2014, which is working for the promotion of RE and EE&C in collaboration with the governmental organisations, industries, financial sector and the international development partners.

Energy efficiency and was found to be easiest was of minimizing emission. It was found that cost of saving 1 MW of electricity is less than half the cost of generating the same. Carbon emission and reduction was the bonus.

For EE&C, a Masterplan requirement was felt. Accordingly, Master Plan up to 2030 was prepared with sets specific targets to achieve by fiscal year (FY) 2020-21 and by 2029-30. To achieve these targets, the master plan identified five major interventions which are:

(i) Energy audit
(ii) EE&C building
(iii) EE&C labelling
(iv) EE&C finance
(v) Awareness raising.

SREDA's Energy Efficiency & Conservation Promotion Financing Project (EECPFP) comprises the fourth pillar among these necessary interventions. The Project is offering low-interest loan to encourage the industries to select energy efficient equipment when they invest

into production facilities. Together with the loan, technical assistance including information dissemination, energy audit and capacity development activities are also being conducted within the Project. The project is being implemented with the support from Japan International Cooperation Agency (JICA).

Other Developing Partners & Private sector involvement in EE

The Developing Partners have shown strong support for EE&C programme. Besides, JICA, World Bank, ADP, UNDP, KfW etc have come up with support for EE&C projects.

International banks like HSBC which are supporting carbon emission reduction are financing large scale EE&C projects.

4.2 Demand-side Energy Efficiency

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. Reducing the amount of energy required to deliver various goods or services is also essential in this regard. Energy efficiency in the demand-side is one of the main pillars for offering sustainable 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 behavior 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.

4.3 Master Plan Targets

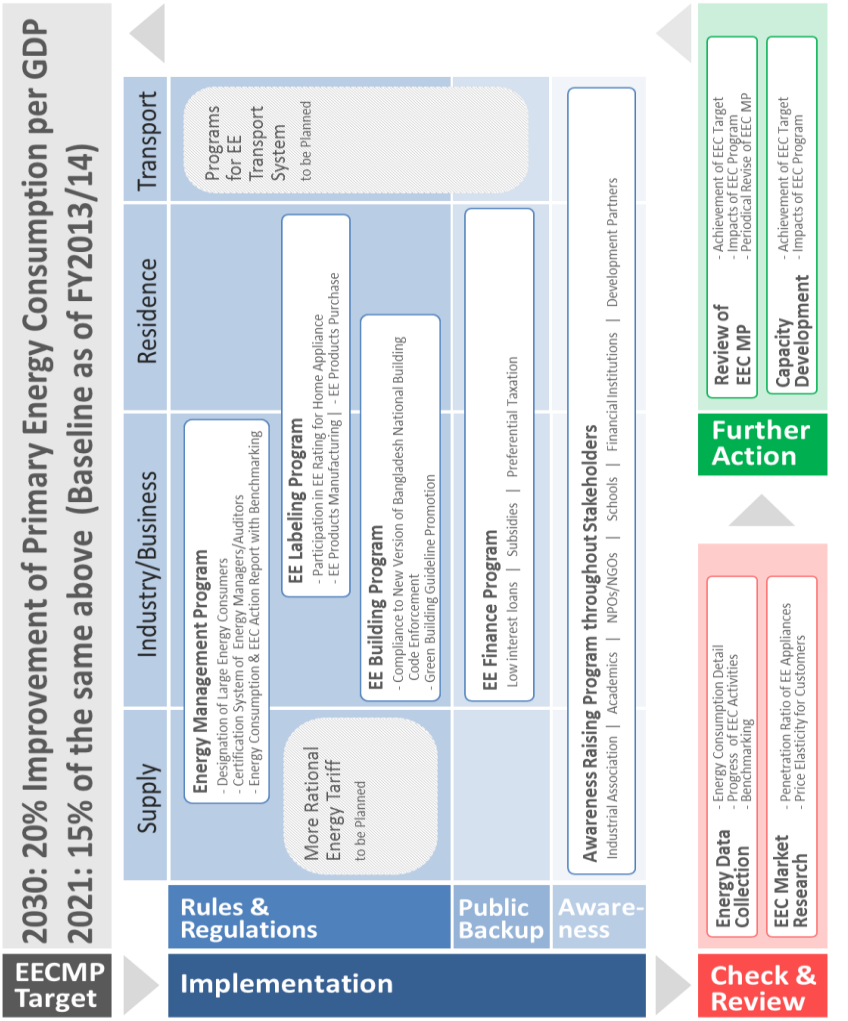
To identify the core actions to achieve energy efficiency national targets SREDA has prepared the “Energy Efficiency and Conservation Master Plan (EECMP) up to 2030”, in May 2016, with the support from Japan International Cooperation Agency (JICA). The targets set in the EECMP are as follows:

- 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 6) 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, which are, (i) energy management program, (ii) EE&C labelling program, (iii) EE&C building program. (iv) EE&C finance program, and (v) awareness raising program. Currently, all these five core actions are either being implemented or being prepared.

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 Project (EECPFP), funded by JICA, as well as the awareness-raising activities and energy management programme for the industries. Further, SREDA is in the process of developing energy labelling regulation and building rating programmes.



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

Figure 6 Structure of the Energy Efficiency & Conservation Master Plan up to 2030

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 29.5 GW. On the other hand, in BAU case where energy saving measures are not implemented, 36.9 GW of power supply capacity will be needed in 2030. It means that 7.4 GW of power supply capacity can be reduced due to energy-saving activities. Expected CO2 emission reduction with the 20% energy saving scenario totals to 246.5 million t-CO2 during the 15 years of implementation.

4.4 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 RE in the global energy mix, doubling the global rate of improvement in energy efficiency is very important. In the 8th 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.

As of now, Bangladesh has several policies on Energy Efficiency and Conservation sector.

a. National Energy Policy 1996.
b. The Energy Efficiency and Conservation Rules, 2016
c. The Energy Audit Regulation, 2018
d. Energy Efficiency and Conservation Master Plan upto 2030
e. Bangladesh National Building Code 2020
f. 8th Five Year Plan
g. Electric Vehicle Charging Station Guideline, 2022

4.5 Energy Efficiency & Conservation Promotion Financing Project (EECPFP)

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.

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.

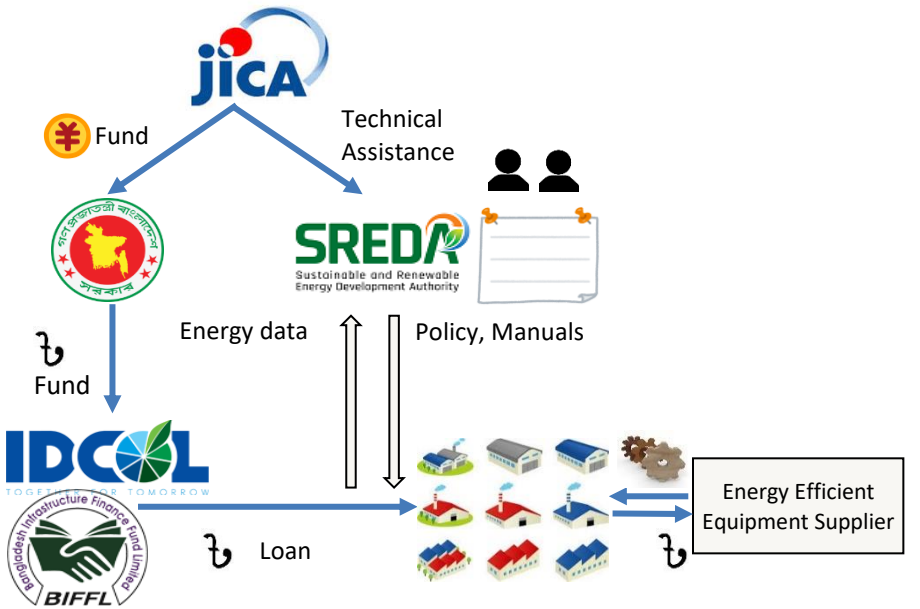


Figure 7 Mechanism of Energy Efficiency and Conservation Promotion Financing Project

There is also a data management infrastructure for the Project. The factories utilising the energy efficient equipment share their monthly energy consumption and production quantity data on SREDA's online Project management information system (MIS).

Energy saving potential with the energy efficient equipment introduced through the Project loan amounts to saving was calculated to be 33,071 toe (ton oil equivalent) or 116,852 MWh per year. Assuming the unit cost of 1 MWh of electricity is BDT 8,150, the total energy cost saving from these 21 sub-projects will add up to BDT 950 million per year.

4.6 Energy Management Programme

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. SREDA started taking Energy Audit Certification exam from 2019.

4.7 Standard, Testing & Labelling

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. EE&C Labeling 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.

4.8 Building Energy Efficiency and Environment

Among the five major activities to be promoted and conducted by SREDA, building energy efficiency is one of them. In order to promote EE&C in building sector, a draft Building Energy Efficiency and Environment Rating (BEEER) system has been prepared. This rating system will be voluntary basis.

4.9 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. School Awareness

Program, EE&C and RE related activities inclusion in secondary and higher secondary level curriculums, participating in the National Electricity week, organise seminars, workshop etc. activities are being conducted by SREDA.

Conclusion

The National energy balance 2020-21 has been prepared with limited data and constraints. National Energy Balance for 2020-21 is the follow up publication will be enriched with more relevant data. This Booklet will be very helpful for making policy decision for energy security and carbon emission.

Sustainable and Renewable Energy Development Authority
IEB Building (9th and 10th Floor), Ramna, Dhaka-1000
Ph- +880255110340, Fax- +880255110341
www.sreda.gov.bd
www.facebook.com/sreda.bd

Supported by-
Energy Efficiency and Conservation Promotion Financing Project (EECPFP)