Methodology for defining the energy user class and questionnaire for carrying out the survey

Technical Assistance for National Certification Scheme for Energy Auditors/Managers in Pakistan

Submitted to:

Climate Technology Centre and Network

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We will be happy to provide any further clarifications, if required.

Abbreviations

APCMA	: All Pakistan Cement Manufacturers Association
CAD/CAM	: Computer Aided Design and Manufacturing
EU	: European Union
FESCO	: Faisalabad Electric Supply Company
GEPCO	: Gujranwala Electric Power Company
HESCO	: Hyderabad Electric Supply Company
IESCO	: Islamabad Electric Supply Company
IMF	: International Monetary Fund
kCal/kg	: Kilo Calorie per kilogram
kCal/kWh	: Kilo calorie per Kilowatt hour
kJ/kg	: Kilo Joule per kilogram
LESCO	: Lahore Electric Supply Company
LNG	: Liquefied Natural Gas
MEPCO	: Multan Electric Power Company
Mtoe	: Metric tonnes of oil equivalent
NEECA	: National Energy Efficiency and Conservation Authority
PESCO	: Peshwar Electric Supply Company
SEPCO	: Sukkur Electric Power Company
T&D	: Transmission and Distribution
USD	: United States Dollar
WAPDA	: Water and Power Development Authority
WHR	: Waste Heat Recovery

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Executive Summary

The National Energy Efficiency and Conservation Act 2016, paves the way for energy conservation and efficient use of energy in Pakistan. The legislation has provided a legal basis to enforce necessary measures for efficient use and conservation of energy in the country in all sectors of the economy, in coordination with the relevant Provincial Departments.

As per the act, the National Energy Efficiency and Conservation Authority (NEECA) is mandated to carry out energy audits either by itself or by directing any certified or designated energy auditor for the designated consumers. In this context, NEECA, as the CTCN request proponent, had requested CTCN's support for developing the national certification scheme for energy auditors and managers including the preparation of draft rules and regulations required for making the certification scheme effective. The objectives of this technical assistance are:

1. Identification of designated consumers based on the definition and engagement of energy user classes for industries;
2. Guidelines on the eligibility and accreditation process;
3. Revision and finalization of draft guidelines, syllabus, and course modules including the development of model question banks for examination processes;
4. Organization and delivery of a two weeks Training of Trainer (ToT) programme; and
5. Review and finalization of draft regulations to support implementation roles as defined in National Certification Scheme.

It is estimated that savings of around US$ 5 billion per year and 42ktonnes per annum of carbon dioxide can be achieved through energy efficiency activities in Pakistan. The certification scheme will also create a pool of energy managers and auditors with relevant skill sets for identification of energy conservation opportunities.

Out of the above objectives, first objective, identification of designated consumers based on the definition and engagement of energy user classes for industries has been completed. Deliverable 2.1 details the methodology adopted for identification of designated consumers along with the sector-wise secondary information gathered for developing the methodology.

1 Introduction

Deliverable 2.1 deals with the methodology defined for identifying energy user class. To arrive at a methodology, review of best practices adopted by various countries throughout the world, with a special focus on countries in Asia Pacific region was carried out. The methodology once defined in association with NEECA, was further discussed in details during the Stakeholder Consultation Workshop.

As per the Terms of Reference of this Technical Assistance, sector specific survey questionnaire was prepared and circulated among industries belonging to different energy intensive industrial sectors. Meetings were held with multiple industrial associations and Government departments to ensure proper response from the industries.

One of the biggest challenges faced during the finalisation of methodology was the severe reluctance from industries to share their energy consumption data. In the absence of any regulation mandating the industries to share their data, the response was meagre. Even after detailed discussions with industrial associations and continuous follow ups, few responses were received from a total of 500 forms circulated among various industries. Multiple meetings and dialogues were conducted with NEECA to arrive at an alternate methodology. Discussions were also held with NEECA and industrial associations. Since all the major energy consuming sectors depend on electricity as well as other forms of fuel like natural gas, coal etc., it was decided to consult the relevant Government Agencies for consumer data. In addition, data available with the various industrial associations as well as in Pakistan Energy Yearbook 2018 was utilised to arrive at a final energy consumption figure.

Another challenge was conducting the stakeholder consultation workshop with relevant stakeholders. With complete support and co-operation of NEECA, the Stakeholder Consultation Workshop was organised in the month of August 2019.

2 Methodology for defining energy user class

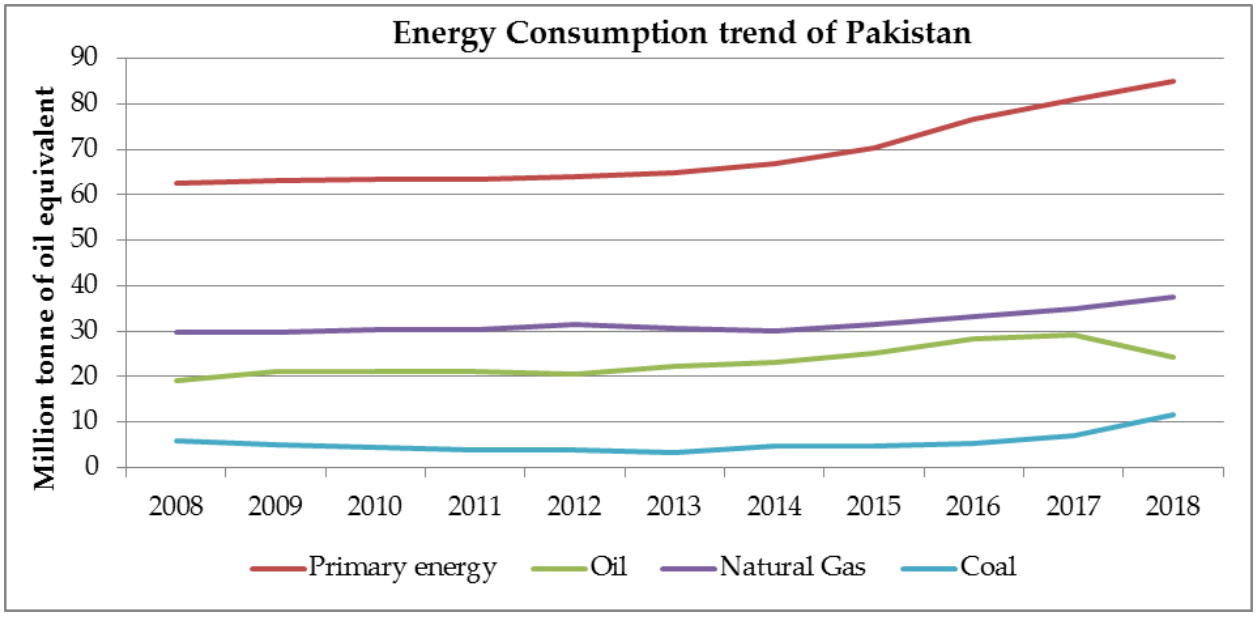
As the main objective of this technical assistance is to support NEECA for implementation of the National Energy Efficiency and Conservation Act 2016, it was required to identify major energy consuming industries where energy conservation activities can be implemented. To identify the major energy consuming industries a methodology was defined. The steps followed in arriving at the methodology are explained below:

- Study and analysis of Pakistan's energy scenario
- Study of secondary energy consumption data and identification of major energy consuming sectors; industrial sector, power generation sector, transportation sector etc.
- Study of secondary socio economic data
- Developing sector specific questionnaire for carrying out survey.
- Collection of consumer data for Electricity and Gas agencies and various industrial associations and Pakistan Energy Yearbook (As mentioned in introduction section, since the methodology of data collection through survey failed, this alternate methodology was adopted) through NEECA
- Finalization of a threshold value for identifying major energy consumer from various industrial sectors in consultation with NEECA and other stakeholders.

2.1 Pakistan Energy Scenario:

An increasing trend of energy consumption has been observed over the years in Pakistan. Figure 1.1 shows the energy consumption trend of Pakistan from 2008 to 2018.

Figure 1.1 Energy consumption trend of Pakistan from 2008 to 2018

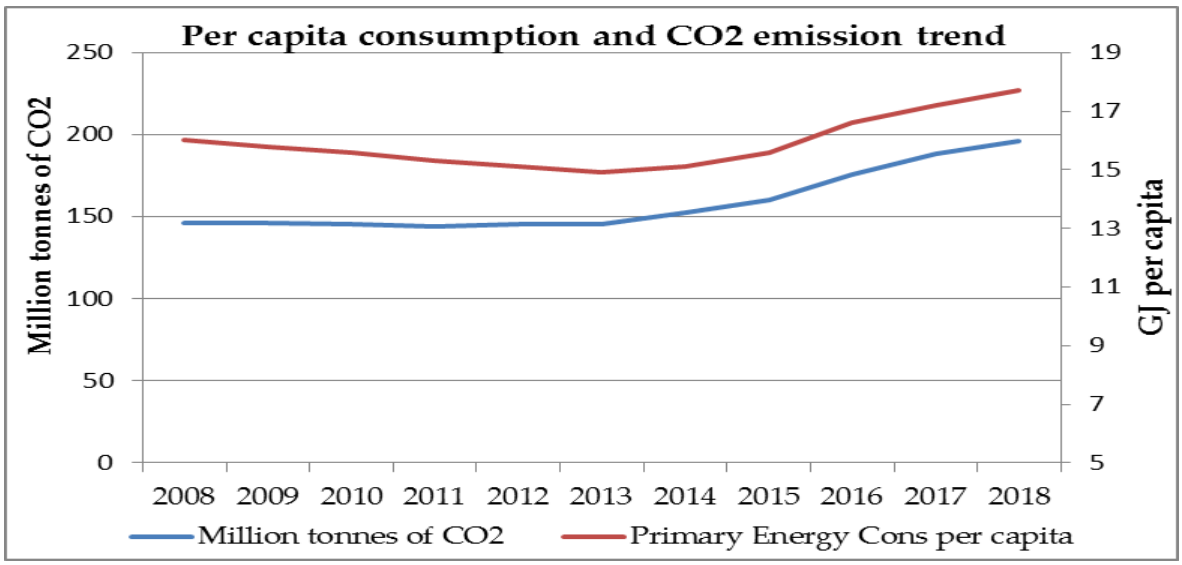


Source: BP Statistical review of World Energy 2019

From the figure above, it can be seen that energy consumption trends were almost flat from 2008 to 2012, owing to the global economic recession but started increasing thereafter. From 2015 onwards, a sharp increase is observed is primary energy consumption trend. The primary energy consumption figure has increased from around 62 million tonnes of oil equivalent in 2008 to 85 million tonnes of oil equivalent in 2018; an increase of 37% over 10 year period. From 2016 to 2018, there is an average increase of 6.5% in primary energy consumption but a drop in the oil consumption. The drop in oil consumption can be attributed to the shifting of furnace oil based thermal power plants in Pakistan to Natural Gas based plant. Since the primary energy consumption is steadily increasing since 2016, it was decided to collect energy consumption data for 3 year period starting from 2016. In addition, collection of data for 3 years ensured that even if there are discrepancies in data of a particular year (due to no operation, intermittent operation, lower production etc.) the data for remaining 3 years would be reliable.

The increase in primary energy consumption has also led to increased carbon dioxide emissions. Figure 1.2 shows the trend for carbon dioxide emissions and per capita energy consumption.

Figure 1.2: Per capita energy consumption and CO2 emission trend

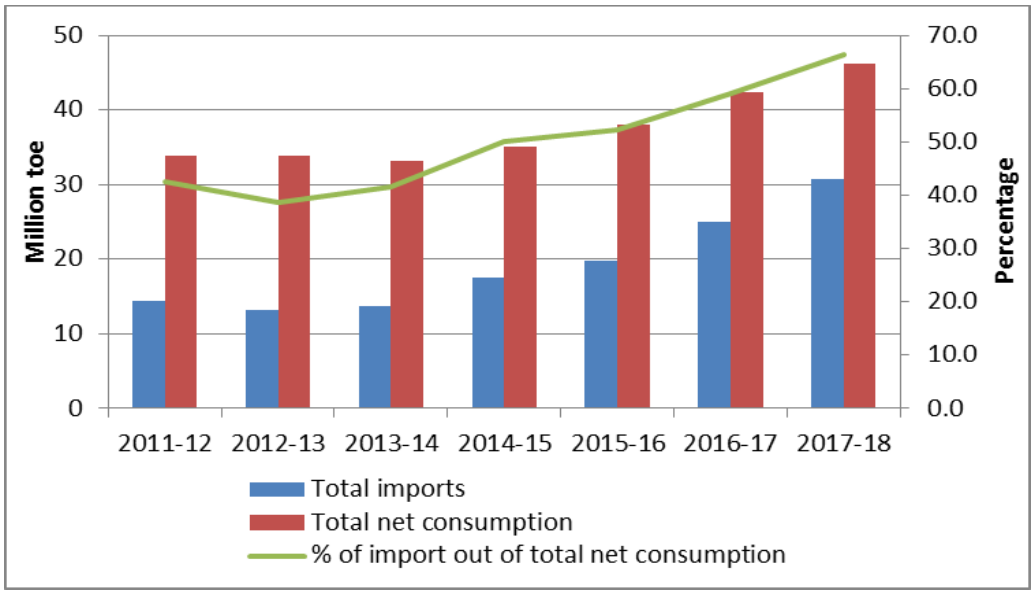


Source: BP Statistical review of World Energy 2019

From figure 1.2, it can be seen that even though the carbon dioxide emission trend was almost constant from 2008 to 2013, there was drop in the per capita energy consumption. This drop is a result of the after effects of global recession in 2008-09. Due to the recession, fuel cost for furnace oil based thermal power plant shot up leading to shortage in supply of electricity. The power shortage indirectly led to drop in output of large manufacturing industries. In 2013, after the IMF loan of 6.6 billion USD, an increase can be observed in the per capita consumption as well as carbon dioxide emission trends. From 2016 onwards, an average of 4% increase in per capita consumption and 7% increase in CO2 emission was observed. Since there has been a steady growth since 2016, data from 2016 onwards is being collected from all sectors to arrive at energy consumption norms.

Pakistan is majorly dependent on imports to meet its primary energy demand. Figure 1.3 shows share of imports on net energy consumption.

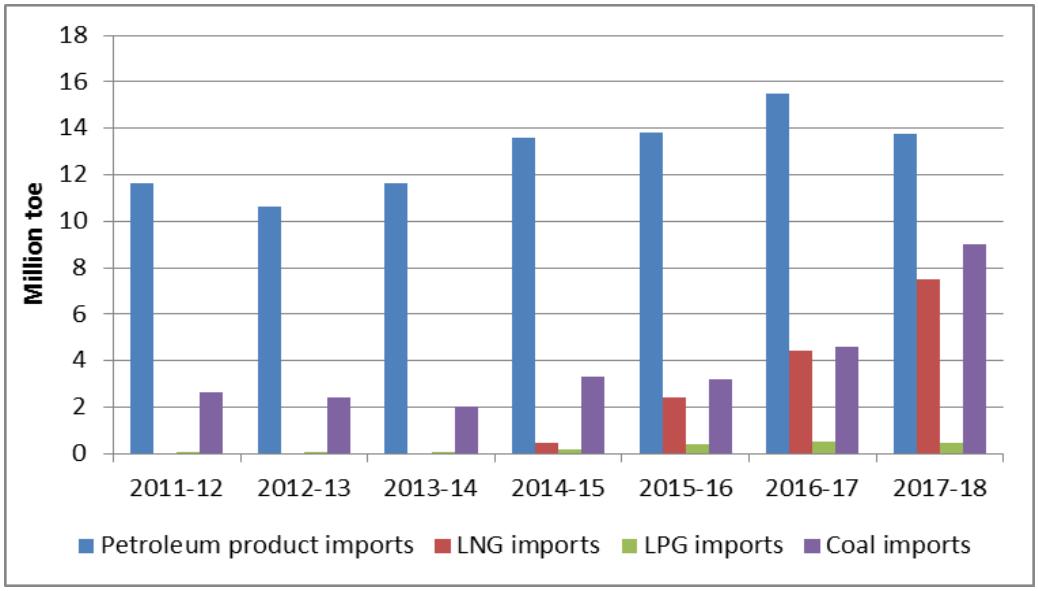
Figure 1.3: Share of imports on net energy consumption



Source: Pakistan Energy Year Book 2018

From figure 1.3, it can be seen that during 2011-12, only 40% of net energy consumption was from import, but this figure has sharply increased to 67% in 2017-18. There has been a steady increase in imports of petroleum products, coal, liquefied natural gas and liquefied petroleum gas. Figure 1.4 shows the import trend of different forms of primary energy.

Figure 1.4: Import trend of different forms of primary energy



Source: Pakistan Energy Year Book 2018

From 2012-13, there has been an increase in petroleum product imports. Over the years, import quantity of coal and LNG has also increased. Due to the switching over of few thermal generating stations from furnace oil to natural gas, petroleum product demand has reduced and LNG demand has increased. As of 2018, natural gas contributes to 44.2% of total primary energy demand. This consumption is majorly in electricity generation followed by industries. Since Natural gas is the highest contributor to primary energy, data from the Gas Authority of Pakistan was collected to account for the energy consumption of individual industries. In recent years, few coal based thermal power generating stations have also been commissioned.

2.2 Identifying major energy consuming sectors

A glimpse of sectorial primary energy consumption is given in Table 1.1.

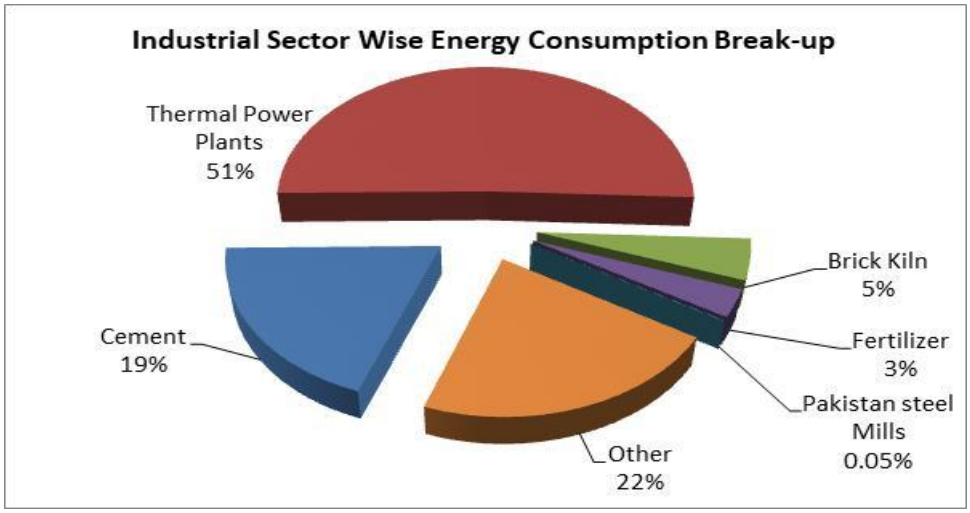
Table 1.1: Sectorial primary energy consumption

Particulars	**Natural Gas**		**Petroleum Product**		**Coal**		**Total fossil fuels**	
	toe	**% share**	**Toe**	**% share**	**toe**	**% share**	**toe**	**% share**
Net primary energy supplied including T&D losses	31,245,760.00		26,340,711.00		10,925,200.00		68,511,671.00	
Consumption								
Electric power station (Including auxiliary energy consumption)	11,050,988.00	35.4	6,470,741.00	24.6	1,984,722.00	18.2	19,506,451.00	**28.5**
Consumption for non-energy use	3,500,893.00	11.2	605,016.00	2.3			4,105,909.00	6.0
Domestic sector	6,655,612.00	21.3	68,162.00	0.3			6,723,774.00	9.8
Commercial sector	751,052.00	2.4		0.0			751,052.00	1.1
Industrial sector	7,638,566.00	24.4	1,785,880.00	6.8	8,940,477.00	81.8	18,364,923.00	**26.8**
Agricultural sector			15,134.00	0.1			15,134.00	
Transportation sector	1,648,649.00	5.3	16,988,579.00	64.5			18,637,228.00	27.2
Other Government usage		0.0	407,198.00	1.5			407,198.00	0.6
Total consumption	**31,245,760.00**	**100.0**	**26,340,710**	**100.0**	**10,925,199.00**	**100.0**	**68,511,669.00**	**100.0**

Source: Pakistan Energy Year Book 2018

From table 1.1, it can be seen that 28.5% of the total primary energy consumption is used for electricity generation in fossil fuel based power generating station. Industrial sector is the second major consumer of energy. Both thermal power plants and industries together account for 55.3% of Pakistan's total primary energy consumption. Thus, it was decided to concentrate on thermal power plants in addition to energy intensive industrial sector for identification of potential designated consumers. Figure 1.5 shows industrial sector wise energy consumption along with thermal power plants.

Figure 1.5: Sector wise energy consumption data.



Source: Table 1.3, Primary Energy Balance Sheet 2017-18, Pakistan Energy Yearbook, 2018

From figure 1.5, it can be seen that maximum energy is consumed by thermal power plants, followed by cement plants. Textile sector is categorized under "others".

2.3 Socio economic data

While analysing the secondary sectorial data, emphasis was also placed on economic and social factors. Over the years, textile has been the biggest export for Pakistan followed by cement and sugar. Textile sector contribute to 54.9% of Pakistan's total exports, sugar contributes 2.2% and cement contributes 1.9%. Pakistan's total exported goods account for 2.1% of its Gross Domestic Product, thus textile sugar and cement together account for around 1.23% of Pakistan's GDP. Thus improving energy efficiency in these sectors will have considerable benefits for the economy.

Pakistan is mainly dependent on fossil fuel for power generation. 65% of the total electricity generation is from fossil fuel, of which 33.6% is from natural gas based generation stations, 32.1% from furnace oil based generation and 0.8% from coal based generation. Petroleum products and natural gas are the major imports for Pakistan. Thus from energy security as well as GDP view point, improvement in energy efficiency in the thermal power plant sector is of utmost importance for Pakistan.

From a social perspective, textile sector is the one which employs maximum percentage of women in Pakistan. 30% of the total work force in textile industries is comprised of women. Augmenting household income and securing a better future for their children are some of the motivating factors for women taking up jobs in the textile sector. As per

multiple surveys, women have shown interest in going for higher studies within textile sector, with stitching and fashion designing being the most favoured courses. A survey of 16 different textile industries revealed that 71% of employees in design division were female. Moreover women who had family members working in textile industries also showed interest in Pattern Drafting and Grading, CAD-CAM and Quality Control courses. Opting for energy efficiency initiatives ensures reduction in the energy cost component of production, which in turn leads to better control over the market. In recent years, textile exports from Bangladesh and China are major competitors for Pakistan. Thus reduction in cost of manufacturing will make the Pakistani textile sector more competitive in global market and create jobs for more women. In addition, it was also found by multiple surveys that wages of women in textile sector are far less than men. With lowering of production cost and increase in profit margins, the industries can be further motivated to remove the wage gap between men and women. Improvements in textile sector revenue can also help in providing and maintaining proper ventilated working environment and hygienic toilets for women.

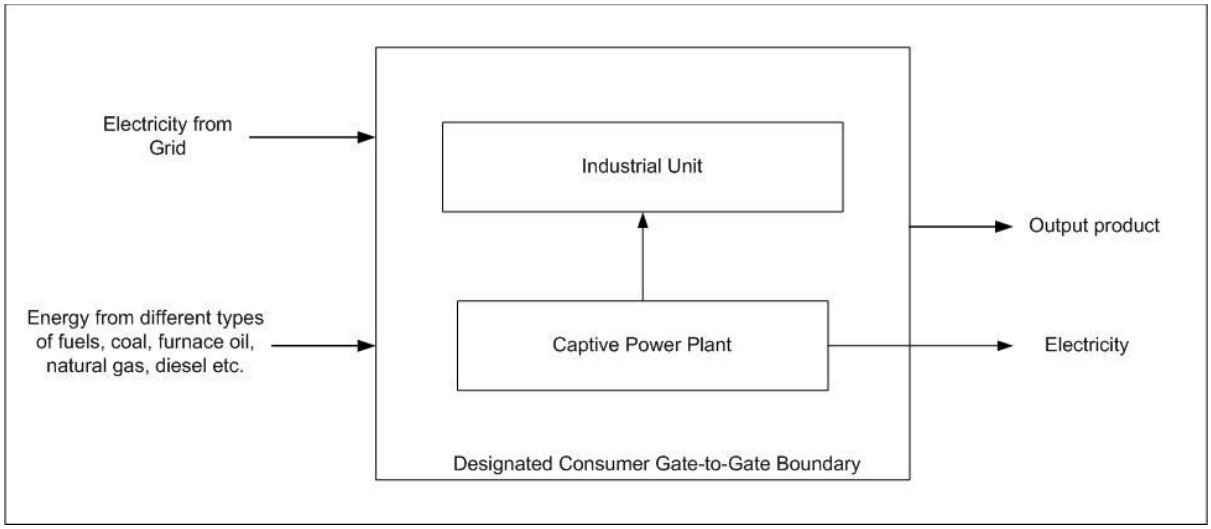
On the basis of secondary sectorial data, the following energy intensive sectors were identified:

- Thermal power plants (excluding captive power plants)
- Cement plants
- Textile plants
- Pulp and paper industries
- Sugar plants
- Steel re-rolling plants

2.4 Methodology for Identifying Potential Designated Consumers

For the identified 6 sectors, sector specific questionnaires were prepared. Same is attached as **Annexure 1.1 to 1.6**. While developing the sector specific questionnaire, a Gate-to-Gate concept was used. The concept is explained in details in figure 1.6.

Figure 1.6: Basic gate to gate boundary diagram



In the gate to gate concept, one individual industry with associated captive/co-generation power plant is considered as an entity. All forms of input energy for both process as well as power generation are converted to tonnes of oil equivalent. Electricity consumed from the grid per annum is also converted to tonnes of oil equivalent by considering a conversion factor of 3600kJ/kWh (as given in Pakistan Energy Yearbook 2018). Sum of both thermal and electrical energy is used to arrive at the annual energy consumption figure. The energy equivalent to electricity exported from captive power plant / co-gen plant will be subtracted from the input energy by multiplying with net heat rate of the captive power plant / co-gen plant.

During initial stages of finalising methodology for defining energy user class, detailed sector specific questionnaires were developed. These questionnaires were designed to collect information pertaining to the primary energy consumption (fossil fuels, electricity and renewable energy) and production in last 3 financial years (July 2015-June 2016, July 2016-June2017and July 2017- June 2018). In addition, details of the type of equipment used along with energy conservation projects implemented were also asked in questionnaire. The logic behind collection of above mentioned data was to get information on the amount of energy used by different industries and shortlist industries as potential designated consumers. A review of the best practices adopted by various countries within the region and EU was carried out to develop a methodology for identification of potential designated consumers. While EU mentions “large” industries as designated consumers, countries in Asia Pacific region define annual energy consumption standards for various industrial sectors. The threshold annual energy consumption values for these countries were finalised on the basis of previous 3-5 years data.

2.5 Collection of consumer data for Electricity and Gas agencies and various industrial associations and Pakistan Energy Yearbook

As collection of primary data through survey was not successful, secondary data obtained through NEECA and industrial association was utilised to arrive at annual energy consumption figures for industries. With support from NEECA, electricity and gas consumption data was collected from respective departments. Electricity data was collected from the eight distribution companies (SEPCO, HESCO, PESCO, MEPCO, IESCO, FESCO, GEPCO, LESCO) and K- electric and gas consumption data was collected from Sui Southern Gas Company Limited and Sui Northern Gas Company Limited. In addition, data regarding total production of cement industries is available with All Pakistan Cement Manufacturers Association (APCMA). For thermal power plant sector, total electricity generation and cost of generation is available in Pakistan Energy Yearbook. An analysis of data collected from various sources revealed that energy consumption data for textile plants can be evaluated from the electricity and gas supply companies’ data. For cement sector production data was available but energy consumption data was not available as most of the industries have captive power generation. For thermal power plant sector, gas consumption is available for 13 natural gas based power plant from Sui Northern Gas Limited. For the remaining 36 thermal power plants data was available in Pakistan Energy Yearbook 2018 was used to estimate annual energy consumption.

As seen from Figure 1.5, thermal power plants and cement plants together account for 70% of annual primary energy consumption in industrial and power generation sector in Pakistan. Textile is the major export for Pakistan and also employs 30% of the women workforce. Hence it was decided to cover cement, textile and thermal power plants in the first phase of identification of potential designated consumers. This will ensure that more than 70% of energy consumption in industrial sector in consultation with NEECA, it was decided to include other sectors in a phased manner in future.

2.6 Methodology for arriving at annual energy consumption data

The data available for the 3 sectors, namely cement, thermal power plant and textile, was analysed and the energy consumption figures were arrived at. Different methodologies were adopted for all three sectors and same is explained in details.

2.6.1 Cement Sector

The cement sector data was collected from APCMA website, which lists the actual clinker and cement production of all cement plants in 2017-18. On the basis of literature review of the energy intensity of cement production, it was observed that global average specific energy consumption is 3.89 GJ/T of cement (*Page 12*, *Industrial Energy Efficiency Project: Benchmarking for Cement sector, UNIDO-GEF*). Thus for cement plants, a benchmark specific energy consumption figure of 3.89GJ/T of cement was adopted. The adopted benchmark figures were utilised to arrive at the annual energy consumption figures for individual cement units listed with APCMA and details of same are provided in **Annexure 2.1**.

2.6.2 Thermal Power Plant Sector

In FY 2017-18, Pakistan had a total of 52 thermal power generating stations with a cumulative installed capacity of 23.16GW. Of the 52 thermal power stations, it was found that only 49 were in operation during FY 2017-18.

Three different methodologies used for arriving at annual energy consumption of the 49 thermal power plants are explained below:

1. Gas consumption data from gas utility (Sui Northern Gas Limited)
2. Average generation cost and average fuel cost basis from Pakistan Energy Yearbook 2018:
   Pakistan Energy Yearbook 2018 provides total units generated (GWh), average generation cost (PKR/GWh) and year wise unit cost of different fuels.
3. Global average heat rate of power plants in 2018: Pakistan Energy Yearbook 2018 provides total units generated by each individual thermal power station. Using average heat rate of power plants in 2018 operating with different fuels, the annual energy consumption was estimated. (*Average heat rate of thermal power plants operating with different fuels was taken from U.S. Energy Information Administration*).

Table 1.2 Methodology for calculating annual energy consumption

Number of thermal stations	Basis for annual energy consumption estimation
WAPDA	
5	Sui Northern Gas Limited data
4	Average generation cost basis from Pakistan Energy Yearbook
K-Electric	
5	Average generation cost basis from Pakistan Energy Yearbook
Independent Power Producers	
8	Sui Northern Gas Limited data
6	Average generation cost basis from Pakistan Energy Yearbook
21	Average heat rate of power plants in 2018

The formulae used for estimating annual energy consumption along with detailed list of thermal power plants with annual energy consumption data is provided in **Annexure 2.2 to 2.4.**

2.6.3 Textile Sector:

The annual energy consumption figures for Textile sector was arrived at from the electricity and gas consumption data provided by the distribution companies and gas supply companies. The conversion ratios considered for converting to mtoe is given below:

1MMCFT = 23.4 mtoe

1 million kWh = 86 mtoe

The list of textile plants with annual energy consumption data is given in **Annexure 2.5**.

2.7 Methodology for finalization of sectorial threshold energy consumption

On the basis of above mentioned methodology, the annual energy consumption figures for individual industries in Thermal Power Plant, Cement and Textile sector was arrived at. In consultation with NEECA, it was decided to identify minimum 100 potential designated consumers for the first phase and same has also been mentioned in Deliverable 1.2: Monitoring and Verification Report . The threshold annual energy consumption figures were arrived by considering the final designated consumer number of 100. The sector wise threshold value and number of industries is given in Table 1.3.

Table 1.3 Sector-wise threshold energy consumption figures

Sector	Threshold Annual Energy Consumption, mtoe	Total Industries	Industries crossing threshold annual energy consumption figure
Cement	50,000	25	23 (92%)
Thermal Power Plants	50,000	49	40 (82%)
Textile	5,000	135	71 (53%)
Total		**209**	**134 (64%)**

As seen from table above, finalisation of 50,000 mtoe for cement and thermal power plant sector ensures that 92% and 82% of total industries fall under potential designated consumer category. A threshold value of 5000 mtoe for textile sector ensures that 53% of the industries become potential designated consumers. This ensures that a total of 134 industries become potential designated consumers. These potential designated consumers need to submit their energy and production data to NEECA on an annual basis and same will be used to identify whether the industry finally qualify as designate consumers. The above methodology for identification of potential designated consumers has already been successfully implemented in various countries in Asia Pacific region.

The above threshold annual energy consumption values were discussed in details during the stakeholder consultation workshop held in Islamabad. A brief of Stakeholder Consultation Workshop is provided in section 2.8.

2.8 Stakeholder Consultation Workshop

A Stakeholder Consultation Workshop was held in Islamabad on 7th August 2019. The workshop was attended by representatives from cement, textile, thermal power plants, steel, buildings as well as brewery sector. In addition, representatives from Pakistan Power Division, OGRA, UNEP, UNDP, British High Commission, AEDB, SAMEDA, other energy audit consultancy firms also participated in the workshop. 8% of the total participants were female. (As per World Bank blog, around 4.9% women hold engineering supervisory roles in Pakistan) The female participants mainly represent freelance consultants in field of clean energy. The above threshold annual energy consumption values were discussed in details and accepted by all present in the workshop.

3 Conclusion

This report defines the methodology used to estimate the annual energy consumption of industries from various sectors and set threshold annual energy consumption limit to qualify as Designated Consumers. Three sectors namely Thermal power stations, cement and textile which represent more than 70% of annual energy consumption of industrial sectors have been selected in the first phase to identify potential Designated Consumers.

Annexures

1.1 Sector specific questionnaire for Thermal Power Plants

1.2 Sector specific questionnaire for Cement Plants

1.3 Sector specific questionnaire for Textile Plants

1.4 Sector specific questionnaire for Sugar Plants

1.5 Sector specific questionnaire for Pulp and Paper Industry

1.6 Sector specific questionnaire for Steel Re-rolling mills

2.1 Annual energy consumption figures of cement plants

2.2 Annual energy consumption figures of thermal power plants based on Sui Northern Gas Limited data

2.3 Annual energy consumption figures of thermal power plants based on Average cost of generation and average fuel cost from Pakistan Energy Yearbook 2018

2.4 Annual energy consumption figures of thermal power plants based on Total units generated (Pakistan Energy Yearbook 2018) and average heat rate (US Energy Information Administration)

2.5 Annual energy consumption figures of textile plants

1.1 Sector specific questionnaire for Thermal Power Plants

Mandatory Sheet		
Thermal Power Plants		
Contact Information	**Plant**	**H.O**
Name of Thermal Power Station		
Address of Company		
Phone No.		
Email		
Fax		
Chief Executive/Unit Head		
Name		
Contact Number		
Email Address		
Designated Contact Person (in Plant)		
Name		
Contact Number		
Email Address		
Electricity/DISCO Consumer Number		
Gas Meter Number		

Mandatory Sheet					
Fuel used in boiler	**Interval**	**Unit**	**(July 2015-June 2016)**	**(July 2016-June 2017)**	**(July 2017-June 2018)**
FO	Annual consumption	Litres			
Density	Annual weighted average	kg/litre			
Gross Calorific Value	Annual weighted average	kCal/kg			
LSHS/LDO	Annual consumption	Litres			
Density	Annual weighted average	kg/litre			
Gross Calorific Value	Annual weighted average	kCal/kg			
Naphtha	Annual consumption	Nm3/Sm3			
Gross Calorific Value	Annual weighted average	kCal/Nm3 or kCal/Sm3			
Natural Gas/LPG	Annual consumption	Nm3/mmBTU			
Gross Calorific Value	Annual weighted average	kCal/Nm3 or kCal/mmBTU			
Coal (Domestic)	Annual consumption	Tonnes			
Gross Calorific Value	Annual weighted average	kCal/kg			
Coal (Imported)	Annual consumption	Tonnes			
Gross Calorific Value	Annual weighted average	kCal/kg			
Others (Please enter any other fuel used)	Annual consumption	Tonnes			
Gross Calorific Value	Annual weighted average	kCal/kg			

Water Consumption Details	**Interval**	**Unit**	**(July 2015-June 2016)**	**(July 2016-June 2017)**	**(July 2017-June 2018)**
Plant water consumption	Annual	m3			

Mandatory Sheet				
Type of Thermal Power Plant	**Please select type of plant**			
Year of commissioning				
Plant Details				
Particulars	**Unit**	**(July 2015-June 2016)**	**(July 2016-June 2017)**	**(July 2017-June 2018)**
Installed Capacity	MW			
Unit/Module Configuration (Eg: 2x150MW+3X300MW)	MW			
Annual Gross Generation	Million kWh			
Plant Operating hours (unit/module wise)	Hours			
Annual weighted average plant Load Factor	%			
Auxiliary Power Consumption	Million kWh			
	%	#DIV/0!	#DIV/0!	#DIV/0!
Design Gross Heat Rate	kCal/kWh			
Operating Gross Heat Rate	kCal/kWh			
Operating Net Heat Rate	kCal/kWh	#DIV/0!	#DIV/0!	#DIV/0!

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Mandatory Sheet												
Unit/Module Wise Operating Details	(July 2015-June 2016)				(July 2016-June 2017)				(July 2017-June 2018)			
	Installed Capacity, MW	Gross Generation, Million kWh	Running Hours	Unit Load Factor (%)	Installed Capacity, MW	Gross Generation, Million kWh	Running Hours	Unit Load Factor (%)	Installed Capacity, MW	Gross Generation, Million kWh	Running Hours	Unit Load Factor (%)
Unit #1												
Unit #2												
Unit #3												
Unit #4												
Unit #5												
Unit #6												
Unit #7												
Unit #8												
Unit #9												
Unit #10												

Optional Sheet	
Equipment Details	
Particulars	**Details**
Boiler Manufacturer	
Turbine Manufacturer	
Engine Manufacturer	
Type of motors (whether standard efficiency/IE2/IE3/IE4)	
Equipment for which VFD is provided	

Energy Efficiency Measures Implemented by plant
List of energy efficiency/energy conservation measures implemented by the plant in last 3 years

1.2 Sector specific questionnaire for Cement Plants

Mandatory Sheet		
Cement Sector		
Contact Information	**Plant**	**H.O**
Name of Plant		
Address of Company		
Phone No.		
Email		
Fax		
Chief Executive/Unit Head		
Name		
Contact Number		
Email Address		
Designated Contact Person (in Plant)		
Name		
Contact Number		
Email Address		
General Information		
Process Type (wet, semi-dry or		
Year of commissioning of Plant		
No. of pre-heaters/stages in Kiln		
No. of pre-heaters/stages in Pre-		
Waste Heat Recovery Plant		
Generation voltage, kV		
Electricity/DISCO Consumer		
Gas Meter Number		

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Mandatory Sheet					
Cement Sector					
Energy Consumption					
Electricity			**(July 2015-June 2016)**	**(July 2016-June 2017)**	**(July 2017-June 2018)**
First source of electricity			**Captive Power Plant**		
Annual units consumed					
Installed Capacity					
Second source of electricity			**Grid**		
Annual units consumed					
Contract Demand					
Third source of electrcity			**DG Set**		
Annual units consumed		kWh			
Installed Capacity		kVA			
Fuel used in kiln/pre-calciner	**Interval**	**Unit**	**(July 2015-June 2016)**	**(July 2016-June 2017)**	**(July 2017-June 2018)**
Coal (leave blank if not used)	Annual consumption	Tonnes			
Gross Calorific Value	Annual weighted average	kCal/kg			
Pet Coke (leave blank if not used)	Annual consumption	Tonnes			
Gross Calorific Value	Annual weighted average	kCal/kg			
AFR (leave blanks if not used)	Annual consumption	Tonnes			
Gross Calorific Value	Annual weighted average	kCal/kg			
FO (leave blank if not used)	Annual consumption	Litres			
Density	Annual weighted average	kg/litre			
Gross Calorific Value	Annual weighted average	kCal/kg			
LSHS/LDO (leave blank if not used)	Annual consumption	Litres			
Density	Annual weighted average	kg/litre			
Gross Calorific Value	Annual weighted average	kCal/kg			
Natural Gas/LPG (leave blank if not used)	Annual consumption	Nm3 or mmBTU			
Gross Calorific Value	Annual weighted average	kCal/m3 or kCal/mmBTU			
Fuel used in Captive Power Plant	**Interval**	**Unit**	**(July 2015-June 2016)**	**(July 2016-June 2017)**	**(July 2017-June 2018)**
Coal (leave blank if not used)	Annual consumption	Tonnes			
Gross Calorific Value	Annual average	kCal/kg			
Pet Coke (leave blank if not used)	Annual consumption	Tonnes			

Gross Calorific Value	Annual average	kCal/kg			
AFR (leave blanks if not used)	Annual consumption	Tonnes			
Gross Calorific Value	Annual average	kCal/kg			
FO (leave blank if not used)	Annual consumption	Tonnes			
Density	Annual weighted average	kg/litre			
Gross Calorific Value	Annual average	kCal/kg			
LSHS/LDO (leave blank if not used)	Annual consumption	Litres			
Density	Annual weighted average	kg/litre			
Gross Calorific Value	Annual average	kCal/kg			
Natural Gas/LPG (leave blank if not used)	Annual consumption	Nm3 or mmBTU			
Gross Calorific Value	Annual average	kCal/m3 or kCal/mmBTU			
Enter number of kilns		**Numbers**	**4**		
Kiln 1	**Interval**	**Unit**	**(July 2015-June 2016)**	**(July 2016-June 2017)**	**(July 2017-June 2018)**
Kiln Production	Annual	Tonne			
Kiln Operating Thermal SEC	Annual	kcal/kg clinker			
Kiln Operating Electrical SEC	Annual	kWh/t clinker			
Kiln 2	**Interval**	**Unit**	**(July 2015-June 2016)**	**(July 2016-June 2017)**	**(July 2017-June 2018)**
Kiln Production	Annual	Tonne			
Kiln Operating Thermal SEC	Annual	kcal/kg clinker			
Kiln Operating Electrical SEC	Annual	kWh/t clinker			
Kiln 3	**Interval**	**Unit**	**(July 2015-June 2016)**	**(July 2016-June 2017)**	**(July 2017-June 2018)**
Kiln Production	Annual	Tonne			
Kiln Operating Thermal SEC	Annual	kcal/kg clinker			
Kiln Operating Electrical SEC	Annual	kWh/t clinker			
Kiln 4	**Interval**	**Unit**	**(July 2015-June 2016)**	**(July 2016-June 2017)**	**(July 2017-June 2018)**
Kiln Production	Annual	Tonne			
Kiln Operating Thermal SEC	Annual	kcal/kg clinker			
Kiln Operating Electrical SEC	Annual	kWh/t clinker			
Performance Indicators	**Interval**	**Unit**	**(July 2015-June 2016)**	**(July 2016-June 2017)**	**(July 2017-June 2018)**
Thermal SEC	Annual	kcal/kg Clinker			
Electrical SEC (up to Clinkerization)	Annual	kWh/Tonne Clinker			
Electrical SEC (Cement Grinding)	Annual	kWh/Tonne Cement			
			Operating Details		
Gross Heat Rate	**Design**	**Units**	**(July 2015-June 2016)**	**(July 2016-June 2017)**	**(July 2017-June 2018)**

Gross Heat Rate of DG Set		kcal/kWh			
Gross Heat Rate of CPP (Steam Turbine)		kcal/kWh			
Gross Heat Rate of CPP (Gas Turbine)		kcal/kWh			

Mandatory Sheet					
Cement Sector					
Plant Design Details	**Interval**	**Unit**	**(July 2015-June 2016)**	**(July 2016-June 2017)**	**(July 2017-June 2018)**
Production Capacity (Clinker)	Annual Installed Capacity	Tonne			
Production Capacity (Cement)	Annual Installed Capacity	Tonne			
Total Clinker Production	Annual	Tonne			
Total Cement Production(All varieties)	Annual	Tonne			
Plant Operating Details					
Production Details	**Interval**	**Unit**	**(July 2015-June 2016)**	**(July 2016-June 2017)**	**(July 2017-June 2018)**
Clinker	Annual Production	Tonne			
OPC	Annual Production	Tonne			
PPC	Annual Production	Tonne			
PSC	Annual Production	Tonne			
Others	Annual Production	Tonne			

Water Consumption Details	**Interval**	**Unit**	**(July 2015-June 2016)**	**(July 2016-June 2017)**	**(July 2017-June 2018)**
Plant water consumption	Annual	m3			

Optional Sheet	
Equipment Details	
Particulars	**Details**
Raw Mill Manufacturer	
Coal Mill Manufacturer	
Pyro section Manufacturer	
Cooler Manufacturer	
Cement Mill Manufacturer	
Air compressor Manufacturers	
Type of motor (whether standard efficiency/IE2/IE3/IE4)	

Energy Efficiency Measures Implemented by plant
List of energy efficiency/energy conservation measures already implemented by the plant are to be listed here

1.3 Sector specific questionnaire for Textile Plants

Mandatory Sheet		
Textile Sector		
Contact Information	**Plant**	**H.O**
Name of Plant		
Address of Company		
Phone No.		
Email		
Fax		
Chief Executive/Unit Head		
Name		
Contact Number		
Email Address		
Designated Contact Person (in Plant)		
Name		
Contact Number		
Email Address		
GENERAL INFORMATION		
Name of the Technology Supplier		
Year of commissioning		
Spinning plant	**Yes**	
Weaving/Knitting plant	**Yes**	
Process/Dying plant	**Yes**	
Co-generation plant	**Yes**	
Electricity/DISCO Consumer Number		
Gas meter number		

Mandatory Sheet					
Fuel used in Co-generation boiler	**Interval**	**Unit**	**(July 2015-June 2016)**	**(July 2016-June 2017)**	**(July 2017-June 2018)**
HSD	Annual consumption	Litres			
Density	Annual weighted average	kg/litre			
Gross Calorific Value	Annual weighted average	kCal/kg			
Pet Coke	Annual consumption	Tonnes			
Gross Calorific Value	Annual weighted average	kCal/kg			
Coal	Annual consumption	Tonnes			
Gross Calorific Value	Annual weighted average	kCal/kg			
FO	Annual consumption	Litres			
Density	Annual weighted average	kg/litre			
Gross Calorific Value	Annual weighted average	kCal/kg			
LSHS/LDO	Annual consumption	Litres			
Density	Annual weighted average	kg/litre			
Gross Calorific Value	Annual weighted average	kCal/kg			
Natural Gas/LPG	Annual consumption	mmBTU or Nm3			
Gross Calorific Value	Annual weighted average	kCal/Nm3 or kCal/mmBTU			
Fuel used in Process Boiler	**Interval**	**Unit**	**(July 2015-June 2016)**	**(July 2016-June 2017)**	**(July 2017-June 2018)**
HSD	Annual consumption	Litres			
Density	Annual weighted average	kg/litre			
Gross Calorific Value	Annual average	kCal/kg			
Coal	Annual consumption	Tonnes			
Gross Calorific Value	Annual average	kCal/kg			
Pet Coke	Annual consumption	Tonnes			
Gross Calorific Value	Annual average	kCal/kg			
FO	Annual consumption	Litres			
Density	Annual weighted average	kg/litre			
Gross Calorific Value	Annual average	kCal/kg			
LSHS/LDO	Annual consumption	Litres			
Density	Annual weighted average	kg/litre			
Gross Calorific Value	Annual average	kCal/kg			

Natural Gas/LPG	Annual consumption	mmBTU or Nm3			
Gross Calorific Value	Annual average	kCal/Nm3 or kCal/mmBTU			

Energy Consumption				
Electricity	**Unit**	**(July 2015-June 2016)**	**(July 2016-June 2017)**	**(July 2017-June 2018)**
First source of electricity	**Co-generation Plant**			
Annual units consumed	kWh			
Installed Capacity	kVA/MW			
Second source of electricity	**Grid**			
Annual units consumed	kWh			
Contract Demand	kVA/MW			
Third source of electricity	**DG Set**			
Annual units consumed	kWh			
Installed Capacity	kVA/MW			

Water Consumption Details	**Interval**	**Unit**	**(July 2015-June 2016)**	**(July 2016-June 2017)**	**(July 2017-June 2018)**
Plant water consumption	Annual	m3			

Mandatory Sheet					
Production Details	**Interval**	**Unit**	**(July 2015-June 2016)**	**(July 2016-June 2017)**	**(July 2017-June 2018)**
Total Production	Annual	GSM			

Co-generation Boiler Details (If No Co-generation boilers, please enter	**Unit**	**(July 2015-June 2016)**	**(July 2016-June 2017)**	**(July 2017-June 2018)**
Number of Boilers	Numbers			
Boiler Capacity	TPH			
Rated Pressure	kg/cm2			
Rated Temperature	°C			
Turbine Capacity	MW			
Number of Extractions with flow, pressure and temperature				

Water Consumption	**Interval**	**Unit**	**(July 2015-June 2016)**	**(July 2016-June 2017)**	**(July 2017-June 2018)**
Plant water consu	Annual	m3			

Stenter Details	**Unit**	**(July 2015-June 2016)**	**(July 2016-June 2017)**	**(July 2017-June 2018)**
Machine Make & Model:				
No. of Machine Installed:				
No. of Machine Working:				
Total Capacity:				
Technology:				
Motor Power	kW/HP			
Speed	Rpm			
Steam Consumption	Kg/hr			
Steam Pressure	Kg/cm^2			
Steam Temperature	^0C			

Spinning Plant Details	Unit	(July 2015-June 2016)	(July 2016-June 2017)	(July 2017-June 2018)
Total Ring Frame Production				
No. of spindles installed				
No. of spindles worked				
Average count,ring frame				
Total double yarn production				
No. of spindle shift installed in Doubling/TFO (Two for One)				
Overall ring frame efficiency				
Overall doubling/TFO efficiency				

Weaving/Knitting Plant Details	Unit	(July 2015-June 2016)	(July 2016-June 2017)	(July 2017-June 2018)
Total Loom Production	Kg			
Gram per square metre	gsm			
Number of looms installed				
Number of looms worked				
Average recd/picks				

Processing Plant Details	Unit	(July 2015-June 2016)	(July 2016-June 2017)	(July 2017-June 2018)
Type of Processing	(Fibre/Yarn/Fabric)			
Total Processing Production				
Type of Product	(Cotton/Synthetic/Blend)			

Optional Sheet	
Equipment Details	
Particulars	**Details**
Air compressor Manufacturers	
Type of motor (whether standard efficiency/IE2/IE3/IE4)	
Equipment for which VFDs are installed	
Any capacitor banks installed	

Energy Efficiency Measures Implemented by plant
List of energy efficiency/energy conservation measures already implemented by the plant in last 3 years

1.4 Sector specific questionnaire for Sugar Plants

Mandatory Sheet		
Sugar Sector		
Contact Information	**Plant**	**H.O**
Name of Plant		
Address of Company		
Phone No.		
Email		
Fax		
Chief Executive/Unit Head		
Name		
Contact Number		
designated Contact Person (in Plant)		
Designated Contact Person (in Plant)		
Name		
Contact Number		
Email Address		
GENERAL INFORMATION		
Plant capacity		
Name of the Technology Supplier		
Year of commissioning		
Number of operating days per annum		
Co-generation Plant installed	**Yes**	
Installed Capacity of Co-generation Plant, MW		
Electricity/DISCO Consumer Number		
Gas Meter Number		

Mandatory Sheet					
Fuel used in Co-generation boiler	**Interval**	**Unit**	**(July 2015-June 2016)**	**(July 2016-June 2017)**	**(July 2017-June 2018)**
Bagasse	Annual consumption	Tonnes			
Gross Calorific Value	Annual weighted average	kCal/kg			
Pet Coke	Annual consumption	Tonnes			
Gross Calorific Value	Annual weighted average	kCal/kg			
Coal	Annual consumption	Tonnes			
Gross Calorific Value	Annual weighted average	kCal/kg			
FO	Annual consumption	Litres			
Density	Annual weighted average	kg/litre			
Gross Calorific Value	Annual weighted average	kCal/kg			
LSHS/LDO	Annual consumption	Litres			
Density	Annual weighted average	kg/litre			
Gross Calorific Value	Annual weighted average	kCal/kg			
Natural Gas/LPG	Annual consumption	Nm3/mmBTU			
Gross Calorific Value	Annual weighted average	kCal/Nm3 or kCal/mmBTU			
Fuel used in Process Boiler	**Interval**	**Unit**	**(July 2015-June 2016)**	**(July 2016-June 2017)**	**(July 2017-June 2018)**
Bagasse	Annual consumption	Tonnes			
Gross Calorific Value	Annual average	kCal/kg			
Coal	Annual consumption	Tonnes			
Gross Calorific Value	Annual average	kCal/kg			
Pet Coke	Annual consumption	Tonnes			
Gross Calorific Value	Annual average	kCal/kg			
FO	Annual consumption	Litres			
Density	Annual weighted average	kg/litre			
Gross Calorific Value	Annual average	kCal/kg			
LSHS/LDO	Annual consumption	Litres			
Density	Annual weighted average	kg/litre			
Gross Calorific Value	Annual average	kCal/kg			
Natural Gas/LPG	Annual consumption	Nm3/mmBTU			
Gross Calorific Value	Annual average	kCal/Nm3 or kCal/mmBTU			

Energy Consumption				
Electricity	**Unit**	**(July 2015-June 2016)**	**(July 2016-June 2017)**	**(July 2017-June 2018)**

First source of electricity	**Co-generation Plant**			
Annual units consumed	kWh			
Units exported to grid	kVA/kWh/MW			
Second source of electricity	**Grid**			
Annual units consumed	kWh			
Contract Demand	kVA/kWh/MW			
Third source of electricity	**DG Set**			
Annual units consumed	kWh			
Installed Capacity	kVA/kWh/MW			

Water Consumption Details	**Interval**	**Unit**	**(July 2015-June 2016)**	**(July 2016-June 2017)**	**(July 2017-June 2018)**
Plant water consumption	Annual	m3			
Specific water consumption	Annual	m3/Tonne			

Mandatory Sheet					
Production Details	**Interval**	**Unit**	**(July 2015-June 2016)**	**(July 2016-June 2017)**	**(July 2017-June 2018)**
Sugar Production	Annual	Tonnes			

Co-generation Boiler Details	**Unit**	**(July 2015-June 2016)**	**(July 2016-June 2017)**	**(July 2017-June 2018)**
Number of Boilers	Numbers			
Boiler Capacity	TPH			
Rated Pressure	kg/cm2			
Rated Temperature	°C			
Turbine Capacity	MW			
Number of Extractions with flow, pressure and temperature				

Evaporator Details	**Unit**	**(July 2015-June 2016)**	**(July 2016-June 2017)**	**(July 2017-June 2018)**
No of stages	Numbers			
Capacity, TPH	TPH			
Stage-1 concentration (brix), Temp	°C			
Stage-2 concentration, Temp	°C			
Stage-3 concentration, Temp	°C			
Stage-4 concentration, Temp	°C			
Type of vacuum system- steam ejector/ vacuum pump				
Vacuum	Torr			
Steam consumption for ejector / Vacuum pump capacity	TPH/kW			

Centrifuge:	**Unit**	**(July 2015-June 2016)**	**(July 2016-June 2017)**	**(July 2017-June 2018)**
Type of centrifuge:				
High stages centrifuge capacity	TPH			
Connected motor	kW			
Low stage centrifuge capacity	TPH			
Connected motor	kW			

Optional Sheet		
Equipment Details		
Cooling Tower		
Particulars	**Unit**	**Value**
Design Cooling Load	kCal/hr	
Design Range	°C	
Approch	°C	
Pump rated flow	m3/hr	
Pump rated head	metre	
Pump associated motor rated capacity	kW	
Air Compressor		
FAD capacity	m3/hr or cfm	
Motor capacity	kW	
Air Pressure	kg/cm2(g)	
Type of motor (whether standard efficiency/IE2/IE3/IE4)		

Energy Efficiency Measures Implemented by plant
List of energy efficiency/energy conservation measures already implemented by the plant are to be listed here

1.5 Sector specific questionnaire for Pulp and Paper Industry

Mandatory Sheet		
Pulp & Paper Sector		
Contact Information	**Plant**	**H.O**
Name of Plant		
Address of Company		
Phone No.		
Email		
Fax		
Chief Executive/Unit Head		
Name		
Contact Number		
Email Address		
Designated Contact Person (in Plant)		
Name		
Contact Number		
Email Address		
GENERAL INFORMATION		
Number of products manufactured		
Major product (Newsprint, Paper board, Specialty, etc)		
Number of paper machines		
Year of commissioning		
Pulp manufacturing unit	**Yes**	
Process boiler using black liquor	**Yes**	
Co-generation plant	**Yes**	
Electricity/DISCO Consumer Number		
Gas Meter Number		

Mandatory Sheet					
Fuel used in Co-generation boiler	**Interval**	**Unit**	**(July 2015-June 2016)**	**(July 2016-June 2017)**	**(July 2017-June 2018)**
HSD	Annual consumption	Litres			
Density	Annual weighted average	kg/litre			
Gross Calorific Value	Annual weighted average	kCal/kg			
Pet Coke	Annual consumption	Tonnes			
Gross Calorific Value	Annual weighted average	kCal/kg			
Coal	Annual consumption	Tonnes			
Gross Calorific Value	Annual weighted average	kCal/kg			
FO	Annual consumption	Litres			
Density	Annual weighted average	kg/litre			
Gross Calorific Value	Annual weighted average	kCal/kg			
LSHS/LDO	Annual consumption	Litres			
Density	Annual weighted average	kg/litre			
Gross Calorific Value	Annual weighted average	kCal/kg			
Natural Gas/LPG	Annual consumption	Nm3/Sm3			
Gross Calorific Value	Annual weighted average	kCal/Nm3 or kCal/Sm3			

Fuel used in Process Boiler	**Interval**	**Unit**	**(July 2015-June 2016)**	**(July 2016-June 2017)**	**(July 2017-June 2018)**
HSD	Annual consumption	Litres			
Density	Annual weighted average	kg/litre			
Gross Calorific Value	Annual average	kCal/kg			
Coal	Annual consumption	Tonnes			
Gross Calorific Value	Annual average	kCal/kg			
Pet Coke	Annual consumption	Tonnes			
Gross Calorific Value	Annual average	kCal/kg			
FO	Annual consumption	Litres			
Density	Annual weighted average	kg/litre			
Gross Calorific Value	Annual average	kCal/kg			
LSHS/LDO	Annual consumption	Litres			
Density	Annual weighted average	kg/litre			
Gross Calorific Value	Annual average	kCal/kg			

Natural Gas/LPG	Annual consumption	Nm3/mmBTU			
Gross Calorific Value	Annual average	kCal/Nm3 or kCal/mmBTU			

Electricity	**Unit**	**(July 2015-June 2016)**	**(July 2016-June 2017)**	**(July 2017-June 2018)**
First source of electricity	**Co-generation plant**			
Annual units consumed	kWh			
Installed Capacity	kVA/MW			
Second source of electricity	**Grid**			
Annual units consumed	kWh			
Contract Demand	kVA/MW			
Third source of electrcity	**DG Set**			
Annual units consumed	kWh			
Installed Capacity	kVA/MW			

Water Consumption Details	**Interval**	**Unit**	**(July 2015-June 2016)**	**(July 2016-June 2017)**	**(July 2017-June 2018)**
Plant water consumption	Annual	m3			
Specific water consumption	Annual	m3/Tonne of paper			

Mandatory Sheet					
Production Details	**Interval**	**Unit**	**(July 2015-June 2016)**	**(July 2016-June 2017)**	**(July 2017-June 2018)**
Pulp Production	Annual	Tonnes			
Product 1 (Enter product name in this column)	Annual	Tonnes			
Product 2 (Enter product name in this column)	Annual	Tonnes			
Product 3 (Enter product name in this column)	Annual	Tonnes			
Product 4 (Enter product name in this column)	Annual	Tonnes			
Product 5 (Enter product name in this column)	Annual	Tonnes			

Black Liquor Boiler Details	**Unit**	**(July 2015-June 2016)**	**(July 2016-June 2017)**	**(July 2017-June 2018)**
Not applicable, please leave blank	Numbers			
Not applicable, please leave blank	TPH			
Not applicable, please leave blank	kg/cm2			
Not applicable, please leave blank	°C			

Paper machine details	**Unit**	**(July 2015-June 2016)**	**(July 2016-June 2017)**	**(July 2017-June 2018)**
Paper machine No 1				
Products manufactured				
Production capacity	Tonnes			
Pope reel length	m			
Speed range	mpm			
Product range	gsm			
MP Steam Consumption	Tonnes			
Steam Pressure	Kg/cm^2			
Steam Temperature	0_C			
LP Steam Consumption	Tonnes			
Steam Pressure	Kg/cm^2			
Steam Temperature	0_C			
Electricity Consumption	kWh			

Paper machine No 2		**(July 2015-June 2016)**	**(July 2016-June 2017)**	**(July 2017-June 2018)**
Products manufactured				

Production capacity	Tonnes			
Pope reel length	m			
Speed range	mpm			
Product range	gsm			
MP Steam Consumption	Tonnes			
Steam Pressure	Kg/cm^2			
Steam Temperature	^0C			
LP Steam Consumption	Tonnes			
Steam Pressure	Kg/cm^2			
Steam Temperature	^0C			
Electricity Consumption	kWh			

Paper machine No 3		**(July 2015-June 2016)**	**(July 2016-June 2017)**	**(July 2017-June 2018)**
Products manufactured				
Production capacity	Tonnes			
Pope reel length	m			
Speed range	mpm			
Product range	gsm			
MP Steam Consumption	Tonnes			
Steam Pressure	Kg/cm^2			
Steam Temperature	^0C			
LP Steam Consumption	Tonnes			
Steam Pressure	Kg/cm^2			
Steam Temperature	^0C			
Electricity Consumption	kWh			

Paper machine No 4		**(July 2015-June 2016)**	**(July 2016-June 2017)**	**(July 2017-June 2018)**
Products manufactured				
Production capacity	Tonnes			

Pope reel length	m			
Speed range	mpm			
Product range	gsm			

MP Steam Consumption	Tonnes			
Steam Pressure	Kg/cm^2			
Steam Temperature	^0C			
LP Steam Consumption	Tonnes			
Steam Pressure	Kg/cm^2			
Steam Temperature	^0C			
Electricity Consumption	kWh			

Paper machine No 5		**(July 2015-June 2016)**	**(July 2016-June 2017)**	**(July 2017-June 2018)**
Products manufactured				
Production capacity	Tonnes			
Pope reel length	m			
Speed range	mpm			
Product range	gsm			
MP Steam Consumption	Tonnes			
Steam Pressure	Kg/cm^2			
Steam Temperature	^0C			
LP Steam Consumption	Tonnes			
Steam Pressure	Kg/cm^2			
Steam Temperature	^0C			
Electricity Consumption	kWh			

Boiler Details	**Unit**	**(July 2015-June 2016)**	**(July 2016-June 2017)**	**(July 2017-June 2018)**
Number of Boilers	Numbers			
Individual boiler Capacity	TPH			
Rated Pressure	kg/cm2			

Rated Temperature	°C			
Turbine Capacity	MW			
Number of Extractions	Numbers			
First extraction: Flow, pressure and temperature	TPH, Bar & °C			
Second extraction: Flow, pressure and temperature	TPH, Bar & °C			
Third extraction: Flow, pressure and temperature	TPH, Bar & °C			

Optional Sheet	
Equipment Details	
Particulars	**Details**
Paper Machine Manufacturer	
Vacuum Pump Manufacturer	
Air compressor Manufacturers	
Type of motor (whether standard efficiency/IE2/IE3/IE4)	

Energy Efficiency Measures Implemented by plant
List of energy efficiency/energy conservation measures already implemented by the plant are to be listed here

1.6 Sector specific questionnaire for Steel Re-rolling mills

Mandatory Sheet		
Steel Melt and re rolling Sector		
Contact Information	**Plant**	**H.O**
Name of Plant		
Address of Company		
Phone No.		
Email		
Fax		
Chief Executive/Unit Head		
Name		
Contact Number		
Email Address		
Designated Contact Person (in Plant)		
Name		
Contact Number		
Email Address		
GENERAL INFORMATION		
Plant capacity		
Name of the Technology Supplier		
Year of commissioning		
Number of operating days per annum		
Natural Gas meter Number		
Electricity/DISCO Consumer Number		

Mandatory Sheet					
Fuel used in Melt Furnace	**Interval**	**Unit**	**(July 2015-June 2016)**	**(July 2016-June 2017)**	**(July 2017-June 2018)**
Induction/Arc Furnace	Annual consumption	KWH			
RE Rolling Section	Annual consumption	KWH			
Coke used in Cupola	Annual consumption	Tonnes			
Gross Calorific Value	Annual weighted average	kCal/kg			
FO	Annual consumption	Litres			
Density	Annual weighted average	kg/litre			
Gross Calorific Value	Annual weighted average	kCal/kg			
Natural Gas/LPG	Annual consumption	Nm3 or mmBTU			
Gross Calorific Value	Annual weighted average	kCal/Nm3 or kCal/mmBTu			

Energy Consumption				
Electricity	**Unit**	**(July 2015-June 2016)**	**(July 2016-June 2017)**	**(July 2017-June 2018)**
source of electricity	**Grid**			
Annual units consumed	kWh			
Contract Demand	kVA			
source of electricity	**DG Set**			
Annual units consumed	kWh			
Installed Capacity	kVA			

Mandatory Sheet				
Production Details	**Unit**	**(July 2015-June 2016)**	**(July 2016-June 2017)**	**(July 2017-June 2018)**
Steel Production	Tonnes			

ARC/ Induction/Cupola Furnace Details	**Unit**	**(July 2015-June 2016)**	**(July 2016-June 2017)**	**(July 2017-June 2018)**
Number of Furnace	Numbers			
Capacity rated	Ton			
Medium /High Frequency	HZ			
Rated Temperature melting	°C			

Re rolling Mill Details	**Unit**	**(July 2015-June 2016)**	**(July 2016-June 2017)**	**(July 2017-June 2018)**
Re reheating furnace	Numbers			
Capacity rated	Ton			
FD motor	kW			
ID motor	kW			
Rolling motor capacity	KW			

Optional Sheet	
Equipment Details	
Particulars	**Details**
Air compressor Manufacturers	
Type of motor (whether standard efficiency/IE2/IE3/IE4)	
Details of capacitor banks installed	

Energy Efficiency Measures Implemented by plant
List of energy efficiency/energy conservation measures implemented by the plant in last 3 years

Annexure 2.1: Annual energy consumption of cement plants

Formulae used:

Global average specific energy consumption: 3.89 GJ/T of cement

(Source: *Page 12*, *Industrial Energy Efficiency Project: Benchmarking for Cement sector, UNIDO-GEF*)

$$Annual\ energy\ consumption, GJ = Cement\ Production, T\ \times 3.89 GJ/T$$

$$Annual\ energy\ consumption, GJ = 0.0239\ mtoe$$

List of cement plants with annual energy consumption

Sr. No.	Name Of Unit	Operational Capacity, TPA		Annual energy consumption
		Clinker	Cement	mtoe
1	Lucky Cement Limited - Indus Highway, Karachi	46,66,667	49,00,000	4,55,632
2	Lucky Cement Limited - Pezu	36,05,714	37,86,000	3,52,045
3	Bestway Cement Limited - Chakwal	34,28,571	36,00,000	3,19,268
4	Fauji Cement Company Limited - Fateh Jang	32,70,000	34,33,500	3,13,409
5	Maple Leaf Cement Factory Limited - Daudkhel	32,10,000	33,70,500	2,78,540
6	Attock Cement Pakistan - Hub Chowki, Lasbela	28,52,857	29,95,500	2,48,970
7	D.G.Khan Cement Limited - Hub	27,60,000	28,98,000	2,25,538
8	Kohat Cement Company Limited - Kohat	25,50,000	26,77,500	2,69,474
9	Cherat Cement Company Limited-Nowshera	23,10,000	24,25,500	1,96,247
10	D.G.Khan Cement Limited - D.G.Khan	20,10,000	21,10,500	1,96,247
11	D.G.Khan Cement Limited - Chakwal	20,10,000	21,10,500	1,96,247
12	Gharibwal Cement Limited - Jehlum	20,10,000	21,10,500	1,90,389
13	Bestway Cement Limited - Kalar Kahar	19,50,000	20,47,500	1,88,785
14	Pioneer Cement Limited - Khushab	19,33,571	20,30,250	1,64,027
15	Dewan Cement Limited - Dhabeji	16,80,000	17,64,000	1,46,453
16	Askari Cement Limited - Nizampur	15,00,000	15,75,000	1,14,233
17	Bestway Cement Limited - Hattar	11,70,000	12,28,500	1,11,304
18	Flying Cement Limited - Lilla	11,40,000	11,97,000	3,34,750
19	Bestway Cement Limited - Farooqia	11,20,000		1,04,144
20	Dewan Hattar Cement Limited - Hattar	10,80,000	11,34,000	1,05,446
21	Askari Cement Limited - Wah	10,50,000	11,02,500	1,02,517
22	Power Cement Limited - Nooriabad, Dadu	9,00,000	9,45,000	87,872
23	Fecto Cement Limited - Sangjani	7,80,000	8,19,000	76,156
24	Dandot Cement Limited - Jehlum	4,80,000	5,04,000	46,865
25	Thatta Cement Limited - Thatta	4,65,000	4,88,250	45,400

Annexure 2.2: Annual energy consumption figures of Thermal Power Plants using gas utility data

Formulae used:

Annual gas consumption data was provided by Sui Northern Gas Limited in HM3

$$1HM^3 = 3.8MMBTU$$

Annual energy consumption, mtoe = MMBTU * 0.023877

(Conversion value taken from Pakistan Energy Yearbook 2018, Appendix 7.4)

List of thermal power plants with annual energy consumption

Sl. No	Power Station	Installed Capacity	Total Generation	Annual gas consumption	Annual Energy, mtoe
	WAPDA*	**MW**	**GWh**	**HM3**	**Total**
1	SPS Faisalabad	132	7.19	16751	1520
2	GTPS Faisalabad	244	160.94	855539	77625
3	TPS Muzaffar Garh	1350	3413.62	428933	38918
4	TPS Guddu (unit 5-13)	1762	7758.00	6171504	559956.6
5	CCPP Nandipur	425	2463.90	4851317	464826
	Private Sector				
6	Altern Energy	31	145.12	155194	14081
7	Halmore Power	225	870.99	2313583	209917
8	Orient Power Balloki	213	841.43	2525203	229118
9	Quaid E Azam Thermal Power Pvt. Ltd.	1180	3367.70	10395076	943172
10	Rousch Power	450	2591.64	4333141	393157
11	Saif Power Sahiwal	225	849.76	2414588	219082
12	Sapphire Electric	212	815.37	2341839	212481
13	TNB Liberty Power	235	1041.56	3115999	282723

Annexure 2.3: Annual energy consumption figures of Thermal Power Plants on average generation cost and average fuel cost basis

Formulae used

For Natural Gas based units:

$$Annual\ fuel\ cost, PKR = \frac{\left(Total\ Units\ Generated(GWh) \times Average\ Fuel\ Cost\ \left(\frac{Ps}{kWh}\right) \times 10^6\right)}{10^2}$$

$$Annual\ fuel\ consumption, MMBTU = \frac{Annual\ fuel\ cost, PKR}{Unit\ cost\ of\ NG, PKR/MMBTU}$$

$$Annual\ energy\ consumption\ , Mtoe = Annual\ fuel\ consumption, MMBTU\ \times 0.024\ Mtoe/MMBTU$$

For Furnace Oil based units:

$$Annual\ fuel\ cost, PKR = \frac{\left(Total\ Units\ Generated(GWh) \times Average\ Fuel\ Cost\ \left(\frac{Ps}{kWh}\right) \times 10^6\right)}{10^2}$$

$$Annual\ fuel\ consumption, Tonne = \frac{Annual\ fuel\ cost, PKR}{Unit\ cost\ of\ FO, PKR/Tonne}$$

$$Annual\ energy\ consumption\ , mtoe = Annual\ fuel\ consumption, Tonne\ \times 0.9737\ Mtoe/Tonne$$

For HSD based units:

$$Annual\ fuel\ cost, PKR = \frac{\left(Total\ Units\ Generated(GWh) \times Average\ Fuel\ Cost\ \left(\frac{Ps}{kWh}\right) \times 10^6\right)}{10^2}$$

$$Annual\ fuel\ consumption, Litre = \frac{Annual\ fuel\ cost, PKR}{Unit\ cost\ of\ HSD, PKR/Litre}$$

$$Annual\ energy\ consumption\ , mtoe = \frac{Annual\ fuel\ consumption, Litre \times Density\ \left(\frac{kg}{Litre}\right) \times 10513\ kCal/kg}{10^7}$$

For Coal based units:

$$Annual\ fuel\ cost, PKR = \frac{\left(Total\ Units\ Generated(GWh) \times Average\ Fuel\ Cost\ \left(\frac{Ps}{kWh}\right) \times 10^6\right)}{10^2}$$

$$Annual\ fuel\ consumption, Tonne = \frac{Annual\ fuel\ cost, PKR}{Unit\ cost\ of\ Coal, PKR/Tonne}$$

$$Annual\ energy\ consumption\ , mtoe = \frac{Annual\ fuel\ consumption, Litre \times 5200\ kCal/Tonne}{10^4}$$

List of thermal power plants with annual energy consumption data

Sl. No	Power Station	Installed Capacity	Total Generation	Average Fuel Cost	Annual Energy Consumption
	WAPDA*	**MW**	**GWh**	**Ps/kWh**	**Mtoe**
4	TPS Guddu (Unit 1-4)	640	284.2	438.91	44719
6	GTPS Kotri	174	94.13	1093.98	36906
8	FBC Lakhra	50	5.25	1066.67	2807
9	TPS Jamshoro	880	2006.12	1045.83	442342
	K-Electric				
11	GTPS Korangi Town	107	323.11	470.26	48335
12	GTPS Site	107	498.13	433.21	70929
13	TPS Bin Qasim II	1260	4764.71	1066.69	1051901
14	Korangi CCP	248	1001.01	388.17	124841
15	TPS Bin Qasim II	573	3750.79	359.42	454027
	Private Sector				
16	AES Laipir M.Garh	362	1089.06	1087.27	214484
17	AES Pak Gen, M.Garh	365	1237.28	1081.62	242404
22	Engro Energy Limited	217	1668.90	509.61	304903
23	Fauji Kabirwala	157	1048.68	890.92	334952
29	HUBCO, Hub	1292	5201.00	1077.93	1015471
30	Hub Power, Narowal	214	1199.69	935.66	203320

Annexure 2.4: Annual energy consumption figures of Thermal Power Plants on average heat rate of power plants basis

Average Heat Rate of Power Plants in 2018 as per US Energy Information Administration:

Coal Based: 10481 BTU/kWh

Natural Gas Based: 7821 BTU/kWh

Petroleum Based: 11095 BTU/kWh

$$Annual\ energy\ consumption, BTU = Total\ units\ generated\ (GWh) \times Average\ Heat\ Rate\ (\frac{BTU}{kWh}) \times 10^6$$

$$Annual\ energy\ consumption, Mtoe = Annual\ energy\ consumption, BTU \times 39683207\ (\frac{Mtoe}{BTU})$$

List of thermal power plants with annual energy consumption

Sl. No	Power Station	Installed Capacity	Total Generation	Annual Energy Consumption
		MW	GWh	Mtoe
	Private Sector			
1	Attock	165	912	255120
2	Atlas Power	219	1246	348500
3	Davis Energen	11	9	1738
4	Foundation Power	185	1394	274718
5	Gul Ahmed Karachi	136	738	206407
6	Habibullah	140	743	146439
7	Haveli Bahdur Shar	1230	2858	754951
8	Kapco KOT Addu	1466	7608	1772123
9	Kohinoor energy, Lahore	131	666	186151
10	Liberty Power Tech	202	1180	329859
11	Nishat Chunian Power	200	1128	315265
12	Nishat Power	200	1222	341599
13	Saba Power	134	498	139317
14	Sahiwal Coal Fired Plant	1320	7307	1929954
15	Tapal Energy, Karachi	126	765	214014
16	UCH - I Power	586	4441	875229
17	UCH - II Power	404	2591	510650
18	Gulf Power Gen	62	3	777
19	Reshman	97	57	15909
20	Baloki	1320	2149	423496
21	Port Qasim	1320	3598	950319

Annexure 2.5: Annual energy consumption of textile plants

S. NO.	ID	NAME	Annual energy consumption. Mtoe
1	1090880000	M/S Ai Karam Textile Mills (Pvt)Ltd	37105
2	8160738602	M/S Gul Ahmed Textile Mills	24218
3	5980880000	M/S Younus Textile Mills	23196
4	4135480000	M/S Lucky Textile Mills	21245
5	9624651000	M/S Indus Dyeing & Manfg. Co. Ltd	20843
6	3184492912	M/S Gul Ahmed Textile Mills	18702
7	5165851000	M/S Agar Textiles (Pvt)Ltd	18244
8	4980880000	M/S Younus Textile Mills	16053
9	2198200000	M/S Amna Industries (Pvt) Ltd	15513
10	46280000	M/S Kassim Textile Pvt.Ltd	15360
11	6329090000	M/S Novatex Limited	15490
12	3839978381	M/S Gul Ahmed Textile Mills Ltd	14665
13	4077137014	M/S Novatex Limited	14275
14	7546951000	M/S Premium Textile Mills Ltd	14119
15	8723418868	M/S A Karam Textile Mills (Pvt Ltd	13603
16	2667331000	M/S Liberty Mills Ltd	13237
17	1046280000	M/S Kassim Textile Pvt.Ltd	12252
18	4741110494	A-Rahim Textile Industries	12706
19	7990070000	M/S Afroze Textile Industries (Pvt) Ltd	12670
20	7187341000	M/S M.P.Cotton Mills Pvt Ltd	12355
21	30290000	M/S Indus Dyeing & Manfg. Co. Ltd	12143
22	8622431000	M/S M Hanif Industries	12028
23	72336865	M/S Colony Mills Ltd, Ismaeelabad Shershah Road Multan	12071
24	6012239131	M/S Zaman Textile Mills Ltd	11781
25	7746951000	M/S Zahra Textile	11439
26	6516020525	M/S Artistic Fabric & Garments Industries (Pvt)	11429
27	4880880000	M/S Gul Ahmed Textile Mills	11296
28	3546951000	M/S Nadeem Textile Mills Ltd	11254
29	4699190000	M/S Artistic Denim Mills Limited	11071
30	6165851000	M/S Ngaina Cotton Mills Ltd	10791
31	8457051000	M/S Saphire Textile Mills Limited (Weaving And Processing Unit) 1.5 Km, Warburton Rd Ferozewattwan Distt Sheikhupura	10703
32	2365851000	M/S Saphire Textile Mills Ltd	10189
33	7936280000	M/S Orient Textile Mills Ltd	10043
34	6646951000	M/S Younus Textile Mills Ltd	10035
35	8646951000	M/S Metco Textile (Pvt) Ltd	9952
36	6413741000	M/S Quetta Textiles Mills Ltd (Captive Power) 47 5-Km Multan Road Bhai Pheru Distt Kasur	9733
37	646951000	M/S Faisal Spinning Mills Ltd	9576
38	3973590000	M/S Ibrahim Fibers Private Ltd Sheikhupura Road Faisalabad	9484
39	2487341000	M/S Siddiq Sons Denim Mills Pvt Ltd	9056

S. NO.	ID	NAME	Annual energy consumption. Mtoe
40	4187341000	M/S Feroze 1888 Mills Limited	8462
41	6757051000	M/S Riaz Textile Mills (Pvt) Limited 23-Km Skp Fsd Rd Ferozewattoan Distt Sheikhupura	7586
42	4646951000	M/S Yunus Testiles Mills Ltd	7577
43	1913590000	M/S Nishat Textile Mills Sheikhupura Road Faisalabad	7372
44	3646951000	M/S Latif Textile Mills (Pvt)Ltd	7329
45	6746951000	M/S Lucky Cotton Pvt. Ltd	7308
46	7781651000	M/S United Textile Mills	7301
47	3177988425	M/S Rjby Textiles (Pvt) Ltd	7293
48	346480000	M/S International Textile Ltd	7206
49	3870741000	M/S U S Denim (Pvt) Ltd 3-Km Defence Road Off Raiwind Road Lahore	7043
50	7646951000	M/S Khas Textile Mills Pvt Ltd	6915
51	7757051000	M/S Diamond Fabrics Ltd 20-Km Skp Fsd Road Ferozewattuan	6809
52	8630741000	M/S Ghazi Fabrics International Limited (Captive Power) 46 Km Multan Road Dina Nath Distt Kasur	6784
53	2100741000	M/S Nishat Mills Ltd Dyeing Finishing 21 Km Off Ferozepur Road Lhr	6706
54	9993590000	M/S Crescent Textile Mills Ltd. Textile Mills Ltd Sargodha Road Faisalabad Faisalabad	6608
55	8575090000	M/S Indigo Textile (Pvt) Ltd	6605
56	6449641000	Rupali Polyester Ltd 30 K M Skp Road Lahore	6181
57	7430741000	M/S Colony Weaving Mills (Pvt) Ltd (Co-Generation Weaving) 4-Km Manga Raiwind Rd D/Kasur	6177
58	7893590000	M/S Ibrahim Fibers Ltd Captive Power Through Co Generation 38th K M S Sheikhupura Road Fasialabad	6153
59	6792259800	M/S Ahmad Hassan Testile Mills Ltd Mm Road Chowk Sarwar Shaheed Sanwan Moon Muzafar Garh	6039
60	6057051000	M/S Nishat Mills Limited 12-Km Fisalabad Rd District Sheikhupura	6033
61	4398666914	M/S Artistic Fabric & Garments Industries	5739
62	3167051000	M/S Suraj Cotton Mill Ltd (Captive Power) Ch 144-Rb 50km Fsd Skp Road Kotla Kahlon Shah Kot Distt Sheikhupura	5167
63	3586040000	M/S Fazal Cloth Mills Jhang Road Muzaffar Garh	5761
64	3110741000	M/S Saphire Finishing Mill Ltd 2-Km Raiwind Manga Rd District Kasur	5034
65	7609278918	M/S Fazal Cloth Mills Unit # 3 Qadir Pur Rawan Bypass Khaenwal Road Multan	4868
66	4745140000	M/S Mehmood Textile Mills Multan Road Muzaffargarh	4746
67	1457051000	M/S Saphire Textile Mills Ltd (Unit No 5) 1-5 Km (Captive Power) Warbuton Rd Feroze Wattwan Distt Sheikhupura	4712
68	2556410830	Fazal Rehman Fabrics Ltd Qadar Pur Rawaan Khanewal Road Multan	4583
69	2051020000	Reliance Weaving Mills Ltd Fazalpur Khanewal Road Multan	4547
70	8257051000	M/S Nishant Mills Ltd 20 Km Ferozewatwan Fsd Skp Road	4454

S. NO.	ID	NAME	Annual energy consumption. Mtoe
		Sheikhupura	
71	3051020000	M/S Reliance Weaving Mill Ltd Fazalpur Khanewal Road Multan	4460
72	9189120000	M/S Masood Spinning Mills 4th Kilometre Multan Road Kabirwala	4238
73	3122230000	M/D Ahmad Fine Textile Mills Ajab Nagar Shahbaz Pur Rd R Y K	4208
74	8709049214	M/S Hassan Spinning Mills (Captive Power) Ltd 2.K.M, Jaranwala Road Khurrianwala Faisalabad	3921
75	2140741000	M/S Nishat Chunian Ltd (Dyeing Of Clothes) Nr Colony Weaving Bucheki Majha Manga Raiwind Rd Distt Kasur	3801
76	587590000	M/S Bismillah Textile Private Ltd 1 Km Janan Wala Rd Khurrianwala	3557
77	6267051000	M/S Prosperity Weaving Mills Ltd Captive Power Nagina House 91-B-1 M M Alam Road Gulberg Iii Lahore - 54660	3504
78	2070741000	M/S Zypher Textiles Ltd (Captive Power) 1km Head Balloki Road Bhai Pheru Distt Kasur	3255
79	3240741000	M/S Kohinoor Weaving Mills Ltd (Captive Power) 8- Km Manga Raiwind Rd Distt Kasur	3135
80	7020741000	M/S Ellcot Spinning Mills Ltd 63 Km Manga Raiwind Road Distt Kasur	3132
81	5710741000	M/S Tritex Cotton Mills Ltd Jamber Khurd B/H Century Paper	2994
82	8586040000	M/S Sunrays Textile Mills Ltd Khanpur Bagasher Road Muzaffar Garh	2992
83	4759671000	M/S Resham Testile Ind Ltd. 15 Km Habib Abad Chunian Road Distt Kasur	2896
84	7726013847	M/S H.A Fibers (Pvt) Ltd Sujan Pur Captive Power 6 Km Khanewal Road Multan	2857
	Electricity Ref No		
85	28131545401530	Muhammad Waseem Mukhtar	11443
86	28131335310200	A A Spinning Mills Ltd	7652
87	24118442604800	M/S Diamond Fabrics Ltd 26km Faisalabad Road Warbarton	7152
88	24119199002400	Master Textile Mills, 3 K.M Off Dars Road Raiwind	5721
89	24118112604900	M-S Reliance Cotton Mill Warburton Road Feroze Watowan	4649
90	24118432604700	M/S Sapphire Fibres Ltd Faisalabad Road Warbartan	4291
91	28131525201800	Masood Textile Mills Ltd Ck 69 Rb Fsd	3862
92	24119199002500	Muhammad Buksh Textile Mill Lt Raiwind Manga Rd Rwd	3647
93	24372250000111	Faisal Spinning Mill Plot No:A-150 Site Nooriabad	3576
94	30159212533900	Masood Spinning Mills Ltd 4th Kilometer Multan Road Kabir Wala Distt: Khanewal	3575
95	30157111346902	Mehmood Textile Mills Multan Road M.Garh	3575
96	24119199001500	M/S Amir Cotten Mills Pvt Ltd 64.Km Multan Road Jumber	3572
97	24116212105500	Crescent Fibers (Ltd) Bhikhi 16- Km Faisalabad Road Sheikhupura.	3570

S. NO.	ID	NAME	Annual energy consumption. Mtoe
98	30157111346203	Fazal Cloths Mills Unit 2 Jhang Rd M Garh	3569
99	24116222113730	Muhammad Saleem M-S Bhanero Textile Mills Ferozewattan 18km Fsd Road Skp	3564
100	30151280490205	Hussain Mills Limited Basti Malook Bwp Road Multan	3562
101	24116222114002	Ms Blessed Textile Ltd Unit 01feroz Watwan 18km F.Bad R Skp	3552
102	30151321942801	Hussain Mills Ltd Shahra-E-Rashid Vehari Road Multan	3540
103	30159212533901	M/S Masood Spinning Mills 04-Km Multan Road Kabir Wala	3540
104	28131285504900	Sargodha Spinning Mills Ltd Sgd Road Faisalabad	3540
105	28131525200535	Zahidjee Textile Mills Ltd S/O Muhammad Sharif M-3 Sahianwala Fiedmc Fsd	3540
106	24116222113740	Ms Faisal Spinning Mills Ltd Weaving Unit Ferozwattwan Skp	3540
107	24116222113790	M/S Bhanero Textile Mills Ltd Weaving Unit 18km Fsb Road Skp	3540
108	24116222114000	M/S Blessed Textile Mills No.3feroze Wattwan Sheikhupura.	3540
109	24118322603300	M-S North Star Textile Mills Warburton Road Feroze	3540
110	24119199006900	M/S Sapphire Fibers Ltd Raiwand Road	3540
111	24119199058000	M/S Kohinoor Textile Mills Manga Raiwind Road Distt Kasur	3540
112	30157111346701	Tata Textile Mill Khan Pur Bagga Sher M.Garh	3537
113	30157111346403	Husnain Textile Mills Pvt Ltd. 3-Km Jhang Road Muzaffar Garh	3508
114	24372210000011	M/S Nagina Cotton Mills Ltd Plot No A-16 Indus Highway Site Kotri	3504
115	24372210000331	M/S Sapphire Textile Ltd No: 1 Plot No A-17 Site Kotri	3504
116	30151923126100	Reliance Weaving Mills Fazal Near 500 Kv Grid Staion Multan	3504
117	30151951551802	M/S Fazal Cloth Mills Qadir Pur Rawan Multan	3504
118	30157111346207	Fazal Cloth Mills (Ltd) Rakh Khan Pur Jhang Road M Garh	3504
119	24116132102700	Ayesha Spinning Mill Lahore Road Sheikhpura	3504
120	24117449004302	Din Textile Mills Multan Road Pattoki	3504
121	24118322601999	Idrees Textile Mills Ferozwatwan Warburton	3504
122	24119199003900	For M/S Al Nasr Textiles Ltd 9 Km Raiwind Manga Road	3504
123	24119199004200	M/S Hira Textile Mills 8 K.M Raiwind Manga Road 3.4 Km Raiwind Manga Road	3504
124	24119199006500	Zephyr Textile Mills Baloki Road Phool Nagar	3504
125	24119199178000	M/S Ellcot Spinning Mills Ltd 6.3 Km Manga Raiwind Road	3504
126	28131335310000	Rafiq Spinning Mils Pvt Ltd Shreen Wala 20 Km Skp Road Fsd	3498
127	27145219320900	Kohinoor Spinning Mill Bhone Road Chakwal	3492

S. NO.	ID	NAME	Annual energy consumption. Mtoe
128	24117349030001	Nafeesa Textile Mills Kasur Depalpur Rd Theeng More	3445
129	30157230343101	M/S Mehmood Textile Mills Unit No 6 Chowk Sarwar Shaheedc S S	3433
130	24119199003501	Tri Taxcotton Mills Jamber Khurd Multan Rd Bhaipheru	3433
131	28131285313870	M/S Crescent Textile Mills Ltd Sargodha Road Faisalabad	3419
132	30151923126102	Reliance Weaving Mills Near 500 Kv Grid Station Kwl Road Multan	3397
133	30151951551803	M/S Fazal Cloth (Weaving Unit) Qadir Pur Rawan Kwl Road Multan	3397
134	24116110000700	M/S C.A Textile Mills Lahore Road Sheikhupura.	3397
135	24372210000021	M/S Island Textile Mills Ltd Plot No.A-12 Site Area Kotri	3361