Azadi Ka Amrit Mahotsav

NITI Aayog

Report of the Inter-Ministerial Committee on **Energy Data Management**

Under Sustainable Growth Pillar of India-US Strategic Clean Energy Partnership

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COMPOSITION OF THE INTER-MINISTERIAL COMMITTEE

Composition of the Inter-Ministerial Committee on Energy Data Management

Sl. No.	Name and Designation	Position
1	Sh. Rajnath Ram, Adviser (Energy), NITI Aayog	Chairman
2	Ms Santosh, DDG, Ministry of Coal	Member
3	Ms Anshu Singh, DDG (Stats), Ministry of Environment, Forest and Climate Change	Member
4	Ms. Harmeet Minhas Kumar, Director, Ministry of Statistics and Programme Implementation	Member
5	Sh. Arijit Sengupta, Director, Bureau of Energy Efficiency	Member
6	Sh. Prahlad, Chief Engineer, Central Electricity Authority	Member
7	Sh. VP Singh, Director, Coal Controller's Organisation	Member
8	Dr Pankaj Sharma, Additional Director, Petroleum Planning and Analysis Cell	Member
9	Sh. Vikram Dhaka, Scientist C, Ministry of New and Renewable Energy	Member
10	Ms Avinash Kumari, Assistant Director, Ministry of Petroleum and Natural Gas	Member
11	Prof. Venkat Ramadesigan, IIT Bombay	Member
12	Prof Ankush Sharma, IIT Kanpur	Member
13	Sh. Srihari Dukkipati, Prayas (Energy Group)	Member
14	Ms. Apurva Chaturvedi, Senior Clean Energy Sepcialist, USAID	Member
15	Ms. Meredydd Evans, Scientist, Pacific Northwest National Laboratory	Member
16	Mr. Samson Adeshiyan, Director, Office of Statistical Methods and. Research, EIA	Member

Sl. No.	Name and Designation	Position
17	Mr. Jon Weers, Lead Technologist and Data Systems Architect. National Renewable Energy Laboratory	Member
18	Sh. Kamil KPS Bhullar, Research Officer, NITI Aayog (Member Convener)	Member

Terms of reference

i. Standardising the definitions, terminologies and calculation methodology of all the key parameters in the energy sector so that reporting of data is uniform.

ii. Arrive at uniform values of standard data including Gross Calorific Value, operation hours, etc.

iii. Standardize methodologies for data collection, data quality, validation, survey design methodologies, etc. and their reporting

iv. Based on the findings of 8 Sub-group reports on energy data management for the various demand and supply sectors, build on the identified energy data gaps and ensure collection and maintenance of the required data.

v. Study and make suggestions for the setting up of a centralised data agency in India

vi. Suggest measures for enriching of India Energy Dashboards

vii. Publish an Energy Statistics Manual/ Handbook, which will include, e.g.:

- Definitions and concepts of all the key parameters in the energy sector
- Formats and methodologies for data collection and reporting
- Standardised data (GCV, operation hours, etc.)
- Energy Balances and energy accounting

viii Organising stakeholder consultations, if required

FOREWORD

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सत्यमेव जयते

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Dated: 12.09.2022

Foreword

Energy sector is one of the key areas of focus in the emerging debate on climate change. Effective policy formulation in this crucial area requires in-depth analysis, which in turn is dependent on readily available, accurate, reliable and comprehensive data. Availability of such data requires institutional mechanisms and processes to collect, process, and disseminate data in a timely manner. Energy data (resource assessment, extraction, conversion, transmission, distribution, and consumption) for India is published by a number of state and national agencies. However, much of the data available is dispersed, in silos, not standardised and difficult to collate. Addressing differences in the organization of data, distributed energy planning among five ministries, use of incompatible formats and standard definitions is a key challenge to make available usable data. This results in significant data gaps and inconsistencies.

2. To address the above issues, the Report of the Inter-Ministerial Committee on Energy Data Management headed by Sh. Rajnath Ram, Adviser (Energy), NITI Aayog has examined the International Recommendations on Energy Statistics, System of Environmental-Economic Accounting for Energy (SEEA) and annual Indian energy statistics publications of the Ministries. With respect to calorific values it is recommended that methods used in arriving at the calorific value should be documented to ensure transparency, clarity and comparability by the respective ministries and default calorific values should be avoided as much as possible. It recommends that National Industrial Classification (NIC-2008) codes and National Product Classification for Manufacturing Sector (NPCMS-2011) may be used to classify data. There are several recommendations pertaining to statistical publications in the energy domain. The report recommends improvements in the publications. The report also highlights the importance of strengthening existing institutions such as the Energy Statistics Division (ESD) of Ministry of Statistics and Programme Implementation (MoSPI) and the Energy Statistics annual publication of MoSPI.

3. The report has concrete recommendations with respect to data definitions, standardization, methodologies, calorific values, energy/commodity balances etc which can go a long way in strengthening the energy balances being reported in India. This report is truly a collaborative effort to address long standing issues pertaining to energy statistics in India.

(Anna Roy)

स्वच्छ भारत
एक कदम स्वच्छता की ओर

PREFACE

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सत्यमेव जयते

भारत सरकार
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Preface

Collection, processing, dissemination, data quality, automation and adoption of best practices are important aspects for developing robust energy data management system in India. Data must be captured not only from the supply side but also from the demand side so that data gaps and inconsistencies are addressed. Good quality data is a requirement for a robust policy planning and medium to long term energy planning. It is often said that what gets measures gets managed. In order to have effective policy making, it is critical that the data available is accurate, reliable and comprehensive.

The report of the inter-ministerial committee has examined key issues with respect to energy data in India such as definitions and concepts of all the key parameters in the energy sector, calorific values, economic/statistical units, energy products/ resources, data collection/compilation and energy and commodity balances. It has made concrete recommendations with respect to these issues which can bring greater accuracy to derivation of energy balances in India.

Improving energy data management in India is an on-going exercise and NITI Aayog is closely working with various stakeholders and line ministries/departments including the Ministry of Statistics and Programme Implementation. This report will play an important role in initiating a discussion around various issues which need to be addressed with regard to energy data management. I would like to thank all the ministries/departments, academic institutions, think tanks and US labs/agencies for their valuable inputs which led to the finalization of the report. Our partners at USAID provided knowledge support at critical junctures for the committee. We hope to continue our engagement with all stakeholders represented on the committee for implementation of the recommendations of the committee and further continuous improvements in India's energy data management system.

Rajnath Ram
Adviser (Energy)

ACKNOWLEDGEMENTS

The report of the committee could not have been completed without the active intellectual support provided by individuals representing various ministries/ departments, agencies and think tanks. The committee would like to thank Ms Santosh, DDG, Ministry of Coal, Ms Anshu Singh, DDG (Stats), Ministry of Environment, Forest and Climate Change, Sh. Arijit Sengupta, Director, Bureau of Energy Efficiency, Sh. Prahlad, Chief Engineer, Central Electricity Authority, Sh. VP Singh, Director, Coal Controller's Organisation, Dr Pankaj Sharma, Additional Director, Petroleum Planning and Analysis Cell, Sh. Vikram Dhaka, Scientist C, Ministry of New and Renewable Energy, Ms Avinash Kumari, Assistant Director, Ministry of Petroleum and Natural Gas, Prof Venkat Ramadesigan, IIT Bombay, and Prof Ankush Sharma, IIT Kanpur for their valuable inputs.

The committee would like to acknowledge the support and inputs provided by Ms Meredydd Evans, Scientist, Pacific Northwest National Laboratory and Mr Samson Adeshiyan, Director, US Energy Information Administration. In particular the committee would like to thank Sh. Srihari Dukkipati, Research Fellow, Prayas (Energy Group) who provided support in terms of the initial paper for discussion. A special thanks to Dr Rakesh Sarwal (Additional Secretary, NITI Aayog when the committee was constituted) and Sh. Navin Kumar Vidyarthi, Director (Energy), NITI Aayog for their efforts towards taking the work of the committee to its logical conclusion.

CONTENTS

BACKGROUND

Energy data (resource assessment, extraction, conversion, transmission, distribution, and consumption) for India is published by a number of state and national agencies. However, much of the data available is dispersed and difficult to collate due to differences in the organization of data, use of incompatible formats and standard definitions. Moreover, there are significant data gaps.

The mandate for Energy Data Management (EDM) in India is fairly decentralized, with the earlier Act being "The Collection of Statistics Act, 2008". Individual Ministries have issued mandates for specific data under their respective domain, however a legal framework needs to be evolved in view of data collection being carried out by through decentralized agencies under various ministries besides MoSPI. Lack of standardized formats make it difficult to automate the process of data sharing and publication on dashboards. There exists a data gap in consumption and demand, no regular surveys are conducted at the household level to determine consumption data of interest. Consumption data also needs to be accessed from four areas in particular – agriculture, building (both residential and commercial), industry and transport.

The shape of the data architecture varies across countries. The local conditions of each country have to be considered while analysing the system best suited to it. Data management systems range from the highly centralized ones (Canada) to highly decentralized (Germany).

There is a need to standardise the definitions, terminologies and calculation methodology of all the key parameters in the energy sector (e.g. import dependency of crude oil, natural gas, etc.) so that reporting of data is uniform. It is also required that we arrive at uniform values of standard data (Gross Calorific Value, operation hours, etc.) and standardize methodologies for data collection, data quality, validation, survey design methodologies, etc. and reporting.

1. INTRODUCTION

1.1 A committee on energy data management was formed by NITI Aayog on 30th July 2021 under the Sustainable Growth Pillar established under the India-US Strategic Partnership. During the meeting of joint working group held on 23rd August, a sub-group was formed on Energy Data Management to identify the parameters which need to be standardized across various energy statistics products in India. The inter-ministerial committee deliberated twice on the subject.

1.2 While preparing the report, the following documents have been referred to:

- International Recommendations for Energy Statistics (IRES) and the associated Energy Statistics Compiler Manual (ESCM) published by the UN Statistics Division
- System of Environmental-Economic Accounting for Energy (SEEA-Energy) published by the UN Statistics Division
- Documents published by MoSPI for industry and products classification, i.e., NIC-2008 and NPCMS-2011 respectively
- Latest annual Indian energy statistics publications, i.e., Coal Directory 2019-20, Petroleum and Natural Gas Statistics 2019-20, All India Electricity Statistics-General Review 2020, Energy Statistics 2021

1.3 During the deliberations of the committee, it was observed that data lacks data definitions and standard classification due to which it is difficult to compile energy balance. This issue was prevalent across ministries. The use of standard classifications is important in the collection, compilation and dissemination of statistics. Standard classifications provide a clear definition, with a unique structure, of the objects that are being measured and collected. They facilitate the compilation of data as the classifications define relationships between concepts and objects. Finally, they allow for better integration of data collected across different statistical domains such as, for example, energy, environment and economic statistics. (ESCM, Section 3.1)

1.4 The committee felt that the following aspects need standardisation in energy statistics as per IRES of UN.

1. Measurement units
2. Energy flows
3. Economic/statistical units
4. Energy products
5. Energy resources
6. Various other classification not mentioned in the IRES
7. Energy and commodity balances
8. Metadata

1.5 The above topics are covered in detail in the subsequent sections of the report, along with some examples where standardisation is needed.

2. STANDARDIZATION OF DATA

Units

2.1 The only unit for energy in the SI system is the joule and is the common energy unit recommended to be used in energy statistics.

2.2 While data may be collected in units that are most suitable for national circumstances, it is desired that the data is disseminated in units that are standardised internationally. Table 1 (reproduced below) in the IRES provides the recommended units for dissemination of energy data and Table 2 provides the dimensions and price units used in India. This table has been reproduced below.

Table 1: Reproduced Table 4.4 of IRES

Energy products	Dimension	Unit
Solid fossil fuels	Mass	Thousand metric tons
Liquid fossil fuels (crude oil, petroleum products, condensate)	Mass	Thousand metric tons
(Liquid) Biofuels	Mass/Volume	Thousand metric tons/ Thousand cubic metres
Gases	Energy	Terajoules
Wastes	Energy	Terajoules
Fuelwood	Volume/Energy	Thousand cubic metres/ Terajoules
Charcoal	Mass	Thousand metric tons
Electricity	Energy	GWh
Heat	Energy	Terajoules
Common unit (e.g., balances)	Energy	Terajoules
Electricity installed capacity	Power	MW
Refinery capacity	Mass/time	Thousand metric tons/year

Table 2: Units used in India

Energy Product	Unit (Quantity)	Unit (Price)
Crude Oil and Condensate	Thousand metric tons	USD per barrel
Natural Gas	Million metric standard cubic metres	USD per mmbtu
Petroleum products	Million metric tons	INR per litre
Biofuels (ethanol)	Crore litres	INR per litre
Electricity installed capacity	MW	INR per MW
Electrical energy	GWh	INR per kWh
Coal	Million tons	INR per ton
Biomass	Million metric tons	INR per ton

2.3 The units followed in Indian energy statistics are more or less similar although there are some minor differences, e.g., coal quantities are reported in million metric tons whereas thousand metric tons is recommended.

2.4 Units for products such as biomass and waste which vary widely in energy, moisture and ash content are recommended to be reported in energy content rather than physical quantities such as mass or volume.

Calorific values

2.5 When expressing energy content of energy products in common energy units, e.g., when building energy balance tables, net calorific values (NCVs) are preferred over gross calorific values (GCVs). The following tables provide the calorific values in use in India.

Table 3: Average International Calorific Values (reproduced from PNG Statistics)

Average International Calorific Value of different fuels		
Products	**K Cals/Kg**	**BTUs/Kg**
Oil Equivalence		
Average Crude Oil/NGLS	10300	40870
United Nations	10175	40375
Oil Products		
NGL	12135	48150
Motor Gasoline	11135	44190
Kerosene	10638	42210
Jet Fuel	11790	46790

Average International Calorific Value of different fuels		
Products	**K Cals/Kg**	**BTUs/Kg**
Gas Oil	10790	42820
Fuel Oil	10440	41430
Coal Equivalences		
Average Hard Coal	7000	27775
India		
Hard Coal	5000	19840
Lignite Brown Coal	2310	916
Firewood	4750	18848
Charcoal	6900	27379
Natural Gas Production (Average) India		
	8000-9480	
Electricity		
Output Basis	860 kcal/kwH	
Fuel Input Basis	25002700	

Table 4: Non-coking coal - gradation based on GCV

GCV BAND (K.Cal./Kg.)
Exceeding 7000
Exceeding 6700 and not exceeding 7000
Exceeding 6400 and not exceeding 6700
Exceeding 6100 and not exceeding 6400
Exceeding 5800 and not exceeding 6100
Exceeding 5500 and not exceeding 5800
Exceeding 5200 and not exceeding 5500
Exceeding 4900 and not exceeding 5200
Exceeding 4600 and not exceeding 4900
Exceeding 4300 and not exceeding 4600
Exceeding 4000 and not exceeding 4300
Exceeding 3700 and not exceeding 4000
Exceeding 3400 and not exceeding 3700
Exceeding 3100 and not exceeding 3400
Exceeding 2800 and not exceeding 3100
Exceeding 2500 and not exceeding 2800
Exceeding 2200 and not exceeding 2500

Table 5: Gradation of coking coal - based on ash content

Grade	Ash Content
Steel Grade - I	Not exceeding 15%
Steel Grade - II	Exceeding 15% but not exceeding 18%
Washery Grade - I	Exceeding 18% but not exceeding 21%
Washery Grade - II	Exceeding 21% but not exceeding 24%
Washery Grade - III	Exceeding 24% but not exceeding 28%
Washery Grade - IV	Exceeding 28% but not exceeding 35%
Washery Grade - V	Exceeding 35% but not exceeding 42%
Washery Grade - VI	Exceeding 42% but not exceeding 49%

2.6 In order for better accuracy in energy balances, it is recommended that specific calorific values are used where possible through the entire chain of flow for each fuel since the calorific values may vary to meet various market requirements, e.g., ethanol blending. The calorific value of ethanol being much lower than Motor spirit and further with its blending %age in MS on the increase, a separate product classification in NPCMS-2011 is required, blending more than 10%. The same is essential in view of the introduction of flex fuel engines and the proposed sale of 100% ethanol as a fuel.

As per NPCMS-2011, under Division 34 (Basic Chemicals), Group 341 (Basic Organic chemicals), Class 3413 (Alcohols, phenols, phenol-alcohols, and their halogenated, sulphonated, nitrated or nitrosated derivatives; industrial fatty alcohols) & Subclass 34110 (Ethyl alcohol and other spirits, denatured, of any strength), product codes listed are 3413101 (Ethyl alcohol) & 3413102 (Methyl alcohol (methanol)). In view of the usage as a fuel, the product classification be need to be modified accordingly. Similarly, products obtained from gasification of the heavier petroleum compounds need to be classified under the Group 334. In addition, a particular energy product may have different energy content over different batches of production, for imports and exports and over time, such as in the case of coal. In such cases, the specific calorific values for each of these quantities should be used, and weighted average calorific value of the energy product should be used when aggregating. All the methods used in arriving at the calorific value should be documented to ensure transparency, clarity and comparability. Default calorific values should be avoided as much as possible. Where needed, default net calorific values provided in Table 4.1 of IRES for various energy products should be used.

Publication	Description	Remarks
Energy Statistics 2021	Chapter 7: Energy Balance and Sankey Diagram	While the methodology for converting physical quantities to energy units is described, the underlying calorific value data is not reported.
PNG Statistics 2019-20	Appendices	Lot of detailed conversion tables (volume to weight, unit versions, impact of temperature, calorific value etc.) which are very useful. Density for a fuel may vary as per different batches of production, imports and exports and ethanol blending over time etc. Similarly, energy content may also vary. Therefore, it is essential that weighted average for volume-mass conversion & calorific value of the energy product be used for calculation purpose. Global conversion factor or energy content may be taken as a standard reference only. It will also entail statistical differences & inaccurate conclusions.

2.7 In case of bio-energy, it is recommended that a detailed assessment of availability of different bio-energy resources and their potential needs to be undertaken. Previous discussions with Ministry of Coal have yielded proposals for a using grade wise calorific values approach whereby the mid-point of the range of calorific values against each grade are used. The note on this methodology is provided in Annexure II.

Energy flows

2.8 As per Energy Statistics 2022, In 2020-21 (P), Primary Energy Supply added up to 8,88,523 Kilo Tonnes of Oil equivalent (KToE)

- Coal, which accounted for 64.93% of the total, and Crude Oil, which accounted for 26.29% were two major contributors to the total energy supply in the country
- Final Energy Consumption (End Use) was 5,53,971ktoe in 2020-21 (P). The industrial sector was the largest consumer of energy in the country, using more than half, i.e., 56.22% of the total final energy consumption.
- The most energy intensive industries were iron and steel, accounting for 15.37% of the industrial energy use followed by Chemicals and petrochemicals 4.43% and construction 1.96%.

- The consumption of the residential, agriculture, commercial & public sectors, non-energy purpose and other sectors represented 34.96% of the total final consumption in the country, and, transport sector accounted for 8.82% of Total Final Consumption.

Data on energy flows needs to be defined for all of the following categories, as per the definitions in Chapter 5 of the IRES:

- Production, including primary and secondary production
- Imports
- Exports
- International marine bunkers
- International aviation bunkers
- Stock changes
- Transfers
- Transformation
- Losses
- Energy industries own use
- Non-energy use
- Final consumption

2.9 Data on International/coastal bunkers are already available in Table V.5 of the IPNG publication released by MoPNG, the ESD may too start reporting the data in their publication. It may be noted that not all the quantity items listed above are reported in the annual energy statistics, e.g. storage capacity and stock changes pertaining to Petroleum and Natural Gas. However, the Stock change data is being reported in the JODI by the Ministry of Petroleum & Natural Gas. . In the case of coal, pit-head stocks are reported, but without data regarding calorific value.

Classification of economic/statistical units

2.10 Classification of statistical units is done according to the type of economic activity, and is a useful way to classifying entities associated with the energy sector. Since there is wide variation in how economic units are organised, there are multiple ways of categorising statistical units depending on the context and application (see Annexure).

2.11 For the purposes of aggregate annual energy statistics, statistical units may be grouped into energy industries, other energy producers, and energy consumers, representing different stages along the energy flows. (IRES, para 5.8)

2.12 Energy industries are defined as those economic units whose principal activity is the primary energy production, transformation of energy or distribution of energy. This includes primary energy producers such as coal mining companies, oil and gas extraction companies;energy transformation companies such as coal washeries, electricity generating plants and refineries; energy storage companies; and energy transportation and distribution companies. In order to improve cross-country comparability of statistics on energy production by energy industries, IRES recommends that countries identify the energy industries listed in the left column of the Table 5.1 of IRES (reproduced in the Annexure). The table also provides information on the ISIC Rev. 4 division/ group/class in which the different energy industries are included.

2.13 Other energy producers include those entities who have some other principal activity, but for whom energy supply is a secondary activity. This includes activities such as bagasse co-generation, captive electricity generation, and rooftop solar generation. This information is not readily available due to self-consumption etc. and also since these entities is dispersed and large in number. These entities are not classified as energy suppliers, but based on their primary activity.

2.14 Energy consumers are economic units that are final users of energy that may use energy products for energy use or for non-energy use. Table 5.3 in IRES lists groups of energy consumers along with correspondence between the identified groups of energy consumers and the relevant categories of ISIC Rev. 4. This table is reproduced in the Annexure. Share of the non-energy sector in Oil & Gas consumption is projected to increase in future with all the global agencies projecting it as the most resilient sector. In view of the projected increase in share of the non-energy sector and in line with the global practices, the same needs to be classified separately with sub-classification basis the current & foreseeable uses. Although the endeavor in the NIC-2008 & NPCMS/NPCS classification is to include all the possible options, however having a long list may come as a constraint in normal usage and based on user interpretation. A concise list based on the current dynamics can make the Energy data management easier and avoid statistical imbalances.

2.15 The IRES recommends that national energy statistics should use a classification compatible with the International Standard Industrial Classification of All Economic Activities (ISIC) Rev. 4 in order to facilitate cross-country comparisons. However, the ISIC classification is broad in scope, since it is a generic classification applicable to all nations globally. Hence countries are encouraged to add sufficient detail needed to reflect their specific circumstances.

2.16 The National Industrial Classification (NIC-2008) published by MoSPI is derived from ISIC Rev 4, and the structure of NIC-2008 is identical to the structure of ISIC Rev. 4 up to 4-digit level 'class', and subsequently divided into 5-digit 'sub classes' according to national requirements. NIC-2008 is used by various government agencies and industry associations and researchers for economic data. For example, NIC-2008 is used to classify the surveyed units in the Annual Survey of Industries (ASI) conducted by MoSPI. However, the annual energy statistics published by energy data agencies in the country currently do not classify industries using the NIC-2008 codes. Some examples (not comprehensive) have been listed in the following table.

Publication	Description	Remarks
Coal Directory 2019-20	Section IV: Despatch and Off-take, Section VIII: Coal Consumption, Section IX: Captive Coal and Lignite Blocks	Consuming sectors, companies owning coal washeries and captive coal and lignite producers need to be identified using the NIC-2008 codes
PNG Statistics 2019-20	Table II.18 and Section V	Consuming sectors in Tables II.18, V.4 to V.12 need to be identified using the NIC-2008 codes
Energy Statistics 2021	Chapter 7: Energy Balance and Sankey Diagram	Consuming sectors listed in the energy balances can be categorised using the NIC-2008 codes

Classification of energy products

2.17 Classification of energy products facilitates standardised data collection and enables integration of data collected by different agencies.

2.18 Energy products are classified in the IRES using the Standard International Energy Product Classification (SIEC), which represents the first internationally agreed classification of energy products. SIEC was the result of a harmonization process of definitions used by international, regional and supranational organizations involved in the collection and compilation of energy statistics. A classification structure with a coding system was then developed based on the harmonized definitions. SIEC went through a wide consultation process with countries as well as consultation with experts on statistical standard classifications. (ESCM, para 3.32)

2.19 The Central Product Classification (CPC) is a complete product classification covering all goods and services, and provides a framework for international comparison and promotes harmonization of various types of statistics. It serves as an international standard for assembling and tabulating all kinds of data requiring product detail, including statistics on industrial production,

domestic and foreign commodity trade, international trade in services, balance of payments, consumption and price statistics and other data used within the national accounts. The latest version of CPC is v2.1.

2.20 National Product Classification for Manufacturing Sector (NPCMS-2011) and National Product Classification for Services Sector (NPCS) developed by CSO, MoSPI to classify products in India are based on the CPC. The NPCMS-2011 is a 7-digit classification with the first 5 digits equal to the CPC and the next 2 digits to cover additional details to suit Indian requirements. The NPCS is an 8-digit classification starting with "99" following by the 5-digit CPC code, followed by 1 digit for Indian requirements.

2.21 Indian Trade Classification, used for classification of imports and exports, is based on the Harmonized Commodity Description and Coding System (HS) – an exhaustive nomenclature of internationally traded commodities (goods) classified according to the following criteria: (a) raw or basic material; (b) degree of processing; (c) use or function; and (d) economic activities. The HS system is used by the DGCI&S to report all export/import data.

2.22 SEEA-Energy uses SIEC in the physical measurement of energy products. Monetary flows of energy products, on the other hand, are often classified using the Central Product Classification (CPC). (SEEA-Energy para 1.72)

2.23 The SIEC along with its correspondence with various versions of the CPC and the HS is provided in Table 3.1 of the IRES and Annex 3A of the ESCM. Even so, SEEA-Energy para 1.72 states the following: "As a one-to-one relationship does not exist between SIEC and Central Product Classification categories, a correspondence between these classifications will be needed for detailed analysis of combined physical and monetary data sets." This needs further investigation. An institutional mechanism must exist to take in record the updates in the concordances as mentioned below.

2.24 Following are some examples where energy products can be better classified by using the NPCMS-2011 code.

Publication	Description	Remarks
Energy Statistics 2021	Chapter 3: Production of Energy Resources	Products need to be identified using NPCMS-2011 code
PNG Statistics 2019-20	Table V.1: Products	MoPNG/PPAC comment: MoPNG will explore shifting of products identification using the NPCMS 2011 code.

Classification of energy resources

2.25 The United Nations Framework Classification for Fossil Energy and Mineral Reserves and Resources (UNFC-2009) is the international standard for the assessment of the status of different mineral and energy resources. It provides a scheme for classifying and evaluating these resources according to three dimensions, namely, their economic and social viability, the field project status and feasibility, and the geological knowledge about these resources. Table 5.1 of the SEEA-Energy groups the detailed categories of UNFC into three aggregated classes characterizing the commercial recoverability of the resources as follows:

Class A	Commercially recoverable resources
Class B	Potentially commercially recoverable resources
Class C	Non-commercial and other known deposits

2.26 Following are examples of non-standardised reporting of coal, oil and gas resources.

Publication	Description	Remarks
PNG Statistics 2019-20	Table II.9 and II.13: Balance Recoverable Reserves of Crude Oil and Natural Gas	Proved and indicated balance recoverable reserves are reported, but not by UNFC classification or the aggregate classes as defined above.

Miscellaneous classifications

2.27 This section consists of some additional classifications that are used in energy statistics publications in India. Standardisation of these classifications would help comparability across various energy statistics publications.

Classification by geographical area

2.28 Where energy statistics are reported at a sub-national geographical area, a standardised classification is needed. This includes reporting the data by states, etc.

Publication	Description	Remarks
PNG Statistics 2019-20	Table III.32: PNG Status	Connections across multiple states and cities are combined. In some cases, CGD companies are listed under "GA/Cities Covered"
PNG Statistics 2019-20	Table II.13: Balance Recoverable Reserves of Natural Gas; Table II.17: Gross and Net Production of Natural Gas	Offshore needs to be classified by basin

Energy and commodity balances

2.29 The IRES publishes the scope and general principles for compiling energy balances. The energy balance published in the Energy Statistics is in line with these principles. However, since the source data that is used to compile the balance is not available at the necessary granularity, there are gaps in the balance especially on the consumption side and large statistical differences in some instances. These could probably be improved by following some of the recommendations listed above, i.e., uniform reporting of calorific values of energy products, and better classification of energy consumers and energy products. In addition, much of the end-use data is as reported by the supply agencies. This needs to be reconciled with data collected at the consumer end for better accuracy.

2.30 The IRES recommends that commodity-wise balances also be published along the same principles as energy balances. The Coal Directory publishes a simplified commodity balance for domestic coal, lignite and imported coal. The PNG Statistics does not publish a commodity balance for oil and gas.

Metadata

2.31 It is recommended that national energy statistics are accompanied by adequate metadata ("data about data"), which is "a specific form of documentation that defines and describes data so that users can locate and understand them, make an informed assessment of their strengths, limitations, usefulness and relevance, and use and share them". (IRES para 9.33) IRES defines two types of metadata:

- Structural metadata are identifiers and descriptors of the data that are essential for discovering, organizing, retrieving and processing statistical datasets. This type of metadata includes labels such as names of the table columns, units of measurement, time period, commodity code, etc., and needs to be published along with the actual data.
- Reference metadata describe the content and quality of the statistical data.

2.32 IRES recommends that development of metadata be provided high priority, and dissemination of up-to-date metadata along with the data should be an integral part of the dissemination of energy statistics. Recommended metadata structure is based on Single Integrated Metadata Structure (SIMS) published by the European Commission (reproduced in the Annexure). Use of web technology and SDMX standards can reduce the reporting burden.

3. DATA COLLECTION AND COMPILATION

3.1 The legal framework underpinning data collection and compilation is very important. Responsibilities of collection, compilation and dissemination should be clearly identified. An efficient institutional arrangement will be cost effective and will avoid duplication. A mechanism for coordination among different agencies involved in data collection and dissemination is required and should have authority to implement its decisions. Experience from other countries shows that a successful energy data management system can be either centralized or decentralized. What is important is that there should be a clear definition of rights and responsibilities of all agencies involved. Formal and informal interaction between various agencies need to be organised for smooth coordination.

3.2 In the Indian context, there is a need to evaluate the benefits of an integrated approach to data collection. Questions related to energy consumption can be integrated in the periodic surveys. For example, household surveys conducted by the National Statistical Office (NSO) can integrate energy related questions in the questionnaire. Similarly, seeking more information on energy use can be incorporated in enterprise surveys.

3.3 MoSPI receives all the required information on Energy related matters directly from different source Ministries; no specific survey gets conducted exclusively for this purpose. Based on the requirement of the different national/international stakeholders, which can be best identified by the concerned administrative Ministries, the 'demand side' data on Energy can be captured by 'reporting agencies'.

3.4 **Recommendation –** Stakeholders may co-ordinate with MoSPI with respect to the energy specific questions which could be integrated in the periodic surveys. Demand side data on energy which is best captured by reporting agencies themselves may also be identified. Data thus collected should be collated and published in useful formats, and reconciled with other official published data.

NITI Aayog can work together with MoSPI in order to work out the details on the specifics and the kind of questions which can be incorporated.

4. CENTRALIZED ENERGY DATA MANAGEMENT AGENCY

4.1 *Energy Statistics Division (ESD)* of MoSPI does collect and compile all the key information on Energy Statistics (collected directly from different Energy Ministries) of India, on annual basis. ESD also computes and publishes different Energy Indicators like *Energy Balance*, *Sankey Diagram (Energy flow diagram)*, *Per-Capita Energy Consumption (PCEC)*, *Energy Intensity* etc. as per IRES (International Recommendation on Energy Statistics) guidelines.

4.2 **Recommendation -** ESD, MoSPI ought to be the natural centralised Energy Data Management Agency of India. A suitable strengthening of the present Energy Statistics Unit of ESD can always deliver the task upto the desired level. However, as per Allocation of Business Rules the expected deliverables of MoSPI does not cover a wide range of activities which are included in the ambit of energy data management agencies internationally. NITI Aayog can support MoSPI for capacity building, training etc in this regard.

5. REQUIREMENT OF AN ENERGY DATA MANUAL

5.1 A compilation of definitions, calorific values, metadata etc are published in the Energy Statistics publication of MoSPI. There is a need to further enrich the Energy Statistics by incorporating the suggestions made for standardisation and classification as highlighted in this report. Further improvements, in consultation with the concerned ministries, may also be incorporated pertaining to;

- Definitions and concepts of all the key parameters in the energy sector
- Formats and methodologies for data collection and reporting
- Standardised data (GCV, operation hours, etc.)
- Energy Balances and energy accounting
- Standard data reporting formats for easy consumption to humans as well as computers

5.2 **Recommendation –** ESD, MoSPI does maintain a compendium containing the concepts and definitions used by different source agencies and based on which energy statistics is compiled. The same can always be updated based on the specific updations/additions from concerned energy ministries/ report.

6. THE WAY FORWARD

6.1 The recommendations of the committee have been compiled in this section.

Calorific Values

Publication	Description	Remarks
Coal Directory 2019-20	Table 4.15, 4.16	Along with grade-wise despatches, weighted average net calorific value within each grade should be provided for coking coal. In case of unavailability of net calorific value, gross calorific values can continue being used as per IRES recommendations
Energy Statistics 2021	Chapter 7: Energy Balance and Sankey Diagram	While the methodology for converting physical quantities to energy units is described, the underlying calorific value data is not reported.
PNG Statistics 2019-20	Appendices	Lot of detailed conversion tables (volume to weight, unit versions, impact of temperature, calorific value etc.) which are very useful. Density for a fuel may vary as per different batches of production, imports and exports and ethanol blending over time etc. Similarly, energy content may also vary. Therefore, it is essential that weighted average for volume-mass conversion & calorific value of the energy product be used for calculation purpose. Global conversion factor or energy content may be taken as a standard reference only. It will also entail statistical differences & inaccurate conclusions.

Publication	Description	Remarks
MNRE estimates of bioenergy potential on its website		Units for products such as biomass and waste which vary widely in energy, moisture and ash content are recommended to be reported in energy content rather than physical quantities such as mass or volume.

6.2 Classification of economic and statistical units

Publication	Description	Remarks
Coal Directory 2019-20	Section IV: Despatch and Off-take, Section VIII: Coal Consumption, Section IX: Captive Coal and Lignite Blocks	Consuming sectors, companies owning coal washeries and captive coal and lignite producers need to be identified using the NIC-2008 codes
PNG Statistics 2019-20	Table II.18 and Section V	Consuming sectors in Tables II.18, V.4 to V.12 need to be identified using the NIC-2008 codes
Energy Statistics 2021	Chapter 7: Energy Balance and Sankey Diagram	Consuming sectors listed in the energy balances can be categorised using the NIC-2008 codes

6.3 Classification of energy products

Publication	Description	Remarks
Energy Statistics 2021	Chapter 3: Production of Energy Resources	Products need to be identified using NPCMS-2011 code
PNG Statistics 2019-20	Table V.1: Products	MoPNG/PPAC comment: MoPNG will explore shifting of products identification using the NPCMS 2011 code.

6.4 Classification of energy resources

Publication	Description	Remarks
Coal Directory 2019-20	Section II: Resources and Exploration	Total resources are reported, but not balance recoverable reserves. In the meeting it was stated that Central Mine Planning and Design Institute has data pertaining to such reserves and this data can be shared with Ministry of Statistics and Programme Implementation

Publication	Description	Remarks
PNG Statistics 2019-20	Table II.9 and II.13: Balance Recoverable Reserves of Crude Oil and Natural Gas	Proved and indicated balance recoverable reserves are reported, but not by UNFC classification or the aggregate classes as defined above.

6.5 Classification by geographical area

Publication	Description	Remarks
PNG Statistics 2019-20	Table III.32: PNG Status	Connections across multiple states and cities are combined. In some cases, CGD companies are listed under "GA/Cities Covered"
PNG Statistics 2019-20	Table II.13: Balance Recoverable Reserves of Natural Gas; Table II.17: Gross and Net Production of Natural Gas	Offshore needs to be classified by basin

6.6 Energy and Commodity Balances

The IRES recommends that commodity-wise balances also be published along the same principles as energy balances. The Coal Directory publishes a simplified commodity balance for domestic coal, lignite and imported coal. The PNG Statistics does not publish a commodity balance for oil and gas.

6.7 Data Collection and compilation

Recommendation – Stakeholders may co-ordinate with MoSPI with respect to the energy specific questions which could be integrated in the periodic surveys. Demand side data on energy which is best captured by reporting agencies themselves may also be identified. Data thus collected should be collated and published in useful formats, and reconciled with other official published data.

NITI Aayog can work together with MoSPI in order to work out the details on the specifics and the kind of questions which can be incorporated.

6.8 Centralized Energy Data Management Agency

Recommendation - ESD, MoSPI ought to be the natural centralised Energy Data Management Agency of India. A suitable strengthening of the present Energy Statistics Unit of ESD can always deliver the task upto the desired level. However, as per Allocation of Business Rules the expected deliverables of MoSPI does not cover a wide range of activities which are included in

the ambit of energy data management agencies internationally. NITI Aayog can support MoSPI for capacity building, training etc.

6.9 Requirement of an Energy Data Manual

Recommendation – ESD, MoSPI does maintain a compendium containing the concepts and definitions used by different source agencies and based on which energy statistics is compiled. The same can always be updated based on the specific updations/additions from concerned energy ministries/ report.

ANNEXURE I

Classification of statistical units

The IRES divides statistical units into two categories (IRES, para 6.5):

a. Observation units—identifiable legal/organizational or physical units which are able, actually or potentially, to report data about their activities; and

b. Analytical units—units created by statisticians, often by splitting or combining observation units, in order to compile more detailed and homogeneous statistics than is possible by using data on observation units

Even though analytical units are not able to reported data themselves about their activities, the use of analytical units is recommended since it may improve the accuracy of energy statistics in cases where complex economic entities are active in both energy production and other economic activities.

SEEA-Energy classifies economic units as enterprises, establishments and industries. (SEEA-Energy para 2.4.2).

a. An enterprise is the view of an institutional unit as a producer of goods and services. Enterprises undertake production in a range of ways including as profit-making businesses, as a part of household activity or as part of the function of government. Importantly, an enterprise can own assets and acquire liabilities and has the capacity to engage in transactions and other economic activities with other economic units. An enterprise may comprise one or more establishments and hence may be situated across multiple locations within a single economy. An enterprise may also undertake ancillary production. In most cases, the production of these services is not recorded as a separate set of outputs; rather, the relevant inputs are recorded as constituting part of the overall inputs to the production of the enterprise's primary and secondary products.

b. An establishment is a unit situated in a single location at which either a single type of productive activity is carried out, or a single productive

activity (the primary activity) accounts for the majority of the value added. If more than one productive activity is carried out by an establishment, activities other than the primary activity are considered secondary activities.

c. The groupings of establishments that undertake similar types of productive activity are referred to as industries. Within SEEA-Energy, establishments are classified within industries using ISIC.

Energy industry classification

IRES Table 5.1: Energy industries with reference to the relevant ISIC category

Energy industry	ISIC Rev. 4
Electricity, CHP and heat plants	Division 35 – Electricity, gas, steam and air conditioning supply
Pumped storage plants	
Coal mines	Division 05 – Mining of coal and lignite
Coke ovens	Group 191 – Manufacture of coke oven products
Coal liquefaction plants	Group 192 – Manufacture of refined petroleum products
Patent fuel plants	Group 192 – Manufacture of refined petroleum products
Brown coal briquette plants	Group 192 – Manufacture of refined petroleum products
Gas works (and other conversion to gases)	Group 352 – Manufacture of gas; distribution of gaseous fuels through mains
Gas separation plants	Division 06 – Extraction of crude petroleum and natural gas
Gas-to-liquids (GTL) plants	Group 192 – Manufacture of refined petroleum products
LNG plants/regasification plants	Group 091 – Support activities for petroleum and natural gas extraction Class 5221 – Service activities incidental to land transportation
Blast furnaces	Group 241 – Manufacture of basic iron and steel
Oil and gas extraction	Division 06 – Extraction of crude petroleum and natural gas Group 091 – Support activities for petroleum and natural gas
Oil refineries	Division 19 – Manufacture of coke and refined products

Energy industry	ISIC Rev. 4
Charcoal plants	Class 2011 – Manufacture of basic chemicals
Biogas production plants	Group 352 – Manufacture of gas; distribution of gaseous fuels through mains
Nuclear fuel extraction and fuel processing	Class 0721 – Mining of uranium and thorium ores Class 2011 – Manufacture of basic chemicals
Other energy industry not elsewhere specified	Class 0892 – Extraction of peat ...

Energy consumer classification

IRES Table 5.3: Main categories of energy consumers (Manufacturing, construction and non-fuel mining industries)

Energy consumers	ISIC Rev. 4
Iron and steel	ISIC Group 241 and Class 2431. Note that the consumption of energy products in coke ovens and blast furnaces is excluded, as these plants are considered part of the energy industries.
Chemical and petrochemical	ISIC Divisions 20 and 21. Note that the consumption of energy products by plants manufacturing charcoal or carrying out the enrichment/production of nuclear fuels (both classified in ISIC 2011) is excluded, as these plants are considered part of the energy industries.
Non-ferrous metals	ISIC Group 242 and Class 2432
Non-metallic minerals	ISIC Division 23
Transport equipment	ISIC Divisions 29 and 30
Machinery	ISIC Divisions 25, 26, 27 and 28
Mining and quarrying	ISIC Divisions 07 and 08, and Group 099, excluding the mining of uranium and thorium ores (Class 0721) and the extraction of peat (Class 0892).
Food and tobacco	ISIC Divisions 10, 11 and 12
Paper, pulp and print	ISIC Divisions 17 and 18
Wood and wood products (other than pulp and paper)	ISIC Division 16
Textile and leather	ISIC Divisions 13, 14 and 15
Construction	ISIC Divisions 41, 42 and 43
Industries not elsewhere specified	ISIC Divisions 22, 31 and 32

Energy consumers	ISIC Rev. 4
Household	ISIC Divisions 97 and 98
Commerce and public services	ISIC Divisions 33, 36–39, 45–96 and 99, excluding ISIC 8422
Agriculture, forestry	ISIC Divisions 01 and 02
Fishing	ISIC Division 03
Not elsewhere specified (including defence activities)	ISIC Class 8422

Single Integrated Metadata Structure (SIMS)

Reproduced from IRESBox 9.3: Metadata items for statistical releases

S.1 Contact (organization, contact person, address, email, phone, fax)

S.2 Introduction

S.3 Metadata update (last certified, last posted and last update)

S.4 Statistical presentation

- S.4.1 Data description
- S.4.2 Classification system
- S.4.3 Sector coverage
- S.4.4 Statistical concepts and definitions
- S.4.5 Statistical unit
- S.4.6 Statistical population
- S.4.7 Reference area
- S.4.8 Time coverage
- S.4.9 Base period

S.5 Unit of measure

S.6 Reference period

S.7 Institutional mandate (legal acts and other agreements, data sharing)

S.8 Confidentiality (policy, data treatment)

S.9 Release policy (release calendar, calendar access, user access)

S.10 Frequency of dissemination

S.11 Dissemination format, accessibility and clarity (News release, publications, online database, micro-data access, other),

S.12 Accessibility of documentation (documentation on methodology, quality documentation)

S.13 Quality management (quality assurance, quality assessment)

S.14 Relevance (user needs, user satisfaction, completeness)

S.15 Accuracy and reliability (overall accuracy, sampling error, non-sampling error (coverage errors, measurement errors, non-response errors, processing errors, model assumption errors))

S.16 Timeliness (time lag to final results) and punctuality (delivery and publication)

S.17 Comparability (geographical, over time)

S.18 Coherence (cross-domain, internal)

S.19 Cost and burden

S.20 Data revision (policy, practice)

S.21 Statistical processing

S.21.1 Source data

S.21.2 Frequency of data collection

S.21.3 Data collection

S.21.4 Data validation

S.21.5 Data compilation

S.21.6 Adjustments

S.21.61 Seasonal adjustment

Conversion Factors

1 kilogram	=	2.2046 pounds
1 Pound	=	454 gm.
1 Cubic metres	=	35.3 cubic feet (gas)
1 Metric ton	=	1 Tonne =1000 kilogram
1 Joule	=	0.23884 calories
1 Mega Joule	=	10^6 joules = 238.84 x 10^3 calories
1 Giga Joule	=	10^9 joules = 238.84 x 10^6 calories

1 Tera Joule	=	10^12 joules = 238.84 x 10^9 calories
1 Peta Joule	=	10^15 joules = 238.84 x 10^12 calories
One million tonnes of coal	=	15.13 petajoules of energy
One million tonnes of oil equivalent (MTOE)	=	41.87 petajoules of energy
One billion cubic meter of natural gas	=	38.52 petajoules of energy
One million cubic meter of natural gas	=	38.52 terajoules of energy
	=	0.03852 petajoules of energy
One billion kilowatt hour of electricity	=	3.60 petajoules of energy

ANNEXURE II

GCV of Coal and the Total Primary Energy Supply (TPES)

Background

The National Statistical Office (NSO) under Ministry of Statistics and Program Implementation (MoSPI) publishes one Annual publication under the heading of **Energy Statistics**, in which the diverse aspects on energy related issues are being analysed and published. Since Coal is a major source of energy in India, thus the energy which gets generated from Coal and supplied to different sectors are one of the key components of this publication. Coal Controller's Org. under MoC is the nodal office which provides all the required information to MoSPI for doing necessary calculation at their end and finally incorporating the same to the latest edition of **Energy Statistics**.

Present scenario

In the minutes of meeting held on 22th July-2020, under the Chairmanship of Shri Rajnath Ram, Adviser, Niti Aaoyoge; CCO, MoC has been directed to come up with some 'representative unique value of GCV', which will be used for the purpose of calculation of TPES by MoSPI in their publication of Energy Statistics.

It has been observed that, though Coal(Non Coking) is a mineral having a wide range of GCV (ranging from as low as 2200 Kcl against G17 to as high as above 7000Kcl against G1) there are several different agencies who uses 'different unique representative GCV values' to represent the 'average calorific value of Coal'. A summary of which is given below:

GRADE of Non Coking Coal	GCV BAND (K.Cal./Kg.)	Representative GCV (Kcal./Kg.) Used by					
		MoSPI	BP Statistics	IESS 2047	BEE	IEA	Prayas Group
G-1	Exceeding 7000	3614	4009	3998	4000	3400-4600	Weighted average of all the GCV's
G-2	Exceeding 6700 and not exceeding 7000						
G-3	Exceeding 6400 and not exceeding 6700						
G-4	Exceeding 6100 and not exceeding 6400						
G-5	Exceeding 5800 and not exceeding 6100						
G-6	Exceeding 5500 and not exceeding 5800						
G-7	Exceeding 5200 and not exceeding 5500						
G-8	Exceeding 4900 and not exceeding 5200						
G-9	Exceeding 4600 and not exceeding 4900						
G-10	Exceeding 4300 and not exceeding 4600						
G-12	Exceeding 3700 and not exceeding 4000						
G-13	Exceeding 3400 and not exceeding 3700						
G-14	Exceeding 3100 and not exceeding 3400						
G-15	Exceeding 2800 and not exceeding 3100						
G-16	Exceeding 2500 and not exceeding 2800						
G-17	Exceeding 2200 and not exceeding 2500						

Since there is a wide range of variation of GCV in Coal, representing the GCV of Coal by means of a 'unique GCV figure' may not be the ideal scenario. But before CCO can suggest any modification/improvement, in term of proposing 'more than one representative values of GCV', it is indispensable to understand that the same can be incorporated in the 'methodology used for calculation of TPES (Total Primary Energy Statistics) from Coal'.

In this regards, after having a discussion with Niti Aayoge and MoSPI and going through the latest publication of **Energy Statistics 2020** (which has data upto FY: 2018-19(P)), it has been understood that, the basic formula which is used to derive the Energy is,

Energy (in KToe) = Quantity of Commodity * Conversion Factor

Where,

Conversion factor = [Net Calorific Value (NCV)]/Mega joules per ton of oil equivalent

where NCV is in kj per kg

Net Calorific Value (NCV) = Gross calorific value (GCV) – (% Moisture Content) [1NCV = 0.9 GCV]

That is case of Coal:

Energy (in KToe) derived from Coal = Quantity of Coal * f(GCV).

(a function of GCV).

Thus, there is provision for using more than one GCV values in order to derive the final Energy which came out of Coal in a particular year.

Limitation of the present practice

It has been observed that there are few limitations of the present system which are given below:

i. The Coal is primarily classified into 2 categories Non Coking (measured in term of GCV values) and Coking (measured in terms of ash-content), while considering the 'representative value 3614 Kcal/kg of coal' both the categories are combined and treated as a single class which is not ideal;

ii. Since there is a wide range of GCV, thus a '*unique/single GCV value representation against the entire class of Coal*' is also not ideal (as it has been already stated before);

iii. In case of Non-Coking Coal, the grade-wise (i.e. GCV wise) production and dispatch quantity coal varies over the year, thus even though '*the total quantity is same for two years, since the Grade-wise composition of production/dispatch is different*', thus there will be '2 different volume of Energy' that will be attributed against those 2 years, which doesn't get reflected under the present practice;

Example:

Considering G1-G6 as Top Grade, G7-G14 as Middle and G15-G17 as Bottom let us consider the following hypothetical case of 'grade-wise dispatch' of Non Coking Coal of 2 years,

	Grades of NC Coal	Year X	Year Y	Difference (X – Y)
Top	G1	10	5	
	G2	30	10	
	G3	17	10	
	G4	40	10	
	G5	30	26	
	G6	24	21	
	Total	**151**	**82**	**69**
Middle	G7	45	90	
	G8	50	80	
	G9	50	24	
	G10	65	25	
	G11	45	28	
	G12	10	31	
	G13	5	30	
	G14	35	34	
	Total	**305**	**342**	**-37**
Bottom	G15	24	20	
	G16	10	35	
	G17	10	21	
	Total	**44**	**76**	**-32**
	Grand Total	**500**	**500**	**0**

i.e. though in the year X, more coal having Top Grades have been dispatched but since the grand total dispatch of Coal remains same in both the year, thus using the present methodology, the 'energy supplied from Coal in both years' will remain same.

iv. It has been observed that the 'TPES (Total Primary Energy Supply) from Coal' which gets calculated using the 'representative value of GCV as 3614Kcal' is a gross underestimation of the Energy Generated from Coal.

If we consider the grade-wise dispatch of coal during FY : 2018-19, we find that.

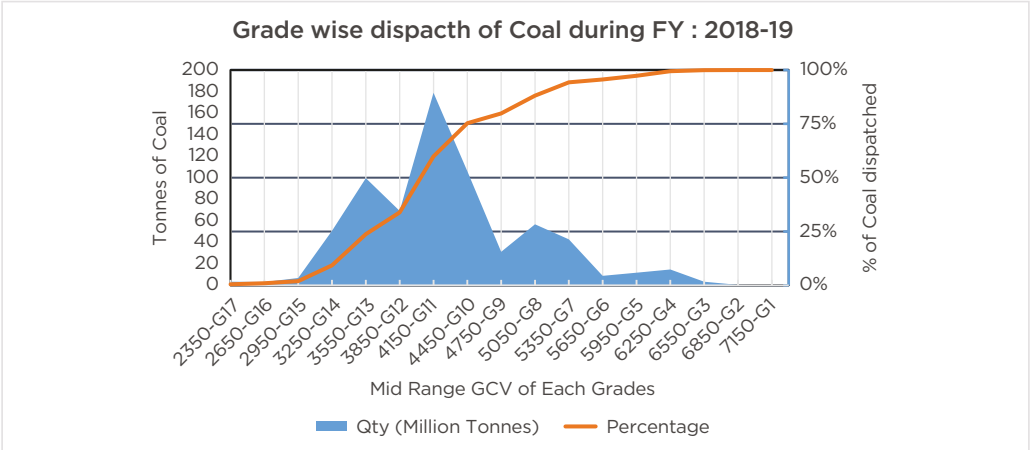
Grade-wise Dispatch of Coal during FY : 2018-19

Grade	Mid Range GCV	Qty (Million Tonnes)	Cumulative Qty	Percentage
G17	2350-G17	3.356	3.356	0.49%
G16	2650-G16	3.083	6.439	0.94%
G15	2950-G15	6.783	13.222	1.92%
G14	3250-G14	50.650	63.872	9.30%
G13	3550-G13	99.528	163.400	23.79%
G12	3850-G12	69.116	232.516	33.85%
G11	4150-G11	178.854	411.370	59.88%
G10	4450-G10	105.981	517.351	75.31%
G9	4750-G9	31.130	548.481	79.84%
G8	5050-G8	56.671	605.152	88.09%
G7	5350-G7	42.694	647.846	94.31%
G6	5650-G6	8.802	656.648	95.59%
G5	5950-G5	11.726	668.374	97.30%
G4	6250-G4	14.702	683.076	99.44%
G3	6550-G3	3.332	686.408	99.92%
G2	6850-G2	0.430	686.838	99.99%
G1	7150-G1	0.099	686.937	100.00%

Observations:

1. The representative GCV of 3614 Kcal/Kg, which is used by for calculation of TPES from Coal comes under the group G13.
2. During FY : 2018-19 around 24% of Coal got dispatched having grades G13 or less (i.e having GCV 3614 or less).
3. More than 75% of dispatched NC Coal are having GCV over 3614 Kcal/kg, which have been treated as Coal having GCV of 3614 Kcl.

The graphical representation is given below:



Similarly for FY : 2017-18, 2016-17, 2015-15 and 2014-15 also is has been found that, the percentage of Coal, having GCV of 3614 Kcal or less, which got dispatched were, around 23%, 18%, 14% and 13% respectively (please refer the excel sheet "*Calculation_TPES*" for details) and most of the coal got dispatched were having GCV much higher than 3614 Kcal.

Thus, we can see that the figure of TPES generated from Coal using representative value of 3614 Kcal/Kgs grossly underestimates the true energy generated and supplied from Coal.

v. Again, since there are more than one representative values of GCVs have been considered by different agencies, the 'Final results' (of generation of Energy) will always vary and which will leads to confusion;

Proposed methodology

As we know that in India the total available Coal in India is from 2 sources, i) Domestic and ii) Import.

Domestic Coal:

a. **Non Coking Coal:**

In the schedules of Coal Directory, CCO captures information on 'sectorwise-gradewise' dispatch of Coal (i.e. each company has to submit the different grades of Coal he has dispatched for different end uses like Power, Iron & Steel, Fertilizer etc. during a particular Financial Year). Since the methodology used for calculation of TPES uses the simple 'quantity X *f*(GCV)' formula, thus instead of using 'single representative figure of GCV against Coal', we can make use of 'Mid-Level GCV' (which is the 'average of the two class boundaries against of a particular grade) of all the Grades of Non-Coking coal. The assumption will be made is that the GCV against a particular grade of coal is distributed uniformly among the entire range of it.

An example is given in this regard has been given in the Excel sheet "*Calculation_TPES*".

In this method we will be able to make use of the maximum information available with CCO, MoC.

b. **Coking Coal:**

In case of Coking Coal also CCO is having the sector-wise dispatch quantity of Coal. Here the classifications are made in term of Ash content and not GCV ranges. Thus, determination of Energy generated from Coking coal may not be as simple as in case of Non Coking coal.

If CMPDIL can provide some approximate 'representative' figures against each Coking Coal grades, then using the similar methodology, the Energy supplied to different sectors from Coking Coal can be determined.

Imported Coal:

The coal which are imported are generally having much higher GCV than 3614 Kcal and used mainly for the purpose of blending. In absence of proper information about the GCVs of Imported coal, we can make use of the following assumptions, which MoC has already made while calculating the National Coal Index (NCI) and Representative Price/Base Bid Prices of Coal, which are,

i. Coal Imported from South Africa belongs to Top Grades (i.e. having GCV range from 5501 Kcal/kg and onwards);

ii. Coal Imported from Indonesia belongs to Middle Grades (i.e. having GCV ranges from 3101Kcal/kg to 5500 Kcal/kg.);

iii. No Coal gets Imported to India which belongs to Bottom grades (i.e. having GCV less than 3100Kcal/kg.);

iv. Coal Imported from Australia are primarily Coking Coal and are of top quality;

For Imports other than these countries, using the assumption (iii) above we may use the **'average of mid-level GCV of Middle Grades Coal'**, which comes out to be **4,300 Kcal/kg**.

Benefits of the proposed methodologies:

i. There will be maximum utilisation of the information/data available;

ii. Any changes in the 'dispatch grades' will be captured;

iii. Some classification on Imported coal has already been derived by ISI (during their formulation of NCI and RP), we are making use of those findings to come up with some 'calorific estimates' of Imported Coal.

ANNEXURE III

File No. P-11026/20/2015-pet(P&E)
NITI Aayog
Energy Vertical

NITI Bhawan, Sansad Marg
New Delhi, Dated 10th September 2021

OFFICE MEMORANDUM

Subject – Constitution of the committee on Energy Data Management

The undersigned is directed to convey that a meeting of the Sustainable Growth Pillar under the India-US Strategic Partnership was held on 12th July 2021 at 5.30 PM via video-conferencing. One of the decisions of the meeting was to form a committee of Indian and US counterparts on Energy Data Management.

2. Accordingly, with the approval of the competent authority, it has been decided to form a committee on Energy Data Management as per the following composition;

S. No.	Member	Position
1	Sh. Rajnath Ram, Adviser (Energy), NITI Aayog	Chairman
2	Ms Santosh, Deputy Director General, Ministry of Coal	Member
3	Ms. Anshu Singh, Deputy Director General, Ministry of Environment, Forest and Climate Change	Member
4	Representative from the Ministry of Petroleum and Natural Gas	Member
5	Ms. Harmeet Minhas Kumar, Director, Ministry of Statistics and Programme Implementation	Member
6	Sh. Arijit Sengupta, Director, Bureau of Energy Efficiency	Member
7	Sh. Prahlad, Chief Engineer, Central Electricity Authority	Member
8	Dr Pankaj Sharma, Additional Director, Petroleum Planning and Analysis Cell	Member
9	Sh. VP Singh, Director, Coal Controller's Organisation	Member
10	Ms. Priya, Scientist C, Ministry of New and Renewable Energy	Member
11	Prof. Rangan Banerjee, IIT Bombay	Member
12	Prof. Ankush Sharma, IIT Kanpur	Member
13	Sh. Srihari Dukkipati, Prayas (Energy Group)	Member
14	Representative from USAID	Member

15	Representative from Department of Energy (DOE)	Member
16	Representative from Pacific Northwest National Laboratory (PNNL)	Member
17	Representative from Energy Information Administration (EIA)	Member
18	Sh. Kamil KPS Bhullar, Research Officer, NITI Aayog	Member Convener

3. The broad terms of reference of the Committee are as follows;

i. Standardising the definitions, terminologies and calculation methodology of all the key parameters in the energy sector so that reporting of data is uniform.
ii. Arrive at uniform values of standard data including Gross Calorific Value, operation hours, etc.
iii. Standardize methodologies for data collection, data quality, validation, survey design methodologies, etc. and their reporting
iv. Based on the findings of 8 Sub-group reports on energy data management for the various demand and supply sectors, build on the identified energy data gaps and ensure collection and maintenance of the required data.
v. Study and make suggestions for the setting up of a centralised data agency in India
vi. Suggest measures for enriching of India Energy Dashboards
vii. Publish an Energy Statistics Manual/ Handbook, which will include, e.g.:
   - Definitions and concepts of all the key parameters in the energy sector
   - Formats and methodologies for data collection and reporting
   - Standardised data (GCV, operation hours, etc.)
   - Energy Balances and energy accounting
viii. Organising stakeholder consultations, if required

4. The Committee is required to submit its report within two months from its first meeting.

Kamil Bhullar

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To,

1. The Secretary, Ministry of Petroleum and Natural Gas (with request to nominate suitable officer as member of the committee)
2. Ms Santosh, Deputy Director General, Ministry of Coal
3. Ms. Anshu Singh, Deputy Director General, Ministry of Environment, Forest and Climate Change
4. Ms. Harmeet Minhas Kumar, Director, Ministry of Statistics and Programme Implementation

5. Sh. Arijit Sengupta, Director, Bureau of Energy Efficiency
6. Sh. Prahlad, Chief Engineer, Central Electricity Authority
7. Dr Pankaj Sharma, additional Director, Petroleum Planning and Analysis Cell
8. Sh. VP Singh, Director, Coal Controller's Organisation
9. Ms. Priya, Scientist C, Ministry of New and Renewable Energy
10. Prof. Rangan Banerjee, IIT Bombay
11. Prof. Ankush Sharma, IIT Kanpur
12. Sh. Srihari Dukkipati, Prayas (Energy Group)
13. Apurva Chaturvedi, USAID (to coordinate with US side representatives)

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