

## **Public Consultation Notice**

National Coal Index is being developed by the Ministry of Coal in pursuance of the recommendations of the High Powered Expert Committee (HPEC) constituted to study the challenges and efficacies of fixed bid system. The report on National Coal Index prepared by HPEC in consultation with Indian Statistical Institute, Kolkata has been considered by the Technical Advisory Committee on SPCL of Ministry of Statistics and Programme Implementation. The Committee has accepted the proposal of Ministry of Coal for compilation of National Coal Index.

2. The objective is to develop a National Coal Index to reflect the movement of price of coal in the domestic coal market. The aim is to have an index that will truly reflect the market price of coal since presently the coal market is dominated by Public Sector CIL and SCCL. CIL has a system of notification of coal prices from time to time and it varies with grade of coal and is used by all in the coal sector as reference price. Besides using the National Coal Index for determination of Revenue and developing the market of coal, the other purpose are as follows:

- a. For taxation purpose, the Coal Index will be the base indicator.
- b. For future calculation of upfront amount and intrinsic value of mine, this Index will be helpful.
- c. For calculation of annual escalation (monthly payment) this index can be basis.

All interested stakeholders and citizens are encouraged to view the report on National Coal Index and submit their views/suggestions at [coalcont-wb@gov.in/](mailto:coalcont-wb@gov.in) [nomauthority.moc@nic.in](mailto:nomauthority.moc@nic.in) by 20.02.2020.

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# **Development of a National Coal Index**

A Report on development of National Coal Index

by

High Power Expert Committee  
Formed by the Government of India  
For improvement of coal block auctions

24<sup>th</sup> October 2019

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# Development of a National Coal Index

## 1 Introduction

### 1.1 Background

Coal is one of the most important sources of energy for the country and a significant contributor to its economic development. The economic development of any country largely rests on its industrial progress, which to a great extent, depends upon its capacity to generate power. Today coal contributes almost 60% of power generation in terms of capacity & almost 75% of power actually generated. Our country has been trying to achieve a balance between demand and supply of coal for various sectors of economy for a long time. Opening up of the coal sectors to various end uses and private companies has been done to expand the supply of coal to industries. Coal reserves in India are sufficient to cater to the energy needs of the Country for a long time. However, it faces many developmental challenges including acquisition of land, environment management, rehabilitation and resettlement.

From 1993 to 2011, **218** coal blocks were allocated to both private companies and PSUs for various end uses. The Hon'ble Supreme court of India declared the allocation of **204** coal blocks out of **218** coal blocks illegal in August 2014 and cancelled allocation of these **204** coal blocks through Screening Committee and Government Dispensation route vide its order dated 24.09.2014. It was considered expedient in public interest by the Central Government to take immediate action so as to ensure energy security of the country.

Accordingly, to overcome the acute shortage of coal in core sectors such as steel, cement and power utilities, which are vital for the development of the country and to mitigate the hardships on household consumers, medium and small enterprises, cottage industries as well as to overcome the overall shortage of coal in the country and augment its production by allocating coal mines to new allocattees, the Coal Mines (Special Provisions) Ordinance, 2014 was promulgated by the President on 21<sup>st</sup> October, 2014.

The said Ordinance was followed by the Coal Mines (Special provision) Second Ordinance, 2014, promulgated on 26<sup>th</sup> December, 2014 and finally the Coal Mines (Special Provisions) Act, 2015 (CMSP Act 2015) was notified on from 30<sup>th</sup> March, 2015. Through the CMSP Act, 2015 and Mines and Minerals (Development and Regulation) Act, 1957 (MMDR Act, 1957) have also been amended to provide for allotment of coal blocks through the process of auction by competitive bidding under Section 11A. The Coal Block Allocation Rules, 2017 under MMDR Act, 1957 lays down the procedure for auction and allotment process.

In order to examine various issues relating to coal sector including the coal mine auctions and difficulties being faced in the current bidding system of coal auction, it was felt that there was a need to evaluate the criteria in the present bid system and study the challenges and efficacies of the fixed bid system for coal auction and prepare a report which will highlight whether the bid criteria needs to be changed for desired improvement in the coal sector.

Accordingly on approval of the Competent Authority a High Power Expert Committee was constituted vide OM (F.No. 102/3/2017/NA) dated 18<sup>th</sup> December 2017. The formed Committee under the chairmanship of Shri Pratyush Sinha, IAS (Retd), Former Chief Vigilance Commissioner, Government of India submitted the report on the efficacy and challenges of the current bidding system and recommendations on 12<sup>th</sup> July 2018.

The scope of the Committee was extended vide OM dated 30<sup>th</sup> May 2018 with the approval of the Hon'ble Minister of Coal by including supervising the job of development of National Coal Index and accordingly the Terms of Reference of the Committee was amended by including sl. no. (vii) of TOR in addition to original roles and responsibility.

***“vii. To oversee the job of development of National Coal Index”.***

To oversee the newly assigned job of development of National Coal Index, the Committee decided to request the assistance of Indian Statistical Institute (ISI) in developing a National Coal Index for the country that will reflect the movement of the price of coal in the domestic coal market. Indian Statistical Institute (a premier Institute working in the field of statistics), after due consideration sent their team consisting of Dr. Nachiketa Chattopadhyay and Dr. Debasis Sengupta for assisting the High Power Expert Committee in developing a National Coal Index for the country.

After intensive consultation with CIL and CCO, the ISI team developed the first version of a national coal index and presented it to officials of CIL and CCO on 20<sup>th</sup> July 2018. Their feedback was incorporated in a modified version that was presented to Shri Pratyush Sinha, Chairman, HPEC, on 26<sup>th</sup> July 2018.

Several rounds of discussion were held with HPEC in its meetings of 14<sup>th</sup> February 2019, 7<sup>th</sup> May 2019 and 27<sup>th</sup> June 2019, where various assumptions, simplifications, modifications were discussed. On 8<sup>th</sup> August 2019, the draft index was presented before a stakeholders' meeting. The feedback received during and after that meeting were perused to fine-tune the index. The final HPEC meeting was held on 31<sup>st</sup> August where the present report was adopted on the basis of a draft given by ISI.

The present report is a culmination of the above exercise.

## **1.2 Purpose and scope of the index**

At the outset of the present exercise, it had been indicated that the purpose of the National Coal Index would be to determine how premium from coal block auctions would vary with time, i.e how the revenue share determined at the time of bidding would vary over time keeping step with the changing price levels. Subsequently the Ministry informed the HPEC that the Index could also be used for developing the coal market, and also as the base indicator for the purpose of taxation.

The Index is meant to encompass all transactions of raw coal in the Indian market. This includes coking and non-coking of various grades transacted in the regulated (power and fertilizer) and non-regulated sectors. The transactions include those at notified price, coal auctions and coal imports.

Washed coal and coal products are not included.

## **1.3 Basic requirements**

It was clarified at the outset by the HPEC to the ISI team that

- The Index should be computed on monthly basis;
- The Index should be forward looking;
- The Index should be computable soon after the end of the month;
- A provisional value of the Index should be available as early as possible;
- There should be separate indices for coking and non-coking coal.

Separate indices for the regulated and non-regulated sectors were sought initially, but the idea was dropped after several practical and conceptual difficulties arose.

## **1.4 The coal market in India**

Indian users mostly use domestically produced coal. Imported coal accounts for only 16% of all purchases by volume (weight). The imported coal is generally of higher quality than domestic coal, and more expensive. As a result, the amount of money spent on purchase of imported coal is about the same as the amount spent on domestic coal. Major countries of origin of imported coal are Australia, South Africa and Indonesia.

The domestic production is dominated by the subsidiaries of CIL and Singareni Collieries Company Limited (SCCL). Other producers produce only 6% of the domestic coal by volume.

Most of the domestic transactions (78% by value, 82% by weight) take place at notified price. Coal auctions commenced in 2005-06 on trials and 2007-08 as a policy after the New Coal Distribution Policy (NCDP) was notified in Oct 2007.

Most of the auctions are conducted by CIL. The auctions are of several types. Spot auction, which is open to all users, is the most common type of auction. There is a special spot auction where coal is transferred at a later time. There is a forward auction for general users and a special forward auction for users in the regulated sector. Exclusive and linkage auctions cater to the nonregulated sector. The volume of transactions through forward and special spot auctions is at present rather small.

### 1.5 Quality of coal

Since 16<sup>th</sup> January 2011, domestically produced non-coking coal are classified by its gross calorific value (GCV) into seventeen quality grades. These grades are listed below.

Grades	GCV Range (Kcal/Kg)
G1	GCV exceeding 7000
G2	GCV between 6701 & 7000
G3	GCV between 6401 & 6700
G4	GCV between 6101 & 6400
G5	GCV between 5801 & 6100
G6	GCV between 5501 & 5800
G7	GCV between 5201 & 5500
G8	GCV between 4901 & 5200
G9	GCV between 4601 & 4900
G10	GCV between 4301 & 4600
G11	GCV between 4001 & 4300
G12	GCV between 3700 & 4000
G13	GCV between 3400 & 3700
G14	GCV between 3101 & 3400
G15	GCV between 2801 & 3100
G16	GCV between 2501 & 2800
G17	GCV between 2201 & 2500

Coking coal produced in India is categorized by of ash content, as follows.

Grade	Ash Content
Steel Grade I (ST-I)	Ash content < 15%
Steel Grade II (ST-II)	15% ≤ Ash content < 18%
Washery Grade I (W-I)	18% ≤ Ash content < 21%
Washery Grade II (W-II)	21% ≤ Ash content < 24%
Washery Grade III (W-III)	24% ≤ Ash content < 28%
Washery Grade IV (W-IV)	28% ≤ Ash content < 35%
Washery Gr. V (W-V)	35% ≤ Ash content < 42%
Washery Gr. VI (W-VI)	42% ≤ Ash content < 49%

Semi-coking coal produced in India is categorized on the basis of ash and moisture content, as follows.

Grade	Ash + Moisture content
Semi coking Gr. I	less than 19%
Semi coking Gr. II	Between 19% and 24%

Coking coal of grade W-V and W-VI and semi-coking coal are produced in negligible quantities.

Quality of coal is a contentious matter, as the price depends on it. Domestically transacted coal generally goes through a sampling and verification process, which can lead to change in the quality grade. This process takes a few months, particularly when there is dispute and arbitration.

Quality grades of imported coal depend on the country of origin and generally do not correspond to Indian grades.



## 2. Charting the terrain

### 2.1 Source and availability of price data

CIL and SCCL bring out price notifications for different grades of coal from time to time. Therefore, as far as these agencies are concerned, the notified price of coal is instantly and publicly available on any given day.

CIL, the largest seller in the domain of domestic auctions, communicates to CCO a monthly summary of auction transactions, including value and volume by grade category, within three weeks of the end of a month. In the case of linkage auctions, the summary of a tranche of transactions is provided from time to time. These data can be used to obtain gradewise unit values of coal for a particular month and for each type of auction.

Transaction level records of the landed value (not just the cost of free on board or FOB, but the cost with insurance and freight or CIF) and volume of coal imported through various ports are maintained by the Directorate General of Commercial Intelligence and Statistics (DGCIS), along with the country of origin, quality parameters and several other details. Of these, a monthly summary excluding the quality parameters, importer's identity and other sensitive information is made accessible by CCO. This summary, which can be used to compute unit values of coal, is generally available within 45 days of the end of the month concerned.

The DGCIS summary includes a commodity code. The commodity codes relevant for raw coal start with the four-digit code 2701. These are listed in the following table.

ITCHS CODE	COMMODITY DESCRIPTION
27012010	ANTHRACITE AGGLOMERATED
27011100	ANTHRACITE COAL W/N PULVRSD BUT NT AGLOMRTD
27011200	BITUMNS COAL W/N PULVRSD BUT NT AGLOMRTD
27011910	COKING COAL
27011990	OTHER COAL W/N PULVRSD BUT NTAGLDMRTD
27011920	STEAM COAL

These classifications are very different from the quality grade classifications, except that coking coal (code 27011990) is clearly identified. Steam coal (code 27011920) is the most commonly found commodity among non-coking varieties, and bituminous coal (code 27011200) comes second.

## 2.2 When and where the index can be computed

A natural choice of the agency that might compute the National Coal Index on regular (monthly) basis is the Coal Controllers' Office.

In view of the delay in availability of auction and import data, it is reasonable to plan computation of the provisional value of the index after the auction data for the month becomes available, and the final value after the import data becomes available.

Once the procedure for computation is put in place, it would be possible to provide the provisional value of the index for a particular month after a delay of one month and the final value after a delay of two months.

The provisional value of the index for a particular month may be computed by using the notified prices of various categories of coal applicable for that month, unit values of coal of these categories booked through auction in that month, and the unit values of imported coal for the preceding month.

## 2.3 Price indices

A general principle of constructing a price index of multiple commodities/items is that a basket (quantities of various items) is fixed and its value is observed over different price situations. Fixing the basket essentially helps in isolating the effect of the price changes from changes in observed values so that price changes can be compared over time, which is the objective of the index formation.

Fixing the basket is the real challenge in justifying the use of a particular price index. For example, the Laspeyres index fixes the initial period basket, and the Paasche index compares the current period basket.<sup>1</sup> A combination of these two baskets has also been used, directly (Edgeworth-Marshall, Tornquist) or indirectly (Fisher).<sup>2</sup>

The basket is important since it determines the weight/ importance/ contributing factor of the individual prices in a single "representative" value.

The well-known indices, looked at as a weighted average of price relatives (price in current period over price in base period), uses some form of value share of the items in the basket as weights.

<sup>1</sup> W. Erwin Diewert, John Greenlees, Charles R. Hulten (2010). *Price Index Concepts and Measurement*, University of Chicago Press.

<sup>2</sup> Bert M. Balk (2012). *Price and Quantity Index Numbers*. Cambridge University Press.

If the value share weights are determined in a suitable manner and fixed, one has the additional advantage of knowing the contribution of items (or groups of items) into the overall value. This is useful for policy interventions. Further, any subgroup index can be obtained in a coherent way (that is, using a similar form of the index) consistent with the overall index.

In the present context too, there is a need of various subgroup indices to be consistent with the overall index, where subgroups may be formed as per policy requirement.

The weights have to be chosen after taking into consideration the behaviour of values of items over the last few years.

The index satisfies some essential requirements:

- (a) It remains unchanged if prices do not change
- (b) Equi-Proportional changes in prices changes the index by the same proportion.

The price relatives are ratios of price at any given time and the price at a suitable base period. The base period is chosen as a period that is normal in terms of price movements and data quality. It is also desirable that the base period is not too far from the period of usage of the index.

The relative importance of the various commodities represented in a price index may change with time. This necessitates a change in the basket (i.e., change in relative weights assigned to various items in the basket). There is a trade-off involved in such a change. As already mentioned, for the index to be an indicator of price changes over a period of time, the same basket has to be used at the beginning and the end of that time interval. Thus, comparability of the index (as indicator of price change) at two points of time is lost if the basket is changed in between. On the other hand, the basket may become outdated over a period of time. For this reason, the weights used in a price index are changed from time to time, but not too frequently.

Usually the base year is also changed when the basket is changed.

## **2.4 Source of data for computation of weights**

As mentioned before, CCO obtains monthly summary of imported coking and non-coking coal. This summary includes both booking volume and booking value, which may be used for computation of weights in a price index. The monthly summarized import data for FY 2014-15 to 2017-18 were made available to the ISI team by CCO.

Monthly summary of booking volume and booking value of coking and non-coking coal of various grades auctioned by CIL for FY 2015-16 to 2017-18 were provided directly by CIL. In respect of linkage auctions, the data were available in the form of tranches of transactions spread over several months.

Records of booking volumes are not recorded or compiled at CIL. The Coal Directory of India contains despatch volumes for any given year, segregated by grade and company. Despatch volumes for any given year, segregated by sector and company are also available. These data were perused from Tables 4.12, 4.12A, 4.16 of the Coal Directories of 2014-15, 2015-16, 2016-17 and 2017-18.<sup>3</sup> More detailed tables containing delineation by sector, company and grade were provided to the ISI team by CIL. Similar break-up were also provided by SCCL in respect of SCCL despatches. Decomposition of the annual despatches into monthly quantities was obtained from Table 4.5 of the respective Coal Directories.

Bharat Coking Coal Limited, a subsidiary of CIL, notifies separate prices for prime coking coal (PCC) for linked washeries (LW) and high volatile medium coking (HVMC) coal for non-linked washeries (NLW). As the coking coal despatch data published in the Coal Directory of India does not delineate between these two varieties, the delineation was obtained directly from CIL/BCCL.

Value data in respect of the despatches are not available. Instead, one can use the price notifications issued by CIL, its subsidiaries and SCCL.

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<sup>3</sup> Coal Directory of India 2014-15, 2015-16, 2016-17, 2017-18.

### **3 Clearing the deck**

#### **3.1 No separate sub-index for regulated sector**

For a sub-index to serve coal users in the regulated sector, one needs to know the proportion in which those users use coal in the three source strata (transactions at notified price, auctions and imports). However this information, in respect of spot, special spot and forward auctions and also for imports, is not held by any office. Instead of overcoming this difficulty with strong and unverifiable assumptions, the ISI team tried to get the information through a user survey conducted by CCO. Unfortunately, this survey elicited less than 8% response.

Subsequently the HPEC indicated that separate indices for regulated and non-regulated sectors may not be needed in respect of auction of coal blocks. This is because, going forward, mining would be done on a commercial basis moving away from the present captive model. In commercial mining the coal mining company would be selling coal to both the regulated and the non-regulated sectors. In view of these developments, the idea of a separate index for the regulated sector was dropped.

#### **3.2 Modelling simplifications**

Booked and despatched quantities of domestic coal may differ in quantity and value. Yet the fact is that auction data contain booking volumes and Coal Directory data contain despatch volumes. After taking into account the practical limitations of current record-keeping, booking volumes were used for auctions, despatch volumes were used for transactions at notified price and landed volumes were used for imports – for the limited purpose of computing weights for the indices.

In order to avoid double counting, e-auction despatches were subtracted from the despatch volumes, which were then treated as notified price transactions. Power and fertiliser sector despatches were delineated from other non-auction despatches, for possible pairing up with notified prices for the regulated and non-regulated sectors, respectively.

Unit value for a month was used in lieu of prices in respect of imported and auctioned coal.

Unlike other grades, the price of G-1 grade non-coking coal is often notified as a function of the GCV value. Since the other non-coking grades have a GCV band of 300 Kcal/Kg (which means the centre of the band is 150 Kcal away from the band boundaries), the average GCV for G-1 coal was taken as 7150 Kcal/Kg, which is 150 Kcal/Kg above the boundary of G-1 and G-2.

It is known that tested grade of coal often differs from declared grade, and this has an implication on the price. It was learnt through consultation with CIL and HPEC that the price adjustments do not have a significant bias in any particular direction, and accordingly the declared grade was used for computation of the index (both for computation of weights and for periodic computation of unit values of auctioned coal).

Price notifications were used to generate a time series of prices of different grades for different companies. In case of a notification becoming effective in the middle of a month, the 'notified' price applicable for that month was defined as a weighted sum of the prices applicable at the beginning and the end of the month, and the number of days falling under each price regime was used to determine the weights of the two parts.

CIL notifications provide separate prices for run of mine (ROM) coal and prices for size-sorted coal called STEAM and SLACK coal. The price difference is small. SCCL provides more detailed price structure depending on the mode/location of despatch. Despatch volumes cannot be matched with these different prices (in the current form of record keeping). Following the current practice of WPI and after consultation with HPEC, it was decided that ROM prices would be used everywhere for despatches at notified price.

Annual despatches of a particular grade of coal by a particular company to a particular sector were decomposed into monthly quantities in a proportionate manner from Table 4.5 of the respective Coal Directories.

Linkage auction booking volumes and values for a particular grade and sector, available from data on tranches spanning several months, were also broken up proportionately into months.

A major issue regarding coal quality was that grades of domestic and imported coal do not match. A broad grouping of quality grades can alleviate the problem. In the absence of any universally acceptable standard on this issue (exemplified by non-existence of global and several changes in the grading system in India), the ISI team chose to use the grouping used for the wholesale price index (WPI) by the Department of Industrial Policy and Promotion (DIPP) of the Ministry of Commerce and Industry. This system uses a single grade of coking coal and three grade ranges of non-coking coal. In this report, best quality group (G-1 to G-6) is referred to as the top grade, the poorest quality group (G-15 to G-17) is referred to as the bottom grade and the intermediate quality group (G-7 to G-14) is called the middle grade.

The standard practice in respect of computation of price indices is that prices with low volumes of transaction are ignored. From this consideration, the ISI team chose to leave out the following from the computation.

- Domestic producers other than CIL and SCCL
- Coal auctioned by SCCL
- Semi-coking and weakly coking coal
- Minor countries of origin in respect of imported coal (all countries other than Australia for coking coal and all countries barring South Africa and Indonesia for non-coking coal)
- Imported items other than those bearing item codes 27011910 (Coking coal), 27011920 (STEAM COAL) and 27011200 (BITUMNS COAL W/N PULVRSD BUT NT AGLOMRTD).

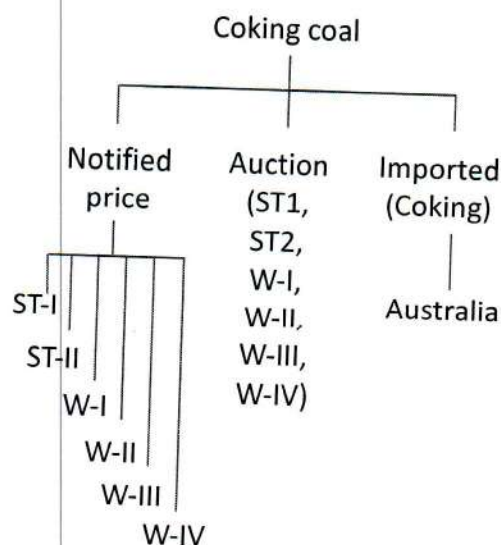
The latter two varieties of imported coal were simply clubbed as non-coking coal. On the basis of further analysis reported below, these two categories of coal were treated as top grade if the country of origin is South Africa and as middle grade if the country of origin is Indonesia.

All forms of auction for a given grade category were merged for simplification.

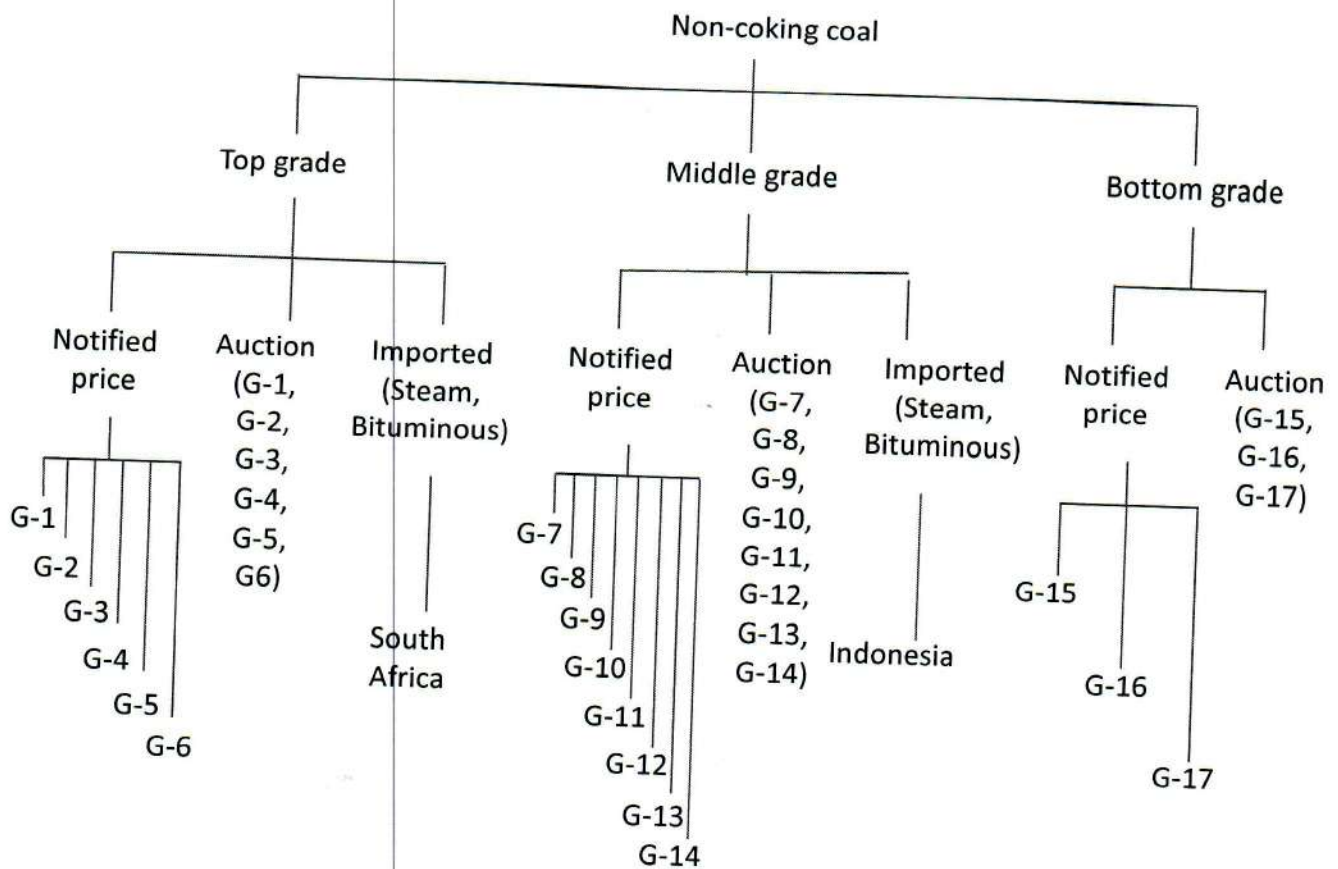
### 3.3 Price channels used for the index

While prices of a variety of coal items would have to be represented in the National Coal Index, there would be variety of prices for a given item too. For example, the spot auction price of G-1 grade coal would be different from its notified price prevailing at the time. Thus, wherever there is scope for a separate price of a coal item, one has to track that price and assign a weight. In this report, the series of prices of a particular coal item transacted in a particular mode, which is assigned a fixed weight, is referred to as a price channel.

After elimination of the price channels in the manner mentioned above, the remaining channels for coking coal are organized as shown in the following diagram.



Likewise, the simplified price channels for non-coking coal and shown in the following diagram.



These two diagrams are still simplistic in the sense that they do not show the following sub-channels.

- Sub-channels for different grades within a group of grades for notified price transactions
- Sub-channels for different companies having different prices for the same grade
- Sub-channels for PCC (LW) and HVMC (NLW) coking coal of different grades, for which BCCL notifies separate prices

The complete list of all the price channels is given in the appendix.



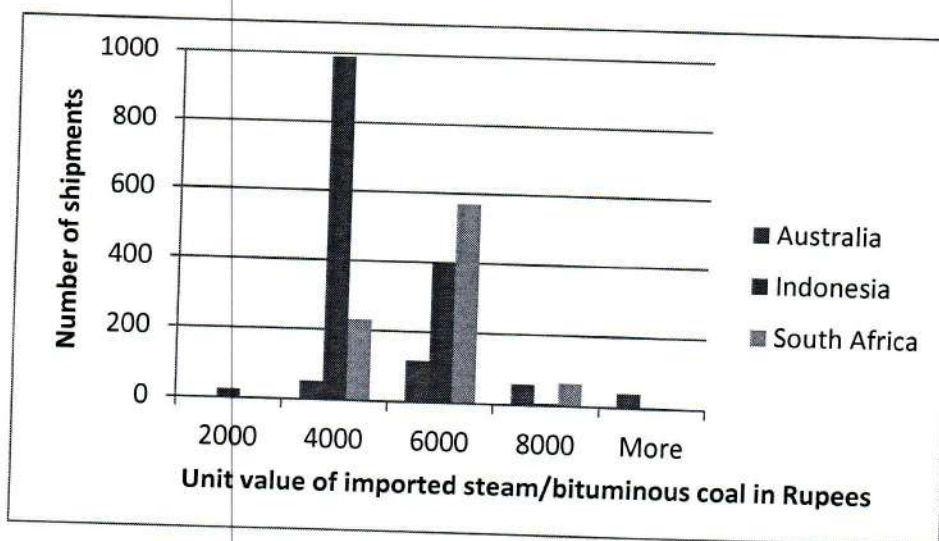
### 3.4 Matching imported coal with domestic grades

As the DGCIS data made available to ISI through CCO are aggregated and no information about GCV and price is available, the ISI team chose to carry out an indicative analysis of privately owned and unverified data available from the website <https://www.seair.co.in/>. The data related to individual transactions of steam coal imports during the period December 2015 to November 2016. The following is a summary of the GCV values imported from Indonesia, Australia and South Africa.

Non-coking coal grade category	Percentage by volume		
	Indonesia	Australia	South Africa
Low (GCV < 3100 Kcal/Kg)	0%	0%	0%
Middle (GCV between 3100 and 5500 Kcal/Kg)	76%	0%	1%
High (GCV > 5500 Kcal/Kg)	24%	100%	99%

Thus, if one decides to use DGCIS data on coal imports, which does not contain GCV information, one may use the country of origin as an indicator of quality grade. In particular, shipments from Indonesia may be regarded as 'middle grade' and shipments from South Africa and Australia as 'top grade'.

The price distribution of steam and bituminous coal imported from the three countries during the periods April 2014 to March 2018, as per DGCIS records, is shown below.



It transpires that imports from Indonesia are more often in the range of lower unit value, while imports from South Africa and Australia are more often in the higher range of unit value. This confirms the finding from previous (private) data that imports from Indonesia are mostly middle grade and those from South Africa are mostly top grade. Non-coking coal imports from Australia may be ignored for low volume.

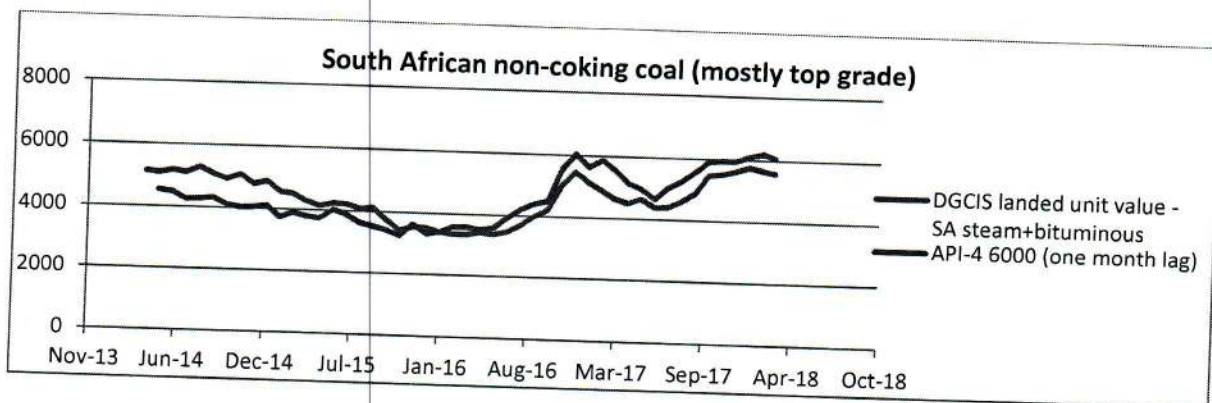
This finding was presented in the HPEC meeting of 27<sup>th</sup> June 2019 and it found consonance with the experience of some members.

It was decided that non-coking coal imported from South Africa and Indonesia would be treated as belonging to top and middle grades, respectively.

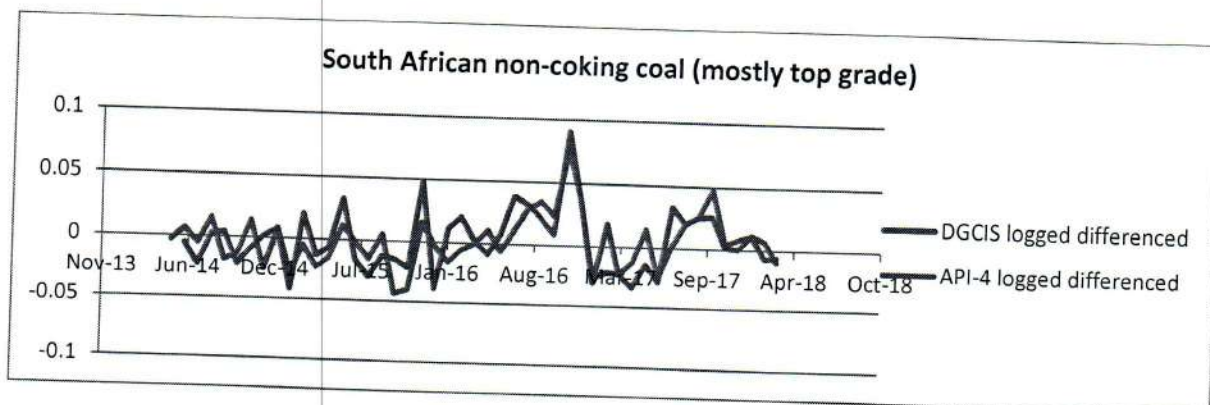
Analysis of the above DGCIS data also revealed that Australia is the country of main relevance for computation of coking coal index.

### 3.5 Foreign indices or DGCIS data with adjustment?

It had been suggested that foreign coal indices may be used in lieu of the imported component of the sub-index for coking coal and non-coking coal of top and middle grades. The choice narrows down to just one country in each case. For South African coal, Shri Partha Bhattacharyya had suggested the use of Argus/McCloskey's API-4 price assessment for coal exported through Richards Bay terminal. Cement Manufacturers' Association (CMA) had more specifically suggested and provided to the ISI team the Richards Bay FOB (6000 Kcal/Kg NAR) price data, which represents top grade non-coking coal imports most appropriately. This price is available in the form of multiple quotations for every month. The representative price for a particular month was chosen as the geometric mean of all the quotations in that month. A comparative plot of this price (API-4 6000), after conversion from USD to INR by using the contemporary conversion rate, with the landed unit value (CIF) of steam and bituminous coal imported from South Africa (DGCIS) revealed that the movement of the latter series lags the former by a month. This lag may have been due to transportation delay. The plot given below compares the DGCIS landed unit value of South African steam and bituminous coal with lagged API-4 6000 price.



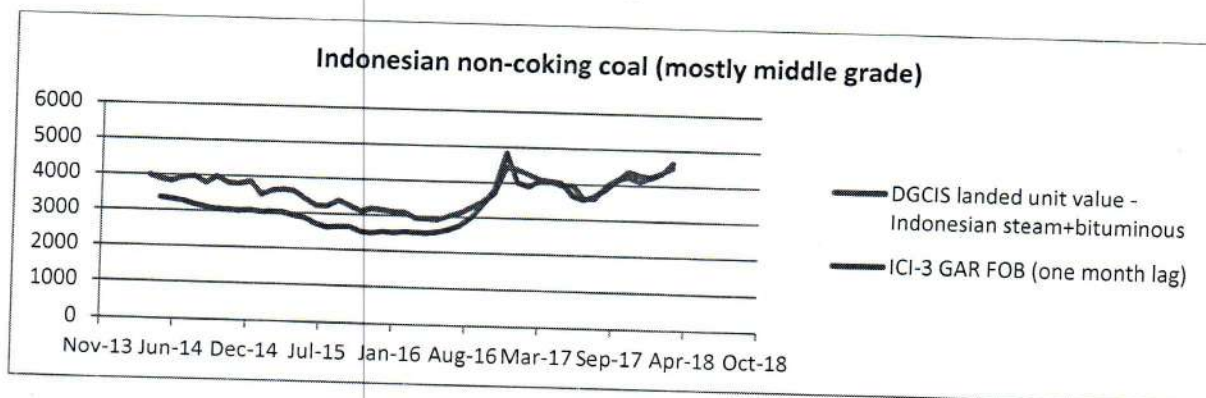
The two series have moved somewhat similarly, though the DGCIS series has had less fluctuation and slower increase overall. The smaller fluctuation is further brought out by the first differences of the logged series, shown in the following plot.



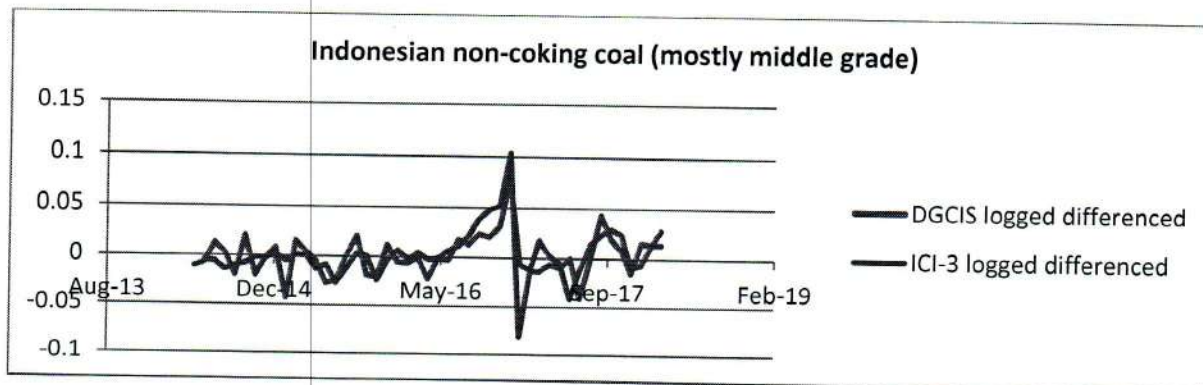
Turning to Indonesian coal, Shri Partha Bhattacharyya suggested the use of the Indonesian index. CMA specifically suggested the ICI-4 (4200 Kcal/Kg GAR) FOB price assessment as the best representative of middle grade equivalent of imports. Two other possible choices are ICI-3 (5000 Kcal/Kg GAR) and ICI-5 (3400 Kcal/Kg GAR). Analysis of the <https://www.seair.co.in/> data produces the following summary of dollar values of non-coking coal imported from Indonesia.

GCV range (Kcal/Kg)	Value (Million USD)	Suitable Indonesian index
Less than 3600	3.62	ICI-5 (3400 Kcal/Kg GAR)
Between 3600 and 4600	20.60	ICI-4 (4200 Kcal/Kg GAR)
Above 4600	57.97	ICI-3 (5000 Kcal/Kg GAR)

It transpires that the best representative price assessment would be ICI-3 (5000 Kcal/Kg GAR), provided by CMA to the ISI team. This series is available in the form of daily USD value. The monthly geometric mean was computed and then converted from USD to INR by using the contemporary conversion rate. When this monthly ICI-3 series was compared with the landed unit value (CIF) of steam and bituminous coal imported from Indonesia (DGCIS), movements of the DGCIS series was found to lag the movements of the ICI-3 series by one month. This lag is also likely due to transportation delay. The plot given below compares the DGCIS landed unit value of Indonesian steam and bituminous coal with lagged ICI-3 price.



The two series have moved somewhat similarly, though the DGCIS series has moved over a narrower range. The first differences of the logged series, shown below, also show greater fluctuation of ICI-3.



The ISI team has attempted a similar analysis for coking coal but could not succeed. Shri Partha Bhattacharyya suggested the use of the Newcastle index, but apparently that is for non-coking coal. Indian imports of coking coal are mostly from Australia, for which no prominent index could be located.

Thus, the following conclusions are in order.

- The most suitable price assessments for imported South African top grade non-coking coal and imported Indonesian middle grade non-coking coal appears to be API-4 and ICI-3, respectively.
- Both of these assessments are made by private agencies.
- When these price assessments are converted to monthly rupee values, these are similar to the unit values of the corresponding categories of imported coal computed from DGCIS data, though the latter series lag by a month.
- The foreign price assessments have greater fluctuations and faster rise over the four years than the corresponding DGCIS unit values.
- The main advantage of the DGCIS unit value is that it is more relevant for the Indian market. The perceived advantage of foreign assessments is that, as they cater to a larger market, they might be less prone to volatility. However, the above analysis shows that the foreign series did not have smaller fluctuations than the DGCIS series during 2014-15 to 2017-18. On the other hand, the faster rise of the foreign price assessments during the period of study exemplify how that their lack of relevance to the Indian market, if ignored, can drive up the coal index unduly and affect Indian users adversely.

- Unit values from auctions conducted in a particular month are expected to be available about a month after the end of that month. There would be a delay of another month before the CCO receives the DGCIS data for the month. The advantages of the domestic computations, mentioned above, make it well worth the wait.
- The effect of freight and insurance charges on price relatives should be minimal, as these appear both in the numerator and the denominator. The only effect is on the weights, which may be higher for CIF.
- Even though the DGCIS unit values are CIF, these do not appear to be unduly inflated. In fact they are often smaller than the foreign price assessments. Thus, there is no strong case for discounting them for freight and insurance.
- Another argument against discounting landed prices of imported coal is that the landed price already excludes domestic transport cost – just like domestic coal. Further discounting them would disrupt this parity.

Therefore, the ISI team used CIF unit values of imported coal as calculated from DGCIS data, instead of foreign price assessments.

## 4 The overall model

### 4.1 The index

The ISI team used a weighted average of price relatives, where weights are fixed on the basis of past value shares, as mentioned earlier. According to this scheme, National Coal Index at the  $i^{\text{th}}$  month for all categories of coal is

$$C_i = w_k K_i + w_n N_i,$$

where,  $K_i$  is coking coal index at the  $i^{\text{th}}$  month,  $N_i$  is non-coking coal index at the  $i^{\text{th}}$  month, and  $w_k$  and  $w_n$  are positive weights such that  $w_k + w_n = 1$ .

The coking coal index for the  $i^{\text{th}}$  month is

$$K_i = w_{tk} K_{ti} + w_{ak} K_{ai} + w_{mk} K_{mi},$$

where  $K_{ti}$ ,  $K_{ai}$  and  $K_{mi}$  are indices (at the  $i^{\text{th}}$  month) of coking coal transactions at notified price, through auctions and through imports, respectively, and  $w_{tk}$ ,  $w_{ak}$  and  $w_{mk}$  are the corresponding positive weights, with  $w_{tk} + w_{ak} + w_{mk} = 1$ . The index (at the  $i^{\text{th}}$  month) of coking coal transactions at notified price is

$$K_{ti} = w_{1tk} K_{1ti} + w_{2tk} K_{2ti} + \dots + w_{6tk} K_{6ti},$$

where  $K_{1ti}$ ,  $K_{2ti}$ , ...,  $K_{6ti}$  are indices (at the  $i^{\text{th}}$  month) of coking coal transactions at notified price for quality grade numbers 1, 2, ..., 6 (i.e., grades ST-I, ST-II, W-I, W-II, W-III and W-IV), and  $w_{1tk}$ ,  $w_{2tk}$ , ...,  $w_{6tk}$  are the corresponding positive weights, with  $w_{1tk} + w_{2tk} + \dots + w_{6tk} = 1$ . The index (at the  $i^{\text{th}}$  month) of coking coal transactions at notified price for quality grade number 1 (i.e., grade ST-I) is

$$K_{1ti} = w_{11tk} \frac{P_{11tki}}{P_{11tk0}} + w_{21tk} \frac{P_{21tki}}{P_{21tk0}},$$

where  $P_{11tki}$ ,  $P_{21tki}$  are prices (at the  $i^{\text{th}}$  month) notified by BCCL for coking coal with quality grade number 1 (i.e., grade ST-I) for regulated and non-regulated sectors, respectively;  $P_{11tk0}$ ,  $P_{21tk0}$  are the corresponding notified prices at the base period; and  $w_{11tk}$ ,  $w_{21tk}$  are the corresponding positive weights, with  $w_{11tk} + w_{21tk} = 1$ . The index (at the  $i^{\text{th}}$  month) of coking coal transactions of other grades at notified price, namely  $K_{2tki}$ ,  $K_{3tki}$ , ...,  $K_{6tki}$ , have similar expressions, but the number of summands for  $K_{3tki}$ , ...,  $K_{6tki}$  are larger because of the larger number of price channels for them (see Appendix).

The index (at the  $i^{\text{th}}$  month) of coking coal transactions through auctions is

$$K_{ai} = \frac{P_{ai}}{P_{a0}}$$

where  $P_{ai}$  is the unit value of all grades of coking coal transacted in the  $i^{\text{th}}$  month through exclusive, forward, special forward, spot, special spot and linkage auctions taken together, and  $P_{a0}$  is the corresponding unit value at the base period.

The index (at the  $i^{\text{th}}$  month) of coking coal transactions through imports is

$$K_{mi} = \frac{P_{mi}}{P_{m0}}$$

where  $P_{mi}$  is the unit value of all coking coal imported in the  $i^{\text{th}}$  month from Australia and  $P_{m0}$  is the corresponding unit value at the base period.

The non-coking coal index for the  $i^{\text{th}}$  month is

$$N_i = w_{1n}N_{1i} + w_{2n}N_{2i} + w_{3n}N_{3i},$$

where  $N_{1i}$ ,  $N_{2i}$  and  $N_{3i}$  are indices (at the  $i^{\text{th}}$  month) of non-coking coal for top, middle and bottom grade categories, respectively, and  $w_{1n}$ ,  $w_{2n}$  and  $w_{3n}$  are the corresponding positive weights, with  $w_{1n} + w_{2n} + w_{3n} = 1$ . The index (at the  $i^{\text{th}}$  month) of non-coking coal of top grade category is

$$N_{1i} = w_{t1n}N_{t1i} + w_{a1n}N_{a1i} + w_{m1n}N_{m1i},$$

where  $N_{t1i}$ ,  $N_{a1i}$  and  $N_{m1i}$  are indices (at the  $i^{\text{th}}$  month) of top-grade non-coking coal transactions at notified price, through auctions and through imports, respectively, and  $w_{t1n}$ ,  $w_{a1n}$  and  $w_{m1n}$  are the corresponding positive weights, with  $w_{t1n} + w_{a1n} + w_{m1n} = 1$ . The index (at the  $i^{\text{th}}$  month) of top-grade non-coking coal transactions at notified price is

$$N_{t1i} = w_{1t1n} \frac{P_{1t1ni}}{P_{1t1n0}} + w_{2t1n} \frac{P_{2t1ni}}{P_{2t1n0}} + \dots,$$

where  $P_{1t1ni}$ ,  $P_{2t1ni}$ , ... are notified prices (at the  $i^{\text{th}}$  month) of different varieties of top-grade non-coking coal for which there is separate notified price (e.g., price of G-1 coal for regulated sector applicable to non-WCL subsidiaries of CIL, the corresponding price for the non-regulated sector; see Appendix for complete list);  $P_{1t1n0}$ ,  $P_{2t1n0}$ , ... are the corresponding notified prices at the base period; and  $w_{1t1n}$ ,  $w_{2t1n}$ , ... are the corresponding positive weights, with  $w_{1t1n} + w_{2t1n} + \dots = 1$ .

The index (at the  $i^{\text{th}}$  month) of top-grade non-coking coal transactions through auctions is

$$N_{a1i} = \frac{P_{a1i}}{P_{a10}}$$

where  $P_{a1i}$  is the unit value of all varieties of top-grade non-coking coal transacted in the  $i^{\text{th}}$  month through exclusive, forward, special forward, spot, special spot and linkage auctions taken together, and  $P_{a10}$  is the corresponding unit value at the base period.

The index (at the  $i^{\text{th}}$  month) of imported top-grade non-coking coal is

$$N_{m1i} = \frac{P_{m1i}}{P_{m10}}$$

where  $P_{m1i}$  is the unit value of all steam and bituminous coal imported from South Africa in the  $i^{\text{th}}$  month, and  $P_{m10}$  is the corresponding unit value at the base period.

The descriptions of indices of non-coking coal of middle and bottom grade categories are similar, with the exception that the import component is absent in the case of the bottom grade category (G-15, G-16 and G-17).

All the weights mentioned above are determined by the shares of total values of the different price channels mentioned above, averaged over the years 2015-16, 2016-17 and 2017-18.

## 4.2 Base period

For notified price dispatches, monthly break up is available only at aggregated level. This means there is little scope for studying seasonality or choosing of any particular month for the base period. A complete year would be a better choice to avoid seasonal bias.

The base year should have 'normal' production, trade and price variation. There is no observable reason to disqualify any particular year from this consideration.

Another consideration is that data should be reliable. Most of the data are collected from similar sources (DGCIS, CIL, SCCL and Coal Directory). Therefore, there is no reason to prefer any particular year.

Yet another consideration is that the base year should be as recent as possible for a forward looking index. From this consideration, 2017-18 may be preferred.

Geometric mean of monthly unit values of the base year 2017-18 is used in the denominator of the sub-indices for different price channels.



### **4.3 Is the index forward looking?**

Only four year of data were available, out of which 2014-15 did not have any transaction through auction. Over this period, no major movement in the proportion of aggregate values in various price channels was observed. Also since the monthly information on domestic dispatches were only apportioned values of yearly aggregates, there is hardly any scope of model-based forecasting of future weights. Under the circumstances, the only option was to use three-year average values for weights.

It is suggested that the weights used in the coal index be revised every four years, and also that these weights be computed from the transactions data spanning four consecutive years, using the methodology described in this report. The first revision would involve transactions data of the financial years 2016-17, 2017-18, 2018-19 and 2019-20. CCO may complete computation of the revised weights by 31<sup>st</sup> December 2021. After the revision is made, the results should be double-checked before making the new weights effective from 1<sup>st</sup> April 2022. The same cycle may be repeated after another four years.

### **4.4 Sub-indices**

The National Coal Indices comes with a number of sub-indices. The sub-indices at the top level are those for coking and non-coking coal. The index for non-coking coal is itself a composite index consisting of sub-indices for top, middle and bottom grades. Each of these sub-indices have further sub-indices accounting for the notified-price, auction and import components. In the case of bottom grade coal there are just two sub-indices as there is no import component.

Some potential users have suggested the utilization of these sub-indices for greater relevance to a particular coal block being auctioned. The HPEC may take a call on whether this should be done in lieu of a single index.

## **5. Some recommendations**

User side data would have been very relevant for the coal index, but it could not be captured in the present set-up. This may be planned for a future revision of the index. Supply side data on individual transactions at notified price would have brought more parity among different types of transaction. This should be feasible with some effort in future.


The rationale and the procedure for construction of the national coal index have been documented here. There has been complete transparency about data used for determining commodity basket and data needed to be used for periodic computation of index. In this context, one needs to ensure that the notified prices used in the coal indices should be determined independently of the values of the indices to avoid circularity.

A set of worksheets containing implementation of the computations needed for the coal index is attached. This MS-Excel file, together with the report, may be put in the public domain, so that there can be verification, suggestions and scope for improvement.

Manual checking, cleaning and validating the data for the present exercise had been a considerable task for the ISI team. The same exercise should be carried out by CCO at the time of revision of weights. Similar scrutiny and diligence is also needed for monthly computation of the coal index, to be made by determining appropriate prices and unit values for the respective price channels. The Committee recommends that the CCO should be entrusted with the task of computing the Index on a monthly basis. In the initial months CCO may need support from ISI. Government may decide what should be this period of support.



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IAS, Joint Secretary & Nominated  
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Partha S Bhattacharyya  
Ex- Chairman, Coal India Limited (Special Invitee)

## Appendix: Full list of price channels

The complete list of price channels used for the National Coal Index, along with its nested structure, is given below.

- Indian coal
  - Coking
    - Coking, notified
      - Coking, notified , ST-I
        - Prime coking, regulated, BCCL ST-I
        - Prime coking, non-regulated, BCCL ST-I
      - Coking, notified , ST-II
        - Prime coking, regulated, BCCL ST-II
        - Prime coking, non-regulated, BCCL ST-II
      - Coking, notified , W-I
        - Prime coking, regulated, BCCL W-I
        - Prime coking, non-regulated, BCCL W-I
      - Coking, notified , W-II
        - Prime coking, regulated, BCCL W-II
        - HVMC, regulated, BCCL W-II
        - Prime coking, non-regulated, BCCL W-II
        - HVMC, non-regulated, BCCL W-II
        - Coking, regulated, ECL W-II
        - Coking, non-regulated, ECL W-II
        - Coking, non-regulated, WCL W-II
      - Coking, notified , W-III
        - Prime coking, regulated, BCCL W-III
        - HVMC, regulated, BCCL W-III
        - Prime coking, non-regulated, BCCL W-III
        - HVMC, non-regulated, BCCL W-III
        - Coking, non-regulated, CCL W-III
        - Coking, non-regulated, ECL W-III
      - Coking, notified , W-IV
        - Prime coking, regulated, BCCL W-IV
        - HVMC, regulated, BCCL W-IV
        - Prime coking, non-regulated, BCCL W-IV
        - HVMC, non-regulated, BCCL W-IV
        - Coking, regulated, CCL W-IV
        - Coking, non-regulated, CCL W-IV
    - Coking, auction
      - Exclusive, forward, special forward, spot, special spot, linkage
    - Coking, imported
      - Coking coal imported from Australia
  - Non-coking
    - Non-coking, top grade (G-1 to G-6 or imported)
      - Non-coking, top grade, notified
        - Non-coking, regulated, CIL (excl WCL) G-1
        - Non-coking, non-regulated, CIL (excl WCL) G-1
        - Non-coking, regulated, CIL (excl WCL) G-2
        - Non-coking, non-regulated, CIL (excl WCL) G-2
        - Non-coking, regulated, CIL (excl WCL) G-3
        - Non-coking, non-regulated, CIL (excl WCL) G-3

- Non-coking, regulated, CIL (excl WCL) G-4
- Non-coking, non-regulated, CIL (excl WCL) G-4
- Non-coking, non-regulated, WCL G-4
- Non-coking, regulated, CIL (excl WCL) G-5
- Non-coking, regulated, WCL G-5
- Non-coking, regulated, SCCL G-5
- Non-coking, non-regulated, CIL (excl WCL) G-5
- Non-coking, non-regulated, WCL G-5
- Non-coking, non-regulated, SCCL G-5
- Non-coking, regulated, CIL (excl WCL) G-6
- Non-coking, regulated, WCL G-6
- Non-coking, non-regulated, CIL (excl WCL) G-6
- Non-coking, non-regulated, WCL G-6
- Non-coking, top grade, auction
  - Exclusive, forward, special forward, spot, special spot, linkage
- Non-coking, top grade, imported
  - Steam and bituminous coal imported from South Africa
- Non-coking, middle grade (G-7-G-14 or imported)
  - Non-coking, middle grade, notified
    - Non-coking, regulated, WCL G-7
    - Non-coking, regulated, SCCL G-7
    - Non-coking, non-regulated, CIL (excl WCL) G-7
    - Non-coking, non-regulated, WCL G-7
    - Non-coking, non-regulated, SCCL G-7
    - Non-coking, regulated, CIL (excl WCL) G-8
    - Non-coking, regulated, WCL G-8
    - Non-coking, regulated, SCCL G-8
    - Non-coking, non-regulated, CIL (excl WCL) G-8
    - Non-coking, non-regulated, WCL G-8
    - Non-coking, non-regulated, SCCL G-8
    - Non-coking, regulated, CIL (excl WCL) G-9
    - Non-coking, regulated, WCL G-9
    - Non-coking, regulated, SCCL G-9
    - Non-coking, non-regulated, CIL (excl WCL) G-9
    - Non-coking, non-regulated, WCL G-9
    - Non-coking, non-regulated, SCCL G-9
    - Non-coking, regulated, CIL (excl WCL) G-10
    - Non-coking, regulated, WCL G-10
    - Non-coking, non-regulated, CIL (excl WCL) G-10
    - Non-coking, regulated, SCCL G-10
    - Non-coking, non-regulated, WCL G-10
    - Non-coking, non-regulated, SCCL G-10
    - Non-coking, regulated, CIL (excl WCL) G-11
    - Non-coking, regulated, WCL G-11
    - Non-coking, regulated, SCCL G-11
    - Non-coking, non-regulated, CIL (excl WCL) G-11
    - Non-coking, non-regulated, WCL G-11
    - Non-coking, non-regulated, SCCL G-11
    - Non-coking, regulated, CIL (excl WCL) G-12
    - Non-coking, regulated, WCL G-12
    - Non-coking, regulated, SCCL G-12
    - Non-coking, non-regulated, CIL (excl WCL) G-12

- Non-coking, non-regulated, WCL G-12
- Non-coking, non-regulated, SCCL G-12
- Non-coking, regulated, CIL (excl WCL) G-13
- Non-coking, regulated, WCL G-13
- Non-coking, regulated, SCCL G-13
- Non-coking, non-regulated, CIL (excl WCL) G-13
- Non-coking, non-regulated, WCL G-13
- Non-coking, non-regulated, SCCL G-13
- Non-coking, regulated, CIL (excl WCL) G-14
- Non-coking, regulated, SCCL G-14
- Non-coking, non-regulated, CIL (excl WCL) G-14
- Non-coking, non-regulated, SCCL G-14
- Non-coking, middle grade, auction
  - Exclusive, forward, special forward, spot, special spot, linkage
- Non-coking, middle grade, imported
  - Steam and bituminous coal imported from Indonesia
- Non-coking, bottom grade (G-15-G-17)
  - Non-coking, bottom grade, notified
    - Non-coking, regulated, CIL (excl WCL) G-15
    - Non-coking, regulated, SCCL G-15
    - Non-coking, non-regulated, CIL (excl WCL) G-15
    - Non-coking, non-regulated, SCCL G-15
    - Non-coking, regulated, CIL (excl WCL) G-16
    - Non-coking, regulated, SCCL G-16
    - Non-coking, non-regulated, CIL (excl WCL) G-16
    - Non-coking, non-regulated, SCCL G-16
    - Non-coking, regulated, CIL (excl WCL) G-17
    - Non-coking, regulated, SCCL G-17
    - Non-coking, non-regulated, CIL (excl WCL) G-17
    - Non-coking, non-regulated, SCCL G-17
  - Non-coking, bottom grade, auction
    - Exclusive, forward, special forward, spot, special spot, linkage