

Staff Paper on the Methodology for Compilation of Coal Price Index applicable for Power Sector

I: Background

In pursuance of Ministry of Power (MOP) Notification dated 19.01.2005 (as amended from time to time) on Guidelines for Determination of Tariff by Bidding Process for Procurement of Power by Distribution Licensees, CERC notifies various escalation rates including the escalation rate for domestic coal, every six months, for the purpose of bid evaluation and payment (from 1.4.2014 onwards only for payment). CERC has been notifying the escalation rate for domestic coal for payment since July 2009. The methodology "*Revised Methodology for Determining the Escalation Factors and Other Parameters to be notified by CERC as per the Amendment to the Competitive Bidding Guidelines dated 27.3.2009*" developed by CERC in July 2009 is being used for computing the escalation rate for domestic coal for payment.

2. Various stakeholders (power producers, mainly Case-1 bidders) through petitions and representations have sought for revision in the existing methodology of computing the escalation rate for domestic coal, submitting that the existing methodology is not capturing the movements in price of non-coking coal applicable for power sector notified by Coal India Limited (CIL). In the order dated 20.10.2016 in the Petition No.26/RP/2016 and 50/MP/2015 filed by the power producers, the Commission had directed the Staff of the Commission, inter alia, to carry out an exercise for revision of methodology for computation of escalation indices for the non-coking coal used in power generation.

3. In view of the petitions/representations, the issue has been examined. As per the existing methodology, WPI for Non-coking coal is being used for computing the escalation rate for domestic coal. It was observed that the escalation rate based on WPI for non-coking coal was not capturing the movements in price of Non-coking coal applicable for the power sector mainly for the reason that WPI for Non-coking coal was based on the price of all grades of non-coking coal (G1-G17) whereas only few grades of Non-coking coal are being allocated/supplied to power producers. Keeping this in view, the Commission through its letter dated 19.3.2015 requested the Office of the Economic

Advisor (OEA), DIPP, Ministry of Commerce and Industry to bring out a separate index considering the price of various grades of non-coking coal used by the power producers (G7-G13) in addition to the general index (G1-G17).

4. Considering the views of CERC, the OEA, in its new series of WPI (Base 2011-12), Notification dated 12.5.2017, has trifurcated the WPI for non-coking coal into G1-G6, G7-G14 & G15-G17. Keeping in view the grades of coal used by the power producers, the Commission has been using WPI for non-coking coal (G7-G14) while notifying the escalation rate for domestic coal since April 2017.

5. CIL Notifies separately the price of Non-coking coal applicable for power sector and other than power sector. It can be observed from the CIL Notification dated May 2016 that there is a substantial increase in the price of Non-coking coal applicable for power sector when compared with the price of Non-coking coal applicable for other than power sector. The OEA, while constructing the new series (Base Year: 2011-12) of WPI for Non-coking coal, did not distinguish between the price of Non-coking coal applicable for power sector and other than power sector. The average price of Non-coking coal applicable for power sector and other than power sector has been considered. Since price of Non-coking coal for power sector are different from the price of Non-coking coal for other than power sector, the index based on average price is not reflective of actual increase in the price of Non-coking coal applicable for power sector. Therefore the stakeholders have expressed concern even with the new series of WPI for Non-coking coal for computing the escalation rate for domestic coal.

6. Keeping in view the differential increase in price of Non-coking coal applicable for power sector and other than power sector, the Commission again pursued the matter with the Ministry of Commerce and Industry and sought for compilation of WPI for non-coking coal for exclusive use of power sector. However, the Ministry of Commerce and Industry, vide letter No.OEA-11025(11)/6/2017-WPD dated 9.10.2017, responded that customized compilation of WPI for any particular sector is not possible. As an alternative, the Ministry of Commerce and Industry suggested CERC to develop its own index keeping in mind the specific needs of the power sector.

7. In the process of arriving at an appropriate escalation rate for domestic coal (i.e. to reflect the actual variation in the price of grades of coal used by the power sector), the Staff of the Commission is proposing for compilation of an index for exclusive use of the power sector and to seek comments of all stakeholders on the same.

II: Present methodology for computing the escalation rate

8. The Commission has been using the methodology developed in July 2009 for computing the escalation rate for domestic coal for payment and the methodology is as under:

"The annual escalation rates for payment have been computed based on latest twelve months data (weekly/monthly). The steps followed while computing the rates are as under.

Step 1: Average index values for the appropriate six months period computed

Step 2: A half-yearly escalation rate computed based on the six months index.

Step 3: Annual escalation rate computed by multiplying half-yearly escalation rate by two."

9. As per the methodology, CERC has been using the WPI for Non-coking Coal for computing the escalation rate for domestic coal. Justification for using the WPI for Non-coking coal has been provided in the methodology as under:

"Escalation rate for Domestic coal component (for Payment)

The Wholesale Price Index (WPI) is the most widely used price index in India. It is the only general index capturing price movements in a comprehensive way. The WPI for Non-Coking coal is available at disaggregated level and is used for computing the escalation rate for domestic coal component for payment.

Name of the Index: *Single index based on WPI for Non-Coking coal*

Source/Publisher: *GOI, Ministry of Commerce and Industry*

Reasons: *Single index is recommended for the following reasons:*

- *The WPI for Non-coking coal is published by Government of India.*

- *The index is available on a weekly basis with the shortest possible time lag*"

10. As per the bidding guidelines, in case of Case-1 (where the location, technology, or fuel is not specified by the procurer) the bidders are free to use any fuel or any grade of coal for power generation. The power producers are generally using more than one grade of coal. The grades of coal used by power producers may vary from time to time during the term of Power Purchase Agreement. While developing the methodology for computing the escalation rate for domestic coal in 2009, the Commission had examined the movements in WPI for Non-coking coal and price of Non-coking coal notified by CIL and noted that the variations between the two were in decimal points. Considering these reasons and the merits in using WPI, it was decided to use WPI for Non-coking coal (which represents the price of all grades of Non-coking coal) for computing the escalation rate for domestic coal for payment. The methodology was finalized after having consultations with stakeholders of the power sector at that time.

III: Proposed methodology for computing the escalation rate

11. In the proposed methodology, there is no change in the computation of the escalation rate for domestic coal. However, there is a change in the index used for computing the escalation rate. It is proposed to compile an index based on the price of Non-coking coal applicable for the power sector for the reason that there is a variation in price of Non-coking coal applicable for power sector and other than power sector as can be seen in Table-1.

Coal Grade/Notification Month	Increase in Price of Non-coking coal applicable for power sector					Increase in Price of Non-coking coal applicable for other than power sector				
	Jun-12	May-13	Dec-13	May-16	Jan-18	Jun-12	May-13	Dec-13	May-16	Jan-18
Gr1	0%	0%	0%	-27%	-8%	0%	0%	0%	-27%	-8%
Gr2	0%	0%	0%	-29%	-5%	0%	0%	0%	-29%	-5%
Gr3	0%	-12%	0%	-17%	-2%	0%	-12%	0%	-17%	-2%
Gr4	0%	-12%	0%	-14%	0%	0%	-12%	0%	-14%	0%
Gr5	0%	0%	0%	-2%	0%	0%	0%	0%	-2%	0%
Gr6	5%	5%	5%	19%	16%	14%	-4%	15%	-3%	2%
Gr7	5%	5%	5%	14%	20%	14%	-3%	14%	-7%	12%

Gr8	5%	5%	5%	13%	3%	14%	-4%	14%	-8%	3%
Gr9	5%	5%	5%	13%	4%	15%	-4%	14%	-8%	4%
Gr10	5%	5%	5%	14%	4%	15%	-4%	14%	-6%	4%
Gr11	5%	4%	5%	16%	18%	14%	-4%	15%	-7%	18%
Gr12	5%	5%	5%	14%	17%	14%	-4%	14%	-7%	17%
Gr13	5%	6%	5%	18%	14%	15%	-3%	14%	-4%	14%
Gr14	5%	5%	5%	17%	15%	13%	-4%	14%	-3%	15%
Gr15	5%	6%	5%	18%	-2%	14%	-3%	15%	-3%	-2%
Gr16	5%	6%	5%	17%	-5%	14%	-3%	14%	-3%	-6%
Gr17	4%	6%	5%	17%	-5%	13%	-3%	13%	-2%	-6%
Average (G7-G14)	5%	5%	5%	15%	12%	14%	-4%	14%	-6%	11%

12. The power producers are free to use coal from any coal company and are free to use any grade of coal for their power generation. Keeping this in view, various factors may need to be considered while compilation of an appropriate index applicable for power sector. It may be required to decide on (i) the grades of Non-coking coal used by power producers; and (ii) the source of coal for power generation from a coal company (CIL, WCL and SCCL).

13. It is observed that power producers predominantly use G7 to G14 grades of Non-coking coal. CIL notifies the price of non-coking coal separately for WCL and all other subsidiaries. The price notified for WCL is different from the price notified for all other subsidiaries. However, the variation in price of Non-coking coal applicable for WCL and all other subsidiaries is more or less same (See Table-2). Therefore, it may be appropriate to compute an index based on the average price of non-coking coal notified by CIL for all subsidiaries including WCL.

Coal Grade/Notification Month	Increase in Price of Non-coking coal applicable for all subsidiaries excluding WCL			Increase in Price of Non-coking coal applicable for WCL				
	May-13	May-16	Jan-18	Jun-12	May-13	Dec-13	May-16	Jan-18
G1	0%	-27%	-8%	0%	0%	0%	-27%	-8%
G2	0%	-29%	-5%	0%	0%	0%	-29%	-5%
G3	-12%	-17%	-2%	0%	-12%	0%	-17%	-2%
G4	-12%	-14%	0%	0%	-12%	0%	-14%	0%
G5	0%	-2%	0%	0%	0%	0%	-2%	0%
G6	10%	19%	22%	9%	1%	9%	19%	11%

G7	10%	14%	20%	9%	1%	9%	14%	20%
G8	10%	14%	3%	9%	1%	9%	13%	3%
G9	10%	13%	4%	10%	1%	9%	13%	4%
G10	10%	14%	4%	10%	0%	10%	15%	4%
G11	9%	16%	18%	9%	0%	9%	15%	18%
G12	10%	15%	17%	9%	1%	10%	14%	17%
G13	11%	18%	13%	9%	2%	9%	18%	14%
G14	10%	18%	15%	9%	2%	10%	16%	15%
G15	11%	18%	-2%	9%	2%	9%	18%	-2%
G16	10%	18%	-5%	9%	2%	10%	16%	-6%
G17	11%	18%	-5%	9%	2%	9%	17%	-4%
Average (G7-G14)	10%	14%	11%	9%	1%	9%	14%	11%

14. The escalation rate for domestic coal may be computed using price or price indices for various grades of Non-coking coal used for power generation. There are various methods that can be used for computing the escalation rate. These are average price method, weighted average price method, price index method. The price index method is generally used for capturing the movements in price of various commodities including coal (For example, Wholesale Price Index, Consumer Price Index and Producer Price Index). Keeping this in view, it may be appropriate to compile a price index for non-coking coal similar to WPI.

15. In this paper, it is proposed to compile a coal price index based on the price of Non-coking coal applicable for power sector notified by CIL. The compiled coal price index is recommended for the use of CERC for computing the escalation rate for domestic coal in place of WPI for Non-coking coal. Main features of the proposed coal price index are as under:

- (i) Similar to WPI, Laspeyres Price Index (*If the quantities of base time period are taken as weights, the weighted aggregative price index is called Laspeyres price index*) is proposed to be used for compilation of the coal price index.
- (ii) CERC has already notified the escalation rate for domestic coal applicable till September 2019 hence the proposed coal price index is required for prospective application. The year 2017-18 is proposed as Base Year in the proposed index for two reasons: (a) the year is a normal year since there are no abnormalities in

the level of production and price variations; and (b) the year is as recent as possible.

- (iii) CIL notifies the pit head run of mine price of non-coking coal applicable for the power sector for all subsidiaries of CIL excluding WCL and for WCL separately. These prices reflect adequately the changes in price of non-coking coal applicable for the power sector. Therefore, these prices are considered for the proposed index.
- (iv) Power producers predominantly use G7-G14 grades of Non-coking coal. Hence, it is proposed to compile a coal price index for G7-G14.
- (v) Base year price shall be the geometric mean of monthly prices of the base year.
- (vi) Weights shall be based on the value of non-coking coal (price x quantity of Non-coking coal) of G7-G14.
- (vii) The compilation of Coal Price Index broadly consists of two stages.
 - a. First, the grade-wise indices (i.e. elementary price index) are calculated using “Jevons Index formula”, which uses the Geometric Mean of price relatives (i.e. the price change). Price relatives are calculated as the percentage ratios, i.e. by dividing the current price by the base period price and multiplying the quotient by 100.
 - b. In the second stage, these elementary price indices are aggregated using weighted arithmetic mean to obtain coal price indices using Laspeyre’s index formula, which has a fixed base-year weighting diagram operative through the entire life span of the series. The formula used is:

$$I = \frac{\sum (I_i \times W_i)}{\sum W_i}$$

Where, \sum represents the summation operation

I = Coal Price Index for G7-G14 grades of coal

W_i = Weight assigned to the i th grade of coal

I_i = Price Index of the i th grade of coal (Elementary Price Index)

16. An example of compilation of elementary price index for April 2018 [as at para 15(vii) a.]

Compilation of Elementary Price Index, April 2018							
Grades of Coal	CIL			WCL			Elementary Price Index, April 2018 (Geometric Mean of Price Relatives) (li)
	Base Price (2017-18)	Current Price (April 2018)	Price Relative = (current price/base price)*100	Base Price (2017-18)	Current Price (April 2018)	Price Relative = (current price/base price)*100	
G7	1676	1926	114.92	2011	2311	114.91	114.92
G8	1431	1465	102.37	1714	1757	102.50	102.44
G9	1110	1140	102.72	1332	1368	102.72	102.72
G10	991	1024	103.35	1192	1228	103.04	103.19
G11	844	955	113.15	1011	1145	113.25	113.20
G12	790	886	112.19	946	1063	112.36	112.28
G13	743	817	109.94	889	980	110.29	110.12
G14	673	748	111.11	808	897	111.05	111.08

17. An example of compilation of Coal Price Index (G7-G14) for April 2018 [as at para 15(vii) b.]

Weights used for compilation of Coal Price Index		
Grades of Coal	Value of Non-coking Coal, 2017-18	Weights (Wi)
G7	17986	4.97
G8	25720	7.10
G9	40766	11.26
G10	72882	20.13
G11	103375	28.55
G12	36005	9.94
G13	45713	12.63
G14	19616	5.42
Total	362063	100.00

Using Laspeye's formula, the Coal Price Index (G7-G14) for April 2018 is computed as under:

$$I_{04/18} = \frac{\sum (li \times Wi)}{\sum Wi} = 108.73.$$

18. The merits of adopting the proposed coal price index over WPI for Non-coking coal are as under:

- (i) The coal price index is more representative since it is based on the price of Non-coking coal applicable for power sector.
- (ii) Time lag in the availability of index is reduced to one month from three months. For example, for October 2019 Notification, if WPI for Non-coking coal is used, the data can be taken from July 2018 to June 2019 for computing the escalation rate for domestic coal (i.e. excluding provisional data on WPI for July and August 2019) i.e. with 3 months lag. If the proposed coal price index is used, the data can be taken from September 2018 to August 2019 i.e. with one month lag.
- (iii) It provides flexibility with respect to choice of parameters such as composition of grades of Non-coking coal, composition of coal prices, base year.

19. The Laspeyre's Price Index has an implicit disadvantage that the quantities of base year are taken as weights. To make the weights more appropriate it is proposed to change the base year from time to time, say every 5 years.

20. The Economics Division of CERC shall compile the Coal Price Index from time to time and post the same on the website of CERC (www.cercind.gov.in).

21. The methodology for compilation of Coal Price Index shall be finalised after considering the views of Office of the Economic Adviser, Ministry of Commerce & Industry, Ministry of Statistics & Programme Implementation and stakeholders of the power sector.

22. Comments of stakeholders are invited on the above issues presented in the staff paper.
