EXPLANATION TO THE NOTIFICATION DATED 31-5-2021 ON ESCALATION RATES AND OTHER PARAMETERS

In pursuance of paragraphs 5.1 and 6.4 of Resolution of Ministry of Power (MOP) on "Guidelines for Tariff Based Competitive Bidding Process for Procurement of Round-The-Clock Power from Grid Connected Renewable Energy Power Projects, complemented with Power from Coal Based Thermal Power Projects" dated 22.07.2020 read with amendment dated 03.11.2020, the Central Electricity Regulatory Commission (CERC) is required to notify various escalation rates/factors and other parameters, for the purpose of bid evaluation. The escalation rates and other parameters are as under:

- (1) Escalation Rate for Domestic Coal
- (2) Escalation Rate for Domestic Gas
- (3) Escalation Rate for Inland Transportation Charges of Coal
- (4) Escalation Rate for Inland Transportation Charges of Gas
- (5) Escalation Rate for Imported Coal
- (6) Escalation Rate for Imported Gas
- (7) Escalation Rate for Transportation of Imported Coal
- (8) Escalation Rate for Transportation of Imported Gas
- (9) Discount rate

2. The escalation factors and other parameters have been computed based on the methodology defined in the CERC Order dated 29-5-2021 in Petition No.7/SM/2021 (see CERC website <u>www.cercind.gov.in</u>).

3. Escalation Rates for Bid Evaluation

After consulting various experts and a study conducted by the Indian Statistical Institute (ISI), Kolkata, CERC had decided to use the method of Minimum Mean Square Error for determining the escalation rates for the purpose of evaluation of bids. Using the method of Minimum Mean Square Error on the time series data for latest twelve calendar years, the annual escalation rates for bid evaluation have been computed for the present Notification dated 31-5-2021. The formula of the method is as under:

e: annual escalation rate in percent =g*100, where: g: escalation factor = $[exp\{\{(6 \ x \ \Sigma n_t=2 \ (t-1)x \ log_e(R_t)\}/\{(n-1)x \ n \ x \ (2n-1)\}\}]-1$ $R_t = (Y_t/Y_1)$ $Y_t = "t"^{th} observation$ $Y_1 = initial observation$ n = number of observations

3.1 Escalation Rate for domestic coal (for Evaluation): CERC has been using its own index based on the price of non-coking coal applicable for power sector (CERC Coal Price Index, Base 2017-18=100) for computing the escalation rate for domestic coal for payment and the same is available from April 2018 onwards. However, for computing the escalation rate for evaluation, time series data for the latest 12 years is required. Due to non-availability of the time series data on CERC coal price index (being available only from April 2018 onwards), as provided in the CERC order dated 29-5-2021, Wholesale Price Index (WPI) for non-coking coal (G7 to G14) (Base 2011-12=100) shall be used for computing the escalation rate for domestic coal for evaluation.

Name of the Index: WPI for non-coking coal (G7 to G14)

Source/Publisher: Ministry of Commerce and Industry, Government of India (website: www.eaindustry.nic.in)

Reasons: Use of Single index of WPI for non-coking coal is considered for the following reasons:

- WPI is a measure of inflation at the wholesale level. It is the only general index capturing price movements of various commodities (including non-coking coal) in a comprehensive way.
- WPI for non-coking coal is published by Government of India.
- WPI for non-coking coal is available on a monthly basis with the shortest possible time lag.
- Time series data on CERC coal price index is not available for 12 years.

Description: The escalation rate for domestic coal shall be computed based on the time series data on WPI for non-coking coal for the period from 2012 onwards.

Computation: The escalation rate for domestic coal has been computed based on the time series data on WPI for non-coking coal (G7 to G14) for the period from

2012 to 2020. The data on WPI for non-coking coal has been taken from the website of Ministry of Commerce & Industry. The escalation rate for domestic coal has been computed as under:

Т	Table-1: ESCALATION RATE FOR DOMESTIC COAL (FOR EVALUATION)						
Year Number (t)	Year	WPI for Non-Coking Coal	$Y_t/Y_1 = Rt$	In R _t	Year -1 (t-1)	Product [(t-1) x (In R _t)]	
1	2012	101.5					
2	2013	106.3	1.05	0.05	1	0.05	
3	2014	113.3	1.12	0.11	2	0.22	
4	2015	113.3	1.12	0.11	3	0.33	
5	2016	118.8	1.17	0.16	4	0.63	
6	2017	122.8	1.21	0.19	5	0.95	
7	2018	136.4	1.34	0.30	6	1.77	
8	2019	136.7	1.35	0.30	7	2.08	
9	2020	136.8	1.35	0.30	8	2.38	
A = Sum	of "product"	column				8.41	
B= 6 time	s (6 x A)					50.47	
$C=(n-1) \times n \times (2n-1); n = Number of Years of data = 9$						1224.00	
D = B/C						0.04	
g (Exponential Factor) = Exponential (D) -1						0.04	
e = Annual Escalation Rate (%) = g x 100						4.21	

The annual escalation rate computed in the above table (4.21%) is notified as escalation rate for domestic coal for evaluation.

3.2. Escalation rate for domestic gas (For Evaluation): The main producers of natural gas in India are (i) Oil & Natural Gas Corporation Ltd (ONGC); (ii) Oil India Ltd (OIL); (iii) Joint Ventures (JVs) of Tapti, Panna Mukta and Ravva; and (iv) Reliance Industries Ltd. The Ministry of Petroleum & Natural Gas, Government of India (MOP&NG) has been regulating allocation and pricing of gas produced by ONGC and OIL by issuing administrative orders from time to time. Since 2006, Petroleum and Natural Gas Regulatory Board (PNGRB) has been regulating the refining, processing, storage, transportation, marketing and sale of natural gas. Petroleum and Planning Analysis Cell of MOP&NG publishes the statistics relating to consumer and producer prices of natural gas. Since the consumer price of gas for North-Eastern States is different from the consumer price for the rest of India, hybrid index of computing the escalation rate for domestic gas. CERC has been using this hybrid index to compute the escalation rate for domestic gas for payment.

Name of the Index: Hybrid index of consumer price of gas (based on 10% weightage to Consumer Price of gas applicable for North-Eastern States and 90% weightage to Consumer Price of gas applicable for rest of India).

Source/Publisher: Ministry of Petroleum & Natural Gas, Government of India and GAIL (India) Ltd.

Reasons: Use of Hybrid index of consumer price of gas is considered for following reasons:

- There is no single price available for gas.
- The weightage has been decided based on the gross production of natural gas in India. The production of natural gas in the NE Region is around 10% of the total production of natural gas in India.
- Instead of producer price of natural gas, consumer price of natural gas has been proposed to be used for computing the escalation rate for two reasons:
 (i) there is a subsidy component involved between the producer price and consumer price; and (ii) the consumer price is the price at which the supplier supplies the natural gas to various consumers and this is exclusive of transportation charges of gas.

Description: The escalation rate for domestic gas shall be computed based on the time series data on consumer price of gas for the latest 12 years.

Computation: The escalation rate for domestic gas has been computed based on the time series data on consumer price of gas for the period from 2009 to 2020. The data has been collected from Ministry of Petroleum & Natural Gas (MOPNG) and GAIL (India) Ltd. Composite series (Average consumer price of Gas), based on 90% weight to Consumer Price-Off-shore (Landfall point and On-shore) and 10% weight to Consumer Price (North-Eastern States) has first been developed, which then has been used for computing the escalation rate as under:

	Composite series: Average Consumer Price of Gas						
Year	Consumer Price- Off-shore (Landfall point and On-shore) (`/'000' cubic metre)	Consumer Price (North-Eastern States) (`/'000' cubic metre)	Proportion of off-shore Gas in total Gas Production	Proportion of North-East gas in Total Gas Production	Average Consumer Price of Gas ('/'000 cubic metre) (Y _i)		
2009	3200	1920	90%	10%	3072		
2010	5373	3224	90%	10%	5158		
2011	7057	4234	90%	10%	6775		
2012	8080	4848	90%	10%	7757		
2013	8860	5316	90%	10%	8506		
2014	9754	5854	90%	10%	9364		
2015	10482	6293	90%	10%	10063		
2016	8359	5014	90%	10%	8024		
2017	6396	3834	90%	10%	6140		
2018	7630	4583	90%	10%	7325		
2019	8851	5310	90%	10%	8497		
2020	6524	3908	90%	10%	6263		

Table-2: ESCALATION RATE FOR DOMESTIC GAS (FOR EVALUATION)						
Year Number (t)	Year	Average Consumer Price of Gas (Rs./'000 cubic metre) (Y _i)	$Y_t/Y_1 = R_t$	In R _t	Year -1 (t-1)	Product [(t-1) x (In R _t)]
1	2009	3072				
2	2010	5158	1.68	0.52	1	0.52
3	2011	6775	2.21	0.79	2	1.58
4	2012	7757	2.53	0.93	3	2.78
5	2013	8506	2.77	1.02	4	4.07
6	2014	9364	3.05	1.11	5	5.57
7	2015	10063	3.28	1.19	6	7.12
8	2016	8024	2.61	0.96	7	6.72
9	2017	6140	2.00	0.69	8	5.54
10	2018	7325	2.38	0.87	9	7.82
11	2019	8497	2.77	1.02	10	10.17
12	2020	6263	2.04	0.71	11	7.84
A = Sum of	"product" co	olumn				59.74
B= 6 times (6 x A)						358.42
$C= (n-1) \times n \times (2n-1); n = Number of Years of data = 12$						3036.00
D = B/C					0.12	
g (Exponential Factor) = Exponential (D) -1						0.13
e = Annual Escalation Rate (%) = g x 100						12.53

The annual escalation rate computed in the above table (12.53%) is notified as escalation rate for domestic gas for evaluation.

3.3 Escalation rate for inland transportation charges of coal (For Evaluation): The transportation of coal to power plants takes place mainly by rail. The Ministry of Railways notifies freight rates for transportation of coal from time to time. The coal freight rates are available, in slabs, for distances from 1 km to 5000 km. The coal freight rates are sensitive to distance. Keeping in view different distances between the power plants and coal mines, the escalation rate for inland transportation charges of coal is proposed to be computed for different distances. The data on coal freight rate for 125 km, 500 km, 1000 km, 2000 km and 3000 km is proposed to be used for computing the escalation rate for inland transportation of coal for distance upto 125 km, upto 500 km, upto 1000 km, upto 2000 km and beyond 2000 km respectively. CERC has been using this methodology and coal freight rates for computing the escalation rates for transportation charges of coal for payment.

Name of the Index: Coal freight rate.

Source/Publisher: Ministry of Railways, Government of India (website: www.indianrailways.gov.in)

Reasons: Use of Single index of coal freight rate is considered for following reasons:

- Coal freight rates are published by Ministry of Railways, Government of India
- The rates are available in public domain.

Description: The escalation rate for inland transportation charges of coal shall be computed based on the time series data on coal freight rates for the latest 12 years.

Computation: The escalation rate for inland transportation charges for coal has been computed based on the time series data on coal freight rates for the period from 2009 to 2020. The data has been collected from Ministry of Railways. The data on coal freight rate for 125 km, 500 km, 1000 km, 2000 km and 3000 km has been used for computing the escalation rate for inland transportation of coal for distance upto 125 km, upto 500 km, upto 1000 km, upto 2000 km and beyond 2000 km respectively. The escalation rate for inland transportation charges for coal has been computed as under:

Table-3	Table-3.1: ESCALATION RATE FOR INLAND TRANSPORTATION CHARGES FOR COAL (UP TO 125 KM) (FOR EVALUATION)						
Year Number (t)	Year	Coal Freight Rate (Rs/Tonne) for 125 km	$Y_t/Y_1 = R_t$	In R _t	Year -1 (t-1)	Product [(t-1) x (In R _t)]	
1	2009	125.10					
2	2010	125.10	1.000	0.000	1	0.000	
3	2011	125.10	1.000	0.000	2	0.000	
4	2012	145.67	1.164	0.152	3	0.457	
5	2013	157.33	1.258	0.229	4	0.917	
6	2014	192.10	1.536	0.429	5	2.144	
7	2015	202.55	1.619	0.482	6	2.891	
8	2016	205.60	1.643	0.497	7	3.478	
9	2017	247.68	1.980	0.683	8	5.464	
10	2018	361.20	2.887	1.060	9	9.543	
11	2019	389.60	3.114	1.136	10	11.360	
12	2020	389.60	3.114	1.136	11	12.496	
A = Sum c	of "product" c	olumn				48.75	
B= 6 times	292.50						
C= $(n-1) \times n \times (2n-1)$; n = Number of Years of data = 12						3036.00	
D = B/C						0.10	
g (Exponential Factor) = Exponential (D) -1						0.10	
e = Annua	I Escalation	Rate (%) = g x 100				10.11	

Table-3.2: ESCALATION RATE FOR INLAND TRANSPORTATION CHARGES FOR COAL (UP								
TO 500 KM) (FOR EVALUATION)								
Year	Year	Coal Freight	Yt/Y1 =Rt	Ln Rt	Year -1 (t-	Product [(t-		
Numbe		Rate			1)	1) x (Ln Rt)]		
r (t)		(Rs/Ionne) for						
		500 KM						
1	2009	462.30						
2	2010	462.55	1.00	0.00	1	0.00		
3	2011	480.60	1.04	0.04	2	0.08		
4	2012	559.43	1.21	0.19	3	0.57		
5	2013	604.12	1.31	0.27	4	1.07		
6	2014	641.17	1.39	0.33	5	1.64		
7	2015	691.95	1.50	0.40	6	2.42		
8	2016	705.86	1.53	0.42	7	2.96		
9	2017	754.08	1.63	0.49	8	3.91		
10	2018	977.68	2.11	0.75	9	6.74		
11	2019	1054.70	2.28	0.82	10	8.25		
12	2020	1054.70	2.28	0.82	11	9.07		
A = Sum	of "product"	column				36.71		
B= 6 times (6 x A)						220.28		
$C=(n-1) \times n \times (2n-1); n = Number of Years of data = 12$						3036.00		
D = B/C						0.07		
g (Exponential Factor) = Exponential (D) -1						0.08		
e = Annual Escalation Rate (%) = g x 100						7.53		

Table-3.3: ESCALATION RATE FOR INLAND TRANSPORTATION CHARGES FOR COAL (UP								
Vear Vear Coal Freight Vt/V1 -Rt Ln Rt Vear -1 (t- Product [/t-								
Numbe	i cai	Rate			1)	1) x (Ln Rt)]		
r (t)		(Rs/Tonne) for 1000 km			,	, , , ,		
1	2009	887.90						
2	2010	888.38	1.00	0.00	1	0.00		
3	2011	923.40	1.04	0.04	2	0.08		
4	2012	1074.75	1.21	0.19	3	0.57		
5	2013	1160.70	1.31	0.27	4	1.07		
6	2014	1231.94	1.39	0.33	5	1.64		
7	2015	1329.43	1.50	0.40	6	2.42		
8	2016	1349.50	1.52	0.42	7	2.93		
9	2017	1391.58	1.57	0.45	8	3.59		
10	2018	1753.71	1.98	0.68	9	6.13		
11	2019	1891.80	2.13	0.76	10	7.56		
12	2020	1891.80	2.13	0.76	11	8.32		
A = Sum	of "product"	column				34.32		
B= 6 times (6 x A)						205.91		
C=(n-1) x n x (2n-1); n = Number of Years of data = 12						3036.00		
D = B/C						0.07		
g (Exponential Factor) = Exponential (D) -1						0.07		
e = Annual Escalation Rate (%) = g x 100						7.02		

Table-3.4:	Table-3.4: ESCALATION RATE FOR INLAND TRANSPORTATION CHARGES FOR COAL (UP TO 2000 KM) (FOR EVALUATION)					
Year Number (t)	Year	Coal Freight Rate (Rs/Tonne) for 2000 km	$\mathbf{Y}_{t}/\mathbf{Y}_{1}=\mathbf{R}_{t}$	In R _t	Year -1 (t-1)	Product [(t-1) x (In R _t)]
1	2009	1644.60				
2	2010	1645.49	1.00	0.00	1	0.00
3	2011	1710.50	1.04	0.04	2	0.08
4	2012	1990.83	1.21	0.19	3	0.57
5	2013	2149.99	1.31	0.27	4	1.07
6	2014	2281.78	1.39	0.33	5	1.64
7	2015	2462.48	1.50	0.40	6	2.42
8	2016	2407.42	1.46	0.38	7	2.67
9	2017	2285.48	1.39	0.33	8	2.63
10	2018	2841.88	1.73	0.55	9	4.92
11	2019	3065.70	1.86	0.62	10	6.23
12	2020	2761.97	1.68	0.52	11	5.70
A = Sum of	"product" col	umn				27.94
B= 6 times	167.62					
$C=(n-1) \times n \times (2n-1); n = Number of Years of data = 12$						3036.00
D = B/C						0.06
g (Exponential Factor) = Exponential (D) -1						0.06
e = Annual	Escalation Ra	ate (%) = g x 100				5.68

Table-3.5: ESCALATION RATE FOR INLAND TRANSPORTATION CHARGES FOR COAL (BEYOND 2000 KM) (FOR EVALUATION)							
Year Numbe r (t)	Year	Coal Freight Rate (Rs/Tonne) for 3000 km	Yt/Y1 =Rt	Ln Rt	Year -1 (t- 1)	Product [(t- 1) x (Ln Rt)]	
1	2009	2103.90					
2	2010	2105.03	1.00	0.00	1	0.00	
3	2011	2188.10	1.04	0.04	2	0.08	
4	2012	2546.61	1.21	0.19	3	0.57	
5	2013	2750.41	1.31	0.27	4	1.07	
6	2014	2918.80	1.39	0.33	5	1.64	
7	2015	3149.90	1.50	0.40	6	2.42	
8	2016	3051.93	1.45	0.37	7	2.60	
9	2017	2835.48	1.35	0.30	8	2.39	
10	2018	3511.37	1.67	0.51	9	4.61	
11	2019	3787.90	1.80	0.59	10	5.88	
12	2020	3409.11	1.62	0.48	11	5.31	
A = Sum	of "product"	column				26.57	
B= 6 times (6 x A)						159.44	
$C=(n-1) \times n \times (2n-1); n = Number of Years of data = 12$						3036.00	
D = B/C						0.05	
g (Exponential Factor) = Exponential (D) -1						0.05	
e = Annual Escalation Rate (%) = g x 100						5.39	

The annual escalation rates computed in the above tables (10.11%, 7.53%, 7.02%, 5.68% and 5.39% respectively applicable for transportation of coal upto 125 km, upto 500 km, upto 1000 km, upto 2000 km and beyond 2000 km) are notified as annual escalation rates for inland transportation charges of coal for evaluation.

3.4 Escalation rate for inland transportation charges of gas (For Evaluation): Domestic and imported natural gas is being transported mainly by GAIL at the rate prescribed by PNGRB. Petroleum and Planning Analysis Cell of Ministry of Petroleum & Natural Gas publishes the statistics relating to transportation charges of natural gas. HVJ pipeline is the major pipeline for transportation of gas in India. The transportation charges applicable for HVJ pipeline charged by GAIL is proposed to be considered for computing the escalation rate for transportation charges of gas. CERC has been using the transportation charges applicable for HVJ pipeline charged by GAIL for computing the escalation rate for payment.

Name of the Index: Transportation charges of gas applicable for HVJ pipeline charged by GAIL.

Source/Publisher: Ministry of Petroleum & Natural Gas, Government of India/ PNGRB (website: <u>www.petroleum.nic.in</u>)/ (website: www.pngrb.gov.in) and GAIL (India) Ltd (<u>www.gailonline.com</u>).

Reasons: Use of Single Index on Transportation charges of gas applicable for HVJ pipeline charged by GAIL is considered for the following reasons:

- GAIL is the main transporter of gas in India
- HVJ pipeline is the major pipeline for transportation of gas.
- Transportation Charges of Gas is determined by PNGRB.

Description: The Escalation Rate for Inland Transportation Charges of Gas shall be computed based on the time series data for transportation charges of gas applicable for HVJ pipeline charged by GAIL for the latest 12 years.

Computation: The Escalation Rate for Inland Transportation Charges for Gas has been computed based on the time series data on transportation charges of gas along HVJ pipeline charged by GAIL for the period from 2009 to 2020. The data has been collected from Ministry of Petroleum & Natural Gas, PNGRB and GAIL (India) Ltd. The escalation rate for inland transportation charges of gas for evaluation has been computed as under:

Table-4:	Table-4: ESCALATION RATE FOR INLAND TRANSPORTATION CHARGES OF GAS							
Year Number (t)	Year	Transportation charges along HVJ pipeline (Rs./'000' cubic metre)	$Y_t/Y_1 = R_t$	In R _t	Year -1 (t-1)	Product [(t-1) x (In R _t)]		
1	2009	1010						
2	2010	982	0.97	-0.03	1	-0.03		
3	2011	856	0.85	-0.17	2	-0.33		
4	2012	856	0.85	-0.17	3	-0.50		
5	2013	856	0.85	-0.17	4	-0.66		
6	2014	856	0.85	-0.17	5	-0.83		
7	2015	856	0.85	-0.17	6	-0.99		
8	2016	856	0.85	-0.17	7	-1.16		
9	2017	856	0.85	-0.17	8	-1.32		
10	2018	856	0.85	-0.17	9	-1.49		
11	2019	1111	1.10	0.10	10	0.95		

12	2020	1365	1.35	0.30	11	3.32
A = Sum of	-3.04					
B= 6 times ((6 x A)					-18.25
C= (n-1) x n	x (2n-1); n = l	Number of Years of	f data = 12			3036.00
D = B/C						-0.01
g (Exponential Factor) = Exponential (D) -1						-0.01
e = Annual Escalation Rate (%) = g x 100 -0.60						

The annual escalation rate computed in the above table (-0.60%) is notified as escalation rate for inland transportation charges of gas for evaluation.

3.5 Escalation Rate for Imported Coal (For Evaluation): CERC has been using composite index, assigning 25% weightage to price/ price index of Australian Coal, NEWC (globalCOAL Index), 25% weightage to price/ price index South African Coal (API4), 25% weightage to price/ price index of Indonesian Coal (ICI3 of Argus) and 25% weightage to price/ price index of Indonesian Coal (Platts Index), for computing the escalation rate for imported coal for payment. The same composite index for latest 12 years has been considered for computing the escalation rate for imported coal for payment.

Name of the Index: Composite index based on globalCOAL Index, API4, ICI3 of Argus and Platts index.

Source/Publisher: globalCOAL, Argus Media Ltd (API4 and ICI3) and Platts

Reasons: Use of Composite index based on Global Coal Index, API4, ICI3 of Argus and Platts index is considered for the following reasons:

- The four indices are internationally acceptable indices.
- Coal is imported by power producers from different countries.
- A similar trend is observed in the prices/ price indices of Australian Coal, South African Coal and Indonesian coal.

Description: The Escalation Rate for imported coal shall be computed based on the time series data on composite index based on globalCOAL Index, API4, ICI3 of Argus and Platts index for the latest 12 years.

Computation: The Escalation Rate for imported coal has been computed based on the time series data on composite index based on globalCOAL Index, API4, ICI3 of

Argus and Platts index for the latest 12 years for the period from 2009 to 2020 as under:

Table-5: ESCALATION RATE FOR IMPORTED COAL (FOR EVALUATION)						
Component Index	Data Series	Annual Escalation Rate				
Composite index based on globalCOAL Index, API4, ICI3 of Argus and Platts index	12 years (Jan 2009 to Dec 2020)	1.17%				

The annual escalation rate computed in the above table (1.17%) is notified as escalation rate for imported coal for evaluation.

3.6 Escalation Rate for Transportation of Imported Coal and Imported Gas (For Evaluation): The import of coal/ gas to India has been taking place from many countries. Keeping this in view, in place of actual freight rates of each country, CERC has been using the price of fuel used for transportation by shipping as a proxy for computing the escalation rate for transportation of imported coal for payment. Singapore 380 CST Bunker Fuel Price has been used for computing the escalation rate for payment to implementation of MARPOL Regulation with effect from 01.01.2020, CERC has started using the price of Low Sulphur Fuel Oil (LSFO) published by Clarksons Research in place of Singapore 380 CST Bunker Fuel Price for computing the escalation rate for payment applicable from January 2020 onwards (CERC order dated 15th January 2020 in Petition No.11/SM/2019). As the time series data on LSFO not being available for 12 years, Singapore 380 CST Bunker Fuel Price has been considered for computing the escalation rate for evaluation.

Name of the Index: Singapore 380 CST Bunker Fuel Price.

Source/Publisher: Clarkson Research

Reasons: Use of Single index of Singapore 380 CST Bunker Fuel Price is considered for the following reasons:

- Fuel prices form a significant component of total ocean freight costs.
- Singapore is a major fuelling point for shipping in the Asian region, and fuel prices in Singapore are seen as leading indicators.
- 380 CST bunker fuel is mainly used in shipping.
- The time series data on LSFO is not available for 12 years

• Clarkson research has historical data and credibility to provide data on shipping transportation.

Description: The escalation rate for transportation of imported coal/ gas shall be computed based on the time series data on Singapore 380 CST Bunker Fuel Price for the latest 12 years.

Computation: The escalation rate for transportation of imported coal/ gas has been computed based on the time series data on Singapore 380 CST Bunker Fuel Price for the latest 12 years for the period from 2009 to 2020 as under:

Table-6: ESCALATION RATE FOR TRANSPORTATION OF IMPORTED COAL/GAS (FOR EVALUATION)						
Component Index Data Series Annual Escalation Rate						
Singapore12 years0.01%380 CST Bunker Price Index(Jan 2009 to Dec 2020)0.01%						

The annual escalation rate computed in the above table (0.01%) is notified as escalation rate for transportation of imported coal/imported gas for evaluation.

3.7 Escalation rate for Imported Gas (For Evaluation): There is no published data available on historical FOB/CIF price of imported LNG in India. Keeping this in view, a proxy has been used for computing the escalation rate for imported gas. As provided in the CERC order dated 29-5-2021, Japan/ Korea Marker (JKM) has been considered for computing the escalation rate for imported gas for evaluation and payment.

Name of the Index: Japan/ Korea Marker (JKM)

Source/Publisher: Platts (website: www.platts.com)

Reasons: Use of Single index of JKM is considered for the following reasons:

- JKM represent landed price in Japan and Korea.
- The Commission is required to notify escalation rate for imported gas and transportation of imported gas separately. For computing the escalation rate for imported gas, it is required to have the index based on FOB price.
- JKM represents more liquid market and widely used index even for LNG contracts by Indian entities Platts publishes the data on JKM.

• Platts provides services to various clients including Federal Energy Regulatory Commission (FERC, USA).

Description: The escalation rate for imported gas shall be computed based on the time series data on JKM published by Platts for the latest 12 years.

Computation: The escalation rate for imported gas has been computed based on the time series data on JKM for the latest 12 years for the period from 2009 to 2020 as under:

Table-7: ESCALATION RATE FOR IMPORTED GAS (FOR EVALUATION)			
Component Index	Data Series	Annual Escalation Rate	
LNG Japan/Korea DES Spot Crg (\$/MMBTU)	12 years (Jan 2009 to Dec 2020)	4.83%	

The annual escalation rate computed in the above table (4.83%) is notified as escalation rate for imported gas for evaluation.

4. Discount Rate for Bid Evaluation

The methodology as approved in the CERC order dated 29-5-2021, has been considered for computing the discount rate for bid evaluation. The discount rate has been computed as under:

Weighted Average Cost of Capital (WACC) has been considered as discount rate and computed as under:

WACC = Cost of Debt + Cost of Equity

Where,

Cost of Debt = 0.70 x (Market Rate of Interest)

Cost of Equity= 0.30 x (Risk Free Rate + b x (Equity Market Risk Premium))

The computation of WACC is given in the following table.

DISCOUNT RATE TO BE USED FOR BID EVALUATION				
Weighted Values	Cost of Debt/Equity	WACC (%)		
1. Cost of Debt				
0.70x(Cost of Debt)x(1-CTR)	5.48			
2. Cost of Equity				
0.30x((RF+bx(ERP))	3.84			
Discount Rate (1+2)		9.31		
Assumptions used for computing the Discount Rate				
Components of Debt/Equity				
Components of Debt/Equity		Assumptions (%)		
Components of Debt/Equity Debt		Assumptions (%) 70.00		
Components of Debt/Equity Debt Equity		Assumptions (%) 70.00 30.00		
Components of Debt/Equity Debt Equity Corporate tax rate for the assessment	nt year 2021-22	Assumptions (%) 70.00 30.00 25.17		
Components of Debt/Equity Debt Equity Corporate tax rate for the assessment (Effective tax rate i.e. inclusive of c	nt year 2021-22 ress and surcharge)	Assumptions (%) 70.00 30.00 25.17		
Components of Debt/Equity Debt Equity Corporate tax rate for the assessmen (Effective tax rate i.e. inclusive of c Risk Free rate (RF)	nt year 2021-22 cess and surcharge)	Assumptions (%) 70.00 30.00 25.17 6.17		
Components of Debt/Equity Debt Equity Corporate tax rate for the assessmen (Effective tax rate i.e. inclusive of c Risk Free rate (RF) Beta Value (b)	nt year 2021-22 cess and surcharge)	Assumptions (%) 70.00 30.00 25.17 6.17 0.67		
Components of Debt/Equity Debt Equity Corporate tax rate for the assessmen (Effective tax rate i.e. inclusive of c Risk Free rate (RF) Beta Value (b) Equity Market Risk Premium (ERP	nt year 2021-22 eess and surcharge)	Assumptions (%) 70.00 30.00 25.17 6.17 0.67 9.89		
Components of Debt/Equity Debt Equity Corporate tax rate for the assessmen (Effective tax rate i.e. inclusive of c Risk Free rate (RF) Beta Value (b) Equity Market Risk Premium (ERP Cost of Debt	nt year 2021-22 cess and surcharge)	Assumptions (%) 70.00 30.00 25.17 6.17 0.67 9.89 10.46		

Debt and Equity in the ratio of 70:30 has been assumed based on norms as per the Tariff Regulations for the period 2019-24.

While calculating the cost of debt, the market rate of interest is being linked to the marginal cost of funds based lending rate (MCLR) that refers to the minimum interest rate of a bank below which it cannot lend, except in some cases allowed by the RBI. The market rate of interest for the year 2020 shall be taken as the MCLR (8.46%, i.e., average of MCLR of five major banks) + 200 basis points. The 200 basis points have been considered as provided in the CERC order dated 29-5-2021. Accordingly, the market rate of interest has been taken as 10.46%.

10 year GOI securities rate for 2020 is being considered as the risk-free rate.

For the calculation of cost of equity, the market risk premium is assumed as the difference between the expected market return and the risk free rate. Accordingly, the market risk premium in this Notification has been arrived at by subtracting the average risk-free rate for the last 12 years from the average rate of return on market portfolio over

the past 12 years. Sensex values for the past thirteen years have been used to arrive at the rate of return on the market portfolio for the past 12 years. Historical approach has been adopted for arriving at the expected market return assuming the expected future return to be the same as past returns.

The beta value has been computed based on the data on Bombay Stock Exchange (BSE) Indices for Power Sector and Sensex for the year 2020.

The WACC computed in the above table (9.31%) is notified as discount rate for bid evaluation.

5. The data series for API-4, globalCoal Index, Argus ICI3, Platts CI, JKM and Singapore 380 CST Bunker Fuel Price Index has been analysed by CERC. The data is not made available for public dissemination since it is paid for and is sourced on a single user subscription.
