EXPLANATION FOR THE NOTIFICATION ON ESCALATION FACTORS AND OTHER PARAMETERS, DATED 28.12. 2010

1.   In pursuance of Clause 5.6 (vi) of Ministry of Power (MOP) Notification dated 19.1.2005 (as amended from time to time) on *"Guidelines for Determination of Tariff by Bidding Process for procurement of Power by Distribution Licensees",* the CERC notifies various escalation factors and other parameters, every six months, for the purpose of bid evaluation and payment.   The relevant Clause of the amendment to the competitive bidding guidelines dated 27.3.2009, is as under:

"2.23   ***Sub-clause (vi) of clause 5.6 is replaced by the following:***

   Following shall be notified and updated by the CERC every six months:

   1. Escalation rate for domestic coal. (Separately for evaluation and payment)

   2. Escalation rate for domestic gas. (Separately for evaluation and payment)

   3. Escalation rates for different escalable sub-components of energy charge for plants based on imported coal. (Separately for evaluation and payment)

   4. Escalation rates for inland transportation charges for coal (Separately for evaluation and payment)

   5. Escalation rates for inland transportation charges for gas (Separately for evaluation and payment)

   6. Escalation rate for different escalable sub-components of energy charge for plants based on imported gas. (Separately for evaluation and payment)

   7. Inflation rate to be applied to indexed capacity charge component.

   8. Inflation rate to be applied to indexed energy charge component in cases of captive fuel source.

   9. Discount rate to be used for bid evaluation.

   10. Dollar-Rupee exchange variation rate. (For the purpose of evaluation)

   11. Escalation for normative transmission charges (For the purpose of evaluation)"

2.   In addition to the above mentioned escalation factors and other parameters, the CERC notifies the matrix of transmission charges and losses as per Format 5.10 & 5.11 of the RFP of Standard Bidding Document of Case-1.

3.   The explanation for the present notification applicable for the period from the date of this notification till 31.3.2011 for the purpose of Evaluation and for the period from 1.10.2010 to 31.3.2011 for the purpose of payment is provided in the following paragraphs.

4.   A new methodology has been used for the determination of escalation factors and other parameters mentioned in this Notification. The new escalation factor determination methodology that is being used here (and which will also be used for all future Notifications) is the culmination of CERC's efforts that began with the holding of the Consultative Round Table Meeting of the experts by the CERC in August 2010 and the conduct of a study by the Indian Statistical Institute (ISI), Kolkata. Through a Public Notice of October 2, 2010, CERC had put out the new methodology for wider stakeholder consultation during the period October 2, 2010 to November 8, 2010. Subsequently, through another public Notice of December 3, 2010, the CERC staff analysis of the stakeholder comments on the new methodology were put out for information and further stakeholder comment, if any, during the period December 3, 2010 to December 10, 2010. Thereafter the new methodology was finalized. **Annexure-1** to this Explanation provides details of the new methodology.

5.   While determining the escalation factors for some of the parameters for the purpose of bid evaluation and payment, CERC uses as input, Ministry of Commerce and Industry (www.eaindustry.nic.in) notified Wholesale Price Index (WPI) as well as some of its disaggregated series (e.g. Non-coking coal; Matches, Explosives & Other Chemicals; High speed diesel; Heavy Machinery & Parts; etc.). Hitherto, CERC has been using the WPI and the corresponding disaggregated series with the year 1993-94 as the base. In the month of September 2010, Ministry of Commerce and Industry (MC&I) has come out with new WPI series with year 2004-05 as the base. MC&I have advised that the applicability or the effective date of the new series be August 2010. In view of this, the new WPI and the new disaggregated series have been used (and will be used for all future Notifications) for determining the escalation factors in this Notification.

6.   For determining the escalation rates for evaluation purpose, data for past 12 years is required and since the new WPI series only goes as far back as 2004-05, suitable conversion factors have been used to arrive at index values for various WPI and its

disaggregated series for periods prior to 2004-05. The methodology for arriving at these conversion factors (called as "linking factors" by MC&I) is provided by MC&I for WPI and a sample of sub-series, the same has been used in this Notification for arriving at the pre 2004-05 index values for WPI and its disaggregated series.

7.   Switching to the use of new WPI (with year 2004-05 as the base) and its new disaggregated series has necessitated a change being made in the composition of the composite series used for determining the escalation rate for coal mined from captive mines. Hitherto, CERC has been determining the escalation rate for coal mined from captive mines by mixing CPI (20%) series with WPI (10%) and four other disaggregated or sub or sub-sub-series of WPI (mixing weights in bracket): High speed diesel (25%), Matches, Explosives & Other Chemicals (10%), Tyres (10%), and Heavy machinery and parts (25%). With the change to new WPI and its disaggregated series, the composition of the composite series used for determining the escalation rate for coal mined from captive mines used in the present and Notification is: WPI (10%), CPI 20%, High speed diesel (25%), Tyres (10%), Matches, Explosives & Other Chemicals (10%), and Machinery and Machine Tools (25%). **Annexure-2** to this Explanation provides detailed reasoning for the change made.

8.   Basis for selection of prices/price indices, weightage given to various prices/ price indices, source of the data used for computing the escalation factors and other parameters for bid evaluation and payment for the current notification may be seen from _old methodology that was used for computing the escalation factors and other parameters published in the earlier notifications (Notification dated 24.11.2006 and Notification dated 3.7.2009 and its Corrigendum dated 29.7.2009)_ available on the CERC website (www.cercind.gov.in).

9.   Escalation Factors and other parameters for Evaluation

The annual escalation factors and other parameters for bid evaluation have been computed based on the time series data for latest twelve calendar years i.e. for the period from 1998 to 2009. New methodology as detailed in **Annexure-1** has been used for computing the escalation factors. The basic formulation used is:

e: annual escalation rate in percent =g*100, where:

g: escalation factor = [exp{{(6 x $\sum_{t=2}^{n}$ (t-1)xLnR_t}/{(n-1)x n x (2n-1)}}]-1
$\quad$ *R_t = (Y_t/Y_1)*
$\quad$ *Y_t = '"t" th observation*
$\quad$ *Y_1 = initial observation*
$\quad$ *n = number of observations*

The annual escalation rate for parameters that require combining of two or more series in pre-determined proportion has been determined by combining each data point of two or more series in the pre-determined proportion to arrive at a composite new single series and then the annual escalation rate has been determined based on this composite new single series.

Computation of the escalation factors and other parameters for evaluation is as under:

(1) Escalation Rate for domestic coal (for Evaluation)

The escalation rate for domestic coal has been computed based on the time series data on Wholesale Price Index (WPI) for non-coking coal for the period from 1998 to 2009. The data on WPI for non-coking coal for the period 2005-09 has been taken from the website of Ministry of Commerce & Industry and the data for the period prior to that has been arrived at by using conversion factor. The escalation rate for domestic coal has been computed as under:

Table-1: Escalation Rate for Domestic Coal (For Evaluation)						
Year No. (t)	Year	WPI for Non-Coking Coal	Yt/Y1 =Rt	Ln Rt	Year -1 (t-1)	Product [(t-1) x (Ln Rt)]
a		b	c = bt/b1	d = Ln(c)	e = a-1	f = d x e
1	1998	63.12				
2	1999	64.77	1.03	0.03	1	0.03
3	2000	67.07	1.06	0.06	2	0.12
4	2001	80.19	1.27	0.24	3	0.72
5	2002	81.38	1.29	0.25	4	1.02
6	2003	85.31	1.35	0.30	5	1.51
7	2004	96.50	1.53	0.42	6	2.55
8	2005	102.60	1.63	0.49	7	3.40
9	2006	102.50	1.62	0.48	8	3.88
10	2007	104.01	1.65	0.50	9	4.49
11	2008	112.70	1.79	0.58	10	5.80
12	2009	116.53	1.85	0.61	11	6.74

A = Sum of "product" column	30.25
B= 6 times (6 x A)	181.50
C= (n-1) x n x (2n-1); n = No. of Years of data = 12	3036.00
D = B/C	0.06
g (Exponential Factor) = Exponential (D) -1	0.06
e = Annual Escalation Rate (%) = g x 100	6.16

The annual escalation rate computed in the above table (6.16%) is notified as escalation rate for domestic coal for evaluation.

(2). Escalation rate for domestic gas (For Evaluation)

The escalation rate for domestic gas has been computed based on the time series data on consumer price of gas for the period from 1998 to 2009. The data has been collected from Ministry of Petroleum & Natural Gas 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) (Rs./'ooo' cubic metre)	Consumer Price (North-Eastern States) (Rs./'ooo' 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 (Rs./'000 cubic metre) (Y_i)
	a	b	c	d	e = (a x c) + (b x d)
1998	2850	1700	90%	10%	2735
1999	2850	1700	90%	10%	2735
2000	2850	1700	90%	10%	2735
2001	2850	1700	90%	10%	2735
2002	2850	1700	90%	10%	2735
2003	2850	1700	90%	10%	2735
2004	2850	1700	90%	10%	2735
2005	3025	1810	90%	10%	2904
2006	3200	1920	90%	10%	3072
2007	3200	1920	90%	10%	3072
2008	3200	1920	90%	10%	3072
2009	3200	1920	90%	10%	3072

Table-2: Escalation Rate for Domestic Gas (For Evaluation)						
Year No. (t)	Year	Average Consumer Price of Gas (Rs./'000 cubic metre) (Yi)	Yt/Y1 =Rt	Ln Rt	Year -1 (t-1)	Product [(t-1) x (Ln Rt)]
1	1998	2735				
2	1999	2735	1.00	0.00	1.00	0.00
3	2000	2735	1.00	0.00	2.00	0.00
4	2001	2735	1.00	0.00	3.00	0.00
5	2002	2735	1.00	0.00	4.00	0.00
6	2003	2735	1.00	0.00	5.00	0.00
7	2004	2735	1.00	0.00	6.00	0.00
8	2005	2904	1.06	0.06	7.00	0.42
9	2006	3072	1.12	0.12	8.00	0.93
10	2007	3072	1.12	0.12	9.00	1.05
11	2008	3072	1.12	0.12	10.00	1.16
12	2009	3072	1.12	0.12	11.00	1.28
A = Sum of "product" column						4.83
B= 6 times (6 x A)						29.00
C= (n-1) x n x (2n-1); n = No. of Years of data = 12						3036.00
D = B/C						0.01
g (Exponential Factor) = Exponential (D) -1						0.01
e = Annual Escalation Rate (%) = g x 100						0.96

The annual escalation rate computed in the above table (0.96%) is notified as escalation rate for domestic gas for evaluation.

(3) Escalation Rate for different escalable sub-components of energy charge for plants based on imported coal (for Evaluation)

(3.1) Escalation Rate for Imported Coal sub-component (For Evaluation)

The escalation rate for imported coal sub-component has been computed based on the time series data on Barlow Jonker Index/Coalfax for the period from 1998 to 2009 as under:

Table-3.1: Escalation Rate for Imported Coal Component (For Evaluation)		
Component Index	Data Series	Annual Escalation Escalation Rate
Barlow Jonker Index	12 years (Jan 1998 to Dec 2009)	11.11%

(3.2) Escalation Rate for Transportation of Coal sub-component (For Evaluation)

The escalation rate for transportation of Coal sub-component has been computed based on the time series data on Singapore 380 CST Bunker Fuel Index for the period from 1998 to 2009 as under:

Table-3.2: Escalation Rate for transportation sub-component (For Evaluation)		
Component Index	**Data Series**	**Annual Escalation Escalation Rate**
Singapore Bunker Price Index	12 years (Jan 1998 to Dec 2009)	19.83%

(3.3) Escalation Rate for Inland Handling of Coal sub-component (For Evaluation)

The escalation rate for Inland Handling of coal sub-component has been computed based on the time series data on WPI and CPI for the period from 1998 to 2009. In case of WPI, the data for the period 2005-09 has been taken from the website of Ministry of Commerce & Industry and the data for the period prior to that has been arrived at by using conversion factor. Composite series (Average index for Inland Coal Handling Cost), using 60% weight to WPI and 40% weight to CPI-IW has first been developed, which then has been used for computing the escalation rate as under:

Composite Series: Average Index for Inland Coal Handling Cost					
Year	**WPI for All Commodities**	**CPI for Industrial Workers**	**Proportion of WPI Component in Total Cost**	**Proportion of CPI Component in Total Cost**	**Average Index for Inland Coal Handling Cost**
1998	74.18	87	60%	40%	79.51
1999	76.79	92	60%	40%	82.71
2000	81.59	95	60%	40%	87.05
2001	85.80	99	60%	40%	91.02
2002	87.92	103	60%	40%	93.99
2003	92.60	107	60%	40%	98.37
2004	98.72	111	60%	40%	103.65
2005	104.04	116	60%	40%	108.73
2006	109.40	123	60%	40%	114.81
2007	114.86	131	60%	40%	121.22
2008	124.82	142	60%	40%	131.56
2009	127.47	157	60%	40%	139.32

Table-3.3: ESCALATION RATE FOR INLAND HANDLING OF COAL COMPONENT (FOR EVALUATION)						
Year No. (t)	**Year**	**Average Index for Inland Coal Handling Cost**	**Yt/Y1 =Rt**	**Ln Rt**	**Year -1 (t-1)**	**Product [(t-1) x (Ln Rt)]**

1	1998	79.51				
2	1999	82.71	1.04	0.04	1	0.04
3	2000	87.05	1.09	0.09	2	0.18
4	2001	91.02	1.14	0.14	3	0.41
5	2002	93.99	1.18	0.17	4	0.67
6	2003	98.37	1.24	0.21	5	1.06
7	2004	103.65	1.30	0.27	6	1.59
8	2005	108.73	1.37	0.31	7	2.19
9	2006	114.81	1.44	0.37	8	2.94
10	2007	121.22	1.52	0.42	9	3.80
11	2008	131.56	1.65	0.50	10	5.04
12	2009	139.32	1.75	0.56	11	6.17
A = Sum of "product" column						24.08
B= 6 times (6 x A)						144.51
C= (n-1) x n x (2n-1); n = No. 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						4.87

(4) Escalation rate for inland transportation charges for coal (For Evaluation)

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 1998 to 2009. The data has been collected from Ministry of Railways. The data on coal freight rate for 100 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 100 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-4.1: Escalation Rate for Inland Transportation Charges for Coal (up to 100 KM) (For Evaluation)						
Year No. (t)	Year	Coal Freight Rate (Rs/Tonne) for 100 km	Yt/Y1 =Rt	Ln Rt	Year -1 (t-1)	Product [(t-1) x (Ln Rt)]
1	1998	95.53				
2	1999	98.85	1.035	0.034	1.000	0.034
3	2000	101.30	1.060	0.059	2.000	0.117
4	2001	103.30	1.081	0.078	3.000	0.235
5	2002	107.25	1.123	0.116	4.000	0.463
6	2003	108.40	1.135	0.126	5.000	0.632
7	2004	114.70	1.201	0.183	6.000	1.098
8	2005	116.80	1.223	0.201	7.000	1.408
9	2006	116.80	1.223	0.201	8.000	1.609
10	2007	116.80	1.223	0.201	9.000	1.810
11	2008	123.03	1.288	0.253	10.000	2.530
12	2009	125.10	1.310	0.270	11.000	2.967
A = Sum of "product" column						12.90
B= 6 times (6 x A)						77.41

C= (n-1) x n x (2n-1); n = No. of Years of data = 12	3036.00
D = B/C	0.03
g (Exponential Factor) = Exponential (D) -1	0.03
e = Annual Escalation Rate (%) = g x 100	2.58

Table-4.2: Escalation Rate for Inland Transportation Charges for Coal (up to 500 KM) (For Evaluation)						
Year No. (t)	Year	Coal Freight Rate (Rs/Tonne) for 500 km	Yt/Y1 =Rt	Ln Rt	Year -1 (t-1)	Product [(t-1) x (Ln Rt)]
1	1998	360.60				
2	1999	373.08	1.03	0.03	1	0.03
3	2000	382.33	1.06	0.06	2	0.12
4	2001	389.98	1.08	0.08	3	0.23
5	2002	393.78	1.09	0.09	4	0.35
6	2003	394.40	1.09	0.09	5	0.45
7	2004	417.20	1.16	0.15	6	0.87
8	2005	424.80	1.18	0.16	7	1.15
9	2006	429.83	1.19	0.18	8	1.40
10	2007	431.50	1.20	0.18	9	1.62
11	2008	454.60	1.26	0.23	10	2.32
12	2009	462.30	1.28	0.25	11	2.73
A = Sum of "product" column						11.28
B= 6 times (6 x A)						67.66
C= (n-1) x n x (2n-1); n = No. of Years of data = 12						3036.00
D = B/C						0.02
g (Exponential Factor) = Exponential (D) -1						0.02
e = Annual Escalation Rate (%) = g x 100						2.25

Table-4.3: Escalation Rate for Inland Transportation Charges for Coal (up to 1000 KM) (For Evaluation)						
Year No. (t)	Year	Coal Freight Rate (Rs/Tonne) for 1000 km	Yt/Y1 =Rt	Ln Rt	Year -1 (t-1)	Product [(t-1) x (Ln Rt)]
1	1998	703.50				
2	1999	724.58	1.03	0.03	1	0.03
3	2000	742.55	1.06	0.05	2	0.11
4	2001	757.38	1.08	0.07	3	0.22
5	2002	754.20	1.07	0.07	4	0.28
6	2003	751.90	1.07	0.07	5	0.33
7	2004	795.33	1.13	0.12	6	0.74
8	2005	809.80	1.15	0.14	7	0.99
9	2006	823.98	1.17	0.16	8	1.26
10	2007	828.70	1.18	0.16	9	1.47
11	2008	873.10	1.24	0.22	10	2.16
12	2009	887.90	1.26	0.23	11	2.56
A = Sum of "product" column						10.15
B= 6 times (6 x A)						60.90
C= (n-1) x n x (2n-1); n = No. of Years of data = 12						3036.00

D = B/C	0.02
g (Exponential Factor) = Exponential (D) -1	0.02
e = Annual Escalation Rate (%) = g x 100	2.03

Table-4.4: Escalation Rate for Inland Transportation Charges for Coal (Up to 2000 KM) (For Evaluation)						
Year No. (t)	Year	Coal Freight Rate (Rs/Tonne) for 2000 km	Yt/Y1 =Rt	Ln Rt	Year -1 (t-1)	Product [(t-1) x (Ln Rt)]
1	1998	1244.93				
2	1999	1279.08	1.03	0.03	1	0.03
3	2000	1310.85	1.05	0.05	2	0.10
4	2001	1337.03	1.07	0.07	3	0.21
5	2002	1367.83	1.10	0.09	4	0.38
6	2003	1375.90	1.11	0.10	5	0.50
7	2004	1455.33	1.17	0.16	6	0.94
8	2005	1481.80	1.19	0.17	7	1.22
9	2006	1521.70	1.22	0.20	8	1.61
10	2007	1535.00	1.23	0.21	9	1.89
11	2008	1617.20	1.30	0.26	10	2.62
12	2009	1644.60	1.32	0.28	11	3.06
A = Sum of "product" column						12.55
B= 6 times (6 x A)						75.28
C= (n-1) x n x (2n-1); n = No. of Years of data = 12						3036.00
D = B/C						0.02
g (Exponential Factor) = Exponential (D) -1						0.03
e = Annual Escalation Rate (%) = g x 100						2.51

Table-4.5: Escalation Rate for Inland Transportation Charges for Coal (Beyond 2000 KM) (For Evaluation)						
Year No. (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	1998	1580.98				
2	1999	1624.33	1.03	0.03	1	0.03
3	2000	1664.70	1.05	0.05	2	0.10
4	2001	1698.03	1.07	0.07	3	0.21
5	2002	1751.03	1.11	0.10	4	0.41
6	2003	1765.90	1.12	0.11	5	0.55
7	2004	1867.83	1.18	0.17	6	1.00
8	2005	1901.80	1.20	0.18	7	1.29
9	2006	1948.15	1.23	0.21	8	1.67
10	2007	1963.60	1.24	0.22	9	1.95
11	2008	2068.83	1.31	0.27	10	2.69
12	2009	2103.90	1.33	0.29	11	3.14
A = Sum of "product" column						13.05
B= 6 times (6 x A)						78.32
C= (n-1) x n x (2n-1); n = No. of Years of data = 12						3036.00
D = B/C						0.03

g (Exponential Factor) = Exponential (D) -1	0.03
e = Annual Escalation Rate (%) = g x 100	2.61

The annual escalation rates computed in the above tables (2.58%, 2.25%, 2.03%, 2.51% and 2.61% respectively applicable for transportation of coal upto 100 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.

(5) Escalation rates for inland transportation charges for gas (For Evaluation)

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 1998 to 2009. The data has been collected from Ministry of Petroleum & Natural Gas and GAIL (India) Ltd. The escalation rate for transportation of natural gas for evaluation has been computed as under:

Year No. (t)	Year	Transportation charges along HVJ pipeline (Rs./'ooo' cubic metre)	Yt/Y1 =Rt	Ln Rt	Year -1 (t-1)	Product [(t-1) x (Ln Rt)]
1	1998	850				
2	1999	850	1.00	0.00	1	0.00
3	2000	850	1.00	0.00	2	0.00
4	2001	850	1.00	0.00	3	0.00
5	2002	1075	1.26	0.23	4	0.94
6	2003	1150	1.35	0.30	5	1.51
7	2004	1150	1.35	0.30	6	1.81
8	2005	1150	1.35	0.30	7	2.12
9	2006	1150	1.35	0.30	8	2.42
10	2007	1150	1.35	0.30	9	2.72
11	2008	1031	1.21	0.19	10	1.93
12	2009	1010	1.19	0.17	11	1.89
A = Sum of "product" column						15.34
B= 6 times (6 x A)						92.02
C= (n-1) x n x (2n-1); n = No. of Years of data = 12						3036.00
D = B/C						0.03
g (Exponential Factor) = Exponential (D) -1						0.03
e = Annual Escalation Rate (%) = g x 100						3.08

Table-5: Escalation Rate for Inland Transportation Charges for Gas (For Evaluation)

The annual escalation rate computed in the above table (3.08%) is notified as escalation rate for inland transportation charges of natural gas for evaluation.

(6) Escalation rate for different escalable sub-components of energy charge for plants based on imported gas

(6.1) Escalation rate for Imported Gas sub-component

      The escalation rate for imported gas sub-component for evaluation has been computed based on the time series data on Japan JCC LNG prices for the period from 1998 to 2009. The data has been subscribed from Platts. The escalation rate for imported gas sub-component has been computed as under:

Table-6.1: Escalation Rate for Imported Gas component (For Evaluation)		
Component Index	**Data Series**	**Annual Escalation Rate**
Japan LNG Price Index	12 years (Jan 1998 to Dec 2009)	11.47%

      The annual escalation rate computed in the above table (11.47%) is notified as escalation rate for imported gas sub-component.

(6.2) Escalation rate for transportation of Gas sub-component

      The escalation rate for transportation of Gas sub-component has been computed based on the time series data on FOB prices of 380cst bunker fuel for the period from 1998-2009. The data has been subscribed from Clarkson Research. The escalation rate for transportation of gas sub-component has been computed as under:

Table-6.2: Escalation Rate for transportation of Imported gas sub-component (For Evaluation)		
Component Index	**Data Series**	**Annual Escalation Rate**
Singapore Bunker Price Index	12 years (Jan 1998 to Dec 2009)	19.83%

      The annual escalation rate computed in the above table (19.83%) is notified as escalation rate for transportation of imported gas for evaluation.

(6.3) Escalation Rate for inland handling of Gas sub-component

      The escalation rate for inland handling of gas sub-component has been computed based on the time series data on Wholesale Price Index (WPI) and Consumer Price Index for industrial workers (CPI-IW) for the period from 1998 to 2009. In case of WPI, the data for the period 2005-09 has been taken from the website of Ministry of Commerce &

Industry and the data for the period prior to that has been arrived at by using conversion factor. Composite series (Average index for Inland Gas Handling Cost), using 60% weight to WPI and 40% weight to CPI-IW has first been developed, which then has been used for computing the escalation rate as under:

Composite Series: Average Index for Inland Gas Handling Cost					
Year	WPI for All Commodities	CPI for Industrial Workers	Proportion of WPI Component in Total Cost	Proportion of CPI Component in Total Cost	Average Index for Inland Gas Handling Cost
1998	74.18	87	60%	40%	79.51
1999	76.79	92	60%	40%	82.71
2000	81.59	95	60%	40%	87.05
2001	85.80	99	60%	40%	91.02
2002	87.92	103	60%	40%	93.99
2003	92.60	107	60%	40%	98.37
2004	98.72	111	60%	40%	103.65
2005	104.04	116	60%	40%	108.73
2006	109.40	123	60%	40%	114.81
2007	114.86	131	60%	40%	121.22
2008	124.82	142	60%	40%	131.56
2009	127.47	157	60%	40%	139.32

Table-6.3: ESCALATION RATE FOR INLAND HANDLING OF GAS COMPONENT (FOR EVALUATION)						
Year No. (t)	Year	Average Index for Inland Gas Handling Cost	Yt/Y1 =Rt	Ln Rt	Year -1 (t-1)	Product [(t-1) x (Ln Rt)]
1	1998	79.51				
2	1999	82.71	1.04	0.04	1	0.04
3	2000	87.05	1.09	0.09	2	0.18
4	2001	91.02	1.14	0.14	3	0.41
5	2002	93.99	1.18	0.17	4	0.67
6	2003	98.37	1.24	0.21	5	1.06
7	2004	103.65	1.30	0.27	6	1.59
8	2005	108.73	1.37	0.31	7	2.19
9	2006	114.81	1.44	0.37	8	2.94
10	2007	121.22	1.52	0.42	9	3.80
11	2008	131.56	1.65	0.50	10	5.04
12	2009	139.32	1.75	0.56	11	6.17
A = Sum of "product" column						24.08
B= 6 times (6 x A)						144.51
C= (n-1) x n x (2n-1); n = No. 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						4.87

The annual escalation rate computed in the above table (4.87%) has been notified as escalation rate for inland handling of gas sub-component.

(7) **Inflation Rate To Be Applied To Indexed Capacity Charge Component (For Evaluation)**

The inflation rate to be applied to indexed capacity charge component has been computed based on the time series data on Wholesale Price Index (WPI) and the Consumer Price Index for industrial workers (CPI-IW) for the period from1998 to 2009. In case of WPI, the data for the period 2005-09 has been taken from the website of Ministry of Commerce & Industry and the data for the period prior to that has been arrived at by using conversion factor. Composite series (Average index for indexed capacity change), using 60% weight to WPI and 40% weight to CPI-IW has first been developed, which then has been used for computing the escalation rate as under:

Composite Series: Average Index for Indexed Capacity Charge					
Year	WPI for All Commodities	CPI for Industrial Workers	Proportion of WPI Component in Total Cost	Proportion of CPI Component in Total Cost	Average Index for Indexed Capacity Charge
1998	74.18	87	60%	40%	79.51
1999	76.79	92	60%	40%	82.71
2000	81.59	95	60%	40%	87.05
2001	85.80	99	60%	40%	91.02
2002	87.92	103	60%	40%	93.99
2003	92.60	107	60%	40%	98.37
2004	98.72	111	60%	40%	103.65
2005	104.04	116	60%	40%	108.73
2006	109.40	123	60%	40%	114.81
2007	114.86	131	60%	40%	121.22
2008	124.82	142	60%	40%	131.56
2009	127.47	157	60%	40%	139.32

Table-7: INFLATION RATE TO BE APPLIED TO INDEXED CAPACITY CHARGE COMPONENT (FOR EVALUATION)						
Year No. (t)	Year	Average Index for Indexed Capacity Charge	Yt/Y1 =Rt	Ln Rt	Year -1 (t-1)	Product [(t-1) x (Ln Rt)]
1	1998	79.51				
2	1999	82.71	1.04	0.04	1	0.04
3	2000	87.05	1.09	0.09	2	0.18
4	2001	91.02	1.14	0.14	3	0.41
5	2002	93.99	1.18	0.17	4	0.67
6	2003	98.37	1.24	0.21	5	1.06
7	2004	103.65	1.30	0.27	6	1.59
8	2005	108.73	1.37	0.31	7	2.19

9	2006	114.81	1.44	0.37	8	2.94
10	2007	121.22	1.52	0.42	9	3.80
11	2008	131.56	1.65	0.50	10	5.04
12	2009	139.32	1.75	0.56	11	6.17
A = Sum of "product" column						24.08
B= 6 times (6 x A)						144.51
C= (n-1) x n x (2n-1); n = No. 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						4.87

The annual inflation rate computed in the above table (4.87%) has been notified as inflation rate to be applied to indexed capacity charge component.

(8) Escalation Rate for Captive Mine Coal (For Evaluation)

Using the data for the period from 1998 to 2009 on CPI for industrial workers (with weight of 20%), WPI for all commodities (with weight of 10%) and disaggregated WPI series for various commodities used in the captive mining, the escalation rate for captive mine coal has been computed. In case of WPI and its disaggregated series, the data for the period 2005-09 has been taken from the website of Ministry of Commerce & Industry and the data for the period prior to that has been arrived at by using conversion factor. Before computing the escalation rate, composite series has been arrived at by giving weight of 10% to WPI; 20% to CPI; 10% to Tyres; 10% to Matches, Explosives & Other Chemicals; 25% to Machinery & Machine Tools; and 25% to HSD Oil and the same has been used for computing the escalation rate.

Period	WPI	CPI	Wholesale Price Index				Composite Series
			Tyres	Matches, Explosive & Other Chemicals	Machinery & Machine Tools	High Speed Diesel Oil	
1998	74.18	87	109.64	95.83	82.51	42.62	76.75
1999	76.79	92	107.59	95.59	82.85	44.29	78.10
2000	81.59	95	107.14	95.48	85.70	60.49	84.02
2001	85.80	99	103.54	98.62	91.63	69.88	88.94
2002	87.92	103	106.09	99.61	92.70	72.65	91.32
2003	92.60	107	101.31	100.45	94.12	81.71	94.80
2004	98.72	111	100.83	100.54	98.19	95.34	100.60
2005	104.04	116	102.66	102.46	103.21	117.83	109.33
2006	109.40	123	110.41	105.85	108.48	129.68	116.69
2007	114.86	131	117.99	112.31	113.31	125.62	120.40
2008	124.82	142	124.48	120.55	116.63	135.66	128.39
2009	127.47	157	127.33	122.41	117.75	130.33	131.16

Based on the composite series annual inflation rate to be applied to indexed energy charge component in case of captive mine coal source for evaluation has been computed as under:

Year No. (t)	Year	Composite Series	Yt/Y1 =Rt	Ln Rt	Year -1 (t-1)	Product [(t-1) x (Ln Rt)]
Table-8: INFLATION RATE TO BE APPLIED TO INDEXED ENERGY CHARGE COMPONENT IN CASE OF CAPTIVE MINE COAL SOURCE (FOR EVALUATION)						
1	1998	76.75				
2	1999	78.10	1.02	0.02	1	0.02
3	2000	84.02	1.09	0.09	2	0.18
4	2001	88.94	1.16	0.15	3	0.44
5	2002	91.32	1.19	0.17	4	0.70
6	2003	94.80	1.24	0.21	5	1.06
7	2004	100.60	1.31	0.27	6	1.62
8	2005	109.33	1.42	0.35	7	2.48
9	2006	116.69	1.52	0.42	8	3.35
10	2007	120.40	1.57	0.45	9	4.05
11	2008	128.39	1.67	0.51	10	5.15
12	2009	131.16	1.71	0.54	11	5.89
A = Sum of "product" column						24.94
B= 6 times (6 x A)						149.63
C= (n-1) x n x (2n-1); n = No. 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						5.05

Annual inflation rate computed in the above table (5.05%) has been notified as inflation rate to be applied to indexed energy charge component in case of captive mine coal source for evaluation

(9) Discount Rate to be used for bid evaluation

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

WACC = Cost of Debt + Cost of Equity

Where,

Cost of Debt = 0.70 (Market Rate of Interest) X (1-Corporate Tax Rate)

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

The computation of WACC can be seen in the following table.

Table-9: DISCOUNT RATE TO BE USED FOR BID EVALUATION

	Cost of Debt/Equity	WACC
1. Cost of Debt		
0.70(MR)x(1-CTR)	**4.90**	
2. Cost of Equity		
0.30((RF+b(RP))	**4.45**	
Discount Rate (1+2)		**9.35**
Discount Rate has been computed based on the following assumptions		
Components of Debt/Equity		**Assumptions (%)**
Debt		70.00
Equity		30.00
Corporate Tax Rate (CTR)		30.00
Risk Free rate (RF)		7.02
Beta (b)		0.87
Equity Market Risk Premium (RP)		8.98
Market Rate of Interest (MR)		10.00

The Debt and Equity of 70:30 has been assumed based on CERC norms on Debt and Equity in its Tariff Regulations 2009-14. The basic corporate tax rate proposed in the GOI Budget for the year 2010-11 (i.e. excluding surcharge and cess) has been assumed while computing the discount rate. The 10 year GOI securities rate for the year 2009 has been taken as risk free rate. Based on the data on Bombay Stock Exchange (BSE) Indices for power sector and Sensex for the year 2009, beta value has been computed. The Equity market risk premium is derived from risk free rate for the year 2009 and the CERC norm for ROE (i.e. 16% post tax) in its tariff regulations 2009-14.

The WACC computed in the above table (9.35%) has been notified as discount rate for bid evaluation.

(10) Dollar-Rupee Exchange Variation Rate (For Evaluation)

The exchange rate of the Indian Rupee vis-à-vis the US Dollar has been taken from the website of the Reserve Bank of India. The data has been taken for the period from the Calendar Year 1998 to 2009 (both inclusive). The computation of exchange variation rate can be seen in the following table.

Table-10 : DOLLAR-RUPEE EXCHANGE VARIATION RATE (FOR EVALUATION)						
Year No. (t)	Year	Rupees per unit of US Dollar	Yt/Y1 =Rt	Ln Rt	Year -1 (t-1)	Product [(t-1) x (Ln Rt)]
1	1998	41.27				
2	1999	43.05	1.04	0.04	1	0.04
3	2000	44.94	1.09	0.09	2	0.17
4	2001	47.19	1.14	0.13	3	0.40
5	2002	48.60	1.18	0.16	4	0.65
6	2003	46.58	1.13	0.12	5	0.61
7	2004	45.32	1.10	0.09	6	0.56
8	2005	44.10	1.07	0.07	7	0.46
9	2006	45.33	1.10	0.09	8	0.75
10	2007	41.29	1.00	0.00	9	0.01
11	2008	43.42	1.05	0.05	10	0.51
12	2009	48.35	1.17	0.16	11	1.74
A = Sum of "product" column						5.91
B= 6 times (6 x A)						35.45
C= (n-1) x n x (2n-1); n = No. of Years of data = 12						3036.00
D = B/C						0.01
g (Exponential Factor) = Exponential (D) -1						0.01
e = Annual Escalation Rate (%) = g x 100						1.17

The annual escalation rate computed in the above table (1.17%) has been notified as dollar-rupee exchange variation rate for bid evaluation.

(11) Escalation for normative transmission charges (For Evaluation)

The escalation for normative transmission charges for evaluation has been computed based on the time series data on Rupees per kW connected load (central sector connected load on CTU lines) for the period from 1998 to 2009. The Rupees per kW connected load series has been developed based on the methodology provided in Annexure-1. The data on Short Term Open Access consumption has been collected from National Load Despatch Centre (NLDC), the data on transmission charges excluding ULDC Charges has been derived from the financial year data provided by Powergrid Corporation of India Ltd (PGCIL) and the data on connected load has been derived from data on central sector connected load (excluding DVC) as of end of calendar years (1997 to 2009) collected from Central Electricity Authority (CEA). Before computing the escalation for normative transmission charges, cost per kW connected has been computed as under:

Calculation of Transmission Charges in Rupees per kW Connected Load								
Year	Transmission Charges without ULDc in Rs. Million	Installed Capacity MW*	Connected Load assuming Auxiliary of 8%	Net generation assuming 85% PLF Million kWh	STOA Million kWh	STOA as % of net generation (K)	Factor ((1/(1+K))	Transmission Charges without ULDC adjusted for STOA	Cost per KW connected (Rs)
	(a)	(b)	(c)=0.92*(b)	(d)=(c*8760*.85)/(10^6)	(e)	(f) = (e)/(d)	(g)= (1/(1+f))	(h)= (a)*(g)	(i) = (h*1000)/(c)
1998	15592	24426	22472	167327	0	0.00	1.00	15592	638.33
1999	18232	25430	23395	174201	0	0.00	1.00	18232	716.95
2000	21585	27181	25006	186195	0	0.00	1.00	21585	794.13
2001	22292	28102	25853	192504	0	0.00	1.00	22292	793.25
2002	24183	29089	26762	199269	0	0.00	1.00	24183	831.33
2003	26985	30662	28209	210041	0	0.00	1.00	26985	880.08
2004	26021	32901	30268	225379	0	0.00	1.00	26021	790.90
2005	28901	35362	32533	242241	17000	0.07	0.93	27005	763.68
2006	34841	38230	35171	261884	26269	0.10	0.91	31665	828.28
2007	41871	42087	38720	288309	30996	0.11	0.90	37807	898.30
2008	49995	44897	41305	307559	31286	0.10	0.91	45379	1010.74
2009	46995	45872	42202	314235	38909	0.12	0.89	41817	911.62
* Average of beginning and end of year.									

Based on cost per kW connected, escalation for normative transmission charges has been computed as under:

Year No. (t)	Year	Cost per KW connected	Yt/Y1 =Rt	Ln Rt	Year -1 (t-1)	Product [(t-1) x (Ln Rt)]
Table-11: ESCALATION FOR NORMATIVE TRANSMISSION CHARGES (FOR EVALUATION)						
1	1998	638.33				
2	1999	716.95	1.12	0.12	1	0.12
3	2000	794.13	1.24	0.22	2	0.44
4	2001	793.25	1.24	0.22	3	0.65
5	2002	831.33	1.30	0.26	4	1.06
6	2003	880.08	1.38	0.32	5	1.61
7	2004	790.90	1.24	0.21	6	1.29
8	2005	763.68	1.20	0.18	7	1.26
9	2006	828.28	1.30	0.26	8	2.08
10	2007	898.30	1.41	0.34	9	3.07
11	2008	1010.74	1.58	0.46	10	4.60
12	2009	911.62	1.43	0.36	11	3.92
A = Sum of "product" column						20.08
B= 6 times (6 x A)						120.50
C= (n-1) x n x (2n-1); n = No. of Years of data = 12						3036.00
D = B/C						0.04
g (Exponential Factor) = Exponential (D) -1						0.04
e = Annual Escalation Rate (%) = g x 100						4.05

The annual escalation rate computed in the above table (4.05%) has been notified as escalation for normative transmission charges for bid evaluation.

(12) Matrix for Transmission Charges and Losses

The Transmission Charges Matrix and Transmission Loss Matrix has been prepared as per Format 5.10 & 5.11 of the RFP of Standard Bidding Document of Case-1 as follows.

(12.1) Transmission charges matrix

Transmission charges matrix has been computed based on the data on region-wise per unit transmission charges (i.e. excluding ULDC charges) and central sector energy collected from PGCIL. Using the calendar year data for the latest 5 years i.e. for the period from 2005 to 2009, average transmission charges has been computed as under:

Year	Region-wise Transmission Charges (Rs/Unit)				
	NR	WR	ER	NER	SR
2005	0.11	0.10	0.11	0.34	0.20
2006	0.14	0.11	0.14	0.33	0.21

Table-12.1: TRANSMISSION CHARGES MATRIX

2007	0.16	0.13	0.20	0.33	0.22
2008	0.19	0.17	0.20	0.34	0.24
2009	0.20	0.24	0.21	0.43	0.27
Average	**0.16**	**0.15**	**0.17**	**0.35**	**0.23**

The computed average region-wise transmission charges has been notified as transmission charges matrix.

(12.2) Transmission Loss matrix

Transmission loss matrix has been computed based on the data on region-wise transmission loss collected from NLDC. Using the calendar year data for the latest 5 years i.e. for the period from 2005 to 2009, average transmission loss has been computed as under:

Table-12.2: TRANSMISSION LOSS MATRIX					
YEAR	**Region-wise Transmission Losses (%)**				
	SR	**NER**	**ER**	**WR**	**NR**
2005	3.26	4.28	3.24	5.06	3.46
2006	4.02	3.88	2.99	4.38	3.98
2007	3.85	3.63	3.40	4.19	3.89
2008	4.13	3.68	3.70	5.05	3.99
2009	4.24	3.57	3.17	5.61	3.90
Average	**3.90**	**3.81**	**3.30**	**4.86**	**3.84**

The computed average region-wise transmission losses has been notified as transmission loss matrix.

10.   Escalation Factors and other parameters for Payment

The annual escalation rates for payment have been computed based on latest twelve months data (weekly/monthly). The steps followed while computing the escalation 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 average six months index.

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

Step 4: The annual escalation rate for parameters that require combining of two or more series in pre-determined proportion has been determined by combining each data point of two or more series in the pre-determined proportion to arrive at a composite new single

series and then the annual escalation rate has been determined based on this composite new single series.

Computation of the escalation factors and other parameters for payment is as under:

(1) Escalation rate for Domestic coal component (for Payment)

The escalation rate for domestic coal for payment has been computed based on the data on WPI for Non-Coking coal for the period from July 2009 to June 2010. The escalation rate for domestic coal has been computed as under.

Table-1: ESCALATION RATE FOR DOMESTIC COAL (FOR PAYMENT)	
Period	**WPI (Non-Coking Coal)**
Jul-09	112.7
Aug-09	112.7
Sep-09	112.7
Oct-09	121.7
Nov-09	131.2
Dec-09	131.2
Jan-10	131.2
Feb-10	131.2
Mar-10	131.2
Apr-10	131.2
May-10	131.2
Jun-10	131.2
Average Index (July 09-Dec 09)	120.37
Average Index (Jan 10-Jun 10)	131.20
Half-Yearly Inflation	9.00%
Annual Inflation Rate	18.00%

The above computed escalation rate (18.00%) is notified as escalation rate for domestic coal for payment.

(2) Escalation rate for domestic gas (For Payment)

The escalation rate for domestic gas has been computed based on the data on consumer price of gas for the period from July 2009 to June 2010. Composite series (Average consumer price of Gas), based on Consumer Price off-shore with 90% weight

and Consumer Price for North-Eastern States with 10% weight has first been developed, which then has been used for computing the escalation rate as under:

Table-2: ESCALATION RATE FOR DOMESTIC GAS (FOR PAYMENT)			
Period	Consumer Prices Off-shore (Landfall point and On-shore) (Rs./'ooo' cubic metre)	Consumer Prices For North-Eastern States (Rs./'ooo' cubic metre)	Average consumer price of Gas* (Rs./'ooo' cubic metre)
Jul-09	3200	1920	3072
Aug-09	3200	1920	3072
Sep-09	3200	1920	3072
Oct-09	3200	1920	3072
Nov-09	3200	1920	3072
Dec-09	3200	1920	3072
Jan-10	3200	1920	3072
Feb-10	3200	1920	3072
Mar-10	3200	1920	3072
Apr-10	3200	1920	3072
May-10	3200	1920	3072
Jun-10	7633	4580	7328
Average Index (July 09-Dec 09)			3072
Average Index (Jan 10-June 10)			3781
Half-Yearly Escalation			23.09%
Annual Escalation			46.18%
* Composite series using weightage of 90% to Consumer Price Off-shore and 10% to consumer price North-Eastern States.			

The annual escalation rate computed in the above table (46.18%) is notified as escalation rate for domestic gas for payment.

(3) Escalation Rate for different escalable sub-components of energy charge for plants based on imported coal (for Payment)

(3.1) Escalation Rate for Imported Coal (For Payment)

Table-3.1: ESCALATION RATE FOR IMPORTED COAL (FOR PAYMENT)		
Component Index	Data Series	Annual Escalation Rate
Composite series using weight of 50% to API4 (Price of South African Coal), 25% to BJI/Coalfax (Price of Australian Coal) and 25% to Global Coal (Price of Australian Coal).	Weekly data from Sept 2009 to Aug 2010	42.07%

(3.2) Escalation Rate for Transportation of Imported Coal (For Payment)

Table-3.2: ESCALATION RATE FOR TRANSPORTATION OF IMPORTED COAL (FOR PAYMENT)		
Component Index	Data Series	Annual Escalation Rate
Singapore Bunker Price Index	Monthly data from Sept 2009 to Aug 2010	-1.99%

(3.3) Escalation Rate for Inland Handling of Imported Coal (For Payment)

The escalation rate for inland handling of imported coal has been computed based on the data on WPI and CPI-IW for the period from July 2009 to June 2010. Composite series, based on WPI with 60% weight and CPI-IW with 40% weight has first been developed, which then has been used for computing the escalation rate. The data on WPI and CPI-IW has been taken from the website of Ministry of Commerce & Industry and Labour Bureau, respectively. The escalation rate for inland handling of imported coal has been computed as under:

Table-3.3: ESCALATION RATE FOR INLAND HANDLING OF IMPORTED COAL (FOR PAYMENT)			
Period	WPI	CPI	Composite Series*
Jul-09	127.8	160.0	140.68
Aug-09	129.3	162.0	142.38
Sep-09	129.9	163.0	143.14
Oct-09	130.5	165.0	144.30
Nov-09	132.4	168.0	146.64
Dec-09	132.9	169.0	147.34
Jan-10	134.8	172.0	149.68
Feb-10	134.8	170.0	148.88
Mar-10	135.8	170.0	149.48
Apr-10	138.3	170.0	150.98
May-10	138.8	172.0	152.08
Jun-10	139.4	174.0	153.24
Average Index (July 09-Dec 09)			144.08
Average Index (Jan 10-Jun 10)			150.72
Half-Yearly Inflation			4.61%
Annual Inflation			9.22%
*Composite series using weightage of 60% to Wholesale Price Index (WPI) and 40% to Consumer Price Index (CPI).			

The annual inflation computed in the above table (9.22%) is notified as escalation rate for inland handling charges of imported coal for payment.

(4) Escalation rates for inland transportation charges for coal (For Payment)

The escalation for inland transportation charges for coal has been computed based on the data on coal freight rates for the period from July 2009 to June 2010. The data has been collected from Ministry of Railways. The data on coal freight rate for 100 km, 500 km, 1000 km, 2000 km and 3000 km has been used for computing the escalation rate for inland transportation charges for coal for distance upto 100 km, upto 500 km, upto 1000 km, upto 2000 km and beyond 2000 km respectively. The escalation rate for inland transportation charges for coal for payment has been computed as under:

Table-4: Escalation Rate for Inland Transportation of Domestic Coal (For Payment)					
Period	Coal Freight Index for 100 km	Coal Freight Index for 500 km	Coal Freight Index for 1000 km	Coal Freight Index for 2000 km	Coal Freight Index for 3000 km
Jul-09	125.1	462.3	887.9	1644.6	2103.9
Aug-09	125.1	462.3	887.9	1644.6	2103.9
Sep-09	125.1	462.3	887.9	1644.6	2103.9
Oct-09	125.1	462.3	887.9	1644.6	2103.9
Nov-09	125.1	462.3	887.9	1644.6	2103.9
Dec-09	125.1	462.3	887.9	1644.6	2103.9
Jan-10	125.1	462.3	887.9	1644.6	2103.9
Feb-10	125.1	462.3	887.9	1644.6	2103.9
Mar-10	125.1	462.3	887.9	1644.6	2103.9
Apr-10	125.1	462.3	887.9	1644.6	2103.9
May-10	125.1	462.3	887.9	1644.6	2103.9
Jun-10	125.1	462.3	887.9	1644.6	2103.9
Average Index (Jul 09-Dec 09)	125.10	462.30	887.90	1644.60	2103.90
Average Index (Jan 10-June 10)	125.10	462.30	887.90	1644.60	2103.90
Half-Yearly Esclation	0.00%	0.00%	0.00%	0.00%	0.00%
Annual Escalation Rate	0.00%	0.00%	0.00%	0.00%	0.00%

The annual escalation rates computed in the above table (0.00%, 0.00%, 0.00%, 0.00% and 0.00% respectively applicable upto 100 km, upto 500 km, upto 1000 kms, upto 2000 kms and beyond 2000 kms) are notified as annual escalation rates for inland transportation charges for coal for payment.

(5) Escalation rate for inland transportation charges for gas (For Payment)

The Escalation Rate for Inland Transportation Charges for Gas has been computed based on the data on transportation charges of gas along HVJ pipeline charged by GAIL for the period from July 2009 to June 2010. The data has been collected from Ministry of Petroleum & Natural Gas. The escalation rate for transportation of natural gas has been computed as under:

Table-5: ESCALATION RATE FOR INLAND TRANSPORTATION CHARGES FOR GAS (FOR PAYMENT)	
Period	**Transportation charges along HVJ pipeline (Rs./'ooo' cubic metre)**
Jul-09	1069
Aug-09	1069
Sep-09	1069
Oct-09	1069
Nov-09	1069
Dec-09	1069
Jan-10	954
Feb-10	954
Mar-10	954
Apr-10	954
May-10	954
Jun-10	954
Average Index (July 09-Dec 09)	1069
Average Index (Jan 10-June 10)	954
Half-Yearly Inflation	-10.76%
Annual Inflation Rate	-21.52%

The annual escalation rate computed in the above table (-21.52%) is notified as escalation rate for transportation charges of gas.

(6) Escalation rate for different escalable sub-components of energy charge for plants based on imported gas

(6.1) Escalation rate for imported gas (for Payment)

The escalation rate for imported gas for payment has been computed based on Japan JCC LNG price for the period from September 2009 to August 2010. The data has been subscribed from Platts. The computation of escalation rate for imported gas can be seen from the following table.

Table-6.1: ESCALATION RATE FOR IMPORTED GAS (FOR PAYMENT)		
Component Index	**Data Series**	**Annual Escalation Rate**
Japan LNG Price Index	Monthly data from Sept 2009 to Aug 2010	30.50%

The annual escalation rate computed in the above table (30.50%) is notified as escalation rate for imported gas for payment.

(6.2) Escalation rate for transportation of imported gas (for Payment)

The escalation rate for transportation of imported gas has been computed based on FOB prices of 380cst bunker fuel for the period from September 2009 to August 2010. The data has been subscribed from Clarkson Research. The escalation rate for transportation of imported gas for payment has been computed as under:

Table-6.2: ESCALATION RATE FOR TRANSPORTATION OF IMPORTED GAS (FOR PAYMENT)		
Component Index	**Data Series**	**Annual Escalation Rate**
Singapore Bunker Price Index	Monthly data from Sept 2009 to Aug 2010	-1.99%

The annual escalation rate computed in the above table (-1.99%) is notified as escalation rate for transportation of imported gas for payment.

(6.3) Escalation rate for inland handling of imported gas (for Payment)

The escalation rate for inland handling of imported gas has been computed based on the data on WPI and CPI-IW for the period from July 2009 to June 2010. Composite series, based on WPI with 60% weight and CPI-IW with 40% weight has first been developed, which then has been used for computing the escalation rate. The data on WPI and CPI-IW has been taken from the website of Ministry of Commerce & Industry and Labour Bureau, respectively. The escalation rate for inland handling of imported gas has been computed as under:

Table-6.3: ESCALATION RATE FOR INLAND HANDLING OF IMPORTED GAS (FOR PAYMENT)			
Period	**WPI**	**CPI**	**Composite Series***
Jul-09	127.8	160.0	140.68
Aug-09	129.3	162.0	142.38

Sep-09	129.9	163.0	143.14
Oct-09	130.5	165.0	144.30
Nov-09	132.4	168.0	146.64
Dec-09	132.9	169.0	147.34
Jan-10	134.8	172.0	149.68
Feb-10	134.8	170.0	148.88
Mar-10	135.8	170.0	149.48
Apr-10	138.3	170.0	150.98
May-10	138.8	172.0	152.08
Jun-10	139.4	174.0	153.24
Average Index (July 09-Dec 09)			144.08
Average Index (Jan 10-Jun 10)			150.72
Half-Yearly Inflation			4.61%
Annual Inflation			9.22%
*Composite series using weightage of 60% to Wholesale Price Index (WPI) and 40% to Consumer Price Index (CPI).			

The annual inflation computed in the above table (9.22%) is notified as escalation rate for inland handling charges of imported gas for payment.

(7) Inflation Rate to be applied to Indexed Capacity Charge Component (For Payment)

The Inflation Rate to be applied to Indexed Capacity Charge Component has been computed based on the data on WPI and CPI-IW for the period from July 2009 to June 2010. Composite series, based on WPI with 60% weight and CPI-IW with 40% weight has first been developed, which then has been used for computing the escalation rate. The data on WPI and CPI-IW has been taken from the website of Ministry of Commerce & Industry and Labour Bureau, respectively. The inflation rate has been computed as under:

Table-7: INFLATION RATE TO BE APPLIED TO INDEXED CAPACITY CHARGE COMPONENT (FOR PAYMENT)			
Period	WPI	CPI	Composite Series*
Jul-09	127.8	160.0	140.68
Aug-09	129.3	162.0	142.38
Sep-09	129.9	163.0	143.14
Oct-09	130.5	165.0	144.30
Nov-09	132.4	168.0	146.64
Dec-09	132.9	169.0	147.34
Jan-10	134.8	172.0	149.68
Feb-10	134.8	170.0	148.88
Mar-10	135.8	170.0	149.48

Period							
Apr-10	138.3		170.0				150.98
May-10	138.8		172.0				152.08
Jun-10	139.4		174.0				153.24
Average Index (July 09-Dec 09)							144.08
Average Index (Jan 10-Jun 10)							150.72
Half-Yearly Inflation							4.61%
Annual Inflation							9.22%
*Composite series using weightage of 60% to Wholesale Price Index (WPI) and 40% to Consumer Price Index (CPI).							

The annual inflation computed in the above table (9.22%) is notified as Inflation Rate to be applied to Indexed Capacity Charge Component.

(8) Inflation Rate to be applied to indexed energy charge component in cases of captive fuel source (For Payment)

Using Consumer Price Index for industrial workers (CPI-IW), Wholesale Price Index for all commodities (WPI-All Commodities) and disaggregated WPI series for various commodities used in the captive mining, the inflation rate to be applied to indexed energy charge component in cases of captive fuel source has been computed. Before computing the escalation rate, composite series has been arrived at by giving weight of 10% to WPI; 20% to CPI; 10% to Tyres; 10% to Matches, Explosives & Other Chemicals; 25% to Machinery & Machine Tools; and 25% to HSD Oil and the same has been used for computing the escalation rate.

Table-8: INFLATION RATE TO BE APPLIED TO INDEXED ENERGY CHARGE COMPONENT IN CASE OF CAPTIVE MINE COAL SOURCE (FOR PAYMENT)							
Period	WPI	CPI	Wholesale Price Index				Composite Series*
			Tyres	Matches, Explosive & Other Chemicals	Machinery & Machine Tools	High Speed Diesel Oil	
Jul-09	127.8	160.0	128	121.9	117.8	133.9	132.70
Aug-09	129.3	162.0	128	122.2	118.0	133.9	133.33
Sep-09	129.9	163.0	128	123	117.1	133.9	133.44
Oct-09	130.5	165.0	128.1	122.8	117.4	133.9	133.97
Nov-09	132.4	168.0	128.7	123.5	117.8	133.9	134.99
Dec-09	132.9	169.0	129.2	125.8	117.8	133.9	135.52
Jan-10	134.8	172.0	131.2	126.5	118.4	133.9	136.73
Feb-10	134.8	170.0	131.8	126.1	118.5	136.6	137.05
Mar-10	135.8	170.0	134.4	127.4	119.5	144.6	139.79
Apr-10	138.3	170.0	135.1	127.6	120.5	145.6	140.63

May-10	138.8	172.0	139.5	128	120.2	145.6	141.48
Jun-10	139.4	174.0	140.2	127.8	120.4	147.4	142.49

Average Index (July 09-Dec 09)	133.99
Average Index (Jan 10-Jun 10)	139.69
Half-Yearly Inflation	4.26%
Annual Inflation	**8.51%**
*Composite series using weight of 10% to Wholesale Price Index (WPI), 20% to Consumer Price Index (CPI), 10% to WPI-Tyres, 10% to WPI-Matches, Explosives & other chemicals, 25% to WPI-Machinery & Machine Tools and 25% to WPI-HSD Oil.	

The annual inflation computed in the above table (8.51%) is notified as inflation rate to be applied to indexed energy charge component in cases of captive fuel source.

11.   The data series for API 4, Global Coal Index, Barlow Jonker Index/Coalfax, Platts Gas Price Index 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.

****

New Methodology for determination of Escalation Factors and other Parameters for the purpose of Bid Evaluation and Payment

The new methodology for the determination escalation factors and other parameters for the purpose of bid evaluation and payment has three components:

1. Use of the method of minimum mean square error for determining the escalation factors and other parameters used in the evaluation of bids
2. Use of composite series
3. Use of Rupees per kW connected as the basis for computation of escalation factor for normative transmission charges

1. Use of the method of minimum mean square error for determining the escalation factors and other parameters used in the evaluation of bids

The Tariff based Competitive Bidding Guidelines [Clause 5.6 (vi)] of Ministry of Power require that CERC notify, every six months, escalation rates for following parameters for evaluation purposes:

1. Escalation rate for domestic coal prices
2. Escalation rate for domestic gas prices
3. Escalation rates for different escalable sub-components of energy charge for plants based on imported coal.
    a. Escalation rate for coal sub-component
    b. Escalation rate for transportation sub-component
    c. Escalation rate for inland handling sub-component
4. Escalation rate for inland transportation charges for coal over various distances
5. Escalation rate for inland transportation charges for gas
6. Escalation rates for different escalable sub-components of energy charge for plants based on imported gas
    a. Escalation rate for gas sub-component
    b. Escalation rate for transportation of gas sub-component
    c. Escalation rate for inland handling sub-component
7. Rate of Inflation to be applied to indexed capacity charge component
8. Rate of Inflation to be applied to indexed energy charge component in cases of captive fuel source
9. Dollar-Rupee exchange variation rate
10. Escalation for normative transmission charges

The new proposed method of minimum mean square error will use the following formulation for determination of escalation factors for the parameters listed above.

e: annual escalation rate in percent =g*100, where:

g: *escalation factor* $= [exp\{\{(6 \times \sum_{t=2}^{n} (t-1) \times LnR_t\}/\{(n-1) \times n \times (2n-1)\}\}]-1$
  $R_t = (Y_t/Y_1)$
  $Y_t = $ *'"t" th observation*
  $Y_1 = $ *initial observation*
  $n = $ *number of observations*

An example in Table 2 shows the methodology of determining the escalation factor for domestic coal by using the Method of minimum mean square error.

2. Use of Composite Series

As per the new proposed methodology, the escalation rate for parameters that require combining of two or more series in pre-determined proportion will henceforth be determined by combining each data point of two or more series in the pre-determined proportion to arrive at a composite new single series and then the escalation rate will be determined based on this composite new single series.

The new proposed method of use of composite series will be applicable for the following parameters that require combining of two or more series in pre-determined proportion:

1. Escalation rate for domestic gas prices
2. Escalation rates for inland handling sub-component of energy charge for plants based on imported coal
3. Escalation rates for inland handling sub-component of energy charge for plants based on imported gas
4. Rate of Inflation to be applied to indexed capacity charge component
5. Rate of Inflation to be applied to indexed energy charge component in cases of captive fuel sources

Example in Table 3 shows the methodology of determining the escalation rate for indexed capacity charge component   by combining each data point of WPI and CPI series in the ratio of 60:40, respectively to arrive at a composite new single series and then finding the escalation rate based on this composite new single series for payment purpose. Example in Table 4 shows the same methodology with respect to the same parameter for payment purposes.

3. Use of Rupees per kW connected as the basis for computation of escalation factor for normative transmission charges

The new proposed methodology will use Rupees per kW connected as the basis for determination of the escalation rate for normative transmission charges (for bid evaluation purposes). Considering the data availability issue and to account for transmission charges paid by Short Term Open Access users, the actual steps for arriving at Rupees per kW connected will be as given in Table 1. An example in Table 5 shows the use of the methodology outlined in Table 1 on actual data.

Table 1: Basic Steps for Arriving at data for determination of Escalation for Normative Transmission Charges

1. Calculations done for 12 Years Data
2. **Let Transmission charges for past 12 years be:** TC1….. TC 12
3. **Let connected load (LTOA) on ISTS system for past 12 years be:** C1………C12
4. **Assuming 85% capacity utilization, let energy net generated from capacity of C1….C12 be:** E1………E12
5. **Let STOA transmitted over ISTS for past 12 years be :** S1……..S12
6. Let STOA transmitted over ISTS for past 12 years as percentage of net energy generation E1……E12 be: K1 ………….K12; with each K = (S/E)
7. **Let Transmission charges to be considered for determination of escalation rate for the past 12 years be:** T1…..T12; where each T = {1/(1+K)}* TC;
8. **The basic Rupees per MW data that will be used for determining the escalation rate will be M1 ….M12, where each M = T/C (see Table Below)**

Year	Transmission Charges in Rs.	kW Connected on ISTS	Rupees per kW Connected
1998	T1	C1	M1= T1/C1
1999	T2	C2	M2 = T2/C2
2000	T3	C3	M3 = T3/C3
2001	T4	C4	M4 = T4/C4
2002	T5	C5	M5 = T5/C5
2003	T6	C6	M6 = T6/C6
2004	T7	C7	M7 = T7/C7
2005	T8	C8	M8 = T8/C8
2006	T9	C9	M9 = T9/C9
200c	T10	C10	M10 = T10/C10
2008	T11	C11	M11 = T11/C11
2009	T12	C12	M 12 = T12/C12

4

Table-2: Escalation Rate for Domestic Coal (For Evaluation)						
Year No. (t)	Year	WPI for Non-Coking Coal	Yt/Y1 =Rt	Ln Rt	Year -1 (t-1)	Product [(t-1) x (Ln Rt)]
1	1998	63.12				
2	1999	64.77	1.03	0.03	1	0.03
3	2000	67.07	1.06	0.06	2	0.12
4	2001	80.19	1.27	0.24	3	0.72
5	2002	81.38	1.29	0.25	4	1.02
6	2003	85.31	1.35	0.30	5	1.51
7	2004	96.50	1.53	0.42	6	2.55
8	2005	102.60	1.63	0.49	7	3.40
9	2006	102.50	1.62	0.48	8	3.88
10	2007	104.01	1.65	0.50	9	4.49
11	2008	112.70	1.79	0.58	10	5.80
12	2009	116.53	1.85	0.61	11	6.74
A = Sum of "product" column						30.25
B= 6 times (6 x A)						181.50
C= (n-1) x n x (2n-1); n = No. of Years of data = 12						3036.00
D = B/C						0.06
g (Exponential Factor) = Exponential (D) -1						0.06
e = Annual Escalation Rate (%) = g x 100						6.16

Year No. (t)	Year	WPI for All	CPI for Industrial	Composite Index for Indexed Capacity Charge (WPI:CPI in 60%:40%)	Yt/Y1 =Rt	Ln Rt	Year -1 (t-1)	Product [(t-1) x (Ln Rt)]
a		b	c	d=(bx0.6)+(cx0.4)	e=dt/d1	f=Ln(e)	g=a-1	h=f x g
1	1998	74.18	87	79.51				
2	1999	76.79	92	82.71	1.04	0.04	1	0.04
3	2000	81.59	95	87.05	1.09	0.09	2	0.18
4	2001	85.80	99	91.02	1.14	0.14	3	0.41
5	2002	87.92	103	93.99	1.18	0.17	4	0.67
6	2003	92.60	107	98.37	1.24	0.21	5	1.06
7	2004	98.72	111	103.65	1.30	0.27	6	1.59
8	2005	104.04	116	108.73	1.37	0.31	7	2.19
9	2006	109.40	123	114.81	1.44	0.37	8	2.94
10	2007	114.86	131	121.22	1.52	0.42	9	3.80
11	2008	124.82	142	131.56	1.65	0.50	10	5.04
12	2009	127.47	157	139.32	1.75	0.56	11	6.17

Table-3: ESCALATION RATE TO BE APPLIED TO INDEXED CAPACITY CHARGE COMPONENT (FOR EVALUATION)

A = Sum of "product" column	24.08
B= 6 times (6 x A)	144.51
C= (n-1) x n x (2n-1); n = No. 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	4.87

Table-4: ESCALATION RATE FOR INLAND HANDLING OF IMPORTED COAL (FOR PAYMENT)					
Period	**WPI**	**WPI Weight**	**CPI**	**CPI Weight**	**Composite Index= (WPIx0.6)+(CPI x 0.4)**
Jan-09	228.9	0.6	148.0	0.4	196.54
Feb-09	227.6	0.6	148.0	0.4	195.76
Mar-09	228.2	0.6	148.0	0.4	196.12
Apr-09	231.5	0.6	150.0	0.4	198.90
May-09	234.3	0.6	151.0	0.4	200.98
Jun-09	235.0	0.6	153.0	0.4	202.20
Jul-09	238.7	0.6	160.0	0.4	207.22
Aug-09	240.8	0.6	162.0	0.4	209.28
Sep-09	242.6	0.6	163.0	0.4	210.76
Oct-09	242.5	0.6	165.0	0.4	211.50
Nov-09	245.4	0.6	168.0	0.4	214.44
Dec-09	246.5	0.6	169.0	0.4	215.50
Average Index (Jan 09-Jun 09)					198.42
Average Index (July 09-Dec 09)					211.45
Half-Yearly Inflation (%)					6.57
Annual Inflation (%)					13.14

Year	Transmission Charges without ULDc in Rs. Million	Installed Capacity MW*	Connected Load assuming Auxiliary of 8%	Net generation assuming 85% PLF Million kWh	STOA Million kWh	STOA as % of net generation (K)	Factor ((1/(1+K))	Transmission Charges without ULDC adjusted for STOA	Cost per KW connected (Rs)
	(a)	(b)	(c)=0.92*(b)	(d)=(c*8760*.85)/(10^6)	(e)	(f) = (e)/(d)	(g)= (1/(1+f))	(h)= (a)*(g)	(i) = (h*1000)/(c)
1998	15592	24426	22472	167327	0	0.00	1.00	15592	638.33
1999	18232	25430	23395	174201	0	0.00	1.00	18232	716.95
2000	21585	27181	25006	186195	0	0.00	1.00	21585	794.13
2001	22292	28102	25853	192504	0	0.00	1.00	22292	793.25
2002	24183	29089	26762	199269	0	0.00	1.00	24183	831.33
2003	26985	30662	28209	210041	0	0.00	1.00	26985	880.08
2004	26021	32901	30268	225379	0	0.00	1.00	26021	790.90
2005	28901	35362	32533	242241	17000	0.07	0.93	27005	763.68
2006	34841	38230	35171	261884	26269	0.10	0.91	31665	828.28
2007	41871	42087	38720	288309	30996	0.11	0.90	37807	898.30
2008	49995	44897	41305	307559	31286	0.10	0.91	45379	1010.74
2009	46995	45872	42202	314235	38909	0.12	0.89	41817	911.62

Table-5: Sample Calculation for arriving at Cost per kW connected as per the Method in Table 1

* Average of beginning and end of year.

Change in the composition of the composite series used for determining the escalation factor for coal mined from captive mines

Hitherto, CERC has been determining the escalation factor for coal mined from captive mines by mixing WPI (10%) and CPI (20%) series with four other disaggregated or sub or sub-sub-series of WPI (mixing weights in bracket): High speed diesel (25%), Matches, explosives and other chemicals (10%), Tyres (10%), and Heavy machinery and parts (25%). "Heavy machinery and parts" is a sub series of "Machinery and Machine Tools" which in turn is a sub-series of WPI. The WPI and the WPI sub-series that were being used till now had year 1993-94 as the base (i.e. old WPI series and it's disaggregated or sub or sub-sub series were being used). Switching to the use of new WPI (with year 2004-05 as the base) and its new disaggregated series, however, has necessitated a change being made in the composition of the composite series used for determining the escalation factor for coal mined from captive mines. This has been explained below:

i. Since for determining the escalation rates for evaluation purpose we need to have data for past 12 years, and since the new WPI series only goes as far back as 2004-05; there was a need to use suitable conversion factors to arrive at index values for various sub and sub-sub series of new WPI and its disaggregated series for periods prior to 2004-05. While the methodology for arriving at these conversion factors (called as "linking factors" by MC&I) is provided by MC&I for WPI and a sample of sub-series, the same can be used for arriving at the pre 2004-05 index values for WPI or any of its sub or sub-sub-sub-series *only if the sub-series or the sub-sub-sub series exist both in the new WPI series and the old WPI series.*

ii. The problem was that, although the new WPI series has "Machinery and Machine Tools" as sub-series, the "Machinery and Machine tools" sub-series itself does not have "Heavy Machinery and parts" as its sub-series in the new WPI series. In fact the new WPI series does not have "heavy machinery and parts" as sub or sub-sub-series. To determine the escalation factor for

capitively mined coal, therefore, "heavy machinery and parts" sub-sub-series had to be substituted with a series that was near enough to "heavy machinery and parts" and which also existed in the new as well as old WPI series (to be able to have the data for 12 years).

iii. Having carefully gone through all the sub and sub-sub series of the new as well as old WPI series, it was found that the only "near enough" common sub-series that was common to new as well as old WPI series was the sub-series "Machinery and machine tools". Since this was the only common sub-series that was common to both new and old WPI series and which was "near enough" to what was hitherto being used (heavy machinery and parts), there was no other alternative than to use sub-series "machinery and machine tools" in place of sub-sub-series "heavy machinery and parts" (which does not exist under new WPI series). The weight for this new sub-series "machinery and machine tools" has been taken to be the same as for "heavy machinery and parts", i.e. 25%.

iv. With this change, the composition of the composite series used for determining the escalation rate for coal mined from captive mines used in the present Notification is: WPI (10%), CPI 20%, High speed diesel (25%), Tyres (10%), Matches, explosives and other chemicals (10%), and Machinery and machine tools (25%).