

Coking Coal Scenario In India

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Coal is said to be prime mover of the industry and it is the major source of Commercial Energy. In Steel Industry coking coal is primarily used as a source of Energy and also as reducing agent.

Coal Inventory :

- Current inventory of coal reserve is 248 billion tons out of which only 93 billion tons is in the proved category.
- Detailed exploration in virgin blocks is needed for upgrading the reserves in proved category.
- Coking coal reserves are 32 billion tons only, which constitute only 13% of total reserve.

Steel Sector-basic Facts :

- Indigenous coking coal is not adequate in quantity as well as quality to cater to the need of the steel sector.
- Import of required quality coal is resorted to fulfil the demand of steel sector.



- Recent developments in coke making include stamp charging, briquette blending, selective crushing and pre-heating of coal charge so as to reduce prime coking coal requirement.

Injection of high grade non-coking coal in blast furnace to reduce coke rate and coal based sponge iron plant, Corex process of production of hot metal utilizing non-coking coal are some of the latest developments.

- Use of non-coking coal for steel plant is to be encouraged as a matter of national policy.

Grade-wise Coking coal resources as on 1.1.2005

Coal type	Category			Total (in BT)	Resource %
	Proved (In BT)	Indicated (In BT)	Inferred (In BT)		
Prime coking	4.6	0.7	-	5.3	2
Medium coking	11.4	11.8	1.9	25.1	10
Semi coking	0.5	1.0	0.2	1.7	1
Total coking	16.5	13.5	2.1	32.1	13
Non-coking	76.0	103.5	35.3	214.8	86.6
Tertiary	0.4	0.1	0.4	0.9	0.4
Total	92.9	117.1	37.8	247.8	100

Medium & Semi Coking Coals

Sl. No.	Parameter	Prime Coking	Medium Coking	Semi Coking
1.	Ash requirement limited to	17±0.5	17±0.5	17±0.5
2.	Volatile matter %	22-25	26-29	34-44
3.	FSI Face swelling index	3.5 to 4.5	3.0	1 to 2
4.	LTGK Gray King Index	G to G	F / G	D - F
5.	Vitrinite reflectance	0.95 to 1.30	0.80 to 0.94	0.65 to 0.79

Grade-wise non-coking coal resources as on 1.1.2005

Depth (m)	Superior			Inferior			Total			Inferred	Grand Total
	Proven	Indicated	Total	Proven	Indicated	Total	Proven	Indicated	Total		
0-300	22.77	17.85	40.62	41.71	44.17	85.88	64.48	62.02	126.5	14.55	141.05
300-600	3.31	15.32	18.63	2.12	19.46	21.58	5.43	34.78	40.21	16.37	56.58
0-600 (Jharia)	0.65	0.02	0.67	4.95	0.48	5.43	5.6	0.5	6.1	-	6.1
600-1200	0.07	3.38	3.45	0.44	2.83	3.27	0.51	6.21	6.72	4.40	11.12
Total	26.80	36.57	63.37	49.22	66.94	116.16	76.02	103.51	179.53	35.32	214.85



Ash Limit For Different Consumer Sectors.

Consumer Sectors	% Ash Limit
Steel	17 ± 0.5
Sponge iron	Less than 25
Cement	Less than 30
Power stations located beyond 1000 Km from mine in critically polluted area	Less than 34

Need of Coal Washing In India :- Coking Coal

- Ash content of available ROM Coking coal is around 26-35 %
- For consistency in coking property
- Gradual depletion of low ash coking coal

Coking Coal Beneficiation :

- Presently, the domestic production of coking coal is being supplied to the steel sectors after washing
- The coking coal production would be augmented from 18.84 Mt. In Tenth plan to 36 Mt in 2024-25.
- Considering the operable capacity of coking coal washeries, it has been estimated that existing washeries will be capable to wash the augmented coking coal upto 24 MT after due modifications / renovations of these washeries.
- Hence, to wash balance 12 Mt. Coal, about five nos. Washeries of annual capacity 2.5 Mt. each shall be installed.

**Coal Production Programme Till 2024-25
(in Million Tons)**

Sl. No.	Production particulars	2006-07	2011-12	2016-17	2021-22	2024-25
A.	COKING COAL					
	CIL Command Area	12.34	19.5	19.5	29	30
	Other than CIL	6.50	6.50	6.50	6	6
	Total coking coal (all India)	18.84	26	26	35	36
B.	LOW VOLATILE HIGH RANK (LVHR) COAL	9.31	13	13	13	13
C.	NON-COKING COAL					
	Superior Grade (CIL)	119	147	170	181	202
	Thermal Grade (CIL & other than CIL)	282	435	559	673	753
	Non-CIL Command Area	-	-	5	25	57
	Total Non-coking coal (All India)	401	582	734	879	1012

Low Volatile High Rank (LVHR) Beneficiation :

- Out of 32 billion tons of coking coal reserve in the country, approximately 8.5 billion tons fall into low volatile high rank (LVHR) category that cannot be used directly in the steel industry.
- The present resource of LVHR coals is estimated to be about 8 billion tons in Jharia Coalfields and 0.5 billion tons in East Bokaro Coalfields.
- These are mainly confined to seam VIII and below in Jharia Coalfields and Karo Group of seams in East Bokaro Coalfields.
- Envisaged that after beneficiation these coal may be used as a blend in coke making.
- The LVHR coal production would be augmented in 9.31 Mt in tenth plan to 13.0 Mt. in 2024-25.
- Seeing the blending property in coke making, entire coal shall be beneficiated at 18% ash level and can be linked to steel sectors as metallurgical coal (blendable coking coal).
- Hence, to wash the 13 Mt. LVHR coal, five nos. of washeries of capacity 2.5 to 3 Mty. each would have to be installed in BCCL and CCL.

Plan Wise Projected Domestic Coal Production and Demand (in Million Tons)

		XI Plan (11-12)	XII Plan (16-17)	XIII Plan (21-22)	XIV Plan (24-25)
Domestic Production		621	778	942	1086
	Coking (washed coal)	26 (13)	26 (13)	35 (18)	36 (18)
	Low volatile high rank (washed coal)	13 (3)	13 (3)	13 (3)	13 (3)
	Non-coking	582	734	879	1012
	Coal equiv. of CBM/UCG	-	5	15	25
Demand at 8% GDP	Total	630	828	1079	1267
	Coking	54	69	90	105
	Non-coking	576	759	989	1162
Gap (-) / Surplus(+) at 8% GDP	Coking	(-38)	(-53)	(-69)	(-69)
	Non-coking	(+) 6	(-) 20	(-) 95	(-) 125

Ref : Coal Vision 2025

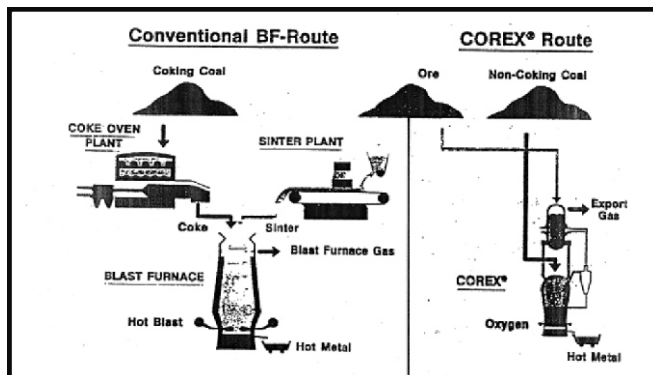
The Non-coking Coal Route :

- Hot metal is the product of blast furnace using coke produced from metallurgical coal, but **COREX** is a revolutionary process, which uses non-coking coal. Such a plant is in operation in India, commissioned by JVSL.



- **COREX** process is said to be cost efficient and environmentally compatible process.
- Production of Hot metal without coking and sinter plants results in substantial reduction of costs. It is said that saving in costs is as much as 25%

Comparison of Production Routes :



Action Program at National Level :

- Faster development of Coal Mines allotted to SAIL viz. TASRA and SITANALA.
- Development of 14th Seam of Jitpur Colliery of SAIL in Jharia Coalfield, which is absolutely virgin.
- For coal block allocation, the Ministry of Coal guide lines accord lesser priority of Steel compared to Power. Power

utilities like NTPC, SEBS, IPPS and captive power plants enjoy higher priority.

- Most of the coking coal mines are underground mines except for TASRA and West Bokaro and to some extent Ramnagar. U/G mining yields only 40% of insitu reserve. Proper mining technology and sand stowing practices are to be developed.

Suggestions :

- As India has high reserves of non-coking coal, some new direct smelting reduction process for producing hot metal from non-coking coal and Iron Ore should be perfected.
- New Coal Mining technologies for extraction of steeply inclined coal seams of Parbatpur, Mahal, Chasnalla, Sitanala etc. should be perfected in association with foreign experts.
- Stowing subsidy for coking coal should be enhanced to cover at least 70% of the cost of stowing.
- High speed drifting and shaft sinking companies do not exist in India. Govt. should invite collaboration in this sector, which is very important to develop new coal mines.
- Coking coal reserves of Jharia coalfield lying below built up areas of town should be made available for extraction.
- Mine fires in coking coal mines are to be dealt effectively

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