**Title:** Development of technology for de-ashing of high ash Indian coal  

**Use:** Clean coal for utilization in metallurgical, power and cement sectors  

**Brief write-up:** India is unfortunately not endowed with rich coking coal reserves and coal washing to reduce the ash level from 22-28% down to 16-17% is a routine commercial activity. Today, even non-coking coals are being washed to cater to the needs of not only the power sector but also to fulfill partial requirements in the blast furnace through pulverized coal injection to the tune of up to 150 kg/ton of pig iron.

Indian coals are usually of high ash. Such coals are neither suitable for iron making nor acceptable for power generation. Only coking coals used to be washed in the past for metallurgical applications. The processing of coarse and medium sized coal is primarily based on gravity based processes. Processing of fines was not necessary in the past. The complexity involved in beneficiation of fine coal is much greater and today this has become mandatory. CSIR-NML has studied coking coals from various sources to bring the ash level down to below 16% from an initial level of 25-30% through flotation based processes. Coal flotation circuits in the washing plants of Jamadoba and West Bokaro of Tata Steel, Gidi of CCL and Dugda of BCCL came up based on the know-how developed by CSIR-NML. New flotation reagents for coal have also been developed in collaboration with Somu Organochem Ltd. at Bangalore. Efforts are now focused on utilizing the abundant reserves of medium coking coals in metallurgical applications through processing. Under the 10th Five Year Plan, CSIR-NML, in association with other sister labs, took up the beneficiation of Low Volatile Medium Coking coals (LVMC) for their efficient utilization. Under this program multi-product beneficiation schemes were developed to produce coals with ash levels of 15-17%. Such schemes mostly involved conventional and advanced gravity techniques as well as mechanical and advanced froth flotation in the fine particle size range.

**Recent developments:** Development of technology for processing of coking and non-coking coals with a view to produce low ash clean coal for iron and steel, power, cement and DRI sectors is a major current research program and will continue to remain a major activity in future. Under an ongoing activity it is desired to develop technology for small and medium entrepreneurs for the production of steel. The conceived scheme requires generation of high purity clean coal to be used for production of composite micropellets with iron ore. In view of this, processing scheme was developed to beneficiate LVC and non-coking coals to reduce the ash content from around 30% down to 12%. The process flowsheet for the same was successfully developed by crushing the ROM coal to a fine size and employing conventional and advanced gravity techniques as well as froth flotation for fines processing. In another ongoing activity, various semi-coking and non-coking coals are being beneficiated to achieve 10% ash in the clean coal for injection in blast furnace and thereby partially substituting low ash coking coal for iron making. CSIR-NML has proposed to conduct research on dry beneficiation of non-coking coal during the 12th Five Year Plan period. Today, all washeries in India adopt wet processing in which significant amount of water is required. Dry beneficiation has added advantages apart from not requiring water. The proposed research is targeted towards developing technology for clean coal production through the dry route for the power, DRI and cement sectors.

**Technoeconomics/financial benefits:** The plants developed for coking coal beneficiation has helped steel industries by supplying clean coal for coke making. They also helped in reducing the waste generation by recovering most of the combustibles from the rejects. On successful completion of the ongoing activities steel making would be within the reach of the small and medium entrepreneurs in which prime coking coal will not be an essential raw material. The high purity semi-coking and non-coking coals can provide significant substitution to imported low ash coking coal. Successful development of dry beneficiation technology has the potential to change the landscape of coal washing.