Report of the Expert Group
on
Washing of Thermal Coal is Vital for India

Due to the use of washed coal, the energy consumed in transportation, handling and milling has been optimised as the inert material from coal is eliminated. This helps in reducing the auxiliary consumption of equipment involved in coal processing because the use of improved coal ultimately results in reduction of emission of GHG as compared to conventional coal.

Quoted from the book 'CONVENIENT ACTION – Continuity for Change' by ***Shri Narendra Modi****, Hon'ble Prime Minister of India*

Coal Preparation Society of India (CPSI)

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Representing India's commitment to Clean Coal to the world, **Coal Preparation Society of India (CPSI)** is a non-profit, non-government professional body having members from coal, power, iron and steel sectors and their allied industries. CPSI has been dedicatedly promoting washing of high ash domestic coal to improve quality and enhance the calorific value, making it more suitable for use in **High Efficiency Low Emission (HELE)** power generating Systems. Such efforts will lead to more environment friendly usage of coal as a source of energy. It will therefore be a step which will facilitate fulfilling the country's commitment to decisions taken in **COP 21**.

Main Objectives of **CPSI** inter alia are;

- To act as a facilitator in policy formulation in coal beneficiation and preparation.
- To provide an effective network amongst coal producers, consumers, coal washery operators, technical and research organizations, venture capitalists both domestic and international.
- To provide an independent platform for deliberating important issues pertaining to technological, operational, financial, commercial and policy aspects of the Indian Coal Preparation Industry.
- To promote and encourage any new idea beneficial for India. Encourage international companies and professional global bodies to exchange information on demonstrated, prevalent state of art technologies relevant to Indian coal industry.
- India's commitment to environment.

CPSI is a member of the **International Organizing Committee (IOC)** of the **International Coal Preparation Congress (ICPC)** which is held once in three years. The **International Organizing Committee (IOC)** is a body on which so far 15 countries are represented through non-government organizations which deal in their respective countries with the issues relating to coal preparation. **CPSI** is a member of **IOC** representing India.

XIX International Coal Preparation Congress & Expo (ICPC) was organised under the aegis of CPSI from 13th to 15th November, 2019 at New Delhi was a great success. This prestigious global event on COAL was held in India after 37 years. The last one was the 9th ICPC held in 1982 in New Delhi.

The World Coal Association, UK, IEA Clean Coal Centre, UK, Federation of Indian Mineral Industries (FIMI), Sponge Iron Manufacturers Association (SIMA) and Association of Power Producers (APP) were associated with CPSI in organising the XIX ICPC.

CPSI is an Associate Member of the **World Coal Association** - a global industry association formed of major international coal producers and stakeholders and has bilateral relationship with IEA Clean Coal Centre, UK for promoting clean coal technologies for use in High Efficiency Low Emission (HELE) power generating Systems.

CPSI is a member of ASSOCHAM and Associate Member of the **PHD Chamber of Commerce and Industry**, and has over **75** large companies as the Corporate Members and a large number of individual members.

CPSI is registered under the Societies Registration Act, XXI of 1860 and its head office is located in New Delhi.

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Preamble

On 21st May 2020, the Ministry of Environment, Forest & Climate Change (MoEFCC) issued a notification negating its own notification of 2nd January 2014 doing away with the use and supply of washed (and blended) coal of ash content not over 34% to power plants located 500 km from the supply sources and also for those located in urban and ecologically sensitive locations, and allowing coal of any ash content to be supplied to the power stations.

The new notification of MoEFCC dated 21st May 2020 is based on inaccurate representations and baseless arguments put forward by Ministries of Coal, Power and NITI Aayog. Therefore, on the face of it this notification is a retrograde step as this would lead to irreparable damage not only to coal-fired power plants but also to the ecology in and around power stations. This will also have adverse impact on India's ability to meet the commitment made at the Paris Climate Treaty of reducing the GHG emissions to pre-2005 level, by 2030.

In view of the wide ranging adverse impact of the Notification dated 21st may 2020 issued by MoEFCC, the Coal Preparation Society of India (CPSI) - a professional body with members from coal, power, iron & steel, cement and allied industries and subject experts got all the aspects of washing of thermal coal and use of washed coal in power plants studied in detail through a group comprising of highly experienced experts having in-depth knowledge of coal mining, preparation, transportation and use in thermal power stations. The Expert Group constituted by CPSI comprised of the following well known industry experts:

1. **Shri Alok Perti**, IAS (Retd), Former Secretary (Coal) to Government of India.
2. **Shri R K Sachdev**, Former Advisor (Coal) to GoI and President, Coal Preparation Society o f India.
3. **Shri V S Verma**, Former Member and Chairman, CERC, Member (Planning) CEA and DG, Bureau of Energy Efficiency (BEE).
4. **Shri Partha Sarathi Bhattacharyya**, Former Chairman, Coal India Ltd.
5. **Shri D N Prasad**, Former Adviser, Ministry of Coal.
6. **Prof. Sumantra Bhattacharya**, Professor and Head, Department of Fuel Minerals & Metallurgical Engineering, Indian Institute of Technology (ISM) Dhanbad.
7. **Dr R Srikanth,** Professor & Dean, National Institute of Advanced Studies, Bangalore.

The Report of the Expert Group will be submitted to various concerned ministries, NITI Aayog and to the Hon'ble Prime Minister of India.

R K Sachdev
President
Coal Preparation Society of India

Executive Summary

Report of the Expert Group
on
'Washing of Thermal Coal is Vital for India'

Background

India is the second largest producer of coal and more than 80% of its annual production is consumed in the power sector. COAL is one of the main drivers of India's economic growth. India is endowed with over 13% of world's proven coal reserves. The total annual production in 2019-20 has been 729 million tonnes. At the current rate of production, the proven reserves can last for several decades and adequately meet the country's need for electricity, iron & steel, cement and many other industries.

While, quantitatively our coal resources are abundant and fairly well distributed in eastern and south eastern parts of the country, but the ash content is very high ranging from 24 to 55%, sometimes even more. Further, with predominance of open cast mining the quality gets further deteriorated due to out of seam dilution. Sulphur content, however, is low from 0.4 to 0.7% only, which is a positive feature of our coals.

Washing of coal is a simple and cost-effective technique of removing the extraneous material, for reducing the ash content and improving the heat value and thereby coal burns efficiently in power plant boilers with significantly reduced emissions. Washing also helps in reducing the inorganic part of sulphur in coal that in turn helps in significantly reduced SOx emissions.

While during FY 2019-20 India's domestic coal production was 729 million tonnes (mt) and total import was of 243 million tonnes (mt), the total consumption was therefore over 970 mt. Of this, power sector utilities, both coast-based and others, consumed about 630 mt of coal. In addition, out of about 180 mt thermal coal that was imported, a part was used by power utilities, for meeting the gap in the domestic supply and

the balance was used by cement and other industries. At least, 70% of this can easily be substituted by domestic washed coal.

On January 2nd 2014, MoEFCC had issued a notification mandating use of washed or blended coal with ash content not over 34% to be supplied for use in power plants located more than 500 km from the supplying mines and also for those located is ecologically sensitive locations, and also those located in urban areas and environmentally sensitive locations. The primary objective of the mandate was to control pollution during transportation as well in and around the power stations. This approach was in tune with the commitments made for reduction of emission intensity of our GDP by 33% in 2030 below the level that existed in 2005.

On 21st May2020 MoEFCC, by issuing a fresh notification, scrapped the mandatory coal washing for power generation in certain thermal power plants that was mandated vide the notification of 2nd January 2014.

The unfortunate aspect of the notification dated 21st May 2020 is that this has been based on the representations made by the Ministries of Coal, Power and NITI Aayog, which are scientifically, environmentally and economically grossly misplaced and in all likelihood will lead to excessive environmental damages and significant losses of economic benefits established out of using washed coal for power generation.

Past studies and trials that have looked at specific power plants in India have shown that the use of washed thermal coal results in the following benefits accruing to the power plants:

- Savings in coal transport cost.
- Increase in operating hours.
- Increase in Plant Load Factor and Plant Utilisation Factor.
- Reduction in break-downs / down time.
- Increase in overall efficiency.
- Increase in generation and units sent out per day.
- Reduction in support fuel oil.
- Reduction in specific coal consumption.

- Saving in land area for ash dumping and reduced water requirement for ash disposal.
- Reduction in CO2, SPM and SOX emissions.
- Savings in per unit cost of electricity generation.
- Reduction in capital cost of new power plants.

Globally also, coal is washed and used in power stations and also traded after making it saleable after washing.

Mahanadi Coalfields (MCL) is currently implementing three greenfield washeries (10 mty capacity each), after securing all necessary clearances, including the environmental clearance (EC) from MoEF&CC. These washeries are being established on the Build-Operate-Maintain (BOM) concept with capital cost being borne by the coal company and operation & maintenance would be responsibility of the contractor for which he would be paid an agreed amount. In case of Lakhanpur washery, which is in advanced stage of commissioning, the capital cost is below Rs. 400 crore and the operating cost has been fixed at Rs.104 per tonne (exclusive of water, power, and GST). The minimum guaranteed yield of washed coal for reducing ash content from 41.5% to 33.5% has been finalized as 78.7%. Similarly, MCL has issued "Letters of Intimation" for setting up state-of-art washeries in the Hingula area and Jagannath area of Talcher coalfield. All three washeries have been designed with environment-friendly features and based on 'closed circuit' concept with zero liquid discharge.

Modern washeries established at the producing mines with high yields and generating rejects with less than 1500 Kcal/kg heat value, which have no useful value and can best be used to fill mine voids are being planned and established. The rationale of avoiding washing of coal on the plea that washeries are 'highly polluting' is flawed. Further, mandatory use of rejects in FBC boilers is fraught with uncertainties and consequent unreliability of power plant operation. Rejects must necessarily be disposed off as mine-fills.

After in-depth examination of all related aspects of washing of thermal coals and the use of washed coal, the Expert Group arrived at the following specific recommendations:

1. All thermal coals should be washed at the mine site before dispatch.

2. All mines having coal production of more than 2.50 million tonnes per annum should be equipped with a coal washery. Coal India Ltd and SCCL should draw a time bound Action Plan to achieve this.

3. Coal mines having smaller production may be provided with a suitably located central coal washery of capacity matching with cluster of mines it is meant to service.

4. All washeries should follow the concept of having discards / rejects of GCV of less than 1500 Kilo Cal/kg as designed for the three washeries under implementation in MCL areas.

5. Washery discards/rejects must be dumped back into de-coaled areas in open cast mines along with the overburden debris.

6. All washeries should be designed and implemented on 'closed circuit' or 'zero liquid discharge' concept.

7. The notification issued by MOEF&CC on 21st May 2020 withdrawing the previous notifications which mandated washing of coal and allowing unwashed coal to be used in power plants under any conditions be held in abeyance and a process of consultation with all stakeholders be initiated to arrive at a more reasonable and scientifically appropriate viewpoint which can then be converted into a formal notification.

This is also noteworthy that in his book 'CONVENIENT ACTION - continuity for Change', Hon'ble Prime Minister Modi says 'Due to the use of washed coal, the energy consumed in transportation, handling and milling, is optimized as the inert material from coal is eliminated. This helps in reducing the auxiliary consumption of equipment involved in coal processing because the use of improved quality coal ultimately results in reduction of emission of GHG as compared to conventional coal.' (Copy of page-86 of the book is attached at Annex - 1 of the Report).

It is also to be noted that the assured supply of washed coal of appropriate quality and adequate volume, will trigger faster implementation of Clean Coal Technologies that will lead to higher energy efficiency of the entire Energy sector (from the mine to the power plant) and result in tariff reductions necessary to enhance the competitiveness of Indian industry. In addition, usage of washed coal in TPPs will also reduce air pollution

and CO2 emissions from the Coal, Railways, and Power sectors. This will also embody the true spirit of 'Atmanirbhar Bharat' and also Atamnirbhar Coal Sector.

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1. Introduction

a. Coal is one of the most significant growth drivers for the Indian economy. According to IEA (2019), at the end of 2018, India was endowed with 13.1 percent of the World's total proven coal reserves which can be extracted profitably with currently available technology under the prevailing market conditions. The All-India production of coal during 2019-20 was 729 million tons (mt) which is an increase of 0.05 percent over the previous year. India's domestic coal production has grown at a Compound Annual Growth Rate (CAGR) exceeding 6 percent between FY 2013-14 (439 mt) and FY 2019-20 (729 mt).

b. Coal-based Thermal Power Plants (TPP) are the backbone of the power generation utilities in the country. The power sector consumes 82% of the coal produced in India. Coal-based TPPs constitute around 56% of the total installed capacity and generated 72% of the total electricity generation in India during FY 2019-20. In general, Indian coals used in TPPs have lower sulphur content (0.5 - 0.7 percent) than most varieties of imported thermal coal.

c. While India is the second-largest producer of coal in the World, the total demand for coal in the country exceeds the domestic supply. Therefore, to meet the domestic demand, India also imported 243 million tonnes (mt) of coal, an increase of 8 mt over the 235 mt of coal imported during FY 2018-19. Of this, approximately 50% (~120 mt) is estimated to be coking coal for steel mills and thermal coal for coastal power plants while the balance ~123 mt is for captive power plants, sponge iron plants, and inland power plants not getting adequate coal supplies due to various reasons. While the 120 mt of coal (~ 50 mt coking and ~ 70 mt thermal) for steel making and coastal power plants cannot be immediately substituted, the balance 123 mt of coal can be substituted provided domestic coal is washed to reduce its ash content and improve the calorific value.

d. In a landmark move, the Central Government has recently opened up commercial coal mining for private players of both Indian and Foreign origin with the primary objective of reducing the import dependence and as a corollary ushering in market driven coal sector. However, as a signatory to the Paris Agreement, the Government of India (GoI) has also committed to certain Nationally Determined Contributions (NDCs) which include the commitment to "reduce the Green House Gas (GHG) emissions intensity of India's Gross Domestic Product (GDP) by 33 to 35% by 2030 from 2005 level (MOEF&CC, 2017)." These seemingly contradictory initiatives (increasing domestic coal production to substitute imports and reduction of GHG emissions) can be reconciled only by enhancing the utilization of clean coal technologies like coal beneficiation which is the oldest and most cost-effective clean coal technology used by most coal suppliers and users in the World.

2. Quality of Indian Coals

a. By their very generic nature, the ash content in Indian coals is high, varying between 24 to 55%, sometimes even more. However, the sulphur content is low, 0.4 to 0.7%. Low sulphur content is a positive feature of our coals. The ash content comprises mainly of shales, stone and other extraneous non-combustible / inert materials. Due to the predominance of open cast mining, the ash content further increases due to mixing of overburden debris.

3. Washing of Thermal Coal for Power Plants - chronology of developments

a. Washing of coal is a simple and cost-effective method of reducing the ash content of mined out (run of mine) coal. In thermal coal, it is considered adequate if ash content is brought down to 34% from 40- 45 % in the run of mine coal.

b. The practice of coal washing is not new to the Indian coal industry. Tata Steel Ltd, had set up the first coal washery in India way back in 1952 for washing of coking coal for their steel plant. Thereafter, a number of coking coal washeries got established in various subsidiaries of Coal India Ltd (CIL). These washeries were designed for supply of washed coking coal to steel plants with middlings supplied to thermal power plants. Some of these coking coal washeries of Coal India Ltd, have now been modified to produce

washed non-coking coal due to changes in the characteristics of the raw coal feed.

c. The washing of coal for thermal power plants has been debated since early eighties. In 1988, the Planning Commission had set up a sub-committee chaired by the Member (Thermal) of the Central Electricity Authority (CEA) which included experts from CIL, NTPC, BHEL, National Productivity Council (NPC), and the Tata Energy Research Institute (TERI), to examine the 'exact economic benefit' of using washed coal in thermal power plants. Based on the recommendations of the Rohnge Committee (named after its Chairman), the Ministry of Coal decided that, 'all coals that are to be delivered to the new power utilities located over 1,000 km from the coalfields should be beneficiated to reduce the ash content to around 34%'.

d. In order to establish the quantifiable benefits of use of washed coal in thermal power plants, a Research and Demonstration project was undertaken for a commercial trial of using beneficiated non-coking coal from Nandan Washery located in Western Coalfield Ltd (WCL), at one of the 250 MW unit of the Satpura Thermal Power Plant of Madhya Pradesh State Electricity Board. The demonstration was undertaken jointly by CMPDI, WCL, MPEB and NPC. This demonstration brought out highly encouraging results as mentioned below:

- Improvement in plant utilization factor from 73 to 96%,
- Improvement in generation from 3.71 MU/day to 4.83 MU/day
- Reduction in coal consumption from 0.77 kg/kWh to 0.553 kg/kWh
- Elimination of support fuel oil from 5 ml per unit generated to nil,
- Savings in operation of coal mills from 5 units to 4 units,
- Savings in operation of coal mill rejects from 0.35 to 0.031%,
- Reduction in smoke and dust emission from 29.78 gm/m3 to 17.23 gm/m3 at ESP inlet and from 1.375 gm/m3 to 0.299 gm/m3 at ESP outlet,
- No furnace wall slagging, boiler tube leakage, clinker formation and abnormal erosion,
- Reduction in alpha quartz from 14.5 to 11%.

e. Based on the encouraging results of the trial run at Satpura TPS, a coal beneficiation plant at Piparwar mine of CCL was commissioned in 1997 for supply of washed coal to Dadri power plant of NTPC. Presently, this

washery is also supplying washed coal to power plant at Yamuna Nagar. One more thermal coal washery was set up at Bina open cast mine of Northern Coalfields Ltd.

f. Subsequently, on a specific query from the Parliamentary Standing Committee of Energy in 1994, the Ministry of Coal (MoC) agreed 'to make efforts to beneficiate all coal produced, keeping the environmental impact of coal utilisation in mind' (Lok Sabha, 1994).

g. In the late 1990s when ADB and World Bank assistance was sought by GOI for expansion of certain Coal India mines, the Asian Development Bank (ADB) commissioned a detailed study by a German consultant (M/S Montan Consulting) on the implementation of Clean Technology through Coal Beneficiation (ADB, 1998). The cost-benefits of using washed coal were studied in some cases, the details of subsequently carried out studies are mentioned under paragraph 9 in this Report.

h. Government mandate of use of washed or blended coal with ash content not over 34%.

Concerned with pollution problems arising from coal-fired power plants, the Ministry of Environment and Forest (MoEF) issued Gazette Notifications in September 1997 and June 1998 to mandate the use of beneficiated/ blended coal containing ash not more than 34 percent (from June 2001 onwards) in power plants located 1,000 km from pithead and also in power plants located in critically polluted areas, urban areas and ecologically sensitive areas.

i. By this time Piprawar coal washery in Central Coalfields Ltd was operational. This washery was to set up to supply washed coal to Dadri power plant of NTPC. Coal India also started taking steps to modify some of its coking coal washeries to process thermal coal for power plants located over 1000 KM from the coal mines.

j. There were many other power plants located more than 1000 km from coal supply source which at that time were not getting any washed coal from Coal India sources. In order to comply with the MoEF mandate of using washed coal of below 34% ash content, these power stations tied up with various third party operated private coal washeries located away from the mines. Such arrangements have been continued and are still continuing. Under these conditions the beneficiary power stations had to incur extra cost for transportation arising out of multiple transhipments of raw coal as well as

washed coal, from and to the available railway sidings. This arrangement led to several irregularities related to the disposal of washery rejects, poor compliance with environmental protection statutes (barring a few exceptions), and increased cost of transportation mainly because the beneficiary power plant had little or no control on the operations of the washery.

k. These experiences clearly indicate that responsibility of washing of coal cannot be left to the user power plants and that the well established practice of the coal supplier selling washed coal as is being done in most countries is the way forward.

4. Coal India Ltd's Plans to set up coal washeries:

a. Globally, coal is washed and then supplied/sold/exported to various customers to ensure the consistency of coal quality. Therefore, the world-wide practice is that it is the supplier who is responsible for the quality of coal and not the user.

b. In 1996, India - US Coal Prep Programme, a bilateral initiative was started covering technical exchanges, study of washability of Indian thermal coal and its cost and benefits etc. This programme was successfully completed with establishment of a state of art coal washery at Korba area of South Eastern Coalfields Ltd (SECL) partly funded by US grant. The raw coal was sourced from Dipka mine and washed coal from this washery was linked to Dahanu power plant now with Adani.

c. Subsequently, Ministry of Coal (MoC) also included coal beneficiation as one of the key subjects for long-term collaboration with the United States of America. The Indo-US collaboration included a number of studies on thermal coal beneficiation as well as international workshops on clean coal technologies suitable for Indian coals. Finally, the US Department of Energy summarised the coal beneficiation imperative for India as follows (Zamuda and Sharpe, 2007) :

"With a growing concern over energy security and sustainability, coupled with concerns about climate change and greenhouse gas emissions from coal combustion, the long-term generation of coal-based thermal power by India will require the use of cleaner coal and clean coal technologies (CCT)."

5. Developments, pre & post Coal India's IPO of October 2010:

a. Most global investors in coal mining are seriously concerned about climate change. In 2010, Coal India Ltd went in for an Initial Public Offer (IPO) which was a resounding success and this success was largely due to the fact that CIL in their Prospectus had emphasised that the company is taking up coal washing in a big way and that this would be financially beneficial to the company. In 2007, at the instance of CIL, Ministry of Coal (MoC) decided that unwashed coal supplies should be gradually discontinued. CIL decided to build 20 washeries immediately with a total capacity of 111 MTPA out of which two washeries were to be set up on a turnkey basis while the rest 18 washeries were to be on Build-Operate-Maintain [BOM] concept where CIL will provide the capital funding and other infrastructure facilities to the BOM operator.

b. CIL also announced that every new opencast project with a capacity of at least 2.5 Mt, which are not linked to pithead power plant will be designed with an integrated washery. Since this strategy was also supported by Government of India, global investors bought into CIL's strategy to improve coal quality since this would have led to more value addition and finally an improved EBITDA in addition to enhancing energy efficiency and reducing pollution and GHG emissions (MoC, 2011).

c. While CIL's production has gone up by approximately 40% compared to the year in which the IPO took place, CIL's share price and market cap are down to one-third since the basic value proposition (value addition through coal washing) has not been implemented as committed at the time of the IPO.

6. MoEFCC notification dated 2nd January 2014 and developments thereafter

a. Keeping in focus the commitments made by CIL and supported by Ministry of Coal to increase coal washing capacities the government took the next logical step. MoEFCC vide notification number GSR 02 (E) dated 2nd January 2014, mandated coal based thermal power plants to use raw or blended or beneficiated coal with ash content not exceeding 34% on quarterly basis, by the timelines given below:

S. No.	Category of Power Plant	Distance of location of thermal power plant from pit-head coal	Time lines
a	Stand-alone thermal power plants (of any capacity), and captive power plants of capacity 100 MW and above	Located in urban areas, or ecologically sensitive areas or critically polluted areas, irrespective of distance from pit-head, excepted pit-head power plants.	With effect from 2nd June 2014
b		Beyond 1000 KM.	With effect from 2nd June 2014
c		Between 750 - 1000 KM	With effect from 1st January 2015
d		# Between 500 - 749 KM	With effect from 5th June 2016.

 # Effective from 5th June 2016, all thermal power plants located over 500 KM from the pit-head are to be supplied with and shall use raw or blended or beneficiated coal with ash content not exceeding 34 percent on a quarterly average basis.

b. In compliance with MoEFCC mandate, MoC also directed coal PSUs to ensure that 'power plants which are covered under the provisions of the said notification shall be supplied with washed/blended or beneficiated coal with ash content not exceeding thirty-four percent on a quarterly average basis.'

c. The 2nd January 2014 notification by MoEF is very important since it put the onus on the country's dominating coal supplier (Coal India) to supply washed coal to its most important customer segment for the first time. Therefore, the flaw in the 1998 notification which put the entire onus on the power plants was rightly corrected by MoEF in 2014 to cast the responsibility on thermal coal suppliers as well as users to supply/use washed coal (or coal with less than 34% ash). Thereafter, Coal India became quite serious about setting up greenfield coal washeries for coal beneficiation which was welcomed by foreign investors who are more concerned about climate change than domestic investors.

d. In August 2018, the Standing Committee on Coal and Steel (in their 46th report) reported to Parliament, MoC's commitment to set up nine (9) non-

coking coal washeries with a combined capacity of 67.5 MT by December 2020 (Lok Sabha, 2018).

7. Coal Washeries under implementation:

a. Mahanadi Coalfields (MCL) is currently in the process of setting up three greenfield washeries (10 MT capacity each) after securing all necessary clearances, including the environmental clearance (EC) from MoEF&CC. These washeries could have come up much earlier but for some inexplicable flip-flops by MoC which forced a change in the business model from the Build-Operate-Maintain (BOM) concept to the Build-Own-Operate (BOO) concept that was not acceptable to most reputed bidders since the BOO model imposed major capital investments (and greater risks)on the bidders compared to the BOM model. As a result, tenders issued were cancelled (even after bids were received) and then reissued on the BOM model wasting a few precious years in the process.

b. One of the three washeries is now under advanced stage of construction at the Lakhanpur coal mine in the Ib Valleycoalfield under MCL. This is a modern washery being set up with a capital investment of less than Rs. 400 crores while the operating cost has been fixed at Rs.104 per tonne (exclusive of water, power, and GST). The minimum guaranteed yield of washed coal for reducing ash content from 41.5% to 33.5% has been finalized as 78.7%.

c. In case of other two coal washeries, one at Hingula and the second at Jagannath open cast mines, MCL has issued "Letters of Intimation" to the selected bidders.

d. All three washeries have been designed with environment-friendly features like "zero-discharge" concept to limit water consumption (from the adjacent coal mines) to 0.10 - 0.12 m3/t of raw coal throughput.

The above background is clearly an indicator of the fact that the government was committed to ensure improvement in quality of coal supplied to users, particularly power plants and this was to be achieved through washing of coal. Several studies and recommendations of various high-level committees have been the basis of this policy. It will be retrograde if these facts are overlooked and washing of coal is not encouraged.

8. Disposal of coal washery rejects/discards

a. Since the basic objective of washing coal is to eliminate shales, stones and other extraneous non-combustibles to the extent desired, the objective should be to get maximum yield of clean coal at the desired ash level, say 34%. It is not advisable to put stress on the usability of such rejects as the cost has already been paid by the buyer. The washery operator has to arrange for disposal of reject back into de-coaled spaces with suitable inter-mixing of overburden debris.

b. Now the question remains as to what should be the desired limit of heat content or GCV, below which the washery discards have no fuel value? The latest study of design of coal washeries under implementation by Mahanadi Coalfields Ltd, shows that these three washeries have been designed to generate reject material having GCV of around 1500 Kilo cal/kg, which have no commercial value and should be dumped back into de-coaled areas in opencast mines along with overburden debris with due precautions as is being practiced elsewhere in Australia, China and the US (Rio Tinto Australia, 2016).

Should washery rejects be burned in FBC based thermal power plants?

c. Hitherto, while issuing environmental clearance (EC) the Ministry of Environment, Forest & Climate Change (MoEFCC) in the past has stipulated 'in case of washeries, middling's and rejects to be utilized in FBC (Fluidised Bed Combustion) technology based thermal power plants. Washeries to have linkage for middling's and rejects in FBC based power plants.

d. The above stipulation is fraught with the following uncertainties and consequent unreliability of power plant operation.

e. The ground reality is that wherever, reject-based plants are being claimed to be operating, these are being fed with a blend of washery rejects and a portion of good coal. This just proves that rejects alone cannot sustain stable boiler operations.

f. There are a number of operational, techno-economic and environmental issues involved with setting up of reject-based FBC power generating units. These are additional requirement of capital, land (both for plant, storage of rejects and for ash disposal) and related infrastructure. These units add to the overall pollution load in the vicinity and many other related issues.

g. In view of the above and in view of the fact that the washery reject from the modern washeries have GCV of around 1500 kcal/kg, these rejects are practically unusable for power generation. Therefore, as being practiced globally, washery rejects should be filled in de-coaled areas along with overburden debris. Needless to mention that the cost of such rejects is already included in price of washed coal.

In view of the aforesaid, setting up of washeries at the mine end would be the only prudent way of ensuring supply of quality coal to power plants rather than passing the responsibility of washing to the power plants, which would put the clock back and lead to various problems.

Observations: The MOEF&CC notification is based on opinions expressed by Ministry of Power, Ministry of Coal and Niti Aayog. They have stated that coal washeries are creating excessive pollution and that washing tends to result in distributing the ash in coal to several locations whereas use of unwashed coal results in ash creation only at the power plant. Washing process primarily reduces ash in coal and increases its heat value. The benefits of using washed coal both in terms of environmental impact and improved performance of the power plant are well established facts and argument for avoidance of distributing ash as a reason to discontinue washing of coal is flawed.

9. Studies carried out on benefits of washed coal:

a. Various studies carried out by credible subject experts and institutions on benefits of using domestic washed coal that accrue to the coal-fired power stations, have shown significant quantifiable benefits in terms of all operational parameters as listed below:

Benefits accruing to the power plants using washed coal

- Savings in coal transport cost
- Increase in operating hours
- Increase in Plant Load Factor
- Increase in Plant Utilisation Factor
- Reduction in break-downs / down time.
- Increase in overall efficiency
- Increase in generation per day

- Reduction in support fuel oil
- Reduction in specific coal consumption
- Increase in total units sent out per day
- Saving in land area for ash dumping
- Reduced water requirement for ash disposal
- Reduction in CO2 emissions
- Improvement in Electro Static Precipitator (ESP)
- Savings in per unit cost of electricity generation.
- Reduction in capital cost of new power plants

b. Various credible institutions / organisations, both Indian and overseas, have studied the costs and benefits of using washed domestic thermal coal in coal-fired power plants. Results of some of these studies have been compiled hereinafter:

Studies on cost-benefits of using washed thermal coal in power plants

1. **Trials of washed coal usage at Satpura TPS of MPEB:**

A research and demonstration project was undertaken for a commercial trial of using beneficiated non-coking coal from Nandan Washery, WCL, for a period of one month at the Satpura Thermal Power Plant of Madhya Pradesh State Electricity Board. The demonstration was undertaken jointly by CMPDI, WCL, MPEB and NPC. These demonstration trials brought out highly encouraging results are in Table-1.

Table-1

	Parameter	**Improvement noticed**
•	Improvement in plant utilization factor	from 73 to 96%,
•	Improvement in generation	3.71 MU/day to 4.83 MU/day
•	Reduction in coal consumption	from 0.77 kg/kWh to 0.553 kg/kWh
•	Elimination of support fuel oil	from 5 ml per unit generated to nil
•	Savings in operation of coal mills	from 5 units to 4 units
•	Savings in operation of coal mill rejects	from 0.35 to 0.031%,

• Reduction in smoke and dust emission	from 29.78 gm/m3 to 17.23 gm/m3 at ESP inlet and from 1.375 gm/m3 to 0.299 gm/m3 at ESP outlet.
• Reduction in alpha quartz	from 14.5 to 11%.
• Extent of furnace wall slagging, boiler tube leakage, clinker formation and abnormal erosion etc.	None detected.

2. **Zamuda and Sharpe (2007)** have summarised the benefits of using washed coal 30% ash) based on extrapolation from case study data where washed coals of higher ash where tested.

Table 2 : Benefits of using washed domestic coal in India
(ADB Study by Montan Consulting Gmbh in 1998)

No.	Parameter	Benefits
1	Rail Transportation	
1.1	Reduction in transport cost	1000 km distance and ash reduction from 41% to 34% results in savings of 15%.
1.2	Reduction in CO2 Emissions due to lower fuel consumption in transportation.	Depends on distance and reduction in ash content. For 1000 km distance and ash reduction from 41% to 34%, reduction in CO2 emissions is about 15%.
2	Power Plant site	
2.1	Decrease in Auxiliary Power	1% decrease for every 1% reduction in feed coal ash.
2.2	Decrease in Auxiliary Fuel	50% reduction when using washed coal (present average 4 ml/kwh).
2.3	Improvement in Plant Load Factor	1.5% improvement for every 10% reduction in feed coal ash.
2.4	Reduction in O&M costs	20% cost reduction for every 10% reduction in feed coal ash.
2.5	Reduction in Capital Investment for New Plants	5% reduction in Capital Investment when using coal with 34% ash instead of 41%.

2.6	Reduced Land Requirement for Ash Disposal	Using coal of 34% ash instead of coal with 41% reduces land requirement by approximately 30%.
2.7	Reduced Water Requirement for Ash Disposal	Using coal with 34% ash instead of 41% reduces water consumption by approximately 30%.
2.8	Reduction in CO2 Emissions	Reduction of 2-3% when using washed coal.
2.9	Improvement in Electro Static Precipitator (ESP) Efficiency	Using washed coal improves ESP efficiency from 98% to 99% thereby reducing PM2.5 pollutants which can enter the alveoli in the lungs and create cardio-vascular and respiratory diseases.

3. **Zamuda and Sharpe (2007)** have also documented the benefits achieved by using washed coal in a Dadri (NTPC) and Dahanu (BSES, now of Adani) power plants. There findings are given in Table 3 and Table 4.

Table - 3 : Results of using washed coal in Dadri TPS of NTPC

Parameter	**Savings/improvement**
• Savings in demurrage to railways	$0.22 per tonne of coal received due to trouble free and smooth unloading at power station.
• Increase in operating hours	up to 10%
• Increase in PLF	up to 4%
• Increase in PUF	up to 12%
• Reduction in breakdown period	up to 60%
• Increase in overall efficiency	up to 1.2%
• Increase in generation per day	2.4 MU's
• Reduction in support fuel oil	0.35 ml/kwh
• Reduction in Sp. Coal consumption	0.05 kg per kwh

• Increase in total units sent out per day	2.3 MU's (approx.)
• Saving in land area for ash dumping	1 acre per year
• Reduction in CO2 emissions (reduced transportations/coal combustion)	> 600,000 ton/year
• Overall benefit resulting from using washed coal	$2.9 million (Rs 119 million) excluding the anticipated reduction in maintenance costs.

Table - 4 : Results of using washed coal at Dahanu TPS of Adani

Parameter	**Savings/improvement**
Ash Generation	Reduced by 8.5%;
PLF	Increased by 15.8%
Cost per unit (Rs. /kWh)	by approximately 10% by Rs. 0.28 per kWh.
Plant availability	increased by 6.5%
Specific oil consumption	decreased by 65%
Aux Power consumption	decreased by 5.4%
Power generation	Increased by 16%

4. **Nabha Power Ltd (NPL) of L & T** uses coal washed in third-party washeries. The raw coal having GCV of 3450 kcal/kg is washed to obtain washed coal with GCV of 4138 kcal/kg received at the NPL (2 x 700 MW) TPP located 1500 km away from the coal mines of South Eastern Coalfields Ltd. The benefits of using washed coal as per NPL are shown in Table 5 :

Table 5 : Relative improvement in parameters of power plants due to the use of washed coal (Experience of Nabha Power Ltd (2 x 700 MW TPP in Punjab)

Parameter	**Expected**	**NPL experience**
Auxiliary Power Consumption	10% decrease for every 10% decrease in feed coal ash.	Against the rated APC of 5.5%, actual APL is 5.15% i-e reduction of ~ 6.3% for ash reduction of~ 10%.
Auxiliary fuel consumption	50% reduction in case of washed coal.	Specific oil consumption of 0.243 ml/kWh against the industry average of 4ml/kWh, which can be attributed to the use of washed coal.

Thermal efficiency	1.5% improvement for every 10% reduction in feed coal ash.	While no separate record is available, NPHR of 2268 kcal/kWh that NPL can meet at full load is significantly attributed to the use of washed coal.
O&M Costs	20% reduction for every 10% reduction in feed coal ash.	O&M expenses are around Rs. 13 Lakhs/MW against the industry average of 16 Lakhs/MW. Reduced wear and tear are experienced.
PLF	1% improvement for every 1% reduction in feed coal ash.	Plant is consistently maintaining high Plant availability as well as high PLF, due to the use of washed coal.
ESP efficiency	With washed coal, ESP efficiency increases from 98% to 99%	Because of the reduced ash content in the Fly ash ESP efficiency at NPL is around ~99%.
Specific COAL consumption	Industry norm: 0.65 to 0.75 kg/kWh.	In the case of NPL, same is 0.50 to 0.55 kg/kWh. This also leads to less handling of coal.
Requirement of ash disposal		10% reduction in ash for Run-of-Mine (ROM) coal requirement of~6 million tons leads to less ash to be handled, to the extent of 6 lakh tons per annum. This leads to sparing of rail capacity.
Reduction in CO2 emissions		Use of ROM coal leads to increased coal flow to the Boiler and higher CO2 emissions.
Inability to meet load when using a large proportion of ROM coal		Unit at times has to be backed down in case of use of low Gross Calorific Value (GCV) ROM coal since required steam parameters cannot be achieved.

Nabha Power Ltd has therefore concluded that the "benefits of using washed coal outweigh the cost by a wide margin and have stated that they would not like to move away from the same."

More recently, in response to a specific query from the CEA, Nabha Power Ltd. (NPL) has stated that they have achieved, "net direct savings of Rs.0.14 per kWh in net generation cost due to the use of washed coal (annual net saving of ~Rs.150 crores)". In fact, the benefits to NPL due to the usage of washed coal would have been much higher had they been able to source coal from CIL's own pithead washery in the Korba coalfield rather than being forced to incur higher transactions costs by off-site "third-party" washeries which usually involve multiple handling / transportation (NPL, 2018).

5. **APGENCO (2019)** has quantified the environmental benefits of using washed domestic coal in their proposed 800 MW TPP at Vijayawada by comparing the environmental impacts of using domestic washed coal (34% ash & 0.62% Sulphur) with model predictions based on domestic raw coal (38% ash & 0.62% Sulphur) and imported coal (16% ash & 0.8% Sulphur). Among all the three scenarios, the Sulphur load and Ground-Level Concentration (GLC) of SO2 were found to be lowest by using domestic, washed coal compared to the other two alternatives using raw coal (domestic/ imported). Particulate Matter (PM) load and GLCs of PM were also found to be lower in the case of domestic washed coal compared to the domestic raw coal proposed earlier (Table 4). Based on this analysis, the Expert Appraisal Committee of MoEF&CC has recommended to the Ministry to grant APGENCO an amendment to the EC permitting them to use washed domestic coal in place of imported coal (MoEF&CC, 2019).

Table 6 : Key benefits of using washed coal in terms of reduced air pollution from APGENCO's expansion (1x800 MW) of the Dr. NTRTPS at Vijayawada (Source: APGENCO, 2019a and 2019b)

Parameter	**Unit**	**Unwashed coal from Talcher**	**Washed coal from Talcher**	**Percentage Reduction**
Fuel Consumption	Tons per day (TPD)	12023	10272	14.6%
Ash generation	Tons per day (TPD)	4560	3492	23.4%
SO2 emission Grams/second (g/s)	1726	1474	14.6%	
NOx emission	Grams/second (g/s)	430	250	41.9%
PM emission Grams/second (g/s)	42.3	24.9	41.1%	
Maximum Incremental GLC of SO2	µg/m3	28.7	24.5	14.6%
Maximum Incremental GLC of PM	µg/m3	0.90	0.53	(41.1%)
Maximum Incremental GLC of NOx	µg/m3	7.2	4.2	(41.7%)

6. **Further, Zamuda and Sharpe (2007)** have estimated that the use of washed coal having 10% less ash than that currently burned in sub-critical TPPs in India with an installed capacity of 70,000 MW can reduce carbon emissions to the tune of 13.2 Mt per year.

7. The costs and benefits of using washed coal in several TPPs in India have also been documented by the Observer Research Foundation (ORF) in their report on coal washing in India (ORF, 2017).

Observation : The government's notification dated 21st May 2020 issued by MOEF&CC cites facts which contradict the findings of various studies carried out in India involving domestic power plants as recorded in the note above. The scientific basis for conclusions drawn by the government is not indicated in the notification. It is a prudent practice to seek opinion of stakeholders when a well-established policy based on scientific principles is sought to be changed. Lack of this procedure reflects on the weakness of the basis on which such decisions are taken.

10. Positive impact of low sulphur in domestic coal.

Domestic coals have very low sulphur, generally 0.40 to 0.70%. This is a very positive feature. Furthermore, as sulphur occurs both in organic form and inorganic form i-e pyritic sulphur, this can be eliminated when coal is washed. Even in the United States of America, where some coals contain as high as 4 - 5% sulphur, they are getting rid of it just by washing of coal and do not prefer post combustion installations like FGDs.

In India, the Central Pollution Control Board (CPCB) has mandated minimum chimney heights of 220 m for CTPPs with a unit size of 200 - 500 MW and 275 m for units of size greater than 500 MW. This was based on studies of Mean Mixing Depths (MMD) in three Indian cities (Kolkata, Delhi and Mumbai) where the MMD was found to be 210 m in coastal areas and 220 m in the inland area of the country (CPCB, 1985).

The efficacy of the CPCB standard regarding chimney heights for TPPs is demonstrated by the fact that the ambient SO2 levels are less than 25 percent of the NAAQ standard in the vicinity of NTPC's high-performing Rihand and Ramagundam TPPs (NTPC, 2019; 2020).

Studies conducted by the US EPA have also established that coal washing can also reduce the Sulphur content of coal in certain cases, particularly when the coal seam contains higher inorganic Sulphur in the form of pyrites (EPA, 1980).

11. Transportation of coal by rail

(a) Rail infrastructure continues to be inadequate and critical for bulk transportation of coal to power plants and other consumers. Pithead coal washeries can reduce railways' burden by around 15-20% due to reduced quantity of inert material contained in run of mine (ROM) coal thereby making available extra capacity to haul additional load. Furthermore, the average GCV of washed coal transported on congested railway routes is higher by 15-20 percent compared to raw coal.

(b) At the current railway freight rates for coal (@ Rs. 2 per ton-km), the switch-over to washed coal can be safely justified by the savings in transportation cost alone in the case of TPPs located more than 500 km from the coal mines. Over and above there are other significant benefits accruing to the power plants (and the final consumer in the case of regulated tariffs) in the form of smoother operations with lower O & M costs and ash disposal costs are greater. These benefits are quantified in various studies and trials carried out by credible independent agencies as brought out in this report. (Prasad, 2019; ORF, 2017; Zamuda and Sharpe, 2007).

Conclusions:

In his book 'CONVENIENT ACTION - continuity for Change', Hon'ble Prime Modi says "Due to the use of washed coal, the energy consumed in transportation, handling and milling, is optimized as the inert material from coal is eliminated. This helps in reducing the auxiliary consumption of equipment involved in coal processing because the use of improved quality coal ultimately results in reduction of emission of GHG as compared to conventional coal." (Copy of page-86 of the book is attached at Annex - 1).

However, in a sudden U-turn from the Honorable PM's exhortation in his book as mentioned above, GoI has issued a notification to reverse the mandate issued by the MoEF on January 2, 2014 of using washing washed coal in certain power stations. Most disturbing aspect of this notification is that it has based on inaccurate representations made by ministries of coal, power and the NITI Aayog. These have been paragraph-wise explained in Annex-2.

Furthermore, this retrograde step of MoEFCC is going against GoI's commitment to reduce the emissions intensity of India's GDP by 33 - 35% by 2030 compared to 2005 and also clearly negating the progress achieved by Mahanadi Coalfields Ltd (MCL) in setting up three modern washeries which will also optimize the value addition as promised by Coal India during its IPO.

Coal will continue to meet the bulk of India's base-load requirements at least for the next two decades, hence there is a need to focus on the sustainability of coal utilization. Moreover, coal usage should be such as to ensure that power generators run at optimum efficiency and produce lesser pollution. This can be achieved only through the use of coal of consistent quality with higher heat value and this is possible in India only through washing of domestic coal which contains a high percentage of ash. Therefore, coal will continue to meet the bulk of India's baseload requirements at least for the next two decades, there is a need to focus on the sustainability of coal utilization. There is a pressing need for GoI to review its sudden decision to abolish the requirement for coal washing by a Notification, without public consultation on such a vital issue, from the point of economics as well as public health due to the following key reasons:

- Indian coals inherently contain high ash content varying between 24 and 55%, even more in some cases. The share of G13 and below coal in Coal India Ltd. (CIL)'s one Billion Tonne production plan is expected to increase substantially in the near future as CCL, MCL and SECL are set to increase their production from opencast coal mines.
- Despite re-gradation of 440 coal mines afresh by the Coal Controller Organization (CCO) in FY 2016-17, and further deterioration in coal quality, TPPs are still complaining about "grade slippage" which is forcing the GENCOs to increase their energy charges by approximately Rs.0.20 per kWh due to the differences between the grade of coal received from CIL/SCCL compared to the grade of coal they have paid for (SRPC, 2019). Grade slippage can be controlled only by washing the coal at the pithead.
- While all studies show significant quantifiable benefits of use of washed coal, unfortunately, these savings have not been fully realised by power plants TPPs (and the electricity consumers) due to the multiple transfer points and transactions involved by using "third-party" washeries due to the failure of Coal India Ltd, to set up modern washeries despite the commitments made to Parliament (as recently as 2018) during the last 20 years.
- One of the most significant benefits of using washed coal is the reduction in cost of transportation. On removal of almost 20-25% ash from coal the volume of coal required to be transported is reduced resulting in lesser transport costs. It is more pronounced when coal is transported to long distances.
- Once the three modern pithead coal washeries in Mahanadi Coalfields Ltd, for which MoEF&CC has already granted the necessary environment and forest

clearances, are commissioned the linked power plants will be benefitted to the fullest extent by using washed coal supplied from these washeries. The experience of usage of washed coal from these washeries will put to rest all doubts and apprehensions about the economic as well as environmental benefits of use of washed coal in coal-fired power plants. The experience of users and operational data generated at the washeries will also help to document the benefits of washed coal and determine a transparent pricing policy for washed coal.

- As much of the pollution concerns relating to SPM, SOx and NOx can by and large be dealt with the use of washed coal in power plants, the use of high cost, import-based end-of-pipe solutions to reduce pollution (despite the low ambient air SO2 levels in the buffer zone of the TPPs using domestic coal in India) are sure to cause grave economic losses to the country in the form of outflows of foreign exchange in addition to tariff hikes.
- By allowing the supply of coal with any ash content, the cost (and associated pollution risks) of land for ash disposal are bound to increase in the future as the existing ash dams would gradually get exhausted since the overall fly ash utilization in India during FY 2018-19 was only 78% with the balance fly ash (and bottom ash) being stacked in ash ponds (for which additional land is not available) creating fugitive dust emissions.
- Fine particulate pollutants have a prolonged impact on public health. Therefore, MoEF&CC must announce a "Graded priority" between pollutants in the order of PM, CO2, SO2, and NOx. Using washed coal may be the most optimal and cost-effective route for TPPs to control their PM emissions which pose the greatest health hazard from TPPs using high-ash domestic coal in India. This will enable TPPs to prioritize the installation of indigenous ESPs with 99.97% efficiency to reduce PM2.5 pollution while sorbent injection of lime is used to minimize SO2 emission (A V Krishnan et al, 2019).
- In 2012 when Government of India decided to switch over the old Useful Heat Value (UHV) based grading and pricing system to Gross Calorific value (GCV) based assessment of quality of coal, the government had envisaged that the GCV based quality check would be more balanced and verifiable unlike UHV which was based on an empirical formula. Furthermore, government had expected that in due course of time all coals would be washed and made 'saleable' as internationally practiced. But this didn't happen for various reasons.
- Using washed coal in TPPs will reduce specific CO2 emissions from the power sector as well as the transportation sector in terms of the amount of CO2 emitted per unit of electricity generated (Zamuda and Sharpe, 2007).

- Assured supply of washed coal of appropriate quality and in adequate volume, will trigger faster implementation of Clean Coal Technologies that will lead to higher energy efficiency of the entire Energy sector (from the mine to the power plant) and result in tariff reductions necessary to enhance the competitiveness of Indian industry. In addition, usage of washed coal in TPPs will also reduce air pollution and CO2 emissions from the Coal, Railways, and Power sectors. This will also embody the true spirit of 'Atmanirbhar Bharat' and also Atamnirbhar Coal Sector.

  Having discussed all related aspects of use of washed coal, the Expert Group arrived at the following specific recommendations:

Recommendations for immediate action

After in-depth examination of all related aspects of washing of thermal and the use of washed coal, the Expert Group arrived at the following specific recommendations:

1. All thermal coals should be washed at the mine site before dispatch.
2. All mines having coal production of more than 2.50 million tonnes per annum should be equipped with a coal washery. Coal India Ltd and SCCL should draw a time bound Action Plan to achieve this.
3. Coal mines having smaller production may be provided with a suitably located central coal washery of capacity matching with cluster of mines it is meant to service.
4. All washeries should follow the concept of having discards / rejects of GCV of less than 1500 Kilo Cal/kg as designed for the three washeries under implementation in MCL areas.
5. Washery discards/rejects must be dumped back into de-coaled areas in open cast mines along with the overburden debris.
6. All washeries should be designed and implemented on 'closed circuit' or 'zero liquid discharge' concept.
7. The notification issued by MOEF&CC on 21st May 2020 withdrawing the previous notifications which mandated washing of coal and allowing unwashed coal to be used in power plants under any conditions be held in abeyance and a process of consultation with all stakeholders be initiated to arrive at a more reasonable and scientifically appropriate viewpoint which can then be converted into a formal notification.

These recommendations are in consonance with what Hon'ble Prime Minister has written in his book 'CONVENIENT ACTION - continuity for Change'.

"Due to the use of washed coal, the energy consumed in transportation, handling and milling, is optimized as the inert material from coal is eliminated. This helps in reducing the auxiliary consumption of equipment involved in coal processing because the use of improved quality coal ultimately results in reduction of emission of GHG as compared to conventional coal."

(Copy of page-86 of the book is attached at Annex - 1 of the Report).

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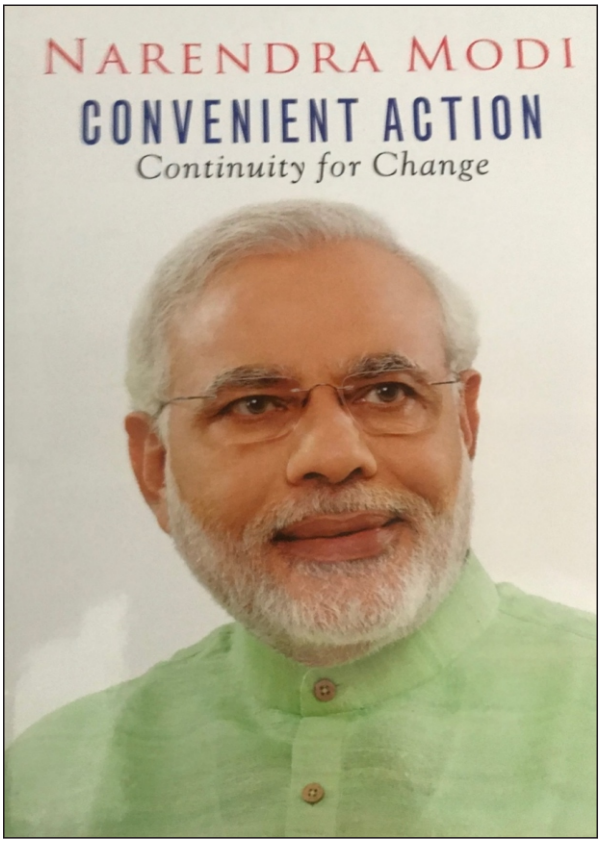
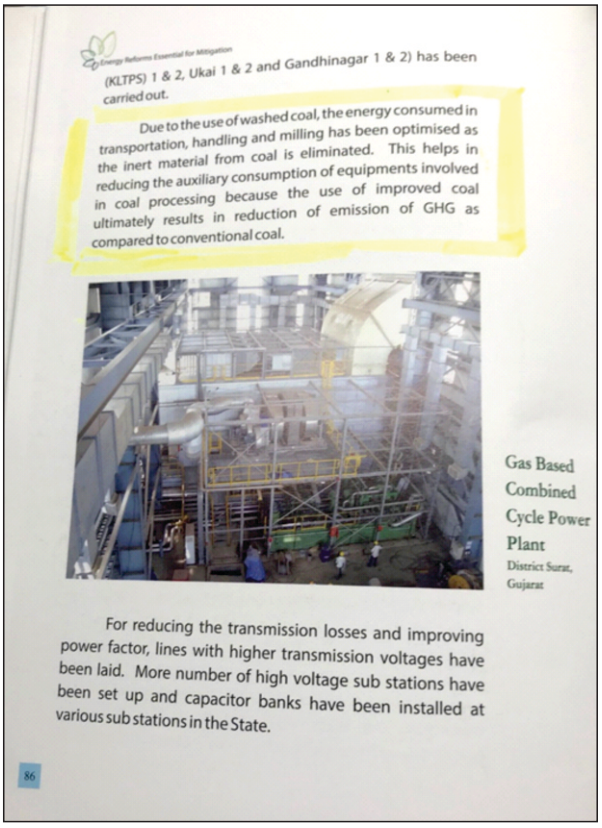
Annex - 1





Energy Reforms Essential for Mitigation

(KLTPS) 1 & 2, Ukai 1 & 2 and Gandhinagar 1 & 2) has been carried out.

Due to the use of washed coal, the energy consumed in transportation, handling and milling has been optimised as the inert material from coal is eliminated. This helps in reducing the auxiliary consumption of equipments involved in coal processing because the use of improved coal ultimately results in reduction of emission of GHG as compared to conventional coal.

Gas Based Combined Cycle Power Plant
District Surat, Gujarat

For reducing the transmission losses and improving power factor, lines with higher transmission voltages have been laid. More number of high voltage sub stations have been set up and capacitor banks have been installed at various sub stations in the State.

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Annex - 2

MoEFCC Notification Dated 21st May 2020
Point-wise clarifications / correction position

Points made by Ministry of Power	Clarifications / correct position
i. With advancement of pollution control technologies, thermal plants are better equipped to capture fly ash and unwashed coal can be used more efficiently and economically.	i. Pollution control technologies at the power plant to capture fly ash do not impact efficiency of the boiler where coal is burnt. It is a fact that inferior quality impacts efficiency of boilers even in critical and super critical power plants.
ii. Fly ash generated in thermal power plants has market, is being used in several beneficial uses like cement manufacturing, brick making etc.,	ii. This argument does not make economic sense. Moreover, the percentage of usable ash from power plants is not high and this will result in excessive pollution at the power station.
iii. Thermal power plants are designed for coal with wide variety of ash content and are equipped with dry ash evacuation, handling and supply systems for ash utilisation; using washed coal makes power generation costlier	iii. Washing coal at the mine and delivering only washed coal to the user will not result in any additional expenses and this should be the practiced. Washing per say is a very simple and inexpensive process. It is completely incorrect to say that washing increases the cost of generation.
iv. Requirement of maintaining average ash content to 34% prompts industries to undertake import of coal, resulting in outflow of foreign exchange etc.	iv. Coal imported by plants which are not designed for use of superior imported coal has been done to make up for shortages in availability of domestic coal from CIL It has no correlation with ash content.

Points made by Ministry of Coal	Clarifications / correct position
i. Coal companies are making efforts to improve raw coal in terms of quality, size and extraneous material over the years which has considerably reduced wear and tear of all related equipment.	i. The removal of ash in coal from 42-45% to 34% will have several environmental benefits like less emission of GHGs when burnt at power plants, less generation of ash etc. World over coal is washed.
ii. Coal washing process involves multiple handling and avoidable road transportation of huge quantities of coal from coal mines to washeries and then to rail sidings for onward transport to power plants;	ii. As washeries are supposed to be set up at the mines, where is the questions of multiple transportation of coal, except in some cases where merchant washeries were set up some distance away, that too because individual mines were of smaller capacity and washeries are taking coal from more than one source.
iii. Mandating power plants to use washed coal requires to be revisited by reconsidering the notification dated the 2nd January, 2014 which will help ease power generation for long distance haulage of coal without adverse impact on the environment.	iii. The argument put forth by Coal Ministry that the withdrawal of notification of 2nd January 2014, will help ease power generation for long distance haulage of coal without adverse impact on environment is totally wrong and misleading. Long distance power plants always stand to gain by taking coal with lower ash content and higher heat value, as they save in freight in taking washed coal of which less quantity is to be transported.
iv. Washing process only divides the coal into washed coal and washery rejects while the ash content of mined coal remains the same; use of low grade coal washery rejects, in the multiple small user industries, generates more pollution etc.	iv. This is an illogical statement. Washing reduces ash from the ROM coal. There is no study which establishes the notion that indiscriminate use of rejects add to pollution. Yes, the ash which would have been generated at the power station is getting distributed but under no circumstances can any process produce more ash than that contained in the unwashed coal. The only logical thing to do is to use rejects to fill mine voids.

Points made by NITI Aayog	Clarifications / correct position
i. Use of washery rejects in nearby industries generates more pollution; the pollution control at numerous points is more difficult than controlling the pollution at power plant end;	i. There is no such situation in and around washeries. Rejects should have minimum heat value so that these can be safely disposed in the mines. MoEFCC guidelines are being followed.
ii. Ash generated in the washing process pollutes water along with coal particles and cannot be gainfully utilised;	ii. Washeries are based on 'Closed Circuit' design and there no effluent let out. In most cases, mine water is being used.
iii. Coal washing process involves increased water use, effluent generation; handling coal dust, runoff and fugitive dust;	iii. As already explained, no effluent is generated and adequate protections for fugitive dust are built is the washeries at suitable points.
iv. Coal washing also adversely impacts topography, water drainage pattern and quality, water bodies, surrounding air quality at large scale; Washing process increases the cost of power generation with no commensurate environmental advantages etc.	iv. Washeries are set up after MOEF gives environmental clearance. If the washeries were having severe adverse impacts then the EMP of such washeries would have had very extensive mitigation measures but this does not seem to be the case. This only indicates that conclusions drawn by NITI Aayog is without any basis.

Notes

Coal Preparation Society of India (CPSI) offers its heartiest compliments to India's coal, power, iron & steel, cement and their allied industries that kept their wheels running in this difficult time of Covid19.

*Washing of coal is vital for introduction of clean coal technologies in India in tune with Hon'ble Prime Minister Shri Narendra Modi's exhortation towards **Atam Nirbhar Bharat** and **Atam Nirbhar** coal industry.*