

Coal Catalyst for Coal Reduction & Pollution Control





Invented By	:	Chandrasekhar Chawan PhD
Producer Company	:	ARC Energy LLC USA
Imported By	:	M/S. ARC Energy (India)
Official Distributor	:	
Official Trade Partner	:	



Chandrashekhar Chawan



- **Chandrashekhar Chawan**, PhD in Physics from University of Bombay,
- Fellow of Scleral Lens Education Society USA.
- Inventor of Patented Diamond studded Eye Jewelry.
- Inventor of Cosmetic/Prosthetic RGP Scleral Lenses patent applied for.
- Inventor of Plastic Cornea
- Inventor of VyasChawan CXL ring
- Inventor of Coal Catalyst for Pollution Control and Coal reduction
- Advisor and Associate Research Scientist with international projects.
- Involved with NASA as public partner scientist.
- Scleral lens Consultant, Myopia Control practitioner, Orthokeratologist, Optometrist & Ocularist.
- Member of American Society of Ocularist, Practicing in Mumbai India, Orlando & Oviedo Florida USA.
- Offers Special effect lenses for Bollywood and Hollywood Movies and Television industries around the world.
- His name is listed in Worlds Who's Who directory in USA



Team at ARC Energy LLC USA

- Chandrashekhar Chawan – Chairman
- Tom Lambart – Director
- Charley Weaver– Director
- Jim Norton – Director
- Mark Cohen – Director
- Andrew K. Tay - Consultant
- RichardC. Parsons – Consultant
- DAN L. SNYDER - Consultant



ARC Energy LLC USA

Registered office 10 S. Bumby Ave. Orlando, FL, 32803 USA

- Liquid Coal Catalyst for Energy enhancement and pollution control.
- Powder Coal Catalyst for Pollution Control
- Additives for Natural Gas for energy enhancement
- Petrol and Diesel additives for mileage improvement
- Energy Savings consultation, Power Plants efficiency improvement consultation,
- Flue Gas Desulfurization installation.
- Solar panels for Satellite with higher efficiency
- Solar Power Walls for home / office / industries.
- Solar Panel automatic cleaning system
- Wind mills for home and individual use.
- Micro Hydro Electricity
- Water panels for water from thin air.



What is ARC™ Energy PlasPlus™

- It is a Liquid Combustion Catalyst to increase heat output of coal using plasma technology
- Sulfur molecule is broken in to O₄ and Barium releasing extra energy in most safe and controlled way for coal fired power plants. Extra 4 molecules of Oxygen again helps in better combustion reducing NO_x output.
- Saving on coal usage
- Reduce production cost, reduce emission and preserve natural resources.



India lost 1.4m lives due to air pollution in 2013: Study

Ranked 6th Worst, China In 4th place

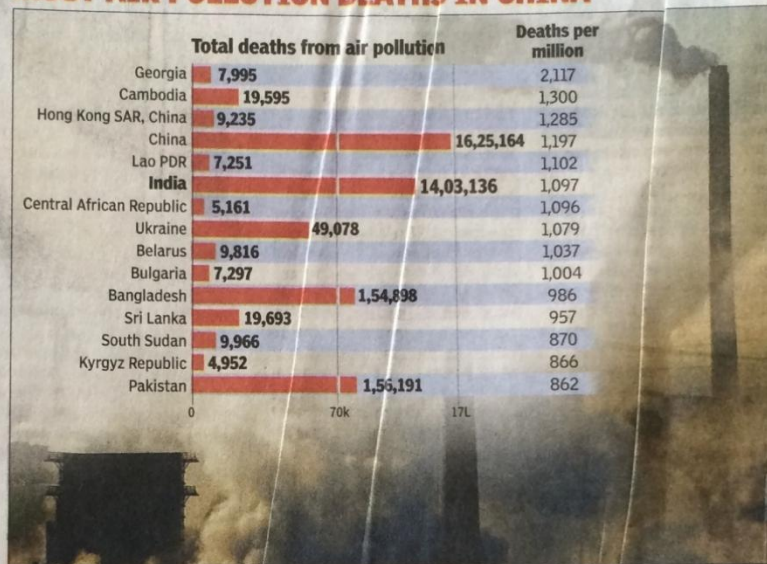
Atul Thakur @timesgroup.com

India lost 1.4 million lives to air pollution in 2013, while in China the toll was 1.6 million, estimates a World Bank report released on Thursday.

The report, released by the World Bank and the Institute for Health Metrics and Evaluation, shows that in 2013 more than 5 million deaths worldwide were attributed to health conditions caused by air pollution. About 60% of them were in the world's two most populous countries. Exposure to air pollution increases a person's risk of contracting ailments such as lung cancer, stroke, heart disease and chronic bronchitis.

China and India aren't among the worst hit in absolute terms because of the sheer size of their respective population. Even after adjusting for population, these two countries along with Bangladesh, Sri Lanka and Pakistan were among the 15 nations with the highest toll per million population. China and India ranked 4th and 6th worst in the world respectively. Bangladesh, Sri Lanka and Pakistan were ranked 11th, 12th

MOST AIR POLLUTION DEATHS IN CHINA



and 15th on this count.

The bank estimates that in 2013 Georgia saw the highest rate of air pollution deaths per million of its population at 2,117. It was followed by Cambodia with a death rate of 1,300 per million. Among the 142 countries for which the bank compiled this data, there were 10 where the rate was higher than 1,000 deaths per million. Australia fared best on this parameter with an estimated death rate of 34 per million.

The report also estimated that air pollution cost the world economy more than \$5 trillion (purchasing Power Parities PPP at 2011 prices) in welfare losses and an additional \$66 billion worth of manpower loss.

China's overall welfare and manpower loss was \$1.6 trillion while India lost more than \$560 billion, which was equivalent to over 10% of China's and 8.5% of India's GDP. Air pollution is estimated to be the fourth leading fatal health risk

worldwide after metabolic risks, dietary risks and tobacco smoke.

The estimates are based on exposure to PM2.5 pollutants. It is noticeable that the risks are much higher in the developing world. By damaging people's health and causing fatal diseases, air pollution can have a lasting effect on a person's economic productivity. Experts argue that typically the economically weakest section is the worst hit because of limited access to health care facilities.

10-20% rise in ozone levels in India, harmful for lungs and crops: Report

Jayashree Nandi
@timesgroup.com

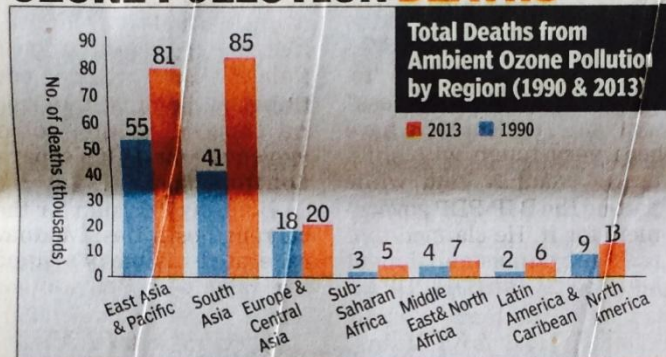
New Delhi: While Indian cities are still grappling with the impacts of severe particulate matter (PM) pollution, a new report has raised the flag on ozone levels (O₃) too.

'The Cost of Air Pollution', a report by the World Bank and Institute of Health Metrics and Evaluation (IHME) released on Thursday, estimates that the concentrations of O₃ has increased by 10 to 20% in India between 1990 and 2013. The trend is similar in neighboring countries and in Brazil, while a declining course was seen in the US and Indonesia, among others.

High ozone levels are not only associated with serious health impacts like reduced lung function, chronic obstructive pulmonary disorder (COPD), aggravating asthma and respiratory conditions, but also with widespread crop loss.

The study also estimates that total deaths due to increase in exposure to O₃ increased by 50% between 1990 and 2013 in South Asia. For this report, the health and

OZONE POLLUTION DEATHS



Sources: World Bank and IHME, using data from IHME, GBD 2013

economic burden of O₃ is only based on COPD incidence from it. Total deaths due to exposure to PM_{2.5} have also increased in South Asia during the same phase, but not as steeply as with O₃.

Interestingly, even though the cost of O₃-related premature deaths are far lower than that of PM_{2.5} (both household and outdoor), O₃ associated economic or welfare losses for South Asia are equivalent to that of North America. The welfare losses due to O₃ exposure are to the tune of 0.4% of gross domestic product (GDP) equivalent, the report states. If you consider man days

lost, it's about 0.09% of GDP equivalent, it says.

Air quality experts said O₃ could be a serious concern soon. "Ever before we could deal with health damage from particulate pollution we are falling into the pincer grip of ozone pollution that damages both lungs and crops. This is also the sign that emissions of toxic gases are increasing rapidly in our country. Keep in mind that for estimating health damage from ozone this report has only considered chronic obstructive pulmonary diseases. The actual cost of health damage could be way higher," said Anumi-

“Even before we could deal with health damage from particulate pollution, we are falling into the pincer grip of ozone pollution that damages both lungs and crops. This is also the sign that emission of toxic gases are increasing rapidly in our country”

Anumita Roy Chowdhury
CSE CLEAN AIR PROGRAMME HEAD

ta Roy Chowdhury, head of Centre for Science and Environment's clean air programme. Ozone is not directly emitted from any source, it is created by chemical reactions between oxides of nitrogen and volatile organic compound in the presence of sunlight. It's mainly released from combustion sources which includes vehicles and industries.

A 2014 study by scientists at Indian Institute of Tropical Meteorology estimated that ozone-induced damage to wheat and rice is enough to feed roughly 35% of 270 million below poverty line (BPL) population in India.

ARC
ENERGY

Now, pollution linked to diabetes too

Study: Prolonged Exposure Leads To Insulin Resistance

Berlin: Long-term exposure to air pollution may increase the risk of developing type 2 diabetes — especially for people with impaired glucose metabolism, a new study has warned. Air pollution exposure at the place of residence increases the risk of developing insulin resistance as a pre-diabetic state of type 2 diabetes, researchers said.

“Whether the disease becomes manifest and when this occurs is not only due to lifestyle or genetic factors, but also due to traffic-related air pollution,” said professor Annette Peters, director of the Institute of Epidemiology II at Hel-

holtz Zentrum Munchen in Germany. For the current study, Peters and her colleagues from the German Centre for Diabetes Research (DZD) analysed the data of nearly 3,000 participants of the Cooperative Health Research in the Region of Augsburg (KORA) study who live in the city of Augsburg and two adjacent rural counties.

All individuals were interviewed and physically examined. The researchers took fasting blood samples, in which they determined various markers for insulin resistance and inflammation.

In addition, leptin was examined as adipokine which has been suggested to be associated with insulin resistance. Non-diabetic individuals underwent an oral glucose tolerance test to detect whether their glucose metabolism was impaired. The researchers compared these data with the concentrations of



GASPING FOR AIR

air pollutants at the place of residence of the participants, which they estimated using predictive models based on repeated measurements at 20 sites (for particle measurements) and at 40 sites (for nitrogen dioxide measurements) in the city and in the rural counties.

“The results revealed that people who already have an impaired glucose metabolism, so-called pre-diabetic individuals, are particularly vulnerable to the effects of air pollution,” said Dr Kathrin Wolf, lead author of the study.

“In these individuals, the association between increases in their blood marker levels and increases in air pollutant concentrations is particularly significant. Thus, over the long term — especially for people with impaired glucose metabolism — air pollution is a risk factor for type 2 diabetes,” said Wolf. The research was published in the journal *Diabetes*. PT

Coal Catalyst for Coal reduction & Pollution Control

- Plasma Technology based on Matter physics
- Matter behaves differently at different temperatures
- Temp above 900°C
- Temp above 700°C
- Temp above 500°C



Plasma Technology based on Matter Physics

- Matter behaves differently in plasma state in presence of our **ARC™ Energy PlasPlus™** Coal catalyst
- Giving out different chemical reactions helping expatiate coal combustion.
- What ever catalyst present in center core where Temp are more than 700°C , reaction taking place will be altered to our benefit i.e. reduce PPM, SOx & NOx and CO and maximum coal combustion.



Coal Catalyst for Coal reduction & Pollution Control

- **ARC™ Energy PlasPlus™** is a coal additive combustion catalyst in liquid form to reduce harmful emissions in Coal fired power plants & reduce your carbon footprint.
- Due to presence of **PlasPlus™** extra heat is generated and that reduces the amount of coal required for the same operations.
- Around 6% to 10% of coal can be saved in ideal condition.



Coal Catalyst for Coal reduction & Pollution Control

- It improves combustion and provide fuel savings reducing harmful SPM, CO₂, CO, SO_x and NO_x gases.
- If boiler/ Furness is operated optimally **ARC™ Energy PlasPlus™** can reduce coal consumption by about 6% to 10% or more in long run.
- Due to coal savings product pays for itself and can save environment as well.



Coal Catalyst for Coal reduction & Pollution Control

- It will reduce clinker formation
- **ARC™ Energy PlasPlus™** will also reduce unburnt carbon in bottom ash and fly ash.
- **ARC™ Energy PlasPlus™** reduces black smoke & deposit formation on heat transfer surfaces.
- Prolonging the life of coal reserves and resources by reducing consumption.

Coal Catalyst for Coal reduction & Pollution Control

- Increasing the power output from a given size of unit, potentially reducing operating costs.
- Reduce coal handling, shoot blowing, transportation etc.
- **ARC™ Energy PlasPlus™** helps coal to burn completely and extract maximum heat energy during combustion, reducing harmful pollution and CO2 at the same time.



Reduced load on FGD

- It will reduce the load on FGD plant as less SO_x is formed in presence of PlasPlus.
- It will also reduce the need for anti-slaging and other coal additives for better performance thus saving on running expenses.

Application & Dosage

- It is mixed with coal, in normal dosage of 1 Lt of **ARC™ Energy PlasPlus™**
To treat 1000 kg of coal.
- Depending on GCV of coal used, size of pulverized coal and air inflow fine tuned, **ARC™ Energy PlasPlus™** additive quantity will differ to get maximum out put.



Coal Catalyst for Coal reduction & Pollution Control

- No changes are necessary in furnace
- The described compositions are simply added to the fuel supply at precise ratios (1Lt Catalyst to 1 MT of Coal).
- The catalysts are largely benign, non-poisons, non-heavy metals which are non-toxic and non-radioactive safe formulations.

Safety Precautions

- Product is safe to handle and is non-hazardous and non-flammable.
- Avoid contact with eyes.
- In case of contact, wash the affected area with water. Treat the product as inorganic chemical.

Packaging

- Come in 200 liter plastic barrels.

8 MWH Captive Plant, Indian Coal Before ARC™ Energy PlasPlus™

RABAK TECHNOLOGIES PVT. LTD.

Customer Name : M/s. Shah Pulp & Paper Mill Ltd. Unit 2, GIDC, Vapi : 8 MWH Boiler

Date : 16-6-15 Day : Monday Rabak Executive :

	09.00	10.00	11.00	12.00	13.00	14.00	15.00	16.00	17.00	18.00	19.00	20.00	Surface Temp. of Insulated Boiler Parts
Steam Pressure	36.2	36.2	36.9	37	37	37.0	35.4	35.6	37.2	38.5	38.3	39.4	
Steam Flow	34.0	34.0	34.7	30	28	35.1	34.2	35	34	34	33	34	
Furnace Bed Temp	893/895	894/896	900/898	908/901	901/900	918/912	883/883	894/898	884/890	915/912	918/901	908/906	
Flue Gas Temp Before HRU	184	184	181	175	169	166	171	167	170	176	178	177	Fuel Consptn.
Flue Gas Temp after HRU	123	124	123	124	122	130	124	126	120	133	133	135	215.76
Feed Water Temp before Economiser	119	118	116	114	111	115	116	114	116	118	116	117	Steam Genrtd.
Feed Water Temp after Economiser	214	213	213	206	204	207	207	117	208	215	209	217	
Steam Super Heat Temp	380	380	376	371	381	381	372	389	389	381	389	375	770
Screw Feeder Totaliser													
Fuel Consumption													
Surface Temp. of Insulated Boiler Parts	43/36	44/31	45/36	45/37	44/36	43/35	43/36	44/37	46/38	47/39	44/38	43/37	Steam to Fuel Ratio
Ash Refuse Loss													
Flue Gas Analysis													3.56
O2	4.1		3.2	3.1	4.4	3.2	3.1	2.3	2.5	3.1	6.4	4.1	
Co2	14.1		15.1	14.6	14.1	14.3	14.3	15.2	15.2	15.1	13.6	14.6	
Co	1000		1000	1000	1000	1000	1000	1000	1000	1000	1000	64.5	
Sox	658		873	898	1000	1000	1000	1000	1000	631	282	289	Bomb GCV of Coal
Nox	835		606	400	503	498	493	881	735	554	947	695	Moisture 2.9
Efficiency BS-845 (Calculated)													
F.D. Air Flow m ³ /hr								34022	33272	33370	33511	33866	

Engineer For RABAK TECHNOLOGIES PVT. LTD. Technical Head For SHAH PAPER & PULP LTD. Engineer Plant Head A Diverse Technological Solution

8 MWH Captive Plant, Indian Coal Before ARC™ Energy PlasPlus™

RABAK TECHNOLOGIES PVT. LTD.

Customer Name : M/s. Shah Pulp & Paper Mill Ltd. Unit 2, GIDC, Vapi : 8 MWH Boiler

Date : 29-6-2015 Day : Monday Rabak Executive : Kevin B. Shembri

	09.00	10.00	11.00	12.00	13.00	14.00	15.00	16.00	17.00	18.00	19.00	20.00	
Steam Pressure	35	35.9	37	37	37	37	38	38.8	36.7	38.6	37.6	37.5	Surface of Insulated Boiler
Steam Flow	35	37	33	34	33	34	34	35	36	34	33	34	
Furnace Bed Temp	894/889	890/893	889/892	891/898	895/895	899/898	868/858	888/877	874/877	889/879	883/887	885/878	
Flue Gas Temp Before HRU	183	179	177	175	177	169	175	181	179	177	180	185	Fuel Cost
Flue Gas Temp after HRU	142	140	132	134	134	133	137	139	137	145	147	150	
Feed Water Temp before Economiser	112	110	109	105	104	104	105	104	103	107	112	116	
Feed Water Temp after Economiser	216	213	211	207	210	210	210	210	208	212	215	221	Steam Generation
Steam Super Heat Temp	376	372	372	388	381	382	382	374	371	372	388	395	
Screw Feeder Totaliser													
Fuel Consumption													
Surface Temp. of Insulated Boiler Parts	46/40	48/41	47/42	53/43	46/40	45/39	45/40	45/41	46/42	45/42	48/39	45/39	Steam to Radiator
Ash Refuse Loss													
Flue Gas Analysis													
O2	6.2	7.6	2.3	2.7	2.8	2.5	3.1	3.2	2.8	2.7	3.2	3.2	
Co2	13.9	17.6	16.1	25.8	15.6	15.6	15.2	15.4	15.7	15.9	15.0	15.1	
Co	607	337	2000	2000	423	483	142	330	480	412	167	189	
Sox	578	390	569	591	632	591	538	547	611	579	467	480	
Nox	460	365	290	258	438	422	504	511	477	430	306	317	Bomb Calorific Value
Efficiency BS-845 (Calculated)													
Feed rate	25	22	22	23	22	22	22	22	22	22	22	22	
Air flow	37	37	37	37	37	37	37	37.3	37	37.1	37.4	37.4	92.33

Engineer For RABAK TECHNOLOGIES PVT. LTD. Technical Head For RABAK TECHNOLOGIES PVT. LTD.

Engineer For SHAH PAPER & PULP LTD. Plant Head For SHAH PAPER & PULP LTD.

A Diverse Techn

Test Data of ADIK

Date	Coal used	GCV Mois.	GCV Dry	Moisture
07/06/2015	181			
08/06/2015	185			
09/06/2015	217			
10/06/2015	179			
11/06/2015	200			
12/06/2015	217			
13-Jun	201	3285	4963	33.5
14/06/2015	204	3839	5267	27.1
15/06/2015	190	3586	5115	29.88
16/06/2015	215	3722	5181	28.16
Average	198.9 Ton	3608	5131.5	29.66

Doping Started on 16/06 it takes 18 hours to get the doped coal in boiler

17/06/2015	191	3417	4967	37.1
18/06/2015	196	3377	4811	29.8
19/06/2015	183	3866	5260	26.5
20/06/2015	162	3822	5361	28
21/06/2015	196	3822	5316	28.1
22/06/2015	190	3747	5181	27.7
23/06/2015	120	Excluded		
24/06/2015	190	3576	5030	28.9
25/06/2015	160	3472	4966	30.11
26/06/2015	181	3694	4967	25.62
Average	183 Ton	3643	5095	29.09

16 Ton Coal saved in first 9 days

27/06/2015 214 Excluded Machine stopped working on 25 & 26
Machine started in night on 27th

28/06/2015	190			
29/06/2015	189	3659	5161	29.1
30/06/2015	195	3796	5210	27.14
01/07/2015	195	3578	5064	29.33
02/07/2015	207	3748	5161	27.3
03/07/2015	111	3685	5059	27.14 Excluded
04/07/2015	75	3681	5210	29.33 Excluded
05/07/2015	175			
06/07/2015	191	3575	5015	28.7
07/07/2015	187			
08/07/2015	181	3578	5061	29.3
09/07/2015	179	3607	4948	27.1
Average	188.9 Ton	3648	5088	28.28

10 Ton Coal is saved in 10 days

10/07/2015	167	2584	5136	30.2
11/07/2015	183			
12/07/2015	176			
13/07/2015	177			
14/07/2015	180			
15/07/2015	178			
Average	176.83 Ton			

22.07 Ton Coal saved in 6 days

Test conducted at 8 MWH Coal fired power plant at Shah Paper Mills Vapi, Gujrat.

- Reduction in coal usage: from 199 tons/day to 177 : 11.0%
- Reduction in CO: from 993 ppm to 632 ppm : 36.4%
- Reduction in SOx: from 987 ppm to 378 ppm : 61.7%
- Reduction in NOx: from 944 ppm to 254 ppm : 73.1%



Adani Power plant Mundra 630 MWH

ADANI POWER LTD Mundra power plant 12 hour test results

Parameters	Unit	18-Jan-16 Before	19-Jan-16 After	Difference (After - Before)
Test Start Time		9.00 AM	9.00 Am	
Test End Time		9.00 PM	9.00 PM	
Generation Average	MW	660.4	660.88	0.48
Coal Flow-Average	TPH	299.56	283.38	-16.18
Coal GCV Assumed	kcal/kg	5000	5000	0
Heat Rate-Calculated	kcal/kWh	2268	2143.95	-124.05
Specific coal consumption-calculated	kg/kWh	0.4536	0.4287	-0.0249
Total Air Flow-Average	TPH	2168	2125	-43
MS Flow-DCS	TPH	2036.69	2052.7	16.01
HPT Intel Pressure @TV (MS) INDICATOR	(MPA)g	23.85	24.05	0.2
MS Temp- Average	°C	555.47	556.07	0.6
HRH Temp-Average	°C	560.19	561.53	1.34
Condenser Vaccum- Average	(kph)g	-88.29	-88.29	0
LPT Exht Temp	°C	48.13	49.41	1.28
CW Inlet Temp - Average	°C	33.11	34.45	1.34
APH Inlet Temp-Average	°C	421.4	420.8	-0.6
APH Outlet Temp-Average	°C	166	168.8	2.8
APH inlet Oxygen-Average	%	2.65	2.5	-0.15
Ambient air temp - SA Temp	°C	42.6	43	0.4
Average Emission Data				
CO	ppm	0	0	
Flue Gaqs Temp	°C	167.2	168.9	1.7
Ambient Temp	°C	35.6	33.9	-1.7
Nox	ppm	217	160	-57
SO2	ppm	398.8	356.5	-42.3



Adani Power Plant Mundra

- 24 hours trial was conducted with powder form catalyst in 2015
- Greta results on emission were noted
- Coal saving was around 2% but detailed of the results were not shared by the company.
- It is advised that minimum 10 days of trial should be conducted to get the desired effect.

Before ARC™ Energy PlasPlus™ at Nasik Thermal Power Station 210 MWH



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After ARC™ Energy PlasPlus™ at Nasik Thermal Power Station 210 MWH



ARC
ENERGY

NTPS / CE / POG / FL02/

No 03805.

Date: 25 MAY 2017

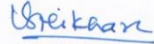
To.

M/S Arc Energy,
Hari Om Nagar, Mulund (E),
Mumbai, 400081

Sub: - Grant of permission to use Arc Energy Coal Catalyst.
Ref: - Your letter No. ARCE/MGC-NSK/006/MUM 041617 dated 27/04/2017

With reference to the above subject matter, Nashik TPS grants permission to use Arc Energy Coal Catalyst for 30 days free trial. Please note down the following points which needs special attention while utilizing Coal Catalyst while referring to your terms and conditions.

1. It is your responsibility to note down / collect data from Plant Control Room/ Local – Specific instruction will be given to the PCR staff.
2. NTPS will try to provide all the necessary data (pre trial) as far as possible & subsequently will be mailed to you.
3. Emission data will be available on weekly basis.
4. Spraying of Coal Catalyst directly in coal mill is not possible. It can be spray on conveyor 17A & 17B.
5. It will be your responsibility to transport Coal Catalyst up to the point of spray; necessary precaution should be taken, so that no any mishap should be happen.
6. Permission to your personnel will be granted with prior submission of the list of the persons visiting to Plant, so that concern staff would arrange the Gate Pass for those persons.
7. You will be allowed to bring measuring instrument for emission measurement with prior submission of list of the instrument, so that concern staff would arrange the Gate Pass for instruments.
8. NTPS will not bear any type of cost for carrying out the trial.


Chief Engineer
NTPS, Nashik

Coal Handling Plant
Sub: Daily Status of coal Bunkered of State -II
CHP - II & III

Date	Daily Gen.	Coal consumption as per coal factor in MT	Coal consumption as per Belt weigher in MT	Current coal factor	Coal factor as per belt weigher	Avg. Bunker level in %
1	2	3	4	5	6	7
01-Aug-17	4.289	3410	3263	0.795	0.761	80%
02-Aug-17	4.148	3298	3380	0.795	0.815	80%
03-Aug-17	4.137	3289	3354	0.795	0.811	85%
04-Aug-17	4.155	3303	3804	0.795	0.916	95%
05-Aug-17	4.255	3383	3785	0.795	0.890	85%
06-Aug-17	4.239	3370	3370	0.795	0.795	80%
07-Aug-17	4.506	3582	3756	0.795	0.834	95%
08-Aug-17	5.915	4702	4048	0.795	0.684	80%
09-Aug-17	5.996	4765	4563	0.795	0.761	70%
10-Aug-17	4.485	3566	3299	0.795	0.736	60%
TOTAL	46.125	36669	36622	0.795	0.794	
11-Aug-17	4.851	4186	3093	0.900	0.665	70%
12-Aug-17	4.468	4019	3539	0.900	0.792	70%
13-Aug-17	4.253	3828	3028	0.900	0.711	70%
14-Aug-17	4.387	3948	4427	0.900	1.009	75%
15-Aug-17	3.943	3549	3714	0.900	0.942	80%
16-Aug-17	4.122	3710	3804	0.900	0.874	75%
17-Aug-17	4.222	3800	3159	0.900	0.748	85%
18-Aug-17	4.103	3693	3181	0.900	0.775	75%
19-Aug-17	4.404	3954	3593	0.900	0.816	80%
20-Aug-17	4.135	3722	3536	0.900	0.855	90%
TOTAL	42.686	38419	34872	0.900	0.817	
21-Aug-17	4.037	3532	3293	0.875	0.816	95%
22-Aug-17	4.376	3829	3188	0.875	0.729	75%
23-Aug-17	4.524	3959	3621	0.875	0.800	90%
24-Aug-17	4.357	3821	3241	0.875	0.742	95%
25-Aug-17	3.987	3489	3373	0.875	0.846	90%
26-Aug-17	4.387	3839	3246	0.875	0.740	80%
27-Aug-17	4.273	3739	3305	0.875	0.773	90%
28-Aug-17	4.258	3300	4007	0.775	0.941	80%
29-Aug-17	4.102	3179	2901	0.775	0.707	80%
30-Aug-17	4.088	3167	3740	0.775	0.915	80%
31-Aug-17	4.318	3346	2740	0.775	0.635	80%
TOTAL	46.715	39200	36655	0.839	0.785	
GRAND TOTAL	135.526	114288	108149	0.843	0.798	

EXECUTIVE ENGINEER
CHP-V.M.S.
M.S.P.O.C.L.I.N.

II nd Week Unit IV															
DATE	CONS.	%ADM	%ASH	%VM	%FC	CV Kcal/kg	ADB Bomb CV	%TM	%ASH	%VM	%FC	CV Kcal/kg	ADB bomb CV	Fly Ash %	Slag Ash%
08/08/17	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00
09/08/17	1363	9.87	40.66	21.15	28.32	3292	3365	16.82	37.52	19.52	26.14	3038	3106	0.64	2.45
10/08/17	3566	10.52	37.67	23.62	28.19	3479	3629	18.46	34.33	21.52	25.69	3170	3307	0.71	2.83
11/08/17	4186	10.30	38.04	22.64	29.02	3476	3584	19.18	34.27	20.40	26.15	3132	3229	0.59	2.79
12/08/17	4019	10.57	38.29	22.88	28.26	3414	3526	17.49	35.33	21.11	26.07	3149	3253	0.67	3.50
13/08/17	3828	11.60	36.95	21.83	29.32	3390	3649	17.75	34.38	20.31	27.56	3154	3395	0.61	1.88
14/08/17	3948	10.48	41.80	21.13	26.39	3096	3300	18.22	38.19	19.30	24.29	2829	3015	0.49	2.10
15/08/17	3549	9.70	41.99	22.73	25.58	3192	3404	18.63	37.84	20.48	23.05	2876	3067	0.95	2.50
WTD.AVG	24459	10.50	39.18	22.38	27.34	3340	3507	18.21	35.80	20.45	25.54	3053	3205.45	0.67	2.58
III rd Week Unit IV															
DATE	CONS.	%ADM	%ASH	%VM	%FC	CV Kcal/kg	ADB Bomb CV	%TM	%ASH	%VM	%FC	CV Kcal/kg	ADB bomb CV	Fly Ash %	Slag Ash%
16/08/17	3710	10.44	38.06	22.05	29.45	3454	3512	17.37	35.11	20.34	27.17	3187	3240	0.89	3.20
17/08/17	3800	10.22	42.68	19.91	27.19	3051	3248	19.10	38.46	17.94	24.50	2750	2927	0.23	2.92
18/08/17	3693	9.33	43.91	21.96	24.80	3065	3164	18.40	39.52	19.76	22.32	2759	2847	0.65	2.26
19/08/17	3964	9.18	45.64	19.51	25.67	2924	3117	15.93	42.25	18.06	23.76	2707	2885	0.90	1.63
20/08/17	3722	9.49	40.81	21.92	27.78	3334	3510	15.75	37.99	20.40	25.86	3103	3267	0.64	2.95
21/08/17	3532	11.47	34.73	22.00	31.80	3618	3777	18.04	32.15	20.37	29.44	3349	3497	0.85	2.12
22/08/17	3829	11.06	37.75	21.23	29.96	3393	3591	16.14	35.59	20.02	28.25	3199	3386	0.40	0.91
23/08/17	3859	10.44	38.06	21.29	30.21	3454	3659	16.91	35.31	19.75	28.03	3205	3395	0.36	1.53
WTD.AVG	30209	10.19	40.26	21.21	27.33	3283	3444	17.19	37.10	19.56	26.15	3029	3178.23	0.62	2.10
IVth Week Unit IV															
DATE	CONS.	%ADM	%ASH	%VM	%FC	CV Kcal/kg	ADB Bomb CV	%TM	%ASH	%VM	%FC	CV Kcal/kg	ADB bomb CV	Fly Ash %	Slag Ash%
24/08/17	3821	10.97	41.03	20.35	27.65	3097	3295	17.69	37.93	18.81	25.56	2864	3046	0.22	2.99
25/08/17	3489	9.52	42.94	20.61	26.93	3129	3380	17.59	39.11	18.77	24.53	2850	3079	0.90	2.49
26/08/17	3839	10.65	42.22	20.37	28.76	3032	3242	18.15	38.68	18.66	24.51	2778	2970	0.60	1.52
27/08/17	3739	10.51	42.98	21.30	25.21	2981	3248	17.79	39.48	19.57	23.16	2738	2984	1.14	2.29
28/08/17	3300	9.72	44.56	20.22	25.50	2947	3138	17.38	40.78	18.50	23.34	2697	2872	0.71	2.35
29/08/17	3179	9.62	43.66	20.29	25.43	3046	3167	16.55	40.31	18.73	24.40	2813	2924	1.00	1.40
30/08/17	3167	9.74	43.62	21.61	25.03	3033	3258	16.28	40.46	20.04	23.22	2813	3022	0.94	2.01
31/08/17	3346	9.63	44.12	21.34	24.91	3002	3225	16.84	40.60	19.64	22.92	2762	2968	0.91	2.57
WTD.AVG	27860	10.08	43.68	20.75	26.09	3034	3246	17.33	39.61	19.08	23.99	2790	2984.64	0.80	2.20
MONTH.AVG	87548	10.25	40.89	21.40	27.46	3216	3396	17.54	37.56	19.66	25.24	2955	3120.91	0.69	2.32

NTPS / CE / POG / FL02/ **No 741**

Date: **09 NOV 2017**

To.

M/S Arc Energy,
Hari Om Nagar, Mulund (E),
Mumbai, 400081

Sub: - Coal Catalyst Trial Test in Unit-4 of Nashik TPS

As claimed by M/s ARC Energy Inc. Mumbai, the coal catalyst/ Chemical/ Compound is supposed to improve the combustion efficiency & also reduce the SPM emissions. Therefore, it was decided to have a trial test at Nashik TPS Unit-4 of 210 MW capacity.

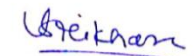
The pretest emission related performance parameters were measured by Environment cell once in a day from 11th to 13th Aug-2017. M/S Arc Energy has used catalyst / Chemical/ Compound whose chemical composition, the level of concentration to be sprayed & other parameters were not submitted & hence not known to NTPS, MAHAGENCO.

The trial test was conducted from 14th to 23rd Aug-2017. The coal catalyst was sprayed on coal fed to bunkers through conveyor belt at bunker level.

During trial test, emission related performance parameters were measured by Environment cell once in a day on 17th, 19th, 21st & 23rd Aug-2017.

At Nashik TPS, the received coal quality changes hourly. There is variation in load on Unit-4 on account of coal quality/ system problem/ LD Backing down during pretest & trial test for performance comparison.

The SPM emission is depends on various factors such as coal quality, unit loading, ESP fields healthiness etc. due to which it is difficult to ascertain the exact effect of this test. However, from comparison of pretest & trial test data, it is observed that there is marginal reduction in SPM emission.


Chief Engineer
NTPS, Nashik

Yajna

FUEL SERVICES



Work Centre : B-15, Gr. Floor, Shree Datta Vihar C.H.S., Shivaji Nagar, B-Cabin,
Thane (W) 400 602.Tel.: 022- 2538 4681, 2542 49 83
e-mail : yajna.fuel86@gmail.com, yajnafuel@vsnl.net web site : www.yajnafuelindia.com

TO WHOMSOEVER IT MAY CONCERN

Nasik NTPS conducted a trial of ARC Energy Plas Plus liquid coal catalyst for emission control and energy enhancer on unit no 4 starting from 15 August 2017 from 10 am. till 9 am of 23 August 2017.

Data used for comparison was Pretrial from 8 Aug – 14th Aug to 15 Aug – 23rd Aug when ARC Energy Plas Plus Coal Catalyst was sprayed on the coal at belt no 17 A & B

The performance of the product is as stated below:

A] Heat rate dropped by 10.3% (Maximum) showing less calories required for generation of power i.e. Kcal/kWh i.e. 10.3% less coal for similar power production..

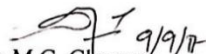
B] Corresponding contributions to loss reduction were as below: -

- | | |
|--|------------|
| 1) Reduction in unburnt carbon | = 4 - 6.3% |
| 2) Dry gas loss | = 1-1.2% |
| 3) Stack emissions of Nox. | = 0.3-0.5% |
| 4) SO ₂ dropped by 13% probably due to oxidizing reaction of additive | = 1.5-2% |

Additional observation was lower SPM may be due to wetting of particles.

Overall, results of the additive are satisfactory and economics may be worked out at from efficiency and environmental quality improvement.

Thanking you,
Yours faithfully,
For Yajna Fuel Services


Dr. M.G. Gharpure.

For YAJNA FUEL SERVICES


PROPRIETOR

ARC
ENERGY

MahaGenCo Nasik Thermal Power Station

210 MWH- Trial in August 2017

- SPM levels reduced
- Overall stack emissions reduced
- When average Electricity Generation was compared with GCV corrected coal usage -10.27 % less coal was required
- Fly Ash was reduced by 10.23%
- Slag Ash was reduced by 10.69%

Air pollutants damage blood vessels: Experts

► From P 1

The Lancet study found that the top five reasons for Indians getting stroke were high blood pressure, diet low in fruit, household air pollution, diet low in vegetables and high salt consumption.

The study's authors said such studies would help devise stroke prevention strategies at the local level. "Air pollution has emerged as a significant contributor to global stroke burden, especially in low-income and middle-income

“The damaged blood vessels precipitate atherosclerosis, a disease in which plaque builds up inside arteries, further leading to stroke

Dr Ashok Mahasur | SPECIALIST

me countries, and therefore reducing exposure to air pollution should be one of the main priorities to reduce stroke burden in these countries," said the study funded by the Bill and Melinda Gates Foundation.

So how does air pollution cause stroke? The IHME study doesn't offer an etiological connection, but experts say air pollutants such as carbon monoxide are known to damage blood vessels. "These damaged blood vessels precipitate atherosclerosis, a disease in which plaque builds up inside arteries, further leading to stroke," said chest specialist Dr Ashok Mahasur, who formerly headed KEM Hospital's Environment Pol-

A MAJOR HEALTH HAZARD

What is a stroke?

► It's a disease affecting arteries leading to and within the brain. A stroke occurs when a blood vessel that carries oxygen and nutrients to the brain is either blocked by a clot or bursts. As that part of the brain doesn't get blood (and oxygen) it needs,

brain cells die

► Every year, 15 million people worldwide suffer a stroke (6 million die & 5 million are left with permanent disability such as loss of vision and/or speech, paralysis and confusion)

► In India, nearly 1.5 million people suffer stroke annually

What the study says

► It looks at the Global Burden of Diseases, 2013 and identifies 10 risk factors for stroke

► Identifies air pollution, for the first time, as a risk factor

► About a third (29.2%) of global disability associated with stroke is linked to air pollution

► Air pollution-stroke link high in developing countries (33.7% vs 10.2% in developed countries)

Risk factors for Indians

► High blood pressure

► Diet low in fruit

► Household air pollution

► Diet low in vegetables

► Diet high in sodium

What is DALYs?

► WHO defines 1 DALY as loss of the equivalent of one year of full health. In terms of DALYs, the study said, air pollution accounted for 29.2% of the stroke-related DALYs

Air pollution on Friday

MUMBAI'S AQI |

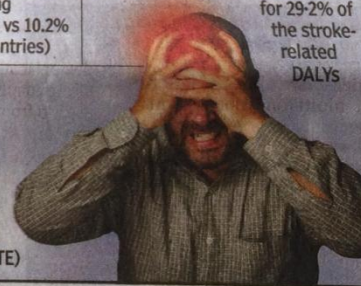
104

(MODERATE)

DELHI'S AQI |

171

(MODERATE)



lution Research Centre. Incidentally, stroke is one of the largest causes for disability in India. "Roughly 1.5 million stroke cases are estimated across India every year. As 80% of the patients don't get

any pain, they fail to go to the doctor with the 4.5-hour golden period," said Dr Hastak. This delay makes stroke-related symptoms such as a paralysed hand or leg or lost vision permanent.

GCV in Lab

CERTIFICATE

GEO-CHEM

ACCREDITED BY NABL
ISO 17025
Certificate No.:
Mechanical Testing : 1-2877
Chemical Testing : 1-2878

International
Independent Inspection
&
Testing Company

TEST CERTIFICATE

Certificate No. : MISC/17/02/004947 Date : 06/02/2017

Party's Name & Address : M/S. ARC ENERGY
MUMBAI.

Party's Letter Ref. No. & Date : LETTER DATED 01/02/2017

Sample Described as : COAL

Date of Receipt of Sample : 03/02/2017

Date/s of Analysis : 03/02/2017 - 04/02/2017

Tested to Specification : ---

Stamped / Sealed By : ---

Analysis No. : MISC/17/02/004947

Sample ID Mark : 'A'

(as described by Party)

SAMPLE RECEIPT CONDITION : SIZE : 1 mm
QUANTITY : 103.350
CONDITION : WET

TEST	METHOD/TECHNIQUE	RESULTS	UNIT OF MEASURE
SAMPLE IS AIR DRIED & PREPARED FOR ANALYSIS AS PER METHOD :			
MOISTURE	ASTM D - 3173 - 11	13.34	%
VOLATILE MATTER	ASTM D - 3175 - 11	39.49	%
ASH	ASTM D - 3174 - 12	6.02	%
FIXED CARBON	ASTM D - 3172 - 13	41.15	%
GROSS CALORIFIC VALUE	ASTM D - 5865 - 13	5447	kcal/kg

SAMPLE NOT DRAWN BY
GEO-CHEM LABS

For GEO-CHEM LABORATORIES (P) LTD.

MANGESH SHINDE
MANAGER
ENERGY DEPARTMENT

RG
PROFORMA NO. : GC-MLD/QF/5.10/03 ISSUE NO. :01 REVISION NO.: 00 PAGE NO.:1 OF 1

1. Test Results related only to the sample (s) tested.
2. Test certificate in full or part shall not be reproduced unless written permission is obtained from M/s. Geo-Chem Laboratories Pvt. Ltd.
3. Geo-Chem Laboratories Pvt. Ltd. is not responsible for the authenticity of photocopied or computer scanned reports / certificates.
This inspection / testing has been performed to the best of our ability and our responsibility is limited to proven negligence. This certificate, which is issued on conditions stipulated overleaf, reflects our findings at the time and place of inspection / testing and does not relieve parties from their contractual obligations. Samples will be retained by us for a period of thirty days only, unless specific instructions to the contrary are received.

Regd. Off.: Geo-Chem House, 294, Shahid Bhagat Singh Road, Fort, Mumbai 400001, India.
www.geochem.net.in

Nº 752854

CERTIFICATE

GEO-CHEM

ACCREDITED BY NABL
ISO 17025
Certificate No.:
Mechanical Testing : 1-2877
Chemical Testing : 1-2878

International
Independent Inspection
&
Testing Company

TEST CERTIFICATE

Certificate No. : MISC/17/02/004949 Date : 06/02/2017

Party's Name & Address : M/S. ARC ENERGY
MUMBAI.

Party's Letter Ref. No. & Date : LETTER DATED 01/02/2017

Sample Described as : COAL

Date of Receipt of Sample : 03/02/2017

Date/s of Analysis : 03/02/2017 - 04/02/2017

Tested to Specification : ---

Stamped / Sealed By : ---

Analysis No. : MISC/17/02/004949

Sample ID Mark : 'C'

(as described by Party)

SAMPLE RECEIPT CONDITION : SIZE : 1 mm
QUANTITY : 106.430
CONDITION : WET

TEST	METHOD/TECHNIQUE	RESULTS	UNIT OF MEASURE
SAMPLE IS AIR DRIED & PREPARED FOR ANALYSIS AS PER METHOD :			
GROSS CALORIFIC VALUE	ASTM D - 5865 - 13	5587	kcal/kg

SAMPLE NOT DRAWN BY
GEO-CHEM LABS

For GEO-CHEM LABORATORIES (P) LTD.

MANGESH SHINDE
MANAGER
ENERGY DEPARTMENT

RG
PROFORMA NO. : GC-MLD/QF/5.10/03 ISSUE NO. :01 REVISION NO.: 00 PAGE NO.:1 OF 1

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Regd. Off.: Geo-Chem House, 294, Shahid Bhagat Singh Road, Fort, Mumbai 400001, India.
www.geochem.net.in

Nº 065103

GCV

- Typical GCV calculation of coal doped with our **ARC™ Energy PlasPlus™** in 1Lt to 1000kg do not show increased in GCV in lab test, as Our product start acting only in plasma lavel and that much temperature is not available in Bomb Calorimeter.



Minimum 10% Pollution Reduction

- 10% less Coal burnt = 10% less emission
- 10% Cost saving
- 10% reduction in Coal handling expenses
- 10% reduction in NO_x, SO_x, CO₂, CO & SPM

Coal Catalyst for Coal reduction & Pollution Control

- Our product can be implemented ASAP in all power plants
- Reduce Pollution, Earn Money on saved coal
- Reduce Carbon foot print on our mother Earth
- Reduce Global warming
- Save Environment Save Earth



ARC Energy to reduce NOx with our OxyRx technology

- Additional technology of Oxygen rich air input – OxyRx to reduce NOx formation and better combustion is also available on request.
- Input Air is only 21% Oxygen and 78% Nitrogen
- Where as only Oxygen is required for combustion
- But 78% Nitrogen is also pushed in and comes out of exhaust with harmful oxides of Nitrogen, that can be reduced with our OxyRx technology
- Load on ID fan is also reduces with our OxyRx technology as only 21% Oxygen rich air to be pushed in, instead of 100% air combined with unwanted 78% nitrogen and other gasses.



Product Patent & Trade Mark

 INTELLECTUAL
PROPERTY INDIA
PATENTS | DESIGNS | TRADE MARKS
GEOGRAPHICAL INDICATIONS

 भारत सरकार
GOVERNMENT OF INDIA
पेटेंट कार्यालय
THE PATENT OFFICE
पेटेंट प्रमाणपत्र
PATENT CERTIFICATE
(Rule 14 of The Patents Rules)

क्रमांक : 022109407
SL No :



पेटेंट सं. / Patent No. : 343205
आवेदन सं. / Application No. : 954/MUM/2015
फाइल करने की तारीख / Date of Filing : 23/03/2015
पेटेंटी / Patentee : DR. CHANDRASHEKHAR CHAWAN

प्रमाणित किया जाता है कि पेटेंटी को उपरोक्त आवेदन में बचावकृतित ENERGY ENHANCER COMPOSITION AND PROCESS IN CLEAN COAL TECHNOLOGY. नामक आविष्कार के लिए, पेटेंट अधिनियम, 1970 के उपबंधों के अनुसार आज तारीख 23rd day of March 2015, से बीस वर्ष की अवधि के लिए पेटेंट अनुदान किया गया है।
It is hereby certified that a patent has been granted to the patentee for an invention entitled ENERGY ENHANCER COMPOSITION AND PROCESS IN CLEAN COAL TECHNOLOGY. as disclosed in the above mentioned application for the term of 20 years from the 23rd day of March 2015 in accordance with the provisions of the Patents Act, 1970.

 INTELLECTUAL
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PATENTS | DESIGNS | TRADE MARKS
GEOGRAPHICAL INDICATION

अनुदान की तारीख : 03/08/2020
Date of Grant : 03/08/2020

 डी. प्रियंका
Controller of Patent

टिप्पणी - इस पेटेंट के नवीकरण के लिए खर्च, यदि इसे नए रखा जाना है, 23rd day of March 2017 को और उसके पचास प्रत्येक वर्ष के समान दिन देना होगा।
Note - The fees for renewal of this patent, if it is to be maintained will fall / has fallen due on 23rd day of March 2017 and on the same day in every year thereafter.

- Trade Mark No. : 3600072 in Class 4



Contact Us

Manufacturer

ARC Energy USA LLC.

10 South Bumby Ave. Orlando, FL 32803 (USA)

Tel: +1 909 999 6519

Contact Person: Dr. Chandrasekhar Chawan

Importer

M/s. ARC Energy (India)

109, Falcon Court, Hari Om Nagar,

Mulund (E), Mumbai-400081

Tel:: +91-9920361631

Website

<http://www.arcenergy.us>

Email

chandrachawan@gmail.com

arcenergyus@gmail.com

