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CESC LIMITED

Budge Budge Generating Station
CESC Limited

Presented by
Mr. Richiek Mittra
Deputy Manager
P&EHS
Budge Budge Generating Station

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Budge Budge Generating Station
3 X 250 MW Coal Based Thermal Power Plant

CESC LIMITED

ISO 9001:2015, ISO 50001:2018, ISO 14001:2015, ISO 45001:2018 & ISO 27001:2013 certified

Major Landmark	Unit - 1	Unit - 2	Unit - 3
COD	07.10.97	01.07.99	28.02.10

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Brief introduction on BBGS, CESC

CESC LIMITED

120 year old fully integrated private power utility engaged in Coal mining, Generation & Distribution of Electricity

567 sq. km distribution license area in Kolkata & adjoining districts

3.4 million consumer base

Budge Budge Generating Station amongst top performing power plants in the country

Certified with ISO 9001:2015, ISO 14001:2015, ISO 45001:2018, ISO 50001:2018 and ISO 27001:2013

Zero Liquid effluent discharge Station

100% Ash Utilization

First Coal based Thermal Power plant of the world to register two of its innovative projects with UNFCCC as CDM projects

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Performance Parameters 2022- 23

CESC LIMITED

01 Annual Generation (mu): 5,330.688

02 Plant Load Factor (%): 81.14

03 Plant Availability Factor (%): 93.63

04 Gross Heat Rate (kCal/kWh): 2268

05 Auxiliary Power Consumption (%): 7.89

06 Specific Oil Consumption (ml/kWh): 0.145

07 Specific Water Consumption (litre/kWh): 2.04

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Energy Performance Last three years

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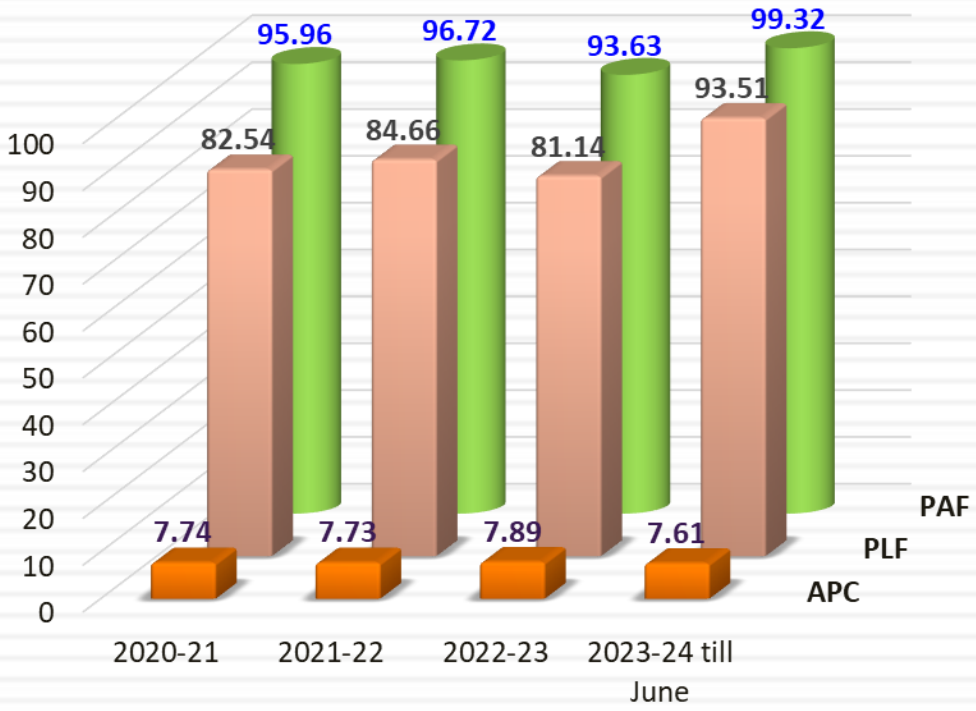
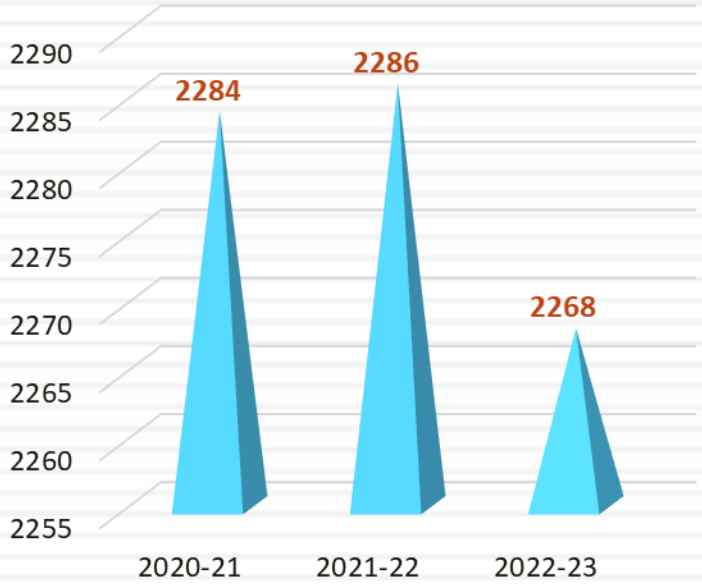
PAF, PLF, APC



Heat Rate



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Best Practices adopted based on Benchmarks

National Benchmarking	Best practices	International Benchmarking	Best practices
Dahanu of Reliance Power	LT VFDs	Isogo ultra supercritical power station Japan	Boiler re-insulation based on thermography
Tata Power, Trombay	Blade vibration monitoring system		
Sterlite Industries Jharsuguda & NTPC Ramagundam	PADO (Performance analysis, diagnostics & optimization)	Takasago of J Power Japan	HP Heater tube cleaning
Jindal Power Raigarh	Isokinetic sampling, dirty air testing.	Tarong TPP, Australia	Online Coal GCV Analyzer
Haldia Energy Limited, (RP-SG group)	Optimization of Conveyor Belt Loading Factor.	Luminant Power(USA)	Remote Monitoring System

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Energy Saving projects implemented in 2020-21

CESC LIMITED

Sl. No.	Project	Investment (INR Million)	Annual Energy Savings (Million kWh)	Savings (INR million)	Payback (Yrs)
1	Installation of VFDs in Overflow Transfer Pumps (OTP) of BBGS Unit #1,2,3	1.64	0.263	0.62	2.64
2	Installation of VFDs in Service Water Pumps of BBGS Unit #1,2,3	2.14	0.263	0.62	3.45
3	Maintenance of APH seals, buckets to reduce air leakage at APH of Unit #3	1.98	2.139	5.05	0.39
4	Replacement of 70W Sodium Vapour lights with LED lights at Unit #3 boiler area	2.93	0.472	1.11	2.64

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Energy Saving projects implemented in 2021-22

CESC LIMITED

Sl. No.	Project	Investment (INR Million)	Annual Energy Savings (Million kWh)	Savings (INR million)	Payback (Yrs)
1	Replacing existing Intake raw Water Pump with lower capacity pump	2.19	0.227	0.535	4.09
2	Replacement of 70W Sodium Vapour lights with LED lights at Main Plant and Coal handling Plant	2.94	0.549	1.3	2.26

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Energy Saving projects implemented in 2022-23

CESC LIMITED

Sl. No.	Project	Investment (INR Million)	Annual Energy Savings (Million kWh)	Savings (INR million)	Payback (Yrs)
1	Replacement of old Sodium Vapour Lights with LED Lights at Unit 1,2&3 boiler area & compressor house	2.436	0.206	0.598	4
2	Unit#3 Ash Conveying Compressor: Rectify Air Piping at Unit#3 Compressed Air Receiver, install separate 6 inch piping for Unit#3 Boiler area.	0.1	0.8	2.317	0.04
3	Replacement of one no of CCW Pump with energy efficient pump for Unit#1-2 AC Plant.	0.37	0.096	0.278	1.33
4	Cartridge renewal of BFP 1B	5.58	1.64	4.75	1.17

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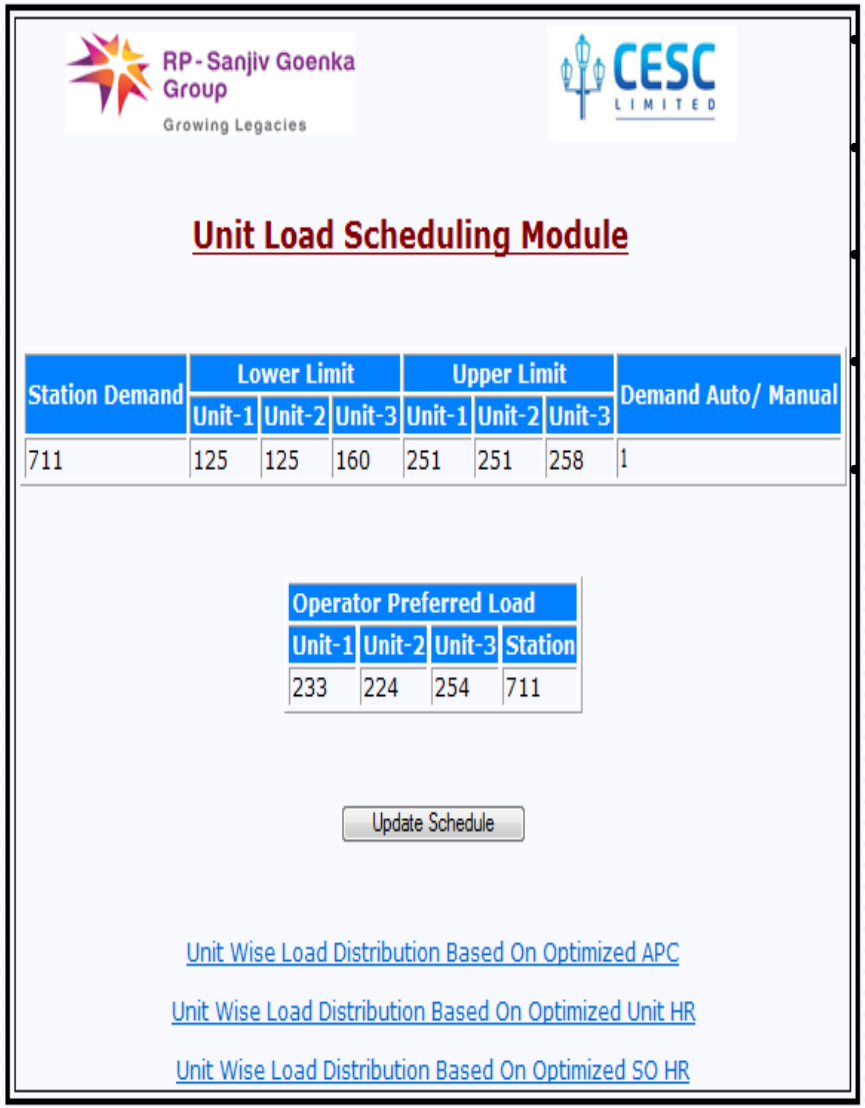
Online Efficiency Based Load Prediction Module

- *3 numbers of 250 MW units in BBGS used to run at high PLF throughout the year for the last 10 years or so.*
- *Presently, with the penetration of Renewable energy it has become compulsive to run at low PLF (Part Load) for a considerable period of time*
- *To operate most efficiently for any Station Generation, the Operation Engineer needs to know the best possible load combination amongst the 3 units.*
- *Station Efficiency depends upon the Unit Heat Rates and Auxiliary Power Consumptions. These can be indicated by a single parameter – "Station Sent Out Heat Rate", which is dynamic in nature with change in Unit Generation. Due to this dynamic behavior, it is impossible to determine the exact Load combination of 3 units manually so that the Station always operate with the best possible Sent out Heat Rate.*
- *A real time tool had been developed to find out the best possible Unit load combination based on optimized Station Sent-out heat rate.*

This Project First of its kind

- *It is a real time big data analysing statistical tool to find out the best possible Unit load combination based on optimized Station Sent-out heat rate.*
- *Compares actual data with the model o/p for the best possible Unit load combination.*
- *Operating personnel can see, enter user inputs (i.e. Target Generation, Units upper & lower limit etc.)*

Innovative Projects implemented (contd…)



- ***Station Demand:*** *Total target Station Generation given by System Control.*
- ***Lower Limit:*** *Minimum Unit Generation allowed for load prediction.*
- ***Upper Limit:*** *Maximum Unit Generation allowed for load prediction.*
- ***Demand Auto/Manual:*** *Auto tracking Enabled.(i.e. Station generation target will follow the actual generation)*
- ***Operator Preferred Load:*** *Overriding Load set point (ignoring recommendation) given by the operator.*

Cost Impact : *Improvement (reduction) of overall station sent out heat rate & reduction of sent out cost (For the month of October 2020, potential of savings was 862.7 GCal, based on sent out heat rate.)*

Instant Solution *– Operator doesn't need to calculate manually each time for best load combination.*

Enhanced Target Achieving *- Optimized Station heat rate and APC can be achieved.*

Better Monitoring *- Reduction of deviation between estimated and actual parameters.*

Innovative Projects implemented (contd…)

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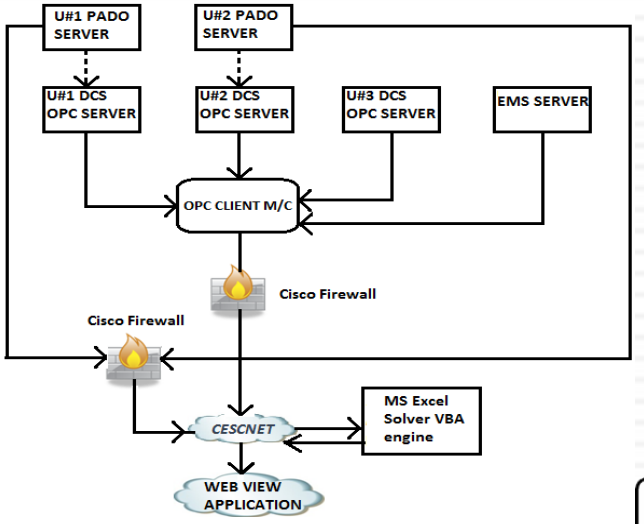
Unit Wise Load Distribution Based On Optimized SO HR

	Model O/P	Unit-1		Unit-2		Unit-3		Station	
		Recomm/Optm/ Estm	Actual	Recomm/Optm/ Estm	Actual	Recomm/Optm/ Estm	Actual	Recomm/Optm/ Estm	Actual
Generation (at recommended load)	Recommended	230	233	224	224	258	254	711	711
Unit HR (at recommended load)	Estimated	2311.63	2289.66	2318.9	2325	2280.29	2292.06	2302.55	2301.79
SO HR (at recommended load)	Optimized	2508.09	2478.7	2547.66	2531	2459.27	2466.88	2502.82	2490.98
APC (at recommended load)	Estimated	7.97	7.62	8.35	8.12	7.3	7.07	7.83	7.64
Operator overide load		233		224		254		711	
SO HR (at operator overide load)	Estimated	2504.99		2547.16		2462.23		2503	

Last updated : 19:35:40

Uniqueness of the project

- *Cost effective- zero investment, a complete in-house project*
- *Zero maintenance cost*
- *Reliable and sustainable solution*
- *Instant Solution Enhanced Target Achieving*
- *Can be easily replicated*



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Innovative Projects implemented (contd…)

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Before implementation							
Heat Loss in Avg. Gcal/month **(JAN19 to DEC19)**	Gcal / year	Rs (considering 1000/Gcal)	Lac Rs	Unit Start up Oil (lac Rs)	Total Material cost (Lac Rs)	Labour (Lac Rs)	TOTAL cost (Rs. Lacs)
14965	179580	179580000	**1795.8**	**10**	1805.8	**0.12**	**1805.92**
After implementation							
Heat Loss in Avg Gcal/month **(OCT20 to JUL21)**	Gcal / year	Rs (considering 1000/Gcal)	Lac Rs	Unit Start up Oil (lac Rs)	Total Material cost (Lac Rs)	Labour (Lac Rs)	TOTAL cost (Rs. Lacs)
13097	157164	157164000	**1571.64**	**0**	1571.64	**0**	**1571.64**
NET Savings per annum (in Rs. Lacs)							**234.28**

ZERO INVESTMENT

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Energy Saving projects planned for 2023-24

CESC LIMITED

Sl. No.	Project	Investment (INR Million)	Projected annual Energy Savings (Million kWh)	Approx.Savings (INR million)
1	Arresting Air Leakage in Unit#3 APH	0.95	1.0072	3.02
2	Arresting of Recirculation Valve Passing of Condensate Extraction Pumps (CEP)	0.11	0.0841	0.25
3	Replacement of old Sodium Vapour Lights with LED Lights	2	0.2241	0.67
4	Belt Conveyor GTU Counter Weight reduction	0	0.0517	0.155

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Utilisation of renewable energy sources

Renewable Energy on site	Capacity	Purpose	Energy Generated (kWh)
Solar Cells over car parking roof	18kWp	To supply power to the Gate Complex Building , which is an IGBC Platinum certified Green Building	Installed in March,2022. Generation in FY 22-23: Around 12 MWh, in FY 22-23 till June,23: Around 5.5 MWh
Solar Cells beside canteen	2kWp	To supply power to the Air to Water Generator at Canteen , which generates potable water from ambient air	Installed in March,2023.

Environment Management
Ash Utilization

Category	Uses of ash
1	Bricks / Blocks / Tiles / Cement
2	Structural filling
3	Land filling
4	Roads & Embankments

Barge

100% Ash Utilization

Aerated concrete blocks

Environment Management
Ash Utilization

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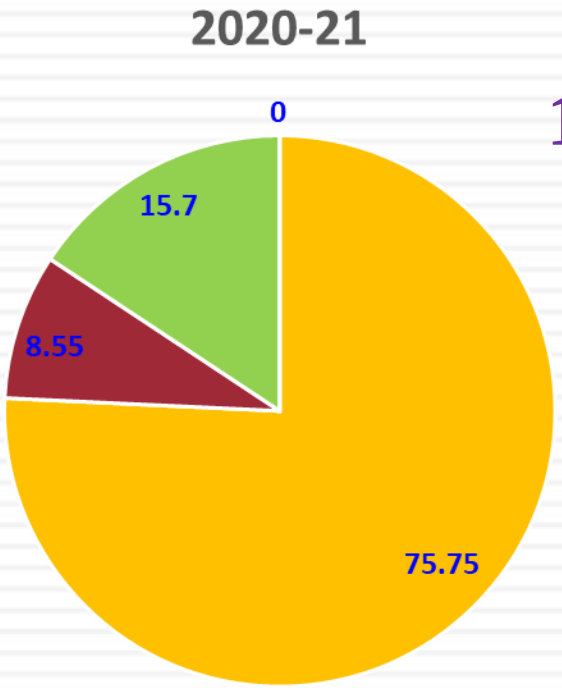
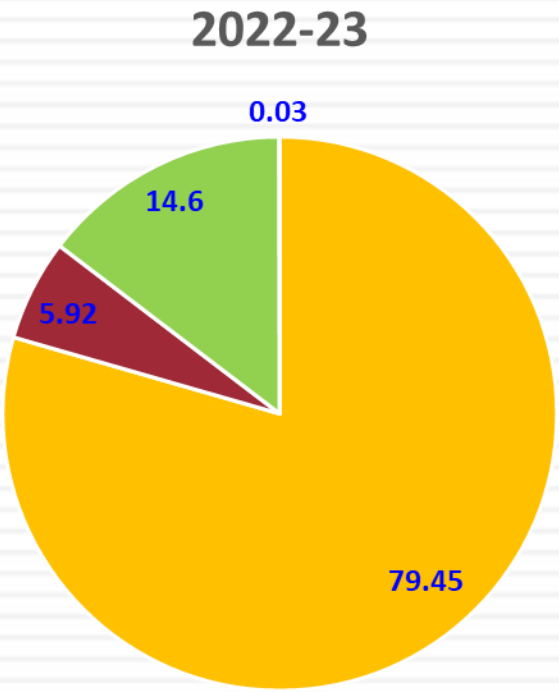
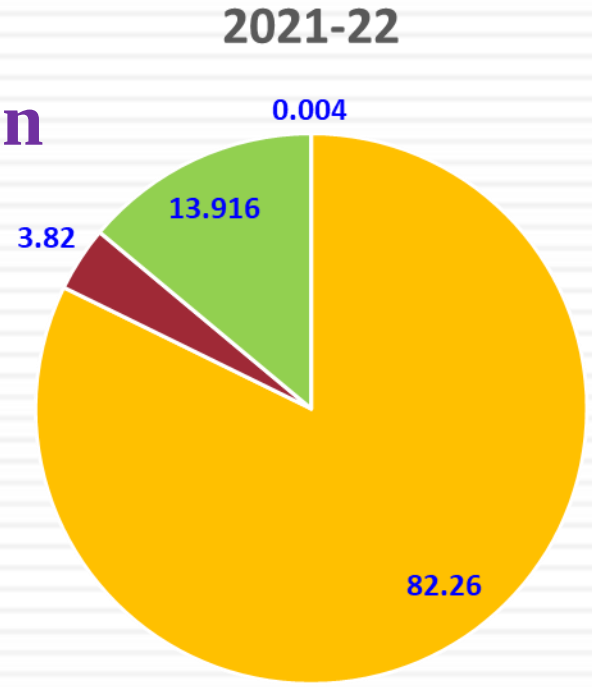
100% Ash Utilization







Cement/concrete

Fly ash bricks

Land Filling

Roads

CII

Environment Management Innovation

INTELLECTUAL PROPERTY INDIA
PATENTS | DESIGNS | TRADE MARKS | GEOGRAPHICAL INDICATIONS

क्रमांक : 03312166
SL No :

भारत सरकार
GOVERNMENT OF INDIA
पेटेंट कार्यालय
THE PATENT OFFICE
पेटेंट प्रमाणपत्र
PATENT CERTIFICATE
(Rule 74 of The Patents Rules)

पेटेंट सं. / Patent No.	:	408580
आवेदन सं. / Application No.	:	202131028863
फाइल करने की तारीख / Date of Filing	:	28/06/2021
पेटेंटी / Patentee	:	1.M/S.CESC LIMITED 2.M/S SDG CONSULTANTS

प्रमाणित किया जाता है कि पेटेंटी को, उपरोक्त आवेदन में यथाप्रकटित "A METHOD FOR PRODUCING CONCRETE USING BOTTOM ASH OF THERMAL POWER PLANTS" नामक आविष्कार के लिए, पेटेंट अधिनियम, 1970 के उपबंधों के अनुसार आज तारीख जून 2021 के अट्ठाईसवें दिन से बीस वर्ष की अवधि के लिए पेटेंट अनुदत्त किया गया है।

It is hereby certified that a patent has been granted to the patentee for an invention entitled "A METHOD FOR PRODUCING CONCRETE USING BOTTOM ASH OF THERMAL POWER PLANTS" as disclosed in the above mentioned application for the term of 20 years from the 28th day of June 2021 in accordance with the provisions of the Patents Act,1970.

INTELLECTUAL PROPERTY INDIA

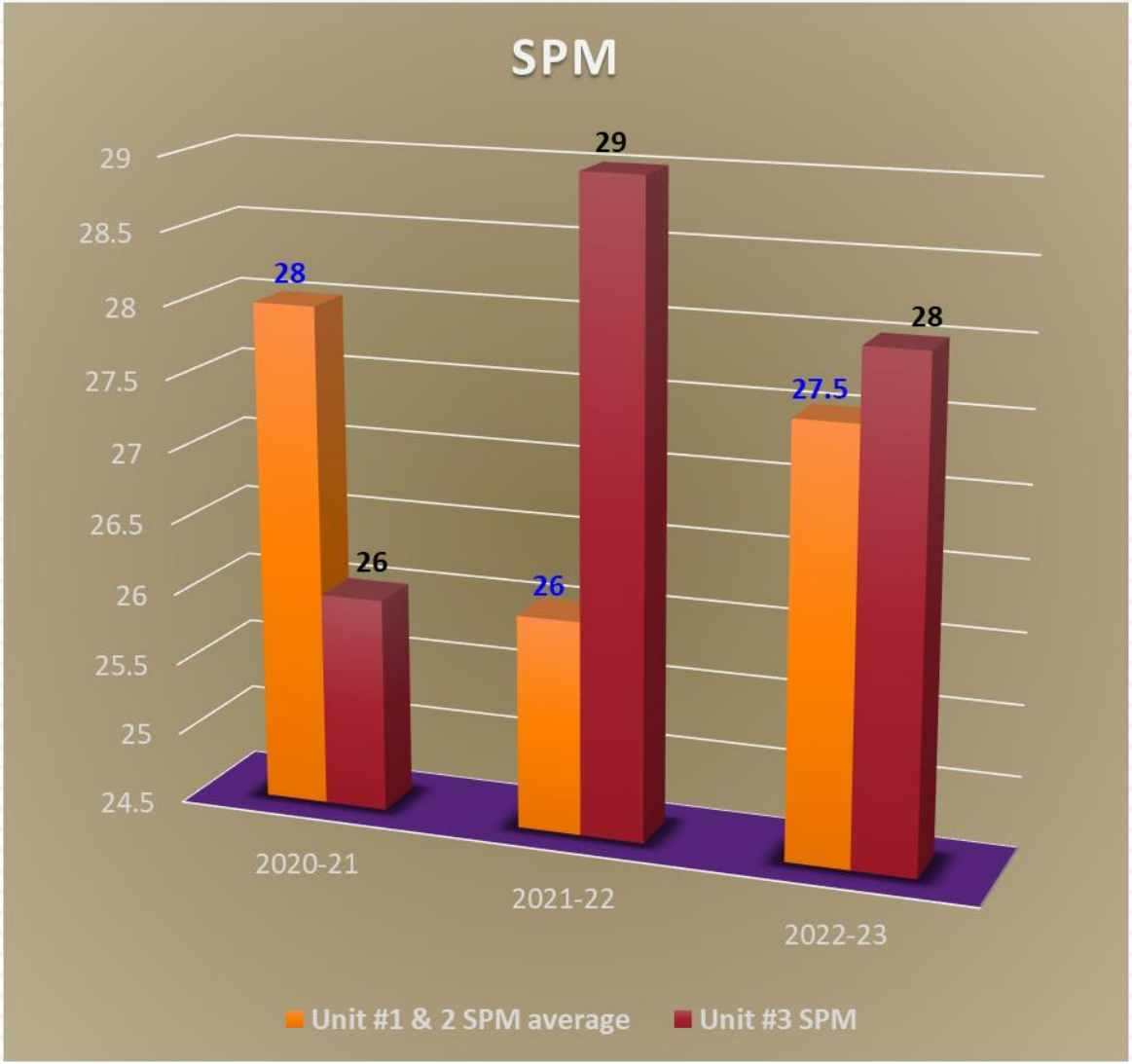
THE PATENT OFFICE GOVT.OF INDIA

अनुदान की तारीख : 07/10/202
Date of Grant :

टिप्पणी - इस पेटेंट के नवीकरण के लिए फीस, यदि इसे बनाए रखा जाना है, जून 2023 के अ
Note.- The fees for renewal of this patent, if it is to be maintained will fall / h
in every year thereafter.

PATENT ON CONCRETE FROM BOTTOM ASH

Environment Management
Emission



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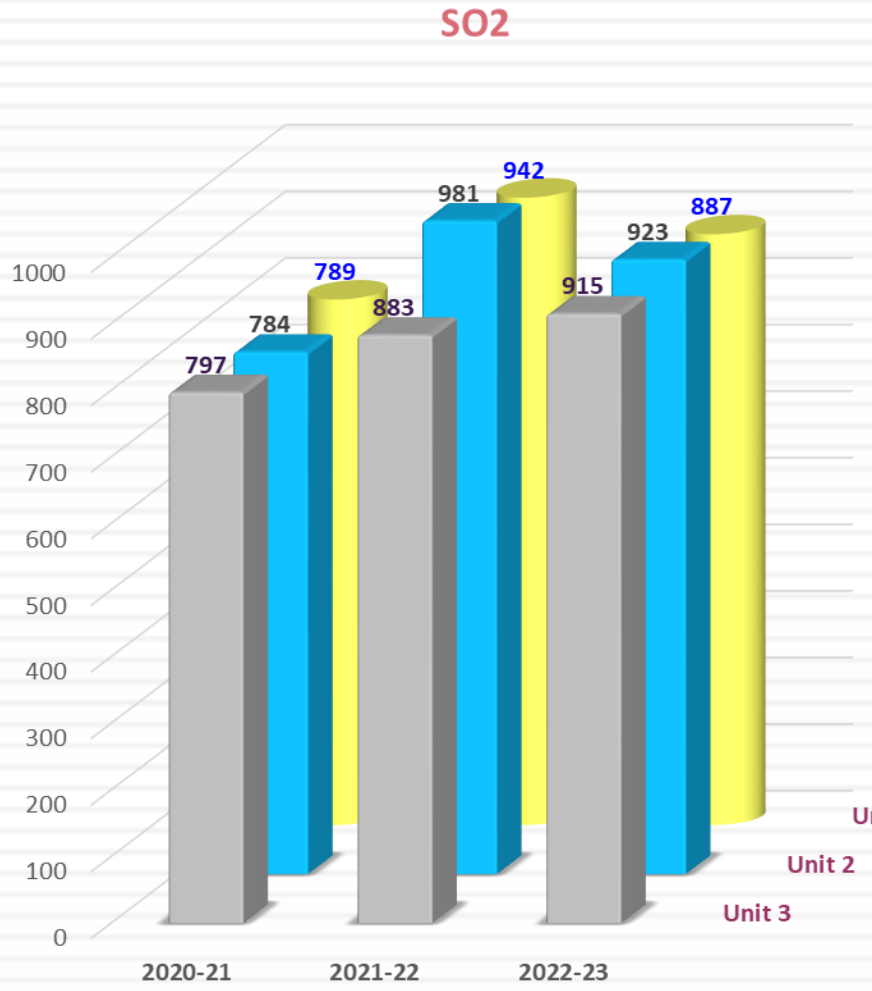
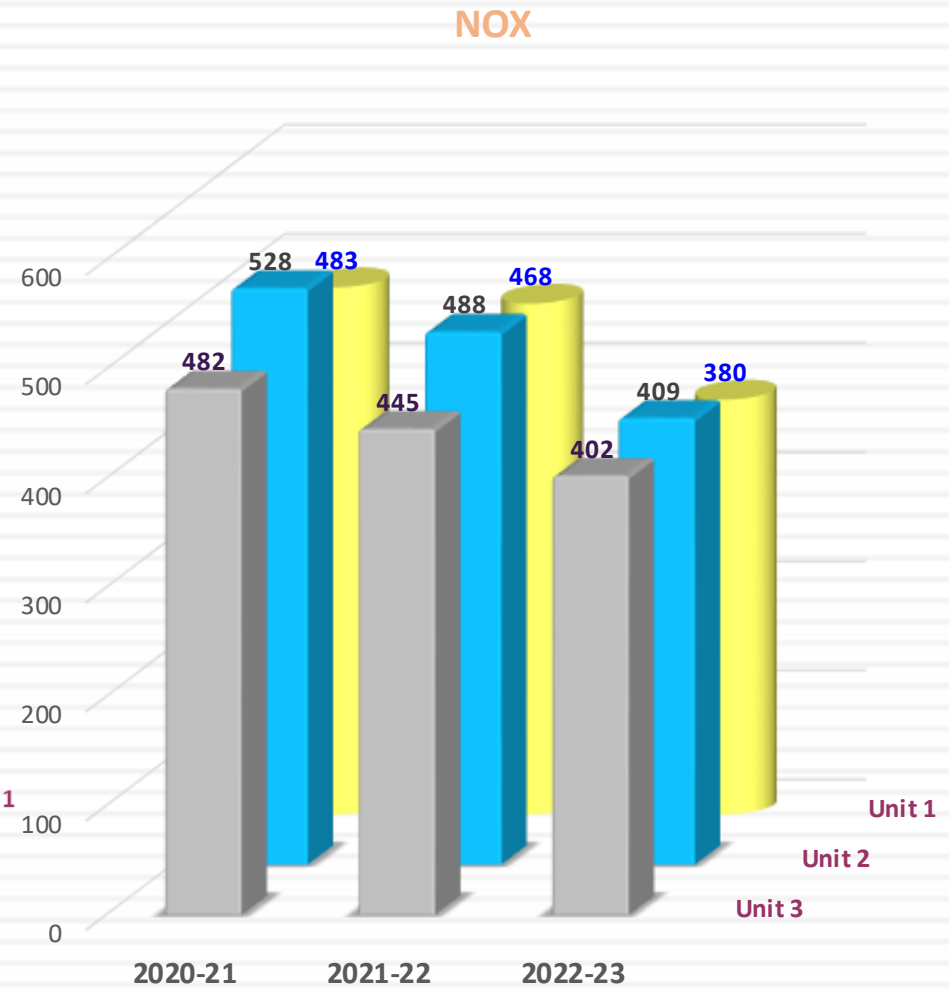
Environment Management
Emission

CESC LIMITED





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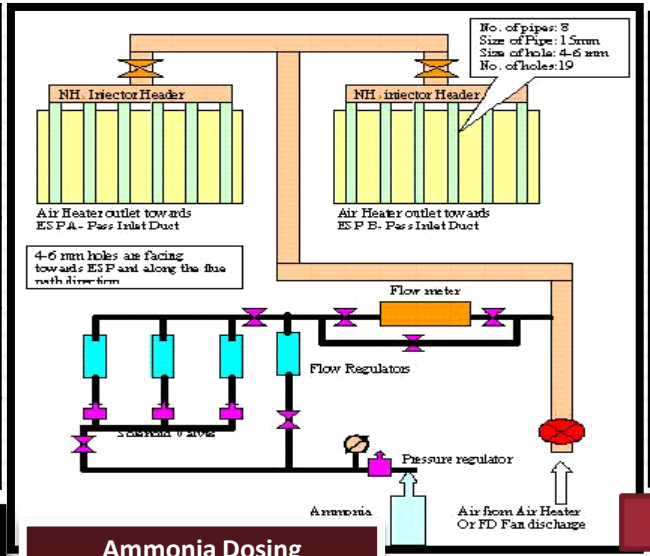
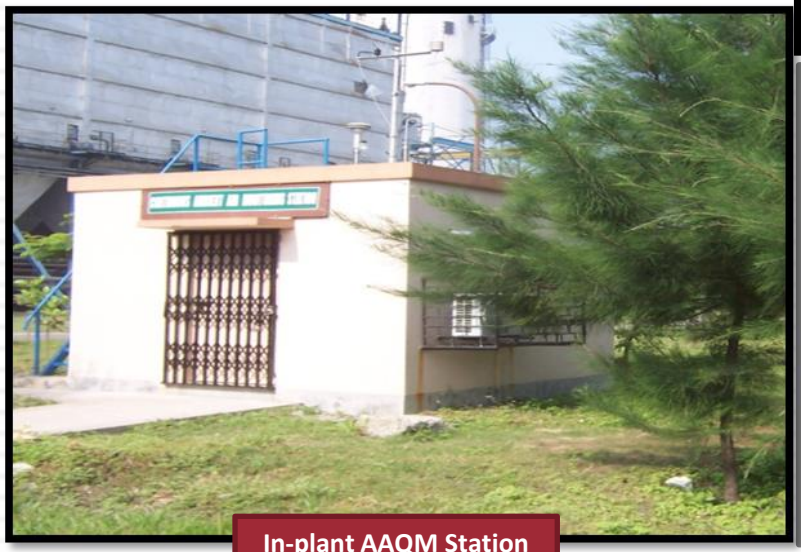
Environment Management
Emission

Sl. No.	Systems implemented
1	Ammonia Dosing System
2	DE & DS System
3	Dry Fog System
4	Water Sprinkler System



Ammonia Dosing

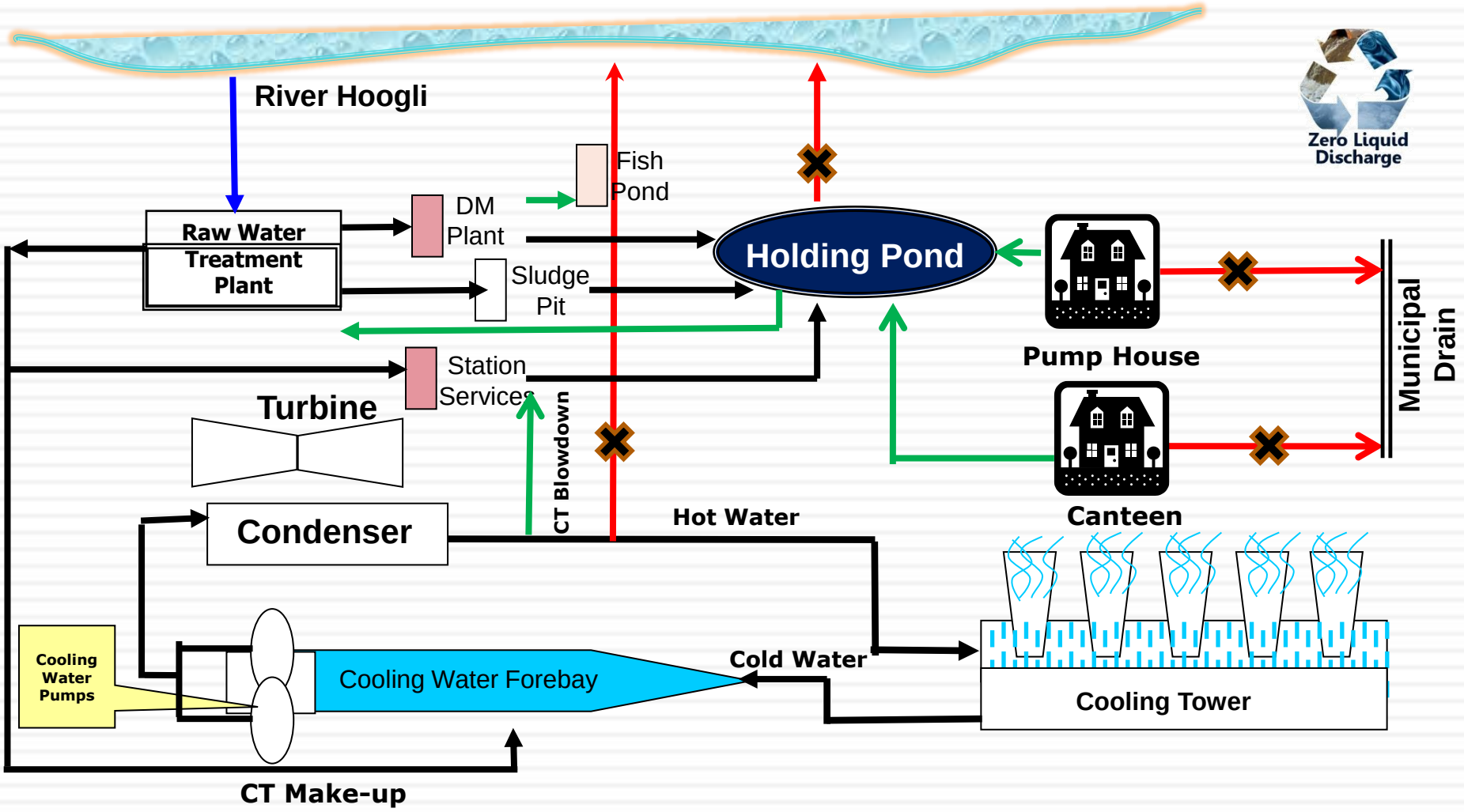
Dry fog system at Wagon Tippler



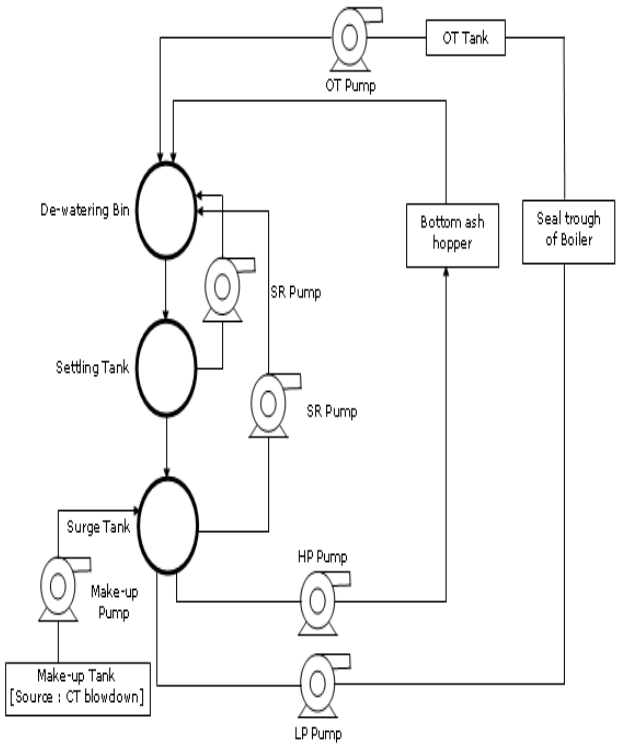
In-plant AAQM Station

Online Stack Monitoring

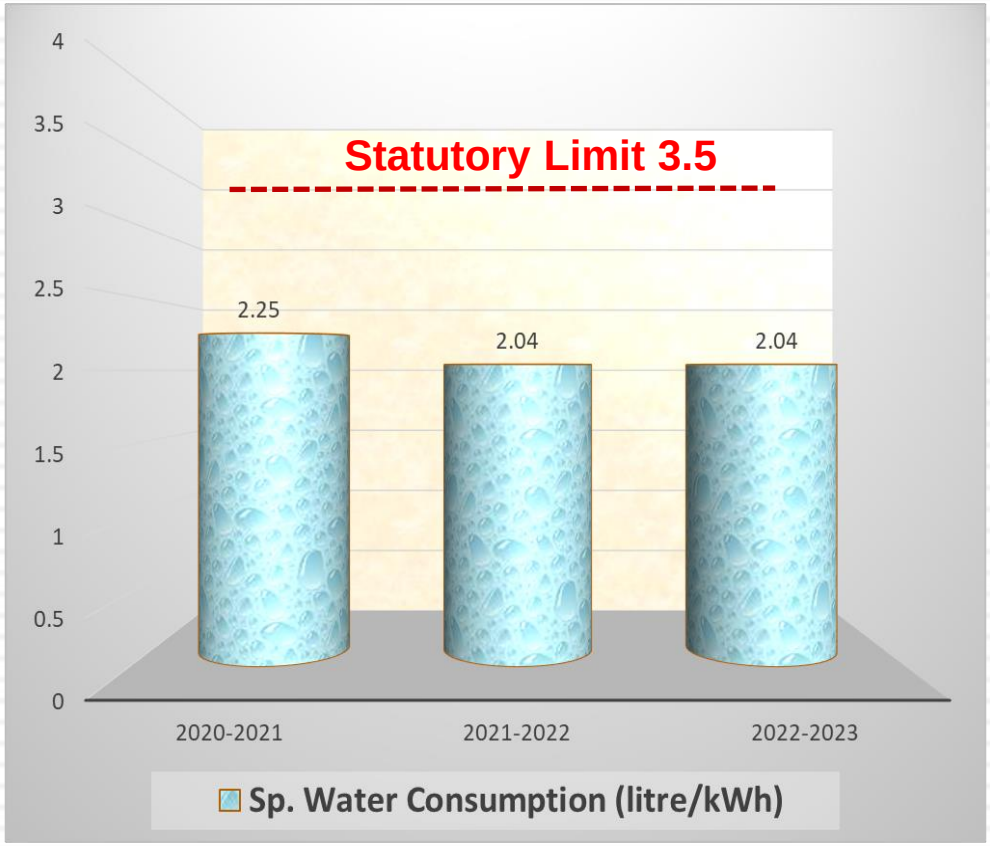
Environment Management
Water



Environment Management
Water



Zero Discharge Bottom Ash System



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Best Practices in the Plant

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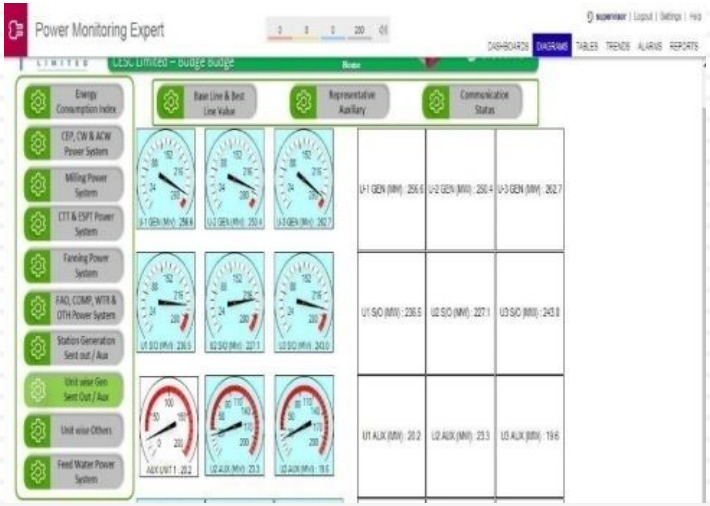

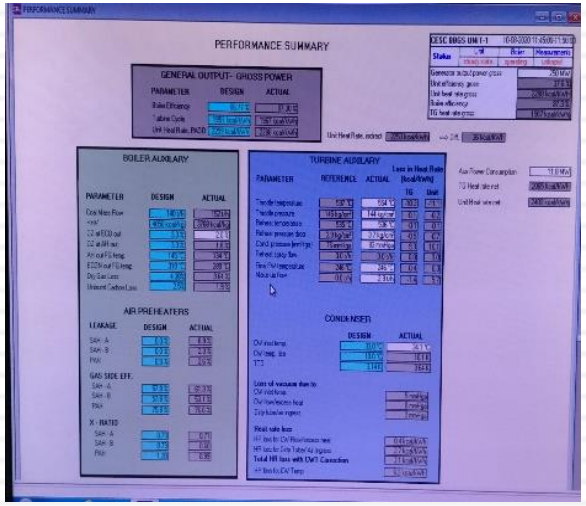

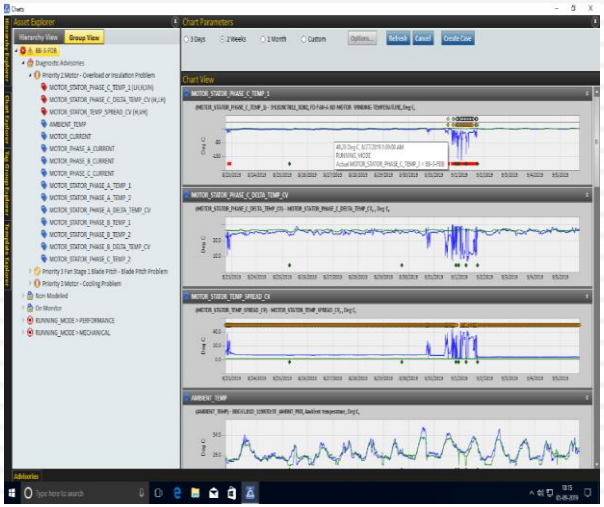

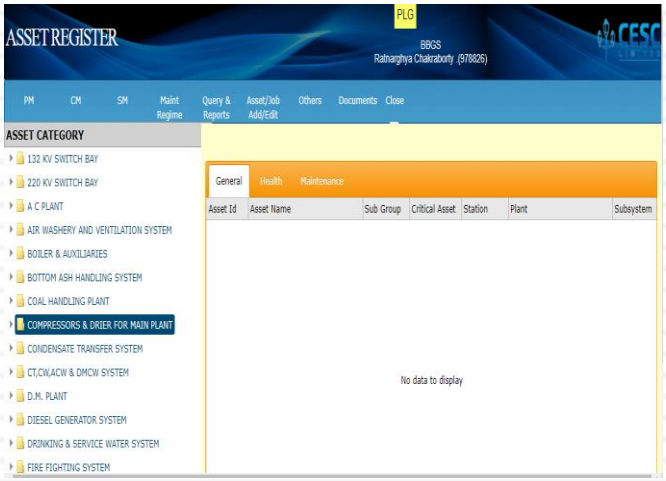

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Best Practices in the Plant

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Solar Powered Air to Water Generator

E- Vehicles

GREEN BUILDING

SPICE GARDEN

BUTTERFLY GARDEN

URBAN FOREST (MIYAWAKI)

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Team work, Employee Involvement & Monitoring

CESC LIMITED

- *Main Plant Operation & Fuel-Ash Operation Departments in Budge Budge Generating Station are given separate APC target in each FY.*
- *All Departments along with individual officers are given separate targets for Energy Conservation programmes.*
- *All Employees are encouraged to participate in "Kaizens". Certificates & token appreciation money are awarded to the participants.*
- *Cross functional teams are formed to implement different projects*
- *Awareness programme carried out throughout the year through Training, Seminars & Benchmarking visits*
- *Awareness building campaign carried out for local communities through participation in Science Fair, Knowledge Carnival etc.*
- *Daily early morning SMS is generated to Top Management regarding critical KPIs including Heat-rate & APC.*
- *Heatrate & APC are thoroughly discussed in Management Review Meeting chaired by the Vice President. Gap analysis, CAPA are discussed, budgetary provision made (if required) and timeline fixed for implementation.*

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Implementation of ISO certification

CESC LIMITED

Aspect	ISO Certification	Valid Till
Quality	ISO 9001:2015	01.06.24
Environment	ISO 14001:2015	01.06.24
Safety	ISO 45001:2018	01.06.24
Energy	ISO 50001:2018	26.02.25
Information Security	ISO 27001:2013	30.10.25

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Awards & Accolades

CESC LIMITED

CII national Energy Efficiency Circle Competition (1st Runner-up)

CII National Award on Water Management 2019

India Smart Grid Forum Innovation Awards 2023 (Gold)

EEF Global Award on Water Conservation

Excellent Energy Efficient Unit 2018 from CII

International Convention on Quality Control Circles Award

Asian Power Award 2017

Best Power Plant in India By CSE

ICC Environment Excellence Award

National Energy Conservation Award 2016 (2nd)

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Thank you

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