RP - Sanjiv Goenka Group

CESC LIMITED

Water Efficiency in Thermal Power Sector

-Sustainable Environment Management

Ashis Saha

General Manager

Budge Budge Generating Station

CESC Limited

About CESC Limited & RP-SG Group…

- CESC Ltd, a 115 year old fully integrated power utility
- 567 sq. km distribution license area
- 2.9 million consumer base
- 3 Thermal plants - 1,125 MW capacity
- 20,400 circuit Km T&D network
- 2X300 MW TPP – Haldia & Chandrapur
- 40 MW AFBC plant at Asansol
- 9 MW Solar power project in Gujarat
- 50 MW Wind Power Plant in Rajasthan & Gujarat

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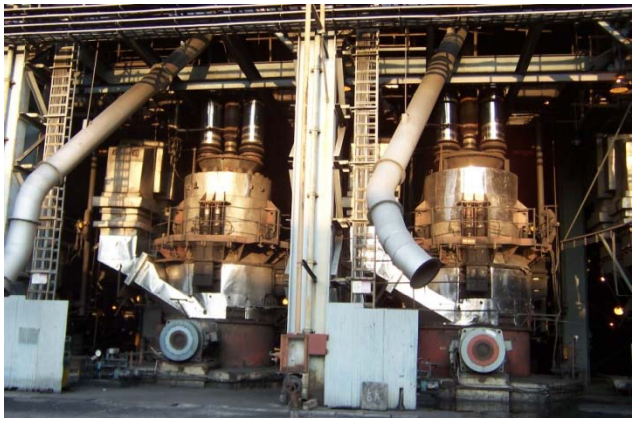
Budge Budge Generating Station

Basic Overview of Power Generation Processes



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Budge Budge Generating Station

Challenges before us in Design Stage in 1995:

In CESC Power Generation sector existing plants were having once through condenser cooling system, but for BBGS, MOEF came up with following norms:

- The temperature rise of the cooling water to be restricted by 5 Deg C.
- Any Power plant by the side of river Ganges should come up with Cooling Tower
- Cooling Tower blow down water heavy metal contents should be limited within prescribed limits.

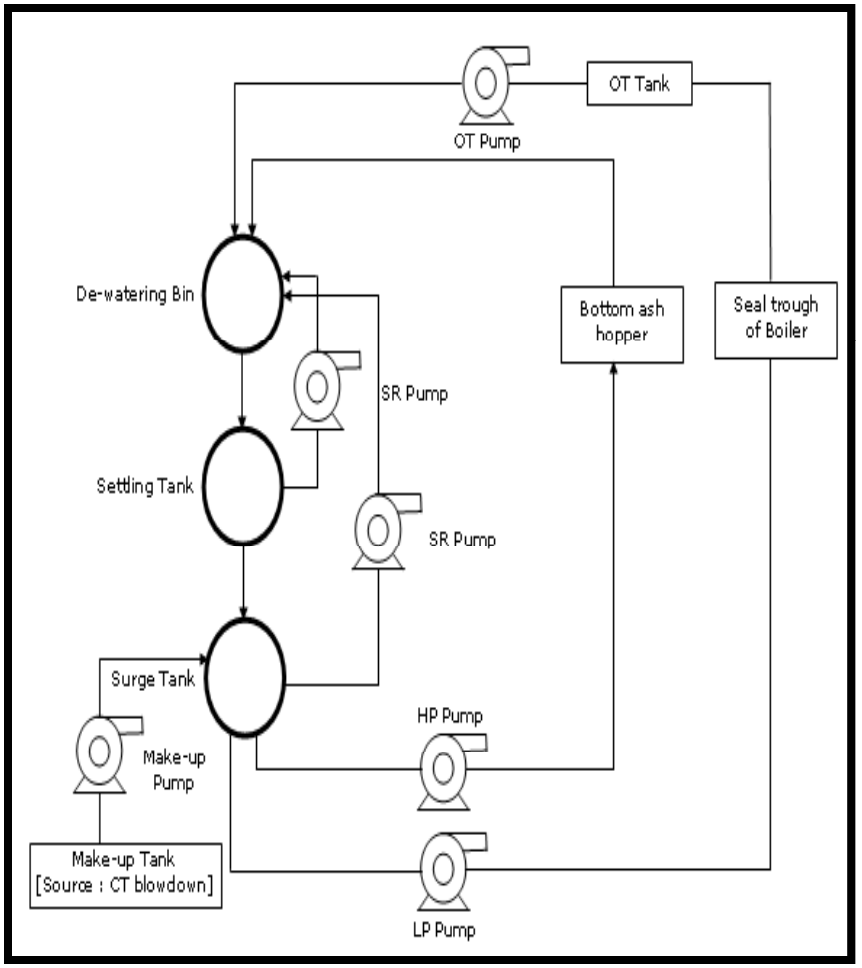
Basic Features of Water Management in BBGS

Technology adoption and Initiatives towards Zero Effluent Discharge Power Station

- Zero Discharge System of Bottom Ash Handling
- Dry fly ash evacuation through dense phase system
- Emergency fly ash disposal by HCSD system
- All Volatile Treatment of Boiler water
- Control of Effluent discharge from Raw/DM water treatment Plant
- Use of CT-CW blow-down as service water
- Closed cycle cooling tower with a COC of 6
- Holding Pond for storage, settlement and recycling of Plant Effluent

Bottom Ash Management (Zero Discharge System)

Bottom Ash is transported as a slurry by mixing water to it. The water is recycled for re-use with only make up water being added to account for the system losses.



Fly Ash Evacuation And High Concentration Slurry System

Fly ash evacuation done through pneumatic dense phase system.

HCSD System: An area has been demarcated for ash disposal in case of exigency by means of High Concentration Slurry disposal system. HCSD system is very effective for ash conveying as very little amount of water (40:60) is being added to make the high concentrated slurry which reduces the water consumption to a considerable extent. The slurry is transported by pumps through pipelines. The rated flow is 55.5 cubic meter per hour. Other benefits of HCSD system includes **no leaching** of ash water as the ash instantly forms mounds and does not have any fugitive emission.

All Volatile Treatment of Boiler water

Requirement :

To produce and maintain a stable protective oxide film on Boiler drum and tube surfaces This can be achieved through: Controlled level of Alkali, Very low level of Oxygen, Low level of potential acid forming impurities such as Cl^- (Less than 0.02 ppm)

Previous System:

a) **Conventional congruent Phosphate-ph control system by dosing Tri-Sodium & Di-Sodium Phosphate (in the ratio 2.6 : 1) and pH maintained between 9.5 to 10.**
b) **A considerable degree of "Phosphate hide out" often occurs when pressure exceeds 102 kg/cm2 in high heat flux zone**
c) **This increases soluble silicates in Boiler water & this has to be taken care by blowing down Drum water**
d) **It entails massive energy loss**

Present System :

a) **Application of "All Volatile Chemicals" (Zero solid treatment)**
b) **pH is maintained between 9.4 & 9.7 by dozing Ammonia.**
c) **Hydrazine-hydrate is also dozed as an Oxygen scavenger.**
d) **The reaction is very slow. Residual hydrazine of more than 40 ppb to 200 ppb max is maintained at Economiser inlet & Ammonia 1-2 ppm in steam circuit.**

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Benefits:

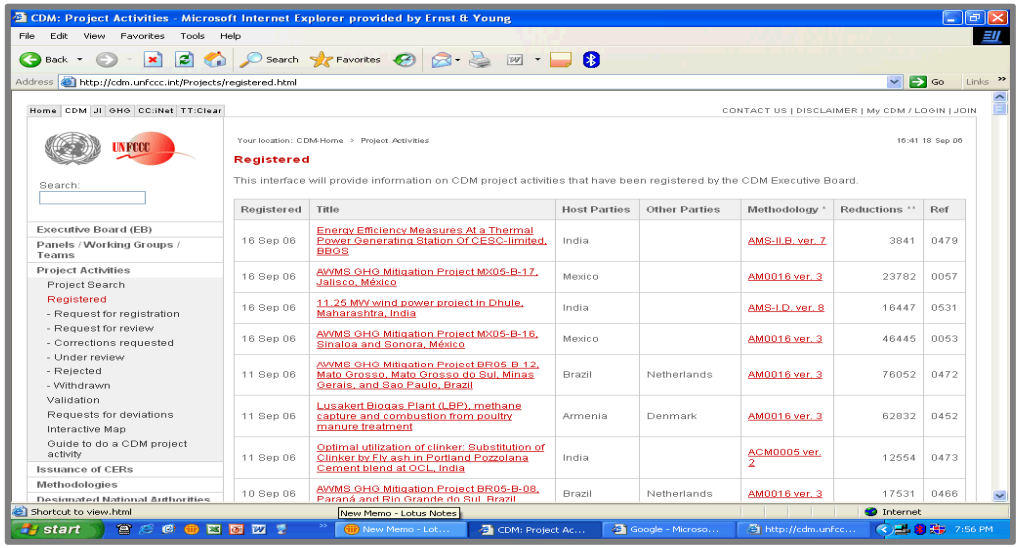
Significant savings in :

a) **D.M. water**
b) **Associated chemicals**
c) **Thermal energy by discontinuing Boiler blow down**
d) **Electrical energy because boiler feed Pump handles less water**

Replacing existing HP Dosing by 'All Volatile Chemical Treatment' resulting in reduction of boiler efficiency loss due to blowdown

Baseline Emissions Reduced = 3091 t of CO2 equivalent.

*BBGS is the **Globally FIRST** Thermal Power plant to register 2 of its Energy saving projects with UNFCCC as CDM projects and earned 30042 CER's till 2012.*



CESC scores global first with green initiative

TIMES NEWS NETWORK

Kolkata: The electricity that you get has just got greener. Not that city-based power utility has switched from coal to renewables, but it has taken significant strides in reducing greenhouse gases emitted by power plants.

In doing so, it has scored a global first. CESC has become the only thermal power generation company to be rewarded by the United Nations Framework Convention on Climate Change (UNFCCC) for its efforts to better the environment. UNFCCC is the nodal agency for monitoring greenhouse gas reduction under the Kyoto Protocol."UNFCCC ratified the energy efficiency programme at Budge Budge thermal unit on September 16. The project has earned CESC 3,894 carbon emission reduction (CER) notes that can be traded for cash," said RPG Enterprises vice-president (corporate finance) B L Chandak.

CESC was given the award by UNFCCC for its effort to reduce greenhouse gases

With CER trading at 12-15, CESC foreign exchange earnings could touch 600,000 in a couple of years if two more CDM projects with potential of 40,000 CER are approved.

But more than revenues, it will help CESC pitch itself as an eco-sensitive company. "Projecting a 'green' image is key to gaining global acceptance. Not only will CESC be seen as a company that practices corporate responsibility, it will impress billion dollar venture funds like CalPER's," Chandak explained.CESC has lined up investment worth over Rs 5,000 crore over the next five years.

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Other water Saving Initiatives

Control of Inclined Surface settler de-sludging in RWTP

ISS de-sludging procedural change from continuous to intermittent have made considerable water savings. The sludge is pumped by sludge pump to sludge pond from where, after settlement the water is recycled back to the system through holding pond .

Control of DM chain Regeneration Effluent

1. ACF regeneration effluent directed towards holding pond.
2. Acid & Alkali effluents during chain regeneration is neutralized & then directed to a **fish pond where we have Pisciculture.**

Increase of COC of cooling water

Dosing of specialty chemicals, biocides, sulphuric acid and sodium hypochlorite in CT-CW water maintaining Ca++ ion concentration as high as 600 ppm. Online monitoring of critical parameters are in place.

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Use of CT-CW Blow-down

CT-CW blow-down water is used in plant for re-use in the following purposes:

1. Road Washing
2. Bottom ash system make-up
3. High Concentration Slurry System
4. Sprinkling water in coal stack
5. Dry fog system for abating fugitive emission

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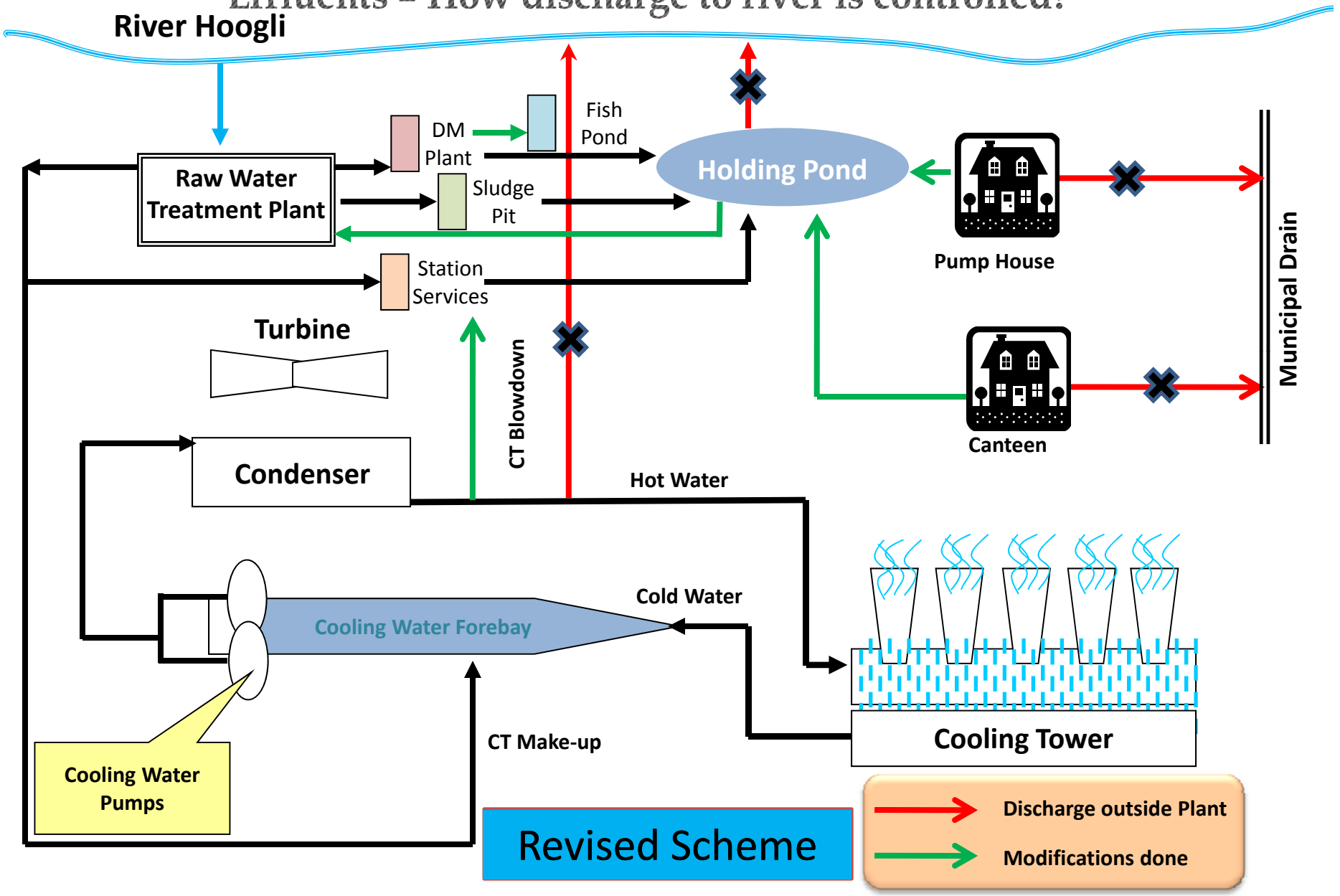
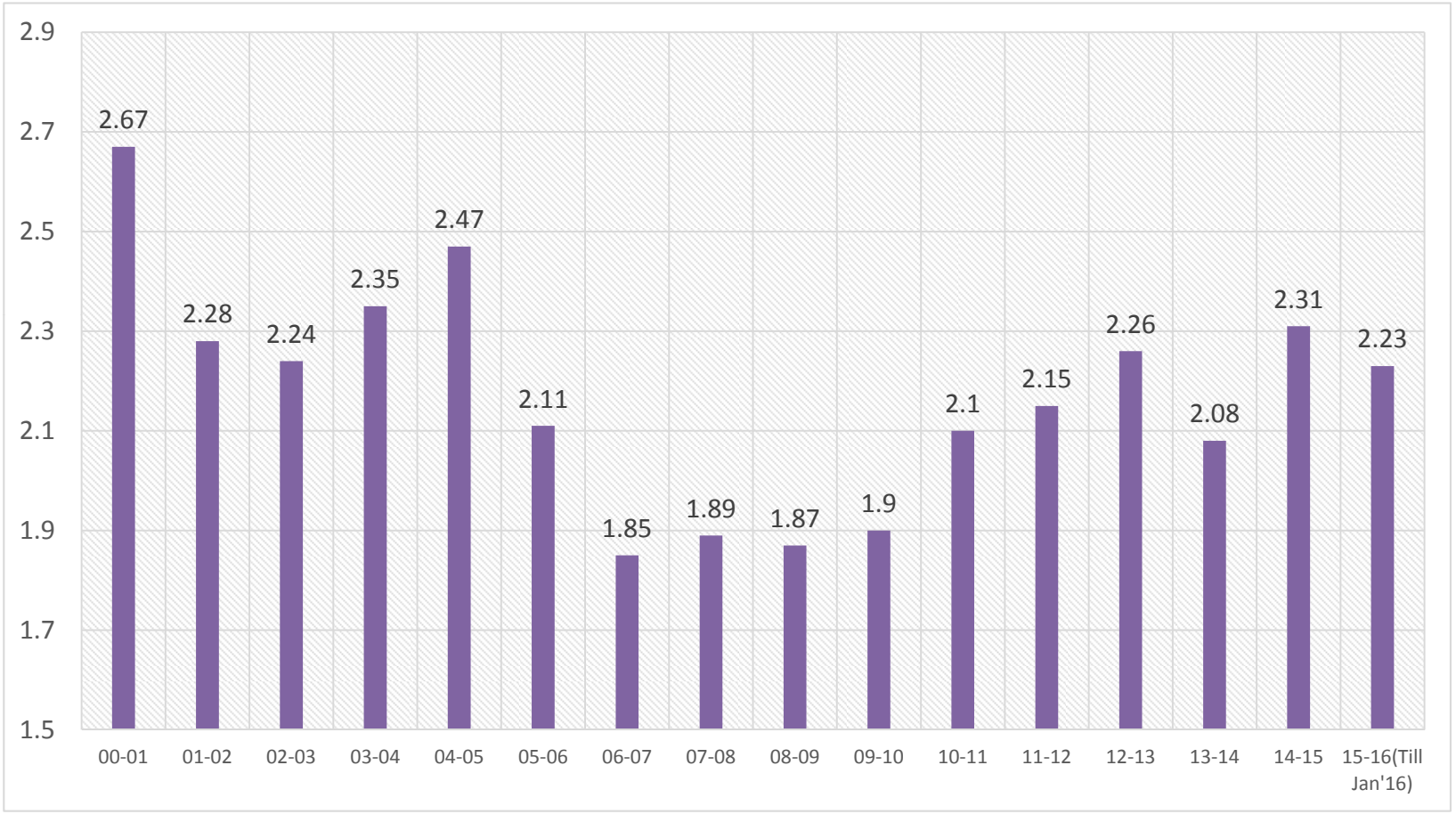
Effluents – How discharge to river is controlled?



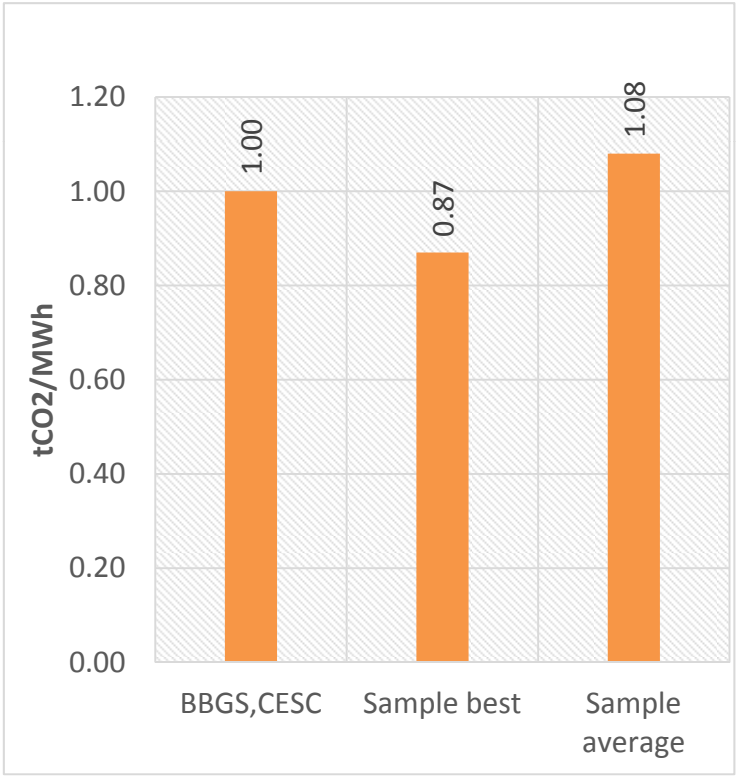
Water Consumption Trend

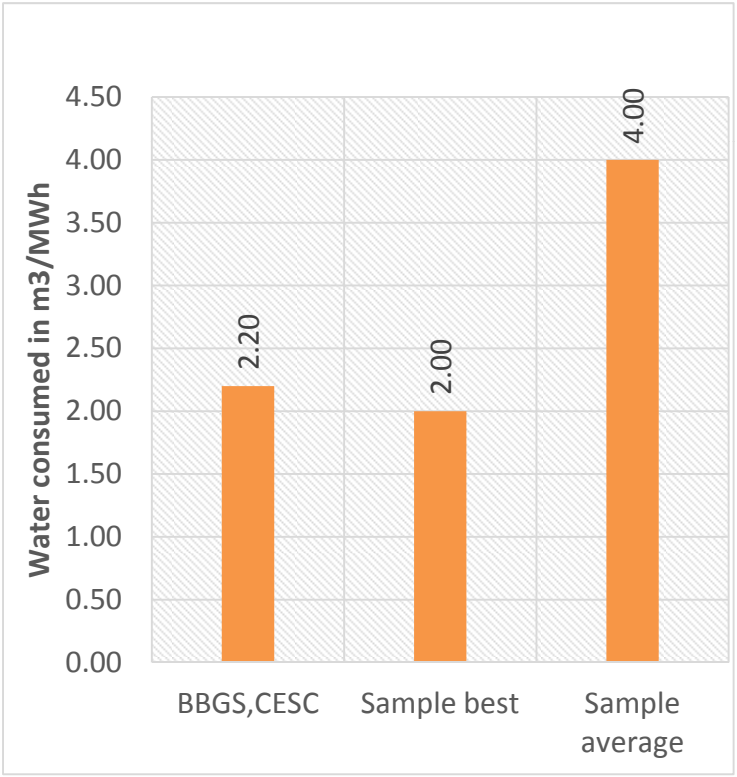


Sp. Water Consumption (Ltr/Kwh)

Acknowledgement by CSE

A study conducted by Centre for Science and environment (Green Rating Project) on 47 coal based thermal power plants in India revealed some interesting facts.





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Thank You