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stoppwatch

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Educating & Informing Stakeholders on Energy, Environment & Thermal Power Plants

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Relevant Websites & Contacts

Under Secretary,
Right to Information (RTI) Cell,
Ministry of Environment, Forests & Climate Change,
Indira Paryavaran Bhavan,
Jor Bagh Road,
New Delhi - 110 003,
India

Tel: 011-24695334
Email: us.rti-mef@nic.in

Web: http://envfor.nic.in/

National Green Tribunal

Faridkot House,
Copernicus Marg,
New Delhi - 110 001
India

Tel: 011-23043501

Fax: 011-23077931

Email: rg.ngt@nic.in

Website: http://www.greentribunal.gov.in/

BOILER TECHNOLOGY: PART III

ULTRA-SUPERCRITICAL TECHNOLOGY

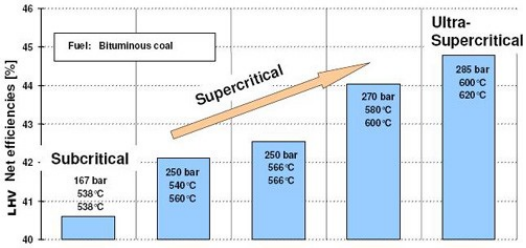
Steam cycle forms the heart of thermal power plants. Typically, in a coal-based thermal power plant, pulverised coal is fed into a giant industrial furnace from which the heat is transferred to boiler. This process heats up the water in the boiler to create steam. The steam is then transferred to turbines, which is linked with a generator to produce electricity. The steam from the turbine is condensed back into water and returned to the boiler for reheating.

The components of an ultra-super critical power production is similar to that of a super-critical technology.

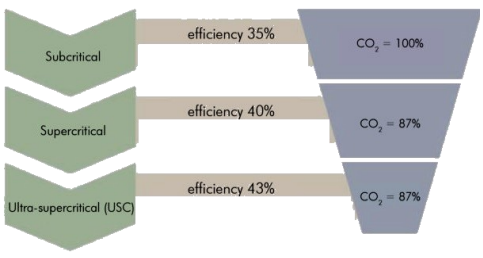
In ultra-super critical (USC) power plants, extreme temperature (620°C) and pressure (300 bar) in the boiler heat the water for converting it to super critical steam. This super critical steam is more efficient compared to the steam from sub/super–critical technologies as they drive the giant turbines with increased efficiency. But, the upfront cost of ultra-super critical technology is 20%–30% more than a traditional subcritical unit. However, this can be offset through improved thermal efficiency and reduced emissions. The latter can be accounted to much less usage of coal per unit, thereby generating lesser emissions per MegaWatt of power output.

The above amount to:

- Reduced letting out of of sulphur dioxide (SO2), nitrogen oxide (NO2), Mercury (Hg), carbon dioxide (CO2), and Particulate Matter (PM).
- Reduced production of solid waste products such as fly ash, bottom ash.
- Reduced requirements for materials used in environment impact control equipments such as alka-line solutions in Flue Gas Desulphurisation, activated carbon in waste water treatment plant, etc.



Source: mcensustainableenergy.pbworks.com



Source: ee.co.za

A report by Siemens states that 1% gain in efficiency for a typical 700MW plant reduces 30-year lifetime emissions by 2,000 Tons of NOx, 2,000 Tons of SO_2, 500 Tons of Particulate Matters and 2.5 million Tons of CO_2.

The visual graph on the left highlights percentages of efficiency and CO2 reduction corresponding to sub/super/ultra-super boiler technologies. It clearly shows that super and ultra-super critical technologies are most efficient with reduced carbon emission, making these technologies environment friendly.

The upcoming thermal power plants should opt for these technologies and existing thermal power plants should consider retro-fitting of sub critical with super/ultra-super critical technologies, for their own benefit and environmental benefits.

However, design challenges in USC boilers persists and are related to thick-walled steam headers, super heaters and the walls. The problems are connected with the selection of materials to develop the components and costs related to manufacturing .

With the above technological advancements, the focus of power equipment manufacturers should be on developing equipment using newer alloys and materials in order to withstand higher temperature and pressure exerted by the steam.

Coal cleaning by 'washing' has been standard practice in developed countries for some time. It reduces emissions of ash and sulfur dioxide when the coal is burned.

Private power plants' PLF seen rising in FY19 on CEA estimate

The Central Electricity Authority (CEA) has set the electricity generation target from conventional sources, which include coal, gas, nuclear and hydro power plants, at 126,000 million units (MU) for FY19, 6.7% higher than power produced from these sources in FY18.

In order to achieve this target, state and private power plants would have to raise their annual production by 9.2% and 13.4%, respectively, while generation from central government-owned plants would slip by 0.7%, data from the CEA report showed.

The estimate sounds positive for private power plants which are running at very low utilisation levels due to less-than-expected growth in power demand. The plant load factor (PLF) for central government-owned thermal power plants in FY18 was 72.4%, while private power plants were running at 55.1% in the same period.

PLFs of less than 60% make it difficult to service debts. Stressed assets in the power sector consist of 34 private power plants with an outstanding debt of Rs 1.74 lakh crore.

The power generation programme was designed on the actual power generation trends from previous years, planned maintenance schedules and new capacity additions anticipated in the new financial year, the statutory body said. Import from Bhutan is expected to remain unchanged at 5BU in FY 19.

Uttar Pradesh is expected to produce 129,423 MU of power, the highest in the country. It would be followed by Maharashtra at 132,643 MU and Chhattisgarh at 111,858 MU.

Although renewable energy units (mainly solar and wind) have rampantly been added in the past few years, currently 19% of the total installed generation capacity, their real contribution to the country's electricity generation remains very low. Renewables produced only 75,606 MU, or 7% of total power generated in the country in the first 11 months of FY18.

Given the irregular and unpredictable nature of solar and wind power, coupled with electricity storage prices remaining high, coal-based power is being seen to be the viable electricity source for at least another couple of decades. The government has decided to have 175,000 MW of installed renewable energy capacity by 2022, and use 40% of energy requirement through renewable sources by 2030.

Financial express April 3, 2018

Meghalaya CM meets Goyal, discusses coal mining ban issue

Meghalaya Chief Minister Conrad Sangma today met Union CoalMinister Piyush Goyal in New Delhi and discussed the coal mining ban that has hit the northeastern state hard for the past four years.

Goyal assured that he would look into the grievance of the coal miners, the Chief Minister's Office said in a statement here

The National Green Tribunal (NGT) had banned mining of coal in Meghalaya in 2014 after it received petitions on rampant violation of environment norms and utter disregard for safety measures by miners.

The Union minister has assured finding an early solution to the problem, Sangmawas quoted as saying in the statement.

"Coal mining is important for the state and the region. It is important that a balance is struck considering the fragile environment. We discussed on ways to initiate coal mining in the state. Sangma said.

Sangma said Goyal has given a positive response to the suggestions and ideas put forward by him and his cabinet colleagues.

Sangma along with PWD Minister Prestone Tynsong, Tourism Minister Metbah Lyngdoh and Sports and Youth Affairs Minister Banteidor Lyngdoh, called on Goyal at his office today.

Last week, the state cabinet had decided to pursue a resolution passed by the state Assembly to urge Centre s intervention for resolving the ban on coal mining in the state.

In 2015, the Assembly had unanimously adopted a resolution to urge the Centre to invoke Para 12 A (b) of the Sixth Schedule through a Presidential notification to exempt Meghalaya from the central laws related to mining which include the Mines and Minerals (Development and Regulations) Act, and the Coal Mines (Nationalisation) Act.

ETEnergy world April 16, 2018

U.S. ETHANOL GROUPS BRISTLE AS EPA FREES REFINERS FROM BIOFUELS LAW

The U.S. Environmental Protection Agency has approved the request of 25 small refineries to be exempted from the nation's biofuels laws, an agency source said on Wednesday, marking a big increase from previous years and triggering an outcry from farm groups worried the move will hurt ethanol demand.

The decade-old law requires refiners to blend increasing amounts of biofuels like corn-based ethanol into the nation's fuel each year, or purchase blending credits from other companies - a policy Intended to provide a boost to Midwestern corn growers, reduce pollution and cut fuel imports.

In the past, the EPA has issued between six and eight waivers from the RFS per year to small refining operations of less than 75,000 barrels per day that can demonstrate they are struggling financially to comply, according to a former official familiar with the waiver program under past administrations.

This time that number has ballooned. "While the applications continue to come in, EPA has granted roughly 25 so far," said the EPA source, who asked not to be named discussing the waivers. The source said the waivers cover the refineries' obligations for 2017, which would come due this year.

A spokeswoman for the EPA, Liz Bowman, said nothing had changed under the administration of President Donald Trump. "The criteria used to grant waivers has not changed since previous administrations," she said.

Biofuel groups blasted the EPA for apparently expanding the use of the hardship waivers, with two of them calling on the agency to immediately halt issuing new exemptions until the public gets a chance to review the agency's actions.

EPA does not disclose the waiver recipients, arguing the information is business confidential.

"EPA appears to be operating under the cover of night in a secretive process where the agency acts as judge, jury, and executioner to effectively reduce the overall demand for biofuels in this country absent any public discourse," said Emily Skor, CEO of biofuel producer Growth Energy.

The National Farmers Union said it was particularly incensed by the waiver Andeavor had acquired.

"Hardship waivers were not designed for large corporations who net billions in profit each year. The National Farmers Union (NFU) is deeply disturbed by these reports, and requests that EPA cease granting these waivers," it said in a letter to EPA Administrator Scott Pruitt.

The news of the number of waivers EPA has granted drove down prices for biofuel blending credits to their lowest levels since 2015, on fears that refiners that typically have to buy them would sell them instead, traders said.

Lower demand for ethanol could hurt biofuel and agricultural companies like Archer Daniels Midland Co, POET and Green Plains Inc.

Refiners have applied for the waivers in larger numbers after a federal appeals court ruling last year that said the EPA must expand the guidelines for approving them.

They have also been encouraged to apply by the Trump administration's recent efforts to broker a deal between the oil and corn industries to reduce the costs of the RFS, industry sources said. Those talks have not yielded a deal.

Refiners granted exemptions win in two ways: They no longer have to blend biofuels or buy credits to comply with the law, and they can sell any credits they had previously purchased to use for compliance.

Prices of U.S. renewable fuel (D6) credits plunged to as low as 29 cents each on Wednesday, the first time they fell below 30 cents since September 2015, according to the Oil Price Information Service.

U.S. Senator Chuck Grassley, a Republican who represents Iowa - the nation's largest corn-growing state - and who backs the biofuels industry, said late on Tuesday that the expansion of the waiver program raised legal questions.

Giving Andeavor "a free pass when other companies are required to follow the law of the land isn't just unfair, it may be illegal," Grassley told Reuters late Tuesday.

Brooke Coleman, head of the Advanced Biofuels Business Council, said he was concerned EPA's Pruitt was using the waivers to gut a program he dislikes.

"Mr. Pruitt is eviscerating a law the president supports – in complete secrecy," he said, pointing out Trump had campaigned on a promise to support the RFS.

Reuters April 4, 2018

A

cooling tower

is a heat rejection device that rejects waste heat to the atmosphere through the ***cooling*** *of a water stream to a lower temperature.*

Citizen consumer and civic Action Group (CAG)

New No. 246, Old No. 277-B,
TTK Road (J.J. Road),
Alwarpet,
Chennai 600 018

Phone: 91-44-24660387
Telefax: 91-44-24994458
Email: tpp@cag.org.in

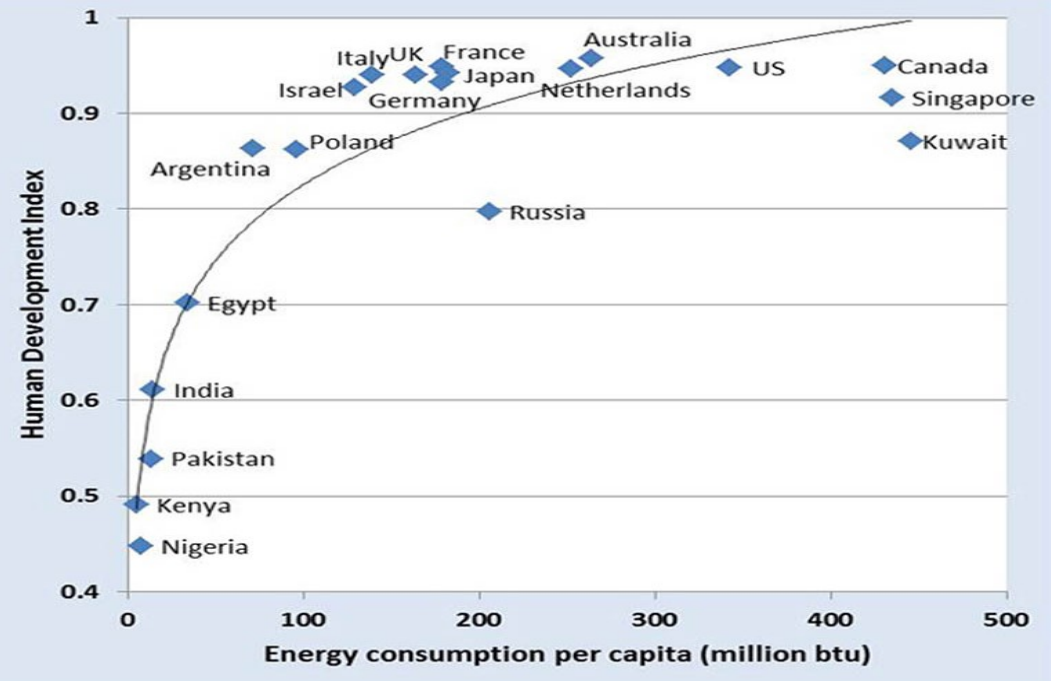
www.cag.org.in

http://thermalwatch.org.in/

30 years of CAG
Citizen consumer and civic Action Group

Citizen consumer and civic Action Group (CAG) is a non-profit, non-political and professional organization that works towards protecting citizens' rights in consumer and environmental issues and promoting good governance processes including transparency, accountability and participatory decision making.

Relation of Human Development and Energy consumption



Regulations and Cases

- Shobhit Chauhan Vs Union of India & Ors, "Environmental clearance was granted for internation exhibition cum convention centre in sub city of Dwarka" *Original Application No 732 of 2017* 4th April 2018 Click here
- *Environment (Protection) Amendment Rules 2018* Development of Emission Standards for SO2 & NOX for Limestone kiln, Ceramic, Foundary, Glass and Reheating Furnaces. Available at: Click here

Publications

- J.Thamilselvi, P. Balamurugan (2018) Extraction of Alumina from coal fly ash. *International Research Journal of Engineering and Technology,* [online] Volume 5(04) Available at : Click here [Accessed 30 Apr 2018]
- Quinhua. X (2018) *Quantitative to qualitative shift in China's International energy cooperation.* Exchange and cooperation [online] Renmin University of China, p50-54 Available at : Click here [Accessed 30 Apr 2018]

Miscellaneous

- Workshop on "International Financial Institutions (IFIs) and Asian Infrastructure Investment Bank (AIIB)" on Saturday, 2 June 2018, in Chennai, India Click here
- International Conference on Nanotechnology, Renewable Materials Engineering & Environmental Engineering will be held on 27th May at Ooty, India Click here