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## Relevant Websites & Contacts

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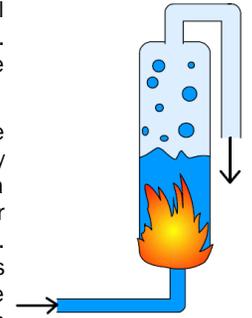
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## BOILER TECHNOLOGY: PART I SUB-CRITICAL TECHNOLOGY

A **boiler** or steam generator is an important component in a coal fired thermal power plant. It is used to produce steam by applying heat energy to water. A boiler incorporates a furnace in order to burn the fossil fuel (coal, gas, waste etc.) and generate heat which is transferred to water to make steam.

Essentially, it is a huge vessel which is capable of transferring heat from one side to other side and as well hold a known quantity of water. The heat energy is supplied from outside the vessel, where the given fuel (coal) is burnt by a process called combustion. The produced heat is transferred to the water through the container walls. This heat transfer boils and evaporates the water. As a result of evaporation, the steam/vapour produced passes through tubes to the turbine, where the steam/heat energy is used to rotate the blades of the turbine which converts the heat energy into usable electrical energy. As heat is used up in electricity production, the temperature of the steam reduces and condenses. This condensed water from the turbine is re-circulated to the boiler along with fresh feed water. With this basic function in hand, boiler technologies can be classified into sub-critical, super critical and ultra super critical technologies. The major differences between the above three are a) pressure of the steam produced in the boiler and b) structural changes to meet up this pressure change.



Also, based on type of heating boiler can be either water tube boiler or fire tube boiler; a) Water tube boiler is where the water passes through tubes and heated from outside. b) Fire tube boiler is where the hot gases from combustion pass through tubes through a sealed container filled with water

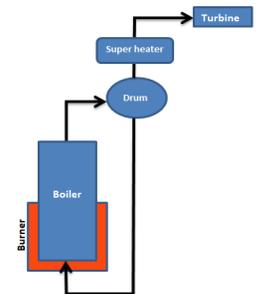
**Critical pressure:** Critical pressure is the point where the liquid and gas phase of the evaporating water exists together. **Super heater** is the structure which converts the wet steam into dry steam (free of any moisture in the steam).

### Sub-critical technology:

In sub-critical boiler technology, the pressure inside the boiler is less than the critical pressure, thus it produces sub-critical steam. This sub-critical steam (mixture of liquid water and gas steam) enters a structure called drum. In this drum the liquid and gas is separated from each other and the steam (free of liquid water) is sent to the super heater. From the super heater, the dry steam is sent to the turbine area for power production.

As, this technology uses drum for separation of liquid and gas phase, it is also called as drum type boiler technology. The pressure inside the boiler here is usually 170 **bar** with **boiler efficiency** ranging from 36% - 37%. This makes the efficiency of sub-critical technology very low compared to the other two technologies mentioned above. However, the cost per unit production for sub-critical will be higher. The coal consumption is also higher, that which results in higher exhaust gas and ash production. Since the residue such as gas and ash are very high this results in higher emission of pollutants like NO<sub>x</sub>, SO<sub>2</sub>, CO<sub>2</sub>, etc.,

The water consumption per MWh of power produced also increases with lesser efficiency. Auxiliary power consumption, which is the power consumed by the power plant itself to meet its electrical demand also shoots up drastically. Considering all the above disadvantages and limitations in the drum structure size, this technology is limited to power plant capacity less than or equal to 600 MW only. The other two technologies; Super critical and Ultra super critical boiler technologies will be briefed in the upcoming newsletters.



## CLOSURE OF BATHINDA & ROPAR THERMAL PLANTS OPPOSED

In accordance with the decision of the central executive of the PSEB Engineers' Association (PSEBA), the power engineers of central zone held a protest meeting at the zonal headquarters on Ferozepur Road here today against the closure of state sector thermal plants at Bathinda and Ropar in a hurried manner.

Addressing the meeting attended by over 150 engineers, PSEBA President Sanjeev Sood, along with other functionaries including vice-president Harjinder Singh Bansal and general secretary Devinder Goyal, said while the Bathinda and Ropar thermal plants have been decided to be closed down as per the guidelines of the Central Electricity Authority, the said guidelines nowhere mandated the closure of re-heat plants (both Bathinda and Ropar thermal plants are re-heat thermal plants).

The power engineers pointed out that the CEA guidelines only directed that non-reheat plants

(less than 100 MW) be closed. Further, the guidelines advised that even in case of non-reheat plants - which have been renovated - should be run for at least 10 years more.

Sood said policy makers in Punjab had decided to close down Bathinda thermal plant even when Rs715 crore had been spent on the renovation of its units and the life of renovated units 1 and 2 has been extended up to 2022 and that of renovated units 3 and 4 up to 2029.

Speakers said while unwarranted haste was being shown in closing the thermal plants, no action was being taken to execute the Ultra Supercritical Thermal Plant (3x800 MW) planned at Ropar. They demanded that the closure of Bathinda and Ropar thermal plants be considered only after commissioning 3x800 MW Ultra Supercritical Thermal Plant at Ropar.

It was also pointed out that the PSPCL can only save hard cash of Rs18 crore a year in case the Bathinda thermal plant was

closed, but will have to shell out much more in case of the non-availability of private thermals due to breakdown or other reasons, especially in paddy/summer season, when the outside power was also very costly as had happened recently, when the Talwandi Sabo thermal plant was shut down due to a fire incident.

Deploing the poor financial health of the power utility, the protesting engineers said it was unheard of in the annals of history of PSPCL/PSTCL, that the monthly salary of its employees had not been disbursed by the end of same month. "Despite acute shortage of staff, engineers are performing beyond their duties to serve the power consumers of the state. However, all their efforts are negated, when the company fails to pay even the monthly salary in time, causing de-motivation in all employees," they said.

[The Tribune](#), February 7 2018

*Land degradation is undesirable human-induced change in the land, costs India 2.5% of its GDP in 2014-*

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## POWER FIRMS TO SPEND LESS

PSU power producers will invest less in 2018-19 on the back of a slow growth in generation from conventional sources and a fall in peak deficit.

In the budget papers, eight PSUs - National Thermal Power Corporation, National Hydroelectric Power Corporation, Damodar Valley Corporation, North Eastern Electric Power Corporation, Satluj Jal Vidyut Nigam, Tehri Hydro Development Corporation, Power Grid Corporation of India and Power Finance Corporation - are shown to invest Rs 53,468.66 crore in 2018-19.

The sum is 16.86 per cent lower than Rs 64,317.69 crore registered in the revised estimate of 2017-18. Thermal power producer NTPC constitutes bulk of the capital expenditure with a plan to invest Rs 22,300 crore, which is lower

20 per cent compared with the previous year.

"Tepid growth in power demand, low plant load factor for coal-based generation, coupled with reducing peak deficit is expected to result in lower investments in the conventional power generation space, which justifies the declining investments," Crisil said in a post budget research report.

Data from the Central Electricity Authority show electricity generation from conventional sources has grown at an average rate of 2.48 per cent between April and November. In contrast, the renewable energy generation growth has been 23.33 per cent in the same period.

The plant load factor, a measure of efficiency and capacity utilisation of the generating units, has come down from 66.81 per cent in April to 59.97 per cent in

December at an all-India level. While peak power demand as of December 2017 was 16,1967 MW, supply was close at 15,7394 MW.

The total budget outlay of Rs 15,000 crore for the power ministry rose marginally by 1 per cent compared with the last fiscal, the outlay for the ministry of new and renewable energy has increased 26 per cent to Rs 5,140 crore.

"No hike in Power Grid Corporation of India investment is expected to moderate growth in the transmission infrastructure. But, rise in budgetary allocation for the ministry of new and renewable energy is likely to drive higher investments in solar parks, canal top and rooftop solar PV plants," Crisil said.

[Telegraph India](#), February 03 2018

# CHINA, NOT TRUMP, DRIVES US COAL EXPORT REVIVAL

If China does seek a way to retaliate against US proposals to impose import curbs on steel and aluminium, then targeting President Donald Trump's favoured coal would be tempting.

One of Trump's key campaign promises in the 2016 election victory was to end the war on what he termed "beautiful, clean" coal. Figures released last week by the US Energy Information Administration (EIA) suggest he has met with some success.

US coal output surged the most in 16 years to reach 773 million short tonnes, equivalent to about 701 million metric tonnes, in 2017, the EIA said on February 16. Coal miners produced about 40.8 million tonnes more in 2017 than in 2016, the EIA said.

So far, so good for Trump. But the problem is that virtually all of the good news for US coal producers is on the export side—and this is mainly a China phenomenon.

US exports are expected to have risen 58 per cent in 2017 from the prior year to about 86.2 million tonnes, according to the EIA, with volumes to Asia nearly doubling to about 28.1 million tonnes. These figures largely tally with ship-tracking and port data compiled by Thomson Reuters Supply Chain and Commodity Forecasts. Seaborne US coal exports were about 79.4 million tonnes in 2017, up from 64.1 million in 2016, according to the vessel data.

China bought 5.95 million tonnes of US coal last year, more than double the 2.8 million of the prior year, while India remained the top Asian destination, with imports of 13 million tonnes, up from 8.7 million in 2016. Japan remained slightly ahead of China with imports of 6.9 million tonnes of US coal in 2017, up from 5.2 million the prior year, according to the vessel-tracking numbers.

These figures don't make it explicit that China is the main driver behind the burgeoning US coal exports, given that the world's largest importer of the polluting fuel only bought 3.15 million tonnes more from the United States last year than in 2016.

However, the main dynamic driving coal markets is Chinese import demand, and the 6.1 per cent gain in its imports in 2017 from the prior year has helped prices for both thermal and coking coal remain at robust levels.

The Asian benchmark thermal coal price, the Newcastle Weekly Index ended 2017 at \$103.88 a tonne, up 10 per cent from the end of 2016. While this represents a solid gain, it's worth noting that the low for 2017 was \$72.42 a tonne, and that the index spent the majority of the year trading above \$80—something it hadn't done since 2013.

## China's gift to U.S Coal

For US coal exports to be competitive in Asia, and also in Europe, a thermal coal price of at least \$70 a tonne is required, given the cost of mining, inland transportation and shipping in the United States.

Chinese import demand has ensured that thermal coal prices have remained in the sweet spot for US producers, allowing them to be competitive in Europe against exports from Colombia and South Africa, as well as in Asia.

The relatively high prices for coking coal, used in steel-making, has also helped US exporters of this higher-quality fuel, especially in India where they compete against supplies from top exporter Australia.

The outlook for US coal exports is largely price-dependent, and this in turn is largely a function of how much China imports. If China comes close in 2018 to importing the 270 million tonnes it did in 2017, then prices are likely to hold up, providing US miners with the opportunity to maintain, or possibly even grow their exports.

The current balance of risks is that China's coal imports will moderate somewhat this year as the country ramps up domestic output and continues its switch to less-polluting fuels such as natural gas.

If this is the case, then prices may drift lower toward the level where US exports start to struggle, especially in Asia.

There is also no current suggestion that China would retaliate against the United States by targeting coal, should Trump accept the recommendation of the US Commerce Department for a slew of curbs and tariffs on steel and aluminium imports from a variety of exporting countries. So far the Chinese response has been limited to saying the US trade review report is "baseless" and that it will take steps to protect its interests if the final decision affects China.

While a tit-for-tat trade war is unlikely to be in either the interests of China or the United States, putting barriers on US coal imports would be a powerful signal from Beijing, aimed straight at Trump's heartland.

[Reuters](#), February 20, 2018

*A **Bag Filter** is an air pollution control device that removes particulates out of air or gas released from combustion of coal for electricity generation. These are very efficient particulate collectors because of the dust cake formed on the surface of the bag which increases its collection efficiency to 99% or better, even when particulate size is very small.*

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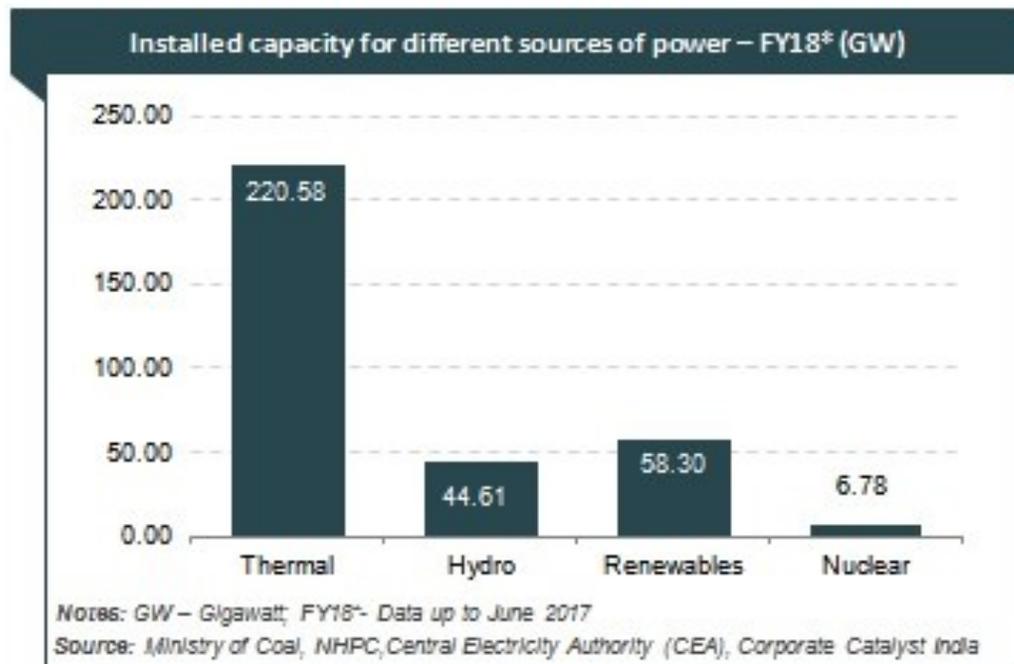
[www.cag.org.in](http://www.cag.org.in)

<http://thermalwatch.org.in/>



*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.*

## INSTALLED CAPACITY FOR DIFFERENT SOURCE OF POWER– FY18



## REGULATIONS AND CASES

- S.P.Muthuraman Vs Union of India & Ors, “Imposing environmental compensation on builders for commencing construction without getting environment clearance” *Original Application No 676 of 2017(PB)* 13th February 2018 [Click here](#)
- Comments are invited from public on “Draft Revised Coastal Zone Management Plan” should reach Department of Environment (ENVIS Centre: Tami Nadu) on or before 06/04/2018 Available at: [Click here](#)

## PUBLICATIONS

- Strambo, C. et al (2018) *Privileged coal: the politics of subsidies for coal production in Colombia* Working Paper no. 2018-01 Stockholm Available at : [Click here](#) [Accessed 28 Feb 2018]
- Zou, J 2018 ‘Review of concentrating solar thermal power industry in China: Status quo, problems, trend and countermeasures’, *IOP Conf. Series Earth and Environmental Science* 108 052119 Available at : [Click here](#) [Accessed 28 Feb 2018]

## MISCELLANEOUS

- The ASAR-International Conference on Renewable Energy, Green technology & Environmental Science (ICREGTES), which will be held on 8th April, 2018 at Bangalore, India [Click here](#)
- IASTEM- 356th International Conference on Environment and Natural Science (ICENS) will be held on 1st - 2nd April, 2018 at Dubai [Click here](#)