EFFICIENCY OF COAL POWER STATIONS

India's existing coal based thermal power plants (TPPs) are currently based on subcritical technology, although efforts are underway to adopt new, more efficient technologies like super-critical (SC), ultra super-critical technology (USC) etc. SC technology is proposed to be adopted at a significant scale (38%) during the 12th Five Year Plan (FYP). From the 13th FYP, it is proposed that no new subcritical TPPs would be allowed. However, the development and deployment of these efficient technologies is sluggish, due to Indian coal which has high ash content and low calorific value. This analysis examines the penetration levels of efficient technology in TPPs. Based on the above, the user of this Tool can estimate the quantity of coal required to meet the desired level of power supply.

Level 1

New technology deployment will be slow in this 'Least effort scenario'. Subcritical capacity addition will stop only after 2027, USC technology will be introduced only in 2022 and Integrated Gasification Combined Cycle (IGCC) is introduced in 2032. The share of IGCC in the coal-fired capacity addition during 2042-47 would be only 30%, and its share of the total capacity in 2047 would be only 12 GW at Level 1 of the analysis on capacity addition, amounting to just 3.8%, while 53% of the capacity would be SC. Hence, total demand for Indian grade coal in 2047 for India, would be 1383 million tons.

Level 2

New technology development/deployment will be slightly faster than scenario 1. Subcritical plant addition will stop after 2017 as per current Government plans (Ministry of Power, 2012). USC technology will be commercialized after 2017 and IGCC after 2027. IGCC will contribute 50% of the capacity addition in the 18th FYP (2042–47). The share of IGCC in coal-fired capacity in 2047 would be 7%, and SC technology would have a share of 47%. Total demand for Indian grade coal in 2047 is expected at 1345 million tons.

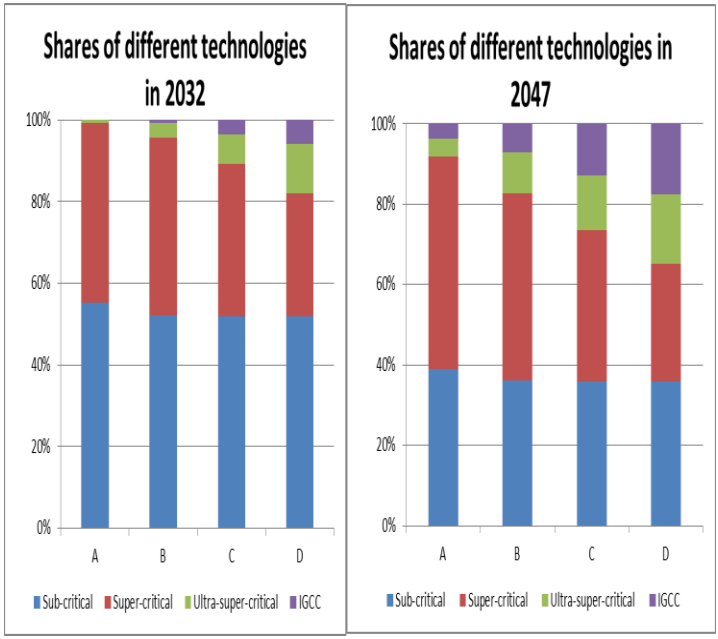
Level 3

New technology development/deployment will be encouraged and hence its adoption would be faster. Sub-critical capacity addition will stop after 2017, USC technology will be commercialized in 2017 and IGCC in 2022. IGCC's share of the capacity addition in the 18th FYP (2042–47) would be 65%. In 2047, the share of IGCC in the coal-fired capacity would have increased to 13%, and SC technology would have reduced to 37.6%. Total demand for Indian grade coal in 2047 in this scenario is 1309 million tons.

Level 4

New technology development/deployment in this 'Heroic effort scenario' will be aggressively promoted. Subcritical capacity addition will stop after 2017. 20% of new capacity addition in the 13th FYP from 2017 would be USC technology, and 20% of new capacity addition in the 14th FYP from 2022 would be IGCC. Of the capacity addition in the 18th FYP (2047), 80% would be IGCC, resulting in its share in the total installed capacity in 2047 being 17.6%. Total demand for Indian grade coal in 2047 in this scenario is 1277 million tons.

The share of different technologies in total coal based installed capacity for these four scenarios in 2032 and 2047 will be as shown in the following figure. The sub-critical technology based capacity that exists in 2047 is primarily due to existing capacity, that does not retire fully until 2047.



Note: Please see detailed documentation for references.