

## **Outcome of the modelling results on Clean Coal Technology in India**

India Energy Security Scenario (IESS), 2047, an energy projection tool developed by NITI Aayog has been used for projecting clean coal technology scenario in India. The BAU scenario of Level 2 (Deterministic Effort), and Aggressive Effort of Level 3 (Clean Coal Technology or CCT) has been considered to project clean coal technologies scenario in India. Other national targets such as 175 GW of Renewable Energy by 2022, Housing for All by 2022, 100 Smart Cities by 2022 & INDC target have been taken into account for projecting projections for adoption of clean coal technology in power sector.

**Clean Coal Technology Share:** BAU scenario shows that year on year basis, share of Ultra Super-Critical technology (USC) will be 35% in 2032 & 60% in 2047. However, share of IGCC technology is projected to be lower at 10% in 2032 & 40% in 2047. CCT scenario shows that the USC will increase to 45% in 2032 & 40% in 2047 and share of IGCC technology will be 15% in 2032 & 60% in 2047. The share of USC is slowly being replaced by IGCC under CCT scenario. The Sub-Critical technology in coal based power plant is projected to retire by 2032.

**Fund Requirement for Clean Coal Technology:** The capex requirement per GW, under IGCC technology will be nearly twice over Sub-Critical technology & Super-Critical technology by 2047 in CCT scenario. The capex per GW, under Ultra Super-Critical technology will be nearly 1.2 time higher than Sub-Critical technology & Super-Critical technology by 2032.

Moreover, IGCC & Ultra-Super Critical technology will increase nearly 10 percentage point's efficiency of the power plant in comparison to Sub-Critical & Super Critical technology. The IGCC & Ultra Super-Critical technology will reduce nearly 30% coal requirement emissions by around 30-50% across NO<sub>x</sub>, SO<sub>x</sub>, CO, Particulate Matter and Raw Water Usage.

**Land Requirement:** The land requirement for clean coal technologies will depend upon the designing of power plant. For example, if vertical/tower type boiler is taken into design (like ISOGO Power Plant, Japan) then land requirement may reduce by around 30-35% for the Ultra Super-Critical technology.

**Coal Consumption and Import Dependence:** The above mentioned CCT share in CCT scenario will reduce 33% coal import for coal power generation. The hydro carbon fuel requirement by power sector will also reduce by nearly 30% in 2032 & 39% in 2047 at 2012 base level.

**Emission Reduction:** Due to intervention of clean coal technologies, emission intensity will reduce by 38% in 2032 & 52% in 2047 at the base level of 2005 emission intensity under CCT scenario. If the above projected scenario is implemented by Ministry of Power, India will easily meet the NDC target and even surpass these target.

**Electricity Generation Mix:** The share of electricity generation through coal based power plant will almost be around 55% in 2032 under BAU scenario and 50% in 2032 under CCT scenario. Therefore, it seem that coal will be major source for electricity even in coming years.