energy. Here in present analysis we use the steady flow energy equation for calculating the energy for each component and neglecting the changes in kinetic and potential energy changes.

Q-W= dh + dke + dpe

Exergy of a given system is defined as the maximum work that can be extracted from it till it reaches the state of thermodynamic equilibrium with its surroundings. While energy is always conserved, exergy is not generally conserved it is destroyed by irreversibieities

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The method of exergy based on second law of thermodynamics and the concept of irreversible production of entropy. The exergy concept has gained considerable interest in the thermodynamic analysis of thermal process and plant system since it has been insufficient from an energy performance stand point. In recent decades , exergy analysis are found out useful method in the design, evaluation, optimization and improvements of thermal power plant.

The exergy analysis is done with the help of exergy balance equation .from this equation we get the max available energy of the system

For Turbine

Inlet exergy
$\Psi_1 = (h_1\text{-}h_1)\text{-}T_0(s_1\text{-}s_0)$
= (3281.1-419)-310(6.259-1.307)
=1326.98 kj/kg .k
Outlet exergy
$\Psi_2= (h_2\text{-}h_0)\text{-}T_0\ (s_2\text{-}s_0)$
= (2975.2-419)-310(8.167-1.307)
= 429.6 kj/kg.k
Exergy Destruction $=\psi_1 - \psi_2$
Ψ=1326.98-429.6
ψ=897.38 kj/kg.k
Energy loss (E) = $h_1\text{-}h_2$
E=3281.1-2975.2
E=305.9 kj/kg.k
For Boiler
Inlet exergy
Ψ_1= (856.9-419)-310(1.370-1.307)
Ψ_1=418.37 kj/kg.k
Outlet exergy
Ψ_2=1326.98
$\Psi=\psi_2\text{-}\psi_1$
Ψ=908.61 kj/kg.k
Energy (E) =h1-h2=Cp dT
E=4.18*(803-593)
=877.61 kj/kg.k

S.No.	*Component Name*	*Exergy*	*Energy*	*Losses*
1	Boiler	908.61	877.8	30.81
2	Turbine	897.38	305.9	591.48

4. Result and Conclusion

The exergy analysis is very important tool to find the actual irreversibilities in different components of any cycle/system and performance based on exergy analysis gives the real assessment of the system. Exergy analysis and Second law of thermodynamics has been performed in this study is able to help to understand the performance of thermal power plant and justify possible efficiency improvements. It gives logical solution for improving the performance opportunities in thermal power plants.

Here in this analysis we see from the energy and exergy calculations the major losses is take place in Turbine.

5. Future Scope

Second law or Exergy analysis has been performed on kalisindh thermal power plant is able to help to understand the performance of this power plant and justify possible efficiency improvements .It gives logical solution improving the power production opportunities in thermal power plants**.**

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