

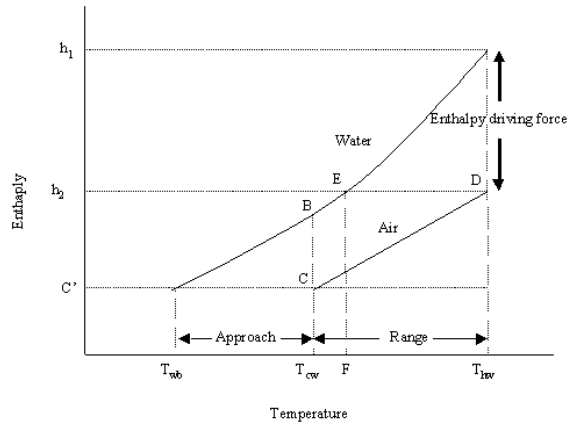


The performance of the cooling plant at a thermal power generation facility is critical to assuring efficient production of electrical energy. Nevertheless, this aspect is often neglected because O&M staff only has access to limited data on cooling performance or lacks the time to do the necessary inspections and supporting calculations.

Tetra Engineering provides an audit and review service for evaluating the current condition and performance of a client's cooling system. The objective is to identify clear actions for achieving improvements in cooling efficiency and reliability.

Primarily aimed at mechanical-draft wet cooling towers, this service incorporates the following tasks:

- **Review of Power Plant Cooling Requirements and Cooling System Design**
 - Check Original Specifications and Design Drawings
 - Analyze OEM or EPC Supplier Performance Test Data
- **On-Site Walkdown and Inspection of Cooling System Equipment**
 - Cooling Tower Civil Works, Fans and Drives
 - Circulating Water Pumps and Piping (Tower to Condenser)
 - Condenser
 - Cooling Control Loop (DCS Algorithms and Field Hardware)
- **Review and Analysis of Operating Data**
 - Obtain Operating History from Plant DCS/Data Historian for Parameters Relevant to Tracking Cooling Performance
 - Audit the Cooling Water Chemistry Treatment Process and Data Logs
 - Interview Cognizant O&M Staff to Obtain Views on Issues and Desired Improvements
- **Deliver Final Report**
 - Incorporates Site Walkdown & Inspection Report with Photographs and other Supporting Documentation
 - Shows Recorded Calculations Comparing Actual Cooling Performance with Design Target
 - Lists Recommended Actions or Equipment Upgrades for Improving Performance and Reliability



Typical Performance Calculations		
Section	Calculated Values	Required Inputs (Ideal)
Cooling Tower	Range & Approach Target vs. Actual Outlet Water Temperature Cooling Cost Fan Efficiency	Tower Inlet & Outlet Water Temperatures, OEM Tower Performance Curves, Test Data, Fan Active Power, Fan Speed, House Load Cost/kWh, Draft velocity, Fan Total Pressure, Relative Humidity, Barometric Pressure, Ambient Temperature, Circulating Water Flow Rate
Condenser	Heat Load Target vs Actual Pressure Cleanliness Factor TTD and Subcooling	Condensate Flow, Circulating Water Flow, Inlet & Outlet Water Temperature, Condenser (Vacuum) Pressure, Hotwell Temperature, Surface Area, Flow Passes, Tube Length