EFFICENCY RECOMMENDATIONS (Formula based)

1. **Optimize Return Temperature (RT)**

   Action: Continuously monitor and adjust the return temperature to maintain optimal levels. A lower return temperature can alleviate the load on the chiller system.

   Rationale: Elevated return temperatures can result in increased total kilowatt consumption (kW_Tot), negatively impacting system efficiency. It is essential to establish a target return temperature that maximizes operational efficiency and minimizes energy expenditure**.**

2. **Adjust Chiller Load (CH Load)**

Action: Ensure that the chiller operates in close alignment with its design load. If the chiller load consistently remains low, consider reducing the number of operating chillers.

Methodology: To optimize flow rates (GPM), it is crucial to select the appropriate chiller type and accurately match the chiller capacity to the cooling load requirements.

Formula:
CH Load =GPMxDelta T x 500

This formula allows for precise calculations to ensure optimal chiller performance and efficiency.

3. **Monitor Power Consumption (kW_Tot)**

Action: Conduct a thorough analysis of total power consumption (kW_Tot) in relation to the chiller load (CH Load). If kW_Tot is disproportionately high compared to the load, investigate potential inefficiencies within the system.

Investigation: In cases where discrepancies are identified, determine which specific component is responsible for the excess power consumption.

Formula:

kW_Tot=kW_RT+kW_CHH+kW_CHP+kW_CHS+kW_CDS+kW_CT

Utilizing this formula will facilitate a comprehensive assessment of power consumption across the system, enabling targeted improvements in energy efficiency.

4. **Optimize Flow Rate (GPM)**
   - **Action**: Ensure that the flow rate is optimized for the system. Too high or too low flow rates can lead to inefficiencies.

- **How:** Adjust GPM to achieve the desired ΔT. For example, if ΔT is low, consider increasing GPM to improve heat transfer.

5.

Improve Temperature Differentials (DeltaCHW)

Action: Strive to achieve a higher temperature differential (ΔT) across the chiller by optimizing flow rates and ensuring optimal performance of the heat exchangers.
Rationale: An increased ΔT can result in reduced energy consumption, thereby enhancing overall system efficiency and performance.

6. **Analyze Component Percentages**
   - **Action**: Review the percentages of each component's power consumption (e.g., Percent_CH, Percent_CHP). If one component is consuming a disproportionate amount of energy, investigate its operation.
   - **Reason**: Higher the percentage for each of these components, more power is used, hence reducing the efficiency.

     Formula: Percentages of Chiller Components:
     Percent_CH=kW_CHHkW_Tot×100*Precent_CH=kW_TotkW_CHH*×100
     Percent_CHP=kW_CHPkW_Tot×100*Precent_CHP=kW_TotkW_CHP*
     ×100
     Percent_CDS=kW_CDSkW_Tot×100*Precent_CDS=kW_TotkW_CDS*
     ×100