# Optimizing Steel Manufacturing: Charge Composition and Energy Use

**1. Target Energy Consumption:**

- **Insight:** The actual energy consumption (20.34M) exceeds the target energy consumption (17.28M). This indicates that the current energy usage is higher than the desired target, suggesting a need for measures to reduce energy consumption to meet the target.

**2. Target Production Efficiency:**

- **Insight:** The actual production efficiency (115.18K) is below the target efficiency (138.21K). This shows that the production process is not as efficient as planned. Identifying bottlenecks and optimizing production processes could help in achieving the target efficiency.

**3. Production Efficiency and Energy Consumption per Ton:**

- **Production Efficiency Insight:** The production efficiency (1.40) is close to the target but still needs improvement. The current production efficiency (0.01) indicates a minor variance, suggesting consistency but still below optimal levels.
- **Energy Consumption per Ton Insight:** The average energy consumption per ton (176.56) indicates the energy efficiency per unit of production. Monitoring this metric helps in understanding energy utilization trends and identifying opportunities for energy savings.

**4. Total Power Consumption by SECTION_IC:**

**Insight**

- Section B has the highest power consumption, followed by Section C. Section A has the lowest. This visualization helps in identifying sections with higher energy usage, enabling targeted interventions to reduce power consumption in the most energy-intensive sections.

- At 74,04,873.93, C had the highest Total Power Consumption and was 15.43% higher than A, which had the lowest Total Power Consumption at 64,14,879.16.
- C had the highest Total Power Consumption at 74,04,873.93, followed by B at 65,15,339.74 and A at 64,14,879.16.

**5. Material Mix Quantities:**

- **Insight:** The largest portion of the material mix is represented by the yellow section (43.47%), indicating a significant amount of a specific material. The red and blue sections also show substantial quantities. This insight is crucial for understanding the composition of materials used and optimizing the mix for better efficiency and quality.

**6. Energy Consumption per Ton by Day:**

**Insight**

- There is variability in daily energy consumption per ton. Some days show higher consumption than others, indicating fluctuations that might be caused by operational inefficiencies or varying material qualities. Identifying the causes of these fluctuations can help stabilize and reduce energy consumption.
- Energy Consumption per Ton jumped from 171.86 to 202.83 during its steepest incline between Tuesday, January 24, 2023 and Tuesday, January 31, 2023.

**7. Total Production Volume by Date and Time:**

**Insight**

- Production volume shows a pattern of peaks and troughs over time. There are noticeable dips, especially in September and October. This could indicate downtime, maintenance periods, or inefficiencies in production scheduling. Smoothing these fluctuations can help in improving overall production efficiency.
- Total Production Volume trended down, resulting in a 3.82% decrease between Tuesday, August 1, 2023 and Tuesday, October 31, 2023.
- Total Production Volume started trending down on Wednesday, October 25, 2023, falling by 21.62% (345.72) in 6 days.

**8. Chemical Compositions:**

**Insight**

- The pie chart shows that carbon makes up the largest percentage (49.89%) of the chemical composition, followed by sulfur (17.65%) and other elements. Maintaining the correct chemical composition is essential for ensuring product quality. Variations in these percentages should be monitored and controlled.

**9. Material Quantities:**

**Insight**

- The quantities of materials (BP, HBI, DRI2_QTY) used show trends over the months of August, September, and October. There appears to be a consistent usage pattern, but any significant deviations should be investigated to ensure optimal material usage and cost efficiency.
- August accounted for 35.41% of Sum of BP.
- Sum of BP and total Sum of HBI are negatively correlated with each other.

## Overall Insights and Recommendations:

- **Energy Efficiency:** There is a need to reduce energy consumption to meet targets. Focus on high-consuming sections like Section B and investigate daily consumption fluctuations.

- **Production Efficiency:** Efforts should be made to identify and mitigate production bottlenecks to improve efficiency to meet targets.

- **Material Optimization:** Monitor and optimize the material mix to ensure it aligns with production quality and efficiency goals.

- **Process Monitoring:** Regularly track production volumes and chemical compositions to ensure consistent quality and identify any inefficiencies or deviations promptly.