Abstract

To reduce peak electricity demand and hence reduce capacity costs due to added investment of generating additional power to meet short intervals of peak demand, can enhance energy efficiency. Where it is possible to adjust timing and the quantity of electricity consumption and at the same time achieve the same useful effect, the value of the energy service itself remains unchanged. Peak demand management is viewed as the balance between demand and generation of energy hence an important requirement for stabilized operation of power system. Therefore, the purpose of this study was to establish the correlation between peak electricity demand management strategies and energy efficiency among large steel manufacturing firms in Nairobi, Kenya. The strategies investigated were demand scheduling, Peak shrinking and Peak shaving. Demand scheduling involves shifting predetermined loads to low peak periods thereby flattening the demand curve. Peak shrinking on the other hand involves installation of energy efficient equipment thereby shifting the overall demand curve downwards. Peak shaving is the deployment of secondary generation on site to temporarily power some loads during peak hours thereby reducing demand during the peak periods of the plant. The specific objectives were to test the relationship between demand scheduling and energy efficiency among large steel manufacturing firms in Nairobi Region; to test the correlation between peak shrinking and energy efficiency among large steel manufacturing firms in Nairobi Region; and to test the association between peak shaving and energy efficiency among large steel manufacturing firms in Nairobi Region. The study adopted a descriptive research design to determine the relationship between each independent variable namely demand scheduling, peak shrinking, peak shaving and the dependent variable, the energy efficiency. The target population was large steel manufacturing firms in Nairobi Region, Kenya. The study used both primary and secondary data. The primary data was from structured questionnaires while secondary data was from historical electricity consumption data for the firms under study. The results revealed that both peak shrinking and peak shaving were statistically significant in influencing energy efficiency among the steel manufacturing firms in Nairobi Region, each with Pearson correlation coefficient of 0.903, thus a strong linear relationship between the investigated strategy and the dependent variable, energy efficiency. The obtained results are significant at probability value of 0.005 ($p < 0.05$). The conclusion is that peak shrinking and peak shaving have an impact on energy efficiency in the population under study, and if properly implemented, may lead to efficient utilization of the available energy. The study further

recommended that peak demand management practices need to be implemented efficiently as a way of improving the overall plant load factor and energy efficiency.