Reschedule Plant Operations or Reduce Load to Avoid Peak Demand Rate (Arc 2.3131)

(The analysis below was extracted from one of the assessment reports by the Clemson University Industrial Assessment Center (IAC). This is only an example recommendation and hence, not all the background information and sources for numbers are included here.)

Est. Electric Demand Savings	= ***0 kWh/yr***
Est. Electric Demand Cost Savings	= ***$14,952/yr***
Est. Implementation Cost	= ***$0***
Simple Payback Period	= ***0 months***

Recommended Action:
It is recommended for the plant to subscribe to an alternative rate structure offered by the utility company and change the operational hours during the non-summer period from 9:00 AM - 5:00 PM to 10:00 AM - 6:00 PM to avoid the higher on-peak demand rate.

Background:
Now the plant is being charged at the fixed rate of $23.42/kW for electricity demand throughout the year and during the both on-peak and off-peak hours. According to the discussions between the plant manager and the utility company, the company is eligible to subscribe for alternative rate structures provided by the utility company. The assessment team analyzed the costs and benefits of different electricity rate structures that are offered by the utility company. According to the initial calculations, if the plant subscribes for an alternative rate structure with variable demand rate for on peak and off-peak hours and change the operational times accordingly, significant savings can be attained from reduced electricity demand costs. The new rate structure details are presented in Table 1 below.

Table 1. New Rate structure offered by the utility company

Energy Charges	Summer	Non-Summer
On-Peak	$25.76/kW	$25.76/kW
Off-Peak	$13.94/kW	$13.94/kW

(A)Summer period On-Peak Hours shall mean the hours from 1:00 p.m. to 7:00 p.m., Monday through Friday, for the months of June, July, August, and September (4 months).

(B) Non-Summer period On-Peak Hours shall mean the hours from 6:00 a.m. to 10:00 a.m., Monday through Friday, for the months of, January, February, March, April, May, October, November, and December (8 months).

(C) The Off-Peak Hours are defined as all hours not specified above as On-Peak Hours.

According to the new offered rate structure the assessment team recommends a change in operational hours during the months of January, February, March, April, May, October, November, and December (8 months) from 9:00AM-5:00PM to 10:00AM-6:00PM to fully utilize the smaller rate of $13.94/kW for electricity demand.

Anticipated Savings:
Using the current fixed rate of $23.42/kW for electricity demand, the average annual electricity demand cost, $AEDC_1$, would be

$$AEDC_1 = 12\text{months} \times \text{Average electricity demand(kW/month) current} \times \text{demand rate(\$/kW)}$$

$$\mathbf{AEDC_1 = 12 \times 225\ kW \times \$23.42/kW = \$63{,}208}$$

Plant is flexible to change the operational hours from 10:00AM-6:00PM during non-summer period (8 months). This way they can avoid the new on-peak demand rate and will use the off-peak rate throughout the workday. During the summer period the on-peak rate will occur between 1:00-7:00PM and they will be charged with the on-peak demand rate of $25.76/kW. Therefore, by using the alternative rate structure the new average annual electricity demand cost, $AEDC_2$, would be

$AEDC_2 =$
Summer months × Average electricity demand (kW/month) × On peak demand rate ($/kW) +
Non-summer months × Average electricity demand (kW/month) × Off-peak demand rate ($/kW)

$$\mathbf{AEDC_2 = 4 \times 225\ kW \times \$25.76/kW + 8 \times 225kW \times \$13.94/kW = \$48{,}256}$$

Finally, the estimated electricity demand cost saving in a year, *EDCS*, can be calculated as

$$EDCS = AEDC_1 - AEDC_2$$

$$\boldsymbol{EDCS = \$63{,}208 - \$48{,}256 = \$14{,}952}$$

Implementation Cost and Payback:
Changing the operational hours from 9:00 AM - 5:00 PM to 10:00 AM - 6:00 PM would not cost any significant amount according to the plant managers. Thus, the *implementation cost, IC*, would be $0. Accordingly, there will not be any payback period. The company will be able to obtain the total saving of $14,952 at the end a 12-month period.