

# Ecolab® CondenserIQ™ Performance Program Documents \$1 Million in Savings at Seminole Electric

**NALCO** Water  
An Ecolab Company

CASE STUDY - POWER  
CH-2064

## BACKGROUND

At Seminole Electric Cooperative's Richard J. Midulla Generating Station in Bowling Green, FL, condenser cleanings are planned events. This natural gas-fired, combined cycle plant utilizes pond water, and macrofouling is a known and understood phenomenon. Every year, in the spring or early summer, the condenser is cleaned in preparation for the high demand summer months.

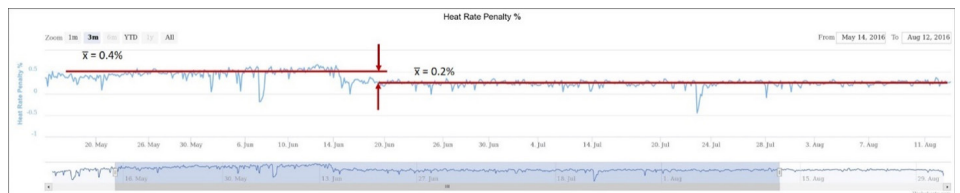
## SITUATION

In mid-June, the plant conducted a condenser cleaning. The cleaning was scheduled in advance, and part of routine operations. The goal: bring the condenser back up to design performance prior to the peak demand season.

The plant utilizes the CondenserIQ program. Applying EPRI and power industry standard calculations, the program uses data from a power plant's data historian to help users better understand what's happening in the condenser.

In this case, the CondenserIQ program reported a 0.2% reduction in the plant's Heat Rate Penalty following the cleaning.

Figure 1: Average Heat Rate Penalty % decreased by 0.2% following a condenser



cleaning.

## ENVIRONMENTAL INDICATORS ECONOMIC RESULTS

Reduced fuel costs (Fuel usage reduced by 3 million therms over seven months)



\$1.0 million

Avoided condenser cleaning cost



\$15,000

eROI is our exponential value: the combined outcomes of improved performance, operational efficiency and sustainable impact delivered through our services and programs.

Heat Rate Penalty % is directly related to condenser backpressure.<sup>1</sup> EPRI has established some norms for changes in backpressure and the CondenserIQ program applies those norms to produce graphs like those shown in Figure 1. In this case, a 0.2% decline in Heat Rate Penalty % represents a 0.2% efficiency gain for the plant.

#### EPRI NORMS FOR CHANGES IN CONDENSER BACKPRESSURE

A 1" Hg change in backpressure represents a:

- 1% efficiency change in a combined cycle plant
- 2% efficiency change in a coal-fired plant
- 3% efficiency change

Coupling the data used by the CondenserIQ program with other operational data shows the impact of the cleaning in financial terms.

The savings associated with the cleaning were over \$338,000 for the two-month period after the cleanings in 2016.<sup>2</sup> The cleaning itself cost about \$15,000.

In addition to showing the benefits of the 2016 cleaning<sup>3</sup>, the CondenserIQ program predicted that these gains might be realized for the future. The program showed clearly how these cost reductions would accrue to the plant immediately.

Following the cleaning, the plant adopted a cooling water dispersant program to keep the condenser clean longer. The cost associated with the program – about \$50,000/year – was justified because, based on the prior experience, a 0.2% change in Heat Rate Penalty represented a cost savings of about \$169,000/month. Since CondenserIQ proved this was already achieved once, the odds were good the results could be repeated.

## RESULTS

A restorative project – like a condenser cleaning – is relatively easy to justify because the gap between current (degraded) performance and design performance is clear. Preventative programs are more difficult to justify without quantified evidence. In this case, using the CondenserIQ program allowed the plant to justify costs associated with maintaining the gains from cleaning the condenser, because CondenserIQ had already proven and quantified in terms of savings.

The year two May Heat Rate was 2% lower than the year one May Heat Rate before the implementation of the dispersant program. The monthly fuel savings associated with maintaining the gains was \$145,000<sup>4</sup>, compared to the prior May. Data from the CondenserIQ program indicated continued excellent performance through the summer of year two<sup>5</sup>. The total fuel savings for the initial 9-month period was \$1 million.



Figure 2: The dispersant program held the gains through the summer of year one.

## CONCLUSION

Through a period of high fuel costs and high demand, this power plant maintained a low Heat Rate and avoided the cost associated with a condenser cleaning by utilizing a dispersant program to keep the condenser clean. The Ecolab CondenserIQ program's quantification of efficiency gains enabled decision makers to see the value in and justify the costs of the dispersant program, which yielded further gains that would have gone unrealized without the help of CondenserIQ.

<sup>1</sup> Heat Rate (Btu/kWh) is a fundamental power plant metric. It summarizes everything going on in the plant down to one, simple measurement: heat energy input to electric power output.

<sup>2</sup> Cost savings were based on a weighted average cost of natural gas of \$3.50/Mcf, weighted based on net generation. The average fuel cost per MWh for the May/June period (prior to cleaning) was \$26.01. The average fuel cost per MWh for the July/August period (after cleaning) was \$25.44, a reduction of \$0.57/MWh. Applying those savings to the lower net generation in the May/June period gives a savings of \$338,343 for a two-month period, \$169,000/month.

<sup>3</sup> From May to August year one, net generation increased 5% per month. Fuel costs increased 4.1% per month. Heat Rate declined by 0.71% per month.

<sup>4</sup> \$145,000/month in reduced fuel costs/MWh x (3 months in year one + 4 months in year two) = \$1,015,000.

<sup>5</sup> Fuel costs rose in May year two to \$4.12/Mcf, higher than during the summer of year one. Electricity demand also increased. During May year one, the plant's capacity factor was 72%. In May year two, it was 82%, an increase of 14%.