PROJECT facts

U.S. Department of Energy
Office of Fossil Energy
National Energy Technology Laboratory

Clean Coal Power Initiative (CCPI)

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Demonstration of Integrated Optimization Software at the Baldwin Energy Complex

CONTACTS

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PARTICIPANT

NeuCo, Inc.,
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ADDITIONAL TEAM MEMBERS

Dynegy Midwest Generation (host)

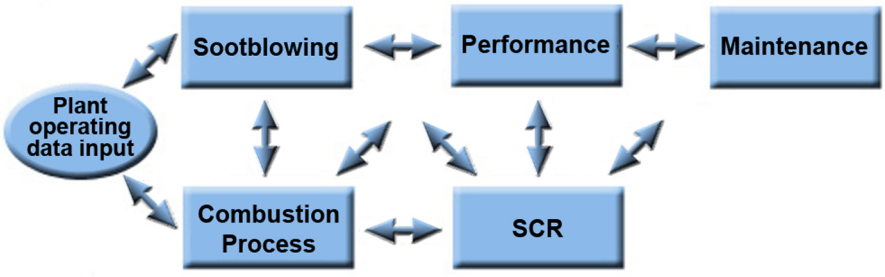
Project Description

NeuCo, Inc., of Boston, Massachusetts, has designed and demonstrated new integrated on-line optimization systems at Dynegy Midwest Generation's Baldwin Energy Complex, a series of three 600-MW coal-fired units located in Baldwin, Illinois.

The control modules developed in this project address cyclone combustion, sootblowing, selective catalytic reduction (SCR) operations, overall unit thermal performance, and maintenance optimization. This project builds on NeuCo's ProcessLink® technology platform that includes neural networks, generic algorithms, and fuzzy logic techniques.

These capabilities were used to apply optimization techniques to a variety of systems within coal power plants, making use of existing control technologies and then linking these systems to each other. The project provides solutions that use system-specific optimization applications, interfacing with operators, sensors and actuators, and a proprietary optimization engine. The overall architecture of this control platform is designed to permit flexible deployment strategies.

Rather than requiring that all data and logic be resident on a single computer, the service model allows applications to leverage networked computational resources. Thus, the core of the design principles for this project is an application architecture built around interoperable services that provide high-value process management and business logic to achieve more efficient plant operations. The integration concept is depicted in the following figure:



LOCATION

Dynegy Midwest Generation's
Baldwin Energy Complex
Baldwin, Randolph County, IL

COST

Total Project Value
$19,094,733

DOE/Non-DOE Share
$8,592,630 / $10,502,103

ESTIMATED PROJECT DURATION

48 months

ADDRESS

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WEBSITE

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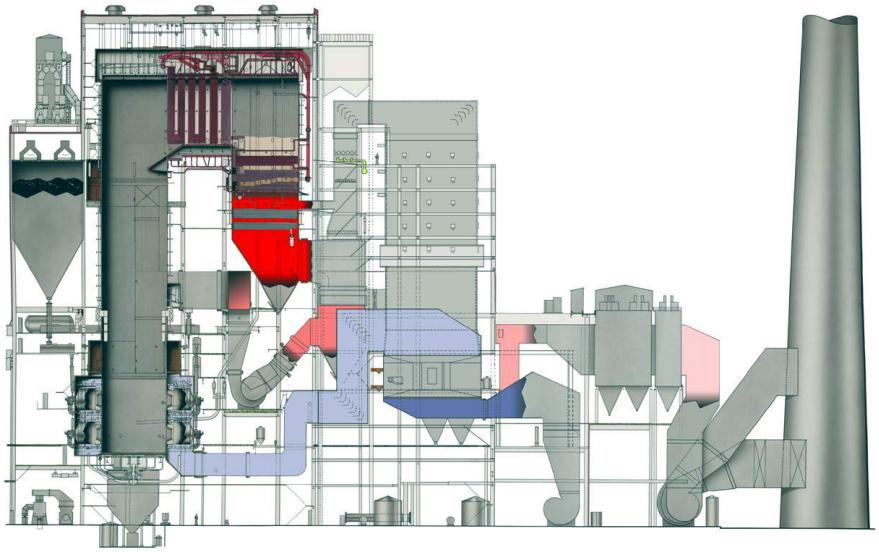
Benefits

This project demonstrated that integrating the on-line optimization system with power plant operations increases the thermal efficiency and reliability of the plant, while achieving a corresponding reduction of airborne emissions such as NO_x, CO_2, and particulates. Optimization results are inherently unit-specific; however, reasonable targets for the integrated set of modules are to meet or exceed the following goals:

- Furnace NO_x reduction improvement by 5 percent
- Heat rate improvement by 1.5 percent
- Increase of annual MWh output by 1.5 percent
- Commensurate reductions in greenhouse gases and particulates
- Significantly lower generation costs, improved reliability, and greater commercial availability

As plant complexity increases through retrofit and repowering applications, introduction of new technologies, and other plant modifications, this integrated-process optimization approach can be an important tool to support a plant operator's control objectives and to link them to corporate objectives of increased efficiency and lower emissions.

With the exception of reducing heat rate by 1.5 percent, all goals were met or exceeded. The heat rate goal could have been met; however, Baldwin Energy Complex management decided to accept a lesser heat rate improvement to fully minimize NO_x emissions. This resulted in a doubling of the target NO_x reduction.



Dynegy Midwest Generation's Baldwin Energy Complex