

**COUNCIL ACTION FORM**

**SUBJECT: POWER PLANT FUEL CONVERSION – PRELIMINARY PLANS AND SPECIFICATIONS FOR UPGRADING TURBINE CONTROL SYSTEMS (TCS) ON UNITS 7 AND 8**

**BACKGROUND:**

In November of 2013 the City Council voted to convert the City's Power Plant from coal to natural gas. In May of 2014 the City Council selected Sargent & Lundy of Chicago, Illinois, to provide engineering and construction oversight services for the conversion project.

The major phases of work necessary to complete this conversion project are outlined below, with project proposed for Council action shown in bold:

1. Procure the natural gas burners, igniters, and scanners, plus boiler/furnace modeling to assess the necessity for boiler modifications. On November 5, 2014 City Council awarded a Contract to Alstom Power Inc. of Windsor, CT, with delivery of this equipment in the fourth quarter of 2015.
2. Replace the Power Plant's Distributed Control System (DCS), including both hardware and software (current project).

**2a. Replace (upgrade) the Turbine Control Systems (TCS) on Unit 7 and Unit 8, plus the steam seal regulator on Unit 8 only.**

3. Design the necessary modifications to the control room and DCS cabinet room.
4. Design the necessary modifications to source natural gas inside the power plant, and all necessary structural, mechanical, and electrical modifications for the power plant to burn natural gas as its primary fuel.
5. Select a contractor to construct a new control room/DCS room in the Power Plant.
6. Select a contractor to modify the Power Plant and install the materials and equipment necessary to operate the Power Plant on natural gas.
7. Select a contractor to install the electrical equipment, including the work associated with the DCS upgrade and the electrical modifications to the control room.

**This specific phase of the conversion project is to purchase new Turbine Control Systems (TCS) for both Unit 7 and Unit 8. Additionally, the steam seal regulator on Unit 8 is to be replaced.**

The original (and current) turbine controls on Units 7 and 8 are designs by the original equipment manufacturer (OEM) that are at least 40 years old. The current controls utilize a combination of complex hydraulic equipment and mechanical linkages to control (govern) the load and speed of the turbine-generator and to safely shut down the turbine during an overspeed event due to the sudden removal of load off the generator. This complex arrangement of hydraulic equipment and mechanical linkages is hard to maintain, even harder to adjust, and does not provide accurate and tight control of the turbine-generator. New upgraded controls will replace most of the hydraulic equipment and mechanical linkage system, and will utilize up-to-date hardware and software to control the turbine-generator, including the necessary equipment to synchronize the generators to the grid.

The original (and current) steam seal regulator on Unit 8 has historically been very problematic on the Unit 8 turbine. The purpose of the steam seal regulator is to seal the shaft of the turbine to prevent air infiltration into the turbine during startup and low load conditions, and to capture steam trying to escape from the turbine under medium and high load conditions. The steam seal regulator must be able to react and modulate seal pressure seal throughout the load range of the turbine-generator. The existing steam seal regulator on Unit 8 is unreliable because it habitually tends to stick (at a certain pressure) and does not modulate the pressure correctly as the load (output) of the turbine-generator increases or decreases.

It is important to note that the technical expertise and knowledge base to maintain and adjust the current controls is scarce, and is rapidly diminishing due to retirements of personnel in the power industry who possess this expertise.

**The Engineer's estimate of the cost for this phase of the project is \$1,064,728, with the following itemized breakdown of costs:**

<b>Unit 7 Turbine Controls</b>	<b>\$380,412</b>
<b>Unit 8 Turbine Controls</b>	<b>\$475,516</b>
<b>Unit 8 Steam Seal Regulator</b>	<b>\$208,800</b>
<b>TOTAL</b>	<b>\$1,064,728</b>

These costs will be covered from funding identified in the approved FY 2014/15 Capital Improvements Plan, which includes \$36,880,000 for the Unit 7 and Unit 8 fuel conversion.

The project budget to date is shown on the next page:

<b>\$36,880,000</b>	<b>FY 2014/15 CIP amount budgeted for project</b>
\$1,995,000	Encumbered not-to-exceed amount for Engineering Services
\$2,395,000	Engineering Services Contract Change Order No. 1
\$3,355,300	Contract cost for Natural Gas Conversion Equipment
\$1,161,300	Estimated cost for DCS equipment (currently out for bid)
<b>\$1,064,728</b>	<b>Estimated cost for TCS equipment (this agenda item)</b>
<b>\$26,908,672</b>	<b>Remaining Project Balance</b> to cover the installation of natural gas burners, natural gas piping into the power plant from the gas gate, DCS installation, Control/DCS room, and other miscellaneous equipment and modifications to the power plant needed for the fuel conversion

**ALTERNATIVES:**

1. Approve the preliminary plans and specifications for the Turbine Controls System (TCS), and set February 25, 2015, as the bid due date, and March 3, 2015, as the date of hearing and award of contract.
2. Do not approve plans and specifications for the Turbine Controls System (TCS) at this time.

**MANAGER'S RECOMMENDED ACTION:**

The Power Plant's existing turbine controls for Units 7 and 8 are 48 and 33 years old, respectively. Up-to-date turbine controls are needed to maintain and to reliably and safely operate the Unit 7 and 8 turbine-generators over the long term. Funding to purchase and install these systems is available from the approved project budget.

Therefore, it is the recommendation of the City Manager that the City Council adopt Alternative No. 1 as stated above.