

ITEM #: 3
DATE: 08-06-24
DEPT: ELEC

COUNCIL ACTION FORM

SUBJECT: INSPECTION OF CT1 COMBUSTION TURBINE TO DETERMINE OPTIONS AND COSTS TO RETURN THE UNIT TO SERVICE

BACKGROUND:

Among the Electric Utility's electric generation assets, the utility operates two combustion turbine units. These units consist of stationary jet engines that burn fuel oil and each turn their attached generators to produce electricity. Combustion Turbine 1 (CT-1) was put into service in 1972, while CT-2 was placed into service in 2005. The units are used to meet electric capacity obligations of the utility, to respond to periods of peak electric demand, and to provide backup power in outage events where other sources of electricity may be limited.

On Monday, July 15, CT-1 experienced an unexpected event. Just after startup and being put on-line, the unit tripped off-line and was not able to be restarted. Power Plant technicians and maintenance staff worked to determine the cause of the trip. Unable to find an apparent cause, the Power Plant Manager requested that a field technician from the Original Equipment Manufacturer (OEM), Wood Group Pratt & Whitney (WGPW), come onsite and perform diagnostics. A purchase order was issued in an amount not to exceed \$12,415.52 for this work.

The OEM technician was able to perform the onsite inspection on Tuesday, July 23. Performing a borescope of the internals of the engine, damage was found on the blades in the high-pressure section of the compressor, particularly the ninth stage of blades. **Because of the damage found, the engine portion of the unit must be removed and send to a turbine repair shop for full disassembly, inspection, and repair.**

To perform this work, City staff issued a request for proposals (RFP) to Wood Group Pratt & Whitney (WGPW) and another turbine company, Sulzer Turbo Services. Staff searched for other companies familiar with the CT-1 engine and who are capable of such an inspection and repair, but no other firms with such capabilities were identified. The purpose of the RFP is for a turbine expert to inspect the post-failure combustion turbine, determine the extent of damage, and identify the repair options and associated repair costs to return the unit to service. Sulzer Turbo Services offered the required services at the lowest price and staff has determined Sulzer Turbo Services to be a viable option to perform the work.

The proposal for this work from Sulzer is itemized as follows:

1. On-site removal of the engine from its base plate and compartment and placement onto a shipping stand and preparation for shipment; provide motor carrier transport from Ames to Sulzer's facility.

The total estimated cost for engine removal and shipment is \$5,500.

2. Receive engine at Sulzer's facility, disassemble engine, de-stack and de-blade, and strip compressor disks, stators, and blades in both the Low Pressure Compressor and the High Pressure

Compressor. Disassemble the Combustion chamber and T1, T2, and T3 blade stages and stators of the turbine section. Perform a thorough visual inspection of entire engine, report findings and recommendations for repairs and parts to return the engine back to service.

The total price to perform the inspection and provide recommendations with cost estimates is \$45,000.

The total cost for all work as described above is estimated to be \$50,500.

Once the inspection and assessment of the engine is complete, Sulzer will provide the City with a report of the findings which will include the options and costs for returning the combustion turbine to service.

It is important to emphasize that the expenditures highlighted above do not cover the costs for repair or replacement of the combustion turbine's engine. Preliminary indications suggest that these costs could range from \$500,000 to \$1 million, although it is difficult to estimate these costs without examining the unit upon disassembly. Once staff receives the report of findings and options to return the unit to service, staff will return to Council for approval of next steps. The Council should note that it is possible that the disassembly and inspection process reveals components unrelated to the damaged sections that may be prudent to proactively repair or replace. If this occurs, costs for the project may increase.

Unless there is a compelling reason not to, it is likely that Sulzer will be engaged to complete the repair work or related work to return the unit to service, since: 1) the turbine will be in Sulzer's possession, 2) Sulzer will be familiar with the unit after having disassembled and inspected it, and 3) Sulzer has an inventory of identical engines that could be utilized if an "engine swap" is more economical. Therefore, Council may be approached in the next several weeks for approval of a change order, which may be for a significantly greater amount than the initial \$50,500 contract. Because of this possibility, staff's evaluation of the two potential vendors included an evaluation of the potential repair costs. Staff is confident that pricing and performance by Sulzer would be in the utility's best interests. Additionally, Sulzer is the only one of the two vendors that has identical engines on hand to be utilized if an engine swap is necessary.

The inspection and repairs for returning CT-1 back to service will be an expense that was not budgeted. Staff plans to pay for these expenses from the excess funds currently in the Ash Pond Capital Improvement Project that is currently underway. The Ash Pond CIP account currently has a balance of \$1,837,538. The excess funds are a result of favorable bids for that project.

ALTERNATIVES:

1. Approve a contract with Sulzer Turbo Services, of La Porte, TX, for up to \$50,500 to provide services to inspect and assess the failure of CT1 combustion turbine engine necessary to identify the items needing repair or replacement and the associated costs.
2. Award a contract to Wood Group Pratt & Whitney of Bloomfield, CT, for up to \$70,000 to provide services to inspect and assess the failure of CT1 combustion turbine engine necessary to identify the items needing repair or replacement and the associated costs.
3. Direct staff to search for other service and repair providers of this engine and solicit additional proposals for inspection and assessment.

CITY MANAGER'S RECOMMENDED ACTION:

This work is necessary to evaluate whether the City's CT1 combustion turbine engine can and should be repaired versus other options. Sulzer Turbo Services is one of two companies regarded by Electric staff to be fully capable to evaluate CT1's condition following the engine failure and to identify and cost out the options to return the unit to service in good operating condition.

This generating unit provides needed capacity, provides quick energy production in an emergency, and provides the City's electric system the ability to "Black Start." Failure to return the unit to service will require the City to purchase replacement capacity and/or explore the purchase and installation of a new generating unit.

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