

ITEM #: 23  
DATE: 12-17-24  
DEPT: ELEC

### COUNCIL ACTION FORM

**SUBJECT: ELECTRIC POWER PLANT CT-1 COMBUSTION TURBINE RETURN TO SERVICE REPAIRS - CHANGE ORDER NO. 2**

**BACKGROUND:**

Among the Electric Utility's electric generation assets, the utility operates two combustion turbine units. Each unit consists of a stationary jet engine that burns fuel oil and turns an attached generator 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 July 15, 2024, 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.

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 needed to be removed and sent to a turbine repair shop for full disassembly and inspection.

Staff sent a request for proposals to the only two firms that were known to be familiar with this engine and able to perform work on it. These were the OEM (WGPW), and Sulzer Turbo Services. On August 6, 2024, [City Council awarded a contract to Sulzer Turbo Services](#) to inspect CT-1 engine in the amount of \$50,500.

At the time, staff explained the rationale for selecting Sulzer and noted: **"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."**

Change Order No. 1 in the amount of \$5,500 was approved by staff to add services and personnel time to inspect the expander while Sulzer was onsite removing the engine.

**DIAGNOSIS AND NEXT STEPS:**

Sulzer has completed the inspection and provided a findings report. It was determined that the failure occurred in the 10<sup>th</sup> stage of the compressor section. The stage contained an originally designed disk that holds the root of each blade, referred to in the industry as a “skinny 10.” A root of one of the blades cracked while the unit was operating, causing the blade to become detached from the disk and impact the stationary blades on both sides. Because the engine was spinning at full speed, the damage caused to the rest of the engine was substantial. **The engine requires a complete rebuild, with most parts needing full replacement. Staff estimates the cost to perform such a rebuild to exceed \$1.6 million; however, staff is not confident that the rebuilt engine would be free from unknown defects that may arise in the future. Additionally, rebuilding this engine is likely to take 8-12 months to perform.**

**Because a majority of the engine parts have been so severely damaged, staff is recommending purchasing a “used” but operable engine from Sulzer and then have that engine overhauled.** The used engine was purchased by Sulzer from another utility as operational, but must be overhauled because of the previous number of hours that it operated before being taken out of service. The overhaul will consist of the engine being fully disassembled and inspected, with any parts found out of tolerance being replaced and all service bulletins and upgrades being performed. Included among this work would be the removal of the "skinny 10" disk (if present) and replacement with a more substantial OEM-approved upgrade. The overhauled engine will come with a warranty that assures its operation for 800 hours or for 12 months, whichever comes first.

CT-1 is very important to the utility as it is the only unit that is capable of a “black start.” This means if the City is completely without power, this unit would be used to start up all other generation. It is also the only unit that can operate both without natural gas and in the cold months, providing reliability in the winter when natural gas supplies are scarce.

**Additionally, the Electric utility is required to have available generating capacity to cover historical peak load for each season, plus a reserve margin. Because the CT-1 unit experienced an unplanned outage, the utility's available capacity has been diminished for the fall quarter. Failure to have a replacement installed by January 14, 2025 will result in decreased capacity for the winter quarter. When the utility's available capacity falls below MISO's requirements, the utility is required to replace the missing capacity through a capacity auction, which can be unpredictable and expose the utility to high costs.**

**The overhaul process for the replacement engine will take 4-6 months for Sulzer to perform. This being the case, Sulzer has offered to lease the City a unit until the overhauled engine can be provided. The lease would cost \$208,650 for up to 6 months plus \$750 per operating hour, inclusive of shipping, installation, commissioning, and removal of the engine.**

A summary of the proposed costs is provided below:

<b>Work Performed</b>	<b>Cost with Sales Tax</b>
<i>Replacement Engine:</i>	
Overhaul Engine	\$ 1,150,250
Shipping Overhauled Engine	8,560
Field Services to Install Overhauled Engine	62,106
<b>Subtotal Replacement Engine</b>	<b>\$ 1,220,916</b>

<i>Temporary Leased Engine:</i>	
Lease Temporary Engine	\$ 101,650
Shipping Lease Engine	17,120
Field Services to Install/Remove Lease Engine	89,880
Allowance for Hourly Operating Charges	75,000
<b>Subtotal Temporary Leased Engine</b>	<b>\$ 283,650</b>
<b>TOTAL</b>	<b>\$ 1,504,566</b>

The table above includes an allowance of funding for the hourly operating fee charged by Sulzer. Staff anticipates that the leased engine will need to be operated for approximately 100 hours during the term of the lease. However, it cannot be known how frequently the unit will need to be operated. The number of hours will be dependent upon weather, required environmental testing, transmission needs, and the condition of the City's other generating units. If the number of hours is significantly higher, staff will return to the City Council for a change order, as necessary. The Electric Utility will provide fuel and any other required operating resources through the existing department operating budget.

Staff was recently made aware that Sulzer is not licensed to collect taxes in the state of Iowa. Therefore, the City will pay applicable taxes directly to the State of Iowa. The change order being proposed for City Council approval will include the sales tax for the original contract and Change Order No. 1, which were previously approved. These taxes total \$4,168.57.

**Change Order No. 2 has been prepared to reflect the cost of the refurbished unit, the leased engine (including an allowance for operation), and taxes for services previously contracted to Sulzer. The Change Order is in the amount of \$1,508,734.57, bringing the total contract amount to \$1,564,734.57.**

#### **FINANCING:**

The costs to return CT-1 back to service, along with the temporary lease unit, will be expenses that were not budgeted. The Electric Utility has an insurance deductible of \$500,000. Insurance will cover the costs of the overhauled replacement unit and installation, less the deductible. The costs for the leased unit are not eligible for reimbursement. Therefore, the Utility's ultimate estimated cost is \$783,650, while insurance coverage is anticipated to pay for \$781,084.57.

The Utility must cover all the expenses while the project is ongoing, until an insurance reimbursement can be obtained. Staff plans to pay for these expenses from the excess funds currently in the Ash Pond Capital Improvement Project that is underway. The Ash Pond CIP account has an unencumbered balance of \$1,695,434, as a result of favorable bids for that project.

#### **ALTERNATIVES:**

1. Approve Change Order No. 2 to Sulzer Turbo Services of La Porte, Texas, in the amount of \$1,508,734.57.

**This action will approve the leasing of an engine from Sulzer and an allowance for operating it during the 4-6 months of use. Additionally, Sulzer will rebuild a used engine and furnish it to the Utility.**

2. Approve Change Order No. 2 to Sulzer Turbo Services of La Porte, TX, in the amount of \$1,225,084.57.

**This action would result in Sulzer rebuilding a used engine, but would not provide for a leased engine to be operated while the rebuild takes place. This option may result in significant costs to the Utility as a result of failing to meet the Utility's capacity obligations!**

3. Refer this item to staff for further information.

**It is important that the Council understand that delays in providing replacement capacity may subject the Utility to increased penalties as a result of failing to meet the Utility's capacity obligations into January 2025.**

**CITY MANAGER'S RECOMMENDED ACTION:**

This work is necessary to return the City's CT-1 combustion turbine engine to service. Electric staff has determined Sulzer Turbo Services to be fully capable of performing the necessary repairs and providing a temporary lease unit. Sulzer performed the inspection at its site and has staff experienced in repairing the same model of gas turbine engines.

**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 in a timely manner 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 described above.