



# CITY OF CORONADO

## CITY COUNCIL STAFF REPORT

September 17, 2024

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### **CONSIDERATION OF ELECTRIC FIRE ENGINE ACQUISITION**

#### **RECOMMENDATION:**

Consider the acquisition of an electric fire engine and provide direction as appropriate.

#### **BACKGROUND:**

The City of Coronado maintains a fleet of three firefighting apparatus: two Type 1 Fire Engines (one serves as a reserve) and a Fire Truck. Each apparatus is scheduled for eight years on the line as a primary unit and then eight years as a reserve unit until reaching the end of its useful life. One fire engine is scheduled for replacement in 2026 and the adopted FY 2024/25 Budget includes \$1.3 million for this acquisition. Historically, the City has purchased a mix of diesel Pierce and Spartan apparatus and was exploring a diesel engine for this replacement cycle. The current build time for a new diesel fire engine is approximately four years from time of order to delivery.

When exploring this purchase, the Fire Department learned of the emergence of the electric fire engine, a fully-functional fire apparatus that is powered by a battery and electric motors rather than a diesel motor. The Fire Department has consistently led the way in advancing firefighter safety, innovation, and sustainability within public safety operations and has been actively exploring opportunities to integrate cleaner technology into its fleet and in keeping with the City's goals. Accordingly, the Department was interested in the potential benefits, risk and costs of an all-electric engine and embarked upon a review of this new technology and outcomes in the field.

The Fire Department reviewed the available electric fire engines on the market, considering factors such as operational performance, battery life and range, environmental and cost benefits, safety and technology features, and compatibility with existing infrastructure. The review process included demonstrations from leading manufacturers, consultations with other fire departments that have successfully integrated electric engines into their fleets, and a review of the total cost of ownership compared to traditional engines.

#### **ANALYSIS:**

Electric fire engines represent a new generation of firefighting apparatus, offering numerous benefits over traditional internal combustion engine vehicles. These benefits include reduced emissions, carcinogenic exhaust exposure reduction, lower maintenance costs, quieter operation, enhanced safety, maneuverability, agility and power compared to their diesel counterparts. Additionally, the acquisition of an electric fire engine aligns with state and local environmental mandates, including California's target for greenhouse gas reduction and the City's own sustainability goal of increasing the number of electric vehicles in the City fleet as noted in the Climate Action Plan's proposed actions.

The Fire Department's analysis of an electric fire engine focused on the Rosenbauer RTX, one of two all-electric fire engines currently available on the market, as it is deployed in Southern

California and available for a demonstration and because it provides a redesign of the fire engine interior, rather than an engine swap in a traditional apparatus design. The Rosenbauer RTX complies with the National Fire Protection Agency (NFPA) 1901, Standard of Automotive Fire Apparatus and would be designed to meet the specific needs of the Fire Department, ensuring that it can perform all required operations effectively and safely.

The following discussion outlines the findings of the Fire Department's review and testing for operations, features, risks and drawbacks.

### Operational Performance

During trials, the RTX showcased strong performance across various operational scenarios. The engine's electric drivetrain delivers instant torque, enabling rapid acceleration and smooth maneuverability which are essential qualities in emergency response situations. Additionally, the dual motor system provides redundancy and ensures reliability under demanding conditions.

The engine has all-wheel drive (AWD) capability and independent suspension, which allows the engine to "crabwalk" to maneuver into tight spaces. The adjustable ride height, which ranges from 7 to 19 inches, allows for effective operations in diverse environmental conditions. The RTX demonstrated the capacity to pump water continuously for over eight hours during firefighting operations.

### Battery Life and Range

One of the critical factors considered during the analysis was the battery life and range of the RTX. The engine is equipped with a high-capacity battery pack capable of providing sufficient range for typical urban and suburban firefighting operations. The RTX also features a 33-gallon auxiliary diesel generator that can be used to charge the battery and extend the vehicle's operational range to 375 miles if necessary, ensuring that the engine remains operational during prolonged incidents or in areas without immediate access to charging infrastructure.

The department assessed the RTX's recharge time and determined it to be well within the acceptable limits for seamless integration into the current operational demands. Notably, 100% of emergency incidents in the City fall within the vehicle's full battery range. On average, each incident could consume between 7-20% of the RTX's battery capacity, which can be fully recharged in approximately 20-25 minutes.

### Safety and Technology Features

The engine includes advanced driver assistance systems (ADAS), such as collision avoidance and lane-keeping assist, which contribute to safer navigation in emergency situations.

The cab design of the RTX is a departure from a traditional fire engine where the mid-cab engine placement divides the two front seats from the rest of the fire crew. The RTX has an open walk-around cab design and allows all crew members to exit from the same door, a helpful safety feature during highway traffic incidents. Each seat within the cab is designed to rotate and face the others, which allows for improved communication and facilitating incident stress debriefings in a private setting among crew members following a severely traumatic event. The RTX has ergonomic seating, climate control, and added space for equipment storage. The low-floor design enhances efficiency by enabling quicker and easier egress and ingress, which is particularly advantageous in emergency situations.

### Infrastructure and Integration

Integrating the RTX into the department's fleet may necessitate infrastructure upgrades. As of today, the department has identified the need for an upgraded 480V, three-phase transformer to support the vehicle's charging requirements. However, Rosenbauer is actively developing an enhanced charger that operates on 220VAC, which would eliminate the need for this transformer upgrade.

### Environmental and Maintenance Considerations

The RTX's fully electric operation significantly reduces greenhouse gas emissions relative to a diesel engine. Zero tailpipe emissions are produced, contributing to improved air quality and reduced noise pollution during operations. The quiet operation of the electric drivetrain also offers the benefit of reducing noise disturbances in residential areas during emergency responses. The reduction in diesel emissions lowers the risk of known carcinogen exposure to Firefighters at the scene of an emergency.

The electric powertrain presents long-term savings in fuel and maintenance expenses. The elimination of an internal combustion engine minimizes the need for routine preventative maintenance, oil changes, and continuous mechanical repairs. Additionally, the incorporation of regenerative braking technology contributes to the extended lifespan of brake components.

Over the typical 8-year service period of a diesel fire engine, fuel costs are estimated to reach approximately \$105,000, with associated emissions of nearly half a million pounds of CO<sub>2</sub>. While the initial acquisition cost of the RTX is substantially higher than that of a traditional diesel engine, less preventative maintenance is needed throughout its service life, thereby reducing lifecycle costs.

### Cost

A significant drawback of the electric engine is the purchase price, as well as the cost of the necessary charging equipment and potential infrastructure upgrades. The cost of the Rosenbauer RTX is \$2,200,000, while the City's current allocation for a fire engine purchase is \$1,300,000, a difference of \$900,000. The estimated cost for upgrading the 480V transformer is approximately \$6,000. It is anticipated that the new 220V charger will be available by the time of delivery, potentially eliminating the need for this upgrade. Additionally, the portable vehicle charging unit is priced at \$35,000.

### New Technology

Electric vehicle technology is relatively new to the fire service, with only eight cities in the United States currently operating the RTX. Consequently, there is limited information of the potential challenges and operational issues over time associated with this type of apparatus.

### Battery Life and Maintenance

The longevity and performance of the battery over the life of the engine can be a concern. Over time, battery capacity may diminish, potentially impacting the engine's operational range and effectiveness.

### Training and Adaptation

Fire Department and Fleet personnel will require additional training to effectively operate and service the apparatus, leading to potential increases in training costs and adaptation periods.

### Resale Value

The resale market for electric fire engines is still developing. Depreciation rates and market demand could impact the long-term value of the investment.

### **Summary**

The all-electric engine was found to meet the operational needs of Coronado firefighting and delivers benefits in terms of noise reduction, emissions reduction, maintenance downtime and expense reduction, fuel cost reduction, and would contribute substantially to a healthier workplace environment from a physical and mental wellness perspective.

The current build time for this electric engine is 18-24 months, which would allow Coronado to replace its end-of-life fire engine two years earlier than with a traditional engine, which has a delivery timeline of four years.

Major drawbacks include the much higher cost of the apparatus and charging infrastructure, unknowns with this new and emerging technology, and battery life.

### **FISCAL IMPACT:**

Acquisition of an electric fire engine would require an additional budget appropriation of \$900,000 for the engine, and approximately \$50,000 for facility upgrades and chargers.

### **ALTERNATIVE:**

Direct staff to return with additional information and research or proceed with purchase of a traditional diesel fire engine.

### **CALIFORNIA ENVIRONMENTAL QUALITY ACT:**

Not Applicable.

### **PUBLIC NOTICE:**

No notice required.

### **ATTACHMENTS:**

None.

Submitted by: Fire Department / Chief Summers