
SECO PRELIMINARY ENERGY ASSESSMENT REPORT

Star Transit

Terrell, TX



Submitted to:

STAR TRANSIT

Star Transit

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March 2022



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Executive Summary

NORESCO was contracted by the Texas State Energy Conservation Office (SECO) to perform a Preliminary Energy Audit (PEA) of the Star Transit facilities in Terrell, TX. These facilities have a combined size of 20,000 square feet (SF) between the administration and parking garage buildings. The purpose of this project is to assess the building's energy use and identify opportunities to lower its greenhouse gas (GHG) emissions and energy consumption. In order to accomplish this goal, an evaluation of the building's historical energy consumption and major energy-consuming equipment has been performed, and a preliminary list of energy conservation measures (ECMs) has been assembled.

Based on utility data received, the facility had an actual annual expenditure for the twelve (12) month period from Aug 2019 to Jul 2020 as shown in Table 1. (Aug 2019 to Jul 2020 period has been selected for the analysis which is the most recent pre-pandemic period to represent typical annual energy use of the facility).

Table 1. Annual Energy and Carbon Use Summary

| Utility | Annual Consumption | Annual Cost |
|---|--------------------|-------------|
| Electricity (kWh) | 121,935 | \$ 21,532 |
| Peak Demand (kW) | 36 | |
| Metric Tons CO ₂ e (MgCO ₂ e) | 54 | |
| Total Energy Cost (\$) | | \$ 21,532* |

*Most recent 12 months available total \$28,689

NORESCO conducted an energy audit site visit in January of 2022. NORESKO identified and estimated the savings and implementation costs for seven (7) ECMs including both capital and UCRM measures.

Because the facility is in the transition phase of upgrading their current fleet from gas powered to electric, two savings scenarios were considered. The first does not consider the electric vehicle (EV) upgrade and solar photo-voltaic (PV) capital improvement project as shown in Table 2; whereas Table 3 reflects this upgrade.

Table 2 Energy and Cost Savings Summary – Based on Current Energy Use

| Annual Energy Use | Estimated Annual Energy Savings | Estimated Annual Cost Savings | Estimated Implementation Cost | Simple Payback Period |
|-------------------|---------------------------------|-------------------------------|-------------------------------|-----------------------|
| Electricity | 37,593 kWh | \$6,656 | \$11,275 | 1.7 |

Table 3 Energy and Cost Savings Summary - Based on EV Addition and Solar System Generation

| Annual Energy Use | Estimated Annual Energy Savings | Estimated Annual Cost Savings | Estimated Implementation Cost | Simple Payback Period |
|-------------------|---------------------------------|-------------------------------|-------------------------------|-----------------------|
| Electricity | 172,603 kWh | \$95,143 | \$559,979 | 6.0 |

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I. Facility Descriptions

The purpose of the onsite survey was to evaluate the facilities major energy consuming equipment in each building including lighting, heating, ventilation, and air-conditioning (HVAC) equipment, miscellaneous equipment, building controls and opportunities to improve the envelope. Evaluating renewable opportunities such as solar panels, EV charging and battery walls were also considered at the request of Star Transit.

The facilities are located at 500 Industrial Blvd, Terrell, TX with a combined size of 20,000 SF. There are two buildings that have been audited highlighted in the Figure 1.



Figure 1. Star Transit Facility Location

I.1.1 Admin Building - Building 1



Figure 2. Admin Building 1

Building Information: Built in 2000, single story, and approximately 10,000 ft². See Figure 2.

Building use: Closed office, conference/training rooms, breakroom and back of house (BOH) spaces

Operating hours: 6am – 5:30 pm, Monday-Friday, no operation on weekends

HVAC system: 6 single zone heatpump units ~11 years old. 1 gas-fired backup generator which is currently not in service.

HVAC controls: Narrow thermostat setpoints (~70°F -72°F), no automatic changeover, thermostats are manually set between heating and cooling, and the majority of them have no automatic setback operation.

Lighting Type: Majority of the fixtures consists of 32W, T8 Fluorescent lamps, plus 34 canister fixtures with 26W compact fluorescent lamps (CFLs).

Lighting Controls: Majority of the office spaces have lighting occupancy sensors that shuts the lights off ~30 min after vacancy.

Building Energy Use: Electricity only

I.1.2 Parking Garage (Bus Barn) - Building 2

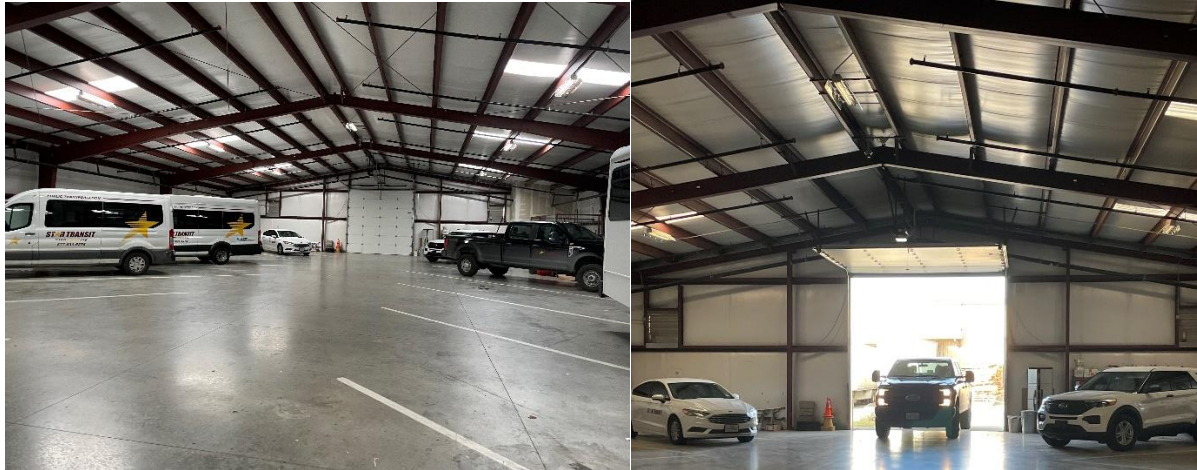


Figure 3. Parking Building 2

Building Information: Built in 2012, single story, and approximately 10,015 ft². See Figure 3.

Building use: Parking garage

Operating hours: 3:30am – 6:30 pm, 7 days per week

HVAC system: Unconditioned (i.e., no heating or cooling). Two motorized exhaust fans & outside air dampers operate on a switch. Additional ventilation is provided via roll up doors.

HVAC controls: Motorized dampers operate on a switch. No other controls.

Lighting Type: 32W, T8 Fluorescent lamps and skylights provide lighting to the space. Exterior lights are burned out

Lighting Controls: Interior lights are on 24/7 (24 hours per day, 7 days per week). Majority of the lamps are not providing sufficient light due to lumen depreciation (i.e., they have not been replaced since construction). Exterior lights are burned out and not on any control either.

Building Energy Use: Electricity

Table 4 shows the main space functions in the facility, their size, number of employees and hours of operation.

Table 4 Space Function and Schedule Summary

| Space Function | Floor Area (SF) | Total # of Employees | Hours of Operation |
|----------------|-----------------|----------------------------------|--|
| Office Space | ~10,000 | 27 | 6am – 5:30 pm, Monday-Friday, no operation on weekends |
| Parking Garage | ~10,000 | No Occupancy, fleet of 14 busses | 3:30am – 6:30 pm, everyday |

II. Recommended Capital Improvements

This section is intended to demonstrate any potential improvement that requires high capital and might not be justified solely based on energy cost savings. Some of these measures such as HVAC equipment replacement could be suggested based on life expectancy of the equipment (see APPENDIX A). Solar PV installation could be another capably intensive project candidate which typically shows long payback periods. Lastly, replacement of broken or unutilized systems that haven't been contributed to the energy bills might be considered for this category. By replacing these non-functioning systems, code requirements or building/occupant needs will be met while there will be penalties due to consumption increase in the utility bills.

Solar PV System Implementation

Star Transit is in the process of converting their current bus fleet to EV's (electric vehicles). Even though the facility's current electricity usage is not high, with the charging stations their consumption will increase dramatically. Also, the site plan and building roof structure for the PV system installation needs to be considered. Table 5 is a summary of the estimated electricity needed to power the 14 buses in their fleet.

Table 5 Electricity Use Summary for EV Bus Fleet

| # bus | Mile/day | Operation hours | Fuel (kWh/mi) | Consumption/bus (kWh/day) | Total Fleet Consumption (kWh/day) | Battery Capacity for each bus (kWh) | Annual EV Demand (kWh) |
|-------|----------|-----------------|---------------|---------------------------|-----------------------------------|-------------------------------------|------------------------|
| 14 | 100 | 12 | 0.77 | 77 | 1078 | 118 | 388,080 |

In order to offset the current electricity and additional EV charging demand, a solar PV system is being considered. However, EV charging would happen during evening hours (6pm-5am). Battery storage could be an off-grid solution, but the magnitude of the electrical storage needed and stock issues, makes this option not feasible. Our recommended solution is a grid-tied operation. Instead of utilizing battery backup, the grid will regulate the connection between demand and supply.

Two scenarios have been analyzed in terms of electricity offset and simple payback period. Material, installation, and operational costs have been considered only for the simple payback calculations. Additional costs such as structural evaluation, hiring an electrician, and charging station connections are excluded for the analysis.

The 1st scenario is a roof mounted application for both buildings. Based on the location and building specifics, solar production is estimated and shown in Figure 4 and proposed roof layout in Figure 5. Additional utility analysis has been performed to optimize the electricity rate to achieve a lower payback period.

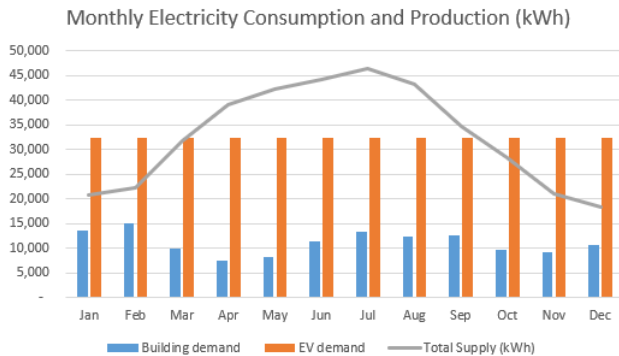


Figure 4 Scenario 1 Demand vs Production



Figure 5 Solar Panel Layout for Scenario 1

The 2nd scenario shown in Figure 6 and Figure 7 consists of both roof and ground mounted options. Since charging stations will be installed in building 2, roof for building 2 and field space around it has been considered

for the evaluation. Due to the specifics of the site, full offset with solar is not feasible because EV charging will require purchasing electricity at night- since battery storage is not an option.

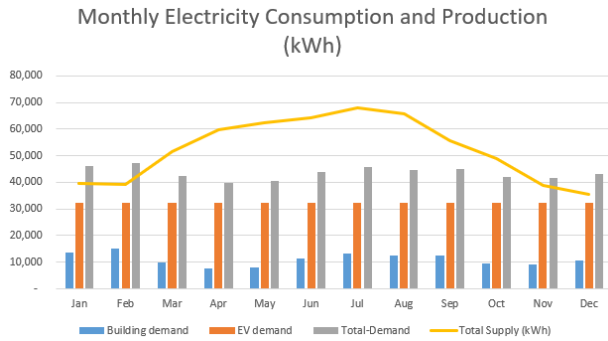


Figure 6 Scenario 2 Demand vs Production



Figure 7 Solar Panel Layout for Scenario 2

Table 6 Capital Measure - Solar System

| Facility | Implementation Cost (\$) | Estimated Energy Savings (kWh/yr) | Estimated Cost Savings/yr | Simple Payback (yrs) |
|---------------------------------------|--------------------------|-----------------------------------|---------------------------|----------------------|
| Building1+2 | \$548,705 | 129,263 | \$87,423 | 6.3 |
| Building2 + Field (next to Building2) | \$903,496 | *629,002 | \$89,560 | 10 |

*Annual energy consumption is met and there is 107,415 kWh excess energy

Details of the Solar System analysis and utility assessment can be found in *Chapter XV - Technical Assistance on Solar Feasibility Analysis and Utility Assessment* chapter of this report.

Exterior Lights – Building 2

There are 4 exterior lights on the barn building whose lamps are burned out. It is assumed that the current lamps are 150W metal halide and when they were still in operation, according to the building staff they were on 24/7. Four (4) 80W LED wall pack fixtures with photocell controls are recommended. Photocell control will reduce the operation to 11 hours per day and LED lamps will consume less energy and have much longer rated lives.

Table 7 Building 2 Exterior Lights Savings

| Facility | Implementation Cost (\$) | Estimated Energy Savings (kWh/yr) | Estimated Cost Savings/yr | Simple Payback (yrs) |
|------------|--------------------------|-----------------------------------|---------------------------|----------------------|
| Building 2 | \$480 | 3,971 | \$734.67 | 0.7 |

III. Recommended Utility Cost Reduction Measures

This section is intended to show potential energy cost saving opportunities which can also be justified with financial analysis. Utility Cost Reduction Measure (UCRM) projects identified during the preliminary analysis are detailed below.

UCRM 1 – Building 1 Lighting Retrofit

Fluorescent T8 lighting fixtures are the most common for each building. It is recommended to replace T8 lamps with new light emitting diode (LED) lamps throughout the buildings. Besides significant reduction in the lighting, cooling, and fan energy usage, LED fixtures have much longer rated life, better color rendition index (CRI) range and similar correlated color temperature (CCT) as shown in the Table 8 below.

Table 8 Fixture Performance Comparison

| Technology | CRI | CCT(K) | Life (Hours) |
|-------------|--------|-------------|--------------|
| Fluorescent | 70-85 | 3,000-6,000 | 10,000 |
| LED | 70-100 | 3,000-6,000 | 100,000 |

For the calculations, lights in building 1 are assumed to be on an average of 11 hours/day for the weekdays and off during weekends. Material and labor costs are included in the payback calculations.

Table 9 UCRM 1 LED Retrofit

| Facility | Implementation Cost (\$) | Estimated Energy Savings (kWh/yr) | Electrical Heating Energy Cost Penalty/yr | Estimated Cost Savings/yr | Simple Payback (yrs) |
|------------|--------------------------|-----------------------------------|---|---------------------------|----------------------|
| Building 1 | \$3,641 | 19,328 | \$245.51 | \$3,330 | 1.1 |

UCRM 2 - Building 1 Interior Lighting Controls

Interior lights at building 1 are fluorescent and the majority of them are controlled with passive infrared (PIR) sensors which have a 30 min delay as required by the energy code. Because fluorescent lamps experience wear and tear on startup, it is wiser to reduce the number of operating cycles to maintain a longer lamp life. However, this could be mitigated by using long-life lamps such as LED which allows time delays as short as 1-5 minutes. It is recommended to update the time settings of the sensors after the LED upgrade in those rooms.

Even though small offices throughout the building have PIR sensors, open offices, common rooms, corridors are currently on manual switches. Vacancy sensors are recommended for restrooms and other back of house spaces (Vacancy sensors are occupancy sensors that must be turned on manually and then turn off lights automatically. The manual on feature prevents automatic powering on of light circuits when not desired). Spaces controlled by manual switches are only considered for the calculations (12 hr/day for 5-day operation is assumed) for Building 1.

Table 10 UCRM 2 Building 1 Interior Lighting Control

| Facility | Implementation Cost (\$) | Estimated Energy Savings (kWh/yr) | Electrical Heating Energy Cost Penalty/yr | Estimated Cost Savings/yr | Simple Payback (yrs) |
|------------|--------------------------|-----------------------------------|---|---------------------------|----------------------|
| Building 1 | \$1,806 | 4,144 | \$52.65 | \$714 | 2.5 |

UCRM 3 Building 2 Interior Lighting Retrofit and Controls

There are 10 skylights in Building 2 which provide a significant amount of daylighting to the barn space. Most of the lighting fixtures are located right under the skylight which enables retrofitting the T8's with new LED fixtures that have an integrated (fixture by fixture) control option for both occupancy and daylight. By doing so, rewiring all of the fixtures would be avoided and more savings will be achieved due to less wattage and less operating hours.

24/7 operation is assumed for the current operation (15% lights assumed to be not on due to burn out) and 40% reduction is taken into account for the proposed case based on ASHRAE 90.1 and California Title 24 requirements on parking garage lighting controls.

Table 11 UCRM 3 Building 2 Interior Lighting Retrofit and Controls

| Facility | Implementation Cost (\$) | Estimated Energy Savings (kWh/yr) | Estimated Cost Savings/yr | Simple Payback (yrs) |
|--------------|--------------------------|-----------------------------------|---------------------------|----------------------|
| **Building 2 | \$2,400 | 6,433 | \$1,190 | 2.0 |

UCRM 4 Improve Thermostat Controls

Existing wireless manual changeover thermostats have a small temperature deadband (~70°F -72°F). Because the changeover is manual, energy waste is assumed to be significant during the swinging seasons. It was also observed that the setback controls have not been well utilized for the unoccupied times. Lastly, placement of thermostats results in comfort issues at the closed offices. The core offices experience noticeably higher temperatures than perimeter offices in winter. In order to address both energy and comfort issues, auto changeover, Wi-Fi connected smart thermostats are recommended which works with smart temperature sensors that detect the temperature of a given room and prioritize heating or cooling needs. Calculations assume setpoints shows below:

Table 12 Thermostat Setpoint Assumptions

| Baseline Setpoints | | Proposed Setpoints | | | |
|--------------------|-------------|----------------------|---------------------|----------------------|---------------------|
| Heating (F) | Cooling (F) | Occupied Heating (F) | Heating Setback (F) | Occupied Cooling (F) | Cooling Setback (F) |
| 70 | 72 | 70 | 68 | 75 | 80 |

Table 13 UCRM 3 Improve Thermostat Controls

| Facility | Implementation Cost (\$) | Estimated Energy Savings (kWh/yr) | Estimated Cost Savings/yr | Simple Payback (yrs) |
|------------|--------------------------|-----------------------------------|---------------------------|----------------------|
| Building 1 | \$3,547 | 7,687 | \$1,422 | 2.5 |

UCRM 5 Utility Rate Plan Change

Anomalies in the current utility rate structure have been determined during the preliminary analysis. On average, Star Transit is charged \$0.19/kWh (for the most recent 12 months) for their electricity usage which is much higher than a typical small commercial facility in TX (see in Figure 8).

| Average \$/kWh Cost | |
|---------------------|-----------|
| 27 Months | 12 months |
| \$0.1832 | \$0.1925 |

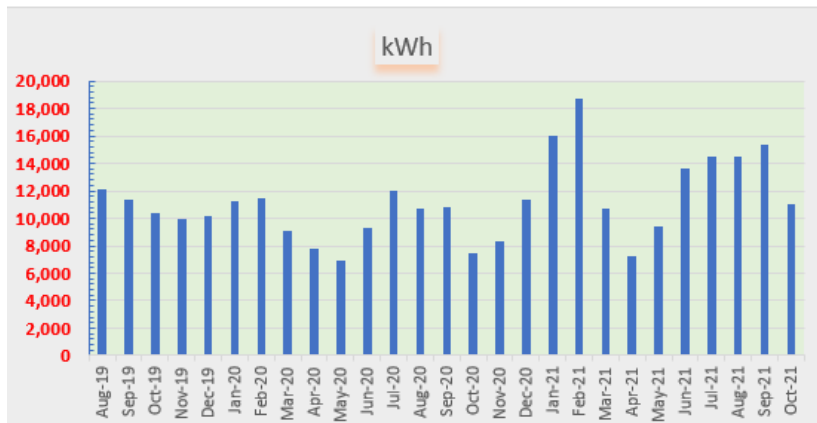


Figure 8 Star Transit Energy Breakdown

Currently Star Transit is on a month-to-month “Business Power Plus Flex Plan” with Reliant Energy. Our market research demonstrated that they are eligible for a much lower rate which would save them up to \$100,135.06 over 5 years (see Figure 9) if they make the necessary updates to their plan.

| Term | \$/kWh | Annual Savings | Term Savings |
|-----------|-----------|----------------|--------------|
| 12 Months | \$0.07266 | \$17,680.91 | \$17,680.91 |
| 24 Months | \$0.06488 | \$18,853.21 | \$37,706.41 |
| 36 Months | \$0.06135 | \$19,385.11 | \$58,155.33 |
| 48 Months | \$0.05931 | \$19,692.50 | \$78,770.00 |
| 60 Months | \$0.05709 | \$20,027.01 | \$100,135.06 |

Figure 9 Proposed Utility Plan Options

IV. Recommended Maintenance & Operation Procedures

Good maintenance and operation procedures significantly improve operating economy, equipment life, and occupant comfort. Generally, maintenance and operation procedural improvements can be made with existing staff and budgetary levels. Below are typical maintenance and operation procedures that have energy savings benefits. The following maintenance and operation procedures should be encouraged and continued to ensure sustainable energy savings.

Table 14 Airside Systems recommended measures

| Description | Recommended Frequency |
|---|-----------------------|
| Inspect filters – Replace as necessary | Quarterly |
| Re balance airside system | 3-5 years |
| Inspect electrical connections and tighten as necessary | Annually |
| Check for proper function of all dampers (outside air, return air, spill, etc.) | Semi-Annual |
| Ensure tight shut-off of dampers | Semi-Annual |
| Lubricate all moving parts | Semi-Annual |
| Clean and check condensate pans, drains and traps | Semi-Annual |

V. LoanSTAR Funding for Utility Cost Reduction Measures

Texas LoanSTAR program is a great alternative for funding options for UCRM implementation. The program was initiated by the Texas Energy Office and approved by the U.S. Department of Energy (DOE). The program maximum loan term for all projects is 15 years (simple payback period). LoanSTAR finances both energy and water efficiency measures and systems commissioning in existing facilities at a very low interest rate. Typical energy savings measures include, but not limited to, energy efficient lighting systems, high efficiency HVAC systems, and energy recovery systems. Lighting retrofits are part of the recommended measures for this project. Additional information on LoanStar Revolving Loan Program and application form can be found in the following links.

<https://comptroller.texas.gov/programs/seco/funding/loanstar/>

[LoanSTAR Revolving Loan Program](#)

[LOANSTAR TECHNICAL GUIDEBOOK](#)

VI. Utility Rate Analysis

The facilities surveyed comprised a total gross area of approximately 20,015 square feet. Annual electric bills for the buildings surveyed were approximately \$21,532 for the 12-month period in Aug 2019-Jul 2020 and \$26,541 for the 12-month period in Aug 2020-Jul 2021.

Aug 2019 – Jul 2020 period has been selected to minimize the possible operational anomalies caused by the COVID-19 pandemic.

VI.1.1 Rate Structure

Star Transit has been on a month-to-month Business Plus Flex Plan with Reliant Energy. Due to being month to month subscription, they have different rates for each month. Demand and consumption are on a blended rate. An average of \$0.18/kWh has been calculated for the 27 months.

Table 15. Electric Rate Analysis

| Date | Energy (kWh) | Demand (kW) | Cost (\$) | \$/kWh |
|--------|--------------|-------------|------------|----------|
| Aug-19 | 12,127 | 43 | \$1,732.88 | \$0.1429 |
| Sep-19 | 11,403 | 39 | \$1,711.25 | \$0.1501 |
| Oct-19 | 10,397 | 37 | \$1,579.65 | \$0.1519 |
| Nov-19 | 9,930 | 85 | \$2,122.02 | \$0.2137 |
| Dec-19 | 10,211 | 85 | \$2,153.92 | \$0.2109 |
| Jan-20 | 11,289 | 71 | \$2,144.84 | \$0.1900 |
| Feb-20 | 11,428 | 83 | \$2,284.24 | \$0.1999 |
| Mar-20 | 9,061 | 76 | \$1,903.47 | \$0.2101 |
| Apr-20 | 7,827 | 35 | \$1,354.08 | \$0.1730 |
| May-20 | 6,960 | 27 | \$1,169.93 | \$0.1681 |
| Jun-20 | 9,278 | 32 | \$1,498.95 | \$0.1616 |
| Jul-20 | 12,024 | 36 | \$1,876.65 | \$0.1561 |
| Aug-20 | 10,687 | 35 | \$1,727.11 | \$0.1616 |
| Sep-20 | 10,825 | 38 | \$1,832.01 | \$0.1692 |
| Oct-20 | 7,451 | 28 | \$1,325.44 | \$0.1779 |
| Nov-20 | 8,334 | 51 | \$1,671.91 | \$0.2006 |
| Dec-20 | 11,318 | 91 | \$2,504.57 | \$0.2213 |
| Jan-21 | 16,040 | 90 | \$3,219.78 | \$0.2007 |
| Feb-21 | 18,679 | 97 | \$3,651.63 | \$0.1955 |
| Mar-21 | 10,692 | 76 | \$2,352.85 | \$0.2201 |
| Apr-21 | 7,251 | 50 | \$1,495.47 | \$0.2062 |
| May-21 | 9,424 | 51 | \$1,911.61 | \$0.2028 |
| Jun-21 | 13,618 | 38 | \$2,343.92 | \$0.1721 |
| Jul-21 | 14,520 | 41 | \$2,505.19 | \$0.1725 |
| Aug-21 | 14,447 | 39 | \$2,473.78 | \$0.1712 |
| Sep-21 | 15,304 | 36 | \$2,593.12 | \$0.1694 |
| Oct-21 | 11,054 | 32 | \$1,964.72 | \$0.1777 |

The energy use index (EUI) represents a facility’s annual energy usage per square foot; it is measured in thousands of British thermal units (BTUs) per square foot per year (kBtu/ft²/Year). Similarly, energy cost index (ECI) is measured as cost per square foot per year (\$/ft²/Year). The EUI and ECI for facilities surveyed are summarized below:

Table 16 Energy Cost and Consumption Benchmarks “Aug2019-Jul2020”

| Facility Name | Building Size (ft2) | Electricity (kWh/yr) | Electricity (kWh/ft ² /yr) | Electricity Cost/yr (\$) | EUI (kBtu/ft ² /yr) | ECI (\$/ft ² /yr) |
|---------------|---------------------|----------------------|---------------------------------------|--------------------------|--------------------------------|------------------------------|
| Building 1+2 | 20,015 | 121,935 | 6.09 | \$ 21,532 | 20.79 | \$1.08 |

VII. Energy Accounting

VII.1.1 Utility Providers

Reliant Energy provides electricity to the facility. Water and sewer are provided by City of Terrell.

VIII. Energy Consumption and Performance

VIII.1.1 Electrical Consumption, Demand, and Load Factor Profiles

The facility’s electrical consumption and local cooling degree days (CDD) and heating degree days (HDD) for the 27 months from January 2018 to December 2020 are presented in Figure 10.

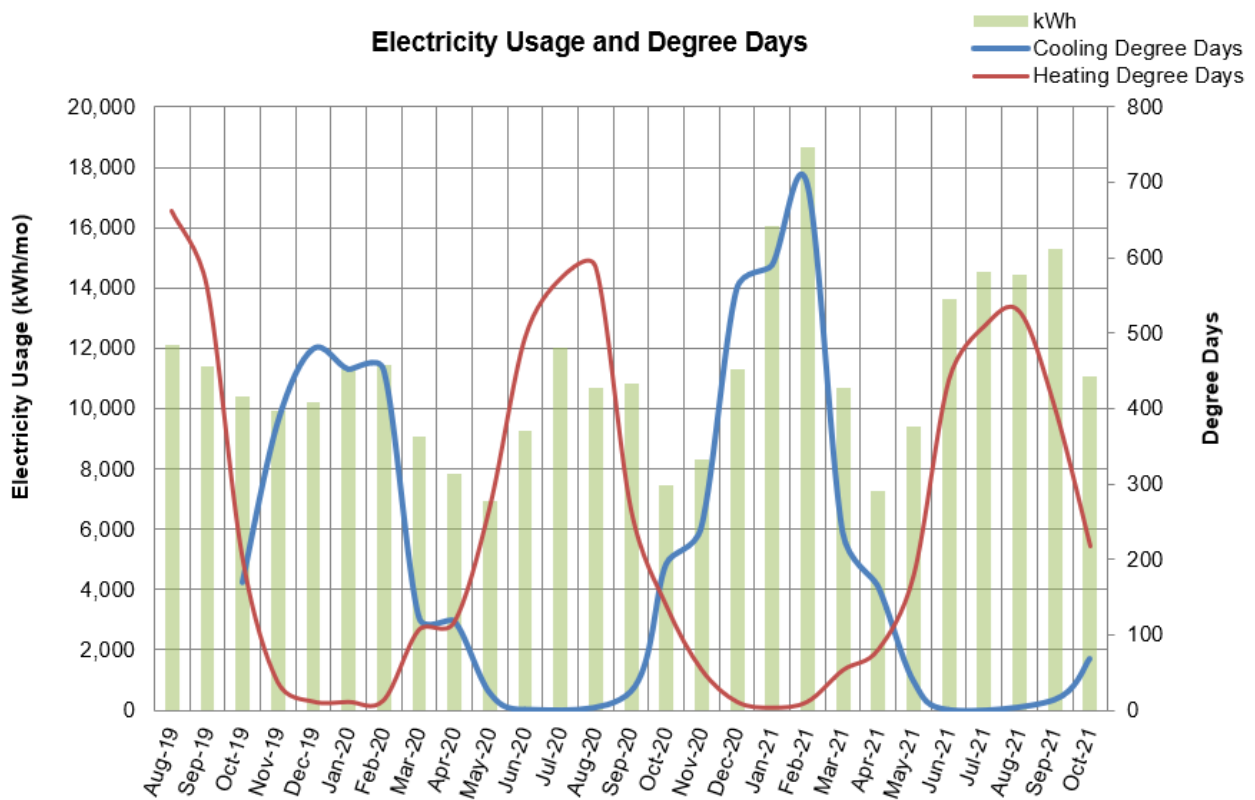


Figure 10 Electricity Usage and Degree Day Profile

The facility’s electrical demand and consumption for the 27 months from Aug 2019 to Oct 2021 are presented in Figure 11.

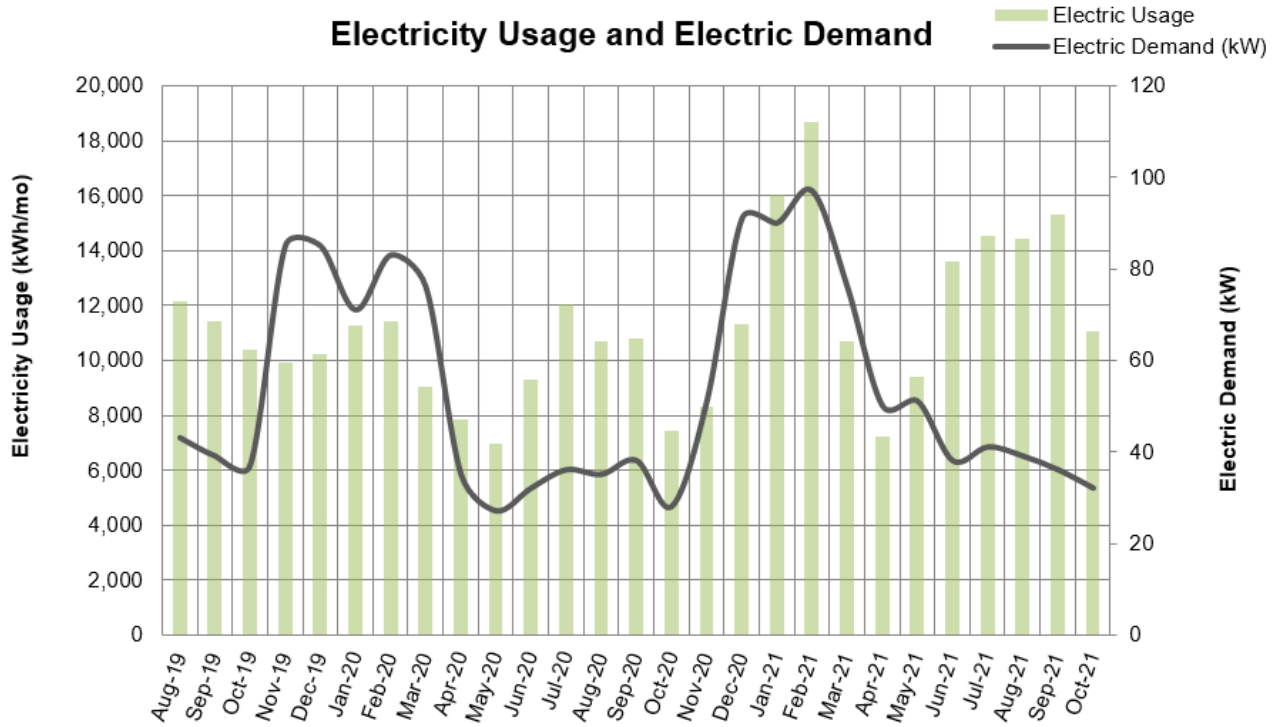


Figure 11. Electricity and Electrical Demand Profile

The facility’s electrical load factor for the 27 months from Aug 2019 to Oct 2021 is presented in Figure 12.

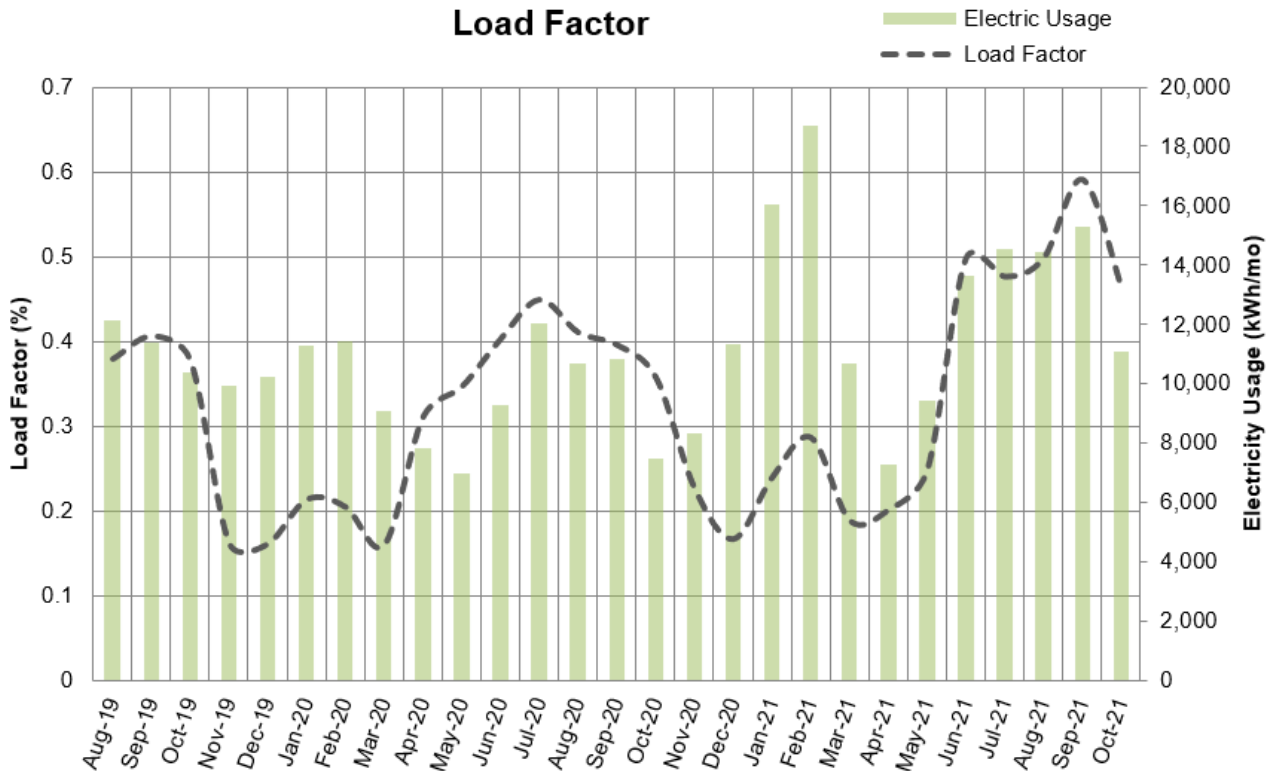


Figure 12. Electricity use and Load Factor Profile

The electrical load factor is equal to the electrical consumption (kWh) divided by the peak load (kW) over a specified time period and is calculated as follows:

$$Load\ Factor = \frac{Monthly\ Consumption\ (kWh)}{Peak\ Demand\ (kW) \times Days\ per\ Month \times 24\ hours\ per\ day}$$

A high load factor means power usage is relatively constant. A low load factor indicates a brief period of high demand is incurred. To service that peak, generating capacity is sitting idle for long periods, thereby imposing higher costs on the system. Electrical rates are designed so that customers with a high load factor are charged less overall per kWh. Buildings with low load factors (i.e. <50%) may be good candidates for electrical demand management improvements.

The overall electricity and electrical demand are high during summer times to meet the cooling load but heating period shows the opposite behavior.

VIII.1.2 Energy Usage Distribution

The building utilizes electricity to meet its end use energy requirements.

IX. Water Consumption and Performance

Building 1 has only 2 restrooms and a breakroom including total of four-bathroom sinks, one kitchen sink, five water closets and one urinal, which are the main source of water consumption (service water) for the whole facility. In Sep 2021, the facility installed a car wash station for the fleet which can be seen in the graphic below:

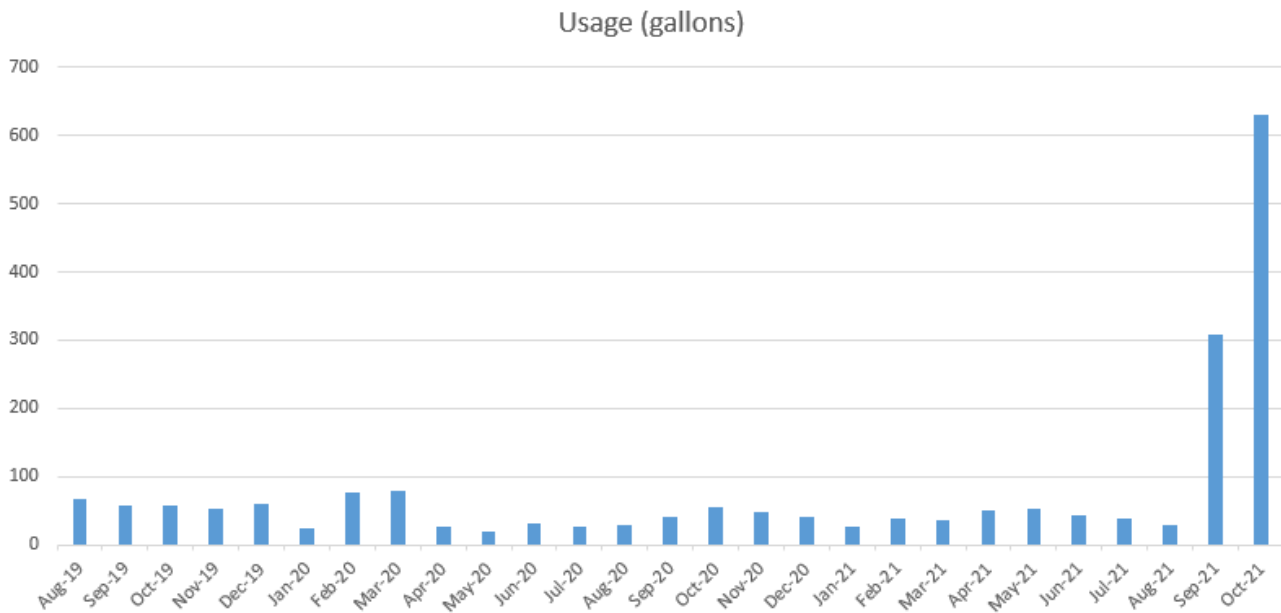


Figure 13 Water Consumption Profile

Due to limited hot water use and the car wash station, there are no recommended water efficiency measures for the facility.

X. EnergyStar Portfolio Manager

NORESCO has created an account for Star Transit and uploaded the utility data into EnergyStar Portfolio Manager. Office building type has been selected for Building 1 and parking garage for Building 2.

Facilities energy data in *Energy Star Portfolio Manager* can be accessed via the following link:

<https://portfoliomanager.energystar.gov/pm/login.html>

ENERGY STAR Portfolio Manager

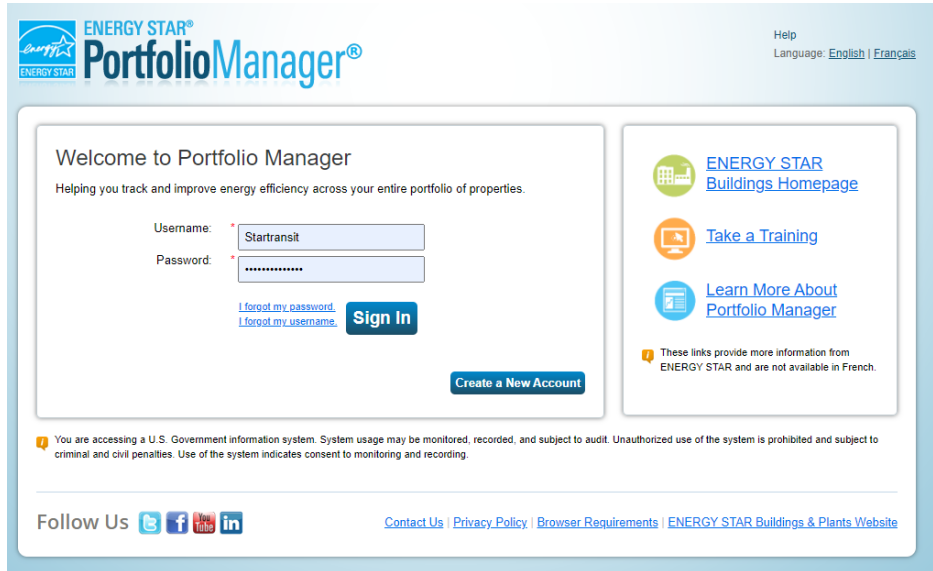


Figure 14 Portfolio Manager Login

Username: Startransit
 Password: Startransit22!

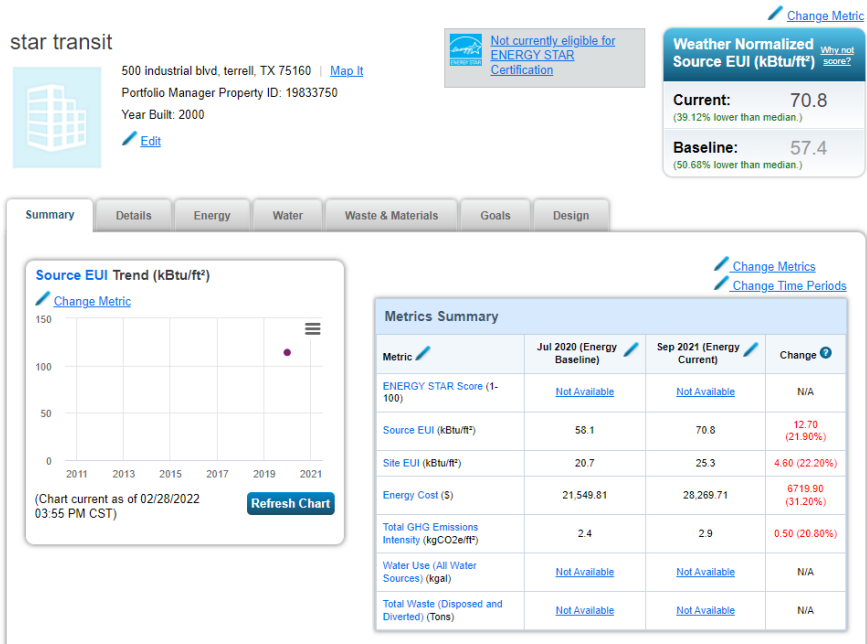


Figure 15 Portfolio Manager Building Profile

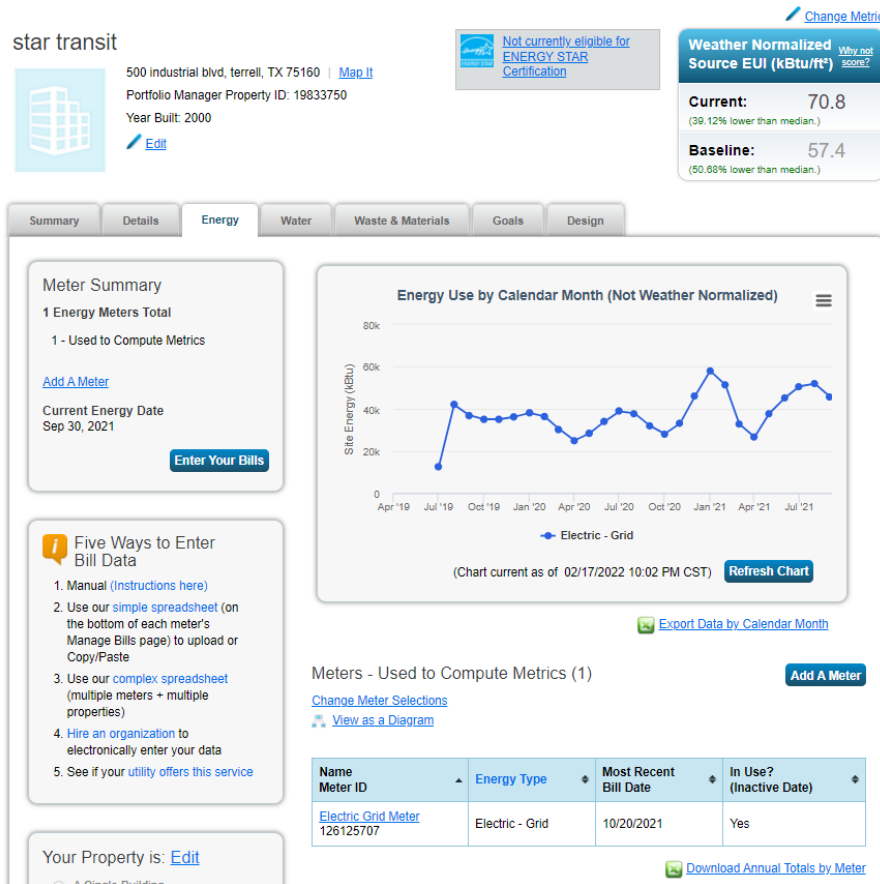


Figure 16 Portfolio Manager Facility Energy Profile

Additional Energy Star Portfolio Manager information could be found in these links:

[Portfolio Manager | ENERGY STAR](#)

[Benchmark Your Building Using ENERGY STAR® Portfolio Manager® | ENERGY STAR Buildings and Plants | ENERGY STAR](#)

XI. Emissions Calculations

Table 17 includes the conversion factors used to calculate the estimated GHG emission savings in Figure 17.

Table 17 GHG Emission Conversion Factors

| Fuel Type | Greenhouse Gas | Quantity | Value | Unit |
|-------------|----------------|-----------------|---------|------------|
| Electricity | CO2 | Mass GHG/Energy | 979.062 | lb GHG/MWh |
| Electricity | CH4 | Mass GHG/Energy | 0.069 | lb GHG/MWh |
| Electricity | N2O | Mass GHG/Energy | 0.01 | lb GHG/MWh |

Because the building only has electricity as energy source, other sources are not considered for the calculations. Proposed case calculations include UCRM1, 2, 3, and 4 only.

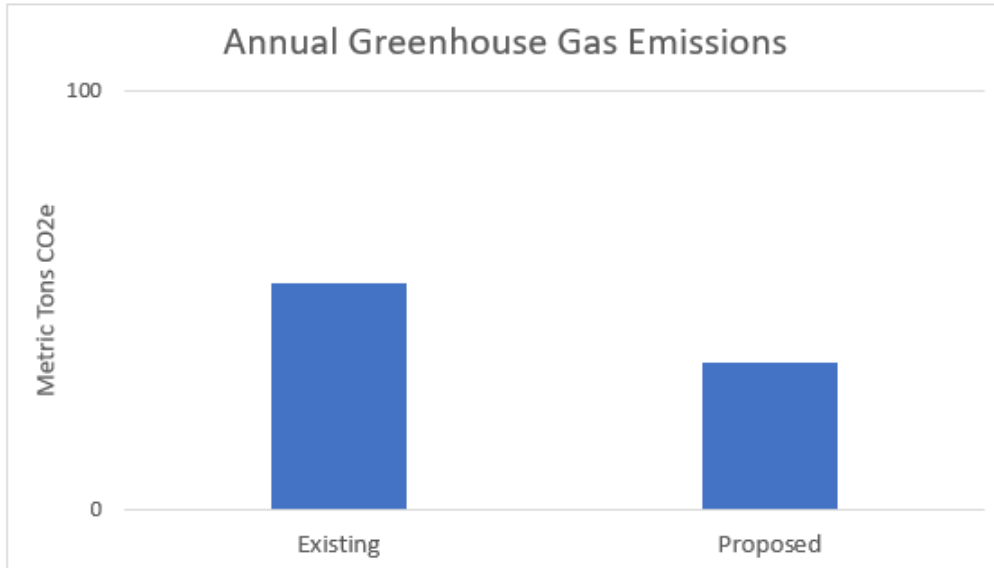


Figure 17. Annual Greenhouse Gas Emissions Summary

XII. Energy Management Policy

Star Transit does not currently have an energy management policy or a dedicated energy manager who would take the lead on planning or implementing the energy & water saving measures. However, they already have taken initiatives on adopting new technologies such as EV (electric vehicle) for the entire fleet which in return will benefit their operation and the environment in long-term. The purpose of having such a policy is to advocate energy efficiency, improve energy & cost-effectiveness, reduce waste and greenhouse gas emissions and to contribute to bigger sustainability goals.

It is recommended to consider the following steps when establishing a plan:

- ✓ Commitment
- ✓ Performance benchmarking/assessment
- ✓ Goal Setting
- ✓ Prioritize strategy initiatives
- ✓ Plan for funding
- ✓ Execution and Monitoring

XIII. Energy Legislation Overview

History of legislation for public sector energy reporting goes back to 2011 (Texas Emissions Reduction Plan). It includes fundamental changes in energy usage to comply with Clean Air Act standards. Senate Bill 12 effective Sep 1st, 2007 extended the timeline for a 5% annual reduction goal to six years. In 2011, Senate Bill 898 superseded SB12, and extended the scope of emissions plan. It required each political subdivision, institution of higher education, or state agency to establish a goal to reduce electrical consumption by at least five percent annually for ten years beginning September 1, 2011. Each entity must report to the State Energy Conservation Office (SECO) regarding the entity's efforts to meet the goal and achieved progress. Form#50-816 (2011) was replaced with a new online energy reporting form in 2019 found at the web link below.

<https://comptroller.texas.gov/programs/seco/reporting/local-gov.php>

XIV. Additional UCRM Funding Options

XIV.1.1 Federal Technical Assistance Programs

Table 12: Federal Technical Assistance Programs in the Transportation Sector

| Program | Description | Citation |
|---|--|--------------|
| Air Pollution Control Program (2007) | Assists state, local, and tribal agencies in planning, developing, establishing, improving, and maintaining adequate programs to prevent and control air pollution and implement national air quality standards. Air quality affects energy efficiency because reduced energy use reduces electricity production, a source of air pollution. | 42 USC 7405 |
| Alternative Transportation in Parks and Public Lands Program (2005) | Provides funds to support planning and capital expenses for alternative transportation systems in parks. | 49 USC 5320 |
| Congestion Mitigation and Air Quality (CMAQ) Improvement Program (2007) | Provides funding to states' departments of transportation, municipal planning organizations, and transit agencies for projects and programs that reduce transportation-related emissions in air quality nonattainment and maintenance areas. | 23 USC 149 |
| Clean Cities | Promotes the energy, economic, and environmental security of the United States by supporting local initiatives to adopt practices that reduce the use of petroleum in the transportation sector. | |
| Clean School Bus USA | Reduces children's exposure to harmful diesel exhaust through a public-private partnership that limits school bus idling, implements pollution reduction technologies, improves route logistics, and switches to clean fuels. | |
| SmartWay Transport Partnership | Assists the ground freight industry in quantifying emissions and creating a plan to reduce fuel consumption. | |
| State Energy Program (SEP) Funding | Provides grants to states to assist in designing, developing, and implementing renewable energy and energy efficiency programs. | |
| Voluntary Airport Low Emission (VALE) Program (2007) | Reduces ground level emissions at commercial service airports located in designated ozone and carbon monoxide air quality nonattainment and maintenance areas | 49 USC 40101 |

Source: AFDC 2009

XIV.1.2 Federal Tax Incentives

Table 11: Federal Tax Incentives Related to Energy in the Transportation Sector

| Policy | Description | Citation |
|---|---|--------------------------------------|
| Advanced Technology Vehicle (ATV) Manufacturing Incentives (2007) | Direct loans for up to 30% of the cost of re-equipping, expanding, or establishing manufacturing facilities in the U.S. used to produce qualified ATVs or ATV components. | PL 110-140, Section 136 |
| Idle Reduction Equipment Excise Tax Exemption (2008) | Qualified on-board idle reduction devices and systems are exempt from the 12% retail excise tax imposed on heavy-duty trucks and trailers. | PL 110-343, Section 206, 25 USC 4053 |
| Heavy-Duty Hybrid Electric Vehicle (HEV) Tax Credit (2007) | A tax credit of up to \$18,000 is available for the purchase of qualified heavy-duty HEVs with a gross vehicle weight rating of more than 8,500 pounds. | 26 USC30B |
| Light-Duty HEV and Advanced Lean Burn Vehicle Tax Credit (2007) | A tax credit for qualified light-duty HEVs and advanced lean burn technology vehicles placed in service after December 31, 2005. The credit begins to phase out in the second quarter following the calendar quarter in which at least 60,000 of a manufacturer's qualifying HEVs and/or lean burn passenger automobiles and light trucks have been sold. | 26 USC30B |
| High Occupancy Vehicle (HOV) Lane Exemption (2007) | Allows states to exempt certified low emission and energy-efficient vehicles from HOV lane requirements. | 23 USC 166 |
| Qualified Plug-In Electric Drive Motor Vehicle Tax Credit | A tax credit for the purchase of a new qualified plug-in electric drive motor vehicle that draws propulsion using a traction battery that has at least four kilowatt hours of capacity, uses an off-board source of energy to recharge the battery, and meets specified emission standards. The credit will begin to be phased out in the second quarter following the calendar quarter in which a minimum of 250,000 qualified plug-in electric drive vehicles have been sold for use in the U.S. This tax credit expires December 31, 2014. | 26 USC 30D |
| Pollution Prevention Grants Program (2007) | Supports state and tribal technical assistance, education, and research programs that help businesses and industries identify better environmental strategies and solutions for complying with federal and state environmental regulations. | 42 USC 13104 |

Source: AFDC 2009

XIV.1.3 PACE (Property Assessed Clean Energy) Programs

TX-PACE is an alternative financing program that helps building owners to have a low-cost, long-term financing options for energy and water efficiency projects.

How It Works

A Building Owner:



If the owner, building, and project all meet PACE requirements:



[TX-PACE](#)

[PACE Program Guidelines](#)

<https://www.aacog.com/735/Texas-Property-Assessed-Clean-Energy-PACE>

XIV.1.4 Performance Contracting via ESCO (Energy Services Company)

Facility owners can utilize the ESPC (energy savings performance contracting) process to conduct energy audits. The contracted ESCO develops individual and grouped savings measures that can be included in the ESPC project. Short or long payback periods or renewable energy systems can be eligible if they're bundled under one contract. The most common financing option for government ESPC projects is the municipal tax-exempt lease-purchase agreement. Internal financing or bonds are other known types as well. Once the savings measures are implemented, the ESCO continues monitoring the savings through M&V (measurement and verification) process.

XIV.1.5 Utility Net Metering & Solar Buyback programs

When Solar PV systems are considered for a project, utility policies and incentives become the most crucial matter. If an off-grid solution is not feasible, a grid-tied option becomes the only solution and the grid should be able to regulate the excess production vs purchase which is called net metering. Some utility providers offer credits for excess kWh up to total usage on the overall account for each month. They also provide fixed low rates for long term subscriptions which mitigates being affected by the market fluctuations.

XV. Technical Assistance on Solar Feasibility Analysis and Utility Assessment

Star Transit is converting their current fleet to EV (electric vehicle). They requested an evaluation of a potential solar generation system to offset the energy use of the existing facilities and to offset the EV charging. They also requested a utility assessment of both their historical utility bills and potential participation in a net metering program if solar system installation is feasible.

Star Transit facility is located adjacent to an open field where neither of the building's roofs are shaded by other buildings or trees as shown in Figure 18. They also own an open field right next to the parking lot which would allow installing a ground mounted solar farm if needed.



Figure 18 Satellite View of the Facility

Star transit operates 14 buses daily, and each bus travels 100 miles/day. When these buses are replaced with EV, their estimated energy consumption to charge the whole fleet based on the selected bus is 1,078 kWh/day (see EV Star bus and its associated technical data are shown in Figure 19 and Figure 21:



Figure 19 Selected EV Bus



Figure 20 Charging Station Example

Building 2 currently operates as a parking garage for the fleet. It is assumed that new vehicles will also use that area for parking and for charging. If traditional Level-2 charging is installed, each bus will have its own

charger totaling 14 stations. Required charging station is shown in Figure 20 and EV consumption details shown in Table 18.

Table 18 EV Consumption Details

| # bus | Mile/day | Operation hours | Fuel (kWh/mi) | Consumption/bus (kWh/day) | Total Fleet Consumption (kWh/day) | Battery Capacity for each bus (kWh) | Annual EV Consumption (kWh) |
|-------|----------|-----------------|---------------|---------------------------|-----------------------------------|-------------------------------------|-----------------------------|
| 14 | 100 | 12 | 0.77 | 77 | 1078 | 118 | 388,080 |

TECHNICAL DATA



CLASSIFICATION

Heavy-duty class 4

GVWR

14,330 lbs.

PAYLOAD CAPACITY *

4,331 lbs.

LENGTH

25 feet

WIDTH

79.5 inches

HEIGHT *

106.5 in, 116.5 inches overall, 75 in (interior)

WHEELBASE

170 inches

APPROACH & DEPARTURE ANGLES

14.7 (front), 12.4 degrees (rear)

CARGO VOLUME AREA (behind driver to rear)

189 long, 70 wide, 74 inches high

MAX SEATING CAPACITY (w/driver)

20 seating, 6 rows, 17.5-inch-wide seats

SEATING CONFIGURATIONS *

Front facing, perimeter, 4-6 fold-up, 2 ADA

ADA LIFT (BRAUNABILITY)

Side or rear wheelchair lift options

FRAME / BODY / ROOF

Steel

PASSENGER DOOR

Electric

TIRES

205 / 75R / 17.5 (qty. 6)

EMERGENCY EXITS

Hatch, window, door

HVAC

39,239 BTU/h, front, rear, electric

ECU COMMUNICATION

CAN BUS, J1939

ALTOONA CERTIFIED

Yes, 92.2 score, 2nd highest score in history

CARB CERTIFIED

LUGGAGE CARGO AREAS

Rear cargo, luggage rack 50,60,70 in. long

REAR CARGO LUGGAGE CAPACITY

102 cubic feet (38x70x66)

BATTERY

Voltage: 576 V, Chemistry: LiFePo4

BATTERY CAPACITY

118 kWh

RANGE *

153 miles

FUEL ECONOMY *

48 mpge, 0.77 kWh/mi, 1.3 mi/kWh

TOP SPEED

68 mph

MOTOR POWER

150 kW max

TRANSMISSION

Direct Drive, No Transmission

AUTONOMOUS INTEGRATION *

Perrone Robotics (option)

DESIGN LIFE

10 years

LCFS EER VALUE * †

HDV, 5.0 EER, 1 credit every 740 kWh

CHARGING * (AC/DC)

LEVEL-2, J1772

11 kW, 11 hrs

DCFC, CCS-1

61 kW, 2 hrs

WIRELESS DC * (option)

60 kW, 2 hrs

VEHICLE VOUCHER REBATES *

E-mail: grants@greenpowermotor.com

BUY AMERICA *

† California region only

* Specification can vary

By region, application, availability

Figure 21 EV Star Technical Data

EV charging electricity use will be on average 3 times higher than the monthly building utility demand. Thus, utility program options need to be constructed around the EV addition and possible offset via Solar PV arrays. In the Texas market, solar plans and rebates are not as common for commercial buildings as they are for residential buildings. Our research shows that currently the electricity provider of Star Transit does not allow net metering, nor they do provide any incentives/rebates. However, there are other providers which do have specific plans for small commercial businesses like Star Transit.

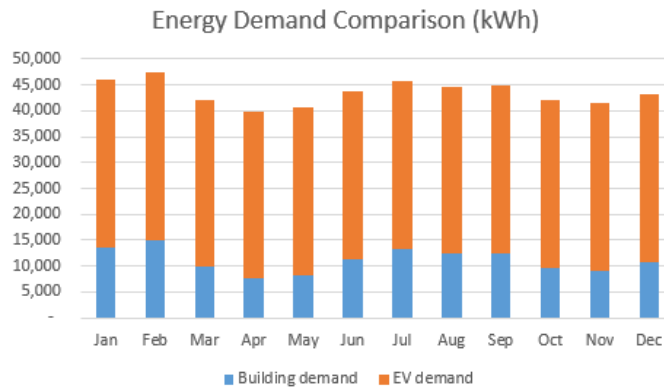


Figure 22 Building Energy vs EV Energy Comparison

Another important detail for the net metering plan is the grid integration. During the daytime, the system will produce more energy than the building uses, the extra electricity will need to flow to the grid as excess generation. The opposite scenario will happen as the electrical fleet is charging during evening/night hours when there is no solar generation; this required electricity will need to be purchased from the grid. So, potential solutions include:

- ✓ A utility plan that offers fixed rates both for purchase and sell, so there are no penalties for the hours that's just production but not enough consumption
- ✓ If utility plans do have penalties for excess generation, then a smaller PV array could be pursued instead of offsetting monthly generation

Our market research shows the first option is feasible which allows excess generation to flow back to the grid and enables selling it at a fixed price which can be used as a credit for upcoming months. Thus, we have considered utilizing both buildings and both sides of the roofs (north and south) in the analyses we conducted. See Figure 23 and Figure 24 for the areas considered for the roof installation.



Figure 23 Building 1 Roof for PV Layout



Figure 24 Building 2 Roof for PV Layout

As it was demonstrated in section Solar PV System Implementation, we detailed out 2 scenarios. The 1st scenario consists of utilizing both roofs for the panel installation, which has a DC system size of 283.3 kW (Figure 25), and the 2nd scenario includes roof mount on building 2 and ground mount for the field around building 2 with a total of 427.1 kW DC system size (Figure 26). Full coverage of the roof area which will block

the use of existing skylights and panels will be mounted on the roof directly without any additional tilt (current roof angle is around 10%) and ~15% system losses are considered in the calculations.

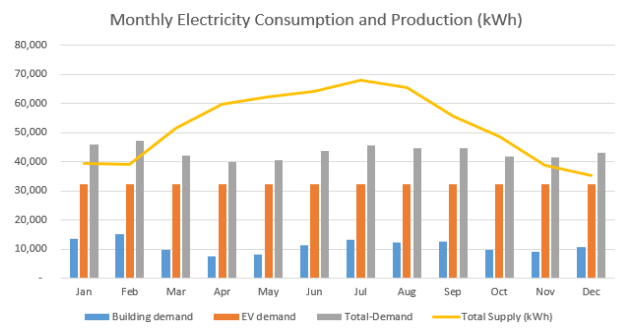
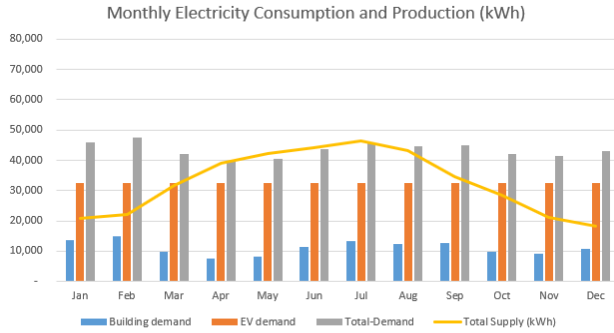


Figure 25 Scenario 1 Consumption vs Production **Figure 26 Scenario 2 Consumption vs Production**

The considered net metering program for the analysis assumes a fixed \$0.04945/kWh for the purchase and \$0.03/kWh for the excess energy credit rate. Estimated cost savings considers \$0.18/kWh rate that the facility currently pays.

Table 19 Energy & Cost Comparison for Both Scenarios

| Facility | Implementation Cost (\$) | Estimated Energy Savings (kWh/yr) | Estimated Cost Savings/yr | Excess Generation (kWh/yr) | Nighttime Demand (kWh/yr) | Simple Payback (yrs) |
|------------|--------------------------|-----------------------------------|---------------------------|----------------------------|---------------------------|----------------------|
| Scenario 1 | \$548,705 | 129,263 | \$82,460 | 258,817 | 388,080 | 6.7 |
| Scenario 2 | \$903,496 | *629,002 | \$89,560 | 495,495 | 388,080 | 10 |

*Includes excess energy production, thus its higher than the actual energy consumption value.

A ballpark material & implementation cost is used in the calculations; however, there are several quotes received which could be considered during actual bidding phase of the project (see Table 20 and Table 21) Annual total consumption is estimated as 521,587 kWh including building and EV consumption.

Table 20 Roof Only Vendor Quotes

| Predicted Annual Consumption (kWh) | Installer | System Size (kW) | Annual Production Estimate (kWh) | Turnkey Price (\$) | Price/Watt (\$) |
|------------------------------------|---------------|------------------|----------------------------------|--------------------|-----------------|
| 521,587 | Freedom Solar | 287.28 | 375,565 | \$548,705 | \$1.91 |
| 521,587 | NuWatt | 287.04 | 336,900 | \$473,616 | \$1.65 |
| 521,587 | GreenSun | 174 | 244,383 | \$421,080 | \$2.42 |
| 521,587 | Srinerger | 108.5 | 150,729 | \$325,350 | \$3.0 |

**Installers are ordered based on the quote receiving date.

Table 21 Roof and Ground Vendor Quotes

| Predicted Annual Consumption (kWh) | Installer | System Size (kW) | Annual Production Estimate (kWh) | Turnkey Price (\$) | Price/Watt (\$) |
|------------------------------------|---------------|------------------|----------------------------------|--------------------|-----------------|
| 521,587 | Freedom Solar | 574.98 | 808,633 | \$1,177,848 | \$2.05 |
| 521,587 | GreenSun | 334 | 469,099 | \$1,085,500 | \$3.25 |

Lastly, Star Transit wanted to get guidance on phases and tasks of a typical solar project. The scope of this TA only includes preliminary system sizing and layout, utility assessment and preliminary feasibility analysis of a solar PV project. However, Table 22 outlines the remaining tasks to be considered for the full scope of a solar project from roof structure/geotechnical assessments to specification development and construction administration.

Table 22 Phases and Tasks of a Typical Solar Project

| Phase | Task |
|----------------------|---|
| System Selection | Preliminary system sizing and layout |
| System Selection | Preliminary bidding |
| System Selection | System size selection |
| System Selection | Utility Analysis |
| System Selection | Preliminary structural evaluation (roof mounted option) |
| System Selection | Preliminary geotechnical evaluation (if ground mounted option is pursued) |
| | Final Report |
| Bidding/design | Solar vendor RFP/scorecard development |
| Bidding/design | Solar vendor selection |
| Bidding/design | Design firm bidding (Proposal review/scorecarding) |
| Bidding/design | Design Firm selection |
| Design | Design oversight |
| Design | RFI, meetings support |
| Design | 100% Design Drawing, 100% Construction Drawing, and IFC Sets |
| Bidding/spec | Electrical spec development |
| Bidding/spec | Solar panel spec development |
| Bidding/construction | RFP/scorecard development |
| Bidding/construction | Proposal review/scorecarding |
| Bidding/construction | Contract negotiation |
| Bidding/construction | Electrical contractor selection |
| Construction | Construction oversight, Permitting, Commissioning |

XVI. Appendices:

APPENDIX A

ASHRAE Equipment Life Expectancy chart

ASHRAE is the industry organization that sets the standards and guidelines for most all HVAC-R equipment.
For additional info about ASHRAE the website is www.ashrae.org.

| Equipment Item | Median Years | Equipment Item | Median Years | Equipment Item | Median Years |
|-------------------------------------|--------------|-----------------------------------|--------------|------------------------|--------------|
| Air conditioners | | Air terminals | | Air-cooled condensers | 20 |
| Window unit | 10 | Diffusers, grilles, and registers | 27 | Evaporative condensers | 20 |
| Residential single or Split Package | 15 | Induction and fan coil units | 20 | Insulation | |
| Commercial through-the wall | 15 | VAV and double-duct boxes | 20 | Molded Blanket | 20 |
| Water-cooled package | 15 | Air washers | 17 | | 24 |
| Heat Pumps | | Ductwork | 30 | Pumps | |
| Residential air-to-air | 15 | Dampers | 20 | Base-mounted | 20 |
| Commercial air-to-air | 15 | Fans | | Pipe-mounted | 10 |
| Commercial water-to-air | 19 | Centrifugal | 25 | Sump and well | 10 |
| Roof-top air conditioners | | Axial | 20 | Condensate 15 | |
| Single-zone | 15 | Propeller | 15 | Reciprocating engines | 20 |
| Multi-zone | 15 | Ventilating roof-mounted | 20 | Steam turbines | 30 |
| Boilers, hot water (steam) | | Coils | | Electric motors | 18 |
| Steel water-tube | 24 (30) | DX, water, or steam | 20 | Motor starters | 17 |
| Steel fire-tube | 25 (25) | Electric | 15 | Electric transformers | 30 |
| Cast iron | 35 (30) | Heat Exchangers | | Controls | |
| Electric | 15 | Shell-and-tube | 24 | Pneumatic | 20 |
| Burners | 21 | Reciprocating compressors | 20 | Electric | 16 |
| Furnaces | | Packaged chillers | | Electronic | 15 |
| Gas- or oil-fired | 18 | Reciprocating | 20 | Valve actuators | |
| Unit heaters | | Centrifugal | 23 | Hydraulic | 15 |
| Gas or electric | 13 | Absorption | 23 | Pneumatic | 20 |
| Hot water or steam | 20 | Cooling towers | | Self-contained | 10 |
| Radiant Heaters | | Galvanized metal | 20 | | |
| Electric | 10 | Wood | 20 | | |
| Hot water or steam | 25 | Ceramic | 34 | | |

APPENDIX B

**Preliminary Energy Assessment
Service Request Form**
Form# 50-852



| | | | |
|---------------------------|-------------|--------------------|-----------------|
| STAR Transit | | 877-631-5278 | |
| <i>Public Entity Name</i> | | <i>Telephone</i> | |
| Tommy Henricks | | Executive Director | |
| <i>Contact Person</i> | | <i>Title</i> | |
| thenricks@STARtransit.org | | Kaufman | |
| <i>Email Address</i> | | <i>County</i> | |
| 500 Industrial Blvd. | Terrell | TX | 75160 |
| <i>Street Address</i> | <i>City</i> | <i>State</i> | <i>ZIP Code</i> |
| PO Box 703 | Terrell | TX | 75160 |
| <i>Mailing Address</i> | <i>City</i> | <i>State</i> | <i>ZIP Code</i> |

Preliminary Energy Assessment Service Eligibility

The State Energy Conservation Office (SECO) provides free preliminary energy assessments (PEAs) for existing public facilities and infrastructure. Eligible entities include municipal and county governments, public school districts, county hospitals, port authorities, major airports, public water authorities and municipally owned utilities. Leased or rented facilities and infrastructure are not eligible for this service.

Principles of Agreement

By submitting this request form, the entity listed above must agree to:

- select a contact person to work with SECO and its designated contractor to establish an energy policy and set realistic energy efficiency goals;
- allow SECO's designated contractor to provide walk-through assessments of selected facilities;
- schedule a time for SECO's designated contractor to make a presentation on the assessment findings to key decision-makers;
- consider implementing the PEA's energy savings recommendations; and
- allow SECO to post portions of this report on its website

Additional Questions

Has this organization used SECO's technical assistance or PEA services in the past? Yes No

Is the primary contact for this PEA familiar with SECO's LoanSTAR revolving loan program? Yes No

Has this organization used SECO's LoanSTAR revolving loan program in the past? Yes No

Signature

This agreement must be signed by your organization's chief executive officer or other signing authority.

| | |
|-------------------|--------------------|
| | 10/7/21 |
| <i>Signature</i> | <i>Date</i> |
| Tommy Henricks | Executive Director |
| <i>Print Name</i> | <i>Title</i> |

Submit completed forms to SECO at seco.forms@cpa.texas.gov
or by mail to: State Energy Conservation Office
Attn: SECO Program Manager
111 E. 17th Street
Austin, TX 78711-1440

LeShawn Manus 10/11/21

APPENDIX C

| Commissioned Systems | Maintenance Recommendations | Recommended Frequency (Days) |
|----------------------|---|------------------------------|
| General | | |
| Ductwork | Check for visible damage - proper insulation - air leaks | 1-2 years |
| | Re balance airside system | 3-5 years |
| | Clean ductwork | 3-5 years |
| | Check fire and smoke dampers for corrosion, obstructions, operation (automated only), fusible links | 1 - 3 years |
| Piping | Chemically test/ treat closed and open HVAC loops for corrosion, fouling and scaling prevention | Continuous |
| | Inspect corrosion coupons | Annually |
| | Check for leaks and physical damage and insulation integrity | Annually |
| | Perform closed loop balancing | 3-5 years |
| | Exercise main and branch isolation and shutoff valves | Annually |
| | Test backflow prevention devices | Annually |

| AIRSIDE | | |
|---------------------------|--|-------------|
| Air Handling Units | | |
| Air Filters | Inspect filters - Replace as necessary. | 90 days |
| | Calibrate manometers and differential pressure transducers. | Annually |
| Fans | Check belt tension and condition if (applicable). Replace or re-tension as required. | Semi-Annual |
| | Inspect & Clean | Semi-Annual |
| | Lubricate fan bearings | 90 days |
| | Inspect drive components (sheaves) for wear and proper alignment. | Semi-Annual |
| | Inspect blower wheels - physical condition and cleanliness. | Semi-Annual |
| | Check airside balancing (traverse with anemometer) and output performance. | 5 years |
| Motors | Inspect electrical connections and tighten as necessary. | Annually |
| | Lubricate motor bearings | 90 days |

| | | |
|-----------------|---|---|
| Dampers | Check for proper function of all dampers (outside air, return air, spill, etc.) | Semi-Annual |
| | Ensure tight shut-off of dampers | Semi-Annual |
| | Lubricate all moving parts | Semi-Annual |
| | Ensure fusible links are not damaged, corroded or sprung | Annually |
| | Face & Bypass dampers are lubricated and tracking | Annually |
| Coils | Clean heating / cooling coils | As needed |
| | Clean and check condensate pans, drains and traps | Semi-Annual |
| | Inspect coils. Repair leaks, straighten damaged/bent coil fins etc | As needed |
| Valves | Stroke heating/cooling valves to determine proper operation | Semi-Annual |
| | Check valves for leak-by and external leaks | Semi-Annual |
| | Exercise manual isolation valves | Annually |
| Piping/Fittings | Inspect piping for leaks | Formally @ 360 days - Informally at every visit |
| | Inspect piping insulation for damage | Formally @ 360 days - Informally at every visit |
| | Remove and clean strainers, upstream of coils | Annually |
| Ductwork | Inspect supply and return ductwork for cleanliness and air leaks | Annually |
| | Clean Ductwork | 5 - year |

| Variable Air Volume (VAV) Terminal Units | | |
|---|--|-----------------|
| Variable Air Volume (VAV) Terminal Units | Check and calibrate the following components: | |
| | Flow meter | 1-2 years |
| | Supply air temperature sensor | 1-2 years |
| | Zone thermostat | Annually |
| | Test operation through the BMS | 1-2 years |
| | Perform periodic testing and balancing | Every (5) years |
| Fans | | |
| Fans | Check belt tension and condition if (applicable). Replace or re-tension as required. | Semi-Annual |
| | Inspect & Clean | Annually |
| | Lubricate fan bearings | 90 days |
| | Inspect drive components (sheaves) for wear and proper alignment. | Semi-Annual |
| | Inspect blower wheels - physical condition and cleanliness. | Semi-Annual |
| | Check airside balancing (traverse with anemometer) and output performance. | 5 years |

| Building Automation System (BAS) | | |
|----------------------------------|--|------------|
| Building Automation System | Maintain PC based hardware and | Continuous |
| | Maintain, update and backup software and firmware including front-end interface systems, subscriptions, licenses and hardware security keys. | Continuous |
| | Maintain graphics to accurately reflect site operating systems. | Continuous |
| | Establish and maintain system access security through hierarchical security level access log-in, and password protection protocols. | Continuous |
| | Establish and maintain user level access login history logs through BMS inherent function and capabilities. | Continuous |
| | Establish and maintain security policies pertaining to user access level capabilities. | Continuous |
| | Ensure that monitors do not display persistent data that can cause image "burn-in" | Continuous |
| | Establish and maintain alarm level management. Distinction between trouble and critical alarms. | Continuous |
| | Update systems periodically with manufacturer recommended software patches, bug fixes and upgrades that enhance and maintain functionality. | Continuous |
| | Maintain updated electronic media database system backups at a remote site for loss prevention purposes. | Continuous |

APPENDIX D

LoanSTAR Application
RFA# BE-G24-2022



PART 1: General Information

Borrower

| | | |
|---------------------------------------|----------------------------------|------------------------------|
| <input type="text"/> | <input type="text"/> | <input type="text"/> |
| <i>Name of Eligible Public Entity</i> | <i>Federal Tax ID</i> | <i>Application Date</i> |
| <input type="text"/> | <input type="text"/> | <input type="text"/> |
| <i>Mailing Address</i> | <i>City</i> | <i>State</i> <i>ZIP Code</i> |
| <input type="text"/> | <input type="text"/> | <input type="text"/> |
| <i>County Name</i> | \$ <i>Total Amount Requested</i> | |

Signing Authority

| | |
|----------------------|----------------------|
| <input type="text"/> | <input type="text"/> |
| <i>Name</i> | <i>Title</i> |
| <input type="text"/> | <input type="text"/> |
| <i>Telephone</i> | <i>Email Address</i> |

Primary Contact (Project Director)

| | |
|----------------------|----------------------|
| <input type="text"/> | <input type="text"/> |
| <i>Name</i> | <i>Title</i> |
| <input type="text"/> | <input type="text"/> |
| <i>Telephone</i> | <i>Email Address</i> |

Secondary Contact (Energy Manager)

| | |
|----------------------|----------------------|
| <input type="text"/> | <input type="text"/> |
| <i>Name</i> | <i>Title</i> |
| <input type="text"/> | <input type="text"/> |
| <i>Telephone</i> | <i>Email Address</i> |

Administrative Contact for Accounting (Financial Contact)

| | |
|------------------------|------------------------------|
| <input type="text"/> | <input type="text"/> |
| <i>Name</i> | <i>Title</i> |
| <input type="text"/> | <input type="text"/> |
| <i>Mailing Address</i> | <i>City</i> |
| <input type="text"/> | <i>State</i> <i>ZIP Code</i> |
| <input type="text"/> | <input type="text"/> |
| <i>Telephone</i> | <i>Email Address</i> |

PART 2: Documentation Submitted with Application

Place a check next to the documentation submitted with the application. One (1) electronic copy of the report is required. Reports must comply with SECO guidelines. See attachments for Project Assessment Commitment and Memorandum of Understanding forms.

- Utility Assessment Report (UAR) – for design-bid-build projects, design-build projects or Energy Savings Performance Contracts (ESPCs)
- Commissioning Report – for Retro- or Re-Commissioning projects
- Preliminary Energy Assessment (PEA) and Memorandum of Understanding (MOU) – a UAR is required to be completed within 140 calendar days of execution of the MOU.
- Project Assessment Commitment and Memorandum of Understanding See attachments for Project Assessment Commitment and Memorandum of Understanding forms– a UAR is required to be completed within 140 calendar days of execution of the MOU.

If UAR cannot be completed within 140 calendar days after notice is received that funding is committed to the project, do **not** proceed. The project is disqualified from loan consideration.

50-031 (10-21/12)



PART 3: Project Information

Complete the following table listing all Utility Cost Reduction Measures (UCRMs). Use Attachment A - Project Financial Worksheets to calculate energy savings.

Facility Name

Address

City

State

ZIP Code

Engineering Firm Name

Address

City

State

ZIP Code

Date of Audit Report

| UCRM NO. | BUILDING | UCRM DESCRIPTION |
|----------|----------|------------------|
| 1 | | |
| 2 | | |
| 3 | | |
| 4 | | |
| 5 | | |
| 6 | | |
| 7 | | |
| 8 | | |
| 9 | | |
| 10 | | |
| 11 | | |
| 12 | | |
| 13 | | |
| 14 | | |
| 15 | | |

How long will it take to complete the project? (months)

A. Is the TOTAL LOAN simple payback for the UCRMs less than 15 years? Yes No

If Yes, proceed to next question..

If No, project is disqualified from further loan consideration.

B. Is the simple payback for each UCRM less than the Estimated Useful Life of the UCRM? Yes No

If No, project is disqualified from further loan consideration.





PART 4: Funding Source

The LoanSTAR program has two funding sources. The interest rate for a LoanSTAR general fund loan is 2% per annum. The interest rate for a LoanSTAR repaid ARRA fund loan is 1% per annum, but requires additional reporting documentation.

What is your preferred funding source?

- 2% LoanSTAR general fund loan (no minimum loan size; maximum loan size is \$8,000,000)
- 1% LoanSTAR repaid ARRA fund loan (minimum loan size is \$3,000,000; maximum loan size is \$8,000,000)
- No preference
- Undecided

PART 5: Certification by Applicant Signing Authority or Chief Financial Officer

I certify that I have reviewed this application, including commitment of "buy-down" funds. The information provided is accurate to the best of my knowledge and in my best professional judgment. If awarded, Borrower will comply with the terms and conditions of the Sample Loan Agreement.

| | |
|--------------|-------|
| | |
| Signature | Date |
| | |
| Printed Name | Title |





Attachment A – Project Financial Calculation Worksheet (Required)

Attachment A1. Design-Bid-Build, Design-Build or Commissioning Project Calculation Worksheet

| UCRM No. | Building | UCRM Description | Construction Time (Months) | Costs (\$) | | | Estimated Annual Saving (\$)* | Payback** (yrs) | UCRM Estimated Useful Life (yrs) |
|---------------|----------|------------------|----------------------------|-------------|--------------|-------|-------------------------------|-----------------|----------------------------------|
| | | | | Eng./Design | Construction | Total | | | |
| | | | | | | | | | |
| | | | | | | | | | |
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| | | | | | | | | | |
| | | | | | | | | | |
| Totals | | | | | | | | | |

* HVAC savings degradation = 0.75% each year.
 ** Individual energy efficiency measure payback must be less than or equal to the estimated useful life of the measure.

TOTAL LOAN AMOUNT

Costs for the UAR, metering and monitoring may be included in the loan at Borrower's option.

| | | |
|--|--|--|
| Costs (\$) Total | | |
| plus UAR Costs | | |
| plus Metering | | (note: maximum metering cost is 3 percent of UCRM costs) |
| plus Monitoring | | (note: maximum monitoring cost is 7 percent of UCRM costs) |
| minus Buy Down | | |
| equals Total Loan Amount | | |
| divided by Total Estimated Annual Savings (\$) | | |
| equals Payback (years) | | |





Attachment A2. Energy Savings Performance Contract (ESPC) Project Calculation Worksheet

| UCRM No. | UCRM Title | Average Annual Savings* | | | | | | | Project Cost (\$) | Payback** (yrs.) | Estimated Project Useful Life (yrs.) |
|--|------------|--------------------------|----------------|------------------|----------------------|---------------------|-----------------|---------------|-------------------|------------------|--------------------------------------|
| | | Electric Energy (kWh/yr) | Demand (kW/yr) | Electric (\$/yr) | Natural Gas (Mcf/yr) | Natural Gas (\$/yr) | Water (kGal/yr) | Water (\$/yr) | | | |
| 1 | | | | | | | | | | | |
| 2 | | | | | | | | | | | |
| 3 | | | | | | | | | | | |
| 4 | | | | | | | | | | | |
| 5 | | | | | | | | | | | |
| 6 | | | | | | | | | | | |
| 7 | | | | | | | | | | | |
| 8 | | | | | | | | | | | |
| Utility Assessment Report Cost | | - | - | - | - | - | - | - | - | - | |
| Initial Measurement & Verification Cost | | - | - | - | - | - | - | - | - | - | |
| Construction Bonding Cost | | - | - | - | - | - | - | - | - | - | |
| Owner's Administration, Management, Training & Other Costs | | - | - | - | - | - | - | - | - | - | |
| Buy Down*** | | - | - | - | - | - | - | - | - | - | |
| TOTAL LOAN AMOUNT (IMPLEMENTATION TOTAL) (Simple Payback) | | | | | | | | | | | |
| Required Ongoing Monitoring Service Cost | | - | - | - | - | - | - | - | - | - | |
| Guaranteed Rebate Savings | | - | - | - | - | - | - | - | - | - | |
| Financing Cost | | - | - | - | - | - | - | - | - | - | |
| TOTAL PROJECT PAYBACK (Project Payback) | | - | - | - | - | - | - | - | - | - | |

* HVAC savings degradation = 0.75% each year.

** Individual energy efficiency measure payback must be less than or equal to the estimated useful life of the measure.

*** Maximum Buy Down on an individual UCRM must not exceed 50% of the total UCRM cost.





Attachment B- Project Assessment Commitment

Attachment B is not required when a Utility Assessment Report (UAR), Commissioning Report or Preliminary Energy Audit is submitted with the application.

Applicant requests LoanSTAR Funding be reserved for a proposed energy efficiency or commissioning project. The dollar amount requested is Applicant's estimated cost to analyze and implement energy efficiency projects that will be financed through the LoanSTAR Program.

LoanSTAR funds, if reserved, will be subject to the following conditions:

1. Applicant agrees to retain a Professional Engineer (PE), licensed in the State of Texas, to prepare a Commissioning Report or UAR that complies with the LoanSTAR Technical Guidelines or with Performance Contracting Guidelines. The PE shall meet the technical analyst qualifications listed in Volume I, Section I, Paragraph C of the LoanSTAR Technical Guidebook. The PE of record shall accept responsibility for implementation of all retrofit activities in the UAR.
2. Applicant agrees to complete a UAR for design-bid-build or design-build contracts or a Commissioning Report for commissioning projects within 140 days after the execution of the Memorandum of Understanding. Borrower also agrees to submit one (1) electronic copy of the completed Commissioning Report or UAR to the State Energy Conservation Office(SECO). **If the UAR is not received by SECO by the "End Date for Commitment", the reserved LoanSTAR funding will be released to other prospective borrowers.**
3. LoanSTAR project expenditures cannot be incurred before the effective date cited in a fully executed loan agreement. The sole function of a Project Assessment Commitment is to request reservation of LoanSTAR Funding for a Borrower during the period the Commissioning Report or UAR are being prepared. This document shall not be construed as a loan agreement and does not authorize the expenditure of LoanSTAR Funding.

Applicant

Name of Public Entity

Name of Signing Authority (printed)

Signature

\$ _____

Amount Requested

Title

Date





Attachment C- Memorandum of Understanding (MOU)

Attachment C is not required when a Utility Assessment Report (UAR) or Commissioning Report is submitted with the application.

Execution of this MOU reserves the requested amount of LoanSTAR Funding for the Applicant.

The reserved LoanSTAR Funding is Applicant's estimated cost based on the Preliminary Energy Assessment or Project Assessment Commitment to analyze and implement energy efficiency projects which will be financed through the LoanSTAR Program.

The LoanSTAR funds reserved will be subject to the following conditions:

1. Applicant's Signing Authority certifies that Applicant has retained a Professional Engineer (PE) to prepare a UAR. The PE of record shall accept responsibility for implementation of all retrofit activities in the UAR. The UAR shall be prepared in accordance with the LoanSTAR Technical Guidelines.
2. Applicant's Signing Authority certifies that one (1) electronic copy of the completed reports referenced in item 1 will be delivered to SECO for review. **If the completed reports are not submitted by the "End Date for Commitment", the reserved LoanSTAR Funding will be released to other prospective borrowers.**
3. The sole purpose of this MOU is to reserve LoanSTAR Funding for the Applicant during the period that its UAR is being prepared. This MOU shall not be construed as a loan agreement. It does not authorize the expenditure of LoanSTAR Funding. LoanSTAR project expenditures cannot be incurred before the effective date cited in a fully executed loan agreement.

Applicant

\$ _____
Amount Requested

Name of Public Entity (printed)

Name of Signing Authority (printed)

Title

Signature

Date

State Energy Conservation Office
To be completed by SECO

SECO Program Manager Name (printed)

SECO Program Manager Signature

Date

End Date for Commitment (Commitments cannot be extended.)

