

855400 LLC CITCO Application Technical Revisions Checklist

Please address the following revisions to the General and sub-applications. Some information is not necessary but would strength the application. This information is labeled as such. It is up to the discernment of the applicant if you would like to include the not necessary information. All other requirements are to prove technical feasibility. These items are due on February 26th, 2026.

General Application

☐ Project Risk Summary and Mitigation Plan

- It was stated in the sub application that “a project risk summary and mitigation plan will be subsequently provided.” When is the planned delivery date for this?

To be provided by March 6th.

High Efficiency Pumps and Motors Sub-Application

☐ Please Update and Provide Rationale for the Following Calculations and Information

- In the compressor calculations, are load factors and efficiencies considered in the BAU and efficient cases? Why or why not?
Installed HP used for comparison between the BAU and efficient cases. The same motor load factor would be applicable to both the BAU and efficient case. The difference in the standard motor rating and the energy efficient motor rating (20%) was used to determine annual savings.

- It appears that an overall/general savings factor of 20% reduction in energy consumption was applied for all projects. What is the rationale for this/where was this assumption pulled from?

The US DOE publication Motor Systems Tip Sheet #11, Adjustable Speed Drive Part-Load Efficiency: DEO/GO-102012-3730, November 2012 was referenced to generate the energy reduction factor. 20% is a conservative reduction in energy consumption from the example shown in DOE/GO-102012-3730 that closer represents the average energy savings in **Redacted**

Does/will this accurately align with how the equipment will operate with and without the VFDs? Yes, all process equipment will be sized appropriately for the design basis and operate close to the best efficiency point (BEP) for normal operation, regardless of drive type.

- How will the VFDs control each piece of equipment they will be installed on? In most applications the VFD control scheme will replace a throttle valve. In an operating scenario where demand is lower, the VFD controlled equipment can decrease RPM, increasing efficiency, to meet process requirements.
- The sub-application states that the estimated annual savings are \$371,000; this seems reasonable, but how was this calculated? By taking the estimated energy savings in kwh multiplied by the commercial energy rate which is approximately nine cents per kwh.

□ Please Provide Further Information Regarding Planned Equipment Installation

- What was referenced to determine the BAU wattage and efficient wattage for the LED project? Are there spec sheets for the LED fixtures that have been picked out you can provide to confirm the actual wattage of the LED fixtures to be installed?
Efficient LED fixture selection:
309W LED - Vigilant High Output - H6U4MC2KMHW4GN
484W LED - Vigilant High Output - H6U4MC2RMHW4GN
50W LED - Philips-Day Brite 1FXP38B835-4-DS-UNV-DIM LM-63-2002
- Are there spec sheets available for the air compressors with the VFDs you can submit? In the PID folder, there is a document that specifies that the model of these air compressors is IR E315n-A125. What is the make?
Compressors manufactured by Ingersoll Rand (IR), model E315n-A125
>>>File Attached
- The sub-application states that the LED lighting project will include the installation of lower wattage LED fixtures in addition to occupancy sensors used in non-production areas. Do the GHG reduction calculations include LED fixtures in production and non-production areas? If so, are all of these the same wattage fixtures as indicated in the GHG reduction calculator? Is that (both production and non-production area lighting) considered in the BAU case too?
Fixture wattages broken out into: area lighting, manufacturing and warehouse, and office spaces. Both the BAU and efficient cases wattages used in the GHG reduction calculations use the respective wattages and fixture counts for these areas.

Area description for different wattage lighting listed in the 'Installing High-Efficiency LED Fixtures & Lamps' section in the Colorado Industrial Tax Credit Offering (CITCO) High-Efficiency Electric Pumps, Motors, Compressors, and/or Lighting Sub-Application document.

- Not Necessary: It does not appear that the GHG reduction estimates consider savings resulting from occupancy sensors, but in the sub-application it states that there will be occupancy sensors included in the non-production areas. Implementation of occupancy sensors increases savings when compared to the BAU case, and therefore also GHG reduction.

Occupancy sensors to be utilized in the non-production areas - yes. Redacted the office area where the benefit will come from. This area is both the smallest differential benefit and the smallest in overall footprint and therefore omitted for conservatism purposes.

□ Please Provide Clarification or Update for the Following Workbook Information

- In the “High Effic Motors_Compressor_Lighting_GHG Avoid_855400 LLC” Excel workbook, worksheet “Scope 2 Emissions”, cell C10 reflects a BAU consumption of 500 W fixtures while the Notes column says these fixtures are 700W, the “EQ-0000065_Lighting” document states that the existing wattage is 500W so just want to confirm that the Notes column is incorrect.

Notes column incorrect. 500W reflects the BAU for area lighting. No changes to GHG calculations sheet cell C10 or Colorado Industrial Tax Credit Offering (CITCO) High-Efficiency Electric Pumps, Motors, Compressors, and/or Lighting Sub-Application document. No impact to calculation - note only.

>>>File Attached, revised cells highlighted.

- In the “High Effic Motors_Compressor_Lighting_GHG Avoid_855400 LLC” Excel workbook, worksheet “Scope 2 Emissions”, cell D11 reflects a proposed consumption of $1224/3 = \sim 415$ fixtures of 484W LED fixtures, while the Notes column says there are 700 fixtures, will there be ~ 415 fixtures or 700 fixtures? The EQ-0000066_Lighting2 document says there are 700 fixtures.

The correct figure should be 700 fixtures. GHG calculations sheet cell D11 is updated. No changes to supporting Colorado Industrial Tax Credit Offering (CITCO) High-Efficiency Electric Pumps, Motors, Compressors, and/or Lighting Sub-Application document.

>>>File Attached, revised cells highlighted.

- In the “High Effic Motors_Compressor_Lighting_GHG Avoid_855400 LLC” Excel workbook, worksheet “Scope 2 Emissions”, cell D12 reflects a proposed consumption of $1224/3 = \sim 415$ fixtures of 50W, while the Notes column says there are 344 fixtures as well as the EQ-0000067_Lighting3 document.

The correct figure is 344 fixtures. GHG calculations sheet cell D11 updated. No changes to supporting Colorado Industrial Tax Credit

Offering (CITCO) High-Efficiency Electric Pumps, Motors, Compressors, and/or Lighting Sub-Application document.
>>>File Attached, revised cells highlighted.

Industrial Process

Equipment Sub-Application

☐ Please Update and Provide Rationale for the Following Calculations and Information

The same rationale for the High Efficiency Pumps and Motors Sub-Application was applied to the Industrial Process Equipment Sub-Application.

- In the VFD calcs, are load factors and efficiencies considered in the BAU and efficient cases? Why or why not?

Installed HP used for comparison between the BAU and efficient cases. The same motor load factor would be applied to both the BAU and efficient case. The difference in the standard motor rating and the energy efficient motor rating (20%) was used to determine annual savings.

- It appears that an overall/general savings factor of 20% reduction in energy consumption was applied for all projects. What is the rationale for this/where was this assumption pulled from?

The US DOE publication Motor Systems Tip Sheet #11, Adjustable Speed Drive Part-Load Efficiency: DEO/GO-102012-3730, November 2012 was referenced to generate the energy reduction factor. 20% is a conservative reduction in energy consumption from the example shown in DOE/GO-102012-3730 that closer represents the average energy savings.

Does/will this accurately align with how the equipment will operate with and without the VFDs?

Yes, all process equipment will be sized appropriately for the design basis and operate close to the best efficiency point (BEP) for normal operation, regardless of drive type.

- How will the VFDs control each piece of equipment they will be installed on?

Redacted

- How was the annual utility savings determined? What rate was used for electricity? How was this determined as this project/facility has not yet been built?

By taking the estimated energy savings in kwh multiplied by the commercial energy rate which is approximately [Redacted] cents per kwh.

- Can the applicant clarify if the project for the vacuum blower is to install a high efficiency system, to put VFDs throughout this system, or both? Both. The vacuum blower system is a high efficiency alternative to the [Redacted]

A vacuum blower system will be able to meet the same vacuum performance as the BAU case

[Redacted] but with fewer power requirements.

In addition to having less installed HP the vacuum blowers will also have capability to operate at variable speed. Reducing motor loads when vacuum demand decreases. This replaces the throttle valve configuration used in the BAU [Redacted]

- The sub-application states “The project will install high efficiency vacuum blowers and multiple variable speed drive motors to minimize the annual power consumption during the paper making process.” Do they mean these VFDs will go on the high efficiency vacuum blowers AND other process equipment, or the VFDs will go on the other process equipment? The GHG calculator reflects that the vacuum blower will also have a VFD(s); clarification for this is needed.

VFDs will be on the vacuum blowers and the other process equipment. Equipment type and count listed in the Colorado Industrial Tax Credit Offering (CITCO) Industrial Process Equipment Electrification Sub Application document section C - Industrial Equipment in the Proposed Equipment table.

☐ Please Provide Information Regarding Equipment Spec Sheets

- Are there spec sheets and/or lists available for all equipment that is in scope of this project?

Yes, process equipment list, electrical equipment list, and equipment procurement list.

- Not Necessary: Does the applicant have spec sheets of each piece of equipment they are planning to install VFDs on to confirm the HP rating of each?

Specifications available for major process equipment. Reference material or BHP calculations used to determine equipment HPs for low voltage applications.

☐ Please Provide Clarification or Update for the Following Workbook Information

- In the GHG reduction calculator, it lists 1 vacuum blower but document “EQ-0000068_VaccumBlower” says there are 3, is the input capacity of

all 3 vacuum blowers 7500HP or is it 7500HP each? The calculator reflects a total HP of 7500. Three (3) vacuum blowers each with a 2500HP variable speed motor. 7500HP total. GHG avoidance calculator.xlsx groups installed HP by Applicant’s work breakdown structure.

- Document “EQ-0000069_Pump” states that there are 46 pumps with a total input capacity of 5,025 HP, but the GHG calculator represents 7,469HP of equipment to get VFDs, not taking into consideration the vacuum blower(s). Same comment about the rotary agitator and the Misc equipment. The equipment planned to get a VFD should match what is in the GHG calculator. Can you provide clarity on the type, quantity, and HP of each piece of equipment considered in this project?

See the Proposed Equipment table from the Colorado Industrial Tax Credit Offering (CITCO) Industrial Process Equipment Electrification Sub Application document listing the breakout by proposed equipment type. The total Estimated Annual Electricity Consumption after Proposed Equipment (kWh/year) matches the GHG calculator.

	Proposed Equipment 1	Proposed Equipment 2	Proposed Equipment 3
Proposed Equipment Type	Vacuum Blower	Pumps	Rotor/Agitators
Count	3	6	4
Power (kW)	Installed 5593 (7500 HP) Consumed 4285 (5826 HP)	625 (850 HP)	1398 (1900 HP)
Efficiency (%)	85	85	85

	Proposed Equipment 1	Proposed Equipment 2	Proposed Equipment 3
Estimated Annual Energy Usage per Unit (kWh/year)	30,195,653	4,405,476	9,847,535

Waste Heat Recovery Sub-Application

☐ Please update and Provide Rationale for the Following Calculations and Information

- o Correct the provided ton/\$ value and provide supporting calculations
0.0011 MT CO2e Annually / \$

$$(6,690 \text{ MT CO}_2\text{e/therm} - 304 \text{ MT CO}_2\text{e/therm} + 4,614 \text{ MT CO}_2\text{e/therm}) / 9,578,710 = 0.0011 \text{ MT CO}_2\text{e Annually} / \$$$

1. Glycol Heat Recovery System

Estimated Equipment Cost (\$)	8,668,710
Annual GHG Avoidance (MT CO2e)	6,690

Glycol peak heat recovery (MMBTU/hr): 30
Factored annual heat recovered (therms/yr): 1,259,760
 $((30 \text{ MMBTU/hr} \times (0.2 \times (5/12))) + (30 \text{ MMBTU/hr} \times (0.5 \times (4/12))) + (30 \text{ MMBTU/hr} \times 0.8 \times (1/12)) + (30 \text{ MMBTU/hr} \times (2/12))) \times (24 \text{ hrs/day} \times 362 \text{ days/year}) \times 10 \text{ therms/MMBTU} = 1,259,760 \text{ therms/yr}$

Glycol System Additional Consumption (therms/yr): 57,267
 $250 \text{ hp} \times 0.7457 \text{ kw/hp} / 0.965 \times 24 \text{ hr/day} \times 362 \text{ days/yr} \times 3412 \text{ BTU/kWh} / 1000000 \text{ BTU/MMBTU} \times 10 \text{ therms/MMBTU} = 57,267 \text{ therms/yr}$

GHG Reduction

$1,259,760 \text{ therms/yr} \times 0.005310388 \text{ MT CO}_2\text{e/therm} = 6,690$
 $57,267 \text{ therms/yr} \times 0.005310388 \text{ MT CO}_2\text{e/therm} = 304$
 $6,690 \text{ MT CO}_2\text{e/therm} - 304 \text{ MT CO}_2\text{e/therm} = 6,386 \text{ MT CO}_2\text{e/therm}$

2. Process Water Heat Recovery

Estimated Equipment Cost (\$)	910,000
Annual GHG Avoidance (MT CO2e)	4,614
Annual Heating Requirement - Boiler (therms/yr)	868,787

Annual Heating Requirement (therms/yr) 729,781
 $((4.18 \text{ J/g/deg C} * 1656 \text{ L/min} * (1\text{kg/L}) * 60 \text{ min/hr} * (45\text{deg C} - 23.6 \text{ deg C})) * (1000 \text{ g/kg}) * (1\text{J}/9.4804\text{e-9 therms}) * (24 \text{ hr/day}) * (362 \text{ days/yr}) = 729,781 \text{ therms/yr}$

Annual Heating Requirement - Boiler (therms/yr) 868,787
 $(729,781 \text{ therms/yr})/0.84 = 868,787 \text{ therms/yr}$

Note the annual heating requirements used in the GHG avoidance for process water recovery uses the boiler efficiency as the heat recovery will replace steam that would need to be generated using an 84% efficient gas boiler

GHG Reduction
 $868,787 \text{ therms/yr} * 0.005310388 \text{ MT CO}_2\text{e/therm} = 4,614$

- Clarify the plant design basis and how it relates to the 669,000 MMBTU/yr waste heat estimate
 125976 MMBTU/yr shown in cycle 4 waste heat recovery calculations (.0531145 MT CO₂e/mmBTU). Applicant excel file reported 6,690MT CO₂/yr - is there confusion on this figure?

- Outlining the year-round loads that will use the recovered heat, including approximate magnitudes and temperature needs

Heating Users	Btuh Total
Air Make Up Units	54,297,000
Air Handling Units	3,863,592
Air Rotation Units	7,252,200
Unit Heaters	11,750,000

Inlet Temp, Winter [°F] 57

Inlet Temp, Summer [°F] 75

Redacted
Redacted

□ Please Provide Further Technical Detail for the Following

Repeating from sub-application for general information before answering the questions proposed.

- Please describe in detail the project scope and proposed changes (e.g. equipment/technology to be installed)

Project includes heat recovery [Redacted] process [Redacted] exhaust. Heat will be used for building heat and pre-heating process inputs using an integrated glycol loop. Heat from the hot exhaust (air) will be captured by air-to-liquid heat exchangers and re-used throughout the process.

- Please describe in detail the objective of the proposed project.

Project will install a dedicated glycol heat recovery system in [Redacted] [Redacted] facility to capture heat from process equipment exhaust. This heat recovery will directly displace natural gas consumption for building heat and process fluid heating. The process will operate 24 hours per day/362 days per year. Estimated energy savings is 14.5 mm BTU/hr (yearly average) with a peak of 30 mmBTU/hr during winter season. Corresponding Natural Gas displacement is estimated at 1,259,760 for the average energy savings

- **Provide technical detail (e.g., flow rates, drying method, energy balance, exchanger considerations) to support the waste heat availability and the 19% recovery assumption**

Potential users of recovered heat are identified and were categorized into building heat and process users. The required heating for the potential users for recovered heat are calculated and compared to the heat recovery available.

These available heat recovery values are provided by process equipment vendors in BTU/h. Depending on waste heat stream details: air exhaust, [Redacted] ΔT , etc. heat exchanger equipment and auxiliary systems are selected to feasibly recover the available heat.

Considered in the avoidance calculation for process water is boiler efficiency (84%)

- **Not Necessary: Offer an estimate of any additional electricity consumption and confirm that it does not materially affect the GHG reductions provided.**

Added to the GHG avoidance for the glycol heat recovery system are minimal additional equipment loads for the glycol supply loop.