

## Phase I Ex Ante Review Findings

Table 1-1: Project Information

<b>IOU</b>	San Diego Gas & Electric (SDG&E)
<b>Application ID</b>	[REDACTED]
<b>Application Date</b>	11/14/13
<b>Program ID</b>	3320
<b>Program Name</b>	Energy Efficiency Business Incentive (EEBI)
<b>Program Year</b>	2013
<b>[REDACTED] Project ID</b>	[REDACTED]
<b>IOU Ex Ante Savings Date</b>	TBD
<b>CPUC Staff Measure Name</b>	VSD Air Compressor and Controller, Air leak Repair
<b>Project Description</b>	[REDACTED]
<b>Date of CPUC Staff Review</b>	12/30/13
<b>Primary Reviewer / Firm</b>	[REDACTED] / [REDACTED]
<b>Review Supervisor / Firm</b>	[REDACTED]
<b>CPUC Staff Project Manager</b>	Peter Lai / California Public Utilities Commission, Energy Division
<b>CPUC Staff Policy Authorization (as needed)</b>	
<b>Type of Review (Desk, On-site, Full M&amp;V, Tool)</b>	Desk
<b>CPUC Staff Recommendation</b>	The project is conditionally approved pending revisions to include only eligible measures, verifying the existing compressors control type, submitting incremental measure cost estimates, and post M&V plan, and providing information regarding the 2013 Title 24 applicability to the project.

## Measure Description

The project involves installing a new, variable speed, rotary screw air compressor comparable to one of the existing 100 HP compressors, as well as installing a new controller to better control system staging and pressure at a manufacturing plant. In addition, it appears that the project will also repair 150 CFM of air leaks.

SDG&E estimates the first year ex ante savings as [REDACTED] kW peak demand reduction and [REDACTED] kWh annual savings.

## Summary of Review

The Investor-Owned-Utility (IOU) submitted the following documents on December 16, 2013 for this Phase I review:

- Customer Signed Application;
- CAGI Data Sheets for the Existing and Proposed Air Compressors;
- Pre-installation Logged Data;
- AirMaster+ Input Files;
- Site Notes; and
- Summary of Responses.

SDG&E has provided the 3<sup>rd</sup> party energy savings calculation using AirMaster+, but the calculation has not been reviewed by SDG&E engineers.

The documentation provided indicates that the existing compressed air controller stages compressors but is not functioning properly. Replacing the controller that is not functioning represents normal maintenance and replacement of like equipment in order to maintain the intended level of service. Installation of like equipment under the non-regressive baseline rule has no system impact and results in zero gross savings. Eligible technologies should be more efficient than standard practice and more efficient than existing equipment being removed.

SDG&E indicates that installing a new VSD compressor is a Replacement on Burnout (ROB) measure. Since the existing compressors are operational, CPUC Staff considers them as Normal Replacements (NR). Incremental measure cost, and a measure EUL is required for all Normal Replacement measures.

In addition, if the project will not be implemented before July 1, 2014, CPUC staff expects SDG&E to revise the baseline to take into account the mandatory requirements of the 2013 Title 24, Section 120.6 Mandatory Requirements for Covered Processes:

“(e) **Mandatory Requirements for Compressed Air Systems.** All new compressed air systems, and all additions or alterations of compressed air systems where the total combined online horsepower (hp) of the compressor(s) is 25 horsepower or more

shall meet the requirements of Subsections 1 through 3. These requirements apply to the compressors and related controls that provide compressed air and do not apply to any equipment or controls that use or process the compressed air.

**EXCEPTION to Section 120.6(e):** Alterations of existing compressed air systems that include one or more centrifugal compressors.

**1. Trim Compressor and Storage.** The compressed air system shall be equipped with an appropriately sized trim compressor and primary storage to provide acceptable performance across the range of the system and to avoid control gaps. The compressed air system shall comply with subsection A or B below:

- A. The compressed air system shall include one or more variable speed drive (VSD) compressors. For systems with more than one compressor, the total combined capacity of the VSD compressor(s) acting as trim compressors must be at least 1.25 times the largest net capacity increment between combinations of compressors. The compressed air system shall include primary storage of at least one gallon per actual cubic feet per minute (acfm) of the largest trim compressor; or,
- B. The compressed air system shall include a compressor or set of compressors with total effective trim capacity at least the size of the largest net capacity increment between combinations of compressors, or the size of the smallest compressor, whichever is larger. The total effective trim capacity of single compressor systems shall cover at least the range from 70 percent to 100 percent of rated capacity. The effective trim capacity of a compressor is the size of the continuous operational range where the specific power of the compressor (kW/100 acfm) is within 15 percent of the specific power at its most efficient operating point. The total effective trim capacity of the system is the sum of the effective trim capacity of the trim compressors. The system shall include primary storage of at least 2 gallons per acfm of the largest trim compressor.

**EXCEPTION 1 to Section 120.6(e)1:** Compressed air systems in existing facilities that are adding or replacing less than 50 percent of the online capacity of the system.

**EXCEPTION 2 to Section 120.6(e)1:** Compressed air systems that have been approved by the Energy Commission Executive Director as having demonstrated that the system serves loads for which typical air demand fluctuates less than 10 percent.

**2. Controls.** Compressed air systems with more than one compressor online, having a combined horsepower rating of more than 100 hp, must operate with a controller

that is able to choose the most energy efficient combination of compressors within the system based on the current air demand as measured by a sensor.

**3. Compressed Air System Acceptance.** Before an occupancy permit is granted for a compressed air system subject to Section 120.6(e), the following equipment and systems shall be certified as meeting the Acceptance Requirements for Code Compliance, as specified by the Reference Nonresidential Appendix NA7. A Certificate of Acceptance shall be submitted to the enforcement agency that certifies that the equipment and systems meet the acceptance requirements specified in NA 7.13.”

If permits exist that grandfather the project under the current code requirements, SDG&E should provide copies of those permits to CPUC staff.

The AirMaster+ files show that 150 CFM of air leaks will be repaired as part of this project. From documentation provided, it is not clear how the system leak-down test will be performed to verify the air leak CFM before leak repairs begin.

For the pre-installation case, SDG&E provided two weeks of logged current and pressure measurement data for the existing compressor. For the post-installation case, SDG&E indicated that the post M&V plan has not been determined. CPUC staff recommends SDG&E to provide detailed post-installation M&V plan. The M&V plan should include at least two weeks of logged data, and the full verification of the existing air compressor control type. The M&V plan needs to describe how the measurements will be used to verify the impacts due to the new VSD air compressor and other planned modifications and improvements made to the overall compressed air system. Also, a system leak-down test should be performed and air leak volume should be documented from this test.

## Review Conclusion

The project is conditionally approved pending revisions to include only eligible measures, verifying the existing compressors control type, submitting incremental measure cost estimates, and post M&V plan, and providing information regarding the Title 24 applicability to the project.

## Summary of CPUC Staff Requested Action by the IOU

CPUC Staff requests that the IOU undertake the recommended steps and submit the following information due on 01/16/2014 (or 14 days from submittal date to IOU):

1. Revise the savings and project costs to include only eligible custom measures.
2. Verify the control type for the existing air compressors. Revise the savings calculations based on the verified control configuration.
3. Provide an itemized breakdown of the total project costs, and incremental measure costs.

4. Submit an M&V Plan that includes at least two weeks of logged data, and details all the parameters measured, indicates the planned measurement intervals, describes the planned data quality assurance steps and data normalization to process production, and explains how the measurements will be used to verify the impacts.
5. If the project will not be implemented before July 1, 2014, revise the baseline to take into account the mandatory requirements of the 2013 Title 24.
6. Provide information to describe how the air leak volume (CFM) has been estimated, and how the repair of leaks will be verified.
7. Provide the EUL for the air leak repair measure. Segregate measures with different EULs.
8. Describe the IOU Program requirements for ongoing air leak maintenance following the completion of the project and how compliance with those requirements will be verified.

Upon project completion, CPUC staff requests that SDG&E provide the following:

1. Submit the post-installation M&V report along with any measurement data taken;
2. Provide detailed information about any compressed air demand reduction measures, such as air leak repairs, implemented after the pre-installation measurements were taken and would be reflected in the post-installation measurements.
3. Provide information regarding any change in the facility's production level that may affect the compressed air demand between pre- and post-installation stage.
4. Provide the final savings estimates, trued-up to the post-installation measurements; and
5. Submit final total project and incremental measure costs supported with detailed, itemized contractor invoices with separate material and labor costs.

**Table 1-2 Review Findings**

Reviewed Parameter	Analysis
<p><b>Project Baseline Type</b> (Early Replacement, Normal Replacement, Capacity Expansion, New Construction, System Optimization, Add-on Measures, Major Renovation) Note: For early retirement projects only, include RUL through EUL baseline)</p>	IOU Proposal: Replacement on Burnout
	CPUC Staff Assessment: Normal Replacement
	CPUC Staff Recommendation: Since the existing compressors are operational, CPUC Staff considers the project a Normal Replacement.
<p><b>Project Baseline Technology</b> (in situ equipment, Title 24 (specify year), other code or other efficiency level (specify), industry standard practice - ISP)</p>	IOU Proposal: Load/unload air Compressor. No compressor sequencing controller.
	CPUC Staff Assessment: Replacing the existing nonfunctioning control system should use the ROB baseline. If installing a new control system has any advantage in reducing the energy use as compared to fully functioning existing controller, incremental savings should be demonstrated. If the project will not be implemented before July 1, 2014, the baseline should be revised to take into account the mandatory requirements of the 2013 Title 24.
	CPUC Staff Recommendation: Existing compressors with a fully functioning control system. Revise the baseline to take into account the mandatory requirements of the 2013 Title 24.
<p><b>Project Cost Basis</b> (Full Incremental, or Both. Note: For early retirement projects, include RUL through EUL cost basis treatment)</p>	IOU Proposal: Full cost
	CPUC Staff Assessment: Incremental measure cost is required for all Normal Replacement measures.
	CPUC Staff Recommendation: Submit final total project and incremental measure costs supported with detailed, itemized contractor invoices with separate material and labor costs
<p><b>RUL</b> (required for early retirement projects only, otherwise N/A)</p>	IOU Proposal: N/A
	CPUC Staff Assessment: N/A
	CPUC Staff Recommendation: N/A
<p><b>EUL</b> (for each measure)</p>	IOU Proposal: 15 years.
	CPUC Staff Assessment: Based on the DEER EUL for ASD and compressors, a 15 year EUL recommended for the new air compressor. Provide the EUL for the air leak repair measure. Segregate measures with different EULs.

Reviewed Parameter	Analysis
	CPUC Staff Recommendation: provide measure EUL for repairing air leaks.
<b>Savings Assumptions</b>	IOU Proposal: The savings for new VSD compressor has been calculated assuming that the control type for the existing compressors is load/ unload and 250 CFM of the air leaks will be fixed.
	CPUC Staff Assessment: A system leak-down test should be performed to verify the air leak CFM before leak repairs begin.
	CPUC Staff Recommendation: Provide information to describe how the air leak volume (CFM) has been estimated, and how the repair of leaks will be verified.
<b>Calculation Methods/Tool review</b>	IOU Proposal: AirMaster+ was used to estimate the savings and input files were provided.
	CPUC Staff Assessment: The savings should be revised to include only eligible measures.
	CPUC Staff Recommendation: Revise the AirMaster+ calculations to include only eligible custom measures
<b>Pre- or Post-Installation M&amp;V Plan</b>	IOU Proposal: Two weeks of logged current and pressure measurement data was provided for the existing compressor. No post M&V plan provided.
	CPUC Staff Assessment: The M&V plan should include at least two weeks of logged data, and the full verification of the existing air compressor control type. The M&V plan needs to describe how the measurements will be used to verify the impacts due to the new VSD air compressor and other planned modifications and improvements made to the overall compressed air system. It is not clear how the leak volume (CFM) has been estimated, and how the repair of leaks will be verified.
	CPUC Staff Recommendation: Submit an M&V Plan that includes a minimum of two weeks of logged data, and details all the parameters measured, indicates the planned measurement intervals, describes the planned data quality assurance steps and data normalization to process production, and explains how the measurements will be used to verify the impacts. Provide information to describe how the air leak volume (CFM) has been estimated, and how the repair of leaks will be verified.
<b>Net-to-Gross Review</b>	IOU Proposal: Not Provided
	CPUC Staff Assessment: An NTG assessment is not warranted at this stage.
	CPUC Staff Recommendation: An NTG interview is not recommended at

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<b>Reviewed Parameter</b>	<b>Analysis</b>
	this stage.



**Table 1-3 Energy Savings Summary, Project Costs & Incentive**

Description	IOU Ex Ante Claim	CPUC Staff Recommendations
<b>First Year kWh Savings</b>	[REDACTED]	TBD
<b>First Year Peak kW Savings</b>	[REDACTED]	TBD
<b>First Year Therms Savings</b>	[REDACTED]	TBD
<b>kWh Savings (RUL Period)</b>	N/A	N/A
<b>Peak kW Savings (RUL Period)</b>	N/A	N/A
<b>Therms Impact (RUL Period)</b>	N/A	N/A
<b>kWh Savings (RUL thru EUL Period)</b>	[REDACTED]	TBD
<b>Peak kW Savings (RUL thru EUL Period)</b>	[REDACTED]	TBD
<b>Therms Savings (RUL thru EUL Period)</b>	[REDACTED]	TBD
<b>Annual Non-IOU Fuel Impact (RUL Period)</b>	N/A	N/A
<b>Annual Non-IOU Fuel Impact (RUL thru EUL Period)</b>	N/A	N/A
<b>Project Costs for Baseline #1 (RUL or EUL)</b>	Full Cost: \$ [REDACTED]	TBD
<b>Project Costs for Baseline #2 (EUL minus RUL period)</b>	Not Provided	TBD
<b>Project Incentive Amount</b>	\$ [REDACTED]	TBD