4.1 Samples: Preliminary Technical Energy Audit (TEA) and Final Investment Grade Audit (IGA)

Under separate cover, provide representative SAMPLE audits of a preliminary TEA and a final IGA that is applicable for an energy performance contracting project in a government facility. (See RFP for proper delivery media.)

In response to this section, provide a brief description of the audits, including energy and economic calculations, and verification that the sample audits were conducted by current members of the company's team proposed for the DAGS Energy Performance Contracting Program (HEPCP). Provide a description of the process your company uses for typical audits (TEA and IGA) in the types of facilities that will participate in the program. Note any changes that will be made to comply with requirements for the program. (Provide the SAMPLE audits under separate cover with an introduction repeating the response for this section.)

TEA Process

The first step in the Chevron ES Performance Contracting Program is determining the feasibility of a project. A project is feasible if it can be paid for through energy and verifiable operational savings within an agreed upon time frame. The facilities are surveyed to determine lighting types, HVAC system types, existing control strategies, and possible applications for renewable energy. Operating personnel are interviewed to get the general information about the facility (square footage, operating schedules, age of systems, rate analysis, energy conservation strategies already implemented, operational problems, desired system changes, etc.). The study includes analysis of the facility's last three years utilities bills, operating expenses, and maintenance/repair history.

An analysis is made of the energy savings potential. We identify potential Energy Conservation Measures (ECMs) and potential facility improvement opportunities. The energy conservation measures must improve the facility as well as save energy. We then estimate the cost and the energy savings and run financial proformas to determine program financials and viability.

We note that the State's program design is such that there is no fee for the TEA study. Our experience in other states has been that a small fee, $8000 to $15000, was awarded to the firm(s) that were not selected to perform the IGA as a means to encourage a high quality level of effort. We would strongly encourage this approach for optimal program results and industry participation.

IGA Process

A major reason for our success with energy management projects is our comprehensive energy audit (CEA, which is equivalent to your program IGA). The purpose of the analysis is to identify, quantify and prioritize viable energy savings opportunities for all aspects of the facility – control systems, air conditioning, heating systems, lighting, building structure (envelope), water and sewer systems, miscellaneous equipment, scheduling procedures, etc. and renewables.

A thorough on-site engineering survey of the facility is made and may include measurement of electrical power usage of motors, air delivery from fans, combustion efficiency of boilers, lighting intensity levels, water usage, etc. The CEA includes interviewing appropriate administrative and maintenance personnel regarding equipment usage, operating schedules, etc. On many larger facilities, this data is then used to rebuild the facility as a

computer energy model. Definitions of building shape, size, construction, occupancy, lighting, temperatures, schedules, controls, plug load, weather locale and other details are used to create the model. The computer then simulates the energy use of the facility for a year, taking into account the changing effects of weather, schedule variances, etc. To verify the accuracy of the model, the simulated energy usage is compared and calibrated to the history of monthly energy bills for the facility over a three-year period. The calibrated model then becomes the "baseline".

All viable ECMs are evaluated over a full year of to determine their energy savings. Where computer models are used, "packages" of ECMs are evaluated in the model to observe the interactive effects of the measures. For example, the effects on savings generated by implementing lighting, HVAC and controls measures as a package.

Next, a cost estimate of each ECM is determined, and the project's cost effectiveness is reviewed. The estimate entails developing schematic diagrams and performance specifications. We solicit price proposals from subcontractors, and estimate measures in-house. All savings and cost estimates are compared to database of past projects to validate their accuracy.

The resulting CEA or IGA report includes a list of each viable energy savings modification with predicted annual savings, cost of implementation, and financial payback. We are thus able to assemble the most cost-effective group of energy savings opportunities possible – those that provide the greatest possible savings for the least investment.

The structure of the CEA Report is:

"Executive Summary" - This section provides an overview of the project. We detail the cost and savings of the ECMs. Recommendations, including cash-flow scenarios are provided.

"Data on Present Facilities" – This section details HVAC, lighting, controls, and envelope at the facility.

"Baseline Energy Use" – This section provides a month-by-month listing of historical energy use. From this information, an energy use baseline is determined (this baseline is used to calibrate the energy model described above). From this baseline, if required by the M&V plan, energy savings are calculated during the monitoring phase. Utility rates and energy usage indices are also included in this section.

"Energy Conservation Measures" – Recommended ECMs are described in this section, including descriptions of the current equipment, the proposed changes, and the impact to the facility environment.

"Environmental Impact" – This section details such things as reductions in emissions, sewer output, and other pollutant and addresses proper disposal of contaminants such as bulbs containing PCBs and refrigerants among other things.

"Appendices" – The Appendices include modeling input and output data, maintenance recommendations, utility rate analyses and the measurement and verification plan.

Enclosed under separate covers are the TEA and IGA that Chevron ES developed for Arapahoe County in Colorado. This is a very thorough audit of a large county with facilities similar to those of the State of Hawaii ESPC program participants.

4.2 Standards of Comfort

A description of the standards of comfort the company generally uses for light levels, space temperatures, ventilation rates, etc. in the facilities intended for this RFP and any flexibility for specific Facility Owner needs. Note any changes that will be made to comply with requirements.

The State of Hawaii Program participants will establish the standards of comfort for its facilities in conjunction with Chevron ES (not *by* Chevron ES). One of the key requirements for facilities is to maintain a quality environment for their customers, students, staff and/or the public. Many things can impact the effectiveness of this environment. Studies have shown that poor lighting, temperature control, and ventilation have a negative impact on the level of sickness, discomfort, and absenteeism.

Space Temperatures

Minimum and maximum set points are established and approved by the client, in conjunction with Chevron ES, not *by* Chevron ES. Standards of comfort are presented as part of our Comprehensive Energy Audit or IGA. In each of our CEA documents, we present the "as-found" temperature settings and operating schedules and the "recommended" temperature and operating schedules. Final decisions remain with the client. Due to the fact that this is, in part, the basis for a portion of our energy savings, it is important for our clients consider this information carefully.

Typically, occupied setpoint values do not differ greatly from what is found during our initial visit, unless the existing setpoints are extreme. Often the majority of our setpoint and schedule changes are during the unoccupied periods. This is when the greatest energy savings can be obtained and is where our focus typically lies.

Light Levels

Light levels are measured during the CEA to determine existing light levels. Our lighting projects are designed to assure that we meet or exceed existing lighting conditions. Our goal in a lighting retrofit is to try to achieve the recommended light levels by the Illuminating Engineering Society (IES) standards. In a retrofit environment where savings drives the project, this ideal level is not always possible. In all cases, however, light levels will meet or exceed existing levels.

Ventilation Rates

As part of the CEA report, we will provide the results of the site survey with regard to IAQ issues. During this comprehensive assessment, our engineers will utilize the industry guidelines established by ASHRAE 62-1989, Ventilation for Acceptable Indoor Air Quality, to determine ventilation requirements for any projects related to central HVAC systems. ASHRAE 62 provides guidance for system and equipment standards and sets forth a procedure for ensuring indoor air quality.

During the design phase of the implementation project, our engineers finalize the preliminary designs established in the comprehensive energy analysis. These designs are fully compliant with the guidelines established in ASHRAE 62. During construction we obtain measurements ensuring that the air systems are providing the ventilation levels as established during the design phase of the project. This process ensures the client that the equipment installed as part of the performance contract is providing proper ventilation.

We have conducted several projects that utilize advanced technologies to actively assure good IAQ. Included in this is the use of demand-controlled ventilation. Demand controlled

ventilation provides for control of ventilation to a space based on active measurement of pollutants. One of the pollutants that can accurately be measured is carbon dioxide (CO_2), which provides an indicator of occupancy. Typical project installations increase outdoor air to the space when space CO_2 levels rise to 600-800 ppm. Outdoor air CO_2 levels are normally about 350 ppm. Exposure to CO_2 levels of 1,200 ppm for 15 minutes can cause nausea, fatigue, drowsiness, and headaches. This project has been implemented by Chevron ES at Offutt Air Force Base and Gustavus Adolphus College in Minnesota.

Additionally, Chevron ES has implemented projects that actively monitor air flows via energy management system projects. These air flow measurements are used to assure that minimum ventilation levels are being met.

In summary, we utilize a combination of innovative solutions and industry standard engineering practices to assure that the challenges of maintaining learning environments are met and maintained in its performance contract projects.

4.3 Baseline Calculation Methodology

A detailed description of the methodology normally used by the company to compute the baseline of energy, water and solid waste. etc. use for a facility. Include a discussion of how the Facility Owner is engaged for development of and agreement on the baseline. Note any changes that will be made to comply with requirements for this RFP.

Baseline energy use is defined as the monthly and annual usage of each energy source used at the building that is indicative of usage with current equipment, occupancy, and operational methodology. The baseline for a facility is developed during the technical energy analysis.

In determining a baseline, Chevron ES will:

1. Analyze energy usage records for the most recent three years, taking into account any changes in facility equipment and operations that would alter the usage during that three-year period.
2. Develop a thorough understanding of the programmatic activities conducted in each building, as well as an understanding of the electrical and mechanical equipment operating patterns.
3. In many larger facilities, develop an energy and water-usage computer simulation model for the facility and calibrated using actual data. This calibrated model is then used as a tool for evaluating energy savings for specific cost saving measures (ECMs) and accounting for energy consumption interactions between ECMs.
4. The proposed baseline will be presented and explained to the participant's staff. Chevron ES and the Client will jointly approve all baseline calculations.

On the following page is a sample baseline summary from a K-12 school district in Tennessee.

CEA Baseline Summary

Williamson County Schools

		Annual Electric Usage			Annual Electric Demand			Annual Natural Gas Usage			Annual Water Usage		
Building Name	Total Dollars*	kWh	Dollars	Avg.$ per kWh	kW	Dollars	Avg.$ per kW	therms	Dollars	Avg.$ per therms	gallons	Dollars	Avg.$ per gallons
Brentwood High School	$305,362	3,602,057	$207,525	0.05761	8,422	$76,633	9.099	19,653	$13,644	0.6942	15,504,867	$84,193	0.00543
Centennial High School	$305,317	5,100,601	$265,208	0.052	12,225	$0	0	15,910	$11,199	0.7039	5,617,481	$28,910	0.00515
Fairview High School	$155,844	2,140,307	$118,653	0.05544	5,596	$0	0	24,417	$17,179	0.7036	2,701,403	$20,012	0.00741
Franklin High School	$269,443	4,134,302	$233,465	0.05647	11,141	$0	0	32,098	$24,239	0.7552	4,099,312	$11,739	0.00286
Page High School	$199,794	2,753,022	$163,972	0.05956	8,178	$0	0	31,928	$22,237	0.6965	2,682,058	$13,585	0.00507
Brentwood Middle School	$137,887	1,888,981	$109,485	0.05796	5,131	$44,457	8.664	22,040	$14,531	0.6593	1,893,061	$13,871	0.00733
Fairview Middle School	$88,062	1,007,597	$64,958	0.06447	3,647	$0	0	17,413	$12,115	0.6957	1,436,602	$10,989	0.00765
Grassland Middle School	$110,088	1,232,699	$76,205	0.06182	4,044	$0	0	29,324	$22,811	0.7779	4,762,796	$11,072	0.00232
Page Middle School	$119,494	1,618,183	$98,617	0.06094	5,220	$0	0	18,654	$13,148	0.7048	1,521,257	$7,729	0.00508
Woodland Middle School	$132,426	1,766,068	$106,084	0.06007	5,175	$0	0	18,908	$14,769	0.7811	1,522,106	$11,573	0.0076
Bethesda Elementary	$85,888	1,019,164	$64,917	0.0637	3,300	$0	0	20,317	$15,608	0.7682	1,272,625	$5,363	0.00421
College Grove Elementary	$63,411	803,851	$48,338	0.06013	2,481	$0	0	13,125	$8,873	0.676	1,366,588	$6,200	0.00454
Crockett Elementary	$84,009	958,999	$63,435	0.06615	3,705	$0	0	14,787	$10,432	0.7055	1,217,534	$10,142	0.00833
Edmondson Elementary	$99,848	1,209,694	$81,019	0.06697	4,271	$37,108	8.688	10,444	$7,209	0.6903	1,226,814	$11,620	0.00947
Fairview Elementary	$65,960	705,172	$48,032	0.06811	2,594	$0	0	12,839	$9,490	0.7392	1,077,767	$8,438	0.00783
Grassland Elementary	$87,161	1,267,854	$75,842	0.05982	3,985	$0	0	8,462	$6,117	0.7229	1,928,087	$5,202	0.0027
Hillsboro Elem/Middle School	$98,700	1,395,158	$76,713	0.05499	3,602	$0	0	23,333	$17,178	0.7362	1,159,966	$4,809	0.00415
Hunters Bend Elementary	$92,346	1,309,606	$79,040	0.06035	4,100	$0	0	11,784	$8,545	0.7251	1,517,093	$4,761	0.00314
Lipscomb Elementary	$97,457	1,174,242	$78,342	0.06672	4,053	$33,655	8.304	10,320	$7,108	0.6888	1,504,607	$12,007	0.00798
Nolensville Elementary	$65,623	894,951	$51,646	0.05771	2,580	$0	0	10,756	$7,915	0.7359	556,029	$6,062	0.0109
Oakview Elementary	$83,343	1,171,261	$72,051	0.06152	3,720	$0	0	9,987	$5,878	0.5886	1,254,845	$5,414	0.00431
Pinewood Elementary	$22,742	219,253	$15,355	0.07003	766	$0	0	10,590	$7,387	0.6975	0	$0	0
Scales Elementary	$108,303	1,097,005	$67,859	0.06186	3,544	$0	0	15,982	$11,003	0.6885	3,817,222	$29,441	0.00771
Trinity Elementary	$75,787	932,115	$57,775	0.06198	2,790	$0	0	13,804	$9,735	0.7052	1,630,507	$8,277	0.00508
Walnut Grove Elementary	$65,483	914,991	$53,535	0.05851	3,080	$0	0	11,749	$8,908	0.7582	979,586	$3,040	0.0031
Bus Garage	$42,730	296,492	$19,684	0.06639	525	$0	0	24,795	$18,481	0.7454	603,843	$4,565	0.00756
Maintenance	$10,341	128,226	$8,164	0.06367	301	$0	0	2,780	$1,944	0.6993	51,420	$233	0.00453
Totals	$3,072,849	40,741,851	$2,405,919	0.05905	118,176	$191,853	1.623	456,199	$327,683	0.7183	62,905,476	$339,247	0.00539

**Total Dollars does not include demand dollars listed, as those dollars are accounted for in the electric usage dollars.*

4.4 Adjustments to Baseline

A discussion of typical factors that can impact the calculated baseline and the company's general approach to adjusting the calculated baseline if one or more of these factors are present Include how the Facility Owner is involved for agreement on any adjustments. Note any changes that will be made to comply with requirements for the RFP.

The baseline(s) for all forms of energy can increase or decrease over the term of a guaranteed performance program. One common reason energy savings can appear to decrease over time is the result of a dynamic facility; i.e., a facility that is modified for reasons outside the scope of the project. Accordingly, the baseline(s) established during the CEA or IGA will need to be modified from time to time to account for major equipment and operational changes made at a facility; such as opening a new wing of a building, replacing a major piece of electrical equipment, or installing personal computers. Other typical changes may include, but are not limited to:

- Occupancy schedule changes
- HVAC schedule changes
- Additional miscellaneous equipment
- New HVAC (cooling) equipment
- Remodeled buildings.

As the participant informs Chevron ES of any changes to a facility that may affect energy use, the effects will be quantified on the overall energy use of the facility. The additional

calculated monthly usage will be presented to the participant for review and approval, and then added to the baseline(s) for use in the savings calculations.

Savings Calculations

Chevron ES will utilize many proven engineering methods to estimate energy savings, including computer modeling, graphical analysis, sub-metering and testing of facilities, spreadsheet analysis, and field measurement and verification. Chevron ES' 32 years of experience in estimating energy savings is obviously another positive factor in making the determination.

To calculate energy savings, Chevron ES engineers "construct" a computer model of the annual energy performance of a building by inputting all of its construction, mechanical, and electrical characteristics, as well as its operating patterns.

Once the building survey is complete and input into the modeling software, the facility is then "matched" to the utility history. For a model to be "matched" means that the computer model's energy consumption is similar to the utility history of the facility. Ideally, a model is matched to its respective building's energy usage by comparing an average of three years of utility data. Chevron ES will often install sub-meters for a period of time to obtain electrical data on facility buildings. No assumptions are made in the calculations.

Dollar Savings Calculations.

The procedures for assigning dollar values to energy, water and O&M savings are described in the following paragraphs.

Energy. Dollar savings are calculated by multiplying the energy incremental rate (i.e., $/kWH, $/kW, $/Therm) by the energy units saved. Adjustments will be made each year to the incremental rate to account for increasing utility rates. There are a number of methods of accomplishing this -- for example, the Consumer Price Index or the actual increase in the utility rate structure. The program participant will approve the adjustment method that is used. The use of a pre-arranged inflation index establishes a floor and ceiling for utility energy costs.

Water. The procedure for calculating water savings is as follows:

Established Base Line – Actual Usage = Energy Savings

Energy Saving x Rate = Dollars Saved

Dollars Saved – Guarantee Amount = Windfall Savings Dollars

Example: Established Base Line = 1,500,000 gallons
Actual Usage = 1,000,000 gallons
Energy Savings = 500,000 gallons
Unit Rate = .05 per gallon
Savings Dollars = $25,000
Guarantee = $19,500
Windfall Savings = $5,500

O&M. Chevron ES will begin by reviewing budget & expenditure reports with the participant to gain an understanding of what types and quantities of supplies and parts are purchased on an annual basis. Sometimes a review of a major vendor's purchasing history is

necessary. In addition, Chevron ES will review maintenance contracts and outsourced maintenance items with the participant. Finally, Chevron ES will calculate the effect of the ECMs on budgets and recommend to the participant amounts that can be used as savings.