RCx Preliminary Assessment Summary

Submitted by Sample Agent

Audit Date :

Facility: Sample ISD High School and address

CenterPoint RCx Full Program 2012

Picture of the RCx Facility

The Preliminary Assessment report herein is the result of a basic facility walkthrough of Sample ISD High School in the XXX district. The purpose of this analysis has been to gather information needed to determine if opportunities exist within this building for implementation of low cost / no cost energy measures which will provide energy savings and/or improved operation for the building.

The Commercial Retro-Commissioning Full Program (RCx-Full) is designed to achieve demand and energy savings in commercial facilities. Peak demand period is from June 1 to September 30 during the week days between the hours of 1:00 PM and 7:00 PM excluding public holidays.

RCx staff and audit staff

Below is a brief summary of the project team players and their roles .

Name	Project Role	Organization	Contact Information
Owner Name	Building Management Contact	Sample ISD	1500,XXX Street Houston TX,77057 Phone: email:
Property Manager Name	Property Manager contact	Sample ISD	1500,XXX Street Houston TX,77057 Phone: email:
Calvin Burnham, P.E.,CEM	RCx Program Manager	CenterPoint Energy	1111 Louisiana Houston, TX 77002 (713) 207-3423 calvin.burnham@centerpointenergy.com
Richard Rusk, P.E.,CEM	RCx Project Manager	Nexant, Inc.	4 Houston Center 1331 Lamar, Suite 1775 Houston, TX 77010 (713) 982-5547 rrusk@nexant.com
RCx Agent Name	RCx Agent Primary Contact	RCx company name	4300,XXX Street , Houston,TX 77048 Phone: Email:

Facility description

Sample ISD's Sample High School is located in northern Harris County approximately twenty-six miles from downtown Houston. The most recently built High School in the district, this 534,000 square foot facility is a 2-story, brick building which began construction in early 2000 and officially opened in July, 2001. Grade levels attending this campus range from 9^{th} through 12^{th} grades and the total student population is 3,200. The building consists of classrooms, cafeteria with full service kitchen, orchestra, choir, auditorium, competition gym, auxiliary gym, ROTC, boys and girls PE, weight room, field house, natatorium, auto shop, ag shop, wood shop, etc.

Systems

The Air Distribution system consists of VAV Air Handling Units (AHU) distributing air at temperatures ranging from 52^{o}F-54^{o}F .No return air ductwork was installed at this campus. In addition to the primary air units, the design includes large Outside Air Units (OAU) and smaller Supply Air Fans designated for delivery of outside air into the building. Air is delivered to Variable Air Volume (VAV) Boxes located above the ceiling with hot water reheats. Common areas are served by constant volume AHU's with ducted OA controlled by a damper.

The Central Plant contains water cooled chillers, including two (2) centrifugal and one (1) screw type chiller. Also within the Central Plant are natural gas fired hot water boilers which are currently scheduled to operate year around for reheating purposes. This primary equipment is served by centrifugal water distribution pumps and cooling towers with fans controlled by Variable Frequency Drives.

Item/Equipment	**Description**	**Capacity/Size**	**Area Served**
Chiller 1-Trane	Water Cooled Screw	360 tons /720 gpm/0.7 kW/ton	Central Plant
Chiller 2,3-Trane	Water Cooled centrifugal	720 tons/1440 gpm/0.6 kW/ton	Central Plant
Cooling Tower 1,2	2-cell	2x25 hp fans with VFD /tower	Central Plant
Boiler 1,2	Natural Gas	12,555 MBH_{input} / 10,050 MBH_{output}	Central Plant
Air Handling Units	VAV	5-20 HP	Classes
OA units	OAHU	5-10 HP	Gyms,Aud,café
Air Handling Units	CV	10-15HP	Gyms,Aud,café
Supply fans	Roof mounted 2HP-5HP	68,000 cfm	School
CW pump 1	Centrifugal	30HP, 1860 gpm	Chiller 1
CW pump 2,3	Centrifugal	50 HP, 2160 gpm	Chiller 2 &3
CHW pumps 1,2,3	Centrifugal	30HP;1440 gpm	Chillers
Lighting	Fluorescent + MH		School

Operating and Occupancy Schedule

Description	Period	Mon	Tue	Wed	Thurs	Fri	Sat	Sun
Chiller	All year	24/7	24/7	24/7	24/7	24/7	24/7	Off
AHU's	All year	4am-8pm	4am-8pm	4am-8pm	4am-8pm	4am-8pm	7am-4pm	Off
CHW Pump	All year	24/7	24/7	24/7	24/7	24/7	24/7	Off
OA fans	All year	Off	Off	Off	Off	Off	Off	Off
Interior Lighting	All year	4am-8pm	4am-8pm	4am-8pm	4am-8pm	4am-8pm	7am-4pm	Off
Exterior Lighting	All year	6pm-6am	6pm-6am	6pm-6am	6pm-6am	6pm-6am	6pm-6am	6pm-6am
Occupancy Hours	All year	8am-6pm	8am-6pm	8am-6pm	8am-6pm	8am-6pm	8am-6pm	8am-6pm

Energy Conservation Recommendations

M 1 : Reprogram operation of Hot Water Boilers

When our engineer was onsite, ambient temperature was around 74^{o}F. However, the Boiler #1 was observed to be operating .Reheating supply air when ambient temperature is above 70^{o}F is unnecessarily wasteful and the set points within the system need to be revised for more moderate operation. This recommendation requires a reprogramming of the operation of Hot Water Boilers to turn off at 65^{o}F ambient rather than at 95^{o}F.

M2 : Reduce Outside Air and exhaust volume

Outside air volumes exceed that required by ASHRAE 62 or the current City of Houston building code . Reduce peak outside air volume to that required by ASHRAE 62. Add VFD's to each OA fan.

M3 : Install Variable Frequency Drives (VFD) on Chilled Water Pumps.

The discharge valves were choked down to 30% open position. Although more information is needed to determine actual pump head and flow rate, we believe there are savings available through installation of lower horsepower motors or variable frequency drives.

M4 : Utilize daylighting techniques to illuminate perimeter corridors and common areas

The corridor lighting was excessively bright and we believe all 3-lamp corridor fixtures can be renovated to remove 1 of the 3 T8 fluorescent lamps from each fixture. It is also believed that none of the corridor lights on the perimeter of the classroom building need to be operated during peak period.

M5 : Reprogram Gymnasium and Auditorium AHU operation

According to the interviews with staff, the Gymnasiums were no longer occupied after 2:30PM and the Auditorium had basically no load conditions at all times of the

day, thus making AHU operation unnecessary. We recommend revisions be made to the DDC control schedules allowing operation of these AHU's at reduced operating hours

M6 : Install timers on Electric Domestic Water Heaters

The DHW's are operating 24/7 continuously through the year. We recommend these units be timed Off at night, beginning at 10PM and being brought back on at 6AM each day.

M7 : Dynamic Condenser Water Temperature Reset

The condenser water set point at the cooling towers is kept constant at 81 F. During wetbulb temperatures, this set point can be lowered to improve the efficiency of the chillers due to lower CW temperatures. This would be a programming into the control system to track the cooling tower approach with the wet bulb temperature.

M8 : Reset Static Pressure Setpoint for VAV units

The setpoint for the VAV's serving the classrooms has been kept constant at 1.5". We recommend that a dynamic reset be programmed to make the static pressure setpoint vary corresponding to the damper position of the most critical zone. This will help reduce the fan speeds at low loads .

M9: Change classroom AHU's scheduled start time to 6:00 am

The classes are occupied at 7:15 am but the AHU's serving these zones come on at 4 am in the morning due to optimal start. We recommend rescheduling these units to start at 6am and thus gain 2 hours in the mornings. This measure will not have any peak savings.

Owner Selection Table

CenterPoint Energy Retro-Commissioning Program - Owner Selection Table	
Project:	RCx-Sample ISD High School
RCx Agent:	Sample RCx Agent
Phase:	Preliminary Assessment Phase- Full
Estimated 2012 Budget Allocated for Participation in Program:	$60,000
Preferred Payback on Investment:	3.0

Measure Description			Owner Selected Measures							
Select measure by entering Y	No.	Measure Description	Peak Period Reductions		Annual Savings			Implementation Cost	Simple Payback	Estimated Completion Date
			kW	kWh	kW	kWh	$ Electricity	$	Years	
Y	1	Reprogram Operation of Hot Water Boilers	42.0	21,168	5.1	45,000	$ 4,950	$ 160	0.0	6/5/2012
Y	2	Reduce Outside Air and exhaust volume	22.0	11,088	13.2	115,249	$ 12,677	$ 24,000	1.9	6/5/2012
Y	3	Install Variable Frequency Drives (VFD) on Chilled Water Pumps.	18.5	9,324	8.8	77,446	$ 8,519	$ 13,500	1.6	12/5/2012
Y	4	Utilize daylighting techniques to illuminate perimeter corridors and common areas	28.0	14,112	4.7	41,232	$ 4,536	$ 6,160	1.4	6/5/2012
Y	5	Reprogram Gymnasium and Auditorium AHU operation	52.0	26,208	3.8	33,212	$ 3,653	$ 80	0.0	6/5/2012
Y	6	Install timers on Electric Domestic Water Heaters	10.0	5,040	5.0	43,362	$ 4,770	$ 4,000	0.8	6/5/2012
Y	7	Dynamic CW Temperature Reset	4.4	2,217	6.5	57,140	$ 6,285	$ 2,000	0.3	7/11/2012
Y	8	Reset SP setpoint for VAV AHU's	2.6	1,310	3.6	31,374	$ 3,451	$ 3,600	1.0	6/5/2012
Y	9	Change class room AHU's scheduled start time to 6:00 am (1 hour prior to actual occupancy) .	-	-	19.6	172,064	$ 18,927	$ 500	0.0	6/5/2012
	Totals (For all Selected (Y) values only)		180	90,467	70	616,079	$67,769	$54,000	0.80	
Table Total (All Measures Combined)			180	90,467	70	616,079	$67,769	$54,000	0.80	

Are the Selected Measures At or Above the Minimum Savings Requirement?	YES
What is Current Estimated Potential Owner Incentives for Selected Measures?	$10,000.00
Are the Selected Measures At or Below the Owner's Specified Budget?	YES
Are the Selected Measures At or Below the Owner's Preferred Payback?	YES

By signing this document, you, the Owner, acknowledge that the RCx Agent has discussed with you or others within your organization the implementation of RCx measures within your facility or facilities. Your signature also indicates that:

1.) Your company is interested in further investigating the selected measures, and intends to move forward with the installation of no less than the measures required to meet the minimum savings.

2.) All installation and/or construction activities will be completed no later than the established project deadline.

3.) You have the necessary authorization within your firm to approve the installation of these measures.

Name (printed):	
Title:	

Signature:	
Date:	