Energy Savings Assessment

PREPARED FOR
Our Customer

ASSESSMENT SITE
Main Building
1234 Main Street
Huntington Beach, CA 92649

ASSESSMENT PERFORMED BY
AIRE RITE

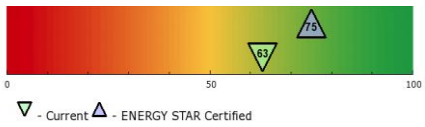
ASSESSMENT DATES
01/01/2011 – 01/08/2011

REPORT ID
127181

Executive Summary

Your Building's Energy Performance Benchmarks

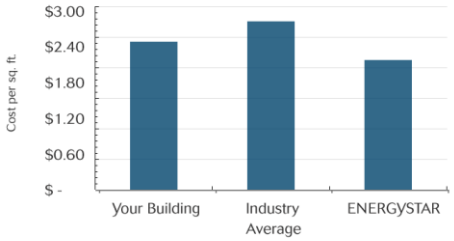
Energy Use



Your building's ENERGY STAR® Energy Performance Rating is **63**. Its Energy Use Index is **97.5 kbtu per sq. ft.**

Your building's ENERGY STAR score of 63 ranks you above average versus your peers, but your building may still have good opportunity to raise your ENERGY STAR score.

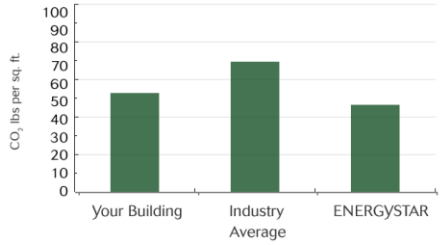
Cost



Your building's annual cost per square foot is **$2.42 per sq. ft.**

Your building's cost per square foot is $0.32 or 12% less than an industry average facility. Your annual cost can be reduced by $64,225 or 31% by achieving an ENERGY STAR score of 90.

Carbon Footprint



Your building's annual carbon footprint is **2,042 tons of CO_2** or **47.8 lbs per sq. ft.**

Your building's carbon emissions are 12% less than an industry average facility, but could be further reduced by 16 lbs per sq. ft. by achieving an ENERGY STAR score of 90.

You could save up to **$64,225** annually or $321,125 over 5 years by raising your ENERGY STAR score to the level of 90.

While a more detailed energy audit is required to quantify actual savings, the savings potential can be estimated by comparing the performance of your building to the ENERGY STAR® database.

Key Findings

- Several areas showed temperatures that are above the typical comfort range. Reducing the temperature during the heating season will reduce energy costs.
- Measurements indicate excessive ventilation. Reducing ventilation will reduce energy costs.
- The operation of lighting extends until after midnight. Reducing the hours of operation will reduce energy costs.
- Several areas showed excessive variation in temperature. This may result in comfort complaints.
- The stated occupancy schedule includes 7:00 am to noon, however measured carbon dioxide levels indicate little if any occupancy on Saturday morning. Check to see if HVAC and lighting system operation is required.
- Installation of variable speed drives on the air handler could be considered to achieve additional energy savings.

How Does Your Building Use Electricity Today?

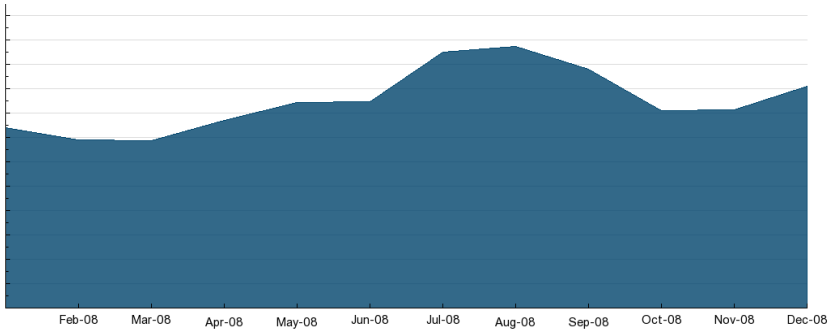
This page shows how electricity use in your building compares to outside weather and helps identify performance issues in the building. Typically your consumption should track the weather pattern for the type of heating or cooling equipment operating in your building. Overall flat consumption can be indicative of 1) simultaneous heating and cooling, 2) extended fan operation, 3) extensive reheat, and 4) an inefficient lighting system. Be aware, some variation can be caused by estimated meter readings which are "fixed" the next time the meter is actually read

Utility Bill Analysis

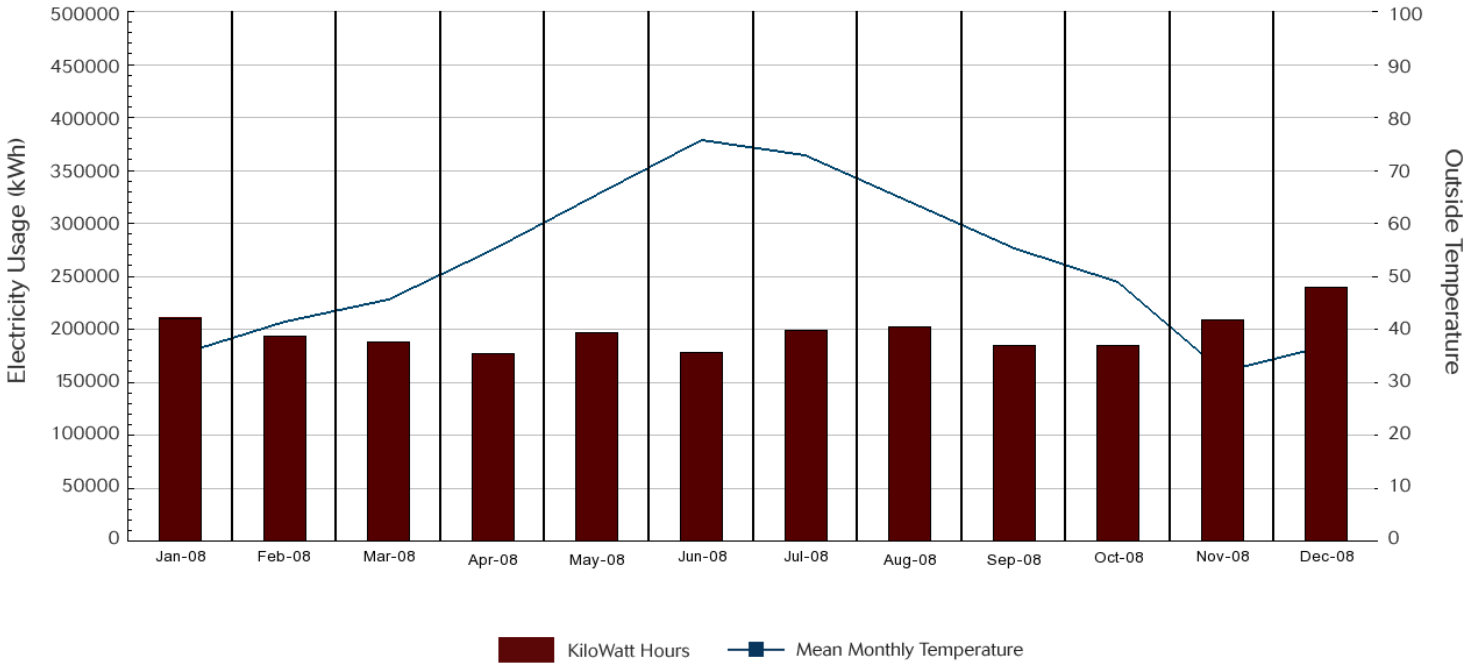
Electricity Consumption

- Electricity comprises 98.7% of your total utility cost, and 96.7% of your total utility consumption.
- Your total spend on electricity is $204,341.
- There were no demand costs entered for this building.

Monthly Electricity Costs



Electricity Consumption And Outside Air Temperature



How Does Your Building Use Fuel Today?

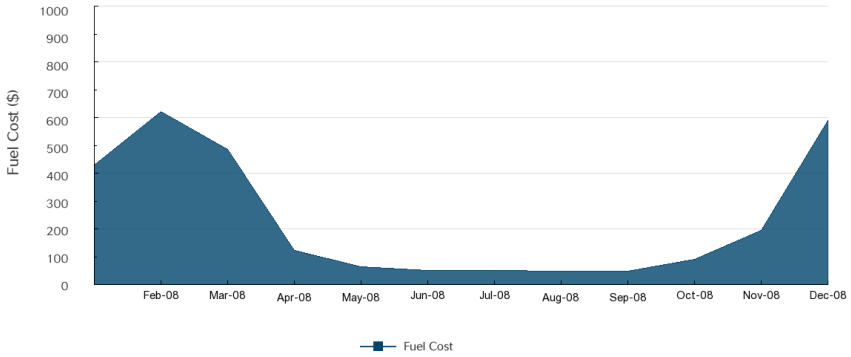
This page shows how Fuel is used in your building relative to outside weather and helps identify performance issues in the building. Typically your consumption should track the weather pattern for the type of heating equipment operating in your building. Overall excessive consumption can be indicative of 1) simultaneous heating and cooling, 2) extensive reheat, and 3) heating in warmer months. Be aware, some variation can be caused by estimated meter readings which are “fixed” the next time the meter is actually read

Utility Bill Analysis

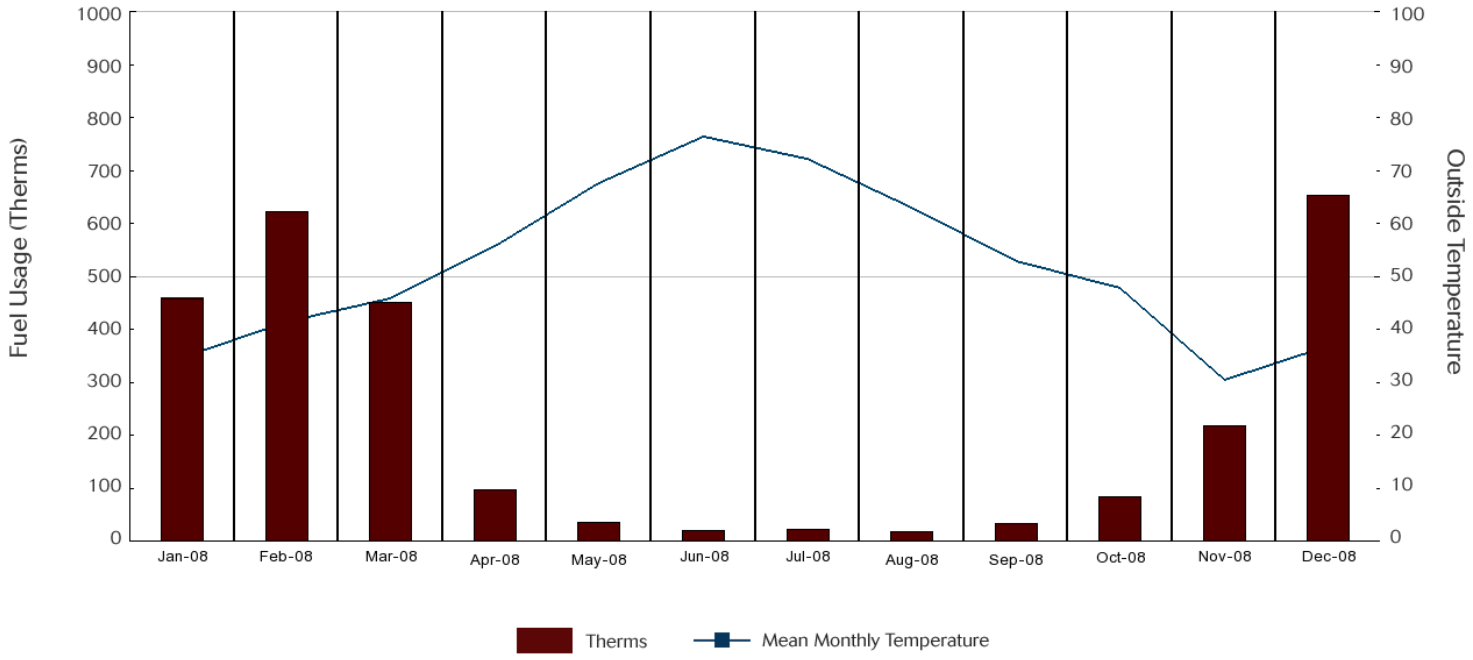
Fuel Consumption

- Fuel comprises 1.3% of your total utility cost, and 3.3% of your total utility consumption.
- Your Total Spend on Fuel is $2,792.

Monthly Fuel Costs



Fuel Consumption And Outside Air Temperature



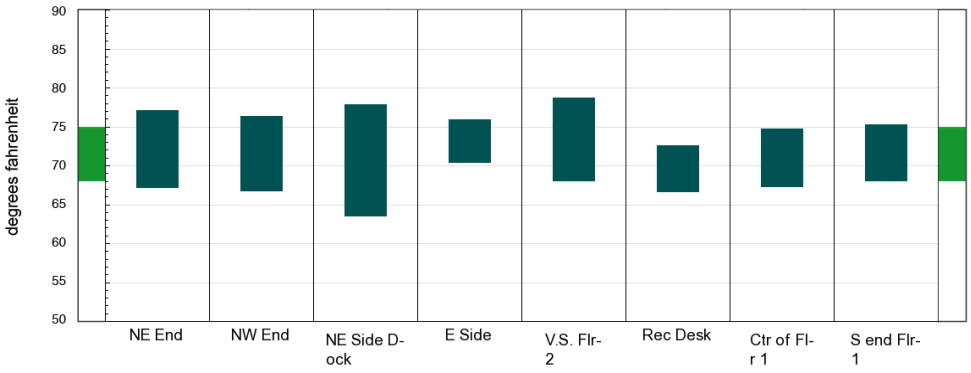
Building Comfort and Ventilation Analysis

This page shows the min/max range of temperature, humidity, and carbon dioxide levels measured during occupied periods. Reducing the range is critical to achieving a building under control that is properly ventilated which allows tenants to be comfortable and productive. The action ratings are based on the worst case found when comparing measured data during occupied hours against established industry guidelines (ENERGY STAR, BOMA, ASHRAE, DOE).

Temperature Findings

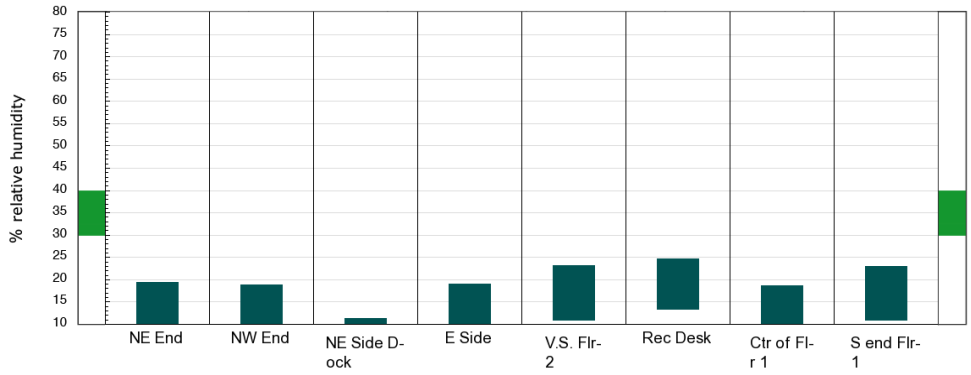
Your building is out of control with ample opportunity to save energy.

- 7 space(s) were too warm at times
- 5 space(s) were too cool at times
- 8 space(s) had excessive temperature variation



Relative Humidity Findings

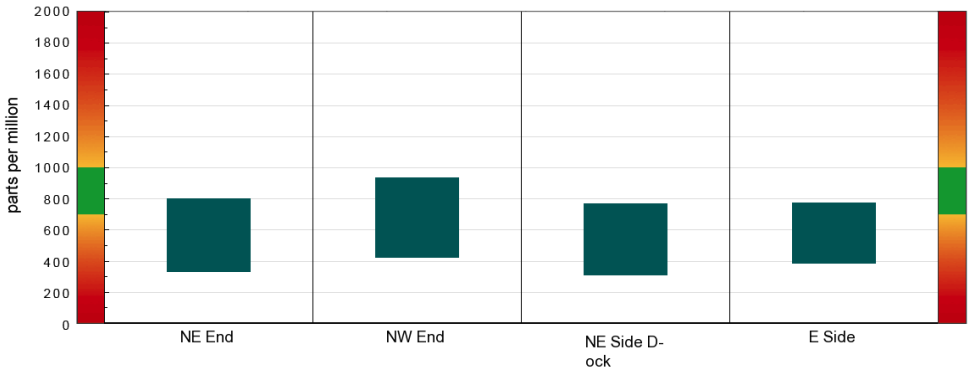
- 0 space(s) had high relative humidity at times
- 8 space(s) had low relative humidity at times



Carbon Dioxide Findings

Your building is over-ventilated and can save energy by reducing the overall amount of outside air ventilation

- 0 space(s) had elevated carbon dioxide levels
- 4 space(s) had low carbon dioxide levels



Outdoor Conditions

Outdoor conditions recorded during the test period are included as part of this report.

The outdoor data included in this report was recorded at: Broomfield, CO 80021

Outdoor Temperature

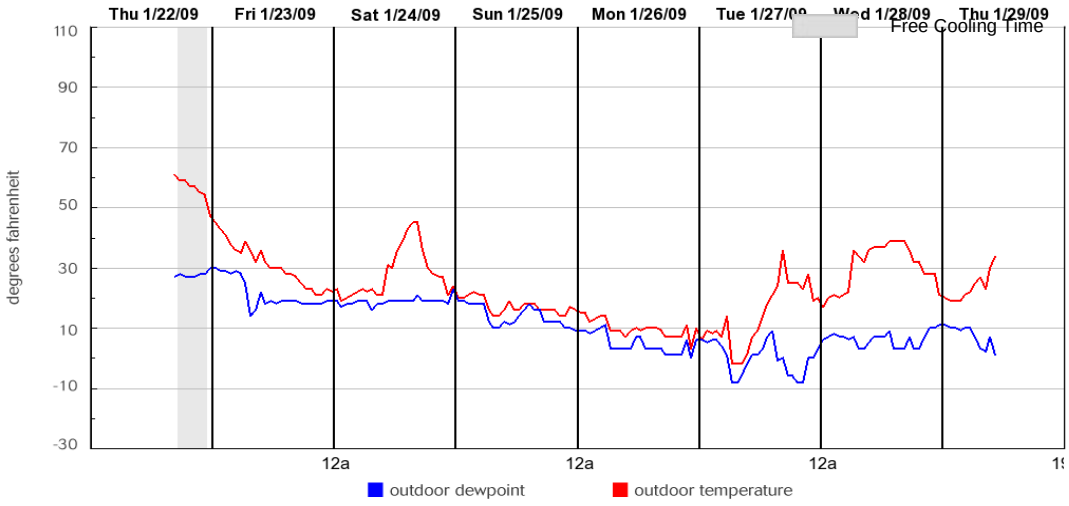
Test Period Avg: 1/22/09 – 1/29/09	Heating Degree Days	Cooling Degree Days
23 ºF	42	0

Outdoor Temperature and Dewpoint

A major factor in the total cost of heating and cooling a building is the heat lost (during heating season) or gained (during cooling season) due to the difference between indoor and outdoor temperatures. The amount of energy consumed to compensate for the difference between outdoor temperature and the desired indoor temperature is driven by three primary factors:

- Heat lost or gained due to conduction through walls, ceilings, and windows.
- Energy required to heat, cool, and dehumidify outside air entering the building, either through infiltration or mechanical ventilation.
- Heat gain due to solar load.

This chart shows the outdoor temperature and dewpoint during the test period at the test location.



More aggressive temperature setbacks during unoccupied periods may provide energy savings with no impact on occupant comfort. Proper ventilation control and use of an economizer for free cooling may also contribute significantly to energy savings.

Temperature

[Sensor Range: 32 to 100 °F; Resolution: 0.1 °F; Calibration Accuracy: ± 1°F]

The ideal temperature is between 68 ºF and 75 ºF during the heating season and 72 ºF and 78 ºF during the cooling season, with variation of less than 3 ºF. Lowering the heating setpoint and raising the cooling setpoint can save significant energy while maintaining a comfortable and productive working environment.

Sources: ASHRAE Standard 55 – 1992, BOMA, ENERGY STAR, DOE

Alert Lvl	
	Occupied/Unoccupied Heating Setpoint is 73 / 64
	Occupied/Unoccupied Cooling Setpoint is 73 / 80

Energy Savings Opportunities

Our findings indicate there are several ways to save money by operating your building differently:

Energy Recommendations Based on Measurements

- Calibrate thermostat(s) to reduce temperature variation
- Verify the control system is shutting the heating & cooling equipment off during unoccupied periods
- Move thermostat(s) to reduce temperature variation
- Balance air flow within duct system to reduce temperature variation

Further Comfort & Energy Recommendations

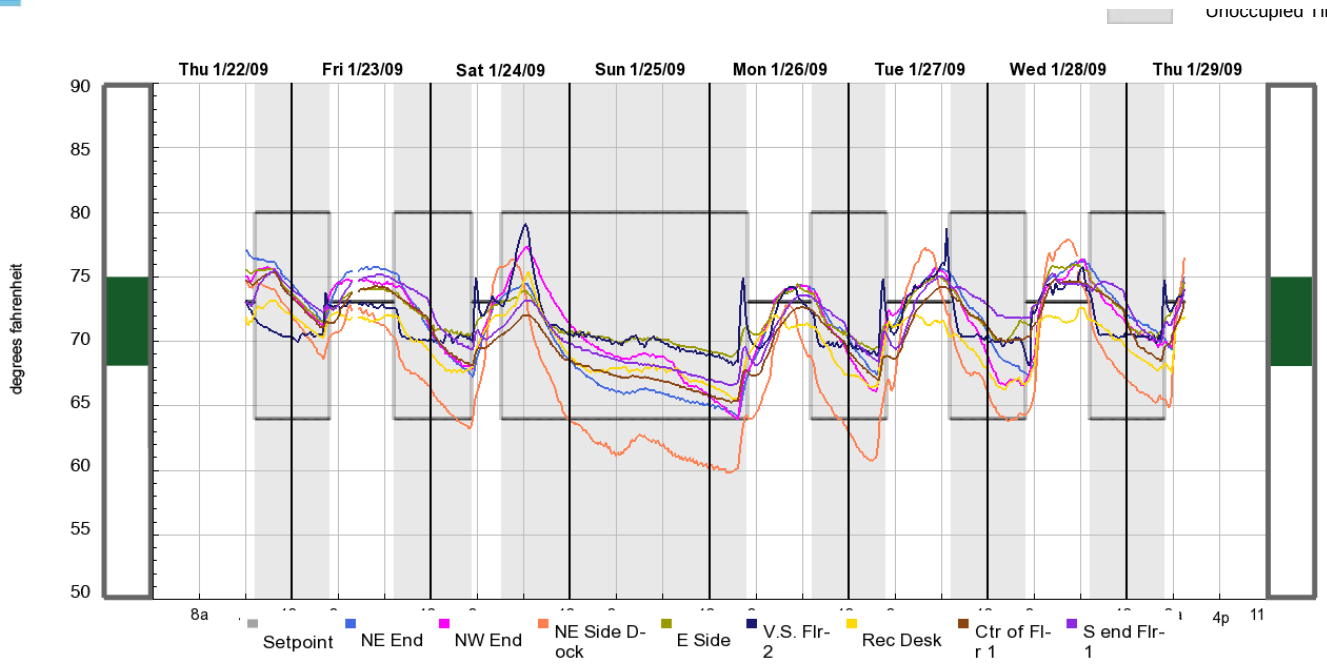
- Raise the cooling set point
- Lower the heating set point
- Increase the amount of cooling set back possible during unoccupied periods

Monitor Statistics

Monitor	Alert Lvl	Min ºF	Max ºF	Avg ºF	%ToR*	SV†
NE End		67	77	73	47%	10
NW End		67	76	73	21%	10
NE Side Dock		64	78	72	40%	14
E Side		70	76	73	25%	5
V.S. Flr 2		68	79	73	6%	11
Rec Desk		67	73	71	7%	6
Ctr of Flr 1		67	75	72	14%	7
S end Flr 1		68	75	73	4%	7

These statistics are for occupied times only.

** % Time out of Range †Spread Value*



Relative Humidity

[Sensor Range: 10 to 95 %; Resolution: 1%; Calibration Accuracy: ± 5%]

Optimum comfort and health is achieved when relative humidity is maintained between 30% and 55%. Readings outside these boundaries may indicate ventilation issues which contribute to an increase of energy used to condition the space.

Sources: ASHRAE Standard 55 – 1992, American Lung Association, Indoor Air Quality Association, BOMA, ENERGY STAR, DOE

Analysis and Recommendations

Our findings indicate areas in your building that may have issues worth investigating for possible energy savings, and especially if there are comfort complaints.

Possible Causes

- No humidification system present
- Excessive ventilation during some periods

Recommended Actions

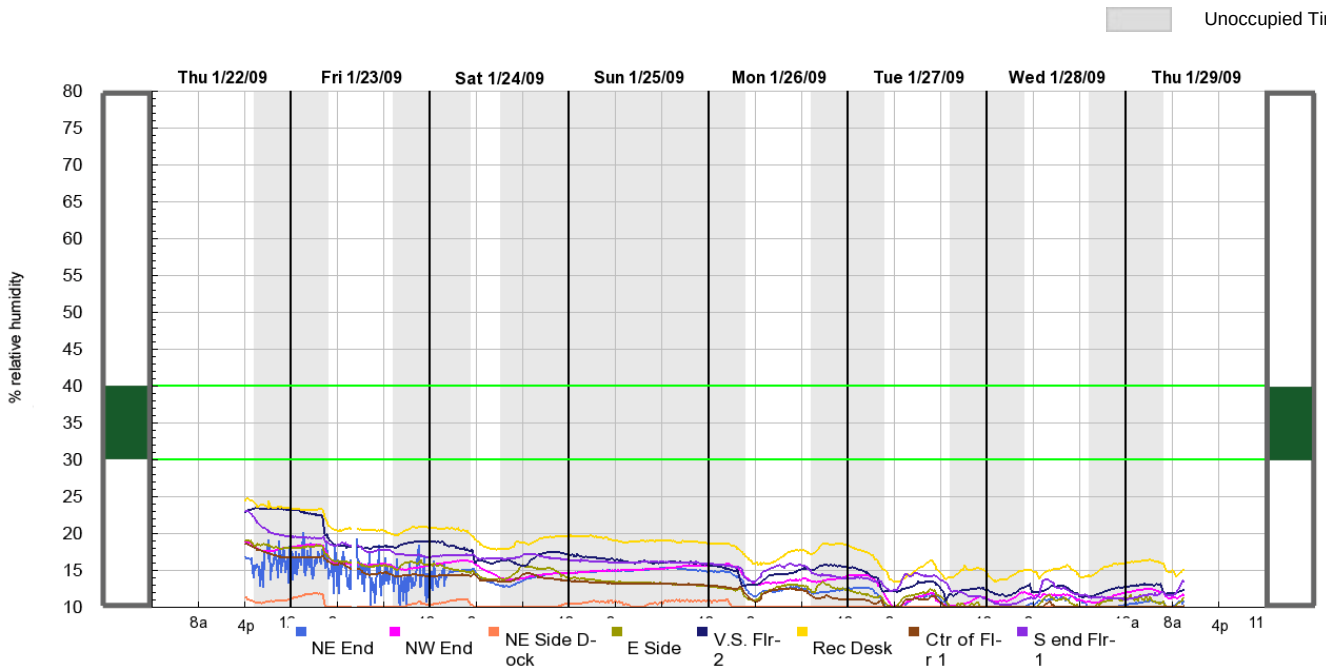
- Add humidification system
- Improve ventilation control

Monitor Statistics

Monitor	Alert Lvl	Min	Max	Avg	% ToR*
NE End		9	19	12	100%
NW End		10	19	13	100%
NE Side Dock		1	11	5	100%
E Side		10	19	13	100%
V.S. Flr 2		11	23	15	100%
Rec Desk		13	25	17	100%
Ctr of Flr 1		8	19	12	100%
S end Flr 1		11	23	15	100%

These statistics are for occupied times only.

** % Time out of Range*



Carbon Dioxide

[Sensor Range: 0 to 2000 ppm; Resolution: 10 ppm; Calibration Accuracy: ± 100 ppm]

Monitoring carbon dioxide levels is an important aspect of ensuring a comfortable, healthy and energy efficient indoor environment. At levels above 1000 ppm, air becomes stale and less comfortable to breathe. Levels well below 1000 ppm may indicate excessive outside air, resulting in higher than necessary energy costs due to the need for conditioning of this additional outside air.

Sources: ASHRAE Standard 62-2001, U.S. Green Building Council, Indoor Air Quality Association, Health Canada, BOMA, ENERGY STAR, DOE

Energy Savings Opportunities

Our findings indicate there are several ways to save money by operating your building differently:

Energy Recommendations Based on Measurements

- Verify dampers are not stuck open or leaky
- Reduce the amount of outside air ventilation
- Install demand control ventilation

Comfort & Health Recommendations

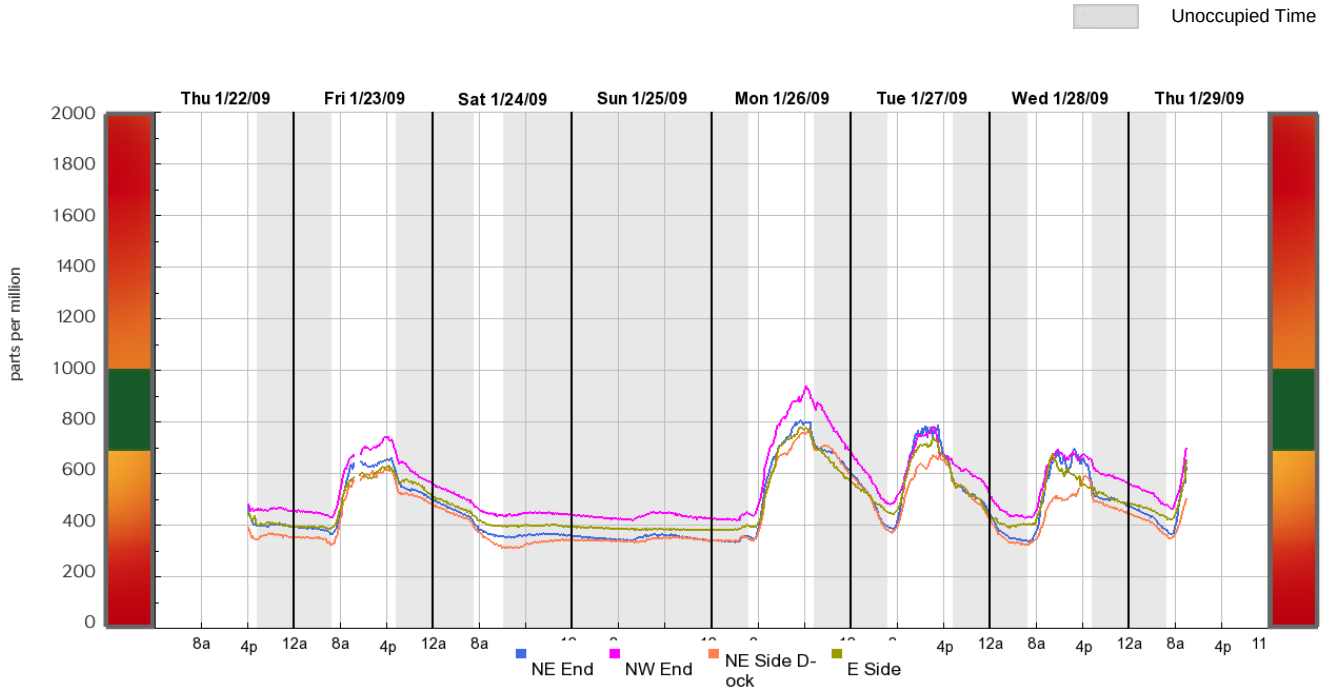
- None.

Monitor Statistics

Monitor	Alert Lvl	Min	Max	Avg	% ToR*
NE End		335	803	571	82%
NW End		427	935	628	74%
NE Side Dock		312	767	512	94%
E Side		387	775	562	85%

These statistics are for occupied times only.

** % Time out of Range*



Lighting

Lighting controls and scheduling are some of the easiest low and no cost investments in energy efficiency. Controlling the artificial lights with occupancy or daylight controls and replacing inefficient bulbs can significantly reduce your electrical energy spend. In the graph below, artificial lights are represented by the sharp on/off of the curve, natural daylight by a gradual increase, and direct sunlight by the large spikes.

Sources: BOMA, ENERGY STAR, DOE

Energy Savings Opportunities

Our findings indicate there are several ways to save money by operating your building differently:

Energy Recommendations Based on Measurements

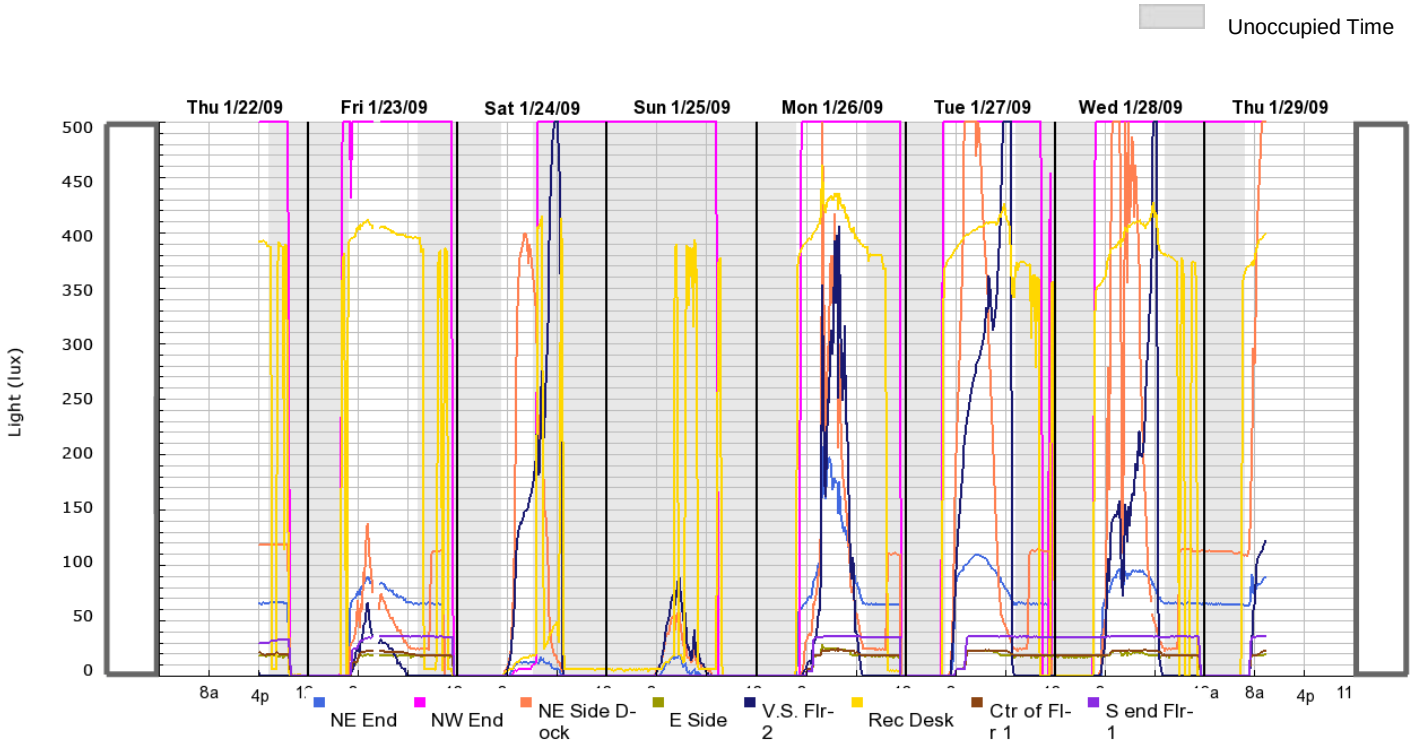
- Verify the light schedule & reduce unoccupied hours operation

Further Energy Recommendations

- Replace inefficient lamps with new high efficiency lamps
- Install occupancy sensors for individual zones
- Install daylight controls on the perimeter
- Reduce after hours use through coordination with the cleaning crews

Stated Schedule: 13.2 average occupied hours

Monitor	Alert Lvl	Measured On-Time
NE End		11. hrs
NW End		15. hrs
NE Side Dock		7.9 hrs
E Side		11. hrs
V.S. Flr 2		1.6 hrs
Rec Desk		11. hrs
Ctr of Flr 1		10. hrs
S end Flr 1		9.3 hrs



Building and Monitor Placement Information

General Information

Contact Information	
Building Name	Office Building
Contact	John Doe
Address	4321 Main Street Westminster, CO 80021
Building Information	
Building Background	Building Usage: **Office** Building Size (sq ft): **85502** # of Stories: **2** Building Status: **New Construction** Construction type: **Cement Block** LEED Cert.: **None** Heating System: **Electric Resistance** Domestic Hot Water: **Gas or Other Fuel (Low Usage)** Economizer: **Yes** Cooling System: **DX / Packaged Unit**
Additional Systems	Humidification: **No** Demand Control Ventilation: **No** Dehumidification: **No**

Monitor Placement

Building Area	Monitor Serial #
NE End	17200
NW End	17177
NE Side Dock	17171
E Side	17124
V.S. Flr 2	16239
Rec Desk	16140
Ctr of Flr 1	16081
S end Flr 1	16001

Temperature Control Schedule

	Time	Heating	Cooling	Occupied
Mon Tue Wed Thu Fri	06:30	73	73	Yes
	17:30	64	80	No
Sat	07:00	73	73	Yes
	12:00	64	80	No

Building Description

Office			
Gross Floor Area	**83238**	Weekly Operating Hours	**70**
Number of Workers on Main Shift	**375**	Number of PCs	**500**
Office Air-Conditioned	**50% or more**	Office Heated	**50% or more**

Computer Data Center			
Gross Floor Area	**2264**	Weekly Operating Hours	**168**

Parking			
Enclosed Floor Area	**0**	Non-Enclosed Floor Area (w/roof)	**0**
Open Floor Area (w/o roof)	**154950**	Weekly Hours of Access	**168**

Building Controls Information

Current Controls	
Controls Type	**Direct Digital**
Schedule Type	**Time Clock**
Air Delivery Method	**Variable Air Volume**
Air-Flow Modulation	**Inlet Guide Vane**

Building Utility Information

Electric Utility Information

	Electric Usage		Electric Demand	
Date	kWh	Cost	KW	Cost
1/26/08	210182	$14,809		$0
2/26/08	193941	$13,794		$0
3/26/08	187475	$13,734		$0
4/26/08	177309	$15,413		$0
5/26/08	196792	$16,840		$0
6/26/08	178438	$16,960		$0
7/24/08	199046	$21,001		$0
8/24/08	202000	$21,459		$0
9/24/08	184489	$19,633		$0
10/23/08	185006	$16,200		$0
11/23/08	208667	$16,276		$0
12/28/08	239039	$18,221		$0
TOTAL:	2362384	$204,341		$0

Fuel Utility Information

	Fuel Usage	
Date	Usage	Cost
1/29/08	458	$428
2/29/08	623	$622
3/29/08	450	$484
4/29/08	97	$122
5/29/08	35	$65
6/29/08	20	$50
7/28/08	23	$50
8/27/08	18	$48
9/29/08	34	$48
10/28/08	84	$90
11/26/08	217	$196
12/28/08	652	$590
TOTAL:	2711	$2,792

Roles and Responsibilities for an Effective Assessment

This assessment was conducted using a combination of on-site visual inspections, input generated through conversations with building maintenance personnel, and measurements made with the BuildingAdvice system. The overall accuracy of this assessment is enhanced by ensuring that accurate input is provided through each step.

Due to potential changes in occupancy, operations, and variable weather conditions, implementation of the proposed energy conservation measures does not guarantee a reduction in energy usage.

Key participants in this process – the building owner / maintenance personnel, the firm conducting the assessment, and AirAdvice all play a critical role in an effective assessment.

The building owner / maintenance personnel are responsible for providing:

1. Knowledgeable and accurate input as to the physical and operating parameters of the building under evaluation
2. Honest responses to questions about complaints and/or knowledge of issues
3. Commitment to provide resources necessary to address issues identified and correct problems noted in the visual inspection and monitoring

The firm conducting this assessment is responsible for:

1. Conducting a thorough interview of individuals knowledgeable about the building's performance
2. Following appropriate industry standards for inspection techniques, measurement techniques, and recommendations
3. Maintaining BuildingAdvice and other test equipment used in the assessment within calibration specifications recommended by manufacturers

AirAdvice is responsible for providing:

1. Monitoring equipment that performs within stated specifications
2. Web-based systems with a high degree of reliability and availability
3. Systems that ensure users are notified when calibration of units is necessary

Confidentiality of the data is preserved on behalf of the user of the BuildingAdvice system and their clients. AirAdvice will not disclose individual building information or test data without the client's written permission. AirAdvice may use aggregated data from the multiple buildings for reporting on industry findings and trends.