

# Hamilton County 2012 Energy Management and Utility Usage Report



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## **DEPARTMENT OF COUNTY FACILITIES**

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### **Mission Statement**

*The Hamilton County Facility Department is committed to providing strategies, equipment, guidelines and methodologies to achieve tenant comfort in all buildings managed by the Facility Department while aggressively minimizing taxpayer costs and benchmarking the energy efficiency of the facilities managed in the process.*

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Hamilton County Department of Facilities

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# **Table of Contents**

Executive Summary.....	2
Energy Star Ratings.....	11
Annual Energy Usage Spreadsheets .....	12
Aggregate Energy& Water Usage Graphs .....	14
Utility Unit Costs .....	17
Building Utility Tracking Graphics .....	18
2020 Auburn .....	19
222 Central Parkway.....	24
230 East 9th.....	29
800 Broadway .....	34
County Administration Building .....	39
Hamilton County Courthouse .....	44
Justice Center .....	49
Courthouse IT (Interruptible Tariff) Savings .....	54
Hamilton County Natural Gas Broker Agreement.....	55
Deregulated Electricity Commodity Purchasing .....	56
Electric T&D Riders Yearly Comparison .....	57

## **APPENDICES**

Glossary of Terms .....	Appendix A
Accomplishments .....	Appendix B
History .....	Appendix C

## **LIST OF FIGURES**

Figure 1: Annual Greenhouse Gas Emissions by Building (Gas & Electric) .....	7
Figure 2: Annual Greenhouse Gas Emissions Change from 2011 to 2012 .....	7
Figure 3: Energy Star Rating Trend .....	11
Figure 4: Annual Electric Usage/SF Comparison .....	14
Figure 5: Annual Gas Usage/SF Comparison .....	15
Figure 6: Annual Water Usage/SF Comparison .....	15
Figure 7: Utility Cost Contributed by Each Building (Electric, Natural Gas & Water) .....	16
Figure 8: Electric Unit Cost .....	17
Figure 9: Natural Gas Unit Cost.....	17
Figure 10: Electric Rider Yearly Average Comparison, 2010 - 2012 .....	57

## **LIST OF TABLES**

Table 1: Annual Energy Usage .....	12
Table 2: Normalized Energy Usage .....	13
Table 3: Courthouse FT / IT Natural Gas Rate Comparison.....	54
Table 4: Natural Gas Comparison, CCAO versus Duke Energy.....	55
Table 5: Electric Comparison, Electric Broker vs. DEO.....	56
Table 6: Electric Rider Yearly Average Comparison, 2010 - 2012.....	57

## **Executive Summary**

In simple terms the consumption of electric energy, natural gas and water continues to decrease due to decrease usage and the result of a proactive Energy Conservation Program since 1998.

The savings in utility costs continued to decrease due to several factors: decreases in usage, electric power contract cost is less than approved utility rates, and the bulk purchasing of natural gas is also less than approved utility rates. These savings were able to offset the continued increases in water/sewer rates.

In the area of benchmarking, two facilities received the US EPA Energy Star Awards for 2012 and several buildings were entered in into the Cincinnati 2012 Kilowatt Crackdown challenge.

Thru the continued implementation and updating of the Energy Conservation Master Plan, this planned approach has saved the Facilities over \$12 million in energy costs since implementation in 1998 and has been the cornerstones of the department's ability to reduced its budget and still achieve an acceptable service levels for the last six years.

The greenhouse gas emission is 11% lower on a building area basis than the base year of 1997 for buildings under the control of the Facilities Department.

Below is a overview of the results by the following sections: USAGE, COST SAVINGS INITIATIVES, ENERGY CONSERVATION MASTER PLAN, ENERGY EFFICIENCY BENCHMARKING, and GREENHOUSE EMISSIONS.

### **ENERGY USAGE**

- **Overall Electric** – The buildings are performing more efficiently in 2012 than 1997, meeting an increased demand while consuming less electricity. Electric usage decreased 2% from 2011 to 2012. 230 East Ninth, 800 Broadway, County Administration, 222 East Central, 2020 Auburn, Courthouse, and the Justice Center consumed 34,000,000 kWh in 2012.
- **Overall Gas** – In 2012, the buildings used 14% less gas than the year before, with a 10% decrease in heating degree days. The downtown campus consumed 103,000MCF in 2012.
- **Overall Water/Sewer** – In 2012, the water and sewer consumption decreased by 6% overall compared to 2012.

### **COST SAVINGS INITIATIVES**

- In 2012, \$192,935 was directly saved through three major cost savings initiatives which include; deregulated electricity commodity purchasing, aggregate natural gas purchasing with over 50 other counties, and a natural gas Interruptible Rate Tariff agreement with Duke Energy Ohio for the Courthouse.
  - Deregulated Electricity Commodity Purchasing: \$65,000 was saved in 2012 (\$35,000 in the major downtown accounts, \$30,000 from all other accounts) through competitive bidding of electricity supply. Electric commodity was provided by Duke Energy Retail Services (DERS) from 2010-2012 and this was the third and final year of the current agreement. In years 2010 and 2011 the rate was a 16% reduction from the standard Duke Energy Ohio rate. In 2012 the projected savings was reduced significantly due to the new Duke Energy Ohio agreement with PUCO which modified the rate structure in January 2012. In summary the County Facilities Department saved \$1,750,695 over

the three (3) year life of this agreement and these savings estimates do not include the County Engineer, DDS, and PBS which "piggybacked" on the bid process.

- Aggregate Natural Gas Purchasing: \$89,500 was saved in 2012 by purchasing deregulated gas through the Commissioners' Association of Ohio (CCAO) bulk gas purchasing contract. The County has saved over \$630,000 during the last twelve (12) years by participating in deregulated natural gas commodity purchasing program through the CCAO. The total cost of natural gas for these buildings decreased 28%.
- Interruptible Rate Tariff: \$38,400 taxpayer dollars were saved by utilizing the Duke Energy Interruptible Rate Tariff (IT) in 2012. This is accomplished by allowing the Courthouse boiler plant to provide all the steam requirements of the Justice Center; thus, meeting the minimum summer time tariff requirements. This savings is expected to continue annually, and has so far saved the taxpayers \$668,000 in gas avoidance cost since 2004.

### **IMPLEMENTATION OF THE ENERGY CONSERVATION MASTER PLAN**

- The Energy Conservation Master Plan (ECM) was implemented in conjunction with ThermalTech Engineering in 1998, then updated in 2002 through the Rebuild America Grant and continued in 2012 with energy audits and as a result has avoided and/or saved the County over \$12 million over a 14 year period. The annual savings to the taxpayer has been approximately \$838,000 as a result of implementing the master plan.
- In 2010 the process of selecting a qualified energy conservation firm was undertaken to provide Performance Contracting for County Facilities with the County successfully contracting with Ameresco, Inc to perform these duties. In September 2011, Ameresco delivered an Investment Grade Audit (IGA) for Phase 1, which included Energy Conservation Measures for the County Administration Building, 230 East 9<sup>th</sup> Street, Alms & Doepke, and Parkhaus Garage buildings. Work scheduled for completion in 2013 with the projected 2014 savings of \$402,000 which is based on the utility rates in 2012. These savings will be used to pay directly for the bonds used to finance this project.

#### County Administration Building

- Lighting retrofit
- Direct digital controls replacement
- VFD installation and motor replacement
- Boiler and water heater upgrades
- Computer room A/C heat recovery
- Water conservation measures

#### 222 Central Parkway

- Lighting retrofit
- Direct digital controls replacement
- VFD installation and motor replacement
- Domestic hot water heat pump
- Water conservation measures

#### 230 East 9th Street

- Lighting retrofit
  - Direct digital controls replacement
  - VFD installation and motor replacement
  - High Efficiency boiler and domestic water heater upgrade
  - Boiler flue and economizer upgrades
  - Cooling tower replacement
  - VAV (variable air volume) retro commission and piping upgrades
  - Condensate reclaim system from rooftop units
  - Water Conservation Measures
- On April 19, 2012 Ameresco delivered an Investment Grade Audit (IGA) for Phase 1A, which included Energy Conservation Measures for the County Courthouse, Justice Center and 800 Broadway buildings. Work has begun in 2012 as listed below with the projected 2014 dollar savings of \$574,875 which is based on the utility rates in 2011. These savings will be used to pay directly for the bonds used to finance this project.

#### Courthouse

- Lighting retrofit
- Direct digital controls upgrade & recommissioning
- Variable frequency drive (VFD) installation and motor replacement
- Water conservation measures
- High efficiency Domestic water heater upgrade
- Boiler blowdown heat recovery
- Computer Room Air Conditioning Upgrades

#### Justice Center

- Lighting retrofit
- Direct digital controls upgrade & recommissioning
- VFD installation and motor replacement
- Water conservation measures
- High efficiency chiller replacement
- Heat pump hot water heater upgrade
- Solar panel and hot water storage upgrade
- LCC Control Room VRF (Variable Refrigerant Flow) Upgrade

#### 800 Broadway

- Lighting retrofit
- Direct digital controls upgrade & recommissioning
- VFD installation and motor replacement
- Water conservation measures
- Heat exchanger replacement
- High efficiency domestic water booster pump replacement
- Phone room A/C modifications
- Data Center consolidation & efficiency upgrades

### **ENERGY EFFICIENCY BENCHMARKING AND TRACKING**

- In 2012 the Facilities Department joined the Cincinnati 2012 Kilowatt Crackdown challenge. This challenge is sponsored by BOMA, IREM, Duke Energy and US EPA. To see which building in Cincinnati are the most energy efficient, All building submitted are tracked using the Energy Star Portfolio Manager to determined whom are the best.
- For several years the Facilities Department has benchmarked the performance of its facilities to the US EPA Energy Star, allowing management to see where improvements in energy

efficiency are needed and recognition. The goal is to meet and then exceed the rating of 75. Presently twelve buildings are being input into the EPA Energy Star Portfolio Manager and tracked. Five major buildings have been tracked since late 2004 and two additional major buildings have been added since 2008. Major highlights are noted below:

- 800 Broadway qualified for and received the Energy Star Award in 2012, and maintains an Energy Star rating of 88. The facility will be eligible again in 2013.
- County Administration Building (CAB) received an Energy Star Award in 2012, and maintains an Energy Star rating of 97. The facility will be eligible again in 2013.
- 2020 Auburn (Youth Detention Center) reduced natural gas and water consumption further by 7% each when compared to 2011 usage. However the Energy Star program presently does not qualify penal institutions with Energy Star certification yet.
- 230 E. 9th Street recorded the most efficient two (2) month period on our record in November and December of 2012, signifying a more efficient future despite an overall increase in consumption due to a construction period. The facility was not able to achieved the Energy Star Award in 2012 like it did in 2011. The facility will be eligible for an Energy Star Award in 2013.
- 222 E. Central (A&D) recorded an impressive 10% reduction in electricity consumption and demand, a 27% reduction in natural gas consumption, and 16% reduction in water usage when compared to 2011 usage.
- The Justice Center's consumption of electricity held steady compared to 2011; however, the peak demand decreased by 130 kW, saving money throughout the year. The Energy Star program presently does not qualify penal institutions with Energy Star certification yet.
- The Courthouse saw a reduction in natural gas usage of 14% compared to the previous year, and water was 17% lower when compared to 2011 usage.
- As a whole, the seven major facilities decreased electric consumption by 2%, natural gas consumption by 14% and water by 6% from the previous year. Cooling requirements due to weather remained the same as 2011, while heating degree days decreased by about 10% (resulting in lower heating loads)..

**Energy Star Ratings for Major County Buildings for Last 5 Years**

<i>Buildings</i>	<i>2012</i>	<i>2011</i>	<i>2010</i>	<i>2009</i>	<i>2008</i>	<i>Notes</i>
800 Broadway	<b>88</b>	<b>86</b>	<b>88</b>	<b>89</b>	<b>84</b>	<b>Received Energy Award for 2012</b>
County Administration	<b>97</b>	<b>93</b>	<b>90</b>	60	51	<b>Received Energy Award for 2012</b>
Justice Center	<b>85</b>	<b>85</b>	<b>86</b>	93	85	Working with EPA on approving facility
YDC (2020)	<b>79</b>	<b>81</b>	<b>78</b>	66	65	Working with EPA on approving facility
230 East Ninth	71	<b>75</b>	74	73	72	
222 E. Central Parkway	57	44	48	47	41	
County Courthouse	48	41	46	69	63	Working with EPA on approving facility

All ratings in **BOLD** are above the 75 rating needed to receive the Energy Star Award. 2008 was when we submitted our first documentation to the US EPA for an Energy Award.

**GREENHOUSE EMISSIONS**

Greenhouse emissions for the individual buildings are tracked since our base year of 1997. The greenhouse gas emission rate is 11% lower on a building area basis than the base year of 1997 for buildings under control of the Facilities Department. Each building tracked reduced the emission of

greenhouse gases compared to the previous year, for a total reduction of 4,040 tons of CO<sub>2</sub>e since the base year. The greenhouse gas (GHG) emissions of the buildings due to energy use totaled 37,400 tons of CO<sub>2</sub>e. Over the past decade, the greenhouse gas emissions of the buildings have fluctuated around the emissions of the base year of 1997, as can be seen in the Annual GHG Emissions chart below. Note that the base year for 2020 Auburn is 2000.

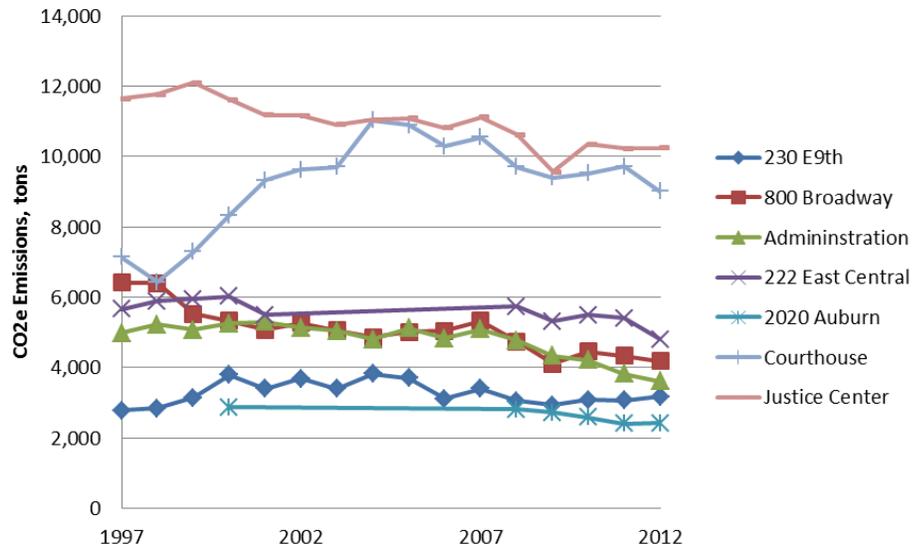


Figure 1: Annual Greenhouse Gas Emissions by Building (Gas & Electric)

The Courthouse and Justice Center make up half of the greenhouse gas emissions out of the buildings considered, as shown in Figure 2. The contribution of each building to the estimated greenhouse gas emission total has remained very similar to that of 2011.

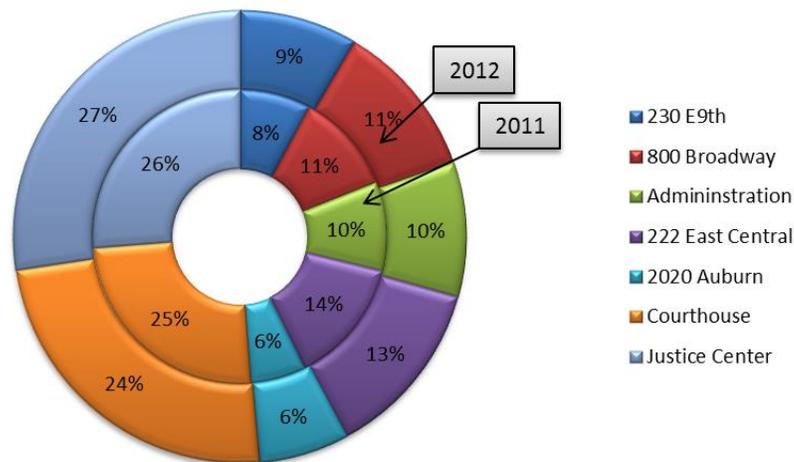


Figure 2: Annual Greenhouse Gas Emissions Change from 2011 to 2012

## Vision Statement and Objectives

The Hamilton County Facility Department envisions a continued aggressive energy savings plan by utilizing the following strategies:

- Continue the energy management consulting services which consists of the following:

- Monthly review of electric, gas and water usage
- Conducting an annual review of electrical pulse meter data for large accounts
- Entering and monitoring each building's energy usage and cost through energy usage tracking software and Energy Star Portfolio
- Document and submit data to US EPA to receive Energy Star Awards
  - All major buildings under Facility control will continue to be entered into the EPA Energy Star program. As buildings reach the 75% passing criteria they will be submitted for the award.
  - For the buildings that do not qualify in this calendar year, the cost and advantages of ECM projects for these buildings to meet the EPA Energy Star minimum guideline will be evaluated.
- Pursue shared services in the area of procurement of energy
  - Purchase deregulated natural gas and deregulated electricity through a block managed by an outside firm through the County Commissioner's Association of Ohio Service Corp. (CCAO)
    - The County is committed to the CCAO natural gas program until 2013. Before this contract expires the options available will be reviewed, and a decision will be reached on how to proceed with natural gas purchases at that time. In 2013 an extension will be presented to the BOCC for approval.
    - The County is committed to First Energy Resources Services for its deregulated electricity commodity through 2015. Facilities will rebid this contract in 2015 and evaluate the new prices versus local electric rates for best cost and lowest risk options.
    - Director of County Facilities will continue to be a member of the CCAO Executive Committee and will be directly involved in approval of the purchase of natural gas.
- In 2013 the Performance Contracting with Ameresco, Inc will be complete and includes;
  - Phase 1 Investment Grade Audit (IGA) in first group of high energy usage buildings (230, Admin, A&D and Parkhaus Garage);
    - Implementation of these projects in 2013 is further reducing the total County expenditures in electric, water and natural gas costs with the annual savings set aside to pay for the bonds financing the projects.
  - Phase 1A Investment Grade Audit (IGA) in second group of high energy usage buildings (800, Courthouse, and Justice Center);
    - Implement these projects by the end of 2013 and we will further reduce the total County expenditures in electric, water and natural gas costs with the annual savings set aside to pay for the bonds financing the projects.
  - Conduct an Investment Grade Audit (IGA) in several of the remaining buildings in 2013 for Phase 2
  - Update the Energy Conservation Master Plan (ECM) in 2014 as a result of the IGA Projects approved and implemented

- Eliminate inefficient use of energy systems wherever possible by:
  - Purchasing efficient major mechanical equipment (boilers, chillers, cooling towers) per County Life Cycle Cost Analysis Resolution
  - Duke Energy has implemented a Smart \$aver energy efficiency program in the last several years, providing rebates for energy efficient equipment. The County will continue to take advantage of these rebates while they are available.
  - Involving building managers in tracking and saving energy use and cost in County owned buildings to ensure that the required reduction in usage per the agreement with Ameresco occurs over the next 12 years.
    - Continuous monitoring of electric, gas and water usage in the buildings will continue to occur monthly in order to ensure anomalies do not occur.
    - Pursuing energy efficient building operation, including scheduling night and weekend setback in all buildings where tenants are not using the spaces, practicing demand curtailment, turning off non-essential equipment when not in use, setting outdoor air dampers to minimum positions, and reducing lighting and other electrical loads as agreed in the IGA with Ameresco.
  - Secure a full-time Energy Manager position to manage energy usage/contracts
  
- Stay on the leading edge of energy saving techniques and implementable solutions for public governments
  - Director continues to maintain his Building Operations Certification (BOC)
  - Attending annual energy conferences and energy saving workshops
    - Plans for attendance of the 2013 Annual Ohio Energy Conference in Columbus, OH as a means of improving our energy savings strategies, understandings and techniques are in effect.
  - Complete the certification of County buildings to the USGBC LEED-EB:O&M Silver Level standard
    - In 2012 the process for achieving LEED-EBOM for 800 Broadway was initiated with submission planned in late 2013.

## **2012 Summary of Results and Energy Outlook**

The usage per square foot graphs included in this year's report show a very consistent downward trend in the last several years for each of the buildings. The average electric, natural gas, and water consumption for all of the buildings has shown improvement in the last several years.

- **Overall Electric** – The buildings are performing more efficiently in 2012 than 1997, meeting an increased demand while consuming less electricity. Electric usage decreased 2% from 2011 to 2012. 230 East Ninth, 800 Broadway, Administration, 222 East Central, 2020 Auburn, the Courthouse, and the Justice Center consumed 34,000,000 kWh in 2012. The utility cost remained the same as the previous year (1% change).
- **Overall Gas** – In 2012, the buildings used 14% less gas than the year before, with a 10% decrease in heating degree days. The downtown campus consumed 103,000 MCF in 2012. The total cost of natural gas for these buildings decreased 28%.
- **Overall Water/Sewer** – In 2012, the water and sewer consumption decreased by 6% overall compared to 2012.

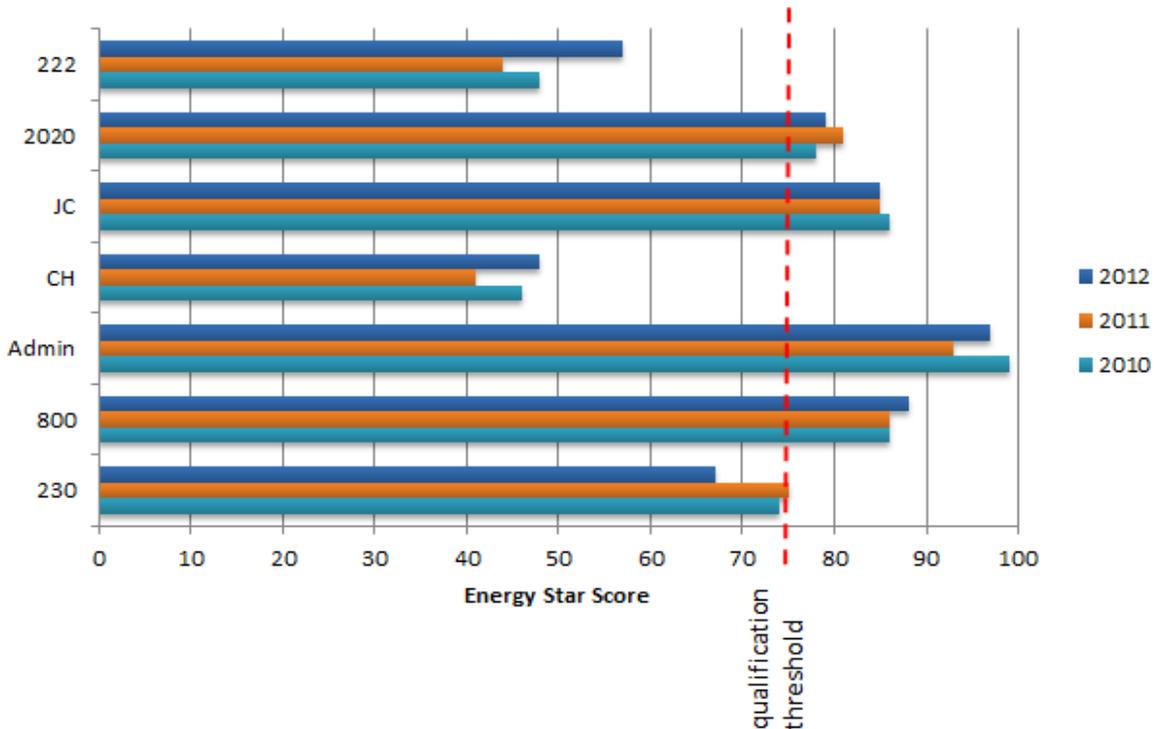
The County faces many energy challenges at the present time. Although Hamilton County Facilities has been proactive in strategically placing the County in a position to benefit from deregulation, lower utility tariffs, enhanced building schedules, night setback, equipment replacements, lighting replacements and energy usage, there still remains more to be done.

- **Electric Power** - The next time to go out for bid for deregulated electricity will be in mid-2015. The County will then compare the cost of the proposed 2015-2018 rate structure from Duke Energy Ohio versus the bids received from firms providing deregulated electricity for 2015 and beyond.
- **Electric T&D** - The cost for electric transportation and distribution is expected to continue to increase, but is not known until their rate plans are submitted and approved by the PUCO. This appears to be happening on an annual basis.
- **Nature Gas Procurement** - In the past year, NYMEX gas futures have continued to record their lowest prices for years. The County has been buying forward at these ten year low prices through the CCAOSC, reducing the cost of natural gas consumption compared to previous years.
- **Water/Sewer Usage** - Facilities continues to be challenged to reduce water usage to offset continued increase in both water and sewer rates. In time the reduction in usage from the Performance Contracting will no longer offset the increased rates and savings will no longer occur.

## Energy Star Ratings

Each year for the past several years, the performance of the buildings has been tracked through the Energy Star program. A few buildings have earned the Energy Star award, a national mark of excellence in energy performance, demonstrating that the facilities are energy efficient. In order to become an Energy Star qualified facility, the building must score in the top 25 percent of like facilities based on the EPA's National Energy Performance Rating System.

The graph below illustrates the Energy Star ratings as of December of the last three years.



**Figure 3: Energy Star Rating Trend**

800 Broadway has received the Energy Star Award annually since 2008 with scores ranging from 84 to 89.

The County Administration Building has received the Energy Star Award for a second straight year in 2012 with scores of 93 and 97. In 2010 a new electric service with less than 12 months of continuous data prevented this building from qualifying.

It should be noted that the Courthouse has reduced scores because it provides all the steam to the Justice Center all year long. Energy Star rejected a variance request to manually adjust the usage for natural gas or to model these buildings as one campus. We will continue to research ways to get the Courthouse qualified.

The Energy Star rating of 230 East 9th and Alms & Doepke are currently below the threshold levels. 230 E 9th Street received the Energy Star Award in 2011 and we expect a 2013 or 2014 qualification.

The Justice Center and 2020 Auburn are currently not eligible due to being penal institutions.

# Annual Energy Usage Spreadsheets

The graph below represents actual data collected over the last three years for the buildings listed. This data is tabulated from Duke Energy and Broker bills collected by Hamilton County Facilities and ThermalTech Engineering.

**Table 1: Annual Energy Usage**

2010												
	Electric		Gas		Water & Sewer		Electric	Gas	Water	All	All	
	KWH	Cost	MCF	Cost	CCF	Cost	KWH/SF	MCF/SF	CCF/SF	Usage/SF	Cost/SF	
230 E9th	2,863,713	\$ 281,836	7,990	\$ 63,903	5,204	\$ 28,306	15	0.41	0.0266	7.51	1.76	Avg Elec Cost/KWH
800 Broadway	4,361,863	\$ 378,857	8,094	\$ 66,073	7,264	\$ 58,713	17	0.32	0.0291	8.89	1.78	\$ 0.0872
Administration	4,430,600	\$ 396,183	3,003	\$ 27,071	10,425	\$ 60,563	24	0.16	0.0560	11.99	2.28	Avg Gas Cost/MCF
222 East Central	5,594,460	\$ 477,080	6,813	\$ 56,779	5,019	\$ 33,298	20	0.25	0.0183	10.30	1.94	\$ 7.08
2020 Auburn	2,441,905	\$ 205,494	5,968	\$ 48,154	6,636	\$ 43,764	14	0.35	0.0390	7.36	1.49	Avg Water Cost/CCF
Courthouse	4,961,811	\$ 466,712	83,154	\$ 548,944	26,656	\$ 142,095	11	1.89	0.0606	6.58	2.31	\$ 5.59
Justice Center	11,303,267	\$ 927,573	1,429	\$ 13,125	47,636	\$ 242,021	22	0.03	0.0907	10.78	1.79	Total Utility Cost
	<b>35,957,619</b>	<b>\$ 3,133,736</b>	<b>116,451</b>	<b>\$ 824,048</b>	<b>108,840</b>	<b>\$ 608,760</b>	<b>18</b>	<b>0.49</b>	<b>0.0458</b>	<b>9.06</b>	<b>\$ 1.91</b>	<b>\$ 4,566,544</b>
2011												
	Electric		Gas		Water & Sewer		Electric	Gas	Water	All	All	
	KWH	Cost	MCF	Cost	CCF	Cost	KWH/SF	MCF/SF	CCF/SF	Usage/SF	Cost/SF	
230 E9th	2,851,511	\$ 244,520	7,839	\$ 59,693	6,109	\$ 35,434	15	0.40	0.0312	7.47	1.55	Avg Elec Cost/KWH
800 Broadway	4,247,108	\$ 332,080	7,909	\$ 61,058	8,246	\$ 65,077	17	0.32	0.0330	8.65	1.57	\$ 0.0791
Administration	4,000,303	\$ 325,002	3,066	\$ 25,374	9,928	\$ 62,102	22	0.16	0.0534	10.84	1.88	Avg Gas Cost/MCF
222 East Central	5,441,731	\$ 429,748	7,578	\$ 63,630	4,443	\$ 32,572	20	0.28	0.0162	10.03	1.79	\$ 6.44
2020 Auburn	2,314,128	\$ 181,119	4,919	\$ 37,825	6,272	\$ 47,036	14	0.29	0.0369	6.95	1.29	Avg Water Cost/CCF
Courthouse	4,989,082	\$ 408,941	85,988	\$ 504,457	26,540	\$ 147,649	11	1.95	0.0603	6.65	2.08	\$ 5.86
Justice Center	11,174,656	\$ 847,227	1,338	\$ 12,262	48,137	\$ 252,882	21	0.03	0.0917	10.66	1.64	Total Utility Cost
	<b>35,018,519</b>	<b>\$ 2,768,637</b>	<b>118,637</b>	<b>\$ 764,299</b>	<b>109,675</b>	<b>\$ 642,752</b>	<b>17</b>	<b>0.49</b>	<b>0.0461</b>	<b>8.75</b>	<b>\$ 1.69</b>	<b>\$ 4,175,688</b>
2012												
	Electric		Gas		Water & Sewer		Electric	Gas	Water	All	All	
	KWH	Cost	MCF	Cost	CCF	Cost	KWH/SF	MCF/SF	CCF/SF	Usage/SF	Cost/SF	
230 E9th	2,954,080	\$ 283,222	8,146	\$ 46,892	7,306	\$ 44,550	15	0.42	0.0373	7.74	1.68	Avg Elec Cost/KWH
800 Broadway	4,211,074	\$ 349,065	5,988	\$ 39,057	6,922	\$ 65,194	17	0.24	0.0277	8.54	1.55	\$ 0.0813
Administration	3,771,632	\$ 330,969	3,040	\$ 22,620	9,613	\$ 64,491	20	0.16	0.0517	10.22	1.90	Avg Gas Cost/MCF
222 East Central	4,911,254	\$ 407,517	5,535	\$ 36,453	3,743	\$ 31,116	18	0.20	0.0136	9.03	1.61	\$ 5.34
2020 Auburn	2,363,537	\$ 183,000	4,550	\$ 27,164	5,804	\$ 45,050	14	0.27	0.0341	7.09	1.24	Avg Water Cost/CCF
Courthouse	5,028,498	\$ 447,700	73,589	\$ 363,918	22,051	\$ 132,158	11	1.67	0.0501	6.55	1.84	\$ 6.32
Justice Center	11,154,453	\$ 795,845	1,739	\$ 11,947	48,095	\$ 271,444	21	0.03	0.0916	10.64	1.54	Total Utility Cost
	<b>34,394,528</b>	<b>\$ 2,797,316</b>	<b>102,587</b>	<b>\$ 548,051</b>	<b>103,534</b>	<b>\$ 654,002</b>	<b>17</b>	<b>0.43</b>	<b>0.0437</b>	<b>8.54</b>	<b>\$ 1.62</b>	<b>\$ 3,999,369</b>

The final tabulations from 2011 show that the electric consumption of these seven buildings decreased by 2% compared to the previous year. The cost of electricity increased slightly, by 1%. Natural gas consumption decreased by 14%, and water consumption decreased by 6%. The cooling degree days and heating degree days indicated milder weather on average in 2012 compared to 2011. The following Normalized Master Spreadsheet presents the utility consumption and cost in an "All Things Being Equal" manner.

The following spreadsheet is normalized energy utility tracking data. In this spreadsheet the effects of weather, the timing of meter reading, and changes in utility cost are factored out of the utility consumption and cost to present the data in an easily comparable manner. A comparison between the normalized energy usages in 2012 to 1997 shows an electric consumption reduction of 4,800,000 kWh and a decrease in the amount of natural gas consumed of 1,800MCF. At the average utility rates in 2012, this translates into a savings of \$491,000 in 2011 when compared to the base year.

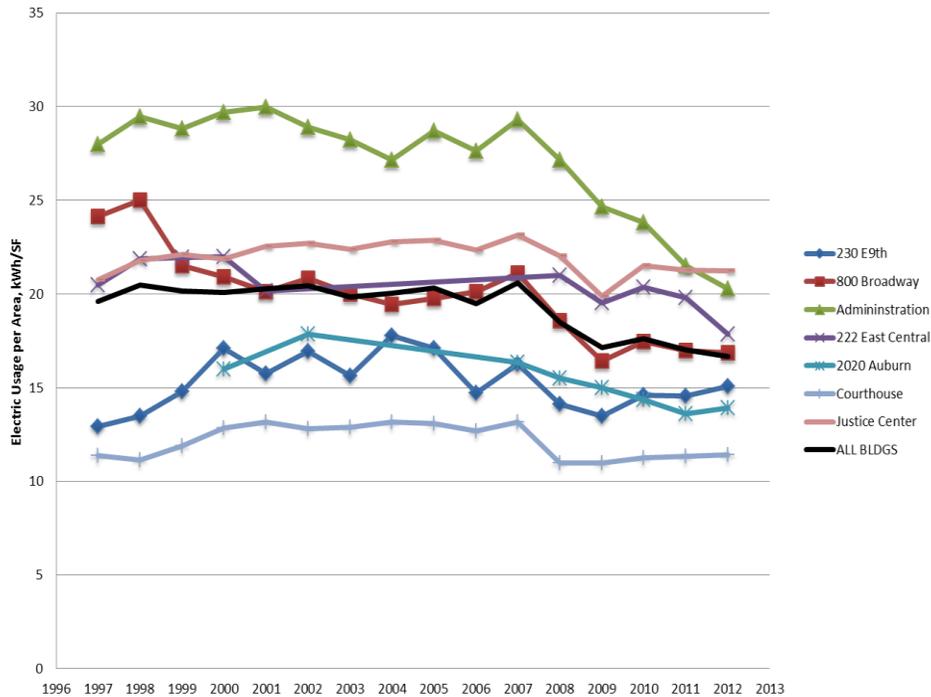
The base year for the comparisons of the buildings is 1997, with the exception of 2020 Auburn. The data collection for this building began later. The base year for the energy consumed by 2020 Auburn is 2000.

**Table 2: Normalized Energy Usage**

1997 (BASE YEAR)									
	Electric		Gas		Base Elec	Base Gas	Bldg	5%	see note below for % explanation
	KWH	Cost	MCF	Cost	Cost	Cost	Cost/SF		
230 E9th	2,534,892	\$ 189,390	7795	\$ 44,303	\$ 0.0747	\$ 5.68	\$ 1.19	842	cooling degree days
800 Broadway	6,035,141	\$ 320,982	15406	\$ 90,259	\$ 0.0532	\$ 5.86	\$ 1.64	5,330	heating degree days
Administration	5,202,636	\$ 303,122	4182	\$ 25,061	\$ 0.0583	\$ 5.99	\$ 1.76	\$ 0.0558	avg electric cost /kwh
222 East Central	5,633,812	\$ 302,832	9042	\$ 53,826	\$ 0.0538	\$ 5.95	\$ 1.30	\$ 5.86	avg gas cost /mcf
2020 Auburn	-	\$ -	0	\$ -	\$ -	\$ -	\$ -		
Courthouse	5,006,743	\$ 335,393	42844	\$ 252,436	\$ 0.0670	\$ 5.89	\$ 1.34		
Justice Center	10,897,246	\$ 519,945	28928	\$ 168,121	\$ 0.0477	\$ 5.81	\$ 1.31		
	35,310,470	\$ 1,971,665	108,198	\$ 634,006				YEARLY COST	\$ 2,605,671
2010									
	Electric		Gas		Actual	Actual	Bldg		
	KWH	Cost	MCF	Cost	Elec Cost	Gas Cost	Cost/SF		
230 E9th	2,778,690	\$ 207,605	7,567	\$ 43,008	\$ 0.0984	\$ 8.00	\$ 1.28	1418	cooling degree days
800 Broadway	4,232,361	\$ 225,100	7,665	\$ 44,906	\$ 0.0869	\$ 8.16	\$ 1.08	5032	heating degree days
Administration	4,299,057	\$ 250,477	2,844	\$ 17,042	\$ 0.0894	\$ 9.01	\$ 1.44	\$ 0.0872	avg electric cost /kwh
222 East Central	5,428,363	\$ 291,789	6,453	\$ 38,411	\$ 0.0853	\$ 8.33	\$ 1.20	\$ 7.08	avg gas cost /mcf
2020 Auburn	2,369,406	\$ 175,628	5,652	\$ 50,552	\$ 0.0842	\$ 8.07	\$ 1.33		
Courthouse	4,814,496	\$ 322,515	78,750	\$ 463,993	\$ 0.0941	\$ 6.60	\$ 1.79		
Justice Center	10,967,676	\$ 523,306	1,353	\$ 7,863	\$ 0.0821	\$ 9.19	\$ 1.01	YEARLY COST	\$ 2,662,195
	34,890,048	\$ 1,996,419	110,284	\$ 665,776					
2011									
	Electric		Gas		Actual	Actual	Bldg		
	KWH	Cost	MCF	Cost	Elec Cost	Gas Cost	Cost/SF		
230 E9th	2,754,227	\$ 205,777	7,388	\$ 41,992	\$ 0.0858	\$ 7.61	\$ 1.26	1234	cooling degree days
800 Broadway	4,102,211	\$ 218,178	7,454	\$ 43,670	\$ 0.0782	\$ 7.72	\$ 1.05	4632	heating degree days
Administration	3,863,826	\$ 225,119	2,889	\$ 17,313	\$ 0.0812	\$ 8.28	\$ 1.30	\$ 0.0791	avg electric cost /kwh
222 East Central	5,256,077	\$ 282,528	7,142	\$ 42,514	\$ 0.0790	\$ 8.40	\$ 1.18	\$ 6.44	avg gas cost /mcf
2020 Auburn	2,235,178	\$ 165,678	4,636	\$ 41,462	\$ 0.0783	\$ 7.69	\$ 1.22		
Courthouse	4,818,871	\$ 322,808	81,040	\$ 477,487	\$ 0.0820	\$ 5.87	\$ 1.82		
Justice Center	10,793,414	\$ 514,991	1,261	\$ 7,330	\$ 0.0758	\$ 9.16	\$ 0.99	YEARLY COST	\$ 2,606,847
	33,823,803	\$ 1,935,079	111,811	\$ 671,768					
2012									
	Electric		Gas		Actual	Actual	Bldg		
	KWH	Cost	MCF	Cost	Elec Cost	Gas Cost	Cost/SF		
230 E9th	2,851,889	\$ 213,074	7,625	\$ 43,340	\$ 0.0959	\$ 5.76	\$ 1.31	1217	cooling degree days
800 Broadway	4,065,399	\$ 216,220	5,605	\$ 32,840	\$ 0.0829	\$ 6.52	\$ 1.00	4169	heating degree days
Administration	3,641,159	\$ 212,146	2,846	\$ 17,052	\$ 0.0878	\$ 7.44	\$ 1.23	\$ 0.0813	avg electric cost /kwh
222 East Central	4,741,358	\$ 254,861	5,181	\$ 30,842	\$ 0.0830	\$ 6.59	\$ 1.04	\$ 5.34	avg gas cost /mcf
2020 Auburn	2,281,775	\$ 169,132	4,259	\$ 38,095	\$ 0.0774	\$ 5.97	\$ 1.22		
Courthouse	4,854,546	\$ 325,198	68,885	\$ 405,866	\$ 0.0890	\$ 4.95	\$ 1.66		
Justice Center	10,768,584	\$ 513,806	1,628	\$ 9,460	\$ 0.0713	\$ 6.87	\$ 1.00	YEARLY COST	\$ 2,481,933
	33,204,709	\$ 1,904,436	96,030	\$ 577,496					

## Aggregate Energy& Water Usage Graphs

The following graphs demonstrate building usage per square foot and cost per square foot basis. These trends are monitored to ensure that building usage does not rise disproportionately to occupancy and weather demands.



**Figure 4: Annual Electric Usage/SF Comparison**

In reviewing this chart, one can see that the electric consumption per unit area has decreased since the previous year overall. This data indicates the County buildings are continuing to use electricity at thrifty rate and that attention has been paid to maintain tenant comfort in an efficient manner. 222 East Central and the County Administration Building show the most improvement in the past year. Several buildings slightly increased consumption of electricity. The average electric consumption per unit area for all of these buildings remains steadily improving, as indicated by the thick black line.

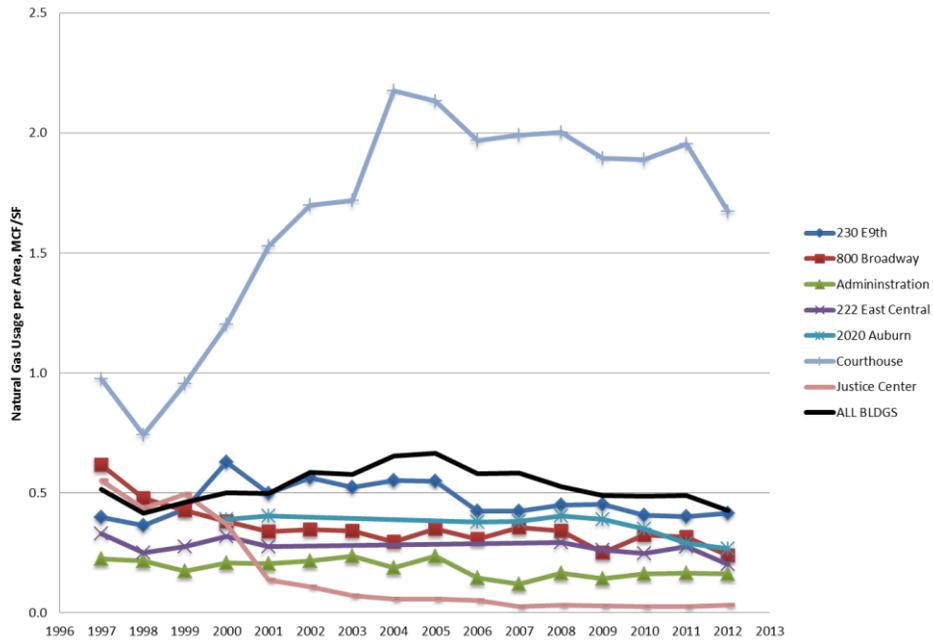


Figure 5: Annual Gas Usage/SF Comparison

The natural gas usage chart indicates that usage has slightly decreased in the last year, led by the Courthouse. The buildings have operated in a steady and efficient manner overall. This chart also indicates when the Courthouse started providing natural gas to the Justice Center (note the large increase in Courthouse). This allows the County to purchase natural gas from Duke Energy on the cheaper IT (interruptible gas tariff) rate for both buildings (see Courthouse IT savings later in report).

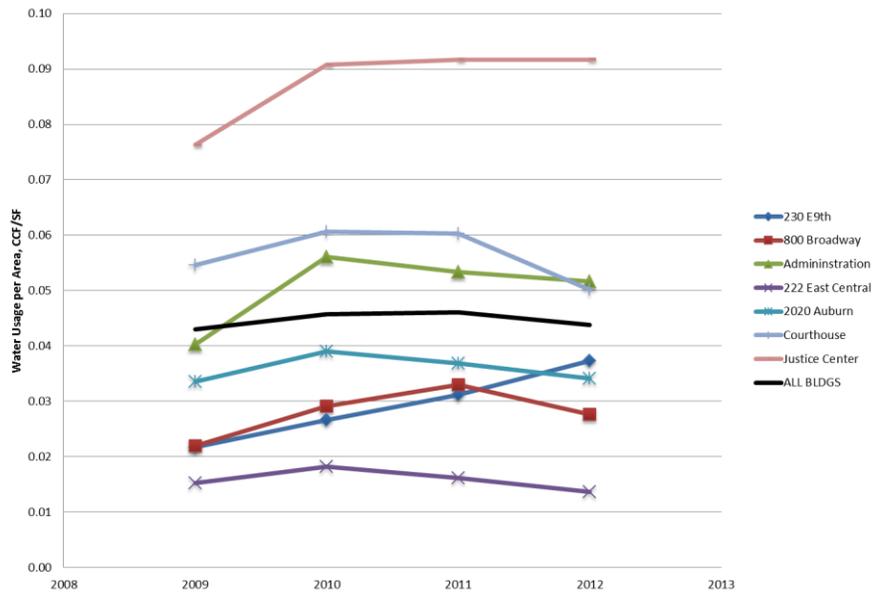
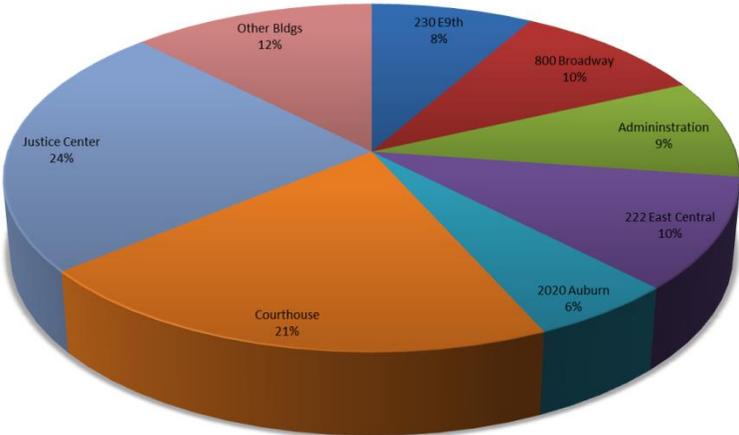


Figure 6: Annual Water Usage/SF Comparison

As shown in the annual water and sewer consumption per square foot chart above, the usage per unit area has decreased slightly in 2012 compared to 2011. All buildings have decreased consumption, except for 230 East 9th. The increase in consumption at this facility is largely due to the construction period during the implementation of several energy efficiency projects.



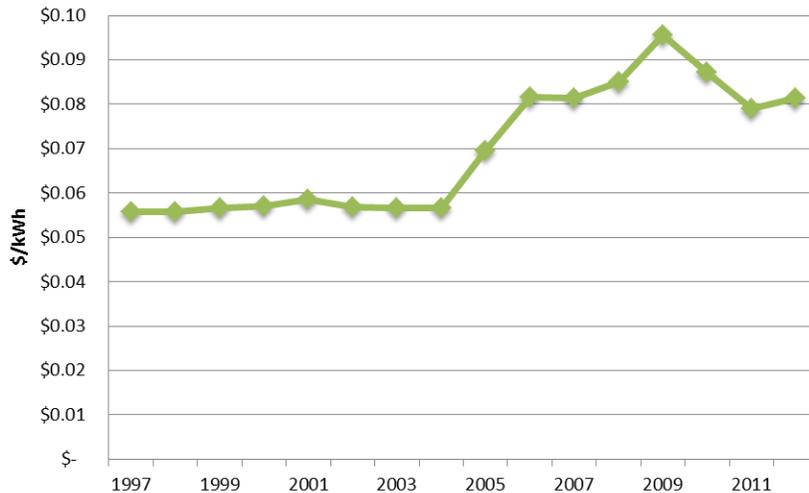
**Figure 7: Utility Cost Contributed by Each Building (Electric, Natural Gas & Water)**

The portion of utility cost contributed by buildings other than those detailed within this report is only 12%.

Other Buildings include: 250 William Howard Taft, Public Works Garages, Sheriff Parking Lot, Patrol Headquarters, Memorial Hall, Communication Center, Coroner's Office, Records Center, Target Range, and Road Maintenance.

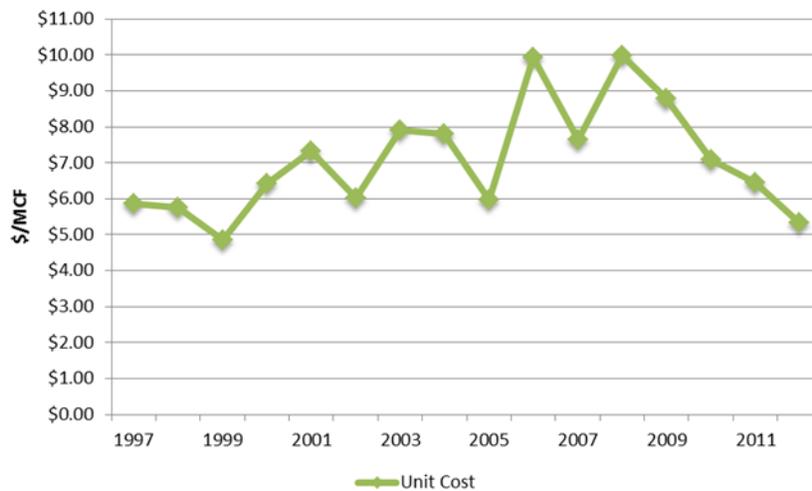
## Utility Unit Costs

In 2012, the electric and natural gas cost for the buildings decreased. The electric cost per kWh increased by 3% compared to 2011, from \$0.0791 to \$0.0813 per kWh. The average cost of natural gas for the year dropped 17% from the previous year, decreasing from \$6.44 to \$5.34. The graphs below illustrate the upward trend in electricity costs since 2004, and natural gas costs since tracking of the buildings began.



**Figure 8: Electric Unit Cost**

The unit cost of electric energy remains much lower than 2009, due to negotiated rates.



**Figure 9: Natural Gas Unit Cost**

The cost of natural gas has fluctuated wildly in the past decade, with 2012 costs the lowest they have been in the last several years. Natural gas is now nearly 50% less than in 2008.

Water and sewer rates increased significantly last year (8%), now totaling \$6.32/cf.

## **Building Utility Tracking Graphics**

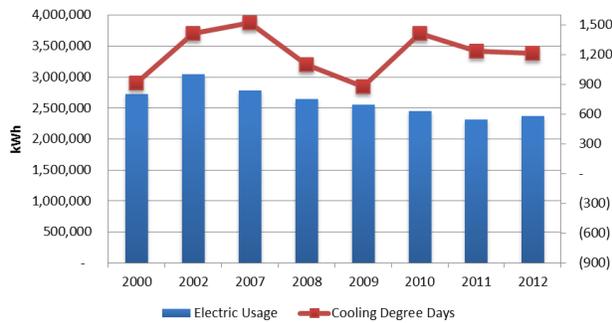
The following tables and figures are visualization and tracking tools used to study, verify and predict usage in the metered buildings on an annual basis. Following each building's data charts is a summary of what observations from these charts and graphs of how well the County has been managing its energy usage.

(beginning on next page)

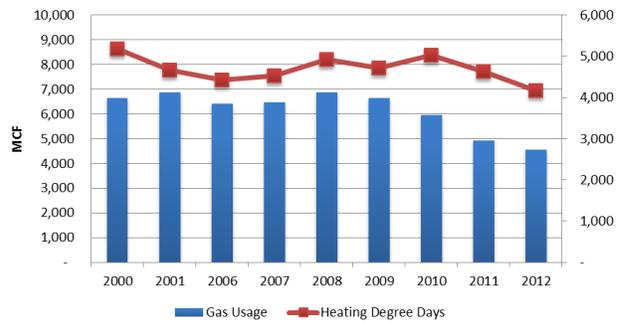
## 2020 Auburn

2020 - Juvenile Youth Center				ARCHIBUS/FM Bldg Data							
				Bldg Code:	2020						
				Bldg Name:	Juvenile Youth Center						
				Address:	2020 Auburn Ave						
				City:	CINCINNATI						
				State:	OH						
				Postal Code:	45219						
				Site Code:	OTHER LOCATIONS						
				Agency:	Juvenile Court						
				Use:	Jail						
				Const Type:	ConcreteBrick						
Date Built:	1995										
Ext Gross Area:	171,449.94 sf										
Int Gross Area:	164,410.41 sf										
Rentable Area:	158,431.96 sf										
Estimated Area:	0.00 sf										
Total Roof Area:	40,319.30 sf										
Leased/Owned:	Owned										
Floor Count:	6										
Sprinklered? :	Yes										
Property :	088-0007-0020-90										
FI Code	Int Gross	Ext Gross	Vert Pen	Service	Rentable	Usable	Room Area				
01	41,361 sf	42,828 sf	1,201 sf	12,926 sf	40,160 sf	27,234 sf	41,360 sf				
02	29,514 sf	30,891 sf	1,323 sf	4,940 sf	28,191 sf	23,250 sf	29,514 sf				
03	29,611 sf	30,891 sf	1,132 sf	4,678 sf	28,480 sf	23,802 sf	29,611 sf				
04	19,237 sf	20,422 sf	1,132 sf	3,615 sf	18,105 sf	14,489 sf	19,237 sf				
0B	3,179 sf	3,535 sf	0 sf	3,179 sf	3,179 sf	0 sf	3,179 sf				
0R	0 sf	0 sf	0 sf	0 sf	0 sf	0 sf	0 sf				
LL	41,508 sf	42,884 sf	1,190 sf	19,207 sf	40,318 sf	21,111 sf	41,508 sf				

2020 Auburn Annual Electric Usage



2020 Auburn Annual Gas Usage



The 2020 Auburn Building has continued to improve the annual energy consumption. Electricity usage slightly by 2%, but natural gas and water consumption dropped 7% relative to 2011.

High-efficiency condensing boilers have been installed since 2010, and the impact of the improved heating system efficiency is clearly visible. In addition, water conservation efforts are visible in the monthly billings as well.

It is also noted that only 50% of the building is being used to house Juveniles, when these areas are used in the future the usage will increase.

**2020-Historical Monthly Electric and Gas Data**

The following data is a representation of electrical and gas usage by month for the past three years. The green cells show the minimum usage for the month. The electric consumption increased slightly, but still remains below that of 2010. Natural gas consumption decreased once again, reduced by a quarter in the last two years. The positive effect of the new boilers at the facility on the natural gas consumption is evident over the past two years. The use of water has also decreased consistently throughout the year.

**2020 Auburn Electric Data**

	Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	TOTAL
2010	kWh	177,128	177,763	165,873	208,430	214,320	240,032	271,039	236,120	215,024	175,628	175,991	184,557	2,441,905
	kWa	346	344	412	458	437	490	480	482	452	410	406	311	490
	kWb	427	427	427	458	439	490	480	482	455	417	417	417	490
	Cost	\$ 15,150	\$ 15,191	\$ 14,423	\$ 17,471	\$ 17,700	\$ 19,871	\$ 21,864	\$ 19,580	\$ 18,056	\$ 15,134	\$ 15,158	\$ 15,896	\$ 205,494
2011	kWh	158,224	156,707	156,612	184,979	202,870	226,286	276,637	229,511	206,632	180,093	165,314	170,263	2,314,128
	kWa	311	304	456	427	467	467	488	482	458	420	416	300	488
	kWb	417	417	458	432	467	467	488	482	458	423	420	415	488
	Cost	\$ 12,576	\$ 12,478	\$ 12,918	\$ 14,635	\$ 16,006	\$ 17,410	\$ 20,808	\$ 17,704	\$ 16,019	\$ 14,094	\$ 13,119	\$ 13,352	\$ 181,119
2012	kWh	154,815	154,523	175,524	183,143	225,790	230,482	266,283	224,642	215,052	184,335	164,666	184,282	2,363,537
	kWa	306	298	485	403	466	466	490	434	447	418	370	326	490
	kWb	415	415	488	415	466	466	490	434	447	419	416	416	490
	Cost	\$ 13,073	\$ 13,057	\$ 15,087	\$ 14,293	\$ 16,911	\$ 17,113	\$ 19,024	\$ 16,383	\$ 16,110	\$ 14,380	\$ 13,493	\$ 14,075	\$ 183,000

**2020 Auburn Gas Data**

	Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	TOTAL
2010	CCF	11,479	9,569	5,263	3,986	3,840	2,369	1,725	1,490	1,846	2,676	5,150	10,289	59,682
	Cost	\$ 9,585	\$ 7,928	\$ 4,103	\$ 3,065	\$ 2,995	\$ 1,857	\$ 1,463	\$ 1,306	\$ 1,512	\$ 2,140	\$ 4,063	\$ 8,137	\$ 48,154
2011	CCF	9,256	7,118	4,916	3,445	2,515	1,875	1,452	1,463	2,256	3,175	4,649	7,067	49,187
	Cost	\$ 7,347	\$ 5,578	\$ 3,588	\$ 2,661	\$ 2,039	\$ 1,601	\$ 1,269	\$ 1,263	\$ 1,811	\$ 2,359	\$ 3,403	\$ 4,906	\$ 37,825
2012	CCF	7,121	6,443	3,353	3,508	2,198	1,787	1,547	1,665	2,175	3,256	5,623	6,826	45,502
	Cost	\$ 4,374	\$ 4,009	\$ 1,823	\$ 1,716	\$ 1,084	\$ 1,053	\$ 965	\$ 1,027	\$ 1,280	\$ 1,950	\$ 3,394	\$ 4,490	\$ 27,164

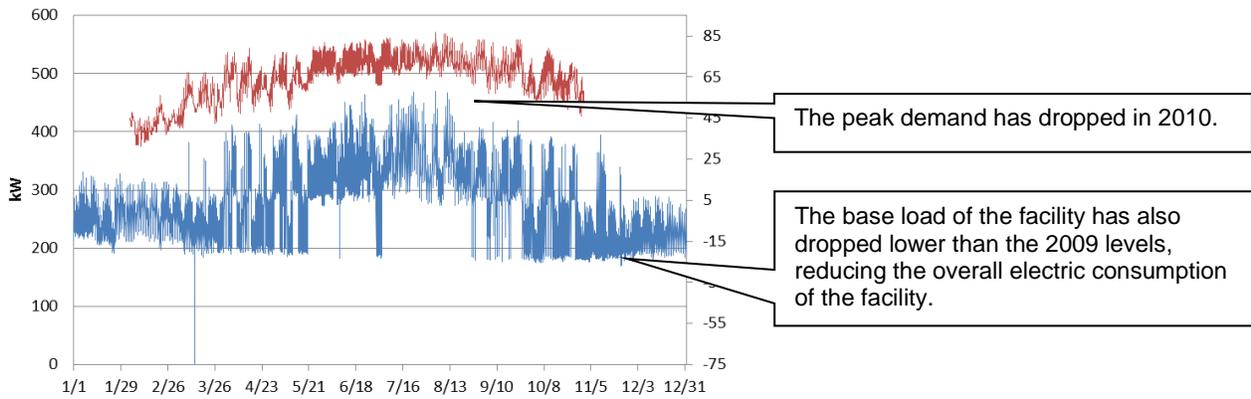
**2020 Auburn Water Data**

	Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	TOTAL
2010	CCF	354	342	365	496	445	756	701	767	991	668	345	406	6,636
	Cost	\$ 2,486	\$ 2,557	\$ 2,951	\$ 3,280	\$ 2,999	\$ 4,737	\$ 4,368	\$ 4,638	\$ 5,886	\$ 4,226	\$ 2,566	\$ 3,071	\$ 43,764
2011	CCF	459	209	449	364	391	701	503	798	1,031	438	520	409	6,272
	Cost	\$ 3,242	\$ 2,000	\$ 3,375	\$ 2,756	\$ 2,900	\$ 4,368	\$ 3,480	\$ 5,082	\$ 6,407	\$ 3,161	\$ 7,102	\$ 3,163	\$ 47,036
2012	CCF	272	333	295	317	360	508	880	723	887	475	392	365	5,804
	Cost	\$ 2,378	\$ 2,978	\$ 2,664	\$ 2,723	\$ 3,013	\$ 4,026	\$ 5,942	\$ 5,075	\$ 6,166	\$ 3,670	\$ 3,187	\$ 3,228	\$ 45,050

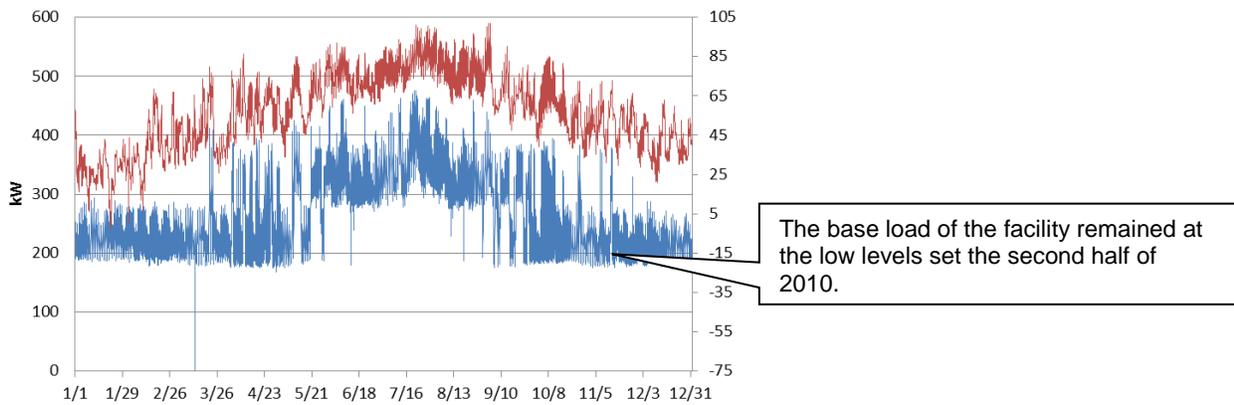
Green cells = minimum of month for past 3 years

2020-Three Year Electrical Review

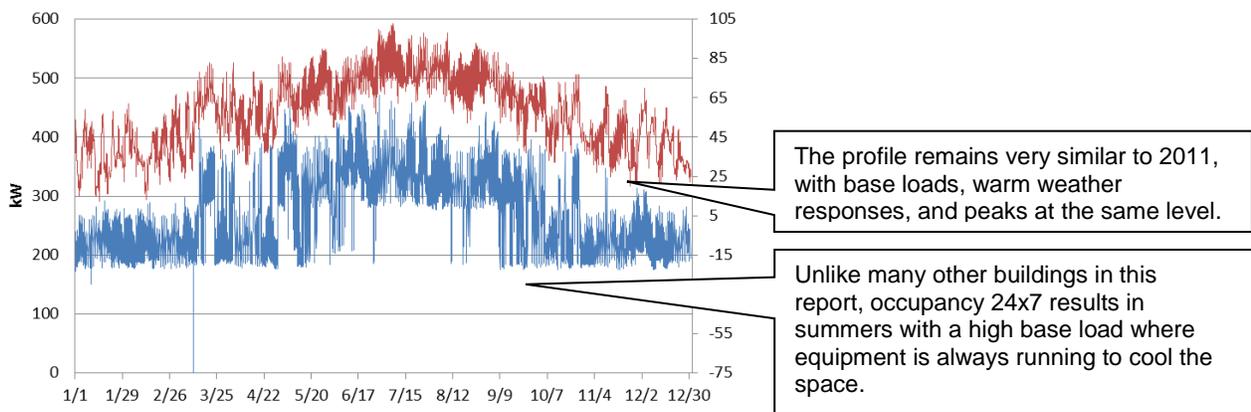
**2020 Auburn Annual Electric Profile (2010)**



**2020 Auburn Annual Electric Profile (2011)**



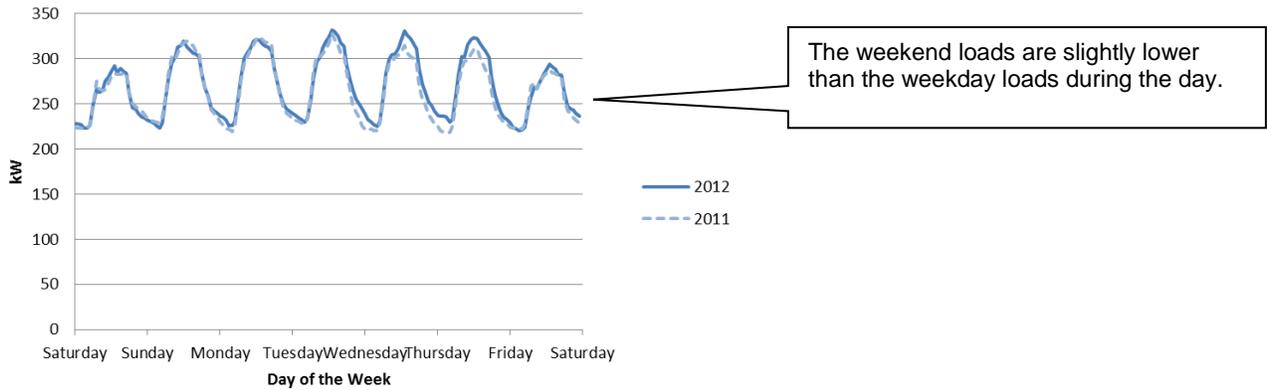
**2020 Auburn Annual Electric Profile (2012)**



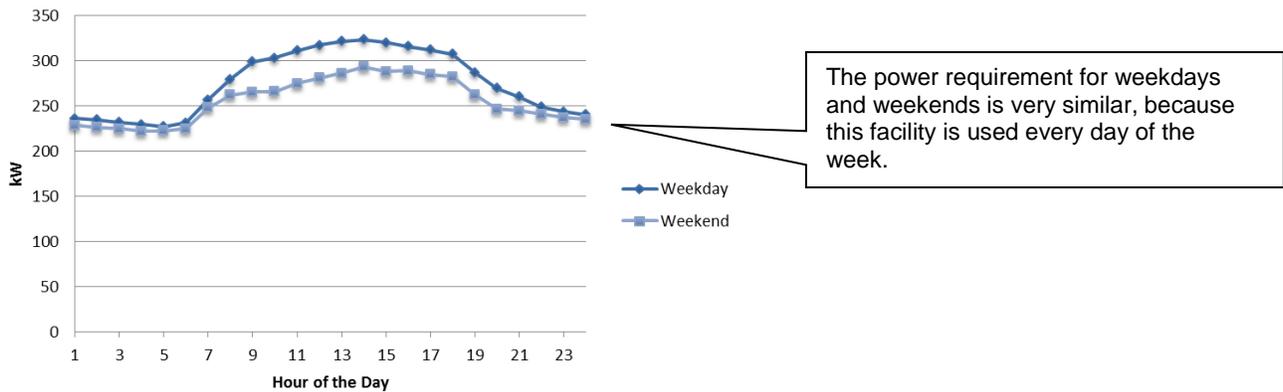
**2020-Electric Profile Review**

The graphs below illustrate the power requirements of the facility throughout a typical week, typical day and the year. The typical week and typical day profiles are averaged throughout the year in order to view how the electric demand varies during the day and across the week. The load duration curve represents the demand as a function of cumulative time for the year.

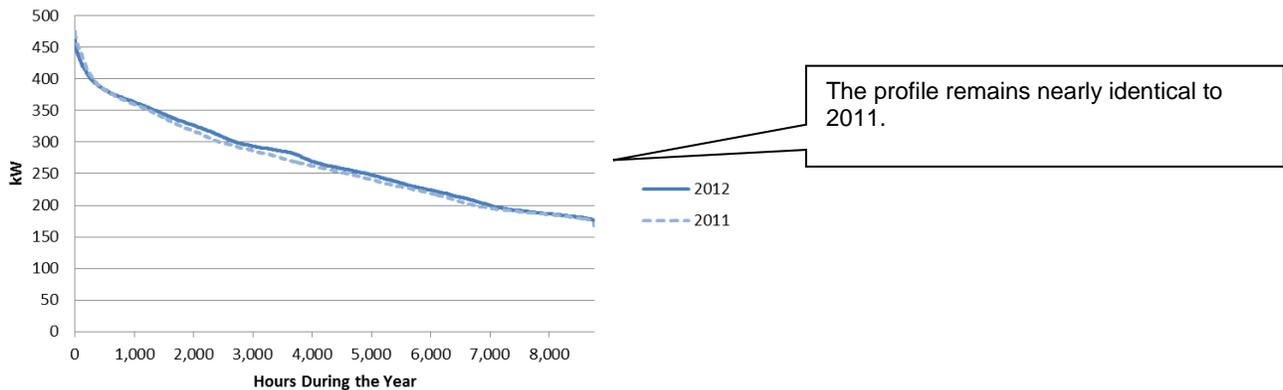
**2020 Auburn Typical Week Profile**



**2020 Auburn Typical Day Profile (2012)**



**2020 Auburn Load Duration Curve**



2020-Energy Star Review

<b>General Information</b> <a href="#" style="color: white; text-decoration: underline;">Edit</a>	
<b>Address:</b> 2020 Auburn Avenue , Cincinnati, OH 45219	
<b>Year Built:</b> 1995	
<b>Property Type:</b> (not set)	
<b>Baseline Rating:</b> 65	<b>Current Rating:</b> 79
<input type="checkbox"/> <b>View Period Ending Dates</b>	
<b>Water Period Ending Dates</b> Current: N/A Baseline: N/A	<b>Energy Period Ending Dates</b> Current: November 2012 Baseline: December 2006
<b>Eligibility for the ENERGY STAR</b>	
Eligible to <a href="#" style="color: blue; text-decoration: underline;">Apply for the ENERGY STAR</a>	

This building earned an Energy Star rating of 79 when classified as an office space and dormitory, unfortunately the facility type is not currently eligible under Energy Star requirements.

2020 Auburn Energy Conservation Measures and Recommendations

Previous ECM's

- Boiler replacement with high-efficiency condensing boilers.

Proposed ECM's

- Conduct an Ameresco ECM audit for energy conservation measures.
  - Retrofit lighting and add occupancy sensors
  - Replace domestic water heaters
  - Replace city water booster pumps
  - Perform water conservation survey and associated work
  - Upgrade and recommission controls
  - Variable frequency drives and motor replacements

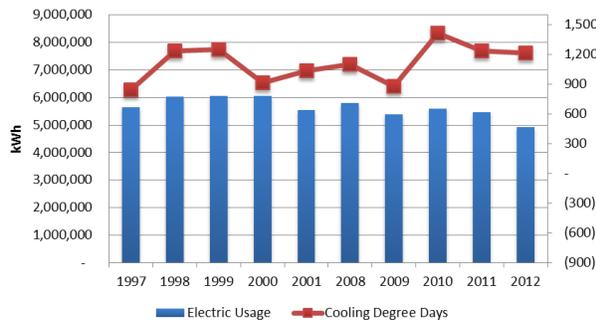
## 222 Central Parkway

0222 - Alms & Doepke Building				ARCHIBUS/FM Bldg Data							
				Bldg Code:	0222						
				Bldg Name:	Alms & Doepke Building						
				Address:	222 East Central Parkway						
				City:	CINCINNATI						
				State:	OH						
				Postal Code:	45202						
				Site Code:	COUNTYCAMPUS						
				Agency:	Job/Family Services						
				Use:	Office						
				Const Type:	Brick						
Date Built:	1878										
Ext Gross Area:	278,611.88 sf										
Int Gross Area:	260,361.49 sf										
Rentable Area:	249,800.68 sf										
Estimated Area:	0.00 sf										
Total Roof Area:	0.00 sf										
Leased/Owned:	Owned										
Floor Count:	8										
Sprinklered? :	Yes										
Property :	075-0004-0240-00										

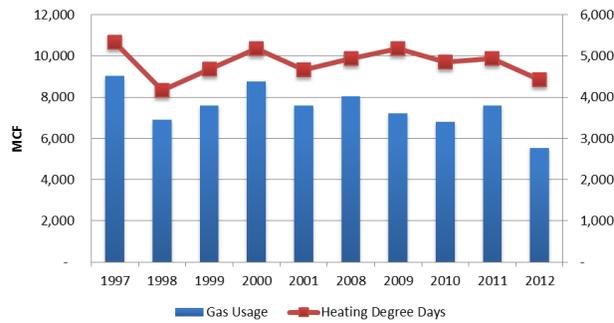
  

FI Code	Int Gross	Ext Gross	Vert Pen	Service	Rentable	Usable	Room Area
01	37,349 sf	39,398 sf	1,432 sf	5,301 sf	35,917 sf	30,616 sf	24,610 sf
02	37,707 sf	40,218 sf	1,467 sf	3,183 sf	36,240 sf	33,056 sf	24,001 sf
03	37,766 sf	40,236 sf	1,406 sf	3,502 sf	36,360 sf	32,857 sf	27,015 sf
04	37,835 sf	40,218 sf	1,457 sf	3,158 sf	36,378 sf	33,220 sf	24,916 sf
05	37,981 sf	40,932 sf	1,355 sf	3,412 sf	36,626 sf	33,214 sf	24,096 sf
06	29,458 sf	31,598 sf	1,694 sf	3,118 sf	27,764 sf	24,646 sf	22,437 sf
07	4,950 sf	5,460 sf	376 sf	475 sf	4,574 sf	4,098 sf	3,704 sf
0B	37,315 sf	40,552 sf	1,372 sf	6,602 sf	35,943 sf	29,341 sf	31,443 sf
OUT	0 sf	0 sf	0 sf	0 sf	0 sf	0 sf	0 sf
SB	0 sf	0 sf	0 sf	0 sf	0 sf	0 sf	0 sf

222 East Central Annual Electric Usage



222 East Central Annual Gas Usage



The 222 Central Parkway has been trended over the last several years, with historical data collected for comparison. The Facilities Department took over building operation at this facility in 2008. The building continues to become more energy efficient as indicated by both the electric & natural gas usages over the last couple of years. Electric consumption decreased by 10%, natural gas consumption decreased by 27%, and water consumption decreased by 16%. 222 has been a leader in reducing energy and water consumption over the last year.

**222-Historical Monthly Electric and Gas Data**

The following data is a representation of electrical and gas usage by month. The green cells show the minimum usage for the month. In 2012, the electric consumption decreased nearly every month compared to 2011, as discussed previously and as indicated by the green shades in half a dozen months. The peak electric decreased compared to the previous year as well. Natural gas consumption decreased significantly throughout the year. Water consumption remained lower than that of the previous year on a monthly basis for the majority of the year as well.

Two new meters were installed in the fall of 2012. It appears that the electric bill may have overcharged for 300-350 kW of electric consumption during this period. ThermalTech Engineering will work with Duke Energy to identify the basis for these charges and determine if any adjustments need to be made. The billed demand for November and December of 2012 also appears to have been impacted by the meter change.

**222 East Central Electric Data**

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	TOTAL	
2010	kWh	390,572	382,129	398,069	430,623	432,077	531,265	597,538	619,216	535,662	438,404	384,756	454,147	5,594,458
	kWa	714	889	1,051	1,256	1,119	1,232	1,136	1,171	1,090	1,089	1,058	1,018	1,256
	kWb	1,014	964	1,051	1,256	1,119	1,232	1,136	1,171	1,090	1,089	1,058	1,048	1,256
	Cost	\$ 33,695	\$ 32,967	\$ 34,712	\$ 38,521	\$ 37,522	\$ 44,945	\$ 48,685	\$ 50,483	\$ 44,320	\$ 38,110	\$ 34,314	\$ 38,806	\$ 477,080
2011	kWh	493,010	417,153	372,969	418,225	409,510	483,565	599,942	559,803	491,436	405,187	405,297	385,634	5,441,731
	kWa	880	912	867	1,063	1,109	1,155	1,312	1,109	1,138	1,081	1,073	1,013	1,312
	kWb	1,047	1,047	1,047	1,063	1,109	1,155	1,312	1,115	1,138	1,115	1,115	1,115	1,312
	Cost	\$ 37,730	\$ 32,796	\$ 29,922	\$ 33,501	\$ 33,184	\$ 38,309	\$ 46,581	\$ 42,805	\$ 38,489	\$ 32,565	\$ 32,572	\$ 31,294	\$ 429,748
2012	kWh	417,048	370,011	404,928	468,938	450,211	450,648	486,679	445,487	445,068	332,628	323,287	316,321	4,911,254
	kWa	885	884	1,175	1,109	1,128	1,071	1,115	1,040	1,023	947	874	737	1,175
	kWb	1,115	1,115	1,175	1,115	1,128	1,115	1,115	1,040	1,023	947	874	737	1,175
	Cost	\$ 34,345	\$ 33,051	\$ 35,455	\$ 37,311	\$ 36,687	\$ 36,523	\$ 38,194	\$ 35,164	\$ 34,886	\$ 33,690	\$ 27,307	\$ 24,904	\$ 407,517

**222 East Central Taft Gas Data**

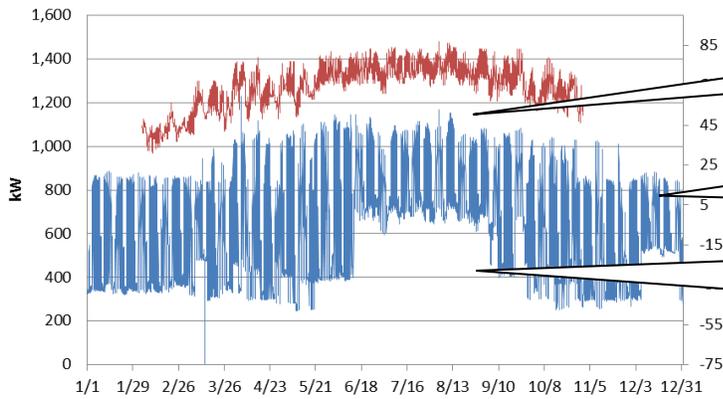
Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	TOTAL	
2010	CCF	17,164	15,262	7,788	1,902	846	126	113	163	250	1,930	5,972	16,618	68,134
	Cost	\$ 14,310	\$ 12,742	\$ 6,564	\$ 1,694	\$ 906	\$ 389	\$ 376	\$ 415	\$ 480	\$ 1,649	\$ 4,574	\$ 12,682	\$ 56,781
2011	CCF	22,928	17,379	9,642	7,078	2,531	201	73	15	379	2,013	3,010	10,529	75,778
	Cost	\$ 17,917	\$ 13,672	\$ 7,553	\$ 5,145	\$ 2,111	\$ 2,572	\$ 86	\$ 428	\$ 584	\$ 1,727	\$ 4,340	\$ 7,495	\$ 63,630
2012	CCF	13,689	11,375	5,297	4,209	1,248	130	102	100	102	1,005	7,983	10,109	55,349
	Cost	\$ 9,363	\$ 6,934	\$ 3,425	\$ 2,088	\$ 815	\$ 391	\$ 381	\$ 381	\$ 379	\$ 866	\$ 4,804	\$ 6,626	\$ 36,453

**222 East Central Taft Water Data**

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	TOTAL	
2010	CCF	298	254	284	293	347	552	667	696	717	386	286	238	5,019
	Cost	\$ 2,077	\$ 2,164	\$ 2,250	\$ 2,158	\$ 2,484	\$ 3,604	\$ 3,883	\$ 3,783	\$ 4,241	\$ 2,552	\$ 2,125	\$ 1,976	\$ 33,298
2011	CCF	231	203	275	220	300	500	508	723	599	367	258	259	4,443
	Cost	\$ 2,039	\$ 1,840	\$ 2,428	\$ 1,870	\$ 2,373	\$ 3,439	\$ 3,302	\$ 4,321	\$ 3,911	\$ 2,607	\$ 2,135	\$ 2,307	\$ 32,572
2012	CCF	184	220	203	318	308	420	474	513	501	290	180	132	3,743
	Cost	\$ 1,794	\$ 2,232	\$ 2,039	\$ 2,542	\$ 2,558	\$ 3,279	\$ 3,364	\$ 3,593	\$ 3,694	\$ 2,396	\$ 1,869	\$ 1,757	\$ 31,116

222-Three Year Electrical Review

**222 Central Annual Electric Profile (2010)**

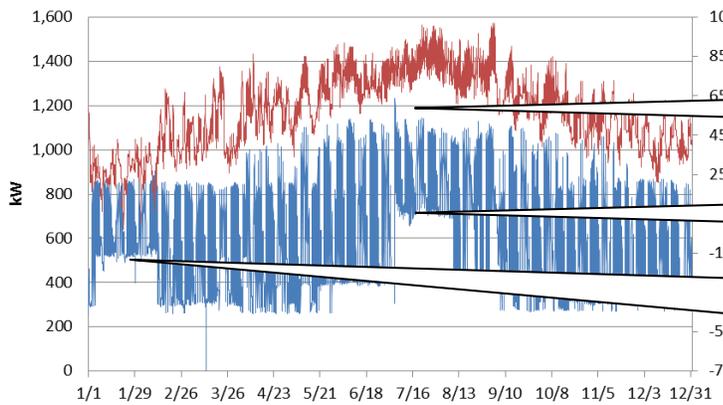


The peak demand in the summer has increased by 100 kW.

Effective weekend scheduling is continuing, reducing the electric load when the building is unoccupied.

The building air conditioning is now being run continuously throughout the summer months, greatly increasing the summertime electric consumption.

**222 E Central Annual Electric Profile (2011)**

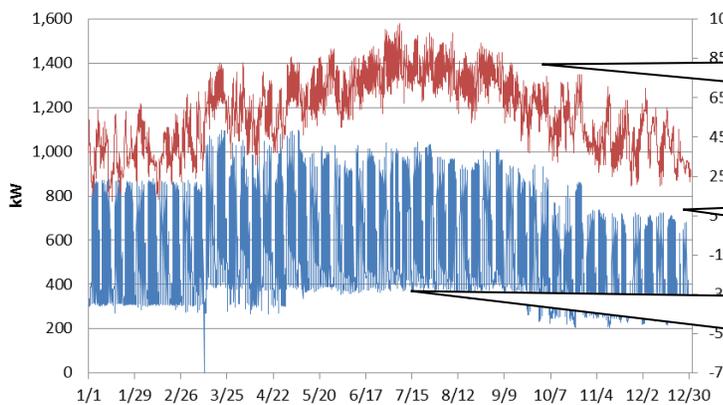


The peak demand in the summer has increased by 4%.

The constant summertime conditioning has reduced by half in duration.

The continuously high loads in the winter increase the electric consumption of the facility overall. 26% more kWh were consumed in January of 2011 compared to the previous year.

**222 E Central Annual Electric Profile (2012)**



Not only has consumption decreased by 10%, but the summertime peak demand decreased by 10% as well.

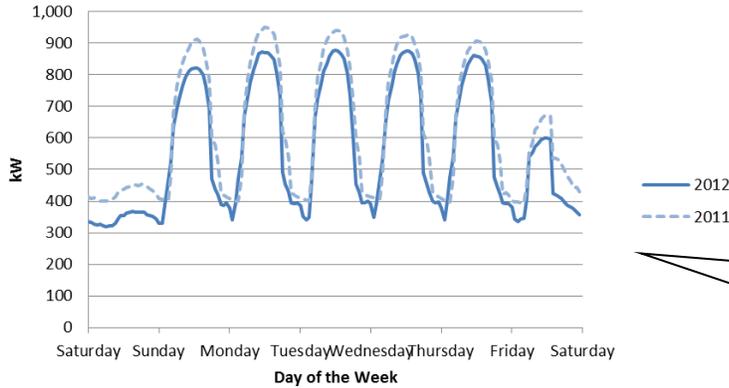
The recorded winter peak demand is significantly lower after a lighting retrofit.

The significant decrease in electricity consumption (10%) is partly contributable to a lower summer base demand. Less cooling equipment is running constantly during the season.

**222-Electric Profile Review**

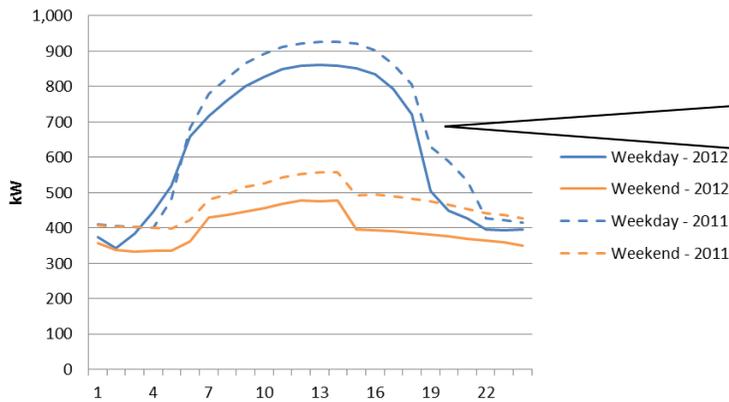
The graphs below illustrate the power requirements of the facility throughout a typical week, typical day and the year. The typical week and typical day profiles are averaged throughout the year in order to view how the electric demand varies during the day and across the week. The load duration curve represents the demand as a function of cumulative time for the year.

**222 E Central Typical Week Profile**



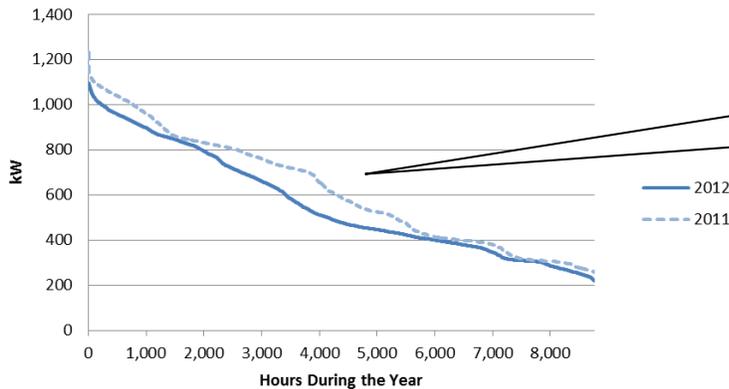
The average electric demand significantly decreased compared to the previous year, particularly during the day and on weekends.

**222 E Central Typical Day Profile**



The setback schedules are clearly visible here. During the week, the power requirement ramps up to nearly double the requirement at night. The demand drops significantly after 3 pm on the weekdays and 1 pm on the weekends.

**222 E Central Load Duration Curve**



The reduction in number of hours at the higher base load in the summer is visible on this load duration curve, as is the reduction in peak demand.

222-Energy Star Review

<b>General Information</b> <a href="#" style="color: white; text-decoration: underline;">Edit</a>	
<b>Address:</b> 222 East Central Parkway , Cincinnati, OH 45202	
<b>Year Built:</b> 1878	
<b>Property Type:</b> Single Facility	
<b>Baseline Rating:</b> 43	<b>Current Rating:</b> 57
<input type="checkbox"/> <b>View Period Ending Dates</b>	
<b>Water Period Ending Dates</b> Current: N/A Baseline: N/A	<b>Energy Period Ending Dates</b> Current: December 2012 Baseline: December 2007
<b>Eligibility for the ENERGY STAR</b>	
Not Eligible: Rating must be 75 or above	

This building's current Energy Star score is 57, higher than past ratings.

222 East Central Energy Conservation Measures and Recommendations

Previous ECM's

- Continue to use night setback on chillers as much as possible. There are numerous times throughout the summer where the chillers run 24/7 in this building. Implement an aggressive chiller schedule so that chiller do not run overnight even during summer months.

Proposed ECM's

- Implement energy savings strategies that decrease electric usage overnight and on weekends. This includes lights off, computers off, and elevators on standby when not in use. Exterior lighting should be minimized during after midnight hours.
- Implement energy conservation measures from completed Ameresco ECM audit.
  - Retrofit lighting and add occupancy sensors
  - Replace domestic water heaters
  - Install domestic hot water heat pump
  - Perform water conservation survey and associated work
  - Upgrade and recommission controls
  - Variable frequency drives and motor replacements

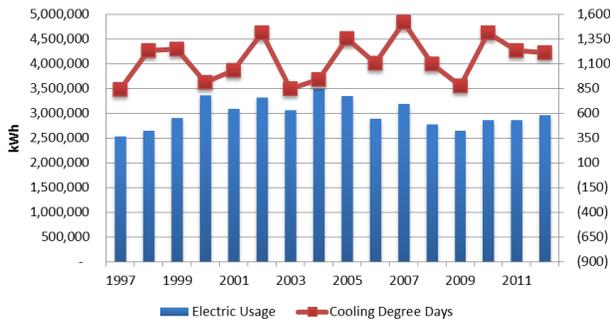
## 230 East 9th

0230 - William Howard Taft Center				ARCHIBUS/IFM Bldg Data				
				Bldg Code:	0230			
				Bldg Name :	William Howard Taft Center			
				Address :	230 East Ninth Street			
				City :	CINCINNATI			
				State :	OH			
				Postal Code:	45202			
				Site Code :	COUNTYCAMPUS			
				Agency :	BOCC			
				Use :	Office			
				Const Type:	BrickStone			
				Date Built :	1925			
				Ext Gross Area:	193,524.83 sf			
				Int Gross Area:	184,574.10 sf			
				Rentable Area:	172,180.32 sf			
				Estimated Area:	0.00 sf			
Total Roof Area:	15,111.27 sf							
Leased/Owned :	Owned							
Floor Count:	16							
Sprinklered? :	Yes							
Property :								

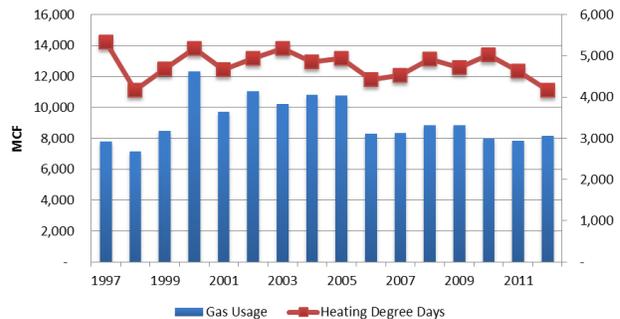
  

Fl Code	Int Gross	Ext Gross	Vert Pen	Service	Rentable	Usable	Room Area
01	13,655 sf	14,439 sf	1,395 sf	3,001 sf	12,260 sf	9,259 sf	13,655 sf
02	13,838 sf	14,482 sf	946 sf	2,164 sf	12,892 sf	10,728 sf	13,781 sf
03	13,778 sf	14,503 sf	886 sf	2,182 sf	12,892 sf	10,710 sf	13,770 sf
04	13,737 sf	14,502 sf	842 sf	2,092 sf	12,895 sf	10,804 sf	13,703 sf
05	13,848 sf	14,503 sf	880 sf	1,843 sf	12,967 sf	11,124 sf	13,848 sf
06	13,895 sf	14,503 sf	903 sf	1,612 sf	12,992 sf	11,380 sf	13,885 sf
07	13,775 sf	14,498 sf	897 sf	1,530 sf	12,878 sf	11,348 sf	13,775 sf
08	13,895 sf	14,503 sf	850 sf	1,654 sf	13,045 sf	11,392 sf	13,895 sf
09	13,890 sf	14,503 sf	883 sf	2,262 sf	13,007 sf	10,745 sf	13,888 sf
0B	14,480 sf	15,049 sf	785 sf	7,484 sf	13,696 sf	6,211 sf	14,480 sf
0P	2,488 sf	2,647 sf	242 sf	2,246 sf	2,246 sf	-0 sf	2,488 sf
0R	0 sf	0 sf	0 sf	0 sf	0 sf	0 sf	0 sf
10	13,880 sf	14,503 sf	915 sf	2,070 sf	12,965 sf	10,895 sf	13,878 sf
11	13,883 sf	14,503 sf	914 sf	1,492 sf	12,969 sf	11,477 sf	13,269 sf
12	13,825 sf	14,503 sf	912 sf	2,220 sf	12,913 sf	10,694 sf	13,825 sf
OUT	0 sf	0 sf	0 sf	0 sf	0 sf	0 sf	0 sf
SB	1,706 sf	1,886 sf	144 sf	1,562 sf	1,562 sf	0 sf	1,706 sf

230 East Ninth Annual Electric Usage



230 East Ninth Annual Gas Usage



The 230 East 9th Building is one of the newer buildings on the County Campus having full DDC control and VAV boxes. It was renovated in the 1990's and includes "Varicone" VAV Air Central Station Air-Handlers, a full DDC building control system and intelligent lighting panels.

The electricity consumption of the facility has been increasing steadily over the last several years. Natural gas consumption appears to be increasing very slightly as well, despite and decrease in heating degree days. Despite these increases, the last couple of months of 2012 indicate that the building will operate much more efficiently in 2013, recording the lowest electricity, natural gas, and water consumptions on our record for the building.

One of the reasons for increases in usage is the Probate Court has been operating a six hour schedule on Saturdays along with limited usage on Sundays.

**230-Historical Monthly Electric and Gas Data**

The following data is a representation of electrical and gas usage by month. The green cells show the minimum usage for the month. The building appears to have reduced electricity, natural gas, and water consumption in November and December of 2012 compared to the previous year. Despite this, electricity and natural gas consumption increased 4%, and water consumption increased by 20%.

The actual electric demand the last couple of months of the year was much lower than it has been in the past due to the implementation of energy conservation measures. Due to the ratchet clause in the utility rate schedule, the facility is still paying for high peak demands set in August of 2012 throughout the winter. ThermalTech Engineering will be discussing options with Duke Energy to reduce the billed demand due to the permanent reduction in electric load from these energy conservation efforts.

**230 East Ninth Electric Data**

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	TOTAL	
2010	kWh	220,721	180,217	186,338	207,253	213,643	280,325	301,240	365,381	286,156	227,087	190,695	204,657	2,644,846
	kWa	520	518	678	864	909	969	953	975	925	853	779	711	975
	kWb	843	843	843	864	909	969	953	975	925	853	829	829	975
	Cost	\$ 30,252	\$ 18,072	\$ 18,530	\$ 20,231	\$ 20,951	\$ 26,270	\$ 27,731	\$ 32,181	\$ 26,544	\$ 21,928	\$ 19,054	\$ 20,091	\$ 296,146
2011	kWh	210,477	184,913	190,391	210,860	223,566	266,002	305,253	310,627	283,575	241,368	223,595	200,884	2,851,511
	kWa	516	704	687	785	884	972	970	960	898	826	717	745	972
	kWb	829	829	829	829	884	972	970	960	898	826	826	826	972
	Cost	\$ 18,172	\$ 16,499	\$ 16,858	\$ 18,540	\$ 19,705	\$ 22,996	\$ 25,385	\$ 25,679	\$ 23,569	\$ 20,300	\$ 19,151	\$ 17,666	\$ 244,520
2012	kWh	222,473	195,727	220,515	228,397	242,858	281,691	342,018	310,690	351,499	268,162	165,315	124,735	2,954,080
	kWa	652	664	814	793	850	826	954	970	870	659	691	384	970
	kWb	825	826	826	826	850	826	954	970	870	824	824	824	970
	Cost	\$ 21,018	\$ 21,071	\$ 22,180	\$ 22,533	\$ 23,527	\$ 24,851	\$ 29,413	\$ 28,310	\$ 28,547	\$ 24,211	\$ 19,681	\$ 17,880	\$ 283,222

**230 East Ninth Gas Data**

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	TOTAL	
2010	CCF	16,448	13,009	9,608	5,084	4,066	3,579	3,596	4,254	3,667	4,014	4,937	7,640	88,371
	Cost	\$ 13,655	\$ 10,833	\$ 7,959	\$ 3,971	\$ 3,122	\$ 2,807	\$ 2,702	\$ 3,276	\$ 2,882	\$ 3,022	\$ 3,757	\$ 5,917	\$ 84,157
2011	CCF	18,021	11,857	8,366	8,140	5,047	2,424	0	0	3,320	5,004	6,914	9,300	78,393
	Cost	\$ 14,081	\$ 9,347	\$ 6,516	\$ 5,793	\$ 3,801	\$ 1,973	\$ 228	\$ 228	\$ 2,566	\$ 3,730	\$ 4,859	\$ 6,571	\$ 59,693
2012	CCF	14,166	11,578	8,270	7,113	5,309	4,475	4,232	4,169	4,270	6,226	4,878	6,775	81,461
	Cost	\$ 9,596	\$ 6,965	\$ 5,079	\$ 3,221	\$ 2,266	\$ 2,268	\$ 2,209	\$ 2,196	\$ 2,169	\$ 3,498	\$ 2,971	\$ 4,454	\$ 46,892

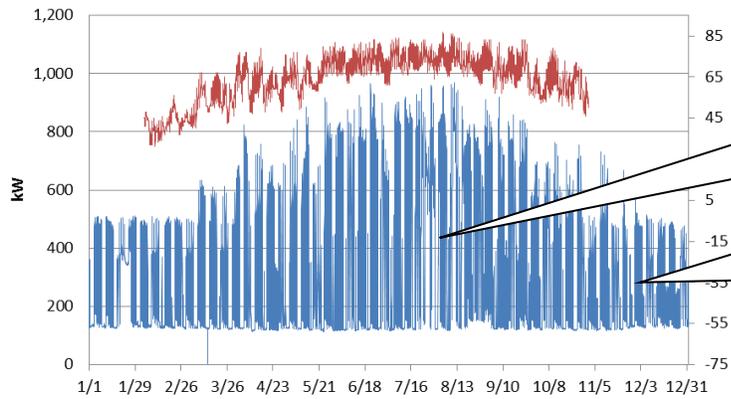
**230 East Ninth Water Data**

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	TOTAL	
2010	CCF	280	345	296	305	519	518	524	622	701	420	359	315	5,204
	Cost	\$ 1,813	\$ 2,375	\$ 2,021	\$ 2,130	\$ 2,902	\$ 2,517	\$ 2,369	\$ 2,517	\$ 3,111	\$ 2,188	\$ 2,188	\$ 2,176	\$ 28,306
2011	CCF	324	283	475	341	479	590	600	725	773	499	492	528	6,109
	Cost	\$ 2,309	\$ 2,083	\$ 3,241	\$ 2,246	\$ 2,984	\$ 3,190	\$ 3,023	\$ 3,352	\$ 3,746	\$ 2,824	\$ 3,006	\$ 3,430	\$ 35,434
2012	CCF	450	546	519	590	646	770	774	867	957	649	300	240	7,306
	Cost	\$ 3,056	\$ 3,875	\$ 3,572	\$ 3,513	\$ 3,745	\$ 4,394	\$ 3,942	\$ 4,329	\$ 5,100	\$ 4,147	\$ 2,427	\$ 2,451	\$ 44,550

= minimum of month for past 3 years

230-Three Year Electrical Review

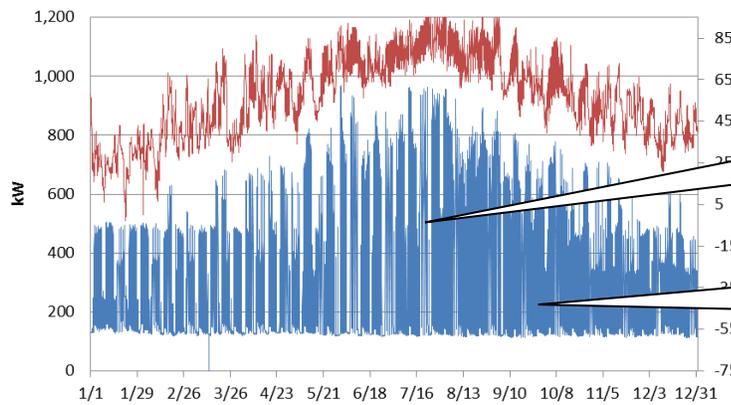
**230 E 9th Annual Electric Profile (2010)**



Continuous chiller operation occurred in the month of January and in the summer, increasing the electric consumption for these months compared to 2008 and 2009.

Improved scheduling toward the end of the year led to the facility reducing its energy consumption to some of the lowest levels in the last few years for these months.

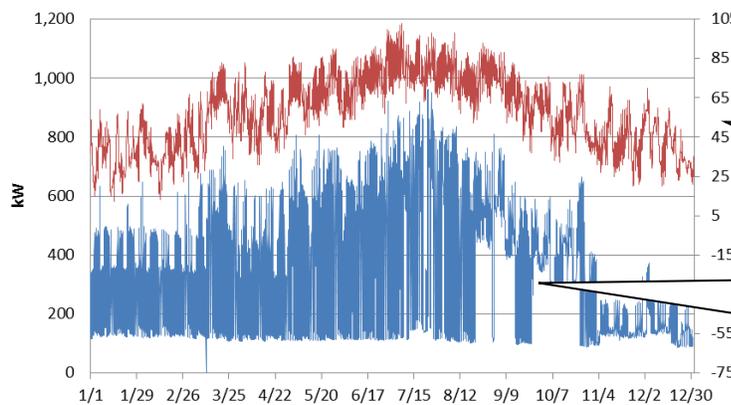
**230 E 9th Annual Electric Profile (2011)**



The chillers are no longer operating continuously, reducing the summertime kWh consumption.

The weekend daytime loads appear to get higher toward the second half of the year.

**230 E 9th Annual Electric Profile (2012)**



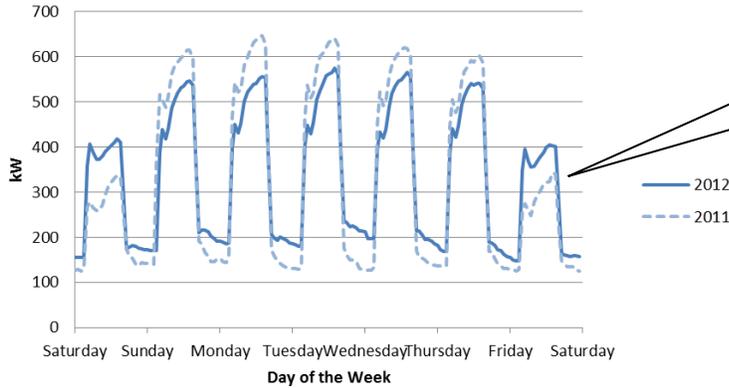
Continuing from the previous year, the weekend daytime loads were much higher than they have been in the past.

The construction period for the energy conservation measures, as well as the resultant change in load profile, are clearly visible in the second half of the year.

**230-Electric Profile Review**

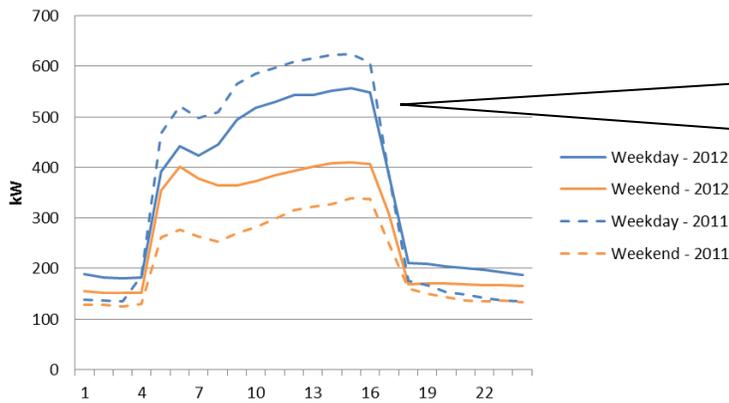
The graphs below illustrate the power requirements of the facility throughout a typical week, typical day and the year. The typical week and typical day profiles are averaged throughout the year in order to view how the electric demand varies during the day and across the week. The load duration curve represents the demand as a function of cumulative time for the year.

**230 E 9th Typical Week Profile**



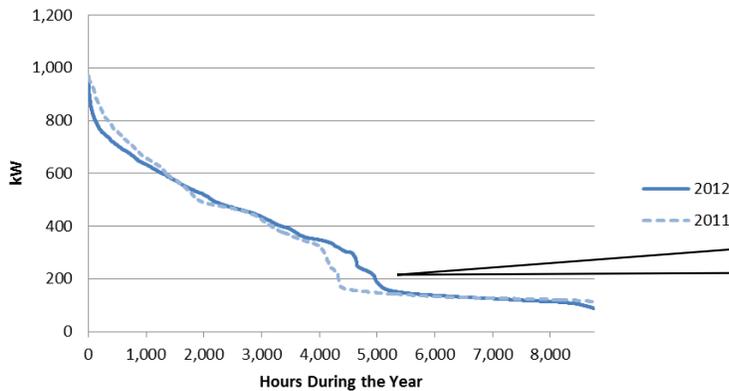
The electric demand on nights and weekends increased greatly on average. This is likely due to the two month period where equipment was run in hand mode.

**230 E 9th Typical Day Profile**



The weekday consumption has decreased on average, likely due to the savings obtained in the last two month of the year after implementation of ECMs. Once again, the construction period is visible in the increased consumption over the weekend and nights.

**230 E 9th Load Duration Curve**



The increase in base load is visible here as an increase in the number of hours spent around 200-300 kW.

230-Energy Star Review

<b>General Information</b> <a href="#" style="color: white; text-decoration: underline;">Edit</a>	
<b>Address:</b> 230 East 9th Street , Cincinnati, OH 45202	
<b>Year Built:</b> 1925	
<b>Property Type:</b> (not set)	
<b>Baseline Rating:</b> 72	<b>Current Rating:</b> 71
<input type="checkbox"/> <b>View Period Ending Dates</b>	
<b>Water Period Ending Dates</b> Current: N/A Baseline: N/A	<b>Energy Period Ending Dates</b> Current: December 2012 Baseline: January 2007
<b>Eligibility for the ENERGY STAR</b>	
Not Eligible: Rating must be 75 or above	

This building is not eligible for an Energy Star award this year.

230 East 9th Energy Conservation Measures and Recommendations

Previous ECM's

- Night setback for equipment.
- Increase boiler efficiency.
- Programmed lighting schedule for unoccupied periods.

Proposed ECM's

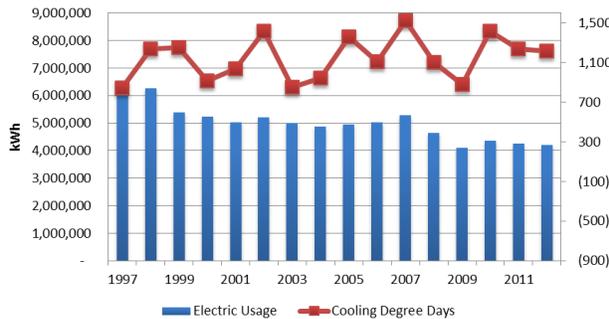
- Implement energy conservation measures from Ameresco ECM audit.
  - Retrofit lighting and add occupancy sensors
  - Replace summer boiler with condensing hot water boiler
  - Reline boiler flue and repair boiler economizers
  - Perform water conservation survey and associated work
  - Upgrade and recommission controls
  - Variable frequency drives and motor replacements
  - Replace cooling towers
  - Reclaim AHU condensate for make-up water (bldg staff ECM)

## 800 Broadway

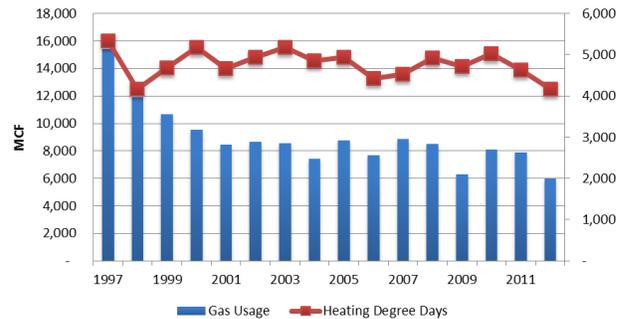
0800 - 800 Broadway Building	ARCHIBUS/FM Bldg Data
	Bldg Code: 0800
	Bldg Name: 800 Broadway Building
	Address: 800 Broadway Street
	City: CINCINNATI
	State: OH
	Postal Code: 45202
	Site Code: COUNTYCAMPUS
	Agency: BOCC
	Use: Office
	Const Type: Stone
	Date Built: 1931
	Ext Gross Area: 372,420.59 sf
	Int Gross Area: 349,318.78 sf
	Rentable Area: 295,239.16 sf
	Estimated Area: 0.00 sf
	Total Roof Area: 41,856.63 sf
	Leased/Owned: Owned
Floor Count: 19	
Sprinklered?: Yes	
Property: 079-0003-0146-00	

Fl Code	Int Gross	Ext Gross	Vert Pen	Service	Rentable	Usable	Room Area
D1	35,947 sf	38,116 sf	2,107 sf	6,402 sf	33,839 sf	27,438 sf	35,937 sf
D2	35,943 sf	38,208 sf	2,794 sf	4,193 sf	33,148 sf	28,955 sf	35,981 sf
D3	36,159 sf	38,196 sf	6,056 sf	5,417 sf	30,103 sf	24,686 sf	36,159 sf
D3M	35,962 sf	38,076 sf	19,499 sf	6,494 sf	16,463 sf	9,970 sf	35,962 sf
D4	31,920 sf	33,764 sf	1,386 sf	3,088 sf	30,534 sf	27,466 sf	31,920 sf
D5	21,001 sf	22,426 sf	4,848 sf	1,667 sf	16,153 sf	14,487 sf	20,988 sf
D6	20,426 sf	21,652 sf	1,248 sf	4,474 sf	19,178 sf	14,705 sf	20,241 sf
D7	5,609 sf	6,191 sf	758 sf	1,226 sf	4,851 sf	3,626 sf	5,609 sf
D8	5,682 sf	6,191 sf	754 sf	1,220 sf	4,928 sf	3,707 sf	6,169 sf
D9	5,749 sf	6,190 sf	750 sf	1,247 sf	4,999 sf	3,752 sf	5,749 sf
D8	39,778 sf	41,884 sf	7,997 sf	10,776 sf	31,781 sf	21,004 sf	40,126 sf
DR	0 sf						
10	5,683 sf	6,191 sf	730 sf	1,275 sf	4,954 sf	3,678 sf	5,682 sf
11	5,703 sf	6,191 sf	771 sf	1,307 sf	4,933 sf	3,625 sf	5,704 sf
12	5,040 sf	5,541 sf	766 sf	1,146 sf	4,274 sf	3,128 sf	5,040 sf
14	5,133 sf	5,541 sf	764 sf	1,117 sf	4,369 sf	3,252 sf	5,133 sf
15	4,397 sf	4,851 sf	761 sf	856 sf	3,636 sf	2,780 sf	4,397 sf
16	3,751 sf	4,151 sf	748 sf	1,278 sf	3,003 sf	1,725 sf	3,753 sf
17	3,655 sf	4,193 sf	473 sf	3,182 sf	3,182 sf	0 sf	3,655 sf
18	2,980 sf	3,294 sf	91 sf	2,889 sf	2,889 sf	-0 sf	2,980 sf
OUT	0 sf						
SB	38,800 sf	41,573 sf	779 sf	11,072 sf	38,022 sf	26,950 sf	38,803 sf

800 Broadway Annual Electric Usage



800 Broadway Annual Gas Usage



The 800 Broadway Building was one of the least efficient buildings in 1997 when the ECM program started. Most of the original ECM projects were concentrated on this building. The results are visible in the above graphs. The building is the first to qualify for an Energy Star Award which is the crowning achievement for the Facility Department and the ECM project.

The electrical graph shows an ever-improving consumption nearly 30% lower than 1997. The electric consumption has slightly decreased in 2012.

The natural gas history shows a strong and steady decrease since 1997, significantly in the past year. Consumption in 2012 was 24% lower than that of 2011.

**800-Historical Monthly Electric and Gas Data**

The following data is a representation of electrical and gas usage by month. The green cells show the minimum usage for the month. The electric consumption decreased very slightly from 2011; however the peak demand dropped, allowing for a decrease in monthly charges throughout the fall and winter. The natural gas consumption decreased significantly in the spring, returning to a similar profile the second half of the year. Water consumption decreased by 16% compared to 2011, primarily due to low usage in the second half of the year.

**800 Broadway Electric Data**

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	TOTAL	
2009	kWh	325,519	280,955	280,660	330,092	371,100	424,743	439,339	447,398	425,646	369,993	340,648	325,770	4,104,780
	kWa	777	760	811	997	946	1,031	1,014	997	1,014	1,048	997	794	1,048
	kWb	891	891	891	997	946	1,031	1,014	1,007	1,014	1,048	997	876	1,048
	Cost	\$ 37,230	\$ 24,499	\$ 24,479	\$ 28,512	\$ 30,873	\$ 34,954	\$ 36,024	\$ 36,574	\$ 35,186	\$ 32,091	\$ 30,151	\$ 20,091	\$ 414,220
2010	kWh	318,339	284,884	286,489	304,746	316,228	399,658	450,181	434,167	403,081	338,199	412,468	298,668	4,247,108
	kWa	777	794	879	879	1,017	998	1,036	1,017	979	998	941	876	1,036
	kWb	875	876	879	879	1,017	998	1,036	1,017	979	998	941	794	1,036
	Cost	\$ 24,580	\$ 22,406	\$ 22,521	\$ 24,083	\$ 25,450	\$ 30,835	\$ 34,102	\$ 32,976	\$ 30,785	\$ 26,588	\$ 33,990	\$ 23,764	\$ 332,080
2011	kWh	322,109	283,751	308,426	352,530	354,468	429,690	456,096	391,284	382,396	310,010	309,320	310,994	4,211,074
	kWa	768	941	922	922	998	960	941	922	864	883	845	845	998
	kWb	881	941	922	922	998	960	951	935	881	883	845	845	998
	Cost	\$ 26,463	\$ 26,639	\$ 27,427	\$ 29,349	\$ 30,581	\$ 33,285	\$ 34,296	\$ 31,242	\$ 30,049	\$ 26,960	\$ 26,350	\$ 26,423	\$ 349,065

**800 Broadway Gas Data**

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	TOTAL	
2009	CCF	21,460	19,885	7,739	1,099	284	231	216	225	236	580	6,977	22,005	62,781
	Cost	\$ 17,742	\$ 16,442	\$ 6,454	\$ 1,031	\$ 424	\$ 388	\$ 370	\$ 382	\$ 392	\$ 628	\$ 5,216	\$ 16,606	\$ 68,088
2010	CCF	25,857	16,840	9,489	6,737	925	278	290	271	255	612	5,000	12,537	79,091
	Cost	\$ 20,077	\$ 13,180	\$ 7,361	\$ 4,834	\$ 889	\$ 430	\$ 441	\$ 423	\$ 409	\$ 660	\$ 3,578	\$ 8,776	\$ 61,058
2011	CCF	19,505	14,758	5,456	1,484	463	268	204	170	169	207	6,937	10,261	59,882
	Cost	\$ 13,123	\$ 8,813	\$ 3,431	\$ 857	\$ 416	\$ 359	\$ 335	\$ 318	\$ 314	\$ 347	\$ 4,122	\$ 6,622	\$ 39,057

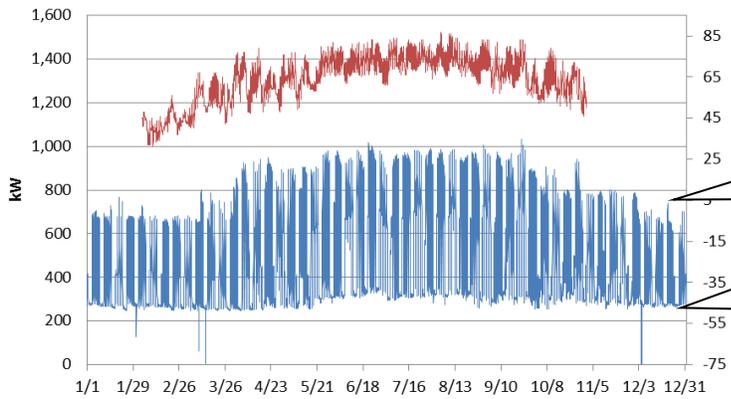
**800 Broadway Water Data**

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	TOTAL	
2009	CCF	283	367	348	315	479	672	739	1,030	1,232	727	650	422	7,264
	Cost	\$ 3,619	\$ 4,599	\$ 4,432	\$ 3,691	\$ 4,388	\$ 5,360	\$ 4,956	\$ 6,203	\$ 7,287	\$ 4,923	\$ 4,841	\$ 4,414	\$ 58,713
2010	CCF	832	619	618	380	469	674	724	1,022	1,030	687	732	459	8,246
	Cost	\$ 5,817	\$ 5,179	\$ 5,974	\$ 4,055	\$ 4,790	\$ 5,612	\$ 5,219	\$ 6,053	\$ 6,809	\$ 5,037	\$ 5,150	\$ 5,382	\$ 65,077
2011	CCF	322	506	425	451	500	796	842	874	932	564	369	341	6,922
	Cost	\$ 4,234	\$ 5,596	\$ 5,139	\$ 4,734	\$ 5,080	\$ 6,468	\$ 5,852	\$ 6,238	\$ 6,893	\$ 5,132	\$ 4,672	\$ 5,156	\$ 65,194

Green cells = minimum of month for past 3 years

800-Three Year Electrical Review

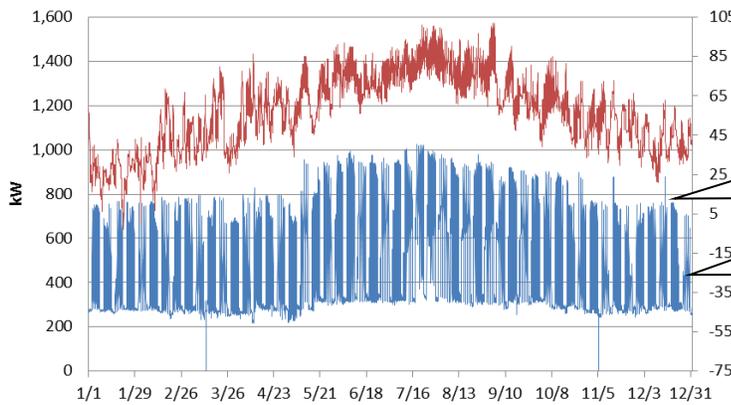
**800 Broadway Annual Electric Profile (2010)**



The wintertime electric demand has dropped considerably, reducing overall winter electric consumption.

The summertime base load has increased by about 100 kW, increasing electric consumption during these months compared to 2009 and 2008.

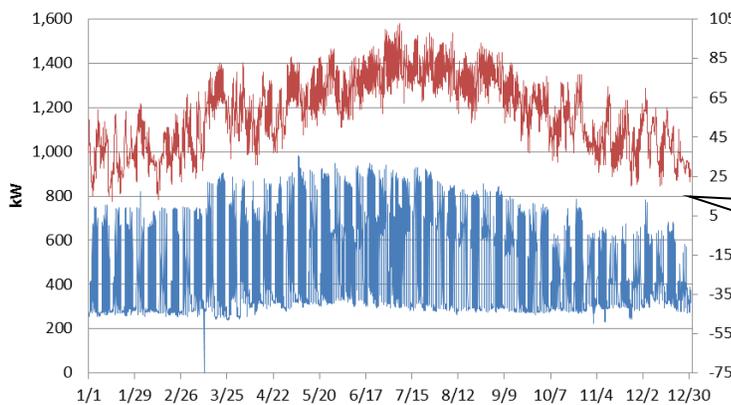
**800 Broadway Annual Electric Profile (2011)**



The wintertime electric demand has increased slightly compared to 2010, but appears to remain much lower than that of 2009.

The duration of summertime peak loads appears to have shortened, with much lower electric demand in the month of April.

**800 Broadway Annual Electric Profile (2012)**

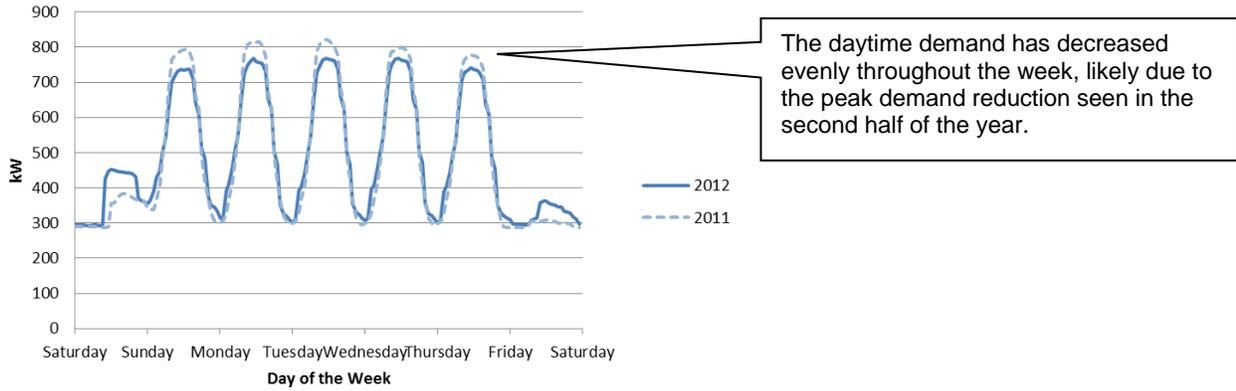


The demand during the day in the winter has decreased about 100 kW.

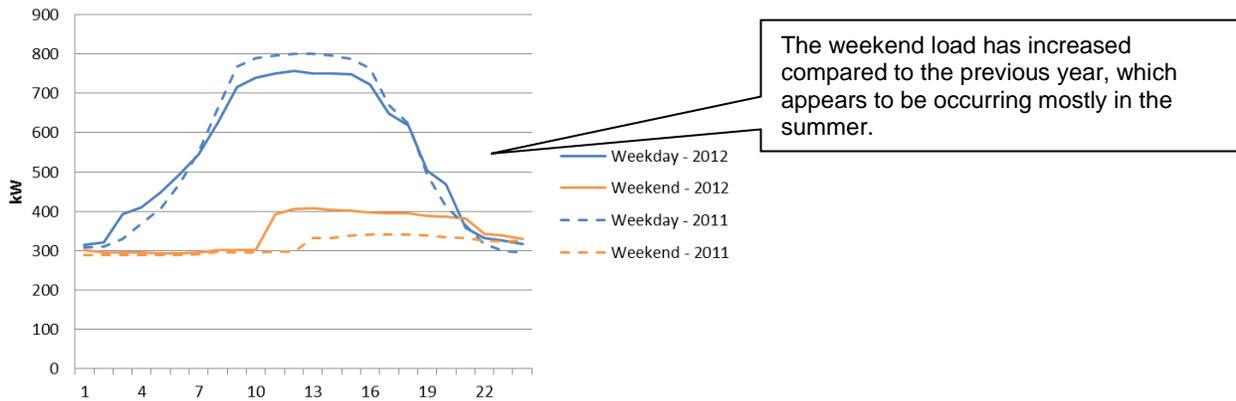
**800-Electric Profile Review**

The graphs below illustrate the power requirements of the facility throughout a typical week, typical day and the year. The typical week and typical day profiles are averaged throughout the year in order to view how the electric demand varies during the day and across the week. The load duration curve represents the demand as a function of cumulative time for the year.

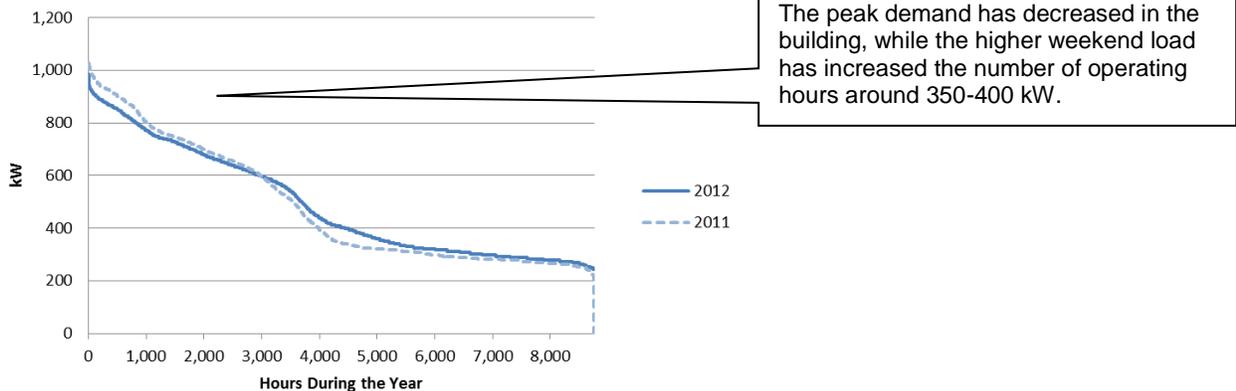
**800 Broadway Typical Week Profile**



**800 Broadway Typical Day Profile**



**800 Broadway Load Duration Curve**



800-Energy Star Review

<b>General Information</b> <a href="#" style="color: white; text-decoration: underline;">Edit</a>	
<b>Address:</b> 800 Broadway Street , Cincinnati, OH 45202	
<b>Year Built:</b> 1931	
<b>Property Type:</b> Single Facility	
<b>Baseline Rating:</b> 79	<b>Current Rating:</b> 88
<input type="checkbox"/> <b>View Period Ending Dates</b>	
<b>Water Period Ending Dates</b> Current: N/A Baseline: N/A	<b>Energy Period Ending Dates</b> Current: December 2012 Baseline: December 2006
<b>Eligibility for the ENERGY STAR</b>	
Not Eligible: Less than one year since the period ending date of the last ENERGY STAR application. Eligible again on 09/30/2013	

This building was received the Energy Star award in 2012 for the fifth straight year. The building should be able to receive another award in September of 2013.

800 Broadway Energy Conservation Measures and Recommendations

Previous ECM's

- Night setback for equipment.
- Time clocks and schedules for all lighting and equipment.
- New more efficient chiller.
- New more efficient boilers.
- New high efficiency domestic water boilers.
- VFD's on pumps and air handlers.
- New high efficiency cooling towers with VFD's.
- Selective lighting replacements.

Proposed ECM's

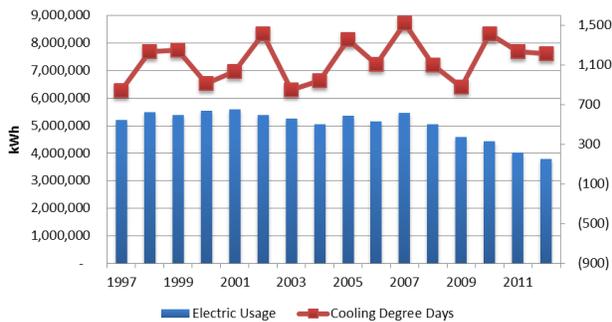
- Additional lighting retrofits with Duke Energy incentives or ESCO.
- Replacement of large low rise air handlers with more efficient equipment.
- Perform water conservation survey and associated work.
- Upgrade control system and retro-commission equipment and controls for schedules.
- Computer room consolidation with new A/C units.

## County Administration Building

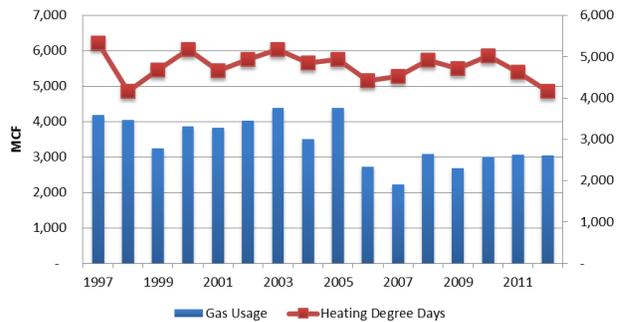
0138 - Administration Building	ARCHIBUS/FM Bldg Data
	Bldg Code: 0138
	Bldg Name: Administration Building
	Address: 138 East Court Street
	City: CINCINNATI
	State: OH
	Postal Code: 45202
	Site Code: COUNTYCAMPUS
	Agency: BOCC
	Use: Office
	Const Type: BrickStone
	Date Built: 1987
	Ext Gross Area: 209,063.30 sf
	Int Gross Area: 196,735.49 sf
	Rentable Area: 182,724.33 sf
	Estimated Area: 0.00 sf
Total Roof Area: 20,488.00 sf	
Leased/Owned: Owned	
Floor Count: 11	
Sprinklered?: Yes	
Property: 079-0001-0128-90	

Fl Code	Int Gross	Ext Gross	Vert Per	Service	Rentable	Usable	Room Area
01	16,844 sf	17,852 sf	2,008 sf	4,981 sf	14,836 sf	9,854 sf	16,844 sf
02	18,027 sf	19,162 sf	2,071 sf	2,679 sf	15,956 sf	13,277 sf	18,027 sf
03	17,934 sf	19,039 sf	1,564 sf	2,980 sf	16,369 sf	13,389 sf	17,934 sf
04	17,929 sf	19,030 sf	1,559 sf	2,972 sf	16,371 sf	13,398 sf	17,929 sf
05	17,419 sf	18,552 sf	893 sf	2,709 sf	16,526 sf	13,817 sf	17,419 sf
06	17,414 sf	18,553 sf	925 sf	3,174 sf	16,490 sf	13,315 sf	17,414 sf
07	17,407 sf	18,549 sf	902 sf	2,680 sf	16,505 sf	13,825 sf	17,407 sf
08	17,400 sf	18,553 sf	893 sf	3,102 sf	16,507 sf	13,405 sf	17,400 sf
09	17,400 sf	18,553 sf	862 sf	2,136 sf	16,538 sf	14,403 sf	17,400 sf
0B	21,521 sf	22,616 sf	1,432 sf	10,231 sf	20,089 sf	9,858 sf	21,521 sf
0R	0 sf	0 sf	0 sf	0 sf	0 sf	0 sf	0 sf
10	17,440 sf	18,606 sf	902 sf	3,615 sf	16,538 sf	12,923 sf	17,440 sf
OUT	0 sf	0 sf	0 sf	0 sf	0 sf	0 sf	0 sf

Administration Annual Electric Usage



Administration Annual Gas Usage



The County Administration Building was renovated in the 1980's and has been upgraded with a rooftop "swing" chiller, new electric service, DDC controls and two new rooftop chillers. The base central heating plant remains 1980 vintage as the boilers, chillers, cooling towers and air handlers are original equipment to that renovation.

The electrical graph shows relatively steady consumption pattern up until 2007, where it has continued to decrease each year. This building has the highest electrical cost per unit area cost due to the large computer center (RCC) residing on the 9th & 10th floor. The computer data center has its own rooftop cooling equipment and air handlers. The consumption decreased in 2009 as the RCC has moved out of the building. This past year consumption decreased by 15%.

The gas history chart demonstrates a 1% increase in gas usage overall.

**CAB-Historical Monthly Electric and Gas Data**

The following data is a representation of electrical and gas usage by month. The green cells show the minimum usage for the month. The electric consumption was at an all-time low for every month of the year. Natural gas consumption increased slightly from the previous year. Water consumption appears to have increased by 32% since 2011, primarily due to an increase in summer consumption.

**Administration Building Electric Data**

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	TOTAL	
2010	kWh	353,105	343,028	329,112	345,861	383,518	480,234	447,605	442,294	441,078	360,343	332,886	325,613	4,584,677
	kWa	922	919	797	1,174	1,019	940	652	1,056	1,079	1,007	1,073	994	1,174
	kWb	774	770	820	1,066	1,356	1,225	1,215	1,309	1,115	1,043	944	829	1,356
	Cost	\$ 30,832	\$ 29,775	\$ 30,189	\$ 32,844	\$ 39,047	\$ 40,675	\$ 45,853	\$ 47,950	\$ 44,313	\$ 40,130	\$ 36,778	\$ 34,429	\$ 452,814
2011	kWh	324,343	285,488	301,961	385,433	405,924	462,495	461,786	450,370	390,898	339,288	301,949	320,665	4,430,600
	kWa	910	902	1,045	1,001	944	936	887	1,097	1,123	1,088	938	760	1,123
	kWb	819	813	812	1,033	971	1,037	1,028	1,097	1,151	1,103	915	851	1,151
	Cost	\$ 36,357	\$ 25,424	\$ 26,608	\$ 33,563	\$ 34,425	\$ 39,091	\$ 39,101	\$ 38,961	\$ 35,203	\$ 31,418	\$ 27,632	\$ 28,402	\$ 396,184
2012	kWh	299,296	263,992	285,864	316,316	303,592	359,529	408,847	371,314	354,123	267,465	266,000	275,294	3,771,632
	kWa	719	728	986	917	984	948	1,074	1,025	895	888	830	739	1,074
	kWb	780	769	846	968	986	975	1,079	1,025	983	952	763	755	1,079
	Cost	\$ 24,629	\$ 23,350	\$ 25,483	\$ 28,609	\$ 28,314	\$ 30,614	\$ 34,377	\$ 31,928	\$ 30,533	\$ 26,224	\$ 23,320	\$ 23,589	\$ 330,969

**Administration Building Gas Data**

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	TOTAL
2010	CCF	7,657	6,313	3,200	1,858	25	0	1	1	1	2,237	5,385	26,678
	Cost	\$ 9,150	\$ 7,821	\$ 4,583	\$ 1,387	\$ 88	\$ 51	\$ 51	\$ 52	\$ 52	\$ 1,782	\$ 4,235	\$ 29,302
2011	CCF	7,364	6,873	3,879	1,399	1,055	828	295	143	160	177	2,663	5,195
	Cost	\$ 6,322	\$ 5,917	\$ 3,429	\$ 1,319	\$ 1,051	\$ 910	\$ 537	\$ 420	\$ 430	\$ 430	\$ 2,210	\$ 4,096
2012	CCF	9,062	3,568	2,426	1,487	494	158	150	140	78	101	179	12,558
	Cost	\$ 6,328	\$ 2,415	\$ 1,746	\$ 964	\$ 541	\$ 417	\$ 417	\$ 418	\$ 380	\$ 398	\$ 454	\$ 8,142

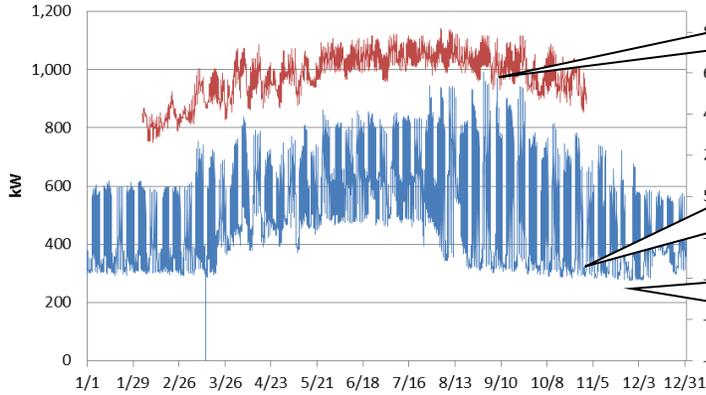
**Administration Building Water Data**

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	TOTAL	
2010	CCF	362	324	492	345	466	4,092	1,258	1,683	1,832	949	630	495	12,928
	Cost	\$ 2,687	\$ 2,472	\$ 3,555	\$ 2,529	\$ 3,267	\$ 6,567	\$ 7,255	\$ 9,407	\$ 10,316	\$ 5,757	\$ 4,667	\$ 3,623	\$ 62,102
2011	CCF	283	367	348	315	479	672	739	1,030	1,232	727	650	422	7,264
	Cost	\$ 3,619	\$ 4,599	\$ 4,432	\$ 3,691	\$ 4,388	\$ 5,360	\$ 4,956	\$ 6,203	\$ 7,287	\$ 4,923	\$ 4,841	\$ 4,414	\$ 58,713
2012	CCF	344	369	362	485	571	1,097	1,458	1,730	1,353	765	574	505	9,613
	Cost	\$ 2,636	\$ 3,069	\$ 2,943	\$ 3,584	\$ 4,098	\$ 7,130	\$ 8,939	\$ 10,463	\$ 8,532	\$ 5,115	\$ 4,116	\$ 3,866	\$ 64,491

Green cells = minimum of month for past 3 years

**CAB-Three Year Electrical Review**

**Administration Annual Electric Profile (2010)**

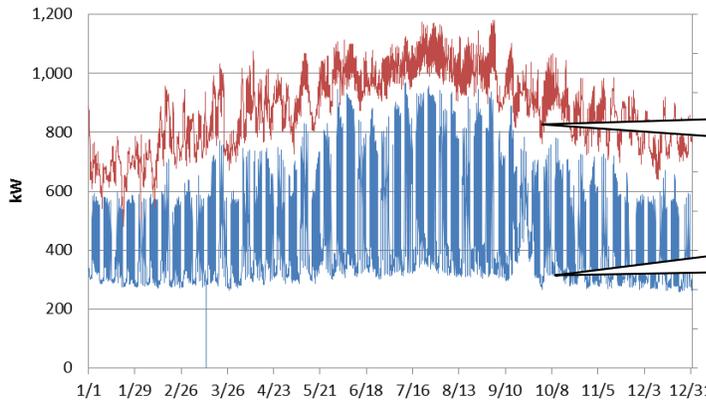


The peak demand is very clearly highly dependent upon outdoor air temperatures.

Energy consumption rose in April and May, largely due to the continuous operation of chillers. The base load other months of the year is lower than that of 2009.

The weekend scheduling continued throughout the year, resulting in continuous electric consumption improvement compared to 2008.

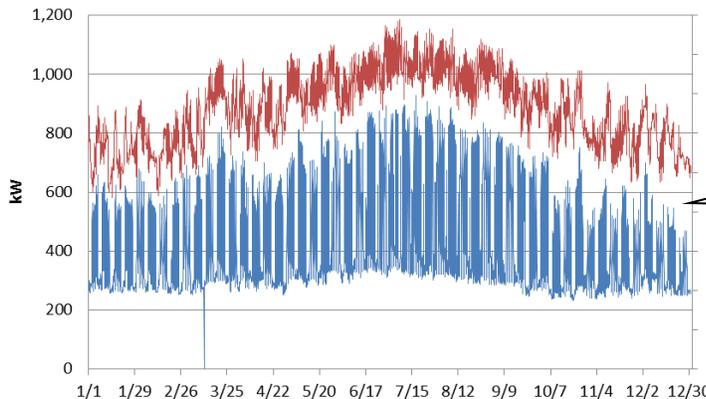
**Administration Annual Electric Profile (2011)**



More frequent jumps in demand are visible; however the average monthly demand across the year

The summertime setback has seen a considerable improvement compared to 2010.

**Administration Annual Electric Profile (2012)**

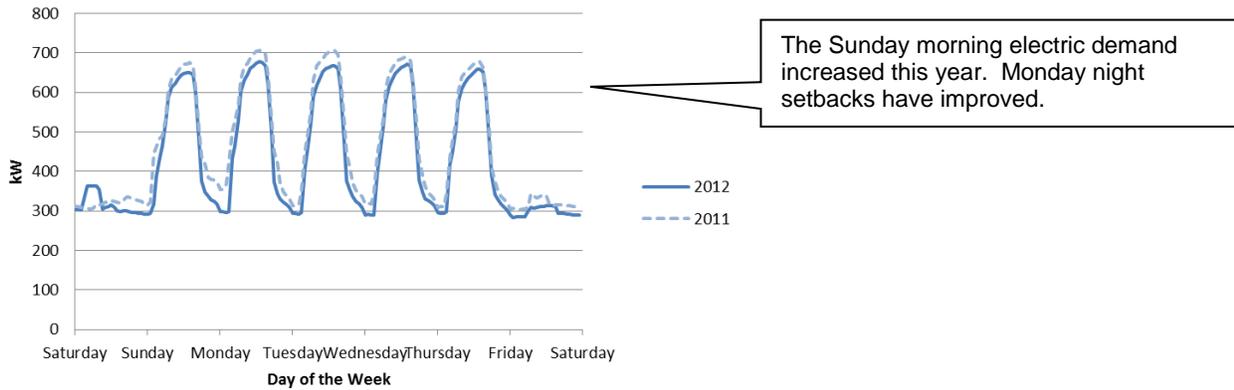


Similar to other buildings, the peak load decreased during the last few months of the year.

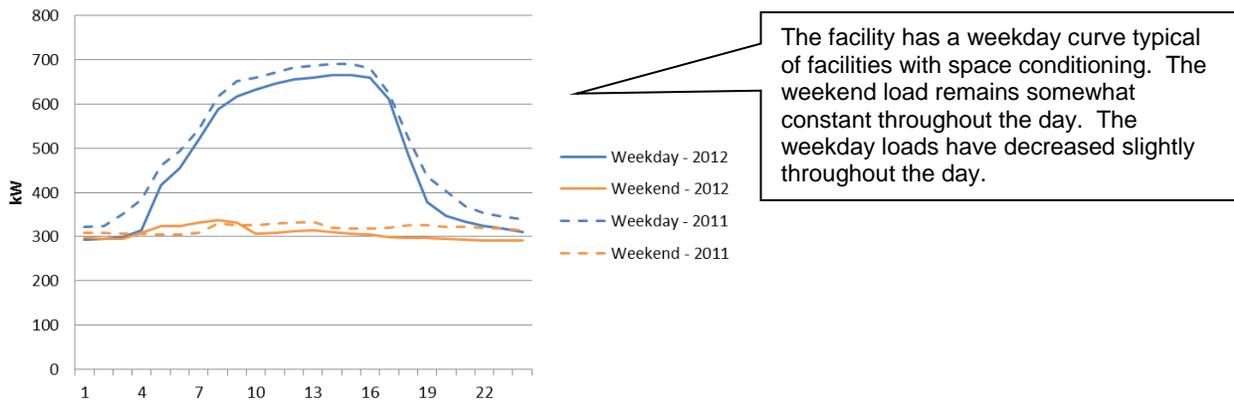
**CAB-Electric Profile Review**

The graphs below illustrate the power requirements of the facility throughout a typical week, typical day and the year. The typical week and typical day profiles are averaged throughout the year in order to view how the electric demand varies during the day and across the week. The load duration curve represents the demand as a function of cumulative time for the year.

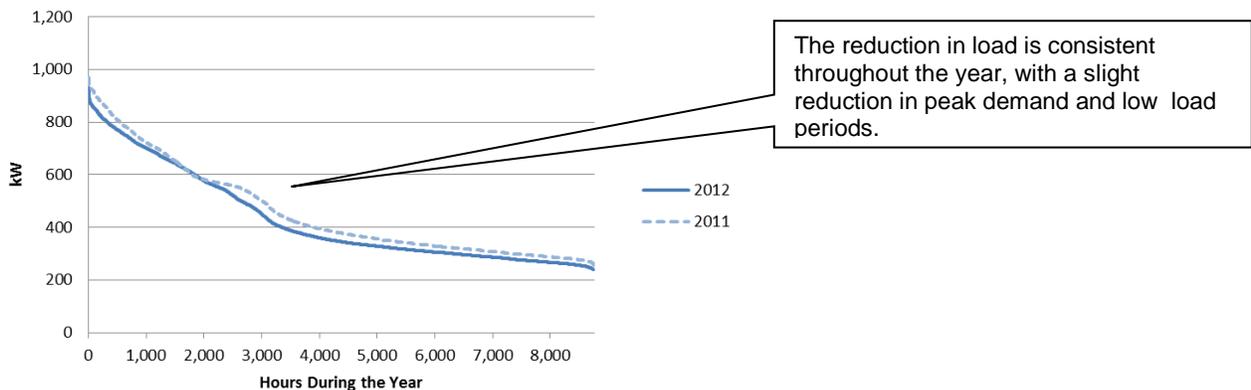
**Administration Typical Week Profile**



**Administration Typical Day Profile**



**Administration Load Duration Curve**



CAB-Energy Star Review

<b>General Information</b> <a href="#">Edit</a>	
<b>Address:</b> 138 East Court Street , Cincinnati, OH 45202	
<b>Year Built:</b> 1987	
<b>Property Type:</b> (not set)	
<b>Baseline Rating:</b> 88	<b>Current Rating:</b> 97
<input type="checkbox"/> <b>View Period Ending Dates</b>	
<b>Water Period Ending Dates</b> Current: N/A Baseline: N/A	<b>Energy Period Ending Dates</b> Current: December 2012 Baseline: December 2006
<b>Eligibility for the ENERGY STAR</b>	
Not Eligible: Less than one year since the period ending date of the last ENERGY STAR application. Eligible again on 08/31/2013	

This building received an Energy Star Award in 2012. The facility will be eligible again in August of 2013.

County Administration Building Energy Conservation Measures and Recommendations

Previous ECM's

- Night setback for equipment.
- New rooftop chiller for "swing" seasons.
- New high efficient rooftop air handling units bought on Life Cycle Cost Methodology.
- Selective lighting replacements.

Proposed ECM's

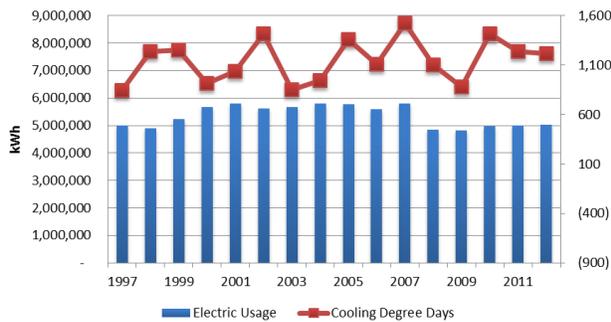
- Implement energy conservation measures from Ameresco ECM audit.
  - Lighting retrofits using Duke Incentive program with occupancy sensors
  - Replace inefficient steam boilers and domestic water heaters
  - Convert steam plant to heating hot water plant
  - Recover heat rejection from computer room A/C units
  - Perform water conservation survey and associated work
  - Upgrade and recommission controls
  - Variable frequency drives and motor replacements

## Hamilton County Courthouse

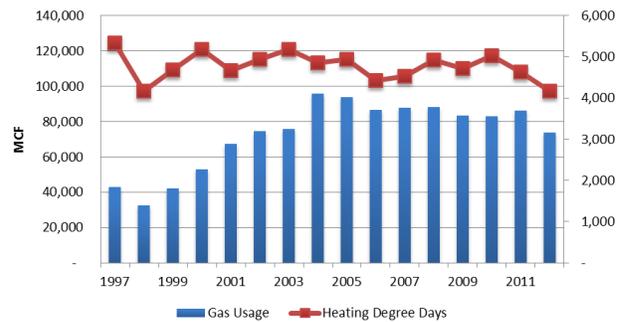
1000 - Courthouse	ARCHIBUS/IFM Bldg Data
	Bldg Code: 1000
	Bldg Name: Courthouse
	Address: 1000 Main Street
	City: CINCINNATI
	State: OH
	Postal Code: 45202
	Site Code: COUNTYCAMPUS
	Agency: BOCC
	Use: Office
	Const Type: Stone
	Date Built: 1915
	Ext Gross Area: 553,685.24 sf
	Int Gross Area: 516,480.17 sf
	Rentable Area: 400,528.35 sf
	Estimated Area: 0.00 sf
Total Roof Area: 77,077.67 sf	
Leased/Owned: Owned	
Floor Count: 9	
Sprinklered?: Yes	
Property: 079-0002-0017-90	

Fl Code	Int Gross	Ext Gross	Vert Pen	Service	Rentable	Usable	Room Area
01	69,885 sf	73,992 sf	12,388 sf	21,457 sf	57,497 sf	36,040 sf	69,937 sf
02	69,717 sf	74,373 sf	19,912 sf	18,337 sf	49,805 sf	31,468 sf	69,711 sf
03	68,305 sf	75,498 sf	12,721 sf	16,207 sf	55,583 sf	39,377 sf	68,303 sf
04	68,301 sf	73,426 sf	24,512 sf	18,556 sf	43,789 sf	25,232 sf	68,306 sf
05	68,236 sf	73,420 sf	13,199 sf	19,435 sf	55,036 sf	35,601 sf	68,300 sf
06	70,734 sf	73,464 sf	23,067 sf	12,595 sf	47,667 sf	35,072 sf	70,734 sf
07	24,384 sf	26,699 sf	7,335 sf	2,988 sf	17,049 sf	14,061 sf	24,384 sf
0B	70,255 sf	75,493 sf	2,817 sf	27,221 sf	67,438 sf	40,217 sf	70,553 sf
0R	0 sf						
OUT	0 sf						
SB	6,665 sf	7,319 sf	0 sf	6,395 sf	6,665 sf	270 sf	6,665 sf

**Courthouse Annual Electric Usage**



**Courthouse Annual Gas Usage**



The County Courthouse has had many renovations in the 1990's as part of a large scale Public Works upgrade project. Future projects were never started due to lack of funding. Those original projects provided five new boilers and several large VAV air handlers. The building has modern electronic DDC controls and two new VFD driven cooling towers.

The electrical graph shows a large upward trend as the building was remodeled and tenants began using the new space in the 1990's. After 2001 the usage levels off and the building began consuming nearly the same amount of electricity year-to-year, until 2008. In 2008, the electric consumption dropped to a level nearly the same as that before the remodeling effort. Two years later, the usage increased slightly, likely due to warmer weather, and the building has remained steady since.

The natural gas history shows a steady increase since 2000 as the Courthouse began providing steam to the Justice Center for combined plant use. The natural gas consumption had generally leveled off in recent years, but decreased significantly in 2012.

**CH-Historical Monthly Electric and Gas Data**

The following data is a representation of electrical and gas usage by month. The green cells show the minimum usage for the month. The electric consumption decreased in the summer. A meter change skews the month of September 2011. 2012 consumption may actually be slightly lower than 2011 had the meter change not occurred. The natural gas consumption decreased significantly for most of the year, as did water.

**Courthouse Electric Data**

	Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	TOTAL
2010	kWh	397,682	357,945	375,505	409,081	399,335	453,778	471,911	497,162	452,635	365,543	366,049	415,185	4,822,436
	kWa	1,037	1,041	1,128	1,156	1,253	1,406	1,386	1,399	1,336	1,250	1,161	1,111	1,406
	kWb	1,266	1,266	1,266	1,266	1,266	1,406	1,386	1,399	1,336	1,250	1,195	1,195	1,406
	Cost	\$ 49,417	\$ 33,589	\$ 34,904	\$ 37,185	\$ 36,546	\$ 41,239	\$ 42,451	\$ 44,290	\$ 40,845	\$ 34,559	\$ 34,220	\$ 37,466	\$ 522,247
2011	kWh	419,553	381,416	397,207	429,264	412,366	459,158	520,080	523,984	241,477	392,122	412,468	399,987	4,989,082
	kWa	1,172	1,172	1,209	1,249	1,172	1,331	1,481	1,426	1,172	1,117	1,284	1,081	1,481
	kWb	1,195	1,195	1,209	1,249	1,194	1,331	1,481	1,426	1,032	1,117	1,284	1,081	1,481
	Cost	\$ 33,724	\$ 31,244	\$ 32,347	\$ 35,252	\$ 33,844	\$ 37,676	\$ 42,382	\$ 42,308	\$ 22,351	\$ 31,747	\$ 34,010	\$ 32,056	\$ 408,941
2012	kWh	420,650	375,940	384,386	382,867	373,711	425,163	540,784	493,647	453,535	363,974	401,700	412,141	5,028,498
	kWa	1,089	1,187	1,204	1,200	1,235	1,374	1,435	1,441	1,300	1,028	1,142	1,042	1,441
	kWb	1,089	1,187	1,204	1,200	1,235	1,374	1,435	1,441	1,300	1,225	1,225	1,225	1,441
	Cost	\$ 34,244	\$ 34,385	\$ 35,002	\$ 34,883	\$ 35,014	\$ 39,332	\$ 45,237	\$ 43,297	\$ 39,432	\$ 34,398	\$ 36,015	\$ 36,461	\$ 447,700

**Courthouse Gas Data**

	Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	TOTAL
2010	CCF	117,755	139,540	125,972	95,357	40,165	41,688	36,199	35,464	35,485	31,968	47,225	84,723	832,908
	Cost	\$ 78,351	\$ 104,788	\$ 91,077	\$ 71,512	\$ 24,854	\$ 25,995	\$ 22,812	\$ 22,835	\$ 22,849	\$ 17,100	\$ 26,232	\$ 40,540	\$ 687,801
2011	CCF	137,299	135,042	102,913	95,235	62,884	53,419	36,601	35,385	36,465	38,530	48,233	77,871	859,877
	Cost	\$ 86,970	\$ 71,378	\$ 60,341	\$ 39,264	\$ 32,307	\$ 23,450	\$ 21,664	\$ 22,021	\$ 21,968	\$ 27,832	\$ 41,146	\$ 56,116	\$ 504,457
2012	CCF	119,374	99,495	63,084	49,987	33,808	30,820	30,226	32,763	31,688	55,782	92,008	96,854	735,889
	Cost	\$ 66,521	\$ 55,564	\$ 37,802	\$ 17,370	\$ 11,776	\$ 12,208	\$ 13,043	\$ 14,900	\$ 14,411	\$ 24,723	\$ 44,117	\$ 51,485	\$ 363,918

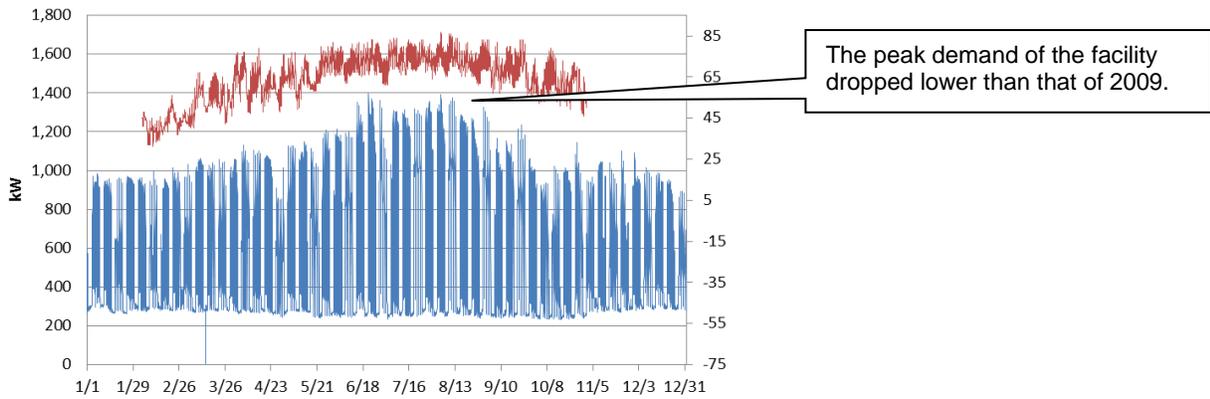
**Courthouse Water Data**

	Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	TOTAL
2010	CCF	1,561	2,050	1,829	1,611	1,927	2,509	2,674	2,933	3,369	2,061	1,869	2,263	26,656
	Cost	\$ 8,605	\$ 11,701	\$ 10,317	\$ 9,518	\$ 10,974	\$ 13,304	\$ 13,560	\$ 14,198	\$ 16,880	\$ 11,145	\$ 10,373	\$ 11,522	\$ 142,095
2011	CCF	2,517	1,737	2,223	1,564	1,876	2,300	2,424	3,105	3,010	1,750	1,798	2,236	26,540
	Cost	\$ 12,564	\$ 10,349	\$ 13,345	\$ 9,527	\$ 11,137	\$ 13,188	\$ 12,708	\$ 14,750	\$ 15,712	\$ 10,293	\$ 10,856	\$ 13,220	\$ 147,649
2012	CCF	1,563	1,890	1,450	2,010	1,911	2,360	2,268	2,632	1,664	872	987	2,444	22,051
	Cost	\$ 10,023	\$ 12,565	\$ 9,964	\$ 12,274	\$ 12,119	\$ 14,412	\$ 12,906	\$ 11,859	\$ 9,029	\$ 6,305	\$ 6,858	\$ 13,841	\$ 132,158

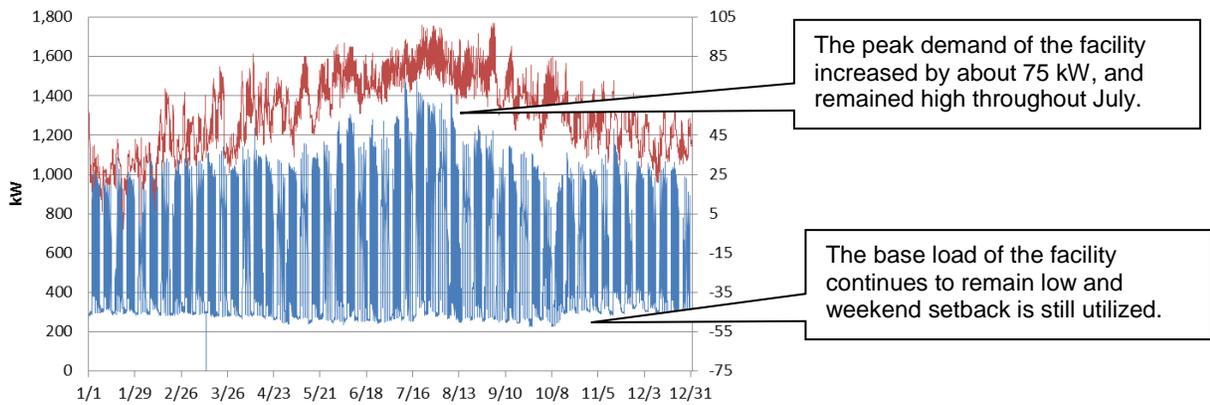
= minimum of month for past 3 years

CH-Three Year Electrical Review

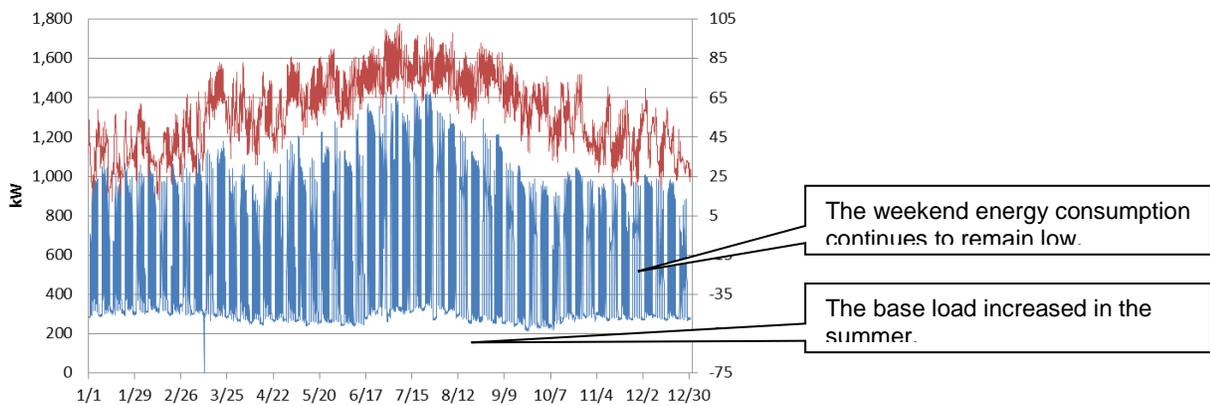
**Courthouse Annual Electric Profile (2010)**



**Courthouse Annual Electric Profile (2011)**



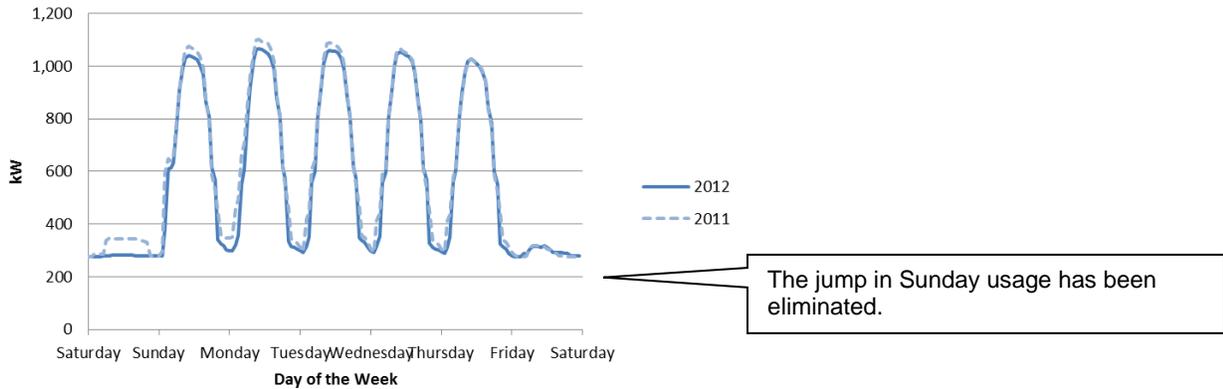
**Courthouse Annual Electric Profile (2012)**



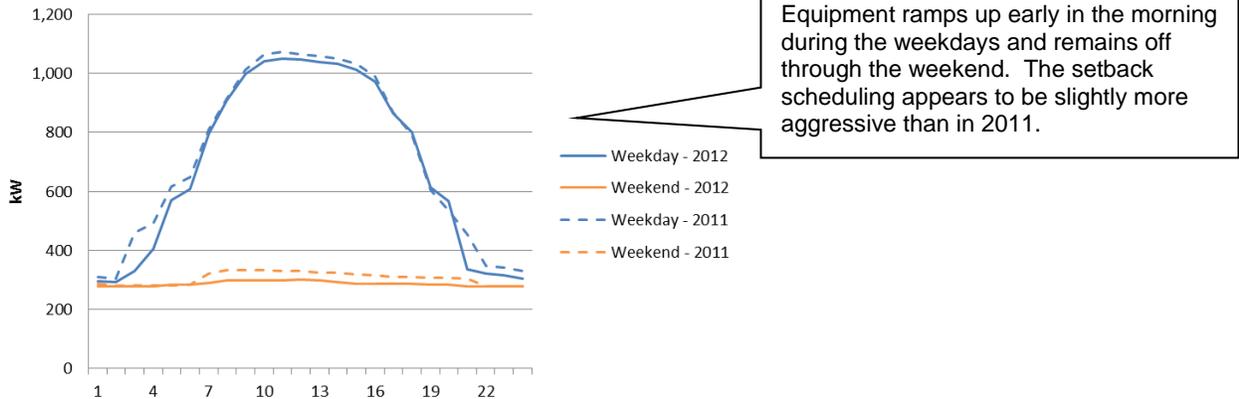
**CH-Electric Profile Review**

The graphs below illustrate the power requirements of the facility throughout a typical week, typical day and the year. The typical week and typical day profiles are averaged throughout the year in order to view how the electric demand varies during the day and across the week. The load duration curve represents the demand as a function of cumulative time for the year.

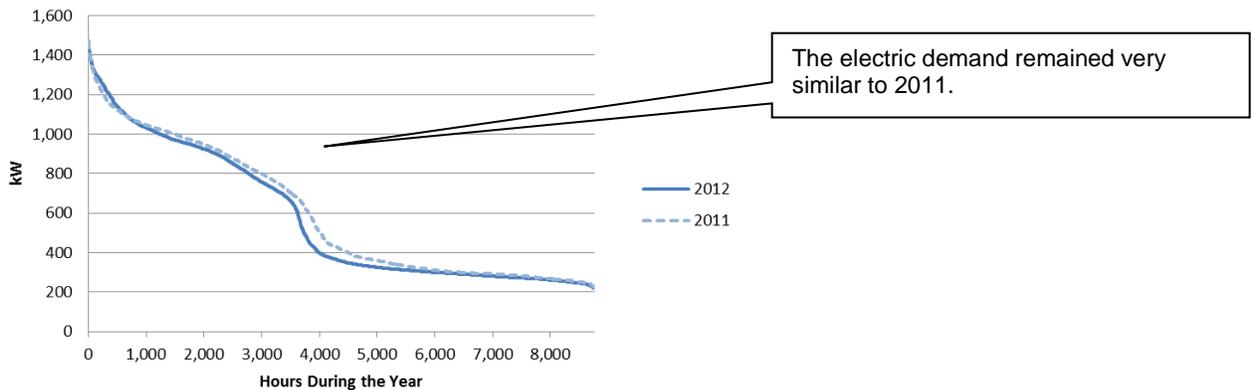
**Courthouse Typical Week Profile**



**Courthouse Typical Day Profile**



**Courthouse Load Duration Curve**



CH-Energy Star Review

<b>General Information</b> <a href="#">Edit</a>	
<b>Address:</b> 1000 Main Street , Cincinnati, OH 45202	
<b>Year Built:</b> 1915	
<b>Property Type:</b> (not set)	
<b>Baseline Rating:</b> 94	<b>Current Rating:</b> 48
<input type="checkbox"/> <b>View Period Ending Dates</b>	
<b>Water Period Ending Dates</b> Current: N/A Baseline: N/A	<b>Energy Period Ending Dates</b> Current: December 2012 Baseline: December 2005
<b>Eligibility for the ENERGY STAR</b>	
Not Eligible: Rating must be 75 or above	

This building does not qualify for an Energy Star because the EPA does not recognize the combined boiler plant as a method of obtaining an Energy Star rating. When combined with the Justice Center, both buildings could qualify.

Hamilton County Courthouse Building Energy Conservation Measures and Recommendations

Previous ECM's

- Night Setback for equipment.
- VAV air handlers.
- Selective lighting replacements.

Proposed ECM's

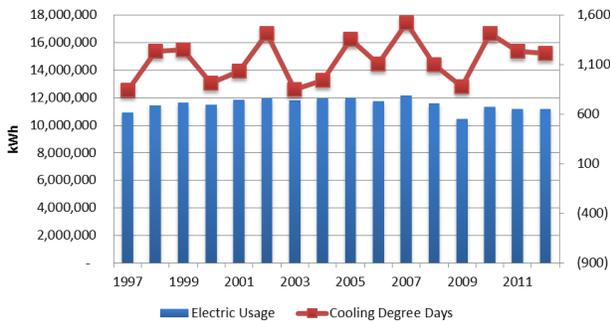
- Implement energy conservation measures from Ameresco ECM audit.
  - Lighting retrofits using Duke Incentive programs with occupancy sensors
  - Steam plant efficiency improvements
  - Free-cooling heat exchanger
  - Perform water conservation survey and associated work
  - Computer room A/C modifications
  - Upgrade and recommission controls
- Complete original construction plans and upgrade all air handlers to newer standards.

# Justice Center

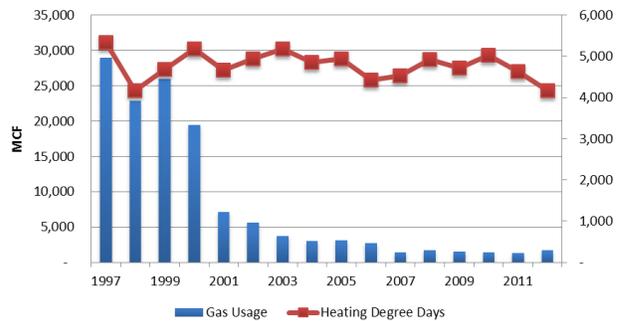
1100 - Justice Center	ARCHIBUS/FM Bldg Data
	Bldg Code: 1100
	Bldg Name: Justice Center
	Address: 1000 Sycamore Street
	City: CINCINNATI
	State: OH
	Postal Code: 45202
	Site Code: COUNTYCAMPUS
	Agency: Sheriff
	Use: Jail
	Const Type: Masonry
	Date Built: 1985
	Ext Gross Area: 736,871.36 sf
	Int Gross Area: 721,586.85 sf
	Rentable Area: 489,538.49 sf
	Estimated Area: 0.00 sf
Total Roof Area: 95,778.18 sf	
Leased/Owned: Owned	
Floor Count: 26	
Sprinklered?: Yes	
Property: 075-0001-0147-90	

FI Code	Int Gross	Ext Gross	Vert Pen	Service	Rentable	Usable	Room Area
N01	33,634 sf	34,489 sf	1,916 sf	8,055 sf	31,719 sf	23,664 sf	33,614 sf
N01M	32,814 sf	35,007 sf	14,246 sf	7,811 sf	18,568 sf	10,757 sf	32,990 sf
N02	31,926 sf	32,831 sf	2,347 sf	3,887 sf	29,579 sf	25,692 sf	31,351 sf
N02M	31,901 sf	32,810 sf	25,698 sf	46 sf	6,202 sf	6,157 sf	31,890 sf
N03	32,256 sf	32,676 sf	2,678 sf	378 sf	29,578 sf	29,199 sf	31,841 sf
N03M	32,365 sf	32,673 sf	20,333 sf	43 sf	12,032 sf	11,989 sf	31,993 sf
N04	32,166 sf	32,606 sf	2,680 sf	367 sf	29,486 sf	29,119 sf	32,311 sf
N04M	32,302 sf	32,606 sf	14,472 sf	43 sf	17,829 sf	17,787 sf	32,376 sf
N05	32,070 sf	32,673 sf	2,317 sf	351 sf	29,752 sf	29,401 sf	32,071 sf
N05M	32,072 sf	32,673 sf	20,479 sf	43 sf	11,593 sf	11,550 sf	31,952 sf
N0B	21,707 sf	22,489 sf	994 sf	14,568 sf	20,713 sf	6,145 sf	21,707 sf
N0P	1,851 sf	2,112 sf	351 sf	1,354 sf	1,500 sf	146 sf	1,851 sf
N0R	0 sf						
NSB	0 sf						
OUT	0 sf						
S01	55,187 sf	56,216 sf	2,334 sf	12,264 sf	52,853 sf	40,589 sf	55,122 sf
S01M	53,671 sf	55,123 sf	26,257 sf	13,465 sf	27,414 sf	13,949 sf	53,642 sf
S02	33,024 sf	33,320 sf	2,809 sf	338 sf	30,215 sf	29,877 sf	33,047 sf
S02M	32,385 sf	32,794 sf	21,586 sf	42 sf	10,799 sf	10,757 sf	32,385 sf
S03	32,376 sf	32,676 sf	2,651 sf	410 sf	29,724 sf	29,315 sf	32,290 sf
S03M	32,243 sf	32,675 sf	20,626 sf	44 sf	11,617 sf	11,572 sf	32,243 sf
S04	32,167 sf	32,606 sf	2,543 sf	352 sf	29,624 sf	29,272 sf	32,172 sf
S04M	32,249 sf	32,673 sf	20,633 sf	44 sf	11,617 sf	11,572 sf	32,162 sf
S05	32,133 sf	32,673 sf	2,195 sf	351 sf	29,937 sf	29,586 sf	32,134 sf
S05M	32,072 sf	32,673 sf	20,395 sf	44 sf	11,677 sf	11,633 sf	31,204 sf
S0B	5,168 sf	5,684 sf	1,158 sf	1,564 sf	4,010 sf	2,447 sf	5,168 sf
S0P	1,851 sf	2,112 sf	351 sf	1,354 sf	1,500 sf	146 sf	1,851 sf
S0R	0 sf						

Justice Center Annual Electric Usage



Justice Center Annual Gas Usage



The Justice Center is the full time penal institution that houses inmates 24/7. The building is air-conditioned via (2) 455-ton chillers, cooling towers and large air handlers on the mezzanine levels. A recent heating upgrade provided a modern electronic DDC control system.

The electrical graph shows a general downward trend over the last few years. Electric consumption in 2012 was higher than that of 2011. Federal and State requirements for both cooling and heating make it difficult to save energy in this building.

The natural gas history shows a drastic decrease in natural gas usage once the Courthouse began providing steam to this building. Building currently only uses natural gas for cooking & boiler testing.

**JC-Historical Monthly Electric and Gas Data**

The following data is a representation of electrical and gas usage by month. The green cells show the minimum usage for the month. The electric consumption and peak demandslightly decreased compared to 2011. Despite an efficient summer, natural gas consumption increasedby 30%, largely because of higher consumption during the boiler testing period. Water consumption remained very similar to that of 2011.

**Justice Center Electric Data**

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	TOTAL	
2010	kWh	859,919	770,892	754,780	828,690	917,879	1,138,808	1,185,774	1,245,082	1,049,935	857,131	796,284	898,093	11,303,267
	kWa	1,300	1,326	1,309	1,568	1,875	1,927	1,953	1,979	1,892	1,884	1,616	1,352	1,979
	kWb	1,524	1,524	1,524	1,568	1,875	1,927	1,953	1,979	1,892	1,884	1,682	1,682	1,979
	Cost	\$ 81,713	\$ 62,972	\$ 61,914	\$ 67,168	\$ 75,386	\$ 90,071	\$ 93,589	\$ 97,820	\$ 84,475	\$ 72,391	\$ 66,710	\$ 73,363	\$ 927,573
2011	kWh	920,603	781,210	782,584	890,293	868,082	1,089,037	1,249,160	1,124,797	1,019,571	819,245	831,234	798,840	11,174,656
	kWa	1,339	1,335	1,594	1,564	1,793	1,918	1,992	1,961	1,914	1,572	1,591	1,334	1,992
	kWb	1,682	1,682	1,682	1,682	1,793	1,918	1,992	1,961	1,914	1,693	1,693	1,693	1,992
	Cost	\$ 68,777	\$ 59,801	\$ 59,891	\$ 67,898	\$ 67,073	\$ 82,064	\$ 92,431	\$ 84,284	\$ 77,262	\$ 62,765	\$ 63,545	\$ 61,436	\$ 847,227
2012	kWh	911,399	776,521	831,217	900,164	890,455	1,012,535	1,205,084	1,073,998	1,053,538	828,287	850,955	820,300	11,154,453
	kWa	1,336	1,342	1,620	1,598	1,843	1,766	1,848	1,860	1,853	1,584	1,553	1,301	1,860
	kWb	1,692	1,693	1,693	1,693	1,843	1,766	1,848	1,860	1,853	1,584	1,581	1,581	1,860
	Cost	\$ 66,307	\$ 59,276	\$ 61,632	\$ 64,550	\$ 66,411	\$ 70,416	\$ 79,796	\$ 74,432	\$ 73,457	\$ 59,682	\$ 60,591	\$ 59,295	\$ 795,845

**Justice Center Gas Data**

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	TOTAL
2010	CCF	815	629	377	1,389	4,550	639	653	658	882	982	2,056	14,782
	Cost	\$ 884	\$ 730	\$ 519	\$ 1,245	\$ 3,467	\$ 685	\$ 574	\$ 696	\$ 699	\$ 840	\$ 929	\$ 1,758
2011	CCF	1,264	759	598	682	623	442	530	485	588	4,915	995	13,383
	Cost	\$ 1,199	\$ 809	\$ 673	\$ 691	\$ 673	\$ 549	\$ 618	\$ 577	\$ 645	\$ 3,668	\$ 901	\$ 1,259
2012	CCF	875	717	416	2,503	819	212	109	190	608	6,960	2,327	17,390
	Cost	\$ 812	\$ 651	\$ 475	\$ 1,287	\$ 554	\$ 335	\$ 289	\$ 327	\$ 516	\$ 3,883	\$ 1,545	\$ 1,272

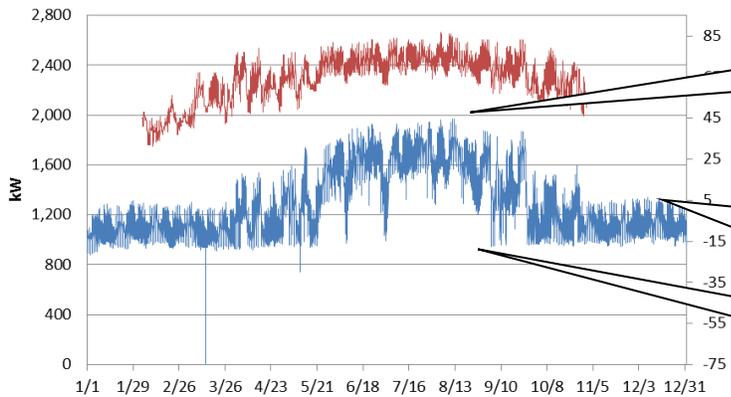
**Justice Center Water Data**

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	TOTAL
2010	CCF	588	743	607	585	645	799	4,439	4,550	5,020	3,693	3,487	28,803
	Cost	\$ 4,521	\$ 6,022	\$ 5,010	\$ 4,985	\$ 5,088	\$ 3,553	\$ 19,773	\$ 19,911	\$ 22,525	\$ 17,959	\$ 18,270	\$ 19,583
2011	CCF	4,016	3,287	4,091	3,084	3,695	4,602	4,473	4,241	5,051	4,133	3,305	48,137
	Cost	\$ 21,723	\$ 18,706	\$ 23,338	\$ 17,130	\$ 20,154	\$ 23,008	\$ 21,436	\$ 19,190	\$ 24,270	\$ 21,892	\$ 18,506	\$ 23,529
2012	CCF	3,763	4,340	4,100	3,673	3,843	4,193	3,653	4,329	5,160	3,625	3,404	48,095
	Cost	\$ 21,509	\$ 26,394	\$ 24,672	\$ 21,258	\$ 21,751	\$ 22,984	\$ 18,158	\$ 21,623	\$ 27,254	\$ 20,810	\$ 20,413	\$ 24,616

= minimum of month for past 3 years

JC-Three Year Electrical Review

Justice Center Annual Electric Profile (2010)

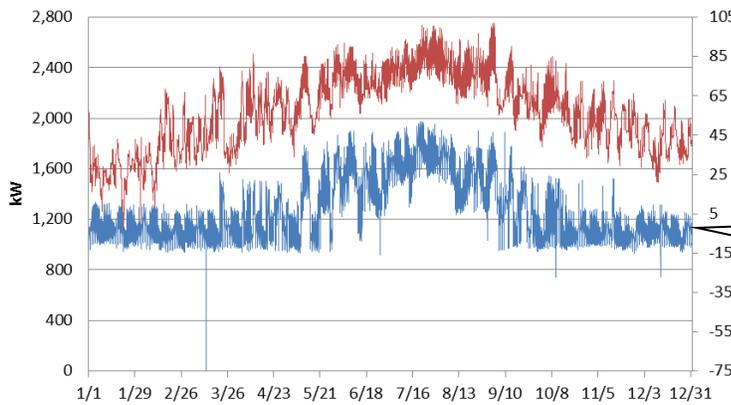


The peak demand increased by nearly 200 kW compared to 2009, but still remained lower than 2008.

While the base and peak loads the first few months of the year were lower than 2009, the rest of the year the base and peak loads increased significantly.

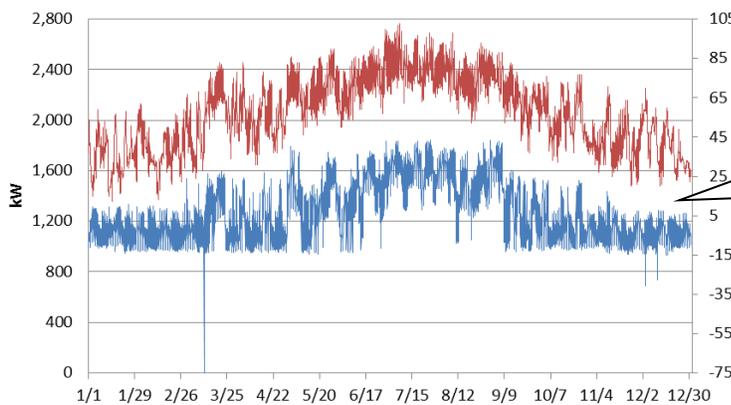
The chillers were operated continuously for long periods of time.

Justice Center Annual Electric Profile (2011)



The electric profile of the Justice Center remained very close to that of 2010.

Justice Center Annual Electric Profile (2012)

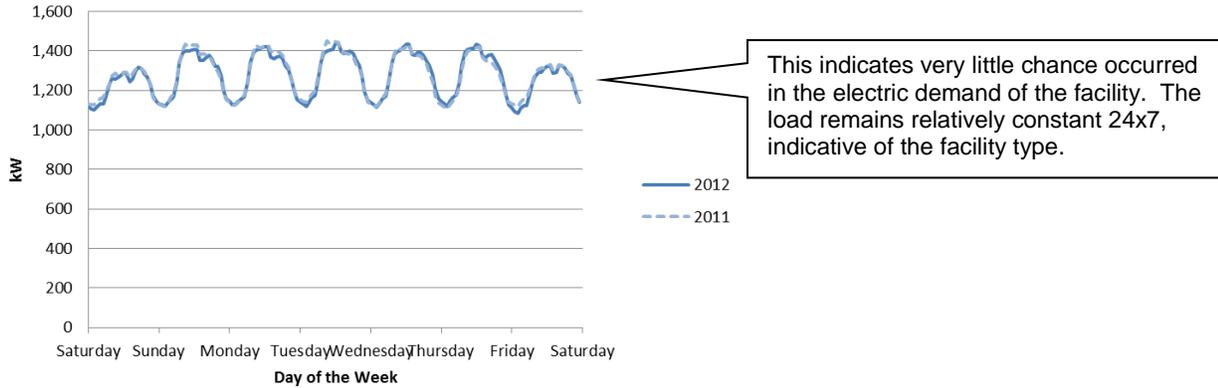


The peak demand of the facility has decreased 130-150 kW compared to 2011 and 2012. This will result in savings in the bill for the winter months as well.

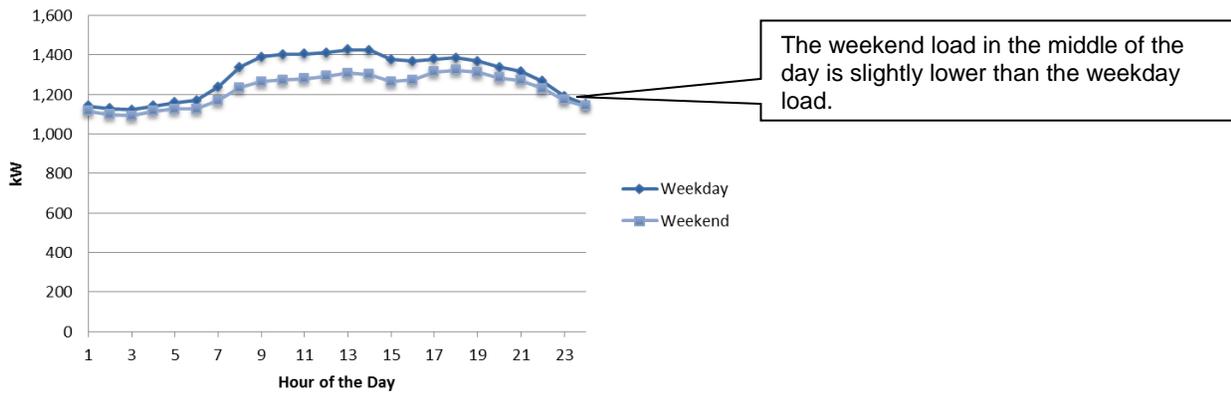
**JC-Electric Profile Review**

The graphs below illustrate the power requirements of the facility throughout a typical week, typical day and the year. The typical week and typical day profiles are averaged throughout the year in order to view how the electric demand varies during the day and across the week. The load duration curve represents the demand as a function of cumulative time for the year.

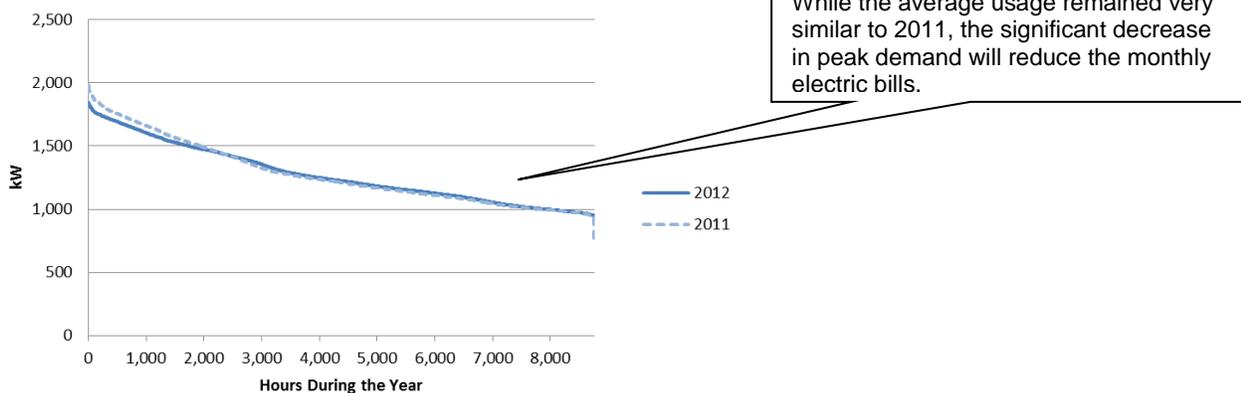
**Justice Center Typical Week Profile**



**Justice Center Typical Day Profile (2012)**



**Justice Center Load Duration Curve**



JC-Energy Star Review

General Information <a href="#">Edit</a>	
<b>Address:</b> 100 Sycamore Street , Cincinnati, OH 45202	
<b>Year Built:</b> 1985	
<b>Property Type:</b> (not set)	
<b>Baseline Rating:</b> 63	<b>Current Rating:</b> 85
<input type="checkbox"/> <b>View Period Ending Dates</b>	
<b>Water Period Ending Dates</b> Current: N/A Baseline: N/A	<b>Energy Period Ending Dates</b> Current: December 2012 Baseline: December 2006
Eligibility for the ENERGY STAR	
Eligible to <a href="#">Apply for the ENERGY STAR</a>	

The Justice Center is not eligible to qualify for the Energy Star because the heating for this building is provided by the Courthouse Boiler Plant. Steam usage is being monitored hourly with the intent of allotting the steam consumption for the facility if the EPA allows this method of submetering in the future.

Justice Center Energy Conservation Measures and Recommendations

Previous ECM's

- New cooling towers with VFD's.
- DDC control system upgrade.
- Upgraded Domestic Water pumping system to new Grundfos with VFD control.

Proposed ECM's

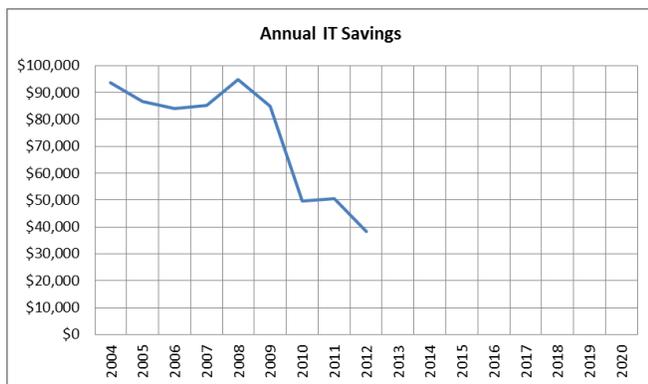
- Implement energy conservation measures from Ameresco ECM audit.
  - Lighting retrofits using Duke Incentive programs with occupancy sensors
  - Perform water conservation survey and associated work
  - Upgrade and recommission controls, demand controlled ventilation.
  - Install single zone cooling in local control rooms to allow for system-wide setback on supply air temperatures.
  - Solar panels and heat pump water heaters for domestic water
  - Variable frequency drives and motor replacements.
  - Chiller Replacement with Green Chiller options based on LCC selections.
  - Ozone laundry cleaning.

## Courthouse IT (Interruptible Tariff) Savings

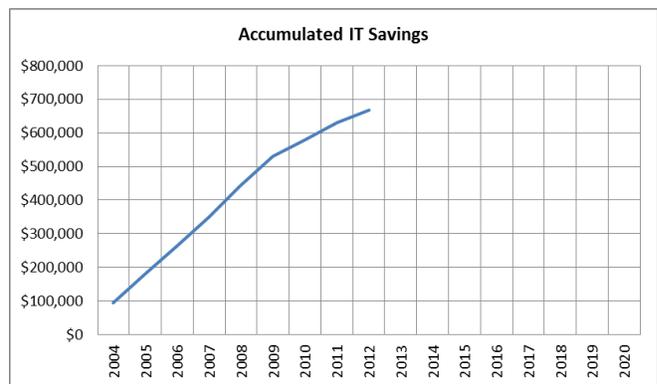
This program was put in place in 2003 and was ready for 2004 usage. An agreement exists between the end user and the local utility (Duke Energy Ohio) that stipulates that natural gas service can be curtailed at the local utility request during high demand times. The end user must also use at least 1,000 MCF during the summer months which the Courthouse because it provides steam to the Justice Center anyways. Table 3 shows the accumulated savings of this plan.

**Table 3: Courthouse FT / IT Natural Gas Rate Comparison**

Year	Gas Usage CCF	Firm Cost	Interruptible Cost	Annual Savings	Accumulated Savings
2004	957,232	\$147,918	\$54,208	\$93,710	<b>\$93,710</b>
2005	938,086	\$144,969	\$58,271	\$86,698	<b>\$180,408</b>
2006	866,570	\$133,956	\$49,751	\$84,205	<b>\$264,613</b>
2007	876,079	\$135,420	\$50,218	\$85,202	<b>\$349,815</b>
2008	880,728	\$157,511	\$62,663	\$94,847	<b>\$444,662</b>
2009	832,908	\$144,772	\$59,864	\$84,908	<b>\$529,570</b>
2010	831,541	\$118,086	\$68,508	\$49,578	<b>\$579,148</b>
2011	859,877	\$119,445	\$69,020	\$50,425	<b>\$629,573</b>
2012	735,889	\$106,063	\$67,682	\$38,381	<b>\$667,954</b>
2013					
2014					
2015					
2016					
2017					
2018					
2019					
2020					
<b>Total</b>	<b>7,778,910</b>	<b>\$1,208,139</b>	<b>\$8,987,049</b>	<b>\$667,954</b>	<b>\$667,954</b>



Annual Savings shows a diminishing return



Accumulated Savings shows a slight slowing of savings

Overall, this program is still valid and successful program saving real world dollars every year as the curtailment calls are minimal and sometimes the County can go an entire year with no curtailments..

# Hamilton County Natural Gas Broker Agreement

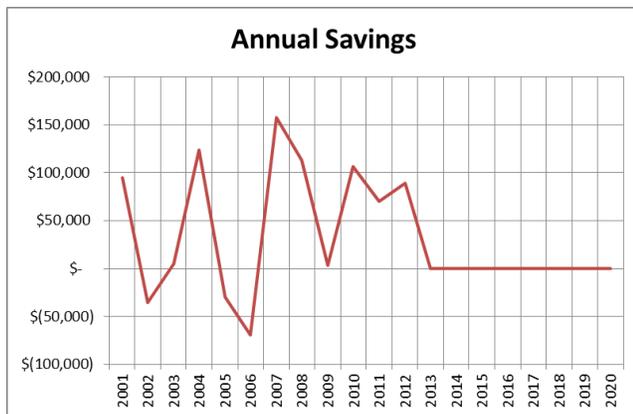
This program was put in place in 2000, with an agreement between the County and County Commissioners' Association of Ohio (CCAO). The CCAO manages a third party gas marketer who aggressively buys natural gas on the open market with strategies that are intended to provide the best gas prices possible to the group with a manageable risk. Monthly totals vary between savings and expenditures but overall the plan is saving money.

**Table 4: Natural Gas Comparison, CCAO versus Duke Energy**

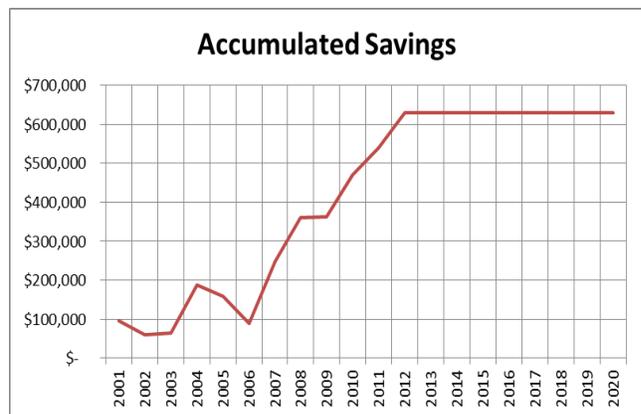
Year	Gas Usage (ccf)	Commodity Cost	Duke Cost	Savings (Annual)	Accumulated Savings
2001	103,533	\$ 629,185	\$ 724,333	\$ 95,148	\$ 95,148
2002	111,710	\$ 491,285	\$ 456,254	\$ (35,031)	\$ 60,116
2003	109,540	\$ 679,907	\$ 684,903	\$ 4,996	\$ 65,112
2004	109,540	\$ 746,382	\$ 870,079	\$ 123,697	\$ 188,809
2005	123,376	\$ 1,204,177	\$1,174,869	\$ (29,309)	\$ 159,501
2006	114,970	\$ 1,173,280	\$1,104,029	\$ (69,252)	\$ 90,249
2007	117,147	\$ 958,818	\$1,116,246	\$ 157,428	\$ 247,677
2008	116,377	\$ 1,120,661	\$1,233,389	\$ 112,728	\$ 360,405
2009	108,652	\$ 845,947	\$ 849,018	\$ 3,072	\$ 363,477
2010	107,817	\$ 594,920	\$ 701,462	\$ 106,541	\$ 470,018
2011	106,140	\$ 538,309	\$ 608,793	\$ 70,483	\$ 540,502
2012	92,502	\$ 365,166	\$ 454,702	\$ 89,537	\$ 630,038
2013				\$ -	\$ 630,038
2014				\$ -	\$ 630,038
2015				\$ -	\$ 630,038
2016				\$ -	\$ 630,038
2017				\$ -	\$ 630,038
2018				\$ -	\$ 630,038
2019				\$ -	\$ 630,038
2020				\$ -	\$ 630,038

**Accumulated Savings Total: \$ 630,038**

As can be seen above in the spreadsheet the County has saved approximately \$630,000 in the last twelve years by participating in deregulated natural gas commodity purchasing through the County Commissioners Association of Ohio (CCAO). As with any open market commodity purchase plan there is always risk on a year to year basis - some years are better than others.



Annual Savings shows the up and down of the market



Accumulated Savings shows overall success

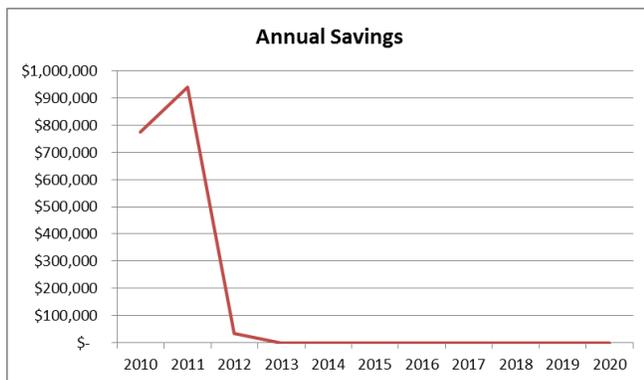
## Deregulated Electricity Commodity Purchasing

This original agreement started January 1, 2010 and ended on December 31, 2012. This original contract was held by Duke Energy Retail Service (DERS) which is a non-regulated supplier completely separate from the regulated utility Duke Energy Ohio (DEO).

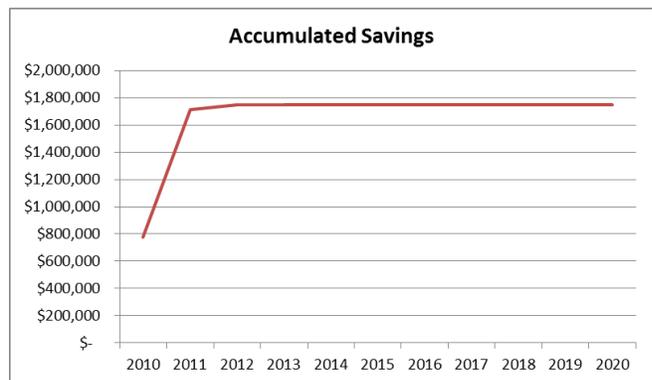
**Table 5: Electric Comparison, Electric Broker vs. DEO**

Year	Electric Usage (kwh)	Electric Cost Supplier	Electric Cost Local Utility	Savings (Annual)	Accumulated Savings
2010	38,283,754	\$ 3,195,133	\$3,970,566	\$ 775,433	\$ 775,433
2011	35,831,797	\$ 2,798,953	\$3,739,180	\$ 940,227	\$ 1,715,660
2012	34,568,328	\$ 2,810,759	\$2,845,793	\$ 35,035	\$ 1,750,695
2013				\$ -	\$ 1,750,695
2014				\$ -	\$ 1,750,695
2015				\$ -	\$ 1,750,695
2016				\$ -	\$ 1,750,695
2017				\$ -	\$ 1,750,695
2018				\$ -	\$ 1,750,695
2019				\$ -	\$ 1,750,695
2020				\$ -	\$ 1,750,695
<b>Accumulated Savings Total:</b>					<b>\$ 1,750,695</b>

To date this program has saved \$1,750,000 over its first 3 years. Utility Markets are always risky and in year 3 the savings were reduced from what we had hoped. The County Facilities Department will continue to pursue the safest and lowest cost options as the markets mature in this area.



Annual Savings shows high savings in Years 1 & 2



Accumulated Savings shows a flattening in 2013

## Electric T&D Riders Yearly Comparison

Electric transmission and delivery (T&D) riders are amounts applied to the monthly bill that are approved by PUCO to compensate Duke Energy Ohio (DEO) for items such as fuel costs, environmental issues, and capital recovery. These amounts can change quarterly and are based on kW billed demand and kWh usage.

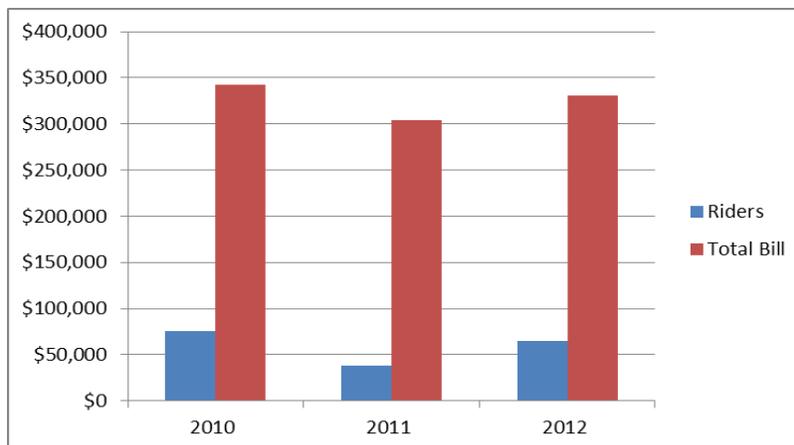
Generation riders and delivery riders are the two categories of electric T&D riders. The generation riders are calculated by applying additional fees or credits for each kW used. An example of a generation rider that applies to Hamilton County Facilities is Rider DR-IKE. This rider is to recover the revenue requirement associated with the costs incurred by Duke Energy due to Hurricane Ike. The amount for this rider is a charge of \$0.11 per kW and will be assessed through March 31, 2014.

The delivery riders are calculated by applying additional fees or credits for each kWh used. An example of a delivery rider that applies to Hamilton County Facilities is Rider OET. This rider is to recover the revenue paid by Duke Energy for the Ohio excise tax. The amount for this rider is a charge of \$0.00465 per kWh for the first 2,000 kWh, \$0.00419 per kWh for the next 13,000 kWh, and \$0.00363 per kWh for the any additional kWh.

The table and figure below illustrates the changes in electric T&D riders and total bill for the last three years using the same billed demand and usage for each year.

**Table 6: Electric Rider Yearly Average Comparison, 2010 - 2012**

Month	Usage		FINAL BILL ESTIMATE		
	Demand	Usage	Riders		Total Bill
	Billed kW	KWH	Total	% Of Bill	Cost
2010	10,881	3,771,632	\$75,702.08	22.13%	\$342,129.15
2011	10,881	3,771,632	\$37,843.54	12.44%	\$304,270.62
2012	10,881	3,771,632	\$64,508.29	19.49%	\$330,935.37



**Figure 10: Electric Rider Yearly Average Comparison, 2010 - 2012**

As can be seen from the table and figure above the T&D rider amounts change frequently and cannot be correlated to an increase or decrease in usage or billed demand. The future T&D riders and T&D rider amounts cannot be estimated with a simple algorithm.

## **Appendix A - Glossary of Terms**

**BASELINE OR BASEYEAR** - The reference to the year in which the County began its Energy Conservation Project, the calendar year 1997.

**BROKER OR MARKETER** - Natural gas marketers, or brokers, are independent companies that arrange alternate rates and terms of service for Primary Gas or Electric supply. Marketers offer the option of different terms of pricing than that offered by Duke Energy, such as a fixed rate for a fixed period of time. Marketers only arrange a customer's gas or electric supply—they do not deliver the natural gas or provide utility services.

**BTU** - A British thermal unit (BTU) is a standard unit of energy that is used in the United States. A 5-ton air conditioner that conditions a typical home is equivalent to 60,000 BTU/hour. A 100 watt light bulb dissipates 341 BTU/hour. The BTU is often used as a quantitative specification for the energy-producing or energy-transferring capability of heating and cooling systems such as furnaces, ovens, refrigerators, and air conditioners.

**CCAO** - County Commissioners' Association of Ohio. For the purposes of this report this refers to the organization in which Hamilton County Facilities is partnered with to provide all natural gas commodities for Hamilton County owned buildings. The CCAO manages the contract through Exelon Energy for all the Counties in the current buying block.

**DDC** - Direct Digital Control is a name given to computer systems used to monitor, trend, adjust and control building HVAC (Heating, Ventilating and Air Conditioning) Systems.

**DEGREE-DAY** - A rough measure used to estimate the amount of heating or cooling required in a given area, defined as the difference between the mean daily temperature and 65 degrees Fahrenheit. Cincinnati typically experiences about 4,500 heating degree-days per year.

**DEO** - Duke Energy Ohio is the regulated utility provider in Hamilton County.

**DERS** - Duke Energy Retail Service is the deregulated branch of Duke Energy in the Hamilton County area.

**ECM** - Energy Conservation Measure. Reference to any activity (project, scheduling, replacement, task) that is taken to save or use energy more wisely.

**ESCO** - Energy Service Company.

**FT RATE** - See IT Rate.

**ENGINEERING ENERGY PARTNER** - An energy service company or registered professionals, such as architectural and engineering firms, that provide the expertise, services, equipment, and financing without performance contracting guarantees (e.g. ThermalTech Engineering in this report).

**GS RATE** - See IT Rate

**HVAC** - Heating, Ventilating and Air Conditioning.

**IGA** - Investment Grade Audit.

**IT RATE** - Interruptible Rate Tariff. An optional rate schedule offered by Duke Energy that charges the customer lower transportation prices on natural gas in exchange for Duke Energy's ability to curtail the gas supply to building during high demand periods. The gas can be purchased on the open market from companies other than Duke Energy. GS stands for General Service (the default residential and commercial rate schedule) and FT stands for Firm Transportation (similar to IT but it cannot be curtailed).

**KW** - The kilowatt (symbolized kW) is a unit of power measurement. Used by the utility industry to measure the peak power consumption of buildings. A peak kW of usage costs about \$10-15/month.

**KWH** - The kilowatt-hour (symbolized kWh) is a unit of energy equivalent to one kilowatt (1 kW) of power expended for one hour (1 h) of time. It is commonly used in electrical measurement applications. A 100 watt light bulb operated for 10 hours consumes 1,000 watt-hours or 1 kWh. A kWh costs about \$0.03-0.05.

**LEED®** - Leadership in Energy and Environmental Design. A rating system created by the U.S. Green Building Council to allow the sustainability and energy efficiency of buildings to be compared. Points can be earned for energy and water savings strategies, indoor environmental quality, materials recycling. The rating system has reward levels of certified, bronze, silver and gold.

**LIFE CYCLE COST (LCC)** - A financial decision-making calculation for building owners and designers. It provides a means of comparing the net present value or rate-of-return of two or more design alternatives. For each alternative, first costs and annual maintenance and energy costs are combined with financial factors input to a LCC spreadsheet. The final result is a number that shows the total cost of ownership over an economic period (20 years typically for mechanical equipment) and allows the owner to select the piece of equipment that provides the best financial return.

**MCF** – A unit of measurement used for natural gas equal to 1,000 cubic feet of gas or about 1 mmBTU. An MCF costs about \$5-10.

**NIGHT SETBACK** -A terminology used when HVAC control systems are schedule off when the building is unoccupied. Normally these setbacks will allow the building to rise to 80 degrees in the summertime and drop to 65 degrees in the wintertime before bringing the building system back on to maintain the building temperature.

**NORMALIZED** - For the purposes of this report there are two cases of normalization. The first is the way in which Duke Energy bills it customers. Since meter read dates often occur in the middle of the month the bills often range from dates (i.e. the 21st of one month to the 21st the next month). When this happens the usage and cost is put in the month with the most days represented (i.e. if a bill arrives on March 1st for the dates of Jan 21 through Feb 21, that is considered the February bill). The second occurrence of normalization occurs in comparing successive calendar years to the baseline year of this report. To accurately decide if energy usage and cost have increased or decrease the rising or falling cost of gas and electric is factored out in addition to the effect of hotter summers and colder winters. This is accomplished by acquiring the degree-days for each year and building a ratio from each year to the base year. Lastly, the minimum utility usage of a building that is independent of external stimuli (e.g. computers, lights, elevators, etc) is determined. The "Normalized" Master Spreadsheet is then created.

**PAYBACK PERIOD** - The amount of time required for an asset to generate enough savings to offset the initial outlay for the asset.

**PC** - Performance Contractor or ESCO as in Energy Service Company.

**PROJECTED SAVINGS** (In a savings-based financing agreement) - Refers to the expected annual dollar value of the reduced energy consumption due to implementing conservation measures.

**SAVINGS-BASED FORMULA** - The formula (calculation of savings procedure) specified in the contract, which is used to determine savings. Usually involves four steps:

1. Determine actual historical usage and contributing operating conditions to form a base year
2. Adjust base year actual usage for variations (temperature, occupancy, etc.) to form a baseline
3. Subtract actual usage from adjusted baseline consumption and
4. Calculate savings by multiplying the units of energy saved by the current cost per unit.

Note: Calculations for electrical demand savings are considered part of the formula but are computed separately.

## **Appendix B - Accomplishments**

Since the implementation of the Energy Conservation Master Plan in 1998, County Facilities has implemented the following ECM's and continues to look for similar improvements in the buildings:

- **All Buildings (1998):** Hamilton County Facilities uses an outside firm, ThermalTech Engineering, to assist in monitoring energy usage monthly. To date this alliance has discovered a \$50,000 billing error at the 800 Broadway building and a \$16,000 electric tariff billing error at an MRDD facility. The alliance also achieved over \$577,000 in IT (Interruptible Tariff) gas savings at the County Courthouse.
  - **All Buildings (2000):** Life Cycle Cost and Total Cost of Ownership to purchase large mechanical equipment (boilers, chillers, air handlers and cooling towers).
  - **All Buildings (2000):** Facilities began purchasing deregulated natural gas with the CCAO in October 2000.
  - **All Buildings (2000):** Implement FT gas rate for all buildings (Duke Energy Resources won bid and later went defunct).
  - **All Buildings (2009):** County Facilities has accepted deregulated electricity bids twice to try to beat Duke Energy prices (currently no bidders have ever been able to meet County bid requirements and Duke Energy prices). In 2010 the County entered into a contract with Duke Energy Retail Services for commodity electricity for three years.
  - **All Buildings (2012):** Implementation of energy conservation measures from Ameresco ECM audit including lighting retrofits with occupancy sensors, direct digital controls upgrades and retro-commissioning, variable frequency drives and high-efficiency motor replacements, water conservation surveys and associated work.
- 
- **230 East 9th (1994):** Completed building upgrade of all HVAC and electrical systems. Upgrade included new DDC building automation system complete with night setback and two hour overrides that turn off unscheduled starts of the heating and cooling system automatically after two hours of unoccupied use. Power Logic electrical panels also allow for two hour unscheduled use of lighting system before it automatically places the lights back into unoccupied mode. Complete variable-flow air handling system with similar zones for better space control. Varicone air handlers on roof to handle part load conditions within the building.
  - **230 East 9th (2012):** Implementation of energy conservation measures from Ameresco ECM audit including high-efficiency condensing boiler and domestic water heater upgrade, boiler flue relining and boiler economizer repair, cooling tower replacement and condensate reclaim from rooftop units (RTU).
- 
- **237 William Howard Taft (2001):** Bought two new boilers using the Life Cycle Cost procedure.
  - **237 William Howard Taft (2006):** Bought new 400-ton Chiller using the Life Cycle Cost procedure. Interlocked with Building Automation System to provide optimal start/stop and night setback wherever possible in building. Added VFD to primary chilled water pump for better flow control through chiller. Controls contractor added additional programming for better backup control of building while in setback over weekends.
  - **237 William Howard Taft (2007):** Upgraded DDC system with night setback programming.
- 
- **800 Broadway (1999):** Turned off Waiting Room AHU fans with timeclocks during unoccupied periods.
  - **800 Broadway (1999):** Used night setback to eliminate unnecessary space heating and cooling during unoccupied periods.

- **800 Broadway (1999):** Eliminated unnecessary space cooling during unoccupied periods in the cooling season.
  - **800 Broadway (1999):** Used small compressors in the computer room cooling units in lieu of the large building chiller during the heating season.
  - **800 Broadway (1999):** Added sewer deduction water meter for cooling tower and boiler make-up water.
  - **800 Broadway (1999):** Insulated bare steam and condensate piping and related equipment in various parts of the building.
  - **800 Broadway (1999):** Installed fluorescent lighting fixtures in place of incandescent units.
  - **800 Broadway (1999):** Upgraded secondary CHW pump VFD controls to allow variable speed operation of pump; block all bypass ports of 3-way valves to promote variable flow.
  - **800 Broadway (1999):** Installed two high-efficiency power burner gas water heaters and shutdown large steam boilers all summer long.
  - **800 Broadway (1999):** Combined cooling tower operation to take advantage of low speed fan operation.
  - **800 Broadway (1999):** Replaced the 600-ton Trane chiller with a high efficiency chiller. Modified the cooling tower piping and fan controls to allow both towers to serve one chiller at lower fan speed.
  - **800 Broadway (1999):** Upgraded the building automation to full DDC system. Utilize scheduling and setbacks. IPAC Phase I. 2000.
  - **800 Broadway (1999):** Programmed "Near optimized control of Chiller Plants" into DDC system.
  - **800 Broadway (2001):** Upgraded the building automation to full DDC system. Utilize scheduling and setbacks. IPAC Phase II. 2001.
  - **800 Broadway (2002):** Upgraded the building automation to Full DDC system. Utilize scheduling and setbacks. IPAC Phase III. 2002.
  - **800 Broadway (2003):** Replaced outdated cooling towers utilized two speed motors with new counterflow cooling towers equipped with VFD's.
  - **800 Broadway (2004):** Replaced old boilers with new higher efficiency boilers.
- 
- **2020 Auburn (2010):** Installed new high-efficiency condensing boilers.
- 
- **Alms & Doepke Building (1994):** Low VOC materials - paint, furniture, carpet.
  - **Alms & Doepke Building (1994):** Met LEED criteria for daylighting/view access to staff.
  - **Alms & Doepke Building (1994):** Installed a high efficiency charcoal filtration system with 100% OA.
  - **Alms & Doepke Building (1994):** Mechanical system flushout ran one week at high temperatures to encourage early off-gassing
  - **Alms & Doepke Building (1994):** Mechanical system monitored offsite to see that the building systems continue to operate at best levels
  - **Alms & Doepke Building (1994):** Mechanical system computer controls defaults to appropriate setting when changed manually to inappropriate settings
  - **Alms & Doepke Building (1994):** High efficiency lighting - among the best available at the time.
  - **Alms & Doepke Building (1994):** Reused/recycled content materials - flooring (primarily carpeting), systems furniture, ceiling tile.

- **Alms & Doepke Building (1999):** Insulated domestic hot water storage tank in penthouse.
  - **Alms & Doepke Building (1999):** Insulated bare steam and condensate piping and related equipment in various parts of the building.
  - **Alms & Doepke Building (1999):** Upgraded insulation values in building.
  - **Alms & Doepke Building (1999):** Insulated bare steam and condensate piping and related equipment in various parts of the building.
  - **Alms & Doepke Building (1999):** Insulated bare steam and condensate piping and related equipment in various parts of the building.
  - **Alms & Doepke Building (2012):** Implementation of energy conservation measures from Ameresco ECM audit including replacement of domestic water heaters with the addition of a heat pump water heater.
- 
- **County Administration Building (1999):** Insulated bare steam and condensate piping and related equipment in various parts of the building.
  - **County Administration Building (2005):** Replaced old evaporative tenth floor chiller with a high efficiency air cooled chiller purchased through life cycle cost analysis.
  - **County Administration Building (2012):** Implementation of energy conservation measures from Ameresco ECM audit including replacement of existing steam boilers with high-efficiency condensing boilers, domestic water heater replacement and recovery of heat rejection from computer room A/C units.
- 
- **County Courthouse (1999):** Replaced constant volume air handlers with energy efficient VAV units under DDC control.
  - **County Courthouse (2003):** Upgraded boiler plant to utilize separate condensate receiver and deaerator so that boiler stack economizers can be utilized to preheat feedwater for better efficiency at steam production.
  - **County Courthouse (2004):** Converted to IT Rate transport gas supply from Duke Energy (Commodity purchased through CCAO).
  - **County Courthouse (2006):** Modified Boiler DDC system to fire boilers more efficiency and prevent moisture carryover during steam production.
- 
- **Justice Center (2001):** Replaced cooling towers with new cooling towers equipped with VFD's.
  - **Justice Center (2006):** Recommissioned the DDC system to eliminate many obsolete and broken control components. Take better control of schedules and outdoor air control. Repaired system back to original specifications.
  - **Justice Center (2006):** Replaced dual duct boxes in Sheriff's Offices to improve comfort and energy usages.
  - **Justice Center (2007):** Installed VFD drives on stairwell pressurization fans to reduce amount of conditioned air being exhausted from building.
  - **Justice Center (2010):** Replaced Domestic Water Booster Pumping system with higher efficiency Grundfos VFD domestic water pumps.
- 
- **Winton Road Records Center (2001):** Installed Air Handling Unit with no economizers to reduce the humidification costs for archive storage facilities. Calculations showed the use of outdoor air for free cooling would use more energy. Acquired variance from Building Department for installation

## **Appendix C - History**

Since the large portion of utility usage is directly attributable to the six major downtown buildings, the charts in this report reflect their usage. In actuality in 2012, the Facility Department manages or co-manages over 3 million square feet of building space and includes the following facilities within the County jurisdiction: 2020 Auburn, 230 East 9th, 250 William Howard Taft, 264 William Howard Taft, 800 Broadway, Communication Center, County Courthouse, County Administration Building, Coroner's Office, Engineer's Garages, 222 East Central Parkway, Justice Center, Memorial Hall, Sheriff Patrol Headquarters, Parkhaus Garage, and Winton Road Records Center. County Facilities does not provide all services in all of these buildings as some of them have their own management, pay their own utility bills, or perform their own maintenance but for the most part County Facilities has something invested in each of these facilities.

### **Energy Conservation Master Plan (ECM)**

In 1998 County Facilities began an Energy Conservation Master Plan (ECM) study with a local engineering firm called ThermalTech Engineering. The County selected ThermalTech Engineering because of their long-standing tradition of engineering energy management (they have performed over 100 Federal Title III energy audits, have a full understanding of Duke Energy's rate tariffs and engineering design experience to assist with installations).

In 2003 the ECM was updated with a grant from Rebuild America and again in 2011 the ECM was update thru Energy Audits preformed by Ameresco.

### **Cinergy Resources**

As the project continued, opportunities to acquire natural gas supplies through deregulation were identified. Facilities and ThermalTech prepared bid documents and secured a brokered supplied natural gas commodity from Duke Energy Resources in 1999 but shortly after the program started, Cinergy Resources went defunct and the County was forced back onto CG&E natural gas.

### **CCAO Service Corporation Natural Gas Programs**

In 1999 the CCAO Service Corporation (CCAOSC) Board of Trustees authorized the establishment of a Natural Gas Program for CCAO members. The 30 counties that signed up for the program saved money in two ways: Pre-payment and Aggregation (buying as a group). Taxable bonds which totaled \$29,890,000 were issued by Hamilton County on October 31, 2000 to assist the CCAO Service Corporation and 30 CCAOSC Natural Gas Program member counties. The program began November 1, 2000 with Exelon Energy managing the gas portion of the program and ended in May 2009.

The County signed on to a new program with the CCAOSC in May 2009 with Palmer Energy acting as the Energy Broker for the CCAOSC Natural Gas Program member counties of which in 2010 there were over 50. Presently the Facilities Director, Ralph Linne, serves on the Natural Gas Executive Committee and is the representative for Hamilton County.

### **Procurement of Electricity form the Deregulated Market**

County Facilities has also attempted to buy electricity on the deregulated market and has twice produced bid packages for this purpose. Jim Clarkson of Resource Management, Inc along with ThermalTech Engineering prepared the bid packets. Bids were opened on two occasions but in one case the prices were not low enough to project any savings to the County and ThermalTech recommended not accepting any bid.

The second bid was not executable due to contract and pricing restrictions by the marketers - basically a contract could not be agreed upon fast enough to keep the bid prices on bid day intact (the market is very volatile).

The third try in 2009 was successful with a three year contract with Duke Energy Retail lowering the cost of electric power by 20%.

In 2012 the fourth time going out for bid was again successful with First Energy being awarded a three (3) year contract for 2013 thru 2015.

### **Energy Manager**

County Facilities has had two full time energy managers since 2001, but has not had this position filled for several years. In lieu of a having a full time employee, ThermalTech Engineering has provided monthly review and reconciliation of utility bills, prepared the RFPs for electric power, updated the ECM, and assisted in preparing the data presented in this report. Presently they analyze trends and reports monthly on County utility usage.

### **List Energy Related Awards**

Over the years in this program, County Facilities has applied for numerous awards and have won many significant awards that honor the efforts. Here is a list of accomplishments to date:

- 2012 EPA Energy Star Award for the 800 Broadway and County Administration Building
- 2011 EPA Energy Star Award for the 800 Broadway, County Administration Building and 230 East Ninth
- 2010 EPA Energy Star Award for the 800 Broadway
- Who's Who 2009: Leaders in Energy Management and Sustainability
- 2009 EPA Energy Star Award for the 800 Broadway
- 2008 EPA Energy Star Award for the 800 Broadway B
- 2006 Governor's Award for Energy Excellence - Honorable Mention
- 2005 Governor's Award for Energy Excellence - Second Place Finisher
- 2005-2006 Local and Regional TOBY (The Office Building of the Year) for 800 Broadway
- 2004 Governor's Award of Energy Excellence - First Place Finisher
- 2004 Alliance to Save Energy - Participant
- 2002 Rebuild America Energy Grant Recipient - Winner
- 2001 NACO Award for Life Cycle Cost Purchasing - Winner
- 2001-2002 Regional TOBY (The Office Building of the Year) for the County Courthouse
- 2000-2001 Local TOBY (The Office Building of the Year) for the County Courthouse
- 2000-2001 Regional TOBY (The Office Building of the Year) for the 230 East Ninth Building
- 1999-2000 Local TOBY (The Office Building of the Year) for the 230 East Ninth Building

End of Report