

Illinois Smart Energy Design Assistance Center

Level II Audit Report That's Rentertainment



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Background:

That's Rentertainment has applied for green business certification from the Illinois Green Business Association (IGBA). As part of that certification, the University of Illinois Smart Energy Design Assistance Center (SEDAC) conducted an energy audit of their facility. SEDAC would like to thank Jenn Iversen and Geoff Merritt for participating in the Smart Energy program and for assistance in providing information pertinent to the energy analysis and recommendations in this report. The audit team composed a list of energy cost reduction measures for consideration.

Facility Description:

That's Rentertainment a video rental business that occupies the first floor and basement of an older building on the corner of Sixth and John Street in campus town in Champaign, Illinois. The first floor area is approximately 1,250 ft². Above the space there are apartments that cover roughly half main floor area, while the other half of the building is only single level. That's Rentertainment shares its north and west walls with other businesses. The basement is mostly empty except for some stored supplies, an older Rheem Fury 40 gallon gas water heater with best possible efficiency of 62 percent, and an old, non-operating boiler.¹

Part of the building was renovated in 1994, while the rest was most likely constructed sometime in the early 1900's. This building previously housed a grocery store for over fifty years. The structure consists of uninsulated brick outer walls and a flat roof.

There are awnings above the double-pane insulated windows on the south and east side of the building that partially limit direct solar heat gain, a boon in the summer months. Most of the south-facing windows have either display cases or cardboard signs that keep the sunlight out of the store. The front single-pane glass door is on the southeast corner of the building and is covered by an overhang. This door has failed weatherstripping and air leakage is evident around the door. There are also southwest and north facing doors that are not used by customers and are well sealed.

Space heating and cooling is provided to the video store by a rooftop unit (RTU) purchased in 1994, its efficiency is unknown. The apartments above share the mechanical systems including the water heater and RTU. A programmable thermostat is set to sixty-eight degrees with a setback of fifty degrees for the winter months and set to seventy-two degrees with a setback of eighty-two degrees in the summer.

The building has a main showroom with displays for movies and a check-out area, a backroom office and break room area, and a small bathroom adjacent to the office. The basement is also accessed from the office. Hot water for the bathroom is provided by the gas water heater (approximately 40 gallon capacity) in the basement. This heater serves the upstairs apartments as well.

There are several computers, printers, cash registers, and other office equipment in both the office and the check-out area. Lighting is provided by 34W T12 linear fluorescent lamps with magnetic ballasts throughout the space along with CFL spotlights in front of the check-out area.



¹ <http://www.rheem.com/product.aspx?id=CC643E03-4C15-4775-B139-E504A95651F7>

Some of the T12 fixtures have lamps that were burned out or are temporarily de-lamped. It appears as if the exit signs are LED, but the exit sign lamp at the front of the store was unlit.

The building is occupied briefly before and after regular hours of operation, which are 10am – 10pm, Monday through Thursday, 10am – 12am on Friday, 11am – 12am on Saturday, and 12pm – 10pm on Sunday, for a total of approximately 85 hours per week.

Commendation:

SEDAC would like to commend the efforts already put forth by That’s Rentertainment. These efforts include:

- Utilizing programmable thermostats that can be programmed anywhere via the internet
- Investigation into replacement of T12 fluorescent lamps
- Regular schedule of powering off lights and plug loads

Utility Profile:

A good method for benchmarking a building’s energy efficiency is to determine its energy use intensity (kBtu/ft²/yr) and energy cost intensity (\$/ft²/yr). A summary of energy use intensities (EUI) and energy cost intensities for That’s Rentertainment is given below. The US Energy Information Administration’s (EIA) Commercial Buildings Energy Consumption Survey (CBECS) was used to compare this tenant with other similar retail buildings. The EUI of this tenant space is 125.8 kBtu/ft²/yr. According to CBECS Table C10, for buildings in Climate Zone 2 between 1,001, and 5,000 ft², the average EUI is approximately 110 kBtu/ft²/yr. From the same CBECS table, for buildings in the same climate zone and which are categorized as retail spaces the average EUI is approximately 92 kBtu/ft²/yr. Both of these signify that there may be room for improvement towards performing better than the average EUI. However, with the store and above apartments sharing some equipment, there is an indeterminate amount of energy going to the apartments, which can distort some of the energy use estimates.

Electricity*	Annual Consumption		Annual Costs		Average Unit Cost	
		26,512	kWh	\$3,965	73%	\$0.15
Natural Gas**	668	therms	\$1,444	27%	\$2.16	\$/therm
		Total Costs***	\$5,409			
		Floor Area	1,250 ft ²			
Electric Use Intensity	21.2	kWh/ft ² /yr	Gas Use Intensity	0.5 therms/ft ² /yr		
Energy Use Intensity	125.8	kBtu/ft²/yr	Energy Cost Intensity	\$4.33 \$/ft²/yr		
* Electricity supplied and delivered by Ameren, Rate Class = DS-2						
** Natural Gas supplied and delivered by Ameren. Rate Class = GDS-2						
*** This value does not include a lighting charge for street lights (average \$16/month)						

Table 1 - Energy Use Intensities

Figure 1 shows the reported monthly electric energy consumption profile for this building compared to cooling degree days. Monthly increases and decreases in electric consumption follow cooling loads for this space in the summer season and show a small increase in the winter, presumably for electric heating. The baseline building electric energy use is approximately 1,500 kWh per month which would account for electricity used for lighting and plug loads.

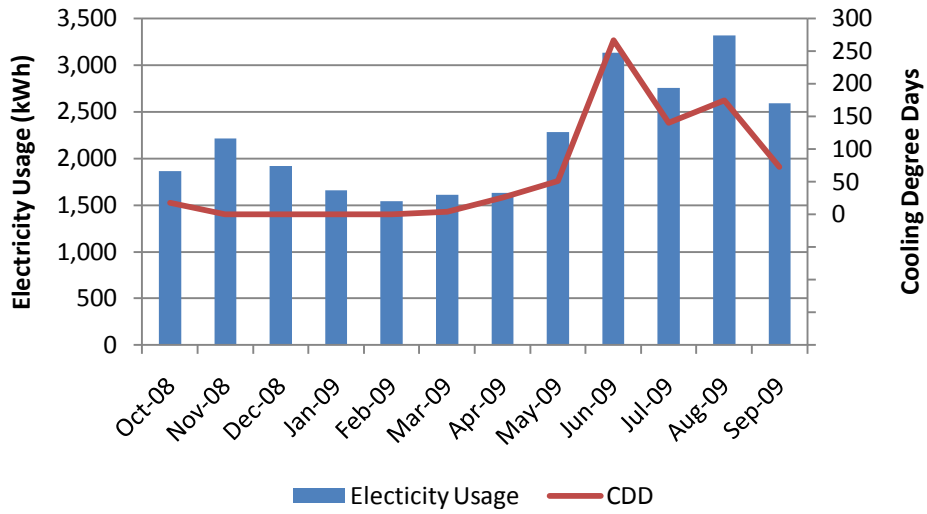


Figure 1 - Electric Usage vs. Degree Days

Figure 2 shows reported monthly natural gas energy consumption profiles compared to heating degree days. The chart shows the baseline energy use for water heating of about 8 therms in the summer and 20 therms in the spring and fall. It is thought that the apartments are not heavily occupied during the summer but when students return, the consumption of hot water increases.

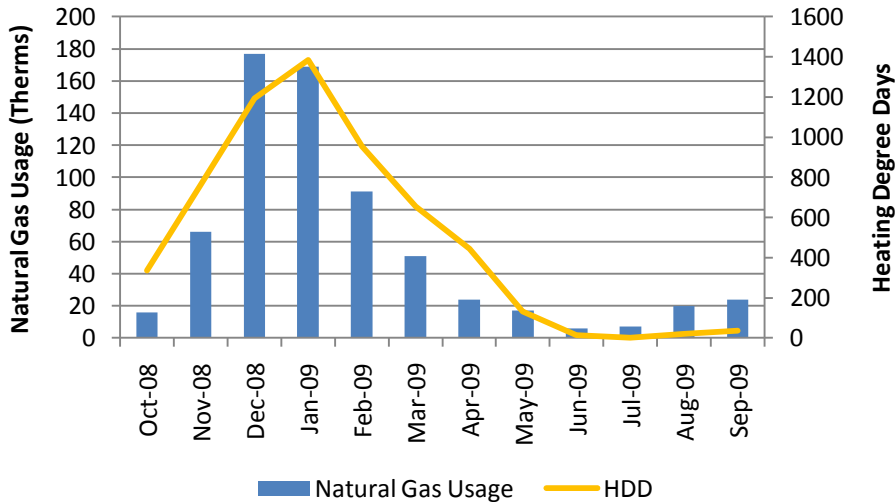


Figure 2 - Gas Consumption vs. Degree Days

Recommended Energy Cost Reduction Measures (ECRMs)²

Lighting: SEDAC suggests lighting retrofits for existing fixtures. Applicable AmerenIP incentive programs are noted.

- **Replace 34W T12 Fluorescent Lighting** – SEDAC recommends replacing the 34W T12 fluorescent lamps and magnetic ballasts throughout the facility with new 28W T8 fluorescent lamps with high efficiency electronic ballasts. Incentives of \$5/lamp are available from Ameren’s Act on Energy Program.
- **Permanently Delamp Unused Light Fixtures and Lamps** – Currently, some T12 fluorescent fixtures with magnetic ballasts only utilize two or three out of four possible lamps. It is recommended to delamp light fixtures to bring fixtures to ideal lighting levels. For small retail spaces this ranges from 30-50 footcandles for ambient lighting and from 75-100 for accent lighting.³ Where existing light levels are acceptable, permanently delamping these fixtures will save additional energy. We recommend installing new lamps and ballasts in a few of the existing fixtures (recommendation above) and then removing lamps until the desired light level is obtained. Once the level is accepted, permanently delamp these fixtures by removing the lamp holders. To qualify for this incentive the “unused lamps, lamp holders, and ballasts must be permanently removed from the fixture and disposed of in accordance with local regulations.” Act on Energy’s custom program offers incentives for permanently delamping the fixtures of \$0.05/kWh saved.

Systems:

- **Insulation for Water Heater** – The water heater is fairly old. Insulation on hot water pipes will yield modest energy savings and should be implemented. Installing a water heater blanket, which is an insulation jacket that should be installed by a qualified plumber or heating contractor, can reduce water heating costs from 4%-9%.⁴
- **HVAC Duct Screens** – There was a layer of dust on the air supply and return duct screens. We recommend cleaning the ducts as well as cleaning the dust off the screens to improve the efficiency of the HVAC system as well as increase the indoor air quality of the space. Make sure that filters are being changed regularly.
- **Rooftop Unit** – SEDAC recommends having the RTU periodically inspected and tuned to maximize its operating efficiency.



Air Sealing:

- **Weatherstripping** – We recommend replacing the weatherstripping at all sides of the main entry door to reduce air infiltration. A periodic check on all door weatherstripping is also recommended.
- **Insulate Outlets** – Electrical outlets and light switches on exterior walls had noticeable air infiltration. Adding insulated outlet gaskets to the two outlets and light switches in the

² Our work does not replace engineering design, which will be necessary for project implementation.

³ DesignLights Consortium. “Lighting KnowHow: Small Retail Spaces”.
http://www.energysavers.gov/your_home/water_heating/index.cfm/mytopic=13070

⁴ http://www.energysavers.gov/your_home/water_heating/index.cfm/mytopic=13070

exterior wall of the front of the store will better seal the building envelope. Gaskets are inexpensive and can be purchased in most home improvement stores.

Check-out and Office Areas:

- **Use Power Strips** – We recommend using power strips for all electronics and appliances that are not ENERGY STAR approved. The fax machine should be plugged in separately if it needs to remain on for receiving faxes. At the end of the day, simply turn off or unplug the power strip to avoid any phantom energy loss through those appliances. Consider purchasing plug load occupancy sensors for use with copiers and/or printers, which can be set to shut down after 30 minutes with no occupancy (for example). Ameren has incentives for plug load occupancy sensors (\$20/sensor). Alternatively, consider purchasing ENERGYSTAR® equipment when replacing equipment in the future as many have built in timers and shut off after no use. Turn off register and related equipment when space is unoccupied.
- **Utilize Power Management Features on Computers** – Some of the computers in the check-out area need to be running continuously to allow for communication with a server. For these computers, we recommend using power management features, standard in Windows and Macintosh operating systems, which place monitors and computers (CPU, hard drive, etc.) into a low-power “sleep mode” after a period of inactivity. Simply touching the mouse or keyboard “wakes” the computer and monitor in seconds. Activating sleep features saves energy, money, and helps protect the environment.
- **Note – Computers requiring 24/7 remote access to their desktops** (via Remote Desktop, for instance) should utilize monitor power management features only, as it may not be able to remotely “wake” computers from system standby or hibernate mode.



Summary:

That's Rentertainment is commended for its attention to energy efficiency and willingness to participate in the Smart Energy program in cooperation with the Illinois Green Business Association. As a small facility in a building dominated by lighting and space conditioning loads, efficiency upgrades and ECRMs are limited, but there is a good opportunity for energy and cost savings. There are several opportunities for reducing energy costs listed below:

- Replace T12 fluorescent lighting and ballasts
- Delamping in lighting that providing sufficient light levels
- Replacing weatherstripping on front door
- Switching off the check out and office equipment (registers, computers, stereo equipment, etc.) by use of power strip or possibly unplugging the equipment when not in use. Alternatively, use power management settings on computers.

Be sure to apply for Ameren's Act On Energy incentives prior to implementing any strategies in this report. All work applied for between now and April 16, 2010 will receive an additional 15%. Work must be completed by May 31, 2010 to qualify.