WASTE REDUCTION PARTNERS

Town of Elkin Town Hall and Police Department

ENERGY ASSESSMENT

CONFIDENTIAL REPORT PREPARED BY

Waste Reduction Partners

ASSESSMENT TEAM

Robert Fuller, Town of Elkin
Russ Jordan, WRP
John Reeder, WRP
Roger Blue, PE WRP

SPONSORED BY

NC Department of Environment and Natural Resources
NC State Energy Office, Department of Commerce
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DATES

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Report: January 2, 2013

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This report was prepared for:
Robert Fuller,
Town Of Elkin
226 North Bridge Street
Elkin, NC 28621
rfuller@elkinnc.org tel 804-794-6480

This report was prepared by: Waste Reduction Partners

Land-of-Sky Regional Council
339 New Leicester Highway, Suite 140
Asheville, NC 28806
828-251-6622

www.wastereductionpartners.org
In partnership with the NC Division of Environmental Assistance and Outreach

Principal Author:
Roger Blue bnr_engnrng@netzero.net
Contributors: Roger Blue, John Reeder

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Energy Assessment - Executive Summary

Introduction

The Town of Elkin requested energy assessments of several town buildings. Waste Reduction Partners is conducting assessments of Town Hall and the Parks and Recreation Center. Other buildings will have energy assessments conducted by Lynn Martin of the State Energy Office. This report covers the Town Hall.

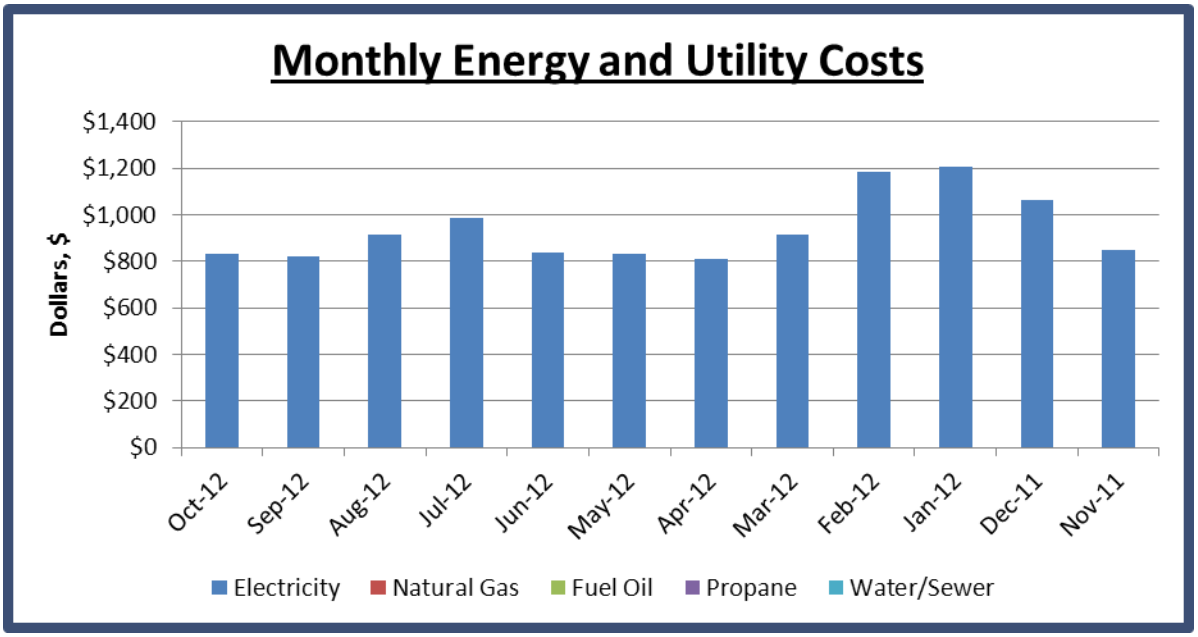
Facility Description

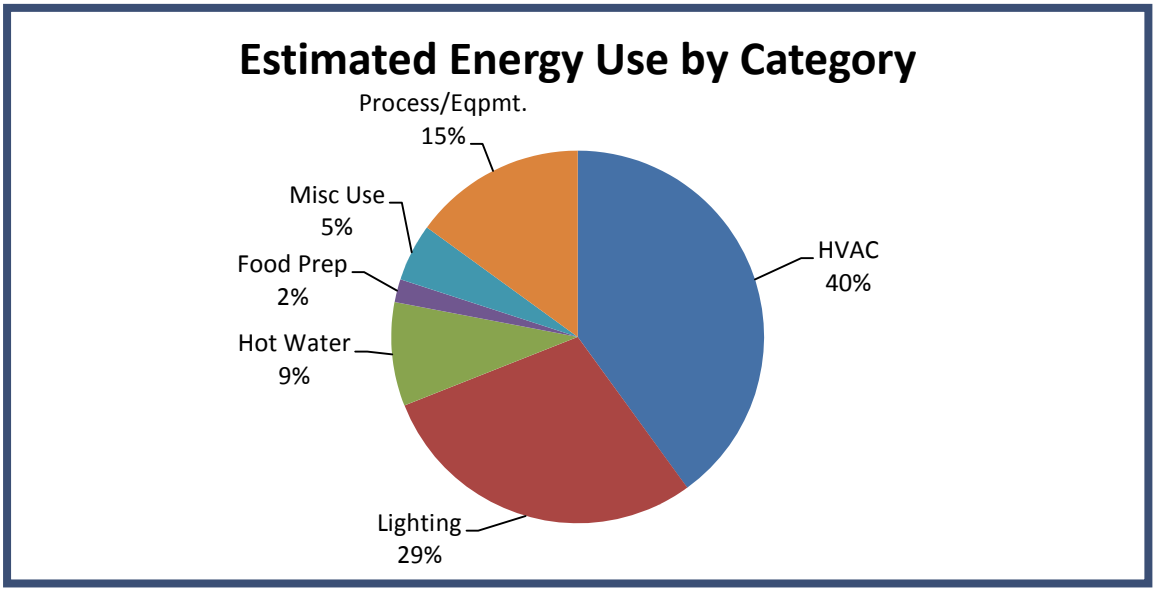
The 8,250 square foot building is about 25 years old. It is a single-level structure containing an entrance and lobby area, hall areas, break/kitchen area, police offices, a utility room, an office equipment/copier room, an IT/computer server room, a rest/locker room. A staff of 15 uses the building on an average day.

Summary of Energy Benchmarks

The Town Hall/Police Department average energy consumption per square foot (energy Index) of heated and cooled space is about 57 kBTU/sq.ft./year. That value is lower than the average 86.4 kBTU/sq. ft. for office buildings in the southeastern United States according to a Utility Savings Initiative sponsored by the NC State Energy Office and the US Department of Energy.

Summary of Energy Benchmarks	
Total Energy Consumed:	467 Million Btu / yr.
Total Energy Index:	57 kBtu / sq. ft. / yr.
Total Energy Cost:	11,239 $ / yr.
Total Energy Cost Index:	1.36 $ / sq. ft. / yr.





Summary of Findings and Recommendations

Estimated Annual Cost & Energy			
Energy Cost Savings, $ / Year	$1415	Electricity Savings, kWh/yr.	17,306
Water Cost Savings, $ / Year	$0	Natural Gas Savings, Therms/yr.	0
Water Savings, Gallons / Year	0	Fuel Oil Savings, Gallons/yr.	0

Estimated Annual Emissions Reductions	
Carbon Equivalent, (CO_2e) - Greenhouse Gases, Pounds/Year	19,466
Nitrogen Oxides, (NO_X) - Precursor to Ozone, Pounds/year	22
Sulfur Oxides, (SO_X) - Contributes to Acid Rain, Pounds/Yr.	83

Summary of Recommendation Measures

Energy Efficiency Recommendations	Cost Savings / yr.	Investment Cost	Payback Period (yr.)	mmBtu Saved
Upgrade T12 fixtures in the building to T8 fixtures.	$410	$1,410	3.4	17
Upgrade Lennox HVAC units to 15 SEER	$324	$8,000	24.7	13
Install Programmable Thermostats	$506	$375	.7	21
Install Attic Stairway Insulator	$66	$66	1.0	3
Upgrade Water Heater	$109	$900	8.3	5
TOTAL	**$1415**			**59**

Optional Measures and Future Choices

1. Take definitive steps to schedule HVAC maintenance – fresh air and recirculation filter changes, light burnout replacement, condenser coil cleaning, dusk to dawn light sensor repair, thermostat calibration, check refrigerant levels, boiler tune-ups, chiller staging under load, and automation that has quit working. Check fresh air make-up settings and insure it works.
2. Keep unoccupied room lights turned off- EPA estimates that lighting is 15% to 30% of the electric bill.
3. Eliminate personal space heaters – Make the HVAC system function properly (shouldn't be a need for personal heaters).
4. Control personal appliance use – small refrigerators, microwaves, space heaters, coffee makers.
5. Equipment life-cycle can justify energy savings for: replacement, for a recommission and major overhaul - equipment items include: heat pumps, packaged/spilt HVAC systems, chillers, boilers, major appliances, VSD motors.
6. Appoint a person to monitor energy saving practices and report findings of conservation practices regularly.
7. When air conditioners/heat pumps are replaced, specify SEER 15 or higher.

Background

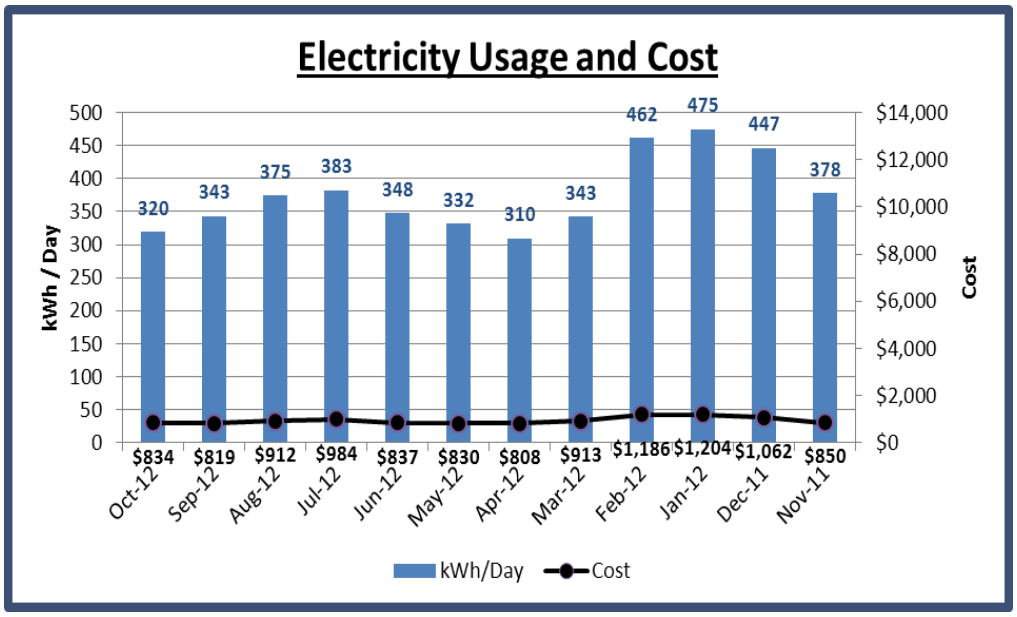
The Town of Elkin requested the Waste Reduction Partners (WRP) Program, administered by Land-of-Sky Regional Council, to perform an energy assessment of the Town Hall/Police Department at 226 North Bridge Street, Elkin, NC beginning with a site visit on November 15, 2012. WRP assessors Russ Jordan, John Reeder and Roger Blue met with town representative Russ Fuller to discuss current energy uses at the Town Hall/Police Department. Staff representatives provided information regarding lighting, HVAC, and other energy consumers. They also provided a guided tour of the facility.

Facility Description

The 8,250 square foot building is about twenty five years old. It is a single-level structure containing an entrance hall, a lobby with associated office areas and reception desk, the conference/meeting room, a break/kitchen area with refrigerator, microwave, etc. , a storage room, an IT/computer server room, office equipment copier room, police offices, a utility room, and a rest/locker room. The building is entered through two double doors into a lobby area that is used frequently and allows cold air to enter in the winter and cooled air to exhaust in the summer. The exit doors all appear to have good seals. The windows and their seals appeared to be in good condition. The attic door is not sealed and needs repair. Facility staff workers and police occupy the facility for a total of 50 hours per week. Occupancy is variable depending on the activities taking place.

Utility Use Analysis

Electricity - The Duke Energy rate schedule is SGS for Town Hall. For the last 12 months, the Town of Elkin has paid $11,239 for 136,920 kilowatt- hours of electricity used. The kWh electricity consumption is equivalent to 467 million BTUs.



Recommendations

Fluorescent Lighting Details

Many of the fluorescent lamps have been upgraded to T8. Savings are for 30% estimated T12 that remain.

Details of Recommendations - Fluorescent Lighting

	Lamp Change		Ballast Change		Lumens per Fixture		Watts per Fixture			Calculation of Energy Savings		
Locat'n Key	Before	After	Before	After	Before	After	Before	After	Reduction	No. of Units	Hrs. / Year	Saving KWH
	4 X 4' 34W	4 X 4' 28W	Normal	Low	8,117	7,891	148	84	64	30	2,600	4,992.00
Total										**30**		**4,992.00**

Calculation of Cost and Payback

	Change		Calculation of Utility Cost Savings			Calculation of Cost and Payback				
Locat'n Key	Before	After	Cost per KWH	Savings KWH	Utility Cost Savings	No. of Units	Equip. Cost per Unit	Labor Cost per Unit	Total Investment Cost	Payback Years
	4 X 4' 34W	4 X 4' 28W	$0.08	4992	$409.75	30	$27.00	$20.00	$1,410.00	3.4

HVAC/Building Envelope Details

The specifications of the 5 A/C units are:

a. Lennox A/C Model CHP16 is a 2 ton unit with a 10.4 SEER. Mfg. 1988
b. Lennox A/C Model CHP15 is a 2 ton unit with a 9.4 SEER. It has heat strips in the air handler. Mfg. 1988.
c. Trane Model WCC048F300BF is a 4 ton A/C unit with a 10 SEER and heat strips.
d. Trane WA060D300A1 is a 5 ton heat pump unit with a 10 SEER. Heat strip for backup/emergency heat.
e. Trane WCD090C300BC is a 7.5 ton A/C unit with a 10 SEER and heat strips.

HVAC/Building Envelope Recommendations

Energy Efficiency Recommendations	Cost Savings	Investment Cost	Payback Period / yr.	mmBtu Saved (yr.)
Upgrade Lennox HVAC units to 15 SEER	$324	$8,000	24.7	13
Install Programmable Thermostats	$506	$375	.7	21
Install Attic Stairway Insulator	$66	$66	1.0	3

Note that the Lennox units are 24 years old and will need replacement soon. See Duke Smart Saver Incentive information at http://www.duke-energy.com/north-carolina-business/smart- saver/smart-saver-incentive-program-customer.asp Programmable thermostats will allow temperature to be set back after hours. Energy savings will amount to about 10% for ten degree setback after hours. Attic stair door does not seal tightly when closed. See example stair insulator in appendix.

The following should be incorporated into a HVAC maintenance program, performed at least every 90 days, to ensure optimum efficiency:

- Check unit controls for proper operation.
- Check the settings and accuracy of the thermostats.
- Clean condenser and evaporator coils. A dirty coil was observed on a package room unit (PTAC) during the walk through.
- Replace or clean filters every 30 days or as needed. Tests have shown that dirty filters can decrease HVAC efficiency by as much as 20%.
- Inspect insulation and replace if worn or missing.
- When replacing air conditioners/heat pumps, specify SEER 15 or higher.

In the attic, a number of pieces of insulation have been moved and not returned to proper location. Replace insulation as needed for increased building efficiency and reduction of hot/cold spots in the office

Water Heater Replacement

The water heater is used for hand washing and kitchen needs. For a typical office building, hot water represents 9% of the total energy costs. The present water heater is old and warm to the touch, with little insulation. Replace with a 30 gallon Energy Star unit with EF rating of .95.

Energy Efficiency Recommendations	Cost Savings	Investment Cost	Payback Period / yr.	mmBtu Saved (yr.)
Replace water heater with Energy Star model	$109	$900	8.3	5

Appendices

A. Facility Statistics

Square Footage	Year Constructed	Hours Occupied per Week	# of Occupants
8,250	1987	50	15

B. Utility History

Mo / Yr.	Elect-All Usage KWH	Electric Cost $	Nat Gas Usage	Nat Gas Cost $	Oil Usage Gallons	Oil Cost $	Propane Usage Gallons	Propane Cost $	Water Usage Gallons	Water / Sewage Cost
Oct-12	10,240	$834	$0	$0	0	$0	0	$0	0	$0
Sep-12	9,960	$819	$0	$0	0	$0	0	$0	0	$0
Aug-12	11,240	$912	$0	$0	0	$0	0	$0	0	$0
Jul-12	12,240	$984	$0	$0	0	$0	0	$0	0	$0
Jun-12	10,080	$837	$0	$0	0	$0	0	$0	0	$0
May-12	9,960	$830	$0	$0	0	$0	0	$0	0	$0
Apr-12	9,600	$808	$0	$0	0	$0	0	$0	0	$0
Mar-12	10,640	$913	$0	$0	0	$0	0	$0	0	$0
Feb-12	13,400	$1,186	$0	$0	0	$0	0	$0	0	$0
Jan-12	15,200	$1,204	$0	$0	0	$0	0	$0	0	$0
Dec-11	13,400	$1,062	$0	$0	0	$0	0	$0	0	$0
Nov-11	10,960	$850	$0	$0	0	$0	0	$0	0	$0
Total	**136,920**	**$11,239**	**0**	**$0**	**0**	**$0**	**0**	**$0**	**0**	**$0**

	Utility Totals		Conversion to BTU Equivalents		Total Units
Electricity	136,920	X	3,413	Btu/kWh =	467 Million Btu's
Natural Gas	0	X	100,000	Btu/Therm =	0 Million Btu's

C. Resources and Fact Sheets

Waste Reduction Partners has created a number of technical publications to help you pursue your utility cost-saving and environmental goals. Click on the link below to open the document.

Self Assessment Guide for Energy Saving Opportunities

Benchmarks - Ranking Building Energy Intensity

Caulk and Weather Stripping

CFL Retrofits in Commercial Lighting

Chillers

Drinking Fountains and Water Coolers

Exhaust Fans

Exit Signs

Fluorescent Light and Ballast Recycling

High Bay Lighting

Insulation Guidelines

Monitor Power System

Occupancy Sensors

Setback Temperature Control

T-12 to T-8 Conversion

Task Lighting

Tracking Energy Savings

Vending Machines

Ventilation and Indoor Air Quality

Commercial Kitchens

Commercial Washing Machines

Commercial Dishwashers

WRP Fact Sheet Compilation (includes all fact sheets listed above)

D. Financial Incentives: Duke Energy Business Incentives

Duke Energy's Super Saver Program offers incentives for many energy efficiency upgrades, including lighting upgrades. These incentives will reduce investment cost and shorten payback periods for the upgrades. For more information, please visit

http://www.duke-energy.com/north-carolina-business/smart-saver/smart-saver-incentive-program-customer.asp

E. Attic Door Insulator Example

Owens Corning AS2 Attic Stair Insulator by Owens Corning approximately $65/ea.

Attic access stairways that have fold down steps allow heat loss or gain in two ways:

1) An uninsulated square footage of the opening by conduction and

2) The leakage of the conditioned air to the attic space or into the conditioned space depending on seasons. Providing a sealed barrier and insulated canopy over stairway provides for cost savings year round. A 1/8" gap around the perimeter of the ladder stairs assembly will provide conditioned air leakage to the attic and cost about $51/year at electricity cost of $0.08/kwh. Conduction losses are about $11/yr. thru an 18 sf uninsulated section to the attic or a total of $66 savings for applying the stair insulator to the attic stair opening. There are more expensive ($200+) Styrofoam boxes that form a better seal; however, the box width can be beyond framing width thus requiring modification to ceiling beams.

F. Follow-up Evaluation

Waste Reduction Partners provides energy, solid waste, water, and pollution prevention assessments to institutional and business entities throughout North Carolina. These assessments are confidential, non-regulatory, and provided at no or reduced cost to the client. A follow-up contact will be made with clients 6-12 months after this assessment report has been delivered to discuss the value of the assessment. The purpose of the follow-up is to evaluate the effectiveness of our reports and consultation and to determine if report recommendations were found to be worthy of implementation. You are encouraged to take the few minutes required to complete the follow-up in order to help Waste Reduction Partners continually improve its services.