FOREST COUNTY
POTAWATOMI
Keeper of the Fire

Potawatomi Carter Casino Hotel

2012 Feasibility Study for the Deployment of Energy Efficiency Measures

Forest County Potawatomi Community
Department of Energy
Tribal Energy Program Review
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Tribal Goal: Reduce Its Environmental Impacts

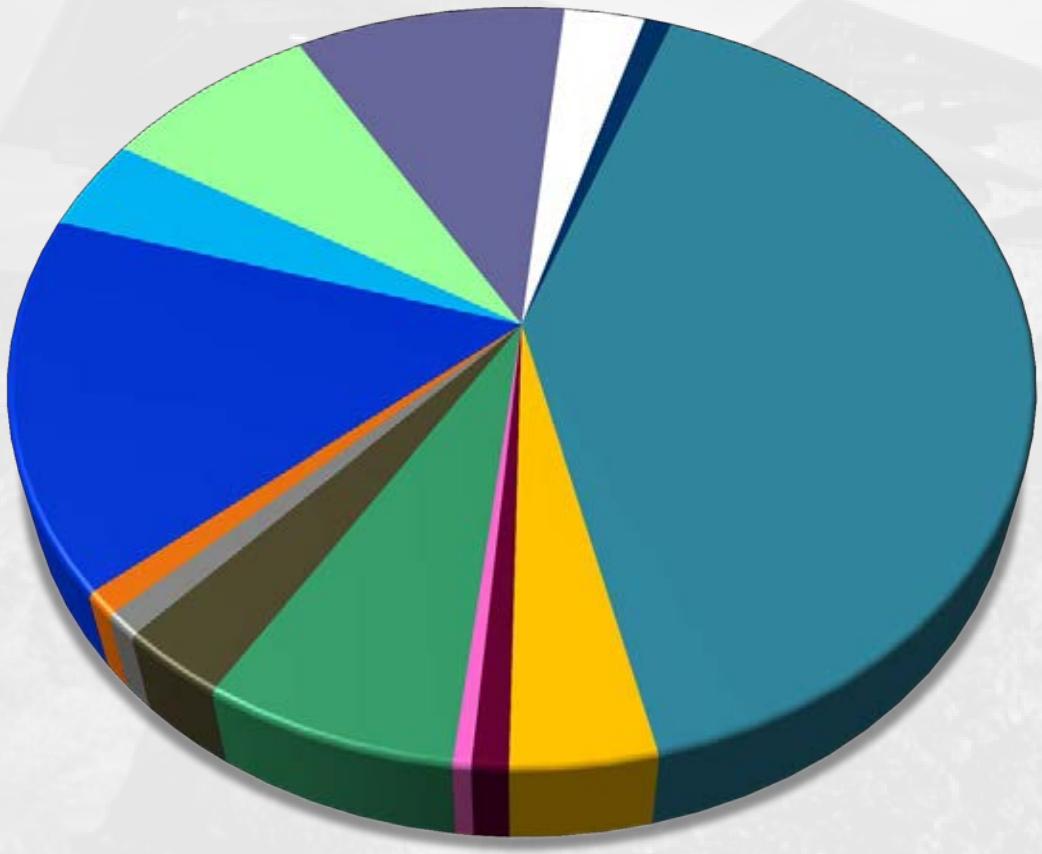
- The Executive Council is the elected leadership of the Forest County Potawatomi
- Potawatomi Carter Casino Hotel is a business enterprise of the Tribe
- It is located in Northern Wisconsin where the average temperature in the winter is 28 degrees
- The Executive Council directed the General Manager of Potawatomi Carter Casino Hotel to develop an Energy Efficiency and Conservation Strategy and to request capital project budgets annually which include energy efficient measures
- Tribe received "Assessing the Feasibility of Comprehensive Energy Efficiency Upgrades at Potawatomi Carter Casino Hotel"

Study Goal: Reduce Energy Consumption By at Least 30%

Areas studied for energy conservation measures

- Lighting
- Building envelope
- HVAC equipment
- Building ventilation airflow rates
- Casino slot machines
- Hot water use
- Pool area

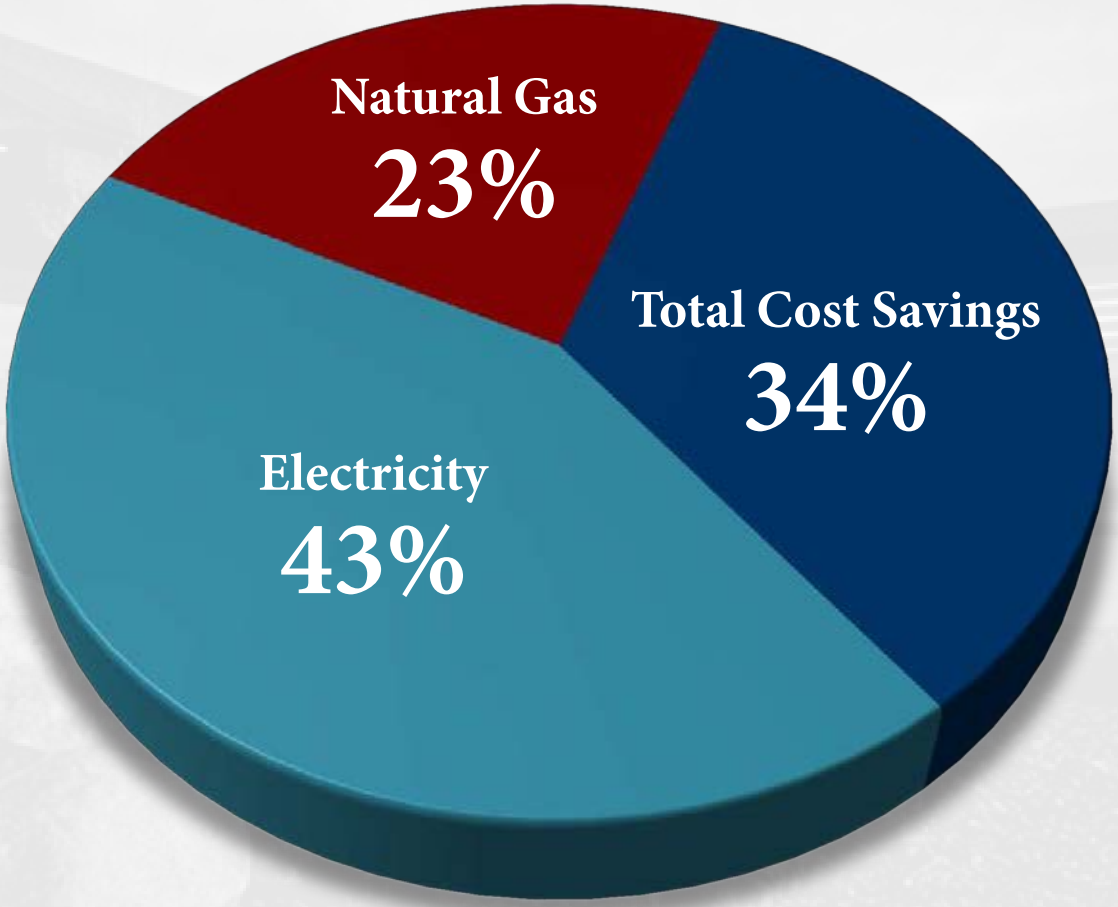
Breakdown of Estimated Energy Use in The Facility by Application



Space Heating (Gas)	41%
Ventilation Fans	16%
Space Cooling	10%
Dom. Water/Kitchen	8%
Slot Machines	7%
Interior Lighting	4%
Space Heating (Elec.)	4%
Laundry	3%
Security and IT	3%
Misc.	1%
Pool Heating	1%
Pumps and Aux.	1%
Rectifiers	1%
Exterior Lighting	1%

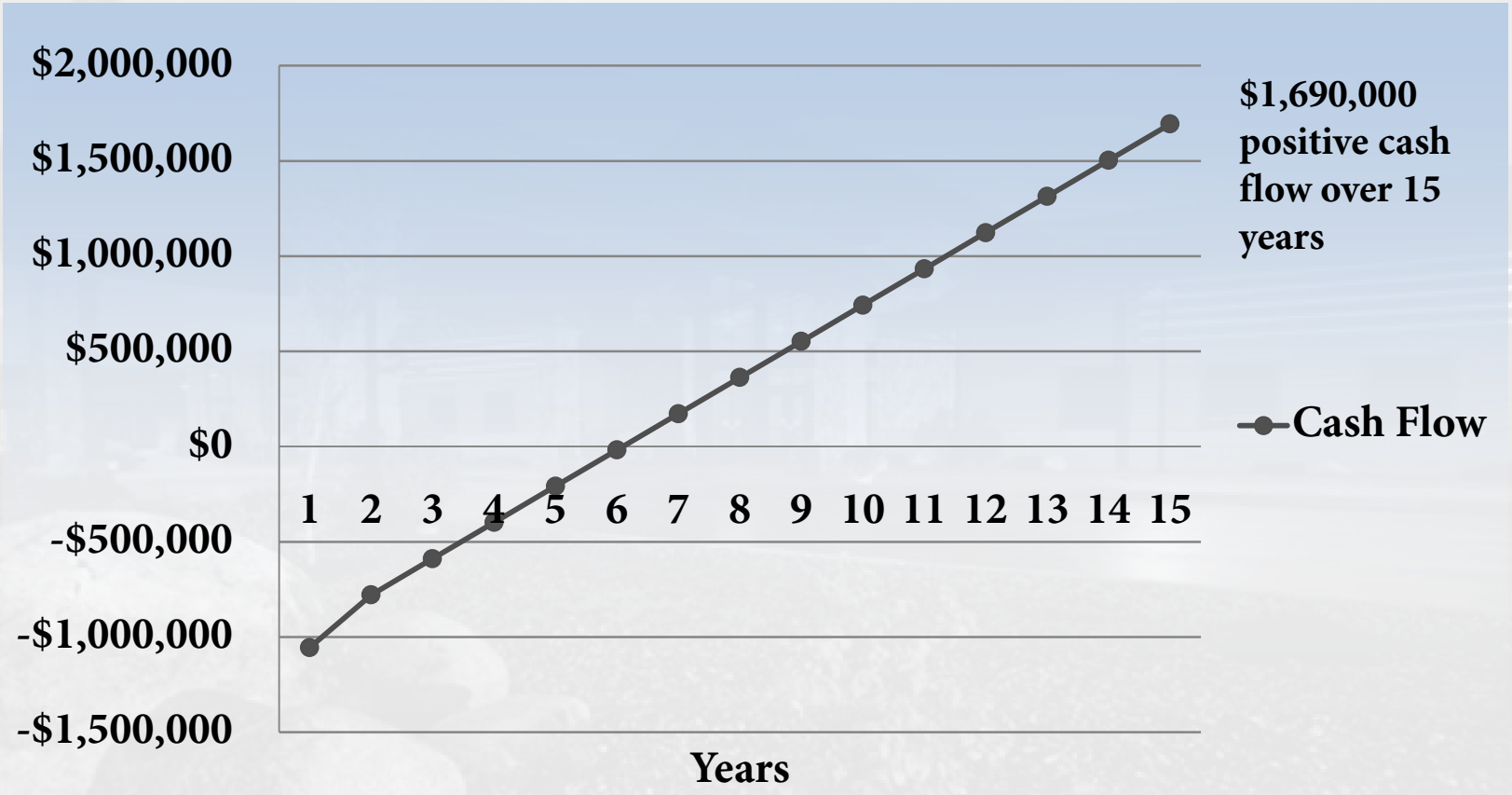
* Rounding applied

Total Annual Cost Savings by Percent of Annual Utility Bill Spending With All Recommended ECMs Implemented



Approximately $190,000 in savings

Simple Cash Flow Analysis With All Recommended ECMs Implemented



Assumes all ECMs implemented in year one; 15 years is the shortest estimated service life for any of the recommended installed equipment

Summary of Recommended Energy Conservation Measures

ECM	Description of ECM	% Energy Use Savings	Total Cost Savings ($/year)	Estimated Capital Cost ($)	Simple Payback (years)
2	Casino Displacement Ventilation With Heat Recovery Chiller	16.36%	$106,000	$864,000	8.15
3	Bingo Hall Demand-Controlled Ventilation	1.90%	$7,500	$26,250	3.50
4	Springs Kitchen Variable Volume Hood Exhaust and Makeup	1.20%	$5,470	$52,500	9.60
5	Banquet Kitchen Variable Volume Hood Exhaust and Makeup	1.20%	$5,470	$52,500	9.60
6	Flames Kitchen Variable Volume Hood Exhaust and Makeup	2.35%	$10,600	$26,250	2.48
9	Retro-Commissioning	3.99%	$26,500	$27,825	1.05
10	Energy Miser for Vending Machines (4)	0.04%	$336	$756	2.25
11	Lighting Fixture and Control Upgrades	0.63%	$5,840	$22,155	3.79
12	Retrofit Casino Slot Machines With LED lights	0.73%	$6,200	$28,665	4.62
13	Room Air Condition Unit and Guest Room Management System	1.52%	$13,000	$42,000*	3.23
15	Conference Room Unit Replacement Upgrade	0.98%	$3,390	$8,000**	2.36
Total Recommended Projects Budget Value		**30.90%**	**$190,300**	**$1,178,000**	**6.19**
Total Recommend Projects – After WFOE Grants			**$190,300**	**$1,065,000**	**5.60**

* Cost increase from replacing room air condition unit with like units

** Incremental cost over base renovation budget

ECM #2: Displacement Ventilation With Heat Recovery Chiller

Heat recovery chillers

- Use heat from cooling to heat domestic and heat hot water instead of wasting heat to air
- More efficient than comparable technologies

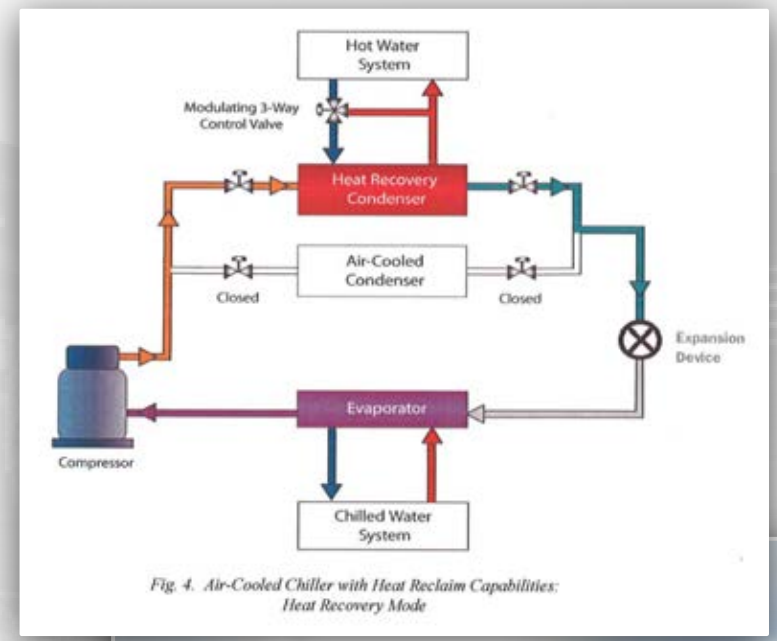
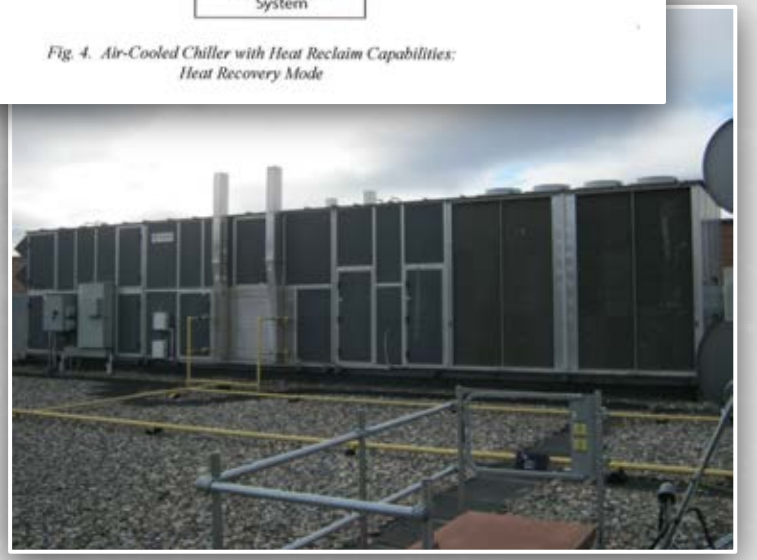


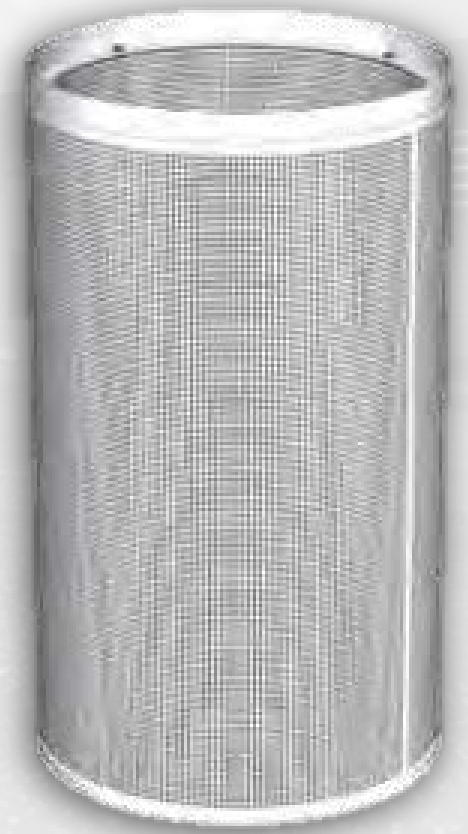
Fig. 4. Air-Cooled Chiller with Heat Reclaim Capabilities: Heat Recovery Mode



ECM #2: Displacement Ventilation With Heat Recovery Chiller

Displacement ventilation

- More efficient air distribution allows for reduced airflow to provide the same amount of cooling
- Casino ceilings height ≈ 16-20 feet; the existing system cools entire space; displacement ventilation only cools the bottom eight feet where patrons are
- Cigarette smoke is transferred above the breathing zone instead of mixed through the entire space



ECM #3, #15: Demand-Controlled Ventilation

- Uses sensors to monitor the return air carbon dioxide and particle counts
- Varies the airflow based on the return air sensor readings
- Savings are from reduced fan power, lower cooling costs, and reduced heating costs since the system is currently a 100% outdoor air system with heat recovery

ECM #4, #5, #6: Demand-Controlled Kitchen Hood Exhaust

- Kitchen hood's exhaust fans run even when cooking is not occurring
- Current building codes allow for reduced airflow when not needed
- This leads to energy savings
- Sensors indicate when full exhaust flow is required
- Variable frequency drives (VFDs) modulate exhaust fan flow rates
- Building controls match supply airflow
- Approximately 40% reduction in energy use

ECM #9: Retro-Commissioning

Benefits of retro-commissioning

- Reduced energy consumption
- Fewer occupant complaints
- Increased ability to manage systems
- Improved equipment performance
- Reduced maintenance costs

ECM #9: Retro-Commissioning

Example discovery at PCCH – economizer damper actuator for rooftop unit

ECM #10: Energy Miser for Vending Machines

How it works

- Powers down machine when area vacant
- Automatically repowers cooling system to keep product cold

Benefits

- Energy savings (average of 1,300 kW per machine)
- Longer machine life

Alternative

Require Energy Star-compliant vending machines with same technology

ECM #11: Light Fixture and Control Upgrades

A broad approach to match upgrade to facility space use and upgrade cost

Replace light switches with switches with occupancy sensors

- For spaces that have varied occupancy and lights can be shut off
- Ensures lights are only used when people are present
- Typical spaces where employed: Bathrooms, storage rooms, equipment rooms

De-lamping

- For spaces where light levels are found to be above code requirements
- Changes in code and excessive safety factors lead to excess lighting
- Cheap, effective way to reduce lighting energy use
- Typical spaces: Meeting rooms, mechanical rooms

ECM #11: Light Fixture and Control Upgrades

A broad approach to match upgrade to facility space use and upgrade cost

Replace fluorescent fixtures with LED fixtures

- For spaces that have continuous occupancy and lights are on all the time
- Reduced maintenance labor costs with longer time between bulb replacement
- Typical spaces where employed: Casino operations rooms

Replace incandescent lights with CFL bulbs

- Bulbs produce same quantity of light for reduced energy use
- Most lights in facility were already switched over; there were some remaining areas
- Note: It does take some time for these bulbs to reach full light levels; verify use type when making this change

ECM #12: Retrofit Casino Slot Machines With LED Lights

- Reduces slot machine lighting energy use by 40-60%
- LEDs last longer, meaning longer time between light bulb changes and reduced maintenance costs
- LEDs give off less heat, which lowers cooling costs for the casino space
- There are many manufacturers that make the retrofit kits

ECM #13: Room HVAC Unit Upgrades and Guest Room Management System

Replace existing air conditioning units with heat pumps

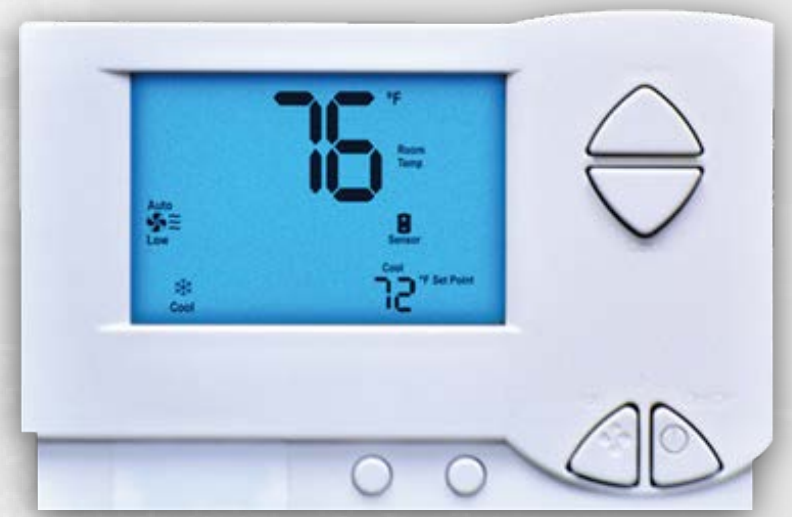
- During a facility trial the heat pump units are 20-30% more energy efficient than the existing AC units

- When combined with a guest room energy management system, has the lowest life cycle costs compared to variable refrigerant flow, four-pipe fan coils, and water source heat pumps

ECM #13: Room HVAC Unit Upgrades and Guest Room Management System

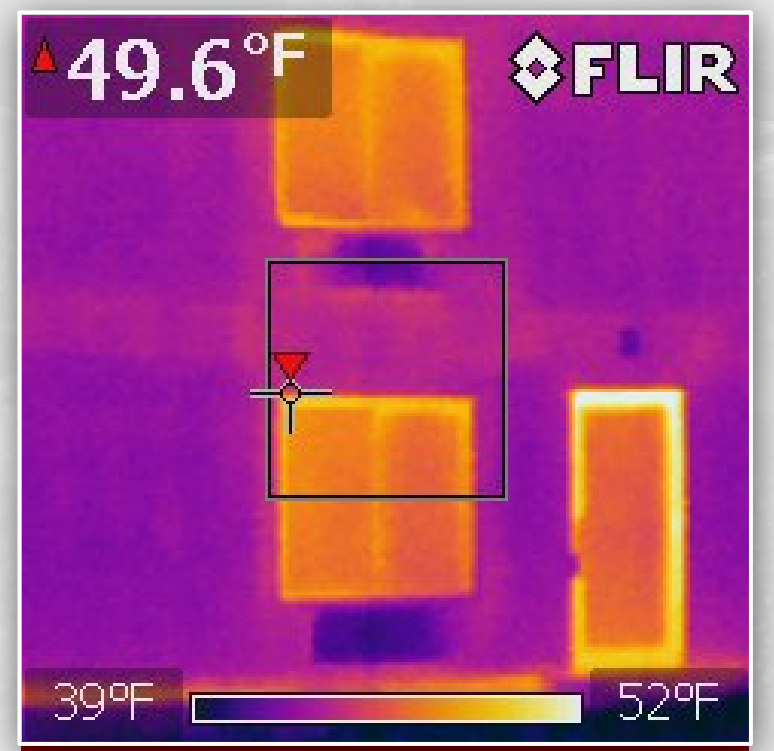
Guest room energy management system

- Thermostat with occupancy sensor tied into the property management system
- Has four modes of operation
  - Room rented – occupied
  - Room rented – unoccupied
  - Room vacant – occupied
  - Room vacant – unoccupied
- Easy for both guests and staff to use
- Allows for monitoring of each room from a remote location



Other Tests – Envelope Testing

Use infrared camera to determine condition of envelope



IR Image

Normal Picture

Conclusion

- If all recommended ECMs are implemented, the Forest County Potawatomi could save over 2,100,000 kWh of electricity and 43,000 therms of natural gas
- This will reduce carbon emissions by approximately 2,000 tons a year – the equivalent of taking over 350 cars off the road each year
- Simple payback on projects with local utility grants is under six years

Questions