

enercase

Multi-Family Apartment Building Heating Control System



What's no
longer flying
out your
windows?

Wasted heat
and energy
dollars



uniongas

A Spectra Energy Company

The logo for ener case, with 'ener' in brown and 'case' in green, is positioned at the top left. A thin green circle arc is visible in the background behind the logo.

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Heating Control System

Just the right amount of heat

Property owners Steeves & Rozema Group reduced the natural gas needed for heating their Sarnia multi-unit apartment building by over 40%. They did it by installing an innovative heating control system developed by K3D Inc. of Windsor, Ontario. This system continuously monitors weather conditions and enables the heating plant to produce and deliver the right amount of heat, within established limits, needed to heat each zone in the building. The result is more even heating and fewer “too hot” and “too cold” complaints from residents. A unique feature limits the amount of heat that is wasted when doors and windows are left open.

Challenge

The Challenge

The Prince at Trillium Park is a five-story, 45-unit apartment building located on Exmouth Street in Sarnia. This 1960s era property uses a natural gas fired hot water central heating plant. The system employs two boilers that provide heat through hydronic radiators located throughout the building.

Wasted and Uneven Heat

Prior to installing the K3D system, temperature control was handled by an "indoor and outdoor" controller which resulted in very uneven and often uncomfortable heating. The sunny side of the building was often too hot at the same time as the windy side was too cold. All the building manager could do was to increase the temperature to try to maintain a suitable temperature for the cold apartments.

This meant that tenants in the hotter apartments resorted to opening windows to vent excess heat. It also created a "stack effect". Simply stated, hot air rises and exits through open windows on the upper floors, causing excessively cold air to be continuously drawn into the building, replacing the air that is leaving the upper floors. The cold air usually enters the building through open or

The "brain" of the control system is an industrial-grade, Programmable Logic Controller (PLC) governed by proprietary control algorithms.



“ Union Gas verified that the K3D system delivered improved building comfort while using 40% less natural gas to heat the building. ”

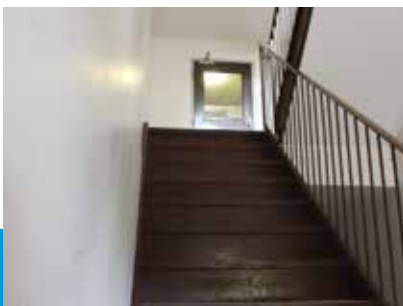
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poorly sealed windows and doors, delivery truck docks, underground parking areas and cracks. The cold air then travels up stairwells and elevator shafts into the upper floor apartments. The heating plant consumes more and more energy trying to heat this intruding cold air. This can quickly get away from a building operator as increasing air flows lead to ever decreasing comfort and increasing energy waste. It can become a never-ending attempt to meet a heating demand created by the excessive influx of cold air.

Ineffective Solutions

The building owner and operator, Steeves & Rozema, tried various approaches to improving energy efficiency. Eight years ago they invested in new, better insulated windows for the building. However, energy savings were disappointing. Windows and doors were continually left open so the boilers kept pumping out heat to warm up the coldest units.

In addition to high energy bills, the owners faced increasing maintenance problems resulting from the heating system issues. Two or three times each winter, heating lines that run under the balcony sills would freeze when doors were left open. The freeze/thaw cycle resulted in leaking pipes, property damage and additional repairs and expenses.



united solutions



The benefits to your building

- Reducing natural gas use by up to 40%
- Dramatically lower energy bills through reduced energy waste
- More even heating means greater occupant comfort and reduced tenant turnover
- Reduced likelihood of frozen pipes
- More attractive rental property with higher property and rental values
- Less wear and tear on heating system components

The benefits to the environment

- Reduced fuel consumption lowers the impact on the environment

New Technology

Union Gas is always seeking innovative demand side management technologies. K3D indicated their heating control system could achieve significant energy savings in multi-family apartment buildings. Union Gas decided to investigate this technology further by partnering with K3D and Steeves & Rozema. By paying some financial incentives, Union Gas enabled Steeves & Rozema to install the system. After it became operational, Union Gas was able to prove the level of natural gas savings.

Comfortable Heat Everywhere

One of the biggest challenges in any apartment building is to provide comfortable heat for all the units. Sun exposure, prevailing winds, humidity, outdoor temperatures and weather affect the heating demands of different building sections. K3D's Heating Control System continuously monitors and adjusts for these ever-changing variables.

At this same property, K3D installed temperature, humidity and wind sensors to provide the necessary real time input variables to the new control system. They also installed new motorized control valves on each of the eight hot water heating pipe risers that distribute heat throughout the building.

Intelligent Control

The "brain" of the control system is an industrial-grade, Programmable Logic Controller (PLC) governed by proprietary control algorithms. The controller actuates a series of solid state relays that manage boiler duty cycles, pump output, and the motorized flow control valves. The result is an intelligent control system that increases heat to areas where it is needed and reduces heat to areas where it is not.

The system is also designed to solve the problem of wasted heat.

All heat requirement calculations are based on the amount of heat needed to reach a desired temperature in an area with closed doors and windows. If a tenant leaves doors or windows open, the system will keep the room from freezing but it will not deliver enough heat to maintain a comfortable temperature. This encourages tenants to close the windows during cold weather and this minimizes the run-away "stack effect".

Spectacular Savings

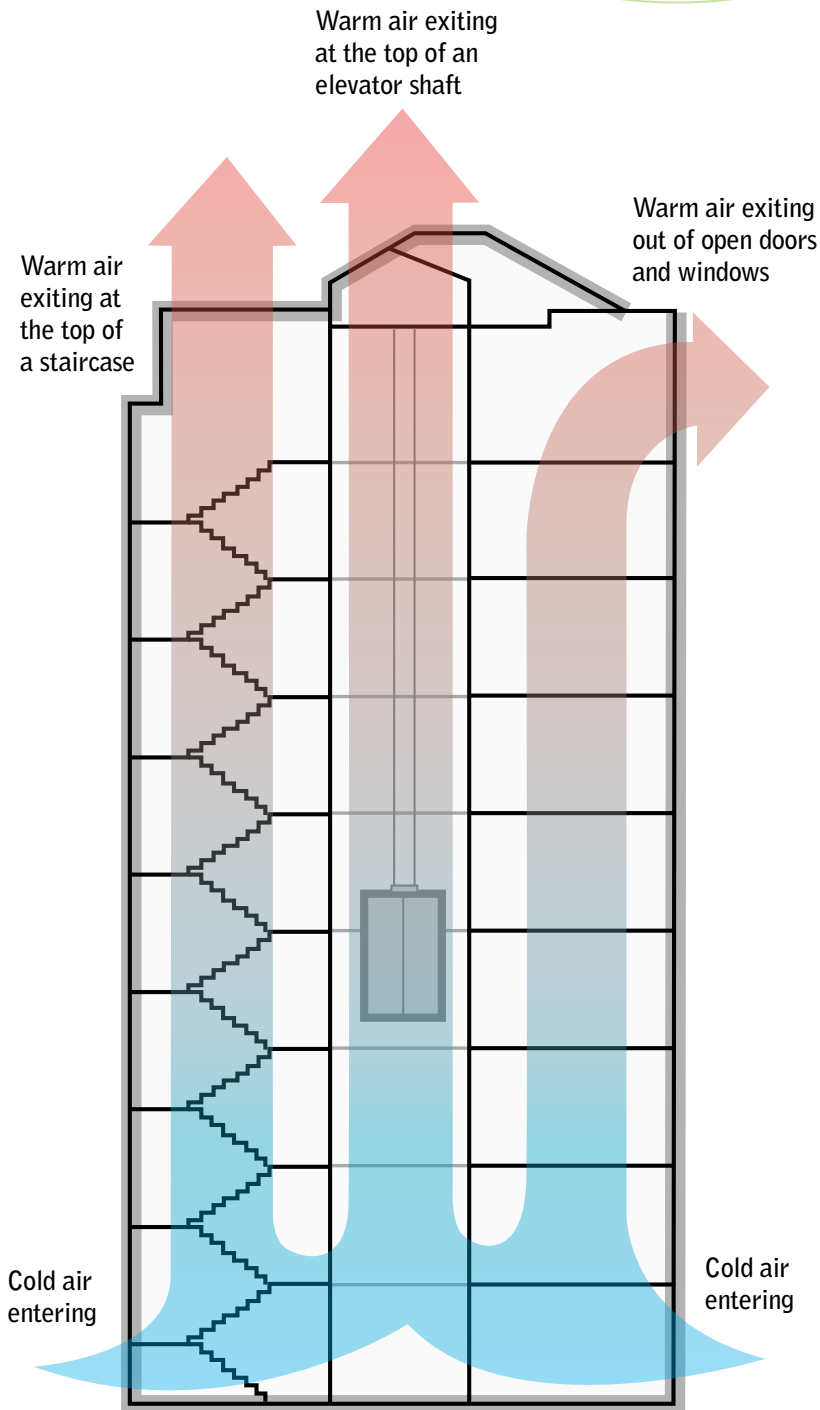
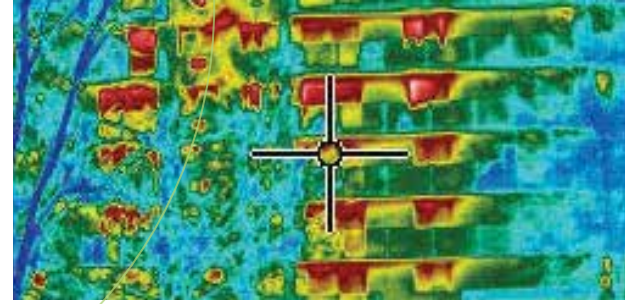
The installation was completed in the fall of 2012 and monitored over a full heating season. Union Gas engineers gathered the gas consumption data and applied a statistical analysis tool (Cumulative Sum of Differences -- CUSUM) to reliably estimate the natural gas savings. Consumption data was then normalized to be representative of an average winter.

The energy savings were spectacular! Union Gas verified a full 40% savings in natural gas used for building heat. At the same time there was a dramatic drop in "too hot", "too cold" complaints from tenants. The system worked exactly as intended -- it put an end to doors and windows being left open and unattended. This change in tenant behaviour also had the added benefit of preventing the usual heating pipe freeze-ups under the door sills that previously occurred at this property.

Additionally, the K3D system reduced boiler run time. This lowered maintenance costs and extended equipment life.

Finally, the K3D Heating Control System is easy to use and maintain. System components can be maintained by any HVAC contractor or control service provider. K3D provides the customer with an encrypted copy of its proprietary software. Landlords use a digital control panel to monitor operations and configure temperature settings.

This infrared image shows the stack effect in an apartment building. The red sections illustrate the highest temperature areas.



Testimonials

“



We are on the top floor. Before the control system was installed, when other tenants complained about the cold, the building managers would turn up the heat. That usually led to our apartment

overheating and then my wife often had to open our windows. Last winter, with the new controls in place, we didn't have to do anything. Now the heat is steady and it is more comfortable than before the controls were installed.

”

Altay Altay
Tenant, The Prince
Sarnia, Ontario

“



Union Gas brought this technology to us and we are very excited about it. The huge savings we achieved surprised all of us; we were able to cut our natural gas

heating consumption by at least 40%. With the incentive received from Union Gas we estimate a two to three year payback and that makes it a good future investment for other buildings as well.

”

Greg Fraser
Vice President, Corporate Real Estate
Steeves & Rozema Group
Sarnia, Ontario



Wins & Highlights

- Heating Control System achieves more uniform heat distribution in all parts of the building and in all weather conditions.
- Upper heating limits ensure that open windows and doors won't trigger full heating plant capacity, aggravating the wasteful "stack effect".
- By reducing excessive cold air infiltration, the K3D Heating Control System not only delivers on its own payback expectations but it also ensures that paybacks from other past and future energy conservation projects are more fully-realized.



Steeves & Rozema Group cut wasted heat at their multi-unit apartment building with a new Heating Control System – lowering their natural gas use by almost half.

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Call the energy experts at Union Gas

For more information on the K3D Heating Control System and Union Gas incentives for multi-family energy efficiency improvements, contact your Union Gas Account Manager.



Energy efficiency projects pay you year after year!