

# SMARTCOOL™ SYSTEMS INC

June 18, 2008

To Concerned Energy Consumers,

In early 2006, Florida Power & Light (FPL) selected the Smartcool ESM™ as part of their Product Development & Management's product assessment program to evaluate, for a full year at a location of their choosing, the ESM's™ energy saving capabilities. Smartcool is pleased to have been selected for this test program as hundreds of technologies are presented to FPL each year for potential inclusion in the testing and evaluation program.

Smartcool has participated with various 3rd party testing labs in the past; one of the largest testing labs in the United States is Oak Ridge National Laboratory (ORNL) which tested the Smartcool ESM™ in 2004. Following the test conducted by ORNL, a report was issued in April of 2005; the result was an estimated 11.87% reduction of compressor kWh consumption across all load scenarios based on the equivalent 7.9% of the total electrical consumption of the packaged unit that was tested on ( $7.9\% \div 66.5\% = 11.87\%$ ). The report also recommended that a test should be conducted in "an actual building application". This ORNL data was instrumental in positioning Smartcool for being selected for the FPL test. A copy of this report is available on the Smartcool website.

Attached to this letter is the recently released summary report that has been provided to FPL from the University of Miami, Department of Industrial Engineering. The Smartcool ESM™ was installed on 6 rooftop air conditioning units, 4 which serviced the main sales floor, one that serviced the pharmacy, and one that serviced the back room. The test was conducted for over a year with the ESM™ in bypass (turned off) for one week and then turned on for a subsequent week. This methodology was repeated throughout the test.

The report indicates the following:

- ✓ **8.9% reduction of kWh usage<sup>1</sup> of the total air conditioning system** throughout the year. This is the equivalent of a **43,660 kWh reduction**.
- ✓ **10.8% reduction of peak demand** which is equated to 6.9 kW in August and estimated to be 422 kW for the year.
- ✓ No statistically significant impact on the indoor air temperature and indoor relative humidity.

Also attached is a case study for this installation. It indicates:

- ✓ **24 – 30 month ROI** before rebate is estimated based on ESM™ cost for this type of installation.
- ✓ **58,911 pounds of greenhouse gases** are reduced annually from these savings<sup>2</sup>

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<sup>1</sup> As the Smartcool ESM™ only reduces energy consumption of compressors; we can convert this number using an assumption that 66.5% of the energy used is attributed to the running of the compressors ( $8.9\% \div 66.5\%$ ). Therefore estimated savings of compressor energy are 13.38%.

<sup>2</sup> Based on Energy Information Administration's Greenhouse Gas Factors for Electricity



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Due to the success of the test, Florida Power & Light have:

- ✓ Provided the report to all regional managers to allow them to present the ESM™ as a recommended product to their Customer base;
- ✓ Qualified the ESM™ for their existing Performance Rebate program;
- ✓ Submitted the ESM™ for a custom rebate that will provide the Customer immediate return on proof of installation.

“We are extremely pleased with the outcome of the 12 month test completed by the University of Miami,” states George Burnes, President & CEO of Smartcool Systems Inc. “The ESM™ provided considerable savings in energy consumption and just as importantly a marked reduction in peak demand. The results will enable Smartcool to provide a true energy efficiency solution to FPL in order for them to provide a superior cost effective service to their customer base and achieve the environmental goals this progressive utility has set for itself.

## About FPL Group

FPL Group, with annual revenues of nearly \$16 billion and a growing presence in 26 states, is nationally recognized as one of the country’s premier energy companies. FPL Group’s two principal subsidiaries are Florida Power & Light Company and FPL Energy, LLC.

FPL is the largest investor-owned electric utility in Florida, serving more than 4.4 million customer accounts. It is one of the largest and fastest-growing electric utilities in the United States and is the nation’s leading utility in customer energy efficiency programs.

FPL Energy is a leader in producing electricity from clean and renewable fuels, a world leader in the development and operation of wind power, and the largest generator of solar power in the nation.

For more information, please visit [www.fpl.com](http://www.fpl.com).

## About Smartcool – “A Clean-Tech Company Specializing in Energy Cost Reduction Technologies”

Smartcool Systems Inc. is an advanced energy savings solutions company specializing in energy and cost reduction technologies for commercial, industrial and retail businesses. The company’s wholly owned subsidiary, Smartcool International Inc., is the owner, developer, manufacturer and worldwide distributor of the Energy Saving Module (ESM™) and the ESM ECO3™. These green technology products reduce the electricity consumption (kWh) and maximum demand (KW) of air conditioning and refrigeration compressors through enhanced system performance. Rather than replacing existing equipment, Smartcool’s products work in conjunction with existing HVAC controls in order to ensure that compressors work at maximum efficiency, while maintaining preset temperature levels and without causing over-cycling.

Rising global energy demand is resulting in significant increases in energy prices. Environmental concerns are causing both government and industry to re-examine the way they do business. Smartcool provides companies around the world with solutions to address the growing pressure to reduce energy costs, increase profits and reduce green house gas emissions. For more information, please visit [www.smartcool.net](http://www.smartcool.net).



## Case Study – ESM™

Business Type	Pharmacy / Grocery Store
Location	Miami, Florida
A/C or Refrigeration	Air Conditioning
Brand	Carrier
Type	Roof Mounted Units
# of Units	6
Controller	Digital T-Stats



## Result Highlights

<b>Return on Investment</b> 29 Months	<b>Annual kWh Reduction</b> 43,660 kWh	<b>kWh Usage Savings</b> 8.9%	<b>Peak Demand Savings</b> 10.8%	<b>Greenhouse Gas Reduction</b> 58,911 lbs
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Evaluation Period	June 2006 – September 2007
Project Description	<p>6 Carrier roof top units were installed on at the facility.</p> <p>Energy data loggers were installed on the electrical mains to the air conditioning units to measure and record the Amperage consumption of the air conditioning system throughout the evaluation period.</p> <p>The data loggers take a measure every 8 seconds and are set to provide a date stamped printout every 4 minutes. During the analysis the data is accumulated over one hour periods to compile the comparative data.</p>
Results Summary	Results from the evaluation clearly demonstrate that the Energy Saving Module™ significantly reduces kWh usage and kW demand consumption providing both financial and environmental benefits.

Electricity Reduction	
Average Daily kWh Reduction	120 kWh
kWh % Reduction	8.9%
Annual kWh Reduction	43,660 kWh
Annual Peak Demand Reduction	10.8%
Annual kW Reduction	422 kW
Return on Investment	46%
Pay Back Period	29 months

Environmental Benefits	
Greenhouse Gas Reduction	58,911 lbs
Tree Equivalent	32 acres
Enough Electricity to Supply	4 Homes



## Department of Industrial Engineering

### Field Monitoring of SmartCool™ ESM™

#### Final Report (Whole Year)

##### Prepared by

*Dr. Shihab Asfour, Professor and Chairman*  
*Dr. Khaled Zakaria, Assistant Scientist*  
*Mr. Tony Reyes, Research Assistant*  
*Mr. Moataz Eltoukhy, Research Assistant*

##### Submitted to

*Mr. Craig Muccio*

**Florida Power & Light Company**



**December, 2007**

## **Executive Summary**

This is a field test of the SMARTCOOL™ Energy Savings Module™ (ESM™) in a commercial HVAC application conducted by the University of Miami for Florida Power & Light Company under FPL's Conservation R&D Program. The Smartcool is an electronic control system which collects temperature data versus time when the compressor is on or off in order to calculate the optimal run time for each compressor. Control modules connect to switches located between the thermostat and each compressor.

The goal of the research is to estimate demand reduction of a heating/ventilation/and air-conditioning (HVAC) control technology from Smartcool Systems, Inc. during Florida Power & Light summer schedule peak hour (4:00 to 5:00 pm), and winter schedule peak hour (7:00 to 8:00 am) specifically during the months of August and January, respectively. Additionally, consumption and reduction of energy (kilowatt-hours) is also of primary importance.

To measure the impact of the SMARTCOOL™, the University of Miami, Department of Industrial Engineering team installed, 21 dedicated data loggers and current transformers (CT), 3 loggers at the service entrance and 3 loggers on each of the A/C roof top units, free-standing, building of a national chain drug store in Miami, Florida.

These loggers were installed to acquire the power consumption at the service entrance and for each of these six units for a full one year. The SMARTCOOL™ was switched ON/OFF every other week to minimize the effect of the weather variation.

This report explains the methodology followed by the University of Miami team, presents the main results obtained, and explains the analysis techniques followed to investigate the performance of the SMARTCOOL™ to determine whether or not the installation of the SMARTCOOL™ on the cooling units will result in a reduction in the power consumption and/or the peak demand. The data collected using the HOBOS were validated by comparing it to a number of the electric bills of that facility. The average absolute percentage difference between the logged kWh and the FPL reported kWh was 3.34% for the 5 billing cycles selected during the winter period, while the average absolute difference between the logged kW demand and the FPL reported kW demand was 2.32%, and for the summer period the average absolute percentage difference between the logged kWh and the FPL reported kWh was 3.34% for the 3 billing cycles selected, while the average absolute difference between the logged kW demand and the FPL reported kW demand was 2.32%.

After validation of the data collection process, the multiple regression technique was the statistical tool used to analyze the data obtained. The kWh consumption data of the

cooling units corresponding to an outside temperature that was below the thermostat setting of 70°F were excluded from the analysis.

Regression equations were developed to describe the relationship between the power consumption of the A/C units (kWh), peak demand recorded at the service entrance (kW) and both the outside temperature and the SMARTCOOL™ were developed.

A t-test was performed on both the indoor relative humidity (RH) and temperature for the summer months. The first hypothesis tested was whether the mean RH with the SMARTCOOL™ “ON” equals the mean RH when it’s “OFF”. The t-test showed that there was no statistical significant difference ( $P < .001$ ) between the mean RH values when the SMARTCOOL™ was “ON” and when it was “OFF”.

The same conclusion was drawn when performing the t-test on the indoor temperature, there was no statistical evidence that turning the SMARTCOOL™ will significantly alter the indoor temperature ( $P < .001$ ).

Based on the regression equation developed, it was concluded that the SMARTCOOL™ managed to reduce the kWh consumption by **8.9%** and to reduce the peak demand by **10.8 %** respectively. Using the test building characteristics and typical average weather for the FPL service territory, the annual energy savings is estimated to be 43,660 kWh with a demand reduction of 6.9 kW at 4-5 PM in August. The greatest energy savings occurred during the summer months (Fig.1). These savings were achieved with no report of change in comfort by the occupants of the test location.

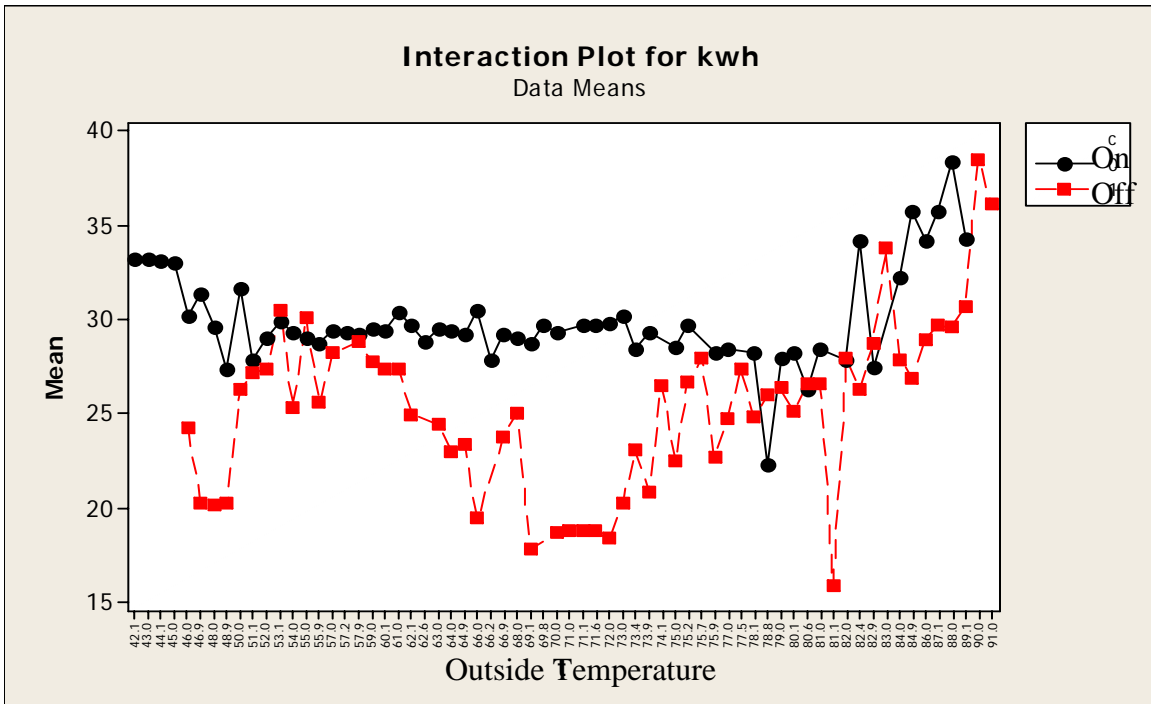


Figure 1. The interaction effect of both the SMARTCOOL™ and outside temperature on the kWh.