VILLAGE GREEN FUND APPLICATION

Applications will be considered and reviewed twice a year.

Title of proposal: *Reducing Energy Consumption of Vending Machines*

Amount requested: $2,140.00

Applicant(s) (please include affiliation [LU, SFH, SOSF, Community, Other]):

Clare Savesenergy (SOSF)
Francis Lovestheearth (LU Faculty)
Louise Kilowatt (LU Student)
Johnny Dogood (LU Student)

Name, campus address and phone of primary contact:

Clare Savesenergy: 110 Electric Hall, SFV; x0002

A. Purpose, Timetable, and Accountability

1. What's the overall idea? Identify the purpose of your proposal. Provide a detailed description of its activities and specific objectives. (Refer to criteria #7 of Charter document)

Purpose of Project: To reduce the amount of electricity consumed (kilowatt hours; kWh) and to reduce carbon dioxide emissions resulting from electricity used by vending machines on the historic campus of the Sylvania Franciscan Village (SFV).

Description of Project:

This project will use electricity miser devices to reduce the electricity consumption of ten (10) refrigerated, beverage vending machines and two (2) non-refrigerated, snack vending machines. These electricity miser devices manage the energy use of a vending machine by lowering the machine's electricity consumption during 'low traffic' periods – times when few people are in the vicinity of the vending machine. The miser plugs into the wall socket and the vending machine then plugs into the miser. An infrared sensor detects motion (e.g., people) in the vicinity of the vending machine and sends signals to the miser unit. When periods of low traffic occur, then the miser cuts back energy to the vending machine.

Our team has researched several models of miser devices and their benefits, and proposes that two types of misers could be used on vending machines in the Sylvania Franciscan Village. The 'Chilly-Miser' with infrared sensors would be used on the 10 refrigerated, beverage vending machines in SFV. The 'Munchy-Miser' with infrared sensors would be used on the two non-refrigerated, snack food vending machines in SFV (that dispense candy, chips, pretzels, crackers, and granola bars).

The Chilly-Miser unit adjusts electricity used by a refrigerated vending machine during times of low traffic and also in response to machine's performance and environment. This miser monitors the performance of the vending machine's cooling unit over each cycle of cooling and helps the cooling unit work more efficiently. The Chilly-Miser prevents what is called "compressor short cycling" so that the power is not turned off to compressor on the cooling unit while the compressor is running. This helps save energy and can lengthen the operating life of the compressor. Also, the Chilly-Miser adjusts electricity use for cooling based on the room temperature, the load of beverages in the machine, and the frequency of activity/sales.

The Munchy-Miser unit adjusts electricity used by a non-refrigerated vending machine during times of low traffic. This miser will power down after 15 minutes of no activity in the vicinity of the vending machine – reducing electricity consumption for lighting and general operation of the machine. As soon as someone approaches the inactive machine, the infrared sensor detects the motion and the miser immediately powers up the vending machine.

Installing vending machine misers is one of the recommendations on the U.S. EPA's Website "Stamp out energy waste": http://www.energystar.gov/buildings/facility-owners-and-managers/existing-buildings/save-energy/stamp-out-energy-waste

Installation of the electricity misers, based on the manufacturer's information, is easy to achieve by simply following the instructions and plugging in the units in the appropriate places. Special technicians or electricians are not needed. SFV staff from Facilities & Maintenance would install the miser units, not the team members proposing this project.

The student members of our team will monitor the energy use of the vending machines to check on each machine's performance before and after the installation of the miser units. Dr. Francis Lovesthearth will teach the students, Louise Kilowatt and Johnny Dogood, how to use power meters to collect electricity usage data and how to graph and analyze the data. The students will collect data on electricity usage of both of the non-refrigerated vending machines and a sample of five (5) of the 10 refrigerated vending machines over a 2-month period prior to installation of the miser units and over a 2-month period after installation of the miser units. The data will be analyzed to see how much electricity savings occurs compared to the manufacturer's reported average estimated savings of 40% for the refrigerated vending machines and 20% for the non-refrigerated vending machines.

The activities described above will enable the project to achieve its purpose and the following objectives:

- Demonstrate a reduction in electricity usage of the vending machines as a result of the electricity misers.
- Demonstrate a cost savings in avoided electricity usage of the vending machines as a result of the electricity misers.
- Demonstrate avoided carbon dioxide emissions as a result of the electricity misers reducing the electricity consumption of the vending machines.

2. What other offices may possibly be impacted by your proposal? Some proposals have an impact on the work or planning of other departments. Here is a short list of areas to consider, depending on the nature of the project:

- ☐ ☑Facilities or Grounds
- ☐ Computing Services or Instructional Technology
- ☐ Environmental Programs
- ☐ ☑Environmental Health and Safety
- ☐ Dining Services
- ☐ Learning
- ☐ Institutional Advancement
- ☐ Sisters of St. Francis
- ☐ Residence Life
- ☐ Curriculum
- ☐ Campus Activities
- ☐ Athletics
- ☐ Admissions
- ☐ Orientation Service-Rosary Care
- ☐ Franciscan Academy
- ☐ Other (indicate below)

Other:

If your proposal affects another department, and you have made contact with someone, please list the individuals whom you spoke with about the project, the date this conversation took place, and ask them to sign this application.

Name: Date spoken with:

Signature: *Obtain signatures here because two offices were checked in Section 2 above – indicating those offices or departments might be affected by this proposal.*

3. Please include the signature of the appropriate leader where your project will take place.

Sisters of St. Francis (Sr. Theresa Darga)

Name: Signature: *Obtain signature here because some of the vending machines targeted in this project and some of the energy savings are in buildings directly operated by the Sisters of St. Francis.*

Lourdes University (Michael Killian)

Name: Signature: *Obtain signature here because some of the vending machines targeted in this project and some of the energy savings are in Lourdes University buildings.*

Sylvania Franciscan Health (Sr. Rachel Nijakowski)

Name:

Signature:

4. How will your project be managed and completed? Please include a detailed timetable for the project's duration and lines of accountability to show who will be responsible for seeing the project through to completion. *IMPORTANT NOTE: If you are a student, please have the faculty/staff/village member who has agreed to serve as an advisor to your project sign this section.*

Action and Person Responsible	**January 2014**	**February 2014**	**March 2014**	**April 2014**	**May 2014**	**June – July 2014**
Train Students to Collect Data: Francis Lovestheearth (LU Faculty)	✓					
Collect data on electricity used by the vending machines prior to miser installation: Louise Kilowatt & Johnny Dogood (LU Students)	✓	✓				
Order & Receive Miser Units: Clare Savesenergy (SOSF)		✓				
Miser Units Installed by Facilities & Maintenance Staff			✓			
Collect data on electricity used by the vending machines after miser installation: Louise Kilowatt & Johnny Dogood (LU Students)				✓	✓	
Submit data to Clare and Francis on electricity used by the vending machines: Louise Kilowatt & Johnny Dogood (LU Students)						✓
Tabulate & Report Projected Savings to Village Green Fund Board: Clare Savesenergy (SOSF) and Francis Lovestheearth (LU Faculty)						✓

"I understand that by serving as an advisor or a sponsor of a student project, I am expected to play a very active and on-going role in the student project to ensure continued success to the project's completion or to the end of the payback period."

Name: Date:

Signature: *Obtain signature of faculty member here because two students are involved in this project and the faculty will serve as their advior on this project.*

5. What's the "green" idea? For your proposal to be funded it must contribute to sustainability or the care for creation; meaning it must have a positive environmental or energy savings impact. Please describe why you think your proposal is a green initiative and how it helps to further the sustainability efforts of the SFV.

Contribution to energy savings: This project is expected to reduce the electricity used by the vending machines in the Village compared to present amounts of electricity used by those machines (40% savings per refrigerated machines and 20% savings per non-refrigerated machines: average savings reported by the manufacturer of the misers). In turn, this will save the Village money that it pays for electricity.

Contribution to sustainability and care for creation: By reducing electricity use, this project is expected to reduce carbon dioxide (CO_2) emissions. Because CO_2 is a greenhouse gas, scientists link the emission of this gas to rising atmospheric temperatures and global climate change. Expected outcomes of global climate change include possible droughts in some locations and more rainfall and flooding in other locations, changes in growing seasons and soil conditions for crops, changes in biodiversity, and coastal flooding as ice sheets and glaciers melt. Ultimately, global climate change is expected to bring about important effects on human heath, displacement of various human populations, and possibly worsening the effects of poverty in certain parts of the world. Any efforts to reduce greenhouse gas emissions, even though small, could contribute to environmental and social well-being.

B. Funding

6. How much will it cost? Please provide a detailed budget for your project with an explanation next to each budget item on exactly how the funds will be spent. If necessary, provide the budget in a separate attachment.

Purchase Cost:

Ten (10) Chilly-Misers with Infrared Sensors for the five refrigerated vending machines:

10 x $155 per miser = $1550.00
Shipping Cost = $ 10.00

Two (2) Munchy-Misers with Infrared Sensors for the two non-refrigerated vending machines:

2 x $155 per miser = $ 310.00
Shipping Cost = $ 10.00

Total Purchase Costs = $1,900.00

Cost of Labor for Preparation and Installation:

2 people x 2 hours each for reading instructions and preparing the misers = 4 hours
2 people x 0.5 hours for installation per vending machine x 12 vending machines = 12 hours

Total Labor Cost = 16 hours x $15.00 per hour = $240

TOTAL Cost of Purchase and Installation = $1,900 + $240 = $2,140.00

7. Can anyone else help pay for it? Are there any other funding sources potentially available or that you have actually attained? If so, please provide details.

Cost of Power Meters: The power meters have been purchased with funding for teaching supplies and equipment as part of the teaching budget of the Department of Chemistry & Physical Sciences and the Department of Biology & Health Sciences at Lourdes University. Therefore, this proposed project is not requesting any funding for the power meters.

8. How can we keep this project going? If your project is meant to be on-going, describe your plans to help ensure the long-term success of your project's goals (e.g., need for future funding, volunteers, support from offices on campus).

Once the electricity miser units are installed and the final data collected (refer to the timetable in #4), there will not be a need for much on-going work. The only work that will be needed is for someone to check the electricity misers every 6- to 12-months to ensure they are working properly. The science faculty and staff of Facilities & Maintenance will work together to check the electricity misers according to instructions and time table recommended by the manufacturer.

C. Project Outcomes and Measuring Success

9. Who/What will benefit from your proposal? Identify the expected outcomes of your project and their importance to individuals, groups, the SFV at large, air quality, the ecosystem, etc.

This project will benefit the SFV financially by reducing the electricity used by the vending machines, thereby reducing the electric bills paid by the SFV. Those savings will benefit the SFV community by enabling the savings to go back into programs within the Village instead of to utility companies.

This project will benefit the SFV by reducing carbon dioxide emissions, thus enabling the SFV to: a) more effectively attain its commitment to the principles in the Care for Creation & Environment document and b) demonstrate to the public that the SFV is making progress in reducing its contributions to global climate change. This project will also benefit air quality and the environment in our region because of less demand for and usage of electricity – electricity that contributes to air and water pollution because it is primarily generated by burning fossil fuels at Toledo Edison's Bayshore Plant in Oregon, OH.

A detailed calculation of the avoided emissions of CO_2 as a result of using the electricity misers on the vending machines is shown below.

Calculation of CO_2 Savings: Our method is based on information from the U.S. Energy Information Administration and Toledo Edison:

- Average of 2 lbs of CO_2 is produced when using three types of coal and two types of oil (burning equal mixes of these 5 fuel types) (Calculated on data available at: U.S. Energy Information Administration (U.S. Department of Energy) Website: "How much carbon dioxide (CO_2) is produced per kilowatt-hour when generating electricity with fossil fuels?" - http://www.eia.gov/tools/faqs/faq.cfm?id=74&t=11)
- Toledo Edison's Bayshore Plant in Oregon, OH has two units: one coal-fired unit and one oil-fired unit (https://www.firstenergycorp.com/content/dam/corporate/generationmap/files/Bay%20Shore%20Plant%20Facts.pdf). Assuming that equal amounts of coal and oil are burned each day, we can use the average value of 2 lbs of CO_2 produced from coal- and oil-burning to produce electricity that SFV would be consuming.

- Total Emissions Avoided for CO_2 by using 10 misers on refrigerated machines and two (2) misers on non-refrigerated machines:

  Refrigerated Vending Machines:

  3.4 kWh Avoided energy per machine per day x 365 days per year = 1241 kWh Avoided energy per machine per year

  10 machines x 1241 kWh Avoided energy per machine per year = 12,410 kWh Avoided energy per year

  12,410 kWh Avoided energy per year x 2 lbs of CO_2 per kWh = 24,820 lbs of Avoided CO_2 per year

  Non-Refrigerated Snack Food Vending Machines:

  1.0 kWh Avoided energy per machine per day x 365 days per year = 365 kWh Avoided energy per machine per year

  2 machines x 365 kWh Avoided energy per machine per year = 730 kWh Avoided energy per year

  730 kWh Avoided energy per year x 2 lbs of CO_2 per kWh = 1460 lbs of Avoided CO_2 per year

  Avoided CO_2 Emissions per year = 12,410 + 1460 = 26,280 lbs of CO_2

  TOTAL Avoided CO_2 Emissions per year: assuming that 90% of the electricity supplied by Toledo Edison comes from fossil fuel burning and 10% comes from nuclear and/or renewable energy sources:

  0.9 x 26,280 lbs of CO_2 = 23,652 lbs of CO_2 per year

The avoided emissions of CO_2 represent a contribution to the efforts of the SFV to reduce its greenhouse gas emissions and to reduce its overall impact on global climate change.

10. How will you measure the project's success? If your project projects financial savings, please indicate if you will be using the Estimation of Savings Method or the Method of Actual Performance Calculations (see Charter #8). Please be very specific about the anticipated outcomes.

Calculation of Energy Savings Using the "Estimation of Savings Method": Our method below is based on information from the manufacturer of the miser units, assuming an electricity savings of 40% on the refrigerated vending machines and 20% on the non-refrigerated vending machines. The current electricity use of the vending machines is, according to the manufacturer's product information:

Present Refrigerated vending machines: 8.5 kWh per machine per day.
Present Non-refrigerated vending machines: 5 kWh per machine per day.

Refrigerated Vending Machines – Energy Savings After Installing 'Chilly-Miser':

40% reduction in electricity use = 0.4 x 8.5 kWh = 3.4 kWh Avoided energy per machine per day

3.4 kWh Avoided energy per machine per day x 365 days per year = 1241 kWh Avoided energy per machine per year

10 machines x 1241 kWh Avoided energy per machine per year = 12,410 kWh Avoided energy per year

12,410 kWh Avoided energy per year x $0.070 per kWh = $868.70 per year

Non-refrigerated Vending Machines – Energy Savings After Installing 'Munch-Miser':

20% reduction in electricity use = 0.2 x 5 kWh = 1.0 kWh Avoided per machine per day

1.0 kWh Avoided energy per machine per day x 365 days per year = 365 kWh Avoided energy per machine per year

2 machines x 365 kWh Avoided energy per machine per year = 730 kWh Avoided energy per year

730 kWh Avoided energy per year x $0.070 per kWh = $51.10 per year

TOTAL Annual Monetary Savings = $868.70 + $51.10 = $919.80 per year

Calculation of Energy Savings Using the "Method of Actual Performance Calculations": In addition to using the "Estimation of Savings Method", our project involves an opportunity for two students on our team to verify savings by using the "Method of Actual Performance Calculations". The students will obtain data on electricity usage (in kWh) for a sample of five of the ten refrigerated vending machines and both of the non-refrigerated vending machines by attaching a power meter to those vending machines to measure the electricity used by each sampled machine. Students will sample the vending machines at randomly selected times over a 2-month period. Each vending machine's electricity usage will be measured once per week on a randomly selected day and time period, including weekends. Each machine will be sampled for 2 months prior to installation of the electricity misers and then for 2 months after the installation of the misers.

Using the collected data, the students will estimate the total amount of energy used by each vending machine prior to and after installation of the misers. Then, the amount of energy saved, money saved, and carbon dioxide avoided will be calculated for each vending machine and for all machines combined by using the methods outlined in sections #9 and #10 of this proposal. The amounts of energy and money saved from the "Estimation of Savings Method" and the "Method of Actual Performance Calculations" will be reported to the Village Green Fund Board so that the

Board can determine the appropriate payback period.

Based on the "Estimation of Savings Method" only, the payback period is presently estimated as follows:

TOTAL Annual Monetary Savings = $919.80 per year (based on electric rate of $0.070 per kWh)

Total Cost of Purchasing and Installing the 12 Misers = $2,140.00

Estimated Payback Period = $2,140 divided by $919.80 per year = **2.33 years**
(or approximately 27 months)

These savings and the estimated payback period will be verified by using the "Method of Actual Performance Calculations" as described on the previous page.

Submission instructions
Please complete this digital application, then print it out and obtain all required signatures. Return the application with any supporting documents to Sr. Janet Doyle, 107 Regina Hall, or to Sr. Janet's mailbox in Umbria Hall.

If you have questions, contact any of the VGF Board members as listed on the website.