SSC Grant

Topic Area Criteria (Energy, Food & Waste, Water, Land, Education, Transportation):

Food & Waste

1. Waste Reduction
2. Outside Resource Reduction (Emphasis on using resources created at UIUC)

Project Summary: *Please summarize the project and its impact on campus sustainability in 2-3 paragraphs*

A sustainable agricultural food (ag-food) system will withstand the test of time, meeting the needs of the present without compromising those of future generations. Also, to support an ag-food system, the raw materials (inputs) and resources used for food transformation and distribution must be conserved, not depleted or degraded. This sustainable ag-food system should result in a better diet for human nutrition, and ultimately in enhanced health outcomes. This proposal describes activities that will result in a model sustainable ag-food system at Illinois, by harmoniously synergizing the production activities at the Sustainable Student Farm (the Farm), the teaching, research, and outreach activities at the Department of Food Science and Human Nutrition (FSHN), and Dining Services' goal of increasing procurement of locally grown foods.

The Farm supplies Illinois residence halls with locally grown, raw foods. In addition, the farm acts as a living laboratory that connects students, community members, and the state at large with regional, small-scale food systems. It has successfully exposed 200-300 students every year on sustainable ag-food production. We will expand the efforts of the Farm by designing, implementing and evaluating a processing/packaging line that adds value and reduces waste of conventional and organically grown vegetable crops. Additionally, the proposed equipment will support our training efforts in the Dept. of FSHN in areas such as sustainable processing techniques (e.g., nutrient preservation, water reduction, waste reduction, and energy conservation) reaching a larger cohort of students every year.

The Farm grows and sells a number of fresh produce items. On a per weight basis, tomatoes are the Farm's number one crop. The vast majority of these tomatoes are currently sold raw to campus Dining Services, where they are either used fresh; or cleaned, processed, and made into sauce. Dining Services prefers to purchase ready-to-eat or ready-to-add sauces, stored cold or frozen, in bags or cans, as opposed to having to process the tomatoes in-house. In addition, only 60-70% of the possible tomato crop is harvested due to the seasonality of locally grown tomatoes not coinciding with the needs of Dining Services. These are common problems with locally-grown produce. Thus, our solution is to collaborate with the Farm and build a line to process tomatoes into value-added, shelf-stable products. FSHN students and faculty will also be able to use equipment to research novel sustainable processing practices while establishing processing protocols for a small scale line that could be built into a community to support local farmers. We will showcase our model processing line through events such as ExplorACES, Agronomy Day, Crop Science Field Days, and short courses aimed at both students and members of the community, reaching thousands of individuals interested in sustainable agricultural

practices. To assist in evaluating the feasibility of providing food processing services to private entities, we will engage FSHN Professional Science Masters (PSM) students who are looking for projects in the field of sustainability, in collaboration with local organizations, business students, and the University of Illinois Extension.

Student Involvement: *Because this funding is generated through student fees, SSC gives preference to projects that incorporate student collaboration. In one-two paragraphs, please indicate how this project will include students.*

Student involvement in this project will be significant. The Farm currently engages student volunteers in both seasonal (e.g., growing and harvesting) and off-season (i.e., soil preparation) activities, amounting to over 1,000 labor hours from 200-300 unique volunteers a year. Our processing/packaging line will serve as an extension of these activities. Students will learn new hands-on skills for sustainable processing practices directly applicable in their future careers. They will be responsible for operating the equipment under supervision of trained FSHN staff. Additionally, the FSHN Dept. operates a student run café (Bevier Café) and sit-down restaurant (SpiceBox). These could also be venues to sell finished products, allowing hospitality management students to experience working with locally grown foods as opposed to current procurement practices involving larger grocers. This equipment line is expected to be a showpiece of pilot level capabilities for both the Farm and the FSHN Dept. Thus, it will be available for tours for individuals of the campus community and the public at large. The integration of short courses and tours will expose students and the public not only to sustainable farming practices, but also to enhanced sustainable processing technologies. Additionally, PSM students will conduct research into sustainable packaging technologies and feasibility studies that satisfy the business and extension needs of the Farm.

Timeframe: *Please indicate the anticipated timeframe of the project including starting date and ending date.*

This project will require significant investment in food grade processing equipment. As such, ample time is necessary to identify, purchase, and operationalize equipment. We propose a three-stage process that will reduce the time to operation and allow us to begin working and learning within 6 months of acceptance of the proposal. Even at the first stage of the project, we will be able to showcase equipment line capabilities and involve students in the process. The research into sustainable processes and logistics of operating a processing facility to work with local farmers will begin immediately. At the request of the funding committee, we will present a complete proposal including all three stages: line equipment, packaging equipment, and certification.

In the first stage, we will purchase and install the initial portion of the necessary processing line equipment. This will be operational within 4-6 months, which could coincide with this year's tomato harvest. The equipment will strengthen our capabilities to process different types of produce, with an

initial focus on tomatoes. We will develop sustainable practices for operating the equipment and food preparation techniques to maximize quality without jeopardizing safety and flavor of final products. Additionally, a PSM internship will be sponsored to research ideal packaging for the finished product. In the second stage, we will purchase equipment to efficiently package finished products. One of the most difficult and sensitive aspects of fresh-produce processing is correct packaging as it is crucial to consumer safety and shelf-life of perishable products. In the final stage, we will certify our produce processing line through the appropriate agency (e.g., Process Authority, FDA, Health Inspector). At this point, we will have a fully operational small-scale processing line that could be emulated by communities and companies worldwide.

Anticipated Budget (Phase 1):

$140,000 – Tomato Processing Equipment

$10,000 - PSM Student Internship Sponsorship focusing on sustainable packaging research

Answers to Questions

What Innovative Processing Technology will be utilized in this project?

The entirety of this project is focused on the idea of making a sustainable food system by taking fresh produce from the Sustainable Student Farm (SSF) and making it available for students on campus through Dining Services. Since it is necessary to process the food in some way to make it available in larger quantities for students year round, we will place an emphasis on ensuring our processing equipment has the smallest energy consumption possible.

A couple of items that will be featured are an ultrasonic washer currently being researched at the Pilot Plant, innovative packaging, and an emphasis on water savings. The ultrasonic washer is used to clean harmful bacteria from the produce using ultrasonic vibrations as opposed to harmful chemicals or harsh scrubbing which degrades the quality of the produce. This machine is currently being used to develop methods for cleaning multiple forms of produce and will be available for cleaning the tomatoes for this project. This is a great innovation and will allow us to clean the tomatoes using very little resources as all water in the process is recycled. Since the packaging is such a crucial aspect of the footprint of this project, we would like to spend some time researching the ideal solution that ensures the food is safely stored, meets the needs of Dining Services, and produces the smallest amount of waste possible. We have several viable candidates for the package, but would like to integrate a Professional Science Master (PSM) student internship into this project over the Summer of 2013 to assist in finding the best solution. This internship will involve researching UIUC Waste Management capabilities, Dining Services preferences, Food Safety requirements, and capabilities of equipment manufacturers. This will allow the student a great experience in researching sustainable packaging while ensuring we have the best option available.

How will equipment be maintained?

As it is our intention to make this program self-sustaining, all equipment will be maintained by being integrated into the Pilot Plant maintenance program. Each piece of equipment is assigned a cost per use and money is collected as it is used. The rates are reviewed annually to ensure funds are at a sufficient level to maintain the equipment. The money from the sale of the tomato products will be used for the maintenance of the equipment, and if there is a surplus, possible expansion into different processing equipment for other SSF produce. Other FSHN equipment in the Pilot Plant will be available to support this project under the same program, and the new tomato processing equipment will be used for short courses or classes similarly. The funds generated by this project will not support or subsidize other Pilot Plant projects.

What is project timeframe?

The ideal timeframe would be structured/funded in 3 stages.

Stage 1- Funded Spring 2013

Stage 1 would include the procurement of the necessary equipment to process the tomatoes into a sauce and the funds necessary to sponsor a Summer internship for a PSM student to develop the packaging equipment specifications and assist in other developmental aspects of the program. This would include working with UIUC waste management, Dining Services, and equipment manufacturers to develop an innovative solution. Depending on funding timing, this stage could be completed in time for Summer 2013 harvest, allowing FSHN students working under the supervision of FSHN faculty/staff and Dining Services' Chefs to start testing the equipment and developing processes and recipes.

Stage 2- Funded Fall 2013

Stage 2 would include funds for the purchase of necessary packaging equipment using the data found over the Spring and Summer of 2013. Work would continue on developing processes and preparing for certification.

Stage 3- Funded Spring 2014

Stage3 would fund two necessary certifications for the project needed to make the tomato sauce available for sale and some dollars for initial short course development. The first certification is a FDA Food Grade certification and the second is a processing authority certification approving the actual process we use to produce the tomato sauce. Up to this point, the products could be tested analytically and made available for taste tests, but not for general consumption or sale. The money would only be used for the certifications/costs directly relating to this project. The FDA food grade certification needs will likely be established by that time from a department feasibility study discussed below. The processing authority certification process can only be started once the line is in place and running for the third party to observe the production and test the final product.

If all funding is in line and the project progresses as planned, we will be ready for a bumper crop of tomatoes the Summer of 2014!

What is budget for Stage 2 and 3? Can you provide clarity on what Stage 3 funds will be used for?

We are still compiling budgets for stages 2 and 3, but will be able to provide solid estimates by the step 2 submission (~March 2013) this Spring , or sooner if necessary. There will need to be some flexibility to account for the different packaging options that will be explored for stage 2, so we will provide a total dollar amount that should capture any costs. Additionally, the FSHN Department is sponsoring a feasibility study for the Pilot Plant and has added a component to develop recommendations and costs necessary to adapt the existing infrastructure for this tomato processing project. This study is in process and should provide us with some crucial information by the time the step 2 funding for this Spring submission is due.

There was also some confusion at the meeting concerning how the stage 3 funds would be used. I would like to bring some clarity to the two certifications required for this project. All funds from this project would only be used in the certification and changes necessary to support this particular project. The FSHN Department is active, normally working with several projects at one time. We have several current projects/programs using other inspected food grade areas within the department and are working on developing the Pilot Plant. The department is currently sponsoring a feasibility study that will outline all necessary costs for conversion of the plant on a per square foot basis. The funds allocated for this project would only support the square footage used by this particular project, just as other projects would need to support their square foot usage. Depending on the success of other projects in the Pilot Plant, there is a high likelihood the costs of certification will be greatly minimized than if this project had to support itself entirely. We are not expecting this to require major infrastructural changes, and we will not be using the funds to support or subsidize any other activity in the Pilot Plant.

The second certification is directly tied to the procedures we use to process the tomatoes. High acid produce packaging requires a third party “Process Authority” to inspect and approve your processing line. This includes things like ensuring the tomatoes are cleaned properly, cooking temperatures are held for appropriate amounts of time to kill bacteria, and tests of the final product. While we have expertise in this area, the FDA requires a third party inspection prior to sale of any produce. They also require the line be functional before approval so they can test it while in production.

How has/will the FSHN Department support this project?

The FSHN Department will support this project in multiple ways. The department and faculty within see this as a great partnership and are willing to work together with the SSC, SSF, and Dining Services to make it a success. Some of those ways are listed below:

- Use of FSHN Pilot Plant facility to process tomatoes as described in proposal
- Pilot Plant Manager time to manage overall project
    - Oversee equipment installation and maintenance
    - Coordination with SSF and Dining Services for recipe creation and logistics
    - Managing project funds, including equipment maintenance accounts
- Encouraging student involvement in project with FSHN classes, short courses, Senior Product Development projects, and events (e.g., ExplorACES, Sustainability Week, and Recruitment events).

As far as facilities maintenance, the department is committed to the continual improvement of the Pilot Plant and will continue searching out more projects and investments. These activities will benefit this project directly by improving infrastructure of the facility and possibly providing other equipment that could expand upon the capability detailed in this proposal. Without these investments, the cost of this type of project would be significantly higher. Some of the recent improvements include:

Activity	**Cost**
Hiring of Pilot Plant Manager and Industry Relationship Coordinator	(2) FT Salaries
Acquisition of new equipment with potential for use in this project	$100,000
Re-painting of facility to meet FDA requirements	$40,000
Small equipment purchase (including grinders, mixers and hand tools)	$20,000
Initiated feasibility study to obtain Food Grade Certification	$10,000
Deep Clean Floors/Equipment	$2500