OFFICE OF SUSTAINABILITY
CAMPUS SUSTAINABILITY FUND

Solar Powered Tucson Village Farm-Growing More

Grant Type
Annual Grant

Application Type
Final Application

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Project Manager 1 Status
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Pima County Cooperative Extension (PCCE)

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Project Manager 2 Role
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Project Advisor Name

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Project Advisor Department

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Fiscal Officer Department Name
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Requested Funding Amount

Only enter this number after completing the budget sheet (the budget template will round up your request).
Mini Grants may request $250 up to $5,000.
Annual Grants may request $5,001 up to $100,000, and up to three years of funding.

Year 1:
$96800

Year 2:

Year 3:

Official Project Name
Solar Powered Tucson Village Farm-Growing More

Primary Project Category
Energy

Secondary Project Category
Carbon Reduction

Background and Context

Please provide relevant background about your organization/team including your mission and/or expertise. Lay out the rationale for the proposed project, focusing on the issue that your project would address. This section is meant to give us more information about you and the context for the project, while the questions below provide space to go into detail about your proposal's plan and specifics.

Response:

Tucson Village Farm (TVF) is a working urban farm built by and for the youth of our community. A program of the Pima County Cooperative Extension and the University of Arizona, TVF is a seed-to-table program designed to reconnect young people to a healthy food system, teach them how to grow and prepare fresh food, and empower them to make healthy life choices.
Our vision is to cultivate healthy lifestyles, wellness, resilience, and sustainability in young people, empowering them to be contributing members of their communities.
To accomplish this, Tucson Village Farm offers year-round, instructional, hands-on programs for youth of all ages. In addition to agricultural and culinary programming, we also have a High Ropes

Course and a 4-H Healthy Living Ambassador club of over 100 teens, and offer outdoor adventure and leadership opportunities for youth year-round. We teach urban youth from all ethnic and socio-economic backgrounds while targeting underserved populations.
The farm, located on the University of Arizona Campus Agricultural Center, also serves as a nexus of volunteer and internship opportunities for UA students. We host an average of 87 UA interns and student workers each year, offering internships and job opportunities in sustainable agriculture, culinary medicine, nutrition, and outdoor education and adventure.
Tucson Village Farm relies on grants, private donations, and program fees in order to maintain and expand our programming. We have a proven track record of successfully leveraging every dollar in order to continue to bring our much-needed programming to Tucson's youth. A true community-based program, TVF has partnered with well over one hundred community organizations, businesses, schools, university departments and colleges, and governments to build our program up from the dirt lot that it was in January 2010, to the successful seed-to-table youth development program that it is today. Each year, we reach an average of 15,000 youth and adults (approximately 11,000 youth and 4,000 adults) and deliver over 60,000 hours of educational programming.
Sustainability is the foundation of Tucson Village Farm's operations. We grow all of our produce pesticide free and are committed to practicing integrated farming techniques and land stewardship to ensure long-term soil health and water-use efficiency in our arid climate. However, one area in which we can improve is our energy use. The heartbeat of the farm is our commercial teaching kitchen – the Angel Charity for Children Culinary Education Center - and its walk-in refrigerator and freezer, ovens, stoves, dishwashers, and hot water, plus retail space and office complex, require a lot of electricity (~55,000 kilowatt hours per year with an annual electrical bill of nearly $14,000.) What if we could produce most of our electricity with the same renewable energy source that grows the crops that fuel our programs?

Project Description

Please provide a thorough description and explanation of your project. Be explicit in what your team is proposing. What are the goals of your project? What will your project's outcomes be? Outcomes should be SMART—specific, measurable, achievable, realistic, and timely. Describe how each objective will be achieved with the anticipated timeframes for each, including any key dates for when certain elements must start or be completed.

Response:

We propose to harness the sun's energy to run our commercial kitchen complex by installing a 25.80 kilowatt rooftop solar energy system. We invited Technicians for Sustainability, a Tucson based, employee-owned company with twenty years of experience in solar energy and sustainable technologies for residential and commercial settings, to submit a proposal for our system. They analyzed our building's annual electricity use and roof structure and determined that the most efficient way to integrate solar would be to utilize the rooftop of the newly-built, 1,600 square foot steel shade structure on the north patio of the Culinary Education Center. This location would accommodate a system that could supply up to 74% of our building's annual energy needs, an estimated production of ~42,500 kilowatt hours of power, and save us over $6,000 a year in electricity fees owed to Tucson Electric Power company. In sustainability terms, this offsets 90,348 pounds of CO2 emissions and saves 21,348 gallons of water annually.

Technicians for Sustainability installations are in high demand; as of December 2023, they were

already scheduling for the first quarter of 2025. If awarded the Sustainability Grant, installation would take place in late spring of 2025 and would take two to three weeks to complete.

Our mission is to teach youth about the benefits of preparing and eating fresh, local produce and to empower healthy lifestyle choices for individuals and communities. Solar power is a natural extension of this mission because it illustrates sustainability practices in a tangible way–it demonstrates that a healthy community comes not only from what we put in our bodies but also what we put into the air. To make this connection concrete, we will produce signage that explains the benefits of solar power for our kitchen, the carbon offsets this represents, and the climate impact rooftop solar can make. All signage will acknowledge the Campus Sustainability Fund as the project funder.

Our system will also provide a unique learning opportunity for youth. Solar power systems track energy production from the sun in real time. By comparing this with our building's total energy use when the sun isn't shining–the difference provided by our continued connection to Tucson Electric Power and the power grid–we can understand the true cost of our power and the benefits of solar energy in the broader context of reducing carbon emissions to mitigate the effects of climate change.

Beyond the learning opportunities for students, adopting solar provides many opportunities to further educate the public as to the benefits of solar power, Tucson Village Farm's commitment to sustainability, and the goals of the Campus Sustainability Fund through our weekly newsletter and our social media platforms, which together reach 28,000 people. We will also promote our grant through newsletters of the UA Agriculture, Life, and Health Sciences Department and Pima County Cooperative Ext.

Budget Narrative

Use this section to provide supplemental justification for the items you are requesting on your budget sheet. Please break down your justifications into the budget categories: Personnel or operating budget. Do not list out each expense or repeat notes made in the budget template, but instead address why the line items are being requested and the purpose they will serve, providing elaboration when necessary.
If you are requesting funding for personnel, use this section to elaborate on the position you are creating and how the budget and timeline was established for it. If you plan to hire students, describe in what capacity. Describe relevant details thoroughly (wages, responsibilities, duration of job, extent of involvement, how you will solicit/ market these opportunities etc.).
Ensure the descriptions match the line items in the budget sheet.
If matching or supporting funds are secured for the project, identify the source and amount in this section, and detail the impact of the matching funds on your overall budget.

Response:

Total Request: $96,800.00

Operating budget: The cost of the solar panel installation is $85,079. This covers all outsourced project costs from start to finish including labor, materials, and installation. Installation will require 2-3 weeks to complete.

Personnel: $4,488 will support an Instructional Specialist at $20/hr for 17 hours/wk over 10 weeks to oversee the installation of panels, lead a team of students and TVF instructional specialists to

develop a solar curriculum that will be used during field trips, trainings, student workshops, teacher trainings, and 4-H special projects. The curriculum will offer a 20-30-minute instructional lesson aimed at introducing solar energy to 3-5th graders attending a field trip on the farm, as well as a 1-hour, more in-depth module for ages 15 and up. This team will also be responsible for developing the content of the educational signage to be installed at the site.

The temporary Instructional Specialist position will be a salary split with a current .5 FTE TVF staff member. Once the solar panels are installed and we have a working curriculum, lessons will be taught by TVF volunteers, UA student workers and interns, AmeriCorps members, and existing staff.

Operating Budget: UA Risk Management fees total $460 ($260 for a permit application fee and $200 to cover the cost of two mandatory inspections).

Operating Budget: UA PD&C fees total $3,200 and cover the cost of oversight of code compliance.

Operating budget: $1,650 will be used to support the printing of educational signage on weatherproof, sun-resistant surfaces, to be installed at the solar site. All signage will acknowledge the Campus Sustainability Fund for its support of the project.

The 2% Administrative Service Charge totals $1,900

Project Feasibility and Logistics

The Campus Sustainability Fund will only fund projects that have completed the necessary work to ensure they can succeed, be completed in the grant's timeline, or have an accurate budget.
Please provide a description of the work that has been completed so far to make this project feasible. Have all relevant partners been contacted/coordinated with? Have you received consent or authorization to complete your project (such as from Housing and Residence Life, Facilities Management, Parking and Transportation, etc.)? Please identify them in your response.
If you are making modifications to campus, do you have authorization or official quotes from Facilities Management to accurately identify the cost of labor and supplies?

Response:

To prepare this proposal, we based our budget on that provided by Technicians for Sustainability (TFS-see attached Tucson Village Farm Rooftop 25.8kW Proposal.pdf.) We contacted Brett Blum, the Building Manager and Director of the Campus Agricultural Center, about our intention to apply for this grant and pursue the installation of solar panels on the Culinary Education Center patio roof. Brett gave his approval for both the project itself and our selection of companies (see attached Tucson Village Farm solar installation permissions correspondence.pdf.) However, he told us that a project of this scale would need approval from UA Planning, Design, and Construction (PD&C).

We spoke with two people from UA PD&C for clarification about the project process. Ted Nasser, in Procurement, confirmed that our project falls within the "informal bid limit" and requires us to have bids from three different solar installers to make our decision. We are soliciting quotes from two additional installers. His department would work with the College of Agriculture Business Office to issue the installer's contract and purchase the system.

Since our pre-proposal was approved, we also talked with Ralph Banks, Executive Director of

Engineering, Design, and Construction at PD&C. He spoke with Brett Blum beforehand to verify his approval. He confirmed that we do not need a Facilities Management permit. Instead, Risk Management Services (RMS) would issue a construction permit using the solar installer's architectural design plans, signed and sealed by an Arizona registrant, and would solicit PD&C's participation to undertake a plan review to assure that everything meets code compliance. Procurement would issue the contract, and once the installation is underway, RMS and PD&C would review the work on-site midway through and at completion to assure compliance.

Ralph explained that we would need to budget $460 for the RMS permit, and that the plan review, code compliance, and minimal inspection services would cost $3,000, so we adjusted our budget accordingly. See TVF solar installation budget correspondence attachment for details.

We spoke again with Brett Blum to get confirmation that continued upkeep of the system would fall under Campus Agricultural Center's long-term building maintenance. He said that any addition to the center would automatically be under their purview and would be maintained. He also reiterated that TFS provides guarantees on their installations. Per their proposal, they give a ten-year guarantee on all non-solar parts and labor, and the solar panels and inverter have a 25-year and 10-year manufacturer warranty, respectively. We would be sure that any installer selected would provide the same guarantee.

If TFS is any indication of how in-demand solar companies are, they are already scheduling for the first quarter of 2025. If the grant were awarded, we would schedule with them in May and be able to complete the project by the gr

Environmental Sustainability Outcomes

Please provide a description of how you expect your project to advance environmental sustainability on campus. A definition of environmental sustainability is provided on our Guides and Tips page.

Response:

With the climate crisis, we need to reduce our emissions of C02 and other heat trapping gasses. Solar power systems efficiently harness the clean, renewable energy of the sun – a bountiful resource in Tucson with 280 sunny days a year – and convert that energy to electricity to directly power the building upon which they are installed. The more solar energy we capture for electricity, the less power we require from non-renewable sources.

Tucson Village Farm gets its power from Tucson Electric Power Company (TEP). TEP is committed to growing a greener energy grid, reducing its dependence on coal and investing in large-scale wind and solar production as well as smaller-scale residential and commercial rooftop solar. Smaller-scale projects are an important part of their goals toward cleaner power generation, and TEP incentivizes this by providing rebates and buying back power generated from these systems to deliver back to the grid.

Our solar installation would provide direct connection to the grid via an inverter, which converts the DC power produced by the solar panels to AC power which can be utilized directly by our building or returned to the grid. When the sun is shining and energy production at the farm exceeds demand, that power would become available to other TEP customers. Likewise, on cloudy days or after dark when the kitchen is still buzzing with young chefs, TEP would provide the power to run operations.

To provide the solar installation proposal, TFS obtained hourly data for our building's energy use. With our commercial rate plan, we will receive $0.063277/kwh for what we send back to the grid. This provides an estimated savings of $.155kWh off of our annual bill, plus other applicable avoided taxes and charges.

The 25.8 kilowatt system we propose would produce an estimated 40,560 – 42,695 kilowatt hours of power annually, or 74% of the building's energy needs, and prevent 90,348 pounds of carbon dioxide from being released into the atmosphere. This is equivalent to offsetting the annual average vehicular emissions from seven American drivers, or to planting 2008 trees a year. These figures were calculated by TFS using formulas from their proposal tool.

The proposal incorporates an expected reduction in annual energy output of 0.5% - the average expected degradation throughout the 25-30 years life span of high quality solar panels. TEP's goal is to be a net-zero energy provider, having all of its power come from renewable, sustainable sources by 2050. As our system degrades, our energy will still come from sustainable sources. Future incentives could promote cost-effective ways for us to continue to generate most of our power on-site. There are many exciting possibilities to expand solar, such as agrivoltaics, on the farm.

Social Sustainability Outcomes

Please provide a description of how you expect your project to advance social sustainability on campus. A definition of social sustainability is provided on our Guides and Tips page.

Response:

Tucson Village Farm is a leader in social sustainability. Our farm serves over 15,000 students and youth a year, many of whom live in underserved communities or food insecure households. Folks who are Black, Indigenous, and People of Color have less access to healthy, fresh produce and consequently suffer higher rates of diabetes, heart disease, and other related diseases. Tucson Village Farm empowers healthy lifestyles by teaching seed-to-table food production. Families learn how to grow and prepare regionally appropriate vegetables and fruits. Farm produce is available to families through regular U-Pick markets and through participation in grant-funded programs such as our USDA funded FARMacy Program, which provides fresh produce, nutrition education and culinary instruction to low-income families and those at high risk of developing diet-related diseases such as type 2 diabetes and obesity.

We are also a distribution center for Market on the Move events: for only $10, participants receive up to 60 pounds of produce that would otherwise have ended up in landfills at the border. These food salvage efforts make food available to audiences that might not otherwise be able to access it, and prevent thousands of pounds of food waste from ending up in landfills, thereby preventing the release of additional heat-trapping gasses into the atmosphere.

Through the FARMacy Program, we also educate doctors and other professionals within the medical community about nutrition, culinary skills, strategies for eating healthy on a budget, and local resources for accessing affordable, healthy food - all valuable healthy living resources that healthcare providers can pass along to their patients.

Student Leadership & Involvement

Please provide a description of how your project will benefit students on campus regarding the creation of leadership opportunities or student engagement. What leadership opportunities exist within your proposal? If you plan to seek student involvement, include relevant details thoroughly and how you will solicit/ market these opportunities.

Response:

TVF currently offers numerous leadership and engagement opportunities for UA students from various disciplines year-round. Each year we host approximately 36 dietetic, Farm, environmental education, culinary, and education interns, hundreds of student volunteers, and a growing number of resident rotation opportunities for doctors from the College of Medicine seeking to learn applied lifestyle medicine. We also offer dozens of student worker positions across the breadth of our programming. These interns and student workers in turn teach healthy living to approximately 7,000 youth each year through our year-round farm-to-table programming.

If awarded this grant, our goal is to expand our existing internship opportunities to include UA students involved in climate research and mitigation, environmental education, environmental engineering, and sustainability as well as to continue our partnership with the College of Engineering to host one or more solar-related capstone projects at TVF. Projects might include collecting, analyzing, and disseminating solar-related data generated at the site, and presenting this data in an age appropriate way through the solar curriculum that UA students and interns will be teaching to youth through field trips and other programming.

Although ideally students would be directly involved in the installation of the panels themselves, it is unclear at this point in time, due to Risk Management protocols and the bidding process, whether permission will be granted to invite students into the installation process.

Once our solar is installed, all 36+ UA interns and student workers, regardless of their field or discipline, as well as many of our student volunteers, will receive training in the benefits of solar power, our responsibility to reduce carbon emissions, and the inner workings of our system.

Our dream is that TVF will become a programmatic model for the future through its diversified farm practices, focus on community-based health and disease prevention, and commitment to green energy, low water use, and environmental stewardship. UA students are, and will continue to be, an integral part of this dream. Having a solar array at our location will ensure numerous educational and leadership opportunities for UA students for many years to come.

Future intern opportunities will be marketed through Handshake, TVF's social media platforms, existing partnerships with UA colleges and departments, including the Campus Agricultural Center, through marketing to interested campus colleagues, and most importantly by word of mouth within the student campus community.

Education, Outreach, and Behavior Change

What opportunities does this project provide for members of the campus/community to learn about sustainability? How will your project educate the campus community and/or incorporate outreach and behavior change, particularly beyond the "sustainability choir?"

Please provide a description of how you expect your project will communicate its impacts to the campus community.

Response:

Tucson Village Farm recently rceived a grant to provide a class for UA students to enroll in and attend at the Farm. The program, called NOURISH (Nutrition Opportunities for Undergraduate students promoting Resilient and Inclusive Sustainable food and Health systems), is designed to increase opportunities and access into careers related to FANH (food, agriculture, nutrition, and human health); produce skilled, diverse graduates prepared to work at the intersection of nutrition, food, and human health; and increase participation of individuals historically underrepresented in USDA FANH-HSI (hispanic serving institutions) mission areas by strengthening the educational pipeline for nutrition and dietetics professionals.

Through this class, students and other members of the campus community will also have the opportunity to directly interact with and learn about our solar power system - and solar in general - while learning beneath the solar panels themselves.

TVF will also collect data that can be accessed by UA researchers, Climas, interns, and students studying climate mitigation. And the fact that the solar panels sit atop the shade structure covering our 1600 sq ft. patio makes it an ideal location for future solar and water harvesting workshops.

With an unobstructed view of the Catalina Mountains, TVF's covered patio is used by numerous University groups, teams, departments, and colleges for various purposes throughout the academic year, including: dinners, meetings, workshops, classes, fundraisers, and donor appreciation events. Each year, many hundreds of members of the campus community gather under the future location of our solar array, and many thousands of community members attend classes, field trips, dinners, fundraising events, concerts, markets, and more on the patio as well.

Educational signage, created with student and community input, will be prominently displayed and viewed by the 15,000 Tucson community and campus community members who visit the farm each year, including field trip participants, the 175 teens in our 4-H Healthy Living Ambassador Program, market customers, volunteers, campers and their parents, event participants, students, and interns.