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## MTSU Clean Energy Initiative Project Funding Request

There are five (5) sections of the request to complete before submitting. See <http://www.mtsu.edu/sga/cleanenergy.shtml> for funding guidelines. Save completed form and email to [cee@mtsu.edu](mailto:cee@mtsu.edu) or mail to MTSU Box 57.

1. General Information	
Name of Person Submitting Request <b>Dr. W. Anderson, Dr. N. Phillips, Dr. F. Bailey, Dr. S. Cui, Dr. J. Carter, Dr. M. Knight, Mr. Matthew Wade</b>	
Department/Office <b>ABAS, Biology, CIM</b>	Phone # (Office) <b>898-2523 (ABAS)</b>
MTSU Box # <b>Campus Box 5 (ABAS)</b>	Phone # (Cell) <b>615-809-4432</b>
E-mail <a href="mailto:warren.anderson@mtsu.edu">warren.anderson@mtsu.edu</a>	Submittal Date

2. Project Categories (Select One)	
Select the category that best describes the project.	
<input type="checkbox"/> Energy Conservation/Efficiency	<input checked="" type="checkbox"/> Sustainable Design
<input type="checkbox"/> Alternative Fuels	<input type="checkbox"/> Other
<input type="checkbox"/> Renewable Energy	

3. Project Information
<p>a. Please provide a brief descriptive title for the project.</p> <p>b. The project cost estimate is the expected cost of the project to be considered by the committee for approval, which may differ from the total project cost in the case of matching funding opportunities. <b>Any funding request is a 'not-to-exceed' amount. Any proposed expenditure above the requested amount will require a resubmission.</b></p> <p>c. List the source of project cost estimates.</p> <p>d. Provide a brief explanation in response to question regarding previous funding.</p>
3a. Project Title <b>Water conservation for rural and urban citizens</b>

\$40,000

3b. Project Cost Estimate **\$40,000**

3c. Source of Estimate

After an onsite visit, Vince Guarino of Rainwater Resources Inc. made some suggestion in preparing a budget estimates. His contact information is [vine@rainwaterresources.com](mailto:vine@rainwaterresources.com)

3d. If previous funding from this source was awarded, explain how this request differs? N/A

#### 4. Project Description

(Completed in as much detail as possible.)

- a. The scope of the work to be accomplished is a detailed description of project activities.
- b. The benefit statement describes the advantages of the project as relates to the selected project category.
- c. The location of the project includes the name of the building, department, and/or specific location of where the project will be conducted on campus.
- d. List any departments you anticipate to be involved. Were any departments consulted in preparation of this request? Who? A listing may be attached to this form when submitted.
- e. Provide specific information on anticipated student involvement or benefit.
- f. Provide information for anticipated future operating and/or maintenance requirements occurring as a result of the proposed project.
- g. Provide any additional comments or information that may be pertinent to approval of the project funding request.

4a. Scope: Work to be accomplished

The dairy now milks 70 head two times per day. After each milking the parlor is cleaned by a water deck spray. Each day 3,200 gallons of water from the utility district are used to clean-up the facility. In 30 day 96,000 gallons are used. On an annual basis this is 35% of the total water used this cost portion is \$8,000 per year. The funds requested would retro fit the parlor roof with gutters to act as catchment area. The milking facility is shown in Figures 1. The milk parlor roof catchment area [Figure 2, small roof] is 130 feet long by 60 feet wide or 7,800 square feet. The loafing shed catchment roof area [Fig 2, large roof] is 216 feet by 84 feet or 18,000 square feet.



Figure 1: aerial view of Dairy facility [milking parlor on right, loafing shed on left] and farm looking north.

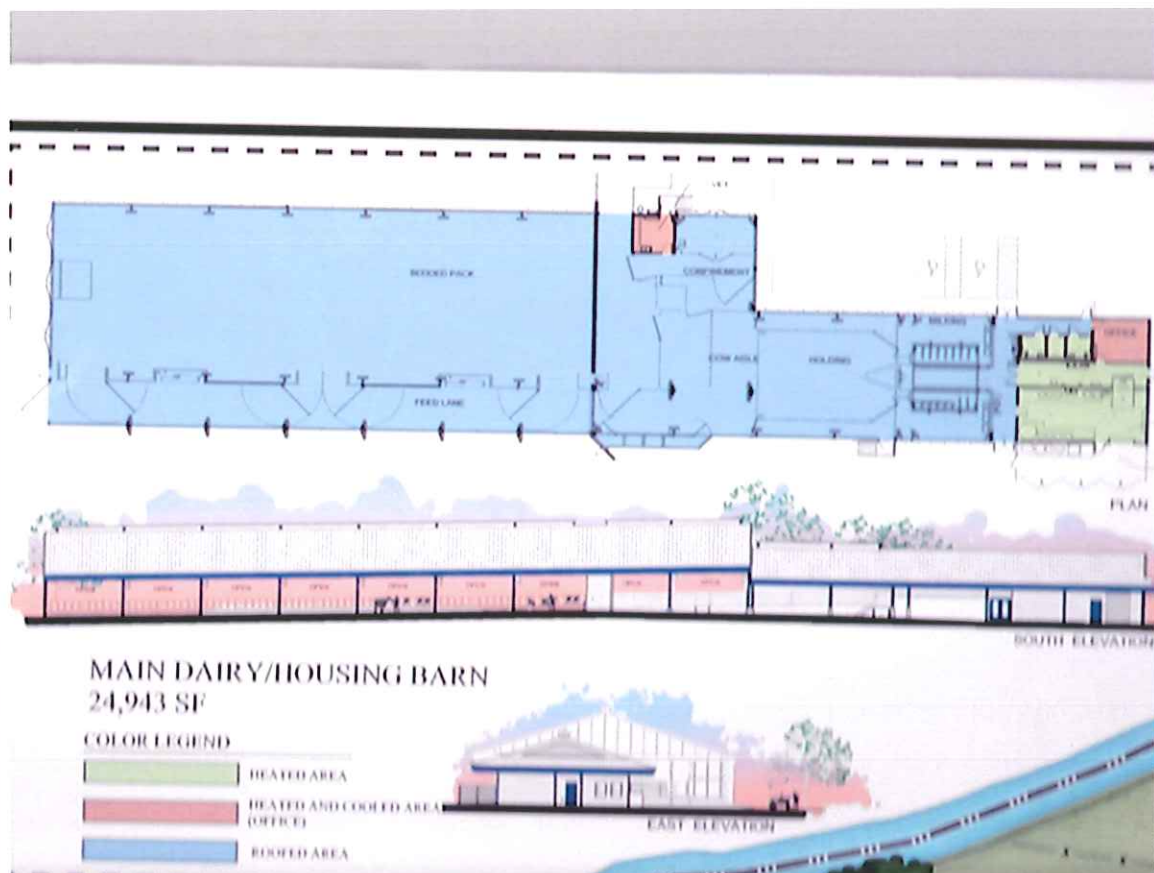


Figure 2: Diagram of the new Dairy floor plan. Collecting water from either parlor roof or loafing roof.

### Cistern

The first water coming off the roof as a rainstorm begins is contaminated with airborne particulates. This will be diverted from the cisterns. Less than 0.1 inches

of rainfall needs to be diverted from the cistern. Gutter guard will cover the gutters that direct water to the cistern and minimize leaf litter entering the cisterns or a watertight gravel and sand filter box may be used to pretreat water entering on top of the cistern.

A reinforced cisterns will be placed above ground. It will be located upslope and 10 feet away from water tight sewage disposal lines. The cisterns will be place southwest side of the milking facility. The interior cistern walls will be smooth. The top will be reinforced and fits tightly over the tank. For maintenance a manhole will be 2 feet across and the cover fit tightly over a curb on the cistern cover. The manhole opening will be near a corner.

The inflow and overflow pipes of the cistern will be the same diameter. The cistern will be vented. A cleanout drain will be 3 to 4 inches in diameter to avoid clogging. All outside opening will be screened.

#### 4b. Scope: Benefit Statement

The MTSU School Agribusiness & Agriscience hosts an annual field day at the Experiential Farm Laboratory in September. The 2015 Field days feature student involvement in the dairy, honey and gardens. Four hundred people from Rutherford and surrounding counties attended the field day and milking demonstration. MTSU School Agribusiness & Agriscience hosts numerous K-12 grade school tours. This past academic year 1800 students and teachers toured the farm laboratory. The farm laboratory is a public and education resource in middle Tennessee.

**4. Project Description (continued)**

## 4c. Location of Project (Building, etc.)

3211 Guy James Rd, Lascassas TN

## 4d. Participants and Roles

Faculty and staff will advise students on the successful completion of an old technology (cisterns) to present day economic situation. ABAS Farm Staff will oversee day to day operations involving cistern water usage. Student Ag organizations will assist in public outreach on this project through informational tours including this water conservation project.

## 4e. Student participation and/or student benefit

ABAS, Biology and CIM students will have the opportunity to acquire hand-on experience in see the application of science to manage available resources. Students will also learn sustainable farming operations through water conservation practices.

## 4f. Future Operating and/or Maintenance Requirements

## 4g. Additional Comments or Information Pertinent to the Proposed Project

After an onsite visit be Vince Guarino of Rainwater Resources Inc made suggestion in preparing an estimated budget.

item Description	10,000 gal	items	\$ cost
cistern		2	\$21,000.00

gutters/downspouts/fasteners	\$ 5000.00
down spout diverter	\$ 500.00
filters	\$ 250.00
water meters	\$ 250.00
pump - move water from cistern back to flush tanks/pipes/joints	\$ 5000.00
supplies	\$ 4000.00
Sub-total	\$35,000.00
Signage	\$ 2000.00
Publication/web page	\$2000.00
Total	\$40,000.00

## 5. Project Performance Information

Provide information if applicable.

- Provide information on estimated annual energy savings stated in units such as kW, kWh, Btu, gallons, etc.
- Provide information on estimated annual energy cost savings in monetary terms.
- Provide information on any annual operating or other cost savings in monetary terms. Be specific.
- Provide information about any matching or supplementary funding opportunities that are available. Identify all sources and explain.

5a. Estimated Annual Energy Savings (Estimated in kW, kWh, Btu, etc.)

N/A

5b. Annual Energy COST Savings (\$)

N/A

5c. Annual Operating or Other Cost Savings. Specify. (\$)

The flush tanks consume 3,200 gallons of water per day in cleaning the milking parlor. The annual water bill for this use is \$8,000. Is it possible to predict a payback period if catch water is used to fill the flush tanks? Table 1 shows the average precipitation over a 10 year period.

Table 1: NOAA average precipitation from 1997 to 2013

Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
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-----Inches/month-----

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4.5	3.9	4.3	4.8	5.8	4.2	4.1	3.4	4.1	3.0	3.9	4.2
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----- Gallon x 10<sup>3</sup>/month collected from 7,800 sq. ft. catchment-----

21.9	19.0	21.0	23.4	28.3	20.5	20.0	16.6	20.0	14.6	19.0	20.5
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----- Gallon x 10<sup>3</sup>/month collected from 18,000 sq. ft. catchment-----

50.7	43.9	48.5	54.1	65.4	47.6	46.2	38.3	46.2	33.8	43.9	47.4
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Assuming rainwater collection is ideal. In Rutherford county maximum and minimum precipitation occurs in May and October {Table 1}. May's monthly precipitation calculated for the parlor roof catchment and loafing roof catchment is 28,000 or 65,000 gallons per month {Table 1}. These figures are 30% to 60% of monthly needs. October's monthly precipitation calculated for the parlor roof catchment and loafing roof catchment is 14,000 or 34,000 gallons per month. These figures are 15% to 30% of monthly needs. The storage capacity of the

cistern(s) will influence the payback time. The flush tanks would drain a 10,000 gallon cistern in 3 days. Twenty thousand gallon cisterns would store water for 6 ¼ days of continuous use by the flush tanks. The farm laboratory water bill would be reduced by 20% on an annual basis if the parlor roof {7,800 sq. ft.} is used to catch rain water. If the loafing shed roof {18,000 sq. ft.} is used, the water bill could be reduced 40% on an annual basis.

5d. Matching or Supplementary Funding (Identify and Explain)