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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/sqa/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 Brian Holley	
Department/Office Information Technology Division	Phone # (Office) (615) 898-2228
MTSU Box # CAB 217	Phone # (Cell)
E-mail brian.holley@mtsu.edu	Submittal Date 02/18/2016

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

3. Project Information
<ul style="list-style-type: none"> <li>a. Please provide a brief descriptive title for the project.</li> <li>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></li> <li>c. List the source of project cost estimates.</li> <li>d. Provide a brief explanation in response to question regarding previous funding.</li> </ul>
3a. Project Title Virtual Desktop Infrastructure Networking
3b. Project Cost Estimate \$9,000
3c. Source of Estimate Quotes from Dell, CDW-G
3d. If previous funding from this source was awarded, explain how this request differs? This request differs from previous applications since it involves networking

equipment used to connect recently purchased VDI hardware to existing networking infrastructure.

#### 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

After successfully implementing and deploying virtual desktops for classrooms and labs on campus over the past few years, ITD determined a hardware refresh will be necessary since we originally purchased most of the back end infrastructure 4-5 years ago. After research and product evaluation, ITD determined the Dell PowerEdge XC series hyperconverged platform running Nutanix OS will be the most appropriate solution to replace the virtual desktop infrastructure hardware.

As a result, ITD purchased two Dell XC730xd starter bundles earlier this month for \$180,000. The bundles include a total of six rack mount servers with internal storage, three of which will operate in the Cope data center and another three will operate in the Telecommunications data center. This equipment will replace two fully populated blade server chassis in the Cope and Telecom data centers and will offload VDI storage requirements from our existing storage area network. In effect, we will reduce our server footprint from 32 blade servers to six rack mount servers. This also includes storage, eliminating the need for a separate storage area network.

In order to connect the new equipment to the existing 10Gb fiber networking infrastructure, we need to order some new cabling and optical transceivers. This includes 6 x 4 meter 10Gb multimode fiber

cables, 6 x 2 meter 10Gb multimode fiber cables, 12 x 10Gb SFP+ optical transceivers from Dell, and 12 x 10Gb SFP+ optical transceivers from Extreme Networks. The total for all equipment comes to approximately \$9,000.

#### 4b. Scope: Benefit Statement

This networking equipment will contribute to and enhance ITD's multi-year server virtualization/consolidation project. In addition, based on Dell's Energy Smart Solution Advisor [here](#), we estimate a total power reduction of 3,730 watts and 12,727.3btu/h savings in cooling. This assumes two fully populated Dell PowerEdge M1000e blade chassis running a transactional CPU load of 10% totaling 5,290 watts and 18,050.2btu/h and six PowerEdge R730xd (same form factor as the XC730xd) nodes running a transactional CPU load of 10% totaling 1,560watts and 5,322.0btu/h per attached Dell Energy Smart Solution Advisor configurations.

### **4. Project Description (continued)**

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

Data centers in the Cope Administration Building and Telecommunications Building

#### 4d. Participants and Roles

Enterprise Server Services and Network Services, Information Technology Division – implementation and management

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

This project directly lowers the operating cost of the University thereby providing an opportunity for the University to reduce the utility costs passed on to students.

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

The initial purchase of the Dell XC730xd starter bundles includes 5 years of maintenance. ITD will pay all subsequent maintenance costs after 5 years.

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

This application relates to a larger multi-year project to reduce the operating costs within the University's data centers. ITD estimates that it will be able to reduce power and cooling demands by at least 50% by the end of the project.

If the University has additional clean energy funds available, ITD asks that consideration be given for the purchase of additional servers to allow for additional operating savings.

### **5. Project Performance Information**

Provide information if applicable.

- a. Provide information on estimated annual energy savings stated in units such as kW, kWh, Btu, gallons, etc.
- b. Provide information on estimated annual energy cost savings in monetary terms.
- c. Provide information on any annual operating or other cost savings in monetary terms. Be specific.
- d. 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.)

Power: ~32,674.8kWh annually  
Cooling: ~12,727.3Btu/hr

5b. Annual Energy COST Savings (\$)

Power: ~\$3,267.48

Cooling: ~\$800

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

Total: ~\$4,067.48

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

The total cost of the entire multi-year server consolidation and virtualization project is approximately several hundred thousand dollars. ITD has proposed allocating equipment and other funds to complete the project.



Solution Name : Solution Configuration

Solution Id : Solution Not Saved

Solution-Level Power Thermal & Acoustic Summary

Solution Summary

Configuration Totals for 220 AC Input Voltage and 25°C

Kilowatt Hour Cost:		\$0.14/kWh
Solution Watts/BTU	1560watts	5322.9btu/h *
Sound Power		6.3bels *
Current		7.1amps
Air Flow	50.6l/s	107.1CFM
Total Weight	195kg	429.9lbs

Item Summary



PowerEdge R730xd  
(Qty:6)

<b>PowerEdge R730xd</b>		
Input Power:	260watts	887.2btu/h *
Power Supply Capacity:*	750watts	2559.1btu/h *
Maximum Potential Power:*	622.4watts	2123.8btu/h *
Input Current:		1.2amps
Sound Power Level:		5.6bels *
Airflow Rate:	8.4l/s	17.9CFM
Weight	32.5kg	71.7lbs
Air Temperature Rise:	26.2°C	47.2°F

<b>Configuration</b>	
CPU Loading:	10%
Workload:	Transactional
PowerEdge R730xd	PowerEdge R730xd Server, No TPM
Chassis Configuration	Chassis with up to 12, 3.5" Hard Drives and 2, 2.5" Flex Bay Hard Drives
Shipping	PowerEdge R730xd Shipping
Processor	Intel® Xeon® E5-2630 v3 2.4GHz,20M Cache,8.00GT/s QPI,Turbo,HT,8C/16T (85W) Max Mem 1866MHz
Additional Processor	Upgrade to Two Intel® Xeon® E5-2630 v3 2.4GHz,20M Cache,8.00GT/s QPI,Turbo,HT,8C/16T (85W)
PCIe Riser	Risers with up to 4, x8 PCIe Slots + 2, x16 PCIe Slots
Memory DIMM Type and Speed	2133MT/s RDIMMs
Memory Configuration Type	Performance Optimized
Memory Capacity	12 x 16GB RDIMM, 2133MT/s, Dual Rank, x4 Data Width
RAID Configuration	RAID 1+RAID 5 for H330/H730/H730P (2 + 3-22 HDDs or SSDs)
RAID Controller	PERC H730 RAID Controller, 1GB NV Cache
Hard Drives	2 x 400GB Solid State Drive SAS Write Intensive 12Gbps 2.5in Flex Bay Drive 6 x 4TB 7.2K RPM SATA 6Gbps 3.5in Hot-plug Hard Drive
Network Daughter Card	Intel X520 DP 10Gb DASHFP+, + I350 DP 1Gb Ethernet, Network Daughter Card
Bezel	Bezel
Rack Rails	ReadyRails™ Sliding Rails With Cable Management Arm
Power Management BIOS Settings	Performance BIOS Setting
Power Supply	Dual, Hot-plug, Redundant Power Supply (1+1), 750W
Power Cords	2 x C13 to C14, PDU Style, 12 AMP, 6.5 Feet (2m) Power Cord, North America
System Documentation	Electronic System Documentation and OpenManage DVD Kit
Operating System	No Operating System
OS Media Kits	No Media Required
Additional Software Offerings	SanDisk DAS Cache, 90 Day Trial License
Processor Thermal Configuration	2 CPU Standard
Embedded Systems Management	iDRAC8, Enterprise with OpenManage Essentials, Server ConfigMgmt

Hardware Support Services	ProSupport Plus: 3 Year Next Business Day Onsite Service
Deployment Services	No Instalaton
Remote Consulting Services	Deployment Consulting 1 Yr 1 Case Remote Consulting Service

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Solution Name : Solution Configuration

Solution Id : Solution Not Saved

Solution-Level Power Thermal & Acoustic Summary

Solution Summary

Configuration Totals for 220 AC Input Voltage and 25°C

Kilowatt Hour Cost:		\$0.14/kWh
Solution Watts/BTU	5290watts	18050.2btu/h *
Sound Power (Partial)*		0bels *
Current		24.5amps
Air Flow (Partial)*	0l/s	0CFM
Total Weight	334.9kg	738.3lbs

Item Summary



PowerEdge M1000E Blade (Qty:2)

PowerEdge M1000E Blade		
Input Power:	2645watts	9025.1btu/h *
Input Current		12.3amps
Weight	167.4kg	369.1lbs
Configuration		
M1000E Enclosure	PowerEdge M1000E Blade Server Chassis	
Power Supply	Redundant Power Supplies (3+3, 3000W at 200-240V) High Efficiency, M1000e Blade Chassis	
Power Distribution Unit and Power Cables	2 x Power Cords, QTY3, 2FT, C19/C20 for M1000E Server Blade Chassis	
Chassis Management Controller	Redundant Chassis Management Controller (CMC) with FlexAddress Plus and CMC Extended Storage	
Chassis iKVM Module	Avocent Integrated KVM Analog Switch Module, PowerEdge M1000E Chassis	
I/O Bays 1 and 2 (Fabric A)	Redundant CbE Pass-Through Modules, IO Bays 1+2, 3+4 or 5+6, M1000E	
I/O Bays 3 and 4 (Fabric B)	Redundant 10GbE Pass-Through Modules -k, IO Bays 1+2, 3+4 or 5+6, M1000e	
I/O Bays 5 and 6 (Fabric C)	Redundant FC8 Pass-Through Modules, IO Bays 3+4 or 5+6, M1000E	
OS Media Kits	No Media Required	
Rack Mounting Rails and Accessories	RapidRails for PowerEdge M1000E Blade Server Chassis	
Integrated Pack Box label	Integrated Pack, Box Label for PowerEdge M600	
Hardware Support Services	3 Year ProSupport and Mission Critical 4HR 7x24 Onsite Pack	
Deployment Services	ProDeploy Dell Server M1000e Converged	
Remote Consulting Services	Declined Remote Consulting Service	



**PowerEdge M630**  
(Qty:32)

<b>PowerEdge M630</b>		
Input Power:	108watts	368.5btu/h *
Maximum Potential Power: *	309.7watts	1056.8btu/h *
Input Current:		0.5amps
Weight:	5.4kg	11.9lbs

<b>Configuration</b>	
CPU Loading:	10%
Workload:	Transactional
PowerEdge M630	PowerEdge M630 Blade Server, No TPM
Chassis Configuration	2.5" Backplane with up to 2 Hard Drives and PERC RAID Controller
Shipping	M630 in Multipack or Chassis
Processor	Intel® Xeon® E5-2630 v3 2.4GHz,20M Cache,8.00GT/s QPI,Turbo,HT,8C/16T (85W) Max Mem 1866MHz
Additional Processor	Upgrade to Two Intel® Xeon® E5-2630 v3 2.4GHz,20M Cache,8.00GT/s QPI,Turbo,HT,8C/16T (85W)
Processor Thermal Configuration	2 CPU up to 135W
Cooling	Standard Cooling
Memory DIMM Type and Speed	2133MT/s RDIMMs
Memory Configuration Type	Performance Optimized
Memory Capacity	2 x 8GB RDIMM, 2133MT/s, Dual Rank, x8 Data Width
RAID Configuration	RAID 1 for H330/H730/H730P (2 HDDs, SAS/SATA/SSD)
RAID Controller	H730 Controller
Hard Drives	2 x 300GB 15K RPM SAS 12Gbps 2.5in Hot-plug Hard Drive
Embedded Systems Management	iDRAC8, Enterprise with OpenManage Essentials, Server ConfigMgmt
Internal SD Module	No Internal SD Module
Power Management BIOS Settings	Performance BIOS Setting
System Documentation	No Systems Documentation, No OpenManage DVD Kit
Additional Software Offerings	SanDisk DAS Cache, 90 Day Trial License
Operating System	No Operating System
Network Daughter Card for Fabric A	QLogic 57810-k Dual port 10Gb KR Blade Network Daughter Card
I/O Card for Fabric C	QLogic QME2572 8Gbps Fibre Channel I/O Mezz Card for M-Series Blades
OS Media Kits	No Media Required
Hardware Support Services	ProSupport Plus: 3 Year Next Business Day On-site Service
Deployment Services	No Installation
Remote Consulting Services	Deployment Consulting 1 Yr 1 Case Remote Consulting Service
Proactive Systems Management	Dell Proactive Systems Management - Declined

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## Energy cost calculator

Electrical energy cost calculator and how to calculate.

Select country:	<input type="text" value="United States"/>	▼
Typical appliance:	<input type="text" value="-- select --"/>	▼
Power consumption:	<input type="text" value="3730"/>	<input type="text" value="watts (W)"/>
Hours of use per day:	<input type="text" value="24"/>	h/day
Energy consumed per day:	<input type="text" value="89.52"/>	kWh/day
1 kilowatt-hour (kWh) cost:	<input type="text" value="10"/>	<input type="text" value="cent"/>
	<input type="button" value="Calculate"/>	<input type="button" value="Reset"/>
Energy cost per day:	<input type="text" value="\$8.952"/>	
Energy cost per month:	<input type="text" value="\$268.56"/>	
Energy cost per year:	<input type="text" value="\$3267.48"/>	

2 x Dell PowerEdge M1000e blade chassis fully populated = 5,290 watts or 18,050.2btu/h

6 x Dell PowerEdge R730xd servers = 1,560 watts or 5,322.0btu/h

Total Power Savings = 5,290 – 1,560 = 3,730 watts

MTSU \$/kWh = \$0.10/kWh per Linda Hardymon