Project Information:

Please provide the following information (take as much space as you need to provide details):

Department :Dane County Facilities Management Address:210 MLK Jr Blvd GA-8	Total project costs:$50000.00
	Funding amount in current budget:0
	Funding amount requested:$50000.00
Project Title: Jail LED lighting changeover	
Project Location: CCB jail 6th and 7th floor	
Project Description: This a proposed project to eliminate all the fluorescent and compact fluorescent bulbs that are being used in the Dane County jail on the 6th and 7th floor of the city county building. We are currently installing a 32 watt 4' T8 fluorescent tube that are driven by an electronic ballast and this project would replace those with 18 watt 4' LED tubes that utilize a built in driver. There is a total of 961 light fixtures in the jail and jail emergency evacuation stairwells that each have 2 lamps in each fixture for a total of 1922 lamps in the jail. The improved lighting conditions that this change over will provide will help to ensure and maintain that safety of the Deputies and non-sworn jail staff as well as the 388 inmates that the jail is capable of housing. If this project gets approval from the SMART committee it will save the county 156712Kwh annually. At the rate that the county currently purchases electricity it would be a savings of $134540.01 over the life of the lamp. The total reduction in CO2 emissions would be 119 tons which is the same as saving 12159 gallons of gasoline or 116070 pounds of coal that will not be burned. A few other benefits are: • An estimated payback of 10 months • The lamps have 10 year warranty • No heavy metals in the new LED bulbs • No ballasts to fail • No scheduled maintenance for the life of the lamp • Focus on energy rebates are available for the lamps • Uses a 4100K color spectrum for improved lumen output	
This project will be the template for going forward and replacing all the fluorescent tubes in the city county building and from there branching out to various human services buildings like the Job Center and Lakeview. If those projects were to happen the annual electrical cost savings to the county would be substantial. If the jail payback is just over 6 months, it would not be much more than that if an entire building was to be done	
Contact person: Nathan Tuggle DCFM Electrician	Phone: 608-444-9566 E-mail:Tuggle.nathan@countyofdane.com

Project Information:

Department: Land and Water Resources (LWR) Parks Division Address: 5201 Fen Oak Drive Madison, WI 53718	Total project costs: $54,360 (See Appendix) Funding amount in current budget: $7,560 (See Appendix) Funding amount requested: $46,800 (See Appendix)
Project Title: Park Facilities Sustainability Initiatives	
Project Location: Lyman F. Anderson Agriculture & Conservation Center 5201 Fen Oak Drive Room 208 Madison, WI 53718	

Project Description:

The Parks Division is proposing to retrofit park facilities with six sustainability initiatives.

1. Low consumption toilets and urinals will replace the existing toilets and urinals. Ten toilets and ten urinals will be installed at Token Creek Park, three toilets will be installed at CamRock Park, and three toilets will be installed at Goodland Park. The low consumption toilets and urinals will reduce water consumption.
2. Sensor faucets will be installed to replace traditional handle operated faucets. Ten sensor faucets in total will be installed. The sensor faucets will reduce water consumption by 85% and eliminate wasteful use.
3. Occupancy sensor will be installed in every bathroom. They will automatically turn on the lights when a person enters the bathroom and will stay on for a limited period of time before turning off. Twenty bathrooms will be equipped with occupancy sensors that will reduce energy consumption and wasteful use of electricity.
4. Glass skylights will be installed within bathrooms. The glass in the bathroom celling will reduce electricity use during daylight hours.
5. LED (Light Emitting Diode) restroom lights will be installed to replace existing standard incandescent bulb lighting. The LED bulbs have a 50,000 hour or 20 year life which will reduce costs and disposal

of incandescent bulbs. Also, the led bulbs will consume less power than standard bulbs.

6. LED parking lighting will be used to replace the existing metal halide lights. Eight lights will be installed at Mendota Park, six at Goodland Park, and 4 at Stewart Park. The LED lights will reduce electricity consumption and eliminate the disposal of mercury laden bulbs.

Describe how the proposed project moves the county toward meeting the following Sustainability Principles. (See the guiding questions in the box below.) Responses to this section will be used to determine the relative level of sustainability for each project.

- Reduce and eventually eliminate county government's contribution to fossil fuel dependence and to wasteful use of scarce metals and minerals;

  For the LED restroom lighting, the LED's contain no mercury and a recent Energy Department study determined that LEDs have a much smaller environmental impact than incandescent bulbs.

  For the LED parking lighting, they will reduce the number of mercury laden metal halide lamps that are frequently removed and disposed in the waste stream. Also, the LED fixtures contain green technology and are mercury and UV free. The finish on the LED lights contains no VOC or toxic heavy metals.

- Reduce and eventually eliminate county government's contribution to dependence upon persistent chemicals and wasteful use of synthetic substances;

  This project will reduce disposal need of both incandescent bulbs (restroom lighting) and metal halide lamps (parking lighting).

- Reduce and eventually eliminate county government's contribution to encroachment upon nature and harm to life-sustaining ecosystems (e.g., land, water, wildlife, forest, soil, ecosystems);

  1. Low consumption toilets and urinals use approximately 62% less water than the older replacements. In addition the reduction of less water reduces the amount of water delivered to the wastewater treatment plan reducing wastewater fees and volume treated. On average the toilets will reduce 1.9 gallons per flush which equates to approximately 13,000 gallons of water per year (assuming 2 flushes per day during park open season).
  2. Sensor faucets combined with low flow heads will reduce water use by approximately 85%. On average the sensor faucets will reduce approximately 32,000 gallons of water per year (assuming 5 minutes of use per day during park open season). Also, it will reduce sewer costs and water needing treatment at the sewerage plant.
  3. Occupancy sensors will be installed to reduce lighting costs and save energy during off peak hours.

4. Glass skylights will take advantage of natural daylight which will result in an energy and costs savings.
5. LED restroom lights are seven times more energy efficient than the current conventional incandescent lights and will cut energy use by more than 80%.
6. LED parking lighting will provide an approximately 70% reduction in energy resulting in a cost saving as well as greenhouse gas reductions.

- Reduce and eventually eliminate county government's contribution to conditions that undermine people's ability to meet their basic human needs.

  The six park facility initiatives will allow reduce the county's need of energy and reduce water consumption. Furthermore, the energy efficient fixtures will reduce the disposal of materials and the associated maintenance.

Include in your description any estimated reductions of CO_2 equivalent emissions related to your proposal. Please use the following calculator: http://www.epa.gov/cleanenergy/energy-resources/calculator.html

The above calculator shows a reduction in 26,081 pounds of CO_2 equivalent emissions. See the attached Appendix for calculation of electricity savings. Another component of the project besides electricity savings is water savings which is not realized in the CO_2 reductions. For example, the reduced water would also require less energy needed for delivery (pumping) and treatment (clarifier) at the wastewater facility.

Describe how the county might build upon the outcomes of the proposed project to work toward greater sustainability.

Lessons learned and experienced gained from installing sustainability initiatives at park facilities may be shared with other departments that are interested in retrofitting or installing new facilities.

Describe how your department will track and measure outcomes of the proposed project (i.e.., annual cost savings, annual energy savings, resource use reductions, maintenance reductions, etc.). Include a timeline for measurement and reporting outcomes, and the staff member contact who is responsible for conducting the tracking and measurement.

The project will be tracked based on the energy savings estimates reported from the manufacturers of the products. Once the product is purchased the energy consumption of the new product will be compared to the existing.

Contact person:	Phone:	E-mail:
Mike Bernards and John Reimer	(608) 224-3612	reimer.john@countyofdane.com

Appendix

Material Costs

Sustainability Item	Item Number	Unit Cost	Number of Units	Cost
Low Consumption Toilet	1	$500	16	$8,000
Low Consumption Urinal	1	$500	10	$5,000
Sensor Faucets	2	$600	10	$6,000
Occupancy Sensors	3	$100	20	$2,000
Glass Boards	4	$100	40	$4,000
LED Restroom Lights	5	$400	32	$12,800
LED Parking Lights	6	$500	18	$9,000
			Total	$46,800

Labor Costs

Sustainability Item	Item Number	Hourly Rate	Number of Hours	Cost
Low Consumption Toilet	1	$30	24	$720
Low Consumption Urinal	1	$30	15	$450
Sensor Faucets	2	$30	15	$450
Occupancy Sensors	3	$30	40	$1200
Glass Boards	4	$30	120	$3600
LED Restroom Lights	5	$30	32	$960
LED Parking Lights	6	$30	18	$180
			Total	$7,560

Total Costs

Material Costs	Labor Costs	Total Cost
$46,800	$7,560	$54,360

Energy Related Savings

Sustainability Item	Item Number	Existing Power Use (kilowatt/year)	New Power Use (kilowatt/year)	Energy Savings (kilowatt/year)	Rate	Cost Savings
Occupancy Sensors, Glass Skylight & LED Restroom Lights	3,4,6	10,300	1,180	9,120	$0.148	$1,349.76
Annual staff maintenance & light bulb replacement for restrooms						$1,200
LED Parking Lights	6	11,680	3,644	8,036	$0.148	$1,189.33
Annual staff maintenance & metal halide lamp replacement for parking lot						$1,500
Total		21,980	4824	17,156	$0.148	$4,239.09

Water Related Savings

Sustainability Item	Item Number	Existing Water Use (gal.)	New Water Use (gal.)	Water Savings (gal.)	Water & Sewer Rate	Cost
Low Consumption Toilet	1	23,968	10,957	13,011	$0.428/100gal	$55.69
Low Consumption Urinal	1	17,120	4,280	12,840	$0.428/100gal	$54,96
Sensor Faucets	2	37,450	5,350	32,100	$0.428/100gal	$137.39
Total		78,538	20.587	57,951	$0.428/100gal	$248.04

Total Savings

Energy Savings	Water Savings	Total Savings
$4,239.09	$248.04	$4,487.13

Payback Period

Total Project Costs	Energy and Water Savings	Payback Period
$54,360	$4,487.13	12 years

Project Information:

Please provide the following information:

Department: Dane County Emergency Management Address: Public Safety Building, Room 2107	Total project costs: $28,000
	Funding amount in current budget: 0
	Funding amount requested: $28,000
Project Title: LED Lighting Upgrade in Emergency Management	
Project Location: Emergency Management Office and Emergency Operations Center	

Project Description:

The goal of this project is to replace and enhance productive overhead lighting for common office space, individual office space, and conference room/emergency operations center for Dane County Emergency Management.

Replacing overhead fluorescent lighting with LED lights will enhance the quality of light and cost less to use. Additionally, installing dimming capability and motion sensing switches will aid in cost savings. This lighting upgrade will include replacing all existing fluorescent fixture ballasts and bulbs with LED ballasts and bulbs. Replacing the present, flat fluorescent fixtures with parabolic LED fixtures will provide for a better and more effective distribution of light while reducing the glare and brightness of the existing lighting.

Cost Breakout	Unit price	Quantity	Total	Potential Additional Savings (Rebates)
LED Parabolic Light fixtures	$ 350	57	$ 19,950	$15 x 57 = $855
Dimmer Capability in EOC	$ 4,000	1	$ 4,000	(unknown)
Dimmer Capability in Offices	$ 500	3	$ 1,500	
Motion Sensing Switches	$ 500	4	$ 2,000	$7.50 x 4 = $30
Additional Switching	$ 550	1	$ 550	(unknown)
Grand Total			$ 28,000	$885 (or more) in rebates

Describe how the proposed project moves the county toward meeting the following Sustainability Principles. (See the guiding questions in the box below.) Responses to this section will be used to determine the relative level of sustainability for each project.

- Reduce county government's contribution to fossil fuel dependence and to wasteful use of scarce metals and minerals; and
- Reduce and eventually eliminate county government's contribution to conditions that undermine people's ability to meet their basic human needs.

Benefits:

- There will be no increased energy needs to accomplish this goal.
- No heavy metals in the LED fixtures
- Replacement of existing fluorescent lighting will reduce current energy requirements.
- Reduced heat from light fixtures
- Dimmable lighting will decrease power use
- Able to employ battery backup for cloudy or rainy days Motion sensing switches will produce additional savings
- Very low maintenance and replacement costs due to longevity of LED lighting
- No cost of transformers or meters to be added for electric service
- Possible qualification for savings from various state and federal taxes and utility incentives
- Reduced emissions of criteria air pollutants from utility electricity production

Describe how the county might build upon the outcomes of the proposed project to work toward greater sustainability.

This project would maintain the county's commitment to sustainable projects, and would be visible to agency representatives within and outside of County government while attending meetings and during emergency operations center activations. This project could be a model for other county departments looking for environmentally friendly lighting projects.

Describe how your department will track and measure outcomes of the proposed project (i.e., annual cost savings, annual energy savings, resource use reductions, maintenance reductions, etc.). Include a timeline for measurement and reporting outcomes, and the staff member contact who is responsible for conducting the tracking and measurement.

There will certainly be reductions in annual energy costs and energy consumption. However, tracking those reductions will be difficult to determine due to the manner in which the Public Safety Building is billed for electricity consumption (we are not aware that our office and EOC are specifically segregated out on the bill). Maintenance costs will be reduced because of the anticipated life of the LED bulbs. Additionally, light dimming capability and motion sensing switches will further-reduce energy consumption.

Contact person: Rick Lange	Phone: 608-284-6891 E-mail: Lange@countyofdane.com

Project Information:

Please provide the following information (take as much space as you need to provide details):

Department: Public Works - Highway Address: 2302 Fish Hatchery Rd Address:	Total project costs: $480,000 Funding amount in current budget: $0 Funding amount requested: $480,000
Project Title: Code Compliance for CNG Vehicle Parking & Maintenance	
Project Location: Fish Hatchery Highway Garage	
Project Description: The Highway Department is one of the County's early adopters of CNG. It has three pickup trucks, two plow trucks, and four 1-ton trucks with dump boxes. They also have plans for several more CNG plows and trucks in the next several years. This project will bring the Fish Hatchery main vehicle storage building and the vehicle maintenance area into compliance with building and safety codes, which will allow the Highway Department to park CNG vehicles in these areas and perform maintenance on their CNG vehicles, as well as CNG vehicles for other Departments. Highway vehicles must be parked inside during the winter to ensure proper operation during storm events. The project includes installation of detectors for CO, NO2, and CH4 (methane), completely new fire alarm systems, increased ventilation and exhaust equipment, new "no open flame" heating units, and emergency gas and electrical shut-offs. Although building code compliance for CNG vehicles can be done on new buildings for very little additional expense, that is not always the case on existing, older buildings. That is because, as building codes change, older buildings are often grandfathered in. They usually do not need to perform significant upgrades to comply with new building codes until a large enough renovation project is undertaken in that building. In this case, the upgrades we need to make to the HVAC and alarm systems for CNG vehicles trigger a code requirement to bring the entire space up to current building codes. By improving the buildings to meet current building and safety codes, not only will we be accommodating CNG vehicles. We will also be improving worker comfort and worker safety through increased ventilation and new fire, CO, NO2, and CH4 detection and alarm systems. Following feedback from the Sustainability Subcommittee, staff also looked into systems that would allow us to completely defuel CNG vehicles, which would allow us to perform maintenance on the vehicles in a normal maintenance shop without building modifications. After talking with several vendors of CNG equipment and other CNG fleet owners, we determined that there is currently no such system available.	

Describe how the proposed project moves the county toward meeting the following Sustainability Principles. (See the guiding questions in the box below.) Responses to this section will be used to determine the relative level of sustainability for each project.

- Reduce and eventually eliminate county government's contribution to fossil fuel dependence and to wasteful use of scarce metals and minerals;
- Reduce and eventually eliminate county government's contribution to dependence upon persistent chemicals and wasteful use of synthetic substances;
- Reduce and eventually eliminate county government's contribution to encroachment upon nature and harm to life-sustaining ecosystems (e.g., land, water, wildlife, forest, soil, ecosystems); and
- Reduce and eventually eliminate county government's contribution to conditions that undermine people's ability to meet their basic human needs.

Include in your description any estimated reductions of CO2 equivalent emissions related to your proposal. Please use the following calculator: http://www.epa.gov/cleanenergy/energy-resources/calculator.html

Describe how the county might build upon the outcomes of the proposed project to work toward greater sustainability.
Currently, there are extremely limited commercial options for maintenance of CNG vehicles. To overcome this hurdle, several Highway maintenance technicians were trained to perform maintenance on CNG vehicles. However, they cannot perform these maintenance tasks in a shop that does not meet building code for CNG vehicle maintenance. If this project is approved, these technicians would be able to maintain CNG vehicles for the Highway Department and other County Departments which are unable to find CNG maintenance shops. This may also lead to increase efficiencies and savings for other County Departments.

Describe how your department will track and measure outcomes of the proposed project (i.e.., annual cost savings, annual energy savings, resource use reductions, maintenance reductions, etc.). Include a timeline for measurement and reporting outcomes, and the staff member contact who is responsible for conducting the tracking and measurement.

This project will allow the Highway Department and all County Department to expand their CNG fleet. We are continuing to track the total amount of CNG used as a measure of the total amount of gasoline and diesel displaced. The amount of CNG used is readily tracked via our fuel management system, which is managed by Jim Matzinger. The amount of CNG fuel used can quickly be used to calculate an emission reduction.

Contact person: John Welch	Phone: 508-516-4154 E-mail: welch@countyofdane.com

Project Information:

Please provide the following information (take as much space as you need to provide details):

Department:Parks/Public Works– Lakes Management Address: 4318 Robertson Rd Madison WI	Total project costs: $136,310 Funding amount in current budget: $60,000 Funding amount requested: $76,310
Project Title: CNG Upgrade for New Weed Hauling Truck	
Project Location: Stationed at Robertson Rd – Vehicle Moves Throughout Dane County	
Project Description: The Lakes Management team is responsible for aquatic weed harvesting on all of the County's lakes, as well as performing construction work on many special County construction projects. To help facilitate both of these job roles, Lakes Management owns several dump trucks. These dump trucks are used to haul lake weeds to compost sites and farmers' fields and for hauling rocks, dirt, and construction & demolition debris from County construction sites. One of these trucks is scheduled to be replaced in 2014, with $60,000 budgeted to purchase a used diesel dump truck. The Lakes Management crew is committed to CNG, and would prefer to demonstrate the effectiveness of CNG in a larger vehicle such as this dump truck rather than using diesel. To this end, they searched tirelessly for a used CNG dump truck, but were unable to find one. In the absence of a used CNG dump truck, the only other option, if the County is to purchase a CNG vehicle, is to purchase new. Staff obtained a quote for a new CNG dump truck for $136,310. The County's cost to produce CNG at our Robertson Road fueling station is $2.00 per gallon less than the County's cost to purchase diesel fuel. Based on the odometers of our existing dump trucks, this vehicle will travel approximately 10,000 miles per year, with a listed fuel efficiency of 5 mpg. Based on those numbers, this CNG truck will displace 2,000 gallons of diesel per year, save $4,000/yr in fuel costs and have a projected payback of 19 years. This vehicle is expected to last 40 years, so there would be a total fuel savings of $160,000 over the life of the vehicle. As a point of reference for the expected vehicle life, the next three dump trucks that are slated for replacement were built in 1971 and 1972 and are still in use today. It is also worth noting that the 3 FTEs in this program have taken three separate training courses for: 1) CNG kit installation on vehicles; 2) maintenance of CNG vehicles; and 3) maintenance of CNG fueling stations. In addition, this vehicle is housed at the Robertson Road shop. This is where the County has a CNG fueling station already installed, making it an ideal candidate for CNG.	

Describe how the proposed project moves the county toward meeting the following Sustainability Principles. (See the guiding questions in the box below.) Responses to this section will be used to determine the relative level of sustainability for each project.

- Reduce and eventually eliminate county government's contribution to fossil fuel dependence and to wasteful use of scarce metals and minerals;
- Reduce and eventually eliminate county government's contribution to dependence upon persistent chemicals and wasteful use of synthetic substances;
- Reduce and eventually eliminate county government's contribution to encroachment upon nature and harm to life-sustaining ecosystems (e.g., land, water, wildlife, forest, soil, ecosystems); and
- Reduce and eventually eliminate county government's contribution to conditions that undermine people's ability to meet their basic human needs.

Include in your description any estimated reductions of CO2 equivalent emissions related to your proposal. Please use the following calculator: http://www.epa.gov/cleanenergy/energy-resources/calculator.html

Increased use of CNG and bioCNG will result in a reduction of emissions and a reduction of our fossil fuel dependence. According to the U.S. Environmental Protection Agency, CNG reduces carbon monoxide by 90%, ground-level ozone emissions by 75%, and greenhouse gas (GHG) emissions by 25%. It produces little or no fine particle pollution. BioCNG reduces life-cycle GHG emissions by 90%. Based on these rates, this dump truck will reduce emissions by 4.9 tons of CO2e if using CNG and 17.64 tons of CO2e if using BioCNG.

Describe how the county might build upon the outcomes of the proposed project to work toward greater sustainability.

This will demonstrate that CNG can successfully be used in large vehicles such as dump trucks. There are more dump trucks that the County owns, with three in the Lakes Management program scheduled for replacement in the next couple of years. In addition, the County owns other large pieces of off-road equipment, all of which use large amounts of fuel. By demonstrating CNG on this dump truck, the County will be more prepared to switch other large pieces of equipment to CNG as CNG options become available for those types of equipment.

This will also increase CNG usage at our existing CNG fuel pump. With increased CNG usage at this pump, our cost per gallon of CNG for all County users decreases. This is due to the fixed monthly costs of the CNG station being spread out over more gallons. With decreased costs per gallon for CNG, this will make CNG even more attractive to other County Departments as they consider future vehicle purchases.

Describe how your department will track and measure outcomes of the proposed project (i.e.., annual cost savings, annual energy savings, resource use reductions, maintenance reductions, etc.). Include a timeline for measurement and reporting outcomes, and the staff member contact who is responsible for conducting the tracking and measurement. All users of the CNG pump at Robertson Road must have a County issued fuel card to use the pump. Similar to what is currently done for the diesel dump trucks at this location, the fuel card will be designated for this CNG dump truck only. The amount of CNG dispensed to this vehicle will be tracked via our fuel management card system, which is managed by Jim Matzinger. The amount of CNG fuel dispensed can quickly be used to calculate an emission reduction associated with this building.	
Contact person: John Welch	Phone: 516-4154 E-mail: welch@countyofdane.com

Project Information:

Please provide the following information (take as much space as your need to provide details):

<table>
<tr><td rowspan="3">Department:

Treasurer
Planning and Development

Address:

210 Martin Luther King Jr. Blvd., rooms 114 & 116
Madison, WI 53703</td><td>Total project costs:

$644.00 (see Appendix A)</td></tr>
<tr><td>Funding amount in current budget:

$0.00</td></tr>
<tr><td>Funding amount requested:

$644.00 (see Appendix A)</td></tr>
<tr><td colspan="2">Project Title:

Treasurer & Planning shared break room refrigerator replacement</td></tr>
<tr><td colspan="2">Project Location:

City-County Building
210 Martin Luther King Jr. Blvd., rooms 114 & 116
Madison, WI 53703</td></tr>
<tr><td colspan="2">Included as part of the application are the following appendices:

Appendix A (Grand Appliance and TV FFHT1826LB Refrigerator Quote)
Appendix B (Energy Guide for the proposed FFHT1826LB Refrigerator)
Appendix C (Natural Resource Defense Council Appliance Efficiency Review)
Appendix D (MG&E Refrigerator Cost of Operation Savings Estimation)
Appendix E (Focus on Energy Refrigerator Cost of Operation Savings Estimation)
Appendix F (EPA Refrigerator Replacement CO_2 Savings)
Appendix G (Dane County Government Sustainable Operations Plan, draft 10-10-13)
Appendix H (Appliance Cost of Operation Calculation Worksheet)</td></tr>
</table>

Project Description:

Dane County is renovating the 1st floor of the City-County Building, which includes the Treasurer's Office and the Planning and Development Department. As part of the project, a shared break room is designated to provide staff with a space for safe storage, preparation, consumption, and cleanup of more healthy and affordable food and beverage options for lunches and breaks. In addition to a place to eat, the break room is designed to include running water and space for a fridge and microwave. Currently, the Planning and Development Department has been using a 1970s Sears Coldspot 63141 Series side-by-side refrigerator for 13-16 years, which is consuming electricity at a cost that is unsustainable compared to that of purchasing a new, efficient Energy Star model (see Appendix B).

The Natural Resource Defense Council (NRDC) estimates a new fridge would consume 75% less energy than those produced in the late 1970s and would save more than $100 a year in utility costs. If moving to an Energy-qualified model, the new refrigerator will save an additional 15% or more by employing better insulation, a more efficient compressor, and more precise temperature control and defrost mechanisms. The NRDC also explains that refrigerators with freezers on top, like the one proposed, use 10-15% less energy than a side-by-side model of equivalent size, like the current one (see Appendix C).

MG&E, the energy provider for the City-County Building, has estimated a side-by-side refrigerator older than 1990 uses approximately 1620 kWh per year with an annual energy cost of $210.60 at $0.130 per kWh. A new top-freezer Energy Star model, according to MG&E documentation, would only consume an estimated 444 kWh per year with an annual cost of $57.72 at the same rate. Please know that this estimate by MG&E uses a higher energy consumption than the new, proposed replacement refrigerator, which would have an actual electricity use of 383 kWh per year. Using the actual energy consumption of the new, proposed replacement refrigerator (383 kWh per year) and the rate of $0.130 per kWh, the annual energy cost would only be $49.79 (see Appendix D).

Focus On Energy, using a slightly higher utility rate of $0.144 per kWh (the rate given by MG&E over the phone), estimates the annual cost of operating the current 1970s side-by-side refrigerator to be about $409.00 per year with an energy consumption of around 2839 kWh per year. With a new, Energy Star model, Focus on Energy estimates a drop in cost to $76.00 per year with an annual energy consumption around 528 kWh. These estimations by Focus on Energy are based on a combination of historical data (adjusted for degradation based on the age of the refrigerator/freezer) and documentation cited by Energy Star. Using the actual annual energy consumption of the new, proposed replacement (383 kWh) at this utility rate ($0.144), the calculated electricity cost would be $55.15 per year (see Appendix E).

With the estimated annual cost-savings to be between $160.81 and $353.85 per year to operate a new top-freezer refrigerator rather than the current side-by-side refrigerator, the cost-savings of purchasing a new, more efficient unit would pay for itself in 2-4 years. From a sustainability perspective, the annual energy-savings is estimated to be between 1237 kWh and 2456 kWh (a 76% – 87% savings in energy consumption).

Describe how the proposed project moves the county toward meeting the following Sustainability Principles. (See the guiding questions in the box below.) Responses to this section will be used to determine the relative level of sustainability for each project.

- Reduce and eventually eliminate county government's contribution to fossil fuel dependence and to wasteful use of scarce metals and minerals;

  The actual amount of electricity drawn by the current 1970s side-by-side fridge has been measured for 94.25 hours using an MG&E meter from the South Central Library System. The current 1970s side-by-side refrigerator uses 1793.825 kWh annually, and the proposed new top-freezer replacement would have an annual electricity use of 383 kWh. This would be an actual calculated savings of 1410.825 kWh per year (a 79% improvement in efficiency and a savings of $203.16 per year).

- Reduce and eventually eliminate county government's contribution to encroachment upon nature and harm to life-sustaining ecosystems (e.g., land, water, wildlife, forest, soil, ecosystems); and

  A reduction in energy use will reduce the county's dependence upon fossil fuels consumed at the power plant and thereby reduce the CO_2 emissions from the production of electricity required for operation of the refrigerator. Using the actual measured kWh consumed by the current refrigerator, a shared new, more efficient unit is calculated on the EPA website to save 2,145 lbs of CO_2. This CO_2 savings is equivalent to saving 2,316 miles/year of emissions from an average passenger vehicle, 1,045 lbs of coal burned, or 2.3 barrels of oil consumed (Appendix F).

  In addition to the long-term beneficial impact of a new top-freezer unit, the current side-by-side unit will be disposed of responsibly by the City-County Building Management. The current unit will be taken to a vendor who will remove any remaining coolant and recycle the remaining structure. No additional funds are required for the internal cost of staff time and travel expenses, but there is a minimal vendor charge for recycling the unit. If including both the internal expenses and the vendor charges, the cost of recycling the current refrigerator is estimated to be comparable to that of the $35 fee required if recycled by the City of Madison Streets Department for a private residence.

- Reduce and eventually eliminate county government's contribution to conditions that undermine people's ability to meet their basic human needs.

  The new shared break room will serve both the Treasurer's Office and the Planning and Development Department. The current 1970s side-by-side refrigerator has been relied upon by the Planning and Development Department for 13-16 years and has reached or surpassed it's life expectancy. In addition to the environmental and financial sustainability of purchasing a replacement fridge, a new, top-freezer replacement fridge will continue to provide staff in two offices (rather than the just one) with a means to safely store food for lunches and offer a more cost-effective means to eat healthier and on a budget during the work week by bringing food from home in lieu of eating out every day. The benefits from this proposal coincide with the Dane County Government Sustainable Operations Plan (see Appendix G).

Include in your description any estimated reductions of CO_2 equivalent emissions related to your proposal. Please use the following calculator: http://www.epa.gov/cleanenergy/energy-resources/calculator.html

The actual measured electricity saved by replacing the current refrigerator with a shared new, more efficient unit is calculated to be 2,145 lbs of CO_2 (equivalencies: 2,316 miles/year emissions from an average passenger vehicle, 1,045 lbs of coal burned, 2.3 barrels of oil consumed).

Describe how the county might build upon the outcomes of the proposed project to work toward greater sustainability.

This project can serve as a test-pilot for improving energy efficiency across the county. It is my understanding that there is no established baseline for energy consumption by existing refrigerators and other break room appliances throughout Dane County offices. The effort put into preparing calculations for this report may prove that a county-wide survey and upgrade in break room appliances could greatly improve the environmental and financial sustainability of county operations.

Describe how your department will track and measure outcomes of the proposed project (i.e.., annual cost savings, annual energy savings, resource use reductions, maintenance reductions, etc.). Include a timeline for measurement and reporting outcomes, and the staff member contact who is responsible for conducting the tracking and measurement.

When businesses are taxed for personal property (such as a refrigerator), the assessed value depreciates for a period of 4, 6, or 10 years (depending on the item), after which time the value (for the purposes of personal property taxes) remains constant until replaced.

To follow the shortest depreciation timeframe and provide for the greatest comparable measurements, every four years the Planning and Development Department Head or the Dane County Treasurer can borrow an MG&E meter from the South Central Library System to measure the electricity drawn by the refrigerator for a one-week period. This is performed by plugging the meter into the outlet and plugging the refrigerator into the meter. This has already been calculated for the current side-by-side refrigerator and will be measured once again when the new, proposed top-freezer refrigerator is acquired through SMART funds and is installed in the new, shared break room. This duplicity establishes a measured baseline and comparison for older refrigerators throughout Dane County offices as well as for the new, more efficient replacement referenced in this proposal.

Every four years, after measuring the electricity demands for a week, the measured kWh would be recorded on the Appliance Cost of Operation Calculation Worksheet to calculate the cost of operating the current refrigerator. Then, the measured/calculated values can be used to compare the Current Fridge Operational Cost to a New Fridge Operational Cost if purchased that year (a replacement unit will need to be determined for this calculation). When the cost-savings breaches a 75% cost-savings in operation by purchasing a new refrigerator, then time has come to replace the current unit. The cost-savings is calculated by the following formula:

(Current Fridge Operational Cost – New Fridge Operation Cost) ÷ (Current Fridge Operational Cost)

If a 75% cost-savings never occurs, then the refrigerator can continue to be used until it no longer operates and can then be replaced with a more sustainable model. SMART funds would be appropriate if and when the cost-savings does breach the 75% operations cost (see Appendix H).

The first assumption in this analysis is that increased use of electricity increases the cost of operation. The second assumption is that fossil fuels will continue to serve as a primary source of energy in the production of electricity during the lifespan of a new fridge, and, therefore, an increased use of electricity would increase reliance on unsustainable energy sources resulting in elevated levels of CO_2 production over time that could be reduced by purchasing a new, more efficient refrigerator.

Contact person: Adam Gallagher	Phone: 608-266-4151 E-mail: Gallagher@countyofdane.com

APPENDIX A

Grand appliance and tv

Corporate Office
3300 16th St., Zion, IL 60099
Ph. (847)746-6000
Fx. (847)746-6015

INVOICE

MADISON
6220 NESBITT ROAD
MADISON, WI 53719
Phone (608) 288-0400

Invoice	M53773-0
Date	07-16-14
Store	10
Type	Delivery
Recap	071614 15:22
Customer ID	6082678814

Bill to

PLANNING AND DEVELOPMENT
210 MARTIN LUTHER KING JR BLVD
MADISON, WI 53703

Ship to

PLANNING AND DEVELOPMENT
210 MARTIN LUTHER KING JR BLVD
MADISON, WI 53703

Warehouse	P/O Number	Delivery Date	Terms	Sold At		Bill to Phones	Ship to Phones
98	K CHLEBOWSKI	11-01-44	COD	10	Home	(608) 267-8814	(608) 267-8814
Salesperson		Salesperson			Work		
40315 DAMON LEMKE					Cell		

NA

Item Number	Description	Brand	Order	Ship	Unit Price	Ship Price
FFHT1826LB	18'TOP MOUNT GLASS ESTAR BLACK	FRG	1	0	624.00	624.00
	Serial#_____					
DELIVERY	DELIVERY~CHARGE & INSTRUCTIONS	XX	1	0	20.00	20.00

N

Sales Amount	644.00
Sales Tax	.00
Freight	.00
Total	644.00
Balance Due	644.00

I agree to purchase the merchandise as listed above and I understand that this purchase is subject to the terms and conditions on grandapplianceandtv.com. I also agree that I have inspected all merchandise I am taking with me today and it matches the condition in which it was sold, which includes knowledge of any existing dents, scratches or physical damage to open box or floor model items.

CUSTOMER SIGNATURE:

X: _____

Grand is committed to your satisfaction
For assistance with your order, contact your salesperson or our dedicated Customer Service team. Customer Service is available six days a week to answer FAQs and assist you in scheduling your product for delivery, installation or service.

Contact Customer Service
Toll-Free: (888) 396-8165 x 3
Email: customerservice@grandapplianceandtv.com
Hours of Operation:
Monday-Friday: 9am to 8pm
Saturday: 9am to 5pm

Tell us how we're doing
Complete a short survey and be automatically entered for a chance to win a $100 pre-paid Visa card!

Scan the QR code above or go to bit.ly/grandtv to complete the survey

U.S. Government

Federal law prohibits removal of this label before consumer purchase.

ENERGYGUIDE

Refrigerator-Freezer
*** Automatic Defrost**
*** Top-Mounted Freezer**
*** No Through-the-Door-Ice-Service**

Electrolux
FFHT1826L*
Capacity: 18.2 Cubic Feet

APPENDIX B

Estimated Yearly Operating Cost

$41

The estimated yearly operating cost of this model was not available at the time the range was published.

Cost Range of Similar Models

383 kWh

Estimated Yearly Electricity Use

Your cost will depend on your utility rates and use.

- Cost range based only on models of similar capacity with automatic defrost , top-mounted freezer , and no through-the-door-ice-service
- Estimated operating cost based on a 2007 national average electricity cost of 10.65 cents per kWh.
- For more information, visit www.ftc.gov/appliances.

PART NO. 242028537

Canada

ENERGUIDE

Energy consumption / Consommation énergétique

0

kWh
per year / par année

▼ **This Model**

Uses least energy / Consomme le moins d'énergie

Type 3

16.5 TO 18.4 CU. FT.
volume in ft^3/ volume en pi^3

Uses most energy / Consomme le plus d'énergie

Similar models compared

Modèles similaires comparés

Model number

FFHT1826L*

Numéro du modèle

APPENDIX C

NATURAL RESOURCES DEFENSE COUNCIL
THE EARTH'S BEST DEFENSE

Efficient Appliances Save Energy -- and Money

Consumers get lower utility bills, and we all get a cleaner environme

En Español

The major appliances in your home -- refrigerators, clothes washers, dishwashers -- account for a b refrigerator or washing machine is more than a decade old, you're spending a lot more on energy th

Today's major appliances don't hog energy the way older models do because they must meet minin standards have been tightened over the years, so any new appliance you buy today has to use less instance, if you buy one of today's most energy-efficient refrigerators, it will use less than half the er

Of course, efficient appliances don't just save you money; they're good for the environment. The les power plants, which means less pollution. The trick is to figure out which models use the least energ

Look for the Energy Star® label. Energy Star models are the most energy efficient in any product energy efficiency minimums set by the federal government. If you remember only one rule when you for the Energy Star label. In some parts of the country, utilities and state governments even sweeten rebates on Energy Star-rated models. Check http://www.energystar.gov for details.

Use the EnergyGuide label. Some uninformed salespeople might tell you that a model you're looki at is the most efficient because it has an EnergyGuide label. Not exactly. All new appliances must c the EnergyGuide label, either on the appliance itself or on the packaging. The label allows you to compare the typical annual energy consumption and operating cost of different models of any type o appliance you're thinking of buying.

Get the right size. Make sure the product you're buying suits your needs. Oversized air conditioner water heaters and refrigerators waste energy and money; in many cases they also don't perform as well.

Whenever possible choose appliances that run on natural gas rather than electricity. Usually needed -- in your home -- than to burn it at a power plant, convert the heat to electricity and then se Look for dryers, stoves and water heaters that run on natural gas.

Think long term. Many of the most energy-efficient appliances cost more initially, but they'll save y major appliances between 10 and 20 years. A more efficient appliance soon pays for itself; lower m

appliance will more than offset a higher purchase price. In addition, the latest resource-efficient clot
electricity, they also use a lot less water and can reduce your water bill.

Below is more specific information to keep in mind if you're in the market for any of the following ma

REFRIGERATORS

If you are thinking of replacing an old appliance, the refrigerator is a good place to start. New refrige
75 percent less energy than those produced in the late 1970s. A family replacing a 1980 vintage fric
meets today's standards will save more than $100 a year in utility costs. Go one step further and bu
-qualified model, and your new refrigerator will save you an additional 15 percent or more by emplo
insulation, more efficient compressors and more precise temperature control and defrost mechanisr

Energy-Saving Purchasing Tips:

- Refrigerators with freezers on top use 10 to 15 percent less energy than a side-by-side model c
  size.
- Generally, the larger the refrigerator, the greater the energy consumption. But one large refrige
  energy than two smaller ones with the same total volume or a smaller fridge plus a separate fre

CLOTHES WASHERS

The energy efficiency of standard top-loading washers has doubled over the last two decades, mos
the amount of water used. (Most of a washer's energy consumption goes to heating water.) Front-lo
have also become more readily available. They generally use less water than top-loaders because
to totally submerge clothes. Their tumbling action constantly lifts water and drops it back down onto
Star top-loaders, however, can be just as efficient as front loaders. Look for the EnergyGuide or En
to compare efficiencies.

Replacing a pre-1994 washer with an Energy Star model can save a family $110 a year on utility bil
washers use 50 percent less energy than other standard models, and only 18 to 25 gallons of wate
load, compared to 40 gallons for standard full-size washers. Many Energy Star models also advertis
wear, better stain removal and briefer drying times.

Energy-Saving Purchasing Tips:

- Choose the right size washer. A smaller washer may be more efficient for small households. Bu
  large family and have to do multiple loads in a washer that's too small for your needs, you coul
  possible energy savings.
- Look for a washer with adjustable water levels. This gives you the option of using less water to
  loads.
- Choose a washer with a faster spin speed. This allows more water to be removed after the was
  drying time and your dryer's energy use.
- Use a gas dryer rather than an electric dryer where possible.

DISHWASHERS

A new dishwasher is not only more efficient than older models, but it's also better at getting dishes c
Manufacturers no longer recommend that you pre-wash your dishes. Simply scrape the remaining f
plates and place them in the machine as is. This will save you time and save money on your water b

The most efficient dishwashers use less hot water, have energy-efficient motors and use sensors to
length of the wash cycle and the water temperature needed to do the job. The newest Energy Star c
25 percent more efficient than the minimum federal standards. Replacing a pre-1994 dishwasher wi
Star model can save $25 a year on utility costs.

Energy-Saving Purchasing Tips:

- Choose a dishwasher with a "light wash" or "energy-saving" wash cycle. It uses less water and
  shorter period of time for dishes that are just slightly soiled.
- Look for dishwashers that have an energy-saving cycle that allows dishes to be air-dried with c
  rather than heat-dried with energy-wasting heating coils.

ROOM AIR CONDITIONERS

The most efficient room air conditioners have higher-efficiency compressors, fan motors and heat-tr
than previous models. A high-efficiency unit reduces energy consumption by 20 to 50 percent. Repl
old model with an Energy Star model can cut energy bills by an average of $14 a year.

Energy-Saving Purchasing Tips:

- Remember, the biggest unit isn't always the best choice, especially for small areas. A smaller u
  long period of time operates more efficiently and is more effective at decreasing humidity than a
  goes on and off frequently.
- If you're comparing several similar units, choose the one with the highest Energy Efficiency Rat
  the EER on the unit or its packaging. The minimum EER required by federal law is 9.7; the mos
  conditioners of 2003 have an EER of 11.7.

CENTRAL AIR CONDITIONERS

If your central air conditioning system is more than 10 years old, replacing it with an Energy Star mo
your energy consumption for cooling by 20 percent.

Energy-Saving Purchasing Tips:

- Look for the seasonal energy efficiency ratio (SEER). Old units typically have a SEER of 6 or 7
  raising the minimum SEER for central air conditioners to 13. Energy Star models already meet
  efficiently when it's hot.
- For maximum efficiency on the hottest days, the air conditioner should have a thermal expansio
  (EER) on your unit should be at least 11.6.

- For optimal performance, buy a matched system of indoor unit, condenser and even thermosta
- Get a reliable contractor to make sure your new unit is the right size for your home, and have it efficient system can't make up for the energy loss due to improper sizing and poor installation.
- Have your contractor make sure all your ducts are sealed and insulated. Duct tests require a fa by sight.

WATER HEATERS

Water heating is typically the third largest energy expense in your home, accounting for about 14 pe can operate for years at very low efficiency before it finally fails. If your gas water heater is more tha than 50 percent efficiency.

Energy-Saving Purchasing Tips:

- Calculate how much hot water your household uses at peak times. Figure that a clothes washe gallons of hot water; a shower, 20 gallons. Washing dishes by hand can use 10 to 15 gallons, a
- Match this figure with the "first hour rating" (FHR) on the EnergyGuide label. The FHR measure can deliver during a busy hour. Don't be misled by the size of the tank -- it doesn't necessarily c
- Once you've found the right FHR range for your household, check the unit's Energy Factor (EF model would have an EF around 0.8.
- A natural gas unit will cost less to operate than electric.

HOME ELECTRONICS

For most products, the Energy Star label is your assurance that the product will operate more efficie TVs, audio equipment, telephones, computers and printers earn the label primarily because they dr use -- regardless of the amount of power they consume when operating. When buying electronics, c a few general caveats in mind.

Energy-Saving Purchasing Tips:

- Ink jet printers tend to be more energy-efficient than lasers.
- LCD televisions and monitors draw less power than CRT or plasma screens.
- Small lightweight power supplies tend to be more energy efficient than large, heavy transforme

MORE SMART SHOPPING TIPS

- **Check for incentives.** Some states offer rewards for buying the most energy-efficient applianc have rebate programs that will refund part of the purchase price of certain new energy-efficient some appliances with the Energy Star label. Check with your local utility and the Energy Star R other incentives are available in your area, or see our state-by-state listing.

- **Use the Internet.** Several websites contain additional useful information. The EPA's Energy St models that carry the Energy Star label and where you can buy them. The American Council fo yearly list of the most energy-efficient appliances. And the Consortium for Energy Efficiency ha efficiency in the home.

last revised 1/13/2010

POPULAR ISSUES

TELL
DIFF

"Prote
future

Shar

APPENDIX D

Refrigerators

Your refrigerator can make a big difference in your energy bills.

Refrigerators - Cost of Operation		
Type/Year	**kWh/Month**	**Estimated Monthly Cost at $0.130/kWh**
Top Freezer (Bottom freezer models use about the same amount.) 18.5 to 20.4 cubic foot		
July 2001 or newer - ENERGY STAR® models	37	$4.81
1993 to June 2001	58	$7.54
1990 to 1993	82	$10.66
Older than 1990	100	$13.00
Side-by-Side 21.5 to 22.4 cubic foot		
July 2001 or newer - ENERGY STAR models	51	$6.63
1993 to June 2001	71	$9.23
1990 to 1993	110	$14.30
Older than 1990	135	$17.55
Ice Makers will increase operating cost by 15% to 20%. Through-the-door ice and water dispensers will add another 10% to 15% to operating costs. Each cubic foot larger adds about 25 kWh per year.		

Use these wise tips:

- Locate away from heat sources such as the oven or a heat register. Avoid direct sunlight.
- Don't place in unheated garage. Poor temperature and humidity control can spoil food.
- Allow at least two inches of clearance around the refrigerator for air circulation and heat dispersal.
- Keep temperature of fresh food section between 35 and 40 degrees; freezer at 0 to 5 degrees.

- If you have an anti-sweat switch, use it only when condensation forms near door seals. The switch heats the area around the door seal to prevent condensation. Turn off in the fall to save energy.

Switched on for hot, humid weather.

Buying tips:

- One larger refrigerator uses less energy than two smaller units.
- Look for ENERGY STAR® label.
- Use yellow EnergyGuide labels to compare.
  - Side-by-sides generally use more electricity.
  - Through-the-door dispensers and automatic ice makers increase electric use.

For more information

Refrigerator Tip Sheet [152 kB PDF]

Refrigerator Retirement Savings Calculator

Refrigerator/Freezer Recycling

Track Your Carbon Footprint at CO2gether.org

Related links

ENERGY STAR

Top Ten Energy-Efficient Appliances

What About Refrigerators and Freezers?

APPENDIX E

ABOUT ENERGY STAR

PARTNER RESOURCES

Refrigerator Retirement Savings Calculator

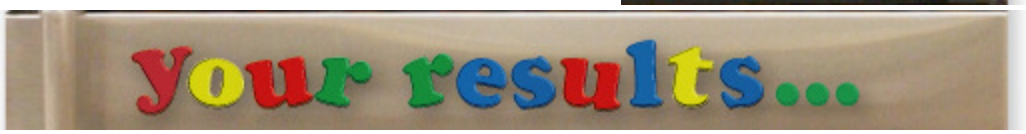
START OVER

19.0-21.4 Cubic Feet
Side-by-Side

$0.144

$408.82

2,839 kWh



You can save more than $1,665 over five years by replacing your old refrigerator or freezer with a new ENERGY STAR qualified model!

Your model costs...

$409 per year to run

An ENERGY STAR qualified model costs...

$76 per year to run

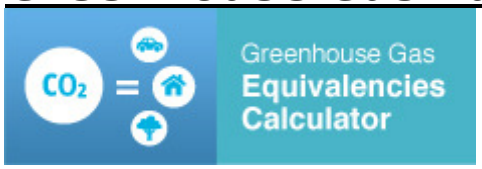
Find Out How

Note: If your refrigerator or freezer is a newer, ENERGY STAR qualified model your results may not display significant savings.

APPENDIX F

Clean Energy

Greenhouse Gas Equivalencies Calculator



About This Calculator

Last Updated: April 2014

- Latest updates and revision history
- Calculations and References

Other Calculators

There are a number of other web-based calculators that can estimate greenhouse gas emission reductions for

- Individuals and households
- Waste, and
- Transportation.

For basic information and details on greenhouse gas emissions, visit the Emissions section of EPA's climate change site.

Did you ever wonder what reducing carbon dioxide (CO_2) emissions by 1 million metric tons means in everyday terms? The greenhouse gas equivalencies calculator can help you understand just that, translating abstract measurements into concrete terms you can understand, such as "equivalent to avoiding the carbon dioxide emissions of 183,000 cars annually."

This calculator may be useful in communicating your greenhouse gas reduction strategy, reduction targets, or other initiatives aimed at reducing greenhouse gas emissions.

Enter Your Data

There are two options for entering reduction data into this calculator.

If You Have Energy Data | **If You Have Emissions Data**

Please note that these estimates are approximate and should not be used for emission inventory or

formal carbon footprinting exercises. Read more about the caveats and explanations on the Calculations and References page

1410.825

kilowatt-hours of electricity

Calculate

Equivalency Results

The sum of the greenhouse gas emissions you entered above is **2,145**

Pounds of Carbon Dioxide Equivalent. This is equivalent to:

Annual greenhouse gas emissions from

0.205

Passenger vehicles

-or-

2,316

Miles/year driven by an average passenger vehicle

-or-

CO_2 emissions from

Carbon sequestered by

http://www.epa.gov/cleanenergy/energy-resources/calculator.html
Last updated on Wednesday, April 16, 2014

0.349

Tons of waste sent to the landfill

-or-

0.05

Garbage trucks of waste recycled instead of landfilled

-or-

109

gallons of gasoline consumed

-or-

1,045

Pounds of coal burned

-or-

0.013

tanker trucks' worth of gasoline

-or-

0.089

homes' energy use for one year

-or-

0.0003

Wind turbines installed

-or-

0.134

homes' electricity use for one year

-or-

0.005

railcars worth of coal burned

-or-

25.4

Incandescent lamps switched to CFLs

-or-

2.3

barrels of oil consumed

-or-

40.5

propane cylinders used for home barbeques

-or-

0

coal-fired power plants in one year

-or-

24.9

tree seedlings grown for 10 years

-or-

0.797

acres of U.S. forests in one year

-or-

0.008

acres of U.S. forests preserved from conversion to cropland in one year

-or-

APPENDIX H

Appliance Cost of Operation Calculation (monitor every 4 years for 1 week)

Department: _____ **Building:** _____ **Room:** _____

Appliance	Date/Time Started	Date/Time Ended	kWh Used	÷	Hours in Test Period	X	Total Hours per Year	X	Electric Rate per kWh	=	Annual Cost
Example : 1970s Sears Coldspot 63141 Series side-by-side refrigerator	*09/19/2014 4:15 p.m.*	*09/23/2014 2:30 p.m.*	*19.3*	÷	*94.25*	X	*8760*	X	*$0.144*	=	*$258.31*
				÷		X	8760	X		=	
				÷		X	8760	X		=	
				÷		X	8760	X		=	
				÷		X	8760	X		=	
				÷		X	8760	X		=	
				÷		X	8760	X		=	
				÷		X	8760	X		=	
				÷		X	8760	X		=	
				÷		X	8760	X		=	
				÷		X	8760	X		=	

Instructions (borrow an energy meter from the library):

Monday morning…

1. Unplug appliance from receptacle.
2. Plug meter into receptacle.
3. Plug appliance into meter.
4. Navigate through display until "Watt Hours" shows
5. Reset the watts-hours to zero (0).
6. On chart…
   a. Identify the appliance being tested.
   b. Write the start date/time for testing.

Friday afternoon…

1. On chart…
   a. Record the ending date/time for testing.
   b. Record the kWh used during testing.
   c. Record the number of hours tested.
   d. Calculate the annual cost (use current utility rate).
2. Unplug appliance from the meter.
3. Unplug the meter from the receptacle.
4. Plug the appliance into the receptacle.