



A PROGRAM OF GEORGIA CITIES FOUNDATION





New Revolving Loan Fund

Purpose:

The Intent of the Green Communities Fund is to provide low interest financing for energy efficiency improvements to downtown businesses and buildings





New Revolving Loan Fund

The Green Communities Fund has been made possible through a grant from the Georgia Environmental Finance Authority. Like Georgia Cities Foundation's existing RLF it targets downtown buildings.





New Revolving Loan Fund

- New addition to existing Georgia Cities Foundation's revolving loan program which is primarily for:
 - Property acquisition
 - Rehabilitation of existing building
 - New construction
- DDA Boundaries – both loan programs





Key Differences

- Direct loan to borrower (rather than through DDA)
- Will affect larger number of existing businesses
- Loan process begins with an energy audit



Energy Audits

- Comprehensive audit of building provides borrower with list of potential energy improvements
- Audits subsidized as part of Green Communities Fund
 - 10,000 sq ft or less = \$500 cost to borrower
 - 10-50,000 sq ft = \$1000 cost to borrower





Loan Terms

- Minimum Loan Amount = \$10,000
- Maximum Loan Amount = \$250,000
- Interest Rate: below market rate (currently 3%)
- Repayment: 5 year, 10 year w/15 year amortization
- Minimum 10% Borrower Equity Participation





Finance Structure

Energy Project Cost	\$12,000 to \$50,000	\$50,001 to \$100,000	\$100,001 to \$250,000	\$250,001 to \$500,000
Financing Structure (GCF ² – Borrower)	90% - 10%	80% - 20%	70% - 30%	50% - 50%
Maximum GCF ² Loan Amount	Up to \$45,000	Up to \$80,000	Up to \$175,000	Up to \$250,000
Minimum Borrower Equity Participation	10%	10%	10%	10%
Loan Term	5 years	5 years	10 years, 15 yr amort.	10 years, 15 yr amort.



Eligible Improvements

- Insulation
- Lighting Retrofits
- Reflective Roofing
- Weather Sealing
- Duct Sealing
- High Efficiency HVAC
- Occupancy Sensors
- Solar Thermal Hot Water Heaters
- Tankless Water Heaters



Project Requirements

- Minimum Energy Savings:
 - 20% energy savings
 - or
 - 10 year return on investment or better
- DDA Verification
- Historic Properties – Improvements must be compliant





Audit Summary

Based on the audit performed by Southface on August 4th, below are the prioritized recommendations, energy cost savings, and estimated costs. Details on each item can be found later in the report.

Name	Annual Savings (\$)	Estimated Cost	Estimated Payback	Energy/Water Savings (CO2 Savings)
1 Upgrade from 13 SEER AC to 16 SEER Ductless AC (see summary report)	\$370	\$1,400	3.8 Years	2,409 kWh (3,600 lbs)
2 Add External Insulation to Roof	\$348	\$5,400	15.5 Years	2,246 kWh (3,356 lbs)
3 Solar Tubes	\$240	\$2,220	9.3 Years	1,466 kWh (2,190 lbs)
4 Retrofit T12 Fixtures with T8 Lighting Fixtures and Lamps	\$220	\$1,900	8.6 Years	1,650 kWh (2,465 lbs)
5 Install Programmable Thermostat	\$123	\$100	10 Months	701 kWh (1,182 lbs)
6 Update Exit Signs to LED lamps	\$103	\$100	12 Months	666 kWh (995 lbs)
7 Compact Fluorescents	\$81	\$44	7 Months	523 kWh (781 lbs)
8 Computer Sleep Mode	\$15	\$0	0 Months	99 kWh (148 lbs)
9 Computer Monitor Power Save	\$7	\$0	0 Months	44 kWh (66 lbs)
10 Add Hot Water Heater Insulation	\$2	\$20	10.0 Years	11 kWh (16 lbs)
11 Install photocells to reduce lighting use.	\$0	\$300	0 Months	0 kWh (0 lbs)
	\$1,509	\$28,084	18.6 Yrs	(14,799 lbs)

These are all recommendations that provide a good financial payback, are workable for the facility, and will provide substantial energy savings.

Note: The costs are estimates only, and it is highly recommend you get actual bids from qualified contractors before deciding to pursue any of these recommendations.



Opportunity Summary List

Below is a summary table of all recommendations and associated cost savings.

Name	Annual Savings (\$)	Estimated Cost	Estimated Payback	Energy/Water Savings (CO2 Savings)
Replace 10 SEER Heat Pump with 13 SEER Heat Pump	(\$460)	(\$16,600)	[36.1 Years]	[2,944 kWh]
1 Upgrade from 13 SEER Heat Pump to 16 SEER Ductless AC	+\$370	+\$1,400	+3.8 Years	+2,409 kWh
Upgrade from 13 SEER Heat Pump to 19 SEER Heat Pump	+\$235	+\$12,000	+51.1 Years	+1,521 kWh

Notes

Energy Efficiency Ratio (EER) is a measure of how efficient a particular air conditioning system is. Specifically, it is the ratio of output cooling (Btu/hr) to input watts. To find the percentage improvement, take the difference between the two EER ratings, and divide by the new EER rating.

By upgrading AC equipment to more efficient models (high EER) when it fails, or if a system has a long run time, then replacing before it fails can be warranted.

The cost of replacing the current HVAC with (2) 4 ton standard efficiency heat pumps is around \$16600. Basis of design is Trane XB13 with a SEER rating of 13. A functional HVAC system with an energy code compliant efficiency rating would be a drastic improvement over the current HVAC system. This system is being used as the base system in the above calculations since the current system must be replaced.

The cost of (2) 4 ton, ductless, multi-zone, split system heat pumps with multiple air handling units is around \$18000. Basis of design is Mitsubishi MXZ-8B49NA condensing units. Many more options are available and some units have much higher efficiencies. The price will vary based on the number of air handling units used and the price listed above is a rough estimate. The ductless system is only slightly more expensive than the standard efficiency heat pump system with added ductwork. The payback period for the added cost is 3.8 years. The installation time and disturbance to the rest of the building will also be substantially reduced over the ducted heat pump system.

A second option is to use (2) 4 ton ducted split system heat pumps. Basis of design is Trane XU20 with a SEER rating of 19. The installed cost would be around \$30000. As you can see from the annual energy savings, there is a diminishing return on your investment when purchasing more efficient equipment. Based on the estimate above, this upgrade in efficiency would not be worthwhile since the expected lifespan of the equipment is around 15 years.

2 Add External Insulation to Roof

\$348	\$5,400	15.5 Years	2,246 kWh (3,356 lbs)
-------	---------	------------	--------------------------

Notes

The current roof has little to no insulation. This affects both energy performance, and could reduce the sizing of the replacement HVAC system.

Roof insulation on a flat roof building is typically installed on top of the roof, under the waterproofing layer. Since the roof is new, an external insulation would be the best fit. The ideal option would be to use an externally rigid foam insulation, that are self ballasted. This means they have a concrete coating on the top, which makes them heavy (won't blow off in wind), and walkable for roof maintenance purposes.

The pricing here is based on using 2" thick Energy Star insulation pavers at an installed price of \$3 per square foot. Cheaper alternatives exist that use typical rigid foam roof insulation with some kind of external ballasting. Using a rigid foam product that can be walked on (e.g. Plazamate, from Dow) would be a better solution than a softer polystyrene board.

The additional insulation should provide at least R10 of insulation value.

3 Solar Tubes

\$240	\$2,220	9.3 Years	1,466 kWh (2,190 lbs)
-------	---------	-----------	--------------------------

Notes

Solar tubes are very good ways to bring in diffuse natural daylight into top floor areas. They are typically composed of a 10" dome installed on the roof, a reflective tube that channels the light to the space, and a ceiling diffuser that spreads out the light into the space (no direct sunlight like a skylight). They are relatively easy to install, and bring in very little heat.

Bringing in natural daylight into a space can increase visual acuity, accurately represent colors, and increase worker/customer satisfaction. Additionally, it allows you to dramatically reduce the lighting usage in the area, typically making it unnecessary on reasonably sunny days.

Assuming that (6) 10" diameter solar tubes are added to the front retail area. Each solar tube will light between 150 and 250 square feet of floor area. The tubes cost \$270 each plus \$100-200 for installation.

Note: The drop ceiling would need to be removed for a simpler installation, which would fit in with an overall lighting retrofit.

4 Retrofit T12 Fixtures with T8 Lighting Fixtures

\$220	\$1,900	8.6 Years	1,650 kWh
-------	---------	-----------	-----------





and Lamps

(2,465 lbs)

Notes

T12 lighting, is an old technology and inefficient when compared to new T8 or T5 lighting systems. These newer systems can reduce the overall fixture wattage by 40%, and reduce the heat load in the building, allowing the air conditioning to run less. An estimate for this is an additional 25% savings (of the T8 retrofit savings) for AC savings.

Standard T8 lamps use 32 watts. Newer T8 lamps can now use 28 watts with similar light levels, saving an additional 12%. The additional costs for the 28w lamps will pay for themselves within the first year.

This assumes that 4 lamp T12 fixtures are replaced with new 3 lamp fixtures with electronic ballast, either 30 or 28 watt lamps.

When upgrading lights, it is important not to just swap out lamp for lamp, fixture for fixture. Each area should be evaluated against current energy code (ASHRAE 90.1-2007) on lighting power density, and then the appropriate number of lamps retrofitted.

Some typical space lighting power densities are (in watts/sq ft):

- Office: 1.1
- Conference Room: 1.3
- Lobby: 1.3
- Corridor: 0.5
- Retail: 1.7
- Classroom: 1.4

Well daylight areas should be considered for dimming ballasts/lamps and a photocell to control them. Areas that are sporadically occupied (break rooms, conference rooms, restrooms) should have motion sensors installed to keep the lights off when unoccupied.

5 Install Programmable Thermostat	\$123	\$100	10 Months	791 kWh (1,182 lbs)
--	-------	-------	-----------	------------------------

Notes

Programmable Thermostats allow you to set time periods for each day when the AC or heat should be on and at what temperature. Once programmed, the temperatures are automatically set by the thermostat.

Units with adaptive, "smart," or "intelligent" recovery features are an exception to this rule – they reach desired temperatures by the set time, since they use formulas that are based on your historical use. Set the desired temperatures only for the hours when the building is occupied, and then set the temperature back (called temperature setbacks) when unoccupied. Temperature setbacks can be 55 deg in the winter, and 90deg in the summer based on ASHRAE 90.1-2004 energy code. For most buildings, these temperatures would not be reached after hours. These can be adjusted if the temperature isn't being reached at the desired time.

6 Update Exit Signs to LED lamps	\$103	\$100	12 Months	666 kWh (995 lbs)
---	-------	-------	-----------	----------------------

Notes

Incandescent bulbs in older Exit Signs use 40 watts, running 24/7. Newer LED replacement lamps only consume 5 watts, and will last for up to 10 years. Retrofit kits are commonly available on the internet and lighting suppliers.

7 Compact Fluorescents	\$81	\$44	7 Months	523 kWh (781 lbs)
-------------------------------	------	------	----------	----------------------

Notes

Compact fluorescent (CF) lamps use 1/3 to 1/2 of the power that a typical incandescent bulb does. They also give off dramatically less heat, easing the load on your summer air conditioning. Typical replacement watts are as follows 23 watt CF = 100 Watt incandescent 17 watt CF = 75 watt incandescent 13 watt CF = 60 watt incandescent

8 Computer Sleep Mode	\$15	\$0	0 Months	99 kWh (148 lbs)
------------------------------	------	-----	----------	---------------------

Notes

Computers come designed with a "sleep" mode, which allows the computer to maintain the running state, but go into a lower power sleep mode. This mode can be set to occur automatically after a period of inactivity, and wakes up in 5-10 seconds when someone comes and moves the mouse/clicks the keyboard. Sleep mode uses 10 watts or less, compared to 60-80 watts typically. Other options are available as well, so choose the one that makes the most sense for your space. Under the power settings (in the control panel), set the computer to go into sleep mode after an appropriate amount of time (e.g. 30min).

9 Computer Monitor Power Save	\$7	\$0	0 Months	44 kWh (66 lbs)
--------------------------------------	-----	-----	----------	--------------------

Notes

Place inactive monitors and computers (CPU, hard drive, etc.) into a low-power sleep mode. A simple touch of the mouse or keyboard "wakes" the computer and monitor in seconds.

Also, you generate less heat from the monitors when they are in "sleep mode", lowering the load on your HVAC system. A free Energy Star program allows you to automatically adjust these settings for all computers.

10 Add Hot Water Heater Insulation	\$2	\$20	10.0 Years	11 kWh (16 lbs)
---	-----	------	------------	--------------------





Facility Equipment and Areas

The equipment of the building was analyzed, and the building operating schedules were applied to that equipment in a software energy model. This model allows us to estimate the amount of electricity and natural gas to run the building, and how the various equipment and rooms contribute to the total usage.

This "expected" usage is then compared to what you actually consumed from the information on the utility bills.

Based on the model created, the energy consumption of the facility is broken out below:

Electric

Equipment Type	Demand (kW)	Avg Monthly Cost	Avg Annual Cost
Heat Pump	7	\$165	\$1,984
Air Conditioning	2	\$15	\$183
General Electrical	2	\$2	\$20
Heating - Electric	2	\$4	\$53
Lighting	2	\$46	\$548
Kitchen Electric	1	\$3	\$36
Air Handlers	1	\$26	\$312
Misc Electrical	0	\$0	\$1
Office Equipment	0	\$4	\$44
Total Model	17	\$265	\$3,180
Total from Bills	14	\$314	\$3,767
Difference	-3 (-21%)	\$49 (16%)	\$588 (16%)

The "Difference" above can be caused by a couple reasons:

- 1) Equipment is running differently than expected, including
 - a. After hour usage, things being left on when the building isn't occupied. Comparing the after hours usage number above with the "Difference" can show whether this may be the cause
 - b. Equipment needing to run longer than the expected schedule
- 2) Equipment used in the building was not captured during the audit. Reviewing the equipment list for any significant missing items would help determine this.
- 3) Changes in the equipment performance, especially the heat pump.

Water

The water bills do not fluctuate with consumption. The building uses very little water and any reduction in water usage will not translate into cost savings. No changes to the plumbing fixtures are recommended.



For More Information

Please Contact:

Chris Higdon

678-651-1018

chigdon@gmanet.com

or visit

www.georgiacitiesfoundation.org

