# State of the Town of Apex Load Management Program and Recommended Changes

## Program Summary

Load Management is a program to reduce the Town's total electric usage during peak or high-demand hours. Roughly two thirds of the Town's power bill is based on its usage during the monthly peak demand hour. By lowering the demand on the electric system through load management, the Town can reduce the total bill, and ultimately, the customer's electricity cost. The program involves a switch on the devices in homes that use the most energy. These devices include electric water heaters, central air conditioning compressor units and heat pumps as well as auxiliary heat strips. During times of peak demand, the Town's load management devices receive a signal from ElectriCities to have these devices cycled off for brief intervals. This typically occurs a few times each month, and lasts for several hours.

Central Air Conditioners and HVAC Heat Pumps: These contribute significantly to peak demands in the summer and can be cycled off and back on without discomfort. Air conditioner compressor is typically cycled off for about one to two hours over the entire load management period. Customers may choose to participate in 25%, 50%, or 100% control levels. For example, a customer on 25% control would have their compressor turned off 7 minutes out of every half hour for a total of one hour during a four-hour load management period. The impact to comfort level for most customers is very minor.

Electric Water Heaters: The heating element of the electric hot water heater is turned off, typically for about one to two hours.

Heat Strips: Heat strips are supplemental, and when they are on, electricity is consumed at a rate three times greater than that of the heat pump alone. During peak hours, heat strips will not run. This will typically last for 1-2 hours. The load management switch will control the heat strip, but the compressor will continue to provide heat to the home.

### Current Program Administration

Under the current program, the Town provides the load management device free to residents ($125/device), and residents are given credits to their power bill for participating in the program. Load management credits are based on the following schedule:

$2.00 per month for Electric Water Heaters
$10.00 per month in January, February, March & April for Electric Heat Strips
$4.00 per month in June, July, August, and September for 25% A/C Control
$8.00 per month in June, July, August, and September for 50% A/C Control
$20.00 per month in June, July, August, and September for 100% A/C Control

Customers may opt out of the program at any time by notifying the Town, who will remove the device from the customer's house.

Article II section 12-19 of the Town's code of ordinances requires all new residential structures have the load management switches installed as a condition of electric service. The ordinance also requires a device be installed if not present for on building permits over $10,000. This requirement is imperative to the program, after initial construction, the installation of building wiring to the load management switches becomes cost prohibitive.

### Current Program Status

Since the inception of the program in the early 90's over 20,000 load management switches have been installed in the Town.

Number of switches currently Installed*
LCR-2000 – ~3400 – Prior to 2006
LCR-2000 – 600 – 2004 to 2006
LCR-5000 – 4,254 – 2006 to June 2013
LCR-5600 – 14,296 – June 2013 to 2023
Total: 22,550
*LCR-2000 quantities are assumed, all other quantities were provided by the Manufacturer from their records.

Technology changes and other detrimental factors have led to switch inoperability. The various factors impacting the program are listed below

- The LCR-2000 series use radio frequency communication and have been inoperable for several years.
- The LCR-5000 and 5600 series switches utilize 1-way paging signals. The paging network is now eroding in the town, so more and more switches are failing to reliably receive a signal. These switches have also been obsolesced by the manufacturer and will be unavailable once the last orders are received.
- HVAC technicians and Owners often bypass the switches in the false belief that the switches are the cause of HVAC systems failing to work.
- Physical deterioration of the switches without sufficient personnel to maintain the currently installed switches.

Due to the issues above, it is estimated that only between 40-50% of the installed switches are currently operational.

## Proposed Path Forward

In order to continue the program, the load management switches need to be replaced with new switches that use cell technology with 2-way communication. These new switches will have several benefits over the previous models. The new switches will enable the Town to know if devices are working, and if they have been bypassed in the field without having to do site audits. If a customer wishes to opt out of or into the program this can be done remotely without sending personnel to physically bypass the switch.

It is recommended that the Town does the following:

- Revise the Town's ordinance
- Replace the existing LCR-2000 model switches in short-term capital project

- Replace the existing LCR-5000 and 5600 model switches in a long-term service contract
- Monitor the system with AMI and potentially add staff in future to optimize, manage, and maintain the system. This will help ensure the system does not fall into the level of disrepair it has currently going forward.

## Initial Costs

The Town's power manager ElectriCities will need to update its control platform (Yukon) to work with the cell based switches, which will have a initial cost to the Town is between $35,000 and $45,000.

## Recurring Costs

The new load management system will have the following annual expenses

- Annual Cost - $25,000 [Hosting] – escalates 4% per year
- Data charges with a cell carrier – estimated $1 per device per year- escalates 4% per year
- New device cost - $175 per device

## Proposed Program Administration Changes

While it is imperative to the success the of the program for the ordinance requiring the load management switches on new construction to remain, the following changes to the ordinance and the administration of the project are recommended.

- Revision to the ordinance that allows Residents/Owners to remove the load management device from their home. The Resident/Owner will be able to opt out of the program but the device will remain installed unless special permission is granted.
- Revision to the Ordinance to clarify that the Town's responsibility ends at the switch, the building wiring is the Owner/Customers responsibility.
- Revision to the Ordinance that the Owner must request a new switch when replacing the main HVAC unit in the home. This will help ensure that load management switches are replaced prior to their end of life, increasing the efficacy of the program. These switches will also be provided by the town.
- Removal of the 50% and 100% control options. There are very few customers that use these tiers of the program, and removing it will relive administration burden.
- Removal of the credit incentive for participating in the program. Rather than receiving a credit for participating, Customers will receive a higher rate if they choose not to participate. This will reduce complexity to the billing system.

## Program Payout

Each new switch has an estimated yearly savings of $114 and with the estimated installation costs will pay itself off in 4 to 6 years. The total return on investment for the 15 year life of the system is estimated to be between $12M & $20M.

## Additional Benefits

In addition to the cost savings the program also benefits the Town with the ability to reduce the load on the system, this reduces the amount of reserve capacity required in the system and provides flexibility in emergency situations.