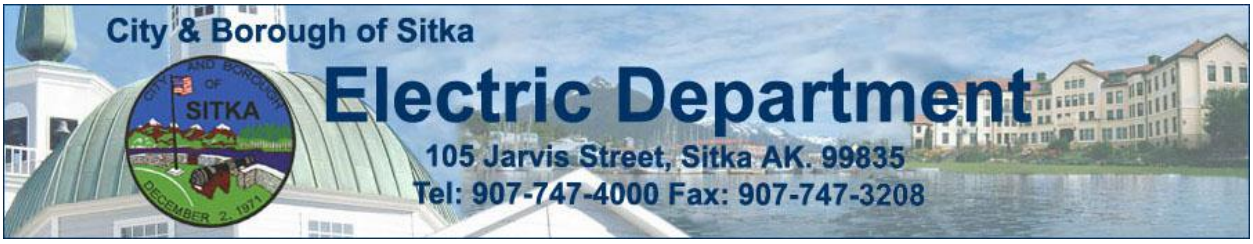

Energy Star Rebate Program

Final Report

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BACKGROUND

Sitka residents are fortunate to be supplied with hydropower to meet the town's electrical load with sustainable, renewable, and affordable electricity. However, with the increase of fuel costs impacting our small community, many residents have switched from oil heating to electric heating for their homes. This was a wise move for the consumer because at current fuel oil prices, heating with electricity is cheaper than fuel oil. For the producer and distributor of Sitka's electricity, this became an issue that needed to be addressed quickly. With the electrical demand reaching maximum generation capacity, Electric Department officials needed to act fast to ensure there is enough power available to supply the community.

How does a utility address a rapidly increasing electric demand that is close to generation capacity? By encouraging the public to conserve power to lessen the load on the hydroelectric generators and to expand available hydro resources to produce more power to sustain the community. This, in turn, decreases the need to produce electricity with the diesel generators, which is not sustainable or cost effective. The Electric Department has developed multiple projects to encourage electrical conservation, including the Energy Stoplight and the Energy Star Rebate Program, and is engaged in one of the biggest projects in Sitka's history with the Blue Lake Hydroelectric Expansion Project.

The Energy Star Rebate Program was a collaborative effort developed by Bitty Balducci, Electric Department intern shared with the Sitka Conservation Society, City Electric Department staff, City Finance staff, and City Public Works Department staff. The purpose of the program is to help electric consumers become energy efficient and act as a catalyst for future energy efficiency upgrades in Sitka. By choosing more energy efficient appliances, electric consumption in the community is decreased and the demand on electric generation is reduced, thus reducing the need to run the diesel generators for supplemental generation.

Why does this matter? When the cost of fuel reached about $3.00 per gallon, many Sitka residents and some government owned buildings, switched to electric heating to heat their buildings. As a consumer, switching to electric heating was more economically feasible because the cost of electricity is cheap relative to the cost of fuel oil. However, with this trend

to convert to electric heating, the demand side of electricity is starting to reach our hydroelectric generation capacity.

In general, the City has a particular generation capacity on the hydroelectric generators. As the maximum capacity is approached, the need for supplemental electrcity is needed from our diesel generators. It costs the City more money to run the diesel generators, outside of general maintenance purposes, than it is for consumers to produce heat using their own heating system (fuel oil, wood, general electric heating). The more it costs the City to produce electricity, the more it will cost the consumer. Whenever the City utilizes the diesel generators to produce supplemental electricity in order for the system to operate normally, a fuel surcharge must be added to residents' utility bills to cover fuel costs for the generators. In the long run, the surcharge will cost more to the consumer than producing heat for their homes on their own because the diesel generator is not as efficient. For example, one gallon of oil burned in an oil furnace is about 90% efficient, while one gallon of oil burned in the diesel generator is about 35% efficient. Until Blue Lake Expansion Project is completed, other programs are needed to assist the community with energy efficiency.

DATA COLLECTION

Bitty Balducci, Electric Department/Sitka Conservation Society Intern, did extensive research to explore various rebate programs around the state and nation in order to get a baseline of standards for our program. She also researched various appliances to gain a better understanding as to which appliances to choose. The vision for the program was to take the most inefficient energy consuming appliances and replace them with more efficient ones in order to lessen the electrical demand on the grid. So qualified participants will receive rebates for purchasing an Energy Star appliance to replace their older, more inefficient appliance.

A public, online opinion survey was also conducted in order to get an idea whether or not the community would participate in this type of rebate program. This is the first appliance rebate program in Sitka and it was not clear whether or not the community would respond positively or negatively. The survey was designed to be super simple and not very time consuming. It was advertised for two weeks for public input.

Out of the 50 participants who responded to the online survey, 96% said they would be interested in participating in the Energy Star Rebate Program if it became available. Survey participants were also asked to rank appliances the Electric Department should consider for the program. Table 1 shows the results from the survey.

Table 1.

Appliance Rank	
1.	Refrigerators/Hot Water Heaters
2.	Dryers
3.	Freezers/Heat Pumps
4.	Washers
5.	Dishwashers
6.	Other

Refrigerators and hot water heaters both tied for the most highly ranked appliance, followed by dryers, freezers and heat pumps, washers, dishwashers, and other appliances. Other suggestions include light bulbs, boilers, insulation, and windows. Out of the appliances on the survey, refrigerators, freezers, washing machines, heat pumps, and heat pump hot water heaters were chosen for the program. These appliances have models that are Energy Star Rated and are easily accessible for purchase.

Once appliances were chosen for the program, rules, funding, and program outlines were then drafted. Permission was also sought from Energy Star in order for us the use their logo and promote their products. Currently, the City of Sitka is a certified Energy Star Partner. Permission was also needed from the City Assembly since a generous amount of funding needed to be moved into a special account for this program. The City Assembly fully supported the Energy Star Rebate Program and saw it as a benefit to the community.

RESULTS

The Energy Star Rebate Program was very successful. The program was scheduled to run from February 24, 2012 to June 30, 2013, or until funds run out. The funds ran out on January

15, 2013. Last checks for the program were issued on February 1, 2013. Table 2 shows the total number of rebates issued for the various appliances.

Table 2.

Appliance	Total $ Dispensed	Total # of Items
Total Freezers	$2,970	18
Total HPHWH	$1,800	3
Total Refrigerator	$18,750	75
Total Washing Machine	$15,950	58
Total Heat Pumps	$60,000	40
Total	$99,470	194

At the time, when the last thousand dollars were available in the fund, a flood of applications came in. However, the last few applications reviewed did not qualify for rebates and funding was still available in the account. Instead of playing the waiting game for one or two more applicants and deciding who is granted the last few rebates, it was decided to keep the program closed and use the remaining funds to cover costs incurred by the program (i.e. advertising).

PROGRAM BENEFITS

So what is the community and the City and Borough of Sitka gaining from this program? The local consumers benefit from the Energy Star Rebate Program by reducing their overall electrical demand on the system and lowering their energy costs, and lessening the potential of utilizing the diesel generators for supplemental power. Local businesses who sold Energy Star rated appliances benefitted from this program and helped keep funds in the local economy. Even when appliances were ordered from out-of-town businesses, in some cases, additional items needed to be purchased in order to make the appliance operate (power cord, duct, or local labor). The City benefits from not having to run diesel generators for electrical generation (only for maintenance work), which in turn, saves money for the consumer. Another benefit from this program is that by properly disposing of one's freezer or refrigerator at the Sawmill

Cove Recycle Center, chloroflurocarbons (CFCs) in the appliance are not released into the environment.

SAVINGS

Believe it or not, through this program, we, as a community, are saving 29,632 kWh per year with the appliances purchased, excluding heat pumps. That is a total savings of $3298.08 in energy costs. An average household uses approximately 1500 kWh per month. This savings is equivalent to 1.6 households using 1500 kWh per month each year. So we just took a whole house and a half off the grid.

Appliances

The following table, Table 3, is a breakdown of total kWh saved per year from each appliance (minus heat pumps). The calculations used to obtain the following numbers were applied using Energy Star Ratings for that particular appliance.

For example, an Energy Star Rated refrigerator is rated to use 577 kWh per year, which is 20% less than a non rated refrigerator of similar characteristics. Assume these values apply when the refrigerator is under normal operating conditions, a non rated refrigerator would be using 721.25 kWh per year. The Energy Star Rated refrigerator is using 144.25 kWh less energy per year and, therefore, is a savings of 144.25 kWh. This value was multiplied by the number of that model purchased for the program and then added together to the other savings from other models to come up with the total savings.

Table 3.

Appliance	Number	Total KWh Saved Per Year
Freezers	18	8602
Heat Pump Hot Water Heaters	3	8674.5
Heat Pumps	40	
Refrigerators	75	10150.12
Washing Machines	58	2205.75

Total Energy Saved (KWh) = 29632.37

Total Saved ($) = 3298.08

Heat Pump Hot Water Heaters

Calculating the savings for heat pump hot water heaters and heat pumps was the most difficult to calculate because of multiple uncontrollable variables. For heat pump hot water heaters, savings depend on the main source for hot water heaters. It was unclear what power source was used for the hot water heater in the applications submitted. Therefore, various scenarios were calculated and averaged in order to make a reasonable guess on savings. Table 4 illustrates the various savings from the different sources comparable to an Energy Star Rated Heat Pump Hot Water Heater.

Table 4.

Water Heater Type	Consumption		Yearly Energy Cost	Savings (KWH)	Savings ($)
Conventional Oil-Fired Storage	273	gallons	$1,127.49	N/A	$969.73
Minimum Efficiency Electric Storage	4874	kWh	$542.48	3018	$256.53
High Efficiency Electric Storage	4621	kWh	$514.32	2765	$235.03
Electric Heat Pump Hot Water Heater	1856	kWh	$206.57	-	-

In order to get the total savings per year value found in Table 4 for heat pump hot water heaters, the savings was averaged between the minimum and high efficiency water heater types, and then multiplied by the number of heat pump water heaters qualified for rebates.

Heat Pumps

Saving calculations from heat pumps were difficult to calculate because there was no definitive baseline to compare to any savings. In this case, many assumptions were set before any calculations were done.

All heat pump models have three ratings that rate their efficiency levels. They are the Seasonal Energy Efficiency Ratio (SEER), Energy Efficiency Ratio (EER), and the Heating Seasonal Performance Factor (HSPF). The higher the number, the more efficient the heat pump. All three ratings are measured by British Thermal Units per Watt Hour (BTU/Wh). To calculate an average usage per year to get cost and usage values, the following assumptions were made using the HSPF value as the main multiplier.

Assumptions:

- Hours of operation for one heat pump was assumed to be 12 hours per day.
- A heating season was estimated to be 125 days. This means that a heat pump will be used to heat one's house for 125 days out of the year under average operating conditions.
- Price per kWh is the average residential rate: $.1113/kWh.
- For the baseline numbers, an average household uses 1500 kWh per month under normal operation. On average, 35% of the monthly kWh usage is assumed to be electric heating. Therefore, the baseline usage for electric heating is 525 kWh per month.

There were 40 heat pump rebates issued as part of this program, however, 48 total heat pumps were installed from the 40 applicants. This is because some applicants installed more than one heat pump or multiple models of heat pumps recorded on their one application. In order to figure the total savings from all of the installed heat pumps, all models in each application were documented and thoroughly researched for Energy Star Ratings and for their SEER, EER, and HSPF numbers. Applicants were also able to mix and match heat pump units with an indoor and outdoor model. These were accurately recorded and utilized properly in the calculations.

The following table, Table 5, indicates the various brands, model names, ratings, and capacity of heat pumps. The heat pump models are not sorted by indoor/outdoor models.

Table 5.

Brand	Model Name	SEER (Btu/Wh)	EER (Btu/Wh)	HSPF (Btu/Wh)	Capacity (Btu/h)	Total Purchased Heat Pumps
Fujitsu	ASU15RLS2 AOU15RLS2	25.43	12.2	14.01	14500	26
Fujitsu	ASU9RLS2 AOU9RLS2	30.36	16.83	13.98	9000	3
Fujitsu	AOU18RLXFW ASU18RLF	19.2		10	18000	1
Fujitsu	AOU24RLXFW ASU24RLF	18		10	22000	3
LG	LMCN185HV	17	9.6	9.1	18000	1
LG	LMU369HV	17	12	10.5	34000	1
LG	LMCN125HV	16		10	12000	1
LG	LMN096HVT	17.5		10	9000	1
Mitsubishi	MSZGE18NA	19.20		10.00	17200	4
Mitsubishi	MUZGE18NA	19.20		10.00	17200	2
Mitsubishi	MUZFE12NA1 MSZFE12NA	23		10.6	12000	1
Mitsubishi	MSZGE06NA	18		10	6000	1
Mitsubishi	MSZGE09NA	21		10	10900	1
Mitsubishi	MSZGE15NA	21		10	18000	1
Mitsubishi	MXZ4B36NA	18		9	35400	1

Note: In the above table, not all cells are filled. Not all heat pump models had complete information that were available at the time of calculations.

In many calculations, the SEER number was utilized. For the purposes of this program, the HSPF value was used as the main multiplier. The SEER number measures the cooling capacity of an appliance during the hot season. This number is not an accurate number to use for Sitka's cooler climate since it is probably safe to assume many residents do not typically use

their heat pump to cool their house. However, the HSPF number makes more sense for our area because it measures the heating performance of a heat pump. Looking at the numbers, using the HSPF would make more sense for Sitka. In general, it takes less energy for a heat pump to produce heat than it does to produce cool air. The following table shows the amount of savings for each heat pump compared to the estimated baseline value of 525 kWh.

Table 6.

Brand	Model Name	HSPF (Btu/Wh)	Capacity (Btu/h)	Total Purchased Heat Pumps	Annual kWh value calculated with HSPF	Monthly Usage in kWh	Price per monthly usage	Total Cost per year with total number of pumps	Difference in Monthly Usage In kWh	Savings per month	Total Savings per year with total number of pumps
Fujitsu	ASU15RLS2 AOU15RLS2	14.01	14500	26	1.03	129.37	$14.40	$4,492.52	395.63	$44.03	$1,144.87
Fujitsu	ASU9RLS2 AOU9RLS2	13.98	9000	3	0.64	80.47	$8.96	$322.44	444.53	$49.48	$148.43
Fujitsu	AOU18RLXFW ASU18RLF	10	18000	1	1.80	225.00	$25.04	$300.51	300.00	$33.39	$33.39
Fujitsu	AOU24RLXFW ASU24RLF	10	22000	3	2.20	275.00	$30.61	$1,101.87	250.00	$27.83	$83.48
LG	LMCN185HV	9.1	18000	1	1.98	247.25	$27.52	$330.23	277.75	$30.91	$30.91
LG	LMU369HV	10.5	34000	1	3.24	404.76	$45.05	$540.60	120.24	$13.38	$13.38
LG	LMCN125HV	10	12000	1	1.20	150.00	$16.70	$200.34	375.00	$41.74	$41.74
LG	LMN096HVT	10	9000	1	0.90	112.50	$12.52	$150.26	412.50	$45.91	$45.91
Mitsubishi	MSZGE18NA	10.00	17200	4	1.72	215.00	$23.93	$1,148.62	310.00	$34.50	$138.01
Mitsubishi	MUZGE18NA	10.00	17200	2	1.72	215.00	$23.93	$574.31	310.00	$34.50	$69.01
Mitsubishi	MUZFE12NA1 MSZFE12NA	10.6	12000	1	1.13	141.51	$15.75	$189.00	383.49	$42.68	$42.68
Mitsubishi	MSZGE06NA	10	6000	1	0.60	75.00	$8.35	$100.17	450.00	$50.09	$50.09
Mitsubishi	MSZGE09NA	10	10900	1	1.09	136.25	$15.16	$181.98	388.75	$43.27	$43.27
Mitsubishi	MSZGE15NA	10	18000	1	1.80	225.00	$25.04	$300.51	300.00	$33.39	$33.39

Total Savings per year = $1922.26

Total Savings per year = 4751.22 kWh

In summary, all the calculated savings are mere estimated calculations from this program. In total, Sitka is saving approximately 34,383.59 kWh of electricity and saving $3,826.89. Naturally, individual results will vary from this program, but participants should see a slight difference in their utility bills each month.

PROGRAM FEEDBACK

The feedback for the program has been extremely positive. Some participants suggested that more appliances should be added or allow newly built homes to be part of the program, but that is not the intention of this program. The intent is for homeowners of already existing homes who may need some assistance to become more energy efficient. The purpose of limiting the amount of appliances available is to reduce the chance of liability within the program.

Some folks were also disappointed to get rid of a perfectly good appliance since one of the rules for the Energy Star Rebate program is to take the old appliance to the Sawmill Cove Recycling Center/Scrap Yard and produce a receipt. However, some folks were still able to follow this rule, but did so in a way where a more inefficient appliance was taken off the grid. For example, some applicants gave their older appliance to somebody who is in need of a better appliance and took their older appliance out to the scrapyard. Another way to get rid of a decent appliance is to ship it to another community for someone else to use. Many folks checked in with Electric Department staff before going ahead with a different disposal method other than what was stated in the rules. That way, their application was not rejected if the form of disposal was not appropriate with the goals of the program. The end goal was to dispose of a less energy efficient appliance with a more efficent one.

Overall, participants and the community appeared to be satisfied and supportive of this program.

CONCLUSION

In conclusion, not only was this program successful for the community, but it was also successful for the utility in order to reduce overall demand on electrical generators. Many

applicants made their purchases from local vendors or utilized local laborers to install various appliances, so this program helped to keep funds within the community.

The main advantage to this program is how much the community is saving in electricity and money. With a savings of 34,383.59 kWh, a savings of approximately 23 households, the community can rest assured this program made an impact on the demand side of operations. However, this does not mean a person should turn on every light in their house or stop conserving electricity, it just means the chances of paying higher costs in electricity because of diesel generation is decreased. The Electric Department would like to keep the margin between supply and demand high just in case something were to happen within the system. We will still have some wiggle room to work. It is probably safe to say nobody wants a repeat of October 2010 when the City lost the power line to the hydro plants and rolling blackouts were the only resort to provide electricity to the community.

ACKNOWLEDGEMENTS

Many notes of appreciation are in order for the success of this program. The community should thank the City Assembly for approving this program. Without their approval, nobody would be getting any rebates for being more energy conscious and lessening the generation load on the system. The collaborative efforts of Bitty Balducci and Chris Brewton need to be applauded because without their eyes on the prize, this program would never have been developed. A special thanks needs to go to other City Departments, Finance and Public Works, for working with the Electric Department in order to answer questions from the community, get the rebate checks out to the customer in a timely matter, and to properly dispose of their inefficient appliance. Thank you to Juliet Agne in the Electric Department, for tracking all applications and funds, as well as compiling data to observe the success of the program. And last, but not least, thank you to the community of Sitka for utilizing this program and providing feedback to help improve the program for other utilities or to use in the future. Without the collaborative efforts of everyone mentioned, this program would not be possible or as successful.