Binghamton Green Revolving Fund Program

- Started in 2006 with $250K seed funding.
- Initial ROI threshold was 3 years or less.
- Early projects included VFD, lighting upgrade, occupancy sensors, and converting refrigeration condenser units from water cooled to air cooled units.
- Project savings are documented and presented to senior administration.
- 2008 - VP of Finance committed to making GRF “permanent”.
- Total investment since 2006 ~ $10 million. Total savings (including $2 million NYSERDA rebates) ~ $13 million.

Examples of Project Proposal Sheets

Binghamton University Energy Savings Project

Replace Existing Metal Halide Lights with High-Bay T8s with Occupancy Sensors

Existing	No. of Fixtures	Wattage of Existing Lights	Operating Hours per Day of Existing Lights	Operating Days per Week of Existing Lights	Operating Weeks per Year of Existing Lights	Electric Rate (¢/kWh)	Total Operating Cost Per Year
Garage Area	24	310	20	7	50	0.09	$4,687.20
Warehouse Area	22	310	16	5	50	0.09	$2,455.20

Proposed	No. of Fixtures	Wattage of Proposed Lights	Operating Hours per Day of Proposed Lights	Operating Days per Week of Proposed Lights	Operating Weeks per Year of Proposed Lights	Electric Rate ($/kWh)	Total Operating Cost Per Year	Light Fixture Material Cost Per Unit	Labor Cost Per Unit	NYSERDA Incentive Per Unit	Occ Sensor Per Unit	Total Cost
Garage Area	24	175	4	7	50	0.09	$ 529.20	$ 320.00	$ 240.00	$ 95.00	Included	$ 11,160
Warehouse Area	22	175	2	5	50	0.09	$ 173.25	$ 320.00	$ 240.00	$ 95.00	Included	$ 10,230
	46				Annual Saving ===>		$6,439.95					$ 21,390
					Payback Years ==>		$ 3.65		Plus 10% Adder ===>			$ 23,529

Binghamton University Energy Savings Project

Res Hall Shower Heads

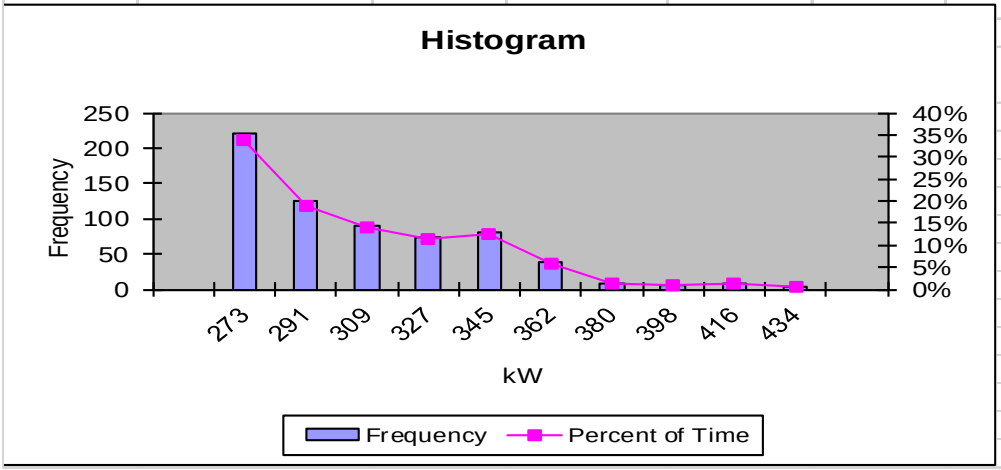
Location			No. of Shower Heads	Existing SH Flow Rate (gpm)	Low Flow SH Flow Rate (gpm)	Portion of Hot Water	Minutes per Shower	Frequency of Usage Per Day	Days per Year	Water Saving (1000 Gal.Per Year)	Fuel Savings (mmBtu)	Material Cost per Shower Head	Labor Cost per Shower Head	Total Cost	Payback (Years)
Mountainview			386	2.25	1.6	50%	10	2	300	1505.4	376.73	$ 12.75	$ 5.00	$ 6,851.50	0.5
Hillside			191	2.25	1.6	50%	10	2	300	744.9	186.41	$ 12.75	$ 5.00	$ 3,390.25	0.5
Dickinson			117	2.25	1.6	50%	10	2	300	456.3	114.19	$ 12.75	$ 5.00	$ 2,076.75	0.5
Hinman			190	2.25	1.6	50%	10	2	300	741	185.44	$ 12.75	$ 5.00	$ 3,372.50	0.5
CIW			200	2.25	1.6	50%	10	2	300	780	195.20	$ 12.75	$ 5.00	$ 3,550.00	0.5
										4227.6	1057.96				

Annual Water Saving @ $2.36/Mgal	$ 9,977.14
Annual Sewer Saving @ $5.11/Mgal	$21,603.04

$31,580.17	$ 8,992.66	$ 13,821.00	$5,420.00	$19,241.00	**0.5**

Binghamton University Energy Savings Project

		Histogram Analysis				Baseline	VFD	Annual Savings
	Chiller Capacity (Tons)	*Demand (kW)*	*Occurrence Frequency*	*% of Time*	Hours	kW/ton	kW/ton	kW
10%	45	273	221	33.69%	1399	0.96	0.65	19,025
20%	90	291	125	19.05%	791	0.68	0.49	13,587
30%	135	309	91	13.87%	576	0.60	0.40	15,396
40%	180	327	74	11.28%	468	0.55	0.35	16,491
50%	225	345	81	12.35%	513	0.50	0.35	17,675
60%	270	362	39	5.95%	247	0.54	0.42	7,999
70%	315	380	8	1.22%	51	0.51	0.44	1,116
80%	360	398	5	0.76%	32	0.52	0.48	524
90%	405	416	8	1.22%	51	0.58	0.55	805
100%	450	434	4	0.61%	25	0.60	0.60	(23)
								92,595 kW



Annual Savings	Project Cost	Payback (Years)
$ 10,710	$54,000	5.0

Binghamton University Energy Savings Project

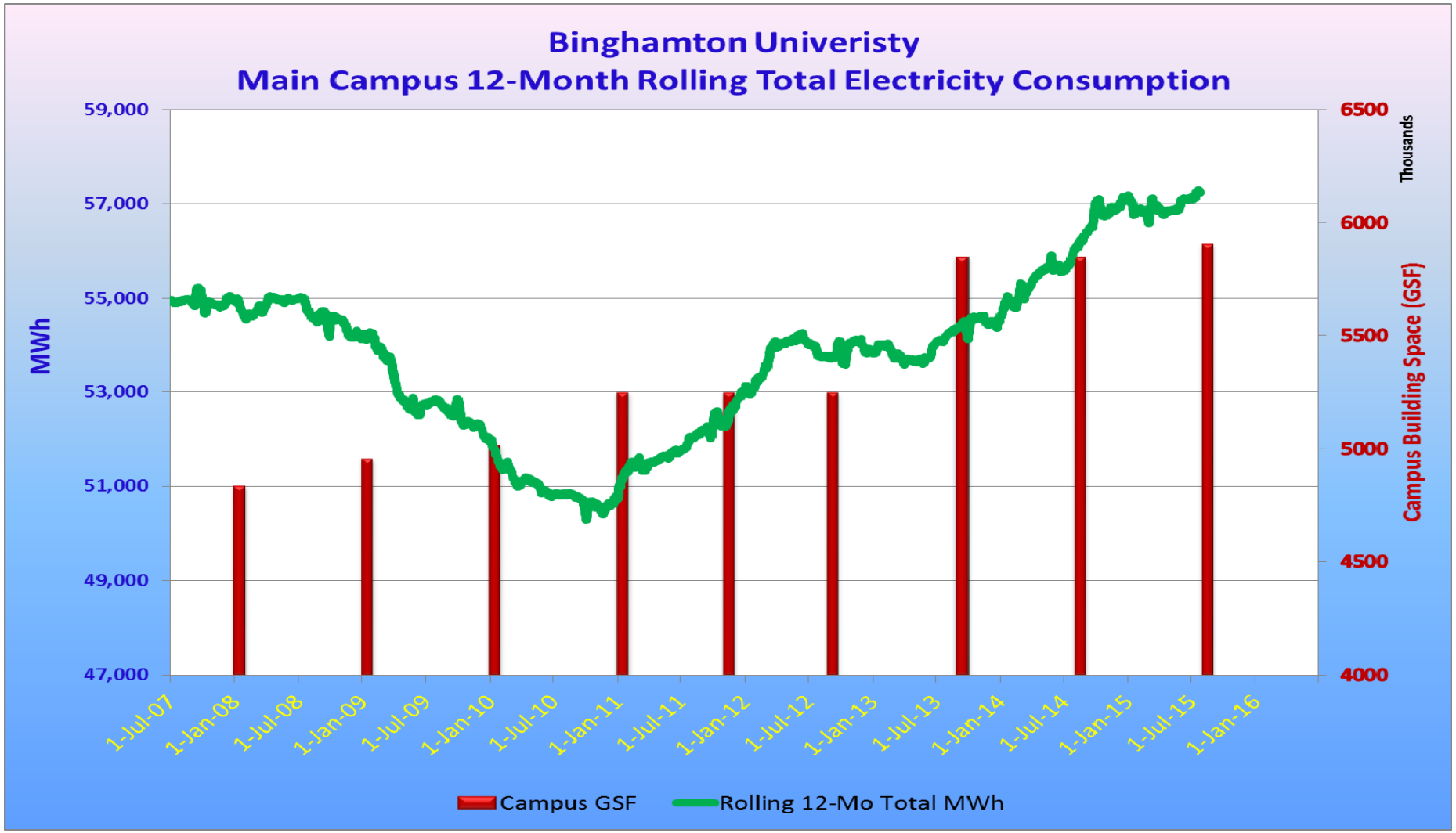
Project Description

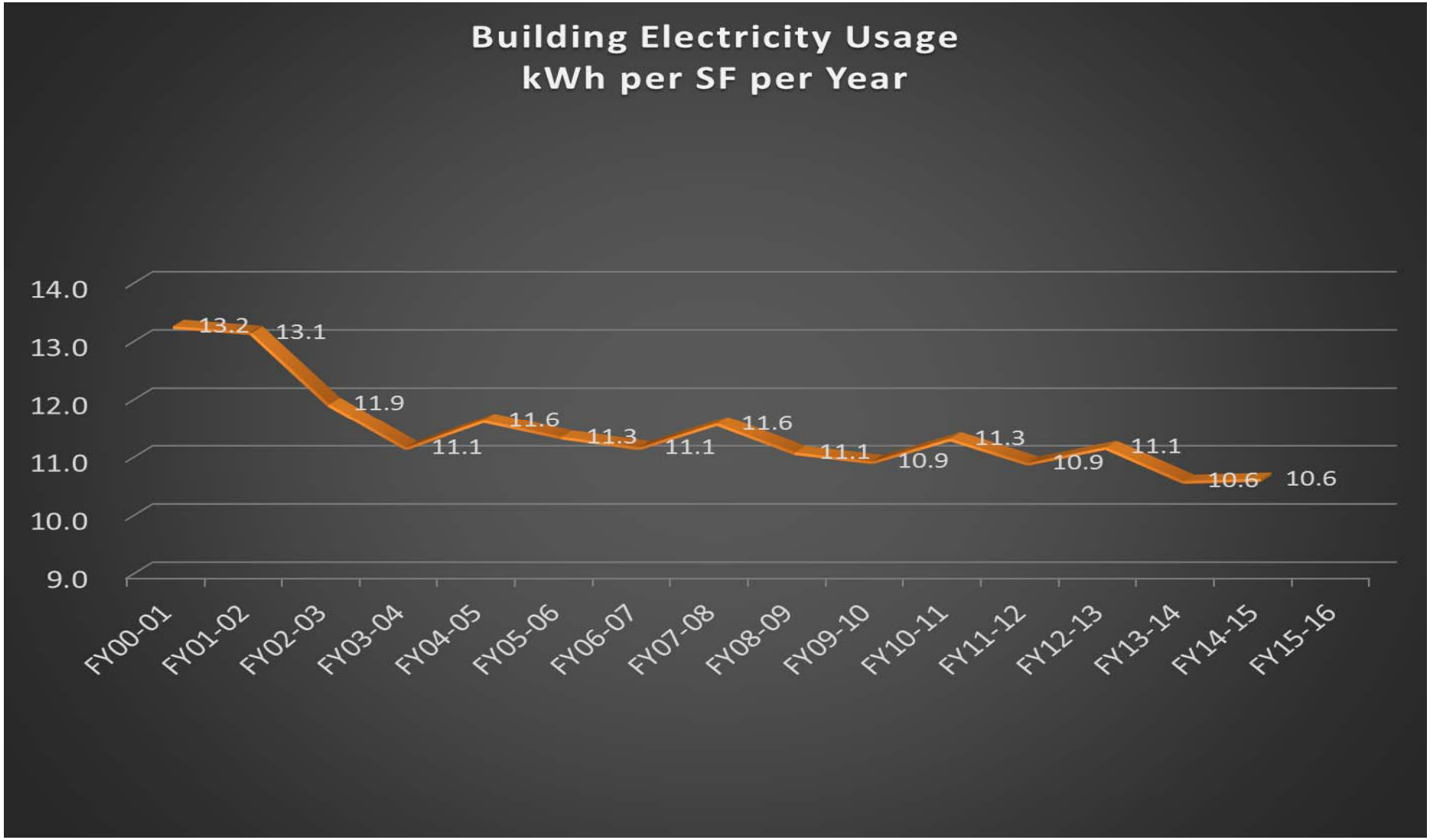
Install smart controls on walking freezers / coolers to reduce compressor starts / stops and defrost cycles

	No. of Coolers	Daily Energy Usage (kWh)	No. of Freezers	Daily Energy Usage (kWh)	Operating Days per year	Total Annual Energy Usage (kWh)	Install Cost Per Unit	Electric Rate ($/kWh)	Annual Operating Cost	Total Project Cost	Payback (years)
Existing Operation	20	25	11	115	365	644225	NA	$ 0.085	$54,759.13	NA	NA
w/ KE2 Control	20	20	11	100	365	547500	$ 750.00	$ 0.085	$46,537.50	23,250.00	2.83

Equipment List

Building	***Coolers***	***Freezers***
CIW Dining	4	2
Appalachian Dining	5	4
Old UU Kitchen	3	1
UU Outdoor Units	1	1
Hinman Dining	5	1
C4	2	1
Commisary		1
Total	20	11


Binghamton Univeristy
Main Campus 12-Month Rolling Total Electricity Consumption
MWh
59,000
57,000
55,000
53,000
51,000
49,000
47,000
Campus Building Space (GSF)
Thousands
6500
6000
5500
5000
4500
4000
1-Jul-07
1-Jan-08
1-Jul-08
1-Jan-09
1-Jul-09
1-Jan-10
1-Jul-10
1-Jan-11
1-Jul-11
1-Jan-12
1-Jul-12
1-Jan-13
1-Jul-13
1-Jan-14
1-Jul-14
1-Jan-15
1-Jul-15
1-Jan-16
Campus GSF
Rolling 12-Mo Total MWh


Building Electricity Usage
kWh per SF per Year
14.0
13.0
12.0
11.0
10.0
9.0
13.2
13.1
11.9
11.1
11.6
11.3
11.1
11.6
11.1
10.9
11.3
10.9
11.1
10.6
10.6
FY00-01
FY01-02
FY02-03
FY03-04
FY04-05
FY05-06
FY06-07
FY07-08
FY08-09
FY09-10
FY10-11
FY11-12
FY12-13
FY13-14
FY14-15
FY15-16

Keys to Success

- Communication, communication, communication
  - ✓Present sound proposals for project funding
  - ✓Circle back to program sponsor with project results
  - ✓Share project performance with all stakeholders
- Take full advantage of NYSERDA / Utility incentive programs
  - ✓Energy efficiency programs
  - ✓Economic development programs
  - ✓Technical support from these funding programs can result in improved efficiency in each project.