ACTON PUBLIC and ACTON-BOXBOROUGH REGIONAL SCHOOL COMMITTEES
APS and ABRSD FY'14 Budget Presentations

Library
R.J. Grey Junior High School

Saturday, January 26, 2013
8:30 a.m. Joint SC Executive Session*
9:00 a.m. – 1:50 p.m. Joint and ABR SC Budget Presentations
2:00 Acton Public SC Budget Presentations

Additional Information

1. APS Enrollment and Class Size
   History and Projections FY '09 – FY '20, *Marie Altieri*

2. Supporting Documents for the Professional Learning Presentation, *Deborah Bookis*

3. Facilities Summaries – *JD Head*

4. Energy Efficiency Opportunity Benchmarking Report – ABRHS September 2012, *JD Head*

***ABRSD FY14 Budget Hearing** is Thursday, 2/7/13 at 7:30 pm in R.J. Grey Junior High Library*

***APS FY14 Budget Hearing** is Thursday, 2/14/13 at 7:00 pm in R.J. Grey Junior High Library*

APS Enrollment and Class Size
History and Projections FY '09 - FY '20

2008-2009						2009-2010							2010-2011						
Grade	Oct 1	Staff	Total Oct 1	Sections	Class Sizes		Oct 1	Staff	Total Enrolled Oct 1	Sections	Class Size	Year to Year Chnge		Oct 1	Staff	Total Enrolled Oct 1	Sections	Class Size	Year to Year Chnge
K	301	3	304	15	20.3	K	334	6	340	16	21.3	36	K	320	8	328	16	20.5	-12
1	326	2	328	15	21.9	1	333	3	336	15	22.4	8	1	347	6	353	16	22.1	17
2	336	5	341	15	22.7	2	349	2	351	15	23.4	10	2	342	2	344	15	22.9	-7
3	349	2	351	15	23.4	3	358	5	363	15	24.2	12	3	344	2	346	15	23.1	-17
4	381	1	382	16	23.9	4	359	2	361	15	24.1	-21	4	369	5	374	15	24.9	13
5	404	0	404	16	25.3	5	391	1	392	16	24.5	-12	5	360	4	364	15	24.3	-28
6	384	2	386	16	24.1	6	407	1	408	16	25.5	22	6	394	1	395	16	24.7	-13
Totals	2481	15	2496	108	23.1		2531	20	2551	108	23.6	70		2476	28	2504	108	23.2	-47

APS Enrollment and Class Size
History and Projections FY '09 - FY '20

2011-2012							2012-2013							2013-2014						
	Oct 1	Staff	Total Enrolled Oct 1	Sections	Class Size	Year to Year Change		Oct 1	Staff	Total Enrolled Oct 1	Sections	Class Size	Year to Year Chnge		Oct 1 Proj	Staff	Total Enrolled Oct 1	Sections	Class Size	Year to Year Chnge
K	294	7	301	15	20.1	-27	K	267	6	273	14	19.5	-28	K	261	7	268	14	19.1	-5
1	333	8	341	16	21.3	-12	1	312	8	320	15	21.3	-21	1	286	6	292	14	20.9	-28
2	353	8	361	16	22.6	17	2	348	8	356	16	22.3	-5	2	325	8	333	15	22.2	-23
3	351	2	353	15	23.5	7	3	382	8	390	16	24.4	37	3	361	8	369	16	23.1	-21
4	351	2	353	15	23.5	-21	4	354	2	356	15	23.7	3	4	387	8	395	16	24.7	39
5	369	5	374	15	24.9	10	5	354	2	356	15	23.7	-18	5	358	2	360	15	24.0	4
6	361	4	365	15	24.3	-30	6	382	5	387	15	25.8	22	6	358	2	360	15	24.0	-27
	2412	36	2448	107	22.9	-56		2399	39	2438	106	23.0	-10		2336	41	2377	105	22.6	-61

APS Enrollment and Class Size
History and Projections FY '09 - FY '20

2014-2015							2015-2016							2016-2017						
	Oct 1 Proj	Staff	Total Enrolled Oct 1	Sections	Class Size	Year to Year Chnge		Oct 1 Proj	Staff	Total Enrolled Oct 1	Sections	Class Size	Year to Year Chnge		Oct 1 Proj	Staff	Total Enrolled Oct 1	Sections	Class Size	Year to Year Chnge
K	261	6	267	14	19.1	-1	K	258	6	264	14	18.9	-3	K	231	6	237	13	18.2	-27
1	280	7	287	14	20.5	-5	1	280	6	286	14	20.4	-1	1	277	6	283	14	20.2	-3
2	299	6	305	14	21.8	-28	2	292	7	299	14	21.4	-6	2	292	6	298	14	21.3	-1
3	337	8	345	15	23.0	-24	3	310	6	316	15	21.1	-29	3	303	7	310	14	22.1	-6
4	366	8	374	16	23.4	-21	4	342	8	350	16	21.9	-24	4	314	6	320	15	21.3	-30
5	392	8	400	16	25.0	40	5	370	8	378	16	23.6	-22	5	346	8	354	16	22.1	-24
6	363	2	365	15	24.3	5	6	397	8	405	15	27.0	40	6	375	8	383	16	23.9	-22
	2298	45	2343	104	22.5	-34		2249	49	2298	104	22.1	-45		2138	47	2185	102	21.4	-113

APS Enrollment and Class Size
History and Projections FY '09 - FY '20

2017-2018							2018-2019							2019-2020						
	Oct 1 Proj	Staff	Total Enrolled Oct 1	Sections	Class Size	Year to Year Chnge		Oct 1 Proj	Staff	Total Enrolled Oct 1	Sections	Class Size	Year to Year Chnge		Oct 1 Proj	Staff	Total Enrolled Oct 1	Sections	Class Size	Year to Year Chnge
K	225	6	231	12	19.3	-6	K	251	6	257	14	18.4	26	K	260	6	266	14	19.0	9
1	248	6	254	13	19.5	-29	1	241	6	247	12	20.6	-7	1	269	6	275	14	19.6	28
2	289	6	295	14	21.1	-3	2	258	6	264	13	20.3	-31	2	252	6	258	12	21.5	-6
3	303	6	309	14	22.1	-1	3	300	6	306	14	21.9	-3	3	268	6	274	13	21.1	-32
4	307	7	314	14	22.4	-6	4	307	6	313	14	22.4	-1	4	304	6	310	14	22.1	-3
5	318	6	324	15	21.6	-30	5	311	7	318	14	22.7	-6	5	311	6	317	14	22.6	-1
6	350	8	358	16	22.4	-25	6	321	6	327	15	21.8	-31	6	315	7	322	14	23.0	-5
	2040	45	2085	98	21.3	-100		1989	43	2032	96	21.2	-53		1979	43	2022	95	21.3	-10

ACTON PUBLIC SCHOOLS
ACTON-BOXBOROUGH REGIONAL SCHOOL DISTRICT

Supporting Documents

for the

Professional Learning Presentation

Budget Saturday
January 26, 2013

Budget Saturday
January 26, 2013

Professional Learning Presentation

Table of Contents

Professional Development Survey APS/AB

This report compiles the responses to the professional development (PD) survey designed to ensure that the Acton, Acton/Boxborough PD program "meets the needs of our diverse faculty and supports our diverse community of learners"[1]. The survey was distributed to educators and administrators during faculty or department meetings during the February/March timeframe. A total of 323 surveys were completed, not all questions were answered. The responses to the 11-questions are organized into demographics (questions 1-3), logistics, feedback on past offerings, and interest in future professional development opportunities (questions 4-11). This document is organized into three sections.

Section	Description
I	Summary of survey results
II	Detailed description of the results for each question
III	Demographic information about the survey participants

Section I

The survey results indicate that Acton and Acton/Boxborough educators and administrators are very interested in keeping up with instructional developments in their respective fields, satisfying the state licensing requirements and improving student performance. Respondents indicated that timing, a direct relationship to content taught and costs were the most important factors influencing participation in PD. Time was cited as an important factor in several questions and respondents indicates a strong preference for professional development during the school day.

The top preferences for PD activities were building or department-based PD, opportunities to take courses/workshops taught by outside experts or additional funding for graduate work. Respondents preferred traditional delivery methods and a majority indicated that they had not tried the on-line options. The data indicated a near perfect relationship between the preference for a delivery method and the respondent's experience with that method (Pearson's r = -0.91). Only one question (8) related to "working towards common goals" did not provide a clear choice for the method to accomplish that objective.

This section summarizes the results of the questions soliciting feedback about the motivation, logistics and preference for future PD choices and delivery methods.

Motivation (Questions 4 & 10) –Questions 4 and 10 solicited feedback on motivation-type factors. In question 4, six of the 14 factors cited for participating in PD received significantly higher ratings than the other responses. Of those six factors, three received significantly higher levels of the "very important" ranking compared with the other three reasons cited (keeping up in my field, maintaining my current license and improving student performance). Table I lists the rankings in descending order by the "very important" rating.

1. Professional Development Survey APS/AB, Introduction, D. Bookis 2/2011, para 1.

Table 1 – Motivation for Participating in PD Offerings Sorted by Very Important Raking

Motivating for Participating in PD	Very Important	Somewhat Important	Rank
Keeping up in my field	81%	18%	1
Maintaining my current license	76%	16%	2
Improving student performance	72%	34%	3
To help students w/diverse learning needs	56%	35%	4
Keeping up with changing content	55%	34%	5
Personal interest	51%	42%	6

Of the seven factors rated as influencing participation in PD as cited in question 10, three areas received significantly higher "very important" rankings. Respondents cited "timing", "direct relationship to the content I teach" and "cost at 84%, 78% and 72% respectively. Timing has consistently been cited as an important factor (questions 5, 6 and 11).

Timing (Questions 5 & 6)

Questions 5 and 6 were related to the timing of professional development. Question 5 asked respondents which timing options "are best for you, personally" and four of the five rating areas related to Question 6 were preceded with text related to the district or school providing "time" or "ample time" for PD activities While the respondents indicated an overwhelming preference for PD offerings *during* the school day ("very convenient"=57%), they indicated that most school/district-provided PD offerings occurred *outside* of the regular work day ("frequently"=54%). A smaller percentage acknowledged that the school/district was willing to provide support for participation in professional conferences that happen during the school day ("frequently"=25%). All other areas citing perceived district support for PD options (time during regular work day and time to examine student work and data for curriculum/instruction revisions) received single-digit ratings ("frequently"=5-7%).

Preferred PD Delivery Method/Satisfaction with Delivery Methods (Questions 7 & 9)

Questions 7 and 9 both asked respondents to rank factors related to the PD delivery method. Question 7 asked about interest levels and Question 9 asked about satisfaction levels with various types of PD methods. Respondents expressed a significantly higher preference for two types of PD time to work with grade level/dept/team colleagues to facilitate collaboration" (85%) and "face-to-face courses/workshops/discussion groups" (73%). There was a near perfect relationship between the preference for a delivery method and the respondent's experience with that method (Pearson's r = -0.91). The majority of staff has not experienced training with the on-line delivery methods cited.

Table 2 – Percentage of staff indicating "Haven't Tried" Specific PD Delivery Method

PD Delivery Method	Percent "Haven't Tried"
Podcasts/vodcasts	78%
Hybrid courses (in-building)	76%
Hybrid courses (outside)	70%
On-line courses/workshops/dis. grps. (in-building)	64%
Hybrid courses (in-district)	63%
On-line courses/workshops/dis. grps. (in-district)	55%
On-line courses/workshops/dis. grps. (outside)	51%

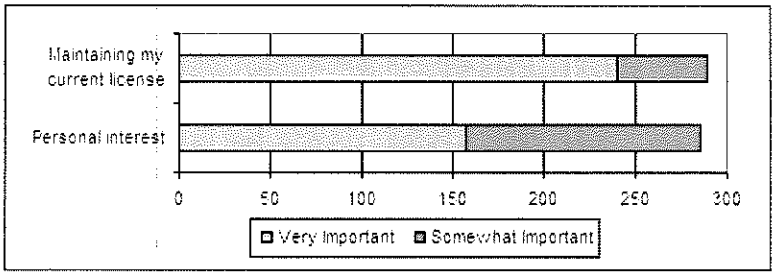
Methods to Work with Peers (Question 8)
This question asked respondents to rate their interest in a variety of methods to work with their peers. Of the five options provided, only one (school-wide teacher meetings to discuss ways to improve teaching and learning) was significantly lower than the other four which received very similar ratings. Respondents clearly preferred addressing common goals in smaller group settings.

Interest in PD Choices (Question 11)
Of the seven options for various PD choices, three received significantly higher "very interested" rankings and one of these options was only ranked by 269 respondents. The tree top ranking questions were "additional time for building or department-based PD" (73%), "opportunities to take courses/workshops taught by outside 'experts'" (71%), and "additional funding for course reimbursement for graduate work" (78%).

Section II

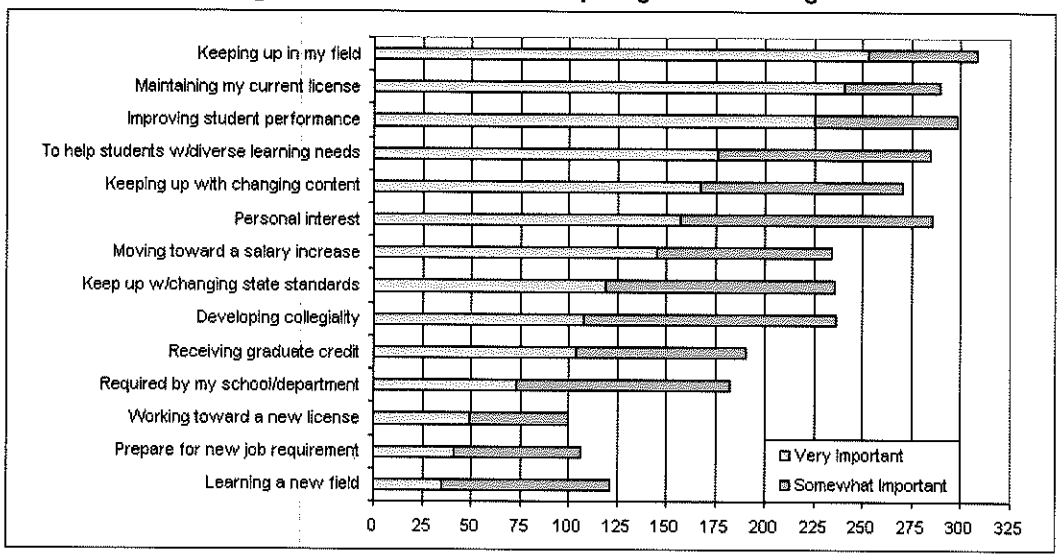
Questions 4-11 requested information on a variety of factors influencing participation in PD and most of these questions contained Likert-type scales. Although there were some exceptions, the rating options usually included four choices—("very", "somewhat", "not very" and "not at all"). Since the purpose of the survey is to collect employee preference to guide the planning of future PD efforts, the positive responses were sorted by order of preference. The stacked bar chart is used to display the strength of the two positive preferences ("very" and "somewhat"). For example, in response to the question seeking "reasons for participation in Professional Development offerings", two reasons ("maintaining my current license" and "personal interest") received similar combined positive ratings; however the mix of those responses was significantly different. Since responses receiving a higher percentage of the most positive rating are presumed to best meet employee needs, most charts are organized in descending order by the "very" rating.

Sample Figure 3: Stacked Bar Chart to Illustrate Significant of Preference



Motivation for Participating in PD Offerings
Question 4 noted that individuals participate in PD for "a variety of reasons, which sometimes shift throughout their career" and asked participants to rank the reasons for participating in professional development. Six of the 14 choices were rated significantly higher than the others (keeping up in my field, maintaining my current license, improving student performance, helping students w/diverse learning needs, keeping up with changing content, and personal interest). Figure 4 charts the response in descending order by the "very important" ranking.

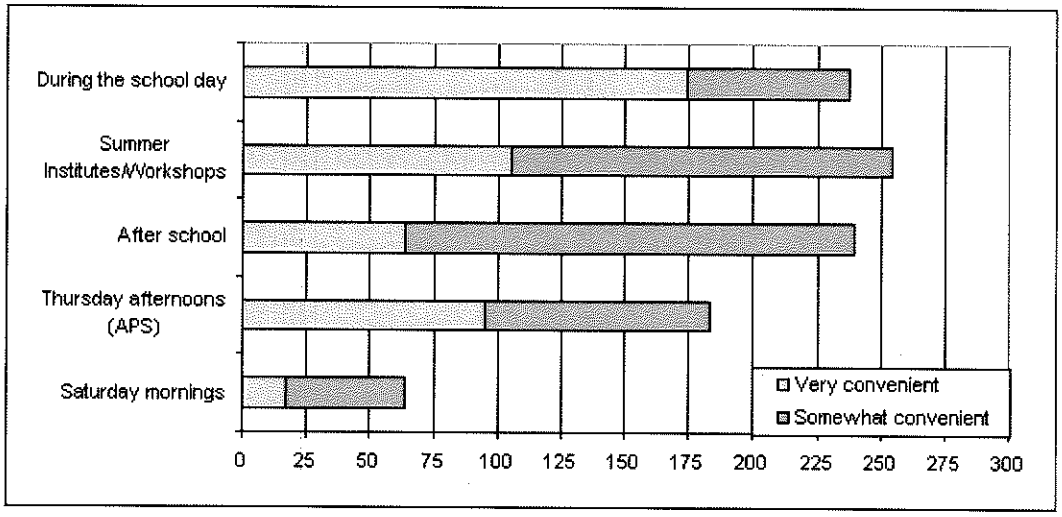
Figure 4: Motivation for Participating in PD Offerings



Timing of Professional Development (Questions 5 and 6)

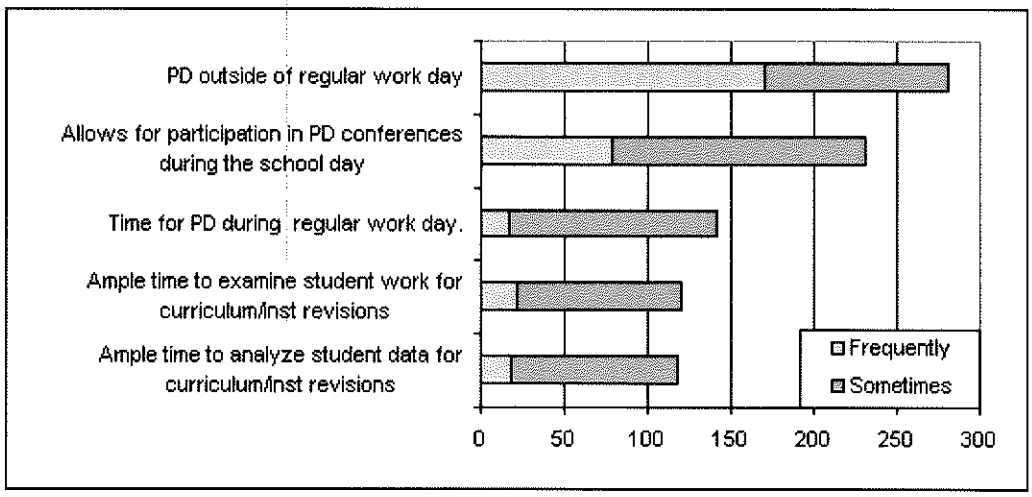
Similar to the previous question, number 5 noted that staff preference for PD may change as educators progress through their careers. Although the combined "very/somewhat convenient" responses to the "summer institutes/workshops" outnumber those for the "during the school day" option, of the 316 participants who responded to this question, 57% cited "During the school day" as "very convenient" compared with 33% for the "summer institutes/workshops". Figure 5 charts the responses.

Figure 5: Timing of Professional Development



Question 6 asked participants to reflect on their experience with district support for various PD options. The response options for these questions were "frequently", "sometimes" and "never". Four of the five questions were preceded with text related to the district or school providing "time" or "ample time" for PD activities. Of the five questions, two were rated significantly higher; participants indicating that there was the most support for PD outside of the regular work day followed by the acknowledgement of support for professional conferences during the regular work day.

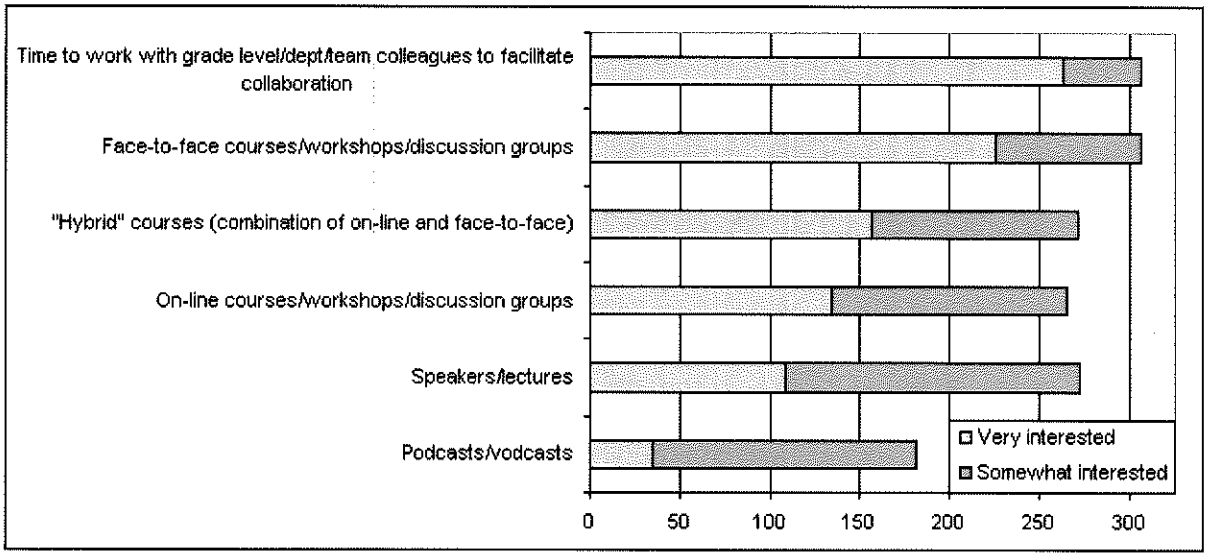
Figure 6: Perceived District Support for PD Options



PD Delivery Method

Question 7 asked respondents to rank their interest in a "the best 'delivery method' for a wide variety of learning goals". Of the survey participants who ranked preferences cited in this question, two delivery methods received the highest ("very interested") ranking; "time to work with grade level/dept/team colleagues to facilitate collaboration" (85%) and "face-to-face courses/workshops/discussion groups" (73%). The next highest "very interested" ranking was hybrid courses which received 58%.

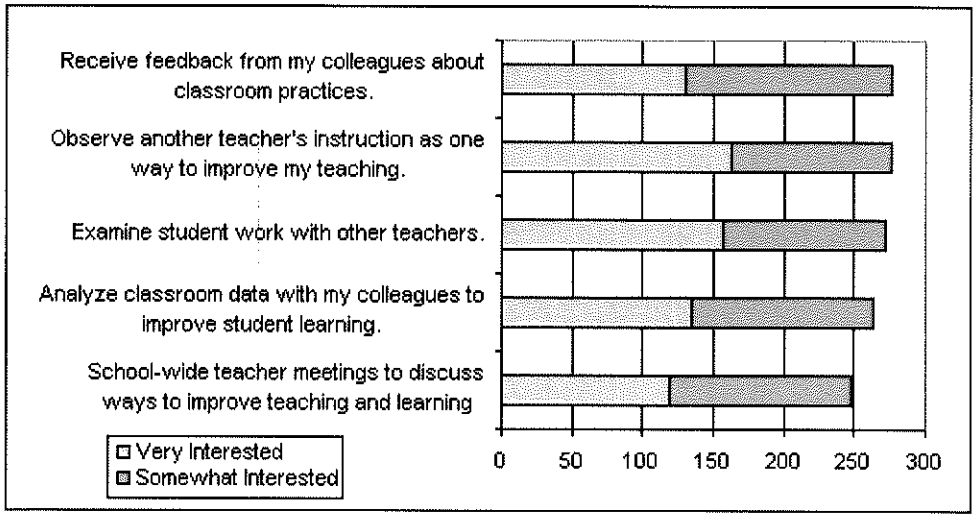
Figure 7: Preference for PD Delivery Method



Options for Teachers to Work Together Toward Common Goals

Question 8 noted that PD "also includes time for teachers to work together toward common goals, learning with and from one another" and cited the 2011/2012 Teacher-to-Teacher initiative as an example. This question asked respondents to rate their interest in a variety of methods to work with their peers. Since there were minor differences between the "very" preferences, the responses are organized by combined frequency.

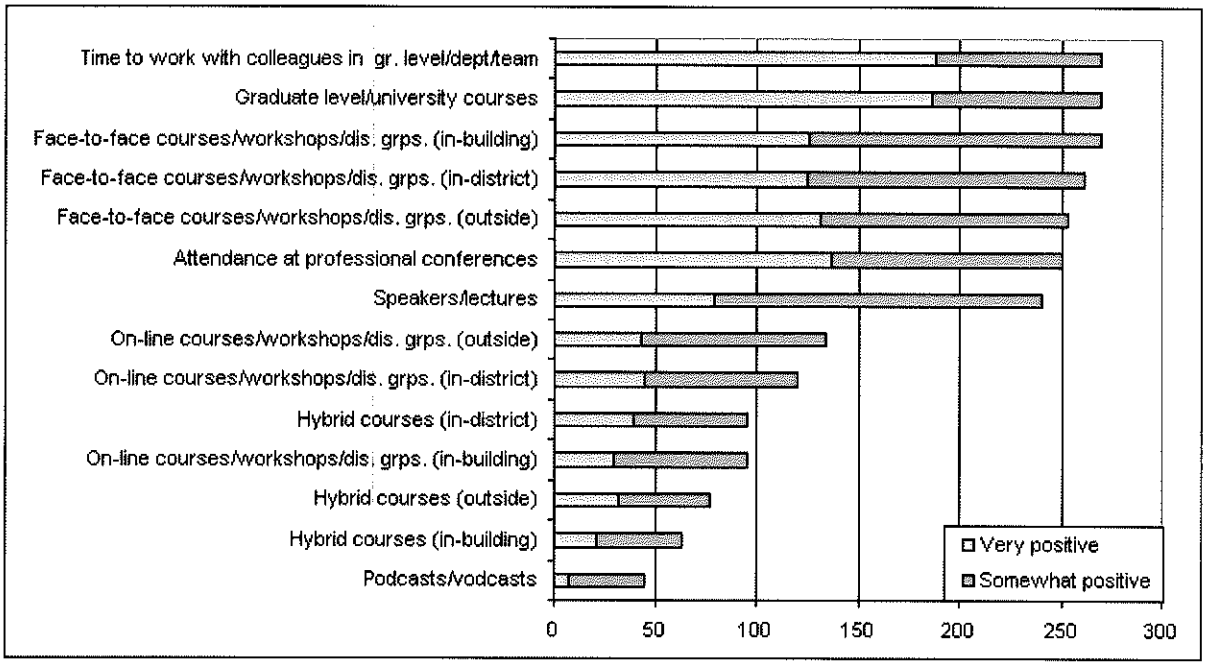
Figure 8: Options for Teachers to Work Together Toward Common Goals



Satisfaction with PD Delivery Methods

Question 9 asked respondents to rate their "level of satisfaction" with various types of PD methods (on-line, face-to-face or hybrid courses/workshops/discussion groups, podcasts/vodcasts, speakers, etc). The rating options included "very", "somewhat" and "not at all" positive as well as a "Haven't tried" option. The two most highly rated experiences were "time to work with colleagues in grade level/dept/team to facilitate collaboration" and "graduate level/university courses" which both received "very positive" rankings of 60%.

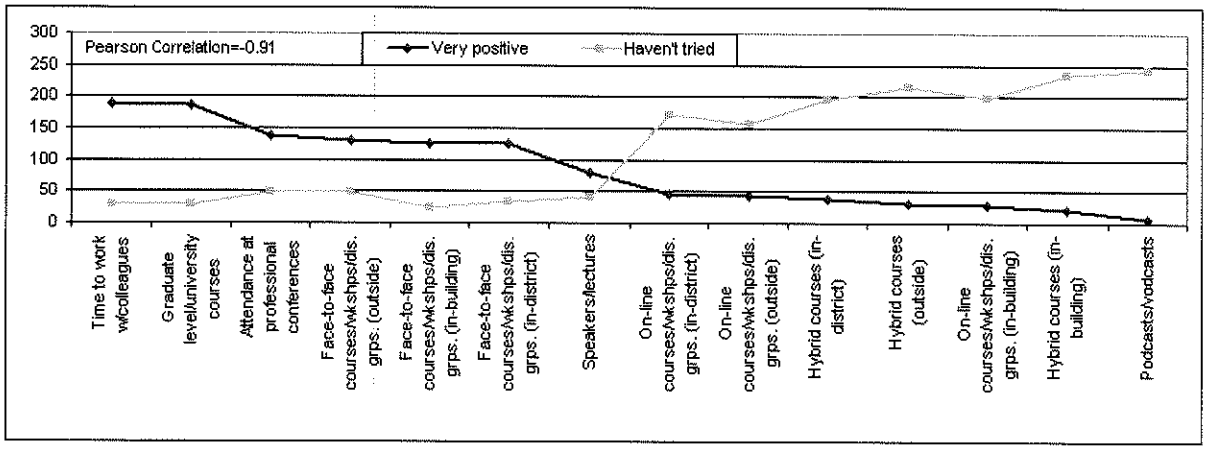
Figure 9: Satisfaction with PD Delivery Methods



Correlation between Positive Ranking and "Haven't Tried"

There was a near perfect negative relationship between the preference for a delivery method and the respondent's experience with that method (Pearson's r = -0.91) as graphed in Figure 9a. There was a similar relationship between the "somewhat positive" responses (r = -0.84).

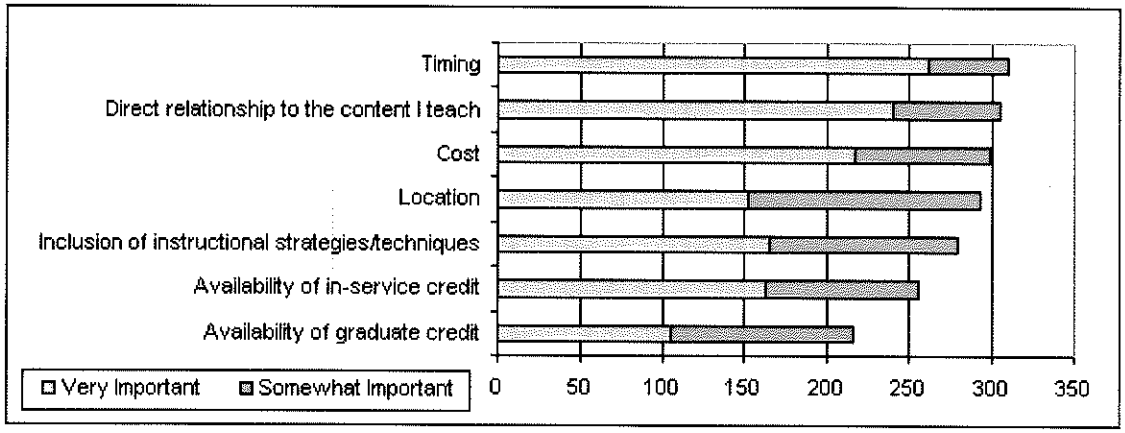
Figure 9a: Relationship between "Very Positive" Ratings and "Haven't Tried"



Factors Influencing Participation in PD

Question 10 asked respondents to rank the importance of various factors in their "decision to participate in Professional Development opportunities". Of the seven options, three ("timing", "direct relationship to the content I teach" and "cost") received significantly higher "very important" rankings (84%, 78% and 72% respectively) compared with the other choices.

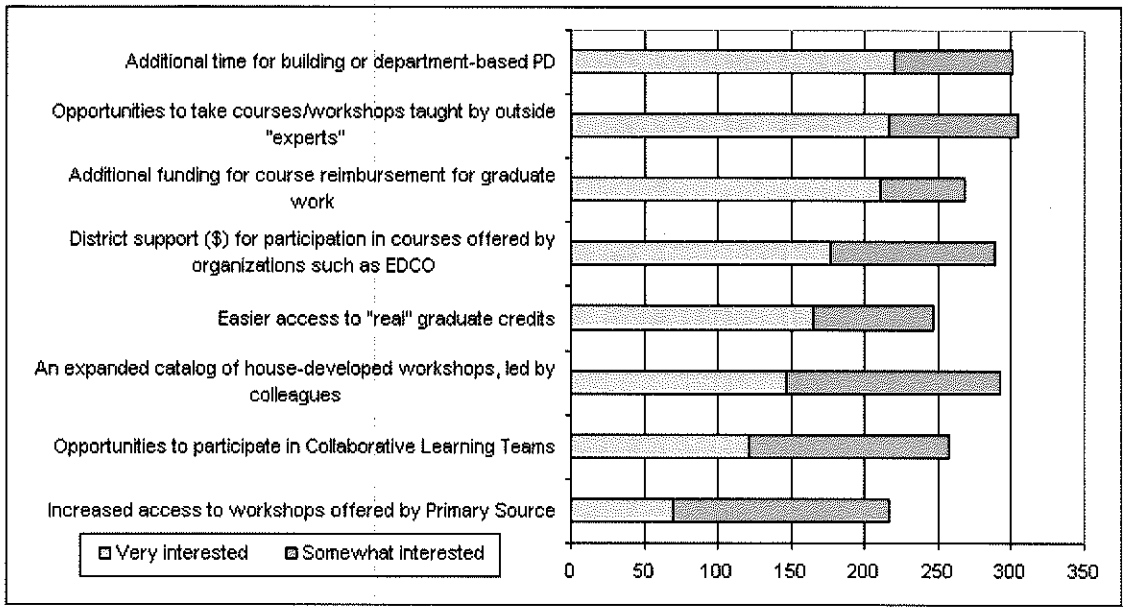
Figure 10: Factors Influencing Participation in PD



Interest

Question 11 asked respondents to indicate interest in the various PD choices. Three choices had somewhat significantly higher "very interested" rankings. However, one question related to graduate courses was only answered by 269 respondents; the top two questions were ranked by 302 and 305 of the 323 respondents. The tree top ranking questions were "additional time for building or department-based PD" (73%), "opportunities to take courses/workshops taught by outside 'experts'" (71%), and "additional funding four course reimbursement for graduate work" (78%).

Figure 11: Factors Influencing PD Choices

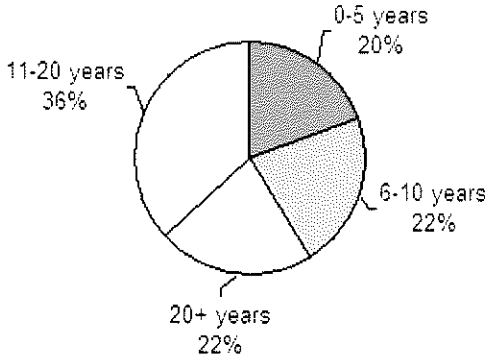


Section III

Demographics

The first three questions asked employees to provide information about their experience in education and their grade level and role in the district. Figure 10 charts the distribution of experience levels. More than one third (36%) of the employees indicated 11-20 years experience in education. The other categories of experience were nearly equally distributed in the three groups 0-5 (20%), 6-10 (22%) and 20+ (22%). Nearly half of the respondents (45.5%) indicated they possessed a teaching license. Individuals for whom education was a career change comprised 18.6% of the respondents.

Figure 10: Career Stages



Questions 2 and 3 asked respondents to indicate the grade-level of the school they were assigned to support (pre-K, elementary, junior high or high school) and their role in the district. Figures 11 and 12 provide the distribution of staff at school levels and their role in the district.

Figure 11: School Level

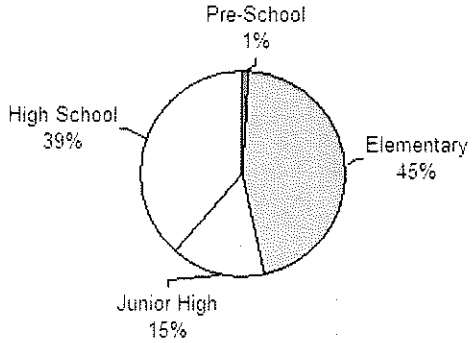
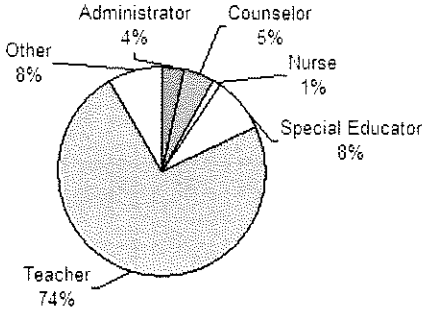


Figure 12: District Role



Mission: To improve student experiences

Values	Staff Survey	Research
Inherent and embedded in daily work	**Factor influencing participation** Direct relationship to content	Inherent and embedded in daily work
Time to collaborate as a school and in smaller groups	**Preference** Building or department-based, in smaller groups	Involves teams of teachers learning together
Collaboration with others outside of district, state, or country	**Preference** Courses/workshops by outside experts	Focused on deepening teachers' content knowledge for teaching
Offerings should address and/or support content, pedagogy, and school culture	**Motivation** Keep up with field, maintain license, improve student performance	Focused on deepening teachers' content knowledge for teaching
Offerings should strive to reflect best practices that are identified in current research	**Factor influencing participation** Timing	Ongoing 30-50 or more hours over a year, Coherent, Intense
View what we do as action-research	**Factor influencing participation** Direct relationship to content	Aligned with teacher's work and practice-based

Professional Learning Research

Darling-Hammond, Linda, et al. "State of the Profession: Study Measures Status of Professional Development." *Journal of Staff Development* 30.2 (2009): 42+. http://www.eric.ed.gov/ERICWebPortal/search/detailmini.jsp?_nfpb=true&_&ERICExtSearch_SearchValue_0=EJ832401&ERICExtSearch_SearchType_0=no&accno=EJ832401

Crow, Tracy. "Professional Learning's Impact Comes From Alignment Across Subjects, Grades and Buildings." *Journal of Staff Development* 32.6 (2011): 4. http://www.learningforward.org/docs/jsd-december-2011/editor326.pdf?sfvrsn=2

Fullan, Michael, and Andy Hargreaves. "Reviving Teaching With 'Professional Capital'." *Education Week* 31.33 (2012): 36-30. http://www.edweek.org/ew/articles/2012/06/06/33hargreaves_ep.h31.html

Hirsh, Stephanie. "A New Definition." *National Staff Development Council* 30.4 (2009): 10-16. http://www.learningforward.org/docs/jsd-fall-2009/hirshlede304-(1).pdf?sfvrsn=2

Leana, Carrie R. "The Missing Link in School Reform." *Stanford Social Innovation Review* Fall (2011). http://www.ssireview.org/articles/entry/the_missing_link_in_school_reform

Nehring, James. "Are We Taking the Wrong Path?" *Phi Delta Kappan* 93.2 (2011). http://www.kappanmagazine.org/content/93/2/80.abstract

Noonoo, Stephen. "Bringing Passion and Collaboration to Professional Development." *THE Journal* 8 Jan. 2013. http://thejournal.com/articles/2013/01/08/bringing-passion-and-collaboration-to-professional-development.aspx

Professional Learning Structures that support the traits of high-performing schools

Research summary of effective professional development
Wilson, S. (2011, October). How Can We Improve Teacher Quality? *Phi Delta Kappan*, V93 N2, 64-65.

Research summary of traits associated with high-performing schools for excellence (policies and practices based on cooperative and reflective cultures)
Nehring, J. (2011, October). Are we taking the wrong path? *Phi Delta Kappan*, V93 N2, 80.

"Our research suggests that talking to peers about the complex task of instructing students is an integral part of every teacher's job and results in student achievement."
Leana, C. (2011, Fall). The missing link in school reform. *Stanford Social Innovation Review.*
http://www.ssireview.org/articles/entry/the_missing_link_in_school_reform

	Collective responsibility for student learning	Shared instructional norms	Collaborative examination of practice	Shared vision and purpose	An inquiry stance toward professional practice	High cognitive demand for all students	High expectation for all students
Teams of teachers working together	Lesson Study Protocols APS Collaborative Grps	Lesson Study Protocols CFGs	Lesson Study Protocols CFGs Teacher –To-Teacher SmartBoard Workgroups Google Workgroups	Lesson Study Protocols	Lesson Study Protocols CGFs Teacher-To-Teacher Seminar Groups	Lesson Study	Lesson Study
A focus on deepening teachers' content knowledge for teaching including how students can misunderstand the content	R & D Work Creating Grad. Level Cour Lesson Study	Mentoring Year 2 Lesson Study SmartBoard Course	Mentoring Year 2 Lesson Study SmartBoard Course SmartBoard Shorts	Mentoring Year 2 Lesson Study	Action Research Sem. (Focus on Content) Lesson Study	Action Research Sem. Lesson Study	Action Research Sem. Lesson Study
Sufficient time for learning (30-50 hours distributed across the year)	APS Collaborative Grps. Lesson Study	Lesson Study	APS Collaborative Grps. Lesson Study SmartBoard Workgrps. Google Workgroups	Lesson Study SmartBoard Workgr Google Workgroups	Lesson Study CFGs SmartBoard Workgr. Google Workgroups Hourly EDTech PD	Lesson Study	Lesson Study
Active engagement of participating teachers	APS Collaborative Grps. R&D Work Lesson Study	Lesson Study	Protocols Lesson Study CFGs SmartBoard Workgr Google Workgroups	Lesson Study SmartBoard Workgr Google Workgroups	Action Research Sem. SmartBoard Workgr Google Workgroups	Lesson Study	Lesson Study
Alignment with teachers' work	APS Collaborative Grps. R&D Work Lesson Study	Lesson Study	Protocols Lesson Study CFGs SmartBoard Workgr Google Workgroups	Lesson Study SmartBoard Workgr Google Workgroups	Action Research Sem. R&D Work SmartBoard Workgr Google Workgroups	R&D Work Lesson Study	R&D Work Lesson Study

Acton FY'13 Curriculum and Assessment Budget
$118,650

Professional Learning	
$62,000	Professional Stipends: Teaching Courses, Mentoring Program, APS Collaborative, Research & Development
$21,000	Contracted Services
$13,400	Dues and Membership (EDCO, National Associations)
$ 950	Travel
$ 1,000	Conferences
$ 400	Periodicals
$ 3,000	PD Subs

Supplies and Materials	
$16,900	Supplies, Learning Materials, Printing Costs

APS Grant Money for Professional Development

2010-11 APS Title I Grant $52,636	2011-12 APS Title I Grant $50,784	2012-13 APS Title I Grant 59,286
$2,000 for Professional Development $500 for Travel/Conferences	$5,000 for PD (as per AYP Title I Regs) Grades ¾ Reading	$5,928 for Professional Development Growing Readers Teachers College
Total: $2,500	**Total: $5,000**	**Total: $5,928**
$1,086 for Texts $45,000 for Reading Specialist $4,050 for MTRS	$42,004 for Reading Specialist $3,780 for MTRS	$48,952 for Reading Specialist $4,406 for MTRS

2010-11 APS Title IIA Grant $37,474	2011-12 APS Title IIA Grant $31,312	2012-13 APS Title IIA Grant $31,646
$1,100 for Mentor Stipends $10,500 for Research and Development $24,500 for Contractual Service	$10,000 Grade Level Meetings $6,492 for Research and Development $14,820 for Contracted Services (Protocols, Literacy)	$12,000 Grade Level Meetings $19,120 for Research and Development
Total: $36,100	**Total: $31,312**	**Total: $31,120**
$1,374 for Supplies and Materials		$526 for Supplies and Materials

APS Grant History

APS Grant Allocation Summary

	FY07	FY08	FY09	FY10	FY11	FY12	FY13
Title I Improving the Academic Achievement of the Disadvantaged	$60, 551	$66,945	$67,818	$60,820	$52,636	$50,291	$59,286
Title II, Part A Improving Educator Quality	$37,771	$38,336	$39,487	$38,447	$37,474	$31,312	$31,646
Title II, Part D Enhanced Educational Technology	$1,129	$1,265	$1,331	$1,079	N/A	N/A	N/A
Title IV, Part A Safe and Drug Free Schools and Community Act	$6,836	$6,020	$6,111	$5,091	$2,697	N/A	N/A
Title V Innovative Programs	$1,538	$1,545	N/A	N/A	N/A	N/A	N/A
Totals	$107,825	$114,111	$114,747	$105,437	$92,807	$81,603	$90,932

Acton-Boxborough FY'13 Curriculum and Assessment Budget
$202,900

Professional Learning	
$35,500	Professional Stipends: Teaching Courses, Mentoring Program, Research and Development
$46,350	Contracted Services
$14,300	Dues and Membership (EDCO, National Associations)
$ 300	Travel
$ 350	Conferences
$18,000	PD Subs

Supplies and Materials	
$88,100	Educational and Mentoring Supplies, JH and HS texts

A-B Grant Money for Professional Development

2010-11 A-B Title I Grant $38,292	2011-12 A-B Title I Grant $36,945	2012-13 A-B Title I Grant $71,183
$3,829 for Professional Development	$3,694 for Professional Learning (JH Lit)	$5,790 for Professional Learning (Lit. Initiatives)
Total: $3,829	**Total: $3,694**	**Totals: $5,790**
$3,809 for SES (Supplemental Education Services)	$7,389 for SES	
$500 for Texts		$4,410 for Texts
$1,000 for Instructional Technology		$2,500 for Instructional Technology
$7,440 for Academic Support	$7,958 for Reading Specialist	$7,960 for Reading Specialist
$21,044 for Support Staff	$17,188 for Support Staff	$34,207 for Support Staff (includes new ASC Asst)
$670 for MTRS	$716 for MTRS	$716 for MTRS
		$15,600 for Literacy Initiatives

2010-11 A-B Title IIA Grant $30,491	2011-12 A-B Title IIA Grant $25,695	2012-13 A-B Title IIA Grant $28,261
$5,000 for Mentor Stipends		
$22,000 for Contracted Services	$21,750 for Cont. Services (Prot, Co-Teach, Writ.)	$16, 400 for Contracted Services (Stds. Based,
$2,491 for Conferences/Travel	$3,945 for Conferences (Lit. for All)	Literacy, Educator Evaluation)
		$9,690 for Research and Development
Total: $29, 491	**Total: $25,695**	**Total: $26,090**
$1,000 for Supplies and Materials		$2,171 for Supplies and Materials

AB Grant History

AB Grant Allocation Summary

	FY07	FY08	FY09	FY10	FY11	FY12	FY13
Title I Improving the Academic Achievement of the Disadvantaged	$46,238	$49,902	$50,195	$43,206	$38,292	$36,945	$71,183
Title II, Part A Improving Educator Quality	$30,391	$31,044	$31,892	$30,824	$30,491	$25,695	$28,261
Title II, Part D Enhanced Educational Technology	$791	$939	$984	$731	N/A	N/A	N/A
Title IV, Part A Safe and Drug Free Schools and Community Act	$6,828	$6,430	$6,583	$5,584	$3,049	N/A	N/A
Title V Innovative Programs	$1,738	$1,755	N/A	N/A	N/A	N/A	N/A
Totals	$85,986	$90,070	$89,654	$80,345	$71,832	$62,640	$99,444

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Facility
Acton-Boxborough Regional High School
36 Charter Road
Acton, MA 01720

Facility Owner
N/A

Primary Contact for this Facility
N/A

General Information

Acton-Boxborough Regional High School	
Gross Floor Area Excluding Parking: (ft²)	386,000
Year Built	1975
For 12-month Evaluation Period Ending Date:	September 30, 2012

Facility Space Use Summary

Acton-Boxborough Regional High School	
Space Type	K-12 School
Gross Floor Area (ft²)	386,000
Open Weekends?	Yes
Number of PCs	714
Number of walk-in refrigeration/freezer units	2
Presence of cooking facilities	Yes
Percent Cooled	100
Percent Heated	100
Months °	12
High School?	Yes
School District °	Acton Boxborough

Pool	
Space Type	Swimming Pool
Pool Size	Short Course (25 yards x 20 yards)
Indoor Outdoor	Indoor
Months in Use °	12

Energy Performance Comparison

	Evaluation Periods		Comparisons		
Performance Metrics	**Current** (Ending Date 09/30/2012)	**Baseline** (Ending Date 06/30/2009)	**Rating of 75**	**Target**	**National Median**
Energy Performance Rating	91	62	75	N/A	50
Energy Intensity					
Site (kBtu/ft²)	56	74	72	N/A	92
Source (kBtu/ft²)	108	156	140	N/A	178
Energy Cost					
$/year	$ 590,027.00	$ 940,293.00	$ 767,278.78	N/A	$ 972,818.80
$/ft²/year	$ 1.53	$ 2.44	$ 1.99	N/A	$ 2.52
Greenhouse Gas Emissions					
$MtCO_2e$/year	1,648	2,277	2,143	N/A	2,717
$kgCO_2e$/ft²/year	4	6	5	N/A	7

More than 50% of your building is defined as K-12 School. Please note that your rating accounts for all of the spaces listed. The National Median column presents energy performance data your building would have if your building had a median rating of 50.

Notes:
o - This attribute is optional.
d - A default value has been supplied by Portfolio Manager.

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Facility
RJ Grey Junior High School
16 Charter Road
Acton, MA 01720

Facility Owner
N/A

Primary Contact for this Facility
N/A

General Information

RJ Grey Junior High School	
Gross Floor Area Excluding Parking: (ft²)	143,280
Year Built	2002
For 12-month Evaluation Period Ending Date:	September 30, 2012

Facility Space Use Summary

RJ Grey Junior High School	
Space Type	K-12 School
Gross Floor Area (ft²)	129,280
Open Weekends?	Yes
Number of PCs	320
Number of walk-in refrigeration/freezer units	4
Presence of cooking facilities	Yes
Percent Cooled	50
Percent Heated	100
Months °	12
High School?	No
School District °	Acton Boxborough

Central Office	
Space Type	Office
Gross Floor Area (ft²)	14,000
Weekly operating hours	60
Workers on Main Shift	17
Number of PCs	17
Percent Cooled	50% or more
Percent Heated	50% or more

Energy Performance Comparison

	Evaluation Periods		Comparisons		
Performance Metrics	**Current** (Ending Date 09/30/2012)	**Baseline** (Ending Date 06/30/2009)	**Rating of 75**	**Target**	**National Median**
Energy Performance Rating	67	43	75	N/A	50
Energy Intensity					
Site (kBtu/ft²)	77	103	71	N/A	92
Source (kBtu/ft²)	131	165	120	N/A	154
Energy Cost					
$/year	$ 220,048.39	$ 371,960.00	$ 202,243.47	N/A	$ 260,031.37
$/ft²/year	$ 1.54	$ 2.60	$ 1.42	N/A	$ 1.82
Greenhouse Gas Emissions					
$MtCO_2e$/year	794	993	730	N/A	938
$kgCO_2e$/ft²/year	6	7	6	N/A	7

More than 50% of your building is defined as K-12 School. Please note that your rating accounts for all of the spaces listed. The National Median column presents energy performance data your building would have if your building had a median rating of 50.

Notes:
o - This attribute is optional.
d - A default value has been supplied by Portfolio Manager.

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Facility
Administration Building
11 Charter Road
Acton, MA 01720

Facility Owner
N/A

Primary Contact for this Facility
N/A

General Information

Administration Building	
Gross Floor Area Excluding Parking: (ft²)	36,203
Year Built	1950
For 12-month Evaluation Period Ending Date:	September 30, 2012

Facility Space Use Summary

Admin	
Space Type	K-12 School
Gross Floor Area (ft2)	36,203
Open Weekends?	Yes
Number of PCs	50
Number of walk-in refrigeration/freezer units	0
Presence of cooking facilities	No
Percent Cooled	50
Percent Heated	100
Months ◦	12
High School?	No
School District ◦	APS

Energy Performance Comparison

	Evaluation Periods		Comparisons		
Performance Metrics	**Current** (Ending Date 09/30/2012)	**Baseline** (Ending Date 06/30/2009)	**Rating of 75**	**Target**	**National Median**
Energy Performance Rating	50	1	75	N/A	50
Energy Intensity					
Site (kBtu/ft2)	78	155	61	N/A	78
Source (kBtu/ft2)	126	262	99	N/A	127
Energy Cost					
$/year	$ 77,182.06	$ 147,310.00	$ 60,555.34	N/A	$ 77,439.53
$/ft2/year	$ 2.13	$ 4.07	$ 1.67	N/A	$ 2.14
Greenhouse Gas Emissions					
$MtCO_2e$/year	191	389	150	N/A	192
$kgCO_2e/ft^2$/year	5	11	4	N/A	5

More than 50% of your building is defined as K-12 School. Please note that your rating accounts for all of the spaces listed. The National Median column presents energy performance data your building would have if your building had a median rating of 50.

Notes:
o - This attribute is optional.
d - A default value has been supplied by Portfolio Manager.

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Facility
Conant Elementary School
80 Taylor Road
Acton, MA 01720

Facility Owner
N/A

Primary Contact for this Facility
N/A

General Information

Conant Elementary School	
Gross Floor Area Excluding Parking: (ft²)	56,017
Year Built	1970
For 12-month Evaluation Period Ending Date:	September 30, 2012

Facility Space Use Summary

Conant School	
Space Type	K-12 School
Gross Floor Area (ft²)	56,017
Open Weekends?	Yes
Number of PCs	111
Number of walk-in refrigeration/freezer units	2
Presence of cooking facilities	Yes
Percent Cooled	20
Percent Heated	100
Months °	12
High School?	No
School District °	N/A

Energy Performance Comparison

	Evaluation Periods		Comparisons		
Performance Metrics	**Current** (Ending Date 09/30/2012)	**Baseline** (Ending Date 06/30/2009)	**Rating of 75**	**Target**	**National Median**
Energy Performance Rating	93	61	75	N/A	50
Energy Intensity					
Site (kBtu/ft²)	55	83	76	N/A	97
Source (kBtu/ft²)	88	141	121	N/A	155
Energy Cost					
$/year	$ 78,795.32	$ 130,381.87	$ 108,348.93	N/A	$ 138,561.21
$/ft²/year	$ 1.41	$ 2.33	$ 1.94	N/A	$ 2.48
Greenhouse Gas Emissions					
$MtCO_2e$/year	207	323	285	N/A	364
$kgCO_2e/ft^2$/year	4	6	6	N/A	7

More than 50% of your building is defined as K-12 School. Please note that your rating accounts for all of the spaces listed. The National Median column presents energy performance data your building would have if your building had a median rating of 50.

Notes:
o - This attribute is optional.
d - A default value has been supplied by Portfolio Manager.

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Facility
Douglas Elementary School
21 Elm Street
Acton, MA 01720

Facility Owner
N/A

Primary Contact for this Facility
N/A

General Information

Douglas Elementary School	
Gross Floor Area Excluding Parking: (ft²)	47,324
Year Built	1965
For 12-month Evaluation Period Ending Date:	September 30, 2012

Facility Space Use Summary

Douglas School	
Space Type	K-12 School
Gross Floor Area (ft2)	47,324
Open Weekends?	Yes
Number of PCs	115
Number of walk-in refrigeration/freezer units	2
Presence of cooking facilities	Yes
Percent Cooled	90
Percent Heated	100
Months °	12
High School?	No
School District °	Acton Public Schools

Energy Performance Comparison

	Evaluation Periods		Comparisons		
Performance Metrics	**Current** (Ending Date 09/30/2012)	**Baseline** (Ending Date 06/30/2009)	**Rating of 75**	**Target**	**National Median**
Energy Performance Rating	94	83	75	N/A	50
Energy Intensity					
Site (kBtu/ft2)	60	76	87	N/A	111
Source (kBtu/ft2)	106	137	153	N/A	196
Energy Cost					
$/year	$ 49,784.33	$ 107,487.11	$ 71,836.50	N/A	$ 91,860.70
$/ft2/year	$ 1.05	$ 2.27	$ 1.52	N/A	$ 1.94
Greenhouse Gas Emissions					
$MtCO_2e$/year	223	260	322	N/A	411
$kgCO_2e/ft^2$/year	5	6	7	N/A	9

More than 50% of your building is defined as K-12 School. Please note that your rating accounts for all of the spaces listed. The National Median column presents energy performance data your building would have if your building had a median rating of 50.

Notes:
o - This attribute is optional.
d - A default value has been supplied by Portfolio Manager.

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Facility
Gates Elementary School
75 Spruce St
Acton, MA 01720

Facility Owner
N/A

Primary Contact for this Facility
N/A

General Information

Gates Elementary School	
Gross Floor Area Excluding Parking: (ft²)	53,933
Year Built	1967
For 12-month Evaluation Period Ending Date:	September 30, 2012

Facility Space Use Summary

Gates School	
Space Type	K-12 School
Gross Floor Area (ft²)	53,933
Open Weekends?	Yes
Number of PCs	102
Number of walk-in refrigeration/freezer units	2
Presence of cooking facilities	Yes
Percent Cooled	20
Percent Heated	100
Months °	12
High School?	No
School District °	N/A

Energy Performance Comparison

	Evaluation Periods		Comparisons		
Performance Metrics	**Current** (Ending Date 09/30/2012)	**Baseline** (Ending Date 06/30/2009)	**Rating of 75**	**Target**	**National Median**
Energy Performance Rating	74	63	75	N/A	50
Energy Intensity					
Site (kBtu/ft²)	75	86	75	N/A	96
Source (kBtu/ft²)	122	138	122	N/A	156
Energy Cost					
$/year	$ 93,203.74	$ 119,482.69	$ 92,770.98	N/A	$ 118,625.19
$/ft²/year	$ 1.73	$ 2.22	$ 1.72	N/A	$ 2.20
Greenhouse Gas Emissions					
$MtCO_2e$/year	275	313	274	N/A	350
$kgCO_2e/ft^2$/year	5	6	5	N/A	6

More than 50% of your building is defined as K-12 School. Please note that your rating accounts for all of the spaces listed. The National Median column presents energy performance data your building would have if your building had a median rating of 50.

Notes:
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d - A default value has been supplied by Portfolio Manager.

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Facility
Parker Damon Building
11 Charter Rd
Acton, MA 01720

Facility Owner
N/A

Primary Contact for this Facility
N/A

General Information

Parker Damon Building	
Gross Floor Area Excluding Parking: (ft²)	139,963
Year Built	2002
For 12-month Evaluation Period Ending Date:	September 30, 2012

Facility Space Use Summary

Parker Damon Elementary School	
Space Type	K-12 School
Gross Floor Area (ft2)	139,963
Open Weekends?	Yes
Number of PCs	289
Number of walk-in refrigeration/freezer units	4
Presence of cooking facilities	Yes
Percent Cooled	100
Percent Heated	100
Months °	12
High School?	No
School District °	Acton Boxborough

Energy Performance Comparison

	Evaluation Periods		Comparisons		
Performance Metrics	**Current** (Ending Date 09/30/2012)	**Baseline** (Ending Date 06/30/2009)	**Rating of 75**	**Target**	**National Median**
Energy Performance Rating	94	48	75	N/A	50
Energy Intensity					
Site (kBtu/ft2)	43	76	61	N/A	77
Source (kBtu/ft2)	93	170	132	N/A	168
Energy Cost					
$/year	$ 210,933.18	$ 374,332.00	$ 297,764.88	N/A	$ 380,810.60
$/ft2/year	$ 1.51	$ 2.67	$ 2.13	N/A	$ 2.73
Greenhouse Gas Emissions					
$MtCO_2e$/year	490	884	692	N/A	885
$kgCO_2e/ft^2$/year	3	6	4	N/A	5

More than 50% of your building is defined as K-12 School. Please note that your rating accounts for all of the spaces listed. The National Median column presents energy performance data your building would have if your building had a median rating of 50.

Notes:
o - This attribute is optional.
d - A default value has been supplied by Portfolio Manager.

ENERGY EFFICIENCY OPPORTUNITY

BENCHMARKING REPORT

Acton-Boxborough Regional High School

Prepared for

Acton-Boxborough Regional School District

36 Charter Road - Acton, MA 01720

Prepared by

EMA - Energy Management Associates, Inc.
www.EMA-Boston.com

September 2012

INTRODUCTION

The Acton-Boxborough Regional School District is a participant in the NSTAR ENERGY STAR Benchmarking Initiative, a program designed to help customers assess the energy performance of their buildings, and identify opportunities for improvement. They chose to participate with the Acton-Boxborough Regional High School (A-B RHS) located at 36 Charter Road, Acton, MA 01720.

Estimated Energy Performance Rating:
90

The performance of this building was assessed using the Portfolio Manager benchmarking tool from ENERGY STAR. For the twelve months ending April 30, 2012, the building received an energy performance rating of 90. The rating represents the percentile ranking of this building compared to others of its type in the United States based on source energy consumption. While the building is well average for a high school, it has the potential of further increasing its ENERGY STAR rating with optimized ventilation and lighting strategies, and conversion of some constant airflow systems to variable airflow systems. Buildings that receive a rating of **75** or greater are eligible for an ENERGY STAR label. A Statement of Energy Performance, generated by Portfolio Manager, and an Action Plan, are included as the last two pages of this report.

To identify opportunities for improving energy performance, Steve Di Giacomo, PE, CEM, CPMP and Nick Hill, CEM, LEED AP of Energy Management Associates, Inc. (EMA) conducted an initial site visit on July 18th. Steve Di Giacomo returned on September 5th in order to assess ventilation conditions in occupied classrooms, and further orientation. Steve returned on September 12 to assess Pool operations, and the IT server room system and on September 13 to verify EMS time schedules, and visit the DPW blue print room.

We would like to recognize and thank Kate Crosby, Energy Advisor, and Mr. Dave Cormier, HVAC Specialist, for their time, interest, and invaluable follow-up discussions during the audit process.

FACILTY DESCRIPTION

Building Description

Major renovations where concluded in 2004, increasing its size to 386,000 square feet. Installed were a new wing, operable double-glazed windows, new roofs, new boilers, new lighting, new pool A/C, and twenty-five (25) new rooftop units (RTUs) and controls. Pre-dating the renovations are eleven (11) RTUs that were installed in 1998. The school is 90% air-conditioned , and has two floors of administrative offices, classrooms, two gyms, a fitness room, short-course heated swimming pool, lockers, TV and radio studio, wood shop, and storage areas .

Lighting & Lighting Controls

The lighting systems at ABRHS were completely overhauled when the school was renovated and expanded. The bulk of the lighting in classrooms, corridors and staff spaces is provided by standard-efficiency T8 fluorescent systems with electronic ballasts. Classroom and office lighting is predominately 4-lamp 2'x4' recessed parabolic fixtures with bi-level switching. This allows occupants to switch off half the lamps in each fixture. These recessed fixtures are also used in the cafeteria areas. Some of the lab classrooms use a pendant-mounted direct/indirect fixture with T8 lamps and electronic ballasts. The hallways in the classroom areas use 1'x4' parabolic fixtures with 2 lamps. Because the lamps are tightly spaced within the fixture body, these are not particularly efficient fixtures. Restrooms, locker rooms and other "back of the house" areas use a variety of other fluorescent fixture types. In some areas, 2'x4' recessed fixtures with prismatic lenses have been de-lamped from 4 lamps to 2-lamps, with no negative impacts. Recessed fixtures

with 32 Watt compact fluorescent lamps and electronic ballasts provide supplemental and accent lighting in some corridor and focal spaces.

The pool is lit by 400 Watt Metal Halide (MH) fixtures, which are wall-mounted around the perimeter of the room and provide indirect uplight. There is also supplemental T8 fluorescent lighting in the pool bleacher area, offices and locker rooms. Underwater lighting is provided by ten (10) 90 Watt incandescent lamps that are mounted behind lenses in the pool walls. These are accessible from the basement beneath the pool. The pool is extensively used by the school and community and lights are generally on from 4:30 am to 10 pm during the week and from 6:30 am to 5 pm on weekends.

The lighting in both gyms is provided by high-bay fixtures using eight (8) 42 Watt compact fluorescent lamps, which produce excellent light levels. These lights also have a (rarely used) bi-level switching option, which allow the use of 4 or 8 lamps per fixture. All fixtures are controlled via wall switches in the gym. Despite the ample daylight in the lower gym, there is no daylighting control for these fixtures. The gyms are heavily used by the school and community on weekdays, with somewhat less usage on weekends.

The auditorium is used extensively for drama and other classes. Most of the house lighting is provided by 300 Watt incandescent lamps. Because drama productions are frequently performed, a full range (100% down to 0%) of theatrical dimming is required. The staff has experimented with LED replacements for the house lights, but has yet to find an alternative that dims well at low levels. Stage work lights are T8 fluorescent.

Most of the parking lot and exterior pole lighting was recently converted to induction systems. Building-mounted lights are a mix of metal halide and compact fluorescent fixtures; work with NSTAR to seek incentives to convert and replace with energy efficient LED exterior-rated fixtures.

Thanks to a high level of staff and student awareness, lights in classroom and offices are generally turned off when the rooms are not in use. The presence of bi-level switching also allows occupants further control. For example, a teacher may have two out of three rows using two lamps per fixture and one row using four lamps. The corridor, restroom and locker room areas are less well-controlled. In the corridors, one-third of the lights are on continuously as security lighting.

Controls

The circa 2004 energy management system (EMS) is a Delta™ Controls system, installed and maintained by RP O'Connell, Inc. The system enables the RTUs' individual package controllers to carry out their sequence of operations. The McQuay RTUs have MicroTech II package controllers, the Venmar have (coincidently) Delta package controllers, and the older Jackson Church RTUs were renovated with Delta ddc controllers. There is custom Delta programming for the pump VFDs, and boiler HW reset programming. Graphics package is inconsistent (some RTU show their VFD and others do not; some have access to schedule and others do not) and in general not as many points were mapped over as would be expected.

Boiler Plant

The boiler plant consists of three (3) circa 2003 gas-fired, forced draft, fire tube Cleaver Brooks (CB) package hot water boilers with an input rating of 8,165,000 BTU per hour and an output rating of 6,695,000 BTU per hour. The primary loop is maintained at 160 to 180 ^{o}F, based on an outdoor air temperature (OAT) reset schedule. The boiler used to shut off anytime the OAT > 65 ^{o}F. However, since May 2011, the a boiler is being run 24x7 and provides year-round pool heat and year-round reheat energy for the CAV and VAV systems. The boiler plant has an N+1 design where two boilers are needed for cold morning start-up, and the 3rd boiler represents a spare. The primary pumps are piped in parallel to a common header. Each boiler has a dedicated 25 hp pump and VFD rated at 670 gpm @ 100' TDH. The new wing of the school has two (2) 10 hp hot water booster pumps and VFD rated at 335 gpm @65' TDG; the 2nd pump is a spare. The new wing of the school has two (2) 10 hp hot water booster pumps each with a dedicated VFD; the 2nd pump is a

spare. HW resets to 180 at 20 °F OAT and below, linearly to 180 °F at 140 °F, per the boiler manufacturer's recommendations. The boiler remains online year-round, providing summer reheat energy to spaces served by CAV RTUs as well as VAV TBs and pool heating.

We recommend that the boiler be shut off whenever the OAT > 65 °F. In order to reduce cold complaints it may be necessary to re-program and reduce the VAV terminal boxes TB minimum airflows, and install some CO2 sensors. It may also be necessary to raise the discharge air temperature (DAT) set-point for the CAV RTUs; although many of the Jackson-Church RTUs have refrigerant reheat coils. Summer time pool heating can be accomplished with the pool heater and the Pool Pak® heat recovery barrel.

Chiller Plant

The chilled water plant consists of a 45-ton McQuay air-cooled package system. The water is distributed to eleven (11) dual temperature 2-pipe unit ventilators (UVs) outfitted with 2-way valves that serve south side classrooms. There are two (2) three-way summer-winter switchover valves, one each located on the common supply and return header.

HVAC

There are eleven (11) Jackson Church RTUs; all contain gas heat, and all but one has DX cooling. They predate the renovations, and are now 14 years old. They are controlled Delta EMS ddc controls. The classroom units are configured as constant volume (CAV)- multi-zone (MZ) units with up to eight (8) zones. Because only one deck is operated at a time, (other opposite deck's damper is closed) the unit is essentially a CAV unit with refrigerant reheat as well as zone hot water reheat. All but two units have an auxiliary refrigerant reheat coil located after the DX coil and gas burner. RTU controls include enthalpy-based economizer controls.

There are eleven (11) McQuay heating ventilator (HV) units; three are outfitted with DX (fitness, band & chorus). These RTUs contain hot water coils with 2-way valves, enthalpy economizer controls. They are controlled with McQuay MicroTech II controls, and enabled / adjusted via Delta Controls EMS. RTU controls include enthalpy-based economizer controls.

There are fourteen (14) McQuay & Venmar air-conditioning / heating RTUs. The new wing is served exclusively by five (5) Venmar RTUs that include VFD / VAV S/R fans, vertical refrigerant heat pipe energy recovery, enthalpy economizer controls, DX cooling, hot water heating, and package Delta controls that interface with the Delta EMS. The remaining nine (9) RTUs are a mix of McQuay CAV / DX Gas, and VAV DX HW, all with package MicroTech II controls that interface with the Delta EMS. RTU controls include enthalpy-based economizer controls. Please see the following table for further details.

Domestic Hot Water (DHW)

Sink and shower domestic hot water is produced year round by two (2) PVI gas fired domestic hot water heaters with integral 600 gallon storage tanks, located in the new wing. Tank storage temperature is maintained at 140 °F. The kitchen hot water is produced by an AO Smith gas hot water heater that is located in the boiler room; hot water is kept in a Vaughn 119-gallon storage tank. The kitchen dishwasher has a Hatco 12-kW electric booster heater.

Swimming Pool (short course)

The pool measures 75' x 60'. The pool area is served by a 36-ton, three-stage CAV PoolPak model SWHP140S-15E-B06 system outfitted with DX, refrigerant reheat coil and auxiliary hot water coil. Also, there is a diverter solenoid for a barrel HX that provides pool heating when the DX coil is active. The compressors are air-cooled by a split 3-fan Bohn condensing unit. The swimming pool water is maintained at 80 °F and the air temperature is maintained at 78°F which helps cut down on evaporation, and pool heating due to evaporation. Until recently, outside the normal heating season (when the CB boilers are

offline), pool-water heating is accomplished by a 54 kW Coates electric heater; however, now that a boiler is kept online 24x7, year-round, and the Coates electric pool heater is no longer in use.

The PoolPak® was commissioned to turn off each evening; currently, the PoolPak operates 24x7, year-round. We recommend that the PoolPak be shut-off each evening. By design it is supposed to provide auxiliary heat via its hot refrigerant-gas heat recovery bundle (barrel) whenever the pool water is below its setpoint *and* the pool space air temperature is above its set-point (presumably summer start-up mode).

IT Data Room

There is a large 5-ton CAV Liebert unit serves the IT data room 2-ton load. It is oversized and electric reheat was added to increase runtime to avoid Liebert controller issues. We recommend that back-up Mitsubishi 2-ton unit be used as the primary cooler, and the Liebert used only as a back-up. This strategy will save both compressor energy and reheat energy. Data loggers can be temporarily installed or hand held amp readings taken in order to approximate potential energy savings.

Solar Photovoltaic Roof Arrays

There is a total of 103 kW installed roof array (S-RECS belong to a 3rd party) that generates ~115,000 kWh per year.

Daily Activities

- 5:30 custodian arrives - turns on hallways lights. Swimming pool usage begins
- 6:45 to 7:00 Teachers arrive
- 7:23 Classes begin
- 2:18 school is dismissed
- Various after school activities
- 10:30 PM final cleaning & lights reduced to security setting / level

Twenty-Eight (28) Holidays / Breaks for 2012 / 13

- August 31
- September 3, 17 & 26
- October 8
- November 6, 12, 22, 23
- December 24, 25, 26, 27, 28, 31
- January 1, 21
- February 18, 19, 20, 21, 22
- March 29
- April 15, 16, 17, 18, 19
- May 27

(Source: http://ab.mec.edu/about/aboutpdf/Calendar.pdf)

The EMS does an excellent job in capturing the major holidays. Please ensure that the single-day holidays are also programmed into the EMS.

Occupied & Unoccupied Setpoints

Space Set Point	Occupied Temperature Mon - Fri 6 AM - 6 PM	Unoccupied Temperature (all other times)
Heating	**68 °F**	**60 °F**
Cooling	**73 °F**	**80 °F**

We believe that the unoccupied heating setpoint could be lowered to the vicinity of 56 °F, and the cooling unoccupied setpoint could be raised to 85 °F for additional savings.

Manufacturer	Unit Name	Area Served	Delta EMS Schedule	Configuration	Sup.Fan Hp	Ret.Fan Hp	CFM of OA	Design CFM
JACKSON CHURCH	RTU-1	Classrooms	M-F 6 to 4	CAV / Gas / DX w/ R-22.RH coil	15	5	2314	9400
JACKSON CHURCH	RTU-2	Classrooms	M-F 6 to 4	CAV / Gas / DX w/ R-22.RH coil	5	3	2065	8920
JACKSON CHURCH	RTU-3	Classrooms	M-F 6 to 4	CAV / Gas / DX w/ R-22.RH coil	10	5	3157	9600
JACKSON CHURCH	RTU-4	Classrooms	M-F 6 to 4	CAV / Gas / DX w/ R-22.RH coil	10	5	2224	10100
JACKSON CHURCH	RTU-5	Classrooms	M-F 6 to 4	CAV / Gas / DX w/ R-22.RH coil	10	5	3691	9250
JACKSON CHURCH	RTU-6	Classrooms	M-F 6 to 4	CAV / Gas / DX w/ R-22.RH coil	10	5	2560	10700
JACKSON CHURCH	RTU-7	Auditorium	M-W, F 6:30 - 9 & Th: 6:30 - 10	CAV / Gas / DX w/ R-22.RH coil	5	3	3742	7400
JACKSON CHURCH	RTU-8	Auditorium	M-W, F 6:30 - 9 & Th: 6:30 - 10	CAV / Gas / DX w/ R-22.RH coil	5	3	3742	7400
JACKSON CHURCH	RTU-9	Auditorium-Stage	M-W, F 6:30 - 9 & Th: 6:30 - 10	CAV / Gas	3	2	1172	5980
JACKSON CHURCH	RTU-10	Café	M-W, F 6:30-4 & Th: 6:30-9	CAV / Gas / DX	3	2	2500	4200
JACKSON CHURCH	RTU-11	Café	M-W, F 6:30-4 & Th: 6:30-9	CAV / Gas / DX w/ R-22.RH coil split	3	2	1500	3700
Carrier	RTU-0	Copy Center	M-F 7 to 4	CAV/ GAS /DX	1.5	NONE	?	2000
McQUAY	RTU-1	Fitness	M-F 6:15 - 9	CAV / HW / DX	5	2	1500	5400
McQUAY	RTU-2	Kitchen	M-F 4 - 2	CAV / HW	7	EF-15, 18, 19	7250	8100
McQUAY	RTU-3	Woodshop	M-F 6 - 3:30	CAV / HW	3	EF-16	1860	4850
McQUAY	RTU-4	Band	M: 6:30 - 4; T-Sat: 6:30 - 9	CAV / HW / DX	5	3	2000	6400
McQUAY	RTU-5	Chorus	M: 6:30 - 4; T-Sat: 6:30 - 9	CAV / HW / DX	3	---	1250	3000
McQUAY	RTU-6	Lockers	M-F 5 - 5:15	CAV / HW	5	EF	3700	6200
McQUAY	RTU-7	Café	M-W, F 6:30-4 & Th: 6:30-9	CAV / HW	7.5	2	3570	7400
McQUAY	RTU-8	Boys Lockers LL	M-Sat: 5:30 - 8:30	CAV / HW	7.5	3, EF-6	5940	8600
McQUAY	RTU-9	Lockers, LL Fitness	M-Sat: 5:15 - 5:15	CAV / HW	7.5	EF-3, 4	4744	7150
McQUAY	RTU-10	Gym 7,680 SF	M-F 5:30 to 10; Sat: 5:30-4	CAV / HW	10	5	7454	14000
McQUAY	RTU-11	Gym 13,552 SF	M-F 5:30 to 10; Sat: 5:30-4	VAV / HW	40	10	7500	32500
McQUAY	RTU/AC-1	TV Studio	M-F 6 - 4	CAV/DX/Gas	2	0.5	450	1750

McQUAY	RTU/AC-2	Radio	M-F 6-3	CAV/DX/Gas	3	0.333	850	3000
McQUAY	RTU/AC-3	Conference Rm	M-F 7 to 5	CAV/DX/Gas	2	0.5	550	2100
McQUAY	RTU/AC-4	Administration	M-F 6 - 5	VAV/DX/HW	15	5	2850	10825
McQUAY	RTU/AC-5	Library	M-F 6-4	VAV/DX/HW	15	5	2775	10500
McQUAY	RTU/AC-6	Library	M-F 6-4	VAV/DX/HW	15	5	2540	10600
McQUAY	RTU/AC-7	Administration	M-F 6-4:45	VAV/DX/HW	15	5	2400	8850
McQUAY	RTU/AC-8	Classrooms	M-F 6 - 3:30	CAV/DX/HW	10	5	3200	7280
Venmar	RTU/AC-9	Classrooms	M-F 5:30 - 4 PM	VAV/DX/HW w/ Heat Pipe	25	15	7000	18560
Venmar	RTU/AC-10	Classrooms	M-F 5:30 - 4 PM	VAV/DX/HW w/ Heat Pipe	25	15	7000	19550
Venmar	RTU/AC-11	Classrooms	M-F 5:30 - 4 PM	VAV/DX/HW w/ Heat Pipe	30	20	13350	21700
Venmar	RTU/AC-12	Classrooms	M-F 5:30 - 4 PM	VAV/DX/HW w/ Heat Pipe	30	20	8500	21850
Venmar	RTU/AC-13	Classrooms	M-F 5:30 - 4 PM	VAV/DX/HW w/ Heat Pipe	30	20	7000	21375
McQUAY	RTU/AC-14	Lobby	M-F 6:30 - 3	CAV/ DX /Gas	5	none	1302	5150
Pool Pak	DAC-1	Pool 6270 SF	24x7	CAV / DX w/R-22 RH Coil & Aux. HW Coil	15	3	3962	11350
McQUAY	CUV-1	Classrooms	M-F 6 - 3	CAV HW / CHW	0.125	EF	500	1500
McQUAY	CUV-2	Classrooms	M-F 6 - 3	CAV HW / CHW	0.125	EF	500	1250
McQUAY	CUV-3	Classrooms	M-F 6 - 3	CAV HW / CHW	0.125	EF	500	1250
McQUAY	CUV-4	Classrooms	M-F 6 - 3	CAV HW / CHW	0.125	EF	500	1250
McQUAY	CUV-5	Classrooms	M-F 6 - 3	CAV HW / CHW	0.125	EF	500	750
McQUAY	CUV-6	Classrooms	M-F 6 - 3	CAV HW / CHW	0.125	EF	500	750
McQUAY	CUV-7	Classrooms	M-F 6 - 3	CAV HW / CHW	0.125	EF	500	750
McQUAY	CUV-8	Classrooms	M-F 6 - 3	CAV HW / CHW	0.125	EF	500	750
McQUAY	CUV-9	Classrooms	M-F 6 - 3	CAV HW / CHW	0.125	EF	500	750
McQUAY	CUV-10	Classrooms	M-F 6 - 3	CAV HW / CHW	0.125	EF	500	750
McQUAY	CUV-11	Classrooms	M-F 6 - 3	CAV HW / CHW	0.125	EF	500	750

Utilities

Kate Crosby provided three years of monthly electric and gas data. The electric data includes purchased power from five (5) NSTAR accounts and energy (kWh) generated by the103 kW photovoltaic roof system. EnerNOC provides hourly sub-meter data for the HS from which Kate is able to apportion the main NSTAR meter usage since it also contains usage for the junior high, two elementary schools, and the admin building.

National Grid hourly gas-usage data was used to generate hourly gas profiles.

Electric kWh usage breakout:

- NSTAR Main Meter - 94.859%
- Hayward Road HS Field Lights 0.869%
- HS Score Board 0.007%
- HS Street Lighting 0.002%
- HS Street Lighting 0.002%
- HS Solar Array power used onsite 4.261%
- Total 100.000%

Gas therm usage breakout:

- NGRID Main Meter 97.0%
- NGRID Kitchen / domestic hot water gas meter 3.0%
- Total 100.0%

Utility	Supplier
NSTAR Electric B-3 NEMA LG - Primary TOU & B-9 Large General - Secondary	Constellation Energy until 12/1/2012, then Suez Energy
National Grid Gas	Direct Energy

Effective 12/1/2012, Suez will charge $0.06165 / kWh + NSTAR T&D at 0.015299. Total energy charge is $0.07695 / kWh, & $23.62 / kW.

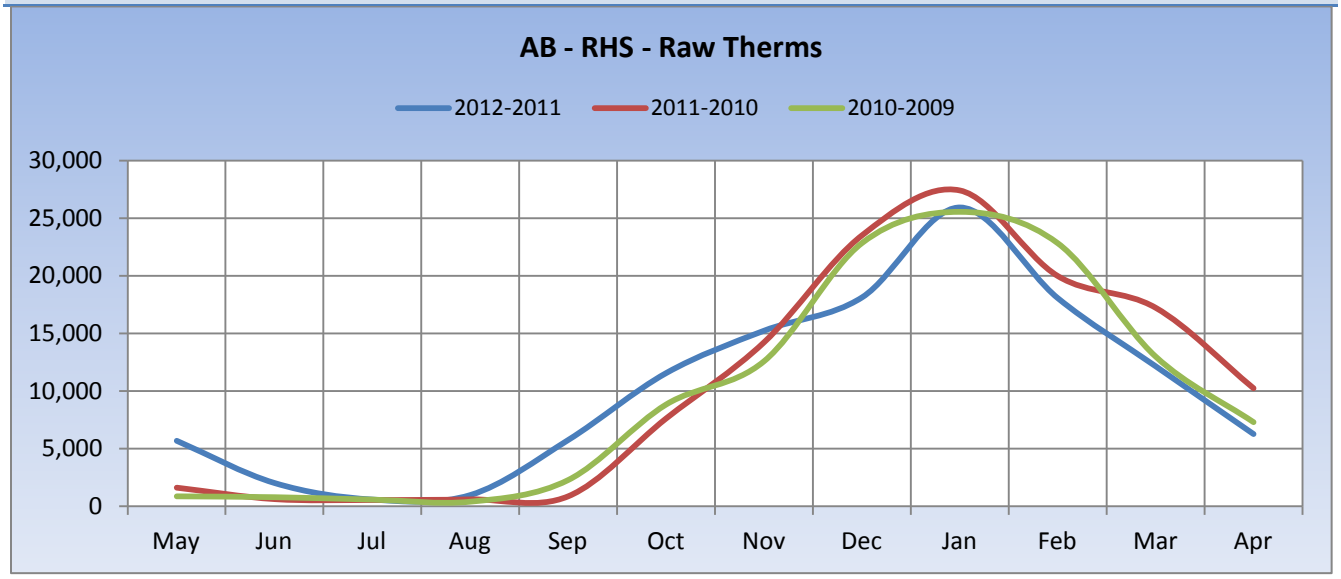
June - Sept – on-peak billing hours are 9AM to 6 PM, Monday-Friday (4 months, 45 hours per week)
October - May – on-peak billing hours are 8AM to 9 PM (8 months, 65 hours per week)

Hrs./Month	Reduction type	Demand	Energy	$/kWh
730	Incremental cost, no billed kW reduction	$ -	$ 0.08	**$ 0.0770**
730	Incremental cost, w/ billed kW reduction	$ 23.62	$ 56.17	**$ 0.1093**
365	Incremental cost, w/ billed kW reduction	$ 23.62	$ 28.09	**$ 0.1417**

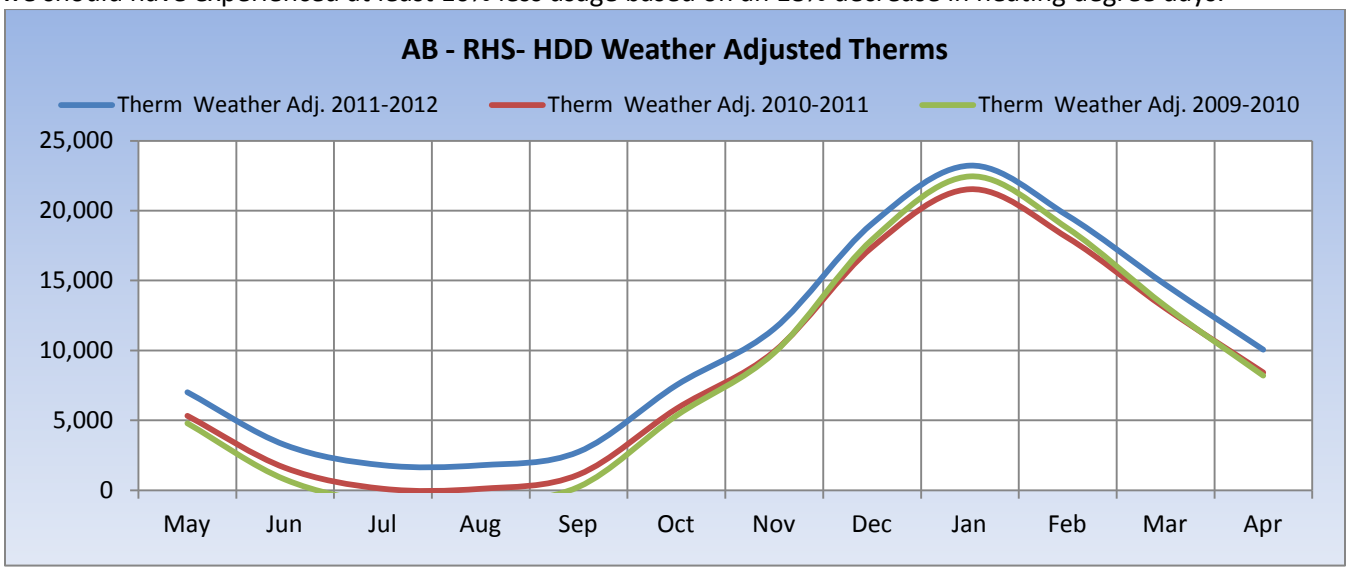
Natural gas is supplied by Direct Energy at a unit cost is $0.78924 per therm, with a contract through July 2014. National Grid delivery charges are approximately $0.3267 per therm for the commercial heating account and $0.4325 per therm for the non-heating account. The weighted aggregate delivery charge is $0.33305 per therm. Total weighted average total cost of gas is $1.1223 / therm

Energy Use - Therms

HDD/d	Days in Period		Therm Equiv. Weather Adj. 2011-2012	Therm Equiv. Weather Adj. 2010-2011	Therm Equiv. Weather Adj. 2009-2010	Therm Equiv. Raw 2011-2012	Therm Equiv.Raw 2010-2011	Therm Equiv.Raw 2009-2010
7.52	31	May	7,016	5,329	4,796	5,686	1,610	877
2.23	30	Jun	3,240	1,607	775	2,016	615	803
0.00	31	Jul	1,797	110	-888	582	539	596
0.00	31	Aug	1,797	110	-888	976	594	413
1.52	30	Sep	2,758	1,126	251	5,762	864	2,298
8.24	31	Oct	7,520	5,833	5,345	11,571	7,627	8,850
14.62	30	Nov	11,562	9,929	9,838	15,251	14,240	12,605
24.87	31	Dec	19,067	17,381	17,920	18,140	23,526	22,859
30.85	31	Jan	23,223	21,536	22,445	25,955	27,428	25,566
27.66	29	Feb	19,646	18,068	18,734	18,079	19,994	22,844
18.60	31	Mar	14,711	13,024	13,175	12,161	17,237	13,006
12.38	30	Apr	10,061	8,428	8,203	6,271	10,246	7,313
	366	Total	122,398	102,483	99,706	122,450	124,520	118,030

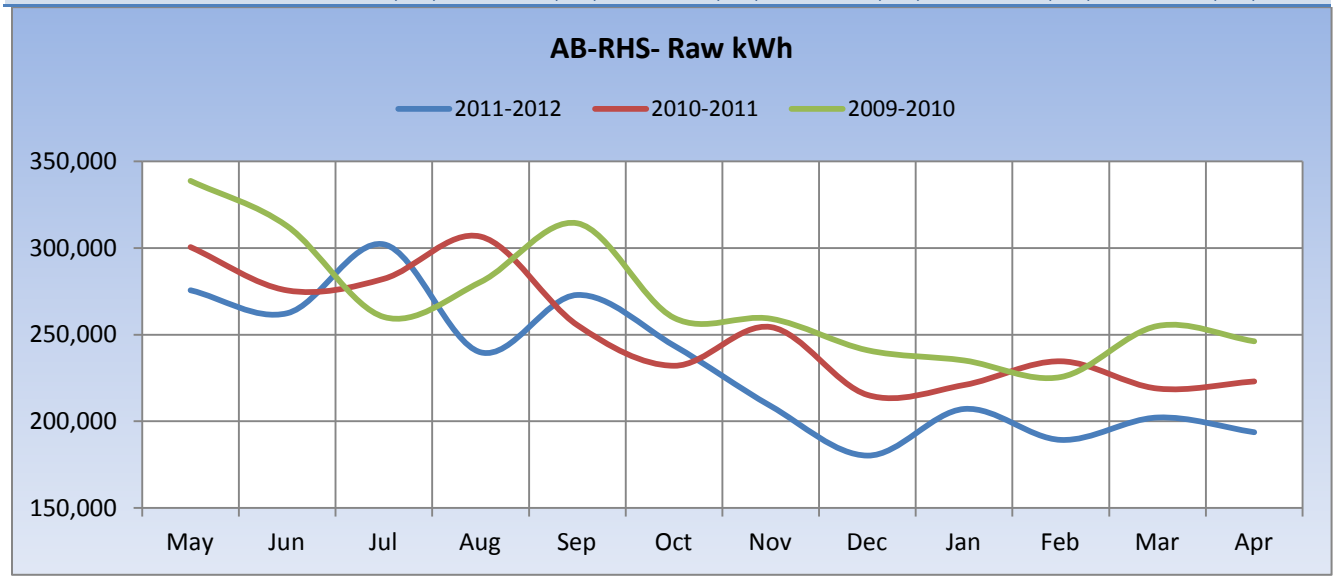


Usage is down 1.7% over the previous winter due to a mild winter; however we predict that weather was so mild we should have experienced at least 10% less usage based on an 18% decrease in heating degree days.

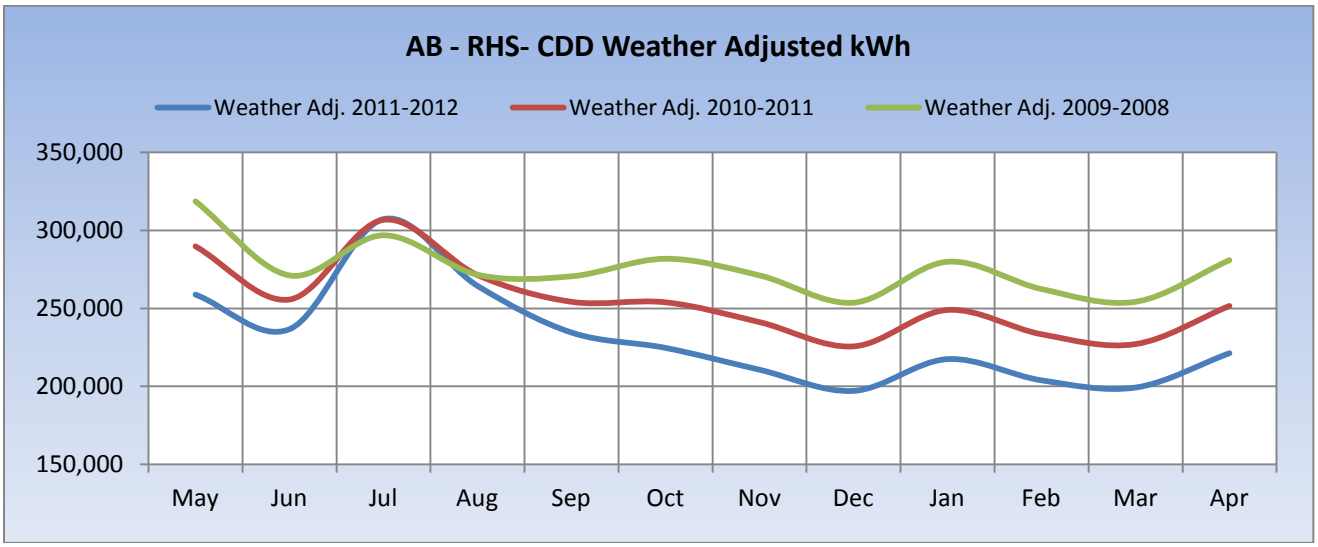


Energy Use - Electric kWh

CDD/d	day		kWh Weather Adjusted 2011-2012	kWh Weather Adjusted 2010-2011	kWh Weather Adjusted 2009-2010	kWh Raw 2011-2012	kWh Raw 2010-2011	kWh Raw 2009-2010
1.56	36	May	258,797	289,748	318,692	275,697	300,535	338,847
4.32	30	Jun	236,645	255,686	271,159	262,446	275,530	312,704
12.31	31	Jul	307,269	306,758	296,892	302,201	282,233	260,308
9.17	29	Aug	264,424	271,354	271,612	239,878	306,588	280,512
4.03	30	Sep	234,492	254,226	270,587	272,982	255,476	314,367
0.89	32	Oct	224,652	253,898	281,847	243,719	232,034	259,806
0.00	31	Nov	210,639	241,221	271,179	208,850	254,373	259,297
0.00	29	Dec	197,049	225,658	253,683	180,245	215,216	241,114
0.00	32	Jan	217,434	249,002	279,926	207,162	220,926	235,203
0.00	30	Feb	203,844	233,440	262,431	189,303	234,614	225,633
0.29	29	Mar	199,202	227,118	254,256	202,222	218,887	255,089
0.47	32	Apr	221,233	251,579	280,937	193,723	222,993	246,263
	371		2,775,680	3,059,687	3,313,202	2,778,428	3,019,405	3,229,143

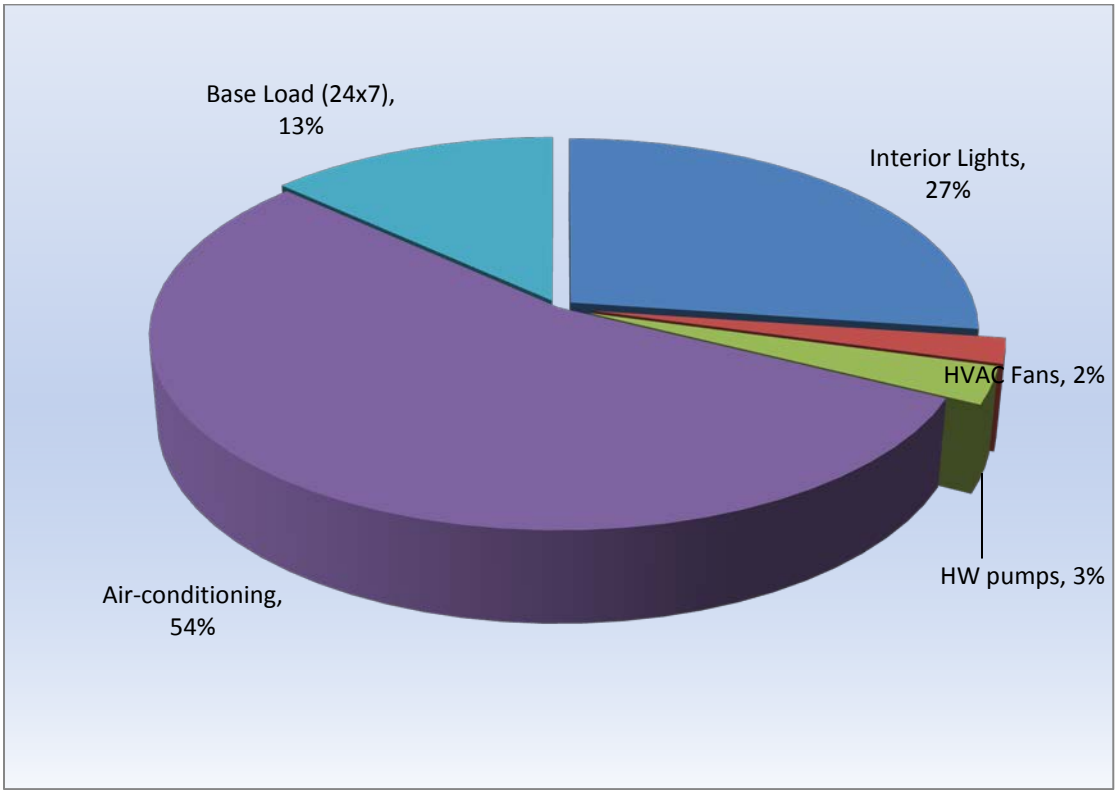


Usage is down 8% over previous year; when we normalize for weather, we find that usage is down around 9%, which is excellent.

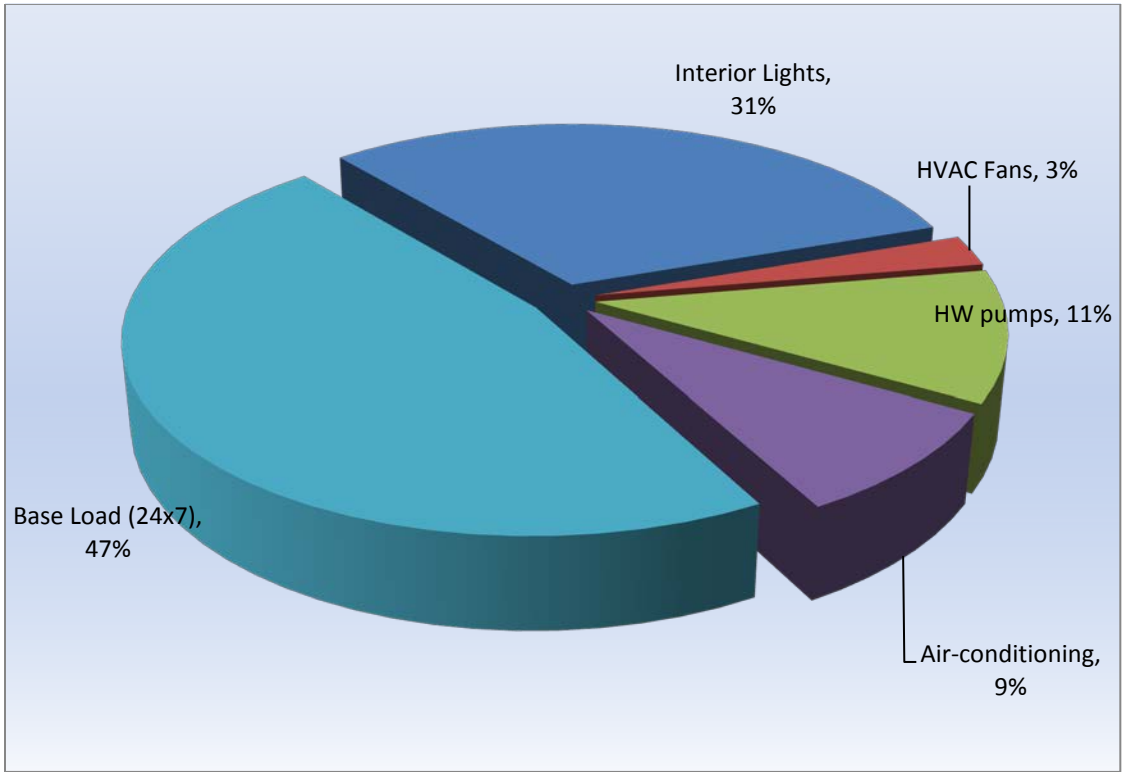


ELECTRIC DISTRIBUTION

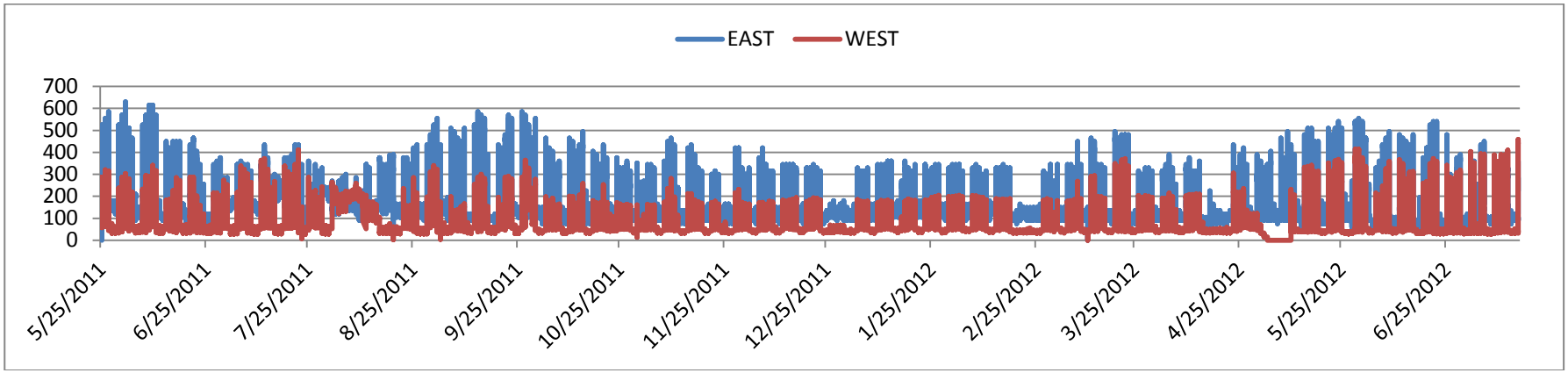
KW DEMAND

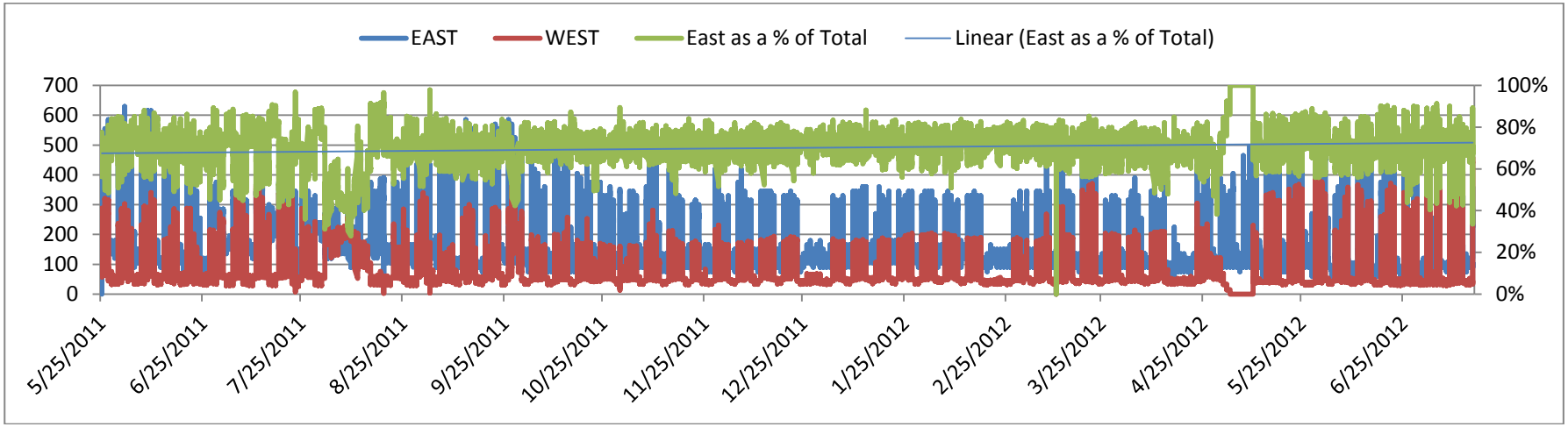


kWh ENERGY



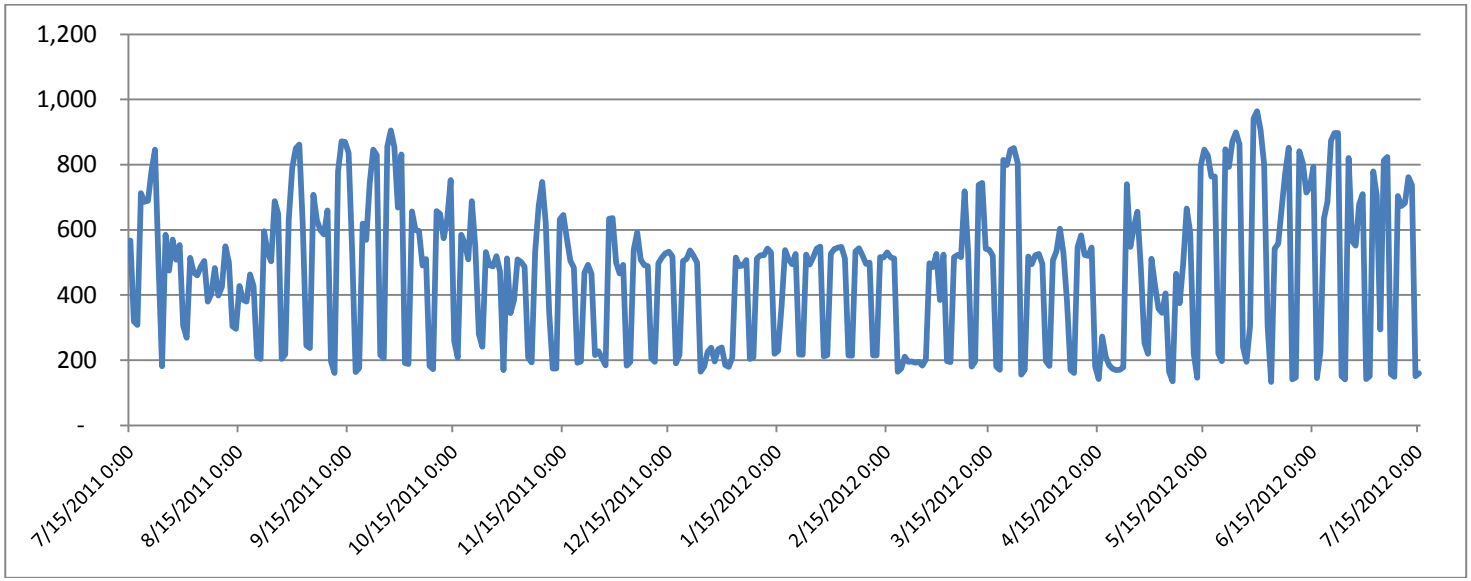
Demand kW Profiles





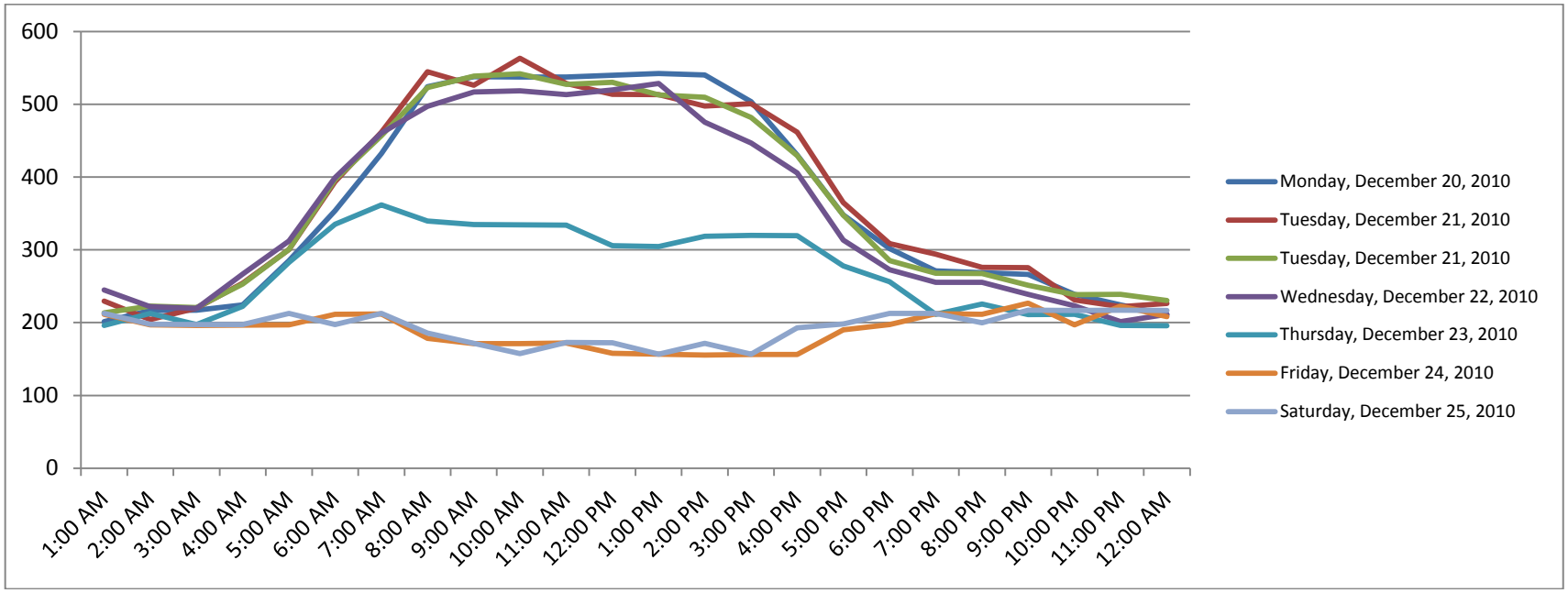
West is the new wing. East is the rest of the school. The green line shows East as a % of total energy. Accordingly, when West's energy drops way down, the green line shoots up..

Daily Max kW - Combined East & West

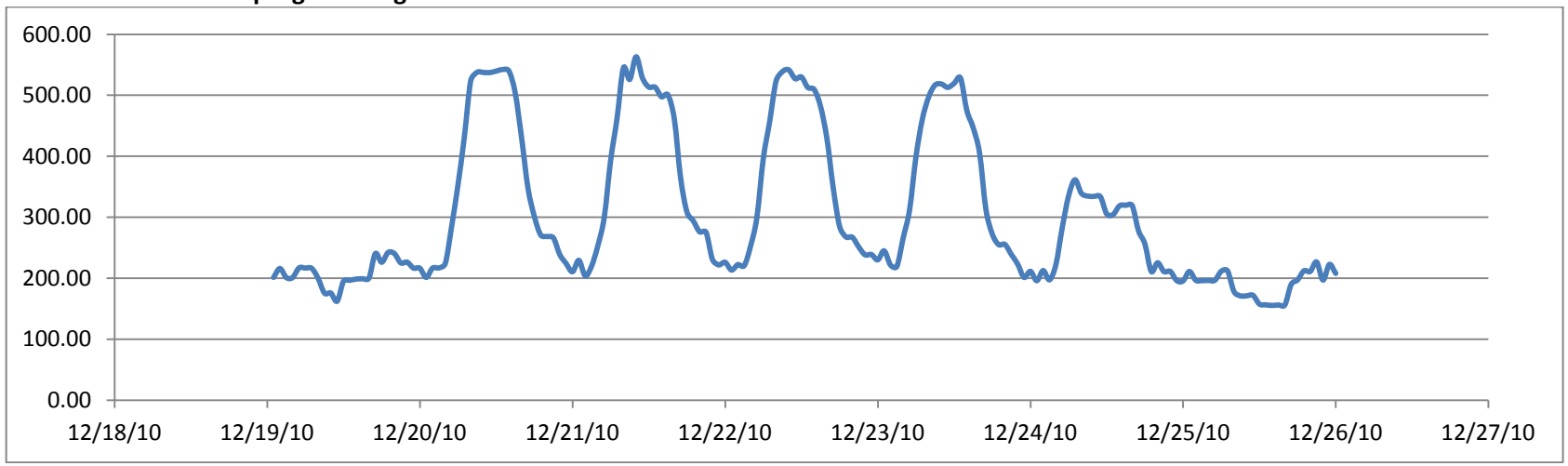


			$ 0.0770	$ 23.6200		
	kW	kWh	Energy	Demand	Tot.Dol	$/kWh
Jan	550	207,162	$ 15,941	$ 12,991	$ 28,932	0.139659
Feb	550	189,303	$ 14,567	$ 12,991	$ 27,558	0.145575
Mar	725	202,222	$ 15,561	$ 17,125	$ 32,685	0.161632
Apr	575	193,723	$ 14,907	$ 13,582	$ 28,488	0.147058
May	825	275,697	$ 21,215	$ 19,487	$ 40,701	0.147631
Jun	950	262,446	$ 20,195	$ 22,439	$ 42,634	0.162449
Jul	825	302,201	$ 23,254	$ 19,487	$ 42,741	0.141432
Aug	575	239,878	$ 18,459	$ 13,582	$ 32,040	0.133568
Sep	825	272,982	$ 21,006	$ 19,487	$ 40,492	0.148334
Oct	700	243,719	$ 18,754	$ 16,534	$ 35,288	0.14479
Nov	620	208,850	$ 16,071	$ 14,644	$ 30,715	0.147069
Dec	600	180,245	$ 13,870	$ 14,172	$ 28,042	0.155576
		2,778,428	**$ 213,800**	**$ 196,518**	**$ 410,318**	**$ 0.1477**

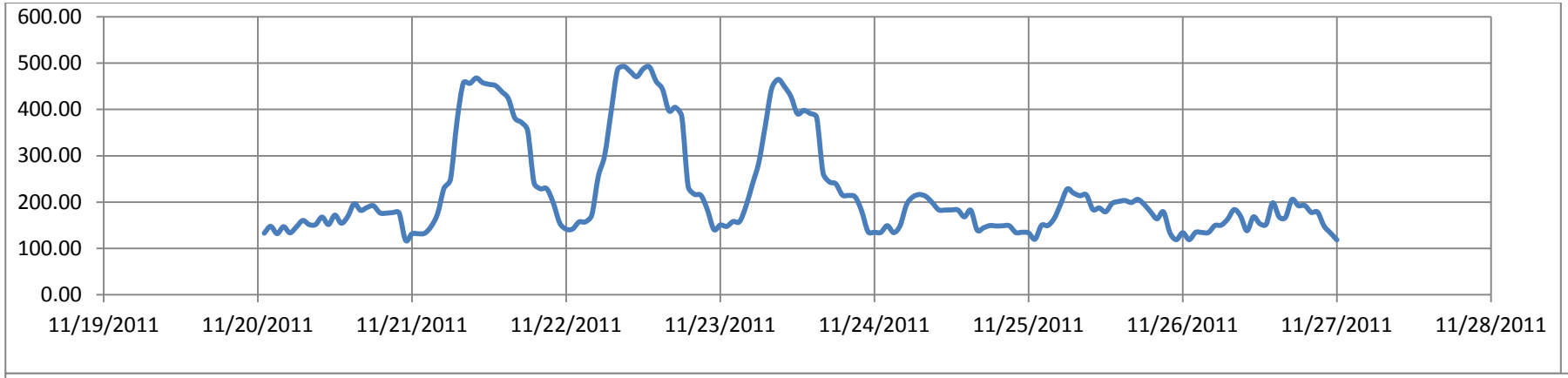
Demand kW Profiles

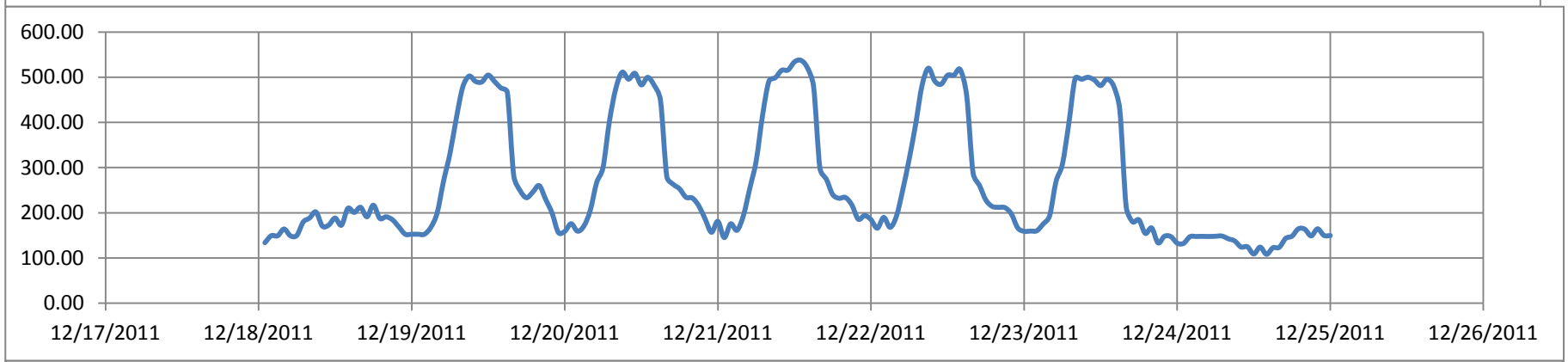


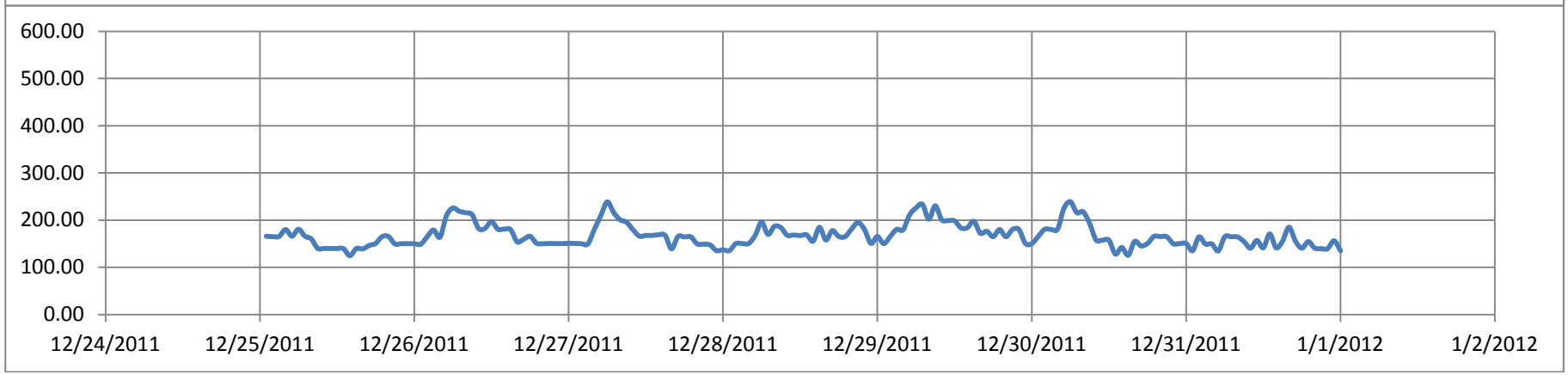
Demonstrates correct programming for weekends.



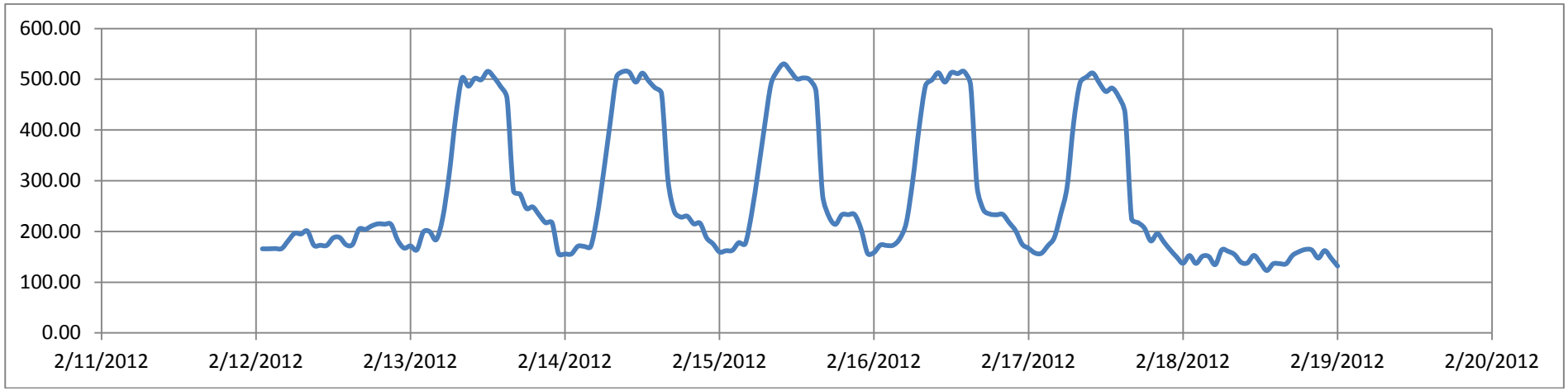
Demonstrates correct Holiday programming.

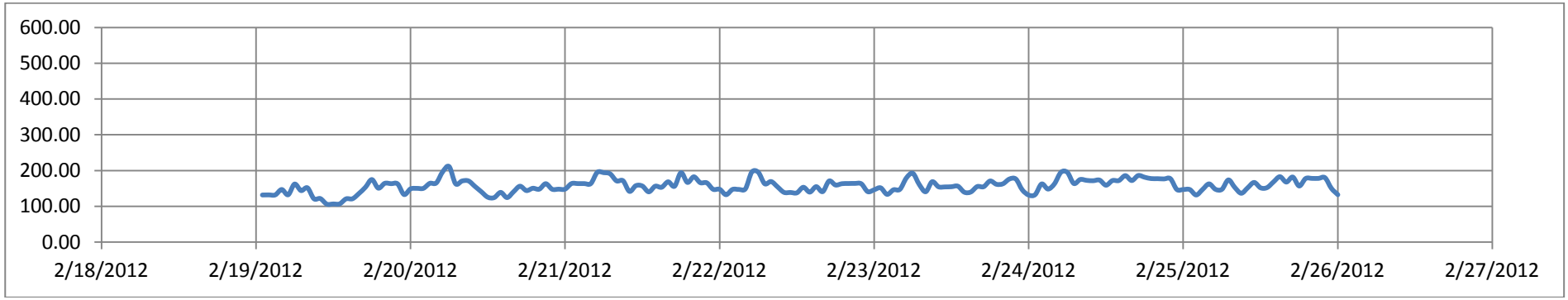




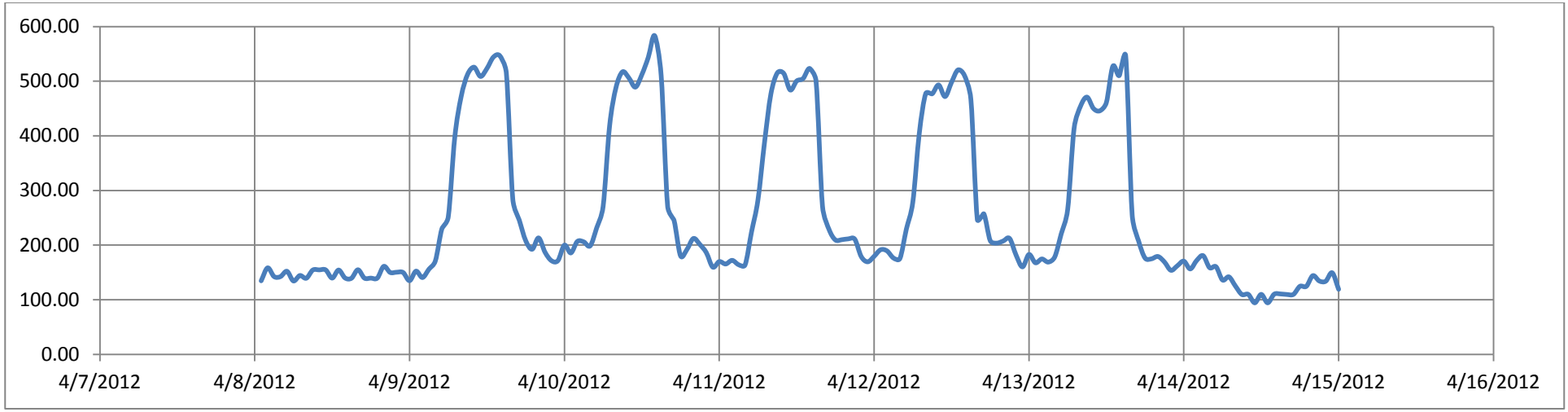


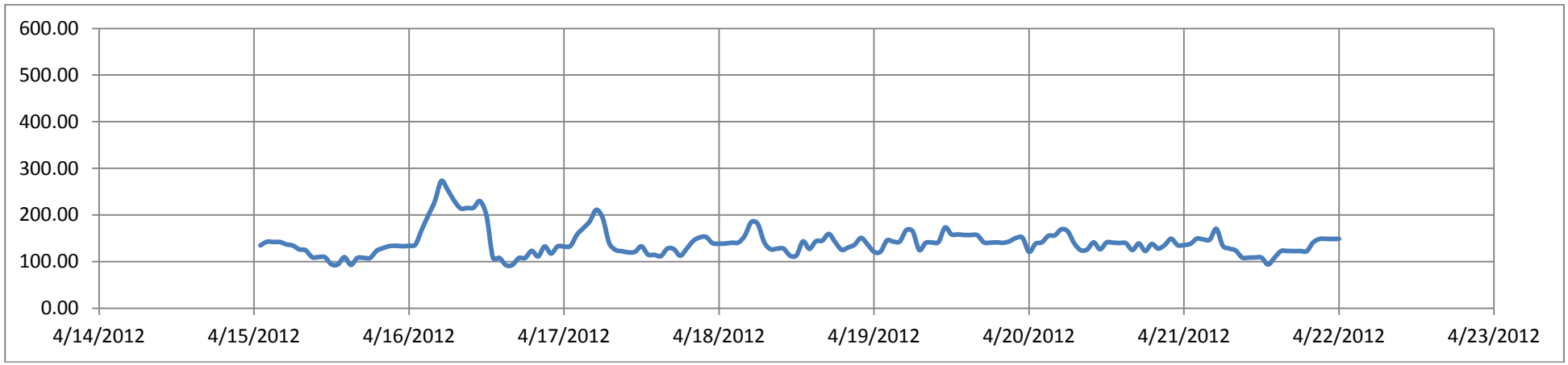
Demonstrates that correct Holiday programming.



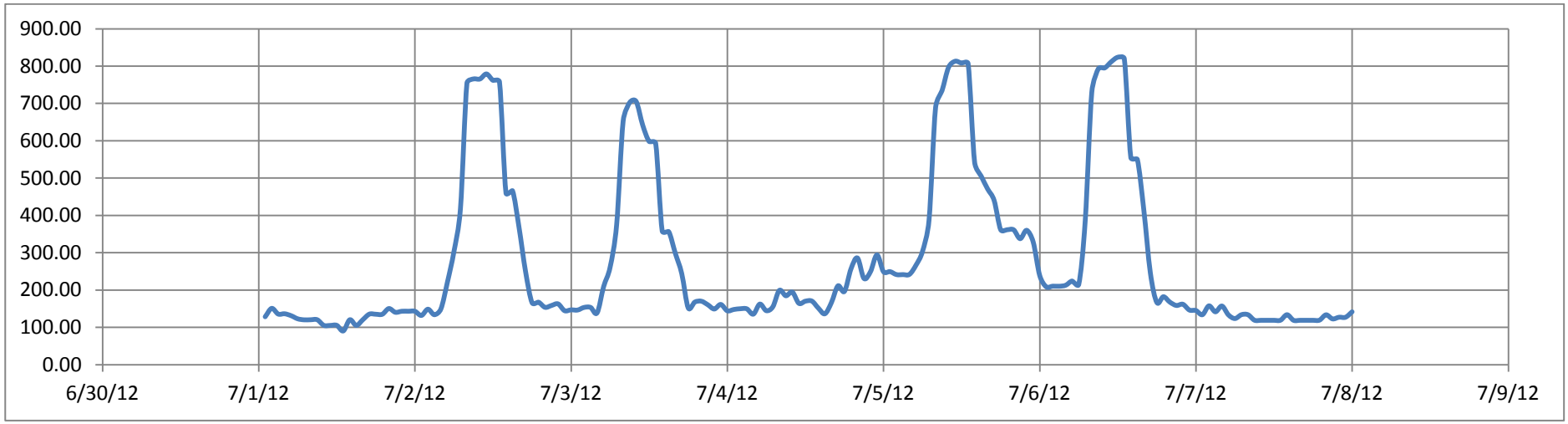


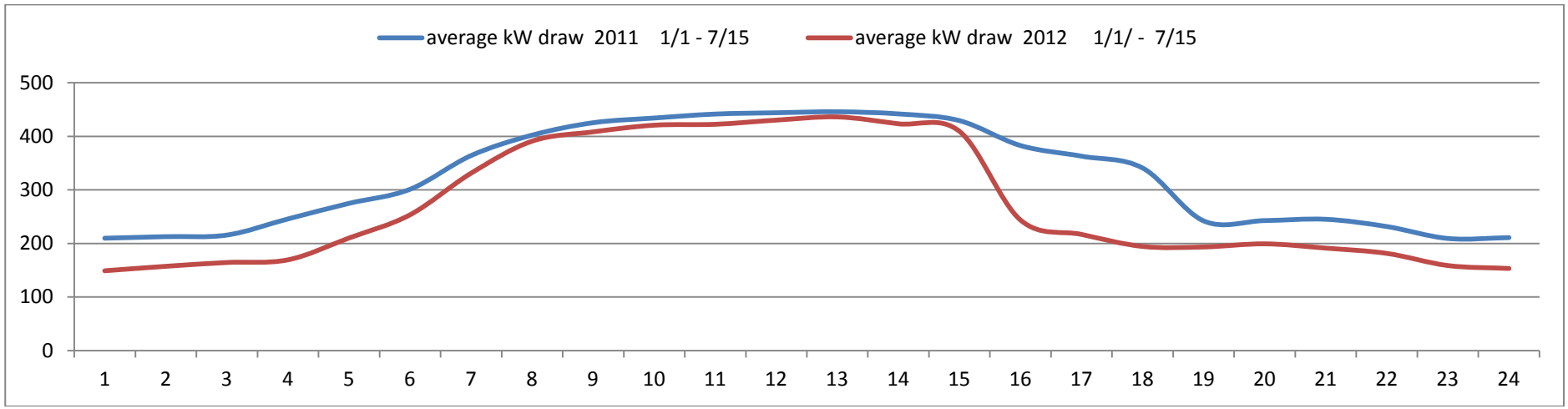
Demonstrates that correct Holiday programming.





Demonstrates correct Holiday programming.

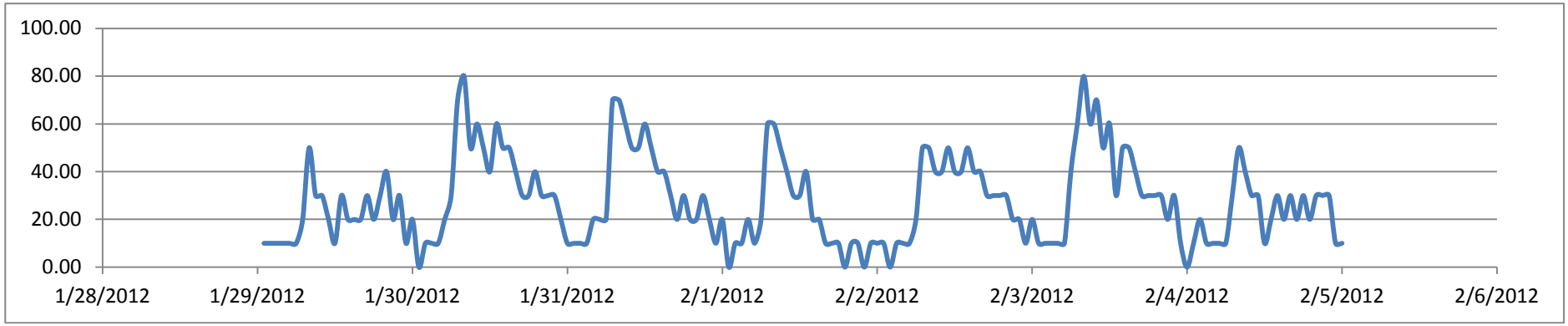




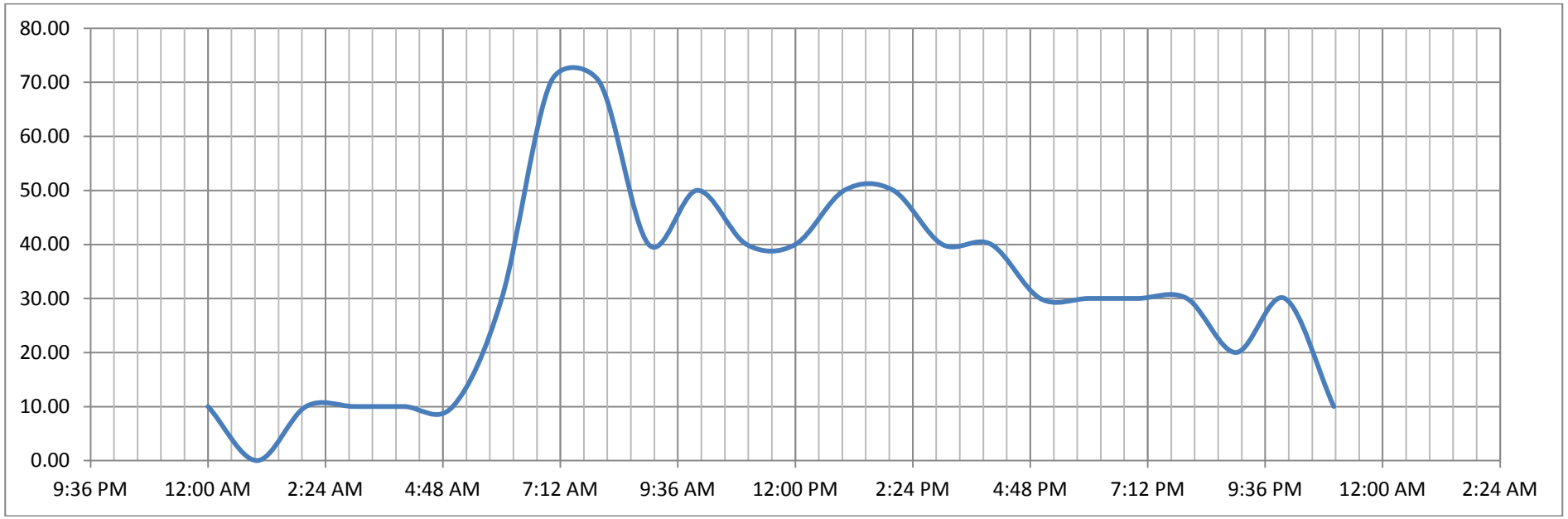
This chart compares two years of hourly average-kW from 00:00 to 24:00 for the first 6.5 months of each of the past two years (we do not have two full years of EnerNOC HS demand data).

There is 60 kW of load that is now being turned off that was not being turned off previously, as well as equipment / lights are being turned off much earlier at the end of the day. Excellent!

Gas Weekly Usage Profile (CCF / hour)



Gas Daily Profile for Feb 29, 2012 (CCF / hour)



Note the sharp rise as the outdoor dampers open up at 6 AM

Benchmarks

The following benchmarking data represents the actual billing data for the twelve months ending August 31, 2011.

Occ kW	Un-Occ'd kW	Site Equiv. Therms	kWh/sf	Occ watt/sf	Un-Occ'd watt/sf	Therm-Equiv. per sf	Site kBTU /sf	Source kBTU/sf	EPA National Ranking
500[1]	150	122,115	7.08	1.30	0.39	0.32	56	115	90

[1] 800 kW with AC-cooling online.

Unoccupied watts / sf is considered to be elevated; it can be reduced to 0.22 w/ sf by turning off the hot water pumps, and PoolPak, and reducing the number of hallway emergency lights.

Current metric tons equivalent of CO_2e are 1,699 (MTCDE) , or 9.7 pounds of CO_2e, per square foot.

Occ kW	Un-Occ'd kW	Site Equiv. Therms	kWh/sf	Occ watt/sf	Un-Occ'd watt/sf	Therm-Equiv. per sf	Site kBTU /sf	Source kBTU/sf	EPA National Ranking
441	65	71,545	5.55	1.14	0.22	0.19	38	84	98

If the EEMs in this report are funded, then your annual metric tons of CO_2e will drop to 1,206 MTCDE, or 6.89 pounds of CO_2e per SF per year.

EEM #	Measure Description	Q	Est'd Savings kWh	Est'd Savings Therm-Equiv	Est'd Svgs per Yr	Cost	Simple PB (Years)
	Low Cost / No Cost Energy Efficiency Opportunities						
1	Computer Power Management	743	37,150	0	$2,859	$0	n/a
2	Controls for Cold Beverage Machine	1	800	0	$62	$180	2.92
3	Employee & Staff Energy Education Program	1	6,834	305	$867	$0	0.00
4	High Efficiency Spray Valves	1	0	98	$109	$100	0.9
5	Turn off Kitchen Pilots each summer	1	0	566	$632	$100	0.2
	Energy Efficiency Opportunities Requiring Capital Outlay						
6	Retro-commissioning of EMS, Boilers, Additional Programming , Boiler Isolation		134,119	34,350	$48,653	52,000	1.1
7	Install VFDs to convert RTU-10 from CAV to VAV (Lower Gym)	1	35,884	0	$2,761	$12,697	4.6
8	Install CO2 DCV for RTU-10 (Lower Gym)	1	0	1,923	$2,146	$3,000	1.4
9	Install CO2 DCV for RTU-11 (Upper Gym)	1	0	1,155	$1,289	$3,000	2.3
10	Install CO2 DCV for RTU-4 (Band)	1	1,981	578	$797	$3,000	3.8
11	Install CO2 DCV for J/C RTU-10 & 11; McQuay RTU-7 (Café)	3	2,956	1,899	$2,347	$6,000	2.6
12	Install CO2 DCV for JC / RTU-7 & 8 (Auditorium)	6	9,905	3,591	$4,770	$10,000	2.1
13	Install VFD to convert JC / RTU-7 & 8 from CAV to VAV (Auditorium)	4	36,012	0	$2,771	$18,600	6.7
14	Energy Efficiency Lighting for Pool, Gym, Corridor, Common Area, Misc., & Auditorium	59	327,019	0	$38,846	$203,110	5.2
15	Install boiler run around loop to have deeper OAT reset schedule	1	0	6,106	$6,814	$17,000	2.5
	Not Recommended At This Time						
16	Install CO2 DCV for RTU/AC-5 & 6 (Library)	8	4,944	753	$1,221	$12,800	10.5
17	Install CO2 DCV for RTU-5 (Choir)	1	217	63	$87	$3,000	34.5
18	CO2 DCV for McQuay (Classroom UVs)	11	1,859	627	$843	$17,600	20.9
19	Install CO2 DCV for RTU / AC-9 , 10, 11, 12, 13 (New Wing Classrooms)	40	11,785	4,776	$6,237	$64,000	10.3
20	Convert Jackson Church CAV Classroom CAV MZ to VAV (eQUEST)	1	67,760	5,000	$10,794	$111,000	10.3
21	Pool Cover	1	18,900	1,800	$3,463	$45,000	13.0
22	Gym Destratification Fan	1	-188	600	$655	$7,000	10.7
23	Solar Hot Water Swimming Pool Heater	1	0	1,000	$1,116	$25,000	22.4
	Totals excluding EEM-16 thru EEM-23		**592,660**	**50,571**	**115,721**	**328,787**	**2.84**
	Total % Savings		**21.7%**	**41.4%**			

NSTAR Electric, National Grid Gas and Energy Management Associates, Inc. (EMA) neither has control of, nor assumes control of the actual building processes, equipment operation or climatic conditions. Additionally, EMA does not expressly or implicitly warrant or represent that EMA's energy and cost estimates of the building or equipment operation will be the actual operation energy and cost. Incentive rebates are estimates, and should be finalized by issuance of a commitment letter for customer measure prior to proceeding with retrofits.

RECOMMENDATIONS

LOW COST/NO COST ENERGY EFFICIENCY OPPORTUNITIES

EEM-1 Control Power Management

Computer energy use can be controlled through a combination of automatic power management features and manual shut down by users. Organizations can use a standardized setting so that all monitors go into sleep mode after 10 minutes of inactivity. Power management can also be enabled for computer hard drives, but may require some investigation and testing before full implementation. Savings calculations in this report are based on 50 kWh saved per PC**.** There are no costs to implement the power management, other than in-house efforts. Insist on 80% or greater energy efficient power supplies and visit www.80plus.org. Additional information is available on the ENERGY STAR website at www.energystar.gov/powermanagement. Some firms have found that some software is disabled by antivirus programs; it has been reported that NightWatchman® does not have this issue: http://www.1e.com/softwareproducts/nightwatchman/index.aspx

► ***Action Steps:*** *Work with in-house IT staff to adjust power management settings.*

EEM-2 Install Controls on Vending Snack and Beverage Machines

We include this measure, even though this building may not have a cold-beverage vending machine in case it may apply to other buildings. Vending machines and refrigerated beverage coolers typically consume energy 24 hours per day, in the form of lights and refrigeration. Energy savings can be achieved by installing an occupancy-based controller that will turn the lights off and reduce the compressor runtime when the area is unoccupied. Savings calculations for this are based on 800 kWh savings per cold beverage machine. NSTAR offers rebate-incentive of $115 for each cold beverage vending machine, and $45 for a snack machine vending-miser. To qualify for the rebate, a vending machine sensor must be installed on a unit located indoors and scheduled to remain in NSTAR's territory for a minimum of three years. A single unit can be used to control a bank of vending machines for additional savings at no additional cost; however circuit breaker capacity should be verified first. The most popular controllers are the Energy Miser series from USA Technologies (www.usatech.com/energy_management).

► ***Action Steps:*** *Purchase Vending Miser directly or work with an NSTAR Preferred Provider to install the device. The Utility Program Manager or Preferred Provider for the facility is able to provide assistance with obtaining financial incentives.*

EEM-3 Employee & Staff Education

An employee or staff education program can raise awareness about how energy is used in the building, and provide recommendations on how employees can help save energy. Energy-saving tips can include shutting off lights, computers, printers, copiers, monitors, miscellaneous electric equipment, closing windows, etc., when the work day is over. We assessed savings at 0.25%.

► ***Action Steps****: An energy education program can be developed by internal employees or with help from external organizations. The ENERGY STAR web site has resources that can help with energy education efforts.*

EEM-4 High Efficiency Spray valves for kitchen pot washing

Kitchen pots, pans and dishes can be cleaned more efficiently with high efficiency nozzles, which deliver the same pot-washing effectiveness while using less hot water. They save approximately 0.5 therm per hour of use.

► ***Action Steps***: *Spray valve can cost around $100, and there is a Mass Save incentive of $100.*

EEM-5 Turning Off Kitchen Pilots during the Summer

The in-house energy committee had the standing natural gas pilots turned off on the kitchen appliances. There was a reduction seen in the gas bill from this action. Savings were based on 2 months no pilot.

► ***Action Steps***: *Now that this program has proven itself, the kitchen exhaust and make-up air fans should be re-programmed. Currently they are schedule to energize over the weekend every 12 hours for one hour, for a total runtime of 4 hours per weekend, to expel any CO2 / CO building up. CO / CO2 readings should be taken with a data logger to determine if fan operation is really required. If required, but not for the full time, then a permanent sensor / trigger program should be written.*

ENERGY EFFICIENCY OPPORTUNITIES REQUIRING CAPITAL OUTLAY

EEM-6 Retro-commissioning of EMS, Boilers, Additional Programming, Boiler Isolation (A through F)

(A) Turn OFF HW Boilers when OAT > 65F; turn OFF PoolPak each evening at 10 PM

The building was commissioned for boilers to be automatically turned off whenever the OAT > 65F, notwithstanding concerns about a lack of reheat. EMA believes that areas served by VAV DX don't require reheat, and by lowering the VAV TB minimum airflow value, or raising the discharge air temperature (DAT) setpoint, the need for reheat can be further mitigated. For CAV DX systems such as the Johnson Church RTUs, these units are outfitted with refrigerant reheat coils; again, raising the DAT setpoint can further aid in reducing the need for reheat. The PoolPak was commissioned to be turned off each evening. During the non heating season the pool should be heated by the electric heater. The kW at the heater is about equal to the extra pump energy previously used to keep the boiler online, so this kW demand should not be a concern.

► ***Action Steps***: *Ensure that kW electric heater controls and flow safety are functioning*

(B) Turn OFF HW Boilers when OAT > 40F & Bldg is Unoccupied

We estimate that there is an additional 1400 hours per heating season that the boilers are running between 40 ^{o}F OAT and 65 ^{o}F OAT when the building is unoccupied.

► ***Action Steps***: *Work with EMS vendor to re-program EMS.*

(C) Reduce PoolPak OA from 35% Min OA (3962 CFM) to 25% Min OA (3010 CFM); verify economizer control set for 80F space temperature.

Based on ASHRAE 62.1-2010 we find that the pool area requires only 3010 CFM of OA (25% OA). The design calls for 3962 CFM of OA (35%). Reducing the amount of cold air being heated all winter will provide attractive gas savings.

► ***Action Item:*** *Work with TAB certified air balancer, and reset min OA on the EMS. Work with NSTAR and NGRID Gas on incentives.*

(D) Troubleshoot Optimal Start Program (pure ventilation savings)

The optimal start program is not functioning. During the winter heating season it is not uncommon to program a 05:00 AM hard-entered start via the EMS. The issue is that a hard-entered start simultaneously opens the fresh air (ventilation) dampers to their minimum position. This does not occur with the optimal start program. Accordingly the fresh air dampers are often open at least 1.5 hours more than they need to be. Correcting the optimal start program can save significant gas and electric.

► ***Action Item:*** *Obtain turnkey quote from EMS control vendor, and work with NSTAR Electric and National Grid Gas.*

(E) Re-Commission EMS / RTU Controls

The EMS was commissioned back in 2004. EMA believes the EMS should be re-commissioned. The graphics should be enhanced, economizer controls verified, and the VAV TB airflow k-factors re-determined. The latter should help with some of the air whistling that is occurring in the new wing.

► ***Action Item:*** *Work with NSTAR Electric and Gas to develop a custom incentive with your controls vendor.*

(F) Isolate 3rd (Spare) Boiler

Cleaver Brooks standby losses are approximately 1.5% to 3% per seasonal hour. Standby loss savings associated with physically isolating the 3rd boiler are estimated to be approximately 6200 therms.

EEM-7 Install VFDs to convert RTU-10 from CAV to VAV (Lower Gym)

Significant electric fan motor savings can be cost effectively obtained by reducing airflow when space heating or cooling loads are not great, and automatically increasing airflow as loads increase. In this case, it is "pure" temperature dependent variable air volume (VAV) operation because no VAV boxes and no minimum static pressure set points are required. There are large fan power savings according to the Affinity (cubic[1]) law, i.e. at 50% flow you will save ~85% power, less VFD & motor losses. EMA recommends maintaining no less than 25% (15 Hz) fan speed. RTU-10 has a supply and return fan with a 10 hp and 5 hp motor, respectively. Airflow shall vary in order to achieve space temperature set-point only after the RTU is delivering maximum heating output. The EMS contractor should become familiar with the operation of the RTU to ensure that all components control in a manner consistent with the above energy strategy, and economizer controls.

[1]*cubic relationship is valid when we take into account power necessary to overcome inertia in order to initiate flow*

► ***Action Item:*** *Obtain turnkey quote from a controls vendor, and work with NSTAR to obtain electric incentives.*

EEM-8 Install CO2 DCV for RTU-10 (Lower Gym)

The gym's ventilation system currently provides minimum ventilation air in support of 500 occupants throughout the day, regardless of the space's actual occupancy. Carbon dioxide (CO2) can be measured and used as a surrogate for occupancy. (The greater the number of occupants, the greater the CO2 level) A CO2 demand-controlled ventilation (DCV) strategy will match the per person ventilation load to the actual number of occupants in the space. This strategy will save energy by reducing the amount of ventilation air requiring heating or cooling. The minimum CFM of OA is exhausted by the RTU's return air fan. The DCV strategy shall be to control the RTU's minimum OA from 2% to 53% (7454 CFM of OA). Economizer (free cooling) shall have priority over CO2 DCV. When not in economizer mode, the minimum OA damper shall

maintain a space CO2 set point of 800 ppm without exceeding its scheduled minimum (2000 CFM) of OA. Verify BAS occupancy schedule with staff.

► ***Action Item:*** *Obtain turnkey quote from qualified control vendors, and work with NSTAR Electric and National Grid Gas custom incentives*

EEM-9 Install CO2 DCV for RTU-11 (Upper Gym)

The gym's ventilation system currently provides minimum ventilation air in support of 500 occupants throughout the day, regardless of the space's actual occupancy. Carbon dioxide (CO2) can be measured and used as a surrogate for occupancy. (The greater the number of occupants, the greater the CO2 level) A CO2 demand-controlled ventilation (DCV) strategy will match the per person ventilation load to the actual number of occupants in the space. This strategy will save energy by reducing the amount of ventilation air requiring heating or cooling. The minimum CFM of OA is exhausted by the RTU's return air fan. The DCV strategy shall be to control the RTU's minimum OA from 2% to 23% (7500 CFM of OA). Economizer (free cooling) shall have priority over CO2 DCV. When not in economizer mode, the minimum OA damper shall maintain a space CO2 set point of 800 ppm without exceeding its scheduled minimum (7500 CFM) of OA. Verify BAS occupancy schedule with staff.

► ***Action Item:*** *Obtain turnkey quote from qualified control vendors, and work with NSTAR Electric and National Grid Gas custom incentives*

EEM-10 Install CO2 DCV for RTU-4 (Band)

The band room ventilation system currently provides minimum ventilation air in support of 135 occupants throughout the day, regardless of the space's actual occupancy. Carbon dioxide (CO2) can be measured and used as a surrogate for occupancy. (The greater the number of occupants, the greater the CO2 level) A CO2 demand-controlled ventilation (DCV) strategy will match the per person ventilation load to the actual number of occupants in the space. This strategy will save energy by reducing the amount of ventilation air requiring heating or cooling. The minimum CFM of OA is exhausted by the RTU's return air fan. The DCV strategy shall be to control the RTU's minimum OA from 2% to 31% (2000 CFM of OA). Economizer (free cooling) shall have priority over CO2 DCV. When not in economizer mode, the minimum OA damper shall maintain a space CO2 set point of 800 ppm without exceeding its scheduled minimum (2000 CFM) of OA. Verify BAS occupancy schedule with staff.

► ***Action Item:*** *Obtain turnkey quote from qualified control vendors, and work with NSTAR Electric and National Grid Gas custom incentives*

EEM-11 Install CO2 DCV for J/C RTU-10 & 11; McQuay RTU-7 (Café)

The cafeteria ventilation system currently provides minimum ventilation air in support of 571 occupants throughout the day, regardless of the space's actual occupancy. Carbon dioxide (CO2) can be measured and used as a surrogate for occupancy. (The greater the number of occupants, the greater the CO2 level) A CO2 demand-controlled ventilation (DCV) strategy will match the per person ventilation load to the actual number of occupants in the space. This strategy will save energy by reducing the amount of ventilation air requiring heating or cooling. The minimum CFM of OA is exhausted by the RTU's return air fan. The DCV strategy shall be to control RTU-10, 11 minimum OA from 2% to 56% (8570 CFM of OA). Economizer (free cooling) shall have priority over CO2 DCV. When not in economizer mode, the minimum OA damper shall maintain a space CO2 set point of 800 ppm without exceeding its scheduled minimum (8570 CFM) of OA. Verify BAS occupancy schedule with staff.

► ***Action Item:*** *Obtain turnkey quote from qualified control vendors, and work with NSTAR Electric and National Grid Gas custom incentives*

EEM-12 Install CO2 DCV for JC / RTU-7 & 8 (Auditorium)

The auditorium ventilation system currently provides minimum ventilation air in support of 500 occupants throughout the day, regardless of the space's actual occupancy. Carbon dioxide (CO2) can be measured and used as a surrogate for occupancy. (The greater the number of occupants, the greater the CO2 level) A CO2 demand-controlled ventilation (DCV) strategy will match the per person ventilation load to the actual number of occupants in the space. This strategy will save energy by reducing the amount of ventilation air requiring heating or cooling. The minimum CFM of OA is exhausted by the RTU's return air fan. The DCV strategy shall be to control RTU-10, 11 minimum OA from 2% to 50% (7500 CFM of OA). Economizer (free cooling) shall have priority over CO2 DCV. When not in economizer mode, the minimum OA damper shall maintain a space CO2 set point of 800 ppm without exceeding its scheduled minimum (7500 CFM) of OA. Verify BAS occupancy schedule with staff.

► ***Action Item:*** *Obtain turnkey quote from qualified control vendors, and work with NSTAR Electric and National Grid Gas custom incentives*

EEM-13 Install VFD to convert JC / RTU-7 & 8 from CAV to VAV (Auditorium)

Significant electric fan motor savings can be cost effectively obtained by reducing airflow when space heating or cooling loads are not great, and automatically increasing airflow as loads increase. In this case, it is "pure" temperature dependent variable air volume (VAV) operation because no VAV boxes and no minimum static pressure set points are required. There are large fan power savings according to the Affinity (cubic[1]) law, i.e. at 50% flow you will save ~85% power, less VFD & motor losses. EMA recommends maintaining no less than 25% (15 Hz) fan speed. RTU-7 & 8 each has a supply and return fan with a 5 hp and 3 hp motor, respectively. Airflow shall vary in order to achieve space temperature set-point only after the RTU is delivering maximum heating or cooling output. The EMS contractor should become familiar with the operation of the RTU to ensure that all components control in a manner consistent with the above energy strategy, and economizer controls.

[1]*cubic relationship is valid when we take into account power necessary to overcome inertia in order to initiate flow*

► ***Action Item:*** *Obtain turnkey quote from a controls vendor, and work with NSTAR to obtain electric incentives.*

EEM-14 Energy Efficient Lighting

Pool Lighting

ABRHS has a proposal to replace the existing metal halide lighting with new wall sconce fixtures using 6 T5HO lamps. These fixtures should be installed with bi-level switching, so that only two or three lamps are on when the lights are being used for security. In addition the 90 Watt incandescent under-pool lighting should be replaced with an LED lamp, preferably a hard-wired replacement.

Gym Lighting –

The compact fluorescent fixtures in the gymnasiums should be replaced with 4-lamp T5HO Fluorescent High Bay fixtures. (This measure also includes one of the CFL high-bay fixtures located in a stairwell.) The new fixtures should have individual occupancy sensors so that only the lights which are needed will be used. The bi-level switching currently in use should be maintained. Photosensors could also be tied in to the Lower Gym fixtures. This measure would also yield maintenance savings due to fewer compact fluorescent lamp replacements.

Corridors & Stairwells

ABRHS has a proposal to install occupancy sensors in the corridors and to install a fixture with built-in occupancy sensor and bi-level switching in the stairwells. By including lights currently left on 24 hours per day, this will drastically reduce the use of lighting during unoccupied periods. In addition, the hallway fixtures should be retrofitted. The existing 1'x4' hallway fixture is not very efficient, with two lamps crammed into a narrow fixture. These should be retrofitted to use a single lamp (centered in the fixture with a retrofit kit) and a high-powered ballast. That would drop fixture wattage from 60 to 36 Watts per fixture for all of the 1'x4' fixtures.

Corridor LED Lighting

The Main Lobby and South Student Center both have 100W metal halide recessed downlights ("cans") in their high ceiling areas. In addition to being inefficient, these fixtures have a short lamp life and require frequent maintenance. The fixtures can be replaced or retrofitted to use LED light sources. In the Lobby, an alternative design using surface-mounted fluorescent or LED fixtures might boost light levels. As part of this work, the Lobby lighting circuit should be separated from the second floor corridors, to allow for better control. Photocell controls should be installed in the Student Center because of the ample daylight in this space. The compact fluorescent recessed downlights in the cafeteria and some of the corridors should also be replaced with a 12 Watt LED fixture, such as the 6" retrofit units by Cree.

Because the Auditorium house lighting is so heavily used, the 300 W incandescent fixtures are good candidates for replacement or retrofit. New LED fixtures or retrofits, in the 48 to 60 Watt range, can effectively replace the incandescent lamps. (The actual wattage will depend on the configuration of the fixture – savings are calculated using a 60 watt LED array.) The key factor for this installation will be the dimming range of the LED driver. In order to function in this environment, it must allow the LED lamps to smoothly dim down to darkness.

Miscellaneous Lighting Measures

Outside of these main categories, there are a number of other cost-effective lighting efficiency opportunities.

- Installing occupancy sensors in the restrooms is be cost-effective, if the 4-lamp fixtures were retrofitted to use 2 T8 lamps and a high-power ballast and if the emergency light in the restrooms (typically 1 of 3) is also controlled with the sensor.
- In some spaces, such as locker room vestibules, two of the four lamps in the recessed fixtures have been removed. While it's not elegant, it appears to be an effective practice. If this is to be continued, the ballast and lampholders ("tombstones") for the removed lamps should also be removed from the fixtures

Lighting Measures Considered but Not Recommended

- Installing occupancy sensors in the locker rooms and custodial closets is a marginal option. The locker rooms have a more complicated geometry that requires extra sensors and the closets are simply too small. An electronic or twist timer could be an option for the closets.
- Because staff and students are conscientious about shutting lights off, it is not cost-effective to install occupancy sensors in classroom and the cafeteria.
- Although LED technology has improved and come down in cost, the recessed downlights in the corridors, which use 32 W compact fluorescent lamps, cannot cost-effectively be retrofitted or replaced.

ECM	kW Saved	kWh Saved	Total Cost	Cost w/ Contingency	Total $ Saved	Rebates	Net Simple Payback
Pool Lighting	15.8	76,252	$ 23,485	$ 25,834	$ 9,502		2.7
Gym	9.0	69,355	$ 26,884	$ 29,572	$ 7,423		4.0
Corridors	5.8	76,391	$ 31,929	$ 35,121	$ 7,233		4.9
Common Area LED Lighting	4.1	33,996	$ 39,993	$ 43,992	$ 3,574		12.3
Miscellaneous	2.2	16,852	$ 10,905	$ 11,996	$ 1,805		6.6
Auditorium	22.3	54,173	$ 51,450	$ 56,595	$ 9,309		6.1
Total Lighting	**59.3**	**327,019**	**$ 184,645**	**$ 203,110**	**$ 38,846**	**$ 81,755**	**3.1**

[1]Rebates are estimates and could be higher or lower.

- ***Action Steps***: *Work with NSTAR to develop custom lighting solutions*

EEM-15 Install Boiler 3-way Hot Water Mixing Valve

By installing a 2-way hot water mixing valve and associated piping and controls, the 140-to 180 ^{o}F OAT reset schedule can be re-programmed to 90-180 ^{o}F. With the current piping configuration, 90-180 ^{o}F is not achievable without significant condensate formation which is acetic and thus corrosive to boiler metal. We believe that building space temperatures, especially during the shoulder seasons will be reduced with a more aggressive reset schedule, and overheating of spaces considerably reduced in addition to radiant pipe heat losses.

- ***Action Steps***: *Work with NGRID Gas to develop custom solutions.*

EEMS EVAULATED BUT NOT RECOMMENDED AT THIS TIME

EEM-16 Install CO2 DCV for RTU/AC-5 & 6 (Library)

This measure is not recommended due to poor economics. This strategy is necessarily different than the previously recommend CO2 strategies in that here we would reduce min OA damper position and use eight (8) CO2 sensors to override their VAV TBs should the zone CO2 increase beyond 800 ppm. Given the usage profiles for the library the payback is too long.

EEM-17 Install CO2 DCV for RTU-5 (Choir)

This measure is not recommended due to poor economics. Chorus occupant profiles are high, and runtimes relatively short

EEM-18 CO2 DCV for McQuay (Classroom UVs)

This measure is not recommended due to poor economics attributed to the classrooms UVs being promptly turned off at 4 PM.

EEM-19 Install CO2 DCV for RTU / AC-9 , 10, 11, 12, 13 (New Wing Classrooms)

This measure is not recommended due to poor economics. The strategy is identical to the library as described in EEM-19 (above).

EEM-20 Convert Jackson Church CAV Classroom CAV MZ to VAV (eQUEST)

This measure is not recommended due to poor economics. These RTUs are being promptly turned off at 4 PM; therefore there isn't a large window of savings opportunity.

EEM-21 Pool Cover

This measure is not recommended due to poor economics. These coves are very expensive, and relative to the amount of energy they would save, especially given the high usage of the pool, which reduces the window of savings-opportunity, the payback is too high.

EEM-22 Gym Destratification Fan

This measure is not recommended due to poor economics. A de-stratification fan can reduce roof heat losses, thereby saving heating energy.

EEM-23 Solar Heating Panels for Pool Heating

This measure is not recommended due to poor economics, i.e. 20 year simple payback. Once the Coates hot water heater is brought online, we recommend data logging its electric heating coil in order to determine pool heating requirements. This will help provide better data for simple payback analysis purposes.

NEXT STEPS

The ENERGY STAR Benchmarking Initiative provides ongoing support as customers work toward implementing the recommended improvements. EMA will review the recommendations in this report with the appropriate contact at the facility, and help them develop an action plan. For recommendations that are eligible for NSTAR incentive funding, the NSTAR Program Manager for this facility can provide assistance with locating implementation contractors and obtaining financial incentives. For the remaining measures, EMA will provide implementation support.

Please call one of the following contacts with any questions:

NSTAR Electric
Program Manager
Steve Grattan
781.441.8243
steven.grattan@nstar.com

NSTAR Electric
Account Executive – Strategic Accounts
Mark Rooney
339-987-7826
mark.rooney@nstar.com

EMA – Energy Management Assoc., Inc
Principal Commissioning &Energy Engineer
Steve Di Giacomo, PE, CEM, CPMP
508-533-1128
steve@EMA-Boston.com

STATEMENT OF ENERGY PERFORMANCE
Acton Boxorough RHS

Building ID: 3222290
For 12-month Period Ending: April 30, 2012[1]
Date SEP becomes ineligible: N/A
Date SEP Generated: September 18, 2012

Facility
Acton Boxorough RHS
36 Charter Road
Acton, MA 01720

Facility Owner
N/A

Primary Contact for this Facility
N/A

Year Built: 2005
Gross Floor Area (ft²): 386,000

Energy Performance Rating[2] (1-100) 90

Site Energy Use Summary[3]

Electricity - Grid Purchase(kBtu)	9,450,600
Natural Gas (kBtu)[4]	12,245,000
Total Energy (kBtu)	21,695,600

Energy Intensity[4]

Site (kBtu/ft²/yr)	56
Source (kBtu/ft²/yr)	115

Emissions (based on site energy use)

Greenhouse Gas Emissions ($MtCO_2e$/year)	1,699

Electric Distribution Utility
NSTAR Electric Co

National Median Comparison

National Median Site EUI	91
National Median Source EUI	186
% Difference from National Median Source EUI	-38%
Building Type	K-12 School

Stamp of Certifying Professional

Based on the conditions observed at the time of my visit to this building, I certify that the information contained within this statement is accurate.

Certifying Professional
N/A

Meets Industry Standards[5] **for Indoor Environmental Conditions:**

Ventilation for Acceptable Indoor Air Quality	**N/A**
Acceptable Thermal Environmental Conditions	**N/A**
Adequate Illumination	**N/A**

Notes:
1. Application for the ENERGY STAR must be submitted to EPA within 4 months of the Period Ending date. Award of the ENERGY STAR is not final until approval is received from EPA.
2. The EPA Energy Performance Rating is based on total source energy. A rating of 75 is the minimum to be eligible for the ENERGY STAR.
3. Values represent energy consumption, annualized to a 12-month period.
4. Values represent energy intensity, annualized to a 12-month period.
5. Based on Meeting ASHRAE Standard 62 for ventilation for acceptable indoor air quality, ASHRAE Standard 55 for thermal comfort, and IESNA Lighting Handbook for lighting quality.

STATEMENT OF ENERGY PERFORMANCE
Acton Boxorough RHS

Building ID: 3222290
For 12-month Period Ending: April 30, 2012[1]
Date SEP becomes ineligible: N/A
Date SEP Generated: November 29, 2012

Facility
Acton Boxorough RHS
36 Charter Road
Acton, MA 01720

Facility Owner
N/A

Primary Contact for this Facility
N/A

Year Built: 2005
Gross Floor Area (ft²): 386,000

Energy Performance Rating[2] (1-100) 98

Site Energy Use Summary[3]

Electricity - Grid Purchase(kBtu)	7,428,444
Natural Gas (kBtu)[4]	7,187,900
Total Energy (kBtu)	14,616,344

Energy Intensity[4]

Site (kBtu/ft²/yr)	38
Source (kBtu/ft²/yr)	84

Emissions (based on site energy use)

Greenhouse Gas Emissions ($MtCO_2e$/year)	1,206

Electric Distribution Utility
NSTAR Electric Co

National Median Comparison

National Median Site EUI	84
National Median Source EUI	186
% Difference from National Median Source EUI	-55%
Building Type	K-12 School

Stamp of Certifying Professional

Based on the conditions observed at the time of my visit to this building, I certify that the information contained within this statement is accurate.

Certifying Professional
N/A

Meets Industry Standards[5] **for Indoor Environmental Conditions:**

Ventilation for Acceptable Indoor Air Quality	**N/A**
Acceptable Thermal Environmental Conditions	**N/A**
Adequate Illumination	**N/A**

Notes:
1. Application for the ENERGY STAR must be submitted to EPA within 4 months of the Period Ending date. Award of the ENERGY STAR is not final until approval is received from EPA.
2. The EPA Energy Performance Rating is based on total source energy. A rating of 75 is the minimum to be eligible for the ENERGY STAR.
3. Values represent energy consumption, annualized to a 12-month period.
4. Values represent energy intensity, annualized to a 12-month period.
5. Based on Meeting ASHRAE Standard 62 for ventilation for acceptable indoor air quality, ASHRAE Standard 55 for thermal comfort, and IESNA Lighting Handbook for lighting quality.

ENERGY STAR® Benchmarking Initiative

Action Plan

Last Updated: 9/26/2012

Customer Information

Facility Name: Acton-Boxborough Regioinal High School 36 Charter Road, Acton, MA

Primary Contact: Kate Crosby kcrosby@abschools.org c 978.580.0052

Energy Performance

Energy performance ratings should be updated at least quarterly

Year Ending	4/30/2012	7/31/2012	10/31/2012	1/31/2013	4/30/2013
Energy Performance Rating	90				
Source Energy Intensity (kBtu/SF)	115.0				
CO2 Foot Print (MtCO2e per Year)	1699.00				
CO2 Foot Print (Pounds per SF)	9.7				

Action Plan

Recommendations should be listed in order of priority

Recommendation	Plans (Personnel Responsible, Funding available, etc.)	Date to be Completed
Computer Power Management		
Controls for Cold Beverage Machine		
Employee & Staff Energy Education Program		
High Efficiency Spray Valves		
Turn off Kitchen Pilots each summer		
Retro-commissioning of EMS, Boilers, Additional Programming , Boiler Isolation		
Install VFDs to convert RTU-10 from CAV to VAV (Lower Gym)		
Install CO2 DCV for RTU-10 (Lower Gym)		
Install CO2 DCV for RTU-11 (Upper Gym)		
Install CO2 DCV for RTU-4 (Band)		
Install CO2 DCV for J/C RTU-10 & 11; McQuay RTU-7 (Café)		
Install CO2 DCV for JC / RTU-7 & 8 (Auditorium)		
Install VFD to convert JC / RTU-7 & 8 from CAV to VAV (Auditorium)		
Energy Efficiency Lighting for Pool, Gym, Corridor, Common Area, Misc., & Auditorium		
Install boiler 3-way mixing valve to achieve deeper OAT reset schedule		

Recommendations Implemented

Recommendation	Expected Savings ($/yr)	Installed Cost	Rebate	Net Payback	Date Completed