# Energy Use in the Student Union Building Kitchen

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# 1- Executive Summary

i-Research Question and Objective:

What is the current level of energy consumption in the Dalhousie Student Union Building (henceforth referred to as the SUB) kitchen, and to what extent can we lower consumption by either modifying behavioral patterns or implementing new equipment?

ii-Summary of Research:

This research used both qualitative and quantitative methods in order assess energy inputs into the SUB kitchen. Interviews were conducted with *Sodexo* employees who worked directly in the kitchen and who worked in management outside of the city. Energy audits were conducted in two ways: with a hand held energy meter for small appliances (see Appendix 1), and a large-scale meter that was wired into the SUB kitchen from Friday, April 1, 2011 at 9:15 am until Wednesday, April 6, 2011 at 11:50 am (see Appendices 2 and 3). E-mails requesting product information were sent out to companies with appliances in the kitchen. Additional research was done to find alternative baseline statistics on appliances and energy calculations were completed based on a combination of all of those sources.

iii-Summary of Findings:

We concluded that the energy savings would be substantial for a number of different appliances and recommend that Dalhousie invest in a kitchen retrofit for the sake of the environment. However, with the exception of the fryers, the time it would take to make back the investment made on new appliances may not be fast enough for Dalhousie to be economically interested. Additionally, *Energy Star* does not promote any walk in refrigerators or freezers so we were unable to give meaningful energy saving calculations for those.

Employees were excited for the project, not for its implications for administrative energy usage or implications for climate change but for potential new efficient equipment that could simplify their jobs.

iv-Conclusions and Recommendations:

This document contains a series of recommended appliances that could suitably replace the outdated models that the SUB kitchen currently holds (see Appendix 4). However, these appliances would be mostly beneficial in reducing the carbon emissions and not the most cost effective choice for Dalhousie to make. The investments made in new technologies could not be made back in the short-term (under 5 years) but could be beneficial in cutting down emissions for the long-term.

Although the employees expressed an interest in new appliances, the qualitative study proved that there were no major behavourial changes that could be made to improve the energy efficiency in the SUB kitchen.

# 2- Introduction

i-Background and Literary Review:

This project is set in a historical context of fluctuating fossil fuel prices. The rapid pace of globalization and industrialization, coupled with population growth and waning fossil fuel supply has led to a steady overall rise in the price of energy. Natural Resources Canada reported that: "Between 1990 and 2007, energy use in Canada increased by 28 percent, from 6,936.3 PJ to 8,870.5 PJ," with one PJ (petajoule) being approximately equal to the energy needs of 9000 homes for one year (National Resource Canada: 2008, 7). During the same period: "the Canadian population grew 19 percent (approximately 1 percent per year), and GDP increased 58 percent (more than 3 percent per year)" (7). In plain terms, energy efficiency increased per unit of GDP, but decreased per capita. It is apparent that natural market forces will not shift our increasing dependency on decreasing fuels; therefore it is up to citizens and institutions (such as Dalhousie University) to push independently for change.

Within this context of increasing consumption, the issue of Climate Change makes energy consumption extremely important. An overall warming of the planet can be attributed to carbon dioxide ($CO_2$) in the atmosphere from anthropogenic sources, resulting in shifting and intensifying weather patterns leading to drought, famine, and conflict (IPCC: 2007, 5).

The current scientific and international consensus is that the burning of fossil fuels for energy production is a major source of $CO_2$ and other greenhouse gasses (GHG's) leading to climate change. In Nova Scotia, NS Power (2011) reports that: "Fifty per cent of North America's electrical power is produced by coal. In Nova Scotia it's about 75 per cent", with most of Nova Scotia's coal being imported from international markets (NS Power: 2011, *Coal*). In reducing energy consumption in the SUB kitchen, Dalhousie will be able to mitigate rising costs to the while reducing greenhouse gas emissions.

The SUB provides food for many of the students at Dalhousie University on a daily basis. With over 16,000 students this is a large task, and as such, it takes a great deal of resources to meet the demand of the hungry youth (Dalhousie University: 2011). Typically, kitchens are high-energy consumers in a intuitional setting, especially ones with old appliances that are still in use, with lab buildings being the highest. The company that manufactured most of the outdated technology that is currently used in the SUB kitchen, *Garland*, states that:

> The foodservice market consists of the most energy-intensive commercial buildings, consuming close to 250,000 Btu/sq. ft., roughly 2.5 times more energy per square foot than any other commercial buildings. By addressing technologies related to cooking, refrigeration

> and sanitation, significant energy and water savings can be achieved (Manitowoc Foodservice, 2011: *Energy Savings*).

With this much energy being used, reducing the emissions from the SUB kitchen could play a vital role in Dalhousie's sustainability plan. The *Climate Change Plan 2010* implemented by Dalhousie University (2010) gives ambitious targets to reduce Greenhouse Gas emissions to 15% by 2013; 20% by 2016 and 50% by 2020 (from the 2008-2009 emissions) and the additional goal of becoming carbon neutral by 2050. Although the kitchen in the SUB represents but a fraction of Dalhousie's total GHG emissions, reform is needed on every front and in every building, and the kitchens can act as a model for further action in the rest of the school.

If the SUB kitchen continues to operate at its current status, it will not only be wasting more money but also wasting unnecessary energy: "In addition to having higher operating costs, inefficient kitchen appliances tend to emit more heat than their efficient counterparts resulting in a hotter kitchen and potentially forcing you to spend more to cool the air in your kitchen" (State of California: 2006, 4). Currently, the amount of energy used by the SUB kitchen is unknown as are the potential savings that could be generated through a thorough evaluation. After analyzing the current technology used in the SUB kitchen, we will be able to make cost effective and energy reducing suggestions based on the technology and the people who use it on a daily basis. We believe that retrofitting the outdated equipment and changing the inefficient behavior between *Sodexo* employees and the appliances within the kitchen will help Dalhousie continue its transition towards a sustainable future.

Newer kitchen appliances have been made to fit stricter regulations and as a result use much less energy and water than older technology. According to the National Resource Defense Council (2011), refrigerators now use less than half of the amount of energy of a refrigerator that is twelve years old or older. Almost half of all $CO_2$ emissions at Dalhousie are derived from electrical usage (see Appendix 5), so reducing the energy from a kitchen has the potential to create a noticable impact on the school's overall footprint (Dalhousie University: 2011). The State of California released a document in 2006 with rough estimations regarding the total energy savings that could be generated through retrofitting a commercial kitchen with more efficient technology (see Appendix 6). This research study aims to come to similar conclusions.

We hypothesized that by simply changing certain inefficient behaviors, employees could contribute to energy and cost savings in the SUB kitchen: "Buying and using an energy-efficient oven, for example, is undoubtedly a good starting point and could trim hundreds of dollars from your annual utility bills—but saving the most energy and money will require something more: good practices" (State of California: 2006, 3). Even with more efficient appliances, there is still a chance that money and energy is being wasted on idling appliances. It is entirely possible that certain appliances are left on throughout the day that need not be. After doing an interview with *Sodexo* employees and observing their interactions with the appliances in the kitchen, we hope to be able to

distinguish necessary idling from idling that wastes energy: "Take broilers, for example. Cutting out only one hour each day of broiler "on" time can translate to a savings of around $450 annually" (State of California: 2006, 1). Even minute behavioral patterns can have a drastic impact on energy consumption; therefore by encouraging modifications to inefficient behaviors we hope to promote cost and energy savings within the SUB kitchen.

This specific research project was generated with the understanding that the *Sodexo* SUB kitchen is inefficient and outdated. *Sodexo* is a food service and facilities management company based out of Issy-les-Moulineaux, France serving thousands of people all over the world every day. They provide these services in a variety of diverse environments, from hospitals to universities. One of those many environments is the Dalhousie University's Students' Union Building (SUB). *Sodexo* relates to the topic of this project as it pertains to energy consumption with in the SUB kitchen.

While the amount of energy being used in the kitchens at Dalhousie may only relate to a small percentage of the total amount, reducing the emissions from the SUB kitchen could play a vital role in reaching Dalhousie's sustainability plan. Dalhousie's Energy Star partnership with the federal office of Energy Efficiency and their ambitious goals of the *Climate Change Plan 2010* make their chances of reaching their goals even greater but the additional investment in new kitchen technology could greatly aid this as well.

Additionally, we analyzed two case studies, retrieved from the Energy Star website, which outline the potential savings of upgrading outdated equipment in institutions. We believe these to be valuable when taking into considerations the differences in commercial and institutional kitchens.

Austin Public Schools, a public school district in Minnesota, USA is used as a shining example of how moving to Energy Star products can reduce costs and make back upfront expenditures in the short to medium term. Constrained by tight budgets and increasing expenses, the district's creative solution was to replace aging cafeteria equipment with efficient equipment, and then reallocate utilities funds into general expenditures. The upfront incremental cost was approximately $19,000, with the Austin Energy Company providing a $4,600 incentive. The school district was able to make back their investment in four years (Energy Star: 2008).

A Food Service Equipment Distributor in Madison, Wisconsin has shown the business advantage that can be gained from distribution of energy efficient or energy star products. Kessenich's Ltd. began carrying efficient products in 2008 and branded themselves as an environmentally friendly, responsible company. The report outlines that Kessenich's "strategy has not only raised [their] visibility in the marketplace, but also significantly augmented sales, resulting in nearly a 60 percent sales increase of ENERGY STAR qualified CFS equipment in one year" (Energy Star: 2008, *Food Service Equipment*). Further, the company provided training for their staff to convey Kessenich's expertise in the field, simplified processes for accessing efficient technology and

educated consumers on both their obligation to reduce consumption and the benefits of doing so (Energy Star: 2008). There is clearly a large consumer demand for efficient or "green" services, and connecting any products with an "eco" label in the current marketplace stands to highlight one company over the rest and increase sales.

ii-Objectives:

The aim of this project was then to assess the energy consumption in the SUB kitchen and make applicable recommendations in order to lower the consumption of energy. This includes gathering the information necessary to make these recommendations. The first steps began with formulating a research question to narrow our objectives and basing this question upon relevant information.

While *Sodexo* uses the SUB kitchen, it is Dalhousie University who owns the building and the equipment in the kitchen. It is also Dalhousie who pays for the energy consumed with in the building including the kitchen. Therefore there is a disincentive for *Sodexo* to upgrade equipment, and it is up to the students and DSU to push for change on the grounds of potential cost efficiency and environmental degradation.

Analyzing the amount of energy the SUB uses will enable us to interpret the potential monetary and energy savings. After analyzing the current technology the SUB kitchen uses we will be able to make cost effective and energy reducing suggestions based on the technology and the people who use it on a daily basis. We believe that retrofitting the outdated equipment and changing the inefficient behavior between *Sodexo* employees and the appliances within the kitchen will help Dalhousie continue its transition towards a sustainable future.

The final research question was: "What is the current level of energy consumption in the Dalhousie Students' Union Building kitchen, and to what extent is it possible to lower consumption by either modifying behavioral patterns or implementing new equipment?" This question produced a number of goals and objectives to guide our work.

The first goal of the project was to numerically quantify the energy consumption of the SUB kitchen. This would provide the actual amount of energy the kitchen was using and would present itself in relevant terms. Meaning the information would come across as an expression of the amount of energy used per hour and per day.

Newer kitchen appliances have been made to fit stricter regulations and as a result use much less energy and water than older technology. According to the National Resource Defense Council (2011), refrigerators now use less than half of the amount of energy of a refrigerator that is twelve years old or older. Almost half of all Co2 emissions at Dalhousie are derived from its electrical consumption, so reducing the energy from a kitchen has the potential to create a huge impact on the schools overall footprint (Dalhousie University: 2011).

Gathering qualitative data that reflects the behavioral patterns associated with the

consumption of energy in the kitchens was the second goal. The gathering of information on the employee's relationship to the equipment enables us to decipher how their behavior is contributing to the total amount of energy consumption. Dalhousie University's *Climate Change Plan 2010* clearly outlines three crucial steps that they plan on taking in order to lower the Greenhouse Gas Emissions from the university as a whole. In addition to their plan to increase energy security, they plan to: "Increase conservation behaviour; enhance energy, water and product efficiency; [and] switch to low and no emissions fuel for energy and transportation" (Dalhousie University: 2010, 19). This background gave us the necessary support to decide on a qualitative report with respect to energy behavior. After all, it is entirely possible that simply changing certain inefficient behaviors could contribute to energy cost savings in the SUB kitchen.

Utilizing the data from the audits, the third goal was to perform a cost benefit analysis for other more efficient technologies, compare the amount of energy consumed to other areas of the university, and give us an idea of how the SUB kitchen is contributing to Dalhousie's total energy consumption.

iii-Summary of the Report:

The following report outlines our project beginning with the methods of our research, a description of the procedures and the study design. It includes a discussion of the validity or reliability of the procedures, the methods, and the limitations of the study as well as the delimitations that we might have imposed on the study. The highlighting of the numerical data related to the quantitative research and the responses from the qualitative assessment resulting from the research are also included. Finally, there is a summary of the research and relevant findings along with a conclusion of the research and recommendations for action and further research.

# 3- Research Methods

i-General Limitations (Brief)

Limited by the timeframe of one semester, funds, and the nature of this project as a class assignment, the Dalhousie Office of Sustainability, a bureau interested in reducing consumption across campus, uses the participation of the students to help enable projects.

This project began by students undertaking the given task of analyzing the amount of energy consumed in the kitchen of the Student Union Building (SUB).

ii-Method 1: Energy Audit:

Over a period of five days the SUB kitchen's energy consumption was metered. This was comprised of a large appliances energy audit and a small appliances energy audit. The large appliances and kitchen's energy consumption was measured by attaching one meter to the main electrical feed for the SUB kitchen. Because this project is concerned with measuring kitchen equipment and behavior related to the use of the equipment, the HVAC (Ventilation) systems energy consumption was not measured. The HVAC system and kitchen equipment run off two different electrical feeds in the main

electrical box for the SUB kitchen.

We had an electrical engineering student and electrician perform the task of installing the large appliances meter. The student assessed the electrical blueprints for the SUB and deciphered where the main box and kitchen equipment feed was in the building. The electrician then installed the meter with the supervision of the student.

Once installed, the meter then relayed information on energy consumption in fifteen-minute intervals to a computer to give real time calculations. The results of the metering were then gathered, organized and put into the form of a graph showing the amount of energy consumed in Kilowatt-hours and at what times x amount of energy was consumed. As opposed to seeing a long list of numbers representing energy consumption and chronology that is confusing and complicated to read and understand, the graph is organized, easy to read and coherent.

To measure the consumption of energy from the small appliances in the kitchen we used an energy-measuring device called a Kill-A-Watt EZ Meter. This was done over a period of two days by going into the SUB kitchen and finding the appliances that fell under the Kill-A-Watt EZ Meter's threshold for measuring energy. The threshold for the meter is around 125 VAC. Plugging the EZ Meter into a wall socket and then plugging the machine we were metering into the EZ Meter gave an accurate description of energy consumption. There is a 0.2% variability in the accuracy of the machine, so while it is not absolutely precise it is as close as we could get for a machine that costs around $40.00.

With the EZ Meter we were able to measure for Watts, Kilowatts, and Kilowatt-hours. By plugging in the data for the price per kilowatt-hour you pay you are also able to measure how much money the appliance is costing in energy costs per hour, day, month and year. The results for the small appliances energy audit are portrayed in watts, volts, and kilowatt-hours per appliance.

There were limitations surrounding the amount of time that the large appliances were measured for. If the large appliance audit had been done over a longer time period we would have more information to analyze and thus a more reliable assessment result.

iii-Method 2: Employee Interviews:

An important method of qualitative data collection was to conduct interviews. First, a conference call with *Sodexo*'s Director of Corporate Citizenship, and then a series of face-to-face interviews with *Sodexo* employees working in the SUB kitchen. The purpose of the conference call with Chris, the Director of Corporate Citizenship, was to explore *Sodexo*'s platform for sustainability and get a glimpse of their commitments to promoting energy efficiency in the workplace. The format of the interview was informal; our group had an hour-long conversation with Chris explaining *Sodexo*'s role in advocating sustainable development and a question and answer period at the end where Chris answered any of our inquiries.

The series of interviews took place with five different *Sodexo* employees working in the SUB kitchen. The goal of the interviews with the *Sodexo* kitchen staff was to explore the behavioral implications of energy consumption in commercial kitchens as well as develop an understanding of the relationship between workers and their equipment, and how that may affect energy consumption. The interviews were conducted in person throughout different areas of the kitchen while the participants continued to work. The questions posed were from a list of approved interview questions (see Appendix 7), including both closed and open-ended questions. The closed-ended questions revealed succinct and definitive answers while the open-ended questions allowed for more expressive and diverse responses from each participant. The series of interviews and the conference call with Chris helped us gain a greater understanding of energy consumption in the SUB kitchen, and ultimately helped effectively answer our research question.

The various interviews we conducted presented certain limitations for a plethora of reasons. While the conference call with Chris was very informative, talking over the phone creates a communication barrier that limits the flow of certain information. The conference call approach to interviewing also creates a very limited timeframe for collecting data.

The interviews with the *Sodexo* kitchen staff also limited our performance. There were only five possible participants to interview, which limited the scope of our findings. Time was also a constraint while conducting the interviews, for the participants were in fact working and expected to continue producing and distributing food for the students and staff in the SUB. Since the participants were working while questions were asked, the responses were limited because the workplace is not a socially conducive environment. Lastly, the results were set within the boundaries of the set questions we asked.

iv-Method 3: Corporate Contact:

Using the list of kitchen appliances that *Sodexo* supplied us with (see Appendix 8), the third method of data collection was to contact all of the companies by e-mail and request information on specific products. Each company was e-mailed with similar message requested the model number of the desired appliance and any additional information that may be provided on it. Out of the fifteen company names listed (Bardeau, Berkel, Blodgett, Bohn, Bunn, Cleveland, Coldstream, Cornelius, Foster, Garland, Globe, Hobart, Hubert, Milner, and Panasonic), we received replies from five. Only three of the five companies who replied were able to provide us with any information on the products (Blodgett, Garland, and Panasonic).

Most of the responses that were given were estimates based on the information that we provided because many of the model numbers were incorrect. Ultimately, very little information could be gathered through this method, we contacted alternative resources: Nova Scotia Efficiency and Energy Star. Although both appeared to have similar difficulties as other companies did with finding information on these appliances, we were able to estimate basic ‘average efficiency’ products from a variety of difference

sources in order to determine baseline average consumption rates (NRCan: 2011, Navigant Consulting Inc.: 2006). Although the information we were given was from a very specific case study, it was incredibly useful when all other options became exhausted.

This method was extremely limited in its scope because we were very reliant on the information provided to us by *Sodexo* and other third parties to provide us with responses. Although the list was a good starting point in our research, the information we ultimately ended up using was not as specific as desired.

v-Information analysis:

After searching for similarly styled appliances to use for energy calculations through a variety of sources, we created a smaller focus on the major appliances used based off of a list of how frequently appliances were used provided to us by *Sodexo* (see Appendix 9). Using the limited information that we were provided with from the companies who produced the appliances and the additional information that we collected regarding kilowatt-hours we were able to determine the annual energy use per appliance and its cost based off of the *Nova Scotia Power* rates for institutions (6.618¢/kWh) (NS Power: 2011, *Large General Tariff*). We found more energy efficient appliances on the *Energy Star* website and compared both the consumption and cost of the old and new models.

# 4- Results

i-Quantitative Data: Energy Audit

From our analysis of the results and the graph representing them we are able to make connections between time and energy demand and the possibility of time-food demand-energy demand. For example, the first day of the audit shows a drastic spike in energy consumption between the times of 09:00 and 09:15, 10:00 and 10:45, 16:00 and 16:15. The Kilowatt-hour's jump from 11 KWh at 10:00 to 22 at 10:45 and 13 KWh at 16:00 to 30 KWh at 16:15 (See Appendix 3 for Large Audit Graph). Leading us to believe that during the morning hours the kitchen is preparing breakfast foods for the large student population that demands food at these hours. Including the preparation of lunch between 10:00 and 10:45 and the serving and preparation of dinner between 16:00 and 16:15. This demand for food consumption at these times would require the demand for energy and thus the large energy consumption seen at these peak hours.

Because the following two days afterwards are a weekend, there are no classes, no students and therefore no food demand. The high-energy consumption represented over the next two days does not support this theory though. However, because we are unable to compare this specific weekend with other weekends before or after we are unable to say weather these high consumption levels are unusual.

The most consistency that is seen in the results is the dramatic rises in consumption levels during the later hours of the night and earlier hours of the morning.

Specifically at or between the hours of 23:00 and 02:30 energy consumption appears to rise from a low level and then drop back down. There is no explanation currently for this, again with a longer time period for metering feedback we may be able to come to a grounded analysis.

Cost Calculations and Comparisons of Appliances

**Current Kitchen equipment in the SUB kitchen energy cost**

| | Time used/day | Day/ week | kWh | kWh/year | Cost* |
|---|---|---|---|---|---|
| Holding Cabinet | 15 h. | 5 | 2.25 | 8,775 (9,855)**** | $580.73 |
| Fryers (2) | 6.5 h. | 5 | 8.63 (each) | 14,585 (each)**** | $1802.70 (both) |
| Stove | 8 h. | 5 | 0.81 | 1,680 (3,244)*** | $111.18 |
| Convection Oven (2) | 6.5 h. | 5 | 1.21 (each) | 2,048 (5,309 each)** | 135.54 (271.08 both) |
| Walk-in cooler | 24 h. | 7 | 0.27 | 2,365*** | $156.52 |
| Walk-in freezer | 24 h. | 7 | 0.41 | 3,548*** | $234.80 |
| Total Cost | | | | | $3157.01 |

* Based on Large Commercial General Tariff – 6.618¢ per kilowatt hour from NS Power (2011).

** Estimate retrieved from case study conducted by NRCan at Big Daddy's Restaurant in Toronto, Ontario (2009).

*** Estimate retrieved from case study conducted by NRCan at Lone Star Texas Grill Restaurant in Pickering, Ontario (2009).

**** Estimate retrieved from Navigant Consulting Inc. (2006)

**Energy Efficient Equipment in the SUB kitchen Energy Cost**

| | Time used/day | Day/ week | kWh | kWh/year | Cost |
|---|---|---|---|---|---|
| Holding Cabinet | 15 h. | 5 | 0.40 | 1,548 | $102.47 |
| Fryers (2) | 6.5 h. | 5 | 0.99 | 1,673 (each) | $221.4 (both) |
| Stove | 8 h. | 5 | 1.93 | 4,014 | $265.67 |
| Convection Oven (2) | 6.5 h.* | 5 | 1.3 | 2,197 (each) | $290.79 (both) |
| Reach-in refrigerator | 24 h. | 7 | 0.17 | 1,518 | $100.49 |

| | | | | | |
|---|---|---|---|---|---|
| Reach-in freezer | 24 h. | 7 | 0.54 | 4,708 | $311.58 |

*Note – energy star does not have walk-in refrigerators of freezers in their inventory, reach-in is closest comparison.

ii-Qualitative Data:

| **Employee Number** | **Abbreviated Responses** |
|---|---|
| Interviewee 1 | •Energy consumption taken in consideration, but not for the sake of the "environment"<br>•Unused equipment turned off<br>•Positive reaction to energy saving posters<br>•Would like to see new equipment<br>•Freezers, fridges and bread makes almost always on<br>•Would appreciate recommendations |
| Interviewee 2 | •Considers energy consumption in that he has a dislike for any form of waste<br>•Turns appliances off when not in use<br>•Mentioned that some equipment is outdated<br>•Electrical appliances in such a large kitchen is unconventional and feels inefficient, natural gas/propane is the norm elsewhere<br>•Quality of food improves with better equipment<br>•Employees are trained to use every piece of equipment<br>•Would be interested in energy consumption training |
| Interviewee 3 | •The recently installed new oven (turbofan) is much more efficient, taking 5 minutes to heat up instead of 25<br>•Efficiency impacts their job, productivity levels and stress levels<br>•Doesn't feel the need for much efficiency training, as employees are already efficient and constrained by the equipment they work with |
| Interviewee 4 | •Front of house employee<br>•Takes efficiency into consideration, but all appliances are slow and electric<br>•Efficiency refers to the ability to do his/her job, efficient equipment means faster heating, less preparation and more food production<br>•Further "efficiency" would result in less food production and infractions of Health and Safety regulations<br>•Would be interested in more gas appliances<br>•Believes efficiency is a priority for *Sodexo* only within the context of savings |
| Interviewee 5 | •Front of house employee<br>•Feels equipment is outdated and inefficient, compared to other institutions<br>•Limited understanding of equipment |

| | |
|---|---|
| | •The employees ability to increase efficiency is constrained by the space, parameters and appliances given. |

# 5- Discussion

i-Findings:

The feedback we received from the meter that was attached to the main electrical feed is represented in the graph above. Because the feedback was relayed to us quarterly on the hour, it provides a lot of information on energy consumption per day, however the audit was done over a very short time period. The six day period that the audit was performed over begins on a Friday and ends on the following Thursday, and therefore does not provide us with the consistency we needed to make significant comparisons. This lack of consistency in consumption levels shown on the graph does not enable us to make concrete analyses that we can adequately support. This lack of reliability with the information leaves us with theories but not a lot of proof to support them.

Because the small appliances we audited are appliances like Panini machines, microwaves, and toaster ovens, the data from the results is easier to analyze. This is so because the audit shows that when the machines are continuously plugged in and idling they use the same amount of energy over the entire idle period. Only once they are in use does the consumption level of energy rise. This shows a relationship between demand and energy consumption. The demand for the machines prompts a spike in the amount of energy they consume because they are put into an active state and not an idling one. If the machines were to be unplugged when they are not in use then it would contribute to a decrease in the total energy consumption of the SUB kitchen. While the machines are only small appliances and demand small amounts of energy, 1.3 KWh for example, any decrease in consumption is a significant one.

ii-Implications for Theory (Equipment Replacement):

Questionable data provided by NRCan in their case studies has skewed a number of our potential conclusions. Considering age of SUB kitchen appliances, it is doubtful that they are more efficient than leading Energy Star Product and emails should be sent to rectify the situation. Results that made sense however clearly show that the fryers should be replaced, as costs would be made back in just over five years (for the process of calculating cost-benefit analysis, see Appendix 10). Barring the fryers, it is not economically viable to replace existing kitchen equipment. The group discovered that Energy Star's economic viability and platform is primarily dependent on their comparison to other baseline products, when a customer is *deciding between two appliances*, one being efficient and one standard. In the case of Sodexo in the SUB, where baseline products have long been purchased and used, there is no differential in the price between two products (which is all that savings usually needs to make back). Instead, efficiency savings is expected to cover the total upfront cost of buying a new product, which is unrealistic.

This is not to say that economic viability is the only motivation for purchasing efficient equipment. The case study of the Food Service Equipment Distributor

*Kessenich's Ltd.* demonstrated that there is potential increase in sales and market visibility by labeling oneself as "ecologically responsible." Further incentive is provided by widespread ecological degradation and the desire to meet Dalhousie's GHG and efficiency targets.

iii-Examination of Failed Hypothesis (Behavourial Changes):

After five employee interviews, it became clear that no employees had any extra training around energy efficiency, nor did any training scheme seem to exist. Further, employees were reluctant to embrace any further training that was not paid for by *Sodexo*. General sentiments towards efficiency were that it was indeed important, but only as it pertains to job performance. Employees were excited for our project, not for its implications for administrative energy usage or implications for climate change, but for potential new efficient equipment that could simplify their jobs. A further consensus that gas appliances are preferable was attained.

# 6- Conclusions

i- Recommendations for Appliances:

Based off of our energy calculations, we were able to find suitable replacements for most of the outdated appliances in the SUB kitchen (Appendix 4). Although these appliances would be more efficient, many of them would not be affordable through energy savings over the next few years. The only substantial savings in this scenario would be seen though the replacement of the fryers, which would make back the upfront cost of the appliance in approximately 5.4 years (For outline of calculations for cost-benefit analysis, see Appendix 10). Because of the limited scope of this study and because some of the data we used for baseline calculations was incorrect, we were unable to determine proper cost-effective recommendations.

ii- Recommendations for Behaviours:

Although initially hypothesized that employee actions could have drastic impact on energy inputs into the kitchen, it is clear after 5 interviews that this is not the case. Employees make do with the equipment given, but are constrained by the inefficiency of the infrastructure. Employees however take personal pride in serving quality food, and employee satisfaction would increase if new appliances were introduced. Signage encouraging efficient behavior may not yield measurable decreases in energy levels, but at the least may serve to connect the spaces of production, preparation and consumption that plague the modern food system.

iii- Recommendations for Further Research:

Limited in scope by finances, time and by the constraints of a classroom setting, only assessments on the energy levels of the SUB Kitchen were made. Within this scope, further study can be conducted into potential costs of replacing equipment, as we were unable to include installation or maintenance costs when doing cost-benefit analyses. Study can be done on the general efficiency and consumption of the building, on the

efficiency of the front-of-house equipment, and potential savings through replacing equipment. Other appliances in the Kitchens can also be assessed, such as lighting. Finally, worker energy efficiency training programs can be researched and implemented, although in the particular case of the SUB Kitchen we found that there is little that workers can do to reduce consumption.

Further study on the topic in a wider scope could include monitoring water usage in the kitchen and in the building. Food waste is one of the largest recorded reasons for unnecessary energy waste, as it is an end of the line product. In essence, food waste embodies all the energy inputs from production, packaging and transport in it, and therefore food waste at the distribution stage is exponentially more costly. A study into food waste and its mitigation is widely undervalued despite its imperative importance.

# 7- Definitions

C02e: "Unit for comparing the radiative forcing of a GHG to carbon dioxide […] The carbon dioxide equivalent is calculated using the mass of a given GHG multiplied by its global warming potential" (Dalhousie University: 2010, 31).

Commercial kitchen: A kitchen that produces food for a large group of people.
Inefficient technology/appliances/equipment: Machinery that is older than and does not meet standards that have been set in the past ~10 years.

Cost savings: Money generated through the reduction of energy use.

Efficient/inefficient Behaviour: Actions that contribute to or reduce the amount of Greenhouse Gases that are being released into the atmosphere.
Emissions: Greenhouse Gases produced from energy use.
Carbon Neutral: When a given party neither reduces nor increases the release of Greenhouse Gases.

Energy savings: The reduction of energy use.

# 8- Appendices

Appendix 1: Small Appliance Audit Results

**Unit energy audit in Volts and Watts while Idle**

1. Bunn CW Series 1985 – Coffee Brewer – 119.1 Volts (1370 Watts)
2. Danby Designer Microwave – 118.1 Volts (700 Watts)
3. Hatco Flav-R-Savor Holding Cabinet (FSHC 1,2) – 118.7 Volts (1440 Watts)
4. Somerset Pizza Dough Flatener CDR 1550S – 118.2 Volts (90 watts)
5. Eurodib Panini Machine – 113.6 Volts (1700 Watts)

6. Tomlinson Soup Kettle – 114.2 Volts (650 Watts)
7. Sharp UP 700 POS Terminal – 118.7 Volts (57 Watts)

**Energy used in KWH while Idle for 24 hrs/day**

1. Bunn CW Series 1985 – Coffee Brewer – 32.8 KWh (1370*24/1000)
2. Danby Designer Microwave – 16.8 KWh (700*24/1000)
3. Hatco Flav-R-Savor Holding Cabinet (FSHC 1,2) – 34.56 KWh
4. Somerset Pizza Dough Flatener CDR 1550S - 2.16 KWh
5. Eurodib Panini Machine – 40.8 KWh
6. Tomlinson Soup Kettle – 15.6 KWh
7. Sharp UP 700 POS Terminal – 1.3 KWh

Appendix 2: Large-scale Energy Audit

Conducted from Friday, April 1, 2011 at 9:15 am until Wednesday, April 6, 2011 at 11:50 am

| | kW | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Meter | A | | | B | | | C | | | Total |
| | Min | Avg | Max | Min | Avg | Max | Min | Avg | Max | Avg |
| 04/01/2011 09:15:00 | 1.44 | 6.05 | 11.03 | 1.10 | 5.40 | 9.49 | 0.21 | 3.86 | 8.80 | 15.31 |
| 04/01/2011 09:30:00 | 1.58 | 7.69 | 14.63 | 1.24 | 7.07 | 14.39 | 0.34 | 5.77 | 13.64 | 20.53 |
| 04/01/2011 09:45:00 | 1.42 | 5.75 | 14.97 | 1.10 | 5.12 | 14.59 | 0.21 | 3.82 | 10.76 | 14.68 |
| 04/01/2011 10:00:00 | 1.50 | 4.59 | 13.10 | 1.10 | 3.87 | 10.64 | 0.35 | 3.24 | 12.09 | 11.70 |
| 04/01/2011 10:15:00 | 1.70 | 5.65 | 13.77 | 1.29 | 4.93 | 13.40 | 0.34 | 3.74 | 10.85 | 14.32 |
| 04/01/2011 10:30:00 | 1.73 | 6.70 | 12.00 | 1.30 | 6.02 | 9.76 | 0.49 | 4.18 | 10.66 | 16.90 |
| 04/01/2011 10:45:00 | 4.28 | 9.12 | 14.74 | 4.09 | 7.91 | 13.42 | 1.30 | 5.10 | 11.03 | 22.12 |
| 04/01/2011 11:00:00 | 1.56 | 4.98 | 11.01 | 1.21 | 4.33 | 8.22 | 0.32 | 3.68 | 10.72 | 12.99 |
| 04/01/2011 11:15:00 | 1.56 | 5.44 | 12.63 | 1.17 | 4.66 | 12.30 | 0.33 | 3.33 | 10.37 | 13.42 |
| 04/01/2011 11:30:00 | 1.92 | 5.73 | 12.96 | 1.30 | 4.55 | 9.53 | 0.57 | 3.44 | 10.58 | 13.72 |
| 04/01/2011 11:45:00 | 1.78 | 5.68 | 11.33 | 1.17 | 4.63 | 9.47 | 0.57 | 3.61 | 7.99 | 13.92 |
| 04/01/2011 12:00:00 | 1.77 | 5.06 | 12.64 | 1.17 | 4.14 | 10.85 | 0.56 | 3.51 | 10.36 | 12.71 |
| 04/01/2011 12:15:00 | 0.86 | 4.78 | 11.46 | 0.32 | 3.84 | 10.96 | 0.56 | 3.42 | 10.30 | 12.04 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 04/01/2011 12:30:00 | 0.61 | 4.57 | 11.79 | 0.18 | 3.80 | 11.09 | 0.32 | 2.96 | 10.04 | 11.34 |
| 04/01/2011 12:45:00 | 1.57 | 5.40 | 13.75 | 1.20 | 4.71 | 13.52 | 0.46 | 3.29 | 8.97 | 13.40 |
| 04/01/2011 13:00:00 | 1.55 | 5.28 | 11.20 | 1.19 | 4.61 | 9.55 | 0.33 | 3.27 | 7.49 | 13.16 |
| 04/01/2011 13:15:00 | 1.55 | 4.56 | 9.66 | 1.16 | 3.92 | 8.02 | 0.32 | 2.93 | 9.81 | 11.41 |
| 04/01/2011 13:30:00 | 1.52 | 5.02 | 12.67 | 1.16 | 4.37 | 12.28 | 0.32 | 3.12 | 10.15 | 12.52 |
| 04/01/2011 13:45:00 | 1.53 | 5.28 | 13.93 | 1.14 | 4.62 | 13.53 | 0.33 | 3.44 | 10.16 | 13.33 |
| 04/01/2011 14:00:00 | 1.52 | 5.15 | 11.18 | 1.14 | 4.48 | 9.56 | 0.46 | 3.06 | 7.53 | 12.68 |
| 04/01/2011 14:15:00 | 1.52 | 5.41 | 10.01 | 1.14 | 4.76 | 9.51 | 0.33 | 3.34 | 10.24 | 13.51 |
| 04/01/2011 14:30:00 | 1.50 | 4.62 | 11.04 | 1.14 | 3.95 | 9.52 | 0.32 | 3.32 | 8.86 | 11.88 |
| 04/01/2011 14:45:00 | 1.52 | 6.07 | 12.66 | 1.11 | 5.47 | 12.24 | 0.33 | 3.43 | 10.07 | 14.97 |
| 04/01/2011 15:00:00 | 1.48 | 6.20 | 13.40 | 1.10 | 5.52 | 11.97 | 0.32 | 2.88 | 7.33 | 14.60 |
| 04/01/2011 15:15:00 | 1.39 | 6.20 | 13.85 | 1.14 | 5.53 | 10.88 | 0.32 | 3.09 | 7.40 | 14.83 |
| 04/01/2011 15:30:00 | 1.39 | 6.24 | 13.72 | 1.14 | 5.57 | 12.23 | 0.33 | 3.40 | 9.04 | 15.21 |
| 04/01/2011 15:45:00 | 1.37 | 5.46 | 12.72 | 1.14 | 4.81 | 9.58 | 0.33 | 2.96 | 9.02 | 13.23 |
| 04/01/2011 16:00:00 | 1.38 | 5.66 | 13.82 | 1.13 | 4.73 | 12.22 | 0.33 | 3.32 | 9.04 | 13.70 |
| 04/01/2011 16:15:00 | 6.66 | 12.35 | 16.56 | 3.71 | 9.61 | 13.57 | 3.06 | 7.40 | 10.14 | 29.37 |
| 04/01/2011 16:30:00 | 4.28 | 10.03 | 12.73 | 3.97 | 7.92 | 9.69 | 3.14 | 7.59 | 10.29 | 25.54 |
| 04/01/2011 16:45:00 | 4.37 | 9.65 | 15.10 | 3.95 | 7.95 | 13.69 | 3.26 | 6.75 | 9.96 | 24.35 |
| 04/01/2011 17:00:00 | 4.11 | 6.66 | 12.32 | 3.95 | 6.26 | 10.86 | 3.13 | 4.80 | 8.66 | 17.72 |
| 04/01/2011 17:15:00 | 4.00 | 6.12 | 9.65 | 3.89 | 6.01 | 9.61 | 3.14 | 4.75 | 7.27 | 16.88 |
| 04/01/2011 17:30:00 | 4.05 | 5.59 | 6.94 | 3.91 | 5.45 | 6.80 | 3.16 | 5.15 | 7.33 | 16.19 |
| 04/01/2011 17:45:00 | 1.29 | 4.58 | 9.67 | 1.07 | 4.44 | 9.61 | 1.58 | 3.94 | 7.29 | 12.97 |
| 04/01/2011 18:00:00 | 4.03 | 6.06 | 9.67 | 3.86 | 5.94 | 9.65 | 1.57 | 3.62 | 7.28 | 15.63 |
| 04/01/2011 | 4.04 | 6.67 | 9.68 | 3.87 | 6.57 | 9.62 | 0.33 | 3.60 | 7.14 | 16.84 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 18:15:00 | | | | | | | | | | |
| 04/01/2011 18:30:00 | 0.35 | 3.30 | 6.88 | 0.08 | 3.12 | 6.82 | 0.27 | 2.72 | 5.97 | 9.13 |
| 04/01/2011 18:45:00 | 0.37 | 3.99 | 8.71 | 0.09 | 3.81 | 8.64 | 0.27 | 2.66 | 5.98 | 10.46 |
| 04/01/2011 19:00:00 | 1.33 | 4.11 | 9.68 | 1.11 | 3.95 | 9.65 | 0.27 | 2.24 | 5.94 | 10.31 |
| 04/01/2011 19:15:00 | 1.32 | 3.98 | 9.66 | 1.10 | 3.83 | 9.63 | 0.27 | 2.19 | 5.94 | 10.00 |
| 04/01/2011 19:30:00 | 1.30 | 3.20 | 6.89 | 1.08 | 3.04 | 6.81 | 0.33 | 2.94 | 7.26 | 9.17 |
| 04/01/2011 19:45:00 | 1.32 | 4.00 | 6.88 | 1.10 | 3.85 | 6.82 | 0.33 | 2.83 | 4.51 | 10.67 |
| 04/01/2011 20:00:00 | 1.32 | 4.03 | 6.96 | 1.10 | 3.86 | 6.82 | 0.32 | 2.73 | 4.50 | 10.61 |
| 04/01/2011 20:15:00 | 1.32 | 3.99 | 6.99 | 1.09 | 3.83 | 6.88 | 0.32 | 3.04 | 4.50 | 10.85 |
| 04/01/2011 20:30:00 | 1.31 | 3.68 | 7.02 | 1.08 | 3.49 | 6.90 | 0.32 | 2.54 | 4.55 | 9.70 |
| 04/01/2011 20:45:00 | 1.30 | 3.51 | 6.97 | 1.08 | 3.34 | 6.85 | 0.32 | 2.90 | 4.52 | 9.75 |
| 04/01/2011 21:00:00 | 1.29 | 3.97 | 6.96 | 1.07 | 3.81 | 6.85 | 0.32 | 2.79 | 4.49 | 10.57 |
| 04/01/2011 21:15:00 | 1.29 | 3.98 | 6.97 | 1.07 | 3.82 | 6.86 | 0.32 | 2.74 | 4.53 | 10.53 |
| 04/01/2011 21:30:00 | 1.29 | 3.87 | 7.00 | 1.06 | 3.70 | 6.89 | 0.33 | 2.82 | 4.57 | 10.39 |
| 04/01/2011 21:45:00 | 1.28 | 3.11 | 6.92 | 1.06 | 2.93 | 6.81 | 0.32 | 2.52 | 7.31 | 8.56 |
| 04/01/2011 22:00:00 | 1.28 | 4.01 | 9.74 | 1.06 | 3.84 | 9.68 | 0.33 | 2.92 | 7.34 | 10.77 |
| 04/01/2011 22:15:00 | 1.27 | 3.98 | 9.68 | 1.06 | 3.81 | 9.60 | 0.32 | 2.73 | 7.28 | 10.52 |
| 04/01/2011 22:30:00 | 1.27 | 3.97 | 9.81 | 1.05 | 3.80 | 9.73 | 0.32 | 2.90 | 7.31 | 10.67 |
| 04/01/2011 22:45:00 | 1.27 | 3.61 | 9.60 | 1.05 | 3.44 | 9.54 | 0.32 | 2.73 | 7.44 | 9.78 |
| 04/01/2011 23:00:00 | 1.26 | 3.53 | 6.82 | 1.05 | 3.37 | 6.76 | 0.32 | 2.88 | 7.24 | 9.79 |
| 04/01/2011 23:15:00 | 1.26 | 3.78 | 9.61 | 1.05 | 3.62 | 9.56 | 0.32 | 2.51 | 7.24 | 9.91 |
| 04/01/2011 23:30:00 | 1.26 | 3.88 | 6.87 | 1.05 | 3.73 | 6.79 | 0.32 | 2.75 | 4.49 | 10.36 |
| 04/01/2011 23:45:00 | 1.26 | 3.94 | 9.58 | 1.05 | 3.79 | 9.55 | 0.32 | 2.86 | 5.98 | 10.59 |
| 04/02/2011 00:00:00 | 1.25 | 3.35 | 6.79 | 1.05 | 3.20 | 6.73 | 0.32 | 2.71 | 7.23 | 9.26 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 04/02/2011 00:15:00 | 1.25 | 3.79 | 9.59 | 1.04 | 3.64 | 9.51 | 0.32 | 2.97 | 7.22 | 10.40 |
| 04/02/2011 00:30:00 | 1.25 | 3.89 | 9.60 | 1.04 | 3.73 | 9.57 | 0.32 | 2.56 | 7.26 | 10.18 |
| 04/02/2011 00:45:00 | 0.35 | 2.93 | 8.75 | 0.08 | 2.73 | 8.65 | 0.32 | 2.73 | 7.28 | 8.39 |
| 04/02/2011 01:00:00 | 0.35 | 3.21 | 9.77 | 0.08 | 3.02 | 9.71 | 0.32 | 2.59 | 7.22 | 8.82 |
| 04/02/2011 01:15:00 | 1.28 | 3.34 | 6.88 | 1.08 | 3.19 | 6.83 | 0.32 | 2.59 | 7.19 | 9.12 |
| 04/02/2011 01:30:00 | 1.27 | 3.83 | 9.56 | 1.06 | 3.69 | 9.59 | 0.32 | 2.90 | 7.21 | 10.41 |
| 04/02/2011 01:45:00 | 1.26 | 3.95 | 9.57 | 1.05 | 3.82 | 9.61 | 0.32 | 2.75 | 7.18 | 10.52 |
| 04/02/2011 02:00:00 | 1.26 | 3.91 | 6.88 | 1.05 | 3.78 | 6.81 | 0.32 | 2.78 | 4.45 | 10.47 |
| 04/02/2011 02:15:00 | 1.25 | 7.59 | 17.16 | 1.05 | 6.41 | 13.94 | 0.32 | 4.84 | 10.39 | 18.84 |
| 04/02/2011 02:30:00 | 6.80 | 10.33 | 16.49 | 4.05 | 8.47 | 13.68 | 5.73 | 7.31 | 10.30 | 26.11 |
| 04/02/2011 02:45:00 | 1.46 | 8.85 | 17.92 | 1.20 | 6.74 | 15.35 | 0.33 | 5.10 | 9.97 | 20.69 |
| 04/02/2011 03:00:00 | 1.59 | 6.95 | 15.30 | 1.20 | 5.82 | 15.33 | 0.33 | 3.99 | 10.34 | 16.77 |
| 04/02/2011 03:15:00 | 1.50 | 5.34 | 12.61 | 1.26 | 4.70 | 12.44 | 0.33 | 3.23 | 10.39 | 13.28 |
| 04/02/2011 03:30:00 | 1.50 | 5.02 | 14.07 | 1.11 | 4.41 | 11.19 | 0.33 | 3.25 | 10.39 | 12.68 |
| 04/02/2011 03:45:00 | 1.49 | 4.83 | 10.18 | 1.11 | 4.20 | 9.76 | 0.33 | 3.42 | 10.37 | 12.46 |
| 04/02/2011 04:00:00 | 1.48 | 5.20 | 12.98 | 1.11 | 4.60 | 12.55 | 0.33 | 2.91 | 10.22 | 12.72 |
| 04/02/2011 04:15:00 | 1.45 | 5.29 | 12.69 | 1.04 | 4.69 | 11.17 | 0.33 | 3.17 | 10.34 | 13.16 |
| 04/02/2011 04:30:00 | 1.43 | 5.22 | 14.27 | 1.03 | 4.64 | 13.87 | 0.33 | 2.97 | 10.25 | 12.83 |
| 04/02/2011 04:45:00 | 1.43 | 5.35 | 13.58 | 1.02 | 4.81 | 12.56 | 0.33 | 3.30 | 10.31 | 13.46 |
| 04/02/2011 05:00:00 | 1.47 | 5.36 | 12.69 | 1.24 | 4.79 | 11.37 | 0.33 | 3.31 | 10.34 | 13.46 |
| 04/02/2011 05:15:00 | 1.49 | 5.24 | 15.04 | 1.11 | 4.63 | 12.55 | 0.33 | 3.19 | 10.00 | 13.06 |
| 04/02/2011 05:30:00 | 1.48 | 6.67 | 12.74 | 1.24 | 4.74 | 10.98 | 0.33 | 4.75 | 10.40 | 16.16 |
| 04/02/2011 05:45:00 | 1.48 | 5.33 | 12.73 | 1.10 | 4.46 | 9.80 | 0.33 | 3.56 | 10.34 | 13.34 |
| 04/02/2011 | 1.49 | 4.76 | 11.28 | 1.10 | 4.12 | 9.79 | 0.33 | 3.36 | 10.33 | 12.25 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 06:00:00 | | | | | | | | | | |
| 04/02/2011 06:15:00 | 1.46 | 5.32 | 12.86 | 1.10 | 4.59 | 12.45 | 0.33 | 3.39 | 10.13 | 13.29 |
| 04/02/2011 06:30:00 | 1.36 | 6.46 | 13.83 | 1.12 | 4.68 | 10.87 | 0.32 | 4.39 | 10.20 | 15.53 |
| 04/02/2011 06:45:00 | 1.50 | 5.22 | 12.61 | 1.12 | 4.50 | 12.22 | 0.33 | 3.30 | 8.59 | 13.03 |
| 04/02/2011 07:00:00 | 0.60 | 3.82 | 10.48 | 0.16 | 3.12 | 10.00 | 0.32 | 3.11 | 10.18 | 10.05 |
| 04/02/2011 07:15:00 | 1.63 | 4.84 | 12.01 | 1.22 | 4.19 | 11.55 | 0.33 | 3.36 | 10.37 | 12.39 |
| 04/02/2011 07:30:00 | 1.60 | 6.83 | 12.98 | 1.20 | 5.87 | 11.31 | 0.33 | 4.64 | 10.61 | 17.34 |
| 04/02/2011 07:45:00 | 1.43 | 6.94 | 14.38 | 1.17 | 6.09 | 14.08 | 0.33 | 4.80 | 9.99 | 17.84 |
| 04/02/2011 08:00:00 | 1.50 | 6.33 | 12.98 | 1.24 | 5.67 | 12.90 | 0.33 | 3.29 | 7.68 | 15.30 |
| 04/02/2011 08:15:00 | 1.49 | 6.26 | 12.75 | 1.15 | 5.07 | 9.96 | 0.33 | 3.95 | 7.65 | 15.28 |
| 04/02/2011 08:30:00 | 1.51 | 5.20 | 11.57 | 1.14 | 4.54 | 11.12 | 0.33 | 3.33 | 7.65 | 13.07 |
| 04/02/2011 08:45:00 | 1.52 | 5.28 | 13.74 | 1.13 | 4.66 | 10.89 | 0.33 | 3.27 | 10.37 | 13.21 |
| 04/02/2011 09:00:00 | 1.53 | 5.53 | 12.93 | 1.15 | 4.91 | 12.50 | 0.33 | 3.40 | 9.12 | 13.83 |
| 04/02/2011 09:15:00 | 1.54 | 5.37 | 13.69 | 1.17 | 4.77 | 11.02 | 0.33 | 3.13 | 10.38 | 13.27 |
| 04/02/2011 09:30:00 | 1.48 | 5.50 | 11.60 | 1.17 | 4.76 | 11.15 | 0.33 | 3.64 | 10.27 | 13.90 |
| 04/02/2011 09:45:00 | 1.54 | 5.68 | 15.08 | 1.15 | 4.76 | 12.41 | 0.33 | 3.44 | 10.27 | 13.88 |
| 04/02/2011 10:00:00 | 1.53 | 5.19 | 11.36 | 1.15 | 4.55 | 9.73 | 0.33 | 3.20 | 10.38 | 12.94 |
| 04/02/2011 10:15:00 | 1.52 | 5.27 | 12.58 | 1.15 | 4.67 | 9.71 | 0.33 | 3.16 | 10.25 | 13.09 |
| 04/02/2011 10:30:00 | 1.51 | 4.65 | 11.42 | 1.13 | 4.05 | 11.00 | 0.33 | 3.06 | 9.04 | 11.76 |
| 04/02/2011 10:45:00 | 1.50 | 4.96 | 12.71 | 1.12 | 4.34 | 12.34 | 0.33 | 3.36 | 10.37 | 12.65 |
| 04/02/2011 11:00:00 | 1.49 | 5.29 | 13.88 | 1.12 | 4.68 | 13.64 | 0.33 | 3.21 | 10.30 | 13.19 |
| 04/02/2011 11:15:00 | 1.49 | 6.03 | 12.67 | 1.15 | 5.58 | 12.57 | 0.33 | 3.87 | 10.41 | 15.48 |
| 04/02/2011 11:30:00 | 1.65 | 7.75 | 14.30 | 1.26 | 8.83 | 15.87 | 0.46 | 8.62 | 17.82 | 25.21 |
| 04/02/2011 11:45:00 | 1.50 | 5.22 | 13.91 | 1.12 | 4.54 | 12.40 | 0.33 | 4.56 | 12.97 | 14.32 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 04/02/2011 12:00:00 | 1.53 | 5.90 | 12.66 | 1.14 | 5.55 | 11.80 | 0.34 | 4.44 | 13.69 | 15.89 |
| 04/02/2011 12:15:00 | 1.50 | 6.47 | 12.93 | 1.20 | 7.36 | 12.53 | 0.47 | 6.80 | 13.18 | 20.63 |
| 04/02/2011 12:30:00 | 1.52 | 6.80 | 15.09 | 1.13 | 6.71 | 15.16 | 1.59 | 6.80 | 13.98 | 20.31 |
| 04/02/2011 12:45:00 | 1.50 | 7.96 | 15.20 | 1.13 | 6.88 | 15.93 | 0.33 | 6.73 | 16.61 | 21.57 |
| 04/02/2011 13:00:00 | 0.61 | 6.54 | 12.83 | 0.23 | 6.40 | 12.49 | 0.33 | 5.71 | 14.80 | 18.65 |
| 04/02/2011 13:15:00 | 0.61 | 5.81 | 13.22 | 0.16 | 5.55 | 12.94 | 0.46 | 6.02 | 15.23 | 17.38 |
| 04/02/2011 13:30:00 | 1.47 | 5.91 | 13.57 | 1.20 | 5.79 | 13.01 | 0.34 | 5.10 | 13.22 | 16.80 |
| 04/02/2011 13:45:00 | 1.50 | 5.91 | 12.62 | 1.19 | 5.24 | 9.57 | 0.33 | 3.32 | 7.62 | 14.47 |
| 04/02/2011 14:00:00 | 1.46 | 4.86 | 9.81 | 1.12 | 4.21 | 9.59 | 0.33 | 3.42 | 7.65 | 12.49 |
| 04/02/2011 14:15:00 | 1.45 | 4.52 | 12.56 | 1.11 | 3.86 | 9.52 | 0.33 | 3.20 | 7.58 | 11.58 |
| 04/02/2011 14:30:00 | 1.44 | 4.97 | 12.56 | 1.23 | 4.33 | 9.48 | 0.34 | 3.52 | 7.59 | 12.83 |
| 04/02/2011 14:45:00 | 1.43 | 5.09 | 10.14 | 1.09 | 4.45 | 9.65 | 0.34 | 3.41 | 7.62 | 12.95 |
| 04/02/2011 15:00:00 | 1.43 | 5.03 | 10.14 | 1.09 | 4.38 | 9.70 | 0.33 | 3.20 | 7.52 | 12.61 |
| 04/02/2011 15:15:00 | 1.43 | 4.67 | 9.98 | 1.21 | 4.02 | 6.93 | 0.33 | 3.30 | 7.65 | 11.99 |
| 04/02/2011 15:30:00 | 1.41 | 4.54 | 9.90 | 1.08 | 3.90 | 9.43 | 0.33 | 3.37 | 7.62 | 11.81 |
| 04/02/2011 15:45:00 | 1.56 | 7.46 | 12.78 | 1.20 | 6.92 | 12.43 | 0.36 | 5.78 | 10.37 | 20.15 |
| 04/02/2011 16:00:00 | 4.14 | 8.19 | 12.68 | 4.01 | 7.63 | 12.32 | 4.39 | 6.65 | 10.31 | 22.47 |
| 04/02/2011 16:15:00 | 4.15 | 6.90 | 12.82 | 3.87 | 6.31 | 12.39 | 3.12 | 5.21 | 9.10 | 18.42 |
| 04/02/2011 16:30:00 | 4.13 | 7.48 | 12.84 | 3.88 | 6.91 | 12.42 | 3.12 | 5.76 | 10.31 | 20.15 |
| 04/02/2011 16:45:00 | 4.20 | 9.11 | 12.82 | 3.89 | 8.54 | 12.50 | 1.57 | 6.04 | 10.38 | 23.69 |
| 04/02/2011 17:00:00 | 1.41 | 5.62 | 12.88 | 1.20 | 4.97 | 12.45 | 0.33 | 2.85 | 9.98 | 13.43 |
| 04/02/2011 17:15:00 | 1.46 | 5.79 | 12.80 | 1.07 | 5.14 | 12.39 | 0.37 | 3.69 | 9.14 | 14.61 |
| 04/02/2011 17:30:00 | 1.42 | 4.60 | 12.40 | 1.06 | 3.93 | 12.19 | 0.33 | 3.08 | 7.73 | 11.61 |
| 04/02/2011 | 4.13 | 7.95 | 12.91 | 4.02 | 7.37 | 12.49 | 3.14 | 6.35 | 10.34 | 21.66 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 17:45:00 | | | | | | | | | | |
| 04/02/2011 18:00:00 | 1.40 | 5.02 | 12.76 | 1.05 | 4.36 | 12.36 | 0.28 | 3.24 | 10.35 | 12.62 |
| 04/02/2011 18:15:00 | 1.38 | 4.83 | 12.42 | 1.05 | 4.19 | 9.62 | 0.27 | 2.58 | 8.65 | 11.60 |
| 04/02/2011 18:30:00 | 1.40 | 4.78 | 12.78 | 1.04 | 4.17 | 12.36 | 0.28 | 2.60 | 9.04 | 11.54 |
| 04/02/2011 18:45:00 | 1.38 | 4.33 | 9.94 | 1.04 | 3.67 | 9.54 | 0.27 | 3.08 | 8.95 | 11.08 |
| 04/02/2011 19:00:00 | 1.39 | 4.99 | 12.61 | 1.04 | 4.34 | 12.26 | 0.34 | 3.75 | 10.37 | 13.08 |
| 04/02/2011 19:15:00 | 0.50 | 4.43 | 11.32 | 0.09 | 3.74 | 9.61 | 0.33 | 3.45 | 10.42 | 11.61 |
| 04/02/2011 19:30:00 | 0.50 | 4.01 | 11.66 | 0.09 | 3.31 | 9.69 | 0.34 | 3.23 | 10.33 | 10.55 |
| 04/02/2011 19:45:00 | 1.47 | 4.67 | 12.58 | 1.09 | 4.00 | 9.51 | 0.34 | 3.04 | 7.73 | 11.72 |
| 04/02/2011 20:00:00 | 1.42 | 4.31 | 9.86 | 1.06 | 3.65 | 9.67 | 0.47 | 3.38 | 7.61 | 11.34 |
| 04/02/2011 20:15:00 | 1.40 | 4.86 | 12.52 | 1.05 | 4.20 | 9.41 | 0.34 | 3.18 | 7.74 | 12.24 |
| 04/02/2011 20:30:00 | 1.40 | 4.93 | 10.21 | 1.05 | 4.27 | 9.75 | 0.34 | 3.19 | 7.67 | 12.39 |
| 04/02/2011 20:45:00 | 1.40 | 4.75 | 12.57 | 1.18 | 4.08 | 9.46 | 0.33 | 3.29 | 7.70 | 12.12 |
| 04/02/2011 21:00:00 | 1.40 | 4.81 | 10.15 | 1.04 | 4.17 | 9.61 | 0.34 | 3.18 | 7.69 | 12.16 |
| 04/02/2011 21:15:00 | 1.40 | 4.27 | 12.35 | 1.04 | 3.63 | 9.52 | 0.34 | 3.22 | 9.15 | 11.12 |
| 04/02/2011 21:30:00 | 1.40 | 4.94 | 12.76 | 1.04 | 4.27 | 9.68 | 0.34 | 3.37 | 10.06 | 12.58 |
| 04/02/2011 21:45:00 | 1.40 | 4.74 | 12.70 | 1.04 | 4.08 | 9.71 | 0.34 | 2.97 | 10.45 | 11.78 |
| 04/02/2011 22:00:00 | 1.26 | 4.68 | 12.85 | 1.03 | 4.00 | 9.76 | 0.34 | 3.05 | 10.46 | 11.73 |
| 04/02/2011 22:15:00 | 1.27 | 4.80 | 15.89 | 1.03 | 4.13 | 12.56 | 0.34 | 3.14 | 10.58 | 12.07 |
| 04/02/2011 22:30:00 | 1.26 | 4.46 | 13.22 | 1.02 | 3.78 | 9.84 | 0.34 | 3.28 | 9.45 | 11.53 |
| 04/02/2011 22:45:00 | 1.25 | 4.73 | 12.80 | 1.03 | 4.08 | 9.80 | 0.34 | 3.23 | 9.17 | 12.04 |
| 04/02/2011 23:00:00 | 1.26 | 4.81 | 12.62 | 1.02 | 4.13 | 9.72 | 0.38 | 3.21 | 7.64 | 12.14 |
| 04/02/2011 23:15:00 | 1.25 | 4.76 | 12.52 | 1.02 | 4.10 | 9.68 | 0.34 | 2.97 | 7.73 | 11.83 |
| 04/02/2011 23:30:00 | 1.39 | 4.82 | 12.53 | 1.02 | 4.17 | 9.70 | 0.34 | 3.25 | 7.68 | 12.24 |

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|---|---|---|---|---|---|---|---|---|---|---|
| 04/02/2011 23:45:00 | 1.39 | 4.38 | 12.35 | 1.03 | 3.73 | 9.81 | 0.38 | 2.95 | 7.64 | 11.06 |
| 04/03/2011 00:00:00 | 1.39 | 4.60 | 12.63 | 1.02 | 3.95 | 9.57 | 0.34 | 3.33 | 7.75 | 11.88 |
| 04/03/2011 00:15:00 | 1.39 | 4.70 | 10.21 | 1.01 | 4.02 | 9.69 | 0.34 | 2.95 | 7.70 | 11.67 |
| 04/03/2011 00:30:00 | 1.39 | 4.80 | 10.25 | 1.02 | 4.14 | 9.76 | 0.34 | 3.26 | 7.69 | 12.20 |
| 04/03/2011 00:45:00 | 1.39 | 4.96 | 12.37 | 1.15 | 4.29 | 9.73 | 0.34 | 3.32 | 8.88 | 12.57 |
| 04/03/2011 01:00:00 | 1.39 | 4.64 | 12.79 | 1.02 | 3.99 | 12.51 | 0.34 | 3.20 | 9.25 | 11.82 |
| 04/03/2011 01:15:00 | 1.37 | 4.38 | 10.09 | 1.01 | 3.70 | 9.68 | 0.34 | 3.11 | 10.54 | 11.18 |
| 04/03/2011 01:30:00 | 0.51 | 3.86 | 11.98 | 0.09 | 3.15 | 11.56 | 0.34 | 2.96 | 10.43 | 9.97 |
| 04/03/2011 01:45:00 | 0.50 | 4.32 | 12.08 | 0.09 | 3.61 | 11.63 | 0.34 | 3.03 | 10.43 | 10.96 |
| 04/03/2011 02:00:00 | 1.41 | 4.95 | 12.60 | 1.05 | 4.30 | 12.45 | 0.34 | 3.49 | 10.43 | 12.75 |
| 04/03/2011 02:15:00 | 1.40 | 4.99 | 11.70 | 1.17 | 4.37 | 11.14 | 0.34 | 3.04 | 8.85 | 12.40 |
| 04/03/2011 02:30:00 | 5.75 | 8.84 | 11.67 | 5.40 | 8.20 | 11.25 | 0.48 | 6.64 | 10.53 | 23.68 |
| 04/03/2011 02:45:00 | 4.11 | 9.13 | 18.42 | 1.04 | 6.92 | 15.59 | 2.96 | 5.93 | 10.52 | 21.98 |
| 04/03/2011 03:00:00 | 1.51 | 6.57 | 15.41 | 1.17 | 5.34 | 12.81 | 0.34 | 3.59 | 10.03 | 15.51 |
| 04/03/2011 03:15:00 | 1.50 | 5.95 | 12.92 | 1.23 | 5.31 | 11.05 | 0.34 | 3.33 | 7.35 | 14.59 |
| 04/03/2011 03:30:00 | 1.50 | 5.55 | 10.27 | 1.09 | 4.95 | 9.89 | 0.34 | 3.35 | 7.79 | 13.85 |
| 04/03/2011 03:45:00 | 1.58 | 4.95 | 11.27 | 1.17 | 4.32 | 11.00 | 0.34 | 3.16 | 7.64 | 12.43 |
| 04/03/2011 04:00:00 | 1.49 | 5.18 | 13.07 | 1.09 | 4.52 | 12.58 | 0.34 | 2.88 | 9.24 | 12.58 |
| 04/03/2011 04:15:00 | 1.48 | 5.03 | 12.85 | 1.09 | 4.38 | 12.48 | 0.34 | 3.10 | 10.54 | 12.50 |
| 04/03/2011 04:30:00 | 1.41 | 6.01 | 15.31 | 1.01 | 5.41 | 15.33 | 0.34 | 3.23 | 10.51 | 14.65 |
| 04/03/2011 04:45:00 | 1.47 | 5.29 | 11.46 | 1.08 | 4.67 | 11.11 | 0.34 | 3.22 | 10.39 | 13.18 |
| 04/03/2011 05:00:00 | 1.48 | 4.73 | 12.58 | 1.21 | 4.13 | 9.74 | 0.34 | 3.32 | 10.41 | 12.18 |
| 04/03/2011 05:15:00 | 1.46 | 5.28 | 12.60 | 1.21 | 4.62 | 9.70 | 0.34 | 3.09 | 7.28 | 13.00 |
| 04/03/2011 | 1.48 | 5.08 | 10.15 | 1.07 | 4.44 | 9.69 | 0.34 | 3.11 | 7.55 | 12.64 |

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|---|---|---|---|---|---|---|---|---|---|---|
| 05:30:00 | | | | | | | | | | |
| 04/03/2011 05:45:00 | 1.46 | 5.25 | 10.00 | 1.07 | 4.59 | 9.46 | 0.47 | 3.19 | 7.66 | 13.03 |
| 04/03/2011 06:00:00 | 1.46 | 4.99 | 11.16 | 1.22 | 4.37 | 9.67 | 0.34 | 3.44 | 7.66 | 12.80 |
| 04/03/2011 06:15:00 | 1.46 | 4.90 | 10.13 | 1.08 | 4.24 | 9.60 | 0.33 | 3.21 | 10.37 | 12.34 |
| 04/03/2011 06:30:00 | 1.48 | 5.43 | 12.46 | 1.22 | 4.81 | 12.16 | 0.33 | 3.06 | 7.57 | 13.31 |
| 04/03/2011 06:45:00 | 1.54 | 5.18 | 10.12 | 1.14 | 4.51 | 9.73 | 0.34 | 3.15 | 7.55 | 12.84 |
| 04/03/2011 07:00:00 | 1.57 | 5.17 | 11.08 | 1.27 | 4.53 | 10.76 | 0.34 | 3.16 | 7.58 | 12.86 |
| 04/03/2011 07:15:00 | 1.52 | 4.68 | 10.10 | 1.11 | 4.02 | 8.32 | 0.34 | 3.29 | 7.63 | 11.98 |
| 04/03/2011 07:30:00 | 0.68 | 7.12 | 11.37 | 0.15 | 5.30 | 9.72 | 0.34 | 4.23 | 7.48 | 16.66 |
| 04/03/2011 07:45:00 | 0.78 | 7.67 | 14.30 | 0.30 | 6.46 | 11.66 | 0.34 | 3.73 | 7.71 | 17.87 |
| 04/03/2011 08:00:00 | 0.68 | 7.69 | 12.79 | 0.06 | 7.07 | 12.53 | 0.33 | 3.20 | 7.73 | 17.96 |
| 04/03/2011 08:15:00 | 1.55 | 4.90 | 12.50 | 1.15 | 4.25 | 9.64 | 0.34 | 3.16 | 10.03 | 12.30 |
| 04/03/2011 08:30:00 | 1.54 | 5.54 | 11.71 | 1.14 | 4.89 | 11.16 | 0.34 | 3.25 | 9.04 | 13.68 |
| 04/03/2011 08:45:00 | 1.52 | 5.69 | 13.82 | 1.21 | 5.07 | 11.05 | 0.34 | 3.17 | 7.59 | 13.92 |
| 04/03/2011 09:00:00 | 1.49 | 5.60 | 15.29 | 1.12 | 4.95 | 12.50 | 0.34 | 3.43 | 10.36 | 13.98 |
| 04/03/2011 09:15:00 | 1.52 | 4.65 | 15.14 | 1.14 | 4.00 | 12.36 | 0.34 | 2.88 | 9.05 | 11.53 |
| 04/03/2011 09:30:00 | 1.38 | 6.27 | 12.47 | 1.12 | 4.62 | 9.61 | 0.34 | 4.18 | 10.00 | 15.07 |
| 04/03/2011 09:45:00 | 1.39 | 4.25 | 11.31 | 1.11 | 4.01 | 11.15 | 0.34 | 2.60 | 7.30 | 10.86 |
| 04/03/2011 10:00:00 | 1.40 | 4.29 | 9.83 | 1.12 | 4.06 | 9.70 | 0.34 | 2.83 | 7.36 | 11.18 |
| 04/03/2011 10:15:00 | 1.38 | 4.39 | 8.52 | 1.11 | 4.17 | 8.33 | 0.34 | 2.79 | 7.35 | 11.35 |
| 04/03/2011 10:30:00 | 1.38 | 3.87 | 7.05 | 1.10 | 3.65 | 6.85 | 0.34 | 2.98 | 4.57 | 10.50 |
| 04/03/2011 10:45:00 | 1.37 | 3.97 | 8.49 | 1.09 | 3.75 | 8.33 | 0.34 | 2.76 | 4.55 | 10.48 |
| 04/03/2011 11:00:00 | 1.36 | 4.09 | 8.41 | 1.09 | 3.87 | 8.23 | 0.33 | 2.53 | 4.54 | 10.49 |
| 04/03/2011 11:15:00 | 1.36 | 4.40 | 9.71 | 1.09 | 4.19 | 9.60 | 0.34 | 2.94 | 7.30 | 11.53 |

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|---|---|---|---|---|---|---|---|---|---|---|
| 04/03/2011 11:30:00 | 1.37 | 4.31 | 9.75 | 1.11 | 4.10 | 9.63 | 0.34 | 2.82 | 7.26 | 11.24 |
| 04/03/2011 11:45:00 | 1.36 | 4.07 | 9.75 | 1.10 | 3.86 | 9.67 | 0.34 | 2.95 | 7.30 | 10.88 |
| 04/03/2011 12:00:00 | 1.39 | 5.02 | 9.82 | 1.13 | 3.68 | 6.93 | 0.34 | 3.95 | 10.15 | 12.66 |
| 04/03/2011 12:15:00 | 1.39 | 4.92 | 11.34 | 1.12 | 3.89 | 11.15 | 0.34 | 3.31 | 9.26 | 12.13 |
| 04/03/2011 12:30:00 | 1.53 | 5.68 | 12.77 | 1.11 | 3.96 | 9.72 | 0.35 | 4.12 | 10.49 | 13.76 |
| 04/03/2011 12:45:00 | 1.37 | 4.74 | 13.85 | 1.09 | 3.99 | 11.00 | 0.34 | 3.23 | 8.79 | 11.96 |
| 04/03/2011 13:00:00 | 1.39 | 4.86 | 9.96 | 1.11 | 4.10 | 8.23 | 0.35 | 3.38 | 10.02 | 12.34 |
| 04/03/2011 13:15:00 | 1.52 | 4.25 | 8.65 | 1.11 | 3.48 | 7.33 | 0.36 | 3.39 | 7.73 | 11.13 |
| 04/03/2011 13:30:00 | 1.41 | 4.91 | 14.01 | 1.13 | 4.16 | 11.08 | 0.35 | 3.60 | 10.35 | 12.68 |
| 04/03/2011 13:45:00 | 0.36 | 4.12 | 12.51 | 0.08 | 3.52 | 9.67 | 0.35 | 2.91 | 8.79 | 10.55 |
| 04/03/2011 14:00:00 | 0.35 | 3.08 | 7.93 | 0.08 | 2.85 | 6.43 | 0.33 | 2.74 | 7.27 | 8.67 |
| 04/03/2011 14:15:00 | 1.36 | 3.96 | 6.98 | 1.12 | 3.78 | 6.89 | 0.33 | 2.64 | 4.51 | 10.38 |
| 04/03/2011 14:30:00 | 1.35 | 3.35 | 6.95 | 1.12 | 3.17 | 6.87 | 0.33 | 2.87 | 4.49 | 9.39 |
| 04/03/2011 14:45:00 | 1.33 | 3.84 | 6.98 | 1.10 | 3.67 | 6.84 | 0.33 | 2.79 | 4.47 | 10.29 |
| 04/03/2011 15:00:00 | 1.33 | 3.96 | 6.96 | 1.10 | 3.78 | 6.82 | 0.33 | 2.76 | 4.47 | 10.50 |
| 04/03/2011 15:15:00 | 1.32 | 3.86 | 9.63 | 1.10 | 3.69 | 9.53 | 0.33 | 2.60 | 7.25 | 10.15 |
| 04/03/2011 15:30:00 | 1.31 | 3.85 | 9.59 | 1.09 | 3.69 | 9.53 | 0.33 | 2.70 | 7.18 | 10.24 |
| 04/03/2011 15:45:00 | 1.30 | 3.32 | 6.84 | 1.08 | 3.15 | 6.78 | 0.33 | 2.80 | 7.19 | 9.27 |
| 04/03/2011 16:00:00 | 1.29 | 3.94 | 9.64 | 1.08 | 3.77 | 9.57 | 0.33 | 2.84 | 7.23 | 10.56 |
| 04/03/2011 16:15:00 | 1.29 | 3.99 | 9.60 | 1.07 | 3.83 | 9.58 | 0.33 | 2.71 | 7.17 | 10.53 |
| 04/03/2011 16:30:00 | 1.29 | 3.91 | 9.50 | 1.07 | 3.76 | 9.47 | 0.33 | 2.90 | 7.16 | 10.57 |
| 04/03/2011 16:45:00 | 1.28 | 3.78 | 6.90 | 1.07 | 3.62 | 6.78 | 0.33 | 2.49 | 5.90 | 9.90 |
| 04/03/2011 17:00:00 | 1.29 | 3.19 | 6.83 | 1.06 | 3.02 | 6.71 | 0.33 | 2.69 | 4.43 | 8.90 |
| 04/03/2011 | 1.29 | 3.89 | 6.89 | 1.06 | 3.72 | 6.77 | 0.33 | 2.85 | 4.48 | 10.47 |

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|---|---|---|---|---|---|---|---|---|---|---|
| 17:15:00 | | | | | | | | | | |
| 04/03/2011 17:30:00 | 1.28 | 3.85 | 6.90 | 1.06 | 3.68 | 6.79 | 0.33 | 2.48 | 4.46 | 10.01 |
| 04/03/2011 17:45:00 | 1.28 | 3.89 | 6.90 | 1.06 | 3.72 | 6.75 | 0.33 | 2.81 | 5.95 | 10.43 |
| 04/03/2011 18:00:00 | 1.28 | 3.72 | 6.90 | 1.06 | 3.56 | 6.75 | 0.33 | 2.55 | 7.20 | 9.83 |
| 04/03/2011 18:15:00 | 1.27 | 3.18 | 6.83 | 1.06 | 3.01 | 6.73 | 0.33 | 2.76 | 7.20 | 8.96 |
| 04/03/2011 18:30:00 | 1.26 | 3.87 | 9.55 | 1.05 | 3.71 | 9.53 | 0.33 | 2.87 | 7.26 | 10.45 |
| 04/03/2011 18:45:00 | 1.26 | 3.95 | 9.53 | 1.05 | 3.80 | 9.51 | 0.33 | 2.78 | 7.19 | 10.53 |
| 04/03/2011 19:00:00 | 1.26 | 3.93 | 9.41 | 1.05 | 3.78 | 9.41 | 0.33 | 2.62 | 7.09 | 10.33 |
| 04/03/2011 19:15:00 | 1.26 | 3.75 | 6.87 | 1.05 | 3.59 | 6.77 | 0.33 | 2.66 | 7.24 | 9.99 |
| 04/03/2011 19:30:00 | 1.26 | 3.16 | 6.72 | 1.04 | 3.00 | 6.63 | 0.33 | 2.59 | 4.47 | 8.75 |
| 04/03/2011 19:45:00 | 1.26 | 3.69 | 6.80 | 1.04 | 3.52 | 6.70 | 0.33 | 2.76 | 7.10 | 9.97 |
| 04/03/2011 20:00:00 | 0.35 | 3.34 | 6.77 | 0.08 | 3.14 | 6.70 | 0.33 | 2.70 | 4.46 | 9.18 |
| 04/03/2011 20:15:00 | 0.36 | 3.12 | 7.79 | 0.08 | 2.90 | 5.72 | 0.33 | 2.74 | 4.44 | 8.76 |
| 04/03/2011 20:30:00 | 1.31 | 3.82 | 6.88 | 1.09 | 3.65 | 6.78 | 0.33 | 2.68 | 4.45 | 10.15 |
| 04/03/2011 20:45:00 | 1.29 | 3.29 | 6.84 | 1.07 | 3.12 | 6.73 | 0.33 | 2.55 | 7.23 | 8.96 |
| 04/03/2011 21:00:00 | 1.28 | 3.77 | 9.61 | 1.07 | 3.61 | 9.55 | 0.33 | 2.99 | 7.22 | 10.37 |
| 04/03/2011 21:15:00 | 1.28 | 3.98 | 9.60 | 1.05 | 3.81 | 9.53 | 0.33 | 2.62 | 7.31 | 10.41 |
| 04/03/2011 21:30:00 | 1.28 | 3.94 | 9.74 | 1.05 | 3.76 | 9.68 | 0.33 | 2.86 | 7.35 | 10.57 |
| 04/03/2011 21:45:00 | 1.28 | 3.85 | 9.75 | 1.05 | 3.66 | 9.68 | 0.34 | 2.63 | 7.32 | 10.13 |
| 04/03/2011 22:00:00 | 1.28 | 3.50 | 6.99 | 1.04 | 3.32 | 6.90 | 0.34 | 2.63 | 4.57 | 9.45 |
| 04/03/2011 22:15:00 | 1.28 | 3.50 | 7.03 | 1.04 | 3.31 | 6.87 | 0.33 | 2.96 | 4.59 | 9.78 |
| 04/03/2011 22:30:00 | 1.28 | 8.91 | 14.01 | 1.05 | 6.70 | 11.09 | 0.34 | 4.74 | 8.95 | 20.35 |
| 04/03/2011 22:45:00 | 2.80 | 9.22 | 14.03 | 2.54 | 6.65 | 11.09 | 0.34 | 5.02 | 10.20 | 20.89 |
| 04/03/2011 23:00:00 | 2.83 | 8.81 | 16.01 | 2.53 | 6.23 | 12.81 | 0.34 | 5.09 | 10.29 | 20.13 |

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|---|---|---|---|---|---|---|---|---|---|---|
| 04/03/2011 23:15:00 | 5.56 | 10.22 | 15.58 | 3.79 | 7.49 | 12.74 | 0.34 | 5.26 | 10.51 | 22.97 |
| 04/03/2011 23:30:00 | 4.22 | 10.03 | 15.20 | 3.84 | 7.79 | 12.57 | 0.35 | 4.86 | 10.06 | 22.69 |
| 04/03/2011 23:45:00 | 1.35 | 9.39 | 17.91 | 1.06 | 7.82 | 15.37 | 0.35 | 4.53 | 10.55 | 21.73 |
| 04/04/2011 00:00:00 | 1.40 | 8.74 | 18.15 | 1.13 | 6.63 | 15.44 | 0.34 | 4.55 | 10.11 | 19.92 |
| 04/04/2011 00:15:00 | 2.81 | 10.50 | 15.28 | 2.54 | 7.77 | 12.57 | 0.35 | 5.58 | 10.41 | 23.84 |
| 04/04/2011 00:30:00 | 1.49 | 6.89 | 12.86 | 1.06 | 5.45 | 9.99 | 0.35 | 3.92 | 8.83 | 16.25 |
| 04/04/2011 00:45:00 | 1.54 | 4.84 | 8.95 | 1.12 | 4.07 | 8.47 | 0.48 | 3.35 | 7.62 | 12.26 |
| 04/04/2011 01:00:00 | 1.53 | 5.46 | 12.58 | 1.12 | 4.75 | 9.69 | 0.34 | 3.20 | 7.65 | 13.41 |
| 04/04/2011 01:15:00 | 1.51 | 6.30 | 15.22 | 1.11 | 5.63 | 12.90 | 0.34 | 3.41 | 10.49 | 15.34 |
| 04/04/2011 01:30:00 | 1.51 | 5.72 | 12.60 | 1.11 | 5.01 | 11.01 | 0.35 | 3.35 | 9.22 | 14.09 |
| 04/04/2011 01:45:00 | 1.51 | 5.52 | 14.04 | 1.11 | 4.82 | 13.84 | 0.35 | 3.34 | 8.83 | 13.68 |
| 04/04/2011 02:00:00 | 1.46 | 4.85 | 10.95 | 1.11 | 4.17 | 9.75 | 0.34 | 3.42 | 10.18 | 12.44 |
| 04/04/2011 02:15:00 | 0.62 | 4.69 | 11.90 | 0.17 | 3.93 | 11.57 | 0.34 | 3.14 | 10.48 | 11.76 |
| 04/04/2011 02:30:00 | 0.64 | 4.56 | 13.45 | 0.16 | 3.80 | 12.94 | 0.34 | 3.25 | 10.38 | 11.61 |
| 04/04/2011 02:45:00 | 1.56 | 5.39 | 12.73 | 1.14 | 4.65 | 12.45 | 0.35 | 3.17 | 10.49 | 13.22 |
| 04/04/2011 03:00:00 | 1.49 | 5.34 | 11.58 | 1.14 | 4.64 | 11.23 | 0.35 | 3.36 | 10.50 | 13.34 |
| 04/04/2011 03:15:00 | 1.53 | 4.81 | 11.58 | 1.12 | 4.09 | 11.13 | 0.35 | 3.20 | 10.07 | 12.10 |
| 04/04/2011 03:30:00 | 1.51 | 5.69 | 12.79 | 1.25 | 4.98 | 12.39 | 0.35 | 3.49 | 10.39 | 14.16 |
| 04/04/2011 03:45:00 | 1.51 | 5.46 | 11.56 | 1.24 | 4.74 | 11.00 | 0.34 | 3.20 | 7.65 | 13.40 |
| 04/04/2011 04:00:00 | 1.65 | 5.39 | 9.89 | 1.24 | 4.67 | 9.62 | 0.48 | 3.53 | 7.56 | 13.58 |
| 04/04/2011 04:15:00 | 1.49 | 4.91 | 11.42 | 1.11 | 4.21 | 8.29 | 0.34 | 3.24 | 7.67 | 12.36 |
| 04/04/2011 04:30:00 | 1.54 | 4.99 | 12.57 | 1.12 | 4.28 | 11.05 | 0.34 | 3.31 | 9.07 | 12.58 |
| 04/04/2011 04:45:00 | 1.72 | 6.90 | 12.71 | 1.15 | 4.58 | 9.69 | 0.34 | 5.08 | 9.88 | 16.57 |
| 04/04/2011 | 1.54 | 5.74 | 16.35 | 1.27 | 4.77 | 13.50 | 0.34 | 3.68 | 9.87 | 14.20 |

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|---|---|---|---|---|---|---|---|---|---|---|
| 05:00:00 | | | | | | | | | | |
| 04/04/2011 05:15:00 | 1.52 | 5.40 | 15.07 | 1.12 | 4.66 | 12.43 | 0.35 | 3.60 | 9.94 | 13.66 |
| 04/04/2011 05:30:00 | 1.60 | 5.22 | 14.16 | 1.17 | 4.47 | 11.16 | 0.35 | 3.44 | 9.25 | 13.13 |
| 04/04/2011 05:45:00 | 1.56 | 5.02 | 10.03 | 1.16 | 4.29 | 8.39 | 0.34 | 3.30 | 9.13 | 12.60 |
| 04/04/2011 06:00:00 | 1.58 | 9.76 | 15.38 | 1.09 | 7.48 | 12.54 | 1.61 | 6.48 | 12.06 | 23.71 |
| 04/04/2011 06:15:00 | 1.58 | 7.34 | 15.47 | 1.15 | 5.98 | 12.84 | 0.42 | 5.19 | 11.00 | 18.51 |
| 04/04/2011 06:30:00 | 1.79 | 6.54 | 15.55 | 1.13 | 5.59 | 12.64 | 0.81 | 4.71 | 10.38 | 16.84 |
| 04/04/2011 06:45:00 | 1.87 | 7.02 | 14.36 | 1.20 | 6.07 | 11.36 | 0.81 | 4.31 | 10.40 | 17.40 |
| 04/04/2011 07:00:00 | 1.94 | 6.06 | 11.78 | 1.12 | 5.11 | 11.10 | 1.92 | 4.48 | 9.70 | 15.65 |
| 04/04/2011 07:15:00 | 1.73 | 4.84 | 10.08 | 1.28 | 3.98 | 9.80 | 1.68 | 4.41 | 9.57 | 13.23 |
| 04/04/2011 07:30:00 | 1.73 | 6.80 | 14.69 | 1.42 | 6.08 | 14.14 | 1.68 | 5.47 | 10.59 | 18.35 |
| 04/04/2011 07:45:00 | 1.77 | 7.51 | 13.06 | 1.35 | 6.83 | 12.48 | 1.34 | 5.48 | 10.42 | 19.81 |
| 04/04/2011 08:00:00 | 1.74 | 7.17 | 14.03 | 1.32 | 6.53 | 13.75 | 1.59 | 5.03 | 10.42 | 18.73 |
| 04/04/2011 08:15:00 | 1.58 | 5.45 | 14.70 | 1.31 | 4.60 | 11.53 | 1.58 | 4.41 | 10.39 | 14.46 |
| 04/04/2011 08:30:00 | 0.64 | 7.35 | 14.98 | 0.17 | 5.47 | 14.26 | 1.58 | 4.87 | 10.55 | 17.70 |
| 04/04/2011 08:45:00 | 1.64 | 6.94 | 15.86 | 1.22 | 6.12 | 14.21 | 1.58 | 4.05 | 10.60 | 17.11 |
| 04/04/2011 09:00:00 | 1.61 | 5.97 | 11.16 | 1.33 | 4.49 | 9.67 | 1.34 | 4.50 | 8.55 | 14.96 |
| 04/04/2011 09:15:00 | 2.58 | 5.99 | 12.26 | 1.17 | 4.23 | 9.58 | 1.35 | 4.34 | 11.05 | 14.56 |
| 04/04/2011 09:30:00 | 2.59 | 7.35 | 13.63 | 1.30 | 5.64 | 12.35 | 1.34 | 4.19 | 10.80 | 17.18 |
| 04/04/2011 09:45:00 | 1.72 | 7.68 | 13.76 | 1.17 | 5.26 | 12.25 | 0.48 | 5.19 | 10.97 | 18.13 |
| 04/04/2011 10:00:00 | 1.58 | 5.00 | 15.18 | 1.18 | 4.14 | 12.41 | 0.34 | 3.33 | 9.75 | 12.48 |
| 04/04/2011 10:15:00 | 1.58 | 5.33 | 12.54 | 1.19 | 4.64 | 12.20 | 0.34 | 3.38 | 10.25 | 13.35 |
| 04/04/2011 10:30:00 | 4.23 | 6.99 | 13.87 | 3.94 | 6.37 | 10.89 | 3.08 | 4.84 | 9.86 | 18.20 |
| 04/04/2011 10:45:00 | 1.70 | 6.46 | 12.69 | 1.32 | 5.81 | 12.27 | 0.48 | 4.50 | 9.01 | 16.77 |

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|---|---|---|---|---|---|---|---|---|---|---|
| 04/04/2011 11:00:00 | 1.58 | 4.99 | 9.90 | 1.19 | 4.28 | 7.99 | 0.34 | 3.15 | 7.47 | 12.43 |
| 04/04/2011 11:15:00 | 1.56 | 5.39 | 9.93 | 1.11 | 4.72 | 9.53 | 0.34 | 3.10 | 7.45 | 13.21 |
| 04/04/2011 11:30:00 | 1.53 | 6.02 | 12.29 | 1.21 | 5.33 | 12.28 | 0.34 | 3.41 | 7.46 | 14.77 |
| 04/04/2011 11:45:00 | 1.60 | 5.78 | 11.23 | 1.34 | 5.11 | 10.87 | 0.34 | 3.18 | 9.03 | 14.08 |
| 04/04/2011 12:00:00 | 1.57 | 5.22 | 12.61 | 1.18 | 4.51 | 12.11 | 0.34 | 3.34 | 10.13 | 13.07 |
| 04/04/2011 12:15:00 | 1.55 | 5.03 | 13.70 | 1.30 | 4.33 | 10.85 | 0.34 | 3.01 | 8.90 | 12.38 |
| 04/04/2011 12:30:00 | 1.55 | 5.47 | 11.23 | 1.16 | 3.90 | 10.75 | 0.47 | 4.11 | 9.77 | 13.48 |
| 04/04/2011 12:45:00 | 1.56 | 5.68 | 10.80 | 1.30 | 4.56 | 9.30 | 0.34 | 3.47 | 9.82 | 13.71 |
| 04/04/2011 13:00:00 | 1.55 | 5.37 | 11.21 | 1.16 | 4.67 | 11.12 | 0.34 | 3.31 | 9.82 | 13.35 |
| 04/04/2011 13:15:00 | 1.56 | 5.45 | 12.63 | 1.16 | 4.74 | 12.32 | 0.35 | 3.24 | 7.46 | 13.43 |
| 04/04/2011 13:30:00 | 1.58 | 4.82 | 12.43 | 1.17 | 4.09 | 9.66 | 0.49 | 3.58 | 7.58 | 12.49 |
| 04/04/2011 13:45:00 | 1.57 | 4.92 | 11.11 | 1.16 | 4.19 | 10.75 | 0.48 | 3.51 | 7.63 | 12.62 |
| 04/04/2011 14:00:00 | 1.76 | 5.35 | 12.39 | 1.34 | 4.62 | 9.69 | 0.48 | 3.48 | 7.57 | 13.45 |
| 04/04/2011 14:15:00 | 1.62 | 5.45 | 12.45 | 1.20 | 4.72 | 10.86 | 0.34 | 3.76 | 7.51 | 13.93 |
| 04/04/2011 14:30:00 | 1.61 | 5.49 | 12.20 | 1.21 | 4.80 | 11.30 | 0.48 | 3.49 | 7.62 | 13.77 |
| 04/04/2011 14:45:00 | 0.57 | 4.85 | 11.62 | 0.25 | 4.17 | 8.79 | 0.48 | 3.58 | 7.52 | 12.60 |
| 04/04/2011 15:00:00 | 1.66 | 5.29 | 11.68 | 1.24 | 4.65 | 11.18 | 0.48 | 3.69 | 7.50 | 13.63 |
| 04/04/2011 15:15:00 | 1.65 | 5.42 | 12.64 | 1.24 | 4.69 | 9.61 | 0.47 | 3.62 | 7.52 | 13.74 |
| 04/04/2011 15:30:00 | 1.62 | 5.32 | 12.65 | 1.23 | 4.59 | 9.55 | 0.34 | 3.53 | 7.49 | 13.45 |
| 04/04/2011 15:45:00 | 1.63 | 5.35 | 13.29 | 1.22 | 4.67 | 10.79 | 0.34 | 3.67 | 8.47 | 13.70 |
| 04/04/2011 16:00:00 | 1.35 | 3.80 | 9.51 | 1.12 | 3.62 | 9.44 | 0.34 | 3.11 | 7.16 | 10.54 |
| 04/04/2011 16:15:00 | 1.33 | 3.46 | 9.41 | 1.11 | 3.28 | 9.37 | 0.33 | 2.98 | 7.17 | 9.72 |
| 04/04/2011 16:30:00 | 1.32 | 3.78 | 9.55 | 1.11 | 3.60 | 9.43 | 0.33 | 2.96 | 7.17 | 10.33 |
| 04/04/2011 | 1.32 | 3.91 | 9.46 | 1.10 | 3.73 | 9.35 | 0.33 | 3.22 | 7.25 | 10.86 |

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|---|---|---|---|---|---|---|---|---|---|---|
| 16:45:00 | | | | | | | | | | |
| 04/04/2011 17:00:00 | 1.32 | 3.97 | 9.56 | 1.09 | 3.79 | 9.50 | 0.33 | 3.08 | 7.22 | 10.85 |
| 04/04/2011 17:15:00 | 1.32 | 3.54 | 6.86 | 1.09 | 3.36 | 6.76 | 0.34 | 3.25 | 7.23 | 10.15 |
| 04/04/2011 17:30:00 | 1.32 | 3.70 | 6.92 | 1.09 | 3.52 | 6.79 | 0.34 | 3.17 | 7.28 | 10.39 |
| 04/04/2011 17:45:00 | 1.32 | 3.86 | 9.64 | 1.09 | 3.67 | 9.56 | 0.34 | 3.37 | 7.29 | 10.91 |
| 04/04/2011 18:00:00 | 1.31 | 3.91 | 9.62 | 1.08 | 3.72 | 9.56 | 0.34 | 2.90 | 7.26 | 10.53 |
| 04/04/2011 18:15:00 | 1.31 | 3.79 | 9.61 | 1.08 | 3.61 | 9.56 | 0.34 | 2.95 | 7.23 | 10.36 |
| 04/04/2011 18:30:00 | 1.30 | 3.38 | 6.97 | 1.07 | 3.19 | 6.84 | 0.36 | 3.36 | 7.23 | 9.92 |
| 04/04/2011 18:45:00 | 1.31 | 3.61 | 7.00 | 1.07 | 3.40 | 6.82 | 0.34 | 2.84 | 4.58 | 9.85 |
| 04/04/2011 19:00:00 | 1.30 | 3.86 | 6.98 | 1.07 | 3.66 | 6.84 | 0.34 | 3.13 | 4.57 | 10.66 |
| 04/04/2011 19:15:00 | 1.31 | 3.92 | 7.00 | 1.07 | 3.73 | 6.88 | 1.60 | 3.53 | 4.57 | 11.19 |
| 04/04/2011 19:30:00 | 1.31 | 3.81 | 7.04 | 1.07 | 3.61 | 6.84 | 0.34 | 2.87 | 5.88 | 10.28 |
| 04/04/2011 19:45:00 | 1.30 | 3.05 | 7.01 | 1.06 | 2.84 | 6.83 | 0.34 | 2.95 | 7.35 | 8.84 |
| 04/04/2011 20:00:00 | 1.28 | 3.88 | 9.82 | 1.07 | 3.70 | 9.71 | 0.35 | 3.24 | 7.40 | 10.82 |
| 04/04/2011 20:15:00 | 1.28 | 3.90 | 9.53 | 1.06 | 3.73 | 9.46 | 0.33 | 3.06 | 7.21 | 10.70 |
| 04/04/2011 20:30:00 | 1.28 | 3.91 | 9.59 | 1.06 | 3.74 | 9.54 | 0.34 | 3.22 | 7.24 | 10.87 |
| 04/04/2011 20:45:00 | 0.36 | 3.07 | 8.69 | 0.08 | 2.86 | 8.56 | 0.33 | 3.13 | 7.28 | 9.05 |
| 04/04/2011 21:00:00 | 0.36 | 2.60 | 7.60 | 0.08 | 2.35 | 5.80 | 0.34 | 3.28 | 7.32 | 8.23 |
| 04/04/2011 21:15:00 | 1.33 | 3.90 | 7.03 | 1.09 | 3.70 | 6.88 | 0.34 | 3.10 | 7.16 | 10.71 |
| 04/04/2011 21:30:00 | 1.31 | 3.88 | 6.88 | 1.09 | 3.71 | 6.76 | 0.33 | 3.30 | 7.22 | 10.89 |
| 04/04/2011 21:45:00 | 1.30 | 3.75 | 6.82 | 1.08 | 3.58 | 6.71 | 0.33 | 2.95 | 4.44 | 10.28 |
| 04/04/2011 22:00:00 | 1.29 | 3.24 | 6.80 | 1.07 | 3.05 | 6.70 | 0.33 | 3.03 | 4.42 | 9.32 |
| 04/04/2011 22:15:00 | 1.30 | 5.35 | 11.13 | 1.07 | 4.47 | 8.19 | 0.37 | 3.82 | 7.25 | 13.64 |
| 04/04/2011 22:30:00 | 1.44 | 7.58 | 13.81 | 1.17 | 6.15 | 11.08 | 0.39 | 4.21 | 7.56 | 17.94 |

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|---|---|---|---|---|---|---|---|---|---|---|
| 04/04/2011 22:45:00 | 1.44 | 9.14 | 14.13 | 1.15 | 6.50 | 11.10 | 1.59 | 5.56 | 7.64 | 21.20 |
| 04/04/2011 23:00:00 | 2.79 | 9.71 | 15.81 | 1.25 | 7.27 | 12.66 | 1.58 | 5.29 | 7.60 | 22.27 |
| 04/04/2011 23:15:00 | 2.77 | 10.36 | 17.95 | 2.38 | 7.87 | 15.29 | 1.58 | 5.54 | 8.77 | 23.77 |
| 04/04/2011 23:30:00 | 4.17 | 10.60 | 15.42 | 3.84 | 7.84 | 12.64 | 1.58 | 5.65 | 7.68 | 24.08 |
| 04/04/2011 23:45:00 | 5.49 | 10.44 | 15.16 | 3.83 | 7.72 | 12.47 | 0.34 | 5.70 | 7.64 | 23.85 |
| 04/05/2011 00:00:00 | 1.54 | 7.11 | 12.56 | 1.14 | 6.13 | 12.47 | 0.47 | 4.10 | 9.93 | 17.35 |
| 04/05/2011 00:15:00 | 1.53 | 5.11 | 12.36 | 1.13 | 4.17 | 9.72 | 0.34 | 3.79 | 7.55 | 13.07 |
| 04/05/2011 00:30:00 | 1.40 | 9.93 | 15.50 | 1.02 | 7.47 | 12.56 | 1.57 | 5.58 | 7.61 | 22.98 |
| 04/05/2011 00:45:00 | 1.63 | 6.76 | 13.86 | 1.21 | 5.75 | 10.90 | 0.38 | 4.01 | 9.85 | 16.52 |
| 04/05/2011 01:00:00 | 1.67 | 5.04 | 13.90 | 1.27 | 4.34 | 11.00 | 0.34 | 3.54 | 7.54 | 12.92 |
| 04/05/2011 01:15:00 | 1.67 | 4.72 | 12.56 | 1.26 | 4.02 | 9.69 | 0.48 | 3.54 | 9.04 | 12.28 |
| 04/05/2011 01:30:00 | 1.39 | 5.29 | 12.60 | 1.12 | 4.60 | 10.80 | 0.35 | 3.66 | 10.37 | 13.54 |
| 04/05/2011 01:45:00 | 1.53 | 5.27 | 15.25 | 1.13 | 4.58 | 12.51 | 0.34 | 3.69 | 10.25 | 13.54 |
| 04/05/2011 02:00:00 | 1.53 | 5.31 | 10.26 | 1.12 | 4.62 | 9.70 | 0.48 | 3.75 | 10.33 | 13.68 |
| 04/05/2011 02:15:00 | 1.52 | 4.68 | 12.54 | 1.25 | 3.97 | 9.68 | 0.34 | 3.69 | 9.75 | 12.35 |
| 04/05/2011 02:30:00 | 1.52 | 5.20 | 13.54 | 1.11 | 4.51 | 12.49 | 1.58 | 3.96 | 10.35 | 13.67 |
| 04/05/2011 02:45:00 | 1.52 | 5.15 | 12.22 | 1.11 | 4.46 | 9.69 | 0.34 | 3.46 | 10.32 | 13.07 |
| 04/05/2011 03:00:00 | 0.64 | 4.69 | 14.03 | 0.25 | 3.95 | 11.56 | 0.34 | 3.26 | 10.27 | 11.90 |
| 04/05/2011 03:15:00 | 0.63 | 4.15 | 13.08 | 0.17 | 3.45 | 12.61 | 0.48 | 3.49 | 9.05 | 11.09 |
| 04/05/2011 03:30:00 | 1.55 | 4.87 | 12.84 | 1.28 | 4.16 | 9.79 | 0.34 | 3.59 | 10.32 | 12.63 |
| 04/05/2011 03:45:00 | 1.52 | 5.27 | 13.81 | 1.14 | 4.51 | 12.42 | 0.34 | 3.35 | 10.24 | 13.13 |
| 04/05/2011 04:00:00 | 1.63 | 5.42 | 12.67 | 1.21 | 4.67 | 12.42 | 0.35 | 3.52 | 9.90 | 13.62 |
| 04/05/2011 04:15:00 | 1.63 | 5.05 | 11.21 | 1.21 | 4.33 | 9.79 | 0.38 | 3.13 | 8.63 | 12.52 |
| 04/05/2011 | 1.63 | 4.98 | 10.16 | 1.34 | 4.25 | 8.38 | 0.34 | 3.20 | 9.72 | 12.42 |

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|---|---|---|---|---|---|---|---|---|---|---|
| 04:30:00 | | | | | | | | | | |
| 04/05/2011 04:45:00 | 1.67 | 5.37 | 10.30 | 1.22 | 4.65 | 9.76 | 0.35 | 3.42 | 7.67 | 13.44 |
| 04/05/2011 05:00:00 | 1.61 | 7.06 | 12.93 | 1.19 | 4.57 | 9.79 | 0.35 | 5.01 | 7.65 | 16.65 |
| 04/05/2011 05:15:00 | 1.57 | 5.12 | 10.20 | 1.17 | 4.25 | 9.72 | 0.34 | 3.46 | 7.54 | 12.83 |
| 04/05/2011 05:30:00 | 1.58 | 4.77 | 12.68 | 1.16 | 4.04 | 9.59 | 0.47 | 3.21 | 8.97 | 12.02 |
| 04/05/2011 05:45:00 | 1.58 | 6.17 | 14.14 | 1.15 | 5.06 | 13.86 | 0.35 | 3.77 | 10.45 | 15.01 |
| 04/05/2011 06:00:00 | 2.94 | 9.72 | 15.72 | 1.14 | 7.48 | 13.84 | 0.53 | 5.62 | 10.42 | 22.82 |
| 04/05/2011 06:15:00 | 2.32 | 9.30 | 14.45 | 1.29 | 7.41 | 12.66 | 1.08 | 6.26 | 12.56 | 22.97 |
| 04/05/2011 06:30:00 | 1.72 | 7.06 | 15.41 | 1.76 | 6.33 | 13.28 | 1.28 | 5.56 | 10.05 | 18.96 |
| 04/05/2011 06:45:00 | 1.77 | 5.91 | 12.83 | 1.74 | 5.58 | 10.38 | 1.27 | 4.74 | 10.37 | 16.23 |
| 04/05/2011 07:00:00 | 1.76 | 7.61 | 15.72 | 1.74 | 7.33 | 15.90 | 1.41 | 5.45 | 12.49 | 20.40 |
| 04/05/2011 07:15:00 | 4.44 | 8.55 | 15.31 | 4.53 | 8.37 | 15.72 | 0.99 | 5.98 | 11.04 | 22.90 |
| 04/05/2011 07:30:00 | 1.52 | 7.10 | 14.35 | 1.73 | 6.86 | 14.32 | 0.88 | 5.26 | 11.27 | 19.23 |
| 04/05/2011 07:45:00 | 2.06 | 7.25 | 13.02 | 1.72 | 6.62 | 11.49 | 1.27 | 3.83 | 9.09 | 17.70 |
| 04/05/2011 08:00:00 | 1.69 | 4.53 | 10.17 | 1.35 | 3.87 | 7.49 | 0.68 | 3.14 | 8.38 | 11.53 |
| 04/05/2011 08:15:00 | 1.67 | 4.64 | 10.28 | 1.38 | 4.00 | 9.86 | 0.55 | 2.19 | 7.55 | 10.84 |
| 04/05/2011 08:30:00 | 1.68 | 5.39 | 11.34 | 1.35 | 4.76 | 9.83 | 0.55 | 2.54 | 6.42 | 12.69 |
| 04/05/2011 08:45:00 | 1.66 | 5.83 | 12.83 | 1.47 | 5.03 | 12.61 | 0.54 | 2.60 | 7.59 | 13.46 |
| 04/05/2011 09:00:00 | 1.53 | 5.82 | 12.34 | 1.34 | 4.49 | 9.96 | 0.55 | 3.53 | 7.57 | 13.85 |
| 04/05/2011 09:15:00 | 0.80 | 4.38 | 12.58 | 0.39 | 2.99 | 9.73 | 0.55 | 3.10 | 7.60 | 10.47 |
| 04/05/2011 09:30:00 | 1.80 | 6.12 | 12.57 | 0.53 | 4.51 | 9.82 | 0.54 | 3.50 | 7.50 | 14.13 |
| 04/05/2011 09:45:00 | 1.68 | 5.35 | 12.49 | 1.26 | 4.38 | 9.55 | 0.07 | 2.53 | 6.48 | 12.26 |
| 04/05/2011 10:00:00 | 1.38 | 3.76 | 9.96 | 1.18 | 3.15 | 8.11 | 0.07 | 1.75 | 5.89 | 8.66 |
| 04/05/2011 10:15:00 | 1.36 | 4.24 | 12.03 | 1.17 | 3.59 | 9.34 | 0.07 | 2.08 | 6.68 | 9.91 |

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|---|---|---|---|---|---|---|---|---|---|---|
| 04/05/2011 10:30:00 | 1.34 | 4.89 | 13.58 | 1.16 | 4.25 | 10.74 | 0.07 | 2.09 | 7.13 | 11.23 |
| 04/05/2011 10:45:00 | 1.33 | 3.87 | 11.89 | 1.14 | 3.22 | 9.42 | 0.07 | 2.08 | 7.04 | 9.17 |
| 04/05/2011 11:00:00 | 1.37 | 4.17 | 10.85 | 1.18 | 3.52 | 9.36 | 0.07 | 2.18 | 6.70 | 9.88 |
| 04/05/2011 11:15:00 | 1.35 | 4.97 | 12.04 | 1.16 | 4.38 | 9.43 | 0.07 | 1.87 | 5.92 | 11.23 |
| 04/05/2011 11:30:00 | 1.50 | 5.14 | 13.24 | 1.16 | 4.54 | 10.82 | 0.07 | 2.07 | 5.81 | 11.75 |
| 04/05/2011 11:45:00 | 1.48 | 3.58 | 10.85 | 1.14 | 2.91 | 8.11 | 0.06 | 1.90 | 7.15 | 8.38 |
| 04/05/2011 12:00:00 | 1.46 | 4.34 | 10.88 | 1.13 | 3.70 | 9.53 | 0.07 | 2.05 | 7.05 | 10.09 |
| 04/05/2011 12:15:00 | 1.46 | 4.38 | 9.85 | 1.14 | 3.73 | 9.40 | 0.07 | 2.30 | 7.11 | 10.42 |
| 04/05/2011 12:30:00 | 1.47 | 4.21 | 9.96 | 1.27 | 3.57 | 9.52 | 0.07 | 1.96 | 7.09 | 9.74 |
| 04/05/2011 12:45:00 | 1.47 | 4.26 | 9.61 | 1.14 | 3.71 | 8.11 | 0.07 | 2.12 | 7.11 | 10.10 |
| 04/05/2011 13:00:00 | 1.48 | 4.84 | 9.97 | 1.15 | 4.21 | 9.64 | 0.07 | 2.04 | 7.13 | 11.10 |
| 04/05/2011 13:15:00 | 1.46 | 4.25 | 9.79 | 1.14 | 3.60 | 9.42 | 0.07 | 2.02 | 7.05 | 9.87 |
| 04/05/2011 13:30:00 | 1.46 | 3.97 | 9.57 | 1.13 | 3.31 | 9.36 | 0.07 | 1.89 | 7.10 | 9.17 |
| 04/05/2011 13:45:00 | 1.45 | 3.77 | 11.03 | 1.12 | 3.11 | 9.49 | 0.07 | 2.15 | 7.10 | 9.03 |
| 04/05/2011 14:00:00 | 1.44 | 4.25 | 9.62 | 1.11 | 3.59 | 6.83 | 0.07 | 2.10 | 7.09 | 9.94 |
| 04/05/2011 14:15:00 | 1.47 | 4.38 | 10.92 | 1.16 | 3.73 | 10.70 | 0.07 | 2.02 | 7.15 | 10.12 |
| 04/05/2011 14:30:00 | 1.50 | 4.16 | 9.85 | 1.16 | 3.50 | 9.53 | 0.07 | 2.02 | 7.07 | 9.67 |
| 04/05/2011 14:45:00 | 1.49 | 4.03 | 9.45 | 1.16 | 3.14 | 6.86 | 0.07 | 2.47 | 7.11 | 9.64 |
| 04/05/2011 15:00:00 | 1.46 | 4.34 | 13.35 | 1.15 | 3.59 | 10.88 | 0.07 | 2.04 | 6.75 | 9.97 |
| 04/05/2011 15:15:00 | 0.57 | 4.04 | 10.00 | 0.16 | 3.36 | 9.60 | 0.07 | 1.93 | 7.03 | 9.34 |
| 04/05/2011 15:30:00 | 0.56 | 3.00 | 7.93 | 0.16 | 2.28 | 7.27 | 0.07 | 2.07 | 7.13 | 7.35 |
| 04/05/2011 15:45:00 | 0.44 | 2.95 | 10.30 | 0.16 | 2.46 | 7.31 | 0.07 | 1.75 | 7.23 | 7.17 |
| 04/05/2011 16:00:00 | 1.28 | 3.18 | 6.98 | 1.11 | 3.02 | 6.87 | 0.06 | 1.60 | 4.14 | 7.80 |
| 04/05/2011 | 1.31 | 3.05 | 6.82 | 1.13 | 2.91 | 6.74 | 0.06 | 1.72 | 4.14 | 7.68 |

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|---|---|---|---|---|---|---|---|---|---|---|
| 16:15:00 | | | | | | | | | | |
| 04/05/2011 16:30:00 | 1.31 | 2.68 | 6.89 | 1.13 | 2.52 | 6.80 | 0.06 | 1.58 | 4.19 | 6.77 |
| 04/05/2011 16:45:00 | 1.31 | 2.62 | 4.15 | 1.13 | 2.47 | 4.04 | 0.06 | 1.38 | 4.18 | 6.48 |
| 04/05/2011 17:00:00 | 1.30 | 2.88 | 6.92 | 1.12 | 2.73 | 6.82 | 0.06 | 1.35 | 4.17 | 6.96 |
| 04/05/2011 17:15:00 | 1.29 | 2.96 | 6.94 | 1.11 | 2.81 | 6.87 | 0.06 | 1.54 | 4.19 | 7.31 |
| 04/05/2011 17:30:00 | 1.29 | 2.57 | 4.16 | 1.11 | 2.41 | 4.03 | 0.06 | 1.60 | 4.19 | 6.57 |
| 04/05/2011 17:45:00 | 1.28 | 2.71 | 6.96 | 1.10 | 2.55 | 6.87 | 0.06 | 1.53 | 4.19 | 6.78 |
| 04/05/2011 18:00:00 | 1.28 | 3.01 | 6.87 | 1.09 | 2.86 | 6.75 | 0.06 | 1.52 | 4.21 | 7.40 |
| 04/05/2011 18:15:00 | 1.28 | 3.00 | 6.96 | 1.09 | 2.84 | 6.87 | 0.06 | 1.41 | 4.21 | 7.25 |
| 04/05/2011 18:30:00 | 1.27 | 2.57 | 6.93 | 1.08 | 2.41 | 6.85 | 0.06 | 1.37 | 4.21 | 6.36 |
| 04/05/2011 18:45:00 | 1.26 | 2.37 | 6.86 | 1.08 | 2.21 | 6.77 | 0.06 | 1.32 | 4.21 | 5.90 |
| 04/05/2011 19:00:00 | 1.26 | 2.96 | 6.91 | 1.07 | 2.81 | 6.83 | 0.07 | 1.54 | 4.22 | 7.31 |
| 04/05/2011 19:15:00 | 1.26 | 2.97 | 6.89 | 1.07 | 2.82 | 6.81 | 0.06 | 1.64 | 4.22 | 7.43 |
| 04/05/2011 19:30:00 | 1.26 | 2.98 | 6.94 | 1.07 | 2.82 | 6.85 | 0.07 | 1.49 | 4.18 | 7.29 |
| 04/05/2011 19:45:00 | 1.26 | 2.24 | 4.15 | 1.06 | 2.07 | 4.02 | 0.07 | 1.62 | 4.22 | 5.93 |
| 04/05/2011 20:00:00 | 1.25 | 2.81 | 6.96 | 1.06 | 2.65 | 6.87 | 0.06 | 1.31 | 4.24 | 6.77 |
| 04/05/2011 20:15:00 | 1.24 | 2.85 | 6.92 | 1.06 | 2.70 | 6.86 | 0.06 | 1.52 | 4.24 | 7.07 |
| 04/05/2011 20:30:00 | 1.24 | 2.81 | 6.83 | 1.06 | 2.66 | 6.74 | 0.07 | 1.76 | 4.23 | 7.24 |
| 04/05/2011 20:45:00 | 1.24 | 2.38 | 4.12 | 1.05 | 2.22 | 4.00 | 0.07 | 1.43 | 4.22 | 6.03 |
| 04/05/2011 21:00:00 | 1.23 | 2.94 | 6.89 | 1.05 | 2.79 | 6.79 | 0.07 | 1.40 | 4.22 | 7.14 |
| 04/05/2011 21:15:00 | 1.23 | 2.93 | 6.91 | 1.05 | 2.78 | 6.83 | 0.07 | 1.78 | 4.25 | 7.49 |
| 04/05/2011 21:30:00 | 0.31 | 2.34 | 6.03 | 0.07 | 2.16 | 5.89 | 0.07 | 1.58 | 4.24 | 6.07 |
| 04/05/2011 21:45:00 | 0.31 | 1.37 | 5.96 | 0.07 | 1.15 | 5.80 | 0.07 | 1.36 | 4.15 | 3.88 |
| 04/05/2011 22:00:00 | 0.31 | 2.71 | 7.13 | 0.07 | 2.53 | 7.00 | 0.07 | 1.34 | 4.20 | 6.58 |

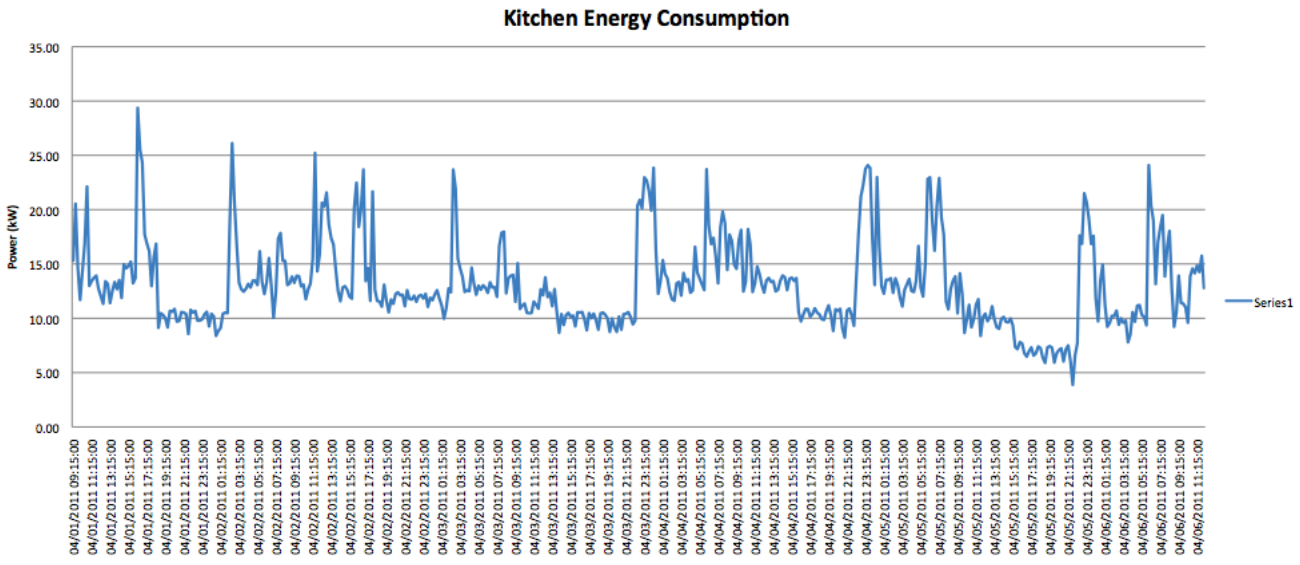
| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 04/05/2011 22:15:00 | 1.28 | 3.16 | 7.78 | 1.08 | 2.91 | 6.91 | 0.07 | 1.63 | 4.23 | 7.70 |
| 04/05/2011 22:30:00 | 1.72 | 8.14 | 14.18 | 1.32 | 5.67 | 11.18 | 0.07 | 3.80 | 7.58 | 17.61 |
| 04/05/2011 22:45:00 | 2.77 | 7.72 | 11.56 | 2.54 | 5.34 | 8.48 | 0.07 | 3.80 | 7.12 | 16.86 |
| 04/05/2011 23:00:00 | 5.57 | 9.96 | 14.04 | 2.55 | 7.23 | 11.27 | 0.07 | 4.31 | 7.36 | 21.50 |
| 04/05/2011 23:15:00 | 3.99 | 9.58 | 15.49 | 1.16 | 7.00 | 12.66 | 0.07 | 4.11 | 7.26 | 20.70 |
| 04/05/2011 23:30:00 | 2.73 | 8.97 | 14.45 | 1.09 | 6.37 | 11.20 | 0.07 | 3.82 | 6.91 | 19.16 |
| 04/05/2011 23:45:00 | 1.36 | 7.73 | 15.12 | 1.13 | 5.37 | 12.51 | 0.07 | 3.74 | 6.98 | 16.85 |
| 04/06/2011 00:00:00 | 1.57 | 8.03 | 12.93 | 1.19 | 5.90 | 9.78 | 0.07 | 3.65 | 7.28 | 17.58 |
| 04/06/2011 00:15:00 | 1.49 | 5.21 | 11.30 | 1.18 | 4.20 | 9.58 | 0.07 | 2.44 | 6.96 | 11.84 |
| 04/06/2011 00:30:00 | 1.48 | 4.24 | 11.43 | 1.12 | 3.41 | 8.37 | 0.07 | 2.07 | 7.08 | 9.73 |
| 04/06/2011 00:45:00 | 1.50 | 5.92 | 12.87 | 1.11 | 4.37 | 9.93 | 0.07 | 3.16 | 7.37 | 13.46 |
| 04/06/2011 01:00:00 | 1.47 | 6.87 | 12.71 | 1.17 | 5.15 | 9.79 | 0.07 | 2.91 | 6.98 | 14.93 |
| 04/06/2011 01:15:00 | 1.48 | 5.00 | 11.22 | 1.12 | 4.13 | 10.03 | 0.07 | 2.12 | 7.01 | 11.24 |
| 04/06/2011 01:30:00 | 1.48 | 3.97 | 11.60 | 1.11 | 3.28 | 8.41 | 0.08 | 1.97 | 7.51 | 9.23 |
| 04/06/2011 01:45:00 | 1.46 | 4.05 | 10.45 | 1.10 | 3.38 | 9.91 | 0.08 | 2.12 | 6.15 | 9.56 |
| 04/06/2011 02:00:00 | 1.46 | 4.46 | 11.57 | 1.10 | 3.77 | 8.42 | 0.07 | 1.98 | 7.48 | 10.22 |
| 04/06/2011 02:15:00 | 1.46 | 4.36 | 11.50 | 1.10 | 3.69 | 8.50 | 0.07 | 2.16 | 7.47 | 10.21 |
| 04/06/2011 02:30:00 | 1.46 | 4.72 | 10.26 | 1.10 | 3.47 | 7.09 | 0.07 | 2.50 | 7.40 | 10.69 |
| 04/06/2011 02:45:00 | 1.46 | 4.05 | 10.05 | 1.09 | 3.26 | 8.44 | 0.07 | 2.11 | 7.34 | 9.41 |
| 04/06/2011 03:00:00 | 1.46 | 4.28 | 11.30 | 1.09 | 3.60 | 11.04 | 0.07 | 2.10 | 7.36 | 9.98 |
| 04/06/2011 03:15:00 | 1.46 | 4.23 | 11.05 | 1.09 | 3.56 | 9.84 | 0.07 | 1.81 | 7.52 | 9.59 |
| 04/06/2011 03:30:00 | 1.46 | 4.21 | 11.51 | 1.10 | 3.54 | 8.36 | 0.07 | 2.04 | 6.16 | 9.79 |
| 04/06/2011 03:45:00 | 0.57 | 3.19 | 10.19 | 0.30 | 2.50 | 9.70 | 0.07 | 2.11 | 7.37 | 7.80 |
| 04/06/2011 | 0.59 | 3.57 | 12.02 | 0.16 | 2.87 | 8.82 | 0.07 | 2.07 | 7.30 | 8.50 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 04:00:00 | | | | | | | | | | |
| 04/06/2011 04:15:00 | 1.54 | 4.52 | 11.34 | 1.15 | 3.82 | 9.74 | 0.07 | 2.23 | 7.33 | 10.56 |
| 04/06/2011 04:30:00 | 1.43 | 4.17 | 12.99 | 1.14 | 3.50 | 9.86 | 0.07 | 2.02 | 7.32 | 9.70 |
| 04/06/2011 04:45:00 | 1.39 | 4.92 | 10.15 | 1.16 | 3.12 | 6.97 | 0.07 | 3.12 | 7.34 | 11.16 |
| 04/06/2011 05:00:00 | 1.51 | 4.93 | 11.71 | 1.15 | 3.55 | 11.19 | 0.07 | 2.73 | 6.96 | 11.21 |
| 04/06/2011 05:15:00 | 1.54 | 4.40 | 9.96 | 1.17 | 3.69 | 8.31 | 0.07 | 2.22 | 7.30 | 10.31 |
| 04/06/2011 05:30:00 | 1.54 | 4.24 | 12.55 | 1.18 | 3.54 | 9.65 | 0.08 | 2.34 | 7.27 | 10.12 |
| 04/06/2011 05:45:00 | 1.53 | 3.92 | 11.36 | 1.18 | 3.24 | 8.29 | 0.07 | 2.20 | 7.24 | 9.37 |
| 04/06/2011 06:00:00 | 1.54 | 9.77 | 15.60 | 1.18 | 7.86 | 12.68 | 3.18 | 6.46 | 12.00 | 24.09 |
| 04/06/2011 06:15:00 | 1.55 | 7.66 | 15.16 | 1.14 | 6.73 | 12.58 | 1.79 | 6.02 | 10.42 | 20.41 |
| 04/06/2011 06:30:00 | 1.49 | 7.37 | 15.33 | 1.06 | 6.46 | 12.58 | 0.79 | 5.18 | 12.16 | 19.00 |
| 04/06/2011 06:45:00 | 1.64 | 4.88 | 11.41 | 0.98 | 3.93 | 8.22 | 0.65 | 4.34 | 11.21 | 13.16 |
| 04/06/2011 07:00:00 | 4.43 | 7.06 | 10.28 | 3.94 | 6.11 | 8.27 | 0.66 | 3.86 | 9.40 | 17.02 |
| 04/06/2011 07:15:00 | 1.92 | 7.77 | 14.13 | 1.17 | 6.86 | 12.49 | 0.65 | 3.72 | 7.98 | 18.34 |
| 04/06/2011 07:30:00 | 3.04 | 8.46 | 14.30 | 2.50 | 6.55 | 10.95 | 0.58 | 4.48 | 7.85 | 19.49 |
| 04/06/2011 07:45:00 | 1.51 | 5.70 | 11.32 | 1.12 | 4.51 | 8.38 | 0.34 | 3.65 | 7.47 | 13.86 |
| 04/06/2011 08:00:00 | 1.67 | 6.41 | 14.09 | 1.26 | 5.72 | 10.95 | 1.72 | 4.44 | 9.09 | 16.57 |
| 04/06/2011 08:15:00 | 1.48 | 6.89 | 12.71 | 1.11 | 6.26 | 12.49 | 0.08 | 4.87 | 10.40 | 18.03 |
| 04/06/2011 08:30:00 | 1.45 | 5.24 | 11.30 | 1.11 | 4.57 | 10.82 | 0.07 | 2.97 | 7.25 | 12.77 |
| 04/06/2011 08:45:00 | 1.43 | 3.85 | 8.66 | 1.10 | 3.17 | 8.16 | 0.07 | 2.20 | 7.16 | 9.22 |
| 04/06/2011 09:00:00 | 1.44 | 4.51 | 9.99 | 1.09 | 3.84 | 9.49 | 0.07 | 2.18 | 7.24 | 10.53 |
| 04/06/2011 09:15:00 | 1.44 | 6.23 | 11.89 | 1.12 | 4.35 | 10.97 | 0.67 | 3.34 | 7.89 | 13.92 |
| 04/06/2011 09:30:00 | 1.88 | 5.16 | 11.91 | 1.05 | 3.20 | 8.24 | 0.31 | 3.05 | 7.49 | 11.41 |
| 04/06/2011 09:45:00 | 2.08 | 4.88 | 10.29 | 1.14 | 3.63 | 9.48 | 0.67 | 2.83 | 7.79 | 11.34 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 04/06/2011 10:00:00 | 0.58 | 4.64 | 9.45 | 0.23 | 3.95 | 9.46 | 0.07 | 2.43 | 7.18 | 11.01 |
| 04/06/2011 10:15:00 | 0.57 | 4.17 | 11.54 | 0.16 | 3.47 | 8.47 | 0.07 | 1.96 | 7.33 | 9.60 |
| 04/06/2011 10:30:00 | 1.73 | 5.34 | 11.18 | 1.36 | 4.72 | 10.72 | 0.22 | 3.82 | 9.25 | 13.87 |
| 04/06/2011 10:45:00 | 2.55 | 5.62 | 11.15 | 2.22 | 4.96 | 10.69 | 2.07 | 3.99 | 9.35 | 14.57 |
| 04/06/2011 11:00:00 | 2.53 | 5.35 | 11.13 | 2.20 | 4.69 | 10.69 | 2.09 | 4.11 | 9.32 | 14.15 |
| 04/06/2011 11:15:00 | 2.64 | 5.75 | 13.26 | 2.29 | 4.75 | 10.41 | 2.08 | 4.35 | 9.32 | 14.86 |
| 04/06/2011 11:30:00 | 2.64 | 5.45 | 11.08 | 2.32 | 4.19 | 8.11 | 2.07 | 4.62 | 9.30 | 14.26 |
| 04/06/2011 11:45:00 | 2.61 | 6.01 | 12.56 | 2.25 | 5.12 | 12.13 | 2.08 | 4.61 | 9.30 | 15.74 |
| 04/06/2011 11:50:00 | 2.60 | 4.69 | 8.44 | 2.24 | 3.90 | 8.00 | 2.23 | 4.20 | 7.65 | 12.79 |
| TOTAL ENERGY CONSUMED | | | | | | | | | | 1603.95 |

Appendix 3: Total Energy Consumption from Large-Scale Energy Audit

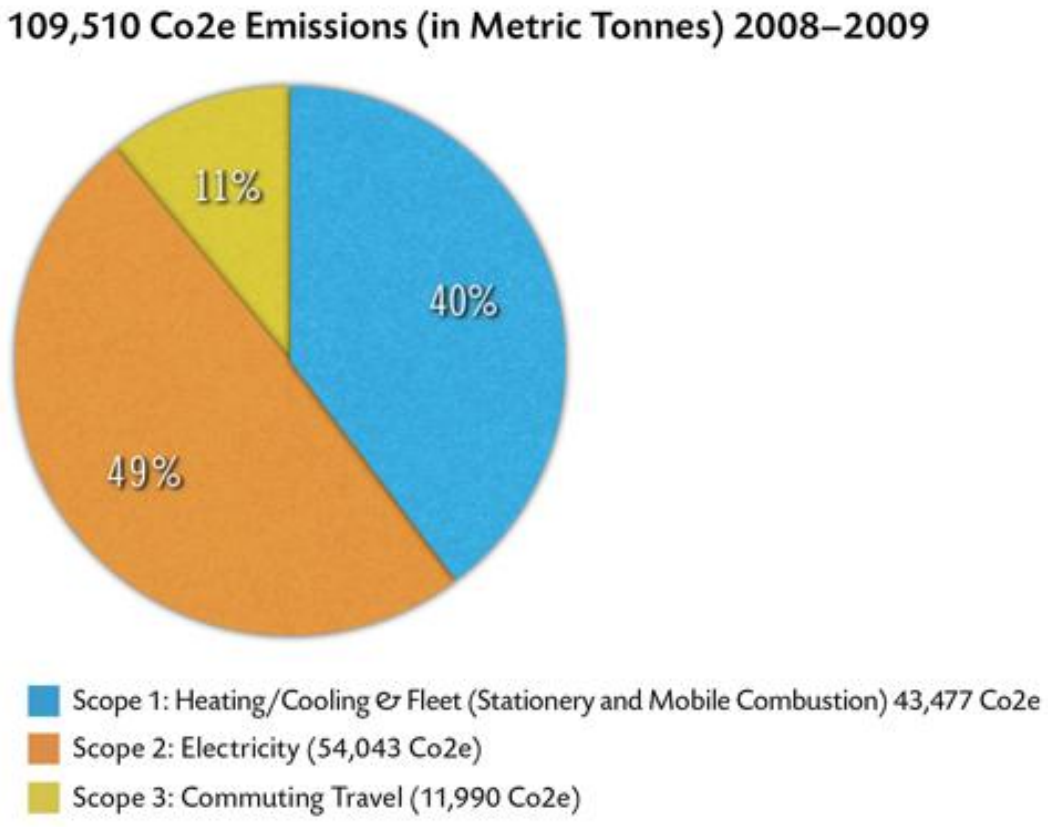
Conducted from Friday, April 1, 2011 at 9:15 am until Wednesday, April 6, 2011 at 11:50 am



Appendix 4: Equipment Replacement Recommendations

| Type of Equipment | Company Name | Brand Name | Model Number | Price |
|---|---|---|---|---|
| Holding Cabinet | Doyon Equipment Inc. | Doyon | DPW10 | $7000 |
| Fryer | Pitco Frialator | Pitco | SE148 | $8,548 |
| Stove (Griddle) | Vulcan-Hart Company | Vulcan-Hart | Rapid Recovery Series 36RRG | $3,571 |
| Convection Oven | Doyon Equipment Inc. | Doyon | Jet Air Plus Oven JA5P2618 | $13,900 |
| Reach-In Refrigerator | Continental Refrigerator | Continental Refrigerator | 2R | $6,606 |
| Reach-In Freezer | Continental Refrigerator | Continental Refrigerator | 2F | $8,442 |

Appendix 5: Carbon Dioxide Equivalent Emissions at Dalhousie University (2008-2009)



Resource: Dalhousie University (2011). *Energy and Climate Change*. Retrieved from: http://office.sustainability.dal.ca/Programs/Energy_and_Climate_c.php

Appendix 6: Potential Savings Generated from Replacing Outdated Kitchen Appliances

| Equipment | Restaurant 1: Standard Equipment | Restaurant 2: Efficient Equipment | Savings/Year Restaurant 2 |
|---|---|---|---|
| 1. STEAMER | ELECTRIC, STANDARD-EFFICIENCY | ENERGY STAR QUALIFIED | $2,700 |
| 2. BROILER | GAS, STANDARD-EFFICIENCY UNDERFIRED | GAS, HIGH-EFFICIENCY UNDERFIRED | $660 |
| 3. OVEN | ELECTRIC, STANDARD-EFFICIENCY CONVECTION | ELECTRIC, HIGH-EFFICIENCY CONVECTION | $290 |
| 4. GRIDDLE | GAS, STANDARD-EFFICIENCY | GAS, HIGH-EFFICIENCY | $60 |
| 5. FRYER | GAS, STANDARD-EFFICIENCY | GAS, ENERGY STAR QUALIFIED | $360 |
| 6. HOLDING CABINET | ELECTRIC, STANDARD-EFFICIENCY | ELECTRIC, ENERGY STAR QUALIFIED* | $430 |
| 7. SPRAY VALVE | STANDARD SPRAY VALVE, 3 GPM | LOW-FLOW SPRAY VALVE*, 1.6 GPM | $1,400 |
| 8. ICE MACHINE | STANDARD-EFFICIENCY ICE MACHINE | HIGH-EFFICIENCY ICE MACHINE | $320 |
| 9. REACH-IN FREEZER | STANDARD-EFFICIENCY SOLID DOOR | ENERGY STAR QUALIFIED SOLID DOOR* | $40 |
| 10. REACH-IN REFRIGERATOR | STANDARD-EFFICIENCY SOLID DOOR | ENERGY STAR QUALIFIED SOLID DOOR* | $60 |
| 11. EXIT SIGNS | THREE INCANDESCENT | THREE LED-BASED | $130 |
| 12. LIGHTING | EIGHT INCANDESCENT LAMPS | EIGHT COMPACT FLUORESCENT LAMPS | $440 |
| | | Annual Savings at Restaurant 2 Using High-Efficiency Equipment: | $6,890 |

Resource: State of California: Efficiency Partnership (2006). *Boosting Restaurant Profits With Energy Efficiency*. Retrieved from www.fypower.org/pdf/BPG_RestaurantEnergyEfficiency.pdf.

Appendix 7: Proposed Interview Questions for *Sodexo* Employees

1) Do you feel that the kitchen equipment in the SUB is outdated and inefficient?
2) Do you notice kitchen equipment being left on when it should not be? If so, do you turn the equipment off when you notice that it's operating in an idle position, or leave it on?
3) Do you think the SUB kitchen would benefit from having new kitchen equipment?
4) Are there any operational or technological problems with the current appliances in the kitchen? If so, what sorts of problems are experienced?
5) Is there any equipment that is left on overnight, or always left on?
6) Would informative posters installed throughout the kitchen help remind you and fellow employees of behavioral changes that would reduce energy consumption?
7) Does *Sodexo* provide you and your colleagues with sufficient training on how to operate the kitchen equipment?

8) Is saving energy through the proper use of equipment promoted throughout the SUB kitchen?

Appendix 8: Appliances Currently in the SUB Kitchen

## MAIN KITCHEN

| | Manufacturer | Description | Model | S# / Voltage | Equip. Remarks |
|---|---|---|---|---|---|
| | | | | | |
| 1 | Blodgett | Convection Oven | EZE-1 | 0681H8911102 208/220/1 | working needs cleaning |
| | | | | 0681H891101 | |
| 2 | Garland | 3 deck Bake Oven 56x64 | | | steam injected works ok |
| 3 | | Baker's Table 6'6"x30" | | | |
| 4 | Foster | Sliding door cooler | EC255GU | 87857 | |
| 6 | | S/S utility table 8'6"x30" | | | Old |
| 7 | | 9'x27" c/w sink Work Table - open base | | | |
| 8 | | 3'6"x30" S/S Bakers Rack for mixer parts | | | |
| 9 | Foster | Freezer | QL48-T | 6895867 | |
| 10 | | TurboFan Flue Seal (2 Chamber Convection and Proofer | | | |
| 11 | Hobart | Mixer | H600 | 6345 208/1 | Not used |
| 12 | Hobart | Mixer | L800 | 33399 208/3 | Not used |
| 13 | | L-shaped 6'6' x 10' 3compt | | | had a power soak sink |
| 14 | Hubert | 40 Gal Kettle | PH-40 | 6845 | Not used 1968 |
| 15 | Hubert | 60 Gal Kettle | PH-60 | 6844 | not used -1968 |
| 16 | Hubert | 30 Gal Kettle | AL30 | 6847 | USED 1968 |
| 17 | Cleveland | Steamer | | | 2 compartment electric |
| 18 | | Misc. Racks | | | |
| 19 | Milner | Walk-in 7'2" x 6'6" | 8288 | C-62-A-4 | very old |
| 20 | Milner | Walk-in 7'2" x 6'6" | 688 | C-62-B | very old |
| 22 | Milner | 14'6" x 6' was 2 boxes | 8288 | C-62-A-2 | very old |
| 23 | | 2 compt. Sink with 6'drainboard | | | |
| 24 | | Worktable w/sink 7'6" | | | |
| 25 | Bardeau | 8' Pizza table | MU-96-SC | 4949-958-04 | working |
| 26 | Berkel | Slicer | 827-H | 30466 | c/w stand |
| 27 | Garland | Fryer | 10-31F | 5438 208 | 25-30 years |
| 28 | Garland | Fryer | 10-31F | 5437 208 | |
| 29 | Garland | HD Grill top range (2) | | | |
| 30 | Garland | 2 burner hot top | | | |
| 31 | Garland | All Purpose top Range | | | |
| 32 | Garland | Roast Oven 4'7"x3'D | | | old but working |
| 33 | Garland | 3 deck (2)Bake (1)Roast | 4055 | 39250 | not made for over 20 years |

| | | | | | |
|---|---|---|---|---|---|
| | | | 4009 | 49906 208/3 | |
| 34 | Coldstream | Freezer 8'6" x 8' | WLDF | 8815897 | 1988 |
| 35 | Hobart | Buffaloe Chooper | 84145 | S7136-670 | |
| 36 | Globe | Slicer | GC10 | 102336 | good shape |
| 37 | | S/S work table 3'x30" | | | |
| | | Baker's Table 6' wood top | | | |
| | | S/S table 10'x30" c/w 1 sink & o/shelf | | | |
| 38 | Bunn | Coffee Machine | CWT-15APS | 13551 | fairly new |
| 39 | Bunn | Coffee Urn | U-3 | 22283 120/208 | |
| 40 | Milner | 4- 1/2 doors | MSSX30 | P5011A | old huge coil |
| 41 | Milner | Cooler | R3SX37COT | C-61 | new coil (old cooler) |
| 42 | | 8' Work table s/s o/&u/shelf | | | |
| 43 | | 6'x3' work table s/s s/overshelf & drawers | | | |
| 44 | | Pepsi juicer | | | |
| 45 | Cornelius | Ice Machine | IAC330 | 9414CA0357 | 1994 |
| | | Bin | 430-AP | GE6586 | |
| 46 | Panasonic | Microwave | NE8052 | AW506700206 | |
| 47 | Foster | Combo cooler/freezer | QHL-48-T | 88864 | works well |
| 48 | Bohn | Freezer Tim Horton | | | |
| 49 | TRUE | Tim Horton 2 door s/s fridge | | | |
| 50 | | Tim Hortons Donut Oven | | | |

Appendix 9: Usage of Major Kitchen Appliances

SUB Kitchen Equipment

| **Equipment** | Turned On | Turned Off | Comments |
|---|---|---|---|
| Hold Hold Unit Crescor | 6:00 AM | 9:00 PM | |
| Ice machine Cornelius | | | continuous |
| Berkel Meat Slicer | | | only during use - approx 1 hour/day |
| Garland Fryers | 10:30 AM | 5:00 PM | |
| Garland Stove | 6:00 AM | 2:00 PM | or when finished |
| Cleveland Steamers | | | as required |
| Steam Kettle | | | as required approx 3 hours/day |
| Metro C5 3 Series Proofer | 6:00 AM | 10:00 AM | as required |
| Blue Seal Turbo Fan Convection Oven | 12 midnight | 6:00 AM | |
| Blue Seal Turbo Fan Convection Oven | 9:00 AM | 4:00 PM | |

Appendix 10: Cost Benefit Calculations

In order to perform a cost-benefit analysis to reveal the cost savings of implementing new equipment, I had to perform a series of calculations. First I had to calculate the kilowatt-hours per year of the old kitchen equipment based on baseline standards provided by two case studies from Natural Resources Canada. This entailed multiplying the yearly hours of usage by the energy usage in kilowatts per hour. I also had to calculate the kilowatt-hours using the same method as above for the recommended kitchen equipment, which were selected from the Energy Star website. Attaining the kilowatt-hours per year enabled me to calculate the annual cost of each appliance given the price of electricity from Nova Scotia Power. This meant multiplying the kWh per year of each appliance by $0.006618. Once the costs for all the equipment were calculated I proceeded to compare the costs of the old inefficient equipment with the new efficient equipment. Firstly, to determine the electricity savings by subtracting the kWh of the new equipment by the kWh of the old equipment, then calculate the cost savings by subtracting the cost of the new equipment by the cost of the old equipment. Given these results we were able to divide the difference between the prices to determine the payoff period of each respective appliance.

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