Trent University's Energy Conservation and Demand Management Plan

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Preface

Under Ontario's Green Energy Act Trent University is required to analyse our energy use and find ways to operate our campus more efficiently. A number of energy efficiency efforts are culminating that will help Trent to address energy conservation and demand more effectively. Fortunately or unfortunately this is peaking at time when utility rates are increasing dramatically. The result being that even reductions of the magnitude anticipated for Trent in the next few years will likely not be enough to actually see a reduction in current budgets, but to avoid the full impact of the increases. The result of inaction will be a substantial increase in operating expenses. The opportunity lies with funding appropriate changes in efficiency to lower this impact and improve the existing building stock on Campus.

1 Context

1. 0 Ontario Reg.397/11

The Ontario government has required all institutions to produce Energy Conservation and Demand Management Plans under Reg 397 /11 'The Green Energy Act', GEA. While this act is widely known for incenting installations of renewable energy in Ontario through the Feed in Tariff program, it also provided an impetus for public institutions to formally evaluate, prioritize and integrate energy conservation into campus operations.

1.1 Using this Plan

This report, while intended to talk specifically about energy opportunities for Trent, will also take the time to provide explanations and overviews of basic energy conservation approaches. This is an effort to support the Trent Community in participating in this plan within their purview whether they are frontline staff, students or management. This document will set a basic institutional framework that will allow Trent to make continuing strides toward greater energy efficiency.

Respecting that this is an academic institute; this plan should be useful for students learning about energy use and conservation, providing context and salient information to assist them with their research projects. It will help guide the Physical Resources Department in developing standards that integrate and prioritize efficiency and in working with university stakeholders to ensure that their projects meet these values. The overarching intention of this report is to precipitate a 'Trent' approach to energy use in our buildings, planning and operations.

Strategies outlined in this plan will help to make Trent more environmentally and fiscally responsible. Efforts to reduce energy use will help buffer Trent's budgets against dramatic increases in utility costs. Enbridge increased rates by approximately 40% on April 1, 2014. Attempting to reduce the burden of this increase, one of approximately 17.5% will supersede the original increase on the publication date of this report, July 1, 2014. This increase will last for 27 months rather than the intended 12 months. (Enbridge, 2014) If Trent's 2013 natural gas costs were to be subject to these increases for 2014 this would be an increase of more than $75,000 without any increased use, just rate increases. Regular annual increases and extreme increases such as from Enbridge make the need for conservation at Trent imperative.

1.2 Trent Culture/Energy History

Trent University has a unique energy past including the gift of a hydro generating station from General Electric. The Stan Adamson Power House was originally rated at a 2.4MW generating capacity and for many years was the sole supplier of electricity to the campus. As the campus grew and the equipment aged Trent's demand was higher and the powerhouse generated less. In 2011 Trent started working with the local utility toward a full-scale renewal of this facility. The result of this partnership is a 3.9MW system with an agreement for the Local Distribution Company (LDC) to manage the operation for a period of 20 years.

Trent has a rich history of environmentalism from our research and programs to our very early adoption of an Environmental Policy in 1994. Members of the Trent Community are great supporters of reducing our collective impact on the environment and will be a key resource in implementing this plan. There are a lot of good conservation efforts at Trent, but at this point in time, these are largely decentralized and lacking a cohesive approach. This plan and its proposed strategies intend to provide a platform to bring these efforts together and find opportunities to replicate them across the campus.

1.3 Trent Approach

Natural Resources Canada outlines a strategic approach to energy conservation that Trent will follow. This includes efforts on three fronts; organizational, technological and behavioural. This relationship is shown in figure 1.

Figure 1. Factors Contributing to a Successful Energy Reduction Program.

The three elements of this approach address the basic areas that require effort. We will increase awareness and understanding of energy issues within the Trent Community, and equip them with knowledge and tools to take action. We need to assess current energy technologies and look for those that best fit the needs of the Trent Community and Trent infrastructure. Lastly, we will need to plan to support this effort throughout the organization. Effective energy efficiency will require not only retrofitting existing systems but also require effective communication, planning and analysis to ensure that all future projects, renovations and purchases support Trent's energy efficiency efforts.

2 Energy Use at Trent

2.0 Perspectives on Energy Use

Before proposing changes it is important to understand energy and how the Trent Community uses it. Depending on how energy data is presented it can show a very different picture. Are we interested in costs, how we use energy, energy use per square meter of built space or by student or the associated emissions? How we look at energy is often very specific but can also be very limiting as there are many factors that we can control, and many that we cannot (or cannot easily) that impact how we see the energy data.

Chart A shows Trent's 2013 energy use for natural gas and electricity by cost. If we change our perspective and look at this same data from a standardized energy standpoint, by converting the kWhs of electricity and cubic meters of natural gas to gigajoules (GJ) of energy, we see a very different picture shown in Chart B.

Chart A –Trent's 2013 Energy Use by Cost

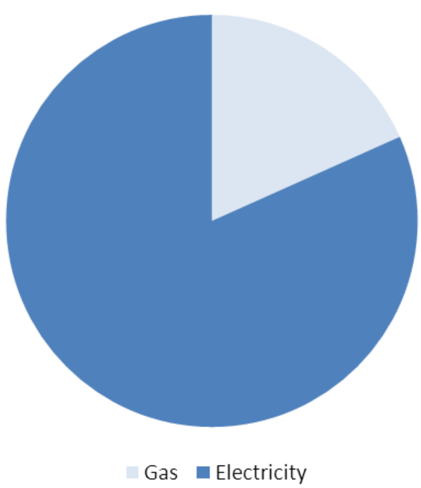
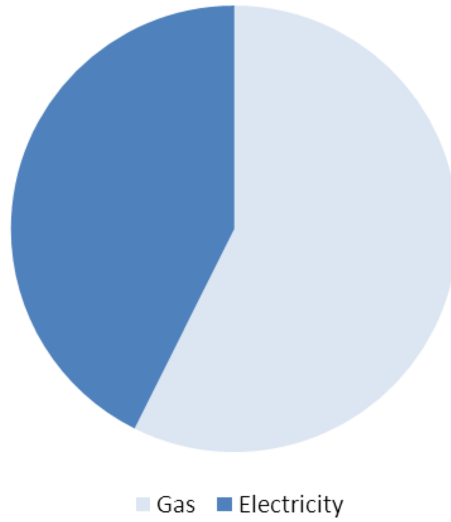


Chart B –Trent's 2013 Energy Use in GJ



By comparing the data shown in these two charts we can clearly see that energy sources do not deliver the same value. It also becomes apparent that understanding energy may not always be as simple as it appears. With the number of people in the Trent community involved in energy use and energy management, it is important to Trent's success moving forward to assist in developing a broader understanding. Appendix B provides electricity and gas consumption data for 2012.

2.1 Green House Gas Emissions

Energy use can also be considered from a pollution perspective. How much Green House Gas (GHG) are we responsible for emitting to run our campus?

Emissions factors for natural gas and electricity both can vary. Electricity depends on the composition of the power sources –utilities with more solar, wind and hydro will have lower emissions than ones using coal or natural gas. For the purposes of this report we will use the following GHG emission factors:

- Electricity – 1kWh = 0.170 Kg eCO_2 (Environment Canada, 2010)
- Natural Gas – $1m^3$ = 1.86314Kg eCO_2 (Enbridge, 2014)

Considering this emission information we can now use the information in Chart A and B to see that energy gained from natural gas is cheaper but comes with higher emissions. Electricity comes at a higher price per unit of energy but comes at a lower environmental impact. Appendix C provides the Reg.397/11 2012 GHG calculation spreadsheet for Trent's campuses.

2.2 External Impacts

Each energy source can be looked at further. Natural gas is largely used for heating and as such our use of it is largely dependent on weather. In cold winters we use more natural gas and less in warmer ones. Electricity generally does not have as strong of a dependence on weather. It is used for cooling and thus should track to a certain extent with summer temperatures however electricity has many other uses to consider throughout the year that can complicate observing specific reliance on weather.

Energy use can be simplified in a number of ways to help reduce the impact of variables such as weather or increasing/decreasing conditioned space. It stands to reason that when we add a building or sell one, we will use more or less energy. What is more difficult is understanding how this impacts energy use without a way to account for these changes.

2.2.1 Base Load - When looking at the amount of energy required there is a minimum amount that will be used daily –regardless of the day or the time of year –this is called the base load. This means that the remainder of electricity that we use varies based on behaviour, activities, equipment function, weather, etc.

2.2.2 Standardize to Area - Typically energy data is standardized to GJ/m2 for buildings. This process eliminates the impact of new buildings or lost buildings when looking at energy use over time. It allows for one to view the per unit energy use. Schools sometimes use a similar method to standardize per student.

2.2.3 Standardize for Weather Impacts - There is also a process called weather normalization that helps reduce the impact that weather has on the data. Through a regression analysis of historical weather data and a baseline set of utility data for a building a predictive model can be developed to estimate how much energy use would have been expected given the weather conditions in any given year.

Once we have reduced the impact of factors that we have little or no control over such as weather, the data starts to reveal impacts of things such as equipment operation, activities and behaviours. With an understanding of the intricacies of energy data we can start to better understand how we use energy and what we use it for providing a better starting point of where to look for opportunities for efficiency and related savings. What are we using that we don't need? Can we provide what we do need more efficiently? What are the impacts of the opportunities, their costs and emission reductions?

3 Increasing Utility Rates

3.0 Increasing Utility Rates

The focus on energy conservation can equally be justified from a financial perspective. Energy is expensive and prices are increasing. A project that saves $10,000 in electricity costs in 2013, as long as the integrity of the project is kept intact, will save an estimated $11,208 next year, $12,668 the next and $14,416 the year after that. Using these types of projections, we can see that not only are the savings compelling at today's utility rates, but if we consider the magnitude of expected utility increases the benefits of making changes as soon as possible become clear.

Unfortunately the financial savings of energy conservation projects are not always this evident. Even the Ontario Energy Plan measures their success in terms of "reduced expected increases." Meaning the reduction of energy use will only buffer the increasing costs rather than reducing actual bills.

The Ontario Plan sets out to reduce expected increases by $16B between 2013-17 and $70B by 2030. Trent will also be reducing our expected cost increases. If we made no changes, our expected cost increases would be over $200,000 in 2014 over 2013 and almost $1M in additional costs just for rate increase over the reporting cycle of this document (5yrs). Recent conservation efforts have reduced energy use. Looking at recent conservation efforts, we have avoided approximately $270,000 in annual utility costs.

Chart C Real and Projected Cost Increased for Natural Gas

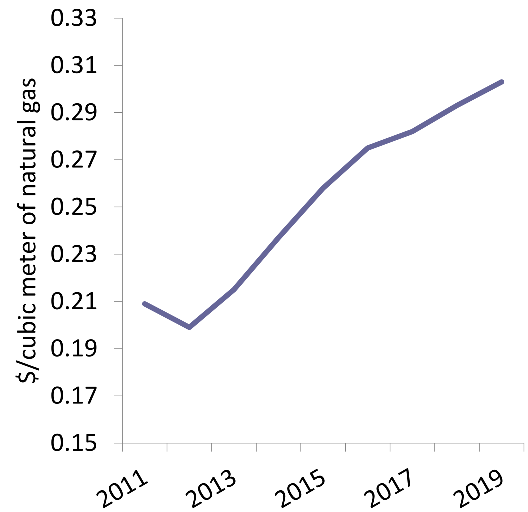
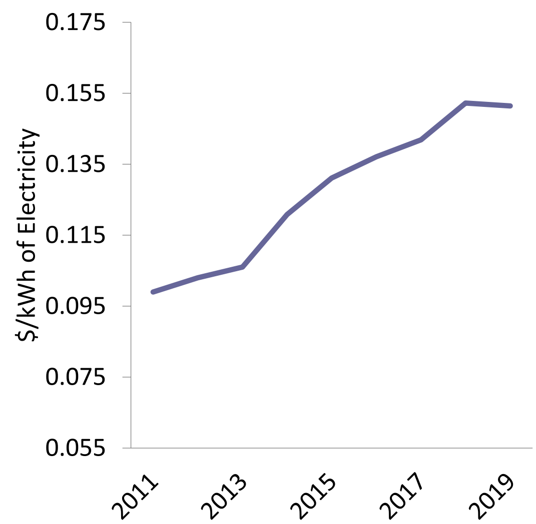


Chart D Real and Projected Cost Increases for Electricity



Projected energy cost increases will drive increased emphasis on energy conservation as the only way to protect Trent against these otherwise fixed cost increases. The only way we can avoid the negative financial impact of the fact that utility costs will continue to rise is to use less energy.

4 Energy Conservation

4.0 Conservation and Demand

Conservation typically means looking for energy that is used but not needed. An example of this could be lights left on in unoccupied areas or heating, cooling or ventilating unoccupied spaces to the same standard as if they were occupied. Conservation is a process of re-evaluating what we need rather than simply continuing with "standard practice."

Conservation can mean eliminating the waste identified through evaluation of needs or could be an adjustment to how the needs are met. Lighting in a space could be adequately provided with lamps using halogen technology, but the same amount of light that is needed could be provided with LEDs and only use at least 75% less energy (Energy Star, 2013). Adding an occupancy sensor, allowing lights to come on only when someone is in the space, can save even more.

Looking at energy use, demand (kW) is one aspect that is typically less familiar to people. Large accounts, such as Trent's, are charged a fee for having electrical capacity available for use. The monthly fee is dependent on a measurement of "demand." Simplified, demand is determined by the single point in time, in a given month, where the customer uses the most electricity. Because the customer, at any time, could require the local distribution company (LDC) to supply this amount of electricity, a demand premium is charged for the LDC to always be ready with the capacity to provide this amount of electricity.

Demand charges for 2013, while they may look small represented in Chart E, were $267,000 amounting to a blended rate of $5.90 per kW. Demand charges cannot be eliminated, but can be reduced through demand management measures. Every demand reducing measure also reduces consumption and emissions.

Chart E. Electricity Use (kWh) and Demand (kW) by Cost

Demand reduction efforts can include using equipment differently or at different times of the day. Some ways of decreasing demand include management of plug loads, coordination of 'start-up' of equipment in the morning and replacing equipment with more efficient equipment.

<u>Utility Rate Estimates</u>

Estimating future rates is difficult –Enbridge has dramatically changed their rates twice this year already. For illustration purposes we have made estimates on increasing natural gas and electricity rates for the duration of this report. This allows us to illustrate the relationship between energy saving projects and how these work over time to offset costs into the future. These estimates were based on information from Enbridge, Aegent Energy Advisors 2012 electricity price forecasting report and the US Energy Administration Annual Outlook for 2013. These are estimates for the purposes of illustrating relationships.

5 Energy Efforts

5.0 Trent Energy Plan -Already Started

Aspects of Trent's energy strategy are already coming together. These pieces need to be pulled into a cohesive approach to ensure that all stakeholders are equipped to integrate this priority into their role at Trent.

The primary focus of this plan is on the role of staff in the Physical Resources Department, however this is not intended to limit involvement –everyone on campus has some level of control over energy use.

One of the initiatives in this plan will be to not only move forward with keeping careful track of the energy aspects of projects, but also to work on historical projects to update data to account for the benefit and savings to date. Numerous projects such as adding variable frequency drives (VFDs) to the system in the Bata Library and replacement of chillers in East Side Services and Champlain have certainly reduced the amount of energy used on campus, but by how much? The following is a brief outline of some of the efforts that have already taken place on Trent's campuses.

In 2008 Trent embarked on major lighting retrofits to update old T12 fluorescent technology to more efficient T8s. This project started with the Environmental Science Complex as a sample building with a larger project following in 2009 that included the Science Complex, Lady Eaton College, Champlain College and Otonabee College. In 2012 these lighting efforts continued with retrofits including the Bata Library and all parking and roadway lighting. These were successful projects with significant annual savings and reductions on GHGs. The following tables illustrate the impact of these savings over time as utility rates have increased and how they will help Trent into the future with escalating utility costs. Similarly, smaller projects such as relamping the Chandeliers in the Great Hall and the lighting in the dining Hall in Gzowski College have taken place. While these projects appear to have modest savings, the savings accumulate and increase with increasing utility rates over time.

Table 1. Estimated Savings to date for Campus Lighting Retrofits

Year	College/ Science Complex	Great Hall	Gzowski Dining Hall	Library/ Roadway & Parking
2008	n/a	$4,408	$4,662	n/a
2009	$47,596	$4,408	$6,216	n/a
2010	$96,676	$4,408	$6,216	n/a
2011	$99,181	$4,743	$6,689	n/a
2012	$103,188	$4,935	$6,969	$15,625
2013	$106,194	$5,079	$7,162	$65,717
Total	$452,835	$27,981	$37,914	$65,717

Looking at these projects moving forward, the expected savings each year will climb as the utility rates increase.

Table 2. Projected Savings for Existing Lighting Retrofits for the Next Five Years.

Year	College/ Science Complex	Great Hall	Gzowski Dining Hall	Library/ Roadway & Parking
2014	121,061	5,790	8,165	78,151
2015	131,351	6,282	8,859	84,794
2016	137,327	6,568	9,262	88,652
2017	142,120	6,797	9,585	91,746
2018	152,495	7,293	10,285	98,443
2019	151,702	7,255	10,232	97,931
Total	836,056	39,985	56,388	539,716

This is a simple example of projects that have already been completed that will save Trent in operating costs into the future. To date they have saved ~$600,000, and will save another ~$1.4M before the renewal date for Trent's Energy Plan. This is a total of ~$2 million in avoided costs for a few fairly simple projects.

In 2008, we completed an inexpensive measure by installing energy management devices on our vending machines, and this has saved an estimated $25,000 to date.

Another example of a project with a lot of impact was our showerhead retrofit. Staff changed out old shower heads that ranged in age and flow rates to a standardized low-flow model. While these savings might be less obvious from an energy standpoint, you can see in Table 3 there were significant natural gas savings related to heating this water in addition to the dramatic water savings. To date this project is estimated to have saved over $400,000 with the potential for much greater savings as gas and water rates rise.

Table 3. Savings from 2008 Showerhead Retrofit.

Annual Savings	Water Cost Savings	Natural Gas to Heat Water Savings
2013	$26,014	$31,418
2012	$28,969	$32,384
2011	$33,511	$39,343
2010	$35,833	$47,504
2009	$34,659	$38,744
2008	$32,213	$36,010
Total	**$191,199**	**$225,404**

This project is a great example of the need for a coordinated approach to energy on campus. The initial changes yielded great savings with positive feedback from end users. However, since this project was implemented, through regular maintenance and subsequent renewal projects this showerhead has not been maintained and ones with higher flow rates have been installed. We can see the impact of this in the data in Table 3.

A centralized approach and/or a project energy check list may have caught this change and allowed for a review of fixtures to strike the best balance between end-use satisfaction, facility requirements and energy/water conservation. Trent will reconsider showerheads when developing a standard with an aim to provide the greatest energy savings while maintaining an acceptable showering experience.

These projects are simply a few recent examples. This is not a comprehensive list but intended as an initial inventory to be built on over time. We not only need to consider the projects themselves, but the Trent approach to taking on new project. This approach will include considering energy efficiency, how to build it in and report on the role of that project in the bigger picture.

6 Moving Forward Efficiently

6.0 Organizational Change

6.0.1 Developing a Standard - While Trent has been implementing energy saving programs and devices for years, this plan will mark the start of this effort being institutionalized. Together, the Trent Community can reduce the energy that we use and reduce the Green House Gas emissions that we are responsible for.

How do we move forward? We need an overarching mandate/policy that energy conservation and optimization is important and will be a priority. This effort will be developed in the form of a Trent Building, Renovation and Maintenance Standard to be developed by the Physical Resources Department starting in the Summer of 2014. This will provide the basis of the 'Organizational Change' component.

Trent takes on a number of renovation projects each year using our internal staff, carpenters, painters, plumbers, electricians, as well with external contractors. A common approach needs to be developed that emphasises energy efficiency and allows for seamless integration of other important aspects such as maintaining our Trent aesthetic and measuring waste diversion. An energy check on all project aspects that use energy such as lighting, heating, fixtures, equipment, etc should be developed as part of the Trent Standard and be used by all parties. Efficiency will be standard practice at Trent going forward.

Trent, in the recent past, has used the LEED framework for new construction projects. This framework uses a points system where buildings must meet a small number of basic requirements but can then choose areas that are important to organizational mandates to increase the environmental responsibility of the building. These areas include things like materials –are they made from recyclable, renewable, reused, local and/or do they have a reduced impact on the quality of indoor air? Another section focusses on water –has everything been done to reasonably reduce the use of potable water inside and outside of the building?

Trent should be focusing efforts on the energy section of this program. Trent should establish a policy that sets a minimum standard of LEED silver with a stated objective of maximizing the efforts in the Energy and Atmosphere section. Having a policy that prioritizes energy efficiency will result in reduced GHG emissions and operating costs.

6.0.2 Optimizing Preventative Maintenance - Trent's approach to preventative maintenance has improved in the last six years moving from a 'run-to-failure' model of building systems maintenance to a basic preventative maintenance approach. Trent allowed for more attention to be given to this conservation effort with a PM Leadhand position being established in 2008.

Moving forward, a review of Trent's PM approach has the potential to highlight areas where more energy could be saved through proactive measures. We are currently addressing the basics of PM such as changing filters and belts, lubricating bearings and pumps and changing filters in liquid systems. Trent PM staff has been working on improving our PM system by increasing the frequency of belt and filter changes, and working on finding the optimal frequency for changes.

PM is such an important part of a holistic energy approach. Maintaining the equipment regularly so that it may function to the best of its ability saves substantial energy. Trent would benefit from the establishment of a formal, written PM plan that includes all of our equipment as well as other aspect of facility PM such as building envelope and cleaning. Looking more holistically at this aspect will identify areas of improvement and identify greater opportunities for energy savings.

6.0.3 Efficient Purchasing - Trent will work on a updating our Environmental Procurement Policy. During this process the Sustainability Office will champion the integration of energy efficiency through measures such as including requirements for energy star appliances and equipment or where these standards are not employed establishing an energy analysis to integrate into the pricing score to evaluate for on-going costs, not just up the front costs.

6.0.4 Setting Goals - Goal setting is an important part of success, however with respect to energy efficiency we need to be sure that this does not interfere with opportunity. Every opportunity must be seized regardless of the goals for that given timeframe. As discussed in Section 5:Energy Efforts, energy saved today is money saved tomorrow and we want to maximize the benefit of our efficiency potential to the greatest extent possible. Targets, however, can help provide an effective planning tool for emissions reductions and effective budget savings.

This report is intended to provide guidance for a five-year period. It can and should be a living document with regard to targets and project specifics as these may change with successes, budgets and opportunity. These targets should only be viewed as a minimum standard.

Table 4 Trent Energy Reduction Targets.

Year	Target Energy (GJ) Reduction
2015	3%
2016	7%
2017	4%
2018	0.50%
2019	0.50%
5-year total	15%

6.1 Technology Change

Trent is working on a number of fronts to improve efficiency through technology and this is being sought, generally, through strategic partnerships. We are in the midst of several projects including an Energy Performance Contract, Enbridge's Run it Right Program and have an energy monitoring system in development. This current activity poses a challenge in providing the detail outlined in Reg 397/11. Many of the details will not be decided on before the July 1, 2014 deadline for the report. Trent's intention for energy conservation meets the intent of the Regulation and Trent's Sustainability Office will publish an annual Energy Update to account for this on-going activity.

6.1.1 Energy Performance Contract – The Energy Performance Contract (EPC) model of energy conservation invites potential partners on to Trent's campus to evaluate the potential for energy savings. The opportunities can range from improved building envelope with insulation, weather sealing or new windows to complete or partial replacement of heating ventilation and air conditioning systems (HVAC) to improved control of building function through expanded building automation. The possibilities are endless and depend to a great extent on the potential for savings and the cost of implementation. The partner(s) would provide a model to fund the work with their payment coming directly from the realized savings.

6.1.2 Enbridge Run it Right – Trent has also applied to participate in the Run it Right program offered by Enbridge Gas. With elements similar to the EPC, this program focuses on facilities operation more so than capital changes.

Trent has had an Enbridge energy assessor audit the areas that are metered for five of our biggest accounts –Gzowski College, Athletics, Health & Life Sciences, Sciences and Bata Library together with Champlain College. This assessor has prepared a list of suggested low-cost/no-cost measures for Trent to review with the aim of implementing them. These measures were primarily programming schedules for Trent's Air Handling Units to establish schedules for individual areas that meet the occupant needs, rather than running at a generic collective schedule. The estimated savings for these efforts are shown in Table 5.

Once Trent completes these measures, Enbridge will reimburse the costs of the implementation and monitor the consumption data for one year.

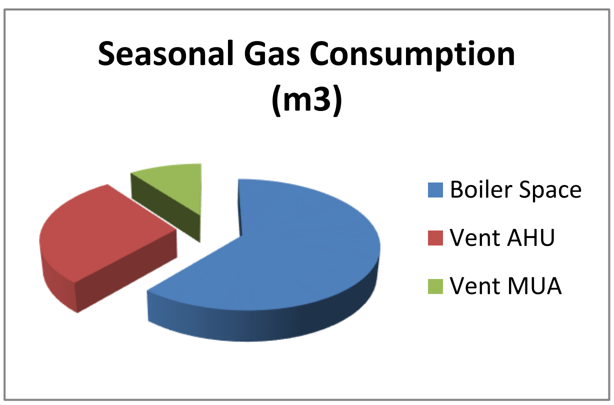
Trent's Run it Right application for Health and Life Sciences was not accepted, however Trent intends to work with Enbridge to have this decision reconsidered as staff feel that there is opportunity in that space.

Table 5. Run it Right Savings Estimates

Building/ Area	Measure	Natural Gas Savings - m3	Estimated Savings
Gzowski College	•Tighten up AHU Schedules •Insulate heat exchanger	11,572	$2,662
Athletics	•Program individual operating schedules for AHUs •Commission ERVs	12,534	$2,883
Sciences	•Program individual operating schedules for each AHU •Connect Boiler plant to BAS system	72,397	$16,651
Bata Library/ Champlain	•Control boiler circulators •Implement new boiler controls with OAT reset •Implement partial occupancy schedule	17,624	$4,053

The audits from the Run it Right program also provide helpful data such as how much of our use is due to seasonal activities and how these are further broken down by end-use. Some of these natural gas consumption details can be seen in figure 2.

Figure 2. Non-Seasonal Natural Gas Use in Sciences (from Enbridge Run it Right Report)



6.1.3 Measurement and Verification - In the past Trent has lacked effective tools to track energy use and as such had trouble effectively targeting conservation efforts, proposing business plans for measures and then evaluating the success of projects- the basic cycle of energy management.
This limitation has not stopped Trent staff from trying to make strides in this area.

Trent is currently working on a project with a number of Ontario Universities to get an online utility tracking system. This M&V tool will not only give Trent a better picture of our energy use, but also allow us to benchmark against similar buildings at other institutions. This tool will have reporting abilities that will account for weather normalization and standardization of data for space changes. It will also allow staff to see data, in some cases in real time.

6.2 Behaviour Support

In developing tools for the Behaviour Support component, the Sustainability Office will establish an employee green group to assist with easily accessible aspects of energy management where everyone in the Trent Community can participate. Representatives from each section will assist with information sharing and help their section in implementing measures specific to their function. Semi-annual forums will be held to share best practices and brainstorm ideas for moving forward.

It is important that Trent support and encourage positive behaviours around energy efficiency. Staff and the Trent Community are engaged and in general, are very positive about their role in making Trent 'green.' Supports will be developed that provide staff with a forum to share good ideas and help others who may want to participate but are not sure where to start.

6.2.1 Green Employee Program - Staff engagement is important from a number of perspectives. One –communication is difficult with the many and varied units at Trent. By having a dedicated 'green' employee in each area, communication will be improved in both directions. Two- unit leaders having a person who has the mandate to 'green' their area will benefit not only from an energy perspective but also from a waste reduction and diversion, green procurement, satisfaction and engagement perspectives as well. The Green Team will brainstorm efforts that could be implemented, benefitting Trent and reducing energy consumption and provide a conduit thought the institution to get messaging out as well as a way for staff to report issues, opportunities and success stories. Too often conservation efforts are taken on in one area and it ends there. With a dedicated group these efforts have the potential to be adapted and implemented across the institution for maximum benefit.

Staff choosing to be part of this program will not have to invest much time. They will be part of an email group and attend periodic forums to discuss initiative and progress and to learn from each other.

It is difficult to quantify the benefits of employee green programs as they span many areas. Trent will realize the benefit in improved employee engagement and satisfaction, see the impact of employee ownership over projects and the impact that has on success. These efforts have the potential to magnify the energy and waste reduction of grass roots initiatives that are currently going on right now across campus. This program is scheduled to start in the fall of 2014.

6.2.2 Residence Energy Program - Similar to the staff program Trent's Sustainability Office will be working with Housing to develop a residence energy program. The main difference and challenge is that students typically are in residence for only one year, allowing for a limited time to affect change. These efforts will focus on student education and engagement around energy efficiency within the control of students living on campus.

6.2.3 Reporting – Under Reg 397/11 Trent is required to update this plan every five years. Striving to keep our energy conservation efforts current and at the forefront of Trent's facilities planning and management, the Sustainability Office will provide an annual update for the Trent Community. This will be a snapshot of how we are meeting our targets, updates on annual utility data, highlighting projects and general progress.

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Appendix A Potential Energy Measures

In developing this report a number of potential projects were highlighted by staff. Due to time, resources and the pending details of the EPC process, these ideas have not been fleshed out. This inventory of possibilities is important to keep on record as we are deciding our next steps.

- Further fumehood retrofits and integration of VOC sensors to allow for required air changes in labs to be based on air quality
- Include Variable Frequency Drives in new construction and renovation projects as well as upgrades to include Vedas in the old Science Building, Environmental Science, Lady Eaton College, Champlain College and Otonabee College Academic.
- Install better controls on chillers. Currently they are set-up with simple on/off function and staff is looking at updating to demand limiting controls.
- Installing Boiler Controls
- Fan Coil units in Gzowski College have current Thermostat with no energy management controls. Staff is looking at controls that would allow for setback and occupancy sensing. This residence is air conditioned and used by conference services in the summer and has great potential for savings.
- Gzowski domestic hot water –could we use solar thermal?
- Retrofit for Science air handlers
- DNA Block B also has thermostats with limited abilities and staff hopes to update these to units with CO2 and occupancy control abilities.
- In DNA we have a building RO Milipour system to treat water for labs. Would a central system be more efficient?
- Programming for Circ pumps
- Athletics (pool Heat) linked with Building heating boiler, dedicated boiler for pool –look at potential for reconfiguring
- Lights in Chemical Science and Gzowski College should have day light controls
- Environmental Science –run two boilers in summer to have very tight control of temperatures – assess actual need for heat

Appendix B. Trent Energy Data 2012

Meter Location	Jan-12	Feb-12	Mar-12	Apr-12	May-12	Jun-12	Jul-12	Aug-12	Sep-12	Oct-12	Nov-12	Dec-12	2012 kWh Total
Symons Campus	1,922,758	1,781,393	1,862,204	1,641,059	1,672,776	1,750,137	1,894,177	1,830,113	1,723,767	1,660,137	1,767,573	1,726,630	21,232,724
Blackburn Hall	114,376	104,739	90,385	81,658	73,930	75,126	78,958	79,440	79,257	81,628	103,434	101,204	1,064,135
MNR	1,143	1,640	1,160	1,360	1,520	1,480	1,600	1920	1,480	1,880	2,120	3,382	20,685
Grounds	2,514	2,859	1,967	2,002	1,191	1,111	995	997	1,091	1,831	2,569	5,234	24,361
Symons Campus Totals	**2,040,791**	**1,890,631**	**1,955,716**	**1,726,079**	**1,749,417**	**1,827,854**	**1,975,730**	**1,912,470**	**1,805,595**	**1,745,476**	**1,875,696**	**1,836,450**	22,341,905
314 LONDON*	446	544	498	457	428	684	908	828	678	498	632	670	7,271
292 LONDON*	4826	6,560	5,640	2,240	1,200	0	0	0	806	960	3,160	7,217	32,608
299 DUBLIN*	2622	3,712	3,467	2,129	1,644	1,207	963	1151	1,456	1,576	2,886	4,771	27,584
292 LONDON*	357	552	632	760	785	815	793	829	806	716	719	834	8,598
300 LONDON -	61419	83,200	77,600	49,896	39,200	22,400	24,000	26,400	24,800	36,000	62,400	108,267	615,582
Traill College Totals	**69,670**	**94,568**	**87,837**	**55,482**	**43,257**	**25,106**	**26,664**	**29,208**	**28,546**	**39,750**	**69,797**	**121,758**	691,643
Oshawa Campus Totals	**47,222**	**44,678**	**49,020**	**42,253**	**42,638**	**47,369**	**53,887**	**48,701**	**48,680**	**48,209**	**48,864**	**43,921**	565,442
Total kWh	**2,110,461**	**1,985,199**	**2,043,553**	**1,781,561**	**1,792,674**	**1,852,960**	**2,002,394**	**1,941,678**	**1,834,141**	**1,785,226**	**1,945,493**	**1,958,208**	**23,598,990**

Trent University Demand Data, 2012

Meter Location	Jan-12	Feb-12	Mar-12	Apr-12	May-12	Jun-12	Jul-12	Aug-12	Sep-12	Oct-12	Nov-12	Dec-12	2012 Total
Main Meter Symons Campus	3,281	3,165	3,173	2,918	3,515	3,899	3,912	3,423	3,571	3,131	3,087	2,978	40,053
Blackburn Hall	206	186	205	207	172	201	201	173	187	204	216	203	2,360
MNR	6	6	6	7	none	none	none	none	none	none	none	none	25
Symons Campus Totals	**3,494**	**3,357**	**3,384**	**3,131**	**3,686**	**4,100**	**4,113**	**3,596**	**3,758**	**3,335**	**3,303**	**3,181**	**42,438**
292 LONDON*	27	23	23	23	13	none	none	none	none	none	none	none	109
300 LONDON -	216	272	204	144	141	70	66	61	73	110	158	177	1,691
Traill College Totals	**243**	**295**	**227**	**167**	**154**	**70**	**66**	**61**	**73**	**110**	**158**	**177**	1,799
Total	**3,737**	**3,652**	**3,610**	**3,298**	**3,840**	**4,171**	**4,179**	**3,657**	**3,831**	**3,445**	**3,460**	**3,358**	**44,237**

Trent University Natural Gas Data, 2012													
	Jan-12	Feb-12	Mar-12	Apr-12	May-12	Jun-12	Jul-12	Aug-12	Sep-12	Oct-12	Nov-12	Dec-12	Total m^3
Sci, Chem Sci, Env Sci, Otonabee Acad.	99,359	146,625	78,228	66,742	21,707	7,987	8,083	14,636	35,778	81,999	109,186	109,375	779,705
Bata and Champlain	27,875	43,647	28,046	20,466	1,585	773	753	1,214	5,742	27,289	34,904	33,093	225,387
LEC KIT	849	1,816	2,765	1,670	2,497	1,306	910	1,159	761	1,815	1,701	680	17,929
BH (BGB)	4,189	10,776	9,237	5,062	4,530	1,322	1,756	746	2,164	1,305	7,571	3,571	52,229
LEC SO	3,484	10,230	5,942	6,189	4,760	1,483	2,642	791	554	3,534	4,426	3,086	47,122
OC SO	1,739	3,739	2,395	1,517	3,378	1,817	1,181	740	680	2,192	1,762	952	22,092
OC NO	1,074	2,451	2,909	2,326	1,671	568	727	640	885	1,933	2,359	827	18,370
WENJACK	777	2,375	2,262	1,488	2,237	1,173	819	993	1,103	1,503	2,625	749	18,104
CC NE QUAD	1,746	4,282	2,675	2,243	1,356	390	345	123	93	1,186	2,459	1,359	18,257
ESC Animal House	5,844	23,768	21,008	11,133	7,456	3,500	2,816	2,366	1,575	4,648	9,825	5,971	99,910
CC N QUAD	4,792	8,322	38,158	5,945	1,772	1,154	619	425	163	2,338	5,408	3,034	72,130
MNR Storage	297	390	1,180	120	324	34	86	20	92	21	196	223	2,983
LEC COMM	4,059	5,379	13,893	901	7,754	1,317	9	614	8	3,002	5,250	3,560	45,746
LEC NO	83	1,590	1,519	1,128	1,637	256	391	107	45	104	101	76	7,037
CHILDCARE	787	1,710	901	786	377	230	85	141	141	395	672	611	6,836
CC West Quad	8,943	12,516	8,164	5,831	517	201	84	313	1,931	9,454	10,519	8,389	66,862
Bldg. Maintenance	705	2,096	1,332	646	131	118	82	44	32	43	467	599	6,295
Gzowski @ Symons	28,981	28,824	22,587	20,518	5,731	1,065	1,161	1,450	2,949	16,549	27,691	26,017	183,523

DNA A & B	40,290	38,186	28,209	25,572	14,088	6,527	5,417	4,045	10,283	20,266	36,005	33,250	262,138
DNA C	48,872	46,520	37,404	35,132	22,379	14,776	14,088	14,297	19,260	31,566	42,520	38,813	365,627
Athletics	23,488	20,985	16,779	10,413	10,014	6,604	5,260	5,082	7,527	14,663	21,022	17,393	159,230
Symons Campus Totals	**308,233**	**416,227**	**325,593**	**225,828**	**115,901**	**52,601**	**47,314**	**49,946**	**91,766**	**225,805**	**326,669**	**291,627**	**2,477,511**
299 Dublin (Kerr)	889	1,932	987	1,104	302	238	0	178	0	567	903	811	7,911
310 London –Bagn.	611	1,219	425	493	171	90	76	52	no data	365	491	527	4,520
300 London	1,564	2,783	1,471	1,415	543	115	0	14	0	998	1,142	1,296	11,341
310 London	912	1,591	980	762	402	61	0	8	1	456	872	773	6,818
314 London	443	822	474	411	167	37	30	5	35	282	348	367	3,421
310 London	322	503	515	422	274	197	168	242	282	370	411	231	3,937
Traill College Totals	**4,741**	**8,850**	**4,852**	**4,607**	**1,859**	**738**	**274**	**499**	**318**	**3,038**	**4,167**	**4,005**	**37,948**
Oshawa Campus	**14,496**	**13,561**	**14,496**	**14,028**	**2,246**	**1,219**	**196**	**182**	**1,638**	**6,657**	**12,596**	**11,760**	**93,074**
Total Gas –m^3	**312,974**	**425,077**	**330,445**	**230,435**	**117,760**	**53,339**	**47,588**	**50,445**	**92,084**	**228,843**	**330,836**	**295,632**	**2,608,533**

Appendix C Ministry of Energy Template Data, 2012

Press TAB to move to input areas. Press UP c	Energy Consumption and Greenhouse Gas Emissions Reporting - for 2012
Confirm consecutive 12-mth period (Jan 2012 to Dec 2012)	
Sector	
Agency Sub-sector	
Organization Name	

Please fill in the mandatory fields indicated in red, in addition to submitting data on your energy usage.

								Energy T					
								Electricity		Natural Gas		Fuel Oil 1 & 2	
Operation Name	Operation Type	Address	City	Postal Code	Total Floor Area	Unit	Avg hrs/wk	Quantity	Unit	Quantity	Unit	Quantity	Unit
Stephenson Building	*Classrooms and related facilities*	*2160 Yonge Street*	*Toronto*	*M7A 2G5*	*135,034.00*	*Square meters*	*70*	*2,181,065.00000*	*kWh*	*125,300.00000*	*Cubic meter*		*Litre*
Symons Campus	Classrooms and related facilities	1600 West Bank Driv	Peterborougl	K9J 7B8	117,700	Square meters	65	22341905.00000	kWh	2477511.00000	Cubic Meter	4573.00000	Litre
Traill Campus	Classrooms and related facilities	300 London Street	Peterborougl	K9H 7P4	7,414	Square meters	65	691643.00000	kWh	37948.00000	Cubic Meter	0.00000	Litre
Oshawa Campus	Classrooms and related facilities	55 Thorton Road Sou	Oshawa	L1J 5Y1	4,571	Square meters	65	565442.00000	kWh	93074.00000	Cubic Meter	0.00000	Litre

Energy Type and Amount Purchased and Consumed in Natural Units										Total (calculated in webform)			
	Fuel Oil 4 & 6		Propane		Coal		Wood		District Heating				
Jnit	Quantity	Unit	Quantity	Unit	Quantity	Unit	Quantity	Unit	Quantity	GHG Emissions (Kg)	Energy Intensity (ekWh/sqft)	Building / Operation Identifier	Comments
		Litre		*Litre*		*Metric Tonne*		*Metric Tonne*	*26.73000*				*max. 255 characters*