TDSB Wastes $1 Million from Computers Running 24/7

This report details how 40,000 TDSB computers should be turned off when not in use to help the environment and save on energy bills.

A James Gibbons Report

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James Gibbons is a Grade 12 student at North Toronto Collegiate Institute.

To the Toronto District School Board:

I would like to tell you about the current computer energy crisis at the Toronto District School Board. Perhaps, you could read this report and help persuade the TDSB to take affirmative action to stop this dreadful waste of electricity.

There are at least 40,000 TDSB computers that are connected to a central network. The computers are left on 24/7 so that they may remotely receive software updates. The computers must be on in order to receive the updates, which may include new software, anti-virus definitions, and device drivers.

Students, teachers, and administrators are instructed to leave the computers on 24/7 so that the computers are always up to date. Unfortunately, the computers are used only a few hours a day. Most computers are not used after 4:00 p.m. and before 9:00 a.m. If this is the case, the computers are humming away unnecessarily for 17 hours each school day. On the weekends, the computers are likely not used at all! Some computers are on for days without being touched once. Desktops generally consume 40-70 watts even when users are not logged in. For example, a popular TDSB computer, the Dell Optiplex GX520 desktop uses about 60 watts an hour when it is idle and unused. The power consumption data was recorded by using a UPM EM100 Energy Meter.

Wasted taxpayers' dollars

Cost of wasted electricity formula (in Canadian dollars)

Annual cost of wasted electricity = Hours wasted per week * 52 weeks per year * cost of electricity per kilowatt * number of computers * electricity consumption per computer per hour

	Formula variable breakdown
Hours wasted per week	= 5 schooldays * hours wasted per school day + 2 weekend days* number of hours wasted per weekend day. = 5 * 17 + 2 * 24 **= 133 wasted hours / week**
Cost of electricity / kilowatt	In Ontario the cost of electricity per kilowatt is generally about $0.065 / kilowatt. **= $0.065 / kilowatt**
Number of computers	There are at least 40,000 computers on the CTMI network. A very small minority of the computers might be laptops, which require slightly less power, but for the purposes of this report, we will assume there are 40,000 desktops in order to simplify the math. **= 40 000 computers**
Electricity consumption / computer / hour	Every different computer model uses a different amount of electricity. This report assumes computers use 60 watts of electricity when turned on but not in use. When computers are off, they are rarely 100% off. A computer that is turned off but plugged in often draws 5 watts / hour. Therefore, in the formula the average energy consumption is 5 watts lower because it is very difficult, if not impossible, to eliminate this minor source of consumption. = 60 - 5 watts = 55 watts = 0.055 kilowatt hours

Annual cost of wasted electricity	= 133 *wasted hours / week* * 52 *weeks* * $0.065 */ kilowatt hour* * 40000 *computers* * 0.055 *kilowatt hours* **= <u>$988 988</u>**

According to this model, that TDSB has unfortunately been wasting about one million dollars every year because of the failure to turn off the computers. This figure is even more upsetting because of the environmental impact of this excessive energy consumption. The TDSB should foster a much greener attitude towards computing. It is definitely sending mixed messages to students. The TDSB Enterprise Help Desk (416-395-HELP) claims that the computers must be on all the time to receive valuable updates. The next portion of this report details one way that the computers could be remotely turned on and off to save the board money and create more environmental credibility.

A Recommended Solution

Computers in a network can be turned on and off remotely using wake on LAN technology. Every computer connected to a network has an IP (internet protocol) address and a MAC address. These numbers are like street numbers in that they identify the location of the computers. A little message called a "magic packet" can be sent to a computer to turn it on. It only takes a millisecond to travel along the network.

I propose that computers that are logged off for more than five minutes be put into sleep mode or turned off using a simple local script. When an update is about to occur, a remote script will run that will remotely turn on/wake up all the 40,000 computers in the network. Five minutes later (after the computers have finished starting up) the updates will be dispatched, which might take 10 minutes. Then, the computers will be once again put in sleep mode or turned off. Another benefit to this solution is that monitors go into sleep mode when the computer is in sleep mode instead of displaying the screensaver. Since a standard CRT monitor uses about 60 watts / hour (the same as an inactive desktop computer), a great deal of additional money would be saved. This entire procedure would cost very little to implement especially considering the environmental benefits and energy bill savings.

How you can help

Thank you very much for reading my report. I hope you better understand how the Toronto District School Board can save one million dollars per year and countless tonnes of carbon dioxide. Please contact me if you would be interested in helping.

Sincerely,

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P.S. Replies may be published and used for media purposes.

Acknowledgements

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Appendix A: Power Monitor readings

Desktop idle: all users are logged off

The desktop consumes an average of 61W when all users are logged off.

Desktop in sleep mode

The desktop consumes an average of 5W when it is in sleep mode.

Desktop off

The desktop consumes an average of 5W when it is turned off.

Appendix B: Background to this report

I was at school one night until 9:00 P.M. working on my school's newspaper and it occurred to me that all the computers were still on. I then thought of the thousands of school computers across the school board, which were left on because they could be receiving valuable automatic updates. At home I had fun one evening turning computers on and off remotely and I thought that the Toronto District School Board could surely figure out how to do this fun trick in order to help end the province's addiction to electricity. I talked with Board technicians and called the Enterprise Helpdesk for answers but I got nowhere. This is the reason why I am asking you to help me. I am aware that the TDSB is facing many financial difficulties and I know the one million dollars spent each year powering computers in the middle of the night could be better used.