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October 10, 2008

Dr. Jerome Melvin
Superintendent of Schools
North Syracuse Central School District
5355 West Taft Road
North Syracuse, NY 13212

Report Number: S9-8-1

Dear Dr. Melvin:

A top priority of the Office of the State Comptroller is to help local government officials manage government resources efficiently and effectively and, by so doing, provide accountability for tax dollars spent to support government operations. The Comptroller is mandated to oversee the fiscal affairs of local governments statewide, as well as their compliance with relevant statutes and observance of good business practices. This fiscal oversight is accomplished, in part, through our audits, which identify opportunities for improving operations and Board governance. Audits can also identify strategies to reduce costs and to strengthen controls intended to safeguard local government assets.

In accordance with these goals, we conducted an audit of seven municipalities throughout New York State. The objective of our audit was to determine whether cost savings could be realized by implementing power management procedures aimed at reducing the electricity used by computer equipment. We included the North Syracuse Central School District in this audit. Within the scope of this audit, we examined the policies and procedures of the District, utility bills and computer infrastructure for the period July 2006 through April 2008.

This report of examination letter provides findings and recommendations specific to the North Syracuse Central School District. We discussed the findings and recommendations with District officials and considered their comments, which appear in Appendix A, in preparing this report. District officials generally agreed with our findings and recommendations and plan to initiate corrective action. At the completion of our audit of the seven municipalities, we will prepare a global report that summarizes the significant issues we identified in all of the units audited.

Summary of Findings

We estimate that the District can save at least \$88,500 annually, by changing the existing District energy conservation policy governing computer usage to require users to power down computers during all periods of inactivity (overnight) and to enable power save settings on all computers.

The District's energy conservation policy is deficient. The policy directs users to leave computers on during weeknights and to power down computers on weekends. It is silent on extended periods such as holidays and does not address power save settings. We also found that users are not following the current policy. Specifically, 39 percent, or 1534 computers, were left on over a weekend when they should have been powered off according to policy. District officials should amend the policy and improve their monitoring and enforcement of the policy.

By implementing our audit recommendations, the District not only will save money by consuming less electricity, it will also reduce greenhouse gas emissions. Specifically, the District could decrease contributions of carbon dioxide, nitrous oxide and sulfur dioxide emissions by 522,000 pounds each school year.

Background and Methodology

The North Syracuse Central School District (District) is located within the communities of North Syracuse, Clay, Cicero, Bridgeport and Mattydale/Hindsdale, in Onondaga County. There are 14 buildings in operation within the District, with approximately 9,750 students and 1,650 full-time and part-time employees. The District's budgeted expenditures for the 2007-08 fiscal year were approximately \$127 million, funded primarily with State Aid, real property taxes and grants.

Delivering educational services is expensive; one of the key expenditures is the cost of electricity. In 2006-07, the District used about 11,419,898 watts of electricity for operations, which cost approximately \$1,559,000. The average cost per kilowatt-hour in 2006-07 was \$0.14. Electricity used by common computer equipment represents a significant portion of the electricity used in District buildings. Computers are key resources in classrooms; most, if not all, school classrooms have computers for teachers and students. In addition, districts have incorporated technology into their libraries as well as labs by equipping them with computers.

The District has 4,488 computers¹ located throughout the 14 District buildings. The District has 4,018 of these computers linked together so they can communicate with each other, exchange commands and share data. This is commonly referred to as a computer network. The remaining computers are kept for spare parts, backups and/or as outdated equipment.

Schools could help in the global effort to reduce our reliance on traditional energy and oil. This involves researching energy efficient operational methods and implementing those options that provide cost and energy efficiencies. Schools have various options available to exercise this leadership role, including the utilization of power management procedures for the computer equipment.

¹ A computer typically has a monitor (screen), central processing unit (CPU), a keyboard and mouse. The term computer will indicate a monitor and CPU in this report, unless otherwise indicated.

Power management reduces energy consumption when personal computers and monitors are not in active use. Power management settings include system standby and hibernate mode, where the monitor and central processing unit (CPU) typically drop down to using only one to three watts of power each. Each mode allows the user to wake up the computer quickly. While many people believe that screensavers save energy, certain graphic intensive screen savers actually use twice the energy of normal computing and prevent computers from entering a power save mode.

During this audit, we examined the energy efficiency of the computer infrastructure at the North Syracuse Central School District for the period July 1, 2006 to April 30, 2008. To accomplish our objectives, we interviewed information technology department staff, examined appropriate policies and procedures relevant to our objectives, analyzed computer inventory records, reviewed district utility bills, the technology plan, Board of Education meeting minutes, energy contracts, energy performance reports and other documents maintained by the District that were relevant to our objectives.

We conducted this performance audit in accordance with generally accepted government auditing standards (GAGAS). Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

Audit Results

Policy Guidance

Local governments and schools should develop policy guidance that addresses energy conservation and efficiencies. Policy guidance helps ensure that the District is utilizing power management features and instructing computer users to follow certain procedures to achieve energy efficiencies. Local governments and schools should periodically monitor compliance with the policy.

The District's energy conservation policy governing computer use is deficient. The policy states: "Computers should be left on during the week," "Computers are to be turned off on Fridays and turned back on Monday's when staff returns" and "Monitors should be turned off each night." The District could further optimize energy conservation by requiring that computers be powered down each night and during holiday (extended) leave periods and that power management settings be enabled on all District computers.

Information Technology (IT) officials indicated that monitoring and enforcement of the energy conservation policy occurs at the building level and not necessarily by the IT staff. Our test results, discussed in detail below, indicate that District staff are not complying with the current policy. For example, our tests found that 39 percent of District computers were left on over the weekend, while the Policy requires that computers should be turned off, thus indicating a need for better monitoring.

Electricity Usage and Potential Savings

Most computer technology is equipped with power management features that if enabled can save electricity and money.² Municipalities should enable power management features and direct users to power on or off the computers during certain daily/weekly times to minimize the electricity demand and expense to the District. The District computers have various power management options available that must be enabled to ensure efficient usage. The following table illustrates the typical electricity demand for the four major computer (CPU and monitor) types at the District by setting type:

AVERAGE ELECTRICAL DEMAND OF COMPUTERS BY TYPE IN WATTS					
CPU'S					
Type	Full Power Mode	Monitor Sleep, CPU Full Power	System Standby	System Hibernate	Shutdown
IBM	96.00	40.25	37.00	8.00	2.75
Nexlink	140.75	87.50	77.00	5.00	1.50
Hewlett Packard	82.00	53.25	2.00	2.00	2.00
Netvista	93.75	31.25	5.00	5.00	2.00

District officials have stated that when new computers are purchased, they currently do not enable power save settings, nor do they require the vendor to enable these settings. District officials indicated that computers are set to log a user out after 20 minutes of inactivity, but this is merely for security purposes and not power management reasons. The only power management setting the District has utilized is enabling the monitors to go into a power save mode after 20 minutes of inactivity. We reviewed the power setting options on 50 machines and verified this to be correct. The District could further reduce energy usage by requiring CPU's to be powered down during weeknights and holiday periods and power management features to be set on all machines.

In order to determine if cost savings could be achieved by minimizing the amount of electricity used by the Districts computers, we tested the on/off status of District computers twice during our scope period, one weeknight and one weekend day, to determine the power status of machines during periods of inactivity (weeknights or during the weekend). To complete these electronic tests, we had the District Network Administrator send an electronic signal, commonly referred to as a "ping," to all the computers on the network. A ping is a basic internet program that allows a user to diagnostically verify if a computer is operating and a valid internet protocol (IP) address exists and can accept requests. Because a ping can only reach working IP addresses, we tested only networked computers in the District.

² The Environmental Protection Agency (EPA) recommends setting computers to enter into a system standby or hibernate mode after 30 to 60 minutes of inactivity as well as setting computer monitors to enter into a sleep mode after 5 to 20 minutes of inactivity. The District's energy conservation policy fails to address power management features.

On Thursday, January 10, 2008, we electronically tested 3,874 of the District's 4,018 networked computers after school hours to determine how many computers were left on after hours. We determined that 68 percent of the District's computers that were pinged responded as being left on. Specifically, we found 2,632 computers were on (CPU fully on and the monitor in sleep mode) during the evening while inactive.

Similarly, on Saturday, January 12, 2008 we electronically tested all 4,018 networked machines in the District to determine how many computers were on over the weekend. The results for this weekend test indicated that 39 percent of the District's computers that were pinged responded as being on. Specifically, we found 1,534 computers were on (CPU fully on and the monitor in sleep mode) during the weekend during this extended period of inactivity.

In addition, on Wednesday, April 16, 2008 during the District's spring break recess, we tested 4,127³ networked computers to determine how many computers were on during the holiday period. We determined that 25 percent of the District's computers that were pinged responded as being on. Specifically, we found 1,052 computers were on during the holiday during this extended period of inactivity.⁴

The District's energy conservation policy indicates that computers should be fully powered down on weekends, however it does not specifically address holidays. The District does electronically notify all computer users to shutdown the computers the day prior to an extended break, which could have helped to contribute to the reduced number of CPU's found to be powered on during the extended break.

Using the above test results, we calculated potential total cost savings for a school year. Our cost-savings analysis is presented conservatively, in that we excluded computers from our results that the network administrator indicated should be left on such as servers, food service machines as well as select IT department staff computers.

The following table illustrates the estimated current kilowatt usage of the tested District computers, the optimal kilowatt usage by requiring District staff to turn off their computers at night and weekends and the potential kilowatt-hour savings available to the District:

POTENTIAL kW SAVINGS				
	Estimated Current kW Usage	Optimal kW Usage	Daily kW Savings	Annual kW Savings
WEEKNIGHT	2,425.27	130.17	2,295.10	426,889.34
WEEKEND	4,412.01	399.07	4,012.94	168,543.65
HOLIDAY	1,584.02	208.00	1,376.02	37,152.43
TOTAL	8,421.30	737.23	7,684.06	632,585.42

³ The District added machines since the January test, thus the number of networked computers increased.

⁴ While recognized that certain staff work during extended holiday breaks (i.e., custodians, administrators, etc), we could not match the employee to the computer to conduct specific testing. We believe impact on our findings would be immaterial.

Overall, by appropriately powering down computers during periods of inactivity, the District could realize cost savings of at least \$88,500 per year in addition to reducing its kilowatt consumption by approximately 632,585 kWh per school year. Further, additional cost savings can be realized by properly enabling power save settings, to ensure computers timely enter a power save mode during inactive periods during the standard workday.

Environmental Impact

The District's electrical energy needs are provided through National Grid. About 23 percent is generated from oil, gas, and coal; the remainder is produced from nuclear, hydro and refuse. All these sources, except for nuclear and hydro, which are considered clean alternatives, produce certain pollutants and have negative impacts on the environment.

A study released by the National Academy of Sciences⁵ confirmed that greenhouse gases are accumulating in the Earth's atmosphere as a result of human activities contributing to global warming. Carbon dioxide (CO₂) emissions contribute to global warming and nitrous oxides (N₂O) and sulfur dioxides (SO₂) are key pollutants that contribute to smog and acid rain. Information about these gases follows.

- Carbon dioxide is a colorless, odorless gas that allows light from the sun's rays to be transmitted to the Earth's surface but blocks heat radiating from the Earth's surface from escaping into the atmosphere, thus contributing to global climate change or warming due to the "greenhouse" effect.⁶
- Nitrogen oxides are compounds of nitrogen and oxygen that once in the air may undergo a chemical transformation into nitrates and nitric acid, contributing to acid rain and ground-level ozone (photo-chemical smog).⁷
- Sulfur dioxide is a heavy, colorless gas that once in the air may undergo a chemical transformation into sulfates and sulfuric acid, contributing to acid rain. Electric generation facilities are the largest source of SO₂ emissions. SO₂ emissions are controlled and monitored by Federal and State environmental regulatory programs.⁸

The District consumed approximately 11,419,898 kWh of electricity in the 2006-2007 school year according to electricity bills. By implementing our audit recommendations, the District could save approximately 632,585 kWh of electricity each year. In addition to lowering the cost of using electricity, the District would also reduce the amount of greenhouse gas emissions from reducing its electricity demand. Depending on fuel source, size, and location, the generation of electricity may also cause other public health, environmental and socioeconomic impacts not disclosed above. Each kWh of traditional electricity consumed produces harmful emissions or byproducts. The following table illustrates the avoided emission equivalents of the pollutants by enabling power saving measures such as shutting down.

⁵ Entitled "Climate Change Science Report", issued 2001.

⁶ Environmental Disclosure, Consumer Guide, New York State Public Service Commission, 8/03.

⁷ Ibid.

⁸ Ibid.

POLLUTION EMISSION EQUIVALENTS (LBS)			
POTENTIAL kWh SAVINGS	<i>CO₂</i>	<i>N₂O</i>	<i>SO₂</i>
632,585	518,720	629	2,654

If the District used power saving measures during periods of inactivity such as on weeknights, weekends and holidays it would eliminate over half a million pounds of pollutants from the atmosphere each year. Districts must consider the environmental impact of their operations (electricity usage) and pursue methods to operate efficiently and in an environmentally sensitive manner.

Recommendations

1. District officials should refocus the District’s energy conservation policy to address shutting down computers and monitors during all extended periods of inactivity such as on weeknights, weekends, and holidays.
2. The Information Technology department should enable power management settings such as standby or hibernate on all district computers in order to reduce the district’s electricity consumption and costs.
3. District officials should monitor and periodically test computers to ensure that both the monitor and CPU are shut-off during periods of inactivity such as weeknights, weekends, and holidays.

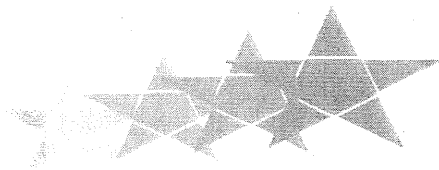
The Board has the responsibility to initiate corrective action. Pursuant to Section 35 of the General Municipal Law, Section 2116-a (3)(c) of the Education Law, and Section 170.12 of the Regulations of the Commissioner of Education, a written corrective action plan (CAP) that addresses the findings and recommendations in this report must be prepared and forwarded to our office within 90 days. To the extent practicable, implementation of the CAP must begin by the end of the next fiscal year. For more information on preparing and filing your CAP, please refer to our brochure, *Responding to an OSC Audit Report*, which you received with the draft audit report. The Board should make the CAP available for public review in the District Clerk’s office.

Sincerely,

Steven J. Hancox
Deputy Comptroller
Office of the State Comptroller
Division of Local Government
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APPENDIX A

The School District officials' response to this audit can be found on the following pages.



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Stephen L. Carr
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June 19, 2008

[REDACTED]
Binghamton Regional Office
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State Office Building, Room 1702
44 Hawley Street
Binghamton, NY 13901-4417

Dear [REDACTED]

At the May 27, 2008 meeting with representatives from the State Comptroller's Office and the North Syracuse Central School District, preliminary findings of the audit of computer energy usage by staff of the North Syracuse Central School District was discussed. The following recommendations were identified from the report.

- *District officials should refocus the District's energy conservation policy to address shutting down computers and monitors during all extended periods of inactivity such as on weeknights, weekends, and holidays.*
- *The Information Technology department should enable power management settings such as standby or hibernate on all district computers in order to reduce the district's electricity consumption and costs.*
- *District officials should monitor and periodically test computers to ensure that both the monitor and CPU are shut-off during periods of inactivity such as weeknights, weekends, and holidays.*

In an effort to address the recommendations, the North Syracuse Central school District and specifically the Computer Services Department has completed the following activities.

1. *Arranged for the purchase of Windows Server 2008. This new operating system provides Group Policy preferences (formerly an independent program titled PolicyMaker Share Manager) that will allow the District to establish settings that will meet energy use guidelines in three distinct operating modes: standby, sleep mode, and while computers are in*

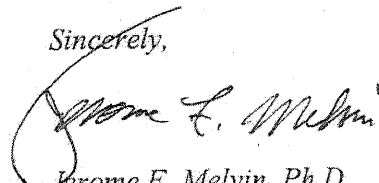
"We're On The Move!"

operation. Installation is planned for summer 2008. This tool will also enable Network Administrators to adjust power management settings such as standby or hibernate on all district computers. Full implementation is scheduled for September 2008.

2. Arrangements have been made for two district computer technicians to be certified to service newly purchased equipment, specifically covering energy management. As a result, the technicians will be able to set-up and configure computers and related equipment to meet or exceed ENERGY STAR specifications for computer usage.
3. Through a process called Networked Task Managing, the Computer Services Department will automatically enforce the power down of all equipment from the hours of 10 PM to 6 AM, every evening starting July 1st, 2008.
4. The department has joined the ENERGY STAR Low Carbon IT Campaign. This program publicly announces our district's commitment to reduce energy consumption when using computer technologies. All staff will be issued a certificate of recognition to hang in their classroom as both a reminder for good practice and a discussion point with students to be more energy conscious.

Once your final report is released, district officials will review the document and address any additional recommendations. We do, however, believe that with the above changes to policy and practice, the district will address the stated recommendations and meet the goals of the audit. Please feel free to contact me if you have any questions.

Sincerely,



Jerome F. Melvin, Ph.D.
Superintendent of Schools