



2011-2012 Energy and Education Plan Year One Final Report and Recommendations

The Erie School District's Energy and Education (E2) Plan was previously approved by the school board in August of 2011. Through regular meetings of the Energy and the Education Committees, the overall plan was implemented. The purpose of this document is to report the accomplishments and benefits of the E2 plan over its first year of implementation, ending in May 2012, and provide recommendations for future District progress.

As a result of the E2 plan, the Erie School District (ESD) made significant accomplishments in many areas related to the operation and maintenance of our school buildings and facilities, the integration of energy conservation and efficiency into curriculum and behavior, partnerships with local institutions, national recognition, and fiscal health through energy savings and grants.

- ✓ Received \$10,000 Sustainable Energy Award from the National Environmental Education Foundation, recognized as one of three high schools across the nation that effectively engages students and teachers in school-wide energy savings through creative and innovative use of technology.
- ✓ Engaged all levels of school participants through the creation of District-wide energy guidelines, energy conservation training for administrative and facility staff, effective implementation of teacher-led team energy audits in 13 schools, and a Kilowatt-Hour (KWH) competition in elementary schools.
- ✓ Through a partnership with the Environmental Protection Agency's Energy Star (ES) program and the acceptance of both a 10 Percent reduction and an Information Technology challenges, all schools now have accounts in the ES Portfolio Manager to track future energy reductions, document resultant savings, and further develop energy reduction plans.
- ✓ Developed elementary, middle and high school curriculum that effectively addresses energy reduction and conservation.
- ✓ Funded all E2 plan development and implementation expenses through grants totaling \$41,844.

- ✓ Northwestern Pennsylvania Collegiate Academy (NPCA) was recognized by the Pennsylvania Department of Education as one of only 47 schools across the state to apply for the US Department of Education Green Ribbon Schools (GRS) award.
- ✓ Partnered with Carnegie Mellon University (CMU) and conducted an in-depth retrofit analysis of McKinley Elementary School. Partnered again with CMU and Green Building Alliance (GBA) and applied for EPA grant to further study indoor environmental quality.
- ✓ All schools improved their ES Portfolio Manager rating from 2011, with five buildings receiving a rating of 75 or above making them eligible for ES Certification. This rating, when verified, means these five schools are in the top 25 percent for energy efficiency in the nation when compared to other schools.



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| SUMMARY OF FINDINGS | INTERPRETATION OF FINDINGS |
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| TOTAL COST OF DEVELOPING AND IMPLEMENTING E2 PLAN | | (\$41,844) |
| Grants Received | | |
| Citizens Power | 4,644 | |
| Science Education Fund | 29,800 | |
| Department of Environmental Protection | 7,400 | |
| | | 41,844 |
| Awards Received | | |
| National Environmental Education Fund | | 10,000 |
| Energy Savings | | |
| Reduced Kilowatt Hours | 959,000 | CO2 reductions of 661 tons, equivalent to the amount of 130 cars, 83 homes, or that consumed by 141 acres of forest |
| Electricity Rate (\$/Kilowatt Hour) | \$0.09 | |
| Total Savings from Electricity Reduction | | \$86,310 |
| Reduced Gas CCF | | |
| Gas Rate (\$/CCF) | | |
| Total Savings from Gas Reduction | | \$274,683 |

Further information on energy savings, including building specific results, is included in the attached chart. It should be noted that the net energy reduction is based adjustment for weather conditions, and therefore not simply a result of a relatively mild winter. This is further evidenced by increase in ES ratings for all district buildings.

The successful results of the E2 plan can, and should, be largely attributed to increased energy awareness and action by school participants. Changes in behavior, versus equipment, were actualized through the E2 plan's comprehensive educational program for faculty, staff, and students. The realized potential of the E2 plan will only continue to create positive results in creating a culture of environmental stewardship and energy conservation for as long as ESD is vigilant in (1) the continued implementation and creation of curriculum and (2) professional development focused on energy reduction and conservation.

Recommendations

The ESD E2 Plan has achieved great success in creating capacity for energy reduction, conservation and education, resulting in considerable financial savings. To ensure future successes, the following actions are recommended:

- ✓ Maintain and develop both the Education and Energy committees, benefit from success, as well as hire an Energy Manager
- ✓ Engage in long-term energy planning focusing on the use of the ES process and indoor environmental quality.
- ✓ Support the E2 plan's next phase by adopting the GRS model to address issues beyond energy, to include water reduction and conservation, waste reduction, and healthy learning environments.

Maintain and develop both the Education and Energy committees, benefit from success, and hire an energy manager.

The effectiveness of the dedicated individuals that enacted the E2 plan cannot be understated. By engaging students in the KWH reduction competition while simultaneously developing the skills of teachers and staff, significant financial savings resulted. Many enjoyed

the May awards ceremony celebrating our success, and the committees look forward to assisting the district in developing further capacity.

It is instructive to observe that if the District had implemented these simple, cost-free conservation measures 20 years ago, this investment would now be worth (at 5 percent simple interest) approximately \$14 million. Considering the state of educational funding in Erie and Pennsylvania in general, it is felt imperative that ESD maintain and develop its energy reduction and conservation program to aid in its long term financial security.

Given the success of the E2 plan, it is recommended that the District make a higher level of commitment to energy conservation by developing policies based on the existing guidelines. The Committees would be happy to assist the district in developing such standards.

Considering that ESD energy costs are over \$2 million per year, it is also recommended that the district consider funding an energy manager. When using a Certified Compensation Professional's analysis of survey data collected from thousands of HR departments at employers of all sizes, industries and geographies provided by salary.com, the national average of a typical Energy Manager is approximately \$96,000. As above, maintaining the current level of energy reduction will, conservatively, save the district \$300,000 annually.

When taking into account that the City of Erie is below national salary averages for energy managers, it is more than feasible to say that the financial savings accrued from the first year of enacting the E2 plan, as well as future savings if Plan remains enacted, can be used to support an energy manager. Further, the Committees believe that even a part-time position could be a very wise investment.

Also, an energy manager's job description is not limited to solely reducing energy costs. Such person performs a variety of functions to develop and implement practices and procedures designed to reduce energy consumption and improve efficiency. They are experts at researching alternative/renewable energy technologies and determining cost-effectiveness of strategies. They may also be used as a consultant for teachers, staff, and administration to further build capacity through the assistance in creation of curriculum, professional development training, and policy recommendation.

Such a person may also go beyond the duty of energy manager and be titled a sustainability coordinator, focusing on other programs and funding opportunities beyond energy, such as waste and water reduction, that also provide opportunities for environmental literacy among students along with resulting fiscal benefits. Although this approach is not prevalent in Pennsylvania K-12 schools, a national demand is increasing for such employees, and it is very common in colleges, some of which have fewer students and facilities than the Erie School District.

Engage in long-term sustainability planning focusing on the use of the Energy Star process and indoor environmental quality.

An essential aspect of the ES partnership and the E2 plan was the development of a cohesive plan to reduce energy usage and build capacity among school participants. This was an important initial step, and it is recommended that ESD develop a long-term plan. This document, at minimum, will focus on energy efficiency and conservation, and may be expanded to incorporate other school sustainability aspects, giving prominence to setting specific goals and milestones.

The district should ensure that the ES process and related tools are fully utilized by building staff. Under the E2 plan, the ES work was primarily done by the Energy Committee, but would be better managed as an operational function. This could include operation of the ES Portfolio Manager software, pursuing ES certification and meeting other standards of the partnership. It should also be noted that the use of Portfolio Manager is now a prerequisite of the Plan-Con process.

It has been shown above that the district can potentially save millions through energy efficiency and conservation. Utilization of the ES program and its many free tools would therefore be a very wise step in the district's long term financial planning.

It is also recommended that ESD sustain and build upon the successes of the E2 plan by investigating the following:

- ✓ In replacing lighting, the first priority should be reducing levels (bulbs), for new technology can actually increase lumens. ES certification standards allow 40 FC in most classrooms, and even lower in common areas. Use of ambient and reflective light should be primary factors in replacement. This was also a key recommendation of the CMU analysis of McKinley Elementary. Significant savings can be recognized in reducing levels and upgrading technology because lighting represents at least 25% of the KWH load in ESD schools.
- ✓ Summer KWH usage is inexplicably high in most school buildings. Investigation of procedures and practices during traditional non-operating school hours and subsequent remediation of energy usage has great potential in reducing operating expenditures and capturing savings.
- ✓ Further investigation of energy usage patterns through daily rate metering for peak and off hours is recommended. A better understanding of how and when we use our energy can be addressed by additional behavioral and operational measures.
- ✓ Supplemental passive strategies for energy reduction and conservation can be realized through the use of control systems, such as automated energy

management systems and occupancy sensors. When considering such strategies, it is recommended that potential vendors supply a cost/benefit analysis to ensure return on investment.

- ✓ The E2 plan did not determine actual energy usage from “Smart Boards” (interactive whiteboards). As this technology and others like it become more prevalent, evaluation under the ES program is recommended. Purchasing decisions based on considerations of energy consumption and long-term savings should be used for these technologies as well as any other new equipment.
- ✓ Building commissioning, or retro-commissioning, is not a current District practice. By using a process that seeks to improve how building equipment and systems function together, effective operation and maintenance can be used to improve overall building performance. To take advantage of long-term energy and maintenance reduction savings, it is recommended that the District give serious consideration to building efficiency, including commissioning, in the upcoming energy service contracting processes.

Support the E2 plan’s next phase of adopting the Green Ribbon Schools model to address issues beyond energy.

In 2011, the U.S. Department of education announced the Green Ribbon Schools program, setting standards for sustainability in K-12 schools. The program is based on three pillars of school sustainability;

1. Reducing environmental impact and costs,
2. Improving the health and wellness of student and staff, and
3. Providing effective environmental and sustainability literacy, incorporating STEM, civic skills and green career pathways.

As mentioned, NPCA applied for the national recognition award. Although not one of the Pennsylvania recipients, the school did receive special recognition from the Pennsylvania Department of Education. Considering the extensive sustainability work done at NPCA, the success of the E2 plan and recognition of NPCA’s GRS application, it is recommended that the GRS model be used as the framework for future district-wide sustainability efforts and the development of the E2 plan.

The E2 efforts have addressed all three of the GRS pillars under the context of energy reduction and conservation. By increasing the environmental literacy of students and directly involving them in sustainability issues, the Plan has successfully made students (as well as faculty and staff) understand the interconnectivity of human actions on environmental impact, health and curriculum. Problem-solving and action, combined with student engagement

whenever possible, allows the E2 educational model to effectively adapt to other aspects of sustainability and better prepare students with practical skills for the 21st century.

By using the GRS model, the committee recommends the development of more comprehensive environmental curriculum and sustainable initiatives. Progress has already been made in addressing other sustainable aspects. By partnering with Carnegie Mellon University, a national leader in researching the relationship of indoor environmental quality to student learning, a no-cost energy and indoor environment analysis on McKinley Elementary was performed. This not only assisted with energy reductions, but also exposed students to career pathways as noted in the third pillar of the GRS model. Many great insights and recommendations resulted from the study and the committee particularly concurs that greater attention should be given to indoor environmental (IE) issues.

By addressing sustainable aspects related to IE quality such as heating and ventilation, daylighting, green cleaning practices, and others, a more comprehensive sustainability plan can be developed. Benefits of such attention will result in further energy reductions, potential increased student attendance, reduced triggers to chronic illnesses such as asthma and allergies, and higher-performing teachers. All of these benefits can exhibit IE related financial savings.

By integrating GRS principles into the ESD curriculum, District, and building on previous success, future applications for award recognition and capture are feasible. This will bring national recognition from a federal sustainability program administered by the Department of Education. The E2 education committee intends to develop a modular curriculum (Phase III) in which students would focus on a specific GRS topic, in their school, such as water and waste reduction and conservation. The GRS model already provides resources, measurements, and milestones to evaluate success on future sustainability topics.



The District is encouraged to fully support this program to not only pursue GRS recognition, but also give students direct involvement in the process. Our committee believes that the E2 Plan has served to demonstrate that real change can be made by students when they are shown reason and relevance.

The E2 committees also recommend making NPCA a model school for sustainable initiatives. With demonstrated success in energy reduction and conservation as seen through the prestigious NEEF award as well as recognition for its GRS application, NPCA is an excellent candidate for introducing these recommended sustainable initiatives. Combining future actions of environmental recognition with the building's already prestigious academic standing will help place NPCA and EDS as leaders within a growing movement.

However, there are fundamental structural and operational matters at Collegiate that cannot be remediated by curriculum alone. Addressing these building issues at NPCA provides an opportunity to achieve ES Certification, GRS nomination, student engagement, as well as be used as a testing site for these recommendations, which when successful can be used to apply to other ESD schools. A vision of LEED certification for NPCA could further recognition and be used as a model for other districts to incorporate an E2 plan as well.

A county wide forum on school sustainability, promoted by ESD, is therefore also recommended. Local schools have a vested and direct impact on their local environment and can benefit from savings. This effort could be coordinated with existing organizations such as Environment Erie and the Health Department to engage and aid the greater Erie community.

We would like to thank the many dedicated individuals who donated their time and energy for successful implementation of the E2 plan and will continue their mission and to thank the Board for its consideration of these recommendations.