

School Power...Naturally ^(sm)

News and Views from the SPN Team

February 2009

Newsletter: Number 27

Contact Bill Peruzzi at BillPeruz@aol.com (941-749-0234) should you have questions concerning the SPN project.

This newsletter features updates on all the newly-funded NYSERDA projects that relate to SPN and an interview with John Pinto of McGraw. Staff from the newly funded projects will be in touch with you soon. You can expect from them additional curricular materials, an expansion of energy topics, improved hardware and software, and additional training opportunities for the staff in your schools.

Please share the SPN newsletter with your IT staff and principals, as appropriate. Over the more than five years since SPN began, there has been a very large turn-over in principals, and we are in the process of updating that SPN email list. In particular, you will want to bring to your principal's attention the One-day School Facilities Management Institute, Inc. (SFMI) Training Summit that NYSERDA is sponsoring. This training event is being held at the NYS Education Department, Chancellor's Hall Building 89 Washington Avenue, Albany NY 12234 on March 26th 2009. Also give him/her this URL www.sbga.org/sfmi and relate that the location (see previous sentence) was left off the brochure.

In Newsletter 26 we featured an article "Fifty School Power Naturally Schools to be Upgraded," and told you we would keep you informed on those SPN upgrades. The information below has been provided by Ned Rich of Heliotronics, Inc.:

The upgrade of the computers and software for all 50 SPN sites is about to begin. Training of the installers has started and it is expected that the first sites (those having persistent problems) will be upgraded starting in March. The major portion of this upgrade will involve installing a "microserver" to replace the various computers currently used to run SunServertm on each of the systems. Over time, we have learned that these computers have been a major source of downtime for the systems and many of them are approaching end of life. The microserver is a physically small (6"x6") unit running XP home that will be mounted to the panel that holds the datalogger and powered via a uninterruptable power supply. The combination of the small size, panel mounting and UPS should eliminate almost all of the causes for computer issues – power fluctuations and unneeded user interaction.

Most sites will have their pyranometers and anemometers replaced as these parts may have degraded with time. New, up-to-date software will also be installed and a new enhanced version of SunViewertm will be made available to each school.

In addition to installing new computers, part of the effort will be directed at repairing problems at sites; in particular, there are new funds to provide replacements for failed parts. While there is little an individual school needs to do to prepare for their upgrade, **some schools will have to arrange for internet access at the inverter panel, as that is necessary for the microserver to function.** To minimize installer trips, this access will need to be available before the upgrade is scheduled. A document detailing the IT requirements will be sent to each site as part of the scheduling of the upgrades.

INTERVIEW WITH JOHN PINTO OF THE McGRAW CSD
Comments within [brackets] were provided by Bill Peruzzi

2/24/09

The information in this interview has been provided by John Pinto, McGraw CSD SPN Solar Coordinator and 6th grade teacher (retired). John, who has Bachelors and Masters degrees from SUNY Cortland, has indicated a willingness to answer questions or otherwise network with solar coordinators and teachers/administrators from SPN participating schools, including sharing with them the power point demonstration that he uses to introduce SPN to teachers.

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The McGraw Central School District is a rural district having one elementary (K-6) school building and one high school building (7-12), both located on West Academy Street. The district has just over 1,000 residents, 579 students and 53 teachers. The schools are located in McGraw, NY east of the highway (Rt. 81) that connects Syracuse to Binghamton, and not far from the county seat, Cortland NY, which is west of Rt. 81.

Although John Pinto retired from the McGraw CSD at the end of the last school year, his interest in the district and energy education seems not to have diminished. On the day in January that I phoned John at home to request an interview, I learned that he had just returned from the elementary school where he had shoveled snow off the rooftop solar array that morning. That action produced a significant improvement in system energy output for the day.

John made extensive use of the SPN Junior Solar Sprint Series in his own classroom where the favorite activity was SPN 11, *Electrical Power* from the Junior Solar Sprint Series of SPN. In this Level II Physical Setting lesson for grades 5–8, students learn how photovoltaic cells produce electricity. After using parallel and series electrical circuits to

see how to increase the electrical power of solar cells, they develop testable hypotheses and design laboratory investigations. The students used instruments (ammeters and voltmeters) and mathematical formulas as they explored what electrical power means. Finally, they examined their school's solar collector rooftop array to determine how their solar cells are arranged to produce optimum electrical output.

Another favorite was SPN13, *Angle/Energy Amount*. In this Level II Physical Setting lesson for grades 5–8, students observe how changing the angle of the solar panel in relationship to the Sun changes the intensity of sunlight and affects the amount of electrical output from the solar panel. This activity underscores the effect of changing sunlight intensities on everyday activities. John rewrote parts of this lesson to make it more appropriate for 6th graders, and was pleased that they were able to experiment with their solar cells to discover that angling and positioning are crucial to output. The students enjoyed compiling solar data from different locations around the state and graphing and mapping that data and comparing it to McGraw's data.

In addition to the Junior Sprint Series, John recommends SPN 21, *An Environmental Puzzle: the Carbon Cycle*. This Level II Environmental Considerations lesson for grades 6–8 provides an overview of how respiration and photosynthesis cycle carbon through ecosystems. The background reading describes the role of the Sun as Earth's ultimate energy source and explains how the energy requirements of plants and animals are met through photosynthesis. The presence of oxygen in the atmosphere is shown to be due to the photosynthetic activity of both prehistoric and present-day plants. Students come to see that, through the burning of fossil fuels, humans are not only adding carbon dioxide to the atmosphere but also depleting the supply of oxygen. According to John, the sixth graders came to the conclusion that solar power was a cleaner more viable source of energy.

John reports that when he started in SPN he adapted many of the lessons to fit the comprehension level of the students, and he confesses himself the teacher also. As the years passed and John became more familiar with the PV system and the SPN lessons, his comprehension and comfort levels have improved. Now, this developer of McGraw's SPN grant proposal has developed a strong interest in alternative energy sources, and is remaining active in the field of education. He has begun to present energy workshops for K-12 classroom teachers and pre-service teachers through the Energy Smart Students Program, which is funded by NYSERDA, and implemented by the Gove Group. This year, additional funding was added to the Energy Smart Students program to carry out statewide teacher training on the SPN lessons. John will be active in the southern tier; he will be joined by other Energy Educators statewide: Lee Cabe from Orange County, Jocelyn Cohen from Brooklyn, Bill LaBine from the Finger Lakes Region, Ray Pitcher from Herkimer County, and William Rock from Westchester County. They will be delivering two new solar workshops for teachers that will be available beginning this spring: Solar Works for Grades 5–8 and Solar Matter Grades 9–12.

Additionally, John has continued to work with the teachers in McGraw CSD who are preparing to take over the SPN program there what with both John and SPN-active high school technology teacher Bob Leslie having recently retiring. Although the PV system is

on the elementary school roof, both McGraw schools are linked up to receive data and the transition is proceeding smoothly as new McGraw teachers carry on the SPN tradition.

Watch for upcoming teacher training sessions or student contests resulting from the projects described below. They will appear on NYSERDA's calendar of educational events: <http://www.getenergysmart.org/EnergyEducation/> Here is a summary of each of the newly-funded NYSERDA projects that will impact SPN participating schools:

School Power...Naturally Related Projects: Contact Information and Summaries

School Power...Naturally (the original)

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“School Power...Naturally” is an innovative program NYSERDA developed to educate New Yorkers about energy, and, in particular, the role solar electric power – photovoltaics, or PV – can play in providing clean, reliable energy for our homes, schools and workplaces. It may be the most extensive program of its kind in the nation. School Power...Naturally has achieved international and national recognition and acclaim for moving beyond the “demo mentality” prevalent in other solar education programs and recognizing the value of online data as a learning tool in conjunction with meaningful curriculum. As a result, School Power...Naturally won the IREC 2006 Annual Innovations award.

- Each of fifty schools, which were competitively selected in 2002, was awarded a 2-kilowatt (kW) grid-tied PV system, including features to collect and display data that link the hardware to lessons in the classroom.
- All schools across the state and elsewhere can fully participate in the educational components of School Power...Naturally by using the curricular materials and data that are available on www.SchoolPowerNaturally.org free to all.

- A broad range of multidisciplinary materials were created by professional curriculum writers for students in grades five through 12. An advisory council provided feedback on their experiences using the lessons in real settings.
- Kit lessons and 64 other Levels II and III lessons describe creative, interactive, and age-appropriate ways for students to learn more about the Sun, solar energy, and energy in general.

Spin-off SPN programs that have been recently funded by NYSERDA:

Design and Implement Maintenance Enhancements for the Existing School Power... Naturally Schools

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This project will continue maintenance for the systems of School Power...Naturally's fifty existing PV systems at host schools across New York. Maintenance allows the systems to record data accurately and upload it to the web consistently, which is essential to the continuing success of the program. When systems do not function well, it is not possible for teachers using those systems to continue to use the data in the classroom.

A comprehensive program of "tune-ups," maintenance, and upgrades will be provided to ensure that the School Power...Naturally PV and DAS systems are maintained reliably, and over the next four years offer considerably more functionality than originally contemplated. This project will install an automated warning system at each school to detect malfunctions; train two installers to work on-site at schools across the state; and install new 7-Watt microserver computers and uninterruptible power supplies at each school.

Enhancing School Power...Naturally With Inquiry and Authentic Data-Based Wind and Solar Curricula and Ongoing, Self-Funding Teacher Training

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Heliotronics, Inc. is the supplier of the original data acquisition system (DAS) hardware and educational software for the fifty schools equipped through School Power...Naturally.

Although, at the time of its installation, the data display technology was state-of-the-art, it can be enhanced substantially, and upgraded to expand the current data system.

Heliotronics will expand access to data from remote wind demonstration sites by adding DAS at the remote sites; expand the School Power...Naturally website so that it can display data from additional systems as they are installed; and expand DAS equipment capabilities at current and future sites to include more weather parameters such as humidity, barometric pressure, and rain.

School Power . . . Naturally Scaleable Pilot Program

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Additional dynamic high speed data and displays that are currently only available to the schools having solar arrays will be made available to a much broader group of schools. This will lay the groundwork for improved statewide adoption and use of the program's resources, substantially improved quality and reliability of the online historical data and broader availability of the high speed data.

This project will ensure program quality assurance by making one of the 50 schools with a solar array and data system, (anticipated to be Somers High School), a hub in the center of a multi-school collaborative cluster.

Solar Workshops for Teachers of Grades 5 - 12

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Statewide teacher training on the many lessons currently in School Power...Naturally is an important step to extend program success. Gove Group, Inc. has a contract with NYSERDA to organize training sessions and provide teacher training for the Energy Smart Students Program, which provides energy literacy and efficiency education.

Photovoltaic education will be added to the existing Energy Smart Students workshops. This project will organize, implement, and market workshops and provide curriculum support for teachers; train educators to present the solar workshops; schedule and present approximately 40 teacher workshops; and, include a solar energy topic in the week-long Energy Smart Students Summer Institute.

School Power...Naturally Program Evaluation

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New West Technologies will identify recommended actions that NYSERDA should undertake to enhance the educational opportunities that the School Power...Naturally program provides to New York students, and support the expanded use of solar power throughout the State. The reports produced will address issues that are raised in education and the solar industry about the importance of real-time data and the influences that affect photovoltaic sales. They will develop a guide to overcoming the barriers for real-time data display; recommend improvements to the current DAS system; document the desire and limitations faced by demonstration sites to expand their solar arrays; and develop a paper on the influence that the School Power...Naturally program has had on the photovoltaic market.

Solar Sails New York – Expansion of Solar and Wind Energy Education for School Power...Naturally

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The goal of this project is to advance both teacher and student learning and participation through an inquiry-based, scientific approach to renewable energy education. Solar Sails NY will expand the School Power...Naturally curricular materials through further kit development, distribution of 250 solar and 200 wind kits, and training in kit lessons.

Teachers and non-formal educators will have the opportunity to attend free professional development workshops on solar and wind energy education, receive free energy education kits for their classroom, center, or institution, and complimentary accompanying curricular units. A downloadable unit suitable for classroom use and home-schooling, will also be made available on the NYSERDA and NESEA websites. It will be a certificate program focusing on learning more about renewable energy forms and applications.

NY State Virtual Wind Contest with Web-based Educational Wind Tool

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It is less feasible to put turbines at schools across New York than it was for School Power...Naturally to install PV arrays on school roofs. So New West Technologies, LLC will help educate students in wind energy by using software designed to simulate real-world situations. The educational software will be used by students responding to a contest challenge to design the most efficient and economical wind turbine installation.

Applying Geospatial Technologies for Expansion of the School Power... Naturally Program

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The Institute for the Application of Geospatial Technology at Cayuga Community College (IAGT) is a non-profit that focuses on education and application of geospatial technologies. GIT (Geographic Information Technologies) are tools that facilitate lessons on spatial and temporal relationships. GIT include GPS (Global Positioning System) and GIS (Geographic Information System).

The Institute will expand the School Power...Naturally program by integrating geospatial technologies that support both PV and wind energy sources. Geospatially-enabled energy lessons will be developed that utilize photovoltaic and wind power data collected from schools in the School Power...Naturally program and other geospatial datasets along with GIS software to allow teachers to cover concepts of solar and wind energies as continuous phenomena. Upon completion of the geospatially-enabled energy educational activities, regional workshops will be conducted across New York State to provide instruction for teachers to understand geospatial technologies and their use in the classroom as well as explore the lessons developed in this project.

School Power...Naturally - Explorations into Wind Energy

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and

Christine Denny

Pandion Systems, Inc.

Educators can get free wind energy education workshops and materials through the *School Power...Naturally Explorations into Wind Energy* program. The KidWind Project will be offering teacher training events throughout New York in 2009 and 2010. Participants will receive the information and tools to teach students the basic principles

behind wind energy using standards-based activities in an engaging, hands-on manner. The curriculum will include lessons on the physics and meteorology associated with generating energy from wind, the necessary mathematical calculations to determine important siting and engineering outcomes, how to measure impacts of wind energy on bird and bat populations, and social debate associated with the siting of wind energy facilities. Teachers will leave the workshop with enough materials to replicate the lessons back in their class room.

The project is a partnership between KidWind and Pandion. Pandion, based in Florida with satellite offices in New York, is an ecological services company that also develops curricula and implements training programs for teachers, and impact assessments for wind energy facilities. KidWind, based in Minnesota, has a suite of lessons and activities on wind energy available for use by teachers nationwide. KidWind has been successfully training teachers in New York State for several years.

Go Power...Naturally

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The Children's Museum of Science and Technology (CMOST) has a Go Power! exhibit and accompanying energy-related programs that educate museum visitors about energy issues. The exhibit will be updated from its main focus on fossil fuels to address the energy-related educational needs of future generations, and to provide underwriting assistance to allow schools to visit CMOST or be visited by CMOST staff.

Advanced Training Workshops in Alternative Energy

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The State University of New York College of Environmental Science and Forestry (SUNY-ESF) will hold a free credit-bearing 4-day workshop with a series of follow-up experiences during the school year, all of which focus on advanced teacher training in the areas of PV and wind technology introduced through a series of lecture and lab experiences. Participants – experienced teachers, pre-service teachers, curriculum coordinators, and Master Trainers – will be provided an extensive background in PV, wind, and other alternative energies. Master Trainers will be responsible for establishing a set of sub-workshops to extend the network of alternative energy educators.