

EPA Environmental Education Grant: *Chicago del Sol*

1. PROJECT SUMMARY

1a. Organization: For 153 years the Chicago Academy of Sciences, Chicago's oldest museum organization, has promoted scientific literacy through outreach, online, and museum-based educational programs that focus on the ecology and natural history of the Midwest. The Academy's new Peggy Notebaert Nature Museum, which recently installed solar panels, offers six engaging exhibits that promote scientific learning to people of all ages. The Academy will work in partnership with the Frank W. Reilly Elementary School, the first Chicago public school to install solar panels.

1b. Summary Statement: The Academy's Online Learning team proposes *Chicago del Sol*, a pilot project for teaching environmental science to elementary students based on an innovative environmental technology initiative promoted by the City of Chicago. Two exciting recent initiatives involve installing solar panels on Chicago Public Schools and Museums and adding rooftop gardens to numerous downtown office buildings (the Academy's Peggy Notebaert Nature Museum has both); our proposal would begin with the former initiative. Using the Reilly school as a pilot test bed, we propose:

- The development of at least four seasonal solar energy activities to be disseminated through the project Web site;
- The development of one interactive online experience (such as a hypertext novel, shockwave game, etc.);
- The use of streaming video and interactive chat technologies to connect students with solar energy experts through two "Webcasts;"
- The presentation of two outreach lessons in four Reilly school classrooms; and
- The use of a museum visit to provide the students with another perspective on solar energy.

Once the program is in place and tested at Reilly, it would be ready for use with the six additional CPS schools that will soon be identified for solar panel installation. The Academy would become a local center for information about solar energy environmental education and the project would provide a model for how other cultural institutions, nature museums, and science centers throughout the country might look to the promotion of innovative environmental technologies by their cities as a basis for their environmental education programming.

1c. Educational Priority: This project will address the following EPA educational priorities:

#2. Education Reform by using the City's implementation of innovative environmental technologies as a springboard for real-world learning in science classrooms;

#3. Community Issues by offering a model for community education that is transferable to any city in the United States where the government is implementing innovative environmental technologies; and

#5. Teaching skills by providing teachers training in and information about the environmental issues surrounding solar energy to improve their environmental education teaching methods.

1d. Delivery Method: In addition to providing teachers with a professional development workshop on solar energy, the Academy will reach its student audience through on-site teaching visits in their classrooms, via the Internet during Webcasts that will feature two-way chat, and through the mutual use of a Web site that offers both teachers and students one learning interactive and at least four seasonal activities related to solar energy.

1e. Audience: The initial target audience for this project is four grade 4-6 science classes at the Reilly school and all 20 teachers of students in those grades. The school population is 75 percent Latino, one percent African-American, and 22 percent Caucasian. Once piloted, the project could be expanded to serve at least the six Chicago Public Schools to receive solar panels in 2001. In addition, Webcasts and online activities will be promoted via CAoS Club, an Academy distance learning program that had over 5,000 teacher members from Illinois during the 1999-2000 school year. Feedback from this group will help determine the strength of the online component of the project as a method for wider dissemination of the project.

1f. Costs: The Academy is requesting funds to develop the *Chicago del Sol* pilot program, which includes outreach visits, a teacher workshop, a museum visit, online activities, two Webcasts, and a Web-based interactive. The expenditure emphasis is on creating rich, multidisciplinary Web resources that can be used by a broad audience (including parents) in conjunction with classroom and museum visits.

2. PROJECT DESCRIPTION

2a. Why

Addressing EPA Priorities

The purpose of *Chicago del Sol* is to capitalize on the City of Chicago's promotion of innovative environmental technologies to bring real-world science lessons into classrooms in Chicago Public Schools. *Chicago del Sol* will continue the Academy's groundbreaking work in education reform (Priority 2) by providing training to teachers about solar energy education and by generating excitement in the classroom about a real world topic. Teaching skills will be improved (Priority 5) by providing content and skills training at a workshop for teachers. Finally, the project makes community issues the center of the inquiry (Priority 3) by focusing on the photovoltaic panels recently installed at the Reilly school and by discussing their impact on the community. For 153 years the Academy has made thoughtful decisions about how best to improve scientific literacy by setting appropriate priorities for its research, education, and outreach work. Academy educators look forward to embracing EPA's environmental education priorities to improve inquiry-based science education in Chicago Public Schools.

Tapping Issues Important to the Community

The Academy has been an important community partner for decades. For example, this summer Academy science and technology educators taught a six-week session of the AT&T CyberNavigator summer camp at the El Valor community center in the Pilsen neighborhood. We provided the students with an experience that included links between science and technology as well as a focus on the issues of clean parks and feeding the homeless. *Chicago del Sol* is another important example of community-based learning. The lessons are not about the Amazon in Brazil, but about the energy cycle of the students' own school ecosystem. Reilly school currently has a Web-based monitoring kiosk in the entryway of the school that offers students and teachers real-time monitoring data from the school's solar panels. Even at the most basic level, students are learning simple environmental relationships, such as how cloud cover decreases solar energy received by the school. Using the existing efforts of Reilly school as a springboard, the Academy will create a program that stresses the importance of the development of alternative energy sources—for not only the community surrounding Reilly school, but for all communities. We understand the importance of enabling community citizenship by providing lessons about the natural and built environment around us. *Chicago del Sol* will strengthen the communities it touches, first in the neighborhood surrounding the Reilly school, then in other neighborhoods as more schools receive solar panels.

Providing a Model for Wider Application

Chicago del Sol will serve as an excellent model for similar programs anywhere in the country where local, city, or state governments take the initiative to make innovative use of environmental technologies. This is especially exciting where it's being done in schools (e.g., solar panels and rooftop gardens in Chicago, new HVAC systems to handle indoor air quality in Massachusetts, innovative pesticide application approaches near schools in Connecticut). The Academy has a proven record of developing programs that can serve as models for wider application. For example, the use of chat technologies during the Academy's CAoS Club Webcasts provided the model for an innovative one-on-one videoconferencing partnership with Joliet, Illinois, public schools to help address their need to teach students the importance of immunization. *Chicago del Sol* will first serve as a model for a larger scale program to serve Chicago schools and, once successful, will be a model for others like it across the country as its Web activities will be accessible nationwide.

2b. Who

Combining Academy and Community Expertise

The project will be led by the Chicago Academy of Sciences in partnership with the science teachers of Frank W. Reilly Elementary School. The Academy educators who will work on this project (Steve Bunyak, Nina Di Leo, and Rafael Rosa—resumes attached in the Appendix) have outreach, online, and museum-based teaching experience. In addition, the Manager of Student and Teacher Services of the Academy's Peggy Notebaert Nature Museum will be involved to ensure the project makes the best use of the Museum and its newly-installed solar panels as a teaching resource.

Reilly Science Department Chair Dan Lucas has 16 years experience in the classroom and led the community Solarbration event that unveiled the school's new solar panels last spring. The Academy will work closely with Mr. Lucas to design and deliver a project that meets the needs of Reilly students but that can also be used later as a model for reaching other Chicago Public Schools.

Reaching the Target Audience and Meeting Their Needs

Our diverse target audience, predominately Latino, is 4th to 6th grade students that are in need of exciting, hands-on, *relevant* science and technology lessons. Studies have shown (Tilgner 1990; Yager and Lutz 1995) that these grades are the key years when students begin to lose interest in science. Results from the Third International Math and Science Study (TIMSS 1997) support these previous studies. TIMSS discovered that while 4th grade students in the United States did relatively well in science when compared to their peers in other countries, junior high and high school students fared progressively worse when compared internationally. By providing engaging activities with real world connections, *Chicago del Sol* will help students understand the validity of science in their world.

As we already have a relationship with Reilly School (please see the attached partnership letter from Principal C. Scott Rzechula in the Appendix), we will not need to expend time and energy marketing to our target audience. We will, however, notify the 5,000 teacher participants in our CAoS Club program of the project and will solicit their comments about the utility of the Web site, Webcasts and online interactive in their classrooms. This will provide us with important data about the strength of the project to reach multiple audiences. We will also communicate regularly with the Chicago Department of Environment and CPS to build relationships with the six schools soon to receive solar panels with an eye toward later expansion of the project.

2c. How

Setting High Expectations and Meeting Them, Step by Step

The Academy has thought carefully about the strategies, objectives, activities, delivery methods, and outcomes associated with this project. These are summarized in the table below.

Step	Strategy	Objectives	Activities	Delivery Methods	Outcomes
1	Know our customers	Confirm student and teacher needs	Pre-evaluation of content, attitudes and skills	Onsite at Reilly school	Data about what the students and teachers need in a solar energy education program
2	Create teacher excitement	Provide skills and content to teachers	Teacher workshop	One three-hour session at Nature Museum	Changes in teacher attitudes and content knowledge about solar energy education; teacher excitement about the program
3	Create an online presence	Provide an information resource and Internet-based location for activities	Launch <i>Chicago del Sol</i> Web site	World Wide Web	Provide teachers and students with a single location to obtain project information and to communicate with one another
4	Get into the schools	Establish relationships with students	Outreach lessons to 4 th -6 th grade classrooms	Onsite at Reilly School	Gains in students' content knowledge about the solar panels installed at their school
5	Bring the students to the Museum	To expose the students to the informal learning environment of a museum	A roof-top tour of the Museum's solar panels and/or a workshop on solar energy	Visit to the Peggy Notebaert Nature Museum	Students discover they can learn important science and environmental concepts outside the classroom using resources such as museums; students learn that many types of entities can benefit from the installation of solar panels

Step	Strategy	Objectives	Activities	Delivery Methods	Outcomes
6	Get the students online	To encourage the students to increase their comfort levels with using technology for learning	Assist Reilly teachers and students with accessing and doing at least four seasonal online activities	<i>Chicago del Sol</i> Web site	Students stay engaged in the project over time and learn the importance of seasonal variations to solar energy; students improve their ability to access and conduct online investigations
7	Engage the students online	Introduce the students to independent learning using an interactive online lesson	Interactive online experience with teacher guidance and tie-in lessons to support the activity	<i>Chicago del Sol</i> Web site	Students discover that they can learn independently by working with online learning technologies
		Provide students with the opportunity to talk with a professional	Two 30-minute Webcasts with interactive chat	Webcasts through the <i>Chicago del Sol</i> Web site	Students gain knowledge about solar energy by directly talking with solar energy experts
8	Learn from our strengths/weaknesses	Ensure <i>Chicago del Sol</i> benefits from a continuous improvement strategy	Conduct evaluation activities and use the data to improve the project as it unfolds	Person-to-person evaluations as outlined in Section 3 below	The <i>Chicago del Sol</i> project is managed to maximize effectiveness and relevance; foundation stones are laid to expand the project beyond the pilot phase
9	Prepare for extension of <i>Chicago del Sol</i> program	Create a program with an ongoing life span that can truly provide a national model	Secure funding to extend the project to other Chicago Public Schools	Written responses to RFPs, including reference to project documentation on the Web site	The <i>Chicago del Sol</i> project expands to serve the six CPS schools soon to receive solar panels and could include educational partnerships with museums such as the Field and Chicago Historical Society, which soon will receive solar panels of their own

Once the program is in place and tested at Reilly, it would be ready for use with the six CPS schools when their solar panels are installed.

Project management is a strength of the Chicago Academy of Sciences team that will be leading this project. The institution has extensive experience in designing interactive online education experiences for homes and schools and, for the past three years, has been recognized by the Illinois State Board of Education as an official provider of online content for Illinois schools. The Academy's Education Department is also nationally recognized for its curriculum design and constructivist approach to science education. The Academy will bring this expertise to the *Chicago del Sol* project.

2d. With What

Producing Quality Educational Materials

The Academy is well qualified to develop excellent learning tools and experiences that teach critical thinking, problem solving, and decision-making skills. For example, the Academy's experience in the area of online learning

has led to an award by the federal Institute for Museum and Library Services of a two-year, \$250,000 grant to develop online interactives for the six permanent exhibits at the new Peggy Notebaert Nature Museum. Recognizing that much high quality solar energy curricula already exists, the Academy will not be developing new curriculum. Instead, we will select and adapt currently available sources that best meet the needs of the target audience. We are confident the students who participate in *Chicago del Sol*—those at Reilly school and then those from six additional schools—will develop critical scientific skills. And because all lessons will be benchmarked to national and Illinois state science standards, the time spent on the solar activities will contribute to student performance on these important metrics.

3. PROJECT EVALUATION

3a. Measuring the Project's Effectiveness

The Academy recognizes the importance of dedication time before, during, and after implementation for project evaluation and assessment. For *Chicago del Sol*, we will use a variety of formal and informal instruments to evaluate the impact of this program on the attitudes, content knowledge, and skills of the students and teachers who participate in this environmental science/technology program. The following evaluation instruments will be used:

- Teacher attitude pre/post tests;
- Teacher workshop evaluations;
- Web-based teacher feedback form for online activities;
- Student content knowledge and attitude pre/post tests;
- Student journals;
- Classroom portfolios—photos, writing, project work; and
- Museum exit survey.

The evaluation strategy for this project consists of a series of formal and informal instruments and techniques for measuring changes in knowledge and attitudes related to the content of solar energy education. Changes in knowledge and attitudes based solely on a person's engagement with a solar energy curriculum are difficult to measure, but the Academy will use a student content gain pre/post test and teacher feedback to measure changes in student knowledge relating to the content of the project. A student attitude pre/post test will also be used to measure changes in student attitudes as a result of the project. These formal instruments will be augmented by informal evaluation tools such as student journals and classroom work. A final project evaluation will be included in the final project report to be submitted to EPA. This evaluation will also be accessible from the *Chicago del Sol* Web site.

3b. Applying Evaluation Data to Strengthen the Project

The Academy has a tradition of improving its educational initiatives by applying the results of program evaluation. Both *Science on the Go!* and *CAoS Club* are long-running Academy programs that are in a continuous improvement cycle based on thorough evaluation. Because *Chicago del Sol* is a pilot project, the full-scale project to be based on *Chicago del Sol* will benefit significantly from the baselines established by the pilot. Data from the evaluation of this project will help us determine the feasibility of extending the project to cover other environmental initiatives such as Chicago's rooftop garden project. We have been careful to propose a dynamic but feasible project that promises larger returns on investment in a successful pilot project. The Academy is excited about Chicago's progressive support of environmental technologies and we look forward to educating Chicago Public School students and teachers about the science that makes these technologies as relevant to our daily lives as they are fascinating.

4. BUDGET

5. APPENDICES

5a. Timeline

The table below presents a timeline for the *Chicago del Sol* project. All steps correlate to those described in Section 2c above.

Project Timeline: <i>Chicago del Sol</i>	
July 2001	<ul style="list-style-type: none">♦ Beginning planning for project
August 2001	<ul style="list-style-type: none">♦ Construct Evaluation Instruments♦ Meet with Reilly Teachers and Students for a Pre-Evaluation and Needs Assessment (Step 1)♦ Present Workshop to 20 4th-6th grade Reilly Teachers (Step 2)♦ Establish <i>Chicago Del Sol</i> Web Site (Step 3)
September 2001	<ul style="list-style-type: none">♦ First Student Teaching Visit at Reilly (Step 4)♦ Student Visit to Nature Museum (Step 5)♦ First Seasonal Web Activity Goes Online—Summer (Step 6)
October 2001	<ul style="list-style-type: none">♦ Second Seasonal Web Activity Goes Online—Fall♦ First Webcast with interactive chat with an expert is produced (Step 7)♦ Begin to secure funding for extension of this project to more schools (Step 9)
November 2001	<ul style="list-style-type: none">♦ Third Seasonal Web Activity Goes Online—Winter
December 2001	<ul style="list-style-type: none">♦ Second Webcast with interactive chat with an expert is produced Second Student Teaching Visit at Reilly, lesson in conjunction with online interactive experience (Step 7)
January 2001	<ul style="list-style-type: none">♦ Fourth Seasonal Web Activity Goes Online—Spring♦ Evaluation and Assessment (Step 8)♦ Preparation to extend project (Step 9)

5b. Key Personnel

Please refer to the attached resumes to learn more about the Academy's key staff for this project:

Steve Bunyak, Online Educator, will lead the *Chicago del Sol* project. Steve has taught at the elementary, middle school, and high school levels and is experienced with projects that meld online, outreach, and museum-based learning. With a degree in environmental law and policy, Steve also has four years of experience providing environmental and information technology consulting to EPA and DoE headquarters offices in Washington, D.C.

Nina Di Leo, Senior Interactive Developer, leads the technical team for the Academy's distance learning program and will develop the online interactive and provide technical oversight for the project. Nina is a seasoned Web developer and has extensive knowledge of HTML, DHTML, Java, Java script, Macromedia Director, PERL, Shockwave, and a host of other Web development tools.

Rafael Rosa, Manager of Online Learning, plays a central role in all of the Academy's distance learning projects and will help to shape the direction of this project. Rafael is skilled in Web development and Web broadcasting technologies and is a skilled educator who will provide overall direction for the project.

5c. Letters of Commitment:

Letter from C. Scott Rzechula, Principal, Frank W. Reilly Elementary School

5d. Press Release: Solar Panels

For Immediate Release

September 22, 2000

Contact: Lisa M. Noland, Director of Public Affairs,
Inoland@chias.org, 773-549-0606, ext. 2054

FIRST OF CITY'S MUSEUMS GOES SOLAR: Nature Museum receives photovoltaic system from Chicago Department of Environment, Spire Solar Chicago, & ComEd

(Chicago) On Friday, September 22, 2000, the first of the city's museums will be readied to go solar. In partnership with the Chicago Department of Environment, Spire Solar Chicago, and ComEd, the Peggy Notebaert Nature Museum will receive solar panels in a project to equip nine of Chicago's museums with an alternative energy source.

The solar panels on the Nature Museum are not visible from ground level, but consist of 280 panels, covering over 3,000 square feet of roof space. The panels, which comprise a 33.6kW system, can supply energy equivalent to power seven single family homes a year.

As the city's premier environmental education destination, the Chicago Academy of Sciences is pleased that its new Nature Museum is the first of the city's museums to receive the panels. "We support Mayor Daley's Green Chicago vision," said Lewis Crampton, Acting President of the Academy. "A clean environment and a healthy economy go together, and this initiative shows why the city of Chicago is leading the nation in making this vision work for everyone."

The Chicago Department of Environment and ComEd are applying for funding for the Nature Museum project through the Illinois Department of Commerce and Community Affairs (DCCA), which can pay up to 60% of the total project cost. The Nature Museum's installation cost is \$327,000. The remainder of project costs will be divided evenly between ComEd and the City of Chicago.

The John G. Shedd Aquarium and the Field Museum of Natural History are next in line for solar system installation. A total of nine museums will be recipients of the photovoltaic systems. Other museums include the Art Institute, Adler Planetarium, Lincoln Park Zoo, Chicago Historical Society, Museum of Science and Industry, Mexican Fine Arts Museum, and DuSable Museum of African American History.

The new solar system provides the Nature Museum the opportunity not only for increased energy efficiency, but the chance to educate a large audience about the importance of using clean, alternative energy resources in keeping with its mission. In addition to the solar project, the Nature Museum will install a rooftop garden, also spearheaded by the Chicago Department of Environment. The garden, one of many that is being created throughout the city, will work in concert with the solar panels to increase the energy efficiency of the Nature Museum.

The Chicago Academy of Sciences' Peggy Notebaert Nature Museum carries on the Academy's tradition of specializing in the ecology and natural history of the Midwest, enhancing programs in Chicago's communities and schools. Located at the corner of Cannon Drive and Fullerton Parkway in Lincoln Park [map], the Nature Museum features six permanent exhibits and special exhibit space for traveling exhibitions. The Nature Museum is proud to be a member of Museums in the Park.