

## Solar One's Letter of Inquiry to Community Board 3 Con Ed Task Force Committee for its Green Design Lab™

### Request

Solar One respectfully requests \$100,000 from Community Board 3's Con Ed Settlement Funds to expand and leverage its 2011 implementation of the Green Design Lab™ (GDL) in Community Board 6 by placing GDL in 5 public schools in Community Board 3 in the 2012 academic year.

Our educators will be on-site in each school for 1-2 days per week, for at least 22 weeks from September to June, 2012-13. Also, they will spend additional time in each school to facilitate student-led greening projects. This in-depth implementation will allow Solar One to apply the most important lesson of its successful 2010 Pilot Program: behavioral change is indeed possible, and its impact sustainable and viral, if you inspire and reach all of a school community's stakeholders by going deeper into one of our curriculum modules over a longer time.

This community-wide behavior shift will undergird GDL's goal to support our City's objective of reducing energy consumption and carbon emissions in schools, thus impacting air quality in a meaningful, instantly measurable way (i.e. kW usage). It is also our aim to simultaneously build awareness of the importance of energy conservation and adopting sustainable practices in the schools and neighborhoods surrounding the Con Ed Plant on 14<sup>th</sup> Street.

This new and very quantifiable implementation of GDL costs considerably more than the 2011 GDL implementation in CB6 – \$39,000 per school, or \$195,000 for 5 schools. **Leveraging its other resources, Solar One will provide for the additional costs beyond our request – \$95,000, or about 50% of total costs – from other funding sources.**

### The Green Design Lab™

The GDL concept is simple: use the school building to teach K-12 students about climate change, sustainable practices and, most importantly, how to green their school. As a result, students become advocates and agents of change, while learning STEM skills. What distinguishes the GDL is that it is not a one-time enrichment workshop or field trip, but an in-depth and integrated, holistic environmental program that spreads beyond the four walls of the classroom into local neighborhoods.

The GDL model aims to have a Triple Bottom Line Impact: to positively improve energy costs, environmental health, and literacy at each school. It is the only environmental program of its kind that focuses on the school as a laboratory for learning and a tool for environmental change.

#### Triple Bottom Line Impact

##### Environmental:

**Primary: Reduced energy and resulting greenhouse gas emissions in school buildings**

**Secondary: Improved sustainable practices in communities related to food, water, air quality and materials**

##### Financial:


**Reduce school system's \$233 million energy bill**

##### Educational:


**Environmental Literacy, STEM Learning, Literacy Student Advocacy**

GDL is Solar One’s single most requested program by the NYC Public Schools. Solar One recently signed a Memo of Understanding (MOU) to deliver the GDL program and curriculum to up to 150 local schools by 2014, assuming adequate funding is secured. In one year, from the inception of its Pilot Program, Solar One’s GDL program has grown by 300%.


The GDL curriculum has 5 modules, each in its own handsomely bounded book – Energy, Air Quality, Food, Water, and Materials. It is a hands-on, project based curriculum and guide for student-led greening projects.

 **Energy**

 **Air Quality**

 **Food**

 **Water**

 **Materials**

In the Air Quality unit, students examine air inside and outside their school, and learn how to improve indoor air quality through better ventilation and the use of non-toxic cleaning products. The Food unit teaches students about the environmental and health impacts of processed food, and how to read nutrition and ingredient labels, with a guide to create student-led, school-wide healthy eating campaigns. The Water unit examines the water cycle and the sources of NYC’s drinking water; projects include how to create a storm water system (such as a green roof) or a reusable water bottle campaign. Students learn about sustainable design and building materials – concrete, glass, lumber, plastic – and how they impact their school and can be more sustainable in the Materials unit; projects include a redesign of their classrooms or a visit to a building created with all locally-sourced materials.

The Energy Module, which is the unit Solar One will explore in-depth, in the GDL 2.0 initiative in 5 CB3 schools, pivots on three central questions: What is energy and where does it come from? How does your school use its energy? How can your school be more efficient with the energy it uses?

### Goals and Objectives

For the grant period we are applying – 2012-13 academic year – Solar One will select 5 schools in CB3 through its in-depth Request For Proposal (RFP) process. It will implement its Energy module within each school, reaching up to 6 classes in each school, depending on the needs and size of the school. The key objective is to have an in-depth, academic implementation with a goal of changing behavior of all the stakeholders within a school community – students, teachers, custodians, administrators and parents.

### Target Schools in Community Board 3

Community Board 3 has 46 public schools; 24 elementary (52%); 5 middle (11%); 15 high schools (32%); 2 specialty schools (4%)<sup>1</sup>. The 5 schools will be selected from a roster of 25 target schools. The target list is based upon a school’s proximity to the Con Ed plant on 14<sup>th</sup> street; and with an eye to creating a balance between elementary, middle and high schools, as well as campus schools. A campus school is a single building that houses more than one school. The target list is as follows:

1. PS 34 Franklin Roosevelt School (K-8)
2. East Village Community School (K-5)
3. Children’s Workshop School (K-5)

<sup>1</sup> Data Source: NYS Education Department, 2006

4. Urban Assembly School of Business for Young Women (HS)
5. East Side Community High School (HS)
6. Technology Arts and Sciences Studio School (6-8)
7. Girls Preparatory Charter School of New York (K-7)
8. PS 15 Roberto Clemente School (K-5)
9. Bard High School Early College (HS)
10. PS 188 Island School (K-8)
11. Tompkins Square Middle School Extension (6-8)
12. Earth School (K-5)
13. PS 64 Robert Simon School (K-5)
14. New Explorations Science, Tech and Math School (K-12)
15. PS 19 Asher Levy School (K-5)
16. Cascade HS for Teaching and Learning (HS)
17. Lower East Side Preparatory School (HS)
18. Neighborhood School (K-5)
19. PS 63 William McKinley School (K-5)
20. Marte Valle Secondary School (HS)
21. Urban Assembly Academy of Government and Law (HS, campus school)
22. Dual Language Asian Studies High School (HS, campus school)
23. Essex Street Academy (HS, campus school)
24. Lower Manhattan Arts Academy (HS, campus school)
25. New Design High School (HS, campus school)

### Strategies and Planned Activities

The 5 chosen schools will have to meet Solar One's RFP criteria: each school must have a committed principal, custodian and sustainability coordinator; teachers who want to integrate sustainability into their teaching in a community-wide way; parents and school communities supportive of a greening effort.

To ensure all schools meet our selection criteria, each school will be required to fill out an application with signatures from the principal, teacher, and custodian. All schools will have to participate in a meaningful planning sessions with our educators; participate in the GDL Energy module, and choose one of our other modules – preferably our Air Quality unit – for at least 10 weeks per module, for a total of 22 weeks per academic year; and create classroom and/or school-wide, student-led sustainability projects. Students will be required to take anonymous pre and post-knowledge surveys.

Our educators will be on site, at each school, for 1-2 full days a week, for at least 22 weeks, depending on the school's needs. Our educators will work closely with the custodians, teachers, and sustainability coordinators in planning sessions; they will teach our Energy module to students in partnership with individual teachers; require an additional, optional module (preferably our Air Quality unit) be implemented by the school; facilitate student-led greening projects; and teach the teachers to eventually lead the lessons themselves.

#### Sample Lessons

What is Energy \* Electricity 101 \* Fossil Fuels \* Emissions \* Building Performance \* Climate Change \* Energy Efficiency & Conservation \* Renewable Energy (Wind, Solar)

#### Sample Activities

Reading & Understanding Electricity Bills \* Energy Awareness Campaign \* Energy Audit \* Performance Audit \* Guessing Wattage of Everyday Appliances

Solar One educators will customize delivery of the GDL curriculum by school and age group. For example, in elementary schools (K-5), up to 4-6 classes per school, 2 days a week, will receive in-classroom instruction. This will ensure school-wide buy in for the program and for energy reduction and awareness-building efforts. In middle and high schools, however, focus will be on one or two grades; for example, 9<sup>th</sup> grade will be the target in high schools. This will lend to an intensive program for these students and will ensure the impact of their efforts is sustained for as long as they are in the building.

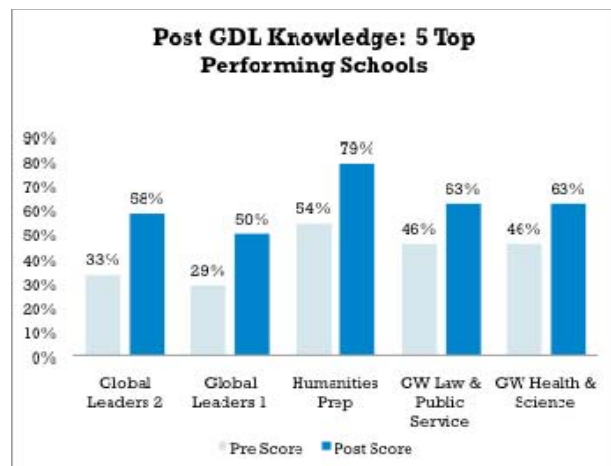
Class projects include school-wide energy reduction campaigns, trips to the boiler room and/or calculating anticipated savings from various energy efficiency upgrades, repairs, replacements, and behavioral changes. To the extent possible, students, teachers and the custodial staff implement these efficiency methods and measure the school's energy use using utility bills.

Every Solar One partner school will also undergo a student-led, building-wide and classroom energy audit. Beginning in Fall 2011, results of this audit will be shared with the Department of Education, Division of School Facilities (Facilities) and, because of Solar One's strong partnership with the DOE, Facilities will do what it can to act on student suggestions (switching out light bulbs, installing caulking on windows, etc.).

### Evaluation

We have worked diligently to provide intellectually honest, meaningful and significant metrics for GDL. We have pre- and post-knowledge surveys given to every student in our program. These surveys were created in partnership, and under the close scrutiny of Denise McNamara, Secondary Science Specialist in the DOE's Division of School Support and Instruction.

Our pre-evaluation will be given at the start of the program to 4<sup>th</sup> grade and above, and this helps Solar One educators to gauge how best to engage and teach each class in any one school. Post-knowledge surveys, given at the end of the program, will help our educators – and all key stakeholders – to assess how much the students learned. For example, in our 2010 Pilot Program, surveys were given to grades 6 and above. The results showed that student knowledge increased by an average of 50% (see chart above).



Final Results for 2010 GDL Pilot in Manhattan

Using a pre and post-program measurement of electricity use, we will evaluate a reduction in electricity use. For example, in our 2010-2011 Pilot, approximately half the schools saw a reduction of energy use as the direct result of behavioral change alone (an average of 2%-8%). In schools with "energy activists" such as PS/IS 187, there was a marked difference – an electricity use reduction of 11.4% during March, when GDL was in full swing in the school, and a 13% decrease of electricity use from January–April, 2011. As we continue to improve GDL based upon lessons learned, it is our goal to achieve, on average, a 10% reduction of energy use in each school.

**Our goal to achieve a 5-10% reduction in energy use (measured by kW usage) fits perfectly with the Con Ed Settlement Fund goal of “local air quality and health improvement in the vicinity of the East River Complex” for self-evident reasons. First, this kind of reduction would eliminate an estimated minimum of 50-100 metric tons of CO<sub>2</sub> emissions from our air – a clear, measurable fact that is directly linked with improvement in air quality, and in turn, an improvement in the health conditions available to residents and daily visitors to the East River Complex. Secondly, our Air Quality unit – which our educators will impress upon all schools to implement as their “optional” module – addresses the direct causations of unhealthy air quality, and how to improve it within our schools.**

In science and statistics, “correlation proves causation” is a well-known logical fallacy; a major goal of scientific experiments and statistical methods is to approximate the counterfactual state of the world. **GDL is an environmental program that operates under this same rigorous, scientific standard. The changes it aims to bring about directly address the *causal*, not *correlative* factors linked to unhealthy environmental conditions such as poor air quality. This claim is supported by how GDL’s outcomes are measurable by an undeniable yardstick – kW hours – and by how they can be replicated.**

To get a sense of what GDL can do with schools in CB3, all we need to do is to look to our estimates of what it will accomplish in the 5 schools it is presently working with in CB6: Salk School of Science, Augustus Saint-Gaudens, Baruch College Campus, Manhattan Comprehensive Night & Day and HS for Language and Diplomacy. The data is as follows: our estimate is a 5-10% decrease in electricity use from last year's levels, between November, 2011, to April 30, 2012. This translates to a reduction of **84,000 to 167,000 kW hours; 58 to 115 metric tons** of CO<sub>2</sub> over that same Nov-May period; and between **\$17,000 and \$34,000 in savings on electric bills.**

#### **Green Design Lab in Elementary Schools (K-5)**

If the GDL pilot proved anything, the program works at all grade levels. However, what was so interesting was how well it worked at the elementary school level. PS 187 in Washington Heights, where our educators worked with only K-5 students, had the best energy saving results out of all the schools in our pilot. The school reduced energy costs by over 10 percent (11% in the month of March). Jim, is there a page limit? We need to stay within the page limit so maybe submit this as an attachment if you can? The following is an article by the *Manhattan Times* that gives the details of PS 187’s outstanding performance:

#### [Washington Heights school jumps ahead of green effort](#)



Written by Gloria Pazmiño

Friday, May 20, 2011

Students, parents, and teachers at P.S. 187 planted recycled textile potted plants as the first step towards building a rooftop garden for their school.

Students at P.S./I.S. 187 Hudson Cliffs on Cabrini Boulevard are getting a hands-on approach to conserving energy, going green, and doing their part in saving the planet, putting theory to practice in their very own classrooms.

Solar One, an organization dedicated to sustainability education, worked in conjunction with the New

York City Department of Education, the Division of School Facilities, and the City's Division of Energy Management, in a program entitled the Green Design Lab, an effort supported by Mayor Bloomberg's goal to reduce greenhouse gas emissions in city-owned buildings.

Back in 2007, New York City released PLANYC, a sustainability plan aimed at curbing the city's greenhouse gas emissions by 30 percent by 2017. One fundamental part of the program was to start the reduction effort with municipal buildings, especially public schools, which are responsible for a quarter of the city's carbon emissions.

During the pilot program, P.S./I.S. 187 had the opportunity to join the "Green Cup Challenge" with the goal of reducing the school's electricity usage. The school placed sixth in the city, reducing energy costs over 10 percent and earning a \$5,000 award by the Mertz Gilmore Foundation. It will go to a continuing effort for energy reduction and sustainability.

Solar One's program includes a blueprint for a year-long curriculum for student-led greening projects in public schools, using the physical buildings as laboratories for learning and making an environmental change with the help of students, teachers, custodians, and parents.



P.S./I.S. 187 received a \$5,000 check from the Mertz Gilmore Foundation for its efforts to bring down energy costs during the "Green Cup Challenge." The Cabrini Boulevard school placed sixth in the city, reducing energy costs by over 10 percent.

School principal Cynthia Chory relied on the help of her fourth- and sixth-grade "energy squads," groups of diligent students who volunteered for daily rounds around the classrooms to make sure lights were shut off and unused electronics unplugged.

"The kids really took an active role in the program. They became very interested, engaged, and committed to the program," Chory said.

In order to organize the effort, students were taught once a week by Solar One educator Alex Smith on

topics such as fossil fuels, nuclear power, climate change, and energy consumption. By taking trips to the boiler room, students learned how the building's energy is produced as a whole. In anticipation of summer, and as a long-term project to help bring cooling costs down, students have also begun planting a rooftop garden made of recycled textile potted plants.

"What's special about this program is that it goes beyond the occasional field trip, or an after school program activity," said Sarah Holloway, parent of a P.S. 187 third grader. "By providing the lessons in the form of a curriculum, students could learn and understand the implications of energy conservation in a hands-on approach that stuck with them beyond the classroom."

Representatives from Solar One said that the long-term goal is to find a way to implement energy conservation into the curriculum in all schools.

For now, Chory is hoping to continue the Green Lab program. "This is definitely a long-term effort," she said. "We are applying for a second year run. Being green is our philosophy and we believe in it."

### **Budget: Green Design Lab™ in 5 Schools in Community Board 3**

Lead-in Educator	44,000
3 Solar One Educators	90,000
Fringe Benefits @32%	42,880
GDL thumbnail drives	750
Printing	3,000
Materials	2,000
Overhead & OTPS	13,000
<b>TOTAL</b>	<b>\$195,630</b>

Fringe Benefits include the following:

- Social Security (employer share) 6.0%
- Medicare (employer share) 1.5%
- Unemployment tax (estimated) 1.5%
- Disability insurance (estimated) 2.0%
- Workers Compensation (estimated) 2.0%
- Medical/Dental Insurance 14.0%
- Life Insurance 1.0%
- 403(b) Company match 1.0%
- 403(b) Employer contribution 3.0%
- TOTAL 32.0%

### **GDL and 2011 Task Force Funded Projects**

From the information available on the CB3 website, the Task Force expects to fund the following 3 initiatives: East 14<sup>th</sup> Street Greening Project, Lower East Side Girls Club, and Theater for the New City. The GDL supports and fills out these initiatives in various ways; and differs in other significant aspects.

Similar to the East 14<sup>th</sup> Street Greening Project, GDL schools have, as a final project, created urban gardens or farms, to not only to improve the quality of life surrounding a school building, but also to

improve the sustainability of a school's landscape. Green roofs are another recommended sustainability project for those participating in the GDL, and this dovetails nicely with the Lower East Side Girls Club green roof initiative. Air Quality is a specific module of the GDL, and one we will be encouraging all participants to take when they are done with their mandatory Energy component. The Air Quality module meshes nicely with the Theater for the New City's "coolroof" and its improvement of indoor air quality. Our Air Quality module has many interesting projects for students such as a Neighborhood Investigation and Air Quality Testing, and an Indoor Air Quality Audit.

There are several ways the Green Design Lab is meaningfully different than any of these three initiatives. The GDL specifically aims to *change behavior*, in a lasting way. This change in behavior will spread out beyond the four walls of the classroom, and unleash real, permanent change in the neighborhoods surrounding the schools. Changing behavior is complex. It requires *time*, and an in-depth, ongoing effort. GDL is not a one-time, field trip environmental program. It is a rigorous, tested, and proven way to maximize the potential of the low hanging fruit of energy efficiency, and our effort to reduce carbon footprint in the NYC public school system, which is the largest in the United States. The need for the GDL is proven by how fast it has grown – it has tripled in size in one year (from 10 to 30 public schools in all five boroughs), and we will announce a plan to reach 150 schools in the next 3 years in the first week of December, 2011. Finally, the GDL program's close and very encouraging partnership with the NYC Department of Education is an assurance that the initiative will be systemically supported. As John Shea, CEO of the NYC Department of Education, Division of School Facilities has said, "Our schools are positioned to make a big difference in helping New York City to meet its greenhouse gas reduction goals."

### **Mission**

Solar One, incorporated in 2004, is a 501(c)(3) not-for profit organization created to be New York City's first Green Energy, Arts, and Education Center. Solar One's mission is to empower people with the knowledge and resources to unleash and build sustainability in their communities. We are dedicated to developing innovative, complete and effective ways to encourage people to re-examine, through critical thinking and scientifically proven information, the ways we live and work in order to reduce our impact on the environment. We seek to set the standards on how to make our urban environment -- specifically New York City -- more sustainable; catalyze the movement to reduce carbon emissions; educate the public about innovative solutions to our environmental challenges; connect people to all the good work being done about current energy, environmental and sustainability issues; and to do all of this in an engaging, intellectually honest, meaningful and entertaining way that leaves people inspired and empowered, facilitating community-wide change.