



NY SUN WORKS

THE GREENHOUSE PROJECT



2017 INFORMATION GUIDE

NY Sun Works is a non-profit organization that builds innovative science labs in urban schools. Through our Greenhouse Project initiative we use hydroponic farming technology to educate students and teachers about the science of sustainability.

We envision a generation of environmental innovators, empowered to create solutions to global resource challenges.

WHAT IS THE GREENHOUSE PROJECT?

The Greenhouse Project is a program of NY Sun Works inspired by The Science Barge. The program is dedicated to improving K through 12 grade Environmental Science Education in urban schools through integrated facilities, hands-on curriculum, and professional development.

Our Greenhouse Classrooms offer students the opportunity to grow food, while learning hands-on about nutrition, water resource management, efficient land use, climate change, biodiversity, conservation, contamination, pollution, waste management, and sustainable development.

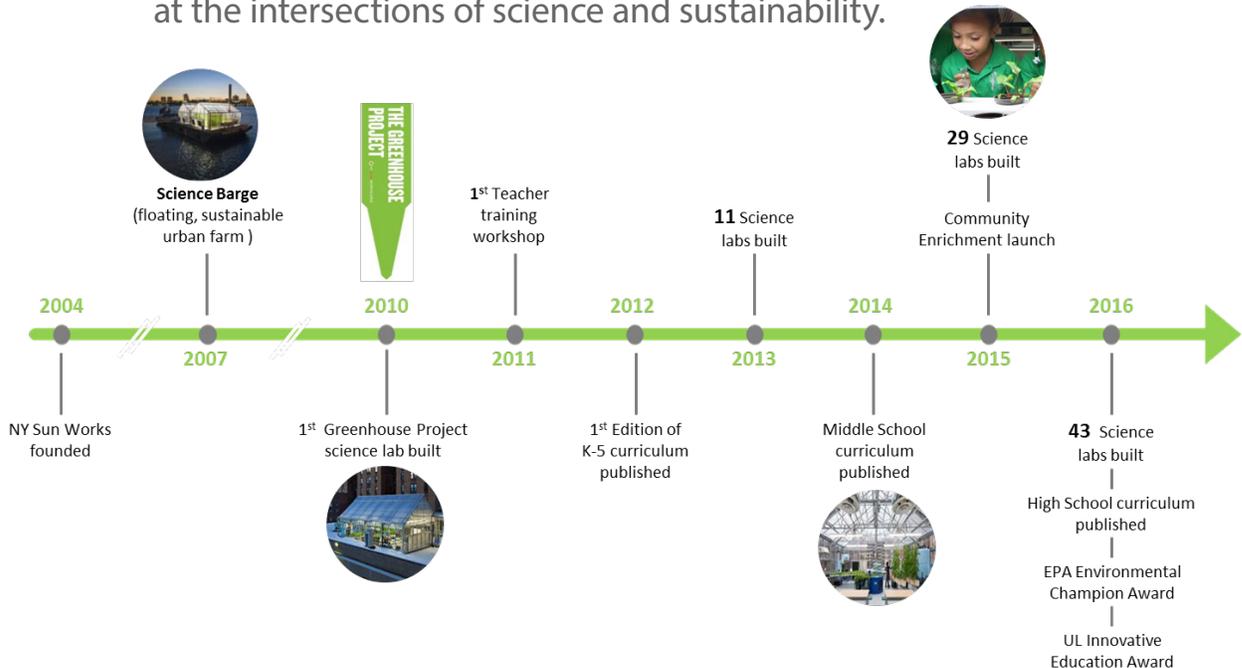
To facilitate this hands-on learning environment, the Greenhouse Project laboratory can also include solar panels, hydroponic growing systems, a fish farm, a rainwater catchment system, a weather station and a vermicomposting station.

The laboratory operates as an integrated part of the school's curricula and prepares children to exceed NYC's science standards.



NY Sun Works was formed in 2004, building and implementing its first major program, the Science Barge; a floating, sustainable urban farm located on the Hudson River. It was the first demonstration of a high-yield, commercial grade urban food production facility powered by wind and solar energy, heated with recycled vegetable oil and irrigated by rainwater.

By 2010, NY Sun Works developed **the Greenhouse Project**, adapted from the Science Barge hands-on teaching model, using hydroponic farming technology to educate students and teachers at the intersections of science and sustainability.



NY Sun Works' Greenhouse Project program is directed to K-12th grade students.

What **sets us apart** from other programs is that our labs run year round and come with a curriculum that covers mandated science standards and STEM. This means that it is not an additional program, but part of the school day as a traditional science class would be. With the Greenhouse Project program we not only offer hands-on science and sustainability education that also address environmental issues around food production, aquaculture, and urban development, with the added value of having fresh and local produce available year round.

NY Sun Works offers two options for our school partner laboratories.

Each option comes with our inquiry-based Curriculum, Teacher Training and Technical Maintenance Training by NYSW staff.

A FULL SCALE GREENHOUSE INCLUDES:

- Hydroponics Systems
- Aquaponics system or fish farm
- Worm-composting station
- Integrated Pest Management System
- Rainwater Catchment System
- Evaporative Cooling System
- SMART Board
- Weather Station
- A dedicated classroom space

CONVERSION OF AN EXISTING CLASSROOM INCLUDES:

- Modular stand-alone hydroponic systems
- Worm-composting station
- Integrated Pest Management system





The Greenhouse Project Classroom "HydroFarm" at the Computer School



The Greenhouse at The Cypress Hills Community School, PS 89 in Brooklyn



The Greenhouse Project Classroom Conversion at PS 84



The Greenhouse Project Classroom Conversion at Bedford Stuyvesant New Beginnings Charter School



The Greenhouse Project Classroom Conversion at PS 208



The Sunworks Center at PS 333

HOW DO I BRING THE GREENHOUSE PROJECT TO MY SCHOOL?



Classroom Conversion

- Establish Greenhouse Project Committee (Principal, Teachers, Parents)
- Contact NY Sun Works
- Classroom Identification and Layout Design
- Identify Sources of Funding and Project Partners (if public, this may include DSF)
- Classroom Installation
- Teacher Training and Curriculum Implementation
- Class Instruction and Maintenance



Full Scale Greenhouse

- Establish Greenhouse Project Committee (Principal, Teachers, Parents)
- Contact NY Sun Works
- Identify Sources of Funding and Project Partners (if public, this will include SCA and DSF)
- Preliminary Design
- Construction
- Teacher Training and Curriculum Implementation
- Class Instruction and Maintenance

WHAT ARE THE COSTS?

There are many factors to consider when estimating the cost of a NY Sun Works Greenhouse Classroom including programmatic goals, existing site conditions, site ownership, as well as maintenance and operations requirements.

To date, the total cost of projects for a full scale greenhouse have ranged between \$850,000 and \$2,400,000.

In-classroom conversions have ranged between \$25,000 and \$50,000.

WHAT DOES A PARTNERSHIP WITH NY SUN WORKS OFFER MY SCHOOL?

Feasibility Study: NYSW will convene a kick-off project meeting with the school's existing core leadership team i.e. the Greenhouse Committee and representatives from school administration to discuss ideal equipment placement, programming, applicability of project to school community, budgetary considerations and development of fundraising concepts.

Classroom Design and Installation: NYSW will design the layout of the systems in the classroom based on electricity load and existing classroom needs. Project budget will consist of definition and installation of interior systems, and operations/maintenance support.

Professional Development: NYSW will advise on the synergies between The Greenhouse Project, school programming and curriculum. This process includes professional development through NYSW's Department of Education certified After School Professional Development course, available to faculty.

K-12th grade STEM curriculum: NYSW will provide innovative, grade-appropriate, interdisciplinary curriculum for all classes that will utilize The Greenhouse Project classroom. Curriculum implementation also includes teacher training workshops lead by NYSW.

Maintenance Plans: NYSW provides on-site maintenance and support to make sure the systems are fully functioning.

Annual Youth Conference: Greenhouse Project partner schools are encouraged to attend and participate in NY Sun Works' Annual *Discovering Sustainability Science Youth Conference*, a live-streaming event showcasing student work from Greenhouse Project Partner Schools. The event features presentations on science and design subjects as well as an exciting and diverse lineup of guest adult speakers.



WHO WILL TEACH THE STUDENTS IN THE GREENHOUSE CLASSROOM?

We require our partner school to commit to providing a teacher who will operate the Greenhouse Classroom, as well as teach the classes. This is vital for the success of a Greenhouse Project Classroom.

NY Sun Works team will support with in-depth systems training for teachers and custodial staff as well as on-going technical support through long term maintenance plans. NY Sun Works will also train teachers in curriculum implementation, and helps with external support and guidance through partnerships with a variety of environmental education networks.



I can see the light in my students eyes when they walk into this class. They really love it. The hands-on experience is really just unparalleled to anything.

*- Tina Wong, Teacher,
PS208*

WHAT IS THE NY SUN WORKS CURRICULUM?

As a core component of our program, NY Sun Works has developed our one of a kind curriculum series: **Discovering Sustainability Science**. The **Kindergarten through 5th grade core curriculum** introduces students to cutting-edge technology and connects science and the environment through sustainable urban farming. The curriculum has been designed to inspire students to ask questions, investigate systems, make predictions and design solutions.

This curriculum emphasizes the child's perspective in the process of learning and promotes project based, critical thinking, and collaborative work. Understanding is achieved through discussion and collaboration as a result of the combination of practice and conceptual explanations.

The Greenhouse Project **middle school 6 - 8th grade curriculum** has been developed under the challenge-based Module design based on the Novare Schools model. Our Modules are intensive, short-term interdisciplinary courses developed around real-world challenges. They are designed to enhance students' understanding of big ideas and broad global concepts, and their development and application of 21st century skills – the kinds of things educators hope students will remember and still need to know and use 20 years from now.

Each Module uses technology with creativity and innovation in a collaborative learning environment. Students study a topic, identify a problem, form a hypothesis, design an experiment/a project, test the hypothesis, and analyze the results.

The "Discovering Sustainability Science" Modules **developed for high school** students go the next step in covering mandated Science Standards identified for 9-12 grades. The Modules address some of the root causes and symptoms of climate change and introduce students to many of the challenges facing marine and terrestrial ecosystems, while empowering them to seek solutions to these challenges, in the classroom and in their lives.

WHAT DO WE DO WITH ALL OF THE FOOD?

The by-product of a Greenhouse Project Classroom is fresh produce throughout the school year - and hydroponic systems yield lots and lots of crops! If you choose to include Aquaponics you will also be able to harvest fish. There are many creative ways you can use the produce and we can help you choose the best option for your school. Here are some of the options we recommend:

- use crops for a snack program in the school
- teach science based nutrition and cooking classes
- run a student operated farm stand
- donate crops to teachers and families
- form meaningful partnerships with local senior centers, food banks and more
- partner with local restaurants for product exchange

