

FINAL Progress Report

Project Title: Solar Consortium of New York Photovoltaic Research and Development Center

Covering Period: June 1, 2008 to December 31, 2009

Date of Report: May 4, 2010

Recipient: The Solar Energy Consortium

Award Number: DE-FG36-08GO88011

Working Partners: Prism Solar Technologies

Cost-Sharing Partners: Prism Solar Technologies

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DOE Project Team: DOE Field Contracting Officer - Steve Palmeri

Project Objective:

The objective of The Solar Energy Consortium is to lead New York State to increase its usage of solar energy systems. The expected outcome is that appropriate technologies will be made available which in turn will help to eliminate barriers to solar energy usage in New York State.

Background:

The Solar Energy Consortium has been created to lead New York State research on solar systems specifically directed at doubling the efficiency, halving the cost and reducing the cost of installation as well as developing unique form factors for the New York City urban environment. The work will be accomplished using TSEC personnel and its University partners toward advancing commercialization of new technology solar products in partnership with industry. In addition, TSEC will analyze the unique energy requirements and barriers to implementation of solar energy. These projects are a cross section of actual solar implementation problems, that when solved will create the opportunity for broad use of solar power.

Work Planned for this Quarter:

This Congressionally Directed Project ended mid-December 2009. Programmatic work continues under CDP EEE0000332.

Significant Accomplishments July 2008 - December 2009:

July 2008 – September 2008:

- Collaborated with NYS economic development agencies and NY Power Authority to successfully attract Globe Specialty Metal's (GSM) solar grade silicon manufacturing producer to Niagara Falls, New York which will result in 500 new jobs over several years as manufacturing ramps up.
- Coordinated a Clarkson University project to develop a unique manufacturing process to enhance the feasibility of the Globe's solar grade manufacturing.
- Coordinated State University of New York (SUNY) New Paltz Solar Solution projects

- o Designed a control system to enhance the power usage efficiency of an apple farm
- o Assessed solar application possibilities for three Ulster County, New York hospitals including roof top electric, off-grid parking lot lights and a short distance vehicle
- o Assessed off-grid solar applications for the US Air National Guard installation at Stewart Field in Newburgh, New York
- o Developed testing approach for a new LED approach from Brite Components.
- TSEC introduced the patent holder to Clarkson University for initial product claim assessment of an extruded polarizing film to pursue a prototype build.
- Began initial work with the New York State Office of General Services to implement solar on state owned facilities.
- Began initial work with the US Department of Justice and UNICOR to introduce solar panel manufacturing in medium security federal prisons.

October 2008 - December 2008:

- Collaborated with the DOE and NYS government organizations to create a pipeline that is projected to bring more than 1100 jobs to the region over the next few years.
- Initial jobs opportunities have begun to occur and a jobs fair has been scheduled for February 2009.
- The “Solar Energy Implementation in New York State” conference was organized and hosted in New York City. Representatives from city and state agencies, universities, industry and the National Renewable Energy Laboratory were in attendance.
- A plan is being discussed with the Federal Prison system and two industry partners to create a custom solar panel manufacturing capability within the federal prison system.
- The capabilities of solar signage and lighting were successfully demonstrated to the New York State Office of General Services and the Port Authority of New York and New Jersey. Both of these organizations are now developing plans to implement these energy saving approaches.
- TSEC has obtained a \$750K grant from New York State to enable the establishment of an advanced infrastructure in support of solar energy research and development. Actions have begun to procure the equipment authorized by this NYS grant.

January 2009 – March 2009

- TSEC’s partner Precision Flow Technologies based in Saugerties, NY reached an agreement with two other companies to design and manufacture solar equipment products. It is expected that collaboration will generate 65 to 80 jobs.
- TSEC’s partner Prism Solar Technologies acquired a manufacturing site in Highland, New York. The facility will be used to produce solar modules for US markets and HPC film for sale to other solar module manufacturers. It is expected that this activity will create over 200 new jobs in the first few years.
- TSEC worked with SpectraWatt, a solar cell manufacturer. The company will be locating its manufacturing in vacant space at IBM in East Fishkill, New York. The company anticipates hiring 100 employees in its first year of operation and an additional 50 for follow on activities.
- TSEC organized and ran a job fair in February, 2009. Thirteen companies with 50 + job openings attended and over 400 job seekers came to the job fair.
- A grant was received from the Heath Resources and Services Administration to develop renewable energy projects and incorporate energy efficient technologies at three Ulster County, New York hospitals.
- TSEC lead eight projects exploring practical applications of solar energy approaches.

April 2009 – June 2009

- TSEC’s partner Prism Solar Technologies has moved into its new facilities in Highland, New York. With the aid of funding facilitated through TSEC, Prism will develop and produce solar modules

for US markets and HPC film for sale to other solar module manufacturers. It is expected that this activity will create over 200 new jobs in the first few years.

- Earthkind Energy a solar hot water collector company relocated its operations to the Tech City Complex, a long vacant ex-IBM facility, in Kingston, NY.
- TSEC is coordinating activities with solar energy manufacturers who are interested in locating manufacturing facilities in New York. Incentive packages are being developed to provide a foundation for these manufacturers to establish operations in New York State.
- TSEC led a team of industry representatives and potential solar farm developers in formulating a response to a Request for Expression of Interest in the New York Power Authority's plans for establishing solar photovoltaic power generation capability.
- Detailed approaches were defined for the putting in place an advanced infrastructure in support of solar energy research and development. This infrastructure has been made possible through a \$750K grant from New York State. The initial implementation of the infrastructure has begun with the construction of a video conference room made possible through a grant match from Fala Technologies. .
- A detailed implementation plan was developed to incorporate energy efficient technologies at three Ulster County, New York hospitals. Funding for the capital for the project will come from HRSA.
- The SUNY New Paltz solar race car activities facilitated by TSEC finished 6th in a field of eleven in its first race.
- TSEC led fourteen projects exploring practical applications of solar energy approaches.

July 2009 – September 2009

- TSEC is coordinating activities with solar energy manufacturers who are interested in locating manufacturing facilities in New York.
- As part of TSEC's leadership role in creating a New York State demand for photovoltaic panels it is developing a core expertise on the creation of solar farms. During this quarter it met with several solar farm developers to help them define implementation plans and identify obstacles. Submitted an RFEI to New York State Power Authority with TSEC partners To Support the Preparation of an RFP for a 100MW Solar Power Initiative in New York State
- TSEC is making progress on in putting in place a New York State funded advanced infrastructure in support of solar energy research and development. Part of that infrastructure is a video conference room at TSEC to ease the communications and travel among the participants in the solar industry. During this period this conference room was completed. In addition, video conferencing systems at Clarkson University and the City University of New York are being constructed.
- Sub-recipient - Prism Solar Technologies, both the Solar Automation stringer/tabber machine and the Bent River Glass to Glass Laminator was received in August 2009. These two machines are being utilized in their pilot production line producing Holographic bi-facial modules for customer prototypes.
- TSEC led fourteen projects exploring practical applications of solar energy approaches.

October 2009 _ December 2009

- TSEC is coordinating activities with national and international solar energy manufacturers who are interested in locating manufacturing facilities in New York.
- As part of TSEC's leadership role in creating a New York State demand for photovoltaic panels, it is developing a core expertise on the creation of solar farms.
- Sub-recipient - Prism Solar Technologies has installed some of the production line and plans to install the remainder in 2Q 2010 to produce Photovoltaic modules with holographic concentrator integration.
- TSEC continued to lead sixteen projects driving solar solutions for novel applications.
- TSEC worked with Solartech Renewables (STR), a start up PV manufacturing company, and the economic development agencies of NYS to assist STR in locating their product manufacturing in

NYS. Manufacturing line install and product roll out anticipated 3rd QR 2010. Projected 60 new manufacturing jobs through December 2010.

Status:

The TSEC performance tasks are divided into Solar Innovation and R & D, Enabling Manufacturing and Solar Solutions. The following results and activities occurred during the award period June 2008 – December 2009.

Task 1: Solar Innovation

TSEC grows solar innovation through its industry to / industry and university to / industry partnerships. TSEC manages solar projects by identifying research topics translated from industry needs and addressing these industry problems through collaborations with universities, addressing industry problems such that solutions can be applied to further penetration of solar systems in New York. The expected outcome is technology transfer to industry.

TSEC has the following collaborative University Partners:

- Binghamton University
- Clarkson University – Center for Advanced Materials Processing
- Cornell University
- Rensselaer Polytechnic Institute - Center of Architecture Science and Ecology
- State University of New York (SUNY) at New Paltz – School of Science and Engineering – Systems Integration/Controls
- City University of New York (CUNY) - College of Engineering and Center for Sustainable Energy (CSE)

Raw Materials

- TSEC, Clarkson University Center for Advanced Materials Processing and Globe Specialty Metals (GSM) collaborated to assist Globe in their Silicon purification manufacturing process. Clarkson University and GSM successfully developed a unique manufacturing process which is both less energy intensive as well as achieving a higher solar grade silicon product. The assistance allowed Globe to reach the necessary purity to make Solar-grade silicon in a new product line for Globe.

Energy Storage

- TSEC worked with Quensor, an energy storage manufacturer, and Cornell University to assist the manufacturer in the development of a prototype system for energy storage. Presently the project is under consideration and evaluation by Cornell University researchers. TSEC also participated in developing a concept paper on a transformational approach to energy storage based on the Quensor system.
- SUNY - Binghamton, TSEC and an industry partner, IOXUS, are collaborating in an early stage project for the development of ultra capacitor technology for energy storage. This work may eventually establish an Energy and Energy Storage Technology Center in Oneonta NY
- Delaware County Power Cooperative, an independent power producer in rural Delaware County, worked with TSEC and the City University of New York to test various options of battery storage for implantation into utility scale solar farms that their cooperative plans to build in the future. Several technologies, such as Lithium Ion, under various environmental conditions are being tested.

Supply Chain Innovation

- Improvements in the economics of PV cells alone without consideration of the economic contributions of technology enhancements and the entire supply chain, raw materials to grid connect; will not maximize cost reduction for photovoltaic electricity. This is a total “systems” approach to solar electric implementation. TSEC is participating with IBM and industry partners in the development of a major solar industry initiative which is targeted at driving a 5X decrease in solar electric costs over five years. TSEC is currently seeking university partners and solar PV supply chain companies to participate. The idea is to innovate through out the PV process, from

raw materials to grid connect, and drive semiconductor experience and improvement approach into solar PV industry.

Novel Photovoltaic Materials

- Clarkson University and TSEC coordinated an assessment of an industry partner's claim of improved photovoltaic efficiency through utilization of a lumeloid polarizing film. With the help of NREL, the assessment concluded that material had some fundamental instabilities and required basic research to get an understanding on how to attain stability. Work has been underway at Clarkson University to determine how to address this basic research requirement. The polarizing film is now in prototype stage. After the preliminary assessments, Clarkson and the patent holder followed through with research and prototype development.
- An industry partner worked with TSEC and collaborated with Clarkson University to test and validate an extrudable polymeric manufacturing conversion process for solar cell production. Additionally Clarkson University plans to assist in co-polymer development with nanoparticle incorporation for conductivity. Clarkson has developed a conceptual proposal for this activity and is awaiting feedback from the industry partner.

Other Solar Innovation

- A proposed grant from NYSERDA for Advance Energy Systems Mass Transit has been awarded to TSEC. This grant will support a feasibility study for a solar powered Mass Transportation Station located in Poughkeepsie, NY officially entitled "Feasibility Study of Solar Photovoltaic and Light Emitting Diode Technology for the Poughkeepsie Metro North Railroad Station". The project is underway and TSEC is coordinating the solar, LED lighting and architectural design. TSEC is optimistic that this project could pave the way for the adoption of renewable energy powered train stations providing a tangible example to the community of eco-friendly design.
- TSEC responded to a request for information from the DOE regarding the Photovoltaic Manufacturing Initiative. TSEC weighed in on the subject of how process development and research would be most effectively coordinated for the advancement of photovoltaic technology across the US.
- TSEC received a \$750 K grant from NYS for putting in place an advanced infrastructure in support of solar energy research and development. TSEC headquarters, Clarkson University and the City University of New York (CUNY) have completed the installation of video conferencing systems enabling video conferencing between the universities, TSEC, and participating industry partners. The video room at TSEC was made possible through a matching grant from FALA technologies. In addition Clarkson University and the City University of New York providing matching funds for their sites. The technology provides TSEC a direct means of communication for industry and researchers at various New York private and public universities in collaborative efforts on potential technology research and technology problem resolution. Though no funds from the current award were expended in the construction of the video conferencing ability for TSEC, it is mentioned here to highlight the enhancement it provides in assisting technology transfer possibilities through direct communication between industry and academia. Additionally, test equipment and solar modules have also been purchased with the NYS funds to be shared with local industry and universities for demonstration and testing purposes.
- TSEC established and distributed a Daily Renewable Energy e-Bulletin reaching a diverse and growing distribution of readers including TSEC industry partners, university partners and researchers, town, county, state and federal officials, federal agencies such as the DOE and Department of Justice, Members of Congress as well as New York State Research and Development Authority (NYSERDA). The Daily Renewable Energy e-Bulletin provides it readers with highlights of current topics such as advances in solar energy from novel PV, smart grid applications and storage to news of large and small solar applications and is made available to anyone who wishes to sign up for distribution at no charge. Recent articles to the bulletin have included renewable energy economics and regulatory topics. The e-Bulletin has been well received.
- TSEC hosted a conference in New York City entitled "Solar Energy Implementation in New York State" on October 24, 2008. This conference brought together individuals from major industry, city and state agencies, university researchers and experts from the National Renewable Energy Laboratory (NREL) who have interests in the development and application of solar power as a renewable energy source for New York State.

Task 2: Enable Manufacturing

TSEC will drive new business process development for new solar products and technologies, attract businesses to the solar industry, encourage specific product development for New York City and New York State markets, remove market barriers for solar in New York and site solar product manufacturing in New York. TSEC continues to work closely with State and local Economic Development leaders to remove market barriers for growth of solar enterprises in New York. The expected outcome is solar industry attraction and creation in New York. Under this award \$2,000,000 of solar manufacturing equipment will be acquired to facilitate the manufacture of solar panels in a new manufacturing facility in New York. The expected outcome is solar industry creation in New York State.

TSEC has 70+ active renewable energy industry partners. Some partners are start up efforts, others are making a lateral move into the renewable energy sector, like traditional semiconductor equipment manufacturers transitioning into CIGs and LED equipment manufacturing. Some have been in the renewable energy business for many years and are experiencing business growth and expansion. Almost all of the industry partners have created jobs to accommodate their renewable energy business expansion. TSEC offers the opportunity for these industry partners to collaborate on products and to access university researchers to assist in technology advances in their products.

Sub Recipient - Prism Solar Technologies - Solar Panel Manufacturing Equipment Acquisition and Job Creation

Sub-recipient Prism Solar Technologies, (“PST”), is a high technology research, development and manufacturing enterprise that produces novel holographic planar concentrator photovoltaic modules. As a sub-recipient, PST received \$1,000,000 of DOE funding and contributed an equal cost share amount toward equipment purchases shown in Table 1 that will be used in the development of their manufacturing process and line to produce photovoltaic (“PV”) modules, integrating their novel holographic concentrator film. The majority of this equipment has already been installed with plans to install the remainder in the 2nd quarter 2010.

Equipment	Components	Status	Operational Plan
Conveyor system complete module line.			
	Laminator	In house and operational for module manufacturing.	Operational for module manufacturing.
	Interconnection Table	Warehoused at manufacturer	Plan to install Q2/2010
	Trimming Station	Warehoused at manufacturer	Plan to install Q2/2010
	Sun Simulator	Warehoused at manufacturer	Installation planned for 5/17/2010 and will be in operation by 5/30/2010
	MiniTecRoller Insertion/Extraction Table	Warehoused at manufacturer	Plan to install Q2/2010
Black Star Laser Cutter w/ Wafer Holder		In house and operational for module manufacturing.	Operational for module manufacturing
Automatic Cell Stringer/Tabber		In house but not operating as purchased.	Plan to send back to manufacturer for modifications.
Scanning Electron Microscope		In house but not operating as purchased.	to be used to scan for cell integrity or breakage.
UV Furnace		Installed and awaiting analysis and integration into production line.	Awaiting analysis and integration into production line.

Table-1 Prism Solar Technologies Equipment Acquisition and Status of Operations

During the course of the award period, Prism Solar Technologies purchased a recently closed Panasonic plasma screen TV R & D and pilot manufacturing facility in Highland, NY in which to manufacture their product. PST is currently in the process of the evaluation and the possible re-commissioning the plasma screen TV manufacturing equipment to PV module and holographic concentrator film production, a research project being separately funded under DOE award EEE0000332. Prism Solar Technologies

currently has 40 employees. PST projects that it will add about 180 more jobs to the local economy during its first few years of operation. It should be noted that Prism Solar Technologies was able to hire back most of the laid off Panasonic plasma screen TV manufacturer employees

Job Creation and Retention

- Recognizing that initial jobs opportunities have begun to occur, TSEC initiated and coordinated the work of four NYS county workforce agencies and the State University of NY at New Paltz to host a job fair in February 2009. The fair both matched employers with prospective employees and provided an understanding of future training needs of companies operating in or those who would be transitioning into the renewable energy space. Area semiconductor manufacturers, IBM and NXP, recently laid off hundreds of highly trained technical personnel. Thirteen companies representing 50+ jobs and 400 job seekers attended the session. A second job fair planned late 2009, was hosted by NXP and TSEC engaged 6 renewable energy industry partners who were expanding and hiring to attend the fair. 25 positions were filled and hundreds of resumes of highly trained and skill personnel were collected for future consideration.
- TSEC collaborated with Globe Specialty Metals to work with the New York Power Authority and State Economic Development Agencies to obtain low cost hydro power for Globe Specialty Metals. This enabled Globe to develop a business case for converting a formerly idle factory in an economically depressed area into a manufacturing facility for solar grade silicon. The manufacturing facility is coming on line and capacity is building incrementally. Targeted jobs are being created. GSM is making available for purchase 20 % of its production yield as economic incentive for PV manufacturers willing to locate to NYS. GSM has supplied pilot product to IBM for their UMG research. Globe expects to grow its work force from their current base of 80 employees to 500 within several years; a specialized work force of underemployed steel workers.
- TSEC assisted EarthKind Energy, a solar thermal company, to create a research and development and manufacturing capability which is located in a New York State facility. EarthKind currently does final assembly of German made solar thermal panels and designs solar thermal systems for its customers. EarthKind is participating in the Solar Thermal Consortium and a major contributor to Solar Thermal Roadmap document.
- TSEC assisted Precision Flow Technologies (PFT), a traditional semiconductor equipment manufacturer, transition into the equipment supply chain for CIGS solar and LED manufacturing. The resulting new business venture has expanded their workforce by 137 in 2009 and required facility expansion into a long term vacant ex-IBM facility in Kingston, NY. PFT has projected continued growth in renewable energy manufacturing and anticipates hiring an additional 190 new employees in 2010. Among the hired staff, were recently laid off NXP and IBM skilled workers.
- TSEC worked with Spectrawatt, a cell manufacturer, and SolarTech Renewables, a PV module manufacturer, both start up companies in their efforts to establish manufacturing facilities in NYS. Spectrawatt has established its manufacturing facility in vacant space at the IBM East Fishkill location. Anticipated ramp up in 2010. Solar Tech Renewables will finalize facility location selection by early 2010 with manufacturing rampup by 3 QRT 2010.
- TSEC worked with Solar Thin Films and New York State Economic Development agencies to help them establish thin film PV manufacturing in a vacant ex-IBM facility in the Hudson Valley of New York. Solar Thin Films was expected to bring 400 new jobs to the area over several years of manufacturing ramp up. Solar Thin Films was purchased by Algatec Solar AG, German-based manufacturer of solar panels and arrays. Unfortunately, Solar Thin Films has decided not to proceed forward with the New York location at this time.
- TSEC has worked with numerous renewable energy companies across the State amounting to the aggregate creation of 266 new jobs in the renewable energy sector in New York State in 2009. These renewable energy companies project a combined job creation of 516 jobs for 2010. Some of those companies, their product and operational status are listed in Table 2.

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 Solar Consortium of New York Photovoltaic Research and Development Center
 The Solar Energy Consortium -TSEC

Company Name	NY County	Product / service	Operational Status
Prism Solar Technologies	Ulster	Holographic Concentrator Film PV Modules	Manufacturing ramp up in process
PrecisionFlow Technologies	Ulster	CIGS & LED equipment manufacturer	Currently manufacturing product / renewable energy sector represents new business
SunWize	Ulster	Solar Installer	Long established renewable energy business
Fala Technologies	Ulster	Solar Powered LED Illuminated Signage	Currently manufacturing product/ renewable energy sector represents new business
SolarTech Renewables	Ulster	PV modules	Start up venture, manufacturing line and product roll out 3 rd QRT 2010
Pappu International	Ulster	import/exporter of renewable energy products between India and the US	Working with NYS solar supply chain firms
EarthKind Solar	Ulster	Solar Thermal Assembly and Installation	Currently assembling product
Active Ventilation	Orange	Solar powered roof ventilation	Currently manufacturing product / Renewable energy sector represents new business
Net Zero Energy Systems	Ulster	Solar Thermal Storage	Currently completing R & D
ANL Lighting	Dutchess	LED Luminaire design and manufacturer, develop electronic circuits to control the LEDs	Producing product
LEDs America	Ulster	LED assembly	Prototyping and certification testing underway
SpectraWatt	Dutchess	PV cells	Manufacturing ramp up in process
Atlantis Energy	Dutchess	BIPV roof tiles	Long established renewable energy business
Taylor Biomass	Orange	Recycling and Biomass energy production (in	Long established business / renewable energy represents new business
Armistead Mechanical	Orange	Installer of HVAC systems	Integrating renewable energy products in their construction business
Perreca Electric	Orange	Regional Electrician	Integrating renewable energy products in their construction business
Widetrionix	Tompkins	Beta-voltaic Battery Design	R & D on military application using solar and the beta-voltaic battery
Globe Specialty Metals	Niagara	Solar grade Si / UMG Si	Long established business, factory ramp up / UMG represents new business
Se"lux	Ulster	LED Luminaire design and manufacturer	Producing Product
ELI	Middlesex, NJ	Very High Efficiency Solar Cells	Manufacturing Pilot product for the Air Force and continuing R & D

Table 2: Renewable Energy Company Listing, Product Description and Operational Status

- The manufacturing capabilities of Globe Specialty Metals, Spectrawatt, Prism Solar Technologies, Solartech Renewables and Precision Flow Technologies, when viewed together, represents the entire PV supply chain from equipment build to raw materials to solar modules all based in New York State.

Solar Market Development

- Regional solar thermal manufacturers discussed a collaborative effort with TSEC to draft a Solar Thermal Roadmap for NYS. TSEC engaged its other industry partners and university partners to collaborate on the roadmap development with the solar thermal manufacturers. The activity spurred the creation of a Solar Thermal Consortium comprised of the roadmap development participants. TSEC actively participated in the Solar Thermal Consortium's development of a White Paper entitled "The Development of a Solar Thermal Market in New York State" which was submitted to NYSERDA. In addition, TSEC worked with the Solar Thermal Consortium to host a well attended Solar Thermal Roadmap Symposium in October of 2009 and plans to host an international video conference on the subject in February 2010. Subcommittees were formed to address the following topics: private sector roles and issues, training and workforce development, the usage of New York's assets for technology development, public sector roles, issues and consumer education and consumer awareness. The results of subcommittee activities as well as presentation of the Solar Thermal Roadmap will occur at the NYSEIA (New York State Energy Industry Association) conference scheduled May 12-13, 2010 in Albany, New York
- TSEC worked closely with the US Department of Justice, Otisville federal prison and UNICOR to convert an inmate electronic assembly facility (electronic components for US military) to a module manufacturing line capable of producing 25 MW per annum in a moderate security facility in the Hudson Valley of New York. The photovoltaic line is active and producing a high efficiency multi-crystalline silicon cell PV panel for the federal market. The creation of a PV manufacturing facility offers supply chain vendors an opportunity to participate in the procurement process.
- TSEC has begun to formalize its processes to support early stage companies in renewable energy. In association with that effort, initial steps were taken to establish workshops in the Hudson Valley to educate local entrepreneurs about the renewable energy field. Together with the Albany NY based Center for Economic Growth, TSEC applied for a NYSERDA grant entitled Clean Energy Incubators to fund this activity. TSEC was recently informed that it was not selected for this award. However, TSEC will continue to work with local entities like Ulster County Development Office and the Small Business Administration to assist green tech entrepreneurs.
- TSEC has successfully secured the support of an internationally recognized test and certification company, TUV Rheinland, to partner with TSEC and the State University of New York at Albany in a proposal to establish a photovoltaic testing and certification center in New York State. The proposal was submitted to NYSERDA and would create about 15 additional highly skilled jobs in three locations throughout New York State. The proposal is strategic in that it would bring unique skills workforce training to New York through the involvement of scientific experts from TUV Rheinland. Furthermore if funded, the center would coordinate and stimulate university research characterizing the performance of photovoltaics under typical Northeastern US weather conditions. Funding indeterminate at the time of this report.
- In order to create demand for a developing manufacturing base, TSEC provided a forum for coordination of potential New York State utility scale solar farm developer activities. This action was initiated in response to a Request for Expression of Interest from the New York Power Authority (NYPA): RFP for 100 MW Solar Power Initiative in New York State. The submitted NYPA response compiled the varying requirements and success criteria of these potential large solar facility providers. The forum will be held on February 3, 2010. A NYPA representative, potential NYS solar farm developers, town supervisors, local utilities and industry partners will be invited. TSEC continues to provide this forum for the solar farm developers in order to focus their concerns and needs.
- TSEC actively participated in Mid-Hudson Regional Green Partners meeting and the Ulster County Workforce Development Board meetings to provide advice on the regional training

requirements for green technologies. TSEC has worked with BOCES and regional community colleges on workforce development for manufacturing by linking manufacturers to the training facilities.

- As part of TSEC's leadership role in creating a New York State demand for photovoltaic panels it is developing a core expertise on the creation of utility scale solar farms. TSEC visited the largest solar farm in the Northeast at Merck Pharmaceuticals headquarters located in New Jersey. The visit provided technical and financial data that will be useful in assisting solar farm developers in New York. TSEC facilitated a meeting between a potential solar farm developer and a local banker at Merck Headquarters solar farm. It was concluded that with the current lack of a New York State approach to feed in tariffs and/or renewable energy credits, the farm would take more than 10 years to pay back. Alternatives such as renewable energy bonds and the USDA REAP program are being explored. TSEC coordinated an onsite visit with Sullivan County representatives and a solar panel manufacturer to discuss plans for a 1MW solar farm near a county land fill. The realization of the project is pending financial support. The alternatives being explored in the item above could also influence this activity.
- TSEC hosted a renewable energy industry CEO's conference in October 2009. The CEOs from over twenty companies in the solar electric, solar thermal and associated suppliers were invited. The conference provided the collaborative venue for decision makers to network, share information, and participate in the growing renewable energy cluster in New York State.

Task 3: Solar Solutions

TSEC is developing Solar Solutions for various practical applications. Working with industry and university partners, TSEC analyzes the unique energy requirements and barriers to implementation of solar energy in these applications. The barriers identified often require applied research and novel approaches. TSEC seeks out, advises and manages high profile solar application projects that require key enabling technologies, which may then be developed. TSEC is accessing its university partners to provide these unique solutions and advance solar technology research. These projects are a cross section of real solar implementation problems that, when solved, will create the opportunity for broader use of solar. The expected outcome is the proliferation of solar systems in high visibility installations and greater public awareness and acceptance of the practicality and usefulness of solar energy as a viable means of energy generation. TSEC wishes to acknowledge the State University of New York at New Paltz and the senior electrical engineering students participating in the TSEC Solar Solution Projects. Solar Solution activities provided applied field experience in renewable energy and energy management supplementing traditional studies for senior electrical engineering students. Those students who elected to apply the field work activities to their senior design project received 2 credits in senior design. Several senior design projects have been implemented in Solar Solution projects.

Note agency and entity descriptions participating in Solar Solution Projects were paraphrased from their respective websites.

Project: Beacon on the Hill - Astor Services for Children & Families

Astor Services for Children & Families, a Catholic Charities funded community based, non-profit organization that provides children's mental health services, child welfare services, and early childhood development programs. Astor serves over 6,000 children and families in New York State's Mid-Hudson Valley region and the Bronx.

- Objective: The project involves the Astor home for children and a HUD associated housing complex design. Efforts were being directed at providing renewable energy in a LEED sustainability structure.
- Personnel: The City University of New York, RPI and TSEC are working with the Bronx Community Development Corporation
- Status: TSEC was participating in regular sessions that are being held toward project design. It was anticipated that in the current economic climate this project will take several years to fully evolve.

- Follow on Work: Currently in a re-assessment phase due to the participation of HUD. Project will probably be closed out to focus on the Astor Home Project.

Project: Air National Guard Base at Stewart Airport:

The 105th Airlift Wing of the New York Air National Guard is based at Stewart Air National Guard Base and is located in Newburgh, New York. It's home to the 105th Airlift Wing whose mission is to provide peacetime and wartime inter-theater airlift operations using the C-5A "Galaxy" cargo aircraft. Newburgh is approximately 100 miles due south of Albany, the capital of New York State. The base encompasses 267 acres and contains 36 buildings, amounting to approximately 757,000 square feet.. The day-to-day base population is approximately 660 personnel

- Objective: Explore solar lighting, solar thermal and photovoltaic applications for the Stewart Air National Guard Base.
- Personnel: TSEC, College interns and professors from The State University of New York at New Paltz, independent contractors
- Status:
 - Solar wall approach: Initial assessment of the proposal developed by independent contractor concluded that the solar wall approach was not cost effective. However, a follow on review found errors in this analysis and the updated proposal and analysis was submitted for the Department of Defense organization responsible for base facilities to do their analysis. Solar farm approach: Initial site assessments have been completed.
 - Solar powered street lighting: TSEC personnel and college interns / professors from The State University of New York at New Paltz researched and analyzed the success and failure of solar powered street lighting as a prelude to implementation of alternative energy lighting at the Air National Guard Base at Stewart Airport. The college interns have and written and presented their initial findings.
 - Utility scale solar Farm: Site assessment performed capped landfill potential location of solar farm
- Follow on Work:
 - Solar wall approach: Awaiting the results of the DOD analysis.
 - Solar powered street lighting: Base reviewing proposal.
 - Utility Scale Solar farm approach: Potential funding of activity in process. Preliminary site assessments complete. Prime PV panel manufacturing engaged in the project as well as the engineering / construction firm. Funding has been made available for the site construction through Department of Defense.

Project: Health Alliance - Senior Design Project

Health Alliance is a non-profit healthcare entity providing a wide range of inpatient and outpatient services through the affiliation of three regional hospitals: Benedictine Hospital, Kingston Hospital and Margaretville Hospital located in Ulster and Delaware counties respectively. Service area includes the Hudson Valley and Eastern New York.

- Objective: Implement alternative energy approaches for three regional hospitals Benedictine, Kingston and Margaretville
- Personnel: TSEC, College interns from SUNY New Paltz, independent contractors and hospital personnel
- Status: HRSA funding approved for a proposal with a combination of transportation, solar thermal, LED lighting and solar signage. Hospitals administrating procuring process to purchase equipment and construction services. Realization of the project will begin 1Q10.
- Follow on Work: Renewable energy approaches are being implemented. LED and solar thermal applications were recommendations generated from senior electrical engineering student design projects

Project: SUNY New Paltz Solar Race Car - Senior Design Project

State University of New York (SUNY) at New Paltz is a regional state-assisted university college for liberal arts / professional studies, serving approximately 7,000 undergraduate and 1,500 graduate

students a semester. SUNY at New Paltz is located in the scenic Hudson Valley of New York State. In 2007, the electrical engineer department formed a Solar Car Student organization.

- Objective: Enable SUNY New Paltz students to apply electrical engineering and solar energy skills to the building and racing a solar race car.
- Personnel: TSEC, a solar car build consultant and a professor and students from The State University of New York at New Paltz
- Status: One car was upgraded and a student team successfully competed in the Formula Sun, Collegiate Solar Car Race in Cresson, TX placing 6th in a field of 11 competitors. A second car will be used in 2010 and is in the process of being built. Initial funding in place from student activities fund. Two cars are to be used in the project. A donated one was upgraded to be used in the 2009 activities. The second one to be used in 2010 is being constructed. Ulster BOCES is completing the frame build.
- TSEC personnel are facilitating the student, BOCES and private industry activity.
- Follow on Work: Complete build of the second car. Prepare for the 2010 solar car competition. TSEC continues to provide technical assistance and industry support to the effort. The solar car effort has generated considerable interest and opportunities for outreach and educational activities about solar energy are being planned.

Project: Veritas Villas

Veritas Villa is an inpatient rehabilitation and wellness center for chemical dependency and alcoholism. The treatment facility is located in Kerhonkson, NY.

- Objective: Determine if alternative energy recommendations can be made to reduce energy usage at the aging rehab facility.
- Personnel: TSEC, SUNY New Paltz students and independent contractors
- Status: Detailed analysis completed and proposal has been submitted for a solar thermal approach. Feasibility study of renewable energy opportunities and recommendations completed and shared with Veritas Villa.
- Follow on Work: Actions on submitted proposal are awaiting the availability of funds. No further activity

Project: Ulster County Law Enforcement Center (UCLEC): County Jail.

UCLEC is the county owned jail and its rated capacity is 426 inmates being supervised by 153 mandated security staff. Currently inmates are being boarded-in from surrounding counties and other New York State counties, which earns additional revenues for Ulster.

- Objective: Determine if alternative energy recommendations can be made to reduce energy usage at the jail facility.
- Personnel: TSEC, SUNY New Paltz students and independent contractors
- Status: Site visits have been completed. Contractor proposals have been presented to the jail administration. Solar thermal and LED light were recommended
- Follow on Work: Implementation is pending the availability of funds. No further activity

Project: Onteora Central School District

Onteora Central School District provides Northwestern Ulster County k-12 public education in 5 schools, Onteora High School, Onteora Middle School, Bennett Elementary School, Phoenicia Elementary School and Woodstock Elementary School. Student enrollment k-12 approximately 1,700.

- Objective: Work with the school district to educate teachers and administrators on solar energy and determine where alternative energy solutions can be applied to reduce energy costs and involve student participation where appropriate.
- Personnel: TSEC, SUNY New Paltz students, independent contractors
- Status: Education sessions were held in December 2008. Energy usage assessments have been delayed.
- Follow on Work: Awaiting further input from the school district. Continued discussions. Evaluation visit scheduled for 1Q10 to determine project scope. TSEC would like to continue efforts toward educational and outreach activities with the school district beyond the renewable energy and energy conservation project

Project: Hudson River Sloop Clearwater

Hudson River Sloop Clearwater, Inc. is a 501(c)3 tax exempt nonprofit, member- supported corporation whose mission is to preserve and protect the Hudson River. As an organization, Clearwater believes its innovative environmental programs, advocacy and celebrations will continue to inspire and energize the next generation of environmental leaders.

- Objective: Develop a camp for students/campers to learn about devices that contribute to energy conservation and to actually see the devices applied in a practical setting
- Personnel: TSEC, independent contractors, Clearwater employees and LED lighting and solar thermal industry partners
- Status: Requirements for LED lighting and solar thermal approaches defined. Proposed solutions developed by independent contractors.
- Follow on Work: Follow on work pending the availability of funds. TSEC would like to continue efforts towards educational and outreach opportunities with HRSC beyond the renewable energy and energy conservation project

Project: Center for Discovery

The Center for Discovery is a non-profit organization that offers adult and pediatric rehabilitation programs for disabled individuals. The Center for Discovery offers individuals with a range of disabilities and medical frailties - and their families -innovative educational, clinical, residential and social and creative arts experiences designed to enrich their lives through personal accomplishment.

- Objective: Apply energy conservation techniques to reduce costs at the facility.
- Personnel: TSEC, independent contractors, Center employees, and solar thermal partner
- Status: Site visits made. Photovoltaic and solar thermal proposals have been made by independent contractors and submitted to the Center.
- Follow on Work: Obtain an independent contractor proposal for lighting. Solar follow on work pending the availability of funds. The Center applied for NYSERDA RPF 1613 ARRA funds but was declined. Any additional renewable energy implementation would be expanding upon existing solar thermal and solar electric systems.

Project: New York State Bridge Authority – Hudson Valley Region.

A New York State agency, the New York State Bridge Authority maintains and operates the vehicle crossings of the Hudson River entrusted to its jurisdiction for the economic and social benefit of the people of the state. The area includes the following five bridges - Bear Mountain Bridge, Newburgh Beacon Bridge, Mid-Hudson Bridge, Kingston / Rhinecliff Bridge and the Rip Van Winkle Bridge with over 58 million combined crossings per year.

- Objective: Assess application of solar thermal techniques and LED lighting to Bridge Authority facilities.
- Personnel: TSEC, independent contractors, Bridge Authority employees and industry lighting partner
- Status: Solar thermal proposal have been submitted for buildings at the Kingston-Rhinecliff and the Mid-Hudson Bridges. A NYSERDA grant submission has been made for this activity. LED lighting demonstration lighting has been installed for evaluation. .
- Follow on Work: Assess the LED lighting energy consumption and reliability. Solar thermal follow on work pending the availability of funds. Demonstration LED lighting in place and under evaluation by the Bridge Authority.

Project: New York State Gas and Electric (NYSEG)

A New York State Agency, NYSEG is a gas and electric provider for parts of upstate and across southern New York

- Objective: Apply energy conservation techniques to reduce costs at NYSEG facilities.
- Personnel: TSEC, independent contractors, NYSEG employees, and industry lighting partner.
- Status: Identified initial focus on LED lighting. Commitment obtained for the delivery of a demonstration LED light set up.

- Follow on Work: Install lighting and do an efficiency and reliability evaluation on LED lighting pending the availability of LED demonstration fixture.

Project: Saratoga County Building Solar Thermal Array:

Saratoga County Town Supervisors

- Objective: Replace or repair non-functioning 30 year old solar thermal array on a county building
- Personnel: TSEC , County personnel, Ballston Spa public works and solar thermal industry partner
- Status: TSEC proposal made to replace the current 140 non-functioning panels with 70 new technology panels.
- Follow on Work: No funding available to complete work

Project: Oakwood Friends School

Oakwood Friends School is New York State's oldest co-educational boarding and day school. It is an independent, college preparatory school serving grades 6-12. non-profit organization. their student body numbers 180 and includes day students as well as five and seven-day boarders from six states and five countries

- Objective: Explore the feasibility of an efficient solar implementation at the school
- Personnel: TSEC and independent contractor
- Status: Initial assessment is that due to heavy tree cover on the property the feasibility doing an efficient solar implementation at the school is minimal.
- Follow on Work: Assess whether a SUNY New Paltz student project could develop an approach that would show an efficient solar system could be designed for the location. This project visit planned in 1Q10.

Project: City Newburgh, NY: Liberty Street Project

City of Newburgh officials

- Objective: Implement solar powered decorative lighting on trees lining Liberty Street in downtown Newburgh
- Personnel: TSEC, SUNY New Paltz students, local realty company representative, and industry lighting partner.
- Status: Analysis completed and presented to City personnel
- Follow on Work: City approval is required for \$3,000 to be spent on prototype lighting. SUNY New Paltz students will do the assessment of the prototype. A successful assessment will lead to a \$30,000 expense to complete the project. TSEC is working with City representatives to better define a project plan for completion.

Project: Ulster County Resource Recovery Agency

Ulster County Resource Recovery Agency is the Ulster County recycling and transfer station closed landfill (capped)

- Objective: Implement alternative energy techniques to save energy costs
- Personnel: TSEC, Agency personnel, independent contractor
- Status: Project focused on replacing Metal Halide lighting with new efficient LED fixtures. Components to use were identified and energy savings were analyzed. The project cost is projected at between \$200 and 300K.
- Follow on Work: LED cost and payback time made the recommendation not feasible. However discussions continue for the implementation of a utility scale solar electric farm on the capped landfill. TSEC is exploring the possibility with the agency utilization of capped landfill as solar farm site.

Project: West Point Military Academy

The Academy is located approximately 50 miles north of New York City on the Hudson River. Renowned as the world's premier leader development institution, West Point accomplishes its [mission](#) by developing

cadets intellectually, physically, militarily, ethically, spiritually, and socially. The student body, or Corps of Cadets, numbers 4,400 and each year approximately 1000 cadets join the [Long Gray Line](#) as they graduate and are commissioned as a second lieutenant in the U.S. Army.

- Objective: Develop alternative energy road map for the campus
- Personnel: TSEC, West Point Garrison personnel
- Status: Continued discussions on renewable energy options and preliminary renewable energy roadmap developed
- Follow on Work: Site visit planned 1Q10, site and energy analysis to be performed.

Project: Mohonk Mountain House

Surrounded by thousands of acres of unspoiled forest and winding trails, this seven-story New York castle has successfully maintained its distinct 19th-century character into the 21st century. Secluded and unspoiled, this historic New York hotel offers a haven of charm and grace nestled in pristine wilderness. Designated as National historic landmark, holds an honorary membership to historic hotels of America. Mohonk has received recognition by the United Nation's Environment Programme.

- Objective: Review Energy Plan consultation to focus on Solar PV, Thermal and Lighting and a variable speed control for existing geothermal pumps.
- Personnel: TSEC, Mohonk and LED Manufacturer partner
- Status: Mohonk Mountain House applied for NYSERDA grant – denied, in discussions with LED manufacturer for energy efficiency lighting solutions
- Follow on Work: TSEC role complete

Project Wright's Apple Farm: -Senior Design Project

Wright's apple farm is an apple orchard located in Gardiner New York. In operation since 1903, the first commercial apple orchard was planted 1910, mostly in Macintosh. The farm also has bakery and farm stand and is family owned and run.

- Objective: Assist the farm in reducing utility expenses through energy efficiency and renewable energy means
- Status: The apple orchard was assessed for methods of reduction of significant energy usage. State University of New York at New Paltz senior electrical engineering students and volunteers from the International Brotherhood of Electrical Workers analyzed the energy consumption of the farm and recommend a renewable energy solution.
- Follow on Work: A geothermal solution was recommended to provide lower cost cooling for three temperature controlled apple storage bins. In addition, the electrical engineering students designed a unique energy management controller, controller donated by Opto22, to regulate the energy demand to reduce operating costs. A case study of the work may be found on Opto 22 website. The orchard explored funding sources for the capital investment required to implement the suggested renewable energy implementation.

Project: Mt. St. Mary's College Energy Improvements

Mount Saint Mary College is a private, 4-year liberal arts college in Newburgh, in the beautiful Mid-Hudson Valley region of New York State. Founded by the Sisters of Saint Dominic in 1960, the Mount is celebrating its 50th anniversary as a 4-year college in 2010. Mount Saint Mary College offers students an affordable liberal arts education with over [50 academic programs](#) and [3 graduate degree programs](#).

- Objective: Determine if alternative energy recommendations can be made to reduce energy usage in the pool area in as part of a residence hall restoration project.
- Personnel: TSEC, independent contractor
- Status: Analysis has completed and a proposal has been submitted to the college.
- Follow on Work: College personnel are reviewing the proposal to determine their next steps. The College not pursuing proposal at this time

Project: Orange Regional Hospital

Orange Regional Medical Center (ORMC), is a 501(c)(3), non-profit organization. Formed by the merger of Arden Hill Hospital and Horton Medical Center, Orange Regional provides 450 beds and employs over 2,400 healthcare professionals. Over 550 doctors hold privileges at the hospital and treat thousands of area families, friends and neighbors. In addition to two main hospital campuses, Orange Regional provides several outpatient locations. The largest outpatient facility, the Orange Regional Medical Pavilion in the Town of Wallkill, offers both outpatient surgical and diagnostic services and private physician offices.

- Objective: Determine if alternative energy recommendations can be made to reduce energy usage in new projects at the hospital.
- Personnel: TSEC, Orange County Community College administration.
- Status: Kickoff meeting held.
- Follow on Work: Reviewed materials supplied by TSEC, no funding available for renewable energy opportunities.

Project: Port Authority of New York and New Jersey

The Port Authority of New York and New Jersey manages bridges, tunnels, airports and transit in New York City and Northern New Jersey

- Objective: Determine if alternative energy recommendations can be made to reduce energy
- Personnel: Port Authority personnel, Airport Management, TSEC, TSEC industry partners
- Progress: Several meetings held with local PA airport management and TSEC to establish goals. Follow up meeting with PA procurement, engineering, and energy staff and TSEC and several TSEC partner companies included a presentation by PA on how to do business with them, a detailed airport tour, and a brainstorming session on renewable product deployment possibilities for the airport. A list was made and published.
- Status: A solar sign, 2 area small solar lights in a small park area, and 2 solar street/highway lights are all being piloted at the airport .Airport manager and PA executive have committed to release an RFP soon for some solar equipment purchases.
- Follow on Work: TSEC to continue to drive projects at Stewart and assist with product specification through the PA RFP process.

Additionally, there are projects associated with the New York State Office of General Services and the Norfolk Southern Railway Systems that were previously reported. The associated entities are currently working these projects internally and have them at various stages of consideration. TSEC involvement has not continued.

Task 4.0 TSEC Operations:

TSEC will provide responsible project administration which includes: legal, financial, seeking out cost share partners, marketing and project management in support of all the tasks listed above. The expected outcome is efficient use of all TSEC and extended resources.

- TSEC has provided responsible project administration

Task 5.0 Project Management and Reporting:

Reports and other deliverables will be provided in accordance with the Federal Assistance Reporting Checklist following the instruction included therein.

- Reports and other deliverables have been provided in accordance with the FAR checklist with the exception of Final close out documents uploaded beyond due date- uploaded May 1, 2010.

Plans for Next Quarter:

This congressionally directed award was completed mid December 2009.

Patents: None

Publications/Presentations June 2008 – December 2009

TSEC Public Presentations and Press Conferences 2nd & 3rd Quarter 2008:

- TSEC announces University Partners Press Conf. New Paltz, NY (1/08)
- “Green Jobs and the Solar Industry in NYS”, Hudson Valley Center for Innovation Entrepreneurs breakfast seminar, Kingston, NY (1/08)
- Prism Solar Technologies Press Conf. Kingston, NY (2/08)
- TSEC collaboration with CUNY Press Conf, Bronx, NY (2/08)
- “TSEC and Solar Energy in NYS”, Greater Southern Dutchess Chamber of Commerce, Fishkill NY (2/08)
- “TSEC Projects” Ulster County Legislature, Kingston New York (3/08)
- “Solar Energy and Engineering” Society of Women Engineers, SUNY at New Paltz (4/08)
- “Solar Energy in NYS, TSEC’s Role” NYC Housing Preservation Development Authority, New York City (4/08)
- “TSEC Resource Team Presentation”, SUNY at New Paltz (4/08)
- “Solar Energy in NYS, TSEC’s role”, Hudson Valley Green Fair (4/08)
- “Solar Energy in NYS, TSEC’s Role” Panel discussion, Solar Summit, NYC (6/08)
- Solar Thin Films announcement Press Conf. Kingston, NY (8/08)

TSEC Public Presentations and Press Conferences 4th Quarter 2008

- Vince Cozzolino was the featured speaker at the Dutchess Regional Chamber of Commerce breakfast Poughkeepsie, NY (10/15/08)
- Attended the “Green Jobs” Saugerties Workforce Development Conference Saugerties, NY (10/16/08)
- Attended the Annual CAMP (Center for Advanced Materials Processing) Technical Symposium “Solar Energy Developments” Clarkson University Potsdam, NY(10/16/08)
- SUNY New Paltz School of Business kickoff Leadership Institute Dinner TSEC was the featured speaker New Paltz, NY (10/22/08)
- “TSEC Projects” were presented to the Ulster County Economic Development Committee Kingston, NY (10/22/08)
- Participated on the panel at the Continuing Education Association of NY Annual Conference, Verona, NY (11/13/08)
- Attended SUNY New Paltz “Power Energy Conference” New Paltz, NY (11/14/08)
- Vince Cozzolino was the featured speaker at the Ulster County Chamber of Commerce breakfast Kingston, NY(11/18/08)
- Attended the “Agricultural Renewable Energy Forum” Kingston, NY (12/3/08)
- 100.7 WHUD Dutchess County Chamber of Commerce radio show interviewed Vince Cozzolino, Beacon, NY (12/9/08)
- Arranged, coordinated and participated in a meeting held at the Onteora School District with school board members, educational staff and facilities personnel.

TSEC Public Presentations and Press Conferences 1st Quarter 2009

- Vincent Cozzolino gave a presentation at the SUNY Orange Emerging and Converging Technologies: SUNY Orange Science & Technology Summit (1/15/09)
- Michael DiTullo/Alan Lemberger attended Economic Development Summit in Hyde Park, NY. (1/26/09)
- John Harrington gave a presentation at the Environmental Consortium of HV Colleges & Universities (2/13/09)

TSEC Public Presentations and Press Conferences 2nd Quarter 2009

- Vincent Cozzolino spoke at the Greater Southern Dutchess County CEO Exchange (4/1/09)
- John Harrington gave Solar Energy presentations to 5 classes at Pine Bush Middle School (4/8/09)

- Vincent Cozzolino spoke at the Orange County Citizen's Foundation Prospering in a Green Economy Preparing Hudson Valley Communities for Energy-Efficient Growth and Industry Conference
- Petra Klein spoke at Dutchess Youth Career Works/Marist Liberty Partnership Career (4/16/09)
- Vincent Cozzolino speaks at Prism Press Conference (4/20/09)
- Frank Falatyn presented to the Ulster County Economic Development Committee (4/22/09)
- Vincent Cozzolino spoke at the "Opportunity Knocks: Creating a Green Workforce in the Hudson Valley," conference. (4/29/09)
- Vincent Cozzolino gave a presentation to the Ulster County Ways and Means Committee (5/13/09)
- Vincent Cozzolino gave a presentation to the Ulster County Legislature (5/13/09)
- TSEC held a Legislative Briefing. Michael DiTullo hosted the meeting and Vincent Cozzolino was the main presenter. (5/18/09)
- Vincent Cozzolino gave a presentation to Mid Hudson Society of Women Engineers Presentation (5/19/09)
- John Harrington spoke at the Ulster Council of MoveOn Clean Energy Jobs Day at Prism (5/28/09)
- Vincent Cozzolino spoke at Mid Hudson Valley Networking Alliance (6/9/09)
- Vincent Cozzolino spoke at the Orange County Chamber of Commerce breakfast (6/10/09)
- Frank Falatyn spoke at a Kiwanis Meeting (6/15/09)
- Michael DiTullo attended Career Pathways partnership Orange-Ulster BOCES at the Career & Technical Education Center in Goshen, NY (6/22/09)
- Vincent Cozzolino presented to the Ulster County Economic Development and Housing, Planning & Transit Committees(6/24/09)

TSEC Public Presentations and Press Conferences 3rd Quarter 2009:

- Vincent Cozzolino participated in the WKNY Ask the Experts in Kingston, NY (7/16/09)
- Vincent Cozzolino spoke at the Prism Solar Technology press conference in Highland, NY (8/11/09)
- Katie McKeon attended the Governor's College on Energy at Marist College, Poughkeepsie, NY 12601 (8/11/09)
- Wendy Arienzo, Bill Cox and Kyle DeFalco, gave at presentation on lighting at Newburgh City Hall (9/16/09)

TSEC Public Presentations and Press Conferences 4th Quarter 2009:

- Dr. Wendy Arienzo, Executive Vice President R & D TSEC, Overview of Photovoltaics, State University of New York at New Paltz (10/09/09)
- Dr. Wendy Arienzo, Executive Vice President R & D TSEC, Introduction to TSEC and Overview of Solar Research Needs – Solar Day, State University of New York at Binghamton, NY (10/15/09)
- TSEC hosted a Hudson Valley renewable energy CEO conference moderated by Vincent Cozzolino, CEO and President TSEC, in Kingston, NY (10/19/09)
- TSEC participated in the Solar Thermal Consortium Conference moderated by Vincent Cozzolino, CEO and President TSEC, in Kingston, NY (10/20/09)
- Vincent Cozzolino, CEO and President TSEC, Solar Technology and Jobs at St. Mary's School in Wappingers Falls, NY (10/21/09)
- Bill Cox, Director of Projects TSEC, Sustainable Energy Manufacturing and Use, Workshop on the Hudson River Quaricentennial (10/22/09)
- Vincent Cozzolino CEO and President TSEC, Renewable Energy Options, Hudson Valley Green Real Estate Conference in Kingston, NY (10/28/09)
- Vincent Cozzolino CEO and President TSEC, participated in the SUNY New Paltz Solar Car Sponsor dinner in New Paltz, NY (11/12/09)
- Publication: Dr. Wendy Arienzo, McKinsey Quarterly on Solar Energy – Commentary (11/09)

- Vincent Cozzolino, CEO and President TSEC, Moderator panel discussion at the Taiwan Renewable Energy Conference - Taipei Econ and Cultural office in New York, New York (11/30/09)
- Vincent Cozzolino, CEO and President TSEC, panel discussion at the Hudson Valley Council Conference at the Carey Institute of Ecosystem studies (12/4/09)

Travel (not all inclusive, most relevant travel listed)

TSEC Travel 2nd & 3rd Quarter 2008

WIREC 2008 – Washington International Renewable Energy Conference

- March 4 – 6, 2008
- 4 personnel sent
- Attended Exhibition and lectures. Made contacts with solar industry leaders to find opportunities to collaborate to further enable manufacturing and advance Solar Innovation.
- Washington DC

DOE Golden Field Offices

March 25 – 27, 2008

- 2 personnel sent
- Met with DOE personnel with respect to current award, reviewed completed application. In support ongoing operations and project management and reporting. Met with Solar lead at NREL to establish contact there to further Solar Innovation.
- Golden, Colorado

Prism Solar Technologies Research Facility

May 13 – 17, 2008

- 2 personnel sent
- Met with researchers at the Prism facility in Tucson and performed due diligence of site / facility and research. Met with the University of Arizona and the City of Tucson to discuss potential cross country solar innovation collaboration opportunities. Both NYC and Tucson are Solar America Cities. The due diligence visit to Prism facility is part of project management and reporting. The site visits to the University of Arizona and contacts established helps to advance Solar Innovation.
- Tucson, Arizona

European Photovoltaic Solar Energy Conference and Exhibition

- August 31 – September 5
- 2 personnel sent
- Attended conference lectures, exhibitions and poster sessions. Met with researchers, universities and solar industry leaders to advance solar innovation
- Valencia, Spain

TSEC has 6 university partners across New York State

- 1 -2 Universities are visited Monthly
- 1 -2 personnel sent
- Meet with University partners and researchers to collaborate on joint solar projects. Review and assess current solar research and further collaboration with industry partners to advance solar innovation and enable manufacturing
- Binghamton University - Potsdam, City University of - New York New York City, Rensselaer Polytechnic Institute- Rensselaer, Binghamton University - Binghamton, State University of New York - New Paltz, Cornell University - Ithaca,

TSEC Travel 4th Quarter 2008

2008 Workshop on Photovoltaics, Arizona Research Institute for Solar Energy, Rio Rico, AZ

- October 28-31, 2008
- 1 personnel sent
- Attended exhibition and lectures. Made contacts with both solar industry representatives and academia to further advance solar innovation

RPI Lighting Research Center

- November 8, 2008
 - Toured facility
 - Researched solar lighting technology
- RPI / Building Integration PV NYC
- November 14, 2008
 - Researched PV technology
- NYSTAR Energy CAT Annual Review
- Meeting Rensselaer Polytechnic Institute Center for Future Energy Systems Troy, NY (12/9/08)
- TSEC has 7 university partners across New York State
- 1 -2 Universities are visited Monthly
 - 1 -2 personnel sent
 - The university partners are City University of New York ,Clarkson University, Cornell University, Rensselaer Polytechnic Institute, Rochester Institute of Technology, SUNY Binghamton, and SUNY New Paltz,
- TSEC Travel 1st Quarter 2009**
- Meeting with DOE Program Management, Washington DC
- January 14-15, 2009 (John Harrington, Ben Klein)
 - 2 TSEC attendees
 - Discussions held on the Lumeloid project
- Project Status/Opportunity Discussions, Washington, DC
- January 21-23 2009
 - 2 TSEC Attendees (Vincent Cozzolino/Petra Klein)
 - Discussions held on status of current TSEC activities and the potential for TSEC's involvement with Norfolk Southern Railroad.
- Energy Storage Projects, Binghamton, NY
- February 11, 2009
 - 2 TSEC Attendees (John Harrington/Ben Klein)
 - Discussions with Binghamton University and REDI on approaches to energy storage development.
- Meetings with Congressman John Hall's Staff, Goshen, NY
- February 19, 2009
 - 1 TSEC Attendee (John Harrington)
 - Discussions held on the Lumeloid project
- Department of Energy Peer Review, Denver, Co
- March 8- 11, 2009
 - 2 TSEC Attendees (Vincent Cozzolino/Petra Klein)
 - Presented TSEC's accomplishments to peer reviewers
 - Attended other peer review sessions and presentations. Made contacts with others in solar industry and academia.
- Project Development Sessions, Washington, DC
- March 19-20, 2009 (Vincent Cozzolino/Petra Klein/Caitlin Shuster)
 - 3 TSEC Attendees
 - Held discussions with Assistant Secretary of the Army
 - Met with personnel from US Federal Bureau of Prisons
 - Met with the US DOE personnel from the Solar Energy Technology Program, the Energy Efficiency and Renewable Energy Program and the Solar Energy Technology Program.
- University Relations Discussions, New York, NY
- March 19, 2009
 - 2 TSEC Attendees (Frank Falatyn/John Harrington)

- Discussed potential ways of TSEC and RPI CASE working together to commercialize emerging architectural solar energy technologies.

TSEC Travel 2nd Quarter 2009

Clarkson University

- NYSERDA Meeting
- April 2-3, 2009
- VP of R & D

New York, NY

- 1st German American Energy Efficiency Conference
- April 10, 2009
- VP of R & D

Albany, NY

- New York State Advanced Battery Consortium (NYS ABC) Meeting
- April 20, 2009
- Research Associate

Washington DC

- National Academy of Sciences The Future of Photovoltaic Manufacturing in the United States Conference
- April 22-23, 2009
- CEO and VP Operations

New York, NY

- High Bridge Project
- May 4, 2009
- VP of R & D

New Paltz, NY

- SUNY NP Engineering Senior Design presentations
- May 8, 2009
- CEO, VP Operations, VP of R & D, Projects Manager

TSEC Travel 3rd Quarter 2009

West Point, NY

- Discussions at the United States Military Academy
- July 6, 2009
- Vincent Cozzolino, Petra Klein

New York, NY

- New Energy Symposium Clean Energy Investment Presentations
- NY Academy of Sciences
- July 8-9, 2009
- John Harrington

Poughkeepsie, NY

- Discussions with Metro-North Railroad and MTA on the feasibility of installing Solar PV, LED lighting and Solar Signage at the Poughkeepsie Station.
- July 15, 2009
- John Harrington, Ben Klein and Caitlin Shuster

New York, NY

- Meetings with Solar Companies in NYC
- July 23-24, 2009
- Vincent Cozzolino

Albany, NY

- Meetings with NYSERDA on the MNR/MTA project
- July 31, 2009
- John Harrington and Ben Klein

Ballston Spa, NY

- Presentation at the Saratoga County Board of Supervisors, 40 McMaster Street,
- August 10, 2009
- Vincent Cozzolino and Petra Klein

Lake Konica, NY

- Discussions with Sullivan County subdivision group on incorporating renewable energy into homes,.
- August 17, 2009
- John Harrington

Albany, NY

- Meeting with NYS Thruway engineers on Solar PV installations alternatives
- August 19, 2009
- John Harrington and Ben Klein

Putnam County, NY

- Meeting with Entergy to initiate collaboration on solar farm development
- September 15, 2009
- John Harrington and Ben Klein

Hamburg Germany

- 24th Annual European Photovoltaic Conference,
- September 19 – 26, 2009
- Vincent Cozzolino, Petra Klein

New York, NY

- New York City Solar Summit
- September 25, 2009
- Wendy Arienzo and John Harrington

Albany NY

- Meeting with NYSERDA and IBM to discuss ways to drive cost solar electricity to \$.05 a KW/h
- September 28, 2009
- Vincent Cozzolino

TSEC Travel 4th Quarter 2009

New York, New York

- Discussion with thin film solar manufacturer about the state of the industry and TSEC
- 10/12/09

Albany New York, College of Nanoscale Science and Engineering

- Discussions for collaborative work
- 10/19/09 and 11/23/09

New York, New York

- Meetings with International photovoltaic equipment manufacturer and NYS economic development international staff for possible location of pilot manufacturing line in NYS
- 11/5/09

Cranberry, New Jersey

- Discussion with novel high efficiency solar cell manufacturer for potential collaborative work
- 11/11/09

Stony Brook, New York

- Attendance to Advanced Energy Meeting
- 11/18-19/09

Status Summary Tables:

Update the attached Excel spreadsheet "Qtrly Report Template_Part 2". Note there are 3 tabs for all work through the reporting quarter.

Please note: The Excel file MUST be submitted in Excel and uploaded with the quarterly report. It may not be write-protected or converted to PDF.

Patents: None