WTEC

Renewable Energy Innovation

Tri-State Solar Wind, LLC
STF Group Inc.
WTEC

1140 RXR Plaza, Uniondale, NY, 11556

Phone: (516) 341-7787

WTEC
Renewable Energy Innovation

STF Group Inc.
"Protecting Tomorrow's Environment Today."

- STF Group is a clean technologies firm focused on commercial, municipal, and utility scale renewable energy generation; energy harvesting and energy efficiency products
- Synergistic Business Divisions
  - Co-manufacturing agreement with Suniva
  - Patented off-grid solar tracking lighting systems
  - Fiberglass reinforced plastic storage and shipping technology.

WTEC
Renewable Energy Innovation

What are the benefits of solar?

- Fills Utility needs for peak power generators
- Scale offers higher reliability factor with minimal effects on grid
- Output can be increased or decreased in short period of time.
- Fuel is free, requires no transport; No post generation waste management.
- No post construction fuel price fluctuations; Simple & reliable budgeting and planning.
- Assists utilities in meeting state and federal renewable energy portfolio standards
- Less environmentally intrusive; siting closer to load centers.

WTEC
Renewable Energy Innovation

Environmental Impacts from the Installation and Operation of Large Scale Solar Power Plants

- Relative to Traditional US Power Generation
- Human Health and Well-Being
  - Reduced Exposure to Hazardous Chemicals, Emissions, and Noise
  - Increased Recreational Resource Quality
- Wildlife and Habitat
  - Reduced Exposure to Hazardous Chemicals, Physical Damages
  - Improved Habitat
- Land Use and Geo-Hydrological Resources
  - Solar Power Plant occupies less land per kW than traditional power
  - Land transformation rate of solar power is lower
  - Reduce Soil Erosion, Surface Runoff, Waste Management Ground Water
- Climate and Greenhouse Gases
  - Reduction Carbon Dioxide and other Green house gas emissions

Elsevier, Renewable and Sustainable Energy Reviews 15 (2011) 3261-3270
Environmental Impacts from the Installation and Operation of a Large Scale Solar Power Plant
Damon Turney, Vasilis Fthenakis, National Photovoltaic Environmental Research Center, Brookhaven National Laboratory

WTEC
Renewable Energy Innovation

Environmental Impacts from the Installation and Operation of Large Scale Solar Power Plants

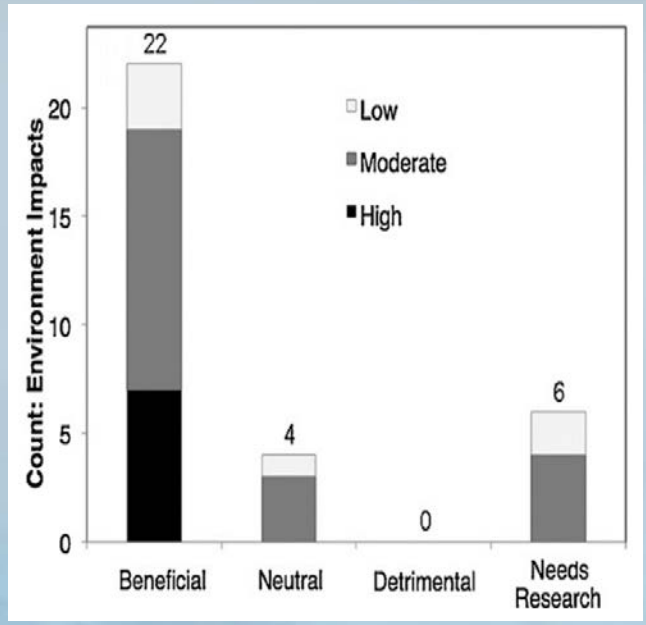
Conclusion: Of the Studies 32 Identified Environmental Impacts of Solar Power Plants

Reduced environmental impact relative traditional power generation

- 32 environmental impacts for solar power plants
- 22 are beneficial relative to traditional power generation
- 4 are neutral
- None are detrimental
- 6 need further research

All high-priority impacts are favorable to solar power

All detrimental impacts from solar power are of low priority



Environmental Impacts from the Installation and Operation of a Large Scale Solar Power Plant: Damon Turney, Vasilis Fthenakis, National Photovoltaic Environmental Research Center, Brookhaven National Laboratory
Elsevier, Renewable and Sustainable Energy Reviews 15 (2011) 3261-3270

WTEC
Renewable Energy Innovation

Benefit Of Having Multiple Solar Farms In West Virginia

Cost efficiency during peak power usage times.

Opportunity to accelerate the diversification of energy mix; avoided cost of generation pertaining to impending regulation.

Economic Development: Infrastructure development, use of local business and labor, education opportunities, job creation.

Leadership: Complements West Virginia's role in providing the nations energy generation needs.

Increased environmental and health benefits; increased social visibility and awareness of the benefits of solar.

WTEC
Renewable Energy Innovation

Cost vs the Actual pricing in West Virginia: Challenges

Development cost historically a major roadblock to solar power being adopted more commonly.

Integration of solar energy into Utility portfolio is price constrained.

No incentives offered by the State or by the serving utility.

Financing heavily reliant on 30% federal Income Tax Credit (ITC) incentive.

WTEC
Renewable Energy Innovation

Answers: Cost Reduction and Utility Adaptation Incentives

Third Party Tax and Private Equity Investment.

Sale of Renewable Energy Credits (RECs).

Leveraging of the West Virginia Economic Development Authority (WVEDA) direct loan program for fixed assets meet job creation criteria; includes renewable energy project.

EPA Revolving Loan Fund (RLF) grants.

Expected electrical rate increases will improve the economics of a solar PV generation plant.

Term based Power Purchase agreement for fixed pricing; hedges against rate increase and energy market volatility.

WTEC
Renewable Energy Innovation

West Virginia's Alternative and Renewable Energy Portfolio Act

Encourages the development of efficient, lower-emitting & reasonably priced alternative and renewable energy resources to:

- Develop a robust and diverse portfolio of electric-generating capacity.
- Support the continued success in attracting new businesses and jobs.
- Use WV alternative and renewable energy resources to meet current/impending gov't environmental standards.

Establish a system of tradable credits awarding Utilities:

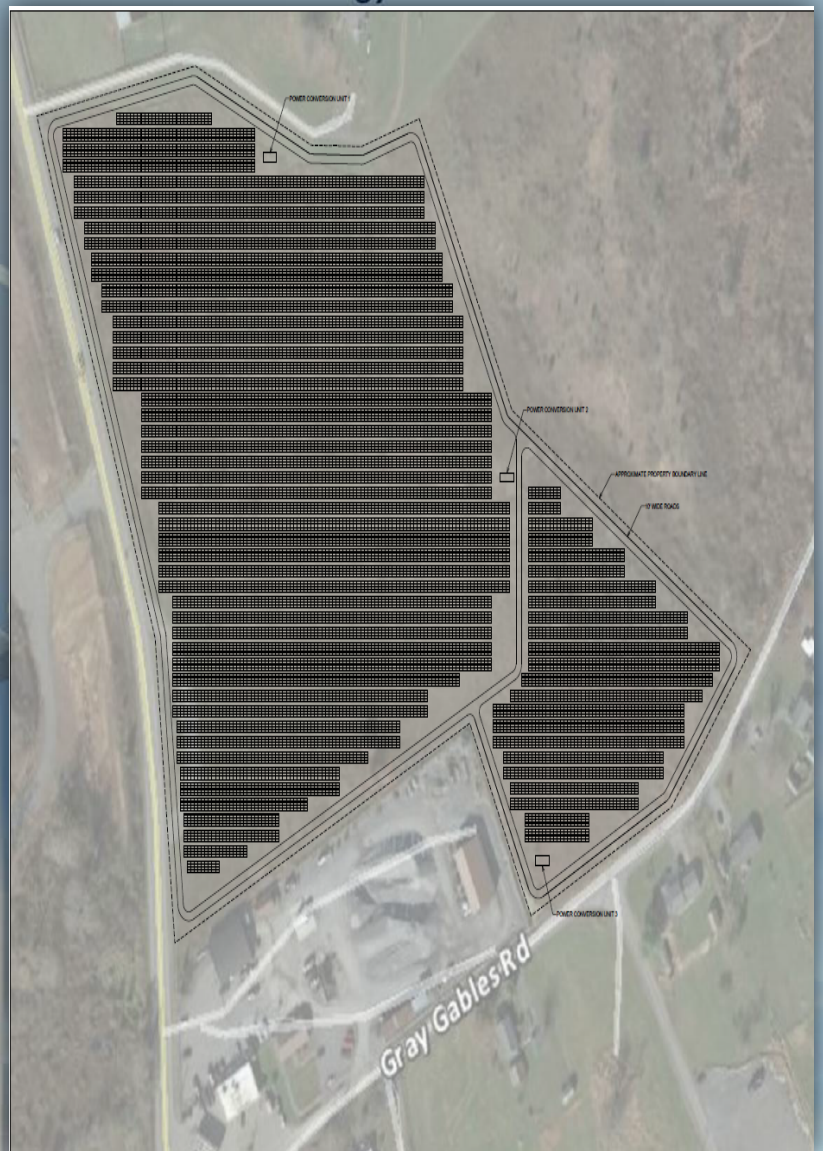
- two (2) credits for each MWh of electricity generated or purchased from a renewable energy resource facility
- three (3) credits for each megawatt hour of electricity generated or purchased from a renewable energy resource facility sited upon a reclaimed surface mine.

Establishes "Alternative and Renewable Energy Resources Research Fund."

- Administered by the Public Service Commission and the Division of Energy
- Matching grants for demonstration, commercialization, research and development projects.

WTEC

Renewable Energy Innovation



Crawley, WV: System Summary

Type of Generating Unit:	**Grid Connected Solar PV**
5.724 MW DC	**1.403 DC / AC RATIO**
72 Fixed Rows, 10 tilt Angle, 0 Azimuth	**17.5' ROW SPACING FROM FRONT OF ONE PANEL TO THE FRONT OF THE PANEL IN THE NEXT ROW**
4 MODULES, LANDSCAPE ORIENTATION	**2,385 W 6x8.5 PILES [APPROX. 1 PILE FOR EVERY 8 MODULES]**
16.07 ACREAGE [APPROX.]	

PV Array Characteristics

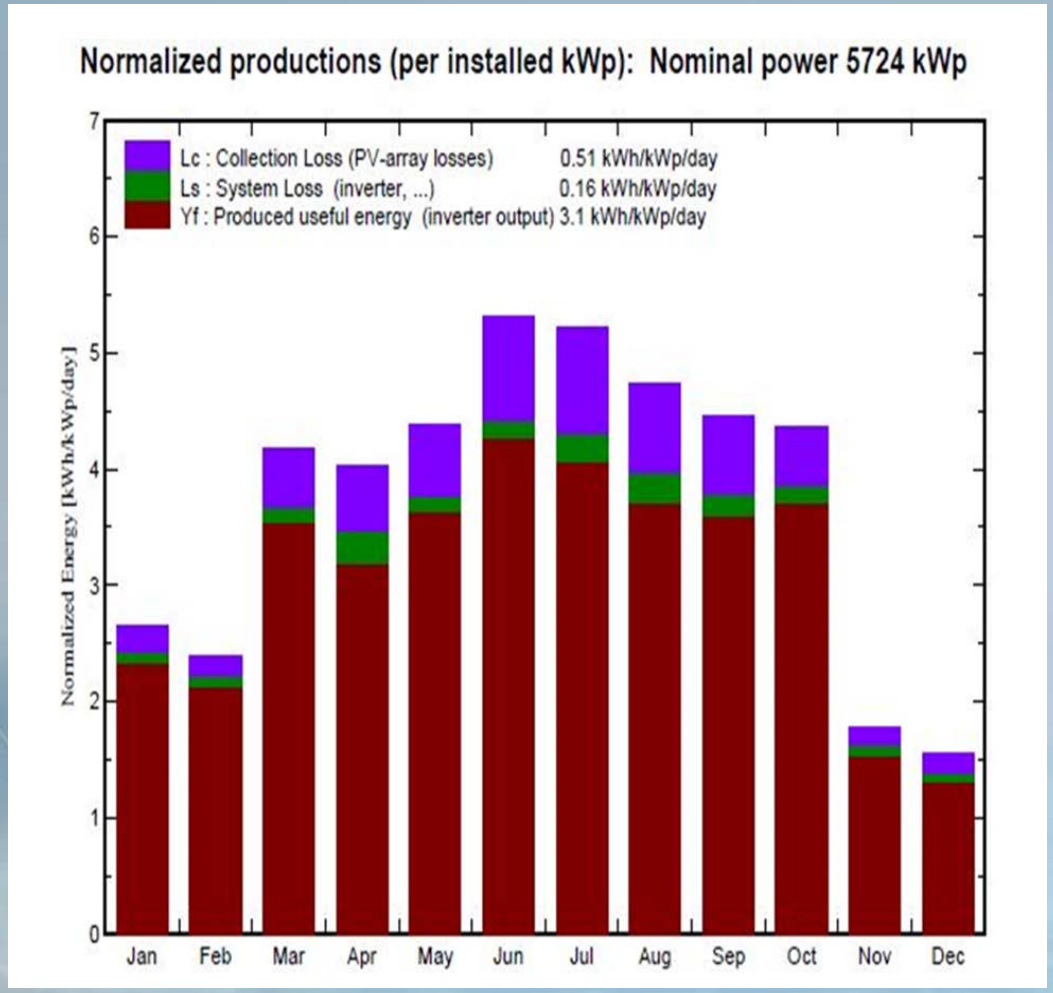
PV Module	Si-poly	Model	MVX300-72-7-701
Manufacturer	Suniva		
Number of PV modules	In series	18 modules	In parallel 1060 strings
Total # of PV modules	Nb. modules	19,080	Unit Nom. Power 300 Wp
Array global power	Nominal (STC)	5,724 kWp	At operating cond. 5067 kWp (50°C)
Array operating characteristics (50°C)	U mpp	582 V	I mpp 8713 A
Total area	Module area	3,7022 m²	Cell area 33432 m²

Inverters

Model	XC680-NA		
Manufacturer	Schneider Electric		
Characteristics	Operating Voltage	550-800 V	Unit Nom. Power 680 kW AC
Inverter pack	Nb. of inverters	6 units	Total Power 4080 kW AC

WTEC

Renewable Energy Innovation



WTEC
Renewable Energy Innovation

About WTEC

- 25 years of experience in the renewable energy industry.
- Completely vertically integrated, offering manufacturing, engineering, and construction.
- Have worked on most of the major solar farms in the United States. Over 13 Gigawatts of Wind Experience and 3 Gigawatts of Solar Experience.
- West Virginia Roots

WTEC
Renewable Energy Innovation

Recent Solar Projects

Project	Client	Size
Somerset	Sun Edison	10MW
Arlington Valley	Fluor	125MW
Catalina	Bechtel	130MW
Mount Signal	AES	267MW
Alpine Solar	First Solar	66MW
Ivanpah	Bright Source	392MW
Topaz Solar	First Solar	550MW
Apex	ABB	20MW

WTEC
Renewable Energy Innovation

Recent Solar Projects

Project	Client	Size
Copper Crossing	Fluor	20MW
Webberville	RES	35MW
CVSR	Bechtel	275MW
Delsea Road	OCI Solar Power	3.71MW
Tucson	OHL	25MW
Alamo 1	RES	50MW
West Antelope	White Construction	20MW

WTEC
Renewable Energy Innovation

Recent Solar Projects

Project	Client	Size
Alamo 2	Blattner	4MW
Alamo 4	Mortenson and OCI	50MW
Scotland Neck	Sunenergy1	28MW
Gila Bend	Black and Veatch	38MW
Sol Orchard	Isolux	25MW
Honduras	Upower	120MW
Lone Pine	Abengoa	30MW
Colton Solar	Specialized Energy	5MW

WTEC
Renewable Energy Innovation

Tucson 20MW Project


WTEC
Renewable Energy Innovation

WTEC

Renewable Energy Innovation

Webberville 35 MW

WTEC
Renewable Energy Innovation

Benefits to the Community

- Up-front partnerships with and local community
- Educating a local workforce for both building the site, managing the site, and educating the community on the benefits of the site
- Hiring local subcontractors and suppliers of equipment and materials
- Economic development through increased infrastructure
- Jobs for the community both during the construction, and in management of the site after construction

WTEC
Renewable Energy Innovation

Any questions?

- Please feel free to contact us at
- James Solano – jims@stfgroupinc.com
- Michael Smith – msmith@windnenergy.com