First, BP Solar is going out of business, but this will not impact BNL’s plans for solar energy research!

- BP Solar will meet all of its contractual commitments with regard to supporting BNL’s solar energy research agenda
  - Access to LISF for research data
  - Support for developing a separate solar research array

- BNL is continuing with its original plans for solar energy research
  - Installing instruments in LISF
  - Developing a separate research array
The LISF is complete and is now operating to generate up to 32MW of power for Long Island.
BNL has completed installing a suite of instruments in the LISF for research purposes

- **Solar Resource Data**
  - Field-based pyranometers: 32 pairs to measure direct and diffuse irradiance across the entire array
  - Baseline irradiance: precision measurement of irradiance at base station to quantify uncertainties in field data
  - Solar tracking measurements
  - Rotating shadowband radiometer

- **Meteorological Data**
  - Temperature (air and panel)
  - Relative Humidity
  - Barometric Pressure
  - Wind speed and direction
  - Rain gauge

- **Total Sky Imagers – Clouds**

- **Electrical Performance Data**
  - Power quality monitors at all inverters, collection substation, and LIPA feeders to BNL
  - DC current and voltage at all strings
Our research plans remain to address key issues with utility-scale solar plants

- **Variability and Non-Dispatchability**
  - Solar energy varies
  - Solar generation cannot be dispatched when needed

- **Grid Integration**
  - Grid is not designed for two-way power flow or distributed generation
  - Distributed generation can adversely impact grid control

- **Environmental Impacts**
  - Understand the impacts utility-scale solar PV plants can have on local ecology

Source: http://www.soldata.dk/pyr-80spc.htm
BNL is also proceeding with developing the Northeast Solar Energy Research Center (NSERC)

- Supplement research using the LISF array
  - Dedicated research array for field testing
  - Laboratory space for standardized testing
- NSERC will enable research in various other areas of interest to the solar industry
  - Field testing under actual northeast conditions
  - Technology development test bed
- Energy would be delivered directly into the BNL electrical system
  - Help with sustainability goals
Development of the research array is underway

- Specifications developed
  - 1MW array
  - Reconfigurable architecture
  - All power delivered to BNL
- A site has been identified for the research array
  - Brookhaven Ave - across from NSLS-II
- Architect-Engineering firm hired
  - Blue Oak Energy (designed LISF)
- Current schedule
  - Conceptual design study underway
  - Final design expected March 2012
  - Construction expected to start Spring 2012
  - Array expected to be operational Fall 2012
The research array will be located across from NSLS-II in 3 areas comprising ~6.5 acres of land.
This site was selected after considering several other locations

- Several other sites were considered
  - Rejected due to issues with excessive tree clearing and/or interconnection costs
- Site selected is best suited for the research array
  - Close proximity to electrical substation
  - Minimizes tree clearing
  - Use of brown field (Area 3)
  - Close proximity to future headquarters for renewable energy research in Building 526
- The combined LISF and Research Array fits within the original 200 acre environmental review
  - LISF 193.4 acres
  - Research Array 6.5 acres
Preliminary Research Agenda for NSERC

- **Smart Grid Integration Studies**
  - Research on strategies that improve communication and control
  - Techniques for integrating large numbers of systems into utility grids

- **Energy Storage Research**
  - Value propositions for integrated grid-level storage
  - Evaluation of storage and control alternatives
  - Reduce intermittency, resource extension
  - Frequency regulation capability

- **Field Testing of New Technologies**
  - Evaluation and testing of new design concepts, such as inverters with capability for voltage regulation and VAR control
  - Comparison of performance for components and systems using different technologies

- **Reliability and Degradation Studies**
  - Long-term reliability and degradation studies under Northeast conditions
  - Standardized test conditions to evaluate component degradation
  - Post mortem testing and failure analyses