

Solar PV Array Size and Type

- ~1.0 MW total – Area 1 sized for testing utility-scale inverters
- System voltage level of 1,000V
- Connected to BNL electrical distribution system
- Capability to test multiple panel technologies with crystalline silicon PV modules making up the bulk of the array
- Capability to re-configure the array into multiple, small (~65kw) arrays for different testing scenarios, as needed
- Fixed tilt for bulk of the array with capability to install some modules on trackers for comparative tests
- Re-configurable to simulate different operating scenarios
- Open racks for comparison tests of other PV technologies

BOP Equipment

- Capability for running macro and micro inverters
- Standard inverters available for module testing
- Capability to incorporate storage technologies
- Load simulator to enable disconnecting from the BNL system for test purposes

Research Instrumentation

- Meteorological base station with precision instruments adjacent to the array
- Solar resource instrumentation at multiple locations within the array
- Power quality instrumentation at inverters and grid interconnection
- String-level current and voltage
- High Sample Rates –1 sec data (512 samples per cycle for PQ data)

Solar Energy Research Labs

- Standardized testing of solar system components (Flash data, I-V curves)
- Solar Resource Simulators, Load simulators
- Environmental chambers – (duplicate environmental conditions for electronics installed on modules)
- Failure Analyses – UL and IEC Test Conditions for Modules and Inverters Environmental Research Lab
- Environmental, health and safety aspects of photovoltaic systems
- Life-cycle analyses

Meteorological Services Lab

- On site Met services
- Instrument repair and calibration

Data Acquisition Lab

- Array data collection, QA/QC, archive

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Northeast Solar Energy Research Center (NSERC)

A multi-purpose research facility on the BNL campus



Grid Integration Studies



Smart Inverter Testing



Microgrid Test-bed



Field Testing

High Resolution Field Data



Field Pyronometer



Pyrgeometer



Rotating Shadowband Radiometer



Power Quality



Total Sky Imager



Pyrheliometer



Sun Tracker

Northeast Solar Energy Research Center (NSERC)

BNL is developing a new Northeast Solar Energy Research Center (NSERC) on its campus that will serve as a solar energy research and test facility for the solar industry. The NSERC will include laboratories for standardized testing in accordance with industry standards, along with a solar PV research array for field testing existing or innovative new technologies under actual northeastern weather conditions. The NSERC will also include access to unique high-resolution data sets from the 32MW Long Island Solar Farm located at BNL. The vision for NSERC is to provide a facility that is accessible to the industry with capabilities to address the major challenges facing the deployment and integration of sustainable solar energy resources, particularly in the northeastern United States, as a means of ensuring the Nation's future energy security.

Business Model

NSERC will be available to the industry

- Owned by DOE, Operated by BNL contractor (currently BSA*)
- Open to industry via pre-arranged access agreements
- No UL Certification or interconnect permits required

NSERC will host Sponsored Research

- DOE sponsored research via proposals by BSA*
- Collaborative sponsored research via CRADAs**
- Collaborative research via joint proposals

Standardized Agreements will be Used

- Address data sharing and intellectual property

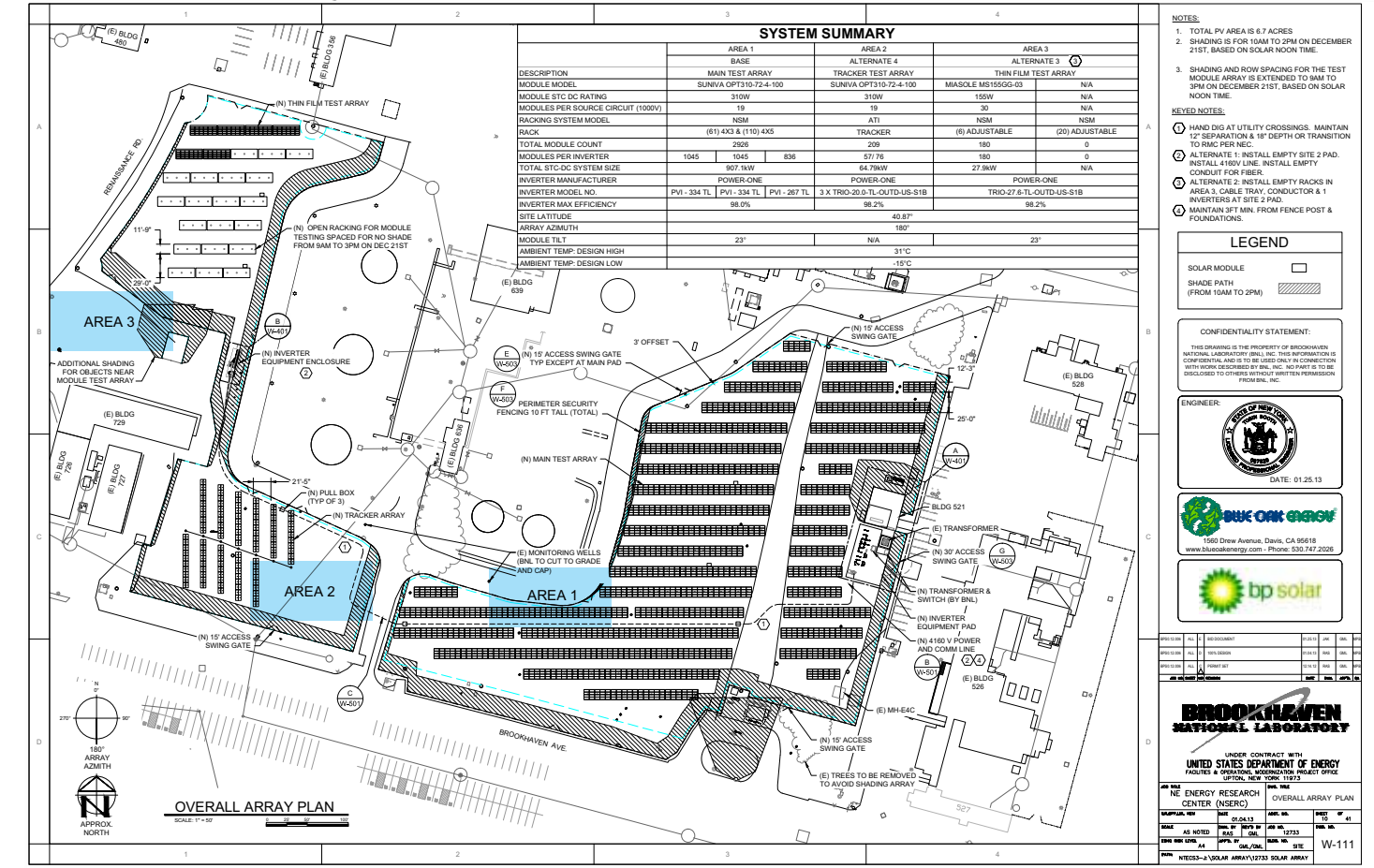
Several overarching research themes are envisioned for the NSERC, including:

- Grid integration of solar energy resources
- Research and developmental testing of new solar system technologies, including new inverter control technologies, micro-inverters, and other technologies – **No UL certification or interconnect permits required for field testing**
- Characterization and management of solar energy variability for plants in the Northeast
- Solar resource measurement and forecasting
- Test bed for Smart Grid enabling technologies, including smart grid sensors and micro-grid control schemes

*Brookhaven Science Associates

**Cooperative Research and Development Agreement

NSERC Solar Research Array



Research Areas

- Solar Photovoltaics
- Grid Integration
- Smart Grid
- Energy Storage
- Smart Inverters
- Solar forecasting
- Reliability and Degradation
- Environmental Sustainability
- Field Testing

NSERC Mission: Support the expansion of solar power in the Northeast by providing high-quality data, field-testing, analyses, and solar energy expertise to address technical, economic, environmental, and policy issues facing solar power deployment in northeastern climates.

Area 1:
~907kw-dc for testing inverters, storage and micro-grids – and provide power to BNL

Area 2:
~65kw-dc for testing modules on trackers

Area 3:
~150kw-dc for testing new module designs and inverter topologies