# Advanced Energy Microgrid

## National Interagency Biodefense Campus, Maryland

### Contract Details

- Enhanced Use Lease
- Up to a 30 Year Contract Term
- 99.999% Power Availability Performance Guarantee

### Advanced Energy Microgrid Components

- 40 MVA medium-voltage microgrid
- 16 MWh displacement energy storage system
- 16 $MW_m$ rotary flywheel capacity
- N+N medium-voltage switchgear lineup
- GPS-synchronized electrical instrumentation
- Redundant radial subsurface concrete electrical ductbanks
- Utility-grade SCADA controls
- Bi-directional thermal distribution loops with condensate return
- 2.5 Million gallon Thermal Energy Storage capacity
- 100,000 gallon onsite fuel storage
- 200,000 PPH 125 PSIG steam plant
- 7,200 ton series counterflow configured chilled water plant
- Secure operator control room with extensive CCTV system
- Solar powered exterior lighting

Housed just beyond the Washington, D.C. beltway on the U.S. Army's Fort Detrick military base, lies the National Interagency Biodefense Campus (NIBC), the largest secured campus of biosafety level 3 and 4 laboratories in the world. During the early planning phases of the NIBC, a strategic decision was made to purchase utilities from a privately owned and operated microgrid located within the NIBC. To accomplish this, the Army competitively selected a development team and entered into an energy services contract that, today, would be called a Microgrid as a Service (MaaS) agreement.

**Since the system achieved commercial operation in April of 2008, the NIBC has experienced uninterrupted electric service, including during PJM-wide outages following Hurricane Sandy and record breaking snowfall events.**

### Power Quality, Storage, and Resiliency

Energy Systems Group (ESG) was the project's co-developer, the facility's design-builder, and is its long-term operator and maintenance provider. Since this Advanced Energy Microgrid facility achieved commercial operation in April, 2008, the NIBC's laboratory tenants have never experienced an unplanned interruption of utility services and have continuously enjoyed power quality levels that fall within what's known as the Information Technology Industry Council (ITIC) Curve. Simply put, the ITIC Curve is an empirically-based boundary model that depicts acceptable voltage conditions for the operation of sensitive electrical equipment and serves as an analytical reference to monitor and track such conditions.

As the microgrid's design-build-operator, ESG provides performance assurances that are guaranteed and contractually backed by liquidated damage provisions that are part of the MaaS structure. Electrical availability is guaranteed to be not less than 99.999% or 5.26 minutes of downtime per year, and as mentioned above, power quality is guaranteed to continuously fall within the ITIC Curve.


The above power quality and availability performance levels are achieved through the use of N+1 redundant rotary flywheels that continuously condition incoming PJM grid power. In the event of even a momentary loss of grid power, the flywheels convert kinetic energy into electrical energy until reciprocating engine generator set (genset) clutches engage to start each of the eight 1.7 MVA gensets. The flywheels then synchronize each genset's electrical output, providing seamless ride-through and uninterrupted conditioned power to various load centers.

In addition to designing and constructing the 48,000 sq. ft. building that houses various electrical and mechanical systems, ESG also built a highly-secure 40 MVA microgrid that consists of two 30 MVA substations, an N+N switchgear system, a redundant subsurface electrical distribution system, and an energy storage system capable of displacing 5 MW of electrical load for a 3.2 hour duration, or a total of 16 MWh. The electrical systems are black-start capable and can island for 88 hours without fuel resupply.