



**ADVANCED ENERGY™**  
Research and Technology Center

AT STONY BROOK UNIVERSITY



**Division of  
Science, Technology  
& Innovation**

Attachment #4.2

# New York State Reliability Council


**Mr. Bob Catell**  
**Chairman, AERTC**

**2/12/21**

**ADVANCED ENERGY**

Enabling Innovation  
Powering Research  
Driving Technology

[www.aertc.org](http://www.aertc.org)

 **ADVANCED ENERGY™**  
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**Research • Resources • Outreach • Commercialization**

-  **IBM**  
Partnership in Research and Innovation
  -  **MIT**  
Partnership in Research and Innovation
  -  **CORNELL UNIVERSITY**  
Partnership in Research and Innovation
  -  **NYU**  
Partnership in Research and Innovation
  -  **ADVANCED ENERGY**  
Partnership in Research and Innovation
  -  **NYERDA**  
Partnership in Research and Innovation
- [www.aertc.org](http://www.aertc.org) | Powering the Future. Working Together.



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# Overview

- Located at R&D Park, Stony Brook University
- NYS Center of Excellence (NYSTAR supported)
- Energy-focused research facility
  - Research labs
  - Shared user-facilities
  - Business incubator labs
- Business assistance & technology support programs
- Industry & research collaboration
- Research partnerships
  - Brookhaven National Laboratory
- Bi-annual Advanced Energy Conference



# Key Research Areas

- Advanced Combustion & Engines
- Bioenergy & Biofuels
- Battery & Storage Research
- Clean Transportation
- Energy Modeling/Simulation
- Energy Focused Nanocatalysts
- Energy Generators/Convertors
- Energy Harvesting
- Energy Impacts on Environment
- Energy Education and Outreach
- Grid Cybersecurity
- Grid Management
- Hydrogen Fuel Generation
- Low Carbon Energy
- Microgrids
- Offshore Wind Energy
- Photovoltaics & Fuel Cells
- Renewable Energy
- Smart Grid
- Smart Power Management
- System Resiliency



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# Quick Facts

- Ribbon cutting - 2011
- Attracted \$150M+ in funding
- \$50M LEED platinum facility
- Supports 150+ on-going energy projects
- Supports 12 research & training centers
- NYS SmartGrid Consortium - founder
- DOE Energy Frontiers Research Center
  - Center for Mesoscale Transport Properties
- DOE/NYSERDA
  - National Offshore Wind R&D Consortium
  - \$40M (DOE/NYSERDA)
- NYS/SUNY
  - Offshore Wind Training Institute
  - \$10M



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# Key Partners

- Stony Brook University
- Brookhaven National Laboratory
- NYSTAR
- NYSERDA



# Centers/Programs – On Site

- Advanced Energy Training Institute
- Center for Clean Water Technology
- Center for Integrated Electric Energy Systems
- Center for Mesoscale Transport Properties
- Clean Energy Business Incubator Program
- Institute of Gas Innovation and Technology
- National Offshore Wind Research and Development Consortium
- New York Energy Policy Institute
- NYS SmartGrid Consortium
- Offshore Wind Training Institute
- Office of Navy Institute for Energy Resilience
- Thermomechanical & Imaging Nanoscale Characterization



# Energy Incubation Ecosystem

- 14 companies (as of 2/1/21)
- AERTC Incubator
  - 6 companies
  - Physical space
- Clean Energy Business Incubation Program
  - 11 companies (3 located in AERTC)
  - Virtual incubation program
- Offerings
  - Business development/strategic planning
  - Investor pitch review/access to investors
  - Manufacturing/engineering expertise
  - Seminars and workshops
  - Faculty and student talent
  - Specialized research facilities on campus
  - Dedicated company space rental through "facility use permits"



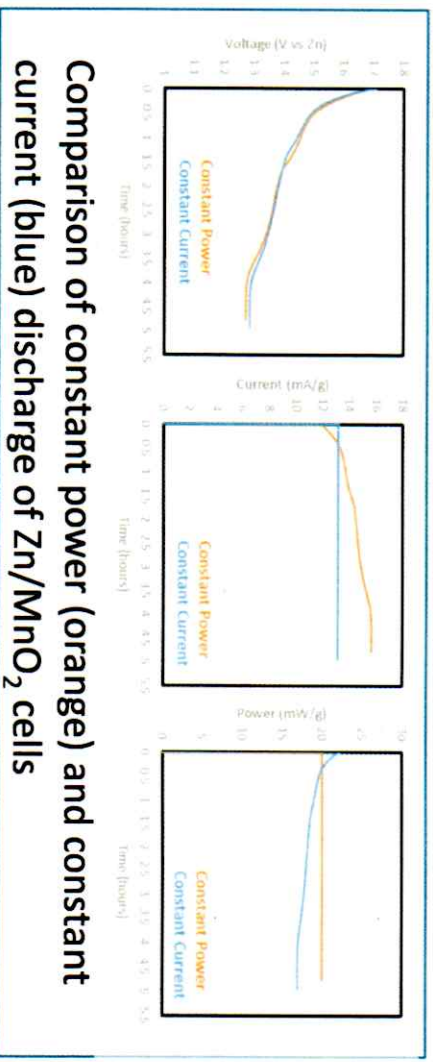
# (E1-20) Energy Storage to Address Electrical Power Intermittency



A. Marschilok (PI), E. Takeuchi (Co-PI) K. Takeuchi (Co-PI)  
 (SBU) January 15, 2021



- **Objective: To investigate the incorporation of energy storage with renewable energy sources to address the electrical power intermittency inherent renewables.**
  - Sub-objective— Investigate multiple usage profiles
  - Sub-objective – Determine suitable battery technologies for the application.
- **Approach**
  - 1) Test zinc aqueous electrolyte cells under the defined usage schemes.
  - 2) Evaluate failure modes of the systems tested and the influence of the specific usage scheme on the failure mode.



- **Quarterly Activity & Results**

- Task 1 is the definition of possible use regimes for energy storage systems that would be linked with the energy generation modality such as solar and wind.

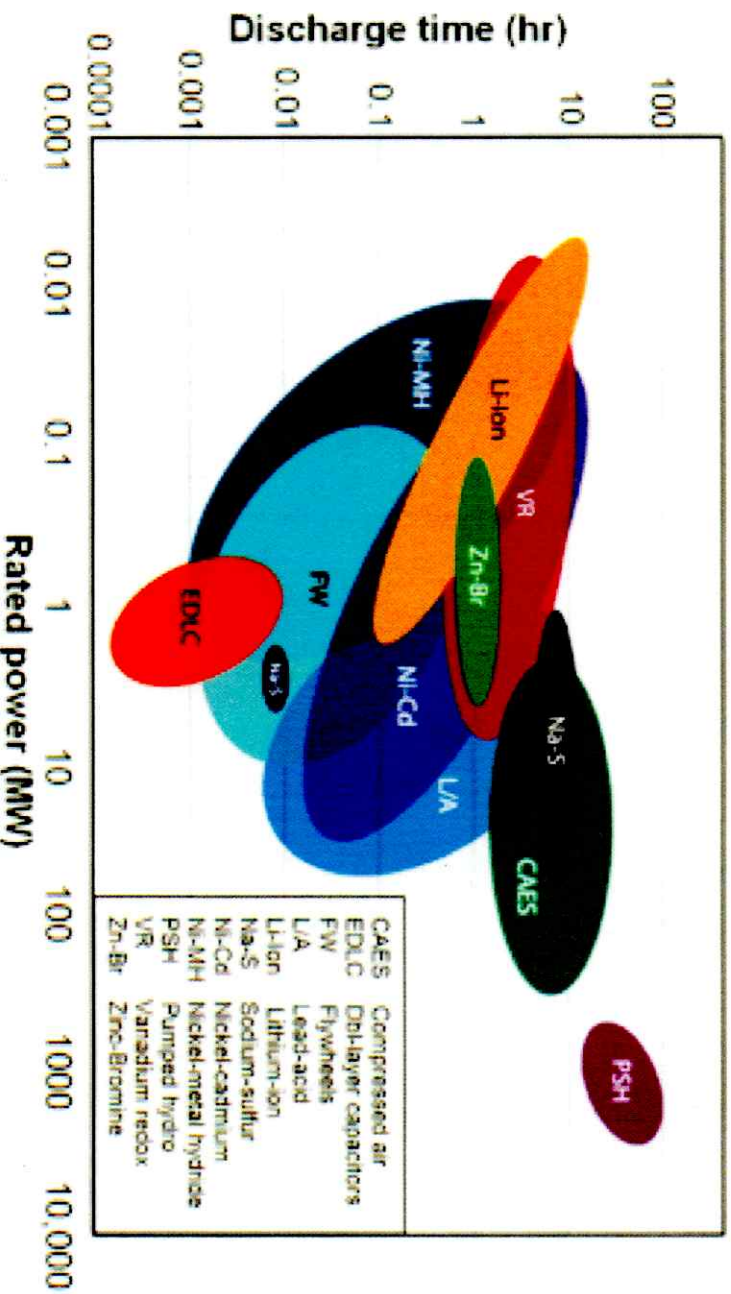
- **Milestone Timeline**

TASK	Q1	Q2	Y1	Q3	Q4	Q1	Q2	Y2	Q3	Q4
1	█									
2		█								
3			█							
4				█						

PI, E-Mail: amy.marschilok@stonybrook.edu  
 Phone: 631-216-7419



# Current Grid Level Battery Technologies

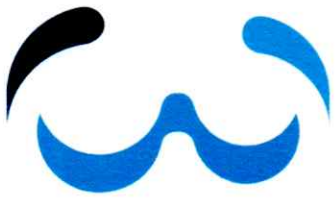


Lead acid batteries still find commercial use because they are cost effective and known technologies. Despite their moderate specific energy (~40 Wh/kg) the lead can be effectively recovered and recycled. Thus lead acid remains of interest for large scale storage that can deliver high rated powers ~100 MW.

Yang, Zhenguo, Jianlu Zhang, Michael C. W. Kintner-Meyer, Xiaochuan Lu, Daiwon Choi, John P. Lemmon, and Jun Liu. 2011. 'Electrochemical Energy Storage for Green Grid', *Chemical Reviews*, 111: 3577-613.



**Utility Technology Solutions**



**Trinity Cyber**

# What We

## Face WIDESPREAD INCREASING ATTACKS

Unprecedented volume and sophistication of cyber attacks increasing across all industries

### NATION-STATE ACTORS

Private companies defending against state-sponsored attacks

### IGNORING THE THREAT ACTOR

Missing the opportunity to proactively manage the threat actor

### RAPIDLY EVOLVING TACTICS

Attackers adapt as soon as a technique is blocked

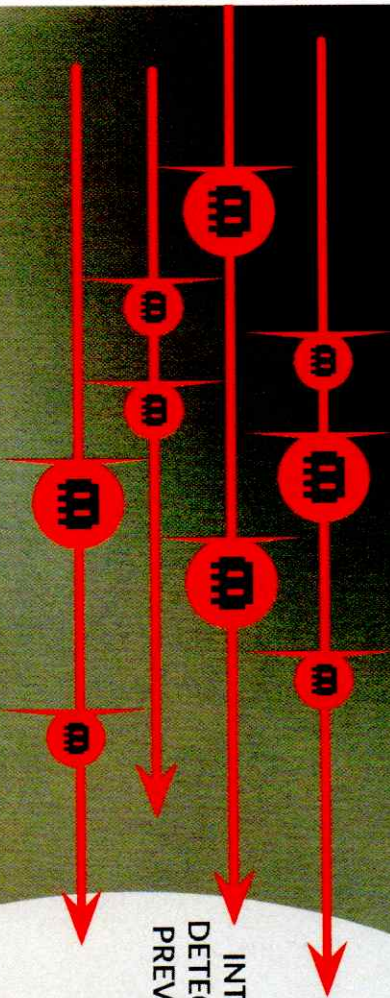
### CONSUMED WITH EVENTS

Security professionals preoccupied with event alerts and tickets

# Traditional



MALICIOUS CONTENT HIDDEN  
WITHIN INTERNET TRAFFIC



# REACTI

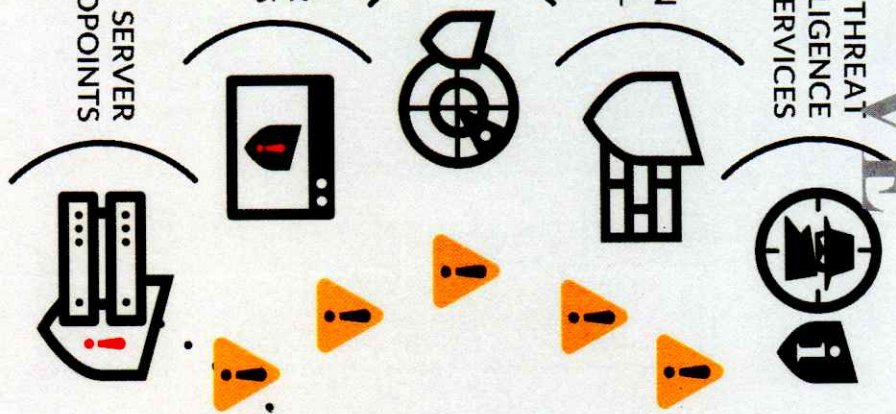
THREAT  
INTELLIGENCE  
SERVICES

NEXT-GEN  
FIREWALL

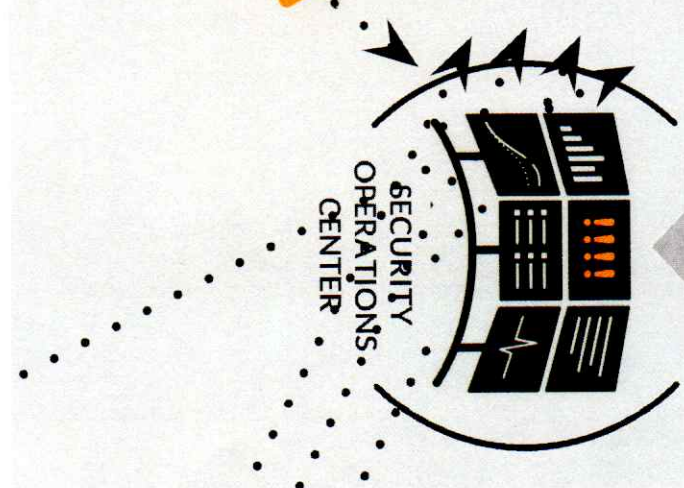
INTRUSION  
DETECTION &  
PREVENTION

USER  
ENDPOINTS

SERVER  
ENDPOINTS

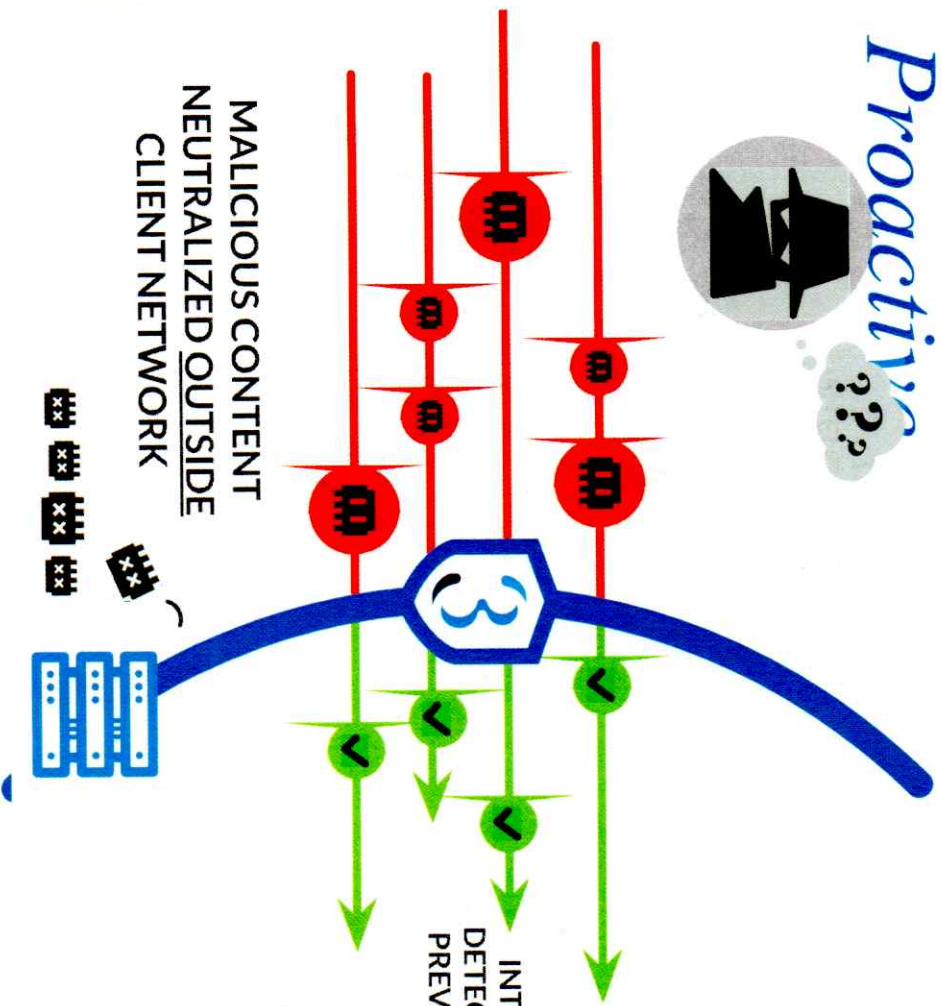
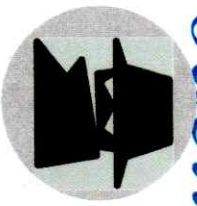


SECURITY  
OPERATIONS  
CENTER



# Trinity Cyber:

*Proactive???*



THREAT INTELLIGENCE SERVICES



NEXT-GEN FIREWALL



INTRUSION DETECTION & PREVENTION



USER ENDPOINTS



SERVER ENDPOINTS



SECURITY OPERATIONS CENTER



CLIENT PORTAL



# Redefining

**WE OPERATE OUTSIDE YOUR NETWORK**

between you and the adversary, providing invisible security never before available to the public

**WE DISRUPT ADVERSARY OPERATIONS**

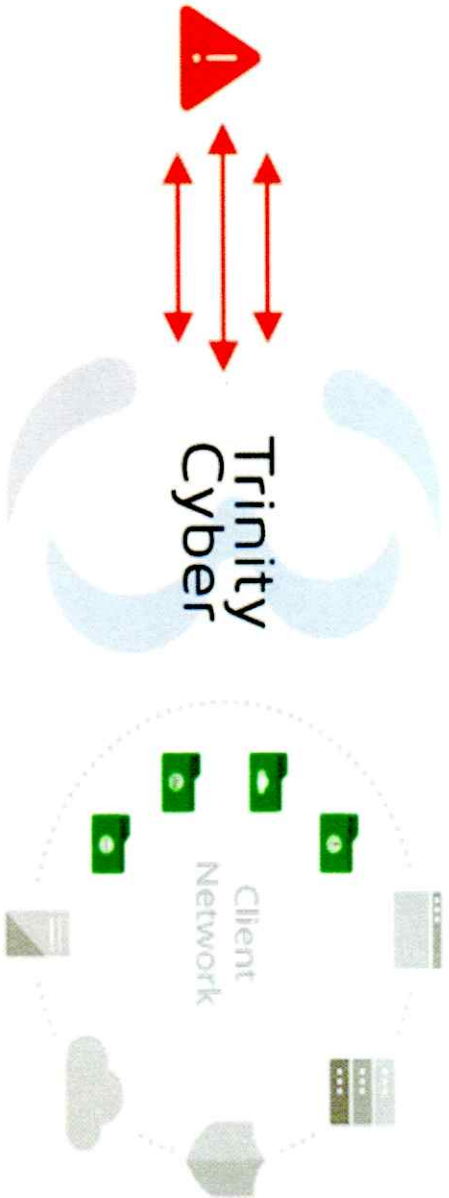
control outcomes, and reduce risk to your business

**WE INTERFERE WITH THE ADVERSARY**

and make them fail

**NO ONE ELSE IS DOING THIS**

and no one else can



# Trinity Cyber

Active • Adaptive • Invisible