



Advanced Grid Innovation Laboratory for Energy

A Program of the New York Power Authority



April 9, 2019

2019 Future Energy Systems Technology Conference
Rensselaer, NY

Overview

- About NYPA
- AGILE background
- AGILE capabilities
- Current status
- Ongoing and upcoming activities
- Future direction

About NYPA

Founded by Franklin D. Roosevelt in 1931 - *Power Authority Act*

- 2000+ employees
- Governance
 - *7 member board*
- Revenue source
 - *Power contracts*
 - *Generation*
 - *Energy Efficiency Projects*

NYS Canals transferred from the NYS Thruway Authority in 2017

- 524 miles across NYS

Mission

"Power the economic growth and competitiveness of New York State by providing customers with low-cost, clean, reliable power and the innovative energy infrastructure and services they value."

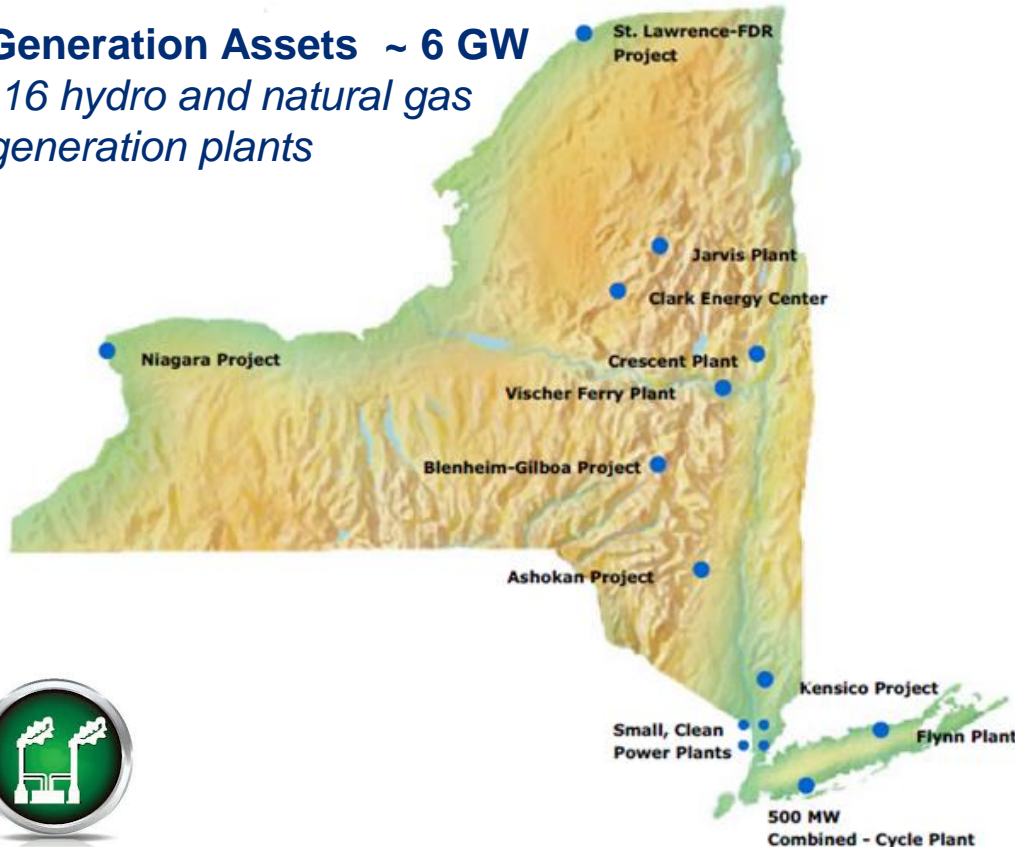


**NY Power
Authority**

About NYPA – Generation Assets

Generation Assets ~ 6 GW

-16 hydro and natural gas generation plants

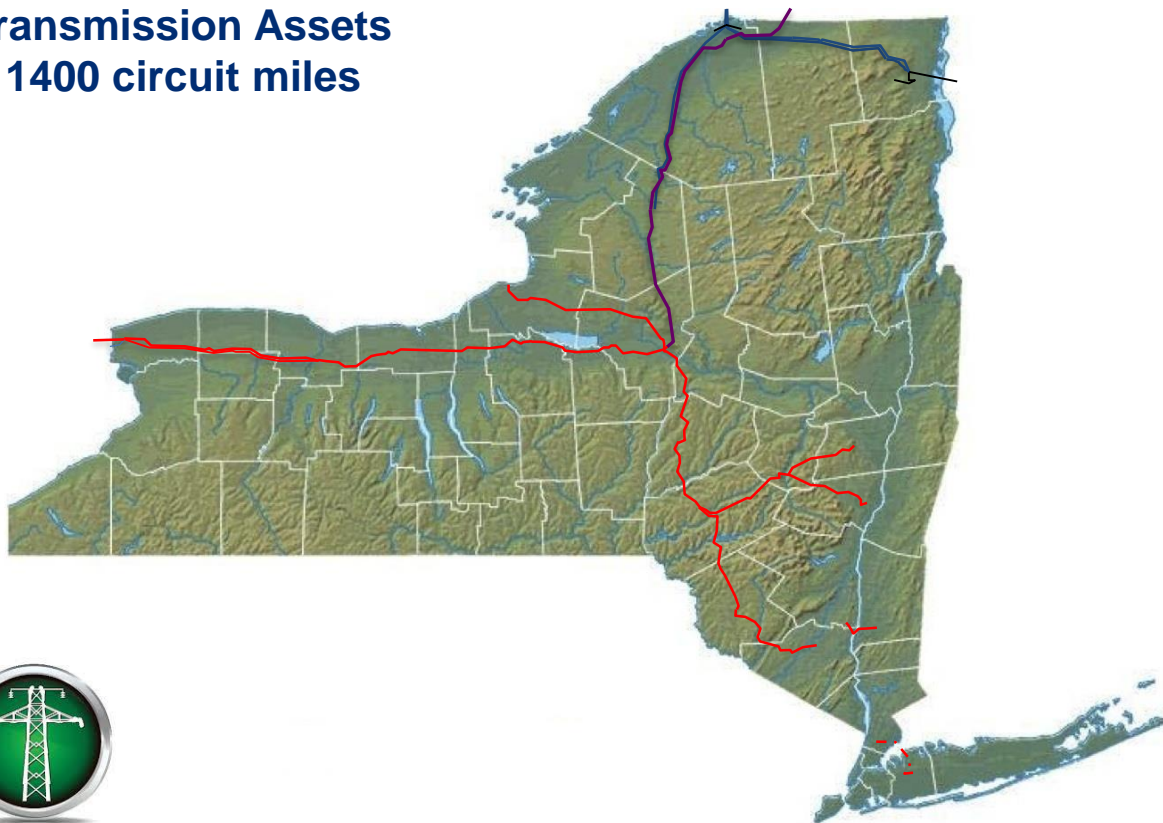


- ❑ Niagara Power Project **~2,675 MW**
- ❑ St. Lawrence Power Project **~800 MW**
- ❑ Blenheim-Gilboa **~1,160 MW**
- ❑ Flynn Power Plant **~167 MW**
- ❑ Astoria CC Plant **~500 MW**
- ❑ Small Hydro Plants **~83 MW**
- ❑ Small Clean Power Plants **~461 MW**



About NYPA – Transmission Assets

Transmission Assets
~ 1400 circuit miles



- 765 kV Transmission
~155 circuit miles
- 345 kV Transmission
~928 circuit miles
- 230 kV Transmission
~338 circuit miles
- 115 kV Transmission
~35 circuit miles
- Total Transmission
~1,456 circuit miles
- Bulk Transmission
Substations
21 substations
- Portion of Bulk NYS Grid
~13% (>115kV)
~34% (>230kV)



About NYPA – Electric Supply Customers



SENY



Economic Development

- Replacement Power
- Expansion Power
- Preservation Power
- Industrial Economic Expansion Power
- Recharge New York

Munis and Co-ops

- 47 municipal
- 4 rural co-operatives

AGILE Background

What is AGILE?

Electric power research laboratory with grid modeling and simulation capabilities and expertise

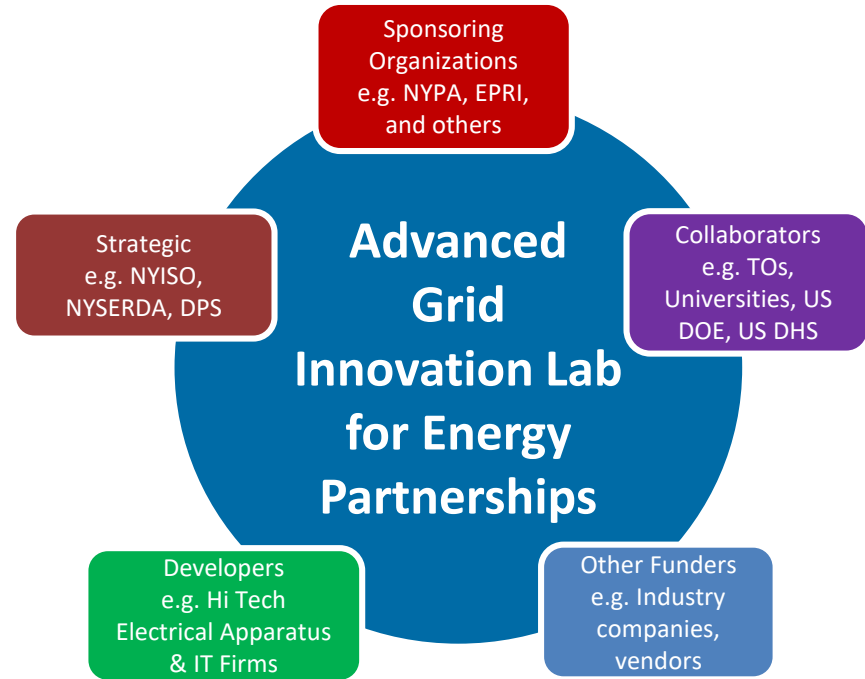
What will AGILE do?

AGILE will conduct collaborative research with utilities and grid tech companies focused on facilitating stakeholders in solving grid related challenges

What does AGILE need?

AGILE's budget will cover the initial operating and capital expenditure for the lab

More sustainable funding models will be investigated for the long-run



Create Value on Key Areas in Electric Power and Energy Sector

Five Key Areas

SENSORS

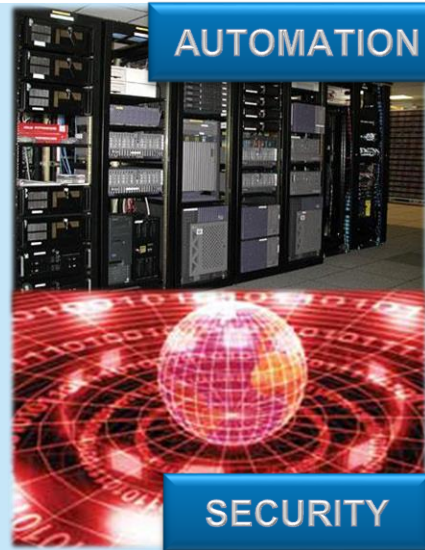


CONTROLS



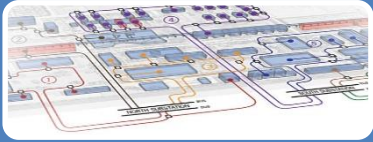
**ADVANCED TRANSMISSION
APPLICATIONS**

AUTOMATION



SECURITY

Current AGILE Capabilities



End-to-end grid modeling and real-time simulation



Hardware/software-in-the-loop equipment testing for digital substation automation and control

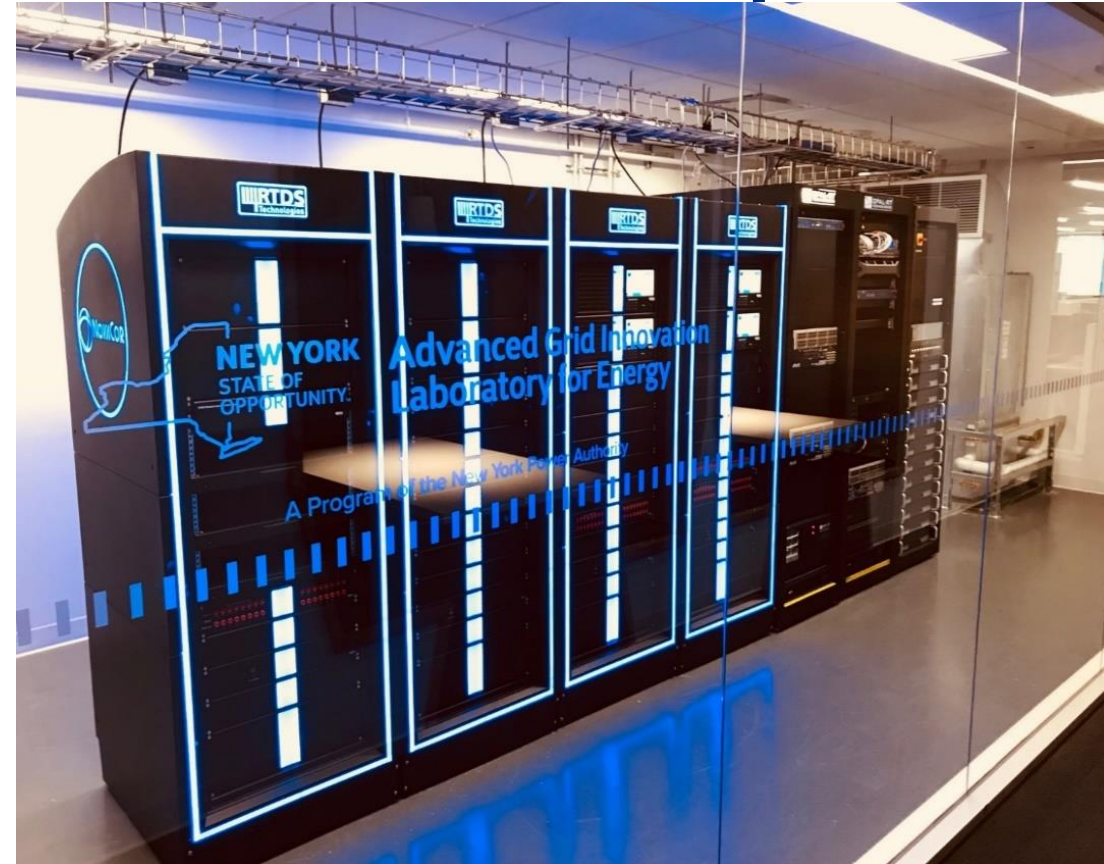


Simulation of communication systems and cyber security events

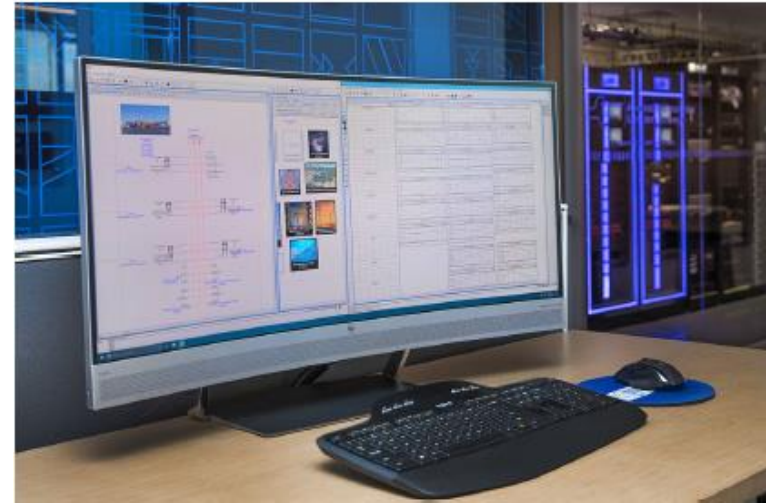


Economic analysis and evaluation of technical solutions

AGILE Phase I Implementation



AGILE Phase I Implementation



Real-Time Simulation Capabilities

RTDS

- 4 NovaCore chassis; 40-core processing power
- Simulation capability: ~800 3-phase buses (transient simulation)
- 132 analog output; 72 analog inputs; 64 digital outputs; 64 digital inputs
- Communication protocols: IEEE C37.118, IEC 61850, Modbus, DNP3, etc.
- RSCAD simulation software

OPAL-RT

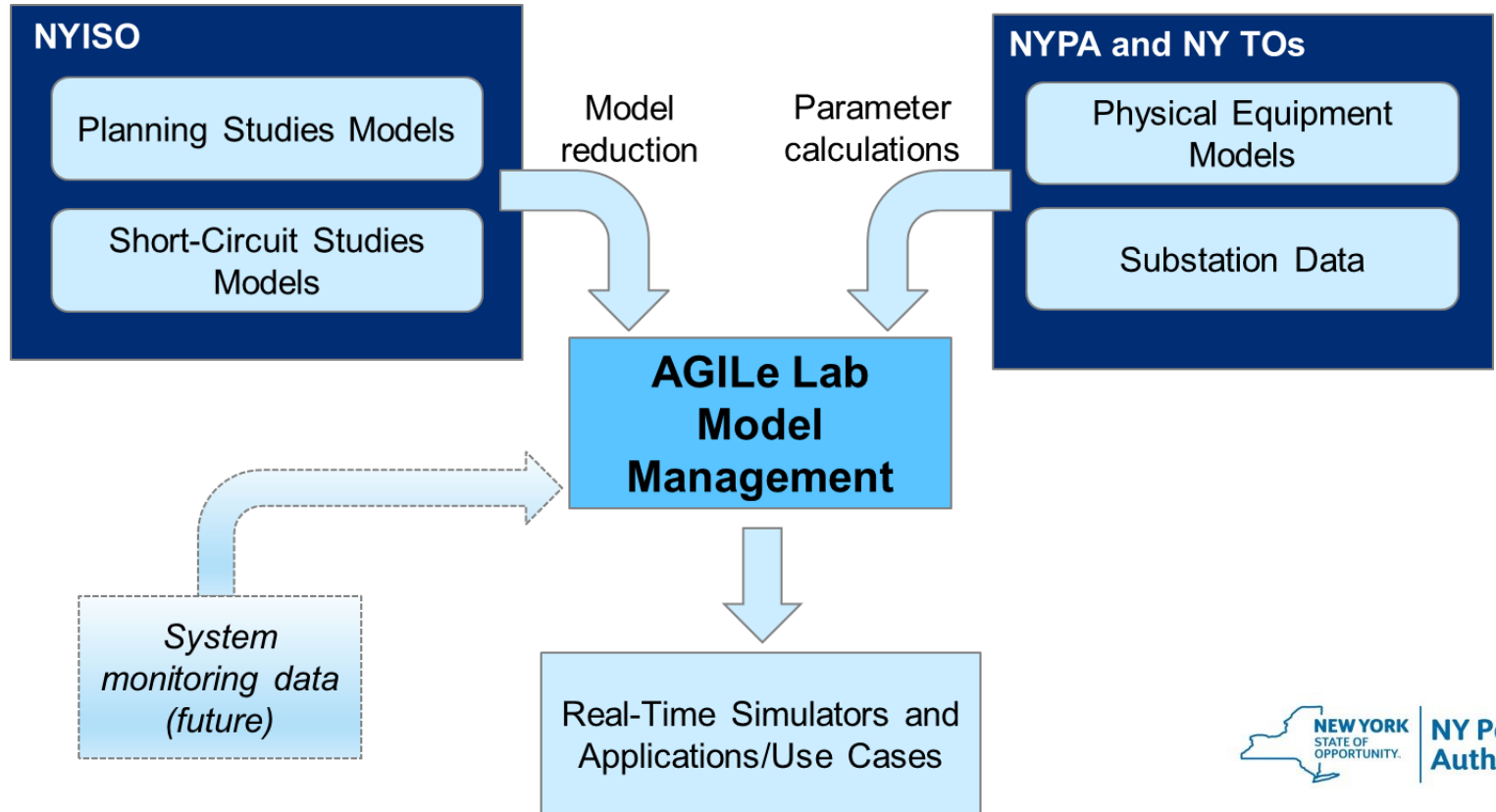
- 1 8048B-TR4F Super Server; 40-core processing power
- Simulation capability: ~800 3-phase buses (transient simulation)
~5,000 single-phase buses (stability simulation)
- 128 analog output; 64 analog inputs; 64 digital outputs; 64 digital inputs
- Communication protocols: IEEE C37.118, IEC 61850, Modbus, DNP3, etc.
- HYPERSIM and RT-LAB (ePhasorSim/eMegaSim) simulation software

OPAL-RT

- 1 OP5600 simulator; Single-core processing power
- Simulation capability: ~ 12 3-phase buses (transient simulation)
- 64 analog output; 32 analog inputs; 32 digital outputs; 32 digital inputs
- 12-channel AE Techron 7224 amplifier via an OP8600 interconnection unit
- HYPERSIM simulation software



Data Acquisition for Model of New York State



Current Status

- MOU in place with all NYS utilities, NYSERDA, and the NYISO
- Phase I lab established on 8th floor of NYPA White Plains office
- EPRI on board to manage AGILE and support operation and R&D activities
- Draft version of 3-phase transient RTDS model of NYS grid 230kV and above completed
- Draft version of NYS dynamic models in Opal-RT completed
- Ongoing establishment of a cyber security test bed
- Ongoing internal NYPA and EPRI projects
- Collaborative applications for external funding

Ongoing and Upcoming Activities



Establishment of a flexible operational framework for a variety of collaborative projects

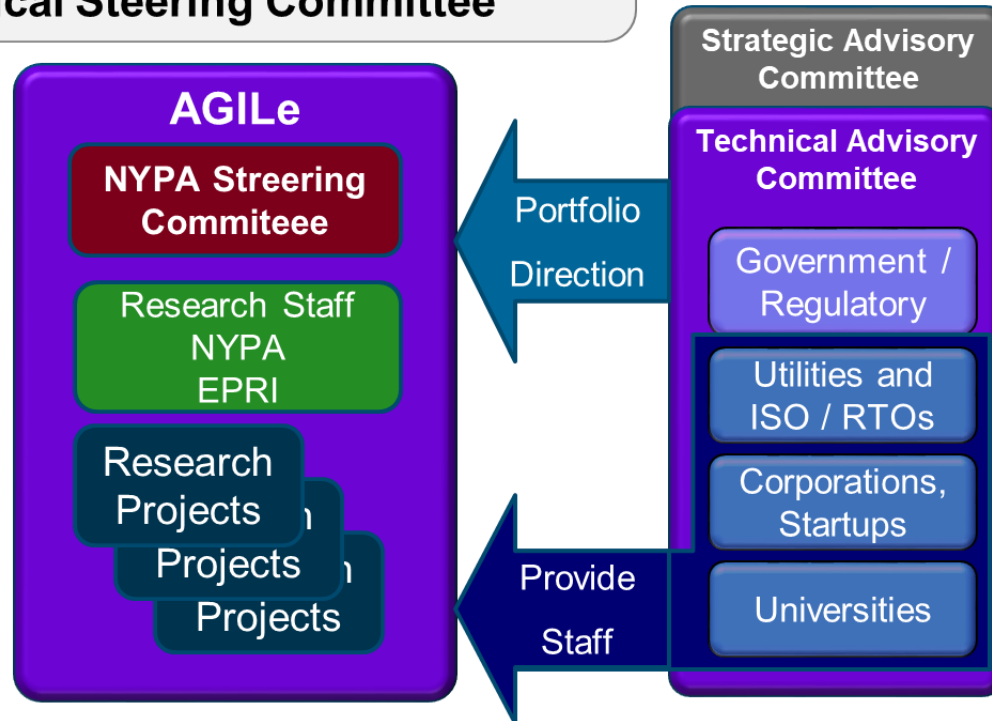
Establishment of AGILE governance and advisory committees

Model expansions and improvements

Implementation of projects for demonstrating lab capabilities based on initial set of use cases selected by TOs

AGILE Governance

- Strategic Advisory Committee
- Technical Advisory Committee
- NYPA Technical Steering Committee



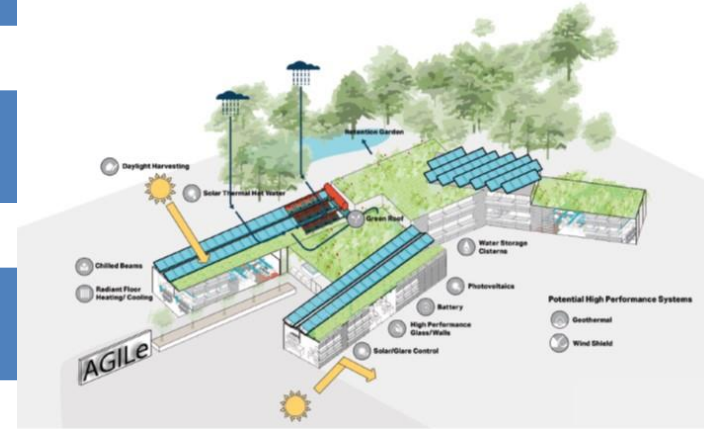
Future Direction – AGILe Phase II

Stand alone lab facility in the vicinity of Albany, NY

Expansion of lab equipment and capabilities

Extended collaborations and stakeholder engagement

Sustainable financial support model



Discussion



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