

STATE UNIVERSITY OF NEW YORK CLEAN ENERGY ROADMAP

2019



The State University
of New York



NY Power
Authority



NYSERDA



Department
of Public Service

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I. EXECUTIVE SUMMARY

In January 2018, Chancellor Kristina M. Johnson outlined a bold clean energy vision aligned with Governor Andrew Cuomo's aggressive, decarbonization efforts. His efforts have included making New York a founding member of the US Climate Alliance - a coalition of 15 states and Puerto Rico committed to reducing greenhouse gas emissions. In addition, the Governor issued Executive Orders 88 and 166 which promote energy efficiency across the State.

The Cuomo Administration is determined to build a cleaner, more resilient, and affordable energy system for all New Yorkers by stimulating investment in clean technologies and energy efficiency – outlined in the Governor's Reforming Energy Vision (REV) plan, the State's Clean Energy Standard, and the State Energy Plan, some of which are discussed in this Roadmap.

Aligned with Governor Cuomo, Chancellor Johnson has outlined eight ambitious goals to enable SUNY's clean energy vision:

- 1 **ACHIEVE ENVIRONMENTAL SUSTAINABILITY**
- 2 **DEVELOP CLEAN ENERGY MASTER PLANS**
- 3 **ESTABLISH A NETWORK OF COMMUNITY RESILIENCE**
- 4 **LEAD WITH NET ZERO BUILDINGS**
- 5 **RETROFIT EXISTING BUILDINGS**
- 6 **ESTABLISH A CLEAN ENERGY NETWORK CONSISTING OF RESEARCH, INNOVATION, PARTNERSHIPS AND EDUCATION.**
- 7 **ATTRACT START-UP ACTIVITIES IN NY**
- 8 **ENHANCE WORKFORCE DEVELOPMENT**



SUNY is well positioned to lead the state in clean energy for a number of reasons:



NO OTHER ENTITY SHARES ITS SCALE

With 64 campuses, SUNY resides in urban, suburban, and rural parts of New York State. In fact, nearly every resident of the State lives within 30 miles of a SUNY campus.



UNPARALLELED BUYING POWER

SUNY's size and distribution across the State creates a unique opportunity to roll out emerging technologies on a larger scale which affords SUNY economies of scale.



ALIGNMENT WITH WIDER STATE GOALS

The Chancellor's vision supports energy goals laid out by other State agencies encouraging collaboration and mutual success.

Achieving the Chancellor's bold vision will provide a pivotal example for universities and organizations across the country.

To achieve SUNY's vision, the New York Power Authority (NYPA) convened a steering committee of SUNY staff and New York State Energy agencies (NYSERDA, DPS, and LIPA) to identify high-impact initiatives that will help SUNY achieve the Chancellor's goals.

SUNY CLEAN ENERGY CHALLENGES

The expansiveness of this Clean Energy vision presents unique opportunities and challenges to SUNY. Three challenges were identified that are addressed with initiatives proposed in the roadmap.



AUTONOMOUS CAMPUS DECISION MAKING

SUNY’s 64 campuses are independent entities with their own decision-making power, finance structure, and individualized missions. The diversity of campus sizes, buildings and resources makes buy-in at the campus level critical to achieving economies of scale.



STAFF CAPACITY

The unique set of buildings on each campus means that a one-size solution will not fit all campuses. Researching, selecting, implementing and maintaining the right mix of technologies to meet the vision will require more staff time and knowledge at a time when available resources are being used for day to day operations and maintenance.



FUNDING IS LIMITED

SUNY’s capital program is dedicated to enabling facility projects, but it needs approximately \$300 million of additional funding above the current \$550 million capital budget to fully meet the Chancellor’s vision. Insufficient capital prevents a holistic approach to building renovation resulting in missed opportunities for greatest energy efficiency.

SUNY Chancellor Johnson is leading from the front and inspiring a shared vision across the campuses and the State agencies. In collaboration, the agencies can support SUNY in realizing its vision.

SUNY CLEAN ENERGY OPPORTUNITIES THROUGH PARTNERSHIP

NYPA, NYSERDA, DPS, and LIPA came together to identify which capabilities and supports could be provided to further SUNY’s goals. The following capabilities were identified:



TECHNICAL EXPERTISE

Agency Stakeholders bring extensive experience from developing clean energy master plans, to writing specifications for retrofits, to deploying advanced distributed energy resources (DER) solutions. SUNY will be provided with support from technical specialists to augment informed choices and investments in new technologies.



STREAMLINED PROCESSING

NYPA’s statutory authority offers campuses a faster procurement route, streamlined implementation and permitting for specific types of energy services, including microgrids, energy efficiency retrofits and EV infrastructure.



NEW FINANCING

NYPA can provide supplemental low-cost financing to projects, while LIPA and NYSERDA can bring additional incentives and assistance to increase investments in deep-energy retrofits and infrastructure.



INNOVATING TOGETHER

To bring new technologies such as electric vehicle charging infrastructure to market faster, NYPA is developing a model where it will own new infrastructure and issue charges based on its usage. This moves the risk of building out new infrastructure to NYPA and eases the ongoing maintenance on existing SUNY staff.



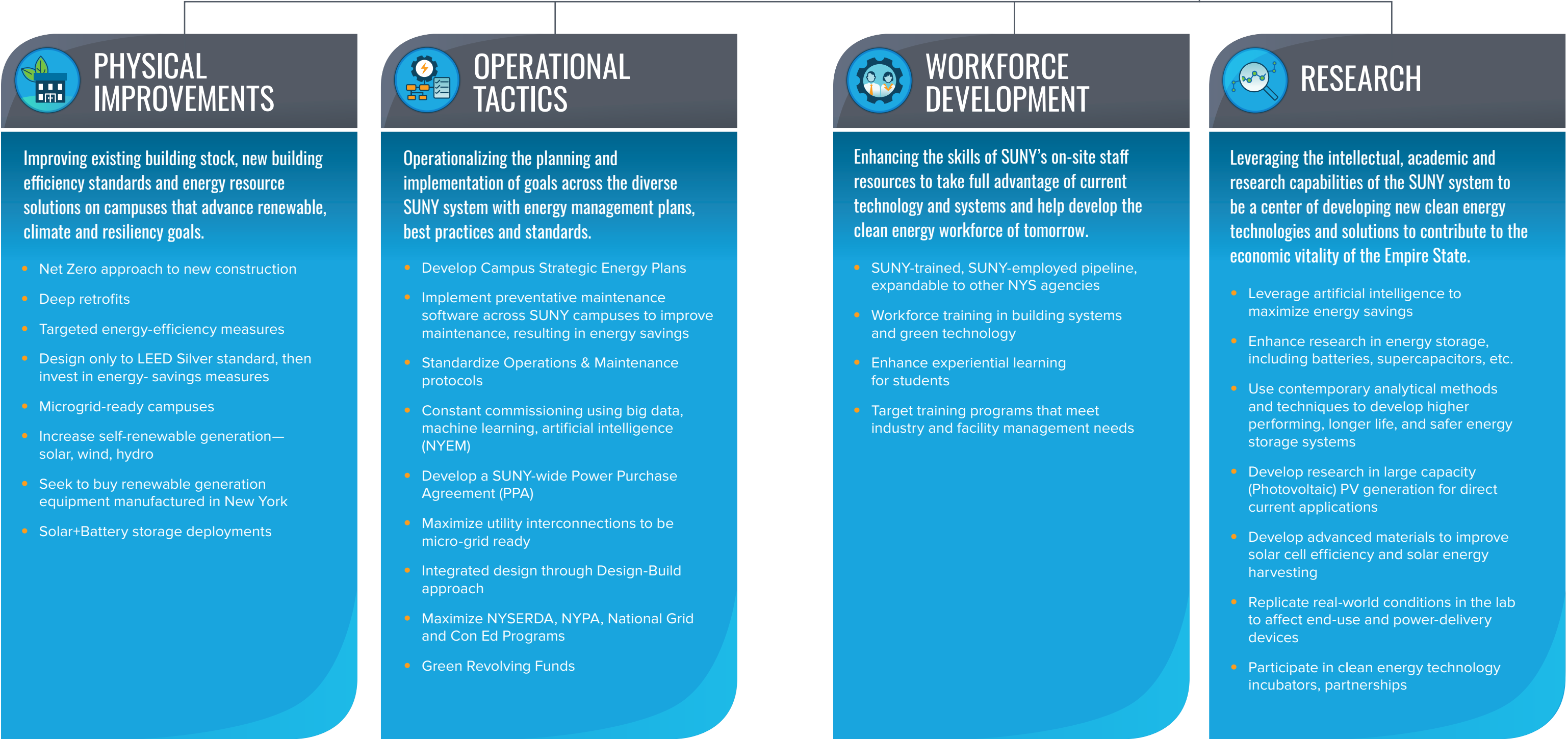
PARTNERSHIP

NYSERDA has entered into a Memorandum of Understanding (MOU) with SUNY to develop a sustainable workforce. Building off of this success, the multi-agency steering committee suggests other areas of strategic partnership to make it easier for campuses to participate.

SUNY'S STRATEGIC ENERGY PLAN APPROACH

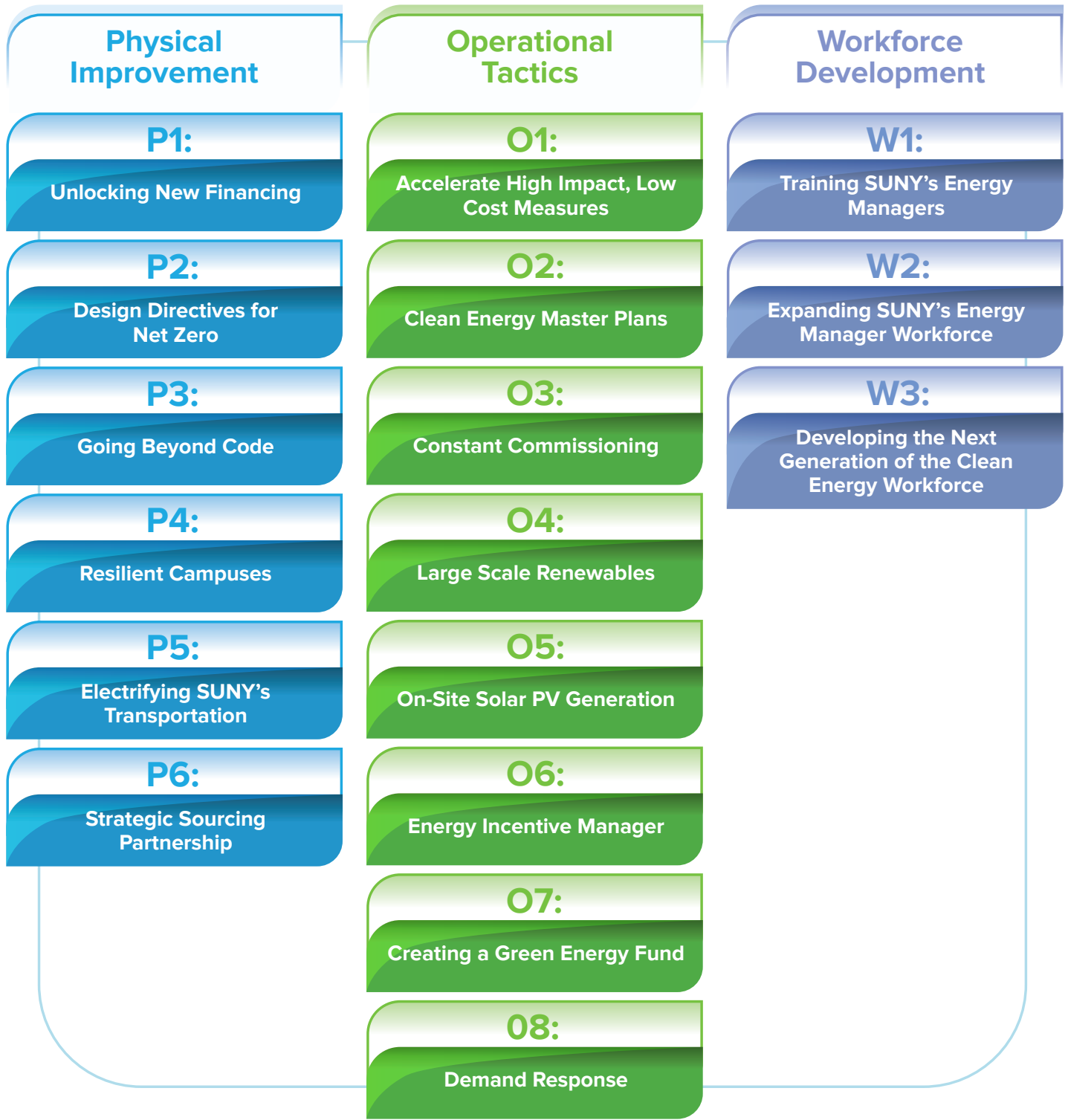
SUNY has developed a Strategic Energy Plan to implement its clean energy goals, divided into the following focus areas: physical improvements, operational tactics, workforce development, and research. The initiatives identified in this roadmap support this Plan. Research initiatives have not been identified through the roadmap process, but NYSERDA has previously supported SUNY in this area and will continue to do so in the future.

COMPREHENSIVE APPROACH TO DEVELOPING SUNY'S STRATEGIC ENERGY PLAN



HIGH-IMPACT INITIATIVES TO REALIZE CLEAN ENERGY GOALS

SUNY, NYPA, NYSERDA, DPS and LIPA (referred to as the Steering Committee in this document) convened a series of workshops to develop initiatives that support the Chancellor’s vision and leverage agency expertise and resources. This effort identified 17 high-impact initiatives which were grouped in three categories:



PRIORITY INITIATIVES

The following are recommended as priority initiatives because they are expected to garner wide support from the campuses and build off of recent successes:

Unlocking New Financing

NYPA can make additional financing available to assist in rapid deployments and to partially address SUNY’s capital funding constraints.

Resilient Campuses

SUNY, NYPA, and NYSERDA will expand on the collaborative efforts at SUNY New Paltz, where a “solar + storage + smart inverter” demonstration project was deployed in 2018. Microgrids can be accomplished by leveraging NYPA financing and project management along with NYSERDA’s expertise in campus level resilience.

Accelerate High Impact, Low Cost Measures

LED lighting can use significantly less energy than fluorescent bulbs and lasts up to 25 times longer. NYPA will provide turnkey services from design to installation and financing to deploy LED lighting solutions. Payback periods will be shortened using NYPA’s preferred materials pricing and all available utility rebates. This initiative will also support the Governor’s goal of 100% LED conversion of indoor and outdoor lighting by 2025.

Demand Response

NYPA will help SUNY expand DR capabilities to SUNY facilities where it is economically beneficial.

Strategic Sourcing Partnership

Through this partnership, NYPA will provide preferred pricing from strategic vendors through aggregated procurement. Additionally, NYPA will coordinate delivery of training and best practice education.

Large Scale Renewables

NYPA has presented a proposal to SUNY to facilitate clean energy at scale under a pre-paid power purchase agreement to lower the greenhouse gas footprint of participating campuses.

The agencies welcome more discussion with SUNY Leadership and its campuses to dive deeper into these initiatives, and agree a course of action. The Steering Committee would also suggest engaging with local stakeholders at the campus level to estimate the likely costs and benefits, to pinpoint available campus resources, and agree which initiatives to pursue and with which campuses to start.

The stakeholders participating in this exercise are encouraged by the Chancellor’s vision and are excited to provide support in making it a reality.

II. USING THIS ROADMAP

This roadmap outlines how SUNY can further achieve measurable progress toward its clean energy goals with the support of the New York State energy agencies. Given the multifaceted complexity of a 64-campus system, technology that is evolving in real time, and the announcements of more ambitious clean energy goals, SUNY must work hard, but not alone, to achieve its goals.

This roadmap addresses the commitments from SUNY and the New York State energy agencies. Achieving clean energy goals is a group effort, and all of SUNY’s stakeholders, including students, faculty, staff, and the public will be asked to contribute to help the organization achieve these ambitious goals.

The initiatives outlined in this report were developed in collaboration with the New York State energy agencies: LIPA, DPS, NYPA, and NYSERDA. Each initiative description and related timing for completion will change based on feedback from campuses and SUNY Leadership priorities. It is not intended that every initiative be pursued simultaneously across all campuses. Available staff time and funding provide a real constraint on what can be done and by when. Instead, this roadmap provides a range of initiatives that campuses can mix and match to enable campuses to deliver on short term objectives and build capacity to meet the clean energy goals laid out by the Chancellor in the long term.



Through collaboration and action, SUNY, along with the New York State Energy agency partners, can shepherd the organization, and the state into fostering a new clean energy future for students, SUNY employees, and New Yorkers.



SUGGESTED NEXT STEPS FOR 2018-2019

1. Discuss Roadmap with SUNY Campuses to prioritize initiatives based on local needs
2. Agree on a workplan for action
3. Use this roadmap as a guide which can be adapted and changed to address new programs and technologies as they arise
4. Assign working groups for each priority initiative
5. Engage local stakeholders at the campus level

III. SUMMARY OF SUNY CLEAN ENERGY GOALS



ACHIEVE ENVIRONMENTAL SUSTAINABILITY

SUNY will source 100% of its grid-sourced electricity from renewable energy and energy storage either on-site or through procurement, reducing GHG emissions by over 400,000 metric tons per year.



DEVELOP CLEAN ENERGY MASTER PLANS

Every campus in the SUNY System will devise a Clean Energy Master Plan (CEMP), or blueprint for achieving 40% reduction of GHG emissions.



ESTABLISH A NETWORK OF COMMUNITY RESILIENCE

SUNY will build a Network of Community Resilience across the 64 SUNY campuses to serve as temporary emergency facilities, providing shelter, heating and cooling by clean energy during outages caused by natural disasters to New York communities.



LEAD WITH NET ZERO BUILDINGS

All new SUNY buildings will be required to meet newly established EUI targets.



RETROFIT EXISTING BUILDINGS

While performing necessary critical maintenance on existing buildings, which are on average over 47 years old, related additional investments will be made in deep-energy retrofits and energy efficiency.



ESTABLISH A CLEAN ENERGY RESEARCH, INNOVATION AND EDUCATION NETWORK

By leveraging its strength in education, research, innovation and partnerships, SUNY will establish a network of partners with industry to attract and retain businesses in New York State.



ATTRACT START-UP ACTIVITIES IN NY

Attract START-UP NY partners to New York and collaborate with SUNY and other public and private universities in the State.



ENHANCE WORKFORCE DEVELOPMENT

Provide a dynamic and engaging learning environment to SUNY students to foster a future clean energy workforce. Also deliver training related to building maintenance and best practices for net zero facilities with complex building systems to assure campus facilities continue to function at peak energy saving capabilities.

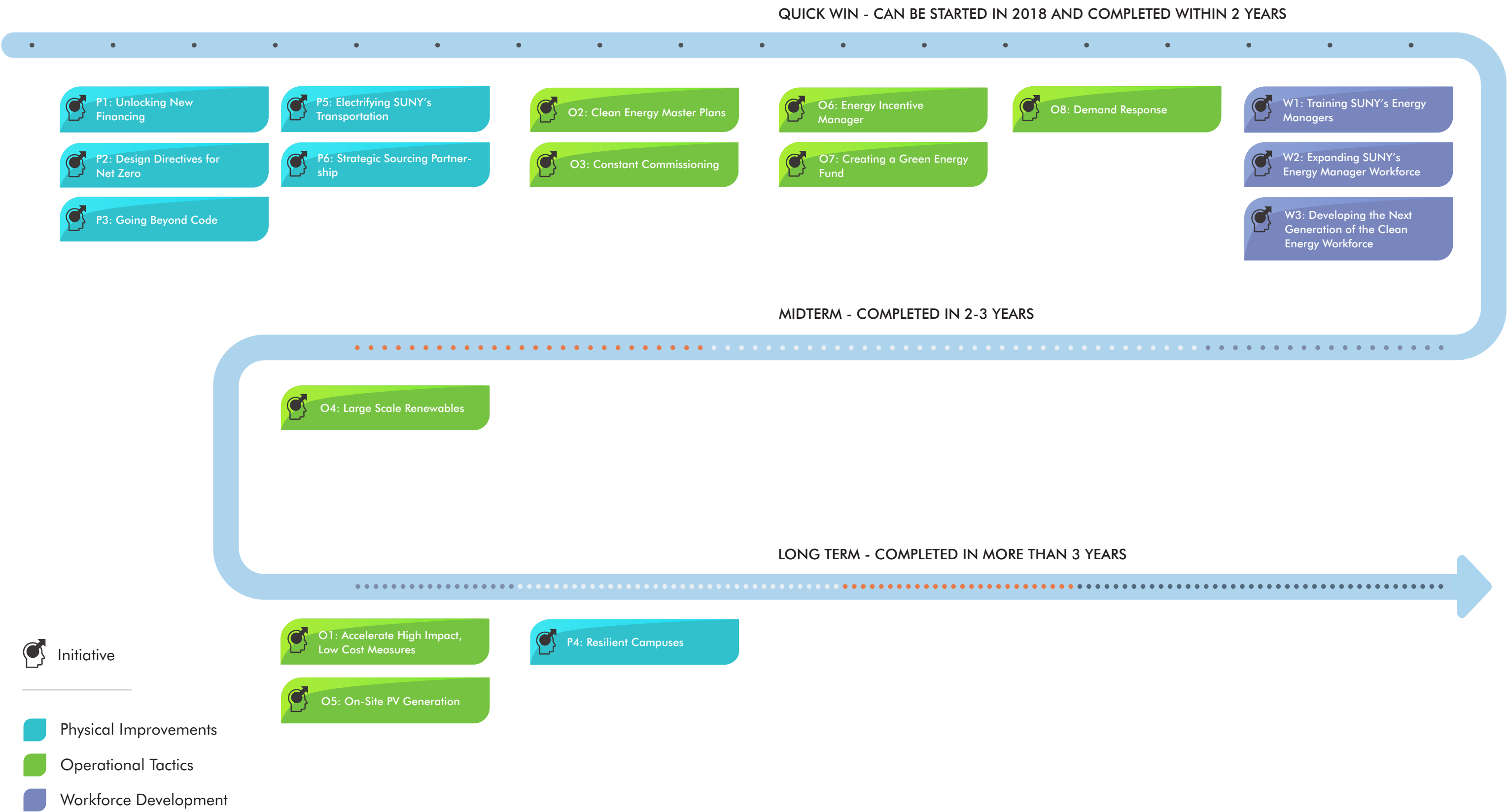
In addition to the above goals, the steering committee created an additional goal to ensure consistency with EO166 goals.



LOW CARBON TRANSPORTATION

SUNY will add Electric Vehicles (EVs) to its fleet and provide charging infrastructure to enable the transition to low carbon vehicles.

OVERVIEW OF ROAD MAP



IV. MEASURING SUCCESS

To measure achievement towards the Chancellor’s vision and track progress towards each goal, key performance indicators were developed. The dates provided for delivery are suggested based on available information. These will be refined based on input from SUNY leadership and campuses. Two of the Chancellors goals, a clean energy innovation and education network and START-UP NY activities, are being pursued outside of this effort and are not reflected within the roadmap.

1

ENVIRONMENTAL SUSTAINABILITY

- Goal:** 100% of grid sourced electricity from renewable energy and energy storage
- Key Performance Indicators:**
- Develop a request for proposal (RFP) for a consultant to research potential energy sources that can contribute to the goal by end of 2018
 - Each campus will develop a plan for how the campus will meet 100% renewables by the end of 2020

2

CLEAN ENERGY TEMPLATE

- Goal:** 100% of campuses achieve 40% reduction of greenhouse gas (GHG) emissions (from 1990 levels) by 2030
- Key Performance Indicators:**
- SUNY will have a Clean Energy template created by the end of 2019

3

A NETWORK OF COMMUNITY RESILIENCE

- Goal:** 100% of campuses will explore the feasibility of a microgrid for all or part of the campus to especially serve facilities needed in the event of an emergency.
- Key Performance Indicators:**
- Current State assessment of resiliency by the end of 2019
 - Identify all campuses that are suitable for microgrids by the end of 2020
 - A SUNY wide template for network of community resilience planning will be created by the end of 2021
 - Campuses will have their resiliency plans implemented within an agreed timeframe

Goal: All new SUNY facilities commencing design in 2019 and beyond will be designed and built to net-zero carbon emission standards.

- Key Performance Indicators:**
- Create design directive for Net Zero new construction for some typologies (facilities where Net Zero construction is possible) by the end of 2018

4

NET ZERO BUILDINGS

Goal: All existing buildings will receive investments in deep-energy retrofits and energy efficiency while performing related critical maintenance.

- Key Performance Indicators:**
- Incorporate concept of deep-energy retrofit requirements into SUNY design directives to strive for significant energy reductions over the baseline by the end of 2018
 - Identify projects that deliver high impact, low cost measures by the end of 2019
 - Enable building energy benchmarking using the New York Energy Manager platform

5

EXISTING BUILDING RETROFITS

Goal: Provide SUNY students with training to enter clean energy workforce. Additionally, provide training and updates to civil service positions related to holistic facility management.

- Key Performance Indicators:**
- Add Energy Managers to five campuses per year (beginning in 2019)
 - Launch training for existing facility staff on Energy and Sustainability at one campus per year (beginning in 2018)

6

WORKFORCE DEVELOPMENT

V. CORE NEW YORK STATE ENERGY AGENCY CAPABILITIES

Each of the four state energy agencies, NYPA, NYSERDA, DPS, and LIPA contributed to this roadmap. The way each can help SUNY is presented in the following section.



NYPA

NYPA’s Clean Energy Business offers a comprehensive suite of design-build energy project services, digital energy management, and peak load reduction capabilities. NYPA brings world-class expertise and deep local knowledge to designing, installing, commissioning, and financing projects for energy efficiency, resiliency, and distributed energy. NYPA has worked on more than 2,100 projects, saving customers hundreds of millions of dollars in energy costs and improving both energy resiliency and productivity.

SUNY and NYPA have a long-standing relationship of developing and implementing energy efficiency projects. Over the past 20 years, through the NYPA Energy Efficiency program, SUNY has invested \$283M to complete 123 projects that have resulted in annual energy savings of \$22.6M and 1.01 TBtu.

NYPA’s foundation is in performing deep energy efficiency retrofits throughout New York State. As customer needs have changed, NYPA has expanded its offerings to include new turnkey services such as the solar plus storage installation at SUNY New Paltz, and the deep sub-metering being conducted at State facilities using NYPA’s New York Energy Manager (NYEM). NYPA’s expertise, combined with its low-cost financing has positioned it as the market leader in the State, enabling comprehensive clean energy solutions.

NYPA has the expertise to be a financing and delivery partner for Physical Improvements, Operational Tactics and Workforce Development in the SUNY Strategic Energy Plan. Services that are most relevant to SUNY’s goals include:

- Implementing energy conservation measures for existing buildings to save money and reduce greenhouse gas emissions
- Procuring clean energy through the development of new renewable energy generation sources
- Hardening existing infrastructure through the development of microgrids
- Greening SUNY’s fleet by strategically siting and building out electric vehicle infrastructure

All of these services are eligible for NYPA’s low cost financing which will lower out of pocket expenses for campuses.



NYSERDA

NYSERDA works with stakeholders throughout New York, including residents, business owners, developers, community leaders, local government officials, university researchers, utility representatives, investors, and entrepreneurs. NYSERDA partners with them to develop, invest, and foster the conditions that:

- Attract the private sector capital investment needed to expand New York’s clean energy economy
- Overcome barriers to using clean energy at a large-scale in New York
- Enable New York’s communities and residents to benefit from energy efficiency and renewable energy

To achieve these goals, NYSERDA manages many incentive, information, and training related initiatives. NYSERDA has committed to SUNY to continue an on-going discussion and is providing “Concierge Services” to ensure continuous access to its portfolio of programs. Below is a concise list of programs and services that are the most likely to be accessed by SUNY in the next six months.

- On-site Energy Manager – Having an empowered on-site energy manager can help facilities actively manage their energy use and lower costs through energy efficiency and optimization. The purpose of this program is to demonstrate the value of a dedicated on-site energy manager that can ensure long-term energy savings are identified and implemented.
- Flexible Technical Assistance Program – The FlexTech program shares the cost to produce an objective, site-specific, and targeted study on how best to implement clean energy and/or energy efficiency technologies.
- Real Time Energy Management – RTEM is a cutting-edge technology that continuously sends a site live and historical performance data to an advanced cloud-based or on-site system to optimize a building’s energy usage.
- Commercial New Construction Program – This program offers objective technical and financial support to commercial building owners and tenants to effect a permanent transformation in the way buildings are designed and constructed in New York State.
- Geothermal Heat Pump Incentive Program – Ground source heat pump (GSHP) systems transfer thermal energy between the ground and a building to heat and cool without any harmful emissions or additional fuel. NYSERDA provides rebates for the installation of this cutting-edge, renewable energy technology.

NYSERDA’s new construction team is also piloting a service to SUNY and The Fund (State University Construction Fund) to help set definitions, review and potentially update guidance documents or specifications, and provide other non-project specific support to help SUNY construction achieve net zero energy design and operation.



LIPA

LIPA offers a variety of incentives, rebates and programs to help customers transition towards energy efficiency. These programs reduce energy usage, lower utility bills, save the environment and improve the efficiency of the electric system. A Technical Assistance (TA) rebate is also available to offset the cost of engineering and design services for qualifying projects.

LIPA has worked closely with NYPA and NYSEERDA to advance energy efficiency initiatives and clean energy technologies. Some notable collaboration programs include:

- Combined Heat & Power
- NYEM implementation on Long Island
- Geothermal Heat Pumps
- REV Campus Challenge Program

LIPA has also helped many SUNY campuses reduce their energy needs and consumption. Since 2000, LIPA has incentivized \$1.4 million in energy efficiency projects at Stony Brook University and its Southampton campus, Farmingdale University, Old Westbury College, Nassau Community College and Suffolk County Community College.

LIPA's Commercial Efficiency Program is also available to coordinate with NYPA and NYSEERDA to help SUNY save energy and realize its sustainability goals through rebates and incentives for installation of energy reducing products.



DPS

The Department of Public Service (DPS) is the staff arm of the Public Service Commission (PSC). The Department's mission is to ensure affordable, safe, secure, and reliable access to electric, gas, steam, telecommunications and water services for New York State's residential and business consumers, while protecting the natural environment. The PSC also seeks to stimulate effective competitive markets that benefit New York consumers through strategic investments that encourage development.

The Department supports SUNY's climate action plan goals of purchasing one hundred percent of its grid-sourced electricity from zero-carbon sources, designing all new SUNY buildings to achieve zero-net carbon emissions, and committing to make extensive energy efficiency retrofits to existing buildings.

Through ongoing programs like the Clean Energy Standard (CES), Clean Energy Fund (CEF), and utility Energy Efficiency programs, the PSC seeks to increase the quantity and access to renewable energy and energy efficiency services and products.

Each New York State Energy Agency has a separate set of responsibilities and mandates. By working together, they can provide SUNY with advanced solutions to address its sustainability goals. There is no single template that addresses how the New York State agencies can assist SUNY, however, there are scenarios where the agencies can come together to address core issues. This roadmap presents scenarios of collaboration which address specific SUNY goals.

VI. PHYSICAL IMPROVEMENTS

OVERVIEW OF FOCUS AREA

The SUNY Campuses have a diverse set of facilities and uses. These buildings are at different points on the pathway towards a carbon neutral future. The initiatives in this section focus on how the New York State Energy Agencies can support SUNY facilities in achieving carbon neutrality.

P1: UNLOCKING NEW FINANCING

DESCRIPTION

Supplement SUNY’s existing capital budget by outlining conditions where NYPA will provide project funding for SUNY campuses. For example, NYPA financing could supplement SUNY’s capital budget to enable more energy efficiency and sustainability projects than could otherwise be possible.



GOAL & KEY PERFORMANCE INDICATORS

This initiative will contribute to the following clean energy goals:

- Net Zero Buildings
- Existing Building Retrofits
- Community Resilience, including microgrid deployments

This will contribute to the following enterprise key performance indicators:

- Develop a framework identifying how each organization can support SUNY in funding, financing and implementation of initiatives by the end of 2018



APPROACH

NYPA and SUNY will co-develop this initiative as follows:

- NYPA to draft a strategic business plan for review by SUNY. This plan will detail processes and structures clearly and concisely for campuses to consider, with accommodation for different campus specific needs.
- Once the strategic business plan is in place, NYPA and SUNY will educate project managers and campus staff about how the funding can be used and the services NYPA can provide.



TIMING

- The NYPA developed strategic business plan will be complete by March 2019

P2: DESIGN DIRECTIVES FOR NET ZERO

DESCRIPTION

Net Zero carbon buildings are not an explicitly defined design or configuration. Net Zero definition, design guidelines, and specifications will need to be established for application to both existing and new building stock.

GOAL & KEY PERFORMANCE INDICATORS

This initiative addresses the net zero buildings goal.
It contributes to two of the key performance indicators:

- Create design directive for Net Zero new construction for some typologies (facilities where Net Zero construction is possible) by the end of 2018
- Create design directive for retrofits striving to Net Zero by the end of 2018

APPROACH

NYSERDA has retained consultant support and is currently working with SUNY to establish definitions for Net Zero Buildings through a series of workshops which began in April 2018. Following alignment on definitions, NYSERDA will support SUNY through a webinar sponsored by NYSERDA bring information about successful net zero case studies to the SUNY facilities staff.

The design guidelines and specifications will be communicated to SUNY campuses through a webinar sponsored by NYSERDA.

COST DRIVERS

NYSERDA Clean Energy Funds are being used for the workshops and development of the Net Zero definition, guidelines and specifications.

TIMING

- Already in progress and to be completed by the end of 2018

P3: GOING BEYOND CODE

DESCRIPTION

NYPA can provide funding, project design and implementation services to assist SUNY in allowing new buildings to go beyond code to achieve high efficiency and Net Zero Energy (NZE) performance. This will take the form of traditional design & construction services and project financing.

GOAL & KEY PERFORMANCE INDICATORS

This initiative addresses the net zero buildings goal.
This initiative contributes to the following key performance indicator:

- All new SUNY facilities commencing design in 2019 and beyond will be designed and built to the net-zero carbon goal as determined by the new design directives.

APPROACH

NYPA can provide turnkey services including design, implementation, project management, and low-cost financing to supplement SUNY capital for energy efficiency measures that exceed the building code requirements. In addition, NYPA will coordinate with LIPA, investor-owned utilities, and NYSERDA to ensure SUNY captures all available incentives. The design portion of this initiative will leverage the Net Zero design guidelines & specifications established through the new SUNY design directive for Net Zero facilities.

As part of the project management role, NYPA will leverage NYSERDA's long-standing commercial New Construction Program which provides technical and financial support to building owners to effect a permanent transformation in the way buildings are designed and constructed in New York State. NYSERDA will also launch a new Net Zero Energy for Economic Development program in May of 2018 as part of the Consolidated Funding Application process. LIPA's Commercial Efficiency Program will also be able to contribute to this initiative through incentives, rebates, and technical assistance and programs.

TIMING

- NYSERDA and LIPA incentive programs are in place for 2018 to support these outcomes
- NYPA financing is available upon further discussion
- SUNY projects can access these supports and services immediately

P4: RESILIENT CAMPUSES

DESCRIPTION

This initiative is focused on establishing SUNY campuses as resilient beacons for New Yorkers, providing clean, reliable energy in times of grid disruption. It has two parts, first focusing on defining resiliency, and second on deploying microgrids for reliable power.

The first part of this initiative will be to define what resiliency means for SUNY at the campus scale. Some key questions which will be answered through this initiative are:

- What are the resiliency requirements?
- How many facilities on each campus and what size facilities have back-up generation capabilities that meet the resiliency requirements?
- Which energy sources can be used for back up generation? What proportion of them can be considered “clean” energy, i.e. low emissions or low carbon?
- Do the facilities need to meet any other resiliency standards (e.g. Red Cross)?

A microgrid is a distribution network that incorporates a variety of possible distributed energy resources that can be optimized and aggregated into a single system. This system can balance loads and generation with or without energy storage. It is capable of islanding whether connected or not to a traditional utility power grid. The second part of this initiative is designed to implement the resiliency plans by deploying on-site microgrids powered by clean energy and/or storage. The importance of this initiative is highlighted by the fact that 93 percent of New Yorkers live within 15 miles of a SUNY campus, and nearly 100 percent live within 30 miles.

GOAL & KEY PERFORMANCE INDICATORS

This initiative will contribute to SUNY’s ability to meet their Network of Community Resiliency goal. It will contribute to the following key performance indicators identified for this goal:

- Create a SUNY-wide template for Network of Community Resilience Plan by 2021

NYPA can provide project development, management and financing services for campuses where creation of a microgrid is feasible.

APPROACH

The first step in this initiative is defining what meeting the resiliency goal will require. NYPA will support SUNY in this phase by providing co-ordination and insights. NYPA can also provide regulatory support through assistance with regulatory filings or advocacy for policy to support microgrids, on-site generation, or storage projects. The draft definition of success will be reviewed and approved by the SUNY Chancellor to ensure that it is consistent with the original vision.

Once the resiliency requirements have been defined, a resiliency plan template will be created to collect all information required to demonstrate that a campus will meet SUNY’s Network of Community Resiliency Goal. The template will be prepared primarily by SUNY staff. NYPA will participate in the template preparation process to provide insights. The resiliency plan template will be distributed to all campuses to complete the required data. SUNY Office for Capital Facilities will support campuses in completing the template.

The following approach will be used for implementation of microgrids:

- SUNY and NYPA work together to develop a microgrid assessment process and resiliency plan template and training for campuses.
- SUNY and NYPA to convene a Task Force to initiate the campus microgrid assessment process
- NYPA to offer seed funding for microgrid pilots based on a longer term commitment
- The program will start with a marquis demonstration pilot to inform future projects

NYPA will take the lead in delivering this initiative. They can act as SUNY’s representatives and advocate for on-site clean energy generation projects. This will also include coordination with LIPA and other utilities in safely, reliably, and cost-effectively interconnecting microgrids to the utility grid. This would include completing site assessments, RFPs and vendor selection. NYPA will incorporate available NYSERDA and LIPA incentives and technical assistance to any applicable projects. NYPA is also able to support this initiative by providing turnkey services including design, implementation, and project management for smaller on-site generation or energy

COST DRIVERS

The external costs associated with defining resiliency are minimal. The effort will require primarily SUNY staff time and efforts. If NYPA carries out microgrid project implementation, the support contributing to the resiliency definition and template will be provided as a free service. Microgrid financing can be supported by NYPA, as per NYPA’s procurement process.

TIMING

- The definition of resiliency will be finalized by the summer of 2019
- The template for the resiliency plans will be prepared by 2020 and campuses will populate the template by 2022

CASE STUDY: E-TECH BUILDING

SUNY is advancing its net-zero goal at the University of Albany. The Emerging Technology and Entrepreneurship Complex (ETEC) building is a new research and instructional building being built by the University at Albany. The non-lab portions of this building, which accounts for over 90% of the total square footage, will achieve NZE. As NZE building designs become more common, the incremental cost of construction will become less expensive. Currently, the market is seeing a 5-10% first-cost premium, with a 10-20 year simple payback. Since many of the measures last for 20 years, or even life-of-building, the Return on Investment (ROI) is significant. With the State engaging in new construction and gut rehabilitation projects every year, the long-term operational cost savings potential for the State is significant.



CASE STUDY: SUNY’S DOWNSTATE MEDICAL MICROGRID

SUNY Office for Capital Facilities is directly involved in the Clarkson Avenue Microgrid project in concert with the Office of Mental Health (OMH) Kingsboro Psychiatric Center (project lead), the State University of New York (SUNY) Downstate Medical Center (DMC), and Kings County Hospital Center as part of NYSERDA’s NY Prize competition. The Clarkson Avenue Microgrid will serve to enhance reliability, mitigate power outages, and enhance overall resiliency and security through the combination of fuel cells, co-generation and emergency generators controlled by a central dispatch control center, and with capability to island from the grid during emergencies or grid failures.

P5: ELECTRIFYING SUNY’S TRANSPORTATION

DESCRIPTION

A transition to Electric Vehicles can help support SUNY’s reduction of GHG emissions. To enable the transition to EVs for student, staff and faculty, SUNY will install and manage EV Charging infrastructure at campuses. NYPA will offer enterprise-level pricing and installation programs for accelerated deployment of EV charging infrastructure at SUNY campuses.

One component of this will be facilitating a short-term process to develop a SUNY Enterprise EV Guidance or Policy document. This process, which can be supported by NYPA and NYSERDA, will lead to a SUNY-wide approach to EV fleets, EV charging rates and guidance on EV Charging infrastructure and vehicle purchasing.

This initiative will serve the following EV stakeholders:

 Students

 Faculty

 Public

 SUNY Fleet

GOAL & KEY PERFORMANCE INDICATORS

This initiative addresses the Environmental Sustainability Goal by reducing GHG emissions. In addition, it addresses the Low Carbon Transportation goal, focused on EV support and deployment.



APPROACH

NYPA can assist with the bid, build, construction and financing of the EV Charging Infrastructure. This can be provided as a turnkey solution by NYPA and payment would not begin until the project is complete. NYPA can also provide SUNY fleet assessment services to help them comply with EO 166. Such studies would include fleet fuel economy, fleet right-sizing/down-sizing, and electrification opportunities.

NYPA and NYSERDA can provide leadership for the development of the EV policy document via workshops. Additional activities will include holding webinars to all SUNY campuses to provide knowledge and education on the policy and resources.

As one of the lead agencies for the Charge NY initiative, NYPA can provide additional benefits to New York State and SUNY. These include:

- Developing a state government workplace charging program
- Financing and installing public EV charging infrastructure
- Assisting in procuring electric transit buses and other EVs
- Advocate for electric rates and programs to support EV programs

COST DRIVERS

NYPA will identify the costs of this program under the strategic sourcing partnership model. NYPA will partner with the other New York State agencies, specifically NYSERDA to lower costs for SUNY on its electrification goals.

TIMING

- The EV Charging Policy document can be drafted by the end of 2019
- The negotiated pricing for EV charging infrastructure will be developed in 2019



P6: STRATEGIC SOURCING PARTNERSHIP

DESCRIPTION

Develop a SUNY-NYPA strategic sourcing partnership to accelerate procurement and deployment of energy efficient retrofits and net zero buildings projects. This partnership will allow SUNY to take advantage of a catalog of reduced, pre-negotiated prices from vendors for many products.

GOAL & KEY PERFORMANCE INDICATORS

This initiative will contribute to two of SUNY’s goals:

- Net Zero Buildings
- Existing Building Retrofits

It will contribute to the following enterprise key performance indicators:

- Developing a strategic sourcing partnership product list and portal by the middle of 2019.



APPROACH

NYPA has the ability to secure preferred pricing from vendors for high volume purchases by leveraging NYPA’s large portfolio of projects, through their economies of scale. This preferred pricing can in turn be passed on to SUNY. For this initiative, NYPA will develop aggregated procurement packages of volume-pricing for SUNY and communicate these throughout the SUNY campuses. NYPA will also include additional benefits as a part of the procurement package. Such benefits include:

- Tailored training sessions from leading manufactures to support operational improvement and workforce development
- NYPA-hosted procurement workshops to inform campuses of options and accelerate adoption

This model will also enable campuses to employ the business model that best suits them. They can select from turnkey service where NYPA purchases and installs equipment or a model where SUNY purchases equipment using NYPA’s preferred market pricing and

TIMING

The training can be complete by the end of 2019.



VII. OPERATIONAL TACTICS

OVERVIEW OF FOCUS AREA

SUNY campuses are staffed with skilled facility managers who will lead their campuses towards a more resilient future. The initiatives in this section focus on providing operational assistance to these facility managers to maximize SUNY’s sustainability outcomes.

01: ACCELERATE HIGH IMPACT, LOW COST MEASURES

DESCRIPTION

To accelerate energy efficiency (EE) adoption on SUNY campuses, NYPA will develop a program that addresses high impact, low cost measures such as LED Lighting and demand controlled ventilation. The program will provide full service support (design, funding and implementation) to SUNY in deploying EE measures where appropriate, as identified in the “New Efficiency: New York” white paper, under the “10% Improvement Projects”¹. The energy bill savings from these measures can be repurposed and used to fund other energy conservation measures.

GOAL & KEY PERFORMANCE INDICATORS

This initiative will contribute to SUNY’s ability to meet their Existing Building Retrofits goal. It will contribute to the following key performance indicators identified for this goal:

- Develop program to deliver high impact, low cost measures by the end of 2018
- Enable building energy benchmarking by the end of 2019 for all facilities

This initiative will also support the requirement announced by the state as part of Earth Day that all State agencies must convert all indoor and outdoor lighting to 100% LEDs by 2025.

APPROACH

NYPA will develop a focused SUNY EE program to address high impact, low cost EE measures. The program will be prepared for SUNY System Administration and will be shared with individual campuses. The program will include design, funding and implementation of the EE measures. The specific EE measures first introduced include the following:

1. Indoor and outdoor lighting retro-fit to LED lighting

2. Demand control ventilation on larger air handling units

3. Time-of-use meters, deep sub-metering, and intelligent controls to enable better equipment and building scheduling and shut down management
4. For larger equipment and buildings, the use of intelligent building management practices and operations

5. Air sealing and other building envelope tune-ups

For each measure type, NYPA will coordinate with LIPA, the relevant investor-owned utilities, and NYSERDA to ensure available incentives are incorporated into the project. NYPA can leverage the strategic sourcing partnership to achieve lower costs for measures and can provide financing for the projects.

In cases where the project includes additional costs (e.g. ceiling replacement and lighting redesign to reduce number of fixtures), those additional expenditures can be incorporated into the project financing. This effort expands SUNY’s capacity to do projects, because no upfront funding is necessary. NYPA financing makes it possible for payments to begin after the project is complete. NYPA will also provide information and case studies to campuses to inform them of the benefits to their environment.

1. New Efficiency: New York, April 2018. <https://www.nyserda.ny.gov/-/media/Files/Publications/New-Efficiency-New-York.pdf>

COST DRIVERS

Project costs for high impact, low cost EE measures vary greatly depending on the application and scope of the project. In NYPA’s experience, these projects will produce a positive cash flow with significant savings beyond the financing payments. Typical payback is less than 5 years and faster with utility incentives. These projects will also result in a significant reduction in annual operating and maintenance costs.

TIMING

- The NYPA program will be established in 2018
- All outdoor lights can be upgraded by the end of 2022 depending on campus prioritization
- Other measures will be completed by 2024



CASE STUDY: STONY BROOK UNIVERSITY

Stony Brook University has partnered with its energy service partners, NYPA and LIPA, in a collaborative effort to complete current projects and incorporate additional energy savings opportunities in the future. Stony Brook University and NYPA partnered on an innovative approach to energy performance contracting that leveraged LIPA rebates and incentives, private sector expertise and public-sector credit ratings. Stony Brook contracted a private energy service company to execute an \$11.5 million energy performance project that includes a variety of energy efficiency upgrades, such as lighting and HVAC controls. LIPA has provided energy efficiency staff for guidance and rebates through the Commercial Efficiency Program for a wide range of measures including LED lighting, HVAC, and Variable Frequency Drives as NYPA also provided financing in support of the project. NYPA has assisted with over \$150M in projects with Stony Brook, including projects at their Medical Center, and their residence and academic buildings. This project is significant for many reasons. First, it represents a major capital upgrade at the largest SUNY campus, which should have an impact on overall State energy reduction goals. Second, it demonstrates the value and viability of EPCs in the State building portfolio. Finally, it sets an important precedent for NYPA-financed projects that are fully implemented by a third party. NYPA is actively partnering with Stony Brook to define their path to achieve EO88 goals, as well as identify how the project provides benefits to building operations and student comfort.

02: CLEAN ENERGY TEMPLATE

DESCRIPTION

To achieve a 40% reduction of GHG emissions (from 2005 levels) by 2030, each campus will need a comprehensive and consistent Clean Energy Master Plan that addresses actions and best practices it must undertake. While some SUNY campuses can develop their own plans from scratch, many campuses will benefit from having a common template to follow. By creating a Clean Energy Master Plan Template, all SUNY campuses can accelerate the creation of their Clean Energy Master Plans (CEMP). Each campus will be able to customize the template to reflect their needs.

GOAL & KEY PERFORMANCE INDICATORS

This initiative will contribute to SUNY’s ability to develop Clean Energy Master Plans. It will contribute to the following key performance indicators for this goal:

- SUNY will have a CEMP template created by the end of 2019
- 100% of campuses in the SUNY System will devise a CEMP to achieve campus sustainability goal

APPROACH

SUNY will lead this effort with support from NYPA and NYSERDA, who will help to convene a subset of SUNY campus energy managers to develop the template. The standard NYPA Energy Master Plan template may be useful as a starting point. The CEMP template should be aligned with the campus Facility Master plans and meet the standards outlined in the Governor’s directives issued on Earth Day for Energy Master Planning.

In addition to preparation of the template, NYPA will work with SUNY to design a survey to collect information that is not currently available in SUNY’s implementations of EnergyCAP or AiM, nor in NYEM. Where possible, SUNY campuses will leverage NYEM data to inform the CEMPs.

Facility Master Plans and Energy Master Plans will provide a comprehensive road map that enables facility operators, business officials, and executive leadership to make data driven decisions that result in optimal life-cycle cost outcomes, while achieving the programmatic mission of the state agency or authority. Comprehensive Facility Master Planning and Energy Master Planning can help better manage capital outlays and operations and maintenance costs and will enable better decision making about the use of capital budgets, off balance sheet debt structures, and other work.

New Efficiency: New York

COST DRIVERS

NYSERDA will be able to provide financial support through the FlexTech program for tracking campus information over time. In addition, NYPA can provide targeted support towards the creation of the CEMP templates.

TIMING

- The template will be completed in 2019
- A timeline will need to be agreed with each campus for creating a Clean Energy Master Plan



03: CONSTANT COMMISSIONING

DESCRIPTION

To ensure optimal performance of SUNY facilities, NYPA and NYSERDA can provide constant commissioning services to track energy performance. This will provide an on-going process to resolve operating problems and optimize energy use. This is especially important for Net Zero Buildings.



GOAL & KEY PERFORMANCE INDICATORS

This initiative will address existing building retrofits, including buildings that undergo deep energy retrofits, and new net zero buildings.



APPROACH

NYEM currently tracks some SUNY metering data but does not provide the required level of detail to enable constant commissioning. Through this initiative, NYPA will enable NYEM to:

- Track ongoing and real-time performance for constant commissioning
- Be “Net Zero ready”, allowing it to track performance of Net Zero buildings.

Where applicable, NYPA will work with LIPA to identify any incentives which might be available to cover the costs of the required NYEM upgrades. LIPA will also support sub-meter deployment for building optimization.



TIMING

- NYEM will incorporate ingesting Net Zero Buildings data into its roadmap and agree a timeline for data transfer with individual campuses

04: LARGE SCALE RENEWABLES

DESCRIPTION

SUNY is assessing several options for meeting its clean energy targets, including a proposal from NYPA for turnkey large-scale renewable resource options that would address some of SUNY’s renewable needs at a system scale.

SUNY will contribute to their Environmental Sustainability (100% renewable) goal and to the compliance mandate under the Clean Energy Standard (CES) to help New York State reach the 50% goal. SUNY’s campuses are currently supplied in one of two ways:

1. Through central energy procurement via the Energy Buying Group (EBG)
2. Through the local Electric Utility/Load-serving entity (LSE) serving the campus

SUNY has an obligation to procure its own Tier 1 compliant renewable resources for campuses served by the SUNY Energy Buying Group. Other LSEs that are serving SUNY’s load directly are actively procuring Tier 1 RECs under the CES.

All LSEs have an obligation to procure Tier 1 RECs in the % established by DPS to help NYS reach the 50% renewable target. DPS has set an interim target Tier 1 CES compliance level of 4.2% by 2021.



GOAL & KEY PERFORMANCE INDICATORS

This initiative addresses SUNY’s Environmental Sustainability goal and the following key performance indicator:

- 100% of electricity grid-sourced from renewable energy and energy storage as soon as possible.



APPROACH

This initiative addresses SUNY’s needs as a large-scale system. NYPA and SUNY can pursue regulatory policy changes to support an LSE’s achievement of both the CES and its own clean energy targets. Should SUNY elect, NYPA can provide information regarding available Tier 1 eligible renewable energy projects complete with up-to-date pricing. NYPA may negotiate Power Purchase Agreements (PPAs) with all parties and can support SUNY’s decision making through energy market intelligence Locational Based Marginal Price (LBMP) forecast runs as necessary.

NYPA and SUNY are evaluating large-scale renewable projects for SUNY campuses in zone E downstate as part of a phase 1 effort. NYPA can develop a custom solicitation for 2019 to accommodate all of SUNY’s corporate needs. This will require agreement to the PPA terms and input from participating campuses. There is no cost to SUNY for this support.

Alternatively, SUNY may hire a consultant to prepare an RFP and evaluate responses. NYPA asserts that they can provide superior terms based on their role as a New York state agency. Further discussion to confirm compliance with statutory requirements is required.

05: ON-SITE SOLAR PV GENERATION

DESCRIPTION

This initiative is designed to provide on-site solar PV generation to all 64 SUNY campuses to incorporate clean energy, at the individual campus scale. This initiative aims to assist the campuses in achieving their EO 88 and 166 goals to reduce energy consumption and GHGs.

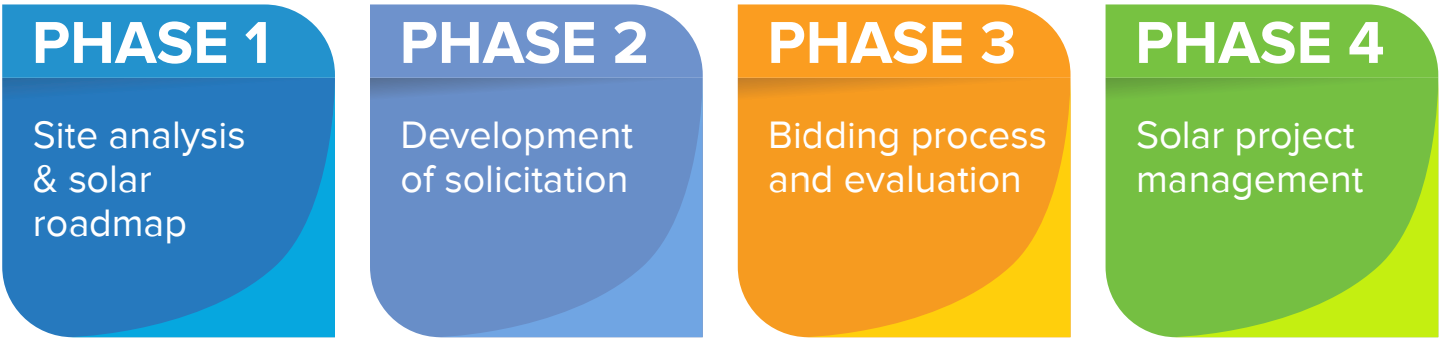
APPROACH

NYPA has a prepay PPA model to evaluate, analyze and develop solar projects through both Power Purchase Agreements (PPAs) and capital implementation models for public entities across New York State (NYS) including SUNY Campuses.

At the SUNY campus scale, NYPA can act as the owner’s representative for on-site clean energy generation projects. This would include completing site assessments, vendor selection, standardizing contracts, and preparation. This will also include coordination with LIPA and other utilities in safely, reliably, and cost-effectively interconnecting solar and other distributed energy resources to the utility grid.

NYPA has partnered with the Office of General Services (OGS) to develop a statewide centralized contract (OGS Contract) that pre-qualifies developers and streamlines the procurement process for all public entities developing solar projects. As recognized by OGS, NYPA is named as the recommended implementer for all solicitations under the OGS Contract.

NYPA and SUNY have standardized an agreement in which all SUNY campuses can utilize this NYPA-OGS partnership to incorporate solar PV in a timely and structured process.



COST DRIVERS

NYPA has developed multiple financing and implementation models that will assist SUNY to achieve these initiatives. Partnering with the clean energy industry, NYPA has streamlined the process for both capital-implemented and third party owned models that provide economic value. Typically, this results in energy costs less than the standard PPA model.

TIMING

- The program has recently been set up and expansion throughout the campuses can be completed by 2025

CASE STUDY: SUNY FREDONIA

In support of SUNY’s goal to source 100% of its electricity needs from renewable resources and become a leader for a sustainable future, NYPA is working with numerous campuses to implement on-site distributed energy resources. One such campus is SUNY Fredonia, which has engaged NYPA’s Clean Energy Business team to assist in developing a large ground-mounted solar photovoltaic system on a vacant parking lot. The 1,400kW solar PV system NYPA has proposed will generate approximately 1,700,000 kWh of electricity per year, the equivalent of taking nearly 300 cars off the road and offsetting nearly 3 million pounds of carbon dioxide. In addition, by implementing this system, SUNY Fredonia will be able to reduce their energy use intensity by over 3%, a significant step towards achieving their Executive Order 88 goal. SUNY Fredonia has positioned itself as a champion of renewable energy, to the benefit of their students, benefactors, and bottom line.



06: ENERGY INCENTIVE MANAGER

DESCRIPTION

The SUNY Office for Capital Facilities would benefit from a dedicated employee to research existing energy related grants, rebates and other incentive programs and assist campuses in completing applications for funding under programs offered by NYSERDA, DOE, local utilities, and other sources. These grants and the energy savings will feed a green revolving fund to continue additional energy efficiency measures. With a dedicated grant-writing resource, SUNY can capture more funding to accelerate Sustainability projects at the campus and system-scale.

GOAL & KEY PERFORMANCE INDICATORS

This initiative addresses both the Existing Building Retrofits and the Net Zero Buildings goals by securing funds to be used for new building, retrofits, or pilot energy projects.

06: ENERGY INCENTIVE MANAGER - CONT'D

APPROACH

If a position is approved, SUNY will lead the effort, including establishing the initial position and assisting in the hiring process. This position could be advertised as an internship for a graduate student.

New York State Energy agencies will support this initiative in two important ways:

- Share news of available grants with SUNY
- Serve as an advisor and/or reviewer for grant proposals

TIMING

- Target for funding and hiring this position in 2018-2019 school year

07: CREATING A GREEN ENERGY FUND

DESCRIPTION

To facilitate and accelerate Deep Energy Retrofits, SUNY should create a revolving green energy fund to reinvest energy savings in new energy projects. Each campus should strive to cover the costs of their energy manager with the savings of these funded projects. This will ensure that early successes can help accelerate ongoing sustainability investment funding.

GOAL & KEY PERFORMANCE INDICATORS

This initiative addresses both the Existing Building Retrofits and the Net Zero Buildings goals

APPROACH

SUNY will track annual energy savings which are achieved through energy efficiency and sustainability initiatives. NYPA can help estimate the energy savings and produce long-term estimates for this fund. This tracking may, in some cases, leverage data collected through NYEM. Savings associated with energy bill savings can be set-aside for use in further sustainability initiatives to accelerate achievement of the SUNY Sustainable Campus Vision.

TIMING

Design of the fund to be completed in conjunction with interested campuses. Timeline for design dependent on campus priorities.

08: DEMAND RESPONSE

DESCRIPTION

Demand Response (DR) can enable campuses to save energy, costs, and associated GHGs by responding to real-time grid reduction signals. While many SUNY campuses participate in DR programs, the approach is not being used system wide. This is due, in part, to the distributed nature of power purchasing by SUNY campuses, and local DR rates. NYPA can support expanding DR deployment by assessing which campuses participate, the structure of their contracts, and identify the potential financial benefits to each campus based on their load and local DR program.

GOAL & KEY PERFORMANCE INDICATORS

This initiative addresses the Existing Building Retrofits and Environmental Sustainability goals.

Road Map Metrics:

All campuses, where there is clearly value, are to be included in the SUNY DR program by the end of 2019

APPROACH

- SUNY and NYPA will convene a Task Force to assess campus curtailment plans and DR contracts
- Campuses will be encouraged to establish a fund to hold DR payments for reinvestment in EE

The New York Energy Manager (NYEM) program will be leveraged as a data source and coordinating platform. To the extent possible, this program could be scaled to coordinate the dispatch of storage resources.

TIMING

- NYPA to initiate the Task Force for evaluation of non-participating campuses by the end of 2019

VIII. WORKFORCE DEVELOPMENT

OVERVIEW OF FOCUS AREA

As the nation’s largest comprehensive public university system, training its workforce and students to be sustainable is core to SUNY’s mission. The initiatives in this section focus on empowering and educating staff and students.

W1: TRAINING SUNY’S ENERGY MANAGERS

DESCRIPTION

This initiative is designed to provide existing facility maintenance staff with training on holistic facility and energy management. The training will help staff to identify and implement energy conservation projects. An energy manager will bring tremendous financial and environmental value to each campus. It is expected that the salary of an energy manager will be covered with the savings from energy efficiency projects.

GOAL & KEY PERFORMANCE INDICATORS



This initiative will contribute to SUNY’s ability to meet their Workforce Development goal and the following key performance indicator:

- Launch training for existing facility staff on Energy and Sustainability at one campus per year (starting in 2018).

APPROACH

This initiative leverages core capabilities provided by both NYPA and NYSERDA. NYPA can provide overall project management services. NYSERDA can provide funding through the Workforce Development and Training program to train existing SUNY staff in holistic facility and energy management.

Deep sub-metering to track energy consumption throughout a facility will highlight high value energy conservation opportunities. At campuses where this metering is not in place, NYSERDA’s Real Time Energy Management (RTEM) program can provide funding for sensors, meters, and other equipment, along with data analytics and information services. NYPA will train staff to use meter level data to analyze energy consumption. NYPA will apply for all applicable NYSERDA incentives as part of their project management role on this initiative.

COST DRIVERS

NYSERDA’s Workforce Development and Training program helps lower the costs required to provide training to SUNY facility staff. Similarly, NYSERDA’s RTEM program provides cost sharing for RTEM equipment. In cases where SUNY does not have the funding available to cover associated costs, NYPA can providing financing.

TIMING

- This training program will be extended to interested campuses once the pilot campus’ staff are trained.

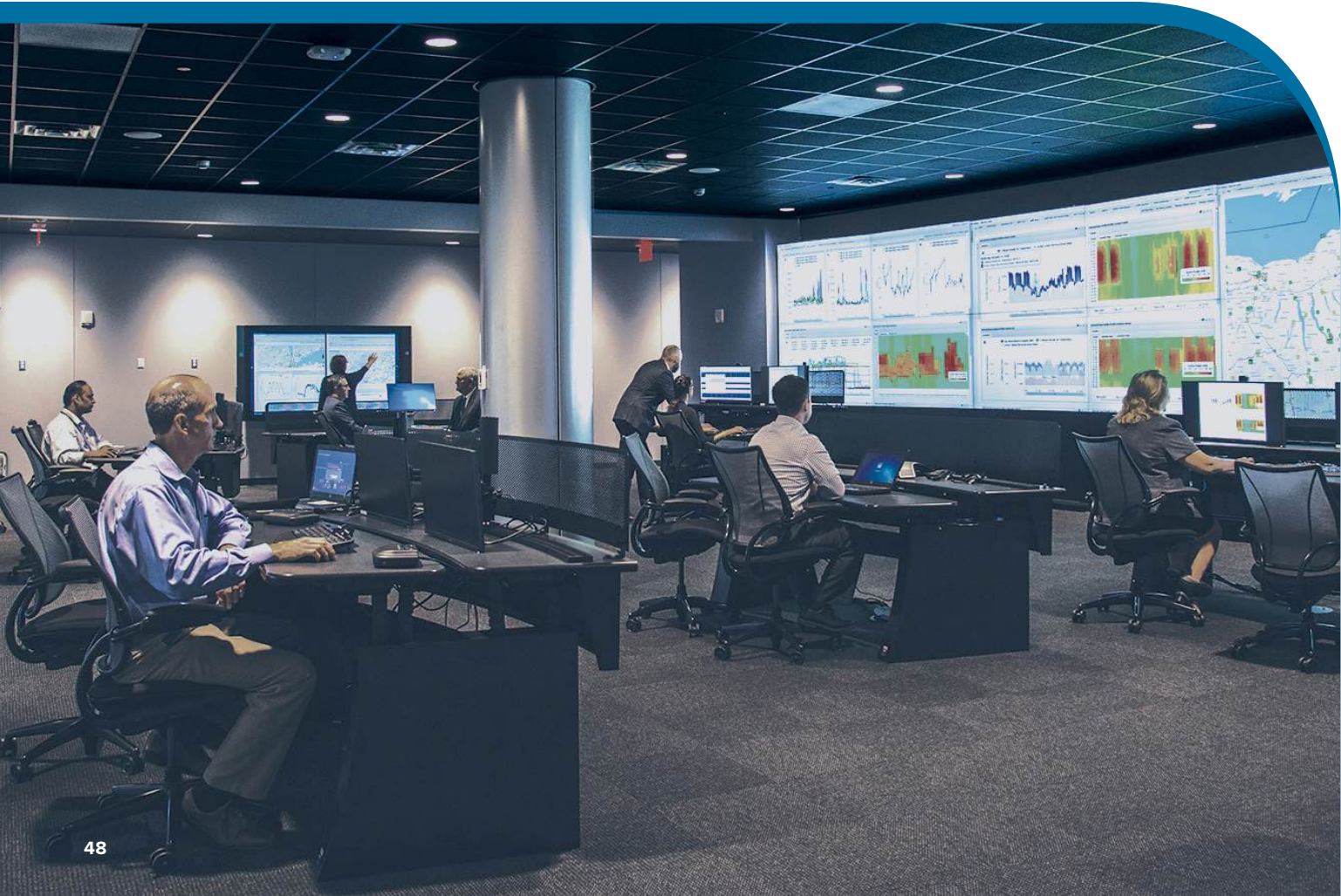


ABOUT NEW YORK ENERGY MANAGER

Headquartered in Albany, the New York Energy Manager (NYEM) is a digital energy service that provides more than 11,000 buildings – including large public and private facilities such as the State University of New York (SUNY) – with relevant, timely data on their energy use and expenditures. NYPA estimates that NYEM will continue to scale up to 20,000 buildings by 2020. These milestones will help New York meet its aggressive energy efficiency targets, including a recently announced 2025 target that incentivizes building owners to pursue building improvements to reduce energy consumption by 185 trillion BTUs (British thermal units) below forecasted energy use in 2025, the equivalent to the energy consumed by 1.8 million New York homes.

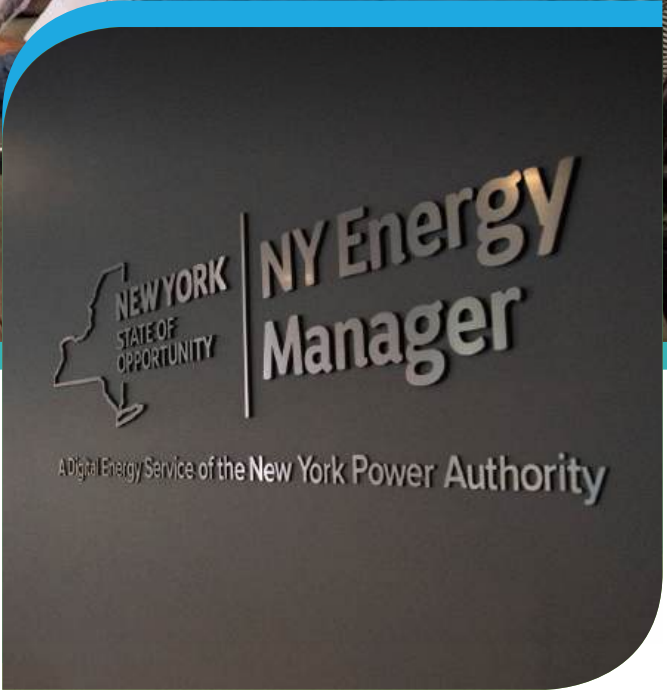
Under a multi-year agreement, NYPA will deploy C3 Energy Management™, a software-as-a-service (SaaS) AI-based application as part of NYEM. The C3 Energy Management™ application significantly expands and enhances NYPA’s capabilities by enabling NYEM to aggregate enormous volumes of disparate data, including real-time data from smart meters, building management systems, end-use equipment controls, sensors, weather data, occupancy and daylight data, solar data, and utility bills. The C3 Energy Management application will allow NYEM to employ machine learning at scale, generate insights about individual customers’ energy usage, and deliver personalized recommendations to help each customer realize their energy, sustainability, and operational savings goals.

This engagement is part of a larger journey that NYPA is embarking on to provide the next level of data-enabled energy management services to its customers. With C3 IoT, NYPA will be positioned to offer a full range of digital energy services to its customers, including building energy load forecasting, fault detection and diagnostics, continuous optimization of energy use, dynamic demand response, solar and energy storage monitoring, and aggregation and dispatch of buildings as distributed energy resources.



BROCKPORT CASE STUDY: TRAINING ENERGY MANAGERS

Chancellor Johnson and SUNY College at Brockport President Heidi Macpherson announced a grant of more than \$220,000 from NYSERDA to develop a training program for building operations and maintenance personnel who will use the New York Energy Manager (NYEM). NYEM, operated by NYPA, will be used to identify opportunities for energy efficiency at their facilities. “The College at Brockport and SUNY are taking steps to better understand how facilities managers can use building-by-building analytics to create a more energy efficient campus,” said Macpherson. “We anticipate a reduction in our annual energy spend by at least five percent as a result of this project, saving approximately \$260,000 per year. One of our strategic goals is to be a sustainable institution for the 21st century, and this program moves us further down that road.”



W2: EXPANDING SUNY'S ENERGY MANAGER WORKFORCE

DESCRIPTION

This initiative is designed to expand the number of campuses which have dedicated Energy Managers. Energy Managers allow campuses to more easily identify and implement energy and sustainability projects. The energy savings achieved by having an Energy Manager on-site will offset the salary. This initiative is tied to the training of existing facility staff (Training SUNY's Energy Managers, initiative W1) to identify projects and sustain savings over time.

GOAL & KEY PERFORMANCE INDICATORS

This initiative will contribute to SUNY's ability to meet their Workforce Development goal. It will contribute to the following key performance indicator:

- Add Energy Managers to two campuses per year (beginning in 2019). Energy Manager placement will be agreed with each individual campus. One factor in selection will be the potential for energy savings. Typical buildings can save up 10-20% in energy costs through proactive management of energy usage. This initiative will strive to place Energy Managers at campuses where the ability to lower energy spend fully offsets the costs of the Energy Manager making the position more financially attractive to campuses.

APPROACH

This initiative leverages the funding provided through the NYSERDA On-site Energy Manager program which covers up to 75% of the salary of an Energy Manager for the first year. SUNY could use this funding in various ways:

1. SUNY could hire Energy Managers directly and apply to NYSERDA for the co-funding. This could be deployed at a rate of 2 campuses per year.
2. To provide Energy Management services across all campuses within one year, NYPA can deploy engineers from its contractor base to support campuses. These services can be ramped down as SUNY-hired Energy Managers are brought on board.

A significant challenge in either option is the single year funding provided by NYSERDA. To attract and retain talented energy managers, SUNY would benefit if the positions were permanent. Changing from a temporary to permanent position will require educating business officers of the financial and sustainability benefits an Energy Manager can provide. NYPA will provide data analysis and documentation that clearly demonstrates the return on investment for energy managers at higher education institutions to help business officers see the financial benefit, and continue to seek additional opportunities to incentivize campuses to hire energy managers.

COST DRIVERS

Energy Managers are essentially self-funded after one year given they are capable of identifying and generating improvements leading to energy savings greater than their salaries. NYPA has sponsored Energy Managers in five New York State cities who, in their first year, have saved an estimated \$1.8M in energy expenditures.

TIMING

- Given challenges in recruiting a high number of talented Energy Managers simultaneously, this initiative will add Energy Managers continuously over time, starting in 2018
- The challenge of having too small a pool of qualified applicants is addressed through the Developing the Next Generation of the Clean Energy Workforce Initiative



CASE STUDY: BUFFALO STATE COLLEGE ENERGY MANAGER

Buffalo State College has secured an on-site manager for up to a two-year term through NYSERDA and NYPA support. This pilot project will assess the effectiveness and success of the position relative to energy dollars saved and other metrics that will be determined in collaboration with NYSERDA.

W3: DEVELOPING THE NEXT GENERATION OF THE CLEAN ENERGY WORKFORCE

DESCRIPTION

SUNY, NYSERDA and NYPA share a strong commitment to clean energy, environmental sustainability and clean energy workforce development.

Through over 7,000 programs, SUNY offers education opportunities in almost all disciplines and all regions of New York State. Since clean energy workforce development is naturally broad and multidisciplinary ranging from science to engineering to energy policy, SUNY is uniquely positioned to provide clean energy workforce development.



GOAL & KEY PERFORMANCE INDICATORS

This initiative will contribute to SUNY’s ability to meet their Workforce Development goal. It will contribute to one of the three key performance indicators identified for this goal:



APPROACH

Recognizing SUNY’s demonstrated capacity in the areas of clean energy and workforce development, Governor Andrew M. Cuomo proposed the Clean Energy Workforce Opportunity Program (“Program”) in his 2016 Built to Lead Agenda, described as follows:

To train 10,000 more workers for jobs in the clean energy sector, the Governor proposes a new \$15 million Clean Energy Workforce Opportunity Program at the State University of New York (SUNY) that will work with clean energy companies to develop a new job training and certification program that will make New York a leader in clean tech workforce development. In partnership with clean energy businesses located on or near SUNY campuses, the fund will allow schools to offer additional courses and hire new faculty and purchase or upgrade the advanced machinery and lab equipment necessary to teach students the skills to succeed in the green energy workforce.

TIMING

The development of the Clean Energy Workforce Opportunity Program will commence in 2018 with implementation occurring over the next several years.

IX. RESEARCH

OVERVIEW

SUNY has the largest, most comprehensive university-connected research foundation in the country.

SUNY has a long and demonstrated track record of success in research and innovation of clean energy, weather forecast, disaster mitigation and preparedness, artificial intelligence, wireless technologies and cybersecurity. Boasting the tenth largest university-owned clean energy patent portfolio in the United States and one of the largest university-owned clean energy patent portfolios in New York State, SUNY has unparalleled capacity to enable solutions that will synergize our research and innovation capacity with our commitment to a sustainable and resilient future, and as a provider of talent necessary to power a clean energy and smart-technology focused workforce.

Energy storage is the key to transform intermittent solar and wind renewable energy into mainstream energy resources and to maintain resilient energy networks. SUNY has leading research capacity in energy storage. The Center for Mesoscale Transport Properties at Stony Brook University, led by Professor Ester Takeuchi, conducts cutting-edge research to develop higher performing, longer life, and safer energy storage systems. Professor Ester Takeuchi is a recipient of the National Medal of Technology and Innovation for her pioneering research in batteries. The NorthEast Center for Chemical Energy Storage at Binghamton University, led by Professor M. Stanley Whittingham, focuses on the design of the next generation of lithium-ion batteries. Professor Whittingham is well recognized globally for his seminal work in the development of lithium-ion batteries.

SUNY also has unique research and development facilities that attract industry partners and entrepreneurs and help accelerate the translation of clean energy technologies into viable products. For example, New York Power Electronics Manufacturing Consortium (NY-PEMC) at SUNY Polytechnic Institute is a public-private partnership producing the next generation of power electronics. PEMC has a full suite of leading-edge, industry-relevant process tools; a manufacturing facility operated under ISO 9001 quality management system; production capacity of 15,000 wafers/year with full complement of on-site analytical services capability; and flexibility for advanced R&D.

Building upon this foundation of leadership in applied research, SUNY and NYSERDA have established a strategic partnership to work collaboratively to achieve efficiency, economic development and public service missions. Such benefits are achieved by turning university research and facilities into business opportunities, supporting state-wide economic development, ensuring that businesses have access to the skilled workers, demonstrating cutting-edge solutions to reduce energy consumption, and curating and supporting a culture of clean energy entrepreneurialism.

The partnership is intended to catalyze innovation and entrepreneurship around clean energy enabling technologies, stimulate new university-industry partnerships, assist SUNY to become a model for the community in building energy efficiency, and educate the next generation of energy industry leaders. The Memorandum of Understanding between SUNY and NYSERDA sets forth a shared vision of:

- Accelerating the adoption of new technologies
- Creating a marketplace to attract clean energy and smart technology firms
- Provide fertile ground for innovative startups
- Prepare the future New York State workforce to meet emerging workforce needs of energy-oriented businesses
- Use SUNY’s buildings as a test-bed for cutting-edge solutions to reduce energy consumption

NYSERDA is specifically partnering with SUNY on several strategies to accelerate clean energy innovation:

- NYSERDA supports multi-year Clean Energy Business Incubators at Stony Brook University and Binghamton University.
- A proposal has been submitted to U.S. DOE to establish the National Off-Shore Wind Research and Development Consortium. If selected, the program is expected to be located at Stony Brook University and will have support from the SUNY leadership on the Research and Development Advisory group and partner institutions from across SUNY campuses and academic institutions nationwide.
- NYSERDA committed to co-funding specific SUNY proposals to the U.S. Department of Energy Frontier Research Centers program that align to NYSERDA’s strategic priorities. For example, the Northeast Center for Chemical Energy Storage at Binghamton University and the Center for Mesoscale Transport Properties at Stony Brook University, both address areas of strategic importance for New York State, including renewables and energy storage innovation, clean transportation, smart grid systems, and the growth of New York’s clean energy business ecosystem.
- NYSERDA is in the planning stage for a portfolio of initiatives under the NYSERDA-University Partnership Initiative. With the unique ability of SUNY to bring together major research universities under one umbrella, NYSERDA is planning on piloting at least two specific programs in partnership with SUNY and its Research Foundation:
 - One program will offer small funding vouchers and express contracting through the Research Foundation for start-up/early-stage businesses to access university laboratories, testing facilities, faculty, and students to address critical technology and commercialization challenges.
 - In another program, NYSERDA will work with the Research Foundation to formulate market needs, assess its unique intellectual property portfolio, and build entrepreneurial teams to advance more cleantech out of SUNY labs and into the market.
- SUNY has welcomed NYSERDA into its SUNY ZAP! initiative to bring advanced entrepreneurial education to New York State in a truly statewide program under the auspices of the federal Innovation Corps program.
- SUNY and NYSERDA will explore additional opportunities to leverage each other’s proof-of-concept programs – SUNY’s Technology Accelerator Fund and NYSERDA’s Technology Acceleration Program – to focus on cleantech acceleration and commercialization in New York State.

UPCOMING EVENTS

- U.S. Department of Energy funding decisions for the programs listed above are anticipated by the third quarter of 2018
- NYSERDA-University Partnership Initiative is pending review with decisions expected within the fourth quarter of 2018
- The first statewide cohort of SUNY ZAP! kicked off in NYC on May 2018

APPENDIX 1: NYPA PROGRAMS

NYPA has many programs that can support SUNY in its Clean Energy Journey. The following is a pairing of how NYPA can directly lead or support a selection of initiatives identified in this roadmap.

SUNY Strategic Energy Focus Area	Initiative	NYPA Programs			
		Turnkey Design and Implementation	Clean Energy Advisory Services	Procurement Expertise and Support	Financing
PHYSICAL IMPROVEMENTS	Unlocking New Financing				
	Going Beyond Code				
	Resilient Campuses				
	Electrifying SUNY's Transportation				
	Strategic Sourcing Partnership				
OPERATIONAL TACTICS	Accelerate High Impact, Low Cost Measures				
	Clean Energy Master Plans				
	Constant Commissioning				
	Large Scale Renewables				
WORKFORCE DEVELOPMENT	Training SUNY's Energy Managers				

APPENDIX 2: NYSERDA PROGRAMS

NYSERDA works with stakeholders throughout New York including residents, business owners, developers, community leaders, local government officials, university researchers, utility representatives, investors, and entrepreneurs. NYSERDA partners with them to develop, invest, and foster the conditions that:

- Attract the private sector capital investment needed expand New York’s clean energy economy
- Overcome barriers to using clean energy at a large-scale in New York
- Enable New York’s communities and residents to benefit from energy efficiency and renewable energy

To achieve these goals, NYSERDA manages many incentive, information, and training related initiatives. NYSERDA has committed to SUNY to continue an on-going discussion and is providing “Concierge Services” to ensure continuous access to its portfolio of programs, however, below is a short list of programs and services that are the most likely to be accessed by SUNY in the next six months.

ON-SITE ENERGY MANAGER

The purpose of this program is to demonstrate the value of a dedicated on-site energy manager that will, with respect to energy:

- Identify, diagnose, and prescribe areas for improvement
- Engage in strategic planning, feasibility studies, awareness communications, data collection and reporting
- Drive managerial and behavioral changes
- Provide leadership and organizational continuity for implementing change
- Account for a facility’s approach to energy efficiency and productivity improvements
- Work effectively with cross-functional teams and senior management

Flexible Technical Assistance Program - The purpose of this program is to help customers make objective investment decisions on energy projects. FlexTech will help determine:

- If a clean energy project meets the customer’s stated needs and project criteria
- How to reduce energy bills
- The payback on potential energy-related building upgrades
- Clean energy master planning

NYSERDA may be able to cover 50% of the costs to complete a FlexTech study.

Eligible study areas can include:

- Strategic energy management assistance
- Energy master planning
- Energy audits such as ASHRAE Level II or comparable analyses
- Targeted system or equipment upgrade options, and
- On-site combined heat and power (CHP) feasibility studies

REAL-TIME ENERGY MANAGEMENT

RTEM is a cutting-edge technology that continuously sends a site’s live and historical performance data to an advanced cloud-based or on-site system. RTEM technologies analyze that data and recommend actionable insights, resulting in lower operating and utility costs, and a smarter building with greater comfort, appeal and marketability.

RTEM helps customers transform the way they manage, consume and buy energy. NYSERDA will cost share up to 30% of the overall RTEM project expenses and provide the tools and support customers need to reap the benefits of building performance optimization. Commercial and multifamily buildings can save up to 15% to 30% a year on energy.

COMMERCIAL NEW CONSTRUCTION PROGRAM

The Commercial New Construction Program offers objective technical and financial support to commercial building owners and tenants to effect a permanent transformation in the way buildings are designed and constructed in New York State.

NYSERDA will work with building owners and their design teams to analyze efficiency opportunities for new or substantially renovated commercial buildings. Additional support is available for projects which are being designed for deep energy savings, zero net energy and for projects which incorporate smart building technologies.

GEOHERMAL HEAT PUMP INCENTIVE PROGRAM

Ground source heat pump (GSHP) systems transfer thermal energy between the ground and a building to heat and cool without any harmful emissions or additional fuel. Through the Ground Source Heat Pump Rebate initiative, NYSERDA is making \$15 million available for the installation of this cutting-edge, renewable energy technology.

NY-SUN

NY-SUN has multiple resources to help New Yorkers harness the power of the sun, including:

- Incentives and Financing: Providing a range of offerings to make going solar more affordable
- Education: Providing information needed to make informed decisions about solar power

NYSERDA’s new construction team is also piloting a service to SUNY and The Fund to help set definitions, review and potentially update guidance documents or specifications, and provide other non-project specific support to help SUNY construction achieve net zero energy design and operation.

APPENDIX 3: THE ROAD MAP PROCESS

This Roadmap was developed through a consensus-driven process. NYPA convened the key stakeholders, specifically SUNY, NYSERDA, LIPA and DPS. Navigant led this process and convened two on-site workshops where goals were reviewed, initiatives proposed and focused, and key modes of collaboration discussed. Core to this process was focusing on SUNY’s needs and challenges associated with achieving its Sustainability Goals. Numerous SUNY campus site managers were interviewed to gain an understanding of the challenges at the local level.

The core team involved in this process include:

SUNY

- Robert Haelen, Senior Vice Chancellor, Office for Capital Facilities
- Karren Bee-Donohoe, Associate Vice Chancellor, Office for Capital Facilities
- Eric Mazzone, Energy Manager, Office for Capital Facilities

NYPA

- Sangeeta Ranade, Vice President Clean Energy Business
- Joe Rende, Director of Business Development
- Nate Anctil, Customer Business Development Manager

NYSERDA

- Matt Brown, Program Manager & Team Lead of New Construction

LIPA

- Michael Deering, Director of Customer Service

DPS

- Tom Rienzo, Chief, Utility Environmental Operations and Compliance

NAVIGANT

- Ted Walker, Managing Director
- Noah Goldstein, Director, Energy Practice
- Andrea Roszell, Associate Director, Energy Practice
- David O’Brien, Director, Energy Practice
- Dia Koujak, Director
- Anissa Dehamna, Associate Director

ACRONYM LIST

- ASHRAE – The American Society of Heating, Refrigerating and Air-Conditioning Engineers
- CEF – Clean Energy Fund
- CEMP – Clean Energy Master Plan
- CES – Clean Energy Standard
- CHP – Combined Heat and Power
- CIC – Customer Installation Commitment
- DER – Distributed Energy Resources
- DMC – Downstate Medical Center
- DPS – The Department of Public Service
- DR – Demand Response
- EBG – Energy Buying Group
- EE - Energy Efficiency
- ETEC – Emerging Technology and Entrepreneurship Complex
- EV – Electric Vehicle
- GHG – Greenhouse Gas
- GSHP – Ground Source Heat Pump
- HVAC – Heating, Ventilation and Air Conditioning
- IoT – Internet of Things
- LEED – Leadership in Energy and Environmental Design
- LIPA – Long Island Power Authority
- LBMP – Locational Based Marginal Price
- LSE – Load-Serving Entity
- MOU – Memorandum of Understanding
- NYEM – New York Energy Manager
- NYPA – New York Power Authority
- NYS – New York State
- NYSERDA – New York State Research and Development Authority
- NZE – Net Zero Energy
- OGS – Office of General Services
- OMH – Office of Mental Health
- PPA – Power Purchase Agreement
- PSC – Public Service Commission
- PV – Photovoltaic
- REC – Renewable Energy Certificate
- REV – Reforming the Energy Vision
- RFP – Request For Proposal
- ROI – Return on Investment
- RTEM – Real Time Energy Management
- SaaS – Software-as-a-Service
- SUNY – State University of New York
- TA - Technical Assistance
- The Fund – State University Construction Fund



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