



CampusEnergy2021

BRIDGE TO THE FUTURE

Feb. 16-18 | CONNECTING VIRTUALLY

WORKSHOPS | Thermal Distribution: March 2 | Microgrid: March 16



CLEAN ENERGY MASTER PLANS ON THE ROAD TO DECARBONIZATION & RESILIENCY

CASE STUDIES OF SUNY ESF & SUNY ONEONTA

Rob Neimeier – CampusEnergy2021



Bright ideas. Sustainable change.

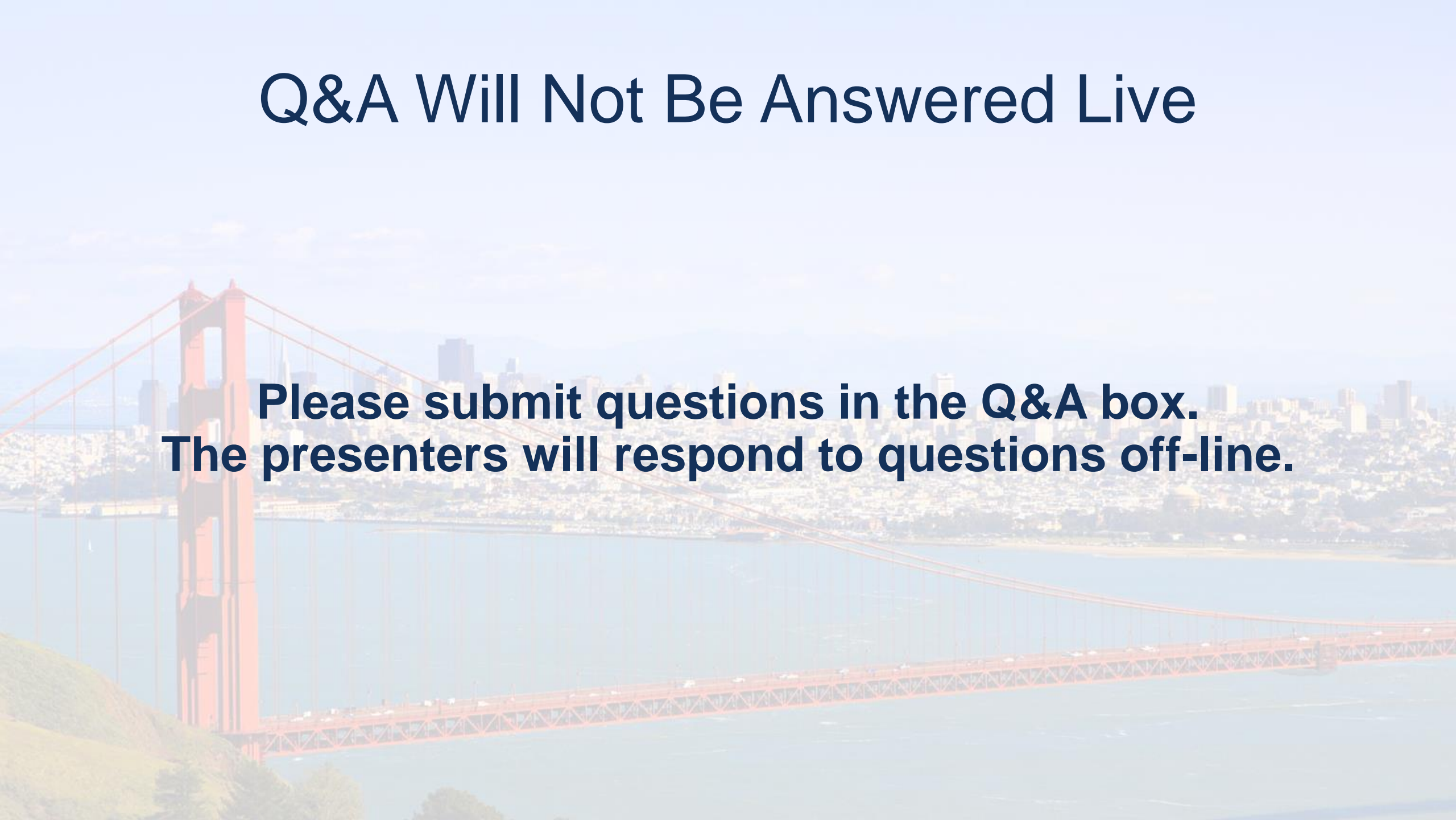


SUNY
ONEONTA



Q&A Will Not Be Answered Live

**Please submit questions in the Q&A box.
The presenters will respond to questions off-line.**



THE CAMPUSES

SUNY College of Environmental Science and Forestry (ESF)

- Syracuse, NY
- 12 Buildings
- 733,000 GSF
- CHP steam plant – natural gas, biomass
- Steam from Syracuse University



SUNY College at Oneonta

- Oneonta, NY
- 43 Buildings
- 2.4M GSF
- Centralized steam and medium temperature hot water



DRIVERS & MANDATES

NEW YORK STATE

Executive Order 166

- Reduce GHG 40% by 2030, 80% by 2050

New Efficiency New York

- Reduce energy consumption 185 TBtu by 2025 through energy efficiency

Climate Leadership and Community Protection Act

- Reduce GHG 85% by 2050
- Carbon Free Electric Grid by 2040

BuildSmart 2025 (issued Sept 2020 by NYPA)

SUNY GOALS/SUCF

- Clean Energy Roadmap
- 100% Renewable Electric ASAP
- Directive 1B-2 - Net Zero New Construction, Deep Energy Retrofits, Renovations



Governor Cuomo Announces Green New Deal Included in 2019 Executive Budget

Nation-Leading Clean Energy and Jobs Agenda Puts New York on a Path to Carbon Neutrality

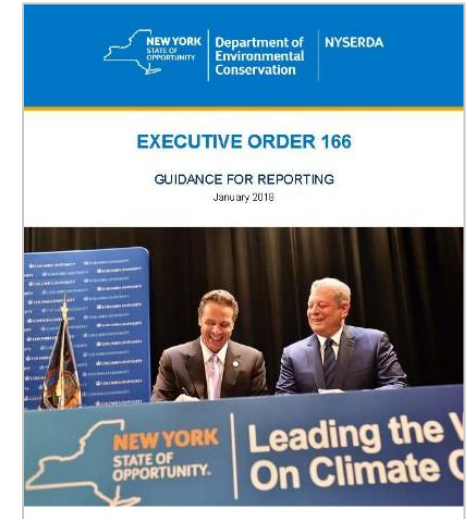
January 17, 2019

[View the video of Governor Cuomo Announcing the Proposal.](#)

Governor Andrew M. Cuomo today announced the Green New Deal, a nation-leading clean energy and jobs agenda that will aggressively put New York State on a path to economy-wide carbon neutrality, is included in the 2019 Executive Budget. The landmark plan provides for a just transition to clean energy that spurs growth of the green economy and prioritizes the needs of low- to moderate-income New Yorkers. Video of the Governor making this announcement is available on [YouTube](#) and in TV quality [h.264, mp4 format](#).

"Climate change is a reality, and the consequences of delay are a matter of life and death. We know what we must do. Now we have to have the vision, the courage, and the competence to get it done," Governor Cuomo said. "While the federal government shamefully ignores the reality of climate change and fails to take meaningful action, we are launching the first-in-the-nation Green New Deal to seize the potential of the clean energy economy, set nation's most ambitious goal for carbon-free power, and ultimately eliminate our entire carbon footprint."

During Governor Cuomo's first two terms, New York banned fracking of natural gas, committed to phasing out coal power by 2020, mandated 50 percent renewable power by 2030, and established the U.S. Climate Alliance to uphold the Paris Agreement. Under the Reforming the Energy Vision agenda, New York has held the largest renewable energy procurements in U.S. history, solar has increased nearly 1,500 percent, and offshore wind is poised to transform the State's electricity supply to be cleaner and more sustainable. Through Governor Cuomo's Green New Deal, New York will take the bold next steps to secure a clean energy future that protects the environment for generations to come while growing the clean energy economy.



CLEAN ENERGY MASTER PLAN PROCESS

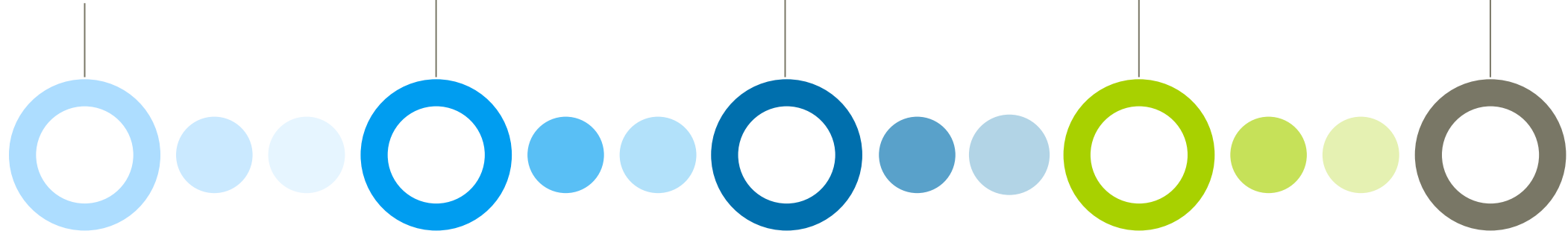
**Review energy
use and
greenhouse gas
emissions trend**

**Complete
energy
scenario
planning**

**High level
assessment
of investment
needs**

**Identify
further
study
needs**

**Collaborate
with Facilities
Master Plan
(FMP) team**



INTEGRATIVE PLANNING CONSIDERATIONS

THE EMP & FMP

Alignment of capital resources with academic priorities and achieving aggressive NYS and SUNY energy goals

Alignment of vision, projects and implementation phasing

Campus development and renovations – impact to buildings, future loads, utilities, site/civil

Understanding the spend and the benefit



UNDERSTANDING THE COMPLEXITY OF TRANSFORMING TO CLEAN ENERGY

Phasing	Phasing conversion from steam to hot water	Building improvements, HVAC upgrades
	Using existing assets during transition	New electrification production technologies; thermal storage needs
Operational	Operation of technologies dependent of external influences (fuel/electricity)	Co-production for heating and cooling
	Expected fluctuation in electricity prices due to intermittent production	New skills required from operational staff

THE VISION OF A LOW CARBON CAMPUS FOR ESF & ONEONTA

CURRENT

Distribution networks:

- Steam
- High or medium temperature hot water



Fossil fuel boilers as base load and peaking



Electricity from the utility grid or microturbines



VISION

Low temperature hot water distribution system and thermal storage – easy plugin of low carbon technologies



Heat pumps for base load (electrification)
Fossil fuel or renewable fuel boilers for peaking and backup



Electricity from solar PPA
Owned solar PV
Future renewable energy grid



STRATEGIC FOCUS AREAS – SUNY ESF

ACT: CLEAN ENERGY MASTER PLAN

ENERGY EFFICIENCY	RESILIENCY	RENEWABLE ENERGY	STEWARDSHIP	ENGAGEMENT
Low cost/no cost measures	Steam to low temperature hot water	Large scale solar power purchase agreement	Campus energy manager	Energy conservation awareness and behavioral change
Energy conservation measures	Low carbon energy supply <ul style="list-style-type: none"> • Geothermal • Heat pumps • Thermal energy storage • Backup and peak generation 	Biomass	Retro-commissioning	Integration with curriculum, research, and workforce development
Building renovations	Gateway center combined heating and power	EV and fleet transition	Preventative maintenance focus	Outreach and community engagement
Deep energy retrofits	Integration with Facilities Master Plan (FMP)		Advanced metering and data analysis	
Net zero carbon new buildings			Workforce development	
% Contribution to GHG Reduction				
27%	40%	25%	6%	2%

SUNY ESF (MAIN CAMPUS) GREENHOUSE GAS EMISSIONS

WITH RENEWABLE ELECTRICITY



LOW CARBON ENERGY SCENARIOS

Scen. 2b - common measures

- Energy conservation measures
- Marshall renovation (deep energy retrofit)
- Moon geothermal
- Steam to hot water conversion
- Disconnect from Syracuse University steam
- Thermal energy storage

Scen. 3a -
2b +
additional
heat pump
capacity

Scen. 3b -
2b +
increase
biomass
boiler use

Scen. 5a -
3a +
cogeneration
engine (on
natural gas)

Scen. 5b -
3b +
cogeneration
engine (on
natural gas)

Electrification with n-gas - 2b +

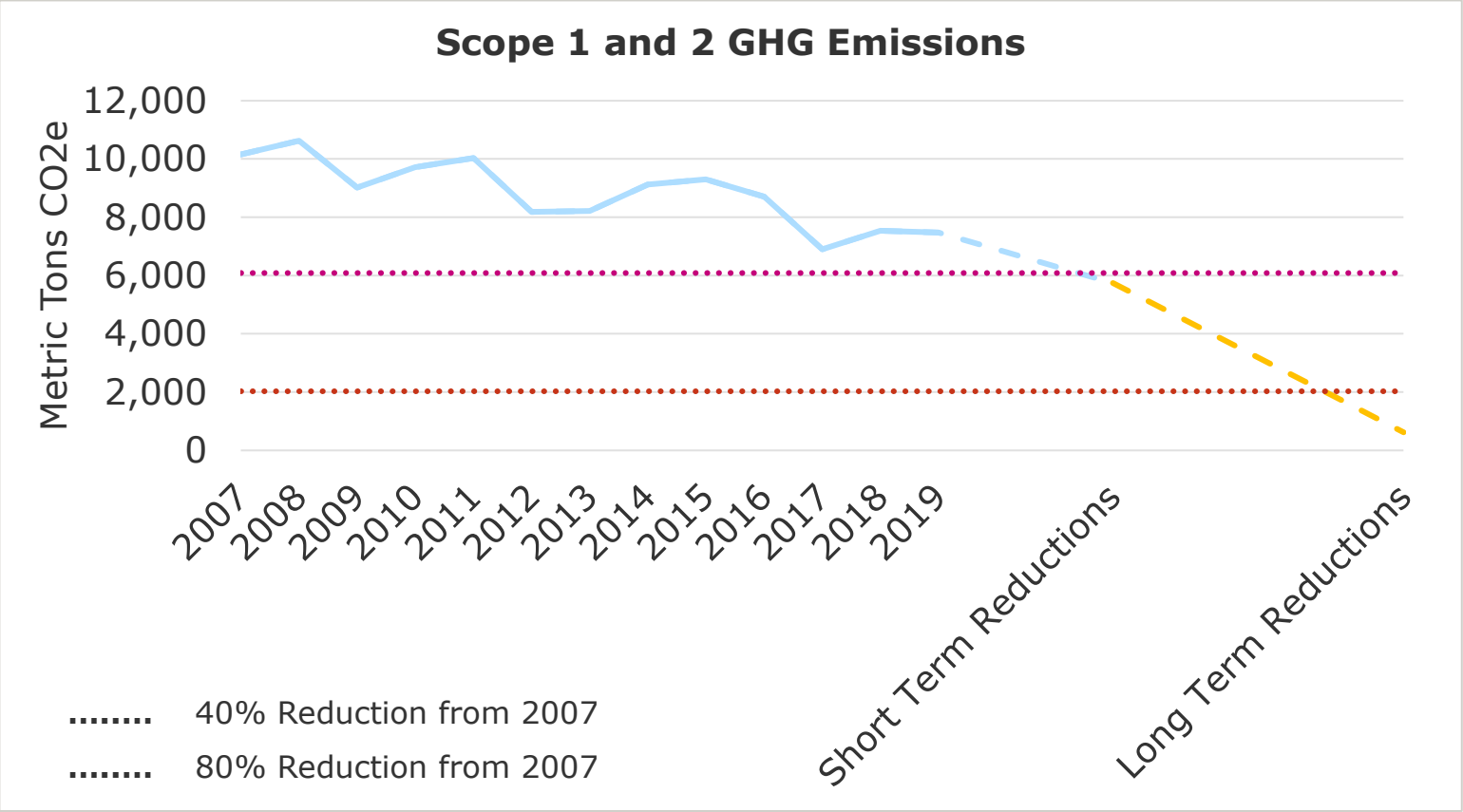
- 70% heat supplied by campus district heat pump
- 30% heat supplied by n-gas boilers

Electrification with bio-oil - 2b +

- 70% heat supplied by campus district heat pump
- 30% heat supplied by bio-oil boilers

GHG EMISSIONS TREND

SUNY ESF



SHORT TERM REDUCTIONS

- Energy efficiency measures
- Stewardship
- Renewables
- Engagement

LONG TERM REDUCTIONS

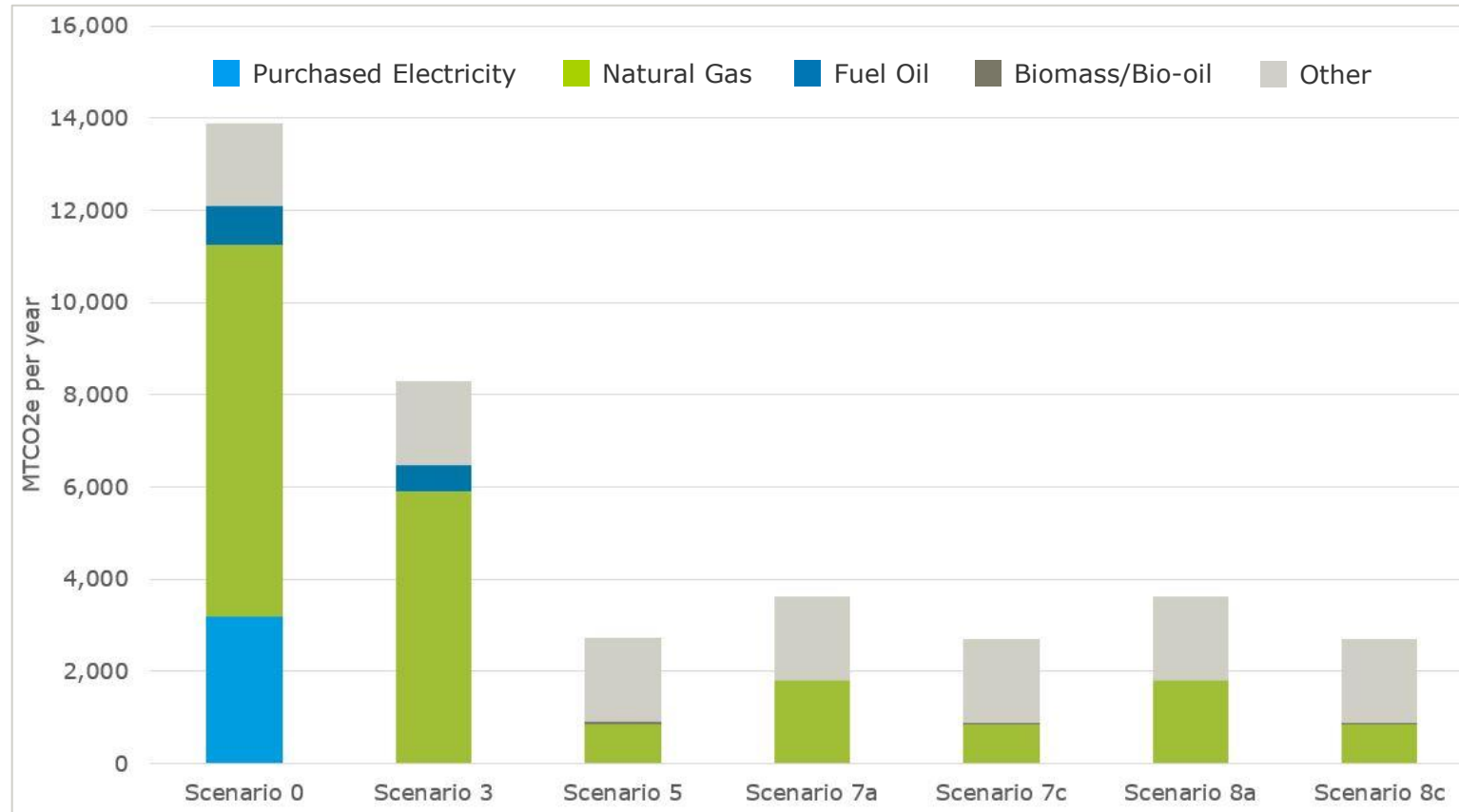
- Facilities Master Plan
- Low carbon energy supply

STRATEGIC FOCUS AREAS – SUNY ONEONTA

ACT: CLEAN ENERGY MASTER PLAN

ENERGY EFFICIENCY	RESILIENCY	RENEWABLE ENERGY	STEWARDSHIP	ENGAGEMENT
Low cost/no cost measures	Transition to low temperature hot water	Large scale solar power purchase agreement	Campus energy manager	Energy conservation awareness and behavioral change
Energy conservation measures	Low carbon energy supply <ul style="list-style-type: none"> • Geothermal • Heat pumps • Thermal energy storage • Backup and peak generation 	2.5 MW solar PV on Collins property	Retro-commissioning	Integration with curriculum, research and workforce development
Building renovations	Integration with Facilities Master Plan (FMP)	EV and fleet transition	Preventative maintenance focus	Campus sustainability coordinator
Deep energy retrofits	Regional energy issues		Advanced metering and data analysis	President's advisory council on sustainability
Net zero carbon new buildings			Workforce development	
% Contribution to GHG Reduction				
17.6%	49.1%	22.9%	3.4%	6.9%

SUNY ONEONTA – GREENHOUSE GAS EMISSIONS WITH RENEWABLE ELECTRICITY



CLEAN ENERGY SCENARIOS

Existing heat production situation (base case)

- Fossil based
- Medium temperature water
- Steam

Common measures 1 (scen. 3)

- Energy conservation measures
- Steam to hot water conversion
- Lower temperature on MTW system

Common measures 2 (scen. 5)

- Energy conservation measures
- Steam to hot water conversion
- Lower temperature on MTW system
- **Wood chips hot water boiler**

3 + GSHP and TES (scen. 7a)

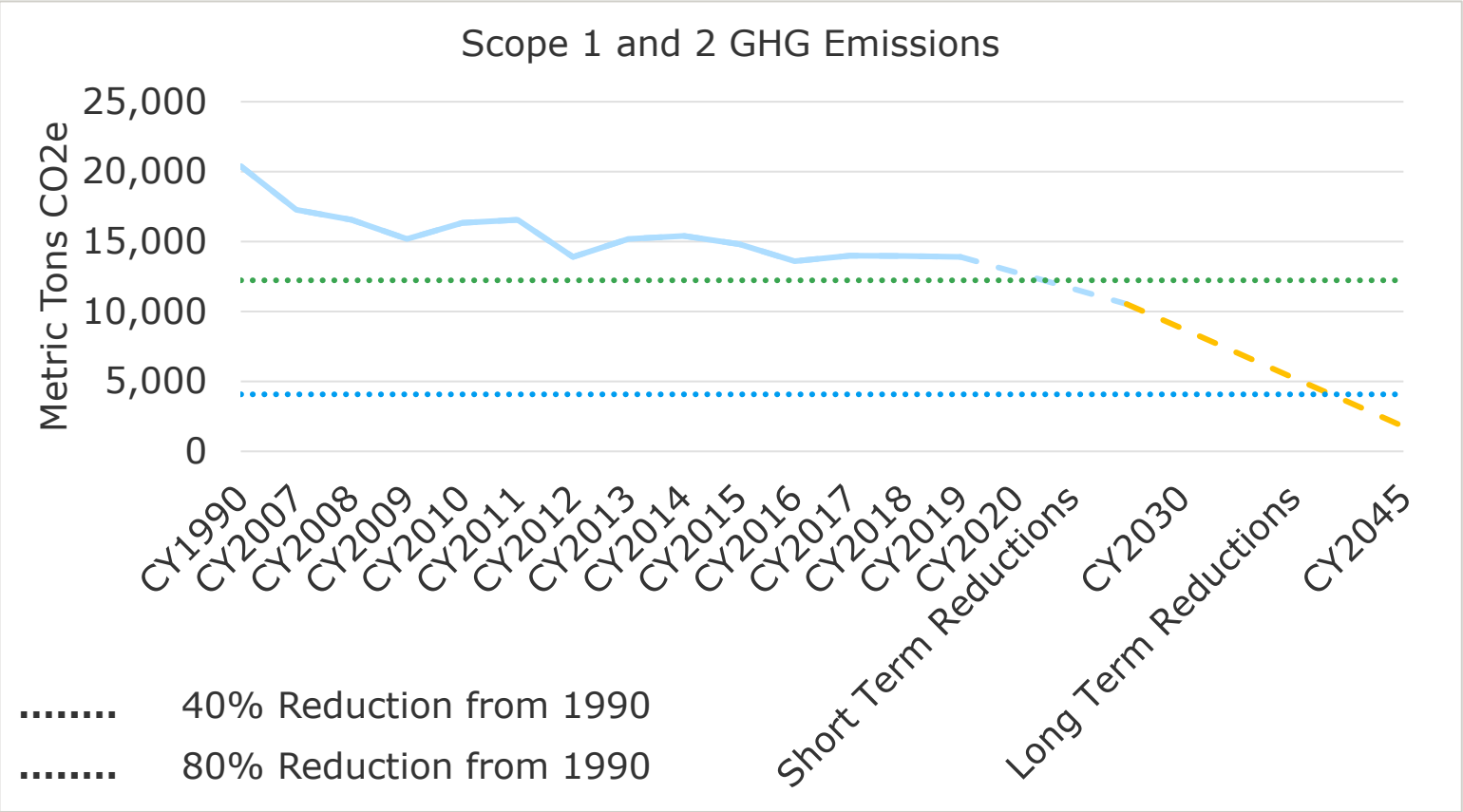
3 + GSHP, TES, solar PV (scen. 8a)

5 + GSHP and TES (scen. 7c)

5 + GSHP, TES, solar PV (scen. 8c)

GHG EMISSIONS TREND

SUNY ONEONTA



SHORT TERM REDUCTIONS

- Energy efficiency measures
- Steam to hot water convert
- Renewables
- Stewardship
- Engagement

LONG TERM REDUCTIONS

- Facilities Master Plan
- Low carbon energy supply

FACTORS IMPACTING A LOW CARBON TRANSITION



Current low natural gas cost utility costs and the impact on capital project economics and operations and maintenance (O&M) costs



Uncertainty of a potential future market tax on carbon or fossil fuels



Market availability and pricing of biomass or bio-oil as fuel options



Enrollment changes and associated revenue fluctuations



Stakeholder perception of the carbon neutral aspects of biomass or bio-oil



Demand for cooling in buildings that do not have it



Availability of grants or incentives to offset first capital costs (e.g., NYSERDA's Ground Source Heat Pump Rebate program)

THANK YOU!

Rob Neimeier

Client Director, Energy Efficiency and Planning
rob.neimeier@ramboll.com

