Getting Stony Brook Off Fossil Fuels

A Response to SBU's Clean Energy Planning

A Report by the University Environment Committee of the Stony Brook University Senate
Approved by the University Environment Committee – 10/19/2023.

INTRODUCTION/EXECUTIVE SUMMARY

The charge of the University Environment Committee (UEC) of the Stony Brook University Senate includes energy conservation and more generally, our university's response to the climate crisis. Building on our university's long-time academic strengths, Stony Brook leadership has shown real initiative in building up research into solutions to climate change, best exemplified by its enterprising and successful bid to steward the Governors Island project for New York City. While such successes have given our university powerful reasons to tout its climate leadership, they shed little light on what has been and is being done or planned across the Stony Brook campus itself to lighten our actual carbon footprint. More attention to our on-campus clean energy transition seems especially warranted by how the pace no longer remains a matter for our campus and its internal leadership alone to decide. Especially since 2019, New York State's legislature and governor have sought to accelerate our state's transition away from fossil fuels through state laws and mandates and laws. Over the past 18 months the UEC has engaged the administration over how SBU's current operations and plans have evolved to meet our state's increasingly stringent clean energy goals.[1]

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[1]This report reflects the committee's response to recent documents, meetings, and presentations, including:

a) *Stony Brook University Clean Energy Master Plan* [hereafter, *CEMP*][for Main, South, Southampton and R&D campuses]; published April 2021. https://www.stonybrook.edu/commcms/univ-senate/senate/_committees/university-environment-committee-minutes/2020-2021/Stony%20Brook%20University%20Clean%20Energy%20Master%20Plan%20-%20Apr21.pdf

b) UEC meeting with Thomas Lanzilotta, Campus Sustainability and Energy Manager, 11/10/2021. https://www.stonybrook.edu/commcms/univ-senate/senate/_committees/university-environment-committee-minutes/2021-2022/SBUUEC_minutes_20211110_v3.pdf

c) UEC meeting with Terence Harrigan, Associate Vice President for Facilities and Services and Tom Lanzilotta, 3/9/2022. https://www.stonybrook.edu/commcms/univ-senate/senate/_committees/university-environment-committee-minutes/2021-2022/SBUUEC_Minutes_20220309.pdf

d) UEC meeting with Terence Harrigan, Associate Vice President for Facilities and Services, Tom Lanzilotta and Mark Toscano, 9/3/2022.

We find that Stony Brook's plans for transitioning to cleaner energy, many of them hatched over the 2010s, have not adequately responded to New York State's ever more demanding requirements for state institutions' transition to clean energy. Passed in 2019, New York State's Climate Leadership and Community Protection Act set a goal of 70% clean electricity by 2030 and 100% by 2040. Most recently, Governor Hochul's 2022 Executive Order 022 speeded up the timetable for what Stony Brook is legally obligated to do, by requiring zero-emissions electricity on campus a full decade earlier, by 2030. The university's Clean Energy Master Plan (CEMP), issued in 2021 in-between these evermore demanding goals, had proposed to meet "7% of its clean energy goals" for 2030 as set by the 2019 mandate--3.5% of its projected energy supply. That promise, however, only meant following through with solar energy projects already in the works. Even after the governor's 2022 Executive Order stepped up the required pace, the university has continued to project that its fossil-fueled Cogen plant, by far the main source of on-campus electricity, will continue to operate until at least 2050. And the current plan for converting SBU to cleaner electricity relies heavily on off-campus conversions, whether to "offsite solar PV" [photovoltaic] purchased from LIPA or through other arrangements.[2] It stands little to no chance of getting our campus to where New York laws and mandates say we need to go.

As noted in the Office of Sustainability's recent presentation before the faculty senate, SBU is currently only .01% of the way to this goal. While this office has laid solid and industrious groundwork over the past decade for our campus's energy transition, limitations on its staff, resources, and authority have severely constrained what it can contemplate or do.

We have as yet no concrete, stepwise plan for how we may achieve clean electricity in just seven years, much less the earlier goal of seventeen. We remain far off the mark not only of our own governor's clean-electricity goals but of the campuses around the world that have joined the United Nations' "Race to Zero," featured at the 2021 Glasgow Climate Summit.[3]

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e) Presentation by Terence Harrigan to SB University Senate meeting, 2/6/2023: https://www.youtube.com/watch?v=OLnD4WVz1-g&t=3782s
This link jumps directly to the beginning of the presentation at 1:03:02. The presentation plus questions runs through 1:22:27

f) PowerPoint slides from the 2/6/2023 Senate presentation: https://www.stonybrook.edu/commcms/univ-senate/reports/_pdfs/Energy%20Strategy%2001-31-23.pdf

g) Additional written and verbal discussions with Terence Harrigan and Thomas Lanzilotta in the spring of 2023.

[2]*CEMP*, p. 6.

[3]United Nations Environment Programme, "Over 1,000 universities and colleges make net-zero pledges as new nature initiative is unveiled," (October 28, 2021)https://www.unep.org/news-and-stories/press-release/over-1000-universities-and-colleges-make-net-zero-pledges-new-nature; the "Race to Zero" pledge sets a longer 2050 goal for zero emissions but requires university commitments to include "explain[ations of] what actions will be taken toward achieving

For Stony Brook University to become a true climate leader within SUNY and among the state's colleges and universities–not to mention on a global scale–we need more engagement from the higher levels of the current administration. A more concerted, whole-university effort to staff and fund our campus' energy transition is necessary, with aggressive pursuit not just of research money but of federal as well as state-level funding for on-the-ground change. We can also draw models and inspiration from other campuses' efforts, including those of Cornell as well as SUNY's own College of Environmental Sciences and Forestry in Syracuse and SUNY-Buffalo.[4] Our campus could and should become a showplace for how to produce clean energy onsite, rather than leaning mainly on offsite providers or credits to meet legal requirements, while our on-campus energy production continues to rely heavily on fossil fuel burning. That means taking a more aggressive and ambitious approach especially to onsite solar and other clean sources, and tapping more of the considerable expertise, interest, and inspiration across our university community to move us forward.

Recommendations in Brief:
Recommendation #1: Expand plans for onsite solar.
Recommendation #2. Seek more alternatives for off-site clean energy supply.
Recommendation #3: Plan to phase out the Cogeneration Plant.
Recommendation #4: Envision renewable alternatives to our reliance on gas-generated steam.
Recommendation #5: Address administrative constraints and complacency.
Recommendation #6: Explore and develop on-site energy storage.
Recommendation #7: Enable bottom-up initiatives to keep improving energy efficiency.
Recommendation #8: Address Stony Brook's greenhouse emissions from transportation.
Recommendation #9: Involve more of the campus in efforts to transition from fossil fuels.

Current Energy Usage[5]

Created and coming of age during an era of cheap energy from fossil fuels, Stony Brook University remains deeply dependent on energy sources that we now know to be major causes of climate change.

Electricity: In Fiscal Year 2018/19, used in the 2021 Clean Energy Master Plan as the baseline, only the R&D park and Southampton bought their electricity directly from LIPA/PSEG-LI, whose

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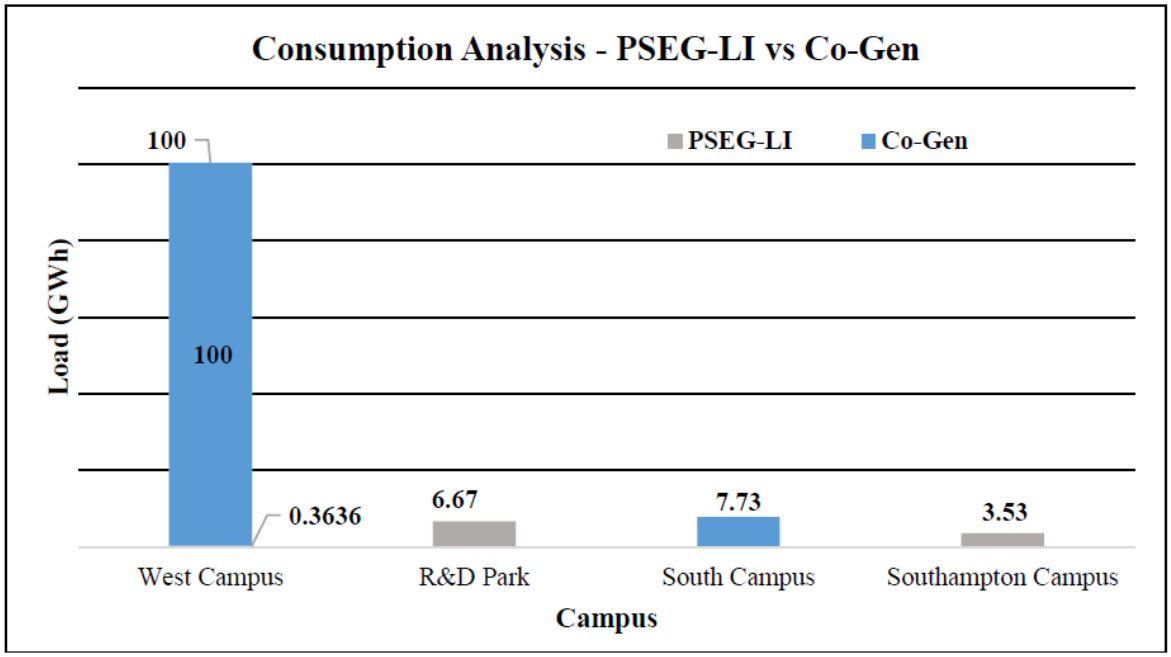
both interim and longer-term pledges, especially in the short- to medium-term [underlining added]" as well as to "report publicly both progress against interim and long-term targets, as well as the actions being taken, at least annually"; "Race to Zero; Starting Line and Leadership Practices 2.0 - In force from 1 June 2021," (April, 2021), p. 2 https://racetozero.unfccc.int/wp-content/uploads/2021/04/Race-to-Zero-Criteria-2.0.pdf

[4]Ramboll, *Clean Energy Master Plan SUNY ESF* (January 10, 2021) https://www.esf.edu/sustainability/projects/cemp.php#:~:text=The%20Clean%20Energy%20Master%20Plan,and%20maintain%20resiliency%20and%20reliability; "University at Buffalo Clean Energy Action Plan," (n.d.) https://www.buffalo.edu/climate-action.html (accessed 7-11-2023).

[5]The following only covers energy usage by the Main (West), South, Southampton, and R&D campuses, as reported in the 2021 CEMP. It does not include the East (medical) Campus, which now has its own clean energy master plan.

own supply even by 2021 was only 3% renewable.[6] That's around 10% of the total consumed by SBU. The other 90% of the electricity used on our campuses is produced onsite, through the burning of natural gas which directly contributes to climate change. While the greenhouse emissions of natural gas are less than those of coal or oil (50% and 30% less according to the Center for Climate and Energy Solutions[7]), they are still quite significant, and natural gas facilities also leak methane, a more potent greenhouse gas than carbon dioxide. An on-campus Co-generation Plant located on 2099 Gymnasium Road imports and burns natural gas to supply Stony Brook's West Campus and South campus with 100% of their electricity needs. That adds up to 100 and 7.73 Gigawatt-hours of load, respectively.[8] Since this plant opened in 1995, it has been owned and run by the Calpine Corporation, a Houston-based firm which operates some 75 mostly gas-fired power plants across the U.S. While the switch to the Calpine plant in the 1990s significantly reduced the campus' carbon footprint of that era, the plant itself is now our campus' single biggest emitter of greenhouse gases.



SBU Electricity Consumption by Campus. From *Clean Energy Master Plan*, p. 18. Figures for FY2018/19. The Co-Gen plant, providing the load depicted in blue, runs on natural gas.

Though Stony Brook's Office of Sustainability has been planning and scoping the possibilities for onsite solar since the 2010s, one limiting factor has been Stony Brook's contract with Calpine. For many years, the company successfully secured severe limitations on other on-

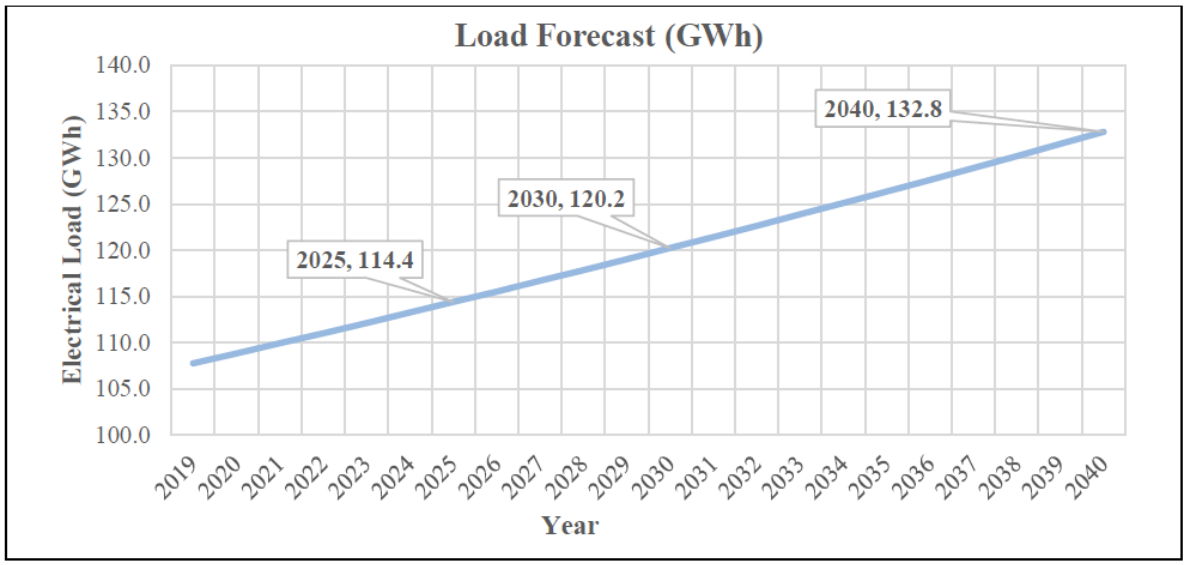
[6]Mark Harrington, "LIPA: Green energy to dominate LI electric grid by 2030," *Newsday* (July 10, 2021) https://www.newsday.com/long-island/lipa-pseg-renewable-power-plants-q46249#:~:text=LIPA's%20planned%20power%20shift,will%20increase%20to%20around%2058%25.

[7] "Natural Gas," *Center for Climate and Energy Solutions Website*, accessed 8-4-2023 https://www.c2es.org/content/natural-gas/ .

[8]*CEMP*, p. 18.

campus production of energy beyond what it provided, legally constraining how much solar or other sources could be developed onsite. A recent renegotiation of this contract has opened the door more widely to other on-campus energy production.

While energy conservation and efficiency measures as well as a temporary drop from the COVID pandemic have limited the growth of Stony Brook's demand for electricity, planners are now projecting it will rise about 1% a year over the upcoming decades. While a yearly rise of this magnitude may seem reasonably incremental, it will add up over time, complicating what will need to be done to meet state-mandated goals. It means, for instance, a ~10% rise by 2030 in electricity needs on the Main and South campuses (see chart below). That exceeds Stony Brook's planned supply of onsite solar production by then, putting that year's goal of zero-emissions electricity further out of reach.



Projected Rise in SBU Electricity Needs (Main and South Campuses). From *Clean Energy Master Plan*, p. 18.

Steam and Hot Water: Many facilities on the Stony Brook campus also require hot water, converted at Stony Brook's own central plant from gas-generated steam from the Cogen plant then send out to other buildings for heating and cooling. The Co-generation plant normally provides most of the campus' steam needs, but boilers belonging to SBU provide backup when that facility goes offline. Stony Brook has two heating and cooling plants, each with four boilers, which run off some combination of natural gas with "ultra low sulfur diesel."[9] Some buildings also have their own natural gas-fired boilers.

Transportation: Beyond electricity and heating, the other major realm in which Stony Brook's dependence on fossil fuels is contributing to climate change is transportation. Gasoline and related fuel consumption is the major source of greenhouse emissions for suburban Long Island

[9] Office of Sustainability, *Stony Brook University Climate Action Plan; 2020 Update* (Office of Sustainability, 2020), p. 6 https://reporting.secondnature.org/media/uploads/cap/2871-capfile.pdf

as a whole. Stony Brook contributes to this atmospheric burden both from its own vehicle fleet and from the many ways its layout and infrastructure compel students, staff, and faculty to use their own cars.

A Transportation Department, separate from the Office of Sustainability, handles much if not all of the campus' energy transition in the transportation realm. In 2016, very few of Stony Brook's own vehicle fleet were electrified: only 19 out of 476 were fully electric and 12 were electric/gasoline hybrids.[10] While those numbers have improved, our campus-owned vehicles by FY2018/19 still relied heavily on fossil fuels, consuming 140,375 gallons of gasoline and 93,697 of diesel fuel, according to the 2021 Clean Energy Master Plan.

Indirect Climate Impacts: A host of other on-campus choices and actions also contribute to greenhouse emissions more indirectly. For instance, wide-spread usage of plastics, made from petroleum by-products, relies on processes of extraction and production that emit greenhouse gases in abundance.

The New Climate Politics Brings New Mandates

Over the past few years, New York's strong climate movement and sympathetic politicians have led to a barrage of new laws and mandates that seek to speed our state's transition away from fossil fuels toward alternative, cleaner sources of energy. The first major push happened in 2012, when an Executive Order 88 by then-governor Cuomo required a 20% improvement in the energy efficiency of state-owned buildings. Especially since 2017, the scope of the mandates set by our legislature, governors, and SUNY chancellors has widened and the prescribed pace of change has accelerated. One after another, their successive goals for weaning Stony Brook's operations off fossil fuels have surpassed even their most recent predecessors in the speed of transformation they require. We dwell here only on the most recent and pertinent, defining the formidable challenges Stony Brook now faces.

In 2019, the state legislature passed and Governor Cuomo signed into law a New York Climate Leadership and Community Protection Act (CLCPA):
https://nyassembly.gov/leg/?default_fld=&leg_video=&bn=A08429&term=2019&Summary=Y&Actions=Y&Text=Y
This pathbreaking act set the following goals for our campus:

- 40% Reduction in Greenhouse Emissions by 2030 (compared to 1990 baseline)
- 85% Reduction in Greenhouse Emissions by 2050 (compared to 1990 baseline)
- Zero Emissions Electricity by 2040
- 70% Renewable Energy by 2030 (surpassing the 50% goal for that year set by Governor Cuomo's Executive Order 166 in 2017)
- 100% Renewable Energy by 2040

[10] "Stony Brook University OP-18: Campus Fleet," *The Sustainability Tracking, Assessment & Rating System* [website] (2016), accessed 8-4-2023

Then in 2022, Governor Hochul signed Executive Order 22, which repealed and replaced Cuomo's Executive Orders 88 and 166. Singling out particular types of emissions, it accelerated the timetable for meeting its stated goals: https://www.governor.ny.gov/executive-order/no-22-leading-example-directing-state-agencies-adopt-sustainability-and
EO22 set the following goals for our campus:

- Zero Emissions Electricity by 2030 (surpassing the 2040 goal set by the CLCPA in 2019)
- Conversion of Light Duty Non-emergency Vehicles to Zero Emissions by 2035
- Conversion of Medium and Heavy Duty Vehicles to Zero Emissions by 2040

What Has Stony Brook Been Doing?

Stony Brook's official responses to the climate crisis go back at least to when President Kenny signed onto the American College and University Presidents' Climate Commitment in 2007. Not long afterward, in 2010, the campus adopted its first Climate Action Plan, and in 2011, created the Office of Sustainability. Initiatives took off that led to the campus' designation in 2015 as the fourth most "Environmentally Responsible University" among the 353 schools to be honored in *The Princeton Review's Guide to Green Colleges*. Over this same period, the campus joined Second Nature, an organization devoted to accelerating climate action in higher education that has since become a partner of the UN's "Race to Zero," and commenced regular tracking of its greenhouse emissions.[11]

By 2023, however, Stony Brook itself has apparently not done the additional planning and reportage necessary to join "Race to Zero," and though it remained in *Princeton Review's Guide to Green Colleges* (now numbering 455), it has slid out of the top 50.[12] Most significantly, however, the more stringent recent NYS mandates have posed serious challenges to our campus' pre-existing efforts to reduce reliance on fossil fuels.

[11] "State University of New York at Stony Brook," *Second Nature Reporting Platform*, accessed 8-4-2023 https://reporting.secondnature.org/institution/detail!2871##2871
[12] "*The Princeton Review Guide to Green Colleges: 2023 Edition*," accessed 8-16-2023 https://www.princetonreview.com/college-rankings/green-guide?ceid=green-colleges

CLCPA vs. EO22	Goal	Baseline Year	Target Year		% Achieved
			CLCPA	EO22	
40% Reduction in GHG Emissions	40%	1990	2030	N/A	141%
85% Reduction in GHG Emissions	85%	1990	2050	N/A	25%
70% Renewable Electric Energy	70%	-	2030	N/A	0.01%
Zero-emissions Electricity *	100%	-	2040	2030	0.01%
0.88 Trillion Btu Reduction of Site Energy use SBU**	100%	2015	N/A	2025	11%
185 Trillion Btu Reduction of Site Energy use Statewide ***	100%	2015	2025	N/A	-
Convert Light-Duty non-Emergency Vehicles to ZEVs	100%	-	N/A	2035	0%
Convert Medium and Heavy-Duty Vehicles to ZEVs	100%	-	N/A	2040	0%
No Fossil Fuel Combustion Infrastructure can be Designed/Constructed at State Facilities after 2024	-	-	N/A	2024	-

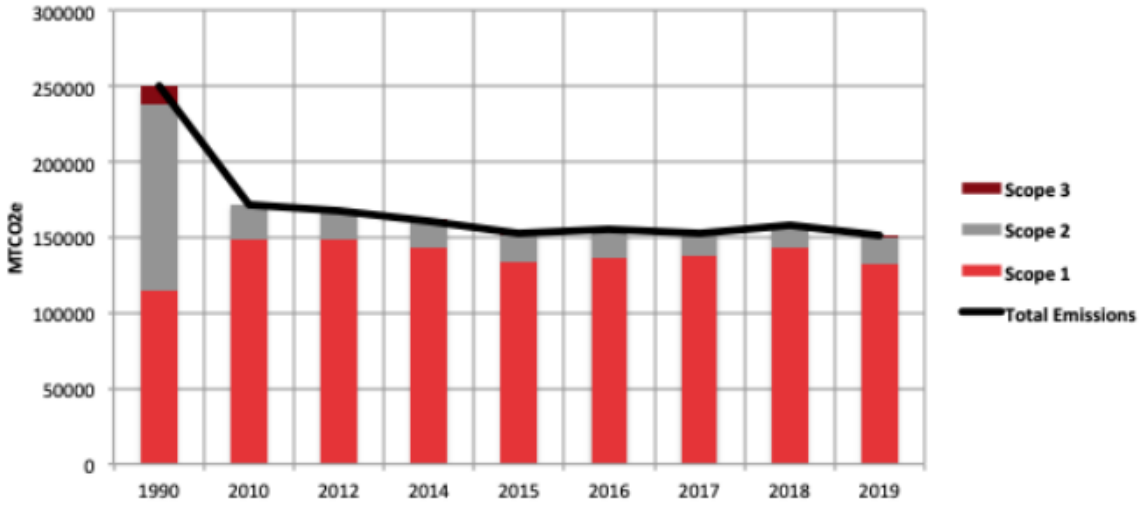
Notes:
* RECs could be purchased to meet goals if sufficiently available
** 11 Trillion Btu for all affected State facilities, 4.4T for SUNY campuses, 0.88T for SBU
*** Applies to all entities in NYS
CLCPA - Community Leadership and Climate Protection Act. NYS Law 2019
EO22 Repeals EO88 and EO166

State Goals versus Current Realities
(Presentation by Terence Harrigan to SBU Senate, 2/6/2023)

Most remarkable here as of 2023 is just how far Stony Brook remains from achieving 100% renewable electric power. Stony Brook is only .01% of the way toward the CLCPA's goal of 70% by 2040, even as that has been superseded by the EO22 goal of zero emissions electric by 2030, ten years earlier. Stony Brook has also apparently made statistically negligible progress converting its vehicle fleet to zero emissions. Even the most positive achievements indicated in this chart, the reductions in overall GHG's (greenhouse gases) lose their luster upon further inquiry. Achievements tallied in the first two lines stems largely from the choice of 1990 as a baseline, which enabled the operation of the natural gas-fueled Calpine plant starting in 1995 to be counted as a reduction.[13]

[13] Also not so clear is why, if GHG emissions have been reduced 41% more than the first goal of 40%, Stony Brook can still be only 25% of the way to 85% GHG emissions reduction.

Figure 2. **GHG Emissions Inventories 1990-2019**



Stony Brook University Greenhouse Gas Emissions over Time. Chart from *Stony Brook University Climate Action Plan; 2020 Update*, p. 8. Scope 1 is from on-campus fuel-burning, Scope 2 counts the emissions from purchased electricity, and Scope 3 is from on-campus energy leakage and loss. The Calpine plant, as it went online in 1995, reduced emissions by dramatically shrinking utility purchases, even as its operation led to a rise in Scope 1 emissions. Since 2010, efficiency measures at the Cogen plant are largely responsible for the drop shown on this chart, but those achievements have been slow and incremental, achieving only about 10.5% reduction overall.

The *Stony Brook University Clean Energy Master Plan* (*CEMP*), published in April 2021, responded to new standards set by the CLCPA, also to a SUNY-wide initiative launched in 2019 by then-Chancellor Kristen Johnson, which called for each campus to develop a plan for moving to 100% renewable energy.[14] Authored by a team from Stony Brook's Office of Sustainability and the New York State Power Authority, it sketched out possible ways forward for the campus to at least come closer to meeting the CLCPA' s new mandates.

Onsite solar: The CEMP reported that the campus was planning to install 2 megawatts (MW) of onsite solar by 2025 and 4 MW by 2030.[15] The Sustainability Office has been laying these plans for onsite solar since the mid-2010s, and that estimate reflected the planning for four sites that was already underway rather than any new initiatives. Invoking additional barriers to more solar sites on campus, the planners estimated onsite solar could only "account for

[14]State University of New York, *Clean Energy Roadmap* (SUNY, 2019), accessed 8-4-2023 https://www.nypa.gov/-/media/nypa/documents/document-library/cleanenergy/suny-clean-energy-roadmap.pdf
[15]*CEMP*, p. 7.

approximately 7% of the renewable energy goals," or 3.5% of projected overall needs.[16] More recently, in the wake of EO22 new goal of 100% clean electricity by Office of Sustainability has estimated these four sites could produce 5.95 MW but confirmed other significant obstacles to expanding onsite solar beyond the four locations currently planned. Barriers cited include:

- University master planning: which rules out any more solar sites
- Costs: solar sites on campus require costly up-front investments, raising the cost especially at the outset compared to the relatively cheap rates with Co-gen, $0.125 per kilowatt-hour (kWh).

Power Purchase Agreement: A contract between SBU and a solar power provider to build and operate on-site solar. In meetings with Sustainability administrators (3/9/2022 and 9/3/2022) we learned that RFP (Request For Proposals) for on-site solar installations have been sent out, bids received from 10 solar companies, and a choice made between them. We haven't yet received any news about when construction is slated to begin.

Off-site solar: While NYPA recognized onsite solar as a "cost-competitive opportunity for the campus," the CEMP reports that it looked more favorably on SBU's reliance on off-site solar energy production, since those costs would be more in the range of $.06-.08 per kWh.[17] This was NYPA's recommended first choice for SBU to meet its many impending clean energy goals.

Virtual Power Purchase Agreements (VPPA): The effective cost of off-site solar to SBU would apparently be considerably more than $.06-.08 per kWh estimate of actual cost because it is set through a Virtual Power Purchase Agreement or VPPA. This is a contractual means through which SBU can secure off-site solar, wind, or other alternative sources of energy at a fixed rate. Here, a buyer ("off-taker") like SBU agrees to purchase energy from a renewable energy producer for a fixed price. The producer can be located at some distance from the buyer; the CEMP considered projects located in Genesee County, in western New York, as candidates for PPV offsite solar as well as wind power for SBU. The charges are turning out to be considerably more than those estimated just for the off-site solar production itself. According to Harrigan's presentation to the Senate, SBU has currently put out bids for solar energy products and is looking to lock in rates of $.19 and .20 per kWh--better than the current LIPA rate of $.21 per kWh but as many as three times more than the $.06-.08 per kWh CEMP estimate.

Renewable Energy Credits (REC): These are financial instruments issued by the state government representing the output of renewable energy projects in the state, which Stony Brook and other state institutions can purchase to count toward their mandated renewable energy goals. "A REC is issued for each 1 MWh of energy produced by a renewable energy system such as solar PV or wind." The CEMP was somewhat opaque about where the money paid for RECs would go. But while purchasing many RECs would enable SBU to legally achieve, for instance, zero emissions electricity by 2030, NYPA recommends against too much reliance on REC purchases to meet upcoming state-mandated goals. Given the high demand

[16] *CEMP*, p. 6.
[17] *CEMP*, p. 12.

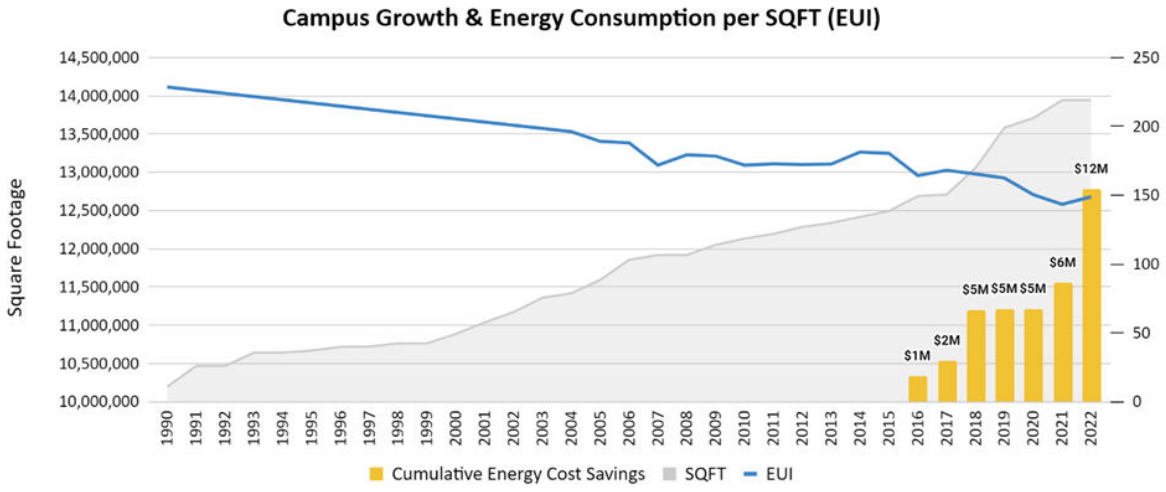
as deadlines approach and the apparent limits on supply, it "does not believe wholesale market RECS will be available to purchase."[18]

Purchasing from LIPA/PSEG is projected to continue for the R&D Park and Southampton campuses. The assumption here is that LIPA will itself be able shift toward more renewable production, meeting the goals the state has set for it and thereby enabling these parts of SBU to meet their own state-mandated goals.

The Cogeneration plant is slated to remain in operation at least until 2050. The CEMP did not contemplate any alternative. It simply assumed that Co-gen's natural gas-fueled electricity would continue to serve as the campus' main energy source over the coming decades. The rationales included:

- Costs: nearly half those from LIPA per kWh; ($0.125 per kilowatt-hour (kWh) versus $0.21 per kWh for LIPA in 2023, which is also "increasing substantially").[19]
- Reliability and resiliency benefits: Stony Brook's labs and other critical operations (presumably also the hospital, though East Campus is not included in the 2021 *CEMP*) need reliable sources of power, for instance, when extreme weather events cause LIPA's grid to go down.

Building efficiency and conservation: Stony Brook University has made notable achievements in these areas, such as the early accomplishment of 20% reduction of the energy usage demanded by Executive Order 88, prior to the 2020 deadline. This reduction in building-related energy consumption s looks all the more impressive given how much their overall square footage has grown over the past decade and more through new construction.



Square Footage of Campus Buildings versus Energy Consumption per Square Foot, 1990-2020. From Thomas Lanzilotta.

[18] *CEMP*, p. 15.
[19] Presentation by Terence Harrigan to SB University Senate meeting, 2/6/2023.

Nevertheless, Executive Order 22 of 2022 sets the more ambitious goal of reducing energy usage in state-owned buildings by 11 trillion BTU per year, which means cutting the overall thermal energy consumption by roughly ~30% compared to the 2015 baseline. This goal is little discussed in the *CEMP* and will likely be the main emphasis of a separate Energy Master Plan. However, it is crucial to consider this plan in the light of a progressive electrification of heating/cooling, which also provides opportunities for replacing an older and relatively inefficient system of steam and hot water delivery through campus, and thus potentially increasing the heat/cooling delivery efficiency. University administrators informed our committee in the Nov 2022 meeting that a replacement of previous turbine-based chillers with electric chillers is already underway. Such replacementsneed to be expanded campus-wide, and/or with other parallel changes, to put an end to our campus' fossil-fuel dependency for both heating and cooling.

Transportation: Currently, the Office of Sustainability is working with the New York Power Authority to come up with a plan for transitioning the university vehicle fleet to meet the new state mandates from the governor's Executive Order 22 (see above).

Beyond the university's own fossil-fueled vehicle fleet, the Office of Sustainability has developed on-campus opportunities that may be helping ease the reliance of students, staff, and faculty on gasoline-powered vehicles. A bike sharing system, consisting of 13 solar powered kiosks and 88 bicycles, offers an alternative way of getting around campus especially for students, discouraging car trips from lot to lot and perhaps alleviating demands on the campus bus system. Some 11 charging stations distributed around the campus' parking facilities enable and encourage the switch to plug-in hybrids or fully electric vehicles by Stony Brook's staff, faculty, students, and visitors. Here as with the energy supply for an electrified university-own fleet, however, any transition will have to contend with aging transformers and other infrastructure, which may need replacing to enable sufficient electrical supply.

Indirect Climate Impacts: Here, the Office of Sustainability has targeted use of plastic water bottles in particular, through the construction of over 100 water bottle filling stations that encourage reusable water bottle usage across the campus. Beyond that program, these more indirect impacts on greenhouse gas emissions, more difficult to assess as well as tackle, have received little attention in formal effects at clean energy planning, either on-campus or at the state-level.

Summary: The combination of approaches laid out in the *CEMP* and our further discussions with administrators does not, in the opinion of the Environment Committee, add up to a convincing pathway to meet state-mandated goals for a transition to cleaner energy. In particular, our campus has no clear plan to achieve zero-emission electricity by 2030. Nor are we much closer to envisioning how we may eliminate our reliance on fossil fuels entirely. Our committee sees no viable step-by-step pathway being laid out for moving our campus to meet either goal.

What Have Other SUNY Campuses Done?

Other campuses in the SUNY system have faced many if not most of the same imperatives and dilemmas as Stony Brook. While we were unable to conduct a systematic survey, we found that the University of Buffalo as well as the SUNY College of Environmental Sciences and Forestry in Syracuse are responding in ways that in key respects surpass measures taken thus far at SBU.

By January 2021, four months before Stony Brook, SUNY College of Environmental Sciences and Forestry had put out its own Clean Energy Master Plan. It contracted the consulting firm Ramboll to handle most of this study; NYPA, by contrast, was little involved. And whereas Stony Brook's CEMP only contemplated future on-site solar projects, ESP could already report several that were up and running. "Three roof-mounted PV arrays on the main campus: a 25-kilowatt (kW) array on Walters Hall, a 25-kW array on Baker Laboratory, and a 50-kW on Moon" added up to 100-kW of energy supply. That was not much compared to the 2 megawatts Stony Brook planned by 2025. But ESF had already begun participating in a New York Higher Education Large Scale Renewable Energy (NY HE LSRE), a large-scale solar consortium of New York State public and private campuses to provide offsite solar electricity for the campus.

The most notable departure of ESF's master plan from SBU's was its exploration of how this campus might shift from steam to a hot water-based system, apparently closer to what Stony Brook has, for its heating and cooling needs. The ESF CEMP proposed a "transition from steam to a low temperature hot water distribution network that would enable a platform with flexible compatibility for low carbon/renewable energy supplies." This envisioned hot-water system would involve lower temperatures than Stony Brook's current one, with additional changes would make it even more different, and more sustainable. By shifting from a centralized to a more distributed network, the planned system would open up myriad opportunities for tapping alternative technologies "such as geothermal, thermal energy storage, heat pumps, and biomass," while also "providing provisions for future developments of heating and cooling technology developments."[20]

While we could not locate any Clean Energy Master Plan for SUNY Buffalo online, we were able to establish how fast it has moved forward with onsite solar energy provision—at a pace exceeding Stony Brook's. It is currently completing a solar array on its north campus begun in 2020 that will "top out at 12.7 million kWh." It is also "considering mandating all new construction provide the ability to install rooftop solar on buildings, similar to a measure California recently enacted requiring builders to include solar power and battery storage in most new construction projects."[21]

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[20] Ramboll, Clean Energy Master Plan SUNY ESF (January 10, 2021), pp. 13, 12, 9-10. https://www.esf.edu/sustainability/projects/cemp.php#:~:text=The%20Clean%20Energy%20Master%20Plan,and%20maintain%20resiliency%20and%20reliability

[21] Onsite Solar at UB: Taking Climate Action for a Brighter Future," University at Buffalo Sustainability website (accessed 7-11-2023) https://www.buffalo.edu/sustainability/onsitesolar.html

SUNY Buffalo's efforts have been bolstered in important part by a "huge team" devoted to sustainability and energy usage, especially compared to Stony Brook's. Even though Stony Brook has more building square footage than Buffalo and indeed the most of any SUNY campus, it has only two staff assigned to sustainability and energy usage, the same as the campus at Farmingdale, which also has much smaller square footage.[22]

Beyond these examples within the SUNY system itself, as one of our committee members notes, most peer universities with large campuses that need to transition to clean energy have already installed a large number of "on-site PV" or photovoltaic (i.e., solar panels), often in parking lots and on building rooftops). For instance, Cornell has completed 15 solar projects to date, which furnish 20% of campus energy needs, and on sunny, high-production days, 100%.[23] Despite much planning, however, Stony Brook still hasn't even gotten a demonstration solar project up and running. Nor has there much if any commitment or effort to replace our gasoline and diesel dependent vehicles with an electric fleet. We need to move faster and do more.

The University Environment Committee's Vision

In what follows, the Environment committee analyzes the options as well as proposed plans for meeting state-mandated goals while providing our own modest suggestions for how SBU may accelerate its transition from fossil fuels.

Recommendation #1: Expand plans for onsite solar--

For Stony Brook University to be more assured of meeting this New York State mandate, we need to confront and overcome the challenges currently faced by the Office of Sustainability in seeking to plan, fund, and build solar facilities on campus. Sustainability's current plans for onsite solar as yet include only four likely sites out of the ten that planners actively evaluated. Two of these are rooftops and another two "grounds." As indicated in the 2023 presentation to the University Senate and pasted below, once online these four will produce about 5.95 MW annually, slightly more than projected in the 2021 CEMP. Remarkably, however, the largest and potentially most productive sites evaluated—five parking lots and one rooftop--were precisely those that Sustainability felt compelled to rule out.

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[22] Thomas Lanzilotta at Zoom Meeting between Office of Sustainability and Environment Committee, September 13, 2023, recording accessed 9-29-2023 https://stonybrook.zoom.us/rec/play/hY8dfSIzJF-7vXGcLlj6Qo8TbQJNNPRtyotvKZtsENYOBK1-gh7mo-Fuhsj3pck7yC8Lx7eTez_pgFjZ.XchalqpLBMMvZ_bo?canPlayFromShare=true&from=share_recording_detail&startTime=1694624770000&componentName=rec-play&originRequestUrl=https%3A%2F%2Fstonybrook.zoom.us%2Frec%2Fshare%2FWCOJZFqaO95n7dv0uP20iiFLBfRbsIP_GxB1i5rUXFafn2FloiSsSa7NVYw0qTb5.zaWe3GLnmbdDAzrs%3FstartTime%3D1694624770000

[23] "Solar Renewable Energy," *Sustainable Campus–Cornell* website, accessed 8-16-2023 https://sustainablecampus.cornell.edu/buildings-energy/solar-energy

	Project	Estimated Annual Electric Production kWh	% of Total Electric	Cumulative Total	% Cumulative Total
1	R&D Ground	3,295,000	1.38%	3,295,000	1.40%
2	Southampton East and West Cottage Ground	1,928,000	0.80%	5,223,000	2.20%
3	Building 17 Rooftop (BTM)	468,100	0.20%	5,691,100	2.40%
4	Southampton Chancellors Hall Rooftop (BTM)	159,600	0.07%	5,850,700	2.40%
5	Southampton Chancellors Hall Lot	1,020,000	0.43%	6,870,700	2.90%
6	South P Lot	7,749,000	3.24%	14,619,700	6.10%
7	Building 17 Carport	1,109,000	0.46%	15,728,700	6.60%
8	Admin Overflow Lot	1,371,000	0.57%	17,099,700	7.10%
9	CEWIT Lot	962,400	0.40%	18,062,100	7.50%
10	*Southampton Gym Rooftop (BTM)	206,900	0.09%	18,269,000	7.60%

Total	18,269,000

Total for PPA eligible (3, 4, & 10 not included, Behind the Meter)	5,223,000
Total BTM	627,700

* Southampton Gym Rooftop was assessed but will not be part of the project due to the potential of the building being demolished

- Make onsite solar a master planning priority: The main barrier mentioned by Harrigan was that these areas were still under the control of the university's own master plan and planners, which might have different future in mind for them. In other words, options that Stony Brook's Office of Sustainability has found could significantly accelerate the university's energy transition, better enabling our campus to meet statewide goals, have been ruled out in favor of presumably more important but as yet unspecified university goals. The university environment committee is eager to hear more about what those other, overriding university goals are for these properties.
- Fully consider the diminishing costs for onsite solar infrastructure: While the upfront costs were also cited as reasons for not investing more in on campus solar, we wondered about the calculations on which such conclusions were based. While Calpine Cogeneration is projected to cost 11-13 cent per kWh at least through the current contract period, about the same as what CEMP projects for onsite solar costs, the cost of solar installations per installed kW has not only been decreasing—by as much as 50% over the last ten years by some reports—and will likely continue to do so. Even at current costs, assuming an operation period of 25 years (conservative compared to the usual 30 years expected lifetime), solar energy projects for homes average approximately 6-8 cent per kWh, half that for electricity from Calpine.[24] Given that solar electricity locally produced on-campus can be fed directly to campus uses, thereby reducing the load on the Cogen plant and eliminating the costs of constantly buying and

[24]See for instance, Sam Wigness, "Going Solar in New York State: Pros, Cons, and Incentives," Solar.com (May 23, 2023), accessed 8-4-2023 https://www.solar.com/learn/going-solar-in-new-york-state/ .Notice this estimate does not include any government subsidy such as under the Inflation Reduction Act (an additional 30% even for tax-exempt institutions, see p. 16).

burning natural gas, and bringing down that share of SBU electricity costs, on-site solar is the financially most attractive renewable energy option.[25]

- Incorporate rooftop solar into building repair and renovation programs: While plans are currently underway for a single rooftop solar facility on the main campus and another in Southampton, committee members have observed many other flat-topped buildings around the main campus, including some currently under repair, with ample roof space apparently going unused. Solar production capacity should be added wherever possible as roofs are repaired, and buildings renovated. Repair and renovation programs should also aim to support and prioritize rooftop solar.
- Incorporate solar-topped carports into parking-lot repair and renovation programs: Solar-topped carports should be installed whenever and wherever possible as parking lots are repaved and repaired. Repaving and repair programs should also aim to support and prioritize the addition of solar production facilities.
- Can Power Purchase Agreement (PPA) contracts for onsite solar be made more economical?; Given the evident cheapness of solar electricity elsewhere, we wondered about the rate of 19 or 20 cent per kWh now being locked into the current PPA agreements for the on-site solar installations, according to Harrigan's recent presentation before the faculty senate. Even considering additional costs such as new infrastructure needed to bring electricity from the solar arrays to the buildings where it is used, the committee has difficulties understanding the difference between 6-8 cent/kWh for domestic solar—or even the 11-13 cents/kWh suggested in the CEMP for on-campus solar-- and the 19 or 20 cents/kWh for onsite solar currently being negotiated.
    - Part of the explanation for the 19-20 cents/kWh for onsite solar costs may be that it compensates for the risks that a solar provider assumes in financing, constructing, commissioning, operating, and maintaining the solar equipment, risks that the University does not incur with a Virtual Power Purchase Agreement (VPPA). If this is the case, Stony Brook University may be better off with a different purchasing/financing mechanism than it is currently contemplating.
- Reconsider the eligibility of onsite solar for government loan programs. While the 2021 CEMP dismissed SBU's eligibility for government loans, "as a state agency exempt from certain taxes,"[26] the 2022 federal Inflation Reduction Act (out after the *CEMP*report), now allows the 30% reduction in costs to be paid out to tax-exempt organizations as well. We therefore encourage the University to reconsider this possibility.[27]
    - If such projects are indeed eligible for the 30% reduction but it is not included in the 19-20 cent/kWh calculation of electricity costs in the PPA agreement, we trust that those terms will be revisited.

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[25]This estimate apparently does not include government subsidies such as under the Inflation Reduction Act (see p. 16).
[26]*CEMP*, p. 11.
[27]Carolyn Berndt and Micheal Gleeson, "Inflation Reduction Act: Clean Energy Project Eligibility for Local Governments," National League of Cities Website (September 23,2022), accessed 8-16-2023 https://www.nlc.org/article/2022/09/23/inflation-reduction-act-clean-energy-project-eligibility-for-local-governments/

- A suggestion about process: Instead of the bidding system for these projects reported by university administrators in meetings of 3/9/2022 and 9/3/2022, we wonder if it would not be better to work with dedicated solar brokers. This method has been successfully used by other New York campuses such as Cornell[28], to reduce costs further. Despite the additional effort required, it could provide additional opportunities for cost reduction in a market that is clearly overheated by subsidies and by the general push for renewables.

Recommendation #2. Seek more alternatives for off-site clean energy supply. Is there really no mechanism by which Stony Brook could directly invest in an off-site wind or solar power plant, and get a more direct benefit in terms of electricity prices when these are delivered through LIPA/PSEG?

- Consider "community solar" and other models: We note that there are currently mechanisms like "net-metering" applied to "community" solar power plants, where a residential user buys a small part of the use of a "community" solar plant, and in exchange can profit from the solar energy produced by the plant by getting a discount on the electricity consumed directly at his house meter. All the currently proposed financing mechanisms foresee an additional cost compared to the baseline cost of electricity from the Cogen plant, both in the case of RECs and in the case of VPPAs. It would be prudent to consider additional mechanisms, in conjunction with the possibility to have off-site produced energy delivered to Campus through the LIPA/PSEG network (this is currently not considered in the CEMP report due to the basic assumption made of continuing to fully rely on the Cogen plan for physically delivering electricity to Campus, with the only exception of what is produced in-front-of-the-meter by on-site solar).
- The LIPA/PSEG alternative: We would like to see more assessment of exactly how the mentioned off-site renewable options compare with the option of progressively buying more electricity directly from LIPA/PSEG while phasing out the Cogen plant and electrifying campus. Such a strategy would simply rely on LIPA/PSEG to increase progressively their fraction of clean energy, thereby also enabling Stony Brook to reach the stated goals. Obviously, the expected increase in LIPA/PSEG rate would need to be taken into account.

Recommendation #3: Plan to phase out the Cogeneration Plant. The continuing complacency about the future of Stony Brook's natural gas-fueled cogeneration plant is also a concern. According to the figures in the 2021 CEMP, this plant currently generates the vast majority of our campus' electricity: 107.76 Gigawatt-hours as opposed to 10.57 from PSEG/LIPA.[29] A recent contract renewal with the Calpine Corporation does open the door to more independent clean energy production on-campus, but extends SBU reliance on this fossil fuel-dependent

[28]Cornell relied on https://solarkal.com/ as solar broker, lowering solar procurement costs significantly; "University Signs Power-purchase Agreement for North Campus Rooftop Solar," *Sustainable Campus–Cornell* website, (February 10, 2020), accessed 8-16-2023 https://sustainablecampus.cornell.edu/news/university-signs-power-purchase-agreement-north-campus-rooftop-solar

[29]*CEMP*, p. 21.

plant for another seven years, essentially ignoring the governor's 2030 deadline for 100% clean electricity on-campus. SBU continues to assume that fossil-fueled electric current as well as steam from Cogen will serve as mainstays of on-campus energy production until 2050.[30]

- Consider onsite alternatives for resilient and reliable energy. Though Stony Brook's "numerous research buildings" with labs–and presumably also its hospital–require energy "resiliency and reliability," scaled up on-site production of solar or other clean energy, combined with batteries for storage, can accomplish these same goals.
- Start planning for on-site generated solar to provide more or most of the same benefits as the Cogen plant. As the CEMP notes, "switching to a new energy source…will require the Campus to incur significant upfront costs and infrastructure upgrades." Yet as noted above, after these investments the lower ongoing costs of onsite solar over the longer term may well bring the cumulative costs to much less than with continued operation of the Cogen plant. Moreover, in our view, any plan for getting us to zero-emissions electricity needs to envision some way for getting the campus's actual electricity usage to that point.

Recommendation #4: Envision renewable alternatives to Stony Brook's reliance on gas-generated steam and hot water. We were surprised that the CEMP report does not go into any details on steam and hot-water generation for heating buildings or running chillers for air conditioning. We understand from more informal discussions with Sustainability staff that alternatives are being investigated for reducing energy usage in these areas, such as through electrification and moving to lower temperature hot water distribution from Stony Brook's Central plant (which receives and converts Cogen-plant generated steam to hot water). Such innovations should be followed through on and made an integral part of a medium-to-long term plan to move to renewable energy. Thanks to an initiative of the Sustainability Office, Stony Brook University is already equipped with state-of-the-art monitoring for electricity, steam, and hot water needs across Campus that can serve this planning well. By analyzing this information and correlating it with expected solar production across time and days of the years, a more detailed understanding of the effective benefits of solar,also its limitations due to the current cogeneration system, can be obtained.

- Extending electrification to heating and cooling: Medium-to-long term, it will not be possible to fully profit from moving to renewable energy, without a full electrification of Campus, including progressively electrifying most of the heat production and cooling needs. For heating, both air-source and ground-source heat pumps could be considered. While these technologies bring most benefits when installed in new buildings, successful retrofits of air-source heat pumps into pre-existing buildings are possible, though we understand Long Island's geology may make them cost-prohibitive at least in many locations. Progressively moving out of using steam, will increase the maximum benefit from renewable energy.
- Looking to other campuses for models. This kind of study and innovation is already happening on other campuses, including those using Cogeneration plants.[31] We

[30] *CEMP*, p. 7.

strongly urge the university administration to investigate these models then start formulating short-to-medium-to-long term plans now, to begin taking intermediate measures that will build toward a longer-term goal of transitioning from natural gas.

Recommendation #5: Address administrative constraints and complacency. Standing in the way of the planning and investments needed are not just a lack of funds but structural constraints in how the planning and financing of clean energy projects is currently being handled.

- Overcoming Sustainability's dearth of authority and resources: Within the SBU administration itself, the Office of Sustainability itself is expected to furnish not just personnel and leadership but the funds for the campus' energy transition. One problem facing this relatively small mid-level office is that the money available to it for financing any new projects has to come either from its own small budget or from financing arrangements worked out with the New York PowerAuthority. One problem with the latter arrangements (at least as the committee understands these) is that the projected cost savings for justifying a given project are calculated for only seven years out, whereas savings from investments in technologies like solar panels generally accrue over much long periods. Compared to clean energy mandates requiring far-reaching changes extending decades out, that is an extremely short time frame, one that places undue constraints on how much financing can be made available. We encourage a search for federal and other state financing arrangements better attuned to the longer-term and large-scale challenges our university now faces on the climate front, including those imposed by New York state law.
- Overcoming administrative silos: Another problem is that authority for Stony Brook's gas-guzzling vehicle fleet lies in a separate department devoted to Transportation. So much of SBU's greenhouse emissions hinge on its transportation infrastructure, fleet, and resources, yet Sustainability and Transportation apparently remain quite separate in their assumed charges, priorities, and budgeting processes. Collaborations begun between them on university fleet electrification need to be expanded upon, and extended to better support private EV usage by students, faculty, and staff.
- Stepping up top-level directives and initiatives: We've been surprised to discover that apparently, there has been no top-level appropriation of significant funds to build more clean-energy facilities or infrastructure on the Stony Brook campus. Nor has there been much if any top-level pursuit of all the new government funding that has come available in the last couple of years to encourage such investments. The contrast with Stony Brook's aggressive pursuit of funding and allies to establish a Climate Exchange on NYC's Governors Island could not be starker.
- Taking more of a whole-university approach to budgeting existing resources for cleaner energy. With more top-down engagement, the university could also take more of a

[31] On how ground-source heat pumps could replace part of the steam generation of the Cogen plant at Cornell: Connor Bayne, et al, "Cornell University Heat Pump Study" (Spring 2022), accessed 8-16-2023 http://www.lightlink.com/francis/Heat_Pump_Spring_2022_Final_Report.pdf

whole-university approach to invest in and develop alternatives to the Cogen plant. Those, too, are investments in Stony Brook's future, every bit as much so as money put into classrooms or labs or climate research.

- More aggressivepursuit of governmental funding and support: In addition to the possible funds that may come available under New York State's recent environmental bond act, we urge more serious exploration of opportunities offered from the federal Inflation Reduction Act of 2022. Overviews of the IRA show new programs for financing through a DOE Loan Programs Office and a host of new tax credits for investing in clean energy.[32] Were Stony Brook to explore partnering with Long Island's more disadvantaged communities in a community solar or similar project, the IRA could provide still more significant funding.

Recommendation #6: Emphasize on-site energy storage: Long-term, battery storage will need to be considered as well, to avoid the large fluctuations in electricity prices, also in availability, that can ensue when on-site and off-site renewable energy sources (wind/solar) happen to be less available than at other times. While difficult to plan for with any precision because future battery prices are so difficult to predict, Stony Brook nevertheless needs to have at least a basic plan in place, perhaps based on an extrapolation of recent trends in the current prices per kWh over the upcoming years. Shifting loads vs time of the day and as a function of energy availability, as well as energy efficiency measures will likely also become an important part of this equation. Here especially, Stony Brook's own considerable expertise in the latest technologies in energy storage should be tapped (see Recommendation #9), both to advise planning and to actively model and implement improving solutions.

Recommendation #7: Enable more bottom-up initiatives to keep improving building and energy efficiency. While university planners project a continued growth of campus electric demand by 1% a year, the Environment Committee urges an explicit aim of reducing that annual growth rate to zero, combined with additional ongoing efforts. To accomplish this goal of zero growth, we suggest the following:

- Further improvements in the Sustainability Office's innovative tracker of energy intensity: Increase the granularity of the monitoring within a building to allow a building manager to have a more granular view of where in the building energy is consumed.
- Consider incentivizing university personnel to consume less energy. Several options can be pursued here, from (1) making personnel more aware of the conservation issue -with a campaign of more general energy conservation awareness- and letting them know about how much energy is consumed by the facilities they make use of at the most granular level possible, to (2) redistributing electricity costs to the single personnel units (e.g. Departments) that make use of a certain building, initially transferring them money

[32] U.S. Department of Energy, "Inflation Reduction Act of 2022; Loan Programs Office," accessed 8-16-2023 https://www.energy.gov/lpo/inflation-reduction-act-2022 ; see also "Tax Credit Monetization" in U.S. Environmental Protection Agency, "Summary of Inflation Reduction Act Provisions Related to Renewable Energy," accessed 8-16-2023 https://www.epa.gov/green-power-markets/summary-inflation-reduction-act-provisions-related-renewable-energy

based on an initial baseline, and allowing them to profit directly from a fixed fraction, e.g. 50%, of the savings they manage to achieve

- Continue increasing amount of smart controls that can switch off or lower consumption when there is no need (e.g. switch off computing nodes in a computer farm when no active jobs are in the queue, or lighting and classroom devices outside class schedule), or preparing to work on time-shifting loads to periods where electricity is less expensive/more available (e.g. in the computing farm analogy, allow for more/less jobs to run depending on the time of the day, or switching off not essential devices, or activating tank-based hot water heaters early/late slightly shifting consumption, re-charging EVs at specific times if possible, etc.).

Recommendation #8: Address Stony Brook's greenhouse emissions from transportation.

- Develop a university transportation plan that prioritizes reducing gasoline and diesel usage by individually-owned as well as university vehicles, to bring down our collective climate impacts from driving.
- Facilitate more coordination and joint-planning between Sustainability and Transportation offices, the latter of which will be so crucial to weaning our suburban campus off gasoline and diesel.
- Commit to long-as well as short-range plans and securefunding to replace the campus's own vehicle fleet with zero-emissions vehicles.
- Step up the retrofitting of our campus for electrified transportation: by expanding ev charging stations and other facilities that make the campus more welcoming to drivers of electric and plug-in hybrid vehicles.

Recommendation #9: Involve more of the campus in Stony Brook's efforts to wean itself from fossil fuels. For the last several years, most if not all of the university's effort to adjust its own conduct and operations to the climate crisis and to evolving state mandates for cleaner energy has been handled by the Office of Sustainability. While its staff have laid much good groundwork, a formidable transition of energy usage for the entire university has thereby been almost entirely sequestered into a relatively small and mid-level unit within university administration. In addition to having the upper levels of the administration more involved, we'd also like to see more outreach and effort to mobilize the rest of our campus.

- Mobilizing faculty expertise: As a research university, Stony Brook is home to many faculty who are actively researching technical and scientific innovations that can alleviate our ingrained reliance on fossil fuels. With the Governors Island project now slated to swell their ranks, with a "Collaborative for the Earth" initiative now being inaugurated by the Stony Brook Provost's Office, the university administration needs to explore and establish ways that Stony Brook's ample, growing expertise can be marshaled to propel a transition toward clean energy on our campus itself. These include, but are by no means limited to:
    - Our College of Engineering and Applied Sciences, for which sustainable technologies are a major emphasis:

https://www.stonybrook.edu/commcms/ceas/research/cross-cutting_research/energy-systems
    - Our Advanced Energy and Research Technologies Center: https://www.stonybrook.edu/commcms/aertc/focus-areas/index.php
    - Faculty from these and other relevant programs could be brought in to speed campus progress toward clean energy goals, by advising planners and administrators, also by being encouraged, for instance, to develop on-campus pilot projects to serve aspects of Stony Brook's energy needs
    - The goals: turning Stony Brook into a living, exemplary laboratory for translating clean energy research and innovation into practice, while speeding campus progress toward clean energy goals.
- Engaging the study body and staff, as well as faculty: Stony Brook's efforts—and struggles—to accomplish those energy transitions should not just remain the province of assigned experts. We need to explore how Stony Brook's larger public may be informed of, also contribute to, this quest for far-reaching change, through town halls, lively digital and social media outreach, opportunities for clubs and volunteering, also through experimentation with other ways of drawing more public input and ideas, as well as information flows.
- Decentralizing our transition efforts–Instead of relying on a top-down approach, consider new ways of opening our collective energy transition to more bottom-up initiatives; for instance, building-by-building energy audits or experiments with battery storage, or the encouragement of student groups' initiatives or intradepartmental efforts.

Conclusions–

The Office of Sustainability has laid important groundwork for the early stages of SBU's energy transition. But the many constraints on its authority, budget, and number of personnel, have limited what it can contemplate, plan, or accomplish. The university apparently does not yet have a concrete, stepwise, and feasible plan for how it will meet the current state-mandated goals for its clean energy transition. Most glaringly missing is exactly how it will achieve the EO 022 mandate of 100% clean on-campus electricity by 2030 (in seven years).

Stony Brook's upper-level administration has been justifiably proud of securing funding and authorizations for leading the climate research initiative at NYC's Governors Island. We would now like to see our leaders "walk the talk," by devoting a similar level of time, work, and resources into our campus' own energy transition. As we've pointed out above, new funding sources are indeed out there but apparently remain little explored. The current level and authority of staffing in Sustainability makes it difficult for them to follow or take advantage of these programs. Devoting upper-level staff specializing in development to such tasks could enable the campus to better tap outside resources that are available for on-campus clean energy projects. With more interest and involvement from the upper-level administration, Stony Brook can also take more of a whole-campus approach to our energy transition. And with more mobilization of Stony Brook's rich reservoirs of expertise, human energy, and commitments to creating a better future, we'll be better able to accelerate the pace of our own energy transition,

while blazing an innovative pathway toward those on-the-ground changes that the rest of our state, nation, and world so desperately need.

This past summer, with **its** heat waves, record-setting temperatures, and air pollution from distant wildfires, has confirmed the planetary emergency we are now in. As a campus, we need to go “far beyond” the start that has already been made, and not just because New York State has imposed new mandates on us. In setting these goals, our politicians and legislature have stepped up to the plate, doing what they can to avert the speed-up of climate-caused catastrophes. Now it is our turn.

AUTHORSHIP

This report was authored by the Energy Working Group of the Stony Brook University Senate University Environment Committee and reviewed by the entire committee.

Working Group coordinator:
Christopher Sellers, Professor, Department of History.

Working Group members:
Daniel Amarante, Lecturer, Department of Chemistry.

Malcolm Bowman, Distinguished Service Professor Emeritus, School of Marine and Atmospheric Sciences.

Giacinto Piacquadio, Associate Professor, Department of Physics and Astronomy.

Thomas Wilson, Instrument Engineer, School of Marine and Atmospheric Sciences.

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