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State of Connecticut
Public Utilities Regulatory Authority

Re: Comments by Clean Energy Group regarding Public Utilities Regulatory Authority's Annual Energy Storage Solutions Program Review - Year 4, Docket No. 24-08-05

Clean Energy Group (CEG), a national nonprofit organization that works to provide innovative technical, economic, and policy solutions to enable communities to participate equitably in the clean energy transition, is pleased to provide these comments in response to the Public Utilities Regulatory Authority's Annual Energy Storage Solutions Program Review - Year 4. These comments reflect the position of CEG and do not necessarily reflect the positions of CEG's partner organizations or funders.

For the past three years, CEG has been working with the Connecticut Green Bank to help multifamily affordable housing providers better understand the economic, health, and resilience benefits of solar and energy storage for their properties and tenants and how the Energy Storage Solutions (ESS) program can help reduce the cost of installing and operating an energy storage system. CEG is also leading a three-year, US Department of Energy-funded project to develop a climate resilient energy code for multifamily affordable housing properties in partnership with the Connecticut Green Bank, Connecticut Department of Energy & Environmental Protection, Connecticut Insurance Department, Operation Fuel, Yale Center on Climate Change and Health, New Buildings Institute, and American Microgrid Solutions. The goal of the project is to establish and advance the implementation of a first-in-the-nation stretch code for multifamily affordable housing properties to install clean and efficient energy systems that will allow vulnerable residents to shelter in place more safely during severe weather events and extended power outages, while also reducing energy consumption and energy burdens for affordable housing residents and providers and decreasing the greenhouse gas footprint of multifamily properties.

CEG's comments are focused on topic area three (3), "Multifamily Housing Tenant Benefits."

Identifying the Energy Storage Economic Gap for Multifamily Affordable Housing

CEG serves as the technical partner of the Connecticut Green Bank to encourage resilient power development – solar paired with battery storage (solar+storage) – at affordable housing facilities, including building awareness of solar+storage technologies and discussing eligible incentive programs like the ESS program. In this capacity, CEG provides project-specific technical assistance to conduct solar+storage feasibility assessments. The feasibility assessments are informed by the actual experience of electricity-dependent tenants through a research and survey initiative led by the Yale Center on Climate Change and Health and Operation Fuel.

Through the Climate Smart Technologies and Home Medical Devices for Affordable Housing initiative, in partnership with the Connecticut Green Bank, Connecticut Insurance Department, Operation Fuel, and Yale, the technical assistance provided was expanded to include an in-depth analysis of how solar+storage can support the health of residents, especially those reliant on electricity for medical needs, such as electricity-dependent medical devices and temperature-regulated medication that requires refrigeration. The technical support included a weatherization audit, providing insight into how the energy efficiency of the building could be improved.

Connecticut has one of the best storage incentives in the country, especially for affordable housing providers, through the ESS program. Paired with the state's robust solar programs, the economics for systems are significantly stronger than most places in the country. However, many affordable housing providers, especially those operating through the US Department of Housing and Urban Development (HUD), still find the cost of battery storage, even when paired with solar, too expensive to justify the investment. Additional barriers have included an inability for master-metered projects to participate in the Residential Renewable Energy Solutions Program and concerns among housing providers that energy resilience doesn't justify the additional investment in energy storage due to the limited number and length of power outages that occur in a typical year.

Through CEG's technical assistance, housing providers have received solar+storage assessments detailing multiple economic and resilience scenarios and education on the benefits of resilience that are harder to monetize, such as public health impacts and emissions reduction. Based on those assessments, the ESS program was found to offset an average of 27% of battery system costs. Across the 18 properties analyzed through the initiative, the average cost of battery systems sized to provide backup power was $438,000 with available ESS incentives and program revenues offsetting an average of $115,000 of the system cost. Many affordable housing providers recognize the value of resilience for their residents but are unable to invest in battery storage through available financing options or their own reserves. Several of the providers CEG assisted are currently seeking grant opportunities to offset battery storage costs not covered by savings and ESS program incentives and returns.

The economic barriers to energy storage development indicate that affordable housing providers in Connecticut require tailored technical assistance, flexible financing options, and additional

adders to make investment in battery storage a reality. Grant programs through existing pathways like HUD are invaluable in supporting early adopters to develop solar+storage but cannot support a sustained pipeline of projects.

Climate Resilient Energy Code for Multifamily Affordable Housing

CEG and its partners are in the process of developing a Climate Resilient Energy Code for multifamily affordable housing that will include measures to increase both the passive survivability of a property during a power outage and the availability of reliable backup power to keep essential services up and running, such as heating and cooling, lighting, refrigeration, and communications and medical device charging. Backup power measures include onsite solar and energy storage. A full list of the measures that will be included in the Climate Resilient Energy Code are detailed in Appendix A of these comments. The initial draft of the code will be completed in October 2024 and finalized in 2025 after multiple rounds of stakeholder and public feedback, including soliciting and incorporating feedback from affordable housing residents.

CEG proposes that the Public Utilities Regulatory Authority consider establishing additional adders in the ESS program for multifamily affordable housing owners that voluntarily adopt the Climate Resilient Energy Code for their properties. The additional adders would represent a portion of the societal benefit that providing resilient backup power to affordable housing residents will provide, either through powering a community space within the property or specified outlets in individual units. These societal benefits include tangible outcomes, such as improved health for medically vulnerable residents and decreased emergency department visits during severe weather conditions, that cannot be easily monetized through existing savings or revenue opportunities. The Climate Resilient Energy Code project team is collaborating with the Pacific Northwest National Laboratory to develop a methodology for quantifying some of these benefits. Preliminary cost and resilience impact analysis results will be available later this year.

Multifamily Affordable Housing Program Participation

CEG is concerned about participation rates of low-income and underserved customers on the residential side of the ESS program.

As noted in the program's year three evaluation report, 200 of 519 residential projects (including submitted, approved, and completed projects) fall into the low-income and underserved category, bringing percentage totals very close to the program's Justice40 goal. However, the report notes that of these 200 units, 161 are attributable to a single approved, but not yet completed, hybrid multifamily affordable housing project in UL territory. If this hybrid project were not completed, low-income and underserved participation rates would fall to 7.5%.

This highlights both the importance of participation by multifamily affordable housing providers and the risk that the program may not attain its equity goals should it fail to address significant remaining barriers to participation by multifamily properties.

CEG agrees with the report's recommendation that

> "Program Administrators should continue to focus on increasing enrollment for underserved participants, especially those that are low-income, and leverage insights from research on barriers to entry for these populations…. To improve the share of underserved and low-income participation and capacity relative to targets, Program Administrators could continue to explore program elements to incentivize multifamily affordable housing participation…. Multifamily affordable housing could be an avenue for increasing low-income participation."

CEG also agrees with the report's recommendation that "For the residential sector, Program Administrators should consider increasing incentives to increase enrollment, especially for low-income participants."

However, while increasing incentives is an important step, it is likely not the only step that needs to be taken to address low participation rates. In the case of multifamily affordable housing, a number of other barriers to participation have been identified, some of which are explored in these comments.

To our knowledge, the Connecticut ESS program is the only energy storage incentive program in the US that has devoted a significant effort to encouraging and supporting the enrollment of multifamily affordable housing properties. It is critical that Connecticut get this aspect of the ESS program right, both for the realization of its own equity goals and as a model for other state programs to emulate. For these reasons, CEG recommends that Connecticut open an additional stakeholder process to solicit input from multifamily affordable housing owners, managers, and developers specifically, and that this input be used to help address remaining barriers to multifamily affordable housing participation. CEG would be interested in helping to facilitate further outreach, engagement, and assistance offered to multifamily affordable housing providers, if that would be of interest.

CEG appreciates the opportunity to submit these comments and would welcome a conversation to discuss them further.

Respectfully submitted,

Seth Mullendore
President and Executive Director
Clean Energy Group

APPENDIX A

Climate Resilient Energy Code Measures

The table below provides a high-level summary of all proposed code concepts, presented in the order of appearing in the forthcoming draft Climate Resilient Energy Code. Each measure includes proposed code language and a reason statement, highlighting its purpose and impact.

Measure	Description
1. Building Envelope and Passive Strategies	
This section includes measures to enhance the building envelope and utilize passive design strategies for improved energy efficiency. Provisions cover advanced air sealing, insulation, high-performance glazing, cool roofs, and surfaces to reduce heating and cooling demands. Requirements for window shading and setting a percentage area for shaded or high-solar reflectance surfaces help mitigate solar heat gain. These measures ensure compliance with the latest standards, promoting buildings with superior thermal performance and lower energy consumption.	
Advanced Air Sealing	This proposal will be aimed at minimizing uncontrolled air leakage through the building envelope to enhance thermal performance, reduce peak load, and reduce energy consumption.
Advanced Insulation and Glazing Requirements	This proposal will require high-performance insulation and glazing to improve thermal resistance and reduce heat transfer, contributing to lower heating and cooling load and demand.
Cool Roofs and Surfaces	This proposal will require the installation of roof and surface materials designed to reflect more sunlight and absorb less heat, helping to reduce cooling loads, improve building energy efficiency, and reduce urban heat island impacts
Window Shading	This proposal will require the installation or use of interior blinds or exterior fixed or operable shading devices and/or the implementation of strategies to reduce solar heat gain through windows, enhancing indoor comfort and reducing cooling load.
Window U-Factors	This proposal will increase standards for window thermal performance to ensure minimal heat transfer, contributing to improved energy efficiency and indoor comfort and reduced building heating and cooling loads.

Green, Blue, and Brown Roofs	This proposal will require the installation of vegetated (green), water-based (blue), or natural material (brown) roofs to improve insulation, reduce urban heat island effects, and manage stormwater. This proposal will be coordinated with solar PV requirements to avoid conflicts with available roof space.
Shaded, Vegetated, or High-Solar Reflectance surfaces	This proposal would require for a percentage of the project area to include shaded, vegetated, or reflective surfaces to reduce heat island effect and enhance overall building energy performance.
Roof testing protocols tailored for high-velocity hurricane zones	This proposal would require specific testing procedures for roofs in hurricane-prone areas to ensure durability and resistance to high winds, contributing to building resilience and longevity.
Ventilation	This proposal would require strategies and systems to provide adequate airflow and indoor air quality, including mechanical and natural ventilation, to maintain a healthy and comfortable indoor environment. This may include requirements on the use of balanced energy/heat recovery ventilation, and place requirements on the use of central vs. decentralized systems, and guidance on how those systems are configured to facilitate operation during grid outage scenarios.
Operable Windows / Natural Ventilation	This proposal would require the use of operable windows to allow natural ventilation. This would allow for fresh air to dwelling unit spaces in the event of a grid disruption where mechanical ventilation cannot be backed up and can facilitate night-flushing for building cooling.
2. Building Systems and Smart Technology	
This section focuses on integrating advanced energy systems and smart technologies to optimize energy use. It includes smart controls and devices for efficient building operations, combined heat and power systems, and demand response measures. Solar + storage systems, backup generation, distributed heating and cooling, emergency circuiting, and microgrids enhance energy resilience and sustainability. These provisions align with the latest technological advancements, promoting efficient and sustainable building energy systems.	
Smart Controls	This proposal would provide guidance on or requirements for the use of advanced control systems that automate and optimize

	building operations, improving energy efficiency and occupant comfort.
Smart Devices	This proposal would provide guidance on or requirements for devices equipped with sensors and connectivity that enable real-time monitoring and control to enhance building performance and energy efficiency.
Combined Heat and Power	This proposal would be limited to guidance on how the use of existing and/or planned systems that simultaneously generate electricity and useful thermal energy from a single fuel source could be used to satisfy a portion of the backup power system requirements for the CRE code.
Demand Response Measure	This proposal would provide guidance on and requirements for strategies that adjust energy consumption during peak demand periods to enhance grid stability and reduce energy costs during normal grid operations.
Solar + Storage	This proposal would address requirements for the integration of solar energy systems with battery storage to provide emergency backup power during grid outage events.
Solar + Storage + Backup Generation	This proposal would address requirements for combining solar energy, battery storage, and fossil-fuel fired backup generators to ensure continuous power supply during outages and enhance overall energy resilience. This proposal would address if and when fossil-fuel fired equipment could be used to satisfy a portion of the backup power system requirement.
Distributed Heating and Cooling – Redundant systems	This proposal would address requirements for distributed heating and cooling systems designed with redundancy to ensure continuous operation and reliability, even in the event of component failure. This proposal may outline the requirement for distributed or dedicated systems for key building areas like community rooms.
Emergency circuiting	This proposal would address requirements for electrical circuits designated to provide power to critical systems during emergencies, ensuring essential operations are maintained.
Microgrids	This proposal would provide requirements for the configuration of localized energy grids that can operate independently from the main

	grid, providing resilience and supporting integration of renewable energy sources, and backup of critical building systems.
EV Managed Charging	This proposal would provide guidance on and requirements for systems that optimize the charging of electric vehicles and/or the integration of vehicle to building (V2B) technology to balance energy demand, enhance grid stability, function with microgrids, and reduce energy costs.
3. Resilience and Emergency Power Systems	
This section emphasizes building resilience and emergency preparedness. It includes provisions for community rooms, alternative compliance pathways, procedures for managing extreme weather events, and configurations of critical building systems and their integration with backup power systems. Post-flood procedures, protection of critical systems, and backup water systems ensure rapid recovery and continuous operation during emergencies. Freeze protection for critical systems, like domestic hot water and hydronic heating/cooling, is also mandated. These measures ensure buildings remain safe, habitable, and operational under various emergency conditions, complying with the latest resilience standards.	
Community Rooms	This proposal would address minimum requirements for designated spaces within buildings for community use, supporting resilience and emergency preparedness during critical events. This would include mechanical, electrical, and plumbing system and emergency backup power configuration considerations.
Alternative Compliance Pathways	This proposal would provide flexible options for meeting energy efficiency and resilience requirements, allowing tailored approaches based on specific needs. This may reference eligible third-party program requirements such as PHIUS or PHIUS Revive standards, LEED base or pilot credits, that may demonstrate compliance with one or more CRE code requirements.
Extreme Weather Event Building Management Procedures	This proposal would require building operations and maintenance information, including guidance on the design intent and how to efficiently and effectively operate the building and critical systems during a grid outage event, be provided to the owner. This may include protocols for managing building operations during extreme weather events to ensure occupant safety and critical system functionality.

Operation procedures for critical systems on backup power supplies	This proposal would require Building operations and maintenance information, including guidance on the design intent and how to efficiently and effectively operate the building and critical systems during a grid outage event, be provided to the owner. This may include protocols for managing building operations during extreme weather events to ensure occupant safety and critical system functionality.
Protect Critical Systems	This proposal would require measures to safeguard essential systems from damage or failure, including waterproofing or elevating systems in flood-prone areas, ensuring continuous operation during emergencies.
Backup Water Systems	This proposal would require the backup of building domestic booster pumps to ensure potable water access to the building in the event of a grid disruption.
Water Supply	This proposal would require the backup of building domestic booster pumps to ensure potable water access to the building in the event of a grid disruption.
Freeze protection of critical systems (DHW, hydronic heating/cooling)	This proposal would require measures to prevent freezing in essential water and heating/cooling systems, ensuring continuous operation in cold conditions, including the backup of critical freeze protection systems.