NE CHAPTER OF THE CHP ALLIANCE:

Recommendations to the New York Department of Buildings Regarding CHP and LL97

This document provides answers to questions posed by New York Department of Buildings (NY DOB) as it grapples with the treatment of distributed energy resources (DERs), specifically combined heat and power (CHP), within the context of LL97. We also hope to demonstrate how CHP systems can serve as decarbonization and resiliency tools to help New York City reach its climate goals and explore how the NY DOB can properly account for the technology's benefits within the LL97 rules.

The **Northeast Chapter of the CHP Alliance** consulted its membership and third-party experts to give detailed responses to the following questions:

How should the City and the State of New York assist owners of large CHP systems to modify their systems to burn lower-carbon fuels (LCFs)? When does it make sense or not make sense to modify said systems?

The City and State of New York can assist owners of large CHP systems in a variety of ways once there is a functioning LCF market.

First and foremost, the City and State must do more to further incentivize and develop proactive initiatives that encourage the introduction of LCFs into existing pipelines and bring down the cost of lower-carbon fuels. While costs currently represent a significant barrier to the deployment of many energy technologies — including CHP — those concerns are secondary to the availability of such fuels. The development of a properly functioning LCF market within the City and State hinges on support for market changes that allow for the decarbonization values of LCFs to be monetized, such as with a clean fuel standard.

In addition, technology demonstrations to prove viability are critical. Demonstration of CHP using LCF's will give regulators, government officials, industry professionals, and end users with critical empirical data about performance, cost, and emissions-reduction potential. The ability of existing CHP systems to use hydrogen blended fuels within an existing system represents another potential opportunity. At present, existing natural gas-fueled CHP systems can use 100% RNG and hydrogen blends up to 30%. Several CHP equipment manufacturers have also developed systems that **can operate** on 100% hydrogen fuel TODAY.

Once more 100% hydrogen systems comes online, then existing natural gas-fueled systems will require a change out of internal fuel piping and valving to accommodate a higher percentage of such blended fuels, as well as a reprogramming of any controllers based on the final percentage of the fuel blend. This process may be completed at a reasonable cost to the customer, and the City or State could offer incentives to offset those costs. In the case of biogas and renewable natural gas, the current natural gas-fueled systems would need little to no updating, which presents the opportunity for the City and State to offer green credits via the purchase of RNG.

What is the current LCF market like in NYC?

The current LCF market in New York City, as it applies to CHP technology, is best described as nascent but growing, as **exemplified** by the **Greenpoint Renewable Energy Project**. The LCF market in New York appears to be focused on transportation-related uses. Although the New York State Senate **passed a bill** during the last legislative session that seeks to establish a clean fuel standard for the state, the corresponding bill in the Assembly has failed to gain any significant momentum. Some H2 projects have been introduced to the broader market, but the larger supply chain is nearly non-existent and almost exclusively project-specific.

How new or how big should a system be to prioritize LCF modification vs. simply phasing out use of the CHP system?

This question is site-specific. Proper sizing is based on a facility's individual goals, which can include economic goals, decarbonization goals, resiliency goals, and others relevant to specific sites and organizations. Consideration should be given to any system with good thermal recovery that can, independent of LCFs, show a net reduction in CO2 intensity when compared with marginal grid emissions. Additionally, the societal benefits of CHP, regardless of fuel, cannot and should not be ignored. CHP, when operating in the right geographic location, at the right times of day, and during the right seasons of the year can help to provide significant societal benefits — such as central grid support — while delivering needed emissions reductions. There is no correct size or age when CHP should be phased out or transitioned to a new fuel — provided the system is delivering high efficiency and lower marginal grid emissions. Likewise, engines, as part of CHP systems, are routinely changed out during planned maintenance schedules. As such, there are multiple opportunities within a CHP system's lifetime to pursue a full upgrade to LCFs.

How can an owner demonstrate that their CHP system is operated in a responsible manner (from an energy and carbon perspective)? What parameters/requirements for continued use can be set that can be documented?

As in many key areas of oversight, proper data collection and interpretation are essential to demonstrating that any system, including a CHP system, is operated in a responsible manner. Measuring the efficiency of a CHP system (energy outputs divided by fuel input) is a common way to qualify performance. Using existing LL84 data as a potential baseline for data, or using such data as a forecasting tool, could provide the necessary oversight as information is accumulated under LL97 conditions. Additionally, using the New York State Energy and Research Development Authority (NYSERDA) CHP Commissioning Campaign data (accumulated from 2017-2020) can serve as a model for any program instituted by the DOB. NYSERDA's campaign included a desk review of historic performance data and system drawings for both CHP and building heating and electric, as well as site visits that focused on inspecting existing system conditions and setpoints. Such a system could prove quite adept at ensuring responsible operation.

Is there a good standard for establishing the operational efficiency of a CHP system?

Current industry standards suggest that a 60% threshold, which is widely viewed as the minimum viability threshold, is a good starting point when discussing an operational standard for CHP system efficiency. Current industry best practice involves looking at net delivered energy streams to a given building. Net delivered energy streams can be broken into net power output and net thermal output. Net power output is measured as gross produced power, less parasitic or ancillary loads required for operation. Net thermal output is measured as end use to a building, less hot water, steam, and/or chilled water. It is our assertion that a combination of the above would likely yield the best possible standard.

Can CHP systems not currently designed to operate in an islanded mode be easily modified to provide resilience? How expensive is that? What are the barriers?

Retrofitting existing, non-black start CHP systems to provide resiliency is site-specific, depending on type of generators and the accessibility of electric connections within a building or site for critical loads. Retrofitting existing CHP systems, depending on generator type, may be possible. Synchronous generators and inverter-based systems can provide backup standby power. Induction generators cannot.

The issue here, however, is that the required electrical system upgrades necessary for such modifications can prove to be costly, based on the configuration of an individual facility's electrical system, the size of the CHP system, and building electric loads. As such, pricing of any retrofit would be project-dependent. It's also critical to examine how many CHP units in New York City are induction-based units. It may not be as feasible to upgrade these induction-based units as it is to upgrade synchronous or inverter-based units, which is a relevant considered.

CHP plants are often designed to be thermal load-following to maximize efficiency, but not to support entire standby critical loads of a building. Therefore, the cost to make these new transfer switches and building electrical connections may not be justified if the resiliency it provides affords only modest support for the building in the event of a grid outage.

Lastly, we are under the impression that very large CHP plants located in New York already have this capability, and many smaller systems do as well, having been provided incentives from NYSERDA to install such systems, not long ago.

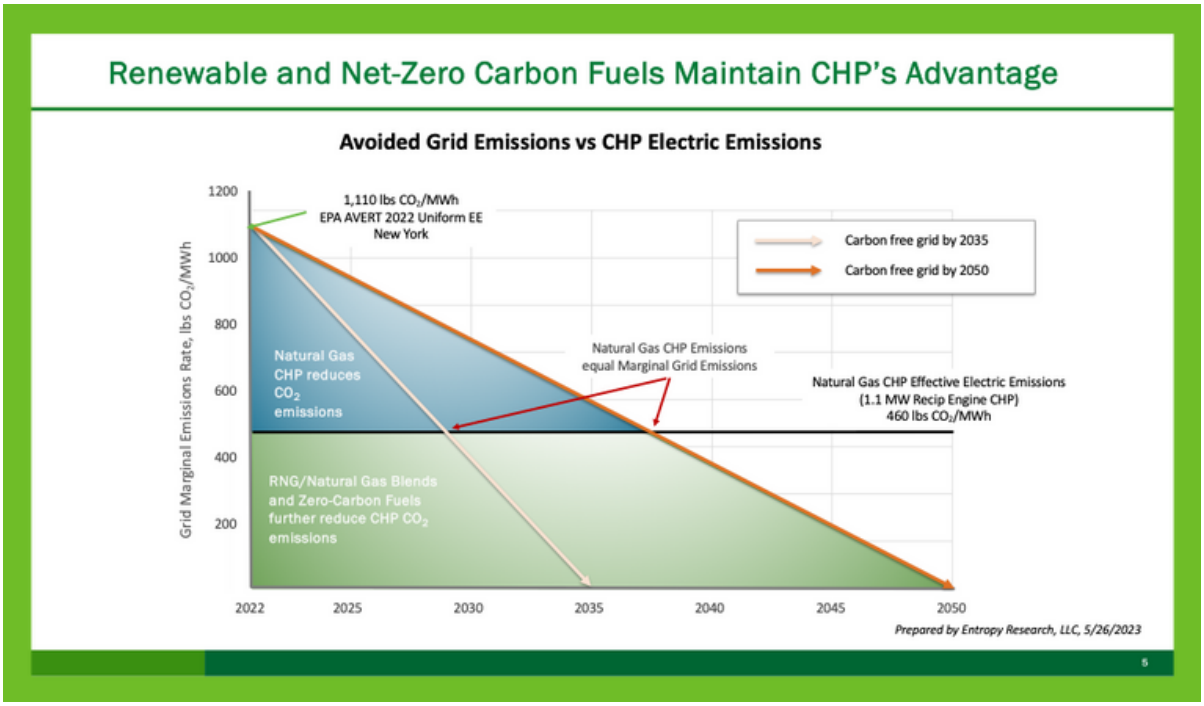
We appreciate your consideration of our responses to your posed questions and our subsequent recommendations for future discussion.

SOCIETAL BENEFITS OF CHP TECHNOLOGY

CHP provides many societal benefits, including emissions reductions which may be accounted for within the context of LL97. At present, LL97 applies a fixed carbon coefficient to natural gas, whether it is combusted in low efficiency boilers or high-efficiency CHP plants.

Societal benefits of CHP include:

- Reduced marginal grid emissions, including carbon and other pollutants, both today and into the near future as shown in graph below.



Source: U.S. Department of Energy, Presentation prepared by Dr. Bruce Hedman, Entropy Research LLC. May 26, 2023.

- Reliable grid support during peak load days thus obviating the need to build out additional generation and transmission assets to address peak loads.
- Resiliency for critical facilities and infrastructure support during grid outages. CHP plants can operate indefinitely during an outage (assuming fuel supply).
- Cost savings and energy budget control, especially for low income, and not-for-profit entities.
- Highest efficient use of premium LCF's, once available.

As the NY DOB contemplates how best to incorporate CHP within the LL97 rules, we ask that it consider the societal benefits outlined above. There are multiple ways to account for CHP benefits, such as providing a lower carbon coefficient for fuel entering a CHP plant. This coefficient can be scaled up as the grid becomes decarbonized. Most CHP plants in New York have separate fuel lines and/or meters which measure fuel input to the system. The City may also provide a credit to a CHP plant that is operated at peak grid load, when the grid is at its highest carbon intensity as marginal resources (gas, oil, coal) are brought in to serve the load.