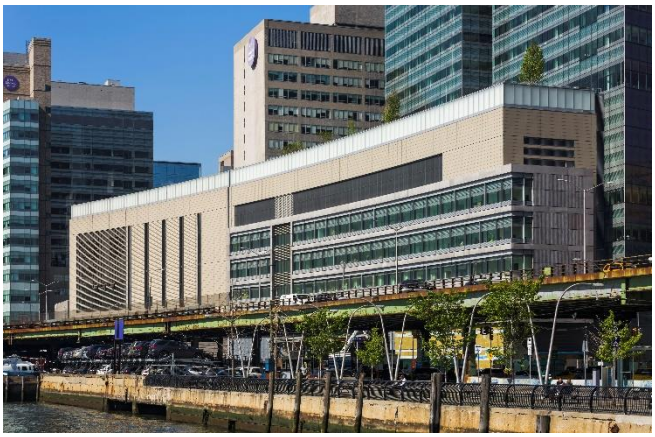
NYU Langone Health
Energy Building:
Delivering Reliable, Resilient, Economical and Clean Heat and Power

In the face of the continued pandemic, the New York-New Jersey DOE CHP TAP recognizes that the resilience and reliability of healthcare infrastructure is of vital importance, and enables the frontline nurses, doctors, specialists, and technicians providing care in our hospitals. Now, more than ever, we recognize the necessity of ensuring the uninterrupted operation of our healthcare campuses. Ensuring the reliability and resiliency of critical healthcare facilities is vital with the rising threat of climate-driven weather events in addition to a worldwide pandemic that places enormous strains on healthcare capacity.



NYU Langone Energy Building, © Jeff Goldberg / Esto

With the need for resiliency at the forefront, we showcase the NYU Langone Health (NYU Langone) Energy Building located on its main Manhattan campus. It is a state of the art six-story, 72,000 square foot building designed to meet NYU Langone's dual objectives of insuring a highly resilient and reliable power source, while simultaneously ensuring their leadership in sustainability. At the heart of the Energy Building is its 11 MW combined heat and power (CHP) system. A natural gas turbine (able to be run on liquid fuel as well for additional redundancy) produces 8 MW of electricity for the site. The waste heat from the turbine is captured by a heat recovery steam generator (HRSG), which drives a steam turbine generator that generates an additional 3 MW of electricity. The Energy Building then takes energy efficiency another step further, distributing the steam that passes through the turbine generator across the main campus to provide heat, hot water, sterilization, and humidification for the hospital. In a final step, the steam is condensed back into hot water and pumped into the HRSG to assist in creating more steam.

A hospital can never afford to lose power. The results of an extended power outage at a hospital can be catastrophic. Likewise, research centers must maintain a constant source of power, as a disturbance in power to the site can mean the irretrievable loss of critical stored research materials. For these reasons, the NYU Langone Energy system is supplemented by two back-up steam boilers that supply the campus when the gas turbine/HRSG/steam turbine system is shut down for maintenance. Similarly, the power supply to the campus has multiple redundancies that include a 7.5-megawatt diesel-fired emergency power plant at the Energy Building if the main system fails for any reason, plus an additional 18 MW of emergency generation spread across the rest of the campus buildings. There is also an intertie with the electric utility grid to serve power needs that can't be met onsite for any reason. For the utility service side, the design of every building is "double-contingency," which means that any two Energy Building feeders can fail and Con Edison will be able to supply 100% of the power needs as backup. The feeders are also fed from two separate substations, so if one is unable to supply power, the other substation can supply 100% of the load.

NYU Langone's CHP system is designed to meet about 60% of the campus' electricity needs and 100% of

its need for steam. The 11 MW CHP system delivers enough steam to heat approximately 1,650 homes and enough electricity to power about 7,400 homes.

The NYU Langone CHP Gas Turbine Enclosure, courtesy NYU Langone

NYU Langone's CHP system is a key component in meeting their aggressive sustainability goals. Across all of its properties, NYU Langone has committed to a 50% reduction in carbon emissions by 2025. The CHP system plays a central role in the hospital's portfolio of energy efficiency and smart energy technology that makes a major carbon reduction feasible. NYU Langone reports that operating the CHP plant has the same environmental impact as taking more than 4,600 cars off the road.

The combination of upgraded energy infrastructure, focus on sustainability and flood protection, and robust emergency management and preparedness planning helped NYU Langone's Manhattan campus become the world's first campus to achieve US Green Building Council (USBGC) PEER Platinum level certification in 2018. This certification recognizes power system efficiency, resiliency, and reliability.

As New York City implements policies to achieve its own laudable greenhouse gas emission goals, it is important that limits on building emissions or gas connections also recognize the benefits of an onsite CHP system like NYU Langone's. In addition to providing reliable and resilient electricity and thermal energy, the CHP system at NYU Langone is cleaner and more economical than purchasing electricity from the grid and supplying steam with onsite boilers. Even though it is fully driven by fossil fuels, a distributed generation asset like the CHP system, provides a substantial energy and carbon advantage over buying power from the grid and generating steam onsite with boilers. This is because it is displacing the dirtiest and least efficient fossil assets on the grid, which are not only far less nominally efficient at generating electricity and subject to transmission losses, but also do not capture any of the waste heat. To that end, the CHP provides 3 to 4 times as much useful energy per therm of natural gas burned as the generation assets that it displaces. The Energy Building saves NYU Langone Health on its total energy bills, provides a hedge against future volatility in energy prices, and affords a very high degree of reliability. At the same time, it achieves superior environmental performance by reducing carbon emissions and air pollution associated with grid produced electricity and steam from local fossil-fueled boilers.