SECURE AND AFFORDABLE ENERGY FOR ROCKAWAYS (SAER): Preliminary Draft Strategy

Dr. Marc A. Weiss, Chairman and CEO, Global Urban Development (GUD), and Santino Plazola, GUD Fellow

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Project Goal/Summary

Secure and Affordable Energy for Rockaways (SAER) is a plan to dramatically improve energy security and community resilience across the Rockaway Peninsula, one of New York City's most climate-vulnerable regions. This will be achieved through the installation of a new energy distribution system, called the EnergyNet. The EnergyNet establishes a new architecture of decentralized, adaptable, and fault-tolerant energy distribution that will alleviate many present resilience issues in the Rockaways. By installing the EnergyNet across the region, the SAER project reduces dependence on the fragile, centralized grid, enhances disaster response capability, and brings the energy infrastructure into the modern age. With the long-term vision of installing the EnergyNet across the entire Rockaway Peninsula, the SAER project begins with the Phase 1 area outlined in this document, located between Arverne and Edgemere, from Beach 28th Street to Beach 60th Street.

The Rockaway Peninsula is highly vulnerable to environmental damage, suffering repeated infrastructure damage in the past during major storms, flooding events, and coastal surges. In particular, the power distribution system, which enables critical functions for everyone through heating, lighting, etc. has repeatedly failed in the face of major storms. The traditional grid (Plain Old Grid System - POGS) is not designed to withstand storm-scale physical damage, or to operate around faults. During events like Superstorm Sandy, outages lasted weeks, and in some cases even months, withholding essential services, including heating, lighting, communications, refrigeration, and power for medical devices and community shelters.

POGS improvement efforts have been insufficient because they continue to rely on the centralized, unstable system with single points of failure. While New York City has made progress in deploying site-specific microgrids, these efforts are fragmentary, creating "energy islands" that help individual facilities, but do not provide coordinated resilience across a community or region.

EnergyNet systems installed in the SAER Phase 1 region will improve energy security by introducing a new grid architecture, on top of the POGS, that contains two foundational shifts in design:

1) Software-controlled smart microgrids that are electrically isolated and self-monitor;
2) A completely bidirectional network of energy distribution between smart microgrids.

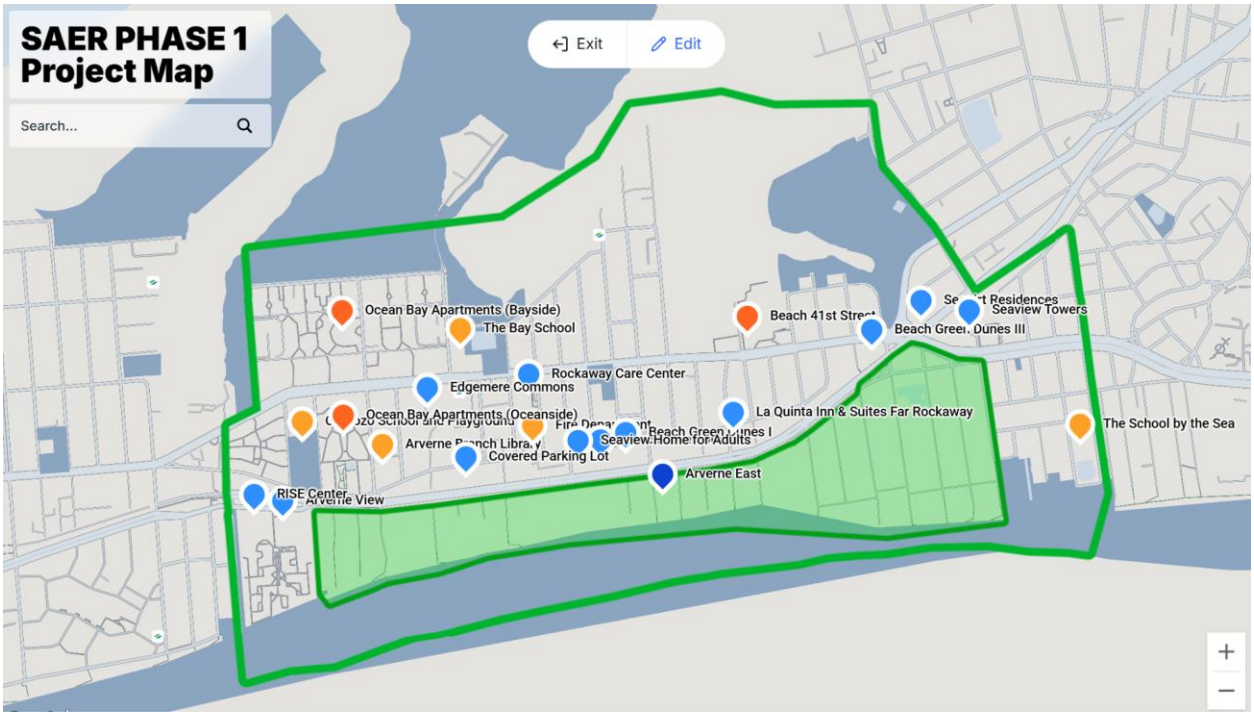
While microgrids alone have already proven valuable for community resilience in New York City and beyond, the combination of advanced smart microgrids plus a unifying, intelligent routing and communications layer results in a system with no single point of failure. Each element of the system, be it a smart microgrid or a distribution line, is individually isolated and can be routed around in the event of damage. There are many routes through the network, and with each smart microgrid producing and storing its own energy, there is always power to flow in the system even when some elements are damaged. The EnergyNet shifts the outlook of resilience and disaster management from creating isolated cases of power within region-wide power outages to isolated cases of power outages within a region-wide, well-powered network.

In a disaster, some power is better than none, and the EnergyNet ensures that communities retain access to critical energy even when the POGS is compromised. Power can be redirected around outages, distributed to where it is needed most, and supplemented from neighboring nodes in the EnergyNet smart microgrid network.

The installation of an EnergyNet system as outlined in this proposal is expected to have the following impacts:

- More reliable energy supply during storms, outages, or grid disruptions.
- Enhanced support for critical services, including schools, fire departments, food distribution hubs, and residential buildings.
- A flexible platform for future clean-energy adoption, including EV charging, community solar, and storage coordination.

SAER Phase 1



The SAER Phase 1 area extends from Beach 28th Street to Beach 60th Street in the Rockaway Peninsula. It involves the following 20 projects between Arverne and Edgemere:

1. Arverne East
2. Edgemere Commons
3. Covered Parking Lot at 50-01 Rockaway Beach Blvd.
4. Rockaway Care Center
5. Arverne View
6. La Quinta Inn & Suites Far Rockaway
7. Seaview Home for Adults
8. Seaview Towers
9. Seagirt Residences
10. Beach Green Dunes I
11. Beach Green Dunes II
12. Beach Green Dunes III
13. NYCHA Beach 41st Street
14. NYCHA Ocean Bay Apartments (Bayside)
15. NYCHA Ocean Bay Apartments (Oceanside)
16. The School by the Sea - P.S./M.S. 43Q
17. FDNY EMS Station 47
18. Arverne Branch Library
19. Cardozo School and Playground
20. P.S. 105 The Bay School

These projects together contain over 8,000 residential apartments, plus critical non-residential facilities, like schools and a fire department. They are selected to incorporate the densest cluster of critical facilities, large residential developments, and projects with existing local generation and storage assets to efficiently make a significant impact. The benefit of this clustering for Phase 1 is that, by covering a smaller area, less new cable installation is required to connect the systems, improving efficiency and lowering potential costs. The SAER Phase 1 area, beyond just the 20 proposed buildings, covers a total population of 20,000 residents that will benefit from the strengthened infrastructure and improved disaster response enabled by an EnergyNet system.

Issues with the Existing Grid

The POGS is fundamentally the same energy distribution system that it was when originally created in the late 1800s, with two major issues. It is a centralized system that routes power in one direction: from a few large power plants to consumers; the loss of one of these power plants, or any damage to the wires delivering power, causes huge negative impacts to the system. POGS also relies on analog controls and real-time balancing, resulting in an unstable system that must be carefully balanced and finely tuned or else the entire system shuts down, as in the April 2025 “Iberian Blackout” when millions of people in Spain, Portugal, and southern France suddenly lost power due to a cascading failure that caused the entire grid to shut down.

What is the EnergyNet?

The EnergyNet is an **energy distribution system** using a **network of smart microgrids** created in Sweden**.** The size of these smart microgrids can vary, though typically they cover an individual building. Each smart microgrid is capable of independent operations with all of the standard benefits of traditional microgrids, though in addition, they also interface with other smart microgrids in the EnergyNet network, enabling coordinated energy sharing and distribution. This is done *on top of* the POGS, meaning there is no need to replace any existing grid infrastructure.

An EnergyNet smart microgrid is characterized by a piece of hardware called an Energy Router, and by a software management layer. This takes the smart microgrid from the traditional model into something that can connect to, and coordinate with, a larger network. The Energy Router is the “hub” device where all internal and external connections are made physically in the smart microgrid. It is modular and supports “plug-and-play” generation, storage, and distribution. The Energy Router monitors, coordinates, and manages connections through its management software. This software is built on the Energy Protocol (EP), a set of rules that handle energy transfer through the network, including coordination, addressing, and routing; it functions analogously to the Internet Protocol (IP). All of these elements combine to enable a smart microgrid that is completely monitored and managed by software to effectively coordinate with any other system running on the EP.

The only real way to cease the functions of the EnergyNet is to take out each and every individual node, in other words, there is no single point of failure in this network.

How EnergyNet Enables the Goal

In the SAER Phase 1 project area, an EnergyNet system will improve energy security through:

Local Power Independence:
If the POGS is blacked out and cannot provide power, systems connected with EnergyNet can still operate on power generated locally. Any facility connected to the SAER network will gain shared access to solar power, battery storage, and any other local renewable generation or storage assets connected to the network. Within SAER Phase 1, the following sites already have existing or in-development generation/storage assets:

- Arverne East,
- Arverne View,
- Beach Green Dunes I, II, & III,
- Edgemere Commons,
- Ocean Bay Apartments (Bayside),
- Ocean Bay Apartments (Oceanside).

Upon completion, each site included in Phase 1 will have local generation and storage, so energy production and sharing can continue in the case of a blackout in the POGS system. Local storage assets also provide buffering -- in the case of solar generation providing less or no power during a storm, power will still be provided from battery storage for an extended period of time. Every individual near the Phase 1 zone will benefit from this energy independence, enabling powered critical facilities to serve as community resilience hubs for everyone during extreme weather events.

Enhanced Disaster Response:

During all times, the software management layer automatically coordinates energy sharing and power utilization, so the system can adjust operations during crisis events. This includes prioritizing power distribution to critical facilities, in particular the Rockaway Care Center, Fire Department, and residential buildings.

Other specific system elements improve disaster response, such as:

- High-placement installations: Equipment will be located above expected flood levels, ensuring continued operation. Intentional cabling and Energy Router placement ensures that the management system can continue operating during harsh storms.
- Active safety monitoring: Continuous insulation monitoring and fusing ensure safety, even with DC (Direct Current) power systems, like the EnergyNet. This can reduce risk of short-circuit house fires, which have caused major damage in previous storms in the Rockaways.
- Modular floor wiring: With the Energy Router's software management and monitoring, floors not impacted by flooding can continue receiving power. If floors are not already modularly wired, this can be incorporated into the EnergyNet installation process.
- Rapid emergency connectivity: Temporary generators or inter-building cables can be plugged in quickly due to modular ports. This allows extra generation to connect and supply power to the system, or damaged connection lines to be replaced quickly in time-sensitive moments.
- Network-level rerouting: Since the EnergyNet is designed as a smart network, healthy parts of the network automatically bypass compromised system elements in the case of flood damage, fire, or damage from debris. Because of the multiple routes for power flow, it is very difficult, by design, to have a full system shutdown.

Modernization of Infrastructure:

The installation of an EnergyNet system in the Rockaways establishes a foundation of modern infrastructure that can be harnessed for further innovation.

The EnergyNet does not struggle to accept new local generation resources; it is built for them. Because of this, solar photovoltaic (PV) systems are the most cost-effective form of local energy generation in an EnergyNet system. Future adoption of clean, renewable power sources in the Rockaway Peninsula, whether solar, wind, water, geothermal, or biomass, is made much more feasible by the presence of an EnergyNet system.

Additionally, the software controls and power electronics inherent in the system allow an EnergyNet grid to be easily compatible with adoption of future technologies. For example, electric vehicle charging stations are easy to integrate with the EnergyNet, solving a major roadblock for the adoption of EVs. EnergyNet even makes it possible for fully charged batteries in electric vehicles to be used as backup power for buildings, providing cost-effective additional resources for both for buildings and for other community energy storage needs. An infrastructure investment for the Rockaways also strengthens the foundation for cheaper and faster infrastructure upgrades in the future.

Proposed Installation Details

Implementation Step 1

The highest priority site to implement an EnergyNet system is Arverne East. Arverne East is a 116-acre, multi-faceted development focused on resilience and community. Including a 35-acre nature preserve, 1,650 apartments, a hotel, and approximately 200,000 square feet of commercial space, it is a large-scale project poised to take full advantage of the EnergyNet. Since all of these properties exist within the same development, smart microgrid systems for each building can be interconnected without the issue of permission from the utility grid owner. In addition, Arverne East already has a microgrid and solar panel system at its Coastal Conservation Center, and is planning for solar installations for each of its buildings. Arverne East is uniquely suited to efficiently integrate an EnergyNet system because of the scale and presence of local renewable energy generation assets.

Within Arverne East, the existing microgrid system at the Coastal Conservation Center will be connected to an Energy Router, allowing smart management and EnergyNet compatibility. This will make efficient use of the solar generation at the Center and enable timely distribution of this power throughout the entire network.

Each building within the development sites at Arverne East will be outfitted with a smart microgrid system, Energy Router, and battery storage. Eventually multiple buildings on the Arverne East property can be served by a single smart microgrid system, which can be determined by specific considerations at a later stage of planning. At least one of the Energy Routers in the Arverne East development will connect to the POGS grid in order to enable potential power exchanges with EnergyNet.

Once completed, Arverne East will serve as the large, stable pilot site from which the EnergyNet will expand outward throughout the SAER project.

Implementation Step 2

To extend the benefits of a resilient energy network throughout the region, we have identified key projects viable for connecting to the SAER Phase 1 EnergyNet. Each of the 20 developments within the project will be outfitted with a smart microgrid system, including an Energy Router, local renewable energy generation resources, and energy storage. Generation resources will typically be in the form of rooftop solar photovoltaic systems, as this is often the cheapest and most efficient option. Energy Routers will be commercially available for purchase for installation at each project, and could even be locally manufactured. Through these Energy Routers, each of the developments will be connected to at least two other neighboring sites (within the 20 sites of Phase 1). At least one of the Energy Routers at each site will be connected to the POGS grid, enabling energy sharing with LIPA for an extra layer of power flexibility.

Parking lots present unique opportunities for integration with electric vehicle charging. In addition to solar PV installation, EnergyNet systems enable EV charging stations to function much more efficiently than does the POGS, so SAER Phase 1 will be a good opportunity to integrate EV charging into EnergyNet and expand overall benefits for the community.

This preliminary draft strategy capitalizes on the full potential of the Arverne East EnergyNet plan. Efficient sharing and storage of local energy between critical infrastructure, such as schools, fire departments, and housing complexes greatly improves the overall strength of the system, providing energy security for the SAER Phase 1 area.

Legal Challenge of Installing New Infrastructure

One major challenge for installing an EnergyNet system in New York is the legal issue of installing new cable connections between projects to form the EnergyNet distribution infrastructure, separate from the existing POGS utility lines.

In the United States, to build new non-utility power connections across properties, permission from the utility owner is needed. Since the Rockaway Peninsula is served by the Long Island Power Authority (LIPA), a publicly owned utility, SAER is uniquely positioned to make a case for LIPA's permission.

The strongest case for non-utility distribution cable installations in the Rockaway Peninsula is through government-owned, neutral infrastructure. With the collaboration of the New York Power Authority (NYPA), LIPA, and each of the project developers within SAER Phase 1, SAER can be developed as a green public infrastructure project.

Under the Build Public Renewables Act, passed in 2023, NYPA can now use funds to plan, finance, build, own, and operate large-scale renewable energy projects. NYPA, the state power authority, can build the SAER project as a part of its public renewables portfolio, using revenue

bonds to assist with funding. According to guidelines established in NYPA's Renewables Strategic Plan, SAER is a perfect fit for its involvement; it is a multi-phase, large-scale public infrastructure plan involving renewable energy generation, and it is easy to repeat or expand. NYPA requires majority ownership of generation and storage assets within the project, so as owners, they can charge fees for usage of storage or generation assets. This fee will be the revenue source for repayment of the revenue bonds.

Each project developer, in collaboration with NYPA, may partially own the generation assets, and will pay NYPA a fee to use power supplied by those assets through the EnergyNet system. Since this avoids long distance utility distribution charges, it is a more affordable power cost, compared to buying electricity from the POGS.

This structure establishes NYPA as the majority owner of the project, and if developed as a public infrastructure initiative, there is significant incentive for LIPA to actively collaborate. The SAER project addresses specific issues that LIPA has been challenged with in the past, particularly disaster response, and it also frees existing capacity for LIPA to maintain a healthy, stable AC grid and saves LIPA money by avoiding reliance on costly "peaker" power plants.

If there is sufficient Swedish private sector involvement in the SAER project (from ViaEuropa, ABB, Skanska, and other possible companies), then the NYPA revenue bonds potentially can obtain sovereign "full faith and credit" guarantees from the Swedish Government's Export Credit Agency (EKN), or NYPA could receive direct financing from Sweden's Export Credit Corporation (SEK). Either way, collaboration with Sweden could significantly reduce NYPA's interest expenses and long-term financing costs, making the SAER project even more affordable and cost-effective.

Another potential public financing source is the New York City Economic Development Corporation. NYCEDC can help fund key elements of the necessary EnergyNet infrastructure and installation, including supporting closely related local economic, business, workforce, and community development initiatives to enhance the overall neighborhood benefits of SAER, in addition to enabling more secure and affordable energy for everyone in the Rockaways.