TECHNICAL ASSISTANCE PANEL REPORT

Energy Resilience for Hunts Point

BRONX, NEW YORK

SPONSORED BY:

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March 28-29, 2019

Urban Land New York Institute

Technical Assistance Panels

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Cover: Creative branding for one of the businesses operating in the Hunts Point Food Distribution Center. Source: ULI New York.

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Acknowledgments

ULI New York and the ULI Urban Resilience program are grateful to the New York City Economic Development Corporation for inviting this Panel to study and make recommendations for alternative energy and resilience solutions in Hunts Point. This Technical Assistance Panel would not have been successful without the help and support of the Asset Management team at the New York City Economic Development Corporation, specifically Matthew Kwatinetz, Executive Vice President for Asset Management, Louise Yeung, Energy Portfolio Manager, and Robert McFadden, Senior Associate. ULI New York would also like to thank BXL Business Incubator for hosting the stakeholder interviews and panel working sessions in its space.

The Hunts Point Technical Assistance Panel — and this report, which springs from it — were made possible through generous funding from the New York Community Trust (NYCT). The Urban Land Institute's New York District Council, the Urban Land Institute's Urban Resilience program and the New York City Economic Development Corporation are grateful for the support and the opportunity to explore this topic.

Executive Summary

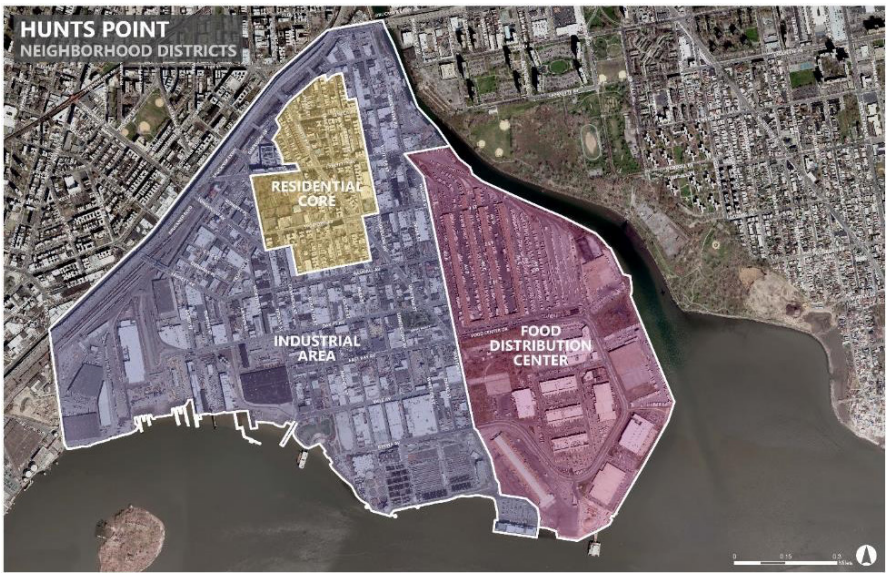
Nearly one-half of the food that feeds New York City hinges on the viability and reliability of the Food Distribution Center (FDC), a network of distribution businesses located on the Hunts Point Peninsula in the Bronx. Bordered by the Bronx River to the north and east and the East River to the south, Hunts Point is characterized by a large industrial area covering the western half of the peninsula, a compact neighborhood core of approximately 13,000 residents, and the FDC in the eastern section of the peninsula.

Following Hurricane Sandy in 2012 and in light of the recommendations of the U.S. Housing and Urban Development Rebuild by Design (RbD) study that followed, the New York City Economic Development Corporation (NYCEDC), which oversees leaseholds and capital improvements to the FDC, identified a pressing need to insure that energy production and food distribution for Hunts Point is sustainable and resilient in the face of future severe weather events and rising sea levels.

To support this goal of a resilient and sustainable energy source for Hunts Point, NYCEDC turned to ULI New York and its Technical Assistance Panels (TAPs) program to explore the viability and benefits of developing hydropower at Hunts Point in order to:

- Achieve net zero energy for the FDC;
- Reduce emissions on the peninsula;
- Contribute to Hunts Point's resilience in the face of future extreme weather events; and
- Potentially generate revenue for NYCEDC (as an energy provider) and support the availability of affordable real estate in the FDC.

These goals align with NYCEDC's approach to prioritize both economic and social improvements in its ongoing real estate and Smart Energy Campus development projects in the Hunts Point neighborhood.



Aerial view of the Hunts Point area, noting the three primary neighborhood districts. Source: NYCEDC.

What was the high-level finding regarding energy generation for the FDC? The Panel's recommendation is that hydropower is not yet commercially viable for Hunts Point, but there are other promising renewable energy opportunities that NYCEDC could pursue to achieve its goals and further climate resilience, green infrastructure, and high quality of life in the neighborhood.

Given the scope of the FDC network, the Panel reframed its understanding of Hunts Point and its role in the regional economy. In exploring the energy needs of the FDC, the Panel quickly learned that the cooling needs of the businesses operating there represent nearly 80% of the total energy demand of the FDC. The FDC is the City's refrigerator, keeping its meat, fish, and produce cool as it is received from around the world and distributed throughout New York City. Therefore, in addition to the initial questions posed to the Panel by the NYCEDC (see Background & Scope, page 7), the Panel considered a resilient energy solution *and* solutions that would assist in addressing the particular cooling demands of the FDC. A key question became:

> *What is the most efficient, sustainable, and resilient way to meet the cooling demands of the FDC while meeting NYCEDC's goals for this critical public facility (resilient energy supply, additional energy production, and promotion of regional food security)?*

In addition to the expertise represented by the Panelists, the Panel leveraged a variety of expertise, perspectives, and resources via a series of stakeholder interviews. Through this process and with additional limited study, the Panel confirmed that hydropower, the initial alternative energy source contemplated by NYCEDC, would not produce the energy needed to power Hunts Point in a manner that would provide a resilient energy solution nor would hydropower provide an additional revenue stream for NYCEDC. Should NYCEDC wish to explore hydropower further, however, the Panel identified the

hydro-technologies, sites, and additional external factors along the East River that may provide a 'best case scenario' pilot project. Through this analysis, the Panel also considered alternative energy solutions such as solar, anaerobic digestion, and geothermal energy production, ultimately determining that geothermal energy would provide NYCEDC with the greatest potential for effective and resilient alternative energy production at Hunts Point.

Geothermal energy has the potential to help mitigate the current demand on the Hunts Point energy network as well as provide additional energy to the peninsula. Advances in geothermal technology have created an energy solution with known and minimal risks, minimal systems maintenance, and minimal environmental impact. With respect to its installation at Hunts Point, the site characteristics align nicely with the requirements for geothermal technology and the energy produced by such an installation could provide NYCEDC and the FDC with a hedge against future increases in electricity rates by producing energy at a lower rate. A critical first step for NYCEDC in the pursuit of geothermal energy as a robust and resilient energy strategy for the FDC will be to conduct a feasibility study on geothermal at Hunts Point.

Ultimately, the Panel recommended a vision for a Balanced Energy Strategy at Hunts Point. This Balanced Energy Strategy includes an energy audit to identify potential reductions in energy consumption, expansion of solar installations, leveraging anaerobic digestion as an energy source and perhaps a more robust waste-reduction/recycling solution, and the introduction of geothermal power to Hunts Point. The Balanced Energy Strategy, shared broadly and publicly, could also assist in aligning residents and businesses around the shared benefits of improved energy infrastructure and green infrastructure in Hunts Point.

The Panel reviewing information gathered from stakeholder interviews. Source: ULI New York.

Background & Scope

The New York City Economic Development Corporation has been investing in improvements to the Food Distribution Center at Hunts Point in an effort to establish the FDC as a "modern and resilient hub for food distribution and manufacturing."[1]

In 2012, following Hurricane Sandy, the resilience of the energy network for the larger Hunts Point peninsula was brought into question, and NYCEDC, which oversees leaseholds and capital improvements to the FDC, began evaluating resilience strategies, specifically energy generation solutions, which may help reduce operating expenses today and protect this regional asset in the face of future climate and weather disasters.

Rebuild by Design (RbD), a design competition launched by the U.S. Department of Housing and Urban Development (HUD) for communities affected by Hurricane Sandy, created a foundation on which NYCEDC is beginning to address the energy and resilience needs for Hunts Point. A key initiative of RbD's Hunts Point Lifelines proposal is the establishment of a microgrid for Hunts Point, integrating cooling, heating, and power generation and rooftop solar installations.

While these energy improvements provide a foundation for Hunts Point, the energy demands of the peninsula, particularly the FDC, far outweigh the energy generated by the current solar arrays and place a significant demand on the Hunts Point microgrid. Knowing this, NYCEDC asked the TAP Panel to explore alternative energy production solutions, with a particular focus on hydropower.

The questions posed by NYCEDC to the TAP Panel are as follows:

Energy and real estate

- How can new hydropower generation catalyze new development and/or expansion of FDC existing businesses?

If not for the fact that the hurricane struck during low tide, many of the businesses on Hunts Point, including those in the Food Distribution Center, would have likely sustained considerable damage. Damage to this network, which provides 4.5 million pounds of food to the region, could prove catastrophic for New York City.

– TAP Briefing Documents

[1] Hunts Point TAP briefing materials.

Hydroelectric power is produced with moving water

Because the source of hydroelectric power is water, hydroelectric power plants are usually located on or near a water source. The volume of the water flow and the change in elevation (or fall) from one point to another determine the amount of available energy in moving water. Swiftly flowing water in a big river, such as the Columbia River that forms the border between Oregon and Washington, carries a great deal of energy in its flow. Water descending rapidly from a high point, such as Niagara Falls in New York, also has substantial energy in its flow.

(U.S. Energy Information Administration, eia.gov)

- What hydropower technology is best suited to meet the needs and conditions of the FDC?
- How can NYCEDC balance the priorities of creating a revenue stream to upgrade aging facilities in the FDC, improving resiliency and the environment, and providing affordable power to tenants?

Land use

- What are the conditions needed on land and water for hydropower, and what sites in Hunts Point within the FDC are best suited for hydropower?
- How can a hydropower project maximize community co-benefits while achieving the mission of NYCEDC's Asset Management Revenue (AMR) Division and the energy portfolio?

Implementation

- What is the timeline and total cost estimated to implement a hydropower project?
- What are the regulatory and permitting needs for such a project?
- What are the lessons that we can learn from the Roosevelt Island Tidal Energy project? Are there case studies of similar hydropower projects that provide best practices?

With expertise in the areas of engineering, resilience, infrastructure, energy consulting, and design, the TAP Panel set forth to answer these questions and deliver a set of recommendations to NYCEDC to help meet its energy, economic, and community goals for Hunts Point and the FDC.

Rebuild by Design – Hunts Point Lifelines

Background

Hunts Point Lifelines is an $800 million proposal submitted in 2014 to Rebuild by Design, a design competition launched by the U.S. Department of Housing and Urban Development (HUD) and philanthropic partners after Hurricane Sandy. The interdisciplinary team behind the proposal included PennDesign/OLIN, HR&A Advisors, eDesign Dynamics, Level Infrastructure, Barretto Bay Strategies, MacLaren Engineering Group, Philip Habib & Associates and Buro Happold.The full $800 million proposal developed for the design competition envisions a resilient, working waterfront supported by initiatives in four categories or "lifelines": Flood Protection "Levee Lab"; Livelihoods; Maritime Emergency Supply Lines; and Cleanways.

The energy project is partially funded by several sources at $71 million, including $45 million of funding from the federal Community Development Block Grant-Disaster Relief (CDBG-DR) program and $26 million in New York City capital funds. This funding will, among other initiatives, launch energy resilience projects in Hunts Point.

Part of the Cleanways lifeline, the Hunts Point energy resilience pilot projects are to "create low-cost, low-carbon cooling;" "a microgrid island;" "refocus the neighborhood around transit;" and "connect residents to the waterfront greenway." NYCEDC leads the implementation of a solar + storage solution in neighborhood schools and a tri-gen microgrid. Environmental permitting and final design for those pilot projects is underway through 2019 with groundbreaking in 2020 and project completion in 2022.

Framing the Investigation

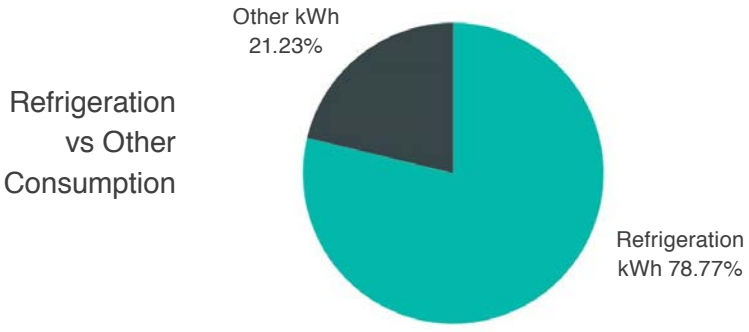
When addressing the questions posed to the TAP, the Panel first conducted a review of the current energy needs of the FDC. Through this investigation, the Panel estimated that 78.77% of the FDC's total energy demand is for cooling, with the remaining 21.23% devoted to other consumption. This cooling demand, nearly 80% of all energy consumed by the FDC, led the Panel to conceptualize the FDC as the City's refrigerator, keeping its meat, fish, and produce cool as it is received from points around the world and distributed to New York City's five boroughs and the larger region.

The Panel also discovered that many of the buildings throughout the FDC were built decades ago and are at the end of their useful life, which leads to day-to-day operational challenges and heightens the risk of business disruption. Buidling upgrades could lead to increased efficiencies of operation and reduced heating and cooling needs.

"The biggest issue with energy is scale."

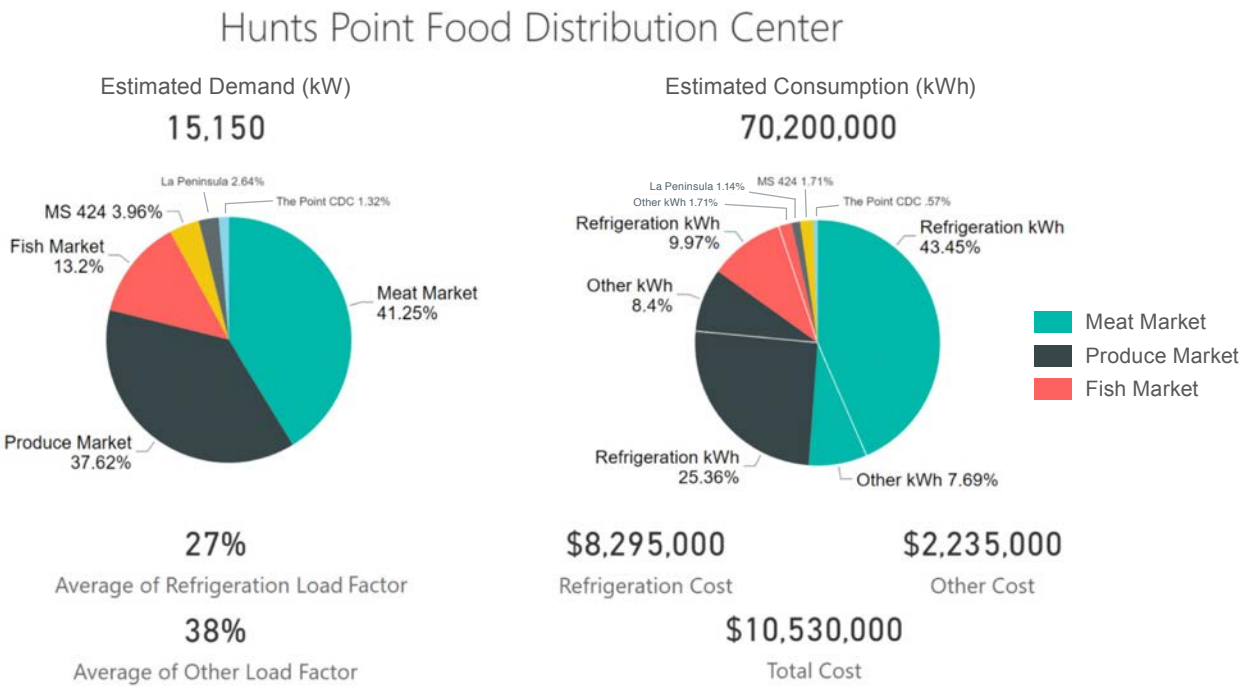
– TAP Panelist

Hunts Point Food Distribution Center



Analysis of energy consumption for refrigeration within the FDC. Source: TAP Panel.

With a clearer understanding of this unusual energy demand, the Panel interviewed a series of Hunts Point stakeholders to explore ways in which NYCEDC can pursue the most efficient, sustainable, and resilient path to meet the FDC's energy demand, while at the same time meeting NYCEDC's goals



Analysis of estimated energy demand and consumption within the FDC by total annual kilowatt and total annual kilowatt hour. Source: TAP Panel.

Hunts Point Community

In addition to the commercial enterprises operating in Hunts Point, the peninsula is also home to approximately 13,000 residents. These residents represent a diverse population, the majority are low-income, and all reside in a section of Hunts Point that is upland and safe from potential storm surge. The residents are not safe, however, from the noxious fumes expelled by transport trucking and the diesel engines running in the industrial area of Hunts Point. Youth asthma rates run high in Hunts Point.

– operational efficiency, resilient energy, and protection of the food distribution network – for this critical public facility.

Public Policy Stakeholders

The Panel interviewed representatives from the Mayor's Office of Resiliency and the Office of Sustainability to understand the City's public policy objectives. The stakeholders shared with the Panel a series of goals, strategies, and tactics for the Hunts Point area. This list included air quality improvements, resilience, emissions reductions (as noted in the publication "New York City's Roadmap to 80 x 50"), energy demand management, potential hydropower purchase from outside the region, wind power installation, expansion of solar installations, and energy storage.

NYCEDC

NYCEDC, as a quasi-public agency agency managing assets in the FDC, has goals that align with the public policy objectives identified above. Additionally, NYCEDC's goals also include key factors such as: cost savings relating to energy consumption; possible revenue generation from alternative energy sources in order to address needed capital improvements; providing recognizable benefits to the community and Hunts Point residents specifically; lowering costs and complexity of current maintenance and operations relating to NYCEDC's FDC asset portfolio; reducing waste; and preserving and growing food-related businesses.

NYCEDC also seeks to promote modern/affordable real estate options, achieve certain environmental justice goals, and create a potential new revenue stream

by positioning NYCEDC as an energy provider, providing services at the same rate or potentially at lower rates than being paid currently by FDC tenants.

FDC Stakeholders

The FDC stakeholders, comprised of the Hunts Point Cooperative Market (the Meat Market), the New Fulton Fish Market (the Fish Market), and the Hunts Point Produce Market (the Produce Market), shared a series of operational goals including:

- Access to predictable and low energy rates – summer rates can peak at over $100,000/month for some FDC businesses;
- Control over the fine-tuning of cooling supplies – for many business owners, regulating a range of temperature controls within their space helps insure that a wide variety of produce remains fresh;
- Building energy savings that can be shared among operators within each market and NYCEDC; and
- A resilient energy source that will serve their businesses in times of power outages, shortages, or natural disasters.

When addressing the possibility of hydro-energy, the FDC reported that they had already provided some feedback to EDC about the possibility of hydropower. In one instance, a stakeholder simply replied, "I thought we ruled that out." Panelists noted that these statements point to a need to improve communications with FDC business owners, making clear the potential benefits that improved energy efficiency and resilience may bring to all.

Community Stakeholders

Hunts Point is home to a number of community organizations focused on providing residents in and around the area with access to recreation and resources, promoting sustainable practices for the peninsula, and creating a community-focused voice in the development discussions and improvements in and around Hunts Point.

Many discussions centered around how to make Hunts Point a healthier environment, particularly given that the neighborhood has one of the highest asthma rates in the region. Common goals included: improving air quality; reducing emissions, particularly from the diesel trucks idling in the Produce Market 24 hours a day, 365 days a year; providing/protecting access to the water, specifically the Bronx River and East River; promoting a healthy environment and reducing impacts to natural habitats; encouraging good communication and public processes; and making visible the benefits to the community.

All of the stakeholders interviewed helped provide the Panel with a broader understanding of the challenges and opportunities for energy production, conservation, and infrastructure installation at Hunts Point.

The entrance to the New Fulton Fish Market at Hunts Point. Source: ULI New York.

Panelists touring one of the businesses operating in the FDC Meat Market. Source: ULI New York.

Rendering of envisioned improved pedestrian facilities in Hunts Point from the Rebuild by Design Hunts Point Lifelines proposal. Source: www.rebuildbydesign.org/data/files/677.pdf.

Hydropower Feasibility

The feasibility of hydropower at Hunts Point, the primary query of NYCEDC in this TAP, was determined by the Panel to be remote and not a viable energy solution in this environment. The Panel did, however, provide a 'best case scenario' for placement of a hydropower system, should NYCEDC wish to explore the option further and/or consider hydropower again at a future date should the techology advance to a stage at which it may be appropriate for installation in the East River. The following pages address the specific questions posed to the TAP Panel.

How can new hydropower generation catalyze new development and/or expansion of FDC existing businesses?

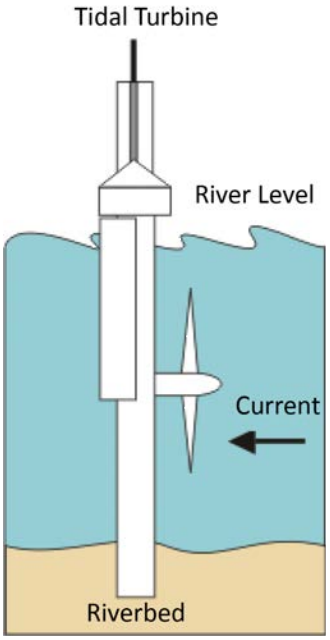


Diagram of a hydropower installation in a riverbed. Adapted from National Energy Education Development Project (public domain).

Based upon current available technology, the Panel did not believe that hydropower was a viable option for the type of energy production needed to catalyze new development or expand existing businesses within the FDC. At present, the technology is still considered experimental and there are no large capital installations that can be referenced as models for an installation at Hunts Point. Today, there are only three significant hydropower installations in the United States and none with site conditions that align, for effective modeling purposes, with Hunts Point.

In addition to the current nascent stage of the technology, the local environmental conditions around Hunts Point would not support a successful hydropower installation. The current velocity in both the Bronx and East rivers falls below optimal turbine minimums; current standard minimum for hydropower generation is 2.25 meters/second and the maximum diurnal at Hunts Point, at its highest, is 2.21 meters/second. Beyond natural river flow velocities, other hydropower options rely on gravity, wherein water is pumped into reservoirs at night when rates are low, and released during the day, creating flow and generating energy when "energy" rates are typically higher. To use this method, a head change would be required at Hunts Point, and damming the Bronx River is not a viable option. Adding to the complications with hydropower are the challenging and potentially dangerous underwater working conditions in the East River and the limited number of companies that

specialize in the technology; this leaves hydropower as a high-risk proposition. Finally, there is the question of storm resilience, particularly in the East River, as the influx of debris, wave surge, and more during storm events could easily compromise or destroy a delicate system of hydropower turbines.

In addition to environmental and technological challenges of hydropower, the upfront costs of a hydropower system are likely prohibitive on a commercial scale at Hunts Point. Hydropower, at present, has a high cost/price point at roughly $0.40-0.60/kw hour (Source: stakeholder interviews, Ocean Renewable Power Company). The initial installation is also very capital intense and there is no demonstrated return with installations to-date. Hydropower installations are heavily reliant on public incentives. Once installation is complete, a high degree of ongoing maintenance is required to keep debris out of the turbines, to insure that the mechanisms are operating efficiently, and to guard against negative impacts of wear by the water. As one Panelist noted, “The Sea always wins.” Finally, and not insignificantly, hydropower installations require a high degree of permitting by New York State Department of Environmental Conservation (NYSDEC), U.S. Army Corps of Engineers (USACE), and more (see pages 15-16).

What hydropower technology is best suited to meet the needs and conditions of the FDC?

Although the Panel did not view hydropower as a viable option at Hunts Point, they did conduct a review of available hydropower installation options to determine the available hydro-technologies and sites should NYCEDC chose to pursue hydropower in the future. The Panel identified the following as potential opportunities for pilot projects:

1. As it relates to a tidal stream generation installation, two options could be considered: either at a port facility pier using integrated turbines (no examples exist); or in the riverbed, in an anchored system or in a water column using a floating system. An example of the latter may be found at Verdant Power’s Roosevelt Island Tidal Energy (RITE) project in the East Channel of the East River, New York City.

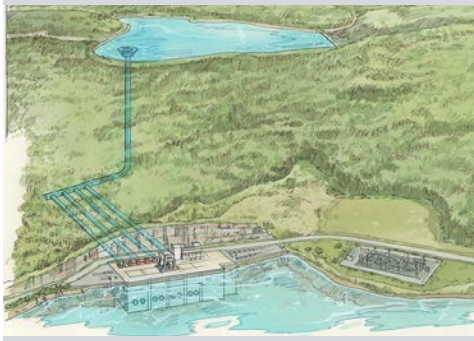
2. A pump storage installation option utilizes a vertical head pump to produce a barrage discharge. An example of this may be found at the Blenheim–Gilboa Hydroelectric Power Station in New York State.

3. Finally, run-of-the-river installations were considered but were quickly dismissed due to feasibility concerns and potential and perceived environmental impact: for an installation with access to the span of the Bronx River, traditional hydroelectric installation could be used (an example is the Augusta Canal installation in Augusta, Georgia); or employ a tidal barrage system, either at the mouth of the Bronx River, in the East

Augusta Canal, Augusta, Georgia. Source: AugustaCanal.com.

Rance Tidal Power Station, La Richardais, France. Source: European Route of Natural Heritage, erih.net.

Verdant Power’s Roosevelt Island Tidal Energy (RITE) project in the East Channel of the East River, New York City. Source: TETHYS.pnnl.gov.



Blenheim–Gilboa Hydroelectric Power Station in New York State. Source: New York Power Authority.

Hydroelectric Power Case Study

Stakeholder Interview with Ocean Renewable Power Company (ORPC)

TideGen Power System

Location: Eastport Maine (first in the western hemisphere)
Installation: $10MM Grant USDOE
Generation: 180 kw/unit
Production Cost: $0.215 per kWh produced
Tidal Range: 20 to 35 feet
Result: Installation was removed after one year following minor damage to component parts.

RivGen Power System

Low profile, advanced design cross-flow turbines designed to be deployed by locally available vessels, equipment, and contractors.

Location: Alaska (first installation)
Installation: $2 million + $900,000 contingency
Generation: 35kW to 50kW
Production Cost: $0.40 to $0.60 per mWh
Anticipated Life Cycle: 20 years
Of Note: NOT tested in river systems like NYC/ East River with currents of less than 5 meters/second

Hydro-technology is continually improving, yet even the professionals managing installations today believe that the true effective commercial application of this technology is still 10-15 years out.

(Top and Middle) ORPC's Patented turbine generator units (TGU(s)) mounted on the TideGen delivery system, ready for shipment and deployment. Images Source: Ocean Renewable Power Company.

ORPC's RivGen system which as recently been deployed in the remote Alaskan village of Igiugig. Source: Ocean Renewable Power Company.

Potential siting of various hydropower installation options at Hunts Point. Source: TAP Panel.

River, using a penstock system of divergence, including a weir, pipeline, etc., (a model comparison could be made to the Rance Tidal Power Station in La Richardais, France).

Which of the above list is best suited for the FDC?

A commercially-viable hydropower installation that could cost approximately $37 million to build does not make economic sense for NYCEDC at Hunts Point.

That said, if an existing capital improvement project were already in the planning stages – with permitting underway and construction costs already built-in – it might be a slightly more viable option to add a fixed-turbine generation system either as a pilot or project at-scale, potentially at a new barge port and integrated with a new port pier. Yet, the energy production will still be lacking as the current flows remain below the minimum standard. The system would, however, be in place and could be updated as the technology improves in the future.

Alternatively, if NYCEDC were willing to consider channelizing the waterflow and making velocity work in favor of energy generation, some power could be generated. This option would require diverting the flow of water at a penstock (floodgate), isolating a part of the Bronx River or East River flow, channeling it through pipelines or weirs, and increasing velocity to design requirements through the Venturi effect. This is a very expensive proposition and one that is fraught with potential challenges from community organizations who seek to promote and protect access to area waterways.

The Venturi Effect

The venturi effect creates a constriction within a pipe that varies the flow characteristics of a fluid (liquid or gas) travelling through the tube.

(Educators.net)

Panelists and NYCEDC professionals evaluate potential sites for hydropower. Source: ULI New York.

What is the timeline and total cost estimated to implement a hydropower project?

In a similarly-sized hydropower installation in Alaska, construction costs reached $80 million, the project took five years to finish, and, at full production capacity, generated only two megawatts of power. The energy demand for cooling alone at Hunts Point is 11.3 megawatts of power.

What are the regulatory and permitting needs for such a project?

Hydropower requires a long and meticulous permitting process typically taking three years to complete. An Environmental Impact Statement would be required as well as permits from the following agencies:

- New York State Department of Environmental Conservation (NYSDEC) – Article 15, Section 404
- U.S. Army Corps of Engineers (USACE) – Section 10, 401 Water Quality Certificate
- New York City Department of Small Business Services (NYCSBS) – Waterfront Permitting
- Department of State Coastal Zone Management Act permitting
- Federal Energy Regulatory Commission
- New York State Office of General Services (NYSOGS) – for any state-owned land under water
- Dredging – Beneficial Use Project (BUD) / Acceptable Use Determination (AUD)
- Interconnection Study with Con Edison
- New York City Department of Environmental Protection (NYCDEP) – relating to outfalls, discharge

What sites in Hunts Point within the FDC are best suited for hydropower?

Given the analysis of available technologies and the potential sites, the Panel conducted a brief SWOT analysis (Strengths, Weaknesses, Opportunities and Threats) of all sites identified. The Vernon C. Bain Center (VCBC; the "Prison Barge") stood out as a relatively interesting site for hydropower generation. The site already has great mooring conditions, a newer platform, and a deeper channel close to the shore. As NYCEDC contemplates future uses at that site, and once the Department of Corrections vacates the location, NYCEDC should consider building in a co-generation plant at that site.

Potential hydropower installation locations evaluated by the Panel. Source: TAP Panel.

Site	Strength	Weakness	Opportunity	Threat
Site A, 300 Food Center Drive	open space, higher current than other sites, potential port development	significant dredging required, capital pier investment, currents below minimum	combine with port facility – most bang for the buck	DEP box culvert/ CSO, permitting, port facility
Site B, DSNY Transfer Station	upland space, minimum dredging, prior structure footprint	high resiltation, currents below minimum, rocky bottom	combined facility with DSNY (transfer station future)	DSNY-owned, existing habitat
Site C, VCBC site (Prison Barge)	open space, higher current than other sides, potential port development	moderate dredging required, currents below minimum, close to navigation channel	mooring for co-gen barge, concurrent with tidal and wave	NYCDOC timeline and future plans
Site D	open space, unused, shoreline is unimproved (blank slate)	significant dredging required, capital pier investment, currents below minimum	minimal	future uses better fitting the FDC

Alternative Energy Solutions

Although Panelists eliminated large-scale hydropower as a viable option, the Panelists recommended pursuing an alternate strategy of energy conservation and geothermal energy to meet NYCEDC's energy resilience goals.

At the FDC, Panelists recognized that the energy challenge is one of cooling and refrigeration rather than additional energy creation. The energy demand for cooling stands at 11.3 MW; the energy demand for all other functions at the FDC is 3.8 MW. This out-sized ratio of 4 megawatts of cooling for every one megawatt of other energy is a primary energy challenge for Hunts Point and an opportunity to identify a more tailored energy solution by installing a renewable energy source designed to optimize cooling. To address this revised challenge, geothermal energy specifically may provide the right energy solution for Hunts Point, and NYCEDC is encouraged to explore the idea further as a way to mitigate the current energy demand and provide an additional energy resource for Hunts Point.

The advantages of using geothermal energy at Hunts Point are numerous:

- Geothermal technology combines heat and power and benefits from power and cooling because energy transformation occurs twice.

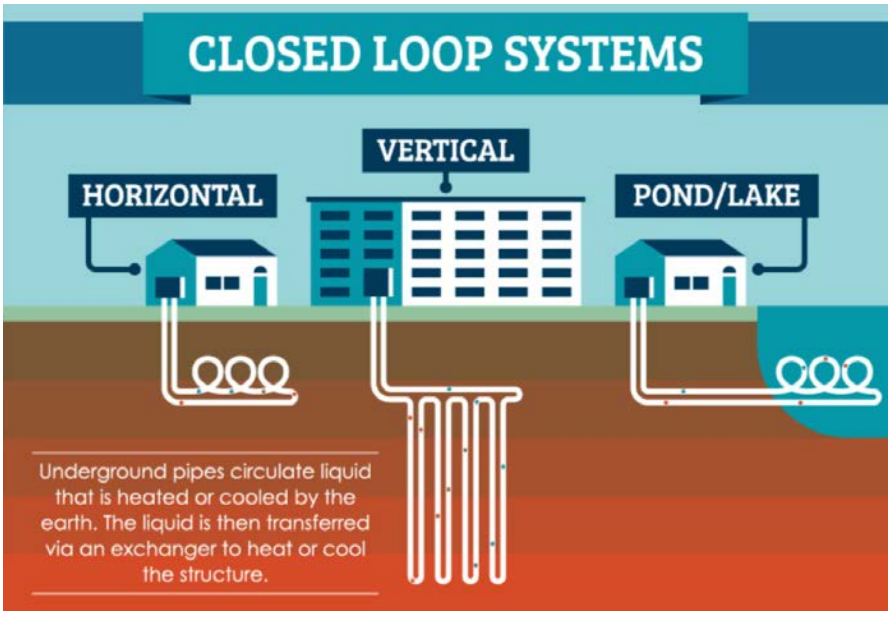


Diagram of a closed loop geothermal energy system. Source: greentumble.com/wp-content/uploads/2017/04/Closed.gif

- Geothermal technology aligns with site characteristics at Hunts Point (deep well opportunities on land under the FCD buildings and a proximate body of water with a channel maintaining a constant cool temperature).
- The risks surrounding geothermal installation and production are known and are minimal.
- Installations require minimal ongoing maintenance.
- Geothermal installations typically create minimal environmental impact and risk.

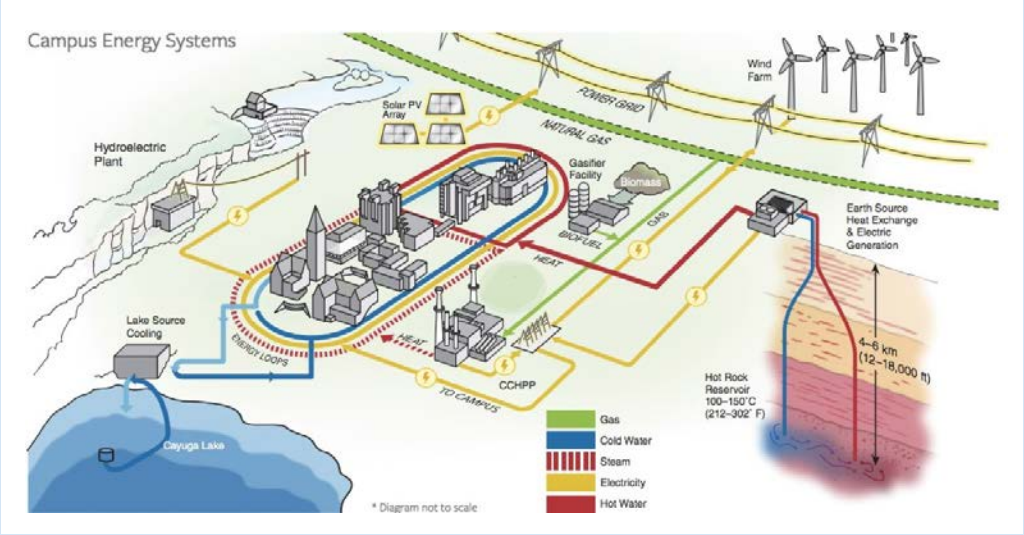
Geothermal Power Case Study

Cornell University – Cayuga Lake, Ithaca

At Cayuga Lake in Ithaca, New York, Cornell University has one of the best energy campuses known, with combined heating and power (CHP), solar, and an open loop lake-sourced cooling installation as key elements of their power generation portfolio. In this instance, Cornell is drawing very cool water from deep in the lake into their system to cool the large university campus.

Key Statistics

System Type:	Open Loop Lake Source Cooling (LSC)
Construction Cost:	$55–60 million
Cooling Capacity:	14,500 ton (51 MW) load
System Scope:	Pipe diameter of 1,600 mm (63”) 3,200 m (10,498 ft) long
Water Depth:	229 m (750 ft)
Water Temperatures:	Between 3-5 degrees Celsius (37-41 degrees Fahrenheit)
Estimated Savings:	80% estimated reduction in fossil fuel consumption



Source: https://earth-sourceheat.cornell.edu/cornells-commitment-to-sustainability/.

- Resilience features, such as submersible on-land pumps, can be easily incorporated into geothermal systems.
- Additional geothermal lines, branching off the primary feed under Food Center Drive, can be installed as additional buildings come online or as existing buildings are rennovated for increased energy efficiency.
- An effective geothermal installation can provide NYCEDC with a hedge against increases in future electricity prices in that a source of cost-efficient energy is readily available to offset purchases of electricity at higher rates.

A geothermal heat exchange system has three main components:

1. A heat pump unit acting in the cooling direction;
2. A heat exchange medium and delivery system (closed-loop piping), comprised of either: a ground loop, shallow or deep; or a water loop, either closed or open in either shallow or deep water; and
3. Building loops for local cooling.

In geothermal installations, one unit of energy going into the system returns three to five units of cooling coming back for use throughout the network.

Geothermal energy installations have a long product life and have been proven to be commercially viable and reliable at sites with significant cooling loads, such as data centers, across the United States.

Conditions at the eventual site of installation will dictate how the system is built. The Panel recommends NYCEDC undertake a through evaluation of the possibilities, but noted that the proximity to a body of water with a deep channel that maintains a steady temperature in the low 30's (Fahrenheit) may likely lead to a water installation (instead of one buried deep in the Earth).

A water coolant system, in this instance a river coolant system, will require the following assets situated on land close to the river:

- Coolant pump station;
- Direct burial pipelines for exchange media;
- Independent coolant loops for buildings;
- Backup power for pumps;
- Pumps for system flow; and
- Tank/Cistern for system maintenance.

The in-water requirements for a river coolant system are as follows:

- Temperatures lower than 50 degrees Fahrenheit;
- Depths greater than 45 feet;
- Keel clearance for water traffic; and
- The placement of a large-diameter high-density polyethylene (HDPE) pipe loop on the floor of the East River.

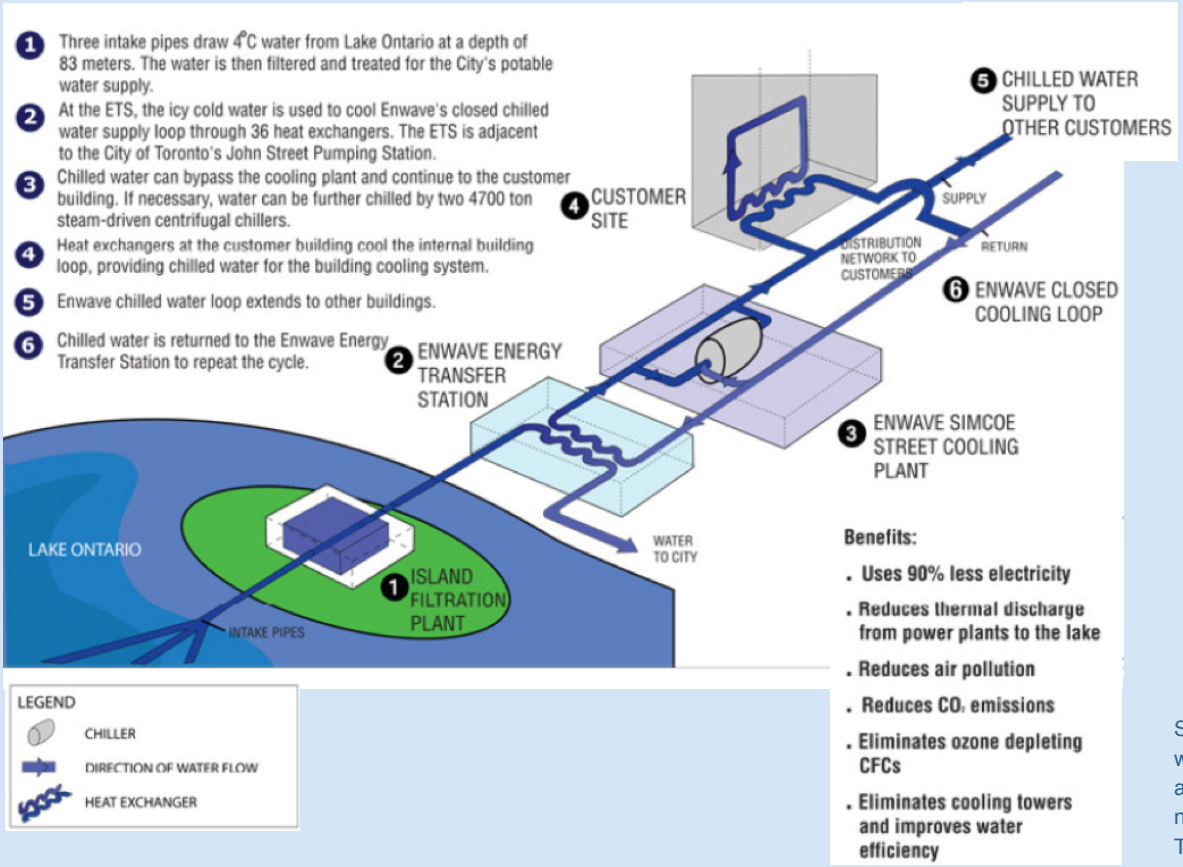
Geothermal Power Case Study

Enwave Energy Corporation – Toronto – Lake Ontario

Toronto has installed a long closed loop geothermal system, taking advantage of the cool waters deep in Lake Ontario to cool the city's financial district.

Key Statistics

System Type:	Closed loop system
Cooling Capacity:	59,000 tons (207 MW)
System Scope:	Pipe diameter of 1,600mm (63")
	15,000 m (49,213 ft) long
Water Depth:	85 m (278 ft)
Water Temperatures:	Between 3-5 degrees Celsius (37-41 degrees Fahrenheit) Water temperatures rise approximately 15 degrees from 39 degrees to 54 degrees.



Source: https://www1.nyc.gov/assets/globalpartners/downloads/pdf/Toronto_DLWC.pdf

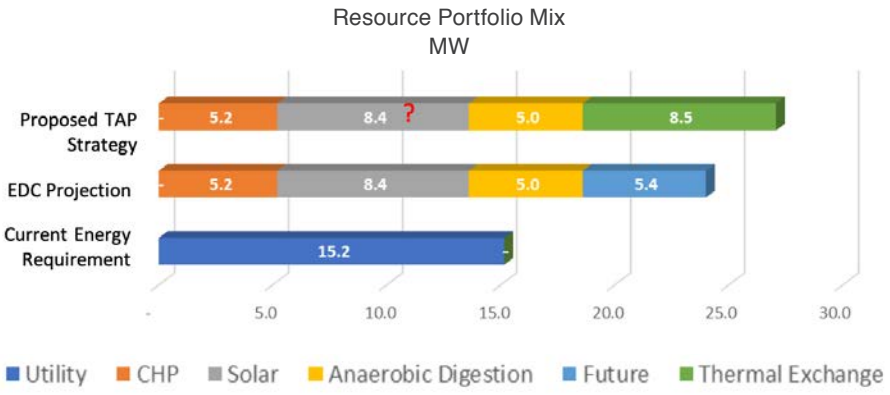
Preliminary Economic Analysis

The economic ramifications and impacts of any energy strategy are key considerations for NYCEDC.

Refrigeration demand in the FDC currently stands at 11.3 megawatts. NYCEDC studies project that demand to increase to approximately 24 megawatts. In a geothermal system, with one unit of energy going in and three to five units of energy produced, NYCEDC and the FDC would no longer need to tap the market to purchase more energy, likely resulting in a significant avoidance of future energy purchases. This provides NYCEDC with an opportunity to re-balance its energy portfolio based on potential production from each energy solution and prioritize the entire portfolio based on production cost.

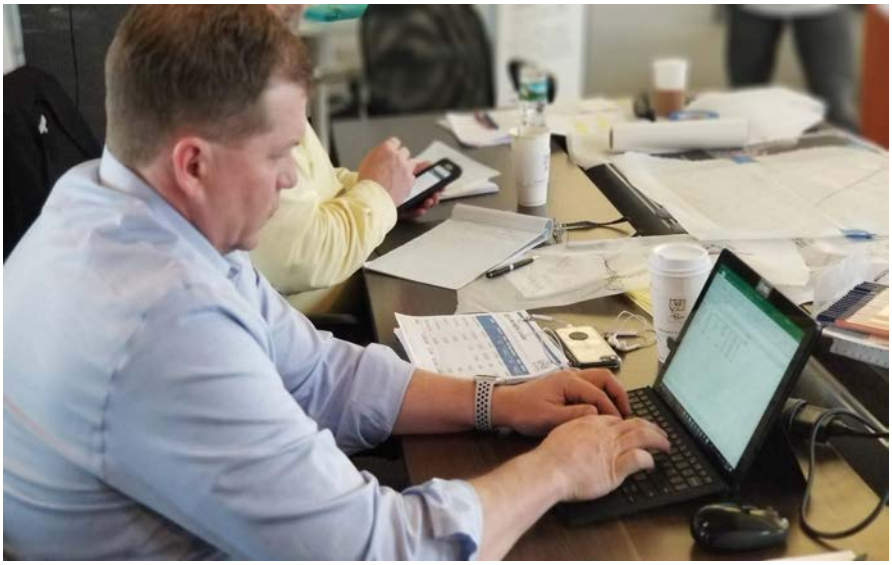
Initial analysis by the Panel of a system using geothermal energy at the FDC puts expected reductions in refrigeration requirements of 8,475 kW and 41,475,000 kWh. These are carbon-related energy purchases that are entirely avoided, resulting in a reduction of greenhouse gas emissions and a utility cost savings of $6.2 million per year.

Assuming an estimated construction cost of $55 million (equivalent of the cost of the Cornell University project), a geothermal installation has an annual estimated project cost of $4.1 million (at 6.25% over 30 years amortization,



Potential mix for an energy portfolio at Hunts Point. Source: TAP Panel.

not including operations and maintenance), providing a net cash-flow benefit of $2.1 million per year. While this does not include an entire life-cycle cost analysis, if energy costs continue to rise, this is a levelized cost. This system will also hedge any increase in electrical rates. Using geothermal, NYCEDC does not become an electricity provider but is instead an energy provider. The additional benefit to this type of energy production is that it lessens the carbon impact of Hunts Point energy consumption, thus accelerating the City's target to reduce greenhouse gas (GHG) emissions by at least 80 percent by 2050 (80 x 50[2]) to 60 percent by 2025. Ultimately, the remaining Hunts Point demand requirement reduces to 9,500 kW.



TAP Panel conducting an economic analysis of the energy scenarios under consideration. Source: ULI New York.

Ripple Effects Beyond Hunts Point

A significant reduction in energy demand could benefit the local utility

If the local utility needs to build up its infrastructure to meet future demand, absent the geothermal system, there may be an opportunity under New York's Reforming the Energy Vision (REV) initiative whereby the utility may seek "non-wires alternatives" (NWA) to infrastructure investment and pay the alternative energy solution (in this case geothermal) to avoid the infrastructure investment. This tends to be accomplished via long term power purchase agreements (PPA) and may be of interest in relation to work at Hunts Point.

Additionally, there are New York State Energy Research and Development Authority (NYSERDA) programs in place to provide incentives for "heat pumps." Exploring geothermal with NYSERDA may also present an opportunity for incentives to help defray the cost of a geothermal system.

[2] **New York City's Roadmap to 80 x 50.**

Balanced Energy Strategy

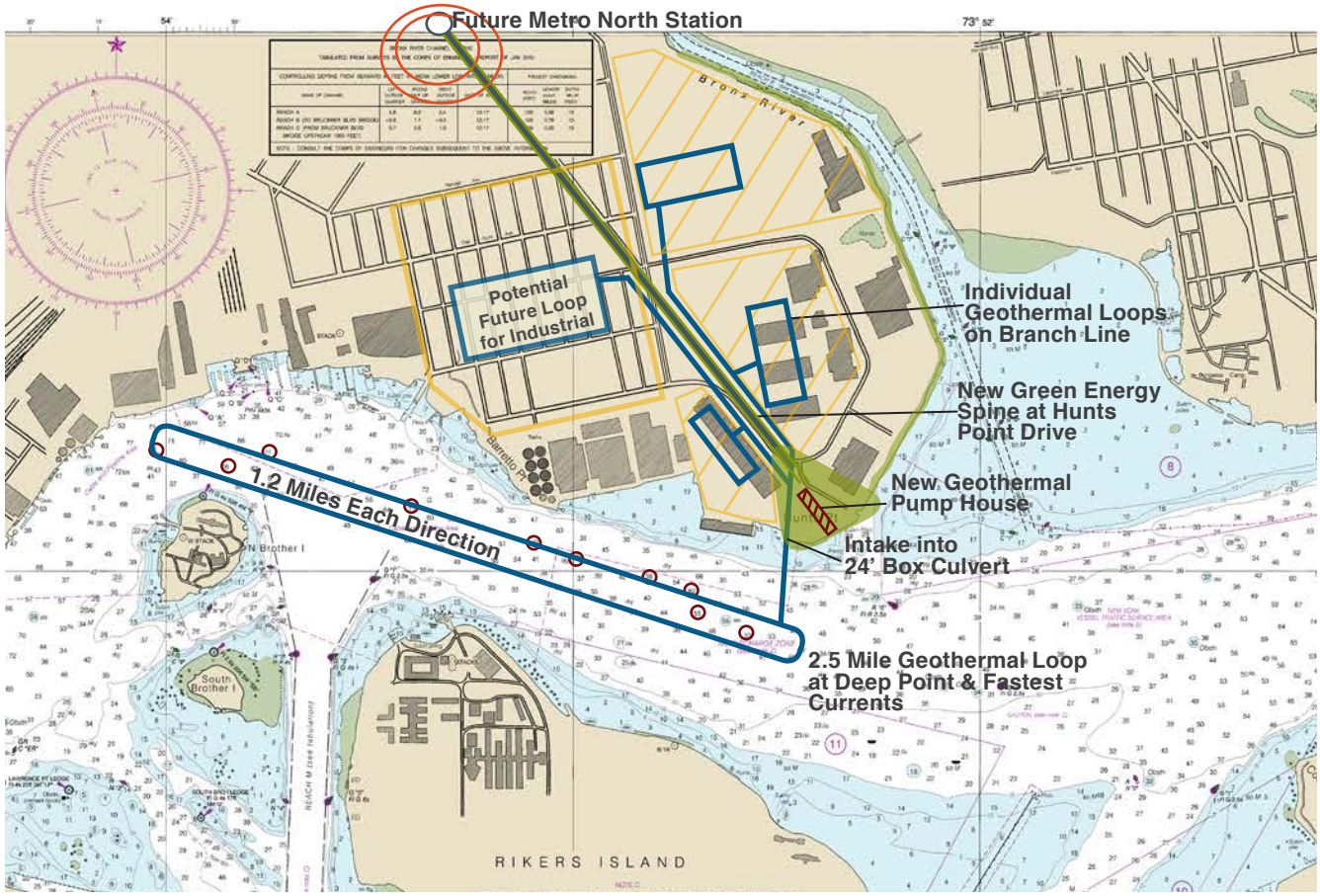
NYCEDC has the opportunity to create a Balanced Energy Strategy for the FDC campus that is based on sound economics, community input and communication, and a coordinated renewable energy strategy utilizing solar, anaerobic digestion, and geothermal for a steady, resilient, and renewable energy solution for Hunts Point. This energy strategy could ultimately provide many community benefits for the neighbors and businesses in Hunts Point, which are particularly critical given the current poor air and environmental quality.

A Balanced Energy Strategy, designed to decrease energy usage throughout the campus via increased energy efficiencies, includes:

- A geothermal strategy for Hunts Point leveraging its proximity to the water;
- A conservation capital plan that utilizes a phasing and staging strategy to replace the outdated buildings throughout the FDC;
- Highly-insulated façades;
- Smart building technology; and
- Green roofs.

This coordinated energy strategy proposes leveraging needed improvements to create a new design vision for Hunts Point and the FDC hinged along a spine of geothermal distribution along Hunts Point Avenue. Additional design and infrastructure considerations would include:

- Locating a pump station at the tip of the peninsula;
- Expanding Hunts Point Landing Park and creating a signature building to house the pump station;
- Utilizing the existing 24-foot underwater box culvert at Hunts Point Landing for a point of entry;
- Utilizing the depths of the East River channel for the HDPE pipe, resulting in over two miles of looped of pipe; and
- Laying the foundation of the geothermal delivery system down Hunts Point Avenue so it may serve as the tree from which energy can branch to serve the Meat Market, the Fish Market, the Produce Market, the residential core, and beyond.



Rendering of a geothermal closed loop water system for Hunts Point. Source: TAP Panel.

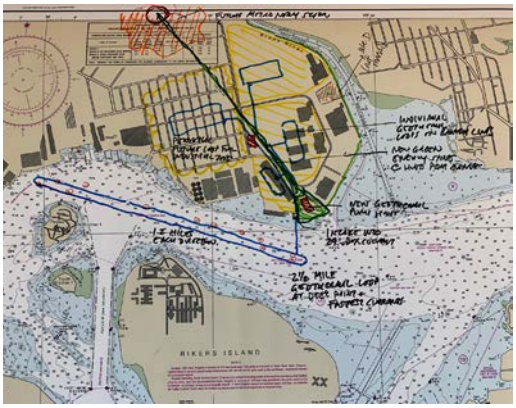
Potential connections to the surrounding community through a geothermal system could build on and support the future Hunts Point Metro North Station at the northern end of Hunts Point Avenue, tying into the long-term plans for transit-oriented development, improved quality of life, and further urbanization in Hunts Point.

The design and construction of a geothermal system would progress quicker than a hydropowered facility, given the significant reduction in required permitting. It is anticipated that the overall permitting period would be reduced from three years for hydropower to just two for geothermal power. The anticipated costs are reduced significantly as noted below:

- Hydropower: 2 MW construction, $80 million, 5 years to complete
- Geothermal: 11.3 MW construction, $55 million, 2 years to complete

Referring to the list of permitting required for hydroelectric power and eliminating those permits not required for a geothermal installation, the permitting process becomes much more manageable:

- ~~Environmental Impact Statement~~



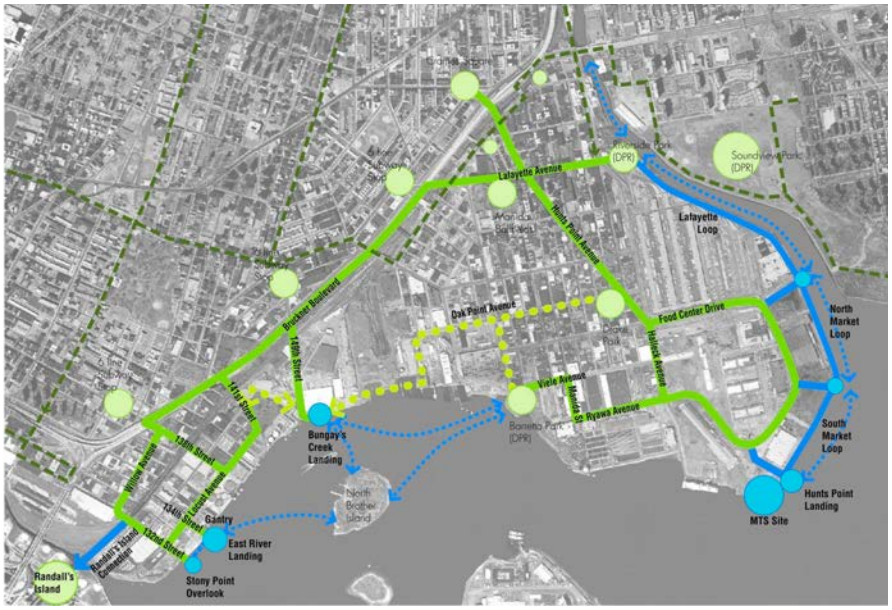
Original Panel sketch of a geothermal closed loop water system for Hunts Point. Source: TAP Panel.

- New York State Department of Environmental Conservation (NYSDEC) – Article 15, Section 404
- U.S. Army Corps of Engineers (USACE) – Section 10, 401 Water Quality Certificate
- ~~New York City Department of Small Business Services (NYCDSBS) – Waterfront Permitting~~
- Department of State Coastal Zone Management Act permitting
- ~~Federal Energy Regulatory Commission~~
- New York State Office of General Services (NYSOGS) – for any state-owned land under water
- ~~Dredging – Beneficial Use Project(BUD) / Acceptable Use Determination (AUD)~~
- ~~Interconnection Study with Con Edison~~
- ~~Department of Environmental Protection (DEP) – relating to outfalls, discharge~~

While permitting in New York City is never an easy process, the requirements for geothermal are significantly more manageable than other more complex renewable energy solutions.

Green Infrastructure

With the installation of geothermal energy infrastructure, there is an opportunity to leverage the existing South Bronx Greenway Master Plan and marry the blue (geothermal) infrastructure with existing and future green infrastructure. A more



Released in November 2006, the South Bronx Greenway Master Plan is one of the primary goals of a comprehensive planning process for the South Bronx that began with the **2005 Hunts Point Vision Plan.** Source: Mathews Nielsen Landscape Architects.

Geothermal Design Precedents and Case Study
Cornell University

Cornell University – Cayuga Lake, Ithaca

System Type: Lake Source Cooling
Energy Generation: 51 MW
This building is used as a teaching facility and educational opportunity for the university, educating the broader public about the benefits, uses, and generation of geothermal power at this site.

Aerial of the Cornell University lake source cooling facility. Source: https://energyandsustainability.fs.cornell. edu/util/cooling/production/lsc/default.cfm

Interior of the Cornell University lake source cooling facility. Source: https://energyandsustainability.fs.cornell. edu/util/cooling/production/lsc/default.cfm

Cornell Tech Campus, Roosevelt Island, Manhattan

System Type: Deep Geothermal Cooling
Well Depth: 400 feet deep

This campus and geothermal construction, located on Roosevelt Island, is a model upon which a potential installation at Hunts Point could be based.

Rendering of the Cornell Tech Campus. Source: https://tech.cornell.edu/

Original Panel sketch of the combination of current and proposed assets in Hunts Point. Source: TAP Panel.

Rendering of the intersection of Hunts Point existing assets with an enhanced greenway, a geothermal energy spine and connectors, and the proposed Metro North Station. Source: TAP Panel.

effective greenway link could be established, connecting Hunts Point's parks, public facilities, the emerging Grow NYC initiative, and Hunts Point Landing. A geothermal energy corridor along Hunts Point Avenue could provide opportunities for enhanced pedestrian links and perhaps a "Green (infrastructure) Boulevard" in addition to a greenway loop around Hunts Point. Finally, the geothermal infrastructure could provide valuable connections to the future Metro North train station and new urban, transit-oriented development.

A Balanced Energy Strategy provides a vision for the Hunts Point campus that connects the community to the process, allowing the community to visualize the benefits of geothermal energy production. Depending upon how NYCEDC chooses to allocate its resources, there is also an opportunity to share the realized benefits with Hunts Point businesses and the broader community. This plan is also built on the foundational combination of installing energy infrastructure with green infrastructure, thereby furthering the sustainability goals for the entire campus.

Geothermal Design Precedents and Case Study
SIMS Municipal Recycling Facility

SIMS Municipal Recycling Facility

The SIMS Municipal Recycling Facility is a highly-functional industrial facility and a NYCEDC success story. The building is used by SIMS as a teaching facility, an educational resource, a model of resilience, and a visitors' center. The building and the educational resources are open to the general public.

SIMS facility (above) and aerial of the facility (middle). Source: https://www.selldorf.com/projects/sunset-park-material-recovery-facility.

Information kiosks at SIMS facility. Source: https://earth911.com/inspire/getting-schooled-recycling/.

Conclusion

To address the energy needs of Hunts Point, and specifically the cooling needs of the FDC, the Panel is convinced that geothermal energy is a highly attractive and viable energy solution for Hunts Point. NYCEDC is encouraged to further explore the opportunities for geothermal energy by **first conducting a feasibility study on geothermal as a more robust and resilient energy strategy for the FDC.**

Through a feasibility study relating specifically to geothermal energy, key questions and considerations include:

- Evaluate the closed loop alternatives, a land or water system. While placing the potential system in the water provides the type of run likely needed to address the energy demands of the FDC, the regulatory requirements of a water-based system might be avoided by remaining on land and drilling deep with vertical wells.
- Confirm the current FDC campus energy requirements and confirm the Panel's financial assumptions.
- Coordinate the Balanced Energy Strategy with the Asset Management capital improvement plans for a staged and sequenced updating of outdated facility upgrades and replacements in the FDC.
- Integrate geothermal with the planned microgrid infrastructure, potential anaerobic digestion, and other renewable energy alternatives to create a Balanced Energy Strategy for Hunts Point. If NYCEDC could meet a larger portion of its energy needs with geothermal, which is highly reliable, the focus for anaerobic digestion could shift to a recycling strategy and the energy created would be an additional benefit.

The potential for success with geothermal energy at Hunts Point would be game-changing for NYCEDC, the Hunts Point businesses, and residents, and the potential reduction in energy consumption has far-reaching benefits for New York City and beyond. The opportunities before NYCEDC are exciting and may serve as models for similar agencies and distribution facilities across the United States.

Additional Recommendations

Though the course of the TAP, the Panel identified several additional areas of study relating to current energy efficiencies and analyzed the potential for additional electric energy production at Hunts Point.

"A phasing and staging plan for construction and expansion plans should be of concern as the buildings are incredibly inefficient today."

– TAP Panelist

Building Envelope and Systems Efficiency

NYCEDC is encouraged to update any existing energy audit(s) and energy efficiency plan(s) produced prior to 2017. In particular, these updates should address such items as building envelopes, refrigeration requirements, equipment efficiencies and life cycle, the effectiveness of current air curtains, and lighting (i.e. high bay LED). Each facility audit should encompass a thorough assessment of demand, consumption, load profile, and billing.

NYCEDC as Energy Provider

The TAP briefing documents and charge to the Panel included questions as to whether or not NYCEDC should consider becoming an energy provider in Hunts Point. Keeping in mind NYCEDC's ongoing efforts that include construction of a combined heat and power (CHP) microgrid, solar panel installation on City-owned industrial properties, and management of substations, these considerations took shape in the following three forms: NYCEDC as an Energy Service Company (ESCo); NYCEDC as a "Utility"; and NYCEDC microgrid.

Energy Service Company (ESCo)

With regard to NYCEDC serving as an ESCo, a comprehensive, total energy solution approach would be encouraged. This includes designing and implementing energy savings projects and retrofitting outdated systems. It would also include focusing on energy conservation, power generation, energy supply, and/or risk management throughout Hunts Point. This type of ESCo system often functions best under performance contracts, which tie directly back to the efficiencies of the systems. There is also the potential for

alternative financing that would be tied to direct or indirect (third-party) asset control with the express intent of lowering energy costs.

NYCEDC could also serve as a direct natural gas or electric reseller on Hunts Point. In this scenario, NYCEDC would secure electric and/or natural gas with bulk pricing, a function of leveraging its multiple consumers on Hunts Point. To do this, however, NYCEDC must meet all of the requirements defined by the New York State Public Service Commission that relate to the reseller position.

Finally, as an ESCo Direct Customer, NYCEDC could schedule and purchase electricity and provide it to Hunts Point as a New York Independent System Operator (NYISO). In this scenario, there must exist a peak connected load of 1 MW at single service point. With that requirement met, NYCEDC could act as "Direct Customer" Agent on behalf of any client with a 1 MW load, or NYCEDC could take the distribution system at point of "client common coupling" (i.e. at the point of the Con Edison connection site) and then represent clients tied to that common coupling.

NYCEDC Defined as a "Utility"

NYCEDC could take the position of serving as a utility, which involves ownership at point of common coupling. At the point of common coupling, the following must be in place:

- Distribution assets are "sectionalized";
- Transformation and distribution assets relating to the "Con Edison site" are in place, which involves an asset purchase negotiation with Con Edison; and
- The construction, ownership, and maintenance of a NYCEDC-owned substation in Hunts Point, which would be fed from the larger Con Edison high-voltage system. This would be similar to the substations in Red Hook and Staten Island, which NYCEDC currently manages, and also involve an interconnection with the Con Edison high-voltage line. Additional research is needed to identify the price differential between the high-voltage metering, to be managed by NYCEDC, and the price current FDC consumers pay.

In a utility scenario, NYCEDC would be accountable for the ownership, maintenance, and upgrade of assets at the point of common coupling to the point of facility connection, typically the facility's meter.

NYCEDC would also be responsible for its own sub-metering, which commonly takes the form of either commercial (not regulated) or residential (heavily regulated) metering.

Lastly, NYCEDC would need to seek a "Declaratory Ruling" by the New York Public Service Commission and/or file as a "lightly regulated utility."

Microgrid

A microgrid is essentially a self-sustaining, small electric grid with its own generation resources and internal loads that may or may not be connected to the larger (utility) macrogrid. It includes at least one generator that can operate in parallel (synchronized) with the utility, or in isolation. (https://www.nyserda.ny.gov/-/media/Microgrids-Report-Summary.pdf)

NYCEDC Microgrid

New York Public Service Law sets forth a clear definition of a "microgrid." Following this definition, NYCEDC would need to consider that it would now be classified as an electric corporation. Its facilities "at or near" the defined generation, common coupling, and other would likewise be considered part of that utility. The definition of "at or near," in this instance, involves any land, work, system, building, improvement, instrumentality, or thing necessary or convenient to the construction, completion, or operation of any co-generation or other alternative generation. This definition is particularly important at points where public roads are crossed. A microgrid utility scenario such as this would require approval from the New York State Public Service Commission via a request for a Declaratory Approval Process.

Transportation

It is important to note that transportation generally accounts for 40% of New York State's greenhouse gas (GHG) emissions. In Hunts Point, there is a significant number of refrigerated tractor trailer trucks running on diesel fuel for 24 hours a day, seven days a week, 365 days of the year. These idling diesel transports are being utilized as additional warehouse and distribution space in instances where building capacity has been met and expansion has yet to occur. NYCEDC should continue working toward replacing this "temporary" form of warehousing with a long-term solution in the form of new facility space via new construction. In the near-term, the Panel encourages further exploration of connections of this diesel transport refrigeration to the local electrical grid via possible feeder capacity scenarios and/or tying electrification of the diesel transports to renewable energy sources directly or indirectly. A tie-in of this nature would help map open opportunity for Reforming the Energy Vision (REV) demonstration and/or other funding sources aimed at GHG emission reduction.

Within many of the distribution facilities, product moving equipment also accounts for significant energy usage and may provide compelling opportunities for implementing energy efficiencies. At present, the food distribution operations rely heavily on lead acid powered fork lifts, scissor, and man lifts. These lead acid batteries are high-maintenance, labor-intensive, and have a relatively short life cycle. NYCEDC is encouraged to explore other alternatives to this lead acid battery power system. Alternatives could include:

- A central hydrogen charging station, requiring produce moving equipment convert to a hydrogen-powered system; or
- Conversion to lithium ion power, which has typical life cycle of 10-15 years and requires less maintenance than the lead acid batteries.

NYCEDC Initiatives

As part of its double bottom line goal of reducing diesel emissions in Hunts Point, NYCEDC is currently pursuing several initiatives to reduce truck traffic through the neighborhood. As part of the FreightNYC program, NYCEDC has released a Request for Expression of Interest (RFEI) in order to gauge market interest in operating a barge terminal. The development of an Alternative Fuel Service Station for the FDC is slated to begin late 2019. NYCEDC has also released its Clean Trucks Initiative RFEI and is seeking partners to install EV chargers on EDC-managed property.

"If we can remove the refrigeration trucks, providing environmental benefits, it would make any improvements more interesting."

– TAP Panelist

In this instance, NYCEDC could act as finance partner on these conversions, negotiating a percentage of the maintenance savings.

Energy Storage

In addition to alternative mechanisms for producing power as a function of resilience in the face of disasters, NYCEDC may wish to evaluate energy storage as a resilience option. Energy storage would provide back-up power to facilities connected to the grid when needed and could also serve as an option to provide power to remove the potential intermittency of renewable energy sources.

Energy storage also provides an interesting opportunity as a dynamic pricing option for NYCEDC. Energy storage would charge during off-peak hours, capturing energy at a rate when prices are typically low and then discharge during on-peak periods, thereby potentially off-setting high hourly pricing. Energy storage could also serve as a substitute for "peaker" plants in the City. Located at various positions around the City, peaker plants receive compensation to be ready to provide power during an outage or when there is low system supply capacity. Energy provided by the peaker plants tends to be short generation run time, generally less than two hours. By capturing and storing energy in the manner noted above, NYCEDC could offer a cleaner option to the peaker plants and could likewise receive compensation in a similar fashion along with any incentives associated with adding energy storage by NYSERDA.

Hell Gate Power Plant, one of many "Peaker Plants" in the New York City area. Source: nylpi.org.

Panelists' Biographies

Pictured left to right: Jay Valgora, Dennis Elsenbeck, Neil Webb, Robert McFadden, Shea Thorvaldsen, Louise Yeung, Venetia Lannon, Shay Alster, Matthew Kwatinetz, Felix Ciampa, and Kate Boicourt.

Shay Alster, AIA, TAP Chair

Principal, GF55 Architects, LLP

New York, NY

Shay Alster, AIA, is a longstanding principal at GF55 Architects, LLP, an Architecture and Interior Design firm with offices in New York and Florida. GF55 prides itself on a wide range of projects throughout the United States including multi-family structures, mixed-use residential apartment complexes, hotels, commercial offices, retail spaces, showrooms, and institutional projects. The firm is widely recognized in their industry and has been awarded the Andrew J. Thomas Award – Pioneering in Housing from The American Institute of Architects. Shay's own expertise and experience with New York City zoning contributed to his spearheading several large-scale urban development projects for which he garnered multiple awards from the New York State Association for Affordable Housing (NYSAFHA). Shay is respected by his peers and recognized in the industry, and he has received numerous accolades from the real estate industry demonstrating his wide breadth of knowledge and his understanding of the critical bridge between architecture and real estate. Prior to joining GF55, Shay worked as an Architectural Designer with RKK&G / The Museum Group of New York where he was responsible for projects such as The Museum of Natural History in New York and The Museo de Arte de Puerto Rico in San Juan and in Ponce (1995-96). He later went on to Kupiec & Koutsomitis Architects P.C., where he was involved in the redevelopment of key landmark areas and buildings in New York City including Times Square at 42nd Street, the Port Authority Bus Terminal, and the Carnegie Libraries (1996-98). A graduate of New York's Pratt Institute School of Architecture, Shay was awarded the Excellence in Design Award and the Pratt Circle Award for Outstanding Academic Achievements. Additionally, Shay holds a Certificate in Real Estate Investment and Finance from New York University. Prior to Pratt, Shay studied Design at the Center of Technology Education in Holon, Israel, while serving as a Captain in the Israeli Air Force. He is a registered architect in New York and Florida, a member of the New York State Association of Affordable Housing, a Housing Committee Member at the AIA NY Chapter, a member of the Urban Land Institute and REBNY, and he holds a certificate from the NCARB. Shay has served as a guest speaker at Baruch College Real Estate School and he has served on the Technical Assistance Panel (TAP) of the Urban Land Institute (ULI) for the Bronx's University Heights Waterfront and for The Town of Sleepy Hollow.

Kate Boicourt

Director of Resilience, Waterfront Alliance

New York, NY

Kate Boicourt is the Waterfront Alliance's Director of Resilience, overseeing the organization's portfolio of resiliency work including WEDG (Waterfront Edge Design Guidelines). Previously, she served as the restoration program manager for the NY-NJ Harbor & Estuary Program (HEP), where she focused on cross-jurisdictional coastal issues related to habitat restoration, public access, and climate change. Prior to her work at HEP, Kate led a team of experts to develop a Climate Change Adaptation Plan for the State of Maryland and has held multiple roles conducting and synthesizing research for public audiences. She holds a Master of Environmental Science from Yale University and a Bachelor of Arts in Biology from Kenyon College.

Dennis W. Elsenbeck

Head of Energy and Sustainability, Energy Consulting Services, Phillips Lytle, LLP

Buffalo, NY

Dennis Elsenbeck provides consulting services on a broad range of energy-related opportunities encompassing a forward view of a balanced perspective on supply, distribution, and demand options. In his leadership role with a major U.S. utility for nearly 30 years, he brings to Phillips Lytle insight, analytics, and business perspectives on long-term policies and the economic landscape. Dennis assists clients with due diligence and regulatory compliance on energy transactions; regulatory counseling involving Public Service Commission proceedings; energy procurement and utility negotiations involving government entities and municipalities; procurement consulting regarding the reduction of energy costs and review of economic incentives; market driven integrated resource planning; and identifying commercial and technical issues associated with energy-related opportunities. Dennis helps clients move critical energy projects forward by providing creative solutions and overcoming project challenges. He works to develop the voice of the consumer in energy policy and bill impacts as sustainability becomes a focus of energy policy. Dennis collaborates with clients in shaping the "utility of the future" with the goal of aligning State Energy Goals with Regional Economic Development Planning. He has an MEng from the University at Buffalo School of Engineering and Applied Sciences, a MBA from the University of Rochester, and a BT in Industrial Engineering Technology from the State University of New York Polytechnic Institute (formally Institute of Technology). Dennis is active at all levels of community engagement as Board Chair for the Northland Workforce Development Center, Member of the Advisory Council for the United Way of Buffalo and Erie County, Board Member with the Buffalo Urban Development Corporation (BUDC), Advisory Member with the Emerging Cleantech Opportunity (ECO) Incubator, Board Member with the Erie Community College Foundation, Member of the University at Buffalo School of Engineering and Applied Sciences Dean's Council, Executive Committee Member of Employ Buffalo Niagara, and Investor Representative for the Greater Rochester Enterprise.

Venetia Lannon

Vice President, Matrix New World Engineering

New York, NY

Venetia Lannon is Vice President at Matrix New World, where she leads the New York City office for the woman-owned, multi-faceted environmental engineering firm with 170+ employees and offices in four states. Her market development responsibilities include climate adaptation services with a focus on nature-based systems for waterfront facilities and stormwater management. Prior to joining the private sector, Venetia spent 20 years in the public service most recently as Governor Cuomo's Deputy Secretary for the Environment. In this capacity, she served as environmental policy advisor to the Governor and his cabinet and oversaw the operations of the state's environmental agencies, including the Department of Environmental Conservation, the Office of Parks Recreation & Historic Preservation, the Environmental Facilities Corporation, and the Adirondack Park Agency. Previously, Venetia was appointed by Governor Cuomo as Regional Director for the Department of Environmental Conservation, overseeing 200 staff and all aspects of DEC's work in New York City. Prior to that, she held several positions working for the City of New York, as a Senior Vice President of the New York City Economic Development Corporation (NYCEDC) and as Deputy Director of the Recycling Bureau at the New York City Department of Sanitation, where she ran the composting program. At NYCEDC, Venetia ran the Maritime division, where key projects included launching the East River Ferry service and developing a barge and rail-served municipal recycling facility in Brooklyn. She was an active contributor to Mayor Bloomberg's Solid Waste Management Plan and an early advocate for sustainability and environmental justice. Venetia graduated from Vassar College with departmental honors and holds a master's in public administration, focusing on environmental policy from Columbia University.

Shea Thorvaldsen

Founder, Principal, and CEO, TMS Waterfront
New York, NY

Shea Thorvaldsen is the President and Founder of TMS Waterfront, a Service Disabled Veteran Owned Small Business (SDVOB) where he runs a shop of seven professionals on multidisciplinary waterfront projects ranging from port planning to marinas, permitting, program management, master planning, and design. Prior to TMS, Mr. Thorvaldsen spent six years with McLaren Engineering Group both as a junior engineer/project manager and, most recently as the Director of the Marine & Infrastructure Divisions. In between, he ran Waterfront Operations and was the Chief Estimator for Heavy / Civil Construction at D'Onofrio General Contractors and was the president of Valsen Marine, one of the Judlay Companies. Key projects in his career included the underwater restoration of the FDR Drive for protection against marine borers, the NYC Ferry design program for the landings completed in 2018, the reconstruction of ONE15 Brooklyn Marina, and he is currently the project executive for the development of a 32-acre port in Tottenville Staten Island. After graduating from Tulane University with a BS in Civil Engineering, Mr. Thorvaldsen served as a Surface Warfare Officer in the US Navy, serving on both the USS Millius (DDG-69) and the USS Constellation (CV-64) with Desron-7 in San Diego.

Jay Valgora, AIA, AICP, LEED AP

Founder & Principal, STUDIO V Architecture
New York, NY

Jay Valgora founded Manhattan-based STUDIO V Architecture, dedicated to the reinvention of the contemporary city. The Studio is focused on transforming and reconnecting edges, creating sustainable, resilient communities in the face of climate change, radical adaptive reuse of industrial and historic structures, and experiments in innovative fabrication. New York's waterfront has provided the location of many of his most prominent projects. STUDIO V's work has been reimagining NYC's waterfront including Astoria, Inwood, Long Island City, Flushing, DUMBO, Gravesend, Sunset Park, and Staten Island. Mr. Valgora's award-winning design of Empires Stores combining historic and contemporary design, overlapping uses, and private entrepreneurship with public spaces exemplifies his philosophy. Mr. Valgora has a Master of Architecture from Harvard University, a Bachelor of Architecture from Cornell and was a Fulbright Fellow to the United Kingdom, where he began his studies reinventing London's former industrial waterfront. Mr. Valgora's work has been recognized with awards including numerous AIA awards, Architizer A+, ULI Design Excellence, MASterworks, and many others. His work is published extensively including The New York Times, Fast Company, Architectural Record, Wall St. Journal, New York Magazine, and Architect's Newspaper. He is currently completing a book on the contemporary transformation of cities titled Last Utopia.

Neil Webb

Director Energy Markets & Growth, OBG, Part of Ramboll Group
Syracuse, NY

Neil Webb has been working within the energy industry for over 28 years. His experience spans the evolution of energy markets from the vertically integrated holding companies of the early 1990s to today's deregulated marketplace. During this transformation, Mr. Webb has been engaged by utilities, independent system operators and energy supply companies to assist in strategic and operational functions of both the wholesale and retail energy markets. Recently, Mr. Webb's work has been focused at the retail level assisting entities with critical decisions involving energy from the procurement of electricity, natural gas, and oil to the planning and management of Renewable Energy Credits (RECs). In the past year he has been heavily involved on energy assurance and resiliency issues including microgrids and innovative platforms to advance the integration of energy storage and distributed generation. Mr. Webb has a bachelor's in Industrial Engineering from Clarkson University and a Masters in Business Administration from the University of Rochester's Simon School.

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