THE CONNECTICUT SITING COUNCIL
DOCKET NO. 461A

EVERSOURCE ENERGY APPLICATION FOR A CERTIFICATE OF ENVIRONMENTAL COMPATIBILITY AND PUBLIC NEED FOR THE CONSTRUCTION, MAINTENANCE, AND OPERATION OF A 115-KILOVOLT (KV) BULK SUBSTATION LOCATED AT 290 RAILROAD AVENUE, GREENWICH, CONNECTICUT, AND TWO 115-KV UNDERGROUND TRANSMISSION CIRCUITS EXTENDING APPROXIMATELY 2.3 MILES BETWEEN THE PROPOSED SUBSTATION AND THE EXISTING COS COB SUBSTATION, GREENWICH, CONNECTICUT, AND RELATED SUBSTATION IMPROVEMENTS.

Testimony of
Katharine A. Deluca
Mitchell E. Mailman
James W. Michel
Denise M. Savageau
Amy J. Siebert
Bruce Spaman

On behalf of
The Town of Greenwich

JULY 18, 2017

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Introduction

Q. Ms. Deluca, please state your name, position and business address.

A. My name is Katharine A. Deluca. I am the Director of Planning and Zoning for the Town of Greenwich. My CV is provided in *Attachment A* attached hereto.

Q. Mr. Mailman, please state your name, position and business address.

A. My name is Mitchell E. Mailman. Since 1972, I have presided over an electrical contracting entity that builds power lines, both underground and overhead, substations and generation facilities, for electric utilities. In that time we have worked for over fifty utilities in twenty states, Mexico and Canada. I am serving as a technical consultant to the Town of Greenwich in connection with this docket. My CV is provided in *Attachment A* attached hereto.

Q. Mr. Michel, please state your name, position and business address.

A. My name is James W. Michel. I am the Deputy Commissioner of Public Works for the Town of Greenwich. My CV is provided in *Attachment A* attached hereto.

Q. Ms. Savageau, please state your name, position and business address.

A. My name is Denise M. Savageau. I am the Conservation Director for the Town of Greenwich. My CV is provided in *Attachment A* attached hereto.

Q. Ms. Siebert, please state your name, position and business address.

A. My name is Amy J. Siebert. I am the Commissioner of Public Works for the Town of Greenwich. My CV is provided in *Attachment A* attached hereto.

Q. Mr. Spaman, please state your name, position and business address.

A. My name is Bruce Spaman. I am the Superintendent, Parks and Trees Division, Department of Parks and Recreation for the Town of Greenwich. My CV is provided in *Attachment A* attached hereto.

Q. On whose behalf are you testifying in this case?

A. We are testifying on behalf of the Town of Greenwich, Connecticut (the "Town").

Q. Have you reviewed the documents submitted by Eversource in support of its current proposal, as well as responses to interrogatories, and the record in Docket 461?

A. Yes.

Q. Based on your review of the record, does the Town have views concerning the need for this project?

A. Yes. As detailed below, the Town questions whether Eversource has demonstrated the need for this transmission-based project, whether its proposal is cost-effective, and whether it will sufficiently improve the reliability of the Town's electrical system.

Q. Based on your review of the record, does the Town have views concerning the proposed route of the transmission line, if Eversource can prove there is a need for this project and that the project will improve system reliability?

A. Yes. As detailed below, if the Siting Council finds that the need for this project exists and that the project will improve system reliability, the Town is in favor of the all-underground route that is set forth in the Alternate Modified Project, subject to certain construction restrictions that will be necessary to mitigate environmental impact.

Q. Based on your review of the record, does the Town have views concerning the proposed location of the new substation, if Eversource can prove there is a need for this project and that the project will improve system reliability?

A. Yes. As detailed below, for safety reasons, if this project is approved, the Town believes the Siting Council should require a fully-enclosed indoor substation located at 281 Railroad Avenue. The Town would support a substation located at 290 Railroad Avenue only if it is a fully-enclosed indoor substation and Eversource demonstrates that it has thoroughly studied the potential safety risks posed by siting the substation at that location and taken all necessary measures to address such risks.

If Eversource proves the need for a transmission-based project and that its proposal will improve system reliability, the Town supports the Alternate Modified Project, subject to certain construction restrictions.

Q. Does the Town support a transmission-based solution to the Town's energy needs?

A. The Town questions the need for a transmission solution, which the Town believes will not adequately improve the reliability of the Town's electrical system. The Town instead suggests alternative measures that would get to the heart of the electric needs in Greenwich, including: improvements to the 27.6-kV feeders and the 13.2-kV distribution system, replacing older equipment and transformers in the existing substations, load-shifting, reliance on the 115-kV tap to the Tomac Substation, and improvements to the Tomac Substation.

Q. Has Eversource been receptive to the Town's suggestions?

A. No. Eversource has insisted on a transmission-based project.

Q. Has Eversource ever provided any explanation for its position?

A. In meetings with the Town, Eversource admitted that the focus on load in Docket 461, and the alleged issues with Cos Cob Substation transformers reaching their capacity, was over-stated and was not the true basis for the need for the project. Rather, in meetings with the Town, Eversource has focused on the need to replace the Prospect Substation with a new substation fed by a 115-kV transmission line. Indeed, in each year since the 2013 date on which Eversource based its load projections, the recorded peak load on the transformers at the Cos Cob Substation has declined significantly from the 2013 data. This demonstrates that the risk of overload is not the true basis for the need for this project.

Q. Because Eversource has insisted on a transmission solution, has the Town compromised its position?

A. Yes. Even though the Town questions the need for this project, if the Council finds that a transmission solution is needed and that the project will improve the reliability of the Greenwich electrical system, the Alternate Modified Project, unlike the Preferred Route in Docket 461, satisfies many serious concerns that were central to the Town's opposition in Docket 461, as explained below.

Q. Throughout Docket 461, the Town opposed the "Preferred Route" which consisted of an underground transmission line through Bruce Park. Now the Town has indicated its willingness to accept an underground line through Bruce Park assuming Eversource can prove the need for this project and that it will improve system reliability. Please explain what has changed.

A. The "Preferred Route" in Docket 461 was a completely different proposal than the Alternate Modified Project in this Docket 461A. There were three primary aspects of the Preferred Route that the Town objected to, all of which were expressed in Docket 461: 1) Eversource's proposed

installation of 115-kV HPFF cables; 2) Eversource's proposed use of horizontal directional drilling, and 3) Eversource's proposed route of the underground transmission line through Bruce Park would have caused devastating and permanent environmental impact, since the line was proposed to be buried beneath pristine parkland, including playgrounds, ball fields, and wetlands, utilizing horizontal directional drilling.

Q. Why did the Town oppose the use of HPFF cables through Bruce Park in Docket 461?

A. HPFF transmission lines consist of steel pipes that are welded together. Three cables are placed within each of these pipes and the void around the cables within these pipes is filled with dielectric fluid, known as "DF 100". DF 100 is a petroleum based oil that carries with it several health concerns should its vapors be inhaled or if it comes into contact with one's skin. The DF 100 within the pipes is kept under pressure, operating at 200 psi.

Leaks in HPFF circuits are commonplace. For example, an HPFF circuit in Stamford leaked when an excavating contractor breached a pipe, and in Boston, Eversource is being plagued by repeated, multiple leaks as a result of welds cracking.[1]

In Docket 461, Eversource proposed that the two circuits would feature two 8" fluid-filled cables and a third 8" pipe to be reserved for future use to recirculate the DF-100 between the Cos Cob Substation and the new proposed substation on Railroad Avenue. For the two active pipes, that would mean almost 50,000 gallons of potentially harmful fluid being

[1] See City of Boston report on 2017 transmission line oil leak in South Boston, available at https://311.boston.gov/reports/101002062232.

pumped 24 hours a day, every day of the year, at 200 psi, underneath pristine parkland, including playgrounds, ball fields, and wetlands, through Bruce Park. If the future recirculating system was ever activated, that would add an additional volume of 32,000 gallons of fluid constantly being pumped under high pressures.

Locating and stopping a fluid leak is not an expeditious process and leaks totaling tens of thousands of gallons occur. The HPFF cables were proposed to be installed next to the playground on Bruce Park Drive, which is the most heavily-used children's play area in Greenwich. The Town could not take the risk of exposing children to a potential leak from the HPFF cables. Furthermore, there are many underground and above ground streams and ponds along the route that feed directly into Long Island Sound. Any leak of the HPFF cables would have been an environmental disaster.

Q. Why did the Town oppose the horizontal directional drilling in Bruce Park in Docket 461?

A. The steel pipes used in a pipe type cable system are customarily installed in forty foot lengths. This mandates a lengthy trench, usually about one hundred feet long that needs to be excavated and left open in order to facilitate the placement and welding of the cable pipe. Eversource likely realized such a lengthy trench excavation was not conducive to its original Preferred Route through Bruce Park and instead proposed the majority of the pipe through the Park to be placed via horizontal directional drilling. This is a form of tunneling, where a drill bores a continuous hole, starting at one point and emerging out of the ground at a point as much as a few hundred feet or more away.

Unlike conventional trenching, known as "open cutting," directional drilling requires a large work area at the site where the drill emerges from the ground and where it is introduced. Clay-like chemicals such as bentonite

are needed to fill the "tunnel" as it is being drilled to prevent the hole already drilled from collapsing on the shaft of the drill. Mixing the dry bentonite with water to make drill slurry takes place on site within the work area. Directional drilling operations must operate continuously on a daily basis, around the clock.

Once the hole has been drilled from location to location, the pipe must be installed. If the length of the drill was nominally 500 feet, a 500-foot string of pipe must be built at the site of where the drill head emerges from the ground. This 500-foot length of pipe is then pulled back to the drilling apparatus, using the drill machine. As the pipe is being drawn into the drilled hole, the hundreds of thousands of gallons of slurry installed to keep the hole open are being drawn out of the hole into the area of the drill machine. At the conclusion of several of these drilled routes, the cable pipes would have been located several feet beneath the bottom of tidal ponds and estuaries. In the event of a leak in the steel pipe, locating and remediating the leak would be almost impossible, with permanent environmental impact resulting.

There were alternatives to directional drilling and pipe-type cable available to Eversource then, and the Town was strongly opposed to exposing its residents and its precious natural resources to potentially irreversible environmental, safety and aesthetic impacts.

Q. Why was the Town opposed to the proposed location of the "Preferred Route" in Bruce Park in Docket 461?

A. The original Preferred Route was completely unacceptable because Eversource proposed construction under pristine land, playgrounds, ball fields and wetlands within Bruce Park. For example, one of the drilling sites was to be directly west of Kinsman Lane. The anticipated work site would have necessitated clear cutting a large forested area which

presently shields the Kinsman Lane residents from I-95. Because the proposed HPFF design was comprised of three individual pipes, each drilling operation (weeks per pipe per drill) would have had to be repeated three times for each location. Horizontal directional drilling beneath undisturbed land in Bruce Park was unacceptable and avoidable.

Q. Why does the Town now favor the Alternate Modified Project assuming Eversource can prove there is a need for this project and it will improve system reliability?

A. The Town's primary concerns with the impact to Bruce Park have generally been mitigated in the Alternate Modified Project, subject to certain construction restrictions set forth below.

Q. Under the Alternate Modified Project, are HPFF cables proposed?

A. No. Instead of HPFF cables, Eversource now proposes solid dielectric XLPE cables. XLPE is a solid plastic insulated cable, which is inert and free of any fluid, and therefore does not contain any of the environmental risks of leakage associated with HPFF cables.

Q. Under the Alternate Modified Project, is horizontal directional drilling proposed?

A. No. XLPE cables do not require steel pipe and are instead installed in PVC ducts. These ducts come in ten and twenty foot lengths, so they do not require lengthy trenches to remain open or require roadway plates to maintain the work site after hours. The entire route through Bruce Park's roads can be installed using "open cut" methodology which precludes the need for directional drilling.

Q. Under the Alternate Modified Project, is the proposed route acceptable?

A. Yes. In the Alternate Modified Project, Eversource now proposes installing the underground cables only beneath paved roads. Burying

transmission lines beneath paved roads is always preferred because the land is already disturbed, and there should be no new environmental harm resulting from the installation. The underground route through Bruce Park's paved roads would keep all the construction activities away from the residents of Kinsman Lane. In addition, the rate of duct installation for the PVC conduit is significantly faster than the steel pipe needed for HPFF, so the entire construction process within the Park would be quicker. There are multiple roads traversing the Park, so it is possible to shut down the road in the immediate vicinity of the trench excavation, increasing productivity even more, as well as safeguarding the public and the Park's natural resources. There are also very few buried utilities beneath the Park's paved roads, such as water, sewer and gas, making for even quicker and easier excavation. Finally, unlike the enormous vegetative removal proposed along the Preferred Route in Docket 461, no such vegetative removal should be needed or allowed in constructing the Alternate Modified Project in this docket.

Q. Does the Town favor any restrictions on construction of the Alternate Modified Route in order to limit environmental impact?

A. Yes. The Town urges that the construction activities and construction vehicles be confined to the paved roads within Bruce Park. Bruce Park is a precious resource that must be preserved for generations to come. Care must be exhibited to preserve all the trees within the Park, many of which are but a few feet from the paved surface of the roads. The roads average a bit over 25 feet in width, and therefore they are sufficiently wide to permit a proper-width trench to be dug, and the associated backhoes and dump trucks positioned, without the need to encroach on the grass shoulders of the road.

Since the roads in the Park must be able to accommodate vehicles of the Greenwich Fire Department, the Town Department of Parks and Recreation prunes the low hanging limbs that might encumber any of the

roads. If additional tree trimming is required, based on demonstrated need, it must follow all Town standards as dictated by the Superintendent of Parks and Trees Division, i.e., the Tree Warden. The Town is opposed to any tree removal which is not necessary in order to install the underground cables beneath the Park's paved roads. There should be no need for vegetative clearing either, which the Town opposes.

In addition, numerous cars presently use the network of roads in the Park. The use of these roads by Eversource's construction vehicles will likely deteriorate the paved surfaces, and the excavated trench will greatly destabilize these thoroughfares. Accordingly, as a condition of installing the cables beneath the Park's roads, Eversource should be required to repave any road used in conjunction with installation of the underground line "curb to curb." In addition, Woods Road could be closed to through traffic when the transmission line is under construction. Other roads, however, could be managed using daily lane closures so that any limitations allow local traffic to travel through the Park.

The new proposal does not sufficiently improve the reliability of the Town's electrical system.

Q. Does the Town believe that Eversource's transmission-based proposal will sufficiently improve the reliability of the electrical system within the Town of Greenwich?

A. No. Under the Alternate Modified Project, the proposed new substation is designed to re-feed the loads currently supplied by the 27.6-kV transformers at the Prospect Substation. The proposed new substation is not designed to receive additional loads from any other substation, and there will be no change to the feeder arrangements (both incoming and outgoing) of the Mianus, Byram, Tomac, and North Greenwich Substations, and the Greenwich Network. In 2013, when the utility experienced its single largest peak load of 130.5 MVA at the 27.6-kV

transformers in the Cos Cob Substation, the actual load recorded at the Prospect Substation was no more than 51.2 MVA, approximately 39% of the total 27.6-kV load in Greenwich. See Docket 461A, table attached to Eversource's Response to Q-CSC-013 dated June 30, 2017. While the proposed new substation would service the load on the current 27.6-kV transformers in the existing Prospect Substation, the remaining 61% of the total 27.6-kV load in Greenwich would be unaffected by Eversource's transmission-based proposal, despite its cost.

Q. Does the Alternate Modified Project eliminate the Town's vulnerability to an outage on both of the 115-kV lines originating in Stamford?

A. No. In August 2012, a tree fell on the 115-kV transmission lines, known as "1750" and "1740," to the east of the Cos Cob Substation. These lines originate in Stamford, and run along the Metro North Railroad ("MNRR") tracks. They are the only circuits that can bring power to the Cos Cob Substation which services the MNRR. The 1750 and 1740 115-kV transmission lines are strung on common steel structures. Should one of these common structures come down, both circuits would be impacted. When the tree fell in August 2012, both of the 1750 and 1740 115-kV transmission lines were impacted, and this resulted in the loss of power to the entire Greenwich electrical system and MNRR as well.

In utility parlance, each backup feeder to a substation is known as a "contingency." "First contingency" is when the main feeder to the substation is out of service, and the backup feeder takes over to prevent the substation from going out of service. "Second contingency" is when the substation's main feeder is out of service, the backup feeder is also out of service, and a second (or third) backup feeder takes over to keep the substation in service. Cos Cob Substation does not even have a "first contingency." Since the 1750 and 1740 115-kV transmission lines share

the same structures, if there is a failure on one of those structures, both lines would go down and no facet of the Cos Cob Substation would be operational.

This design limitation greatly impacts the ability to maintain these circuits. Eversource is currently under a federal directive to raise the height of the 1740 and 1750 lines over the bridge that transverses the railroad tracks at Riverside Avenue. Since both of these circuits cannot be de-energized concurrently, to implement this modification, the utility must build a temporary pole, and an operation that could have been completed quickly and inexpensively will instead become protracted and very costly, with an adverse impact on the Greenwich residents who use the Riverside Station of MNRR.

Because Eversource has not proposed any modifications to the 1750 and 1740 115-kV transmission lines between Stamford and the Cos Cob Substation, Greenwich would remain completely vulnerable to a repeat of the 2012 event, even after Eversource's proposed $100 million project is built. There are even more significant risks, such as a train derailment causing cars to jump the tracks as took place in 2013 on the MNRR tracks at Spuyten Duyvil. If this were to occur, even after the construction of Eversource's newest proposed project (and all those previously presented to the Council), Greenwich would again be left without electricity. Since the proposed new substation will receive electricity from the 1750 and 1740 lines, the substation could not remain energized if the 115-kV feeders between Stamford and the Cos Cob Substation were lost for whatever reason.

Q. Is the Town's vulnerability to an outage to any of its 13.2-kV distribution lines solved by the proposed new substation?

A. No. While failures to the 115-kV and 27.6-kV systems do take place, the most common events causing the loss of power to customers in Greenwich are weather events that involve damage to the 13.2-kV distribution system. The majority of 13.2-kV feeders are run overhead through the streets on wood poles. Building a new substation can help in a few isolated circumstances when another entire substation goes down (a rare occurrence), but would be of no assistance should a tree fall on a 13.2-kV overhead feeder. More Greenwich residents would receive more reliable electric service if Eversource undertook "storm hardening" measures in the 13.2-kV system. However, these far less costly measures are not part of the current application.

Q. Is the obsolete equipment in the Byram Substation addressed in the Alternate Modified Project?

A. No. In prior testimony and documentation in Docket 461, Eversource described the substation equipment in Byram as "obsolete." In its initial application in Docket 461, Eversource planned to retire that equipment and shift its loads to the proposed new substation. However, Eversource's current proposal does not address these claimed deficiencies in the Byram Substation. Under the Alternate Modified Project, the equipment at Byram Substation is left completely intact and the Byram Substation will remain in service. In 2013, over 12% of the peak load on the 27.6-kV transformers in the Cos Cob Substation was delivered to the Byram Substation. Whereas many of the other 27.6-kV substations in Greenwich have seen a decrease in their peak loads compared to 2013, the recorded loads at Byram Substation have actually increased. See Docket 461A, table attached to Eversource's Response to Q-CSC-013 dated June 30, 2017. Eversource's proposal does not

address the real reliability concerns of the "obsolete" equipment at the Byram Substation.

Q. What other deficiencies do you see in the electrical system in Greenwich at this time?

A. There is a significant risk to the customers served by the Tomac Substation, and not one of Eversource's proposals to date has addressed that risk.

The majority of the distribution system in Greenwich operates at 13.2-kV. The Mianus, Byram, Prospect, North Greenwich, and Cos Cob (not the 27.6-kV portion) Substations, all distribute electricity at 13.2-kV, mostly overhead on wood poles. Every one of the 13.2-kV circuits that come out of those five substations has ties to other 13.2-kV circuits. In the event of a problem at one substation, load can be transferred from 13.2-kV circuits originating at another substation. Some of these transfers can be done automatically and some need a line crew dispatched to manually operate equipment. Similarly, if a section near the middle of one 13.2-kV feeder were to come down, through "sectionalizing" the distribution of electricity would continue unimpeded.

However, the Tomac Substation, which feeds customers in southeast Greenwich (Old Greenwich), distributes power at 4.8-kV. In the case of the feeders from the Tomac Substation, there are no ties to feeders from other substations because no other substation produces 4.8-kV. A 4.8-kV circuit cannot be tied directly to a 13.2-kV circuit.

Eversource describes the Tomac Substation as an "Island Substation" and as a result, it is very vulnerable. The Tomac Substation has a tap from the 1750 115-kV transmission line which originates in Stamford and it is also linked to the Cos Cob Substation and the 27.6-kV system by feeder

12H59. Thus, unlike every other substation in Greenwich, the Tomac Substation can be fed from two distinctly different sources. This makes it immune to a failure of the 27.6-kV transformers in the Cos Cob Substation. However, the Tomac Substation has only a single transformer that is capable of delivering the 4.8-kV electricity it feeds to Old Greenwich. If that transformer has a problem, as it did in April 2016, all of the customers served by that transformer (well over 1000) will lose their power. Until a replacement transformer, a temporary substation, or generators are brought to the site, there can be no restoration of electricity to those customers.

Currently, it is standard practice for utilities to have "third," "fourth" and even "fifth" contingencies. However, the Tomac Substation has no available backup in the form of a second 4.8-kV transformer, nor does it have the ability to tie the 4.8-kV circuits to 13.2-kV circuits (achievable by installing step down transformers on strategically located poles).

The Alternate Modified Project does not address the deficiencies at the Tomac Substation.

Instead of the transmission-based proposal submitted by Eversource, there are other alternative measures available to address the Town's energy needs.

Q. Do you believe a non-transmission solution is feasible and practical?

A. Yes. By upgrading the Town's distribution system, Eversource can get to the heart of the reliability concerns in the Town, rather than causing Connecticut consumers to pay for an expensive transmission-based solution, which does not do enough to address the Town's energy needs.

Q. Is the Town's 27.6-kV distribution system properly designed?

A. Historically, the Town has largely had reliable electric service because of the design of its distribution system. The concept of having a single 115-kV source (the Cos Cob Substation), and then distributing energy at 27.6-kV to several substations throughout Greenwich, which in turn converts the electricity to 13.2-kV to be distributed along almost every street (either on wood poles or underground) is well-founded. This design is precisely what Consolidated Edison Company of New York does in its rural boroughs of Queens, Brooklyn, Staten Island, and the Bronx. If there are now issues with reliable electric service, those issues are best addressed by reinforcing and upgrading this distribution design.

Q. Is Eversource's proposal compatible with all of the electric distribution in Greenwich?

A. No. The new proposal contemplates a new 115-kV transmission line to a new substation which converts electricity from 115-kV directly to 13.2-kV. However, even if this new 115-kV line and substation are built, more than 60% of the peak load of Greenwich -- including vital loads such as Greenwich Hospital and the Greenwich Wastewater Treatment Plant -- would remain fed by 27.6-kV distribution feeders. In other words, Eversource's proposal does not address a critical issue which is reinforcing the 27.6-kV distribution feeders.

Q. Instead of feeding the proposed new substation from a 115-kV transmission line, could the proposed substation be fed from 27.6-kV feeders?

A. Yes. The existing 13.2-kV transformer capacity at the Prospect Substation is 55 MVA, and ever since its inception, the Prospect Substation has been fed by 27.6-kV feeders. The proposed new substation (and its proposed 60 MVA of 13.2-kV transformer capacity) would be smaller than the North Greenwich Substation, which has 75

MVA worth of 13.2-kV transformer capacity. North Greenwich is fed by two 27.6-kV feeders, 11R53 and 11R54, which originate in the Cos Cob Substation, and by a backup 27.6-kV feeder from the Byram Substation. Instead of constructing a costly new transmission line, the proposed new substation could be fed by 27.6-kV feeders just as the larger North Greenwich Substation is presently being fed.

Indeed, Eversource has demonstrated its commitment to this approach. Between 2010 and 2012, Eversource spent $22.4 million to refurbish and install new 27.6-kV feeders into the North Greenwich Substation. See Docket 461, June 2015 Application, p. E-16, Table E-4. The same approach should be adopted now.

Q. Is there an issue with the current 27.6-kV feeders to the Prospect Substation? If so, how should that issue be addressed?

A. Yes. Without question the present 27.6-kV feeder arrangement to the Prospect Substation is less than optimal. The four main feeders to the Prospect Substation must also service the Greenwich Network. The loads on these 27.6-kV feeders cannot be segregated. If there is a need to de-energize one of these feeders to the Greenwich Network, the entire feeder, including the segment feeding the Prospect Substation, must be taken off line. Throughout the year, there are many occasions, such as routine maintenance, when a utility must shut down one or more feeders to one of its networks.

The Massachusetts arm of Eversource has worked very closely with the Okonite Company, a major producer of electrical cables, to develop new cables to enable additional power to be delivered by cables equal in overall size to older cables. Consolidated Edison Company of New York has done the same thing in New York City where, like Boston, it is difficult to rip up the streets to install new duct banks. These utilities are now

capable of moving more ampacity through their existing ducts, without huge civil construction expenditures associated with installing new duct banks needed to accommodate larger cables. This can be achieved by removing older conductors and replacing them with new conductors capable of carrying more power or ampacity that can safely be installed in the same conduits.

It appears the 27.6-kV cables feeding the Prospect Substation have undergone more faults than what one would expect of such feeders. In that these faults occurred when the cables were not overloaded or close to fully-loaded, the cause of those failures is not an electrical overload, but rather the cables' age, care or workmanship. Even if the proposed new 115-kV transmission line and substation are built, the 27.6-kV cables will have to remain in service to power the Greenwich Network, Greenwich Hospital, and other key loads. They will also have to remain as feeders and back up circuits to the Byram and North Greenwich Substations. Instead of constructing a new 115-kV transmission line, Eversource could reconductor two or more of the existing feeders serving the Prospect Substation with a modern optimally-designed cable system. The new 27.6-kV feeders should be "express" feeders which do not also feed the Greenwich Network, and are instead connected solely to the new substation. This solution would do far more to address the real needs of the Town than the proposed 115-kV transmission line, and it would remove from service 27.6-kV cables that Eversource acknowledges are unreliable. See Docket 461A, Pre-Filed Testimony of Kenneth Bowes at p. 5; Docket 461, March 20, 2016 Hearing Tr. at p. 45.

Q. Has Eversource demonstrated the need for this project?

A. No. Just as the initial application in Docket 461 was based on erroneous load projections, the errors in those projections and the inaccurate

assumptions they rely on continue to the present date, and this basis for the supposed need for this project has been proven false.

Q. How have the Eversource load projections been proven false?

A. One of the purported justifications for the need for a transmission-based project is Eversource's claim that there is an imminent risk of overloads on transformers at the Cos Cob Substation. This alleged risk was premised on unrealistic assumptions about the future load usage on these transformers that have been proven to be false. Eversource based its projections on 2013 load data, and then an assumption of 1% growth rate each year into the future. Contrary to these assumptions, peak load has declined on these transformers compared to 2013.

Table 1 below compares Eversource's projected peak loads at the Cos Cob Substation for 2014-2016 as shown in Table E-1 of Eversource's June 2015 Application, compared to the actual peak loads for those years, as shown in the table attached to Eversource's Response to Q-CSC-011 dated June 30, 2017:

Table 1: Cos Cob 27.6-kV System Peak projected vs. actual recorded peak - Load in MVA

Year:	2014	2015	2016
Projected peak load	131.8	133.1	134.5
Actual peak load:	107.7	114.8	115.6
% Over-projected:	18.3%	13.7%	14.1%

Table 2 below compares Eversource's projected available capacity on the 135 MVA-capacity 27.6-kV transformers at Cos Cob Substation for 2014-2016, compared to the actual available capacity for those years:

Table 2: Cos Cob 27.6-kV Transformers (135 MVA capacity) projected vs. actual capacity - in MVA			
Year:	2014	2015	2016
Projected available capacity:	3.2	1.9	.5
Actual available capacity:	27.3	20.2	19.5
Available capacity above projections:	24.1	18.3	18.9

Eversource over-projected the peak load usage, and under-projected the amount of available capacity, on the 27.6-kV transformers at the Cos Cob Substation for all of the years since 2013, even though 2016 was the hottest summer on record in the State of Connecticut.

Despite these erroneous projections, Eversource has not updated them – and continues to rely on them – despite the decline in load usage. Accordingly, to the extent the claimed need for this project is based on the supposed imminent risk of the Cos Cob Substation 27.6-kV transformers reaching their limits, this need has not been demonstrated.

Q. Is the Town's population expected to grow?

A. No. The Town has not experienced significant population change over the last twenty years, and the population of Greenwich is in fact projected by the Connecticut Economic Resource Center to slightly decrease by 2020. Thus, Eversource's overly aggressive load projections are inconsistent with the realities of actual and future load usage in Greenwich. See the Connecticut Economic Resource Center Data Sheet for the Town of Greenwich dated October 2014, attached as Exhibit B to the Town's Response to Interrogatory Q-2 dated February 16, 2016.

Q. Is the Town participating in any programs designed to reduce electrical usage in Greenwich?

A. Yes. The Town fully recognizes the importance of load-reduction efforts, and it is working with Eversource and Energize CT on a program designed

to reduce load usage in the Town. As shown in the Eversource Presentation to Town of Greenwich dated May 12, 2017 the Town is a "Clean Energy Community" and it has committed to a 20% reduction in energy use by 2018. A copy of the Eversource Presentation is attached hereto as *Attachment B*.

Since 2008, the Town has participated in the CT Clean Energy Community. Over this time, the program has expanded from a focus on alternative energies to a concerted effort on energy efficiency. Greenwich has embraced these changes and participated in numerous programs including Solarize CT and C-PACE. During this past year, the Town, working with Eversource, has completed an updated benchmarking of all Town buildings, an audit of a selected Town building, and it will be implementing an energy efficiency plan as a pilot with Eversource. On the community side and again working with Eversource, the Town launched the Home Energy Solutions program in 2016, and it will be launching the Small Business Energy Advantage program in the fall of 2017 working with our Chamber of Commerce. The Town and Eversource are now engaged in the development of a strategic partnership to promote energy efficiency among the Town's residential and consumer customers as outlined in the attachment. See Eversource Presentation at p. 6. We are hopeful that all of these measures will enhance conservation in the Town, and reduce the Town's load usage, further demonstrating why Eversource's load projections are over-stated.

Q. How much added 13.2-kV transformer capacity will the Alternate Modified Project provide for the electrical system in the Town?

A. 5 MVA. In Docket 461, Eversource proposed retiring the transformers at the Byram and Prospect Substations (combined 80 MVA of capacity) with a new 134 MVA capacity substation for a net increase of 54 MVA in 13.2-kV transformer capacity. In this Docket 461A, Eversource proposes

retiring only the transformers at the Prospect Substation (55 MVA of capacity) with a new substation containing 13.2-kV transformer capacity of 60 MVA, for an increase of only 5 MVA in capacity.

Q. Is Eversource's proposal a cost-effective approach?

A. No. The Town believes that the current proposal is too expensive for the minimal benefit received in return. Indeed, the original proposal in Docket 461 contemplated a larger new substation with 134 MVA of 13.2-kV transformer capacity at a cost of $140 million. Table 3 below compares the estimated costs per MVA of 13.2-kV capacity and additional MVA of 13.2-kV capacity of the proposed project in Docket 461 with the Alternate Modified Project in this Docket 461A:

Table 3: Cost comparison
Preferred Route in Docket 461 vs. Alternate Modified Project

	Cost	13.2-kV Capacity of new substation (in MVA)	13.2-kV capacity to be retired (in MVA)	Additional 13.2-Kv capacity (in MVA)	Cost per MVA of new substation	Cost per MVA of additional 13.2-kV capacity
Proposed Route in Docket 461:	$140,000,000	134	80	54	$1,044,776.12	$2,592,593
Alternate Modified Project:	$100,000,000	60	55	5	$1,666,666.67	$20,000,000

Eversource has proposed a $100 million project for a mere 60 MVA of 13.2-kV transformer capacity. For just an additional 5 MVA of 13.2-kV transformer capacity, a project costing $100 million is not cost-effective. Compared to the original proposal in Docket 461, the current transmission-based proposal costs an additional $600,000 per MVA of 13.2-kV transformer capacity, a 63% increase in cost per MVA. The cost per additional MVA of 13.2-kV transformer capacity in the Alternate Modified Project is more than seven times more than that in Docket 461.

Finally, the proposal does not sufficiently improve the reliability of electric service to the Town. As noted above, a far more prudent expenditure would involve upgrades to the Town's 27.6-kV and 13.2-kV distribution system. Eversource has demonstrated that two new 27.6-kV feeders can be installed at substantial distances, at a cost of around $22 million. See Docket 461, June 2015 Application, p. E-16, Table E-4.

Q. Please summarize your suggested measures to improve system reliability in Greenwich.

A. In summary, the following upgrades would do far more to improve the reliability of the Town's electrical system compared to Eversource's proposed new 115-kV to 13.2-kV substation on Railroad Avenue:

- Construct a new indoor substation at 281 Railroad Avenue, in place of the aged equipment at the Prospect Substation.
- Reconductor and reconfigure all four 27.6-kV feeders 11R51, 11R52, 11R55, and 11R58, which are not operating properly.
- Instead of feeding the new substation with a 115-kV transmission line, feed the new substation with at least two reconductored 27.6-kV feeders coming out of the Cos Cob substation. The two new feeders should be "express" feeders from Cos Cob to the new substation, and should not be tied to the Greenwich Network.
- Rebuild the Tomac Substation, as follows:
  a. The Tomac Substation is currently tied to only one of the two 115-kV transmission lines originating in Stamford. Add a second tie to the other 115-kV overhead line which provides a second 115-kV feeder source.
  b. Add a second 115-kV - 27.6-kV transformer (or two new ones so the existing transformer can be replaced), which allows Tomac to feed Mianus from two separate sources.
  c. Build a second 27.6-kV feeder line between Tomac and Mianus. Currently there is only feeder, 12H59. This would

allow Mianus to always be fed from Tomac and not from the 27.6-kV transformers at Cos Cob, thereby reducing load on the Cos Cob transformers.

d. Install two new 115-kV - 4.8-kV - 13.2-kV dual voltage transformers in Tomac and new 13.2-kV switchgear. That prepares Tomac for any eventual changeover to 13.2-kV, eliminating the only 4.8-kV distribution line in Greenwich.

- Rebuild and upgrade the Byram Substation, including upgrading its presently "obsolete" equipment.
- Examine shifting load to the under-utilized North Greenwich Substation.
- Continue to partner with Eversource to implement the Town's energy efficiency plan.

Q. Why will your proposed suggested measures provide more system reliability in Greenwich than Eversource's proposal?

A. Unlike Eversource's proposal, our plan addresses many of the significant deficiencies in the Greenwich electrical system. Our proposal addresses the need to upgrade the failing 27.6-kV feeders coming out of the Cos Cob Substation. It connects the Tomac Substation to each of the 115-kV transmission lines originating in Stamford, which thereby provides an additional feeder to the Tomac Substation. It addresses the need to upgrade the "obsolete" equipment at the Byram Substation.

In sum, this proposal provides more "bang for the buck" and does far more to address the true system reliability issues in Greenwich than does Eversource's transmission-based proposal.

The Town's concerns with an open-air substation at 290 Railroad Avenue

Q. What are the Town's concerns with Eversource's proposal to build an open air substation at 290 Railroad Avenue?

A. For safety reasons, any new substation on Railroad Avenue must be an indoor substation. Because Eversource's proposed new substation at 290 Railroad Avenue would have an open-air design, the majority of the proposed new substation at 290 Railroad Avenue would rely on the air space around it for electrical separation. Electrical wires are usually covered in non-conductive insulation to prevent their being contacted by people or objects. At higher voltages, where there is a significant amount of current to be carried, hollow tubes (most often made from aluminum) resembling pipes are used instead of wires. Each of these is called a "bus" and each bus is uninsulated. To prevent a bus from shorting out on an adjacent bus, there must be a minimum air space maintained between the two.

Unlike in an indoor substation, equipment in an open air substation, such as disconnect switches, are not contained. When these are opened or closed there is a visible flash, a spark that occurs. This spark is essentially a fire. (There are numerous videos of these fires available on YouTube using the search terms, "Operation of 115kv Switches.") In addition, there can often be a very loud banging noise when equipment is operated.

Transformers contain tens of thousands of petroleum-based, flammable, dielectric fluid, and they can and do catch fire. While most circuit breakers no longer contain dielectric fluid, they too have been known to catch fire. It is for good reason that first responders from municipalities will not attempt to fight a fire in a substation until representatives from the utility have arrived.

Developments in high voltage equipment have allowed the construction of totally enclosed indoor substations. Building an open air substation in close proximity to any form of occupied building has become rare. Utilities such as Consolidated Edison Company of New York, Potomac Electric Power Company, and Atlantic City Electric, have all advanced to construction of indoor substations for their most recent substations, even at voltages of 115-kV and higher. Eversource should be held to the same standards, for the protection of the Town's residents and businesses.

Q. Does the Town have a particular concern with Eversource's proposal to build the new substation at 290 Railroad Avenue?

A. Yes. As real as the risk of fire is for a typical 115-kV open air substation, locating the site at 290 Railroad Avenue poses an even greater concern. The property to the immediate south is an Airgas facility that stores compressed gases. Many of these gases are flammable, such as propane and acetylene. Some of these gases support burning, such as oxygen. Others are extremely hazardous when released into the atmosphere, such as chlorine. The storage facility is surrounded by signs reading: "No smoking," "No sparks," and "Shut Engine Off." Locating an open-air 115-kV substation next door to the Airgas facility is a safety risk that can and should be avoided.

Very often in substation fires there is a leakage of dielectric fluid, usually from transformers. Transformer cases can and do rupture sometimes without explanation. A fire in Consolidated Edison Company of New York's Dunwoodie Substation in Yonkers resulted in a dielectric fluid leak that eventually contaminated the Hutchinson River. If the oil containment and fire walls that are missing around the 27.6-kV transformers in the Cos Cob Substation are typical of the preventative measures Eversource employs, they are several iterations removed from the precautions other utilities, including Consolidated Edison Company of New York, currently

subscribe to. In addition, 290 Railroad Avenue is at a higher elevation than Horseneck Brook, which is less than 100 feet from the edge of the property. Horseneck Brook flows directly into Long Island Sound. Indeed, 290 Railroad Avenue is in a FEMA flood zone. An open-air 115-kV substation should not be constructed at this site.

Q. Would construction of a new substation at 290 Railroad Avenue pose a nuisance for residents?

A. Yes. If the substation were to be located at 290 Railroad Avenue, Eversource has made it clear that it would also employ 281 Railroad Avenue as a construction storage yard for the building of the new substation and the associated circuits. Personnel, equipment and vehicles would be in and out of 281 Railroad Avenue at all hours of the day and night for the duration of the project. This would be a significant annoyance to the many people living near Railroad Avenue.

Q. Would you support an open air substation if site conditions differed from Railroad Avenue?

A. Yes. Assuming the location were isolated and not surrounded by buildings, for instance if the substation were situated next to an open field, an open air substation would be acceptable. An open air substation should certainly not be situated next to a compressed gas storage facility. Building an indoor substation is not motivated by aesthetic concerns but by safety and prudence.

Q. If the Siting Council approves a new substation, where should it be located?

A. If the Siting Council approves a new substation, the Town urges that it be a fully-enclosed indoor substation at 281 Railroad Avenue. In addition, if the Siting Council approves a new substation at 290 Railroad Avenue, the

Town maintains that it be a fully-enclosed indoor substation rather than an open-air substation as proposed by Eversource.

In addition, unlike the site at 290 Railroad Avenue, Eversource already owns 281 Railroad Avenue. The site is vacant and is presently used for storage. It has a street on both its north and south boundaries to aid in firefighting. Since it is abutted by buildings on its east and west boundaries, it should not house an open air substation and instead, it must be an indoor substation. Locating an indoor substation between residential structures was recently accomplished with much success by Atlantic City Electric.

Since the equipment would all be fully-enclosed (with the exception of the transformers which are also indoors but instead of being in a roofed enclosure, have a metal screen above them to keep out any airborne debris), the risk of debris landing on the equipment is avoided. With the environs being fully enclosed, it is possible to have smoke and heat detection systems placed around all the equipment. An indoor substation, unlike an open air substation surrounded by a wall or visual screen, is usually difficult to discern as a substation. For example, Atlantic City Electric's substation at Peermont Avalon looks identical to the other beach houses on the block, and the New York Power Authority's facility on Davenport Avenue in New Rochelle is indistinguishable from its residential neighbors. As a result, an indoor substation poses less of a target for those wanting to do harm to the facility.

Furthermore, indoor substations create far less audible noise from their operations than open air substations. In addition, they mitigate the risk in the event of an uncontained dielectric fluid leak. Importantly, 281 Railroad Avenue is also well away from the Airgas storage facility.

To date, Eversource has not demonstrated that it has undertaken the investigatory steps needed to determine the extent of the safety risks posed by siting an open air substation at 290 Railroad Avenue. In addition, Eversource has not described in its application how it will construct a substation at 290 Railroad Avenue in a manner that would mitigate those risks.

As a result, the Town prefers that any new substation be a fully-enclosed indoor substation located at 281 Railroad Avenue.

The costs of the Alternate Modified Project are overstated.

Q. Do you believe the Eversource estimate of $100 million is a reasonable estimate for the construction of the Alternate Modified Project?

A. We believe that Eversource's $100 million estimate is overstated, for a number of reasons. In particular, the $57.1 million estimate relating to the installation of the underground XLPE transmission line is high.

Q. Explain why Eversource's estimate for the installation of the underground cables in the Alternate Modified Project is inflated.

A. There should be significant reduced costs associated with: 1) the cost of installing XLPE cables, 2) the number of manholes required for the all-underground route, and 3) the size of the copper conductors.

Q. What savings should be achieved in installing the XLPE cables?

A. There should be significant reduced costs associated with the cost of installing the XLPE cables.

In Docket 461, Eversource testified that "the estimated cost of the underground transmission line work is $72 million." See Docket 461, Pre-Filed Direct Testimony of Kenneth B. Bowes, Raymond Gagnon and Jacqueline Gardell dated August 25, 2015, at p. 29. That "underground

transmission line work" consisted of two, 8" steel pipes to house cable, and a third 8" steel pipe to allow for fluid recirculation in the future. It included two HPFF circuits extending from the Cos Cob Substation to a new substation on Railroad Avenue. In Docket 461, Eversource had proposed an unacceptable route through Bruce Park, using horizontal directional drilling.

Because Eversource will not be utilizing horizontal directional drilling in the Alternate Modified Project, there will be a savings of approximately $21 million, based on Eversource's submissions in Docket 461. See Docket 461, Eversource's Response to Q-OCC-003 dated August 18, 2015. Although the horizontal directional drilling has been eliminated, in the Alternate Modified Project, a small portion of the $21 million savings is offset by increases in other civil construction costs. For example, in the Preferred Route in Docket 461, the drills would have measured 4800 linear feet in length. A major portion of that length has to be "open cut" in the new design in the Alternate Modified Project, corresponding to an additional 758 cubic yards of excavation. The cost of this added trenching in the Alternate Modified Project's XLPE scheme is approximately $500,000. In addition, the HPFF scheme in the June 2015 Application featured seven, very large manholes; whereas the XLPE scheme in the Alternate Modified Project has sixteen, smaller vaults. These additional vaults are likely to cost, in total, $750,000. **Accordingly, the use of open-cut XLPE conductors, rather than directional-drilled HPFF conductors, results in a net savings of $19.75 million without any form of markup.**

In addition, the change from HPFF to XLPE cables will result in a substantial savings. The steel pipe used in an HPFF cable design, with its welded joints, has been eliminated and replaced by a conventional PVC (plastic) duct. Unlike the HPFF cable system, the XLPE circuits do not

require a fluid pumping plant, tens of thousands of gallons of DF-100 dielectric fluid, hand taped joints and terminations, or welded pipe joints that must be X-rayed, pressure tested and vacuum tested. In addition, the XLPE cables require a narrower trench.

The specified HPFF cable is $50 per foot of conductor more expensive than the XLPE cable now proposed. With a quantity in excess of 72,000 linear feet of cable (two circuits, each 2.3 miles, with three cables per circuit), the change from HPFF to XLPE would save over $3.5 million. In total, a comparison of the purchase price of the material needed to construct an XLPE system instead of an HPFF system yields a **net savings of over $6.2 million in direct costs, without any form of markup.**

There is also significant labor savings associated with not having to weld the steel pipe, conduct the various tests associated with the steel pipe, or utilize the highly specialized skills required of the HPFF cable installers and jointers. **The net savings in labor costs would be in excess of $1.5 million without markup**.

Accordingly, as presently designed, in the Alternate Modified Project, the XLPE feeders could be constructed at a savings of $27.45 million compared to the HPFF feeders proposed in Docket 461. Therefore, the cost of the underground transmission line should be reduced from $72 million to $44.55 million.

Q. What other savings of the cost of the electrical material (conduit, wire, splices, terminations, etc.) needed to construct the circuits should be realized by substituting XLPE cables for HPFF cables?

A. The 115-kV XLPE cable between the Cos Cob Substation and a new substation on Railroad Avenue is projected to be 2.3 miles in length. That

route is slated to feature manholes at eight locations, which would result in there being nine cable segments in the entire run from point to point. That averages 1349.3 feet per cable segment.

In 2015 and originally in this docket, Eversource proposed a combination "hybrid" overhead and underground cable route between the same two points. The westernmost portion of the hybrid design was to feature the very same cable as is being proposed for the totally underground route in the Alternate Modified Project. In its hybrid proposal, Eversource planned to run this same cable from the western transition poles (east of Steamboat Road in the Metro North Right of Way) to a new substation on Railroad Avenue, a distance of over 2600 linear feet without a manhole. See Docket 461, January 12, 2016 Hearing Tr. at p. 86, Line 17.

In order to locate manholes for splicing, a detailed analysis of the projected tension anticipated during the pulling of the cable must be performed. The changes in elevations of the conduit as well as the number, severity and gradualness of all the cable bends impact the final numbers. There are limits to the tension any cable can be subjected to. Only via these studies can one precisely know the number of splice vaults that would be necessary and their location.

Based on Eversource's prior assertion that a length of cable in excess of 2600 feet could be installed without a splice, it is likely that the need for a manhole every 1349.3 feet in the Alternate Modified Project can be amended. If the manholes were reduced from the present eight locations to five locations, the average length per cable segment would be 2024 feet, still considerably shorter than the 2600 feet previously proposed by Eversource in the hybrid underground/overhead designs.

Eliminating three manhole locations would correspond to saving the cost of six manholes (each of the two feeders has its own set of vaults), 18 cable installations and 18 cable splices. **In total, that would result in savings of $1.5 million without markup.**

Q. What savings should be achieved with appropriately-sized copper conductors?

A. In Eversource's June 2015 application, the proposed substation on Railroad Avenue was sized based on a proposed capacity of 134 MVA. By contrast, in the present design, the new substation is described as being 60 MVA. See Docket 461A, Eversource's Response to Q-CSC-023 dated June 12, 2017. In the June 2015 Application, the HPFF feeders to the new substation were to be 3500 kcmil Copper. In this docket, the XLPE feeders are described as also being 3500 kcmil Copper. Under normal operation, the current carrying capabilities of HPFF cable and XLPE cable are the same. Whereas in the Alternate Modified Project, the substation capacity was reduced by over 50%, the 115-kV feeders to it remain the same size. This can and should be corrected.

A 60 MVA, 115-kV substation can deliver approximately 318 amperes. A set of three, 115-kV, 3500 kcmil Copper, XLPE feeders can carry 1400 amperes. Accordingly, the present feeder design could carry more than four times the ampacity of the designed capacity of the substation it is feeding.

Without question, a smaller diameter copper conductor, could be used to feed the new substation and still have ample reserve capacity. A smaller conductor results in a less expensive cable (more than 72,000 total feet of cable will be needed). A smaller conductor reduces the overall total diameter of the cable. A cable of smaller diameter requires smaller conduits. Smaller conduits result in narrower and shallower trenches, greatly reducing the cost of the civil construction component of the

installation. Smaller conductor cables weigh less and therefore can be pulled longer distances, possibly allowing the number of manholes to be reduced.

In total, we estimate the cost savings associated with proper sized copper conductors to be as much as $2.5 million without markup.

Q. Is there any other added cost associated with the Alternate Modified Project that can be eliminated?

A. Yes. There remains the issue of how to cross Indian Harbor at Davis Avenue. In the Alternate Modified Project, Eversource assumes construction of a pedestrian bridge at a cost of $2.9 million. Eversource has offered an alternate involving a cofferdam that would reduce that price to $1.1 million. Eversource offers no details as to how it would construct the cofferdam and the Town has serious concerns about a cofferdam's impact on Bruce Park. If Eversource's intent is to build the cofferdam with cranes mounted on a floating barge system in a way that does not impose an unacceptable environmental impact on Bruce Park, use of a cofferdam may present a viable construction option at a cost savings.

Q. Can you quantify the amount of total cost savings that should be achieved in the Alternate Modified Project?

A. Eversource estimates the cost of building the transmission line in the Alternate Modified Project to be $57.1 million. See Docket 461A, Petition for Reconsideration, Exhibit B, Section A, p. A-17. Based on the net savings identified above, and as set forth in Table 4 below, a more accurate estimate for the actual cost for construction of the transmission line should be approximately $38.75 million, more than $18 million less than Eversource's estimate.

Table 4: Cost Savings in Alternate Modified Project	
Item	Amount
Eversource's estimated cost of underground transmission line in Docket 461:	$72,000,000
Net amount saved by open-cutting rather than horizontal directional drilling:	($19,750,000)
Material costs saved by using XLPE rather than HPFF cables:	($6,200,000)
Labor costs saved by not using HPFF cables:	($1,500,000)
Costs saved by reducing number of manholes:	($1,500,000)
Costs saved by using appropriately-sized copper conductors:	($2,500,000)
Costs saved by use of cofferdam in lieu of pedestrian bridge:	($1,800,000)
Total savings:	($33,250,000)
Estimated cost, after savings, of underground transmission line:	$38,750,000

Q. Even with these cost savings, does the Town believe that this project should be adopted?

A. No. As noted above, the Town questions the need for the proposed transmission-based project and whether the reliability of service to customers in Greenwich will be sufficiently improved with this project. The Town continues to believe that a better solution to the Town's energy needs involves the suggested measures it identified on pages 23 – 24 above, rather than this transmission-based proposal. However, if Eversource proves the need for this project and that the project will sufficiently improve system reliability, then the Town supports the Alternate Modified Project, subject to the construction restrictions described above, and suggests that it can be constructed with the cost savings outlined above.

ATTACHMENT A

Katharine A. DeLuca, AICP
Greenwich Town Hall
101 Field Point Road
Greenwich, Connecticut 06830
(203)622-7894

Employment

Town of Greenwich (Planning and Zoning Department)
Greenwich, Connecticut *September 2014 - Present*
Director of Planning and Zoning/Zoning Enforcement Officer/Town Planner

- Provide technical guidance, advice and assistance to the P&Z Commission, zoning enforcement staff, elected officials, Town Departments and Boards, and the general public on the Town's physical development and on matters of regulation enforcement, violations, interpretation of the Building Zone and Subdivision Regulations, conditions of approvals and a broad range of planning, zoning, enforcement, nuisance and land use activities.
- Recommend new or modifications to the Town's Building Zone and Subdivision Regulations and oversees the enforcement of the Zoning Regulations and conditions of application approvals.
- Review Town-wide development proposals, and works with the town's boards and Departments in the implementation of the goals and policies of the Plan of Conservation and Development. Exercises considerable latitude for independent initiative and action within the scope of department programs and policies.
- Make public presentations of technical analyses, proposed amendments to the Building Zone and Subdivision Regulations, and planning studies for various audiences including the P&Z Commission, the Board of Selectman and Representative Town Meeting, real estate firms, and community stakeholders.
- Manage and develop policies and procedures of the department, appropriate delegation of the work flow to staff and implementation of an efficient office organization. Demonstrate continuous effort to improve operations, decrease turnaround times, streamline work processes, and work cooperatively and jointly to provide quality seamless customer service.
- Supervise, manage and coordinate the department assignments, daily operations and office activities of a 17 member professional and administrative team comprising the Planning and Zoning (P&Z) and Zoning Enforcement Department. Handle all personnel actions such as hiring, termination, staff training and development, assignment, and performance evaluations.
- Represent the Planning and Zoning Commission to the public, the media and outside groups and agencies. Testify on Commission actions, and coordinate the preparation of materials for presentation in court.
- Prepare the Department budget and attend all applicable meetings with the Board of Estimation and Taxation (BET) and Representative Town Meeting (RTM) Committees to defend budget, demonstrate control over expenditures and assure consistency and conformance with established goals and objectives.
- Provide analytical reviews of applications for Commission public meetings; attend the P&Z Commission meetings and explain written positions in meetings. Coordinate and maintain

flow of information among Town agencies and departments regarding application reviews from each Commission meeting. Conduct field inspections.

- Provide advice and guidance on the production and implementation of planning studies that guide development and establish the framework for regulations.

Town of Greenwich (Planning and Zoning Department)
Greenwich, Connecticut — *October 2005 – 2014*
Deputy Director of Planning and Zoning

- Worked under the general direction of the Planning and Zoning Director/Zoning Enforcement Coordinator (Town Planner) and assumed the duties, responsibilities and authority of the Director in her absence.

Town of Greenwich (Planning and Zoning Department)
Greenwich, Connecticut — *August 2000 - 2005*
Planner II

- Coordinated and managed the work flow to ensure an efficient schedule and time-line on items from everyday office function to complex projects.
- Supported the Greenwich Planning and Zoning Commission through the application review process of public hearing and administrative level applications by preparing staff reports, maps and graphics to illustrate findings, summarizing proposals and comments solicited from other departments, and drafting decision letters, building permit and Certificate of Occupancy sign-offs.
- Assisted the public and answer questions related to application procedures, reading, analyzing, and interpreting engineering and architectural plans submitted in support of zoning applications in addition to providing demographic data from the U.S. Census Bureau.
- Used GIS for several Town-wise projects the R-6 Zone Study, the Town-wide Floor Area Ratio Analysis, and the inventory and mapping of Town-owned properties.

Town of Greenwich (Planning and Zoning Department)
Greenwich, Connecticut — *August 1999 - 2000*
Planner I

- Critiqued and assembled documents from site plan or subdivision files to create a Return of Record which is used by the Law Department and the Town Planner in litigation with the Town.
- Analyzed site plan and subdivision applications for Commission action including writing staff reports, decision letters, and Planning and Zoning sign-off letters to the Building Department.
- Reviewed applications for the Architectural Review Committee (an advisory board to the Planning and Zoning Commission) for zoning compliance in addition to preparing agendas, minutes, and assisting the Committee at regularly scheduled meetings.

- Worked closely with other Town of Greenwich Departments to collect, present, and analyze information for the Planning and Zoning Commission in order to facilitate their decision making on pending applications.
- Responsible for routing pending applications to other Town of Greenwich Departments for their comments.
- Assisted the public in answering questions about the Town of Greenwich zoning and subdivision regulations.
- Created GIS data layers for Town-wide use including the newly adopted Sewer Boundary Map and the Open Space Map.

Capitol Region Council of Governments
Hartford, Connecticut *January 1999 – May 1999*
Intern
- Developed a methodology to illustrate the encouragement of smart growth as supported by the town's Zoning and Subdivision Regulations.

UCONN Center for Geographic Information and Analysis
Storrs, Connecticut *January 1999 – May 1999*
ESRI Site License Manager and GIS Analyst
Research Assistant for the Department of Geography
- Distributed and installed ESRI Software at Public Education Institutions in Connecticut. Required written and verbal communication with individuals from technical and non-technical backgrounds. Assisted in the creation and maintenance of an Access 97 database of the participants.
- Created and presented several ArcView workshops for faculty and students at the University of Connecticut.
- Responsible for the correspondence between the editor and the authors of potential publications in the journal *Cartography and Geographic Information Systems.*
- Integral part of a team that created Federal Geographic Data Commission compliant metadata for Connecticut geospatial data.

Department of Geography
University of Connecticut, Storrs, Connecticut *August 1997 – May 1999*
Teaching Assistant
- Assisted the Professor in teaching a graduate level course in NT ARC/INFO.
- Taught ArcView and Idrisi in the laboratory component of an undergraduate course entitled "Introduction to GIS".

Education

University of Connecticut
Storrs, Connecticut
M.A. awarded 2003 (Major: Geography)
Specialization in land use planning and GIS.
Thesis titled, Using a Geographic Information System to Model Alternative Land Use Scenarios at the Watershed Scale

University of New Hampshire
Durham, New Hampshire
B.A. awarded 1996 (Major: Geography; Minor: Spanish)

Skills ArcGIS, Idrisi, Microsoft Word, Excel, Access, PowerPoint, CityView, OnBase

Awards Town of Greenwich Award of Excellence, 2001
Town of Greenwich Personal Achievement Award, 2003
Town of Greenwich Manager of the Year, 2011

Denise M. Savageau
Conservation Director, Town of Greenwich
101 Field Point Road, Greenwich, CT 06830
203-622-6461 denise.savageau@greenwichct.org

Professional Profile

- Senior environmental professional with over 30 years of public sector experience working with local, state, and federal government.
- Diverse experience integrating natural resource management, land use planning, environmental regulation, resource economics, and related public policy matters.
- Visionary leader with demonstrated success in program development, administration, and implementation.
- Solid experience in inter and intra-governmental coordination and public/private partnerships.
- Skilled communicator with proven ability in public speaking, media relations, public outreach, and sustainable literacy.

Education
University of Connecticut, Storrs, Connecticut
Bachelor of Science in Agricultural Economics – 1985
Concentration in Resource Economics and Natural Resource Management – Magna Cum Laude

University of Massachusetts, Amherst, Massachusetts – 1972-1974

Salaried Positions

Conservation Director, Town of Greenwich, CT – November 1997 to present
Overall tasks: Serves as department head for the Conservation Department. Responsibilities include managing the day-to-day operations of the Commission and providing recommendations to all Town departments on conservation/environmental matters including, but not limited to, drinking water supply protection, watershed management, flood protection, open space protection, Brownfield redevelopment, wildlife management, fisheries restoration, and community resiliency/sustainability initiatives. Serve as part of the Town's Emergency Operations Team providing GIS and real time water data support in the local EOC. Work extensively in public relations and outreach with excellent speaking and media relations skills. Experience and workload includes:

1) **Drinking Water Supply Protection/Drought Response** – both surface and groundwater
   a) Lead staff on water supply team and liaison to water company and State agencies
   b) Continual monitoring of water supply for early signs of drought using real time data from various sites including USGS
   c) Coordinates Town response during water supply emergencies

2) **Open space protection and management**
   a) Oversees open space protection of Town of Greenwich including the development and implementation of the Open Space Plan. Coordinated protection of over 311 acres of open space providing administrative and technical support including preparation of natural resource inventories of sites, GIS mapping, formulation of cost-benefit analysis,

and coordination with. Properties included Pomerance/Tuchman, Blake/Colman, Treetops and Calf Island.

b) Oversees inventory of open space both public and private using GIS.
c) Coordinated the creation of new GIS layers for open space including links to deeds/land records.
d) Developing recommendations for use of town-owned open space and on parcels for acquisition/protection and coordinates implementation with other departments
e) Serve as liaison to the Greenwich Land Trust and other groups working on open space providing resources (e.g. GIS assistance) to accomplish common open space goals
f) Lead staff on open space special projects, including acquisition, easements, enhancement, and restoration and natural resource inventories.

3) **Watershed Planning and Management**
   a) Coordinates watershed planning and protection throughout Town of Greenwich
   b) Led the development and EPA approval of the Mianus River Watershed Plan.
   c) Assisted SWRPA with the develop and EPA approval of the Byram River Watershed Management Plan
   d) Serves as liaison between community watershed groups and other town departments
   e) Performs technical review of land use applications and field inspections for E&S controls and storm water management. Overhauled E&S review procedures for Planning and Zoning. Coordinates E&S controls during construction with post construction BMP implementation.
   f) Serves on storm water management team that developed and now implements the MS4 storm water management program.

4) **Technical Assistance to Planning and Zoning**
   a) Review P&Z applications for conservation concerns including, but not limited to, impact on water resources including drinking water supplies and coastal resources, open space, tree protection, wildlife/ habitat, and cultural resources.
   b) Technical advisor for archaeological sites
   c) Lead for Conservation Commission on the development of the Plan of Conservation and Development and implementation of assigned tasks to the Commission including the Open Space Plan and Natural Resource Inventory.

5) **Wildlife/Fish and Habitat Management**
   a) Directs surveys and provides technical assistance on key wildlife issues and habitat protection/restoration efforts on both public and private lands.
   b) Coordinates with P&R on management of open space parks including critical habitats and invasive species control.
      i) Manages survey of mile-a-minute weed and participates in biological control monitoring for CT Invasive Plant Working Group
      ii) Oversees the protection and management of the two Important Bird Areas in Greenwich (Greenwich Point Park and Great Captains Island) and serves as liaison with Audubon CT.
   c) Supports Shellfish Commission with protection and enhancement of shellfishery in Greenwich waters.

d) Coordinates with state and federal programs including CT DEEP, NOAA, USFWS, and EPA LISS.
e) Established Habitat Volunteer Program that includes but is not limited to:
    i) Vernal pool surveys and monitoring on town owned land and participation in Frogwatch monitoring program. Conducts training for Greenwich and other local conservation and inland wetland commissions on vernal pools.
    ii) Horseshoe crab monitoring and tagging program in coordination with CT DEEP and Project Limulus
    iii) Operation and management of Mianus River Fishway, a diadromous fishway that supports the migration of alewives, blueback herring, and American eel. Includes twice daily monitoring/data collection during spring migration to support CT DEEP program.
    iv) Installation and management of purple martin houses at Greenwich Point. Conducts survey and bird banding in coordination with CT DEEP.
    v) Participation in state and federal shore bird surveys including piping plover, American oyster catcher, and osprey.
    vi) Establishment of eBird (Cornell University) hotspots at Town parks to harness citizen science monitoring
f) Nuisance Wildlife/people conflicts - provide technical support to First Selectman and all Town departments, and residents.
    i) Developed and directs the Town's resident Canada goose management program focusing on population stabilization through a coordinated egg oiling program using the USFWS Resident goose registration program. Provides training to staff and residents on humane egg oiling protocol.
    ii) Promotes and directs the Conservation Commissions deer management plan on public and private lands to reduce impact of deer on biodiversity, reduce incident of Lyme disease, and reduce the number of deer/vehicle accidents. Coordinates survey of deer population and herd reduction strategies with CT DEEP and the Fairfield County Deer Management Alliance.
    iii) Coordinates education and outreach on wildlife/human interactions including development of "Living with Wildlife" factsheets for Coyotes and Black Bear. Handles media and serves as liaison to Police Department and CT DEEP.
    iv) Supports Health Department with implementation of vector disease prevention including using best management practices for mosquito controls

6) **Community Resilience Planning/Emergency Preparedness**
    a) Guided successful inclusion of climate change into the Town's planning process including the Plan of Conservation and Development.
    b) Coordinate with P&Z and other departments on planning for coastal resiliency and flood plain management and serve as part of the Town's Emergency Operations Center Team providing technical support on tidal and stream gages, GIS mapping, etc.
    c) Coordinate/facilitate outreach efforts on flood protection and management working with EMOC, DPW, P&Z, and local neighborhood groups
    d) Initiated the use of real time water data into emergency operations on the local level in 2006. Expanded work to include GIS applications in correlation with the real time

data. Featured in NOAA Coastal Service magazine May/June 2013 issue. http://csc.noaa.gov/digitalcoast/publications/coastal-services-may-and-june-2013

e) Prepared maps and property lists for Emergency Operations Center beginning in 2011 using Town GIS data. Incorporated 2 foot contours to better predict targeted areas in correlation with SLOSH maps. Collected post storm data of wrack lines for storms Irene and Sandy and incorporated into GIS. Directed creation of new GIS layers using post-Sandy LIDAR that include 1 foot contours and catch basin elevation data.

f) Coordinated installation and maintenance of stream flow gage on Byram River with USGS and Emergency Operations team in Greenwich. Have now correlated gage readings with actual water elevations in field for use by emergency operations. Use this gage and surrounding gages to monitor water conditions year round for drought and flooding applications.

g) Coordinated installation and maintenance of tidal gage at Grass Island with USGS. Have now correlated gage reading with water elevations in coastal flood areas in Greenwich for use in field by emergency operations. Use this and NOAA gages during coastal storm events.

h) Prepared and presented post-Sandy information to numerous local audiences now available on town website. http://www.greenwichct.org/upload/medialibrary/d01/Sandy-A_Look_at_Coastal_Flooding.pdf

i) Coordination of Hazard Mitigation Grant program in 2013 to elevate homes in flood prone areas. As of 2/12/2015, 14 homes have been approved by FEMA and are in various stages of project completion.

j) Secured Coastal Resiliency grant for P&Z and Conservation to begin development of database on base flood elevations for all residential homes in Greenwich's coastal flood zones.

k) Serving on advisory committee for Coastal Storm Awareness Program (CSAP) for tri-state Cooperative Extension effort looking at human behavior/response to major storm events including pre-storm warnings. Coordinated focus local focus groups with researchers looking at resident evacuation decisions.

7) **Sustainable Community Programs**

a) Liaison to CT Green Bank and the CT Clean Energy Community including participation it the CT Solarize, CT C-Pace programs, Home Energy Solutions, Small Business Energy Advantage, and town benchmarking.

b) Coordinated energy efficient block grant program resulting in 90+kW PV installation at the Glenville School

c) Oversees the development and implementation Leaf Recycling and Home Composting Program involving residential and school facilities.

d) Initiated Brownfield to Greenfield project at the former Cos Cob Power Plant including succeeding in an EPA Targeted Brownfield Assessment and following up with writing an EPA Brownfield Clean Grant, which resulted in the opening of the Cos Cob Park in 2015.

8) **Cultural Resource Conservation**
   a) Directs inventory of historical and archaeological resources on public and private properties including the recently completed historic survey of Old Greenwich and the ongoing archaeology surveys are Greenwich Point.
   b) Provide support for Certified Local Government program in coordination with Historic District Commission and Planning and Zoning
   c) Promotes the adaptive reuse of historic buildings through public/private partnerships – recent successes include the Cos Cob Pump Station redevelopment by Greenwich Adult Day Care and the restoration of the Innis Arden Cottage as in Environmental Center at Greenwich Point.
   d) Supervised the Byram Cemetery corrective actions and historic resource report in coordination with the State Archaeologist.
   e) Serve as Town liaison to State Archaeologist office

9) **Public Outreach and Education**
   a) Created and now directs networking exchange with all environmental organizations in Town including a yearly roundtable and listserve.
   b) Oversees environmental programming at Innis Arden Cottage
   c) Coordinates numerous lectures and programs annually with local NGO's.
   d) Develops and presents series of lectures/programs on myriad of environmental topics.
   e) Supports environmental education in local public and private schools through teacher training, direct programming, and support of PTAC Green Schools Committee. This includes assisting schools achieve Green Leaf/Green Ribbon status.

District Manager - Hartford County Soil and Water Conservation District - Oct. 1986 to Nov. 1997
Responsibilities included managing day-to-day operations, administration, budgeting, staff supervision, technical programming, and interagency coordination. Program provided technical assistance and technology transfer to municipalities and farmers/land owners in Hartford County with emphasis on soil conservation, watershed management, wetland protection, flood plain protection, non-point source pollution prevention, best management practices, and farmland preservation.

1. Provided site plan reviews, erosion and sediment control inspections, and wetland delineation/ field confirmations to local inland wetland and watercourse agencies
2. Developed proto-type for the CT Inland Wetland Commissioners Training program and worked on the program for over 10 years.
3. Participated as resource profession in the CT DEEP/RC&D Environmental Review Team.
4. Conducted flood audits for Hartford County residents on the Connecticut River and coordinated several stream bank stabilization and flood control projects with USDA-NRCS
5. Coordinated training for professional engineers on USDA-NRCS TR-55 and TR-20 hydrologic modeling programs.
6. Directed Sustainable Agriculture Research grant focused on nutrient management through composting of dairy manure with municipal leaves collected.
7. Secured and supervised over $500K in 319 grants focused on reducing nonpoint source pollution including the Ketch Brook restoration project.

Other Experience

Current

- **Long Island Sound Study Citizen's Advisory Committee** – member
- **CT's Water Planning Council Advisory Group** – municipal representative. Co-chair of workgroup updating Connecticut's Drought Preparedness and Response Plan.
- **USDA Natural Resource Conservation Service State Technical Committee** - member
- **CT Council on Soil and Water Conservation** – board member
  As a member of the CT Council on Soil and Water Conservation, secured $10 million grant in 2015 to improve water quality in the Long Island Sound working on a landscape scale initiative within the entire watershed. Grant is part of the USDA NRCS Regional Conservation Partnership Program.
- **National Association of Conservation Districts** – board member
- **Connecticut Association of Conservation Districts** - President
- **Southwest (CT) Soil and Water Conservation District** –Secretary
- **Coastal Storm Awareness Program (tri-state Cooperative Extension)** – advisory board member
- **Environmental Education Facilitator for Connecticut Department of Energy and Environmental Protection (DEEP)** – trained facilitator for environmental education programs including Project WET, Project Wild, Project Learning Tree and Project Food, Land and People.

Past

- **CT Hazard Mitigation Plan Update** – workgroup member
- **Governor's Permitting Task Force** – served as municipal representative to this task force set up to review environmental permitting for efficiencies but maintain the integrity of the program. Link to report: http://www.ct.gov/deep/lib/deep/permits_and_licenses/assessment/finalreportpermittaskforce.pdf
- **Governor's Climate Change Adaptation Subcommittee** – municipal representative appointed to the committee charged with looking at how changing conditions are/will impact our state. Co-chaired of Infrastructure Workgroup with CT DEEP water quality professional Paul Stacey. Link to report: http://www.ct.gov/deep/lib/deep/climatechange/impactsofclimatechange.pdf
- **Dept. of Environmental Protection (DEP) Vernal Pool Task Force** – represented local municipalities on task force charged with the development of a working definition of vernal pools for inclusion in DEP's Model Inland Wetlands and Watercourses Regulations.
- **Soundwaters, Inc.** – board member
- **Audubon Greenwich** – science committee member
- **Bruce Museum** – science committee member

Recent Training

- Hazard Mitigation Planning Training – FEMA – March 5-6, 2013
- Climate Adaptation Training For Coastal Communities – NOAA and CT Sea Grant 2013
- National Conservation Leadership Development Training –sponsored by USDA NRCS and NACD – June 2017

Amy J. Siebert, P.E.

Education:
Bachelor of Science in Environmental Technology, Cornell University
Masters of Science in Environmental Engineering, The University of Texas at Austin
Masters in Public Affairs, The Lyndon Baines Johnson School of Public Affairs at UT Austin

Employment:

Town of Greenwich, Department of Public Works, Commissioner, September 2008 to present
Responsible for overall management of Building Construction and Maintenance, Building Inspection, Engineering, Highway, Waste Disposal, and Wastewater Divisions, as well as overall business administration. Infrastructure managed includes over 120 buildings, 75 bridges, 185 miles of sanitary sewer, a 12.5 million gallon per day wastewater treatment plant and 28 pump stations, 265 miles of roadway and related structures, over 10,000 stormwater structures and associated piping network, and a waste transfer station and recycling center.

Town of Greenwich, Department of Public Works, Deputy Commissioner, July 2007 to August 2008
Worked with Commissioner to manage the divisions comprising the DPW. Initiatives included moving forward the townwide stormwater master planning, work on business process improvements, budget and capital project planning, and improving division coordination and cooperation.

Town of Greenwich, Department of Public Works, Sewer Division Manager, Jan 2004 to June 2007
Manage Sewer Division activities and staff, including:

- Day to day operations including customer service, permit delivery, overall operations and maintenance, interdepartmental coordination, safety programs, regulatory compliance.
- Capital project delivery, including engineering and construction contract management, and overall program development.
- Consent order response and management, addressing both operations and capital projects to meet the order's goals and deadlines.
- Asset management plan delivery, including computerized maintenance management system implementation and coordination of activities and capital projects in support of plan goals.
- Budgeting - preparing, tracking and forecasting both operations and capital budgets.

Malcolm Pirnie 1990 – 2003
Managed and participated in a broad range of public utility projects nationwide, related to the capital delivery process and overall utility management and improvement initiatives. Example project types include:

- Facility planning and operability reviews, providing operations perspective to the capital project planning and design process.
- Operations liaison on capital projects, including startup planning and operator training, and coordination with construction services, design and client staff.

- Operations and maintenance plan development, including web-based manuals, documenting operating strategies, design criteria, standard operating procedures, troubleshooting, equipment and controls descriptions, etc.
- Maintenance program development, including computerized maintenance management program implementation.
- Health and safety program development and training, with an emphasis on process safety management and process hazard analysis.
- Best practices assessments, for water and wastewater plants, and collection systems, reviewing roles and responsibilities, communication, procedures in place to support program goals, and opportunities to streamline and improve current practices.
- Operations planning, including staffing, information management, and performance measure development.
- General operations support, including process and operability reviews, pretreatment program support, emergency response planning, and other as needed services.
- Collection system capacity, management, operations and maintenance program assessment and development, emphasizing policies and procedures to improve overall system management.

United States Environmental Protection Agency, 1988
Research Grant: Analysis of the effects of RCRA third party liability insurance requirements on municipal solid waste disposal.

The University of Texas at Austin / L.B.J. School 1986-1989
Research Assistant, College of Engineering: Degradation of Chlorinated Phenols
Teaching Assistant, LBJ School: Statistics and Operations Research

Cornell University 1984-1986
Research Assistant, Agricultural Waste Management Laboratory: Supported various research projects in the waste treatment field.

Sample Consulting Project List

Mobile Area Water and Sewer System, Mobile, Alabama
Part of a team reviewing the overall utility's organizational structure and current business practices. Recommendations ranged from consolidating field crews in particular divisions to modifying the governance structure of the current Board. Managed a project to help the utility address its consent order issues resulting from collection system capacity issues. Elements included documenting treatment plant wet weather operating procedures, operations and maintenance program workflows, and evaluating budgeting and cost tracking practices.

Department of Special Services, New Castle County, Delaware
Managed an assessment of the Department's sewer system management program, developing a prioritized list of recommended steps to improve its program while meeting anticipated capacity, management, operation, and maintenance regulation requirements. Findings ranged from the need to implement a well defined capital project prioritization process to documenting work flows across departments to improve communication and cooperation.

Bergen County Utilities Authority, Little Ferry, New Jersey

Managing various projects in support of utility operations. Updated confined space entry program to reflect change in New Jersey regulations, moving to a one permit system. Updated the Authority's emergency response plan to reflect current organizational changes and facility modifications. Performed an operational and financial analysis for sludge handling facilities recommissioning, to support the Authority's sludge disposal planning.

City of Atlanta Dept. of Public Works, Atlanta, Georgia

Part of team performing condition assessments for the City of Atlanta's biosolids treatment facilities, as part of their turnover to private operation. Managed additional work creating the protocols to develop adjusted remaining service lives for assets based on condition and age to populate asset database.

City of Atlanta Bureau of Water, Atlanta Georgia

Part of a team performing condition assessment for the City of Atlanta's water treatment facilities as part of their return to public operation.

Nassau County Department of Public Works, Nassau County, New York

Managed team efforts to review wastewater treatment facility and distribution system condition, related operations practices, and capital planning in support of a project to prepare for potential formation of an independent utility.

North Jersey District Water Supply Commission, Wanaque, New Jersey

Managed startup and operations services for three corrosion control facilities being placed into service to serve the distribution system for lead and copper control. Coordinated work with contractor, construction administration, designer, and client staff.

New York City Department of Environmental Protection, New York, New York

Managing and participating in a range of projects, from operability reviews for the large Wards Island Water Pollution Control Plant to startup planning and operations and maintenance documentation for wells within the Brooklyn Queens Aquifer system.

James W. Michel, P.E.

Deputy Commissioner of Public Works
Town of Greenwich, Connecticut

Education and Certifications

Bachelor of Science in Civil Engineering, **University of Illinois**, Urbana, IL (1995)
M.B.A., Business Administration, **Keller Graduate School**, Phoenix, AZ (1999)
Undergrad Studies in Land Surveying, **Southern Illinois Univ.**, Joliet, IL (2003)
Professional Engineer – **State of Connecticut**
Emerging Leaders Academy – **American Public Works Association** (2014)

Career History

Town of Greenwich, Greenwich, CT — Jan. 2011 to Current
Deputy Commissioner of Public Works

I assist the Commissioner of Public Works in perform administrative and professional work in planning, organizing and directing the department including the execution of professional engineering services for other Town departments, agencies and boards. My primary focus has been working directly with the Engineering and Highway Divisions executing their capital project work including bridge replacement, roadway maintenance and reconstruction, curb and sidewalk maintenance, and stormwater system operations including compliance with the MS4 permit. I assist the department in reviews for land development projects proposed by local residents and developers. I have successfully applied for numerous state and federal grants obtaining $15 Million in funding for the Town over the last few years. I am serving as the Town liaison for an Army Corps of Engineers flood feasibility study for the Byram River watershed. I have implemented several new technology programs to help improve the efficiency of the department including being the first municipality in Connecticut to use Adaptive Signal Control Technology. I interact with stakeholders through the public information meeting process along with direct interaction to address their concerns in order to maintain the high level of customer service the residents have come to expect.

In 2014, I completed the APWA Emerging Leaders Program. I presented at the APWA Sustainability Conference in 2013 and several other regional conferences on the subjects of Stormwater Management, Low Impact Development and Succession Planning.

The Greenwich Public Works Department encompasses 6 divisions including Engineering, Highway, Waste Disposal, Sewer, Building Inspection, and Building Construction and Maintenance. The Town of Greenwich (population 61,000) is 67 square miles with 265 miles of road, over 140 miles of sidewalk, 75 bridges and a 20 million gallon wastewater treatment plan. I work closely with all divisions on the annual operating and capital budget development. We have a total of 146 FTE, an operating budget of approximately $21 Million and annual capital budget of $20 Million. The department employees are represented by three separate labor unions.

Condon Consulting Engineers, P.C., New Lenox, IL Oct. 2000 to Dec. 2009
Vice President

As manager of a newly formed branch office, my duties included establishing a diverse client base that includes private developers, Park District Staff, Village and City Engineering and Public Works Departments and the general public. I was responsible for the operations of the office and personally responsible for the performance of every project. The work that was completed by this office was approximately 70% residential, 30% commercial and industrial, including a significant intersection project with Will County.

Bookman Edmonston, Rancho Cordova, CA Apr. 2000 to Oct. 2000
Senior Engineer

I provided consulting services for two projects with Lucasfilms, Ltd. One was located at the Presidio in San Francisco for a redevelopment and the other for the construction document review of the new digital design studio in Marin County. I created alternatives for the utility relocations, grading plan designs and storm water management.

La Marca Engineering Group, Phoenix, AZ Sept. 1997 to Apr. 2000
Project Manager

I was responsible for the transition during the purchase of an existing civil engineering firm by a company in Illinois. I managed the transition and implementation of new technology including AutoCAD and other computer based software packages. I developed several new clients and maintained the relationships that existed prior to the transition. In this position I was managing a variety of commercial and industrial projects including several Jack-in-the-Box and Del Taco new construction projects along with several self storage facilities.

Condon Consulting Engineers, P.C., McHenry, IL June 1996 to Sept. 1997
Design Engineer

I completed several design projects including multi-family residential designs, commercial site design plans and industrial building sites. I served on the field crew to learn the responsibilities of the field technicians.

Smith Engineering Consultants, Inc., McHenry, IL May 1995 to June 1996
Construction Engineer

I was the resident engineer for two major construction projects ($4.5 million new roadway in Harvard, IL and a 2 mile water and force main extension in Fox Lake, Illinois). I was doing field inspections, IDOT project documentation, change order approvals, and pay requests.

Bruce Spaman
Superintendent
Parks & Trees Division
Tree Warden

Administration.....622-6472
Griffith E. Harris Golf Course....531-7200
Information/Programs.....622-7830
Marine & Facility Operations.....618-7651
Parks & Trees.....622-7824
Recreation.....622-6478

DEPARTMENT OF PARKS AND RECREATION
Parks & Trees Division

July 14, 2017

BRUCE SPAMAN: PROFESSIONAL RESUME

PROFESSIONAL EXPERIENCE:

Timberline Land Management Co. 1982 - 1993

Timberline Land Management Co. was established to provide land management consulting and technical services to private landowners, government, businesses, and organizations.

Bartlett Tree Experts July 1993 - March 1994

Position; Arborist/Sales Representative: Hartford area representative coordinating arboricultural services and forestry operations.

Bartlett Tree Experts March 1994 - November 1995

Position; Local Office Manager & Arborist/Sales Representative : Supervise sales representatives, production, and clerical personnel to provide a complete range of tree care services for residential, commercial, institutional, and municipal clients.

Forest Management Services: November 1995 – September 2002

Owner and Consulting Forester/Arborist. Independent Consultant in the fields of Urban Forestry, Rural Forestry, Arboriculture and Parkland Management. Certified Forester; State of Connecticut, Dept. of Environmental Protection (#F107)

City Forester (Consultant); Middletown, Connecticut: 1990 - 2002

Street tree, shade tree and forest land management for the City of Middletown as a consultant to the City's Urban Forestry Commission.

Tree Warden, Town of Madison, CT: 1997 – 2003

Oversee the care management of town-owned trees. Contract and supervise tree pruning, removals and planting.

Tree Warden, Town of Guilford, CT: 1997 – 2001

Oversee the care management of town-owned trees. Contract and supervise tree pruning, removals and planting.

Superintendent of Parks & Trees, Town of Greenwich, CT September 2002 - Present

The Parks and Trees Division is responsible for the maintenance of all parks, playgrounds, school campuses, athletic fields, passive recreation areas, beach parks, traffic circles, public cemeteries, shade trees, roadside trees, and public grounds.

EDUCATION:

Paul Smith's College: School of Forestry
Paul Smiths, NY 12970
Degree: Associates in Applied Sciences (A.A.S.) 1974
Minor concentrations in Surveying & Forest Recreation

CERTIFICATES & LICENSES:

Licensed Arborist, State of Connecticut (#61770);
Connecticut Advanced Certified Tree Warden 2003 - Present
Commercial Pesticide Applicator; Supervisory License

PROFESSIONAL AFFILIATIONS:

Forest Practices Advisory Board, Connecticut Dept. of Environmental Protection, Division of Forestry January 2007

PROFESSIONAL AWARDS:

Connecticut Urban Forestry Council; Outstanding Urban Forestry Professional, 1994

PROFESSIONAL ORGANIZATIONS:

Middletown Urban Forestry Commission
The Connecticut Urban Forestry Council, Board of Directors
The Connecticut Tree Warden's Association; served as Board Member/Secretary
Forest Practices Advisory Board, Connecticut Dept. of Environmental Protection, Division of Forestry
The International Society of Arboriculture; Member
The International Society of Arboriculture; Member, New England Chapter,
Past Connecticut Representative
Society of Municipal Arborists
The Connecticut Tree Protective Association
The Society of American Foresters

ASSOCIATION MEMBERSHIPS:

The Greenwich Garden Education Center, Advisory Council
Greenwich Tree Conservancy, Ex Officio Board Member
Greenwich Green & Clean, Board of Directors
The Connecticut Forest & Park Association
The American Forestry Association

MITCHELL E. MAILMAN
129 Palmers Hill Road
Stamford, CT 06902
E-Mail: mitchellemailman@gmail.com

Home: 203 327-0825
Cell: 917-855-0389

PROFESSIONAL EXPERIENCE

1990 - Present GENERAL MANAGER - Electric Lines Division, Welsbach Electric Corp. (An entity formed by the merger of M. Mailman & Associates, and Welsbach Electric Corp.)

Responsible for administration and day-to-day management of an electrical construction company that has worked for fifty utilities, in twenty states, and has annual revenues averaging $25 million. Overall supervisor of field workers, estimators, designers, purchasing personnel, and support staff.

* **Projects of note:**

Pittsburgh, Pennsylvania, for Duquense Light. Construction of four miles of double circuit, 138 kilovolt and 345 kilovolt, high pressure fluid filled feeder lines.

New York City, for Consolidated Edison and the New York Power Authority. Construction and interconnection of, eleven, 60 megawatt gas turbine generators, at six sites.

Long Island Sound (underwater site), for New York Power Authority. Installation of cathodic protection for circuit, 345 kilovolt, cross-Sound submarine cable.

Boston, Massachusetts, for NSTAR Electric & Gas. Design and installation of fluid circulation, for 345 kilovolt fluid filled circuits to K Street substation.

Long Island, ("Amagansett to Montauk"), for Long Island Lighting Company. Construction of twelve miles, underground, 35 kilovolt, solid dielectric feeder.

Mississippi, Louisiana, Texas, for Entergy and the Southern Companies. Restoration work following Hurricane Katrina, (approximately 100,000 man hours.)

1983 - 1990 VICE PRESIDENT CONSTRUCTION, Eichner Properties

Partner in charge of design, permitting, and construction of high rise, luxury, residential condominiums and office building projects in Manhattan, for real estate development firm.

400 East 70th Street, "The Kingsley" 190 units
188 East 64th Street, "The Royale", 205 units
300 East 85th Street, "The America", 100 units
2373 Broadway, "The Boulevard", 250 units
150 West 56th Street, "CitySpire", 220 units
156 West 56th Street, 300,0000 square feet, office complex
1540 Broadway, "Bertlesman Building", 1,000,000 square feet, office building and retail complex.

1972 - 1990 OWNER - M. Mailman & Associates, Inc.
Founder of electrical construction company, specializing in pole line and substation construction.

* **Customers included:**

Hartford Electric Light Company
Orange & Rockland Utilities
Pitney Bowes
Iona College
Columbia University

EDUCATION

September 1968 - June 1971	Stuyvesant High School for Mathematics & Science, New York, NY
September 1971 - June 1973	Columbia School of Engineering, New York, NY Field: Civil Engineering
September 1973 - June 1975	Columbia College Field: Architecture BA
September 1975 - June 1975	Columbia Graduate School of Architecture, New York, NY Field: Architecture
September 1975 - June 1976	Columbia Graduate School of Architecture Field: Architectural Technology, New York, NY

PROFESSIONAL AFFILIATIONS

Panelist - American Arbitration Association

Director - National Electrical Contractors Association

Northeastern Line Construction Chapter

Chairperson - Northeast Joint Apprenticeship and Training - Subcommittee New Jersey

Trustee - Line Safety Fund - New Jersey

PROFESSIONAL ACCOMPLISHMENTS

Journeyman Lineman

Cable Splicer up through 345 kilovolts

Articles published in *Transmission and Distribution Magazine*

Guest Lecturer: Columbia Graduate School of Architecture, Cardozo Law School

Contributor: OSHA Transmission and Distribution Committee

COMMUNITY SERVICE

Past President/Founding Member - "Stamford Sunrise" Rotary Club.

Board of Trustees - Bi-Cultural Day School; Stamford, CT.

Advisor - Engineering Club - Westchester Day School; Mamaroneck, NY.

Committee Chairperson - Congregation Agudath Sholom; Stamford, CT.

AVOCATIONS

Professional cycling coach

"SPIN" Instructor

Ocean going yacht racing, member of the Stamford Yacht Club

Rock, ice and alpine climbing

Gourmet chef

PERSONAL

Married, September 1, 1985, Susan M. Rich of Darien, CT.
One child, Max Rich Mailman, born February 9, 1999.
Stamford, CT resident since 1980.

ATTACHMENT B

EVERSOURCE

COMMITTED TO ENERGY EFFICIENCY *ACROSS NEW ENGLAND*

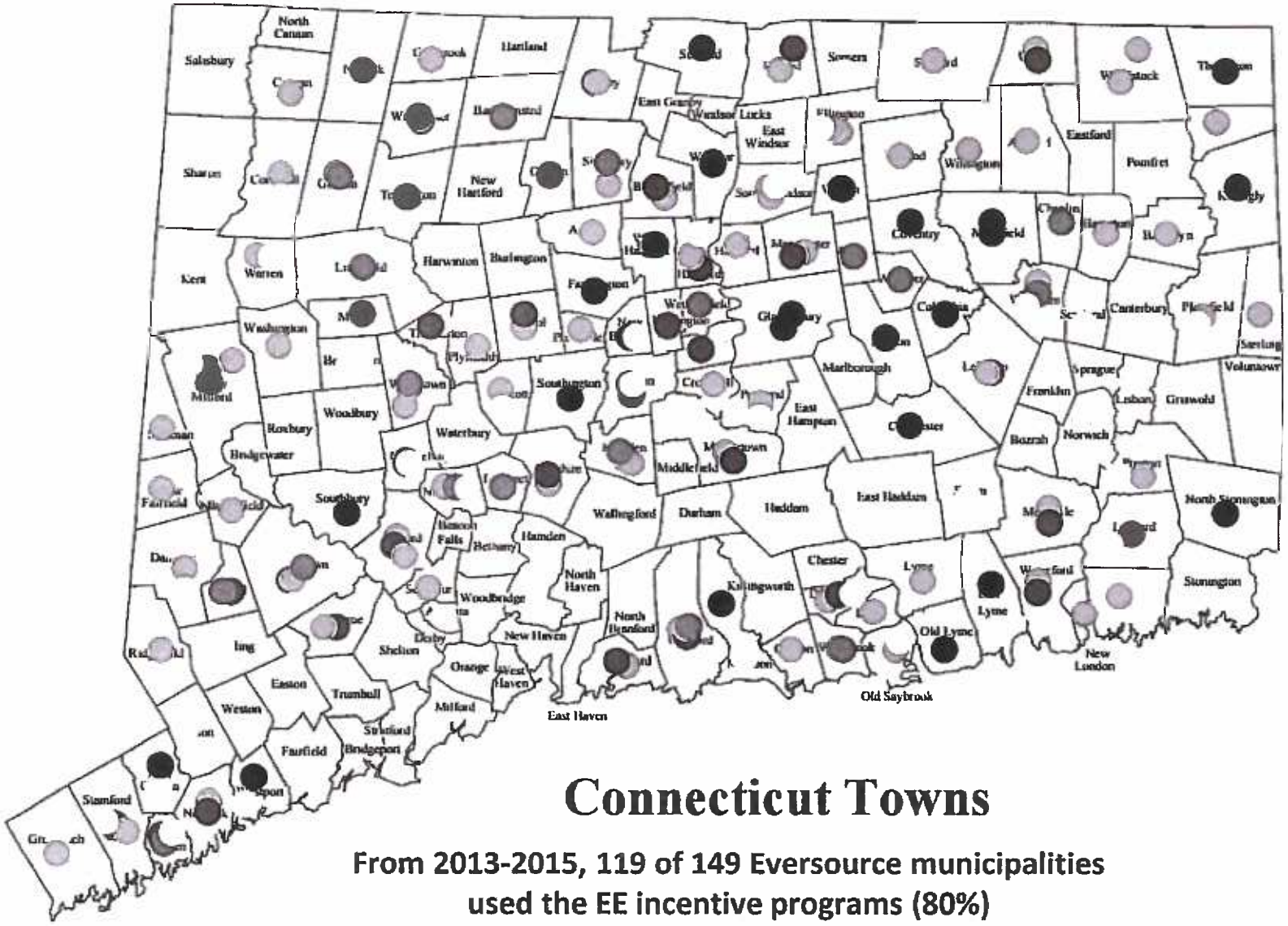
AGENDA

EVERSOURCE

- Introductions
- Greenwich energy data review
- Strategies to move forward
- MOU Opportunity
- Next Steps/Other

MUNICIPAL PARTICIPATION

EVERSOURCE



Connecticut Towns

From 2013-2015, 119 of 149 Eversource municipalities used the EE incentive programs (80%)

FOCUSED ON SMARTER SOLUTIONS

EVERSOURCE

Sustained energy efficiency requires solutions that align with customer needs.

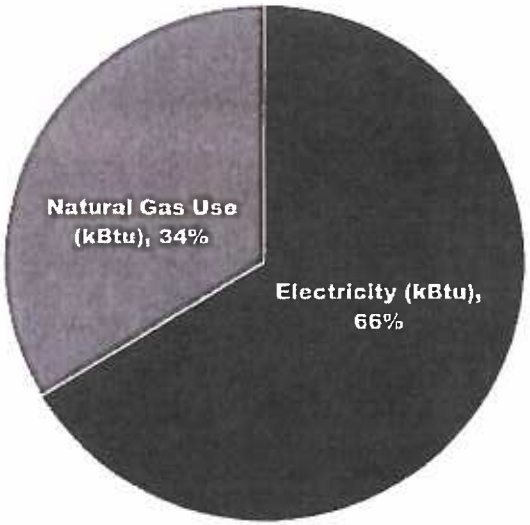
- Tailored service bundles based on usage
- Strategic planning to maximize energy resources
- Integration of technology for streamlined delivery and analytic insight

GREENWICH ENERGY PROFILE

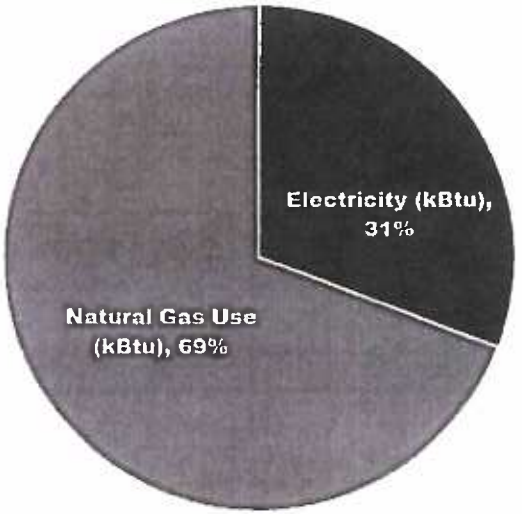
EVERSOURCE

- 233 electric accounts, 32M kWh annual
  - Largest 10 accounts = 2/3 of consumption
- CNG Gas

Town Facilities



BOE Facilities

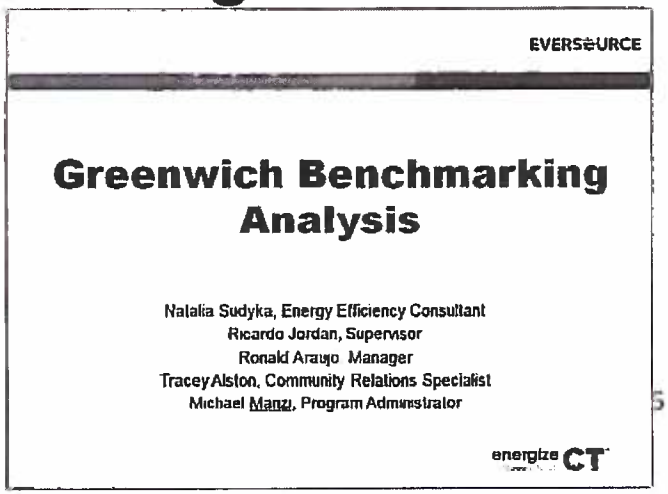


GREENWICH OVERVIEW

EVERSOURCE

- **Clean Energy Community since 2014**
  - Pledged 20% energy reduction by 2018
  - Benchmarked using baseline Municipal Fiscal Year 2014
  - Municipal Action Plan drafted
  - Promoted energy efficiency (residential, commercial)

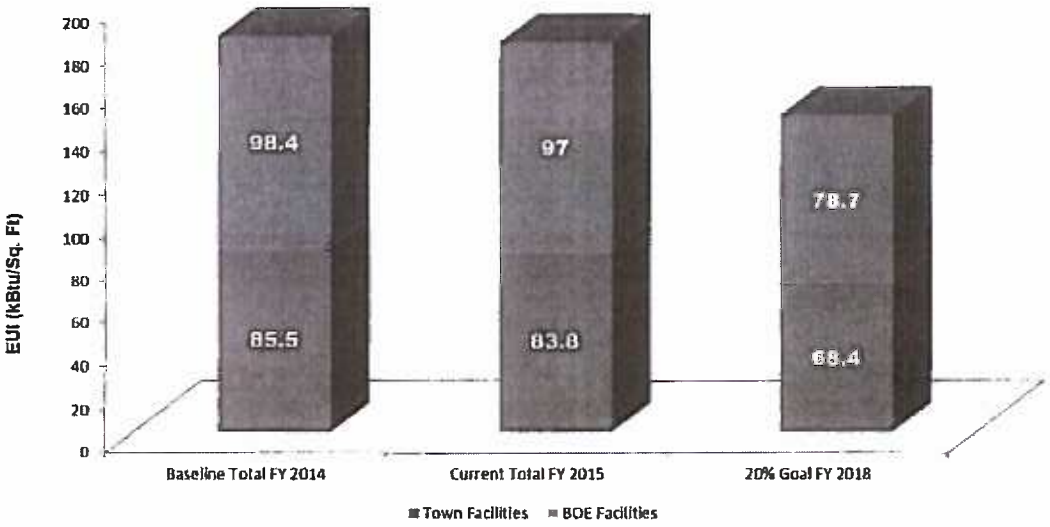
- **35 Facilities benchmarked in EPA ENERGY STAR Portfolio Manager**
  - 19 Town Facilities
  - 15 Board of Education Facilities



GREENWICH
ENERGY EFFICIENCY ACTIVITIES

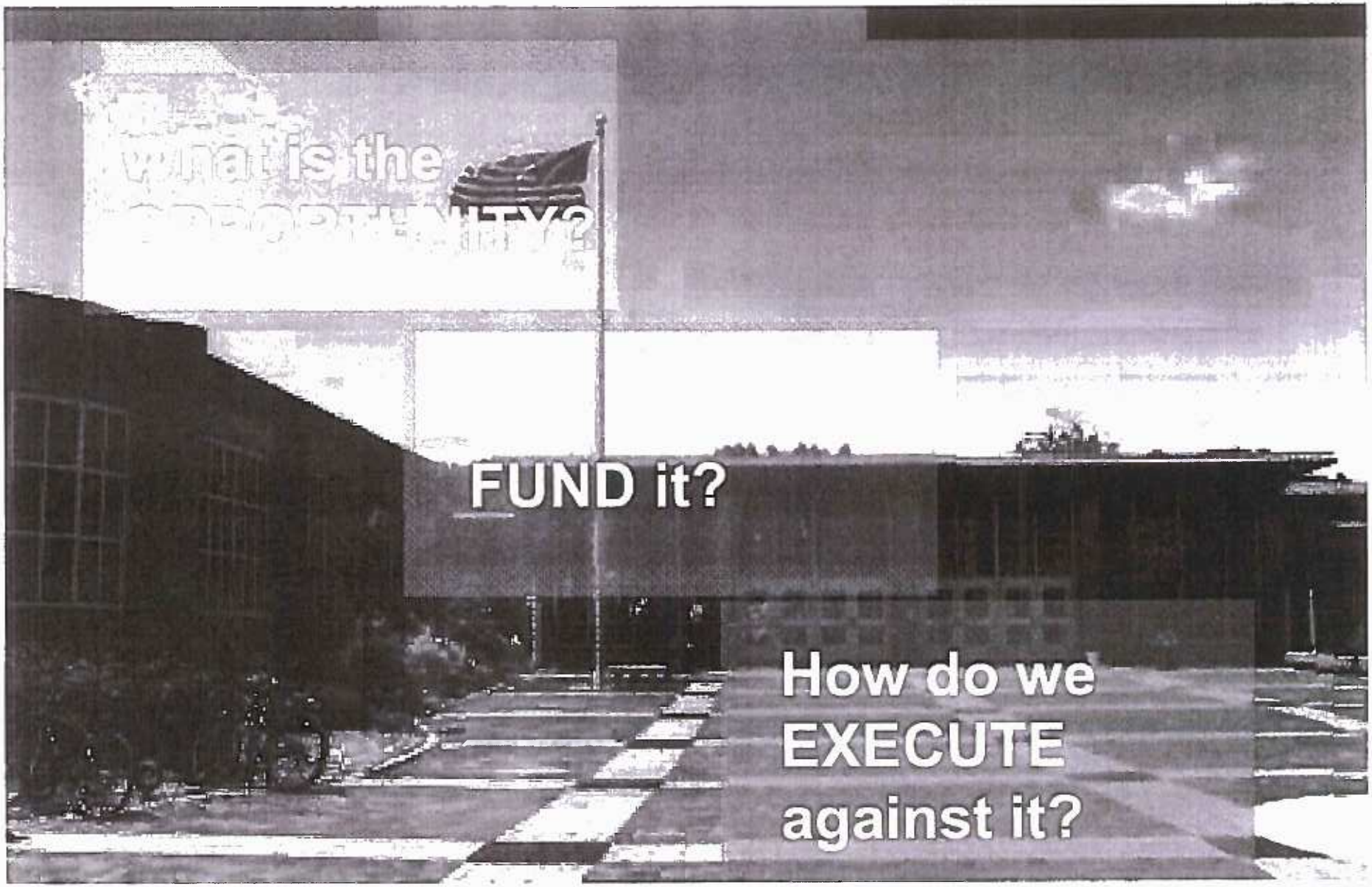
EVERSOURCE

- EE Projects
  - 2013-2017: 10 projects
    - 1.6M kWh saved (5% of consumption)
    - 9 of top 13 accounts addressed
  - 2013-2017 CT Muni Avg:
    - ~7% savings
    - Only 35% addressed largest user



CRITICAL STRATEGIC QUESTIONS

EVERSOURCE



EXISTING CT STRATEGIC PARTNERSHIPS

EVERSOURCE

United Technologies

UCONN

STAMFORD 1641 CONNECTICUT

ESPN

FOXWOODS RESORT CASINO

THE WONDER OF IT ALL

BENEFITS OF A STRATEGIC PARTNERSHIP

EVERSOURCE

For Greenwich:

- Work with knowledgeable, trusted, professional energy partner
- Make infrastructure improvements that save energy costs
- Replace outdated energy-consuming equipment
- Meet energy and greenhouse gas goals
- Meet water efficiency goals
- Obtain low cost financing for projects

STRATEGIC PARTNERSHIP PROCESS

EVERSOURCE

- Create Strategic Energy Management Plan / Design Charette
- Formalize MOU
  - Establish actions and commitments by both parties (non-binding) to accomplish goals of SEMP
    - Town: Proposes EE investments and annual savings goals
    - Eversource: Identifies available support services, incentive rates, and rewards to customer for achieving goals
- Publicly recognize the Town's commitment to achieving energy savings

DRIVING CHANGE FOR BETTER ENERGY

EVERSOURCE

- ✓ Collaborative Partnering
- ✓ Energy Efficiency to Offset Demand
- ✓ Savings for Customers
- ✓ Sustainability
- ✓ Better for Our Environment

Ceres #1 Ranking

Mobilizing Business Leadership for a Sustainable World

CERTIFICATE OF SERVICE

I hereby certify that on this day a copy of the foregoing was delivered by Electronic Mail and First Class U.S. Mail, postage prepaid, to all parties and intervenors of record, as follows:

Kathleen Shanley
Manager — Transmission Siting
Eversource Energy 56 Prospect Street Hartford, CT 06103
kathleen.shanley@eversource.corn

Raymond Gagnon
Director — Transmission Projects
Eversource Energy 56 Prospect Street Hartford, CT 06103
raymond.gagnon@eversource.com

Jeffery Cochran, Esq.
Senior Counsel, Legal Department
Eversource Energy
107 Selden Street
Berlin, CT 06037
jeffery.cochran@eversource.com

Anthony M. Fitzgerald, Esq.
Carmody Torrance Sandak & Hennessey LLP
195 Church Street
New Haven, CT 06509
afitzgerald@carmodylaw.corn

Marianne Barbino Dubuque
Carmody Torrance Sandak & Hennessey LLP
50 Leavenworth Street
Waterbury, CT 06702
mdubuque@carmodylaw.com

Lauren Henault Bidra, Esq.
Staff Attorney
Office of Consumer Counsel
Ten Franklin Square
New Britain, CT 06051
Lauren.bidra@ct.gov

Joseph A. Rosenthal, Esq.
Principal Attorney
Office of Consumer Counsel
Ten Franklin Square
New Britain, CT 06051
Joseph.rosenthal@ct.gov

Parker Stacy
1 Kinsman Lane
Greenwich, CT 06830
pstacy@optonline.net

Carissa Depetris
Dwight Ueda
Field Point Estate Townhouses
172 Field Point Road, #10
Greenwich, CT 06830
carissa.depetris@gmail.com
d_ueda@yahoo.com

Christine Edwards
111 Bible Street
Cos Cob, CT 06807
SeeEdwards@aol.com

Richard Granoff, AIA, LEED AP
Granoff Architects
30 West Putnam Avenue
Greenwich, CT 06830
rg@granoffarchitects.com

Anthony Crudele
Bella Nonna Restaurant & Pizzeria
280 Railroad Avenue
Greenwich, CT 06830
bellanonnagreenwich@gmail.com

Cecilia H. Morgan
3 Kinsman Lane
Greenwich, CT 06830
cecimorgan@aol.com

Joel Paul Berger
4208 Bell Boulevard
Flushing, NY 11361
communityrealty@msn.com

Meg Glass
9 Bolling Place
Greenwich, CT 06830
glass50@hotmail.com

P. Jude Collins, President
Morningside Circle Association
67 Circle Drive
Greenwich, CT 06830
Mail@morningsidecircle.org

David A. Ball