

**POWER OUTAGE ON METRO-NORTH'S NEW HAVEN
LINE: HOW TO PREVENT FUTURE FAILURES
ALONG PASSENGER RAIL'S BUSIEST CORRIDOR**

FIELD HEARING

BEFORE THE

SUBCOMMITTEE ON SURFACE TRANSPORTATION
AND MERCHANT MARINE INFRASTRUCTURE,
SAFETY, AND SECURITY

OF THE

COMMITTEE ON COMMERCE,
SCIENCE, AND TRANSPORTATION
UNITED STATES SENATE

ONE HUNDRED THIRTEENTH CONGRESS

FIRST SESSION

OCTOBER 28, 2013

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ONE HUNDRED THIRTEENTH CONGRESS

FIRST SESSION

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POWER OUTAGE ON METRO-NORTH'S NEW HAVEN LINE: HOW TO PREVENT FUTURE FAILURES ALONG PASSENGER RAIL'S BUSIEST CORRIDOR

MONDAY, OCTOBER 28, 2013

U.S. SENATE,
SUBCOMMITTEE ON SURFACE TRANSPORTATION AND
MERCHANT MARINE INFRASTRUCTURE, SAFETY, AND SECURITY,
COMMITTEE ON COMMERCE, SCIENCE, AND TRANSPORTATION,
Bridgeport, CT.

The Subcommittee met, pursuant to notice, at 10 a.m. in Bridgeport City Council Chambers, Bridgeport City Hall, Hon. Richard Blumenthal, presiding.

OPENING STATEMENT OF HON. RICHARD BLUMENTHAL, U.S. SENATOR FROM CONNECTICUT

Senator BLUMENTHAL. I am very pleased to call to order this field hearing of the United States Committee on Commerce, Science, and Transportation, a field hearing that I would like to thank Senator Rockefeller, our Chairman, for permitting us to hold here in Bridgeport, Connecticut. I thank him and the staff of the Commerce Committee for their excellent planning and to Jeff Long of my staff, and I thank the City of Bridgeport for hosting us here this morning.

This hearing is really prompted by the breakdown in service that occurred on September 25, barely more than a month ago, in the Mount Vernon area. But it is really the result of much broader and deeper problems that have manifested themselves over many years and that are the subject of complaints to me, repeated complaints to me and I suspect to many of my colleagues and elected officials who are here this morning, and I thank them very much for being here.

Let me just take one comment from a Westport commuter who wrote to me, quote, "Enough is enough. The outage due to the electrical problem obviously is a major failure, one for which the cause should be determined and the appropriate people held responsible." But the fact is that this is only the latest manifestation of the serious service deterioration that Metro-North riders have been putting up with for some time.

When I'm asked why we are having this hearing, I think that letter from a Westport commuter sums it up as well as anything I can say. The fact of the matter is that I was dismayed and frustrated and outraged as much as that commuter and others by the 12-day

service disruption caused by Con Ed's failure to carry out its work and prepare adequately for the possibility of a large-scale power outage.

We're here today as part of a continuing fact finding and investigation that I intend to carry on beyond this hearing, because it has larger implications for service not only in the Northeast, but throughout the country. The fact of the matter is that this outage and disruption in service was due either to inadequate management or insufficient funding in necessary equipment, infrastructure, and other essentials, or both.

The failure to plan for this kind of contingency and provide backup sources of power was a failing that we cannot permit to be repeated. It simply cannot recur. So the goal today is not only to hold accountable whoever was responsible, but also to make sure that it's prevented in the future.

This hearing will focus closely on Con Edison and the particular equipment that was permitted to last beyond its normal design life, specifically the feeder cable that was 36 years old, 6 years over its recommended use. But it will also focus on Metro-North and others who could and should have planned for the contingency that occurred to avoid this disruption.

My hope is that there will be lessons learned, enabling us to avoid this kind of occurrence in the future. I'll be interested to learn whether Federal regulations should be strengthened, regulations of the Federal Railway Administration. The May 17 derailment which preceded this breakdown in service and caused disruption on the same line involved requirements for electrical maintenance and other kinds of maintenance that perhaps were involved here as well. We're going to be exploring whether Metro-North and similar railroads should be required to have backup sources as a matter of the Federal Railway Administration's requirements.

One point is very clear, and that is that Con Ed should be reimbursing Metro-North, Amtrak, and others for all the costs that occurred in this service outage—\$2 million a day is estimated to have been the cost for Metro-North, \$62 million in costs to Connecticut's economy, and other costs incurred by riders and commuters. So that kind of reimbursement ought to be a given.

Another question is whether Amtrak should be doing more. Its contribution over the last 10 years of \$64 million to upgrade and improve equipment compared to the \$3.2 billion invested in that infrastructure raises the question about whether it should be expected to shoulder a fair share.

And perhaps most immediately, and the reason that we have Commissioner Redeker here, is that there are other substations along the line in Connecticut, three more now, two more planned, where the same points of vulnerability may exist. Those substations are serviced by CL&P and Northeast Utilities as well as United Illuminating, and we'll want to know at this hearing or in fact finding to be pursued, whether more has to be done to make sure that those lines are secure, reliable, and safe.

Finally, I'm concerned about reports that Con Edison is understaffed, that the failure to ensure adequate staffing means that an important operation, maintenance activities, are not done properly. We know, for example, in the last four years that Con Edison has

cut nearly 17 percent of its full time work force, even though the company recently testified at the New York State Public Service Commission hearing that its loads have grown.

At my and Senator Schumer's request, the New York Public Service Commission is conducting its own investigation. We will eagerly await the results of that investigation and also the investigation, apparently, that Con Ed is doing on its own. I'm disappointed that Con Ed so far has not provided the preliminary review that's mentioned in a September 30 *New York Times* article. If that review is available, I ask that it be provided to the Committee.

I hope that we can anticipate the continued cooperation of both Con Ed and Metro-North, as well as others who are represented here today. And I want to thank them for being here today to give us the benefit of what they have found so far.

Our first panel is composed of two of our elected representatives, two Members of Congress, who represent the individuals who are affected most immediately, United States Congressman Jim Himes and United States Congresswoman Elizabeth Esty.

Thank you so much for being here today. Please proceed.

STATEMENT OF JIM HIMES, U.S. REPRESENTATIVE, FOURTH CONGRESSIONAL DISTRICT, CONNECTICUT

Mr. HIMES. Good morning, Senator Blumenthal, and thank you very much for holding this hearing here in Bridgeport. I'm delighted to be joined by my colleague, Elizabeth Esty, a member of the Transportation and Infrastructure Committee of the U.S. House of Representatives, as well as by any number of state-elected officials, municipal officials, and, of course, representatives of Metro-North and Con Edison.

I'm happy you're holding this hearing, because this is the second time in 6 months that my constituents in the Fourth District of Connecticut and your constituents, Senator, have had both their safety and their economic well-being put at risk by crumbling infrastructure. You and I visited the scene of a very dangerous accident just two miles up the road here, where, thank God, there was no loss of life. But it could have, as we acknowledged at the time, been much worse.

One month after the outage that inconvenienced and did economic damage to many of our constituents, we reflect on what went wrong and how the problem was handled. It is important that we achieve total clarity regarding what occurred and how it can be avoided in the future.

It is also clear we must re-review plans for redundant power during maintenance projects. We owe it to the 125,000 travelers who ride Metro-North every day to do our best to ensure these kinds of prolonged outages do not occur again in the future.

Just as important as accountability is understanding that this outage underscores the urgent need to invest in our aging transportation energy and infrastructure. Talk to any one of the business groups in this area, and they will tell you that one of the—perhaps the main reason why businesses find it difficult to move into the area is the aging infrastructure, the difficulty of moving employees around and getting them to their places of work. This is something

that is essential economically for Fairfield County and, frankly, for Connecticut as a whole.

Between last year's power outages that left passengers in sweltering heat, this year's train derailment caused by unstable rails and loose embankments, and now this wide scale power outage, it is clear that there is more we can and must do to bring our national infrastructure into the 21st century. According to Transportation for America, today, in Connecticut's Fourth District, over 40 percent of our highway and roadway bridges are either structurally deficient or functionally obsolete and in dire need of repair.

This represents, like all that we've talked about in the rail world, both an unacceptable lack of transportation efficiency and a dangerous public safety concern. It is clear that we need to commit long-term Federal, state, municipal, and private sector funding to infrastructure improvement.

Infrastructural neglect compromises our safety. Nearly 45 percent of the 34,000 annual U.S. highway fatalities occur in crashes where substandard road conditions, obsolete designs, or roadside hazards were a factor. The train derailment on the Bridgeport-Fairfield border this spring is just the latest reminder of the very real danger of failing to invest in our transportation infrastructure.

As a father and a husband, I worry about the safety of my family on Connecticut's highways and railroads. And, of course, I worry about the safety of each and every one of my constituents. As a representative of the citizens of the Fourth District of Connecticut, I will do everything I can to prevent future accidents caused by inadequate infrastructure.

There's a lot of work we need to do. But I remain optimistic that we can get the job done. With so much at stake, with safety and with jobs and with the economic vitality of this region at stake, we simply cannot afford not to make these crucial investments in our outdated infrastructure. In the weeks and months ahead, as we continue investigating the recent power outage, I hope we can begin a long needed discussion on making a down payment for our safety and in Connecticut's economic vibrancy by investing in transportation and energy infrastructure that is in dire need of repair.

This process, of course, will be to some degree about accountability, and it's important that we understand what happened and who was responsible for avoiding what happened. But at the end of the day, our infrastructure is in the position that it is in because all of us, from the Federal to the state to the municipal to the private sector, have not been adequate stewards of this essential life blood of our economy.

So I look forward to working with Metro-North, Amtrak, Con Edison, with you, Senator, and with my colleagues at the Federal, state, and municipal level to make sure that we have a region that is economically vibrant and safe for our constituents in the 21st Century. Thank you.

Senator BLUMENTHAL. Thank you, Congressman Himes.
Congresswoman Esty?

**STATEMENT OF ELIZABETH ESTY, U.S. REPRESENTATIVE,
FIFTH CONGRESSIONAL DISTRICT, CONNECTICUT**

Ms. ESTY. Thank you, Senator Blumenthal, for chairing this hearing here today. And I want to thank and acknowledge Senator Murphy, who I know will be joining us, Representative Himes and all of our colleagues in the Connecticut delegation, and all the state and local officials who are here today for our continued collaboration and work on this matter on behalf of the citizens of Connecticut.

I appreciate the opportunity to testify today on the power outage along Metro-North's New Haven Line. As Representative Himes underscored, and you did, yourself, Senator, the disruption around the New Haven Line is unacceptable and an avoidable failure that caused significant damage both to our state's economy and to people's lives.

The analysis conducted by the Connecticut Department of Economic and Community Development estimates the incident cost the Connecticut economy \$62 million and reduced state revenues by \$2 million and, beyond that, interrupted lives of approximately 62,500 Metro-North commuters over the eight work days that work was suspended. Many of these people depend on reliable rail service for their livelihoods. In this day and age, it is simply inexcusable for the loss of one feeder cable to an electrical substation to impose such a costly burden on our state and on its residents.

As a member of the House Transportation and Infrastructure Committee and especially as a member of the Rail Subcommittee, I've called on my colleagues in the House to hold similar hearings, because it is a matter of critical importance both for our state and for our country. When our transportation infrastructure fails, negative consequences cascade across state boundaries.

In this case, the service disruption on Metro-North also harmed Amtrak customers and disrupted travel for customers all along the entire Northeast Corridor. The failure of the Con Edison electrical line shows how one vulnerable piece of infrastructure can threaten service reliability on a massive scale across our state and beyond. That's why this hearing is so important and why I will continue to urge the House Subcommittee on Railroad to hold its own hearing.

This concern is especially timely because my committee will soon be addressing legislation reauthorizing Amtrak, and that deliberation must be informed by a clear understanding of Amtrak's infrastructure needs. The only way we can prevent service failures like this one from happening again is to understand what caused them in the first place. Only then will we be able to make the necessary investments and policy changes to ensure reliable service both for commuters in Connecticut and for the growing ranks of rail passengers nationwide.

To that end, I'd like to make three broad points. First, the investments ahead for Amtrak, especially along the Northeast Corridor, are going to be significant. I'm sure Mr. Boardman and Commissioner Redeker will cover this in greater detail. But just consider the following facts.

In 2012, Amtrak's total traction power consumed almost 940 million kilowatt hours at a cost of \$92 million. The 25 Hz network powering service from New York to Washington, D.C., was in-

stalled between 1910 and 1938. This equipment is long overdue and in need of replacement.

Amtrak's state of good repair program identifies equipment that will directly affect train delays in the event of a failure and either rehabilitates or replaces that equipment first. Still, it will take continued and significant investment to get the energy substations along that route to a state of good repair.

Second, I believe passenger rail is a good investment, and that continuing to improve Amtrak's service on the Northeast Corridor will bear enormous positive returns over time. Ridership is at an all-time high, with 46 percent growth along the Northeast Corridor since 1998. Amtrak's operating profit along the Northeast Corridor was \$308 million last year. On-time performance is improving, and Amtrak is the least energy intensive mode of travel when measured in terms of BTU per passenger mile.

Third, Congress must also evaluate the service providers on whom Amtrak and Metro-North rely. Amtrak and Metro-North cannot provide reliable service to commuters unless partners like Con Edison are also reliable. Metro-North didn't damage the electrical cables in question, and it wasn't a lack of Federal investment that caused Mount Vernon substation to fail. That's why we need to consider the roles and responsibilities of utilities like Con Edison to prevent these kinds of failures.

There are troubling indications of woefully insufficient standards and practices that exposed our transportation system and our constituents to unacceptable risk. Senator, as you have already referenced, in the last four years, Con Edison has cut nearly 17 percent of its full time workforce, even though loads have increased.

It's my understanding that in the wake of Superstorm Sandy, reports were filed with Governor Cuomo's Moreland Commission that expressed concerns regarding insufficient staffing levels. These concerns were reflected in the Moreland Commission's final report which recommended that, quote, "Utilities should review existing staffing levels and evaluate the impacts of an aging workforce on their ability to respond to a major event."

It would be inexcusable if, after the findings of the Moreland Commission, low staff levels either contributed to the New Haven Line outage or hindered Con Edison's ability to respond. I hope Mr. Ivey addresses these concerns.

This outage should never have happened. We owe it to our constituents to get to the bottom of what happened. And we owe it to our country to have the kind of 21st Century transportation system in which this will not happen again.

Thank you, Senator Blumenthal, for inviting us here to testify, and I look forward to hearing from the other witnesses.

Senator BLUMENTHAL. Thank you both. Thank you for being here today. Thank you for your leadership, and I know that you are very directly concerned and involved in these issues. I really thank you for your very thoughtful and insightful testimony here today. Thank you very much.

I know that you have other engagements, and you'll have to leave before the conclusion of the hearing. But you being here is very, very important. Thank you very much to both of you.

Our next panel will consist of Howard Permut, President of MTA Metro-North Railroad; Craig Ivey, President of Consolidated Edison; James Redeker, Commissioner of the Connecticut Department of Transportation; and Otto Lynch, a Fellow of the Structural Engineering Institute of the American Society of Civil Engineers. My thanks to each of you for being here today. I'm going to dispense with an elaborate lengthy introduction of each of you because I think you're well known to me and other members of the Committee.

Perhaps we can begin with you, Mr. Permut.

**STATEMENT OF HOWARD PERMUT, PRESIDENT,
MTA METRO-NORTH RAILROAD**

Mr. PERMUT. Good morning Senator Blumenthal and members of the Senate Committee on Commerce, Science, and Transportation. My name is Howard Permut, President of Metro-North Railroad, and I thank you for holding this critically important hearing today. I would also like to thank Congressman Himes and Congresswoman Esty for speaking here this morning. As the elected representatives of our customers who travel on the New Haven Line in the state of Connecticut, I value their input and perspective.

Between September 25 and October 7, service on Metro-North's New Haven Line was severely curtailed when the only in-service electric feeder cable that was providing power to a critical eight-mile section of the line failed. For those 12 days, the Nation's busiest commuter railroad corridor was cut in two, crippling both the New Haven Line and Amtrak's Northeast Corridor service and resulting in very limited and, at times, difficult transportation options for these customers.

The electric feeder that failed is one of two feeder cables that connect to a Metro-North substation in Mount Vernon. That substation then converts the electricity it receives from Con Edison's system to a voltage that can be used for the railroad's traction power needs. On September 25, one feeder was already offline to advance work to modernize and expand the capability of that substation.

Prior to taking the feeder offline, Metro-North and Con Ed had many discussions of how to best accomplish the work. We assessed the risk of only having one feeder in service. Part of that assessment included prior history of performance and preparation.

In 2006, Metro-North reconfigured this same substation to enable one feeder to be taken out of service while continuing to provide sufficient traction power from the remaining single feeder so that Con Ed could do work elsewhere on its system. After Metro-North's reconfiguration was completed, we were able to operate without any problem on one feeder for a total of 38 days while Con Ed performed their work. We also operated on one feeder during this past summer, a good test of performance, giving us more confidence in our ability to provide service.

Nevertheless, on September 25, something went wrong in the freeze pit where work was being done by Con Ed, and the railroad's service plan was insufficient to meet our customers' needs. Craig Ivey and I both agree that our companies will redouble efforts to ensure that we are better prepared in the future.

As soon as the power failure occurred, the employees of both companies sprang into action. At Metro-North, our goal was to provide as much service as possible as soon as possible. Con Ed began working on providing an alternate power source.

The truth is that there is no alternative transportation service that can carry 132,000 daily customers. Initially, through a combination of diesel trains and buses, we could provide 33 percent of a regular New Haven Line schedule. Con Edison was able to re-engineer, secure, and install a temporary power source, allowing us to operate a limited number of electric trains.

With that assistance, we were able to increase the number of trains to approximately 50 percent to 60 percent of a full schedule. In addition, our partners at the state and local level, as well as our colleagues at New York City Transit, helped us create a robust park-and-ride program, with a total of 8,600 free park-and-ride spaces at four sites in the Bronx and Westchester County. We also added rail cars on the Hudson and Harlem trains during this disruption.

Ultimately, these options provided service alternatives for approximately 70 percent of our customers. Throughout the disruption, we worked constantly to communicate with our customers through the use of our website, e-mail alerts, station and train announcements, social media, press releases and press conferences. Customer service representatives were on hand to provide assistance on the phone and in person at stations.

After Con Edison completed their work on the new feeder line, our service was finally restored on Monday, October 7. Restoring the service was nothing short of a herculean effort by everyone involved at both Metro-North and Con Ed. I want to personally thank these men and women, all of whom worked tirelessly in performing such a monumental task in trying to deliver service to our customers during this difficult period.

We recognize the hardship that this event caused our customers, and because of the unparalleled magnitude and duration of this disruption, the MTA Board authorized Metro-North to credit a future ticket purchase for New Haven Line customers holding monthly or weekly tickets valid for travel during this period. This credit can be applied between now and March 31. Mail and Ride customers will have the credit automatically deducted from the price of their December monthly ticket.

Con Edison is conducting an investigation into what caused the feeder to fail. In addition, the New York State Department of Public Service is conducting an independent analysis of what happened, what went into planning the work and both Metro-North's and Con Ed's response. Metro-North will participate fully in this analysis.

But the reality is that power supply is only one area of the New Haven Line infrastructure that requires attention. For example, there are four moveable bridges in the state of Connecticut, all of which are more than a century old, that need replacement. And while our maintenance forces work hard to keep them safe for train operation and functioning as a movable bridge, they must be replaced in the coming years. If not, we could be facing a disruption

just as significant as the one we just experienced for a far longer period of time.

Governor Cuomo has recognized the need to invest in transportation. As a result, New York State has provided \$4.8 billion in direct funding to all public transportation in the state, with \$4.3 billion going to support the services provided by the MTA. This is more than 46 other states combined. In the last 10 years, the State of Connecticut has also invested \$3.2 billion in the New Haven Line infrastructure and rolling stock.

Yet despite this level of self-help, the fact is that Federal investment in mass transit and Amtrak is simply insufficient to address our current state of good repair needs, let alone to build redundancy and contingency. This critical underfunding of our public works and infrastructure has to change. We look forward to working with you to increase the investment necessary for maintaining the rail infrastructure in a state of good repair.

I appreciate the opportunity to appear before you today, and I welcome any questions you have.

[The prepared statement of Mr. Permut follows:]

PREPARED STATEMENT OF HOWARD PERMUT, PRESIDENT,
MTA METRO-NORTH RAILROAD

Good morning Senator Blumenthal, Senator Murphy and members of the Senate Committee on Commerce, Science, and Transportation. My name is Howard Permut, President of Metro-North Railroad and I thank you for holding this critically important hearing. I would also like to thank Congressman Himes and Congresswoman Esty for speaking here this morning. As the elected representatives of our customers who travel on the New Haven Line in the state of Connecticut, I value their input and perspective.

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Prior to taking the feeder off-line, Metro-North and Con Ed had many discussions of how to best accomplish the work. We assessed the risk of only having one feeder in service. Part of that assessment included prior history of performance and preparation. In 2006, Metro-North reconfigured this same substation to enable one feeder to be taken out of service while continuing to provide sufficient traction power from the remaining single feeder so that Con Ed could do work elsewhere on its system. After Metro-North's reconfiguration was completed, we were able to operate without any problem on one feeder for a total of 38 days while Con Ed performed their work. We also operated on one feeder during this past summer—a good test of performance, giving us even more confidence in our ability to provide service.

Nevertheless, on September 25, something went wrong in the "freeze pit" where work was being done by Con Ed and the railroad's service plan was insufficient to meet our customers' needs. Craig Ivey and I both agree that our companies will redouble efforts to ensure that we are better prepared in the future.

As soon as the power failure occurred, the employees of both companies sprang into action. At Metro-North, our goal was to provide as much service as possible as soon as possible. Con Ed began working on providing an alternate power source.

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I appreciate the opportunity to appear before you today and I welcome any questions you have.

Senator BLUMENTHAL. Thank you, Mr. Permut.
Mr. Ivey?

STATEMENT OF CRAIG IVEY, PRESIDENT, CONSOLIDATED EDISON COMPANY OF NEW YORK

Mr. IVEY. Good Morning, Senator Blumenthal. My name is Craig Ivey, and I am the President of Con Edison of New York, the utility which provides electric, gas, and steam to the City of New York and parts of Westchester County. I want to thank you for the opportunity to participate in this morning's hearing. I would also like to recognize Senator Murphy, Congressman Himes, and Congresswoman Esty for their ongoing engagement in this issue.

Before I begin, I want to express on behalf of Con Edison that we clearly recognize the hardships endured by Metro-North's commuters during the train service interruption and regret the set of circumstances that led to the disruption. And I want to make clear to this panel, as well as to Metro-North riders, that we are committed to doing everything within our role to support the MTA to prevent anything like this from happening again, particularly as the agency's substation project moves forward.

I also want to commend our employees and Metro-North employees, who reacted so quickly and professionally in this emergency to restore partial service, and then full service, to the New Haven line.

On September 13, 2013, one of the two Con Edison transmission lines, or feeders, serving the Metro-North New Haven Corridor was taken out of service at Metro-North's request to accommodate work they were conducting at their Mount Vernon substation. To clarify, this is Metro-North's substation, not Con Edison's substation. The feeder was scheduled to be out of service from September 13, 2013, until October 13 so that the line could be repositioned and reconnected to their new equipment in Mount Vernon.

On Wednesday, September 25, at 5:22 a.m., the remaining in-service feeder cable failed and caused a total loss of power supply to Metro-North's Mount Vernon substation. A preliminary review indicates that the feeder fault was related to our work on the scheduled feeder shutdown. I will go into greater detail shortly.

Within a few days of the feeder failure, Con Edison successfully erected a temporary substation at the Harrison station to provide enough power to allow for the partial restoration of Metro-North service on September 30. This was an innovative, unconventional, and ultimately successful effort to transform low voltage, residential 13,000 volt power into higher voltage, 27,000 volt power, for the train line.

On October 3, we were able to reconnect and reenergize the 138,000 feeder that had been removed from service at Metro-North's request 10 days sooner than scheduled. This reconnection allowed Metro-North to return to its regular commuter schedule on Monday, October 7. Our crews worked around the clock to expedite repairs to the failed feeder, which was reenergized on October 19, returning the Metro-North supply to its normal configuration of two transmission feeders.

We are conducting a thorough review of the cause of the feeder failure to understand how this incident occurred and prevent it from happening again. The New York Public Service Commission is also conducting its own independent review.

High-voltage transmission feeders are housed in oil-filled pipes. As a result, removing these feeders from service is a complex process. We have to freeze the insulating oil in the pipe within a freeze pit in order to contain the oil.

We located the fault on the failed feeder just outside of the freeze pit work area. We found that the ground surrounding the work area was frozen, which we believe contributed to the failure.

Having completed these freeze operations for decades, approximately 20 times a year, we have no records of a condition of this nature developing at any other time. Our investigation will include

a forensic analysis of the cable, the pipe, and the surrounding work area to help pinpoint the cause.

It is important to note that Con Edison continuously assesses the condition of its underground feeder cables with respect to possible degradation due to aging. Over the past several years, several sample sections of cable similar in construction to those supplying the Metro-North Railroad have been subjected to in-depth engineering evaluations. These evaluations and our experience with these cable systems indicate that the condition and performance of the cable is primarily a function of the thermal and electrical stresses to which the cable is subjected as opposed to the age of the cable.

Con Edison recognizes how critical Metro-North service is to the New York-Connecticut area. Con Edison bears an equally monumental responsibility in powering our dynamic region. This is why we are having extensive discussions with Metro-North regarding their future substation replacement work and the need to ensure that this type of event does not happen again.

Thank you, and I look forward to taking your questions.

[The prepared statement of Mr. Ivey follows:]

PREPARED STATEMENT OF CRAIG IVEY, PRESIDENT,
CONSOLIDATED EDISON COMPANY OF NEW YORK

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York Public Service Commission is also conducting its own independent review. High-voltage transmission feeders are housed in oil-filled pipes. As a result, removing these feeders from service is a complex process. We have to freeze the insulating oil in the pipe within a “freeze pit” in order to contain the oil.

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Senator BLUMENTHAL. Thank you, Mr. Ivey.
Commissioner Redeker?

**STATEMENT OF JAMES P. REDEKER, COMMISSIONER,
CONNECTICUT DEPARTMENT OF TRANSPORTATION**

Mr. REDEKER. Good morning, Senator Blumenthal. Thank you for this chance to testify. I am Jim Redeker, the Commissioner of the Connecticut Department of Transportation, and I am also the current Chair of the Northeast Corridor Commission. I’m honored to have the opportunity to discuss the power outage on the Metro-North New Haven Line, the impacts it had on the Northeast Corridor, and the need to ensure investments in the infrastructure to sustain this critical transportation and economic driver in the region and for the entire Northeast Corridor.

For over 160 years, the New Haven Line has been an essential transportation and economic link between Manhattan, the northern suburbs of New York City, and the cities in southwestern and central Connecticut. The New Haven Line is also critical to the entire Northeast Corridor, linking Boston to New York and Washington.

The New Haven Line is the single busiest rail line in North America. Over 39 million passengers are served by Metro-North annually on the commuter system, and an additional 3 million intercity passenger trips are served by Amtrak. The ridership performance is record setting, indicating the attractiveness and importance of the New Haven Line to Connecticut, to New York, and the entire region.

The State of Connecticut plays a unique role in the Northeast Corridor, since the state owns 46 miles of the Northeast Corridor infrastructure between New Haven and the New York border, as well as three branch lines. In total, Connecticut owns 235 track miles on the Northeast Corridor and branches.

As the owner, Connecticut has invested significant state and Federal resources to upgrade the rail infrastructure, including track, catenary, and bridges. Connecticut has funded the replace-

ment of 405 New Haven Line electric passenger vehicles and the construction of related maintenance facilities to support that fleet.

As a result of the state's investment, progress toward a state of good repair has been strong. In the last 10 years, Connecticut has invested over \$3.2 billion in the New Haven Line, and out of that, two-thirds or \$2 billion has been funded by state bond funds, while the remainder is Federal Transit Administration rail formula or discretionary funding.

Unfortunately, even this amount of funding is not enough to address the infrastructure upgrades or improvements necessary for the New Haven Line. And Connecticut is not alone in addressing the backlog of investment in infrastructure. The Northeast Corridor relies on over 1,000 bridges and tunnels, many of which were constructed a century ago and are in desperate need of replacement or repair.

Key segments of the Northeast Corridor are operating at or near capacity, such as the Hudson River tunnels between New York and New Jersey, which carry 70,000 riders a day and have no space for additional trains during rush hour. Major components of the Northeast Corridor electrical and signaling systems date back to the 1910s, making service on the corridor highly susceptible to malfunctions and delay.

Major investments in the corridor are essential to reduce delays, achieve a state of good repair, and build capacity for growth. In 2010, the Northeast Corridor infrastructure master plan estimated that the corridor required \$2.6 billion in annual expenditures over 20 years, or \$52 billion total, to achieve a state of good repair and build infrastructure capable of supporting passenger rail demand forecast for 2030.

Investment levels over the past several decades have been critical in supporting the Northeast Corridor's enviable record of continuous safe operation, but have barely covered the cost of normalized replacement of basic components. They fall far short of the levels needed to address repair backlogs and meet future needs. The Northeast Corridor Commission is currently in the process of developing an updated capital investment plan for the corridor that will address the needs of freight, commuter, and intercity services.

The New Haven Line receives power from four substations. The substation in Mount Vernon, New York, which experienced the failure on September 25 is the single point of power between Pelham and Harrison, New York.

In Connecticut, there are three substations that provide power for the New Haven Line. These are designed so that if one substation is offline, the others can provide redundant power. In addition, Connecticut is constructing two new substations, one in New Haven and one in Cos Cob. With the addition of these two new substations, there will be additional power to support the expansion of service with the new M8 rail fleet and provide complete redundancy in Connecticut to power the New Haven Line if any of the substations is offline.

These projects are scheduled to be completed by the end of the calendar year. They provide an example of the proactive strategic investments Connecticut is making to upgrade the New Haven

Line and support future improvement and expansion of service for all users of the line.

Unfortunately, on September 25, there was an unprecedented failure of the power supply at the substation in Mount Vernon, New York. The substation was undergoing a planned necessary upgrade, but a failure of a feeder cable left the New Haven Line without power in a critical section of New York. As a result, no Metro-North or Amtrak electric trains operated, leaving well over 130,000 customers without train service, and for 11 days, the Nation's busiest rail line was crippled.

Impacts to New York and Connecticut customers and businesses had a compelling economic impact that cannot be simply modeled. The impact on people's livelihood and mobility was profound. While we don't know what caused the failure, we certainly know that thousands of people were without the critical service, and we obviously need to do everything possible to avoid a similar incident from occurring again. To that end, we await feedback from Con Edison so critical lessons learned might be included in all future projects.

I want to take a moment to reflect on the efforts to provide service during the 11 days without Mount Vernon substation in service. As soon as the incident occurred, Connecticut DOT was in direct contact with Metro-North to initiate the delivery of substitute services. Recognizing there is no solution that can provide full capacity of the New Haven Line, the MTA, Metro-North, and Connecticut DOT developed and implemented substitute rail, bus, and park-and-ride options that provided the most service that could possibly be delivered during the repair period.

With the ultimate addition of temporary power by Con Edison, substitute services ultimately were able to provide options for an estimated 85 percent of normal weekday New Haven peak ridership. The immediate response by Governor Malloy to urge people to find alternatives, telecommute, or stay home was instrumental in the ability to manage this crisis. Consistent and thorough updates on the progressive addition of service were also communicated, and, above all, customers and other citizens rose to deal with the crisis and deserve a great deal of credit as they coped through this long service impact.

The impact that this outage had resulted in an unprecedented action by the MTA board of directors to authorize a credit to customers. The action is not something that should be taken lightly, but it was clearly due to a once in a lifetime failure that had an extraordinary impact. In fact, this singular action is not recommended for the ongoing business practices that govern the New Haven Line.

The New Haven Line, as part of the Northeast Corridor, is a critical transportation and economic system. The line has seen and will continue to see significant investments in ongoing maintenance and system upgrades. Its performance as the busiest rail commuter line in the country is exceptional. On average, it delivers consistent, high-quality, reliable service that exceeds 95 percent on-time performance.

The quality of the system is improving consistently with the rapid delivery of new rail cars, upgraded power supply and cat-

enary systems, new stations, and new parking. Those investments have also seen the implementation of the most significant additional weekday and weekend services in the history of the line. The results are proven by the growth in ridership in all markets in this region and for trips along the Northeast Corridor.

Thank you for your time. I'll be happy to answer questions.
[The prepared statement of Mr. Redeker follows:]

PREPARED STATEMENT OF JAMES P. REDEKER, COMMISSIONER,
CONNECTICUT DEPARTMENT OF TRANSPORTATION

Good morning Senator Blumenthal, Senator Murphy, and members of the Subcommittee. I am Jim Redeker, Commissioner of the Connecticut Department of Transportation (CTDOT). I am also the current Chair of the Northeast Corridor Commission. I am honored to have the opportunity to discuss the power outage on Metro-North's New Haven Line (NHL), the impacts it had on the Northeast Corridor (NEC), and the need to ensure investments in the infrastructure to sustain this critical transportation and economic driver in the region and for the entire Northeast Corridor.

New Haven Line—Infrastructure and Investments

For over 160 years, the New Haven Line has been an essential transportation and economic link between Manhattan, the northern suburbs of New York City and the cities in southwestern and central Connecticut. The New Haven Line is also critical to the entire Northeast Corridor, linking Boston to New York and Washington. The New Haven Line is the single busiest rail line in North America. Over 39 million passengers are served by Metro-North annually on the commuter system, and an additional 3 million intercity passenger trips are served by *Amtrak*. The ridership performance is record-setting, indicating the attractiveness and the importance of the New Haven Line to Connecticut, to New York and to the entire region.

The State of Connecticut has a unique role on the NEC, since the State owns 46 miles of the NEC infrastructure between New Haven and the New York border as well as three branch lines. In total, Connecticut owns 235 track miles on the NEC and three branch lines. As the owner, Connecticut has invested significant state and Federal resources to upgrade the rail infrastructure, including track, catenary and bridges. Connecticut has funded the complete replacement of 405 New Haven Line electric passenger vehicles (M8 rail cars) and the construction of related new maintenance facilities to support that fleet. As a result of the State's investment, progress toward a State of Good Repair has been strong. In the last 10 years, Connecticut has invested over \$3.2 billion in the NHL. Of that, two-thirds, or over \$2 billion has been funded by state bond funds, while the remainder is Federal Transit Administration rail formula or discretionary funding.

Unfortunately, even this amount of funding is not enough to address the infrastructure upgrades or improvements necessary for the New Haven Line. And Connecticut is not alone in addressing the backlog of infrastructure investments. The NEC relies on over 1,000 bridges and tunnels, many of which were constructed over a century ago and are in desperate need of replacement or repair. Key segments of the NEC are operating at or near capacity, such as the Hudson River Tunnels between New York and New Jersey, which carry over 70,000 riders daily and have no space for additional trains during rush hour. Major components of the NEC's electrical and signaling systems date back to the 1910s, making service on the Corridor highly susceptible to malfunctions and delay. Major investment in the Corridor is essential to reduce delays, achieve a state-of-good-repair, and build capacity for growth. In 2010, the NEC Infrastructure Master Plan (Master Plan) estimated that the Corridor required approximately \$2.6 billion in annual expenditures over twenty years (\$52 billion total) in order to achieve state-of-good-repair and build infrastructure capable of supporting passenger rail demand forecasts for 2030. Investment levels over the past several decades have been critical in supporting the NEC's enviable record of continuous safe operation but have barely covered the costs of normalized replacement of basic components. They fall far short of the levels needed to address repair backlogs and meet future needs. The NEC Commission is currently in the process of developing an updated capital investment plan for the NEC that will address the needs of freight, commuter and intercity services.

New Haven Line Power

The New Haven Line receives power from four substations. The substation in Mount Vernon, New York which experienced the failure on September 25, 2013 is the single point of power between Pelham and Harrison, New York. In Connecticut, there are three substations that provide power for the New Haven Line. These are designed so that if one substation is off line, the others can provide redundant power. In addition, Connecticut is constructing two new substations—one in New Haven and one in Cos Cob. With the addition of these two new substations, there will be additional power to support the expansion of service with the new M8 rail fleet and provide complete redundancy in Connecticut to power the New Haven Line if any of the substations is off line. These projects are scheduled to be completed by the end of this calendar year. These projects are an example of the proactive, strategic investments Connecticut is making to upgrade the New Haven Line and support the future improvement and expansion of service for all the users of the line.

Power Outage

Unfortunately, on September 25 there was an unexpected failure of the power supply at the substation in Mount Vernon, New York. The substation was undergoing a planned, necessary upgrade, but the failure of a feeder cable left the New Haven Line without power in the critical section in New York. As a result, no Metro-North or *Amtrak* electric trains could be operated, leaving well over 130,000 customers without train service. For eleven days, the Nation's busiest rail line was crippled. The impacts to New York and Connecticut customers and businesses had a compelling economic impact that cannot be simply modeled. The impact on people's livelihood and mobility was profound.

While we do not know what caused the failure, we certainly know that thousands of people were without this critical service, and we obviously need to seek to do everything possible to avoid a similar incident from occurring again. To that end, we await feedback from Con Edison so that critical lessons learned might be included in all future projects of this kind.

Customer Service

I want to take a moment to reflect on the efforts made to provide service to customers during the eleven days without the Mount Vernon substation in service. As soon as the incident occurred, Connecticut DOT was in direct contact with Metro-North to initiate the delivery of substitute services. Recognizing that there is no solution that can provide the full capacity of the New Haven Line, the Metropolitan Transportation Authority (MTA), Metro-North and CTDOT developed and implemented substitute rail, bus and park/ride options that provided the most service that could possibly be delivered during the repair period. With the ultimate addition of temporary power by Con Edison, the substitute services ultimately were able to provide options for an estimated 85 percent of normal weekday New Haven Line peak ridership.

The immediate response by Governor Dannel Malloy to urge people to find alternatives, telecommute or to stay home was instrumental in the ability to manage this crisis. Consistent and thorough updates on the progressive addition of service were also communicated. Above all, customers and other citizens rose to deal with the crisis and deserve a great deal of credit as they coped through this long service impact.

The impact that this outage had resulted in an unprecedented action by the MTA Board of Directors to authorize a credit to customers. This action is not something that should be taken lightly, but it was clearly due to the once-in-a-lifetime failure that had an extraordinary impact. In fact, this singular action is not recommended for the ongoing business practices that govern the New Haven Line.

Summary

The New Haven Line, as part of the Northeast Corridor, is a critical transportation and economic system. The line has seen, and will continue to see, significant investments in ongoing maintenance and in system upgrades. Its performance, as the busiest rail commuter line in the country, is exceptional. On average, it delivers consistent, highly reliable service that exceeds 95 percent on-time performance. And the quality of the system is improving consistently and rapidly with the delivery of all new rail cars, upgraded power supply and catenary systems, new stations and new parking. Those investments have also seen the implementation of the most significant additional weekday and weekend services in the history of the line. The results are proven by the growth in ridership in all markets in this region and for trips along the entire Northeast Corridor.

Senator BLUMENTHAL. Thank you, Commissioner.

Mr. Lynch, thank you for being here today. I know you've submitted lengthy testimony, and all of the testimony is going to be made part of the record along with the exhibits that you submitted. So let me suggest that you summarize your testimony this morning. Thank you.

**STATEMENT OF OTTO LYNCH, P.E., FELLOW,
STRUCTURAL ENGINEERING INSTITUTE,
AMERICAN SOCIETY OF CIVIL ENGINEERS**

Mr. LYNCH. My name is Otto Lynch, and I'm a member of the American Society of Civil Engineers, and I'm currently serving on their Committee on America's Infrastructure, representing the energy division. The ASCE would like to commend you for having this hearing today on the power outages and the larger issues related to the need for power delivery redundancy and improved reliability for the nation's electric grid.

Virtually all infrastructure systems, from trains and traffic lights, to clean drinking water delivery and wastewater disposal, rely on electricity. This hearing today, on the eve of the anniversary of Superstorm Sandy, serves as an important reminder of just how vulnerable we are and how quickly one event can have a crippling effect on our communities when we are not adequately prepared.

I am here to testify not on the specific events, but on the big picture questions to keep them from happening again here or anywhere in America. Our infrastructure is the foundation on which the national economy depends, yet it is taken for granted by most Americans. Most of us do not notice until the road is closed, the water stops running, the lights go out, or the commuter trains quit working.

ASCE's 2013 Report Card for America's Infrastructure graded the Nation's infrastructure a D+. This is based on 16 categories and found that the Nation needs to invest approximately \$3.6 trillion by 2020 across those sectors to maintain the national infrastructure in good condition. The energy category also received a D+ in the 2013 Report Card.

To update just our energy systems would cost \$736 billion between now and 2020. Unfortunately, we are only on schedule to spend \$629 billion. That leaves an investment gap of \$107 billion.

America relies on an aging infrastructure, electrical grid, and pipeline distribution systems, some of which originated in the 1880s. This interconnected system includes power plants, a transmission grid, and distribution networks. The transmission grid forms the critical link between generation infrastructure and the distribution of electricity to households and businesses. Like our interstate highway system, failing to maintain adequate investment in this national asset has created congestion and the inability for power to flow efficiently from point A to point B.

At one time, the U.S. had the best electric grid in the world. Unfortunately, that is no longer true. Aging equipment has resulted in an increasing number of intermittent power disruptions as well as a vulnerability to cyber attacks. It is my understanding that in

this specific case, the underground transmission line was 36 years old and was only designed for 30 years.

Reliability issues are also emerging due to the complex process of rotating in new renewable energy sources and retiring our older energy sources. According to a recent report by the Executive Office of the President of the United States, "Economic Benefits of Increasing Electric Grid Resilience Due to Weather Outages," severe weather is the leading cause of power outages in the United States.

The Edison Electric Institute reports that while transmission system outages do occur, over 90 percent of the outages occur along distribution systems. With respect to the failures in our distribution systems, The National Electrical Safety Code, which is adopted by all states except California, currently exempts all utility structures less than 60 feet tall, or distribution structures, from meeting the loads normally required in extreme weather for other structures.

Structures greater than 60 feet tall, transmission structures, must meet the minimum ASCE requirements. The only storm hardening that structures less than 60 feet tall must meet was last revised in 1941, and the minimum load was actually decreased at that time.

Florida Power and Light began a storm hardening program in 2007 that included a significant decision to design all structures, regardless of height, according to the ASCE standards. As a result, in May 2013, it was announced that Florida Power and Light's experience with the recent tropical storms shows main power lines that have been hardened are roughly half as likely to experience an outage during severe weather.

On the transmission side, congestion at key points in the electric transmission grid has been rising over the last five years, which raises concerns with distribution, reliability, and cost of service. This congestion can lead to system-wide failures and unplanned outages. As we saw with the blackout of 2003 and other recent blackouts, these outages are not only an inconvenience, but they put public safety at risk and increase costs to consumers and businesses. The ASCE has determined that the average cost of a 1-hour power outage is just over \$1,000 for a commercial business.

Although we currently have adequate power generation, we are shifting to more and more renewable energy sources and also retiring our coal plants. You don't build a new wind farm on the side of a retired coal plant. Thus, we are seeing a major shift in the locations of our power sources. We now have to transmit electricity from entirely different regions of our country than we ever have before. I equate it to moving the fuse panel on your house to the other side. As such, just like you would have to rewire your house, we are essentially having to rewire all of America.

We would like to build more transmission lines for redundancy purposes. But the permitting and siting of these needed lines, especially when they are redundant, meets very stiff public resistance, which can result in significant project delays or even cancellations while significantly driving up the cost. It shouldn't take 10 or 15 years to permit a transmission line that only takes less than a year to build. It shouldn't take five times as much to permit the line as it costs to build it.

As detailed in the ASCE Failure to Act Study, unless investment is accelerated, the performance of the U.S. economy will suffer. Americans will lose jobs. Personal income will fall. Business productivity will go down, and U.S. exports will fall. If we invest an additional \$11 billion per year from now until 2020, we can prevent these losses. This investment gap is not insurmountable. I would venture to say if we could streamline the permitting process, the annual investment could be significantly lowered.

There are a number of solutions that can help ensure that the Nation's interconnected electric grid remains reliable and efficient. First, we need to adopt a national energy policy that anticipates and adapts to future energy needs and promotes the development of sustainable energy sources, while increasing the efficiency of energy use, promoting conservation, and decreasing dependence on fossil fuels as sources are depleted. Such a policy must be adaptable and scalable to local and state policy.

Two, we need to provide mechanisms for timely approval of transmission lines to minimize the time from preliminary planning to operation. Three, we should design and construct additional transmission grid infrastructure to efficiently deliver power from remote geographic locations to developed regions that have the greatest demand requirements.

Four, we need to encourage the adoption of the same minimum design standards and storm loads for distribution poles as are used for transmission poles based on ASCE standards. And, finally, we need to continue research to improve and enhance the Nation's transmission and generation infrastructure as well as the development of technologies such as smart grid, real-time forecasting for transmission capacity, and sustainable energy generation which provide a reasonable return on investment.

Thank you very much.

[The prepared statement of Mr. Lynch follows:]

PREPARED STATEMENT OF THE AMERICAN SOCIETY OF CIVIL ENGINEERS

"THE NEED TO MAINTAIN AND MODERNIZE THE NATION'S ELECTRIC GRID"

The American Society of Civil Engineers (ASCE)¹ would like to commend the Senate Committee on Commerce, Science, and Transportation for holding a hearing on the power outages that recently affected Metro-North's New Haven line, and the larger issues related to the need for redundancy and improved reliability for the Nation's electric grid. Virtually all infrastructure systems from trains and traffic lights, to clean drinking water delivery and wastewater disposal, rely on electricity.

This hearing today, on the eve of the anniversary of Hurricane Sandy, serves as an important reminder of how vulnerable we are, and how quickly one event can have a crippling effect on our communities when we are not adequately prepared.

An Aging Infrastructure System

Our infrastructure is the foundation on which the national economy depends, yet it is taken for granted by most Americans. Most of us do not notice until the road is closed, the water stops working, or the lights go out.

Deteriorating and aging infrastructure is not only an inconvenience, it financially impacts our families, local communities, and our entire country. Our inability to

¹ASCE was founded in 1852 and is the country's oldest national civil engineering organization. It represents more than 146,000 civil engineers individually in private practice, government, industry, and academia who are dedicated to the advancement of the science and profession of civil engineering. ASCE is a non-profit educational and professional society organized under Part 1.501(c)(3) of the Internal Revenue Code. www.asce.org

keep our infrastructure in good working condition undermines our Nation's competitiveness and economic strength.

As stewards of the Nation's infrastructure, civil engineers are responsible for the design, construction, operation and maintenance of our vital public works. With that responsibility comes the obligation to periodically assess the state of the infrastructure, report on its condition and performance, and advise on the steps necessary to improve it.

ASCE's 2013 *Report Card for America's Infrastructure*² graded the Nation's infrastructure a "D+" based on 16 categories and found that the Nation needs to invest approximately \$3.6 trillion by 2020 across those sectors to maintain the national infrastructure in good condition.

The energy category also received a grade of "D+" in the 2013 Report Card. To update just our energy systems would cost \$736 billion between now and 2020. Unfortunately, we are only on track to spend \$629 billion during that time period, leaving an investment gap of \$107 billion.

The Report Card highlights the fact that, like everything, infrastructure has a lifespan. Good maintenance can extend that lifespan, but not forever, and a lack of maintenance can shorten it. This is not something that happens dramatically overnight, but a gradual worsening over time.

Far too many of our infrastructure systems lack the funding needed for proper maintenance and we continue to see categories that simply are not seeing the investment to improve day to day performance and save money in the long-term. The backlog of projects to maintain and modernize our infrastructure keeps growing.

Conditions of the Nation's Electric Grid

America relies on an aging electrical grid and pipeline distribution systems, some of which originated in the 1880s. This interconnected system includes power plants, a transmission grid, and distribution networks. The transmission grid forms the critical link between generation infrastructure and distribution of electricity to households and businesses. Like our interstate highway system, failing to maintain adequate investment in this national asset has created congestion and the inability for power to flow efficiently from point A to point B.

Aging equipment has resulted in an increasing number of intermittent power disruptions, as well as vulnerability to cyber attacks. Reliability issues are also emerging due to the complex process of rotating in new energy sources and "retiring" older infrastructure. According to a recent report by the Executive Office of the President of the United States, *Economic Benefits of Increasing Electric Grid Resilience to Weather Outages*, severe weather is the leading cause of power outages in the United States.³ The Edison Electric Institute reports that while transmission system outages do occur, roughly 90 percent of all outages occur along distribution systems.⁴

The National Electrical Safety Code,⁵ which is adopted by all states except California, currently exempts all utility structures less than 60 feet tall, *i.e.*, "distribution poles", from meeting the loads normally required in extreme weather for other structures derived by ASCE standards.⁶ Structures greater than 60 feet tall, *i.e.*, transmission structures, must meet these minimum ASCE standards. The only 'storm loading' that structures less than 60 feet tall must meet was last revised in 1941, and the minimum load was actually decreased at that time.

Florida Power and Light (FPL) began a Storm Hardening program in 2007 that included a significant decision to design all structures, regardless of height, according to the ASCE standard. As a result, in May 2013 it was announced that "*FPL's experience with the recent tropical storms shows main power lines that have been hardened are roughly half as likely to experience an outage during severe weather.*"⁷

Congestion at key points in the electric transmission grid has been rising over the last five years, which raises concerns with distribution, reliability and cost of service. This congestion can also lead to system-wide failures and unplanned outages. These outages are not only an inconvenience, but they put public safety at risk and

² www.infrastructurereportcard.org

³ Economic Benefits of Increasing Electric Grid Resilience to Weather Outages, Executive Office of the President (of the United States), August 2013. p. 3 http://energy.gov/sites/prod/files/2013/08/02/2013%20Grid%20Resiliency%20Report_FINAL.pdf

⁴ Edison Electric Institute. "Underground vs. Overhead Distribution Wires: Issues to Consider." Washington, D.C. Accessed July 22, 2013.

⁵ 2012 National Electrical Safety Code, p. 191–203, <http://standards.ieee.org/about/nesc/>

⁶ ASCE 7–10, Minimum Design Loads for Buildings and Other Structures, <http://www.asce.org/Product.aspx?id=2147487569&productid=194395836>

⁷ FPL announces plan to accelerate strengthening of Florida's electric grid during annual storm drill, May 2, 2013, <http://www.fpl.com/news/2013/050213.shtml>

increase costs to consumers and businesses. The average cost of a one-hour power outage is just over \$1,000 for a commercial business.

In the near term, it is expected that energy systems have adequate capacity to meet national demands. From 2011 through 2020, demand for electricity in all regions is expected to increase 8 percent or 9 percent in total, based on population growth and projections from the U.S. Energy Information Administration. After 2020, capacity expansion is forecast to be a greater problem, particularly with regard to generation, regardless of the energy resource mix. Excess capacity is expected to decline in a majority of regions, and generation supply could dip below demand by 2040 in every area except the Southwest without prudent investments.⁸

The permitting and siting of needed transmission lines often meets with public resistance, which can result in significant project delays or eventual cancellations while driving up costs. Over three times as many low-voltage line projects, which are typically built in more urban areas, were delayed in 2011, compared to high-voltage lines.⁹ The result is that while new transmission lines are anticipated and planned, they are not being built due to permitting issues.

Investment for transmission has been increasing annually since 2001 at a nearly 7 percent annual growth rate. For local distribution systems, however, national-level investment peaked in 2006 and has since declined to less than the level observed in 1991.¹⁰ Construction spending has decreased in recent years, although the aging of local distribution networks, lack of funding for maintenance, and resulting equipment failures have received public attention and put pressure on some utilities to make improvements.

Economic Implications of Continued Underinvestment

In an effort to examine the broader economy's link to the health of the Nation's infrastructure, ASCE released a series of economic studies in 2012 that answers a critical question—what does a “D+” mean for America's economic future? The study on energy, *Failure to Act: The Economic Impact of Current Investment Trends in Electricity Infrastructure* shows that an investment in our Nation's generation, transmission, and distribution systems can improve reliability, reduce congestion, and build the foundation for economic growth.

While investments in the transmission sector have been promising since 2005, unless the investment gap is filled, electricity interruptions will rise, increasing costs for households and businesses.

Interruptions may occur in the form of equipment failures, intermittent voltage surges and power quality irregularities due to equipment insufficiency, or blackouts or brownouts as demand exceeds capacity for periods of time. The periods of time can be unpredictable in terms of frequency and length.

By 2020, there is estimated to be an investment shortfall of \$107 billion across generation, transmission and distribution systems needed to keep up with the projected demand for energy. Shortfalls in grid investments (transmission and distribution) are expected to account for almost 90 percent of the investment gap, equaling nearly \$95B in additional dollars needed to modernize the grid.

By 2020, the cumulative costs of service interruptions to households will be \$71 billion, or \$565 per household over the period. Businesses will lose approximately \$126 billion.

Thus, the total cost to the U.S. economy will be \$197 billion from now until 2020, and annual costs to the economy will average \$20 billion by 2020. These costs are not felt equally across the United States, with larger cost increases in the South and West.

Unless investment is accelerated, the performance of the U.S. economy will suffer.

- *Americans will lose jobs.* The U.S. economy will end up with an average of 529,000 fewer jobs than would otherwise occur by the year 2020. Impacts will fall heavily on the retail and consumer spending sectors with a 40 percent drop in employment in retail, restaurants, and bars as households spend more on electricity.
- *Personal Income Will Fall:* Personal income will fall by a total of \$656 billion by 2020.

⁸ ASCE, *Failure to Act: Economic Impact of Current Investment Trends in Electricity Infrastructure*, 2012, p. 30.

⁹ NERC 2011 Long-Term Reliability Assessment, p. 35

¹⁰ Transmission and distribution numbers from Edison Electric Institute, *2012 Report*, table 9–1; generation investment was estimated from reporting forms of the EIA and Federal Energy Regulatory Commission, with averages applied for investment cost per kilowatt hour for applicable generating technologies [close up space between lines]

- *Business productivity will go down.* GDP is expected to fall by a total of \$496 billion by 2020.
- *U.S. exports will fall.* The U.S. will lose \$10 billion in exports in 2020, which could grow to \$40 billion by 2040. The hardest hit industrial sectors will be:
 - Aerospace
 - Electronic components
 - Air transport

If we invest an additional \$11 billion per year from now until 2020, we can prevent these losses. This investment gap is not insurmountable.



Moving Forward to Modernize our Nation's Electric Grid

There are a number of solutions that can help ensure that the Nation's inter-connected electric grid remains reliable and efficient:

- Adopt a national energy policy that anticipates and adapts to future energy needs and promotes the development of sustainable energy sources, while in-

creasing the efficiency of energy use, promoting conservation, and decreasing dependence on fossil fuels as sources are depleted. Such a policy must be adaptable and scalable to local and state policy.

- Provide mechanisms for timely approval of transmission lines to minimize the time from preliminary planning to operation.
- Design and construct additional transmission grid infrastructure to efficiently deliver power from remote geographic generation sources to developed regions that have the greatest demand requirements.
- Encourage the adoption of the same minimum design methods and storm loads for distribution poles as are used for transmission structures derived by ASCE standards.
- Continue research to improve and enhance the Nation's transmission and generation infrastructure as well as the deployment of technologies such as smart grid, real-time forecasting for transmission capacity, and sustainable energy generation which provide a reasonable return on investment.

Conclusion

Electricity is the basis for a competitive U.S. economy and contributes to the success or failure of American businesses. Our quality of life also depends on access to affordable and reliable energy.

Looking ahead in the 21st century, our Nation is increasingly adopting technologies that will automate our electric grid and help manage congestion points. In turn, this will require robust integration of transmission and distribution systems so that the network continues to be reliable. Investments in the grid, select pipeline systems, and new technologies have helped alleviate congestion problems in recent years, but capacity and an aging system will be issues in the long term.

To compete in the global economy, improve our quality of life and raise our standard of living, we must maintain and modernize America's infrastructure and the electric grid.

National Electrical Safety Code®

Secretariat
Institute of Electrical and Electronics Engineers, Inc.

Approved 14 April 2011
Institute of Electrical and Electronics Engineers, Inc.

Approved 3 June 2011
American National Standards Institute

2012 Edition

Abstract: This Code covers basic provisions for safeguarding of persons from hazards arising from the installation, operation, or maintenance of (1) conductors and equipment in electric supply stations, and (2) overhead and underground electric supply and communication lines. It also includes work rules for the construction, maintenance, and operation of electric supply and communication lines and equipment. The Code is applicable to the systems and equipment operated by utilities, or similar systems and equipment, of an industrial establishment or complex under the control of qualified persons. This Code consists of the introduction, definitions, grounding rules, list of referenced and bibliographic documents, and Parts 1, 2, 3, and 4 of the 2012 Edition of the National Electrical Safety Code.

Keywords: communications industry safety; construction of communication lines; construction of electric supply lines; electrical safety; electric supply stations; electric utility stations; high-voltage safety; operation of communications systems; operation of electric supply systems; power station equipment; power station safety; public utility safety; safety work rules; underground communication line safety; underground electric line safety

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Section 25. Loadings for Grades B and C

250. General loading requirements and maps

A. General

1. It is necessary to assume the wind and ice loads that may occur on a line. Three weather loadings are specified in Rules 250B, 250C, and 250D. Where all three rules apply, the required loading shall be the one that has the greatest effect.
2. Where construction or maintenance loads exceed those imposed by Rule 250A1, the assumed loadings shall be increased accordingly. When temporary loads, such as lifting of equipment, stringing operations, or a worker on a structure or its component, are to be imposed on a structure or component, the strength of the structure or component should be taken into account or other provisions should be made to limit the likelihood of adverse effects of structure or component failure.

NOTE: Other provisions could include cranes that can support the equipment loads, guard poles and spotters with radios, and stringing equipment capable of promptly halting stringing operations.

3. It is recognized that loadings actually experienced in certain areas in each of the loading districts may be greater, or in some cases, may be less than those specified in these rules. In the absence of a detailed loading analysis, using the same respective statistical methodologies used to develop the maps in Rule 250C or 250D, no reduction in the loadings specified therein shall be made without the approval of the administrative authority.
4. The structural capacity provided by meeting the loading and strength requirements of Sections 25 and 26 provides sufficient capability to resist earthquake ground motions.

B. Combined ice and wind district loading

Four general degrees of district loading due to weather conditions are recognized and are designated as heavy, medium, light, and warm island loading. Figure 250-1 shows the districts where these loadings apply. Warm island loading applies to Hawaii and other island systems located in the range of 0 to 25 degrees latitude, north or south.

NOTE: The localities are classified in the different loading districts according to the relative simultaneous prevalence of the wind velocity and thickness of ice that accumulates on wires. Light loading is for places where little, if any, ice accumulates on wires. In the warm island loading zone, cold temperatures and ice accumulation on wires only occurs at high altitudes.

Table 250-1 shows the radial thickness of ice and the wind pressures to be used in calculating loads. Ice is assumed to weigh 913 kg/m³ (57 lb/ft³).

C. Extreme wind loading

If no portion of a structure or its supported facilities exceeds 18 m (60 ft) above ground or water level, the provisions of this rule are not required, except as specified in Rule 261A1c, 261A2e, or 261A3d. Where a structure or its supported facilities exceeds 18 m (60 ft) above ground or water level the structure and its supported facilities shall be designed to withstand the extreme wind load associated with the Basic Wind Speed, as specified by Figure 250-2. The wind pressures calculated shall be applied to the entire structure and supported facilities without ice. The following formula shall be used to calculate wind load.

$$\text{Load in newtons} = 0.613 \cdot (V_{m/s})^2 \cdot k_z \cdot G_{RF} \cdot I \cdot C_f \cdot A(m^2)$$

$$\text{Load in pounds} = 0.00256 \cdot (V_{mi/h})^2 \cdot k_z \cdot G_{RF} \cdot I \cdot C_f \cdot A(ft^2)$$

where

0.613	Velocity-pressure numerical coefficient reflects the mass density of air
0.00256	for the standard atmosphere, i.e., temperature of 15 °C (59 °F) and sea level pressure of 760 mm (29.92 in) of mercury. The numerical coefficient 0.613 metric (0.00256 customary) shall be used except where sufficient climatic data are available to justify the selection of a different value of this factor for a design application.
k_z	Velocity pressure exposure coefficient, as defined in Rule 250C1, Table 250-2
V	Basic wind speed, 3 s gust wind speed in m/s at 10 m (mi/h at 33 ft) aboveground, Figure 250-2
G_{RF}	Gust response factor, as defined in Rule 250C2
I	Importance factor, 1.0 for utility structures and their supported facilities
C_f	Force coefficient (shape factor). As defined in Rules 251A2 and 252B
A	Projected wind area, m ² (ft ²)

The wind pressure parameters (k_z , V, and G_{RF}) are based on open terrain with scattered obstructions (Exposure Category C as defined in ASCE 7-05). Exposure Category C is the basis of the NESC extreme wind criteria. Topographical features such as ridges, hills, and escarpments may increase the wind loads on site-specific structures. A Topographic Factor, K_{zt} , from ASCE 7-05, may be used to account for these special cases.

NOTE: Special wind regions—Although the wind speed map is valid for most regions of the country, special wind regions indicated on the map are known to have wind speed anomalies. Winds blowing over mountain ranges or through gorges or river valleys in these special regions can develop speeds that are substantially higher than the values indicated on the map.

1. Velocity pressure exposure coefficient, k_z

The velocity pressure exposure coefficient, k_z , is based on the height, h, to the center-of-pressure of the wind area for the following load applications:

- a. k_z for the structure is based on 0.67 of the total height, h, of the structure above ground line.

NOTE: In Table 250-2, for $h \leq 75$ m (250 ft), the structure k_z values are adjusted for the wind load to be determined at the center-of-pressure of the structure assumed to be at 0.67 h. The wind pressure is assumed uniformly distributed over the structure face normal to the wind.

- b. k_z for the wire is based on the height, h, of the wire at the structure.

In special terrain conditions (i.e., mountainous terrain and canyon) where the height of the wire aboveground at mid-span may be substantially higher than at the structure, engineering judgment may be used in determining an appropriate value for the wire k_z .

- c. k_z for a specific height on a structure or component is based on the height, h, to the center-of-pressure of the wind area being considered.

The formulas shown in Table 250-2 shall be used to determine all values of k_z .

EXCEPTION: The selected values of k_z tabulated in Table 250-2 may be used instead of calculating the values.

2. Gust response factor, G_{RF}

- a. The structure gust response factor, G_{RF} , is determined using the total structure height, h. When calculating a wind load at a specific height on a structure, the structure gust response factor, G_{RF} , determined using the total structure height, h, shall be used.

- b. The wire gust response factor is determined using the height of the wire at the structure, h, and the design wind span, L. Wire attachment points that are 18 m (60 ft) or less above ground or water level must be considered if the total structure height is greater than 18 m (60 ft) above ground or water.

In special terrain conditions (i.e., mountainous terrain and canyon) where the height of the wire aboveground at mid-span may be substantially higher than at the attachment point, engineering judgment may be used in determining an appropriate value for the wire G_{RF} .

- c. The gust response factor, G_{RF} , to be used on components, such as antennas, transformers, etc., shall be the structure gust response factor determined in Rule 250C2a.

Selected values of the structure and wire gust response factors are tabulated in Table 250-3. The structure and wire gust response factors may also be determined using the formulas in Table 250-3. For values of $h > 75$ m (250 ft) and $L > 600$ m (2000 ft), the G_{RF} shall be determined using the formulas in Table 250-3.

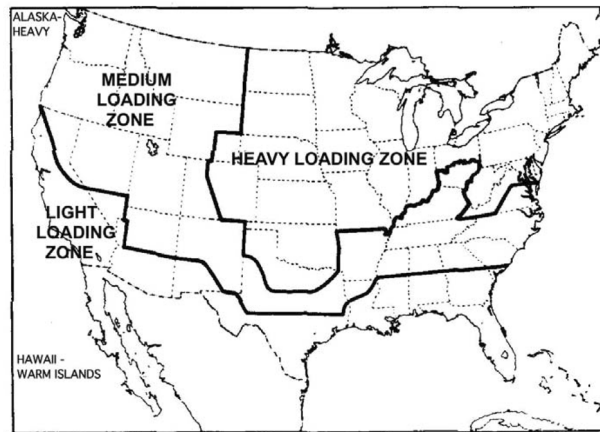
NOTE: Where structure heights are 50 m (165 ft) or less and spans are 600 m (2000 ft) or less, the combined product of k_z and G_{RF} may be conservatively taken as 1.15 if it is desired to simplify calculations.

D. Extreme ice with concurrent wind loading

If no portion of a structure or its supported facilities exceeds 18 m (60 ft) aboveground or water level, the provisions of this rule are not required. Where a structure or its supported facilities exceeds 18 m (60 ft) aboveground or water level, the structure and its supported facilities shall be designed to withstand the ice and wind load associated with the Uniform Ice Thickness and Concurrent Wind Speed, as specified by Figure 250-3. The wind pressures for the concurrent wind speed shall be as indicated in Table 250-4. The wind pressures calculated shall be applied to the entire structure and supported facilities without ice and to the iced wire diameter determined in accordance with Rule 251. No loading is specified in this rule for extreme ice with concurrent wind loading for warm islands located from 0 to 25 degrees latitude, north or south.

Ice is assumed to weigh 913 kg/m^3 (57 lb/ft^3).

1. For Grade B, the radial thickness of ice from Figure 250-3 shall be multiplied by a factor of 1.00.
2. For Grade C, the radial thickness of ice from Figure 250-3 shall be multiplied by a factor of 0.80.
3. The concurrent wind shall be applied to the projected area resulting from Rules 250D1 and 250D2 multiplied by a factor of 1.00.



The Warm Island Loading District includes American Samoa, Guam, Hawaii, Puerto Rico, Virgin Islands, and other islands located from 0 to 25 degrees latitude, north or south.

Figure 250-1—General loading map of United States with respect to loading of overhead lines

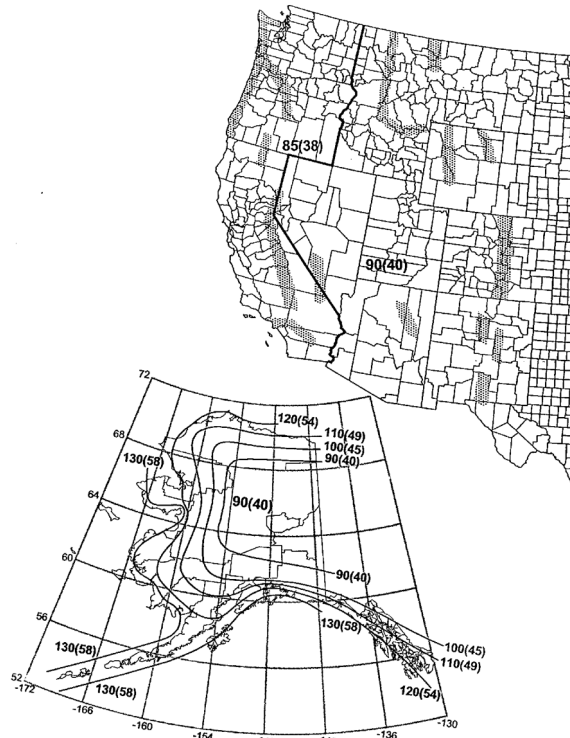
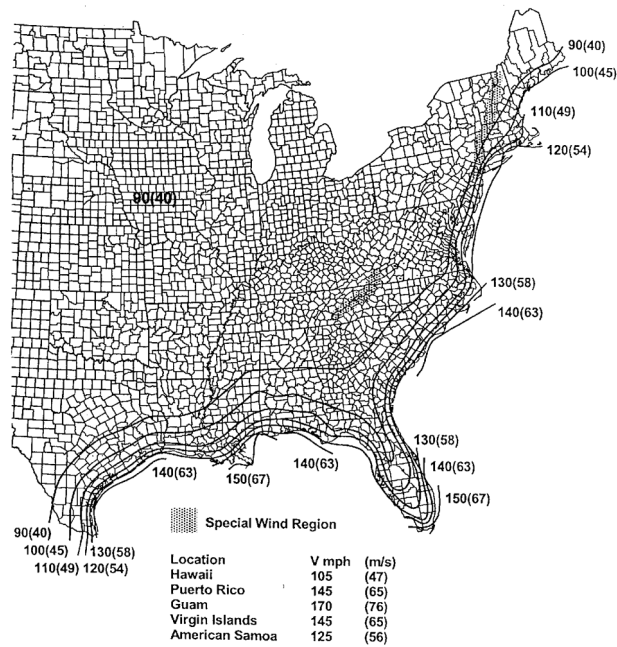


Figure 250-2(a)—Basic wind speeds

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**Notes:**

1. Values are nominal design 3-second gust wind speeds in miles per hour (m/s) at 33 ft (10 m) above ground for Exposure C category.
2. Linear interpolation between wind contours is permitted.
3. Islands and coastal areas outside the last contour shall use the last wind speed contour of the coastal area.
4. Mountainous terrain, gorges, ocean promontories, and special wind regions shall be examined for unusual wind conditions.

Figure 250-2(b)—Basic wind speeds

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F-250-2(c)

Part 2: Safety Rules for Overhead Lines

F-250-2(d)

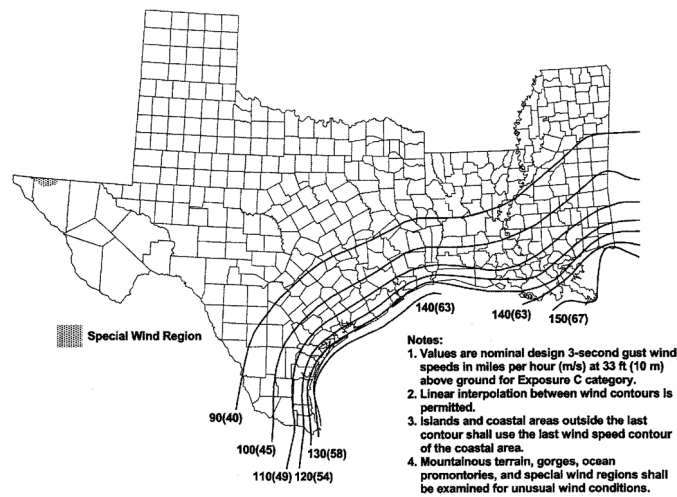


Figure 250-2(c)—Western Gulf of Mexico hurricane coastline

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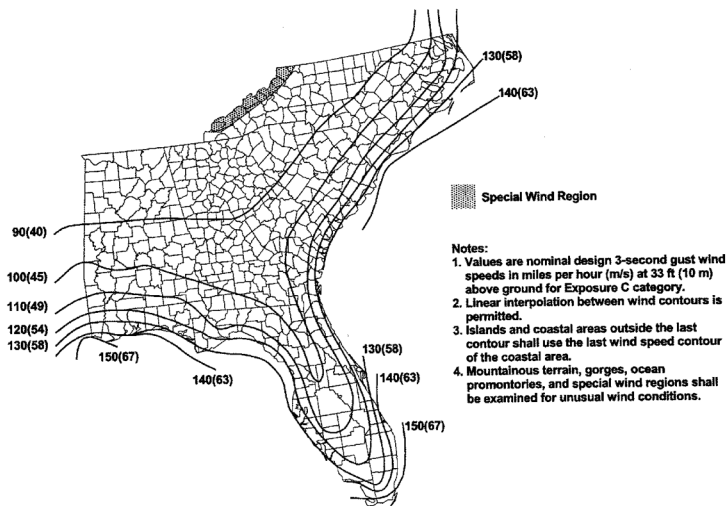


Figure 250-2(d)—Eastern Gulf of Mexico and southeastern U.S. hurricane coastline

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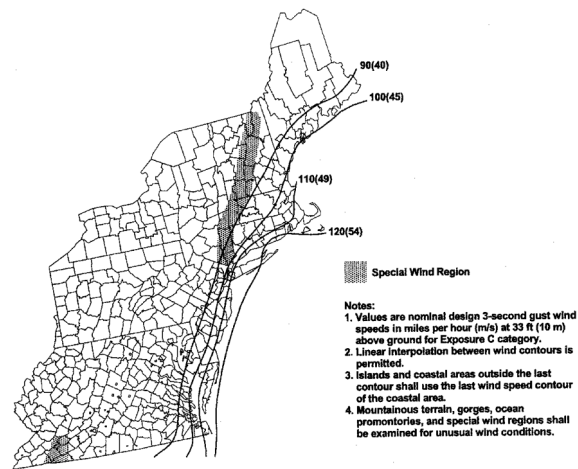
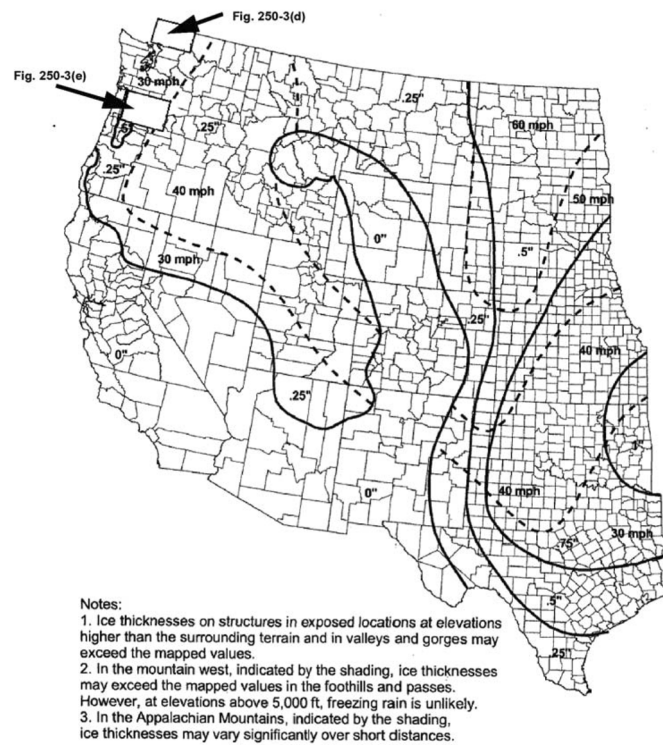


Figure 250-2(e)—Mid and northern Atlantic hurricane coastline

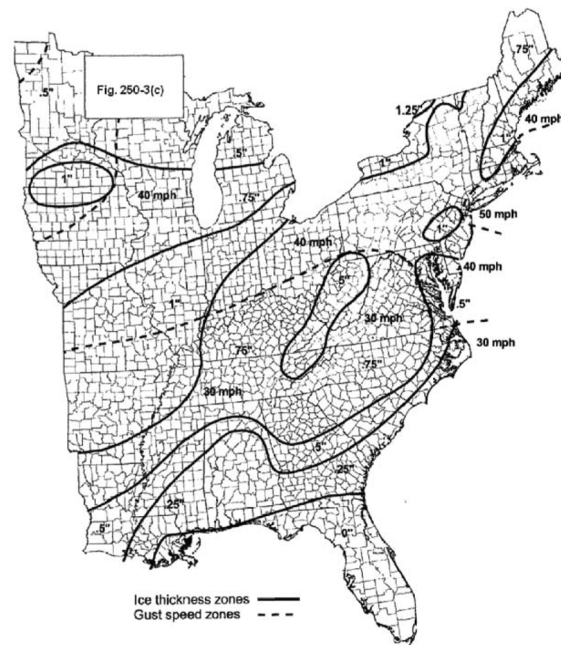
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50-YEAR MEAN RECURRENCE INTERVAL UNIFORM ICE THICKNESSES DUE TO FREEZING RAIN
WITH CONCURRENT 3-SECOND GUST SPEEDS: CONTIGUOUS 48 STATES.

Figure 250-3(a)—Uniform ice thickness with concurrent wind

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**50-YEAR MEAN RECURRENCE INTERVAL UNIFORM ICE THICKNESSES DUE TO FREEZING RAIN
WITH CONCURRENT 3-SECOND GUST SPEEDS: CONTIGUOUS 48 STATES.**

Figure 250-3(b)—Uniform ice thickness with concurrent wind

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F-250-3(c)

Part 2: Safety Rules for Overhead Lines

F-250-3(d)

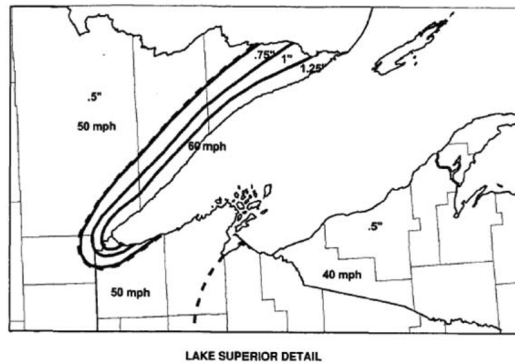


Figure 250-3(c)—Uniform ice thickness with concurrent wind

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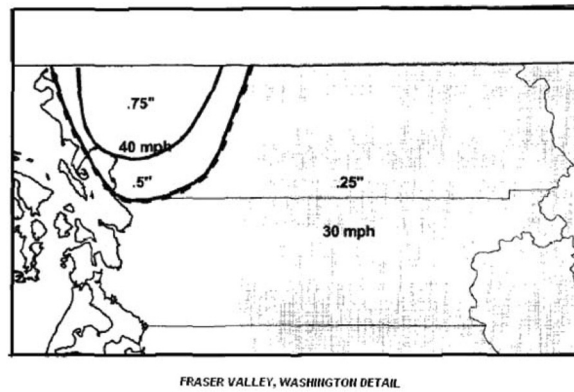


Figure 250-3(d)—Uniform ice thickness with concurrent wind

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F-250-3(e)

Part 2: Safety Rules for Overhead Lines

F-250-3(e)

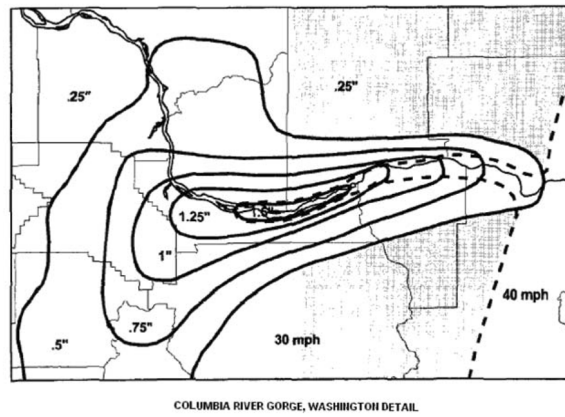


Figure 250-3(e)—Uniform ice thickness with concurrent wind

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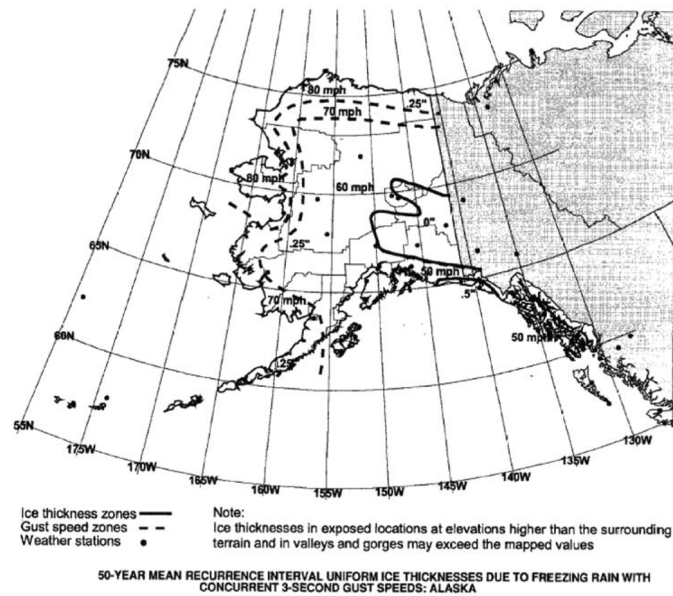


Figure 250-3(f)—Uniform ice thickness with concurrent wind

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Table 250-1—Ice, wind pressures, and temperatures

	Loading districts (for use with Rule 250B)					Extreme wind loading (for use with Rule 250C)	Extreme ice loading with concurrent wind (for use with Rule 250D)
	Heavy see Figure 250-1	Medium see Figure 250-1	Light see Figure 250-1	Warm islands located at 0 to 25 degrees latitude ①			
				Altitudes sea level to 2743 m (9000 ft)	Altitudes above 2743 m (9000 ft)		
Radial thickness of ice							
(mm)	12.5	6.5	0	0	6.5	0	See Figure 250-3
(in)	0.50	0.25	0	0	0.25	0	See Figure 250-3
Horizontal wind pressure							
(Pa)	190	190	430	430	190	See Figure 250-2	See Figure 250-3
(lb/ft ²)	4	4	9	9	4	See Figure 250-2	See Figure 250-3
Temperature							
(°C)	−20	−10	−1	+10	−10	+15	−10
(°F)	0	+15	+30	+50	+15	+60	+15

^① Islands located at 0 to 25 degrees latitude include American Samoa (14°S), Guam (13°N), Hawaii (22°N), Puerto Rico (18°N), and Virgin Islands (18°N).

Senator BLUMENTHAL. Thank you. Thank you very much to all of you. I'm going to begin my questioning with Mr. Ivey, if I may. Let me just say I appreciate that all of you agree, and I strongly share the view, that our nation needs to make additional investments in infrastructure.

As you may know, I proposed a National Railway Trust Fund, similar to our highway fund, to help provide the funds that are necessary for that investment. Our nation has been laggard and lax in making sufficient investments, and so I think we begin on that common ground.

We begin also, I think, on the common ground that this failure had costs that are intolerable and disruptive, not only to the commuters that you serve, but also to freight and our economy. The ripple effects were far reaching and profound.

Mr. Ivey, speaking about cost, can you commit to us today that Con Ed will reimburse Metro-North for the refunds that it has to make to its riders?

Mr. IVEY. Thank you, Senator. Con Edison recognizes the critical role that this line plays to the New York and Connecticut area. We also know that adequate contingency plans are important for critical infrastructure providers, whether they are water treatment facilities or hospitals.

The MTA has already provided for refunds for customers. We, as a utility, don't believe our customers should bear the risk when a customer decides to take one of the feeders out of service, because we do know that failures can happen. In this case, it's a very improbable circumstance, but the failure did occur. But we think it unfair to ask our customers to bear the risk when a customer takes a piece of equipment out of service at their request.

Senator BLUMENTHAL. It was your line that failed, was it not?

Mr. IVEY. Yes, sir.

Senator BLUMENTHAL. And it was your responsibility to maintain and make sure that line served the substation owned by Metro-North. Is that correct?

Mr. IVEY. Again, Metro-North requested on September 13 that one of the two feeders that serve the Mount Vernon substation be taken out of service to facilitate their upgrade. We were performing freeze operations in order to facilitate that work on our feeders. As I said in my testimony, this is a process that we've done over many years, back decades. The earliest procedures on this were written back in the 1950s. Our employees were following time-tested, documented procedures for these freeze operations.

As I said earlier, we're going to do forensic analysis on the cable, the pipe, and the work area, to learn what has occurred here. We think it more likely than not that the freeze operations contributed to the failure of the in-service feeder. So that's something, as I said earlier, that the Public Service Commission of New York is going to review, and they're going to be part of that investigation.

But, again, it goes back to our customers not bearing the risk when an individual customer like Metro-North decides to take one of the two feeders out of service. And we're doing work—again, it's unfortunate. The circumstances around the feeder failure is something we've not seen in our history. We do a number of these operations on an annualized basis, and we just haven't seen this occur.

Senator BLUMENTHAL. Those two substations were served by two feeder cables side by side, correct?

Mr. IVEY. That's correct.

Senator BLUMENTHAL. And you've provided me and my office with a diagram showing the two feeder cables, 38W09 and 38W10, correct?

Mr. IVEY. That's correct.

Senator BLUMENTHAL. And they were, in effect, right next to each other, correct?

Mr. IVEY. The freeze pit that you're describing there is—the dimensions are eight foot by six foot by five foot deep, and the two feeders coming through that freeze pit, as the picture you have described—my recollection is that the feeders are roughly two feet apart. So we're conducting freeze operations on the one feeder. Inside the freeze pit, we actually protect the other feeder while we're performing operations on the one.

Senator BLUMENTHAL. In effect, you surround the feeder cable on which work is being done with a freeze jacket, correct?

Mr. IVEY. With a jacket, yes, sir.

Senator BLUMENTHAL. And you pump in the liquid nitrogen to freeze the cable.

Mr. IVEY. That's correct.

Senator BLUMENTHAL. And in this instance, through whatever mechanism or dynamic that occurred in the freeze pit, the other cable suffered damage as a result, correct?

Mr. IVEY. That's correct. It's important to note that inside the freeze pit—an excavation, if you will, eight foot by six foot by five foot deep—we protected the other in-service feeder. So the area where the failure occurred was outside the freeze pit some five feet below grade, not visible to any of the workers that were—

Senator BLUMENTHAL. And, normally, there would be no failing as a result of this procedure. Is that correct?

Mr. IVEY. That's correct. We do—

Senator BLUMENTHAL. And in this instance, the cables—at least one of the cables, the one that failed, was 36 years old, correct?

Mr. IVEY. I believe these particular cables were installed roughly in 1976, Senator, as I recall it.

Senator BLUMENTHAL. And the normal design life is 30 years.

Mr. IVEY. We believe that thermal and mechanical issues are more correlated to failures of these feeders than age. We've done engineering evaluations on these cables, and we've pulled cables out of the field that are of this vintage that are 60 years of age, and we find that the thermal insulation is very much not degraded at all with an awful lot of life left.

Additionally, as we look back at the performance of these feeders over 10, 20, 30, 40 years, we tend to see three to four failures on an annualized basis on a base of around 700 miles of these sorts of cable systems. So as we look backward, we see really strong performance of these feeder cables, regardless of the age. And as we take feeders out and do engineering evaluations, we don't find degradation of the insulation level which would be indicative of a potential of a future failure.

Senator BLUMENTHAL. So my belief—and I think a rational person would conclude—is that the fact that this cable was 6 years be-

yond its normal design life was a contributing factor, if not the cause, of perhaps its deteriorating and ultimately its failing. You would deny that that was a rational and logical conclusion?

Mr. IVEY. Again, we have to go through the forensic analysis of the cable, the pipe, and the work area.

Senator BLUMENTHAL. And you're doing that forensic analysis now?

Mr. IVEY. That starts this week, I believe.

Senator BLUMENTHAL. And when will it be done?

Mr. IVEY. Early November, as I recall, Senator, we'll finish the analysis on the cable, the pipe. That's our projected date. But it's important, again, to note that we're saying it's more likely than not that the operations we were doing at the freeze pit likely contributed to the cause of the failure.

I said in my direct testimony we saw freezing of the ground outside the freeze pit, not visible to the naked eye, five feet below grade. And I believe, absent this work, we're not talking about this feeder failure. These feeders have a long history of very good performance. We've not seen feeder failures on these feeders. So there's strong performance with these feeders. So, again, age is not the factor that causes these feeders to fail.

Senator BLUMENTHAL. And I apologize for putting it in sort of simplistic layman's language. But, in effect, the feeder cable, 6 years beyond its normal design life, was somehow impacted by this freezing which caused it to fail. Is there any other reason that your forensic analysis would disclose other than that failing being the result of the freezing?

Mr. IVEY. I believe, again, it's more likely than not that what the forensic analysis will confirm are early indications that the freeze operations contributed to the failure of the feeder.

Senator BLUMENTHAL. And are you saying that the fact that it was 6 years beyond its normal design life was irrelevant or should be dismissed as a possible cause?

Mr. IVEY. Our experience has indicated that age is not the factor. It's mechanical and thermal loading of these feeders that contribute to failure, not—age is not the factor here. In fact, these feeders, again, that go into the Mount Vernon substation were installed in 1976. We've not seen any failures on these feeders.

Senator BLUMENTHAL. But one way or the other, it was your equipment that failed, correct?

Mr. IVEY. It was, sir.

Senator BLUMENTHAL. So why should you not cover the cost?

Mr. IVEY. Again, this particular failure is something we've not seen. Our employees were following documented, time-tested procedures. Again, we want to learn about what happened here by going through the forensic analysis and gain benefit from the lessons learned. But we have not seen this sort of phenomenon before.

I understand this is an absolute inconvenience to the folks of Connecticut and New York in terms of the impact on this line. So I'm not minimizing that for a second. But, again, we have to finish the analysis, confirm what happened here and why, so we can build those lessons learned into what we do going forward.

Senator BLUMENTHAL. Well, may I just suggest that my own view, with all due respect, is that there is an obligation. It cer-

tainly is an ethical, in my view, obligation, if not a legal obligation, for Con Ed to make whole, to compensate, to reimburse Metro-North and others who suffered as a result of Con Ed's failure of equipment.

And it may have been the result of a failure to replace a feeder cable that was 6 years beyond its normal design life. It may have had to do with the way the freeze operation was conducted. But, again, I would urge that you cover the cost.

Let me ask you—did you warn Metro-North about the potential risk of this operation?

Mr. IVEY. Meaning the freeze operation?

Senator BLUMENTHAL. The potential negative impacts of the freeze operation that was necessary to enable Metro-North to work on its station.

Mr. IVEY. To my knowledge, we did not provide any warning that there was potential impact of the freeze operation. Again, it's important to note that we've done this 20 times a year over a long period of time. We have time-tested, well documented procedures that our employees follow, and we just haven't seen the freeze operations impact an adjacent feeder.

Senator BLUMENTHAL. So there was no warning to Metro-North that this freeze operation might have risks of the feeder cable failing.

Mr. IVEY. Not to my knowledge.

Senator BLUMENTHAL. Was there any preparation in terms of contingency for the possibility that that feeder cable would fail and, therefore, in effect, no power would be provided to the railroad?

Mr. IVEY. In this instance, on September 13, we take out the one feeder on a scheduled basis in order to facilitate Metro-North's work at the Mount Vernon substation. We know at that point that we're down to a single feeder, in a single contingency situation. Equipment does fail. It's improbable in this instance. But failures do occur.

I don't know Metro-North's capabilities in terms of diesel train losses and capability to move passengers along the New Haven Line. What I do know at that point is we're down to a single feeder, and equipment does fail. So I would defer to Mr. Permut at Metro-North regarding their contingency plans for the improbable instance of a feeder failure.

Senator BLUMENTHAL. There was, in fact, no contingency plan, correct?

Mr. IVEY. Again, I would defer to Mr. Permut about the contingency plan in order to move passengers along this line. After the failure, Senator, as you know, we worked—in about 3 days time stood up a temporary substation at Harrison. Despite what occurred in advance of the outage, we knew people were being impacted by the outage to this line.

So we worked very closely with Metro-North and its engineers, and we essentially built a substation in three days. And on that Saturday before announcing service levels on Monday, we tested trains on that line, using residential power to serve train load. We had a successful test, and we announced incremental services. So, essentially, we created a contingency after the outage in order to provide enhanced levels of service to the line.

Senator BLUMENTHAL. Mr. Ivey, I want to express my appreciation for the work done by the men and women who work for you in so quickly reacting and the enormous effort that it took to construct that temporary station. So my questions are not without appreciation for the extraordinary effort and time and, indeed, expense. How much did it cost to construct that temporary substation?

Mr. IVEY. I don't remember precisely, but in round numbers around \$4 million to stand up that temporary substation.

Senator BLUMENTHAL. \$4 million?

Mr. IVEY. Around \$4 million.

Senator BLUMENTHAL. And in the diagram that, again, you've provided my office, that substation is represented by the red diagram here?

Mr. IVEY. That's correct.

Senator BLUMENTHAL. And that was at a cost of about \$4 million. But that substation was unplanned, correct?

Mr. IVEY. That's correct.

Senator BLUMENTHAL. So the plan, in effect, had to be done on the fly in reaction to this massive outage that occurred at 3 a.m. on September 25.

Mr. IVEY. That's correct.

Senator BLUMENTHAL. Wouldn't it have been a better practice either to have a backup or at least to have a plan?

Mr. IVEY. Again, in my view, it would be the responsibility of Metro-North to determine, in the unlikely event of a single feeder failing, what the contingency plan would be. What would be the contingency plan? I would use an analogy, Senator, if you would allow me. If we had a hospital that had two feeds, and they asked Con Edison to take one of the two feeders out of service to upgrade their equipment, we would facilitate that. Then they would be on one feeder in that instance.

I don't see it as my job to figure out how large their generator should be, what maintenance and what loads. That's really—I don't know their business, like I don't know Metro-North's business. I don't know their capacity to replace electric trains with diesel trains. And, really, I think I would have to rely on them to determine their ability to move people along this really important corridor.

Senator BLUMENTHAL. The contingency plan, in other words, or the backup system would be solely Metro-North's responsibility. Is that your view?

Mr. IVEY. We believe—yes, and that Metro-North had a contingency plan for this improbable event.

Senator BLUMENTHAL. Mr. Permut, was there a contingency plan?

Mr. PERMUT. From our perspective, Senator—and I think it's important that we start with just a little background for a minute. We had been in discussions between Con Edison and Metro-North for a number of years in this project, and we had been discussing risk. As Mr. Ivey indicated, the probability of an event was extremely low, and that was our understanding as well. Saying that, it's clear that something went wrong, and the plans that we had were not sufficient to run the New Haven Line.

As I said in my testimony, as part of the second part of this project, as well as on an ongoing basis, we have agreed to work together to look at what the contingency could be. It's very clear to us that we are unable to have an adequate service plan for our customers if we don't have sufficient electric power.

This is, as was pointed out, the largest electric line in the country. We cannot come anywhere close to providing the service that our customers deserve and we'd like to deliver without having an adequate amount of power. So as we go forward, we are going to be working together looking at the question of contingencies tied to the power supply, because we know that if there's not power, we cannot operate close to a regular service.

Mr. Redeker testified—and I can explain further if you'd like—that we are working in Connecticut on providing electrical redundancy so we can operate service if we lose a substation. And that's two projects that will be done within a matter of a few months.

Senator BLUMENTHAL. Well, I'm going to turn to Connecticut in just a moment.

I should mention, as you can all see, that we've been joined by my colleague, Senator Murphy, and I'm sure he'll have some questions, too. I don't mean to monopolize the proceedings here.

But your point, Mr. Permut, if I can just cut through what you just said, is that, essentially, there was no plan in this instance for the Mount Vernon substation, either Dunwoodie or Washington Street substation, in the event that power was lost.

Mr. PERMUT. Senator, there was not a plan. And, again, I would just state that there is no—absent having electrical power, we cannot provide New Haven Line service.

Senator BLUMENTHAL. But there is the possibility for having a backup. And I'm going to ask Mr. Lynch in just a moment about the protocols and what those protocols prescribe for backup power in this kind of situation. But wouldn't it have been prudent to have either a backup source of power or at least a contingency plan, which eventually had to be devised ad hoc on the fly?

Mr. PERMUT. Let me respond to that. I think that, clearly, when we look back, if we had had an alternative source of power, we would have avoided this—a third source of power during this operation, we would have avoided this very, very unfortunate event. To develop that is something, as I mentioned, again, the parties had talked about. There are significant costs associated with that. And as you know, and as you actually stated, we are constantly balancing issues of spending money on contingency versus spending money—money we desperately need—to just bring the line into a regular state of good repair. So that's the type of thought process that we follow.

The contingency that was set up at Harrison was an improvement. But understand that because of the nature of the high-voltage power that New Haven gets—and the best Con Edison could do, using, as I think Mr. Ivey explained, their network—that allowed us, after they did all that work, which was extremely important, to run three trains, electric trains in that section, at the same time. The normal New Haven Line schedule requires 10 trains, 10 electric trains. So that's a contingency, but it's a partial contingency.

Senator BLUMENTHAL. What was the cost of the 12 days of disrupted service?

Mr. PERMUT. Senator, we're still calculating that. We have some preliminary estimates. I would—

Senator BLUMENTHAL. You're making refunds, or at least you're giving your customers credit.

Mr. PERMUT. There are refunds, and we lost a significant number of riders because of the service was—people didn't want to take the train. We couldn't collect tickets as well because the trains were so jammed. We also, at extra cost, had a lot of people doing a lot of work. We had the bussing cost.

So on order of magnitude is between, I would say, \$8 million and \$12 million, and we are still looking at and will be gathering that data over the next weeks. We'll see how many people are asking for the refunds. As you know, we just started that last week, and we'll be calculating that and we'll be finalizing that.

Senator BLUMENTHAL. The estimate that I saw was about \$2 million a day. Is that wrong?

Mr. PERMUT. No, no, that's—I'm not sure of the source. Our estimate right now for the 12 days is between \$8 million to \$12 million.

Senator BLUMENTHAL. Are you concerned that there may be the same vulnerability, Mr. Permut, with respect to other substations that exist in Connecticut?

Mr. PERMUT. I'm always concerned about the risks we have on the New Haven Line. We have an old infrastructure. I'm very concerned about, particularly, the bridges, the catenary system. The moveable bridges are 120 years old. The catenary system is 100 years old. So I'm always concerned about that.

With regard to the substations in Connecticut, we have, as I think Mr. Redeker testified, three substations. They're far apart. That's historically what the railroad inherited with the New Haven Line built. So we have in round numbers, Senator, a substation about every 20 miles between Harrison, New York, which is where the Con Ed system ends and CL&P starts, and New Haven.

Over the past years, Connecticut has invested in expanding that supply system. They've built new substations, and they've expanded the substations, both for redundancy and so we could operate more service. The service has grown so dramatically in the past 30 years.

At this point in time, we have two very important projects that will give us full—right now, we have redundancy for about 30 miles of the 55 miles between Harrison and New Haven, which means that if we lost one substation in that 30-mile section, we could continue to operate. The two projects that Connecticut is funding, one in Cos Cob and one in New Haven, will give us full redundancy from Harrison to New Haven for 55 miles.

Senator BLUMENTHAL. And when you say full redundancy, do you mean a second backup for every substation?

Mr. PERMUT. I mean if they lose a substation—substations will typically have more than one feed. So it's not a matter of losing one feed. It's a matter of losing the substation. Typically, the way the New Haven Line is built—because it's AC traction and you have fewer substations. When you look at the subway, when you look at

Metro-North's Harlem and Hudson lines, you have substations every few miles, and they are designed so if we lose one substation, which happens, the line can continue to operate. That's a fairly common occurrence.

On the New Haven Line, it's somewhat different because of, again, how it was built. So when these two projects are completed, which should be by the first quarter of 2014, we will then be able to operate between Harrison and New Haven if we lose one of the substations completely.

Senator BLUMENTHAL. So if one of the feeder cables fails, or one of the substations fails, there will be a backup that—

Mr. PERMUT. Yes.

Senator BLUMENTHAL.—will be absolutely reliable.

Mr. PERMUT. That's right. The power can come from another substation.

Senator BLUMENTHAL. Do you agree, Commissioner?

Mr. REDEKER. Yes, I do. The goal of these two projects is complete redundancy, and our schedule for that is a little delayed because we've had to shift resources to the Mount Vernon area with Metro-North. But we believe that within a couple of months, we will be completely redundant with those systems throughout the New Haven Line.

Senator BLUMENTHAL. So as of 2014, there's no possibility that this kind of breakdown in service could occur for the reasons that it did in Mount Vernon?

Mr. REDEKER. That's correct.

Senator BLUMENTHAL. Mr. Lynch, let me ask you before I turn to Senator Murphy—the protocol is moving in a direction of “N-2”, meaning that there are two backups for this kind of feeder cable, “N-1” being the one backup situation. Is that generally correct, that the recommendation of the American Society of Civil Engineers is moving in that direction?

Mr. LYNCH. In general, in the industry—speaking outside of ASCE—the industry desires to have an “N-1”, that is, so that you can take any line out for service, maintenance, whatever you need to do. We would love to have “N-1”. It's hard to get.

As I mentioned earlier, just to add a line that isn't needed—it's very hard to go out and tell the public that we're going to build a new line so that we can have that “N-2” contingency—“you mean, it's not going to be used?” “Well, yes, it's going to be used if we need it.” It's just impossible to do. The public doesn't want that. They don't want to pay for it. They don't want to see it. They don't want to deal with it.

In the case that I'm hearing right here, from what I'm hearing at this table, it appears to me there was a redundant system. It's just that one of them was already taken out. Could there have been a third one? Sure. Who's going to pay for that? Who's going to permit it? Where can we put that line at? I don't know the specifics of the exact situation, but that would be very nice. Is it realistic? I'm not sure.

Senator BLUMENTHAL. When work is done on one cable or one line, the chances of outage are always there, and the improbable often happens, correct?

Mr. LYNCH. I wouldn't say often. It can happen.

Senator BLUMENTHAL. So prudent planning would dictate that there be some kind of backup, correct?

Mr. LYNCH. Yes. And as engineers, we would love to do that. Unfortunately, there's cost and everything else that's involved with doing that, and we have to consider that.

Senator BLUMENTHAL. And the entire New Haven Line, when it comes to electric power, really is only as strong as its weakest point, because if the weakest point fails, as we saw in Mount Vernon, the entire line is crippled, correct?

Mr. LYNCH. Yes, sir.

Senator BLUMENTHAL. Thank you.

Mr. LYNCH. I would like to add, as I sit here, our nation is running on less redundancy than that railroad is out there.

Senator BLUMENTHAL. Thank you.

Senator Murphy?

**STATEMENT OF HON. CHRISTOPHER MURPHY,
U.S. SENATOR FROM CONNECTICUT**

Senator MURPHY. Thank you very much, Mr. Chairman, and I want to thank you for convening this hearing and having what has been a laser-like focus on protecting Connecticut consumers and repairing and upgrading our infrastructure. As a member of this committee, you have been on top of this crisis since day one. And having taken the unusual step of bringing the Committee here to Connecticut shows that you are not giving up in your efforts to try to learn from the mistakes made here.

I want to thank you for giving me the courtesy of being able to join the Committee to ask a few questions. And given that this is really your hearing, Mr. Chairman, I only have a few. Let me just apologize for being a little late and not hearing the testimony of my colleagues. But I'm glad that you've assembled two very esteemed panels to talk about what happened and what happens going forward.

I have maybe just a few questions to add to yours regarding the specific situation at hand. I think, Mr. Chairman, you did a wonderful job of outlining some of the most important questions about what happened and how we learn going forward. And then I may have a few broader questions about the fragility of the line with respect to other potential liabilities down the line.

First, Mr. Permut, as a lay person who doesn't spend his time on this committee examining these issues in the depth that Senator Blumenthal does, can you just explain to me how the responsibility for investment in electrical infrastructure along the line and feeding into the line is divided up today between the MTA and Con Edison? Who takes care of what pieces of the infrastructure as that arrangement stands today?

Mr. PERMUT. Let me say that we have arrangements with three utilities, Con Edison, Connecticut Light and Power, and United Illuminating. Because of the nature of the high voltage that comes into the New Haven Line, anything we do has to be done with the utility, because together we have to plan—if we want to build a substation or make a change, it has to be consistent with the feeder network. So there's regular ongoing dialog between ourselves and the utilities.

The other part of the discussion is between ourselves and Connecticut, the Connecticut Department of Transportation. And we make the judgments jointly as to how to spend scarce public dollars. What are the best investments to be made? We made a judgment call, as Mr. Redeker pointed out, about four or 5 years ago to invest in the power system in Cos Cob and New Haven to provide additional power, to provide a level of redundancy.

So once that decision is made between the parties—and we will get input from the utilities because that's the only way we know what's feasible and what it costs—then that project is implemented either by the State of Connecticut or by Metro-North staff working with the appropriate utility.

Senator MURPHY. So in this case, where you had Con Ed doing either upgrades or improvements or repair work, how is that cost distributed, and who pays for that work?

Mr. PERMUT. Well, in this particular case, we had two separate contracts. There's a contract with NIPA, who was the project manager, and then we had a separate agreement with Con Edison to do the work necessary to allow us to do the work at the substation. The cost for that is borne by Metro-North in the agreement with Con Edison.

Senator MURPHY. You had some back and forth with Senator Blumenthal about the improvements that you're going to be doing along a portion of the line due early 2014 to create redundancies. And, Mr. Permut, you referred to ongoing discussions you're having about future options to increase redundancy, I assume, over the rest of the line. Can you just talk about what the options are to create redundancies along the other section of the line?

Mr. PERMUT. Well, the other section is the section between Harrison and Pelham, which was powered by this Mount Vernon substation. And Mr. Ivey and I had agreed—our priority, obviously, was to get the service back, and then, as Mr. Ivey mentioned, to bring the second feeder back, which happened about 10 days ago.

We also agreed that the next step was to review what the options are to provide additional redundancy in this section both during the second phase of this project at Mount Vernon as well as on a permanent basis, since this section will be different than the rest of the New Haven Line where you'll have that redundancy. So our engineering people have just started that discussion, and it would be premature for me to say right now it's this option or this option or this option.

Senator MURPHY. Give me a time frame. Give me a time frame of when a decision could be made and then, given the potential options, what the time frame would be for implementation.

Mr. PERMUT. I think by the end of the year, we'll have a better sense of what the options are and what the time frame is that goes with that. I can't give you a good sense on how long it will take, because each option will have its own time frame and have its own implications. So we have to jointly look at that, and I don't want to prematurely say something that would turn out to be incorrect.

Senator MURPHY. Mr. Chairman, if you would allow me to ask one broader question while I have the panel—

Senator BLUMENTHAL. Sure.

Senator MURPHY.—in front of me. What we're really talking about here is the fact that we have a string that runs from Boston to Washington, D.C., and in a multitude of different ways, that string could be cut at any moment by a collision, a storm hitting a portion of the string, an electrical disturbance. And any time you cut that string, it essentially stops or greatly curtails service along the entirety of the stretch.

And this isn't our only liability. We have numerous other liabilities. We've talked about the decaying state of the bridges along the line in Connecticut, which we hope is not the next shoe to drop.

But here's the broader question. How on earth do we come up with the financing necessary to prevent the next crisis and the next interruption in service happening, when, today, our stretch of rail line is one of the few profitable ones for Amtrak, throwing off anywhere from \$200 million to \$300 million to the rest of the country, and we have a list of \$50 billion worth of repairs along the full extent of the Northeast Corridor that need to be done over the next 10 to 20 years just to maintain the state of good repair? It seems to me that we have to be thinking out of the box in terms of how we come up with the money to allow you to invest in the kind of work that you need to do, above and beyond just the work that you're going to need to do to create redundancies along the electrical feeder system.

So let me present that question to you, Howard, and then to you, Commissioner Redeker, to just give us a quick snapshot. And I know you could talk about this for the entire afternoon. But what are the financing mechanisms that we need to be talking about in the United States Congress to try to give you the resources to make the investments that you know you need to make and everybody knows you need to make?

Mr. PERMUT. Senator, let me say I think that that discussion and the determination of fund sources is one for the U.S. Senate and for the Congress itself. I don't think it's the place of myself, either from an expertise standpoint or from a responsibility standpoint, to really identify within the national priority how that should be done.

I will say—which is very concerning to us—that the last time Congress passed a bill, funding for transit was roughly flat. That bill runs out at the end of next year, and it's desperately needed, the money for both transit and Amtrak, for the railroads for transit and Amtrak. That's absolutely a critical requirement so we can address these needs.

As the operator of the service, we can prioritize what our needs are. But in the end, it's the funding sources and the funding partners who will be critical in making that determination and making that happen.

Senator MURPHY. Commissioner Redeker?

Mr. REDEKER. Yes, thank you. It is a national dilemma, and I think that it's important to recognize that it is something that is being worked on through the Northeast Corridor Commission for the Northeast Corridor; certainly by Congress in terms of reauthorization of important legislation like PRIIA; and states, as members and, frankly, as operators.

You mentioned that Amtrak makes some profit. But Amtrak has a huge need from an expense point of view. I think if we look at existing funding mechanisms, we know that they're inadequate to do the job that we've identified. And I think actions like the PRIIA Act that came up with some new solutions about cost allocation, you know, give us some new tools. But they too will be inadequate.

What I think is important is that as we plan for the future, first, we identify a realistic amount of funding necessary annually to achieve a state of good repair—that's fundamental to this corridor so that it doesn't have these flaws—and invest those dollars smartly so that projects that are replacement or upgrades of an old infrastructure come with built-in redundancy. Clearly, the impact from storms—Superstorm Sandy, as we face that anniversary—indicates that systems with redundancy, different routes, different alternatives, are important.

We, as part of a national effort for the future of high-speed rail, are looking at just that issue. Is there an ability to invest in that existing state of good repair, but also be looking at redundant or alternative systems to provide those options in the case of a tragic event or a storm or unanticipated outage?

So I think if we pick the right number—because if we just say \$52 billion without identifying what that means annually and where that might come from in any stretch of the imagination, be that from the operators, from the states, from the Federal Government—clearly, I think each one of those has a role to play. And what we've seen in other countries is the successful investments in a railroad infrastructure come from a Federal Government. It's a national asset, and the infrastructure itself is typically funded principally through the Federal Government.

The capacity of states taking on more obligations is stretched, just as every other one. That's not going to be a full solution either. But I think a realistic number worked through annually is something that, if we put our minds together, we probably can achieve.

Senator MURPHY. I would just respectfully disagree with you, Mr. Permut. I understand maybe the discomfort that comes with proposing a policy solution as an operator. But I think the stakes are so grave here that you and your organization, knowing your customers and knowing the infrastructure better than anyone, should have a seat at the table and a leading seat at the table in proposing solutions. I know that that's not an easy thing to do when you're just trying to keep a line up and operating.

Mr. PERMUT. Well, Senator, if I may, I think what's most important that we have to do is represent our customers and inform the dialog as to what's needed and what the implications are. We do advocate for our customers. We do advocate for the funding.

What I was addressing, and possibly a little more narrowly than the question, was which is the best mechanism, be it a gas tax or something else, increasing the gas tax. I didn't feel, and I don't feel that it would be Metro-North's role to be putting forward that type of detail. Clearly, with regard to what the need is and advocating for the need and advocating for the customers, we will do that, and we have done that, and we will continue to do so.

Senator MURPHY. Final question to Commissioner Redeker. Let me just ask a hard question about choices. And you're talking

about allocating enough money for new improvements to make sure that you build in redundancies. So let me just make sure that we're doing this right.

You have a certain pot of money that could be used to increase speed or frequency of travel along an existing line, or perhaps not make as big an investment in speed and frequency and instead build a redundant system next to it. Are we always better off spending the additional money to build redundancy, or are we better off using that money to increase speed and frequency and just take the chance that the system may fail for a couple of hours or a couple of days, but that that will be offset by the increased delivery to consumers on the day that the system is running?

And that is not a loaded question. I just think it's a worthwhile question to ask, given the fact that we do have limited money, and we're going to have to choose to use it either on building redundancy or on moving more quickly down the list of the projects that we know have to be done.

Mr. REDEKER. The answer from my perspective is that building simply a redundant system for the sake of redundancy is an expense. And I think it's been mentioned that it's extraordinary when it comes to infrastructure and out of the question, too expensive for us with the resources we have.

But if we look at smart investments for the state of good repair, things that also bring travel time improvements, frequency and capacity improvements, and if we can at the same time, using the substations in Connecticut as an example, provide redundancy so that we spend the same dollars or just a little more when we do an investment to add redundancy, then we ultimately build a better system. So I think we have to look at that.

The choices about priorities really do come, for me, from the proper economic cost-benefit investment scenario. We have to look at what are the costs and what are the benefits from every dollar we spend, so we choose to make the right investments. But I think if we do that and look at better, faster, cheaper ways to deliver projects, we might be able to add components like redundancy as we do them.

Senator MURPHY. Thank you, Mr. Chairman.

Senator BLUMENTHAL. Thank you, Senator Murphy.

I want to come back to that larger question that Senator Murphy asked and really suggest, Mr. Permut and Commissioner and members of this panel and others, that there really is a need for leadership in this area. There's a need for specific proposals.

I urge that there be an infrastructure bank as a means of providing that financing and, at the very least, that there be a national rail trust fund, as I mentioned earlier, similar to the Highway Trust Fund. To be very blunt, your customers, Mr. Permut, I think, have very little conception about how deteriorating and aging infrastructure is imperiling their service and, very possibly, their lives.

They saw it back in May, when a derailment and collision caused grave injuries to more than 50 people and jeopardized lives and livelihoods for a substantial period of time. But they had no idea that the joints connecting two rails were weakened, and, in fact, the NTSB very likely will conclude that that infrastructure deterio-

ration or decay was responsible for the derailment that eventually caused the collision. They had no idea that feeder cables were going through this maintenance and work beginning September 13.

So the kind of information and awareness that we're trying to raise here in this hearing, I think, is very important for you and other leaders in the industry to raise in the course of public discussion and dialog. And the same goes for other members of the panel and others in the industry. So I would just make that observation, and I take it you don't necessarily disagree.

Mr. PERMUT. No. I agree with you completely, and we will continue to inform the discussion, as you point out, the absolute critical need for investment in infrastructure on the New Haven Line. It's absolutely critical to the economic development, the future safe operation and the economic development.

Senator BLUMENTHAL. So let me just go back from that global line of questioning to more of the detailed questioning, because I want to go back to the backup or redundancy on the Metro-North line going through Connecticut. My understanding is—and I'm holding up a diagram here of the various substations. I know it's difficult to see, but there's Cos Cob, Sasco Creek, Devon, Union Avenue, and New Haven.

Without going into the specifics of each of those substations and what their current status is, is the plan for there to be backup from one of these stations to the other, for example, Sasco Creek to Cos Cob, if one of them goes offline? In other words, if Cos Cob goes offline, would the backup be sufficient from one of the others—presumably Sasco Creek, because it's the nearest—to provide the kind of power that is necessary to avoid the fiasco or the debacle that occurred in New York?

Mr. PERMUT. I understand. Once these two projects are completed, which will be by, again, the first quarter of 2014, the answer is yes.

Senator BLUMENTHAL. There would be sufficient power supply from these other substations to compensate for the alternative neighboring substation if it went offline?

Mr. PERMUT. Yes.

Senator BLUMENTHAL. And, finally, Mr. Ivey, can you commit that you will provide the forensic analysis as soon as it's done to this committee?

Mr. IVEY. We will, sir.

Senator BLUMENTHAL. And can you commit, also, that you'll provide the preliminary review? I know we've asked for it.

Mr. IVEY. The review I think you're referencing was a New York Times article where they were just reporting our preliminary findings. There wasn't really a preliminary report. That was our preliminary findings at that time.

Senator BLUMENTHAL. So there's nothing in writing, no report?

Mr. IVEY. It wasn't a report. It was preliminary findings at that time. I think the week—the Monday or Sunday right after the event occurred on September 25.

Senator BLUMENTHAL. I'm going to ask that we continue this discussion about the refund or reimbursement issue, because I don't think, again, with all due respect, I'm satisfied that Con Ed is doing as much as it should to provide for the monetary compensa-

tion to Metro-North or to others who may have been harmed. But we can continue that discussion after this proceeding.

Thank you.

Mr. IVEY. Thank you.

Senator BLUMENTHAL. I thank you all, and we'll move to the next panel.

Our next panel will consist of John Hartwell, who is a member of the Connecticut Commuter Rail Council, a long-time advocate for Connecticut riders and consumers; Joseph Boardman, President and Chief Executive Officer of Amtrak, and a veteran as well as a chief executive of that company; and Mr. Joseph McGee, Vice President of Public Policy and Programs for The Business Council of Fairfield County, a long-time public servant and formerly an official of our state government.

Welcome to you all and thank you very much for being here.

We'll begin with you, Mr. Hartwell.

**STATEMENT OF JOHN HARTWELL, MEMBER,
CONNECTICUT COMMUTER RAIL COUNCIL**

Mr. HARTWELL. Thank you, Senator Blumenthal and Senator Murphy. My name is John Hartwell, and I'm a member of the Connecticut Commuter Rail Council. Created by the state legislature, our mandate is to advocate for customers of all commuter lines in the state and make recommendations for improvements, a task that this Council and its immediate predecessor have undertaken for more than a quarter century.

Our members come from commuter rail lines both currently operating and planned: the New Haven line, including its three branches; Shore Line East; and the future New Haven-Springfield line. And we serve without pay, budget, or staff.

In the week following the resumption of full New Haven Line service after the Con Ed incident, I went to the Greens Farms station near where I live with three members of the Connecticut state legislature to talk with commuters about their experience during the service interruption. I used my background in market research to create and administer a survey, asking commuters what they did to cope with the disruption, how they felt about Metro-North's response, what they knew about the possibility of refunds, and how they rated their overall rail commuting experience.

Two days later, I repeated this survey at the Westport station, gathering 67 responses overall, not enough for real statistical analysis, but certainly enough to get a sense of customer frustration. Commuters used a variety of strategies to cope with the reduced service. A few drove into the city or to an alternative station, had satellite offices they could go to, or worked from home. Most, however, made the best of whatever trains were available, often standing for more than an hour in packed cars to get to their destination.

To put this in perspective, I-95 is already jammed during morning and evening rush hours. Metro-North customers have the highest fares and the lowest mass transit subsidy in the nation, and parking at the stations is limited and expensive. If you've paid for a monthly ticket and are lucky enough to have a train station parking pass, you want to make use of them.

When asked about how Metro-North responded to the crisis, the most common rating was a three on a five-point scale, with the positives and negatives above and below evenly divided. Most who volunteered comments felt that Con Ed was to blame for the problem itself, but many said that communication from Metro-North about alternatives was poor. They understood that they needed to make allowances for a difficult situation, but they also wanted much more timely, accurate information so they could make rational choices.

When asked what they knew about the possibility of refunds, most had heard the MTA was going to do something, but almost no one at that point had a clear idea of how it was going to work or what it was going to mean to them. And in terms of their overall satisfaction with Metro-North, they were somewhat more positive, a 3.3 on that same five-point scale, but far from satisfied.

New Haven Line customers have experienced repeated service failures in the past few years, including Hurricane Sandy, Hurricane Irene, heavy snowfall in October, and ice storms in mid-winter. These were weather-related, but the derailment at Bridgeport last May clearly was caused by a deteriorating infrastructure that has left people worried and angry. And branch line customers are short-changed when their diesel engines are redeployed, leaving them with unreliable bus service operated by drivers who have no idea where they're going, or with no service at all.

Under Governors Rell and Malloy, the state has spent huge amounts on new cars, which is terrific, and the Connecticut Department of Transportation has major renovation projects underway. But the fact remains that we are paying the price for years of deferred maintenance. Billions more are needed to upgrade or replace track, bridges and catenary, install better signal systems and positive train control, and give us real-time communication.

Commuter rail is the lifeblood of Fairfield County, and it's not just the traditional businessmen to Grand Central who are affected when the trains don't run. We have many customers who never leave the state, traveling every day to work from Danbury to Stamford, or Waterbury to Bridgeport, or Guilford to New Haven. And there are thousands more who reverse commute, including some who come up from New York City to work here.

The railroad is fundamental to Connecticut's economy and to the quality of life that attracts so many who choose to live and raise families here. You've already been told about how old the infrastructure is, and you're going to hear about the economic impact of these disruptions, both in Connecticut and along the whole eastern seaboard corridor. One hundred years ago, this service was state-of-the-art. It should be again.

I'd like to make one more point before I close about fairness. Two years ago, after another major service failure, the Council proposed a Passenger Bill of Rights, which I've attached to my testimony. It called, in part, for monthly and weekly ticket holders to receive a credit whenever Metro-North couldn't provide either scheduled train service or a bus substitute. To us, at that time, the problem was straightforward. If you don't get what you paid for, you should get your money back.

I'd like to applaud Governor Malloy's leadership during this current crisis in prompting the MTA to offer a credit to monthly and weekly ticket holders, and I hope that our representatives in Hartford can work together to make this a permanent policy. More than 50,000 taxpayers who ride the trains every day deserve no less.

Thank you. [The prepared statement of Mr. Hartwell follows:]

PREPARED STATEMENT OF JOHN HARTWELL, MEMBER,
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I used my background in market research to create and administer a survey, asking commuters what they did to cope with the disruption, how they felt about Metro-North's response, what they knew about the possibility of refunds, and how they rated their overall rail commuting experience. Two days later I repeated this survey at the Westport station, gathering sixty-seven responses overall. Not enough for real statistical analysis, but certainly enough to get a sense of customer frustration.

Commuters used a variety of strategies to cope with the disruption. A few drove into the City or to an alternative station, had satellite offices they could go to, or worked from home. Most, however, made the best of whatever trains were available, often standing for more than an hour in packed cars to get to their destination.

To put this in perspective, I-95 is already jammed during morning and evening rush hours, Metro-North customers have the highest fares and lowest mass transit subsidy in the nation, and parking at the stations is limited and expensive. If you've paid for a monthly ticket and are lucky enough to have a train station parking pass, you want to make use of them.

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are thousands more who reverse commute, including some who come up from New York to work here.

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I'd like to make one more point before I close, about fairness. Two years ago, after another major service failure, the Council proposed a "Passenger Bill of Rights", which I've attached. It called in part for monthly and weekly ticket holders to receive a credit whenever Metro-North couldn't provide either scheduled train service or a bus substitute. To us at that time the problem was straightforward—if you don't get what you paid for you should get your money back.

I'd like to applaud Governor Malloy's leadership during the current crisis in prompting the MTA to offer a credit to monthly and weekly ticket holders, and I hope that our representatives in Hartford can work together to make this a permanent policy. More than fifty thousand taxpayers who ride the trains every day deserve no less.

Thank you.



Metro North Passenger Bill of Rights

Metro North customers have a right to expect rail transportation that is safe, reliable, and professional:

1. Rail cars must have essential safety equipment, functional lighting, heat in winter, air conditioning in summer, PA system, and clean rest rooms.
2. Passengers deserve a seat, not just a ride. Metro North will schedule service to meet anticipated demand, and conductors will enforce rules to maximize seat availability.
3. Conductors will treat customers courteously, provide accurate and timely information, be fully conversant with all safety and emergency procedures and protocols, wear clearly visible name badges, and be able to communicate with operation centers and the train crew at all times.
4. Metro North will provide accurate, timely communication regarding on-time performance through all means possible, including station displays, platform and on-train announcements, web site, email, social media, and RSS feeds. In the event of a significant disruption or delay of 15 minutes or more, Metro North will specify the problem and its anticipated impact on system performance.
5. If service is canceled, alternative transportation will be provided as quickly as possible. Metro North will not leave passengers stranded.
6. In the event that Metro North cancels train service and fails to provide alternative bus service for a period of more than twenty (20) hours, Metro North must provide a proportional credit to any passenger who holds a current weekly or monthly train ticket.
7. Metro North, in coordination with federal, state, and local authorities, will maintain safety and security protocols, including emergency contingency plans, to ensure essential services at all times.

This Bill of Rights will be prominently displayed on all trains and in Metro North stations.

Senator BLUMENTHAL. Thank you, Mr. Hartwell.
Mr. Boardman?

**STATEMENT OF JOSEPH H. BOARDMAN, PRESIDENT AND
CHIEF EXECUTIVE OFFICER, AMTRAK**

Mr. BOARDMAN. Thank you, Senator Blumenthal and Senator Murphy.

Senator Blumenthal, your focus on this disruption in and of itself should serve as a wake-up call to what would happen if we had an issue at one of the Northeast Corridor's many single points of failure. Thank you for your leadership on the issue. I believe your investigation and your leadership will help to demonstrate the absolute need for all of us to stop taking this vital infrastructure for granted and start investing in the future of the region and the nation.

Amtrak operates and maintains 401 miles of the 457-mile Northeast Corridor, and we work closely with Metro-North, which operates and maintains the other 56 miles. The Northeast Corridor serves a region that houses more than a sixth of the Nation's population and generates \$1 out of every \$5 of our gross domestic product on less than 2 percent of the country's land area.

The Northeast Corridor is a transportation asset of national importance. Its bridges, tunnels, electrical supply, signal systems, rails, and roadbeds are all aging and failure prone and lacks redundant systems to keep it operating in the event of failure. We've heard about that all morning.

The incident we are here to discuss demonstrates the consequences of such a failure. But we have many points of failure that would demonstrate similar consequences or even greater, longer-lasting consequences, particularly if they came at one of the many critical points, or single points of failure, in the states of Connecticut, New York, or New Jersey.

I'm talking about a single point of failure where it's a part of the system that, if it fails, will stop the entire system from working, like the string being cut, Senator Murphy. In its current state, our system faces the threat of a major failure—with comparable impacts to this incident in terms of disruption—on a daily basis, for much of our infrastructure is aging and heavily trafficked, while capital investment has lagged.

Between Superstorm Sandy, infrastructure failures, snow storms, and other service disruptions, Amtrak's services that use the Northeast Corridor lost a total of about 360,000 riders and \$37 million in Fiscal Year 2012. The lost riders and revenues are the clearest record of the problem of aging and decaying infrastructure.

The ugly truth is that our national failure to invest in the common good of our national infrastructure is eroding the serviceability of this railroad, our highway system, our aviation industry, our transit systems, our ports, and our utilities. And as a result, it's eroding the confidence of our future sense of national well-being.

The NEC has suffered from decades of unmitigated deferrals of investment needs and reductions in our planned capital investment programs. The result is a complicated process of compounding deterioration. Consequently, today, we have an infrastructure that

while safe—and it is safe—is vulnerable to service disruptions at virtually any time and place. And the vulnerability is highest, as Superstorm Sandy demonstrated, at the points where congestion is greatest and redundancy is nonexistent.

Amtrak and Metro-North both suffer from the same basic challenge. Since we took over this line in the 1970s, business and traffic have grown, but investment has not kept pace. Amtrak knows what it needs for the Amtrak-owned segments of the Northeast Corridor. Amtrak needs \$782 million per year in today's dollars to bring the infrastructure into a state of good repair every year for the next 15 years. And we must be on an equal footing with the capital planning formulas for the highway and transit systems.

The planning for intercity rail is poorly executed because the investments are considered by congressional appropriators on a year-to-year budget basis, rather than funding the program as the highway and transit programs are. In Fiscal Year 2012 and Fiscal Year 2013, the total funding level was about half of that needed, and Amtrak is always subject to deficient levels of planning because of the lack of predictable funding on a multiyear basis.

This level and method of investment isn't enough to sustain an aging system that's coping with record levels of traffic. There are several processes that are now in place that we hope will allow us to harness the support of the states with the Federal investment in the Northeast Corridor.

The process of asset aging is irreversible. At some point, everything needs replacement, and replacement is feasible only if adequate funding is available. And for Amtrak, as for Metro-North, funding on the required scale will have to come from a strong coalition that involves the Federal government, the states, the users of the Northeast Corridor, local government, and the private sector where it makes sense.

We must not take this vital infrastructure for granted. Instead, we must start investing in the future of the region and the Nation with multiyear investments that will demonstrate our own faith in the future of our nation.

Thank you. [The prepared statement of Mr. Boardman follows:]

PREPARED STATEMENT OF JOSEPH H. BOARDMAN, PRESIDENT
AND CHIEF EXECUTIVE OFFICER, AMTRAK

Thank you very much for the opportunity to testify today.

Amtrak operates and maintains 401 miles¹ of the 457 mile Northeast Corridor (NEC), and we work closely with Metro-North, which operates and maintains the other 56 miles. The NEC serves a region that houses more than a sixth of the Nation's population, and generates \$1 out of every \$5 of our gross domestic product on less than 2 percent of our country's land area. While our line is a transportation asset of national importance, it is aging and failure prone, and lacks redundant systems to keep it operating in the event of failure. While the incident we are here to discuss was not necessarily an infrastructure failure, the consequences of such a failure would be similar, particularly if they came at one of the many critical points, or "single points of failure," in the states of Connecticut, New York, or New Jersey. A single point of failure is a part of a system that, if it fails, will stop an entire system from working. In its current state, our system faces the threat of a major failure—with comparable impacts to this incident in terms of disruption—on

¹ Includes 37 miles in Massachusetts that are owned by Massachusetts Bay Transit Authority but maintained and dispatched by Amtrak.

a daily basis, for much of our infrastructure is aging and heavily trafficked, while capital investment has lagged.

Amtrak owns 122.5 miles of rail line in Connecticut and we have invested heavily in the state over the last two decades. In 2000, we finish the electrification of the 156 mile segment between New Haven and Boston with \$2.6 billion in Federal funds, and we also have invested nearly \$300 million to replace several bridges in recent years, such as the replacement of the movable portion of the Thames River Bridge in New London. Some of these projects were completed as part of the American Recovery and Reinvestment Act, which provided us with a substantial infusion of funding in 2009, and we invested more than \$167 million in the state of Connecticut to improve every aspect of our railroad.

As you probably know, Amtrak also does a lot of business in the state of Connecticut, which is served by our Northeast Corridor and Springfield Line trains. We operate 46 daily trains, including *Acela*, *Northeast Regional*, *Vermont*, and *Springfield Shuttle* services. Last year, we carried more than 1.7 million people to or from stations in Connecticut, and we employ 680 residents with a total payroll of more than \$51 million. We spent another \$51 million on goods and services in the state in 2012, \$11 million of that right here in Bridgeport.

As you would expect, we work closely with the Connecticut Department of Transportation, who we are pleased to add as a new state partner under a Federal-state cost sharing methodology that went in effect in October for service on the line to Springfield, MA. We also work very closely with Metro-North Railroad, which is, on the basis of train mileage, our sixth largest host railroad—which might not seem impressive, until you stop to consider that Metro-North hosts Amtrak trains for only fifty-six miles, while some of our services run on host railroad tracks for trips of up to 2,400 miles. It's a busy line, carrying 48 of our trains and about 300 Metro-North trains on a typical weekday. We are vividly aware of the challenges Metro-North faces in maintaining an aging and heavily used railroad, because these are our challenges, too. For Metro-North, as for Amtrak, the reality is that we are stewards of an aging infrastructure system that requires increasing levels of investment just to maintain the existing level of service; faster or more frequent service requires even more. Consequently, when we get a service disruption caused by a point of failure on this infrastructure, it can be costly and prolonged. The recent Metro-North shutdown is a case in point. Because of it, we were unable to offer *Acela* service between Boston and New York City. The *Acela* trains are what we call "integral train sets," with the electric locomotives permanently joined to the coaches, so we can't swap out a diesel engine if the power system fails. That meant cancelling those trains, and since approximately 72 percent of all *Acela* riders on the North End of the NEC are travelling between the three Boston area stations and New York Penn, we lost about 18,300 *Acela* riders. Fortunately, we were able to run the *Regional* trains behind diesel power over Metro-North, so we actually picked up some 6,300 riders on the *Regionals* (a likely spillover effect from cancelled *Acelas*), which reduced our net ridership impact to 12,000. This ridership "bump" produced an offsetting gain of about a half a million dollars in *Regional* revenue, leaving us with a net financial impact of \$2 million. *Acela* service was completely halted for six days, and we were not able to resume a full slate of scheduled services for another six days. This disruption was of slightly longer duration than usual—but it is by no means unique. The blocking of all service on the line in the wake of the derailment and collision on Metro-North in May cost us about \$4 million in revenue losses, and a freight derailment in New Haven, on Amtrak's infrastructure, cost about \$700,000 in lost revenue in March.

The lost riders and revenues are the clearest manifestation of the problem of aging and decaying infrastructure. This process, which is continual, is gradually eroding the serviceability of the railroad as underfunding takes its toll. To get some idea of what the consequences of underfunding are, I asked our Chief Engineer to study the problem of decapitalization earlier this year, because the NEC has suffered from decades of unmitigated deferrals of investment needs and reductions in our planned capital investment programs. The result is a complicated process of compounding deterioration. When we defer maintenance on one part of the infrastructure, we see that other effects that show up in areas of the infrastructure where we might not otherwise have had a problem. For example, where tunnel deterioration is an issue, we find that one of the effects can be greater corrosion of the rails, which correlates strongly to tunnel condition. When we find problems, we can either address them in large, comprehensive programs, or we can do spot repairs. Large programs cost more, of course, but the unit cost is significantly lower than the unit cost for spot repairs. Unfortunately, when we don't have enough money for the larger programs we need, we have no choice but to go with spot repairs. But spot repairs don't renew the infrastructure or prevent further decay—they simply

fix the problems that affect day-to-day operations and safety. But as the infrastructure continues to deteriorate, you have to do more spot repairs, which in turn consume more resources. And we have an infrastructure that, while safe, is vulnerable to service disruptions at virtually any time and place—and the vulnerability is highest, as Super Storm Sandy demonstrated, at the points where congestion is greatest and redundancy is nonexistent. While I have spoken principally about the Amtrak-managed segments of the railroad, these cannot be disaggregated from the larger problem of disinvestment. Amtrak and Metro-North both suffer from the same basic challenge: since we took over this line in the 1970s, business and traffic have both grown, but investment has not kept pace. Consequently, we are running more and more service on a line that is now several decades older—but major components of that line should have been replaced years ago.

To address this need, Amtrak studied state of good repair investment needs for the Amtrak-owned segments of the NEC in 2011. At the time, our proposal envisioned the spending of about \$782 million per year in today's dollars, to bring the infrastructure into a state of good repair by 2026. Unfortunately, funding has not been available, and in FY 2012 and 2013, the total funding level was about half of that need. It simply isn't enough to sustain an aging system that's coping with record levels of traffic.

There are several processes that are now in place that we hope will allow us to harness the support of the states with the Federal investment in the NEC. I am hopeful that the ongoing Section 212 process, mandated by the 2008 Passenger Rail Investment and Improvement Act, will allow us to continue the process of building a collaborative relationship with the states to better manage and fund the NEC. The Northeast Corridor Commission's excellent report on "Critical Infrastructure Needs on the Northeast Corridor," published earlier this year, outlines the need: the challenge ahead of us is balancing a growing demand for the services of all of the NEC's users with the needs of the infrastructure. It is old and aging, and the process of asset aging is irreversible: at some point, everything needs replacement, and replacement is feasible only if adequate funding is available—and for Amtrak, as for Metro-North, funding on the required scale will have to come from a strong coalition that involves the Federal government, States, users of the NEC, local government and the private sector where it makes sense. This disruption should serve as a wakeup call to what would happen if we had an issue at one of the NEC's many single points of failure. We must stop taking this vital infrastructure for granted and start investing in the future of the region and the Nation. And we must not only address the current vulnerabilities, but also provide the capacity that is urgently needed—not just for the decades of growth we expect to see, but the ongoing growth that is stretching a fragile and vulnerable but nevertheless vital transportation system.

Senator BLUMENTHAL. Thank you, Mr. Boardman.
Mr. McGee?

**STATEMENT OF JOSEPH MCGEE, VICE PRESIDENT,
THE BUSINESS COUNCIL OF FAIRFIELD COUNTY**

Mr. MCGEE. Good morning, Senator Blumenthal and Senator Murphy. My name is Joseph McGee, and I represent the Business Council of Fairfield County. Our members include businesses both in Stamford as well as in Fairfield County. We estimate that over 5,000 of our employees of member companies come to work by train.

I want to summarize my testimony and shift a bit after listening to this presentation this morning. While the economic impact of the Con Ed outage is significant, the 11-day disruption, in reality, focuses on our need to understand the potential vulnerabilities of the New Haven Line and their impact on the economy of Connecticut and the U.S.

I want to just parenthetically say what's interesting to me this morning is I had chaired the Two Storm Panel for Governor Malloy. We had 9 days of hearings and 100 witnesses on the risk to Connecticut for extreme weather. At the time, we looked at the

railroad, and it was very clear that this was an area of huge vulnerability, because it runs along the coast.

But what was very interesting in that testimony—you know, it was a year and a half ago now—was that the New Haven Line is either the single largest energy user or the second largest energy user in the state of Connecticut. And at that time, when we asked the utilities what was the nature of their interaction with the rail system in terms of energy efficiency, it was surprising. The railroad had not used any of the state incentives for energy efficiency at that time, and a red flag went off.

When I began looking at this whole issue of risk on the rail line, which came up this morning, this issue of redundancy needs to be clearly understood. The view that was presented here is that we have like a Christmas tree line, right, and if one bulb goes out, the line goes out. But maybe if we have a redundant system, if a bulb goes out, the line stays on.

The reality is that if you look at the standard for financial services which you require, we have tertiary backup. So we protect our financial data and the movement of it with three systems, primary, secondary, and tertiary. In the movement of people to work, we have a system that is essentially a primary system with a questionable level of redundancy. And that raises a very serious question on this whole issue of energy policy, vis-à-vis, the railroad.

If you look at the state of Connecticut right now, we're looking at micro grids for areas of communities so that in a storm, critical resources can come back to power quickly. We learned in the storm that our telecommunication system had battery backup that lasted 2 days. In a 10-day outage, how does that work?

So when you're looking at this issue—and I would really encourage the Senate committee to look very carefully at this issue of electric power and redundancy, vis-à-vis, the rail system, and the whole issue of a large system funded through large-scale power versus micro grids and the advantage of power delivered in a different way.

This is a really big deal, and it gets very short shrift. But it goes to the heart of can this system survive a risk of severe weather or just human screw-up? It's a big deal. I don't think it was adequately addressed this morning.

On this issue of infrastructure—and I know it's a money issue, but it's kind of like, "Well, we need so much money, we need so much money. I didn't really want to put the secondary system in place because it would have cost money." I'd like to know what Howard's answer would be after what he went through on his risk analysis of making that decision.

There's a lot of finger pointing of who was responsible. Con Ed says to you today, "Well, yes, it was our equipment, but it was the customer who made us do it. Therefore, I don't think I should be responsible for paying customers for their lost time at work." There's the beginning of a finger pointing here over a much bigger question: How is this going to work? Who is responsible?

I'll conclude on this note. In looking at the state of good repair, we know that the New Haven Line needs about \$3 billion to bring it up to a state of good repair—the 100-year-old bridges, the catenary system, the control system. We haven't heard what it's going

to take to bring the New York side up to a state of good repair. That number could be \$3 billion, \$4 billion, \$5 billion.

One of the issues here is while there is a capital plan for the New Haven Line, we in Connecticut always hear about the Connecticut side of this. But in the business community, we're interested in how the whole line works. What's the investment required for the whole system?

Let me put this in context. Right now, today, the New Haven Line, the single busiest rail line in America, is at 70 percent capacity. It's estimated that within 20 or 25 years, it'll be at 100 percent capacity. That means we'll be congested on the rail line. We have congested highways. We will, in a very short period of time, have congested railways.

The rail system is the single economic driver for Fairfield County. If you look at what has happened in downtown Stamford, it is the rail system. The most expensive property in Connecticut, in Stamford, is now around the train station. Twenty years ago, it was up by the Merritt Parkway.

The growth of our downtown housing market and the employment labor force has seen 10,000 new residents in downtown Stamford. That group of urban professionals is tied to the rail system. So this rail system is the economic driver of Fairfield County, of Stamford, and the state of Connecticut.

When you tell us that we have a \$3 billion backlog on state of good repair, and then you don't lay out to us—well, what does the future look like? As we grow the economy in Connecticut, we have to expand the capacity of this rail line. Where is the plan for that? All we talk about is a state of good repair. This system needs to be running much more frequently.

Parenthetically, if New Haven was only an hour from New York by train, it revitalizes New Haven. If Bridgeport was 45 minutes from New York, it revitalizes Bridgeport. If Stamford was 30 minutes instead of 46, it's an economic boom. If we want an economic driver for the state of Connecticut, it's improved and more frequent and faster rail service.

So this hearing this morning, while I applaud you for having it, really raises some fundamental issues about our commitment to economic growth in the state of Connecticut tied to a rail system which all operators admit is behind the times, is archaic, and out of date. I think there's an urgency here that needs to be felt. If we're going to grow the economy here, this has got to be fixed.

The bottom line is \$3 billion right now on the Connecticut side is a hefty investment in a state with the highest per capita debt in the Nation. So there has to be a role for Boardman and Amtrak in paying their fair share for the Connecticut experience. I'm using the rail in Connecticut.

And I'll end on that note. Thank you.

[The prepared statement of Mr. McGee follows:]

PREPARED STATEMENT OF JOSEPH MCGEE, VICE PRESIDENT, THE BUSINESS COUNCIL
OF FAIRFIELD COUNTY

Good morning, Senator Blumenthal, Senator Murphy and members of the Committee, I am Joseph McGee, Vice President of The Business Council of Fairfield County. The Business Council's members include businesses in Stamford and throughout Fairfield County.

While the economic impact of the Con Edison outage is significant, the 11 day disruption in reality focuses our need to understand the potential vulnerabilities of the New Haven Line and their impact on the economy of Connecticut and the U.S.

Commissioner Redecker in testimony before this Committee last April stated that the Northeast Corridor (NEC) generates \$1 out of every \$5 in U.S. gross domestic product and that one out of three Fortune 100 companies are headquartered within close proximity to the NEC rail system. The Northeast Corridor (NEC) in which the New Haven Line is a 46 mile segment is a major national economic driver.

On a regional level, ridership on the New Haven Line has surpassed a record 38.8 million total rides in 2012. Of equal importance, while ridership from Stamford to Grand Central on a daily basis has increased to 9,243 passengers, daily commuters to Stamford now exceed those commuting to NYC. That shift in daily commuter destinations reflects the emergence of Fairfield County as a regional economic center in its own right not just a group of bedroom communities for Manhattan executives.

On a local level, property in proximity to the Stamford railroad station is the highest assessed property in the city. Twenty five years ago corporate campuses in North Stamford near the Merritt Parkway were the most valuable. However, today the New Haven Rail Line is the key transportation investment that powers the Fairfield County economy and the emergence of a dynamic and growing corporate and residential housing market in downtown Stamford.

In a 2013 demographic analysis of the Downtown Stamford residential market, the Stamford Downtown Special Services District reported that 80 percent of its residents had a 4 year college degree and 40 percent of that group had an advanced degree. For comparison, Connecticut's workforce, the most educated in the U.S. has a 36 percent college degree achievement level. This highly educated labor force which numbers close to 10,000 and will double over the next 6 years is choosing Stamford because it fun, convenient and close to rail. In fact of the 6000 housing units in Downtown, 60 percent studio or one bedroom and 40 percent 2 bedrooms the actual car per unit is just under one per unit, far different than a suburban standard of more than 1.5 cars per residence. This young professional population is the labor force that corporations covet and provides Stamford and Connecticut with an economic competitive advantage but it must be understood that it is highly mobile and thrives in a high quality urban environment. Reliable rail service with frequent service to NYC is the critical element in the downtown Stamford construction boom.

Consequently, estimates of the economic damage to Connecticut as a result of the recent Con Edison outage while dramatic are not surprising. The Connecticut Department of Economic and Community Development (CT DECD) estimates¹ a \$62 million loss in state GDP from the outage, which includes approximately \$5.3 million in lost industry sales, \$3 million in addition production costs (incurred by the need to run diesel trains and busses), and \$2.25 million in aggregated reallocation of spending by consumers. Finally an estimated \$14.94 million amenity and time value loss (included in the DECD's overall \$62 million figure) represents a cost in travel time, alternative transport methods, fuel and wage hours incurred not only by regular rail commuters, but also by highway users. Failure of the New Haven Line affected all travelers and industries in the region.

When surveyed last week about the impact of the outage on their companies, the common theme that emerged was best summed up by Purdue Pharma, "We moved to Stamford. The rail road was a big part of the decision and we have invested considerable resources to encourage our employees to use it."

Overall our members initiated resiliency measures that allowed them to function during the outage. However, members of our Transportation Roundtable have grown increasingly concerned about the need to insure that the New Haven line operates at a state of good repair.

While we recognized that the State of Connecticut and the Federal Government have invested significant dollars in the New Haven line over the last 5 years, estimates that the Connecticut portion of the rail line needs over \$3 billion to simply bring it up to a state of good repair are chilling. Four bridges in Fairfield County that are over 100 years old on the busiest single rail line in America raise serious questions of the risk of a catastrophic failure. The question of course is how to pay for the investment in the New Haven Rail Line? Connecticut's current capacity to fund \$3 billion in rail improvements is highly problematic. This situation demands

¹ Connecticut Department of Economic and Community Development. "An Evaluation of the Con Edison Power Outage on the Metro-North Railroad New Haven Line: A Department of Economic and Community Development Economic Impact Analysis (EIA)." Available at: www.courantblogs.com; Accessed: 10/23/13.

a national response. Amtrak's role and the appropriate level of their support for rail improvements on the New Haven line needs a full airing.

Investment in Connecticut's rail infrastructure would provide the single largest boost to our state's economic growth.

Senator BLUMENTHAL. Thank you. Thank you to each of you for your very helpful and illuminating testimony.

Mr. McGee, you may not know, but I actually have supported the idea of improving our rail system so as to enable an hour trip from New Haven to New York and 45 minutes from Bridgeport to New York. I agree, as well, that that would really empower and enable tremendous economic growth throughout Fairfield County and Connecticut as well.

Mr. MCGEE. Senator, if you could do an economic analysis of that investment—you know, it's curious. We do an economic analysis when the system fails. It costs us \$62 million or it costs us \$8 million when it fails. We'd love to see an economic analysis done of the impact of investment in the New Haven Line and what it would mean to the Connecticut economy. That could be a very powerful driver of public opinion on this issue.

Senator BLUMENTHAL. Now, you may know that Metro-North has taken the position that it is impossible. I'm not sure whether I'm quoting exactly the Metro-North spokesperson. But my belief is that not only is it possible, but it will come someday that we will see that kind of rapid rail service on this line with sufficient investment. That's the condition, that there be sufficient investment. And I'd be very interested in your economic analysis.

Mr. MCGEE. Senator, you know, it's really interesting that New York City is building a whole new station under Grand Central. I think it's going to cost \$12 billion. So we're bringing riders in from Long Island now. They used to go to Penn Station—half of them now coming to Grand Central. It's cutting 20 minutes off their trip into Manhattan—\$12 billion. D'Amato got that rolling as a challenge—Senator Pothole—did great work in getting the Federal funding for that station.

That begins to put us at a disadvantage competitively. We have not increased our speeds to Manhattan in 50 years. And to say simply that we can spend \$12 billion in New York to create the eastside access, but we can't fix the tunnels for the New Haven Line—this is not acceptable.

Does that mean we're at the end of the economic line here? Long Island and New Jersey can make these investments, but we can't make these investments in New York to benefit the Connecticut line? That's a serious question.

Senator BLUMENTHAL. Mr. Hartwell, let me ask you for, number one, perhaps your description of the impacts of this disruption in service on the lives of commuters, but also the very positive impacts that this kind of expanded or enhanced service would provide to them.

Mr. HARTWELL. Thank you, Senator. It's clear that at the individual level, there were tremendous impacts on people's lives. But most of them simply soldiered through it. I talked to people who had been commuting 10, 15, 20—actually one man for 40 years on the railroad. All of them said that the service is better today than it used to be. They understood that this was a big problem, and

many of them simply, as I said, soldiered through it, because they had to get to work. So they did what they had to do to get to work.

Would they like more service? Absolutely. We have the new cars, for example, which are really very nice cars. But, by the way, each one of them carries fewer passengers than the old cars. So scheduling is now a problem. There are trains now that used to run with seats available that no longer have seats available because they're running the same number of cars with fewer seats.

These sorts of things have to get worked out. As Joe said, the railroad is the lifeblood of Fairfield County. And if we were looking for more service, for example, we should have what some people call subway service, meaning a train that comes so often on a local basis that you wouldn't need a schedule. You would simply go to the train station and know that if you wanted to get from Greens Farms to East Norwalk, you could do so with a reasonable expectation of spending only 10 or 15 minutes at the station, and you wouldn't need to be carrying a schedule with you.

Those sorts of things, nobody is talking about, because we're only talking about trying to fix the problems. But there is a tremendous amount of up-scale capacity here if we could bring it online.

Senator BLUMENTHAL. And I think people often fail to realize that the connectivity, the interdependence of the line—it's a lifeblood, but in a way it's more like an artery. If an artery is blocked at some point, the whole body fails.

Mr. HARTWELL. Let me give you just one quick example if I might. The three branch lines—if you are on the Danbury line, all the trains in the morning run north to south, because right now, we can only put one train on a line at the time because there isn't positive train control. Now, that's supposed to be coming. But there also aren't enough places for trains to pass each other.

So what's the import of that? If you live in Bridgeport or in Norwalk, you can't take the train in the morning to Danbury. You would have to wait until all of the morning passengers who are coming down—there are three trains coming down. Same thing on the Waterbury line.

So there isn't this kind of connectivity that you would expect to have with this basic piece of infrastructure here. It's still too limited. So those are things, again, that no one is talking about, but that could provide a lot of internal economic development in the state.

Senator BLUMENTHAL. I want to join, by the way, in your expressing appreciation to Governor Malloy and to Commissioner Redeker for their commitment to improving infrastructure as they did by investing in the new cars that, very likely, helped to save lives as a result of the derailment and collision that occurred back in May.

Mr. Boardman, talking about interdependence or connectivity, obviously, Amtrak uses these rails. I cited earlier—I think you were here—the figure of \$64 million invested in the past 10 years out of the \$3.2 billion that has been invested in the stretch of track. Wouldn't it be fair to expect Amtrak to invest more?

Mr. BOARDMAN. Yes.

Senator BLUMENTHAL. Can you commit that you will work toward providing a larger share?

Mr. BOARDMAN. If you commit, Senator, we'll commit, because the bottom line is we receive our funding from the Federal government. And as Senator Murphy talked about a few minutes ago, we're spending off operating money off the Northeast Corridor in the neighborhood of \$200 million to \$300 million. I'll use your numbers. That goes to support long distance trains. It doesn't go to reinvest in the Northeast Corridor. It doesn't go for capital. It goes to show a lower subsidy for Amtrak, which shouldn't even be considered subsidy.

It's an availability for transportation the same way that you maintain interstate highways or that you maintain an air traffic control system or a port. And yet go back to 1971 when this was created, when Amtrak was created, and it was created with the idea of a subsidy because this was supposed to be a profit-making railroad, even though no railroads had made money with passenger transportation. So we believe more needs to go into Connecticut, Massachusetts, Rhode Island, New York, New Jersey, and even those states south of New York and south of this area.

Senator BLUMENTHAL. Wherever it comes from, in other words, Connecticut and the Northeast deserve a fair share.

Mr. BOARDMAN. Absolutely.

Senator BLUMENTHAL. Thank you.

Senator Murphy?

Senator MURPHY. Thank you, Mr. Chairman, again for allowing me to ask a few questions.

Mr. Boardman, can you talk a little bit about what the standard for redundancy along the portion of the Northeast line that Amtrak owns is? Of course, we have an anomaly in Connecticut in which you operate a lot of trains that do very well, but you don't own the line. So can you talk a little bit about how you think about redundancy, especially with respect to electrical service on the lines that you do operate?

Mr. BOARDMAN. Well, we have an idea of a gateway program from the south into New York. The biggest bottleneck is Penn Station in New York. The biggest bottlenecks are Connecticut, New York, and New Jersey. So redundancy for us there is two new tunnels.

Also—and you can go back to Superstorm Sandy just a year ago—Substation 41 failed. So we had a problem with electricity south of New York, not just north of New York. And, today—and I thought Joe really did a good job of this—talked about these micro grids, and that's being discussed in New Jersey right now for the improvements that are necessary for that kind of redundancy.

There has to be some redundancy. But, as others have said, it can be expensive. There are techniques that maybe we can follow to keep the cost down. But one of the best things is to have a reliable system, a system that's kept up to a good standard.

Senator MURPHY. You talked a little bit about the importance of ultimately having multiyear funding. There's two problems. You're underfunded and you get money one year at a time. I think probably the highway folks would say that they still enjoy one of those problems, that they're underfunded even if they get the money at 2 years to 5 years at a clip.

But can you just talk, with specificity, if you have it, as to what kind of decisions you could make if you had multiyear funding? What are you doing now that you shouldn't be doing simply because you've got to make decisions 12 months at a time?

Mr. BOARDMAN. I think that's a great question. And I brought this book for that purpose, and I'm sure Jim Redeker has got it with him as well. Every one of the projects and bridges and difficulties that we've identified is in here, and most of them are identified, Senator, as feasibility and conceptual engineering, and then preliminary engineering. And most of them aren't beyond that.

They need to be in final design and construction. And with a plan for the future—I was a New York State Commissioner of Transportation for a few years, and what we found in New York with the highway program—and I learned this—is that when you have a program management, once you've started studying a project, you get it done. It may not be the exact year you want it done. It might be a couple of years later, because you've got environmental processes and so forth.

But because you had the contract authority from Congress to get that money out of the trust fund, as you've talked about, Senator Blumenthal, we built it. That's what needs to happen for the railroad in the Northeast Corridor. We need to have contract authority and move these projects and stop dealing with it one year at a time.

Senator MURPHY. You talked about how the operating profit made on the Northeast line primarily through the Acela service offsets operating losses in other places. Can you just explain to me what prevents you from making a commitment that that money is spent back in Connecticut by essentially making a commitment through your capital dollars to increase commitments to the Northeast to effectively offset the fact that our operating money is offsetting losses in other places?

Mr. BOARDMAN. There are a couple of things. If we're going to use those dollars, we have to get approval to indebt ourselves. We just can't take the \$380 million and put it into the infrastructure. It wouldn't be the right way to do it. We need to finance it over the life of the actual investment itself.

That means we go to, usually, the RRIF program, for example, if we're going to buy new locomotives, which we've done—70 new electric locomotives for the Northeast Corridor. And we're looking right now at having an RFP out at the end of November for new high-speed trains with more seats than we currently have in order to increase the capacity. So those dollars have to be approved through the RRIF program through the USDOT.

What we can do is really held in the hands of Congress. If Congress says, "We don't want you to use those dollars for those purposes; instead, we need those revenues," and so they sweep out the revenue and they send it to a lower overall subsidy for us, we don't have control over that. The appropriators do.

Senator MURPHY. But you've got a capital account that comes on an annual basis that you have authority with which to allocate, correct?

Mr. BOARDMAN. Yes, and it only covers about half of our capital costs.

Senator MURPHY. Right. But I guess my question is why couldn't you just make a different allocation decision within that budget to make sure that the Northeast is offset for the operating revenue that comes off of this line?

Mr. BOARDMAN. Well, we think we ought to have more flexibility in that area, and we'd like to discuss that with you.

Senator MURPHY. And then, last, Mr. Boardman, we're discussing a new cost-sharing plan along the line in terms of who pitches in and how much money for the maintenance of the line. And some initial reports suggest that Connecticut is due some increased money from Amtrak in order to help us maintain our line. What is Amtrak's position on the NEC process right now that's taking a look at this issue?

Mr. BOARDMAN. I say this with a smile, Senator. We also look forward to the Shoreline East paying us more for its use of Amtrak's corridor. We agree this needs to get fixed. We are in total agreement with that. We've got it with New Jersey Transit. We've got it with Long Island Railroad. Everybody needs to be there.

But if it just becomes robbing Peter to pay Paul, and we don't make the investments necessary that Joe talked about, we're not getting the growth that we really need to protect the economy of this nation.

Senator MURPHY. I got you. We sort of think that there's already a lot of robbing Peter to pay Paul, and we feel like we're more often than not Peter.

Joe, you did a great job, so I don't have any questions for you.

But I have one for John, my final one, which is this. You know, there might be an impression out there—I'm not suggesting on behalf of MTA or Con Ed, but maybe, amongst others as well—that rebates for lost days just doesn't need to be a priority because the people that use this line to get to and from New York can afford the loss, that this is just a bunch of people who are making a lot of money in New York who go back and forth, and so if they don't get rebates, who cares? Their money will come from someplace else.

Can you tell us a little bit about who the people are that use this line? And I know that you will attempt to dispel the notion that this is just a bunch of people who are making a couple of hundred thousand dollars a year going back and forth to New York every day.

Mr. HARTWELL. There are a lot of people that think of Fairfield County as the ATM of the state, and I definitely object to that. If you stood on the platforms, as I've done, and talked to commuters, you'll see that, yes, there are some people who are making \$200,000 or more riding the trains every day and paying very high taxes because of that.

But you'll also find that there are single mothers, there are people who are unemployed and trying to find a job, there are students, there are—everybody is on the trains. And the people in Fairfield County—there are pockets of enormous wealth. That is obvious. There are also pockets of extreme poverty, and those people are on the trains, too.

If you are on the train going to work, you're probably a taxpaying citizen, and you should get a fair deal. And a fair deal says if you don't get the service, you should get your money back. That seems,

to me, so completely obvious. If you buy a plane ticket, and the plane doesn't fly because there's bad weather, you get your money back. So why not on the trains? It makes no sense to me.

Some people have said, "Look, you're getting a monthly deal here, so why should we give you any money back?" But let's think about that for a second. If everybody bought a daily ticket, how much more transaction costs would there be for the railroad to actually sell those tickets? You couldn't possibly do it.

So the fact that people are buying monthly tickets actually saves the railroad money, and that money, in some respects, is passed on to the customer. These are basic economic positions, and I do not understand how anyone could take the opposite side of that argument, except that, of course, it's going to cost somebody some money. But it shouldn't come out of the pockets of the people who have paid for a service and don't get it.

Senator MURPHY. Well said.

Thank you very much, Mr. Chairman.

Senator BLUMENTHAL. Thank you, Senator Murphy.

And I might just expand on your answer to say that the ridership is not only going into New York. It's also, within Connecticut, going both ways, from Stamford up to Bridgeport to New Haven.

I was at two of the Fairfield stations this morning and saw ridership on both sides of the tracks, students going from Fairfield north or east, as well as commuters going into New York. So we're really talking about commuting both ways, and I think Mr. McGee would agree that the companies and employers that come to Connecticut in Fairfield County depend increasingly on commuters coming to them by rail both ways, from both parts of the state and even from New York.

Now, increasingly, our economic vibrancy depends on people being able to access Fairfield County from New York by rail. Is that correct?

Mr. MCGEE. Yes, Senator. It's changed, you know. The view that everyone on the train goes to Manhattan is not true anymore. More people come into Stamford on a daily basis than go to New York, and that shifted about probably 6 or 7 years ago. But I don't think people have caught up to the fact that that's really occurred. People use the train in Connecticut now.

Senator BLUMENTHAL. Mr. Boardman, let me just ask you and others a question. We've talked about redundancy in terms of micro grids. But what about fuel cells? Are they a promising source of potential power?

Mr. BOARDMAN. I don't believe—from what I've known about them in the past, unless there's something that's really upgraded, they're not going to be something we can use soon.

Mr. MCGEE. Senator, if I could add, in a 2007 case, the Connecticut Academy of Science has looked at that issue about fuel cells on the rail line and concluded that, at that point, the technology wasn't there for it to be practical. Now, there has been a lot of improvement in fuel cells since that period, so it's probably worth looking at again. But when it was looked at in 2007, it was concluded it wasn't appropriate.

Senator BLUMENTHAL. Thank you.

I want to thank each of you for your testimony. It has been very, very helpful and important to the work of this committee. And I want to thank our previous panel as well, and most especially Chairman Rockefeller for his permitting us to have this field hearing and for me to chair it, and for the excellent work of our Committee staff, again, and my staff.

For anyone who has additional thoughts or submissions for the record, we're going to hold it open for 10 days. And with that, I'm going to adjourn the hearing.

[Whereupon, at 12:15 p.m., the hearing was adjourned.]

A P P E N D I X

BOROUGH OF NAUGATUCK, OFFICE OF MAYOR ROBERT A. MEZZO
Naugatuck, CT, October 25, 2013

Senator JAY ROCKEFELLER, Chairman,
U.S. Senate Committee on Commerce, Science, and Transportation,
Surface Transportation Committee,
Washington, DC.

RE: UNITED STATES SENATE TRANSPORTATION COMMITTEE HEARINGS SUPPORT
FOR WATERBURY—BRIDGEPORT METRO-NORTH BRANCH LINE

Dear Senator Rockefeller:

Thank you for the opportunity to submit written testimony in support of improvements to the Waterbury—Bridgeport Metro-North Branch Rail Line (“Waterbury Line”). This section of transportation infrastructure is critical for expanded economic development in all the communities through which it passes.

The Borough of Naugatuck, a community of approximately thirty two thousand (32,000) citizens located in southwest Connecticut, is currently entertaining development proposals for multiple, town-owned properties in its urban core. The Waterbury Line is a pivotal component of what we collectively envision as a smart-growth, transit oriented revitalization of downtown Naugatuck. Many of our citizens work in densely populated communities to our south, and rely on southbound transportation networks for travel to and from work.

Currently the primary means of travel from the Naugatuck River Valley to Fairfield County and New York is Connecticut Route 8. Unfortunately congestion on this limited access highway is significant during morning and evening drive times as motorists attempt to link with the Merritt Parkway and Interstate 95. While each community from Waterbury south to Derby has a station along the Waterbury line, commuters are reluctant to use public transportation because of the limited and often poor rail service currently in place.

The recent power outage along the main line, which is the subject of Monday’s (10/28/2013) Transportation Committee hearings, undoubtedly created inconvenience and frustration on behalf of Metro-North commuters. Unfortunately this is something that is a continuous feeling shared by many regular Waterbury Line passengers. When there have been problems with rail cars on the main line, it has become common practice to move Waterbury Line diesel trains to the main line. This generally results in extended periods during which buses are substituted for trains along the Waterbury Line.

Another major concern for Waterbury Line commuters is the frequency by which trains depart and return to stations along the Naugatuck River Valley corridor. A major obstacle to increasing trains on the Waterbury Line is that it is a single track which prevents multiple trains from traveling at different times. A recent Connecticut Department of Transportation study of the Waterbury Line suggested the installation of multiple side tracks at strategic locations along the rail line which would allow for trains to pass one another. Unfortunately limited resources combined with the Federal mandate to provide positive train control along the entire Waterbury Line have prevented any action on this recommendation.

The limitations to service and frequency of disruption provide a serious inconvenience to those who rely on the Waterbury Line as their primary means of transportation. Equally concerning are all the countless other commuters who refuse to consider public transportation because of the inherent inconveniences imposed by current Waterbury Line service. Many of these Naugatuck River Valley commuters believe they have no other choice than to drive to and from their destinations south on the already congested network of state and interstate roads.

Building a first class, convenient public transportation system for these United States is a big idea that requires commitment and vision from the Federal government. For generations the communities throughout the Naugatuck River Valley

have been leaders and innovators during our Industrial Age. As we seek to revitalize the historic downtowns in each of our communities, we require a reliable and sustainable transportation system that will meet the needs of the modern economy. We strongly urge you and the honorable members of United States Senate Transportation Committee to support and fund improvements to the Waterbury Line. I would be pleased to further discuss this matter with you at your convenience.

Sincerely,

ROBERT A. MEZZO,
Mayor.

THE CITY OF WATERBURY
Waterbury, CT, October 25, 2013

Senator JAY ROCKEFELLER, Chairman,
U.S. Committee on Commerce, Science, and Transportation,
Surface Transportation Committee,
Washington, DC.

Dear Senator Rockefeller:

Please accept this written correspondence as testimony for the Committee hearing being conducted in Bridgeport, Connecticut on October 28, 2013.

As Mayor of the City of Waterbury, I have been a staunch advocate for improvements to and investments in the State of Connecticut's rail system, including the Waterbury Branch of the New Haven Line. We all know that Connecticut's passenger rail system is a strategic link between the major northeast urban centers of New York City and Boston as well as a major component of the entire eastern rail corridor. In addition to the benefits of being in a strategic location, Connecticut is rich in natural and human resources that place us in the forefront of the national economy in terms of science and technology, aviation, manufacturing, education, and a variety of financial services. Capitalizing on these resources requires the development and upkeep of a rail system that allows us to offer an attractive business environment; high quality, efficient mobility options; and, a high quality of life. Improving the productivity of our rail transportation system is essential to the competitive advantage of Connecticut, its regions and urban centers, and in turn, the national economy.

Waterbury is situated at the terminus of the Waterbury branch of the New Haven Line. Operations on the branch line are dependent upon and affected by the reliability of the main New Haven line. Any disruptions to electrical service on the New Haven line ultimately impact the cities and towns up and down the Naugatuck River Valley. Such disruptions include power outages, whether manmade or natural, accidents or delays. With the New Haven line being over 100 years in age, such disruptions are certainly not rare. When the New Haven line "goes down," diesel locomotives are pulled off the Waterbury Branch line, causing disruptions for passengers on the Branch line, whether or not they plan to connect to the New Haven Line.

When our diesel trains are redeployed, the result is stranded commuters who have to wait for CTDOT to implement a bus system in place of the suspended rail. The bus system is then fraught with its own delays and inefficiencies as drivers try to familiarize themselves with the route and connections are missed.

It is crucial that the Federal Government take a hard look at rail conditions in the State of Connecticut and support the upgrades and major investments that will result in a more resilient public rail system that can meet the challenges of the 21st century. Such investments should include improvements to the New Haven main line, as well as significant upgrades to the Waterbury Branch.

The Waterbury Branch line is in need of passing sidings, full signalization and a transfer station at Devon Wye so that more than one train can operate on the line. Without these improvements, our Valley economy is severely hamstrung and mobility options for our residents are limited. The City of Waterbury and the State of Connecticut are investing in improvements to Waterbury's Train Station, with the goal of encouraging transit-oriented development. We are redeveloping brownfields, planning and designing sustainable riverfront development and reusing our historic downtown buildings as we build a new City economy. Efficient and reliable rail passenger service on the New Haven Line, and specifically, the Waterbury Branch line, is at the heart of our economic development strategies.

As Mayor of the City of Waterbury, I ask the Committee to make the needed investments in the New Haven line and the Waterbury Branch that will ensure their reliability and efficiency so that Connecticut can offer viable transportation options

to its businesses and residents that will drive the growth of our local, state and national economies.

Yours truly,

NEIL M. O'LEARY,
Mayor.

COUNCIL OF GOVERNMENTS, CENTRAL NAUGATUCK VALLEY
Waterbury, CT, October 25, 2013

Senator JAY ROCKEFELLER, Chairman,
U.S. Senate Committee on Commerce, Science, and Transportation,
Surface Transportation Committee,
Washington, DC.

Dear Senator Rockefeller:

The power outage along the New Haven Line, which stranded over a hundred thousand commuters and tens of thousands of Amtrak passengers, highlights the fragile nature of our aging passenger rail network in Connecticut. Along with the recent storms and accidents of the last two years, it is clear that more needs to be done to ensure the resiliency of the passenger rail network upon which so many people and communities depend. We appreciate your committee's interest in learning about this issue and ask for your support of this essential transportation facility.

The future economic development and vitality of our communities is directly linked to dependable, convenient, and regular rail service. Greater investment in the rail line is essential to keep the line in a good state of repair, grow ridership, and minimize the potential for accidents, mistakes, and storm damage. Investments in the New Haven Line, and its branches, immediately benefit millions of people, reducing commute times and traffic congestion, increasing opportunities for economic development and activity, and support the redevelopment of the historic, walkable centers of our communities.

Disruptions on the New Haven Line ripple throughout the entire Metro-North system. When the power is cut on the main line, the diesel train sets that serve the Naugatuck Valley's Waterbury Branch are redeployed to the main New Haven Line, leaving our passengers stranded until busing can be started. Replacement buses are less dependable and deter reliance on the Waterbury Branch. Such disruptions in service hinder our communities' revitalization efforts, which are based around the branch line.

Our municipalities are making significant efforts to revitalize their downtowns and economies by investments in their train stations and support for transit-oriented development. Federal support, along with local, state, and private investment, is essential to making these projects work. We are hopeful that you will recognize the opportunities along the Waterbury Branch and support our efforts to improve it.

Thank you for your interest and giving us this opportunity.

Sincerely,

SAMUEL S. GOLD, AICP,
Acting Executive Director.

RESPONSE TO WRITTEN QUESTIONS SUBMITTED BY HON. RICHARD BLUMENTHAL TO
HOWARD PERMUT

Question 1. What levels of redundancy do you have for electricity along the New Haven line in CT? How is that different from what currently exists in NY where Con Ed operates?

Answer. The general function of a substation is to take power from the utility and make it useable for railroad operations. Every substation in New York and Connecticut has full redundancy for normal service operations. This means that substations are designed so that the loss of a major electrical component (*e.g.*, feeder, transformer) at the substation will not affect electric train service and full operations can continue. This function is called "second order contingency" or "N+1" design.

If a major component is taken offline for either short or long term maintenance, this redundancy can become compromised, as was seen last fall in Mt. Vernon.

Currently, the catenary system on the New Haven Line, east of the state border, has three supplying substations, Cos Cob, Sasco Creek, and Devon. If the Sasco Creek substation is offline completely, the adjacent substations are able to bridge

the gap so that train service is not affected. Metro-North and Connecticut Department of Transportation (ConnDOT) are working to bring this type of additional power capability to the Cos Cob and Devon substations. Construction of a new substation in the New Haven Yard at the far east end of Metro-North territory will allow service to continue to operate if the Devon substation is offline, and the fortification of the electric tie system in New York described below will provide this capability if the Cos Cob substation is offline.

The New Haven Yard substation and the fortification of the electric tie system are scheduled to be completed the first quarter of 2014.

Regarding operations in New York State, Con Ed is not the only power supplier. NYS Electric and Gas also provides power in portions of the State.

All New York substations—no matter which utility supplies the power—are designed and built to the same type of second order contingency or N+1 design described above, so train service is not impacted due to loss of a major electrical component in the substation. All 54 DC substations on Metro-North's Harlem and Hudson Lines, as well as the Mt. Vernon substation on the New Haven Line are designed and built to this standard. As noted above, second order contingency allows substations to continue to operate if a major component within the substation is offline.

Question 2. How will your contingency plans change in the future as a result of this incident?

Answer. Metro-North is making a number of changes to its project planning and contingency planning processes as a result of the Mt. Vernon incident. New processes and procedures have been used to plan the substation improvements currently underway at Cos Cob. Prior to beginning this project, Metro-North, ConnDOT and Connecticut Light & Power (CL&P) met, developed and jointly agreed to: project management plans for the actual transformer replacement; a power contingency plan that provides a primary and back up source; contingency plans for rail and rail/bus service in the event of a disruption; a plan for, communications with customers and other stakeholders. This same process will be used before any future major substation maintenance projects.

In addition, Metro-North is working to build redundancy at all substation locations to cover periods when maintenance is underway.

As noted above, in the remaining CT territory east of Devon, construction of a new supply substation in New Haven Yard will provide redundancy to the existing Devon supply substation.

In New York, Metro-North will fortify an existing emergency electrical tie system, to allow for a contingency power supply in case the utility serving the area is interrupted. While Con Edison and CL&P systems cannot be tied together, this system will provide redundancy for our Cos Cob substation, where power is provided by CT Light and Power, and our Mt Vernon substation, where Con Ed provides power. Once complete, this tie will allow the railroad to continue to operate train service should the Cos Cob or Mt. Vernon substation fail, although trains would operate more slowly and with delays.

Although Metro-North remains in discussion with Con Ed to build an additional supply substation, identifying a location is challenging given the availability of utility transmission voltage sources near the right of way.

RESPONSE TO WRITTEN QUESTION SUBMITTED BY HON. CHRISTOPHER MURPHY TO
HOWARD PERMUT

Question. While the effort to install full electrical redundancy along the Connecticut portion of line is already underway, any additional light that can be shed on the parallel plan for the New York track segments would be much appreciated. What is the menu of options being considered? What are the accompanying installation timelines for each potential option? When will a formal decision be made on the final redundancy plan?

Answer. Please see the answer provided in question 2 above for discussion of measures in New York.

The fortified emergency tie between the New York and Connecticut sections is anticipated to be complete in March 2014. The Mt. Vernon substation is scheduled for completion summer 2015.

RESPONSE TO WRITTEN QUESTIONS SUBMITTED BY HON. RICHARD BLUMENTHAL TO
CRAIG IVEY

Question 1. Are you aware of CL&P's plan to get electricity from nearby substations to power CT track in times of need? Do you plan to build similar redundancy?

Answer. James Redeker, Commissioner of the Connecticut Department of Transportation, described redundancy in the power supply to the New Haven line along the Connecticut portion of the route in the opening statement of his testimony at the October 28, 2013 hearing in Bridgeport. He noted two ongoing projects intended to enhance the redundancy by the first quarter of next year. Mr. Redeker's testimony was corroborated by Howard Permut, President of the Metro-North Railroad, in his response to a question asked during the hearing. This redundancy is achieved through Metro-North's design and investment along the Connecticut portion of the route, in collaboration with the Connecticut Department of Transportation. It's our understanding through conversations in industry forums that CL&P supports the ongoing projects as a contractor to Metro-North, but has not made any changes in their own electric system to provide redundancy to the New Haven line.

In the aftermath of the September 25 event, Metro-North has been actively seeking to establish an additional and redundant supply for the portion of track in New York State from Harrison to Pelham, initially on a temporary or interim basis to allow the upgrade project at their Mount Vernon substation to move forward without delay, and then on a permanent basis. Con Edison has assembled a team of engineers, operators, planners, and managers to fully support Metro-North's efforts along these lines. The New York Power Authority (NYPA) is also supporting this effort. All three entities—Metro-North, Con Edison, and NYPA—have met on multiple occasions, and will continue to meet, to achieve the goal of establishing an additional and redundant supply as quickly and effectively as possible.

Question 2. Can you provide my office with more information on the amount of money that ConEd spends on repair, maintenance and upgrades for the lines that supply Metro-North? Does ConEd have a capital improvement plan for such supply lines? Can you please provide it to my office?

Answer. The two 138kV feeders that supply electric service to the Metro-North Mt. Vernon substation are 38W09 and 38W10. Each underground feeder is 3.65 miles long and has 14 manholes which contain splices. Each feeder consists of three cables housed in a steel carrier pipe filled with a dielectric fluid which cools and electrically insulates the cables. The steel carrier pipe is protected from corrosion with a cathodic protection system. The feeders have circuit breakers, switches and associated protective relay equipment at the substations where they originate and terminate. Except for the current failure, these two supply feeders have never experienced any cable faults since they were energized.

Con Edison regularly inspects, tests, and maintains feeders 38W09 and 38W10 and their associated equipment. From 2009 through 2013 (year to date) Con Edison spent \$271,782 to maintain the feeders and their associated equipment.

In 2013, Con Edison invested \$2.4M in capital improvements to upgrade a circuit breaker, switches, and protective relays associated with feeder 38W10. The Company has plans to invest an additional \$2.4M in capital improvements to upgrade substation equipment associated with feeders 38W09 and 38W10.