Testimony
of
Citizens Against Overhead Power Line Construction

Prepared
for the
Connecticut Siting Council

Docket 370

October 30, 2009

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The Connecticut Light & Power Company application for Certificates of Environmental Compatibilitiy and Public Need for the Connecticut Valley Electric Transmission Reliability Projects which consits of (1) The Connecticut portion of the Greater Springfield Reliability Project that traverses the municiplaities of Bloomfield, East Granby, and Suffield, or potentially including an alternate portion that traverses the municipalities of Suffield and Enfield, terminating at the North Bloommfield Substation; and (2) the Manchester Substation to Meekville Junction Circuit Separation project in Manchester, Connecticut.	CT DOCKET No. 370 October 30, 3009

Citizens Against Overhead Power Line Construction Pre-filed Testimony

Testimony of Richard Legere, ARM
Executive Director, CAOPLC

Preface

I am addressing my comments to the CSC first as the Executive Director of Citizens Against Overhead Power Line Construction (CAOPLC). CAOPLC is an organization comprised of approximately 100 families and property owners in East Granby and Suffield who are affected by Docket 370, including property owners who allow the Metacomet Trail to be on their land.

Second, I am addressing some specific comments as an individual property with concerns about the siting of the power towers on my land. In that regard I would like to make a few specific suggestions to the CSC about how the towers can be sited, if the CSC approves overhead towers over undergrounding of the power lines through the Metacomet/Newgate area.

DIRECT TESTIMONY OF RICHARD M. LEGERE, ARM
ON BEHALF OF CITIZENS AGAINST OVERHEAD POWER LINE CONSTRUCTION
CONCERNING THE PROPOSED GREATER SPRINGFIELD RELIABILITY PROJECT AS A COMPONENT
OF THE PROPOSED NEEWS PROJECTS

Q. Mr. Legere, please tell the CSC when CAOPLC was founded and what does CAOPLC hope to achieve by participating in the CSC hearings?

A. CAOPLC began as a grassroots advocacy group representing Suffield 23 and East Granby families who have serious concerns about the adverse impacts of CL&P's proposed NEEWS/GSRP 345,000 volt overhead alternating current power lines.

CAOPLC was formed the day after CL&P held the Suffield Open House for the GSRP. To be clear, CAOPLC is not a NIMBY (not in my backyard) group. It would be foolish to argue against having reliable electric energy. It would be equally foolish and inappropriate to argue that utility ratepayers should overpaying or paying as much as possible for that energy. If there is a need for new transmission power lines, our concerns and opposition relates to how they are constructed, their long terms impacts, and whether new transmission lines exactly as proposed by CL&P are the best long term solution for Connecticut and the New England power grid. We are also concerned about the disproportionate impact of the adverse health and financial impacts upon a select few families.

We do not think that power line construction should be, and has to be, a zero sum game. That is a situation where NU, CL&P, WMECO and ISO-NE are winners and everyone else who lives in a power line sited community or neighboring community loses. We do not think that given the large sums of money that will invested, that power line construction should have a narrow focus; it should be done in such a way that the transmission line is compatible with future regional and countrywide power grid initiatives.

CAOPLC is now receiving emails and meeting with town officials through the NEEWS project area. It seems that what could be viewed as our "backyard" concerns are shared by a much wider group of individuals throughout the NEEWS project area.

Q. Are you providing your testimony as an expert with specialized engineering knowledge regarding power transmission lines?

A. No.

Q. Please briefly detail your education and professional background.

A. I received a Bachelor of Arts degree from Bennington College in Bennington, Vt. My degree is in Literature and Languages. My area of concentration was Poetry and Writing.

My professional background is in the commercial insurance business and risk management businesses, and I have over 30 years of experience in these areas. I have a professional designation called an ARM or Associate in Risk Management. The ARM designation is offered by the AICPCU/IIA organization, which is a professional trade organization comparable to the AMA, ABA or CPA professional organizations for their respective professions.

I currently work as an independent consultant specializing in commercial insurance program and product development. This is a specialized area of the insurance business. If there is interest in what this work involves, I have a web site that can provide some additional information. Please see www.legereconsulting.com I have provided a summary of my education and professional experience and my resume with this testimony. A brief summary of the ARM course work is as follows:

ARM 54—Risk Assessment: *Risk Management Programs; The Risk Management Process; Legal Foundations of Liability Loss Exposures; Assessing Property, Liability, Personnel, and Net Income Loss Exposures; Management Liability and Corporate Governance; Forecasting; Cash Flow Analysis.*

ARM 55—Risk Control: *Controlling Property, Personnel, Liability, and Net Income Loss Exposures; Intellectual Property Loss Exposures; Criminal Loss Exposures; Disaster Recovery for Property Loss Exposures; Understanding Claim Administration; Fleet Operations Loss Exposures; Environmental Loss Exposures; Understanding System Safety; Motivating and Monitoring Risk Control Activities.*

ARM 56—Risk Financing: *Insurance as a Risk Financing Technique; Reinsurance and Self-Insurance; Retrospective Rating Plans and Captive Insurance Companies; Finite and Integrated Risk Insurance Plans; Capital Market Products; Forecasting Accidental Losses; Accounting and Income Tax Aspects; Claim Administration; and Allocating Risk Management Costs.*

Q. What is your professional and educational background and why would it be relevant to your testimony?

A. To preface my answer, unless a private citizen affected by a transmission line project happens to be an electrical power transmission engineer or an economist to use those as examples, he or she is not able to offer much in the way of specific expert technical testimony to help the CSC in its consideration of the transmission projects and in its deliberations as to what is the best solution given the mission and mandate of the CSC.

However, I consider my degree in Poetry to be relevant and helpful to the evidentiary hearings. I realize that some may find this statement amusing, but I will explain why I think this is so and show why my literature and poetry skills are directly transferrable to my profession of analyzing, quantifying, qualifying and deploying investment capital to transfer and insure risk.

A poet's academic training teaches him or her to be expert in multi-dimensional analysis and context. When one critically reads a poem there are a number of considerations at work such as how does the poem on its first reading "hit you." That is, what is the poem's raw emotional impact? And that emotional impact obviously will vary from person to person. Next, you could look at the meter of the poem. Iambic pentameter is the most well known example of recognized poetic meter and each culture has its own metric structures. You can look for alliteration or look at the poet's diction – elegant, rough hewn, commoner or king. There is the historic context of the poem when it was written and when it is read. There is the personal or biographic context of the poem. Often the unusual use of language, the odd word, or the use of cross cultural meter is instructive to further understanding what is at work in the poet's mind. There are many, many other aspects to look at but I think I have made my point in this brief discussion about analytic skills.

A person trained in literature and poetry is one who is trained to think, analyze and put information into context. And I think that this ability to analyze and understand context and broad themes is important in evaluating the Greater Springfield Reliability Project even if the subject matter is reliability, zonal capacity pricing, reactive power, or thermal overloads instead of Life, Love, Beauty and the Human Condition.

My profession is risk management and insurance underwriting. Insurance deals with "pure risk." Pure risk is non-investment or non-speculative risk. Until insurers such as AIG started financial product

transfers. We are now all too familiar with what happens when insurers branch out into the terra incognita of unregulated speculative risks.

Reviewing and analyzing risk involves similar multidimensional analytic skills and analytic process as critically reading a poem. What this has to do with my testimony is that while I cannot offer expert testimony as an engineer, I can offer expert testimony as a risk management professional. And that testimony is best expressed and most useful to the CSC as a series of questions and decision matrices about what is known about the GSRP and NEEWS, what is not yet known and in providing different and broader perspectives and greater context for decisions to be made.

Q. Do you have professional or educational experience, including scientific experience that you would also consider relevant to your testimony and want to present to the CSC?

A. Yes. I completed some evening MBA classes at the University of Puget Sound in Seattle. The most relevant is coursework in economics.

I have also done a lot of professional work in heuristics and in "time horizon" decision outcomes in terms of modeling decision matrices, creating experiential analytic tools, adopting actuarial tools such as "upset factors" to maximize the credibility of the underwriting decision making process and maximizing the profitability of insuring risks, probability calculations, prospective and retrospective financial and risk analysis, strategic analyses on capital deployment balanced against a time horizon. I realize that this is pretty arcane material and if there is interest I will be happy to explain it and why this perspective and expertise informs my comments and testimony.

I do have a background in the sciences, particularly in biology. So that I do not repeat the materials in my background summary, I will only highlight a few things. I did take many science courses in college. I liked the course work and did consider pursuing a career in molecular biology. I have a research assistant's attribution on published paper:

"Structure of eukaryotic chromatin. Evaluation of periodicity using endogenous and exogenous nucleases." Keichline LD, Villee CA, Wassarman PM. Biochem Biophys Acta. 1976 Feb 18; 425(1):84-94. PMID: 1247619 [PubMed - indexed for MEDLINE]

This work was done when I was in college studying at the LHRRB (Laboratory of Human Reproduction and Reproductive Biology) at Harvard Medical School. The research partner to Drs. Villee and Keichline for their research was Francis Crick at MRC Labs in England. It was very, very rewarding to have these people as my mentors and I was impressed at how generous they were with their time and knowledge, in particular Dr. Keichline.

Here are some observations and opinions that I can offer with a high degree of confidence given my science background:

- If the current state of scientific understanding is moving towards formalizing that EMFs are linked to certain diseases and that the harmful effect of EMFs is exacerbated in some individuals because of human gene mutations, I can confidently and expertly say to the CSC that research papers from the applicant saying that EMF animal studies provide no causal or statistical links to disease are of minimal value and credibility and that the CSC should not use them as evidence. I

personally think most individuals do not need a scientific background to understand that point; just common sense and the ability to reason. Said a bit differently, I can distinguish between "good science" and "junk science" and offer reasoning as to why within the expertise that I have.

- If research studies say DNA is affected in some way by EMFs, I know that if you want to understand the research in greater detail it is critical to ask what kind of DNA is affected. If this statement is perplexing, it is indicative of the extent of one's knowledge of molecular biology.

- I am able to distinguish between what is expert scientific testimony and what is not. For example, references that will be made in this testimony to dose/response curves are not expert testimony. I am not furnishing data from research that I conducted or conclusions drawn from that research. I am providing excerpts from articles published in scientific journals which are easily found and all citations are properly footnoted. I believe the CSC is capable of deciding the merit or lack of merit of that information.

Not to make light of the dose/response phenomenon but many college freshman will usually have an intimate knowledge of the dose/response curve. The "college freshman dose/response formula" goes something like: {One or Two beers = good; Fourteen beers = bad}. This is not a very difficult or challenging concept to understand.

It is however critical to the EMF discussion that follows. The dose response curve material is offered because given CL&P's references to how it will mitigate EMFs at the edge of the right of way and metrics such as AAL to show that effective EMF mitigation is being offered is confusing, misleading and in my opinion, "junk science".

Given the fact that the residents in a semi-rural areas such as the Newgate and Metacomet area spend a considerable amount of time on the land near or under the transmission lines in recreational and agricultural activities or travelling under the transmission lines to get into or out of our properties, I believe unless this situation is recognized, engineering the power lines to have 4 or 8 milliGauss at the edge of the right of way completely ignores the fact that we will be exposed to 200 or 300 mG levels when we are under the power lines.

Q. And is there other professional or educational experience that you would consider relevant to your testimony?

A. Yes. I have a background in real estate including real estate appraisal. I created a number of real estate insurance products for a major insurance company and managed the underwriting and risk assumption activities of this product division. I have been a speaker at the Real Estate Board of New York. I have written articles on real estate issues for insurance trade publications.

This real estate experience is mentioned because this testimony discusses "Fall Zone" homes and the FHA underwriting guidelines for these homes. At one point, counsel for the applicant objected to say that I was unqualified to offer an opinion on this matter without first asking a question to see if I was qualified to opine. At another point Mr. Fitzgerald said the information I offered on "Fall Zone" homes was untrue. I will clear up any questions on this issue before a discussion of "Fall Zone" homes begins.

Here is the link for the FHA web site: http://www.fhainfo.c om/fhaappraisals4.htm Here is the information from the FHA web site on high voltage overhead transmission power lines (HVOTL):

Overhead high voltage transmission towers and lines: High voltage lines are those that carry 60 kilovolts or greater. Distribution lines are the common lines used for supplying power to housing developments and similar facilities that often carry 12 kilovolts or less. **No home may be located within the designed fall distance of any pole, tower or support structure of a high-voltage transmission line, radio/TV transmission tower, microwave relay dish or tower or satellite dish (radio, TV cable, etc.). Neither high voltage nor distribution lines shall pass directly over any structure on the property (this does not include service lines that deliver power to the house).**[1]

I also asked a question in the Realtors forum on Zillow.com about overhead power lines, home value and desirability. Here is the link. You will see that I am identified as the person asking the question and that various Realtors have provided their opinions. http://www.zillow.com/advice-thread/Do-high-voltage-power-lines-near-a-house-about-300-feet-have-an-impact-on-property-value/178204/

Having a transmission line near a home impacts its ability to have FHA financing if there are fall zone concerns and also diminishes the pool of potential buyers. This will be discussed in depth later on in the testimony.

I have also worked as an energy analyst for a conservation and resource management consulting company when I was in college. Details are furnished in my background summary.

Q. Please describe the concerns of CAOPLC and its members.

A. Here are our key concerns:

- We are most concerned about our health and safety, particularly the health of our children and grandchildren from the EMF radiation from CL&P's proposed 345 kV AC overhead lines.

- We are concerned about the visual pollution of any power transmission tower that would be located in the Newgate area of East Granby and West Suffield. The CL&P Newgate area right of way (ROW) borders and runs parallel to the Metacomet Trail. The Metacomet Trail, as a part of the MMM Trail, was recently awarded a national historic heritage trail designation, a designation similar to the Appalachian Trail. All Metacomet area residents share a deep concern about the extraordinary visual pollution that will occur from new ten (10) to thirteen (13) story power towers. It will scar a beautifully scenic, pastoral and historic area and damage it irreparably.

- We are concerned about the severe erosion and water runoff problems in the Phelps Road area in West Suffield which is also in the Newgate area and along Metacomet trail. On the southern part of Phelps Road there are a number of homes on a steep slope that currently experience heavy water runoff problems whenever there are moderate to heavy rains and especially in springtime with the spring rains and snow melt. Any further clearing of the right of way will exacerbate those erosion

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1 This material is taken from the HUD Appraisal handbook (4150.2) CHG-1, section J. OVERHEAD HIGH-VOLTAGE TRANSMISSION LINES. I wonder how this would be interpreted for **residential ingress and egress to a property under a HVOTL** as is the situation at my home on 1204 Newgate Road.

and runoff problems and cause erosion and water runoff problems257 slope residents but the lower slope residents on the northern side of the road whose property receives the runoff waters.

- We have concerns about the possible serious loss of our property values for overhead power lines. Estimates of our diminished property values run from a few thousand dollars for some homes, to in the case of some homes in the hundreds of thousands to the million dollar range.

- We have concerns that the possible loss of our property values will impact our small towns' tax bases and cause a financial "ripple effect" through local businesses in both Connecticut and our Massachusetts neighbors, such as Realtors and contractors and other small, local shops and service businesses struggling through a recessionary economy.

- We have concerns specifically about the impact of EMFs on children who do not reside in or along the CL&P ROW. While there are no public schools presently located near the proposed power lines, there are a number of facilities that host or sponsor recreational events that attract children and there may be licensed day care facilities. A good example is the Suffield Sportsman Club. I have been at the club during events to gather signatures for our petition. I have been struck by the number of children who attend recreational events such as a Turkey Shoot.

- We have concerns about the impact on our agricultural lands. Suffield in particular is proud of its heritage as a farming community, a tradition that dates back to the 1600's. Suffield is Connecticut's foremost town in preserving agricultural and open space lands from development. We think that recognizing the unique attributes, culture and benefits of each community, and preserving the local uniqueness and flavor from unnecessary or inappropriate power transmission development, will preserve and promote this community diversity. This will benefit all of Connecticut's and Massachusetts's small towns by helping us to sustain those attributes, landscapes and the quality of life that we hold dear.

Q. Have you brought CAOPLC's concerns to CL&P and has CL&P been responsive to the group concerns?

A. Yes, we have addressed our concerns to CL&P. In our opinion CL&P has not been responsive. We are concerned about the unresponsiveness of CL&P to its local, resident ROW ratepayers' concerns and we question why CL&P conducts business in this way. You can see this in some of CL&P's dismissive answers to our interrogatory questions about our EMF exposures. (See CAOPLC Interrogatories, 6-30-09, Q-CAOPLC- 004, 005, 010)

We saw signs of it in our many "community outreach2295 " discussions with CL&P where we tried to explain our concerns and suggest alternative designs that addressed our concerns, such as alternative siting options, alternative transmission pole designs, and ways to mitigate EMF's. But actions speak louder than words and it was clear by CL&P's actions that CL&P had its plans and designs firmly set and was unwilling to offer any realistic and meaningful modifications.

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2 "Outreach" is CL&P's term. If CL&P outreach was responsive to the public's concerns there would not be grass roots advocacy groups like CAOPLC.

CL&P will say that they did plan a number of underground variations. That is true. But the underground variations are unworkable and unrealistic. Members of our group met with CL&P's representatives this summer (2009) at both in-home meetings and community meetings. A significant number of people voiced strong concerns about EMF radiation from the proposed 345 kV power line, especially with regard to their children and grandchildren's health. We are conducting a petition drive and currently have the signatures of over 200 Suffield and East Granby residents who are concerned about the significant health risks such as childhood leukemia and the adverse economic effects of high voltage overhead power lines. Although we have expressed our concerns, CL&P has refused to adequately address this issue, or entertain the siting or construction options we suggested, or even attempt to reassure us other than to say (incorrectly) that the World Health Organization says EMF's from high voltage transmission power lines are safe.

Q. What has CL&P proposed to the CT Siting Council as its alternative plans for underground routes?

A. Two of the alternative plans would involve excavating either Newgate Road or Routes 20 and 187 in East Granby and West Suffield. Among some of the many unacceptable affects of these alternative plans, is that CL&P proposes to bury its 345kV AC lines under the roadways so that we, our children and grandchildren, will drive over them and walk along them numerous times each day for miles at a time. This "solution" will most likely dramatically INCREASE our EMF exposure over that of a 345 kV overhead power line.

In order to sway public opinion to believe that the overhead power lines are the least of all evils, CL&P's underground proposals seem specifically developed to destroy the historic Newgate Road and Metacomet Trail landscape, as well as disrupt people's lives and subject them to as much inconvenience as possible in the construction process that CL&P says will last for years.

CL&P's "alternate underground plan" for Newgate Road risks the possible collapse of the historic Old Newgate Prison, a National Historic Register property, by routing the proposed underground power line's tunnels adjacent to its foundation and the copper mine's underground tunnels. Personally, I cannot understand how and why professional engineers can proffer such absurd solutions. A logical explanation seems to be that CL&P is intentionally proposing dead-on-arrival construction alternatives.

If these two options are dismissed, that will leave only an overhead 345 kV AC power line and the underground 345 kV AC option through the existing right of way. We believe it is CL&P's express purpose to offer alternative underground plans so objectionable, so unworkable and so patently ridiculous that underground construction solutions are discarded as options by the CT Siting Council. If so, CL&P is making a mockery of the intent of CT 04-246, the law that requires underground lines in residential areas, the siting process and us as its customers.

We believe that transmission and utility infrastructure construction should not be a zero sum game, where the weakest and least able to advocate for their health, safety and well being are the losers and those with the most money win and prevail.

Q. What do you want to tell the CSC about EMF radiation and theconcerns of CAOPLC's families?

A. First we want to acknowledge that there is no scientific consensus on EMF radiation. CAOPLC cannot unequivocally say EMF radiation is unsafe; nor can NU or CL&P or WMECO say with 100% certainty that an overhead alternating current high voltage power line's EMF radiation is safe and harmless for all people.

The scientific community seems to be split on this issue. The BioInitiative Report's scientists and many other scientists feel that EMFs are harmful and harmful to the point of being deadly. Of particular

[3] Here is the web site for the BioInitiative report: http://www.bioinitiative.org/ On page 4 of the Summary for the Public, the BioInitiative report's scientists say:

> *"Not everything is known yet about this subject; but what is clear is that the existing public safety standards limiting these (EMF) radiation levels in nearly every country of the world look to be thousands of times too lenient. Changes are needed.*
> *New approaches are needed to educate decision-makers and the public about sources of exposure and to find alternatives that do not pose the same level of possible health risks, while there is still time to make changes."*

The BioInitiative Report also offered what I believe to be the most cogent reason as to why there is not agreement among scientists on EMFs and why we have included information for the CSC on Toxicogenomics. Again, I do not think I have to be an expert to introduce what is "informational content" about this new field which may prove to be of value in being able to measure EMF's effects on a living system. If I were presenting research data to support a position I wanted to establish and offer as evidence, that would be expert testimony:

BioInitiative Report : Main Reasons for Disagreement among Experts:

1) Scientists and public health policy experts use very different definitions of the standard of evidence used to judge the science, so they come to different conclusions about what to do. ***Scientists do have a role, but it is not exclusive and other opinions matter.*** [emphasis added]

2) We are all talking about essentially the same scientific studies, but use a different way of measuring when enough is enough" or "proof exists".

3) Some experts keep saying that all studies have to be consistent (turn out the same way every time) before they are comfortable saying an effect exists.

4) Some experts think that it is enough to look only at short-term, acute effects.

5) Other experts say that it is imperative we have studies over longer time (showing the effects of chronic exposures) since that is what kind of world we live in.

6) Some experts say that everyone, including the very young, the elderly, pregnant women, and people with illnesses have to be considered – others say only the average person (or in the case of RF, a six-foot tall man) matter.

7) There is no unexposed population, making it harder to see increased risk of diseases.

8) The lack of consensus about a single biological mechanism of action.

9) The strength of human epidemiological studies reporting risks from ELF and RF exposures, but animal studies don"t show a strong toxic effect.

10) ***Vested interests have a substantial influence on the health debate. (CAOPLC Emphasis)***

concern is childhood leukemia. The WHO (WorldHealth Organization) has classified EMF's as a "possible carcinogen" which is far from CL&P's belief and assertion to East Granby and Suffield residents that the WHO thinks EMFs are safe. The WHO has recommended further prioritized research especially on childhood leukemia. We still do not know and may not know for a years the full extent of EMFs effects.

And this is our perspective on the matter of EMF and the public's health and safety: First of all, we ask that all due consideration is given by the CSC to our health and safety. That is consistent with the intent as we read it of CT law 04-246 that requires underground construction of power lines in residential areas and especially near those areas in which children are present. And while we feel strongly, passionately about our health and safety risks from the GSRP, we cannot mount the kind of extensive and vigorous defense that we could if we had CL&P's resources and access to experts. And the irony is, as we understand it from the docket 370 testimony, that CL&P's money and vigorous advocacy is eventually incorporated into its expenses and charged back to its rate payers. Our own money is used against us.

While the science is still evolving on EMF's, we feel that the prudent public policy to follow is to require underground construction for high voltage power lines. If future research shows EMF's to be a direct cancer risk, what will Connecticut's and Massachusetts's recourse be against NU, CL&P and WMECO after billions are spent to construct overhead power lines? Do we spend billions more to tear down the overhead lines and build the high voltage lines like we should have in the first place? Or do we go into the "acceptable levels of fatalities" risk analysis mode and do the calculus on how many child and adult deaths are acceptable?

Our collective history on being proactive and on the right side of public health issues for potentially hazardous substances is not a good one. There is a famous quote from George Santayana about *"Those who forget history are condemned to repeat it."* We once thought Asbestos was safe and a wonder material. It found its way into commercial and residential insulation, automotive break shoes and number of other commercial and residential insulation and heat shielding applications. Here is a sampling of substances and chemicals that were once approved by government regulators, substances that caused billions in remediation and litigation expenses.

TOXIC

TOXIC CHEMICALS AND SUBSTANCES ONCE APPROVED AND NOW BANNED BY THE FEDERAL GOVERNMENT	
Arsenic	Asbestos
Lead Paint	Mercury
DDT	CFC's
Alar	Thimerisol
Thalidimide	2-4 D
2-4-5 T Agent Orange	MBTE (in gasoline)
DES	PCB's & Dioxin (endocrine function disruptors)

No one can yet answer definitively if EMFs will join this group but we once again have the opportunity to either learn from history or have history repeat itself. But if the trend in scientific understanding is that EMFs are a health risk, it is easy to deal with cell phone radiation for example. You can simply choose how much you want to limit or avoid using a cell phone. That cannot be done if NU and ISO-NE have us invest $2 billion in NEEWS and a decade later it is proven EMFs are a cancer hazard. What are the options? Tear down the high voltage HVAC transmission power lines and replace them with no-EMF HVDC transmission lines in residential areas? What is a realistic probability of that happening? Could we afford to rip out a regional grid? Buy out all of the affected right of way homes? Engage is countrywide asbestos type litigation?

It seems so much simpler to recognize that HVAC technology, as Mr. Ashton referred to it in his questioning of Mr. Chernick, is a 1960's era technology. As I have testified, I moved here from Washington state. While I am against overhead towers in heavily populated residential areas, and in national scenic areas, it may surprise CL&P to hear me say that in the very open areas of the West such as the Washington Palouse (where the vast wheat farms are) overhead lines are appropriate and cost effective. It should be noted that some are HVDC lines, such as the Pacific DC Intertie. It may be a simplistic way of saying it, but I believe that what CL&P and ISO-NE are proposing for NEEWS is the equivalent to a 10 mpg giant SUV when the world needs a Hybrid or PHEV solution and that technology is readily available.

Q. Are there specific concerns that the residents of East Granby and Suffield have that they want the CSC to understand?

A. Yes. At the CSC docket 370 proceedings and prior proceedings such as dockets 217 and 272 much testimony has been given by the applicant to various plans and solutions to achieve ***reductions in EMF levels at the edge of the right of way***. I do not think our concerns or comments on the issue of our exposure to EMFs has been fully realized or understood or addressed.

And our concern is this: because our towns of East Granby and Suffield are a mix of dense suburban residential development and a semi-rural agricultural/horse farm life style, one in which some people own more land than a suburban lot, that edge-of-the-right-of-way EMF considerations or proposed EMF reductions at the edge of the right of way are meaningless.

They are meaningless because we travel under or around the power lines a number of times each day. We are in the right of way much more than most our suburban or city resident counterparts in the more southern and shoreline Connecticut counties. We therefore feel our concerns about EMF exposure are real and warranted but are not as yet being adequately recognized or addressed.

We asked in our interrogatories to CL&P a number of questions about EMFs. Here is the statement that we used to preface our EMF interrogatory questions:

"We could take some comfort in CL&P's quoted EMF number of 2.7 mG at our house at a distance of 350 feet from the edge of the power line ROW, if we intended to stay locked in our homes and not ever venture out. But that is not why someone buys acreage property or chooses to live in the country vs. a city. We spend time outdoors, walking, cross country skiing in the winter, walking our dogs up to Newgate Road and beyond, my orchard in

particular is much closer to the power lines, and we do work in our fields like mowing and tree and fire wood cutting – there is a lot of outdoor activity – and that holds true for all of the residents in our area especially for families with children. Given the above prefaced situation and importantly that that CL&P has quoted a 200 mG reading directly below the proposed GSRP 345 kV power line, our questions are these: "

CL&P' responses included, *"The cited statement is descriptive. Unless a person spent a large fraction of the year on or very close to the right-of-way, variations in the height of the line conductors would have a minor influence on their average long-term exposure."*[4]

My Mom had a great saying when my brother and I were growing up, "**You boys are hard of listening.**" If this is not a profound example of CL&P's being deliberately hard of listening and profoundly tone deaf then I do not know what is. For CL&P to respond to a statement that details all of the ways that rural residents do actually spend a large fraction of the year on or very close to the right-of-way by responding ***as if it never had even heard that information,*** makes me wonder if CL&P's real message is not, "Look we can afford to build a power line but we can't afford to build it safely, at least not as we have designed it."

I wish I could offer technical expertise and an alternative design for the transmission line. But I can't. No one at the hearings other than the applicant has that capability. But since the applicant has such a huge financial vested interest in the Greater Springfield Reliability and NEEWS projects, we ask that the CSC do what it did in the docket 272 hearings and retain the services of an independent consulting firm such as KEMA to see if there is not a better, safer and cheaper way to arrive at the reliability goals and power transfer outcomes NU and ISO-NE say we need to achieve.

What I see going on right now is that without an independent engineering assessment, the CSC is as a country person would say, "Is letting the foxes count your chickens."[5]

Q. Do you feel that CL&P acknowledges that there are risks from EMF exposure?

A. No, I do not. I base that opinion on the statements made by the applicant in its testimony. CL&P also responded in writing to a different CAOPLC interrogatory on EMF's by stating that, "*CL&P's representatives verbally stated at the referenced (town) meetings that no public health risk of transmission line EMF exposure has been established after several decades of research on this topic.*"[6]

Here is a statement from the report of the **British Children with Leukaemia Foundation**, a charity founded by Princess Diana:

Electric and magnetic fields (EMF) are created by the presence of electricity. They surround us in modern life and are produced in varying degrees and strengths by all elements of the electricity supply system – from high voltage power lines to the electrical appliances in our homes. EMF have come under scrutiny as a possible source of harm

[4] CL&P response Q-CAOPLC-004 6/30/09

[5] I have raised chickens, so perhaps Mr. Fitzgerald will not object and say that I lack the expert qualifications to make this comment. For the record: Araucana, Barred Rocks, Wyandotte and Rhode Island Reds.

[6] CL&P response Q-CAOPLC-01 6/30/09

and have been blamed for a wide range of adverse health effects. A great deal of research has been carried out investigating these possible effects, with mixed results. Perhaps the largest body of evidence relates to childhood leukaemia where there is now the strongest evidence of a link.

And the report goes on to conclude and the highlighting is the Children with Leukaemia Foundation's report's highlighting and not CAOPLC's highlighting:

Do electric and magnetic fields cause childhood leukaemia?

Following our review of the evidence, we have to say we don't know - yet. We believe that there is good epidemiological evidence for a doubling of risk of childhood leukaemia in children exposed to EMF above a certain level (0.4 μT). To progress from this to a proof that EMF are a cause of childhood leukaemia is a big jump and, at this stage, not clearly supported by the biological evidence although we have perhaps moved on from 'implausible' to 'plausible'. More research work needs to be done and this report ends with some recommendations for future studies.

Here is the key point that we think is not yet at the forefront of EMF discussion with regard to the GSRP: The EMF threshold referenced in the above report is 0.4 μT or 4 mG. The formula to convert microTesla to MilliGauss is to multiply microTesla by a factor of 10. [7]

The British study is concerned about "plausible" epidemiological associations at what amounts to a 4 milliGauss level. The 200 milliGauss level that CL&P says we will experience as we travel near or under the GSRP power lines is 50 times that of the threshold in this study. We have found that a large number of the scientific studies on EMF's are based on these lower single digit milliGauss levels.

We know of no study and it appears that CL&P does not know of one either from its answer to our interrogatory question shown below that has the information we want on cancer risks and cumulative time subjected to EMF exposure. CL&P responded with ***"CL&P knows of no epidemiological study of this type the question describes ever being performed or proposed."***

This was the question we asked. "Question: We want a chart or study that shows cancer and/or any other health risks vs. time exposed at 115 kV and 345 kV EMF levels. Can CL&P furnish epidemiological data such as this? Given all of the data presented by CL&P in CSC docket 272, did CL&P or its expert witnesses present this type of information? Can and will CL&P present this data at the docket 370a evidentiary hearings, why or why not?"

And CAOPLC offered this example as a way to explain our concern about Annual Average Load calculations and ask questions to highlight why we think AAL is a very misleading metric and why CL&P is using it:

"Here is an explanation of why metrics like the AAL are not meaningful especially to a layperson concerned about his or her EMF exposures and cancer risk: Suppose I had a Ferrari. If my average speed for a six hour European trip was 55 mph that sounds very responsible and safe.

[7] This formula was offered by CL&P in response to CAOPLC interrogatory question Q-CAOPLC-002.

But what if I then told you that I derived that average speed by travelling 523 back roads at 37 mph for most of the trip with a couple of bursts to 170 mph on the German Autobahn?

The average speed is not problematic or dangerous, the maximum speed is. An average EMF (reading) without quantifying the low and high boundary numbers is very misleading and of little or no value."

CL&P response was: *"The analogy between the speed of a vehicle to the current flow on a transmission line is flawed. While there is a clear relationship between increased (sic) in the speed of a vehicle and the increase in the risk of harm, such is not the case with respect to EMF exposures."*

Q. So how would you respond to CL&P's answer to your question?

A. With all due respect, CL&P's answer is wrong because it missed the point of the question. We were asking through our "Ferrari" example about the dose/response curve, not the flow of current through the power line. We were asking about not the average dosage but the maximum dosage of EMFs. And CL&P's statement in its answer to Q-CAOPLC-10 of *"National and international agencies have not determined that magnetic fields associated with electric transmission lines pose any risk, nor have they determined that increasing levels of exposure result in increased risk"* is directly contradicted by the BioInitiative Report, the British Leukaemia study just cited in this testimony and many other scientific papers that believe that 3 to 4 mG may be a possible upper limit of safe exposure. The Connecticut Department of Public Health in its EMF fact sheet says, "However, some studies have shown an association between household EMF exposure and a small increased risk of childhood leukemia at average exposures above 3 mG."

We were asking for CL&P's response using one of the most basic principles of toxicology and pharmacology: that different concentrations of any substance will produce different effects. And since most EMF studies and concerns are at the single digit milliGauss level and our potential EMF exposure will be in the 200 milliGauss and above range, it is certainly a subject worth exploring.

Here is some further information on the dose/response relationship and it is footnoted on its sources:
Dose/Response curve

A **dose-response curve** is a simple X-Y graph relating the magnitude of a stressor (e.g. concentration of a pollutant, amount of a drug, temperature, intensity of radiation) to the response of the receptor (e.g.

organism under study). The response may be a physiological 559 or biochemical response, or even death (mortality). A number of other effects (or endpoints) can be studied.

The measured dose (usually in milligrams, micrograms, or grams per kilogram of body-weight) is generally plotted on the X axis and the response is plotted on the Y axis. Commonly, it is the logarithm of the dose that is plotted on the X axis, and in such cases the curve is typically sigmoidal, with the steepest portion in the middle.

The first point along the graph where a response above zero is reached is usually referred to as a [redacted]. For most beneficial or recreational drugs, the desired effects are found at doses slightly greater than the threshold dose. At higher doses, undesired side effects appear and grow stronger as the dose increases. The stronger a particular substance is, the steeper this curve will be. In quantitative situations, the Y-axis usually is designated by percentages, which refer to the percentage of users registering a standard response (which may be death, as in LD50). Such a curve is referred to as a quantal dose response curve, distinguishing it from a graded dose response curve, where response is continuous.[8]

PROBLEMS WITH THE LINEAR DOSE/RESPONSE MODEL

Problems exist regarding non-linear relationships between dose and response, thresholds reached and 'all-or-nothing' responses. These inconsistencies can challenge the validity of judging causality solely by the strength or presence of a dose-response relationship. A threshold model or linear no-threshold model may be more appropriate, depending on the circumstances.

Endocrine disruptors have also been cited with producing one effect at high dose and a different effect at low doses.

BASIC TOXICOLOGY PRINCIPLES[9]

The science of toxicology is based on the principle that there is a relationship between a toxic reaction (the response) and the amount of poison received (the dose). An important assumption in this relationship is that there is almost always a dose below which no response occurs or can be measured. A second assumption is that once a maximum response is reached any further increases in the dose will not result in any increased effect.

One particular instance in which this dose-response relationship does not hold true is in regard to true allergic reactions. Allergic reactions are special kinds of changes in the immune system; they are not really toxic responses. The difference between allergies and toxic reactions is that a toxic effect is directly the result of the toxic chemical acting on cells. Allergic responses are the result of a chemical stimulating the body to release natural chemicals which are in turn directly responsible for the effects seen. Thus, in an allergic reaction, the chemical acts merely as a trigger, not as the bullet.

For all other types of toxicity, knowing the dose-response relationship is a necessary part of understanding the cause and effect relationship between chemical exposure and illness. As Paracelsus once wrote, "The right dose differentiates a poison from a remedy." Keep in mind that the toxicity of a chemical is an inherent quality of the chemical and cannot be changed without changing the chemical to another form. **The toxic effects on an organism are related to the amount of exposure.**

[8] Material is from Wikipedia.

[9] Material is excerpted from http://pmep.cce.cornell.edu/profiles/extoxnet/TIB/dose-response.html

MEASURES OF EXPOSURE

Exposure to poisons can be intentional or unintentional. The effects of exposure to poisons vary with the amount of exposure, which is another way of saying "the dose." Usually when we think of dose, we think in terms of taking one vitamin capsule a day or two aspirin every four hours, or something like that. Contamination of food or water with chemicals can also provide doses of chemicals each time we eat or drink. Some commonly used measures for expressing levels of contaminants are listed in table 1. These measures tell us how much of the chemical is in food, water or air. The amount we eat, drink, or breathe determines the actual dose we receive.

Concentrations of chemicals in the environment are most commonly expressed as ppm and ppb. Government tolerance limits for various poisons usually use these abbreviations. Remember that these are extremely small quantities. For example, if you put one teaspoon of salt in two gallons of water the resulting salt concentration would be approximately 1,000 ppm and it would not even taste salty!

Table 1. Measurements for Expressing Levels of Contaminants in Food and Water.

Dose	Abbrev.	Metric equivalent	Abbrev.	Approx. amt. in water
parts per million	ppm	milligrams per kilogram	mg/kg	1 teaspoon per 1,000 gallons
parts per billion	ppb	micrograms per kilogram	ug/kg	1 teaspoon per 1,000,000 gallons

DOSE-EFFECT RELATIONSHIPS

The dose of a poison is going to determine the degree of effect it produces. The following example illustrates this principle. Suppose ten goldfish are in a ten-gallon tank and we add one ounce of 100-proof whiskey to the water every five minutes until all the fish get drunk and swim upside down. Probably none would swim upside down after the first two or three shots. After four or five, a very sensitive fish might. After six or eight shots another one or two might. With a dose of ten shots, five of the ten fish might be swimming upside down. After fifteen shots, there might be only one fish swimming properly and it too would turn over after seventeen or eighteen shots.

The effect measured in this example is swimming upside down. Individual sensitivity to alcohol varies, as does individual sensitivity to other poisons. There is a dose level at which none of the fish swim upside down (no observed effect). There is also a dose level at which all of the fish swim upside down. The dose level at which 50 percent of the fish have turned over is known as the ED50, which means effective dose for 50 percent of the fish tested. The ED50 of any poison varies depending on the effect measured. In general, the less severe the effect measured, the lower the ED50 for that particular effect. Obviously poisons are not tested in humans in such a fashion. Instead, animals are used to predict the toxicity that may occur in humans.

One of the more commonly used measures of toxicity is the LD50. The LD50 (the lethal dose for 50 percent of the animals tested) of a poison is usually expressed in milligrams of chemical per kilogram of body weight (mg/kg). A chemical with a small LD50 (like 5 mg/kg) is very highly toxic. A chemical with a large LD50 (1,000 to 5,000 mg/kg) is practically non-toxic. The LD50 says nothing about non-lethal toxic effects though. A chemical may have a large LD50, but may produce illness at very small exposure levels. It is incorrect to say that chemicals with small LD50s are more dangerous than chemicals with large LD50s, they are simply more toxic. The danger, or risk of adverse effect of chemicals, is mostly determined by how they are used, not by the inherent toxicity of the chemical itself.

The LD50s of different poisons may be easily compared; however, it is always necessary to know which species was used for the tests and how the poison was administered (the route of exposure), since the LD50 of a poison may vary considerably based on the species of animal and the way exposure occurs. Some poisons may be extremely toxic if swallowed (oral exposure) and not very toxic at all if splashed on the skin (dermal exposure). If the oral LD50 of a poison were 10 mg/kg, 50 percent of the animals who swallowed 10 mg/kg would be expected to die and 50 percent to live. The LD50 is determined mathematically, and in actual tests using the LD50, it would be unusual to get an exact 50% response. One test might produce 30% mortality and another might produce 70% mortality. Averaged out over many tests, the numbers would approach 50%, if the original LD50 determination was valid.

The potency of a poison is a measure of its strength compared to other poisons. The more potent the poison, the less it takes to kill; the less potent the poison, the more it takes to kill. The potencies of poisons are often compared using signal words or categories as shown in the example in table 2.

The designation toxic dose (TD) is used to indicate the dose (exposure) that will produce signs of toxicity in a certain percentage of animals. The TD50 is the toxic dose for 50 percent of the animals tested. The larger the TD the more poison it takes to produce signs of toxicity. The toxic dose does not give any information about the lethal dose because toxic effects (for example, nausea and vomiting) may not be directly related to the way that the chemical causes death. The toxicity of a chemical is an inherent property of the chemical itself. It is also true that chemicals can cause different types of toxic effects, at different dose levels, depending on the animal species tested. For this reason, when using the toxic dose designation it is useful to precisely define the type of toxicity measured, the animal species tested, and the dose and route of administration.

Returning to CAOPLC's analogy of the 170 mph Ferrari after this brief explanation of toxicology, it seems evident that despite CL&P's answer that both time weighted exposure and maximum dosage levels are both critical to understanding the possible harmful and lethal effects of EMF radiation.

And yet it is still difficult to isolate out and remove any micro and macro environmental effects from an analysis of EMF's. Returning to the Children with Leukaemia Foundation study, on page 8 there is a table of other positive causative factors in childhood leukemia such as exposures to pesticides and herbicides (CL&P does apply herbicides to maintain the ROW), to having smokers as parents, diet and possible genetic mutations.

GENE MUTATIONS AND CHILDHOOD LEUKEMIA RISK

And there is this recent discovery reported in a British newspaper, The Daily Mail, which we have attached as Exhibit One. The article reports gene mutation in some children quadruples the risk of childhood leukemia and bone marrow cancers for children who live within 333 feet of a high voltage power line. The research showed that one in 20 children have this gene mutation. This offers a possible explanation as to why various animal studies cited in EMF scientific literature have shown no or minimal response to EMF radiation. The researchers did not at the time make the connection that a gene mutation could be why rats showed no effects in the confines of their studies.

that a

Q. What is the purpose of introducing material on Toxicogenomics?

A. The purpose of introducing material on Toxicogenomics is to show that first of all, there is a new scientific method that shows promise. And the CSC is required to update its EMF standards so hopefully this is useful information.

Because there are so many variables at work in assessing cause and effect and in trying to isolate environmental and risk factors in a person who is going about their daily activities from only EMF risk factors, Toxicogenomics may have promise in providing an analytic protocol to assess the effects of EMFs in a controlled and accurate and isolated experimental environment. We have provided both pro and con materials on this relatively new scientific method.

Again, at the highest level of discussion, what do we collectively do if EMFs are proven dangerous? Saying that we can't afford to tear down the lines, and we can't afford to buy large numbers of home back and thus maybe there is an acceptable level of deaths so that the greater good for society benefits by having a reliable electric grid is a much different argument to behold and digest when you may be one of the "acceptable deaths." It is especially difficult to accept when no EMF HVDC technology is being adopted at a record pace worldwide.

Here is some material for the CSC's consideration on Toxicogenomics.

Toxicogenomics

There is also another scientific advance that may help resolve the questions surrounding EMFs and power lines. It is the relatively new scientific discipline of Toxicogenomics.

Toxicogenomics is the study of the response of the genome to toxic agent exposure; it has been described as „a tool of unprecedented power" in toxicology [1].

The term „Toxicogenomics" in its broadest meaning encompasses profiling of gene expression, protein composition (proteomics) and the metabolic constituents (metabonomics) of a cell. A key toxicogenomic technique is to profile (using a DNA microarray or „gene chip") the cell-wide changes in gene expression following exposure to toxins. This approach creates the potential to provide a molecular „fingerprint" of exposure or toxicological response to specific classes of toxic substances.

Gene expression changes measured by DNA microarrays can provide a more sensitive and characteristic marker of toxicity than typical toxicological endpoints such as morphological changes, carcinogenicity and reproductive toxicity. Moreover, altered gene expression can occur immediately following exposure, whereas the clinical manifestation of toxicity might take days, months or even years to develop. Initial „proof-of-principle" experiments have successfully identified the category or toxicological mechanism of toxic chemicals on the basis of their gene expression profiles. The potential promise of this technology is enormous. For example, DNA microarrays could be used to identify or confirm the category of toxic substances to which an individual was exposed, based on gene expression profiling.

Notwithstanding the tremendous potential of gene expression profiling, many obstacles and uncertainties remain to be resolved before toxicogenomic data should be used outside the research context for practical, regulatory or legal applications. The toxicological significance of gene expression changes must be validated, including an evaluation of the robustness of microarray results

between or across different laboratories, species, individuals, tissues 740 and time periods [4]. For example, it will be important to understand the time course of gene expression changes following toxic exposures because some alterations might be transient and others might lead to permanent changes.[10]

Like all new technologies, Toxicogenomics has its advocates who see great promise and its critics who while recognizing the promise of Toxicogenomics have questions relating to its role in policy making decisions in environmental law and possible concerns of its ability to accurately isolate cause and effect relations in heterogeneous populations.[11]

And NU/CL&P's stance, offered to us in our "community outreach meetings" is that CL&P believes there is no adverse effect from EMF radiation but if there were adverse effects that CL&P has no legal responsibility and are insulated from wrongful death claims from EMF's because CL&P "follows the standards and practice of current power line construction techniques." This clearly is not a model of corporate responsibility or good citizenship. And it clearly seems to fly in the face of recent research.

Speaking as a credentialed risk management professional, overhead AC transmission lines while they may arguably be initially less expensive to construct than underground AC lines, especially from the perspective of CL&P's cash flow and quarterly profits, are a false and very risky economy. It is a Pennywise and Pound foolish choice given the potential for lethal exposure and the high costs of remediation and litigation that could come from overhead AC power lines' EMF radiation.

CL&P's insistence on HVAC technology and high voltage overhead lines asks us to trade our health and safety against the visual pollution of 10 to 13 story high power towers. That is an easy choice. Our health and our children's' health and safety is much more important. If high towers reduce EMF fields and given the amount of time residents and children spend in the ROW, the higher the towers the better if that is our only choice to reduce our EMF exposure. We note that in the Durham area the 345 kV towers are up to 180 feet tall to produce the reductions in EMFs deemed necessary.

Is there a safe and more environmentally responsible way to construct the transmission lines to meet CL&P's stated need for reliable electricity but without all of the possible health, safety and visual impacts of rows of large overhead towers? CAOLPC believes there is: HVDC power lines.

Q. What is the purpose and relevance of the following testimony on HVDC technology?

A. It is offered, not as expert testimony because I have said that I am not an engineer, but as informational materials to show that there are alternatives to HVAC transmission technology. HVDC is a no-EMF technology. Since most of the reliability issues that the Greater Springfield Reliability Project is seeking to remediate are thermal problems, when I look at the proposed use of HVAC technology that by the very nature of having three phased alternating current flows that produce heat and EMFs as a by-product of the cycling of the electrical phases I am at a loss to understand why this is the preferred

[10] Toxicogenomics and toxic torts, Gary E. Marchant, Web: http://www.law.asu.edu/files/Programs/Sci-Tech/Commentaries/trends.marchant.pdf

[11] The False Promise Of The Genomics Revolution For Environmental Law, *David E. Adelman** http://www.law.harvard.edu/students/orgs/elr/vol29_1/adelman.pdf

technology solution. I am also at a loss to see, other than a lot of 781 work has been done already to understand why the project cannot be redesigned to take advantage of a solution that may move everyone much closer to a win-win outcome and a very prudent investment and deployment of nfrastructure capital that may have a longer useful life span than HVAC.

Here is background information on HVDC for the CSC's consideration. We only ask that it be read and considered by the CSC. If it is not useful we trust that the CSC, rather than the attorneys representing their clients those individuals and companies who have enormous financial vested interests, would be the best arbiter of the materials and their applicability.

HVDC TECHNOLOGY – BACKGROUND INFORMATION, TECHNICAL APPLICATIONS AND COSTS

The text below is excerpted from: Connecticut Siting Council -- Investigation into the Life Cycle Costs of Electric Transmission Lines, 2007. (Underlining is for emphasis and to note CAOPLC's discussion points.)

" 5.3.2 HVDC Typical Costs

High voltage direct current transmission systems involve the conversion of alternating current power to direct current for the purpose of transmitting the power over long distances, typically hundreds of miles. Shorter applications are also feasible depending upon the specific requirements. A recent example in the Connecticut is the Cross Sound cable, a 40 km, 330 MW, ±150 kV HVDC cable connecting Connecticut with Long Island, New York. The (Cross Sound) cable connects the 345 kV transmission system at New Haven to the 138 kV system at Shoreham Generating Station on Long Island.

HVDC is used for special purposes such as, connecting AC systems of different system strengths or frequencies, and for connecting remote hydro or wind power interconnections to the grid. HVDC has the following characteristic benefits:

- Controllable – power injected where needed
- Higher power over the same right of way, thus fewer lines
- Bypassing congested circuits – no inadvertent flow
- Reactive power demand limited to terminals
- Less losses over long distances

Each potential application of HVDC must be evaluated in comparison to an AC circuit to meet the same need. HVAC and HVDC are not equal technical alternatives. **For overhead applications, long distance, point-to-point power transfers are an application where HVDC may be the only reasonable alternative. For underground or submarine applications the high capacitance and the resulting costs, create the possibility for HVDC to be cost competitive and operationally preferred to an AC circuit. The Cross Sound cable is an example.** The high cost of terminal converter stations required for HVDC often offset any potential savings compared to an AC line.

Only long distance applications tend to overcome this cost addition. Distances required to reach a break even comparison between AC and HVDC vary widely with underground and overhead applications, but

generally underground (or submarine) distances of 30 miles are required while the overhead distance required for feasibility may be ten times as much12824 . (See footnote 10)

HVDC must also be considered in the context of being a component of a larger AC system. The compatibility of the systems, the locations and land requirements for converter stations, future load growth, long term maintenance costs and many other considerations must be taken into account when considering an HVDC application. These are all critical elements of a life-cycle cost analysis that compares HVDC and HVAC for each specific situation. Some examples of installed cost of two terminal HVDC systems are shown in Table 5-4. (This includes the terminals only, not the line itself.)

Table 5-4 HVDC Typical Costs

2 Terminal HVDC Typical Costs
Transmission System Capacity Installed Cost (millions of dollars)

200 MW $40 - $50 500 MW $75 - $100
1000 MW $120 - $170 2000 MW $200 - $300

The potential use of HVDC transmission as an alternative to the proposed Middletown to Norwalk HVAC transmission project was studied and debated in detail during the Docket 272 proceedings in 2004.

The end result was that HVDC lines were rejected as a viable alternative for the proposed AC line. The reasons for rejecting HVDC were:

1. The risk of introducing harmonics into the system associated with ***classical HVDC solutions.***[13]

2. Increased complexity in the control and operation of HVDC systems due to the scheduling of power.[14]

[12] If instead of looking at the GSRP as having a stand-alone Connecticut component and having a stand-alone Massachusetts component, since it is all NU subsidiary companies constructing the project it should be viewed as a single project. CL&P will not consider HVDC for the CT portion because it is only a few miles and thus not cost effective. Changing a CL&P hat to a WMECO hat when the GSRP crosses the Suffield-Agawam border, should not be allowed to disadvantage the economics or consideration of HVDC technology, especially when weighed against all of the health, social, economic benefits and the preservation of the Metacomet trail's scenic beauty that using underground HVDC cables would bring.
Additionally, the NEEWS CCRP project directly connects to the GSRP. IF GSRP and CCRP are connected it is one, long 50 mile power line running from Ludlow, MA to the Watertown, CT area. It should be treated as such especially if favorable engineering solutions are being overlooked because of CL&P's arbitrary parsing of the power transmission project into arbitrary components. The same holds true for the NEEWS Intestate Reliability and RIRP projects. When considered together the NEEWS projects are roughly 150 miles of transmission lines at a projected cost of $2.4 billion.

[13] CAOPLC *Emphasis added.* See Addendum Materials, page 35 of docket 370 ABB HVDC engineering document which was commissioned by CL&P. ABB has solution for harmonics.

[14] See Addendum Materials.

The likelihood that an HVDC solution may preclude any additional 852 generation from ever being installed between Beseck and Norwalk due to the additional costs of 100 to 150 million dollars for each generator connection and the difficulty in recovering these high costs". (Tr. 7/29/04, p. 139). 15 854

In this case, the additional costs for each generator connection are those associated with building an additional HVDC terminal. Many other aspects of embedding an HVDC line were also discussed during the Docket 272 hearings.

These and the above-mentioned factors make it unlikely that either an overhead or underground HVDC line will be installed within the State of Connecticut as a direct alternative to an HVAC line. Therefore, the life cycle costs of such lines are not addressed in this report."

NOTES AND COMMENTARY ON HVDC TECHNOLOGY AND THE CSC'S REPORT AND FINDINGS.

- It appears from the highlighted text that the CSC only examined the "HVDC Classic" technology in its commentary.

- There are two well established types of HVDC technology, (1) "HVDC Classic" and (2) "HVDC Light".

- We believe the CSC's conclusion that "it unlikely that either an overhead or underground HVDC line will be installed within the State of Connecticut as a direct alternative to an HVAC line" is now incorrect and potentially prejudicial to docket 370 unless it is reexamined and updated to address the HVDC Light technology.

- ***It appears that the way transmission technology and design is developing is to move towards national super grids especially when renewable energy generation is included. A super grid would separate transmission power line functions from distribution line functions. The transmission lines would most likely be HVDC technology. Distribution lines would be lower capacity HVAC power lines.***

- ***CAOPLC asks the CT siting council to investigate if this separation of transmission power lines from distribution lines would be a workable model for GSRP and NEEWS and the New England regional grid given the billions of investment anticipated and proposed for these projects? Would this provide even greater reliability benefits? Would this be a better long term solution?***

This below excerpted material is from the web site of the Swiss electronics giant, ABB, who developed the HVDC Light technology. Much the same information can also be found on the web site of Siemens, ABB's German counterpart. Any search of HVDC installations will find that the vast majority of the world has embraced the technology and that there are numerous successful installations of HVDC Classic and Light technology.

[15] Also *see* Addendum. ABB offered a solution for installing new generation facilities.

HVDC Light[15]

"HVDC Light is the most interesting power transmission system developed for several decades"

HVDC Light® s a state-of-the-art power system designed to transmit power underground and under water, also over long distances. It offers numerous environmental benefits, including "invisible" power lines, neutral electromagnetic fields, oil-free cables and compact converter stations.

HVDC Light® increases the reliability of power grids, and the technology extends the economical power range of HVDC transmission down to just a few tens of Megawatts (MW). In the upper range, the technology now reaches 1,200 MW and ±320 kV.

It is quick to install and provides an alternative to conventional AC transmission systems and local generation. Possible applications include:

- Connecting wind farms to power grids
- Underground power links
- Providing shore power supplies to islands and offshore oil & gas platforms
- Connecting asynchronous grids
- City centre in-feed

Utilities are under extreme pressure to meet consumer and regulatory demands for a high quality, competitively priced power supply that has low environmental impact. The expansion of AC transmission capacity is often limited by local planning regulations and the concerns of local residents who object to the installation of new overhead lines.

It is now economically feasible to expand transmission capacity using underground HVDC cables. This approach not only minimizes environmental impact, it also improves the quality of the power supply.

HVDC Light® was introduced in 1997. A number of underground transmissions up to 350 MW are in commercial operation and more are being built.

APPLICATIONS OF HVDC Light

HVDC Light is an alternative to conventional AC transmission or local generation in many situations.

HVDC Light® has important advantages, such as underground cables instead of overhead lines, short delivery times, **compact stations**, controllability of power and voltages, possibility for multi-terminal operation, etc.

The fact that it is possible to build a long electric power transmission line underground and avoid public opposition and long uncertain approval processes, makes the HVDC Light system very attractive.

[15] Source: http://www.abb.com/industries/us/9AAC30300094.aspx

From only this brief introduction, it appears clear that we would be remiss especially considering CL&P's proposed investment of $700 million dollars in the GSRP and $2.4 billion in NEEWS to not fully and ndependently investigate this technology.

One of CAOPLC's key goals to have the CSC approve retaining an independent engineering firm such as KEMA and also obtain independent studies from ABB and Siemens to study and determine:

(1) if it would be technically feasible, cost effective and appropriate to use HVDC Light technology in CL&P's existing design for the GSRP and other NEEWS projects,

(2) if number 1 is not technically feasible, or cost effective, could similar reliability objectives be achieved with a different design that does use HVDC Light technology and,

(3) if so, prepare a comparative study of HDVC Light underground cable vs. 345 kV HVAC underground cable and345 kV HVAC overhead cables for the entire group NEEWS projects.

OTHER COMPELLING AND IMPORTANT HVDC DOCUMENTS FOR THE CSC TO REVIEW:[17]

(1) This is a PowerPoint presentation given by Jeffrey A. Donahue, President and CEO of a HydroQuebec subsidiary company, TransEnergieUS, at the FERC Technical Conference, Hartford, Connecticut, October 13, 2004 on HVDC. It includes a number of photographs on how simply HVDC cable is installed using Australia's Murraylink project as an example.

This presentation is one of the best overviews of HVDC that we have found:

http://www.ferc.gov/eventcalendar/Files/20041026155240-Donahue,%20Trans%C3%A9nergy.pdf

(2) This next document is ABB's engineering proposal for Docket 272 Middletown to Norwalk that confirmed the HVDC Light met every technical consideration set forth by NU's engineering staff and ISO-NE, that there are a number of successful worldwide installations (page 40) and that the proposed construction and installation costs (page 39) are comparable to CL&P's HVAC overhead/underground solution that was constructed for the Middletown to Norwalk segment:

http://www.ct.gov/csc/lib/csc/docket_272/nh1-493072-v1-abb_technical_description.pdf

(3) This reference is for ABB's technical study for docket 272 Middletown to Norwalk that confirmed the HVDC Light met every technical consideration set forth by NU's engineering staff and ISO-NE.

http://www.ct.gov/csc/lib/csc/docket_272/nh1-493071-v1-abb_underground_hvdc_feasibility_study_report.pdf

(4) And the last reference paper we would ask that the CSC and MA EFSB review, is a brief but very well done summary of the benefits of HVDC and its applications from Prof. L. A. Koshcheev, St-Petersburg, High Voltage Direct Current Power Transmission Research Institute. This paper was prepared for the Third Workshop on Power Grid Interconnection in Northeast Asia, Vladivostok, Russia, September 30 - October 3, 2003.

[17] If you are reading this as an electronic MS Word document, you should be able to right click your mouse and "Open Hyperlink" to view these documents.

The Koshcheev paper is written in mostly layperson's terms and addresses HVAC health issues and on pages 7 and 8 discussed land use costs and how HVDC improves the economics of siting power lines in right of ways. Visual impacts are addressed on page 8. As an editorial comment, it is surprising to CAOPLC that the Russian government and its sponsored HVDC research agency are much more progressive and ecologically oriented than is NU and CL&P in its stance towards the benefits of Implementing HVDC technology over that of HVAC technology:

http://www.nautilus.org/archives/energy/grid/2003Workshop/Koshcheev_paper_final1.pdf

In CAOPLC's research efforts, we have found that there is a growing consensus of opinion that HDVC will become a more dominant technology and that HVAC, while the preferred solution for the past century, will go the way of the buggy whip for the backbone of our national power grid. One startling fact is that solely in the generation and transmission of electric power, the USA loses enough electricity to power all of Japan.[18]

HVDC AND RENEWABLE ENERGY[19]

Although there is a great deal of discussion about the need to harness renewable energy to help in both replacing the carbon-based fuel sources currently used in power generation and to lessen our dependence on foreign oil, there has been less discussion regarding the need to build a new Infrastructure to convey that power. HVDC is the superior technology for renewable energy transmission.

The current electrical infrastructure is designed to move power from coal-fired power plants, natural gas fired generators (and a few nuclear plants) to large cities. The possible size of new solar and wind energy farms in California, the southwest and upper Midwest and wind farms throughout the New England coast easily swamps the ability of existing transmission lines to carry that power. By some estimates the amount of power that needs to be moved from anticipated solar and wind farms exceeds the existing infrastructure by a factor of four on any given route. This means that it will be necessary for some entity to undertake what could easily be described as the biggest regional infrastructure project since the Interstate highway system.

There are only two ways to convey this new source of renewable energy and they are the same two methods debated by Thomas Edison and Nicolai Tesla in the 1800s: direct current (Edison's choice) and alternating current (Tesla's choice). Although Tesla won the argument and alternating current became the predominant means by which utilities move electricity in the United States, High Voltage Direct Current ("HVDC") lines offer several advantages over AC for the transmission of wind energy over long distances.

1. For long-distance distribution of electrical power, HVDC systems can be more efficient. As electricity is transmitted via an alternating current line, because of the constant cycling of the three phase power part of the transmitted energy transforms into heat and is wasted. HVDC systems suffer significantly lower thermal losses than the commonly used alternative current systems.

[18] Michael Grunwald, Time Magazine, January 12, 2009 on Energy Efficiency and Conservation.

[19] This material was excerpted and edited from various sources found on the Internet.

2. HVDC can carry much more power per conductor. This can be a substantial advantage when using a narrow right of way for a utility easement, as more power can be carried on each line. This also decreases the need for a wider tower array to carry the power.

3. HVDC lines can be placed closer together as they are not as susceptible to electrical harmonic interference. This is another feature of HVDC that works well with a narrower right of way.

4. Narrow right of way. The large AC projects currently in development may need in excess of 250 feet in width in order to build the large towers needed to support HVAC. Existing laws may not support that extra width. By utilizing HVDC, it may be possible to avoid the larger footprint needed for the tower structures. Instead of H-frame towers, HVDC can use single large steel pole structures or be installed for much longer underground distances than HVAC.

There are a few disadvantages of HVDC systems that have been documented:

1. High cost of conversion. The main disadvantage of HVDC is the high cost of converting DC to AC. Therefore, it is anticipated that a HVDC utility line will have a limited number of converter stations, perhaps as few as two, one on each end of the line. For the transmission of renewable energy, this may not be a major disadvantage as the market for electrical power tends to be in areas that do not generate significant amounts of renewable energy.

2. Lack of existing knowledge, experience and infrastructure and resistance to adoption by utilities and RTOs. Long-distance HVDC systems have not been widely used in the Americas.

However, a number of companies have announced intentions to use HVDC for electrical transmission lines, including the Titan project, which is a joint venture between Clipper Windpower and BP Alternative Energy for the transmission of wind energy from South Dakota to Chicago and several Siemens is currently constructing a 5,000 megawatt (at 800 kilovolts) line in the Guangdong province in southern China. HVDC is widely used in Europe in undersea cables and is used by utilities to balance loads from disparate AC systems.

In New England, there is the 450 kV DC facility terminating at Sandy Pond. National Grid USA operates the New England portion of two interconnections know as Phase 1 and Phase 2, between New England and Canada. Sandy Pond is a + 450 kV DC 2000 MW bipolar converter terminal located in Ayer, MA.

HVDC CONNECTION BETWEEN JAMES BAY, CANADA AND AYER (SANDY POND), MASSACHUSETTS.

[PICTURE HERE]

As renewable energy legislative mandates for ever increasing amounts of renewable energy come into play, for example in Connecticut there is a mandate to have at least 20% of the electricity to come from renewable sources, there will be a growing demand for renewable energy power. If that milestone is not achieved there is a penalty, an Alternative Compliance Payment, that goes to the CT Clean Energy Fund. The fund will then invest the money into renewable projects.

Both of Connecticut's utilities, UI and CL&P have produced studies that predict the renewable energy penalties could reach $200 million by 2011 and $320 by 2020. The costs are incorporated into the rates consumers pay for electricity. The CT Clean Energy Fund paints a rosier picture saying that there are enough renewable energy projects to meet the regional demand.[20]

No matter which prediction plays out, CAOPLC believes there is a compelling need to investigate the use of HVDC technology. It provides the far greater environmental benefit. It will most likely be a technology with a more productive and longer life cycle. It is less susceptible to outage from wind, ice and weather related causes. Studies in North Carolina showed an outage rate of 50% less. Studies conducted by the Australian government showed a outage rate of 80% less than HVAC overhead lines.[21]

[20] Hartford Advocate September 11, 2008

[21] FERC Technical Conference, Hartford, Connecticut, October 13, 2004, Jeffrey A. Donahue, Hydro Quebec

If we are building GSRP and NEEWS as reliability projects, why would we choose to use the less reliable HVAC overhead technology over the more reliable HVDC? That benefit should at least be required to be modeled and entered into the testimony and record for the GSRP and NEEWS.

HVDC is easier and quicker to install with simple cut and cover trenches. It required only plastic splices and not the huge concrete splice vaults of HVAC. HVDC does not have the technical limitations of HVAC underground lines.

And when right of way costs and land acquisitions are considered, HVDC is a clear winner. On the Newgate right of way, CL&P has said that only one more HVAC line can be installed in the 305 foot right of way before more land is needed and presumably taken from residents by Eminent Domain. In the narrow GSRP Massachusetts right of way, the situation is even more problematic. HVDC solves that concern.

As we mentioned in previous testimony, CL&P has a fiduciary duty to its institutional shareholders. That may be why this was written in the CSC summary report by the CT Woodland Coalition to its members on how CL&P responded to a two engineering studies from ABB, the company that invented HVDC Light technology, on its finding that the Middletown to Norwalk project could be constructed underground:

Wednesday, December 15, 2004 [22]
Evidentiary Hearings (emphasis underlining and bolding is by CAOPLC)

Today opened with brief statements by four chief elected officials from municipalities along the Phase Two line. All felt that the Siting Council should take more time and be allotted more funds to evaluate undergrounding more thoroughly, per the state legislation in favor of undergrounding. (CT 04-246)

The major testimony of the day concerned the ABB Report. It offers a high-voltage direct current (HVDC) alternative to the proposed Phase Two, which transmits high-voltage alternating current (HVAC). Witnesses elaborated on the three options presented in the ABB Report, all of which involve undergrounding most of the way from Norwalk to Middletown. According to ABB, the HVDC approach solves the reliability problems ISO-NE has found in the proposed Phase Two.

1. **ABB. During early Siting Council hearings, it became evident that HVDC could be put underground reliably for longer distances than HVAC, and the Siting Council directed NU to follow up on this possibility: NU then hired ABB.** As a worldwide company that is a leader in HVDC technology, ABB did feasibility studies to see if HVDC underground could meet the Applicant's specifications for Phase Two.

2. The ABB Report. HVDC transmission is a fundamentally different type of electrical system than HVAC. It offers few problems with undergrounding; instead, the main problem ABB needed to analyze was the feasibility of embedding a SWCT HVDC line in a system that is otherwise HVAC. They came up with three feasible options, all involving different combinations of new converter stations and other equipment to manage the integration. **One feature of their study was that it covered only Norwalk to Beseck (a substation in Wallingford), and not the entire length of the line from Norwalk to Middletown. This was per order of the Applicants. (CL&P)**

[22] http://woodlandscoalition.com/HearingUpdates.htm#_ftn1

3. Discussion of the ABB Report. Much of the cross examination by the Applicant's and ISO of ABB was contentious, the cross serving to challenge the very company hired by the Applicants. ABB was questioned closely about reliability in regards to a DC segment in the middle of an AC line. Questions were raised about expandability, what happens when there is new generation23, for example. PSE&G, a generating company, also participated in the cross of ABB, also not in a supportive questioning. The attorneys representing the municipalities pressed, in their cross, ABB to know if an HVDC line could be extended the whole length of the proposed route from Norwalk to Middletown, and ABB was unable to give them that assurance, stating they hadn't been contracted to study the whole route24. The cost of an HVDC alternative is clearly an issue, as new converter stations would have to be built from the ground up at certain points, to replace conventional sub-stations, but since ABB had not been contracted to examine costs in any detail, cost comparisons were not a major focus of discussion.

4. Next steps. At present, the Reliability and Operability Committee (ROC), a group of engineers from the Applicants and ISO-NE, are doing tests, running studies and evaluating all of the major alternatives so far suggested to original Phase Two proposal. The ROC report is due on or about December 20. It's unclear what the ROC report will suggest, or whether its suggestions will focus on an HVDC alternative. Many good questions, yet to be answered, were put on the table regarding the use of DC in this project.

CL&P is not impartial and not without its vested interests. CL&P cannot be relied upon because of its fiduciary duties to shareholders to produce fair and impartial engineering studies for a technology that for whatever reason CL&P chooses not to embrace.

Therefore, CAOPLC asks that the CSC and/or MA EFSB should the two councils wish to act jointly and share expenses to retain an independent engineering firm to such as KEMA to study the feasibility of using HVDC Light or HVDC technology for the GSRP and other NEEWS projects. And that the consulting firm, rather than CL&P, should direct the scope of inquires made to manufactures such as ABB and Siemens for informational requests and engineering studies and proposals.

Q. What other issues do you want to bring to the CSC's attention?

A. I am providing commentary below on the visual impacts of the towers along the scenic and now formally designated National Heritage Trail, the M-M-M Trail, know in our area as the Metacomet trail.

I am also providing commentary on the issues of diminished property values that result from the construction of power towers adjacent to residential properties.

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23 Ironically, CL&P is now quite vigorous in its opposition to a new CT based CCGT generation facility proposed by NRG.

24 If the proper instruction had been given to ABB by CL&P to follow the mandate of the CSC to investigate the undergrounding of the entire transmission route, CAOPLC wonders how the Middletown project would have turned out. We feel in retrospect that at a minimum, the CSC should have required ABB to investigate the feasibility of undergrounding the entire route and not proceeded until that critical information was on the record and evaluated.

VISUAL AND ENVIRONMENTAL IMPACTS OF THE GSRP

The visual impacts that cause the most concern for CAOPLC members are those of the proposed towers. Tower height is a no-win trade-off between EMF mitigation and the Visual Pollution of the overhead towers.

If one followed the principles of reductio ad absurdum, would anyone agree to run power lines along the top of Mount Rushmore or along the middle of the Washington DC mall or in the middle of the Grand Canyon? Absolutely not. It would be unthinkable to deface such national treasure as these.

The siting councils have to decide the importance of preserving a National Heritage Trail area. Does the Metacomet trail and Newgate area rise in importance to that of Mount Rushmore? No. Is it a locally and regionally historically significant and beautiful scenic and recreational area? Yes. Beyond these brief comments, lies your deliberations with regard to the importance of the Metacomet and MMM trails and their need for protection from visual pollution.

CL&P has used the Truescape simulation technology to try to show how benign the impacts of the GSRP will be. CAOPLC has a number of issues with the use of Truescape. First it was only done in a "leaves up" season. That is the equivalent in our minds to CL&P having ABB study only a portion of the underground solution and then dismissing their conclusions as incomplete. For a full and balanced view of the visual impacts on this area, a companion simulation should have been done showing the area with the leaves down.

The area has heavy deciduous trees foliage. CAOPLC will readily concede that when there are leaves on the trees, the present 70 foot tall lattice towers are for the most part adequately hidden. We are not so certain about the much higher 130 foot towers. But when there are no leaves on the trees, our panoramic view is that of power towers.

Our second issue with Truescape can be summed up by the testimony and conclusion reached Truescape's expert witness, Mr. Coggan:

> MR. LEGERE: There was -- when you're -- you're looking at the video, it's location 7, it's the intersection of Copper Hill and Newgate Road, and in the video it was where it came up to a red stop sign and you saw a 35 mile-an-hour speed limit sign, a couple of towers, the camera pulls back, and -- and where you're saying that the Truescape is representative -- video accurate of the area -- I want to ask why the opposite direction -- the views from the -- you're standing north looking south -- if you switched your viewpoint and you were south looking north, the Truescape would have shown two houses that are considered fall zone houses [25] where the tower --
>
> CHAIRMAN CARUSO: Are they --
> MR. LEGERE: -- is directly --

[25] A "Fall Zone" house is defined by HUD and FHA as a home situated so close to a power tower that if the tower were to fall, personal injury and property damage would occur. Fall Zone homes are not eligible for FHA financing, thus making them extremely difficult to market and sell without the ability to secure FHA's financing.

CHAIRMAN CARUSO: Well, I guess the question is why did you choose going in that direction rather than –

MR. LEGERE: Yes –

CHAIRMAN CARUSO: -- turning around and seeing it the other way?

MR. LEGERE: Yes.

CHAIRMAN CARUSO: Okay. Why did you choose the directions in which you showed the simulation?

MR. COGGAN: Well, it was a -- it was a collaborative decision between Truescape and Northeast Utilities. It seemed to me to be the most obvious route.

And one of the -- one of the reasons was that -- from my perspective when I first drove down there and we dropped that at the clearing on Newgate Road and we looked through, that seemed to give a decent view of the power line. Now one of the things that we always and do is get a synergy with the viewpoints and we try and go and take consistent and -- consistent in the direction that we're traveling. And bear in mind that this is a representative video rather than a drawing upon each individual house. So it's as simple as that. There was no other reason than, you know, it seemed logical for us.

MR. LEGERE: It seemed -- my -- my -- my last question would be **if the viewpoints -- if the survey points were different, Truescape would show a different view of the area?[26]** 1228 CAOPLC emphasis added.

MR. FITZGERALD: I think we can stipulate to that.

MR. COGGAN: No, because we –

MR. FITZGERALD: No, we can't –

MR. COGGAN: -- we directed where the -- where the survey points were. So we -- we actually -- they weren't known survey points that were in the ground. We had a surveyor go out there and create those points for us on the backbone of the photo point positions that we were using.

MR. LEGERE: I think maybe you didn't understand my question, and I think maybe I'm not understanding your answer. But to give it one other try, **if -- if you used entirely different survey points -- you used the term directing -- if you directed different survey points at different other points in the Newgate area, the video would potentially look different?**

MR. COGGAN: Well if we choose to simulate different areas –

MR. LEGERE: That's -- that's my –

[26] Bolding added by CAOPLC for emphasis.

MR. COGGAN: -- of course it would –

MR. LEGERE: -- that's my question.

MR. COGGAN: -- yes.

MR. LEGERE: Yes, okay. That's it for me.

I humbly admit that I do not have the cross examination skills of a courtroom litigator and especially those of the Applicant's attorney. But if a private citizen in a few minutes of cross examination can determine that the Truescape simulation only shows as a simulation what NU, CL&P want it to show, it is not a very "truescape" at all. And its use and value in the final siting deliberations of the GSRP's visual impacts must be heavily discounted.

Equally problematic is a situation and information that we came across researching the clean water act. We would preface it by saying that CAOPLC does not believe in anything other than a polite and respectful dialogue. We see no value in theatrics or confrontational tactics. Nor in personal or reputational attacks.

So if we can present this in the most general way possible so that we avoid making it a personal issue and make it a concern that we have about how the construction process will be documented and monitored, we want to bring to the CSC's attention that we found that one of CL&P's panel of experts ran into legal difficulties for work that was done on a prior energy project. The senior executives of the firm that this person worked with as a consultant were indicted by the federal government and eventually pled guilty to civil and criminal charges and paid fines of $22 million.

The CL&P panel expert we are referring to was also personally indicted by the federal government but after the settlement was reached with the corporation and senior management plead guilty, the district court dismissed the charges against the consultant. To be fair, the individual and the firm were not found guilty or personally liable but neither were they found by a court to be innocent.

Our concern does not relate to innocence or guilt and it is not about professional ability or competence. It is about what assurance do we have that the situation that occurred in this federal lawsuit will not occur on the GSRP? We would be willing to let CL&P address this issue in private before any response is offered. But we do feel it is a valid question to ask and a concern about what environmental safeguards will be in place.

CAOPLC also discussed the issues of water runoff and the right of way clearing on Phelps Road. Our ideal solution is the undergrounding of the power lines and the use of HVDC power lines because the construction process is much less invasive, less land need to be cleared and there is of course the very big benefit that HVDC power lines do not emit EMF radiation.

PROPERTY VALUES

CAOPLC members have concerns about the visual impacts and the health and safety impact of the power towers on our property values. In response to our concerns about the diminution of our property values, CL&P says emphatically that "THERE IS NO LOSS OF VALUE FROM THE POWER LINES."

Interestingly when we ask about rights we have in the easement land, such as to ask that no pesticides be sprayed on our agricultural lands, especially for those properties that practice organic agriculture, CL&P paradoxically says we have no right to control what CL&P does in the right of way land.

Our property owner's rights to easement land, according to CL&P, were given up when we bought our properties "BECAUSE THE EXISTING POWER LINES CAUSED A REDUCTION IN PROPERTY VALUE," a benefit we enjoyed in the form of a reduced price at the time of purchase. That reduction in value balances giving up, apparently as CL&P views it, all of our rights to the land save for paying property taxes on it on behalf of CL&P,

It goes without saying, other than in CL&P's world view, that it can't work both ways:

- There can't be a "loss of property value" when it is favorable and supportive to CI&P;
- and there cannot be a "no loss of property value" situation when the reverse is true, when it is unfavorable and unsupportive to CL&P.

There have been numerous academic studies done to try to qualify and quantify the effects of high voltage power lines on home values. All of the studies use statistical modeling. An often cited study of how to model and calculate the diminution of value of stigmatized properties is the Chalmers and Rohr study[27], In one paper on EMF valuation, the authors wrote:

> "EMFs have already been identified as one type of "stigma" that can influence the value of the property negatively (Chalmers and Roehr, **1993)**. However, using the expectation of future health problems as the basis of "fear" is new to our literature. A correct definition and measurement of this new concept is critical as it can be a part of the future evidence in any stigmatized property. This is the purpose of this article.
>
> Although the measurement tool for stigmatized income properties has been presented in the recent literature as the discounted loss of adjusted net operating income (Chalmers and Roehr, 1993), little agreement exists on the best estimation technique for residential properties. This article examines the issues that have been covered in a number of current cases to estimate the loss in residential value from fear. This information is critical to residential valuation in future appraisal assignments near a power line and to lenders who have loans on these properties." [28]

[27] James A Chalmers and Scott Roehr, "Issues in the Valuation of Contaminated Property," The *Appraisal Journal* (January 1993): 28-41.
[28] Cancerphobia: Electromagnetic Fields and Their Impact In Residential Loan Values *James A. Bryant & Donald R. Epley* Journal of Real Estate Research, Volume 15, Numbers 1/2, 1998.

Because an in depth discussion of statistics and survey techniques are beyond the scope of our testimony, it is accurate to say any discussion of whether or nor HVOL (high voltage overhead lines) is much like a discussion of EMFs. We do however want the CSC to note that the academic studies that say EMFs are a stigma to real property were authored by CL&P's expert Dr. Chalmers who is now apparently arguing against himself. It seems that Dr. Chalmers was for EMFs being a cause of diminished property values before he was against them.

There are too many variables to account for such as if in new housing developments whether or not a developer has increased the lot size or improved the amenities of a home near a HVOL power line, or one that has a view of a transmission tower to help sell it. And are those variables and differences accounted for in the data and statistical modeling? Some studies show that HVOL power lines do cause diminished property values to varying degrees and some studies show no loss of value.

It would be an interesting academic exercise to analyze a few variables: (1) whether or not a study commissioned and paid for by a utility, real estate developer or anyone else (a utility company) who had a vested interest in not having a loss of value had a strong statistical correlation with a finding of no loss or diminution of property value from HVOLs and (2) the price paid for the study and the study's findings. As England Prime Minister, Benjamin Disraeli so wonderfully put it, his quote was often attributed to Hartford's own Mark Twain, "There are three kinds of lies: lies, damned lies, and statistics."

There is a much easier way and practical to address and come to conclusions about this situation of diminished property values. Look at the Summary of Project Outreach Communication that CL&P entered into the CT CSC docket 370's evidence. There are numerous instances in that document where either a potential property buyer or a Realtor called CL&P to ask about the GSRP. There is some evidence that buyers are concerned about HVOL power lines as shown in this logged comment:

> "Customer Service referred call to NU. Realtor stated that several have made but then dropped offers on the house after hearing about requested aerial photos."[29]
>
> There was another entry to note that an area resident bought his own EMF meter to measure the radiation on his property.

It is also very interesting to note that in the log of CL&P's outreach communications, when questioned about the proposed Greater Springfield Reliability Project power line in the Metacomet - Newgate area and about the proposed power line's proximity to homes, CL&P said it will be 75 feet away from the existing 115 kV power line. True. But is that useful information? Is that all that a prospective homebuyer should be told?

Did CL&P refer them to the CT DPH web site for the informational material that have in EMFs?

Did CL&P tell individuals, especially if they have children, that if they have concerns to contact an inspector who is licensed to conduct an EMF inspection?

I don't see anything anywhere in the materials submitted to say that CL&P did, NU is currently running a PR campaign about NU, CL&P and the environment. In one public service advertisement they talk about

[29] Page 5 of CL&P's Summary of Project Outreach Communications

donating bicycles to young children. That is certainly a worthy and wonderful act of corporate generosity. But it may well be more valuable to a small child if NU and CL&P embarked on a program of truthful disclosure of power line EMF hazards to parents contemplating a home purchase next to a power line. That way when a child is riding his or her bicycle, maybe even one donated by CL&P, they will not be exposed to childhood leukemia and will be able to ride a bicycle past their childhood years.

A NON-STATISTICAL TEST FOR DIMINISHED VALUES

The simplest question to ask, is if given the choice between two relatively similar homes in terms of price, square footage, school districts, neighborhood and home amenities and so forth, if one home was within a short distance (using the Newgate area distance, at or less than 300 feet) of a ten or thirteen story metal power transmission pole with 345,000 volts crackling through the power lines and one similar home was not, which home would you chose for your family?

At what price point, especially if you had read about the dangers of EMFs would you personally choose next to a high voltage overhead line as a place to raise your family? Would that home be a safe environment for your children to grow up? Would that home be a safe environment for adults with a familial history of cancer? How much money would make you decide to take a risk?

CAOPLC asked this question in our CL&P interrogatories on page 8:

Does CL&P agree or disagree with the following statement, **"If a demonstrable loss of property value occurs to a property owner from CL&P's GSRP overhead power line ROW construction project(s), that loss of property value constitutes a de facto Eminent Domain taking of property without giving the ROW resident the benefit of due process and legal representation." Please answer in detail with a legal justification for your answer.**

CL&P answered all of the other questions in this series on property values and the power line easement but chose not to offer an answer or an objection to this question. To CAOPLC's residents CL&P's silence is all of the information that we need to know.

We think there is a simple solution to this problem. **If NU and CL&P feel that there is no loss in property value from its overhead power lines, why not offer to buy the homes at a fair market price, or at the assessed value, whichever is the greater from any resident who feels that it is unsafe or that their property values will be severely diminished and let the homeowner and their family move? Other utilities have done his very thing.**

CL&P could since CL&P insists there is no loss in property value, resell the properties and potentially make a profit. If NU or CL&P needs to, they can form a local or regional real estate company and let it function across in Connecticut or across state lines for NEEWS.

Q. Why did you buy you home on Newgate Road? Clearly you could see the power line, why did you chose it?

A. One of the important comments that I have heard from people, bloggers, and even at the CSC hearings is why did you buy that home when you knew that the power line was located on the property and you would have problems? The misconception is the part about we knew there were problems,

Let me answer this question directly and start by using my own situation. When my wife and I moved to Connecticut thirteen years ago, we were torn between a few different properties. The one we liked the best was at 1204 Newgate Road. The features of 1204 Newgate Road we did not like and were on the fence about was there was the power line running across the drive way at the front part of the almost 30 acre property and the property's proximity to Bradley Airport.

We discussed this with our Realtor. We visited the property a numbers of times and at different times as a part of our due diligence on the airport issue. I have say having lived here for thirteen years there are a few times when there is airplane noise but we accept that as a reasonable trade off for the location. My wife, who does what I do for a living, called CL&P a number of different times. She was told there was nothing to worry about and that the power lines had been there for decades, since the 1940's or thereabouts.

My wife prepared a list of questions for CL&P and we asked them all. We were told that the lines were low power lines - household current, which is patently incorrect but we did not know that they were 115 kV power lines until CL&P held the Suffield GSRP open house. We were also told that nothing further was planned or would be built in the right of way. With all of that in mind from our conversations with CL&P, we thought we had done our homework and we purchased the house. Since I am submitting this testimony under oath, I can truthfully say if we were told the correct information by CL&P that the power lines were 115 kV power lines and that the right of way was a major interstate right of way that at some point in time would have another power line or multiple power lines built in it we would be living in a different home. It was a very difficult to overcome our apprehensions about the power lines but everything else that we wanted was at this property. And we liked Suffield, and particularly the Metacomet area for its rural and pastoral beauty. And now that beauty may be destroyed by CL&P's huge metal GSRP towers.

NOTES FOR PHOTOGRAPH EXHIBITS

In the photo exhibits that follow, the first image in the next three pages is an un-retouched photograph of a home in the Durham or Middletown area. The power towers shown are the Middletown to Norwalk towers. The second image shown in the next three pages has had the Middletown to Norwalk 345 kV power towers removed using Photoshop.

The fourth page has images of 3131 Phelps Road in West Suffield. This house is shown for a number of reasons. First, on the very first Truescape simulation, the simulation begins at the Spencer Woods Wildlife area at the corner of Phelps and Mountain Roads in West Suffield. The Truescape simulation then heads westward down Phelps Road until the simulation ends. Most of the homes shown in this simulation have heavy foliage in from of them making the 115 kV towers look innocuous. The ***very*** next home after the point NU and CL&P decided to stop Truescape simulation would have been this house. If the simulation had proceeded another 50 to 100 feet, you would have seen these views.

The first picture on page 4 is unretouched showing the 115 kV Lattice Tower. The second image is a scaled simulation of a 140 foot Greater Springfield Reliability Project tower next to the Phelps Road home and the existing lattice tower (image and tower are on the Lyman Orchards golf course). We think the SMP towers will be visible over the top of the Metacomet Ridge and will have a tremendous negative territorial visual impact. Note: Please ignore the first photo's date; I have the wrong year set on my camera.

Photo Exhibit 1

Which home would you prefer to buy? Which home would most families prefer to buy? The home with the Middletown-Norwalk power line in the back or a property without a power line at all?

PHOTO

PHOTO

Photo Exhibit 2

PHOTO

PHOTO

Photo Exhibit 3

PHOTO

PHOTO

Photo Exhibit 4

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FINAL COMMENTS

CAOPLC is in the process of preparing photographs, aerial photographs and video and a video presentation of the Newgate/Metacomet area. It is not yet ready but since CL&P was allowed to show the Truescape simulation, we ask that we be given an equal opportunity to show the information that Truescape does not.

On the aerial video, I was finally able to find a pro bono pilot. He told me that a flight plan needs to be filed because we will be flying low under one of Bradley's runway approaches. We also have to have the wind going in the right direction so that the east-west runway use is minimized. Last, we obviously need Visual Flight conditions. He estimated on 10-28-09 that we could most likely be able to get in the air within a two weeks. And we do want the leaves off of as many trees as possible.

With regard to CL&P's application and testimony, if I could speak for myself and on behalf of CAOPLC, I am troubled by how much information is incorrect. The problem for a layperson is you have no idea what testimony or written material is critical to the CSC's decision process and ultimately the CSC's findings of fact and what information is not. Or to use one of the legal terms I have picked up, we do not know what information may be dispositive or not.

I am offering a few examples that seem to me to be indicative of a situation important beyond a seemingly trivial first appearance. In the EMF section in Volume 1 of 11, Section O, page O-4, CL&P makes reference to a 1985 study from Gauger that says people are exposed to high EMF levels in their daily lives and "reports the maximum AC magnetic fields from a sampling of (household) appliances as 3,000 mG from a can opener, 2,000 mG from a hair dryer, 5 mG from an oven ..."

Is that the best data that CL&P has available, a study that is 24 years old? My professional training is in underwriting risk and hazard information. I have found that after 30 years that the key element to analyze is not so much what is said but why information is said. It is those odd bits of information that appears as "outliers" or "omissions" that are often critically important. My professional curiosity piqued I got my EMF meter[30] and performed a "field test." The results are shown on the next page. Again, please ignore the picture date, and I discovered it after this material was put together too late to reshoot the pictures and still make our deadline.

The first set of pictures show that on the "High" setting an EMF reading of 72. 7 to 82.3 mG is obtained right next to the motor running on the high setting.

The next images show that 4.4 mG is obtained at a close distance to the dryer end again running on the high setting. This reading which would be next to the person's head is 4.4 mG not 2,000 mG. A reading of 1.0 mG is at a distance that where one might actually use for the hair dyer to avoid scorching your head. The last picture shows the dryer at low setting at 33.6 mG right next to the electric motor.

Here is why I think this is important and how it ties back to the dose-response curve. If you understand the theory behind dose-response[31], it becomes clear that after the point where a lethal dose is reached

[30] The certificate of laboratory calibration for this instrument is included in this testimony.

[31] And to avoid an objection from the Applicant's counsel, I will state as a part of this testimony that my mentor at Harvard Medical School Dr. Keichline was as specialist in pharmacology, so I did learn quite a bit about the subject of dose and response and how to structure credible experiments.

(LD) it really does not matter if as a regulatory bureaucrat such as the EPA, you set a the maximum LD limit to avoid at LDx + 100 or LDx + 10,000 or LDx+1,000,000 because at LDx+I0, most people are dead. X is the unit of hazardous substance. My point is if EMFs are proven to be a cancer causing agent, if the WHO or the ICRNIP says today that the acceptable time weighted 24 hour exposure limit for EMF is 1,500 mG to make up a number, if it turns out the LD number is 30mG again to make up a number, the old incorrect limit of 1,500 could have been 150 mG or 150,000 mG wrong it is still wrong until the precise LD threshold is known.

But orders of magnitude can be telling. If the vast majority of scientific studies are analyzing exposure rates at 3 mG, 4mG, and only single digit mG levels when we are being told that our EMF mG exposure as we travel under the GSRP power lines is in the 200 to 300 Mg range, it is troubling. It is distressing. It is of great concern when you are the person about to be exposed.

I hope that CL&P is just recycling 24 year old information. I hope that CL&P is not trying in a subtle way to influence the CSC'S perception of EMF exposures to counter what CT DPH says in their EMF brochure, that EMFs of above 4 mG may a critical threshold of exposure for childhood leukemia by saying that CL&P's hair dryer produces 2,000 mG and that hasn't been a problem to anyone. It hasn't because it appears that my hair dryer only produces 1.0 to 4.4 mG depending on how much heat you can tolerate at your scalp as you dry your hair.

[PICTURE]

[PICTURE]

1559 [PICTURE]

1560 [PICTURE]
1561

Another example of problematic testimony can be found in the July 29, 2009 transcript:

> MR. HOLTMAN: Well, there's no question in your mind, is there Ms. Mango, that the approval of the CL&P application as presented will result in that right-of-way, the poles and the clearing, becoming more visible from more places from the Metacomet Trail?
>
> MS. MANGO: Well, I'm not sure that's true. I think it would depend on the person's perspective. I think it would depend on the types of poles and I think it would depend on the intervening vegetation. For example, if a subdivision developer, private developer came in and built 100 homes at the base of West Suffield Mountain, between the right-of-way and the trail, then you probably could see the right-of-way more if he cut down 200 acres of trees to build those homes. If the land remains as it is now from certain other vantage-points then I would think you would probably once again see an incremental effect if you were looking hard to see maybe the taller structures for the transmission line.

This testimony shows a stunning lack of familiarity with our area including property tax incentives to keep the land in agricultural production and a strong local bias against large scale residential development. There is also the Metacomet Compact, the multi-town agreement that limits the height of ridgeline structures and development to protect the Metacomet area views. CL&P has not made mention of that document. There is a much higher probability that I, a 56 year old overweight 5'8" man with bad knees and no jump shot, will be drafted by the Boston Celtics to play in the NBA this year than there is of even a 15 home sub-division being approved in East Granby or West Suffield in the Newgate-Metacomet area. It is a straw man argument, a red herring. And as stated, we have no idea what information will be dispositive information. I wish I had a viable suggestion to the Siting Council on how to separate the wheat testimony from the chaff.

At another point and I have to apologize that I could not yet find it, I believe that Ms. Mango testified when she showed "travel pictures" of her hike on the Metacomet Trail that in her opinion she thought that there was little to no use of the Metacomet Trail in "leaf down" conditions. Thus the visibility of any power tower was not as big an issue or concern as when hikers are on the trail in the spring and summer.

I would like to make a few comments on this testimony, even if the first part were true, tower visibility is quite important the hundreds of residents who live in the area. Next, at the most recent meeting of the CT Forest and Parks Metacomet Trail Stewardship council on October 13, 2009, I asked the members of the stewardship council if they could tell me how much the Metacomet trail is used in late fall and winter. The answer was there was a lot of use of the Metacomet Trail in colder weather and in the winter.

One council member told me she only hikes in colder weather because that is the time you can enjoy hiking tick free and not worry about Lyme disease. That sentiment was expresses by a few individuals. They asked why I wanted to about know this and I mentioned the GSRP and Ms. Mango's theory. "She

no clue about what she is talking about" was the answer! got from one of the Metacomet Trail Stewards[32].

To address some overall comments to the Siting Council, what I have learned these past few months is this. You have an enormously difficult task to do. I appreciated that fact at the very beginning of the hearings but after months of testimony, it is abundantly clear. From a of a citizen's perspective, the CSC is potentially faced with a Hobbesean choice or as one young girl's father, Kevin Constable, put it very plainly at the Suffield public hearings, " ••• my main concern is the health risks for everybody that's involved. Who gets to decide who gets to live and who gets to die? Do you understand what I'm saying?"

CL&P as the applicant has a design that they feel is the best design for CL&P and its shareholders. To deviate too far away from that point to build a power line that is much less profitable would have CL&P's breach the fiduciary duty CL&P and NU have to their shareholders. CL&P has a vested interest and we should recognize that Should anyone dispute it, look at the motion counsel for WMECO made to bar Westover Air Force Base from testifying at the joint CT and MA hearings. Westover wanted to testify as an intervenor that the proposed siting of the GSRP by WMECO posed a risk to aviation safety. WMECO's counsel tried to argue that aviation safety should not be addressed by the MA EFSB. Fortunately common sense prevailed, but if that does not clearly demonstrate a strong self-absorbed vested interest, I am not sure what does.

ISO-NE's testimony showed that it operates within a very narrow framework. ISQ-NE does not make societal or environmental impacts a key driver in its work, system reliability is its mandate and focus.

The testimony of Julia Frayer on behalf of CL&P did not include modeling any adverse economic impacts of the GSRP. The scope of the LEI work product and testimony as directed by NU and CL&P was to determine if there were positive economic benefits to ratepayers as a whole from constructing this specific transmission power line in this specific way,

With regard to a competitive energy market, given what we learned from ISQ-NE's testimony and the testimony of Mr. Chernick, the economics and the design of ISQ-NE's local market pricing if it were applied to the automobile industry would work like this: Hyundai, Ford, Honda, and Toyota are all producers of quality small sedans. Hyundai (representing Millstone Nuclear) charges $13,000 for its economy vehicles. Ford, Honda, and Toyota charge $15,500 on average for their vehicle. Whenever BMW and Volvo sell cars at $45,000, all car manufactures including Hyundai as the first tier producer and Ford, Honda, and Toyota as the second tier of economy manufactures all get to sell their cars at $45,000 even though in the case of the lowest cost producers their production cost are less and they can and do enter the market and sell their products at a lower cost.

Now Rolls Royce, Bentley and Ferrari (the RMR producers) each sell a luxury convertible car because it is summer time and that is when convertibles are purchased, According to our ISO-NE locational electric energy market pricing, all car manufacturers now get to sell their cars at $275,000 because that is the cost at the highest tier of production. Try explaining that to someone. Try explaining that to someone on a fixed income.

[32] In case the Applicant's counsel objects to this last statement as hearsay, we understand that Hearsay evidence may be admitted in a contested administrative hearing as long as it is reliable and probative. 47 CS 228.

Would it not make more sense if protecting the consumer and having reliable low cost energy is the real goal, if making certain that our Connecticut business environment is a competitive and attractive environment to encourage start-up entrepreneurship is a goal, if another goal is that we are provide real solutions to combat global warming and create energy independence, if those are our goals why don't we instead of building more and more transmission lines look at doing something that actually reduces peak demand. That takes the Rolls Royces and Bentleys out of the equation not just to lower our high marginal energy costs but actually drive down the marginal energy cost threshold.

At its most fundamental level, the Greater Springfield Reliability Project is not so much about constructing a reliability power line project as it is about the prudent, long term deployment of $2 billion of public infrastructure capital. Consider that the United States wastes enough energy in the generation and transmission of energy every year to power all of Japan for that same year.

There is no investment in any type of local renewable energy production in these proposals. What would the GSRP look like if it became the Greater Springfield Reliability and Renewable Project? What would happen if instead of building power transmission lines through Suffield and east Granby, CL&P invested the CT share of the GSRP in a public-private partnership where it placed solar and perhaps some small wind turbines at the residences and small businesses in Suffield, East Granby and Bloomfield to drive down the high marginal costs of peak summer time demand and RMR generation?

Assuming a no state or federal renewable energy incentive cost of $20,000 per residence/small business at a $150,000,000 investment by CL&P in renewable solar and wind[33] production, CL&P could place infrastructure at 7,500 residences or small businesses. At an average usage level of 790 kWH per month, these investments would have a ROI pay-back time of roughly a decade and after that the energy production would be at no cost. The life cycle would be that of a transmission investment. There would be no harmful EMF concerns. Duke Energy is doing this very thing.

The problem is no one has a business model that supports this for a large scale investment. There is no government mandate. There is the corporate equivalent of the "it's not my job mentality" at work. ISO-NE is not charge with transforming our gird, it is charged with reliability and it derives its revenues from transaction costs as essentially a commodity trading exchange. ISO-NE is not going to work itself out of a job even if we all would be better off with much more renewable and green energy.

And with regard to reliability, we are proposing to build the Greater Springfield Reliability Project in the least reliable way. Underground lines according to various utilities are 50% to 70% more reliable on average than overhead power lines. If the initial triggering event for the 2003 blackout was a sagging power line contacting a tree limb, or a squirrel as Chairman Caruso said, if that power line were underground there would have been no 2003 blackout. Eleven more people would be living and billions would not have been lost.

But we can't build HVAC lines for long distances. True. But you can build HVDC lines for long distances and their underground construction is easy and low cost. See the Murray Link project in Australia. But HVDC have short term overvoltage problems says Mr. Ashton. True, but that is only a part of the story because there is HVDC technology to mitigate over voltage events and HVDC does work well with asynchronous systems.

33 See http://www.awea.org/faq/rsdntqa.html#Howdoresidentialwindturbineswork

I am not saying that HVDC is, or may even be, the answer because I am not qualified to opine on electrical engineering issues. But I am qualified to opine in my specialty area of risk and hazard decision making and time horizon decision making. If you look at the proposed capital investments by NU for the years 2010 to 2013 in new post-NEEWS HVDC transmission lines requiring new right of ways, one should ask are we building our infrastructure piece meal. Do we have any sort of comprehensive plan? Are we building redundant power lines? Having as many power lines as possible is a benefit to NU and stabilizes revenues. But is it a benefit to consumers?

This is our key point: What is a benefit to consumers? If we are deploying $2 billion in capital infrastructure money, the only way to do this correctly is to get a qualified second opinion. That is why we believe KEMA was hired in the docket 272 proceedings. That is why, given that the CSC has the legal authority to do so, that a firm like KEMA must be hired to review all possible options including removing the artificial delineations of GSRP, CCRP and IRP to see if there is not a better way, a win-win way to spend $2 billion of the consumers' money.

To the citizens of East Granby and Suffield CL&P is saying we can afford to build a power line, we just can't afford to build it safely and not with devastating financial consequences for local residents. And you unlucky folks and your children just have to buck up and take one for the team.

We found a few quotations that could be applicable to the ultimate result of the GSRP's and NEEWS siting process's final decision.

> The first is from Sir Winston Churchill, "You can always count on Americans to do the right thing, after they've tried everything else."
>
> The second is from Ralph Waldo Emerson, "Do not follow where the path may lead. Go instead where there is no path and leave a trail"
>
> The last is from Mark Twain: An Englishman is a person who does things because they have been done before. An American is a person who does things because they haven't been done before.

Even though we greatly admire Sir Winston Churchill, we hope that Emerson's and Twain's words are the one that ring true.

If we are going to spend the $2.4 billion in GSRP/NEEWS money let it be spent to blaze a path that leads New England towards greater energy independence, greater sources of renewable energy and a New England transmission grid infrastructure that keeps pace with what is being used and developed through the USA and in the rest of the world.

We thank the CSC for the opportunity to present our testimony and to give voice to the concerns of the hundreds of residents who will be affected by the GSRP and the NEEWS projects.

Respectfully submitted,

Citizens Against Overhead Power Line Construction

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BY: Richard Legere, Executive Director

CERTIFICATION

I hereby certify that a copy of the foregoing will be mailed, e-mailed and/or hand delivered to all known parties and intervenors of record on the docket 370a service list.

_____

Richard Legere

KEY EXHIBITS

Daily Mail News Article on "Faulty Gene Makes Children Who live Near Power lines More likely To Develop Leukemia."

Light and Invisible HVDC Light article

CL&P exhibit of EMFs from 345 kV HVAC line for West Suffield residence

ADDENDUM MATERIALS

Excerpts from ABB Study for docket 272 - Middletown to Norwalk. Document located at: http://www.ct.gov/csc/cwp/view.asp?A=3&Q=272580

Met all established engineering criteria:

"The study conducted by ABB consisted of four major tasks:

1. System harmonic frequency analysis
2. Power flow analysis
3. Short-circuit analysis
4. Stability analysis

The results of these analyses are discussed in this report. Individual reports for each of the analyses are provided as attachments to this main report. The key finding of the study is that it is technically feasible for an HVDC solution to meet the 13 criteria shown in Table ES-1. Specifically, an all HVDC solution based on VSC technology will shift the first system resonance frequency to above the 3rd harmonic, a major concern with the AC alternative. Other considerations such as short-circuit duty, prevention of line overloads, maintaining voltage and dynamic stability were all analyzed and found to be within acceptable limits. Additional detailed studies are required to come up with an optimal system design in order to cover additional scenarios, contingency conditions, and other operational considerations. **Middletown Norwalk Transmission Project 10/01/04 VSC HVDC System Feasibility Study"** [34]

"Based on the results of this feasibility study, it is concluded that HVDC Options I and 2 are both feasible and capable of meeting the 13 performance criteria set forth by NU, UI and ISO-NE. The selection of the most cost-effective solution will require additional detailed studies to optimize the design, taking into account of costs, reliability, operability and flexibility."[35]

[34] *ASS Study, Executive Summary, page IV*
[35] *ABS Study, Executive Summary, page V*

" 2.1 Study Criteria
ABB was engaged by NU, UI and ISO-NE to conduct a study to investigate if a VSC based HVDC system could fulfill the technical criteria relevant for this particular application in Southwest Connecticut. NU with input from New England ISO and UI, has outlined 13 criteria that must be satisfied by the underground HVDC solution. These criteria are presented in Table 1 below.

Table 1. System Criteria for Middletown to Norwalk Project

1. Moving approximately 1200 MW of power into Southwest Connecticut. Approximately 1200MW of power injection (800MW incremental after Phase II, and Phases I & II give 1400MW; comparison of transfer capacity for both AC and DC line outages.)

2. Resolving short circuit issues at Pequonnock 115kV and Devon 115kV and Devon 115kV target of 90% of 63kA or below

3. Resolve generation interdependencies at Pequonnock, Devon, and Norwalk Harbor

4. Improve the point of the first system resonance to 3rd harmonic or higher.

5. Provide a means of interconnecting new generation.

6. Have the ability to add new load serving stations as required.

7. Must be able to operate throughout a load cycle and throughout the year with varying dispatches and line outages.

8. The project cannot cause any new overloads on the system.

9. Respect technical and physical limitations.

10. The project needs to result in a dynamically stable system

11. The project needs to provide adequate voltage on the system.

12. Respect existing contracts and system capabilities cannot degrade capabilities such as the 352 MW (330MW net) capability of the Cross Sound Cable and 200MW across the 1385 submarine cable between Norwalk Harbor and Northport, LI.

13. Adverse Sub-synchronous Tortional Interaction (SSTI) effects should not be present - System must not act to destabilize torsional modes of nearby generators.

The study uses the planning and reliability criteria of ISO-NE." [36]

[36] ABB Study, page 2