Event: Public Hearing on House Bill 1723 (New Hampshire House of Representatives) **Topic:** Critical Infrastructure/Grid Vulnerability (EMP/GIC)

Identified Speakers:

- **Chairman:** (Presiding Chair of the Committee)
- **Rep. Rita Matson:** Prime Sponsor of the Bill.
- **Lt. Col. (Ret.) Tommy Waller:** Center for Security Policy (Expert Witness).
- **Rep. Corman:** Committee Member (Background in Electrical Engineering).
- **Rep. McGee:** Committee Member.
- **Rep. Wendy Thomas:** Committee Member.
- **Vice Chair Thomas:** Committee Vice Chair.
- **Rep. Bernardi:** Committee Member.
- **Alec O'Meara:** Director of External Affairs, Unitil.
- **Michael Licata:** Director of Gov. & Community Relations, Eversource.
- **Brian Dickey:** VP of Electric Operations, Eversource.
- **Dave Claudio:** Director of System Operations, Eversource (Mentioned).
- **Rep. Reynolds:** Committee Member.
- **Rep. Partial:** Committee Member.

Chairman: I request that all members return to their seats promptly at 1:00 so that we can begin. We have four bills to have public hearings on this afternoon, and we are going to start with our first: House Bill 1723.

Before we get going, I'll remind everybody who may be attending this hearing that if you plan to speak, you need to file a pink card. You need to fill out and bring the pink card up to my location here at the front of the room. If you have no plans to speak, pink cards are not necessary, obviously.

So, with that, I will now introduce this bill, House Bill 1723: *Requiring utilities and electric grid operators to assess and report the vulnerability of high voltage transformers to geomagnetic and electromagnetic disturbances, and to recommend mitigation measures to protect the state electric infrastructure.*

To introduce this bill to the committee, I'll call on Representative Rita Matson.

Rep. Rita Matson: Mr. Chair—for the record, Rita Matson. To introduce... I was just going to read the Act, but you just did that. I can read the whole bill, but I don't think we want to be here until tomorrow. So, what it basically is, is that US power companies would need to do a survey to tell us all of the extra-high voltage transformers in their system, which ones are the most vulnerable, and which ones have the longest lead times for planning purposes for replacement. And that's basically what the bill is.

I would like to introduce the co-writer of the bill. This is Tommy Waller from the Center for Security Policy, and he's going to explain.

Chairman: Okay, and before we hear from Mr. Waller—Lieutenant Colonel Waller, Retired—I just want to point out that while this sign in front of us says that this is HB 1723-FN, which would imply that it has a fiscal note, the bill in fact does not have one. So, I just want to make that clear to everyone. And now, I look forward to hearing from Lieutenant Colonel (Retired) Tommy Waller.

Lt. Col. Tommy Waller: Thank you, sir. So, Tommy Waller, work for the Center for Security Policy. We're a 501(c)(3) non-profit based out of Washington DC. As a 501(c)(3) non-profit, our mission is to provide uncompromised analysis on what threatens our Republic and then unconventional solutions to keep Americans safer. Part of how we provide that uncompromised analysis is that we refuse funding from governments, from any foreign sources, or from any industry that can profit off of our recommendations. So, we are here purely to represent the public interest.

As was mentioned, my background is in the Marines; served as an infantry officer, but about halfway through my career transitioned to the civilian sector and have been working for the Center for about 14 years. During that time, I was asked to lead the nationwide Secure the Grid Coalition. This is a group of national security experts, engineers—people whose purpose is to secure this infrastructure that we cannot live without. We provide threat briefings routinely, educational material routinely on these various threats.

Last year, I provided a threat briefing to members of this legislature and was inspired to see that those members went and actually put forth a resolution at the National Conference of State Legislators to address this threat, which we'll talk about briefly.

I also want to clarify that as a 501(c)(3), we mostly do education for policymakers. There are times when we're asked for the solutions, and we sit down and we work through those. And so, this bill was created in consultation with engineers, lawyers, and policymakers over a series of months—many people who gave a lot of time to think through what is the best procedure to move forward and actually see some action to protect our critical infrastructure. So, it was a group effort, a coalition effort, and I want to thank this committee for hearing it.

Let me just briefly mention that our Coalition seeks to address six threats to the grid: government policies, supply chain vulnerabilities, cyber-physical sabotage, and then both man-made and electromagnetic threats. This bill addresses those electromagnetic spectrum threats, specifically one known as GIC or Geomagnetically Induced Currents.

Briefly, just to explain: when a nuclear weapon is detonated in the exo-atmosphere—a high altitude nuclear EMP called HEMP—one of the phenomena that happens is very similar to a phenomenon that the sun can produce when it produces a Coronal Mass Ejection (CME), or what we might sometimes hear as a solar flare.

Electromagnetic energy in the crust of the earth... so we may be looking up and seeing a flash or a beautiful aurora, but beneath our feet is this current traveling, looking for the path of least resistance. It finds that path of least resistance in our electric grid, travels up through the neutral wire of our extremely high voltage and hard-to-replace transformers, and enters the grid that way. So, GIC is the threat that we seek to mitigate with this bill.

Unless you survey the system... The North American Electric Reliability Corporation (NERC) has a standard for protecting against GIC. Attention to the color table there that shows the difference between the standard and what the real threat is. Now, these transformers we seek to protect, some of them have lead times as long as four to six years. Extremely hard to replace. On an annual basis, our nation suffers about 10 billion dollars in economic loss from naturally occurring solar weather. Those same GICs that pass through the transformer reduce its lifespan and harm downstream equipment. So we're losing 10 billion every year as a nation. And if that GIC is extremely strong, like what you see on this chart on the right, it can catastrophically damage those transformers, creating very, very long blackouts.

To address your attention to this table: the NERC standard has a scaling factor that results in New Hampshire, where we are now, having just over two volts per kilometer for protection. What that means is that the utility industry can comply with this federally approved standard without actually having to install any protective hardware. What the bill does is it compels the utility industry to use their existing models—which they use to comply with the federal standard—but instead of plugging in that number that the standard requires, it would plug in the realistic number of 85 volts per kilometer. This number, just this last May 2025, became the internationally accepted IEC standard for E3 HEMP (High Altitude EMP).

Why would we want to give that number of 85? Because we can take care of protecting our grid against the worst threat, which is nuclear EMP E3. And while we do that, we completely solve the problem of solar weather.

One last point, it's not illustrated here, but I will say when NERC developed its standard for solar storm protection against GIC, eight scientists that NERC employed to develop that standard recommended initially that it be at the rate of 30 to 40 volts per kilometer. So, if you look at that chart, that would be way, way higher than what we have now, right?

And so, again, all this bill does is it asks the utilities really to do their job, right? They should be assessing their system for all sorts of vulnerabilities, but specifically as it relates to GIC, to assess the system to the realistic threat. And in keeping with the CEII (Critical Energy Infrastructure Information) requirements for confidentiality, making sure that only the right parties have the information that is needed to make the decisions on how then to protect it.

Good news: as I mentioned before, technology—proven technology—exists to mitigate this threat. It's affordable. I personally have briefed the federal government more than half a dozen times. And unfortunately, they haven't acted. And so, at this point, we believe that it's important for the states to take action from the bottom up. So, at this point, I'd be happy to answer any

questions that you may have regarding the threat, the solutions, and the policy that is being recommended today.

Chairman: After that testimony, I'm sure we do have some questions, and I'm going to start the questioning myself. You have defined on page two, lines nine through 16, something you call CEII, which means Critical Energy Infrastructure Information protocols. And then later in the bill, also on page two line 37, you mention that information needs to be collected and can be redacted for CEII. Can you help me understand... is that enforceable? Is that challengeable in court? Exactly how could we offer our utilities assurance that this information would remain confidential?

Lt. Col. Waller: Right. The CEII protocols that the utilities use are something they're familiar with. I have the utmost confidence that if it's the utility industry and the government handling this information, that it will be protected. They're very, very adept at doing that and very good at making sure that that information stays confidential. I have plenty of examples that I could share, but when it comes to transparency and public disclosure, there is a very rich history of the electric utility industry working with government to not have information shared with the public. So I'm confident that that would be treated with the utmost operational security.

Chairman: Thank you. Representative Corman has a question.

Rep. Corman: Hey, Duke. So you said there's a technology that exists to protect. Is that just for protecting transformers? And can you talk a little bit about the technology, please?

Lt. Col. Waller: Sure. So, regarding the question about technology for the GIC threat: the technology that I'm referencing is called Solid Ground. This technology has been developed over the last 18 years roughly. And it's been tested by the federal government—the Defense Threat Reduction Agency (DTRA), Idaho National Laboratory, and TVA, as well as the industry's research organization EPRI (Electric Power Research Institute), the Western Area Power Administration, and the Tennessee Valley Authority. It's operated flawlessly for that period that it's been installed.

And what we've actually seen, Representative Corman, is in some of these most recent solar storms—where we might predict that the effects of the GIC, traditionally we think of GIC affecting the North American continent where it would be worse in the northern latitudes and diminish as you go south (that's how the NERC standard is developed)—what we've seen is there are devices activating in southern latitudes even before the northern latitudes activate.

The point being that the technology works. It's proven. Other countries are deploying the technology. On Monday of this week, I sent a letter to the Department of Energy to warn them of additional evidence we found of the People's Republic of China deploying this across their grid. Emprimus, the manufacturer, has received a number of requests from foreign nations to manufacture and provide their Solid Ground technology.

In December, I went and witnessed the last test of one of the devices they had just completed. She took a AA battery out of the flashlight in my pocket and touched it to the unit and it activated

perfectly. It was extremely inspiring. But then it was just as depressing to think that that device was being packed up to be shipped to a foreign country—albeit an Allied country—but not the United States of America.

So that's a long answer to your question. It's meant to protect transformers, which are the backbone of the grid. Here's one of the things that is notable, though: it doesn't just protect the transformers against the catastrophic levels of GIC that would ruin the transformer. It blocks all GIC. So that AA battery... it blocked that direct current. What that means is that the deployment nationwide of Solid Ground would save the American economy 10 billion a year. And what it would cost is a one-time 3 to 4 billion price tag for the whole country. Which was about one third of one percent of the Infrastructure Bill. And these are things that I've briefed the Department of Energy on before. So the solution exists, it's been thoroughly tested, it's been deployed in at least three locations in the United States, and it needs to be deployed nationwide.

Rep. Corman: Is this device... once it's used, is it reusable? Or is it more like a fuse where once it's blown, you got to replace it?

Lt. Col. Waller: Oh, Representative, that's a great question. Okay, so the way Solid Ground works... there's a number of operating modes that it can be on, but if you put it in the automatic mode where it detects that GIC, it's going to block as many times as it needs to, to protect for as long duration as is necessary. So it's not a one-time fuse like you're mentioning. This device—at least the ones that have been installed at ATC for over 10 years—it doesn't even really require maintenance. It's just plug it in and "set it and forget it," so to speak.

The installation process is also pretty simple. The utility will put down a concrete pad ahead of time for the device to sit on somewhere in the substation. And then all they have to do is take the wire that connects to the device and connect it to the neutral that's stuck in the ground from that transformer. The transformer can be running full speed. So, it literally can be installed in an operating grid without interrupting anything. Do the battery test, walk away, and it's ready to go.

Chairman: Representative McGee has a question.

Rep. McGee: Thank you, Mr. Chairman. Thank you for taking my question. So is this device, is the Solid Ground technology, rated to do this up to this 85 volts per kilometer?

Lt. Col. Waller: Yes, ma'am. The history behind the development of the device... the company, Emprimus (and previously Crown Ironworks), for generations did a lot of work for the U.S. over the WWI/WWII period. The founders of this company were inspired to address the biggest part of the EMP issue and solve it technologically. From the very beginning, what they envisioned was creating something that would protect against the worst-case scenario.

When we talk about solar weather, you know, what we think of as a "bad" solar storm would be like the 1859 Carrington Event... looking at your chart, that would have been what you see in yellow there. There's something called a Miyake Event, which in the course of Earth's history, has been a massive solar storm way stronger than anything you see on this chart. They

developed that technology to protect against that level. If you can measure the protection, it would be way off the chart of this page.

Chairman: Representative Thomas has a question.

Rep. Wendy Thomas: Thank you Representative Wendy Thomas. Thank you for being here. I have some questions concerning the utilities, which may or may not be surprising. So, at the end of page two, you define the elements of the report: the timing and the cost. My question is, could this bill impose undue regulatory burdens without funding for the utilities or any statutory authority under existing State utility law?

Lt. Col. Waller: My answer would be no. At this point, I guess you'd have to ask yourself: does the state pay for the utilities to comply with the NERC standard, or do they do that on their own? We are just asking them to take the same procedures they take to abide by the NERC standard and just plug in the real number.

Rep. Wendy Thomas: Follow up. I also do not see any enforcement or legal consequences for any missed reports or inadequate assessments.

Lt. Col. Waller: It's a good catch. That might be something to add.

Chairman: A follow-up on Representative Thomas's question. Is there proposed legislation at the moment that would preclude allowing the utilities to recover costs from ratepayers for doing this assessment report?

Lt. Col. Waller: As far as the question related to how to pay for it... towards the end, one of the things that you'll see there is that the report asks the utilities for their recommended solutions, the cost, the priority list, and then their recommendations for funding, which could be potentially grant sources or rate recovery mechanisms. So what the bill does is actually ask the utilities to help us understand the best way to pay for this.

Chairman: Okay, thank you. Representative Thomas has another question.

Rep. Wendy Thomas: Representative Wendy Thomas. So, electric grid reliability and transformer standards are already subjected to oversight by federal bodies. You mentioned FERC and NERC. Do you anticipate legal debates that could arise over State versus Federal on this? Whether or not New Hampshire can mandate reporting and assessments that overlap with federal regulations?

Lt. Col. Waller: I could anticipate that there would be some people who would want to debate it, but I don't think it needs to be debated. The regulatory process between NERC and FERC is very time-consuming. Just the vegetation management standard that was established after the great Northeast Blackout of August 14, 2003—you all may remember that was a single point of failure from a tree branch in Ohio—that process between NERC and FERC to establish an enforceable regulatory standard took about nine and a half years. The idea here is to expedite

the understanding of how we can protect the grid in New Hampshire and not subject ourselves to that unduly time-consuming process that the federal government uses.

Rep. Wendy Thomas: Follow up. We're talking about the grid in New Hampshire, but it sounds like this is a national problem. What's the pushback on a federal level for doing this?

Lt. Col. Waller: You know, ma'am, I haven't experienced pushback. When I briefed Secretary Granholm, for example, she was very polite, smiled, even gave us a thumbs up. I think when it came to the previous administration, there were a lot of investments being made in other things that they imagined took higher priority, but there was never really any hostile reaction. Folks that I've briefed are similarly very well received. I guess it's a track record we have as a nation that things at the federal level take a long time. But I think where your question was also going, ma'am, is that the electrons don't care about state boundaries. This truly will have to be addressed regionally, but it's got to start somewhere, and this is the "First in the Nation" state. That's why I'm honored to be here to help you start it.

Chairman: Vice Chair Thomas has a question.

Vice Chair Thomas: Thank you, Mr. Chair. Just for clarification: you made a statement that this information process is already being done by all utilities and that all they have to do is use the right number. Is it, in fact, just a simple case of going to a formula and replacing one number with another, pushing a button, and the report will be generated? Or is there something more to it? I'm a little bit confused as to what has to be done.

Lt. Col. Waller: The utility industry has operating models that they use to comply with the NERC standard right now. So, just putting that number in would be one step. Now, the bill does tell them that they need to look at other factors, because when it comes to GIC vulnerability, the age of the transformer is a factor, among others. When we essentially took this request to help figure out what needed to be in the bill, I pushed it out to engineers from across the utility industry and experts on solar weather/EMP, and I asked them for the inputs—what are the most significant characteristics of a transformer to figure out how to triage? And that's what you see in the bill. So one part is putting in the right number, but there are other steps like looking at its age, its design. That list of requirements is going to give the industry a really good sense of which ones need to be protected the most.

Vice Chair Thomas: Thank you for the follow-up. Do you still maintain that the extra steps that would need to be done would be at virtually no additional cost?

Lt. Col. Waller: If you're looking at making a spreadsheet where you go through and you put the age of the transformer, where it was manufactured... it'd be kind of hard for me to imagine that they don't already have that somewhere in a spreadsheet. If they have employees on staff that are paid salary to maintain accountability of their equipment, I can't imagine it would be a lot more to just have them put it in this format. I wouldn't see that this would be unduly costly.

Chairman: A question.

Rep. Corman: Thank you again, Mr. Chairman. So, this bill has some very specific numbers in it: 100 kilovolts or greater, 25 MVA, use a waveform and a particular figure, magnetic field strength, right? Normally, if I'm voting on a bill, I understand what's in the bill. Now, I actually have a PhD in electrical engineering, but it really was computer science, not double-E, and definitely not Power Electronics. But I'm wondering, how am I going to understand?

Lt. Col. Waller: I don't know how much time we have, but what I would suggest is we just start with volts per kilometer. That standard is there to protect the electric grid from GIC. Where you're at in your state, the scaling factor that's being used—like Maine, Minnesota—it'd be four volts per kilometer. Imagine the transmission line... and then inducing into that infrastructure. And so, when you look at the numbers that we have here, 85 volts per kilometer is what is recommended with that IEC standard. That's the real comparison. The current standard that the utilities abide by—which, again, they can comply with and not have to install any kind of protection—results in New Hampshire being about 2.4 volts per kilometer.

No matter whether it's a Carrington Class solar storm or the 1921 solar storm... that storm produced about 20 volts per kilometer. Carrington would be larger, a Miyake event would be far larger. Or nuclear tests... and then 85 is the new standard for HEMP E3. So that's one way to understand it. I realize this is a technical document, created with the input from a lot of technical experts.

Chairman: Are there questions? Representative Bernardi.

Rep. Bernardi: Mr. Chair. So, the 85 is what the bill suggests, but the unit has greater protection capacity than that?

Lt. Col. Waller: You know, regarding the Miyake events, I'd have to go back and look at volts per kilometer, but when I looked at a table that compared Miyake to Carrington, it was like the comparison between NERC and Carrington. It was like the absolute worst case.

Chairman: We do have pink cards from Unitil and Eversource, so we'll be hearing from them. Representative McGee.

Rep. McGee: Mr. Chairman, thanks again. So, this bill looks like it's relatively preliminary, right? It's asking our State utilities to help us create an assessment of the vulnerabilities of the system. So then there would need to be follow-on work, discussion, legislation eventually to understand what we would then do in terms of taking any action, right? Because there would be costs associated with that. So that's what you're looking at, is just trying to implement the idea of having the state tell us?

Lt. Col. Waller: That's right. Yes, ma'am. For the utilities to basically say, "Hey, against this realistic threat, here's what we found, here would be the cost to fix it, and here are all of our recommendations for how to pay for that." We're literally inviting the utility industry to ask for help.

Chairman: Representative Thomas.

Rep. Wendy Thomas: Thank you. Representative Wendy Thomas. I have two questions. One is a clarifying question. You mentioned that New Hampshire is "First in the Nation." Did you mean that because we're politically first, or that no other state has implemented this at this point?

Lt. Col. Waller: You are the first state to follow this specific bill.

Rep. Wendy Thomas: Who receives this report? And are there security issues with this kind of information escaping the utilities?

Lt. Col. Waller: If the information were to be put in the wrong hands, then you absolutely could have security issues. And that's why CEII is highlighted. If you have specific entities within the state that you think should be the right ones to receive it...

Chairman: Yes, ma'am. So lines 29 through 30 specify that the entity shall submit a report to the Department of Energy with copies to the Public Utilities Commission, the Governor, the Chief of Homeland Security, and the Legislature.

Lt. Col. Waller: Yes. This may be the time for you to say, "Okay, well, is there like one committee in the legislature or something?"

Chairman: Additional questions? Vice Chair Thomas.

Vice Chair Thomas: Thank you, Mr. Chair. You mentioned earlier about the NCSL (National Conference of State Legislators) and their adoption. Would you explain what you meant by that for the benefit of the committee?

Lt. Col. Waller: It's an inspiring story where legislators who were presented a real threat at the Conference of State Legislators developed a resolution. Coming from here in New Hampshire, to identify the longest lead-time assets and prioritize those first. Our coalition took that resolution and started to ask ourselves, "Well, how do we help them do that?" Long lead-time assets? Okay, transformers. What are the solutions? What are the vulnerabilities? And so it was that resolution by unanimous vote from a nationwide conference asking for this to be solved that inspired us to start helping figure out how to solve it.

I brought this to the Department of Energy as well. I'm doing everything I can to work top-down and bottom-up. We're just going to fix this. The states that are ready to say what they need might be the first ones to receive what the federal government has to offer. Sort of makes sense, right? If you till the soil?

Chairman: After Vice Chair Thomas does a quick follow-up here, I think we're going to move on. We need to hear from some other folks.

Vice Chair Thomas: So, as a result of the resolution that came from New Hampshire, it would be the emphasis of why you're introducing the bill to New Hampshire first.

Lt. Col. Waller: Here first, because y'all asked for it. I mean, this lawmaker to my right (Rep. Matson) said, "Hey, help me figure this out."

Rep. Corman: I have a question for the Chair if I may. Can we recall the testifier after hearing from Eversource and Unitil if further questions arise?

Chairman: To the two of you, for your testimony. Next, we're going to hear from Unitil, and I'm going to call Alec O'Meara.

Alec O'Meara (Unitil): Good afternoon. For the record, my name is Alec O'Meara. I am the Director of External Affairs at Unitil. We have no formal position on this bill for a very specific reason: that is that we only have a handful of devices on our system—less than five—that would be covered under the language of this bill. That's largely because what this bill is looking at is high voltage equipment, the transmission system. And that tracks with everything I know in terms of solar flares and electromagnetics, in that the higher the voltage, the potential higher the overall vulnerability is.

In my career at Unitil, I received an inquiry from a reporter asking about this particular topic—specifically asking about solar flares—and I went down a deep rabbit hole learning all about it. There is a technology that exists right now to protect the system from this kind of solar flare or electromagnetic phenomenon, and that is: you shut it down.

ISO New England... in the years since, there's been a handful of times where I have gotten a heads-up from my dispatch folks looking at what happens if we are seeing a geomagnetic disturbance. De-energize the system. It is called the Carrington Event because of the flash on the sun approximately 18 hours prior to the actual flare. So, there is an opportunity to know that there is the potential risk for something like this to occur, and then to be able to shut it down.

This particular language here says that covered entities shall *not* rely solely on the operational procedures, such as load shedding or reactive power supply, to mitigate GIC risk. A lot of what is in here goes to the same comments that Mr. Elliott with DOE was making yesterday, in that there's a real balancing act on a lot of this stuff between reliability and affordability. Yes, there are things that utilities can do that can protect against all manner of things, but then the question becomes: is the cost to implement that worth the potential risk to the system?

I would wonder whether or not it isn't worth looking at what existing mitigation efforts also exist. When I first heard about this, I came away feeling that these opportunities to shed load effectively were sufficient. Now, I recognize that if we're talking about a nuclear blast, that may not be the same thing. I noted that in this language, it goes to 20,000 nano-Teslas (nT). I was wondering why; I now know why. It's because it's looking at events much, much larger than that.

Chairman: Could you mention the page and line number?

Alec O'Meara: Page three lines 10 through 12.

Chairman: Okay, thank you. I have a follow-up question. The folks who introduced the bill said that utilities are already gathering much of this information. Is that your understanding? Do you think your company already has this information at hand?

Alec O'Meara: One of the first things I did hear folks in our engineering team say is that we would likely need a consultant of some sort on our end. I know that there would certainly be a lot more devices affecting Eversource, so I defer to them in terms of the scale of this work. I can only add that I personally have learned to be skeptical whenever I hear anyone say it's "easy" for a utility to do something.

Chairman: Thank you. Representative Corman has a question.

Rep. Corman: This is an easy one, I think. Just a clarification: when you say that you're talking about just cutting power to everybody, all your customers, and de-energizing the entire system... load shed?

Alec O'Meara: Yes, sir, that's correct. That is a command ISO New England calls. Typically, they are brought up in situations where there may be a capacity deficiency. This is a situation where, in the event you saw something catastrophic, you would then be directed to shed load. That load shed would happen probably before our system; it's just something that we would be aware of and prepared for.

Rep. Corman: And this would not be a decision that Unitil would make. It would be a decision that ISO New England makes?

Alec O'Meara: That is correct. We rely on them to understand that an event has occurred.

Rep. Wendy Thomas: Representative Wendy Thomas. My question was also about de-energizing the system. Have you done this in the past, I assume? And what kind of a time frame are we looking at here? Minutes, hours, days?

Alec O'Meara: Let's start with the first bit of that. No, this has never happened before. I don't believe there's ever been an instance throughout New England where load shedding has happened regarding a geomagnetic disturbance. The flare itself... you could be at risk for an extended period, but the actual duration is relatively recent. These are better questions for the transmission folks.

Chairman: Okay, seeing no further questions, I want to thank you for your testimony. I call next on Eversource, who will be represented by Michael Licata, Brian Dickey, and Dave Claudio. Welcome, gentlemen.

Michael Licata (Eversource): Good afternoon. I'm Michael Licata, the Director of Government and Community Relations for Eversource. I'm joined by Brian Dickey, our Vice President of Electric Operations, and Dave Claudio, who is our Director of System Operations.

First, we really do appreciate the bill sponsor and the bill co-sponsors' concern over this critical issue. It's critically important that there is awareness and understanding of the threats that geomagnetic and electromagnetic events can cause. I also want to assure the committee that there is a great deal of work that has been done on this issue regarding evaluating grid vulnerabilities as well as response plans, in conjunction with NERC and ISO New England. I'm going to turn it over to Brian now to walk through some of the assessments we have done.

Brian Dickey (Eversource): Good afternoon. So, as far as the studies at the transmission level, we do have models as part of the NERC standard. The NERC standard is predicated on geomagnetic storms, not a [HEMP] type device. Geomagnetically Induced Currents limited to a 12 volt per kilometer threshold.

The threshold for the study is to study everything from a 200 kV threshold and above, with grounded wye primary windings. So it's very discreet. What's in the bill is a little bit different and would not apply to just transmission; it would apply to distribution. We have models... but for the distribution system, we do not have that data. It would take considerable time to create a model to model the distribution system.

On the transmission level, again, we do have that information. I don't know if it's just a matter of plugging in a new value. I'm sure there's a little bit more to it than that, and I don't know if the time period of 180 days after the bill's passage is doable.

Chairman: Excuse me, I'm going to interrupt you briefly. Someone has a question.

Vice Chair Thomas: You have the transmission system assessed, but for the distribution, how many units in the distribution system would you have to go out and get data for?

Brian Dickey: It's not only the units; it's the system itself we'd have to model. I'm trying to understand how big the elephant is. We're talking probably 90 transformers at least. All the lines... the DC component of overhead lines.

Chairman: Representative Reynolds wants to follow up.

Rep. Reynolds: Thank you, Mr. Chairman. Another thing that we talk a lot about here... companies that want to put distributed generation (solar) on the system apply, and the utilities evaluate. I find it hard to hear that you have the information about the transformers on your distribution system?

Brian Dickey: So we have an AC model (Alternating Current). We do not have the DC component. All I'm saying is we'd have to go out and obtain that information. My understanding is when they did the transmission study, relating that to the distribution system, that's what we have.

Michael Licata: Please continue.

Brian Dickey: Thank you. Walking through some of the specific language on the bill... pointed out the 180 day message. That time frame might create some challenges.

You heard from Unitil about the 20,000 Nano Tesla / 85 volt per kilometer. That is a much, much higher standard. Sticking with page two, on lines 30 and 31... we did have concerns about providing information to the Public Utilities Commission, the Governor, the Chief of Homeland Security (I think you would want that to be the Director of the Division of Homeland Security and Emergency Management), and all 424 members of the New Hampshire State Legislature. That goes into the next concern: starting at line 33, it is extremely detailed in the amount of information and specificity on our transformers. I guess I question the necessity of having that information included to begin with at that specific level of detail.

Also included in the assessment on line 7 on page 3: a "priority list of transformers by damage risk and critical infrastructure impact." Similar concern that we would not want to disclose that publicly.

Then, moving down to the reference to CEII protocols as defined in RSA 378-A:2. I'm assuming that's a typo... I don't think there is a 378-A:2. Legislative Services likely needs to clean that up.

Similar to Unitil, we did have concerns about why load shedding is eliminated as a mitigation strategy. Again, that is currently the strategy that utilities employ as directed by ISO New England.

And finally, there is an open question about a state directing a transmission owner to do work that would be recoverable through rates, which would be approved by FERC (Federal Energy Regulatory Commission). The costs... if the State of New Hampshire were to tell us to install specific devices, those would be recovered through the transmission rate, which is set by FERC. So you kind of have a jurisdictional issue associated with that.

We'd be happy to work with the Department of Energy, PUC, and Department of Homeland Security on other mitigation strategies.

Chairman: Thank you. A quick question regarding your comments about lines 30 and 31. You think it might be more appropriate to have this information available to the Department of Energy and possibly the PUC, but *not* the Governor, the Chief of Homeland Security, and the Legislature?

Michael Licata: I think that would be helpful. I would have to check with our folks on the inclusion of Homeland Security. Especially on cybersecurity issues, there might be some value in sharing information with them.

Chairman: Representative Bernardi has a question.

Rep. Bernardi: The issue of load shedding is a little troubling to me. My understanding of solar EMP is we have maybe a couple of minutes from the coronal event to the time you need to shed. Is ISO New England going to be able to shut down the entire grid? Because that's what it

would take. You can't just shut off little pieces. If one of the North Korean satellites decides to wipe out our grid, it's gone. How do you deal with that?

Brian Dickey: Two things there. First is the solar. Obviously, in contemporary times, there is more monitoring of the sun, advance notice, and it does take some time for a CME to get to the Earth. So we do get notice. We watch Var flow (reactive power flow). We get indication on the system if there is excessive current and excessive reactive var flow. You wouldn't kill everything; you'd kill a piece of equipment or de-energize a piece of equipment.

For a nuclear device... that's a different issue. That would be a National Security issue. I can't give you an expert opinion on that. But again, load shedding in the event of a solar event... if you kill the big transformers, you've killed the whole system.

Chairman: Representative Partial.

Rep. Partial: Would ISO New England be more effective if somebody like that organization undertook a study of this nature?

Brian Dickey: Engineers work on it. Completed a study. Outside vendor verified that study to make sure it was accurate based on the NERC standard. Again, the NERC standard is very discreet: grounded wye, 200 kV or greater, which limits the study to transmission only. This [bill] ends up pushing the study into the distribution room.

Michael Licata: Just to follow up, when NERC published [the standard], ISO New England contacted all the transmission owners and set up a process which I believe took four years for each of the transmission owners to complete that assessment.

Chairman: Clarification. Mr. Dickey, did I understand you to say the bill raises changing the number [voltage threshold] online?

Brian Dickey: That and the winding configuration. The colonel was talking about auto-transformers, high voltage transformers with grounded wye connections. On our distribution system, we have many transformers that are connected to the transmission system... down to a distribution voltage of 34.5 kV. The primary windings on those transformers are Delta connected, meaning there's no connection to ground. That's not how this reads. It just says primary voltage of 100 kV or greater capacity. That's a little bit different than the NERC standard and how it's written. So this pushes the study down and would create more cost.

Chairman: Representative Reynolds.

Rep. Reynolds: In your opinion, is the bill sponsor's definition of the threshold—the net being cast—overbroad?

Brian Dickey: It depends on what the bill is trying to do. The previous parties talked about transmission studies. The way this is written, it impacts distribution.

Michael Licata: If I could just add one thing... one of the reasons we talk about transmission as being a vulnerable infrastructure to these type of events is one, the voltage, but also the distance.

Brian Dickey: Yes, so if you think about what these studies do, they're looking at induced currents in the earth. The extra high voltage is more susceptible due to the length of the lines. Transmission lines are long, very long lines. GIC currents run west to east, or if you're near a large body of water like the Atlantic Ocean. Transmission runs in a beeline. Distribution lines run all over the place; they meander right through the communities.

Chairman: Representative Thomas has a question.

Rep. Wendy Thomas: Thank you. Can you just assure me that you have a published research process in the event of a solar flare?

Brian Dickey: Yes, we have an operating procedure. We get notification from NOAA. They have a network to get that out to NPCC, which gets sent to ISO, which gets out to us. Once that's triggered, we go into enhanced monitoring. We're looking at reactive var flows, making sure we're not getting any heating on our transformers. We measure current, voltage, temperature, winding temperature in real time in the control room.

Chairman: Okay. Vice Chair Thomas has another question.

Vice Chair Thomas: The previous speaker alluded to the cost of what it would take to fix this nationally, which was three or four billion dollars. In my mind, I could double that because costs always increase. Even at that, it sounds pretty cheap to fix something on that scale. I'm trying to understand the reluctance here on trying to identify areas that would help a national effort. My concern is for the catastrophic... what this country would be like without power that some entity was able to inflict on us on a no-notice basis. I feel like we're the people trying to prove that the Earth is round. This bill could be turned into an order to provide that type of information from a starting point.

Michael Licata: I don't want to leave the committee with the impression that there is reluctance on behalf of the utility to protect our infrastructure. But there's a balance. You can't protect against everything. As we look to balance the affordability of the services we provide and the reliability... we always take that cost into account and the risk profile.

Brian Dickey: We're willing to do whatever the regulations require us to do. Whatever the state bodies are looking for us to do. It's just a matter of balancing the cost and keeping affordability.

Chairman: House rules prohibit you from asking questions of folks who are testifying [referring to interjection]. We'll have to take that offline because we've run out of time here. Appreciate your testimony. Since I have no more pink cards on House Bill 1723, I'm going to close the public hearing on this proposed legislation.