Literature Study to the Impact of HVTLs on Property Value

Before a discussion can be entered about the perception of electric transmission lines and their effect on property value, it is important to understand what a transmission line is and how it differs from a distribution line.

An electric *transmission* line is an electric line that transports electrical power from one substation to another. These lines are typically 100kV (kilovolts) or larger, exceeding one mile in length, have large wood or steel support towers over 65ft in height, and often have more than one set of wires (3 wires per circuit plus the static wire). The graphic below shows the different types of transmission line support structures and their typical kilovolts.

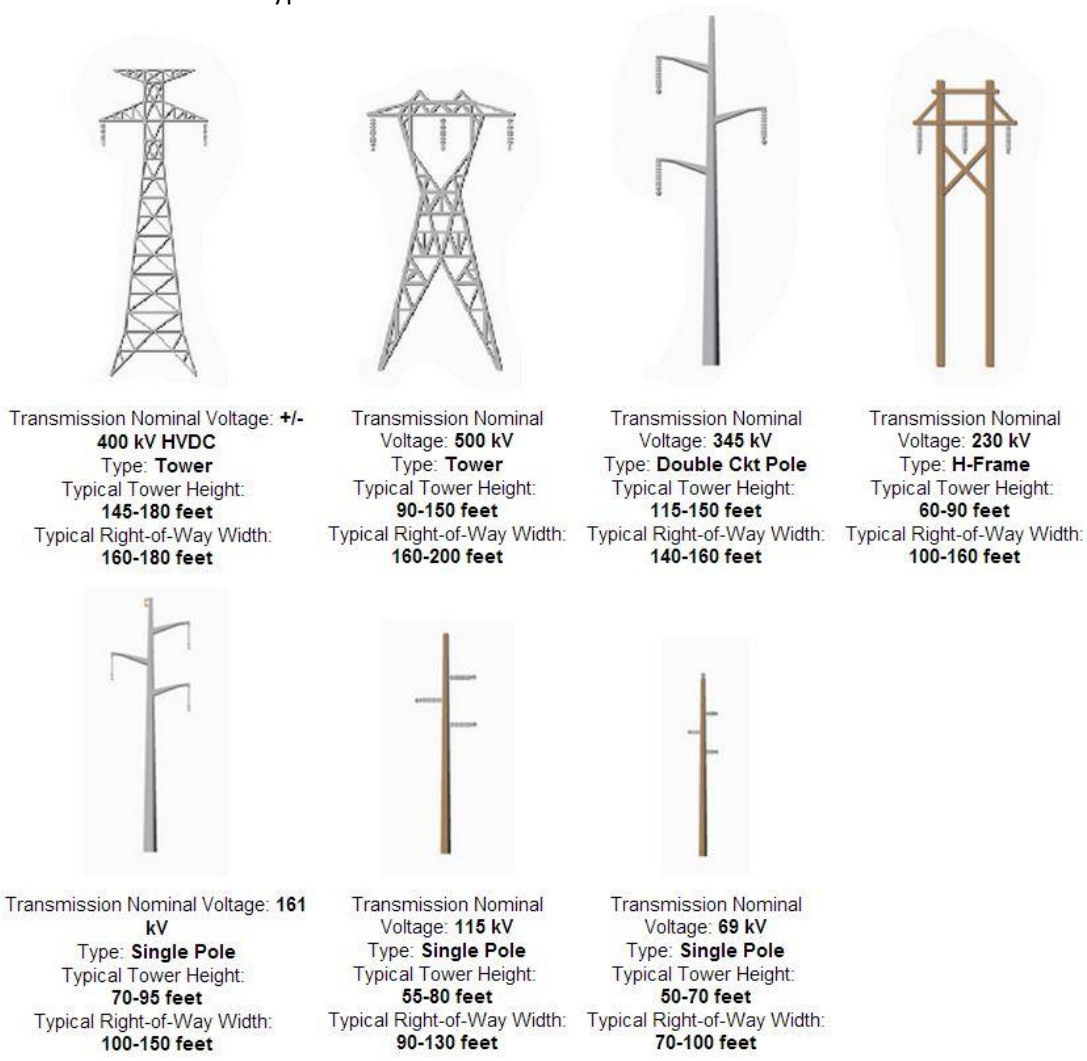

Figure 1: from Minnesota Electric Transmission Planning. www.Minnelectrans.com.

Electric transmission lines do not directly serve electric utility customers: their power is moved from power source to a substation. Transmission line wires are not insulated and are "bare." Typically, they are constructed to have at least 20ft of clearance between the ground elevation and wire at low sag.

The following graphic demonstrates the relationship between transmission and distribution lines.

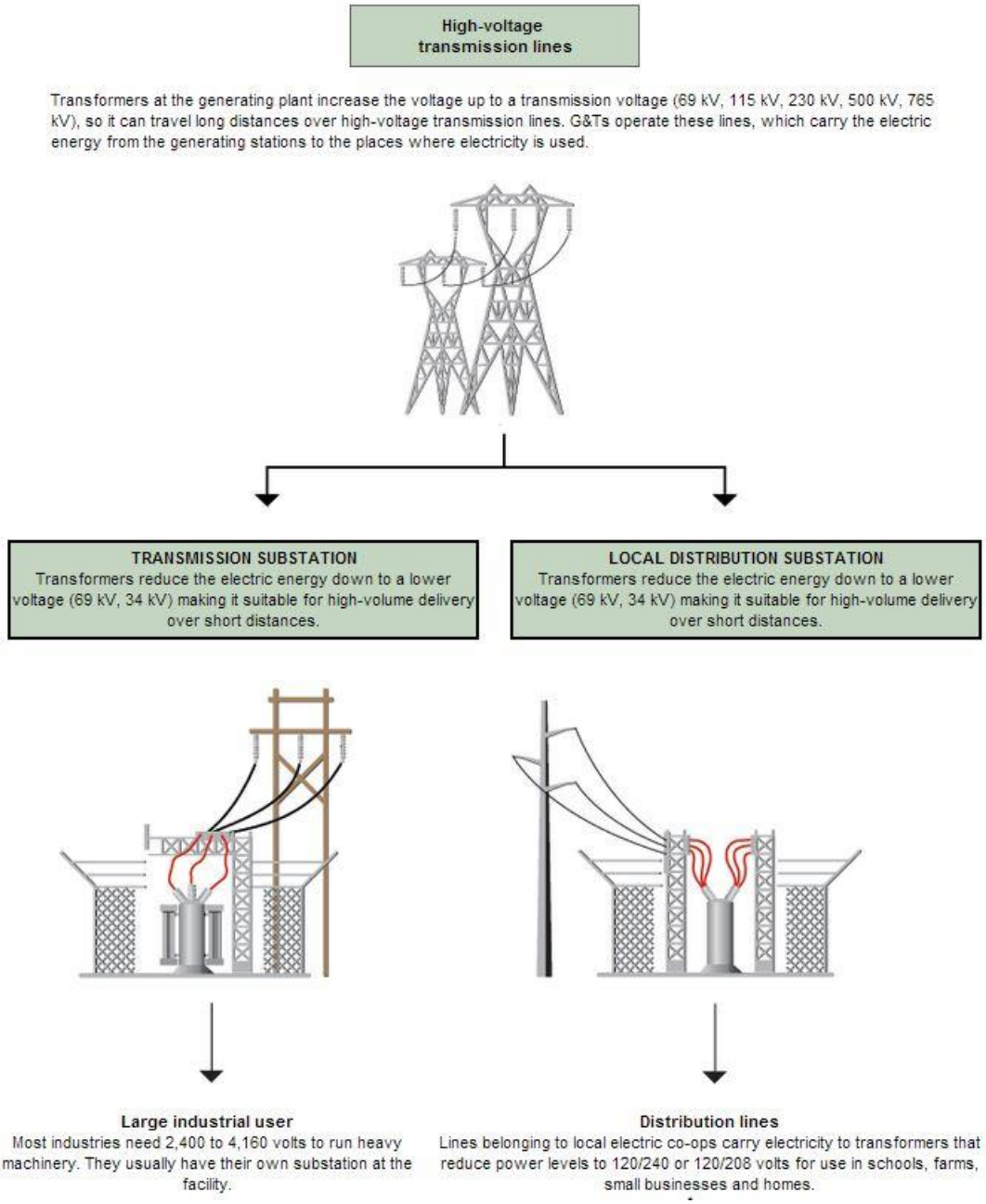

Figure 2: from Minnesota Electric Transmission Planning. www.Minnelectrans.com.

An electric *distribution* line is an electric line that transports electricity from the substation to the electric utility customers. These lines are of less voltage, typically under 65kV, carried on wood poles of 45ft in height or less, and hold one pair of wires. The voltages of these lines are downgraded before the electricity is brought to the customer's residence or commercial building.

The focus of this study is on transmission lines, not distribution lines.

Perception = Value

The valuation of properties that have an electric transmission line requires an understanding of the basic principles of Market Value. Market Value is defined, in layman's terms, as the value a property would sell for at a given date considering an open market. (A complete definition of this term is included in the body of the appraisal report.) An open market assumes that the property is available for purchase by the public, being properly marketed for maximum exposure, and that the buyer is well informed, fully knowledgeable and acting in their best interest. Included in this definition is that the buyer has full knowledge of the pros and cons of the property, and then acts with that knowledge in a way that will benefit them. In other words, the value of the property is based on the perception of the buyer. Understanding that perception drives value is the foundation in analyzing the effect that electric transmission lines have on property value.

The key point of the Market Value definition, which gives guidance to answer the impact question, is the willing buyer part of the equation. In appraising a property, the appraiser attempts to reflect the potential buyer of the subject property and estimate their action as to the subject property with all its advantages and disadvantages (knowledgeable buyer). To accurately reflect this buyer, the appraiser must determine the typical profile of such a buyer of the property in question. An example of this would be a one-bedroom condominium on the lake; it may indicate a typical buyer to be a retired couple who is looking for a recreational retreat for themselves and their guests. Another example would be a parcel with the best use being a dairy farm; the typical buyer would be a person either currently engaged in dairy farming looking to expand or relocate, or one who desires to enter into this field – in either case a dairy farmer. Such an analysis should be obvious, yet it is often overlooked when appraising properties.

For rural properties that are utilized for agricultural purposes, the most likely buyer would be one who: (1) prefers the rural lifestyle over the urban lifestyle; (2) typically generates their income from working in the agricultural field; (3) would be sensitive to environmental issues that affect the uses of the land and the view shed of the land; and (4) would be sensitive to health and safety issues relating to the land and its use.

It is most likely that such a person, when confronted with an electric transmission line traversing the property, would view such an improvement as aesthetically ugly, potentially hazardous to their health, disruptive to rural lifestyle and potentially harmful to the use of the land for agricultural purposes.

Research Format

Our literature study into the impact of electric transmission lines involved investigating, collecting, indexing and reading many of the published articles, news stories and published transcripts relating to the topics of EMFs and stray voltage. Stray voltage was included in this research due to the concern dairy farmers have relating to its presence from high voltage power lines. This research yielded over a thousand pages of information that was collected and analyzed. The purpose of this study was to discover "what is the public's perception of high voltage transmission lines." This study broke down the issues into major headings as will follow.

HVTL Impacts on Rural and Agricultural Properties

Throughout the nation's rural communities, literature research suggests that the presence of an HVTL easement can have a noticeable impact on both the use and appeal of rural properties and farms. Common concerns include stray voltage, health risks to livestock and cattle, diminished livelihoods and heritage, limited land use, and lessened aesthetic appeal. As the following literature survey will show, many different issues play a role in shaping one's perception of the impact of HVTLs on rural property values.

Stray Voltage

To understand the potential impact of HVTLs on rural land, it's important to discuss a key component in many farmers' apprehension about HVTLs: stray voltage.

Stray voltage is the rural equivalent of the high-profile residential Electromagnetic Field (EMF) factor, but instead of fearing leukemia or brain cancer, farmers fear their animals will become unproductive, ill, and even die.

Whenever energy is transferred, some is lost along the way. If metal buildings are near leaking energy, they can act as a conduit for voltage to find its way to feeding systems, milking systems and stalls.

In their 1995 presentation, "Stray Voltage: The Wisconsin Experience," a team of researchers led by Mark Cook and Daniel Dascho stated that farmers most worry that stray voltage will increase somatic cell count in their animals, make cows nervous, reduce milk production, and increase clinical mastitis.[1]

"Few issues are more upsetting to dairymen than fighting case after case of clinical mastitis with more and more cows in the sick pen," writes Dr. Winston Ingalls. "It represents extra time to properly handle such cows, lost production, vet calls, treatment products, concern about contaminated milk and an occasional dead or culled cow."[2]

In Cook & Dascho's presentation, they discuss their findings from a non-random sampling study of farms with stray voltage complaints stemming from a nearby substation. Their research team found no significant relationship between cow contact current and distance from the substation or contact currents. However, they also noted that cow contact current depends on many physical factors from on-farm and off-farm electrical power systems. They say, "There are many confounding factors that may outweigh the impacts of stray voltage which makes it difficult to draw conclusions from field studies about its effects on production and animal health."[3]

In a 2003 study prepared for the NRAES Stray Voltage and Dairy Farms Conference, a research team conducted by the University of Wisconsin-Madison, and led by Dr. Douglas J Reinemann, studied the

1 Stray Voltage: The Wisconsin Experience. Written for presentation at the 1995 International Meeting by Mark A Cook, Daniel M Dascho, Richard Reines and Dr. Douglas J Reinemann.
2 Clinical Mastitis. Winston Ingalls, Ph.D. GoatConnection.com. August 2, 2003. http://goatconnection.com/articles/publish/article_173.shtml
3 Stray Voltage: The Wisconsin Experience. Written for presentation at the 1995 International Meeting by Mark A Cook, Daniel M Dascho, Richard Reines and Dr. Douglas J Reinemann.

effects of stray voltage on cows at four dairy farms over a two-week time period. He and his team found that after the first few days of exposure, cows quickly acclimated to the presence of stray voltage. They also found that stray voltage of 1mA had little effect on the immune system of a cow.[4]

Concerning EMF levels, they noted that "even though man-made signals were larger than the naturally occurring currents, levels are significantly lower than what is considered sufficient earth current strength to develop step potential anywhere near the Public Service Commission 'level of concern.'"[5]

Stray voltage is usually undetectable by humans, and some researchers believe it occurs when electricity escapes a power line or wiring system and emits a secondary current. The problem intensifies with older barns that add automated electrical equipment, "raising ambient levels of current. Soon the cumulative effect of these secondary currents becomes harmful to cows." Though stray voltage can be measured, experts don't know how and why it happens or what conclusive effect (if any) it has on animals.[6]

Despite little concrete evidence, courts have compensated farmers for their losses due to stray voltage when all other factors are eliminated. In 1999, a jury awarded Peterson Bros. Dairy $700,000 after deciding that stray voltage from an automated feeding system from Maddalena's Dairy Equipment of Petaluma, California slashed the herd's milk output and increased the cow's death rate.[7]

The company's defense attorney called stray voltage "junk science," the Petersons' claim of stray voltage in the milk barn a "harebrained theory" unsupported by electrical engineers, and blamed the herd's health problems on the Petersons' own mismanagement.[8]

In a similar case in Wisconsin in 2004, a dairy operation owned by George and Kathy Muth successfully sued Wisconsin Electric Power Co. (now We Energies) for negligence in the maintenance and operation of a distribution system on their farm. They claimed that the system led to stray voltage that injured and killed several of their dairy cows and damaged their milk production. The utility said that the levels of stray voltage were "extremely low" and were levels you could find anywhere.[9]

The farmers said that shortly after moving to their new location, they faced low milk production, excessive illnesses, and deaths of cows.[10] The cows didn't walk right or act normal. They didn't want to go into the barn, inside, or into the stalls. The Muths examined everything from the animals' food to

4 Dairy Cow Response to the Electrical Environment: A Summary of Research conducted at the University of Wisconsin-Madison. Paper presented at the NRAES Stray Voltage and Dairy Farms Conference. Dr. Douglas J. Reinemann. April 2003.

5 Results of the University of Wisconsin Stray Voltage Earth-Current Measurement Experiment. A revised version of a report submitted to the State of Wisconsin Legislature on June 25, 2003. Written by David L Alumbaugh and Dr. Louise Pellerin.

6 Jury gives $700,000 to dairy farmers for losses blamed on "stray voltage." Author Unknown. The Associated Press. April 21, 1999.

7 Ibid.

8 Ibid.

9 Power company negligent in dairy suit; Jury awards $850,000 to couple over effect of stray voltage on cows. Lauria Lynch-German. Milwaukee Journal Sentinel. February 27, 2004.

10 Jury must decide in voltage complaint; Farm family says stray power harmed dairy herd. Lauria Lynch-German. Milwaukee Journal Sentinel. February 5, 2004.

their bedding until consultants told them it could be stray voltage. In one year, they lost 15-18 cows and calves. Autopsies were inconclusive.[11]

After reviewing herd management and nutrition, they hired a consultant who detected stray voltage. Later that year the utility found no stray voltage problems. The farmers further consulted with veterinarians and tested and ruled out all the other factors except for stray voltage.[12]

The farmers hired an electrician to upgrade the farm's wiring, but it didn't decrease the stray voltage. After being asked, the utility made some other changes, but this also had no effect. Further consultants still found stray voltage from a conductor on the utility's distribution lines. A couple years later the utility removed a piece of underground electrical equipment and the herd immediately recovered…though the level of stray voltage remained the same.[13]

The utility's attorney stated that being able to measure something doesn't make it harmful. He cited several federal and state studies that say the current must be 2 milliamps or higher to adversely affect cattle and said no reading on their farm reached that level.[14]

The jury awarded the dairy farm $850,000 in damages.[15]

Stray voltage fears aren't limited to dairy or cattle operations. Max Hempt, a horse farm owner in Pennsylvania, tried to oppose a proposed 9-mile 138kV HVTL because he feared that the line's EMFs caused by stray voltage could cause sterility and death among his horses.[16]

Though it's difficult to prove a significant presence of stray voltage, and even more difficult to prove a direct correlation between stray voltage and poor health, courts have awarded farmers sizable judgments to compensate them for damaging stray voltage from nearby power lines.

In 2002, one such case in Iowa made it to the state supreme court where the court upheld a $700,000 judgment to a dairy farmer who argued that stray voltage from nearby power lines injured his herd. A substation sits less than a quarter mile from his farm. He said he often got electric shocks from the metal buildings on the farm. Also, he said his herd acted oddly, appearing frightened and refusing to enter barns. Milk production also suffered.[17]

The defendant, Interstate Power Co., said that "there's an inherent risk to transmitting electricity" and it shouldn't be vulnerable to such lawsuits unless they were negligent. The court ruled in favor of the dairy farmer, citing the lack of a statute exempting electric utilities from nuisance claims.[18]

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11 Dairy farm owner testifies that stray voltage killed cows in his herd. Lauria Lynch-German. Milwaukee Journal Sentinel. February 10, 2004.
12 Jury must decide in voltage complaint; Farm family says stray power harmed dairy herd. Lauria Lynch-German. Milwaukee Journal Sentinel. February 5, 2004.
13 Ibid.
14 Ibid.
15 Power company negligent in dairy suit; Jury awards $850,000 to couple over effect of stray voltage on cows. Lauria Lynch-German. Milwaukee Journal Sentinel. February 27, 2004.
16 Farmer Fears Stray Voltage From PP&L 138 kV Line Could Harm His Horses**.** Author Unknown. Northeast Power Report. June 24, 1994.
17 Court upholds stray voltage judgment. Mike Glover. The Associated Press. October 10, 2002.
18 Ibid.

One year later, the Wisconsin Supreme Court similarly found "that a utility can be held responsible for harming the health of a dairy herd with stray voltage even though state-recommended voltage tests did not find potentially damaging levels where the animals congregated."[19]

As the preceding case studies show, courts have acknowledged stray voltage and its possible effects. However, to fully understand the apprehension surrounding power lines, one must examine the EMF debate and its fear factor.

EMFs and Fear

In 1990, the EMF debate was so prevalent that members of Congress passed a bill that would limit the public's exposure to EMFs.[20] A couple years later, in response to public concern about EMFs, Congress established the EMF-RAPID program in 1992 to be managed by the National Institute of Environmental Health Sciences (NIEHS). RAPID is an acronym for Research and Public Information Dissemination. Its purpose was to coordinate and execute a limited research program to fill information gaps concerning the potential health effects of exposure to EMFs, to achieve credibility with the public that previous research has not earned, and to coordinate and unify federal agencies' public messages about possible EMF effects.[21] The program originally was to receive $65 million in funding,[22] but the final budget was $45 million.[23]

Several years later in 1999, the National NIEHS studied the health effects of EMF exposure and found conflicting results. Though they concluded that the evidence is weak linking EMFs to health risks, they also found that the most common health risk was leukemia (mostly appearing in children). They also found a fairly consistent pattern of a small, increased risk of childhood leukemia with increasing exposure. The majority of the panel's voting members voted to acknowledge EMFs as a possible human carcinogen. They concluded that ELF-EMF exposure cannot be recognized as entirely safe because of weak scientific evidence.[24]

In 2005, UK scientists conducted a case-control study on childhood cancer in relation to distance from high voltage power lines in England and Wales. They found an association between childhood leukemia and proximity of home address at birth to HVTLs. "The apparent risk extends to a greater distance than would have been expected from previous studies," although they have yet to discover an "accepted biological mechanism" to explain their results.[25]

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19 Utility liable for stray voltage, high court says. Don Behm. Milwaukee Journal-Sentinel. June 26, 2003.
20 Electric Powerlines: Health and Public Policy Implications – Oversight Hearing before the Subcommittee on General Oversight and Investigations of the Committee on Interior and Insular Affairs House of Representatives, 101st Congress, second session on electric powerlines: health and public policy implications. March 8, 1990.
21 Electric and Magnetic Fields Research Program by Mr. Mukowski from the Committee on Energy and Natural Resources. 105th Congress, first session. June 12, 1997.
22 Ibid.
23 The Federal EMF RAPID Program. http://www.sdge.com/safety/california-federal-international-research-programs/federal-emf-rapid-program.
24 NIEHS Report on Health Effects from Exposure to Power-Line Frequency Electric and Magnetic Fields. Released by the National Institute of Environmental Health Sciences on May 4, 1999.
25 Childhood cancer in relation to distance from high voltage power lines in England and Wales: a case-control study. Gerald Draper, Tim Vincent, Mary E Kroll, John Swanson. British Medical Journal (bmj.com). June 3, 2005.

Though an accepted biological mechanism remains elusive, an early nineties case made it possible to link loss of property value to a fear of EMFs. In the 1993 case, *Criscuola v. Power Authority of the State of New York*, the court found that, "there should be no requirement that the claimant must establish the reasonableness of a fear or perception of danger or of health risks from exposure to high voltage power lines" and "Whether the danger is a scientifically genuine or verifiable fact should be irrelevant to the central issue of its market value impact."[26]

Utilities say that landowners should not be able to recover damages or injunctive relief "based on myth, superstition or fear about an alleged health risk that is not supported by substantial scientific or medical evidence."[27]

With the EMF debate unresolved, and evidence for both sides of the argument, some communities are reluctant to approve new HVTLs…and may even legally oppose them.

In an effort to preempt public opposition, Public Service Enterprise Group offered hundreds of thousands of dollars to New Jersey towns opposing its proposed HVTL project if the towns dropped all opposition and didn't comment on the payments. Opponents called them "bribes." The utility called them "settlements" to help minimize impacts of the project on towns and residents.[28]

Some towns accepted payment, but the majority did not. Either they said they didn't have enough time to respond to the offer, or they rejected them as payoffs. One of the opposing mayors, Mayor James Sandham of Montville, said it's not about the money; "It's about safety and property values."[29]

HVTLs and Property Values

Fear can impact the public's buying habits. Residential homeowners' resistance to abutting HVTLs is well documented. Though homeowners may fear negative effects on their community and environment,[30] their first point of opposition is usually safety, especially if there are many children in the neighborhood. Though the 1979 Wertheimer study linking EMFs to childhood leukemia has long been contested, supported, and contested again, the very existence of a debate about the safety of EMFs sows enough doubt in residents' minds to justify the fear.[31] And that fear can influence the values of nearby homes.[32] [33] [34] [35]

26 'Criscuola' – The Sparks Are Still Flying. Michael Rikon. New York Law Journal. April 24, 1996.
27 High Court Hears Arguments Today on EMF Claims. Todd Woody. The Recorder. June 6, 1996.
28 Opponents of $750M N.J. power line project argue towns were paid to drop opposition. Lawrence Ragonese. The Star-Ledger. January 31, 2010.
29 Ibid.
30 NY Power Line Opponents Win Court Fight. Associated Press. New York Post. February 20, 2009.
31 Lines in Sand and Sky. B.Z. Khasru. Fairfield County Business Journal. September 3, 2001. Vol. 40 Issue 36, p3, 2p.
32 Power line plan concerns metro residents. Melissa Maynarich. News 9 (Oklahoma). July 22, 2008.
33 Power Line Worries Landowners. Ben Fischer. The Wisconsin State Journal. June 3, 2006.
34 Lines in Sand and Sky. B.Z. Khasru. Fairfield County Business Journal. September 3, 2001. Vol. 40 Issue 36, p3, 2p.
35 Commissioners voice opposition to transmission lines. David Rupkalvis. The Graham Leader. February 9, 2010.

When given the choice to purchase two identical homes, one with such health concerns and the other without, most buyers will choose the home without the concern,[36] forcing the homeowner to lower their price. Aesthetic impact can also influence a property's value. Many residents don't want to look at HVTLs,[37] something they consider to be an "eyesore."[38]

One of the hardest properties to sell can be one encumbered by an HVTL. Unlike roadway proximity, its effect isn't readily noticeable or measurable. Though homes near HVTLs typically have larger lots (and that can be a benefit), the biggest disadvantage is the fear factor surrounding EMFs.[39]

In the early nineties, when EMFs were just entering the public consciousness, it was difficult to find a measurable price difference between homes close to an HVTL and those that were not.[40] However, two researchers (Hsiang-te Kung & Charles F Seagle) conducted a case study on the impact of power transmission lines on property values and found that such negligible results depended almost entirely on the public's ignorance of EMFs and their related issues. They also found that the amount of potential property loss increased dramatically the more homeowners were aware of the potential health impacts of EMFs.[41]

The effect of HVTLs on property values has long been a matter of contention with many studies either proving a diminutive effect or none at all. Methodologies differ and different areas of the country register different results. Some markets (ex. high-end homes) are very sensitive to HVTLs whereas others (ex. low-end homes) hardly notice them. The size of the line and the pylons are also a factor. A 69kV power line will have less effect than will a 1,200kV power line. Distance from the easement also matters. Some studies combine homes thousands of feet from HVTLs with those directly encumbered. Research sponsors also may play a factor with many being funded by the utilities themselves.

For example, in a 2007 study funded by a utility, researchers Jennifer Pitts and Thomas Jackson conducted market interviews, literature research and empirical research and reported little (if any) impact of power lines on property values. However, they did note that there is an increasing recent opinion that proximity to power lines has a slight negative effect on property values.[42]

Two California appraisers, David Harding and Arthur Gimmy, published a rebuttal to the Pitts-Jackson study that disagreed with their methodology, took issue with their sponsor, addressed omitted information and failure to conduct before-and-after cost comparisons.[43]

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36 Real Estate Agents on Property Value Declines. 4 Realtor opinion letters submitted to residents in the Sunfish, MN area whose properties are being affected by an HVTL.
37 Ibid.
38 Power line plan concerns metro residents. Melissa Maynarich. News 9 (Oklahoma). July 22, 2008.
39 High Voltage Transmission Lines, Electric and Magnetic Fields (EMF's) And How They Affect Real Estate Prices. David Blockhus. January 3rd, 2008. http://siliconvalleyrealestateinfo.com/electric-and-magnetic-fields-emfs-and-how-they-effect-real-estate-prices.html
40 Impact of power transmission lines on property values: A case study. Hsiang-te Kung & Charles F Seagle. Appraisal Journal. Vol. 60, Issue 3, p.413, 6p. July 1992.
41 Ibid.
42 Power lines and property values revisited. Jennifer M. Pitts & Thomas O. Jackson. Appraisal Journal. Fall, 2007.
43 Comments on "Property Lines and Property Values Revisited." (Letter to the editor) David M. Harding & Arthur E. Gimmy & Thomas O. Jackson & Jennifer M. Pitts. Appraisal Journal. Winter, 2008. http://www.entrepreneur.com/tradejournals/article/176131510.html

Pitts and Jackson responded to the rebuttal and defended their methodology, saying they purposely limited their literature research to only include empirical, peer-reviewed articles from The Appraisal Journal and the American Real Estate Society journals. They acknowledged they conducted the research for "a litigation matter" but did not elaborate on their sponsor.[44]

In a similar case, researchers James A Chalmers and Frank A Voorvaart published a large study spanning nearly 10 years and over 1,200 properties in which they found that an encumbering HVTL had only a small negative effect on the sale price of a residential home. In half of their samples they found consistent negative property values mostly limited to less than 10%, with most between 3%-6%.[45]

They summarized their findings as showing "no evidence of systematic effects of either proximity or visibility of 345kV (kilovolt) transmission lines on residential real estate values."[46]

They did, however, say that, "An opinion supporting HVTLs effects would have to be based on market data particular to the situation in question and could not be presumed or based on casual, anecdotal observation. It is fair to presume that the direction of the effect would in most circumstances be negative, but the existence of a measureable effect and the magnitude of such an effect can only be determined by empirical analysis of actual market transactions."[47]

Appraiser Kerry M. Jorgensen disagreed with the authors' views that paired data analysis and retroactive appraisal were "too unrefined and too subjective to be of much value," and that only through objective statistics could the effect of HVTLs on property value be truly understood. He argued that relying too much on statistics can be dangerous as there could be problems with how the data is compiled and interpreted. For example, he points out that out of their set of 1,286 qualifying sales, only 78 (6%) are directly encumbered by a power line easement, and only 33 (2.6%) more are within 246 feet of a power line easement.[48]

The Chalmers-Voorvaart study also attracted the interest of Washington Post Real Estate writer Elizabeth Razzi who wrote that the study was paid for by Northeast Utilities and completed before they proposed a high-voltage transmission grid in New England. She also wrote that both Chalmers and Voorvaart are appraisers and expert witnesses for the power industry.[49]

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44 Ibid.

45 High-Voltage Transmission Lines: Proximity, Visibility, and Encumbrance Effects. James A Chalmers and Frank A Voorvaart. The Appraisal Journal via the Appraisal Institute website. Volume 77, Issue 3; Summer, 2009; pages 227-246. Reposted by CostBenefit of the Environmental Valuation and Cost-Benefit News blog - http://www.envirovaluation.org/index.php/2009/11/09/high-voltage-transmission-lines-proximity-visibility-and-encumbrance-effects

46 Power Lines Don't Affect Property Values. The Appraisal Journal. July 30, 2009. http://www.appraisalinstitute.org/about/news/2009/073009_TAJ.aspx

47 High-Voltage Transmission Lines: Proximity, Visibility, and Encumbrance Effects. James A. Chalmers, PhD and Frank A. Voorvaart, PhD. The Appraisal Journal. Summer 2009. Pgs. 227-245.

48 Letters to the Editor. Kerry M. Jorgensen. Appraisal Journal. January 1, 2010. http://www.thefreelibrary.com/Comments+on+"high-voltage+transmission+lines:+proximity,+visibility,...-a0220765052

49 Do High-Voltage Lines Zap Property Values? Elizabeth Rassi. Local Address. August 4, 2009. http://voices.washingtonpost.com/local-address/2009/08/do_high-voltage_lines_zap_prop.html

Several studies have found that, over time, property value damages from nearby HVTLs diminish though properties near the pylons stay permanently damaged no matter the elapsed time.[50] In the first case, though the property owner may grow accustomed to HVTLs and thus think less of them, new potential buyers aren't as sensitized and the diminutive impact is fresh to them.

Realtors usually oppose HVTLs. Nearly all surveyed realtors and appraisers in the Roanoke and New River valleys of Virginia said that close proximity to HVTLs would diminish property values by as much as $25,000, but mostly for high-end homes. Lower-end homes see little impact.[51]

Diminished property values can also impact communities. In one case, Delaware residents were worried that a proposed 1,200 megawatt HVTL would depress local property values, thus weakening the local tax base and leading to higher taxes to offset the losses. Kent Sick, author of a 1999 paper on power lines and property values, projects losses from a few percentage points to 53%.[52]

In Atlanta, a local realty group named Bankston Realty ranked power lines as the number one item that damages resale value, followed closely by busy roads and inferior lot topography. They advise buyers to pay 15% less of the asking price if power lines are present, and they advise sellers to accept it as a logical perception of value.[53]

Evidence suggests that HVTLs affect the health of residents in close proximity to lines 345kV and higher. Evidence also suggests that the power lines have little to no impact on property values because encumbered lots are often larger and more private than unencumbered lots, resulting in no diminution of purchase price. However, most studies did observe longer time on the market for encumbered properties.[54]

Rural Impact

Now that the reader is aware of stray voltage, EMFs, and property values, the reader will have a deeper understanding of the potential effects of HVTLs on rural land throughout the United States.

In Goodhue County, Minnesota, an area locally known for protecting agriculture, CapX2020 (a utility consortium) is proposing to build a 345kV HVTL through the county that may be doubled to 690kV. Local landowner Linda Grovender voiced her concern in a 2010 letter to the editor of the Cannon Falls Beacon. She worries that the line, proposed to traverse residential and agricultural lands instead of following existing utility right-of-way, will have an adverse effect on her family's health (due to EMFs),

50 The Effect of Public Perception on Residential Property Values in Close Proximity to Electricity Distribution Equipment. Sally Sims, B.Sc. Paper presented to the Ph.D. Forum at the Pacific Rim Real Estate Society Conference. January 2002. This is the first part to the study.
51 A Question of Power: Part III – Realtors: High voltage lines lower property values. Leslie Brown. Roanoke Times. 1998. http://www.vapropertyrights.org/articles/98lineslowervalues.html
52 Expert: Power lines hurt property value, market research shows sellers lose up to 53 percent. Elizabeth Cooper. Gannett News Service. May 20th, 2006.
53 Atlanta Homes and Resale Value… Power lines are a definite NO. The Bankston Group. July 17, 2008. http://atlantaintheknow.com/2008/07/17/atlanta-homes-and-resale-value-power-lines-are-a-definite-no/
54 High Voltage Power Lines Impact On Nearby Property Values. Ben Beasley. Right of Way Magazine. February 1991.

jeopardize agricultural interests, result in lost agricultural productivity, and damage property values.[55] She wrote that if the proposed 345kV HVTL is doubled to 690kV (as it legally could be) it could have an adverse effect on her family's health, jeopardize agricultural interests, result in lost agricultural productivity, and damage property values.[56]

The CapX2020 line was approved in April of 2012,[57] but many landowners still oppose the project. Farmers and homeowners "in record numbers" are trying to invoke Minnesota's "buy the farm" law, "hoping it will force utilities to buy them out so they can move away from the looming towers." However, the 79 landowners are being frustrated by restrictions in how it's applied.[58]

Elsewhere n Minnesota, Dairyland Power Cooperative (one of the chief members of CapX2020) surveyed rural landowners for their opinion regarding the proposed HVTL in their area. Whether they were crop or dairy farmers, each had several reasons why the proposed line would impact their business. The unnamed respondents shared Grovender's views and said they prefer to use highway corridors and woodlands to avoid impacts to productive agricultural land; protect livestock; avoid interference with large farm equipment, GPS, and navigation systems used in farm machinery; preserve open channels for crop-dusting; protect farm buildings; protect pasture land, tree farms, and timber production.[59]

The Dairyland survey also found that livestock operations are concerned that the HVTL will generate stray voltage, impacting livestock and feedlots. Cattle, horses, and other livestock will not go near transmission lines due to stray voltage. And stray voltage can impact the health of beef cattle and hogs. Farmers also fear potential impacts on dairy operations, poultry, livestock mortality, horse boarding facilities, and herd reproduction.[60]

HVTLs also pose potential technological obstacles. For example, The GPS equipment used in the farm equipment may not be able to steer around transmission poles, potentially making farming around the towers extremely difficult.[61]

One major concern was routing the HVTLs through the middle of properties or fields. The surveyed farmers quoted many repercussions for bisecting a property. They include: Interrupted irrigation and tile drainage equipment and practices; decreased food production; fragmented existing cropland and dairy operations; diminished lease value: the addition of transmission lines would make it difficult to lease farm land for the top rental price; compacted soil from construction of the HVTLs and access roads: it would take 3–5 years to restore.[62]

55 No CAPX2020. Letter to the Editor by Linda Grovender. The Cannon Falls Beacon. March 23, 2010.
56 Ibid.
57 Regulators Approve Last Segment of CapX2020 Transmission Line. NAW Staff. North American Wind Power website. April 16, 2012.
http://www.nawindpower.com/naw/e107_plugins/content/content.php?content.9697#.USMFJKV1-So
58 'Buy the Farm' law not working, Minnesota landowners say. David Shaffer. Star Tribune. February 12, 2013.
59 SE Twin Cities-Rochester-La Crosse Transmission System Improvement Project Macro-Corridor Study, Appendix A: Summary of Public Comments regarding a proposed HVTL. Dairyland Farm Cooperative. September 2007.
60 SE Twin Cities-Rochester-La Crosse Transmission System Improvement Project Macro-Corridor Study, Appendix A: Summary of Public Comments regarding a proposed HVTL. Dairyland Farm Cooperative. September 2007.
61 Ibid.
62 Ibid.

Across the border in Wisconsin, the state's Department of Agriculture validated many of the Minnesota respondents' concerns when it found that HVTL construction could compact soil, making it difficult to plow and plant those areas, naturally resulting in reduced crop yields. The HVTLs force farmers to change planting patterns to avoid support structures. Since farmland is only as valuable as its ability to yield good crops, rural property values suffer from the limitations and effects of HVTLs on their land.[63]

Potential compaction, forced building changes, and lower property values equally threaten dairy operations as much as they threaten agricultural farmers. Susan and Robert Herckendorf, dairy farmers in the path of the proposed A-W HVTL, are worried that the line could put local dairies out of business.[64]

In researching the possible negative factors of the then-proposed Arrowhead-Weston HVTL in Wisconsin in 2000, the state's Public Service Commission found that rural property values may decrease from "concern or fear of possible health effects from electric or magnetic fields; The potential noise and visual unattractiveness of the transmission line; Potential interference with farming operations or foreclosure of present or future land uses."[65] They also found that the value of agricultural property will likely decrease if the pylons inhibit farm operations."[66] However, they also found that adverse effects appear to diminish over time.[67]

The impact report further states that, on farmland, HVTL installation can remove land from production, interfere with operation of equipment, create safety hazards, and deprive landowners the opportunity to consolidate farmlands or develop the land for another use. The greatest impact on farm property values is likely to occur on intensively managed agricultural lands.[68]

Nearly a decade later in 2009, the Wisconsin Public Service Commission conducted another study on the environmental impacts of transmission lines and found that "in agricultural areas, the number of poles crossing a field may be the most significant measure of impact," and "agricultural values are likely to decrease if the transmission line poles are in a location that inhibits farm operations."[69] Beyond the impact of pole placement, the PSC found that "the overall aesthetic effect of a transmission line is likely to be negative to most people, especially where proposed lines would cross natural landscapes. The tall steel or wide 'H-frame' structures may seem out of proportion and not compatible with agricultural landscapes or wetlands."[70] They further explained, "Transmission lines can affect farm operations and increase costs for the farm operator. Potential impacts depend on the transmission line design and the type of farming. Transmission lines can affect field operations, irrigation, aerial spraying, wind breaks, and future land development."[71]

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63 Line could affect farms, property values. Author Unknown. Oshkosh Northwestern. June 26, 2000.
64 Ibid.
65 Property Values (pages 212-215) from Final Environmental Impact Statement, Arrowhead-Weston Electric Transmission Line Project, Volume 1. Public Service Commission of Wisconsin. Docket 05-CE-113. Date issued, October 2000.
66 Ibid..
67 Ibid.
68 Property Values (pages 212-215) from Final Environmental Impact Statement, Arrowhead-Weston Electric Transmission Line Project, Volume 1. Public Service Commission of Wisconsin. Docket 05-CE-113. Date issued, October 2000.
69 Environmental Impacts of Transmission Lines. Public Service Commission of Wisconsin. March 2009.
70 Ibid.
71 Ibid.

The study further examines how rural HVTL pole placements can affect agricultural land values: They can create problems for turning field machinery and maintaining efficient fieldwork patterns; expose properties to weed encroachment; compact soils and damage drain tiles; result in safety hazards due to pole and guy wire placement; hinder or prevent aerial activities by planes or helicopters; interfere with moving irrigation equipment; hinder future consolidation of farm fields or subdividing land for residential development.[72]

To oppose these potentially diminutive effects on their land, landowners sometimes organize against them. In Ohio, a group of concerned citizens formed the group, Citizens Advocating Responsible Energy (CARE), to oppose FirstEnergy's proposed Geauga County power line. On their website they state the reasons for their opposition. They fear the HVTL will devalue the properties it crosses, force affected property owners to continue paying taxes on damaged property, damage natural beauty and local ecology, lessen agricultural productivity of impacted land (thus reducing farm income and local purchasing power), and create a thorough-fare for snowmobiles and off-road vehicles.[73]

Other times, concerned landowners are united in voice, but not in form. In 2010, Idaho property owners in Bonneville County are nervously following the progress of Idaho Falls Power's proposed 161kV HVTL (North Loop Project) that would pass close to their homes.[74] Later, in 2011, they formed the group, The Alliance for Property Rights and Fiscal Responsibility to "give the citizens of Idaho Falls and Bonneville County a voice as it relates to the North Loop Project." [75]

On March 8, 2012, attorneys for the Alliance challenged Idaho Falls Power and the City of Idaho Falls effort to "take control of land outside of their jurisdiction and condemn a right of way for the construction of a 161kv transmission line." As a result, a district court judge ordered the City of Idaho Falls to "show cause why it has authority to proceed with a condemnation of county property, and if any such authority exists." [76]

Lynn Pack, a Bonneville County dairy farmer, has educated himself on HVTLs and said he's most concerned with stray voltage. "It causes so many problems with cow's production. They won't feed, they won't drink water, they dry up and when they dry up they just don't give any milk."[77] Another property owner, Sharon Nixon, fears the HVTL could harm her husband's health after his recent victory over bone cancer. She also fears the value of her home will fall. "It is not something we want in our backyard. We worked all our lives. This is our dream home." [78]

Idaho Falls Power General Manager Jackie Flowers said the HVTL is a necessary step to meet new federal energy reliability standards and that the utility is open to the public's input.[79]

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72 Ibid.
73 We oppose FirstEnergy's proposed Geauga County power line. Website posting by Citizens Advocating Responsible Energy (CARE). Date unknown but website copyright suggests sometime from 2008-2009.
74 Transmission Lines Worry Property Owners. Brett Crandall. Local News 8. March 5, 2010.
75 Protect Property Rights. http://allianceforpropertyrights.blogspot.com.
76 Protect Property Rights Press Release. March 12, 2012.
http://allianceforpropertyrights.blogspot.com/2012/03/press-release-march-12-2012-alliance.html.
77 Ibid.
78 Ibid.
79 Ibid.

A year earlier in Idaho, a coalition of Rockland County farmers tried to convince Idaho Power Company to avoid routing a new HVTL through their land, citing environmental and development concerns.[80] Doug Dokter, Idaho Power project leader, said the new lines are required because the existing lines are at their capacity.[81] Because of their concerns, utility representatives say they're looking at other options and hope for a compromise to avoid invoking eminent domain to take the land.[82]

Sometimes opposition to a proposed HVTL route can alter its course. In 1994, Public Service Company of New Mexico abandoned plans to take new right-of-way through the Jemez Mountains for a 50-mile long HVTL extension that Indian groups and environmentalists argued would cut through several miles of pristine vistas and Native American ruins.[83] The utility instead re-routed the extension to follow an existing utility corridor, bringing the decade-long dispute to a close.[84]

In 2008, California farmers and ranchers found themselves in a similar situation. San Diego Gas & Electric proposed a 150-mile long, 500kV HVTL (in conjunction with several 230kV HVTLs) across San Diego and surrounding counties to meet increasing energy needs and transport required renewable energy.[85]

Affected landowners are worried the line will have "huge" impacts on their properties. Katie Moretti, an affected cattle rancher, and other farmers worry that building construction access roads across untouched land will limit their land's future use. She also worries that the utility won't compensate her for the loss of use.[86]

Another rancher, Glen Drown, also worries about the impact the line will have on land-use and property values since the proposed route bisects several of his parcels subdivided for future development.[87]

Local dairy producer, Richard Van Leeuwen, is worried that stray voltage from the line would damage the health of his calves and milking cows. To protect his herd's health he said he would have to relocate the calf farm to another part of his property, costing millions.[88]

San Diego County Farm Bureau Executive Director Eric Larson acknowledges that the farming community won't be able to stop the project, but he's trying to make it compatible with the area's farming interests by recommending burying the line underground in some areas, going around some areas, and utilizing existing right-of-way.[89]

Elsewhere in the state, the City of Brentwood researched the potential impact of HVTLs on agricultural land values by interviewing several of their local and experienced Real Estate brokers. All the brokers

80 Headway being made on proposed route for power transmission line. Author Unknown. The Power County Press and Aberdeen Times. April 8, 2009.
81 Ibid.
82 Ibid.
83 PNM Scraps Jemez Power Line Plan. Keith Easthouse. Sante Fe New Mexican. December 16, 1994.
84 Ibid.
85 Proposed power line would impact farms. Christine Souza. California Farm Bureau Federation. May 28, 2008.
86 Proposed power line would impact farms. Christine Souza. California Farm Bureau Federation. May 28, 2008.
87 Ibid.
88 Ibid.
89 Ibid.

said that “Agricultural land with power lines above ground is worth less than properties with below-ground utilities.”[90]

However, in a 2007 report, the California Department of Conservation’s Farmland Mapping and Monitoring Program reported that HVTLs installed on agricultural land for a wind farm will result in a temporary disturbance of 10 acres of farmland and permanently affect 1 acre. Since the affected areas are mainly grazing land, the report concluded that the HVTL would not significantly impair productivity. Though the impact to agricultural productivity during construction would be negative, they claimed it would be mostly insignificant.[91]

Across the country in Leesburg, Virginia, 26 landowners opposed Dominion Energy’s proposed 230kV HVTL, saying it will damage their property values, thus decreasing their tax base and thus affect the county as a whole. They also fear its impact on Blue Ridge tourism.[92]

Bill Hatch, owner of a 400-acre farm was upset to learn the line would run through his farm. He said the proposed line would so affect his farm that he could only afford to keep it by direct marketing or agro-tourism, but he admitted that few people would want to visit a farm with power lines.[93]

Landowners want the utility to bury the lines, but the utility says it will cost 10 times more than traditional overhead lines. However, Harry Orton, an underground power line expert, testified that while the initial costs of burying the lines are higher, the lower cost of maintenance over the years evens the cost along the lines’ lifecycle.[94]

A year later in 2006, Dominion proposed an additional 500kV HVTL to meet growing demand and routed it through northern Virginia because it was the most efficient route. However, the area is also one of the state’s most pristine, and the proposal met with fierce resistance from landowners, environmentalists, Congressman Frank Wolf, and actor Robert Duvall.[95]

In the path of the HVTL are landowners of some of the most valuable land in Virginia, and they were bothered that the utility plans to erect the 40-mile, 15-story HVTL in their back yards.[96]

One landowner, Cameron Eaton, fears the line will bring financial ruin and “sink” her investment into her 100-acre Fauquier County property and horse business. "No one will buy that land if some ugly power line could run right over their house. I'm broken off at the knees."[97]

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90 City of Brentwood, California. Website page explaining their approaches to valuing agricultural land. Date and author unknown.
91 3.3 Agricultural Resources. Part of the public draft by The California Department of Conservation’s Farmland Mapping and Monitoring Program. July 2007.
92 Committee Hears Debate Over Underground, Overhead Power Lines. Megan Kuhn. Leesburg Today. May 20, 2005.
93 Ibid.
94 Committee Hears Debate Over Underground, Overhead Power Lines. Megan Kuhn. Leesburg Today. May 20, 2005.
95 Landowners Fear Ruin from Power Line Route. Sandhya Somashekhar. Washington Post Staff Writer. December 11, 2006.
96 Ibid.
97 Ibid.

Real estate agents consider the area's picturesque countryside to be its most valuable quality. Matt Sheedy, a land developer and president of Virginians for Sensible Energy Policy, said that the very proposal that the line will soon dominate the countryside has already "sent land values plummeting." Brokers confirmed that the market froze. People backed out of real estate contracts, unwilling to live anywhere under the line. Sheedy's groups estimated that land immediately affected could lose as much as 75% of its value.[98]

"When you're out in the country and you're selling property, what you're selling is the open space and the bucolic views and the history," Sheedy said. "Running power lines through an area like this is just devastating." To landowners Gene and Deborah Bedell, who were trying to sell their 223-acre farm to pay for their retirement, it was a hard blow. Their agent told them no one would buy their property if they knew "that it could have a power line looming over it."[99]

Further north in New York, over 50 landowners and local officials spoke before the state's Public Service Commission in opposition to Upstate NY Power Corp's proposed construction of a 230kV HVTL in their community.[100]

Sharon B. Rossiter, co-owner of Doubledale Farms in Ellisburg, said the HVTL will damage their crop cycle, remove 100 acres from use, and make planting difficult by having to navigate around the poles. Also worried is Roberta F. French, owner of Farnham Farms in Sandy Creek. The proposed line will bisect her blueberry farm, eliminating two-thirds of it.[101]

Jay M. Matteson, Jefferson County agricultural coordinator, advocated routing the HVTL through public land to avoid damaging productive, private land. "The burden should be on New York state and the developer to prove to local landowners why their land is less valuable than public land," he said.[102]

The Town of Henderson opposed it because the town's foundation is tourism and agriculture, and the community is "very concerned about the visual impacts of this project."[103]

Robert E. Ashodian, chairman of the Henderson Harbor Area Chamber of Commerce's Economic Development Committee, agreed. "The scenic resources of the community and the natural resources are at the heart of the value of the community."[104]

In an effort to appease worried or angry landowners, agricultural property owners in Montana with HVTLs encumbering their land will be exempt from paying taxes on land within 600 feet on either side of the HVTL Right-of-Way.[105]

In the 2002 study, "The Impact of Transmission Lines on Property Values: Coming to Terms with Stigma," authors Peter Elliott and David Wadley cite a 1978 Canadian study that, according to one commentary,

98 Ibid.
99 Ibid.
100 Transmission line gets no support. Nancy Madsen. Watertown Daily Times. November 17, 2009.
101 Transmission line gets no support. Nancy Madsen. Watertown Daily Times. November 17, 2009.
102 Ibid.
103 Ibid.
104 Ibid.
105 Tax facts on proposed power line. The Montana Standard Staff. The Montana Standard. July 11, 2009.

found “the per acre values from more than 1,000 agricultural property sales in Eastern Canada were 16-29% lower for properties with easements for transmission lines than for similar properties without easements.” The impact was greater on smaller properties. The 1978 study found little difference in impact from 230kV or 500kV HVTLs. The study also found that the impacts didn’t seem influenced by time.[106]

Three more Canadian studies on the impact of HVTLs on agricultural land values found different results.[107] Brown 1976 studied the effect of low-voltage power lines on agricultural land in Saskatchewan and found no measurable impact on property values. The Woods Gordon 1981 study focused on the effects of 230kV to 500kV HVTLs on Ontario farmland and found some areas had an average of a 16.9% negative impact, two areas had a positive effect, and others showed no statistically significant effect. The third study, a master’s thesis referred to as Thompson 1982, found sales prices were lower for properties crossed by HVTLs but only where the land has potential for irrigation (pgs. 56-57).[108]

Summary

Overall, the majority of the articles indicated a fear of these power lines, citing health concerns and safety as the primary factors. Other concerns included stray voltage issues (mainly with rural publications) and interference with agricultural activity and aesthetics. It was clear that most of the information the public receives about these matters was negative.

106 The Impact of Transmission Lines on Property Values: Coming to Terms with Stigma. Peter Elliott & David Wadley. Property Management, pgs.137-152. 2002.
107 The Effects of Overhead Transmission Lines On Property Values: A Review And Analysis Of The Literature. Edison Electric Institute Siting & Environmental Planning Task Force. 1992.
108 Ibid.