

# Power Lines and Property Prices

BY RICHARD J. RODDEWIG, CRE, MAI, FRICS; AND CHARLES T. BRIGDEN, CRE, FRICS, ASA

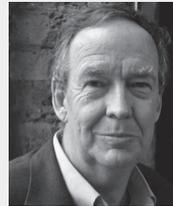
## THE POWER INDUSTRY TRANSFORMATION

THE AMERICAN ELECTRICITY GENERATING INDUSTRY HAS experienced a radical transformation during the past 20 years. Once a tightly regulated public utility consisting of a small number of large cap companies operating on a state-by-state basis, the electric industry has become a partially deregulated, semi-public utility consisting of dozens of large and small cap companies producing, buying, selling and distributing energy. Production facilities and distribution networks exist on a local, regional and even national basis.

Among the major issues, concerns and challenges still playing out in the regulatory and market arenas as the industry transforms itself are the following:<sup>1</sup>

- overcapacity in some states and regions and undercapacity in others, resulting in peak period power shortages, brownouts and blackouts;
- creation of a competitive national marketplace of buyers and sellers of generating capacity and power;
- competitive bidding by power companies to provide service to cities, neighborhoods and even individual consumers such as single-family homeowners and small businesses;
- creation of federal, state and even local tax incentives
- how to encourage “green and clean” energy production from such renewable energy sources as wind, solar, solid waste and landfill gases;
- more stringent environmental regulation of coal-burning power plants based on concerns about the environmental effects of smokestack emissions of sulfur, arsenic and other heavy metals;
- the contribution of power plant CO2 emissions to global climate change;
- how to protect the power generating and distribution system from terrorist attacks;

## About the Authors



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- the recognition that construction of additional nuclear power plants in the United States is no longer politically (and economically) feasible;
- a search for alternative—often less expensive and potentially more environmentally friendly—sources of fuel for power plants;
- how to balance the benefits of substituting natural gas for coal as a power plant fuel source—lower prices and lower CO2 and heavy metal smokestack emissions—with the concerns about the environmental impacts of recently developed fracking technology that can capture large amounts of previously untapped natural gas in shale formations

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in many parts of the country including New York, Pennsylvania, North Dakota, Colorado and Texas;

- an aging and capacity constrained natural gas and petroleum pipeline system raising increased concerns about potential leaks and explosions;
- increasing reliance on rail shipments of crude oil;
- transformation of the system into a “smart grid” through a “modernization of the electricity delivery system so that it monitors, protects, and automatically optimizes the operation of its many interconnected elements.”<sup>2</sup>

### IMPLICATIONS OF THE INDUSTRY TRANSFORMATION FOR THE ELECTRICAL ENERGY DISTRIBUTION SYSTEM

Somewhat lost from public view (and policy discussion) in all of this is the power grid system itself. It too has been in the midst of a radical transformation as the electric industry attempts to not only meet future demands in high growth areas of the country but also to increase reliability, provide enhanced connectivity between Eastern and Western segments of the national grid, and connect the distribution grid to the best locations for generating renewable energy from wind and solar sources. Improving the reliability of the grid system has become a number one priority in the wake of highly publicized failures in the grid system, such as the 2003 Northeast blackout (the largest in history) that affected more than 50 million people in the U.S. and Canada and exposed systemic problems in the distribution system that create serious reliability issues.<sup>3</sup>

The power industry recognizes the magnitude of the distribution issues and is taking steps to address the nation’s need for a significant upgrade to it. A 2011 technical report<sup>4</sup> prepared by the Electric Power Research Institute summarizes the situation as follows:

“(t)he present electric power delivery infrastructure was not designed to meet the increased demands of a restructured electricity marketplace, the energy needs of a digital society, or the increased use and variability of renewable power production. As a result, there is a national imperative to upgrade the current power delivery system to the higher performance levels required to support continued economic growth and to improve productivity to compete internationally.”

To cope with all of the changes in electrical energy fuel sources and meet the expected 26 percent increase in

U.S. electricity demand by 2030,<sup>5</sup> the electric industry has started to significantly expand and reconfigure the power grid system for the 21st century. There are currently about 2.7 million miles of power lines in the United States<sup>6</sup> including more than 200,000 miles of high voltage (230 kilovolts and greater) transmission lines.<sup>7</sup> While growth in demand will generate significant additions to the transmission grid system in the next two decades, reconfiguration to enhance reliability and better connect to renewable energy sources will be the principal driver of new power line corridors and additions of new lines to existing rights-of-way.<sup>8</sup>

### AESTHETICS, HEALTH, PROPERTY VALUES AND THE ELECTRICAL GRID SYSTEM

One result of the expansion and reconfiguration of the grid system is a revival of public concern and media attention about the effect of power lines and transmission corridors on property values. At least three types of property value impact issues are involved:

- First, what is the impact of power lines and transmission corridors on the value of adjacent properties, especially single-family homes?
- Second, what is the impact of power lines on properties, typically undeveloped land or rural agricultural properties, across which transmission rights-of-way must pass?
- Third, does the addition of a second or third line (and supporting towers) have an incremental adverse effect on home, land or farm prices even if the original line did not?

The property value impact concerns are inextricably linked to two other concerns: first, aesthetic concerns about the effect of overhead wires and supporting towers on views; and, second, concerns about the possible adverse health impacts associated with exposure to electromagnetic fields (EMFs).

Early real estate research in the 1960s and 1970s focused on the aesthetic and scenic impacts of power lines.<sup>9</sup> A 1982 summary of this research found 27 studies of which “ten found that transmission lines had no significant effect on land values, ten were inconclusive, and five concluded that the overall effect of transmission lines on land values was negative.”<sup>10</sup>

In the 1980s and early to mid-1990s, however, concerns began to be raised about the connection between electromagnetic fields and cancer.<sup>11</sup> The concerns were

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so significant that in 1991 Congress asked the National Academy of Sciences to review the research and issue a report. In particular, three Scandinavian studies concerning a possible linkage between EMF exposure and cancer published in 1993 and 1994 received widespread attention.<sup>12</sup> The National Academy of Sciences convened a special committee that reviewed the published health effects literature, and in its 1997 final report concluded “that the current body of evidence does not show that exposure to these [EMF] fields presents a human health hazard.”<sup>13</sup> The National Institute of Environmental Health Sciences (NIEHS) also conducted an extensive review of the published health effects research. In its Working Group report published in June 1998, NIEHS concluded “that power line frequency magnetic fields are a possible cause of cancer.”<sup>14</sup>

Childhood leukemia was the subject of a number of the studies done in the 1980s and 1990s. The U.S. Environmental Protection Agency sums up the state of the research related to childhood leukemia and EMFs as follows:

“Many people are concerned about potential health effects. Much of the research about power lines and potential health effects is inconclusive. Despite more than two decades of research to determine whether elevated EMF exposure, principally to magnetic fields, is related to an increased risk of childhood leukemia, there is still no definitive answer. The general scientific consensus is that, thus far, the evidence is weak and is ‘not sufficient to establish a definitive cause-effect relationship.’”<sup>15</sup>

The increased public concerns in the 1980s and 1990s about possible health effects of exposure to EMFs generated a new round of real estate research related to power line impacts on real estate prices. As in the earlier round of studies, some found adverse impacts to property prices and values while others found no impact or statistically insignificant impacts despite the additional media attention given possible health effects of exposure to EMFs.<sup>16</sup> The same is true of the additional studies recounted in the published literature since the turn of the 21st century. For example, a study published in 2009 in *The Appraisal Journal*<sup>17</sup> involving residential sales from 1999 to 2007 in Connecticut and Massachusetts could find no significant impact on prices from proximity to, or visibility of, power lines. By contrast, an earlier Houston study in the early 1990s found that assessed values of 100 homes adjacent to power lines were between 12.8

and 30.7 percent lower than other homes in the same neighborhoods.<sup>18</sup>

One of the more recent reviews of the published real estate literature on power line impacts<sup>19</sup> summed up past studies of the effects of power lines on prices and values as follows:

“Both the market interviews and academic literature show that the impacts of power lines on residential properties are varied and difficult to measure. The impacts from the power lines, as well as other negative externalities, depend on many factors, including market location, condition, and personal preference.”<sup>20</sup>

### REAL ESTATE IMPACT ISSUES RAISED IN A TYPICAL TRANSMISSION CORRIDOR APPROVAL PROCESS

Even in this new era of deregulation, proposals to create new transmission line corridors or upgrade or add lines to existing corridors require approval by state regulators. The approval process in each state typically involves public hearings and submission of written comments and reports by those proposing the expansion or upgrading as well as by opponents. These hearings can be extremely contentious. Although the power industry has the resources to hire experts to demonstrate the need for the proposed corridor or upgraded line and address the concerns of the public and residents along the rights-of-way, citizen groups and neighborhood-based organizations often have also been well organized in their efforts to present an opposing point of view. Among the major power line corridor expansion controversies around the country are the following:<sup>21</sup>

- New York Governor Andrew Cuomo in 2012 unveiled an “Energy Highway” initiative involving a multi-billion-dollar reconfiguration of the state’s grid system to provide improved connectivity between electricity-surplus areas in western New York State and Albany, and ultimately New York City where demand is greatest. Although the plan has received consensus support and legislative approval, the identification of the necessary new or expanded right-of-way corridors has resulted in considerable opposition from coalition groups of municipalities and organizations.<sup>22</sup>
- A number of power line proposals in California have been opposed by a variety of property owner and environmental groups in recent years. For example, California Gas & Electric has spent more than a decade unsuccessfully seeking approval of a 117-mile, \$1.9 billion transmission line corridor that

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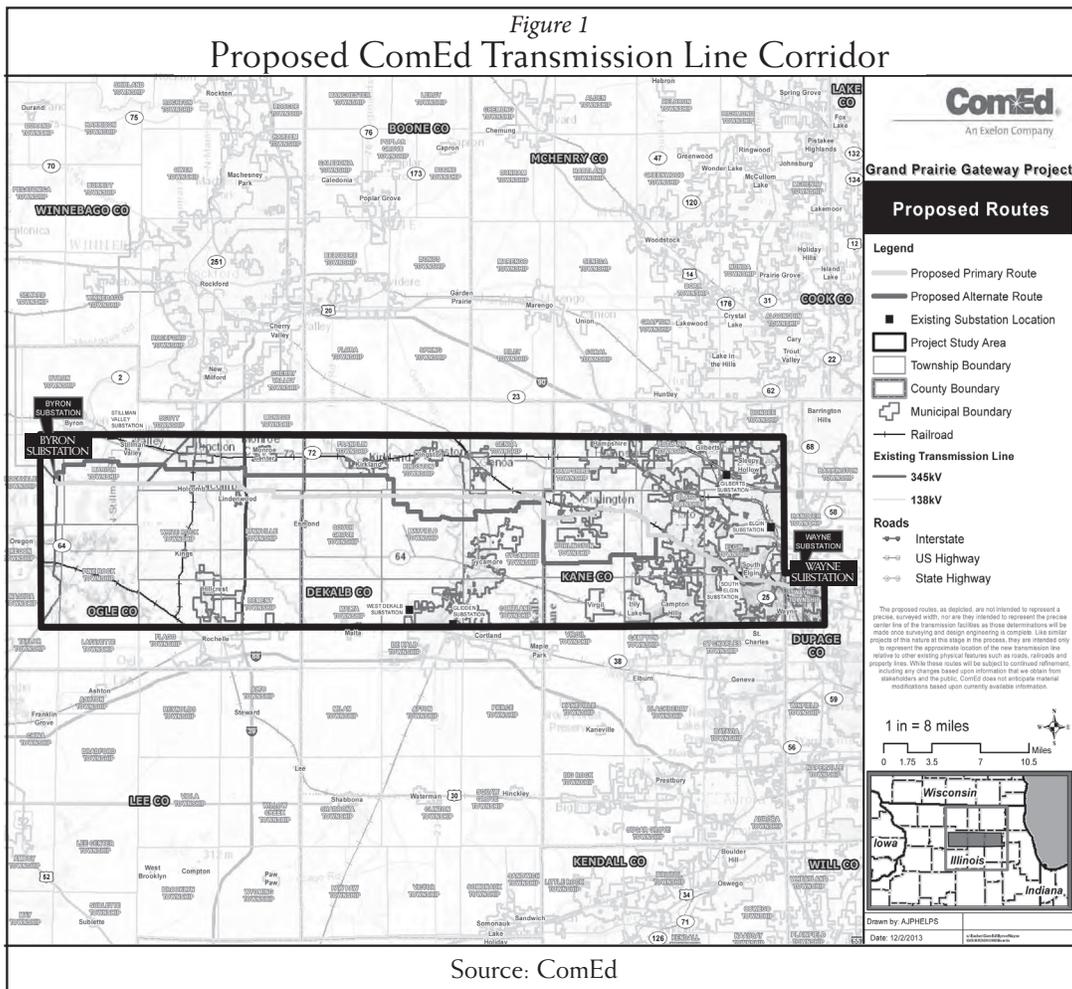
would connect the San Diego metro area with significant solar and geothermal renewable energy resources in the Imperial Valley east of San Diego; and in March of 2014, the California Public Utility Commission failed to approve a much shorter 3.5-mile transmission line that would cut through parts of the communities of Thousand Oaks, Moorpark and Simi Valley, and improve substation connectivity.<sup>23</sup>

- And in Kansas and Missouri, the proposed 750-mile route of the so-called “Grain Belt Express,” a \$2.0 billion project to carry Kansas wind energy to Illinois, Indiana and other eastern states is encountering opposition from many farmers.<sup>24</sup> The Missouri Public Service Commission is scheduled to hold hearings on its section of the corridor in 2014.

While much of the technical discussion in such hearings focuses on the need for the proposed line or upgrade, its costs and the effect on electricity prices to the consumer, the most emotional discussion often focuses on the

potential health effects of exposure to EMFs and whether health effect concerns will translate into an adverse effect on property prices and values if the proposed corridor or upgrade is completed.

A proposed transmission line corridor in Illinois illustrates the property value issues likely to arise as the nation expands and upgrades the grid system. In 2013 ComEd, the principal electricity generator and distributor for the Chicago metropolitan area and much of northern Illinois, proposed to construct and operate an approximately 60-mile 345kV transmission line between its Byron nuclear generating plant in western Illinois and the rapidly growing western Chicago suburbs. State regulations required ComEd to hold public meetings concerning the proposal in the communities along the proposed right-of-way. In December of 2013, following conclusion of the community meetings, ComEd officially filed for Illinois Commerce Commission approval to construct and operate the line. In the filing, both a primary and an alternate route were identified as shown in Figure 1.



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Along some portions of the proposed route, the 345kV line would be constructed in existing transmission line corridors or in railroad rights-of-way where ComEd already had negotiated corridor agreements. But in some areas, acquisition of easements would be necessary across either undeveloped land zoned for future development or across rural land in agricultural use.

All written public comments and public testimony as well as briefs and filings by law firms representing ComEd and various interveners were posted on the Illinois Commerce Commission website as soon as they were received.<sup>25</sup> Many of the public comments<sup>26</sup> and some of the submitted testimony involved health concerns related to EMFs, property value impact concerns, or both.

The public comments and testimony raising concerns about power line impacts on property values were submitted by homeowners, agricultural land owners, a school district official, and even a suburban mayor. They were personal opinions, typically unsupported by data or studies, concerning the potential impact of the proposed corridor on property values. The opinions and testimony included the following:

- One statement submitted claimed it was “self evident” that there will be a 10 to 30 percent impact on single-family home values.<sup>27</sup>
- Another homeowner claimed that the construction of the power line will “most certainly destroy our property values.”<sup>28</sup>
- A school district official stated that the proposed corridor “will have a negative effect on the value of numerous properties within the District.”<sup>29</sup>

No study or other price impact support accompanied any of those three statements. Many others made similar statements or expressed similar concerns but again did not provide any sales data studies in Chicago, elsewhere in Illinois, or anywhere else in the United States to support the opinions.

One intervener stated that published studies indicated “a 15 to 50 percent drop in values of nearby homes because of overhead high voltage transmission lines” and, as support, referenced a British study allegedly showing a 38 percent drop in values of homes within 328 feet, and a Canadian study showing a 16 to 29 percent impact on farmland that has an easement for a power line corridor. However, the British and Canadian studies were not submitted with the intervener’s testimony and in response to a data request, the intervener provided only website

links.<sup>30</sup> Both of those links referenced the British and Canadian studies but did not include copies of the studies referenced.

The real estate impact questions raised in power line controversies will vary from one public hearing situation to the next. In the case of ComEd in Illinois, however, the questions raised by the public comments and submissions included the following:

- What are the recognized and generally accepted methods for determining if a proposed power line corridor will adversely impact home prices and values?
- Do power lines always adversely impact the prices and values of adjacent homes?
- Does the addition of a second line to an existing corridor create an incremental adverse impact on prices and values?
- When a corridor is built in a rapidly growing market area, can sound land use planning techniques diminish the possibility of adverse impacts on home prices?
- Do health effect concerns related to EMFs translate into any special impact on prices in age-restricted communities?
- How do power lines affect farmland operations and rural land prices?

The authors of this article were asked to address those and other issues raised by the public comments and submissions in the Illinois proceedings. In answering those questions, we also reviewed the real estate literature referenced in the comments and submissions and did our own comprehensive review of the published literature. We then studied the effects of existing power lines on home prices in the Chicago area to determine the likely impacts of the proposed transmission line corridor on prices and values. The remainder of this article presents our findings and our conclusions, beginning with a review of how appraisers evaluate the effects of environmental conditions on real estate prices and values.

### WHAT ARE THE RECOGNIZED AND GENERALLY ACCEPTED METHODS FOR DETERMINING THE IMPACT OF POWER LINES ON PRICES AND VALUES?

The real estate appraisal profession has more than four decades of experience in analyzing the impacts of power lines on prices and values. As a result, the profession has

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developed recognized and generally accepted techniques for determining the impact of potential “detrimental conditions” on real estate prices and values. Power lines and their associated EMFs also can be characterized as a potentially “adverse environmental condition.” The Appraisal Standards Board in Washington, D.C., has issued specific guidance for determining the impact of “adverse environmental conditions” on prices and values.<sup>31</sup> Its Advisory Opinion 9 (AO-9) deals with the appraisal of properties affected by such adverse environmental conditions. Among the elements of AO-9 important to a consideration of the potential impact of proposed power line corridors on property prices and values are the following:

- AO-9 states that every analysis of the potential impact of an environmental condition on property value “must be based on market data, rather than unsupported opinion or judgment.”<sup>32</sup>
- AO-9 also states that estimating the effect of such environmental conditions “involves the application of one or more specialized valuation methods” that must be applied “consistent with the requirements related to the valuation approaches in USPAP [the Uniform Standards of Professional Appraisal Practice].”<sup>33</sup>

The courses and peer-reviewed publications of the appraisal profession define the generally accepted methodology for determining the impact of environmental conditions on real estate markets, property prices, market rents and market value.<sup>34</sup> Those courses and publications have long recognized the following:

- Proximity to a source of an adverse environmental condition does not automatically cause an adverse impact to prices and values of nearby properties.<sup>35</sup>
- While opinions of homeowners and other non-real estate professionals may have some relevance to understanding a marketplace, such opinions are not a substitute for analysis of actual sales prices.<sup>36</sup> As a publication of The Appraisal Institute puts it: “the impact [of power lines] on real estate is determined by the market and not by scientific analysis [related to possible health effects].”<sup>37</sup>

As a result, before arriving at an opinion concerning the likely impact of a proposed power line on real estate prices and values, licensed real estate appraisers are required to investigate actual sales transaction in other communities or neighborhoods with power lines.

### DO POWER LINES ALWAYS ADVERSELY IMPACT PRICES AND VALUES OF ADJACENT SINGLE-FAMILY HOMES?

#### Review of the Published Real Estate Literature

The real estate appraisal and real estate economics literature has long been clear that power lines do not automatically adversely impact the value of adjacent properties and in some cases may actually enhance values.<sup>38</sup> Some studies have found adverse impacts while others have found no impacts. Pitts and Jackson in 2007 summarized the published appraisal and real estate economics literature as follows:

“While most research indicates that HVTL [high voltage transmission lines] have no significant impact or a slight negative impact on residential properties, some studies have shown that lots adjacent to or with views of an HVTL right-of-way actually sell for a premium over more distant lots.”<sup>39</sup>

Among the more recent studies in the real estate appraisal and real estate economics literature are the following:

- A July 2003 study in *The Appraisal Journal* that compared prices paid for 296 abutting properties to 296 comparable but non-abutting properties in Portland, Oregon; Seattle, Washington and Vancouver, British Columbia. The authors could find no significant difference in prices between the two sets of sales. They also could find no effect on price appreciation rates from power line proximity.<sup>40</sup>
- A Fall 2007 *Appraisal Journal* article said the following:
 

“Many studies indicate that the HVTL (high voltage transmission line) have no significant effect on residential property values. More recently, however, an increasing number of studies do show a small diminution in value attributable to the close proximity of these lines.

“When negative impacts are evident, studies report an average discount of between 1 and 10 percent of property value.”<sup>41</sup>
- An *Appraisal Journal* Summer 2009 article looked at the previously published literature and, specifically, at what the authors called the 16 studies that form the “core of the professional literature.” The authors summarized the key conclusions from those 16 articles as follows:

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- “Over time, there is a consistent pattern with about half of the studies finding negative property value effects and half finding none;
  - When effects have been found, they tend to be small; almost always less than 10 percent and usually in the range of 3 to 6 percent;
  - Where effects are found, they decay rapidly as distance to the lines increases and usually disappear at about 200 to 300 feet (61 meters to 912 meters);
  - Two studies investigating the behavior of the effect over time find that, where there are effects, they tended to dissipate over time;
  - There does not appear to have been any change in the reaction of markets to high-voltage transmission line proximity after the results of two widely publicized Swedish health effects studies were preliminarily released in 1992.<sup>42</sup>
- A Winter 2012 article in *The Appraisal Journal* summarized the published literature as typically indicating either no effect on prices, or a relatively small effect when there are impacts. It then commented as follows: “(T)heir [high voltage transmission lines] presence is apparently not given sufficient weight by buyers and sellers of real estate to have had any consistent material effect on market value.”<sup>43</sup> That article ended with the following statement about the published literature: “the findings in the published literature (are) that property value effects cannot be presumed and are generally infrequent.”<sup>44</sup>

The literature confirms the conclusion of the appraisal profession that power lines do not always or automatically adversely impact prices and values of adjacent or nearby properties.

### THE TRANSMISSION LINE CORRIDOR IN ILLINOIS: ANALYSIS OF SINGLE-FAMILY HOME PRICES IN SOUTH ELGIN

A number of the interveners, as well as many of those submitting public comments to the Illinois Commerce Commission, lived in the Sugar Ridge and River Ridge subdivisions in South Elgin, a western suburb in a fast-growing part of the Chicago metro area. These two adjacent single-family home neighborhoods were developed in the early 1990s. There is a transmission line right-of-way along the south border of the two neighborhoods. That corridor was authorized in a 1994

Illinois Commerce Commission proceeding<sup>45</sup> and the 138kV line constructed on 95- to 110-foot monopoles with eight cross arms was energized on August 1, 1996. The transmission line corridor also is part of a railroad right-of-way.<sup>46</sup> In the 2014 proceedings, many Sugar Ridge and River Ridge residents expressed concern that the addition of a second line in the corridor would intensify an adverse effect of power line proximity on prices and values.

Residents of the two neighborhoods had opposed the earlier 1994 power line corridor. During that earlier proceeding, residents submitted a report from an appraiser who studied prices there as well as in eight other subdivisions near power lines and concluded that the proposed corridor would reduce home values by about five percent.<sup>47</sup>

As experts for ComEd, we were asked to analyze the history of home prices in those two neighborhoods since 1994 to determine if the existing power line was adversely impacting the neighborhood. We collected and analyzed multiple listing sales data between 1994 and 2013 in Sugar Ridge and River Ridge. We then undertook two types of analyses. First, we analyzed the average price each year for homes located within 500 to 700 feet of the transmission line corridor. We compared the average prices for those homes to the average price for other homes located further away in the same subdivisions. Prices were analyzed based on price paid per square foot of home area in order to eliminate any effect from differences in home size on the absolute sale price paid.

The map in Figure 2 shows the sales in the area within 500 to 700 feet from the transmission line corridor compared to sales in the rest of the subdivision. The existing transmission line is shown by the dashed line.

The northern edge of Area 1 on the map is located between 500 feet and 700 feet north of the northern edge of the transmission line corridor.

The comparison of average sale prices between 1994 and 2013 is shown on the graph in Figure 3.

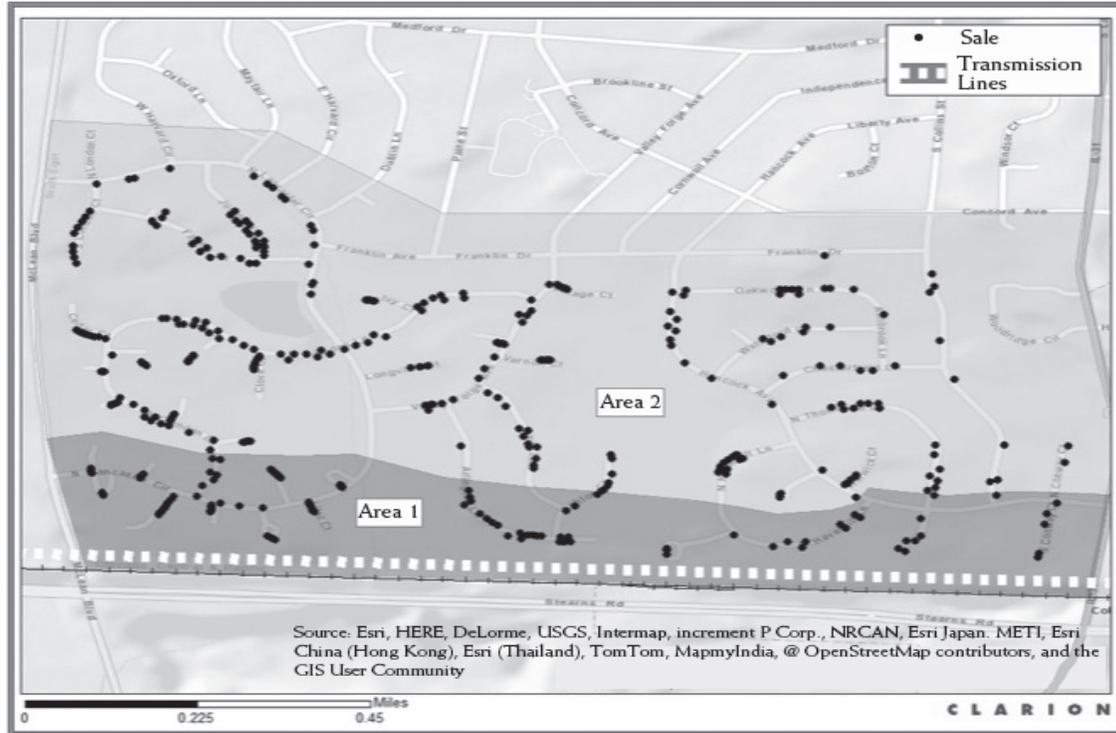
In 15 of the 20 years studied, the average price of a home in the area located closest to the transmission line corridor was higher than in the rest of the Sugar Ridge and River Ridge neighborhood. Overall, the average price per square foot paid for homes in the portions of the subdivisions closest to the transmission line corridor was about 3.5 percent higher than the average price paid for homes not located in proximity to the transmission line corridor.

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Figure 2

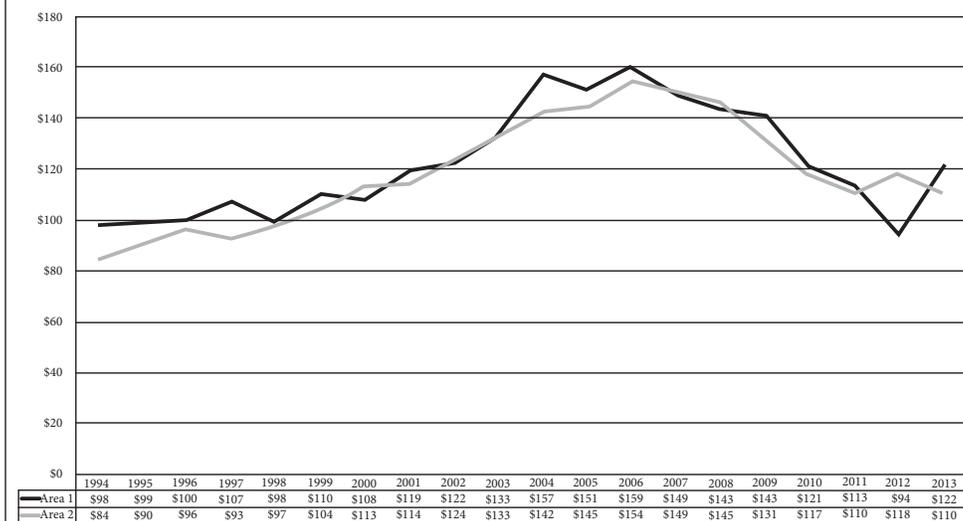
Map of Sales of Homes in Sugar/River Ridge Subdivision near the Transmission Line Corridor (1994 to 2013)



Source: ESRI.com and Clarion Associates, Inc.

Figure 3

Sugar/River Ridge Subdivision Average Annual Sale Price per SQ. Ft. (1994-2013)



Source: Clarion Associates, Inc., 2014

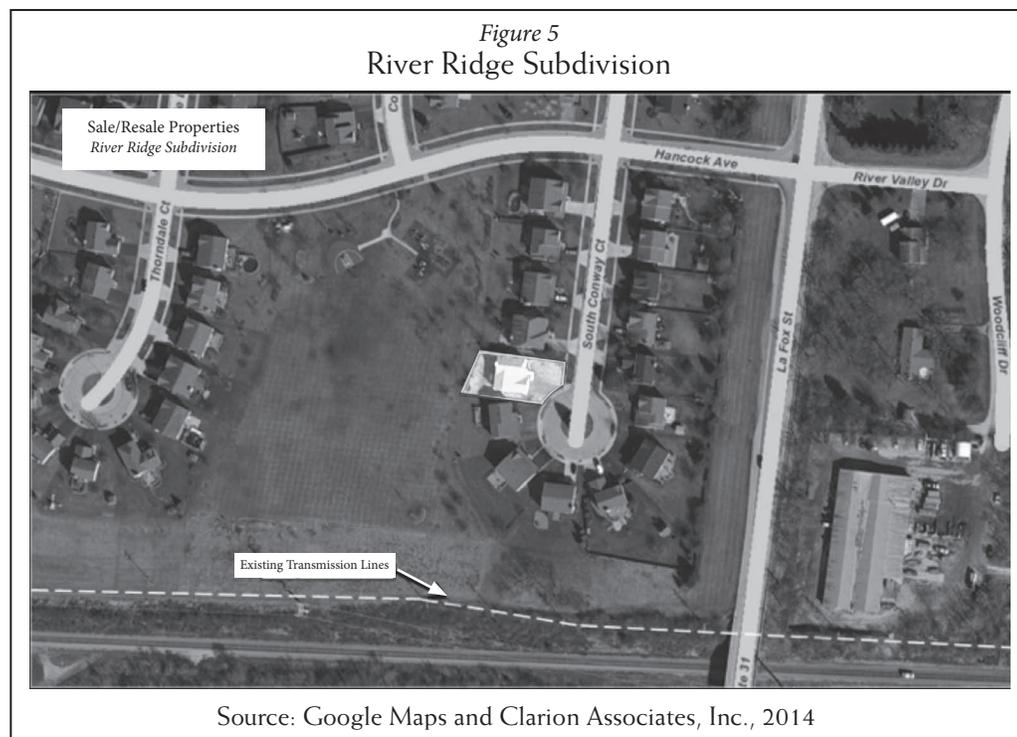
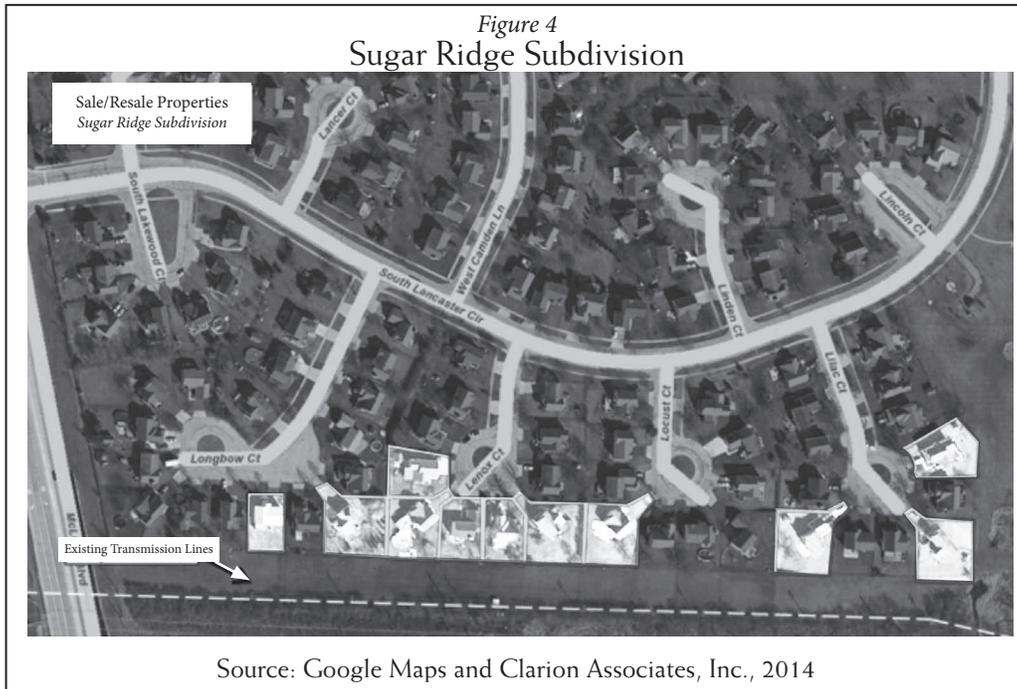
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We also used a paired sales analysis involving primary pairings<sup>48</sup> to determine if prices were lower for homes that either backed up to the existing transmission line corridor or had clear views of the power lines and supporting poles. We compared the rate of appreciation for those homes in the paired sales analysis to the average rate of appreciation for homes in Sugar Ridge and River Ridge that sold over

the same period of time but were far enough away from the transmission line corridor not to be affected.

The paired sales analysis involved 17 sales and subsequent resales involving 12 homes.<sup>49</sup> The locations of the homes are shown in the satellite maps in figures 4 and 5.

The sale/resale comparisons are as indicated in figure 6.



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Figure 6  
Analysis of Sale and Resale Comparisons

Address	First Sale Year	Second Sale Year	ROW Annual Compound Rate of Appreciation	Non-ROW Sugar Ridge Rate of Appreciation	ROW to Non-ROW Appreciation Rate Worse
7 Lenox Ct.	1997	2008	3.70%	4.10%	Same
9 Lenox Ct.	1995	2002	4.60%	4.70%	Better
11 Lenox Ct.	1996	2004	5.80%	5.00%	Better
	1999	2004	8.27%	6.40%	Better
15 Lenox Ct.	1996	2005	5.80%	4.70%	Same
17 Lenox Ct.	1997	2004	6.30%	6.20%	Better
11 Longbow Ct.	1993	2005	6.60%	5.10%	Better
	2003	2005	7.50%	4.40%	Better
17 Longbow Ct.	1996	2004	5.80%	5.00%	Better
	1996	2013	0.90%	0.60%	Better
	2004	2013	-4.60%	-2.90%	Worse
7 Lilac Ct.	1996	2013	2.10%	0.90%	Better
11 Lilac Ct.	2003	2009	-4.90%	-0.30%	Worse
19 Lilac Ct.	2001	2003	8.20%	8.00%	Better
15 Locust Ct.	2003	2010	-0.80%	-1.80%	Better
25 South Conway Ct.	2008	2011	-4.10%	-8.80%	Better

Source: Clarion Associates, Inc.

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The data in Figure 6 indicate that homes either backing up to the right-of-way (ROW) or with clear views of power lines appreciated at a rate either equal to or better than non-ROW homes in Sugar Ridge and River Ridge in 13 of the 16 sale/resale comparisons. In other words, homes immediately adjacent to the power lines outperformed the rest of the market in Sugar Ridge and River Ridge.<sup>50</sup>

### DO HIGH-VOLTAGE POWER LINES AFFECT PRICES AT NEW SUBDIVISIONS DEVELOPED ADJACENT TO THEM?

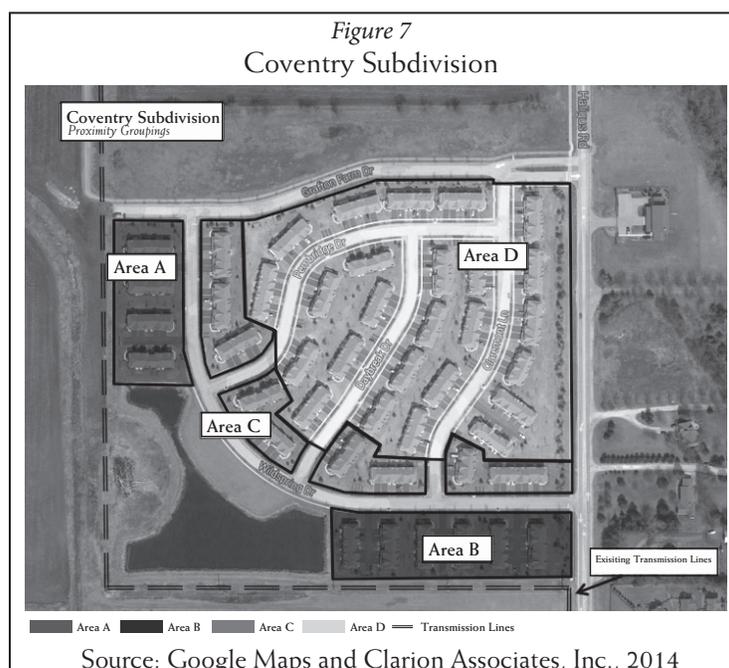
Some of the comments and testimony submitted to the Illinois Commerce Commission claimed that constructing a power line through undeveloped suburban areas zoned (or planned) for future development would adversely affect future development and prices. Our experience as zoning and planning consultants, however, has indicated that residential development can be planned in such a way as to minimize conflicts between power lines and planned developments. For example, required open space, stormwater detention ponds, surface parking or even garages can be planned in such a way as to minimize the visibility and proximity of power lines.

To test the effect of power line construction in rapidly growing suburban areas, we investigated development along a McHenry County transmission line corridor between Huntley and Algonquin, two rapidly growing communities in northwest metropolitan Chicago.<sup>51</sup> The corridor had been acquired and developed by ComEd

and energized in 2001<sup>52</sup> and is one of the most recent transmission line corridors developed in the Chicago metro area. The corridor contains a 138kV double circuit line on 64- to 99-foot monopoles. When it was developed, there was considerable undeveloped land adjacent to the right-of-way. Much of the land has subsequently been developed with new residential housing since the date of completion of the power line installation.

We investigated the route of the Huntley to Algonquin line that was the subject of a prior 1996 Illinois Commerce Commission approval proceeding.<sup>53</sup> We identified the Coventry development, a townhouse project at the northwest corner of the intersection of Haligus Road and Wildspring Road in Lake in the Hills, Illinois, as a good test case.<sup>54</sup> The townhouses were developed after the creation of the power line corridor and installation of the line.

We collected and analyzed Coventry sales data between 2004 and 2013. First, prices on the south and west side of Wildspring Road immediately adjacent to the transmission line right-of-way (areas A and B in the map below) were compared to prices on the other side of Wildspring Road (Area C in the map below). The average sale price between 2004 and 2013 was exactly the same. Second, sale prices for the townhouses on both sides of Wildspring Road (areas A, B and C) were compared to prices in the rest of the townhouse complex (Area D) located away from the right-of-way.



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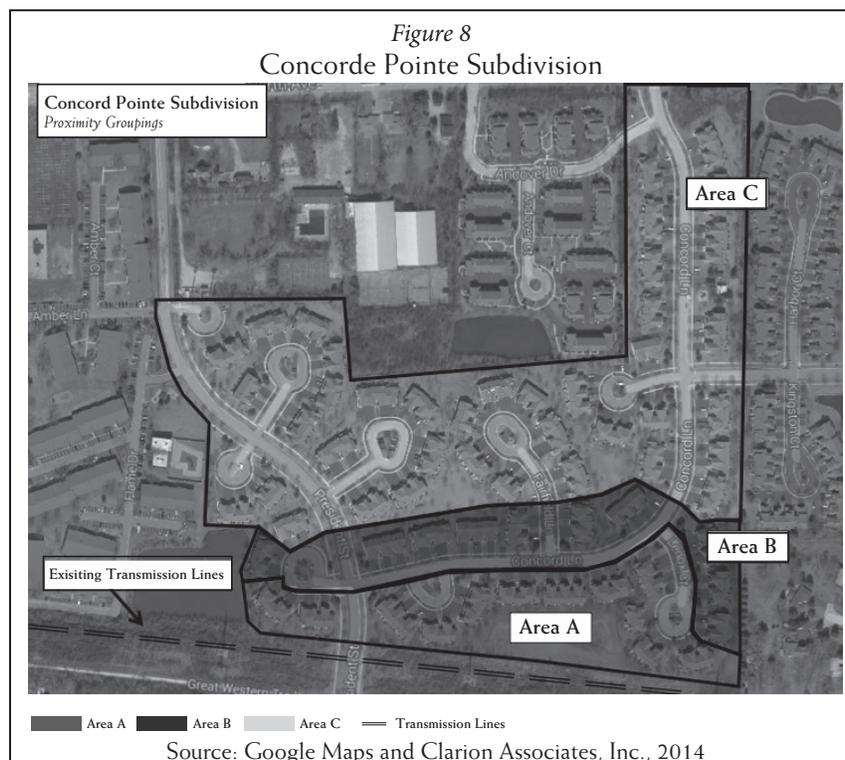
The average price for the Wildspring Road townhouses was 8.3 percent higher than for townhouses in the rest of the development. And townhouses on the south and west side of Wildspring Road located immediately adjacent to the transmission line right-of-way sold at an average price about 8.6 percent higher than in the rest of the development. The analysis indicated there has been no adverse impact from proximity to the transmission line on the townhouse sale prices at Coventry. And note the configuration of the townhouse clusters closest to the power line corridor—they were oriented in such a way as to minimize the views of the towers and power lines, an example of how good site planning for new subdivisions adjacent to power lines can minimize the potential for adverse impacts on prices and values.

### DO MULTIPLE SETS OF ADJACENT POWER LINES AND SUPPORT TOWERS ADVERSELY IMPACT PRICES AND VALUES?

Some of the opponents of the proposed corridor were concerned that even if a single power line might not affect prices and values, the addition of a second power line adjacent to the Sugar Ridge and River Ridge subdivisions in South Elgin would adversely impact home prices. To understand if a double line corridor automatically adversely impacts prices and values, we studied prices at the Concord Pointe development in Carol Stream, Illinois,

another western Chicago suburb. The expert report submitted by the South Elgin residents who opposed the 1995 Illinois Commerce Commission proceeding involving the original transmission line to be constructed in the railroad right-of-way adjacent to Sugar Ridge had included an analysis of townhouse prices at Concord Pointe. That 1995 expert report stated that the Concord Pointe townhouse developer was offering \$3,500 discounts to purchasers of the units located immediately adjacent to the transmission line right-of-way.<sup>55</sup>

That right-of-way adjacent to Concord Pointe consists of a double set of open lattice towers. One of the lattice towers supports two 138 kV lines and the other supports two 345 kV lines.<sup>56</sup> To understand the impact of the double set of power lines, we collected Northern Illinois Multiple Listing Service sales data from 1995 to 2013. Sale prices per square foot for townhouses located adjacent to the transmission line corridor (Area A in the map below) were compared to prices paid for other Concord Pointe townhomes not located adjacent to the power lines (Areas B and C in the map below). Some of the townhomes in Area B have views of the tops of the two sets of lattice towers. The map below shows three areas in Concord Pointe—areas A, B and C—defined by their relative proximity to the transmission line corridor located adjacent to the south end of the development.



## Power Lines and Property Prices

*Figure 9*  
Comparisons of Average Annual Sales Price per Square Foot

Area A v. Area B & C				Area A & B v. Area C			
Year	Area A	Areas B & C	% Difference	Year	Area A B	Areas C	% Difference
1995	\$107	\$95	12.7%	1995	\$107	\$95	12.7%
1996	\$78	\$98	-20.2%	1996	\$81	\$106	-23.4%
1997	\$102	\$100	1.6%	1997	\$99	\$103	-3.6%
1998	\$99	\$97	1.8%	1998	\$97	\$98	-0.8%
1999	\$99	\$98	1.3%	1999	\$98	\$98	0.8%
2000	\$99	\$103	-3.4%	2000	\$101	\$103	-1.8%
2001	\$115	\$112	2.3%	2001	\$113	\$113	0.0%
2002	\$118	\$122	-3.2%	2002	\$122	\$121	1.0%
2003	\$122	\$136	-10.4%	2003	\$130	\$134	-2.8%
2004	\$152	\$140	8.8%	2004	\$139	\$141	-1.9%
2005	\$155	\$150	3.7%	2005	\$155	\$148	4.3%
2006	\$145	\$157	-7.5%	2006	\$151	\$156	-3.3%
2007	\$163	\$156	4.4%	2007	\$162	\$155	4.1%
2008	\$157	\$150	4.0%	2008	\$157	\$148	6.2%
2009	\$143	\$127	12.6%	2009	\$135	\$127	5.9%
2010	\$112	\$113	-1.2%	2010	\$119	\$112	5.9%
2011	\$92	\$110	-16.2%	2011	\$98	\$113	-13.6%
2012	\$110	\$99	10.7%	2012	\$104	\$100	3.5%
2013	\$111	\$106	5.5%	2013	\$105	\$108	-3.6%
		Average	0.4%			Average	-0.5%

Source: MRED LLC and Clarion Associates, Inc.

As indicated in the Figures 9, the average price differentials when comparing Area A to areas B and C, and then comparing areas A and B to Area C, were less than one percent.

The comparison indicates there has been no adverse impact on average prices at Concord Pointe from proximity to the power lines. The good buffering of the power line corridor by vegetation may have contributed to the lack of impact. The sales data also indicates the original \$3,500 price discount given in 1995 was not warranted.

### IS AGE-RESTRICTED SENIOR HOUSING MORE SIGNIFICANTLY AFFECTED BY POWER LINE PROXIMITY THAN OTHER TYPES OF HOUSING?

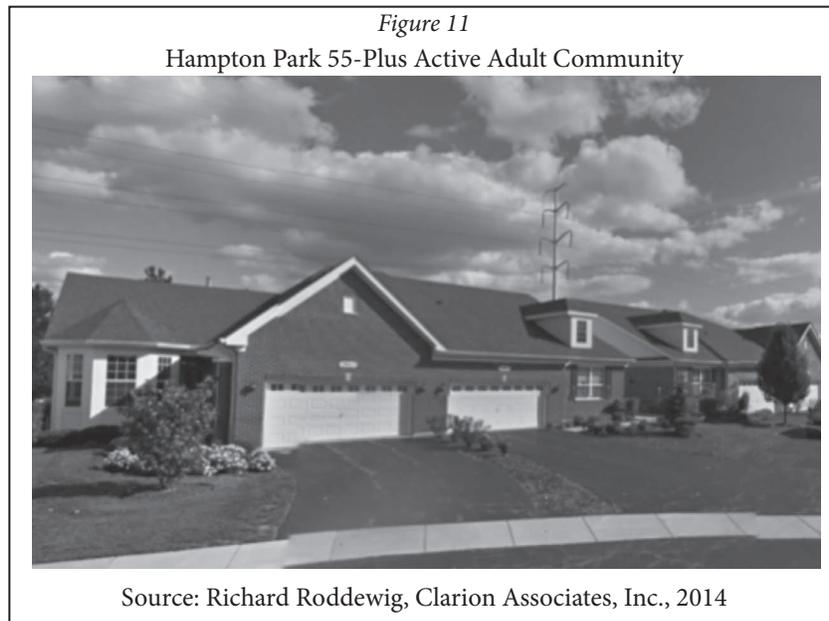
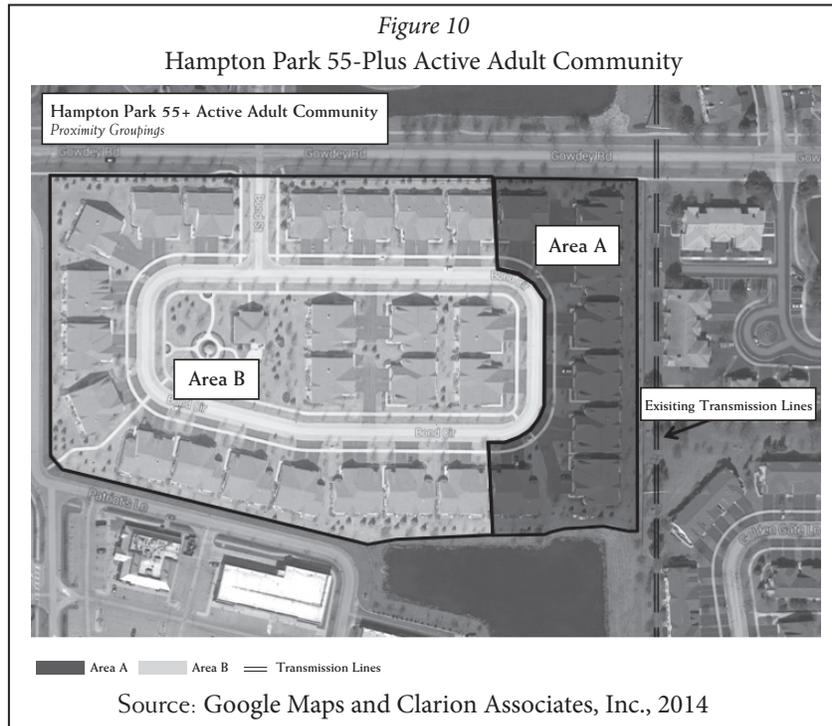
Many of the comments and statements in opposition to the proposed corridor linking the Byron power plant and

the western Chicago suburbs were filed by residents of the 55-and-over age-restricted Bowes Creek townhome community in Elgin. The proposed power line would be constructed in a railroad right-of-way that ran adjacent to a portion of that development. Many of their comments in opposition referenced studies indicating that power lines can interfere with the operation of implanted pacemakers.<sup>57</sup>

Hampton Park in Naperville, Illinois, is an age-restricted senior development adjacent to a power line corridor. It reportedly was developed between 2005 and 2008<sup>58</sup> long after the installation of the adjacent monopole transmission line corridor. The location of those townhomes (and the transmission line adjacent to it) is shown in Figure 10.

FEATURE

# Power Lines and Property Prices



The map and photo in figures 10 and 11 show a Google Maps Street View of some of the Hampton Park townhomes showing the monopole power line with four cross arms behind them.

Sale prices in Hampton Park for the years between 2005 and 2013 were collected from the multiple listing services

and analyzed. Prices paid per square foot for townhomes adjacent to the transmission line corridor were compared to prices in the rest of the community. Townhomes adjacent to the transmission line corridor sold on average for 4.3 percent more than townhomes in the rest of the community, as shown in Figure 10.

## Power Lines and Property Prices

Figure 12

Area A v. Area B			
Year	Area A	Areas B & C	% Difference
2005	n/a	\$190	n/a
2006	\$208	\$200	4.2%
2007	\$215	\$226	-4.9%
2008	n/a	n/a	n/a
2009	n/a	\$150	n/a
2010	\$170	n/a	n/a
2011	n/a	\$130	n/a
2012	\$184	\$157	17.1%
2013	\$170	\$169	0.8%
		Average	4.3%

Source: MRED LLC and Clarion Associates, Inc.

### ARE FARMS CROSSED BY (OR ADJACENT TO) POWER LINE EASEMENTS ADVERSELY AFFECTED IN VALUE?

Some portions of both the preferred and alternative Illinois transmission line corridors would require acquisition of easements across farmland. Many of the comments received by the Illinois Commerce Commission involved concerns about the effect of transmission line corridors on agricultural operations<sup>59</sup> and farmland prices and values.

A number of published articles going back to the 1970s discuss the effect of power line easements and corridors on rural and farm land property values. For example, “Impact of Electric Power Transmission Line Easements on Real Estate Values,” authored by Louis E. Clark, Jr., MAI, and F. H. Treadway, Jr., MAI, and published in 1972 includes the following statement at page 19:

“If a farm contains 150 to 200 acres or more, as many do now, the loss of a fraction of an acre in tower sites cannot be considered critical. This factor is continually demonstrated in farm sales throughout the country. Of course, few farmers want power lines on their farms. However, studies are not based upon popularity polls, but upon sociological interactions between an informed buyer and an informed seller, each acting without duress in negotiating a sale price for a farm. When one examines a farm sale dispassionately, he often finds that even though

few sellers want to have a transmission line on their farm, when selling fewer still are willing to accept a reduced price for their property (reduced even by the amount paid them by the utility). As a result, with this type property little empirical evidence can be found to show conclusively that price reductions are incurred because of transmission lines.”

A 2012 *Appraisal Journal* article involved an analysis of 19 transactions involving “Production Agricultural Lands” in Montana. The analysis indicated that “there was no market evidence to support a claim of adverse effect of the transmission lines on sale prices.”<sup>60</sup> That research also involved investigation of whether farmers and ranchers made an adjustment to their asking prices when selling productive agricultural properties with transmission line easements:

“Interestingly, there was no indication of adjustment to the sale price for the extent of the encumbrance of the property by the transmission line easement. The implication is that the owner at the time of construction gets compensated for the easement by the utility, but does not have to make a corresponding adjustment in the subsequent sale of the property. Presumably this is because the overall agricultural productivity of the property is not affected by the transmission lines.”<sup>61</sup>

The 2012 *Appraisal Journal* article studying rural western land values looked at a variety of other situations in which power lines are located close to rural western land. The author concluded that “the research reported here is certainly consistent with the findings in the published literature that property value effects cannot be presumed and are generally infrequent.”<sup>62</sup>

That 2012 *Appraisal Journal* article also referenced two other farm land impact studies. The first found “no negative influence on [the] number of towers or the presence of HVTL (high voltage transmission lines) relative to otherwise similar parcels without HVTL.”<sup>63</sup> The second was a study of 88 rural land transactions between 2002 and 2008 in Wisconsin that were “encumbered by a transmission line easement.”<sup>64</sup>

According to the author of the 2012 *Appraisal Journal* article, that Wisconsin study indicated a “small (1.1 to 2.4 percent), but statistically insignificant effect for the sale of properties crossed by HVTL relative to uncrossed properties” and that when the author of the Wisconsin study grouped the sales by location, “edge locations showed no effect, while properties crossed by the line showed a small price effect of -2.1 to -3.4 percent.”<sup>65</sup>

## Power Lines and Property Prices

### SUMMARY AND CONCLUSIONS

The power industry is going through a radical transformation that raises many issues and includes a significant expansion and reconfiguration of the distribution grid to meet the new challenges of providing electricity in the 21st century. One result will be the construction of thousands of miles of new power lines either in existing rights-of-way or in new corridors. In the public approval processes mandated by law and regulation in every state before transmission corridors can be upgraded or constructed, long-standing public concerns about the effect of power lines and transmission corridors on property values typically will be raised.

The real estate appraisal profession has developed generally recognized and accepted methods for determining the impact of power lines on property prices and values. These methods are all based on analysis of actual prices paid for properties either on or adjacent to power lines. The appraisal profession has long recognized that proximity to a source of an adverse environmental condition such as EMFs from power lines does not automatically cause an adverse impact to prices and values of nearby properties and that while opinions of homeowners and other non-real estate professionals may have some relevance to understanding a marketplace, such opinions are not a substitute for analysis of actual sales prices.

And the real estate appraisal profession has been studying those prices since the 1960s. Some of the many published studies have found adverse impacts to property prices and values while others have found no impact or statistically insignificant impacts despite media attention given possible health effects of exposure to EMFs. When price impacts are found, they typically are rather small.

As examined in this article, a recent proposal related to a new 60-mile corridor in Illinois generated significant public comments and submissions about possible adverse impacts to prices and values of single-family homes, age-restricted townhomes, and farmland. Studies of detached single-family and attached townhouse prices in the Chicago suburbs submitted in the proceedings by the authors of this article, who were retained by the electric utility company, found no adverse impact on attached or detached home prices or on prices paid for age-restricted townhomes. The studies also found that sound land use planning and subdivision layout procedures can eliminate any adverse impact on prices. ■

*The authors would like to acknowledge Ms. Anne S. O'Connell, real estate analyst in the Chicago office of Clarion Associates, for her assistance in the preparation and analysis of the sales data that went into many of the charts in this article.*

### ENDNOTES

1. See, for example, PwC Annual Global Power & Utilities Survey, "Energy transformation: The impact on the power sector business model," October 2013, and Yuan Liao, "Transformation of Electric Power Grid into Smart Grid," International Journal of Advance Innovative Thoughts and Ideas, 2013.
2. "Report to NIST on the Smart Grid Interoperability Standards Roadmap," Electric Power Research Institute, Palo Alto, California, 2009.
3. That blackout lasted days and cost the regional economies an estimated \$6.0 billion. "The 2003 Northeast Blackout--Five Years Later," Scientific American, Aug. 13, 2008.
4. "Estimating the Costs and Benefits of the Smart Grid. A Preliminary Estimate of the Investment Requirements and the Resultant Benefits of a Fully Functioning Smart Grid," Electric Power Research Institute, Palo Alto, California, 2009.
5. "What You Need to Know About Energy," National Academies of Sciences, <http://needtoknow.nas.edu/energy/energy-sources/electricity/>.
6. Martin, Chris, Mark Chediak and Ken Wells, "Why the U.S. Power Grid's Days Are Numbered," *Bloomberg Businessweek.com*, Aug. 22, 2013.
7. Evans, Peter, "Power of Networks in an Age of Gas," 2013 EIA Energy Conference, June 17–18, 2013, Washington, D.C.
8. For an excellent summary of the issues related to future planning of the distribution grid system, see "The Future of the Electric Grid: An Interdisciplinary MIT Study," Massachusetts Institute of Technology, 2011.
9. See, for example, Louis E. Clark, Jr. and Felix H. Treadway, Jr., "Impact of Electric Power Transmission Line Easements on Real Estate Values," American Institute of Real Estate Appraisers, 1972.
10. Lita Furby, Robin Gregory, Paul Slovic and Baruch Fischhoff, "Electric Power Transmission Lines, Property Values, and Compensation," *Journal of Environmental Management*, Vol. 27 (1988), 69, at p. 10; Furby, Lita, Robin Gregory, Paul Slovic and Baruch Fischhoff, "Electric Power Transmission Lines, Property Values, and Compensation," *Journal of Environmental Management*, Vol. 27, 1988, p. 72, referencing G. Fridricksson, M. MacFayden and K. Branch, "Electric Transmission Line Effects on Land Values: A Critical Review of the Literature," Mountain West Research, 1982.

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11. A 1996 article cites 1979 as a turning point year due to publication of one of the first studies to link EMFs to health effects. See, R. Gregory and D. von Winterfield, "The Effects of Electromagnetic Fields from Transmission Lines on Public Fears and Property Values," *Journal of Environmental Management*, Vol. 48, pp. 201–214. The 1979 study they cite is N. Wertheimer and E. Leeper, "Electrical Wiring Configurations and Childhood Leukemia in Rhode Island," *American Journal of Epidemiology*, Vol. 109, pp. 273–284.
12. Olsen, J.H., A. Nielsen, and G. Schulgen, "Residence Near High-Voltage Facilities and the Risk of Cancer in Children," *British Medical Journal*, Vol. 307, pp. 891–895; P. K. Verkasalo, E. Pukkala, M. Y. Hongisto, J.E. Valjus, P. J. Drvinen, K. V. Heikkil, and M. Koskenvuo, "Risk of Cancer in Finnish Children Living Close to Power Lines," *British Medical Journal*, Vol. 307, pp. 895–899; and M. Feychting and A. Ahlbom, "Magnetic Fields, Leukemia, and Central Nervous System Tumors in Swedish Adults Residing Near High-Voltage Power Lines," *Epidemiology*, Vol. 5, pp. 501–509.
13. National Research Council, Committee on the Possible Effects of Electromagnetic Fields on Biologic Systems, "Possible Health Effects of Exposure to Residential Electric and Magnetic Fields," National Academy Press, Washington, D.C., 1997, p. 2.
14. [www.epa.gov/radtown/power-lines.html](http://www.epa.gov/radtown/power-lines.html).
15. Ibid.
16. A 2010 article in the *Journal of Real Estate Research* references six such studies of actual sale prices. See Thomas O. Jackson and Jennifer Pitts, "The Effects of Electric Transmission Lines on Property Values: A Literature Review," *Journal of Real Estate Research*, Vol. 18, No. 2, 2010, p. 239.
17. Chalmers, James A. and F. A. Voorvaart, "High-Voltage Transmission Lines: Proximity, Visibility and Encumbrance Effects," *The Appraisal Journal*, Summer 2009, pp. 227–245.
18. Bolton, David R., "Properties Near Power Lines and Valuation Issues," Southwestern Legal Foundation Institute on Planning, Zoning and Eminent Domain, November 17–19, 1993, p. 13.
19. We have not attempted in this article to summarize or reference all of the published literature on the subject of power line impacts on property prices and values. And we have focused on the studies of power line impacts in North America. There have been many studies conducted in Europe and Australia as well that are not referenced here. Many of the articles referenced or cited in this article, however, contain detailed lists and summaries of the published literature including some of overseas studies. Readers are encouraged to review those citations for more detail about the various past studies that have been done.
20. Pitts, Jennifer M. and Thomas O. Jackson, "Power Lines and Property Values Revisited," *The Appraisal Journal*, Fall 2007, p. 323. Professor Jackson was a member of the Appraisal Standards Board that promulgated Advisory Opinion 9 (AO9).
21. For information on a variety of power line proposals around the United States and the opposition they have created, see <http://www.energyjustice.net/powerlines>.
22. See, for example, Sarah Imboden, "State's Power Line Plan Electrifies Local Opposition," *The Observer*, Nov. 27, 2013, [www.rhobserver.com/20700/states-power-line-plan-electrifies-opposition/](http://www.rhobserver.com/20700/states-power-line-plan-electrifies-opposition/). Barring local acceptance, the new corridors will need to be acquired via use of the government's power of eminent domain.
23. Matthew L. Wald, "Power Line Project Faces Challenges in California Valley," *The New York Times*, Nov. 27, 2010. In March of 2014, the California Public Utility Commission failed to approve a much shorter 3.5-mile transmission line that would cut through parts of the communities of Thousand Oaks, Moorpark and Simi Valley, and improve substation connectivity.
24. For various points of view about the project, see [www.grainbeltexpresscleanline.com/site/home](http://www.grainbeltexpresscleanline.com/site/home) and <http://www.blockgbe.com/>.
25. Information and filings related to this corridor proposal can be found at [www.icc.illinois.gov/docket/CaseDetails.aspx?no=13-0657](http://www.icc.illinois.gov/docket/CaseDetails.aspx?no=13-0657).
26. As of May 9, 2014, after the official close of public testimony, the Illinois Commerce Commission website had posted 289 comments from the public.
27. Direct Testimony of John Tomaszewicz, Tomaszewicz Ex. 1.0, 4: 57–64.
28. Direct Testimony of Robert Mason, Mason Ex. 1.0, 3: 36–37.
29. Direct Testimony of Jeffrey King, Chief Operations Officer, School District U-46, Ex. 1.0, 4: 83–84.
30. One website link (no longer accessible) was to <http://www.brucejme/Fact.9.pdf>. On that website was a "Fact Sheet # 9" dated Jan. 30, 2010. The intervener also referenced the website <http://burythecable.ie/askon.pdf> referencing an ASKON Consulting Group "Media Information Pack" dated Oct. 9, 2008, and published in Ireland.
31. In the aftermath of the federal bailout of the savings and loan industry in the 1980s, Congress passed legislation establishing an Appraisal Standards Board to develop a set of professional standards for the real estate appraisal profession. Congress also required all states to establish a process for licensing real estate appraisers and to require all licensed appraisers to follow the Uniform Standards of Professional Appraisal Practice (USPAP) promulgated by the Appraisal Standards Board.
32. USPAP 2014-2015 Advisory Opinions, p. A-20, lines 177–178. This is echoed in many publications of the Appraisal Institute including "Real Estate Damages: Applied Economics and Detrimental Conditions," Second Edition, 2008, which at p. 238 says the following: "In the analysis of detrimental conditions, it is important that the appraiser be knowledgeable about the available tools, properly select and apply those tools, avoid unproven or suspect methodologies, and ultimately have relevant market data to support opinions and conclusions."

## Power Lines and Property Prices

33. USPAP 2014–2015 Advisory Opinions, p. A-20, lines 181–183.
34. USPAP requires licensed appraisers to complete the research and analyses “necessary to develop credible assignment results.” USPAP, 2014-2015 Edition, Scope of Work Rule, p. U-14, lines 429-430. The Scope of Work Rule in USPAP then says that the acceptability of the research and analysis is measured based on what “an appraiser’s peers’ actions would be in performing the same or a similar assignment.” USPAP, 2014–2015, Scope of Work Rule, p. U-14, lines 433–434. The phrase “an appraiser’s peers” is defined in USPAP as “other appraisers who have expertise and competency in a similar type of assignment.” USPAP, 2014–2015, Definitions, p. U-1, line 32. The answer to USPAP Frequently Asked Question 160 entitled “Judging the Actions of An Appraiser’s Peers” states that “journals and publications, professional meetings and conferences, education through courses and seminars, and appraisal discussion groups” (USPAP, 2014-2015, supra, FAQ 160, p. F-73) are the sources of knowledge about what an appraiser’s peers would do in a similar assignment.
35. “The fact that a property is impacted by a detrimental condition does not automatically mean that it has a material impact on the property’s value. Detrimental conditions may or may not cause a material impact on value. Frequently, detrimental conditions have no material impact on value whatsoever.” Randall Bell, with contributing authors Orell C. Anderson and Michael V. Sanders, “Real Estate Damages: Applied Economics and Detrimental Conditions,” Second Edition, The Appraisal Institute, 2008, p. 238.
36. As with many detrimental conditions, subjective fear of hazard does not necessarily equate to objective evidence of diminished property value.
37. *Op. cit.* at 35, p. 110.
38. See, for example, Clark, *op. cit.* at 9, pp. 11–12: “Many persons have indicated by their actions a preference for a specific property, even though encumbered by an easement, as compared to other properties which are not. The reason for their actions is not as important as the effect, individually and collectively, on values... few within the real estate profession have factual knowledge of the impact of these easements on the value of real estate. Some appraisers rely on, and frequently express, opinions with no factual foundation. Thus, transmission line easements and their effects, if any, on adjacent or nearby properties are controversial subjects.”
39. Pitts and Jackson, *op. cit.*, p. 324.
40. Wolverton, Martin L. and Steven C. Bottemiller, “Further Analysis of Transmission Line Impact on Residential Property Values,” *The Appraisal Journal*, July 2003, p. 244.
41. Pitts and Jackson, *op. cit.*, p. 323.
42. Chalmers and Voorvaart, *op. cit.*, p. 229.
43. Chalmers, James A., “High Voltage Transmission Lines and Rural, Western Real Estate Values,” *The Appraisal Journal*, Winter 2012, p. 31.
44. *Ibid.*, p. 44.
45. Petition of COMMONWEALTH EDISON COMPANY for a Certificate of Public Convenience and Necessity, under Section 8-406 of the Illinois Public Utilities Act to construct, operate and maintain a new electric transmission line in Kane and DuPage Counties, Illinois, Docket No. 94-0179.
46. As part of the prior authorization of the 138kV line, a previously existing distribution line on wooden poles was relocated within the existing corridor.
47. See Illinois Commerce Commission Order, dated Aug. 9, 1995, 1995 Ill. PUC LEXIS 501, \*15-\*16. We also presented expert testimony in that prior proceeding. As it related to Sugar Ridge, our 1994 work reviewed the expert report prepared for residents. In our sales analysis in 1994, we found no discernible adverse effect on Sugar Ridge home prices from the announcement of the proposed transmission line project.
48. The 14th Edition, 2013, of *The Appraisal of Real Estate*, p. 399, defines “paired data analysis” as “a quantitative technique used to identify and measure adjustments to the sale prices or rents of comparable properties; to apply this technique, sales or rental data on nearly identical properties except for one characteristic is analyzed to isolate the single characteristic’s effect on value or rent.” It then defines “pure pairings” as “pairs of sales or rental data from properties that are identical except for the single element being measured.”
49. There were 17 sales but only 12 homes because some of the homes sold more than once.
50. In this case, the width of the power line right-of-way provided additional buffering of the homes from the towers and the lines.
51. The population of Huntley increased from 5,953 in 2000 to 24,291 in 2010, a 308 percent increase, while Algonquin grew more than 30 percent from 22,989 to 30,046 persons during the same decade. <http://censusviewer.com/cities/IL>.
52. Application of COMMONWEALTH EDISON COMPANY for a Certificate of Public Convenience and Necessity, under Section 8-406 of the Illinois Public Utilities Act, and for an Order, under Section 8-503, of the Illinois Public Utilities Act, authorizing and directing ComEd to construct, operate and maintain new electric transmission lines in Kane and McHenry Counties, Illinois, Docket No. 96-0410.
53. Application of COMMONWEALTH EDISON COMPANY for a Certificate of Public Convenience and Necessity, under Section 8-406 of the Illinois Public Utilities Act, and for an Order, under Section 8-503, of the Illinois Public Utilities Act, authorizing and directing ComEd to construct, operate, and maintain new electric transmission lines in Kane and McHenry Counties, Illinois, Docket No. 96-0410.

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54. Townhouse developments make excellent case studies for this type of proximity impact studies. Unlike single-family home developments, townhouse developments more frequently involve the same type of unit with the same number of bedrooms, bathrooms, garage spaces, square footage and finishes.
55. As part of our review of that expert report in 1995, we interviewed a sales agent at Concord Pointe who indicated that even though some potential buyers were not concerned about the proximity of some of the units to the transmission line or did not even mention proximity to power lines as a concern, the sales technique for the townhomes located adjacent to the transmission line was to automatically tell the purchaser that a \$3,500 discount will be provided if the buyer takes one of those units. There was no bargaining involved, and the discount was a sales promotion device. Such a discount amounted to about a two to three percent discount from the average sales price in 1995. (Rebuttal Testimony of Richard J. Roddewig, MAI, CRE, President, Clarion Associates, Inc., Docket No. 94-0179.)
56. The 345 kV lattice towers adjacent to Concord Pointe are approximately 135 to 170 feet in height, and the 138 kV lattice towers are approximately 110 to 160 feet in height.
57. See, for example, Alexandre Trigano, MD, et al., "Clinical Study of Interference with Cardiac Pacemakers by a Magnetic Field at Power Line Frequencies," *Journal of the American College of Cardiology*, Vol. 45, No. 6, March 2005, pp. 896-900.
58. <http://www.55places.com/illinois/communities/hampton-park>.
59. Dairy farmers seemed to be especially concerned. "Stray voltage" that can be produced by power lines and other sources has been found in some studies to affect dairy cow behavior and milk production. See, for example, Public Service Commission of Wisconsin, *Environmental Impacts of Transmission Lines*, p. 22. In Minnesota, dairy farmers have sued utility companies alleging that their cows have produced less milk and even died as a result of proximity to power lines. See, for example, [www.postbulletin.com/business/capx-court-case-to-test-minnesota-s-buy-the-farm/article\\_3c6af2d0-8bf1-58d0-9c63-6007dc5a5f30.html](http://www.postbulletin.com/business/capx-court-case-to-test-minnesota-s-buy-the-farm/article_3c6af2d0-8bf1-58d0-9c63-6007dc5a5f30.html).
60. Chalmers 2012, op. cit., p. 35.
61. Ibid.
62. Ibid., p., 44.
63. Brown, Dean J.A., "The Effect of Power Line Structures and Easements on Farm Land Values," *Right of Way*, December 1975/January 1976, pp. 33-38.
64. Jackson Thomas, "Electric Transmission Lines Is There an Impact on Riral Land Values?" *Right of Way*, November/December 2010, pp. 32-38.
65. Chalmers 2012, op. cit., p. 31.