

COMMONWEALTH OF MASSACHUSETTS

PLYMOUTH, SS

LAND COURT
DEPARTMENT OF
THE TRIAL COURT

CHRISTINE A. BOSTEK, et al.,)
)
Plaintiffs)
v.)
)
ENTERGY NUCLEAR GENERATION)
COMPANY, et al.)
)
Defendants)

CIVIL ACTION NO.
13 MISC 479028-RBF

**AFFIDAVIT OF DR. STEPHEN SHEPPARD IN SUPPORT OF PLAINTIFFS’ OPPOSITION
TO DEFENDANT ENTERGY’S MOTION TO DISMISS PLAINTIFFS’ FIRST AMENDED
COMPLAINT FOR LACK OF STANDING**

Personal Qualifications:

1. My full name is Stephen Charles Sheppard.
2. My residential address is 86 Gale Road, Williamstown, MA 01267.
3. I am a Professor of Economics at Williams College in Williamstown, Massachusetts. I have held this position since 2000.
4. I hold a Ph.D. and a Masters Degree in economics from Washington University in St. Louis, MO, and a Bachelor’s of Science Degree in economics from the University of Utah in Salt Lake City, UT.
5. Since 1976, I have conducted research, written, lectured, and taught on topics such as microeconomic theory, urban economics, land use regulation, housing markets, and environmental economics.
6. I have conducted research, written, and lectured on the topic of the economic impacts of nuclear power plants on local economies, including the impact of such plants on local property values.

7. I have provided expert testimony in commercial nuclear reactor licensing hearings before the U.S. Nuclear Regulatory Commission (NRC) regarding the effect of proximity to an operating commercial nuclear reactor on the value of residential real estate. I have provided expert testimony in other litigation not involving the NRC regarding the effect of disamenities on real estate property values.
8. My Curriculum Vitae is included as Attachment A hereto.
9. I have studied the local real estate market in Plymouth, MA, as well as the effect of Pilgrim Nuclear Power Station (Pilgrim) on the local residential real estate market.
10. I reviewed the location of the parcels of real estate owned by the plaintiffs in this litigation. See ¶s 57 and 58 below.
11. I have also reviewed the location of Pilgrim's proposed independent spent fuel storage installation (ISFSI), which is located on Lot 44-000-001B-000 on the Plymouth Assessor's Maps.
12. I reviewed NRC documents regarding the safety and security of Pilgrim, news media relating to the safety and security of Pilgrim, information supplied by Entergy to the Plymouth Zoning Board of Appeals in June and July 2013, and the pleadings filed in this case.
13. I am familiar with leading studies on the impact of commercial nuclear power plants, and spent nuclear fuel storage and transportation on local residential real estate property values. I am also familiar with studies on the impact of hazardous waste facilities, environmental contamination, and landfills on local residential real estate property values. These studies are relevant to and informative of the potential impact of an ISFSI at Pilgrim on local residential property values.
14. The specific documents I reviewed and/or relied upon in generating my opinions regarding Pilgrim's ISFSI are contained in Attachment B to this Affidavit, which includes the full citations for all documents referenced herein.

15. Hedonic modeling is a standard method in the field of economics used to evaluate the effect of a single variable on real estate property values. This model considers real estate property value as a “bundle” of characteristics and obtains estimates of the contributory value of each characteristic to the market value of real property. (See: Sirmans 2005; Sheppard 1999)
16. Proximity of residential real estate to an ISFSI would be an appropriate characteristic to isolate and evaluate using a hedonic model.
17. Negative residential real estate property value effects arising from proximity to Pilgrim’s ISFSI could include a lower purchase price, inability to access capital, inability to finance or refinance, and/or a delay in sale. (See: Simons 2006, p.72)
18. This means that owners of residential real estate could suffer a loss of use and enjoyment of their property because the reduced market value results in a reduction in their ability to obtain home equity loans or to use the home as collateral for loans to finance other purchases and activities.
19. Due to improvements in data analysis and our understanding of the operation of housing markets, generally, more recent studies that make use of current methodologies provide more accurate estimation of the market effects of a local disamenity.
20. A disamenity, in the context of determination of real estate property values, is any local factor that has a generally negative or unattractive character and that will, as a result, tend to diminish the amount that a buyer is willing to pay for the property and diminish the observed market price for the property. An environmental disamenity is a disamenity whose impact is a characteristic of the local environment and whose impact is or could be transmitted via the air, land or water that surrounds or is part of a particular property. As such, environmental disamenities by their very nature tend to affect properties that share a common exposure to the environment in a local area, with negative effects increasing the closer the property is to the disamenity.

21. When a buyer and seller negotiate to determine the market price of a particular property, the perception of risk naturally arises in determining the amount the buyer is willing to pay and the amount a seller is willing to accept. The risks, and the buyer and seller perceptions of them, are important because real estate is a durable asset whose value to the owner comes in the form of benefits or rights that are available to the owner during the time of ownership, which may be many years. It is impossible for an owner to be certain about the benefits, costs, and levels of amenity or disamenity that will affect the value of ownership in the future. The possibility of variation in these features at a future time is perceived as a risk of ownership. In addition to this risk, which arises because of variability in the benefits of ownership, there is an additional risk concerning the ability to sell the property at the time of the owner's choosing. Any factor that can give rise to variability in the desirability of property ownership and/or to the market value of the property contributes to the risk and the perception of risk associated with the property.
22. The existence of risk and the perception of risk associated with a particular property or area negatively affects the market value of real estate. This happens for several reasons. First, most individual buyers and sellers can be regarded as risk averse (in the sense used by economists) and this means they require some compensation in order to purchase an asset whose value is risky. For real estate, this compensation comes in the form of a discount in the price of the property relative to comparable properties that are not perceived to be subject to the risk. Second, while the owners of real estate have available insurance markets that permit them to manage and reduce the financial risks associated with certain hazards (like fires and floods) these markets are not complete. As a result owners of real estate are not able to fully insure against risks, and properties that are subject to greater risks and the perception of greater risks will have lower market prices compared to identical properties that are not subject to these risks.

Analysis of the ISFSI's effect on residential real estate property values in Plymouth

23. The ISFSI at Pilgrim is a disamenity separate from and additional to Pilgrim, which operates as a commercial nuclear reactor generating electricity.
24. Public perception of the risk of proximity to spent nuclear fuel is an individual market variable, and economic studies consistently treat proximity to spent nuclear fuel as an independent variable in hedonic modeling. (See: Gawande 2013; Clark 1999)
25. It is my understanding that spent nuclear fuel will remain on site in dry casks stored on the concrete pad of the ISFSI at Pilgrim after the nuclear plant has ceased the generation of electricity and will potentially remain onsite after plant decommissioning is complete. After Pilgrim ceases generating electricity, the sole use of Lot 44-000-001B-000 will be nuclear waste storage. (See: 2007 Spent Fuel Management Plan)
26. Proximity to an ISFSI is analogous to proximity to other waste storage or hazardous waste sites, such as landfills and Superfund sites. Analyses of the market effect of proximity to these analogous sites may inform the potential market effect of proximity to an ISFSI. (See, e.g.: Simons 2006, Analyzing “nuisance uses,” including leaking underground storage tanks, Superfund sites, landfills, water and air pollution, power lines, pipeline ruptures, nuclear power plants, and animal feedlots.)
27. Hedonic models consistently treat proximity to a waste storage site or an identified hazardous waste site as an individual market variable. (See: Ham 2013; Kiel 1995; Kinnanan 2009; Ready 2010)
28. The stigma associated with a waste storage site can persist even if the waste is properly stored, cleaned up, or the site is closed. (See: Kinnaman 2009, p. 387, “property values continued to rise with distance from the open or closed landfill, suggesting a potential stigma effect associated with the old landfill site;” Ham 2013, p.125, “It is interesting that the impact of landfill sites on house prices appears to endure over periods in excess of 20 years after closure.”)

29. The stigma associated with presence of spent nuclear fuel impacts residential property values over the long-term in a variety of circumstances. (See: Gawande 2013, p. 71, finding a minimum of 2.5% to 5% declines in long run property price due to the [spent nuclear fuel] shipment program.” The effect “is long-lived even in the absence of any accident involving the [spent nuclear fuel] shipments.”)
30. The storage of spent nuclear fuel in dry casks in the ISFSI at Pilgrim constitutes an identifiable change in activity at the plant, from electricity generation to generation plus dry cask storage outside on a concrete pad. No longer is Plymouth just the site of a commercial nuclear generating plant, it is also host to an ISFSI for the storage of spent nuclear fuel.
31. The Pilgrim ISFSI increases the number of structures on the Pilgrim site, and increases the total land-use footprint of the Pilgrim facility. This increase in industrial use of more land on Lot 44-000-001B-000 and the increase in land-use footprint can be expected to increase negative property value impacts. (See: Sheppard 1995.)
32. It is reasonable to believe, given the preponderance of evidence from studies of other similar hazardous waste sites and facilities, that the ISFSI will negatively alter the nature of the impact of Pilgrim on local residential property values.
33. The ISFSI extends the duration of the Pilgrim plant's depressive effect on local residential property values.
34. Pilgrim is a disamenity, which currently depresses the value of Plaintiffs' properties. This is supported by the Brian Prest study of 2009 that specifically investigated the depressive effect of Pilgrim and is consistent more broadly with the meta-analysis undertaken by Simons 2006, who found that proximity to a nuclear power plant resulted in a statistically significant loss of residential property values of nearly \$26,000 per residence. (See: Prest 2009, p.4, Finding “strong evidence that house prices are adversely effected by proximity to the [Pilgrim] nuclear plant;” Simons 2006, p.83).

35. Evidence submitted to the NRC during hearings regarding the relicensing of Indian Point Nuclear Power Station, located in New York and owned by Entergy, indicates that Entergy admits that nuclear power plants can have an adverse effect on local property values. (See: NYS-17B, p. 13, citing Entergy SOP, p. 21-22: “Entergy claims that the State must establish that it is the facility’s physical impacts that are responsible for its adverse impacts, rather than public fear and aversion.”). Entergy’s own expert found an effect of the nuclear plant on local real estate values. (See NYS-17B, p.13, “Dr. Tolley’s finding—that house values increase as distance from IPEC increases—is in fact *consistent* with Dr. Sheppard’s conclusion: that IPEC depresses property values. *See* Sheppard Rebuttal Testimony at 35-39.”)
36. With regard to the socioeconomic impacts of Pilgrim, the NRC’s “Supplemental Environmental Impact Statement,” developed for Pilgrim’s relicensing proceedings (2007 GEIS) incorporates the conclusions of the NRC’s 1996 Generic Environmental Impact Statement for nuclear power plant relicensing, which admits that “buyers from outside the community are occasionally averse to purchasing properties close to a nuclear power plant,” and that “small impacts to housing value and marketability are projected.” (See: 1996 GEIS sec. 4.7.1.2-.3).
37. Publicized safety and security violations and other negative publicity can exacerbate the negative effect on residential property values of proximity to an environmental disamenity. (See: Kiel 1995, p. 428, “results indicate that community knowledge of the site, as well as government agency announcements, causes house prices to decline.”)
38. The disaster at the Fukushima Dai-ichi Nuclear Power Plant in Fukushima Prefecture, Japan increased public awareness of the risks of commercial nuclear power plants and has contributed to an elevated public perception of the risks of such facilities. This elevated perception of risk is particularly significant for individuals living in close proximity to a commercial nuclear power plant. (See: Huang 2013)

39. Pilgrim’s historic and current low safety rating likely contributes to its adverse effect on local property values. (See: Prest 2009, p. 2, “Pilgrim has been fraught with problems;” Assessment 2013).
40. Recently, numerous safety and security concerns regarding Pilgrim have been announced publicized by the NRC, state officials, and the media.
- a. The NRC recently announced that Entergy may not be able withstand certain levels of earthquake activity, and Entergy is required to perform an additional analysis of the plant’s ability to withstand severe earthquakes. The NRC identified Pilgrim as a high-priority facility regarding this issue, one of only ten the nation to receive this designation. Massachusetts Senators Markey and Warren wrote to the NRC to publically express their concern on this issue. (See: NRC Seismic Evaluation 2014; Quake Risk 2014; Seismic Study 2014, quoting William Dean, NRC Regional Administrator: “recent analysis, show[s] seismic activity that exceeds their design standards;” and, Markey and Warren 2014, “We were alarmed to discover that of the dozens of reactors that reassessed their vulnerability to earthquakes in the wake of the Fukushima meltdowns...the risk at both Pilgrim and Seabrook is larger than the risk the reactors were originally licensed to withstand.”)
 - b. The NRC recently announced that Pilgrim’s safety rating was downgraded, giving the plant a “degraded cornerstone” assessment due to unplanned plant shutdowns in 2013. The NRC held a public meeting in Plymouth on May 1, 2014 to discuss the downgrade, which was reported in local media. (See: NRC Assessment 2013; Performance Issues 2014)
 - c. Massachusetts Governor Deval Patrick wrote a well-publicized letter to the NRC regarding the safety of Pilgrim in March 2014, calling for its shutdown if the plant cannot comply with safety standards. (See: State House 2014 “Citing the lack of a

‘viable evacuation plan,’ Gov. Deval Patrick has asked the nation’s top nuclear regulator to order the decommissioning of Pilgrim Nuclear Power Station if it does not comply with “all health, safety and environmental regulations.”)

- d. Massachusetts State Senator Dan Wolf wrote a public letter to Department of Energy Secretary Steven Chu on July 12, 2011 regarding concerns about the safety of Pilgrim, including the risks of spent fuel rod storage, insufficient emergency evacuation and response plans, and aging plant technology. He has since publically expressed his opinion that Pilgrim is not safe and should be shut down. (See: Wolf 2011, “My position is that to date, all of these concerns have not been addressed. If they were, I would support re-licensing the plant. If they cannot be...I urge you not to re-license Pilgrim;” Wolf 2013, “Questioning the safety of Pilgrim Nuclear Power Station, state Sen. Dan Wolf (D-Harwich)... called for the 685-megawatt plant to be decommissioned.”)
- e. In 2012, citing post-Fukushima concerns, the NRC required Pilgrim to provide updated information regarding the plant’s ability to withstand site-specific flood hazards. This information must be submitted to the NRC by March 2015. (See: NRC Letter 2012). Due to recent announcements regarding climate change and sea level rise, the media has questioned whether Pilgrim could withstand storm surges and flooding, given that rates of sea level rise are faster on the U.S. Atlantic Coast. (See: USGS 2012; Rising Seas 2014, “most nuclear power facilities were built well before scientists understood just how high sea levels might rise in the future” and estimating worst-case flooding at Pilgrim by 2032)

41. The publicized safety and security concerns at Pilgrim can be expected to exacerbate Pilgrim’s negative effect on residential property values.

42. The decontamination, mitigation, closing, and/or clean-up of an environmental disamenity causes affected local property values to rebound. (See: Sheppard 2011; Jackson 2009, p.115-116, “Over the years, studies have found a consistent pattern of a rebound in prices of previously impacted residential, commercial, and industrial properties following the remediation and cleanup of the contamination source. This pattern reflects the increased knowledge about the sites and their environmental condition, the resolution of environmental compliance issues, and the positive effect of this in reducing perceptions of environmental risk and uncertainty.”)
43. It is reasonable to expect that if Pilgrim were to cease operation, the value of real property in close proximity to the plant would, over time, rebound from its currently depressed state. (Prest 2009, p. 5, “closing the [Pilgrim] plant and preserving the green space can generate significant external benefits, on the order of \$52.9 million.”)
44. Based on documents filed by Entergy with the Plymouth Zoning Board of Appeals, the ISFSI is required for the continued operation of Pilgrim. (See: Serkey 2013, RFA #245). As illustrated by Entergy’s recent announcement regarding the closure of Vermont Yankee, Entergy could choose to cease operation at Pilgrim at any point prior to expiration of its current operating license. (See: Vermont Yankee Press Release).
45. The ISFSI allows Entergy to continue to operate Pilgrim longer than it otherwise would be able to, extending the length of time that the operating plant itself remains a neighborhood disamenity. (See: Pilgrim Q&A, “Though new racking technologies have allowed for increased storage capability within Pilgrim’s pool, it is reaching capacity so we need to move some of the fuel to dry cask storage;” RFA #245).
46. Use and operation of the ISFSI extends the length of time that the Pilgrim plant operates and generates spent nuclear fuel in Plymouth. It extends the length of time that the Pilgrim plant itself adversely affects local property values, which is an ongoing economic injury to

individuals owning real property in close proximity to the plant, potentially until the expiration of its current operating license in 2032. (See: Prest 2009).

47. The ISFSI increases the total amount of spent nuclear fuel stored on-site at Pilgrim and the frequency of spent nuclear fuel handling, movement, and transportation at the site.
48. Documents filed by Entergy with the Plymouth Zoning Board of Appeals state that Pilgrim's wet pool is at least 83% full. (See: Serkey 2013). If the plant is to continue operating under its current NRC operating license, which allows operations until 2032, it must construct and use the ISFSI for additional spent fuel storage capacity. (See: Pilgrim Q&A).
49. Relative to the capacity of the existing wet pool inside the Pilgrim reactor building, construction of the ISFSI increases the total volume of spent nuclear fuel stored on the Pilgrim site and increases the number of times that spent fuel assemblies must be handled, moved, and transported at the site.
50. An increased volume of stored waste has an increased negative market effect on local residential property prices, and properties located closer to high-volume waste storage sites are most significantly affected. (See: Ready 2010, p.321 "landfills that accept high volumes of waste (500 tons per day or more) decrease adjacent residential property values by 13.7%, on average. This impact diminishes with distance at a gradient of 5.9% per mile. Lower volume landfills decrease adjacent property values by 2.7% on average, with a gradient of 1.3% per mile.")
51. The increase in handling, movement, and transportation of spent nuclear fuel on a site can be expected to generate an increased negative impact on local residential property values. (See: Gawande 2010).
52. It is likely that the increased volume of spent nuclear fuel stored, handled, moved, and transported at the Pilgrim site due to the ISFSI will increase the negative effects of proximity to Pilgrim on local residential property values.

53. Adverse effects on local residential property values will be most prominent in neighborhoods adjacent to Pilgrim.
54. The 1996 GEIS admits that “the significance of any given nuclear power plant to its host area will depend to a large degree on its location, with the effects generally being most concentrated in those communities closest to the plant. Major influences on the local communities include the plant’s effects on employment, taxes, housing, off-site land use, economic structure, and public services.” (See: 1996 GEIS sec. 2.3.8.2.)
55. Existing peer reviewed and other studies suggest that the impacts of the ISFSI will be greater for properties that are located nearest to the plant. Such effects are well established for residential property within a one-mile radius. (See: Clark 1999, p.405, citing Fox et al. (1985), “the siting of a temporary nuclear waste storage facility in Tennessee is more likely to be capitalized into residential property values if there is an increase in the public’s knowledge or understanding of the risks associated with facility,” and “the willingness to pay for distance from the facility’ is likely to have significant price effects only for properties within approximately one mile of the plant.”)
56. The market effect of the ISFSI is likely to extend to homes beyond a one-mile of Pilgrim. (See: Prest 2009; Sheppard 2011)
57. A variety of peer-reviewed and other studies suggest that it is reasonable to expect that the value of properties within 5 miles of Pilgrim will be adversely affected by the construction and operation of the ISFSI. (See: Prest 2009, p. 73, “homebuyers place significant value on avoiding the risks of nuclear power and these valuations are capitalized into property values. The price-distance elasticity for the nuclear plant is estimated at 0.0861 (significant at the 99% level), extending to about 8km.”)

58. The real estate located within **1 miles** of Pilgrim and owned by the following plaintiffs are very likely to suffer a reduced market value due to construction and operation of the ISFSI at Pilgrim:

- a. Diane Buckbee, 223 Rocky Hill Road, Plymouth, MA;
- b. Frederick Paris, 131 Rocky Hill Road, Plymouth, MA;
- c. Jacqueline Hochstin, 727 and 729 Rocky Hill Road, Plymouth; and,
- d. Virginia Curcio, 715 Rocky Hill Road, Plymouth, MA.

59. The real estate located within **2 miles** of Pilgrim and owned by the following plaintiffs are likely to suffer a reduced market value due to construction and operation of the ISFSI at Pilgrim:

- a. Christine Bostek, 172 Taylor Ave, Plymouth, MA;
- b. Donna Barrett, 182 Taylor Ave, Plymouth, MA;
- c. John D. Carr (Jack), 177 Taylor Ave, Plymouth, MA;
- d. Robert Crone, 6 Homer Ave, Plymouth, MA.

60. There have been numerous studies on the impact of proximity to hazards and risks of disamenities and property values. For example, Guignet studies the impact on property values of proximity to leaking underground storage tanks. He finds that while for “average” properties there is little evidence of an impact of the risk arising from leaking underground storage tanks on property values, for well-informed buyers and sellers of properties whose source of drinking water is at greater risk of being affected by the leaks, there is a measurable and significant impact on property values. (See: Guignet 2012). Zabel and Guignet follow this up by demonstrating that the impact on property values of leaking underground storage tanks is greater for risks that have been well-publicized and are more severe. (See: Zabel 2012). Research has also shown that the standard of remediation applied to a disamenity can directly affect the extent to which the risk posed by the disamenity affects property values. A recent

study by Linn examines a voluntary brownfields cleanup program where the state government certified some site cleanup efforts but where seeking such certification was voluntary. (See: Linn 2013). Sites that had been certified as complying with state standards had less impact on property values, and real estate near a brownfield site whose cleanup had been certified had prices that were about 1% higher than properties that were otherwise identical and near uncertified sites. (See: Linn 2013).

61. The research cited above suggests that the presence of disamenity risk from the ISFSI and Pilgrim Nuclear Generating Station can be expected to have a negative impact on nearby property values, and this impact can be expected to be larger when the risks are understood and well-publicized. Furthermore, recent research suggests that application of best practices for reducing the risk of disamenity can be expected to increase the current property values for real estate near the facility.

Signed under the pains and penalties of perjury this 4 day of June 2014.

A handwritten signature in black ink, appearing to read "Stephen Sheppard", written in a cursive style.

Dr. Stephen Sheppard

December 30, 2013

**Attachment A to Sheppard
Affidavit**

Curriculum Vita

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Education:

Ph. D., Washington University, St. Louis, 1984
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Published Papers:

- ‘The Qualitative Economics of Development Control’, by Stephen Sheppard, *Journal of Urban Economics*, **24**, 310-330, (1988).
- ‘British Planning Policy and Access to Housing’, by Paul Cheshire and Stephen Sheppard, *Urban Studies*, **26**, 469-485, (1989).
- ‘Nice Demand in Rough Neighborhoods: Continuity in Non-Convex, Dispersed Economies’, by Stephen Sheppard, in *Economic Theory and International Trade: Essays in Memoriam of J. Trout Rader*, edited by Wilhelm Neufeind and Raymond Riezman, Berlin : Springer - Verlag, (1992).
- ‘A Model of Regional Contraction and Unemployment’, by Barry McCormick and Stephen Sheppard, *Economic Journal*, **102**, 366-377, (1992).
- ‘The Benefits of Transport Improvements in a City with Efficient Development Control’, by Stephen Sheppard and Mark Stover, *Regional Science and Urban Economics*, **25**, 211-223, (1995).
- ‘Capturing Land Value Based Externalities in U.S. Communities’ (in Japanese), by Stephen Sheppard, in *Land Use and Capturing Land Value Based Externality*, edited by Makato Ikeda, Tokyo: Mitsubishi Research Institute (1995).
- ‘On the Price of Land and the Value of Amenities’, by Paul Cheshire and Stephen Sheppard, *Economica*, **62**, 247-267 (1995).
- ‘Housing Supply under Rapid Economic Growth and Varying Regulatory Stringency: An International Comparison’, by Stephen Mayo and Stephen Sheppard, *Journal of Housing Economics*, **5**, 274-289 (1996).
- ‘Welfare Economics of Land Use Regulation’, by Paul Cheshire and Stephen Sheppard, *LSE Research Papers in Environmental and Spatial Analysis No. 42*, London: London School of Economics, February, 1997, ISBN 0-7530-017-5.

Published Papers, continued:

- ‘The Costs of Constraint’, by Paul Cheshire and Stephen Sheppard, *Parliamentary Review*, February 1997, p. 38.
- ‘An economic analysis of land use planning: some welfare and distributional effects of the British system - or the costs of constraint’, by Paul C. Cheshire and Stephen Sheppard, *VOGON Journal*, **5**, May 1997, 11-16.
- ‘Estimating hedonic demand using single-market data: a practical solution using “nearby” instruments’, by Paul C. Cheshire and Stephen Sheppard, *LSE Research Papers in Environmental and Spatial Analysis No. 51*, (August, 1998) London: London School of Economics, ISBN 0 7530 1251 0.
- ‘Estimating Demand for Housing, Land, and Neighbourhood Characteristics’, by Paul Cheshire and Stephen Sheppard, *Oxford Bulletin of Economics and Statistics*, **60**, August 1998, 357-382.
- ‘Hedonic Analysis of Housing Markets’, by Stephen Sheppard, in *Handbook of Regional and Urban Economics Volume 3: Applied Urban Economics*, edited by Paul Cheshire and Edwin Mills, Amsterdam: North Holland, 1999, Chapter 41, pp 1595 – 1635.
- ‘Land strapped’, by Paul Cheshire and Stephen Sheppard, *ROOF Housing Market Healthcheck*, Issue 2, Winter 1999.
- ‘Building on brown fields: the long term price we pay’, by Paul Cheshire and Stephen Sheppard, *Planning In London*, Issue 33, April-June 2000, 34-36.
- ‘Fiscal Austerity and Public Servant Quality’, by Nadeem ul Haque, Peter Montiel, and Stephen Sheppard, *Economic Inquiry*, **38**, July 2000, 487-500.
- ‘Public Investment and Regional Labour Markets: The Role of UK Higher Education’, by Phil McCann and Stephen Sheppard, in *Public Investment and Regional Development: Essays in Honour of Moss Madden*, Felsenstein D., et al. (eds), 2001, Edward Elgar, Cheltenham.
- ‘Housing Supply and the Effects of Stochastic Development Control’, by Stephen Mayo and Stephen Sheppard, *Journal of Housing Economics*, **10**, 109-128 (2001).
- ‘Review of *Economics of Cities: Theoretical Perspectives* by Jean-Marie Huriot and Jacques-Francois Thisse’, by Stephen Sheppard, *Journal of Regional Science*, **42**, 423-427 (2002).
- ‘The Welfare Economics of Land Use Planning’, by Paul Cheshire and Stephen Sheppard, *Journal of Urban Economics*, **52**, 242-269, (2002).
- ‘Income inequality and residential segregation: labour sorting and the demand for positional goods’, by Paul Cheshire, Vasillis Monastiriotis and Stephen Sheppard, in R. Martin and P. Morrison (eds) *Geographies of Labour Market Inequality*, London: Routledge, 83-109, (2003).
- ‘The Rise, Fall and Rise Again of Industrial Location Theory’, by Philip McCann and Stephen Sheppard, *Regional Studies*, **37**, 6-7, 649-663, (2003).
- ‘Taxes Versus Regulation: the Welfare Impacts of Policies for Containing Sprawl’, by Paul Cheshire and Stephen Sheppard, in *The Property Tax, Land Use and Land Use Regulation*, edited by Dick Netzer, Edward Elgar Publishing, Cheltenham (2003).
- ‘Introduction to Feature: The Price of Access to Better Neighbourhoods’ by Paul Cheshire and Stephen Sheppard, *The Economic Journal*, **114**, F391-F396, (2004).

Published Papers, continued:

- ‘Capitalising The Value Of Free Schools: The Impact of Supply Characteristics and Uncertainty’ by Paul Cheshire and Stephen Sheppard, *The Economic Journal*, **114**, F397-F424, (2004).
- ‘Land Markets and Land Market Regulation: Progress Towards Understanding’ by Paul Cheshire and Stephen Sheppard, *Regional Science and Urban Economics*, **34**, 619-837, (2004).
- ‘Land Use Regulation and Its Impact on Welfare’ by Stephen Sheppard, Chapter 10 (pp 285-318) in *Urban Dynamics and Growth: Advances in Urban Economics*, edited by Roberta Capello and Peter Nijkamp, Elsevier, Amsterdam (2004).
- ‘The Introduction of Price Signals into Land Use Planning Decision-making: a proposal’ by Paul Cheshire and Stephen Sheppard, *Urban Studies*, **42**, 647-663, (2005).
- ‘The Distributional Impact of Housing Discrimination in a Non-Walrasian Setting’, by Ralph Bradburd, Stephen Sheppard, Joseph Bergeron, Eric Engler and Evan Gee, *Journal of Housing Economics*, **14**, 61-91, (2005).
- ‘An Analysis of Ethnic Differences in UK Graduate Migration Behaviour’, by Alessandra Faggian, Philip McCann and Stephen Sheppard, *Annals of Regional Science*, **40** (2), 461-471, (2006).
- ‘Impact of Rent Controls in Non-Walrasian Markets: An Agent-Based Modeling Approach’, by Ralph Bradburd, Stephen Sheppard, Joseph Bergeron and Eric Engler, *Journal of Regional Science*, **46**, 455-491, (2006).
- ‘The Impacts of Terrorism on Urban Form’ by S. Brock Blomberg and Stephen Sheppard, *Brookings-Wharton Papers on Urban Affairs*, p. 257-290, (2007).
- ‘Some Evidence that Women Are More Mobile Than Men: Gender Differences in U.K. Graduate Migration Behavior’, by Alessandra Faggian, Philip McCann and Stephen Sheppard, *Journal of Regional Science*, **47**, 517-539, (2007).
- ‘Higher Education, Graduate Migration and Regional Dynamism in Great Britain’, by Alessandra Faggian, Philip McCann and Stephen Sheppard, chapter 12 in *Universities, Knowledge Transfer And Regional Development Geography, Entrepreneurship and Policy*, edited by Attila Varga, Cheltenham: Edward Elgar (2009).
- ‘Urban Structure in a Climate of Terror,’ by Stephen Sheppard, chapter 7 in *Guns and Butter: The Economic Causes and Consequences of Conflict*, edited by Gregory D. Hess, Cambridge: MIT Press (2009)
- ‘Understanding Place and the Economics of Space: The Contributions of Roger Bolton’ by Stephen Sheppard *International Regional Science Review* **32**, 259-263 (2009)
- ‘Measuring and Modeling Global Urban Expansion’ by Stephen Sheppard, Chapter 7 in *Global Urbanization* edited by Susan Wachter and Eugenie Birch, Philadelphia: University of Pennsylvania Press (2011)
- ‘In memoriam: Charles Leven (1928–2011)’ by Paul Cheshire and Stephen Sheppard, *Papers in Regional Science*, **90**, 447-449, (2011).
- ‘Do Planning Policies Constrain the Growth of Metropolitan Regions?’ in *Metropolitan Regions Knowledge Infrastructures of the Global Economy*, Klaesson, J., Johansson, B., Karlsson, C. (Eds.), Springer, Berlin, (2012).
- ‘Museums in the Neighborhood: the local economic impact of museums’ by Stephen Sheppard, Chapter 8 in *Handbook of Economic Geography and Industry Studies*, Giarattani, F., Hewings, G., and McCann P.,(eds.), Edward Elgar Press, Cheltenham, (2013).

Published Papers, continued:

‘The Economic Consequences of Cultural Organizations’ by Peter Pedroni and Stephen Sheppard, Chapter 9 in *The Arts, New Growth, and Economic Development*, Michael Rushton (ed.), Brookings Institution Press, Washington, (2013).

Other Papers:

‘Equilibria in Spatial Economies with a Continuum of Consumers’, unpublished doctoral dissertation submitted to Washington University, 1984.

‘Regional Shifts in Population and Changes in Metro-Nonmetro Boundaries in the U.S.’, by Charles Leven and Stephen Sheppard.

‘Structure of Demand and Equilibria in a Spatial Economy’, Virginia Tech Working Paper.

‘Historical Perspective on Population Change Within Urban Component Boundaries in the United States’, by Charles Leven and Stephen Sheppard.

‘Migration, Signaling, and the Efficiency of Regional Decline’, by Barry McCormick and Stephen Sheppard.

‘Unemployment, Regional Decline, and Efficient Policy’, by Barry McCormick and Stephen Sheppard

‘CAFE Economics: a note on the Limits and Effectiveness of Fuel Economy Regulation’, by Stephen Sheppard and Adam Werner.

‘Hedonic Perspectives on ‘the’ Price of Land: *Space, access, and amenity*’, by Paul Cheshire and Stephen Sheppard.

‘Higher education and migration across the Celtic frontier: mobility of Scottish and Welsh students’, by Philip McCann and Stephen Sheppard

‘The Impact of Rental Housing Vouchers: A non-Walrasian Simulation Analysis’ by Ralph Bradburd, Stephen Sheppard, Kelsey Peterson and Evan Miller

‘The Urban Growth Management Initiative: Confronting The Expected Doubling Of The Size Of Cities In The Developing Countries In The Next Thirty Years – Methods And Preliminary Results’ by Daniel L. Civco, Anna Chabaeva, Shlomo Angel and Stephen Sheppard

‘The Causes of Global Urban Expansion’ by Stephen Sheppard, Shlomo Angel and Daniel L. Civco

‘Buying into Bohemia: the impact of cultural amenities on property values’ by Stephen Sheppard and Kay Oehler

‘Infill versus Outspill: the microstructure of urban expansion’ by Stephen Sheppard

‘Informal Sprawl?’ by Stephen Sheppard

‘Demand for Museum Experience, Regional Development and Spatial Competition’ by Stephen Sheppard and Nathaniel Walton

‘The potential of social network analysis for research on the cultural sector’ by Kay Oehler and Stephen C. Sheppard, Center for Creativity Community Development, working paper, available at www.c-3-d.org .

Other Papers, continued:

- ‘The economic impact of non-profit organizations in Berkshire County’ by Stephen Sheppard and Kay Oehler , Center for Creative Community Development, working paper, available at www.c-3-d.org .
- ‘Network analysis and the social impact of cultural arts organizations’ by Kay Oehler, Stephen C. Sheppard, Blair Benjamin, and Laurence K. Dworkin, Center for Creative Community Development, working paper, available at www.c-3-d.org .
- ‘Culture and revitalization: The economic effects of MASS MoCA on its community’ by Stephen C. Sheppard, Kay Oehler, Blair Benjamin, and Ari Kessler, Center for Creative Community Development, working paper, available at www.c-3-d.org .
- ‘Mill town, factory town, cultural economic engine: North Adams in context’ by Kay Oehler, Stephen C. Sheppard, and Blair Benjamin, Center for Creative Community Development, working paper, available at www.c-3-d.org .
- ‘Shifting sands in changing communities: The neighborhoods of North Adams, Massachusetts’ by Kay Oehler, Stephen C. Sheppard, Blair Benjamin, and Lily Li, Center for Creative Community Development, working paper, available at www.c-3-d.org .
- ‘The Contribution of Housing Markets to the Great Recession’ by Peter Pedroni and Stephen Sheppard, Williams College Working Papers in Economics, 2010.
- ‘Localization of nonprofit enterprises in the US’ by Stephen Sheppard, Williams College Working Papers in Economics, 2011.
- ‘Why is Gentrification a Problem?’ by Stephen Sheppard, Center for Creative Community Development, working paper, available at www.c-3-d.org, 2012.
- ‘Culture Shocks and Consequences: the connection between the arts and urban economic growth’ by Peter Pedroni and Stephen Sheppard, Williams College Working Papers in Economics, 2012.
- ‘Private Schools and Urban Prosperity’ by Stephen Sheppard, Williams College Working Papers in Economics, 2013.
- ‘Culture Concentrations: the spatial structure of arts nonprofits’ by Stephen Sheppard, Williams College Working Papers in Economics, 2013.

Honors and Awards:

- Royal Economic Society Prize for 2004 (awarded for best paper published during the year in the *Economic Journal*, shared with Paul Cheshire)
- Herman H. Lehman Fellow at the Oakley Center for the Humanities and Social Sciences, Williams College, 2004-05
- Fellow, Weimer School of Advanced Studies in Real Estate and Land Economics, Homer Hoyt Advanced Studies Institute, 2006

Research Interests:

- Theory of Spatial Economies and Land Markets
- Urban Economics and Housing Markets
- Microeconomic Theory
- Public Finance
- Environmental and Natural Resource Economics
- Economics of cultural organizations

Teaching Interests:

Urban and Regional Economics
Microeconomics
Local Public Finance
Microeconomic Theory

Research Experience:

Staff Economist, Olympus Research Corporation, Salt Lake City, Utah, 1976-1977.

Participant, Summer Program for Young Scientists, International Institute for Applied Systems Analysis, Laxenburg, Austria; research with the Human Settlements and Services Group, 1979.

Senior Research Officer, Department of Economics, University of Reading, Reading, England. Participated in ESRC funded project 'The Economic Consequences of the British Planning System: A Pilot Study', 1984-85.

Consultant, International Bank for Reconstruction and Development: The World Bank. Prepared research report concerning the effects of stochastic regulatory behavior of planners on land use and housing with emphasis on the experience of Thailand, Korea, and Malaysia, 1989-90.

Consultant, International Bank for Reconstruction and Development: The World Bank. Preparing analysis for Policy Research Division on the Effects of Fiscal Constraints and the Endogenous Determination of Public Servant Quality, 1994-95.

Visiting Scholar, International Monetary Fund Research Department, Spring 1995, January 1996.

Academic Visitor, London School of Economics, Houghton Street, London, 1996-97

Consultant for the World Bank, collaborated on study and preparation of a report on the causes, consequences and management of urban growth in developing countries, focusing on San Salvador, El Salvador, (2002).

Consultant for the Inter-American Development Bank, investigated and prepared report on policy alternatives for support of social rental housing in Sao Paulo, Brazil, (2002-2003).

Consultant for CHF International, coordinated preparation of survey and analysis of data to investigate the economic benefits of emergency shelter provision, (2004).

Founder and Director, Williams Center for Creative Community Development, a research center focused on understanding the role of the cultural sector in promoting economic development and community revitalization, (2004 – present).

Research Funding:

The Development of a Microsimulation model for Analysing the Impact of Planning on Housing Choices, Co-Principal Researcher, grant from the U.K. Department of Environment, Transport, and the Regions, 1997-98.

Recipient of curriculum development grant as part of Award for the Integration of Research and Education (AIRE) from the National Science Foundation (NSF) to Oberlin College, for development of curricular modules to train and assist students in undertaking hedonic analysis of property markets, 1998-99.

Lincoln Institute of Land Policy, Visiting Fellowship. To collaborate with Paul Cheshire on research project '*The Mediating Role of Land and Housing Markets in Urban Areas*', \$5000, Autumn 2000.

Research Funding, continued:

A Center for the Study of Arts and Culture-Based Community Development: A Planning Grant Proposal, in collaboration with Joe Thompson, MASS MoCA, submitted to the Ford Foundation, funded for \$28,000, 2003.

The Urban Growth Management Initiative: Confronting the Expected Doubling of the Size of Cities in the Developing Countries in the Next Thirty Years, in collaboration with Shlomo Angel, NYU, submitted to the Research Committee of The World Bank on behalf of The Urban Development Division, funded for \$230,000, 2003-04.

The Center for Creative Community Development: Implementation Proposal, in collaboration with Joe Thompson, MASS MoCA, submitted to the Ford Foundation, funded for \$585,000, 2004-2008.

The Causes and Consequences of Urban Expansion, National Science Foundation Award SES-0433278, \$425,000, 2004-2007.

Museums and Community: evaluating the economic and social impact of museums, Institute for Museum and Library Services, \$334,384, 2006-2009.

Analysis of property value impacts and evolving social networks around cultural spaces. Leveraging Investments in Creativity (LINC), \$100,000, 2009-10.

Economic impact, visitor participation and social networks in space for change. Leveraging Investments in Creativity (LINC), \$166,000, 2011-12.

Culture, Clusters and the Causal Connection of the Arts to Economic Prosperity, National Endowment for the Arts ArtWorks Research Program, \$25,000, 2012-13.

Teaching Experience:

Adjunct faculty, MA program, Webster University, Webster Groves, Missouri; 1979-1981

Instructor in Economics, Washington University; 1980

Senior Teaching Associate in Economics, Washington University; 1980-1981

Assistant Professor of Economics, Virginia Polytechnic Institute and State University; September 1982 - December 1983, and April 1985 to June 1990.

Visiting Assistant Professor of Economics, Washington University in St. Louis; July 1989 to June 1990

Assistant Professor of Economics, Oberlin College; July 1990 to May 1993

Associate Professor of Economics, Oberlin College; June 1993 to 1998

Professor of Economics, Oberlin College; June 1998 to July 2000

Professor of Economics, Williams College, July 2000 to present

James Phinney Baxter III Professor of Public Affairs, Williams College, July 2002 to 2006

Robert F. Wright Class of 1952 Professor of Economics, Williams College, July 2006 to 2009

Class of 2012 Professor of Economics, Williams College, 2009 to present

Courses taught:

Advanced Microeconomic Theory

Current Issues in Economics: Fiscal Federalism

Current Issues in Economics: Land Markets

Courses taught, continued:

Economics of Business Decisions
Economics of Land, Location, and the Environment
Environmental Economics
History of Economic Thought and Policy
Managerial Economics
Microeconomic Theory I, II (graduate level)
Price Theory (undergraduate level)
Principles of Economics
Public Economics
Seminar in Environmental and Natural Resource
Theory of Exchange and Production
Transportation Economics
Urban Economics
Economics of Culture and the Arts
Urbanization and Development
Cities, Regions and the Economy
Economic Analysis of Housing Markets

Other Professional Activities:

1990 - 2000	Environmental Studies Program Committee, Oberlin College
1997 – 1999	Educational Technology Committee, Oberlin College
1998 – 2000	Research and Development Committee, Oberlin College
2001 – 2002	Ad hoc Committee on the role of athletics, Williams College
2002 – 2004	Center for Environmental Studies Advisory Committee, Williams College
2002 – 2003	Information Technology Committee, Williams College
2003 – 2004	Committee on Educational Priorities, Williams College
2003 – 2013	Director, Williams College Center for Creative Community Development
2007 – 2010	Chair, Department of Economics, Williams College
2011 – 2012	Faculty Lecture Committee, Williams College
2012 – 2013	Chair, Library Advisory Committee, Williams College
1986 – 2005	Proposal Referee, National Science Foundation
1987-89, 1993-94, 1996-97	Referee, <i>Urban Affairs Review</i>
1987 - 1990	Referee and Committee Member, Transportation and Economic Analysis Subcommittee, National Academy of Science
1990	Referee, <i>Contemporary Policy Issues</i>
1990, 1992, 1994, 2000	Referee, <i>Journal of Economic Education</i>
1991	Reviewer, <i>Harper Collins Publishers</i>
1991	Reviewer, <i>Wadsworth Publishers</i>
1993 – 2010	Referee, <i>Journal of Urban Economics</i>
1993, 1999, 2003 – 2007	Referee, <i>Regional Science and Urban Economics</i>
1994, 1996, 1997	Referee, <i>The Economic Journal</i>
1998	Referee, <i>The American Sociological Review</i>
1998	Referee and Consultant, <i>The Oxford University Press</i>
2000	Referee and Panelist, National Science Foundation ITR/SOC program
2004	Referee, <i>Journal of Health and Social Behavior</i>
2000	Referee, <i>Australian Economic Papers</i>
2001	Referee, <i>Regional Studies</i>
2006, 2011-2012	Referee, <i>Environment and Planning</i>
2002 – 2011, 2013	Referee, <i>Urban Studies</i>

Other Professional Activities, continued:

2009 – 2010	Referee, <i>Economic Development and Cultural Change</i>
2011	Referee, <i>International Journal of Urban Sustainable Development</i>
2012	Referee, <i>Journal of Cultural Economics</i>
2012 – 2013	Referee, <i>Annals of Regional Science</i>
2012	Referee, <i>Letters in Spatial and Resource Sciences</i>
2012 – 2013	Referee, <i>National Tax Journal</i>
2013	Referee, <i>Journal of Economic Geography</i>
2013	Member of ArtWorks Research Grant referee panel, <i>National Endowment for the Arts</i>
1994 – 1995	Consultant and Expert Witness for plaintiff's counsel in case of Marie DeSario, <i>et al.</i> , v. Industrial Excess Landfill, Inc., <i>et al.</i>
1995	Consultant and Expert Witness for plaintiff's counsel in case of Friendly's Ice Cream Corporation v. L.S. Piping & Mechanical Services
1996-1998	Consultant and Expert Witness for plaintiff's counsel in case of Sherrill <i>et al.</i> v. Hess, <i>et al.</i>
1996-2001	Consultant and Expert Witness for plaintiff's counsel in case of Clara M. White v. Aztec Catalyst Co., <i>et al.</i>
1998-2001	Consultant and Expert Witness for plaintiff's counsel in case of Randal O. Lowe, <i>et al.</i> v. Sun Refining and Marketing Co., <i>et al.</i>
1999-2000	Consultant and Expert Witness for plaintiff's counsel in case of Dalespring Corporation v. Bullington*Gleason, <i>et al.</i>
1999-2001	Consultant and Expert Witness for plaintiff's counsel in case of William Rehoreg, <i>et al.</i> v. Stoneco, Inc.
2002-2003	Interamerican Development Bank, consultant providing report on "Social Rental Housing in Sao Paulo, Brazil: the present situation contrasted with the European and North American Experience"
2003-2004	CHF International, coordinated preparation of survey and analysis of data to investigate the economic benefits of emergency shelter provision
2007-2010	Chair, Department of Economics, Williams College
2007-2013	Consultant and expert analysis for the New York State Attorney General's Office in the matter of relicensing ENTERGY NUCLEAR OPERATIONS, INC. (Indian Point Nuclear Generating Units 2 and 3)
2011-2013	Consultant for The Housatonic Railroad Company, Inc., preparation of economic analysis of the impacts of proposed passenger rail service to Connecticut and Massachusetts
2012	Consultant and expert analysis in the case of Jewell v Aaron's, Inc. involving data analysis to determine share of employees who had been improperly compensated
2012-2013	Consultant and expert analysis for German Rubenstein LLP and Brannon and Associates in the case of the Behr-Dayton Toxic Plume

Presentations and Invited Seminars:

1982	Midwest Mathematical Economics meetings, St. Louis, Missouri
1983	Winter meetings of Econometric Society, San Francisco, California
1984	Theory workshop, Warwick University, Coventry, England
1985	World Congress of the Regional Science Association, Rotterdam, Netherlands
1988	Economics workshop, Northern Illinois University, Dekalb, Illinois
1988	Economic theory workshop, University of Reading, Reading, England
1989	European meetings of Econometric Society, Munich, West Germany
1990	Western Regional Science Association, Molokai, Hawaii
1990	Public Finance and Resource Economics workshop, University of Illinois, Urbana, Illinois
1990	North American Meetings, Regional Science Association, Boston, Massachusetts
1991	European Meetings, Regional Science Association, Lisbon, Portugal

Presentations and Invited Seminars, continued:

- 1992 Microeconomics workshop, Virginia Polytechnic Institute and State University, Blacksburg, Virginia
- 1992 Tenth World Congress of the International Economics Association, Moscow, Russian Republic
- 1992 AREUEA/USC International Conference on Real Estate and Urban Economics, Los Angeles, California
- 1992 North American Meetings of the Regional Science Association International, Chicago, Illinois
- 1993 Southern Economics Association, New Orleans, Louisiana
- 1994 Participant in Roundtable on Educational Technology in Economics, sponsored by Addison Wesley at Allied Social Science Meetings, Washington, D.C.
- 1996 American Real Estate and Urban Economics Association, International Housing Markets, Orlando, FL.
- 1996 Graduate seminar, London School of Economics.
- 1997 European Real Estate Society, Berlin, Germany.
- 1997 The Northeast Universities Development Consortium Conference
- 1997 Lincoln Institute of Land Policy
- 1998 American Real Estate and Urban Economics Association, at Allied Social Sciences Meetings, Chicago, IL.
- 1998 University of Glasgow, Urban Economics seminar
- 1998 North American Meetings, Regional Science Association, Santa Fe, New Mexico
- 1999 Departmental Workshop, U.S. Air Force Academy
- 1999 European Regional Science Association, Dublin, Ireland
- 1999 North American Meetings, Regional Science Association, Montreal, Canada
- 1999 Department seminar, Case Western Reserve University
- 2000 Department seminar, Williams College
- 2000 World Congress of the Regional Science Association, International, Lugano, Switzerland.
- 2000 Lincoln Institute of Land Policy, internal staff seminar
- 2000 North American Meetings, Regional Science Association, Chicago, Illinois
- 2001 Pacific Regional Science Organization (PRSCO) Meetings, Portland, Oregon
- 2002 Lincoln Institute of Land Policy, Director's Conference, Scottsdale, Arizona
- 2002 Lincoln Institute of Land Policy, Conference on the Analysis of Urban Land Markets and the Impact of Land Market Regulation
- 2002 North American Meetings of the Regional Science Association, San Juan, Puerto Rico
- 2002 World Bank Inaugural Urban Research Symposium, Washington, DC
- 2003 North American Meetings, Regional Science Association, Philadelphia, PA
- 2003 Centre for Economic Policy Research/European Science Foundation/Centre for Economic Performance Conference *Topics in Economic Geography: A Dialogue Between Economists and Geographers*
- 2003 Inter-American Development Bank Conference on Housing Policy, Sao Paulo, Brazil
- 2004 North Atlantic Regional Council, Society for College and University Planners, Williamstown, MA
- 2004 North American Meetings of the Regional Science Association, Seattle, WA
- 2004 Allied Social Sciences Associations annual meetings, AREUEA Session San Diego, CA
- 2005 Americans for the Arts National Conference, Austin, TX
- 2005 Summer Institute of Arts Management, Amherst and North Adams, MA
- 2005 Social Theory, Politics and the Arts National Conference, Eugene, OR
- 2005 Grantmakers in the Arts National Conference, Pasadena, CA
- 2005 University of Reading, Economics Department Workshop, Reading, England
- 2005 CESifo Conference on "Guns and Butter: The Economic Causes and Consequences of Conflict", Munich, Germany
- 2006 Allied Social Sciences Associations, AREUEA Session, *The Causes and Consequences of Urban Expansion*. Boston, MA
- 2006 Homer Hoyt Advanced Studies Institute, *The Causes of Global Urban Expansion and the Consequences for Commercial Property*, Palm Beach, Florida
- 2006 The Earth Institute at Columbia University, workshop on "Rethinking the Estimation and Projection of Urban and City Populations", *What Can We Learn From Remotely-Sensed Data?*, New York, NY
- 2006 World Bank Policy Research and Economic Modeling Conference (PREM), *Panel Discussion on Global Urban Expansion*, Washington, DC.

Presentations and Invited Seminars, continued:

- 2006 Lincoln Institute of Land Policy, Conference on Land Policies for Urban Development, *Comments on: Community Land Trusts and Affordable Housing*, Cambridge, MA.
- 2006 The World Bank Seminar, *Modeling the Causes of Urban Expansion*, Washington, DC.
- 2006 Boston University Arts Research Initiative Symposium on Research, Policy and Practice: Building Capacity in Creative Communities, *Panel Discussion on Research and Theory*, Boston, MA
- 2006 Lincoln Institute of Land Policy, *The Causes and Consequences of Urban Expansion*, Cambridge, MA.
- 2006 Keynote Address at NAREA 2006 Post-Conference Workshop, “Opportunities and Challenges Facing the Rural Creative Economy”, *The Creative Economy and Quality of Life in Small Cities*, Mystic, CT.
- 2006 19th Advanced Summer School in Regional Economics, European Regional Science Association Summer Institute, *Four Lectures on GIS and Spatial Econometrics*, Groningen, Netherlands
- 2006 The Association for Cultural Economics International (ACEI) meetings, *Buying into Bohemia: the impact of cultural amenities on property values*, Vienna, Austria.
- 2006 Keynote Address at New York State Economics Association, *The Causes and Consequences of Global Urban Expansion*, Albany, NY
- 2006 Brookings-Wharton Conference on Urban Affairs, *The Impacts of Terrorism on Urban Form*, Washington, DC.
- 2006 Grantmakers in the Arts “Research at Eye Level” pre-conference, co-organized and hosted conference, co-presented two papers: *North Adams and Mass MOCA: evaluating the impact of creative community development* and *Measuring New England’s Creative Economy – New England Cultural Database and Counting on Culture Tool*, North Adams, MA.
- 2006 North American Meetings of the Regional Science Association, *Infill versus Outspill: the microstructure of urban expansion*, Toronto, Canada.
- 2006 MIT Urban/Real Estate Seminar, *Infill versus Outspill: the microstructure of urban expansion*, Cambridge, MA.
- 2006 Lincoln Institute of Land Policy, Symposium on Valuation Techniques and Land Value Assessment, *Panel Discussion Participant*, Cambridge, MA
- 2007 Homer Hoyt Advanced Studies Institute, *Infill versus Outspill: the microstructure of urban expansion*, Palm Beach, Florida
- 2007 Ford Foundation Shifting Sands Initiative Peer Learning Conference, *Telling Your Story: C3D Toolkits for Advocacy and Evaluation*, Honolulu, Hawaii
- 2007 Innovations for an Urban World: a Global Urban Summit, *Measuring and Modeling Global Urban Expansion*, Bellagio, Italy.
- 2007 Social Theory, Politics and the Arts Annual Meeting, *Using Network Analysis to Evaluate the Social Impact of Cultural Arts Organizations*, New York City, NY
- 2007 Urban Anchors in the 21st Century, conference at the University of Pennsylvania, *A Tale of Two Cities: North Adams, Massachusetts and Beacon, New York*, Philadelphia, PA
- 2007 North American Meetings of the Regional Science Association, *Buying into Bohemia: The Impact of Cultural Amenities on Property Values*, Savannah, GA
- 2008 North American Meetings of the Regional Science Association, *Museums in the Neighborhood*, Brooklyn, NY
- 2009 Meetings of the Allied Social Sciences Associations, *Informal Sprawl?*, San Francisco, CA
- 2009 North American Meetings of the Regional Science Association, *Demand for Museum Experience, Regional Development and Spatial Competition*, San Francisco, CA
- 2010 Ford Foundation/Leveraging Investments in Creativity, Space for Change Convening, *Building a community through culture: measuring and visualizing MACLA’s impact*, Los Angeles, CA
- 2010 National Endowment for the Arts, conference on Arts and Livability: The Road to Better Metrics, *Infusing aesthetics into property value measurement*, Washington, DC
- 2010 North American Meetings of the Regional Science Association, *The Contribution of Housing Markets to the Great Recession*, Denver, CO
- 2011 45th annual meeting of the Berkshire Regional Planning Commission, keynote address, *Nonprofit clusters in the innovative economy*, Pittsfield, MA.
- 2011 Ford Foundation/Leveraging Investments in Creativity, Space for Change Convening, *Space for Change tools for understanding*, New Orleans, LA

Presentations and Invited Seminars, continued:

- 2011 North American Meetings of the Regional Science Association, *Localization of nonprofit enterprises in the US*, Miami, FL
- 2012 Charles Leven Memorial Conference, *Culture Shocks and Consequences: the connection between the arts and urban economic growth*, Washington University in St. Louis, St. Louis, MO
- 2012 Brookings/NEA Arts, *New Growth Theory, and Economic Development* symposium, *Culture Shocks and Consequences: the connection between the arts and urban economic growth*, Brookings Institution, Washington, DC
- 2012 Greater Boston Urban and Real Estate Economics Seminar (GBUREES), *Culture Shocks and Consequences: the connection between the arts and urban economic growth*, Boston Federal Reserve Bank, Boston, MA
- 2012 North American Meetings of the Regional Science Association and the Urban Economics Association, *Culture Shocks and Consequences*, Ottawa, Canada
- 2013 American Real Estate and Urban Economics Association section of the Allied Social Sciences Association 2013 meetings, *Private Schools and Urban Prosperity*, San Diego, CA.
- 2013 North American Meetings of the Regional Science Association and the Urban Economics Association, *Culture Concentrations: the spatial structure of arts nonprofits*, Atlanta, Georgia

Personal:

Date of Birth: January 16, 1955

Marital Status: married, two children

Attachment B to Sheppard Affidavit

Nuclear Regulatory Commission and Dept. of Energy Documents

1. Nov. 6, 2013 NRC Pilgrim Assessment Follow-Up Letter- Pilgrim Nuclear Power Station, ML13310A318. (“NRC Assessment 2013”)
2. *Strategy for the Management and Disposal of Used Nuclear Fuel and High-Level Radioactive Waste*, U.S. Department of Energy, January 2013. (“DOE 2013”)
3. Letter Number 2.07.055, Spent Fuel Management Plan Submitted by Entergy Nuclear Operations Inc. to the U.S. NRC, June 7, 2007 with regard to Pilgrim Nuclear Power Station. (“2007 Spent Fuel Management Plan”)
4. *Generic Environmental Impact Statement for License Renewal of Nuclear Power Plants*, NUREG-1437, May 1996 (“1996 GEIS”) (Available electronically at: <http://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1437/v1/>)
5. *Generic Environmental Impact Statement for License Renewal of Nuclear Power Plants, Supplement 29, Regarding Pilgrim Nuclear Power Station*, NUREG-1437, Supplement 29 Vol. 1, July 2007. (“2007 GEIS”) (Available electronically at: <http://pbadupws.nrc.gov/docs/ML0719/ML071990020.pdf>)
6. *Impacts of the Indian Point Energy Center on Property Values*, Testimony of Stephen Sheppard, NRC ML12030A234, December 2011. (“Sheppard 2011”)
7. *Testimony of Entergy Witnesses Donald P. Clearly, C. William Reamer, and George S. Tolley Regarding Contention NYS-17B (Property Values)*, Docket Nos. 50-247-LR and 50-286-LR, ENT000132, Submitted March 28, 2012. (“Entergy 2012”)
8. *State of New York’s Revised Statement of Position Regarding Contention NYS-*

- 17B, Docket Nos. 50-247-LR and 50-286-LR, Submitted June 29, 2012, ASLBP No. 07-858-03-LR-BD01 (“NYS-17B”).
9. May 9, 2014 NRC Letter, Subject: Screening and Prioritization Results Regarding Information Pursuant to Title 10 of the Code of Federal Regulations 50.54(f) Regarding Seismic Hazard Re-Evaluations for Recommendation 2.1 of the Near-term Task Force Review of Insights from the Fukushima Dai-ichi Accident, ML14111A147. (“NRC Seismic Evaluation, 2014”)
 10. April 18, 2014 Letter from Senators Markey and Warren to NRC Chair Alison MacFarlane regarding seismic risk of Pilgrim. (“Markey and Warren 2014”).
 11. July 12, 2011 Letter from Senator Dan Wolf to Dept. of Energy Secretary Steven Chu regarding the relicensing of Pilgrim Nuclear Power Plant. (“Wolf 2011”)
 12. March 12, 2012, NRC Letter, Subject: Request for Information Pursuant to Title 10 of the Code of Federal Regulations 50.54(f) Regarding Recommendations 2.1, 2.3, and 9.3 of the Near-term Task Force Review of Insights from the Fukushima Dai-ichi Accident, ML12053A340. (“NRC Letter 2012”)

Economic Studies

13. *A Meta-Analysis of the Effect of Environmental Contamination and Positive Amenities on Residential Real Estate Values*. Simons, Robert A; Saginor, Jesse D. *The Journal of Real Estate Research*; Jan-Mar 2006; 28, 1; ProQuest Central pg. 71 (“Simons 2006”).
14. *Do Landfills Always Depress Nearby Property Values?* Ready, Richard. *The Journal of Real Estate Research*; Jul/Sep 2010; 32, 3; ProQuest Central pg. 321 (“Ready 2010”)

15. *A Landfill Closure and Housing Values*. Thomas C. Kinnaman, 2009 (JEL H42, H72, Q51, Q53, R21) (“Kinnaman 2009”)
16. *Measuring the Impact of the Discovery and Cleaning of Identified Hazardous Waste Sites on House Values*. Katherine A. Kiel *Land Economics*, Vol. 71, No. 4 (Nov., 1995), pp. 428-435 Published by: [University of Wisconsin Press](#) Stable URL: <http://www.jstor.org/stable/3146708> (“Kiel 1995”)
17. *The Effect of Decisions About Spent Nuclear Fuel on Residential Property Values*. Risk Analysis Vol. 17, No. 5, 1997. William C. Metz, David E. Clark. (“Metz 1997”)
18. *Spent nuclear fuel and residential property values: the influence of proximity, visual cues and public information*. David E. Clark, Tim Allison. *Papers Reg. Sci.* 78, 403–421 (1999) (“Clark 1999”)
19. *A survey of house price hedonic studies of the impact of environmental externalities*. Boyle, Melissa; Kiel, Katherine. *Journal of Real Estate Literature*; 2001; 9, 2; ProQuest Central, pg. 117 (“Boyle 2001”)
20. *The long-run impact of nuclear waste shipments on the property market: Evidence from a quasi-experiments*. Kishore Gawande, Hank Jenkins-Smith, May Yuan. *Journal of Environmental Economics and Management* 65 (2013), 56–73 (“Gawande 2013”)
21. *The valuation of landfill disamenities in Birmingham*. Yun-Ju Ham, David J. Maddison, Robert J.R. Elliott. *Ecological Economics* 85 (2013) 116–129 (“Ham 2013”)

22. *The Composition of Hedonic Pricing Models*. G. Stacy Sirmans, David A. Macpherson, Emily N. Zeitz. *Journal of Real Estate Literature*; 2005; 13, 1; Proquest Central pg. 3. (“Sirmans 2005”)
23. *Measuring the Externalities of Nuclear Power: A Hedonic Study*. Prest, Brian. Williams College, May 2009. (“Prest 2009”)
24. *When Good Things Happen to Bad Properties*, Jackson, Thomas. *Environment and the Appraiser*, p.112, Spring 2009). (“Jackson 2009”)
25. *On the Price of Land and the Value of Amenities*, by Paul Cheshire and Stephen Sheppard, *Economica*, 62, 247-267 (1995). (“Sheppard 1995”)
26. *Hedonic Analysis of Housing Markets*, by Stephen Sheppard, in *Handbook of Regional and Urban Economics Volume 3: Applied Urban Economics*, edited by Paul Cheshire and Edwin Mills, Amsterdam: North Holland, 1999, Chapter 41, pp. 1595–1635. (“Sheppard 1999”)
27. *Effect of the Fukushima nuclear accident on the risk perception of residents near a nuclear power plant in China*, Huang, Lei, et. al., *Proceedings of the National Academy of Sciences*, Early Edition 2013. (“Huang 2013”)
28. *What Do Property Values Really Tell Us? A Hedonic Study of Underground Storage Tanks*, Guignet, Dennis, *Land Economics*, 89 (2): pp 211–226 (2012). (“Guignet 2012”)
29. *A hedonic analysis of the impact of LUST sites on house prices*. Zabel, Jeffrey and Guignet, Dennis, *Resource and Energy Economics*, 34 pp 549–564 (2012). (“Zabel 2012”)
30. *The effect of voluntary brownfields programs on nearby property values:*

Evidence from Illinois. Linn, Joshua *Journal of Urban Economics*, 78 pp 1–18.
(2013) (“Linn 2013”)

Media

1. *High Tritium Level Seen at Pilgrim*, Christine Legere, CapeCodOnline.com, January 18, 2014, available at:
<http://www.capecodonline.com/apps/pbcs.dll/article?AID=/20140118/NEWS/401180331/-1/news01>
2. *NRC Downgrades Pilgrim’s Performance Rating*, Erin Ailworth, *The Boston Globe*, November 9, 2013, available at:
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39. June 5, 2013, Memo from Richard Serkey of Winokur, Serkey & Rosenberg, PC to the Plymouth Zoning Board of Appeals re: Case No. 3712. ("Serkey 2013")
40. November 15, 2013, Plaintiffs' First Amended Complaint, ("Complaint 2013")
41. November 25, 2013, Answer and Affirmative Defenses of Defendant Entergy Nuclear Generation Co. to Plaintiffs' First Amended Complaint ("Answer 2013")
42. April 11, 2014, Defendant Entergy Nuclear Generation Co.'s Objections and Responses to Plaintiff's Revised First Requests for Admissions to Defendant Entergy, RFA #245 ("RFA #245")

Maps

43. GoogleEarth map of all Plaintiff residences created by the staff of Plaintiff Pine DuBois.
44. GoogleEarth map of Plaintiff residences within 2 miles of Pilgrim created by the staff of Plaintiff Pine DuBois.
45. Plymouth Assessor's Office, Map 44.