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Making Existing Homes Greener

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MAKING EXISTING HOMES GREENER

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I. ENVIRONMENTAL IMPACTS OF BUILDINGS

Buildings have always constituted the major ingredient of our *built environment*, which consists of human-made physical structures and physical infrastructure in all places: urban, suburban, and rural.[1] Buildings obviously have immense value, but they also have an enormous impact on our environment. The construction of buildings, and their ongoing maintenance and use, consume massive quantities of raw materials.[2] Buildings cover large areas of natural and open lands. They account for approximately one-half of U.S. energy consumption

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1. RUSSELL P. LOPEZ, THE BUILT ENVIRONMENT AND PUBLIC HEALTH 5 (2012) ("The built environment itself consists of all the many features that have been constructed and modified by humanity [including] . . . the construction of homes [and] . . . the structure of neighbourhoods and metropolitan areas.").

2. *Green Building Facts*, U.S. GREEN BLDG. COUNCIL, http://www.usgbc.org/Docs/Archive/General/Docs18693.pdf [https://perma.cc/8R4K-JXYA] (last visited Aug. 28, 2017).

and 75% of electricity consumption.[3] Buildings also devour large shares of natural gas and water supplies.[4]

Buildings are a prime contributor to greenhouse gas emissions, a concern of heightened importance in an era of global climate change.[5] Buildings produce close to one-half of all U.S. carbon dioxide emissions.[6] More precisely, it is not buildings per se that cause the emissions. Rather, they result from human activities associated with buildings. For example, emissions attributable to a building will decrease if occupants decide to turn down the thermostat for heat in the winter and to turn up the thermostat during summer air conditioning season. The energy use of buildings is a major component of building-related carbon dioxide emissions.

Buildings often create health risks for occupants. For a long time, most people have appreciated traditional safety concerns associated with problems such as fire, structural collapse, storm-inflicted damage, and flaws in electrical and heating systems. However, during the past few decades, there has been a growing appreciation of substantial risks from indoor pollutants and other environmental hazards, which are more subtle and harder to detect. Contaminants often found inside buildings include molds and toxins released from construction materials and products used inside buildings.[7] Mold and mildew result from high humidity and water penetration into walls and other cavities. Radon gas at unsafe levels is often present in buildings. The problems are often exacerbated by relatively little exchange of indoor and outdoor air. With occupants not opening windows as frequently as people did in the past and instead relying on modern heating and cooling systems and building envelopes that have little air leakage, bad air stays inside rather than dissipating outdoors. The term *sick building syndrome* took hold to identify buildings, often places of

3. *Why the Building Sector?*, ARCHITECTURE 2030, http://architecture2030.org/buildings_problem_why/ [https://perma.cc/FTZ5-T7DY] (last visited Aug. 28, 2017). Building operations consume 41.7%, and building construction and materials make up 5.9%. *Id.* Slightly lower percentages are reported by the U.S. Department of Energy. Buildings account for 72.9% of the electricity and 41.1% of the total primary energy consumed in the United States, a number that has risen from 33.7% in 1980. *See generally* U.S. DEP'T OF ENERGY, BUILDINGS ENERGY DATA BOOK 1-1, http://en.openei.org/doe-opendata/dataset/6aaf0248-bc4e-4a33-9735-2babe4aef2a5/resource/3edf59d2-32be-458b-bd4c-796b3e14bc65/download/2011bedb.pdf [https://perma.cc/RGM6-VF9F] (last updated Mar. 2012).

4. Buildings use about 21% of the natural gas and 10% of the water consumed in the United States. BUILDINGS ENERGY DATA BOOK, *supra* note 3, at 1-1, 8-1.

5. U.S. buildings emit 40% of the nation's carbon dioxide emissions, an increase from 33% in 1980. *Id.* at 1-19. Another source indicates buildings produce 45% of U.S. carbon dioxide emissions. *Why the Building Sector?*, *supra* note 3.

6. *Why the Building Sector?*, *supra* note 3.

7. *See* Lesley King O'Neal et al., *Sick Building Claims*, 20 CONSTRUCTION LAW. 16, 16 (Jan. 2000) (nearly 30% of all new and remodeled buildings worldwide have indoor air quality problems, an increasing source of litigation).

work but also homes, where the health of occupants suffered due to indoor pollutants.[8]

The environmental movement that has taken hold in the last half-century includes the objective of reducing the adverse impacts buildings have on the natural environment. In the United States, this has manifested itself in changes in the design and construction of buildings.

Modern buildings—those built recently—perform better with respect to some, but not all, environmental criteria than older buildings. The most prominent characteristic is the efficiency of energy use for heating, cooling, and appliances. Improvement in this regard is attributable to contemporary and evolving standards for the building envelope. Newer buildings are much better insulated, are more airtight, and often use better windows. Building codes, which are periodically revised and updated, have forced much of the enhancement.

Residential buildings of all types—homes—obviously reflect and create large shares of buildings' consumption of energy and other resources and their emission of carbon. The United States has approximately 135 million dwelling units,[9] housing a population of over 313 million people.[10] Most of the units—almost 84 million—are detached single-family homes.[11] Approximately 41 million are units in multi-family buildings, ranging from duplexes to large multi-floor buildings.[12] Like other buildings, newer residential buildings generally outperform older structures with respect to energy consumption.

During the past two decades, a "green building movement" has emerged, at first concentrating on the "greening" of government and commercial building. More recently, the focus has turned to the greening of residential buildings. "Green homes" are increasingly popular in the United States and throughout the world. They consume less energy; reduce environmental impacts; and conserve land, water,

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8. *See* James M. Andris, Jr., *Adopting Proactive Standards to Protect Americans in Indoor Environments: Volatile Organic Compound Emissions Regulation*, 56 WM. & MARY L. REV. 1947 (2015).

9. *Annual Estimates of Housing Units for the United States*, U.S. CENSUS BUREAU, https://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=PEP_2015_PEPANNHU&prodType=table [https://perma.cc/C235-5DAJ] (last visited Aug. 28, 2017) (The Census Bureau estimates 134,789,944 housing units as of July 1, 2015); This is an increase of over 3 million units from July 1, 2010. *Id.*

10. *Monthly Population Estimates for the United States*, U.S. CENSUS BUREAU (Dec. 2015), https://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?src=bkmk [https://perma.cc/U2VA-UHNX].

11. *General Housing Data – All Housing Units (NATIONAL)*, U.S. CENSUS BUREAU, https://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=AHS_2013_C01AH&prodType=table [https://perma.cc/96SE-2CH2] [hereinafter General Housing Data] (last updated Feb. 24, 2015).

12. *Id.* (Manufactured homes, mobile homes, is a separate category totaling 8,603,000 as of July 1, 2015. Most of the "mobile homes" are not truly mobile. Many are functionally the same as regular homes, i.e., placed on foundations, with normal utility connections, occupied by a household with no expectation of moving the unit.).

and other natural resources. Now, thousands of homebuyers are willing to take into account *green* environmental considerations when making home purchase decisions. They are motivated economically (the prospect of lower utility bills) and altruistically (doing what is good for the environment).

II. THE GREENING OF NEW BUILDINGS

Two types of standards, one mandatory and the other voluntary, are directed at reducing the amount of energy consumed by building operations. Building codes regulate the physical design, structure, and components of buildings to achieve purposes such as safety, durability, and preservation of property values.[13]

Building codes in urban settings are more than a century old. Long ago, building regulations only addressed short-term health and safety concerns (e.g., fire codes, buildings that will not collapse), but they evolved to include minimum levels for insulation and durability. The International Code Council ("ICC"), the most-prominent organization responsible for drafting and revising codes, promulgated the International Residential Code ("IRC") for One- and Two-Family Dwellings (2009) and the International Energy Conservation Code ("IECC") (2009).[14] Many local governments in the United States adopt these codes as their local building codes. The ICC and other code organizations periodically revise their codes to require that buildings meet higher standards with respect to features such as insulation levels, heating and cooling systems, and safety protection.[15]

The second type of standard aimed at saving energy consumed by building consists of certification regimes for green buildings. During the 1990s, private-sector organizations developed voluntary standards to promote green building practices, the most prominent being Leadership in Energy and Environmental Design ("LEED").[16] The green building standards initially focused on newly constructed large real estate projects, mainly governmental and commercial buildings. An owner seeks to have the owner's building or project certified by the

13. *See* Keith H. Hirokawa, *At Home with Nature: Early Reflections on Green Building Laws and the Transformation of the Built Environment*, 39 ENVTL. L. 507, 519–20 (2009).

14. *See generally Publications*, INT'L CODE COUNCIL, https://www.iccsafe.org/codes-tech-support/codes/the-i-codes/ [https://perma.cc/NC4V-BNE5].

15. For example, the International Code Council operates on a three-year cycle, publishing revised codes every three years.

16. The United States Green Building Council ("USGBC"), a nonprofit organization whose members are predominantly building industry participants, developed LEED to promote green building strategies and practices. *About*, U.S. GREEN BLDG. COUNCIL, http://www.usgbc.org/about [https://perma.cc/89DF-PDZN] (last visited Aug. 28, 2017). USGBC launched its pilot program in 1998. *Id.* The current version, LEED version 4, came out in November 2013. *Better Buildings Are Our Legacy*, U.S. GREEN BLDG. COUNCIL, http://www.usgbc.org/leed [https://perma.cc/LV7S-CGRF] (last visited Aug. 28, 2017).

organization as having components or features related to energy efficiency and other *green factors*. Inspections of the property are required to confirm compliance with program requirements.[17] To earn certification, the owner must secure a certain number of "points" based on the incorporation of specified "elements" in the project. Some elements are mandatory, but many are optional. For example, points may be gained if an office building is located near a mass transit station, or the owner installs bicycle racks, but again, these are optional and not necessary. Mandatory elements include compliance with minimum insulation standards and water efficiency measures.[18]

More recently, the green building movement turned to the new construction of residential buildings, with several organizations having developed voluntary green home standards. Currently there are three separate national systems: (1) the federal government's Energy Star Certified Homes program; (2) LEED for Homes;[19] and (3) the National Green Building Standard ("NGBS").[20] These three standards share common characteristics. All are voluntarily followed by homebuilders who choose to adopt them; all exceed legal requirements imposed by typical building codes;[21] and all provide documentation through the issuance of a certificate by a third-party expert. None of these standards allow the homebuilder to certify compliance. The Energy Star Homes program, developed and operated by the federal Environmental Protection Agency ("EPA"), is especially notable.

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17. *See This is LEED*, U.S. GREEN BLDG. COUNCIL, http://leed.usgbc.org/leed.html [https://perma.cc/FSK4-SG6C] (last visited Aug. 28, 2017) ("LEED certification provides independent verification of a building or neighborhood's green features, allowing for the design, construction, operations and maintenance of resource-efficient, high-performing, healthy, cost-effective buildings.").

18. *See e.g.*, *LEED for New Construction and Major Renovations Scorecard (v4)*, U.S. GREEN BLDG. COUNCIL, http://www.usgbc.org/credits [https://perma.cc/FQ2R-AZ3H] (follow "Download Scorecard" hyperlink) (last visited Aug. 28, 2017).

19. The USGBC launched its certification program for homes in 2005. *LEED for Homes*, U.S. GREEN BLDG. COUNCIL, http://www.usgbc.org/redirect.php?Document ID=3936 [https://perma.cc/QRQ5-HU8A] (last visited Sept. 2, 2016); For program requirements, *see generally LEED for Homes Rating System*, U.S. GREEN BLDG. COUNCIL (Jan. 1, 2010), http://www.usgbc.org/Docs/Archive/General/Docs3638.pdf [https://perma.cc/V6YK-4RQD].

20. The National Association of Home Builders ("NAHB") developed the National Green Building Standard ("NGBS") in collaboration with the International Code Council ("ICC"). The first version came out in 2009 as an industry standard. It replaced the NAHB Model Green Home Building Guidelines, developed internally in 2005. *See* ICC, NATIONAL GREEN BUILDING STANDARD (2012), http://shop.iccsafe.org/2012-national-green-building-standard-icc-700-2012.html ("A collaborative effort between the NAHB and ICC, the Standard provides the 'green' practices that can be incorporated into new homes, including high-rise multifamily buildings, home remodeling and additions, hotels and motels, and the site upon which the green homes are located.").

21. Building codes regulate the physical design, structure, and components of buildings to achieve purposes such as safety, durability, and preservation of property values. *See* Hirokawa, *supra* note 13, at 519–20 (describing history and evolution of building codes); *see also supra* Part II.

The Energy Star Homes program has captured almost the entire market for green home certification—over 98%. LEED for Homes and NGBS each represent less than 1% of the homes certified to date as green in the United States.[22]

Voluntary certification standards for new homes are important tools, with great potential for providing reliable environmental information to homebuyers and encouraging homebuilders to make better, greener products, thus enabling buyers to make better decisions. So far, much of this potential is unrealized, mainly because Energy Star considers only the energy efficiency of the structure and its heating and cooling systems; ignoring other important factors, including the location and size of the house, the lot, and the greenness of building materials and construction practices.[23]

III. THE PROBLEM OF EXISTING HOUSING

Even when the combination of building codes and voluntary standards work effectively to promote the construction of new green homes, they cannot provide a solution with respect to the overall performance of our housing stock. For many products, setting new standards that are only prospective can be highly effective. For goods having a short, useful life, this is especially true. For example, few people keep and use computers, monitors, and phones for many years. Goods with longer, useful lives, like automobiles and refrigerators, are still regularly replaced by most owners; therefore, relatively few "vintage" units remain in service decades after their production.

Housing is unlike other goods. Houses—both single-family units and multi-family buildings—generally remain in service for a long time. Most homes are used and occupied for many decades, and are constructed in a fashion that, with proper maintenance, may remain in service indefinitely. Census data shows that the average U.S. home is forty years old.[24] Many are much older. Over 40 million U.S. homes that are presently occupied were built before 1960.[25] Because our housing stock contains so many units built long ago, practices and programs that aim at making existing housing greener are highly important.

One problem with respect to efforts to green existing housing is definitional. Green housing (or sustainable housing) is hard to define.

22. JAWANDA C. JACKSON, AN EXPLORATORY STUDY OF THREE PATHS TO GREEN HOMES: ENERGY STAR HOMES, LEED FOR HOMES, AND THE NATIONAL GREEN BUILDING STANDARD 12 (2014), http://www.spdc.msu.edu/uploads/files/Programs/CM/Housing_Education_and_Research_Center/mastersreport_greenhomes_JawandaJackson_101414.pdf [https://perma.cc/YRR4-5HHQ].

23. *See* James Charles Smith, *Green Home Standards: Information and Incentives*, 54 HOUS. L. REV. 1139 (2017).

24. *General Housing Data*, *supra* note 11 (median year in which structure built is 1975).

25. *Id.*

Although several voluntary certification standards for newly produced housing are in widespread use, they differ significantly in the elements they consider and rate. No consensus as to what makes a house green has emerged. This problem resembles previous debates over organic foods, which after a number of years were largely resolved by the federal government's promulgation of national regulatory standards.[26] The problem of defining green housing is the same whether the subject is existing housing or new housing. Most people probably agree that the efficient use of energy is a major consideration, but there are many different ways one can measure energy efficiency. Other considerations often considered with respect to the certification of new green homes include: proximity to public transportation; the use of recycled building materials; the use of local building materials; and landscaping plans that require little irrigation. Some of these considerations will be highly important to some people, and some of no importance to others. Although commentators sometimes decry the lack of consensus, and call for measures that might create a standard definition,[27] perhaps a single standard is neither achievable nor desirable. Different people have different values, and the market may function well when it allows each person to achieve the person's own objectives.

For existing houses, many choices that bear on *greenness* have already been made and are not readily changeable. For example, house size, lot size, and access to local infrastructure, although ignored by the Energy Star Certified Homes program, have substantial environmental impacts, and thus are properly treated as elements bearing on greenness.[28] For new home construction, a green choice is the use of construction materials that are renewable, local in origin, or otherwise green.

For existing houses, these characteristics are generally set and determined, with the making of significant changes not practical, both for economic reasons and for market reasons. For one example, consider house size. Other things being equal, a smaller house consumes less energy than a larger one, and thus is inherently greener; but few if any homeowners will decide that a home remodeling that reduces

26. Chiefly, resolution followed from the National Organic Program developed by the U.S. Department of Agriculture, implementing the Organic Foods Production Act of 1990. 7 U.S.C. § 6501 (2012); *see* Valerie J. Watnick, *The Organic Foods Production Act, the Process/Product Distinction, and A Case for More End Product Regulation in the Organic Foods Market*, 32 UCLA J. ENVTL. L. & POL'Y 40 (2014); *see also* Marie A. Moore, *Every Contract Tells a Story (or Should)*, PROB. & PROP., Jan./Feb. 2014, at 64 (discussing hypothetical involving seller of peanuts who argues his peanuts are "organic" because all peanuts contain organic matter).

27. *See, e.g.*, Patrick Kain, *Improving Green Building: Comparing LEED Certification to the FDA and its Private, Third-Party Ratings Approach*, 5 AM. U. BUS. L. REV. 291, 311 (2016) (advocating federal intervention to set green-building standards to displace LEED standards and those of other private organizations).

28. *See* Smith, *supra* note 23, at 1154–67.

square footage is a good idea. Instead, home remodeling often increases building size. For characteristics that depend upon the neighborhood—consider proximity to public transportation, as one example—the owner of one existing house, acting alone, cannot do anything. In principle, all the houses in an existing neighborhood that lack access to public transportation can be made greener by community-wide transportation planning that extends or adds infrastructure.

For existing homes with substantial "non-green" characteristics, two approaches are possible. First, one could focus only on the characteristics that are realistically changeable. This focuses the owner and potential buyers on the realistic choices that are available. Second, one can rate the greenness of existing houses, compared to other existing houses, ignoring changeability. This may have the benefit of encouraging buyers to make greener choices in their buying decisions. They can avoid "non-green" houses that cannot be changed. If this has the effect of reducing their market value, this may have a societal positive, even though accompanied by a loss in value for the home's present owner. This latter approach may also have the benefit of pushing the envelope on what is changeable. If the demand for greener existing homes is high enough, contractors and other market participants may decide to make drastic changes. Not only are drastic changes to individual homes possible, but also neighborhood features may be changed to make communities more sustainable, including changes that make suburban neighborhoods more walkable.[29]

IV. MUNICIPAL GREEN HOME ORDINANCES

A. *San Francisco Ordinance*

San Francisco, California, is the pioneer for U.S. municipal regulations aimed at making the existing housing stock greener. The City adopted its Residential Energy Conservation ordinance in 1982,[30] and subsequently in 1991 added a companion, the Residential Water Conservation ordinance.[31] The City's stated objective is "to protect natural resources and cut greenhouse gas emission through reduced energy and water use."[32] It also justifies the measures by asserting that residents will save costs: "The required improvements will also lessen

29. *See* RETROFITTING SPRAWL: ADDRESSING SEVENTY YEARS OF FAILED URBAN FORM (Emily Talen ed., 2015).

30. *See generally* S.F., CAL., HOUSING CODE ch. 12 (2013); *What You Should Know About the Residential Energy Conservation Ordinance (RECO)*, S.F. DEP'T OF BUILDING INSPECTION (Mar. 2009), http://www.sfdbi.org/ftp/uploadedfiles/dbi/Key_Information/ResidentialEnergyConservationOrdinance.pdf [https://perma.cc/466Q-E2TZ].

31. *See generally* S.F., CAL., HOUSING CODE ch. 12A (2013); *see also What You Should Know About the Residential Energy Conservation Ordinance (RECO)*, *supra* note 30.

32. *What You Should Know About the Residential Energy Conservation Ordinance (RECO)*, *supra* note 30.

the impact of rising energy and water costs on renters and homeowners alike."[33]

The San Francisco conservation laws require inspections of residential buildings prior to their sale, with mandatory upgrades for deficiencies revealed by the inspections. The energy conservation inspection applies only to older homes. This energy inspection is required for houses built before 1979.[34] The water conservation inspection is required for all houses, regardless of their age.

Energy conservation targets five elements. Three of the measures relate to insulation; insulation at minimum levels is required for: (1) the attic;[35] (2) the hot water heater;[36] and (3) the heating and cooling ducts.[37] In addition, (4) exterior doors must have weather stripping; and (5) openings in the building exterior must be caulked and sealed.

Water conservation has three elements: (1) low-flow showerheads and faucet aerators are required;[38] (2) all toilets must meet modern efficiency standards;[39] (3) water leaks must be located and repaired.[40]

The San Francisco ordinance imposes obligations on the seller to obtain inspections and remedy any deficiencies before the closing of the sale. The seller must deliver certificates of compliance for both energy conservation and water conservation to the buyer prior to the

33. *Id.*

34. The trigger is the building permit date, a fact easy to ascertain by resorting to the city's records. Inspections are required for houses built on or before July 1, 1978. S.F., CAL., HOUSING CODE ch. 12 § 1208(a)(2) (2007).

35. R-19 is required but R-11 is allowed without the need to insulate further if the inspection reveals existing insulation in place. S.F., CAL., HOUSING CODE ch. 12 § 1212(a)(1).

36. R-6 is required. § 1212(a)(3).

37. R-3 is required. *See id.* § 1212(a)(5).

38. The maximum shower head flow rate is 2.5 gallons per minute. Showers may have no more than one shower head per valve. S.F., CAL., HOUSING CODE ch. 12A § 12A10(a) (2013). Faucets and faucet aerators cannot exceed 2.2 gallons per minute at a flowing water pressure of 60 pounds per square inch. S.F., CAL., HOUSING CODE ch. 12A § 12A10(b) (2013). The original 1991 ordinance required faucet aerators of a type approved by the city Bureau of Building Inspection without specifying a flow rate. *San Francisco Housing Code – Chapter 12A – Residential Water Conservation*, S.F.: RENT BOARD, http://sfrb.org/san-francisco-housing-code-ch-12a-residential-water-conservation [https://perma.cc/4MYZ-F3F5] (last visited Aug. 28, 2017).

39. Presently the ordinance requires toilets using no more than 1.6 gallons per flush. S.F., CAL., HOUSING CODE ch. 12A § 12A10(c) (2013). Originally the 1991 ordinance required replacement of toilets with a flush volume of more than 3.5 gallons. The 2009 amendments reduced the volume to 1.6 gallons. New toilets installed after July 1, 2011 may not exceed 1.28 gallons per flush. S.F., CAL., PLUMBING CODE ch. 4, § 402.2 (2013).

40. The 2009 amendments to the ordinance added the water leak component. Water leak inspections are accomplished by a water meter test. "Compliance is achieved if there is no meter movement for ten minutes while all household fixtures are shut off." S.F., CAL., HOUSING CODE ch. 12A, § 12A10(d)(1) (2013). In addition, toilet water tanks and toilet flushing mechanisms are inspected for slow leaks. S.F., CAL., HOUSING CODE ch. 12A, § 12A10(d)(3) (2013).

transfer of title.[41] The ordinance requires recording both certificates in the real property records prior to or concurrent with the transfer of title.[42] Both the inspection results and the certificates of compliance are public records.[43]

However, the ordinance allows for some flexibility in the timing of the required conservation work. The parties may establish an escrow for accomplishing work after closing. The escrow serves to transfer responsibility for compliance to the buyer. Inspections must be performed and filed with the City prior to closing, along with a notice of escrow account. At closing, 1% of the purchase price is set aside in the escrow account. The buyer must agree to perform within 180 days after closing.

The ordinance sets a limit on how much a homeowner must spend to comply with the energy conservation requirements. For single-family homes, duplex units, and individual condominiums and co-operative units, the maximum expenditure is $1,300. However, the cost of complying with the water conservation requirements is not subject to a cap.

Energy conservation inspection and remediation is a one-time requirement. Once a certificate of compliance is acquired, no energy inspection is required for subsequent sales of the property. This is surprising. Perhaps the assumption is that once the conservation measures are taken, they will remain in service without impairment for the lifetime of the house. If so, this is doubtful. Modern insulation generally has a very long useful life but can degrade over time due to a number of factors, including penetration by moisture; exposure to UV rays; or disturbance from varmints, insects, or other causes.[44] Weather stripping almost certainly will need periodic replacing.[45] Cracks in the building exterior may develop over time, due to settlement of the foundation or other factors. When a homeowner replaces the water heater (it generally lasts 10–15 years), the owner might choose not to add insulation to the replacement unit.

Additionally, water conservation inspections are required for each sale. Although the expense of repeated inspections on each sale does not represent a high-dollar amount, it is a transaction cost—not only

41. S.F., CAL., HOUSING CODE ch. 12, § 1211 (2013); S.F., CAL., HOUSING CODE ch. 12A, § 12A09 (2013).

42. S.F., CAL., HOUSING CODE ch. 12A § 12A06(b). A 2009 amendment authorizes the use of electronic forms for inspections and certificates in lieu of paper forms. *Id.* § 12A06(a).

43. *Id.* § 12A06(c).

44. *See Standard Estimated Life Expectancy Chart for Homes*, INTERNACHI, https://www.nachi.org/life-expectancy.htm [https://perma.cc/CD2D-2PXV] (last visited Aug. 28, 2017) (100 plus years for fiberglass, foamboard, and other common insulation materials).

45. *Id.* ("The gaskets/weather-stripping of exterior doors may have to be replaced every 5 to 8 years.").

with respect to the inspection fee itself—but also the incidental costs of delay, submission of documents, and recordation of the certificate. Whether the benefits stemming from repeated inspections outweigh the costs may be questionable. Inspections may have two types of benefits: providing useful information to buyers and requiring the implementation of water conservation measures. A professional inspection is not necessary to inform a buyer as to whether the faucets and showerheads are low flow—that is obvious from use. Although some buyers may not readily distinguish newer water-efficient toilets from older toilets, after the first water inspection, the house will have only water-efficient toilets.[46] It makes sense to have a professional inspection for water leakage, as it generally would not be obvious to a buyer. However, owners are often alerted to substantial hidden water leaks when they receive water bills that are abnormally high, prompting the owner to contact the water company or a plumber to diagnose the problem.

The costs of inspections and certificates are not high, though this is not surprising, given how few elements are assessed. If the seller chooses to have the City's Department of Building Inspection perform the energy and water inspections, the present cost is less than $300.[47] In addition, the seller must pay to file the inspection with the City's department,[48] and must pay to record the certificates in the public land records.

Instead of paying the City to inspect, the seller may hire a private inspector who is certified by the City. The inspector is allowed to set the fee for the inspection. An advantage is that the private inspector may also be a contractor, who will then make necessary improvements.[49] The City will not prosecute any of the required work. One

46. If between the first inspection and sale and a resale the owner replaces the toilet, due to federal regulation, the only new toilets available to buy on the market are low usage (1.6 gallons per flush or less) S.F., CAL., HOUSING CODE ch. 12A § 12A10(c) (2013). It is conceivable that an owner might replace an efficient toilet with a used "vintage" toilet, but not likely to happen often.

47. The fee schedule indicates $158.10 for the initial inspection, $79.05 for the compliance inspection, and $48.36 for the energy certificate. *See* CITY OF S.F., DEP'T OF BLDG. INSPECTION, FEE SCHEDULE ENERGY CONSERVATION (2015), http://sfdbi.org/sites/default/files/Table%201A-N%20-%20Energy%20Conservation%202015.pdf [https://perma.cc/HGE5-23XV]. Presumably, the compliance inspection is only necessary if the initial inspection indicates that the property has not passed—remedial work is required before closing.

48. It appears the filing fee is required even when the city makes the inspection. *What You Should Know About the Residential Energy Conservation Ordinance (RECO) 6*, *supra* note 30.

49. This may be attractive to sellers, as they will not have to solicit a bid from a separate contract after receiving the inspection, but this potentially raises a conflict of interest. The inspector might recommend more work than is necessary, or request a higher-than-market price.

private inspection firm advertises a total fee of $200 for both inspections, including filing and recordation.[50]

The San Francisco ordinance has two enforcement provisions. First, the building is declared to be a public nuisance if the owner fails to obtain an energy or water inspection or to install conservation measures within 180 days after the due date for inspection or conservation work.[51] Such a declaration authorizes the building inspector to issue a notice authorizing correction or repair and a civil action against the owner.[52] Second, the ordinance authorizes a buyer to institute a civil action to require compliance with the ordinance requirements,[53] authorizing a court to grant injunctive relief. It is not clear whether the buyer has other implied remedies, such as refusing to close the purchase in the absence of conservation inspections and certificates of compliance, or if the sale closes without compliance of the ordinance requirements, suing for damages for the costs of necessary work.

Real estate brokers play no formal role in the enforcement of the City's energy conservation ordinance. The ordinance does not impose liability on brokers who participate in the closing of transactions without compliance; likewise, the ordinance does not provide for a cause of action by buyers against brokers who close such transactions. Nevertheless, it appears that residential brokers play a substantial role in educating the parties (their clients) and in persuading sellers to obtain required inspections and to complete remedial work. A competent listing broker, representing the seller, would always check to see if an inspection is needed and so advise the client.[54] Likewise, a buyer's broker would make sure that the buyer obtains documentation for the energy and water inspections and work, just as the broker would generally recommend comprehensive home inspections of other components of the property.

San Francisco's energy ordinance appears outdated and might benefit by updating. Exempting homes built after 1978 probably made sense when the ordinance was first passed in 1982, but today, homes built in 1978 are close to thirty years old and there is little reason to expect that all or most of them perform optimally with respect to energy conservation. One problem, shared by similar green standards, is that periodic and regular code revisions raise the floor with respect to the performance of building envelopes. For example, insulation at the R-11 level for attics made sense in the late 1970s but not today with a

50. SF ENERGY INSPECTION, http://www.sfenergyinspection.com/ [https://perma.cc/WS72-N7WQ] (last visited Aug. 28, 2017).

51. S.F., CAL., HOUSING CODE ch. 12, § 1215(a) (2013); S.F., CAL., HOUSING CODE ch. 12A, § 12A12(a) (2013).

52. S.F., CAL., HOUSING CODE ch. 1, § 102A.2 (2013).

53. S.F., CAL., HOUSING CODE ch. 12, § 1212(b) (2013); S.F., CAL., HOUSING CODE ch. 12A, § 12A12(a) (2013).

54. *See, e.g.*, *For Sellers*, JACKSONFULLER, https://jacksonfuller.com/about/for-sellers/ (last visited Aug. 28, 2017).

minimum of R-30 prescribed.[55] Also, the ordinance grants a lifetime exemption when the first certificate of compliance is recorded—but many types of insulation degrade over time and so does weather stripping. Cracks and other faults in building exteriors develop slowly over time.

A second area in which the San Francisco ordinance might benefit from updating has to do with its scope. The San Francisco ordinance focuses on improvements to homes where energy performance is extremely poor. Many features of the house are ignored. For example, thin, single-pane windows are allowed, instead of energy-efficient, double-pane glass windows. Attic insulation, although important, cannot make a house well insulated; there is no inspection to ascertain or upgrade the levels of insulation within exterior walls or underlying the roof. By focusing only on low-hanging fruit, the ordinance does nothing to incentivize improvements for the overwhelming percentage of San Francisco homes where energy performance is better than abysmal.

B. *Austin Ordinance*

Austin, Texas, adopted an energy conservation ordinance in 2009 mandating that home sellers purchase and supply energy audit reports to potential buyers. The City's Energy Conservation Audit and Disclosure ("ECAD") ordinance applies to homes more than ten years old within the Austin city limits that receive electric service from Austin Energy, a municipally owned utility company.[56] Homes covered by the ECAD ordinance are detached, single-family homes; dwelling units in buildings with four or fewer units; and condominium units.[57]

The ECAD ordinance is purely a disclosure law. Unlike the San Francisco ordinance, ECAD does not require the seller or buyer to undertake any work recommended by energy audit reports. No repairs or upgrades are required, regardless of how badly the house performs. An early draft of the ordinance required upgrades, but the proponents dropped that requirement when the Austin Board of Realtors agreed to support a disclosure-only ordinance.[58]

The energy audit evaluates four elements of the home:

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55. Energy Star recommends RS 30 to 60 for attics in Climate Zone 3, where San Francisco is located. *Recommended Home Insulation R-Values*, ENERGY STAR, https://www.energystar.gov/index.cfm?c=home_sealing.hm_improvement_insulation_table [https://perma.cc/4URB-CG99].

56. Austin Tex., CODE OF ORDINANCES tit. 6, ch. 6-7, art. 1 § 6-7-2 (2016).

57. *Id.* § 6-7-1(2), (7) (defining "condominium" and "residential facility"). Landlords of units in buildings with five or more dwelling units must provide energy audit reports to current and prospective tenants. *Id.* §§ 6-7-1(5), 6-7-22 (multi-family energy audit).

58. Tom Benning, *Energy Audits Vex Austin's Home Sellers*, WALL ST. J.: REAL ESTATE (June 8, 2009, 12:01 AM), http://www.wsj.com/articles/SB124441959646192659 [https://perma.cc/C6A7-S7KQ].

- air conditioning and heating system efficiency;
- air infiltration, duct performance, air sealing in plumbing, and weather stripping;
- windows; and
- attic insulation.[59]

The Austin ordinance generally requires that the seller provide the energy audit to the buyer no later than the signing of the contract of sale.[60] As a practical matter, an owner who engages a broker to list a home for sale is told to obtain an audit immediately to be included in materials given to potential buyers. The benefit is that it avoids delay if a buyer turns in an offer to purchase that the seller wishes to accept.

The ECAD ordinance grants Austin Energy broad authority to develop and run the ECAD program.[61] The ordinance itself is essentially an enabling act. Austin Energy decided the audit should cover the four elements listed above. Austin Energy approves private-sector auditors, who must be certified by one of two trade organizations: Residential Energy Services Network ("RESNET") or Building Performance Institute ("BPI").

The seller selects the auditor from Austin Energy's approved list. The auditor provides the audit report both to the seller and to Austin Energy.[62] Audit reports are good for ten years from the date the audit is performed.[63] For sales taking place after the ten-year period, a new audit is required.

The ECAD ordinance makes it a misdemeanor for a seller to fail to comply with the energy audit requirements,[64] but has no express provisions dealing with buyer remedies for a seller's noncompliance.[65] Because the ordinance is clear in imposing the inspection and remediation obligations on the seller, it is likely that the buyer has implied remedies for noncompliance by the seller. Presumably, the buyer has the right to refuse closing the purchase in the absence of

59. *Id.*

60. For most transactions, a Texas statute obligates a seller to deliver a written Disclosure of Property Condition "to the purchaser on or before the effective date of an executory contract binding the purchaser to purchase the property." TEX. PROP. CODE ANN. § 5.008(f) (West 2014). ECAD piggybacks the timing of delivery of the audit report to the timing of the statutory disclosure notice. Austin, Tex., CODE OF ORDINANCES tit. 6, ch. 6-7, art. 2, § 6-7-12(2)(a) (2016). Special timing rules apply if the contract provides an option for the purchaser to terminate for any reason or if statute does not require a disclosure notice. Ch. 6-7, art. 2, § 12(1), (2)(b).

61. Austin Tex., CODE OF ORDINANCES tit. 6, ch. 6-7, art. 1, §§ 6-7-3, 6-7-5(A) (2016).

62. *Id.* art. 2, § 6-7-11(B) (2016).

63. *Id.* art. 1, § 6-7-5(B) (2016).

64. *Id.* art. 6, § 6-7-42 (2016).

65. In contrast, if a buyer does not timely receive the statutory disclosure notice of property condition, the statute expressly allows the buyer to terminate the contract. TEX. PROP. CODE ANN. § 5.008(f) (West, Westlaw through 2015 Reg. Sess.). ("[T]he purchaser may terminate the contract for any reason within seven days after receiving the notice.").

conservations inspections and certificates of compliance. If the sale closes without compliance of the ordinance requirements, the buyer will possibly have the right to damages for the costs of necessary work.

It is hard to assess the value of the ordinance. In principle, energy audit reports allow potential buyers to compare the energy conservation performance of homes on the market and to take this information into account when deciding which home to purchase. Buyers may negotiate with sellers to make energy conservation upgrades, just as they regularly negotiate with sellers to repair defects identified by home inspections. Thus, although one might think that a disclosure-only ordinance—unlike a mandatory upgrade law—will have little or no effect on incentivizing energy conservation, this is not necessarily the case.

Audit reports appear to be relatively expensive, beginning at about $300.[66] According to Austin Energy, audit reports usually identify material deficiencies,[67] but Austin Energy has not published any detailed information about audit reports. There are no public records available on any website. In general, ECAD suffers from a lack of transparency. To the extent that energy audit reports have economic value for homebuyers, their value is predictive. The better the audit report findings, the more likely it is that the buyer will spend less for electricity. However, owners should care more about actual performance rather than predictions and estimates. For the sale of an existing home, providing the buyer with actual utility bills showing actual electricity consumption—several years' worth, ideally—would be more valuable than an energy audit. ECAD, however, does not require sellers to disclose their electric bills to buyers; nor does it authorize Austin Energy to make its bills available to prospective buyers and interested persons—a measure that would cost far less, and have more value, than energy audit reports.

The City of Austin has touted its ordinance as "a model for cities and states seeking ways to push energy conservation."[68] Although this may be true in some respects, many elements of ECAD make sense only in the context of a government-owned and government-operated electric company. The city council has granted Austin Energy extremely broad discretion in developing and running the program, even to the point of not providing guidance as to nature or scope of an

66. *ECAD Ordinance*, AUSTINENERGY, https://perma.cc/G3KK-ANFL (last visited Aug. 28, 2017) ("The estimated cost of an audit is about $200 to $300 for a typical single-family home 1,800 square feet or smaller with one air conditioning system.").

67. For example, for the average home, ducts leak at almost twice the recommended code standard of 10% and attic insulation for older homes is ten inches less than recommended. *Energy Conservation Audit & Disclosure Ordinance: First Year Status Report 3*, AUSTIN ENERGY (June 2009), http://www.austintexas.gov/edims/document.cfm?id=139825 [https://perma.cc/5PKA-YCC7].

68. Benning, *supra* note 58.

energy audit.[69] A number of aspects of the ECAD program seem to be designed for the purpose of advancing Austin Energy's business. For example, sellers who voluntarily participate in Austin Energy efficiency or weatherization programs earn exemptions from the audit report requirements.[70] Austin Energy's publications tout the virtues of owners upgrading with high-efficiency heat pumps,[71] failing even to mention the alternative of high-efficiency gas furnaces.[72] In addition, the scope of the ECAD ordinance itself—limited to properties where Austin Energy provides electric service—implies that the purpose of the ordinance is to facilitate the utility's business, rather than a broader community interest.

V. NATIONAL GREEN HOME REGULATIONS

The United Kingdom introduced the Energy Performance Certificate ("EPC") in 2007 as part of its implementation of a European Union initiative that called for a dramatic reduction in the energy consumed by European buildings.[73] At its inception, the EPC was part of a broader disclosure program known as a Home Information Pack ("HIP"). The government suspended the obligation of sellers to provide HIPs in 2010 but retained the EPC element.

In the United Kingdom, an EPC is required for sales and rentals of all existing homes. Both sellers (landlords) and agents (brokers) are responsible for obtaining the EPC. This step must be accomplished before marketing, and thus is available to potential buyers and tenants as soon as listings or advertisements commence. Once obtained for a home, an EPC is valid for ten years. After ten years, a subsequent sale or rental necessitates a new EPC for the property.

When an owner orders an EPC, the assessor visits the property and inspects the following components: exterior walls, roof insulation, floor, windows, open fireplaces, boiler, lighting, heating system, heating controls, hot water cylinder insulation, ventilation system, and

69. The ECAD ordinance does not define "energy audit." Instead, the director of Austin Energy is authorized to adopt administrative rules for the substance of the audit and the "audit and disclosure forms." Austin Tex., CODE OF ORDINANCES tit. 6, ch. 6-7, art. 1, §§ 6-7-3, 6-7-5(A) (2016). *See supra* note 61 and accompanying text.

70. Austin, Tex., CODE OF ORDINANCES tit. 6, ch. 6, art. 2, § 6-7-13(B)(2)–(4) (2016).

71. *Embrace Home Energy Efficiency*, AUSTIN ENERGY (2016), https://austinenergy.com/wps/wcm/connect/465a73b8-4c68-465a-96bd-3ab24dccac4c/ECAD_GuideForHomebuyersSellersOwnersBroch_WEB.pdf?MOD=AJPERES [https://perma.cc/U9QZ-7MMZ].

72. This is not surprising, given that Austin Energy is not a natural gas supplier. Yet, U.S. natural gas prices have fallen over the past several years, with many owners viewing gas heat as presently more affordable than electric heat.

73. *The Energy Performance of Buildings Directive*, CHARTERED INSTITUTION OF BUILDING SERVS. ENGINEERS http://www.eauc.org.uk/file_uploads/briefing_epbd_jan07.pdf [https://perma.cc/SX7G-FEFZ]. In the EU, 160 million buildings use over 40% of Europe's energy and create over 40% of its carbon dioxide emissions.

conservatory and extensions. The results of the inspection are documented in the EPC, a nationally standardized document containing the following elements for residential properties:

- ratings for Energy Efficiency and Environmental Impact (CO2) on a scale of A to G to rate a property's current energy efficiency and carbon footprint;
- estimates of energy use, carbon dioxide emissions, and fuel costs for lighting, heating, and hot water;
- recommendations to improve the home's energy performance and environmental impact; and
- estimates of potential ratings, energy use, carbon dioxide emissions, and fuel costs if the recommendations are put in place.[74]

The rating system assigns both letter and number grades. During the inspection, a home earns Standard Assessment Procedure ("SAP") points. The highest rating is A. The point ranges for the grades are:[75]

A 92–100 SAP points
B 81–91 SAP points
C 69–80 SAP points
E 39–54 SAP points
G 0–38 SAP points

Earning a higher grade or SAP total depends upon making energy-efficient repairs or improvements. A menu indicates the SAP points available for various categories or items. For example, if the house lacks an efficient heating system, installing a modern condensing boiler can reap an impressive 47 SAP points. Better insulation can matter significantly: roof insulation earns 13 SAP points for adding cavity wall insulation and 10 SAP points for roof insulation. On the other hand, replacing single-pane windows with double-glazing windows gains only 4 SAP points.

EPCs become public records. Real estate agents are required to upload EPCs to a website. EPCs then are readily available to the public on the Internet at no cost. Anyone can search any community in the United Kingdom, by address or postal code, to determine which properties have EPCs and read and download EPCs.

As a national system, the United Kingdom's EPC regime has several advantages over local regimes, such as the San Francisco and Austin ordinances. Due to efficiencies of scale, it is much easier to educate participants in transactions, and the public generally, as to the nature of the regulation and the processes. Sellers, landlords, buyers, tenants, energy auditors (assessors), and government officials all benefit from a standardized, national system.

74. *EPC Ratings Explained*, ENERGY KEY (May 13, 2017), http://www.energykey.co.uk/epc.html [https://perma.cc/8QVT-CKGY].
75. *Id.*

One related benefit from the national system is large cost savings due to the development of a standardized product. Competition among national auditing firms results in prices that are a fraction of what sellers in San Francisco or Austin pay for energy inspections.[76] However, these inspections are far less comprehensive and provide substantially less information.

The EPC regulation began as a pure disclosure law, which required no remedial work or upgrades for underperforming homes, no matter how low the grade. This is beginning to change due to reforms in the rental sector. The motivation is to protect tenants based on the perception that for rental properties often neither landlord nor tenant has sufficient incentives to invest in repairs or improvements that improve energy performance or reduce environmental impact. A recent report indicates that about one million tenants currently pay £1,000 more than average on their energy bills.[77]

Beginning on April 1, 2016, tenants have a statutory right to make energy-efficiency improvements to their homes.[78] The tenant must request consent from the landlord, who may not unreasonably withhold consent unless the landlord proposes implementing alternative energy efficient measures.[79] The improvements are funded by the tenant or, at no cost to the landlord, by a governmental entity or another person.[80]

A separate measure mandates a minimum energy performance rating for rental housing, to be achieved at the landlord's expense. Beginning in April 2018, it will become unlawful for landlords to grant new residential leases unless the property has a minimum EPC rating of E. Two years later (April 2020) the bar will extend to all existing residential lettings, regardless of the lease inception date.[81]

76. *See, e.g.*, EPC.CO.UK, http://www.energyperformancecertificates.co.uk [https://perma.cc/2KSU-4G9P] (quoting price of £34 "for properties up to 4 bedrooms in selected areas").

77. Adam Vaughan, *Landlords to be Banned from Letting Draughtiest Homes*, GUARDIAN (Feb. 5, 2015), https://www.theguardian.com/environment/2015/feb/05/landlords-draughty-homes-ban [https://perma.cc/G9B5-4H67].

78. *The Energy Efficiency (Private Rented Property) (England and Wales) Regulations 2015*, ENERGY CONSERVATION, ENGLAND AND WALES (2015), http://www.legislation.gov.uk/ukdsi/2015/9780111128350/pdfs/ukdsi_9780111128350_en.pdf [https://perma.cc/7H8P-PSKW].

79. *Id.*

80. *Id.*

81. The same regulation extends to the rental of commercial premises, the only distinction being deferring the start date for existing commercial tenancies until April 2023.

VI. EVALUATION OF REGULATORY APPROACHES

A. *The Rarity of Local Ordinances*

The three regulatory regimes studied above—the San Francisco and Austin ordinances and the United Kingdom EPC regulation—differ in key aspects but have a common objective. They seek to make existing housing greener by requiring, under some circumstances, housing inspections that evaluate the energy efficiency of dwelling units.[82] A study of the regimes raises important policy questions. Why have so few U.S. cities adopted similar existing green home ordinances? This Author has discovered only one other city that requires energy inspections of existing houses—Berkeley, California—which adopted an ordinance similar to San Francisco's in 1987.[83] Is the striking failure of this pioneering effort to catch on due to a fundamental flaw in the concept, or does it stem from particular issues of design or something else?

Water efficiency regulations for existing homes are also rare. One exception is DeKalb County, Georgia, which adopted an ordinance similar to San Francisco's water conservation ordinance in 2008. The DeKalb ordinance requires that all homes sold contain only low-flow plumbing fixtures.[84]

Politics may provide one explanation for the marked failure of mandatory conservation laws for existing homes to catch on. The field known as political economy examines how political institutions and the economic system influence each other. In many U.S. cities, it is often asserted that local development interests have a major influence on local government.[85] Those interests include homebuilders, commercial builders, local banks, real estate brokers, and other professionals such as architects, engineers, and attorneys. Although their efforts are often focused on the promotion of new development, they may also perceive proposals to regulate existing housing as threaten-

82. In addition, the San Francisco ordinance has the additional goal of water conservation.

83. BERKELEY, CAL., CODE § 19.81 (2016). The measure was originally called the Residential Energy Conservation Ordinance (RECO). In 2015, it was incorporated in a new ordinance, the Building Energy Saving Ordinance (BESO), that also includes energy conservation measures for commercial buildings. *Residential Energy Conservation Ordinance (RECO)*, CITY OF BERKELEY, http://www.ci.berkeley.ca.us/ContentDisplay.aspx?id=16030 [https://perma.cc/GUS5-J23K] (last visited Aug. 26, 2016).

84. DEKALB COUNTY, GA., INEFFICIENT PLUMBING FIXTURES REPLACEMENT PLAN ORDINANCE §§ 25-45–25-49; Low-flow toilets, showerheads, kitchen faucets, and lavatory faucets are required. *Id.* § 25-46; The seller must disclose the requirements of the ordinance to potential purchasers. *Id.* § 25-48(a); The purchaser bears the responsibility for replacements; county water service is available only if the owner submits a certificate of compliance with the application for water service. *Id.* § 25-48(c); The ordinance applies only to houses built before 1993. *Id.* § 25-47(e); Beginning in 1993, DeKalb County has required low-flow fixtures in new houses. *Id.*

85. *See, e.g.*, Harvey Molotch, *Growth Machines*, 2 ENCYCLOPEDIA OF HOUSING 255 (Andrew T. Carswell ed. 2d ed. 2012).

ing to their economic interests. For real estate brokers, who generally earn more commissions on the resale of homes than on the sales of new housing units, opposition to ordinances that might chill sales is understandable. As mentioned above, real estate brokers in Austin played a key role in persuading local government to pass an ordinance that required disclosure but did not mandate energy-efficient repairs or improvements. Even so, it is noteworthy that the cities with green home ordinances—Austin, Berkeley, and San Francisco—are all perceived as bastions of liberal politics, unlike most U.S. cities, both large and small. Environmentalists in such cities have generally succeeded in local politics to a far greater extent than in other urban locales with reputations for conservative or moderate local governments.

Political considerations at the urban level go beyond interest groups whose occupations depend upon development, construction, and frequent home sales. City residents care about local laws, especially local laws that affect them personally. Due to the high rate of homeownership in most U.S. cities, homeowners generally exert substantial influence in the election of local legislators. Homeowners may not perceive green home ordinances that will impose new requirements when and if they sell their homes as a good thing. Even those homeowners who are generally supportive of laws that protect the environment may be skeptical that the environmental benefits of disclosure or upgrade laws outweigh the costs (most of which they might bear). Local politicians, like all politicians who run for office, usually pay some attention to the preferences of their constituents.

Even if the urban political economy provides an explanation for why so few U.S. cities have followed the lead of Austin, Berkeley, and San Francisco in passing green home ordinances, and even if the political dynamics are not likely to change substantially in the near future, that does not prove that such ordinances lack merit. Political infeasibility by itself does not demonstrate unsoundness. A law might provide substantial benefits to the community, exceeding costs by a wide margin, even though at the present time the law cannot be enacted.

B. *Disclosure or Mandatory Upgrade Law?*

The most basic issue of design is whether an inspection law should follow the disclosure model (Austin), the mandatory upgrade model (San Francisco), or a hybrid approach (United Kingdom). A robust literature addresses the general question of the merits of disclosure laws.[86] Almost always, those who justify disclosure laws do so on utilitarian grounds: the law is sound if the benefits exceed the costs. Bene-

86. *See* ARCHON FUNG ET AL., FULL DISCLOSURE: THE PERILS AND PROMISE OF TRANSPARENCY (2008); Omri Ben-Shahar & Carl E. Schneider, *The Failure of Mandated Disclosure*, 159 U. PA. L. REV. 647 (2011); David M. Grether et. al., *The Irrelevance of Information Overload: An Analysis of Search and Disclosure*, 59 S. CAL. L.

fits accrue to consumers (or other information recipients) because the disclosed information is thought to be useful. Here, there is some divergence as to what it means to be useful. The primary strand marries usefulness to choice; information is useful if it influences the consumer's choice. It must affect behavior to be useful—not the behavior of all consumers, but at least a significant number of people. This approach often is paternalistic in the sense that the law is designed to push behavior in a direction desired by the law's author. For example, warnings on tobacco and alcohol products are often seen as having the objective of reducing consumption.[87] But a disclosure law that affects consumer behavior can be free of paternalism. The law may affect behavior without the government wishing to "nudge" choice in a particular direction. When consumers have differing preferences with different trade-offs, the information may assist them in making individual choices that better meet their needs. This way, there is no public policy or governmental interest implicated by their choices.

Disclosure laws always have costs to be compared to their benefits to consumers. Costs fall on both parties. The seller or other disclosing party bears a production cost: the cost of acquiring the information and communicating it to the consumers. Sometimes these costs are relatively small. The seller may already know the information, so the seller will not have to spend money to inspect or otherwise acquire the information. Likewise, the disclosure method may not represent a large transaction, especially when standardized forms are available and there is a high volume of transactions, so as to lower the per-unit cost of disclosure.

The consumer bears a processing cost, which includes decision making. Consumers always have at least some information processing cost (ignoring the situation in which a consumer ignores the disclosure completely, in which case the benefit is obviously zero). One processing cost is represented by the idea of "information overload"—too much information, often complex, is provided so that most consumers will not understand or assimilate it. Thus, many scholars believe that simplified disclosures are more effective, arguing against the intuitive opinion that the more information, the better. But even simple disclosures impose costs because they must be read and processed to matter. Another processing cost relates to market choice. If the consumer is considering a choice between competing products, then the processing costs involve multiple disclosures from different providers.

REV. 277 (1986); Daniel E. Ho, *Fudging the Nudge: Information Disclosure and Restaurant Grading*, 122 YALE L.J. 574 (2012).

87. Consider the Food and Drug Administration's attempt to require graphic visual warnings on cigarettes. *Compare* Discount Tobacco City & Lottery, Inc. v. United States, 674 F.3d 509 (6th Cir. 2012) (upholding the plan as disclosing information about risks), *with* R.J. Reynolds Tobacco Co. v. FDA, 696 F.3d 1205 (D.C. Cir. 2012) (finding a first amendment violation based on the conclusion that the visual images had the goal of reducing smoking rates).

The disclosure approach seems preferable to the mandatory upgrade approach in this context of green home energy and water conservation, at least in the context of home sales (rentals raise different considerations). Disclosure preserves the autonomy of the seller and buyer to make their own decisions as to whether to make upgrades and improvements—and if so, when and how. The decision not to implement recommended conservation measures comes at a cost to the buyer, in terms of higher utility bills. In many other areas, mandatory laws that require property owners to add improvements or make changes are justified for reasons of health and safety. For example, laws that require residences to have smoke detectors make sense because of the strong public policy for reducing fire-related deaths and injuries.

C. *Geographical Scale*

The geographical scale of regulation matters. The comparison of U.S. municipal ordinances to the United Kingdom EPC regulation raises the question of regulatory scale. If a green home law for existing homes has merit, what are the costs and benefits of local regulation compared to regulation on a larger geographical scale, such as metropolitan, statewide, or national?

The United Kingdom experience suggests that if a green home law makes sense, it is best to implement it over an expansive territory. As indicated above, the costs of compliance associated with the U.K. law are far less than in Austin and San Francisco. Homeowners in Austin pay approximately six times more than U.K. homeowners for energy audits when they sell their homes, and homeowners in San Francisco pay approximately four times more. In addition, the informational costs of educating interested persons as to the law's features and requirements are less in the U.K., due to the fact that a single national law with standardized documents applies. Homeowners, sellers, buyers, and supporting professionals including brokers, attorneys, and title agents are able to learn about a single national system. Government-provided resources, private organizations, and developers of services, including software, have a large market to serve. They provide economies of scale that are not present in a single urban market, no matter how big the city may be. This point takes on more importance when participants to a home sale are not all long-time residents of the same community.[88]

88. For example, assume a resident of Manchester, who inherited a home in London, is selling that home to a resident of Liverpool, who plans to move to the London home. Both parties may be familiar with the UK EPC law, as it applies in their home jurisdictions. Instead, assume a resident of Chicago, who inherited a home in Austin, is selling that home to a person from Atlanta—what are the odds that either person is already familiar with the Austin ECAD ordinance?

In addition, a broad geographical scope overcomes a potential market problem that may stem from local green home ordinances. If such ordinances affect market value, they decrease market value by adding transactions costs to sales. When nearby communities, outside of the city that enacts the ordinance, lack similar ordinances, housing units in those "unregulated" markets have a market advantage. It may be that the economic effect is small because the transaction costs of compliance are relatively small, but the effect will still be present. Potential buyers will have an economic incentive to buy in the neighboring unregulated community. This distortion is eliminated if, instead of a municipal law, the green home law applies to an entire metropolitan area, or even better, a larger geographical unit such as a state or the nation.

D. *Regulatory Scope*

Another important issue is regulatory scope. Which houses must be subjected to energy audits and when? First, all three regimes have provisions exempting certain types of housing from the audit requirements. Second, what is the best trigger? All three regimes share a common starting point: the sale of a house triggers the audit requirement. None requires an audit of owner-occupied housing in the absence of the owner making a decision to sell or to rent the unit.

In principle, a law could require the periodic (or one-time) energy audit of all housing, regardless of sale or rental. The law would need to specify a schedule; for example, a schedule could phase in, depending upon the age of the housing, with older units needing an inspection first. In many respects, a straight requirement for audits for all houses would be easier to administer than using sales or rentals as a trigger. If the goal is to maximize the greening of existing housing, such an all-inclusive approach seems preferable.

Another policy issue reflected by the differences in the three regimes concerns the treatment of rental housing. If the objective is to make existing housing as green as possible, a law that uses only housing sales as the trigger seems flawed. In all major housing markets, a significant percentage of the housing stock is rental, rather than owner-occupied. Moreover, with owner-occupied housing, there is a strong argument that the owner has sufficient incentives to invest in energy-efficient repairs and upgrades without legal compulsion in the form of a required purchase of an energy audit or required work. If repairs or upgrades will reduce energy costs significantly, so that the payback period is reasonably short, then it is in the owner's self-interest to make them.

Conversely, for rental housing there is a barrier to repairs and upgrades not present for owner-occupied housing. Because leases usually obligate tenants to pay for utilities (electricity, natural gas, and water), repairs and upgrades that reduce these costs benefit the tenant but provide no immediate benefit to the landlord. Yet, tenants are

generally not willing to undertake expensive repairs and upgrades, even if their lease allows that action, if the payback period exceeds the remaining term of their lease. For example, they may not obtain a lease renewal, in which event they will lose the remaining economic value of their energy-efficient improvements. When the premises revert to the landlord, only the landlord or new tenants will benefit from the original tenant's expenditures.

In principle, the landlord has an economic incentive to invest in energy-efficient improvements because they will make the dwelling unit more attractive to tenants. Thus, the landlord's improvements allow the landlord to request and obtain higher rents. The problem, however, is one of information. In the rental housing market, the key term of interest to tenants (after property location, size, and apparent quality) is monthly rent. Few rental advertisements inform the tenant as to estimated utility costs. This could change as landlords who upgrade their rental housing to make it greener could advertise that feature. But unless and until that happens—with the landlord providing information as to estimated utility savings compared to other rental properties—landlords will justifiably conclude that investing in making their properties greener will not likely be a financially sound decision.

E. *Voluntary Green Home Standards*

Voluntary standards for new homes have achieved substantial use in the market for sales of new housing. Both the EPA's Energy Star Certified Home and LEED for Homes rely upon certification by third parties, with their brand perceived as indicating the attainment of energy efficiency and environmental quality. Other lesser-known, private-sector organizations offer similar programs. It is worth considering whether voluntary certification systems have the potential to expand to the market for sales of existing homes by providing useful information to potential homebuyers and proper incentives for the seller or buyer to make repairs or add improvements that "green" the home.

The EPA allows existing homes to be certified, but they must meet the same field verification as a new home under construction. This makes certification of an existing home impractical because visual inspection of insulation and air barrier assemblies is required.[89] The EPA has studied a proposal to allow infrared camera testing to substitute, but so far this is not allowed for the most recent versions of the

89. *Energy Star Policy for Existing Homes*, ENERGY STAR, https://www.energystar.gov/index.cfm?c=bldrs_lenders_raters.nh_policy_existing [https://perma.cc/EG34-ENDS]. For existing homes undergoing gut rehabilitation (including removal of all siding), certification is practical. *See id.*

Energy Star Home program.[90] LEED for Homes takes the same approach; certification is allowed, but it is only practical for major renovation that includes gutting.[91] Even if this barrier were overcome, there is little potential for Energy Star or LEED certification to become widespread for existing homes. The Energy Star program has received market success by attracting homebuilders, who participate because they see the Energy Star product as having market value for selling the new homes that they build, to become Energy Star partners.

It is possible that some or all of the barriers for existing homes in the Energy Star or LEED for Home programs could be overcome by reforms in those programs. Even if this happens, it seems unlikely that market forces would induce many homeowners to seek voluntary certification. It is true that a person who buys a new home that is Energy Star or LEED certified may have the expectation of gaining value, if in the future the buyer sells, by advertising their home as green-certified, in effect passing on that certification to the new buyer. For owners of presently non-certified existing homes who intend to sell, it is highly unlikely that the cost of obtaining Energy Star certification would add value that would be recouped in the form of higher sales prices. Likewise, for new homes LEED certification costs significantly more than Energy Star certification, so it seems improbable that a significant number of home sellers would seek LEED certification, expecting that the cost of doing so would raise the sales price by more than that cost.

F. *Pricing Models*

Perhaps energy audits, with or without mandatory repairs or upgrades, are unnecessary to incentivize homeowners to conserve resources. Pricing incentives may do the work. To state an obvious point, owners must purchase the energy they consume—electricity and, for many homes, fossil fuels as well.[92] Many homeowners (those who connect to water systems rather than have their own water wells) purchase water as well. All modern U.S. pricing models take account of volume consumed—for example, kilowatt hours for electricity, therms for natural gas, and gallons *for* water. Owners who consume more, pay more, and thus have an incentive to find ways to conserve. That incentive includes acquiring information by volunteering for an

90. *EPA Clarifies Use of Thermography for TBC Inspection*, ENERGY STAR, https://www.energystar.gov/index.cfm?c=bldrs_lenders_raters.nh_thermography_inspection [https://perma.cc/TZB3-RXAV] (last visited Aug. 28, 2017).

91. Shelley Little, *What is a LEED Certified Home?*, FRESHOME (Oct. 9, 2014), http://freshome.com/2014/10/09/what-is-a-leed-certified-home/ [https://perma.cc/Y9FY-226R].

92. This ignores the relatively few homeowners who presently produce electricity by solar panels.

energy audit, which in many U.S. markets may be obtained at no cost or low cost through utility programs.

Indeed, in many U.S. communities, utility companies have adopted tiered-pricing models, which increase per-unit prices for owners whose monthly use exceeds a baseline. These models flip normal pricing models, which reduce per-unit prices for high-volume purchasers of goods or services (e.g., the volume discount model). Austin, for example, has a five-tier rate structure for electricity that rewards customers who use less electricity with lower rates. This incentivizes customers to modify their energy use and to make energy-efficiency improvements to their homes. The general strategy behind tiered pricing is to set the break point between the lowest tier and next-highest tier at a point that can be reasonably achieved by a household that both conserves diligently and occupies a home with energy-efficient characteristics. If a tiered-pricing model is properly designed with resource conservation as the objective, owners will make the optimal investment in energy audits and improvements without a law telling them they must do so.

Pricing does not have to consist of revenues paid to utility companies, whether they are privately-owned utilities or public utilities. Taxation may do some or all of the work. Pricing models may be combined with taxation that encourages the greening of existing housing. Governments tax sales made by utilities, just as they tax many other goods and products that are sold in our economy. From a consumer's standpoint, the allocation between purchase price and tax is not relevant. What matters is the bottom line —how much, including taxes, must I pay to get the product that I want? Understandably, using a combination of pricing (amounts paid to the utility) and taxing (taxes collected by the utility and remitted to the government) to achieve the goal of making existing housing greener requires coordination between the government entity that imposes the tax and utility (or in most cases, the regulatory agency that approves the utility's rate structure). Both entities need to consult and work together to arrive at a sum of price and tax that produces a tiered system with the proper incentives.

Utility pricing systems have the potential to solve the environmental problems stemming from existing homes that are not sufficiently green in terms of energy and water consumption. A pricing model, if properly designed, will be superior to regulation, either imposed at the point of sale or leasing, or imposed as a general matter on existing homes. The advantage of pricing and taxation models is that they internalize the societal costs of non-green decisions related to purchase, improvement, maintenance, and operation.

The pricing system must employ appropriate tiers, which start at a base (low) rate for consumption, up to a level that reflects a house that has appropriate insulation, modern, efficient systems and appliances, and no other physical problems that waste resources. Then a

higher tier—preferably multiple tiers that get progressively higher—should apply to penalize a household's excess consumption of electricity, water, natural gas, and any other resources that are sold by quantity. Pricing may include taxes imposed by one or more levels of government, which together result in tiers that provide the proper incentive for owners to invest in making their homes greener.

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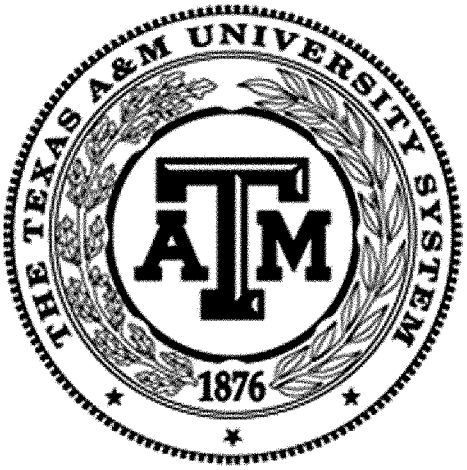

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