

Residential Government Agency Requirements and Case Studies on Measuring Market Reaction to Energy-Efficient Features

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Abstract

How to measure market reaction has been the subject of debate and confusion among residential lending appraisal users and appraisers. The purpose of this article is to offer methods and examples of how to measure market reaction to energy-efficient features, especially as market reaction pertains to government agency requirements.

Introduction

Measuring market reaction is an important skill in valuing property features. In an appraisal, a *market study* is “an analysis of the market conditions of supply, demand, and pricing for a specific property type in a specific area.”¹ Appraisers analyze data, review studies, and survey market participants to understand the market’s acceptance of certain property features and how much they are willing to pay for the features, i.e., market reaction. Measuring market reaction is most difficult for new property features and especially green or energy-efficient features. When a feature is new to a market, sales of properties with these features are not present. Therefore, measuring market reaction requires the use of methods other than paired sales to address how buyers in the market may react regarding demand and the price they are willing to pay. The lack of sales with the feature(s) may simply be a result of databases that have limited searchable fields, and it

does not necessarily support a conclusion that the feature has no value and no demand. While the market reaction discussion in this article centers around green and energy features, similar issues may arise for any new home feature. Appraisers must avoid making an unsupported assumption or premise about market area trends. The purpose of this article is to offer methods and examples of how to measure and support findings of market reaction to energy features.

Supporting Findings of Market Reaction

The lack of understanding of how to support market reaction exists in the underwriting/lender world as well as in the valuation profession. Market reaction is treated in distinctively different ways by Fannie Mae, Freddie Mac, and FHA. The disagreement of how to address market reaction mainly centers around the Fannie Mae *Selling Guide*’s wording quoted in Exhibit 1.² As shown, this section of the *Selling Guide* calls for adjustments for market reaction to energy-

1. Appraisal Institute, *The Dictionary of Real Estate Appraisal*, 6th ed. (Chicago: Appraisal Institute, 2015), s.v., “market study.”

2. Fannie Mae, Sec. B4-1.3-05 “Improvements Section of the Appraisal Report,” *Selling Guide: Fannie Mae Single Family* (Washington, DC: Fannie Mae, March 6, 2019); <http://bit.ly/2Tvmhue>.

Exhibit 1 Fannie Mae *Selling Guide*: Energy Efficient Improvements

Energy Efficient Improvements

An energy-efficient property is one that uses resource-effective design, materials, building systems, and site orientation to conserve nonrenewable fuels.

Special energy-saving items must be recognized in the appraisal process and noted on the appraisal report form. For example, when completing the appraisal report (Form 1004), special energy-efficient items are to be addressed in the Improvements section in the Additional features field. The nature of these items and their contribution to value will vary throughout the country because of climactic [*sic*] conditions, differences in utility costs, and overall **market reaction to the cost of the feature**. [Emphasis added.]

Some examples of special energy-efficient features may include, but are not limited to, energy efficient ratings or certifications, programmable thermostats, solar photovoltaic systems, low-e windows, insulated ducts, and tank-less water heaters.

Appraisers must compare energy-efficient features of the subject property to those of comparable properties in the Sales Comparison Approach adjustment grid. If the appraiser's analysis determines that an adjustment is warranted based on the **market reaction** to such item(s), the adjustment must be included in the adjustment grid. [Emphasis added.]

Source: Fannie Mae, Sec. B4-1.3-05 "Improvements Section of the Appraisal Report," *Selling Guide: Fannie Mae Single Family* (Washington, DC: Fannie Mae, March 6, 2019), 566.

efficient improvements, but it does not provide guidance on how market reaction is to be identified, measured, or supported. The *Selling Guide* also specifically states that it is an "unacceptable appraisal practice" to use "adjustments to comparable sales that do not reflect market reaction to the differences between the subject property and the comparable sales."³

Confusion arises when the *Selling Guide*'s statement regarding "comparable properties in the Sales Comparison Approach adjustment grid" is emphasized and the text related to consideration of "market reaction to the cost of the feature" is ignored. Appraisers have reported that some underwriters have interpreted the *Selling Guide* sections shown in Exhibit 1 as implying that market reaction support means only comparable sales evidence or at least a paired-data set analysis. They have been told that if they do not have a comparable sale with the same energy or green feature, they cannot attribute value to the feature.

Freddie Mac's *Single-Family Seller/Service Guide*⁴ also calls for the contributory value of energy-efficient features to be measured based on market reaction, but it goes a step further than

Fannie Mae by clearly identifying methods beyond paired-data analysis to support a conclusion. In comparison, the *FHA Single Family Housing Policy Handbook* does not use the term *market reaction*, but like Freddie Mac's *Seller/Service Guide* it discusses alternate methods of analysis to measure the contributory value of features. A review of the residential selling guides from Fannie Mae, Freddie Mac, and FHA, and some examples of how each addresses market reaction, are most revealing.

It is instructive to first look at what Fannie Mae has accepted in the past regarding market reaction analysis. Previous forms made it clear that the cost and income approaches could be used to discern market reaction when comparable sales were not available. In 1989, Fannie Mae Form 1004A (Freddie Mac Form 70A) gave an example of how to value energy efficiency if no comparable sales were available. Exhibit 2 shows this form's example of how to calculate the value of energy-efficient items.

While use of this form was discontinued in 2009, it offers an example of how to estimate the value of energy-efficient or green features when

3. Fannie Mae, *Selling Guide*, 535.

4. Freddie Mac, *Single-Family Seller/Service Guide* (Washington, DC: Freddie Mac, March 13, 2019), <http://bit.ly/FreddieGuide>.

Exhibit 2 Fannie Mae Form 1004A Estimate of Value of Energy-Efficient Items**Part 2 - Estimate of value of energy-efficient items**

This section can be used to help estimate the value of energy-efficient items only when adequate comparable market data are not available.

In such cases, the value of the energy-efficient items should be the lesser of

- (a) the present worth of the estimated savings in utility costs, as determined by capitalizing the savings at an interest rate that is not less than the current interest rate for home mortgages for a period that does not exceed the lesser of the item's expected physical life or seven years, or
- (b) the installed cost of the energy-efficient item or construction technique, less any physical, functional, and external depreciation.

For example, if the subject property is an existing house with inadequate insulation and infiltration barriers - such as one without storm windows, caulking and weatherstripping - and the estimated savings per month is \$35 for upgrading the property (based on an energy audit/rating), the appraiser could use the following calculations as a guide.

Installed cost (less depreciation)	\$2,500	
Expected life	7 + years	
Expected monthly savings	\$35 per month	\$420 x 4.789 = \$2,011.38
Expected annual savings	\$420 per year	
Present value factor (annual compound interest at 10.5% for 7 years)	4.789	

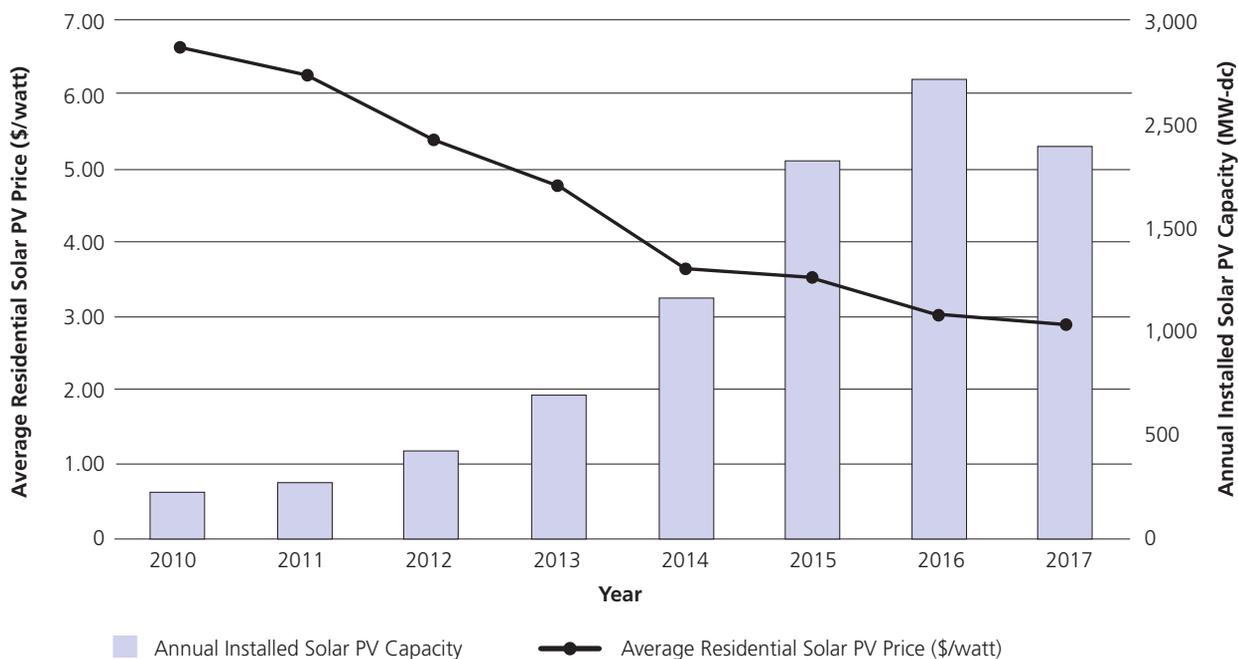
For this example, it would appear reasonable (**only if adequate comparable data were not available**) that a typical purchaser might pay a premium of \$2,000 for the property as improved with the suggested energy-related items.

sales are not yet available in the market (or not identifiable due to limitations of databases). The calculations in the form make it clear that the value of the features may be estimated using the lesser of the present worth of the estimated savings or the installed cost of the energy-efficient item less any depreciation. These two methods, cost and income, were only to be used if comparable data were not available according to the Fannie Mae Energy Addendum.

Market Reaction to Cost New. If a product is priced too high, how will the market react? While there may be "early adopters" willing to purchase at a price considered too high, they may not reflect the majority of the market. If a high percentage of the market refuses to pay the price, it must be lowered to gain market share, or incentives must be applied to offset the cost new and kick-start the market. Once the market accepts the pricing the incentive is removed. If a builder or seller prices their house over the market level, it will experience a longer marketing time and/or an eventual lower sale price. The example in Fannie Mae Form 1004A alludes to cost as one indicator of the market reaction. Estimating the possible depreciation from obsolescence for a new product is the weakness in this method.

A good example of the market reacting to cost new can be seen in the history of residential solar photovoltaic (PV) systems, which shows installations have increased as the costs have decreased. Ten years ago, the solar PV cost exceeded \$6.50 per watt and the number of installations was few. When the price fell to +/- \$3 per watt, the number of installations increased. It could be argued that part of the increase in installations may be attributed to an improving economy and/or increased buyer knowledge; however, the lower cost cannot be ignored as a probable reason as well. As costs decreased, the property owners' period to recoup the initial investment also decreased, making the buying decision more favorable. The residential solar market has reacted to the lower costs by demonstrating an increased willingness to pay; this trend is illustrated in Exhibit 3.

It would be inappropriate to address each feature of a home based on cost new because homes are typically sold as a package deal. However, if new construction sales are showing a high percentage of new home buyers are selecting certain green features this suggests a market trend. In this case, it would be appropriate to conclude that the cost less depreciation might be a consideration on a home's resale.

Exhibit 3 Residential Solar Photovoltaic Market Reaction to Falling Cost to Install

Source: SEIA/Wood MacKenzie Power and Renewables Solar Insight Management

Market Reaction to Income or Savings. Without a doubt, real estate markets react to prices and income. Real estate investors know that if they overprice rentals, the market will react by finding an alternative. Potential buyers do not search the multiple listing service (MLS) to find for sale properties until they decide how much they are willing to pay. This willingness to pay decision includes a decision on how much the buyer is willing to pay for energy-related features. The easiest and most common procedure buyers use in their analysis is the feature's cost and/or the potential savings benefit from the feature. While all buyers will not use a financial calculator to develop a present value or discounted cash flow of the savings, they will consider total savings and cost new to estimate how much they are willing to pay today for that product.

A good example of the role of cost and income in buying decisions is found in the purchase of solar photovoltaic (PV) systems. A solar PV sales team typically gives a sales presentation using the cost of the system and an income approach of how much money the system user will save over the typical physical life of the system. The potential user then decides if they are willing to pay the

installed cost to save an estimated amount on utility costs over the specified period or life of the system. Later, a home seller may share this sales presentation information with the appraiser and real estate agent to illustrate the system's estimated value. The sales presentations do not consider all the items that an appraiser would consider, however, in valuing the energy system. The sales presentation usually ignores maintenance, loss in production due to aging, sun hour changes, and discounting of savings to today's dollars. Nonetheless, this is a good illustration of how buyers make decisions on the purchase of solar PV systems through a cost and income consideration.

Alternate Analyses of Market Reaction

Freddie Mac Single-Family Seller/Service Guide

As mentioned earlier, Fannie Mae's *Selling Guide* provides only vague guidance on measuring market reaction and valuing home features. In contrast, the *Freddie Mac Single-Family Seller/Service Guide* presents a clearer approach to the real-world market and the challenges presented

Exhibit 4 Freddie Mac *Single-Family Seller/Service Guide*

(o) Properties with energy-efficient improvements

Energy-efficient features (e.g. photovoltaic systems, water efficient improvements, energy efficient windows) or high-performing energy-efficient homes must be identified and any impact to market value must be recognized in the appraisal report. The contributory value of energy improvements and any premium paid for a high-performing energy-efficient home must be measured based on the market reaction, similar to any other property feature. Appraisers must be familiar with energy reports, energy ratings or other new concepts that may be developed to identify the energy efficiency of a home. If relied upon, any reports must be generally acceptable and, if available, these reports and information must be included in the appraisers' analysis.

If the high-performing energy-efficient home or energy improvements are new to the market, there may be a lack of sales with similar features or a lack of data available from traditional data sources. As a result, additional due diligence on behalf of the appraiser may be necessary. **In these cases, the appraiser may also need to consider whether methods such as the income approach, cost analysis, discounted cash flows, market surveys or any other applicable methods are appropriate. If the appraiser's analysis concludes an adjustment is necessary, the appraiser must justify and support the analysis and conclusions.** This information may be included in an addendum or in supplementary documentation, if necessary. [Emphasis added.]

Source: Freddie Mac *Single-Family Seller/Service Guide* (Washington, DC: Freddie Mac, March 13, 2019), 5601-54 to 5601-55.

without sales data; it gives alternatives to solve the market reaction question.⁵ Exhibit 4 shows that the *Seller/Service Guide* includes specific language on potential alternative approaches for measuring market reaction.

Freddie Mac's *Seller/Service Guide* clearly states that in the absence of similar sales other methods may be used to form an opinion of the contributory value of energy improvements. The other methods named include the following:

- Income approach
- Cost analysis
- Discounted cash flows
- Market surveys
- Any other applicable methods that are appropriate

While the Fannie Mae *Selling Guide* may be implying the same methods, users of that guide are not in agreement on the intent of its text. Social media appraiser groups have lively discussions on this topic, illustrating the lack of consensus on what is appropriate when measuring market

reaction. This article will provide several examples of how market reaction can be measured.

Example: MLS Support for Market Reaction.

Measuring market reaction takes additional research to develop a supportable opinion. For example, in a recent relocation appraisal, the appraiser initially wrote a detailed narrative on how the existence of a power purchase agreement (PPA)⁶ negatively impacted the property's potential "anticipated sale price" (the valuation used in an employee relocation matter). The narrative was reviewed by other appraisers prior to completion of the report, who found the narrative's opinion convincing but unsupported. Market facts to support opinion could only be achieved through research of the MLS for information on the number of sales, listings, or pending sales that have a power purchase agreement or a solar photovoltaic system lease. The results of this additional research were contradictory to the initial opinion.

The county MLS files were searched for any active listings, pending sales, and closed sales

5. Freddie Mac, *Single-Family Seller/Service Guide*, Chapter 5601.

6. A power purchase agreement is a financial agreement where an investor installs a solar photovoltaic system on a property and the property owner agrees to purchase the energy produced by the system at a given price per kWh and for a term that may range from ten to twenty years. Power purchase agreements vary in terms and benefits and should be analyzed prior to making valuation conclusions regarding their effect on the real property. A power purchase agreement is not included in the mortgage debt-to-income ratio since it is purchase of energy not leasing of equipment.

between 1/1/17 and 6/24/18 having leased solar panels⁷ or solar panels subject to a long-term PPA. The search results identified 91 comparables (12 active listings, 8 pending sales, and 71 sold and closed sales) with leased solar panels or PPAs. Next, the MLS fact sheets for 44 comparables were reviewed (8 listings, 5 contract sales, and 31 sold and settled sales in the subject's general competing price range). The next step included contacting listing agents involved in these 44 comparables to obtain their input relating to the effect the non-owned solar panels had on the marketability and sale or list prices of the properties. Based on the MLS data and interviews of the agents, the following information was uncovered:

1. The majority of the contract sale or sold properties involved transactions where buyers were willing and able to assume the terms of the leases or PPAs. Agents for a few properties indicated there had been multiple offers and that all the competing offers included agreements to assume the lease or PPA. For the listing comparables the agents stated there was no significant resistance to the presence of the solar panels, leases, or PPAs.
2. The sales identified went under contract for sale during similar time frames compared to other houses in the competing market areas that were offered for sale.
3. The overwhelming majority of the listing agents interviewed stated they did not add or deduct value for the non-owned solar panels when they priced the properties for listing.

Based on this specific research of comparable data and agent interviews, the appraiser revised his opinion and conclusions in the report. Market reaction conclusions related to existence of a PPA were documented through the listings, pending sales, and closed sales found in the subject's price range in the general market. Interview of the agents involved in the comparable

sales gave further market reaction support indicating the market did not negatively react to the existence of a leased solar system. This evidence of market reaction was accepted by the client relocation company. (Relocation companies could be characterized as being more discriminating than lenders in their review and support requirements as relocation companies often engage more than one appraiser on each property.) Although the client in this example is not a mortgage market lender, the approach used illustrates a technique that could be used to support market reaction findings within the provisions of the *Freddie Mac Seller/Servicer Guide*.

FHA Single Family Housing Policy Handbook

The Fannie Mae *Selling Guide*'s use of market reaction is not interrupted consistently by underwriters and appraisers. The *Freddie Mac Seller/Servicer Guide*, however, gives a clear understanding of what methods are acceptable to measure market reaction or contributory value. A review of the *FHA Single Family Housing Policy Handbook*⁸ reveals an even more detailed description of what is acceptable to measure the contributory value or market reaction to the feature. Exhibit 5 shows the specific language of the *FHA Policy Handbook* as it relates to measurement and reporting of the contribution of property components to value.

The *FHA Policy Handbook* gives clarity to acceptable methods in valuing the features of a home and measuring market reaction. The *FHA Policy Handbook* plainly discredits the viewpoint that the matched-pair technique is the only acceptable method for documenting market reaction. As shown in Exhibit 5, subsection (D) states, "If there is insufficient data to perform a matched pairs analysis the Appraiser must analyze and report one of the approaches below to calculate an appropriate adjustment." This makes it clear that paired-data are not the only support of an adjustment and it specifies use of alternate methods when insufficient data exists.⁹

7. Solar photovoltaic leases differ from power purchase agreements in that the property owner leases the system instead of simply buying the energy produced. The solar lease is typically twenty-five to thirty years and varies in payment type, wording, and buyout of the system. A solar lease payment is included in the mortgage debt-to-income ratio on the debt side.

8. US Department of Housing and Urban Development (HUD), *FHA Single Family Housing Policy Handbook*, Handbook 4000.1 (Washington, DC: HUD, December 30, 2016); <http://bit.ly/HUD40001>.

9. It is also interesting that the policy emphasizes the requirement to have competency in using these techniques and the appraiser must explain the analysis. It would not be enough to say the adjustment is based on the present value indication of \$5,000 or on market reaction; the appraiser would be required to explain the method and support the inputs used.

Exhibit 5 *FHA Single Family Housing Policy Handbook: Measurement and Reporting of Contributory Value*

iii. Measurement and Reporting of Contribution to Value

(A) Definition

Contributory Value refers to the change in the value of a Property as a whole, whether positive or negative, resulting from the addition or deletion of a property component.

(B) Standard

Measurement of the Contributory Value of the component is accomplished by the application of techniques based on one or more of the recognized three approaches to value: cost approach, income approach, and sales comparison approach. Each of these recognized methods and techniques requires the Appraiser to collect, verify, and analyze all information necessary for credible assignment results.

(C) Required Analysis and Reporting

The Appraiser must apply all appropriate methods and techniques necessary for credible assignment results.

(D) Sales Comparison Based Extraction Method

If there is sufficient data based on direct sales comparison to produce credible results, the Appraiser must calculate the adjustment and explain the methodology and analysis supporting the method and results in the appraisal report. The Appraiser must apply the extracted adjustment to the comparable sales and include the reasoning that supports the analyses, opinions, and conclusions in the report.

If there is insufficient data to perform a matched pairs analysis the Appraiser must analyze and report one of the approaches below to calculate an appropriate adjustment. [Emphasis added.]

(E) Cost Approach Based Method

The Appraiser must include the details of the item(s) being valued and measure the Contributory Value of the component(s) to the whole by calculating the cost of the item less accrued depreciation. The Appraiser must include consideration of physical depreciation,

functional obsolescence (including superadequacies) and external obsolescence in the estimate of accrued depreciation and apply the resulting calculation of the Contributory Value to the comparable sales.

(F) Income Approach Based Methods

(1) Gross Rent Multiplier Method

If the Property is located in a market where the Appraiser can calculate a GRM, and rental data for properties with similar special energy components is available, the Appraiser must extract an adjustment relevant to the rental value of the feature from the analysis of those similar rentals and apply the appropriate GRM factor to calculate an adjustment for the comparable sales.

(2) Net Income/Savings Capitalization Method

The Appraiser may use an income approach solution based on capitalization of savings attendant to the alternative energy source. The Appraiser may estimate the present value of the future benefit using the discounted cash flow technique or commercially available tools; however, the Appraiser must be competent to use them and provide an explanation of the analysis.

(G) Reconciliation of the Approaches

The Appraiser may elect to utilize some of the tools and training available from professional organizations and energy-related firms. The Appraiser must provide a credible analysis and reconciliation explaining the methodology and support for the adjustment.

As related to special building components, the Appraiser must provide an analysis of the information and conclusions supporting the application of adjustments.

The Appraiser must reconcile all the methods utilized and resolve to a final opinion of the adjustment, analyzing both the quantity and quality of available data.

Source: US Department of Housing and Urban Development, *FHA Single Family Housing Policy Handbook* (Handbook 4000.1), December 30, 2016, 542–543.

Common Errors and Issues. The statements in the FHA and Freddie Mac guides regarding use of alternate methods are reinforced by comments in the Appraisal Institute's February 2018 publication, *Common Errors and Issues*.¹⁰ This monograph describes errors that have been noted in a significant number of assignments. The errors in theory and practice listed include the following:

- Failing to understand that matched pairs are NOT the only way to support an adjustment
- Failing to understand that it is no more appropriate to NOT make an adjustment when it is needed than to MAKE one that has NO support [Emphasis in original.]

These two common errors pertain to analysis of market reaction and further support the provisions in the Freddie Mac and FHA guides calling for use of alternate methods besides matched pairs to determine market reaction and to support adjustments.

Market Value, Marketing, and Market Reaction

Consideration of the elements of market value should be part of an appraiser's analysis and comparable selection. If the sale is a foreclosure or the buyer and seller are related, appraisers would agree that the sale transaction is not an arm's-length transaction and a market value sale. Marketing is also a consideration in determining market value, as the marketing of a property's features may affect the knowledge of market participants and therefore sale price.

Market value is the major focus of most real property appraisal assignments. Its components are described as follows in *The Dictionary of Real Estate Appraisal*, sixth edition:

The most widely accepted components of market value are incorporated in the following definition: The most probable price, as of a specified date, in cash, or in terms equivalent to cash, or in other precisely revealed terms, for which the specified property rights should sell after reasonable exposure in a competitive market under all conditions requisite to a fair sale, with the buyer and seller each

acting prudently, knowledgeably, and for self-interest, and assuming that neither is under undue duress.¹¹

Does marketing affect the market reaction to a home's features? Market participants will react in their decision-making to advertising or promotion of a property's features and benefits. Marketing is key to introducing a new home feature to the public and real estate agents are key in educating the public about the feature, its benefits, and why it should sell for more. This scenario can be applied to the marketing of homes with energy-efficient features. Market value requires a knowledgeable buyer and seller. A buyer will not pay a premium for a feature if it is physically invisible because it is hidden behind the walls or it is unknown to the buyer due to lack of marketing. A feature's existence and benefits must be known to buyers in order for there to be a market reaction and price impact.

Two studies were published in 2017 and 2018 that compare the way homes with green and energy features were marketed to their sale price premiums or lack of premium. The point of these studies is that market value, as defined, implies good (competitive) marketing and reasonable market exposure under all conditions requisite to a fair sale. The studies' results suggest trends in price premiums related to the marketing.

Market reaction can be identified through formal or informal surveys of buyers, sellers, brokers, real estate agents, or builders. Appraisers have limited interaction with the buyers and sellers, and real estate professionals may have a better handle on market reaction to a new feature than an appraiser who can only measure sales that explicitly identify the features. In the case of the studies reported here, both included an informal survey of the agents involved in the transactions to gain a better understanding of the market's reaction to the green features.

Study 1—Green Homes in Northern California

The first study, *Green Homes Sales Prices in Northern California*, studied certified green homes in ten Northern California counties, including the San Francisco Bay and Sacramento areas.¹² The

10. Appraisal Institute, *Common Errors and Issues* (Chicago: Appraisal Institute, 2018), 14; <http://bit.ly/ErrorsIssues>.

11. Appraisal Institute, *The Dictionary of Real Estate Appraisal*, 6th ed., s.v. "market value."

12. Sandra Adomatis, *Green Homes Sales Prices in Northern California* (Oakland, CA: Build It Green, January 2018), <http://bit.ly/NoCalGreen>.

study found that green home labels and features are often invisible at time of sale, hindering the ability of the real estate industry to capture any green premium for their clients and complicating analysis of premiums. This complicates a market reaction analysis as well.

The study identified several interrelated challenges that cause these difficulties in analyzing green premiums. First, the green label information for each sale examined in this study was rarely anything more than a comment in the listing's narrative description; the MLS's "green fields" were either unused or improperly used. This prevented real estate agents from easily searching for green homes on behalf of their clients and prevented appraisers from finding comparables to properly value those homes. It also prevented potential buyers from finding homes with green features.

Many real estate professionals involved in the sales used in this study were interviewed and admitted they were unfamiliar with the properties of green homes.¹³ This lack of knowledge would make it difficult for agents to recognize and communicate the value-add features of green homes to potential buyers, and it suggests that the buyers may not have been knowledgeable either. When the agents marketing green homes have limited knowledge of the features or their benefits, it is reasonable to assume the marketing did affect the sale prices. These factors have implications in terms in the definition of *market value*, which requires "reasonable exposure in a competitive market under all conditions requisite to a fair sale, with the buyer and seller each acting prudently, knowledgeably, and for self-interest."

This study pointed to marketing as a potential reason green homes did not sell for more than the 2.19% premiums found in this study. It commented that the green features were invisible in the listings and transactions and many of the agents had limited knowledge of the features or benefits. Real estate professionals reported difficulty in recognizing and communicating green home features or their benefits. This hindered

the proper marketing of green homes by sales agents, the ability of buyer's agents to find green homes for their clients, and the inclusion of green home features by appraisers in valuations.¹⁴ Marketing highlights special features and benefits to inform potential buyers and allow them to make knowledgeable buying decisions.

Study 2—Pearl-Certified Home Sales in Virginia

The second study, *Appraisers Analysis of Pearl National Home Certification Sales Premiums*, compared sale price premiums to the marketing of Pearl-certified homes in the Northern Virginia/Maryland and Central Virginia market areas.¹⁵

This study reported that in the study areas the MLSs had fields for some energy or green features, but it was difficult to identify Pearl-certified home sales, and most of the Pearl-certified home sales found had documents attached. In areas where the MLSs remove the attachment once the property status applied is "sold," it complicated the research and analysis of the features. The study noted that there is room for improvement in the marketing of Pearl-certified properties as well as other properties with energy and/or green features. If the buyer was not fully aware of the high-performing features he/she would not be fully informed. The study found that some real estate agents did a particularly good job marketing the benefits of Pearl-certified homes, as illustrated by the comments from actual listings identified in the study.

The study suggested that improving marketing of properties using Pearl documentation, words that appeal to buyer emotion, and full population of relevant MLS fields could materially affect the sale prices as well as the appraised values for these homes. This study, like the previously summarized study, demonstrated the importance of the market value definition's requirement that both parties are well informed or well advised and acting in what they consider their own best interests.

Marketing can play a role in sale price premiums and appraised values moving forward. Agents

13. Article 11 of the National Association of Realtors' Code of Ethics requires realtors to be competent or to partner with someone who does have competency in the types of property involved.

14. Adomatis, *Green Homes Sales Prices*, 13, 31.

15. Sandra Adomatis, *Appraisers Analysis of Pearl National Home Certification Sales Premiums* (Vienna, VA: Pearl National Home Certification, October 30, 2017), 38; <http://bit.ly/PearlHomes>. Pearl Certification is a national firm that provides third-party certification of high-performing homes, i.e., homes with "performance assets" that make them healthy, safe, comfortable, energy and water efficient.

Exhibit 6 Paired Data Analysis Pearl-Certified Homes

Pearl Gold	Contract Date	Days on Market	Sold Price (\$)	Adjusted Sale Price (\$)	Living Area (Sq. Ft.)	Sales Price Premium (\$) (Pearl Sale Price – Adjusted Non Green Sale Price)	Premium as % of Sale Price (%) (Premium/Pearl Sale Price)	Age (Yrs.)
Crozet, VA								
Single-Unit Detached								
Pearl	2/26/17	29	477,000		2,170			15
Pair 13	7/8/16	63	445,000	430,766	2,535	46,234	9.69	9
Pair 14	7/30/16	1	449,900	435,792	2,518	41,208	8.64	19

and appraisers have varying degrees of understanding terms like “RESNET HERS”¹⁶ or “Pearl Home Certification.” In the study, one good example revealed a pairing of two Pearl-certified homes in Silver Spring, Maryland, and Falls Church, Virginia. The listings did not include “Pearl-certified” wording or documents, and these pairings showed the highest negative premium (that is, the Pearl-certified home sold for less than the non-Pearl-certified home comparable). While we deal with an imperfect market, results like in this example may be answered by one of the following questions. Would the result have been different if the MLS remarks and attachments promoted the Pearl-certified high-performance features? Were there feature differences not identified in the MLS or upon agent verification? These are questions that an appraiser must analyze prior to using this sale as a comparable. Future study of the MLS descriptions and promotion of these homes compared to the sale price premium is needed to draw supported conclusions.

Exhibit 6 shows an example of a pairing that had minor adjustments where there had been good marketing and the highest sale price premiums. In Exhibit 6, the pairs have minor adjustments and strongly support a close positive adjustment. Here, the Pearl-certified home was marketed in the MLS, which may account for the

higher premiums. These premiums support the upper end of the range with solid pairings closely bracketing 9%. The MLS listings included Pearl Home certification documents and the Appraisal Institute’s Residential Green and Energy Efficient Addendum.¹⁷ The photograph gallery also showed the Pearl certificate, and the second sentence of the listing comments stated, “Gold certified efficiency rating from Pearl.”¹⁸

Market reaction can be better understood through examination of additional published studies. For example, the Pearl Home certification study quoted a survey of builders and compared it to the results of the 35 pairs as a test of reasonableness. This *Green Multifamily and Single Family Homes 2017* report summarized a poll of 231 single-family home builders and developers. The polled builders indicated that they believe their customers are willing to pay 1% to 4% more for a green home. In that same survey, 63 single-family remodelers were polled, and 79% of them stated that they believe their clients are willing to pay “more” for a green home than one without green features. The most common perception of the builders polled was that it costs between 5% and 10% more to build a new green home.¹⁹ It is reasonable to assume an informed builder would not include these features on speculation without government subsidies, tax bene-

16. The Residential Energy Services Network (RESNET) provides an energy rating known as the Home Energy Rating System (HERS) Index; www.resnet.us.

17. The Appraisal Institute’s “Residential Green and Energy Efficient Addendum” is a form developed to communicate the features of green or high-performance properties. It addresses the six elements of green building and complements the mortgage industry’s Form 1004 appraisal form, which does not address these features. See <http://bit.ly/GreenAddendum>.

18. Adomatis, *Pearl National Home Certification Sales Premiums*, 27, 51.

19. Dodge Data and Analytics and National Association of Home Builders, *Smart Market Brief: Green Multifamily and Single Family Homes 2017*, survey conducted December 2016–April 2017.

Exhibit 7 Recent Market Reaction Studies

Study Name	Authors/Publication Date	Study Period/ Market Area	Sale Price Premium Range
What Is Green Worth? Unveiling High-Performance Home Premiums in Washington, D.C. http://bit.ly/2FbsSzQ	Sandra K. Adomatis, with contributors Leonard Kolstad, Donald Boucher, Tamora K. Pappas, and Alex Uminsk; September 2015	February 2013–July 2015; Washington, DC	Range of 2% to 5%
An Early Look at Energy Efficiency and Contributory Value: Case Studies of Residential Properties in the Greater Denver Metro Area	Lisa Desmarais; 2015	2006–2014; Greater Denver Metro Area	An overall range of 1% to 15%; excluding outliers, range is 2% to 5%
The Market Valuation of Energy Efficient and Green Certified Northwest Homes	Taylor Watkins and other contributors; May 2013	2014–2015 (30 pairs); Northwest U.S., Oregon and Washington	A range of –0.2% to 8%
An Empirical Assessment of the Value of Green in Residential Real Estate	Anjelita Cadena and Thomas A. Thomson; <i>The Appraisal Journal</i> (Winter 2015)	October 2008–September 2013; Bexar County-San Antonio, TX	1% increase for green certification; 2% increase for green components; 6% increase for energy-efficient features
The Value of LEED Homes in the Austin-Round Rock Real Estate Market	Greg Hallman of McCombs School of Business; 2017	2008–2016; Austin-Round Rock, TX	Houses with green designation sell for 6% more than one without; houses with LEED certification sell for 8% more
Appraisers Analysis of Pearl National Home Certification Sales Premiums	Sandra K. Adomatis, with contributors Donald Boucher, Woody Fincham, and Betsy Hughes; October 2017	2016 and 2017; Virginia and Maryland	Average (mean) premium of 5% in market area where Pearl has established a presence and where agents are marketing certification effectively. For Pearl-certified homes in all market areas, average (mean) premium was just over 2%
Green Homes Sales Prices in Northern California	Sandra K. Adomatis and Denis DeSaix; January 2018	2015–2017; San Francisco Bay Area	2.19% average sale price premium identified for green features. Marketing of the features needs improvement

fits or publicity benefits for doing so. Therefore, the results of the Pearl Home certification study, with 35 paired-data sets at 2% to 5%, predominantly falls within the range of the builders and developers polled and below the cost to build new green homes. In a balanced market, a buyer would not pay more than cost new for a product that can be purchased in the market.

While 35 pairs are not a robust data set, they do provide a representation of the market's reaction

to a feature or property type and would be within the FHA's recognized alternate methods. The limited data was supported by a test of reasonableness to add credibility to the results. Additional published studies added support to the conclusions instead of just one paired-data analysis. The study shows the market is reacting to the green features of Pearl-certified homes in the market area as would be expected from other published reports; a list of relevant studies is shown in Exhibit 7.²⁰

20. The *Green Multifamily and Single Family Homes 2017* report can be downloaded at www.nahb.org/smr.

Supporting Evidence of Market Reaction

Comparison of Market Reaction from Similar Areas. When a feature is not present in a market, market reaction can be measured by researching another market that is similar in price range and demographics. The key to using this method is comparing similar markets that have physical and demographic similarities. Appraisal reports should articulate the similarities and findings that led the appraiser to believe the markets would react similarly. This method would meet appraisal standards and would be credible support for a market reaction conclusion.

For example, when the first green home in Port Charlotte, Florida, was appraised, there were no paired sales for comparison. It was necessary to research the Phoenix, Arizona, market area for similar style houses and similar buyer characteristics. The Phoenix market was more mature with green features than the Port Charlotte market, and it offered evidence of how a similar market might react.

Market Trends and Reaction Measured through

RESNET Appraiser Portal. Appraisal Institute professionals have access to the RESNET Appraiser Portal to research residential properties to discover energy ratings, estimated utility costs, estimated annual savings based on the energy-efficiency rating, Energy Star, and Pearl Home certified.²¹ These are details that a residential appraiser typically would not find in public records or in the MLS.

For example, in Punta Gorda, Florida, a search of the RESNET Appraiser Portal showed that

205 houses built between 2013 and 2017 had HERS Index ratings²² and 42 of these houses were Energy Star certified. The number of ratings over five years in this town of 18,800 population suggests there is a trend toward energy efficiency. In contrast, earlier search of the MLS and real estate agent interviews suggested that houses with HERS Index ratings were not present in this market. (The MLS serving this area showed 4 properties built between 2013 and 2017 had HERS Index ratings and 17 had Energy Star certifications that were actively listed or sold.) Although the MLS has a searchable HERS Index field capable of a range searches for HERS Index ratings as well as an Energy Star searchable field, the results were not accurate. Running a search of the MLS alone might lead an appraiser to incorrectly conclude that energy efficiency is not important and does not add value in this market since the MLS reported only 4 properties over five years had a HERS Index rating. The 561 single-unit permits during the study period compared to the 205 HERS Index ratings indicates 36.5% of the permits received a HERS Index rating and 7.5% were Energy Star certified.

Keep in mind the RESNET Appraiser Portal is not a database of sales, it is a database to assist appraisers in measuring market reaction and energy-efficiency trends based on the number of homes with the ratings. The trend becomes clearer when the number of HERS Index ratings are compared to the new construction permit numbers during that same period. The table below shows the numbers and trends.

Homes Built 2013–2017	RESNET Search Results for HERS Index Ratings	MLS Search Results for HERS Index Ratings	RESNET Search Results for Energy Star Homes	MLS Search Results for Energy Star Homes
561	205	4	42	17
205 HERS/561 New Const. = 36.5% HERS Index Ratings		← Trends →		42 ES/561 New Const. = 7.5% Energy Star

21. For information on how Appraisal Institute professionals may access the RESNET portal, go to <http://bit.ly/RESNETinfo>. Public access is available on a limited basis at <http://bit.ly/RESNETpublic>.

22. The Home Energy Rating System, or HERS Index rating, measures the energy efficiency of the structure. The rating considers all things that make the home energy efficient including envelope, mechanicals, windows, doors, lighting, and appliances. The lower the number, the more efficient the home should be. These ratings are typically reliable for several years to come assuming no material changes have been made to the structure or mechanicals. Changes in windows, doors, mechanicals, electrical fixtures, or additions could change the rating. It would not be necessary to rerate the house 5-10 years later unless changes were made. See www.resnet.us.

Other energy-efficient ratings may refer to the RESNET ratings as their basis. For example, in some states including Florida, the Energy Rating Index (ERI)²³ is an option in the compliance path using the HERS Index. Going forward governmental jurisdictions are increasing energy standards and applying ERI ratings in their building codes. As governmental and social changes occur, appraisers must be aware of the related energy-efficiency requirements.

In the above Punta Gorda example, it took less than five minutes to search the RESNET Appraisal Portal and another twenty minutes to call the city for building permit numbers. An appraiser relying solely on the MLS and public record searches is at risk for an unsupported and/or inaccurate conclusion. Some features require valuation professionals to go the extra mile to form a credible opinion regarding market reaction and trends. While this example does not give value for the feature, it certainly says that 36.5% of new construction is paying extra to have a HERS Index rating, suggesting energy efficiency is important in the market.

Employing the energy savings given on the RESNET Appraiser Portal to develop a value using a present value calculation is an approach that is mentioned in the *FHA Policy Handbook* and Freddie Mac's *Seller/Servicer Guide*. The RESNET Appraiser Portal database offers another resource to identify the market's trend toward energy-efficient housing and data to develop a value using the methods previously discussed in Exhibits 2, 4, and 5.

As the Scope of Work Rule in the Uniform Standards of Professional Appraisal Practice states, "Credible assignment results require support by relevant evidence and logic. The credibility of assignment results is always measured in the context of the intended use." The

resources and methods addressed in this article can provide relevant evidence to arrive at a logical and credible assignment result.

Overview of Methods to Develop Market Reaction Opinions

Measuring market reaction is not a simple MLS search for sales with the same feature; it is a review of the overall market and may require extending the research to similar markets. While many of the suggestions discussed here refer to green or energy features, similar resources are available for a variety of other home features. Below is a list of possible approaches for measuring market reaction.

Possible Ways to Measure Market Reaction

1. Review sales, listings, pending sales, and new construction data to uncover how many homes have the same features.
2. Pair the sales or listings to identify sale price differences that are attributed to the feature.
3. Identify additional cost of the features and depreciation to compare to other methods. Cost is easy to support, and it is a tool that buyers typically use in their buying decisions.
4. Use savings amounts to develop a present value calculation or GRM income approach to the value of the feature if the savings can be quantified.
5. Review the RESNET Appraiser Portal to identify what share of the market has energy ratings or Energy Star certifications.
6. Survey builders, real estate agents, and buyers to understand their perspective on what is happening in the market concerning the study feature.

23. The Energy Rating Index (ERI) is a compliance path introduced in the 2015 version of the International Energy Conservation Code (IECC) code. If a builder chooses this option, it relies on the Home Energy Rating System (HERS) to assess the projected energy use in homes and a score on a scale of 1-100 that conveys energy efficiency. For more information on ERI implementation in states visit <http://bit.ly/ERIstates>.

7. Call the local building department to identify how many new construction homes are incorporating the study feature(s). This method addresses the supply side of the market offering the feature. Follow this step with Item 9 in this list for a look at the supply and demand side of this market feature.
8. Identify studies that focus on the feature(s) in question and use them as a test of reasonableness. Some groups that publish annual studies or surveys that give insight into the market reaction to features include:
 - National Association of Realtors
 - National Association of Home Builders
 - Dodge Data and Analytics
9. Research the percentage of new home buyers who select a feature when a builder offers the feature as an optional item to be installed in new construction. If many builders offer a particular feature (presumably at cost plus a reasonable profit margin), but only a small fraction of buyers actually select it, then that would be an indication that the cost of this item would likely not substantially carry over to a resale situation. On the other hand, if a high percentage of new home buyers voluntarily select the option, then that would suggest this is a popular feature and the cost of this item might substantially carry over in a resale situation. In addition, a trend of new home buyers increasingly selecting the option would be a sign that the feature is becoming more popular; a decreasing trend, of course, would indicate the reverse.

Conclusions

This article has identified the different government agency guidelines referencing how to measure market reaction to an energy-efficient feature. An overview of the guidelines and the case studies show options for measuring market reaction. The list of possible ways of measuring market reaction would apply to a wide range of market areas. While the focus of this article is energy-efficient features, the methods for measuring market reaction would apply to any feature offered in housing.

Measuring market reaction is not a new procedure and there are ways to measure market reaction outside the analysis of existent sales with the same features. Well-trained appraisers who are willing to dig deeper and conduct extra research will be able to meet the challenges in today's changing residential valuation assignments. An automated valuation model (AVM) may find it difficult to accurately value properties with new green or high-performance features because AVMs rely on property details available through public sources, MLSs, energy-rating sources, and/or green databases. Currently green, energy-efficient, and high-performance features are not coded to allow extraction to compliment the automated valuation modeling. As houses become more like the cartoon home of the Jetsons,²⁴ appraisers who rise to the occasion to value these new features will be positioned to be the valuation champions in this challenging market of new home features.

About the Author

Sandra K. Adomatis, SRA, LEED Green Associate, NAR Green, is an appraiser, consultant, and educator with Adomatis Appraisal Service in Punta Gorda, Florida. She specializes in the valuation of green and energy-efficient residential properties and is a frequent national speaker on the topic of green valuation. Adomatis is the author of the Appraisal Institute text *Residential Green Valuation Tools*, a developer of educational materials for the Appraisal Institute's Valuation of Sustainable Buildings Professional Development Program, and the developer of the Appraisal Institute's residential and commercial energy-efficient addendums. She received the Appraisal Institute's Dr. William N. Kinnard, Jr. Award in 2012 for her work in appraisal education, the Appraisal Institute's President's Award in 2013 for her work on behalf of the Institute, and *The Appraisal Journal's* 2016 Armstrong/Kahn Award for most outstanding original article. **Contact: adomatis@hotmail.com**

SEE NEXT PAGE FOR ADDITIONAL RESOURCES >

24. <http://bit.ly/2JmTm6O>.

Additional Resources

Suggested by the Y. T. and Louise Lee Lum Library

Appraisal Institute

- **Education**—Valuation of Sustainable Buildings Professional Development Program
<https://www.appraisalinstitute.org/education/your-career/professional-development-programs/>
- **Lum Library, External Resources [Login required]**
Information Files—Energy Efficiency
- **Publications**
<https://www.appraisalinstitute.org/store/books-and-ebooks/>
 - *An Introduction to Green Homes*
 - *Residential Green Valuation Tools*
 - *The Valuation of Green Commercial Real Estate*

ASHRAE—HVAC energy-saving technology papers

<https://technologyportal.ashrae.org/>

Database of State Initiatives for Renewables and Efficiency

<https://www.dsireusa.org>

Dodge Data and Analytics

<https://www.construction.com>

National Association of Home Builders

<https://www.nahb.org>

US Department of Energy

<https://www.energy.gov>

US Green Building Council

<https://new.usgbc.org>