Review on impacts of energy factors on real estate values

Abstract:

Real estate valuation is an issue of particular concern. It depends on many factors such as economic social and physical factors. The energy is one of the important factor, which affects the real estate value. In property appraisal, the energy can be considered as a price-setting factor in market price of real estate. Then, it is so difficult for real estate appraiser to determine why property price differ and how much this difference can be attributed to particular distinguishing features such as energy.

Many studies have exanimated the effects of various factors on real estate value such as transportation, location, conditions, houses features, pollution……. However, the energy is not much analyzed as factor of real estate value despite it great role in real estate value determination. This paper seeks to fill that void by examining the effects of energy on property values: power tower, power lines, energy transformation plants.

The study is engaged in a legal doctrinal analysis of law and scientific research findings. It analyses decisions from courts and tribunals related to the impacts of energy on property prices in order to establish their views of energy factor in determining real estate values and who bears the responsibility of property appreciation or depreciation.

It presents many aspects related to energy as value factor of real estate, it can be used to assess the market price and determine the influence of energy factor may have on the property final market value.

This research informs property appraisers of the energy importance in real estate appreciation and increasing value. However, in few cases, the energy could decrease the property value specially properties near or below high voltage line power or transformations plants if the risk is shared and approved.

Key words: Energy, real estate valuation, value factors, appraiser, property price.

Introduction

It is world wide accepted that the real estate business is one of the most important economic sectors in the world. Its value depends on many factors and appraisal approaches. Real estate appraisal is an issue of particular concern. It is the process of developing an opinion regarding the value of property based on the knowledge, experience, environment and professional assessment of value by real estate appraisers. The valuation is very subjective. To assess the property's value, it is crucial to assess the influence of factors on property market value.

Many factors can affect the property value such as physical factors: location, distance from center, features, conditions, facilities connections (energy in particular) and pollution. The second kind of factors is economic factors, which play a great role in real estate valuation such as supply and demand, interest rate, economic outlook, property market performance, investment potential. The third type of factors is social factors related to all social aspects, which affect the property market value such as demographic data, jobs …

Many studies have examined the effects of various factors on real estate values such as location, transportation, conditions, and homes features. However, the energy is not much analyzed as factor of real estate value despite its great role in determining the property values. The energy can be considered as a price setting factor in market price of real estate.

In this study, we focused on the impact of energy factor in real estate appraisal in order to provide real estate appraiser tools to assess the property value taking into account the energy and its impacts on property market value. Then, some sub-questions are asked like how energy factors increase/decrease the property values? To which extend, energy factors affects the real estate appraisal and appraisers reports? and does courts take into account the energy factors in determining the property value?

It is a difficult task to determine why real estate prices differ and how much this difference can be attributed to particular distinguishing features such as energy and its relationships with other factors. The theme is very important in order to highlight energy aspects that increase or decrease the real estate market value and provide practitioners (judges, real estate appraisers, expert witness…) some rules to assess the property value according to the energy adaptation and facilities.

This paper makes a contribution to the literature. First, the effects of energy on real estate are not well analyzed in the literature. Moreover, when it is explored it studies the impacts of energy on scientific point of view and it does not take into account the legally framework. Previous studies examine the link between energy and real estate price using exclusively scientific approaches.

However, our research is the first to analyze the effects of energy on property market value using analytical approach basing on scientific research findings and regulatory framework associated with courts decisions in the field. To the best of our knowledge, there is a lack of systemic approach on the effects of energy on real estate appraisal.

The paper is organized as follows. First, we start with an introduction and in the second section, an overview of literature is given. In the third section, the regulatory framework is considered. Then, we analyze the effects of energy on real estate values in the third section. Finally, we wrap up the paper with a conclusion in the fourth section.

1. Literature review:

Energy and its effects will have various implications for property. However, the energy is not only the factor which affect the real estate value. Many factors can decrease or increase the property marcket prices. In the literature, the research analyzes the impacts of such as factors on real estate value. This review will be limited to location, climate change and pollution as setting factors of real estate prices.

Location plays a great role in determining the homes values. The distance from or to city center is a factor which increases the real estate market value because of the amenities that offer the city center (majority of administrations, commercial centers, jobs..). the distance from center is a factor that affect the real estate value as well as the littoral amenties (distance from littoral). The real estate value decrease with the increasing of the distance from the littoral [1], [2], [3].

Concerning climate change, many studies conducted in USA state that climate change factors such as flooding, scarcity, seal level and drought decrease the real estate value. For example, sea level rise decreases the homes prices by 7% than comparable homes [4]. In addition, findings of some research indicate that the value of homes located in the threatened sea level rise areas, unprotected by adapted structures (bulkheads, ripraps, groin fields…) decreases by 19 to 23% on average. However, protected homes see its value increase by 21% [5]. Also, the research finds an evidence positive relationship between increase in reducing drought severity and property prices. A 1% increase in rainfalls is associated with up 0.07% increase in real estate price and 0.05% in rents. In addition, a 1% increase in temperature reduces the real estate value by up to 0.99% and rents by 0.55% [6]. Moreover, Higher temperatures is not only the source of weather events but they increase the homes prices because higher temperatures are the cause of using more energy to air conditioning and fans and more water to keep lawns and landscaping alive [7].

The pollution is very big problem, which affects negatively the real estate value. In property appraisal, the pollution is considered as a price-setting factor in market price of real estate. It is responsible of depreciation of property market prices. Therefore, the real estate value depends on air pollution, water contamination, soil contamination and noise. All those factors decrease the property value by up 24% of value [8], [9], [10], [11].

Many other factors are analyzed in the literature. However, the energy still not much analyzed as setting factor in determining real estate value outside cases cited in this paper despite the importance given by the legislator.

2. Regulatory framework:

In 2009, Morocco adopted a national energy strategy. The main objective of such strategy is strengthening the security of its energy supply. Moreover, securing general cost effective access to electricity. In order to reduce energy dependence and mitigate greenhouse gas emissions, the Kingdom has accelerated the development of renewable energies. In February 2010, Morocco Agency for solar Energy is created according to law No. 57-09 in the objective to implement Moroccan solar program. In addition, law No. 13-09 was promulgated in 2010 to liberalize and perform the renewable energy sector through the opening up of many kinds of energy production to competition (renewable and thermic energy).

The energy knows many legislations reforms. The main reforms can be summarized as follows:

- Law No. 16-08 promulgated in October 2008 allowing industrial installation to produce up to 50 KW from renewable energies.
- Law No. 16-09 amended by law No. 39-16 creating agency for the development of renewable energy and energy efficiency.
- Law No. 54-14 promulgated in august 2015 allowing self-energy producers to join the transport grid in order to transmit produced energy from production plants to consumptions sites.
- Law No. 48-15 dated 24 may 2015 relating to the regulation of electricity and establishing the Moroccan Energy Authority.
- Law No. 58-15 in 12 January 2016 amended law No. 13-03 allowing independent producers access to the low voltage grid.

Conscious of the energy importance and energy efficiency in the development programs, Morocco has reinforced his regulatory framework related to the energy in order to meet the energy development needs.

In Morocco, according to the National Office of Electricity and Drinking Water report in 2020, the Global rural Electrification Program (PERG) has been very successful thanks to its global character and its participatory financing method. After launching this program in 1996 and until the end of 2019, the results of rural electrification are as follows: electrification by connection to the networks of 40,829 villages sheltering 2,134,596 households, installation of 51,559 households by photovoltaic kits in 3,663 villages during the period 1998– 2009 and 19,438 households in 900 villages during the period 2016-2018 as part of the National Initiative of Human Development (solar project). Therefore, the rural electrification rate reached up 99.72%.

1. Methodology:

To identify in which extent the energy factors can affect the real estate value, the study is engaged in a doctrinal analysis approach of relevant legal and academic research. The study is engaged with relevant recent academic research, courts cases related to the energy as factor of appreciation or depreciation of property market value.

The research engaged in doctrinal analysis of relevant case decisions in order to fulfil its purpose pf informing appraisers of the scientific findings in the field and the courts views of developing in properties near of energy factors. Therefore, the study tries to identify the party who bears the responsibility of depreciation or appreciation of real estate value according to the development of areas near of energy sources, lines and plants.

2. Energy effects analysis on real estate appraisal

Energy plays a very important role in economic growth. It is an essential and crucial factor of production as well as the key of the success of any strategy promoting economy. The energy has not only an impact on human well-being by making life easier and providing a range of energy services such as heating, cooling, cooking and lighting, but also it has some effects on real estate, in particular on its value. It plays an essential role in increasing or decreasing the real estate value. Real estate value decreasing or increasing depends on many aspects related to energy such as energy efficiency, sources of energy (wind or solar) and energy facilities.

2.1.Energy efficiency

In 2015, investment in energy efficiency in the world reached 221 billion dollars, or about 14% of the global investment in the energy sector [12]. In the same line, energy efficiency is a lever for energy transformation era in Morocco. It started since 2008 with the national priority actions program (PNAP) which has as target to reduce electricity consumption by 25% and shed peak load by 15% [12].

In the European Union, household's consumption represents 26% of final energy consumption in 2019 (Energy consumption in households, Eurostat, June 2021). This rate is similar in Morocco when the building sector, the most energy intensive sectors, consumes more than 33% with 7% by the commercial building and 26% is consumed by the residential sector according to the Moroccan Agency for Energy Efficiency.

Energy efficiency in the residential housing market can play a great role not only in environment protection by reducing global carbon emissions but also by increasing real estate value. The energy efficiency affects the property value. Many studies has demonstrated that the energy efficiency increases the real estate value. Then, energy efficient Homes are sold for more than conventional homes [13]. Moreover, Building energy efficiency is associated with a lower probability of mortgage default [14]. In addition, Consumers capitalize the moto that « label creates transparency in the energy efficiency of dwellings » into the price of their perspectives homes [15].

Then, lower energy use is associated with a higher selling price [16]. In this field, evidence of a positive association between price per square meter and energy performance rating: premium from one to 7% has been demonstrated [17]. In addition, this premium can increase to reach 9% (in USA) and up 10% (in Europe) when homes rated "A" under the European Union's system commanded a 10% premium [18]. Moreover, improving efficiency can lead a reduction in annual energy expenses by 25% which represents 1$/sq foot [19].

In addition, rental income is affected by energy consumption reduction. For example, one-euro reduction in energy costs corresponds to an increase of 23 euro in rental incomes [20].

The energy efficiency affects not only the real estate valuation by increasing its market value but also the rental income.

Global warming, the volatility permanent of oil prices, the increase in global demand and the environmental problems (60% of gas emissions related to energy) are all factors that have in favor of the emergence of renewable energies [21]. Therefore, many wind or solar farms are built to produce clean energy. However, those farms can affects the real estate surrounding by increasing or decreasing its value.

2.2.Wind Energy

A substantial growth in the wind energy production was observed last decade. Among concerns about wind farms, their possible impact on the appraisal of nearby lands is often raised.

Wind energy farms can have some impacts on real estate value. However, many studies findings show that there is no statistical evidence that home values near turbines were affected in the post-construction, post announcement or pre construction stages [22]. In addition, the view of the wind farm and the distance of the property to the wind facilities do not have statistically significant impact on property sales price [23]. Moreover, the wind farm can temper the house price growth in England, but, this effect is likely to be zero and even be positive in Scotland [24]. In France, several independent studies have concluded that the impact, if could be identified, would be in the close vicinity (properties located nearby the wind farms from less than two kilometers) and sufficiently small for both properties value loss and for number of concerned properties [25]. European Court of Human Rights decision supports this opinion when it has declared the application inadmissible [26].

2.3. Solar energy

Homeowners, buyers and appraisers confirm that the installation of solar panels and solar batteries in houses can increase real estate market prices.

Solar energy is another source of energy. New findings show that homes with solar panels have increased in property value. It is created by installing solar panels. Then solar panels farms is becoming more and more widespread in many regions when conditions are favorable. There is few studies, which examine the impact of solar farms on real estate value. However, solar panels in the buildings increase the property value by 4 to 6% on average and the value is depending on the city [27]. Moreover, homes with solar panels sell faster and fro 17% more than homes without solar panels [28].

2.4. Power facilities

In order to supply buildings, industrial and agriculture on energy, it is necessary to construct a high, medium and low voltage power lines and power transformations facilities. The construction of such energy plants and connections between production units and consumption sites requires crossing public and private properties.

Power facilities (lines and transformations plant) can be the source of many kinds of pollution such as noise and electromagnetic waves. This pollution can have an impact on real estate by decreasing its value. Many studies have demonstrates an evidence association between power facilities and property market value. Therefore, Within 11,500 feet of the power plant a typical property loses 0,9% of its value for each 10% move closer to the plant [29]. This opinion was supported by Provincial court of Murcie in his decisions N° 80/2001 dated 13/02/2001 [30] and Supreme Court decision N° 10-17.645 [31]. However, the European court of human rights has declared the

application inadmissible in many cases related to transformation plant installation [32] and high voltage power line [33, 34].

3. Conclusion

Energy is the most important factor of production. It is used throughout all production chain stages. Energy does not affect only life aspects but also it has direct effects on real estate values. Therefore, the energy plays great role in increasing property market value. Homeowners, buyers, appraisers and courts decisions confirm that the energy installations have an impact, almost positive, on real estate market prices.

The energy efficiency, solar panels and wind energy are some factors, which affect positively and significantly the real estate market prices. However, in few cases, the energy can be a factor which decrease the property value specially properties near or below high voltage line power or transformations plants.

A substantial growth in renewable energy is expected in the coming decades. Those energies have effects not only on real estate by increasing its market value but also on environment protection by enhancing climate change impacts.

According to the findings of this research, more importance should be given to the energy in development programs as factor of depreciation or appreciation of property prices. Moreover, many studies should treat this field in order to determine the impacts of each energy components on real estate value.

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