



# PLEA 2017 EDINBURGH

*Design to Thrive*

## Real estate and sustainable construction: Private perspectives for progress in energy regulation of a liberalised market

Felipe Encinas<sup>1,2</sup>, Carlos Aguirre<sup>3</sup> and Carlos Marmolejo<sup>4</sup>

<sup>1</sup> Escuela de Arquitectura, Facultad de Arquitectura, Diseño y Estudios Urbanos, Pontificia Universidad Católica de Chile, Santiago, Chile, [felipe.encinas@uc.cl](mailto:felipe.encinas@uc.cl)

<sup>2</sup> Centro de Desarrollo Urbano Sustentable (CEDEUS)

<sup>3</sup> Escuela de Construcción, Universidad de las Américas, Santiago, Chile, [caguirre@udla.cl](mailto:caguirre@udla.cl)

<sup>4</sup> Centro de Política de Suelo y Valoraciones, Escuela Técnica Superior de Arquitectura de Barcelona, Universidad Politécnica de Cataluña, Barcelona, España, [carlos.marmolejo@upc.edu](mailto:carlos.marmolejo@upc.edu)

**Abstract:** In real estate markets such as Santiago de Chile where energy efficiency certificates are not mandatory, incorporating solutions that respond to the growing demand for sustainability entails a natural tension between their acceptance as necessary measures and the way they are addressed by the market. Under this mechanism, the market has introduced housing features that are communicated individually through real estate marketing. Energy efficient elements are more commonly seen in higher-end homes, where they are treated as standard features, while they are still considered innovations at the lower end of the housing market. However, it has been shown that energy efficient features decline in relative importance over time, ceasing to be considered marks of distinction. In contrast, energy efficiency certification shows great potential for generating a proposal to create sustainable value over time, particularly due to its ability to objectively communicate a buildings' energy performance. This suggests that this model should be reviewed from a public policy perspective, with the understanding that the current voluntary standards must compete with other features, in addition to improving the minimum required standards.

**Keywords:** real estate market, real estate marketing, energy efficiency certification, sustainable features

### Introduction

In most countries, home energy efficiency beyond certain minimal requirements has been left largely to the dynamics of the real estate markets at the residential level. In certain cases, this regulatory requirement is supplemented by required energy efficiency certification, which typically takes the form of ranking by categories, giving rise to labelling (Pérez-Lombard *et al.*, 2009). The European Directive on Energy Performance in Buildings has introduced the universal use of energy certificates in the European housing market (Official Journal of the European Union, 2003). This policy aims to provide energy transparency in real estate transactions so that the public can make more informed purchase or leasing decisions. This method banks on the indirect promotion of more energy-efficient buildings, as it is believed that their lower energy use costs will convince consumers to pay a premium for them, thereby offsetting the higher production costs and encouraging real estate developers to build them.

The real estate market of Santiago de Chile was selected as a case of a liberalised market where energy efficiency certificates exist as a tool but are not mandatory in housing transactions. In general, the housing market in Chile has a low government presence, which was defined by López-Morales, Gasic and Meza (2012) as “pro-business urban planning”. The country has, however, adopted regulations – in a prescriptive manner – that affect the energy performance of residences. In 2000, the rules known as the "Thermal Regulations" established requirements regarding maximum permissible thermal transmittance for roofs, while the 2007 update added requirements for thermal conditioning of perimeter walls, windows and ventilated floors (MINVU, 2016). While these standards have been welcomed as an initial effort, their actual contribution to household savings in energy efficiency is suboptimal (Collados and Armijo, 2008; Bustamante *et al.*, 2009), as they have not been updated in 10 years. In the case of Santiago, for example, this regulation defines  $1.9 \text{ W/m}^2\text{K}$  as the maximum permissible thermal transmittance for perimeter walls, which can be achieved by building thicker brick walls rather than by using thermal insulation. The OECD itself, to which Chile belongs, has addressed the matter, strongly recommending that the country improve its standards for thermal envelope (Caldera, 2012). Nonetheless, the "Energy Rating," an instrument that evaluates a home's energy efficiency, has been in use since 2013. While plans originally called for the system to be implemented gradually as a requirement beginning in 2016 (DITEC, 2015), this was postponed indefinitely, becoming a voluntary practice. Furthermore, the market has been very slow to adopt the system. For example, of all the homes that have achieved the final rating, only 5.4% are private market homes, which, in absolute terms, translates into 404 homes in all of Chile from the system's introduction in 2013 to October 2015 (MINVU, 2015). This is clearly a minuscule fraction of the total national housing stock, which has fluctuated between 70,000 and 90,000 units during the same period (CChC, 2016).

Given that the national market has not widely adopted any objective tool such as the energy efficiency rating to inform consumers of energy efficiency in real estate transactions, the approach to communicating the competitive advantages of energy efficiency or sustainability has been to treat it as one of the home's marketing features. These can be defined as the characteristics of a real estate product that differentiate it from other homes, adding to its aggregate value. As defined by Lancaster (1966), housing is desired not in and of itself but as the sum of each real estate product's features, where the most important have a greater impact on determining preferences and choices (Jansen, 2011), according to the compensatory logic of trade-offs. Thus, from the buyer's perspective, the price of a home is based on two points: the features the buyer requires (associated with the image of the future home) and the buyer's purchasing power (associated with future debt). It is therefore possible to propose an approach that observes and values property features based on what they contribute to this model. This observation is contextual and therefore analyses the set of features of an existing known supply as a whole, with the advertising emphasis determined by each supplier.

This article aims, first, to describe how the real estate market adopts and advertises energy efficiency and sustainability in a context where energy efficiency certification is not compulsory. Moreover, it seeks to assess whether a proposal can be formulated for the construction of long-term sustainable value based on the logic of the features proposed by the residential market in Santiago de Chile, and whether this is the best option for encouraging the adoption of sustainability in construction.

## Methodology

The methodology of this study consists of using two approaches to investigate property features. First, to perform a cross-sectional analysis of features by geographical area, two submarkets in the city of Santiago were selected. While both are becoming increasingly densely populated, there is a significant difference in the forms of development they exhibit. While the submarket of Santiago Centre, the historic centre associated with middle-income residents, offers one- and two-bedroom apartments with a significant amount of infrastructural features (such as gym, multi-purpose room) and mid-level finishes, highlighting their proximity to public transport, the Las Condes Avenue submarket is entirely distinct. In the latter neighbourhood, located in the eastern part of town and associated with higher-income residents, buildings generally have a lower average height, larger size, high-end finishes and prime locations. For both cases, the entire supply of apartments was collected during the second half of 2016, based on their website, printed and billboard advertising. Additionally, a survey of housing applicants in these sectors was conducted, inquiring about the level of importance they attached to each of the property features listed. Second, a longitudinal analysis of the evolution of the various sustainable features in real estate marketing was undertaken by cataloguing all advertisements appearing between 2012 and 2016 in the "Housing and Decoration" magazine of the newspaper *El Mercurio* and the "Houses" supplement of the newspaper *Publitrero*. The former is a national newspaper, while the latter is a free publication with circulation restricted to the city of Santiago. A total of 7,290 advertisements were catalogued and examined for mentions of various features as well as the degree of importance attributed to each.

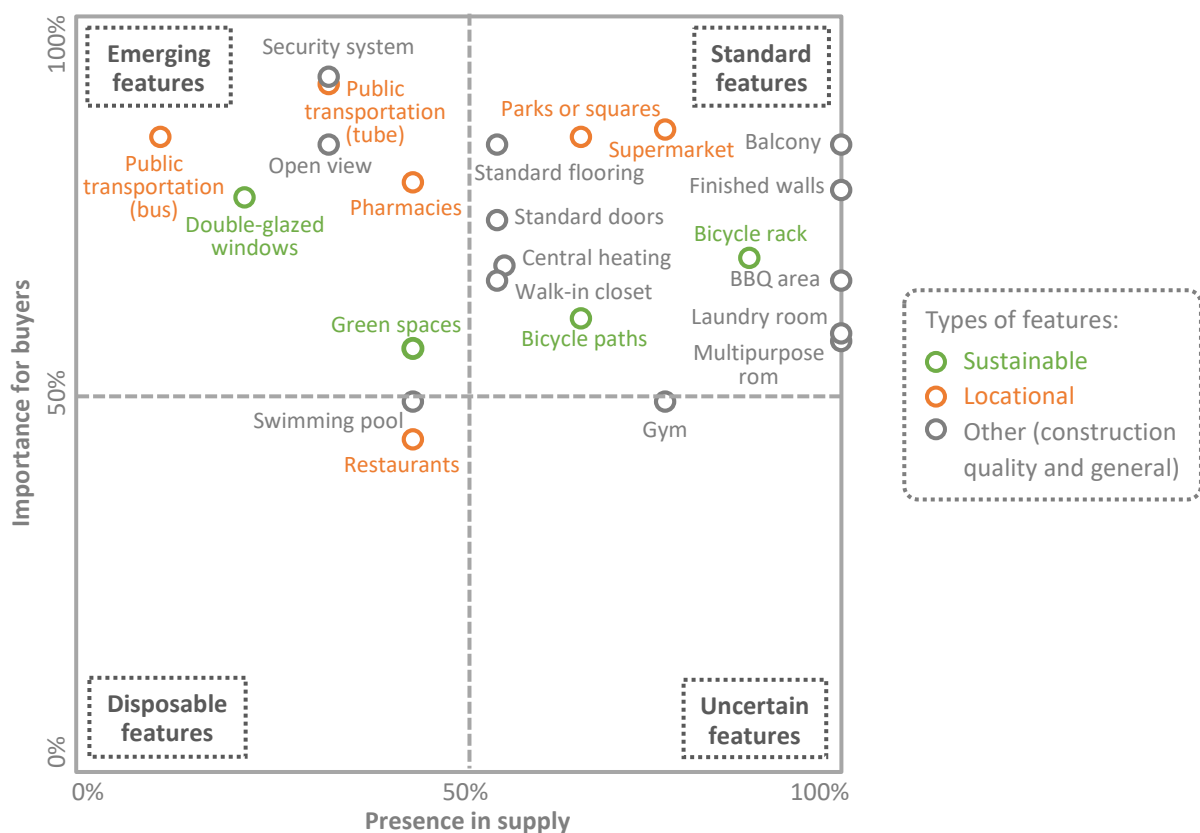


Figure 1. Value of features on the supply and demand sides for the Santiago Centre submarket

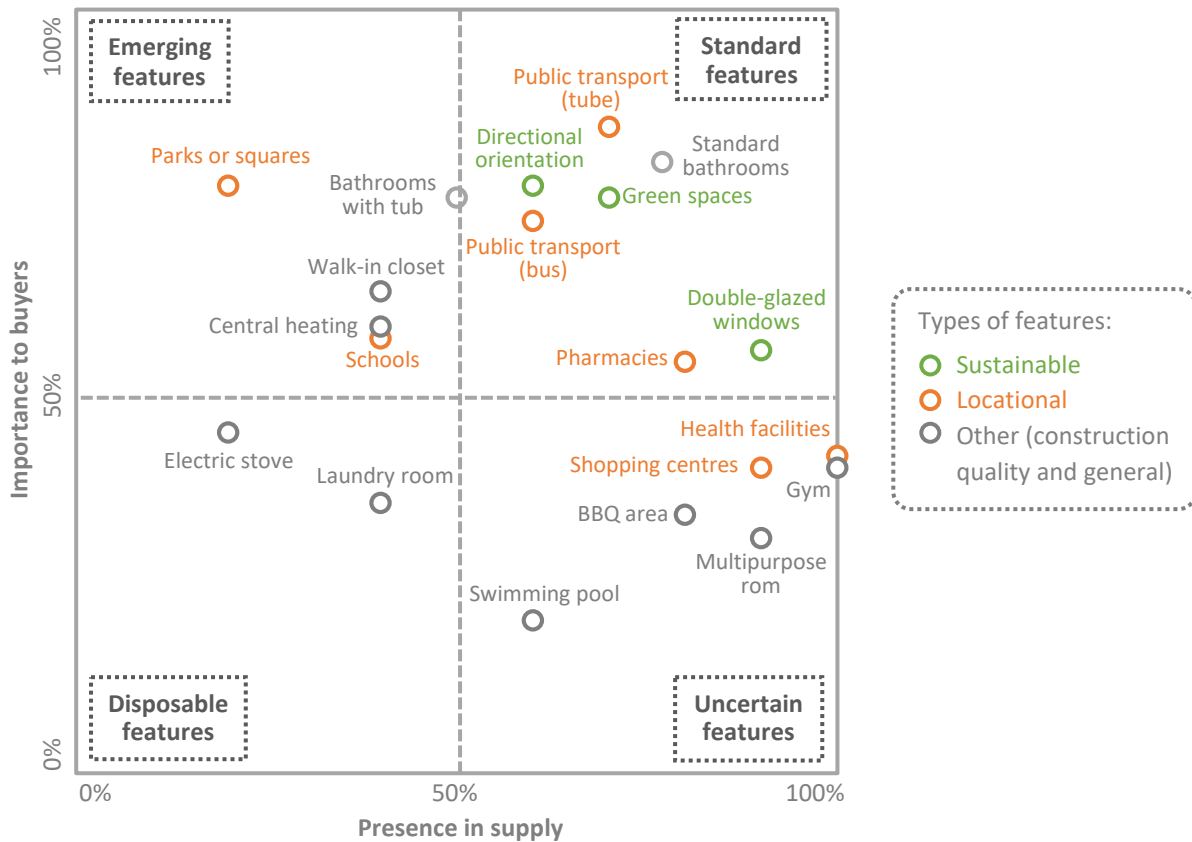


Figure 2. Value of features on the supply and demand sides for the Las Condes Avenue submarket

## Results and discussion

### *Cross-sectional analysis of features offered and sought*

Figures 1 and 2 present the assessment of supply/demand for various features in the two submarkets. These figures show how the features are strategically positioned in four categories, expressed as quadrants: standard features (high presence on the supply side and high importance on the demand side); emerging features (low presence on the supply side and high importance on the demand side); uncertain features (high presence on the supply side and low importance on the demand side); and disposable features (low presence on the supply side and low importance on the demand side). It may be observed that the features in each quadrant vary between the two submarkets at the same point in time, from which one can infer that the submarkets display different positioning strategies and different values among their consumers. In the case of Santiago Centre, the business strategy relies on pricing and is oriented mainly to investors, while on Las Condes Avenue, the strategy is clearly one of differentiation and meeting the consumer's desires. Accordingly, it can be inferred that the way sustainable features are positioned differs by neighbourhood and is associated with the strategies for different submarkets. For example, in Santiago Centre, these features may be present and highlighted whenever they may enhance value without significantly increasing the price. Thus, the sustainable features of a "bicycle rack" (very low cost) and "bicycle paths" (an external feature) are the only items positioned in the standard features quadrant in this case (Figure 1). In contrast, for the Las Condes Avenue submarket, sustainable features that add value to the real estate product

("double-glazed windows," "green spaces", "directional orientation") become standard features even when they raise the price of the property (Figure 2). However, there exists a risk of *greenwashing* wherever the project's sustainability (and therefore its marketing) is based solely on individual features without validated information, particularly when the minimum standards for energy efficiency are very low.

### ***Longitudinal analysis of sustainable features in real estate marketing***

The results obtained for the total number of projects in the real estate marketing database present an overview of the sustainable features mentioned in the advertisements. The five most commonly mentioned terms related to sustainability are "double-glazed windows" (5.4%), "solar panels" (5.3%), "energy efficient" (4.5%), "bicycle rack" (2.3%), "sustainable" (2.1%) and "energy efficiency certification" (1.9%). While the percentage of overall market penetration is relatively low, the complexity of the real estate market suggests that this ranking may appear differently in different market categories. For the purposes of this study, the price categories will be defined as under £70,000; between £70,000 and £130,000; and over £330,000. These segments represent buyers with different purchasing power, and in a city as residentially segregated as Santiago de Chile, they also correspond to different neighbourhood submarkets. Broadly speaking, the under £70,000 category and the over £330,000 category correspond to the submarkets of Santiago Centre and Las Condes Avenue, respectively.

Figure 3 shows the development of how two features have been positioned in real estate advertising aimed at these different price segments. It may be observed that the feature "double-glazed windows" appears prominently in advertising aimed at the high-end market at the beginning of the period studied but declines in prominence over time for that price range; by the final semester, "double-glazed windows" is mentioned more frequently in advertising to the under-£70,000 category than in high-end advertising. This may be explained by the fact that such features become expected standards in high-end construction, particularly in a context where weak minimum requirements diminish such features' capacity to provide differentiation. However, the popularization of this feature may favour lower-priced homes, which are capable of assuming the higher associated cost. In contrast, the feature "energy efficiency certification" appears almost exclusively in the higher-priced segment studied, where it remains prominent throughout the study period.

Finally, it is relevant to examine the results regarding the prominence of different features, as data on their presence and importance may shed new light on the evolution of real estate marketing's approach to sustainable construction. Thus, the findings on the "double-glazed windows" feature reveal a critical situation: while initially appearing in the higher and middle importance categories, these energy efficiency features were completely relegated to the category of low importance by the final year of the study (Figure 4). The exception is the "energy efficiency certification" feature – in this case, mainly related to the "Energy Rating" and LEED certification – which maintained its level of moderate importance. This highlights the considerable potential of multi-dimensional certification models for guiding the communication of supply in terms of sustainability, rather than the attributes being presented as a function of one single feature.

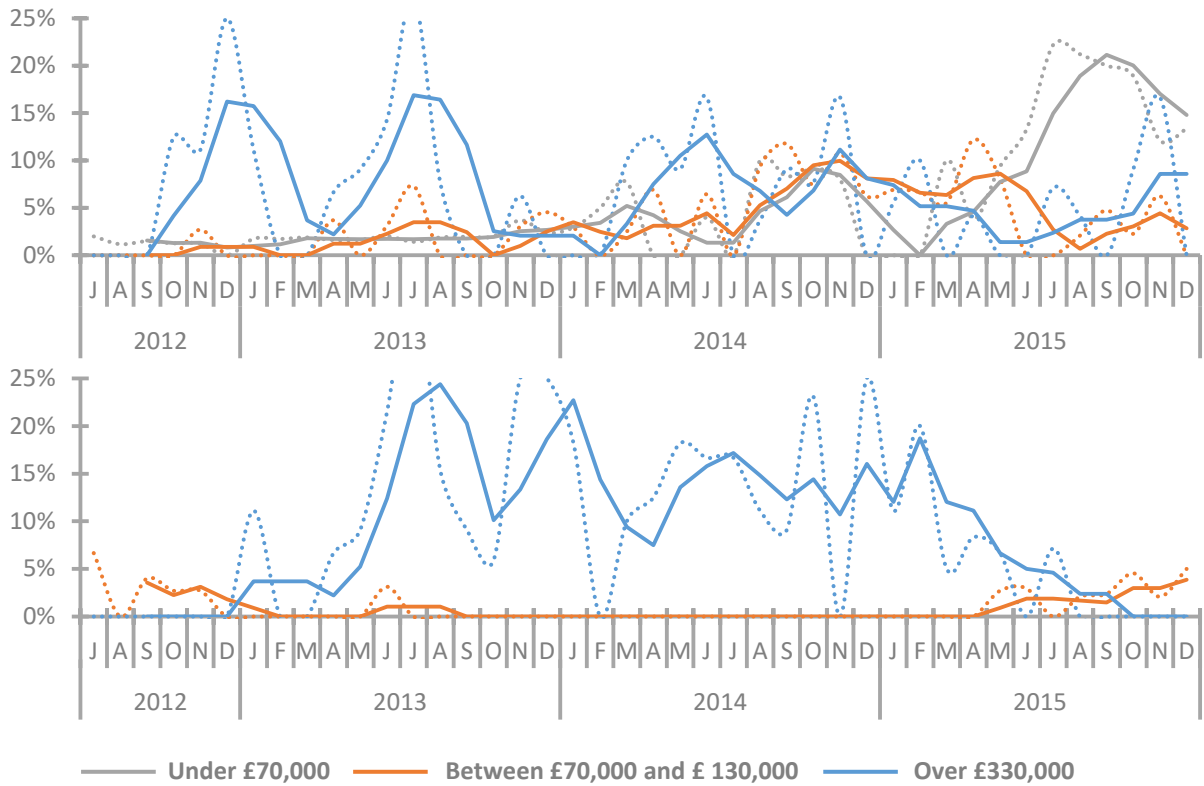


Figure 3. Presence of the features "double-glazed windows" (above) and "energy efficiency certification" (below) in real estate advertising by rolling quarter according to housing price range

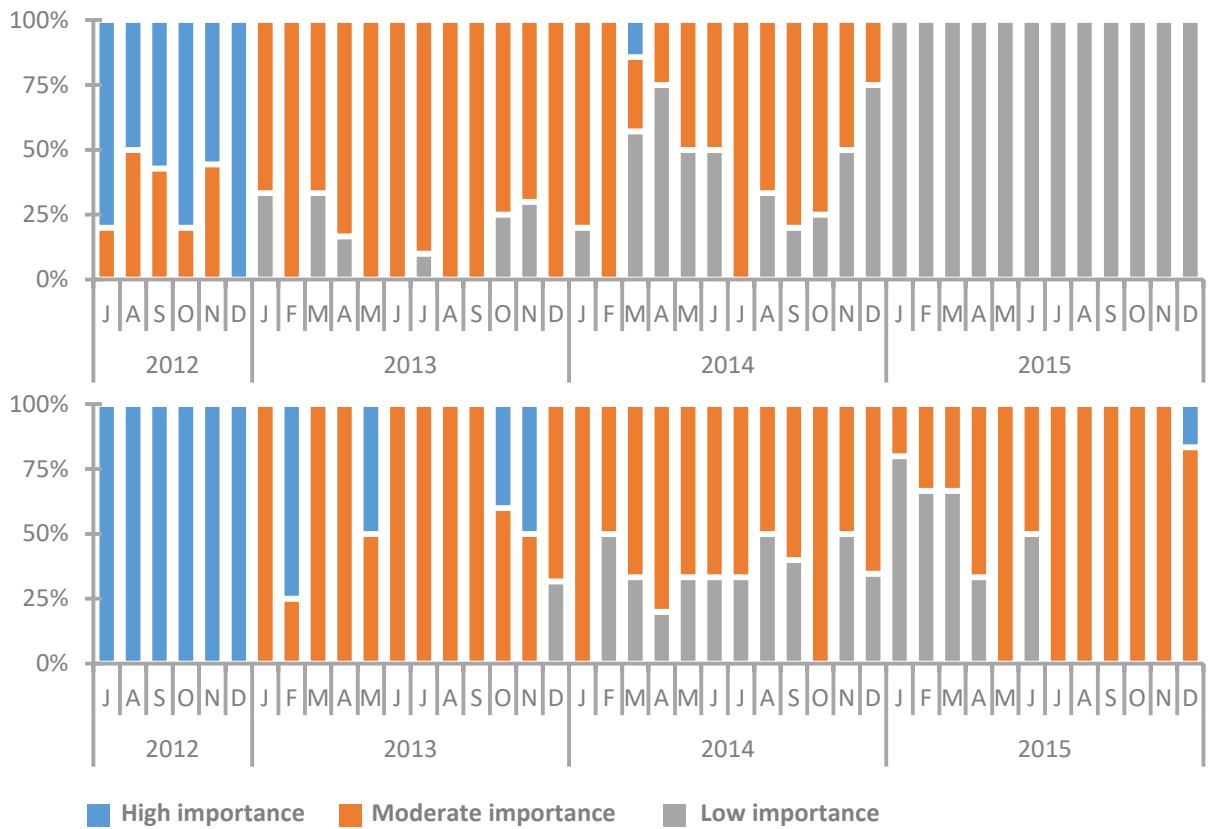


Figure 4. Level of importance of the features "double-glazed windows" (above) and "energy efficiency certification" (below) in monthly advertisements

## Conclusions

The logic of attributing and promoting features associated with real estate stems from the perception of how these add value to the product and, therefore, increase its demand. Therefore, the industry gauges how consumers value each feature. This assessment of value differs for each of the submarkets, which in a city as residentially segregated as Santiago de Chile also entails segregation by housing prices. Thus, developers interpret these features differently, promoting them according to the segment where they are most competitive. Buyers, for their part, generate a type of zero-sum balance of trade-offs between their purchasing and borrowing power and their assessment of the value of each of the property's features. This accounts for how the buyer understands, recodifies and values the advertising stimulus.

At first reading, most sustainable features appeared more prominently in higher-income markets (defined as standard features in the cross-sectional analysis) than in lower-priced markets, where features (such as bicycle racks) that do not significantly affect the developers' profit margin were highlighted. However, longitudinal analysis revealed that over time, these features were gradually included among the standard expectations for a building, losing their relative importance as a mark of distinction and thus their prominent place in advertisements. Thus, "energy efficiency certification" is virtually the only feature that has the potential to maintain its role as a mark of sustainable construction over the long run, particularly due to its ability to provide the buyer with an objective measurement of a building's energy performance, overcoming the asymmetries of information affecting consumers. International experience, in particular with respect to European energy certificates, suggests that these instruments are indeed capable of encouraging the market to move towards supplying real estate products with higher levels of energy efficiency, as noted in the market premiums associated with homes that receive the highest energy efficiency ratings, as has been noticed by Bio Intelligence Service, Lyons and IEEP (2013), Fuerst *et al.* (2013, 2016), Gelegenis *et al.* (2014), de Ayala, Galarraga and Spadaro (2016) and Marmolejo (2016).

In addition, having weak minimum standards for energy performance creates easy access to minimal improvement that does not actually represent a significant contribution to energy efficiency, opening the door to greenwashing. Thus, improving the minimum required standards set out in the new national thermal regulations could boost competitiveness not only within the market, generating better products in terms of quality and post-sale service, but also among suppliers of constructive solutions and energy efficient technologies. Furthermore, the advertising-focused approach adopted in this article suggests that policies on energy efficiency certification should be reviewed, as the current voluntary approach forces energy efficiency certification to compete with other features on equal footing (compared, for example, with location, which is very important to certain middle-income buyers). Finally, the results show how information asymmetries are also segregated, with different housing submarkets attributing different degrees of value to sustainability. Public policy should be sensitive to these differences, in particular because at the lower end of the market, there is a much closer relationship between sale price and real estate financing that limits how much buyers can pay for housing.

## Acknowledgements

This research received funding from the National Commission for Scientific and Technological Research of Chile through the FONDECYT Research Initiation project 11130556 “Analysis and positioning of the attributes of energy efficiency and sustainability in the residential housing market of Santiago.” We also received support from the Centre for Sustainable Urban Development (CEDEUS), CONICYT/FONDAP Project 15110020.

## References

- de Ayala, A., Galarraga, I. and Spadaro, J. V. (2016) ‘The price of energy efficiency in the Spanish housing market’, *Energy Policy*, 94, pp. 16–24.
- Bio Intelligence Service, Lyons, R. and IEEP (2013) ‘Energy performance certificates in buildings and their impact on transaction prices and rents in selected EU countries’, (April).
- Bustamante, W., Rozas, Y., Cepeda, R., Encinas, F. and Martínez, P. (2009) *Guía de Diseño para la Eficiencia Energética en la Vivienda Social*. Edited by Ministerio de Vivienda y Urbanismo; División Técnica de Estudio y Fomento Habitacional y Programa País de Eficiencia Energética. Santiago: Pontificia Universidad Católica de Chile.
- Caldera, A. (2012) *Building Blocks for a Better Functioning Housing Market in Chile*. OECD Econo. OECD Publishing. doi: 10.1787/5k9fj3hgsvh-en.
- CChC (2016) *Mercado Inmobiliario - Oferta Nacional y Gran Santiago, Indicadores*. Available at: <http://www.cchc.cl/centro-de-informacion/indicadores/mercado-inmobiliario-oferta-nacional>.
- Collados, E. and Armijo, G. (2008) ‘Predicting the impacts of an energy refurbishing programme in Chile: More than energy savings’, in Mumovic, D. and Santamouris, M. (eds) *A handbook of sustainable building design and engineering. An integrated approach to energy, health and operational performance of buildings*. First edit. Earthscan Ltd.
- DITEC (2015) *Sistema de calificación energética de viviendas en Chile*. Santiago: División Técnica, Ministerio de Vivienda y Urbanismo.
- Fuerst, F., McAllister, P. M., Nanda, A. and Wyatt, P. (2013) ‘Is Energy Efficiency Priced in the Housing Market? Some Evidence from the United Kingdom’, *SSRN Electronic Journal*, pp. 1–34. doi: 10.2139/ssrn.2225270.
- Fuerst, F., McAllister, P., Nanda, A. and Wyatt, P. (2016) ‘Energy performance ratings and house prices in Wales: An empirical study’, *Energy Policy*. Elsevier, 92, pp. 20–33. doi: 10.1016/j.enpol.2016.01.024.
- Gelegenis, J., Diakoulaki, D., Lampropoulou, H., Giannakidis, G., Samarakou, M. and Plytas, N. (2014) ‘Perspectives of energy efficient technologies penetration in the Greek domestic sector, through the analysis of energy performance certificates’, *Energy Policy*. Elsevier, 67, pp. 56–67. doi: 10.1016/j.enpol.2013.09.051.
- Jansen, S. J. T. (2011) ‘Chapter 5. The Multi-attribute Utility Method’, in Jansen, S., Coolen, H., and Goetgeluk, R. (eds) *The Measurement and Analysis of Housing Preference and Choice*, pp. 101–125. doi: 10.1007/978-90-481-8894-9.
- Lancaster, K. J. (1966) ‘A New Approach to Consumer Theory’, *Journal of Political Economy*, 74(2), p. 132. doi: 10.1086/259131.
- López-Morales, E., Gasic, I. and Meza, D. (2012) ‘Urbanismo proempresarial en Chile: Políticas y planificación de la producción residencial en el altura en el pericentro del Gran Santiago’, *Revista INVI*, 27(76).
- Marmolejo, C. (2016) ‘La incidencia de la calificación energética sobre los valores residenciales: un análisis para el mercado plurifamiliar en Barcelona’, *Informes de la Construcción*, 68(543), p. e156. doi: 10.3989/ic.16.053.
- MINVU (2015) *Informe Técnico Sistema de Calificación Energética de Viviendas*. Santiago: Ministerio de Vivienda y Urbanismo. Available at: <http://calificacionenergetica.minvu.cl/estadisticas-de-la-cev/>.
- MINVU (2016) *Ordenanza General de Urbanismo y Construcciones*. Santiago: Ministerio de Vivienda y Urbanismo.
- Official Journal of the European Union (2003) ‘Directive 2002/91/EC of the European Parliament and of the Council of 16 December 2002 on the energy performance of buildings’, pp. 65–71.
- Pérez-Lombard, L., Ortiz, J., González, R. and Maestre, I. R. (2009) ‘A review of benchmarking, rating and labelling concepts within the framework of building energy certification schemes’, *Energy and Buildings*, 41(3), pp. 272–278. doi: 10.1016/j.enbuild.2008.10.004.