ANALYSING THE IMPACT OF COMPREHENSIVE REFURBISHMENT POLICIES ON SOCIAL AND HERITAGE PROTECTION ISSUES

OLATZ GRIJALBA-ASEGUINOLAZA & ARRITOKIETA EIZAGUIRRE-IRIBAR
Department of Architecture, University of the Basque Country, Spain

ABSTRACT

Urban regeneration and housing refurbishment policies have prioritised integral interventions in the last few decades by considering together energetic efficiency, accessibility and safety issues. However, the increasing complexity of this approach can lead to the weakening of other important aims such as heritage protection or addressing social vulnerability. Accordingly, the objective of the paper is to analyse the evolution of current refurbishment strategies and their effects on socio-economic inequality and built-heritage conservation in order to identify deficiencies and stablish criteria to address them and improve existing public refurbishment programmes. For that purpose, variables related to each issue (refurbishment public aid, heritage preservation and socio-economic vulnerability) have been defined and analysed using GIS, overlapping data related to different variables and studying the relations between them at different scales (urban, census section and building). The city of Donostia (Gipuzkoa, Spain) has been used as a case study, where areas have been clustered according to the connection between the three aspects so that specific strategies can be developed and implemented for each case.

Keywords: refurbishment policies, energy efficiency, heritage, socio-economical vulnerability

1 INTRODUCTION

Intervention at building scale through the rehabilitation of existing residential blocks has special relevance to the urban regeneration strategy. This has undergone a major transformation in the last decade and have taken on new challenges [1]: they have gone from being mere conservation interventions, to more complex approaches where the objective is to improve the building and adapt it to the current demands of habitability, safety, accessibility and/or energy efficiency.

This evolution of rehabilitation strategies has been mainly due to the high energy saving potential of the existing housing stock and the consequent possible reduction in CO_2 emissions from the construction sector [2]–[3]. This fact has been taken on board in the European Union (EU) and has been incorporated into the lines of public policy through several directives that oblige the member states to act in this sense [4]–[7].

As a result, policies to promote rehabilitation in Spain, as defined in regional or state housing plans, have prioritized so-called comprehensive actions, in which energy efficiency improvement is introduced as an essential requirement for access to subsidy programmes. These promotion measures have managed to increase to a certain extent the actions on the building envelope and, evidently, improve the efficiency of the buildings undergone such intervention [8]. However, this progress has been at the expense of other essential objectives such as the conservation of heritage or the mitigation of the social imbalance of cities.

With regard to heritage conservation, the difficulties arise because of conflicting interests involved in the intervention. Improving the energy efficiency of buildings is generally based on reducing the demand for heating and this is achieved largely by acting on the building envelope (adding the corresponding layer of thermal insulation or replacing carpentry or glass with more efficient ones). This can be done through two main types of intervention:

- Adding thermal insulation inside the façades: From the technical point of view, it is not the best solution and generates greater difficulties in management and inconvenience in the implementation, since it must be executed from inside.
- Adding a layer of thermal insulation on the outside of the façade: Technically, it is the most suitable solution (it avoids thermal bridges and guarantees action on the entire envelope) but involves greater difficulty in maintaining the character and the heritage value of the building.

It is very common that buildings considered of heritage value have the envelope protected by law and, therefore, it is not possible to act on it. Current legislation includes this circumstance and exempts from the requirement of energy intervention any building that has some degree of protection, regardless of its protection category. Because of this condition, two controversial situations arise [9]:

- Non-listed building, but with a certain representative value, that is refurbished energetically losing heritage value.
- Listed building in which energy refurbishment requires technically more complicated and less efficient solutions, so energetical refurbishment is not finally performed.

The latter is excluded from public aid, as comprehensive refurbishment is not carried out. So, the key is in how best to balance energy-efficiency measures with the values attached to heritage buildings [10] and in determining intermediate requirement levels in order to incorporate these heritage buildings into policies to promote rehabilitation [11].

On the other hand, the strategies of public intervention in the consolidated city, in addition to pursuing the objective of being more environmentally sustainable, must seek the improvement of social integration through strategies that promote social equity through the prioritization of aid to the neediest areas or persons. However, the buildings that require more attention are generally inhabited by a population of scarce resources and with high rates of unemployment and social exclusion. These buildings are also concentrated in specific areas of the city, constituting neighborhoods or areas of urban vulnerability [12], where public administration should concentrate its efforts in the area of rehabilitation.

However, one of the problems that hinder comprehensive rehabilitation of buildings is that the intervention budget increases considerably and even though public aid tends to be greater, the cost to families increases. This circumstance makes it impossible for the most underprivileged population groups to pay their proportional share and makes it very difficult, even sometimes impossible, to renovate the building [13].

Given the need of governments and public administrations to achieve concrete and ambitious objectives in terms of energy saving, the rehabilitation policy tends to be achievable; the one that can be materialized prevails over the case really most in need. This means that there is a tendency for comprehensive refurbishment to take place outside the most vulnerable neighbourhoods, even in cases where it is promoted with public money.

This change in the dynamics of public rehabilitation policy is relatively recent and not sufficiently studied. The objective of the work presented in this paper is to analyse the evolution of current refurbishment strategies and its effects on socio-economic inequality and built heritage conservation in order to identify deficiencies and stablish criteria to address them and improve existing public refurbishment programmes.

The first phase of a work in progress is presented, where after establishing the theoretical base a method and a spatial tool have been generated to carry out the analysis on a city scale, applying it to a specific case study.

2 METHODOLOGY

The research is based on an analysis of the theoretical and normative context of the three areas considered: refurbishment interventions and public aid received for this purpose, the value and conservation of built heritage and socio-economic vulnerability. Once the research processes have been established for each of them, a monographic Geographic Information System (GIS) has been generated through the free QGIS application where the information is superimposed and interrelations between the factors analysed in each field are studied.

In this first phase, work is carried out on the entire city, with data disaggregated at building scale, using cadastral information as a base (code, use, year of construction, number of dwellings per building and number of floors). The specific information of the three areas analysed has been introduced in their respective layers containing the following information:

- Rehabilitation interventions in residential buildings: classified by year of processing of the file in the local administration and the type of rehabilitation carried out.
- Public aid granted for rehabilitation: classified by the administration granting the aid, the year the aid was granted, the economic amount and the type of action subsidised (actions on the envelope, improvement of accessibility conditions, intervention in installations, rehabilitation of structural elements, etc.).
- Heritage protection level: identification of buildings officially catalogued and protected by municipal, regional or national legislation, determining the elements subject to such protection and the level established for it.
- Socio-economic vulnerability: although data at portal level are available to the local administration, they have not been accessible at this stage due to issues linked to the Data Protection Act. Therefore, the analysis has been carried out at census section level, and later transferred to building scale. For this calculation the following indicators have been used: rate of ageing of the population, level of feminisation of over-ageing, presence of immigrant population, population older than 10 years without training and first level training and average income level of families.

All the data have been entered into the GIS in order to verified whether the initial hypotheses of the research are corroborated or not. For that purpose, on the one hand, the study of the distribution dynamics of each of the areas has been carried out separately and, on the other, the link between these dynamics has been analysed.

3 DATA AND STUDY CONTEXT

The proposed methodology has been applied in city of Donostia, one of the three capitals of the Basque Country. It has 186,665 inhabitants, so it is a medium-sized city that allows the urban analysis to be carried out globally.

Moreover, the time and the spatial scope of the study have been limited taking into account the context and the information available for the case study. On the one hand, data from 2010 onwards have been used, since the *Municipal Ordinance of Energy Efficiency and Environmental Quality* of Donostia is from the year 2009 and comprehensive refurbishments have been developed after that. On the other hand, the analysis has focused on the urban area, because that is where residential areas are mainly located (Fig. 1).

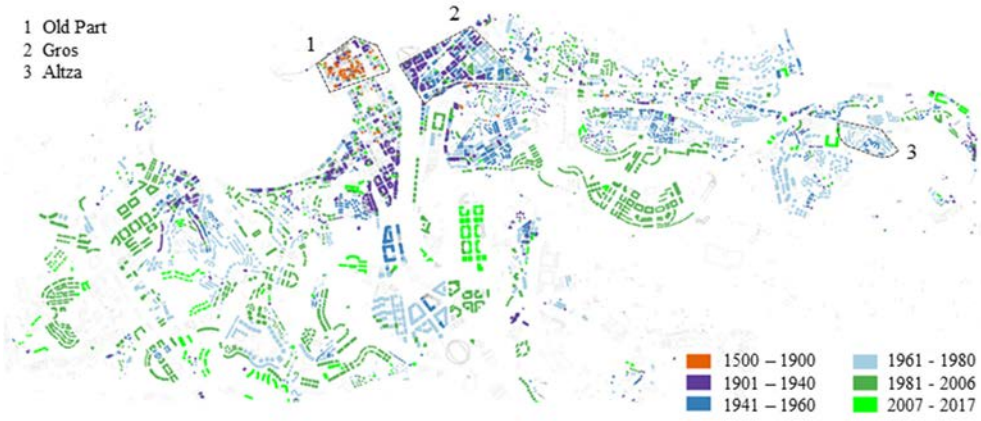

Figure 1: Construction data of buildings in the city of Donostia.

In this regard, a data collection and management have been carried out in order to assess the three variables. For that purpose, data from different sources have been used:

- Refurbishments:
  - Interventions carried out within the framework of Municipal Ordinance of Energy Efficiency and Environmental Quality of the City Council of Donostia (2009) classified according to the type of element rehabilitated.
  - Public aid granted for refurbishment classified according to the type of refurbishment promoted: single interventions (RENOVE COM and RENOVE PART, 2011–2014), energy efficiency interventions (PAREER-CRECE, 2015 and REVIVE, 2012) and comprehensive interventions (RENOVE EE, 2013–2018)
- Heritage protection level listed in the Special Plan for the Protection of Urban and Built Heritage of the City Council of Donostia (2014) classified according to the level of protection, being "a" the highest level (protection of the whole building) and "d" the lowest (protection of an element)
- Socio-economic vulnerability: data at census section level from Eustat (Basque Statistics Institute) and INE (National Statistical Institute), developed by GISLAN and classified in 5 levels: very high, high, medium, low and no vulnerable.

4 RESULTS

The proposed methodology has enabled one to study the three variables on their own (location of refurbished buildings and money they have received from public aid, location of type of protection of heritage buildings and distribution of social vulnerability in the city) but also to define the relations between them (refurbishment public aids vs. heritage preservation or socio-economic vulnerability).

At a first glance, the spatial distribution of refurbishments developed within the Municipal Ordinance of Energy Efficiency and Environmental Quality of the City Council of Donostia (2009) is quite uniform. Moreover, most of the interventions focus on vertical or horizontal building envelopes, façades or roofs, but only few take action on both of them.

Interventions that have been subsidised are slightly more concentrated in the Gros district and the Old Part of the city. Nevertheless, the distribution of money can be different. The Old Part and Altza are the districts that received the highest amounts of public money per household. This is because they were declared Integral Rehabilitation Areas (IRA).

In general, 31.62% of dwellings have received some public aid for refurbishment purposes in Donostia (Fig. 2). It should be noted that 28.73% of the houses in Donostia were built after 1980. The number of households receiving some rehabilitation assistance has grown over the years. However, aid for energy efficiency improvements (PAREER CRECE and RENOVE EE) refers only to the 1.68% of households that have received some aid. Anyhow, the amounts received per dwelling have been considerably higher than in other programs (2966 €/dwelling vs. 231 €/dwelling).

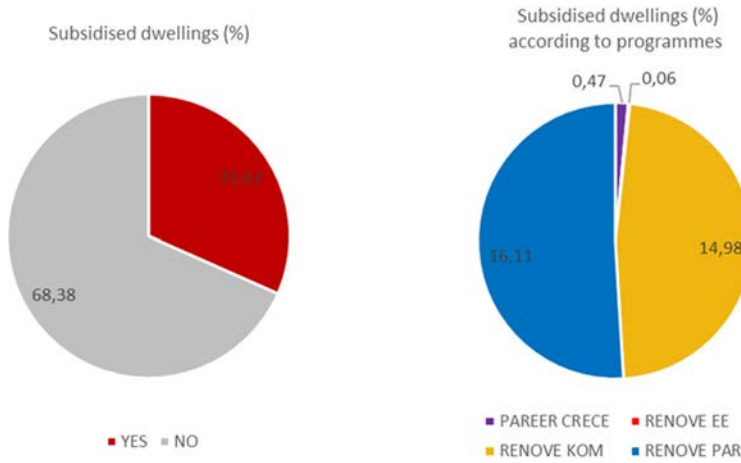

Figure 2: Refurbishment public aids in Donostia (the program REVIVE does not appear in the graph because no aid has been granted in Donostia within this program).

4.1 Refurbishment public aids vs. heritage preservation

Firstly, it should be noted that only few refurbishments are still integral. In Donostia, for example (Table 1), 73 dwellings distributed in 4 buildings have received some public aid related to integral refurbishments (RENOVE EE). Interventions related to energy efficiency that have been subsidised (PAREER CRECE and RENOVE EE) are also few in number, 631 dwellings distributed in 29 buildings. In this context, there is only one protected heritage building (protection level d) in these two groups. Although these programmes are related to aids involving more money, they reach few citizens and a certain incompatibility with protected buildings is identified. In the other analysed public aids (RENOVE programme for communities and individuals), money was distributed among buildings of different heritage protection level, although the lower the protection level the lower the number of subsidised buildings. Accordingly, protected buildings have received only 3.48% of the money granted by the energy efficiency programmes, while in the case of the other programmes the percentage is 14.24. It should be also considered that the number of buildings with no heritage protection is high. Moreover, the majority of buildings that do not need any rehabilitation are located in the group of unprotected buildings, as heritage buildings tend to be historical in general. This is why there is a clear need for context-sensitive analysis.

Table 1: Aid granted for rehabilitation according to the level of heritage protection.

		Protection level					
		a	b	c	d	-	total
PAREER CRECE	€	0	0	0	65093	1608670	1673763
	%	0	0	0	3.89	96.11	100
	dwelling (nº)	0	0	0	12	546	558
	building (nº)	0	0	0	1	24	25
RENOVE EE	€	0	0	0	0	197720	197720
	%	0	0	0	0	100	100
	dwelling (nº)	0	0	0	0	73	73
	building (nº)	0	0	0	0	4	4
RENOVE COM	€	1000	14000	92231	609555	4290940	5007726
	%	0.02	0.28	1.83	12.08	85.04	100
	dwelling (nº)	6	127	524	3048	13860	17565
	building (nº)	1	6	39	246	788	1080
RENOVE PART	€	132	1318	43161	438732	2935190	3418533
	%	0.00	0.04	1.25	12.73	85.13	100
	dwelling (nº)	6	45	289	2392	16185	18917
	building (nº)	1	2	20	191	873	1087

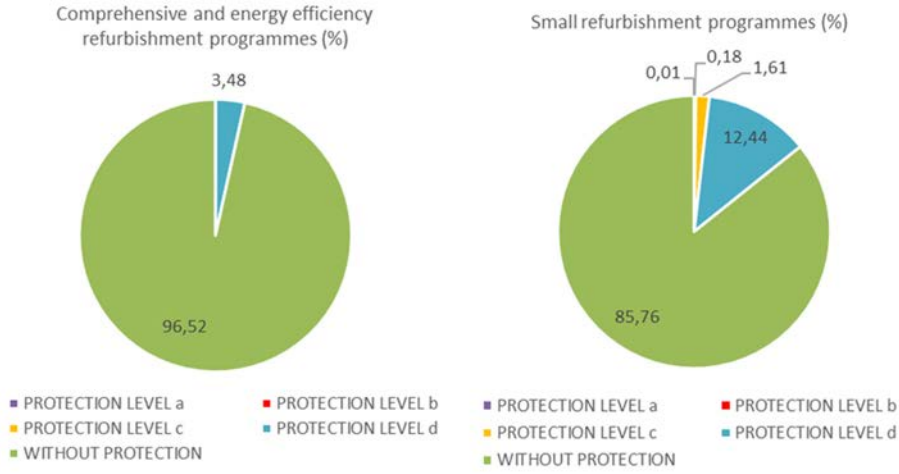

Figure 3: Percentage of aid granted according to the heritage protection level.

In this regard, the percentage of subsidised dwellings has been determined taking into consideration the number of dwellings of each heritage protection level and the average money that has been received for refurbishment purposes in order to compare previous data relatively and in context. Accordingly, the main differences between the type of programme (integral refurbishment programmes or energy efficiency purpose programs and other refurbishment programmes) are easily distinguished (Fig. 3).

The percentage of dwellings benefiting from the first type of aid is less than 1%, even in buildings without heritage protection. Meanwhile, the received quantity is higher for protected buildings (there is only one in Donostia). For the second type of aid, however, the percentage of benefited dwellings located in protected buildings is higher than the ones located in buildings without any protection in some of the protection levels (protection levels b and d), but the quantity of money rises when the protection level decreases or disappears (Fig. 4).

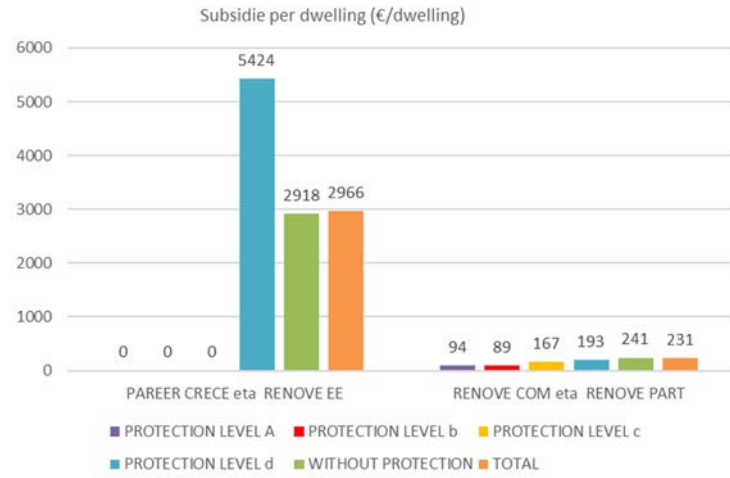

Figure 4: Average aid granted per building according heritage protection level.

Figure 5: Distribution of protected buildings rehabilitated with or without public aid.

Finally, the relation between the heritage protection level of a building and the distribution of refurbishment public aid has been analysed in Fig. 5. The prevailing colour is red, which represents the protected buildings that have not received public aids for refurbishment purposes. Although there are several protected buildings that have received aids, mostly in the Old Part of the city because it was declared as Integral Rehabilitation Area (IRA), there is no concentration or clustering of them.

4.2 Refurbishment public aids vs. socio-economic vulnerability

Firstly, the areas with different levels of socio-economic vulnerability have been defined taking into consideration the presented variables and, then, their relation to different refurbishment public aid programmes has been studied. At a first glance, distribution of public aids is quite homogeneous in all vulnerable areas, although it necessary to say that public money has generally been earmarked for non-vulnerable areas (Fig. 6). At a second glance, however, there are considerable differences between the two type of refurbishment programmes in number of subsidised dwellings and the quantity of money distributed.

Figure 6: Distribution of interventions in socio-economic vulnerable areas.

Comprehensive or energy purpose refurbishment programmes (REVIVE, RENOVE EE and PAREER) have reached few vulnerable areas. Only 16% of the houses subsidised by the PAREER programme are located in areas with very high level of vulnerability, 19% if all vulnerable areas are considered. Meanwhile, RENOVE EE has been fully distributed among non-vulnerable areas. In this regard, medium and high level of vulnerability areas have not received any public aid (Fig. 7). Meanwhile, small refurbishment programmes (RENOVE programme for communities and individuals) have been distributed more equitably between the different vulnerability levels: 7%, 6%, 6% and 10% in low, medium, high and very high vulnerability areas (Table 2). However, most of the subsidised dwellings (71) are located again in non-vulnerable areas.

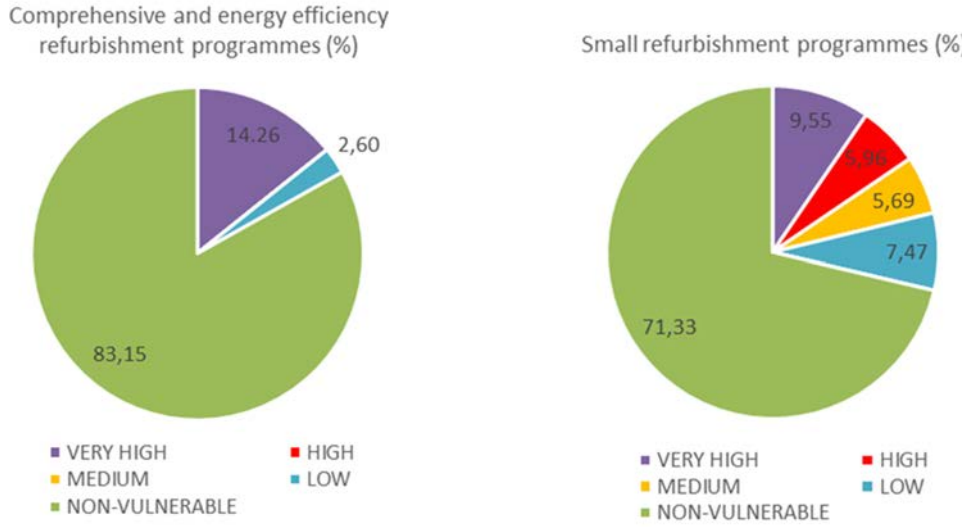

Figure 7: Percentage of aid granted for rehabilitation according to the level of socio-economical vulnerability.

Table 2: Aid granted for rehabilitation according to the level of socio-economic vulnerability.

		Socio-economic vulnerability level					
		very high	high	medium	low	-	total
PAREER CRECE	€	262543	0	0	47807	1333420	1643770
	%	15.97	0	0	2.91	81.12	100
	dwelling (nº)	81	0	0	10	467	558
	building (nº)	2	0	0	1	22	25
RENOVE EE	€	0	0	0	0	197720	197720
	%	0	0	0	0	100	100
	dwelling (nº)	0	0	0	0	73	73
	building (nº)	0	0	0	0	4	4
RENOVE COM	€	302470	331553	239241	344930	3794360	5012554
	%	6.03	6.61	4.77	6.88	75.70	100
	dwelling (nº)	1489	690	735	903	13784	17601
	building (nº)	54	45	49	59	879	1086
RENOVE PART	€	502997	171287	241057	285697	2224910	3425948
	%	14.68	5.00	7.04	8.34	64.94	100
	dwelling (nº)	1895	708	879	922	14531	18935
	building (nº)	61	47	57	59	867	1091

As in the previous case, the percentage of subsidised dwellings has been determined taking into consideration the number of dwellings at each vulnerability level and the average money that have received in each level in order to compare previous data relatively and in context. Accordingly, the highest percentage of subsidised dwellings corresponds to very high vulnerability areas (Fig. 7). For comprehensive and energy purpose refurbishment programmes 1.32% of dwellings have some aid, more than in non-vulnerable areas. It should be noted that this percentage (55.2%) is noticeably higher in the small refurbishment programmes. The dynamics vary if the amount of the aid (€ per dwelling) is considered. On the one hand, low level vulnerability areas are the ones that show the highest values in integral refurbishment programmes (4781 €/dwelling instead of the average 2918 €/dwelling, Fig. 8). On the other hand, although differences are smaller in the second type of programmes, all vulnerability levels present values that are higher than the one that corresponds to non-vulnerable areas.

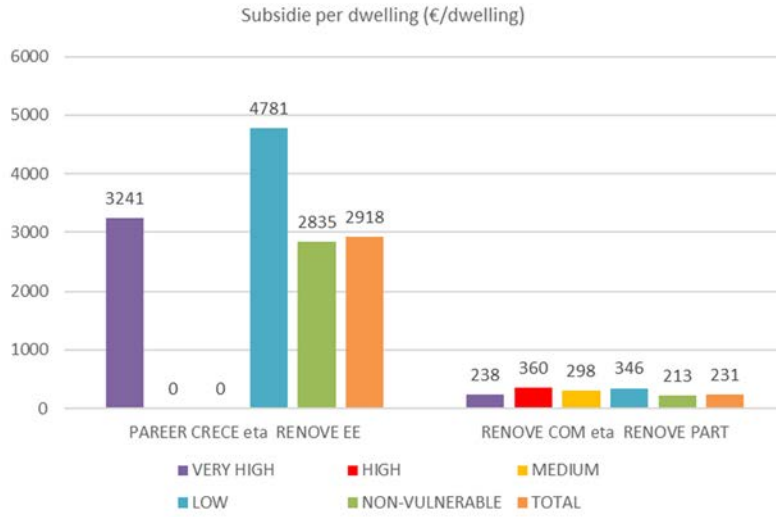

Figure 8: Average aid granted per building according to vulnerability level of the area.

5 CONCLUSIONS

The results obtained show the clear disassociation between the three areas studied and the possibility of deepening the distributive dynamics of the public rehabilitation policy in order to achieve a balance between the energy, socio-economic and heritage protection objectives dependent on it.

For that purpose, research developed by GIS tools is the key. It is based on automatization of data processing. However, previous steps are necessary, such as data collection or compatibility between data, which can be sometimes laborious. In this case, data related to heritage protection variable or vulnerability variable were suitable for their use in GIS and only small changes have to be made. In contrast, information related to refurbishment programmes had to be entered manually after making data from different sources comparable. The initial step of the proposed methodology, hence, refers to the selection of the different data sources and the compatibility for the analysis in question.

Notwithstanding the difficulties, QGIS has been useful for management of data and the analysis of relations between variables in the case of the city of Donostia. Accordingly, energy efficiency refurbishments over the last eight years have been studied considering allocation and distribution of public aids. In this regard, distribution of aid is quite uniform at city scale and differences between districts or between the city centre and peripheries are not detected.

Nevertheless, the study of the quantity of money of aid given shows that areas declared as IRA have received more money. The two IRAs are characterised by very high socio-economic vulnerability level, so one of the initial hypotheses has not been confirmed in this first phase of the research: areas with high vulnerability level have received a high percentage of aid. Work of greater depth and at neighbourhood level is needed to really appreciate how these performances have been distributed and draw reliable conclusions regarding the connection between aid and socio-economic vulnerability.

Regarding the relations between the refurbishment purpose public aid and heritage protection level of the building, the second hypothesis is partially confirmed. For the case of the small refurbishment programmes, although subsidised dwelling percentages in heritage protection levels b and d are higher than the ones without any protection, the average quantity of money received for protected buildings (any protection level) is lower than for buildings without any protection. In this regard, in-depth investigation on the issue is necessary in order to identify the relations between the different protection levels and the refurbishment aid, or variations that can occur at district level.

Finally, in addition to further developing the proposed method, applying it to other cities will broaden the analysis and will determine which are the local dynamics and which are the general ones.

ACKNOWLEDGEMENT

This research work is part of the Project “Controversias de la política de rehabilitación integral con la conservación del patrimonio y la vulnerabilidad social-económica”, which is being developed thanks to a call for research and dissemination activities at the Higher Technical School of Architecture of San Sebastian (2018).

REFERENCES

[1] Del Val, J.R., Rehabilitación urbana en España (1989–2010). Barreras actuales y sugerencias para su eliminación. *Informes de la Construcción*, **63**, pp. 5–20, 2011.

[2] Đukanović, L., Radivojević, A. & Rajčić, A., Potentials and limitations for energy refurbishment of multi-family residential buildings built in Belgrade before the World War One. *Energy and Buildings,* **115**, pp. 112–120, 2016.

[3] Nejat, P., Jomehzadeh, F., Taheri, M.M., Gohari, M. & Majid, M.Z.A., A global review of energy consumption, CO_2 emissions and policy in the residential sector (with an overview of the top ten CO_2 emitting countries). *Renewable and Sustainable Energy Reviews*, **43**, pp. 843–862, 2015.

[4] Directive 2002/91/EC, European Parliament and of the Council of 16 December 2002 on the energy performance of buildings, 2002.

[5] Directive 2010/31/EU, European Parliament and of the Council of 19 May 2010 on the energy performance of buildings, 2010.

[6] Directive 2012/27/EU, European Parliament and of the Council of 25 October 2012 on energy efficiency, amending Directives 2009/125/EC and 2010/30/EU and repealing Directives 2004/8/EC and 2006/32/EC, 2012.

[7] Directive (EU) 2018/844, European Parliament and of the Council of 30 May 2018 amending Directive 2010/31/EU on the energy performance of buildings and Directive 2012/27/EU on energy efficiency, 2018.
[8] Cuchí A. & Sweatman P., *A National Perspective on Spain's Building Sector. A Roadmap for a New Housing Sector*, GBCe and Fundación CONAMA, 2011.
[9] Santamaria, E.J.U., Igiñiz, L.E. & Superior, D.D.A.E.T., La intervención energética en el patrimonio edificado: un problema no resuelto. *PH: Boletín del Instituto Andaluz del Patrimonio Histórico*, **23**(88), pp. 260–262, 2015.
[10] Smith, O., Balancing heritage and environmental policies for sustainable refurbishment of historic buildings: The case of New Court, Trinity College, Cambridge. *The Historic Environment: Policy & Practice*, **5**(2), pp. 116–131, 2014.
[11] Uranga Santamaría, E.J., *La Intervención Energética en el Patrimonio Edificado Residencial*, Análisis del Barrio de Gros de Donostia: San Sebastián, 2017.
[12] Cassiers, T. & Kesteloot, C., Socio-spatial inequalities and social cohesion in European cities. *Urban Studies*, **49**(9), pp. 1909–1924, 2012.
[13] Grijalba, O., La regeneración urbana en la CAPV. Divergencias entre el discurso y la realidad. Doctoral dissertation, Universidad del País Vasco-Euskal Herriko Unibertsitatea, 2017.