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A Methodology to Regulate Transformation of a City's Appearance Due to Energy Efficiency Building Renovations: A Case Study: Errenteria (Spain)

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Abstract: The need to improve the energy performance of European buildings is beyond all doubt, as indicated by the different regulatory determinations on energy and climate change adopted by different public administrations in recent years. The primary actions have focused on improving the thermal enclosure of buildings; the placement of new energy-efficient skins on their exterior façades is consequently beginning to deconfigure, distort, homogenize and globalize the city in an alarming manner. In the case of Spain, the lack of a specific regulation on how to proceed when renovating the vast majority of residential buildings without heritage protection is leaving the ultimate decision in the hands of owner associations. It is therefore urgent to endow municipal administrations with a tool enabling them to regulate and control the transformation of a city's image before it is too late. To that end, a pioneer methodology is proposed to classify the unprotected building stock of a municipality with a view to future renovation actions, depending on the degree of their vulnerability and the greater or lesser need to protect their image and the other pre-existing features. As a theoretical case study to test the proposed methodology, the locality of Errenteria, Spain, was chosen, demonstrating that it is an effective tool easy to apply in any city nationwide, regardless of the respective location, size and management capacity.

Keywords: energy efficiency renovation; urban aesthetics; urban landscape; urban policy; open methodology

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Citation: Lizundia, I.; Uranga, E.J.; Azcona, L. A Methodology to Regulate Transformation of a City's Appearance Due to Energy Efficiency Building Renovations: A Case Study: Errenteria (Spain). *Heritage* **2023**, *6*, 6112–6131. https://doi.org/10.3390/heritage6090321

Academic Editor: Kristian Fabbri

Received: 27 July 2023
Revised: 20 August 2023
Accepted: 24 August 2023
Published: 26 August 2023

1. Introduction

The different regulatory determinations regarding energy and climate change adopted at both European and national level by different public administrations in recent years have led to an evident surge in the renovation of collective housing. Directives 2018/31/EU and 2012/27/EU on energy efficiency, amended by Directive 2018/844/EU, which in turn reflects the 2015 Paris Agreement on climate change of COP21, along with the respective transposition into Spanish law by means of Law 8/2013 on urban renewal, regeneration and renovation or the various revisions of the ERESEE long-term strategy for energy efficiency renovation in the Spanish building sector [1], have given rise to a process that will in every sense transform Spain's building stock.

Buildings are the biggest consumer of energy in the European Union, accounting for around 40% of the power consumed in the EU and nearly 35% of its greenhouse gas (GHG) emissions. It is estimated that to achieve a 55% reduction in emissions by 2030, the European Union should reduce direct GHG emissions associated with energy in the building sector by 60%, its final energy consumption by 14% and the consumption of energy for heating and cooling by 18%. However, around 75% of existing buildings are not energy efficient and it is estimated that around 85–95% of current buildings will still be in use in 2050 [2]. In the case of Spain, 55% of existing buildings were built before 1980, without any thermal regulation guidelines whatsoever, as they predate the 1979 introduction of the first Basic Building Standard “Technical Conditions of Buildings NBE CT 79” [3,4].

The need to improve the energy performance of European buildings and more specifically the Spanish building stock is therefore beyond any doubt. The main actions meant to achieve the envisaged goals are streamlining the use and management of buildings, reducing buildings’ energy demand by intervening in the enclosure and in ventilation, improving the energy efficiency of fixtures and the use of renewable energies [1]. Of all of them, the renovation of a building’s thermal enclosure is what is most visible to citizens’ eyes, as they see how the appearance of many Spanish cities, mainly those in northern Spain due to its particular climate and the high number of rehabilitation interventions compared to other areas of the country, is being altered substantially by the indiscriminate placement of new and varied skins on the exterior façades of buildings. Although the main rehabilitative efforts are focusing on this part of the building enclosure, the debate about whether it is the most energy efficient and financially profitable option in certain areas of southern Europe is open [5–8].

In any case, the decision of a residents’ association to undertake major renovation work on their building’s enclosure is seldom driven by environmental, energy or macroeconomic issues. Historically, the main reason for setting in motion a renovation process has been the existence of damage that affects the safety, livability and, to a lesser extent, aesthetics of the building. When a residents’ association approves or is forced to approve the decision to carry out renovation work on the exterior enclosure, it may limit the action to repair work that corrects existing damage or may opt for an integral renovation meant to improve the energy efficiency of the entire outer skin. The main arguments for choosing the second option are usually to take advantage of auxiliary means, the existence of significant financial aid for energy efficiency improvement from public administrations, and the updating and overall improvement of the building’s aesthetics. Except for interventions in buildings catalogued with a certain degree of protection from the heritage standpoint or those involving integral renovation by public initiative in urban complexes or neighborhoods in which a master plan that establishes the main intervention strategies is used, such as in the cases of Santa Adela in Granada [9] or Txantrea in Pamplona [10], the decision on how to act and what construction solutions will be applied in the renovation of any building is left in the exclusive hands of the respective owner’s committee, hence, in the hands of an occasional and inexpert developer who, advised for better or worse by the technical and construction personnel who will take part in the renovation process, will only be concerned about the construction, energy, financial and aesthetic aspects concerning their own building, without taking into account the intervention’s eventual impact on the neighborhood or the city. This fact, along with the lack of public regulation for thousands of unprotected residential buildings, means that the great diversity of materials and solutions on the market is anarchically and indiscriminately superimposed on the façades of all those buildings, significantly and sometimes irreversibly altering the appearance of our towns and cities.

The protection of the city’s architectural and urban heritage is regulated by the public administration. Normally, due to their further and better knowledge of local heritage, the municipal councils are the institutions responsible for producing catalogues that list the buildings and complexes to preserve, establishing the respective protection levels and intervention guidelines. But many of these catalogues have a time limit which affects the protection of contemporary architecture. This lack of standard regulations for most buildings built in the second half of the 20th century [11] is the factor that most influences the transformation of the city’s image, as they have become the authentic lead players in renovation nowadays due to their high number, precarious state of conservation in many cases and their shortcomings from the standpoints of energy efficiency and accessibility.

In the same sense, it is significant to note how the possible impact on a building’s compositional and architectural image resulting from action on the enclosure is outside the set of parameters analyzed by different planning tools and regulations [12,13] when establishing the intervention criteria for achieving improved energy efficiency. In the case of Spain, most strategic plans, such as the urbanZEB project [14], the ERESEE program, the Long-Term Building Intervention Strategy of Euskadi [15] or the 2014 GTR Report [16] take into account three fundamental aspects when conceiving strategies for energy efficiency renovation of residential buildings: architectural description, energy description and financial description. With some variants, the main parameters which all of them take into account when describing buildings' architecture are as follows: the main use of the building; the type of building; the type of ownership; the number of dwellings; the type of urban planning; the year of construction; the number of floors; and the area of enclosure per dwelling. The combination of some of these parameters defines different scenarios in which data linked to the building's construction characteristics are introduced, such as the building's compactness, the overall thermal transmittance of the enclosure, the heat capacity of the enclosure or the rate of airflow infiltrating through the framing. There are exceptional cases in which, for example, a municipal council has issued an ordinance for the sole purpose of preserving whole the appearance of a worker housing complex built in the mid-20th century that was not previously protected, such as the one at Alaberga in Errenteria [17]. It can therefore be seen that the compositional, typological and aesthetical aspects or those with urban and architectural value which may be affected due to the transformation of buildings' outer skin are left out of the equation and are not considered when regulating the different kinds of intervention, except in the case of buildings or complexes previously included in protection catalogues for heritage reasons, in which case the different regulations opt for the simplest solution, such as excluding them from any obligation to upgrade their exterior enclosure [18].

No normative reference has been found in the European scope which incorporates action criteria for those compositional, typological or aesthetic aspects in unprotected buildings or building complexes. As for architectural heritage, although the doctrinal core of the laws in different European countries does coincide, following the guidelines set by international agreements such as the 1985 Granada Convention, for example, legislation at national level is divergent. In any case, some countries such as France, a pioneer in this regard, are taking important steps to give normative value to contemporary architecture that is still unprotected [19]. The effort over the years by associations such as DOCOMOMO International, which have been collecting, referencing and listing buildings and architectural complexes from the second half of the 20th century not yet included in official catalogues, should accordingly be highlighted.

However, although some architecture from recent decades may gradually be recognized and protected over time, in many cities most buildings and neighborhoods will still be defenseless in terms of actions that affect them. The proposed methodology is precisely addressed to all of them. Article 8.1 of the Madrid Document ICOMOS already anticipated this in 2011: "pressure for architectural heritage sites to become more energy efficient will increase over time. Cultural significance should not be adversely impacted by energy conservation measures" [20]. While voices of alarm have been raised about the risk of alteration of what is considered architectural heritage, what about all those anonymous buildings that are totally unprotected?

At this point, it becomes necessary to refer to the concept of urban landscape. In all the definitions of urban landscape, the biophysical and cultural interaction between the built space and the respective individual or collective perception is always present [21–23]. Besides being able to be analyzed scientifically, the urban landscape is somewhat subjective, an interpretation of the reality from an aesthetic, emotional and existential perspective [24] that forms the basis of the residents' memory, generating a sense of place and identity [25]. In a city which, as Mendes stated [26], is for everyone, the appearance of each of the neighborhoods and buildings that form that urban landscape, both with and without heritage value, forms part of the collective memory.

Ultimately, this study aims to set out a methodology that enables the administration to introduce a series of variables not heretofore considered in the regulation of interventions in the thermal enclosures of unprotected buildings, so as to minimize as far as possible the architectural homogenization, depersonalization and disfigurement of large areas of cities.

2. Materials and Methods

2.1. Design of the Methodology

The proposed methodology is divided into three phases. The first two phases will serve to describe the building by analyzing a series of variables, while in the third phase, different action criteria will be proposed, depending on the results obtained in the previous phases.

In Phase I, the concept of vulnerability is introduced, which could be understood to mean the set of characteristics and circumstances of an element that make it prone to being damaged when threatened [27]; for the purpose of this study, it will be defined as the potential risk of a built unit having certain characteristics affected when subjected to a renovation process. Firstly, the city's various building complexes are defined, and their degree of vulnerability is determined. Entire neighborhoods can be considered as well as small residential groups, the only premise being that they can be recognized as complexes because the buildings that form them share common features. The vulnerability degree of these complexes is specified by a number between 0 and 100 which shall be called the complex vulnerability degree (CVD). The indicators to be taken into account when obtaining the CVD will be unitary character, typological homogeneity, chromatic homogeneity, alteration degree, recognized quality and urban relevance. The specific influence of each of them will be weighted according to the respective relevance and degree of impact; each parameter will in turn be graded proportionally. Once the CVD has been determined, each building will be evaluated individually, obtaining a second value between 0 and 100 which shall be called the building vulnerability degree (BVD). In this case, the indicators that will be taken into account will be compositional value, materiality, construction quality, alteration degree, construction deterioration, energy qualification, recognized quality and accessibility degree. In both cases (CVD, BVD), previously protected buildings or building complexes included in the different municipal heritage protection plans or catalogues are excluded to thereby avoid regulatory interference with intervention criteria already envisaged and set out in those protection plans or catalogues. However, if there is a need to adjust, modify or update those criteria, it could be recommendable to include the proposed methodology.

In Phase II, the degree of protection to assign to each building is determined, obtaining a value which shall be called the rehabilitation protection degree (RPD) and which will refer to the greater or lesser need for a building to preserve its previous features. The RPD is graded between I and IV and a weighted combination between the CVD and BVD is obtained.

Once the description of each building has been completed with the CVD, BVD and RPD values, in Phase III, the different intervention possibilities are studied along with the application criteria in each case, considering the particular values for each building, and specific conditions or limits may be established for some of its parts or elements that should be reflected in its respective file [28]. The different intervention proposals put forward should be a fundamental tool for technical personnel of the municipal administration when regulating renovation actions within their responsibilities. Figure 1 summarizes the different phases of the proposed methodology:

2.2. Phase I: Determination of the Vulnerability Degree (CVD and BVD)

The concept of vulnerability has been extensively covered in different scientific disciplines. Since the term vulnerability was proposed for the first time in the 1970s [29], both its definition and the choice of the different indicators to determine it in any study scope have been the subject of continual research and debate [30–32]. In any event, the choice should be made on a small scale and specifically adjusted to the context [33]. In this case, the chosen indicators aim to adjust to the final objective of establishing how the renovation of a building's façade enclosure can change its previous architectural image and that of the building complex in which it is included, differentiating it from those normally used when studying the energy efficiency of an intervention. But, unlike the objective and cold numeric values obtained when making energy and financial calculations, the observer's subjective view will inexorably influence the study of the composite effect. It is therefore key to minimize arbitrariness and try to objectivize as much as possible the vulnerability degree with indicators that can correctly describe the analyzed element.

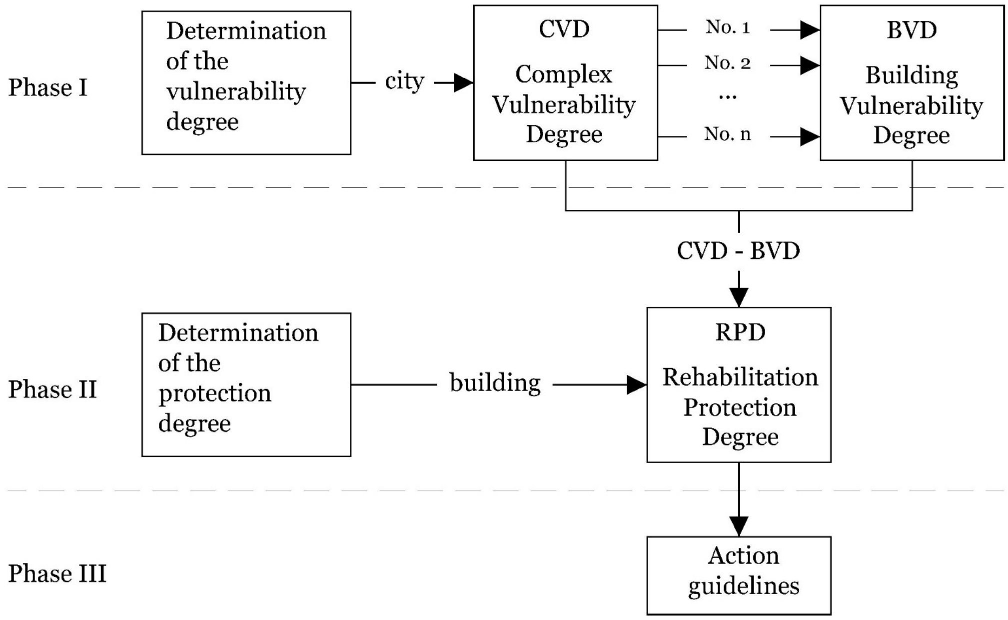


Figure 1. The framework of the research method.

The indicators selected to determine the CVD of a building complex are as follows:

- Unitary nature: it is assessed whether the complex is the result of a single and unitary project operation. This is considered one of the most relevant parameters because any partial modification inevitably affects the whole. The authorship, drafting and execution dates and other features of the project should be duly verified by bibliographic and archival research;
- Typological homogeneity: although the concept of architectural typology has been defined and interpreted diversely over the course of history [34–36], we could understand it as being the set of architectural, compositional, construction-related and functional features of a building complex that result in a homogeneous image and enable its respective recognition as a landscape clearly identified in the memory of the urban fabric;
- Chromatic homogeneity: color is a vital component of the urban landscape, as it offers unique visual experiences and a perception of the surroundings that affects citizens' emotions. The growing chromatic homogeneity of new façade skins depending on the fashions of the moment and the lack of integration with the color of the existing urban landscape are disfiguring the image of the city [37–39];
- Alteration degree: the interventions undertaken over the course of time have distorted to a greater or lesser extent the original configuration and image of the complex, hence conditioning the greater or lesser impact of future actions;
- Recognized quality: the urban and architectural quality and singularity of the complex, consolidated in time and recognized in specialty publications and various media or obtained by other analysis methods [40]. Many building estates and complexes with high urban and architectural value built between the 1940s and the 1980s are still not included in heritage protection catalogues and run a high risk of being totally deconfigured by current and future interventions;

- Authorship relevance: the recognized relevance of the designer or designers of the building complex should also be considered;
- Location of the complex: the location of the neighborhood or building complex in the municipality's urban fabric can minimize or maximize the impact of any possible intervention;
- Number of buildings: the built volume of the complex is another factor to consider due to its multiplying effect.

Table 1 summarizes the degree of weighting for each indicator, its grade, the points assigned at each level and the valuation criteria used.

Table 1. Determination of CVD (complex vulnerability degree).

Indicator	Weight. (%)	Grade	Value	Valuation Criterion
Unitary project (UP)	20%	Yes No	20 0	Depending on whether or not the complex is the result of a single unitary project. Absolute value, not graded.
Typological homogeneity (TH)	20%	1–100% of bldgs. 61–80% 41–60% 11–40% 0–10%	20 15 10 5 0	Percentage of buildings in the complex, which currently share architectural, compositional, construction-related and functional typology.
Chromatic homogeneity (CH)	20%	1–100% of bldgs. 61–80% 41–60% 11–40% 0–10%	20 15 10 5 0	Percentage of buildings of the complex that currently share a same range of colors in the different elements that form the façade, regardless of the materials used in the finishes.
Alteration degree (AD)	20%	0–10% of bldgs. 11–40% 40–60% 61–80% 81–100%	20 15 10 5 0	Percentage of buildings in the complex that present an alteration with respect to the original after renovations over time. The less altered complexes are assigned the maximum value as their image is more vulnerable to being affected by future interventions.
Recognized quality (RQ)	8%	Exceptional High Medium Low or none	8 5 3 0	Architectural and urban singularity of the complex recognized in specialty publications and diverse media.
Authorship relevance (AR)	8%	Exceptional High Medium Low or none	8 5 3 0	Relevance of the designer recognized in specialty publications and diverse media.
Location of the complex (CL)	2%	Historic center Expansion (ensanche) districts Outskirts	2 1 0	Location of the complex in the municipality's urban fabric.
Numbers of buildings (BN)	2%	>20 $4 \leq X \leq 20$ <4	2 1 0	Number of buildings which form the complex

For its part, the BVD of a building is obtained from the weighted value of the following indicators:

- Richness of composition and materials: the valuation of the design and composition of a façade depends on the subjective perception of the observer. But bearing in mind that the proposed methodology has to serve as a base tool for the technical personnel responsible for cataloguing, and hence qualified in architectural interpretation, the range of subjectivity is reduced and the compositional richness, which includes concepts such as the design, form, volumes, proportions or materials used may be duly valued;

- Construction quality: the greater or lesser need to upgrade the outer skin of a building is closely linked to the quality of the materials and construction solutions originally used;
- Alteration degree: work to repair or improve the façade finishes, color changes, anarchic replacement of window frames, indiscriminate closing of balconies, uncontrolled installation of air-conditioning devices or unequal placement of awnings can totally deconfigure a building's image;
- Construction deterioration: Due to their precarious construction characteristics and multiple shortcomings, the exterior enclosures of many buildings built between 1940 and 1980 are very deteriorated, which makes them authentic lead players in renovation nowadays [41]. To determine the extent of a building's construction deterioration, the analysis recommendations issued by international bodies such as ICOMOS [42] or the manuals and guides published by Spain's different regional administrations should be used to produce the building assessment reports (IEE or ITE), such as that of the Basque Country [43], for example;
- Energy qualification: most existing buildings must currently have a certificate that accredits their energy characteristics [44]. The energy qualification is the result of calculating the energy consumption needed to meet the building's energy demand in normal functional and occupation conditions. It classifies buildings using a series of seven letters, where the letter G corresponds to the least efficient building and the letter A to the most efficient building, according to energy consumption and CO_2 emissions compared to a basic building of similar typology and location. The need to improve the energy efficiency of all those buildings built before approval of the first thermal standard in 1979 is obvious and will oblige intervention in their thermal enclosure;
- Recognized quality: the same criteria used to obtain the CVD are followed;
- Authorship relevance: the same criteria used to obtain the CVD are followed;
- Need to improve accessibility: Work to install lifts has multiplied and in many cases affects the building façades by invading part of the exterior space. It is therefore necessary to analyze whether the building requires work of this type because it can significantly alter its external image [45].

Table 2 summarizes the degree of weighting for each indicator, its grade, the points assigned at each level and the valuation criteria used.

Table 2. Determination of BVD (building vulnerability degree).

Indicator	Weight (%)	Score	Points	Valuation Criteria
Richness of composition and materials (CR)	20%	Very high	20	Aspects to value in the façade's composition: design, form, volumes, proportions, materials, etc.
		High	15	
		Medium	10	
		Low	5	
		Very low or none	0	
Construction quality (CQ)	15%	Very low or none	15	Quality of original materials and construction solutions used to execute the façade. Buildings with worse construction quality are assigned the maximum value as they are more prone to undergoing renovation and seeing their original image change.
		Low	11	
		Medium	7	
		High	3	
		Very high	0	

Table 2. *Cont.*

Indicator	Weight (%)	Score	Points	Valuation Criteria
Alteration degree (AD)	15%	Very low or none	15	Façade alteration degree due to work to improve façade finishes, change color, replace window frames and railings, close balconies, place awnings, etc. The least altered complexes are assigned the maximum value, as they are more vulnerable to having their appearance affected by future interventions.
		Low	11	
		Medium	7	
		High	3	
		Very high	0	
Construction deterioration (CD)	15%	Very high	15	Degree of deterioration of the construction materials and elements comprising the façade, such as the cladding, framing, balconies, cornices, moldings, fixtures, etc.
		High	11	
		Medium	7	
		Low	3	
		Very low or none	0	
Energy qualification (EQ)	15%	G	15	Energy qualification extracted from the Energy Efficiency Certificate (CEE) Registry of the Basque Country. If it does not have a CEE, one obtained in a similar building will be used. Complexes with the worst qualification will be assigned the maximum value as they are more vulnerable to having their image affected by future interventions.
		F	11	
		E	7	
		D	3	
		≥C	0	
Recognized quality (RQ)	8%	Exceptional	8	Architectural singularity and quality of the building, recognized in specialty publications and diverse media.
		High	5	
		Medium	3	
		Low or none	0	
Authorship relevance (AR)	8%	Exceptional	8	Relevance of the designer recognized in specialty publications and diverse media.
		High	5	
		Medium	3	
		Low or none	0	
Need to improve accessibility (AI)	4%	Yes	4	Need to carry out work to eliminate architectural barriers that can affect the building's external image. Absolute value, not graded.
		No	0	

2.3. Phase II: Determination of the Rehabilitation Protection Degree (RPD)

After concluding Phase I, the vulnerability degree of each building will have been defined by a double figure derived from the CVD and BVD values obtained. The second phase aims to determine the RPD value of each building, graded between I and V according to the greater or lesser need to preserve and protect its previous image in any intervention. Grade I will mean the lowest protection and grade V the highest. The different RPD grades will be assigned proportionally to the value of the CVD of the built complex or the BVD of the building considered; both are not necessarily linked. Hence, a building with a BVD above 80 will obtain a grade V RPD in all cases, regardless of the CVD of the complex it belongs to and, vice versa, all buildings belonging to a complex with a CVD above 80 will obtain a grade V RPD, without considering their particular BVD. All the intermediate values will be weighted according to the same criteria. Table 3 indicates the manner of assigning the RPD value in each case:

Table 3. Determination of RPD (rehabilitation protection degree).

RPD		BVD, Building Vulnerability Degree				
		0–20	**21–40**	**41–60**	**61–80**	**81–100**
CVD, Complex Vulnerability Degree	0–20	I	II	III	IV	V
	21–40	II	II	III	IV	V
	41–60	III	III	III	IV	V
	61–80	IV	IV	IV	IV	V
	81–100	V	V	V	V	V

2.4. Phase III: Action Criteria

The CVD and BVD values reached in Phase I are the result of the building's response to a series of indicators previously adopted, while the RPD value obtained in Phase II is derived from the combination of the previous two. If the aim of both phases is to obtain objective numerical data by means of a series of tables that serve to describe the building, Phase III aims to establish action criteria to regulate the different forms of future intervention on its façades. In this case, the definition, valuation and application of the different options will not be a direct consequence of the previously obtained data but rather will depend on the particular characteristics of each building as well as on the criteria of the municipal technical personnel in charge of the respective regulation and on the construction solutions available on the market at any given time. A rigorous yet flexible tool must therefore be set up to help lawmakers establish intervention guidelines in each case, with the ultimate aim of avoiding the architectural deconfiguration of both the building and the complex in which it is situated. The criteria adopted for regulating the façade renovation processes in each of the RPD grades, always open to eventual adjustments and changes, are summarized in Table 4.

Table 4. Facade action criteria.

<table>
<tr><th rowspan="2">Action Criteria</th><th colspan="5">RPD, Rehabilitation Protection Degree</th></tr>
<tr><th>I</th><th>II</th><th>III</th><th>IV</th><th>V</th></tr>
<tr><td>Composition and volumes</td><td colspan="2">Free modifications</td><td colspan="2">Occasional modifications after prior analysis</td><td>Maintenance or recovery of the original solution</td></tr>
<tr><td>Color</td><td>Free modifications</td><td colspan="2">Possible modification, subject to analysis by municipal technical personnel</td><td colspan="2">Recovery of the original color in all elements</td></tr>
<tr><td>Materiality of blind wall cladding</td><td>Free modifications</td><td colspan="2">Possible modification, subject to analysis by municipal technical personnel</td><td>Similar to the original. Facing brick or stone: prior analysis</td><td>Mandatory recovery of the original finish</td></tr>
<tr><td>Closure of balconies over time</td><td colspan="2">Maintained, unless otherwise required by regulations</td><td colspan="2">Elimination recommended and possibility of new unitary design</td><td>Mandatory elimination</td></tr>
<tr><td>Fixtures per façade</td><td>Maintained, unless otherwise required by regulations</td><td colspan="2">Concealment recommended</td><td colspan="2">Mandatory concealment</td></tr>
<tr><td>Barriers, railings and parapets</td><td>Possibility of unlimited replacement</td><td>Changes of design and homogenous material permitted on the entire façade</td><td>Material similar to the original, with possible change of homogenous design</td><td colspan="2">Recovery of the original solution, maintaining the design though allowing change of material in the case of metal railings</td></tr>
<tr><td colspan="6">Additional conditions</td></tr>
<tr><td rowspan="2">Buildings in complexes with homogeneous original features</td><td>No limit</td><td>Similar chromatic solution</td><td>Similar construction solution and chromatic solution</td><td colspan="2">Same construction, chromatic and accessibility solution</td></tr>
<tr><td colspan="5">A different, unitary and homogenous transformation solution is permitted for the entire complex to optimize energy efficiency, subject to analysis by municipal technical personnel</td></tr>
<tr><td>Identical buildings sharing a single block or built volume</td><td colspan="5">Same color and same construction and accessibility solution</td></tr>
</table>

The necessary flexibility in the criteria established in Table 4 should be open to innovative proposals that are not just limited to simple replacement of the building's outer skin. Interventions that propose a possible alteration of the appearance of the building or housing complex by adding new volumes and architectural elements to make them more energy efficient from an architectural and urban standpoint can be perfectly viable, as long as they are consistent with the image assessment principles set out in the methodology. One example of this may be the intervention by Lacaton & Vassal in the Grand Parc district of Bordeaux in 2017 [46].

3. Case Study: Errenteria

The methodology's application in Errenteria, a municipality of 39,000 inhabitants in the historic territory of Gipuzkoa, Spain, is proposed in the following points. It will first be necessary to divide the locality into different neighborhoods and building complexes, to then determine the CVD of each of them. Subsequently, by way of example, three complexes with different CVD values will be chosen with the aim of determining the BVD and RPD of each and every one of the buildings they comprise.

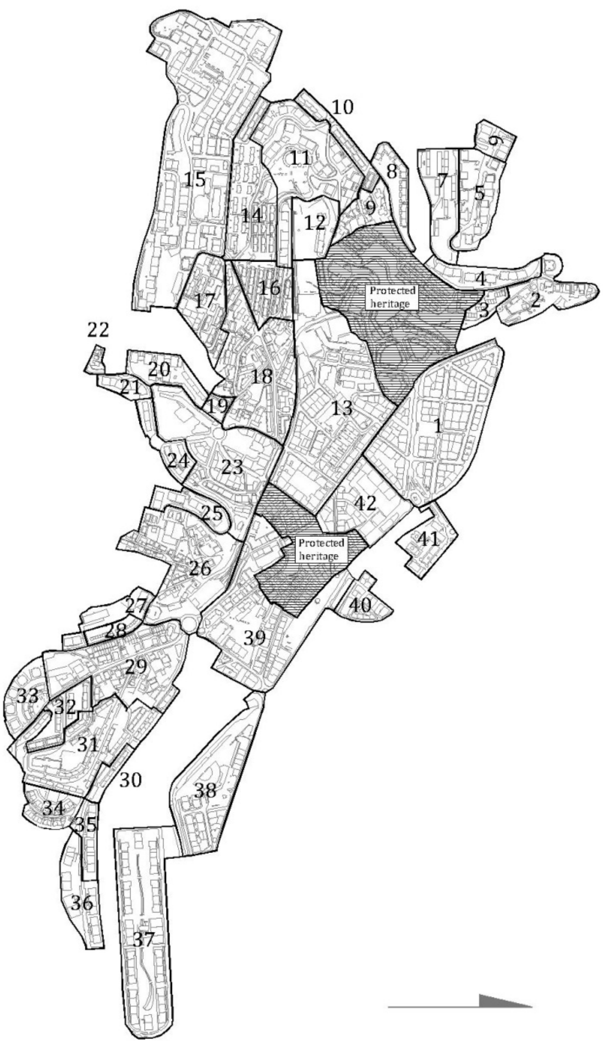
3.1. Errenteria: A Brief History

Errenteria was until the mid-19th century a rural town. In 1845, the municipality's industrialization began with the establishment of the first modern factory, the Sociedad de Tejidos de Lino (Linen Cloth Company). The arrival of industrialization led to population growth and gradual urban transformation. Between 1860 and 1910, the number of Errenteria's inhabitants doubled, while during the following years and until the late 1940s, the wars experienced in both Europe and in Spain led to fluctuations in its industrial, social and urban development [47]. During the 1950s, there was significant urban development: on the one hand, the new settlement of Alaberga was built (1952–1956), with 563 dwellings and a full program of urban amenities and infrastructures and, on the other, the municipal master plan was approved (1954), based on an old project from the 1920s [48]. But the municipality's real transformation began in the 1960s, when it became one of the major urban–industrial centers of the Basque Country. Between 1960 and 1975, the municipality of Errenteria experienced one of the highest population growths in all of Gipuzkoa, rising from 18,642 to 46,329 inhabitants and becoming the third most populous municipality in that territory. During those years, the period of Spanish developmentalism, immigration from other provinces would be a key factor of that increase, which brought profound and irreversible urban, social and economic changes [49–51]. The urban growth model during those years would also vary radically. While in the case of Alaberga, the construction of dwellings was accompanied by a series of amenities such as schools, laundry, market and even a chapel, in the new neighborhoods, the massive and virtually exclusive construction of housing blocks prevailed. In the early 1960s, the construction of the districts of Iztieta, Galtzaraborda, Gabierrota and Morronguilleta was approved and began. The main urban developments of the early 1970s would be those of Agustinas, Capuchinos and Beraun, at a record pace of 333 dwellings per year [52]. The Capuchinos project would comprise 13 towers with 15–16 floors, with a total of 900 dwellings; for its part, the Beraun neighborhood would surpass all imaginable figures and accumulate more than 2,100 dwellings constructed according to the same building typology.

3.2. Determination of the CVD of the Different Neighborhoods and Building Complexes

Table 5 reflects the municipality's division into different neighborhoods and building complexes and the CVD values corresponding to each of them according to the indicators defined in Table 1.

Table 5. CVD. Neighborhoods and building complexes in Errenteria.



Complex No.	CVD								
	UP	TH	CH	AD	RQ	AR	CL	BN	TOTAL
1	0	10	10	10	0	0	1	2	33
2	0	10	10	5	0	0	0	1	26
3	20	20	20	20	0	0	0	1	81
4	20	20	20	20	0	0	0	1	81
5	20	20	10	10	3	3	0	1	67
6	0	15	5	0	0	0	0	0	20
7	20	20	20	15	0	0	0	1	76
8	20	20	20	20	0	0	0	1	81
9	20	15	10	10	0	0	0	1	56
10	20	20	5	5	0	0	0	1	51
11	0	20	5	0	0	0	0	2	27
12	20	20	20	20	0	0	0	0	80
13	0	5	5	10	0	0	1	2	23
14	20	20	5	5	0	0	0	2	52
15	20	15	10	5	0	0	0	2	52
16	20	15	15	10	0	0	0	2	62
17	20	15	10	5	0	0	0	2	52
18	0	10	5	5	0	0	0	2	22
19	20	20	20	20	0	0	0	0	80
20	20	20	20	15	0	0	0	1	76
21	20	20	20	20	0	0	0	1	81
22	0	5	0	5	0	0	0	0	10
23	0	10	5	10	0	0	0	2	27
24	20	20	20	20	0	0	0	1	81
25	20	20	20	20	0	0	0	1	81
26	0	10	5	5	0	0	0	2	22
27	0	5	0	0	0	0	0	0	5
28	20	20	20	20	0	0	0	0	80
29	0	5	5	10	0	0	0	2	22
30	0	10	5	10	0	0	0	1	26
31	20	20	15	10	0	0	0	2	67
32	20	15	20	10	0	0	0	1	66
33	20	15	20	20	0	0	0	1	76
34	20	20	20	20	0	0	0	1	81
35	20	20	20	20	0	0	0	1	81
36	20	20	20	20	0	0	0	1	81
37	20	20	20	20	0	0	0	2	82
38	0	5	5	15	0	0	0	2	27
39	0	5	0	10	0	0	1	2	18
40	0	5	0	15	0	0	1	2	23
41	0	15	5	5	0	0	1	1	27
42	0	5	0	10	0	0	1	2	18

3.3. Determination of the BVD and RPD of the Buildings of Complexes Nos. 14, 31 and 41

Once the CVDs of all the neighborhoods and building complexes of Errenteria have been obtained, three of them are selected with the aim of determining the BVD and RPD of each and every one of the buildings comprising them. The chosen complexes are complex no. 14 with a CVD of 52; complex no. 31 with a CVD of 67; and complex no. 41 with a CVD of 27.

Complex no. 14, Galtzaraborda:

Situated on a slope in Galtzaraborda, this complex includes 41 buildings spread over 21 blocks, with a total of 324 dwellings. This is a social housing project planned by the architect Vicente Saralegui in 1963 and built between 1963 and 1966. The typology comprises a commercial ground floor and 3–4 levels with two residences per floor; the buildings originally had a conventional façade with a double layer of brick, uninsulated air chamber and an exterior coating of white paint. In recent years, the façades of most of the buildings have been renovated and thermally insulated using ventilated façade or ETICS (external thermal insulation composite systems) solutions, significantly altering the white and homogenous appearance of the original complex (Figure 2). Accessibility is still a pending issue, as only one of the 41 buildings has proceeded to install a lift.

(a)

(b)

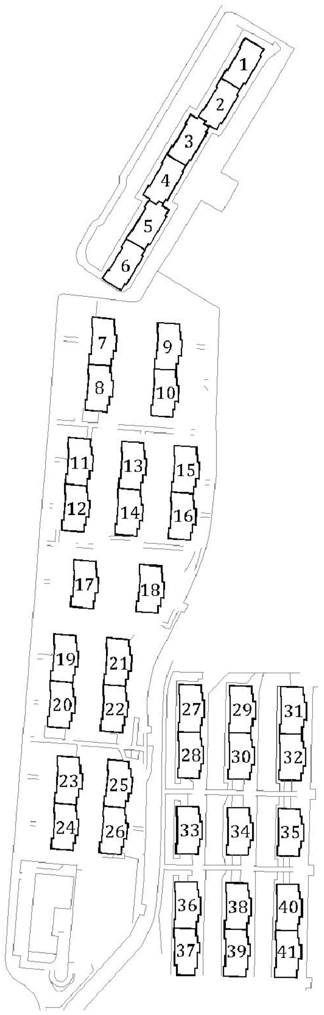
Figure 2. (**a**) Galtzaraborda, 1964 [53]; (**b**) Galtzaraborda, 2023 (author's archive).

Table 6 reflects the CVD and BVD values, the numeric CVD-BVD combination and the RPD value, according to the criteria set out in Table 3, for each and every one of the buildings in complex no. 14.

Complex no. 31, Agustinas:

Situated in the neighborhood of Agustinas, this complex comprises 53 buildings spread over 14 blocks, with a total of 566 dwellings. This is a social housing project planned by the architect Rafael Llopis in the mid-1960s and built between 1968 and 1975, except for one building dated 1992. The typology is that of commercial ground floor and five levels with two residences per floor; the buildings have a conventional façade comprising a layer of exterior facing brick, uninsulated air chamber and an interior layer of brickwork. Although only integral interventions to improve energy efficiency have been carried out and most of the later façades maintain the original configuration featuring beige-colored facing brick, the installation of several lifts and a large number of balconies closed over the years on the main façades have significantly altered the original image (Figure 3).

Table 6. CVD, BVD, CVD-BVD and RPD. Complex no. 14, Galtzaraborda.



Complex No.	CVD	Building No.	BVD									CVD BVD	RPD (Table 3)
			CR	CQ	AD	CD	EQ	RQ	AR	AI	TOTAL		
		1	5	15	3	3	15	0	0	4	45	52–45	III
		2	5	15	3	3	11	0	0	4	41	52–41	III
		3	5	15	7	3	11	0	0	0	41	52–41	III
		4	5	15	7	3	3	0	0	4	37	52–37	III
		5	5	15	7	0	7	0	0	4	38	52–38	III
		6	5	15	7	0	7	0	0	4	38	52–38	III
		7	5	15	7	0	11	0	0	4	42	52–42	III
		8	5	15	7	0	11	0	0	4	42	52–42	III
		9	5	15	7	7	15	0	0	4	53	52–53	III
		10	5	15	7	7	15	0	0	4	53	52–53	III
		11	5	15	7	0	15	0	0	4	46	52–46	III
		12	5	15	7	0	15	0	0	4	46	52–46	III
		13	5	15	3	3	15	0	0	4	45	52–45	III
		14	5	15	7	0	15	0	0	4	46	52–46	III
		15	5	15	3	11	7	0	0	4	45	52–45	III
		16	5	15	7	0	15	0	0	4	46	52–46	III
		17	5	15	7	0	7	0	0	4	38	52–38	III
		18	5	15	3	11	11	0	0	4	49	52–49	III
		19	5	15	7	0	11	0	0	4	42	52–42	III
		20	5	15	3	0	7	0	0	4	34	52–34	III
14	52	21	5	15	7	0	7	0	0	4	38	52–38	III
		22	5	15	3	0	7	0	0	4	34	52–34	III
		23	5	15	7	0	11	0	0	4	42	52–42	III
		24	5	15	15	11	15	0	0	4	65	52–65	IV
		25	5	15	3	7	11	0	0	4	45	52–45	III
		26	5	15	3	7	7	0	0	4	41	52–41	III
		27	5	15	3	11	15	0	0	4	53	52–53	III
		28	5	15	3	0	15	0	0	4	42	52–42	III
		29	5	15	3	11	15	0	0	4	53	52–53	III
		30	5	15	3	0	7	0	0	4	34	52–34	III
		31	5	15	11	15	15	0	0	4	65	52–65	IV
		32	5	15	3	0	15	0	0	4	42	52–42	III
		33	5	15	0	0	15	0	0	4	39	52–39	III
		34	5	15	3	0	11	0	0	4	38	52–38	III
		35	5	15	15	15	7	0	0	4	61	52–61	IV
		36	5	15	3	0	15	0	0	4	42	52–42	III
		37	5	15	3	0	7	0	0	4	34	52–34	III
		38	5	15	3	0	15	0	0	4	42	52–42	III
		39	5	15	3	0	7	0	0	4	34	52–34	III
		40	5	15	15	15	7	0	0	4	61	52–61	IV
		41	5	15	3	0	15	0	0	4	42	52–42	III

The data on the CVD, BVD, CVD-BVD and RPD of complex no. 31 are reflected in Table 7.

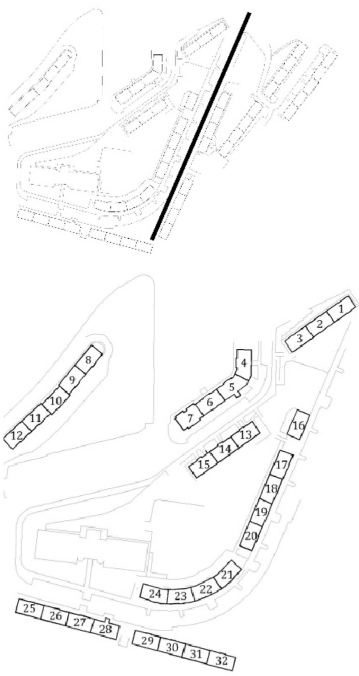
Complex no. 41, Olibet:

The neighborhood called Olibet comprises six buildings spread over four blocks and a total of 427 dwellings. The six towers have 14 upper floors used for housing, as well as commercial space, storage areas and garages in the lower floors. It was built in 1974 and 1975. The architects involved were Juan María Aguirre, Joaquín Muñoz, Carlos Casla and Manuel Sancho. All the buildings originally presented a similar conventional façade solution using a double layer of brickwork and air chamber, with an exterior layer of exposed brick, except for one of them which had continual cladding. At present, the original image of four of the six buildings has been totally transformed after undergoing energy efficiency renovation processes. Both the chromatics and the construction solutions used in the new skins were different; among those found are ETICS cladding and ventilated façades with metallic finishes (Figure 4).

(**a**) (**b**) (**c**)

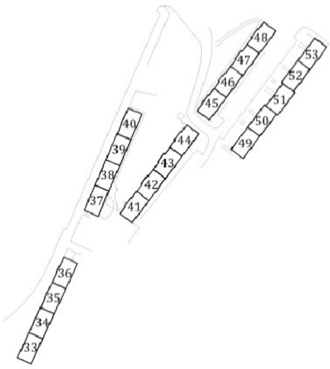
Figure 3. (**a**) Agustinas, 1973 [48]; (**b**) Agustinas, posterior facade, 2023 (author's archive); (**c**) Agustinas, main facade, 2023 (author's archive).

Table 7. CVD, BVD, CVD-BVD and RPD. Complex no. 31, Agustinas.



Complex No.	CVD	Building No.	BVD									CVD BVD	RPD (Table 3)
			CR	CQ	AD	CD	EQ	RQ	AR	AI	TOTAL		
31	67	1	5	11	0	7	11	0	0	4	38	67–38	IV
		2	5	11	3	7	15	0	0	4	45	67–45	IV
		3	5	11	0	7	15	0	0	4	42	67–42	IV
		4	5	11	0	7	7	0	0	0	30	67–30	IV
		5	5	11	0	7	7	0	0	0	30	67–30	IV
		6	5	11	3	7	7	0	0	4	37	67–37	IV
		7	5	11	15	3	7	0	0	0	41	67–41	IV
		8	5	11	7	11	15	0	0	4	53	67–53	IV
		9	5	11	3	11	11	0	0	0	41	67–41	IV
		10	5	11	11	11	11	0	0	4	53	67–53	IV
		11	5	11	3	11	7	0	0	0	37	67–37	IV
		12	5	11	3	11	7	0	0	0	37	67–37	IV
		13	5	11	3	7	11	0	0	4	41	67–41	IV
		14	5	11	7	7	7	0	0	4	41	67–41	IV
		15	5	11	3	7	11	0	0	4	41	67–41	IV
		16	5	11	3	7	7	0	0	0	33	67–33	IV
		17	5	11	0	3	15	0	0	4	38	67–38	IV
		18	5	11	3	7	15	0	0	4	45	67–45	IV
		19	5	11	3	7	15	0	0	4	45	67–45	IV
		20	5	11	3	7	15	0	0	4	45	67–45	IV
		21	5	11	0	3	7	0	0	4	30	67–30	IV
		22	5	11	11	7	7	0	0	4	45	67–45	IV
		23	5	11	3	7	15	0	0	4	45	67–45	IV
		24	5	11	0	3	7	0	0	4	30	67–30	IV
		25	5	11	3	7	7	0	0	0	33	67–33	IV
		26	5	11	3	7	7	0	0	0	33	67–33	IV
		27	5	11	3	7	11	0	0	0	37	67–37	IV
		28	5	11	3	7	7	0	0	0	33	67–33	IV
		29	5	11	7	7	15	0	0	4	49	67–49	IV
		30	5	11	7	7	11	0	0	4	45	67–45	IV
		31	5	11	3	7	11	0	0	0	37	67–37	IV
		32	5	11	7	7	15	0	0	4	49	67–49	IV
		33	5	11	7	7	15	0	0	0	45	67–45	IV

Table 7. *Cont.*



Complex No.	CVD	Building No.	BVD									CVD BVD	RPD (Table 3)
			CR	CQ	AD	CD	EQ	RQ	AR	AI	TOTAL		
		34	5	11	7	7	7	0	0	4	41	67–41	IV
		35	5	11	3	7	7	0	0	4	37	67–37	IV
		36	5	11	3	7	15	0	0	4	45	67–45	IV
		37	5	11	7	7	15	0	0	4	49	67–49	IV
		38	5	11	7	7	7	0	0	4	41	67–41	IV
		39	5	11	7	7	15	0	0	4	49	67–49	IV
		40	5	11	3	7	15	0	0	4	45	67–45	IV
		41	5	11	3	7	15	0	0	0	41	67–41	IV
		42	5	11	7	7	15	0	0	4	49	67–49	IV
		43	5	11	7	7	7	0	0	4	41	67–41	IV
		44	5	11	7	7	15	0	0	0	45	67–45	IV
		45	5	11	7	7	7	0	0	0	37	67–37	IV
		46	5	11	7	7	11	0	0	0	41	67–41	IV
		47	5	11	7	7	15	0	0	0	45	67–45	IV
		48	5	11	7	7	7	0	0	0	37	67–37	IV
		49	5	11	7	7	11	0	0	4	45	67–45	IV
		50	5	11	7	7	11	0	0	4	45	67–45	IV
		51	5	11	7	7	15	0	0	0	45	67–45	IV
		52	5	11	7	7	11	0	0	0	41	67–41	IV
		53	5	11	7	7	11	0	0	0	41	67–41	IV

(**a**) (**b**)

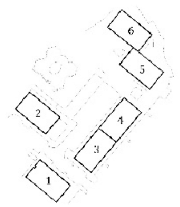
Figure 4. (**a**) Olibet, 1974 [48]; (**b**) Olibet, 2023 (author's archive).

In Table 8, the CVD, BVD, CVD-BVD and RPD values of complex no. 41 are defined.

3.4. Discussion of Results

It has already been stated that vulnerability is an open concept subject to multiple interpretations which can be approached from different sides. The choice of appropriate indicators for its analysis is therefore not simple and immediate. Nor is the proportionality and specific weight for each of them. Beyond obtaining specific data on Errenteria's different complexes and buildings, the application of the methodology proposed in the case study served to adjust and fine-tune the analysis parameters for obtaining the CVD and BVD vulnerability values reflected in Tables 1 and 2 and to define and specify the action criteria in the façade interventions reflected in Table 4.

Table 8. CVD, BVD, CVD-BVD and RPD. Complex no. 41, Olibet.



Complex No.	CVD	Building No.	BVD									CVD BVD	RPD (Table 3)
			CR	CQ	AD	CD	EQ	RQ	AR	AI	TOTAL		
41	27	1	10	7	15	7	15	0	0	0	54	27–50	III
		2	10	7	0	0	7	0	0	0	24	27–24	II
		3	10	7	0	0	7	0	0	0	24	27–24	II
		4	10	7	0	0	7	0	0	0	24	27–24	II
		5	10	7	0	3	7	0	0	0	27	27–27	II
		6	10	7	15	7	7	0	0	0	46	27–46	III

Analyzing the CVD of Errenteria, it is seen that the complexes that reach values above 80 (nos. 3, 4, 8, 21, 24, 25, 34, 35, 36, 37) are those built more recently, with a unitary project and blocks of identical typology. Due to their closeness in time, they have not yet been subject to renovation and maintain the original appearance. Although they are the most vulnerable to seeing their image altered in the future due to non-consensus partial interventions, regulation implemented in time can still prevent their deconfiguration. In the case of the unitary and homogenous complexes built in the 1960s and 1970s (nos. 5, 7, 10, 11, 14, 15, 16, 17, 20, 30, 31, 32, 41), the CVD presents unequal results depending on the interventions their various buildings were subject to over time. Of all of them, complex no. 30 is the one with the lowest CVD value, 27, while complex no. 20, with a current image very close to the original and still in time to be preserved, has a value of 76. The buildings situated in heterogeneous complexes or neighborhoods of larger size, with constructions from different time periods and typologies and an unequal alteration degree (nos. 1, 13, 18, 23, 29, 38, 39, 42), are those that obtain a lower degree of vulnerability, with a CVD between 18 and 33.

Complex no. 14 in the Galtzaraborda neighborhood, with a high alteration degree, has a CVD of 52. Virtually all of its buildings have undergone some kind of intervention. Besides the numerous energy efficiency renovations conducted in the last ten years, work to repair and clean façades has been carried out, along with changes to framing and closure of balconies over time. ETICS-type cladding with very disparate finishing solutions in terms of design, color and texture has prevailed (26 of the 41 blocks, 26/41) over non-energy-efficiency façade improvements conducted in previous years (13/41) or the ventilated façade solution (1/41). Only one of the blocks maintains its original façade sheets. Most of the residences (260/324) closed some of their balconies, in some cases even removing the façade sheet to prolong an interior room until the new closure. As a result of all this, the BVD of most of the buildings is between 37 and 53. Only four buildings slightly surpass the value of 60. Even though this is a complex without any special architectural value, its unitary, homogenous and monochromatic nature would confer upon it value as a complex that would have been very interesting to preserve. The alteration degree in a neighborhood with such a high number of buildings unfortunately means that the situation is irreversible. The total deconfiguration of the image of the Galtzaraborda project is the clearest example of the need for regulation of future energy efficiency improvement interventions such as what is proposed in this study. The RPD value as a result of the CVD-BVD combination is III for virtually all the complex's buildings, whereby the intervention criteria can only be limited to preventing major alterations in the future.

For its part, complex no. 31 of the Agustinas neighborhood has a CVD of 67, a very high figure for a complex of 53 buildings with more than fifty years of existence. This is because, barring certain partial interventions on the façades of some blocks, most of them maintain the original skin of facing brickwork, which continues to confer upon the complex a relatively unitary and homogenous appearance. Although none of the buildings were subject to integral energy efficiency improvement interventions on their façades, the neighborhood's original image has substantially changed due to the indiscriminate closure of balconies (54% of the residences, 306/566) and the addition of new volumes for the installation of lifts on the outside of some blocks (22/53). The major change affects the main façades, as they comprise large balconies which have been closed by means of light frames, with designs of all types, hiding the characteristic facing brickwork of the posterior layer. The BVD of the different buildings is similar to the previous case, between 30 and 53. The combination of these values with a CVD of 67 confers an RPD of IV on all blocks in the complex, implying more restrictive regulation for future interventions. The action criteria would allow occasional modifications in the composition and volumes, unavoidable when lifts are installed, and would oblige a final lining similar to the facing brick and with a similar tone, concealment of the façade fixtures and a balcony railing design similar to the original, permitting changes of material. In the case of the balcony closures, their elimination would be recommended, although this would be complicated from the legal standpoint, as the time limitation on eventual urban infringements has expired. In any case, it would oblige the design of light frames for the unitary balcony, identical for the whole complex, in the event of modification or new closures in the future. Also, bearing in mind the additional homogenous characteristics set out in Table 4, as it is a complex with homogenous original features with an RPD of IV, the new façade solutions should be identical for all the blocks from the construction, chromatic and accessibility standpoints. After a more exhaustive prior analysis, the design of a different façade solution could also be put forward, unitary and homogenous for the entire complex, with a view to improving its energy efficiency. However, the interventions already carried out and the high number of buildings, and consequently of owners, would in this case make it hard for administration and ownership to reach an overall agreement to proceed with a change of solution.

In the case of the neighborhood of Olibet, complex no. 41, the resulting CVD is 27. This is a very low figure because, unlike the two previous cases, the six tall buildings which form the complex did not form part of a unitary and homogenous project and, above all, due to the radical transformation of the building's skin in four of them. Three blocks were lined very recently with a ventilated façade solution with a metal finish and another one presents continual cladding that conceals the pre-existing facing brick finish. Only two of the blocks maintain their original façade, although some balconies have also been closed. The combination of CVD and BVD in this case implies an RPD of II or III, a qualification which, given the complex's alteration degree, means that the two blocks that have not yet been renovated are free to opt for solutions with very few conditions.

4. Conclusions

The main conclusions of this research work are the following:

- The placement of new energy efficient skins on buildings is beginning to distort and deconfigure the image of our towns and cities in an alarming manner. The proliferation of ETICS cladding and above all ventilated façade linings that are flat, aseptic, decontextualized and not linked to the architecture and palette of colors usually found in the locality is generating a process of homogenization and globalization of the urban landscape that is truly desolating;
- The need for energy efficiency renovation of the old and occasionally obsolete stock of Spanish buildings to make them more efficient is not in question, though it is obvious that the urgencies due to regulatory and financial pressure of all kinds do not facilitate peaceful and unhurried discussion and reflection among the major intervening players to determine and reach a consensus on the best way to carry it out;
- As the main agent for safeguarding the heritage, which belongs to everyone, the public administration is obliged to protect the building stock to ensure its transmission between generations, for this purpose regulating the renovation processes needed for an energy transition toward more efficient and sustainable cities. The transformation of the image of complexes and buildings affects all citizens and the decisions about how to deal with it cannot only remain in the hands of the owner associations of the respective buildings;
- The municipal administration does not at present have a tool that helps regulate the collateral impact of energy efficiency renovation on the city's appearance. Fortunately,

and according to their different features, the buildings with heritage value do have a certain degree of protection. This is not so for all those anonymous architectural buildings and complexes which, along with the former, make up the city. And they are specifically the ones, and most of them residential, that have become the lead players in the energy efficiency renovation boom now being experienced. Although some of them have already been transformed, in a process hard to reverse in the short term, there is still time to protect that other large majority which will be renovated in the coming years;

- The proposed methodology aims to endow the administration with a tool that enables it to regulate aspects concerning the architectural and urban image of the buildings when they undergo energy efficiency renovation processes. Sophisticated methodologies can eventually generate complex data and analyses meant only for experts, which makes their application difficult. The most effective programs are the ones that establish a balance between the wealth of information and the simplicity of the respective application [54]. The methodology described was designed so that it could be applied in any city nationwide, regardless of the respective location, size, architectural, urban and climate-related characteristics, and management capacity. By means of a simple procedure based on the combination of several tables, the buildings are described and classified according to their degree of vulnerability in any transformation process in order to ultimately determine the different action criteria. This last phase is open to eventual adjustments and modifications by the administrative personnel in charge of urban regulation in each municipality with a view to adjusting it to the specific characteristics. This work can be carried out by municipal technical personnel or shared by a multidisciplinary team which includes, besides municipal technical personnel, external personnel and/or bodies associated with architecture, urbanism, the history of renovation and even citizens' representatives [55,56], such as resident and neighborhood associations, etc.;
- The result of the analysis of the building stock using the methodology described should be set out in a municipal renovation catalogue that covers each and every one of the municipality's architectural complexes and buildings not previously included in the heritage protection catalogue, in which the criteria to fulfil when undertaking their renovation are established.

Author Contributions: I.L., E.J.U. and L.A. participated in the entire research process. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Data Availability Statement: The data presented in this study are available in this article. Data sharing does not apply to this article.

Conflicts of Interest: The authors declare no conflict of interest.

References

1. MITMA Ministerio de Transportes, Movilidad y Agenda Urbana. ERESEE 2020. 2020. Available online: https://www.mitma.gob.es/recursos_mfom/paginabasica/recursos/es_ltrs_2020.pdf (accessed on 27 July 2023).
2. European Commission. Recovery and Resilience Scoreboard. 2023. Available online: https://ec.europa.eu/economy_finance/recovery-and-resilience-scoreboard/ (accessed on 27 July 2023).
3. INE Instituto Nacional de Estadística. Censos de Población y Viviendas 2011, Edificios. 2011. Available online: https://www.ine.es/jaxi/Datos.htm?path=/t20/e244/edificios/p02/l0/&file=00008.px (accessed on 27 July 2023).
4. Escandón, R.; Suárez, R.; Sendra, J.J. Protocol for the Energy behaviour assessment of social housing stock: The case of southern Europe. *Energy Procedia* **2016**, *96*, 907–915. [CrossRef]
5. Curado, A.; de Freitas, V.P. Influence of thermal insulation of facades on the performance of retrofitted social housing buildings in Southern European countries. *Sustain. Cities Soc.* **2019**, *48*, 101534. [CrossRef]
6. De Vasconcelos, A.B.; Pinheiro, M.D.; Cabaço, A.; Manso, A. Energy cost-efficient rehabilitation measures for the portuguese residential buildings constructed in the 1960-1990 period. *Sustain. Constr. Build. Pathol. Rehabil.* **2016**, *8*, 23–42. [CrossRef]

7. Magalhâes, S.; de Freitas, V.P. A complementary approach for Energy efficiency and confort evaluation of renovated dwellings in Southern Europe. *Energy Procedia* **2017**, *132*, 909–914. [CrossRef]
8. Serrano, A.; Barrios, A.; Molina, M. Towards a feasible strategy in Mediterraneam building renovation through a multidisciplinary approach. *Sustain. Cities Soc.* **2017**, *32*, 532–546. [CrossRef]
9. Román, E.; Gayoso, M.; Córdoba, R.; Sánchez, C. Santa Adela neighborhood's Urban Regeneration Area (Granada). *Ciudad. Y Territ.* **2021**, *53*, 201–208. [CrossRef]
10. Córdoba, R.; Sánchez, C.; Torres, F.J.; Román, E. Rehabilitation to favor energy saving in the Txantrea neighborhood–Efidistrict Fwd project (Pamplona). *Ciudad. Y Territ.* **2022**, *54*, 723–730. [CrossRef]
11. Cervero, N. Public housing as urban heritage: Experience and research approach in Spain. *Conserv. Patrim.* **2022**, *41*, 52–67. [CrossRef]
12. Bucón, R.; Sobotka, A. Decision-making model for choosing residential building repair variants. *J. Civ. Eng. Manag.* **2015**, *21*, 893–901. [CrossRef]
13. Nowogonska, B. Proposal for determing the scale of renovation needs of residential buildings. *Civ. Environ. Eng. Rep.* **2016**, *22*, 137–144. [CrossRef]
14. Arcas-Abella, J.; Pagés-Ramon, A.; Bilbao, A. UrbanZEB Tool. Towards the Development of Urban Strategies for Energy Transition of Buildings. *ACE Archit. City Environ.* **2021**, *16*, 9888. [CrossRef]
15. Cuchí, A.; Basque Government. Estrategia de Intervención a Largo Plazo en el Parque de Edificios de Euskadi. 2019. Available online: https://www.euskadi.eus/informacion/regeneracion-urbana/web01-a2lurral/es/ (accessed on 27 July 2023).
16. Cuchí, A.; Sweatman, P. Informe GTR 2014 Estrategia Para la Rehabilitación. 2014. Available online: https://www.miteco.gob.es/images/es/rciinformegtr2014_tcm30-178967.pdf (accessed on 27 July 2023).
17. Errenteria City Council. Barrio de Alaberga. In *Criterios Técnicos Para la Homogeneización de Fachadas*; Errenteriako Udala: Errenteria, Spain, 2015.
18. Etxepare, L.; Uranga, E.J.; Sagarna, M.; Lizundia, I. Effects of the energy rehabilitation on the first residential towers in Gipuzkoa (1958-1974). Some notes for the archaeologists of the future. *Inf. Construcción* **2019**, *71*, e304. [CrossRef]
19. Sanz, L.M. La Protección del Patrimonio Arquitectónico en los Paises Europeos del Diálogo 5+5. Análisis y Comparación de la Legislación y Studio de la Viabilidad de la Armonización de las Categorías en las que se Clasifica el Patrimonio Arquitectónico. Ph.D. Thesis, Universidad Politécnica de Madrid, Madrid, Spain, 2020. [CrossRef]
20. ICOMOS International Scientific Committee on Twentieth Century Heritage. Madrid Document, Approaches for the Conservation of Twentieth-Century Architectural Heritage. 2011. Available online: https://openarchive.icomos.org/id/eprint/2697/1/Madrid_Document_2011-EN_FR_ES.pdf (accessed on 27 July 2023).
21. Antrop, M. Balancing heritage and innovation–the landscape perspectives. *BSGLg* **2017**, *69*, 41–51. [CrossRef]
22. Corraliza, J.A.; Aragonés, J.I. Social Psychology and the Urban Fact. *Psicothema* **1993**, *5*, 411–426. Available online: https://www.psicothema.com/pii?pii=1151 (accessed on 27 July 2023).
23. Hernández, J.A. Evaluating the urban environmental landscape of Juriquilla and Santa Rosa Jáuregui, Queretaro, México. *Econ. Soc. Y Territ.* **2021**, *20*, 633–666. [CrossRef]
24. Maderuelo, J. The urban landscape. *Estud. Geográficos* **2010**, *71*, 575–600. [CrossRef]
25. Gao, S.; Liu, S.F. Exploration and analysis of the aesthetic cognitive schema of contemporary western urban landscapes. *IJERPH* **2021**, *18*, 5152. [CrossRef]
26. Mendes, P. *La Ciudad es de Todos*; Fundación Caja de Arquitectos: Barcelona, Spain, 2011.
27. Kuran, C.; Morsut, C.; Kruke, B.; Krüger, M.; Segnestam, L.; Orru, K.; Naevstad, T.; Airola, M.; Keränen, J.; Gabel, F.; et al. Vulnerability and vulnerable groups from an intersectionally perspective. *Int. J. Disaster Risk Reduct.* **2020**, *50*, 101826. [CrossRef]
28. Madrid City Council. Modificación del PGOU de 1997 Para la Ampliación del Catálogo de Edificios Protegidos. 2021. Available online: https://www.comunidad.madrid/transparencia/sites/default/files/regulation/documents/01_memoria-informe_mpg_0.pdf (accessed on 27 July 2023).
29. White, G. *Natural Hazards, Local, National, Global*; Oxford University Press: Oxford, UK, 1974.
30. Hinkel, J. "Indicators of vulnerability and adaptive capacity": Towards a clarification of the science-policy interface. *Glob. Environ. Chang.* **2011**, *21*, 198–208. [CrossRef]
31. Ruiz, N. La definición y medición de la vulnerabilidad social. Un enfoque normativo. *Investig. Geográficas* **2012**, *77*, 63–74. [CrossRef]
32. Turner, B.L.; Kasperson, R.; Matson, P.; McCarthy, J.; Corell, R.; Christensen, L.; Eckley, N.; Kasperson, J.; Luers, A.; Martello, M.; et al. A framework for vulnerability analysis in sustainability science. *Proc. Natl. Acad. Sci. USA* **2003**, *100*, 8074–8079. [CrossRef]
33. Hongjun, J.; Myungjin, L.; Changhyun, C.; Soojun, K.; Hung Soo, K. A study on the selection of representative Indicators of flood vulnerability assessment. *J. Korean Soc. Hazard Mitig.* **2018**, *18*, 335–346. [CrossRef]
34. Güney, Y. Type and typology in architectural discourse. *BAÜ FBE Derg.* **2007**, *9*, 3–18.
35. Martín, M.J. La Tipología en Arquitectura. Ph.D. Thesis, Universidad de Las Palmas de Gran Canaria, Las Palmas de Gran Canaria, Spain, 1984. Available online: https://accedacris.ulpgc.es/bitstream/10553/1914/1/779.pdf (accessed on 27 July 2023).
36. Moneo, R. On Typology. *Oppositions* **1978**, *13*, 188–211.

37. Badami, A.A. Management of the image of the city in urban planning: Experimental methodologies in the color plan of the Egadi Islands. *Urban Des. Int.* **2022**. [CrossRef]
38. Mi-young, K. A study on the urban color planning development for the improvement of city environment and for city identity establishment. *J. Korea Des. Forum* **2010**, *27*, 37–52. [CrossRef]
39. Zhong, T.; Ye, C.; Wang, Z.; Tang, G.; Zhang, W.; Ye, Y. City-scale mapping of urban façade color using Street-View imagery. *Remote Sens.* **2021**, *13*, 1591. [CrossRef]
40. Elwazani, S.; Gandikota, S. Information flow settings in building rehabilitation. *Int. Arch. Photogramm. Remote Sens. Spat. Inf. Sci.* **2017**, *XLII*, 209–214. [CrossRef]
41. Lizundia, I.; Etxepare, L.; Sagarna, M.; Uranga, E.J. The cost of the mandatory Energy refurbishment of the collective housing: A social problem? *Inf. Construcción* **2018**, *70*, e269. [CrossRef]
42. ICOMOS International Scientific Committee on Twentieth Century Heritage. Recommendations for the Analysis, Conservation and Structural Restoration of Architectural Heritage. 2003. Available online: https://ancientgeorgia.files.wordpress.com/2012/04/recommendations_icomos-principles-and-guidelines.pdf (accessed on 27 July 2023).
43. Gobierno Vasco. Guía Metodológica Para la Inspección Técnica de Edificios. 2013. Available online: https://www.euskadi.eus/contenidos/evento/20131210_ite/es_ite/adjuntos/guiaite2013.pdf (accessed on 27 July 2023).
44. MPR Ministerio de la Presidencia, Relaciones con las Cortes y Memoria Democrática. Real Decreto 390/2021, de 1 de Junio, por el que se Aprueba el Procedimiento Básico Para la Certificación de la Eficiencia Energética de los Edificios. 2021. Available online: https://www.boe.es/buscar/doc.php?id=BOE-A-2021-9176 (accessed on 27 July 2023).
45. Díaz, C.; Cornado, C.; Vima, S. The addition of new elevators in buildings of modern housing estates of the metropolitan area of Barcelona. In Proceedings of the Rehabend 2020, Granada, Spain, 24–27 March 2020.
46. Lacaton, A.; Vassal, J.P. Vital Neighbourhoods: Lessons from International Housing Renewal 2017; pp. 61–82. Available online: https://www.lacatonvassal.com/data/documents/20181221-14342817_Publica-compressed.pdf (accessed on 27 July 2023).
47. Fernández, Z.; Maceira, L. Errenteria, pueblo industrial: Una historia que contar. *Bilduma Rev. Serv. Arch. Ayunt. Errenteria* **2015**, *27*, 25–82. Available online: https://static.errenteria.eus/web/eu/herria/artxiboa/Bilduma/Bilduma%2027_2015/web%20por%20articulos/castellano/pueblo-industrial.pdf (accessed on 27 July 2023).
48. Jiménez de Aberasturi, J.C.; Picavea, P. *Historia de Rentería*; Errenteriako Udala: Errenteria, Spain, 1996; pp. 427–552.
49. Arrieta, L.; Barandiaran, M. *Diputación y Modernización: Gipuzkoa 1940–75*; Diputación Foral de Gipuzkoa: San Sebastián, Spain, 2003.
50. De Terán, F. *Planeamiento Urbano en la España Contemporánea (1900–1980), 3rd ed*; Alianza Universidad Textos: Madrid, Spain, 1982.
51. Mas, E. El urbanismo del periodo desarrollista en las capitales vascas. *Rev. Int. De Los Estud. Vascos* **2005**, *50*, 443–491.
52. TALDE. *Estudio Socio-Económico de las Normas Subsidiarias de Planeamiento del Municipio de Rentería*; Errenteriako Udala: Errenteria, Spain, 1981.
53. Oarso. Renteria 1964, (7). Errenteria, Spain. 1964. Available online: https://errenteria.eus/es/municipio/publicaciones-municipales/revista-oarso/no-7-oarso-1964/ (accessed on 27 July 2023).
54. Briceño, M.; Owen, M.E.; Contreras, W. A proposal of indicator system for evaluating visual quality in urban scenery. *Ecodiseño Sostenibilidad* **2011**, *3*, 65–104.
55. Bonet, J. Territory as space for the democratic radicalization. A critical approach to the processes of citizen participation in urban policies in Madrid and Barcelona. *Athenea Digit.* **2012**, *12*, 15–28. [CrossRef]
56. Correia, D.; Feio, J.E.; Marques, J.; Teixeira, L. Participatory methodology guidelines to promote citizens participation in decisión-making: Evidence based on a portuguese case study. *Cities* **2023**, *135*, 104213. [CrossRef]