



Figure 5.17: Neighbourhood associations of AVA (Asociación Vecinos Aluche), ASVEYCO (Ciudad los Ángeles) and Poblado de Orcasitas

(Photos January 2025 and October 2023)



Figure 5.18: The before and after: building without retrofit on the left, and building retrofitted on the right. Ciudad los Angeles

(Photos January 2025)



Figure 5.19: The before and after: building without retrofit on the left, and building retrofitted on the right. Aluche neighborhood

(Photos January 2025)



Figure 5.20: The before and after: building without retrofit on the left, and building retrofitted on the right. Poblado de Orcasitas neighbourhood

(Photos March 2024)

While ASVEYCO (neighbourhood association of Ciudad los Angeles) reported not being involved in retrofit initiatives in Ciudad los Angeles, they have played a significant role in facilitating retrofits in past public projects. Acting as a key intermediary during the 2005-2008 State Plan of urban regeneration, ASVEYCO worked in between local government and presidents of homeowner communities leading to significant neighbourhood improvements. This neighbourhood association previously played a crucial role in urban regeneration by successfully advocating for the area's designation as a “Designated Integrated Rehabilitation Area” (“*Área de Rehabilitación Integral*”) by the Madrid City Council. The liaison between homeowner communities and the government was taken by ASVEYCO.

Past interventions, however, do shape ongoing community engagement, even if ASVEYCO is no longer involved. Indeed, in the case of Ciudad los Angeles, one local construction company operating in the area reports receiving spontaneous demand. From their understanding, this demand stems both from accessibility needs and from residents having witnessed previous retrofit projects in the neighbourhood, which increases awareness and builds confidence among other residents to engage in similar renovation works.

“it is a very old building stock, made of brick walls, and the majority does not have elevators... the residents are in their majority elderly people” (Local construction company, February 2025)

“Our own commercial agents are the neighbours themselves! We don’t need outreach representatives...” (Local construction company, February 2025)

5.2.3.1.2 The singularity of the neighbourhood association work in Poblado de Orcasitas neighbourhood to mobilize retrofits

The neighbourhood Orcasitas stands out as a leader in bringing retrofit awareness to the table, particularly under the leadership of the current president of the local neighbourhood association. In fact, according to our research the neighbourhood concentrates the vast majority of demand for retrofit subsidies in energy efficiency and also in conservation and remediation (see Figure 5.5). In the neighbourhood of Orcasitas, a long-time resident—now serving as president of the neighbourhood association—initiated a large-scale building renovation effort, leading to 70% of the multifamily building stock being retrofitted over the past 10 years. It all started in 2014, when one of the buildings’ facades began to crawl: a 600 kg window parapet detached from one of the buildings, raising alarm among residents. The neighbourhood - as many others in the southern zone of Madrid- has a uniform pattern of construction, and current president of the local neighbourhood association personally took charge and began to investigate public support options for renovating the deteriorating facades in the area, given the risk of more rocks falling from facades, and endangering residents.

After conducting comprehensive archival research on the construction types of the neighbourhood's buildings and holding meetings with public offices, she reached out to each neighbour, explaining the procedure for applying for integrated retrofit solutions that included energy efficiency improvements. She liaised with Public Administrations to understand how to apply for subsidies on time, and she closely monitored the construction works of her neighbours, following up closely with their contractors and architects. This work included archival research, months of meetings with public offices and offering continuous information and support to neighbours for the past decade:

“If in other neighbourhoods there isn’t someone they can turn to... In my neighbourhood, they come to me for anything... really, anything! The neighbours, the whole neighbourhood... There hasn’t been a single person left without an answer. When I don’t know something, I ask, and I know where to go because I have contacts in the city council.” (Neighbourhood Association President, August 2023)

RESULTS

*(...)“ It's a hell of a lot of work ('es un trabajo bestial'). It's dedicating millions of hours,going to millions of meetings with administrations and the city council.”
(Neighbourhood Association President, August 2023)*

*“Hey, I have a quote here... Would you take a look at it for me?” I always tell my neighbours they have to request 3 quotes... And I always say to choose companies that don't impose their architect on you because otherwise, they'll never defend you(...)”
(Neighbourhood Association President, March 2024)*

"It's really about guiding them every step of the way..." (Neighbourhood Association President, March 2024)

Her approach has been based on trust and availability, ensuring clarity in explaining a complex process and being available for all the questions her neighbour may have before or during the retrofit process. She engages with residents individually, simplifying information, offering guidance, and providing continuous support. This includes addressing their questions, explaining each required step, assisting with paperwork, overseeing construction work, and managing the conflicts that inevitably arise during these interactions.

“I approach them as a neighbour...(...) I haven't convinced anyone. Because convincing is like forcing someone to do something they don't want to do, and what you need to do... what you need to do is help them understand that what you're saying is actually a necessity and what they need to do to get it done.” (Neighbourhood Association President, March 2024)

“(...) even if you have to talk to them like small children. Hey, look, don't worry. Let's sit down and have a coffee. Listen, if you are understanding what I am explaining here, please don't leave the meeting. When I finish this I will sit down and explain it to you. If you don't have time? Please give me your phone number, we'll talk tomorrow, and have a coffee and I will explain, don't worry.” (Neighbourhood Association President, March 2024)

“You have to talk to them like children. Not in a technical way! The neighbour wants to know three things: How much will it cost me? When will the construction work be completed? What is the amount of subsidy I will receive? This is what they want to know!The administration is not doing this, in the case of my neighbourhood I'm the one doing it.” (Neighbourhood Association President, August 2023)

“You have no idea of aaaaall the work it takes. It's not just about getting the subsidy and you're done... No, no, no!... Because then there are problems with the architect, there are issues with permits, there's the lack of coordination between the City Council and the "Junta Municipal". Later on, there are also problems with the construction companies, work that wasn't done well and isn't being done well, the architects' indifference.... “.” (Neighbourhood Association President, March 2024)

“There are so many things... I mean, what you see right now... Yes, how nice: we do get subsidies, and look how beautiful the neighbourhood looks now... It seems so easy, but there is soooo much work behind it.” (Neighbourhood Association President, March 2024)

5.2.3.2. Property management (*Administrador de fincas*)

The Property Manager (*Administrador de fincas*) manages the accounts, cleaning services, and building maintenance. They handle budgets, collections, and payments, supervise repairs and services, and ensure legal compliance. Additionally, they organize meetings in collaboration with homeowner community Presidents to facilitate collective decision-making, provide resident assistance, and contracting suppliers. Their work guarantees the proper functioning and conservation of the building.

However, they are typically not proactive regarding retrofits specifically, as noted by a property manager interviewee active in the Aluche neighbourhood. Instead, they tend to respond to requests from presidents of homeowner communities (*presidentes de comunidad de propietarios*) to undertake retrofit projects.

“I have been a property manager for 30 years and I have been handling subsidies in the past 3 years... It is actually beneficial for us as property managers, because buildings in Aluche come up with so many complaints about dampness and moisture in walls and ceilings that we are expected to fix anyway, and that often are not covered by insurance...” (Local property manager, February 2025)

“Our main concern was thermal transmittance and the dampness in our building that is made of brick walls, like the other in the neighbourhood... I have reached out directly to my property manager to support me in managing construction works — it was me reaching out to them with this request, not the other way around.” (President of a community of property owners, January 2025)

Some interviewees suggest that property management could be on policymakers' radar and further mobilized to encourage the communities they manage to engage in retrofits. To accomplish this, property managers would need to adopt a longer-term perspective regarding the buildings' lifecycle, working on long-term planning alongside presidents of homeowner communities, and leverage their direct contact with these communities.

"I think the logic of what a property manager's function needs to change. The property manager can't just be there to manage cleaning payments and change the door lock and so on" (Housing policy consultant, September 2023)

"The manager, together with the community, should have a management plan for the building looking several years ahead. (...) many communities do the ITE (building inspection), but then they don't carry out the works that the inspection requires, so the manager should be there for that, to put pressure that this needs to be done to comply with the law, for safety reasons." (Housing policy consultant, September 2023)

"They should create and set up work plans, financing plans(...) I would like them to tell me, as a homeowner 'hey, look, there's this subsidy. Your property can apply.(...)' there could be a public program that pays administrators to do that," (Housing policy consultant, September 2023)

5.2.3.3. Construction companies

5.2.3.3.1 Leveraging homogeneous construction patterns to facilitate renovation plans

Construction companies operating in southern Madrid strategically focus on specific areas where they can **maximize economies of scale**. Their expertise remains largely business-driven, primarily used to optimize economies of scale rather than influence public decision-making, since the more projects they get the more revenue they get. By concentrating their work in neighbourhoods with common building typologies, they can optimize renovation processes and replicate more easily successful projects of renovations. A Madrid-based construction company exemplifies this approach. Their renovation projects are predominantly located in the Orcasitas neighbourhood and other southern districts such as Moratalaz and Simancas. They recognize that while building typologies may vary, the standardized urban development patterns from the South of Madrid, typical of the *desarrollismo* era (1960s, 1970s) facilitate the implementation of scalable renovation strategies:

"Why do we focus on the south of Madrid? Mainly because the buildings there are old, dating back to the 1960s and 70s. They were built during Spain's rapid

urban development of that period, the “desarrollismo” era, and as a result, their thermal transmittance is much higher. If you look for buildings in Madrid with these features, that haven’t been renovated, that have significant energy loss, and therefore higher energy demand, you naturally end up in these neighbourhoods. Additionally, these areas tend to coincide with populations that are more economically disadvantaged.” (Local construction company, November 2024)

Construction companies in the sector follow a business-driven approach, and one of them describes their process as investing by prioritizing homogeneous housing developments, which often coincide with *desarrollismo*-era housing developments. These buildings often have higher thermal transmittance due to the quality of materials used in the rapid development of the southern districts during that period. These companies target these homogeneous developments, and they generate local viability studies in particular neighbourhoods to identify structural similarities that enable cost-efficient renovations at scale.

“The urban planning model established during the “desarrollismo” era (...). Even if the housing typologies change depending on the neighbourhood... they are all essentially the same. The facade problems of Orcasitas are unique to the Poblado de Orcasitas typology. But asbestos issues are generally the same across developments in this era, because it was a good and cheap material at the time.” (Local construction company, November 2024)

"When we decide to target a neighbourhood, that’s what we look for. We look for buildings that are similar or identical where the work can be repeated. (...) We conduct a feasibility study, check the land registration, and examine the buildings. Then we assess whether this type of building can be replicated across one, two, or three typologies. For example, the Orcasitas neighbourhood: one has ten floors, another has six, and then there are others with four. So in the end, when you study the renovations, you categorize them into three types: A, B, and C. And from there, we develop a proposal. (...)" (Local construction company, November 2024)

5.2.3.3.2 Harness the potential of buildings with poor energy performance for greater energy efficiency improvements.

The concentration of buildings with very poor energy performance in the southern districts of Madrid mean that even minimal interventions can lead to significant energy efficiency improvements. This is due to the non-linear progression of energy ratings, where buildings with the lowest grades have the greatest potential for significant upgrades (see 5.1.2). This, in turn,

facilitates access to energy-efficiency subsidies, as many projects easily meet the requirement of improving energy efficiency ratings by at least two levels.

"Subsidies are greater if you achieve at least one or two levels of energy efficiency improvement. So if you live in the Salamanca neighbourhood, your home is already well insulated, you have good PVC or aluminum windows, and a proper roof. (...) You live comfortably. What happens in these other neighbourhoods? Their homes are poorly insulated, their roofs leak, they don't have elevators...so a simple repair already makes great improvement in energy efficiency" (Local construction company, November 2024)

5.2.3.3.3 Combining urgent repairs with energy efficiency interventions

Construction companies also highlight that they often also respond to homeowners communities who are mainly seeking to repair something urgent, such as elevators for elderly populations living in these buildings.

"There are many elderly people, and the majority of homeowners still live in these buildings. One neighbour hadn't left her home in five years because there was no elevator... almost 90% of the buildings in that neighbourhood had no elevator..." (Local construction company, Ciudad los Angeles, February 2025)

The construction companies often assess homeowners regarding subsidies available and often encourage them to include energy efficiency improvements to come along with their urgent repairs:

"When roofs contain asbestos, they have to be removed, but if we tell homeowners that if they add the SATE, then we tell them it becomes much cheaper overall because with just the roof replacement, they don't achieve the two-letter energy efficiency improvement that gives them more funding. As a result, by including the full insulation package, the subsidies become much more attractive." (Local construction company, November 2024)

In many cases, an immediate issue—such as leaks, or asbestos in the roof—leads to a broader renovation, especially when financial incentives align.

"For example, if you need to repair a facade... There are no subsidies for simply repainting it, but there are subsidies for retrofitting. If they need to meet mandatory Technical Building Inspection (ITE) requirements, we explain that it

might be more cost-effective to include additional improvements. Since there are available subsidies, improving thermal insulation makes financial sense.” (Local construction company, Ciudad los Angeles, February 2025)

5.2.3.3.4 Peer Effect

Despite operating across Madrid, one of the construction companies interviewed claims that most of their clients are located in the Southern area. They recall the effect of past policy interventions, and describe their experience in Ciudad Los Ángeles as having an “*call effect*”, where a few successful renovations in one neighbourhood trigger interest among neighbours.

“It is difficult to explain the retrofit process to people without a concrete example... We started working in the neighbourhood (Ciudad Los Ángeles) more than 10 years ago. We started when policies from the Plan Estatal 2013-2017 defined Ciudad Los Ángeles as a vulnerable area... Because the experience was positive and impacted many buildings, the neighbours could see the change... as a result, interest arose spontaneously.” (Local construction company, Ciudad los Angeles, February 2025)

In contrast, another construction company that operates specifically in the Southern districts of Madrid, employs a door-to-door approach to reach new clients, and they mention the challenge of gaining trust in areas where they lack an established presence. Some have tried to become more involved via neighbourhood associations but these are often not involved in retrofit matters.

“And there we go, knocking door to door to the neighbours. We have salespeople. (...) They say: 'Hey, look, I don't know if you're aware of these types of subsidies that have become available...' We have men and women who call through the intercom: 'Hello. How are you? Look, we're from a renovation company. We're bringing you a catalog of options and approximate quotes. We'll leave it here for you to take a look (...)'” (Local construction company, November 2024)

To overcome skepticism, they use past renovation projects as credibility boosters, inviting potential clients to see completed work in Orcasitas.

“Then what we often do, if they're suspicious, is to tell them: 'Well, just tell us what day works for you and we'll make a joint visit to Orcasitas, for example.' So, we also use our construction sites as a marketing tool..” (Local construction company, November 2024)

Once renovations begin in a neighbourhood, demand escalates rapidly: The moment one project starts in the neighbourhood, there's almost no need to do commercial outreach. The commercial activity comes on its own. (...) The first thing we put up is the scaffolding and a sign, a 12-meter large banner with the phone number, and from there people start calling our office." (Local construction company, November 2024)

6. DISCUSSION

The research contributes to the emerging literature on retrofit intermediaries and provides empirical evidence to the literature of urban transformations, shedding light on how actors and spatial factors influence policy outcomes, thanks to a granular lens. In this section, we discuss the results of our study and provide recommendations for how household retrofit policies are shaped and implemented within urban environments. We examine how these policies unfold at the municipal level and consider the role of socio-spatial factors and intermediary actors in influencing their uptake. Furthermore, we explore how enhanced collaboration among place-based and non-place-based intermediaries—operating between municipal and household levels—can improve policy outcomes.

This research originally asks: “*Considering the need to adopt a more granular scale of analysis and spatially grounded perspectives to understand the processes of urban transformation in a city’s building stock, how do household retrofit policies unfold at the municipal level, and how do actors influence spatial variations in implementation?*”

1. *Socio-spatial dimensions: How does the implementation of household retrofit policies vary spatially within municipal boundaries, given the heterogeneous social and material conditions of urban environments? What are the broader implications of this granular scale approach into how we might rethink climate policy strategies that have a greater chance of being implemented at a local level?*
2. *Intermediaries and the “human dimension”: what **role and influence** do intermediaries play in bridging implementation, and how do they address the breakdown between municipal policies and the household level, where the human dimension is a decisive factor?*

Section 6.1 responds to the first subquestion, outline the key themes that emerged, and underlines the importance of adopting a granular, place-sensitive approach to understand urban transformation processes, such as the renovation of the building stock, describing the key themes that emerged, reinforcing the literature regarding the importance of local, place-based networks in implementation. The potential for enhanced collaboration between place-based and non-place-based intermediary activities emerges as a key theme. These intermediaries—operating between municipal institutions and individual households—can play a critical role in strengthening policy feedback loops. By combining data-driven insights with territorial capillarity, such collaboration can contribute to more effective and targeted household retrofit policy outcomes.

6.1. Socio-spatial dimensions

In this study we contribute to the debate on the “matter of scale” in urban transformation literature by adopting a granular, spatially grounded analysis within municipal boundaries. This approach reveals transformations at district and neighbourhood levels that are not made visible in the analysis with aggregated data at the municipal scale.

6.1.1. Subsidy demand is spatially concentrated in specific areas, despite the program's lack of intentional geographic targeting.

A spatially grounded approach that reaches a more granular level of analysis at the sub-city scale reveals that some particular areas are promoting retrofit uptake and taking advantage of public subsidies. Although these policies are not targeted in their design - since funding is allocated on a first-come, first-served basis - subsidy demand and retrofit implementation remain highly concentrated in specific areas.

Quantitative analysis of the “Plan Rehabilita” data from 2020, 2021, and 2022 shows out of twenty-one districts in Madrid, three districts located in the South of Madrid account for 57% of all energy efficiency subsidies received. The demand in these three districts is highly concentrated within a single neighbourhood in each district. Demand for conservation and remediation subsidies in “Plan Rehabilita” follow the same spatial concentration patterns of energy efficiency subsidies demand, suggesting that one type of intervention drives the next. The district of Usera, however, presents a disproportionately higher demand, three times that of the other two districts—driven primarily by a single neighbourhood, Orcasitas (Figure 5.5). In fact, the zone of the Poblado de Orcasitas has delivered a renovation of 70% of its multifamily buildings stock: from a total of 107 multifamily buildings, 90 have been renovated.

At the municipal level, the pace and scale of retrofit uptake in Madrid remain below targets, despite the full allocation of the public funds that have been made available for retrofit subsidies. However, this granular analysis allowed us to identify that these areas are actively taking advantage of these programs, with strong demand for subsidies. Notably, one neighbourhood has been particularly effective, successfully retrofitting 70% of its multifamily building stock: 35% of the total amount dedicated to energy efficiency subsidies in Madrid were channelled to the Orcasitas neighbourhood, therefore contributing to the massive transformation of the building stock (See Annexes

Annex I).

6.1.2. The spatial concentration of overlapping social and material vulnerabilities drive subsidy demand in specific areas, highlighting how the precarious state of buildings can influence demand patterns

The spatial concentration of demand for energy efficiency subsidies in the three districts of Southern Madrid is accompanied by similar spatial patterns of demand for conservation and remediation subsidies in the same areas. These three districts concentrate overlapping social and material conditions: the building stock has a higher proportion of low energy performance rates and the areas have household net incomes substantially below Madrid's average, placing them among the city's most economically disadvantaged areas. The qualitative methods and site visits provided an understanding that despite local actors having played different roles in retrofit in these neighbourhoods- the exceptional leadership observed in Orcasitas neighbourhood will be later discussed - the buildings share precarious material conditions that generate more frequent disruptions and need for repair.

The buildings in these areas date back to the “*desarrollismo*” era, a period of rapid construction in the 1960s and 1970s aimed at accommodating the new coming working-class migrants. Constructed using materials such as brick walls and prefabricated concrete, these buildings are characterized by high thermal transmittance, contributing to their poor energy performance. Because of the lower quality of their construction standards, buildings in these areas also suffer from more frequent disruptions, making retrofitting a necessity rather than an optional improvement. In contrast, wealthier neighbourhoods with better construction quality do not experience the same pressing need for retrofit interventions.

“ ... they often need to repair their buildings’ condensation problems, dampness and moisture that too often come up... They reach out to us to solve them.” (Local construction company, November 2024)

“During the ‘desarrollismo’ period from the 60s onward, when Madrid began to grow, people from other communities in rural villages were arriving in these areas and needed housing, so construction happened very quickly (...) but they were made with a quality that, well... was made with the means available at that time....” (city council member, August 2024)

“That is, if you go to the Salamanca neighbourhood, the buildings are very old, but they were already well built. There is no urgent need for retrofitting (...) the buildings of low constructive quality, with higher thermal transmittance, and so on, are always in poorer, older neighbourhoods.” (City council member, August 2024)

These areas also have a higher concentration of population over 65 (higher than Madrid average), many of whom are homeowners who originally moved there during the construction boom of 1960s and 1970s. Buildings often lack elevators, and elderly populations urge for retrofit interventions:

"But the buildings in the worst condition are the oldest ones, which in turn are inhabited by older people. (...) So their basic problems are different from what we perceive and what they need. It's not that they're not interested in having a comfortable home, they are interested, but if they have to decide between heating my home or putting on a sweater. (...) I'll put on a sweater and they can install an elevator for me because I don't have money for everything." (City council officer, August 2025)

"We have a very old population. There are many buildings without elevators in Madrid. (...) So there are people confined to their homes because they have limited mobility in their own buildings." (Madrid Institute of Architects member, January 2024)

Overlapping social and material conditions, often concentrated in specific areas, appear to be important conditions that drive retrofit demand (Bolton et al., 2023; Stieß & Dunkelberg, 2013; Wilson et al., 2015). This dynamic aligns with research suggesting that climate concerns are rarely the main driver of retrofits; rather, everyday necessities and urgent repairs serve as key ‘human dimension’ factors influencing these decisions (Brown et al., 2018; Edwards & Bulkeley, 2017). Retrofitting demand typically emerges in response to urgent necessities—such as asbestos removal, elevator installation, or emergency repairs. However, the socio-demographic concentration of low-income, elderly populations in areas with poor construction contrasts with existing literature, which suggests that younger populations with higher incomes are more likely to view retrofitting as a long-term investment (Casanovas, Cuchí, Herrero et al., 2018; Nair et al., 2010).

6.1.3. The “spillover effect”: how unavoidable repairs in buildings can facilitate the inclusion of energy improvements

Energy efficiency improvements are not a top priority for Madrid residents. The funding distribution clearly shows this: 80% of “Plan Rehabilita” funds go toward accessibility improvements through the installation of elevators, while the remaining three intervention areas—conservation, remediation, and energy efficiency—receive less demand (Madrid City Council, 2019a).

"When you knock on someone's door and tell them you're going to carry out renovation work, they will say, 'Thank you very much, but I have other problems.' I believe in climate change, but it's not my priority." (Madrid Institute of Architects member, January 2024)

"An elevator is very noticeable. I mean, if I can't get down from my apartment, I see it, I feel it, it's obvious. (...) It's not that people aren't interested in having a comfortable home—they are. But if they have to choose between being able to leave their home or putting on a sweater... (...) I'll put on a sweater, and they'll install an elevator, because I can't afford everything" (City council member, August 2024)

Still, a spillover effect is observed in the quantitative results of the distribution of “Plan Rehabilita” funds—where conservation, remediation, and energy retrofit subsidies are particularly concentrated in the same three neighbourhoods—is further supported by the interviews. In Madrid, interviews reveal that energy efficiency measures are more often undertaken when paired with other essential repairs, such as fixing leaks, cracked facades, or damaged pipelines.

"They replace the boiler because it broke, and since there are subsidies, maybe then they consider doing something more, like improving energy efficiency. (...) But if you want to install a SATE in your facade, you have to reach an agreement with the neighbours—there's no other way around it." (City Council member, January 2024)

"Since they're going to remove the asbestos from the roof, we argue they could use this opportunity to also change the SATE on the facade. It will make it cheaper for them in terms of subsidy, because if they only focus on the roof, they don't meet the two letter upgrade in energy efficiency they need to achieve to become eligible for energy efficiency funds. If they demonstrate this improvement, they will get more subsidy overall." (Local construction company, November 2024)

While the lack of elevators is a widespread issue, particularly in these districts, the pattern of demand is not as explicit as in other categories (See Figure 5.5 and Figure 5.7). Unlike remediation and conservation interventions, which show a clear correlation with energy efficiency, our data does not indicate a strong link between elevator installation and energy efficiency improvements.

In fact, the “Plan Rehabilita” program already encourages combined interventions, since the subsidy amount increases significantly when renovations achieve a two-letter energy efficiency

rating upgrade, encouraging combined rather than incremental interventions. While applications are processed on a first-come, first-served basis, the government provides higher subsidies for construction projects in designated vulnerable areas. Additionally, projects that achieve an upgrade of at least two energy efficiency rating levels qualify for more energy efficiency subsidies than they do if they only improve one letter (Madrid City Council, 2023). Since energy efficiency gains are not linear, buildings with lower initial ratings have greater potential for significant improvement.

“In terms of insulating a building, a window replacement alone isn't considered sufficient for energy efficiency funding. However, if you combine window upgrades with SATE facades, you'll likely meet the requirements by improving your energy rating by more than one letter, making you eligible for the subsidy.” (City council member, August 2024)

*“The worse your energy rating, the easier it is to qualify for subsidies and drastically reduce energy demand, so aid is also channelling to older buildings.”
 (“Oficina Verde” member, August 2023)*

These findings reinforce previous literature findings that retrofits are not a latent demand among homeowners, who are more likely to deal with the hurdles of getting collective agreements in multifamily dwellings when disruptions require immediate action. (Brown et al., 2018; Edwards & Bulkeley, 2017; Parag & Janda, 2014; Raven et al., 2021; Wilson et al., 2015). While the literature acknowledges that energy retrofit engagement often occurs in conjunction with other repairs —since climate change is not always the primary motivator—, it emphasizes the importance of more systematically linking situational opportunities, repair needs, or refurbishments with energy efficiency and conservation measures (Bolton et al., 2023; Edwards & Bulkeley, 2017; Stieß & Dunkelberg, 2013).

6.1.4. The “imitation effect:” past targeted policies that generate a lasting effect in particular places

The spatial concentration of demand is also influenced by the lasting impact of past targeted retrofit or neighbourhood regeneration policy initiatives which generate a spontaneous continuity beyond their formal conclusion. This continuity is driven by ongoing mobilization, collective learning, and the visible presence of renovated buildings that serve as tangible examples to replicate:

“The opportunity for aid appears: People who received aid in the past mobilize in an organized manner because they already had this experience, and are better positioned to achieve better results.” (Academic expert, October 2023)

Indeed, former municipal policies such as the “Plan MA-DRE”, for example, allocated funding to vulnerable areas (APIRUS areas). The three areas that continue to push the demand funding are indeed APIRUS areas that received aid in the past:

“I think the MA-DRE Plan, for example, served for this, to begin activating these vulnerable neighbourhoods. If you have a program that is only for you, well, you participate. (...) And if you are well-prepared because you already have a history of applying, you probably also already have an architect who will help you prepare your project to apply for aid. You are prepared. So this is what the MA-DRE Plan served for... and even though there isn't an APIRUS area criterion (vulnerability areas) like there was before... if you are prepared and you're seeing that the neighbouring building looks great and has taken advantage of the aid, well, you are well positioned. (...) The Rehabilita Plan is still drawing a bit from the MA-DRE plan effect because it takes time to get people mobilized.” (City council member, June 2024)

“They see that past experiences in the neighbourhood have been positive. This encourages them to reach out to us. Without a clear example—something they can see firsthand or a reference from someone they trust, like 'my cousin told me'—it becomes much harder to convince them that the investment is worthwhile.” (Local construction company, February 2025)

Visible improvements, at the neighbourhood level, serve as a persuasive tool: when one building undergoes enhancements—whether in terms of comfort, or even aesthetics—it sparks interest and encourages nearby households to follow the trend. People tend to trust recommendations from those they know, and word-of-mouth advice about suppliers and processes from neighbours or close relations further drives the adoption of retrofitting within the community.

“The imitation effect (‘efecto contágio’) really works. It’s the Spanish envy you know? It really works, doesn’t it? Of course! People see that it’s a successful experience. Because now it’s not just something they’re being told about—they’re seeing it for themselves. And on top of that, their neighbour is telling them, ‘It costed me this much because I got this amount covered.’” (City council member)

“One day, someone approached me and asked, ‘Do you live here?’ I was entering the building, and I said, ‘Yes, yes, I do.’ And they said, ‘Tell me, what do I need to do to get

this done?' (...) Once they see it—once they realize you're warm, comfortable, and even saving money—of course they want it too!" (neighbourhood activist)

Beyond improving the structural and energy performance of buildings of cheap construction, one interviewee raised how these renovations also foster a sense of dignity and pride among residents and homeowners. Investing in the renovation of poorly built areas not only improves living conditions but also fosters a greater sense of pride and esteem among residents for their homes:

"There is also a matter of dignity and aesthetics. If we all start applying SATE in these buildings' facades, we could improve our cities... There are well-done SATE facade renovations that enhance a building's state.... And what we're seeing is more dignity. These are residential buildings without any significant architectural interest, and poor materials, and a well-applied SATE can really make them look better." (Madrid Institute of Architects member, January 2024)

The phenomenon — where retrofit dynamics gain traction within communities once they become tangible interventions — offers valuable insights into the potential of localized strategies to scale retrofitting efforts. This “imitation effect” has a socio-spatial dimension, as visible, concrete examples transform retrofitting from an abstract idea into a material and even desirable outcome. This aligns with the literature on the 'human dimension' of retrofitting which emphasizes how social relationships and community dynamics influence homeowners' decisions. When interventions are visible within a community, homeowners are more likely to trust that the retrofitting efforts are worthwhile, as they are influenced by the experiences and recommendations of those around them (Bolton et al., 2023; Middlemiss et al., 2024; Parag & Janda, 2014; Raven et al., 2021; Wilson et al., 2015). These examples deserve greater attention in policy design and implementation.

6.2. Intermediaries and the human dimension

In this section, we describe key themes that emerged regarding how place-based intermediaries operate and examine how their collaboration with non-place-based intermediaries could be strengthened to improve policy outcomes by integrating their respective capacities—such as the production of granular data and more capillarity across territories—into more coordinated and strategic efforts.

6.2.1. “Local champions”: how place-based intermediaries drive community-led retrofit efforts and influence subsidy demand patterns in particular neighbourhoods

While neighbourhood associations have not been as active in other areas, the transformation of the neighbourhood of Orcasitas has been driven by strong leadership at the neighbourhood level. This neighbourhood mobilizes a disproportionate amount of energy efficiency subsidies and also leads the demand for conservation and remediation subsidies (“Plan Rehabilita” 2020, 2021, 2022). Like the other two areas, the demand stems from the poor condition of its construction, particularly in the buildings’ facade, sparking concern and urgency. The massive building renovation process in the neighbourhood began after a dangerous deterioration of the facade occurred in 2014, raising alarm among residents. The facades in the neighbourhood of Orcasitas share very similar design patterns, typical of neighbourhoods that emerged during the “*desarrollismo*” era:

“Out of nowhere, a piece of stone from the facade fell. Just like that, without warning. It showed no signs, made no noise—it just fell.” (Neighbourhood Association President, August 2023)

A long-time resident of the neighbourhood and the current president of the Poblado de Orcasitas neighbourhood association, personally took charge and began to investigate public support options for renovating the area’s deteriorating facades. After conducting comprehensive archival research on the construction types of the neighbourhood’s buildings and holding meetings with public offices, she reached out to each neighbour, explaining the procedure for applying for integrated retrofit solutions for repairs, and included energy efficiency improvements.

- **Inform and mobilize the community:** She has offered continuous information and support to neighbours for the past decade and develops connections in administrations to make sure her community gets prepared in time for the calls and take advantage of the subsidies that are made available:

“I find out about upcoming subsidies in advance—two months before they become released, I already start to hold meetings to inform my neighbours. (...) I say, ‘Hey everyone, the subsidies have just been announced, please, tell me what do you need?’ They tell me, ‘I don’t know how to get the X...’ and I tell them, ‘Look, you need to do this, this, and then this...’” (Neighbourhood Association President, March 2024)

"... I haven't convinced anyone (...). Because convincing someone feels like forcing them into something they don't want. What you really have to do is help them understand why what you're saying they need to do is actually necessary, and what steps need to be made to make it happen. (...) You are there to help, but people come to their own conclusions about what to do" (Neighbourhood Association President, March 2024)

"It's really about guiding them (neighbours) step by step, taking them by the hand, never being dismissive, never just agreeing with them for the sake of it... because sometimes there are people who try to get their way around it." (Neighbourhood Association President, March 2024)

- **Tailored support:** She guides neighbours through every step of the application process, not only providing information but also offering one-on-one assistance and being readily available to address any questions that arise:

"...And I always tell them: ask me, don't worry, call me whenever you want. If I can't answer, I'll call you back... (...) They call me, for example, 'Hey, I have a budget estimate. Can you take a look?' Because I always tell them, 'you have to ask for three budget estimates, at least three different ones(...).'" (Neighbourhood Association President, August 2023)

"Besides the general meeting at the neighbourhood association, I help them through the entire process, so they understand what they need to do and why they need to do it. What documents do they need to compile and by what time? It's not just about the construction work; they need to request a permit, pay certain fees beforehand to apply... beyond the construction costs, there are other costs they need to cover. I also explain that we have an agreement with a bank so that the part that is not covered by the subsidy can be financed under optimal conditions. (...) It's an enormous amount of work—millions of hours, millions of meetings with the administration and the city council." (Neighbourhood association President, August 2023)

The leadership at the neighbourhood association leadership helps alleviate the cognitive burden of residents not only during the application process, as previously mentioned, but also throughout the construction phase. Her physical presence in the neighbourhood facilitates her to closely monitor the construction work, actively following up with contractors, architects, and other stakeholders to ensure everything progresses as planned:

"You have no idea of aaaaaall the work it takes. It's not just about getting the subsidy and you're done... No, no, no!... Because then there are problems with the architect,

there are issues with permits, there's the lack of coordination between the City Council and the "Junta Municipal". Later on, there are also problems with the construction companies, work that wasn't done well and isn't being done well, the architects' indifference...." (Neighbourhood Association President, December 2024)

"It's exactly what we were saying before: if you have a four-legged stool and you remove one leg, it becomes unstable. The same thing happens here. You have to stay on top of how everything evolves at each step because if one part fails, you ruin the entire process." (Neighbourhood Association President, December 2024)

"There are so many things... I mean, what you see right now... Yes, how nice: we do get subsidies, and look how beautiful the neighbourhood looks now... It seems so easy, but there is soooo much work behind it." (Neighbourhood Association President, March 2024)

- **Untangling conflicts:** Besides informing and fostering neighbours to engage in retrofits and take advantage of the opportunity of subsidies to improve their buildings, she is there, physically present to untangle conflicts that emerge within the stakeholders involved during the construction work, unexpected outcomes, and mediating on behalf of homeowner communities.

"I get these calls, like: 'Hey, my building entrance is flooded... The ramp is broken...' and I have to be there to see it! (...) when I get there and speak to the architect and to the construction company to resolve it, they start blaming one another, a constant 'you you you, me, me, me you you...' (Neighbourhood Association President, March 2024)

The demand for public subsidies to this particular area has been largely driven by the deteriorating condition of the built environment and the urgent need for facade repairs, like in the other two neighbourhoods identified in this research. However, the presence of a place-based intermediary like the woman president of the Poblado de Orcasitas neighbourhood association—who effectively navigates government authorities, suppliers, and homeowner communities—has played a crucial role in leveraging subsidies for this neighbourhood. As a “trusted messenger,” she overcomes human dimension barriers, mobilizes homeowners, facilitates access to funding, and provides them continuous support until the construction is done. While she initially lacked technical expertise on the matter, her voluntary commitment to the project enabled her to develop the necessary knowledge to be equipped to guide homeowners step by step through the process. The results are striking: 35% of all energy

efficiency subsidies goes to Orcasitas, and she also mobilizes the majority of remediation and conservation subsidies to the neighbourhood. While the other neighbourhoods share deteriorating building conditions, the neighbourhood associations are not actively mobilizing collective demand efforts; rather they are coming one by one, independently, according to the information obtained in interviews and on-site visits in local neighbourhood associations in Ciudad los Ángeles and Aluche.

"If other neighbourhoods don't have someone like me... a go-to person they can turn to like they have in Orcasitas... That's the thing, people turn to me for everything, everything! The neighbours, the entire neighbourhood. No one has ever been left without an answer. And if I don't know how to answer, I'll ask ask—I know where to go because I have contacts in the city council." (Neighbourhood Association President, March 2024)

"Most of the neighbourhoods in the South of Madrid we work on with demand comes one by one... it is not organized collective demand like it is so in Orcasitas" (Local construction company, November 2024)

"That's why I always tell them: get out of your offices, come to the neighbourhood, come see the neighbourhoods—because they (administrations) don't even know where we are!" (Neighbourhood Association President, August 2023)

And the key is: how do we activate the last mile? The only case in building retrofitting that I know of where the last mile has been activated is this one. (...) It's the symbiosis between the neighbour and the technician. If there is no symbiosis between the neighbour and the technician, then there is nothing."

(Lawyer of the Madrid Assembly, Regional Government, on the Orcasitas neighbourhood)

Intermediaries with already established community relationships are more likely to establish relations of trust and be able to connect abstract energy efficiency targets and everyday household needs (Middlemiss et al., 2024; Edwards & Bulkeley, 2017). The role and influence of embedded, place-based intermediaries align with existing literature emphasizing the importance of their physical presence in communities and their ability to act as "trusted messengers" or "local champions" to accelerate retrofits and drive homeowner engagement (Bolton et al., 2023; Brown et al., 2018; Edwards & Bulkeley, 2017; Parag & Janda, 2014; Putnam & Brown, 2021). Their capacity to translate complex, abstract information into

practical, everyday concerns highlights the significance of intermediaries' non-technical skills in the success of retrofit initiatives (Bobrova et al., 2024; Owen et al., 2014; Raven et al., 2021). Without financial stakes in the process, these intermediaries leverage their non-technical skills—particularly trust—to mobilize communities and facilitate retrofit adoption (Brown et al., 2018; Edwards & Bulkeley, 2017; Putnam & Brown, 2021). Moreover, their support extends beyond the subsidy application process, guiding homeowners through the complexities of building renovation and construction, effectively tailoring the "retrofit journey" to individual needs (De Wilde & Spaargaren, 2019).

6.2.2. Strengthening place and non place based intermediaries' collaboration towards data-driven policies

6.2.2.1. Tracking subsidy distribution and the impact of information hubs in Madrid is limited by a lack of disaggregated data.

Targeting specific areas for intervention would require shifting from a top-down policy structure—a “one size fits all policy” where subsidies are distributed based on demand—to a data-driven approach to make informed decisions of where to allocate subsidies in the city. While global, EU, and national efforts are shaping municipal plans toward climate neutrality in Madrid, policy evaluation reports highlight a breakdown in vertical coordination at the local level. Municipal plans often lack detailed district-level data, nor a comprehensive assessment of the building stock, hindering effective implementation (Casanovas, Cuchí, Herrero et al., 2018; De Gregorio Hurtado & Gharbi, 2022). Moreover, data collection on the distribution of various subsidy programs is fragmented across national, regional, and municipal levels, resulting in an incomplete picture of uptake and the overall scope of publicly funded retrofits. For these reasons, the researcher used “Plan Rehabilita” data as a proxy to examine uptake in publicly funded programs that aim to stimulate retrofit uptake.

Additionally, there is no systematic mechanism for tracking emissions or analyzing sectoral contributions to GHG emissions at district or neighbourhood level in Madrid. Data collection is largely centered on the municipal level, overlooking the granular spatial dimension needed to evaluate the impact of retrofit interventions. For example, the city's GHG emissions inventory, to this date, collects data at an aggregated municipal level, categorized by sectors such as buildings and transportation (Madrid City Council, 2022). The lack of disaggregated data at district or neighbourhood level limits the ability to assess the effectiveness of localized retrofit interventions and ultimately assess their contribution to GHG reductions. Patterns of

social inequality also remain unclear, making it difficult to assess the effectiveness of interventions in reducing disparities. Additionally, energy burden data is collected only in aggregated form, not at the neighbourhood or district level, which further limits insight into spatial variations across the territory. Castán Broto (2017) emphasizes the importance of disaggregated data to visibilize inequality: *“Lack of data disaggregation leads to analyses which are largely blind to the geographical patterns of environmental degradation, and the gross inequalities that shape such patterns.” (...)* *This manner of accounting obscures key aspects such as the differentiation of emissions within cities.*” (Castán Broto, 2017, p. 3).

The lack of geographical granularity of data is not only a problem in Spain, but neighbourhood level data is often not collected, according to the Global Survey on Buildings and Climate (OECD, 2024). Interviewees have stressed the importance of systematically collecting and tracking energy-efficiency data of the existing building stock in Madrid and in other Spanish cities. A former public officer leading Urban Regeneration strategies for the city of Madrid, acknowledged that while more detailed information on buildings could be integrated within the already existing process of the periodic technical building inspections (the “ITE” procedures), the decision to collect data at such a granular level ultimately remains a political one:

“By law, you are not required to report energy-efficiency performance in the ITE (Technical Building Inspection), so you just focus on facades, sanitation, etc., and avoid getting into that. In the end, since there are so few of us in the administration... (...) Strengthening teams is ultimately a political decision. If I have a clear vision and say: ‘This needs to be done because we are going to start inventorying the city’ and begin tracking...”(City Council member, June 2024)

The impact of information hubs such as the “Oficina Verde” also remains unclear, as data from visitors is not tracked either. The office lacks comprehensive visitor tracking, making it difficult to assess who benefits from the program and whether “Oficina Verde” effectively reaches diverse socio-economic groups or the highest-emission areas. The majority of visits in 2022-2023 (60%) came from individual households, despite the fact that multifamily buildings make up 95% of the residential stock (see Annex II). This indicates a misalignment between the outreach efforts and the actual composition of the building stock, potentially limiting the impact of retrofit initiatives on the larger-scale, collective renovations needed.

The “Oficina Verde” is not tracking what social groups visit them, nor what areas are benefitting from their information services, or where public-private partnerships are yielding results. There is no detailed analysis of the socio-demographic profiles of visitors, making it difficult to assess what social groups are benefitting from the program.

“Every time someone had a consultation, we asked them to fill out a form... But we don’t like to overwhelm people too much... With the temporary mobile office experiment, we considered doing it and started filling it out, but we quickly became overwhelmed... There were 5 or 6 people waiting in line... and some left because they didn’t want to wait.” (“Oficina Verde” representative, July 2023)

Without a structured assessment of the populations accessing “Oficina Verde”'s services, it remains unclear which social groups and territories across the city are being reached, and whether their efforts to bridge the information gap are effective.

Evaluating the office’s reach and impact in accelerating retrofits and overcoming information gaps is challenging since they primarily measure their effectiveness by noting that available funds are exhausted:

“Since we only handle the initial phase, we don’t have an exact figure—if it is whether 5%, 10%, or 50% of the people who came here (to “Oficina Verde”) and who actually went ahead with the renovation. (...) The only way we can measure our impact is by seeing that the funds have run out... And the reality is that the funds are depleted. Right now, the waiting list doubles or even triples the available funding of all the lines available. It’s not just our work, of course, but have we played a role? Yes, absolutely. (...) If no initiatives had been taken, the funds would probably have remained untouched.” (“Oficina Verde” representative)

Overall, there aren’t many incentives to collect very specific data, as some interviewees who work in city council have raised that they are primarily evaluated by their ability meet budget execution targets rather than optimizing the effectiveness or equitable distribution of the funds in different areas:

In Spain (in almost all public administrations), managers are evaluated based on their ability to spend the allocated budget rather than on how efficiently they do so. If I’m given 3 million to install photovoltaic panels, I’ll do something to make sure they get installed. Either I create a very complex process, or I open it up even if I know that those from Pozuelo will take it all. And if you impose restrictions, the complexity will leave you far from meeting the budget spending targets.” (City Council member, January 2024)

The President of the neighbourhood association of Poblado de Orcasitas criticizes the local government's inertia in enhancing implementation of retrofit policies, emphasizing that little real learning seems to be taking place.

“The thing is: it is real, it really can be done. This is how you can do it. If it can be done, why isn't it being done? (...) I find it hard to understand that the administration hasn't yet been capable... So, if the Administration isn't capable, they can't expect a resident to break their back or give ten years of their life to successfully complete a project.” (Neighbourhood Association President, March 2024)

“We've been working on renovations for five years. And we keep going. But every time I go to events on energy retrofits to talk about the case of Orcasitas, I keep talking about the same thing. And I hear the same thing over and over again. We've been hearing the same thing for five years.” (Neighbourhood Association President, March 2024)

(...) I continue to repeat this: We don't have anything special, I repeat. I don't get any extra money. It does not have to be an exception. It shouldn't be, really” (Neighbourhood Association President, March 2024)

Despite Madrid's commitment to climate-neutrality, the local government exhibits a form of passive resistance by failing to collect granular emissions data and systematically track progress—a gap that ultimately undermines the city's ability to implement targeted climate action and demonstrate meaningful advancement toward its stated environmental goals. Indeed, authors have identified resistance to change even in cities recognized as climate champions (Hölscher et al., 2019; Khan, 2013; Wamsler, 2015). While energy efficiency data reporting is only mandatory (and therefore, collected) when a building is sold or rented, you don't get a comprehensive inventory of the state of the building —making energy reporting mandatory as part of the already existing “ITE” process would be a step to integrate more granular data and tracking. Detailed data collection does not appear to be a priority since the “Oficina Verde”, which was launched to disseminate information and promote retrofit uptake, does not systematically collect data to assess which populations and territories are being reached, limiting the ability to evaluate effectiveness and which populations and areas are taking advantage of retrofit subsidies. While the City Council celebrates the growing demand for subsidies and views the exhaustion of funds as a sign of increasing public awareness, this perspective overlooks whether the subsidies are reaching the most vulnerable populations or addressing the places where GHG emissions and energy efficiency needs most attention.

6.2.2.2. Strengthening collaborations among intermediaries has the potential to foster data-driven policies and improved feedback mechanisms

Middlemiss et al. (2024) argue that paying more attention to the role of intermediaries in energy retrofits could offer new perspectives to policy makers and practitioners on understanding the

problem, potentially leading to alternative ways to target policies for more effective implementation (Middlemiss et al., 2024). The research revealed intermediaries within Madrid's retrofit system that has emerged in response to recent climate action plans targeting climate neutrality. This expanded ecology comprises both place-based and non-place-based intermediaries—including some that emerged spontaneously without direct government support. Local governments could more intentionally cultivate partnerships between place-based and non-place based intermediaries to transform the current fragmented approach into a more collaborative structure that can potentially yield greater and more distributed outcomes in retrofit uptake in the city. Currently, each of these intermediaries operate within a rather fragmented ecology: they have distinct roles, goals, and interests within this landscape of expanding funding opportunities. These intermediaries include utilities, universities, information hubs, neighbourhood associations as well as private sector players operating locally such as construction companies and property managers. In this section we outline the potential synergies in the retrofit intermediaries landscape and propose alternative connections to enhance retrofit adoption.

6.2.2.3. Facilitating local network formation: The potential for municipalities to enhance their outreach strategies by collaborating with place-based intermediaries in specific neighbourhoods

Rather than relying on centralized information and centralized information hubs to raise awareness and drive retrofit adoption, the “Oficina Verde” could expand its reach and address varying levels of knowledge and motivation across neighbourhoods by nurturing partnerships with place-based actors that have deeper community connections and greater capillarity in the territory. While retrofit demand is concentrated in specific low-performing, low-income areas, the city's building stock is generally inefficient. Therefore, retrofitting efforts should also expand to other areas to enhance uptake and drive the broader transformation of the built environment. The research shed light on the potential of local networks to influence retrofit outcomes, as demonstrated by the network that emerged in a neighbourhood like Orcasitas.

Local governments could more strategically identify and support "local champions" by strengthening connections with already existing place-based intermediaries such as neighbourhood associations in particular neighbourhoods. This approach would facilitate network formation and accelerate retrofit initiatives across different areas. These intermediaries have the potential to play a crucial role in catalyzing large-scale retrofits, as made possible by the leadership example of the Orcasitas neighbourhood association. The amount of energy-efficiency subsidies channelled to this district is three times higher than the other two areas

demanding most subsidies. While all three areas share similar deteriorating building conditions, what sets Orcasitas apart is its unique neighbourhood leadership and mobilization. This strong local engagement has played a decisive role in securing a disproportionately higher share of funding for the neighbourhood.

The strategic activation of neighbourhood associations has been used in the past in the process of implementation of regeneration and retrofit initiatives in Madrid. For example, the ASVEYCO neighbourhood association in Ciudad Los Ángeles played a key mediating role between homeowner communities and local government in the early 2000s, accelerating neighbourhood regeneration efforts (Córdoba-Hernandez et al., 2020; Herraéz, 2000). The long-term impact of this approach to building renovation is evident in the continued demand for retrofits in the area today.

Another place-based actor who has capillarity in the territory and could be further leveraged are property managers, who work across buildings in particular neighbourhoods. While these private sector actors may not be as deeply embedded in the community as neighbourhood associations or local activists, they operate closer to homeowner communities and could have a valuable role to play. They could evolve from mere administrators to sustainability catalysts by developing long-term building plans, identifying retrofit opportunities, and connecting homeowners with available subsidies. Policymakers could create incentive programs that compensate property managers for guiding communities through energy efficiency improvements.

6.2.2.4. The potential for municipalities to collaborate with intermediaries to leverage granular data and to track retrofit implementation progress in different areas of the city

To effectively target specific areas and inform, for example, the “Oficina Verde” outreach strategies for activating place-based intermediaries, data-driven approaches are essential. By leveraging granular data and cultivating strategic partnerships with existing actors involved in the retrofit system—including universities, utilities, and construction companies—local governments can deepen their understanding of retrofit dynamics, create more responsive feedback mechanisms, and continuously adapt policy strategies to local contexts. We outline in this section how a greater collaboration with non-place intermediaries could improve data collection and learning feedback loops, by leveraging their knowledge and expertise to target policies with more informed decisions.

6.2.2.4.1 Facilitating multi-stakeholder collaborations and tracking granular-level GHG emissions and energy efficiency data.

By supporting local governments in implementing systematic data collection methods, strengthening partnerships with the University can support local governments in the identification of underserved areas and support the design and revision of existing plans, towards data-driven, targeted retrofit interventions.

6.2.2.4.2 The collaboration of itdUPM with Madrid City Council

One example of a collaboration that has contributed to the enhancement of policy feedback loops, is the Fair Transitions project, a partnership between itdUPM and the Madrid City Council, described in the Results chapter. The intermediation work led by itdUPM in the revision of the Madrid Roadmap Towards Climate-Neutrality consisted in liaising City Council with non-government organizations to make an in-depth examination of the potential social inequalities that emerge in the implementation of climate-neutral policies, such as household energy retrofits. The process resulted in the publication of a revised version of the Madrid Roadmap that made more explicit the potential social inequities that are worth paying attention to when implementing such policies. It is worth mentioning that besides cultivating multi-stakeholder strategies to promote policy feedback loops, there is also an established long standing collaboration between the Universidad Politécnica de Madrid (UPM) and the Madrid City Council in generating the city's emissions inventory that contributes to monitoring effects of urban climate policies in the city.

The example of itdUPM illustrates the potential role of the University as a transition intermediary that nurtures partnerships, and well positioned to provide in-depth analysis and monitoring of implementation of climate policies. The learnings from the process with Madrid city council is in dialogue with the efforts of the citiES platform, led by itdUPM and EU Climate KIC, that supports Spanish cities in their implementation plans towards a transition to climate neutrality. In collaboration with the Green Building Council Spain, the platform has developed a “Roadmap for the Decarbonization of the Construction Sector in Spanish Cities.” Recognizing the need for localized solutions, the report advocates for the establishment of decentralized neighbourhood offices as an effective, scalable model for replication across Spanish cities (CitiES, 2023).

6.2.2.4.3 Insights to Madrid from the collaboration of University of Catalunya and the Basque Country for the collection building-by-building data

The University of Catalunya supports the Basque government by collecting detailed building-level data, assessing energy performance, and creating tailored retrofit roadmaps. Thanks to

their data-driven strategy, their collaboration helps municipalities identify priority buildings, plan step-by-step renovations to improve energy ratings, and actively targeting specific areas that are most in need rather than waiting for voluntary engagement

Replicating such a model in Madrid could enhance the allocation of financial resources with renovation priorities, promoting a more data-driven approach to urban energy efficiency policies. The collaboration between the Universidad Politécnica de Madrid (UPM) and the Madrid City Council in generating the city's Emissions Inventory is already well established, but data is collected at an aggregated level to this date. More granular data at the district and neighbourhood levels to assess the effectiveness of household-level policies and identify areas with higher concentrations of GHG emissions coming from buildings could be further cultivated. The collection of building-by-building data collection and analysis—as demonstrated in the Basque Country—allows the production of a systematic mapping with granular data indicating building conditions, assessment of specific renovation needs, and the development of customized energy retrofit roadmaps to improve efficiency in the city's building stock.

6.2.2.4.4 The potential for municipalities to leverage collaborations with energy utilities to incorporate building-level electricity consumption data (and inform the development of targeted strategies that drive energy transformation)

Gathering granular, building-level electricity consumption data for thermal needs in Madrid could significantly strengthen data-driven energy retrofit strategies. Iberdrola emerges as a significant national electricity provider with a prominent market presence in Madrid, supplying electricity to 46% of the local market. They operate with a long-term vision primarily focused on electrification rather than accelerating large-scale household renovations. Unlike local construction companies, whose revenue depends on the volume of projects completed, Iberdrola's main interest lies in shaping and influencing policy development to facilitate the electrification of buildings. Their increasing engagement in retrofit initiatives as delegated developers, while not particularly relevant in terms of volume of projects, has granted them strategic influence at the municipal level, including a greater participation in building regulations and legislations in the city.

Iberdrola possesses strong data analysis capabilities, generating detailed electricity consumption data at the building level, which could be leveraged by the local government to map particular areas where electrification access can be problematic. Iberdrola also has an extensive territorial presence, with offices in various neighbourhoods, giving them potential capillarity in reaching homeowners and collaborating with place-based actors. Despite having

physical neighbourhood offices across Madrid, Iberdrola's local representatives are not actively involved in retrofit engagement: their staff primarily assist residents with billing inquiries and administrative tasks, particularly supporting older adults who may not be familiar with online platforms. By leveraging this presence and collaborating more closely with local governments and neighbourhood organizations, Iberdrola could play a stronger role in bridging the knowledge gap among homeowners, making retrofit opportunities more accessible and supporting the integration of energy transition efforts with local needs.

6.2.2.4.5 Leveraging data on construction patterns in different areas to adapt different strategies for intervention

Construction companies can provide valuable expertise that could better inform the City Council to design different targeting strategies to advance renovation policies. By mapping patterns of construction in different areas and identifying differing necessities for potential repairs and energy efficiency upgrade, public investment in buildings could be further optimized and tailored to the specific conditions of different areas within the city.

This industry expertise can be leveraged to refine policies, such as mapping regions with greater energy efficiency deficits in construction, elaborate feasibility studies, identifying areas with significant structural deficiencies, and pinpointing housing developments suitable for scalable and replicable interventions. The research identified how construction companies have been leveraging scale gains in Madrid's southern districts for a number of reasons. First, the cheaper construction with which the buildings in these three areas were constructed can result in more frequent disruptions and urgent repair needs—such as asbestos removal, leaks, or elevator installations. These necessary repairs present a key opportunity to integrate energy efficiency improvements, as seen in the three identified areas of Madrid and in the literature, which suggests that climate change alone is not the primary driver of retrofitting decisions (Stieß & Dunkelberg, 2013; Wilson et al., 2015). Second, a concentration of buildings with high thermal transmittance also means that their low energy performance increases the likelihood of a small intervention making a way more significant progress in efficiency gains, enhancing return over investment. Third, targeting areas with homogeneous construction patterns—such as those identified in the south of Madrid—can enhance the replicability of interventions, allowing solutions to be easily adapted from one building to another.

Another key insight is the spillover and imitation effect observed in retrofit adoption. When repairs for conservation and remediation need to be made, including energy efficiency becomes more menable, since energy efficiency is not perceived as an urgent need (Edwards & Bulkeley, 2017; Madrid City Council, 2019a). Additionally, when improvements take place in a specific area, they become tangible, visible, desirable and people trust it is possible to get it done by

speaking to their neighbours. When residents see improvements in their community, they are more likely to trust the process and engage in similar upgrades themselves. Social dynamics, including desirability and neighbourhood status, further reinforce this effect (Bolton et al., 2023; Parag & Janda, 2014; Raven et al., 2021).

6.2.3. Implications in terms of equity and more effectively lowering GHG emissions

A granular analytical lens has allowed us to identify a spatial concentration in the demand for household energy efficiency subsidies, revealing areas where urban transformations are progressing. In Madrid, we have identified that overlapping socio-material inequalities, concentrated in specific areas, have influenced policy outcomes. This provides valuable insights for local governments to better leverage the unique conditions of specific neighbourhoods enabling more targeted interventions that optimize public expenditure and achieve more effective social and greenhouse gas (GHG) emissions outcomes. Heterogeneous social and material realities in cities drive differing demand patterns, and these dynamics have become visible through a more granular, spatially grounded analysis.

While the buildings receiving most subsidies are areas that do concentrate low-performing buildings and low-income households, the widespread poor performance across all 21 districts suggests the need for a more comprehensive renovation strategy. Most buildings are rated E-G in energy efficiency, indicating that although three districts drive the primary demand for subsidies, a broader, district-wide approach to building improvements is essential. Addressing different needs in different areas of the city would require strategies that account for the unique material conditions and social contexts of different urban areas, ensuring broader participation and tailored interventions.

There is a potential for the government to collect, analyse and improve policy feedback loops by strengthening collaborations between the existing ecology of place-based and non-place based intermediaries who have become increasingly active in the household energy retrofit system, driven by the growing focus on climate neutrality within the EU. Our research underscores how the currently fragmented landscape of intermediaries in the retrofit system could be better connected by recognizing their contributions to data generation, networking, and knowledge exchange, as well as their varying degrees of embeddedness within specific territories. Place-based intermediaries, in particular, can play a crucial role in overcoming human dimension barriers such as trust and proximity, which are often decisive factors in retrofit decisions. Additionally, leveraging data generated by utilities, universities, and

construction industry actors—who are already engaged in knowledge exchange and networking—can provide valuable insights. By obtaining more granular geographical data, policymakers can better identify priority areas for intervention and intentionally engage both place-based and non-place-based actors, ultimately leading to more effective implementation strategies within specific territories.

7. CONCLUSIONS

Annual rates of household retrofits remain low, posing a challenge to meeting climate neutrality targets in European cities and drive the ability to deliver a radical transformation of the existing building stock. Considering this research objectives, we provided an analysis of the distribution of publicly funded programs (looking at empirical data of “Plan Rehabilita” of the years 2020, 2021, 2022) aimed at accelerating the renovation of existing residential buildings, with a particular focus on reducing household energy demand. The building sector is a major contributor to GHG emissions, particularly in Europe, where the building stock is old, and characterized by a very low turnover rate: 80% of existing buildings are projected to remain in use by 2050 (La Salle et al., 2022; OECD, 2024; UNEP, 2024). Despite coordinated efforts at the EU, national, regional, and municipal levels over the past five years to address this, retrofit rates are still not progressing quickly enough to meet carbon-neutral goals, suggesting a breakdown in the implementation between the municipal and household levels.

7.1. Theoretical contributions

The primary question this study has sought to respond is: *“Considering the need to adopt a more granular scale of analysis and spatially grounded perspectives to understand the processes of urban transformation in a city’s building stock, how do household retrofit policies unfold at the municipal level, and how do intermediary actors influence spatial variations in implementation?”*

This study's theoretical approach combines literature on urban transformations and retrofit intermediaries. Household energy retrofits serve as a lens for understanding how transformations unfold in the urban built environment, while the concept of intermediaries allows mapping roles of various actors, deepening our understanding of how they operate in the retrofit system, and assessing in what ways they influence policy outcomes.

A case study with a mixed-method approach was adopted. A quantitative analysis was employed to analyse the spatial distribution of subsidies — the primary policy instrument in place in Madrid to accelerate household retrofits. The researcher conducted a data mining process to gather subsidy data from the municipal program “Plan Rehabilita”—which distributes retrofit subsidies for accessibility, conservation, remediation, and energy efficiency needs—along with information on building energy performance ratings and social indicators,

in order to map the policy outcomes at the district and neighbourhood levels. The data is translated on maps and charts, to identify spatial variations in subsidy distribution and how these patterns of distribution relate to energy performance rates and household income. A key methodological limitation is the limited availability of spatialized data, as granular analysis requires precise spatial detail. A contribution of the work is the formulation of simple analysis tools that deal with insufficiently available spatialized data.

Our findings show that, despite the low aggregated rate of energy retrofits at the municipal level - which remains far from the targets - a granular approach revealed that urban transformations are unfolding in specific locations. Demand is highest in districts with a greater concentration of low-performing buildings and low-income households — despite these areas not being intentionally targeted by policy design. While these findings contradict existing literature— which suggests that subsidies and a demand-driven, “one-size-fits-all” policy would primarily benefit those who are wealthier and better informed—they indicate that subsidies in Madrid are reaching more vulnerable populations residing in buildings with deteriorated conditions.

In fact, certain place-based conditions in the three neighbourhoods analysed have largely influenced these policy outcomes. Results suggest that this spatial concentration of demand for energy efficiency subsidies is primarily driven by these areas shared social and material vulnerabilities, such as deteriorating building conditions, owner-occupants age, income, and the frequent need for repairs (see Section 6.1.2 and 6.1.3). The three districts demanding most energy-efficiency subsidies also present a significantly higher share of demand for conservation and remediation subsidies (Figure 5.5). While patterns in the demand for accessibility subsidies are less pronounced and do not appear to necessarily trigger a spillover effect, accessibility subsidies are still in high demand in the same three districts.

The results highlight that the need to solve unavoidable repairs caused by material deterioration and poor-quality construction is an important trigger for energy retrofit subsidy applications, as property owners are more likely to incorporate energy efficiency improvements when undertaking repair projects (“the spillover effect”). This aligns with authors who have underlined that everyday necessities of owner-occupants as the real drivers of retrofit decisions, rather than abstract concerns about climate change (Bobrova et al., 2024; Bolton et al., 2023; Brown et al., 2018; De Wilde & Spaargaren, 2019; Edwards & Bulkeley, 2017; Parag & Janda, 2014; Stieß & Dunkelberg, 2013; Zaunbrecher et al., 2021). These findings, which demonstrate how local context influences policy outcomes, also contribute to the debates in the urban transformation literature, where authors argue that cities are not homogeneous spaces that passively receive interventions. Rather, local context actively shapes policy outcomes, further highlighting the significance of place-based conditions in driving urban transformation

CONCLUSIONS

processes (Castán Broto et al., 2019; Castán Broto & Westman, 2020; van der Heijden et al., 2019; Westman & Castán Broto, 2022).

Place-based intermediaries and their capacity to mobilize can also play an important role. The quantitative analysis not only revealed that 57% of energy efficiency subsidies are concentrated in three districts in the Southern area of Madrid but also pointed to demand being pushed by single neighbourhoods in each of the three districts. The neighbourhood of Orcasitas, in the Usera district calls particular attention as the neighbourhood alone mobilizes 35% of total energy efficiency subsidies from the “Plan Rehabilita” programs of 2020, 2021, 2022. This mobilization was catalyzed by urgent concerns regarding building deterioration, but the presence of a local leadership (place-based intermediary) has been crucial in organizing collective demand in Orcasitas, setting this neighbourhood apart from the other two with similarly high demand. In the neighbourhoods of Aluche and Ciudad los Angeles, demand is less organized: while these neighbourhoods experience similar social and material vulnerabilities that drive subsidy demand for building repairs, the findings from this study suggest that their demand for subsidies remains largely fragmented, driven by isolated homeowners. What distinguishes Orcasitas is its strong capacity for collective mobilization, driven by a neighbourhood association leadership that effectively mobilized and coordinated collective action that significantly influenced policy outcomes. This finding aligns with literature suggesting how intermediaries who already have ties in particular communities effectively promote household energy retrofit adoption (Edwards & Bulkeley, 2017; Parag & Janda, 2014).

In particular, the place-based intermediaries play a crucial role in advancing retrofits by resolving conflicts and overcoming resistance to change —tensions that are often underexplored in the UT literature and made visible in this study through a granular approach (Khan, 2013; Westman & Castán Broto, 2022). In the case of Poblado de Orcasitas, the leader of the neighbourhood association navigated local governments’ passive resistance and bureaucratic inertia while continuously reaching out to her neighbours with whom she had established a relationship of trust. Later, the leader physically present to closely monitor how the construction works unfold on-site, facilitating collaboration between homeowners, architects, builders, and resolving conflicts that arise during the year-long renovation process. They often tackle practical everyday obstacles that are often overlooked in theoretical discussions, and crucial to deliver this type of transformation (Nagorny-Koring, 2019a)

The effectiveness of retrofit policies would be enhanced if place-based intermediaries were more intentionally supported by non-place-based intermediaries, who can produce and analyse city disaggregated data, allowing each to leverage their distinct roles and influence within the retrofit system. This research contributes to the literature of intermediaries in the context of

household energy retrofits by proposing an analytical framework that incorporates a spatial dimension, distinguishing between place-based and non-place-based intermediaries. Responding to Kivimaa et al.'s (2018) call for greater attention to the types of intermediation and their connection across geographical scales, our study addresses a key gap by examining how intermediaries operate within municipal contexts—particularly relevant in the context of implementation of household energy retrofit policies (Kivimaa et al., 2018; Kivimaa & Martiskainen, 2018). Through a case study at the local level, we demonstrate how intermediary activities can be better connected to address implementation challenges, such as data gaps, and to support more effective coordination between actors and intermediary activities.

7.2. Policy recommendations

This thesis argues that targeted interventions in specific locations can be more effective than “one size fits all” policy instruments, such as the on-demand distribution of subsidies to promote household energy retrofits in Madrid (Stieß & Dunkelberg, 2013; Wilson et al., 2015). The results revealed that neighbourhood-specific physical and social vulnerabilities can serve as more effective entry points to stimulate energy retrofit adoption (See 7.1). For example, the research revealed that local construction companies are already leveraging targeted strategies to promote their business and introduce retrofits in such neighbourhoods. They focus on neighborhoods with buildings with homogeneous construction patterns—such as those in neighborhoods from the *desarrollismo* era—which make retrofits easier to replicate from one building to another. Additionally, in these poorly built structures with low energy performance, even small interventions can lead to more substantial energy performance gains, which is also an advantage when applying for energy subsidy applications. Finally, they capitalize on the peer “imitation effect” by strategically investing in specific locations, as neighbours become engaged when they see similar buildings improved: thus, energy efficiency interventions become less abstract, and contribute to more dignified façades, improved thermal comfort, and increased self-esteem in lower-income neighbourhoods (See 6.1.4). Similarly, the results indicated that past area-targeted retrofit policies can trigger an “imitation effect,” encouraging continued renovations even after the program ends, as observed in Ciudad Los Ángeles. (See 6.1.4).

The empirical data suggests that targeted interventions in disadvantaged neighbourhoods in Madrid may be particularly effective, and local governments could leverage this potential in the design of their policy strategies. Considering the increasingly long tenure of ownership in Madrid which averages around 15 years (2024), this study assumes that owner-occupants primarily base their decisions on their living conditions—such as comfort and the dignity of their households, rather than on household unit value increase. These outcomes are more likely

to be perceived as beneficial in neighbourhoods with older or fragile buildings, where structural remediation and conservation works are a necessity for owner-occupants. These place-based factors facilitate the adoption of energy efficiency interventions and enable local governments to both achieve higher energy savings per project (by targeting deteriorated, low-performing buildings) and address precarious living conditions in low-income neighbourhoods.

Local governments could strengthen partnerships with non-place-based intermediaries, such as energy utilities, universities, and construction companies, to systematically collect and analyze comprehensive, neighbourhood-level data on buildings' physical conditions (e.g., deteriorating facades, recurrent need for repairs, limited elevator access), household energy consumption, and socio-demographic characteristics (e.g., income levels, aging population), to promote targeted, data-driven implementation strategies. As noted in Section 5.1.1, for example, Madrid's municipality does not collect energy burden data at the district or neighbourhood level—an important economic factor that could help identify additional determinants for targeted interventions. Universities, for example, are well positioned to lead these efforts. In Madrid, UPM already leads GHG emissions data reports for the Madrid city government and the *itdUPM* facilitates multi-stakeholder activities to promote multi-stakeholder partnerships (Lumbreras Martín et al., 2021). In addition, the partnership between the University of Catalunya and the Basque Country also provides an illustrative example of how to promote localized, data-driven interventions to accelerate household energy retrofit rates.

Still, to better identify priority areas for targeted interventions, greater synergy among the currently fragmented landscape of place-based and non-place-based intermediaries should be encouraged. After identifying neighbourhoods with a greater likelihood of adopting household energy retrofits, policies could intentionally incentivize place-based intermediaries who have greater capillarity in these particular communities and territories. Neighbourhood associations are well positioned to promote organized collective efforts and, thanks to their local ties, are more likely to overcome human-dimension barriers in retrofit decisions, leveraging trust and physical proximity, as demonstrated in the case of *Orcasitas*. Other place-based intermediaries, such as property managers, could also be further incentivized to promote retrofits locally as they work closely with presidents of homeowner communities and monitor building maintenance costs and repairs.

This entails a greater administrative burden, as collecting more data is ultimately a political decision, and so does intentionally articulating an ecology of non-place-based intermediaries. Likewise, mapping potential local champions (place-based intermediaries) is a strategic decision to enhance territorial capillarity, but appears from past experiences and current ones to improve effectiveness of policies that depend on bottom-up engagement—such as retrofit

initiatives—and facilitate the monitoring of policy outcomes and feedback loops to re-evaluate public spending.

7.3. Limitations and further research

Limitations in this study must be acknowledged. The study does not provide a comprehensive picture of retrofits across Madrid, as it relies on the “Plan Rehabilita” program as a proxy for subsidy demand distribution, while other areas may be undergoing renovations through different complementary programs run at national and regional levels. While the study enhances understanding of urban transformations and the role of actors in policies requiring bottom-up adoption, time constraints restricted the inclusion of additional relevant local actors identified later in the research process.

Furthermore, it is worth noting that this research provided granular data in areas with higher demand for the current subsidy program, which are low-income. However, more detailed data could be collected in higher-income neighbourhoods to better understand their drivers and inform other targeted retrofit strategies, as these buildings also require upgrading. Additionally, data on historic preservation regulations and protected status designations in central areas could be analysed to assess their influence on the lower retrofit adoption rates observed in these wealthier districts. Due to time constraints and the need for additional data mining to properly map these relationships, this aspect could not be fully explored in the current study.

Future research could expand this mixed-method approach to provide a more granular analysis of other neighbourhoods in Madrid, as well as applying this methodology in other Spanish cities through in-depth case studies. Applying the proposed ecology of intermediaries’ framework would deepen insights on existing and potential roles in retrofitting, illuminate patterns of inequality, and enhance monitoring of policy outcomes in heterogeneous urban environments.

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Annexes

Annex I

Excel table with data from maps and charts

Annex II

itdUPM Report on the revision process of the roadmap towards climate neutrality (2024)

Appendix

Appendix A: Semi-structured interview guideline

Section	Questions
INTRODUCTION	<p>Greetings, and present myself as a Brazilian doctoral researcher of itdUPM.</p> <p>Presentation of interview objective: The project investigates the geographical distribution of subsidies, the factors shaping their adoption, and the role of policymakers, industry stakeholders, and households in shaping policy effectiveness. We aim to understand the spatial patterns of uptake in household energy retrofit subsidies in Madrid, and in what ways have actors influenced policy outcomes. Additionally, we outline the working definition of household energy retrofit policies in this project and analyze their evolution in the context of Europe's recent momentum toward advancing climate-neutral policies.</p>
WHY?	<p>To what extent you have been involved in retrofit projects, and what was your role?</p> <p>In your experience, do you think the subsidies are a useful policy instrument to retrofit uptake? If not, why so?</p> <p>What actors are a part of the system and what drives them to enter the retrofit system in Madrid?</p> <p>What social and built environment factors have influenced the spatial patterns of demand for subsidies, in your opinion? Do these quantitative results surprise you? If not, why so?</p>
HOW?	<p>What is missing in the way policies are currently designed to accelerate retrofits? How could it be designed differently?</p> <p>Can you further describe how this actor operates and in what ways he contributed to retrofit uptake?</p> <p>What collaborations are missing that could further strengthen policy development?</p>
CLOSING	<p>Is there anyone else you recommend me to reach out to?</p> <p>Do you recommend a source of data to further investigate</p> <p>Anything more you would like to add that was not contemplated by the questions?</p>

Appendix B: Site visits and workshops attended

Type	Description	Date
Site visits	Ciudad los Ángeles and Campamento neighbourhoods, and “ASVEYCO” neighbourhood association	January 9, 2025 AO
	Aluche neighbourhood and visit to two neighbourhood associations: “AVA” and “Asociación de Vecinos Puerto Chico”	January 28, 2025
	Poblado Dirigido de Orcasitas neighbourhood and Guetaría neighbourhood association	December 18, 2024; March 18 2024; August 8, 2023
	“En ruta hacia la transición energética: visita a proyectos vecinales inspiradores: La Pablo Renovable y Poblado Dirigido de Orcasitas” (Tangente, NGO)	November 19, 2023
	“Oficina Verde” (Calle Bustamante)	January 12, 2024; July 27, 2023
Workshops and participant observation	itdUPM Fair Transition workshops: 3 sessions on the revision of the Roadmap to climate neutrality	April 11, 2023; May 23, 2023; June 29, 2023
	UIMP summer course promoted by the citiES platform: “Inclusión social para una transición climática justa”	July 17, 2023
	citiES platform: Programa Rehabilitación Energética Sesiones 1 y 3: Herramientas operativas para el seguimiento y escalado de la rehabilitación / Oficinas de rehabilitación: la ventanilla operativa abierta a la ciudadanía	November 17 and 30, 2023 (online)
	“Jornada descarbonización del parque inmobiliario español”	February 24, 2025
	“Reducing building emissions and achieving energy efficient buildings; case studies in New York City”	October 9, 2024
	Jornada “Oficina Verde”: “Políticas y fondos europeos para la Transición Energética en el sector residencial	September 17, 2024 (online)
	CONAMA sessions “Una rehabilitación de edificios ambiciosa climáticamente”	December, 4, 2024

Appendix C: List of interviewees (roles and dates)

Interview	Date	Sector
1	March, 2023; June 2024	City council officer
2	July 2023	Iberdrola representative
3	July 2023	“Oficina Verde” representative
4	September 2023	Housing policy consultant
5	October 2023	Member of the Spanish Cities Platform (citiES)
6	August, 2023; March 2024; December 2024	Neighbourhood Association president
7	October 2023; June 2024	Academic expert
8	January 2024; February 2025	Iberdrola representative
9	January 2024	City council officer
10	January 2024	Madrid Institute of Architects member and representative
11	March 2024	Lawyer of the Madrid Assembly, Regional Government
12	May 2024	Academic expert
13	June 2024	Regional government representative, Decarbonization Department
14	June 2024	National government public officer
15	June 2024	City council officer
16	July 2024	National government public officer
17	July 2024	Retired member of city council dedicated in neighbourhood renovations
18	August 2024	City council officer
19	August 2024	City council officer
20	August 2024	City council officer
21	October 2024	Academic expert
22	November 2024	Local construction company
23	February 2025	Local construction company
24	January 2025	President of a community of property owners
25	February 2025	Local property manager
26	February, 2025	President of a community of property owners

Appendix D: Coding themes from interviews

THEME	Quotes
“The imitation effect”	<p data-bbox="676 432 1343 768">“The imitation effect (‘efecto contágio’) really works. It’s the Spanish envy you know? It really works, doesn’t it? Of course! People see that it’s a successful experience. Because now it’s not just something they’re being told about—they’re seeing it for themselves. And on top of that, their neighbour is telling them, ‘It costed me this much because I got this amount covered’. (City council member)</p> <p data-bbox="676 824 1343 1077">“One day, someone approached me and asked, ‘Do you live here?’ I was entering the building, and I said, ‘Yes, yes, I do.’ And they said, ‘Tell me, what do I need to do to get this done?’ (...) Once they see it—once they realize you’re warm, comfortable, and even saving money—of course they want it too! “ (neighbourhood activist)</p> <p data-bbox="676 1133 1343 1294"><i>“Once you finally see it... you see your neighbour feels warm and comfortable at home and even saves money. Envy is terrible. We people are really that simple, to be frank” (Neighbourhood activist, March, 2024)</i></p> <p data-bbox="676 1350 1343 1559">“The opportunity for aid appears: People who received aid in the past mobilize in an organized manner because they already had this experience, and are better positioned to achieve better results.” (Academic expert, October 2023)</p> <p data-bbox="676 1615 1343 2000"><i>“There’s a legacy of the MA-DRE Plan in the Orcasitas neighbourhood that helped getting this area prepared and expand their retrofitting efforts. Although the APIRUs criterion of allocation is no longer as fundamental, you have the ‘contagion effect’ : you see that the neighbouring building looks great and you also have the history to prepare your project and you request assistance.... It takes time for people to mobilize, so maturity matters....” (City council member, June 2024)</i></p>

"I think the MA-DRE Plan , for example, served for this, to begin activating these vulnerable neighbourhoods. If you have a program that is only for you, well, you participate. (...) And if you are well-prepared because you already have a history of applying, you probably also already have an architect who will help you prepare your project to apply for aid. You are prepared. So this is what the MA-DRE Plan served for... and even though there isn't an APIRUS area criterion (vulnerability areas) like there was before... if you are prepared and you're seeing that the neighbouring building looks great and has taken advantage of the aid, well, you are well positioned. (...) The Rehabilita Plan is still drawing a bit from the MA-DRE plan effect because it takes time to get people mobilized." (City council member, June 2024)

"Previous policies targeting the Ciudad Los Angeles (Villaverde district) created a calling effect ('efecto llamada'), and the demand from residents persists even if the former targeted initiative is no longer in place. Since neighbours see it with their own eyes in their own neighbourhoods, it becomes something more tangible. (...) We don't have sales representatives; the neighbours do the work themselves by telling each other the benefits, how to get it done, and demand keeps coming!" (Construction company, February 2025)

"They see that past experiences in the neighbourhood have been positive. This encourages them to reach out to us. Without a clear example—something they can see firsthand or a reference from someone they trust, like 'my cousin told me'—it becomes much harder to convince them that the investment is worthwhile." (Construction company, February 2025)

"There's a lot of mimicry. So, the moment one building gets started in the neighbourhood, , there's almost no need to do commercial outreach. The commercial

activity comes on its own. (...) The first thing we put up is the scaffolding and a sign, a 12-meter large banner with the phone number, and from there people start calling our office." (Construction company, South of Madrid)

"There is also a matter of dignity and aesthetics. If we all start applying SATE in these buildings' facades we could improve our cities... There are well-done SATE facade renovations that enhance a building's state.... And what we're seeing is more dignity. These are residential buildings without any significant architectural interest, and poor materials, and a well-applied SATE can really make them look better." (Madrid Institute of Architects member)

"Our own commercial agents are the neighbours themselves! We don't need outreach representatives..." (Construction company referring to Ciudad los Angeles neighbourhood)

"The spillover effect"

"It often starts with accessibility needs. When we begin studying the installation of the elevator, we often also propose energy efficiency —essentially, 'since we're installing the elevator, let's also improve efficiency.'" (Vicente, Renueva, November 2024).

"An elevator is very noticeable. I mean, if I can't get down from my apartment, I see it, I feel it, it's obvious. (...) It's not that people aren't interested in having a comfortable home—they are. But if they have to choose between being able to leave their home or putting on a sweater... (...) I'll put on a sweater, and they'll install an elevator, because I can't afford everything" (City council member, August 2024)

"They replace the boiler because it broke, and since there are subsidies, maybe then they consider doing something more, like improving energy efficiency.

(...) But if you want to install a SATE in your facade, you have to reach an agreement with the neighbours—there's no other way around it."

" (City Council member, January 2024)

"Subsidies cover everything that helps your building move up at least one energy rating. The energy efficiency scale is not linear—it depends on which rating you depart from. Sometimes, efficiency improves by more than 30%. For example, moving from a B to an A is extremely difficult because the building is already highly efficient. But moving from an F to a D or from a G to an F is much easier. The improvement in those cases is much bigger." (City council member, August 2024)

"Since they're going to remove the asbestos from the roof, we argue they could use this opportunity to also change the SATE on the facade. It will make it cheaper for them in terms of subsidy, because if they only focus on the roof, they don't meet the two letter upgrade in energy efficiency they need to achieve to become eligible for energy efficiency funds. If they demonstrate this improvement, they will get more subsidy overall." (Construction company, November 2024)

"In terms of insulating a building, a window replacement alone isn't considered sufficient for energy efficiency funding. However, if you combine window upgrades with SATE facades, you'll likely meet the requirements by improving your energy rating by more than one letter, making you eligible for the subsidy." (city council member, August 2024)

"The worse your energy rating, the easier it is to qualify for subsidies and drastically reduce energy demand, so aid is also channeling to older buildings." (Green office member, August 2023)

"When roofs contain asbestos, they have to be removed, but if we tell homeowners that if they add the SATE, then we tell them it becomes much cheaper overall because with just the roof replacement, they don't achieve the two-letter energy efficiency improvement that gives them more funding. As a result, by including the full insulation package, the subsidies become much more attractive." (Construction company)

"For example, if you need to repair a facade... There are no subsidies for simply repainting it, but there are subsidies for retrofitting. If they need to meet mandatory Technical Building Inspection (ITE) requirements, we explain that it might be more cost-effective to include additional improvements. Since there are available subsidies, improving thermal insulation makes financial sense." (Construction company, Ciudad los Angeles)

'When they fix a leak or their roof, we argue that if they also add SATE to their facade, it ends up being much cheaper overall with the subsidy because fixing the roof alone does not exceed the two points in energy efficiency rating levels' (Construction company, November 2024).

"They have a leak, and they're going to repair it. But then they find out there are also asbestos... Asbestos is an important driver that motivates retrofits. That's when they come to us: when it's not elevators, it's the asbestos or roof leaks, which they really need to resolve." (Construction company, November 2024)

Building trust

"People don't trust things will work out. There have been very bad experiences with subsidies in the past." (City council member, August 2024)

"Look, I speak as a neighbour, and you (the administration) keep wearing your suits and ties! Let's be real: you don't even know where these neighbourhoods are. You haven't even visited them... So

how are you going to know what's happening, what's being done, or how things work? From your office, you look at a map, search on Google, and decide, 'Intervene here, there, and over there.' (...) You (the administration), with all your resources, are achieving nothing."

— (Neighbourhood activist, Interview, August 2023)

"Then what we often do, if they're suspicious, is to tell them: 'Well, just tell us what day works for you and we'll make a joint visit to Orcasitas, for example.' So, we also use our construction sites as a marketing tool.."
(Construction company, South of Madrid)

"It is difficult to explain the retrofit process to people without a concrete example... We started working in the neighbourhood (Ciudad Los Angeles) more than 10 years ago. We started when policies from the Plan Estatal 2013-2017 defined Ciudad Los Angeles as a vulnerable area... Because the experience was positive and impacted many buildings, the neighbours could see the change... as a result, interest arose spontaneously."
(Construction company, Ciudad los Angeles)

"I approach them as a neighbour...(..) I haven't convinced anyone. Because convincing is like forcing someone to do something they don't want to do, and what you need to do... what you need to do is help them understand that what you're saying is actually a necessity and what they need to do to get it done."

"I think it can get very unprofessional because people have been spending money, trusting that these rehabilitation agents would manage it for them, and now they find themselves abandoned (...). After all, they are not regulated... There are neighbours who call: 'Hey, about my window. They installed them. They promised they would manage the subsidy for me and I haven't heard anything from them.'"(Cristina, COAM)

Decentralized

**strategies/heterogeneous
urban environments**

"In my neighbourhood? Yes, sure I am the information booth—I am the one, of course. The neighbour calls me, 'Hey Manuela, I can't see you during the week.' So I say, 'Okay, let's have a coffee tomorrow, and we'll go through everything.' Because you have to explain it like you would to small children so that they understand. Because the truth is, everyone's situation is different." (Neighbourhood activist, Interview, August 2023)

[About "Oficina Verde"] "No one's going to go there... First of all, they will think: what am I supposed to find out? Subsidies okay, but what for? People don't even know what questions to ask." (Neighbourhood activist, August 2023)

"The "Oficina Verde" does interesting work, but of course, they reach very few people ('llegan a cuatro gatos'). There are too few of them. If you set up an office every couple of blocks, it might be a different story. We need to look for other kinds of solutions. (...) The private sector usually faces resistance because residents think they are going to be scammed." (city council member)

"That's why I always tell them (the administration): get out of your offices, come to the neighbourhood, come see the neighbourhoods—because they (the administration) don't even know where we are!"

*And the key is: how do we activate the last mile? The only case in building retrofitting that I know of where the last mile has been activated is this one. (...) It's this symbiosis between being the neighbour and the technician. If there is no symbiosis between the neighbour and the technician, then there is nothing."
— (Lawyer, Madrid Assembly, on the Orcasitas neighbourhood)"*

"If in other neighbourhoods there isn't someone they can turn to... In my neighbourhood, they come to me for anything... really, anything! The neighbours, the whole neighbourhood... There hasn't been a single person left without an answer. When I don't know something, I ask, and I know where to go because I have contacts in the city council." (Neighbourhood Association president, August 2023)

" There are also significant differences between neighbourhoods in terms of energy efficiency awareness. In Chamberí, Salamanca, and Chamartín,

knowledge is very high, whereas in other neighbourhoods, it is not. Some residents struggled to understand what we were doing.” (“Oficina Verde” member, July 2023)

“What drives certain groups of people to make this change? Investing in your home has a symbolic value—the desire to modernize your home, for example... or, alternatively, you only renovate when something breaks and needs to be repaired. We need to address the symbolic factors that influence different groups of people in different places to retrofit... What motivates different groups of people to retrofit their homes to make them more energy efficient?” (City council member, December 2023)

"It's not just about offering some subsidies and waiting to see who applies for them. If they (the government) don't have a thorough territorial assessment to tell each building where it needs to be in 2050, how much it will cost, the steps required, and how they are going to help these buildings get there, how can we expect progress? This would require shifting the model from 'I hand out subsidies' to a model of 'let's determine where your building needs to be ' : this is what I would call a strategic vision." (Academic expert, June 2024).

Necessity drives demand for subsidies

“Out of nowhere, a piece of stone from the I fell. Just like that, without warning. It showed no signs, made no noise—it just fell.” (neighbourhood activist)

“But the buildings in the worst condition are the oldest ones, which in turn are inhabited by older people. (...) So their basic problems are different from what we perceive and what they need. It's not that they're not interested in having a comfortable home, they are interested, but if they have to decide between heating my home or putting on a sweater. (...) I'll put on a sweater and they can install an elevator for me because I don't have money for everything.” (city council officer, August 2025)

“We have a very old population. There are many buildings without elevators in Madrid. (...) So there are people confined to their homes because they have limited mobility in their own buildings.” (Madrid Institute of Architects member)

“There are many elderly people, and the majority of homeowners still live in these buildings. One neighbour hadn’t left her home in five years because there was no elevator... almost 90% of the buildings in that neighbourhood had no elevator...” (Construction company, Ciudad los Angeles)

“ ... they often need to repair their buildings’ condensation problems, dampness and moisture that too often come up... They reach out to us to solve them.” (Construction company)

“During the ‘desarrollismo’ period from the 60s onward, when Madrid began to grow, people from other communities in rural villages were arriving in these areas and needed housing, so construction happened very quickly (...) but they were made with a quality that, well... was made with the means available at that time....” (city council member, August 2024)

“That is, if you go to the Salamanca neighbourhood, the buildings are very old, but they were already well built. There is no urgent need for retrofitting (...) the buildings of low constructive quality, with higher thermal transmittance, and so on, are always in poorer, older neighbourhoods.” (city council member, August 2024)

“Subsidies are greater if you achieve at least one or two levels of energy efficiency improvement. So if you live in the Salamanca neighbourhood, your home is already well insulated, you have good PVC or aluminum windows, and a proper roof. (...) You live comfortably. What happens in these other neighbourhoods? Their homes are poorly insulated, their roofs leak, they don’t have elevators...so a simple repair already makes great improvement in energy efficiency” (construction company representative)

“I have been a property manager for 30 years and I have been handling subsidies in the past 3 years... It is actually beneficial for us as property managers, because

buildings in Aluche come up with so many complaints about dampness and moisture in walls and ceilings that we are expected to fix anyway, and that often are not covered by insurance...” (Property manager Aluche neighbourhood)

Informing and mobilizing communities

“I find out about upcoming subsidies in advance—two months before they become released, I already start to hold meetings to inform my neighbours. (...) I say, ‘Hey everyone, the subsidies have just been announced, please, tell me what do you need?’ They say, ‘Manuela, don’t know how to get the X...’ I tell them, ‘Look, you need to do this, this, and then this...’”

“... I haven’t convinced anyone (.). Because convincing someone feels like forcing them into something they don’t want. What you really have to do is help them understand why what you’re saying they need to do is actually necessary, and what steps need to be made to make it happen. (...) You are there to help, but people come to their own conclusions about what to do”

“It’s really about guiding them (neighbours) step by step, taking them by the hand, never being dismissive, never just agreeing with them for the sake of it... because sometimes there are people who try to get their way around it.”

“(...) even if you have to talk to them like small children. Hey, look, don’t worry. Let’s sit down and have a coffee. Listen, if you are understanding what I am explaining here, please don’t leave the meeting. When I finish this I will sit down and explain it to you. If you don’t have time? Please give me your phone number, we’ll talk tomorrow, and have a coffee and I will explain, don’t worry.” (March 2024)

“Most of the neighbourhoods in the South of Madrid we work on with demand comes one by one... it is not organized collective demand like it is so in Orcasitas” (Construction company)

“Our main concern was thermal transmittance and the dampness in our building that is made of brick walls, like

the other in the neighbourhood... I have reached out directly to my property manager to support me in managing construction works — it was me reaching out to them with this request, not the other way around.”
(Homeowner community president in Aluche neighbourhood)

Tailored support to homeowners

“...And I always tell them: ask me, don't worry, call me whenever you want. If I can't answer, I'll call you back... (...) They call me, for example, 'Hey, Manuela, I have a budget estimate. Can you take a look?' Because I always tell them, 'you have to ask for three budget estimates, at least three different ones..(...).”

“You have to talk to them like children. Not in a technical way! The neighbour wants to know three things: How much will it cost me? When will the construction work be completed? What is the amount of subsidy I will receive? This is what they want to know! The administration is not doing this, in the case of my neighbourhood I'm the one doing it.”

"Besides the general meeting at the neighbourhood association, I help them through the entire process so they understand what they need to do and why they need to do it. What documents do they need to compile and by what time? It's not just about the construction work; they need to request a permit, pay certain fees beforehand to apply... beyond the construction costs, there are other costs they need to cover. I also explain that we have an agreement with a bank so that the part that is not covered by the subsidy can be financed under optimal conditions. (...) It's an enormous amount of work—millions of hours, millions of meetings with the administration and the city council."

"If other neighbourhoods don't have someone like me... a go-to person they can turn to... That's the thing, people turn to me for everything, everything! The neighbours, the entire neighbourhood. No one has ever been left without an answer. And if I don't know how to answer, I'll ask ask—I know where to go because I have contacts in the city council."

Hey, Manuela, I have a quote here... Would you take a look at it for me?" I always tell my neighbours they have to request 3 quotes... And I always say to choose companies that don't impose their architect on you because otherwise, they'll never defend you(...) ”
(neighbourhood activist, March, 2024)

*"It's really about guiding them every step of the way..."
(neighbourhood activist, March, 2024)*

**Cognitive burden:
subsidy procedures and
construction works**

"When you knock on someone's door and tell them you're going to carry out renovation work, they will say, 'Thank you very much, but I have other problems.' I believe in climate change, but it's not my priority." (Madrid Institute of Architects member, January 2024)

"There are so many things... I mean, what you see right now... Yes, how nice: we do get subsidies, and look how beautiful the neighbourhood looks now... It seems so easy, but there is soooo much work behind it."

"That financial burden, potential upfront payments can discourage many homeowner communities to begin (...) We can take advantage of our financial capacity as a big company, our liquidity, to step in and take on these projects." (Energy utility, 2023)

"In Spain, people own apartments in multifamily buildings. And that means that building ownership is very fragmented. Multifamily property owners are very disorganized because there is no tradition of joint, cooperative management, or anything like that..." (Expert, 2023)

So, what is the dynamic of these property owner communities who only act when there is an urgent need? When a balcony falls down, when the elevator stops working, when there are leaks—that's when they come together and take action. But energy efficiency is something more abstract. It's something with long-term implications, not short-term." (Expert, 2023)

"You have to do 200.000 things in order to get your application accepted... Then you need to present lots of other documents to justify once the works are completed. Things are already complicated, so adding this to the list is a burden, really..." (Regional Government member, Comunidad de Madrid, June 2024)

"You have to make it easier for them—very easy—so it doesn't become yet another problem for them... because they already have enough problems of their own." (...)

“Government paybacks are often delayed, and applying for subsidies also require a large volume and highly technical paperwork. (...) To apply for Next Generation funds you need to upload 36 different documents! (...) The online application procedures are too complex for elderly groups and those with limited resources... (...) (“Oficina Verde” representative, workshop ITD 2023)

(...)People don't want to get involved in renovations (...) even if you tell them it's for free... ‘You're going to come into my home, I'll have to leave for a few months? No way..’ ” (“Oficina Verde” representative, workshop ITD 2023)

Untangling conflicts

“I get these calls, like: ‘Hey Manuela, my building entrance is flooded... The ramp is broken...’ and I have to be there to see it! (...) when I get there and speak to the architect and to the construction company to resolve it, they start blaming one another, a constant ‘you you you, me, me, me you you...’ “

“You have no idea of aaaaall the work it takes. It's not just about getting the subsidy and you're done... No, no, no!... Because then there are problems with the architect, there are issues with permits, there's the lack of coordination between the City Council and the "Junta Municipal". Later on, there are also problems with the construction companies, work that wasn't done well and isn't being done well, the architects' indifference.... “

“There are so many things... I mean, what you see right now... Yes, how nice: we do get subsidies, and look how beautiful the neighbourhood looks now... It seems so easy, but there is soooo much work behind it.”

(...)“ It's a hell of a lot of work (‘es un trabajo bestial’). It's dedicating millions of hours, going to millions of meetings with administrations and the

city council.” (Neighbourhood Association President, August 2023)

Data-driven strategies

“By law, you are not required to report energy-efficiency performance in the ITE (Technical Building Inspection), so you just focus on facades, sanitation, etc., and avoid getting into that. In the end, since there are so few of us in the administration... (...) Strengthening teams is ultimately a political decision. If I have a clear vision and say: ‘This needs to be done because we are going to start inventorying the city’ and begin tracking...” (City Council member, June 2024)

“You have to encourage them and to do so you need to go after them (...) That’s a different approach from what’s happening now. Instead of just waiting ‘let’s see who applies for it’, you need to ensure that those who are in the worst conditions actually come forward.” (Academic expert, 2024)

“This means working building by building, based on their rating. (..) Every building has an energy rating. How do you plan renovations to improve one rating level at a time? Since all buildings will eventually need to reach an ‘A’ rating, what’s your step-by-step approach to gradually improve different systems to achieve this goal?” (Academic referring to UBEM models)

“But this demands more people...and this means, a lot of money, and more importantly it requires immense organization capacity” (Academic in UBEM project)

“Here’s what we did for Basque Country. There, we developed a roadmap for each building, showing where it needs to be, how it can get there, the available options, costs, reductions—everything. (...) That is strategic planning. For each building, we have a draft of what its renovation passport should look like to reach 2050. (...) Then you need to actively seek out building owners and tell them: ‘I’m offering you this financial aid, but only because you need to reach this and that specific intervention in your particular building.’” (Academic involved in UBEM project)

No data, no learning

In Spain (in almost all public administrations), managers are evaluated based on their ability to spend the allocated budget rather than on how efficiently they do so. If I'm given 3 million to install photovoltaic panels, I'll do something to make sure they get installed. Either I create a very complex process, or I open it up even if I know that those from Pozuelo will take it all. And if you impose restrictions, the complexity will leave you far from meeting the budget spending targets." (City Council member, January 2024)

"Since we only handle the initial phase, we don't have an exact figure—if it is whether 5%, 10%, or 50% of the people who came here (to "Oficina Verde") and who actually went ahead with the renovation. (...) The only way we can measure our impact is by seeing that the funds have run out... And the reality is that the funds are depleted. Right now, the waiting list doubles or even triples the available funding of all the lines available. It's not just our work, of course, but have we played a role? Yes, absolutely. (...) If no initiatives had been taken, the funds would probably have remained untouched." ("Oficina Verde" representative)

"Every time someone had a consultation, we asked them to fill out a form... But we don't like to overwhelm people too much... With the temporary mobile office experiment, we considered doing it and started filling it out, but we quickly became overwhelmed... There were 5 or 6 people waiting in line... and some left because they didn't want to wait." ("Oficina Verde" representative)

"The thing is: it is real, it really can be done. This is how you can do it. If it can be done, why isn't it being done? (...) I find it hard to understand that the administration hasn't yet been capable... So, if the Administration isn't capable, they can't expect a resident to break their back or give ten years of their life to successfully complete a project." (neighbourhood activist in Orcasitas)

"We've been working on renovations for five years. And we keep going. But every time I go to events on energy retrofits to talk about the case of Orcasitas, I keep talking about the same thing. And I hear the same thing over and over again. We've been hearing the same thing for five years."

(...) I continue to repeat this: We don't have anything special, I repeat. I don't get any extra money. It does not have to be an exception. It shouldn't be, really

Barriers to retrofit in Madrid *“There is a huge lack of awareness about what energy efficiency in households actually means.” (“Oficina Verde” member, July 2023.).*

“We need to reflect on how we communicate things—that’s clear. What people haven’t fully grasped about renovations is that they improve comfort, even without heating. (...) Since the concept of thermal comfort isn’t deeply ingrained, the information is instead focused on energy savings. And it’s true that it takes a long time to get a return on an investment like this.” (City Council member, August 2024)

“We’ve been meeting with homeowner associations with offers for renovation. We say, ‘install a SATE.’ We show images and say, ‘We’re going to install a ventilated facade here.’ And they say, ‘Excuse me, but what exactly is that? Can you explain it to us?’ They have no idea of what a SATE is.”(Energy utility representative, July 2023)

“There just isn’t enough information. Put out announcements! Small ones. Explain what a SATE is so that people start becoming familiar with it... The administration should be responsible for that. These are topics that people don’t understand.” (Neighbourhood activist, March 2024)

“ There are also significant differences between neighbourhoods in terms of energy efficiency awareness. In Chamberí, Salamanca, and Chamartín, knowledge is very high, whereas in other neighbourhoods, it is not. Some residents struggled to understand what we were doing.” (“Oficina Verde” member, July 2023)

“What drives certain groups of people to make this change? Investing in your home has a symbolic value—the desire to modernize your home, for example... or, alternatively, you only renovate when something breaks and needs to be repaired. We need to address the symbolic factors that influence different groups of people in different places to retrofit... What motivates different groups of people to retrofit their homes to make

them more energy efficient?" (City council member, December 2023)

[About "Oficina Verde"] "No one's going to go there... First of all, they will think: what am I supposed to find out? Subsidies okay, but what for? People don't even know what questions to ask." (Neighbourhood activist, August 2023)

"The "Oficina Verde" does interesting work, but of course, they reach very few people ('llegan a cuatro gatos'). There are too few of them. If you set up an office every couple of blocks, it might be a different story. We need to look for other kinds of solutions. (...) The private sector usually faces resistance because residents think they are going to be scammed." (city council member)
